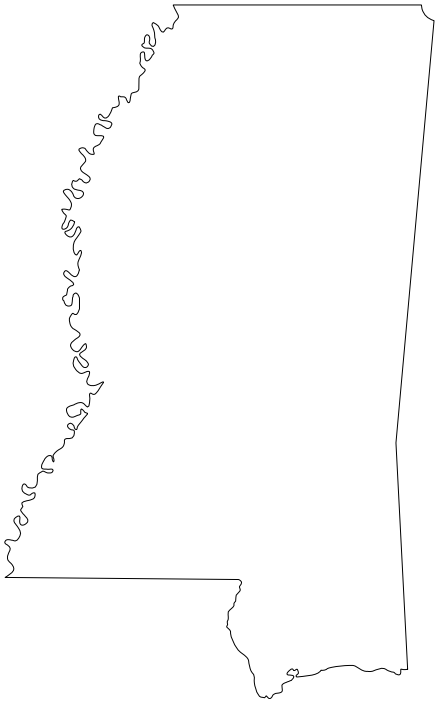
# UNDERGROUND STORAGE TANK REGULATIONS



**MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY**
**OFFICE OF POLLUTION CONTROL**
**Underground Storage Tank Branch**
**P. O. Box 2261**
**Jackson, Mississippi 39225-2261**
**(601) 961-5171**

**Adopted by the Commission on Environmental Quality on March 22, 1989**
**Amended on October 1, 2008**
**Amended on August 25, 2011**

# PART 280
# TECHNICAL STANDARDS AND CORRECTIVE ACTION REQUIREMENTS FOR OWNERS AND OPERATORS OF UNDERGROUND STORAGE TANKS (UST)

## Subpart A—Program Scope and Interim Prohibition


§ 280.10 Applicability.
§ 280.11 Interim prohibition for deferred UST systems.
§ 280.12 Definitions.
§ 280.13 Industry codes and recommended practices.


## Subpart B—UST Systems: Design, Construction, Installation and Notification


§ 280.20 Performance standards for new UST systems.
§ 280.21 Upgrading of existing UST systems.
§ 280.22 Notification requirements.


## Subpart C—General Operating Requirements


§ 280.30 Operation and maintenance of spill and overfill prevention.
§ 280.31 Operation and maintenance of secondary containment.
§ 280.32 Operation and maintenance of corrosion protection.
§ 280.33 Compatibility.
§ 280.34 Repairs and replacement.
§ 280.35 Reporting and recordkeeping.
§ 280.36 Delivery prohibition.
§ 280.37 Operator training.


## Subpart D—Leak Detection


§ 280.40 General requirements for all UST systems.
§ 280.41 Requirements for petroleum UST systems.
§ 280.42 Requirements for hazardous substance UST systems.
§ 280.43 Methods of leak detection for tanks.
§ 280.44 Methods of leak detection for piping.
§ 280.45 Leak detection recordkeeping.


## Subpart E—Leak Reporting, Release Reporting, Investigation, and Confirmation


§ 280.50 Reporting of leaks and suspected releases.
§ 280.51 Investigation due to off-site impacts.
§ 280.52 Release investigation and confirmation steps.
§ 280.53 Reporting and cleanup of spills and overfills.

## Subpart F—Release Response and Corrective Action for UST Systems Containing Petroleum or Hazardous Substances

§ 280.60 General.
§ 280.61 Initial response.
§ 280.62 Initial abatement measures and site check.
§ 280.63 Initial site characterization.
§ 280.64 Free product removal.
§ 280.65 Investigations for soil and ground-water cleanup.
§ 280.66 Corrective action plan.
§ 280.67 Public participation.

## Subpart G—Out-of-Service UST Systems and Closure

§ 280.70 Temporary closure.
§ 280.71 Permanent closure and changes-in-service.
§ 280.72 Assessing the site at closure or change-in-service.
§ 280.73 Applicability to previously closed UST systems.
§ 280.74 Closure records.

## Subpart H—Financial Responsibility

§ 280.90 Applicability.
§ 280.91 Compliance dates.
§ 280.92 Definition of terms.
§ 280.93 Amount and scope of required financial responsibility.
§ 280.94 Allowable mechanisms and combinations of mechanisms.
§ 280.95 Financial test of self-insurance.
§ 280.96 Guarantee.
§ 280.97 Insurance and risk retention group coverage.
§ 280.98 Surety bond.
§ 280.99 Letter of credit.
§ 280.100 Use of state-required mechanism.
§ 280.101 State fund or other state assurance.
§ 280.102 Trust fund.
§ 280.103 Standby trust fund.
§ 280.104 Local government bond rating test.
§ 280.105 Local government financial test.
§ 280.106 Local government guarantee.
§ 280.107 Local government fund.
§ 280.108 Substitution of financial assurance mechanisms by owner or operator.
§ 280.109 Cancellation or nonrenewal by a provider of financial assurance.
§ 280.110 Reporting by owner or operator.
§ 280.111 Recordkeeping.
§ 280.112 Drawing on financial assurance mechanisms.
§ 280.113 Release from the requirements.

§ 280.114 Bankruptcy or other incapacity of owner or operator or provider of financial assurance.
§ 280.115 Replenishment of guarantees, letters of credit, or surety bonds.
§ 280.116 Suspension of enforcement. [Reserved]

Appendix 280.1 – Guidelines for the Evaluation of UST Cathodic Protection Systems

Appendix 280.2 – Self Certification of UST System Return to Delivery Eligibility

Appendix 280.3 – Guidelines for the Operation of Petroleum UST Systems [Reserved]

Appendix 280.4 – Guidelines for the Permanent Closure of Petroleum UST Systems

## Subpart A—Program Scope and Interim Prohibition

### § 280.10 Applicability.

(a) The requirements of this part apply to all owners and operators of an UST system as defined in §280.12 except as otherwise provided in paragraphs (b), (c), and (d) of this section. Any UST system listed in paragraph (c) of this section must meet the requirements of §280.11.

(b) The following UST systems are excluded from the requirements of this part:

(1) Any UST system holding hazardous wastes listed or identified under Subtitle C of the Solid Waste Disposal Act, or a mixture of such hazardous waste and other regulated substances.

(2) Any wastewater treatment tank system that is part of a wastewater treatment facility regulated under section 402 or 307(b) of the Clean Water Act.

(3) Equipment or machinery that contains regulated substances for operational purposes such as hydraulic lift tanks and electrical equipment tanks.

(4) Any UST system whose capacity is 110 gallons or less.

(5) Any UST system that contains a *de minimis* concentration of regulated substances.

(6) Any emergency spill or overflow containment UST system that is expeditiously emptied after use.

(c) *Deferrals.* Subparts B, C, D, E, and G do not apply to any of the following types of UST systems:

(1) Wastewater treatment tank systems;

(2) Any UST systems containing radioactive material that are regulated under the Atomic Energy Act of 1954 (42 U.S.C. 2011 and following);

(3) Any UST system that is part of an emergency generator system at nuclear power generation facilities regulated by the Nuclear Regulatory Commission under 10 CFR part 50, appendix A;

(4) Airport hydrant fuel distribution systems; and

(5) UST systems with field-constructed tanks.

(d) *Deferrals* – Emergency generator tanks.

(1) Except as provided for in paragraph (2) of this section, leak detection requirements set forth in Subpart D do not apply to any UST system that stores fuel solely for use by emergency power generators.

(2) New or replaced tanks and piping of an emergency generator UST system installed on or after October 1, 2008, shall be secondarily contained in accordance with §280.20(a)(4) and §280.20(b)(4) and monitored for leaks in accordance with §280.43(g) and §280.44(c) unless the piping meets all of the requirements in §280.41(b)(2)(iii).

**§ 280.11 Interim prohibition for deferred UST systems.**

(a) No person may install an UST system listed in §280.10(c) for the purpose of storing regulated substances unless the UST system (whether of single- or double-wall construction):

(1) Will prevent leaks due to corrosion or structural failure for the operational life of the UST system;

(2) Is cathodically protected against corrosion, constructed of noncorrodible material, steel clad with a noncorrodible material, or designed in a manner to prevent the leak or threatened leak of any stored substance; and

(3) Is constructed of materials that are compatible with the stored substance.

**§ 280.12 Definitions.**

*Aboveground release* means any release to the surface of the land or to surface water. This includes, but is not limited to, releases from the above-ground portion of an UST system and aboveground releases associated with overfills and transfer operations as the regulated substance moves to or from an UST system.

*Ancillary equipment* means any devices including, but not limited to, such devices as piping, fittings, flanges, valves, dispensers, and pumps used to distribute, meter, or control the flow of regulated substances to and from an UST.

*Belowground release* means any release to the subsurface of the land and to ground water. This includes, but is not limited to, releases from the belowground portions of an underground storage tank system and belowground releases associated with overfills and transfer operations as the regulated substance moves to or from an underground storage tank.

*Beneath the surface of the ground* means beneath the ground surface or otherwise covered with earthen materials.

*Cathodic protection* is a technique to prevent corrosion of a metal surface by making that surface the cathode of an electrochemical cell. For example, a tank system can be cathodically protected through the application of either galvanic anodes or impressed current.

*Cathodic protection tester* means a person who can demonstrate an understanding of the principles and measurements of all common types of cathodic protection systems as applied to buried or submerged metal piping and tank systems. At a minimum, such persons must have education and experience in soil resistivity, stray current, structure-to-soil potential, and component electrical isolation measurements of buried metal piping and tank systems.

*CERCLA* means the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended.

*Certificate of Registration* means a document identifying an underground storage tank facility as being registered with the MDEQ and having paid all of the tank regulatory fees for the time period indicated on the certificate. The Certificate of Registration will be issued annually upon payment of tank regulatory fees and is valid only for the fiscal year in which it was issued. The Certificate of Registration must be conspicuously displayed at the facility.

*Compatible* means the ability of two or more substances to maintain their respective physical and chemical properties upon contact with one another for the operational life of the tank system under conditions likely to be encountered by the UST system.

*Connected piping* means all underground piping including valves, elbows, joints, flanges, and flexible connectors attached to a tank system through which regulated substances flow. For the purpose of determining how much piping is connected to any individual UST system, the piping that joins two UST systems should be allocated equally between them.

*Consumptive use* with respect to heating oil means consumed on the premises.

*Containment sump* means a secondary containment device installed underneath a dispenser, at the tank or along a piping system designed to prevent leaks from the dispenser, submersible

pump, piping connectors, fittings or other UST system ancillary components from reaching the environment.

*Corrosion expert* means a person who, by reason of thorough knowledge of the physical sciences and the principles of engineering and mathematics acquired by a professional education and related practical experience, is qualified to engage in the practice of corrosion control on buried or submerged metal piping systems and metal tanks. Such a person must be accredited or certified as being qualified by the National Association of Corrosion Engineers or be 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.

*Delivery prohibition* means prohibiting the delivery, deposit, or acceptance of product to an underground storage tank that has been determined to be ineligible for such delivery, deposit or acceptance.

*Delivery prohibition tag* means a tag, device, or mechanism on the tank's fill pipe that identifies an underground storage tank as ineligible for product delivery. The tag or device is easily visible to the product supplier and clearly states and conveys that it is unlawful to deliver to, deposit into, or accept product into the ineligible underground storage tank.

*Dielectric material* means a material that does not conduct direct electrical current. Dielectric coatings are used to electrically isolate UST systems from the surrounding soils. Dielectric bushings are used to electrically isolate portions of the UST system (e.g., tank from piping).

*Dispenser* means a device located above ground that meters the amount of regulated substances transferred to a point of use outside of the UST system, such as a motor vehicle. This definition does not include the "hanging hardware" (breakaways, hoses, nozzles) associated with the dispenser.

*Electrical equipment* means underground equipment that contains dielectric fluid that is necessary for the operation of equipment such as transformers and buried electrical cable.

*Excavation zone* means the volume containing the tank system and backfill material bounded by the ground surface, walls, and floor of the pit and trenches into which the UST system is placed at the time of installation.

*Existing tank system* means a tank system used to contain an accumulation of regulated substances or for which installation has commenced on or before December 22, 1988. For purposes of determining whether or not secondary containment is required, an existing tank system means a tank system used to contain an accumulation of regulated substances for which installation has commenced before October 1, 2008. Installation is considered to have commenced if:

> (a) The owner or operator has obtained all federal, state, and local approvals or permits necessary to begin physical construction of the site or installation of the tank system; and if,

(b) (1) Either a continuous on-site physical construction or installation program has begun; or

(2) The owner or operator has entered into contractual obligations—which can not be cancelled or modified without substantial loss—for physical construction at the site or installation of the tank system to be completed within a reasonable time.

*Expeditiously emptied* means that any accumulation of regulated substances in a UST is removed within 24 hours or another time frame determined by the MDEQ to be reasonable.

*Farm tank* is a tank located on a tract of land devoted to the production of crops or raising animals, including fish, and associated residences and improvements. A farm tank must be located on the farm property. "Farm" includes fish hatcheries, rangeland and nurseries with growing operations.

*Flow-through process tank* is a tank that forms an integral part of a production process through which there is a steady, variable, recurring, or intermittent flow of materials during the operation of the process. Flow-through process tanks do not include tanks used for the storage of materials prior to their introduction into the production process or for the storage of finished products or by-products from the production process.

*Free product* refers to a regulated substance that is present as a non-aqueous phase liquid (e.g., liquid not dissolved in water.)

*Gathering lines* means any pipeline, equipment, facility, or building used in the transportation of oil or gas during oil or gas production or gathering operations.

*Hazardous substance UST system* means an underground storage tank system that contains a hazardous substance defined in section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (but not including any substance regulated as a hazardous waste under subtitle C) or any mixture of such substances and petroleum, and which is not a petroleum UST system.

*Heating oil* means petroleum that is No. 1, No. 2, No. 4—light, No. 4—heavy, No. 5—light, No. 5—heavy, and No. 6 technical grades of fuel oil; other residual fuel oils (including Navy Special Fuel Oil and Bunker C); and other fuels when used as substitutes for one of these fuel oils. Heating oil is typically used in the operation of heating equipment, boilers, or furnaces.

*Hydraulic lift tank* means a tank holding hydraulic fluid for a closed-loop mechanical system that uses compressed air or hydraulic fluid to operate lifts, elevators, and other similar devices.

*Interstitial monitoring* means a method of monitoring the interstitial space of a secondarily contained UST system for a leak of regulated substances or ingress of external fluids (groundwater or other fluids not intended as monitoring fluids).

*Interstitial space* means the opening formed between the primary (inner) and secondary (outer) wall of a UST system with double-walled construction or the opening formed between the wall of a containment sump and the UST system component that it contains.

*Leak* means any spilling, leaking, emitting, discharging, escaping, leaching or disposing from an UST system or resulting from the operation of the UST system. A leak may or may not result in a release to the environment. A leak from a single-walled UST system will normally result in a release to the environment. A leak from the primary containment of a secondarily contained UST system may or may not result in a release to the environment depending upon the integrity of the secondary containment.

*Leak detection* means determining if a leak of a regulated substance has occurred from the UST system.

*Liquid trap* means sumps, well cellars, and other traps used in association with oil and gas production, gathering, and extraction operations (including gas production plants), for the purpose of collecting oil, water, and other liquids. These liquid traps may temporarily collect liquids for subsequent disposition or reinjection into a production or pipeline stream, or may collect and separate liquids from a gas stream.

*MDEQ* means the Mississippi Department of Environmental Quality.

*Maintenance* means the normal operational upkeep to prevent an underground storage tank system from leaking or releasing product.

*Motor fuel* means petroleum, petroleum-based substances, biofuels or any petroleum/biofuel blend that is typically used in the operation of a motor engine. This definition includes all biofuels, including 100% biodiesel or ethanol.

*New tank system* means a tank system that will be used to contain an accumulation of regulated substances and for which installation has commenced after December 22, 1988. (See also "Existing Tank System.") This term applies to underground tanks, piping, dispensers, and submersible pumps.

a) Underground tank – A new tank is one that is installed where there previously was no tank. The tank may be one that has never been used before or may be one that has been previously used but recertified by the manufacturer.

b) Pipe – A new pipe is one that is installed where there previously was no pipe. It may be an entirely new piping run from the tank to the dispensers or it may be a new section of pipe added to an existing pipe. The new piping can not have been previously used.

c) Dispensers – A new dispenser is one that is installed where there previously was no dispenser. The dispenser may be one that has never been used before or may be one that has been previously used.

d) Submersible pump – A new submersible pump is one that is installed where there previously was no submersible pump. The submersible pump may be one that has never been used before or may be one that has been previously used.

*Noncommercial purposes* with respect to motor fuel means not for resale.

*On the premises where stored* with respect to heating oil means UST systems located on the same property where the stored heating oil is used.

*Operational life* refers to the period beginning when installation of the tank system has commenced until the time the tank system is properly closed under Subpart G.

*Operator* means any person in control of, or having responsibility for, the daily operation of the UST system.

*Overfill release* is a release that occurs when a tank is filled beyond its capacity, resulting in a discharge of the regulated substance to the environment.

*Owner* means:

(a) In the case of an UST system in use on November 8, 1984, or brought into use after that date, any person who owns an UST system used for storage, use, or dispensing of regulated substances; and

(b) In the case of any UST system in use before November 8, 1984, but no longer in use on that date, any person who owned such UST immediately before the discontinuation of its use.

*Person* means an individual, trust, firm, joint stock company, Federal agency, corporation, state, municipality, commission, political subdivision of a state, or any interstate body. "Person" also includes a consortium, a joint venture, a commercial entity, and the United States Government.

*Petroleum UST system* means an underground storage tank system that contains petroleum or a mixture of petroleum with *de minimis* quantities of other regulated substances. Such systems include those containing motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents, and used oils.

*Pipe* or *Piping* means a hollow cylinder or tubular conduit that is constructed of non-earthen materials that routinely contains and conveys regulated substances from the underground storage tank to the dispenser or other end-use equipment. Such piping includes any elbows, couplings, unions, valves, or other in-line fixtures that routinely contain and convey regulated substances. This definition does not include vent, vapor recovery, fill lines or tank risers.

*Pipeline facilities (including gathering lines)* are new and existing pipe rights-of-way and any associated equipment, facilities, or buildings.

*Regulated substance* means:

(a) Any substance defined in section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 (but not including any substance regulated as a hazardous waste under subtitle C);

(b) Petroleum, including crude oil or any fraction thereof that is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute); and

(c) Any substance defined as a "motor fuel".

The term "regulated substance" includes but is not limited to petroleum and petroleum-based substances comprised of a complex blend of hydrocarbons derived from crude oil though processes of separation, conversion, upgrading, and finishing, such as motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents, and used oils.

*Release* means a leak from an UST system or resulting from the operation of the UST system that reaches the environment.

*Release detection* means determining whether a leak of a regulated substance that has occurred from the UST system has reached the environment.

*Repair* means to restore a tank or UST system component that has caused a leak of product from the UST system. As it applies to the integrity of underground storage tanks and piping, repair means any activity intended to restore a UST system to operation that does not meet the definition of replace.

*Replace* - This term applies to underground tanks, piping, dispensers, and submersible pumps.

(a) Underground tank – Replace means to remove an existing tank and install another tank in its place. The replacement tank may be one that has never been used or one that has been used but recertified by the manufacturer.

(b) Pipe – Replace means to remove an existing pipe and install another pipe in its place. In order to be considered a piping replacement, one hundred (100) percent of the piping, excluding connectors, needed to transfer the regulated substance from a single tank to the most distant dispenser or end use device must be removed and replaced. Connectors include any flexible connectors, risers or other transitional components such as fittings. The replacement piping must be new from the factory and can not have been previously used.

(c) Dispenser – Replace means to remove an existing dispenser and install another dispenser in its place and the equipment used to connect the dispenser to the piping is also replaced. The equipment necessary to connect the dispensers may include check

valves, shear valves, risers, flexible connectors or other transitional components that are beneath the dispenser and connect the dispenser to the piping. The replacement dispensers may be new or may have been used before.

(d) Submersible pump – Replace means to remove an existing submersible pump and install another submersible pump in its place and the equipment used to connect the submersible pump is also replaced. The equipment needed to connect the submersible pump may include ball valves, check valves, flexible connectors unions, tees, ells or other pipe fittings and transitional components that connect the submersible pump to the piping. The replacement submersible pump may be new or may have been used before.

*Residential tank* is a tank located on property used primarily for dwelling purposes.

*SARA* means the Superfund Amendments and Reauthorization Act of 1986.

*Secondary containment* means an impervious layer or barrier that extends around the primary (inner) tank or pipe that is designed, constructed and installed to contain any leak from any part of the tank or piping that routinely contains regulated substances. Examples of secondarily contained systems include double-walled or jacketed tanks, double-walled or jacketed piping and/or containment sumps that may be installed at the top of the tanks, under dispensers or at piping transitions. Secondary containment must be designed, constructed and installed to:

(a) Prevent the release of regulated substances to the environment for the operational life of the secondary containment system;

(b) Prevent the ingress of water or other external fluids into the interstitial space for the operational life of the secondary containment system;

(c) Allow for monitoring of the interstitial space to detect any leak from the primary tank system and ingress of external fluids;

(d) Be checked for evidence of a leak and ingress of external fluids at least once every 30 days in accordance with §280.43(g) and §280.44(c); and

(e) Be compatible with the substances stored and external soil/fluids for the operational life of the secondary containment system.

*Septic tank* is a water-tight covered receptacle designed to receive or process, through liquid separation or biological digestion, the sewage discharged from a building sewer. The effluent from such receptacle is distributed for disposal through the soil and settled solids and scum from the tank are pumped out periodically and hauled to a treatment facility.

*Storm-water or wastewater collection system* means piping, pumps, conduits, and any other equipment necessary to collect and transport the flow of surface water run-off resulting from precipitation, or domestic, commercial, or industrial wastewater to and from retention areas or

any areas where treatment is designated to occur. The collection of storm water and wastewater does not include treatment except where incidental to conveyance.

*Submersible pump* (also referred to as a "submerged turbine pump") means a device installed within a tank designed to transfer product from the tank to the dispenser in a pressurized piping system. The term submersible pump includes the submersible motor, extractor assembly and the pump head (housing) assembly.

*Supplier* means any person who delivers or deposits motor fuels into an underground storage tank. This term may include oil companies, jobbers, petroleum transportation companies, or other product delivery entities.

*Surface impoundment* is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials) that is not an injection well.

*Tank* is a stationary device designed to contain an accumulation of regulated substances and constructed of non-earthen materials (e.g., concrete, steel, plastic) that provide structural support.

*Underground area* means an underground room, such as a basement, cellar, shaft or vault, providing enough space for physical inspection of the exterior of the tank situated on or above the surface of the floor.

*Underground release* means any belowground release.

*Underground storage tank* or *UST* means any one or combination of tanks (including underground pipes connected thereto) that is used to contain an accumulation of regulated substances, and the volume of which (including the volume of underground pipes connected thereto) is 10 percent or more beneath the surface of the ground. This term does not include any:

(a) Farm or residential tank of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes;

(b) Tank used for storing heating oil for consumptive use on the premises where stored;

(c) Septic tank;

(d) Pipeline facility (including gathering lines) regulated under:

(1) The Natural Gas Pipeline Safety Act of 1968 (49 U.S.C. App. 1671, *et seq.)*, or

(2) The Hazardous Liquid Pipeline Safety Act of 1979 (49 U.S.C. App. 2001, *et seq.)*, or

(3) Which is an intrastate pipeline facility regulated under state laws comparable to the provisions of the law referred to in paragraph (d)(1) or (d)(2) of this definition;

(e) Surface impoundment, pit, pond, or lagoon;

(f) Storm-water or wastewater collection system;

(g) Flow-through process tank;

(h) Liquid trap or associated gathering lines directly related to oil or gas production and gathering operations; or

(i) Storage tank situated in an underground area (such as a basement, cellar, mineworking, drift, shaft, or tunnel) if the storage tank is situated upon or above the surface of the floor.

The term "underground storage tank" or "UST" does not include any pipes connected to any tank which is described in paragraphs (a) through (i) of this definition.

*Upgrade* means the addition or retrofit of some systems such as cathodic protection, lining, or spill and overfill controls to improve the ability of an underground storage tank system to prevent the leak of product.

*UST compliance manager* means any person or persons identified by the owner/operator who has primary responsibility for the proper management, operation and maintenance of the tank system at a UST facility. The UST compliance manager is also responsible for the implementation of all applicable MDEQ requirements necessary to achieve and maintain compliance with the UST system including monitoring, testing, reporting and record keeping.

*UST operations clerk* means any person or persons identified by the owner/operator who has primary responsibility for the initial response to any alarms or other indications of emergencies presented by a spill, leak or release from a UST system. The UST operations clerk is typically on-site at the facility and monitors the dispensing of product.

*UST system* or *Tank system* means an underground storage tank, connected underground piping, underground ancillary equipment, and containment system, if any.

*Wastewater treatment tank* means a tank that is designed to receive and treat an influent wastewater through physical, chemical, or biological methods.

**§ 280.13 Industry codes and recommended practices.**

The following industry codes and recommended practices may be utilized to comply with the requirements of Subparts B, C, D and G. Other codes and recommended practices may also be

utilized provided they have been determined by the MDEQ to be no less protective of human health and the environment than those listed below.

API 1007, "Loading and Unloading of MC 306/DOT 406 Cargo Tank Motor Vehicles"

API 1604, "Closure of Underground Petroleum Storage Tanks"

API 1615, "Installation of Underground Petroleum Storage Systems"

API 1621, "Bulk Liquid Stock Control at Retail Outlets"

API 1626, "Storing and Handling Ethanol and Gasoline-Ethanol Blends at Distribution Terminals and Service Stations"

API 1627, "Storing and Handling of Gasoline-Methanol/Cosolvent Blends at Distribution Terminals and Service Stations"

API 1631, "Interior Lining and Periodic Inspection of Underground Storage Tanks"

API 1637, "Using the API Color-Symbol System to Mark Equipment and Vehicles for Product Identification at Service Stations and Distribution Terminals"

ASTM E1430, "Standard Guide for Using Release Detection Devices with Underground Storage Tanks"

ASTM E1526, "Standard Practice for Evaluating the Performance of Release Detection Systems for Underground Storage Tank Systems"

FPTPI T-95-2, "Remanufacturing of Fiberglass Reinforced Underground Storage Tanks"

KWA "Recommended Practice for Inspecting Buried Lined Steel Tanks Using a Video Camera"

NACE RP-0169, "Control of External Corrosion Protection on Underground Storage Tank Systems by Cathodic Protection"

NACE RP-0177, "Mitigation of Alternating Current and Lightning Effects on Metallic Structures and Corrosion Control Systems"

NACE RP-0178, "Design, Fabrication, and Surface Finish of Metal Tanks and Vessels to be Lined for Chemical Immersion Service"

NACE RP-0184, "Repair of Lining Systems"

NACE RP-0285, "Corrosion Control of Underground Storage Tank Systems by Cathodic Protection"

NACE RP-0288, “Inspection of Linings on Steel and Concrete”

NACE TM-0101, “Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Tank Systems”

NACE TM-0497, “Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems”

NFPA 30, “Flammable and Combustible Liquids Code”

NFPA 30A, “Automotive and Marine Service Station Code”

NFPA 326, “Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair”

NFPA 385 “Standard for Tank Vehicles for Flammable and Combustible Liquids”

PEI RP100, “Recommended Practices for Installation of Underground Liquid Storage Systems”

PEI RP500, “Recommended Practices for Inspection and Maintenance of Motor Fuel Dispensing Equipment”

PEI RP900, “Recommended Practices for the Inspection and Maintenance of UST Systems”

STI “STI-P3 Specification and Manual for External Corrosion Protection of Underground Steel Storage Tanks”

STI F841, “Standard for Dual Wall Underground Steel Storage Tanks”

STI F894, “ACT-100 Specification for External Corrosion Protection of FRP Composite Steel Underground Storage Tanks”

STI F961, “ACT-100-U Specification for External Corrosion Protection of FRP Composite Steel Underground Storage Tanks”

STI R892, “Recommended Practice for Corrosion Protection of Underground Piping Networks Associated with Liquid Storage and Dispensing Systems”

STI R922, “Specification for Permatank”

STI R972, “Recommended Practice for the Installation of Supplemental Anodes for STI-P3 USTs”

UL 58, “Steel Underground Tanks for Flammable and Combustible Liquids”

UL 79, “Power-Operated Pumps for Petroleum Dispensing Products”

UL 87, “Power-Operated Dispensing Devices for Petroleum Products”

UL 971, “Non-Metallic Underground Piping for Flammable Liquids”

UL 1316, “Glass Fiber Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols and Alcohol-Gasoline Mixtures”

UL 1746, “External Corrosion Protection Systems for Steel Underground Storage Tanks”

**Subpart B—UST Systems: Design, Construction, Installation and Notification**

**§ 280.20 Performance standards for new UST systems.**

In order to prevent leaks due to structural failure, corrosion, or spills and overfills for as long as the UST system is used to store regulated substances, all owners and operators of new UST systems must meet the following requirements.

(a) *Tanks.* Each tank must be properly designed and constructed, and any portion underground that routinely contains product must be protected from corrosion, in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory as specified below and all new or replacement tanks installed on or after October 1, 2008, must have secondary containment in accordance with §280.20(a)(4):

(1) The tank is constructed of fiberglass-reinforced plastic; or

(2) The tank is constructed of steel and cathodically protected in the following manner:

(i) The tank is coated with a suitable dielectric material;

(ii) Field-installed cathodic protection systems are designed by a corrosion expert;

(iii) Impressed current systems are designed to allow determination of current operating status as required in §280.32(c); and

(iv) Cathodic protection systems are operated and maintained in accordance with §280.32 ; or

(3) The tank is of composite construction (steel clad with fiberglass-reinforced-plastic or other polymeric materials); or

(4) The tank is of secondary containment construction. Secondarily contained tanks shall comply with the following:

(i) Prevent the release of regulated substances to the environment for the operational life of the tank;

(ii) Prevent the ingress of water or other external fluids into the interstitial space for the operational life of the tank;

(iii) Allow for monitoring of the interstitial space to detect any leak from the primary tank and ingress of external fluids;

(iv) Be checked for evidence of a leak and ingress of external fluids at least once every 30 days in accordance with §280.43(g); and

(v) Be compatible with the substances stored and external soil/fluids for the operational life of the tank; or

(5) The tank construction and corrosion protection are determined by the MDEQ to be designed to prevent the leak or threatened leak of any stored regulated substance in a manner that is no less protective of human health and the environment than paragraphs (a)(1) through (4) of this section.

(b) *Piping.* Each pipe and ancillary component that routinely contains regulated substances must be properly designed, constructed, and protected from corrosion as specified below and all new or replacement piping installed on or after October 1, 2008, that is not part of a repair must be secondarily contained in accordance with §280.20(b)(4):

(1) The piping is constructed of fiberglass-reinforced plastic or other polymeric materials; or

(2) The piping is constructed of steel and cathodically protected in the following manner:

(i) The piping is coated with a suitable dielectric material;

(ii) Field-installed cathodic protection systems are designed by a corrosion expert;

(iii) Impressed current systems are designed to allow determination of current operating status as required in §280.32(c); and

(iv) Cathodic protection systems are operated and maintained in accordance with §280.32; or

(3) The piping is of composite construction (metal with fiberglass-reinforced plastic or other polymeric materials); or

(4) The piping is of secondarily contained construction. Secondarily contained piping shall comply with the following:

(i) Prevent the release of regulated substances to the environment for the operational life of the piping system;

(ii) Prevent the ingress of water or other external fluids into the interstitial space for the operational life of the piping system;

(iii) Allow for monitoring of the interstitial space to detect any leak from the primary pipe and ingress of external fluids;

(iv) Be checked for evidence of a leak and ingress of external fluids at least once every 30 days in accordance with §280.44(c); and

(v) Be compatible with the substances stored and external soil/fluids for the operational life of the piping system; or

(5) The piping construction and corrosion protection are determined by the MDEQ to be designed to prevent the leak or threatened leak of any stored regulated substance in a manner that is no less protective of human health and the environment than the requirements in paragraphs (b)(1) through (4) of this section.

(c) *Spill prevention equipment.* Except as provided in §280.20(e)(2), to prevent spilling associated with product transfer to the UST system, owners and operators must use spill prevention equipment that will, for the operational life of the spill prevention equipment:

(1) Prevent the release of product to the environment when the transfer hose is detached from the fill pipe (for example, a spill catchment basin); and

(2) Prevent the release of any product to the environment that may leak from the transfer hose/tank connection during the product transfer; and

(3) Be compatible with the substances stored and external soil/fluids.

(d) Overfill prevention equipment. Except as provided in §280.20(e)(2), to prevent overfilling of the tank during product transfer to the UST system, owners and operators must use overfill prevention equipment that is accessible for inspection, compatible with the substances stored and will, for the operational life of the overfill prevention equipment, meet one of the following:

(1) Automatically shut off flow into the tank when the tank is no more than 95 percent full; or

(2) Alert the transfer operator when the tank is no more than 90 percent full by restricting the flow into the tank or triggering a high-level alarm; or

(3) Restrict flow 30 minutes prior to overfilling, alert the operator with a high level alarm one minute before overfilling, or automatically shut off flow into the tank so that none of the fittings located on top of the tank are exposed to product due to overfilling.

(e) Owners and operators are not required to use the spill and overfill prevention equipment specified in paragraphs (c) and (d) of this section if:

(1) Alternative equipment is used that is determined by the MDEQ to be no less protective of human health and the environment than the equipment specified in paragraphs (c) and (d) of this section; or

(2) The UST system is filled by transfers of no more than 25 gallons at one time.

(f) *Installation.* All tanks, piping and ancillary equipment must be properly installed in accordance with one or more of the industry codes and recommended practices listed in §280.13 and in accordance with the manufacturer's instructions.

(g) *Certification of installation.* All owners and operators must ensure that all tanks, piping and applicable ancillary components are installed by a contractor certified by the MDEQ as a UST installer. Owners and operators must provide certification of compliance with these requirements on the UST notification form in accordance with §280.22. In addition, one or more of the following may also be required in order to demonstrate compliance with paragraph (f) of this section by providing a certification of compliance on the UST notification form in accordance with §280.22.

(1) The installer has been certified by the manufacturer; or

(2) All work listed in the manufacturer’s installation checklists have been completed; or

(3) The owner and operator have complied with another method for ensuring compliance with paragraph (f) of this section that is determined by the MDEQ to be no less protective of human health and the environment.

(h) Dispensers. All new or replacement dispensers installed on or after October 1, 2008, must have secondary containment installed that will:

(1) Prevent the release of regulated substances to the environment for the operational life of the dispenser secondary containment;

(2) Prevent the ingress of water or other external fluids into the interstitial space for the operational life of the dispenser secondary containment;

(3) Allow for monitoring of the interstitial space to detect any leak from the dispensers or enclosed components of the piping system and ingress of external fluids;

(4) Be checked for evidence of a leak and ingress of external fluids at least once every 30 days in accordance with §280.44(c); and

(5) Be compatible with the substances stored and external soil/fluids for the operational life of the dispenser secondary containment.

(i) Submersible pumps. All new or replacement submersible pumps installed on or after October 1, 2008, must have secondary containment installed that will:

(1) Prevent the release of regulated substances to the environment for the operational life of the submersible pump secondary containment;

(2) Prevent the ingress of groundwater or other external fluids into the interstitial space for the operational life of the submersible pump secondary containment;

(3) Allow for monitoring of the interstitial space to detect any leak from the submersible pump or enclosed components of the piping system and ingress of external fluids;

(4) Be checked for evidence of a leak and ingress of external fluids at least once every 30 days in accordance with §280.44(c); and

(5) Be compatible with the substances stored and external soil/fluids for the operational life of the submersible pump secondary containment.

(j) Piping shear valves. All pressurized piping must be equipped with shear valves designed to shut-off the flow of product in the event a dispenser cabinet is impacted. All shear valves must be:

(1) Properly installed in accordance with one or more of the industry codes and recommended practices listed in §280.13 and in accordance with the manufacturer's instructions.

(2) Effective October 1, 2009, be tested for functionality (the poppet valve or other shut-off mechanism is manually closed to confirm that it will shut off the flow of product) at least once every 12 months.

(3) Records. A written record documenting the shear valve testing must be maintained (in accordance with §280.35) to demonstrate compliance with this section. These records must provide the results of the last two (2) tests required in this section.

**§ 280.21 Upgrading of existing UST systems.**

(a) *Alternatives allowed.* Not later than December 22, 1998, all existing UST systems must comply with one of the following requirements:

(1) New UST system performance standards under §280.20;

(2) The upgrading requirements in paragraphs (b) through (d) of this section; or

(3) Closure requirements under subpart G of this part, including applicable requirements for corrective action under subpart F.

(b) *Tank upgrading requirements.* Steel tanks must be upgraded to meet one of the following requirements in accordance with any applicable code of practice listed in §280.13:

(1) *Interior lining.* A tank may be upgraded by internal lining if:

(i) The lining is installed in accordance with the requirements of §280.34, and

(ii) Within 10 years after lining, and every 5 years thereafter, the lined tank is internally inspected and found to be structurally sound with the lining still performing in accordance with original design specifications.

(2) *Cathodic protection.* A tank may be upgraded by cathodic protection if the cathodic protection system meets the requirements of §280.20(a)(2) (ii), (iii), and (iv) and the integrity of the tank is ensured using one of the following methods:

(i) The tank is internally inspected and assessed to ensure that the tank is structurally sound and free of corrosion holes prior to installing the cathodic protection system; or

(ii) The tank has been installed for less than 10 years and is monitored monthly for leaks in accordance with §280.43 (d) through (h); or

(iii) The tank has been installed for less than 10 years and is assessed for corrosion holes by conducting two (2) tightness tests that meet the requirements of §280.43(c). The first tightness test must be conducted prior to installing the cathodic protection system. The second tightness test must be conducted between three (3) and six (6) months following the first operation of the cathodic protection system; or

(iv) The tank is assessed for corrosion holes by a method that is determined by the MDEQ to prevent leaks in a manner that is no less protective of human health and the environment than paragraphs (b)(2) (i) through (iii) of this section.

(3) *Internal lining combined with cathodic protection.* A tank may be upgraded by both internal lining and cathodic protection if:

(i) The lining is installed in accordance with the requirements of §280.34; and

(ii) The cathodic protection system meets the requirements of §280.20(a)(2)(ii), (iii), and (iv).

(c) *Piping upgrading requirements.* Metal piping that routinely contains regulated substances and is in contact with the soil and/or water (electrolyte) must be cathodically protected in accordance with one or more of the industry codes recommended practices listed in §280.13 and must meet the requirements of §280.20(b)(2)(ii), (iii), and (iv).

(d) *Spill and overfill prevention equipment.* To prevent spilling and overfilling associated with product transfer to the UST system, all existing UST systems must comply with new UST system spill and overfill prevention equipment requirements specified in §280.20 (c) and (d).

**§ 280.22 Notification requirements.**

(a) Any owner who intends to install a new or replace an existing underground storage tank, pipe, dispenser, or submersible pump on or after October 1, 2008, must, within 30 days of such planned installation, submit a "State of Mississippi Notice of Upcoming Underground Storage Tank System Installation" form.

Note: If an unplanned replacement of an existing tank, pipe, dispenser, or submersible pump is necessary due to failure, an accident or for other circumstances the MDEQ deems appropriate, submittal of a "State of Mississippi Notice of Upcoming Underground Storage Tank System Installation" form is not required.

(b) Any owner who brings into use, installs, replaces or changes the operational status of an underground storage tank, pipe, dispenser or submersible pump, after May 8, 1986, must within 30 days of bringing such tank, pipe, dispenser or submersible pump into use or changing the operational status of, submit a "State of Mississippi Notification for Underground Storage Tank System" form.

Note: Owners and operators of UST systems that were in the ground on or after May 8, 1986, unless taken out of operation on or before January 1, 1974, were required to notify the designated state or local agency in accordance with the Hazardous and Solid Waste Amendments of 1984, Pub. L. 98–616, on a form published by EPA on November 8, 1985, (50 FR 46602) unless notice was given pursuant to section 103(c) of CERCLA.

(c) Any person who becomes the owner of an existing underground storage tank system must, within 30 days of becoming the owner, submit a "State of Mississippi Underground Storage Tank System Change of Ownership" form or a "State of Mississippi Notification for Underground Storage Tank System" form.

(d) All owners and operators of UST systems installed on or after December 22, 1988, must certify in the notification form compliance with the following requirements:

(1) Installation of tanks and piping under §280.20(g);

(2) Cathodic protection of steel tanks and piping under §280.20 (a) and (b);

(3) Financial responsibility under subpart H of this part; and

(4) Leak detection under §§280.41 and 280.42.

(e) All owners and operators of UST systems installed on or after December 22, 1988, must ensure that the installer certifies in the notification form that the methods used to install the tanks and piping complies with the requirements in §280.20(f).

(f) Beginning October 24, 1988, any person who sells a tank intended to be used as an underground storage tank must notify the purchaser of such tank of the owner's notification obligations under paragraph (b) of this section.

**Subpart C—General Operating Requirements**

**§ 280.30 Operation and maintenance of spill and overfill prevention equipment.**

(a) Owners and operators must ensure that releases due to spilling or overfilling do not occur. The owner and operator must ensure that the volume available in the tank is greater than the volume of product to be transferred to the tank before the transfer is made and that the transfer operation is monitored constantly to prevent overfilling and spilling. Prior to receiving a delivery, owners and operators must ensure that the spill prevention equipment is free of any fluids or debris and the full volume of the spill containment device is available to contain any spills that may occur during the delivery. After completion of the delivery, owners and operators must ensure that the spill prevention equipment is emptied of any regulated substances that may have accumulated during the delivery operation.

(b) The owner and operator must report, investigate, and clean up any spills and overfills in accordance with §280.53.

(c) The integrity of all spill prevention equipment that is not continuously monitored must be tested in accordance with the following requirements:

(1) Frequency.

(i) Spill prevention equipment installed on or after October 1, 2008, must be tested after installation and before the UST system receives any delivery of regulated substances and at least once every 12 months thereafter.

(ii) Spill prevention equipment installed before October 1, 2008, must be tested by October 1, 2009, and at least once every 12 months thereafter.

(iii) Spill prevention equipment must be tested whenever it is suspected, by visual evidence or other means, that the integrity of the spill prevention equipment may be in question.

(2) Criteria. All spill prevention equipment integrity testing must be conducted in accordance with the manufacturer’s specifications and any applicable code of practice listed in §280.13.

Note: In the absence of manufacturer's specifications or an applicable industry code or recommended practice, the inspection may be accomplished by filling the spill containment with water or other suitable liquid and checking to ensure that no more than one-eighth inch of liquid is lost over a one (1) hour period. Alternative test methods may be utilized only if recognized by the MDEQ as no less protective of human health and the environment at those test methods listed above.

(3) Records. A written record documenting the integrity testing of spill containment equipment must be maintained (in accordance with §280.35) to demonstrate compliance with this section. These records must provide the results of the last two (2) tests required in this section.

(d) Overfill prevention equipment (including any tight-fill adapters that may be in use) must be inspected and proper operation ensured in accordance with the following requirements:

(1) Frequency.

(i) Overfill prevention equipment installed on or after October 1, 2008, must be inspected for proper operation after installation and before the UST system receives any delivery of regulated substances and at least once every 12 months thereafter.

(ii) Overfill prevention equipment installed before October 1, 2008, must be inspected for proper operation by October 1, 2009, and at least once every 12 months thereafter.

(iii) Overfill prevention equipment must be inspected whenever it is suspected, by visual evidence or other means, that the proper operation of the overfill prevention equipment may be in question.

(2) Criteria. At a minimum, the inspection must ensure that the overfill prevention equipment:

(i) Is properly installed; and

(ii) Is properly functioning in accordance with the manufacturer's specifications and any applicable code of practice listed in §280.13.

Note: In the absence of manufacturer's specifications or an applicable industry code or recommended practice, the inspection may be accomplished by removal of the equipment from the tank, visual examination and confirmation that the overfill device is installed at the correct height within the tank.

(3) Records. A written record documenting the inspection of the overfill prevention equipment must be maintained (in accordance with §280.35) to demonstrate compliance

with this section. These records must provide the results of the last two (2) inspections required in this section.

**§ 280.31** Operation and maintenance of secondary containment.

(a) Owners and operators of UST systems installed on or after October 1, 2008, and all secondarily contained UST systems utilizing interstitial monitoring in accordance with §280.43(g) or §280.44(c) must comply with the following requirements in order to ensure that releases due to improper operation and maintenance of secondary containment do not occur:

(b) The owner and operator must report and investigate any leak or suspected release in accordance with Subpart E.

(c) Any regulated substances found within the secondary containment must be removed within 24 hours of discovery or another time frame determined by the MDEQ to be appropriate.

(d) All secondary containment that is not continuously monitored must be inspected for proper operation in accordance with the following requirements:

(1) Frequency. The integrity of all secondary containment components of a UST system that can be observed must be visually inspected at least once every 12 months.

(2) Criteria. At a minimum, the inspection must ensure that the secondary containment:

(i) Is maintained free of liquids and debris if the interstice is designed to be dry;

(ii) Appears to be liquid tight with no cracks, broken seals or other visual evidence of failure; and

(iii) The integrity of the secondary containment must be tested in accordance with the manufacturer's specifications and any applicable code of practice listed in §280.13 if there is evidence of failure. The presence of fluids other than the substance stored or the hydrostatic monitoring fluid within the interstice may be sufficient to require testing of the integrity. If the integrity of the secondary containment is in question, testing must be conducted unless it can be shown that the source of the fluid has been determined and the condition has been corrected.

Note: In the absence of manufacturer's specifications or an applicable industry code or recommended practice, the integrity test may be accomplished by filling the secondary containment with water or other suitable liquid to a level at least six (6) inches above the highest penetration fitting or joint and checking to ensure that no more than one-eighth inch of liquid is lost over a one (1) hour period. Alternative test methods may be utilized only if recognized by the MDEQ as no less protective of human health and the environment at those test methods listed above.

(3) Records. A written record documenting the visual inspection of the secondary containment and integrity testing if required must be maintained (in accordance with §280.35) to demonstrate compliance with this section. These records must provide the results of the last two (2) inspections and any corresponding tests required in this section.

**§ 280.32 Operation and maintenance of corrosion protection.**

All owners and operators of steel UST systems with corrosion protection must comply with the following requirements to ensure that leaks due to corrosion are prevented for as long as the UST system is used to store regulated substances:

(a) All corrosion protection systems must be operated and maintained to continuously provide corrosion protection to the metal components of that portion of the tank and piping that routinely contain regulated substances and are in contact with the soil and/or water (electrolyte).

(b) All UST systems equipped with cathodic protection systems must be inspected for proper operation by a qualified cathodic protection tester in accordance with the following requirements:

(1) *Frequency.* All cathodic protection systems must be tested within 6 months of installation and at least every 3 years thereafter or according to another reasonable time frame established by the MDEQ; and

(2) *Inspection criteria.* The criteria that are used to determine that cathodic protection is adequate as required by this section must be in accordance with the requirements in appendix 280.1 ("Guidelines for the Evaluation of Underground Storage Tank Cathodic Protection Systems") and any applicable industry code or recommended practice listed in §280.13.

(c) UST systems with impressed current cathodic protection systems must also be inspected every 60 days to ensure the equipment is running properly.

(d) For UST systems using cathodic protection, records of the operation of the cathodic protection must be maintained (in accordance with §280.35) to demonstrate compliance with the performance standards in this section. These records must provide the following:

(1) The results of the last six (6) inspections required in paragraph (c) of this section; and

(2) The results of testing from the last two (2) inspections required in paragraph (b) of this section.

**§ 280.33 Compatibility.**

Owners and operators must use an UST system made of materials that are compatible with the substances stored in the UST system and with any soils, backfill materials, interstitial monitoring

fluids, groundwater or other fluids the tank system may be exposed to either internally or externally.

**§ 280.34 Repairs and replacement.**

Owners and operators of UST systems must ensure that repairs will prevent leaks due to structural failure or corrosion as long as the UST system is used to store regulated substances. The repairs must meet the following requirements:

(a) Repairs to UST systems must be properly conducted in accordance with the manufacturer's specifications and any applicable code of practice listed in §280.13.

(b) Repairs to fiberglass-reinforced plastic tanks must be conducted in accordance with the manufacturer's specifications and any applicable code of practice listed in §280.13.

(c) Metal pipe sections and fittings that have leaked product as a result of corrosion or other damage must be replaced. Replaced as it applies to metal pipe sections means that only the section of pipe from joint-to-joint must be replaced when repairing such a pipe system. It is not intended to imply that the entire piping system must be replaced with a secondarily contained pipe system. Repairs to fiberglass-reinforced plastic piping must be conducted in accordance with the manufacturer's specifications and any applicable code of practice listed in §280.13.

(d) Repaired tanks and piping must be tightness tested in accordance with §280.43(c) and §280.44(b) after such repairs are complete and before the UST system is brought back into service.

(e) Repaired spill containment equipment and secondary containment that can not be tightness tested must be tested in accordance with §280.30(c) and §280.31(d) after such repairs are complete and before the UST system is brought back into service.

(f) Repaired dispensers, submersible pumps and other ancillary equipment that can not be tightness tested must be visually inspected for any leaks to ensure integrity after such repairs are complete and before the UST system is brought back into service.

(g) If an existing underground storage tank, pipe, dispenser, or submersible pump is replaced, the requirements in §280.20 apply only to the specific underground storage tank, pipe, dispenser, or submersible pump being replaced, not to other underground storage tanks, piping, dispensers or submersible pumps located at the underground storage tank facility.

(h) The MDEQ may waive the requirement that secondary containment be installed when a dispensers or submersible pump is replaced because of an accident or for other circumstances the MDEQ deems appropriate.

(i) Within 6 months following the repair of any cathodically protected UST system, the cathodic protection system must be tested in accordance with §280.32 (b) and (c) to ensure that it is operating properly.

(j) UST system owners and operators must maintain records of each repair and replacement for the remaining operating life of the UST system that demonstrate compliance with the requirements of this section.

**§ 280.35 Reporting and recordkeeping.**

Owners and operators of UST systems must cooperate fully with inspections, monitoring and testing conducted by the MDEQ, as well as requests for document submission, testing, and monitoring by the owner or operator pursuant to section 9005 of Subtitle I of the Resource Conservation and Recovery Act, as amended.

(a) *Reporting.* Owners and operators must submit the following information to the MDEQ:

(1) Notification for all UST systems (§280.22), which includes certification of installation for new UST systems (§280.20(g));

(2) A notification within 30 days of changing the status of a tank (§280.22(b));

(3) A notification before installation of new tanks, piping, dispensers, and submersible pumps (§280.22(a));

(4) Reports of all leaks including suspected releases (§280.50), spills and overfills (§280.53), and confirmed releases (§280.61);

(5) Corrective actions planned or taken including initial abatement measures (§280.62), initial site characterization (§280.63), free product removal (§280.64), investigation of soil and ground-water cleanup (§280.65), and corrective action plan (§280.66); and

(6) A notification before permanent closure or change-in-service (§280.71).

(7) Notification of persons trained in accordance with §280.37(d) as UST compliance managers.

(b) *Recordkeeping.* Owners and operators must maintain the following information:

(1) Recent compliance with piping shear valve testing requirements (§280.20(j));

(2) Recent compliance with spill prevention testing requirements (§280.30(c));

(3) Recent compliance with overfill prevention inspection requirements (§280.30(d));

(4) Recent compliance with secondary containment inspection and testing requirements (§280.31);

(5) Documentation of operation of corrosion protection equipment (§280.32);

(6 )Documentation of UST system repairs and replacement (§280.34);

(7) Recent compliance with leak detection requirements (§280.45); and

(8) Results of the site investigation conducted at permanent closure (§280.74).

(9) Records documenting the training of all persons trained in accordance with §280.37(d) as UST compliance managers and §280.37(e) as UST operations clerks.

(c) *Availability and maintenance of records.* Owners and operators must keep the records required either:

(1) At the UST site and immediately available for inspection by the MDEQ; or

(2) At a readily available alternative site and be provided for inspection to the MDEQ upon request.

(3) In the case of permanent closure records required under §280.74, owners and operators are also provided with the additional alternative of mailing closure records to the MDEQ if they can not be kept at the site or an alternative site as indicated above.

**§ 280.36 Delivery Prohibition**

Effective October 1, 2008, it shall be unlawful for any person to deliver to, deposit into, or accept a regulated substance into an underground storage tank at a facility that has been identified by the MDEQ to be ineligible for such delivery, deposit, or acceptance.

(a) Classification as ineligible.

(1) The MDEQ shall classify an underground storage tank as ineligible for delivery, deposit, or acceptance of a regulated substance as soon as practicable after it is determined one or more of the following conditions exists:

(i) Assessed tank regulatory fees are more than 90 days past due for payment;

(ii) Required spill prevention equipment is not installed;

(iii) Required overfill prevention equipment is not installed;

(iv) Required leak detection equipment is not installed;

(v) Required corrosion protection equipment is not installed;

(vi) Required secondary containment is not installed; or

(vii) A leak of regulated substances which presents an eminent threat of release or for which the owner/operator has not initiated repairs or an appropriate response in a timely manner.

(2) The MDEQ may classify an underground storage tank or underground storage tank facility as ineligible for delivery, deposit, or acceptance of a regulated substance if the owner/operator of the tank system has been issued a written warning for any of the following violations and the owner/operator fails to complete corrective action within 120 days of the issuance of the written warning, unless the deadline is extended:

(i) Required spill prevention equipment is not properly operated or maintained;

(ii) Required overfill prevention equipment is not properly operated or maintained;

(iii) Required leak detection equipment is not properly operated or maintained;

(iv) Required corrosion protection equipment is not properly operated or maintained;

(v) Required secondary containment is not properly operated or maintained; or

(vi) Other conditions the MDEQ deems appropriate.

(3) The MDEQ may defer the application of delivery prohibition if it is determined that delivery prohibition is not in the public interest.

(b) Notification of ineligibility.

(1) The MDEQ will provide owners/operators with a written notice of the determination of ineligibility prior to the prohibition of delivery, deposit, or acceptance of regulated substances into the tank becoming effective. The written notice may be:

(i) Personally delivered to the owner/operator or the authorized representative of the owner/operator at the conclusion of the inspection or as soon as practicable thereafter; or

(ii) Sent via certified US mail to the last known address of the owner/operator.

(2) The MDEQ may provide further notification to owners/operators of the determination of ineligibility by one or more of the following:

(i) Telephone;
(ii) Electronic mail;
(iii) Facsimile;

(iv) Posting a listing of ineligible tanks on the MDEQ website; or
(v) Presence of a delivery prohibition tag on the fill riser of an ineligible tank.

(3) The MDEQ will notify suppliers of tanks determined to be ineligible for delivery by posting a list of ineligible tanks on the MDEQ website. Suppliers may also be notified of ineligible tanks by one or more of the following:

(i) Telephone;
(ii) Electronic mail;
(iii) Facsimile;
(iv) US mail; or
(v) Presence of a delivery prohibition tag on the fill riser of an ineligible tank.

(4) Owners/Operators shall document that they have notified the appropriate product suppliers when the MDEQ has made a determination of product delivery ineligibility for any tank that they own/operate.

(c) Identification of ineligible underground storage tanks. Once a determination of ineligibility has been made, the MDEQ will identify those underground storage tanks by placing them on a list of ineligible tanks on the MDEQ website. The ineligible tanks may also be identified by one or more of the following:

(1) Delivery prohibition tags may be placed on the fill riser or other appropriate alternative location of any ineligible tank. It shall be unlawful for anyone to remove, alter, destroy, deface or otherwise tamper with a delivery prohibition tag without valid authorization from the MDEQ; or

(2) Withdrawal of the Certificate of Registration.

(d) Reclassification of underground storage tanks that have reestablished compliance. The MDEQ shall reclassify any ineligible tank as eligible to receive deliveries as soon as practicable upon receipt of documentation that the conditions that caused the ineligibility have been satisfactorily corrected, the MDEQ will subsequently:

(1) If present, remove the delivery prohibition tag from the tank or alternatively provide the owner/operator with the authority to remove the red tag;

(2) Remove the name of the facility from the list of ineligible tanks on the MDEQ website; and

(3) Provide a letter to the owner/operator stating the tank is eligible to receive product.

(e) Self certification of UST system return to delivery eligibility. For any tank that has been determined to be ineligible for product delivery, the MDEQ will provide to the owner/operator a "Self Certification of UST System Return to Delivery Eligibility" form (appendix 280.2) that may be utilized by the owner/operator to certify that the conditions that caused the tank to be

declared ineligible have been corrected. Upon proper execution of the form the owner/operator may remove any delivery prohibition tag that may be present and deliveries may resume. However, the final determination of eligibility must be made by the MDEQ through the process described in §280.36 (d).

**§ 280.37 UST compliance manager and UST operations clerk training.**

To ensure UST systems are managed, operated and maintained in a compliant manner protective of human health and the environment, trained UST compliance managers and UST operations clerks must be identified for every UST facility that is operating.

*(a) General Requirements.*

(1) Owners must identify at least one person as the UST compliance manager for each of their UST facilities.

(2) Owners must identify at least one person as the UST operations clerk for each of their manned, operating UST facilities.

(3) Separate individuals may be identified as a UST compliance manager and a UST operations clerk or the same individual may be identified as both.

(4) For manned facilities, at least one UST operations clerk must be present onsite whenever the UST system is operating. Emergency contact information and appropriate emergency response procedures shall be available at the facility.

(5) For unmanned facilities, emergency contact information and appropriate emergency response procedures shall be prominently posted at the facility.

*(b) UST compliance manager training requirements.* The training required for UST compliance managers must provide the instruction necessary to operate and maintain a UST system in compliance with all applicable MDEQ requirements including, but not limited to:

(1) Notification;

(2) Emergency response and release reporting;

(3) Record keeping;

(4) Temporary and permanent closure;

(5) Release detection;

(6) Spill and overfill prevention;

(7) Corrosion protection;

(8) UST system construction and product compatibility;

(9) Financial responsibility; and

(10) UST operations clerk training.

*(c) UST operations clerk training requirements.* The training required for UST operations clerks must provide the instruction necessary to:

(1) Properly respond to emergencies involving the operation of the UST system that pose an immediate danger or threat to the public or to the environment; and

(2) Properly respond to alarms caused by spills, leaks or releases from an UST system.

*(d) Acceptable methods of UST compliance manager training*. The training requirements for UST compliance managers may be satisfied by any one of the following:

(1) A MDEQ approved program consisting of classroom, on-line, or hands-on training. An evaluation must be conducted after the training to measure and verify that the person has the skills necessary to maintain compliance with the applicable UST rules and regulations. Examples of evaluation include written testing, practical demonstration, or other tools acceptable to MDEQ; or

(2) A MDEQ approved examination designed to measure and verify that the person tested has the skills necessary to maintain compliance with the applicable UST rules and regulations; or

(3) Training that is determined by MDEQ to be no less protective of human health and the environment as the methods described in paragraphs (1) and (2) of this section.

*(e) Acceptable methods of UST operations clerk training.* The training requirements for UST operations clerks may be satisfied by any one of the following:

(1) Training conducted by the UST compliance manager that includes, at a minimum, the requirements in §280.37(c).

(2) Training that is determined by MDEQ to be no less protective of human health and the environment as the method described in paragraph (1) of this section.

*(f) Schedule for training*.

(1) Owners shall ensure that UST compliance managers and UST operations clerks for each of their UST facilities is trained no later than August 8, 2012.

(2) After August 8, 2012, any new UST compliance manager must be trained in accordance with §280.37(d) within 30 days of assuming UST system compliance responsibilities.

(3) After August 8, 2012, any new UST operations clerk must be trained in accordance with §280.37(e) before assuming UST clerk responsibilities.

(4) Retraining. If a UST facility is determined by MDEQ to be out of significant operational compliance, the UST compliance manager must be retrained in accordance with §280.37(d) or a new compliance manager designated for that facility.

## Subpart D—Leak Detection

### § 280.40 General requirements for all UST systems.

(a) Owners and operators of new and existing UST systems must provide a method, or combination of methods, of leak detection that:

(1) Can detect a leak from any portion of the tank and the connected underground piping that routinely contains product;

(2) Is installed, calibrated, operated, and maintained in accordance with the manufacturer's instructions and any applicable code of practice listed in §280.13, including routine maintenance and service checks for operability or running condition; and

(3) Meets the performance requirements in §280.43 or §280.44, with any performance claims and their manner of determination described in writing by the equipment manufacturer or installer. In addition, methods used after the date shown in the following table corresponding with the specified method except for methods permanently installed prior to that date, must be capable of detecting the leak rate or quantity specified for that method in the corresponding section of the rule (also shown in the table) with a probability of detection (Pd) of 0.95 and a probability of false alarm (Pfa) of 0.05.

| **Method** | **Section** | **Date after which Pd/Pfa must be demonstrated** |
|---|---|---|
| Manual Tank Gauging | 280.43(b) | December 22, 1990. |
| Tank Tightness Testing | 280.43(c) | December 22, 1990. |
| Automatic Tank Gauging | 280.43(d) | December 22, 1990. |
| Automatic Line Leak Detectors | 280.44(a) | September 22, 1991. |
| Line Tightness Testing | 280.44(b) | December 22, 1990. |

(b) When a leak detection method operated in accordance with the performance standards in §280.43 and §280.44 indicates a leak may have occurred, owners and operators must notify the MDEQ in accordance with subpart E.

(c) Owners and operators of all UST systems must comply with the leak detection requirements of this subpart by December 22 of the year listed in the following table:

**Schedule for Phase-in of Release Detection**

| **Year system was installed** | **Year when release detection is required (by December 22 of the year indicated)** | | | | |
|---|---|---|---|---|---|
| | **1989** | **1990** | **1991** | **1992** | **1993** |
| Before 1965 or date unknown | RD | P | | | |
| 1965–69 | | P/RD | | | |
| 1970–74 | | P | RD | | |
| 1975–79 | | P | | RD | |
| 1980–88 | | P | | | RD |
| New tanks (after December 22) immediately upon installation. | | | | | |

P=Must begin leak detection for all pressurized piping as defined in §280.41(b)(1)(i).

RD=Must begin leak detection for tanks and suction piping in accordance with §280.41(a), §280.41(b)(2)(i), and §280.42.

(d) Any existing UST system that can not apply a method of leak detection that complies with the requirements of this subpart must complete the closure procedures in subpart G by the date on which leak detection is required for that UST system under paragraph (c) of this section.

**§ 280.41 Requirements for petroleum UST systems.**

Owners and operators of petroleum UST systems must provide leak detection for tanks and piping as follows:

(a) *Tanks.* Tanks installed before October 1, 2008, must be monitored at least every 30 days for leaks using one of the methods listed in §280.43 (d) through (h) except that:

> (1) UST systems that meet the performance standards in §280.20 or §280.21, and the monthly inventory control requirements in §280.43 (a) or (b), may use tank tightness testing (conducted in accordance with §280.43(c)) at least every 5 years until December

22, 1998, or until 10 years after the tank is installed or upgraded under §280.21(b), whichever is later;

(2) UST systems that do not meet the performance standards in §280.20 or §280.21 may use monthly inventory controls (conducted in accordance with §280.43(a) or (b)) and annual tank tightness testing (conducted in accordance with §280.43(c)) until December 22, 1998 when the tank must be upgraded under §280.21 or permanently closed under §280.71; and

(3) Tanks with capacity of 550 gallons or less may use weekly tank gauging (conducted in accordance with §280.43(b)).

(4) Tanks installed on or after October 1, 2008, must be monitored at least every 30 days for leaks in accordance with §280.43(g).

(b) *Piping.* Underground piping that routinely contains regulated substances must be monitored for leaks in a manner that meets one of the following requirements:

(1) *Pressurized piping.* Underground piping that conveys regulated substances under pressure must be equipped with an automatic line leak detector conducted in accordance with §280.44(a); and

(i) Pressurized piping installed before October 1, 2008, must have an annual line tightness test conducted in accordance with §280.44(b) or have monthly monitoring conducted in accordance with §280.44(c) or §280.44(d).

(ii) Pressurized piping installed on or after October 1, 2008, must be monitored at least once every 30 days for leaks in accordance with §280.44(c).

(2) *Suction piping.* Underground piping that conveys regulated substances under suction must:

(i) Have a line tightness test conducted at least every 3 years and in accordance with §280.44(b), or use a monthly monitoring method conducted in accordance with §280.44(c) or §280.44(d) if it was installed before October 1, 2008.

(ii) Must be monitored at least every 30 days for leaks in accordance with §280.44(c) if it was installed on or after October 1, 2008.

(iii) No release detection is required for suction piping that is designed and constructed to meet the following standards:

(A) The below-grade piping operates at less than atmospheric pressure;

(B) The below-grade piping is sloped so that the contents of the pipe will drain back into the storage tank if the suction is released;

(C) Only one check valve is included in each suction line;

(D) The check valve is located directly below and as close as practical to the suction pump; and

(E) A method is provided that allows compliance with paragraphs (b)(2)(iii) (B)–(D) of this section to be readily determined.

**§ 280.42 Requirements for hazardous substance UST systems.**

Owners and operators of hazardous substance UST systems must provide leak detection that meets the following requirements:

(a) Leak detection at existing UST systems must meet the requirements for petroleum UST systems in §280.41. By December 22, 1998, all existing hazardous substance UST systems must meet the leak detection requirements for new systems in paragraph (b) of this section.

(b) Leak detection at new hazardous substance UST systems must meet the following requirements:

(1) Secondary containment systems must be designed, constructed and installed to:

(i) Contain regulated substances leaked from the tank system until they are detected and removed;

(ii) Prevent the release of regulated substances to the environment at any time during the operational life of the UST system; and

(iii) Be checked for evidence of a leak at least every 30 days.

Note: The provisions of 40 CFR 265.193, Containment and Detection of Releases, may be used to comply with these requirements.

(2) Double-walled tanks must be designed, constructed, and installed to:

(i) Contain a leak from any portion of the inner tank within the outer wall; and

(ii) Detect the failure of the inner wall.

(3) External liners (including vaults) must be designed, constructed, and installed to:

(i) Contain 100 percent of the capacity of the largest tank within its boundary;

(ii) Prevent the interference of precipitation or ground-water intrusion with the ability to contain or detect a leak of regulated substances; and

(iii) Surround the tank completely (i.e., it is capable of preventing lateral as well as vertical migration of regulated substances).

(4) Underground piping must be equipped with secondary containment that satisfies the requirements of paragraph (b)(1) of this section. In addition, underground piping that conveys regulated substances under pressure must be equipped with an automatic line leak detector in accordance with §280.44(a).

(5) Other methods of leak detection may be used if owners and operators:

(i) Demonstrate to the MDEQ that an alternate method can detect a release of the stored substance as effectively as any of the methods allowed in §280.43(b) through (h) can detect a release of petroleum;

(ii) Provide information to the MDEQ on effective corrective action technologies, health risks, and chemical and physical properties of the stored substance, and the characteristics of the UST site; and,

(iii) Obtain approval from the MDEQ to use the alternate release detection method before the installation and operation of the new UST system.

**§ 280.43 Methods of leak detection for tanks.**

Each method of leak detection for tanks used to meet the requirements of §280.41 must be conducted in accordance with the following:

(a) *Inventory control.* Product inventory control (or another test of equivalent performance) must be conducted monthly to detect a leak of at least 1.0 percent of flow-through plus 130 gallons on a monthly basis in the following manner:

(1) Inventory volume measurements for regulated substance inputs, withdrawals, and the amount still remaining in the tank are recorded each operating day;

(2) The equipment used is capable of measuring the level of product over the full range of the tank's height to the nearest one-eighth of an inch;

(3) The regulated substance inputs are reconciled with delivery receipts by measurement of the tank inventory volume before and after delivery;

(4) Deliveries are made through a drop tube that extends to within one foot of the tank bottom;

(5) Product dispensing is metered and recorded within the local standards for meter calibration or an accuracy of 6 cubic inches for every 5 gallons of product withdrawn; and

(6) The measurement of any water level in the bottom of the tank is made to the nearest one-eighth of an inch at least once a month.

(b) *Manual tank gauging.* Manual tank gauging must meet the following requirements:

(1) Tank liquid level measurements are taken at the beginning and ending of a period of at least 36 hours during which no liquid is added to or removed from the tank;

(2) Level measurements are based on an average of two consecutive stick readings at both the beginning and ending of the period;

(3) The equipment used is capable of measuring the level of product over the full range of the tank's height to the nearest one-eighth of an inch;

(4) A leak is suspected and subject to the requirements of subpart E if the variation between beginning and ending measurements exceeds the weekly or monthly standards in the following table:

| **Nominal tank capacity** | **Weekly standard (one test)** | **Monthly standard (average of four tests)** |
|---|---|---|
| 550 gallons or less | 10 gallons | 5 gallons. |
| 551–1,000 gallons | 13 gallons | 7 gallons. |
| 1,001–2,000 gallons | 26 gallons | 13 gallons. |

(5) Only tanks of 550 gallons or less nominal capacity may use this as the sole method of leak detection. Tanks of 551 to 2,000 gallons may use the method in place of manual inventory control in §280.43(a). Tanks of greater than 2,000 gallons nominal capacity may not use this method to meet the requirements of this subpart.

(c) *Tank tightness testing.* Tank tightness testing (or another test of equivalent performance) must be capable of detecting a 0.1 gallon per hour leak rate from any portion of the tank that routinely contains product while accounting for the effects of thermal expansion or contraction of the product, vapor pockets, tank deformation, evaporation or condensation, and the location of the water table.

(d) *Automatic tank gauging.* Equipment for automatic tank gauging that tests for the loss of product must meet the following requirements:

(1) The automatic product level monitor test can detect a 0.2 gallon per hour leak rate from any portion of the tank that routinely contains product; and

(2) The equipment is inspected for proper operation at least once every 12 months. The inspection must be conducted in accordance with the manufacturer's periodic maintenance specifications and any applicable code of practice listed in §280.13.

(e) *Vapor monitoring.* Testing or monitoring for vapors within the soil gas of the excavation zone must meet the following requirements:

(1) The materials used as backfill are sufficiently porous (e.g., gravel, sand, crushed rock) to readily allow diffusion of vapors from releases into the excavation area;

(2) The stored regulated substance, or a tracer compound placed in the tank system, is sufficiently volatile (e.g., gasoline) to result in a vapor level that is detectable by the monitoring devices located in the excavation zone in the event of a release from the tank;

(3) The measurement of vapors by the monitoring device is not rendered inoperative by the ground water, rainfall, or soil moisture or other known interferences so that a release could go undetected for more than 30 days;

(4) The level of background contamination in the excavation zone will not interfere with the method used to detect releases from the tank;

(5) The vapor monitors are designed and operated to detect any significant increase in concentration above background of the regulated substance stored in the tank system, a component or components of that substance, or a tracer compound placed in the tank system;

(6) In the UST excavation zone, the site is assessed to ensure compliance with the requirements in paragraphs (e) (1) through (4) of this section and to establish the number and positioning of monitoring wells that will detect releases within the excavation zone from any portion of the tank that routinely contains product; and

(7) Monitoring wells are clearly marked and secured to avoid unauthorized access and tampering.

(f) *Ground-water monitoring.* Testing or monitoring for liquids on the ground water must meet the following requirements:

(1) The regulated substance stored is immiscible in water and has a specific gravity of less than one;

(2) Ground water is never more than 20 feet from the ground surface and the hydraulic conductivity of the soil(s) between the UST system and the monitoring wells or devices is

not less than 0.01 cm/sec (e.g., the soil should consist of gravels, coarse to medium sands, coarse silts or other permeable materials);

(3) The slotted portion of the monitoring well casing must be designed to prevent migration of natural soils or filter pack into the well and to allow entry of regulated substance on the water table into the well under both high and low ground-water conditions;

(4) Monitoring wells shall be sealed from the ground surface to the top of the filter pack;

(5) Monitoring wells or devices intercept the excavation zone or are as close to it as is technically feasible;

(6) The continuous monitoring devices or manual methods used can detect the presence of at least one-eighth of an inch of free product on top of the ground water in the monitoring wells;

(7) Within and immediately below the UST system excavation zone, the site is assessed to ensure compliance with the requirements in paragraphs (f) (1) through (5) of this section and to establish the number and positioning of monitoring wells or devices that will detect releases from any portion of the tank that routinely contains product; and

(8) Monitoring wells are clearly marked and secured to avoid unauthorized access and tampering.

(g) *Interstitial monitoring.* Monitoring of the space between the inner (primary) and the outer (secondary) tank walls may be used, but only if the system is designed, constructed and installed to meet the following requirements:

(1) The sampling or testing method can detect a release from any portion of the tank that routinely contains product;

(2) The sampling or testing method can detect ingress of external fluids (groundwater or other fluids not intended as monitoring fluids) into the interstice;

(3) Records must be maintained that show the interstice has been checked at least every 30 days for evidence of a leak or ingress of external fluids;

(i) If the interstice is monitored continuously, records must document that the electronic device monitoring the interstice is in communication with the control console at least monthly;

(ii) If the interstice is monitored continuously, records must document the alarm history and provide the appropriate reporting (if applicable) and reconciliation of each alarm;

(iii) Any electronic device that monitors the interstice must be tested at least once every 12 months for proper function. The functionality test must simulate a leak and be in accordance with the manufacturer's specifications and any applicable industry code or recommended practice listed in §280.13; and

(4) Any regulated substance that enters the interstice must be removed within 24 hours of discovery or another time frame determined by the MDEQ to be reasonable.

(h) *Other methods.* Any other type of leak detection method, or combination of methods, can be used if:

(1) It can detect a 0.2 gallon per hour leak rate or a release of 150 gallons within a month with a probability of detection of 0.95 and a probability of false alarm of 0.05; or

(2) The MDEQ may approve another method if the owner and operator can demonstrate that the method can detect a release as effectively as any of the methods allowed in paragraphs (c) through (h) of this section. In comparing methods, the MDEQ shall consider the size of leak that the method can detect and the frequency and reliability with which it can be detected. If the method is approved, the owner and operator must comply with any conditions imposed by the MDEQ on its use to ensure the protection of human health and the environment.

**§ 280.44 Methods of leak detection for piping.**

Each method of leak detection for piping used to meet the requirements of §280.41 must be conducted in accordance with the following:

(a) *Automatic line leak detectors.* Methods which alert the operator to the presence of a leak by restricting or shutting off the flow of regulated substances through piping or triggering an audible or visual alarm may be used only if they detect leaks of 3 gallons per hour at 10 pounds per square inch line pressure within 1 hour. Testing must be performed in accordance with the following requirements:

(1) Frequency.

(i) Automatic line leak detectors installed on or after October 1, 2008, must be tested in accordance with the requirements of this section at startup to verify proper operation and at least once every 12 months thereafter.

(ii) Automatic line leak detectors installed before October 1, 2008, must be tested in accordance with the requirements of this section by no later than October 1, 2009, and at least once every 12 months thereafter.

(2) Criteria. All testing of automatic line leak detectors must be conducted in accordance with the manufacturer's specifications and any applicable code of practice listed in §280.13 and

(i) Involve the simulation of a leak in the piping at the dispenser that is at the highest elevation above the submersible pump. If there is no change in elevation, the test must be conducted at the dispenser that is the furthest away from the submersible pump;

(ii) Be conducted with the leak detector installed in the system as it normally would be during operation;

(iii) Verify that the leak detector is capable of detecting a leak equivalent to 3 gallons per hour at 10 pounds per square inch line pressure within 1 hour; and

(iv) Be conducted finitely and the test results reported quantitatively.

(3) Records. A written record documenting the testing of automatic line leak detectors must be maintained (in accordance with §280.35) to demonstrate compliance with this section. These records must provide the results of the last two (2) tests required in this section.

(b) *Line tightness testing.* A periodic test of piping may be conducted only if it can detect a 0.1 gallon per hour leak rate at one and one-half times the operating pressure.

(c) Interstitial monitoring. Monitoring of the space between the inner (primary) and the outer (secondary) pipe walls may be used, but only if the system is designed, constructed and installed to meet the following requirements:

(1) The sampling or testing method can detect a leak from any portion of the pipe that routinely contains product;

(2) The sampling or testing method can detect ingress of water or other external fluids into the interstice;

(3) Records must be maintained that show the interstice has been checked at least every 30 days for evidence of a leak or ingress of external fluids;

(i) If the interstice is monitored continuously, records must document that the electronic device monitoring the interstice is in communication with the control console at least monthly;

(ii) If the interstice is monitored continuously, records must document the alarm history and provide the appropriate reporting (if applicable) and reconciliation of each alarm;

(iii) Any electronic device that monitors the interstice must be tested at least once every 12 months for proper function. The functionality test must be in accordance with the manufacturer's specifications and any applicable industry code or

recommended practice listed in §280.13. The functionality test must simulate a leak; and

(4) Any regulated substance that enters the interstice must be removed within 24 hours of discovery or another time frame determined by the MDEQ to be reasonable.

(d) *Applicable tank methods.* Any of the methods in §280.43 (e), (f) or (h) may be used if they are designed to detect a leak from any portion of the underground piping that routinely contains regulated substances.

**§ 280.45 Leak detection recordkeeping.**

All UST system owners and operators must maintain records in accordance with §280.35 demonstrating compliance with all applicable requirements of this subpart. These records must include the following:

(a) All written performance claims pertaining to any leak detection system used, and the manner in which these claims have been justified or tested by the equipment manufacturer or installer, must be maintained for 5 years, or for another reasonable period of time determined by the MDEQ, from the date of installation;

(b) The results of any sampling, testing, or monitoring must be maintained for at least 1 year, or for another reasonable period of time determined by the MDEQ, except that the results of tank tightness testing conducted in accordance with §280.43(c) must be retained until the next test is conducted; and

(c) Written documentation of all calibration, maintenance, and repair of leak detection equipment permanently located on-site must be maintained for at least one year after the servicing work is completed, or for another reasonable time period determined by the MDEQ. Any schedules of required calibration and maintenance provided by the leak detection equipment manufacturer must be retained for 5 years from the date of installation.

**Subpart E—Leak Reporting, Release Reporting, Investigation, and Confirmation**

**§ 280.50 Reporting of leaks and suspected releases.**

Owners and operators of UST systems must report to the MDEQ within 24 hours, or another reasonable time period specified by the MDEQ, and follow the procedures in §280.52 for any of the following conditions:

(a) The discovery by owners and operators or others of released regulated substances at the UST site or in the surrounding area (such as the presence of free product or vapors in soils, basements, sewer and utility lines, and nearby surface water);

(b) The discovery by owners and operators or others of regulated substances within the interstitial space of a double-walled tank or pipe. In the case of containment sumps, reporting is required only if the amount of regulated substances is equal to or greater than one eighth inch or if there is evidence of a leak and it appears the containment sump is not liquid tight;

(c) Unusual operating conditions observed by owners and operators (such as the erratic behavior of product dispensing equipment, the sudden loss of product from the UST system, or an unexplained presence of water in the tank), unless system equipment is found to be defective but not leaking, and is immediately repaired or replaced; and

(d) Monitoring results from a leak detection method required under §280.41 and §280.42 that indicate a leak may have occurred unless:

> (1) The monitoring device is found to be defective, and is immediately repaired, recalibrated or replaced, and additional monitoring does not confirm the initial result; or
>
> (2) In the case of inventory control, a second month of data does not confirm the initial result.

**§ 280.51 Investigation due to off-site impacts.**

When required by the MDEQ, owners and operators of UST systems must follow the procedures in §280.52 to determine if the UST system is the source of off-site impacts. These impacts include the discovery of regulated substances (such as the presence of free product or vapors in soils, basements, sewer and utility lines, and nearby surface and drinking waters) that has been observed by the MDEQ or brought to its attention by another party.

**§ 280.52 Release investigation and confirmation steps.**

Unless corrective action is initiated in accordance with subpart F, owners and operators must immediately investigate and confirm all suspected releases of regulated substances requiring reporting under §280.50 within 7 days, or another reasonable time period specified by the MDEQ, using either the following steps or another procedure approved by the MDEQ:

(a) *System test.* Owners and operators must conduct tests (according to the requirements for tightness testing in §280.43(c) and §280.44(b)) that determine whether a leak exists in that portion of the tank that routinely contains product, or the attached delivery piping, or both.

> (1) Owners and operators must repair, replace or upgrade the UST system, and begin corrective action in accordance with subpart F if the test results for the system, tank, or delivery piping indicate that a leak exists.
>
> (2) Further investigation is not required if the test results for the system, tank, and delivery piping do not indicate that a leak exists and if environmental contamination is not the basis for suspecting a release.

(3) Owners and operators must conduct a site check as described in paragraph (b) of this section if the test results for the system, tank, and delivery piping do not indicate that a leak exists but environmental contamination is the basis for suspecting a release.

(b) *Site check.* Owners and operators must measure for the presence of a release where contamination is most likely to be present at the UST site. In selecting sample types, sample locations, and measurement methods, owners and operators must consider the nature of the stored substance, the type of initial alarm or cause for suspicion, the type of backfill, the depth of ground water, and other factors appropriate for identifying the presence and source of the release.

(1) If the test results for the excavation zone or the UST site indicate that a release has occurred, owners and operators must begin corrective action in accordance with subpart F;

(2) If the test results for the excavation zone or the UST site do not indicate that a release has occurred, further investigation is not required.

**§ 280.53 Reporting and cleanup of spills and overfills.**

(a) Owners and operators of UST systems must contain and immediately clean up a spill or overfill and report to the MDEQ within 24 hours, or another reasonable time period specified by the MDEQ, and begin corrective action in accordance with subpart F in the following cases:

(1) Spill or overfill of petroleum that results in a release to the environment that exceeds 25 gallons or another reasonable amount specified by the MDEQ, or that causes a sheen on nearby surface water; and

(2) Spill or overfill of a hazardous substance that results in a release to the environment that equals or exceeds its reportable quantity under CERCLA (40 CFR part 302).

(b) Owners and operators of UST systems must contain and immediately clean up a spill or overfill of petroleum that is less than 25 gallons or another reasonable amount specified by the MDEQ, and a spill or overfill of a hazardous substance that is less than the reportable quantity. If cleanup can not be accomplished within 24 hours, or another reasonable time period established by the MDEQ, owners and operators must immediately notify the MDEQ.

Note: Pursuant to §§302.6 and 355.40, a release of a hazardous substance equal to or in excess of its reportable quantity must also be reported immediately (rather than within 24 hours) to the National Response Center under sections 102 and 103 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and to appropriate state and local authorities under Title III of the Superfund Amendments and Reauthorization Act of 1986.

**Subpart F—Release Response and Corrective Action for UST Systems Containing Petroleum or Hazardous Substances**

**§ 280.60 General.**

Owners and operators of petroleum or hazardous substance UST systems must, in response to a confirmed release from the UST system, comply with the requirements of this subpart except for USTs excluded under §280.10(b) and UST systems subject to RCRA Subtitle C corrective action requirements under section 3004(u) of the Resource Conservation and Recovery Act, as amended.

**§ 280.61 Initial response.**

Upon confirmation of a release in accordance with §280.52 or after a release from the UST system is identified in any other manner, owners and operators must perform the following initial response actions within 24 hours of a release or within another reasonable period of time determined by the MDEQ:

(a) Report the release to the MDEQ (e.g., by telephone or electronic mail);

(b) Take immediate action to prevent any further release of the regulated substance into the environment; and

(c) Identify and mitigate fire, explosion, and vapor hazards.

**§ 280.62 Initial abatement measures and site check.**

(a) Unless directed to do otherwise by the MDEQ, owners and operators must perform the following abatement measures:

(1) Remove as much of the regulated substance from the UST system as is necessary to prevent further release to the environment;

(2) Visually inspect any aboveground releases or exposed belowground releases and prevent further migration of the released substance into surrounding soils and ground water;

(3) Continue to monitor and mitigate any additional fire and safety hazards posed by vapors or free product that have migrated from the UST excavation zone and entered into subsurface structures (such as sewers or basements);

(4) Remedy hazards posed by contaminated soils that are excavated or exposed as a result of release confirmation, site investigation, abatement, or corrective action activities. If these remedies include treatment or disposal of soils, the owner and operator must comply with applicable State and local requirements;

(5) Measure for the presence of a release where contamination is most likely to be present at the UST site, unless the presence and source of the release have been confirmed in

accordance with the site check required by §280.52(b) or the closure site assessment of §280.72(a). In selecting sample types, sample locations, and measurement methods, the owner and operator must consider the nature of the stored substance, the type of backfill, depth to ground water and other factors as appropriate for identifying the presence and source of the release; and

(6) Investigate to determine the possible presence of free product, and begin free product removal as soon as practicable and in accordance with §280.64.

(b) Within 20 days after release confirmation, or within another reasonable period of time determined by the MDEQ, owners and operators must submit a report to the MDEQ summarizing the initial abatement steps taken under paragraph (a) of this section and any resulting information or data.

**§ 280.63 Initial site characterization.**

(a) Unless directed to do otherwise by the MDEQ, owners and operators must assemble information about the site and the nature of the release, including information gained while confirming the release or completing the initial abatement measures in §§280.60 and 280.61. This information must include, but is not necessarily limited to the following:

(1) Data on the nature and estimated quantity of release;

(2) Data from available sources and/or site investigations concerning the following factors: surrounding populations, water quality, use and approximate locations of wells potentially affected by the release, subsurface soil conditions, locations of subsurface sewers, climatological conditions, and land use;

(3) Results of the site check required under §280.62(a)(5); and

(4) Results of the free product investigations required under §280.62(a)(6), to be used by owners and operators to determine whether free product must be recovered under §280.64.

(b) Within 45 days of release confirmation or another reasonable period of time determined by the MDEQ, owners and operators must submit the information collected in compliance with paragraph (a) of this section to the MDEQ in a manner that demonstrates its applicability and technical adequacy, or in a format and according to the schedule required by the MDEQ.

**§ 280.64 Free product removal.**

At sites where investigations under §280.62(a)(6) indicate the presence of free product, owners and operators must remove free product to the maximum extent practicable as determined by the MDEQ while continuing, as necessary, any actions initiated under §§280.61 through 280.63, or

preparing for actions required under §§280.65 through 280.66. In meeting the requirements of this section, owners and operators must:

(a) Conduct free product removal in a manner that minimizes the spread of contamination into previously uncontaminated zones by using recovery and disposal techniques appropriate to the hydrogeologic conditions at the site, and that properly treats, discharges or disposes of recovery byproducts in compliance with applicable local, State and Federal regulations;

(b) Use abatement of free product migration as a minimum objective for the design of the free product removal system;

(c) Handle any flammable products in a safe and competent manner to prevent fires or explosions; and

(d) Unless directed to do otherwise by the MDEQ, prepare and submit to the MDEQ, within 45 days after confirming a release, a free product removal report that provides at least the following information:

(1) The name of the person(s) responsible for implementing the free product removal measures;

(2) The estimated quantity, type, and thickness of free product observed or measured in wells, boreholes, and excavations;

(3) The type of free product recovery system used;

(4) Whether any discharge will take place on-site or off-site during the recovery operation and where this discharge will be located;

(5) The type of treatment applied to, and the effluent quality expected from, any discharge;

(6) The steps that have been or are being taken to obtain necessary permits for any discharge; and

(7) The disposition of the recovered free product.

**§ 280.65 Investigations for soil and ground-water cleanup.**

(a) In order to determine the full extent and location of soils contaminated by the release and the presence and concentrations of dissolved product contamination in the ground water, owners and operators must conduct investigations of the release, the release site, and the surrounding area possibly affected by the release if any of the following conditions exist:

(1) There is evidence that ground-water wells have been affected by the release (e.g., as found during release confirmation or previous corrective action measures);

(2) Free product is found to need recovery in compliance with §280.64;

(3) There is evidence that contaminated soils may be in contact with ground water (e.g., as found during conduct of the initial response measures or investigations required under §§280.60 through 280.64); and

(4) The MDEQ requests an investigation, based on the potential effects of contaminated soil or ground water on nearby surface water and ground-water resources.

(b) Owners and operators must submit the information collected under paragraph (a) of this section as soon as practicable or in accordance with a schedule established by the MDEQ.

**§ 280.66 Corrective action plan.**

(a) At any point after reviewing the information submitted in compliance with §§280.61 through 280.63, the MDEQ may require owners and operators to submit additional information or to develop and submit a corrective action plan for responding to contaminated soils and ground water. If a plan is required, owners and operators must submit the plan according to a schedule and format established by the MDEQ. Alternatively, owners and operators may, after fulfilling the requirements of §§280.61 through 280.63, choose to submit a corrective action plan for responding to contaminated soil and ground water. In either case, owners and operators are responsible for submitting a plan that provides for adequate protection of human health and the environment as determined by the MDEQ, and must modify their plan as necessary to meet this standard.

(b) The MDEQ will approve the corrective action plan only after ensuring that implementation of the plan will adequately protect human health, safety, and the environment. In making this determination, the MDEQ should consider the following factors as appropriate:

(1) The physical and chemical characteristics of the regulated substance, including its toxicity, persistence, and potential for migration;

(2) The hydrogeologic characteristics of the facility and the surrounding area;

(3) The proximity, quality, and current and future uses of nearby surface water and ground water;

(4) The potential effects of residual contamination on nearby surface water and ground water;

(5) An exposure assessment; and

(6) Any information assembled in compliance with this subpart.

(c) Upon approval of the corrective action plan or as directed by the MDEQ, owners and operators must implement the plan, including modifications to the plan made by the MDEQ. They must monitor, evaluate, and report the results of implementing the plan in accordance with a schedule and in a format established by the MDEQ.

(d) Owners and operators may, in the interest of minimizing environmental contamination and promoting more effective cleanup, begin cleanup of soil and ground water before the corrective action plan is approved provided that they:

(1) Notify the MDEQ of their intention to begin cleanup;

(2) Comply with any conditions imposed by the MDEQ, including halting cleanup or mitigating adverse consequences from cleanup activities; and

(3) Incorporate these self-initiated cleanup measures in the corrective action plan that is submitted to the MDEQ for approval.

**§ 280.67 Public participation.**

(a) For each confirmed release that requires a corrective action plan, the MDEQ must provide notice to the public by means designed to reach those members of the public directly affected by the release and the planned corrective action. This notice may include, but is not limited to, public notice in local newspapers, block advertisements, public service announcements, publication in a state register, letters to individual households, or personal contacts by field staff.

(b) The MDEQ must ensure that site release information and decisions concerning the corrective action plan are made available to the public for inspection upon request.

(c) Before approving a corrective action plan, the MDEQ may hold a public meeting to consider comments on the proposed corrective action plan if there is sufficient public interest, or for any other reason.

(d) The MDEQ must give public notice that complies with paragraph (a) of this section if implementation of an approved corrective action plan does not achieve the established cleanup levels in the plan and termination of that plan is under consideration by the MDEQ.

**Subpart G—Out-of-Service UST Systems and Closure**

**§ 280.70 Temporary closure.**

(a) When an UST system is temporarily closed, owners and operators must notify the MDEQ and continue operation and maintenance of corrosion protection in accordance with §280.32, and any leak detection in accordance with subpart D. Subparts E and F must be complied with if a release

is suspected or confirmed. However, leak detection is not required as long as the UST system is empty. The UST system is empty when all materials have been removed using commonly employed practices so that no more than one (1) inch of residue remains in the system.

(b) When an UST system is temporarily closed for 3 months or more, owners and operators must also comply with the following requirements:

(1) Leave vent lines open and functioning;

(2) Cap and secure all other lines, pumps, manways, and ancillary equipment;

(3) Empty the tank in accordance with §280.70(a); and

(4) Continue operation and maintenance of corrosion protection in accordance with §280.32.

(c) When an UST system is temporarily closed for more than 12 months, owners and operators must permanently close the UST system if it does not meet either performance standards in §280.20 for new UST systems or the upgrading requirements in §280.21, *except that* the spill and overfill equipment requirements do not have to be met. Owners and operators must permanently close the substandard UST systems at the end of this 12-month period in accordance with §§280.71–280.74, *unless* the MDEQ provides an extension of the 12-month temporary closure period. Owners and operators must complete a site assessment in accordance with §280.72 before such an extension can be applied for.

**§ 280.71 Permanent closure and changes-in-service.**

(a) At least 30 days before beginning either permanent closure or a change-in-service under paragraphs (b) and (c) of this section, or within another reasonable time period determined by the MDEQ, owners and operators must notify the MDEQ of their intent to permanently close or make the change-in-service, *unless* such action is in response to corrective action. The required assessment of the excavation zone under §280.72 must be performed after notifying the MDEQ but before completion of the permanent closure or a change-in-service.

(b) To permanently close a tank system, owners and operators must empty and clean it by removing all liquids and accumulated sludges from the tank system. All tank systems taken out of service permanently must also be either removed from the ground or filled with an inert solid material.

(c) Continued use of an UST system to store a non-regulated substance is considered a change-in-service. Before a change-in-service, owners and operators must empty and clean the tank by removing all liquid and accumulated sludge and conduct a site assessment in accordance with §280.72.

**§ 280.72 Assessing the site at closure or change-in-service.**

(a) Before permanent closure or a change-in-service is completed, owners and operators must measure for the presence of a release in accordance with appendix 280.4 ("Guidelines for the Permanent Closure of Petroleum Underground Storage Tank Systems") and any applicable industry code or recommended practice listed in §280.13.

(b) If contaminated soils, contaminated ground water, or free product as a liquid or vapor is discovered under paragraph (a) of this section, or by any other manner, owners and operators must begin corrective action in accordance with subpart F.

**§ 280.73 Applicability to previously closed UST systems.**

When directed by the MDEQ, the owner and operator of an UST system permanently closed before December 22, 1988 must assess the excavation zone and close the UST system in accordance with this subpart if releases from the UST may, in the judgment of the MDEQ, pose a current or potential threat to human health and the environment.

**§ 280.74 Closure records.**

Owners and operators must maintain records in accordance with §280.35 that are capable of demonstrating compliance with closure requirements under this subpart. The results of the excavation zone assessment required in §280.72 must be maintained for at least 3 years after completion of permanent closure or change-in-service in one of the following ways:

(a) By the owners and operators who took the UST system out of service;

(b) By the current owners and operators of the UST system site; or

(c) By mailing these records to the MDEQ if they can not be maintained at the closed facility.

**Subpart H—Financial Responsibility**

**Source:** 53 FR 43370, Oct. 26, 1988, unless otherwise noted.

**§ 280.90 Applicability.**

(a) This subpart applies to owners and operators of all petroleum underground storage tank (UST) systems except as otherwise provided in this section.

(b) Owners and operators of petroleum UST systems are subject to these requirements if they are in operation on or after the date for compliance established in §280.91.

(c) State and Federal government entities whose debts and liabilities are the debts and liabilities of a state or the United States are exempt from the requirements of this subpart.

(d) The requirements of this subpart do not apply to owners and operators of any UST system described in §280.10 (b) or (c).

(e) If the owner and operator of a petroleum underground storage tank are separate persons, only one person is required to demonstrate financial responsibility; however, both parties are liable in event of noncompliance. Regardless of which party complies, the date set for compliance at a particular facility is determined by the characteristics of the owner as set forth in §280.91.

**§ 280.91 Compliance dates.**

Owners of petroleum underground storage tanks are required to comply with the requirements of this subpart by the following dates:

(a) All petroleum marketing firms owning 1,000 or more USTs and all other UST owners that report a tangible net worth of $20 million or more to the U.S. Securities and Exchange Commission (SEC), Dun and Bradstreet, the Energy Information Administration, or the Rural Electrification Administration; January 24, 1989, except that compliance with §280.94(b) is required by: July 24, 1989.

(b) All petroleum marketing firms owning 100–999 USTs; October 26, 1989.

(c) All petroleum marketing firms owning 13–99 USTs at more than one facility; April 26, 1991.

(d) All petroleum UST owners not described in paragraphs (a), (b), or (c) of this section, excluding local government entities; December 31, 1993.

(e) All local government entities (including Indian tribes) not included in paragraph (f) of this section; February 18, 1994.

(f) Indian tribes that own USTs on Indian lands which meet the applicable technical requirements of this part; December 31, 1998.

[53 FR 43370, Oct. 26, 1988, as amended at 54 FR 5452, Feb. 3, 1989; 55 FR 18567, May 2, 1990; 55 FR 46025, Oct. 31, 1990; 56 FR 66373, Dec. 23, 1991; 59 FR 9607, Feb. 28, 1994]

**§ 280.92 Definition of terms.**

When used in this subpart, the following terms shall have the meanings given below:

*Accidental release* means any sudden or nonsudden release of petroleum from an underground storage tank that results in a need for corrective action and/or compensation for bodily injury or property damage neither expected nor intended by the tank owner or operator.

*Bodily injury* shall have the meaning given to this term by applicable state law; however, this term shall not include those liabilities which, consistent with standard insurance industry practices, are excluded from coverage in liability insurance policies for bodily injury.

*Chief Financial Officer,* in the case of local government owners and operators, means the individual with the overall authority and responsibility for the collection, disbursement, and use of funds by the local government.

*Controlling interest* means direct ownership of at least 50 percent of the voting stock of another entity.

*Director of the Implementing Agency* means the EPA Regional Administrator, or, in the case of a state with a program approved under section 9004, the Director of the designated state or local agency responsible for carrying out an approved UST program.

*Financial reporting year* means the latest consecutive twelve-month period for which any of the following reports used to support a financial test is prepared:

(1) a 10–K report submitted to the SEC;

(2) an annual report of tangible net worth submitted to Dun and Bradstreet; or

(3) annual reports submitted to the Energy Information Administration or the Rural Electrification Administration.

"Financial reporting year" may thus comprise a fiscal or a calendar year period.

*Legal defense cost* is any expense that an owner or operator or provider of financial assurance incurs in defending against claims or actions brought,

(1) By EPA or a state to require corrective action or to recover the costs of corrective action;

(2) By or on behalf of a third party for bodily injury or property damage caused by an accidental release; or

(3) By any person to enforce the terms of a financial assurance mechanism.

*Local government* shall have the meaning given this term by applicable state law and includes Indian tribes. The term is generally intended to include: (1) Counties, municipalities, townships, separately chartered and operated special districts (including local government public transit systems and redevelopment authorities), and independent school districts authorized as governmental bodies by state charter or constitution; and (2) Special districts and independent school districts established by counties, municipalities, townships, and other general purpose governments to provide essential services.

*Occurrence* means an accident, including continuous or repeated exposure to conditions, which results in a release from an underground storage tank.

Note: This definition is intended to assist in the understanding of these regulations and is not intended either to limit the meaning of "occurrence" in a way that conflicts with standard insurance usage or to prevent the use of other standard insurance terms in place of "occurrence."

*Owner or operator,* when the owner or operator are separate parties, refers to the party that is obtaining or has obtained financial assurances.

*Petroleum marketing facilities* include all facilities at which petroleum is produced or refined and all facilities from which petroleum is sold or transferred to other petroleum marketers or to the public.

*Petroleum marketing firms* are all firms owning petroleum marketing facilities. Firms owning other types of facilities with USTs as well as petroleum marketing facilities are considered to be petroleum marketing firms.

*Property damage* shall have the meaning given this term by applicable state law. This term shall not include those liabilities which, consistent with standard insurance industry practices, are excluded from coverage in liability insurance policies for property damage. However, such exclusions for property damage shall not include corrective action associated with releases from tanks which are covered by the policy.

*Provider of financial assurance* means an entity that provides financial assurance to an owner or operator of an underground storage tank through one of the mechanisms listed in §§280.95–280.103, including a guarantor, insurer, risk retention group, surety, issuer of a letter of credit, issuer of a state-required mechanism, or a state.

*Substantial business relationship* means the extent of a business relationship necessary under applicable state law to make a guarantee contract issued incident to that relationship valid and enforceable. A guarantee contract is issued "incident to that relationship" if it arises from and depends on existing economic transactions between the guarantor and the owner or operator.

*Substantial governmental relationship* means the extent of a governmental relationship necessary under applicable state law to make an added guarantee contract issued incident to that relationship valid and enforceable. A guarantee contract is issued "incident to that relationship" if it arises from a clear commonality of interest in the event of an UST release such as coterminous boundaries, overlapping constituencies, common ground-water aquifer, or other relationship other than monetary compensation that provides a motivation for the guarantor to provide a guarantee.

*Tangible net worth* means the tangible assets that remain after deducting liabilities; such assets do not include intangibles such as goodwill and rights to patents or royalties. For purposes of this

definition, “assets” means all existing and all probable future economic benefits obtained or controlled by a particular entity as a result of past transactions.

*Termination* under §280.97(b)(1) and §280.97(b)(2) means only those changes that could result in a gap in coverage as where the insured has not obtained substitute coverage or has obtained substitute coverage with a different retroactive date than the retroactive date of the original policy.

[53 FR 43370, Oct. 26, 1988, as amended at 54 FR 47081, Nov. 9, 1989; 58 FR 9050, Feb. 18, 1993]

**§ 280.93 Amount and scope of required financial responsibility.**

(a) Owners or operators of petroleum underground storage tanks must demonstrate financial responsibility for taking corrective action and for compensating third parties for bodily injury and property damage caused by accidental releases arising from the operation of petroleum underground storage tanks in at least the following per-occurrence amounts:

(1) For owners or operators of petroleum underground storage tanks that are located at petroleum marketing facilities, or that handle an average of more than 10,000 gallons of petroleum per month based on annual throughput for the previous calendar year; $1 million.

(2) For all other owners or operators of petroleum underground storage tanks; $500,000.

(b) Owners or operators of petroleum underground storage tanks must demonstrate financial responsibility for taking corrective action and for compensating third parties for bodily injury and property damage caused by accidental releases arising from the operation of petroleum underground storage tanks in at least the following annual aggregate amounts:

(1) For owners or operators of 1 to 100 petroleum underground storage tanks, $1 million; and

(2) For owners or operators of 101 or more petroleum underground storage tanks, $2 million.

(c) For the purposes of paragraphs (b) and (f) of this section, only, “a petroleum underground storage tank” means a single containment unit and does not mean combinations of single containment units.

(d) Except as provided in paragraph (e) of this section, if the owner or operator uses separate mechanisms or separate combinations of mechanisms to demonstrate financial responsibility for:

(1) Taking corrective action;

(2) Compensating third parties for bodily injury and property damage caused by sudden accidental releases; or

(3) Compensating third parties for bodily injury and property damage caused by nonsudden accidental releases, the amount of assurance provided by each mechanism or combination of mechanisms must be in the full amount specified in paragraphs (a) and (b) of this section.

(e) If an owner or operator uses separate mechanisms or separate combinations of mechanisms to demonstrate financial responsibility for different petroleum underground storage tanks, the annual aggregate required shall be based on the number of tanks covered by each such separate mechanism or combination of mechanisms.

(f) Owners or operators shall review the amount of aggregate assurance provided whenever additional petroleum underground storage tanks are acquired or installed. If the number of petroleum underground storage tanks for which assurance must be provided exceeds 100, the owner or operator shall demonstrate financial responsibility in the amount of at least $2 million of annual aggregate assurance by the anniversary of the date on which the mechanism demonstrating financial responsibility became effective. If assurance is being demonstrated by a combination of mechanisms, the owner or operator shall demonstrate financial responsibility in the amount of at least $2 million of annual aggregate assurance by the first-occurring effective date anniversary of any one of the mechanisms combined (other than a financial test or guarantee) to provide assurance.

(g) The amounts of assurance required under this section exclude legal defense costs.

(h) The required per-occurrence and annual aggregate coverage amounts do not in any way limit the liability of the owner or operator.

**§ 280.94 Allowable mechanisms and combinations of mechanisms.**

(a) Subject to the limitations of paragraphs (b) and (c) of this section,

(1) An owner or operator, including a local government owner or operator, may use any one or combination of the mechanisms listed in §§280.95 through 280.103 to demonstrate financial responsibility under this subpart for one or more underground storage tanks, and

(2) A local government owner or operator may use any one or combination of the mechanisms listed in §§280.104 through 280.107 to demonstrate financial responsibility under this subpart for one or more underground storage tanks.

(b) An owner or operator may use a guarantee under §280.96 or surety bond under §280.98 to establish financial responsibility only if the Attorney(s) General of the state(s) in which the underground storage tanks are located has (have) submitted a written statement to the implementing agency that a guarantee or surety bond executed as described in this section is a legally valid and enforceable obligation in that state.

(c) An owner or operator may use self-insurance in combination with a guarantee only if, for the purpose of meeting the requirements of the financial test under this rule, the financial statements of the owner or operator are not consolidated with the financial statements of the guarantor.

[53 FR 43370, Oct. 26, 1988, as amended at 58 FR 9051, Feb. 18, 1993]

**§ 280.95 Financial test of self-insurance.**

(a) An owner or operator, and/or guarantor, may satisfy the requirements of §280.93 by passing a financial test as specified in this section. To pass the financial test of self-insurance, the owner or operator, and/or guarantor must meet the criteria of paragraph (b) or (c) of this section based on year-end financial statements for the latest completed fiscal year.

(b)(1) The owner or operator, and/or guarantor, must have a tangible net worth of at least ten times:

(i) The total of the applicable aggregate amount required by §280.93, based on the number of underground storage tanks for which a financial test is used to demonstrate financial responsibility to EPA under this section or to a state implementing agency under a state program approved by EPA under 40 CFR part 281;

(ii) The sum of the corrective action cost estimates, the current closure and post-closure care cost estimates, and amount of liability coverage for which a financial test is used to demonstrate financial responsibility to EPA under 40 CFR 264.101, 264.143, 264.145, 265.143, 165.145, 264.147, and 265.147 or to a state implementing agency under a state program authorized by EPA under 40 CFR part 271; and

(iii) The sum of current plugging and abandonment cost estimates for which a financial test is used to demonstrate financial responsibility to EPA under 40 CFR 144.63 or to a state implementing agency under a state program authorized by EPA under 40 CFR part 145.

(2) The owner or operator, and/or guarantor, must have a tangible net worth of at least $10 million.

(3) The owner or operator, and/or guarantor, must have a letter signed by the chief financial officer worded as specified in paragraph (d) of this section.

(4) The owner or operator, and/or guarantor, must either:

(i) File financial statements annually with the U.S. Securities and Exchange Commission, the Energy Information Administration, or the Rural Electrification Administration; or

(ii) Report annually the firm's tangible net worth to Dun and Bradstreet, and Dun and Bradstreet must have assigned the firm a financial strength rating of 4A or 5A.

(5) The firm's year-end financial statements, if independently audited, cannot include an adverse auditor's opinion, a disclaimer of opinion, or a “going concern” qualification.

(c)(1) The owner or operator, and/or guarantor must meet the financial test requirements of 40 CFR 264.147(f)(1), substituting the appropriate amounts specified in §280.93 (b)(1) and (b)(2) for the “amount of liability coverage” each time specified in that section.

(2) The fiscal year-end financial statements of the owner or operator, and/or guarantor, must be examined by an independent certified public accountant and be accompanied by the accountant's report of the examination.

(3) The firm's year-end financial statements cannot include an adverse auditor's opinion, a disclaimer of opinion, or a “going concern” qualification.

(4) The owner or operator, and/or guarantor, must have a letter signed by the chief financial officer, worded as specified in paragraph (d) of this section.

(5) If the financial statements of the owner or operator, and/or guarantor, are not submitted annually to the U.S. Securities and Exchange Commission, the Energy Information Administration or the Rural Electrification Administration, the owner or operator, and/or guarantor, must obtain a special report by an independent certified public accountant stating that:

(i) He has compared the data that the letter form the chief financial officer specifies as having been derived from the latest year-end financial statements of the owner or operator, and/or guarantor, with the amounts in such financial statements; and

(ii) In connection with that comparison, no matters came to his attention which caused him to believe that the specified data should be adjusted.

(d) To demonstrate that it meets the financial test under paragraph (b) or (c) of this section, the chief financial officer of the owner or operator, or guarantor, must sign, within 120 days of the close of each financial reporting year, as defined by the twelve-month period for which financial statements used to support the financial test are prepared, a letter worded exactly as follows, except that the instructions in brackets are to be replaced by the relevant information and the brackets deleted:

Letter from Chief Financial Officer

I am the chief financial officer of [insert: name and address of the owner or operator, or guarantor]. This letter is in support of the use of [insert: “the financial test of self-insurance,” and/or “guarantee”] to demonstrate financial responsibility for [insert: “taking corrective action” and/or “compensating third parties for bodily injury and property damage”] caused by [insert: “suddent accidential releases” and/or “nonsudden accidential releases”] in the amount of at least [insert: dollar amount] per occurrence and [insert: dollar amount] annual aggregate arising from operating (an) underground storage tank(s).

Underground storage tanks at the following facilities are assured by this financial test or a financial test under an authorized State program by this [insert: "owner or operator," and/or "guarantor"]: [List for each facility: the name and address of the facility where tanks assured by this financial test are located, and whether tanks are assured by this financial test or a financial test under a State program approved under 40 CFR part 281. If separate mechanisms or combinations of mechanisms are being used to assure any of the tanks at this facility, list each tank assured by this financial test or a financial test under a State program authorized under 40 CFR part 281 by the tank identification number provided in the notification submitted pursuant to 40 CFR 280.22 or the corresponding State requirements.]

A [insert: "financial test," and/or "guarantee"] is also used by this [insert: "owner or operator," or "guarantor"] to demonstrate evidence of financial responsibility in the following amounts under other EPA regulations or state programs authorized by EPA under 40 CFR parts 271 and 145:

| ***EPA Regulations*** | ***Amount*** |
|---|---|
| Closure (§§264.143 and 265.143) | $____ |
| Post-Closure Care (§§264.145 and 265.145) | $____ |
| Liability Coverage (§§264.147 and 265.147) | $____ |
| Corrective Action (§§264.101(b)) | $____ |
| Plugging and Abandonment (§144.63) | $____ |
| Closure | $____ |
| Post-Closure Care | $____ |
| Liabilitly Coverage | $____ |
| Corrective Action | $____ |
| Plugging and Abandonment | $____ |
| Total | $____ |

This [insert: "owner or operator," or "guarantor"] has not received an adverse opinion, a disclaimer of opinion, or a "going concern" qualification from an independent auditor on his financial statements for the latest completed fiscal year.

[Fill in the information for Alternative I if the criteria of paragraph (b) of §280.95 are being used to demonstrate compliance with the financial test requirements. Fill in the information for Alternative II if the criteria of paragraph (c) of §280.95 are being used to demonstrate compliance with the financial test requirements.]

***Alternative I***

| | | |
|---|---|---|
| 1. | Amount of annual UST aggregate coverage being assured by a financial test, and/or guarantee | $____ |
| 2. | Amount of corrective action, closure and post-closure care costs, liability coverage, and plugging and abandonment costs covered by a financial test, and/or guarantee | $____ |
| 3. | Sum of lines 1 and 2 | $____ |
| 4. | Total tangible assets | $____ |
| 5. | Total liabilities [if any of the amount reported on line 3 is included in total liabilities, you may deduct that amount from this line and add that amount to line 6] | $____ |
| 6. | Tangible net worth [subtract line 5 from line 4] | $____ |
| | | Yes No |
| 7. | Is line 6 at least $10 million? | __ _ |
| 8. | Is line 6 at least 10 times line 3? | __ _ |
| 9. | Have financial statements for the latest fiscal year been filed with the Securities and Exchange Commission? | __ _ |
| 10. | Have financial statements for the latest fiscal year been filed with the Energy Information Administration? | __ _ |
| 11. | Have financial statements for the lastest fiscal year been filed with the Rural Electrification Administration? | __ _ |
| 12. | Has financial information been provided to Dun and Bradstreet, and has Dun and Bradstreet provided a financial strength rating of 4A or 5A? [Answer "Yes" only if both criteria have been met.] | __ _ |

***Alternative II***

| | | |
|---|---|---|
| 1. | Amount of annual UST aggregate coverage being assured by a test, and/or guarantee | $____ |
| 2. | Amount of corrective action, closure and post-closure care costs, liability coverage, and plugging and abandonment costs covered by a financial test, and/or guarantee | $____ |
| 3. | Sum of lines 1 and 2 | $____ |
| 4. | Total tangible assets | $____ |
| 5. | Total liabilities [if any of the amount reported on line 3 is included in total liabilities, you may deduct that amount from this line and add that amount to line 6] | $____ |
| 6. | Tangible net worth [subtract line 5 from line 4] | $____ |
| 7. | Total assets in the U.S. [required only if less than 90 percent of assets are located in | $____ |

| | | |
|---|---|---|
| | the U.S.] | |
| | | Yes No |
| 8. | Is line 6 at least $10 million? | $__ _ |
| 9. | Is line 6 at least 6 times line 3? | __ _ |
| 10. | Are at least 90 percent of assets located in the U.S.? [If "No," complete line 11.] | __ _ |
| 11. | Is line 7 at least 6 times line 3? | __ _ |
| [Fill in either lines 12–15 or lines 16–18:] | | |
| 12. | Current assets | $____ |
| 13. | Current liabilities | ____ |
| 14. | Net working capital [subtract line 13 from line 12] | _____ |
| | | Yes No |
| 15. | Is line 14 at least 6 times line 3? | __ _ |
| 16. | Current bond rating of most recent bond issue | __ _ |
| 17. | Name of rating service | __ _ |
| 18. | Date of maturity of bond | __ _ |
| 19. | Have financial statements for the latest fiscal year been filed with the SEC, the Energy Information Administration, or the Rural Electrification Administration? | __ _ |

[If "No," please attach a report from an independent certified public accountant certifying that there are no material differences between the data as reported in lines 4–18 above and the financial statements for the latest fiscal year.]

[For both Alternative I and Alternative II complete the certification with this statement.]

I hereby certify that the wording of this letter is identical to the wording specified in 40 CFR part 280.95(d) as such regulations were constituted on the date shown immediately below.

[Signature]

[Name]

[Title]

[Date]

(e) If an owner or operator using the test to provide financial assurance finds that he or she no longer meets the requirements of the financial test based on the year-end financial statements, the

owner or operator must obtain alternative coverage within 150 days of the end of the year for which financial statements have been prepared.

(f) The Director of the implementing agency may require reports of financial condition at any time from the owner or operator, and/or guarantor. If the Director finds, on the basis of such reports or other information, that the owner or operator, and/or guarantor, no longer meets the financial test requirements of §280.95(b) or (c) and (d), the owner or operator must obtain alternate coverage within 30 days after notification of such a finding.

(g) If the owner or operator fails to obtain alternate assurance within 150 days of finding that he or she no longer meets the requirements of the financial test based on the year-end financial statements, or within 30 days of notification by the Director of the implementing agency that he or she no longer meets the requirements of the financial test, the owner or operator must notify the Director of such failure within 10 days.

**§ 280.96 Guarantee.**

(a) An owner or operator may satisfy the requirements of §280.93 by obtaining a guarantee that conforms to the requirements of this section. The guarantor must be:

(1) A firm that (i) possesses a controlling interest in the owner or operator; (ii) possesses a controlling interest in a firm described under paragraph (a)(1)(i) of this section; or, (iii) is controlled through stock ownership by a common parent firm that possesses a controlling interest in the owner or operator; or,

(2) A firm engaged in a substantial business relationship with the owner or operator and issuing the guarantee as an act incident to that business relationship.

(b) Within 120 days of the close of each financial reporting year the guarantor must demonstrate that it meets the financial test criteria of §280.95 based on year-end financial statements for the latest completed financial reporting year by completing the letter from the chief financial officer described in §280.95(d) and must deliver the letter to the owner or operator. If the guarantor fails to meet the requirements of the financial test at the end of any financial reporting year, within 120 days of the end of that financial reporting year the guarantor shall send by certified mail, before cancellation or nonrenewal of the guarantee, notice to the owner or operator. If the Director of the implementing agency notifies the guarantor that he no longer meets the requirements of the financial test of §280.95 (b) or (c) and (d), the guarantor must notify the owner or operator within 10 days of receiving such notification from the Director. In both cases, the guarantee will terminate no less than 120 days after the date the owner or operator receives the notification, as evidenced by the return receipt. The owner or operator must obtain alternative coverage as specified in §280.110(c).

(c) The guarantee must be worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

Guarantee

Guarantee made this [date] by [name of guaranteeing entity], a business entity organized under the laws of the state of [name of state], herein referred to as guarantor, to [the state implementing agency] and to any and all third parties, and obligees, on behalf of [owner or operator] of [business address].

*Recitals.*

(1) Guarantor meets or exceeds the financial test criteria of 40 CFR 280.95 (b) or (c) and (d) and agrees to comply with the requirements for guarantors as specified in 40 CFR 280.96(b).

(2) [Owner or operator] owns or operates the following underground storage tank(s) covered by this guarantee: [List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to 40 CFR 280.22 or the corresponding state requirement, and the name and address of the facility.] This guarantee satisfies 40 CFR part 280, subpart H requirements for assuring funding for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"; if coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the above-identified underground storage tank(s) in the amount of [insert dollar amount] per occurrence and [insert dollar amount] annual aggregate.

(3) [Insert appropriate phrase: "On behalf of our subsidiary" (if guarantor is corporate parent of the owner or operator); "On behalf of our affiliate" (if guarantor is a related firm of the owner or operator); or "Incident to our business relationship with" (if guarantor is providing the guarantee as an incident to a substantial business relationship with owner or operator)] [owner or operator], guarantor guarantees to [implementing agency] and to any and all third parties that:

In the event that [owner or operator] fails to provide alternative coverage within 60 days after receipt of a notice of cancellation of this guarantee and the [Director of the implementing agency] has determined or suspects that a release has occurred at an underground storage tank covered by this guarantee, the guarantor, upon instructions from the [Director], shall fund a standby trust fund in accordance with the provisions of 40 CFR 280.108, in an amount not to exceed the coverage limits specified above.

In the event that the [Director] determines that [owner or operator] has failed to perform corrective action for releases arising out of the operation of the above-identified tank(s) in accordance with 40 CFR part 280, subpart F, the guarantor upon written instructions from the [Director] shall fund a standby trust in accordance with the provisions of 40 CFR 280.108, in an amount not to exceed the coverage limits specified above.

If [owner or operator] fails to satisfy a judgment or award based on a determination of liability for bodily injury or property damage to third parties caused by ["sudden" and/or "nonsudden"]

accidential releases arising from the operation of the above-identified tank(s), or fails to pay an amount agreed to in settlement of a claim arising from or alleged to arise from such injury or damage, the guarantor, upon written instructions from the [Director], shall fund a standby trust in accordance with the provisions of 40 CFR 280.108 to satisfy such judgment(s), award(s), or settlement agreement(s) up to the limits of coverage specified above.

(4) Guarantor agrees that if, at the end of any fiscal year before cancellation of this guarantee, the guarantor fails to meet the financial test criteria of 40 CFR 280.95 (b) or (c) and (d), guarantor shall send within 120 days of such failure, by certified mail, notice to [owner or operator]. The guarantee will terminate 120 days from the date of receipt of the notice by [owner or operator], as evidenced by the return receipt.

(5) Guarantor agrees to notify [owner or operator] by certified mail of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code naming guarantor as debtor, within 10 days after commencement of the proceeding.

(6) Guarantor agrees to remain bound under this guarantee notwithstanding any modification or alteration of any obligation of [owner or operator] pursuant to 40 CFR part 280.

(7) Guarantor agrees to remain bound under this guarantee for so long as [owner or operator] must comply with the applicable financial responsibility requirements of 40 CFR part 280, subpart H for the above-identified tank(s), except that guarantor may cancel this guarantee by sending notice by certified mail to [owner or operator], such cancellation to become effective no earlier than 120 days after receipt of such notice by [owner or operator], as evidenced by the return receipt.

(8) The guarantor's obligation does not apply to any of the following:

(a) Any obligation of [insert owner or operator] under a workers' compensation, disability benefits, or unemployment compensation law or other similar law;

(b) Bodily injury to an employee of [insert owner or operator] arising from, and in the course of, employment by [insert owner or operator];

(c) Bodily injury or property damage arising from the ownership, maintenance, use, or entrustment to others of any aircraft, motor vehicle, or watercraft;

(d) Property damage to any property owned, rented, loaded to, in the care, custody, or control of, or occupied by [insert owner or operator] that is not the direct result of a release from a petroleum underground storage tank;

(e) Bodily damage or property damage for which [insert owner or operator] is obligated to pay damages by reason of the assumption of liability in a contract or agreement other than a contract or agreement entered into to meet the requirements of 40 CFR 280.93.

(9) Guarantor expressly waives notice of acceptance of this guarantee by [the implementing agency], by any or all third parties, or by [owner or operator].

I hereby certify that the wording of this guarantee is identical to the wording specified in 40 CFR 280.96(c) as such regulations were constituted on the effective date shown immediately below.

Effective date:_____

[Name of guarantor]

[Authorized signature for guarantor]

[Name of person signing]

[Title of person signing]

Signature of witness or notary:

_____

(d) An owner or operator who uses a guarantee to satisfy the requirements of §280.93 must establish a standby trust fund when the guarantee is obtained. Under the terms of the guarantee, all amounts paid by the guarantor under the guarantee will be deposited directly into the standby trust fund in accordance with instructions from the Director of the implementing agency under §280.108. This standby trust fund must meet the requirements specified in §280.103.

**§ 280.97 Insurance and risk retention group coverage.**

(a) An owner or operator may satisfy the requirements of §290.93 by obtaining liability insurance that conforms to the requirements of this section from a qualified insurer or risk retention group. Such insurance may be in the form of a separate insurance policy or an endorsement to an existing insurance policy.

(b) Each insurance policy must be amended by an endorsement worded as specified in paragraph (b)(1) of this section, or evidenced by a certificate of insurance worded as specified in paragraph (b)(2) of this section, except that instructions in brackets must be replaced with the relevant information and the brackets deleted:

(1) Endorsement

Name: [name of each covered location]

_____
_____

Address: [address of each covered location]

_____
_____
Policy Number:_____

Period of Coverage: [current policy period]

_____
_____

Name of [Insurer or Risk Retention Group]:

_____
_____

Address of [Insurer or Risk Retention Group]:

_____
_____
Name of Insured:_____
Address of Insured:_____
_____
_____

Endorsement:

1. This endorsement certifies that the policy to which the endorsement is attached provides liability insurance covering the following underground storage tanks:

[List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to 40 CFR 280.22, or the corresponding state requirement, and the name and address of the facility.]

for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"; in accordance with and subject to the limits of liability, exclusions, conditions, and other terms of the policy; if coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the underground storage tank(s) identified above.

The limits of liability are [insert the dollar amount of the "each occurrence" and "annual aggregate" limits of the Insurer's or Group's liability; if the amount of coverage is different for

different types of coverage or for different underground storage tanks or locations, indicate the amount of coverage for each type of coverage and/or for each underground storage tank or location], exclusive of legal defense costs, which are subject to a separate limit under the policy. This coverage is provided under [policy number]. The effective date of said policy is [date].

2. The insurance afforded with respect to such occurrences is subject to all of the terms and conditions of the policy; provided, however, that any provisions inconsistent with subsections (a) through (e) of this Paragraph 2 are hereby amended to conform with subsections (a) through (e);

a. Bankruptcy or insolvency of the insured shall not relieve the ["Insurer" or "Group"] of its obligations under the policy to which this endorsement is attached.

b. The ["Insurer" or "Group"] is liable for the payment of amounts within any deductible applicable to the policy to the provider of corrective action or a damaged third-party, with a right of reimbursement by the insured for any such payment made by the ["Insurer" or "Group"]. This provision does not apply with respect to that amount of any deductible for which coverage is demonstrated under another mechanism or combination of mechanisms as specified in 40 CFR 280.95–280.102.

c. Whenever requested by [a Director of an implementing agency], the ["Insurer" or "Group"] agrees to furnish to [the Director] a signed duplicate original of the policy and all endorsements.

d. Cancellation or any other termination of the insurance by the ["Insurer" or "Group"], except for non-payment of premium or misrepresentation by the insured, will be effective only upon written notice and only after the expiration of 60 days after a copy of such written notice is received by the insured. Cancellation for non-payment of premium or misrepresentation by the insured will be effective only upon written notice and only after expiration of a minimum of 10 days after a copy of such written notice is received by the insured.

[Insert for claims-made policies:

e. The insurance covers claims otherwise covered by the policy that are reported to the ["Insurer" or "Group"] within six months of the effective date of cancellation or non-renewal of the policy except where the new or renewed policy has the same retroactive date or a retroactive date earlier than that of the prior policy, and which arise out of any covered occurrence that commenced after the policy retroactive date, if applicable, and prior to such policy renewal or termination date. Claims reported during such extended reporting period are subject to the terms, conditions, limits, including limits of liability, and exclusions of the policy.]

I hereby certify that the wording of this instrument is identical to the wording in 40 CFR 280.97(b)(1) and that the ["Insurer" or "Group"] is ["licensed to transact the business of insurance or eligible to provide insurance as an excess or surplus lines insurer in one or more states"].

[Signature of authorized representative of Insurer or Risk Retention Group]

[Name of person signing]

[Title of person signing], Authorized Representative of [name of Insurer or Risk Retention Group]

[Address of Representative]

(2) Certificate of Insurance

Name: [name of each covered location]

_____
_____

Address: [address of each covered location]

_____
_____

Policy Number:_____
Endorsement (if applicable):_____

Period of Coverage: [current policy period]

_____

Name of [Insurer or Risk Retention Group]:

_____
_____

Address of [Insurer or Risk Retention Group]:

_____
_____

Name of Insured:_____

Address of Insured:

_____
_____
_____

*Certification:*

1. [Name of Insurer or Risk Retention Group], [the “Insurer” or “Group”], as identified above, hereby certifies that it has issued liability insurance covering the following underground storage tank(s):

[List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to 40 CFR 280.22, or the corresponding state requirement, and the name and address of the facility.]

for [insert: “taking corrective action” and/or “compensating third parties for bodily injury and property damage caused by” either “sudden accidental releases” or “nonsudden accidental releases” or “accidental releases”; in accordance with and subject to the limits of liability, exclusions, conditions, and other terms of the policy; if coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the underground storage tank(s) identified above.

The limits of liability are [insert the dollar amount of the “each occurrence” and “annual aggregate” limits of the Insurer's or Group's liability; if the amount of coverage is different for different types of coverage or for different underground storage tanks or locations, indicate the amount of coverage for each type of coverage and/or for each underground storage tank or location], exclusive of legal defense costs, which are subject to a separate limit under the policy. This coverage is provided under [policy number]. The effective date of said policy is [date].

2. The [“Insurer” or “Group”] further certifies the following with respect to the insurance described in Paragraph 1:

a. Bankruptcy or insolvency of the insured shall not relieve the [“Insurer” or “Group”] of its obligations under the policy to which this certificate applies.

b. The [“Insurer” or “Group”] is liable for the payment of amounts within any deductible applicable to the policy to the provider of corrective action or a damaged third-party, with a right of reimbursement by the insured for any such payment made by the [“Insurer” or “Group”]. This provision does not apply with respect to that amount of any deductible for which coverage is demonstrated under another mechanism or combination of mechanisms as specified in 40 CFR 280.95–280.102.

c. Whenever requested by [a Director of an implementing agency], the [“Insurer” or “Group”] agrees to furnish to [the Director] a signed duplicate original of the policy and all endorsements.

d. Cancellation or any other termination of the insurance by the [“Insurer” or “Group”], except for non-payment of premium or misrepresentation by the insured, will be effective only upon written notice and only after the expiration of 60 days after a copy of such written notice is received by the insured. Cancellation for non-payment of premium or misrepresentation by the insured will be effective only upon written notice and only after expiration of a minimum of 10 days after a copy of such written notice is received by the insured.

[Insert for claims-made policies:

e. The insurance covers claims otherwise covered by the policy that are reported to the [“Insurer” or “Group”] within six months of the effective date of cancellation or non-renewal of the policy except where the new or renewed policy has the same retroactive date or a retroactive date earlier than that of the prior policy, and which arise out of any covered occurrence that commenced after the policy retroactive date, if applicable, and prior to such policy renewal or termination date. Claims reported during such extended reporting period are subject to the terms, conditions, limits, including limits of liability, and exclusions of the policy.]

I hereby certify that the wording of this instrument is identical to the wording in 40 CFR 280.97(b)(2) and that the [“Insurer” or “Group”] is [“licensed to transact the business of insurance, or eligible to provide insurance as an excess or surplus lines insurer, in one or more states”].

[Signature of authorized representative of Insurer]

[Type name]

[Title], Authorized Representative of [name of Insurer or Risk Retention Group]

[Address of Representative]

(c) Each insurance policy must be issued by an insurer or a risk retention group that, at a minimum, is licensed to transact the business of insurance or eligible to provide insurance as an excess or surplus lines insurer in one or more states.

[53 FR 43370, Oct. 26, 1988, as amended at 54 FR 47081, Nov. 9, 1989]

**§ 280.98 Surety bond.**

(a) An owner or operator may satisfy the requirements of §280.93 by obtaining a surety bond that conforms to the requirements of this section. The surety company issuing the bond must be among those listed as acceptable sureties on federal bonds in the latest Circular 570 of the U.S. Department of the Treasury.

(b) The surety bond must be worded as follows, except that instructions in brackets must be replaced with the relevant information and the brackets deleted:

Performance Bond

Date bond executed:_____
Period of coverage:_____

Principal: [legal name and business address of owner or operator]

_____

Type of organization: [insert “individual,” “joint venture,” “partnership,” or “corporation”]

_____

State of incorporation (if applicable):

_____

Surety(ies): [name(s) and business address(es)]

_____

Scope of Coverage: [List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to 40 CFR 280.22, or the corresponding state requirement, and the name and address of the facility. List the coverage guaranteed by the bond: “taking corrective action” and/or “compensating third parties for bodily injury and property damage caused by” either “sudden accidental releases” or “nonsudden accidental releases” or “accidental releases” “arising from operating the underground storage tank”].

Penal sums of bond:

| | | |
|---|---|---|
| Per | occurrence | $_____ |
| Annual | aggregate | $_____ |

Surety's bond number:_____

Know All Persons by These Presents, that we, the Principal and Surety(ies), hereto are firmly bound to [the implementing agency], in the above penal sums for the payment of which we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally; provided that, where the Surety(ies) are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sums jointly and severally only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sums only as is set forth opposite the name of such Surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sums.

Whereas said Principal is required under Subtitle I of the Resource Conservation and Recovery Act (RCRA), as amended, to provide financial assurance for [insert: “taking corrective action” and/or “compensating third parties for bodily injury and property damage caused by” either “sudden accidental releases” or “nonsudden accidental releases” or “accidental releases”; if

coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the underground storage tanks identified above, and

Whereas said Principal shall establish a standby trust fund as is required when a surety bond is used to provide such financial assurance;

Now, therefore, the conditions of the obligation are such that if the Principal shall faithfully ["take corrective action, in accordance with 40 CFR part 280, subpart F and the Director of the state implementing agency's instructions for," and/or "compensate injured third parties for bodily injury and property damage caused by" either "sudden" or "nonsudden" or "sudden and nonsudden"] accidental releases arising from operating the tank(s) indentified above, or if the Principal shall provide alternate financial assurance, as specified in 40 CFR part 280, subpart H, within 120 days after the date the notice of cancellation is received by the Principal from the Surety(ies), then this obligation shall be null and void; otherwise it is to remain in full force and effect.

Such obligation does not apply to any of the following:

(a) Any obligation of [insert owner or operator] under a workers' compensation, disability benefits, or unemployment compensation law or other similar law;

(b) Bodily injury to an employee of [insert owner or operator] arising from, and in the course of, employment by [insert owner or operator];

(c) Bodily injury or property damage arising from the ownership, maintenance, use, or entrustment to others of any aircraft, motor vehicle, or watercraft;

(d) Property damage to any property owned, rented, loaned to, in the care, custody, or control of, or occupied by [insert owner or operator] that is not the direct result of a release from a petroleum underground storage tank;

(e) Bodily injury or property damage for which [insert owner or operator] is obligated to pay damages by reason of the assumption of liability in a contract or agreement other than a contract or agreement entered into to meet the requirements of 40 CFR 280.93.

The Surety(ies) shall become liable on this bond obligation only when the Principal has failed to fulfill the conditions described above.

Upon notification by [the Director of the implementing agency] that the Principal has failed to ["take corrective action, in accordance with 40 CFR part 280, subpart F and the Director's instructions," and/or "compensate injured third parties"] as guaranteed by this bond, the Surety(ies) shall either perform ["corrective action in accordance with 40 CFR part 280 and the Director's instructions," and/or "third-party liability compensation"] or place funds in an amount up to the annual aggregate penal sum into the standby trust fund as directed by [the Regional Administrator or the Director] under 40 CFR 280.108.

Upon notification by [the Director] that the Principal has failed to provide alternate financial assurance within 60 days after the date the notice of cancellation is received by the Principal from the Surety(ies) and that [the Director] has determined or suspects that a release has occurred, the Surety(ies) shall place funds in an amount not exceeding the annual aggregate penal sum into the standby trust fund as directed by [the Director] under 40 CFR 280.108.

The Surety(ies) hereby waive(s) notification of amendments to applicable laws, statutes, rules, and regulations and agrees that no such amendment shall in any way alleviate its (their) obligation on this bond.

The liability of the Surety(ies) shall not be discharged by any payment or succession of payments hereunder, unless and until such payment or payments shall amount in the annual aggregate to the penal sum shown on the face of the bond, but in no event shall the obligation of the Surety(ies) hereunder exceed the amount of said annual aggregate penal sum.

The Surety(ies) may cancel the bond by sending notice of cancellation by certified mail to the Principal, provided, however, that cancellation shall not occur during the 120 days beginning on the date of receipt of the notice of cancellation by the Principal, as evidenced by the return receipt.

The Principal may terminate this bond by sending written notice to the Surety(ies).

In Witness Thereof, the Principal and Surety(ies) have executed this Bond and have affixed their seals on the date set forth above.

The persons whose signatures appear below hereby certify that they are authorized to execute this surety bond on behalf of the Principal and Surety(ies) and that the wording of this surety bond is identical to the wording specified in 40 CFR 280.98(b) as such regulations were constituted on the date this bond was executed.

*Principal*

[Signature(s)]

[Names(s)]

[Title(s)]

[Corporate seal]

*Corporate Surety(ies)*

[Name and address]

[State of Incorporation: _____

[Liability limit: $_____

[Signature(s)]

[Names(s) and title(s)]

[Corporate seal]

[For every co-surety, provide signature(s), corporate seal, and other information in the same manner as for Surety above.]

Bond premium: $_____

(c) Under the terms of the bond, the surety will become liable on the bond obligation when the owner or operator fails to perform as guaranteed by the bond. In all cases, the surety's liability is limited to the per-occurrence and annual aggregate penal sums.

(d) The owner or operator who uses a surety bond to satisfy the requirements of §280.93 must establish a standby trust fund when the surety bond is acquired. Under the terms of the bond, all amounts paid by the surety under the bond will be deposited directly into the standby trust fund in accordance with instructions from the Director under §280.108. This standby trust fund must meet the requirements specified in §280.103.

**§ 280.99 Letter of credit.**

(a) An owner or operator may satisfy the requirements of §280.93 by obtaining an irrevocable standby letter of credit that conforms to the requirements of this section. The issuing institution must be an entity that has the authority to issue letters of credit in each state where used and whose letter-of-credit operations are regulated and examined by a federal or state agency.

(b) The letter of credit must be worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

Irrevocable Standby Letter of Credit

[Name and address of issuing institution]

[Name and address of Director(s) of state implementing agency(ies)]

Dear Sir or Madam: We hereby establish our Irrevocable Standby Letter of Credit No. ___ in your favor, at the request and for the account of [owner or operator name] of [address] up to the aggregate amount of [in words] U.S. dollars ($[insert dollar amount]), available upon presentation [insert, if more than one Director of a state implementing agency is a beneficiary, “by any one of you”] of

(1) your sight draft, bearing reference to this letter of credit, No. ___, and

(2) your signed statement reading as follows: "I certify that the amount of the draft is payable persuant to regulations issued under authority of Subtitle I of the Resource Conservation and Recovery Act of 1976, as amended."

This letter of credit may be drawn on to cover [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"] arising from operating the underground storage tank(s) identified below in the amount of [in words] $[insert dollar amount] per occurrence and [in words] $[insert dollar amount] annual aggregate:

[List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to 40 CFR 280.22, or the corresponding state requirement, and the name and address of the facility.]

The letter of credit may not be drawn on to cover any of the following:

(a) Any obligation of [insert owner or operator] under a workers' compensation, disability benefits, or unemployment compensation law or other similar law;

(b) Bodily injury to an employee of [insert owner or operator] arising from, and in the course of, employment by [insert owner or operator];

(c) Bodily injury or property damage arising from the ownership, maintenance, use, or entrustment to others of any aircraft, motor vehicle, or watercraft;

(d) Property damage to any property owned, rented, loaned to, in the care, custody, or control of, or occupied by [insert owner or operator] that is not the direct result of a release from a petroleum underground storage tank;

(e) Bodily injury or property damage for which [insert owner or operator] is obligated to pay damages by reason of the assumption of liability in a contract or agreement other than a contract or agreement entered into to meet the requirements of 40 CFR 280.93.

This letter of credit is effective as of [date] and shall expire on [date], but such expiration date shall be automatically extended for a period of [at least the length of the original term] on [expiration date] and on each successive expiration date, unless, at least 120 days before the curent expiration date, we notify [owner or operator] by certified mail that we have decided not to extend this letter of credit beyond the current expiration date. In the event that [owner or operator] is so notified, any unused portion of the credit shall be available upon presentation of your sight draft for 120 days after the date of receipt by [owner or operator], as shown on the signed return receipt.

Whenever this letter of credit is drawn on under and in compliance with the terms of this credit, we shall duly honor such draft upon presentation to us, and we shall deposit the amount of the draft directly into the standby trust fund of [owner or operator] in accordance with your instructions.

We certify that the wording of this letter of credit is identical to the wording specified in 40 CFR 280.99(b) as such regulations were constituted on the date shown immediately below.

[Signature(s) and title(s) of official(s) of issuing institution]

[Date]

This credit is subject to [insert "the most recent edition of the Uniform Customs and Practice for Documentary Credits, published and copyrighted by the International Chamber of Commerce," or "the Uniform Commercial Code"].

(c) An owner or operator who uses a letter of credit to satisfy the requirements of §280.93 must also establish a standby trust fund when the letter of credit is acquired. Under the terms of the letter of credit, all amounts paid pursuant to a draft by the Director of the implementing agency will be deposited by the issuing institution directly into the standby trust fund in accordance with instructions from the Director under §280.108. This standby trust fund must meet the requirements specified in §280.103.

(d) The letter of credit must be irrevocable with a term specified by the issuing institution. The letter of credit must provide that credit be automatically renewed for the same term as the original term, unless, at least 120 days before the current expiration date, the issuing institution notifies the owner or operator by certified mail of its decision not to renew the letter of credit. Under the terms of the letter of credit, the 120 days will begin on the date when the owner or operator receives the notice, as evidenced by the return receipt.

[53 FR 37194, Sept. 23, 1988, as amended at 59 FR 29960, June 10, 1994]

**§ 280.100 Use of state-required mechanism.**

(a) For underground storage tanks located in a state that does not have an approved program, and where the state requires owners or operators of underground storage tanks to demonstrate financial responsibility for taking corrective action and/or for compensating third parties for bodily injury and property damage, an owner or operator may use a state-required financial mechanism to meet the requirements of §280.93 if the Regional Administrator determines that the state mechanism is at least equivalent to the financial mechanisms specified in this subpart.

(b) The Regional Administrator will evaluate the equivalency of a state-required mechanism principally in terms of: certainty of the availability of funds for taking corrective action and/or for compensating third parties; the amount of funds that will be made available; and the types of costs covered. The Regional Administrator may also consider other factors as is necessary.

(c) The state, an owner or operator, or any other interested party may submit to the Regional Administrator a written petition requesting that one or more of the state-required mechanisms be considered acceptable for meeting the requirements of §280.93. The submission must include copies of the appropriate state statutory and regulatory requirements and must show the amount of funds for corrective action and/or for compensating third parties assured by the mechanism(s). The Regional Administrator may require the petitioner to submit additional information as is deemed necessary to make this determination.

(d) Any petition under this section may be submitted on behalf of all of the state's underground storage tank owners and operators.

(e) The Regional Administrator will notify the petitioner of his determination regarding the mechanism's acceptability in lieu of financial mechanisms specified in this subpart. Pending this determination, the owners and operators using such mechanisms will be deemed to be in compliance with the requirements of §280.93 for underground storage tanks located in the state for the amounts and types of costs covered by such mechanisms.

[53 FR 43370, Oct. 26, 1988; 53 FR 51274, Dec. 21, 1988]

**§ 280.101 State fund or other state assurance.**

(a) An owner or operator may satisfy the requirements of §280.93 for underground storage tanks located in a state, where EPA is administering the requirements of this subpart, which assures that monies will be available from a state fund or state assurance program to cover costs up to the limits specified in §280.93 or otherwise assures that such costs will be paid if the Regional Administrator determines that the state's assurance is at least equivalent to the financial mechanisms specified in this subpart.

(b) The Regional Administrator will evaluate the equivalency of a state fund or other state assurance principally in terms of: Certainty of the availability of funds for taking corrective action and/or for compensating third parties; the amount of funds that will be made available; and the types of costs covered. The Regional Administrator may also consider other factors as is necessary.

(c) The state must submit to the Regional Administrator a description of the state fund or other state assurance to be supplied as financial assurance, along with a list of the classes of underground storage tanks to which the funds may be applied. The Regional Administrator may require the state to submit additional information as is deemed necessary to make a determination regarding the acceptability of the state fund or other state assurance. Pending the determination by the Regional Administrator, the owner or operator of a covered class of USTs will be deemed to be in compliance with the requirements of §280.93 for the amounts and types of costs covered by the state fund or other state assurance.

(d) The Regional Administrator will notify the state of his determination regarding the acceptability of the state's fund or other assurance in lieu of financial mechanisms specified in this subpart. Within 60 days after the Regional Administrator notifies a state that a state fund or

other state assurance is acceptable, the state must provide to each owner or operator for which it is assuming financial responsibility a letter or certificate describing the nature of the state's assumption of responsibility. The letter or certificate from the state must include, or have attached to it, the following information: the facility's name and address and the amount of funds for corrective action and/or for compensating third parties that is assured by the state. The owner or operator must maintain this letter or certificate on file as proof of financial responsibility in accordance with §280.107(b)(5).

**§ 280.102 Trust fund.**

(a) An owner or operator may satisfy the requirements of §280.93 by establishing a trust fund that conforms to the requirements of this section. The trustee must be an entity that has the authority to act as a trustee and whose trust operations are regulated and examined by a federal agency or an agency of the state in which the fund is established.

(b) The wording of the trust agreement must be identical to the wording specified in §280.103(b)(1), and must be accompanied by a formal certification of acknowledgement as specified in §280.103(b)(2).

(c) The trust fund, when established, must be funded for the full required amount of coverage, or funded for part of the required amount of coverage and used in combination with other mechanism(s) that provide the remaining required coverage.

(d) If the value of the trust fund is greater than the required amount of coverage, the owner or operator may submit a written request to the Director of the implementing agency for release of the excess.

(e) If other financial assurance as specified in this subpart is substituted for all or part of the trust fund, the owner or operator may submit a written request to the Director of the implementing agency for release of the excess.

(f) Within 60 days after receiving a request from the owner or operator for release of funds as specified in paragraph (d) or (e) of this section, the Director of the implementing agency will instruct the trustee to release to the owner or operator such funds as the Director specifies in writing.

**§ 280.103 Standby trust fund.**

(a) An owner or operator using any one of the mechanisms authorized by §§280.96, 280.98, or 280.99 must establish a standby trust fund when the mechanism is acquired. The trustee of the standby trust fund must be an entity that has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal agency or an agency of the state in which the fund is established.

(b)(1) The standby trust agreement, or trust agreement, must be worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

Trust Agreement

Trust agreement, the "Agreement," entered into as of [date] by and between [name of the owner or operator], a [name of state] [insert "corporation," "partnership," "association," or "proprietorship"], the "Grantor," and [name of corporate trustee], [insert "Incorporated in the state of ___" or "a national bank"], the "Trustee."

Whereas, the United States Environmental Protection Agency, "EPA," an agency of the United States Government, has established certain regulations applicable to the Grantor, requiring that an owner or operator of an underground storage tank shall provide assurance that funds will be available when needed for corrective action and third-party compensation for bodily injury and property damage caused by sudden and nonsudden accidental releases arising from the operation of the underground storage tank. The attached Schedule A lists the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located that are covered by the standpoint trust agreement.

[Whereas, the Grantor has elected to establish [insert either "a guarantee," "surety bond," or "letter of credit"] to provide all or part of such financial assurance for the underground storage tanks identified herein and is required to establish a standby trust fund able to accept payments from the instrument (This paragraph is only applicable to the standby trust agreement.)];

Whereas, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this agreement, and the Trustee is willing to act as trustee;

Now, therefore, the Grantor and the Trustee agree as follows:

*Section 1. Definitions*

As used in this Agreement:

(a) The term "Grantor" means the owner or operator who enters into this Agreement and any successors or assigns of the Grantor.

(b) The term "Trustee" means the Trustee who enters into this Agreement and any successor Trustee.

*Section 2. Identification of the Financial Assurance Mechanism*

This Agreement pertains to the [identify the financial assurance mechanism, either a guarantee, surety bond, or letter of credit, from which the standby trust fund is established to receive payments (This paragraph is only applicable to the standby trust agreement.)].

*Section 3. Establishment of Fund*

The Grantor and the Trustee hereby establish a trust fund, the "Fund," for the benefit of [implementing agency]. The Grantor and the Trustee intend that no third party have access to the Fund except as herein provided. [The Fund is established initially as a standby to receive payments and shall not consist of any property.] Payments made by the provider of financial assurance pursuant to [the Director of the implementing agency's] instruction are transferred to the Trustee and are referred to as the Fund, together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, IN TRUST, as hereinafter provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount or adequacy of, nor any duty to collect from the Grantor as provider of financial assurance, any payments necessary to discharge any liability of the Grantor established by [the state implementing agency]

*Section 4. Payment for ["Corrective Action" and/or Third-Party Liability Claims"]*

The Trustee shall make payments from the Fund as [the Director of the implementing agency] shall direct, in writing, to provide for the payment of the costs of [insert: "taking corrective action" and/or compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"] arising from operating the tanks covered by the financial assurance mechanism identified in this Agreement.

The Fund may not be drawn upon to cover any of the following:

(a) Any obligation of [insert owner or operator] under a workers' compensation, disability benefits, or unemployment compensation law or other similar law;

(b) Bodily injury to an employee of [insert owner or operator] arising from, and in the course of employment by [insert owner or operator];

(c) Bodily injury or property damage arising from the ownership, maintenance, use, or entrustment to others of any aircraft, motor vehicle, or watercraft;

(d) Property damage to any property owned, rented, loaned to, in the care, custody, or control of, or occupied by [insert owner or operator] that is not the direct result of a release from a petroleum underground storage tank;

(e) Bodily injury or property damage for which [insert owner or operator] is obligated to pay damages by reason of the assumption of liability in a contract or agreement other than a contract or agreement entered into to meet the requirements of 40 CFR 280.93.

The Trustee shall reimburse the Grantor, or other persons as specified by [the Director], from the Fund for corrective action expenditures and/or third-party liability claims in such amounts as [the Director] shall direct in writing. In addition, the Trustee shall refund to the Grantor such amounts

as [the Director] specifies in writing. Upon refund, such funds shall no longer constitute part of the Fund as defined herein.

*Section 5. Payments Comprising the Fund*

Payments made to the Trustee for the Fund shall consist of cash and securities acceptable to the Trustee.

*Section 6. Trustee Management*

The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the Grantor may communicate in writing to the Trustee from time to time, subject, however, to the provisions of this Section. In investing, reinvesting, exchanging, selling, and managing the Fund, the Trustee shall discharge his duties with respect to the trust fund solely in the interest of the beneficiaries and with the care, skill, prudence, and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims; except that:

(i) Securities or other obligations of the Grantor, or any other owner or operator of the tanks, or any of their affiliates as defined in the Investment Company Act of 1940, as amended, 15 U.S.C. 80a–2(a), shall not be acquired or held, unless they are securities or other obligations of the federal or a state government;

(ii) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the federal or state government; and

(iii) The Trustee is authorized to hold cash awaiting investment or distribution uninvested for a reasonable time and without liability for the payment of interest thereon.

*Section 7. Commingling and Investment*

The Trustee is expressly authorized in its discretion:

(a) To transfer from time to time any or all of the assets of the Fund to any common, commingled, or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and

(b) To purchase shares in any investment company registered under the Investment Company Act of 1940, 15 U.S.C. 80a–1 et seq., including one which may be created, managed, underwritten, or to which investment advice is rendered or the shares of which are sold by the Trustee. The Trustee may vote such shares in its discretion.

*Section 8. Express Powers of Trustee*

Without in any way limiting the powers and discretions conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered:

(a) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale. No person dealing with the Trustee shall be bound to see to the application of the purchase money or to inquire into the validity or expediency of any such sale or other disposition;

(b) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;

(c) To register any securities held in the Fund in its own name or in the name of a nominee and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in other fiduciary capacities, or to deposit or arrange for the deposit of such securities in a qualified central depository even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee of such depository with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the United States Government, or any agency or instrumentality thereof, with a Federal Reserve bank, but the books and records of the Trustee shall at all times show that all such securities are part of the Fund;

(d) To deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the federal or state government; and

(e) To compromise or otherwise adjust all claims in favor of or against the Fund.

*Section 9. Taxes and Expenses*

All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of this Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor, and all other proper charges and disbursements of the Trustee shall be paid from the Fund.

*Section 10. Advice of Counsel*

The Trustee may from time to time consult with counsel, who may be counsel to the Grantor, with respect to any questions arising as to the construction of this Agreement or any action to be

taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting upon the advice of counsel.

*Section 11. Trustee Compensation*

The Trustee shall be entitled to reasonable compensation for its services as agreed upon in writing from time to time with the Grantor.

*Section 12. Successor Trustee*

The Trustee may resign or the Grantor may replace the Trustee, but such resignation or replacement shall not be effective until the Grantor has appointed a successor trustee and this successor accepts the appointment. The successor trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. Upon the successor trustee's acceptance of the appointment, the Trustee shall assign, transfer, and pay over to the successor trustee the funds and properties then constituting the Fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of a successor trustee or for instructions. The successor trustee shall specify the date on which it assumes administration of the trust in writing sent to the Grantor and the present Trustee by certified mail 10 days before such change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this Section shall be paid as provided in Section 9.

*Section 13. Instructions to the Trustee*

All orders, requests, and instructions by the Grantor to the Trustee shall be in writing, signed by such persons as are designated in the attached Schedule B or such other designees as the Grantor may designate by amendment to Schedule B. The Trustee shall be fully protected in acting without inquiry in accordance with the Grantor's orders, requests, and instructions. All orders, requests, and instructions by [the Director of the implementing agency] to the Trustee shall be in writing, signed by [the Director], and the Trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions. The Trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the Grantor or [the director] hereunder has occurred. The Trustee shall have no duty to act in the absence of such orders, requests, and instructions from the Grantor and/or [the Director], except as provided for herein.

*Section 14. Amendment of Agreement*

This Agreement may be amended by an instrument in writing executed by the Grantor and the Trustee, or by the Trustee and [the Director of the implementing agency] if the Grantor ceases to exist.

*Section 15. Irrevocability and Termination*

Subject to the right of the parties to amend this Agreement as provided in Section 14, this Trust shall be irrevocable and shall continue until terminated at the written direction of the Grantor and the Trustee, or by the Trustee and [the Director of the implementing agency], if the Grantor ceases to exist. Upon termination of the Trust, all remaining trust property, less final trust administration expenses, shall be delivered to the Grantor.

*Section 16. Immunity and Indemnification*

The Trustee shall not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this Trust, or in carrying out any directions by the Grantor or [the Director of the implementing agency] issued in accordance with this Agreement. The Trustee shall be indemnified and saved harmless by the Grantor, from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the Grantor fails to provide such defense.

*Section 17. Choice of Law*

This Agreement shall be administered, construed, and enforced according to the laws of the state of [insert name of state], or the Comptroller of the Currency in the case of National Association banks.

*Section 18. Interpretation*

As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement.

In Witness whereof the parties have caused this Agreement to be executed by their respective officers duly authorized and their corporate seals (if applicable) to be hereunto affixed and attested as of the date first above written. The parties below certify that the wording of this Agreement is identical to the wording specified in 40 CFR 280.103(b)(1) as such regulations were constituted on the date written above.

[Signature of Grantor]

[Name of the Grantor]

[Title]

Attest:

[Signature of Trustee]

[Name of the Trustee]

[Title]

[Seal]

[Signature of Witness]

[Name of the Witness]

[Title]

[Seal]

(2) The standby trust agreement, or trust agreement must be accompanied by a formal certification of acknowledgement similar to the following. State requirements may differ on the proper content of this acknowledgment.

State of_____
County of_____

On this [date], before me personally came [owner or operator] to me known, who, being by me duly sworn, did depose and say that she/he resides at [address], that she/he is [title] of [corporation], the corporation described in and which executed the above instrument; that she/he knows the seal of said corporation; that the seal affixed to such instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said corporation; and that she/he signed her/his name thereto by like order.

[Signature of Notary Public]

[Name of Notary Public]

(c) The Director of the implementing agency will instruct the trustee to refund the balance of the standby trust fund to the provider of financial assurance if the Director determines that no additional corrective action costs or third-party liability claims will occur as a result of a release covered by the financial assurance mechanism for which the standby trust fund was established.

(d) An owner or operator may establish one trust fund as the depository mechanism for all funds assured in compliance with this rule.

[53 FR 43370, Oct. 26, 1988; 53 FR 51274, Dec. 21, 1988]

**§ 280.104 Local government bond rating test.**

(a) A general purpose local government owner or operator and/or local government serving as a guarantor may satisfy the requirements of §280.93 by having a currently outstanding issue or issues of general obligation bonds of $1 million or more, excluding refunded obligations, with a

Moody's rating of Aaa, Aa, A, or Baa, or a Standard & Poor's rating of AAA, AA, A, or BBB. Where a local government has multiple outstanding issues, or where a local government's bonds are rated by both Moody's and Standard and Poor's, the lowest rating must be used to determine eligibility. Bonds that are backed by credit enhancement other than municipal bond insurance may not be considered in determining the amount of applicable bonds outstanding.

(b) A local government owner or operator or local government serving as a guarantor that is not a general-purpose local government and does not have the legal authority to issue general obligation bonds may satisfy the requirements of §280.93 by having a currently outstanding issue or issues of revenue bonds of $1 million or more, excluding refunded issues and by also having a Moody's rating of Aaa, A, A, or Baa, or a Standard & Poor's rating of AAA, AA, A, or BBB as the lowest rating for any rated revenue bond issued by the local government. Where bonds are rated by both Moody's and Standard & Poor's, the lower rating for each bond must be used to determine eligibility. Bonds that are backed by credit enhancement may not be considered in determining the amount of applicable bonds outstanding.

(c) The local government owner or operator and/or guarantor must maintain a copy of its bond rating published within the last 12 months by Moody's or Standard & Poor's.

(d) To demonstrate that it meets the local government bond rating test, the chief financial officer of a general purpose local government owner or operator and/or guarantor must sign a letter worded exactly as follows, except that the instructions in brackets are to be replaced by the relevant information and the brackets deleted:

Letter from Chief Financial Officer

I am the chief financial officer of [insert: name and address of local government owner or operator, or guarantor]. This letter is in support of the use of the bond rating test to demonstrate financial responsibility for [insert: “taking corrective action” and/or “compensating third parties for bodily injury and property damage”] caused by [insert: “sudden accidental releases” and/or “nonsudden accidental releases”] in the amount of at least [insert: dollar amount] per occurrence and [insert: dollar amount] annual aggregate arising from operating (an) underground storage tank(s).

Underground storage tanks at the following facilities are assured by this bond rating test: [List for each facility: the name and address of the facility where tanks are assured by the bond rating test].

The details of the issue date, maturity, outstanding amount, bond rating, and bond rating agency of all outstanding bond issues that are being used by [name of local government owner or operator, or guarantor] to demonstrate financial responsibility are as follows: [complete table]

| **Issue date** | **Maturity date** | **Outstanding amount** | **Bond rating** | **Rating agency** |
|---|---|---|---|---|
| | | | | [Moody's or Standard & Poor's] |

The total outstanding obligation of [insert amount], excluding refunded bond issues, exceeds the minimum amount of $1 million. All outstanding general obligation bonds issued by this government that have been rated by Moody's or Standard & Poor's are rated as at least investment grade (Moody's Baa or Standard & Poor's BBB) based on the most recent ratings published within the last 12 months. Neither rating service has provided notification within the last 12 months of downgrading of bond ratings below investment grade or of withdrawal of bond rating other than for repayment of outstanding bond issues.

I hereby certify that the wording of this letter is identical to the wording specified in 40 CFR Part 280.104(d) as such regulations were constituted on the date shown immediately below.

[Date]_____
[Signature]_____
[Name]_____
[Title]_____

(e) To demonstrate that it meets the local government bond rating test, the chief financial officer of local government owner or operator and/or guarantor other than a general purpose government must sign a letter worded exactly as follows, except that the instructions in brackets are to be replaced by the relevant information and the brackets deleted:

Letter from Chief Financial Officer

I am the chief financial officer of [insert: name and address of local government owner or operator, or guarantor]. This letter is in support of the use of the bond rating test to demonstrate financial responsibility for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage"] caused by [insert : "sudden accidental releases" and/or "nonsudden accidental releases"] in the amount of at least [insert: dollar amount] per occurrence and [insert: dollar amount] annual aggregate arising from operating (an) underground storage tank(s). This local government is not organized to provide general governmental services and does not have the legal authority under state law or constitutional provisions to issue general obligation debt.

Underground storage tanks at the following facilities are assured by this bond rating test: [List for each facility: the name and address of the facility where tanks are assured by the bond rating test].

The details of the issue date, maturity, outstanding amount, bond rating, and bond rating agency of all outstanding revenue bond issues that are being used by [name of local government owner or operator, or guarantor] to demonstrate financial responsibility are as follows: [complete table]

| **Issue date** | **Maturity date** | **Outstanding amount** | **Bond rating** | **Rating agency** |
|---|---|---|---|---|
| | | | | [Moody's or Standard & Poor's] |

The total outstanding obligation of [insert amount], excluding refunded bond issues, exceeds the minimum amount of $1 million. All outstanding revenue bonds issued by this government that have been rated by Moody's or Standard & Poor's are rated as at least investment grade (Moody's Baa or Standard & Poor's BBB) based on the most recent ratings published within the last 12 months. The revenue bonds listed are not backed by third-party credit enhancement or are insured by a municipal bond insurance company. Neither rating service has provided notification within the last 12 months of downgrading of bond ratings below investment grade or of withdrawal of bond rating other than for repayment of outstanding bond issues.

I hereby certify that the wording of this letter is identical to the wording specified in 40 CFR part 280.104(e) as such regulations were constituted on the date shown immediately below.

[Date]_____
[Signature]_____
[Name]_____
[Title]_____

(f) The Director of the implementing agency may require reports of financial condition at any time from the local government owner or operator, and/or local government guarantor. If the Director finds, on the basis of such reports or other information, that the local government owner or operator, and/or guarantor, no longer meets the local government bond rating test requirements of §280.104, the local government owner or operator must obtain alternative coverage within 30 days after notification of such a finding.

(g) If a local government owner or operator using the bond rating test to provide financial assurance finds that it no longer meets the bond rating test requirements, the local government owner or operator must obtain alternative coverage within 150 days of the change in status.

[58 FR 9053, Feb. 18, 1993]

**§ 280.105 Local government financial test.**

(a) A local government owner or operator may satisfy the requirements of §280.93 by passing the financial test specified in this section. To be eligible to use the financial test, the local government owner or operator must have the ability and authority to assess and levy taxes or to freely establish fees and charges. To pass the local government financial test, the owner or operator must meet the criteria of paragraphs (b)(2) and (b)(3) of this section based on year-end financial statements for the latest completed fiscal year.

(b)(1) The local government owner or operator must have the following information available, as shown in the year-end financial statements for the latest completed fiscal year:

(i) *Total revenues:* Consists of the sum of general fund operating and non-operating revenues including net local taxes, licenses and permits, fines and forfeitures, revenues from use of money and property, charges for services, investment earnings, sales (property, publications, etc.),

intergovernmental revenues (restricted and unrestricted), and total revenues from all other governmental funds including enterprise, debt service, capital projects, and special revenues, but excluding revenues to funds held in a trust or agency capacity. For purposes of this test, the calculation of total revenues shall exclude all transfers between funds under the direct control of the local government using the financial test (interfund transfers), liquidation of investments, and issuance of debt.

(ii) *Total expenditures:* Consists of the sum of general fund operating and non-operating expenditures including public safety, public utilities, transportation, public works, environmental protection, cultural and recreational, community development, revenue sharing, employee benefits and compensation, office management, planning and zoning, capital projects, interest payments on debt, payments for retirement of debt principal, and total expenditures from all other governmental funds including enterprise, debt service, capital projects, and special revenues. For purposes of this test, the calculation of total expenditures shall exclude all transfers between funds under the direct control of the local government using the financial test (interfund transfers).

(iii) *Local revenues:* Consists of total revenues (as defined in paragraph (b)(1)(i) of this section) minus the sum of all transfers from other governmental entities, including all monies received from Federal, state, or local government sources.

(iv) *Debt service:* Consists of the sum of all interest and principal payments on all long-term credit obligations and all interest-bearing short-term credit obligations. Includes interest and principal payments on general obligation bonds, revenue bonds, notes, mortgages, judgments, and interest bearing warrants. Excludes payments on non-interest-bearing short-term obligations, interfund obligations, amounts owed in a trust or agency capacity, and advances and contingent loans from other governments.

(v) *Total funds:* Consists of the sum of cash and investment securities from all funds, including general, enterprise, debt service, capital projects, and special revenue funds, but excluding employee retirement funds, at the end of the local government's financial reporting year. Includes Federal securities, Federal agency securities, state and local government securities, and other securities such as bonds, notes and mortgages. For purposes of this test, the calculation of total funds shall exclude agency funds, private trust funds, accounts receivable, value of real property, and other non-security assets.

(vi) *Population* consists of the number of people in the area served by the local government.

(2) The local government's year-end financial statements, if independently audited, cannot include an adverse auditor's opinion or a disclaimer of opinion. The local government cannot have outstanding issues of general obligation or revenue bonds that are rated as less than investment grade.

(3) The local government owner or operator must have a letter signed by the chief financial officer worded as specified in paragraph (c) of this section.

(c) To demonstrate that it meets the financial test under paragraph (b) of this section, the chief financial officer of the local government owner or operator, must sign, within 120 days of the close of each financial reporting year, as defined by the twelve-month period for which financial statements used to support the financial test are prepared, a letter worded exactly as follows, except that the instructions in brackets are to be replaced by the relevant information and the brackets deleted:

Letter From Chief Financial Officer

I am the chief financial officer of [insert: name and address of the owner or operator]. This letter is in support of the use of the local government financial test to demonstrate financial responsibility for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage"] caused by [insert: "sudden accidental releases" and/or "nonsudden accidental releases"] in the amount of at least [insert: dollar amount] per occurrence and [insert: dollar amount] annual aggregate arising from operating [an] underground storage tank[s].

Underground storage tanks at the following facilities are assured by this financial test [List for each facility: the name and address of the facility where tanks assured by this financial test are located. If separate mechanisms or combinations of mechanisms are being used to assure any of the tanks at this facility, list each tank assured by this financial test by the tank identification number provided in the notification submitted pursuant to 40 CFR Part 280.22 or the corresponding state requirements.]

This owner or operator has not received an adverse opinion, or a disclaimer of opinion from an independent auditor on its financial statements for the latest completed fiscal year. Any outstanding issues of general obligation or revenue bonds, if rated, have a Moody's rating of Aaa, Aa, A, or Baa or a Standard and Poor's rating of AAA, AA, A, or BBB; if rated by both firms, the bonds have a Moody's rating of Aaa, Aa, A, or Baa and a Standard and Poor's rating of AAA, AA, A, or BBB.

Worksheet for Municipal Financial Test

*Part I: Basic Information*

1. Total Revenues

a. Revenues (dollars) _____

Value of revenues excludes liquidation of investments and issuance of debt. Value includes all general fund operating and non-operating revenues, as well as all revenues from all other governmental funds including enterprise, debt service, capital projects, and special revenues, but excluding revenues to funds held in a trust or agency capacity.

b. Subtract interfund transfers (dollars)_____

c. Total Revenues (dollars)_____

2. Total Expenditures

a. Expenditures (dollars) _____

Value consists of the sum of general fund operating and non-operating expenditures including interest payments on debt, payments for retirement of debt principal, and total expenditures from all other governmental funds including enterprise, debt service, capital projects, and special revenues.

b. Subtract interfund transfers (dollars)_____

c. Total Expenditures (dollars)_____

3. Local Revenues

a. Total Revenues (from 1c) (dollars) _____

b. Subtract total intergovernmental transfers (dollars)_____

c. Local Revenues (dollars)_____

4. Debt Service

a. Interest and fiscal charges (dollars)_____

b. Add debt retirement (dollars)_____

c. Total Debt Service (dollars)_____

5. Total Funds (Dollars)_____

(Sum of amounts held as cash and investment securities from all funds, excluding amounts held for employee retirement funds, agency funds, and trust funds)

6. Population (Persons)_____

*Part II: Application of Test*

7. Total Revenues to Population

a. Total Revenues (from 1c)_____

b. Population (from 6)_____

c. Divide 7a by 7b _____

d. Subtract 417_____

e. Divide by 5,212_____

f. Multiply by 4.095_____

8. Total Expenses to Population

a. Total Expenses (from 2c)_____

b. Population (from 6)_____

c. Divide 8a by 8b _____

d. Subtract 524 _____

e. Divide by 5,401_____

f. Multiply by 4.095_____

9. Local Revenues to Total Revenues

a. Local Revenues (from 3c)_____

b. Total Revenues (from 1c)_____

c. Divide 9a by 9b _____

d. Subtract .695_____

e. Divide by .205_____

f. Multiply by 2.840 _____

10. Debt Service to Population

a. Debt Service (from 4d) _____

b. Population (from 6)_____

c. Divide 10a by 10b _____

d. Subtract 51 _____

e. Divide by 1,038_____

f. Multiply by −1.866_____

11. Debt Service to Total Revenues

a. Debt Service (from 4d)_____

b. Total Revenues (from 1c)_____

c. Divide 11a by 11b _____

d. Subtract .068 _____

e. Divide by .259 _____

f. Multiply by −3.533 _____

12. Total Revenues to Total Expenses

a. Total Revenues (from 1c)_____

b. Total Expenses (from 2c)_____

c. Divide 12a by 12b_____

d. Subtract .910 _____

e. Divide by .899 _____

f. Multiply by 3.458 _____

13. Funds Balance to Total Revenues

a. Total Funds (from 5) _____

b. Total Revenues (from 1c)_____

c. Divide 13a by 13b _____

d. Subtract .891 _____

e. Divide by 9.156_____

f. Multiply by 3.270 _____

14. Funds Balance to Total Expenses

a. Total Funds (from 5)_____

b. Total Expenses (from 2c)_____

c. Divide 14a by 14b_____

d. Subtract .866 _____

e. Divide by 6.409 _____

f. Multiply by 3.270 _____

15. Total Funds to Population _____

a. Total Funds (from 5) _____

b. Population (from 6)_____

c. Divide 15a by 15b _____

d. Subtract 270 _____

e. Divide by 4,548 _____

f. Multiply by 1.866 _____

16. Add 7f + 8f + 9f + 10f + 11f + 12f + 13f + 14f + 15f + 4.937_____

I hereby certify that the financial index shown on line 16 of the worksheet is greater than zero and that the wording of this letter is identical to the wording specified in 40 CFR part 280.105(c) as such regulations were constituted on the date shown immediately below.

[Date]

[Signature]

[Name]

[Title]

(d) If a local government owner or operator using the test to provide financial assurance finds that it no longer meets the requirements of the financial test based on the year-end financial

statements, the owner or operator must obtain alternative coverage within 150 days of the end of the year for which financial statements have been prepared.

(e) The Director of the implementing agency may require reports of financial condition at any time from the local government owner or operator. If the Director finds, on the basis of such reports or other information, that the local government owner or operator no longer meets the financial test requirements of §280.105 (b) and (c), the owner or operator must obtain alternate coverage within 30 days after notification of such a finding.

(f) If the local government owner or operator fails to obtain alternate assurance within 150 days of finding that it no longer meets the requirements of the financial test based on the year-end financial statements or within 30 days of notification by the Director of the implementing agency that it no longer meets the requirements of the financial test, the owner or operator must notify the Director of such failure within 10 days.

[58 FR 9054, Feb. 18, 1993]

**§ 280.106 Local government guarantee.**

(a) A local government owner or operator may satisfy the requirements of §280.93 by obtaining a guarantee that conforms to the requirements of this section. The guarantor must be either the state in which the local government owner or operator is located or a local government having a "substantial governmental relationship" with the owner and operator and issuing the guarantee as an act incident to that relationship. A local government acting as the guarantor must:

(1) demonstrate that it meets the bond rating test requirement of §280.104 and deliver a copy of the chief financial officer's letter as contained in §280.104(c) to the local government owner or operator; or

(2) demonstrate that it meets the worksheet test requirements of §280.105 and deliver a copy of the chief financial officer's letter as contained in §280.105(c) to the local government owner or operator; or

(3) demonstrate that it meets the local government fund requirements of §280.107(a), §280.107(b), or §280.107(c) and deliver a copy of the chief financial officer's letter as contained in §280.107 to the local government owner or operator.

(b) If the local government guarantor is unable to demonstrate financial assurance under any of §§280.104, 280.105, 280.107(a), 280.107(b), or 280.107(c), at the end of the financial reporting year, the guarantor shall send by certified mail, before cancellation or non-renewal of the guarantee, notice to the owner or operator. The guarantee will terminate no less than 120 days after the date the owner or operator receives the notification, as evidenced by the return receipt. The owner or operator must obtain alternative coverage as specified in §280.114(c).

(c) The guarantee agreement must be worded as specified in paragraph (d) or (e) of this section, depending on which of the following alternative guarantee arrangements is selected:

(1) If, in the default or incapacity of the owner or operator, the guarantor guarantees to fund a standby trust as directed by the Director of the implementing agency, the guarantee shall be worded as specified in paragraph (d) of this section.

(2) If, in the default or incapacity of the owner or operator, the guarantor guarantees to make payments as directed by the Director of the implementing agency for taking corrective action or compensating third parties for bodily injury and property damage, the guarantee shall be worded as specified in paragraph (e) of this section.

(d) If the guarantor is a state, the local government guarantee with standby trust must be worded exactly as follows, except that instructions in brackets are to be replaced with relevant information and the brackets deleted:

Local Government Guarantee With Standby Trust Made by a State

Guarantee made this [date] by [name of state], herein referred to as guarantor, to [the state implementing agency] and to any and all third parties, and obliges, on behalf of [local government owner or operator].

*Recitals*

(1) Guarantor is a state.

(2) [Local government owner or operator] owns or operates the following underground storage tank(s) covered by this guarantee: [List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to 40 CFR part 280 or the corresponding state requirement, and the name and address of the facility.] This guarantee satisfies 40 CFR part 280, subpart H requirements for assuring funding for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"; if coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the above-identified underground storage tank(s) in the amount of [insert dollar amount] per occurrence and [insert dollar amount] annual aggregate.

(3) Guarantor guarantees to [implementing agency] and to any and all third parties that:

In the event that [local government owner or operator] fails to provide alternative coverage within 60 days after receipt of a notice of cancellation of this guarantee and the [Director of the implementing agency] has determined or suspects that a release has occurred at an underground

storage tank covered by this guarantee, the guarantor, upon instructions from the [Director] shall fund a standby trust fund in accordance with the provisions of 40 CFR part 280.112, in an amount not to exceed the coverage limits specified above.

In the event that the [Director] determines that [local government owner or operator] has failed to perform corrective action for releases arising out of the operation of the above-identified tank(s) in accordance with 40 CFR part 280, subpart F, the guarantor upon written instructions from the [Director] shall fund a standby trust fund in accordance with the provisions of 40 CFR part 280.112, in an amount not to exceed the coverage limits specified above.

If [owner or operator] fails to satisfy a judgment or award based on a determination of liability for bodily injury or property damage to third parties caused by [”sudden” and/or “nonsudden”] accidental releases arising from the operation of the above-identified tank(s), or fails to pay an amount agreed to in settlement of a claim arising from or alleged to arise from such injury or damage, the guarantor, upon written instructions from the [Director], shall fund a standby trust in accordance with the provisions of 40 CFR part 280.112 to satisfy such judgment(s), award(s), or settlement agreement(s) up to the limits of coverage specified above.

(4) Guarantor agrees to notify [owner or operator] by certified mail of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code naming guarantor as debtor, within 10 days after commencement of the proceeding.

(5) Guarantor agrees to remain bound under this guarantee notwithstanding any modification or alteration of any obligation of [owner or operator] pursuant to 40 CFR part 280.

(6) Guarantor agrees to remain bound under this guarantee for so long as [local government owner or operator] must comply with the applicable financial responsibility requirements of 40 CFR part 280, subpart H for the above identified tank(s), except that guarantor may cancel this guarantee by sending notice by certified mail to [owner or operator], such cancellation to become effective no earlier than 120 days after receipt of such notice by [owner or operator], as evidenced by the return receipt.

(7) The guarantor's obligation does not apply to any of the following:

(a) Any obligation of [local government owner or operator] under a workers' compensation, disability benefits, or unemployment compensation law or other similar law;

(b) Bodily injury to an employee of [insert: local government owner or operator] arising from, and in the course of, employment by [insert: local government owner or operator];

(c) Bodily injury or property damage arising from the ownership, maintenance, use, or entrustment to others of any aircraft, motor vehicle, or watercraft;

(d) Property damage to any property owned, rented, loaded to, in the care, custody, or control of, or occupied by [insert: local government owner or operator] that is not the direct result of a release from a petroleum underground storage tank;

(e) Bodily damage or property damage for which [insert owner or operator] is obligated to pay damages by reason of the assumption of liability in a contract or agreement other than a contract or agreement entered into to meet the requirements of 40 CFR part 280.93.

(8) Guarantor expressly waives notice of acceptance of this guarantee by [the implementing agency], by any or all third parties, or by [local government owner or operator],

I hereby certify that the wording of this guarantee is identical to the wording specified in 40 CFR part 280.106(d) as such regulations were constituted on the effective date shown immediately below.

Effective date:_____

[Name of guarantor]

[Authorized signature for guarantor]

[Name of person signing]

[Title of person signing]

Signature of witness or notary:

If the guarantor is a local government, the local government guarantee with standby trust must be worded exactly as follows, except that instructions in brackets are to be replaced with relevant information and the brackets deleted:

Local Government Guarantee With Standby Trust Made by a Local Government

Guarantee made this [date] by [name of guaranteeing entity], a local government organized under the laws of [name of state], herein referred to as guarantor, to [the state implementing agency] and to any and all third parties, and obliges, on behalf of [local government owner or operator].

*Recitals*

(1) Guarantor meets or exceeds [select one: the local government bond rating test requirements of 40 CFR part 280.104, the local government financial test requirements of 40 CFR part 280.105, or the local government fund under 40 CFR part 280.107(a), 280.107(b), or 280.107(c)].

(2) [Local government owner or operator] owns or operates the following underground storage tank(s) covered by this guarantee: [List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to 40 CFR part 280 or the corresponding state requirement, and the name and address of the facility.] This guarantee satisfies 40 CFR part 280, subpart H requirements for assuring funding for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"; if coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the above-identified underground storage tank(s) in the amount of [insert dollar amount] per occurrence and [insert: dollar amount] annual aggregate.

(3) Incident to our substantial governmental relationship with [local government owner or operator], guarantor guarantees to [implementing agency] and to any and all third parties that:

In the event that [local government owner or operator] fails to provide alternative coverage within 60 days after receipt of a notice of cancellation of this guarantee and the [Director of the implementing agency] has determined or suspects that a release has occurred at an underground storage tank covered by this guarantee, the guarantor, upon instructions from the [Director] shall fund a standby trust fund in accordance with the provisions of 40 CFR part 280.112, in an amount not to exceed the coverage limits specified above.

In the event that the [Director] determines that [local government owner or operator] has failed to perform corrective action for releases arising out of the operation of the above-identified tank(s) in accordance with 40 CFR part 280, subpart F, the guarantor upon written instructions from the [Director] shall fund a standby trust fund in accordance with the provisions of 40 CFR part 280.112, in an amount not to exceed the coverage limits specified above.

If [owner or operator] fails to satisfy a judgment or award based on a determination of liability for bodily injury or property damage to third parties caused by ["sudden" and/or "nonsudden"] accidental releases arising from the operation of the above-identified tank(s), or fails to pay an amount agreed to in settlement of a claim arising from or alleged to arise from such injury or damage, the guarantor, upon written instructions from the [Director], shall fund a standby trust in accordance with the provisions of 40 CFR part 280.112 to satisfy such judgment(s), award(s), or settlement agreement(s) up to the limits of coverage specified above.

(4) Guarantor agrees that, if at the end of any fiscal year before cancellation of this guarantee, the guarantor fails to meet or exceed the requirements of the financial responsibility mechanism specified in paragraph (1), guarantor shall send within 120 days of such failure, by certified mail, notice to [local government owner or operator], as evidenced by the return receipt.

(5) Guarantor agrees to notify [owner or operator] by certified mail of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code naming guarantor as debtor, within 10 days after commencement of the proceeding.

(6) Guarantor agrees to remain bound under this guarantee notwithstanding any modification or alteration of any obligation of [owner or operator] pursuant to 40 CFR part 280.

(7) Guarantor agrees to remain bound under this guarantee for so long as [local government owner or operator] must comply with the applicable financial responsibility requirements of 40 CFR part 280, subpart H for the above identified tank(s), except that guarantor may cancel this guarantee by sending notice by certified mail to [owner or operator], such cancellation to become effective no earlier than 120 days after receipt of such notice by [owner or operator], as evidenced by the return receipt.

(8) The guarantor's obligation does not apply to any of the following:

(a) Any obligation of [local government owner or operator] under a workers' compensation, disability benefits, or unemployment compensation law or other similar law;

(b) Bodily injury to an employee of [insert: local government owner or operator] arising from, and in the course of, employment by [insert: local government owner or operator];

(c) Bodily injury or property damage arising from the ownership, maintenance, use, or entrustment to others of any aircraft, motor vehicle, or watercraft;

(d) Property damage to any property owned, rented, loaned to, in the care, custody, or control of, or occupied by [insert: local government owner or operator] that is not the direct result of a release from a petroleum underground storage tank;

(e) Bodily damage or property damage for which [insert: owner or operator] is obligated to pay damages by reason of the assumption of liability in a contract or agreement other than a contract or agreement entered into to meet the requirements of 40 CFR part 280.93.

(9) Guarantor expressly waives notice of acceptance of this guarantee by [the implementing agency], by any or all third parties, or by [local government owner or operator].

I hereby certify that the wording of this guarantee is identical to the wording specified in 40 CFR part 280.106(d) as such regulations were constituted on the effective date shown immediately below.

Effective date:_____

[Name of guarantor]

[Authorized signature for guarantor]

[Name of person signing]

[Title of person signing]

Signature of witness or notary:

_____

(e) If the guarantor is a state, the local government guarantee without standby trust must be worded exactly as follows, except that instructions in brackets are to be replaced with relevant information and the brackets deleted:

Local Government Guarantee Without Standby Trust Made by a State

Guarantee made this [date] by [name of state], herein referred to as guarantor, to [the state implementing agency] and to any and all third parties, and obliges, on behalf of [local government owner or operator].

*Recitals*

(1) Guarantor is a state.

(2) [Local government owner or operator] owns or operates the following underground storage tank(s) covered by this guarantee: [List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to 40 CFR part 280 or the corresponding state requirement, and the name and address of the facility.] This guarantee satisfies 40 CFR part 280, subpart H requirements for assuring funding for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"; if coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the above-identified underground storage tank(s) in the amount of [insert: dollar amount] per occurrence and [insert: dollar amount] annual aggregate.

(3) Guarantor guarantees to [implementing agency] and to any and all third parties and obliges that:

In the event that [local government owner or operator] fails to provide alternative coverage within 60 days after receipt of a notice of cancellation of this guarantee and the [Director of the implementing agency] has determined or suspects that a release has occurred at an underground storage tank covered by this guarantee, the guarantor, upon written instructions from the [Director] shall make funds available to pay for corrective actions and compensate third parties for bodily injury and property damage in an amount not to exceed the coverage limits specified above.

In the event that the [Director] determines that [local government owner or operator] has failed to perform corrective action for releases arising out of the operation of the above-identified

tank(s) in accordance with 40 CFR part 280, subpart F, the guarantor upon written instructions from the [Director] shall make funds available to pay for corrective actions in an amount not to exceed the coverage limits specified above.

If [owner or operator] fails to satisfy a judgment or award based on a determination of liability for bodily injury or property damage to third parties caused by ["sudden" and/or "nonsudden"] accidental releases arising from the operation of the above-identified tank(s), or fails to pay an amount agreed to in settlement of a claim arising from or alleged to arise from such injury or damage, the guarantor, upon written instructions from the [Director], shall make funds available to compensate third parties for bodily injury and property damage in an amount not to exceed the coverage limits specified above.

(4) Guarantor agrees to notify [owner or operator] by certified mail of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code naming guarantor as debtor, within 10 days after commencement of the proceeding.

(5) Guarantor agrees to remain bound under this guarantee notwithstanding any modification or alteration of any obligation of [owner or operator] pursuant to 40 CFR part 280.

(6) Guarantor agrees to remain bound under this guarantee for so long as [local government owner or operator] must comply with the applicable financial responsibility requirements of 40 CFR part 280, subpart H for the above identified tank(s), except that guarantor may cancel this guarantee by sending notice by certified mail to [owner or operator], such cancellation to become effective no earlier than 120 days after receipt of such notice by [owner or operator], as evidenced by the return receipt. If notified of a probable release, the guarantor agrees to remain bound to the terms of this guarantee for all charges arising from the release, up to the coverage limits specified above, notwithstanding the cancellation of the guarantee with respect to future releases.

(7) The guarantor's obligation does not apply to any of the following:

(a) Any obligation of [local government owner or operator] under a workers' compensation disability benefits, or unemployment compensation law or other similar law;

(b) Bodily injury to an employee of [insert local government owner or operator] arising from, and in the course of, employment by [insert: local government owner or operator];

(c) Bodily injury or property damage arising from the ownership, maintenance, use, or entrustment to others of any aircraft, motor vehicle, or watercraft;

(d) Property damage to any property owned, rented, loaded to, in the care, custody, or control of, or occupied by [insert: local government owner or operator] that is not the direct result of a release from a petroleum underground storage tank;

(e) Bodily damage or property damage for which [insert: owner or operator] is obligated to pay damages by reason of the assumption of liability in a contract or agreement other than a contract or agreement entered into to meet the requirements of 40 CFR part 280.93.

(8) Guarantor expressly waives notice of acceptance of this guarantee by [the implementing agency], by any or all third parties, or by [local government owner or operator].

I hereby certify that the wording of this guarantee is identical to the wording specified in 40 CFR part 280.106(e) as such regulations were constituted on the effective date shown immediately below.

Effective date:_____

[Name of guarantor]

[Authorized signature for guarantor]

[Name of person signing]

[Title of person signing]

Signature of witness or notary:

If the guarantor is a local government, the local government guarantee without standby trust must be worded exactly as follows, except that instructions in brackets are to be replaced with relevant information and the brackets deleted:

Local Government Guarantee Without Standby Trust Made by a Local Government

Guarantee made this [date] by [name of guaranteeing entity], a local government organized under the laws of [name of state], herein referred to as guarantor, to [the state implementing agency] and to any and all third parties, and obliges, on behalf of [local government owner or operator].

*Recitals*

(1) Guarantor meets or exceeds [select one: the local government bond rating test requirements of 40 CFR part 280.104, the local government financial test requirements of 40 part CFR 280.105, the local government fund under 40 CFR part 280.107(a), 280.107(b), or 280.107(c).

(2) [Local government owner or operator] owns or operates the following underground storage tank(s) covered by this guarantee: [List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to 40 CFR part 280 or the

corresponding state requirement, and the name and address of the facility.] This guarantee satisfies 40 CFR part 280, subpart H requirements for assuring funding for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"; if coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the above-identified underground storage tank(s) in the amount of [insert: dollar amount] per occurrence and [insert: dollar amount] annual aggregate.

(3) Incident to our substantial governmental relationship with [local government owner or operator], guarantor guarantees to [implementing agency] and to any and all third parties and obliges that:

In the event that [local government owner or operator] fails to provide alternative coverage within 60 days after receipt of a notice of cancellation of this guarantee and the [Director of the implementing agency] has determined or suspects that a release has occurred at an underground storage tank covered by this guarantee, the guarantor, upon written instructions from the [Director] shall make funds available to pay for corrective actions and compensate third parties for bodily injury and property damage in an amount not to exceed the coverage limits specified above.

In the event that the [Director] determines that [local government owner or operator] has failed to perform corrective action for releases arising out of the operation of the above-identified tank(s) in accordance with 40 CFR part 280, subpart F, the guarantor upon written instructions from the [Director] shall make funds available to pay for corrective actions in an amount not to exceed the coverage limits specified above.

If [owner or operator] fails to satisfy a judgment or award based on a determination of liability for bodily injury or property damage to third parties caused by ["sudden" and/or "nonsudden"] accidental releases arising from the operation of the above-identified tank(s), or fails to pay an amount agreed to in settlement of a claim arising from or alleged to arise from such injury or damage, the guarantor, upon written instructions from the [Director], shall make funds available to compensate third parties for bodily injury and property damage in an amount not to exceed the coverage limits specified above.

(4) Guarantor agrees that if at the end of any fiscal year before cancellation of this guarantee, the guarantor fails to meet or exceed the requirements of the financial responsibility mechanism specified in paragraph (1), guarantor shall send within 120 days of such failure, by certified mail, notice to [local government owner or operator], as evidenced by the return receipt.

(5) Guarantor agrees to notify [owner or operator] by certified mail of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code naming guarantor as debtor, within 10 days after commencement of the proceeding.

(6) Guarantor agrees to remain bound under this guarantee notwithstanding any modification or alteration of any obligation of [owner or operator] pursuant to 40 CFR part 280.

(7) Guarantor agrees to remain bound under this guarantee for so long as [local government owner or operator] must comply with the applicable financial responsibility requirements of 40 CFR part 280, subpart H for the above identified tank(s), except that guarantor may cancel this guarantee by sending notice by certified mail to [owner or operator], such cancellation to become effective no earlier than 120 days after receipt of such notice by [owner or operator], as evidenced by the return receipt. If notified of a probable release, the guarantor agrees to remain bound to the terms of this guarantee for all charges arising from the release, up to the coverage limits specified above, notwithstanding the cancellation of the guarantee with respect to future releases.

(8) The guarantor's obligation does not apply to any of the following:

(a) Any obligation of [local government owner or operator] under a workers' compensation disability benefits, or unemployment compensation law or other similar law;

(b) Bodily injury to an employee of [insert: local government owner or operator] arising from, and in the course of, employment by [insert: local government owner or operator];

(c) Bodily injury or property damage arising from the ownership, maintenance, use, or entrustment to others of any aircraft, motor vehicle, or watercraft;

(d) Property damage to any property owned, rented, loaded to, in the care, custody, or control of, or occupied by [insert: local government owner or operator] that is not the direct result of a release from a petroleum underground storage tank;

(e) Bodily damage or property damage for which [insert: owner or operator] is obligated to pay damages by reason of the assumption of liability in a contract or agreement other than a contract or agreement entered into to meet the requirements of 40 CFR part 280.93.

(9) Guarantor expressly waives notice of acceptance of this guarantee by [the implementing agency], by any or all third parties, or by [local government owner or operator],

I hereby certify that the wording of this guarantee is identical to the wording specified in 40 CFR part 280.106(e) as such regulations were constituted on the effective date shown immediately below.

Effective date:_____

[Name of guarantor]

[Authorized signature for guarantor]

[Name of person signing]

[Title of person signing]

Signature of witness or notary:

[58 FR 9056, Feb. 18, 1993]

**§ 280.107 Local government fund.**

A local government owner or operator may satisfy the requirements of §280.93 by establishing a dedicated fund account that conforms to the requirements of this section. Except as specified in paragraph (b), a dedicated fund may not be commingled with other funds or otherwise used in normal operations. A dedicated fund will be considered eligible if it meets one of the following requirements:

(a) The fund is dedicated by state constitutional provision, or local government statute, charter, ordinance, or order to pay for taking corrective action and for compensating third parties for bodily injury and property damage caused by accidental releases arising from the operation of petroleum underground storage tanks and is funded for the full amount of coverage required under §280.93, or funded for part of the required amount of coverage and used in combination with other mechanism(s) that provide the remaining coverage; or

(b) The fund is dedicated by state constitutional provision, or local government statute, charter, ordinance, or order as a contingency fund for general emergencies, including taking corrective action and compensating third parties for bodily injury and property damage caused by accidental releases arising from the operation of petroleum underground storage tanks, and is funded for five times the full amount of coverage required under §280.93, or funded for part of the required amount of coverage and used in combination with other mechanism(s) that provide the remaining coverage. If the fund is funded for less than five times the amount of coverage required under §280.93, the amount of financial responsibility demonstrated by the fund may not exceed one-fifth the amount in the fund; or

(c) The fund is dedicated by state constitutional provision, or local government statute, charter, ordinance or order to pay for taking corrective action and for compensating third parties for bodily injury and property damage caused by accidental releases arising from the operation of petroleum underground storage tanks. A payment is made to the fund once every year for seven years until the fund is fully-funded. This seven year period is hereafter referred to as the "pay-in-period." The amount of each payment must be determined by this formula:

$$\frac{TF - CF}{Y}$$

Where TF is the total required financial assurance for the owner or operator, CF is the current amount in the fund, and Y is the number of years remaining in the pay-in-period, and;

(1) The local government owner or operator has available bonding authority, approved through voter referendum (if such approval is necessary prior to the issuance of bonds), for an amount equal to the difference between the required amount of coverage and the amount held in the dedicated fund. This bonding authority shall be available for taking corrective action and for

compensating third parties for bodily injury and property damage caused by accidental releases arising from the operation of petroleum underground storage tanks, or

(2) The local government owner or operator has a letter signed by the appropriate state attorney general stating that the use of the bonding authority will not increase the local government's debt beyond the legal debt ceilings established by the relevant state laws. The letter must also state that prior voter approval is not necessary before use of the bonding authority.

(d) To demonstrate that it meets the requirements of the local government fund, the chief financial officer of the local government owner or operator and/or guarantor must sign a letter worded exactly as follows, except that the instructions in brackets are to be replaced by the relevant information and the brackets deleted:

Letter from Chief Financial Officer

I am the chief financial officer of [insert: name and address of local government owner or operator, or guarantor]. This letter is in support of the use of the local government fund mechanism to demonstrate financial responsibility for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage"] caused by [insert: "sudden accidental releases" and/or "nonsudden accidental releases"] in the amount of at least [insert: dollar amount] per occurrence and [insert: dollar amount] annual aggregate arising from operating (an) underground storage tank(s).

Underground storage tanks at the following facilities are assured by this local government fund mechanism: [List for each facility: the name and address of the facility where tanks are assured by the local government fund].

[Insert: "The local government fund is funded for the full amount of coverage required under §280.93, or funded for part of the required amount of coverage and used in combination with other mechanism(s) that provide the remaining coverage." or "The local government fund is funded for ten times the full amount of coverage required under §280.93, or funded for part of the required amount of coverage and used in combination with other mechanisms(s) that provide the remaining coverage," or "A payment is made to the fund once every year for seven years until the fund is fully-funded and [name of local government owner or operator] has available bonding authority, approved through voter referendum, of an amount equal to the difference between the required amount of coverage and the amount held in the dedicated fund" or "A payment is made to the fund once every year for seven years until the fund is fully-funded and I have attached a letter signed by the State Attorney General stating that (1) the use of the bonding authority will not increase the local government's debt beyond the legal debt ceilings established by the relevant state laws and (2) that prior voter approval is not necessary before use of the bonding authority"].

The details of the local government fund are as follows:

Amount in Fund (market value of fund at close of last fiscal year):_____

[If fund balance is incrementally funded as specified in §280.107(c), insert:

Amount added to fund in the most recently completed fiscal year:_____

Number of years remaining in the pay-in period: ____]

A copy of the state constitutional provision, or local government statute, charter, ordinance or order dedicating the fund is attached.

I hereby certify that the wording of this letter is identical to the wording specified in 40 CFR 280.107(d) as such regulations were constituted on the date shown immediately below.

[Date]

[Signature]

[Name]

[Title]

[58 FR 9059, Feb. 18, 1993]

**§ 280.108 Substitution of financial assurance mechanisms by owner or operator.**

(a) An owner or operator may substitute any alternate financial assurance mechanisms as specified in this subpart, provided that at all times he maintains an effective financial assurance mechanism or combination of mechanisms that satisfies the requirements of §280.93.

(b) After obtaining alternate financial assurance as specified in this subpart, an owner or operator may cancel a financial assurance mechanism by providing notice to the provider of financial assurance.

[53 FR 43370, Oct. 26, 1988. Redesignated at 58 FR 9051, Feb. 18, 1993]

**§ 280.109 Cancellation or nonrenewal by a provider of financial assurance.**

(a) Except as otherwise provided, a provider of financial assurance may cancel or fail to renew an assurance mechanism by sending a notice of termination by certified mail to the owner or operator.

(1) Termination of a local government guarantee, a guarantee, a surety bond, or a letter of credit may not occur until 120 days after the date on which the owner or operator receives the notice of termination, as evidenced by the return receipt.

(2) Termination of insurance or risk retention coverage, except for non-payment or misrepresentation by the insured, or state-funded assurance may not occur until 60 days after the date on which the owner or operator receives the notice of termination, as evidenced by the return receipt. Termination for non-payment of premium or misrepresentation by the insured may not occur until a minimum of 10 days after the date on which the owner or operator receives the notice of termination, as evidenced by the return receipt.

(b) If a provider of financial responsibility cancels or fails to renew for reasons other than incapacity of the provider as specified in §280.114, the owner or operator must obtain alternate coverage as specified in this section within 60 days after receipt of the notice of termination. If the owner or operator fails to obtain alternate coverage within 60 days after receipt of the notice of termination, the owner or operator must notify the Director of the implementing agency of such failure and submit:

(1) The name and address of the provider of financial assurance;

(2) The effective date of termination; and

(3) The evidence of the financial assistance mechanism subject to the termination maintained in accordance with §280.107(b).

[58 FR 9051, Feb. 18, 1993]

**§ 280.110 Reporting by owner or operator.**

(a) An owner or operator must submit the appropriate forms listed in §280.111(b) documenting current evidence of financial responsibility to the Director of the implementing agency:

(1) Within 30 days after the owner or operator identifies a release from an underground storage tank required to be reported under §280.53 or §280.61;

(2) If the owner or operator fails to obtain alternate coverage as required by this subpart, within 30 days after the owner or operator receives notice of:

(i) Commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming a provider of financial assurance as a debtor,

(ii) Suspension or revocation of the authority of a provider of financial assurance to issue a financial assurance mechanism,

(iii) Failure of a guarantor to meet the requirements of the financial test,

(iv) Other incapacity of a provider of financial assurance; or

(3) As required by §280.95(g) and §280.109(b).

(b) An owner or operator must certify compliance with the financial responsibility requirements of this part as specified in the new tank notification form when notifying the appropriate state or local agency of the installation of a new underground storage tank under §280.22.

(c) The Director of the Implementing Agency may require an owner or operator to submit evidence of financial assurance as described in §280.111(b) or other information relevant to compliance with this subpart at any time.

[58 FR 9051, Feb. 18, 1993]

**§ 280.111 Recordkeeping.**

(a) Owners or operators must maintain evidence of all financial assurance mechanisms used to demonstrate financial responsibility under this subpart for an underground storage tank until released from the requirements of this subpart under §208.113. An owner or operator must maintain such evidence at the underground storage tank site or the owner's or operator's place of work. Records maintained off-site must be made available upon request of the implementing agency.

(b) An owner or operator must maintain the following types of evidence of financial responsibility:

(1) An owner or operator using an assurance mechanism specified in §§280.95 through 280.100 or §280.102 or §§280.104 through 280.107 must maintain a copy of the instrument worded as specified.

(2) An owner or operator using a financial test or guarantee, or a local government financial test or a local government guarantee supported by the local government financial test must maintain a copy of the chief financial officer's letter based on year-end financial statements for the most recent completed financial reporting year. Such evidence must be on file no later than 120 days after the close of the financial reporting year.

(3) An owner or operator using a guarantee, surety bond, or letter of credit must maintain a copy of the signed standby trust fund agreement and copies of any amendments to the agreement.

(4) A local government owner or operator using a local government guarantee under §280.106(d) must maintain a copy of the signed standby trust fund agreement and copies of any amendments to the agreement.

(5) A local government owner or operator using the local government bond rating test under §280.104 must maintain a copy of its bond rating published within the last twelve months by Moody's or Standard & Poor's.

(6) A local government owner or operator using the local government guarantee under §280.106, where the guarantor's demonstration of financial responsibility relies on the bond rating test

under §280.104 must maintain a copy of the guarantor's bond rating published within the last twelve months by Moody's or Standard & Poor's.

(7) An owner or operator using an insurance policy or risk retention group coverage must maintain a copy of the signed insurance policy or risk retention group coverage policy, with the endorsement or certificate of insurance and any amendments to the agreements.

(8) An owner or operator covered by a state fund or other state assurance must maintain on file a copy of any evidence of coverage supplied by or required by the state under §280.101(d).

(9) An owner or operator using a local government fund under §280.107 must maintain the following documents:

(i) A copy of the state constitutional provision or local government statute, charter, ordinance, or order dedicating the fund, and

(ii) Year-end financial statements for the most recent completed financial reporting year showing the amount in the fund. If the fund is established under §280.107(a)(3) using incremental funding backed by bonding authority, the financial statements must show the previous year's balance, the amount of funding during the year, and the closing balance in the fund.

(iii) If the fund is established under §280.107(a)(3) using incremental funding backed by bonding authority, the owner or operator must also maintain documentation of the required bonding authority, including either the results of a voter referendum (under §280.107(a)(3)(i)), or attestation by the State Attorney General as specified under §280.107(a)(3)(ii).

(10) A local government owner or operator using the local government guarantee supported by the local government fund must maintain a copy of the guarantor's year-end financial statements for the most recent completed financial reporting year showing the amount of the fund.

(11)(i) An owner or operator using an assurance mechanism specified in §§280.95 through 280.107 must maintain an updated copy of a certification of financial responsibility worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

Certification of Financial Responsibility

[Owner or operator] hereby certifies that it is in compliance with the requirements of subpart H of 40 CFR part 280.

The financial assurance mechanism(s) used to demonstrate financial responsibility under subpart H of 40 CFR part 280 is (are) as follows:

[For each mechanism, list the type of mechanism, name of issuer, mechanism number (if applicable), amount of coverage, effective period of coverage and whether the mechanism covers

"taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases."]

[Signature of owner or operator]

[Name of owner or operator]

[Title]

[Date]

[Signature of witness or notary]

[Name of witness or notary]

[Date]

(ii) The owner or operator must update this certification whenever the financial assurance mechanism(s) used to demonstrate financial responsibility change(s).

[58 FR 9051, Feb. 18, 1993]

**§ 280.112 Drawing on financial assurance mechanisms.**

(a) Except as specified in paragraph (d) of this section, the Director of the implementing agency shall require the guarantor, surety, or institution issuing a letter of credit to place the amount of funds stipulated by the Director, up to the limit of funds provided by the financial assurance mechanism, into the standby trust if:

(1)(i) The owner or operator fails to establish alternate financial assurance within 60 days after receiving notice of cancellation of the guarantee, surety bond, letter of credit, or, as applicable, other financial assurance mechanism; and

(ii) The Director determines or suspects that a release from an underground storage tank covered by the mechanism has occurred and so notifies the owner or operator or the owner or operator has notified the Director pursuant to subparts E or F of a release from an underground storage tank covered by the mechanism; or

(2) The conditions of paragraph (b)(1) or (b)(2) (i) or (ii) of this section are satisfied.

(b) The Director of the implementing agency may draw on a standby trust fund when:

(1) The Director makes a final determination that a release has occurred and immediate or long-term corrective action for the release is needed, and the owner or operator, after appropriate

notice and opportunity to comply, has not conducted corrective action as required under 40 CFR part 280, subpart F; or

(2) The Director has received either:

(i) Certification from the owner or operator and the third-party liability claimant(s) and from attorneys representing the owner or operator and the third-party liability claimant(s) that a third-party liability claim should be paid. The certification must be worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

Certification of Valid Claim

The undersigned, as principals and as legal representatives of [insert: owner or operator] and [insert: name and address of third-party claimant], hereby certify that the claim of bodily injury [and/or] property damage caused by an accidental release arising from operating [owner's or operator's] underground storage tank should be paid in the amount of $[_____].

[Signatures]

Owner or Operator

Attorney for Owner or Operator

(Notary)

Date

[Signatures]

Claimant(s)

Attorney(s) for Claimant(s)

(Notary)

Date

or (ii) A valid final court order establishing a judgment against the owner or operator for bodily injury or property damage caused by an accidental release from an underground storage tank covered by financial assurance under this subpart and the Director determines that the owner or operator has not satisfied the judgment.

(c) If the Director of the implementing agency determines that the amount of corrective action costs and third-party liability claims eligible for payment under paragraph (b) of this section may exceed the balance of the standby trust fund and the obligation of the provider of financial

assurance, the first priority for payment shall be corrective action costs necessary to protect human health and the environment. The Director shall pay third-party liability claims in the order in which the Director receives certifications under paragraph (b)(2)(i) of this section, and valid court orders under paragraph (b)(2)(ii) of this section.

(d) A governmental entity acting as guarantor under §280.106(e), the local government guarantee without standby trust, shall make payments as directed by the Director under the circumstances described in §280.112 (a), (b), and (c).

[58 FR 9052, Feb. 18, 1993]

**§ 280.113 Release from the requirements.**

An owner or operator is no longer required to maintain financial responsibility under this subpart for an underground storage tank after the tank has been properly closed or, if corrective action is required, after corrective action has been completed and the tank has been properly closed as required by 40 CFR part 280, subpart G.

[53 FR 43370, Oct. 26, 1988. Redesignated at 58 FR 9051, Feb. 18, 1993]

**§ 280.114 Bankruptcy or other incapacity of owner or operator or provider of financial assurance.**

(a) Within 10 days after commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming an owner or operator as debtor, the owner or operator must notify the Director of the implementing agency by certified mail of such commencement and submit the appropriate forms listed in §280.111(b) documenting current financial responsibility.

(b) Within 10 days after commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming a guarantor providing financial assurance as debtor, such guarantor must notify the owner or operator by certified mail of such commencement as required under the terms of the guarantee specified in §280.96.

(c) Within 10 days after commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming a local government owner or operator as debtor, the local government owner or operator must notify the Director of the implementing agency by certified mail of such commencement and submit the appropriate forms listed in §280.111(b) documenting current financial responsibility.

(d) Within 10 days after commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming a guarantor providing a local government financial assurance as debtor, such guarantor must notify the local government owner or operator by certified mail of such commencement as required under the terms of the guarantee specified in §280.106.

(e) An owner or operator who obtains financial assurance by a mechanism other than the financial test of self-insurance will be deemed to be without the required financial assurance in the event of a bankruptcy or incapacity of its provider of financial assurance, or a suspension or revocation of the authority of the provider of financial assurance to issue a guarantee, insurance policy, risk retention group coverage policy, surety bond, letter of credit, or state-required mechanism. The owner or operator must obtain alternate financial assurance as specified in this subpart within 30 days after receiving notice of such an event. If the owner or operator does not obtain alternate coverage within 30 days after such notification, he must notify the Director of the implementing agency.

(f) Within 30 days after receipt of notification that a state fund or other state assurance has become incapable of paying for assured corrective action or third-party compensation costs, the owner or operator must obtain alternate financial assurance.

[58 FR 9053, Feb. 18, 1993]

**§ 280.115 Replenishment of guarantees, letters of credit, or surety bonds.**

(a) If at any time after a standby trust is funded upon the instruction of the Director of the implementing agency with funds drawn from a guarantee, local government guarantee with standby trust, letter of credit, or surety bond, and the amount in the standby trust is reduced below the full amount of coverage required, the owner or operator shall by the anniversary date of the financial mechanism from which the funds were drawn:

(1) Replenish the value of financial assurance to equal the full amount of coverage required, or

(2) Acquire another financial assurance mechanism for the amount by which funds in the standby trust have been reduced.

(b) For purposes of this section, the full amount of coverage required is the amount of coverage ed by §280.93 of this subpart. If a combination of mechanisms was used to provide the assurance funds which were drawn upon, replenishment shall occur by the earliest anniversary date among the mechanisms.

[58 FR 9053, Feb. 18, 1993]

**§ 280.116 Suspension of enforcement. [Reserved]**

# APPENDIX 280.1 - GUIDELINES FOR THE EVALUATION OF UNDERGROUND STORAGE TANK CATHODIC PROTECTION SYSTEMS

# TABLE OF CONTENTS

**SECTION 1 – GENERAL**
1.1 Introduction …….. 1

**SECTION 2 – REGULATIONS**
2.1 Rules …… 2

**SECTION 3 – TYPES OF CATHODIC PROTECTION**
3.1 General …… 4
3.2 Galvanic Systems ……... 4
3.3 Impressed Current Systems …….. 4

**SECTION 4 – QUALIFICATIONS TO TEST CATHODIC PROTECTION SYSTEMS**
4.1 Qualifications ……... 5

**SECTION 5 – INSTALLATION/REPAIR OF CATHODIC PROTECTION SYSTEMS**
5.1 Galvanic Systems ……... 6
5.1.1 sti-$P_3$® Tanks ……... 6
5.1.2 Factory Coated Metallic Piping …… 6
5.1.3 Non-factory Coated Metallic Piping …… 6
5.1.4 Metallic Piping Installation/Repair ……... 6
5.2 Impressed Current Systems …….. 8
5.2.1 Rectifier Adjustment …… 8

**SECTION 6 – CATHODIC PROTECTION TESTING**
6.1 Equipment …… 9
6.1.1 Voltmeter/Ammeter …… 9
6.1.2 Reference Electrode ……... 10
6.1.3 Lead Wires/Test Probes/Miscellaneous …….. 11
6.2 Test Criteria …… 12
6.3 Voltage (IR) Drops …….. 13
6.4 Stray Current …….. 14
6.5 Dissimilar Metals/Bimetallic Couples ……... 15
6.6 Other Test Considerations …… 16
6.7 Continuity Testing ……... 18
6.7.1 Continuity Testing of Galvanic Systems …… 19
6.7.2 Continuity Testing of Impressed Current Systems …… 19
6.8 Reference Electrode Placement …… 19
6.8.1 General ……..…… 19
6.8.2 Local Placement …….. 19
6.8.3 Remote Placement …… 20
6.8.4 Galvanic Placement …… 20
6.8.5 Impressed Current Placement …….. 21
6.9 Soil Access …….. 21
6.10 Cathodic Protection Test Locations …… 22
6.10.1 Galvanically Protected (sti-$P_3$® ) Tanks ……..…. 22
6.10.2 Galvanically Protected Metallic Piping ……... 23

6.10.3 Tanks Protected by Impressed Current ..... 25
6.10.4 Piping Protected by Impressed Current ..... 26
6.10.5 "100 Foot Rule" for Piping ..... 27

**SECTION 7 – DOCUMENTATION OF EVALUATION**

7.1 Documentation ..... 28
7.1.1 As Built Drawings ..... 28
7.1.2 Site Drawing ..... 28
7.1.3 MDEQ UST Cathodic Protection Evaluation Form ..... 29
7.1.4 Pass/Fail/Inconclusive ..... 30
7.2 Corrosion Expert's Evaluation ..... 30
7.3 What if the Evaluation Result is Fail? ..... 31

**FIGURE 1** ILLUSTRATION OF REFERENCE ELECTRODE CALIBRATION ..... 11
**FIGURE 2** GRAPHIC REPRESENTATION OF VOLTAGE DROP IN "ON" POTENTIAL ..... 13
**FIGURE 3** LOCAL REFERENCE ELECTRODE PLACEMENT FOR sti-$P_3$® TANKS ..... 22
**FIGURE 4** REMOTE EARTH REFERENCE ELECTRODE PLACEMENT ..... 23
**FIGURE 5** LOCAL REFERENCE ELECTRODE PLACEMENT FOR GALVANICALLY PROTECTED PIPING WHEN PIPING ANODES ARE AT TANKS ..... 23
**FIGURE 6** LOCAL REFERENCE ELECTRODE PLACEMENT FOR GALVANICALLY PROTECTED PIPING WHEN PIPING ANODES ARE AT DISPENSERS ..... 24
**FIGURE 7** LOCAL REFERENCE ELECTRODE PLACEMENT FOR GALVANICALLY PROTECTED PIPING WHEN PIPING ANODES ARE AT BOTH ENDS OF THE PIPING ..... 24
**FIGURE 8** LOCAL REFERENCE ELECTRODE PLACEMENT FOR GALVANICALLY PROTECTED PIPING WHEN ANODES ARE INSTALLED AT CENTER OF PIPING OR LOCATION IS UNKNOWN ..... 25
**FIGURE 9** REFERENCE ELECTRODE PLACEMENT FOR TANKS PROTECTED BY IMPRESSED CURRENT SYSTEM WHEN ANODES ARE EVENLY DISTRIBUTED ..... 25
**FIGURE 10** REFERENCE ELECTRODE PLACEMENT FOR TANKS PROTECTED BY IMPRESSED CURRENT SYSTEM WHEN ANODES ARE UNEVENLY DISTRIBUTED ..... 26
**FIGURE 11** REFERENCE ELECTRODE PLACEMENT FOR METALLIC PIPING PROTECTED BY IMPRESSED CURRENT SYSTEM ..... 27
**FIGURE 12** "100 FOOT RULE" FOR METALLIC PIPING PROTECTED BY GALVANIC OR IMPRESSED CURRENT SYSTEM ..... 27
**FIGURE 13** EXAMPLE OF A SITE DRAWING CONSTRUCTED AS PART OF A UST SYSTEM CATHODIC PROTECTION SURVEY ..... 29

**APPENDIX A** Industry Codes/Standards, References and Regulations
**APPENDIX B** Glossary
**APPENDIX C** Interpretation of Structure-to-Soil Potential Measurements (Voltages) Obtained on Galvanic Cathodic Protection Systems
**APPENDIX D** Interpretation of Structure-to-Soil Potential Measurements (Voltages) Obtained on Impressed Current Cathodic Protection Systems

**APPENDIX E** Continuity Testing Procedure for Galvanic/Impressed Current Systems

**APPENDIX F** Structure-to-Soil Test Procedure for Galvanic Cathodic Protection Systems

**APPENDIX G** Structure-to-Soil Test Procedure for Impressed Current Cathodic Protection Systems

**APPENDIX H** Checklist for Galvanic Cathodic Protection System Survey

**APPENDIX I** Checklist for Impressed Current Cathodic Protection System Survey

**APPENDIX J** Typical Potentials of Selected Metals

**APPENDIX K** Galvanic (Sacrificial Anode) Cathodic Protection System Evaluation Form

**APPENDIX L** Impressed Current Cathodic Protection System Evaluation Form

**APPENDIX M** Impressed Current Cathodic Protection System 60 Day Record of Rectifier Operation

## SECTION 1 – GENERAL

### 1.1 Introduction

The purpose of this document is to establish the policy of this office regarding the evaluation of cathodic protection systems operating on underground storage tank (UST) systems in the State of Mississippi. While conducting structure-to-soil potential surveys is the primary means of testing cathodic protection systems, other aspects related to the evaluation, installation, operation and repair of cathodic protection systems are also addressed in this document where necessary.

Evaluation of cathodic protection systems to ensure they are functioning as intended has proven to be one of the more problematic areas that has led to a great deal of confusion and various practices among individuals engaged in the field of cathodic protection. Because the applicable regulations contain no specific criteria and instead defer to industry standards, a large degree of latitude has historically been provided for interpretation of what constitutes an acceptable evaluation.

Since there are many factors that can affect cathodic protection, there is understandably no standard test method or "cookie-cutter" approach that will work at every site that has a cathodic protection system in operation. Therefore, the primary intent of this policy is to create a level playing field in which everyone engaged in the field of UST system cathodic protection in the State of Mississippi understands what is expected. The second focus of this policy is to provide that documentation sufficient to reproduce the results generated by a cathodic protection tester must be established in order to conduct a valid cathodic protection evaluation. To this end, forms that must be utilized when evaluating cathodic protection are included in Appendix K and L of this document.

It is further necessary to understand that the creation of this policy has necessitated a compromise to some degree. Every effort has been made so as not to place an unduly harsh burden on the tank owners and contractors who operate in the State of Mississippi. At the same time, it is necessary to be protective of human health and the environment to the degree required to achieve the charge of the Mississippi Department of Environmental Quality (MDEQ). This document represents the best efforts of the MDEQ to assure that cathodic protection systems operate as intended and effectively mitigate corrosion while being mindful of the economic constraints that must be considered.

Some of the more important points established with this guidance document are:

- Access to the soil directly over the structure that is being tested must be provided.
- Both "local" and "remote" structure-to-soil potentials must be obtained on galvanic systems.
- "Instant off" potentials must be obtained on all impressed current systems.
- Continuity/isolation must be established whenever a cathodic protection survey is conducted.
- Under certain conditions a "corrosion expert" must evaluate the cathodic protection survey.
- A person must meet certain minimum qualifications in order to conduct an effective evaluation.

Simply conducting a structure-to-soil potential survey does not adequately evaluate a cathodic protection system. Other considerations that may need to be addressed are outlined in the text of this document and include: continuity measurements; evaluation of rectifier operation; current distribution among an impressed current anode ground bed; consideration of voltage drops; assurance of wiring integrity; continuity bonds; as built drawings and others.

This policy is not intended to replace any statute or regulatory requirement concerning the installation, repair, operation or testing of cathodic protection systems. Rather, it is intended to state the interpretation of the MDEQ with regard to the implementation of those rules and regulations applicable to UST cathodic protection systems.

## SECTION 2 - REGULATIONS

### 2.1 Rules

Federal and state laws require that any component of a UST system that routinely contains product and is in contact with the soil must be protected from corrosion. If the UST component in question is of metallic construction and it is in contact with the soil and/or water, it must be cathodically protected. If it is cathodically protected it must also be coated with a suitable dielectric material if the metallic component in question was installed after December 22, 1988.

The rules also require that all cathodic protection systems must be evaluated within six months of installation/repair and once every three years thereafter. Consideration should be given to evaluating impressed current systems on an annual basis since these types of systems are more susceptible to failure or may be in need of adjustment on a more frequent basis in order to provide adequate cathodic protection.

The MDEQ UST regulations reference several industry codes and practices and a listing of these may be found in Appendix A of this document. Following are the pertinent paragraphs the UST rules that are related to cathodic protection:

280.12 Definitions

> "Cathodic Protection" is a technique to prevent corrosion of a metal surface by making that surface the cathode of an electrochemical cell. For example, a tank system can be cathodically protected through the application of either galvanic anodes or impressed current.
>
> "Cathodic protection tester" means a person who can demonstrate an understanding of the principles and measurements of all common types of cathodic protection systems as applied to buried or submerged metal piping and tank systems. At a minimum, such persons must have education and experience in soil resistivity, stray current, structure-to-soil potential, and component electrical isolation measurements of buried metal piping and tank systems.

"Corrosion expert" means a person who, by reason of thorough knowledge of the physical sciences and the principles of engineering and mathematics acquired by a professional education and related practical experience, is qualified to engage in the practice of corrosion control on buried or submerged metal piping systems and metal tanks. Such a person must be accredited or certified as being qualified by the National Association of Corrosion Engineers (NACE) or be 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.

280.20 Performance Standards for New UST Systems

(a) (2) The tank is constructed of steel and cathodically protected in the following manner:

(i) The tank is coated with a suitable dielectric material;

(ii) Field-installed cathodic protection systems are designed by a corrosion expert;

(iii) Impressed current systems are designed to allow determination of current operating status as required in 280.32 (c); and

(iv) Cathodic protection systems are operated and maintained in accordance with 280.32.

280.32 Operation and Maintenance of Corrosion Protection

(a) All corrosion protection systems must be operated and maintained to continuously provide corrosion protection to the metal components of that portion of the tank and piping that routinely contain regulated substances and are in contact with the ground.

(b) All UST systems equipped with cathodic protection systems must be inspected for proper operation by a qualified cathodic protection tester in accordance with the following requirements:

(1) *Frequency*. All cathodic protection systems must be tested within 6 months of installation and at least every 3 years thereafter.

(2) *Inspection Criteria*. The criteria that are used to determine that cathodic protection is adequate as required by this section must be in accordance with a code of practice developed by a nationally recognized association.

(c) UST systems with impressed current cathodic protection systems must also be inspected every 60 days to ensure the equipment is running properly.

(d) For UST systems using cathodic protection, records of the operation of the cathodic protection must be maintained (in accordance with 280.35) to demonstrate compliance with the performance standards in this section. These records must provide the following:

(1) The results of the last three inspections required in paragraph (c) above;

(2) The results of testing from the last two inspections required in paragraph (b) above.

280.34 Repairs Allowed

(e) Within 6 months following the repair of any cathodically protected UST system, the cathodic protection system must be tested in accordance with 280.32 (b) and (c) to ensure that it is operating properly.

## SECTION 3 - TYPES OF CATHODIC PROTECTION

### 3.1 General

The two types of cathodic protection that are typically installed on UST systems are galvanic (sacrificial anode) and impressed current systems. An attempt to explain the principles involved in the theory of cathodic protection is beyond the scope of this document and it is assumed the reader has a basic understanding of the subject. However, stated in the simplest terms, both of these types of cathodic protection attempt to reverse the flow of electric current away from the metal that is intended to be protected from corrosion. Both types of cathodic protection prevent electric current from leaving the protected structure by supplying an electrical charge in the form of DC power sufficient to overcome any current that would otherwise leave the structure. The way in which the required electrical current is provided is what distinguishes the two types of cathodic protection.

### 3.2 Galvanic Systems

Galvanic systems are also known as sacrificial anode systems because an anode (usually zinc or magnesium) corrodes instead of the protected metal. Because the anode corrodes instead of the metal that it is protecting, the anode is said to sacrifice itself. Sacrificial anodes are connected directly to the structure to be protected by either welding or mechanical connection of lead wires.

Galvanic systems are generally limited to those tank components that are well coated with a dielectric material (sti-$P_3$® tanks or fusion bonded epoxy coated steel piping) because the available current output of these systems is low. Attempts to protect long runs of uncoated piping or uncoated tanks generally is not practical because the useful life of the anodes is too short or the number of anodes needed is too great.

### 3.3 Impressed Current Systems

Impressed current systems are sometimes called rectifier systems because they utilize a device (a rectifier) to convert an external AC power source to the required DC power source. In this type of system, anodes are installed in the soil around the structure to be protected and the DC power is supplied to the anodes through buried wires. The power to the rectifier cannot be interrupted except when conducting maintenance or testing activities. Normally, a dedicated and protected circuit is provided for the impressed current system so that the power cannot be inadvertently cut off.

In impressed current systems the protected structure is bonded to the DC power system to complete the electrical circuit. It is critical that the anodes are connected to the positive terminal and the protected structure to the negative terminal of the rectifier. Reversal of the lead wires will make the components of the tank system anodic and can cause a rapid failure of the tank system due to corrosion. In addition, it is critical that all wire connections and splices are well insulated. Any breaks in the wiring insulation will allow current to leave the wire at that point and a rapid failure of the wire can occur due to corrosion.

Impressed current systems are generally installed on those tank systems that were installed prior to the effective date of the UST regulations since these tanks usually do not have a good dielectric coating. The level of cathodic protection provided by an impressed current system can be adjusted since the voltage produced by the rectifier can be changed. Because conditions that affect the level of cathodic protection needed are likely to change over time, adjustment of the rectifier is frequently necessary.

## SECTION 4 – QUALIFICATIONS TO TEST CATHODIC PROTECTION SYSTEMS

### 4.1 Qualifications

In order to test cathodic protection systems in the State of Mississippi, an individual must meet certain minimum qualifications. It is the intent of the MDEQ that those individuals who meet the minimum qualifications perform testing in a manner that is consistent with the policies of this guidance document. Should an individual who meets the minimum qualifications as described below not possess the knowledge and expertise needed to properly evaluate a cathodic protection system, that individual should not attempt to undertake such an evaluation.

While it is not necessary to be an "expert" to test cathodic protection systems in most cases, it should be recognized that the proper evaluation of the two types of cathodic protection systems may require differing levels of expertise. Impressed current systems are inherently more involved and require a higher level of understanding than galvanic systems. In addition, certain circumstances and conditions may exist that would preclude an individual from making an effective evaluation of a cathodic protection system without the assistance of someone who is more qualified.

Because the testing of impressed current systems is inherently more complicated, someone who is only minimally qualified as a "tester" should recognize that he may or may not be able to properly evaluate all such systems. Galvanic cathodic protection systems that are operating as designed are normally straightforward and a lesser degree of expertise is needed to properly evaluate such systems. However, troubleshooting and/or repair of such systems may require someone who has a higher level of expertise than a person who is only minimally qualified as a tester.

Scenarios that require an expert to either conduct or evaluate the cathodic protection survey are listed in Section 7.2 of this document. It should be recognized that there might be other circumstances that require an expert although they may not be specifically listed. A listing of those individuals who meet the qualifications of an expert (certified as either as a "corrosion specialist" or a "cathodic protection specialist") can be found at the web site of NACE International (www.nace.org).

Listed below are the minimum qualifications necessary to test cathodic protection:

- Anyone who meets the definition of "cathodic protection tester" as found in 40 CFR 280.10 is recognized as qualified to test cathodic protection.

- Anyone who holds a certification from NACE International which that organization recognizes at a minimum as qualifying that person as a cathodic protection tester.

- Anyone who is certified by the MDEQ as a UST installer is recognized as being able to test cathodic protection systems provided they are familiar with the concepts involved and abide by the requirements contained within this guidance document. If a UST installer does not understand the basic concepts related to the testing, maintenance and operation of cathodic protection systems, that person should not attempt to evaluate such systems.

Should it be determined that a MDEQ certified UST installer is conducting evaluations of UST cathodic protection systems in a manner that is not consistent with the intent of the MDEQ policy, they may be subject to penalty and/or revocation of their UST installer certification upon a determination of good cause by the Mississippi Commission on Environmental Quality.

## SECTION 5 - INSTALLATION/REPAIR OF CATHODIC PROTECTION SYSTEMS

### 5.1 Galvanic Systems

#### 5.1.1 sti-$P_3$® Tanks

Anyone who is a MDEQ certified UST installer may repair the cathodic protection system of a sti-$P_3$® tank provided any provisions the tank manufacturer may have are also met. The design requirements for the installation of additional sacrificial anodes to a sti-$P_3$® tank may be met without the need for a corrosion expert to design such, provided the provisions of the Steel Tank Institute "Recommended Practice for the Installation of Supplemental Anodes for sti-$P_3$® UST's R-972-01" are followed. An evaluation of the cathodic protection system must be conducted within six months of the installation/repair in accordance with the requirements of this document.

#### 5.1.2 Factory Coated Metallic Piping

Installation of sacrificial anodes to factory coated (fusion bonded epoxy) metallic piping may be accomplished without the design of a corrosion expert provided the provisions of the Steel Tank Institute "Recommended Practice for Corrosion Protection of Underground Piping Networks Associated with Liquid Storage and Dispensing Systems R892-91" are followed. As an alternative, the practices as described in the Petroleum Equipment Institute "RP 100–2000 Recommended Practices for the Installation of Underground Liquid Storage Systems" may also be followed when installing sacrificial anodes on factory coated piping.

#### 5.1.3 Non-factory Coated Metallic Piping

The installation and/or repair of a galvanic cathodic protection system installed on metallic piping that is not factory coated with a dielectric material may be accomplished by anyone who is a MDEQ certified UST installer. However, the design of the galvanic cathodic protection system must be accomplished by a corrosion expert. In addition, an evaluation of the cathodic

protection system must be conducted within six months of the installation/repair in accordance with the requirements of this document.

### 5.1.4 Metallic Piping Repair/Installation

Provided below are some general observations that are commonly applicable to questions that arise when attempting to meet the corrosion protection requirements on metallic piping and other metallic components of a typical UST system.

**Protected Components -** Any metallic component of the piping system, including all metallic nipples, ells, tees, couplings, unions, ball valves, etc. must be protected from corrosion if they are in contact with the soil and/or water. Corrosion protection may be accomplished by either a) isolating the component in question from contact with the soil and/or water or b) coating/wrapping with a suitable dielectric material and cathodic protection. Any isolation boot or containment sump designed to isolate the metallic component from contact with the soil must also prevent water from contacting the component in question in order to eliminate the need for cathodic protection. If the metallic component in question is cathodically protected, it must also be coated/wrapped with a suitable dielectric material if it was installed after December 22, 1988.

**Unprotected Components -** Metallic components of the UST system that do not require corrosion protection include: tank vent lines; any type of tank riser pipe; tank hold down straps; remote tank fill lines and submersible turbine pump (STP) heads. Although the pump head "routinely contains product", it is not required to meet the corrosion protection requirements and may be in contact with the soil or submerged in water without the need for cathodic protection. However, the pump head should remain visible (not buried) so that any obvious corrosion problems or leaks that may be present can be observed and appropriate action taken to prevent or repair any leaks.

**Repair -** Some confusion exists over whether or not metallic piping that has failed can be repaired or must be replaced. "Repaired" as related to steel pipe involves the replacement of the section of pipe that has failed. The entire run of steel piping does not have to be replaced but the repair must consist of replacement of the section of pipe that has failed. Only steel pipe that is factory coated with a dielectric material (fusion bonded epoxy) can be used to replace the failed section of pipe regardless of whether the existing pipe is galvanized or coated steel. Under no circumstances is it allowable to install galvanized piping when it is intended to serve as a product transfer line. Because of the complexities that may be involved in the cathodic protection of galvanized steel piping, a corrosion expert must evaluate and/or conduct the cathodic protection survey after the repair.

**Electrical Continuity -** Dielectric unions are normally not installed if the piping is protected by an impressed current system. It is essential that all metallic piping that is part of the UST system is bonded to the negative circuit of the impressed current system if it is buried. It is normally desirable to electrically isolate any metallic portion of the UST system that is not buried or submerged in water from that portion that is buried/submerged.

**Electrical Isolation -** If metallic piping is galvanically protected, it is critical that effective electrical isolation is provided. Failure to isolate the protected piping will result in premature failure of the sacrificial anodes. Isolation can be difficult to achieve where cathodically protected piping is present under dispensers that have shear valves present. This is due to the requirement that the shear valve must be properly anchored to the island form. Particular care should be exercised in these instances to assure proper isolation. If possible, the dielectric union should be installed below the shear valve so that anchoring does not cause a continuity problem.

**Screw Joints -** Particular care should be taken when dealing with metallic piping that is mechanically coupled with threaded screw joints. Any threaded joint in a metallic piping material can serve as a break in the electrical continuity of the piping system. It has been established that threaded couple pipe joints can develop enough electrical resistivity over time to effectively isolate each section of a piping system. For obvious reasons, this is highly undesirable in a cathodic protection system and you should ensure that electrical continuity is present between any sections of piping that are intended to be protected. Jumper wires or welding may be necessary across each pipe couple in order to assure electrical continuity between each section of piping.

**Flex Connectors -** Any metallic flexible connector (including stainless steel) that is utilized on a piping system must be protected from corrosion. The flex connector may be isolated from contact with soil/water or cathodically protected. If the flex connector is cathodically protected, it must also be coated/wrapped with a dielectric material if it was installed after December 22, 1988.

**Containment Sumps -** If metallic components of a piping system are installed in a containment sump, the sump must be maintained dry. If a sump contains water and you are unable to keep the water out, the metallic components must be protected from corrosion. The metallic components may be protected by installing appropriate isolation boots (in the case of flex connectors) or sacrificial anodes. If cathodic protection is necessary, the sump may or may not be filled with clean sand to a depth adequate to bury the anode. Burial of the anode may help prevent an oxidation film from forming on the anode (and causing passivation) in the event that standing water is not always present in the sump. In either case, it is critical that the anode be installed within the containment sump. Do not place the anode outside of the sump.

**"Mixed" Piping -** In those instances where fiberglass reinforced plastic or flexible piping is connected to an existing metallic pipe (e.g. to extend a fueling island), a cathodic protection test station or access to the soil where the two dissimilar materials are joined must be provided. This is necessary to effectively test the adequacy of cathodic protection operating on the metallic piping.

## 5.2 Impressed Current Systems

Anyone who is a MDEQ certified UST installer may install and/or repair an impressed current cathodic protection system. However, the design of an impressed current system must be accomplished by a corrosion expert. If the repair of an impressed current cathodic protection

system results in the reconfiguration of any of the components of the system, then the reconfiguration must also be designed by a corrosion expert.

If the repair only involves the replacement of existing components, a corrosion expert does not need to "sign-off" on such work. However, after any repair/alteration of the impressed current system is made, an evaluation of the cathodic protection survey must be conducted within six months of the repair. If the repair/alteration results in any of the conditions found in Section 7.2 of this document being met, the cathodic protection survey must be conducted/evaluated by a corrosion expert.

### 5.2.1 Rectifier Adjustment

Anyone who is considered qualified as a cathodic protection tester may adjust the rectifier output/voltage of an impressed current cathodic protection system. An evaluation of the cathodic protection system must be conducted whenever an adjustment to the rectifier is made. Before making any adjustments to the rectifier, the power must be turned off. Open both the AC and the DC circuit breakers.

It should be recognized that increasing the rectifier output could cause an increase in the potential for stray current to be generated that may have a detrimental effect on other buried metallic structures at the facility. Excessive rectifier output can also significantly shorten the life of the anode ground bed since the anodes will be consumed more quickly than necessary. In addition, care should also be taken to ensure that components of the rectifier do not become overheated (causing a potential fire hazard) as a result of increasing the output.

When evaluating the operation and output of a rectifier, it is important to make all measurements with a good quality multimeter. Do not rely on the output indicated by the voltmeter and/or ammeter that may be installed on the rectifier. Most rectifier gauges are adjustable and you should make any adjustment that may be indicated by measurement with the portable multimeter.

The gauges that are commonly built into rectifiers are usually not accurate and may even be frozen in a fixed position. If the indicator needle is frozen on the rectifier voltmeter/ammeter and cannot be freed, you should replace the gauge. If replacement is not accomplished, you should note that the gauge is not functioning so that an observer will be able to discern that the gauge is inoperable.

For the reasons given above and other considerations, a person qualified as a corrosion expert should be consulted whenever the output is adjusted or repairs are made to the rectifier.

## SECTION 6 - CATHODIC PROTECTION TESTING

### 6.1 Equipment

Although the equipment required to test cathodic protection systems is relatively simple, it is very important that the equipment be maintained in good working order and is free of corrosion

and contamination. The basic equipment includes a voltmeter/ammeter (multimeter), reference electrode, wires, clips and test probes.

It may also be necessary to have a current interrupter for impressed current systems when the power cannot be easily cut on and off at the rectifier. A clamp-on type ammeter can be useful when troubleshooting impressed current systems. Wire locators can help determine the location of buried anode lead wires and header cables. Hand tools to clean corrosion or dielectric coatings from the surface of the structure you are testing at the point of contact with lead wires/probes may also be necessary.

### 6.1.1 Voltmeter/Ammeter

A good quality voltmeter/ammeter (multimeter) that has an adequate degree of accuracy is essential for testing cathodic protection due to the low voltage/current involved. Most "low end" voltmeters/ammeters are not capable of achieving results accurate enough to ensure reliable results and should therefore not be used.

All testing of cathodic protection systems must be accomplished with a high internal resistance (impedance of 10 meg-ohms or greater) voltmeter that is properly maintained and periodically calibrated in accordance with the manufacturer's recommendations. The voltmeter should be calibrated at least on an annual basis. It is important that the voltmeter has a high internal resistance in order to avoid introducing a large error when measuring structure-to-soil potentials.

The voltmeter must have a high degree of sensitivity and must be placed in as low a scale as possible (normally the 2 volt DC scale works well) in order to accurately measure the small voltages associated with cathodic protection systems. All voltage measurements obtained should be recorded as millivolts (mV). For example, a reading of -1.23 volts should be recorded as -1230 mV; a reading of -.85 volts should be recorded as -850 mV.

Voltmeters that have a variable input resistance can be utilized to ensure that contact resistance between the reference electrode and the electrolyte has been evaluated as a source of error (voltage drop) in the observed structure-to-soil potential. This is accomplished by changing the input resistance and noting whether or not the voltage observed changes significantly. If no voltage change is observed when the input resistance is changed, it can be assumed that contact resistance is not causing an error in the structure-to-soil potential measurement.

An ammeter that has a very low internal resistance is necessary when testing impressed current systems in order to accurately determine the current output of the rectifier and/or individual circuits in the system. Generally, amperage should only be measured where calibrated measurement shunts are present. Alternatively, a "clamp-on" type ammeter may be utilized in those cases where shunts are not present.

The batteries in the portable multimeter must also be in good condition. Batteries that are in poor condition can cause unintended errors. If there is any question about the condition of the batteries in the multimeter, they must be replaced.

### 6.1.2 Reference Electrode

A standard copper/copper sulfate reference electrode (also known as a half cell or reference cell) must be utilized in order to obtain structure-to-soil potentials. The reference electrode must be maintained in good working condition and must be placed in the soil in a vertical position when conducting a test.

On those sti-$P_3$® tanks that have a PP4® test station, a reference electrode is permanently buried in the tank pit. Since it is generally not possible to determine where the permanent reference electrode was installed on these types of systems, it is also necessary to conduct structure-to-soil potential measurements in the conventional manner (i.e. with a portable reference electrode in the soil directly over the tank and at a remote placement). A tank may not be passed on the basis of a structure-to-soil potential obtained with a PP4® test station. Both the local and the remote potential obtained in the conventional manner must indicate that adequate cathodic protection has been provided regardless of what the PP4® test station indicates.

Maintenance of the reference electrode is important for accurate results and includes:

a. The copper-sulfate solution inside the reference electrode should be clear. If the solution appears cloudy, this may indicate that the solution has become contaminated and the reference electrode should be compared with the known standard as described in paragraph e below. Should it be necessary to replace the solution, only distilled water and new copper-sulfate crystals should be used. Excess copper-sulfate crystals must be present in order to assure a saturated solution. Under average conditions, it is usually a good idea to empty and replace the solution every 2 or 3 months.

b. The porous ceramic tip must be maintained moist at all times. If the tip is allowed to dry out, it may lose its porosity and a good low resistivity contact with the soil will not be possible. Periodic replacement of the tip may be necessary.

c. The copper rod inside the reference electrode should periodically be cleaned with non-metallic sandpaper. Do not use black metal oxide sandpaper, steel wool or any other metallic abrasive as this can cause the copper rod to become contaminated. If the copper rod becomes contaminated, it is best to replace the reference electrode.

d. The copper-sulfate solution must be free of contamination or errors will be introduced in the readings you observe. If the reference electrode is submerged in water or placed in moist soils that are contaminated, it is likely that the solution will become contaminated.

e. The reference electrode that is used in the field must be periodically calibrated. How often the reference electrode needs to be calibrated depends upon several different factors. Among the more important factors that should be considered are the frequency of use and the exposure of the reference electrode to contaminants. As a general rule, calibration should be checked once every week if the reference electrode is used daily. If the reference electrode is only periodically used, calibration should be checked prior to each use.

Calibration of the reference electrode is accomplished by comparing it with another reference electrode that has never been used. The unused reference electrode that is to act as the calibration standard should be properly set up (ready for use) and must not have ever been used in the field so that no chance of contamination exists.

To calibrate the field electrode:

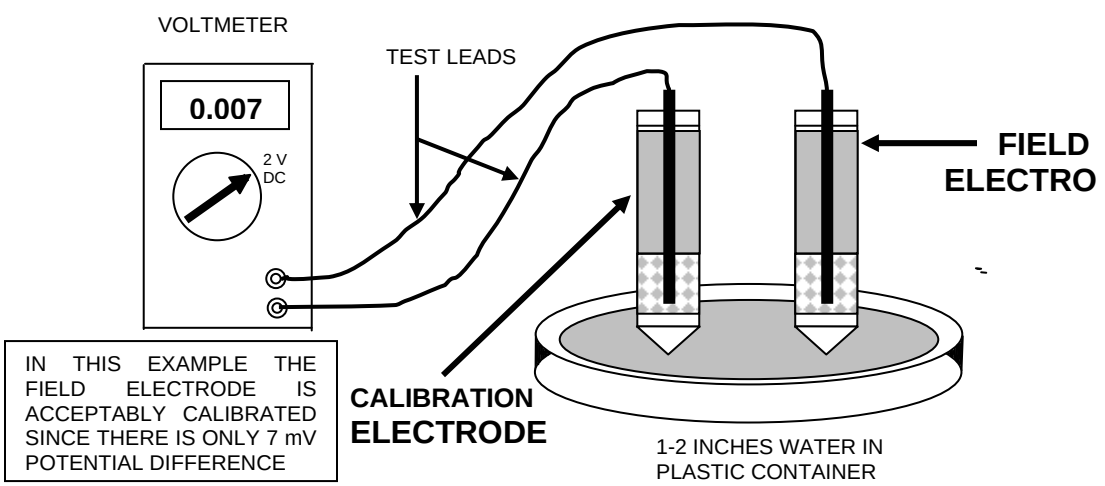
1. Place the voltmeter on the 2 volt DC scale (or lower) and connect the leads to the reference electrodes as shown in the illustration below.

2. Place both the field electrode and the standard electrode in a shallow nonmetallic container that has one to two inches of tap water in the bottom of it. Do not use distilled water. The reference electrodes must be placed vertically in the container with the ceramic tip of each submerged in the water.

3. Observe the potential measurement displayed on the voltmeter. If more than 10 mV potential exists between the two reference electrodes, the field reference electrode should be properly cleaned and refilled with new solution until the potential difference is 10 mV or less. If you are unable to achieve a 10 mV or less potential difference after cleaning/reconditioning, the field electrode must be replaced.

4. In order to lessen the chance of cross contaminating the calibration electrode, you should leave the calibration electrode in the water for the shortest time necessary to complete the test.

**FIGURE 1 - ILLUSTRATION OF REFERENCE ELECTRODE**



### 6.1.3 Lead Wires/Test Probes/Miscellaneous

You should ensure that the insulation material of any lead wires is in good condition. Any clips or probes used to make contact with the structure to be tested must be clean and free of corrosion. A spool of suitable wire of sufficient length is necessary to conduct continuity and/or "remote earth" testing. It is usually necessary to have a probe that can be attached to the end of a tank gauging stick in order to contact the tank bottom since it is not uncommon for the test lead on sti-$P_3$® tanks to either be missing or discontinuous with the tank shell. A pair of locking pliers can sometimes be useful when attempting to get a solid connection.

## 6.2 Test Criteria

There are three test criteria that can be utilized to indicate if adequate cathodic protection is being provided to the structure being evaluated:

**850 On -** A structure-to-soil potential of –850 mV or more negative with the protective current applied. This is commonly referred to as "850 on" or the "on potential". This criterion is normally the only one available for galvanic systems since the protective current usually cannot be interrupted.

Voltage drops (see Section 6.3) other than those across the structure to electrolyte boundary must be taken into consideration whenever this criterion is applied. Voltage drops may have a significant impact on the potentials observed when testing impressed current systems with the protective current applied. Therefore, the 850 on criterion is not applicable to impressed current systems.

**850 Off -** A structure-to-soil potential of –850 mV or more negative with the protective current temporarily interrupted. This is referred to variously as "850 off", "polarized potential" or "instant off potential". This criterion is applicable to impressed current and galvanic systems where the protective current can be interrupted. Caution must be exercised when testing impressed current systems to ensure that no active sacrificial anodes are also installed near the protected structure. If there are active anodes influencing the observed potential, the 850 off criterion is not applicable.

The instant off potential is the 2$^{nd}$ value that is observed on a digital voltmeter the instant the power is interrupted. The first number that appears immediately after power interruption must be disregarded. After the second number appears, a rapid decay (depolarization) of the structure will normally occur. In order to obtain instant off potentials, a current interrupter or a 2$^{nd}$ person is necessary. If a current interrupter is not available, have the second person throw the power switch at the rectifier off for 3 seconds and then back on for 15 seconds. Repeat this procedure until you are sure an accurate instant off reading has been obtained.

This criterion is considered by most to be the best indicator that adequate cathodic protection has been provided. Therefore, consideration should be given to adjusting the rectifier output upward until the 850 off criterion has been met if this is feasible.

**100 mV Polarization -** A polarization voltage shift of at least 100 mV. Commonly referred to as "100 mV polarization" or "100 mV shift". This criterion is applicable to galvanic and impressed current systems where the protective current can be temporarily interrupted. Either the formation or the decay of at least 100 mV polarization may be used to evaluate adequate cathodic protection.

The "true" polarized potential may take a considerable length of time to effectively form on a structure that has had cathodic protection newly applied. If the protective current is interrupted on a metallic structure that has been under cathodic protection, the polarization will begin to decay nearly instantaneously. For this reason, it is important that the protective current not be interrupted for any significant length of time. Generally, not more than 24 hours should be allowed for the 100 mV depolarization to occur. On a well-coated structure complete depolarization may take as long as 60-90 days. Complete depolarization of uncoated structures will usually occur within 48 hours although it could take as long as 30 days.

The base reading from which to begin the measurement of the voltage shift is the instant off potential. For example, a structure exhibits an on voltage of –835 mV. The instant off voltage is -720mV. In order to meet the 100 mV polarization criteria, the structure-to-soil potential must decay to at least –620 mV (final voltage).
The use of native potentials to demonstrate the formation of 100 mV polarization is generally only applicable when a system is initially energized or is re-energized after a complete depolarization has occurred. This is because it is necessary to leave the reference electrode undisturbed (or returned to the exact position) between the time the native and the final voltage are obtained.

It is only necessary to conduct a 100 mV polarization test on that component of the UST system where the lowest (most positive) instant off structure-to-soil potential exists in order to demonstrate that the UST system meets this criterion. If the criterion is met at the test point where the potential is most positive, it can be assumed that it will be met at all other test locations.

## 6.3 Voltage (IR) Drops

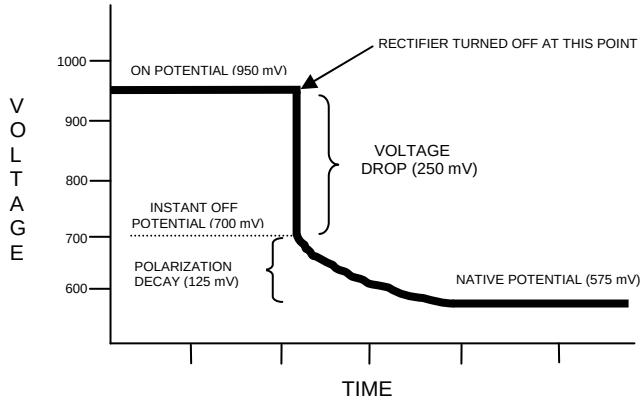
The effect voltage drops have must be considered whenever structure-to-soil potentials are obtained during the survey of a cathodic protection system. The concept of voltage drops is a difficult and controversial subject and a full discussion is beyond the scope of this document. However, stated in the simplest terms, a voltage drop may be thought of as any component of the total voltage measurement (potential) that causes an error.

The term IR drop is sometimes used and it is equivalent to voltage drop. IR drop is derived from Ohm's Law which states that V = I R. In this equation, V stands for voltage, I represents current (amperage) and R stands for resistance. Because the observed voltage is equal to the amperage (I) multiplied by the resistance (R) a voltage drop is commonly referred to as an IR drop. There are various sources of voltage drops and two of the more common are discussed below.

**Current Flow -** Whenever a current flows through a resistance, a voltage drop is necessarily created and will be included whenever a measurement of the electrical circuit is conducted. In order to effectively eliminate this voltage drop when testing impressed current systems, it is necessary to interrupt the protective current. The magnitude of the voltage drop obtained on impressed current systems is evaluated by conducting both on and instant off potential measurements.

To illustrate how this type of voltage drop contributes to the potential observed when measuring impressed current systems consider the following example. A potential of -950 mV is observed when the rectifier is on. A potential of -700mV is observed when the power is interrupted. Taking the absolute values (negative is dropped), the voltage drop component of the on potential is 250 mV (950 - 700 = 250). Figure 2 is a graphical representation of this voltage drop and also shows how the instant off potential will degrade over time until the native potential is reached.

**FIGURE 2 - GRAPHIC REPRESENTATION OF VOLTAGE DROP IN "ON" POTENTIAL**




**Raised Earth -** All active anodes will have a voltage gradient present in the soil around them producing a "raised earth effect". An abnormally high (more negative) potential will be observed if the reference electrode is within the voltage gradient of an active anode. The magnitude or area of influence of the voltage gradient is dependent predominantly on the voltage output of the anode and the resistance of the soil. Unfortunately, there is no "rule of thumb" guidance that can be given to determine how far away you must be from an anode in order to be outside the voltage gradient. If you suspect the potential you obtain may be affected by raised earth, you should take a remote reading and compare the two.

Because of the raised earth effect, it is necessary to place the reference electrode as far away from any active anode (and still be directly over the structure) when obtaining local potentials on galvanic systems. Since the protective current can not typically be interrupted in galvanic systems, any effect this type of voltage drop may have is evaluated by placing the reference electrode remote. Placement of the reference electrode remote ensures that the reference electrode is not within the voltage gradient of an active anode. Since it is desirable to eliminate

any effect voltage drops may have, it is necessary to obtain both local and remote structure-to-soil potentials on galvanic systems. Any effect raised earth may have when testing impressed current systems is eliminated by temporarily interrupting the power.

### 6.4 Stray Current

An unintended current that is affecting the structure you are trying to protect is referred to as a stray current. Stray currents can cause rapid corrosion failure of a buried metallic structure and are caused by an electric current flowing through the earth in an unintended path. If the metallic object you are trying to cathodically protect is buried near the path of the stray current, the current may "jump-on" the protected structure because it offers a lower resistance path for the current to flow. The affected structure will be cathodic where the stray current enters but will be highly anodic where the stray current returns to the earth. At the point where the current discharges, rapid corrosion of the structure intended to be protected will occur.

Although stray currents are relatively rare on UST systems, common sources include: a) Railroad crossing signals (powered by batteries); b) Traffic signals that have induction type sensors buried in the pavement; c) Portable or fixed emergency power generators; d) Electrical railway systems such as streetcars or subways in urban areas; e) DC welding operations and other types of industrial machinery or processes that utilize DC power.

If unsteady readings are observed on the protected structure and you have determined that it is not because of a bad electrical connection, you should suspect that stray current is affecting the protected structure. In some cases, a pattern can be seen in the potential whereby it alternates between two relatively stable readings. These patterns can sometimes help to identify the source of the stray current. If you suspect that stray current may be affecting the UST system, a thorough investigation must be conducted as soon as possible by a qualified corrosion expert since stray current can cause a rapid failure of the affected structure.

**Cathodic Interference -** When the impressed current cathodic protection system operating on the structure you are trying to protect causes an unintended current on some other nearby structure, this type of stray current is referred to as "cathodic interference". Cathodic interference can cause a rapid failure of the water lines and other buried metallic structures at the facility where the cathodic protection system is operating. If you observe what you believe to be an abnormally high (more negative) potential on a buried metallic structure, you should suspect that the impressed current system operating on the UST system is causing cathodic interference. Instances where cathodic interference may be present include: a) copper water lines that are not bonded to the impressed current system and have a polarized potential of greater than -200 mV; b) metallic flex connectors associated with fiberglass reinforced plastic piping that have abnormally high (more negative) potentials and are not bonded to the impressed current system; c) sti-P3® tanks are buried at a facility where there is an impressed current system operating and are not bonded to the negative circuit. When the sti-P3® tanks have zinc anodes and a potential more negative than -1100 mV (more negative than -1600 mV in the case of magnesium anodes) is observed, it is likely that cathodic interference is occurring. Because of the potential for stray current to impact sti-P3® tanks, it is normally necessary to bond them into the impressed current

system. A corrosion expert must be consulted whenever cathodic interference is suspected in order to properly investigate and make any repairs/modifications that may be necessary.

## 6.5 Dissimilar Metals/Bimetallic Couples

The effect bimetallic couples may have must also be considered whenever structure-to-soil potentials are obtained during the survey of a cathodic protection system. The concept of dissimilar metals/bimetallic couples and the impact they can have on the proper evaluation of cathodic protection systems is a difficult and controversial subject and a full discussion is beyond the scope of this document. However, you should be aware that bimetallic couples may substantially influence the structure-to-soil potentials of a tank system to the extent that the 100 mV polarization criterion is not applicable. Because the validity of the 100 mV criterion may be suspect, consideration should be given to only utilizing the -850 mV instant off criterion when evaluating impressed current systems. A brief discussion follows.

Caution must be exercised when evaluating steel UST systems that have metals of lower electrochemical potential electrically connected to them. Typically, bimetallic couples are only of concern on impressed current systems since those steel components protected by galvanic systems are electrically isolated from other metallic structures. Copper is the metal of lower potential that is commonly of concern. Sources of copper at UST facilities include the water service lines and the grounding system of the electrical power grid. Since the AC power supply to the submersible turbine pump should be continuous with the electrical service grounding system, which may in turn be continuous with the water lines, a significant amount of copper may be coupled to the steel UST system.

The effect this type of bimetallic couple has on the impressed current system can sometimes be clearly seen on those UST systems that store fuel for emergency power generators. Commonly these generator tank systems are installed with copper supply and return lines. When these tanks were retrofitted with an impressed current system, the copper lines were bonded into the cathodic protection system. In these instances, it is not uncommon to observe native structure-to-soil potentials on the UST system of -450 mV or more positive.

If the native structure-to-soil potential of the UST system is substantially lower than what you would normally expect, it is likely that a significant amount of copper is electrically bonded to the UST system. Typically, the expected native potential of a steel UST system should not be more positive than -500 mV.

To illustrate the effect of the copper-steel couple, consider the following example: A steel UST system that is coupled to copper has a native structure-to-soil potential of -300 mV with the bimetallic couple intact. If the copper couple is broken the UST system native potential is -600 mV. With the copper couple intact, the polarized (off) potential of the UST system -450 mV. Although the voltage shift satisfies the 100 mV polarization criterion (from -300 mV to -450 mV), it is likely that the steel UST system is not adequately protected. This is because the UST system is not polarized at least 100 mV beyond the native potential of the steel. Since the true native potential of the steel UST system in this example is -600 mV, you would need to reach a polarized (instant off) potential of -700 mV or more negative.

Because the unaffected native potential of steel UST systems is generally not known, the application of the 100 mV polarization criterion would be inappropriate when there is a significant amount of copper (or other more noble metal) electrically continuous. For this reason, it is always desirable to demonstrate that the UST system satisfies the 850 off criterion when evaluating a cathodic protection system.

### 6.6 Other Test Considerations

Various other factors can affect the accuracy of structure-to-soil potentials. Listed below are some of the more common factors that you should keep in mind:

**Contact Resistance –** In order to obtain an accurate structure-to-soil potential, a good (low resistivity) contact between the reference electrode and the soil must be made. Sometimes, the soil at the surface is too dry and water needs to be added in order to lower the resistance between the reference electrode and the soil. In addition, if the porous ceramic tip of the reference electrode becomes clogged or contaminated it should be replaced since this in itself can cause a high contact resistance.

**Contaminated Soil –** You should ensure that the soil the reference electrode is placed in is free of contamination. Hydrocarbon contamination can cause a high resistance between the reference electrode and the soil.

**Current Requirement Testing –** When a current requirement test is conducted on galvanically protected tanks (refer to STI R972-01 for a description of this test), the affected structure can exhibit an elevated (more negative) structure-to-soil potential during the test and for a period of time after the test is completed. This is due to a temporary polarization of the tested structure which will dissipate over a period of time ranging from a few minutes to perhaps a few days depending on several different factors. Therefore, time sufficient for the temporary polarization of the affected structure to "drain-off" after a current requirement test is conducted must be allowed before an accurate structure-to-soil potential can be obtained. In addition, any potential measured with the battery connected should be disregarded as this measurement contains a large voltage drop. Only instant off voltages are meaningful when the battery is connected.

**Drought Conditions –** On occasion, it has been observed that structure-to-soil potentials can be improved by running water into the backfill material of the tank bed when extended periods of no rain have occurred. This is commonly done by placing a water hose in one of the tank bed monitoring wells (or other access points) and allowing the water to run for a period of a few hours. This practice serves to lower the resistance of the backfill material. However, you should keep in mind that the resistivity of the soil is not appreciably lowered if the moisture content is 20% or higher.

**Electrical Shorts –** When a substandard reading is observed on a galvanically protected system, it is common to find that some other metallic object is electrically connected to the protected structure. For instance, on sti-$P_3$® tanks, the nylon bushings installed in the tank bungs were

sometimes removed when the various risers and other tank system components were installed or an electrical conduit was buried in contact with the tank shell.

**Electromagnetic Interference –** Overhead high voltage power lines, railroad crossing signals, airport radar systems and radio frequency transmitters (CB radios, cellular phones, etc.) can all cause an interference that will result in an inaccurate voltage reading.

**Galvanized Metals -** Buried metals that have a high electrochemical potential can also influence the voltage observed if the reference electrode is placed in close proximity to such metals. For instance, the steel of some of the man ways that are installed to provide access to the tank appurtenances may be galvanized. If the reference electrode is placed in the soil of such a manway, an artificially high (more negative) potential may be observed. This is actually a raised earth effect although the galvanized metal is not acting to cathodically protect the buried structure of concern.

**Parallel Circuits –** Care should be taken to ensure that the person conducting the structure-to-soil testing does not allow their person to come into contact with the electrical components of the testing equipment. If the person touches the electrical connections, an error may be introduced due to the creation of a parallel circuit.

**Pea Gravel –** Because pea gravel or crushed stone typically has a very high electrical resistivity, it is necessary to ensure that it is saturated with water when attempting to measure structure-to-soil potentials with the reference electrode placed in the pea gravel. Evaluate any effect high contact resistance may have by changing the input resistance of the voltmeter as described in Section 6.1.1. As an alternative way to evaluate the effect contact resistance may have, place the reference electrode remotely. If the remote reading is substantially more negative than the local, high resistance is indicated. Placement of a saturated sponge on the surface of the pea gravel may help overcome high contact resistance.

**Photovoltaic Effect –** It is known that sunlight striking the viewing window of a reference electrode can have an effect (as much as 50 mV) on the voltages observed when conducting testing. You should ensure that the viewing window of the reference electrode is kept out of direct sunlight. As an alternative, the viewing window can be covered with black electrical tape in order to prevent any sunlight from reaching the copper-copper sulfate solution.

**Poor Connection –** If the observed structure-to-soil potentials are unsteady and the voltmeter will not stabilize, you should suspect a bad connection somewhere. Ensure that all electrical connections are clean and tight and good contact is made between the test lead and the structure.

**Shielding –** Sometimes, a buried metallic structure that is between the reference electrode and the structure you are attempting to test will cause the reference electrode to be unable to "see" the structure you are testing. Shielding is commonly cited when low potentials are observed with the reference electrode placed locally over sti-$P_3$® tanks due to the various tank risers, pump heads, piping, electrical conduits and metallic manways that are typically located over the tank.

**Temperature –** The temperature of the reference electrode affects the voltages that are observed when conducting cathodic protection testing. You may need to make a correction to the observed potential in some extreme and/or marginal cases. The "standard" temperature is considered to be $77^{o}$ F. For every degree less than 77 add 0.5 mV from the observed voltage. For every degree above 77 subtract 0.5 mV from the observed voltage. To illustrate this, consider the following (in order to simplify the calculation, the negative sign is dropped from the structure-to-soil potential): A voltage of 845 mV is observed when the temperature is $57^{o}$ F. In this case the corrected voltage would then be 855 mV ($20^{o}$ X 0.5 mV = 10 mV. Therefore: 845 mV + 10 mV = 855 mV).

## 6.7 Continuity Testing

When conducting an evaluation of a cathodic protection system, it is normally necessary to establish that the cathodically protected components of a UST system are either electrically isolated or electrically continuous depending on the type of cathodic protection system. Ohmmeters (continuity testers) such as those utilized to test automotive wiring circuits are not acceptable for use on buried metallic structures and should never be used for testing continuity of UST system components. The "fixed cell-moving ground" method and the "point-to-point" method are the two commonly utilized ways to test continuity and are discussed in more detail below.

**Fixed Cell - Moving Ground Method -** The most commonly accepted method of conducting a continuity survey is referred to as fixed cell – moving ground. In this method, the reference electrode is placed at a location remote from any of the cathodically protected structures. Potentials of all the metallic structures present at the site are then measured without moving the reference electrode (refer to Appendix E for a more complete description). Because the conditions found at the reference electrode/electrolyte interface can change over a short period of time (causing the observed potential to change), it is important to conduct this type of testing as quickly as possible.

When determining whether electrical continuity or isolation is provided, the following guidelines are generally accepted for fixed cell – moving ground surveys:

- If two or more structures exhibit potentials that vary by 2 mV or less, the structures are considered to be electrically continuous.
- If two or more structures exhibit potentials that vary by 10 mV or greater, the structures are considered to be electrically isolated.
- If two or more structures exhibit potentials that vary by more than 2 mV but less than 10 mV, the result is inconclusive and further testing (point-to-point) is necessary.

**Point-to-Point Method -** An easier and usually more accurate way to test continuity is the "point-to-point" method. With this method, a reference electrode is not utilized. The two

structures that are to be tested are simply touched with each lead of the voltmeter and the voltage difference (if any) is observed. For example, if you are trying to establish that electrical isolation exists between a tank and the fill riser associated with that tank, you would simply touch the fill riser with one of the voltmeter leads and the tank shell with the other voltmeter lead and observe the voltage difference.

When conducting point-to-point testing, any current that is flowing through the UST components can cause an inaccurate test result. Impressed current systems must be turned off.

When determining whether electrical continuity or isolation is provided, the following guidelines are generally accepted for point-to-point surveys:

- If the voltage difference observed between the two structures is 1 mV or less, the two structures are considered to be electrically continuous with each other.

- If the voltage difference observed between the two structures is 10 mV or greater, the two structures are considered to be electrically isolated from each other.

- If the voltage difference observed between the two structures is greater than 1 mV but less than 10 mV, the result is inconclusive and further testing beyond the scope of this document is necessary.

### 6.7.1 Continuity Testing of Galvanic Systems

In order for sacrificial anodes to function efficiently, the protected component must be electrically isolated from any other metallic structures that may be connected to or in contact with the protected structure. This is generally accomplished through the use of dielectric bushings and unions and by making sure that no additional metallic structures come into contact with the protected structure.

On those systems where adequate cathodic protection has not been achieved, it is common to find that some unintended metallic structure is electrically continuous with the protected structure. Frequently, an electrical conduit is in contact with a sti-$P_3$® tank or the tank bung nylon bushings are missing or damaged. If metallic tank hold down straps were improperly installed, they will wear through the epoxy coating on the tank over time and cause premature anode failure. With metallic piping, the shear valve anchoring bracket usually provides an electrical bond with the dispenser cabinet and all of the other metal connected to it. When this is the case, the anodes are trying to protect much more metal than intended and the life of the anodes is shortened.

### 6.7.2 Continuity Testing of Impressed Current Systems

All protected components of the UST system must be electrically continuous in an impressed current cathodic protection system. Various bonds may be required in order to ensure that continuity has been provided. Failure to establish continuity in an impressed current system can result in accelerated corrosion of the electrically isolated components.

Carefully check all bonds when evaluating an impressed current system as these are of critical importance. Commonly, tanks are bonded into the negative circuit by attachment to the tank vent lines above ground. Because of this, it is easy for the integrity of the bonds to be compromised. It is equally important to ensure that the positive lead wire(s) have continuity. Any break in the insulation or dielectric coating of the positive circuit will allow current to discharge from the break and cause rapid corrosion failure of the wire. This is why it is absolutely critical that all buried positive circuit splices are properly coated and insulated.

## 6.8 Reference Electrode Placement

### 6.8.1 General

Where you place the reference electrode when taking structure-to-soil potential measurements is of critical importance. It is also essential that the exact location of the reference electrode placement is documented so that anyone could come back at a later date and reasonably duplicate the test. Reference electrode placement must be indicated by both written description and visually shown on a drawing of the tank system. The forms in Appendix K and L of this guidance document provide for both written and visual description of reference electrode placement.

### 6.8.2 Local Placement

Placement of the reference electrode is considered local when it is in the soil directly over the structure that is being tested. As discussed in Section 6.3, consideration of any effect active anodes have (raised earth) must be considered when selecting the appropriate location for local placement.

In addition, shielding of the reference electrode by other buried metallic components may also need to be considered. For instance, it is necessary to ensure that the tip of the reference electrode is below the metallic skirting found on most man ways. If the tip of the reference electrode is not below the metal skirt, it may be shielded from “seeing” the cathodic protection current.
Ideally, the tip of the reference electrode should be as close to the structure-to-soil interface as is practical in order to minimize the voltage drop present in the soil due to resistivity. In practice, about 6 inches of soil between the tip of the reference electrode and the structure being tested works well.

### 6.8.3 Remote Placement

The remote potential represents the average potential of the entire surface of the protected structure. The purpose of remote placement is to eliminate any effect that raised earth may be contributing to the measurement of the structure-to-soil potential and to overcome any effects shielding may have.

Placement of the reference electrode is considered remote when it is placed in the soil a certain distance away from the structure that is being tested. There are several different factors that

determine the distance necessary in order to reach remote earth and a full discussion is beyond the scope of this document. However, a remote condition can normally be achieved when the reference electrode is placed between 25 and 100 feet away from any protected structure.

Depending on the conditions specific to the particular location where the cathodically protected structure is, the minimum distance to remote earth may be considerably more than 25 feet. Therefore, it is important that you establish that the reference electrode is truly remote when obtaining a structure-to-soil potential. In order to ensure that remote earth has been achieved, place the reference electrode at least 25 feet away from the protected structure and observe the potential. Move the reference electrode out away from the protected structure another 10 feet or so and observe the potential. If there is no significant difference in the two potentials, it can be assumed that remote earth has been achieved. If there is a significant difference, continue moving the reference electrode out away from the protected structure until no significant difference is observed.

When selecting a location to place the reference electrode to establish remote earth, it is essential that there are no other cathodically protected structures (e.g. natural gas lines) in proximity to the reference electrode. Foreign cathodically protected structures can cause an abnormally high (more negative) potential that is not indicative of the remote potential of the structure you are measuring. It is also important that there are no other buried metallic structures in the vicinity of the reference electrode. Any metallic structure that is buried near the reference electrode could possible affect the structure-to-soil potential that is observed on the protected structure.

In addition to the above considerations, you should attempt to select the remote placement such that the reference electrode can “see” the structure you are testing. This means that there should not be any buried metallic structure between the remote reference electrode placement and the protected structure. If you suspect that shielding may be affecting the observed potential, place the reference electrode away from the protected structure in a different direction.

### 6.8.4 Galvanic Placement

All galvanic cathodic protection systems must be tested with the reference electrode placed both local and remote. In order to pass the structure-to-soil survey, both the local and the remote potentials must indicate that adequate cathodic protection has been provided. If neither the local or the remote potential satisfies one of the cathodic protection criteria, the structure fails the test. If one of the potentials indicates adequate cathodic protection but the other does not, the result of the test is inconclusive. If the test result is inconclusive, repairs must be made or a corrosion expert must evaluate the data and/or conduct further testing to declare either pass or fail.

### 6.8.5 Impressed Current Placement

Impressed current cathodic protection systems are only required to be tested with the reference electrode placed locally. In order to pass the survey, the potential obtained with the reference electrode placed locally must satisfy either the 850 off or the 100 mV polarization criteria. While only one test point is required, the tester should obtain structure to soil potentials from as many

soil access points along the structure as is practical. If any of the potentials indicate that adequate cathodic protection has not been provided, the structure should be failed.
Although not required by this guidance, it may be useful to place the reference electrode remotely when testing an impressed current system. The remote potential may provide additional information by which to evaluate the cathodic protection system. However, the structure may not be passed based on the remote potential itself. In all circumstances, the potential obtained with the reference electrode placed locally must indicate that adequate cathodic protection has been provided.

Additionally, special circumstances may require that a remote potential be obtained when testing impressed current systems. For instance, if there are active sacrificial anodes buried in close proximity to the structure being tested, the local potential may be influenced by raised earth. The voltage drop caused by the sacrificial anodes would preclude the accurate measurement of the local structure-to-soil potential. If it is known that sacrificial anodes are impacting the potentials obtained locally, remote potentials must be obtained.

The remote potential obtained under these special circumstances must meet either the 850 off or the 100 mV polarization criteria in order for the tested structure to pass the survey. An explanation must be given in the "comments" of Section XVI of the MDEQ impressed current cathodic protection evaluation form as to why the remote potential must be considered. The remote potentials should be indicated on the form by designating remote in the location code column of Section XVI.

### 6.9 Soil Access

All structure-to-soil potentials that are intended to satisfy one of the three acceptable criteria found in Section 6.2 must be obtained with the reference electrode placed in the soil. Therefore, the person conducting the evaluation must either confirm that soil access is available or make prior arrangements with the owner of the UST system to secure access.

Under no circumstances is it allowable to place the reference electrode on concrete, asphalt, or any other paving material to achieve satisfactory structure-to-soil potentials. Likewise, the practice of placing the reference electrode on a crack or expansion joint of a concrete or asphalt paving is not recognized as an acceptable method of obtaining satisfactory structure-to-soil potentials.

Placement of the reference electrode in an observation (monitoring) well to obtain a passing reading is also not allowed. While it may be useful to obtain data by placing the reference electrode on a crack in the pavement or in an observation well, the structure-to-soil potentials obtained by such placement are not in themselves acceptable to demonstrate adequate cathodic protection.

Access may be provided by drilling holes through the pavement or the installation of proper cathodic protection test stations. A practical way to provide soil access is to drill a ½ inch diameter hole in the pavement so that a "pencil" type reference electrode (3/8 inch diameter) can be inserted through the pavement and into the soil. Upon completion of the survey, the hole

should be filled with a fuel resistant caulking material so that easy access can be provided at a later date. As an alternative, a two inch hole could be drilled to allow use of a standard reference electrode. A short length of PVC pipe could be epoxied in the hole and plugged with a threaded cap. Various cathodic protection test stations/man ways are available for installation. Whenever, a new tank system is installed or the pavement is reworked around an existing system, provisions for access to the soil must be made so that adequate cathodic protection testing may be accomplished.

## 6.10 Cathodic Protection Test Locations

Because there are many different possible tank and cathodic protection system configurations that may occur, it is not feasible to attempt to illustrate every situation that may exist and the examples given in the following sections are offered as representative of some typical scenarios to illustrate the general principles. It may sometimes be necessary for you to utilize judgement to apply the intent of this guidance document when circumstances arise that are not specifically addressed in this guidance document.

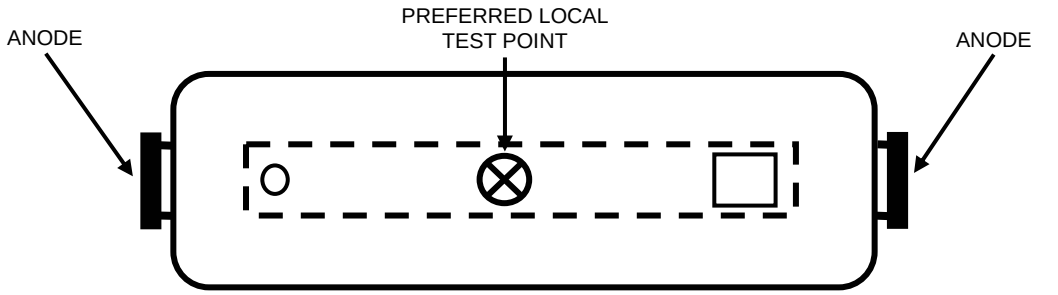
All galvanic cathodic protection systems must be tested with the reference electrode placed both locally and remotely. Impressed current systems are only required to be tested with the reference electrode placed locally.

### 6.10.1 Galvanically Protected (sti-$P_3$®) Tanks

The measurement of both local and remote structure-to-soil potentials is necessary when evaluating sti-$P_3$® tanks. The appropriate location to place the reference electrode locally would be in the soil at the middle of the tank (see Figure 3). However, if access to the soil is not available at the middle of the tank, the reference electrode may be placed at any point along the centerline of the tank but not directly over the anodes at each end of the tank.

Caution should be exercised to ensure that there are no sacrificial anodes installed in the soil around the submersible pump manway to protect any steel piping that may be associated with the tank. If anodes are installed at the pump manway, the reference electrode must be placed in the soil near the opposite end of the tank.

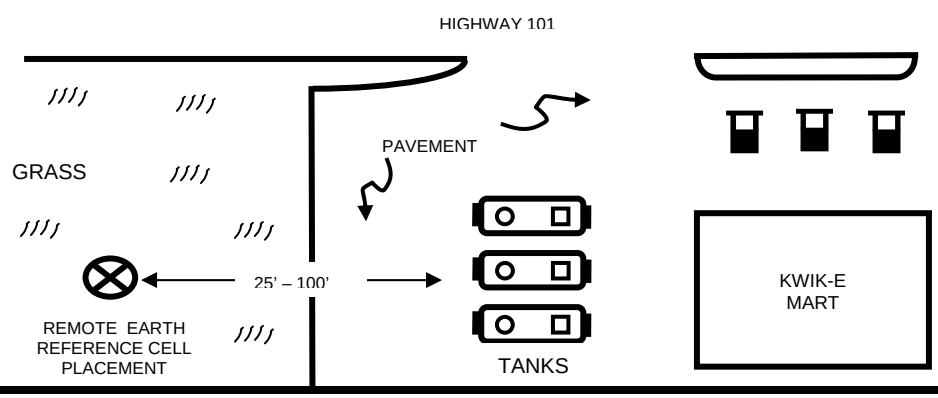
**FIGURE 3 – REFERENCE ELECTRODE PLACEMENT FOR sti-$P_3$® TANKS**




REFERENCE CELL MAY BE PLACED ANYWHERE ALONG CENTER LINE OF TANK AS INDICATED BY AREA OUTLINED IN DASHED RECTANGLE

In addition to the local potential described above, a remote potential must also be obtained. Remote generally means the reference electrode is placed in the soil at least 25 feet away and not more than 100 feet away from the tank you are measuring (See Figure 4). Refer to Section 6.8.3 for a more complete discussion of remote reference electrode placement.
Care must be taken that the remote location is not in proximity to any other cathodically protected structure (e.g. natural gas lines) or directly over any other kind of buried metallic structure. The remote placement should be such that the reference electrode is aligned with the longitudinal axis of the tanks and can "see" the anodes. This orientation is desirable in order to prevent shielding.

**FIGURE 4 – "REMOTE EARTH" REFERENCE ELECTRODE PLACEMENT**

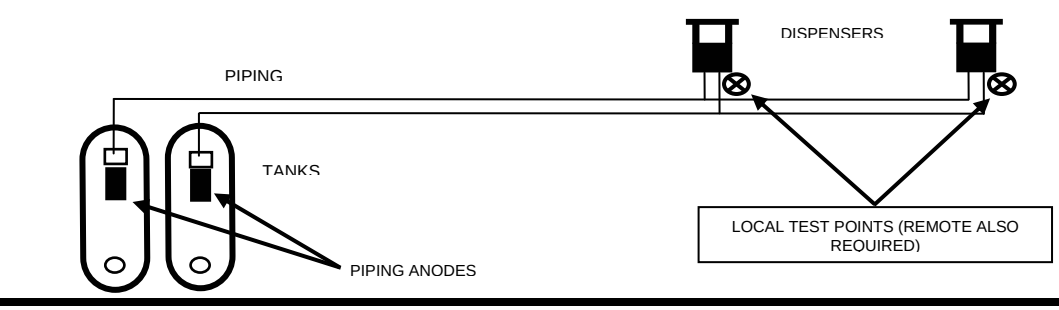



### 6.10.2 Galvanically Protected Metallic Piping

Both local and remote potentials are required on all galvanically protected metallic piping. When metallic piping is protected by sacrificial anodes, several different possibilities exist as to where would be the appropriate location to place the reference electrode to obtain local potentials. Knowing where the anodes that are protecting the piping are installed is of critical importance. When obtaining local potentials, the reference electrode must be placed in the soil directly over the pipe to be evaluated at a point that is the most distant from any anode that may be along the pipe.

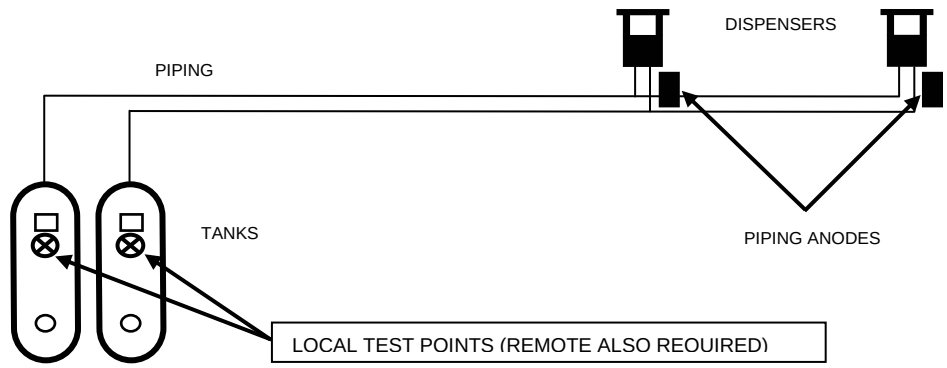
Because it is a common practice to bury piping anodes at the submersible pump manway of a tank, the appropriate location to place the reference electrode to obtain local potentials is at the dispensers (See Figure 5). Remote placement of the reference electrode is also necessary.

**FIGURE 5 – LOCAL REFERENCE ELECTRODE PLACEMENT FOR GALVANICALLY PROTECTED PIPING WHEN PIPING ANODES ARE AT TANKS**



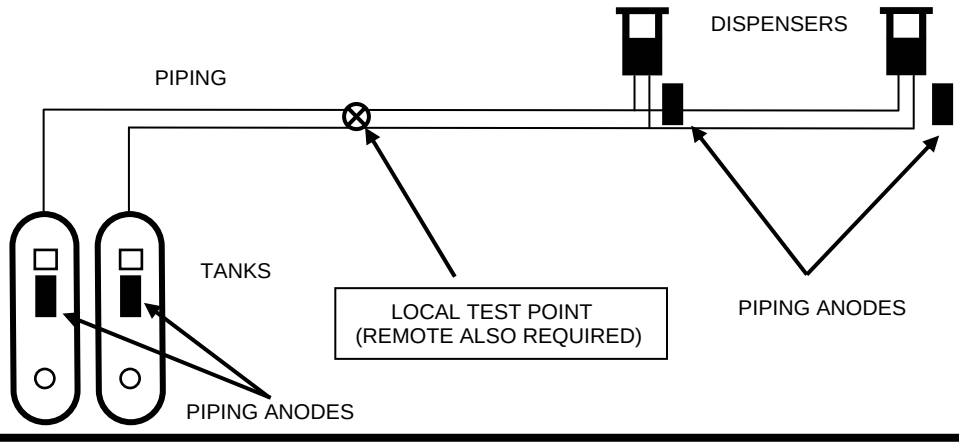
When the piping anodes are installed at the dispensers, the appropriate local reference electrode placement would be at the piping nearest the tanks (usually the submersible turbine pump manway) as shown in Figure 6. Remote placement of the reference electrode is also necessary.

**FIGURE 6 – LOCAL REFERENCE ELECTRODE PLACEMENT FOR GALVANICALLY PROTECTED PIPING WHEN PIPING ANODES ARE AT DISPENSERS**




When the piping anodes are located at both the tanks and the dispensers, the reference electrode must be placed at the approximate center of the piping run to obtain local potentials (See Figure 7). Remote placement of the reference electrode is also necessary.

**FIGURE 7 – LOCAL REFERENCE ELECTRODE PLACEMENT FOR GALVANICALLY PROTECTED PIPING WHEN PIPING ANODES ARE AT BOTH ENDS OF THE PIPING**




When the anodes are installed at the center of the piping, or it is not known where the anodes are installed, the reference electrode must be placed at both the tank and the dispenser end of the piping to obtain local potentials (See Figure 8). Remote placement of the reference electrode is also necessary.

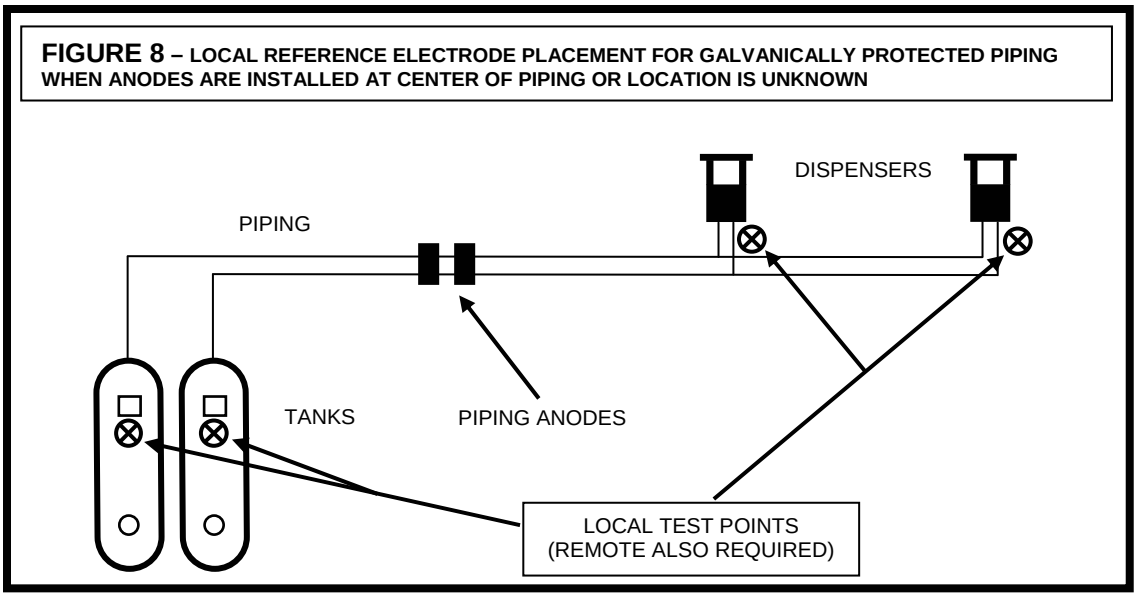



**FIGURE 8 – LOCAL REFERENCE ELECTRODE PLACEMENT FOR GALVANICALLY PROTECTED PIPING WHEN ANODES ARE INSTALLED AT CENTER OF PIPING OR LOCATION IS UNKNOWN**

### 6.10.3 Tanks Protected by Impressed Current

With impressed current cathodic protection systems, tank potentials are required to be measured with the reference electrode placed locally. Where the location of the anodes is known and they are relatively evenly distributed about the tank bed, the appropriate location to place the reference electrode would be in the soil at the middle of the tank (See Figure 9). However, if access to the soil is not available at the middle of the tank, the reference electrode may be placed in the soil at any point along the centerline of the tank similar to that described in Section 6.10.1.

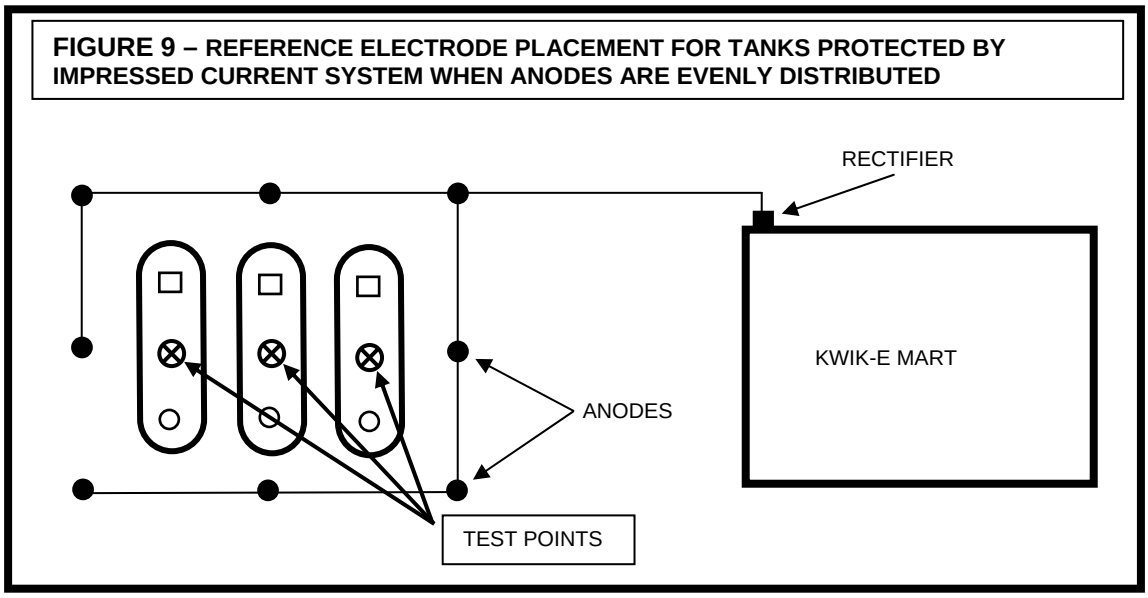
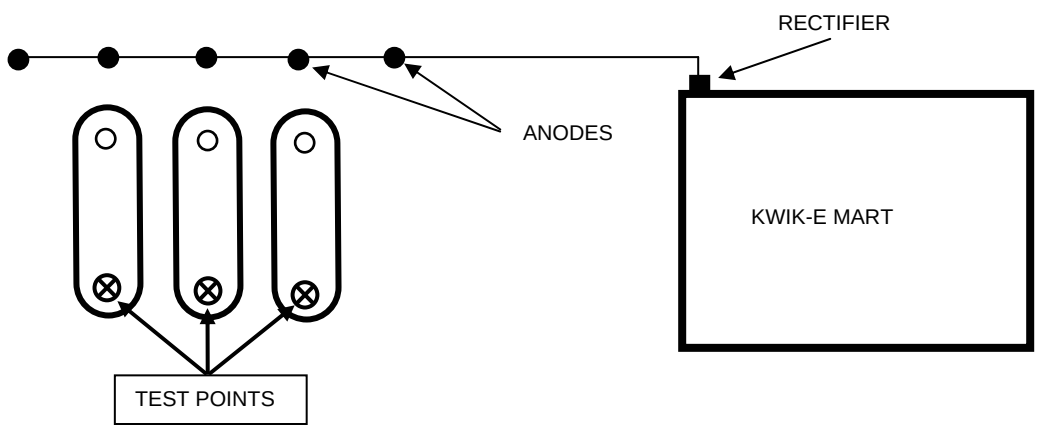



**FIGURE 9 – REFERENCE ELECTRODE PLACEMENT FOR TANKS PROTECTED BY IMPRESSED CURRENT SYSTEM WHEN ANODES ARE EVENLY DISTRIBUTED**

As with the evaluation of any cathodic protection system, the location of the anodes in relation to reference electrode placement can be of critical importance. When selecting the appropriate local placement, it is necessary to place the reference electrode at the point over the structure that is the most distant from any active anode due to the effects of attenuation. Attenuation of the cathodic protection current may occur whereby effective protection is not achieved at some point along a UST system. For instance, if all of the active anodes are along one side of a tank bed, current distribution and attenuation may prevent sufficient protective current from reaching the side of the tanks away from the anodes. The preferred placement of the reference electrode would be along the centerline of the tanks at the end opposite to that where the anodes are installed (See Figure 10).

**FIGURE 10 – REFERENCE ELECTRODE PLACEMENT FOR TANKS PROTECTED BY IMPRESSED CURRENT SYSTEM WHEN ANODES ARE UNEVENLY DISTRIBUTED**




If it is not known where the anodes are installed, at least one measurement is required along the centerline of the tank. Testing should be conducted at as many locations along the centerline of the tank as are available. If soil access is available at each end of the tank and in the middle, all three structure-to-soil potentials should be recorded. If any one of the measured potentials does not meet one of the acceptable criteria, the structure should be failed.

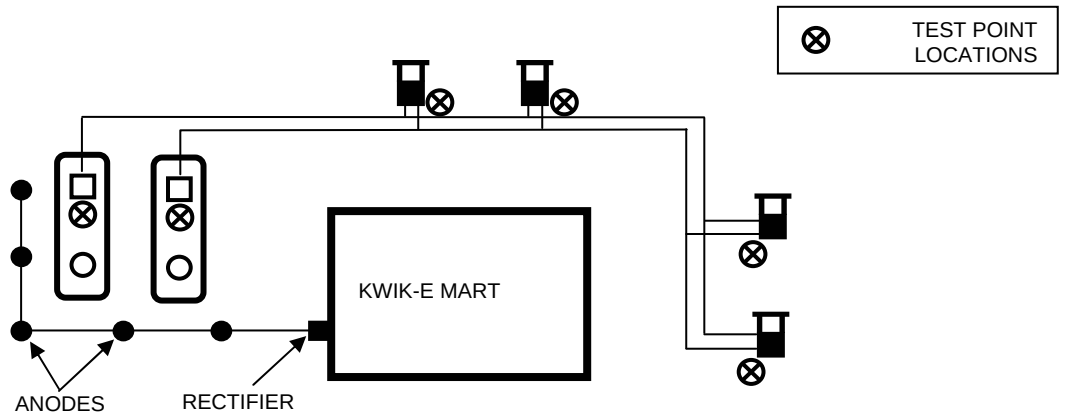
In addition, if it is possible to measure the individual circuits in an impressed current system, a determination can be made as to which anodes are functional and how the current is distributed throughout the groundbed. How the current is distributed should be considered when choosing reference electrode placement when conducting a structure-to-soil potential survey. If for instance it is known that the majority of the rectifier output current is directed to only those anodes along one end of a tank bed, the reference electrode should be placed at the opposite end of the tank bed.

### 6.10.4 Piping Protected by Impressed Current

With impressed current cathodic protection systems, pipe potentials are required to be measured with the reference electrode placed locally. Just as with any other type of cathodic protection

system, knowing where the anodes that are protecting the piping are installed is of critical importance. Due to the high degree of variability that exists in anode placement and piping configurations, structure-to-soil potentials must be obtained by placing the reference electrode at both the tank and dispenser end of any piping that is protected by impressed current (See Figure 11).

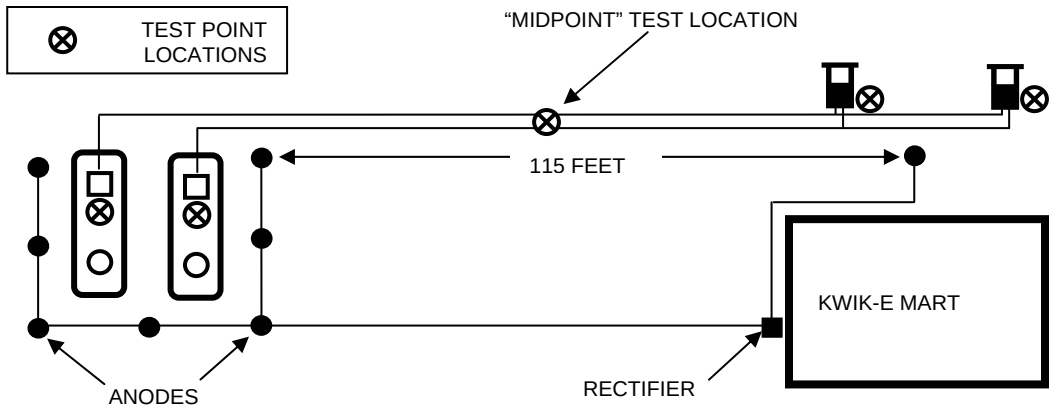
**FIGURE 11 – REFERENCE ELECTRODE PLACEMENT FOR METALLIC PIPING PROTECTED BY IMPRESSED CURRENT SYSTEM**




### 6.10.5 "100 Foot Rule" for Piping

For both galvanic and impressed current systems, if more than 100 feet of piping exists between any two anodes, the reference electrode must also be placed at the midpoint between the two anodes that are separated by more than 100 feet (see Figure 12). In addition, if it is not known where the piping anodes are located, there can be no more than 100 feet of piping between any two test points. This midpoint placement is in addition to any other reference electrode placement that may be required as noted above in Sections 6.10.1 through 6.10.4.

**FIGURE 12 – "100 FOOT RULE" FOR METALLIC PIPING PROTECTED BY GALVANIC OR IMPRESSED CURRENT SYSTEM**



## SECTION 7 - DOCUMENTATION OF EVALUATION

### 7.1 Documentation

As with any kind of testing or work that is being performed at a UST facility, it is critical that proper documentation be made of all activities and test procedures. Without proper documentation, the evaluation of a cathodic protection system through the application of a structure-to-soil potential survey is of little value.

Although it has been previously stated, the exact location where the reference electrode was placed in order to obtain a passing structure-to-soil potential is of critical importance and cannot be overemphasized. For this reason, an exact description of where the reference electrode was placed for each structure-to-soil potential obtained during the survey is an absolute necessity. Failure to properly document reference electrode placement will result in the survey being deemed invalid.

Additionally, in order to effectively evaluate the survey of a cathodic protection system it is essential to be able to clearly understand how the survey was conducted. Likewise, when a re-survey of an existing system is being conducted it is important that the tester understands how the previous survey was conducted. Various forms of documentation may be necessary in order to clearly convey the procedures and survey results. In the sections that follow, some of the more critical aspects of documentation are discussed in more detail.

#### 7.1.1 As Built Drawings

If any modification to the construction of the cathodic protection system is made (e.g. supplemental anodes) it is necessary to show the modification on the "as built" drawings. If no as built drawing is available, you must indicate the location of any anode addition on the site drawing that is constructed as part of the evaluation. As built drawings are required whenever a cathodic protection system is installed or substantially modified. The drawings should include: a) how many anodes were installed; b) what type of anodes were installed; c) where were the anodes installed; d) how deep were the anodes installed; e) what type of wire was used; f) how were the wires bonded, etc.

#### 7.1.2 Site Drawing

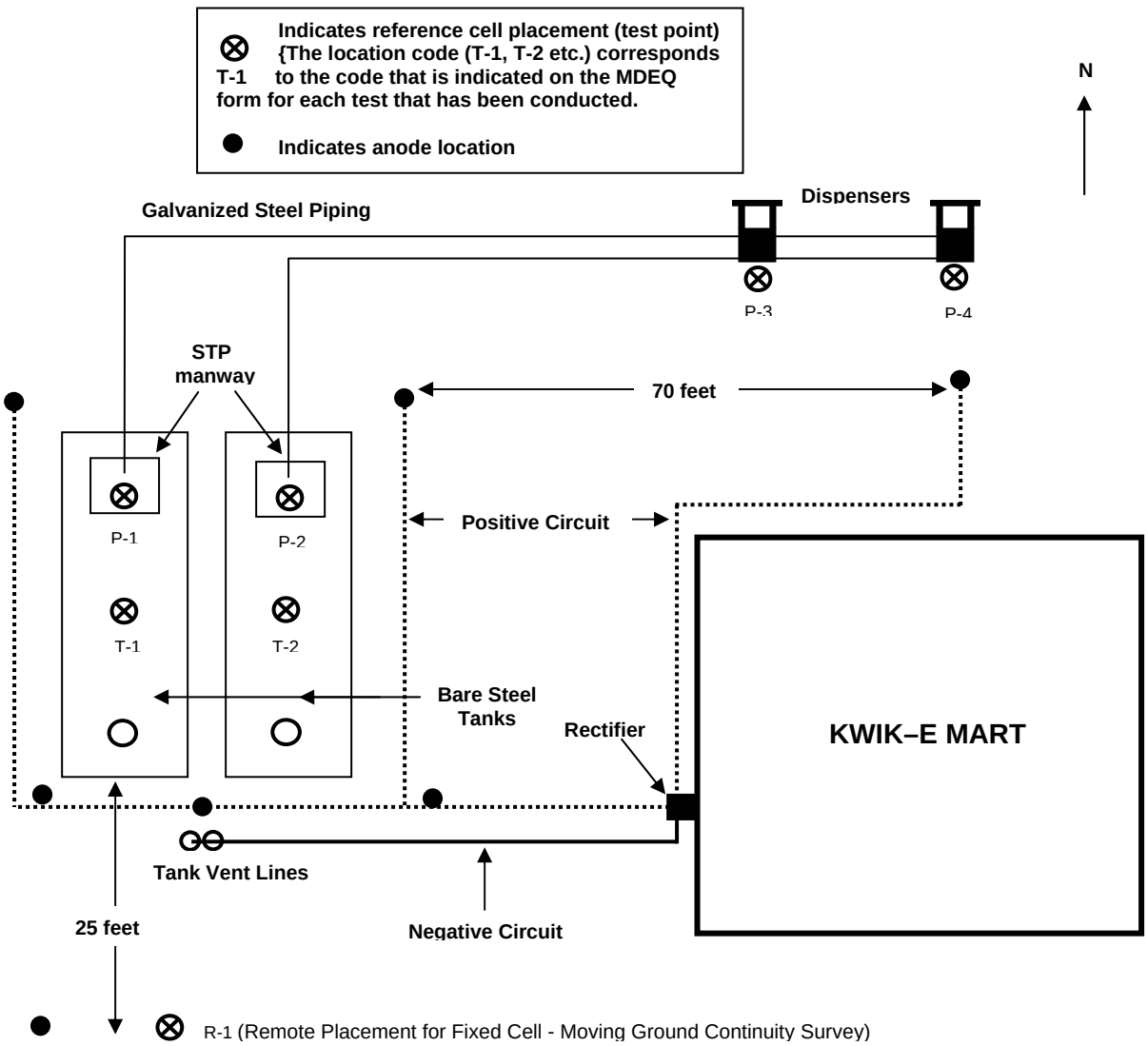
Whenever a cathodic protection survey is conducted, a site drawing depicting the UST system, the cathodic protection system and any related features of the facility must be constructed. In addition, you must indicate on the drawing where the reference electrode was placed for each of the structure-to-soil potentials utilized to obtain a pass. Figure 13 is an example of a site drawing that shows the type of information that is necessary to properly complete the evaluation.

While it is understood that you will not always know where all of the pertinent components of the cathodic protection system may be buried, all that is known must be indicated. It is very important to show where the anodes are located on the site drawing. If you do not know where

the anodes are buried, voltage gradients in the soil may help you determine the approximate location as described in the raised earth discussion of Section 6.3.

Should any modifications to the cathodic protection system be made, it is very important that such modifications be both visually indicated on the site drawing and a written narrative made that describes the work conducted. If as built drawings are available, it is acceptable to utilize these drawings for the purposes of meeting the requirements of this section. Any modifications or changes to the UST and/or cathodic protection systems that have been made since the construction of the as built drawings must be included.

**FIGURE 13 – EXAMPLE OF A SITE DRAWING CONSTRUCTED AS PART OF A UST SYSTEM CATHODIC PROTECTION SURVEY**



### 7.1.3 MDEQ UST Cathodic Protection Evaluation Forms

Whenever a cathodic protection survey is conducted in the State of Mississippi, the appropriate form (s) prescribed by the MDEQ (Appendix K and/or L) must be utilized to document the survey. However, use of the prescribed form(s) is not intended to limit other kinds of documentation that may be desirable in order to complete the evaluation. For instance, it may be necessary to provide a written narrative describing various aspects of the evaluation or a repair/modification that are not captured by completion of the form(s) them selves.

### 7.1.4 Pass/Fail/Inconclusive

In order to assure uniformity in the manner in which cathodic protection evaluations are documented, it is necessary to "make a call" as prescribed in the MDEQ cathodic protection evaluation form found in Appendix K and L of this document. The terms "pass", "fail" and "inconclusive" are utilized for this purpose. Therefore, it is necessary to clarify what these terms mean and their applicability as related to the evaluation of cathodic protection systems utilizing the MDEQ forms. An evaluation conducted by an individual who is only qualified as a cathodic protection tester must result in one of three conclusions, pass, fail or inconclusive. If the person conducting the evaluation is qualified as a corrosion expert, the evaluation must result in either pass or fail.

**Pass -** The term "pass" as related to Section VI and VII (tester's/corrosion expert's evaluation) of the MDEQ galvanic/impressed current cathodic protection system evaluation forms is taken to mean that the structure-to-soil potential survey indicates all of the protected structures at a facility meet at least one of the three accepted criteria. Pass as related to Section XIV and XVI (potential survey) of the respective MDEQ galvanic/impressed current cathodic protection system evaluation forms means that the individual structure that is being tested meets at least one of the accepted criteria.

**Fail -** The term "fail" as related to Section VI and VII (tester's/corrosion expert's evaluation) of the MDEQ galvanic/impressed current cathodic protection system evaluation forms means that the structure-to-soil potential survey indicates that there are one or more protected structures at a facility that do not meet any of the accepted criteria. Fail as related to Section XIV and XVI (potential survey) of the respective MDEQ galvanic/impressed current cathodic protection system evaluation forms means that the individual structure that is being tested does not meet any of the accepted criteria.

**Inconclusive -** The term "inconclusive" as related to Section VI (tester's evaluation) of the MDEQ galvanic/impressed current cathodic protection system evaluation forms means that a person qualified only as a tester is unable to conclusively evaluate the cathodic protection system and a corrosion expert must "make the call". A cathodic protection tester must indicate inconclusive whenever one or more of the conditions listed in Section 7.2 of this document are applicable.

Inconclusive as related to Section XII and XV (continuity testing) of the respective MDEQ galvanic/impressed current cathodic protection system evaluation forms means that it cannot be

determined if the individual structure that is being tested is either electrically isolated in the case of galvanic systems or is electrically continuous in the case of impressed current systems.

Inconclusive as related to Section XIV of the MDEQ galvanic cathodic protection system evaluation form is utilized when both the local and the remote potential measurements do not result in the same conclusion. If for instance the local potential was -900 mV but the remote was -700 mV an inconclusive would result since the local indicates that adequate cathodic protection is provided but the remote does not.

## 7.2 Corrosion Expert's Evaluation

Because the MDEQ has allowed those individuals who may only have minimal training in the principles of cathodic protection to conduct testing of such systems, it must be recognized that there will be instances where the expertise of someone who is more qualified and better understands the principles involved will be necessary.

Some of the more obvious scenarios where a person with a level of expertise equivalent to a "corrosion expert" {as defined in Section 2.1 (280.12) of this document} are necessary are given below. If any of the conditions given below are met, a corrosion expert must evaluate the survey results obtained by a tester and/or conduct further testing and complete Section VII of the MDEQ cathodic protection system evaluation form(s). If the structure-to-soil potential survey is conducted by a person who is qualified as a corrosion expert, completion of Section VII of the MDEQ form(s) is all that is necessary.

A corrosion expert is required to evaluate and/or conduct the survey when:

1. Supplemental anodes are added to a galvanic cathodic protection system and an accepted industry standard is not followed and/or properly documented.

2. Supplemental anodes or other changes in the construction of an impressed current system are made.

3. It is known or suspected that stray current may be affecting the protected structure.

4. The repair and/or addition of supplemental anodes to bare steel/galvanized piping that is galvanically protected (see Section 5.1.3).

5. An inconclusive was declared when testing a galvanically protected structure because both the local and the remote potentials did not indicate the same result (one indicated pass but the other indicated fail).

Although not specifically listed above, it should be recognized that there might be additional circumstances that may arise that will require evaluation, and/or design by a corrosion expert.

## 7.3 What if the Evaluation Result is Fail?

It is important to properly notify the tank owner if an evaluation of the cathodic protection system fails. Necessary repairs should be accomplished within 90 days of receipt of the "failed" evaluation. The tank owner is responsible for ensuring that the cathodic protection system is maintained in a manner that will provide adequate corrosion protection to the UST system.

As it is recognized that many factors may cause a lower than desired voltage to be obtained during a structure-to-soil survey, there may be several different courses of action appropriate to resolve the "fail". For instance, it is not uncommon to simply retest a sti-$P_3$® tank that has failed a cathodic protection survey at a later date and achieve a passing result.

Therefore, a 90-day re-testing period is allowed whenever a fail is obtained during which no action is necessary to repair or modify the cathodic protection system. This applies only to those galvanic and impressed current systems that appear to be in good working condition. If there are obvious problems with a system or you are unable to achieve a pass within the 90-day window, the tank owner must make any repairs and/or modifications that are necessary to achieve a pass. Repairs and/or modifications must be completed as soon as practical but no more than 90 days should be allowed after expiration of the "90 day window".

## APPENDIX A - INDUSTRY CODES/STANDARDS, REFERENCES and REGULATIONS

### INDUSTRY CODES/STANDARDS

American Petroleum Institute (API) RP1632 3rd Edition "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems".

American Petroleum Institute (API) RP1615 5th Edition "Installation of Underground Petroleum Storage Systems".

National Association of Corrosion Engineers (NACE International) RP0169-96 "Control of External Corrosion on Underground or Submerged Metallic Piping Systems".

National Association of Corrosion Engineers (NACE International) TM0101-2001 "Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Tank Systems".

National Association of Corrosion Engineers (NACE International) RP0285-2002 "Corrosion Control of Underground Storage Tank Systems by Cathodic Protection".

Petroleum Equipment Institute (PEI) RP 100-2000 "Recommended Practices for Installation of Underground Liquid Storage Systems".

Steel Tank Institute (STI) R892-91 "Recommended Practice for Corrosion Protection of Underground Piping Networks Associated with Liquid Storage and Dispensing Systems".

Steel Tank Institute (STI) R972-01 "Recommended Practice for the Installation of Supplemental Anodes for sti-$P_3$® UST's".

### REFERENCES

Department of Defense MIL-HDBK-1136 "Maintenance and Operation of Cathodic Protection Systems".

Department of Defense MIL-HDBK-1136/1 "Cathodic Protection Field Testing".

### REGULATIONS

Subtitle I of the Resource Conservation and Recovery Act published in the Code of Federal Regulations Chapter 40 Part 280 "Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tank Systems".

## APPENDIX B – GLOSSARY

**100 mV POLARIZATION –** One of the three criteria that are commonly accepted as indicating adequate cathodic protection has been achieved. It is typically measured by interrupting the protective current on an impressed current system. When the current is interrupted, an "instant off" potential is recorded and the structure under cathodic protection is then allowed to depolarize until a change of at least 100 mV in potential is observed. Not more than 24 hours should be allowed for the depolarization to occur when conducting this test.

**850 ON –** One of the three criteria that are commonly accepted as indicating adequate cathodic protection has been achieved. It is measured with the protective current applied and is typically the only measurement possible with galvanic systems since the anodes cannot be disconnected. This criterion is not applicable to impressed current systems since a large portion of the "on" measurement can be comprised of a voltage drop when the protective current is applied.

**850 OFF** - One of the three criteria that are commonly accepted as indicating adequate cathodic protection has been achieved. It is measured with the protective current interrupted (either the power is cut off to the rectifier or the sacrificial anodes are disconnected). This criterion is considered by most to be the best indicator that adequate cathodic protection has been provided.

**ANODE –** The electrode of an electrochemical cell where oxidation (corrosion) occurs. With respect to cathodic protection, it can be thought of as the place where electrons leave the surface of a metal. Common galvanic anodes are zinc and magnesium.

**AMPERE (AMP) –** The basic unit of current flow in an electric circuit. Amperage can be thought of as "gallons per minute" in a water system.

**AS BUILT DRAWINGS –** Drawings that show how a system was actually installed in the field. Sometimes, unforeseen factors prevent the installation of a system as it was intended in the design drawings and this is why it is important to have detailed and accurate "as built" drawings.

**ATTENUATION -** The protective effects of cathodic protection current diminish as you move away from the source of the protective current. To illustrate this, on an impressed current system where the ground bed is installed only on one side of the tank bed, the end of the tanks away from the ground bed will receive less protective current than the side of the tanks closest to the anodes. Attenuation of protective current applies to galvanic systems as well.

**CATHODE –** The electrode of an electrochemical cell where reduction (and no corrosion) occurs. With respect to cathodic protection, it can be thought of as the place where current enters the surface of a metal.

**CATHODIC PROTECTION –** The technique of causing the entire surface of a metallic structure to become a cathode with respect to its external environment (soil). This is

accomplished by supplying an electric current sufficient to overcome the tendency of naturally occurring electrical currents to leave the metallic structure.

**CATHODIC PROTECTION EVALUATION –** The interpretation of whether or not a cathodic protection system is providing sufficient corrosion protection. An evaluation incorporates all cathodic protection testing, surveys, rectifier operation/output measurements, consideration of voltage drops, condition of dielectric coatings, continuity, bond integrity, circuit integrity and any other factors or site specific conditions that may have an influence on the operation and effectiveness of a cathodic protection system.

**CATHODIC PROTECTION SURVEY –** Refers to the process whereby all of the structure-to-soil measurements necessary to contribute to the final evaluation of a system are obtained.

**CATHODIC PROTECTION TEST –** Refers to the process whereby only a single structure-to-soil measurement is obtained.

**CONTINUITY –** As related to cathodic protection, continuity means that two metallic structures are electrically continuous. With impressed current systems all protected structures must be continuous and this is normally accomplished through the use of wires referred to as continuity bonds.

**CORROSION –** The deterioration of a material (usually a metal) caused by an electro-chemical reaction with its environment. Corrosion of metals involves the flow of electrons (current) between an anode and a cathode. Corrosion will occur where the electrons leave the surface of a metal.

**CURRENT TEST –** A method of temporarily creating an impressed current cathodic protection system on a galvanically protected structure so that it can be determined how much protective current is necessary in order to achieve adequate cathodic protection. This is normally done by connecting a 12-volt battery to the structure to be tested and to a temporary anode.

**DIELECTRIC MATERIAL –** A coating that does not conduct electricity. Various coatings are utilized and some examples are the "fusion-bonded epoxy" found on factory coated steel piping and coal tar epoxies commonly found on sti-$P_3$® tanks.

**DISTRIBUTED GROUND BED –** Used to describe an anode configuration in which the anodes are more or less equally distributed around the metallic structure that is intended to be protected.

**ELECTROLYTE –** As related to UST cathodic protection systems, electrolyte refers to the soil and/or water surrounding the metallic structure that is under cathodic protection.

**ELECTROMAGNETIC INTERFERENCE –** As related to corrosion protection, it is an external electrical current that causes an error in a voltmeter measurement. Sources are

commonly associated with high voltage AC power lines, radio frequency transmitters and airport radar systems.

**FAIL –** See Section 7.1.4.

**FIELD INSTALLED –** Refers to any impressed current system or sacrificial anode cathodic protection system that is installed at a pre-existing UST location or when sacrificial anodes are installed on new metallic pipe in the field. Any cathodic protection system except for those associated with unmodified sti-$P_3$® tanks may be thought of as "field installed".

**FINAL POTENTIAL (VOLTAGE) –** The voltage that is observed at the end of the depolarization period associated with the measurement of "100 mV polarization". The final voltage must be at least 100 mV less than the "instant off" voltage in order to meet the 100 mV polarization criterion for adequate cathodic protection.

**"FIXED CELL – MOVING GROUND" –** A technique for measuring continuity in a UST system whereby the reference electrode is placed in the soil at a location remote from the UST system and is left undisturbed (fixed cell) while potentials are measured on various parts of the UST system (moving ground).

**GALVANIC (SACRIFICIAL) ANODE –** A metal of high electro-potential (see Appendix J) that is used to protect another metal. Zinc and magnesium are two metals that are commonly utilized in the protection of UST systems.

**GALVANIC CATHODIC PROTECTION –** A cathodic protection system that utilizes sacrificial anodes to provide the protective current. The anode will corrode (sacrifice itself) instead of the metal it is intended to protect. The anode provides a protective current (reverses the electron flow) because it has a higher electrochemical potential than the metal it is intended to protect. Galvanic systems are normally limited to the protection of well coated structures because they have a very low driving potential.

**IMPRESSED CURRENT ANODE –** A metal that is utilized to deliver the current from a rectifier to the soil in order to protect the intended metallic structure. Impressed current anodes are commonly made of graphite, high silicon cast iron and "mixed-metal oxides" because the metal must be highly resistant to corrosion in order to have an acceptably long life span.

**IMPRESSED CURRENT CATHODIC PROTECTION –** A cathodic protection system in which the protective current is supplied by an external source (rectifier). The level of protective current that is delivered to the structure is adjustable and is much higher than that associated with galvanic anodes. For this reason, impressed current systems are utilized on those UST systems that are uncoated or require a high amount of protective current.

**INCONCLUSIVE -** See Section 7.1.4.

**INSTANT OFF POTENTIAL (VOLTAGE) –** The voltage that is observed momentarily after the power to an impressed current cathodic protection system is interrupted. It is used as the base line from which to begin calculating a "100 mV polarization". The second number that appears after the current is interrupted is considered the proper value to represent the instant off potential.

**ISOLATION –** As related to cathodic protection, isolation means that two metallic structures are electrically discontinuous. With galvanic systems a protected structure must be electrically isolated and this is normally accomplished through the use of nylon bushings and dielectric unions.

**LOCAL POTENTIAL (VOLTAGE) –** The structure-to-soil potential of a metallic structure that is measured with the reference electrode placed in the soil immediately over the protected structure.

**NACE INTERNATIONAL –** Acronym for National Association of Corrosion Engineers International.

**NATIVE POTENTIAL (VOLTAGE) –** The structure-to-soil potential exhibited before any cathodic protection is applied.

**ON POTENTIAL (VOLTAGE) –** The structure-to-soil potential that is measured with the protective current applied.

**PARALLEL CIRCUIT –** Can be caused by the person conducting the test making contact with a metallic part of the test leads, or reference electrode when conducting structure-to-soil potential measurements. The creation of parallel paths must be avoided since inadvertent errors can be introduced.

**PASS –** See Section 7.1.4

**PASSIVATION -** When a metal undergoes passivation, an oxidation layer forms on the surface of the metal due to corrosion and can be defined as the loss of chemical reactivity. The oxidation layer acts as a coating and prevents or slows further corrosion of the metallic object since oxygen is prevented from reaching the underlying metal.

**PHOTOVOLTAIC EFFECT –** Sunlight striking the electrolyte solution in a copper-copper sulfate reference electrode can cause an error in the observed structure-to-soil potential and must be avoided.

**"POINT-TO-POINT" -** A technique for measuring continuity in a UST system whereby each lead of a voltmeter is connected to the two metallic structures of interest (negative lead to one structure and positive to the other). The voltage difference (if any) measured with the voltmeter connected in this manner indicates if continuity is present or not.

**POLARIZATION –** The change in the structure-to-soil potential of a metallic structure due to the application of a protective current. In this guidance document, polarization is considered to mean cathodic polarization - that is, the potential of the metal is shifted in the negative direction.

**POLARIZED POTENTIAL –** The structure-to-soil potential of a metallic structure that is observed after the protective current is applied and sufficient time has elapsed for the structure to completely polarize.

**RAISED EARTH –** Term used to describe the high voltage gradient found in the soil around an active impressed current or sacrificial anode. Placement of the reference electrode in proximity to an active anode will cause an abnormally high (more negative) structure-to-soil potential than would be present if the anode were not in close proximity.

**RECTIFIER –** A device utilized in impressed current systems that changes AC power to DC power.

**REFERENCE ELECTRODE –** Also referred to as a reference cell or a half-cell. A device whose electrochemical potential is constant that is used to measure the structure-to-soil potential of buried metallic structures. The potential that is observed on the buried metallic structure is relative to the potential of the reference electrode. The potential of a buried metallic structure would be zero if it were of the exact same composition as the reference electrode if all sources of measurement error were eliminated.

**RESISTANCE –** A measurement of the tendency of a substance to inhibit the flow of electrical current. Resistance in UST cathodic protection systems is generally meant to refer to the electrical properties of the backfill materials (soil).

**REMOTE EARTH –** The structure-to-soil potential of a metallic structure that is measured with the reference electrode placed in the soil at a point well away (remote) from the protected structure. Remote earth is generally thought of as at least 25 feet and not more than 100 feet away. Remote earth is established when the observed structure-to-soil potential does not significantly change no matter how far away the reference electrode is from the protected structure.

**SACRIFICIAL ANODE –** See Galvanic Anode.

**SHIELDING –** A structure that prevents or diverts an electrical current from reaching the desired location. Normally thought of as something that stops a reference electrode from being able to "see" the metallic structure that you trying to measure.

**sti-$P_3$® TANK –** A steel tank manufactured to the standard created by the Steel Tank Institute that comes from the factory with a "pre-engineered" cathodic protection system. The "P3" means that the steel tank is protected in three ways: 1) A protective dielectric coating is factory applied; 2) Sacrificial anodes (normally zinc) are factory installed on the tanks and 3) dielectric bushings are installed to facilitate electrical isolation of the tank.

**STRAY CURRENT –** An electrical current that travels along an unintended path. Normally thought of as a current from some external source that enters a protected metallic structure at one point that then exits at another point. The point where the stray current exits the protected structure can be subject to intense corrosion and failure may rapidly occur.

**STRUCTURE-TO-SOIL POTENTIAL –** Also know as "pipe-to-soil potential' or "structure-to-electrolyte potential" – The difference in the potential of the surface of a buried metallic structure and the electrolyte (soil) that surrounds it with respect to a reference electrode in contact with the electrolyte (soil). Can be thought of as the voltage difference between a buried metallic structure and the soil that it is buried in.

**VOLTAGE –** The basic unit of force in an electric circuit. Voltage is equivalent to pounds per square inch in a water system.

**VOLTAGE (IR) DROP –** With respect to UST cathodic protection systems, voltage drops may be thought of as any voltage that causes an error in the observed structure-to-soil potential. Whenever a current is flowing through a resistance, a voltage drop is present and is part of the voltage measurement obtained.

## APPENDIX C

| GENERALIZED INTERPRETATION OF STRUCTURE-TO-SOIL POTENTIAL MEASUREMENTS (VOLTAGES) OBTAINED ON GALVANIC CATHODIC PROTECTION SYSTEMS | |
|---|---|
| Listed in this table are some generalized observations that can be applied to the interpretation of structure-to-soil potentials. Depending on the specific site conditions and other factors, differing interpretations are possible. | |
| **VOLTAGE** | **GENERALIZED INTERPRETATION** |
| **POSITIVE** | Test leads are reversed (negative should be connected to the reference electrode and the positive should contact the structure you are testing in order to observe negative voltages). Could indicate that stray current is affecting the structure (consult with a corrosion expert). |
| **0 to -100** | Usually occurs when you are attempting to measure a structure that has a test lead that is not continuous with the tank. Because you are measuring the potential of a copper wire with reference to the copper-copper sulfate half-cell, the potential is zero or very near it. Disregard test lead and make direct contact with the protected structure. |
| **-101 to -399** | Try again – A reading in this range is not normally seen on an underground steel structure. Could indicate that steel structure is electrically connected to a significant amount of a more noble metal (e.g. copper). Very corroded low carbon steel may also be indicated. |
| **-400 to -599** | Steel structure does not meet regulatory requirements. Usually means that the steel structure has no cathodic protection. Existing sacrificial anodes could be completely "burned-out" or were never there to begin with. |
| **-600 to -849** | Steel structure does not meet regulatory requirements. Usually means that the steel structure has anodes but for whatever reason, something is causing a low reading that may indicate adequate cathodic protection has not been provided. The anodes may be trying to protect a structure that requires more current than they can produce. The protected steel structure may not be electrically isolated from all other metallic structures (conduct continuity testing). The environmental conditions may not be favorable at the time you are attempting to obtain the reading. Retest during the next 90 days to see if an acceptable reading can be obtained. |
| **-850 to -1100** | Steel structure protected by zinc anodes meets regulatory requirements and cathodic protection is judged to be adequate. Readings in this range are what you would expect on most sti-$P_3$® tanks that have not been modified and are reading "good" since nearly all come from the manufacturer with zinc anodes. |
| **-850 to -1600** | Steel structure protected by magnesium anodes meets regulatory requirements and cathodic protection is judged to be adequate. Readings in this range are what you would typically expect on steel piping that is |

| | |
|---|---|
| | reading "good" since magnesium anodes are generally installed on piping. You may also find readings up to -1600 mV on a sti-$P_3$® tank that has been retrofitted or was supplied at the factory with magnesium anodes. |
| **MORE NEGATIVE THAN -1100 WITH ZINC ANODES ONLY** | Voltages more negative than -1100 mV are theoretically not possible if there are only zinc anodes installed. If you have a reading more negative than -1100 mV and you are sure magnesium anodes are not present, you should suspect that stray current may be affecting the cathodically protected structure. A corrosion expert should be contacted immediately since stray current can cause a corrosion failure in a relatively short period of time. |
| **MORE NEGATIVE THAN -1600** | Voltages more negative than -1600 mV are theoretically not possible with any sacrificial anode cathodic protection system. If you have a reading more negative than -1600 mV on any galvanic cathodic protection system, you should suspect that stray current may be affecting the cathodically protected structure. A corrosion expert should be contacted immediately since stray current can cause a corrosion failure in a relatively short period of time. |
| **VARIABLE** | If the voltmeter readings vary you should suspect that stray current may be affecting the cathodically protected structure. Sometimes, the stray current can cause a pattern to develop that is recognizable. An example would be the on/off pattern of a nearby DC powered welding operation. A corrosion expert should be contacted immediately since stray current can cause a corrosion failure in a relatively short period of time. |
| **RAPIDLY FLUCTUATIN G** | If the voltmeter will not stabilize, it usually means that there is a high electrical resistance somewhere. Check all lead wires and connections and make sure that you are making a solid and clean metal to metal connection. Soil where the reference electrode is placed could be too dry. Add water to the soil or wait until a heavy rain occurs and try again. Petroleum contaminated soils may cause a high contact resistance. The tip of the reference electrode may need to be cleaned or replaced. |

## APPENDIX D

| GENERALIZED INTERPRETATION OF STRUCTURE-TO-SOIL POTENTIAL MEASUREMENTS (VOLTAGES) OBTAINED ON IMPRESSED CURRENT CATHODIC PROTECTION SYSTEMS | |
|---|---|
| Listed in this table are some generalized observations that can be applied to the interpretation of structure-to-soil potentials. Depending on the specific site conditions and other factors, differing interpretations are possible. | |
| **VOLTAGE** | **GENERALIZED INTERPRETATION** |
| **ANY POSITIVE VOLTAGE OR 0 TO -100 "ON" or "OFF"** | Can indicate that the structure you are attempting to measure is not bonded to the impressed current system (conduct continuity testing). Stray current could be affecting the protected structure (consult a corrosion expert). Positive and negative wires could be reversed (negative must be to protected structure and positive to anode). Test leads are reversed (positive lead should contact structure and negative lead should be connected to reference electrode). Could indicate that you are measuring the potential of a copper wire. |
| **-101 to -399 "ON" or "OFF"** | Try again – A reading in this range is not normally seen on an underground steel structure. Could indicate that steel structure is electrically connected to a significant amount of a more noble metal (e.g. copper). Very corroded low carbon steel may also be indicated. |
| **-400 to -599 "ON" or "OFF"** | Usually means that the steel structure has no cathodic protection. Existing impressed current anodes could be completely "burned-out". Continuity of anode lead wires (positive circuit) could be broken. Negative bonds on the protected structures may be broken or non-existent. |
| **-600 to -849 "ON" or "OFF"** | Usually means that the steel structure has some protection but for whatever reason, something is causing a low reading that may indicate adequate cathodic protection has not been provided. The impressed current system may be trying to protect a structure that requires more current than it can produce (rectifier output too small). The impressed current system may not be capable of effectively distributing the required current to all parts of the structure you are trying to protect (not enough anodes, anodes improperly installed, soil resistivity too high). The steel structure that is intended to be protected may not be electrically continuous with the other metallic structures under protection (conduct continuity testing). The environmental conditions may not be favorable at the time you are attempting to obtain the reading. Retest during the next 90 days. |
| **-850 or MORE NEGATIVE** | Steel structure may or may not be adequately protected. Usually indicates that the impressed current system is providing current to the structure although the reading normally includes a large voltage (IR) drop. Because the flow of current through the soil causes a voltage drop, the on potential |

| | |
|---|---|
| **"ON"** | cannot be used to indicate that adequate cathodic protection has been provided. Instant off potentials must be utilized to demonstrate cathodic protection. |
| **-850 or MORE NEGATIVE "OFF"** | Steel structure protected by impressed current system meets regulatory requirements and cathodic protection is judged to be adequate. A potential measurement of -850 mV or more negative with the protective current temporarily interrupted (850 off) is considered to be the best indicator that adequate cathodic protection has been provided. |
| **MORE NEGATIVE THAN -1220 mV "OFF"** | Instant off potentials more negative than -1220 mV are theoretically not possible. If you observe an instant off potential more negative than -1220 mV, you should suspect stray current is affecting the protected structure. Consult a corrosion expert immediately since stray current can cause a rapid corrosion failure of the protected structure. |
| **MORE NEGATIVE THAN -2000 "ON"** | Usually means that a high resistance exists in the ground bed that is causing a large voltage drop. This condition is normally evident by checking the rectifier output since the voltage is very high but the amperage is relatively low. However, you should be cautious when abnormally high voltages are observed since this can have a detrimental effect on cathodically protected structures or the anodes may be rapidly depleted. Stray current may also be generated that can adversely affect other buried metallic structures such as water lines and other utilities. Consult a corrosion expert whenever it is suspected that too much voltage is being generated. |
| **VARIABLE "ON" or "OFF"** | If the voltmeter readings vary, you should suspect that stray current may be affecting the cathodically protected structure. Sometimes, the stray current can cause a pattern to develop that is recognizable. An example would be the on/off pattern of a nearby DC powered welding operation. A corrosion expert should be contacted immediately since stray current can cause a corrosion failure in a relatively short period of time. |
| **RAPIDLY FLUCTUATING "ON" or "OFF"** | If the voltmeter will not stabilize, it usually means that there is a high electrical resistance somewhere. Check all lead wires and connections and make sure that you are making a solid and clean metal to metal connection. Soil where the reference electrode is placed could be too dry. Add water to the soil or wait until a heavy rain occurs and try again. Petroleum contaminated soils may cause a high contact resistance. The tip of the reference electrode may need to be cleaned or replaced. |

# APPENDIX E

**CONTINUITY TESTING PROCEDURE FOR GALVANIC/IMPRESSED CURRENT CATHODIC PROTECTION SYSTEMS**

## Fixed Cell – Moving Ground Continuity Test Procedure

1. Place reference electrode in contact with the soil at a location remote (25 – 100 feet) from all cathodically protected structures. You must ensure that the remote reference electrode placement is not in proximity to any other cathodic protection systems (e.g. natural gas pipelines) or directly over any buried metallic structure in order to minimize the chances of unwanted interference.
2. Be sure that reference electrode is firmly placed in moist soil and is not in contact with any vegetation.
3. Connect reference electrode to the negative terminal of voltmeter using a long spool of suitable wire.
4. Connect positive lead wire to voltmeter. This lead wire should have a sharp test prod (scratch awl or similar) in order to assure good contact with the metallic structures under test.
5. Place voltmeter on 2 volt DC scale.
6. Contact each buried metallic structure with the positive test lead without moving the reference electrode. Typical items that would be tested during a continuity survey include: all tanks, tank risers, submersible pump heads, piping, flex connectors/swing joints, vent lines, electrical conduits, dispensers, utilities, etc.
7. Obtain voltage for each component and record on MDEQ continuity testing form.
8. Voltages for each component that is tested must be obtained as quickly as possible since the observed potential can change over time. This is because the conditions in the soil where the reference electrode is placed can change over a relatively short period of time.

**Fixed Cell – Moving Ground Data Interpretation**

- If two or more structures exhibit potentials that vary by 2 mV or less, the structures are considered to be electrically continuous.
- If two or more structures exhibit potentials that vary by 10 mV or greater, the structures are considered to be electrically isolated.
- If two or more structures exhibit potentials that vary by more than 2 mV but less than 10 mV, the result is inconclusive and further testing (point-to-point) is necessary.

**Point-to-Point Continuity Test Procedure**

1. Turn off power to rectifier if testing an impressed current system. This is necessary to obtain accurate results.
2. Connect test leads to voltmeter. Both test leads should have a sharp test prod or suitable clip lead in order to make good contact with tested structures.
3. Place voltmeter on 2 volt (or lower) DC scale.
4. Connect one voltmeter test lead to one of the structures for which continuity is being tested and connect the other voltmeter test lead to the other structure that is being tested.
5. Record voltages observed on each of the two structures that are being compared and record on MDEQ continuity testing form.

Note: Testing with this method does not require a reference electrode. The two structures of interest are simply connected in parallel with the voltmeter and a determination made as to whether or not any potential difference exists between them.

**Point-to-Point Data Interpretation**

- If the voltage difference observed between the two structures is 1 mV or less, this indicates that the two structures are considered to be electrically continuous with each other.
- If the voltage difference observed between the two structures is 10 mV or greater, this indicates that the two structures are considered to be electrically isolated from each other.
- If the voltage difference observed between the two structures is greater than 1mV but less than 10 mV, the result is inconclusive and further testing beyond the scope of this document is necessary.

# APPENDIX G

## STRUCTURE-TO-SOIL TEST PROCEDURE FOR IMPRESSED CURRENT CATHODIC PROTECTION SYSTEMS

1. Inspect rectifier for proper operation and document necessary information. This includes measurement of output voltage/amperage with a multimeter (do not rely on rectifier gauges) and measurement of individual anode circuits (if installation allows such). Record all necessary information under Section XI and XII of MDEQ impressed current form.

2. Place voltmeter on 2 volt DC scale.

3. Connect voltmeter negative lead to reference electrode.

4. Place reference electrode in clean soil directly over the structure that is being tested. At least one measurement must be taken for each tank - the preferred test point is usually the center of the tank. Piping normally requires measurement at each end of the pipe (see Section 6.10.3 and 6.10.4 of MDEQ guidance document for further explanation).

   - The reference electrode may not be placed on concrete or other paving materials.
   - Ensure that the reference electrode is placed in a vertical position (tip down).
   - Ensure that the soil where the reference electrode is placed is moist – add tap water if necessary.
   - Ensure that the soil where the reference electrode is placed is not contaminated with hydrocarbons.
   - Ensure that the reference electrode window is not exposed to direct sunlight.

5. Connect voltmeter positive lead to structure that is to be tested.

   - Ensure that good metal-to-metal contact is made between the test lead clip/probe and the structure.
   - Ensure that no corrosion exists where the test lead makes contact with the structure.
   - Ensure that your body does not come into contact with the electrical connections.
   - Ensure that test leads are not submerged in any standing water.
   - Ensure that test lead insulation is in good condition.

6. Obtain voltage potential with the protective current applied and record in the on column on the MDEQ impressed current cathodic protection evaluation form.

7. Without moving reference electrode from the position it was in during step 6 above, obtain voltage potential with the protective current temporarily interrupted and record in the instant off column on the MDEQ impressed current cathodic protection form.

   - The instant off potential is the 2$^{nd}$ value that is observed on a digital voltmeter the instant the power is interrupted. The first number that appears immediately after power interruption must be disregarded. After the second number appears, a rapid decay (depolarization) of the structure will normally occur.
   - In order to obtain instant off potentials, a current interrupter or a 2$^{nd}$ person is necessary. If a current interrupter is not available, have the second person throw the power switch at the rectifier off for 3 seconds and then back on for 15 seconds. Repeat this procedure until you are sure an accurate instant off reading has been obtained.

8. Conduct 100 mV polarization decay if you are unable to obtain an instant off potential of -850 mV or more negative in step 7 above. (Note: While not a requirement of this guidance document, consideration should be given to adjusting the rectifier output until an instant off potential of -850 mV is achieved or the maximum safe output is reached.) It is only necessary to conduct 100 mV polarization where the lowest (most positive) instant off potential is observed on the UST system.

   - 100 mV of polarization is determined by leaving the power interrupted on the structure until a change of at least 100 mV in the structure-to-soil potential is observed. In calculating the 100 mV decay, the instant off potential obtained in Step 7 above is utilized as the starting point (e.g. if instant off = -800 mV, power must be left off until decayed to -700 mV).
   - Calculate voltage change by subtracting final (or ending) voltage from the instant off voltage and record these values in the appropriate columns on the MDEQ impressed current cathodic protection evaluation form.

**Data Interpretation** (for a more complete discussion refer to Appendix D of this guidance document)

- If the instant off potential is -850 mV or more negative, the 850 off criterion is satisfied and it is judged that adequate cathodic protection has been provided.
- If the instant off potential is more positive than -850 mV, the tank may or may not be adequately protected and a 100 mV polarization test is necessary.
- If the structure exhibits more than 100 mV polarization, the 100 mV polarization criterion is met and it is judged that adequate cathodic protection has been provided.
- If you are unable to meet either the 850 instant off or the 100 mV polarization criteria, it is judged that adequate cathodic protection has not been provided and repairs/modification are indicated. Alternatively, a person qualified as a corrosion expert could evaluate/conduct the survey and determine that cathodic protection is adequate based on their interpretation.

## APPENDIX H

| CHECKLIST FOR GALVANIC CATHODIC PROTECTION SYSTEM SURVEY | |
|---|---|
| ☐ | Identified UST owner, UST facility, CP tester, tester's qualifications and reason for survey (complete Sections I – V of MDEQ galvanic cathodic protection form). |
| ☐ | Described UST and cathodic protection system (complete Section X of MDEQ galvanic cathodic protection form). |
| ☐ | Constructed site drawing depicting all pertinent components of the UST and cathodic protection systems at the facility (complete Section XII of MDEQ galvanic cathodic protection form). |
| ☐ | Reviewed any previous cathodic protection design/repair/testing data that may be available. |
| ☐ | Ensured soil access was available directly over each cathodically protected component at the facility (see Section 6.9.2 of MDEQ cathodic protection guidance document for discussion). |
| ☐ | Conducted continuity testing of all pertinent metallic components at the UST facility by the fixed remote – moving ground and/or the point-to-point method (complete Section XII of MDEQ galvanic cathodic protection form). |
| ☐ | Obtained local structure-to-soil potentials on every cathodically protected structure with the reference electrode placed in the soil directly over the structure under test (complete Section XIV of MDEQ galvanic cathodic protection form). |
| ☐ | Obtained remote potentials or transposed remote potentials obtained during continuity testing for every cathodically protected structure to appropriate column in Section XIV of MDEQ galvanic cathodic protection form. |
| ☐ | Indicated location (by code or other means) of reference electrode placement on site drawing for each structure-to-soil potential that was obtained during the survey. |
| ☐ | Described any repairs and/or modifications that were made to the cathodic protection system (complete Section XI of MDEQ galvanic cathodic protection form). |
| ☐ | Indicated whether or not each protected structure met the –850mV on criteria for both the local and remote reference electrode placement by indicating pass/fail/inconclusive in the appropriate column in Section XVI of the MDEQ galvanic cathodic protection form. |
| ☐ | If only qualified as a tester - indicated the results of the evaluation by marking either pass, fail or inconclusive in Section VI of MDEQ galvanic cathodic protection form. |
| ☐ | If only qualified as a tester - marked inconclusive if any of the conditions found in Section 7.2 of MDEQ cathodic protection guidance document were applicable to survey. |
| ☐ | If tester indicated inconclusive, either repairs were conducted or a corrosion expert evaluated/conducted the survey and completed Section VII of MDEQ galvanic cathodic protection form. |
| ☐ | If a corrosion expert conducted and/or evaluated the survey – indicated the results by marking either pass or fail in Section VII of MDEQ galvanic cathodic protection form. |
| ☐ | Indicated criteria that were applied to the evaluation by completion of Section VIII of the MDEQ galvanic cathodic protection form. |
| ☐ | Indicated action required as a result of the survey by marking either none, retest or repair & retest in Section IX of MDEQ galvanic cathodic protection form. |
| ☐ | Provided UST owner with any other type(s) of documentation that may be necessary in order to adequately describe the cathodic protection evaluation including the operating status and any repairs or recommendations and attached same to the MDEQ galvanic cathodic protection form. |

## APPENDIX I

### CHECKLIST FOR IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM SURVEY

- ☐ Identified UST owner, UST facility, CP tester, tester's qualifications and reason for survey (complete Sections I – V of MDEQ impressed current cathodic protection form).
- ☐ Described UST system and type of cathodic protection (complete Section X of MDEQ impressed current cathodic protection form).
- ☐ Constructed site drawing depicting all pertinent components of the UST and cathodic protection systems at the facility (complete Section XIV of MDEQ impressed current cathodic protection form).
- ☐ Reviewed any previous cathodic protection design/repair/testing data that may be available.
- ☐ Checked rectifier for proper operation and measured output voltage/amperage with portable multimeter and indicated all other pertinent information (complete Section XI of MDEQ impressed current form).
- ☐ Measured current output of all positive and negative circuits if the system was designed to allow for such (complete Section XII of the MDEQ impressed current cathodic protection form).
- ☐ Ensured soil access was available directly over each cathodically protected component at the facility.
- ☐ Conducted continuity testing of all pertinent metallic components at the UST facility by the fixed remote – moving ground and/or point-to-point method (complete Section XV of MDEQ impressed current form).
- ☐ Recorded native structure-to-soil potentials in appropriate column in Section XVI of MDEQ impressed current cathodic protection form if this data was available or the system had been down long enough for complete depolarization to occur.
- ☐ Obtained structure-to-soil potential on every cathodically protected structure with the reference electrode placed in the soil directly over the structure under test with the protective current applied (on) and recorded voltages in appropriate column in Section XVI of MDEQ impressed current cathodic protection form.
- ☐ Obtained structure-to-soil potential on every cathodically protected structure without moving reference electrode from placement utilized to obtain on potential with the protective current temporarily interrupted (instant off) and recorded voltages in appropriate column in Section XVI of MDEQ impressed current form).
- ☐ Conducted 100 mV polarization test if all protected structures did not meet the -850 instant off criterion. Obtaining a 100 mV decay is only required on that component of the UST system that displays the lowest (most positive) instant off potential in order to demonstrate the criterion has been satisfied.
- ☐ Indicated location (by code or other means) of reference electrode placement on site drawing for each structure-to-soil potential that was obtained.
- ☐ Described any repairs and/or modifications that were made to the cathodic protection system (complete Section XIII of MDEQ impressed current cathodic protection form).
- ☐ Indicated whether or not each protected structure met the –850mV instant off criteria and/or the 100 mV polarization criteria by indicating pass/fail in the appropriate column in Section XVI of the MDEQ form.
- ☐ If only qualified as a tester - indicated the results of the evaluation by marking either pass, fail or inconclusive in Section VI of MDEQ impressed current cathodic protection form.
- ☐ If only qualified as a tester - marked inconclusive if any of the conditions found in Section 7.2 of MDEQ cathodic protection guidance document were applicable to survey.
- ☐ If it was necessary for the tester to indicate inconclusive, a corrosion expert evaluated the data obtained by a tester and/or conducted his own testing and completed Section VII of MDEQ impressed current form.
- ☐ If a corrosion expert conducted evaluation – indicated the results by marking either pass or fail in Section VII of MDEQ impressed current cathodic protection form.
- ☐ Indicated criteria that were applied to the evaluation by completion of Section VIII of the MDEQ form.
- ☐ Indicated action required as a result of the survey by marking either none, retest or repair & retest in Section IX of MDEQ impressed current cathodic protection form.
- ☐ Provided UST owner with any other type(s) of documentation that may be necessary in order to adequately describe the cathodic protection evaluation including the operating status and any repairs or recommendations and attached same to the MDEQ impressed current cathodic protection form.

## APPENDIX J

| TYPICAL POTENTIAL OF SELECTED METALS | |
|---|---|
| The table below lists some common metals and their observed electrical potentials as measured with respect to a copper/copper sulfate reference electrode. | |
| **METAL** | **VOLTAGE** |
| Magnesium (commercially pure) | -1750 |
| Magnesium (alloy found in typical cathodic protection anode) | -1600 |
| Zinc (nearly 100% pure - as found in typical cathodic protection | -1100 |
| Aluminum (5% zinc alloy) | -1050 |
| Aluminum (pure) | -800 |
| Low Carbon Steel (new – clean & shiny) | -600 to -750 |
| Low Carbon Steel (old – rusty) | -500 to -600 |
| Stainless Steel (active - unpassivated) | -450 to -600 |
| Cast Iron (not graphitized) | -500 |
| Lead | -500 |
| Low Carbon Steel in Concrete | -200 |
| Brass, Bronze | -200 |
| Stainless Steel (passivated) | 50 to -250 |
| Copper | 0 to -200 |
| High Silicone Cast Iron | -200 |
| Carbon, Graphite | +300 |
| Silver | +500 |
| Platinum | +900 |
| Gold | +1200 |

## APPENDIX K
## STATE OF MISSISSIPPI
## GALVANIC CATHODIC PROTECTION SYSTEM EVALUATION

## APPENDIX L
## STATE OF MISSISSIPPI
## IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM EVALUATION

## APPENDIX M
## STATE OF MISSISSIPPI
## IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM
## 60 DAY RECORD OF OPERATION

# 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 UST INSTALLER CERTIFICATION NUMBER: |
| ADDRESS: | | OTHER (EXPLAIN): |
| CITY: | STATE: | |

## V. 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 by _____ (required within 6 months of installation/repair & every 3 years thereafter).

## VI. 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 VIII).

☐ **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).

☐ **INCONCLUSIVE** If the remote and the local do not both indicate the same test result on all protected structures (both pass or both fail), 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.

☐ **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).

☐ **FAIL** 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)

☐ **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).

☐ **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).

☐ **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)

☐ **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.

PRODUCED BY THE MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY, OFFICE OF POLLUTION CONTROL, UST BRANCH
PO BOX 2261, JACKSON, MS 39225 PHONE (601) 961-5171 FACSIMILE (601) 961-5093 www.deq.state.ms.us 7/08

## X. DESCRIPTION OF UST SYSTEM

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

## 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 MDEQ cathodic protection guidance document are required to be designed and/or evaluated by a corrosion expert (completion of Section VII required).

☐ Supplemental anodes for a sti-$P_3$® tank (attach corrosion expert's design or documention industry standard was followed).

☐ Supplemental anodes for metallic pipe (attach corrosion expert's design or documention industry standard was followed).

☐ Galvanically protected tanks/piping not electrically isolated (explain in "Remarks/Other" below).

Remarks/Other: _____

_____

_____

## 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 by a code (1,2, T-1,) 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.**

PRODUCED BY THE MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY, OFFICE OF POLLUTION CONTROL, UST BRANCH

## 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 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 VOLTAGE | STRUCTURE "B" [4] FIXED REMOTE VOLTAGE | POINT-TO-POINT [5] VOLTAGE DIFFERENCE | ISOLATED/ [6] CONTINUOUS/ INCONCLUSIVE |
|---|---|---|---|---|---|
| (example) PREMIUM TANK BOTTOM | (example) PREMIUM TANK FILL RISER | (example) -921 mV | (example) -915 mV | | (example) INCONCLUSIVE |
| (example) PREMIUM TANK BOTTOM | (example) PREMIUM TANK FILL RISER | | | (example) 17 mV | (example) ISOLATED |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**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 measured structure-to-soil potential of the cathodically protected structure {"A"} in millivolts (e.g. –921 mV).
4 Record the measured structure-to-soil potential of the unprotected structure {"B"} in millivolts (e.g. –915 mV).
5 Record the voltage observed between the protected and the unprotected structures when conducting point-to-point testing (e.g. 17 mV).
6 Document whether the test (fixed cell and/or point to point) indicated the protected structure was isolated, continuous or inconclusive.

PRODUCED BY THE MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY, OFFICE OF POLLUTION CONTROL, UST BRANCH
PO BOX 2261, JACKSON, MS 39225 PHONE (601) 961-5171 FACSIMILE (601) 961-5093 www.deq.state.ms.us 7/08

# 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).
- Both the local and the remote voltage must be –850 mV or more negative, in order for the structure 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 NAME:**

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

**DESCRIBE LOCATION OF REMOTE REFERENCE ELECTRODE PLACEMENT:**

| LOCATION [1] CODE | STRUCTURE [2] | CONTACT POINT [3] | LOCAL REFERENCE CELL PLACEMENT [4] | LOCAL VOLTAGE [5] | REMOTE VOLTAGE | PASS/FAIL/ INCONCLUSIVE [7] |
|---|---|---|---|---|---|---|
| (example) 1 | (example) PLUS TANK | (example) TANK BOTTOM | (example) PLUS TANK STP MANWAY | (example) -928 | (example) -810 | (example) INCONCLUSIVE |
| (example) 2 | (example) PLUS PIPING | (example) DISPENSER 5/6 | (example) UNDER DISPENSER 5/6 | (example) -890 | (example) -885 | (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 contact with the structure that is being tested is made (e.g. plus tank @ test lead; diesel piping @ dispenser 5/6; tank test lead; pp4, etc).
4 Describe the exact location where reference electrode is placed for each "local" measurement (e.g. soil @ plus tank STP; soil @ dispenser 5/6; etc.)
5 Record the structure-to-soil potential measured with the reference electrode placed "local" in millivolts (e.g. –865 mV, -920 mV, etc.).
6 Record the structure-to-soil potential measured with the reference electrode placed "remote" (copy voltage that was obtained during continuity survey).
7 Indicate whether the tested structure passed or failed the –850 mV "on" criterion based on your interpretation of the test data.

PRODUCED BY THE MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY, OFFICE OF POLLUTION CONTROL, UST BRANCH
PO BOX 2261, JACKSON, MS 39225 PHONE (601) 961-5171 FACSIMILE (601) 961-5093 www.deq.state.ms.us 7/08

# STATE OF MISSISSIPPI
# IMPRESSED CURRENT 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 UST INSTALLER CERTIFICATION NUMBER: |
| ADDRESS: | | OTHER (EXPLAIN): |
| CITY: | STATE: | |

## V. 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

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

## VI. 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 VIII).

☐ **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).

☐ **INCONCLUSIV** The cathodic protection survey of an impressed current system must be evaluated by a corrosion expert because one or more of the conditions listed in Section 7.1.5 of the MDEQ cathodic protection guidance document are applicable (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) supplemental anodes or other changes in the construction of the impressed current system are made; b) stray current may be affecting buried metallic structures or c) an inconclusive result was indicated in Section VI.

☐ **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).

☐ **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)

☐ **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 (instant-off).

☐ **100 mV POLARIZATION** Structure(s) exhibit at least 100 mV of cathodic polarization.

## IX. 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.

PRODUCED BY THE MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY, OFFICE OF POLLUTION CONTROL, UST BRANCH
PO BOX 2261, JACKSON, MS 39225 PHONE (601) 961-5171 FACSIMILE (601) 961-5093 www.deq.state.ms.us 7/08

## X. DESCRIPTION OF UST SYSTEM

| TANK | PRODUCT | CAPACIT | TANK MATERIAL | PIPING MATERIAL | FLEX |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |

## XI. 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" | | | | | | | |

## XII. IMPRESSED CURRENT POSITIVE & NEGATIVE CIRCUIT MEASUREMENTS

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 (-) | | | | | | | | | | | |

## XIII. 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 MDEQ cathodic protection guidance document are required to be designed and/or evaluated by a corrosion expert (completion of Section VII required).

- ☐ Additional anodes for an impressed current system (attach corrosion expert's design).
- ☐ Repairs or replacement of rectifer (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).

Remarks/Other: _____

_____

_____

## XIV. 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 (1,2,3 R-1, R-2, R-3…etc.) corresponding with the appropriate line number in Section XVI of this form.

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

PRODUCED BY THE MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY, OFFICE OF POLLUTION CONTROL, UST BRANCH
PO BOX 2261, JACKSON, MS 39225 PHONE (601) 961-5171 FACSIMILE (601) 961-5093 www.deq.state.ms.us 7/08

# XV. 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/ [6] CONTINUOUS/ INCONCLUSIVE |
|---|---|---|---|---|---|
| (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.

PRODUCED BY THE MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY, OFFICE OF POLLUTION CONTROL, UST BRANCH
PO BOX 2261, JACKSON, MS 39225 PHONE (601) 961-5171 FACSIMILE (601) 961-5093 www.deq.state.ms.us 7/08

# XVI. IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM SURVEY

- This section may be utilized to conduct a survey of an impressed current cathodic protection system by obtaining structure-to-soil potential measurements.
- The reference electrode must be placed 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 MDEQ 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 or more negative or the 100 mV polarization criterion must be satisfied in order to pass.

**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 | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | ENDING[7] VOLTAGE | VOLTAGE [8] CHANGE | FAIL [9] |
| (example) 1 | (example) PLUS TANK | (example) TANK BOTTOM | (example) SOIL @ REG. TANK STP MANWAY | (example) -1070mV | (example) -875 mV | | | (example) PASS |
| (example) 2 | (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 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

**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; 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.

PRODUCED BY THE MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY, OFFICE OF POLLUTION CONTROL, UST BRANCH
PO BOX 2261, JACKSON, MS 39225 PHONE (601) 961-5171 FACSIMILE (601) 961-5093 www.deq.state.ms.us 7/08

# STATE OF MISSISSIPPI
# IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM
# 60-DAY RECORD OF RECTIFER OPERATION

- This form may be utilized to document that the cathodic protection system rectifier is checked for operation at least once every 60 days.
- Checked for operation is taken to mean that it was confirmed the rectifier was receiving power and is "turned-on".
- If your rectifier is so equipped, you should also record the output voltage, amperage and the number of hours indicated on the meter.
- Any significant variance should be reported to your corrosion professional so that any repairs and/or adjustments necessary can be made.

| UST OWNER | | UST FACILITY | |
|---|---|---|---|
| **NAME:** | | **NAME:** | **ID #** |
| **ADDRESS:** | | **ADDRESS:** | |
| **CITY:** | **STATE:** | **CITY:** | **COUNTY:** |

## IMPRESSED CURRENT RECTIFIER DATA

| | |
|---|---|
| Rectifier Manufacturer: | Rated DC Output: _____ VOLTS _____AMPS |
| Rectifier Model: | Rectifier Serial Number: |

What is the 'as designed' or lastly recommended rectifier output? _____ VOLTS _____AMPS

## 60-DAY LOG OF RECTIFIER OPERATION

| DATE INSPECTED | RECTIFIER TURNED ON? | TAP SETTINGS | | DC OUTPUT | | HOUR METER | INSPECTOR INITIALS | COMMENTS |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | VOLTS | AMPS | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

PRODUCED BY THE MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY, OFFICE OF POLLUTION CONTROL, UST BRANCH
PO BOX 2261, JACKSON, MS 39225 PHONE (601) 961-5171 FACSIMILE (601) 961-5093 www.deq.state.ms.us 7/08

**APPENDIX 280.2**

| STATE OF MISSISSIPPI<br>SELF CERTIFICATION OF UST SYSTEM RETURN TO DELIVERY ELIGIBILITY | | | |
|---|---|---|---|
| **UST OWNER** | | **UST FACILITY** | |
| Owner Name | | Facility Name | |
| Owner Address | | Facility Physical Street Address | |
| City | State | City | State<br>**MS** |
| Phone | | County | |
| Tank Owner Contact Person | | MDEQ UST Facility I.D. Number | |

I CERTIFY UNDER PENALTY OF LAW THAT:

1. The underground storage tank facility referenced above has completed the repairs/modifications necessary to establish compliance and is eligible to receive product deliveries.

2. I have personally examined and am familiar with the information contained in this submittal and any accompanying documents. This information, to the best of my knowledge, is true, accurate and complete.

| **UST OWNER** | **MDEQ CERTIFIED UST INSTALLER** | |
|---|---|---|
| Printed Name of Owner or Authorized Representative | Printed Name of Certified UST Installer | |
| Owner's Signature | Installer's Signature | |
| Date | Date | MDEQ Certification Number |

This form must be signed by both the UST owner and a MDEQ certified UST installer.

MDEQ reserves the right to make the final determination of whether or not the UST facility has satisfactorily returned to compliance.

PRODUCED BY THE MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY, OFFICE OF POLLUTION CONTROL, UST BRANCH
PO BOX 2261, JACKSON, MS 39225 PHONE (601) 961-5171 FACSIMILE (601) 961-5093 www.deq.state.ms.us 7/08

# APPENDIX 280.3 [Reserved]

# APPENDIX 280.4 - GUIDELINES FOR THE PERMANENT CLOSURE OF PETROLEUM UNDERGROUND STORAGE TANK SYSTEMS

## CONTENTS

**SECTION 1 – GENERAL**

**1.1 Introduction ..... 1**

**SECTION 2 – PAPERWORK AND REPORTING REQUIREMENTS**

**2.1 Tank Registration ..... 2**
**2.2 Notice of Intent to Permanently Close UST System(s) ..... 2**
**2.3 Underground Storage Tank System Closure Report ..... 2**
**2.4 Sample Chain-of-Custody ..... 3**

**SECTION 3 – SAMPLING PROCEDURES**

**3.1 General Sampling Requirements ..... 4**
**3.2 Soil Versus Groundwater Samples ..... 4**
**3.3 Soil Sample Collection Procedures ..... 5**
**3.4 Groundwater Sample Collection Procedures ..... 5**

**SECTION 4 – SAMPLING LOCATIONS FOR TANKS**

**4.1 General Requirements ..... 7**
**4.2 Removal of a Single Tank ..... 7**
**4.3 Removal of Two or More Tanks Within a Common Excavation ..... 8**
**4.4 Tank Closure in Place or Change in Service ..... 10**

**SECTION 5 – SAMPLING LOCATIONS FOR PIPING**

**5.1 General Requirements ..... 13**
**5.2 Dispenser Islands ..... 13**
**5.3 Piping Trenches ..... 16**

**SECTION 6 – BACKFILL SAMPLING**

**6.1 General Requirements ..... 18**

**6.2 Backfill Handling Options ..... 19**

**SECTION 7 – DEVIATIONS FROM MINIMUM SAMPLING REQUIREMENTS**

**7.1 Hazards or Obstructions ..... 19**

**7.2 Waiver of Sampling Requirements ..... 20**

**SECTION 8 – SAMPLE ANALYSIS**

**8.1 Tanks ..... 20**

**8.2 Dispenser Islands & Piping ..... 21**

## APPENDICES

**Appendix A - "The Closure Cycle..... 22**

**Appendix B - Permitted Solid Waste Landfills..... 23**

**Appendix C - "Notice of Intent to Permanently Close UST System(s)"..... 24**

**Appendix D - "UST System Closure Report"..... 25**

**Appendix E - Chain-of-Custody Record ..... 26**

**Appendix F - Industry Codes and Standards ..... 27**

**Appendix G – Boring Log for UST System Closure in Place ..... 28**

**Appendix H – Definitions..... 29**

## SECTION 1 - GENERAL

### 1.1 Introduction

The purpose of this document is to provide guidance that explains what the policies of the Underground Storage Tank (UST) Branch are regarding the permanent closure of petroleum UST systems. If you are permanently closing a UST system that has contained a regulated substance other than petroleum, you must contact the UST Branch in order to determine what sampling requirements must be met.

Any tank that was in use on or after December 22, 1988, must be permanently closed if taken out of use for more than a 12-month period unless the tank meets the corrosion protection requirements. If a tank was taken out of use prior to December 22, 1988, and was closed in accordance with acceptable industry standards at that time, it is not required to be permanently closed in accordance with the present UST rules and regulations. Generally, the acceptable industry practice prior to December 22, 1988, was to simply empty the UST of product and in some instances, fill the tank with water. However, if a release is discovered at a tank that was closed prior to December 22, 1988, the release must be reported to the UST Branch and remediated just as if the release had occurred today.

The UST regulations require that when a UST is permanently closed, the site must be sampled for the presence of a release where contamination is most likely to be present. Therefore, the sampling requirements in this guide are only the minimum necessary and are not intended to substitute for the specific conditions that may apply to an individual site. Additional sampling may be justified whenever obvious areas of contamination are found.

No closure report will be accepted as complete without the minimum sampling data that is described herein. However, an allowance will be made where certain circumstances prohibit the collection of the minimum sampling points necessary such as when a tank is to be closed in place but one end of the tank is underneath a building. If it is necessary to deviate from the minimum sampling procedure, the tank owner must submit to the UST Branch an alternative sampling plan thirty (30) days prior to the closure to gain approval.

A Mississippi Department of Environmental Quality (MDEQ) certified contractor must supervise the permanent closure of any UST system that was in use on or after December 22, 1988. The certified contractor must ensure that all UST regulations and industry codes/practices (see Appendix F) relating to the closure are followed. To obtain a current listing of MDEQ certified contractors, contact the UST Branch at (601) 961-5171.

The state Fire Marshall's office and/or local fire department may need to be contacted prior to performing UST closure. You may also be required to obtain city or local demolition permits.

All underground utilities must be identified and clearly marked prior to any excavation or drilling. Contact Mississippi One-Call System, Inc. at 1-601-362-4374 in order to have all underground utilities marked.

Certain terms used in this document are defined in Appendix H for your reference.

## SECTION 2 - PAPERWORK AND REPORTING REQUIREMENTS

### 2.1 Tank Registration

Prior to performing a UST closure, the owner is to verify that the USTs are properly registered with the UST Branch. Any UST system that was in use on or after January 1, 1974, must be registered. If it is determined that a UST system is not registered, the permanent closure will not be approved until the tanks are registered and any applicable annual tank regulatory fees are paid in full. Tanks may be registered by submittal of a "Notification for Underground Storage Tanks" form which may be obtained by contacting the UST Branch or may be downloaded from the Internet at www.deq.state.ms.us.

### 2.2 Notice of Intent to Permanently Close Underground Storage Tank System(s)

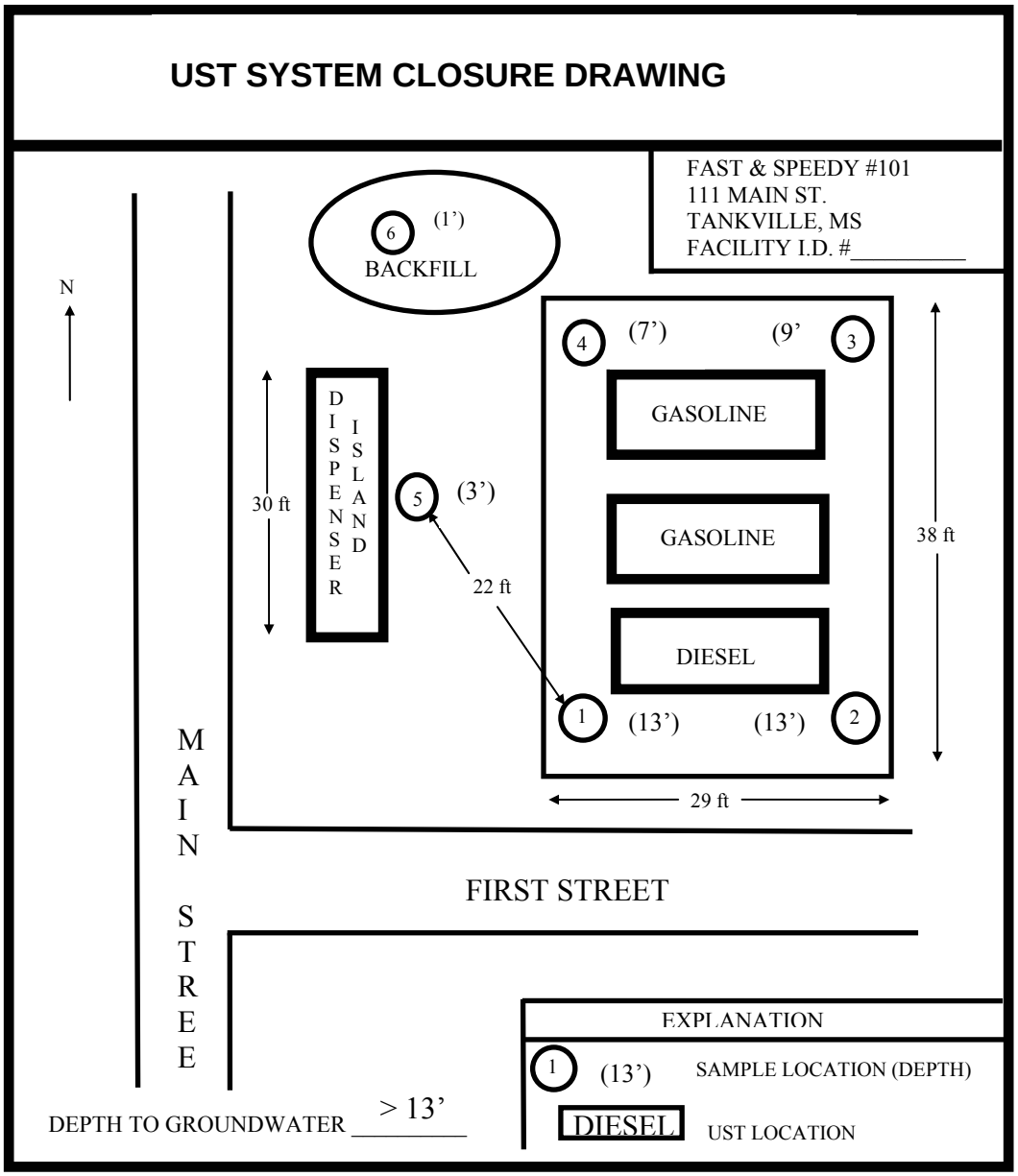
The owner of the UST system or his representative must submit the "Notice of Intent to Permanently Close Underground Storage Tank System(s)" form (Appendix C) at least **30 days** prior to the closure. This form becomes invalid if the closure is not initiated within 120 days after submission. Any form submitted that does not have the owner's signature and the name of the certified contractor is not considered to be valid. Note that an owner may be subject to penalty if a Notice of Intent to Permanently Close UST System(s)" form is not filed with the UST Branch prior to performing a tank closure.

### 2.3 Underground Storage Tank System Closure Report

The owner of the UST system or his representative must submit the "Underground Storage Tank System Closure Report" form (Appendix D) and all supporting documentation within 60 days of completing the UST closure. The form must be signed by the owner and the certified contractor to be valid. Supporting documentation that must be included with the submittal of the UST Closure Report form includes; a) copies of all analytical results of any and all samples; b) valid sample chain-of-custody; and c) site drawing. In addition, if the closure involves the disposal of contaminated soils and/or groundwater, a copy of the waste manifests must be included in the submittal. Failure to submit all of the documentation necessary to complete the closure will result in the return of the UST Closure Report form to the tank owner.

The site drawing must contain the following:

- general site layout showing tank locations and the substance(s) stored
- dispenser locations
- depth to groundwater (if encountered)
- dimensions of the excavation
- sample locations (sample identification on the drawing must match the labeling on each of the sample containers)
- depth at which each sample was collected.



### 2.4 Sample Chain-of-Custody

A chain-of-custody record (Appendix E) shall accompany the sample from the time of sample collection to delivery to the lab. The possession or custody of samples must be traceable from the time they are collected until the time the sample is submitted to the laboratory for analysis.

If chain-of-custody procedures are not followed, the integrity of the samples is compromised and the analysis is invalidated. A chain-of-custody record must be completed for all samples that will be analyzed by the laboratory. This record must be completed in the field at the time of sampling. Correct chain-of-custody must continue when the samples are transferred to the laboratory or to the person responsible for the delivery of the samples to the laboratory. Upon transfer of the samples, each person handling the samples must sign, date, and note the time each person received the samples.

Completed chain-of-custody records must be submitted for all samples and included with the UST System Closure Report. A sample chain-of-custody form can be found at Appendix E or may be obtained from the laboratory.

## SECTION 3 - SAMPLING PROCEDURES

### 3.1 General Sampling Requirements

Soil and/or groundwater samples must be collected to determine if a release has occurred. The importance of good sampling procedures is critical to the assessment of a site at a UST closure. Since gasoline and some other petroleum products consist largely of volatile organic compounds, special care in collecting samples is required. Special precautions must be taken to be certain that samples collected from each site are representative of the soil and/or groundwater at that location and that the sample is neither altered nor contaminated by the sampling and handling procedure.

When collecting samples for Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) analysis, new disposable latex or nitrile gloves must be worn at each sample collection location. When collecting samples for Polynuclear Aromatic Hydrocarbons (PAH) analysis, new disposable vinyl or nitrile gloves must be worn at each sample collection location. Latex is not a suitable glove material when collecting samples for PAH analysis since PAH's have an affinity for latex.

The minimum number of sample containers (i.e. aliquots) that are stated in this document are only intended to be guidance. Always contact your laboratory to determine the sample size and aliquots that are required for a particular laboratory.

All samples must be placed in proper containers immediately upon collection, properly packaged and labeled with the following minimum information:

1. facility name

2. sample location (e.g. NW corner of tank bed, Sample #1, etc.)
3. date and time samples were collected
4. depth samples were collected
5. person collecting samples
6. analytical test(s) required

All samples must be placed on ice immediately after collection and shipped to the laboratory within 24 hours of collection.

## 3.2 Soil Versus Groundwater Samples

Soil samples must be collected whenever evidence of soil contamination exists. However, if water is encountered, pump it out in accordance with all regulatory requirements and determine if the water in the tank excavation or borehole returns within 24 hours. If the water returns, assume that the water is true groundwater. If groundwater is present, water sample(s) must be collected. If groundwater is sampled, no soil sampling is required unless soil contamination is evident. If soil contamination is evident at either the tank excavation or the piping trench/dispenser island, soil samples must be collected in accordance with Sections 5-7 of this document in addition to any water samples.

## 3.3 Soil Sample Collection Procedures

### 3.3.1 Collecting Soil Samples for Gasoline (BTEX) Analysis

For BTEX analysis, collect at least one 4-oz sample from each sampling point. The sampling procedure is as follows:

1. Use a stainless steel spoon, spatula or some other appropriate sampling device. NOTE: Sampling device must be decontaminated between each sampling location.
2. Soil samples should be tightly packed into the sample container using the stainless steel spoon or appropriate sampling device.
3. Completely fill sample container (4-oz widemouth amber glass container with a Teflon liner) so that no headspace is present.
4. Immediately store samples on ice and ship to the laboratory within 24 hours of collection.

### 3.3.2 Collecting Soil Samples for Diesel, Oil, Etc. (PAH) Analysis

For PAH analysis, collect at least one 8-oz sample from each sampling point. The sampling procedure is as follows:

1. Use a stainless steel spoon, spatula or some other appropriate sampling device. NOTE: Sampling device must be decontaminated between each sampling location.

2. Soil samples should be tightly packed into the sample container using the stainless steel spoon or appropriate sampling device.
3. Completely fill sample container (8-oz widemouth amber glass container with a Teflon liner) so that no headspace is present.
4. Immediately store samples on ice and ship to the laboratory within 24 hours of collection.

## 3.4 Groundwater Sample Collection Procedures

### 3.4.1 Collecting Groundwater Samples for Gasoline (BTEX) Analysis

For BTEX groundwater analysis, collect at least three (3) 40-ml samples from each sampling point.

1. Sampling containers should be pre-labeled before any sample collection begins.
2. Decontaminate bailer and use clean new string/line.
   NOTE: In general, use a disposable bailer and not one that must be decontaminated between borings or wells in order to lessen the chance of cross-contamination.
3. Slowly lower the bailer into the water. Do not allow the bailer to free-fall.
4. Allow the bailer to go into the water as far as possible without touching the bottom of the boring and/or tank hole.
5. Remove the bailer from the water before it is completely immersed under the water.
6. Collect three aliquots:
   a. transfer the sample from the bailer to amber 40-ml glass vials with Teflon-lined septum cap, leaving no head space;
   b. each sample should be carefully poured down the inside of the vial to minimize turbulence;
   c. verify no headspace by inverting the vial and tapping it gently to check for trapped air bubbles. If any are present, a new sample must be collected;
   d. as a rule of thumb, it is best to gently pour the last few drops into the vial so that surface tension holds the water in a “convex meniscus”. The cap is then placed on the vial and some overflow is lost, but air space in the bottle is eliminated;
   e. Immediately store samples on ice and ship to the laboratory within 24 hours of collection.

### 3.4.2 Collecting Groundwater Samples for Diesel, Oil, Etc. (PAH) Analysis

For PAH analysis collect one water sample (1 liter) from each sampling point.

1. Sampling containers should be pre-labeled before any sample collection begins.
2. Transfer the sample from the bailer to a one liter widemouth glass sampling container with a Teflon liner. Completely fill container to the top.

3. Immediately store the samples on ice and ship to the laboratory within 24 hours of collection.

| BTEX and PAH Sample Handling Requirements for Soil/Groundwater Samples | | |
|---|---|---|
| **Parameter** | **Media** | **Container** |
| BTEX (Gasoline) | Soil | One 4-oz (120-ml) amber glass with Teflon liner |
| PAH (Diesel, Oil, etc.) | Soil | One 8-oz (250-ml) amber widemouth glass with Teflon liner |
| BTEX (Gasoline) | Water | Three 40-ml amber vials with septum caps |
| PAH (Diesel, Oil, etc.) | Water | One 1 liter widemouth glass with Teflon liner |

## SECTION 4 – SAMPLING LOCATIONS FOR TANKS

### 4.1 General Requirements

The goal of sampling a tank excavation at closure is to represent the contamination which may exist in a manner that is as accurate as possible while at the same time minimizing the number of samples that are necessary to achieve the stated purpose. Although the sampling locations described in this document are the minimum necessary, they are not intended to substitute for the conditions which may exist at a particular location. Therefore, a certain amount of professional judgement is necessary in order to evaluate and properly assess the site conditions at a tank closure.

When conducting sampling at a tank removal, all backfill materials must be removed from the excavation prior to sampling. Whether sampling the sidewalls or the floor of an excavation, all samples must be collected from a depth of at least one foot into the native soil. Soil samples shall be collected immediately after the removal of all backfill material. When closing tanks in place, the soil borings must be conducted in the native soil immediately surrounding the tank bed excavation. Soil samples shall be collected immediately after completion of the soil boring.

No compositing of samples (including sampling of the backfill) is allowed and each sample that is collected must be analyzed separately.

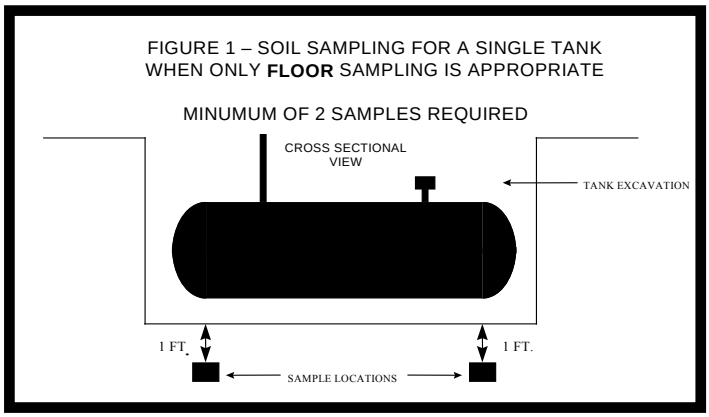
If "true" groundwater (refer to Section 3.2) is encountered during excavation activities, a groundwater sample must be collected from the excavation. No soil sampling is required if a groundwater sample is collected unless soil contamination is evident. Any soils that appear to be contaminated must be sampled in addition to sampling of the groundwater. Follow the soil sampling requirements as described in Sections 5-7 of this document when soil sampling is necessary.

## 4.2 Removal of a Single Tank

Prior to beginning any sampling activity, all backfill materials must be removed from the excavation. Sampling of the tank excavation may occur from the floor of the excavation only or from both the sidewalls and the floor, depending on the site conditions. A discussion of where to sample the excavation and the minimum number of samples that are necessary to satisfy the requirements of the UST Branch follows:

### 4.2.1 Removal of a Single Tank - No Sidewall Contamination Apparent

If no contamination is apparent in the sidewalls, only floor sampling is required. Two samples must be collected from the floor of the excavation at a depth of one foot into the native soil. The samples must be collected from the areas of the floor that appear to be the most contaminated. However, you should also take into consideration the entire area of the excavation so that both of the floor samples are not collected from the same general area. If no area of the floor appears to be obviously contaminated, or the floor appears to be uniformly contaminated, the samples must be collected from each end of the excavation as shown in Figure 1.

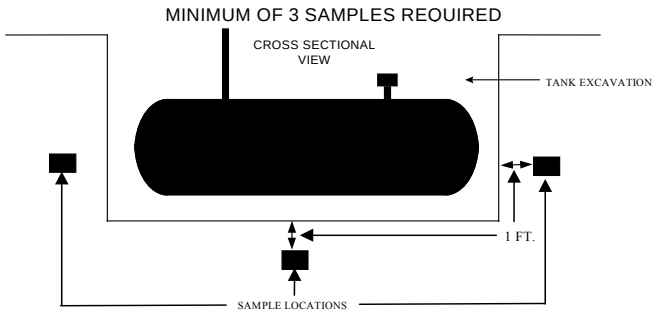



### 4.2.2 Removal of a Single Tank - Sidewall Contamination Apparent

If any of the sidewalls appear to be contaminated, sidewall samples must be collected. As shown in Figure 2 below, a minimum of three samples are required to assess the excavation when the sidewalls are contaminated. Two samples must be collected from the sidewalls and one from the floor of the excavation.

The first sidewall sample must be collected from the sidewall of the excavation that appears to be the most contaminated. The second sample must be collected from one of the three remaining sidewalls that appears to have the greatest remaining contamination. If no other sidewall appears to be contaminated, the second sample must be collected from the wall opposite of the sidewall which appears to be the most contaminated. The third sample to be collected must come from the floor of the excavation. The floor sample must be collected from the area of the floor that appears to be the most contaminated. If no area of the floor appears contaminated or if it appears uniformly contaminated the sample must be collected from the center of the excavation.

FIGURE 2 - SOIL SAMPLING FOR A SINGLE TANK
WHEN **SIDEWALL** SAMPLING IS APPROPRIATE



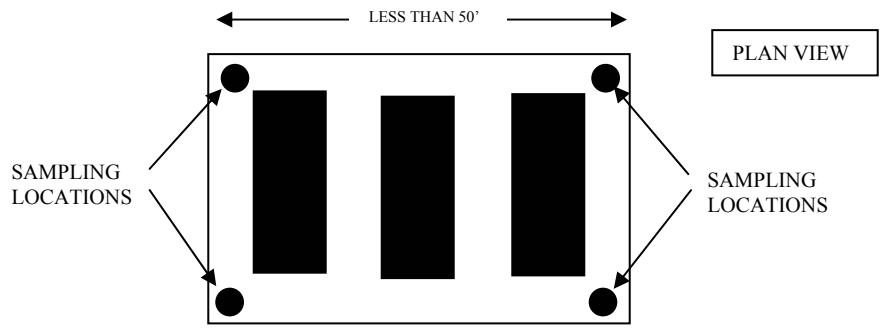

## 4.3 Removal of Two or More Tanks Within a Common Excavation

Prior to beginning any sampling activities, all backfill materials must be removed from the tank excavation. As will be discussed, sampling of the tank excavation may occur from the floor of the excavation only or from both the sidewalls and the floor, depending on the site conditions.

### 4.3.1 Removal of Two or More Tanks - No Sidewall Contamination Apparent

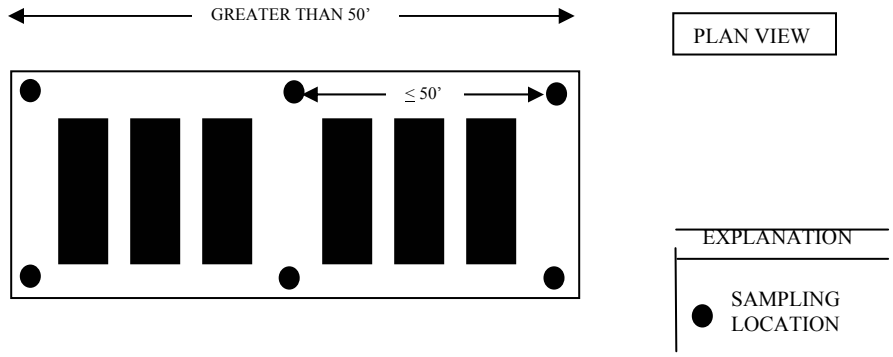
If no contamination is apparent in the sidewalls, only floor sampling is required. When the excavation is 50 feet or less in all dimensions, four samples must be collected from the floor of the excavation at a depth of one foot into the native soil. The samples must be collected from the areas of the floor that appear to be the most contaminated. However, you should also take into consideration the entire area of the excavation so that no two of the samples are collected from the same general area. If no area of the floor appears to be obviously contaminated, or the floor appears to be uniformly contaminated, the samples must be collected from each corner of the excavation as shown in Figure 3.

FIGURE 3 - SOIL SAMPLING WHEN ONLY FLOOR SAMPLING IS APPROPRIATE AND EXCAVATION IS ≤50'




However, if the excavation is greater than 50 feet in any dimension, additional samples must be collected along each dimension of the excavation that is greater than 50 feet in length. The additional sample must be collected from the center of that dimension of the excavation as shown in Figure 4. Soil sampling must also be conducted in such a manner that no more than 50 feet exists between any two sampling points as measured along each dimension (side) of the excavation.

FIGURE 4 - SOIL SAMPLING WHEN ONLY FLOOR SAMPLING IS APPROPRIATE AND EXCAVATION IS > 50'

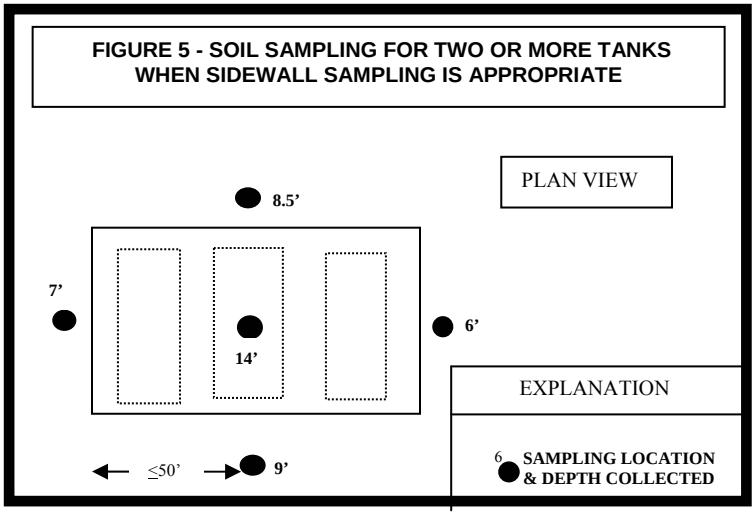


### 4.3.2 Removal of Two of More Tanks - Sidewall Contamination Apparent

If any of the sidewalls appear to be contaminated, all of the sidewalls must be sampled. As shown in Figure 5 below, a minimum of five samples are required to assess the excavation when the sidewalls are contaminated. One sample must be collected from each of the four sidewalls and one from the floor of the excavation. The sidewall samples must be collected from the area of each sidewall that appears to be the most contaminated. If a wall appears to be clean, the sample for that uncontaminated wall must be collected from the same depth where the highest level of contamination appears in the most contaminated wall of the excavation.

The fifth sample must come from the floor of the excavation. The floor sample must be collected from the area of the floor that appears to be the most contaminated. If no area of the floor appears contaminated or if it appears uniformly contaminated, the sample must be collected from the center of the excavation.

Soil sampling must also be conducted in such a manner that no more than 50 feet exists between any two sampling locations along each wall of the excavation.




## 4.4 Tank Closure in Place or Change in Service

Since potentially contaminated soils cannot be seen during closure in place activities as when removing tank systems, the sampling requirements for closure in place are more conservative. You must follow the exact guidelines given in this document unless special circumstances do not allow such. Any alternative sampling plan must be submitted to the UST Branch for approval at the same time the "Notice of Intent to Permanently Close UST System(s)" form is submitted.

If "true" groundwater (refer to Section 3.2) is encountered during soil boring activities, groundwater samples must be collected from each boring that contains groundwater and each sample must be analyzed separately. Soil sampling must be

conducted from those borings that do not have groundwater. In addition, regardless of whatever soil and/or groundwater sampling that is conducted, one soil sample must be collected from the boring that exhibited the highest level of petroleum contamination during the field screening process (see Section 4.4.4).

Tanks closed in place must be cleaned and filled with an inert solid material such as sand, concrete, virgin drilling mud or a "foam" material approved for such purposes. If virgin drilling mud is used, the mixture must consist of 25-30 pounds of bentonite per 42 gallon barrel of water and the pH must be between 6.5 and 8. All tank sludges removed during the cleaning process must be properly disposed of in accordance with all regulatory requirements.

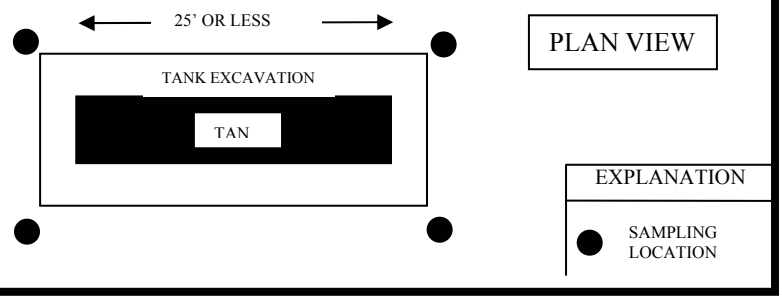
### 4.4.1 Change in Service

A change in service is when the contents of the tank are changed from a regulated substance (e.g. gasoline) to an unregulated substance (e.g. water). In order to accomplish a change in service, the same notification and sampling requirements for the permanent closure of a UST system must be followed. Sampling must be conducted in the same manner as tank closure in place and the interior of the tank properly cleaned. In addition, you must notify the UST Branch of the change in service by submittal of a "Notification for Underground Storage Tanks" form which indicates what unregulated substance is presently stored in the tank.

### 4.4.2 Closure in Place of a Single Tank Less Than or Equal to 25 Feet in Length

Four borings are required when closing in place a single tank less than or equal to 25 feet in length. One borehole at each corner the tank bed must be advanced to a depth of at least one foot below the bottom of the tank and into the native soil as shown in Figure 6. In order to determine the appropriate sampling depth and number of samples to collect, conduct field screening of the soil column following the guidance Section 4.4.4.

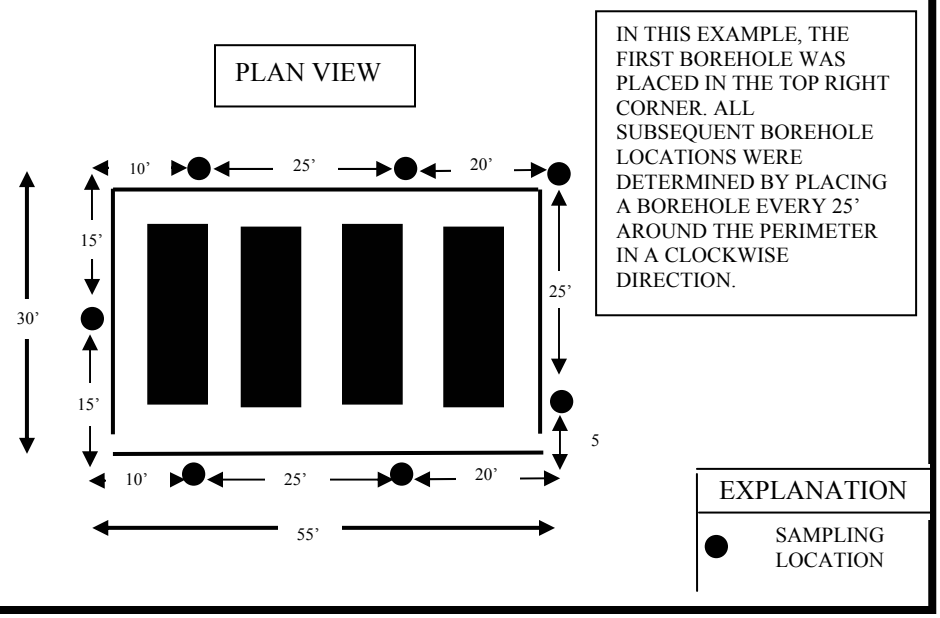
FIGURE 6 – SAMPLING LOCATIONS FOR A SINGLE TANK (≤ 25') CLOSURE IN PLACE



### 4.4.3 Closure in Place of Two or More Tanks Within a Common Tank Bed

For closure in place of two or more tanks within a common tank bed or a single tank that is greater than 25 feet in length, soil borings must be conducted at intervals of every 25 feet along the perimeter of the tank bed as shown in Figure 7. In order to determine the appropriate sampling depth and number of samples to collect, conduct field screening of the soil column following the guidance in Section 4.4.4.

FIGURE 7 – CLOSURE IN PLACE
SAMPLING LOCATIONS FOR TWO OR MORE TANKS




### 4.4.4 Field Screening of Soils

In order to properly evaluate the appropriate depths to collect soil samples, conduct field screening in two foot intervals of the soil column in each boring. Field screening involves placing the soil in a container (normally a zipper-type plastic bag) and evaluating the headspace with a suitable hydrocarbon meter.

Because soils must be relatively undisturbed to obtain accurate field screening results, any boring that is conducted during sample collection/screening must be accomplished in a manner that will produce a "core" of the soil column. Cuttings produced from rotary drilling equipment are not acceptable for either field screening or sample collection.

In order for the field screening to be evaluated by UST staff, a boring log must be submitted along with the analytical results of sampling. The boring log must show the type of soil encountered throughout the length of the boring. The boring log must also show hydrocarbon vapor levels in parts per million as determined by the

field screening process for every two feet of the boring. Please refer to Appendix G for an example of an acceptable boring log.

Soil samples must be conducted at the depth at which the highest levels of hydrocarbon vapors were detected during the field screening process. If no significant variations are found during field screening, samples must be collected from a depth of at least one foot below the bottom of the tanks into the native soil. If the field screening process reveals that all samples should be collected at less than maximum depths, at least one additional sample must be collected from the borehole that had the highest level of vapors found during the field screening process. This additional sample must be collected from a depth of one foot below the bottom of the tanks and into the native soil.

## SECTION 5 - SAMPLING LOCATIONS FOR DISPENSER ISLANDS & PIPING

### 5.1 General Requirements

When performing a UST system closure, all piping must be removed from the ground or properly closed in place. However, if new underground tanks are installed to replace the tanks being closed, the existing piping may be utilized provided it is constructed of non-corrodible materials or coated and cathodically protected steel. If aboveground tanks are being installed, the existing piping may be utilized if it meets the corrosion protection requirements and all soil/groundwater sampling required for a piping closure in place is accomplished.

When closing piping in place, the goal is to render the piping unusable. Therefore, provided the piping is no longer usable, filling of all voids in the piping is not necessary. Pump a concrete slurry or other suitable inert solid material in the piping as full as practical and cap each end of the piping.

Below are several procedure examples to follow when you are only replacing piping or abandoning a dispenser island:

- **I am only abandoning an island – the facility will remain operating as a UST facility.** In this case, you must submit the "Notice of Intent to Permanently Close a UST System" and indicate on the form that only piping is being closed. The section of piping that supplied the abandoned dispenser island must also be closed in accordance with the requirements of this document.

- **I am only replacing the piping – the facility will remain operating as a UST facility and all of the new piping will utilize the existing trenches/dispenser islands.** In this case, you must submit the "Notice of Intent to Permanently Close a UST System" and indicate on the form that only piping is being removed. All dispenser

islands/piping trenches must be closed in accordance with the requirements of this document.

- **I am only replacing the tanks – the existing piping will be utilized.** In this case, you must submit the "Notice of Intent to Permanently Close a UST System" and indicate on the form that only tanks are being closed. The tanks must be closed in accordance with the requirements of this document.

- **I am only repairing the piping (please refer to Appendix H for the definition of "repair").** Repairs of piping are not subject to any of the UST closure requirements. However, if you discover contaminated soils and/or groundwater while conducting the repairs you must collect the appropriate soil and/or groundwater samples for laboratory analysis.

## 5.2 Dispenser Islands

Sampling is required whenever a dispenser island is taken out of service or the piping associated with the island is closed or replaced. However, small changes to the piping system such as installation of new flex connectors or pipe nipples in order to set new dispensers are not subject to the sampling requirements. An island is considered to be any dispenser or series of dispensers that are oriented in a straight line. Therefore, several different dispense arrangements may exist that could be considered as one island. You should use your professional judgement to determine the most appropriate sampling scheme.

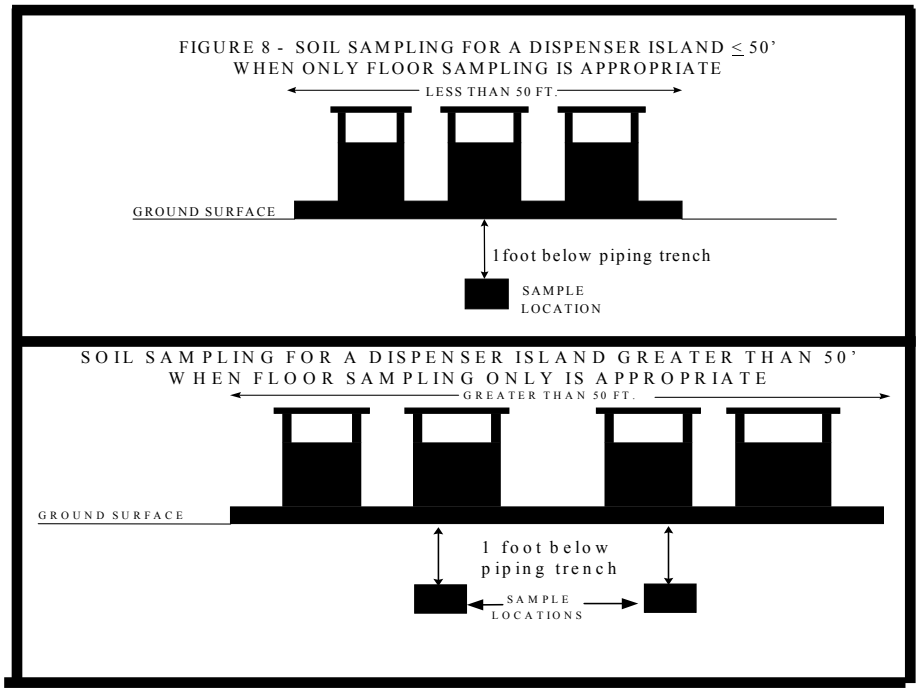
If the dispensers are located directly above the tanks and the tanks are also being permanently closed, no discreet dispenser island samples are necessary provided all of the dispensers are located within the perimeter of the tank bed.

### 5.2.1 Removal of Dispenser Islands – No Sidewall Contamination Apparent

Prior to beginning any sampling activity, all backfill materials must be removed from the excavation. If no contamination of the sidewalls is apparent, one soil sample must be collected from the floor of the excavation. The sample must be collected at a depth of one foot below the piping trench and into the native soil. The sample must be collected from the area of the floor that appears to be the most contaminated. If no area of the floor appears to be contaminated, the sample must be collected from the center of the excavation when the dispenser island is less than or equal to 50 feet in length as shown if Figure 8.

Two soil samples must be taken below each dispenser island if the island is more than 50 feet in length. The samples must be collected from beneath the piping trench at least one foot into the native soil. The samples must be collected from the areas of the floor that appears to be contaminated although no more than 50 feet may exist between any two sample locations. If no area of the floor appears contaminated, the

sample locations must be spaced equally along the length of the island and such that no more than 50 feet exists between any two sampling locations as shown in Figure 8.




### 5.2.2 Removal of Dispenser Islands – Sidewall Contamination Apparent

If any of the sidewalls of the excavation appear to be contaminated, the sidewalls must be sampled. At least two samples are required for dispenser islands less than 50 feet in length when sidewall sampling is necessary. One sample must be collected from the area of the sidewall that appears to be the most contaminated. The second sample must be collected from the floor of the excavation where the most contamination appears to be present. The second sample must be collected from the floor of the piping trench and at least one foot into the native soil. If no area of the floor appears contaminated or it appears uniformly contaminated, the sample must be collected as shown in Figure 8.

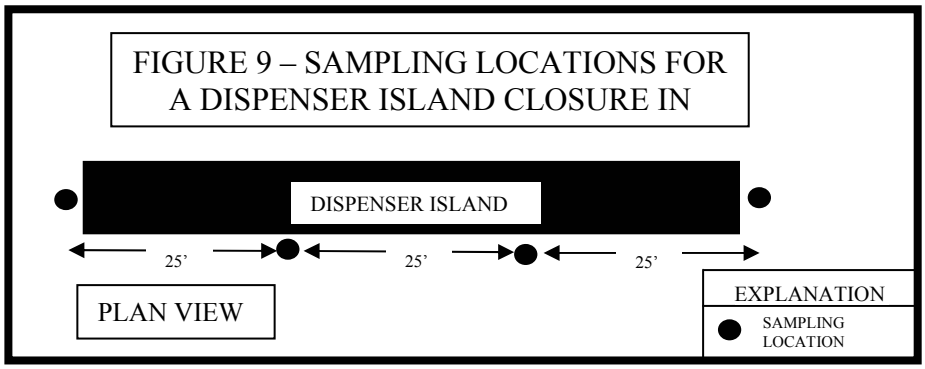
If the dispenser island is greater than 50 feet in length and sidewall sampling is necessary, at least three samples are required. One of the samples must be collected from the area of the sidewall that appears to be the most contaminated. The other two samples must be collected from the floor of the excavation where the most contamination appears to be present. However, you should also take into consideration the entire area of the excavation so that both of the floor samples are not collected from the same general area. If no area of the floor appears contaminated or if it appears uniformly contaminated, collected floor samples as shown in Figure 8.

### 5.2.3 Dispenser Island Closure in Place

Since potentially contaminated soils cannot be seen during closure in place activities as when excavating, the sampling requirements for closure in place are more conservative. You must follow the exact guidelines given in this document unless special circumstances do not allow such. Any alternative sampling plan must be submitted to the UST Branch for approval at the same time the "Notice of Intent to Permanently Close UST System(s)" form is submitted.

Soil borings must be conducted at each end of the dispenser island and along the length of the island such that no more than 25 feet exists between any two borings as shown in Figure 9. The borings must extend to a depth of at least one foot below the bottom of the piping trench and into the native soil. Samples must be collected from each boring following the field screening practices as described in Section 4.4.4.

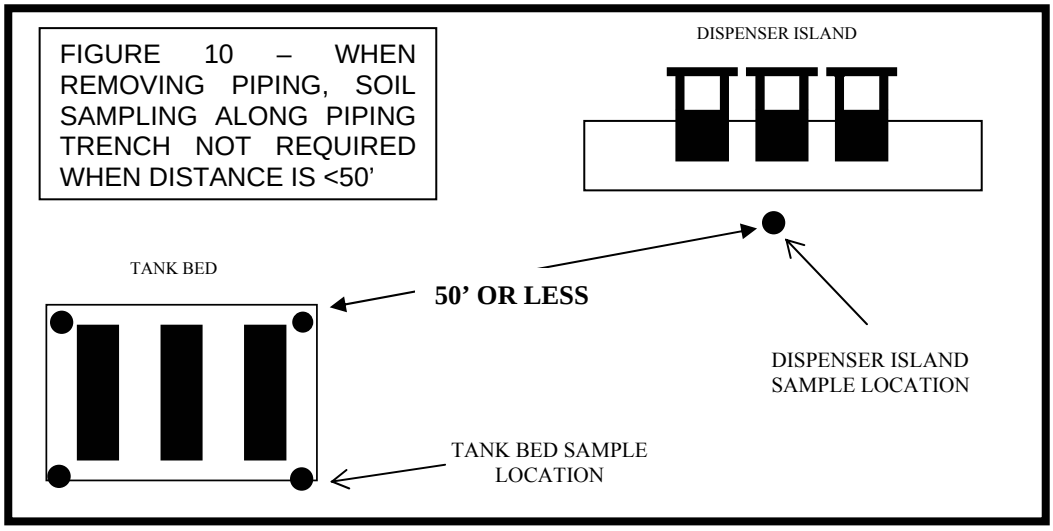
If "true" groundwater (refer to Section 3.2) is encountered during soil boring activities, groundwater samples must be collected from each boring that contains groundwater and each sample must be analyzed separately. Soil sampling must be conducted from those borings that do not have groundwater. In addition, regardless of whatever soil and/or groundwater sampling that is conducted, one soil sample must be collected from the boring that exhibited the highest level of petroleum contamination during the field screening process.




## 5.3 Piping Trenches

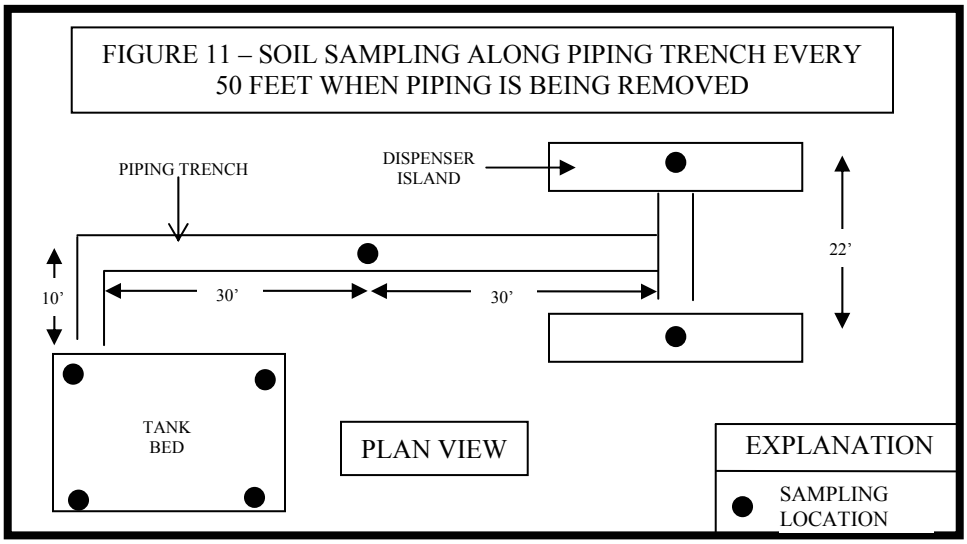
Sampling is required whenever a piping trench is taken out of service or piping is replaced. However, repairs (see definition in Appendix H) or small changes to the piping system such as installation of new flex connectors or unions are not subject to the sampling requirements.

When both the tanks and piping are being removed and 50 feet or less of piping trench exists between the dispenser island sampling point and the nearest tank excavation sampling point, no additional sampling is required along the piping trench unless soil contamination along the piping trench is evident as shown in Figure 10.




### 5.3.1 Removal of Piping – No Sidewall Contamination Apparent

Prior to beginning any sampling activity, all backfill materials must be removed from the piping trench excavation. If no contamination of the sidewalls is apparent, soil samples must be collected from the floor of the excavation. The samples must be collected from the floor of the piping trench at least one foot into the native soil. The samples must be collected from the areas of the floor that appears to be the most contaminated although no more than 50 feet may exist between any two sampling locations. If no area of the floor appears contaminated or if it is uniformly contaminated, the samples must be collected along the length of the piping trench such that no more than 50 feet exists between any two sampling locations as shown in Figure 11.



### 5.3.2 Removal of Piping – Sidewall Contamination Apparent

If any of the sidewalls of the piping trench excavation appear to be contaminated, the sidewalls must be sampled. Samples must be collected from the areas of the sidewalls that appear to be the most contaminated. However, sampling must be conducted so that no more than 50 feet exists between any two sampling points.

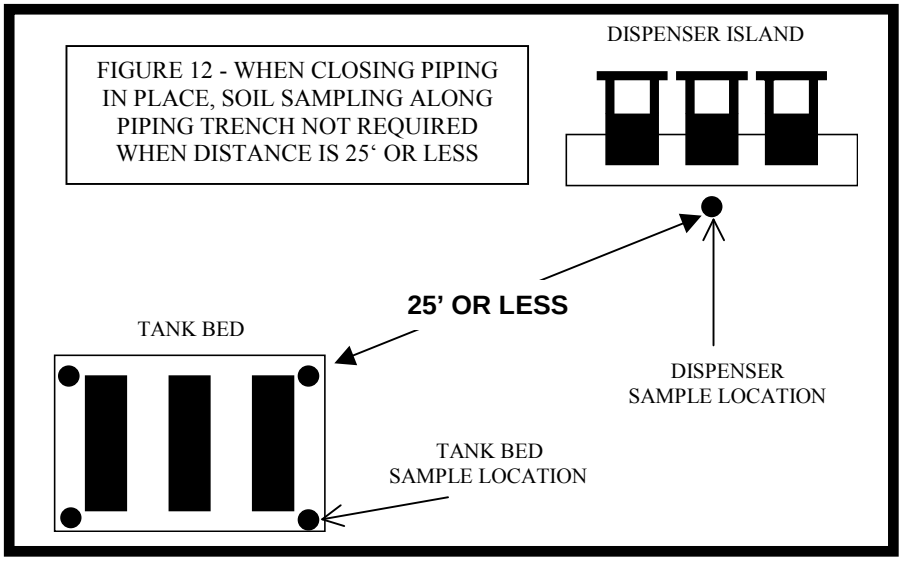
If the site conditions are such that the sidewalls are the appropriate locations for all samples, at least one of the samples must be collected from the floor of the piping trench excavation where the most contamination appears to be present. The sample must be collected at a depth of at least one foot below the piping trench and into the native soil. If no area of the floor appears contaminated or it appears uniformly contaminated, the sample must be collected at the midpoint of the piping trench.

### 5.3.3 Closure in Place of Piping

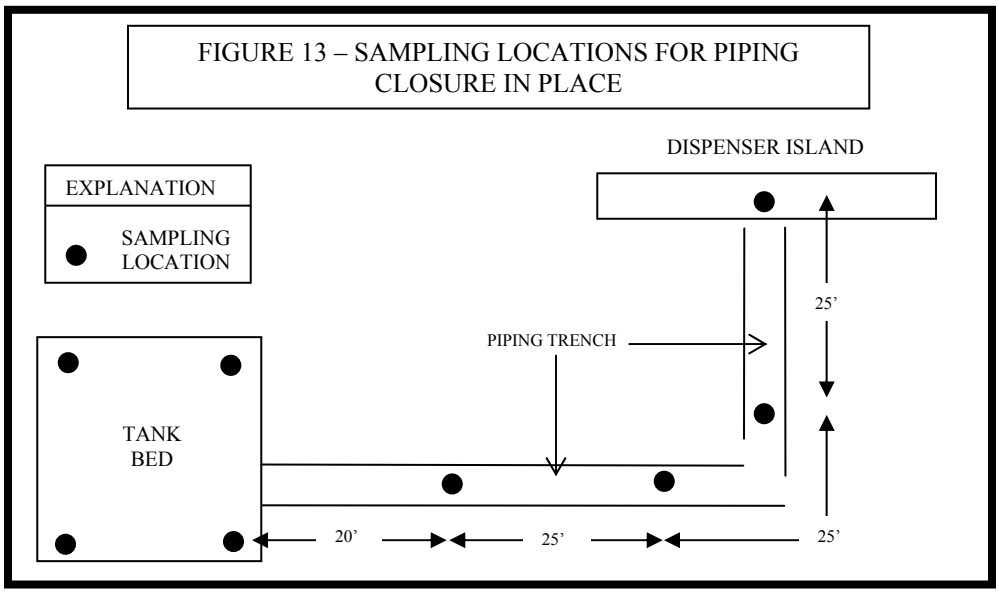
Since potentially contaminated soils cannot be seen during closure in place activities as when excavating, the sampling requirements for closure in place are more conservative. All sampling schemes must follow the exact guidelines given in this document unless special circumstances do not allow such. Any alternative sampling plan must be submitted to the UST Branch for approval.

When piping is to be closed in place, sampling along the piping trench is not required if the location of the dispenser island sample is within 25 feet of the nearest tank excavation sample. The 25 foot distance is measured in a straight line as depicted in Figure 12.

If you are conducting a piping closure in place but the tanks are remaining active, the 25 foot distance referenced above has no significance. Under these circumstances, a sample must be collected from the dispenser island and from the end of the piping trench where it enters the tank bed. If there is more than 25 feet of piping trench located between these two sampling points, additional samples must be collected such than no more than 25 feet exists between any two sample points.




If the distance between the dispenser island sample and the nearest tank bed sample is greater than 25 feet, soil samples must be collected along the piping trench such that no more than 25 feet of piping exists between any two sampling points as shown in Figure 13. This means that some excavation is required in order to locate the piping trench since sampling must occur underneath or immediately adjacent to the trench. All soil borings must extend to a depth of at least one foot below the bottom of the piping trench and into the native soil. Samples must be collected from each boring following the field screening practices as described in Section 4.4.4.




If “true” groundwater (refer to Section 3.2) is encountered during soil boring activities, groundwater samples must be collected from each boring that contains groundwater and each sample must be analyzed separately. Soil sampling must be conducted from those borings that do not have groundwater. In addition, regardless of whatever soil and/or groundwater sampling that is conducted, one soil sample

must be collected from the boring that exhibited the highest level of petroleum contamination during the field screening process.

## SECTION 6 – BACKFILL SAMPLING

### 6.1 General Requirements

All excavated backfill material must be sampled unless it is disposed of in an approved sanitary landfill. This is because the soil samples collected from the native soil of the tank excavation may not be representative of the contamination levels of the backfill materials.

A minimum of one soil sample is required to be collected for each 100 cubic yards of material. Sample the backfill material as soon as possible after stockpiling. The samples must be collected at a point at least one foot into the stockpile following the same sample collection procedures as for any other soil sampling. The backfill samples must be analyzed for the same constituents as the tank excavation samples.

### 6.2 Backfill Handling Options

Typically, all backfill material is contaminated and should be handled as such until laboratory analysis proves otherwise. The following are the options allowed for handling the backfill material:

a. Dispose of in an approved landfill (Appendix B).

   Conduct any sampling that may be required by the landfill and receive permission from the landfill you wish to utilize.

b. Stockpile on site and await the lab results of sampling.

   All backfill material should be placed on and covered with an impervious material (plastic sheeting). If the analytical results of the backfill material are below the action levels of the UST Branch, the backfill material may be placed back into the excavation. If the results are above our limits, your options are as described in paragraphs a, d or e of this section.

c. Sample the backfill material and return it to the excavation.

   **The backfill material may be returned to the excavation before the analytical results are obtained with the understanding that the backfill material may have to be re-excavated if the analytical results are above the action levels of the UST Branch. If the results are above the action levels of the UST Branch, your options are as described in paragraphs a, d or e of this section.**

d. Aerate the backfill material on site.

If the analytical results indicate concentrations above the action levels of the UST Branch and the owner does not want to dispose of the backfill material in an approved sanitary landfill, the backfill material may be aerated on site. To aerate the backfill material, place the backfill material on an impervious material (plastic sheeting), spread the backfill material approximately one foot thick. Build a berm around the soil that will retain any rainwater and prevent any contamination from spreading. Cover the soil on rainy days; uncover the soil on sunny days. Disc or till the soil weekly. Contact a UST Branch Project Manager for instructions before initiating the aeration process.

e. Stockpile the backfill material at a different location.

Before this is done, approval must be obtained from the MDEQ Groundwater Division-Special Waste Section.

## SECTION 7 – DEVIATIONS FROM MINIMUM SAMPLING REQUIREMENTS

### 7.1 Hazards or Obstructions

When circumstances do not allow the collection of samples from the locations required in this document, the owner must contact the UST Branch and receive prior approval of any alternative sampling plan. Draw a sketch of the facility that shows the tank system in relation to any obstacles and show the proposed sampling locations.

### 7.2 Waiver of Sampling Requirements

While not generally a recommended practice, sampling requirements may be waived if the facility has monitoring wells as the method of leak detection and no evidence of a release has been noted. The UST Branch generally will only consider groundwater monitoring to grant a waiver. In order to request a waiver, submit the previous twelve months of monitoring well records at the same time the "Notice of Intent to Permanently Close UST System(s)" form is submitted and indicate you wish to have the sampling requirements waived.

However, if evidence of petroleum contaminated soil and/or groundwater is found during closure activities, samples must then be collected from the appropriate locations and analyzed as described in this guidance document.

## SECTION 8 -SAMPLE ANALYSIS

### 8.1 Tanks

The samples must be analyzed for the product last stored in the UST (refer to the table below). However, if evidence of a leak from a previously stored product is found or it is known that the tank stored a different substance at one time, the samples must be analyzed for that substance also. For example, all of the tanks have stored gasoline for the past several years but it is known that one of the tanks was once used to store diesel fuel. Therefore, all samples collected from the tank excavation would have to be analyzed for both PAH and BTEX.

In addition, if an excavation contained tanks that stored substances that require both BTEX and PAH analysis (i.e. gasoline and diesel fuel), all samples collected from the excavation must be analyzed for both BTEX and PAH.

## 8.2 Dispenser Islands and Piping

Samples must be analyzed for the products last transferred in the piping. However, if evidence of a leak from a previously stored product is found or it is known that the piping transferred a different substance at one time, the samples must be analyzed for that substance also.

In addition, if both diesel fuel and gasoline piping are in the same trench/dispenser island, all samples collected from the piping trench/dispenser island must be analyzed for both BTEX and PAH.

**REQUIRED SAMPLE ANALYSIS (TANKS & PIPING)**

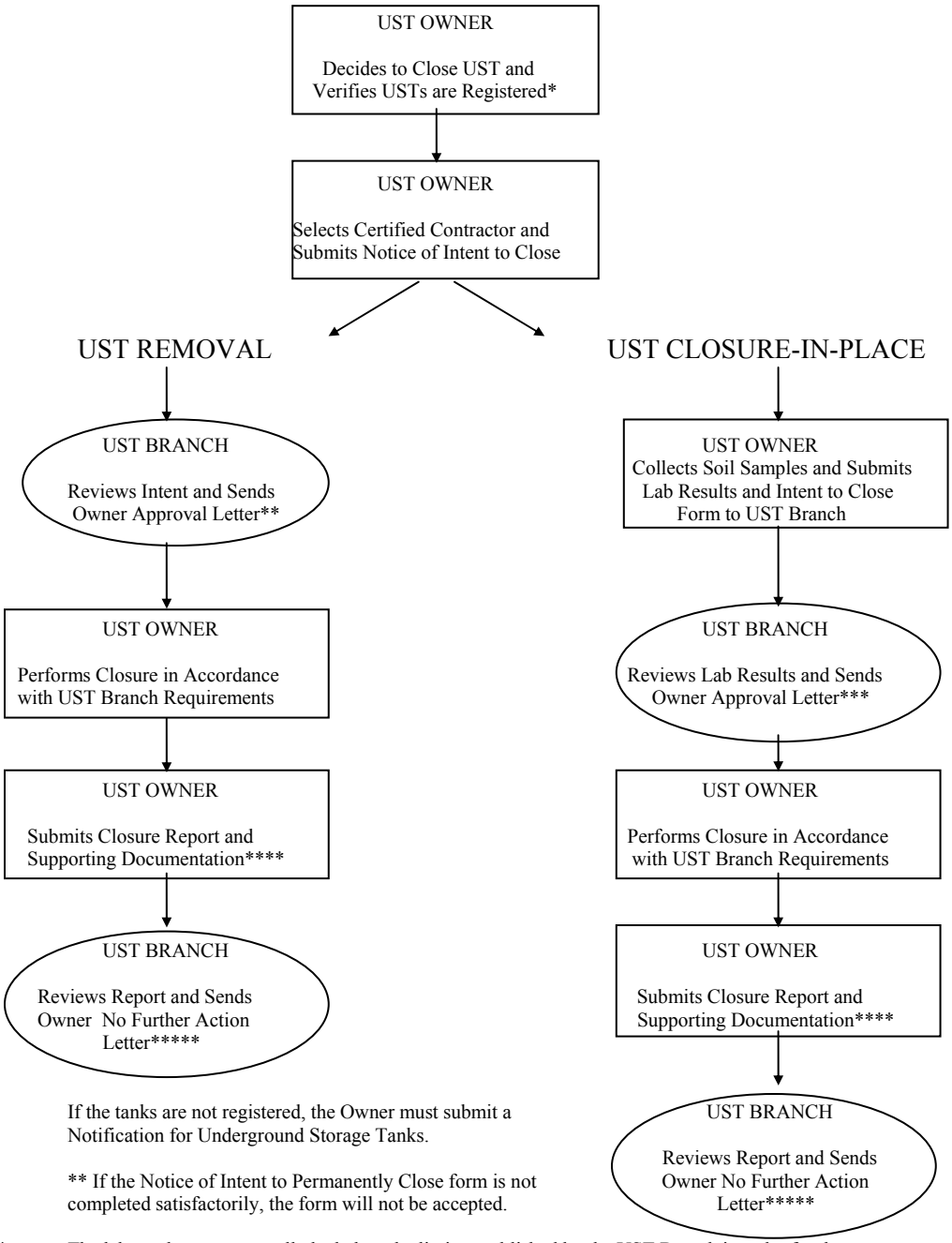
| Product Stored | Sample Media | Analysis |
|---|---|---|
| Gasoline | Soil/Water | BTEX* |
| Diesel Fuel, Used Oil<br>Kerosene, Jet Fuel | Soil/Water | PAH** |
| Hazardous or Other Substances | Soil/Water | *** |

* BTEX = The analysis for Benzene, Toluene, Ethylbenzene and Xylenes. EPA Methods 8021B, 8260B

** PAH = The analysis for polynuclear aromatic hydrocarbons (EPA Methods 8100, 8270C or 8310)

*** Analyze by approved method for the substance stored or contact the UST Branch for required analysis

## APPENDIX A
## "The Closure Cycle"




* If the tanks are not registered, the Owner must submit a Notification for Underground Storage Tanks.

** If the Notice of Intent to Permanently Close form is not completed satisfactorily, the form will not be accepted.

*** The lab results must normally be below the limits established by the UST Branch in order for the Closure-in-Place to be approved.

**** Supporting documentation: a) lab results of any sampling; b) chain-of-custody; c) manifests for the disposal of any contaminated soils, waters, or tank sludges; d) site drawing.

***** If lab results are above UST Branch limits, Owner is notified of contamination and works with UST Branch to clean up site.

# APPENDIX B

## Permitted Solid Waste Landfills

## Adams County

Plantation Oaks Landfill
Operator – Waste Management, Inc.
(601) 445-8459

## Chickasaw County

Prairie Bluff Landfill
Operator – Waste Management, Inc.
(662) 456-9560

## Clay County

Golden Triangle Regional Landfill
Operator – Golden Triangle SW Mgt. Auth.
(662) 324-7566

## Harrison County

Pecan Grove Landfill
Operator – Waste Management, Inc.
(228) 255-5553

## Jefferson County

Jefferson County Landfill
Operator – Southern Landfill Mgt., Inc.
(601) 786-9997

## Kemper County

Kemper County Landfill
Operator - Kemper Co. Landfill
Company, L.L.C.
(601) 656-5411

## Lauderdale County

Pine Ridge Landfill
Operator – Waste Management, Inc.
(601) 483-0715

## Leflore County

Leflore County Sanitary Landfill
Operator – County & Santek Envir. of MS
(601) 453-8550

## Madison County

Little Dixie Landfill
Operator – BFI Waste Systems
(601) 982-9488

## Pearl River County

Central Landfill
Operator – Transamerican Waste
(601) 795-2500

## Perry County

Pine Belt Regional Landfill
Operator – Pine Belt SW Auth.
(601) 545-6676

## Pontotoc County

Three Rivers Regional Landfill
Operator – Three Rivers SW Authority/
Santek Envir. of MS
(662) 488-0444

## Scott County

Clearview Environmental Control
Operator – Chambers/USA Waste
(800) 832-2937

## Tippah County

Northeast Mississippi Regional Landfill
Operator – Northeast Authority/
Waste Services, Inc.
(662)223-5445

## Tunica County

Tunica County Landfill
Operator – Trashhunters, Inc.
(662) 363-2282

## Washington County

Big River Landfill
Operator – BFI Waste Systems

(662) 335-1014

## Madison County

City of Canton Sanitary Landfill
Operator – City of Canton
(601) 859-3245

## Winston County

City of Louisville Landfill
Operator – City of Louisville
(662) 773-9201

# APPENDIX C

## Notice of Intent to Permanently Close Underground Storage Tank System(s)

| Return Completed Form To | Mississippi Department of Environmental Quality<br>Office of Pollution Control<br>P. O. Box 10385<br>Jackson, MS 39289-0385 | Facility I. D. Number: _____<br>Date Received by MDEQ: _____ |
|---|---|---|

Complete and return this form within thirty (30) days prior to permanently closing tank system

### I. Location of Tank System

Name: _____

Address: _____

City: _____ County: _____

### II. Ownership of Tank System

Name: _____

Address: _____

City: _____ State: _____ ZIP: _____

### III. Date of Scheduled Tank System Closure

Month: _____ Day: _____ Year: _____

### IV. Type of Permanent Closure

Tank & Piping Removal _____
Tank Removal Only _____
Piping Removal Only _____

Tank & Piping Closure in Place _____
Tank Closure in Place Only _____
Piping Closure in Place Only _____

Type of fill material to be used for Closure in Place

Sand _____
Concrete _____
Virgin Drilling Mud _____
Approved "foam" _____

Will any new underground Tanks _____ Piping _____ be installed at this facility?

### V. Underground Storage Tank System Information

| Tank | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| Date of Installation | | | | | | | | | |
| Tank Capacity | | | | | | | | | |
| Substance stored throughout history of tank (check all that apply) | gasoline | | | | | | | | |
| | diesel | | | | | | | | |
| | used oil | | | | | | | | |
| | kerosene | | | | | | | | |
| | other | | | | | | | | |

### VI. Contractor Information

Name of Company Performing Closure: _____

Name of Individual Certified by MDEQ to Permanently Close USTs: _____

Mississippi DEQ UST Certification Number: _____ Expiration Date: _____

### VII. Sampling Requirements

All sampling must be performed in accordance with the Mississippi Department of Environmental Quality's Underground Storage Tank Guidelines for the Permanent Closure of Petroleum Underground Storage Tanks.

| Product Stored in Tank | Media | Analysis to be Performed |
|---|---|---|
| Gasoline | Soil or Groundwater | BTEX (EPA Methods 8021B, 8260B) |
| Waste Oil, Diesel, Kerosene | Soil or Groundwater | PAH (EPA Methods 8100, 8270C, 8310) |
| Other than above | Soil or Groundwater | Contact Office of Pollution Control |

### VIII. Owner Agreement

Oath: I certify that the information listed above is true and correct to the best of by belief and knowledge.

_____ _____ _____

Owner's Name Owner's Signature Date Signed

**Produced by the Mississippi Department of Environmental Quality, Office of Pollution Control, UST Branch**
**P. O. Box 2261, Jackson, MS 39225 601.961.5171 /fax 601.961.5093 / www.deq.state.ms.us**

7/08

APPENDIX D

# UNDERGROUND STORAGE TANK SYSTEM CLOSURE REPORT

**Return Completed Form To** **Department of Environmental Quality**
**Office of Pollution Control**
**PO Box 10385**
**Jackson MS 39289-0385**

Facility I.D. No. _____

Date Received by MDEQ _____

## Location of Tank System

**Name** _____

**Address** _____

**City** _____ **County** _____

## Ownership of Tank System

**Name** _____

**Address** _____

**City** _____**State** ____ **ZIP** _____

## TYPE OF UNDERGROUND STORAGE TANK SYSTEM CLOSURE

Tank and piping removal _____
Tank removal only _____
Piping removal only _____

Tank and piping closure in place _____
Tank closure in place only _____
Piping closure in place only _____

Were any new tanks installed? _____
Was any new piping installed? _____
Number of active tanks remaining _____

## Description of Underground Storage Tanks (Complete for each closed tank at this location.)

| I. Tank Information | Tank No. | Tank No. | Tank No. | Tank No. | Tank No. | Tank No. |
|---|---|---|---|---|---|---|
| Estimated age of tank in years. | | | | | | |
| Estimated total capacity in gallons. | | | | | | |
| Substance stored in tank. | | | | | | |
| **II. Tank Closure Information** | | | | | | |
| Date product was removed from tank/piping (mm/dd/yy). | | | | | | |
| Date tank/piping was permanently closed (mm/dd/yy). | | | | | | |
| If closed in place, list the inert material used (sand, concrete, drilling mud approved foam material). | | | | | | |

### Disposition of excavated backfill material

Note: All backfill materials must be handled in accordance with the Mississippi Department of Environmental Quality's (MDEQ) Guidelines for the Permanent Closure of UST Systems.

Disposed of in landfill _____
Returned to excavation _____
Stockpiled on site _____
Aerating on site _____
Aerating off site _____

Submit the following supporting documentation with this Closure Report:
1. Lab analytical results of sampling
2. Sample Chain-of-Custody
3. Site Drawing
4. Waste manifests if tank sludges, water or backfill materials are disposed.

## III. Site Assessment Information

Date samples were collected. (mm/dd/yy) _____
Was there any soil staining apparent? _____
Was there any free product noted? _____

Was groundwater encountered (yes/no) _____
Depth to groundwater (feet) _____
Were visible holes in tanks/piping? _____

**To be completed by the tank owner:** (Please print or type all but signature) **Date:**

**Oath: I certify that the information concerning closure is true to the best of my belief and knowledge.**

**Owner's Name**:

**Owner's Signature:**

**To be completed by person certified by MDEQ to Permanently Close:** **Date:**

**Name of person certified by MDEQ to close/remove:**

**MDEQ Certified Contractor's Signature:**

**MDEQ Certified Contractor's Company:**

**MDEQ Certification No.:**

**Produced by the Mississippi Department of Environmental Quality, Office of Pollution Control, UST Branch**
**P O Box 2261, Jackson, MS 39225 (601) 961-5171 Fax (601) 961-5093 www.deq.state.ms.us** 7/08

# APPENDIX E

## CHAIN OF CUSTODY RECORD

| Company Name:<br><br>Address: | Location Name:<br><br>Address: | UST Facility I.D. Number:: |
|---|---|---|
| Sampler Name: | Sampler Signature: | |
| Number of coolers: | Required Due Date (mm-dd-yy): | |

| Sample Identification | Type of Container | Collection | | | | | | Analysis Required | Lab Number |
|---|---|---|---|---|---|---|---|---|---|
| | | No. of Containers | Date | Time | Initials | Comp-C Grab-B | Soil-S Water-W | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

REMARKS

| Relinquished by: | Date/Time: | Accepted by: | Date/Time: | Relinquished by: | Date/Time: | Accepted by: | Date/Time: |
|---|---|---|---|---|---|---|---|
| Relinquished by: | Date/Time: | Accepted by: | Date/Time: | Relinquished by: | Date/Time: | Accepted by: | Date/Time: |

## APPENDIX F

### Industry Codes and Standards for Underground Storage Tank Closure or Change in Service

"Removal and Disposal of Used Underground Storage Tanks", American Petroleum Institute Recommended Practice 1604, 1220 L St., NW, Washington, DC 20005 (202) 682-8000.

"Cleaning Petroleum Storage Tanks", American Petroleum Institute Publication 2015.

"Interior Lining of Underground Storage Tanks", American Petroleum Institute Publication 1631.

"Criteria for a Recommended Standard...Working in Confined Space", The National Institute for Occupational Safety and Health, Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

"Tank Closure Without Tears: An Inspector's Safety Guide", New England Interstate Environmental Training Center, 2 Fort Road, South Portland, ME 04106 (207) 767-2539.

"Excavation & Trenching Operations", Occupational Safety & Health Administration Publication 2226.

APPENDIX G

**BORING LOG FOR UST SYSTEM CLOSURE IN PLACE**

BORE HOLE NUMBER 1

| DEPTH (FEET) | SOIL TYPE | HYDROCARBON VAPORS (PPM) |
|---|---|---|
| 0 | TOP SOIL | |
| | | 70 |
| 2 | CLAY | 110 |
| 4 | | 100 |
| 6 | SAND | 850 (SAMPLE COLLECTED FOR ANALYSIS) |
| 8 | | 410 |
| 10 | CLAY | 220 |
| 12 | SAND | 370 |
| 14 | | |

*** INDICATE LOCATION OF EACH BORING ON CLOSURE DRAWING AND NUMBER ACCORDINGLY.**

**Type of Instrument utilized for field screening_____**

**Manufacturer of instrument _____**

**Date last calibrated (mm/dd/yy)_____ _____**

**NOTE: Boring Logs for each borehole and the laboratory analytical results of all sampling must be submitted at the same time the "Notice of Intent to Permanently Close Underground Storage Tank(s)" form is submitted in order for the closure in place to be approved by the UST Branch.**

## APPENDIX H - DEFINITIONS

**Aliquot-** Part of the whole. One sampling location may require two or more discreet containers in order to qualify as an adequate sample. Each sample container is an aliquot.

**Aquifer** - Underground bodies of sand or gravel which contains groundwater.

**Backfill** – All of the soil which was placed in the excavation when the tank system was installed. In UST systems installed after 1988, the backfill is normally easy to determine since tank systems were required to be backfilled with clean sand or gravel and these materials are easily differentiated from the native soil.

**BTEX** - Benzene, Toluene, Ethylbenzene, and Xylenes, the four major components of gasoline.

**Convex Meniscus** - Curved or rounded like the outside of a circle.

**Decontamination** - A process in which to clean and remove contaminants from sample equipment and devices with detergent wash following a series of rinses with distilled water.

**Groundwater** - For the purposes of UST closures, it is the naturally occurring water that seeps into the tank excavation from the aquifer.

**Headspace** - The air space between the sample and the top of the closed container.

**Holding time** - The length of time allowed between sample collection and analysis by the laboratory.

**Native soil** - Soil which has been undisturbed by activities of man.

**PAH** - Polynuclear Aromatic Hydrocarbons.

**Preservative** - A chemical added to a water and/or soil samples to prevent deterioration or to maintain the original characteristics.

**Repair** – To restore a piping system. Repair as utilized in this document means that some minor component, such as a flex connector or a coupling/union, of the piping system has been replaced or simply tightened.

**Septum cap** - A sample container cap that has a membrane for extracting water with a syringe.

**Stockpiling** - Storing excavated materials on site. Correct stockpiling requires putting the excavated material on plastic at a height not greater than 3 feet. A berm should surround the stockpiled material in order to prevent rainwater run-off.

**Teflon lined -** A synthetic liner used to line the sides and caps of sample containers to prevent samples from sticking.

**VOC -** Volatile Organic Compounds - chemicals which readily vaporize under normal atmospheric conditions.