

CHAPTER 7150
MINNESOTA POLLUTION CONTROL AGENCY
UNDERGROUND STORAGE TANKS; PROGRAM

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GENERALLY

7150.0010 APPLICABILITY.

Subpart 1. **Scope.** The requirements of this chapter apply to all owners and operators of an underground storage tank system as defined in part 7150.0030, except as otherwise provided in this part.

Subp. 2. **Exclusions.** The following underground storage tank systems are excluded from the requirements of this chapter:

A. an underground storage tank system holding hazardous wastes listed or identified under chapter 7045 or Code of Federal Regulations, title 40, part 261, or a mixture of such hazardous waste and other regulated substances;

B. a wastewater treatment tank system that is part of a wastewater treatment facility regulated under United States Code, title 33, section 1317 or 1342;

- C. equipment or machinery that contains regulated substances for operational purposes such as hydraulic lift tanks and electrical equipment tanks;
- D. an underground storage tank system with a capacity of 110 gallons or less;
- E. an underground storage tank system that contains a de minimus concentration of regulated substances;
- F. an emergency spill or overflow containment underground storage tank system that is expeditiously emptied after use;
- G. a farm or residential tank of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes;
- H. a tank of 1,100 gallons or less capacity used exclusively for storing heating oil for consumptive use on the premises where stored;
- I. a septic tank;
- J. a pipeline facility, including gathering lines, regulated under United States Code, title 49, chapter 24 or 29;
- K. a surface impoundment, pit, pond, or lagoon;
- L. a storm water or wastewater collection system;
- M. a flow-through process tank;
- N. a storage tank situated in an underground area such as a basement, cellar, mineworking, drift, shaft, or tunnel if the storage tank is located upon or above the surface of the floor;
- O. an oil-water separator;
- P. underground storage tank systems containing radioactive material that are regulated under the Atomic Energy Act of 1954, United States Code, title 42, sections 2011 to 2296;
- Q. an underground storage tank system that is part of an emergency generator system at nuclear power generation facilities regulated by the Nuclear Regulatory Commission under Code of Federal Regulations, title 10, part 50, Appendix A; and
- R. airport hydrant fuel distribution systems.

Subp. 3. [Repealed, 32 SR 1751]

Subp. 4. **Emergency power generator tanks.** Parts 7150.0300 to 7150.0340 and 7150.0450, subpart 3, item D, do not apply to an underground storage tank system installed before December 22, 2007, that stores fuel for use by emergency power generators.

Subp. 5. **Heating oil tanks.** Parts 7150.0010; 7150.0030; 7150.0090, subparts 1, 2, 4, and 6; 7150.0100, subparts 7, 9, and 10; and 7150.0205, subparts 1 to 4, apply to an underground storage tank system of over 1,100 gallons capacity used exclusively for storing heating oil for consumptive use on the premises where stored.

Statutory Authority: *MS s 116.49*

History: *16 SR 59; 32 SR 1751; 34 SR 1610*

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7150.0020 [Repealed, 32 SR 1751]

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7150.0030 DEFINITIONS.

Subpart 1. **Scope.** For the purposes of this chapter, the following terms and abbreviations have the meanings given them. Terms that are not specifically defined have the meanings given them in Minnesota Statutes, sections 115.01, 115C.02, and 116.46.

Subp. 2. **Agency.** "Agency" means the Minnesota Pollution Control Agency.

Subp. 3. **Appurtenances.** "Appurtenances" means devices such as piping, fittings, flanges, valves, dispensers, and pumps used to distribute, meter, or control the flow of regulated substances to or from an underground storage tank.

Subp. 4. **Beneath the surface of the ground.** "Beneath the surface of the ground" means beneath the ground surface or otherwise covered with earthen materials.

Subp. 5. **Cathodic protection.** "Cathodic protection" means using 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.

Subp. 6. **Cathodic protection tester.** "Cathodic protection tester" means a person who has demonstrated 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, by passing a cathodic protection test given by the National Association of Corrosion Engineers or the Steel Tank Institute. Such persons must also 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.

Subp. 7. **Change in status.** "Change in status" means a permanent removal from service or a change in the reported uses, contents, or ownership of an underground storage tank under Minnesota Statutes, section 116.48, subdivision 3, including temporary closure of 90 days or more and change to storage of a nonregulated substance.

Subp. 8. **Permanent closure.** "Permanent closure" means permanently taking an underground storage tank out of service by either closing it in place or removing it from the ground.

Subp. 9. **Commissioner.** "Commissioner" means the commissioner of the Minnesota Pollution Control Agency.

Subp. 10. **Compatible.** "Compatible" means the ability of two or more substances to maintain their respective physical and chemical properties upon contact with one another under conditions likely to be encountered in the underground storage tank system.

Subp. 11. **Connected piping.** "Connected piping" means 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 an individual underground storage tank system, the piping that joins two underground storage tank systems is allocated equally between them.

Subp. 12. **Consumptive use.** "Consumptive use," with respect to heating oil, means consumed on the premises.

Subp. 13. **Corrosion expert.** "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. The 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.

Subp. 14. **Dielectric material.** "Dielectric material" means a material that does not conduct direct electrical current. Dielectric coatings are used to electrically isolate underground storage tank systems from the surrounding soils. Dielectric bushings are used to electrically isolate parts of the underground storage tank system, for example, tank from piping.

Subp. 14a. **Dispenser.** "Dispenser" means equipment that is used to transfer a regulated substance from underground piping, through a rigid or flexible hose or piping located above ground, to a point of use outside of the underground storage tank system, such as a motor vehicle. A dispenser does not include a loading rack used to transfer a regulated substance into the storage compartment of a bulk transport vehicle.

Subp. 15. **Electrical equipment.** "Electrical equipment" means underground equipment that contains dielectric fluid that is necessary for the operation of equipment such as transformers and buried electrical cable.

Subp. 16. **Excavation zone.** "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 underground storage tank system is placed at the time of installation.

Subp. 17. [Repealed, 32 SR 1751]

Subp. 18. **Farm tank.** "Farm tank" means a tank located on a tract of land devoted to the production of crops, raising animals, including fish, range land, nurseries with growing operations, and associated residences and improvements. A farm tank must be located on the farm property.

Subp. 19. **Flow-through process tank.** "Flow-through process tank" means 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.

Subp. 20. **Free product.** "Free product" means a regulated substance that is present as a nonaqueous phase liquid, for example, liquid not dissolved in water.

Subp. 21. **Gathering lines.** "Gathering lines" means a pipeline, equipment, facility, or building used in the transportation of oil or gas during oil or gas production or gathering operations.

Subp. 22. **Hazardous material.** "Hazardous material" means:

A. a substance listed in Code of Federal Regulations, title 40, part 302, including petroleum constituents under subpart 36, item C, but not including:

(1) a hazardous waste listed or identified under chapter 7045 or Code of Federal Regulations, title 40, part 261;

(2) petroleum under subpart 36, item A, B, or D; or

(3) a substance that is not liquid at a temperature of 60 degrees Fahrenheit and pressure of 14.7 pounds per square inch absolute; or

B. any mixture of substances identified in item A and petroleum, unless the amount of the substance identified in item A is de minimus.

Substances identified in items A and B which also meet the definition of petroleum are considered hazardous materials.

Subp. 23. **Hazardous material underground storage tank system.** "Hazardous material underground storage tank system" means an underground storage tank system that is used to contain a hazardous material.

Subp. 24. **Heating oil.** "Heating oil" means petroleum that is Nos. 1, 2, and 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.

Subp. 25. **Hydraulic lift tank.** "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.

Subp. 25a. **Lessee.** "Lessee" means a person who leases an underground storage tank system. A lessee is also an operator if the lessee is in control of the daily operation of the underground storage tank system.

Subp. 26. **Maintenance.** "Maintenance" means the normal operational upkeep to prevent an underground storage tank system from releasing a regulated substance.

Subp. 27. **Motor fuel.** "Motor fuel" means petroleum or a petroleum-based substance that is motor gasoline, aviation gasoline, No. 1 or 2 diesel fuel, biodiesel, or any grade of gasohol, and is typically used in the operation of a motor engine.

Subp. 28. [Repealed, 32 SR 1751]

Subp. 29. **Noncommercial purposes.** "Noncommercial purposes," with respect to motor fuel, means not for resale.

Subp. 30. **On the premises where stored.** "On the premises where stored," with respect to heating oil, means underground storage tank systems located on the same property where the stored heating oil is used.

Subp. 31. **Operational life.** "Operational life" means the period beginning when installation of the tank system has begun until the time the tank system is permanently closed under part 7150.0410.

Subp. 32. **Operator.** "Operator" means a person in control of or having responsibility for the daily operation of the underground storage tank system or a person who was in control of or had responsibility for the daily operation of the tank immediately before discontinuation of its use.

Operator also means a person who is responsible under Minnesota Statutes, section 115C.021, for a release from an underground storage tank containing petroleum, or a person who is responsible under Minnesota Statutes, section 115B.03, for a release from an underground storage tank containing a hazardous material. Operator does not include a person who operates a tank if the tank is not regulated by this chapter.

Subp. 33. **Overfill release.** "Overfill release" means a release occurring when a tank is filled beyond its capacity, resulting in a discharge of the regulated substance to the environment.

Subp. 34. **Owner.** "Owner" means a person who holds title to, controls, or possesses an interest in an underground storage tank, and a person who held title to, controlled, or possessed an interest in the tank immediately before discontinuation of its use.

Owner also means a person who is responsible under Minnesota Statutes, section 115C.021, for a release from an underground storage tank containing petroleum, or a person who is responsible under Minnesota Statutes, section 115B.03, for a release from an underground storage tank containing a hazardous material.

Owner does not include a person who owns a tank if the tank is not regulated by this chapter and does not include a person who holds an interest in a tank solely for financial security, unless through foreclosure or other related actions the holder of a security interest has taken possession of the tank.

Subp. 35. **Person.** "Person" means an individual, partnership, association, public or private corporation, or other legal entity, including the United States government, an interstate commission or other body, the state, or any agency, board, bureau, office, department, or political subdivision of the state, but does not include the Minnesota Pollution Control Agency.

Subp. 36. **Petroleum.** "Petroleum" means one of the following substances:

A. diesel fuel oil, gasoline, and heating fuel oil as defined in Minnesota Statutes, section 296A.01, subdivisions 14, 23, and 26;

B. crude oil or a fraction of crude oil that is liquid at a temperature of 60 degrees Fahrenheit and pressure of 14.7 pounds per square inch absolute;

C. constituents of gasoline and fuel oil under item A and constituents of crude oil under item B; or

D. petroleum-based substances that are comprised of a complex blend of hydrocarbons derived from crude oil through processes of separation, conversion, upgrading, and finishing, such as motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, and used oils.

Subp. 37. **Petroleum underground storage tank system.** "Petroleum underground storage tank system" means an underground storage tank system that is used to contain petroleum or a mixture of petroleum with de minimus quantities of hazardous materials.

Subp. 38. **Pipe or piping.** "Pipe" or "piping" means a hollow cylinder or tubular conduit for conveying a regulated substance from one point to another within an underground storage tank system.

Subp. 39. **Pipeline facilities.** "Pipeline facilities," including gathering lines, means new and existing pipe rights-of-way and any associated equipment, facilities, or buildings.

Subp. 40. **Regulated substance.** "Regulated substance" means a hazardous material or petroleum.

Subp. 41. **Release.** "Release" means a spilling, leaking, emitting, discharging, escaping, leaching, or disposing from an underground storage tank into the environment including spills associated with overfills and transfer operations as the regulated substance moves to or from an underground storage tank system. "Release" does not include discharges or designed venting allowed under agency rules.

Subp. 42. **Release detection.** "Release detection" means determining whether a release of a regulated substance has occurred from the underground storage tank system into the environment or into

the interstitial space between the underground storage tank system and its secondary barrier or secondary containment around it.

Subp. 43. **Repair.** "Repair" means the correction or restoration to operating condition of an underground storage tank or appurtenance. "Piping repair" includes installation of a single run of up to ten feet of new piping to replace existing piping. Piping repair involving installation of a single run of more than ten feet of new piping to replace existing piping constitutes replacement. "Dispenser repair" includes installation of a new dispenser to replace an existing dispenser so long as work is performed entirely on or above any shear valves and check valves. Installation of a new dispenser to replace an existing dispenser constitutes replacement if the work is performed beneath any shear valves or check valves or on any flexible connectors or unburied risers.

Subp. 43a. **Replace or replacement.** "Replace" or "replacement" means the installation of a new underground storage tank or appurtenance in substantially the same location as another tank or appurtenance in lieu of that tank or appurtenance, not including installation of new piping in connection with certain repairs as described in subpart 43.

Subp. 44. **Residential tank.** "Residential tank" means a tank located on property used primarily for dwelling purposes.

Subp. 44a. **Secondary containment tank or secondary containment piping.** "Secondary containment tank" or "secondary containment piping" means a tank or piping that:

A. is designed with an inner primary shell and a liquid-tight outer secondary shell or jacket that extends around the entire inner shell;

B. is designed to contain any leak through the primary shell from any part of the tank or piping that routinely contains a regulated substance; and

C. allows for monitoring of the interstitial space between the shells and detection of any leak.

Subp. 45. **Septic tank.** "Septic tank" means a watertight, covered receptacle designed to receive or process through liquid separation or biological digestion, the sewage discharged from a building sewer. The effluent from the 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.

Subp. 46. **Storm water or wastewater collection system.** "Storm water or wastewater collection system" means piping, pumps, conduits, and any other equipment necessary to collect and transport the flow of surface water runoff resulting from precipitation, or domestic, commercial, or industrial wastewater to and from retention areas or areas where treatment is designated to occur. The collection of storm water and wastewater does not include treatment, except where incidental to conveyance.

Subp. 47. **Surface impoundment.** "Surface impoundment" means a natural topographic depression, artificial excavation, or diked area formed primarily of earthen materials, although it may be lined with synthetic materials, that is not an injection well.

Subp. 48. **Tank.** "Tank" is a stationary device designed to contain an accumulation of regulated substances and constructed of nonearthen materials, such as concrete, steel, and plastic, that provide structural support.

Subp. 49. **Tank system.** "Tank system" has the same meaning as underground storage tank and underground storage tank system.

Subp. 50. **Underground area.** "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.

Subp. 51. **Underground storage tank or underground storage tank system.** "Underground storage tank" or "underground storage tank system" means any one or combination of containers including tanks, vessels, enclosures, or structures and underground appurtenances connected to them that is used to contain or dispense an accumulation of regulated substances, and the volume of which, including the volume of underground pipes connected to them, is ten percent or more beneath the surface of the ground. This term does not include any tank or pipes connected to a tank described in part 7150.0010, subpart 2.

Subp. 52. [Repealed, 32 SR 1751]

Subp. 53. **Wastewater treatment tank.** "Wastewater treatment tank" means a tank that is designed to receive and treat an influent wastewater through physical, chemical, or biological methods.

Statutory Authority: *MS s 115.03; 116.49*

History: *16 SR 59; 17 SR 1279; L 1992 c 575 s 53; 25 SR 556; 32 SR 1751*

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7150.0090 NOTIFICATION AND CERTIFICATION.

Subpart 1. **Prenotification.** At least ten days before beginning any of the following activities, owners and operators must notify the commissioner in the manner prescribed by the commissioner of their intent to perform the activity:

- A. installation or replacement of an underground storage tank system, including tanks, piping, or dispensers;
- B. permanent closure of an underground storage tank system;
- C. change in status of an underground storage tank system to storage of a nonregulated substance; and
- D. inspection of an internally lined tank.

Subp. 2. **Notification of installation, replacement, or change in status.** An owner or operator who brings an underground storage tank system, including tanks, piping, or dispensers, into use or makes a change in status must, within 30 days of bringing such tank system into use or making a change in status, submit to the agency, in the manner prescribed by the commissioner, a notice of the existence of such tank system or type of change in status, including the information required by Minnesota Statutes, section 116.48, subdivisions 1 and 3.

Subp. 3. **Certification by owners and operators.** Owners and operators of new and replacement underground storage tank systems, including tanks, piping, and dispensers, must sign and certify in the notification form compliance with the following requirements:

- A. installation of tanks, piping, and dispensers according to parts 7150.0100 and 7150.0205, including secondary containment of new and replacement tanks, piping, and dispensers;
- B. financial responsibility under Code of Federal Regulations, title 40, part 280, subpart H; and
- C. release detection according to parts 7150.0300 to 7150.0340.

Subp. 4. **Certification by installers.** Owners and operators of new and replacement underground storage tank systems, including tanks, piping, or dispensers, must ensure that the installer signs and certifies in the notification form that:

- A. all work was performed as specified by the manufacturer's instructions;
- B. all work was performed according to the applicable codes of practice in part 7150.0205;
- C. all work was performed according to applicable state and federal regulations, including this chapter; and
- D. the installer is in compliance with certification requirements imposed by chapter 7105.

Subp. 5. **Notification of cathodic protection testing.** Owners and operators of underground storage tank systems with cathodic protection must notify the agency, or ensure that a cathodic protection tester notifies the agency, of the results of testing of cathodically protected tanks and piping as required by part 7150.0215, within 30 days of completion of testing, in the manner prescribed by the commissioner.

Subp. 6. **Notification of tank sale.** A person who sells a tank intended to be used as an underground storage tank or property that the seller knows contains an underground storage tank must notify the purchaser of the tank in writing prior to closing the transaction of the new owner's notification obligations under subpart 2 and Minnesota Statutes, section 116.48.

Subp. 7. **Notification of tank purchase.** A person who purchases property that the purchaser knows contains an underground storage tank system must notify the commissioner within 30 days after closing the transaction, pursuant to subpart 2. The notification shall include the change in ownership and verify that all operators, including lessees, have read this chapter and have sufficient knowledge in the operation and maintenance of underground storage tank systems.

Statutory Authority: *MS s 116.49*

History: *32 SR 1751*

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DESIGN AND CONSTRUCTION

7150.0100 PERFORMANCE STANDARDS FOR UNDERGROUND STORAGE TANK SYSTEMS.

Subpart 1. **Purpose.** To prevent releases due to structural failure, corrosion, or spills and overfills for as long as the underground storage tank system is used to store regulated substances, all owners and operators of underground storage tank systems must meet the requirements in subparts 7 to 14.

Subp. 2. [Repealed, 32 SR 1751]

Subp. 3. [Repealed, 32 SR 1751]

Subp. 4. [Repealed, 32 SR 1751]

Subp. 5. [Repealed, 32 SR 1751]

Subp. 6. [Repealed, 32 SR 1751]

Subp. 7. **Installation.** All underground storage tank systems must be properly installed according to the manufacturer's instructions and one of the following codes of practice developed by a nationally recognized association or independent testing laboratory. The codes are incorporated by reference under part 7150.0500:

A. American Petroleum Institute, Installation of Underground Petroleum Storage Systems, API 1615 (1996);

B. Petroleum Equipment Institute, Recommended Practices for Installation of Underground Liquid Storage Systems, RP100 (2005);

C. American Society of Mechanical Engineers, Process Piping, B31.3 (2005); or

D. American Society of Mechanical Engineers, Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids, B31.4 (2006).

Subp. 8. [Repealed, 32 SR 1751]

Subp. 9. **Compatibility.** Owners and operators must use underground storage tank systems, spill catchment basins, submersible pump sumps, and dispenser sumps made of or lined with materials that are compatible with the substance stored in the underground storage tank system. Owners and operators storing alcohol blends may use the following guidance to comply with the requirements of this part: American Petroleum Institute, Storing and Handling Ethanol and Gasoline-Ethanol Blends at Distribution Terminals and Service Stations, API 1626 (1985). The document is incorporated by reference under part 7150.0500.

Subp. 10. **Repairs allowed.** Owners and operators of underground storage tank systems must ensure that repairs will prevent releases due to structural failure or corrosion as long as the underground storage tank system is used to store regulated substances. The owner and operator shall ensure that the person performing the repairs has been certified under chapter 7105. The repairs must meet the requirements in items A to F.

A. Repairs to underground storage tank systems must be properly conducted according to one of the following codes of practice developed by a nationally recognized association or independent testing laboratory. The codes are incorporated by reference under part 7150.0500:

(1) National Fire Protection Association, Flammable and Combustible Liquids Code, NFPA 30 (2003);

(2) American Petroleum Institute, Repairing Crude Oil, Liquefied Petroleum Gas, and Product Pipelines, API RP 2200 (1994);

(3) American Petroleum Institute, Interior Lining and Periodic Inspection of Underground Storage Tanks, API 1631 (2001); or

(4) American Petroleum Institute, Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems, API 1632 (1996).

B. If metal pipe sections are found to have pitting-type corrosion damage, or if metal or fiberglass-reinforced plastic pipe sections have released a regulated substance, then the entire piping segment between the tank and any dispensers must be replaced with secondary containment piping according to part 7150.0205, subpart 3, item D. Piping may be repaired and the entire segment need not be replaced if:

(1) the piping is already secondarily contained; or

(2) a release is due to an external, onetime cause such as damage during excavation activity.

C. Within 30 days after completion of a tank repair, the tank must pass either a tightness test in accordance with part 7150.0330, subpart 4, or a tightness test at a 0.1 gallon per hour leak rate using

equipment for automatic tank gauging. Within 30 days after completion of a piping repair, the piping must pass a tightness test in accordance with part 7150.0340, subpart 3, item A.

D. Within six months after the repair of a cathodic protection system, the cathodic protection system must be tested according to part 7150.0215 to ensure that it is operating properly.

E. Impressed current cathodic protection systems must be repaired by a corrosion expert who is qualified to repair impressed current cathodic protection systems.

F. Sacrificial anode cathodic protection systems must be repaired by a cathodic protection tester or a corrosion expert who is qualified to repair sacrificial anode cathodic protection systems.

Subp. 11. Spill and overfill release prevention.

A. Owners and operators must ensure that releases due to spilling or overfilling do not occur. The owner or 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. One of the following codes of practice developed by a nationally recognized association or independent testing laboratory must be used to comply with this subpart. The codes are incorporated by reference under part 7150.0500:

(1) National Fire Protection Association, Flammable and Combustible Liquids Code, NFPA 30 (2003);

(2) National Fire Protection Association, Standard for Tank Vehicles for Flammable and Combustible Liquids, NFPA 385 (2007); or

(3) American Petroleum Institute, Bulk Liquid Stock Control at Retail Outlets, API 1621 (1987).

B. The owner and operator must report, investigate, and clean up any spills and overfills according to Minnesota Statutes, section 115.061.

Subp. 12. Sump and basin maintenance. Spill catchment basins, submersible pump sumps, and dispenser sumps shall be maintained free of storm water and debris. Regulated substances spilled to any spill catchment basin, submersible pump sump, or dispenser sump shall be immediately removed.

Subp. 13. Shear valves. All shear valves shall be securely anchored.

Subp. 14. Drop tubes. All underground storage tanks shall have a drop tube that extends to within six inches of the tank bottom.

Statutory Authority: *MS s 116.49*

History: *16 SR 59; 32 SR 1751; 34 SR 1610*

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7150.0200 [Repealed, 32 SR 1751]

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7150.0205 DESIGN AND CONSTRUCTION.

Subpart 1. **Tanks.** Each tank must be properly designed and constructed and any part underground that routinely contains product must be protected from corrosion using one of the following methods, except that all hazardous materials tanks and all tanks, other than heating oil tanks, installed or replaced after December 22, 2007, must comply with item D. The corrosion protection methods must be in accordance with one of the codes of practice in subpart 2 developed by a nationally recognized association or independent testing laboratory. Tanks that do not meet the requirements of this subpart must be permanently closed according to part 7150.0410.

- A. The tank is constructed of fiberglass-reinforced plastic.
- B. The tank is constructed of steel and cathodically protected in the following manner:
 - (1) the tank is coated with a suitable dielectric material;
 - (2) field-installed cathodic protection systems are designed by a corrosion expert;
 - (3) impressed current systems are designed to allow determination of current operating status as required in part 7150.0215, subpart 3, item A; and
 - (4) cathodic protection systems are operated and maintained according to part 7150.0215.
- C. The tank is constructed of a steel and fiberglass-reinforced plastic composite.
- D. The tank is secondarily contained.
 - (1) Secondary containment tanks shall use one of the following designs:
 - (a) the tank is of double-walled fiberglass-reinforced plastic construction;
 - (b) the tank is of double-walled steel construction, with cathodic protection of the outer wall meeting the requirements of item B;
 - (c) the tank is of double-walled steel construction with a fiberglass-reinforced plastic jacket; or
 - (d) the tank is of single-walled steel construction with a fiberglass-reinforced plastic jacket, which is designed to contain and detect a leak through the steel wall.
 - (2) All secondary containment tanks shall be capable of containing a release from the inner wall of the tank and shall be designed with release detection according to part 7150.0330, subpart 6.
 - (3) If a tank is replaced in accordance with this item, all piping appurtenant to the tank shall comply with subpart 3, item D.
- E. The tank is internally lined.
 - (1) A tank with an internal lining as the sole method of corrosion protection shall be internally inspected and evaluated within ten years after lining, and every five years thereafter, and found to be structurally sound with the lining still performing according to original design specifications, as follows:

(a) internal inspections and evaluations shall be conducted in accordance with American Petroleum Institute, Interior Lining and Periodic Inspection of Underground Storage Tanks, API 1631 (2001), incorporated by reference under part 7150.0500;

(b) lining inspectors shall be approved by the manufacturer of the lining, if an approval process exists, or shall be qualified by reason of training and experience in the application and inspection of type of internal lining to be inspected;

(c) the owner, operator, or lining inspector shall notify the commissioner at least ten days prior to performing an inspection according to part 7150.0090, subpart 1;

(d) inspections shall include thorough cleaning of the lining; visual inspection of the lining for cracking, blistering, perforation, disbonding, and excessive wear; ultrasonic thickness testing (steel tanks only); holiday (spark) testing for lining continuity; lining thickness measurement; lining hardness testing; and representative photographs of internal surfaces;

(e) inspections shall be primarily by manned entry. Video camera observation alone is not allowed;

(f) minor abnormal conditions of the lining, such as short cracks or localized disbonding, may be repaired, so long as the conditions do not constitute more than five percent of the lining surface area and the repairs will return the lining to substantially the original design specifications;

(g) if a repair to the tank or to the internal lining as allowed under unit (f) is performed, the tank must pass a tightness test at a 0.1 gallon per hour leak rate using equipment for automatic tank gauging or another test method, prior to or within 30 days after returning the tank to service;

(h) a written inspection report shall be produced that describes the results of all tests and evaluations required by unit (d), and the results of tightness testing under unit (g). The report shall identify any abnormal conditions found during the inspection and the measures taken to correct the conditions. The inspector shall certify in the report that, in the professional judgment of the inspector, the tank is structurally sound, the lining is performing according to original design specifications, and the tank and lining will maintain their integrity for at least five years under the anticipated conditions of use; and

(i) the inspection report under unit (h) shall be submitted to the commissioner within 60 days of the internal inspection.

(2) A tank with an internal lining as the sole method of corrosion protection shall be permanently closed and site assessment completed according to parts 7150.0410 and 7150.0420 if at any time the lining is found to have failed. Lining failure is defined as any abnormal conditions other than minor abnormal conditions described in subitem (1), unit (f). The lining may not be replaced, nor may such a tank be upgraded with cathodic protection or another corrosion protection method to meet the requirements of this subpart.

F. The tank construction and corrosion protection are determined by the commissioner to be designed to prevent the release or threatened release of a stored, regulated substance in a manner that is no less protective of human health and the environment than items A to E. The commissioner's determination under this item must be obtained in writing and the owners and operators must keep the determination for the life of the tank.

Subp. 2. **Codes of practice for tanks.** Codes of practice for subpart 1 are described in items A to E. The codes are incorporated by reference under part 7150.0500.

- A. The following codes of practice apply to subpart 1, item A:
- (1) Underwriters Laboratories, Standard for Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures, UL 1316 (2006); or
 - (2) Underwriters' Laboratories of Canada, Standard for Reinforced Plastic Underground Tanks for Flammable and Combustible Liquids, ULC-S615-98 (1998).
- B. The following codes of practice apply to subpart 1, item B:
- (1) Steel Tank Institute, Specification and Manual for External Corrosion Protection of Underground Steel Storage Tanks, STI-P3 (2006);
 - (2) Underwriters Laboratories, Standard for Safety for External Corrosion Protection Systems for Steel Underground Storage Tanks, UL 1746 (2007);
 - (3) Underwriters' Laboratories of Canada, External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids, CAN/ULC-S603.1-03 (2003);
 - (4) Underwriters' Laboratories of Canada, Standard for Steel Underground Tanks for Flammable and Combustible Liquids, CAN/ULC-S603-00 (2000);
 - (5) Underwriters' Laboratories of Canada, Isolating Bushings for Steel Underground Tanks Protected with External Corrosion Protection Systems, ULC-S631-05 (2005);
 - (6) National Association of Corrosion Engineers, Corrosion Control of Underground Storage Tank Systems by Cathodic Protection, RP0285-2002 (2002); or
 - (7) Underwriters Laboratories, Standard for Steel Underground Tanks for Flammable and Combustible Liquids, UL 58 (1996).
- C. The following codes of practice apply to subpart 1, item C:
- (1) Underwriters Laboratories, Standard for Safety for External Corrosion Protection Systems for Steel Underground Storage Tanks, UL 1746 (2007); or
 - (2) Steel Tank Institute, ACT-100 Specification for External Corrosion Protection of Composite Steel Underground Storage Tanks, STI F894 (2006).
- D. The following codes of practice apply to subpart 1, item D:
- (1) Underwriters Laboratories, Standard for Steel Underground Tanks for Flammable and Combustible Liquids, UL 58 (1996);
 - (2) Underwriters Laboratories, Standard for Safety for External Corrosion Protection Systems for Steel Underground Storage Tanks, UL 1746 (2007);
 - (3) Steel Tank Institute, Recommended Practice for Interstitial Tightness Testing of Existing Underground Double Wall Steel Tanks, RP012 (2006); and
 - (4) Steel Tank Institute, Standard for Dual Wall Underground Steel Storage Tanks, STI F841 (2006).
- E. The following code of practice applies to subpart 1, item E: American Petroleum Institute, Interior Lining and Periodic Inspection of Underground Storage Tanks, API 1631 (2001).
- Subp. 3. **Piping.** The piping that routinely contains regulated substances and is in contact with the ground must be properly designed, constructed, and protected from corrosion using one of the following

methods, except that all hazardous materials piping and all piping, other than heating oil piping, installed or replaced after December 22, 2007, other than piping that conveys regulated substances under safe suction meeting the design requirements of part 7150.0300, subpart 6, item B, subitem (2), shall comply with item D. The corrosion protection methods in items A to D must be in accordance with one of the codes of practice in subpart 4 developed by a nationally recognized association or independent testing laboratory.

- A. The piping is constructed of fiberglass-reinforced plastic.
- B. The piping is constructed of steel and cathodically protected in the following manner:
 - (1) the piping is coated with a suitable dielectric material;
 - (2) field-installed cathodic protection systems are designed by a corrosion expert;
 - (3) impressed current systems are designed to allow determination of current operating status as required in part 7150.0215, subpart 3, item A; and
 - (4) cathodic protection systems are operated and maintained according to part 7150.0215.
- C. The piping is constructed of a steel and fiberglass-reinforced plastic composite.
- D. The piping is secondarily contained.
 - (1) Secondary containment piping shall use one of the following designs:
 - (a) the piping is of double-walled fiberglass-reinforced plastic construction;
 - (b) the piping is of double-walled steel construction, with cathodic protection of the outer wall meeting the requirements of item B;
 - (c) the piping is of double-walled steel construction with a fiberglass-reinforced plastic jacket;
 - (d) the piping is of single-walled steel construction with a fiberglass-reinforced plastic jacket, which is designed to contain and detect a leak through the steel wall; or
 - (e) the piping is of double-walled nonmetallic flexible construction.
 - (2) All secondary containment piping shall be capable of containing a release from the inner wall of the piping and shall be designed with release detection according to part 7150.0340, subpart 4.
- E. The piping is of single-walled nonmetallic flexible construction.
- F. The piping construction and corrosion protection are determined by the commissioner to be designed to prevent the release or threatened release of a stored regulated substance in a manner that is no less protective of human health and the environment than the requirements of items A to D. The commissioner's determination under this item must be obtained in writing and the tank owners and operators must keep the determination for the life of the tank.

Subp. 4. **Codes of practice for piping.** Codes of practice for subpart 3 are described in items A and B. The codes are incorporated by reference under part 7150.0500.

- A. The following codes of practice apply to subpart 3, item A:
 - (1) Underwriters Laboratories, Emergency Breakaway Fittings, Swivel Connectors and Pipe-Connection Fittings for Petroleum Products and LP-Gas, UL 567 (2004);
 - (2) Underwriters' Laboratories of Canada, Standard for Flexible Underground Hose Connectors for Flammable and Combustible Liquids, CAN/ULC-S633-99 (1999); or

(3) Underwriters' Laboratories of Canada, Guide for Glass-Fiber-Reinforced Plastic Pipe and Fittings for Flammable Liquids, ULC Subject C107C-M1984 (1984).

B. The following codes of practice apply to subpart 3, item B:

(1) National Fire Protection Association, Flammable and Combustible Liquids Code, NFPA 30 (2003);

(2) American Petroleum Institute, Installation of Underground Petroleum Storage Systems, API 1615 (1996);

(3) American Petroleum Institute, Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems, API 1632 (1996); or

(4) National Association of Corrosion Engineers, Control of External Corrosion on Underground or Submerged Metallic Piping Systems, SP0169-2007 (2007).

Subp. 5. Spill and overfill prevention equipment.

A. Except as provided in item B, to prevent spilling and overfilling associated with product transfer to the underground storage tank system, owners and operators must use the following spill and overfill prevention equipment:

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

(2) overfill prevention equipment that will:

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

(b) 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 audible to the transfer operator.

B. Owners and operators are not required to use the spill and overfill prevention equipment specified in item A if:

(1) alternative equipment is used that is determined by the commissioner to be no less protective of human health and the environment than the equipment specified in item A; or

(2) the underground storage tank system is filled by transfers of no more than 25 gallons at one time.

The commissioner's determination under subitem (1) must be obtained in writing and the tank owners and operators must keep the determination for the life of the tank.

Subp. 6. Submersible pumps.

A. After December 22, 2007, any new or replacement submersible pump, including replacement pump head, shall be provided with secondary containment around and beneath the pump head. Secondary containment shall be:

(1) designed to contain a release from the pump head and any connectors, fittings, and valves beneath the pump head until the release can be detected and removed;

(2) designed with liquid-tight sides, bottom, cover, and points of penetration;

(3) constructed of fiberglass-reinforced plastic or other synthetic material of comparable thickness and durability; and

(4) compatible with the stored substance.

B. The following code of practice may be used to meet the requirements of this subpart, as applicable: Underwriters' Laboratories of Canada, Under-Dispenser Sumps, ULC/ORD-C107.21-1992 (1992). The code is incorporated by reference under part 7150.0500.

Subp. 7. Dispensers.

A. After December 22, 2007, any new dispenser, and any replacement dispenser where work is performed beneath any shear valves or check valves or on any flexible connectors or unburied risers, shall be provided with secondary containment beneath the dispenser. Secondary containment shall be:

(1) designed to contain a release from the dispenser and any connectors, fittings, and valves beneath the dispenser until the release can be detected and removed;

(2) designed with liquid-tight sides, bottom, and points of penetration;

(3) constructed of fiberglass-reinforced plastic or other synthetic material of comparable thickness and durability; and

(4) compatible with the stored substance.

B. The following code of practice shall be used to meet the requirements of this subpart: Underwriters' Laboratories of Canada, Under-Dispenser Sumps, ULC/ORD-C107.21-1992 (1992). The code is incorporated by reference under part 7150.0500.

Statutory Authority: *MS s 116.49*

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7150.0211 CLASS A, B, AND C OPERATOR REQUIREMENTS.

Subpart 1. **Definitions.** For purposes of this part, the following definitions apply.

A. "Class A operator" means an individual who has primary responsibility to operate and maintain the underground storage tank system.

B. "Class B operator" means an individual who has daily responsibility to operate and maintain the underground storage tank system.

C. "Class C operator" means an individual who has daily on-site presence and responsibility to handle emergencies and alarms pertaining to a spill or release from the underground storage tank system.

D. "Unattended card-lock facility" means a facility where control of dispensing a regulated substance is through a mechanical or electronic method without the constant on-site presence of a Class A, Class B, or Class C operator.

Subp. 2. **General.** Class A, B, and C operators must be either the owner or operator of the underground storage tank system, or a designated employee of the owner or operator. The owner or operator of an underground storage tank system must designate a Class A, Class B, and Class C operator for the tank system, except that the owner or operator is not required to designate a Class C operator for unattended card-lock facilities. A Class A, Class B, or Class C operator must be present on site during the operation of the tank system, except at unattended card-lock facilities, which must have a sign posted according to subpart 3. The owner and operator of an underground storage tank system are responsible for ensuring that the Class A, Class B, and Class C operators are fulfilling their responsibilities under this chapter.

Subp. 3. **Unattended card-lock facility.** An unattended card-lock facility must have a legible sign posted in a conspicuous place with the name and address of the facility and the telephone number of the facility owner, operator, or local emergency response.

Subp. 4. **Class A operator responsibilities.** The Class A operator is responsible for managing resources and personnel to achieve and maintain compliance with this chapter.

Subp. 5. **Class B operator responsibilities.** The Class B operator is responsible for daily operation and maintenance of the underground storage tank system. The Class B operator must be present on site at least one time per month to ensure proper operation and maintenance of the tank systems, except that the Class B operator of an unattended card-lock facility must be present on site at least one time per week. Each month, the Class B operator must validate that:

- A. required release detection monitoring is being performed according to parts 7150.0300 to 7150.0340;
- B. required reporting is being performed and records are being maintained according to part 7150.0450;
- C. spill, overfill, and corrosion protection systems are in place and operational according to part 7150.0205;
- D. cathodic protection testing has been performed according to part 7150.0215;
- E. unusual operating conditions or release detection system indications have been reported and investigated according to Minnesota Statutes, section 115.061; and
- F. routine operation and maintenance activities have been accomplished.

Subp. 6. **Class C operator responsibilities.** The Class C operator must be present on site daily and is responsible for handling emergencies and alarms pertaining to a spill or release from a tank system, including reporting spills and releases. The Class C operator must be trained by a Class A or B operator before assuming responsibility for the tank system.

Subp. 7. **Class A and B operator examinations.**

A. Class A and B operators must pass an agency-administered examination verifying operator knowledge of the underground storage tank system with a score of 75 percent or higher, except as provided in item D.

B. Class A and B operators must pass the agency-administered examination within 30 days after being designated by the owner or operator of the tank system, except as provided in item C. The Class B operator must retake the examination within 30 days after a change in any of the following tank system components:

- (1) tank or piping construction material;

- (2) tank or piping release detection method; or
- (3) type of cathodic protection system.

C. Class A and B operators must be designated and pass the initial agency-administered examination according to the following deadlines:

- (1) operators at underground storage tank facilities where the facility telephone area code is 651, 952, 612, or 763 must pass the examination no later than August 8, 2011. After August 8, 2011, item B applies; and
- (2) operators at underground storage tank facilities where the facility telephone area code is 507, 218, or 320, or other area code must pass the examination no later than August 8, 2012. After August 8, 2012, item B applies.

D. If a designated Class A or B operator is certified in another state as a Class A or B operator for underground storage tanks, the owner or operator may apply to the commissioner for a waiver of the examination requirement in item A. The owner or operator must submit to the commissioner a copy of the designated Class A or B operator's current certification issued by another state and information to demonstrate that the other state's operator certification examination is equivalent in content to the agency-administered examination under item A. If the waiver is approved by the commissioner, the owner or operator is subject to the commissioner's conditions of approval and to the other requirements in this part, including the examination requirements in item B and subpart 8, item B.

Subp. 8. Class A and B operator training requirements.

A. If the Class A or B operator does not receive a passing score of 75 percent or higher on the examination under subpart 7, the Class A or B operator must attend an agency-approved training course and retake and pass an agency-administered examination within 60 days after notification by the commissioner.

B. If the commissioner determines that the owner or operator of a tank system has violated part 7150.0205, subpart 5; 7150.0215; 7150.0300; 7150.0330; 7150.0340; or 7150.0400, the Class B operator of the tank system must attend an agency-approved training course and retake and pass an agency-administered examination within 60 days after notification by the commissioner.

Subp. 9. Application procedures for training course approval.

A. Persons seeking to train Class A and B operators must submit an application to the commissioner for approval according to this subpart.

B. To apply for commissioner approval of an operator training course, a training provider must submit an application to the commissioner on an application form provided by the commissioner. The application must contain the following information:

- (1) the course sponsor's name, address, and telephone number;
- (2) a list of states that currently approve the training course;
- (3) the course curriculum, including topics to be covered and length of the training;
- (4) a letter from the training course sponsor that clearly indicates how the course meets the requirements of this chapter;
- (5) a copy of all course materials, such as student manuals, instructor notebooks, and handouts;
- (6) a copy of the certificate that will be issued to students who attend the course; and

(7) other information determined by the commissioner to be relevant to evaluating whether the course will provide knowledge to operators to meet the requirements of this chapter.

C. Training must provide the knowledge necessary for operators to monitor and maintain tank systems in a manner that complies with this chapter, prevents releases to the environment, minimizes the size of accidental releases through early detection, and mitigates damage from releases with proper emergency response.

D. The commissioner shall suspend or revoke approval of a training course if the commissioner finds that the course is no longer providing training that meets the requirements of this chapter.

E. Except as provided in item D, approval of a training course remains in effect until the commissioner notifies the approved training provider that changes in the course are required to maintain commissioner approval. At that time, the training provider must submit a revised training course to the commissioner for approval.

Statutory Authority: *MS s 116.49*

History: *34 SR 1610*

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OPERATION AND MAINTENANCE

7150.0215 OPERATION AND MAINTENANCE OF CATHODIC PROTECTION.

Subpart 1. **General.** Cathodic protection systems must be operated and maintained to continuously provide cathodic protection to the metal components of the parts of the tank and piping that routinely contain regulated substances and are in contact with the ground.

Subp. 2. **Sacrificial anode systems.** Sacrificial anode cathodic protection systems must be tested for proper operation according to the following requirements:

A. systems must be tested by a cathodic protection tester within six months of installation and at least every three years thereafter, and within six months after any repairs and at least every three years thereafter;

B. the criteria that are used to determine that cathodic protection is adequate as required by this subpart must be according to National Association of Corrosion Engineers, Corrosion Control of Underground Storage Tank Systems by Cathodic Protection, RP0285-2002 (2002), incorporated by reference under part 7150.0500; and

C. systems designed with external testing stations must be tested using a voltmeter according to this subpart, but do not require testing by a cathodic protection tester.

Subp. 3. **Impressed current systems.** Impressed current cathodic protection systems must be tested for proper operation according to the following requirements:

A. the rectifier must be read every 60 days to ensure that current is being delivered to the system and the voltage and amperage readings shall be recorded;

B. systems must be tested by a corrosion expert or a cathodic protection tester within six months of installation and at least annually thereafter, and within six months after any repairs and at least annually thereafter; and

C. the criteria that are used to determine that cathodic protection is adequate as required by this subpart must be according to National Association of Corrosion Engineers, Corrosion Control of Underground Storage Tank Systems by Cathodic Protection, RP0285-2002 (2002), incorporated by reference under part 7150.0500.

Statutory Authority: *MS s 116.49*

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7150.0240 [Repealed, 32 SR 1751]

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RELEASE DETECTION

7150.0300 RELEASE DETECTION.

Subpart 1. **General.** Owners and operators of underground storage tank systems must provide a method, or combination of methods, of release detection for tanks, piping, dispensers, and submersible pumps that:

A. can detect a release from any part of the tank and the connected underground piping, dispensers, and submersible pumps that routinely contains product;

B. is installed, calibrated, operated, and maintained according to the manufacturer's instructions, including routine maintenance and service checks for operability or running condition; and

C. meets the performance standards in part 7150.0330 or 7150.0340. The performance of release detection equipment must be documented with written specifications supplied by the equipment manufacturer or installer. Methods of release detection for tanks and piping must be capable of detecting the leak rate or quantity specified for that method in parts 7150.0330 and 7150.0340.

Subp. 2. **Release notification.** When a release detection method operated according to the performance standards in parts 7150.0330 and 7150.0340 indicates a release may have occurred, owners and operators must notify the agency according to Minnesota Statutes, section 115.061.

Subp. 3. [Repealed, 32 SR 1751]

Subp. 4. [Repealed, 32 SR 1751]

Subp. 5. **Tanks.** Tanks must be monitored at least every 30 days for releases using one of the following methods or combination of methods, except that hazardous materials tanks and tanks installed on or after December 22, 2007, must comply with item B:

- A. automatic tank gauging according to part 7150.0330, subpart 5, combined with inventory control in accordance with part 7150.0330, subpart 2;
- B. interstitial monitoring according to part 7150.0330, subpart 6;
- C. inventory control according to part 7150.0330, subpart 2, subject to the following conditions:
 - (1) tank tightness testing shall be performed according to part 7150.0330, subpart 4, within five years after installation; and
 - (2) inventory control shall be discontinued within ten years after tank installation and another method of release detection shall be substituted;
- D. for tanks with capacities of greater than 1,000 gallons and less than 2,000 gallons, manual tank gauging according to part 7150.0330, subpart 3, subject to the following conditions:
 - (1) tank tightness testing shall be performed according to part 7150.0330, subpart 4, within five years after installation; and
 - (2) manual tank gauging shall be discontinued within ten years after tank installation and another method of release detection shall be substituted;
- E. for tanks with capacities of 1,000 gallons or less, manual tank gauging according to part 7150.0330, subpart 3; or
- F. another method of release detection according to part 7150.0330, subpart 7.

Subp. 6. **Piping.** Underground piping that routinely contains regulated substances must be monitored for releases using one of the following methods or combination of methods, except that piping installed on or after December 22, 2007, must comply with item A, subitem (3) or (4):

- A. Pressure piping. Underground piping that conveys regulated substances under pressure must use one of the following methods:
 - (1) line leak detection conducted according to part 7150.0340, subpart 2, and annual line tightness testing conducted according to part 7150.0340, subpart 3, item A;
 - (2) line leak detection conducted according to part 7150.0340, subpart 2, and monthly line tightness testing conducted according to part 7150.0340, subpart 3, item B;
 - (3) line leak detection conducted according to part 7150.0340, subpart 2, and monthly interstitial monitoring conducted according to part 7150.0340, subpart 4, item A, subitem (2); or
 - (4) continuous interstitial monitoring conducted according to part 7150.0340, subpart 4, item A, subitem (1).
- B. Suction piping.
 - (1) Except as described in subitem (2), underground piping that conveys regulated substances under suction must:
 - (a) have a line tightness test conducted at least every three years if it can detect a 0.1 gallon per hour leak rate at one and one-half times the operating pressure; or
 - (b) have monthly interstitial monitoring conducted according to part 7150.0340, subpart 4.

(2) 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 entire 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; and
- (d) the check valve is located directly below and as close as practical to the suction pump.

C. Other methods. Another method of release detection may be used according to part 7150.0340, subpart 5.

Subp. 7. **Sump and basin monitoring.** Dispenser sumps, spill catchment basins, and submersible pump sumps shall be visually checked for releases on a monthly basis. A submersible pump sump may be visually checked for releases on an annual basis if it is secondarily contained in accordance with the design requirements of part 7150.0205, subpart 6, and is equipped with a continuous automatic sensing device that signals the operator of the presence of either the regulated substance or water in the sump. If sumps and basins are equipped with automatic leak-sensing devices that signal the operator of the presence of any regulated substance, sensors shall be tested annually for proper function. Sumps and basins shall be maintained free of storm water and debris. Regulated substances spilled to sumps and basins shall be immediately removed and the source of the spills, drips, or leaks must be investigated and remedied.

Statutory Authority: *MS s 116.49*

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7150.0330 METHODS OF RELEASE DETECTION FOR TANKS.

Subpart 1. **Applicability.** Each method of release detection for tanks used to meet the requirements of part 7150.0300, subpart 5, must be conducted according to this part.

Subp. 2. **Inventory control.** Product inventory control must be conducted monthly to detect a release of at least 1.0 percent flow-through plus 130 gallons on a monthly basis in the following manner:

- A. inventory volume measurements for regulated substance inputs, withdrawals, and the amount still remaining in the tank are recorded each operating day;
- B. 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;

C. the regulated substance inputs are reconciled with delivery receipts by measurement of the tank inventory volume before and after delivery;

D. deliveries are made through a drop tube that extends to within six inches of the tank bottom;

E. product dispensing is metered and recorded within the local standards for meter calibration incorporated by reference at part 7601.1000;

F. 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; and

G. practices described in American Petroleum Institute, Bulk Liquid Stock Control at Retail Outlets, API 1621 (1987), incorporated by reference under part 7150.0500, may be used, where applicable, as guidance in meeting the requirements of this subpart.

Subp. 3. **Manual tank gauging.** Manual tank gauging must be conducted in the following manner:

A. 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;

B. level measurements are based on an average of two consecutive stick readings at both the beginning and ending of the period; and

C. 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.

A leak is suspected and subject to the requirements of Minnesota Statutes, section 115.061, if the variation between beginning and ending measurements exceeds the weekly or monthly standards in the following table:

Tank Capacity	Weekly Standard (one-test)	Monthly Standard (four-test avg.)	Minimum Duration of Test
If manual tank gauging is the ONLY leak detection method used:			
up to 550 gallons	10 gallons	5 gallons	36 hours
551-1,000 gallons (when largest tank is 64" x 73")	9 gallons	4 gallons	44 hours
1,000 gallons (if tank is 48" x 128")	12 gallons	6 gallons	58 hours
If manual tank gauging is combined with Tank Tightness Testing:			
1,001-2,000 gallons	26 gallons	13 gallons	36 hours

Subp. 4. **Tank tightness testing.** Tank tightness testing must be capable of detecting a 0.1 gallon per hour leak rate from any part 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.

Subp. 5. **Automatic tank gauging.** Equipment for automatic tank gauging that tests for the loss of product and conducts inventory control must meet the following requirements:

- A. the automatic product level monitor test can detect a 0.2 gallon per hour leak rate from any part of the tank that routinely contains product; and
- B. inventory control is conducted according to the requirements of subpart 2.

Subp. 6. **Interstitial monitoring.**

- A. Interstitial monitoring of secondary containment tanks shall be conducted:
 - (1) continuously, by means of an automatic leak-sensing device that signals the operator of the presence of any liquid in the interstitial space; or
 - (2) monthly, by means of a procedure capable of detecting the presence of any liquid in the interstitial space.
- B. The interstitial space shall be maintained free of water, debris, or anything that could interfere with leak detection capabilities.
- C. On an annual basis, any automatic leak-sensing device shall be tested for proper function.

Subp. 7. **Other methods.** Any other type of release detection method, or combination of methods, can be used if:

- A. the method 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; and
- B. the owner and operator can demonstrate to the commissioner that the method can detect a release as effectively as any of the methods allowed in this part and obtain the commissioner's prior written approval of the method. In comparing methods, the commissioner shall consider the size of release that the method can detect and the frequency and reliability with which it can be detected. If the method is approved by the commissioner, the owner and operator must comply with any conditions imposed by the commissioner on its use to ensure the protection of human health and the environment.

Statutory Authority: *MS s 116.49*

History: *16 SR 59; 32 SR 1751; 34 SR 1610*

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7150.0340 METHODS OF RELEASE DETECTION FOR PIPING.

Subpart 1. **Applicability.** Each method of release detection for piping used to meet the requirements of part 7150.0300, subpart 6, must be conducted according to this part.

Subp. 2. **Automatic line leak detectors.** Methods that continuously alert the operator to the presence of a leak by restricting or shutting off the flow of regulated substances through piping, or by triggering an audible or visual alarm, may be used only if they detect leaks of three gallons per hour at ten pounds per square inch line pressure within one hour. An annual test of the operation of any line leak detector must be conducted. Testing shall:

- A. be conducted by a person:
 - (1) certified under chapter 7105;
 - (2) approved by the manufacturer of the equipment to test the detector; or

- (3) qualified by reason of training or experience to test the detector;
- B. comply with the manufacturer's testing requirements;
- C. involve creation of a physical leak in a piping segment; and
- D. verify the leak detection threshold of three gallons per hour at ten pounds per square inch line pressure within one hour.

Subp. 3. **Line tightness testing.** A periodic test of piping may be conducted:

- A. annually, if it can detect a 0.1 gallon per hour leak rate at one and one-half times the operating pressure; or
- B. monthly, if it can detect a 0.2 gallon per hour leak rate at standard operating pressure.

Subp. 4. **Interstitial monitoring.**

- A. Interstitial monitoring of secondary containment piping shall be conducted:
 - (1) continuously, by means of an automatic leak-sensing device that signals the operator of the presence of any regulated substance in the interstitial space or sump; or
 - (2) monthly, by means of a procedure, such as visual monitoring, capable of detecting the presence of any regulated substance in the interstitial space or sump.
- B. The interstitial space or sump shall be maintained free of water, debris, or anything that could interfere with leak detection capabilities.
- C. On an annual basis, any sump shall be visually inspected for integrity of sides and floor and tightness of piping penetration seals. Any automatic leak-sensing device shall be tested for proper function.

Subp. 5. **Other methods.** Any other type of release detection method, or combination of methods, may be used if:

- A. the method 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; and
- B. the owner and operator can demonstrate to the commissioner that the method can detect a release as effectively as any of the methods allowed in subparts 2 to 4 and obtain the commissioner's prior written approval of the method. In comparing methods, the commissioner shall consider the size of release that the method can detect and the frequency and reliability with which it can be detected. If the method is approved by the commissioner, the owner and operator must comply with any conditions imposed by the commissioner on the method's use to ensure the protection of human health and the environment.

Statutory Authority: *MS s 116.49*

History: *16 SR 59; 32 SR 1751; 34 SR 1610*

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7150.0350 [Repealed, 32 SR 1751]

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OUT-OF-SERVICE UNDERGROUND STORAGE

TANK SYSTEMS AND CLOSURE**7150.0400 TEMPORARY CLOSURE.**

Subpart 1. **Requirements.** In addition to the requirements of the most current Minnesota Fire Code, owners and operators must comply with the provisions in subparts 2 to 5 relating to temporary closure.

Subp. 2. **Tanks out of service less than 90 days.** When an underground storage tank system is out of service for less than 90 days, owners and operators must continue operation and maintenance of corrosion protection according to part 7150.0215, and any release detection according to parts 7150.0300 to 7150.0340. Release detection is not required as long as the underground storage tank system is empty. The underground storage tank system is empty when all materials have been removed using commonly employed practices so that no more than 2.5 centimeters, or one inch, of residue remains in the system as measured through any part of the tank system.

Subp. 3. **Tanks out of service 90 days.** When an underground storage tank system is out of service for 90 days or more, owners and operators must also comply with the following requirements:

- A. leave vent lines open and functioning;
 - B. cap and secure all other lines, pumps, passageways, and appurtenances;
 - C. empty the tank;
 - D. continue operation and maintenance of cathodic protection according to part 7150.0215;
- and
- E. notify the commissioner of the change of status to temporary closure according to part 7150.0090, subpart 2.

Subp. 4. **Tanks out of service one year.** When an underground storage tank system is out of service for one year or more, owners and operators must permanently close the underground storage tank system according to part 7150.0410, unless the owner or operator requests an extension of the closure period by submitting an application for an extension on a form approved by the commissioner and the commissioner approves the extension in writing based on compliance with this part. Conditions of extension shall include record keeping requirements according to part 7150.0450 and the continued operation and maintenance of cathodic protection according to part 7150.0215. The underground storage tank system may not be returned to service without the written approval of the commissioner, based on compliance with the applicable requirements of this chapter.

Subp. 5. **Tanks out of service five years.** All underground storage tank systems must be permanently closed if the tank system is out of service for five years or more.

Statutory Authority: *MS s 116.49*

History: *16 SR 59; 32 SR 1751; 34 SR 1610*

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7150.0410 PERMANENT CLOSURE AND CHANGE IN STATUS TO STORAGE OF NONREGULATED SUBSTANCES.

Subpart 1. **Requirements.** In addition to the requirements of the most current Minnesota Fire Code, owners and operators must comply with the provisions in subparts 2 to 7 relating to permanent closure or change in status to storage of nonregulated substances.

Subp. 2. **Notice of closure or change in status.** At least ten days before beginning either permanent closure under subpart 3 or a change in status under subpart 4, owners and operators must notify the commissioner of their intent to permanently close or make the change in status, unless such action is in response to corrective action. The required assessment of the excavation zone under part 7150.0420 must be performed after notifying the commissioner but before completion of the permanent closure or a change in status.

Subp. 3. **Permanent closure.** To permanently close a tank, owners and operators must empty and clean it by removing all liquids and accumulated sludges from the tank and piping. All tanks and piping taken out of service permanently must also be either removed from the ground or filled in with an inert solid material.

Subp. 4. **Storage of nonregulated substances.** Continued use of an underground storage tank system to store a nonregulated substance is considered a change in status. Before a change in status to storage of a nonregulated substance, owners and operators must empty and clean the tank and piping by removing all liquid and accumulated sludge and conduct a site assessment according to part 7150.0420.

Subp. 5. **Certification of closers.** Owners and operators must ensure that persons performing permanent closures under subpart 3 or changes in status under subpart 4 are in compliance with certification requirements imposed by chapter 7105. Such persons must furnish copies of current certificates issued by the agency to the owner and operator before beginning a permanent closure under subpart 3 or a change in status under subpart 4.

Subp. 6. **Tank system closure certification.** Owners and operators must ensure that the person who permanently closes or changes the status of an underground storage tank system to a nonregulated substance certifies in the notification form that the methods used comply with this part.

Subp. 7. **Cleaning and closure procedures.** The cleaning and closure procedures listed in one of the following documents must be used as guidance for complying with this part. The documents are incorporated by reference under part 7150.0500:

A. American Petroleum Institute, Closure of Underground Petroleum Storage Tanks, API 1604 (1996);

B. American Petroleum Institute, Interior Lining and Periodic Inspection of Underground Storage Tanks, API 1631 (2001); or

C. American Petroleum Institute, Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks, API 2015 (2001).

Statutory Authority: *MS s 116.49*

History: *16 SR 59; 32 SR 1751; 34 SR 1610*

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7150.0420 SITE ASSESSMENT.

When permanently closing a tank or making a change in status to storage of a nonregulated substance, owners and operators must measure through laboratory analysis for the presence of a release where contamination is most likely to be present at the underground storage tank site. If contaminated soils, contaminated groundwater, or free product as a liquid or vapor is discovered by this measurement or by any other manner, owners and operators must notify the agency immediately and begin corrective action according to Minnesota Statutes, section 115.061. In selecting sample types, sample locations, and measurement methods, owners and operators must consider the method of closure, the nature of the stored substance, the type of backfill, the depth to groundwater, and other factors appropriate for identifying the presence of a release.

Statutory Authority: *MS s 116.49*

History: *16 SR 59; 32 SR 1751; 34 SR 1610*

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7150.0430 PREVIOUSLY CLOSED UNDERGROUND STORAGE TANK SYSTEMS.

When directed by the commissioner, the owner and operator of an underground storage tank system permanently closed before December 22, 1988, must assess the excavation zone according to part 7150.0420 and close the underground storage tank system according to part 7150.0410 if releases from the underground storage tank may, in the judgment of the commissioner, pose a current or potential threat to human health and the environment.

Statutory Authority: *MS s 116.49*

History: *16 SR 59; 32 SR 1751*

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7150.0440 [Repealed, 32 SR 1751]

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7150.0450 REPORTING AND RECORD KEEPING.

Subpart 1. **General.** Owners and operators of underground storage tank systems must cooperate fully with inspections, monitoring, and testing conducted by the agency, as well as requests for document submission, testing, and monitoring by the owner or operator.

Subp. 2. **Reporting.** Owners and operators must submit the following information to the commissioner within the applicable time frames:

A. notification and certification for all underground storage tank systems under part 7150.0090, including cathodic protection test reports;

B. notification of the discovery of an abandoned tank under Minnesota Statutes, section 116.48, subdivision 2;

C. reports of all releases under Minnesota Statutes, section 115.061, including suspected releases, spills and overfills, and confirmed releases;

D. information generated in the course of taking corrective action as defined in Minnesota Statutes, section 115C.02, subdivision 4;

E. notification before permanent closure or change in status to a nonregulated substance under part 7150.0410; and

F. inspection reports for internally lined tanks under part 7150.0205, subpart 1, item E, subitem (1).

Subp. 3. **Record retention.** Owners and operators must maintain the following information in a legible manner for the specified time frame:

A. the commissioner's determination under part 7150.0205, subpart 1, item F; subpart 3, item F; or subpart 5, item B, subitem (1), that alternative corrosion protection equipment or spill and overflow prevention equipment may be used, shall be maintained for the life of the tank system;

B. for underground storage tank systems using cathodic protection, the following records of the operation of the cathodic protection must be maintained:

(1) the results of the last three tests of sacrificial anode systems required by part 7150.0215, subpart 2, item A;

(2) the results of rectifier readings for impressed current systems required by part 7150.0215, subpart 3, item A, for at least three years; and

(3) the results of the last three tests of impressed current systems required by part 7150.0215, subpart 3, item B;

C. documentation of underground storage tank system repairs, including the nature of each repair, results of required integrity testing, and any commissioner's written determination under part 7150.0100, subpart 10, item C, shall be maintained for the life of the tank system;

D. documentation of compliance with release detection requirements under parts 7150.0300 to 7150.0340, as follows:

(1) all written performance claims pertaining to any release detection system used, and the manner in which these claims have been justified or tested by the equipment manufacturer or installer, including documentation of "safe suction" design according to part 7150.0300, subpart 6, item B, subitem (2), must be maintained for as long as the system is being used to comply with the requirements of this chapter;

(2) the results of any sampling, testing, or monitoring must be maintained for at least ten years, including:

(a) monthly tank inventory control according to part 7150.0330, subpart 2;

(b) monthly manual tank gauging according to part 7150.0330, subpart 3;

(c) monthly or annual tank tightness testing according to part 7150.0330, subpart 4;

(d) monthly automatic tank gauging according to part 7150.0330, subpart 5;

(e) monthly interstitial monitoring of secondary containment tanks according to part 7150.0330, subpart 6, item A, subitem (2);

(f) monthly results of an alternative tank release detection method according to part 7150.0330, subpart 7;

- (g) annual testing of any line leak detector according to part 7150.0340, subpart 2;
- (h) annual line tightness testing according to part 7150.0340, subpart 3, item A;
- (i) monthly line tightness testing according to part 7150.0340, subpart 3, item B;
- (j) monthly interstitial monitoring of secondary containment piping according to part 7150.0340, subpart 4;
- (k) monthly results of an alternative piping release detection method according to part 7150.0340, subpart 5;
- (l) monthly sump and basin monitoring according to part 7150.0300, subpart 7; and
- (m) annual testing of any automatic leak-sensing device in any secondarily contained tank according to part 7150.0330, subpart 6, item C, or submersible pump sump according to part 7150.0340, subpart 4, item C;

(3) written documentation of all calibration, maintenance, and repair of release detection equipment permanently located on site must be maintained for at least ten years after the servicing work is completed. Any schedules of required calibration and maintenance provided by the release detection equipment manufacturer must be retained as long as the system is being used to comply with the requirements of this chapter; and

(4) documentation of the commissioner's approval of alternate release detection methods under part 7150.0330, subpart 7, or 7150.0340, subpart 5, must be maintained for as long as the methods are being used to comply with the requirements of this chapter;

E. results of the site assessment conducted at permanent closure or change in status to a nonregulated substance under part 7150.0420 and any other records that are capable of demonstrating compliance with closure requirements under parts 7150.0400 and 7150.0410. The results of the site assessment required in part 7150.0420 must be maintained for at least three years after completion of permanent closure or change in status in one of the following ways:

- (1) at the facility by the owners and operators who took the underground storage tank system out of service;
- (2) at the facility by the current owners and operators of the underground storage tank system site; or
- (3) by mailing these records to the commissioner if the records cannot be maintained at the closed facility;

F. certification that the facility's Class A operator and Class B operator have passed the operator examination requirements or documentation of current certification in another state if the commissioner has approved a waiver of the agency-administered examination. Certifications on current personnel must be kept until closure of the facility. Certifications on former personnel must be kept for at least three years from the date of the employee's termination;

G. records of monthly or weekly on-site presence of the Class B operator according to part 7150.0211, subpart 5, must be kept for at least ten years; and

H. records that document that the Class C operator has received the training required in part 7150.0211, subpart 6, including the date of training, who performed the training, and the contents of the

training. Training records on current personnel must be kept until closure of the facility. Training records on former personnel must be kept for at least three years from the date of the employee's termination.

Subp. 4. **Record location.** Owners and operators must maintain the records required:

A. at the underground storage tank site where the records are immediately available for inspection by the commissioner; or

B. at a readily available alternative site, in which case the records must be immediately submitted to the commissioner upon request.

Statutory Authority: *MS s 116.49*

History: *32 SR 1751; 34 SR 1610*

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7150.0500 INCORPORATION BY REFERENCE.

Subpart 1. **Scope.** For purposes of chapter 7150, the documents in subpart 2 are incorporated by reference. These documents are not subject to frequent change. They can be found at the Minnesota Pollution Control Agency Library, 520 Lafayette Road, Saint Paul, Minnesota 55155, at the addresses indicated, or through the Minitex interlibrary loan system. If any of the documents are amended, and if the amendments are incorporated by reference or otherwise made a part of federal technical rules at Code of Federal Regulations, title 40, part 280, then the amendments to documents are also incorporated by reference in this chapter.

Subp. 2. **Referenced standards.** The documents referenced throughout this chapter are listed in items A to H:

A. American Society of Mechanical Engineers, 345 East 47th Street, New York, New York 10017.

(1) B31.3, Process Piping (2005); and

(2) B31.4, Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids (2006).

B. American Petroleum Institute, 1220 L Street Northwest, Washington, D.C. 20005.

(1) API 1604, Closure of Underground Petroleum Storage Tanks (1996);

(2) API 1615, Installation of Underground Petroleum Storage Systems (1996);

(3) API 1621, Bulk Liquid Stock Control at Retail Outlets (1987);

(4) API 1626, Storing and Handling Ethanol and Gasoline-Ethanol Blends at Distribution Terminals and Service Stations (1985);

(5) API 1631, Interior Lining and Periodic Inspection of Underground Storage Tanks (2001);

(6) API 1632, Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems (1996);

(7) API 2015, Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks (2001); and

(8) API RP 2200, Repairing Crude Oil, Liquefied Petroleum Gas, and Product Pipelines (1994).

C. National Association of Corrosion Engineers, Publications Department, P.O. Box 218340, Houston, Texas 77218.

(1) SP0169-2007, Control of External Corrosion on Underground or Submerged Metallic Piping Systems (2007); and

(2) RP0285-2002, Corrosion Control of Underground Storage Tank Systems by Cathodic Protection (2002).

D. National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269.

(1) NFPA 30, Flammable and Combustible Liquids Code (2003); and

(2) NFPA 385, Standard for Tank Vehicles for Flammable and Combustible Liquids (2007).

E. Petroleum Equipment Institute, P.O. Box 2380, Tulsa, Oklahoma 74101: RP100, Recommended Practices for Installation of Underground Liquid Storage Systems (2005).

F. Steel Tank Institute, 570 Oakwood Road, Lake Zurich, Illinois 60047.

(1) STI-P3, Specification and Manual for External Corrosion Protection of Underground Steel Storage Tanks (2006);

(2) STI F841, Standard for Dual Wall Underground Steel Storage Tanks (2006);

(3) STI F894, ACT-100 Specification for External Corrosion Protection of Composite Steel Underground Storage Tanks (2006); and

(4) R012, Recommended Practice for Interstitial Tightness Testing of Existing Underground Double Wall Steel Tanks (2006).

G. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, Illinois 60062.

(1) UL 58, Standard for Steel Underground Tanks for Flammable and Combustible Liquids (1996);

(2) UL 567, Emergency Breakaway Fittings, Swivel Connectors and Pipe-Connection Fittings for Petroleum Products and LP-Gas (2004);

(3) UL 1316, Standard for Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures (2006); and

(4) UL 1746, Standard for Safety for External Corrosion Protection Systems for Steel Underground Storage Tanks (2007).

H. Underwriters' Laboratories of Canada, 7 Crouse Road, Scarborough, Ontario, Canada M1R 3A9.

(1) CAN/ULC-S603.1-03, External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids (2003);

(2) CAN/ULC-S603-00, Standard for Steel Underground Tanks for Flammable and Combustible Liquids (2000);

(3) ULC-S615-98, Standard for Reinforced Plastic Underground Tanks for Flammable and Combustible Liquids (1998);

(4) ULC-S631-05, Isolating Bushings for Steel Underground Tanks Protected with External Corrosion Protection Systems (2005);

(5) CAN/ULC-S633-99, Standard for Flexible Underground Hose Connectors for Flammable and Combustible Liquids (1999);

(6) ULC Subject C107C-M1984, Guide for Glass-Fiber-Reinforced Plastic Pipe and Fittings for Flammable Liquids (1984);

(7) ULC/ORD-C107.21-1992, Under-Dispenser Sumps (1992); and

(8) ULC/ORD-C971-2005, Nonmetallic Underground Piping for Flammable and Combustible Liquids (2005).

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