CHAPTER 135
TECHNICAL STANDARDS AND CORRECTIVE ACTION REQUIREMENTS FOR OWNERS AND OPERATORS OF UNDERGROUND STORAGE TANKS

[Prior to 12/3/86, Water, Air and Waste Management[900]]

567—135.1(455B) Authority, purpose and applicability.

135.1(1) *Authority.* Iowa Code chapter 455B, division IV, part 8, authorizes the department to regulate underground tanks used for storage of regulated substances, and to adopt rules relating to detection, prevention and correction of releases of regulated substances from such tanks, maintenance of financial responsibility by owners or operators of such tanks, new tank performance standards, notice and reporting requirements, and designation of regulated substances.

135.1(2) *Purpose.* The purpose of these rules is to protect the public health and safety and the natural resources of Iowa by timely and appropriate detection, prevention and correction of releases of regulated substances from underground storage tanks (UST).

135.1(3) *Applicability.*

a. The requirements of this chapter apply to all owners and operators of a UST system as defined in rule 567—135.2(455B) except as otherwise provided in paragraphs 135.1(3)*"b"* and *"c."*

(1) Previously deferred UST systems. Airport hydrant fuel distribution systems, UST systems with field-constructed tanks, and UST systems that store fuel solely for use by emergency power generators must meet the requirements of these rules as follows:

1. Airport hydrant fuel distribution systems and UST systems with field-constructed tanks must meet the requirements in rule 567—135.21(455B).

2. UST systems that store fuel solely for use by emergency power generators installed on or before November 28, 2007, must meet the requirements in rule 567—135.5(455B) by October 13, 2021.

3. UST systems that store fuel solely for use by emergency power generators installed after November 28, 2007, must meet all applicable requirements of this chapter at installation.

(2) Any UST system listed in paragraph 135.1(3)*"c"* must meet the requirements of subrule 135.1(4).

b. Exclusions. The following UST systems are excluded from the requirements of this chapter:

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

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

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

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

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

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

c. Partial exclusions. Rules 567—135.3(455B), 567—135.4(455B), 567—135.5(455B), 567—135.6(455B), 567—135.15(455B) and 567—135.21(455B) do not apply to any of the following types of UST systems:

(1) Wastewater treatment tank systems;

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

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

(4) Aboveground storage tanks associated with:

1. Airport hydrant fuel distribution systems regulated under rule 567—135.21(455B); and

2. UST systems with field-constructed tanks regulated under rule 567—135.21(455B).

d. Nonpetroleum underground storage tank systems. Rules 567—135.8(455B) to 567—135.12(455B) do not apply to any nonpetroleum underground storage tank system except as otherwise provided for by the department.

135.1(4) *Installation requirements for partially excluded UST systems.*

a. Owners and operators must install a UST system listed in subparagraphs 135.1(3)*"c"*(1) to 135.1(3)*"c"*(3) storing regulated substances (whether of single- or double-wall construction) that meets the following requirements:

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

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

(3) Is constructed or lined with material that is compatible with the stored substance.

b. Notwithstanding paragraph 135.1(4)*"a,"* a UST system without corrosion protection may be installed at a site that is determined by a corrosion expert not to be corrosive enough to cause it to have a release due to corrosion during its operating life. Owners and operators must maintain records that demonstrate compliance with the requirements of this paragraph for the remaining life of the tank.

NOTE: The following codes of practice may be used as guidance for complying with this subrule.

- NACE International Standard RP-02-85, Practice SP 0285, "External Corrosion Control of Underground Storage Tank Systems by Cathodic Protection";
- NACE International Standard Practice SP 0169, "Control of External Corrosion on Metallic Buried, Partially Buried, Underground or Submerged Metallic Piping Systems";
- American Petroleum Institute Recommended Practice 1632, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems"; or
- Steel Tank Institute Recommended Practice R892, "Recommended Practice for Corrosion Protection of Underground Piping Networks Associated with Liquid Storage and Dispensing Systems."

[**ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.2(455B) Definitions.

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

"Active remediation" means corrective action undertaken to reduce contaminant concentrations by other than passive remediation or monitoring.

"Airport hydrant fuel distribution system" or *"airport hydrant system"* means a UST system which fuels aircraft and operates under high pressure with large diameter piping that typically terminates into one or more hydrants (fill stands). The airport hydrant system begins where fuel enters one or more tanks from an external source such as a pipeline, barge, rail car, or other motor fuel carrier.

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

"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.

"Asbestos-cement pipe" (AC refers to asbestos-cement) means a pipe or conduit constructed of asbestos fiber and Portland cement, which can be used to transport water.

"ASTM" means the American Society of Testing and Materials.

"Backflow preventer" means a check valve used to ensure water flows in one direction and designed to prevent contamination from an end user, such as a home, from getting into the general water supply. An approved backflow preventer shall be a reduced-pressure backflow preventer or an antisiphon device which complies with the standards of the American Water Works Association and has been approved by the Foundation for Cross-Connection Control and Hydraulic Research.

"Bedrock" means the rock, usually solid, underlying soil or any other unconsolidated surficial cover.

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

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

"Best available technology" means those practices which most appropriately remove, treat, or isolate contaminants from groundwater, soil or associated environment, as determined through professional judgment considering actual equipment or techniques currently in use, published technical articles, site hydrogeology and research results, engineering and groundwater professional reference materials, consultation with experts in the field, capital and operating costs, and guidelines or rules of other regulatory agencies.

"Best management practices" means maintenance procedures, schedule of activities, prohibition of practices, and other management practices, or a combination thereof, which, after problem assessment, is determined to be the most effective means of monitoring and preventing additional contamination of the groundwater and soil.

"Biodiesel" means a renewable fuel comprised of mono-alkyl esters of long-chain fatty acids derived from vegetable oils or animal fats, that is blended with petroleum-based diesel fuel, which meets the standards provided in Iowa Code section 214A.2.

"Carcinogenic risk" means the incremental risk of a person developing cancer over a lifetime as a result of exposure to a chemical, expressed as a probability such as one in a million (10^{-6}). For carcinogenic chemicals of concern, probability is derived from application of certain designated exposure assumptions and a slope factor.

"Cast iron pipe" means a pipe or conduit used as a pressure pipe for transmission of water, gas, or sewage or as a water drainage pipe. It comprises predominantly a gray cast iron tube historically used uncoated, with newer types having various coatings and linings to reduce corrosion and improve hydraulics.

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

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

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

"Certified groundwater professional" means a person certified pursuant to Iowa Code section 455B.474 and 567—Chapter 134, Part A.

"Change-in-service" means changing the use of a tank system from a regulated to a nonregulated use.

"Chemicals of concern" means the compounds derived from petroleum-regulated substances which are subject to evaluation for purposes of applying risk-based corrective action decision making. These compounds are benzene, ethylbenzene, toluene, and xylenes (BTEX) and naphthalene, benzo(a)pyrene, benz(a)anthracene, and chrysene. (NOTE: Concentration values for these last four constituents are determined by a conversion method from total extractable hydrocarbons, see subrule 135.8(3).)

"Class A operator" means the individual who has primary responsibility to operate and maintain the UST system in accordance with applicable requirements. The Class A operator typically manages resources and personnel, such as establishing work assignments, to achieve and maintain compliance with regulatory requirements under this chapter.

"Class B operator" means the individual who has day-to-day responsibility for implementing applicable regulatory requirements established by the department. The Class B operator typically implements in-field aspects of operation, maintenance, and associated record keeping for the UST systems.

"Class C operator" means the individual responsible for initially addressing emergencies presented by a spill or release from a UST system. The Class C operator typically controls or monitors the dispensing or sale of regulated substances.

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

"Conduit" means underground structures which act as pathways and receptors for chemicals of concern, including but not limited to gravity drain lines and sanitary or storm sewers.

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

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

"Containment sump" means a liquid-tight container that protects the environment by containing leaks and spills of regulated substances from piping, dispensers, pumps and related components in the containment area. Containment sumps may be single-walled or secondarily contained and located at the top of the tank (tank top or submersible turbine pump sump), underneath the dispenser (under-dispenser containment sump), or at other points in the piping run (transition or intermediate sump).

"Corrective action" means an action taken to reduce, minimize, eliminate, clean up, control or monitor a release to protect the public health and safety or the environment. Corrective action includes, but is not limited to, excavation of an underground storage tank for the purpose of repairing a leak or removal of a tank, removal of contaminated soil, disposal or processing of contaminated soil, cleansing of groundwaters or surface waters, natural biodegradation, institutional controls, technological controls and site management practices. Corrective action does not include replacement of an underground storage tank. Corrective action specifically excludes third-party liability.

"Corrective action meeting process" means a series of meetings organized by department staff with owners or operators and other interested parties such as certified groundwater professionals, funding source representatives, and affected property owners. The purpose of the meeting process is to develop and agree on a corrective action plan and the terms for implementation of the plan.

"Corrective action plan" means a plan which specifies the corrective action to be undertaken by the owner or operator in order to comply with requirements in this chapter and which is incorporated into a memorandum of agreement or other written agreement between the department and the owner or operator. The plan may include but is not limited to provisions for additional site assessment, site monitoring, Tier 2 revisions, Tier 3 assessment, excavation, and other soil and groundwater remedial action.

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

"Department" means Iowa department of natural resources.

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

"Dispenser" means equipment located above ground that dispenses regulated substances from the UST system.

"Dispenser system" means the dispenser and the equipment necessary to connect the dispenser to the underground storage tank system.

"Drinking water well" means any groundwater well used as a source for drinking water by humans and groundwater wells used primarily for the final production of food or medicine for human consumption.

"Ductile iron pipe" means a pipe or conduit commonly used for potable water distribution and for the pumping of sewage. The predominant wall material is ductile iron, a spheroidized graphite cast iron, and commonly has an internal cement mortar lining to inhibit corrosion from the carried water and various types of external coatings to inhibit corrosion from the environment.

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

"Enclosed space" means space which can act as a receptor or pathway capable of creating a risk of explosion or inhalation hazard to humans and includes "explosive receptors" and "confined spaces." Explosive receptors means those receptors designated in these rules which are evaluated for explosive risk. Confined spaces means those receptors designated in these rules for evaluation of vapor inhalation risks.

"Ethanol" means ethyl alcohol that is to be blended with gasoline if it meets the standards provided in Iowa Code section 214A.2.

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

"Existing tank system" means a tank system used to contain an accumulation of regulated substances or for which installation has commenced on or before January 14, 1987. Installation is considered to have commenced if:

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

1. Either a continuous on-site physical construction or installation program has begun; or,
2. The owner or operator has entered into contractual obligations, which cannot be canceled or modified without substantial loss, for physical construction at the site or installation of the tank system to be completed within a reasonable time.

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

"Field-constructed tank" means a tank constructed in the field. For example, a tank constructed of concrete that is poured in the field or a steel or fiberglass tank primarily fabricated in the field is considered field-constructed.

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

"Free product" refers to a regulated substance that is present as a light nonaqueous phase liquid (e.g., liquid not dissolved in water).

"Gasket" means any type of pipe seals made of a variety of rubbers including but not necessarily limited to styrene-butadiene rubber (SBR), nitrile-butadiene rubber (NBR or nitrile), ethylene propylene diene monomer (EPDM), neoprene (CR), and fluoroelastomer rubber (FKM), which are used to seal pipe connections.

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

"Groundwater ingestion pathway" means a pathway through groundwater by which chemicals of concern may result in exposure to a human receptor as specified in rules applicable to Tier 1, Tier 2 and Tier 3.

"Groundwater plume" means the extent of groundwater impacted by the release of chemicals of concern.

"Groundwater to water line pathway" means a pathway through groundwater which leads to a water line.

"Groundwater vapor to enclosed space pathway" means a pathway through groundwater by which vapors from chemicals of concern may lead to a receptor creating an inhalation or explosive risk hazard.

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

"Hazard quotient" means the ratio of the level of exposure of a chemical of concern over a specified time period to a reference dose for that chemical of concern derived for a similar exposure period. Unless otherwise specified, the hazard quotient designated in these rules is one.

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

"Highly permeable soils" means for the purpose of UST closures: fractured bedrock, any soils with a hydraulic conductivity rate greater than 0.3 meters per day, or any soil material classified by the Unified Soil Classification System as published by the United States Department of the Interior or ASTM designation as (1) GW - well graded gravel, gravel-sand mixtures, little or no fines, (2) GP - poorly graded gravel, gravel-sand mixtures, little or no fines, (3) SW - well graded sands, gravelly sands, little or no fines, or (4) SP - poorly graded sands, gravelly sands, little or no fines.

"Hydraulic conductivity" means the rate of water movement through the soil measured in meters per day (m/d) as determined by the following methods. For a saturated soil, the Bouwer-Rice method or its equivalent shall be used. For unsaturated soil, use a Guelph permeameter or an equivalent in situ constant-head permeameter in a boring finished above the water table. If an in situ method cannot be used for unsaturated soil because of depth, or if the soil is homogeneous and lacks flow-conducting channels, fractures, cavities, etc., laboratory measurement of hydraulic conductivity is acceptable.

If laboratory methods are used, collect undisturbed soil samples using a thin-walled tube sampler in accordance with American Society of Testing and Materials (ASTM) Standard D1587. Samples shall be clearly marked, preserved and transported to the laboratory. The laboratory shall measure hydraulic conductivity using a constant-head permeameter in accordance with ASTM Standard D2434 or a falling-head permeameter in accordance with accepted methodology.

"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.

"Institutional controls" means the restriction on use or access (for example, fences, deed restrictions, restrictive zoning) to a site or facility to eliminate or minimize potential exposure to a chemical(s) of concern. Institutional controls include any of the following:

1. A law of the United States or the state;
2. A regulation issued pursuant to federal or state laws;
3. An ordinance or regulation of a political subdivision in which real estate subject to the institutional control is located;
4. A restriction on the use of or activities occurring at real estate which are embodied in a covenant running with the land which:

- Contains a legal description of the real estate in a manner which satisfies Iowa Code section 558.1 et seq.;
- Is properly executed, in a manner which satisfies Iowa Code section 558.1 et seq.;
- Is recorded in the appropriate office of the county in which the real estate is located;
- Adequately and accurately describes the institutional control; and

- Is in the form of a covenant as set out in Appendix C or in such a manner reasonably acceptable to the department.

5. Any other institutional control the owner or operator can reasonably demonstrate to the department which will reduce the risk from a release throughout the period necessary to ensure that no applicable target risk is likely to be exceeded.

"Light, nonaqueous-phase liquid" or *"LNAPL"* refers to an organic compound that is immiscible with, and lighter than water (e.g., crude oil, gasoline, diesel fuel, heating oil).

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

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

"MCLs" means the drinking water primary maximum contaminant levels set out in 567—41.3(455B).

"Memorandum of agreement" means a written agreement between the department and the owner or operator which specifies the corrective action that will be undertaken by the owner or operator in order to comply with requirements in this chapter and the terms for implementation of the plan. The plan may include but is not limited to provisions for additional site assessment, site monitoring, Tier 2 revisions, Tier 3 assessment, excavation, and other soil and groundwater remedial action.

"Motor fuel" means a complex blend of hydrocarbons typically used in the operation of a motor engine, such as motor gasoline, aviation gasoline, No. 1 or No. 2 diesel fuel, or any blend containing one or more of these substances (for example, motor gasoline blended with alcohol).

"New tank system" means a tank system that will be used to contain an accumulation of regulated substances and for which installation has commenced after January 14, 1987. (See also "Existing Tank System.")

"Noncarcinogenic risk" means the potential for adverse systemic or toxic effects caused by exposure to noncarcinogenic chemicals of concern, expressed as the hazard quotient.

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

"Non-drinking water well" means any groundwater well (except an extraction well used as part of a remediation system) not defined as a drinking water well including a groundwater well which is not properly plugged in accordance with department rules in 567—Chapters 39 and 49.

"Nonresidential area" means land which is not currently used as a residential area and which is zoned for nonresidential uses.

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

"Operational life" refers to the period beginning when installation of the tank system has commenced until the time the tank system is properly closed under rule 567—135.15(455B).

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

"Overexcavation" refers to the excavation of subsurface materials outside the excavation zone for the purpose of removing contaminated substances.

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

"Owner" means:

1. In the case of a UST system in use on July 1, 1985, or brought into use after that date, any person who owns a UST system used for storage, use, or dispensing of regulated substances; and

2. In the case of any UST system in use before July 1, 1985, but no longer in use on that date, any person who owned such UST immediately before the discontinuation of its use.

Owner does not include a person or institution, who, without participating in the management or operation of the underground storage tank or the tank site or engaging in petroleum production,

refining or marketing, holds indicia of ownership primarily to protect that person's security interest in the underground storage tank or the tank site property, prior to obtaining ownership or control through debt enforcement, debt settlement, or otherwise.

"Pathway" means a transport mechanism by which chemicals of concern may reach a receptor(s) or the location(s) of a potential receptor.

"Permanent closure" means removing all regulated substances from the tank system, assessing the site for contamination, and permanently removing tank and piping from the ground or filling the tank in place with a solid inert material and plugging all piping. Permanent closure also includes partial closure of a tank system such as removal or replacement of tanks or piping only.

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

"Person who conveys or deposits a regulated substance" means a person who sells or supplies the owner or operator with the regulated substance and the person who transports or actually deposits the regulated substance in the underground tank.

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

"Pipe" or *"piping"* means a hollow cylinder or tubular conduit that is constructed of nonearthen materials and that routinely contains and conveys regulated substances.

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

"Point of compliance" means the location(s) at the source(s) of contamination or at the location(s) between the source(s) and the point(s) of exposure where concentrations of chemicals of concern must meet applicable risk-based screening levels at Tier 1 or other target level(s) at Tier 2 or Tier 3.

"Point of exposure" means the location(s) at which an actual or potential receptor may be exposed to chemicals of concern via a pathway.

"Polybutylene pipe" (PB refers to polybutylene) means a water supply pipe comprised of a form of plastic resin that was used extensively from 1978 until 1995. The piping systems were used for underground water mains and as interior water distribution piping. Polybutylene mains are usually blue in color, but may be gray, black, or white. The pipe is usually ½ inch or 1 inch in diameter, and it may be found entering a residence through the basement wall or floor, concrete slab or through the crawlspace; frequently it enters the residence near the water heater.

"Polyethylene pipe" (PE refers to polyethylene) means a water supply pipe comprised of thermoplastic material produced from the polymerization of ethylene. PE pipe is manufactured by extrusion in sizes ranging from ½ inch to 63 inches. PE pipe is available in rolled coils of various lengths or in straight lengths of up to 40 feet. PE pipe is available in many forms and colors, including single-extrusion colored or black pipe, black pipe with co-extruded color striping, and black or natural pipe with a co-extruded colored layer. PE pipe has been demonstrated to be very permeable to petroleum while still retaining its flexible structure.

"Polyvinyl chloride pipe" (PVC refers to polyvinyl chloride) means a pipe made from a plastic and vinyl combination material. The pipes are durable, hard to damage, and long-lasting. A PVC pipe is very resistant and does not rust, nor is it likely to rot or wear over time. PVC piping is most commonly used in water systems, underground wiring, and sewer lines.

"Portland cement" means hydraulic cement (cement that not only hardens by reacting with water but also forms a water-resistant product) and is produced by pulverizing clinkers consisting essentially of hydraulic calcium silicates, usually containing one or more forms of calcium sulfate as an inter ground addition.

"Potential receptor" means a receptor not in existence at the time a Tier 1, Tier 2 or Tier 3 site assessment is prepared, but which could reasonably be expected to exist within 20 years of the preparation of the Tier 1, Tier 2 or Tier 3 site assessment or as otherwise specified in these rules.

"Preferential pathway" means conditions which act as a pathway permitting contamination to migrate through soils and to groundwater at a faster rate than would be expected through naturally occurring undisturbed soils or unfractured bedrock including but not limited to wells, cisterns, tile lines, drainage systems, utility lines and envelopes, and conduits.

"Protected groundwater source" means a saturated bed, formation, or group of formations which has a hydraulic conductivity of at least 0.44 meters per day (m/d) and a total dissolved solids of less than 2,500 milligrams per liter (mg/l) or a bedrock aquifer with total dissolved solids of less than 2,500 milligrams per liter (mg/l) if bedrock is encountered before groundwater.

"Public water supply well" means a well connected to a system for the provision to the public of piped water for human consumption, if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year.

"Receptor" means enclosed spaces, conduits, protected groundwater sources, drinking and non-drinking water wells, surface water bodies, and public water systems which when impacted by chemicals of concern may result in exposure to humans and aquatic life, explosive conditions or other adverse effects on health, safety and the environment as specified in these rules.

"Reference dose" means a designated toxicity value established in these rules for evaluating potential noncarcinogenic effects in humans resulting from exposure to a chemical(s) of concern. Reference doses are designated in Appendix A.

"Regulated substance" means an element, compound, mixture, solution or substance which, when released into the environment, may present substantial danger to the public health or welfare or the environment. Regulated substance includes:

1. Substances designated in Table 302.4 of 40 CFR Part 302 (September 13, 1988),
2. Substances which exhibit the characteristics identified in 40 CFR 261.20 through 261.24 (May 10, 1984) and which are not excluded from regulation as a hazardous waste under 40 CFR 261.4(b) (May 10, 1984),
3. Any substance defined in Section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (but not including any substance regulated as a hazardous waste under subtitle C), and
4. Petroleum, including crude oil or any fraction thereof that is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute). The term "regulated substance" includes but is not limited to petroleum and petroleum-based substances comprised of a complex blend of hydrocarbons such as motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents, and used oils.

"Release" means any spilling, leaking, emitting, discharging, escaping, leaching or disposing of a regulated substance, including petroleum, from a UST into groundwater, surface water or subsurface soils.

"Release detection" means determining whether a release of a regulated substance has occurred from the UST system into the environment or a leak has occurred into the interstitial space between the UST system and its secondary barrier or secondary containment around it.

"Repair" means to restore to proper operating condition a tank, pipe, spill prevention equipment, overfill prevention equipment, corrosion protection equipment, release detection equipment or other UST system component that has caused a release of product from the UST system or has failed to function properly.

"Replace" or *"replacement"* means the installation of a new underground tank system or component, including dispensers, in substantially the same location as an existing tank system or component.

"Replaced" means:

1. For a tank: to remove a tank and install another tank.
2. For piping: to remove 50 percent or more of piping and install other piping, excluding connectors, connected to a single tank. For tanks with multiple piping runs, this definition applies independently to each piping run.

"Residential area" means land used as a permanent residence or domicile, such as a house, apartment, nursing home, school, child care facility or prison, land zoned for such uses, or land where no zoning is in place.

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

"Risk-based screening level (RBSL)" means the risk-based concentration level for chemicals of concern developed for a Tier 1 analysis to be met at the point(s) of compliance and incorporated in the Tier 1 Look-up Table in Appendix A.

"SARA" means the federal Superfund Amendments and Reauthorization Act of 1986.

"Secondary containment" or *"secondarily contained"* means a release prevention and release detection system for a tank or piping. This system has an inner and outer barrier with an interstitial space monitored for leaks. This term includes containment sumps when used for interstitial monitoring of piping.

"Secondary containment tank" or *"secondary containment piping"* means a tank or piping which is designed with an inner primary shell and a liquid-tight outer secondary shell or jacket which extends around the entire inner shell, and which is designed to contain any leak through the primary shell from any part of the tank or piping that routinely contains product, and which also allows for monitoring of the interstitial space between the shells and the detection of any leak.

"Septic tank" is 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 such receptacle is distributed for disposal through the soil and settled solids and scum from the tank are pumped out periodically and hauled to a treatment facility.

"Service line" means a pipe connected to a business or residence from a water main, typically of a size not exceeding 6 inches in diameter, and including its gaskets and other appurtenances. For purposes of this chapter, service lines refer to pipes specifically used for drinking water transmission.

"Site assessment investigation" means an investigation conducted by a certified groundwater professional to determine relevant site historical data, the types, amounts, and sources of petroleum contaminants present, hydrogeological characteristics of the site, full vertical and horizontal extent of the contamination in soils and groundwater, direction and rate of flow of the contamination, ranges of concentration of the contaminants by analysis of soils and groundwater, the vertical and horizontal extent of the contamination exceeding department standards, and the actual or potential threat to public health and safety and the environment.

"Site cleanup report" means the report required to be submitted by these rules and in accordance with department guidance which may include the results of Tier 2 or Tier 3 assessment and analysis.

"Site-specific target level (SSTL)" means the risk-based target level(s) for chemicals of concern developed as the result of a Tier 2 or Tier 3 assessment which must be achieved at applicable point(s) of compliance at the source to meet the target level(s) at the point(s) of exposure.

"Soil leaching to groundwater pathway" means a pathway through soil by which chemicals of concern may leach to groundwater and through a groundwater transport pathway impact an actual or potential receptor.

"Soil plume" means the vertical and horizontal extent of soil impacted by the release of chemicals of concern.

"Soil to water line pathway" means a pathway which leads from soil to a water line.

"Soil vapor to enclosed space pathway" means a pathway through soil by which vapors from chemicals of concern may lead to a receptor creating an inhalation or explosive risk hazard.

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

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

"Surface water body" means general use segments as provided in 567—paragraph 61.3(1)*"a"* and designated use segments of water bodies as provided in 567—paragraph 61.3(1)*"b"* and 567—subrule 61.3(5).

"Surface water criteria" means, for chemicals of concern, the Criteria for Chemical Constituents in Table 1 of rule 567—61.3(455B), except that "1,000 ug/L" will be substituted for the chronic levels for toluene for Class B designated use segments.

"Surface water pathway" means a pathway which leads to a surface water body.

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

"Target level" means the allowable concentrations of chemicals of concern established to achieve an applicable target risk which must be met at the point(s) of compliance as specified in these rules.

"Target risk" refers to an applicable carcinogenic and noncarcinogenic risk factor designated in these rules and used in determining target levels (for carcinogenic risk assessment, target risk is a separate factor, different from exposure factors, both of which are used in determining target levels).

"Technological controls" means a physical action which does not involve source removal or reduction, but severs or reduces exposure to a receptor, such as caps, containment, carbon filters, point of use water treatment, etc.

"Temporary closure" means a regulated tank or UST system that has been out of operation for three months or more.

"Tier 1 level" means the groundwater and soil levels in the Tier 1 Look-up Table set out in rule 135.9(455B) and Appendix A.

"Tier 1 site assessment" means the evaluation of limited site-specific data compared to the Tier 1 levels established in these rules for the purpose of determining which pathways do not require assessment and evaluation at Tier 2 and which sites warrant a no further action required classification without further assessment and evaluation.

"Tier 2 site assessment" means the process of assessing risk to actual and potential receptors by using site-specific contaminant concentrations and designated Tier 2 exposure and fate and transport models to determine the applicable target level(s).

"Tier 3 site assessment" means a site-specific risk assessment utilizing more sophisticated data or analytic techniques than a Tier 2 site assessment.

"Training program" means any program that provides information to and evaluates the knowledge of a Class A, Class B, or Class C operator through testing, practical demonstration, or another approach acceptable to the department regarding requirements for UST systems that meet the requirements of subrules 135.4(6) to 135.4(12).

"Under-dispenser containment (UDC)" means containment underneath a dispenser system designed to prevent leaks from the dispenser and piping within or above the UDC from reaching soil or groundwater.

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

"Underground release" means any below-ground release.

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

a. Farm or residential tank of 1100 gallons or less capacity used for storing motor fuel for noncommercial purposes. Iowa Code section 455B.473(4) requires those tanks existing prior to July 1, 1987, to be registered. Tanks installed on or after July 1, 1987, must comply with all 567—Chapter 135 rules;

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

c. Septic tank;

d. Pipeline facility (including gathering lines):

(1) Which is regulated under 49 U.S.C. Chapter 601, or

(2) Which is an intrastate pipeline facility regulated under state laws as provided in 49 U.S.C. Chapter 601 and which is determined by the Secretary of Transportation to be connected to a pipeline, or to be operated or intended to be capable of operating at pipeline pressure or as an integral part of a pipeline;

e. Surface impoundment, pit, pond, or lagoon;

f. Storm-water or wastewater collection system;

g. Flow-through process tank;

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

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

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

"Underground storage tank professional" or *"UST professional"* means an individual licensed by the department under 567—Chapter 134, Part C. The licensing program includes underground storage tank system installation, installation inspection, UST system testing, tank lining, cathodic protection installation/inspection, and UST removal. The license issued will list the type of work the individual is licensed to perform.

"Underground utility vault" means any constructed space accessible for inspection and maintenance associated with subsurface utilities.

"Unreasonable risk to public health and safety or the environment" means the Tier 1 levels for a Tier 1 site assessment, the applicable target level for a Tier 2 site assessment, and the applicable target level for a Tier 3 site assessment.

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

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

"Utility envelope" means the backfill and trench used for any subsurface utility line, drainage system and tile line.

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

"Water line" means a hollow cylinder or tubular conduit that routinely contains and conveys potable water and is constructed of nonearthen materials, including but not limited to asbestos-cement, copper, high-density polyethylene (HDPE), polybutylene, polyethylene, and wood. Such piping includes any elbows, couplings, unions, valves, or other in-line fixtures, as well as the gaskets, which contain and convey potable water.

"Water main pipe" means a main line to the water distribution system with feeder lines or service lines connected to it and which typically is 6 inches or greater in diameter, and includes its gaskets and other appurtenances.

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567—135.3(455B) UST systems—design, construction, installation and notification.

135.3(1) *Performance standards for new UST systems.* In order to prevent releases due to structural failure, corrosion, or spills and overfills for as long as the UST system is used to store regulated substances, all owners and operators of new UST systems must meet the following requirements. The UST system must be secondarily contained in accordance with subrule 135.3(9).

a. Tanks. Each tank must be properly designed and constructed, and any portion underground that routinely contains product must be protected from corrosion, in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory as specified below:

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

NOTE: The following codes of practice may be used to comply with subparagraph 135.3(1)*"a"*(1): Underwriters Laboratories Standard 1316, "Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures" or Underwriters Laboratories of Canada S615, "Standard for Reinforced Plastic Underground Tanks for Flammable and Combustible Liquids."

(2) 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 paragraph 135.4(2)*"c."* This shall be accomplished by providing the rectifier with ampere and voltage meters that can be read by the owner and operator for comparison to the design standard set by the corrosion expert or a device that can warn the owner and operator when changes in ampere and voltage occur outside the design standard set by the corrosion expert;
4. Cathodic protection systems are operated and maintained in accordance with subrule 135.4(2) or according to guidelines established by the department; and
5. Impressed current systems must be designed not to cause stray current that can damage other underground structures (metal electrical conduits, water lines, gas lines, etc.); or

NOTE: The following codes of practice may be used to comply with subparagraph 135.3(1)*"a"*(2):

- Steel Tank Institute "Specification STI-P3® Specification and Manual for External Corrosion Protection of Underground Steel Storage Tanks";
- Underwriters Laboratories Standard 1746, "External Corrosion Protection Systems for Steel Underground Storage Tanks";
- Underwriters Laboratories of Canada S603, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids," and S603.1, "Standard for External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids," and S631, "Standard for Isolating Bushings for Steel Underground Tanks Protected with External Corrosion Protection Systems";
- Steel Tank Institute Standard F841, "Standard for Dual Wall Underground Steel Storage Tanks"; or
- NACE International Standard Practice SP 0285, "External Corrosion Control of Underground Storage Systems by Cathodic Protection," and Underwriters Laboratories Standard 58, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids."

(3) The tank is constructed of steel and clad or jacketed with a noncorrodible material; or

NOTE: The following industry codes may be used to comply with subparagraph 135.3(1)*"a"*(3):

- Underwriters Laboratories Standard 1746, "Corrosion Protection Systems for Underground Storage Tanks";
- Steel Tank Institute ACT-100® Specification F894, "Specification for External Corrosion Protection of FRP Underground Storage Tanks";
- Steel Tank Institute ACT-100-U® Specification F961, "Specification for External Corrosion Protection of Composite Steel Underground Storage Tanks"; or
- Steel Tank Institute Specification F922, "Steel Tank Institute Specification for Permatank®."

(4) The tank is constructed of metal without additional corrosion protection measures provided that:

1. The tank is installed at a site that is determined by a corrosion expert not to be corrosive enough to cause it to have a release due to corrosion during its operating life; and
2. Owners and operators maintain records that demonstrate compliance with the requirements of paragraph 135.3(1)*"a"*(4)"1" for the remaining life of the tank; or

(5) The tank construction and corrosion protection are determined by the department to be designed to prevent the release or threatened release of any stored regulated substance in a manner that is no less protective of human health and the environment than subparagraphs 135.3(1)*"a"*(1) to (4).

b. Piping. The piping that routinely contains regulated substances and is in contact with the ground must be properly designed, constructed, and protected from corrosion in accordance with a code of

practice developed by a nationally recognized association or independent testing laboratory as specified in this rule. This includes piping for remote tank fill locations.

All piping must have secondary containment, installed according to manufacturer's specifications, and be compatible with the product stored and the environment to which it will be exposed. Piping must maintain its original specifications and structural integrity. Piping whose structural integrity has degraded must be replaced. All piping installations must meet National Fire Prevention Association Standard 30 and Standard 30A or the International Fire Code as adopted by the Iowa state fire marshal in 661—Chapter 221, "Flammable and Combustible Liquids."

(1) The piping is constructed of a noncorrodible material; or

NOTE: The following codes of practice may be used to comply with subparagraph 135.3(1)*"b"*(1):

- Underwriters Laboratories Standard 971, "Nonmetallic Underground Piping for Flammable Liquids"; or
- Underwriters Laboratories of Canada Standard S6660, "Standard for Nonmetallic Underground Piping for Flammable and Combustible Liquids."

(2) 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 paragraph 135.4(2)*"c"*; and
4. Cathodic protection systems are operated and maintained in accordance with subrule 135.4(2) or guidelines established by the department; or

NOTE: The following codes of practice may be used to comply with subparagraph 135.3(1)*"b"*(2):

- American Petroleum Institute Recommended Practice 1632, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems";
- Underwriters Laboratories Subject 971A, "Outline of Investigation for Metallic Underground Fuel Pipe";
- Steel Tank Institute Recommended Practice R892, "Recommended Practice for Corrosion Protection of Underground Piping Networks Associated with Liquid Storage and Dispensing Systems";
- NACE International Standard Practice SP 0169, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems";
- NACE International Standard Practice SP 0285, "External Corrosion Control of Underground Storage Tank Systems by Cathodic Protection"; or
- National Fire Protection Association Standard 30, "Flammable or Combustible Liquids Code."

(3) The piping is constructed of metal without additional corrosion protection measures provided that:

1. The piping is installed at a site that is determined by a corrosion expert to not be corrosive enough to cause it to have a release due to corrosion during its operating life; and
2. Owners and operators maintain records that demonstrate compliance with the requirements of paragraph 135.3(1)*"b"*(3)"1" for the remaining life of the piping; or

(4) The piping construction and corrosion protection are determined by the department to be designed to prevent the release or threatened release of any stored regulated substance in a manner that is no less protective of human health and the environment than the requirements in subparagraphs 135.3(1)*"b"*(1) to (3).

c. Spill and overfill prevention equipment.

(1) Except as provided in subparagraph 135.3(1)*"b"*(2), to prevent spilling and overfilling associated with product transfer to the UST 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:

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

- Alert the transfer operator when the tank is no more than 90 percent full by restricting the flow into the tank (not allowed for suction product delivery systems, for tanks with stage 1 vapor recovery or when product delivery is by pumping) or triggering a high-level alarm; or
- Restrict flow 30 minutes prior to overfilling, alert the transfer operator with a high-level alarm one minute before overfilling, or automatically shut off the flow into the tank so that none of the fittings located on top of the tank are exposed to product due to overfilling.

(2) Owners and operators are not required to use the spill and overfill prevention equipment specified in subparagraph 135.3(1)*"b"*(1) if:

1. Alternative equipment is used that is determined by the department to be no less protective of human health and the environment than the equipment specified in paragraph 135.3(1)*"b"*(1)"1" or "2"; or
2. The UST system is filled by transfers of no more than 25 gallons at one time.

(3) Flow restrictors used in vent lines may not be used to comply with paragraph 135.3(1)*"c"*(1)"2" when overfill prevention is installed or replaced.

(4) Spill and overfill prevention equipment must be periodically tested or inspected in accordance with subrule 135.4(12).

(5) Spill prevention equipment must be kept free of any liquid and debris. Any liquid or debris must be removed prior to product delivery.

d. Installation. The UST system must be properly installed in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory and in accordance with the manufacturer's instructions. The UST system installation shall be conducted by an installer licensed by the department under 567—Chapter 134, Part C, and in accordance with 567—subrules 134.24(3) and 134.24(4).

NOTE: Tank and piping system installation practices and procedures described in the following codes may be used to comply with the requirements of paragraph 135.3(1)*"d"*:

- American Petroleum Institute Publication 1615, "Installation of Underground Petroleum Storage System";
- Petroleum Equipment Institute Publication RP100, "Recommended Practices for Installation of Underground Liquid Storage Systems"; or
- National Fire Protection Association Standard 30, "Flammable and Combustible Liquids Code," and 30A, "Code for Motor Fuel Dispensing Facilities and Repair Garages."

e. Certification of installation. All owners and operators must ensure that the following methods of certification, testing, and inspection are used to demonstrate compliance with paragraph 135.3(1)*"d"* by providing a certification of compliance on the UST registration form in accordance with subrule 135.3(3).

(1) The installer is licensed by the department as provided in 567—Chapter 134, Part C; and

(2) The installation has been inspected by a licensed installation inspector as required by 567—Chapter 134, Part C.

f. Dispenser systems. Each UST system must be equipped with under-dispenser containment (UDC) for any new or replaced dispenser system.

(1) A dispenser system is considered new when both the dispenser and the equipment needed to connect the dispenser to the underground storage tank system are installed at a location where there previously was no dispenser (new UST system or new dispenser location at an existing UST system). The equipment necessary to connect the dispenser to the underground storage tank system includes check valves, shear valves, unburied risers or flexible connectors, or other transitional components that are underneath the dispenser and connect the dispenser to the underground piping.

(2) UDC shall be installed whenever an existing dispenser system is removed and replaced with another dispenser and the equipment used to connect the dispenser to the underground storage tank system is replaced. This equipment includes flexible connectors or risers or other transitional components that are beneath the dispenser and connect the dispenser to the piping. UDC is not required when only the emergency shutoff or shear valves or check valves are replaced.

(3) UDC shall be installed beneath the dispenser whenever ten feet or more of piping is repaired or replaced within ten feet of a dispenser.

(4) UDC must be liquid-tight on its sides, bottom, and at any penetrations. UDC must allow for visual inspection and access to the components in the containment system or be periodically monitored for leaks from the dispenser system.

135.3(2) *Upgrading of existing UST systems.* Owners and operators must permanently close any UST system that does not meet the new UST system performance standards or has not been upgraded in accordance with paragraphs 135.3(2)*"b"* through *"d."* This subrule does not apply to previously deferred UST systems. Upgrading is no longer allowed for UST systems not upgraded by December 22, 1998.

a. Alternatives allowed. Not later than December 22, 1998, all existing UST systems had to comply with one of the following requirements:

(1) New UST system performance standards under 135.3(1);

(2) The upgrading requirements in paragraphs *"b"* through *"d"* below; or

(3) Closure requirements under rule 567—135.15(455B), including applicable requirements for corrective action under rules 567—135.7(455B) to 567—135.12(455B).

Replacement or upgrade of a tank system on a petroleum contaminated site classified as a high or low risk in accordance with rule 567—135.12(455B) shall be a double wall tank or a tank equipped with a secondary containment system with monitoring of the space between the primary and secondary containment structures in accordance with paragraph 135.5(4)*"g."*

b. Tank upgrading requirements. Steel tanks had to be upgraded to meet one of the following requirements in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory:

(1) *Interior lining.* Tanks upgraded by internal lining must meet the following:

1. The lining was installed in accordance with the requirements of subrule 135.4(4), and

2. Within ten years after lining, and every five years thereafter, the lined tank is internally inspected and found to be structurally sound with the lining still performing in accordance with original design specifications.

3. If the internal lining is no longer performing in accordance with original design specifications and cannot be repaired in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory, the lined tank must be permanently closed in accordance with rule 567—135.15(455B).

(2) *Cathodic protection.* Tanks upgraded by cathodic protection meet the requirements of paragraphs 135.3(1)*"a"*(2)"2," "3," and "4" and the integrity of the tank was ensured using one of the following methods:

1. The tank was internally inspected and assessed to ensure that the tank was structurally sound and free of corrosion holes prior to installing the cathodic protection system; or

2. The tank had been installed for less than ten years and is monitored monthly for releases in accordance with 135.5(4)*"d"* through *"i"*; or

3. The tank had been installed for less than ten years and was assessed for corrosion holes by conducting two tightness tests that meet the requirements of paragraph 135.5(4)*"c."* The first tightness test must have been conducted prior to installing the cathodic protection system. The second tightness test must have been conducted between three and six months following the first operation of the cathodic protection system; or

4. The tank was assessed for corrosion holes by a method that is determined by the department to prevent releases in a manner that is no less protective of human health and the environment than paragraphs 135.3(2)*"b"*(2)"1" to "3."

(3) *Internal lining combined with cathodic protection.* Tanks upgraded by both internal lining and cathodic protection must have met the following:

1. The lining was installed in accordance with the requirements of subrule 135.4(4); and

2. The cathodic protection system was installed within six months of lining installation and meets the requirements of paragraphs 135.3(1)*"a"*(2)"2," "3," and "4."

NOTE regarding paragraph 135.3(2)*"b"*: The following historical codes of practice were listed as options for complying with paragraph 135.3(2)*"b"*:

- American Petroleum Institute Publication 1631, "Recommended Practice for the Interior Lining of Existing Steel Underground Storage Tanks";
- National Leak Prevention Association Standard 631, "Spill Prevention, Minimum 10 Year Life Extension of Existing Steel Underground Tanks by Lining Without the Addition of Cathodic Protection";
- National Association of Corrosion Engineers Standard RP-02-85, "Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems"; and
- American Petroleum Institute Publication 1632, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems."

NOTE regarding paragraph 135.3(2)*"b"*(1)"2": The following codes of practice may be used to comply with the periodic lining inspection requirement of this subrule:

- American Petroleum Institute Recommended Practice 1631, "Interior Lining and Periodic Inspection of Underground Storage Tanks";
- National Leak Prevention Association Standard 631, Chapter B, "Future Internal Inspection Requirements for Lined Tanks";
- Ken Wilcox Associates Recommended Practice, "Recommended Practice for Inspecting Buried Lined Steel Tanks Using a Video Camera"; or
- Underwriters Laboratories (UL) 1856 Underground Fuel Tank Internal Retrofit Systems.

c. Piping upgrading requirements. Metal piping that routinely contains regulated substances and is in contact with the ground must be cathodically protected in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory and must meet the requirements of paragraphs 135.3(1)*"b"*(2)"2," "3," and "4."

NOTE: The codes of practice listed in the note following subparagraph 135.3(1)*"b"*(2) may be used to comply with this requirement.

d. Spill and overfill prevention equipment. To prevent spilling and overfilling associated with product transfer to the UST system, all existing UST systems must comply with UST system spill and overfill prevention equipment requirements specified in paragraph 135.3(1)*"c."*

135.3(3) *Registration and notification requirements.*

a. Except as provided in paragraph 135.3(3)*"b,"* the owner of an underground storage tank existing on or before July 1, 1985, shall complete and submit to the department a copy of the registration form provided by the department.

b. The owner of an underground storage tank system taken out of operation between January 1, 1974, and July 1, 1985, shall complete and submit to the department a copy of the registration form provided by the department unless the owner knows the tank has been removed from the ground. For purposes of this subrule, "owner" means the person who owned the tank immediately before the discontinuation of the tank's use.

c. An owner or operator who brings into use an underground storage tank system after July 1, 1985, shall complete and submit to the department a copy of the registration form provided by the department within 30 days of the final installation inspection required in 567—paragraph 134.27(2)*"c"* by a licensed installation inspector. The owner or operator shall not allow the deposit of any regulated substance into the tank without prior approval of the department or until the permanent registration tag and annual tank tag have been attached to the tank fill pipe and the tank system is covered by an approved financial responsibility mechanism in accordance with 567—Chapter 136.

d. All owners and operators of new UST systems must provide UST system details and a site diagram, and certify in the registration form compliance with the following requirements:

(1) Installation of tanks and piping under paragraph 135.3(1)*"e"*;
(2) Cathodic protection of steel tanks and piping under paragraphs 135.3(1)*"a"* and *"b"*;
(3) Financial responsibility under 567—Chapter 136;
(4) Release detection methods under subrules 135.5(2) and 135.5(3);
(5) Class A, B and C operator certification under subrule 135.4(6);
(6) NESHAP Stage 1 vapor recovery.

e. All owners and operators of new UST systems must ensure that the licensed installer certifies in the registration form that the methods used to install the tanks and piping comply with the requirements in paragraph 135.3(1)*"d."*

f. Exemption from reporting requirement. Paragraphs 135.3(1)*"a"* to *"c"* do not apply to an underground storage tank for which notice was given pursuant to Section 103, Subsection c, of the Comprehensive Environmental Response, Compensation and Liabilities Act of 1980. (42 U.S.C. Subsection 9603(c))

g. Reporting fee. The registration form submitted by the owner to the department under paragraphs 135.3(1)*"a"* to *"c"* shall be accompanied by a fee of $10 for each tank included in the form.

h. Notification requirement for installing a tank. A person installing an underground storage tank and the owner or operator of the underground storage tank must notify the department of their intent to install the tank 30 days prior to installation. Notification shall be on a form provided by the department.

i. Notification requirements for a person who acquires, sells, installs, modifies or repairs a UST system.

(1) A person, company or lending institution that assumes ownership or operation of a regulated underground storage tank must submit notification to the department on a form provided by the department within 30 days of acquisition and prior to tank operation. The owner must include copies of training certificates for the Class A and Class B operators (135.4(6)) and proof of financial responsibility required in 567—Chapter 136. The new owner is responsible for any current and back tank management fees that have not been previously paid.

(2) A person who sells, installs, modifies, or repairs a tank used or intended to be used in Iowa shall notify, in writing, the purchaser and the owner or operator of the tank of the obligations specified in paragraphs 135.3(3)*"c"* and *"j"* and the financial assurance requirements in 567—Chapter 136. The notification must include the prohibition on depositing a regulated substance into tanks which have not been registered and issued tags by the department, or tanks which do not have financial assurance as required in 567—Chapter 136. A standard notification form supplied by the department may be used to satisfy this requirement.

j. It is unlawful for a person to deposit or accept a regulated substance in an underground storage tank that has not been registered and issued permanent or annual tank management tags in accordance with rule 567—135.3(455B). It is unlawful for a person to deposit or accept a regulated substance into an underground storage tank if the person has received notice from the department that the underground storage tank is subject to a delivery prohibition or if there is a "red tag" attached to the UST fill pipe or fill pipe cap as provided in subrule 135.3(8).

(1) The department may provide written authorization to receive a regulated substance when there is a delay in receiving tank tags or at new tank installations to allow for testing the tank system.

(2) The department may provide known depositors of regulated substances lists of underground storage tank sites that have been issued tank tags, those that have not been issued tank tags, and those subject to a delivery prohibition pursuant to subrule 135.3(8). These lists do not remove the requirement for depositors to verify that current tank tags are affixed to the fill pipe prior to delivering product. Regulated substances cannot be delivered to underground storage tanks without current tank tags or those displaying a delivery prohibition "red tag" as provided in subrule 135.3(8).

(3) A person shall not accept or deposit a regulated substance in an underground storage tank after receiving written or oral notice from the department that the tank is not covered by an approved form of financial responsibility in accordance with 567—Chapter 136.

k. If an owner or operator fails to register an underground storage tank within 30 days after installation pursuant to paragraph 135.3(3)*"c,"* the owner or operator shall pay an additional $250 per tank late fee upon registration of the tank. The imposition of this fee does not preclude the department from assessing an additional administrative penalty in accordance with Iowa Code section 455B.476.

135.3(4) *Farm and residential tanks.*

a. The owner or operator of a farm or residential tank of 1100 gallons or less capacity used for storing motor fuel for noncommercial purposes is subject to the requirements of this subrule.

b. Farm and residential tanks, installed before July 1, 1987, are required to be registered with the department.

c. Farm and residential tanks installed on or after July 1, 1987, must be in compliance with all the underground storage tank regulations.

135.3(5) *Registration tags and annual management fee.*

a. Tanks of 1100 gallons or less capacity that have registered with the department will be issued a permanent registration tag.

b. The owner or operator of tanks over 1,100-gallon capacity must submit a tank management fee form and fee payment of $65 per tank by January 15 of each year.

(1) An additional $250 per tank late fee must be paid if the tank management fee is not paid by March 1.

(2) The owner or operator must submit written proof that the tanks are covered by an approved form of financial responsibility in accordance with 567—Chapter 136.

(3) Upon proper payment of the fee and acceptable proof of financial responsibility, and a determination there are no outstanding compliance violations, a one-year renewal tag will be issued for the period from April 1 to March 31.

(4) If there are outstanding compliance violations, the annual tank tags may be withheld until the violations are corrected.

(5) The department shall refund a tank management fee if the tank is permanently closed prior to April 1 for that year.

c. The owner or operator shall affix the tag to the fill pipe of the underground storage tank where it will be readily visible.

d. A person who conveys or deposits a regulated substance shall inspect the underground storage tank to determine the existence or absence of a permanent registration tag, a current annual renewal tag, or a delivery prohibition "red tag" as provided in subrule 135.3(8). If a current annual renewal tag, or a silver permanent tag for regulated tanks less than 1,100 gallons is not affixed to the fill pipe or fill pipe cap or if a delivery prohibition "red tag" is displayed, the person shall not deposit the substance in the tank.

e. The owner or operator must return the tank tags upon request of the department for failure to meet the requirements of rules 567—135.3(455B) to 567—135.5(455B) or the financial responsibility rules in 567—Chapter 136 after permanent tank closure or when tanks are temporarily closed for over 12 months, or when the tank system is suspected to be leaking and the responsible party fails to respond as required in subrule 135.8(1). The department will not return the tags until the tank system is in full compliance with the technical requirements of this chapter and financial responsibility requirements of 567—Chapter 136.

135.3(6) *Previously unregistered petroleum underground storage tanks.* A petroleum underground storage tank required to be registered under subrules 135.3(3) and 135.3(4), which has not been registered shall be registered under the following conditions:

a. The tank registration fee under paragraph 135.3(3)*"g"* shall accompany the registration.

b. The storage tank management fee and any late fees under subrule 135.3(5) and paragraph 135.3(3)*"k"* shall be paid for past years in which the tank should have been registered.

c. The department may waive the late fee(s).

135.3(7) *Exemption certificates from the environmental charge on petroleum diminution.* Rescinded IAB 5/19/21, effective 6/23/21.

135.3(8) *Delivery prohibition process.*

a. Identifying sites subject to delivery response prohibition action.

(1) Annual renewal tag and tank management fee process. Owners and operators shall certify to the following on a form prepared by the department when applying for annual tank tags pursuant to subrule 135.3(5):

1. Installation and performance of an approved UST and piping release detection method as provided in rule 567—135.5(455B), including an annual line tightness test and a line leak detector test if applicable.

2. Installation of an approved overfill and spill protection system as provided in paragraph 135.3(1)*"c."*

3. Installation of an approved corrosion protection system as provided in paragraphs 135.3(1)*"a"* and *"b."*

4. If the UST system has been out of operation for more than three months, that the UST system has been temporarily closed in accordance with rule 567—135.15(455B) and a certification of temporary closure has been submitted to the department.

5. If the UST system has been removed or filled in place within the last 12 months, the date of removal or filling in place and whether a closure report has been submitted as provided in rule 567—135.15(455B).

(2) Sites with provisional status. If the UST system has been classified as operating under provisional status as provided in paragraph 135.3(8)*"c,"* owners and operators when applying for annual tank tags pursuant to subrule 135.3(5) must certify on a form prepared by the department that the owners and operators are in compliance with an approved provisional status remedial plan as provided in paragraph 135.3(8)*"c."*

(3) Compliance inspections. The department may initiate a delivery prohibition response action based on: (1) a finding resulting from a third-party compliance inspection conducted pursuant to rule 567—135.20(455B); (2) a department investigation and inspection conducted pursuant to Iowa Code section 455B.475; or (3) review of a UST system check or other documentation submitted in response to a suspected release under rule 567—135.6(455B) or in response to a confirmed release under rule 567—135.7(455B).

b. Delivery prohibition eligibility criteria. A delivery prohibition response action may be initiated upon a finding that the UST system is out of compliance with department rules and meets the eligibility criteria as specified below. Reinstatement criteria define the standards and process for owners and operators to document that they have taken corrective action sufficient to authorize resumption of fuel to the USTs. Prior to initiation of the delivery prohibition, owners and operators are afforded a minimum level of procedural due process such as prior notice and the opportunity to present facts to dispute the finding. Where notice and the opportunity to take corrective action prior to initiation of a delivery prohibition response action are required, notice by the department or by a certified compliance inspector as provided in rule 567—135.20(455B) shall be sufficient.

If the department finds that any one of the following criteria has been satisfied, the department may initiate a delivery prohibition response action following the notice procedures outlined in paragraph *"e"* of this subrule. After initiation of the delivery prohibition response action, the department will offer the owner or operator an opportunity to establish reinstatement criteria by written documentation and, if requested, an in-person meeting.

(1) An approved release detection method for USTs or UST piping is not installed, such as automatic tank gauging, groundwater monitoring wells and line leak detectors, and there is no record that an approved method such as inventory control, statistical inventory reconciliation, or interstitial space monitoring has been employed during the previous three months. If the owner or operator claims to have documentation that an approved release detection method has been conducted, the owner or operator will be given two business days to produce the documentation.

REINSTATEMENT CRITERIA: The owner or operator must submit results of a passing UST system precision tightness test at the 0.1 gallon-per-hour leak rate in paragraphs 135.5(4)*"c"* and 135.5(5)*"b."* The owner or operator must also document installation and operation of an approved release detection system. This may include proof that a contract has been signed with a qualified statistical inventory reconciliation provider or that a qualified inventory control method has been implemented and training has been provided to onsite supervisory personnel.

(2) No documentation of a required annual line tightness test or line leak detector test has been provided, and the owner or operator has failed to conduct the required testing within 14 days of written notice by the department or a certified compliance inspector as provided in rule 567—135.20(455B).

REINSTATEMENT CRITERIA: The owner or operator must provide documentation of a passing line precision tightness test at the 0.1 gallon-per-hour leak rate in paragraph 135.5(5)*"b"* and a line leak detector test as provided in paragraph 135.5(5)*"a."*

(3) Overfill and spill protection is not installed.

REINSTATEMENT CRITERION: The owner or operator must provide documentation that overfill and spill protection equipment has been installed.

(4) A corrosion protection system is not installed or there is no record that an impressed current corrosion protection system has been in operation for the prior six months.

REINSTATEMENT CRITERIA: A manned entry tank integrity inspection must be completed prior to installation of a corrosion protection system, and the owner or operator must submit results of a passing UST system precision tightness test at the 0.1 gallon-per-hour leak rate in paragraphs 135.5(4)*"c"* and 135.5(5)*"b."* A corrosion protection analysis must be completed and approved by the department.

(5) The owner or operator has failed to provide proof of financial responsibility in accordance with 567—Chapter 136.

REINSTATEMENT CRITERION: The owner or operator must submit acceptable proof of financial responsibility in accordance with 567—Chapter 136.

(6) A qualified UST system release detection method is installed and is being used but the documentation or the absence of documentation is sufficient to question the reliability of the release detection over the past 12-month period. The owner or operator shall be notified of the deficiencies, shall be given at least two business days to produce documentation of compliance and, if necessary, shall be required to conduct a leak detection system analysis and a system tightness test within 14 days. If the owner or operator fails to produce documentation of compliance or to conduct the system analysis and the UST system precision tightness test at the 0.1 gallon-per-hour leak rate in paragraphs 135.5(4)*"c"* and 135.5(5)*"b,"* the department may initiate a delivery prohibition response action. Notice by the department or a compliance inspector as provided in rule 567—135.20(455B) shall be sufficient to initiate a delivery prohibition response action.

REINSTATEMENT CRITERIA: The owner or operator must submit documentation that the leak detection method analysis sufficiently documents compliance and explains the reasons for the accuracy and reliability concerns. If necessary, the owner or operator must submit passing results of a UST system precision tightness test at the 0.1 gallon-per-hour leak rate in paragraphs 135.5(4)*"c"* and 135.5(5)*"b."*

(7) The owner or operator has failed to document completion of a three-year corrosion protection test or to repair defective corrosion protection equipment within 30 days after notice of the violation by the department or a certified compliance inspector as provided in rule 567—135.20(455B).

REINSTATEMENT CRITERION: The owner or operator must submit documentation of a three-year corrosion protection test as provided in rule 567—135.3(455B).

(8) The owner or operator has failed to complete a compliance inspection required by rule 567—135.20(455B) within 60 days after written notice of the violation by the department.

REINSTATEMENT CRITERION: The owner or operator must submit a compliance inspection report as provided in rule 567—135.20(455B).

(9) The owner or operator has failed to take necessary abatement action in response to a confirmed release as provided in subrules 135.7(2) and 135.7(3).

REINSTATEMENT CRITERION: The owner or operator must document compliance with the abatement provisions in subrules 135.7(2) and 135.7(3).

(10) The owner or operator has failed to undertake and document release investigation and confirmation steps within seven days in response to a suspected release as provided in paragraph 135.6(3)*"a."*

REINSTATEMENT CRITERION: The owner or operator must document release confirmation and system check as provided in paragraph 135.6(3)*"a."*

(11) The owner or operator has failed to provide documentation of Class A or B operator training.

REINSTATEMENT CRITERION: The owner or operator must submit a copy of the certificates of training for Class A and B operators.

(12) The owner or operator has failed to install required secondary containment.

REINSTATEMENT CRITERION: The owner or operator must document secondary containment has been installed as provided in subrule 135.3(9).

(13) The owner or operator has failed to pay the annual tank management fee.

REINSTATEMENT CRITERION: The owner or operator must pay the current and any previous unpaid tank management fees in addition to any late fees as provided in paragraph 135.3(5)*"b."*

(14) When tanks are no longer in use or in temporary closure.

REINSTATEMENT CRITERION: The owner or operator must provide a completed Return to Service form along with required documents.

c. Provisional status. The department may classify a UST system as operating under a provisional status when the department documents a pattern of UST operation and maintenance violations under rules 567—135.3(455B) through 567—135.5(455B) and suspected release and confirmed release response actions under rules 567—135.6(455B) and 567—135.7(455B). The department shall provide the owner or operator with a notice specifying the basis for the proposed classification and a proposed remedial action plan. The objective of the remedial action plan is to provide the owner and operator an opportunity to undertake certain remedial actions sufficient to establish a reasonable likelihood that future regulatory compliance will be achieved.

The remedial action plan may include but is not limited to provisions for owner/operator training, development of a facility-specific compliance manual, more frequent third-party compliance inspections than otherwise required under rule 567—135.20(455B), monthly reporting, and retention of a third-party compliance manager/consultant. If the owner or operator and the department cannot reach agreement on a remedial action plan, the department may initiate enforcement action by issuance of an administrative order pursuant to 567—Chapter 10. This provision does not grant the owner or operator an entitlement to this procedure, and the department reserves all discretion to undertake an enforcement action and assess penalties as provided in Iowa Code sections 455B.476 and 455B.477.

d. Administrative orders. The department may impose a delivery prohibition as a remedy for violations of the operation and maintenance provisions in rules 567—135.3(455B) through 567—135.5(455B) and the suspected and confirmed release response actions in rules 567—135.6(455B) and 567—135.7(455B). This remedy may be in addition to the assessment of penalties as provided in Iowa Code section 455B.476 and other appropriate injunctive relief necessary to correct violations.

e. Due process prior to initiation of a delivery prohibition response action.

(1) Prior to imposing a delivery prohibition response action under paragraph 135.3(8)*"b"* above, the department will provide notice to the owner or operator or, if notice to the owner or operator cannot be confirmed, to a person in charge at the UST facility of the basis for the finding and the intent to initiate a delivery prohibition response action. Notice may be by verbal contact, by facsimile, or by regular or certified mail to the UST facility address or the owner's or operator's last-known address. The owner and operator will be given a minimum of one business day to provide documentation that the finding is inaccurate or that reinstatement criteria in subparagraphs 135.3(8)*"b"*(1) through (5) have been satisfied. Additional days and the opportunity for a telephone or in-person conference may be provided the owner and operator to contest the factual basis for a finding under subparagraphs 135.3(8)*"b"*(6) through (14). Additional procedural due process may be afforded the owner and operator on a case-by-case basis sufficient to satisfy Constitutional due process standards.

If insufficient information is submitted to change the finding, the department will notify the owner or operator and a person in charge at the UST facility of the final decision to impose the delivery prohibition response action.

(2) Provisional status. Upon a finding that an owner or operator under provisional status has failed to comply with the terms of a remedial action plan as provided above, the department may initiate a delivery prohibition response action by giving actual notice to the owner or operator of the basis for the finding of noncompliance and the department's intent to initiate a delivery prohibition response action. The delivery prohibition response action shall not be imposed without providing the owner or operator the opportunity for an evidentiary hearing consistent with the provisions for suspension and revocation of licenses under 567—Chapter 7.

f. Delivery prohibition procedure. Upon oral or written notice that the delivery prohibition response action has been imposed, the owner or operator and any person in charge of the UST facility shall be notified that they are not authorized to receive any further delivery of regulated substances until conditions for reinstatement of eligibility are satisfied. Owners and operators are required to provide the department with names and contact information for all persons who convey or deposit regulated substances to the USTs. The department will attempt to notify known persons who convey or deposit regulated substances to the USTs that they are not authorized to deliver to the USTs until further notice by the department as provided in paragraph 135.3(3)*"j"* and subrule 135.3(5).

The department shall visit the site and affix a "red tag" to the fill pipes or fill pipe caps of all affected USTs. It is unlawful for any person to deposit or accept a regulated substance into a UST that has a "red tag" affixed to the fill pipe or fill pipe cap. The department may allow the owner and operator to dispense and sell the remainder of existing fuel unless the department determines there is an immediate risk of a release or other risk to human health, safety or the environment. The department shall confirm in writing the basis for the delivery prohibition response action, contacts made prior to the action, and steps the owner or operator must take to reinstate fuel delivery.

135.3(9) *Secondary containment requirements for UST system installations.* All new and replacement underground storage tank systems and appurtenances used for the storage and dispensing of petroleum products shall have secondary containment in accordance with this subrule. The secondary containment provision includes the installation of containment sumps.

a. Tanks and piping installed or replaced after November 28, 2007, must have secondary containment that is designed, installed, and maintained according to the performance standards in subrule 135.3(1) and paragraph 135.5(3)*"b."*

(1) The secondary containment may be manufactured as an integral part of the primary containment or constructed as a separate containment system.

(2) At a minimum, the secondary containment must:

1. Contain regulated substances leaked from the UST system until detected and removed.

2. Prevent the release of regulated substances into the environment at any time during the operational life of the underground storage tank system.

3. Be checked for evidence of a release from the tank at least every 30 days as provided in paragraph 135.5(2)*"a."*

b. Testing and inspection. Containment sumps shall be liquid-tight and must be inspected and tested in accordance with the following:

(1) Inspections for secondary containment sumps (spill catchment basins, turbine sumps, transition or intermediate sumps, and under-dispenser containment).

1. Inspections for secondary containment sumps shall consist of visual inspection by an Iowa-licensed installer or Iowa-certified compliance inspector every two years.

2. Containment sumps must be intact (no cracks or perforations) and liquid-tight, including sides and bottom.

3. Containment sumps must be maintained and kept free of debris, liquid, and ice at all times.

4. Regulated substances leaked or spilled into any containment sumps shall be immediately removed.

(2) Secondary containment sumps used for interstitial monitoring of piping shall be tested upon installation and periodically in accordance with subrule 135.4(12).

[**ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.4(455B) General operating requirements.

135.4(1) *Spill and overfill control.*

a. Owners and operators must ensure that releases due to spilling or overfilling do not occur. The owner and operator must ensure that the volume available in the tank is greater than the volume of product to be transferred to the tank before the transfer is made and that the transfer operation is monitored constantly to prevent overfilling and spilling.

NOTE: The transfer procedures described in National Fire Protection Association Standard 385, "Standard for Tank Vehicles for Flammable and Combustible Liquids," or American Petroleum Institute Recommended Practice 1007, "Loading and Unloading of MC 306/DOT 406 Cargo Tank Motor Vehicles," may be used to comply with paragraph 135.4(1)*"a."* Further guidance on spill and overfill prevention appears in American Petroleum Institute, "Recommended Practice 1621 for Bulk Liquid Stock Control at Retail Outlets."

b. The owner and operator must report, investigate, and clean up any spills and overfills in accordance with 135.6(4).

135.4(2) *Operation and maintenance of corrosion protection.* All owners and operators of metal UST systems with corrosion protection must comply with the following requirements to ensure that releases due to corrosion are prevented until the UST system is permanently closed or undergoes a change in service in accordance with subrule 135.15(2):

a. All corrosion protection systems must be operated and maintained to continuously provide corrosion protection to the metal components of that portion of the tank and piping that routinely contain regulated substances and are in contact with the ground.

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

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

(2) *Inspection criteria.* The criteria that are used to determine that cathodic protection is adequate as required by this subrule must be in accordance with a code of practice developed by a nationally recognized association.

NOTE: The following codes of practice may be used to comply with subparagraph 135.4(2)*"b"*(2).

- NACE International Test Method TM 0101, "Measurement Techniques Related to Criteria for Cathodic Protection of Underground Storage Tank Systems";
- NACE International Test Method TM0497, "Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems";
- Steel Tank Institute Recommended Practice R051, "Cathodic Protection Testing Procedures for STI-P3® USTs";
- NACE International Standard Practice SP 0285, "External Control of Underground Storage Tank Systems by Cathodic Protection"; or
- NACE International Standard Practice SP 0169, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems."

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

d. For UST systems using cathodic protection, records of the operation of the cathodic protection must be maintained (in accordance with 135.4(5)) to demonstrate compliance with the performance standards in this subrule. These records must provide the following:

(1) The results of the last three inspections required in paragraph *"c"*; and

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

e. When an impressed current cathodic protection system is failing cathodic protection for the time periods given below, owners and operators must take the following actions:

(1) For impressed current cathodic protection systems that have been inoperative for 0 to 90 days after failing a corrosion protection test or after discovering the system is not operating, all of the following must be completed:

1. Power must be restored to an inoperative corrosion protection system. A damaged or failed corrosion protection system must be repaired by a cathodic protection tester. A corrosion expert must approve any modifications to the system that are outside of the original design.
2. The corrosion protection system must be retested within six months of repair.
3. A copy of the test and any repairs must be kept as part of the cathodic protection records.
4. A copy of the new design standards must be kept as part of the cathodic protection records.

(2) For impressed current corrosion protection systems that have been inoperative for 90 to 365 days or repaired 90 to 365 days after failing a corrosion protection test, all of the following must be completed:

1. Notify the department.
2. Power must be restored to an inoperative corrosion protection system.
3. The corrosion protection system must be repaired, tested and returned to service under the supervision of a corrosion expert.
4. A precision tightness test must be conducted on the entire UST system.
5. The corrosion protection system must be retested within six months of the repair or power being restored.
6. A copy of the test and any repairs must be kept as part of the cathodic protection records.
7. A copy of the new design standards must be kept as part of the cathodic protection records.
8. If determined the tank is not suitable for corrosion protection, the tank must be permanently closed in accordance with subrule 135.15(2).

(3) If the impressed current corrosion protection system has been inoperative for more than 365 days or was not repaired for more than 365 days after failing a corrosion protection test, all of the following must be completed:

1. Notify the department.
2. Immediately empty and stop using the tank system.
3. An internal inspection of the steel tank must be conducted according to a national standard (e.g., API 1631). If the UST fails the internal inspection, the UST owner must permanently close the tank in accordance with subrule 135.15(2).
4. All metal piping and buried metal components (e.g., flex connectors, couplings) that routinely contain product must be inspected by a UST professional or cathodic protection tester. If the metallic components have no visible corrosion and have passed a line tightness test (unless the piping is exempt from leak detection, e.g., Safe or European Suction) then the cathodic protection system may be repaired or replaced under the supervision of a corrosion expert. Metallic components that show visible corrosion must be replaced.
5. A precision test must be conducted on the entire UST system following repair or replacement of the cathodic protection system.
6. The corrosion protection system must be retested within six months of repair.
7. A copy of the tests and any repairs must be kept as part of the cathodic protection records.
8. A copy of the new design standards must be kept as part of the cathodic protection records.

(4) If the impressed current cathodic protection system has been inoperable for more than 365 days and cannot or will not be brought back into immediate use, the tank system must be permanently closed in accordance with rule 567—135.15(2).

135.4(3) *Compatibility.* Owners and operators must use a UST system made of or lined with materials that are compatible with the substance stored in the UST system.

a. Owners and operators must notify the department at least 30 days prior to switching to a regulated substance containing greater than 10 percent ethanol, greater than 20 percent biodiesel, or any other regulated substance identified by the department.

b. Owners and operators must have a UST installer licensed under 567—Chapter 134, Part C, submit the department's checklist for equipment compatibility for the UST system to the department.

NOTE: Owners and operators storing alcohol blends may use the following codes to comply with the requirements of subrule 135.4(3): American Petroleum Institute Recommended Practice 1626, "Storing and Handling Ethanol and Gasoline-Ethanol Blends at Distribution Terminals and Service Stations Filling Stations."

135.4(4) *Repairs and replacement.* Owners and operators of UST systems must ensure that repairs will prevent releases due to structural failure or corrosion as long as the UST system is used to store regulated substances. The repairs must meet the following requirements:

a. Repairs to UST systems must be properly conducted in accordance with a code of practice developed by a nationally recognized association or an independent testing laboratory.

NOTE: The following codes and standards may be used to comply with paragraph 135.4(4)*"a"*:

- National Fire Protection Association Standard 30, "Flammable and Combustible Liquids Code";
- International Fire Code;
- American Petroleum Institute Recommended Practice 2200, "Repairing Crude Oil, Liquefied Petroleum Gas, and Product Pipelines";
- American Petroleum Institute Recommended Practice 1631, "Interior Lining and Periodic Inspection of Underground Storage Tanks";
- National Fire Protection Association Standard 326, "Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair";
- National Leak Prevention Association Standard 631, Chapter A, "Entry, Cleaning, Interior Inspection, Repair, and Lining of Underground Storage Tanks";
- Steel Tank Institute Recommended Practice R972, "Recommended Practice for the Addition of Supplemental Anodes to STI-P3® Tanks";
- NACE International Standard Practice SP 0285, "External Control of Underground Storage Tank Systems by Cathodic Protection"; or
- Fiberglass Tank and Pipe Institute Recommended Practice T-95-02, "Remanufacturing of Fiberglass Reinforced Plastic (FRP) Underground Storage Tanks."

b. Repairs to fiberglass-reinforced plastic tanks may be made by the manufacturer's authorized representatives or in accordance with a code of practice developed by a nationally recognized association or an independent testing laboratory.

c. Piping and fittings.

(1) Metal pipe sections and fittings that have released product as a result of corrosion or other damage must be replaced. Noncorrodible pipes and fittings may be repaired in accordance with the manufacturer's specifications.

(2) Any replacement of ten feet or more of piping shall have secondary containment.

(3) If 50 percent or more of any piping run is removed, the entire piping run must be removed and replaced with secondarily contained piping and interstitial monitoring.

(4) All piping replacements requiring secondary containment shall be constructed with transition or intermediate containment sumps.

d. Repairs to secondary containment areas of tanks and piping used for interstitial monitoring and to containment sumps used for interstitial monitoring of piping must have the secondary containment tested for tightness according to the manufacturer's instructions, a code of practice developed by a nationally recognized association or independent testing laboratory, or according to requirements established by the department within 30 days following the date of completion of the repair. All other repairs to tanks and piping must be tightness tested in accordance with paragraphs 135.5(4)*"c"* and 135.5(5)*"b"* within 30 days following the date of the completion of the repair except as provided in subparagraphs (1) to (3) below:

(1) The repaired tank is internally inspected in accordance with a code of practice developed by a nationally recognized association or an independent testing laboratory; or

(2) The repaired portion of the UST system is monitored monthly for releases in accordance with a method specified in paragraphs 135.5(4)*"d"* through *"i"*; or

(3) Another test method is used that is determined by the department to be no less protective of human health and the environment than those listed above.

NOTE regarding paragraph 135.4(4)*"d"*: The following codes of practice may be used to comply with paragraph 135.4(4)*"d"*:

- Steel Tank Institute Recommended Practice R012, "Recommended Practice for Interstitial Tightness Testing of Existing Underground Double Wall Steel Tanks"; or
- Fiberglass Tank and Pipe Institute Protocol, "Field Test Protocol for Testing the Annular Space of Installed Underground Fiberglass Double and Triple-Wall Tanks with Dry Annular Space."

- Petroleum Equipment Institute Publication RP1200, "Recommended Practices for the Testing and Verification of Spill, Overfill, Leak Detection and Secondary Containment Equipment at UST Facilities."

e. Within six months following the repair of any cathodically protected UST system, the cathodic protection system must be tested in accordance with paragraphs 135.4(2)*"b"* and *"c"* to ensure that it is operating properly.

f. Within 30 days following any repair to spill or overfill prevention equipment, the repaired spill or overfill prevention equipment must be tested or inspected, as appropriate, in accordance with subrule 135.4(1) to ensure it is operating properly.

g. Installation of any new or replacement turbine pumps involving the direct connection to the tank shall have secondary containment.

h. UST system owners and operators must maintain records of each repair until the UST system is permanently closed or undergoes a change-in-service pursuant to subrule 135.15(2).

i. Repairs or replacements to a UST system must be conducted by an Iowa-licensed UST professional whose license is issued for that specific work.

135.4(5) *Reporting and record keeping.* Owners and operators of UST systems must cooperate fully with inspections, monitoring and testing conducted by the department, as well as requests for document submission, testing, and monitoring by the owner or operator pursuant to Section 9005 of Subtitle I of the Solid Waste Disposal Act, as amended.

a. Reporting. Owners and operators must submit the following information to the department:

(1) Notification for all UST systems (135.3(3)), which includes certification of installation for new UST systems (135.3(1)*"e"*);

(2) Notification of equipment replacement or addition of new equipment;

(3) Reports of all releases including suspected releases (135.6(1)), spills and overfills (135.6(4)), and confirmed releases (135.7(2));

(4) Corrective actions planned or taken including initial abatement measures (135.7(3)), initial site characterization (567—135.9(455B)), free product removal (135.7(5)), investigation of soil and groundwater cleanup and corrective action plan (567—135.8(455B) to 567—135.12(455B));

(5) A notification before permanent closure or change-in-service (135.15(2));

(6) Notification of any change in ownership;

(7) Notification of any change in Class A or Class B operators;

(8) Notification of any loss of financial responsibility (i.e., insurance);

(9) Notification prior to UST systems switching to certain regulated substances.

b. Record keeping. Owners and operators must maintain the following information:

(1) A corrosion expert's analysis of site corrosion potential if corrosion protection equipment is not used (135.3(1)*"a"*(4); 135.3(1)*"b"*(3)).

(2) Documentation of operation of corrosion protection equipment (135.4(2));

(3) Documentation of UST system repairs (135.4(4)*"h"*);

(4) Documentation of compliance with release detection requirements (135.5(6));

(5) Results of the site investigation conducted at permanent closure (135.15(3));

(6) Cathodic protection system testing results (135.4(2));

(7) Class A, B and C operator training certificates (135.4(6));

(8) Secondary containment test results (135.3(9));

(9) Documentation of periodic walkthrough inspections (135.4(13));

(10) Documentation of compatibility for UST systems (135.4(3));

(11) Documentation of compliance for spill and overfill prevention equipment and containment sumps used for interstitial monitoring of piping (135.4(12)).

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

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

(2) At a readily available alternative site and be provided for inspection to the department within two business days of department request.

NOTE: In the case of permanent closure records required under subrule 135.15(5), owners and operators are also provided with the additional alternative of mailing closure records to the department if they cannot be kept at the site or an alternative site as indicated above.

135.4(6) *Training required for UST operators.*

a. An owner or operator shall designate Class A, Class B, and Class C operators for each underground storage tank system or facility that has underground storage tanks regulated by the department, except for unstaffed facilities, which may designate only Class A and Class B operators.

b. A facility may not operate unless operators have been designated and trained as required in this rule, or unless otherwise agreed upon by the department based on a finding of good cause for failure to meet this requirement and a plan for designation and training at the earliest practicable date.

c. Trained operators must be readily available to respond to suspected or confirmed releases, equipment shut-offs or failures, and other unusual operating conditions.

d. A Class A or Class B operator should be immediately available for telephone consultation with the Class C operator when a facility is in operation. Class A or Class B operators should be able to be on site at the storage tank facility within four hours.

e. For staffed facilities, a Class C operator must be on site whenever the UST facility is in operation.

f. For unstaffed facilities, a Class B operator must be geographically located such that the person can be on site within two hours of being contacted by the public, the owner or operator of the facility, or the department. Emergency contact information and emergency procedures must be prominently displayed at the site. An unstaffed facility shall have an emergency shutoff device as provided in 135.5(1) and a sign posted in a conspicuous place that includes the name and telephone number of the facility owner, an emergency response telephone number to contact the Class B operator, and information on local emergency responders.

g. Designated operators must successfully complete required training under subrule 135.4(9).

h. A person may be designated for more than one class of operator.

i. When a facility is found to be out of compliance, the department may require that the designated UST system Class A, B, or C operator be retrained under a plan approved by the department. The retraining must occur within 30 days from departmental notice for Class A and Class B operators and within 15 days for Class C operators.

135.4(7) *UST operator responsibilities.*

a. Class A operator.

(1) Class A operators have the primary responsibility to operate, maintain, and have knowledge of the regulatory requirements for the underground storage tank system and facility. The Class A operator's responsibilities include managing resources and personnel to achieve and maintain compliance with regulatory requirements under this chapter in the following ways:

1. Class A operators assist the owner by ensuring that underground storage tank systems are properly installed and expeditiously repaired and inspected; financial responsibility is maintained; and records of system installation, modification, inspection and repair are retained and made available to the department and certified compliance inspectors. The Class A operator shall properly respond to and report emergencies caused by releases or spills from UST systems, ensure that the annual tank management fees are paid, and ensure that Class B and Class C operators are properly trained.

2. Class A operators shall be familiar with training requirements for each class of operator and may provide required training for Class C operators.

3. Class A operators shall provide site drawings that indicate equipment locations for Class B and Class C operators.

(2) Department-licensed installers, installation inspectors, and department-certified compliance inspectors may perform Class A operator duties when employed or contracted by the tank owner to perform these functions so long as they are properly trained and designated as Class A operators pursuant to subrules 135.4(9) through 135.4(11). Class A operators who are also certified compliance inspectors under 567—Chapter 134, Part B, may perform in-house facility inspections of the UST system, but shall not perform department-mandated compliance inspections pursuant to rule 567—135.20(455B).

Compliance inspections of a UST facility required by rule 567—135.20(455B) must be completed by a third-party compliance inspector certified under 567—Chapter 134, Part B.

(3) When there is a change in ownership or operator status, the new owner or operator is responsible for designating a Class A operator prior to bringing the UST system into operation. The Class A operator is responsible for ensuring that all necessary documentation for change of ownership is completed and submitted to the department and that all compliance requirements of this chapter are satisfied prior to bringing the UST system into operation. The compliance requirements may be provided to the owner or operator using the department's checklist.

If the UST system was temporarily closed, the designated Class A operator must ensure the department's checklist for returning a UST into service is followed, all compliance requirements of this chapter have been met, and the necessary documentation is submitted to the department.

(4) When there is a change in UST ownership, property ownership or operator status, the designated Class A operator for the current owner and operator is responsible for notifying the department when the change is final and, if possible, prior to the new owner or operator taking possession of the site.

b. Class B operator.

(1) A Class B operator is knowledgeable of the applicable underground storage tank regulatory requirements and standards and implements them in the field or at the tank facility. A Class B operator oversees and implements the day-to-day aspects of operation, maintenance, and record keeping for the underground storage tanks at facilities within four hours of travel time from the Class B operator's principal place of business. A Class B operator's responsibilities include, but are not limited to:

1. Performing mandated system tests at required intervals and making sure spill prevention, overfill control equipment, and corrosion protection equipment are properly functioning.
2. Assisting the owner by ensuring that release detection equipment is operational, release detection monitoring and tests are performed at the proper intervals, and release detection records are retained and made available to the department and compliance inspectors.
3. Making sure record-keeping and reporting requirements are met and that relevant equipment manufacturers' or third-party performance standards are available and followed.
4. Properly responding to, investigating, and reporting emergencies caused by releases or spills from USTs.
5. Performing UST release detection in accordance with rule 567—135.5(455B).
6. Monitoring the status of UST release detection.
7. Meeting spill prevention, overfill prevention, and corrosion protection requirements.
8. Reporting suspected and confirmed releases and taking release prevention and response actions according to the requirements of rule 567—135.6(455B).
9. Training and documenting Class C operators to make sure at least one Class C operator is on site during operating hours. Class B operators shall be familiar with Class C operator responsibilities and may provide training for Class C operators.

(2) Department-licensed installers, installation inspectors, and department-certified compliance inspectors may perform Class B operator duties when employed or contracted by the tank owner to perform these functions so long as they are properly trained and designated as Class B operators under subrules 135.4(9) through 135.4(11). Class B operators who are also certified compliance inspectors under 567—Chapter 134, Part B, may perform in-house facility inspections of the UST system, but cannot perform department-mandated compliance inspections pursuant to rule 567—135.20(455B). Compliance inspections of a UST facility pursuant to rule 567—135.20(455B) must be completed by a third-party compliance inspector certified under 567—Chapter 134, Part B.

(3) The owner or operator of a site undergoing a change in ownership shall designate a Class B operator prior to bringing the UST system into operation. The Class B operator must conduct an inspection using the department's inspection checklist and submit the completed checklist along with the change of ownership form prior to operation. If a UST system was temporarily closed, the Class B operator shall ensure that the department's checklist for returning a UST to service is followed and that the necessary documentation is submitted to the department prior to operation of the UST system.

c. Class C operator. A Class C operator is an on-site employee who typically controls or monitors the dispensing or sale of regulated substances and is the first to respond to events indicating emergency conditions. A Class C operator must be present at the facility at all times during normal operating hours. A Class C operator monitors product transfer operations to ensure that spills and overfills do not occur. The Class C operator must know how to properly respond to spills, overfills and alarms when they do occur. In the event of a spill, overfill or alarm, a Class C operator shall notify the Class A and Class B operators, as well as the department and appropriate local emergency authorities as required by rule.

(1) Written basic operating instructions, emergency contact names and telephone numbers, and basic procedures specific to the facility shall be provided to all Class C operators and readily available on site.

(2) There may be more than one Class C operator at a storage tank facility, but not all employees of a facility need be Class C operators.

135.4(8) *UST operator training course requirements.* Individuals must attend a department-approved training course covering material designated for each operator class. Individuals must attend every session of the training, take the examination, and attend examination review.

a. Class A operators. To be certified as a Class A operator, the applicant must successfully complete a department-approved training course that covers underground storage tank system requirements as outlined in 567—Chapters 134 to 136. The course must also provide a general overview of the department's UST program, purpose, groundwater protection goals, public safety and administrative requirements. The training must include, but is not limited to, the following:

(1) Components and materials of underground storage tank systems.

(2) A general discussion of the content of PEI/RP900-08, Recommended Practices for the Inspection and Maintenance of UST Systems, and PEI/RP500, Recommended Practices for Inspection and Maintenance of Motor Fuel Dispensing Equipment.

(3) Spill and overfill prevention, to include the American Petroleum Institute (API) Publication RP1621, "Recommended Practice for Bulk Liquid Stock Control at Retail Outlets," and National Fire Protection Association Standard 30, "Flammable and Combustible Liquids Code."

(4) Ensuring product delivery to the correct tank by using color-symbol codes in the API Standard RP1637, "Using the API Color-Symbol System to Mark Equipment and Vehicles for Product Identification at Service Stations and Distribution Terminals."

(5) Proper fuel ordering and delivery, including procedures in API RP1007, "Loading and Unloading of MC/DOT 406 Cargo Tank Motor Vehicles."

(6) Release detection methods and related reporting requirements.

(7) Corrosion protection and inspection requirements, including the requirement to have a department-licensed cathodic protection tester.

(8) Discussion of the benefits of monthly or frequent inspections and content and use of inspection checklists. Training materials for operators shall include the department's "Iowa UST Operator Inspection Checklist" or a checklist template similar to the department's document.

(9) Requirement and content of third-party compliance inspections.

(10) How to properly respond to an emergency, including hazardous conditions.

(11) Product and equipment compatibility, including the department's ethanol compatibility guidance and certification.

(12) Financial responsibility, including detailed explanation of liability, notice and claim procedures, and the six-month window to check for and report a release prior to insurance termination to maintain coverage for corrective action.

(13) Notification of installation and storage tank registration requirements.

(14) Requirement to use department-licensed companies and individuals for UST installation, testing, lining, and removal.

(15) Temporary and permanent closure procedures and requirements.

(16) NESHAP vapor recovery requirements.

(17) Conditions under which the department may stop fuel delivery and take enforcement action.

(18) Ensuring that annual tank management fees are paid.

(19) Ensuring that suspected and confirmed releases are investigated and reported according to subrule 135.6(1).

b. Class B operators. To be certified as a Class B operator, the individual must successfully complete a department-approved training course that provides in-depth understanding of UST system regulations applicable to this class. Training must also provide a general overview of the department's UST program, purpose, groundwater protection goals, public safety and administrative requirements. Training shall cover the operation and maintenance requirements set forth in this chapter, including, but not limited to, the following:

(1) A general discussion of the content of PEI/RP900-08, Recommended Practices for the Inspection and Maintenance of UST Systems, and PEI/RP500, Recommended Practices for Inspection and Maintenance of Motor Fuel Dispensing Equipment.

(2) Components and materials of underground storage tank systems.

(3) Spill and overfill prevention.

(4) Ensuring product delivery to the correct tank by using color-symbol codes in the API Standard RP1637.

(5) Proper fuel ordering and delivery, including procedures from API RP1007.

(6) Methods of release detection and related reporting requirements.

(7) Corrosion protection and related testing.

(8) Requirements of 30-day and annual walkthrough inspections. Training materials for operators shall include the department's "Iowa UST Operator Inspection Checklist" or a checklist template similar to the department's document.

(9) Requirement and content of third-party compliance inspections.

(10) Emergency response, reporting and investigating releases.

(11) Product and equipment compatibility, including the department's ethanol compatibility guidance and certification.

(12) Financial responsibility, including detailed explanation of liability, notice and claim procedures, and the six-month window to check for and report a release prior to insurance termination to maintain coverage for corrective action.

(13) Notification of installation and storage tank registration requirements.

(14) Requirement to use department-licensed companies and individuals for UST installation, testing, lining, and removal.

(15) Reporting and record-keeping requirements.

(16) Overview of Class C operator training requirements.

(17) NESHAP vapor recovery requirements.

(18) Conditions under which the department may stop fuel delivery and take enforcement action.

(19) Requirements for facilities that operate unstaffed at any time.

c. Class C operators. To be certified as a Class C operator, an individual must complete a department-approved training course. A Class A or Class B operator who has completed a department-approved training course may provide the Class C training. Class C operator training must include at a minimum:

(1) A general overview of the department's UST program and purpose;

(2) Groundwater protection goals;

(3) Public safety;

(4) UST system overview;

(5) Administrative requirements; and

(6) Action to be taken in response to an emergency condition due to a spill or release from a UST system.

Training must include written procedures for the Class C operator, including notification instructions necessary in the event of emergency conditions. The written instructions and procedures must be readily available on site. A Class A or Class B operator may provide additional on-site Class C training specific to the operator's UST system.

135.4(9) *Examination and review requirement.* Class A and Class B operators must complete the department-approved training course and take an examination to verify their understanding and knowledge. The examination may include both written and practical (hands-on) testing activities. The trainer must follow up the examination with a review of missed test questions with the class or individual to ensure understanding of problem areas. Upon successful completion of the training course, the applicant will receive a certificate verifying the applicant's status as a Class A, Class B, or Class C operator.

a. *Reciprocity.* The department may waive the training course for operators upon a showing of successful completion of a training course and examination approved by another state or regulatory agency that the department determines are substantially equivalent to the UST requirements contained in this chapter.

b. *Transferability to another UST site.* Class A and Class B operators may transfer to other UST facilities in Iowa provided the operator is properly designated by the facility owner as a Class A or Class B operator according to 567—subrule 135.4(11). Class A and Class B operators transferring from other states shall seek prior approval of training qualifications, unless the department has preapproved the out-of-state program as substantially equivalent to the requirements of this chapter.

135.4(10) *Timing of UST operator training.*

a. An owner shall ensure that Class A, Class B, and Class C operators are trained by approved training providers before an operator assumes duties of that class of operator.

b. When a Class A or Class B operator is replaced, a new operator must be trained prior to assuming duties for that class of operator. A copy of the certificate of training must be submitted to the department within 30 days of assuming duties.

c. Class C operators must be trained before assuming the duties of a Class C operator. Written basic operating instructions, emergency contact names and telephone numbers, and basic procedures specific to the facility shall be provided to all Class C operators and readily available on site. A Class C operator may be briefed on these procedures concurrent with annual safety training required under Occupational Safety and Health Administration regulations, 29 CFR, Part 1910.

135.4(11) *Documentation of operator training.*

a. The owner of an underground storage tank facility shall maintain a list of designated operators. The list shall be made available to the department in accordance with subrule 135.4(5). The list shall represent the current Class A, Class B and Class C operators for the UST facility and must include:

(1) The name of each operator and the operator's class(es); contact information for Class A and Class B operators; the date each operator successfully completed initial training and refresher training, if any; the name of the company providing the training; and the name of the trainer.

(2) For all classes of operators, the site(s) for which an operator is responsible if more than one site.

b. A copy of the certificates of training for Class A and Class B operators shall be on file and readily available for inspection in accordance with subrule 135.4(5). Records verifying completion of training or retraining of Class A, Class B, and Class C operators must identify name of trainee, date trained, operator training class completed, and list the name of the trainer or examiner and the training company name, address, and telephone number. Owners and operators must maintain these records for as long as Class A, Class B, and Class C operators are designated.

c. A copy of the certificates of training for Class B and Class C operators shall be available at each facility for which the operator is responsible.

d. Class A and Class B operator contact information, including names and telephone numbers and any emergency information, shall be conspicuously posted at unstaffed facilities near the dispensers and the station building.

135.4(12) *Periodic testing of spill prevention equipment and containment sumps used for interstitial monitoring of piping and periodic inspection of overfill prevention equipment.*

a. Owners and operators of UST systems with spill and overfill prevention equipment and containment sumps used for interstitial monitoring of piping must meet these requirements to ensure the equipment is operating properly and will prevent releases to the environment:

(1) Spill prevention equipment (such as a catchment basin, spill bucket, or other spill containment device) and containment sumps used for interstitial monitoring of piping must prevent releases to the environment by meeting one of the following:

1. The equipment is double walled and the integrity of both walls is periodically monitored at a frequency of not less than the frequency of the walkthrough inspections described in subrule 135.4(13). If owners and operators discontinue periodic monitoring of this equipment, they must begin meeting paragraph 135.4(12)*"a"*(1)"2" and conduct a test within 30 days of discontinuing periodic monitoring of this equipment; or

2. The spill prevention equipment and containment sumps used for interstitial monitoring of piping are tested at least once every three years to ensure the equipment is liquid tight by using vacuum, pressure, or liquid testing in accordance with one of the following criteria:

- Requirements developed by the manufacturer (Note: Owners and operators may use this option only if the manufacturer has developed requirements); or
- A code of practice developed by a nationally recognized association or independent testing laboratory; or
- Requirements determined by the department to be no less protective of human health and the environment than the requirements listed in this subrule.

(2) Overfill prevention equipment must be inspected at least once every three years. At a minimum, the inspection must ensure that overfill prevention equipment is set to activate at the correct level specified in paragraph 135.3(1)*"c"* and will activate when regulated substance reaches that level. Inspections must be conducted in accordance with one of the following criteria:

1. Requirements developed by the manufacturer (Note: Owners and operators may use this option only if the manufacturer has developed requirements); or

2. A code of practice developed by a nationally recognized association or independent testing laboratory; or

3. Requirements determined by the department to be no less protective of human health and the environment than the requirements listed in this subrule.

b. Owners and operators must begin meeting these requirements as follows:

(1) For UST systems in use on or before June 23, 2021, the initial spill prevention equipment test and overfill prevention equipment inspection must be conducted not later than October 13, 2021.

(2) For UST systems brought into use after June 23, 2021, these requirements apply at installation.

c. Owners and operators must maintain records as follows for spill prevention equipment and overfill prevention equipment:

(1) All records of testing or inspection must be maintained for three years; and

(2) For spill prevention equipment and containment sumps used for interstitial monitoring of piping not tested every three years, documentation showing that the prevention equipment is double-walled and the integrity of both walls is periodically monitored must be maintained for as long as the equipment is periodically monitored.

NOTE: The following code of practice may be used to comply with this section: Petroleum Equipment Institute Publication RP1200, "Recommended Practices for the Testing and Verification of Spill, Overfill, Leak Detection and Secondary Containment Equipment at UST Facilities."

135.4(13) *Periodic operation and maintenance walkthrough inspections.* Conduct inspections to properly operate and maintain UST systems.

a. Conduct a walkthrough inspection every 30 days that, at a minimum, checks the following equipment as specified below (Exception: spill prevention equipment at UST systems receiving deliveries at intervals greater than every 30 days may be checked prior to each delivery):

(1) Spill prevention equipment: visually check for damage; remove liquid or debris; check for and remove obstructions in the fill pipe; check the fill cap to make sure it attaches securely on the fill pipe and gasket is in good condition; and, for double-walled spill prevention equipment with interstitial monitoring, check for a leak in the interstitial area, and

(2) Release detection equipment: check to make sure the release detection equipment is operating with no alarms or other unusual operating conditions present, and ensure records of release detection testing are reviewed and current.

b. Conduct a walkthrough inspection annually, at a minimum, checking the following equipment as specified below:

(1) Containment sumps: visually check for damage, leaks to the containment area, or releases to the environment; remove liquid (in contained sumps) or debris; and, for double-walled sumps with interstitial monitoring, check for a leak in the interstitial area, and

(2) Handheld release detection equipment: check devices such as tank gauge sticks or groundwater bailers for operability and serviceability;

c. Conduct operation and maintenance walkthrough inspections according to a standard code of practice developed by a nationally recognized association or independent testing laboratory that checks equipment comparable to paragraphs 135.4(13)*"a"* and *"b"*; or

NOTE regarding paragraph 135.4(13)*"c"*: the following code of practice may be used to comply with paragraph 135.4(13)*"c"*: Petroleum Equipment Institute Recommended Practice RP 900, "Recommended Practices for the Inspection and Maintenance of UST Systems."

d. Conduct operation and maintenance walkthrough inspections developed by the department that checks equipment comparable to paragraphs 135.4(13)*"a"* and *"b."*

e. Owners and operators must maintain records (in accordance with subrule 135.4(5)) of operation and maintenance walkthrough inspections for 12 consecutive months. Records must include a list of each area checked, whether each area checked was acceptable or needed action taken, a description of actions taken to correct an issue, and delivery records if spill prevention equipment is checked less frequently than every 30 days due to infrequent deliveries.

[**ARC 8124B**, IAB 9/9/09, effective 10/14/09; **ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.5(455B) Release detection.

135.5(1) *General requirements for all UST systems.*

a. Owners and operators of UST systems must provide a method, or combination of methods, of release detection that:

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

(2) Is installed and calibrated in accordance with the manufacturer's instructions, including routine maintenance and service checks for operability or running condition; and

(3) Beginning October 13, 2021, is operated and maintained, and electronic and mechanical components are tested for proper operation, in accordance with one of the following:

1. Manufacturer's instructions;

2. A code of practice developed by a nationally recognized association or independent testing laboratory; or

3. Requirements determined by the department to be no less protective of human health and the environment than the two options listed above.

(4) A test of the proper operation must be performed at least annually and, at a minimum, as applicable to the facility, cover the following components and criteria:

1. Automatic tank gauge and other controllers: test alarm; verify system configuration; test battery backup;

2. Probes and sensors: inspect for residual buildup; ensure floats move freely; ensure shaft is not damaged; ensure cables are free of kinks and breaks; test alarm operability or running condition and communication with controller;

3. Automatic line leak detector: test operation to meet criteria in paragraph 135.5(5)*"a"* by simulating a leak;

4. Vacuum pumps and pressure gauges: ensure proper communication with sensors and controller; and

5. Handheld electronic sampling equipment associated with groundwater and vapor monitoring: ensure proper operation.

NOTE regarding subparagraphs 135.5(1)*"a"*(3) and (4): The following code of practice may be used to comply with subparagraphs 135.5(1)*"a"*(3) and (4): Petroleum Equipment Institute Publication RP1200, "Recommended Practices for the Testing and Verification of Spill, Overfill, Leak Detection and Secondary Containment Equipment at UST Facilities."

(5) Meets the performance requirements in subrule 135.5(4) or 135.5(5), with any performance claims and their manner of determination described in writing by the equipment manufacturer or installer. In addition, methods conducted in accordance with paragraphs 135.5(4)*"b," "c,"* and *"d"* and paragraphs 135.5(5)*"a"* and *"b"* must be capable of detecting the leak rate or quantity specified for that method with a probability of detection of 0.95 and a probability of false alarm of 0.05.

b. When a release detection method operated in accordance with the performance standards in subrule 135.5(4) or 135.5(5) indicates a release may have occurred, owners and operators must notify the department in accordance with rule 567—135.6(455B).

c. When an owner and operator continually show the inability to conduct leak detection with the method being used, the department may require the owner and operator to find an alternative leak detection method. If the owner and operator cannot demonstrate compliance with leak detection, delivery prohibition in accordance with subrule 135.3(8) may be enforced.

d. Any UST system that cannot apply a method of release detection that complies with the requirements of this rule must complete the closure procedures in rule 567—135.15(455B). For previously deferred UST systems described in rules 567—135.1(455B) and 567—135.21(455B), this requirement applies after the effective dates described in subrule 135.1(3) and paragraph 135.21(1)*"a."*

e. Any UST facility that uses pressurized piping and dispenses product in the absence of a Class A, B, or C operator shall comply with the following requirements:

(1) Employ automatic line leak detectors that do one or more of the following:

1. Shut down the submersible pump when a leak is detected.
2. Restrict the flow of product when a leak is detected.
3. Trigger an audible or visual alarm when a leak is detected.

(2) At facilities implementing 135.5(1)*"e"*(1)"2" or "3," the facility's operator shall be notified or shall conduct a visit through one of the following methods:

1. Notification of the Class B operator by immediate electronic communication.
2. Signage directing the customer to contact the Class B operator or a designated contact person. The sign must be immediately visible to the customer and state that slow flow or an audible or visual alarm is an indication of a possible release. The sign must provide a 24-hour telephone number of the Class B operator or designee and direct the customer to stop dispensing product.
3. Daily visit to the site by a Class A, B, or C operator or designee. Visits shall include observation of every automatic line leak detector for shutdown, alarm, or restricted flow conditions. Methods of observing for restricted flow conditions may include dispensing product into a proper container or personal vehicle, observing a customer dispense product into a vehicle, or another method approved by the department. Owners and operators shall maintain an onsite log of site visits to demonstrate compliance with this provision. The log shall include the name of the observer and method used to observe the status of the automatic line leak detectors.

(3) All UST facilities subject to 135.5(1)*"e"* must comply with its provisions by July 1, 2014.

135.5(2) *Requirements for petroleum UST systems.* Owners and operators of petroleum UST systems must provide release detection for tanks and piping as follows:

a. Tanks. Tanks must be monitored at least every 30 days for releases using one of the methods listed in paragraphs 135.5(4)*"d"* to *"i"* except that:

(1) Tanks installed after November 28, 2007, must use interstitial monitoring of the secondary containment as the primary leak detection method in accordance with paragraph 135.5(4)*"g."*

(2) Tanks installed on or before November 28, 2007, with capacity of 550 gallons or less and tanks with a capacity of 551 to 1,000 gallons that meet the tank diameter criteria in paragraph 135.5(4)*"b"* may use manual tank gauging (conducted in accordance with paragraph 135.5(4)*"b"*).

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

(1) *Pressurized piping.* Underground piping that conveys regulated substances under pressure must:

1. Be equipped with an automatic line leak detector conducted in accordance with paragraph 135.5(5)*"a"*; and

2. Have an annual line tightness test conducted in accordance with paragraph 135.5(5)*"b"* or have monthly monitoring conducted in accordance with paragraph 135.5(5)*"c."* Piping installed after November 28, 2007, must use interstitial monitoring of the piping secondary containment in accordance with paragraph 135.5(5)*"d."*

(2) *Suction piping.* Underground piping that conveys regulated substances under suction must either have a line tightness test conducted at least every three years and in accordance with paragraph 135.5(5)*"b,"* or use a monthly monitoring method conducted in accordance with paragraph 135.5(5)*"c."* Remote fill is considered suction piping. No release detection is required for suction piping that is designed and constructed to meet the following standards:

1. The below-grade piping operates at less than atmospheric pressure;

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

3. Only one check valve is included in each suction line;

4. The check valve is located directly below and as close as practical to the suction pump; and

5. A method is provided that allows compliance with "2" through "4" to be readily determined.

(3) Piping installed or replaced must meet one of the following:

1. Pressurized piping must be monitored for releases at least every 30 days in accordance with paragraph 135.5(5)*"d"* and be equipped with an automatic line leak detector.

2. Suction piping must be monitored for releases at least every 30 days. No release detection is required for suction piping that meets paragraphs 135.5*"b"*(2)"1" through 135.5*"b"*(2)"5."

135.5(3) *Requirements for hazardous substance UST systems.* Owners and operators of hazardous substance UST systems must have containment that meets the following requirements and monitor these systems pursuant to paragraph 135.5(4)*"g"* at least every 30 days:

a. Secondary containment systems must be designed, constructed and installed to:

(1) Contain regulated substances leaked from the primary containment until they are detected and removed;

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

(3) Be checked for evidence of a release at least every 30 days.

b. Double-walled tanks must be designed, constructed, and installed to:

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

(2) Detect the failure of the inner wall.

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

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

(2) Prevent the interference of precipitation or groundwater intrusion with the ability to contain or detect a release of regulated substances; and

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

d. Underground piping must be equipped with secondary containment that satisfies the requirements of this subrule (e.g., trench liners, jacketing of double-walled pipe). In addition, underground piping that conveys regulated substances under pressure must be equipped with an automatic line leak detector in accordance with paragraph 135.5(5)*"a"*;

e. For hazardous substance UST systems installed on or before November 28, 2007, other methods of release detection may be used if owners and operators:

(1) Demonstrate to the department that an alternate method can detect a release of the stored substance as effectively as any of the methods allowed in paragraphs 135.5(4)*"b"* to *"i"* can detect a release;

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

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

135.5(4) *Methods of release detection for tanks.* Each method of release detection for tanks used to meet the requirements of 135.5(2) must be conducted in accordance with the following:

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

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

(2) The equipment used is capable of measuring the level of product over the full range of the tank's height to the nearest 1/8 of an inch;

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

(4) Deliveries are made through a drop tube that extends to within 1 foot of the tank bottom;

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

(6) The measurement of any water level in the bottom of the tank is made to the nearest 1/8 of an inch at least once a month.

NOTE: Practices described in the American Petroleum Institute Recommended Practice 1621, "Recommended Practice for Bulk Liquid Stock Control at Retail Outlets," may be used, where applicable, as guidance in meeting the requirements of subparagraphs 135.5(4)*"a"*(1) to 135.5(4)*"a"*(6).

b. Manual tank gauging. Manual tank gauging must meet the following requirements:

(1) Tank liquid level measurements are taken at the beginning and end of the test period during which no liquid is added to or removed from the tank;

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

(3) The equipment is capable of measuring the level of product over the full range of the tank's height to the nearest 1/8 of an inch;

(4) A release is suspected and subject to the requirements of rule 567—135.6(455B) if the variation between the beginning and ending measurements exceeds the weekly or monthly standards in the following table. Immediately contact the department if these standards are exceeded.

Nominal Tank Capacity	Minimum Duration of Test	Weekly Standard (one test)	Monthly Standard (four-test average)
550 gallons or less	36 hours	10 gallons	5 gallons
551-1,000 gallons (when tank diameter is 64 inches)	44 hours	9 gallons	4 gallons
551-1,000 gallons (when tank diameter is 48 inches)	58 hours	12 gallons	6 gallons
551-1,000 gallons (also requires annual tank tightness testing)	36 hours	13 gallons	7 gallons
1,001-2,000 gallons (also requires annual tank tightness test)	36 hours	26 gallons	13 gallons

(5) Only those tanks of 550 gallons or less nominal capacity or tanks of 551 to 1,000 gallons nominal capacity with diameters of 64 inches or 48 inches may use this as the sole method of release detection. Other tanks of 551 to 2,000 gallons may use this method in place of inventory control in

paragraph 135.5(4)*"a."* Tanks of greater than 2,000 gallons nominal capacity may not use this method to meet the requirements of this rule.

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

The tank tightness test procedure must be certified by a third party and meet US EPA testing procedures. The testing procedures are found in *Standard Test Procedures for Evaluating Leak Detection Methods*: *Volumetric Tank Tightness Testing Methods* (EPA /530/UST-90/004) March 1990 or as revised by EPA or *Non-Volumetric Tank Tightness Testing Methods* (EPA /530/UST-90/005) March 1990 or as revised by EPA.

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

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

(2) The automatic tank gauging equipment must meet the inventory control (or other test of equivalent performance) requirements of paragraph 135.5(4)*"a"*;

(3) The leak test must be performed according to manufacturer specifications;

(4) The automatic tank gauging equipment must be certified by a third party and meet US EPA testing procedures in *Standard Test Procedures for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems* (ATGS) (EPA /530/UST-90/006) March 1990 or as revised by US EPA; and

(5) The test must be performed with the system operating in one of the following modes:

1. In-tank static testing conducted at least once every 30 days; or

2. Continuous in-tank leak detection operating on an uninterrupted basis or operating within a process that allows the system to gather incremental measurements to determine the leak status of the tank at least once every 30 days.

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

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

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

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

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

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

(6) In the UST excavation zone, the site is assessed to ensure compliance with the requirements in subparagraphs 135.5(4)*"e"*(1) through (4) and to establish the number and positioning of monitoring wells that will detect releases within the excavation zone from any portion of the tank that routinely contains product;

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

(8) The vapor product detector must be certified by a third party and meet US EPA testing procedures in *Standard Test Procedures for Evaluating Leak Detection Methods: Vapor-Phase Out-of-Tank Product Detectors* (EPA/530/UST-90/008) March 1990 or as revised by US EPA.

f. Groundwater monitoring. Testing or monitoring for liquids on the groundwater must meet the following requirements:

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

(2) Groundwater is never more than 20 feet from the ground surface and the hydraulic conductivity of the soil(s) between the UST system and the monitoring wells or devices is not less than 0.01 cm/sec (e.g., the soil should consist of gravels, coarse to medium sands, coarse silts or other permeable materials);

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

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

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

(6) The continuous monitoring devices or manual methods used can detect the presence of at least 1/8 of an inch of free product on top of the groundwater in the monitoring wells;

(7) Within and immediately below the UST system excavation zone, the site is assessed to ensure compliance with the requirements in subparagraphs 135.5(4)*"f"*(1) through (5) and to establish the number and positioning of monitoring wells or devices that will detect releases from any portion of the tank that routinely contains product; and

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

g. Interstitial monitoring. Interstitial monitoring between the UST system and a secondary barrier immediately around or beneath it may be used, but only if the system is designed, constructed and installed to detect a leak from any portion of the tank that routinely contains product and also meets one of the following requirements:

(1) For secondary containment systems, the sampling or testing method must be able to detect a leak through the inner wall in any portion of the tank that routinely contains product:

1. Continuously, by means of an automatic leak sensing device that signals to the operator the presence of any regulated substance in the interstitial space; or

2. Monthly, by means of a procedure capable of detecting the presence of any regulated substance in the interstitial space.

3. The interstitial space shall be maintained and kept free of liquid, debris or anything that could interfere with leak detection capabilities.

(2) For UST systems with a secondary barrier within the excavation zone, the sampling or testing method used can detect a leak between the UST system and the secondary barrier:

1. The secondary barrier around or beneath the UST system consists of artificially constructed material that is sufficiently thick and impermeable (at least 10^{-6} cm/sec for the regulated substance stored) to direct a leak to the monitoring point and permit its detection;

2. The barrier is compatible with the regulated substance stored so that a leak from the UST system will not cause a deterioration of the barrier allowing a release to pass through undetected;

3. For cathodically protected tanks, the secondary barrier must be installed so that it does not interfere with the proper operation of the cathodic protection system;

4. The groundwater, soil moisture, or rainfall will not render the testing or sampling method used inoperative so that a release could go undetected for more than 30 days;

5. The site is assessed to ensure that the secondary barrier is always above the groundwater and not in a 25-year flood plain, unless the barrier and monitoring designs are for use under such conditions; and

6. Monitoring wells are clearly marked and secured to avoid unauthorized access and tampering.

(3) For tanks with an internally fitted liner, an automated device can detect a leak between the inner wall of the tank and the liner, and the liner is compatible with the substance stored.

h. Statistical inventory reconciliation. Release detection methods based on the application of statistical principles to inventory data that test for the loss of product must meet the following requirements:

(1) Use a leak threshold that does not exceed one-half the minimum detectible leak rate;

(2) The statistical test must be able to detect at least a 0.2 gallon per hour leak rate from any portion of the tank that routinely contains product; and

(3) The report by the SIR company must be a quantitative result with a calculated leak rate and include the leak threshold (leak rate at which a leak is declared), the calculated leak rate (leak rate calculated from the inventory records) and minimum detectable leak rate (minimum leak rate that can be determined from the inventory records).

1. A "pass" means that the calculated leak rate for the data set is less than the leak threshold and the minimum detectable leak rate is less than or equal to the certified performance standard;

2. A "fail" means the calculated leak rate for the data set is equal to or greater than the leak threshold;

3. An "inconclusive" means the minimum detectable leak rate exceeds the certified performance standard and the calculated leak rate is less than the leak threshold. If for any other reason the test result is not a "pass" or "fail," the result is "inconclusive";

(4) Owners and operators must notify the department in accordance with rule 567—135.6(455B) when a monthly SIR report of "fail" occurs or two consecutive inconclusive results occur.

(5) Owners and operators must assure the SIR analytical results are complete and available to the department upon request.

(6) The statistical inventory reconciliation method must be certified by a third party and meet US EPA testing procedures in *Standard Test Procedures for Evaluating Release Detection Methods: Statistical Inventory Reconciliation* (EPA 510-B-19-004) May 2019 or as revised by EPA.

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

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

(2) The department may approve another method if the owner and operator can demonstrate that the method can detect a release as effectively as any of the methods allowed in paragraphs *"c"* to *"h."* In comparing methods, the department 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, the owner and operator must comply with any conditions imposed by the department on its use to ensure the protection of human health and the environment.

135.5(5) *Methods of release detection for piping.* Each method of release detection for piping used to meet the requirements of 135.5(2) must be conducted in accordance with the following:

a. Automatic line leak detectors. Methods which alert the operator to the presence of a leak in pressurized piping by restricting or shutting off the flow of regulated substances through piping or triggering an audible or visual alarm may be used only if they detect leaks of 3 gallons per hour at 10 pounds per square inch line pressure within one hour. An annual test of the operation of the leak detector must be conducted in accordance with paragraph 135.5(1)*"a."*

b. Line tightness testing. A periodic test of piping may be conducted only if it can detect a 0.1 gallon-per-hour leak rate at one and one-half times the operating pressure. The line leak detection method must be certified by a third party and meet US EPA testing procedures in *Standard Test Procedures for Evaluating Release Detection Methods: Pipeline Release Detection* (EPA 510-B-19-005) May 2019 or as revised by EPA.

c. Applicable tank methods. Except as described in paragraph 135.5(2)*"a,"* any of the methods in paragraphs 135.5(4)*"e"* through *"i"* may be used if they are designed to detect a release from any portion of the underground piping that routinely contains regulated substances.

d. Interstitial monitoring of secondary containment. Interstitial monitoring may be used for any piping with secondary containment designed for and capable of interstitial monitoring.

(1) Leak detection shall be conducted:

1. Continuously, by means of an automatic leak sensing device that signals to the operator the presence of any regulated substance in the interstitial space or containment sump; or

2. Monthly, by means of a procedure capable of detecting the presence of any regulated substance in the interstitial space or containment sump, such as visual inspection.

(2) The interstitial space or sump shall be maintained and kept free of water, debris or anything that could interfere with leak detection capabilities.

(3) At least every two years, any sump shall be visually inspected for integrity of sides and floor and tightness of piping penetration seals. Any automatic sensing device shall be tested for proper function.

135.5(6) *Release detection record keeping.* All UST system owners and operators must maintain records in accordance with 135.4(5) demonstrating compliance with all applicable requirements of this rule. These records must include the following:

a. 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, must be maintained for five years, or for another reasonable period of time determined by the department, from the date of installation. Records of site assessments required for vapor monitoring under subparagraph 135.5(4)*"e"*(6) and groundwater monitoring under subparagraph 135.5(4)*"f"*(7) must be maintained for as long as the methods are used. Records of site assessments must be signed by a professional engineer or professional geologist, or equivalent licensed professional with experience in environmental engineering, hydrogeology, or other relevant technical discipline acceptable to the department;

b. The results of any sampling, testing, or monitoring must be maintained for at least one year, or for another reasonable period of time determined by the department, except as follows:

(1) The results of tank tightness testing conducted in accordance with paragraph 135.5(4)*"c"* must be retained until the next test is conducted; and

(2) The results of annual operation tests conducted in accordance with subparagraphs 135.5(1)*"a"*(3) and (4), must be maintained for three years. At a minimum, the results must list each component tested, indicate whether each component tested meets criteria in subparagraphs 135.5(1)*"a"*(3) and (4), or needs to have action taken, and describe any action taken to correct an issue; and

(3) The results of tank tightness testing, line tightness testing, and vapor monitoring using a tracer compound placed in the tank system conducted in accordance with paragraph 135.21(2)*"f"* must be retained until the next test is conducted; and

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

[**ARC 8469B**, IAB 1/13/10, effective 2/17/10 (See Delay note at end of chapter); **ARC 0559C**, IAB 1/9/13, effective 12/19/12; **ARC 1100C**, IAB 10/16/13, effective 11/20/13; **ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.6(455B) Release reporting, investigation, and confirmation.

135.6(1) *Reporting of suspected releases.* Owners and operators of UST systems must report to the department within 24 hours, or within 6 hours in accordance with 567—Chapter 131 if a hazardous condition exists as defined in 567—131.1(455B), or another reasonable time period specified by the department, and follow the procedures in 135.8(1) for any of the following conditions:

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

b. Unusual operating conditions observed by owners and operators (such as the erratic behavior of product dispensing equipment, the sudden loss of product from the UST system, an unexplained presence of water in the tank, or liquid in the interstitial space of secondarily contained systems), unless:

(1) The system equipment or component is found not to be releasing regulated substances to the environment;

(2) Any defective system equipment or component is immediately repaired or replaced; and

(3) For secondarily contained systems, except as provided for in paragraph 135.5(4)*"g"*(2)"4," any liquid in the interstitial space not used as part of the interstitial monitoring method (for example, brine filled) is immediately removed.

c. Monitoring results, including investigation of an alarm, from a release detection method required under subrules 135.5(2) and 135.5(3) that indicate a release may have occurred unless:

(1) The monitoring device is found to be defective, and is immediately repaired, recalibrated or replaced, and additional monitoring does not confirm the initial result; or

(2) The leak is contained in the secondary containment and:

1. Except as provided for in paragraph 135.5(4)*"g"*(2)"4," any liquid in the interstitial space not used as part of the interstitial monitoring method (for example, brine filled) is immediately removed; and

2. Any defective system equipment or component is immediately repaired or replaced;

(3) In the case of inventory control, a second month of data does not confirm the initial result or the investigation determines no release has occurred; or

(4) The alarm was investigated and determined to be a non-release event (for example, from a power surge or caused by filling the tank during release detection testing).

135.6(2) *Investigation due to off-site impacts.* When required by the department, owners and operators of UST systems must follow the procedures in 135.6(3) to determine if the UST system is the source of off-site impacts. These impacts include the discovery of regulated substances (such as the presence of free product or vapors in soils, basements, sewer and utility lines, and nearby surface and drinking waters) that has been observed by the department or brought to its attention by another party.

135.6(3) *Release investigation and confirmation steps.* Owners and operators must immediately investigate and confirm all suspected releases of regulated substances requiring reporting under 135.6(1) within seven days, or another reasonable time period specified by the department, using either the following steps or another procedure approved by the department:

a. System test. Owners and operators must conduct tests (according to the requirements for tightness testing in paragraphs 135.5(4)*"c"* and 135.5(5)*"b"*) or, as appropriate, secondary containment testing described in paragraph 135.4(4).

(1) The test must determine whether:

1. A leak exists in that portion of the tank that routinely contains product, or the attached delivery piping; or

2. A breach of either wall of the secondary containment has occurred.

(2) If the system test confirms a leak into the interstice or a release, owners and operators must repair, replace, upgrade, or close the UST system. In addition, owners and operators must begin corrective action in accordance with rule 567—135.9(455B) if the test results for the system, tank, or delivery piping indicate a release exists.

(3) Further investigation is not required if the test results for the system, tank, and delivery piping do not indicate a release exists and if environmental contamination is not the basis for suspecting a release.

(4) Owners and operators must conduct a site check as described in paragraph 135.6(3)*"b"* if the test results for the system, tank, and delivery piping do not indicate a release exists but environmental contamination is the basis for suspecting a release.

b. Site check. A certified groundwater professional must conduct a site check in accordance with the tank closure in place procedures as provided in 135.15(3) or they may conduct a Tier 1 assessment in accordance with subrule 135.9(3). Under either procedure, the certified groundwater professional must follow the policies and procedures applicable to sites where bedrock is encountered before groundwater as provided in 135.8(5) to avoid creating a preferential pathway for soil or groundwater contamination to reach a bedrock aquifer. The certified groundwater professional must measure for the presence of a release where contamination is most likely to be present at the UST site. In selecting sample types, sample locations, and measurement methods, the certified groundwater professional must consider the nature of the stored substance, the type of initial alarm or cause for suspicion, the type of backfill, the depth of groundwater, and other factors appropriate for identifying the presence and source of the release.

(1) If the test results of the site check indicate action levels in 567—135.14(455B) have been exceeded, owners and operators must begin corrective action in accordance with rules 567—135.7(455B) to 567—135.12(455B).

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

135.6(4) *Reporting and cleanup of spills and overfills.*

a. Reportable releases. Owners and operators of UST systems must contain and immediately clean up a spill, overfill or any aboveground release, and report to the department within 24 hours, or within 6 hours in accordance with 567—Chapter 131 if a hazardous condition exists as defined in rule 567—131.1(455B) and begin corrective action in accordance with rules 567—135.7(455B) to 567—135.12(455B) in the following cases:

(1) Spill, overfill or any aboveground release of petroleum that results in a release to the environment that exceeds 25 gallons, causes a sheen on nearby surface water, impacts adjacent property, or contaminates groundwater; and

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

b. Nonreportable releases. Owners and operators of UST systems must contain and immediately clean up a spill, overfill or any aboveground release of petroleum that is less than 25 gallons and a spill, overfill or any aboveground release of a hazardous substance that is less than the reportable quantity. If cleanup cannot be accomplished within 24 hours, owners and operators must immediately notify the department.

NOTE: Any spill or overfill that results in a hazardous condition as defined in rule 567—131.1(455B) must be reported within 6 hours. This includes the transporter of the product. A release of a hazardous substance equal to or in excess of its reportable quantity must also be reported immediately (rather than within 24 hours) to the National Response Center under Sections 102 and 103 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and to appropriate state and local authorities under Title III of the Superfund Amendments and Reauthorization Act of 1986.

[**ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.7(455B) Release response and corrective action for UST systems containing petroleum or hazardous substances.

135.7(1) *General.* Owners and operators of petroleum or hazardous substance UST systems must, in response to a confirmed release from the UST system, comply with the requirements of this rule except for USTs excluded under 135.1(3)*"b"* and UST systems subject to RCRA Subtitle C corrective action requirements under Section 3004(u) of the Resource Conservation and Recovery Act, as amended.

135.7(2) *Initial response.* Upon confirmation of a release in accordance with 135.6(3) or after a release from the UST system is identified in any other manner, owners and operators must perform the following initial response actions within 24 hours of a release or within another reasonable period of time specified by the department:

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

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

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

135.7(3) *Initial abatement measures.*

a. Unless directed to do otherwise by the department, owners and operators must perform the following abatement measures:

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

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

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

(4) Remedy hazards posed by contaminated soils that are excavated or exposed as a result of release confirmation, site investigation, abatement, or corrective action activities. If these remedies

include treatment or disposal of soils, the owner and operator must comply with applicable state and local requirements;

(5) Rescinded IAB 7/17/96, effective 8/15/96.

(6) Investigate to determine the possible presence of free product, and begin free product removal as soon as practicable and in accordance with 135.7(5).

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

135.7(4) *Initial site characterization.* Rescinded IAB 7/17/96, effective 8/15/96.

135.7(5) *Free product assessment and removal.* The free product assessment and removal requirements in this chapter are primarily concerned with a regulated substance that is present as a light nonaqueous phase liquid (LNAPL) in a monitoring well, boring, excavation, or other location at a thickness of more than 0.01 ft. At sites where investigations under subparagraph 135.7(3)*"a"*(6) indicate 0.01 ft. or more of free product, owners and operators must immediately initiate a free product recovery assessment and submit a report in accordance with paragraph 135.7(5)*"d"* and initiate interim free product removal while continuing, as necessary, any actions initiated under subrules 135.7(2) and 135.7(3), or preparing for actions required under rules 567—135.8(455B) to 567—135.12(455B). Owners and operators must immediately begin interim free product removal by bailing or by installation and maintenance of passive skimming equipment until an alternative removal method is required by or approved by the department. A certified groundwater professional must initially determine the frequency of bailing and proper installation and maintenance of the skimming equipment based on a determination of the recharge rate of the free product. The department may approve implementation of this interim removal process by persons not certified as groundwater professionals. For approval a certified groundwater professional must submit (1) sufficient documentation establishing that the bailing or skimming system has been adequately designed and tested, and (2) a written plan for regular maintenance, reporting and supervision by a certified groundwater professional. Interim free product recovery reports must be submitted to the department on a monthly basis and on forms provided by the department. In meeting the requirements of this subrule, owners and operators must:

a. Conduct free product removal at a frequency determined by the recharge rate of the product and in a manner that minimizes the spread of contamination into previously uncontaminated zones by using recovery and disposal techniques appropriate to the hydrogeologic conditions at the site, and that properly treats, discharges or disposes of recovery by-products in compliance with applicable local, state and federal regulations. Unless approved by the department, free product assessment and recovery activities must be conducted by a certified groundwater professional. Owners and operators must report the results of free product removal activities on forms designated by the department;

b. Use abatement of free product migration as a minimum objective for the design of the free product removal system. Free product recovery systems must be designed to remove free product to the maximum extent practicable;

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

d. Free product recovery assessment and report. Unless directed to do otherwise by the department, prepare and submit to the department, within 45 days after confirming a release, a free product recovery assessment report and a proposal for subsequent free product removal activities. The free product recovery assessment report and removal proposal must contain at least the following information:

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

(2) The estimated quantity, type and thickness of free product observed or measured in monitoring wells, boreholes, and excavations, the recharge rate in all affected monitoring wells and a detailed description of the procedures used to determine the recharge rate;

(3) A detailed justification for the free product removal technology proposed for the site. Base the justification narrative on professional judgment considering the characteristics of the free product

plume (i.e., estimated volume, type of product, thickness, extent), an assessment of cost effectiveness based on recovery costs compared to alternative methods, site hydrology and geology, when the release event occurred, testing conducted to verify design assumptions and the potential for petroleum vapors or explosive conditions to occur in enclosed spaces. Proposals for removal systems other than hand bailing or passive skimming systems must be completed and submitted on a format consistent with the department's corrective action design report.

(4) A schematic and narrative description of the free product recovery system used;

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

(6) A schematic and narrative description of the treatment system, and the effluent quality expected from any discharge;

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

(8) The disposition of the recovered free product;

(9) Free product plume definition and map. The extent of free product must be assessed. If monitoring wells are used to define the free product plume, the number and location of wells and separation distance between the wells used to define the plume must be based on the receptors present and the site hydrology and geology. A minimum of five monitoring wells are required to construct the plume map. The boundary of the plume may be determined by half the distance between wells with free product and wells with no free product. If the groundwater professional can adequately define the plume using other technology as approved by the department, fewer than five wells may be used to define the boundary of the plume;

(10) The estimated volume of free product present, how the volume was calculated, recoverable volume and estimated recovery time; and

(11) Identification of all water lines, regardless of construction material, within the area of free product. A water line shall be considered within the area of free product if it is located within the boundary of the free product plume as defined by wells unless it can be demonstrated that no LNAPL exists within 10 feet (horizontally or vertically) of the water line and the LNAPL is not migrating nor is likely to migrate. Water lines within the area of free product must be relocated unless there is no other option and the department has approved an alternate plan of construction. See paragraph 135.12(3)*"c."*

e. The department will review the free product assessment report; and, if approved, the owner or operator must implement the installation of the approved recovery system within 60 days or other time period approved by the department.

f. Termination of free product recovery activities. Owners and operators may propose to the department to terminate free product recovery activities when significant amounts of hydrocarbons are not being recovered. The department will consider proposals to terminate free product recovery when the amount of product collected from a monitoring well is equal to or less than 0.1 gallon each month for a year unless another plan is approved by the department. When free product activities have been terminated, owners and operators must inspect the monitoring wells monthly for at least a year unless another schedule is approved by the department. The department must be notified and may require that free product recovery activities be reinitiated if during the monthly well inspections it is determined the product thickness in a monitoring well exceeds 0.02 ft. The monthly well inspection records must be kept available for review by the department.

g. Unless directed to do otherwise by the department, prepare and submit to the department within 180 days after confirming a release, a Tier 2 site cleanup report.

[**ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.8(455B) Risk-based corrective action.

135.8(1) *General.* The objective of risk-based corrective action is to effectively evaluate the risks posed by contamination to human health, safety and the environment using a progressively more site-specific, three-tiered approach to site assessment and data analysis. Based on the tiered assessment, a corrective action response is determined sufficient to remove or minimize risks to acceptable levels. Corrective action response includes a broad range of options including reduction of contaminant

concentrations through active or passive methods, monitoring of contamination, use of technological controls or institutional controls.

a. Tier 1. The purpose of a Tier 1 assessment is to identify whether a site poses an unreasonable risk to public health and safety or the environment based on limited site data. The objective is to determine maximum concentrations of chemicals of concern at the source of a release(s) in soil and groundwater. The Tier 1 assessment assumes worst-case scenarios in which actual or potential receptors could be exposed to these chemicals at maximum concentrations through certain soil and groundwater pathways. The point of exposure is assumed to be the source showing maximum concentrations. Risk-based screening levels (Tier 1 levels) contained in the Tier 1 Look-Up Table have been derived from models which use conservative assumptions to predict exposure to actual and potential receptors. (These models and default assumptions are contained in Appendix A.) If Tier 1 levels are not exceeded for a pathway, that pathway may not require further assessment. If the maximum concentrations exceed a Tier 1 level, the options are to conduct a more extensive Tier 2 assessment, apply an institutional control, or in limited circumstances excavate contaminated soil to below Tier 1 levels. If all pathways clear the Tier 1 levels, it is possible for the site to obtain a no action required classification.

b. Tier 2. The purpose of a Tier 2 assessment is to use site-specific data to assess the risk from chemicals of concern to existing receptors and potential receptors using fate and transport models in accordance with 567—135.10(455B). See 135.10(2)*"a."*

c. Tier 3. Where site conditions may not be adequately addressed by Tier 2 procedures, a Tier 3 assessment may provide more accurate risk assessment. The purpose of Tier 3 is to identify reasonable exposure levels of chemicals of concern and to assess the risk of exposure to existing and potential receptors based on additional site assessment information, probabilistic evaluations, or sophisticated chemical fate and transport models in accordance with 567—135.11(455B).

d. Notification. Whenever the department requires a tiered site assessment and a public water supply well is within 2,500 feet of a leaking underground storage tank site, the department will notify the public water supply operator.

e. Pathway reevaluation. Prior to issuance of a no further action certificate in accordance with 135.12(10) and Iowa Code section 455B.474(1)*"h"*(3), if it is determined that the conditions for an individual pathway that has been classified as "no action required" no longer exist, or the site presents an unreasonable risk to a public water supply well and the model used to obtain the pathway clearance underpredicts the actual contaminant plume, the individual pathway shall be further assessed consistent with the risk-based corrective action provisions in rules 567—135.8(455B) through 567—135.12(455B).

135.8(2) *Certified groundwater professional.* All assessment, corrective action, data analysis and report development required under rules 567—135.6(455B) to 567—135.12(455B) must be conducted by or under the supervision of a certified groundwater professional in accordance with these rules and department guidance as specified.

135.8(3) *Chemicals of concern.* Soil and groundwater samples from releases of petroleum regulated substances must always be analyzed for the presence of benzene, ethylbenzene, toluene, and xylenes. In addition, if the release is suspected to include any petroleum regulated substance other than gasoline or gasoline blends, or if the source of the release is unknown, the samples must be tested for the presence of Total Extractable Hydrocarbons (TEH). Appendices A and B and department Tier 2 guidance define a method for converting TEH values to a default concentration for naphthalene, benzo(a)pyrene, benz(a)anthracene and chrysene and conversion back to a representative TEH value. These default values must be used in order to apply Tier 2 modeling to these constituents in the absence of accurate laboratory analysis.

135.8(4) *Boring depth for sampling.* When drilling for the placement of groundwater monitoring wells, if groundwater is encountered, drilling must continue to the maximum of 10 feet below the first encountered groundwater or to the bottom of soil contamination as estimated by field screening. If groundwater is not encountered, drilling must continue to the deeper of 10 feet below the soil contamination as estimated by field screening or 75 feet from the ground surface.

135.8(5) *Bedrock aquifer assessment.* Prior to conducting any groundwater drilling, a groundwater professional must determine if there is a potential to encounter bedrock before groundwater. These

potential areas include (1) areas where karst features or outcrops exist in the vicinity and (2) areas with bedrock less than 50 feet from the surface as illustrated in Tier 1 and Tier 2 guidance. The purpose of this determination is to prevent drilling through contaminated subsurface areas thereby creating a preferential pathway to a bedrock aquifer. If the first encountered groundwater is above bedrock but near the bedrock surface or fluctuates above and below bedrock, the groundwater professional should evaluate the subsurface geology and aquifer characteristics to determine the potential for creating a preferential pathway. If it is determined that the aquifer acts like a nongranular aquifer as provided in 135.10(3)*"a"* or bedrock is encountered before groundwater, the groundwater professional must conduct a Tier 2 assessment for all pathways under 567—135.10(455B), including the specified bedrock procedures under 135.10(3).

If the first encountered groundwater is above bedrock with sufficient separation and aquifer characteristics to establish that it acts as a granular aquifer, site assessment may proceed under the site check procedure in 567—135.6(455B), the Tier 1 procedure in 567—135.9(455B) or the Tier 2 procedure in 567—135.10(455B) as would be customary regardless of the bedrock designation. However, even under this condition, drilling through bedrock should be avoided in contaminated areas.
[**ARC 7621B**, IAB 3/11/09, effective 4/15/09; **ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.9(455B) Tier 1 site assessment policy and procedure.

135.9(1) *General.* The main objective of a Tier 1 site assessment is to reasonably determine the highest concentrations of chemicals of concern which would be associated with any suspected or confirmed release and an accurate identification of applicable receptors. The potential source of a release, nature of the substance released, site stratigraphy, depth to groundwater, and other appropriate factors must be considered when selecting the sample types, sample locations, and measurements methods. The placement and depth of borings and the construction of monitoring wells must be sufficient to determine the sources of all releases, the vertical extent of contamination, an accurate description of site stratigraphy, and a reliable determination of groundwater flow direction.

a. Pathway assessment. The pathways to be evaluated at Tier 1 are the groundwater ingestion pathway, soil leaching to groundwater pathway, groundwater vapor to enclosed space pathway, soil vapor to enclosed space pathway, soil to water line pathway, groundwater to water line pathway and the surface water pathway. Assessment requires a determination of whether a pathway is complete, an evaluation of actual and potential receptors, and a determination of whether conditions are satisfied for obtaining no further action clearance for individual pathways or for obtaining a complete site classification of "no action required." A pathway is considered complete if a chemical of concern has a route which could be followed to reach an actual or potential receptor.

b. Pathway clearance. If contaminant concentrations for an individual pathway do not exceed the applicable Tier 1 levels or if a pathway is incomplete, no further action is required to evaluate the pathway unless otherwise specified in these rules. If the contaminant concentrations for a pathway exceed the applicable Tier 1 level(s) in the "Iowa Tier 1 Look-up Table," the response is to conduct further assessment under Tier 2 or Tier 3 unless an effective institutional control is approved. In limited circumstances excavation of contaminated soils may be used as an option to obtain pathway clearance. If further site assessment indicates site data exceeds an applicable Tier 1 level(s) for a previously cleared pathway or the conditions justifying a determination of pathway incompleteness change, that pathway must be reevaluated as part of a Tier 2 or Tier 3 assessment.

c. Chemical group clearance. If concentrations for all chemicals of concern within a designated group of chemicals are below the Tier 1 levels, no further action is required as to the group of chemicals unless otherwise specified in these rules. Group one consists of benzene, ethylbenzene, toluene, and xylenes (BTEX). Group two consists of naphthalene, benzo(a)pyrene, benz(a)anthracene and chrysene; TEH default values are incorporated into the Iowa Tier 1 Look-Up Table and Appendix A for group two chemicals.

d. Site classification. A site can be classified as no action required only after all pathways have met the conditions for pathway clearance as provided in this rule.

e. Groundwater sampling procedure. Groundwater sampling and field screening must be conducted in accordance with department Tier 1 guidance. A minimum of three properly constructed groundwater monitoring wells must be installed, subject to the limitations on maximum drilling depths, for the purpose of identifying maximum concentrations of groundwater contamination, suspected sources of releases, and groundwater flow direction.

(1) Field screening must be used to locate suspected releases and to determine locations with the greatest concentrations of contamination. Field screening is required as per department guidance at each former and current tank basin, each former and current pump island, along the piping, and at any other areas of actual or suspected releases. In placing monitoring wells, the following must be considered: field screening data, available current and historical information regarding the releases, tank and piping layout, site conditions, and drilling data available from sites in the vicinity. At least one well must be placed at each suspected source of release which shall include at a minimum: the pump island with the greatest field screening level, each current and former underground storage tank basin, and if field screening shows greater levels than at the pump islands or tank basins, at other suspected sources of releases. As a general rule, wells should be installed outside of the tank basin through native soils but as close to the tank basin as feasible. A well must be installed in a presumed downgradient direction and within 30 feet of the sample with the greatest field screening level. Three of the wells must be placed in a triangular arrangement to determine groundwater flow direction.

(2) Where the circumstances which prompt a Tier 1 assessment identify a discrete source and cause of a release, and the groundwater professional is able to rule out other suspected sources or contributing sources such as pump islands, piping runs and tank basins, the application of field screening and groundwater well placement may be limited to the known source.

f. Soil sampling procedure. The objective of soil sampling is to identify the maximum concentrations of soil contamination in the vadose and saturated zones and to identify sources of releases. The same principles stated above apply to soil sampling. Soil samples must be taken from borings with the greatest field screening levels even if the boring will not be converted to a monitoring well. At a minimum, soil and groundwater samples must be collected for analysis from all borings which are converted to monitoring wells.

Iowa Tier 1 Look-Up Table

Media	Exposure Pathway	Receptor	Group 1				Group 2: TEH	
			Benzene	Toluene	Ethylbenzene	Xylenes	Diesel*	Waste Oil
Groundwater (µg/L)	Groundwater Ingestion	Actual	5	1,000	700	10,000	1,200	400
		Potential	290	7,300	3,700	73,000	75,000	40,000
	Groundwater Vapor to Enclosed Space	All	1,540	20,190	46,000	NA	2,200,000	NA
	Groundwater to Water Line	PVC or Gasketed Mains	7,500	6,250	40,000	48,000	75,000	40,000
		PVC or Gasketed Service Lines	3,750	3,120	20,000	24,000	75,000	40,000
		PE/PB/AC Mains or Service Lines	200	3,120	3,400	19,000	75,000	40,000
	Surface Water	All	290	1,000	3,700	73,000	75,000	40,000
Soil (mg/kg)	Soil Leaching to Groundwater	All	0.54	42	15	NA	3,800	NA
	Soil Vapor to Enclosed Space	All	1.16	48	79	NA	47,500	NA
	Soil to Water Line	All	2.0	3.2	45	52	10,500	NA

NA: Not applicable. There are no limits for the chemical for the pathway, because for groundwater pathways the concentration for the designated risk would be greater than the solubility of the pure chemical in water, and for soil pathways the concentration for the designated risk would be greater than the soil concentration if pure chemical were present in the soil.

TEH: Total Extractable Hydrocarbons. The TEH value is based on risks from naphthalene, benzo(a)pyrene, benz(a)anthracene, and chrysene. Refer to Appendix B for further details.

Diesel*: Standards in the Diesel column apply to all low volatile petroleum hydrocarbons except waste oil.

135.9(2) *Conditions requiring Tier 1 site assessment.* Unless owners and operators choose to conduct a Tier 2 assessment, the presence of bedrock requires a Tier 2 assessment as provided in 135.8(5), or these rules otherwise require preparation of a Tier 2 site assessment, a Tier 1 site assessment must be completed in response to release confirmation as provided in rule 567—135.6(455B), or tank closure investigation under 567—135.15(455B), or other reliable laboratory analysis which confirms the presence of contamination above the action levels in 567—135.14(455B).

135.9(3) *Tier 1 assessment report.* Unless directed to do otherwise by the department or the owners or operators choose to prepare a Tier 2 site cleanup report, owners and operators must assemble information about the site and the nature of the release in accordance with the department Tier 1 guidance, including information gained while confirming the release under 567—135.6(455B), tank closure under 567—135.15(455B) or completing the initial abatement measures in 135.7(1) and 135.7(2). This information must include, but is not necessarily limited to, the following:

a. Data on the nature and estimated quantity of release.

b. Results of any release investigation and confirmation actions required by subrule 135.6(3).

c. Results of the free product investigations required under 135.7(3)*"a"*(6), to be used by owners and operators to determine whether free product must be recovered under 135.7(5).

d. Chronology of property ownership and underground storage tank ownership, identification of the person(s) having control of, or having responsibility for the daily operation of the underground storage tanks and the operational history of the underground storage tank system. The operational history shall include, but is not limited to, a description of or suspected known subsurface or aboveground releases, past remediation or other corrective action, type of petroleum product stored, recent tank and

piping tightness test results, any underground storage tank system repairs, upgrades or replacements and the underground storage tank and piping leak detection method being utilized. The operational history shall confirm that current release detection methods and record keeping comply with the requirements of 567—135.5(455B), that all release detection records have been reviewed and report any evidence that a release detection standard has been exceeded as provided in 135.5(4) and 135.5(5).

e. Appropriate diagrams of the site and the underground storage tank system and surrounding land use, identifying site boundaries and existing structures and uses such as residential properties, schools, hospitals, child care facilities and a general description of relevant land use restrictions and known future land use.

f. Current proof of financial responsibility as required by 567—136.19(455B) and 567—136.20(455B) and the status of coverage for corrective action under any applicable financial assurance mechanism or other financial assistance program.

g. A receptor survey including but not limited to the following: existing buildings, enclosed spaces (basements, crawl spaces, utility vaults, etc.), conduits (gravity drain lines, sanitary and storm sewer mains and service lines), water lines and other utilities within 500 feet of the source. For conduits and enclosed spaces, there must be a description of construction material, conduit backfill material, slope of conduit and trenches (include flow direction of sewers), burial depth of utilities or subsurface enclosed spaces, and the relationship to groundwater elevations.

h. An explosive vapor survey of enclosed spaces where there may be the potential for buildup of explosive vapors. The groundwater professional must provide a specific justification for not conducting an explosive vapor survey.

i. A survey of all surface water bodies within 200 feet of the source.

j. A survey of all active, abandoned and plugged groundwater wells within 1,000 feet of the source with a description of construction and present or future use.

k. Accurate and legible site maps showing the location of all groundwater monitoring wells, soil borings, field screening locations and screening values, and monitoring well and soil boring construction logs.

l. A tabulation of all laboratory analytical results for chemicals of concern and copies of the laboratory analytical reports.

m. Results of hydraulic conductivity testing and description of the procedures utilized.

n. A Tier 1 site assessment in accordance with the department's Tier 1 guidance. The Tier 1 report shall be submitted on forms and in a format prescribed by this guidance.

135.9(4) *Groundwater ingestion pathway assessment.* The groundwater ingestion pathway addresses the potential for human ingestion of petroleum-regulated substances from existing groundwater wells or potential drinking water wells.

a. Pathway completeness. This pathway is considered complete if: (1) there is a drinking or non-drinking water well within 1,000 feet of the source(s) exhibiting the maximum concentrations of the chemicals of concern; or (2) the first encountered groundwater is a protected groundwater source.

b. Receptor evaluation. A drinking or non-drinking water well within 1,000 feet of the source(s) is an actual receptor. The Tier 1 levels for actual receptors apply to drinking water wells and the Tier 1 levels for potential receptors apply to non-drinking water wells. Potential receptor points of exposure exist if the first encountered groundwater is a protected groundwater source but no actual receptors presently exist within 1,000 feet of the source.

c. Pathway clearance. If the pathway is incomplete, no further action is required for this pathway. If the Tier 1 level for actual or potential receptors is not exceeded, no further action is required for this pathway. Groundwater wells that are actual or potential receptors may be plugged in accordance with 567—Chapter 39 and 567—Chapter 49 and may result in no further action clearance if the groundwater is not a protected groundwater source and the pathway is thereby incomplete.

d. Corrective action response. If maximum concentrations exceed the applicable Tier 1 levels for either actual or potential receptors, a Tier 2 assessment must be conducted unless effective institutional controls are implemented as provided below. Technological controls are not acceptable at Tier 1 for

this pathway. Abandonment and plugging of drinking and non-drinking water wells in accordance with 567—Chapters 39 and 49 is an acceptable corrective action response.

e. Use of institutional controls. To apply an effective institutional control, if drinking or non-drinking water wells are present within 1,000 feet of the source, and the applicable Tier 1 level is exceeded, the well(s) for which there is an exceedence must be properly plugged. If the groundwater is a protected groundwater source and the maximum concentrations do not exceed the Tier 1 level for potential receptors but do exceed the Tier 1 level for actual receptors, the owner or operator must provide notification of site conditions on a department form to the department water supply section, or if a county has delegated authority, then the designated county authority responsible for issuing private water supply construction permits or regulating non-public water well construction as provided in 567—Chapters 38 and 49.

If the groundwater is a protected source and the maximum concentrations exceed the Tier 1 level for potential receptors, the owner or operator must (1) implement an institutional control prohibiting the use of the groundwater for installation of drinking and non-drinking water wells within 1,000 feet of the source; and (2) provide notification as provided above. If an effective institutional control is not feasible, a Tier 2 assessment must be performed for this pathway in accordance with rule 567—135.10(455B).

f. Receptor evaluation for public water supply wells. Rescinded IAB 3/11/09, effective 4/15/09.

135.9(5) *Soil leaching to groundwater pathway assessment.* This pathway addresses the potential for soil contamination to leach to groundwater creating a risk of human exposure through the groundwater ingestion pathway.

a. Pathway completeness. If the groundwater ingestion pathway is complete, the soil leaching to groundwater pathway is considered complete.

b. Receptor evaluation. There is a single receptor type for this pathway and one applicable Tier 1 level.

c. Pathway clearance. If the pathway is incomplete or the pathway is complete and the maximum concentrations of chemicals of concern do not exceed the Tier 1 levels, no further action is required for assessment of this pathway.

d. Corrective action response. If the Tier 1 levels are exceeded for this pathway, a Tier 2 assessment must be conducted or alternatively, institutional controls or soil excavation may be undertaken in accordance with 135.9(7)*"h."*

e. Use of institutional controls. Institutional controls must satisfy the conditions applicable to the groundwater ingestion pathway as provided in 135.9(4)*"e."*

135.9(6) *Groundwater vapor to enclosed space pathway assessment.* This pathway addresses the potential for vapors from contaminated groundwater to migrate to enclosed spaces where humans could inhale chemicals of concern at unacceptable levels. This pathway assessment assumes the health-based Tier 1 levels will adequately protect against any associated short- and long-term explosive risks.

a. Pathway completeness. This pathway is always considered complete for purposes of Tier 1 and must be evaluated.

b. Explosive vapor survey. An explosive vapor survey must be conducted in accordance with procedures outlined in the department Tier 1 guidance. If potentially explosive levels are detected, the groundwater professional must notify the owner or operator with instructions to report the condition in accordance with 567—Chapter 131. The owner or operator must begin immediate response and abatement procedures in accordance with 567—135.7(455B) and 567—Chapter 133.

c. Receptor evaluation. For purposes of Tier 1, there is one receptor type for this pathway and the Tier 1 level applies regardless of the existence of actual or potential receptors.

d. Pathway clearance. No further action is required for this pathway, if the maximum groundwater concentrations do not exceed the Tier 1 levels for this pathway.

e. Corrective action response. If the maximum concentrations exceed the Tier 1 levels for this pathway, a Tier 2 assessment of this pathway must be conducted unless institutional controls are implemented. Technological controls are not acceptable at Tier 1 for this pathway.

f. Use of institutional controls. An institutional control must be effective to prohibit the placement of enclosed space receptors within 500 feet of the source.

135.9(7) *Soil vapor to enclosed space pathway assessment.* This pathway addresses the potential for vapors from contaminated soils to migrate to enclosed spaces where humans could inhale chemicals of concern at unacceptable levels. This pathway assessment assumes health-based screening levels at Tier 1 will adequately protect against short- and long-term explosive risks.

a. Pathway completeness. This pathway is always considered complete for purposes of Tier 1 and must be evaluated.

b. Explosive vapor survey. An explosive vapor survey must be conducted in accordance with procedures outlined in the department Tier 1 guidance. If potentially explosive levels are detected, the groundwater professional must notify the owner or operator with instructions to report the condition in accordance with 567—Chapter 131. The owner or operator must begin immediate response and abatement procedures in accordance with 567—135.7(455B) and 567—Chapter 133.

c. Receptor evaluation. For purposes of Tier 1, there is one receptor type for this pathway, and the Tier 1 level applies regardless of existing or potential receptors.

d. Pathway clearance. No further action is required for this pathway, if the maximum soil concentrations do not exceed the Tier 1 levels for this pathway. If the Tier 1 levels are exceeded, soil gas measurements may be taken in accordance with the Tier 2 guidance at the area(s) of maximum concentration. Subject to confirmation sampling, if the soil gas measurements do not exceed the target levels in 135.10(7)*"f,"* no further action is required for this pathway. If the Tier 1 level is not exceeded but the soil gas measurement exceeds the target level, further action is required for the pathway.

e. Soil gas samples. To establish that the soil gas measurement is representative of the highest expected levels, a groundwater professional must obtain two soil gas samples taken at least two weeks apart. One of the samples should be collected beneath the frost line depth during a seasonal period of lowest groundwater elevation.

f. Corrective action response. If the maximum concentrations exceed the Tier 1 levels and the soil gas measurements exceed target levels for this pathway, or if no soil gas measurement was taken, a Tier 2 assessment of this pathway must be conducted unless institutional controls are implemented or soil excavation is conducted as provided below. Technological controls are not acceptable at Tier 1 for this pathway.

g. Use of institutional controls. An institutional control must be effective to eliminate the placement of enclosed space receptors within 500 feet of the source.

h. Soil excavation. Excavation of contaminated soils for the purpose of removing soils contaminated above the Tier 1 levels is permissible as an alternative to conducting a Tier 2 assessment. Adequate field screening methods must be used to identify maximum concentrations during excavation. At a minimum, one soil sample must be taken for field screening every 100 square feet of the base and each sidewall. Soil samples must be taken for laboratory analysis at least every 400 square feet of the base and each sidewall of the excavated area to confirm that remaining concentrations are below Tier 1 levels. If the base or a sidewall of the excavation is less than 400 square feet, a minimum of one sample must be analyzed for each sidewall and the base.

135.9(8) *Groundwater to water line pathway assessment.* This pathway addresses the potential for creating a drinking water ingestion risk due to contact with water lines and causing infusion to the drinking water.

a. Pathway completeness and receptor evaluation.

(1) Actual receptors. This pathway is considered complete for an actual receptor if there is an existing water line within 200 feet of the source and the first encountered groundwater is less than 20 feet below ground surface.

(2) Potential receptors. This pathway is considered complete for a potential receptor if the first encountered groundwater is less than 20 feet below ground surface.

b. Pathway clearance. If the pathway is not complete, no further action is required for this pathway. If the pathway is complete and the maximum concentrations of all chemicals of concern do not exceed the Tier 1 levels for this pathway, no further action is required for this pathway.

c. Utility company notification. The utility company which supplies water service to the area must be notified of all actual and potential water line impacts as soon as knowledge of a potential risk is determined.

d. Corrective action response.

(1) For actual receptors, if the Tier 1 levels are exceeded for this pathway, all water lines within 200 feet must be replaced with water line materials and gasket materials of appropriate construction in accordance with current department standards set forth in 567—Chapter 43 and with no less than nitrile or FKM gaskets or as otherwise approved by the department, or the water lines must be relocated beyond the 200-foot distance from the source. A Tier 2 assessment must be conducted for this pathway if lines are not replaced or relocated.

(2) For potential receptors, upon utility company notification, no further action will be required for this pathway.

135.9(9) *Soil to water line pathway assessment.* This pathway addresses the potential for creating a drinking water ingestion risk due to contact with water lines and infusion into the drinking water.

a. Pathway completeness and receptor evaluation.

(1) Actual receptors. This pathway is considered complete for an actual receptor if a water line exists within 200 feet of the source.

(2) Potential receptors. This pathway is always considered complete for potential receptors.

b. Pathway clearance. If the pathway is not complete for actual receptors, no further action is required for this pathway. If the pathway is complete for actual receptors and the maximum concentrations of all chemicals of concern do not exceed Tier 1 levels for this pathway, no further action is required. For potential receptors, upon utility company notification, no further action will be required for this pathway for potential receptors.

c. Utility company notification. The utility company which supplies water service to the area must be notified of all actual and potential water line impacts as soon as knowledge of a potential risk is determined.

d. Corrective action response. For actual receptors, if the Tier 1 levels are exceeded for this pathway, all water lines within 200 feet must be replaced with water line materials and gasket materials of appropriate construction in accordance with current department standards set forth in 567—Chapter 43 and with no less than nitrile or FKM gaskets or as otherwise approved by the department, or the water lines must be relocated beyond the 200-foot distance from the source. Excavation of soils to below Tier 1 levels may be undertaken in accordance with 135.9(7)*"h."* If none of these options is implemented, a Tier 2 assessment must be conducted for this pathway.

135.9(10) *Surface water pathway assessment.* This pathway addresses the potential for contaminated groundwater to impact surface water bodies creating risks to human health and aquatic life.

a. Pathway completeness. This pathway is considered complete if a surface water body is present within 200 feet of the source. For purposes of Tier 1, surface water bodies include both general use segments and designated use segments as provided in 567—subrule 61.3(1).

b. Receptor evaluation. The Tier 1 levels for this pathway only apply to designated use segments of surface water bodies as provided in 567—subrules 61.3(1) and 61.3(5). The point of compliance is the source with the highest concentrations of chemicals of concern. General use segments of surface water bodies as provided in 567—paragraph 61.3(1)*"a"* are only subject to the visual inspection criteria.

c. Visual inspection requirements. A visual inspection of all surface water bodies within 200 feet of the source must be conducted to determine if there is evidence of a sheen on the water or there is evidence of petroleum residue along the bank. If a sheen or residue is evident or has been reported to be present, the groundwater professional must make a sufficient investigation to reasonably determine its source. If in the opinion of the groundwater professional, the sheen is not associated with the underground storage tank site, the professional must report and reasonably justify this opinion. If in the opinion of the groundwater professional the sheen is not a petroleum-regulated substance, a sample must be laboratory tested in accordance with 567—135.16(455B) to confirm it is not a petroleum-regulated substance.

d. Pathway clearance. If the pathway is not complete or it is complete and the maximum concentrations of all chemicals of concern at the point of compliance do not exceed the Tier 1 levels and there is no petroleum sheen or residue attributable to the site, no further action is required for assessment of this pathway.

e. Corrective action response. If a Tier 1 level is exceeded for any chemical of concern for a designated use segment within 200 feet of the source, or the groundwater professional determines the presence of a petroleum-regulated substance sheen or residue, a Tier 2 assessment of this pathway must be conducted.

135.9(11) *Tier 1 submission and review procedures.*

a. Within 90 calendar days of release confirmation or another reasonable period of time determined by the department, owners and operators must submit to the department a Tier 1 report in a format prescribed by the department and in accordance with these rules and the department Tier 1 guidance.

b. If the owner or operator elects to prepare a Tier 2 site cleanup report instead of a Tier 1 assessment, the department must be notified in writing prior to the expiration of the Tier 1 submission deadline. The Tier 2 site cleanup report must be submitted to the department in accordance with rule 567—135.10(455B) within 180 calendar days of release confirmation or another reasonable period of time determined by the department.

c. Tier 1 report completeness and accuracy. A Tier 1 report is considered to be complete if it contains all the information and data required by this rule and the department Tier 1 guidance. The report is accurate if the information and data is reasonably reliable based first on application of the standards in these rules and department guidance and second, generally accepted industry standards.

d. The certified groundwater professional shall include the following certification with the Tier 1 site assessment report:

I, _____, Groundwater Professional Certification No. _____, am familiar with all applicable requirements of Iowa Code section 455B.474 and all rules and procedures adopted thereunder including, but not limited to, 567—Chapter 135 and the Department of Natural Resources Tier 1 guidance. Based on my knowledge of those documents and information I have prepared and reviewed regarding this site, UST Registration No. _____, LUST No._____ I certify that this document is complete and accurate as provided in 567 IAC 135.9(11)*"c"* and meets the applicable requirements of the Tier 1 site assessment.

Signature:

Date:

e. Upon receipt of the groundwater professional's certified Tier 1 report, the groundwater professional's proposed site classification for the site shall be determinative unless, within 90 days of receipt, the department identifies material information in the report that is inaccurate or incomplete. Material information may be data found to be inaccurate or incomplete or a report that lacks information which, if correct and complete, would result in a different site classification than proposed by the certified groundwater professional. If the department determines that the site cleanup report is inaccurate or incomplete, the department shall notify the groundwater professional of the inaccurate or incomplete information within 90 days of receipt of the report and shall work with the groundwater professional and the party responsible for cleanup to obtain correct information or additional information necessary to appropriately classify the site. If the groundwater professional recommends proceeding to Tier 2, or a Tier 2 site cleanup report is required pursuant to 135.7(5)*"g,"* 135.8(5), or 567—135.9(455B), the groundwater professional's site classification and pathway classification recommendations shall not be considered determinative until the Tier 2 report is submitted for review as provided in 135.10(11).

f. If a "no action required" site classification is proposed, the department shall review the report in accordance with 135.12(6) and the review standards in paragraph 135.9(11)*"e."*

135.9(12) *Tier 1 site classification and corrective action response.*

a. No action required site classification. At Tier 1, a site is only eligible for a "no action required" classification. To be classified as no action required, each pathway must meet the requirements for pathway clearance as specified in this rule. If the department determines a no action required site classification is appropriate, a no further action certificate will be issued as provided in 135.12(10).

b. Where an individual pathway or a chemical group meets the requirements for clearance but the site is not entitled to a no action required classification, only those pathways and chemical groups which do not meet the no further action requirements must be evaluated as part of a Tier 2 assessment as provided in rule 567—135.10(455B).

c. Compliance monitoring and confirmation sampling. Compliance monitoring is not an acceptable corrective action at Tier 1. Except for soil gas sampling under 135.9(7), confirmation sampling to verify a sample does not exceed a Tier 1 level is not required. However, the department retains the authority to require confirmation sampling from existing groundwater monitoring wells if a no action required classification is being proposed at Tier 1 and the department has a reasonable basis to question the representative validity of the samples based on, for example, the seasonal bias of the sampling, evidence of multiple sources of releases, marginal groundwater monitoring well locations and analytical variability.

d. Expedited corrective action. Expedited corrective action is permissible in accordance with 135.12(11).

[**ARC 7621B**, IAB 3/11/09, effective 4/15/09; **ARC 9011B**, IAB 8/25/10, effective 9/29/10; **ARC 9331B**, IAB 1/12/11, effective 2/16/11; **ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.10(455B) Tier 2 site assessment policy and procedure.

135.10(1) *General conditions.* A Tier 2 site assessment must be conducted and a site cleanup report submitted for all sites which have not obtained a no action required site classification and for all pathways and chemicals of concern groups that have not obtained no further action clearance as provided in 567—135.9(455B). If in the course of conducting a Tier 2 assessment, data indicates the conditions for pathway clearance under Tier 1 no longer exist, the pathway shall be further assessed under this rule. The Tier 2 assessment and report must be completed whenever free product is discovered as provided in 567—135.7(455B). If the owner or operator elects to complete the Tier 2 site assessment without doing a Tier 1 assessment, all the Tier 1 requirements as provided in 567—135.9(455B) must be met in addition to requirements under this rule.

a. Guidance. The Tier 2 site assessment shall be conducted in accordance with the department's "Tier 2 Site Assessment Guidance" and these rules. The site cleanup report shall be submitted on forms and in a format prescribed by this guidance. The Tier 2 data analysis shall be performed by using computer software or online application developed by the department.

b. Classification. At Tier 2, individual pathways may be classified as high risk or low risk or no action required and separate classification criteria may apply to actual and potential receptors for any pathway. A single pathway may have multiple classifications based on actual or potential receptor evaluations. A pathway must meet both the criteria for actual and potential receptors for the pathway to obtain a classification of no action required. Sites may have multiple pathway classifications. For a site to obtain a no action required classification, all pathways must meet the individual pathway criteria for no action required classification.

c. Public right-of-way. As a general rule, public right-of-way will not be considered an area of potential receptor exposure except for potential sanitary sewer evaluation under the soil and groundwater vapor pathways, subrules 135.10(6) and 135.10(7).

135.10(2) *General Tier 2 assessment procedures.*

a. Objectives. The objective of a Tier 2 assessment is to collect site-specific data and with the use of Tier 2 modeling determine what actual or potential receptors could be impacted by chemicals of concern and what concentrations at the source are predicted to achieve protection of these receptors. Both Tier 1 and Tier 2 are based on achieving similar levels of protection of human health, safety and the environment.

b. Groundwater modeling. Tier 2 uses fate and transport models to predict the maximum distance groundwater contamination is expected to move and the distribution of concentrations of chemicals of concern within this area. The model is used for two basic purposes. One, it is used to predict at what levels of concentration contamination would be expected to impact actual and potential receptors. Two, it is used to determine a concentration at the source which if achieved, and after dispersion and degradation,

would protect actual and potential receptors at the point of exposure. In predicting the transport of contaminants, the models assume the contaminant plume is at "steady state" such that concentrations throughout the plume have reached a maximum level and are steady or decreasing. The Tier 2 models are only designed to predict transport in a direct line between the source and downgradient to a receptor. In order to more reasonably define a modeled plume in all directions, paragraph *"i"* defines a method of decreasing modeled concentrations as a percentage of their distance in degrees from the downgradient direction.

c. Soil vapor models. The soil vapor models are vertical transport models and do not use modeling to predict soil contaminant transport horizontally to receptors.

d. Soil leaching to groundwater modeling. The soil leaching to groundwater model is a model that predicts the maximum concentrations of chemicals of concern that would be expected in groundwater due to vertical leaching from the area of maximum soil concentrations and then incorporates the groundwater transport models to predict contaminant transport through groundwater pathways.

e. Modeling default parameters. The Tier 2 model formulas and applicable parameters are designated in Appendix B and must be followed unless otherwise specified in these rules. Unless otherwise specified, target levels at a point of exposure may be the Tier 1 level(s) or may be determined using site-specific parameters. The target level at a point of exposure is calculated using the Tier 1 formulas in Appendix A and either site-specific measurements or the default values for those parameters identified as "optional" and "site-specific" in Appendix B.

f. Source width. The source width and source length are variables used in modeling and must be determined by the following criteria and as specified in the department's Tier 2 guidance. The following are not to be used as criteria for defining the extent of the contaminant plumes.

(1) Source width (equals S_w in models) for groundwater transport modeling. The sum of group one chemical (benzene, toluene, ethylbenzene, xylenes or "BTEX") concentrations for each groundwater sample is determined and the location of the sample with the maximum total BTEX is identified. Linear interpolation is used to estimate the area where groundwater concentrations would be expected to exceed 50 percent of the maximum BTEX value, and this area is considered for the source width measurement. The same procedure is used to determine source width for group two chemicals, using TEH in groundwater. The width of the groundwater contamination perpendicular to estimated groundwater flow direction (S_w) is determined, and the larger of either group one or group two chemicals is used in the groundwater transport model.

(2) Source width (S_w) and source length (equals W in models) for soil leaching to groundwater transport modeling. Both the source width perpendicular to the estimated groundwater flow direction (S_w) and the source length parallel to the estimated groundwater flow direction (W) are used in the soil leaching to groundwater model. The sum of BTEX concentrations for each soil sample is determined and the location of the sample with the maximum total BTEX is identified. Concentrations from both the vadose zone and the saturated zone must be considered when determining the maximum. Linear interpolation is used to estimate the area where soil concentrations would be expected to exceed 50 percent of the maximum BTEX value, and this area is considered for the source width and source length measurements. The same procedure is used to determine source width for group 2 chemicals, using TEH in soil. Source width and source length measurements for BTEX in groundwater are also taken following the same linear interpolation criteria in *"f"*(1) above. The source width value used in the model is the greatest of either the soil source width measurements or the groundwater source width measurement. The source length value used in the model is the greatest of either of the soil source length measurements or the groundwater length measurement.

g. Modeled simulation line. The simulation line represents the predicted maximum extent of groundwater contamination and distribution of contaminant concentrations between the source(s) and actual or potential receptor locations. The model calculates the simulation line using maximum concentrations at the source(s) and predicting the amount of dispersion and degradation. Modeled data in the simulation line are compared with actual contaminant concentrations to verify the predictive validity of the model and to make risk classification decisions.

h. Modeled site-specific target level (SSTL) line. The modeled SSTL line represents acceptable levels of contaminant concentrations at points between and including the source(s) and an applicable point(s) of exposure or other point(s) of compliance (ex. a potential receptor point of exposure). The SSTL line is calculated by assuming an applicable target level concentration at the point(s) of exposure or point(s) of compliance and modeling back to the source to determine the maximum concentrations at the source (SSTL) that must be achieved to meet the target level at the point of exposure or compliance. Comparison of contaminant concentrations from actual samples to this SSTL line is used to determine a risk classification and determine appropriate corrective action response.

i. Crossgradient and upgradient modeling. In determining the SSTL line and the simulation line in directions other than downgradient, the modeled contaminant concentrations are applied to reduced distances, as specified in the "Tier 2 Guidance." The modeled results are applied to 100 percent of the distance within an angle of 30 degrees on either side of the range of downgradient directions, as specified in Tier 2 guidance. The modeled results are applied to 20 percent of the distance in the upgradient direction and directly proportional distances between these two outer limits. If the groundwater gradient is less than 0.005 or the groundwater contaminant plume shows no definitive direction or shows directional reversals, the modeled concentrations are applied to 100 percent of the distance in all directions from the source. As the downgradient velocity increases, the upgradient modeled distance is reduced to less than 20 percent of the downgradient modeled distance.

j. Plume definition. The purpose of plume definition at Tier 2 is to obtain sufficient data to determine the impact on actual and potential receptors, to determine and confirm the highest levels of contamination, to verify the validity of the models, and to determine groundwater flow direction. The number and location of borings and monitoring wells and the specificity of plume definition will depend on the pathway or pathways being assessed and the actual or potential receptors of concern. Unless otherwise specified, groundwater and soil contamination shall be defined to Tier 1 levels for the applicable pathways. Linear interpolation between two known concentrations must be used to delineate plume extent. Samples with no concentrations detected shall be considered one-half the detection limit for interpolation purposes.

k. Pathway completeness. Unless a pathway has obtained clearance under Tier 1, each pathway must be evaluated at Tier 2. Pathways are generally considered complete (unless otherwise specified) and receptors affected if actual receptors or potential receptor points of exposure exist within the modeled contaminant plume using the modeled simulation line calculated to the applicable target level at a point of exposure. If the actual contaminant plume exceeds the modeled plume, the pathway is complete and must be evaluated if actual or potential points of exposure exist within a distance extending 10 percent beyond the edge of the defined plume.

l. Points of exposure and compliance. For actual receptors, the point(s) of exposure is the receptor. For potential receptors, the potential receptor point(s) of exposure is determined by using actual plume definition or the modeled simulation line to determine all points which exceed the target level(s) for potential receptors. The potential receptor point(s) of exposure is the location(s) closest to the source where a receptor could reasonably exist and which is not subject to an institutional control; for example, the source is the potential receptor point of exposure if not subject to an institutional control or an adjoining property boundary line if that property is not subject to an institutional control. At Tier 2, the point(s) of exposure or potential receptor point(s) of exposure is a point of compliance unless otherwise specified. Other points of compliance are specified by rules and will generally include all points along the SSTL line for purposes of pathway and site classification and corrective action response.

135.10(3) *Bedrock assessment.*

a. General. As provided in 135.8(5), if bedrock is encountered before groundwater, special assessment procedures under this subrule apply. The Tier 2 assessment procedures apply to the extent they are not inconsistent with this subrule. The objectives of these special procedures are to avoid creating a preferential pathway for contamination through a confining layer to a bedrock aquifer; to avoid creating a preferential pathway to a fractured system, and to determine whether groundwater transport modeling can be used and, if not, what alternative procedures are required. The owner or operator may choose to conduct a Tier 3 assessment under 567—135.11(455B) as an alternative to

proceeding under this subrule. For sites where bedrock is encountered before groundwater, there are three general categories of site conditions which determine the assessment procedures that apply:

(1) Nongranular bedrock. Nongranular bedrock is bedrock which is determined to not act as a granular aquifer as provided in subparagraph (2). Nongranular bedrock generally has some type of fractured system where groundwater transport modeling cannot be applied and which makes it difficult to define the extent of contamination.

(2) Granular bedrock. Granular bedrock is bedrock which is determined to act as a granular aquifer and for which monitoring wells do not exist at the source. For purposes of this rule, a granular aquifer is one that shows no extraordinary variations or inconsistencies in groundwater elevations across the site, groundwater flow, hydraulic conductivities, or total dissolved solid concentrations among monitoring wells. Although the extent of contamination can be defined in granular bedrock, groundwater transport modeling cannot be used because monitoring wells shall not be installed at the source if soil contamination is present. If soil contamination above a Tier 1 level is not identified or an overexcavation of contaminated soil has successfully removed all soil contamination greater than a Tier 1 level, then monitoring wells can be installed in the source area and the site can be evaluated as exempt granular bedrock.

(3) Exempt granular bedrock. Exempt granular bedrock is bedrock which is determined to act as a granular aquifer as provided in subparagraph (2) and for which monitoring wells exist at the source as of August 15, 1996. Sites in exempt granular bedrock shall be evaluated using regular Tier 1 and Tier 2 procedures in this rule.

NOTE: Nongranular bedrock is subject to special bedrock assessment procedures even if groundwater monitoring wells exist at the source, because the flow is not predictable by the Tier 2 model.

b. Exempt soil pathways. The soil vapor to enclosed space pathway and the soil to water lines pathway shall be assessed under the regular Tier 2 procedures in subrules 135.10(7) and 135.10(9) respectively. In all cases, the assessment must comply with the policy of avoiding a preferential pathway to groundwater consistent with subrule 135.8(5) and this subrule.

c. Soil and groundwater assessment. The vertical and horizontal extent of soil contamination shall first be defined to Tier 1 levels for the soil leaching to groundwater pathway without drilling into bedrock. A minimum of three groundwater monitoring wells shall be located and installed between 50 to 100 feet beyond the soil contamination Tier 1 levels to avoid creating a preferential pathway. Analytical data as normally required by these rules and guidance must be obtained.

d. Soil contamination remediation. For all sites where soil contamination exceeds the soil leaching to groundwater Tier 1 levels, soil excavation or other active soil remediation technology must be conducted in accordance with department guidance to reduce concentrations to below this Tier 1 level. Soil remediation monitoring must be conducted in accordance with 567—135.12(455B).

e. Groundwater plume definition. If it is determined the groundwater acts in a manner consistent with a granular aquifer as provided in subparagraph *"a"*(2) and guidance but does not meet the criteria for exemption under subparagraph *"a"*(3), the plume must be defined. The policy of avoiding the creation of a preferential pathway to the bedrock aquifer in accordance with 135.8(5) must be followed.

f. Soil leaching to groundwater ingestion pathway. Under this subrule, the soil leaching to groundwater pathway only need be evaluated in combination with the groundwater ingestion pathway. Because of the policies requiring soil remediation to the soil leaching to groundwater Tier 1 levels under paragraphs *"d"* and *"k,"* the soil leaching pathway target levels applicable to other groundwater transport pathways and other soil pathways would not be exceeded. If a soil leaching to groundwater Tier 1 level is exceeded, the pathway is high risk.

g. Special procedures for the groundwater ingestion pathway.

(1) A protected groundwater source is assumed without measurements of hydraulic conductivity for all sites designated as granular or nongranular bedrock.

(2) Groundwater well receptor evaluation for granular and nongranular bedrock designations. All drinking and non-drinking water wells within 1,000 feet of the source must be identified and tested for chemicals of concern. All public water supply systems within one mile of the source must be identified

and raw water tested for chemicals of concern. All area within 1,000 feet of the source is considered a potential receptor point of exposure.

(3) Target levels. The following target levels apply regardless of granular aquifer designation. If drinking water wells are within 1,000 feet of the source, the applicable target level is the groundwater ingestion pathway Tier 1 level for actual receptors. If non-drinking water wells are within 1,000 feet of the source, the applicable target level is the groundwater ingestion pathway Tier 1 level for potential receptors. For potential wells, the applicable target level is the groundwater ingestion pathway Tier 1 level for potential receptors.

(4) Sentry well. If the Tier 1 level for actual receptors is exceeded at sites designated as granular bedrock and the receptor has not yet been impacted, a monitoring well shall be placed between the source and an actual receptor, outside the defined plume and approximately 200 feet from the actual receptor. For alternative well placement, the certified groundwater professional must provide justification and obtain department approval. This monitoring well is to be used for monitoring potential groundwater contamination of the receptor.

(5) High risk classification. A site where bedrock is encountered before groundwater shall be classified high risk for this pathway if any of the following conditions exist regardless of granular aquifer determination: The target level at any actual receptor is exceeded; drinking water well receptors are present within 1,000 feet and groundwater concentrations in any monitoring well exceed the groundwater ingestion Tier 1 level for actual receptors; non-drinking water wells are within 1,000 feet and groundwater concentrations in any monitoring well exceed the groundwater ingestion pathway Tier 1 level for potential receptors; or for sites designated nongranular bedrock, if groundwater concentrations for chemicals of concern from any public water system well within one mile of the source exceed 40 percent of the Tier 1 level for actual receptors, and groundwater concentrations in any monitoring well exceed the groundwater ingestion Tier 1 level for actual receptors. Corrective action shall be undertaken as provided in paragraph *"k."*

(6) Low risk classification. Sites without an actual receptor within 1,000 feet shall be classified as low risk for this pathway if no high risk conditions exist, and the Tier 1 level for potential receptors is exceeded. The site is subject to monitoring as provided in paragraph *"l."* If an actual receptor exists within 1,000 feet, a site designated as granular or nongranular bedrock shall be classified low risk for this pathway when soil contamination has been removed or remediated to below the soil leaching to groundwater Tier 1 levels, and all groundwater monitoring wells are non-detect or below the applicable target level for actual and potential receptors. A site may be reclassified to no action required for this pathway after all monitoring wells meet the exit monitoring criteria as specified in paragraph *"l."* (NOTE: Exit monitoring is required because groundwater monitoring wells are not located at the source or if they are, the data is highly unreliable given the nature of bedrock.) If actual receptors do not exist or have been properly plugged and concentrations exceed the Tier 1 level for potential receptors, institutional controls and notification to permitting authorities may be employed in accordance with 135.10(4)*"i."* The institutional control must prohibit use of groundwater for 1,000 feet.

h. Special procedures for the groundwater vapor to enclosed space pathway.

(1) Soil gas plume. Soil gas measurements must be taken regardless of granular aquifer determination and in accordance with Tier 2 guidance to determine a soil gas plume. Soil gas where practical should be measured at the soil-bedrock interface. At a minimum, soil gas must be measured at the suspected area of maximum contamination and near the three monitoring wells with the highest concentrations that exceed the Tier 1 level for the groundwater to enclosed space pathway. Where the plume has been defined, soil gas measurements should be taken near wells exceeding the Tier 1 level. Other soil gas measurements must be taken as needed to define the extent of contamination where soil gas measurements exceed the soil gas vapor target levels.

(2) The soil gas target levels are those defined in 135.10(7)*"f."*

(3) High risk classification. A site designated as granular or nongranular bedrock shall be classified high risk for this pathway if an actual confined space receptor exists within 50 feet of the soil gas plume based on the soil gas target level as defined in 135.10(6).

(4) Low risk classification. A site designated as granular or nongranular bedrock shall be classified as low risk for this pathway if the soil gas exceeds the vapor target level at any point and no actual confined space receptors exist within 50 feet of the soil gas contaminant plume.

i. Special procedure for the groundwater to water line pathway.

(1) Target level. The applicable target level is the Tier 1 level for the specific type of water line.

(2) High risk classification. A site designated as granular or nongranular bedrock shall be classified high risk for this pathway if the highest groundwater elevation is within three feet of the bottom of a water line as provided in subparagraph 135.10(8)*"a"*(1), risk classification cannot be determined as provided in rule 567—135.12(455B) due to limitations on placement of monitoring wells, and water lines exist within 200 feet of a monitoring well which exceeds the Tier 1 level.

j. Special procedures for the surface water pathway. Any surface water body within 200 feet of the source must be evaluated under the following for sites designated as granular or nongranular bedrock. The provisions of 135.10(10) apply to the extent they are not inconsistent with the following, including the visual inspection requirements.

(1) Point of compliance. The monitoring well closest to the surface water body must be used as the point of compliance to evaluate impacts to designated use segments as described in subrule 135.10(10) and for general use segments that fail the visual inspection criteria of paragraph 135.10(10)*"b."* If the surface water criteria are exceeded for a designated use segment, an allowable discharge concentration must be calculated and met at the point of compliance. For general use segments failing the visual inspection criteria, the acutely toxic target level must be met at the point of compliance.

(2) High risk classification. A site designated as granular or nongranular bedrock shall be classified high risk for this pathway if the surface water body is within 200 feet of the source, risk classification cannot be determined as per 567—135.12(455B) due to limitations on placement of monitoring wells, and the monitoring well closest to the designated use segment exceeds the allowable discharge concentration. A general use segment failing the visual inspection criteria is high risk if, after the sheen is removed, the monitoring well closest to the general use segment exceeds the acutely toxic target level.

(3) Low risk classification. If the allowable discharge concentration is not exceeded at the point of compliance, the site shall be classified as low risk for this pathway and subject to monitoring under paragraph *"l."* The monitoring well closest to the receptor shall serve as the sentry well for monitoring purposes.

k. High risk corrective action response. Owners and operators have the option to conduct a Tier 3 assessment in accordance with 567—135.11(455B).

(1) Groundwater ingestion pathway. For high risk sites, where soil exceeds the soil leaching to groundwater Tier 1 level for actual receptors, soil excavation or other active remediation of soils must be conducted in accordance with department guidance to reduce soil concentrations to below the soil leaching Tier 1 level. Corrective action other than monitoring of groundwater is required at sites designated as nongranular bedrock if the actual receptor has been or is likely to be impacted. Corrective action other than monitoring of groundwater is required at sites designated as granular bedrock if the actual receptor has been impacted or the sentry well required by subparagraph 135.10(3)*"g"*(4) has been impacted above Tier 1 levels. Acceptable corrective action for impacted or vulnerable groundwater wells may include active remediation, technological controls, institutional controls, well plugging, relocation, and well reinstallation with construction measures sufficient to prevent contaminant infiltration to the well and to prevent formation of a preferential pathway.

(2) Groundwater ingestion pathway high risk monitoring. For high risk sites designated as nongranular or granular bedrock, if the soil concentrations do not exceed the soil leaching to groundwater Tier 1 levels or have been reduced to this level by corrective action, and corrective action of groundwater is not required as in subparagraph 135.10(3)*"k"*(1), these sites shall be subject to groundwater monitoring as provided in paragraph 135.10(3)*"l."* Corrective action other than monitoring of groundwater is required at sites designated as granular bedrock if groundwater concentrations exceed the applicable target level less than 200 feet from an actual receptor. Reevaluation of the potential for

impact to actual receptors is required at sites designated as nongranular bedrock if concentrations from monitoring wells increase more than 20 percent of the previous samples.

(3) For water line pathways. For high risk sites, active remediation must be conducted to reduce concentrations below the applicable target levels, or water lines and gaskets must be replaced or relocated, including the use of institutional and technological controls. If lines are polybutylene, polyethylene, or asbestos-cement, the lines must be removed or relocated. All water lines that are replaced must be replaced with water line materials and gasket materials of appropriate construction in accordance with current department standards set forth in 567—Chapter 43 and with no less than nitrile or FKM gaskets or as otherwise approved by the department.

(4) Other pathways. For high risk sites other than groundwater ingestion and water lines, active remediation must be conducted to reduce concentrations below the applicable target levels including the use of institutional and technological controls.

l. Monitoring. For high and low risk sites, annual monitoring at a minimum is required as specified below, and potential receptor status for low risk sites must be confirmed. Annual monitoring may be used to meet the exit requirements for no action required classification in accordance with paragraph *"m."*

(1) Groundwater in nongranular bedrock designations. All groundwater monitoring wells must be monitored at least annually.

(2) Groundwater in granular bedrock designations. The following monitoring wells must be monitored at least annually: a well with detected levels of contamination closest to the leading edge of the groundwater plume between the source and the receptor, and a sentry well with concentrations below the applicable target level consistent with subparagraph *"g"*(4) and paragraph *"j."*

(3) Soil gas. For sites where the soil gas target level is exceeded, annual monitoring of soil gas is required at the suspected area of maximum contamination and between the soil gas plume and any actual receptors within 100 feet of the soil gas plume.

m. No action required classification. A site may be given a no action required classification after conducting a Tier 2 assessment as provided in this subrule if maximum soil concentrations do not exceed the Tier 1 levels for the soil leaching pathway, and if groundwater exit monitoring criteria and soil gas confirmation sampling are met as specified below.

(1) Groundwater in nongranular bedrock designations. Exit monitoring requires that samples from all groundwater monitoring wells must not exceed the applicable target levels for annual sampling for three consecutive years. If soil contamination above a Tier 1 level is not identified or if an overexcavation has successfully removed all soil contamination greater than a Tier 1 level and monitoring wells are installed in the source area, exit monitoring criteria are met when two consecutive samples collected at least six months apart from all monitoring wells show concentrations less than the lowest target level.

(2) Groundwater in granular bedrock designations. Exit monitoring must be met in two ways: A monitoring well between the source and the receptor must not exceed applicable target levels for three sampling events, and samples must be separated by at least six months; and the three most recent consecutive groundwater samples from a monitoring well between the source and the receptor with detected levels of contamination must show a steady or declining trend and meet the following criteria: The first of the three samples must be greater than detection limits, concentrations cannot increase more than 20 percent from the first of the three samples to the third sample; concentrations cannot increase more than 20 percent from the previous sample; and samples must be collected at least six months apart.

(3) Soil gas. Confirmation sampling for soil gas must be conducted as specified in 135.12(6)*"c."*

n. After receiving a no action required classification, all monitoring wells must be properly plugged in accordance with 567—Chapters 39 and 49.

135.10(4) *Groundwater ingestion pathway assessment.*

a. Pathway completeness. Unless cleared at Tier 1, this pathway is complete and must be evaluated under any of the following conditions: (1) the first encountered groundwater is a protected groundwater source; or (2) there is a drinking water well or a non-drinking water well within the modeled groundwater plume or the actual plume as provided in 135.10(2)*"j"* and 135.10(2)*"k."*

b. Receptor evaluation. All drinking and non-drinking water wells located within 100 feet of the largest actual plume (defined to the appropriate target level for the receptor type) must be tested, at a minimum, for chemicals of concern as part of the receptor evaluation. Actual plumes refer to groundwater plumes for all chemicals of concern. Untreated or raw water must be collected for analysis unless it is determined to be infeasible or impracticable.

All existing drinking water wells and non-drinking water wells within the modeled plume or the actual plume as provided in paragraph *"a"* must be evaluated as actual receptors. Potential receptors only exist if the groundwater is a protected groundwater source. Potential receptor points of exposure are those points within the modeled plume or actual plume that exceed the potential point of exposure target level. The point(s) of compliance for actual receptor(s) is the receptor. The point(s) of compliance for potential receptor(s) is the potential receptor point of exposure as provided in 135.10(2)*"j"* and 135.10(2)*"k."*

c. Target levels. For drinking water wells, the target level at the point(s) of exposure is the Tier 1 level for actual receptors. For non-drinking water wells, the target level at the point(s) of exposure is the Tier 1levels for potential receptors. For potential receptors, the target level at the potential receptor point(s) of exposure is the Tier 1 level for potential receptors.

d. The soil leaching to groundwater pathway must be evaluated in accordance with 135.9(5) if this pathway is complete.

e. Modeling. At Tier 2, the groundwater well located within the modeled plume is assumed to be drawing from the contaminated aquifer, and the groundwater transport model is designed to predict horizontal movement to the well. If the groundwater professional determines that assessment of the vertical movement of contamination is advisable to determine the potential or actual impact to the well source, a Tier 3 assessment of this vertical pathway may be conducted. The groundwater professional shall submit a work plan to the department specifying the assessment methods and objectives for approval in accordance with 567—135.11(455B). Factors which should be addressed include, but are not limited to, well depth and construction, radius of influence, hydrogeologic separation of aquifer, preferential pathways, and differing water quality characteristics.

f. Public water supply well assessment. Rescinded IAB 3/11/09, effective 4/15/09.

g. Plume definition. The groundwater plume shall be defined to the applicable Tier 1 level for actual receptors except, where there are no actual receptors and the groundwater is a protected groundwater source, the plume shall be defined to the Tier 1 level for potential receptors.

h. Pathway classification. This pathway shall be classified as high risk, low risk or no action required in accordance with 567—135.12(455B).

i. Corrective action response. Corrective action must be conducted in accordance with 567—135.12(455B). Abandonment and plugging of wells in accordance with 567—Chapters 39 and 49 is an acceptable corrective action response.

j. Use of institutional controls. Institutional controls may be used to obtain no action required pathway classification. If the pathway is complete and the concentrations exceed the applicable Tier 1 level(s) for actual receptors, the drinking or non-drinking water well must be properly plugged in accordance with 567—Chapters 39 and 49 and the institutional control must prohibit the use of a protected groundwater source (if one exists) within the actual or modeled plume as provided in paragraphs 135.10(2)*"j"* and 135.10(2)*"k."* If the Tier 1 level is exceeded for potential receptors, the institutional control must prohibit the use of a protected groundwater source within the actual or modeled plume, whichever is greater. If concentrations exceed the Tier 1 level for drinking water wells and the groundwater is a protected groundwater source, the owner or operator must provide notification of the site conditions on a department form to the department water supply section, or if a county has delegated authority, then the designated county authority responsible for issuing private water supply construction permits or regulating non-public water well construction as provided in 567—Chapters 38 and 49.

k. Notification of well owners. Upon receipt of a Tier 2 site cleanup report and as soon as practicable, the department shall notify the owner of any public water supply well identified within

the Tier 2 site cleanup report that a leaking underground storage tank site is within 2,500 feet and an assessment has been performed.

135.10(5) *Soil leaching to groundwater pathway assessment.*

a. General. The soil leaching to groundwater pathway is evaluated using a one-dimensional model which predicts vertical movement of contamination through soil to groundwater and transported by the groundwater to a receptor. The model is used to predict the maximum concentrations of chemicals of concern that would be present in groundwater beneath a source which is representative of residual soil contamination and maximum soil concentrations. The predicted groundwater concentrations then must be used as a groundwater source concentration to evaluate its impact on other groundwater transport pathways, including the groundwater ingestion pathway, the groundwater vapor pathway, the groundwater water line pathway and the surface water pathway.

b. Pathway completeness. This pathway is complete whenever a groundwater transport pathway is complete as provided in this rule.

c. Plume definition. The soil plume shall be defined to the Tier 1 levels for the soil leaching to groundwater pathway.

d. Receptor evaluation. Receptors for this pathway are the same as the receptors for each complete groundwater transport pathway.

e. Modeling and target levels. The soil and groundwater parameters shall be measured as provided in 135.10(2).

The soil leaching to groundwater model shall be used to calculate the predicted groundwater source concentration. Each applicable groundwater transport pathway model shall then be used in accordance with the rules for that pathway to predict potential impact to actual receptors, the location of potential receptor points of exposure and the site-specific target level (SSTL) in groundwater at the source. This SSTL then is used to calculate a SSTL for soil at the source. If the soil concentrations exceed the SSTL for soil, corrective action response shall be evaluated.

f. Corrective action response. If the maximum soil concentration at the source exceeds the SSTL for soil for actual or potential receptors, corrective action must be taken in accordance with 567—135.12(455B).

135.10(6) *Groundwater vapor to enclosed space pathway assessment.*

a. Pathway completeness. Unless cleared at Tier 1, this pathway is always considered complete for purposes of Tier 2.

b. Explosive vapor survey. If an explosive vapor survey has not been conducted as part of a Tier 1 assessment, an explosive vapor survey of enclosed spaces must be conducted during the Tier 2 assessment in accordance with 135.9(6)*"b"* and procedures outlined in the department's Tier 1 guidance.

c. Confined space receptor evaluation. Actual and potential receptors are evaluated at Tier 2 for this pathway.

(1) Actual receptors. An existing confined space within the modeled groundwater plume or the actual groundwater plume as provided in 135.10(2)*"j"* and 135.10(2)*"k"* is an actual receptor. For the purpose of Tier 2, a confined space is a basement in a building occupied by humans. Buildings constructed with a concrete slab on grade or buildings constructed without a concrete slab, but with a crawl space are not considered confined spaces. Sanitary sewers are considered confined space receptors and preferential pathways if an occupied building exists within 200 feet of where the sewer line crosses over or through actual or modeled groundwater contamination which exceeds the target levels calculated for sewers. The sanitary sewer includes its utility envelope. The point of exposure is the receptor and points of compliance include the locations where target level measurements may be taken as provided in paragraphs *"f"* and *"g."*

(2) Potential receptors. Potential receptors are confined spaces that do not presently exist but could exist in the future. Areas within the actual groundwater plume perimeter or modeled groundwater plume perimeter are considered potential receptor points of exposure. Potential receptors are evaluated and target levels established based on the current zoning as provided in paragraph *"f."* The potential receptor point of exposure is a point of compliance.

d. Owners and operators may be required to address vapor inhalation hazards in occupied spaces other than confined spaces as defined in these rules when evidence arises which would give the department a reasonable basis to believe vapor hazards are present or may occur.

e. Plume definition.

(1) The soil plume must be defined in accordance with 135.10(2)*"f"* for the purposes of estimating source width and source length used in soil leaching to groundwater and groundwater transport models.

(2) The groundwater plume must be defined to the target levels derived from site-specific data as provided in paragraph *"f."*

f. Target levels. Target levels can be based on groundwater concentrations, soil gas measurements, and indoor vapor measurements as provided below.

(1) For actual receptors and potential receptors, groundwater modeling as provided in 135.10(2) is used to calculate the groundwater concentration target level at the point of exposure. Default residential exposure factors, default residential building parameters, and a target risk of 10^{-4} are used to determine target levels for actual receptors and potential receptor points of exposure in residential areas and areas with no zoning. Default nonresidential exposure factors, default nonresidential building parameters, and a target risk of 10^{-4} are used to determine target levels for actual receptors and potential receptor points of exposure in nonresidential areas. Default values are provided in Appendices A and B.

(2) For actual receptors, the indoor vapor target levels are designated in 135.10(7)*"f."* For actual and potential receptors, the soil gas target levels are designated in 135.10(7)*"f."*

(3) Sanitary sewers are treated as human health receptors, and groundwater concentration target levels at the point of exposure are based on the application of a target risk of 2×10^{-4} for carcinogens and a hazard quotient of 2 for noncarcinogens.

g. Pathway evaluation and classification. Upon completion of evaluation of analytical results of appropriate samples and modeled data, the pathway must be classified high risk, low risk or no further action as provided in rule 567—135.12(455B).

(1) Actual receptors. If it can be demonstrated that the groundwater plume has reached steady state concentrations under a confined space, indoor vapor measurements at the point(s) of exposure and soil gas measurements at an alternative point(s) of compliance may be used for the pathway evaluation. When assessing sanitary sewers for pathway clearance, soil gas measurements may be evaluated against the soil gas target levels; however, indoor vapor cannot be used as criteria for pathway clearance. Soil gas measurements shall be taken and analyzed in accordance with 135.16(5) and the department's Tier 2 guidance, and at locations in the plume where measured groundwater concentrations exceed the levels which are projected by modeling to exist beneath the actual receptor. If measured groundwater concentrations beneath the actual receptor exceed the levels projected from modeling, then the soil gas measurements may be taken either adjacent to the actual receptor in areas expected to exhibit the greatest soil gas measurements or at an alternative point of compliance between the source and receptor where the actual groundwater concentrations exceed the groundwater concentrations which exist beneath the confined space. If the soil gas measurements and confirmation samples taken in accordance with 135.12(6)*"c"* do not exceed the soil gas target levels, the pathway as to actual receptors shall be classified no action required. If the soil gas target levels are exceeded, either the pathway shall be classified high risk, or indoor vapor measurements may be taken in accordance with the department's Tier 2 guidance. If indoor vapor measurements and confirmation samples do not exceed the indoor vapor target levels, the pathway as to actual confined space receptors shall be classified no action required. If the Tier 1 indoor vapor target levels are exceeded, the pathway shall be classified high risk.

(2) Potential receptors. If the potential receptor groundwater concentration target level(s) is exceeded at any potential receptor point of exposure based on actual data or modeling, the pathway shall be classified low risk. However, if soil gas measurements taken at the potential receptor point(s) of exposure and alternate point(s) of compliance and confirmation samples do not exceed the target levels in 135.10(7)*"f,"* the pathway, as to potential receptors, shall be classified no action required. If the target level(s) for potential sanitary sewer receptors is exceeded, the pathway shall be classified as low risk. Where the area of potential receptor exposure includes public right-of-way, the pathway may be classified as no action required if the owner or operator provides sufficient documentation

to establish that there are no foreseeable plans for construction of sanitary sewers through the area of potential receptor exposure. The municipal authority must acknowledge consent to the no action required classification whenever target levels are exceeded. If the municipal authority reports that it has confirmed plans for construction of sanitary sewers through the area of potential receptor exposure, the pathway shall be reevaluated as an actual receptor.

h. Corrective action response. Unless the pathway is classified as no action required, corrective action for this pathway must be conducted as provided in 567—135.12(455B). Actual receptors are subject to corrective actions which: (1) reduce groundwater concentrations beneath the enclosed space to below the target level; (2) reduce the measured soil gas levels to below the soil gas target levels; (3) reduce the indoor vapor concentrations to below the indoor vapor target level; or (4) reduce the vapor level to below 10 percent of the lower explosive limit (LEL), if applicable. Potential receptors are subject to the monitoring requirements in 135.12(5). Soil vapor monitoring may be conducted in lieu of groundwater monitoring for this pathway. Institutional or technological controls as provided in 567—135.12(455B) may be used.

i. Municipal authority notification for potential sewer receptors. The municipal authority responsible for sewer construction must be notified of the environmental conditions whenever target level(s) is exceeded for potential sanitary sewers. The notification must show the area where groundwater concentrations and soil gas samples exceed target levels. The owner or operator must acknowledge what plans, if any, exist for construction of sanitary sewers through the area of potential receptor exposure.

135.10(7) *Soil vapor to enclosed space pathway assessment.*

a. Pathway completeness. Unless cleared at Tier 1, this pathway is always considered complete for purposes of Tier 2.

b. Explosive vapor survey. If an explosive vapor survey has not been conducted as part of a Tier 1 assessment, an explosive vapor survey of enclosed spaces must be conducted during the Tier 2 assessment in accordance with 135.9(6)*"b"* and procedures outlined in the department's Tier 1 guidance.

c. Confined space receptor evaluation. Actual and potential receptors are evaluated at Tier 2 for this pathway.

(1) Actual receptors. An existing confined space within 50 feet of the edge of the plume is an actual receptor. For the purpose of Tier 2, a confined space is a basement in a building occupied by humans. Buildings constructed with a concrete slab on grade or buildings constructed without a concrete slab, but with a crawl space are not considered receptors. Sanitary sewers are considered confined space receptors and preferential pathways if an occupied building exists within 200 feet of where the sewer line crosses over or through soil contamination which exceeds the target levels calculated for sewers. The sanitary sewer includes its utility envelope. The point of exposure is the receptor and points of compliance include the locations where target level measurements may be taken as provided in paragraphs *"f"* and *"g."*

(2) Potential receptors. Potential receptors are confined spaces that do not presently exist but could exist in the future. Areas where soil concentrations are greater than the Tier 1 level applicable to residential areas or alternative target levels for nonresidential areas as specified in paragraph *"f"* are considered potential receptor points of exposure. Potential receptors are evaluated and target levels established based on the current zoning. An area with no zoning is considered residential. The potential receptor point of exposure is a point of compliance.

d. Owners and operators may be required to address vapor inhalation hazards in occupied spaces other than confined spaces as defined in these rules when evidence arises which would give the department a reasonable basis to believe vapor hazards are present or may occur.

e. Plume definition. The soil plume must be defined to the Tier 1 level for this pathway unless vapor measurements taken at the area(s) with the maximum levels of soil contamination do not exceed the soil gas target level in 135.10(7)*"f."* If soil gas measurements taken from the area(s) of maximum soil concentration do not exceed target levels, confirmation sampling must be conducted in accordance with 135.12(6)*"c"* prior to proposing a no action pathway classification.

f. Target levels. Target levels can be based on soil concentrations, soil gas measurements, and indoor vapor measurements as provided below:

(1) For actual receptors, the soil concentration target level is the Tier 1 level. For potential receptors, the soil concentration target level for residential areas and areas with no zoning is the Tier 1 level. For areas zoned nonresidential, the target level is calculated using the default nonresidential exposure factors and building parameters from Appendix A and a target risk of 10^{-4}.

(2) The following indoor vapor target levels apply to actual receptors other than sanitary sewers and the soil gas target levels apply to all actual and potential receptors. These levels were derived from the ASTM indoor air inhalation and the soil vapor to enclosed space models designated in Appendix A.

	Indoor Vapor ($\mu g/m^3_{air}$)	**Soil Gas ($\mu g/m^3$)**
Benzene	39.2	600,000
Toluene	555	9,250,000

(3) Sanitary sewers are treated as human health receptors, and soil concentration target levels at the point of exposure are based on application of a target risk of 2×10^{-4} for carcinogens and hazard quotient of 2 for noncarcinogens.

g. Pathway evaluation and classification.

(1) Actual receptors. Confined space receptors may be evaluated using soil gas measurements and indoor vapor measurements. When assessing sanitary sewers for pathway clearance, soil gas measurements may be evaluated against the soil gas target levels, however, indoor vapor cannot be used as criteria for pathway clearance. Soil gas measurements shall be taken adjacent to the actual receptor or at an alternative point of compliance between the source and receptor such as the property boundary, and in accordance with 135.16(5) and the department's Tier 2 guidance. If the soil gas measurements and confirmation samples taken in accordance with 135.12(6)*"c"* do not exceed the soil gas target levels, the pathway as to actual receptors shall be classified no action required. If the soil gas target levels are exceeded, either the pathway shall be classified high risk, or indoor vapor measurements may be taken in accordance with the department's Tier 2 guidance. If indoor vapor measurements and confirmation samples do not exceed the indoor vapor target levels, the pathway as to actual receptors shall be classified no action required. If the indoor vapor target levels are exceeded, the pathway shall be classified high risk.

(2) Potential receptors. If the potential receptor target level(s) based on soil concentrations is exceeded at any potential receptor point of exposure, the pathway shall be classified low risk. However, if soil gas measurements taken at the potential receptor point(s) of exposure and alternate point(s) of compliance and confirmation samples do not exceed the target levels in paragraph *"f,"* the pathway shall be classified no action required as to potential receptors. If the target level(s) for potential sanitary sewer receptors is exceeded, the pathway shall be classified as low risk. Where the area of potential receptor exposure includes public right-of-way, the pathway may be classified as no action required if the owner or operator provides sufficient documentation to establish that there are no foreseeable plans for construction of sanitary sewers through the area of potential receptor exposure. The municipal authority must acknowledge consent to the no action required classification whenever target levels are exceeded. If the municipal authority reports that it has confirmed plans for construction of sanitary sewers through the area of potential receptor exposure, the pathway shall be reevaluated as an actual receptor.

h. Corrective action response. Unless the pathway is classified as no action required, corrective action for this pathway must be conducted as provided in 567—135.12(455B) and in accordance with department Tier 2 guidance. Actual receptors are subject to corrective actions which: (1) reduce the indoor vapor concentrations to below the target level; (2) reduce measured soil gas levels to below the soil gas target levels; and (3) if applicable, reduce the vapor level to below 10 percent of the lower explosive limit (LEL). Potential receptors are subject to monitoring requirements as provided in 135.12(5). Soil vapor monitoring may be conducted in lieu of soil monitoring for this pathway. Institutional or technological controls as provided in 567—135.12(455B) may be used.

i. Municipal authority notification for potential sewer receptors. The municipal authority responsible for sewer construction must be notified of the environmental conditions whenever target level(s) is exceeded for potential sanitary sewers. The notification must show the area where soil concentrations and soil gas samples exceed target levels. The owner or operator must acknowledge what plans, if any, exist for construction of sanitary sewers through the area of potential receptor exposure.

135.10(8) *Groundwater to water line pathway assessment.*

a. Pathway completeness and receptor evaluation.

(1) Actual receptors include all water lines where the highest groundwater elevation is higher than three feet below the bottom of the water line at the measured or predicted points of exposure. The highest groundwater elevation is the estimated average of the highest measured groundwater elevations for each year. All water lines must be evaluated for this pathway regardless of distance from the source and regardless of the Tier 1 evaluation, if the lines are in areas with actual data above the applicable Tier 1 level and modeled data above the SSTL line. If actual data exceeds modeled data, then all water lines are considered actual receptors if they are within a distance extending 10 percent beyond the edge of the contaminant plume defined by the actual data.

(2) Potential receptors include all areas where the first encountered groundwater is less than 20 feet deep and where actual data or modeled data are above Tier 1 levels.

(3) The point(s) of exposure is the water line, and the points of compliance are monitoring wells between the source and the water line which would be effective in monitoring whether the line has been or may be impacted by chemicals of concern.

b. Plume definition. If this pathway is complete for an actual receptor, the groundwater plume must be defined to the Tier 1 levels, with an emphasis between the source and any actual water lines. The water inside the water lines shall be analyzed for all chemicals of concern.

c. Target levels. Groundwater modeling as provided in 135.10(2) must be used to calculate the projected concentrations of chemicals of concern and site-specific target levels. The soil leaching to groundwater pathway must be evaluated to ensure contaminated soil will not cause future groundwater concentrations to exceed site-specific target levels. The target level at the point(s) of exposure is the Tier 1 level.

d. Pathway evaluation and classification. Upon completion of evaluation of analytical results of appropriate samples and modeled data, the pathway must be classified high risk, low risk or no further action as provided in rule 567—135.12(455B). The water quality inside the water lines is not a criterion for clearance of this pathway.

e. Utility company notification. The utility company which supplies water service to the area must be notified of all actual and potential water line impacts as soon as knowledge of a potential risk is determined. If the extent of contamination has been defined, this information must be included in utility company notification, and any previous notification made at Tier 1 must be amended to include this information.

f. Corrective action response.

(1) For actual receptors, unless the pathway is classified as no further action, corrective action for this pathway must be conducted as provided in 567—135.12(455B). If the concentrations of chemicals of concern in a water line exceed the Tier 1 levels for actual receptors for the groundwater ingestion pathway, immediate corrective action must be conducted to eliminate exposure to the water, including but not limited to replacement of the line with an approved material.

(2) For potential receptors, upon utility company notification, no further action will be required for this pathway for potential receptors.

135.10(9) *Soil to water line pathway assessment.*

a. Pathway completeness and receptor evaluation.

(1) Actual receptors include all water lines within ten feet of the soil plume defined to the Tier 1 level. All water lines must be evaluated for this pathway regardless of distance from the source if the lines are in areas where Tier 1 levels are exceeded.

(2) Potential receptors include all areas where Tier 1 levels are exceeded.

b. Plume definition. The extent of soil contamination must be defined to Tier 1 levels for the chemicals of concern.

c. Target level. The point(s) of exposure includes all areas within ten feet of the water line. The target level at the point(s) of exposure is the Tier 1 level.

d. Pathway classification. Upon completion of evaluation of analytical results of appropriate samples, the pathway must be classified high risk, low risk or no further action as provided in rule 567—135.12(455B). Measurements of water quality inside the water lines may be required, but are not allowed as criteria to clear this pathway.

e. Utility company notification. The utility company which supplies water service to the area must be notified of all actual and potential water line impacts as soon as knowledge of the potential risk is determined. If the extent of contamination has been defined, this information must be included in utility company notification, and any previous notification made at Tier 1 must be amended to include this information.

f. Corrective action response.

(1) For actual receptors, unless the pathway is classified as no further action, corrective action for this pathway must be conducted as provided in 567—135.12(455B).

(2) For potential receptors, upon utility company notification, no further action will be required for this pathway for potential receptors.

135.10(10) *Surface water pathway assessment.*

a. Pathway completeness. Unless maximum concentrations are less than the applicable Tier 1 levels, this pathway is complete and must be evaluated under any of the following conditions: (1) there is a designated use surface water within the modeled groundwater plume or the actual plume as provided in 135.10(2)*"f"* and 135.10(2)*"g"*; or (2) any surface water body which failed the Tier 1 visual inspection as provided in 135.9(10).

b. Visual inspection. A visual inspection must be conducted according to 135.9(10)*"c."* If a sheen or residue from a petroleum-regulated substance is present, soil and groundwater sampling must be conducted to identify the source of the release and to define the extent of the contaminant plume to the levels acutely toxic to aquatic life as provided in 567—subrule 61.3(2).

c. Receptor evaluation.

(1) Surface water criteria apply only to designated use segments of surface water bodies as provided in 567—subrules 61.3(1) and 61.3(5). If the surface water body is a designated use segment and if maximum groundwater concentrations exceed applicable surface water criteria, the extent of contamination must be defined as provided in paragraph *"d."* The point of compliance for measuring chemicals of concern at the point of exposure is the groundwater adjacent to the surface water body because surface water must be protected for low flow conditions. In-stream measurements of concentrations are not allowed as a basis for no further action.

(2) If the visual inspection indicates the presence of a petroleum sheen in a general use segment within 200 feet of the source, as defined in 567—paragraph 61.3(1)*"a,"* the segment must be evaluated as an actual receptor. The point of compliance for measuring chemicals of concern at the point of exposure is the groundwater adjacent to the general use segment.

d. Plume definition. The groundwater plume must be defined to the surface water criteria levels for designated use segment receptors and to the acutely toxic levels for general use segment receptors, with an emphasis between the source and the surface water body.

e. Target levels. Determining target levels for this pathway involves a two-step process.

(1) Groundwater modeling as provided in subrule 135.10(2) must be used to calculate the projected concentrations of chemicals of concern at the point of compliance. If the modeled concentrations or field data at the point of compliance exceed surface water criteria for designated use segments, an allowable discharge concentration must be calculated. If the projected concentrations and actual concentrations at the point of compliance do not exceed surface water criteria, no further action is required to assess this pathway.

(2) The department water quality section will calculate the allowable discharge concentration using information provided by the certified groundwater professional on a department form. Required

information includes, at a minimum, the site location and a discharge flow rate calculated according to the department's Tier 2 guidance. The allowable discharge concentration is the target level which must be met adjacent to the surface water body which is the point of compliance.

(3) The target level at the point of exposure/compliance for general use segments subject to evaluation is the acutely toxic levels established by the department under 567—Chapter 61 and 567—subrule 62.8(2). If the modeled concentrations of contaminant concentrations at the point of exposure/compliance exceed the acutely toxic levels, modeling must be used to determine site classifications and corrective action in accordance with rule 567—135.12(455B).

f. Pathway evaluation and classification. Upon completion of evaluation of analytical results of appropriate samples and modeled data, the pathway must be classified high risk, low risk or no further action as provided in rule 567—135.12(455B).

(1) For general use segments, as defined in 567—subrule 61.3(1), if the groundwater professional determines there is no sheen or residue present or if the site is not the source of the sheen or residue or if the sheen does not consist of petroleum-regulated substances, no further action is required for assessment of this pathway. If a petroleum-regulated substance sheen is present, the pathway is high risk and subject to classification in accordance with rule 567—135.12(455B).

(2) For designated use segments, as provided in 567—subrules 61.3(1) and 61.3(5), if projected concentrations of chemicals of concern and actual contaminant concentrations at the point of compliance do not exceed the target level adjacent to the surface water, and the groundwater professional determines there is no sheen or residue present, no further action is required for assessment of this pathway.

g. Corrective action response. Unless the pathway is classified as no further action, corrective action for this pathway must be conducted as provided in 567—135.12(455B). For surface water bodies failing the visual inspection criteria, corrective action must eliminate the sheen and reduce concentrations to below the site specific target level in accordance with 567—135.12(455B).

135.10(11) *Tier 2 submission and review procedures.*

a. Owners and operators must submit a Tier 2 site cleanup report within 180 days of the date the department approves or is deemed to approve a Tier 1 assessment report under 135.9(12). If the owner or operator has elected to conduct a Tier 2 assessment instead of a Tier 1, or a Tier 2 assessment is required due to the presence of free product under 135.7(5), the Tier 2 site cleanup report must be submitted within 180 days of the date the release was confirmed. The department may establish an alternative schedule for submittal.

b. Site cleanup report completeness and accuracy. A Tier 2 site cleanup report is considered to be complete if it contains all the information and data required by this rule and the department's Tier 2 guidance. The report is considered accurate if the information and data are reasonably reliable based first on the standards in these rules and department guidance, and second, on generally accepted industry standards.

c. The certified groundwater professional responsible for completion of the Tier 2 site assessment and preparation of the report must accompany each Tier 2 site cleanup report with a certification as set out below:

I, _____, groundwater professional certification number _____, am familiar with all applicable requirements of Iowa Code section 455B.474 and all rules and procedures adopted thereunder including, but not limited to, the Department of Natural Resources' Tier 2 guidance. Based on my knowledge of those documents and the information I have prepared and reviewed regarding this site, UST registration number _____, LUST No._____, I certify that this document is complete and accurate as provided in 135.10(11) and meets the applicable requirements of the Tier 2 site cleanup report.

Signature

Date

d. Upon receipt of the groundwater professional's certified Tier 2 report, the groundwater professional's proposed site classification for the site shall be determinative unless, within 90 days of receipt, the department identifies material information in the report that is inaccurate or incomplete. Material information may be data found to be inaccurate or incomplete or a report that lacks information

which, if accurate and complete, would result in a different site or pathway classification than proposed by the certified groundwater professional. If the department determines that the site cleanup report is inaccurate or incomplete, the department shall notify the groundwater professional of the inaccurate or incomplete information within 90 days of receipt of the report and shall work with the groundwater professional and the party responsible for cleanup to obtain correct information or additional information necessary to appropriately classify the site. If the groundwater professional recommends proceeding to Tier 3, the groundwater professional's site classification and any pathway classification recommendations subject to or influenced by a Tier 3 assessment shall not be considered determinative until the Tier 3 report is submitted for review as provided in 567—135.11(455B).

e. If a "no action required" site classification is proposed, the department shall review the report in accordance with 135.12(6) and the review standards in paragraph 135.10(11)*"d."*

f. The department may, in the interest of minimizing environmental or public health risks and promoting a more effective cleanup, require owners and operators to begin cleanup of soil and groundwater before the Tier 2 site cleanup report is approved.

g. Review of the public water supply receptor risk assessment. Rescinded IAB 3/11/09, effective 4/15/09.

[**ARC 7621B**, IAB 3/11/09, effective 4/15/09; **ARC 9011B**, IAB 8/25/10, effective 9/29/10; **ARC 9331B**, IAB 1/12/11, effective 2/16/11; **ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.11(455B) Tier 3 site assessment policy and procedure.

135.11(1) *General.* Tier 3 site assessment. Unless specifically limited by rule or an imminent hazard exists, an owner or operator may choose to prepare a Tier 3 site assessment as an alternative to completion of a Tier 2 assessment under 567—135.10(455B) or as an alternative to completion of a corrective action design report under 567—135.12(455B). Prior to conducting a Tier 3 site assessment, a groundwater professional must submit a work plan to the department for approval. The work plan must contain an evaluation of the specific site conditions which justify the use of a Tier 3 assessment, an outline of the proposed Tier 3 assessment procedures and reporting format and a method for determining a risk classification consistent with the policies underlying the risk classification system in 567—135.12(455B). Upon approval, the groundwater professional may implement the assessment plan and submit a report within a reasonable time designated by the department.

135.11(2) *Tier 3 site assessment.* A Tier 3 assessment may include but is not limited to the use of more site-specific or multidimensional models and assessment data, methods for calibrating Tier 2 models to make them more predictive of actual site conditions, and more extensive assessment of receptor construction and vulnerability to contaminant impacts. If use of Tier 2 models is proposed with substitution of other site-specific data (as opposed to the Tier 2 default parameters), the groundwater professional must adequately justify how site-specific data is to be measured and why it is necessary. The groundwater professional must demonstrate that the proposal has a proven applicability to underground storage tank sites or similar conditions or has a strong theoretical basis for applicability and is not biased toward underestimating assessment results. The Tier 3 assessment report shall make a recommendation for site classification as high risk, low risk or no action required, at least two corrective action response technologies and provide justification consistent with the standards and policies underlying risk classification and corrective action response under 567—135.12(455B) and Iowa Code chapter 455B, Division 4, Part 8.

135.11(3) *Review and submittal.* The department will review the Tier 3 assessment for compliance with the terms of the approved work plan and based on principles consistent with these rules and Iowa Code chapter 455B, Division IV, Part 8. Upon approval of the Tier 3 assessment, the department may require corrective action in accordance with 567—135.12(455B).

567—135.12(455B) Tier 2 and 3 site classification and corrective action response.

135.12(1) *General.* 1995 Iowa Code section 455B.474(1)*"d"*(2) provides that sites shall be classified as high risk, low risk and no action required. Risk classification is accomplished by comparing actual contaminate concentrations to the concentrations that are predicted by the use of models. Concentrations must be compared to the simulation model which uses the maximum concentrations

at a source and predicts at what levels actual or potential receptors could be impacted in the future. Concentrations must also be compared to the site-specific target level line which assumes a target level concentration at the point of exposure and is used to predict the reduction in concentration that must be achieved at the source in order to meet the applicable target level at the point of exposure. These models not only predict concentrations at points of exposure or a point of compliance at a source but also predict a distribution of concentrations between the source and the point of exposure which may also be points of compliance. The comparison of contaminate concentrations with these distribution curves primarily is considered for purposes of judging whether the modeled data is reasonably predictive and what measures such as monitoring are prudent to determine the reliability of modeled data and actual contaminate concentrations.

For the soil vapor to enclosed space and soil to water line pathways, there are no horizontal transport models to use for predicting future impacts. Therefore, for these pathways, sites are classified as high risk, low risk or no action required based on specified criteria below and in rule 567—135.10(455B).

135.12(2) *High risk classification.* Except as provided below, sites shall be classified as high risk if, for any pathway, any actual contaminate concentrations exceed the site-specific target level line at any point for an actual receptor.

a. For the soil vapor to enclosed space and soil to water line pathways, sites shall be classified as high risk if the target levels for actual receptors are exceeded as provided in 135.10(7) and 135.10(9).

b. For the soil vapor or groundwater vapor to enclosed space pathways, sites shall be classified as high risk if the explosivity levels at applicable points of compliance are exceeded as provided in 135.10(6) and 135.10(7).

c. Generally, sites are classified as low risk if only potential receptor points of compliance are exceeded. The following is an exception. For the soil leaching to groundwater ingestion pathway for potential receptor conditions, the site shall be classified as high risk if the groundwater concentration(s) exceeds the groundwater Tier 1 level for potential receptor and the soil concentration exceeds the soil leaching site-specific target level at the source.

135.12(3) *High risk corrective action response.*

a. Objectives. The primary objectives of corrective action in response to a high risk classification are both short-term and long-term. The short-term goal is to eliminate or reduce the risk of exposure at actual receptors which have been or are imminently threatened with exposure above target levels. The longer term goal is to prevent exposure to actual receptors which are not currently impacted or are not imminently threatened with exposure. To achieve these objectives, it is the intent of these rules that concentrations of applicable chemicals of concern be reduced by active remediation to levels below the site-specific target level line at all points between the source(s) and the point(s) of exposure as well as to undertake such interim corrective action as necessary to eliminate or prevent exposure until concentrations below the SSTL line are achieved. If it is shown that concentrations at all applicable points have been reduced to below the SSTL line, the secondary objective is to establish that the actual chemical concentrations can be reasonably relied upon to predict future conditions at points of exposure rather than reliance on the modeled data. Reliance on actual contaminant concentrations is achieved by establishing through monitoring that concentrations within the contaminant plume are steady or declining. Institutional controls and technological controls may be used to sever pathways or control the risk of receptor impacts.

b. For the groundwater to water line and soil to water line receptors, these objectives are achieved by active remediation, replacement or relocation of high risk water line receptors in the actual and modeled plume areas. If water lines and gaskets are replaced in an area of contamination, they must be replaced with water line materials and gasket materials of appropriate construction in accordance with current department standards set forth in 567—Chapter 43 and with no less than nitrile or FKM gaskets or as otherwise approved by the department.

c. In areas of free product, all water lines, regardless of construction material, must be relocated unless there is no other option and the department has approved an alternate plan of construction. Refer to subparagraph 135.7(5) *"d"* (11). If a service line remains in the area of LNAPL, a backflow preventer shall be installed to prevent impacts to the larger water distribution system.

d. For the soil vapor pathway, these objectives are achieved by active remediation of soil contamination below the target level at the point(s) of exposure or other designated point(s) of compliance using the same measurement methods for receptor evaluation under 135.10(7) and 135.10(9).

e. For a site classified as high risk or reclassified as high risk for the soil leaching to groundwater ingestion pathway, these objectives are achieved by active remediation of soil contamination to reduce the soil concentration to below the site-specific target level at the source.

f. A corrective action design report (CADR) must be submitted by a certified groundwater professional for all high risk sites unless the terms of a corrective action plan are formalized in a memorandum of agreement within a reasonable time frame specified by the department. The CADR must be submitted on a form provided by the department and in accordance with department CADR guidance within 60 days of site classification approval as provided in 135.10(11). The CADR must identify at least two principally applicable corrective action options designed to meet the objectives in 135.12(3), an outline of the projected timetable and critical performance benchmarks, and a specific monitoring proposal designed to verify its effectiveness and must provide sufficient supporting documentation consistent with industry standards that the technology is effective to accomplish site-specific objectives. The CADR must contain an analysis of its cost-effectiveness in relation to other options. The department will review the CADR in accordance with 135.12(9).

g. Interim monitoring. From the time a Tier 2 site cleanup report is submitted and until the department determines a site is classified as no action required, interim monitoring is required at least annually for all sites classified as high risk. Groundwater samples must be taken: (1) from a monitoring well at the maximum source concentration; (2) from a transition well, meaning a monitoring well with detected levels of contamination closest to the leading edge of the groundwater plume as defined to the pathway-specific target level, and between the source(s) and the point(s) of exposure; and (3) from a guard well, meaning a monitoring well between the source(s) and the point(s) of exposure with concentrations below the SSTL line. If a receptor is located within an actual plume contoured to the applicable target level for that receptor, the point of exposure must be monitored. If concentrations at the receptor already exceed the applicable target level for that receptor, corrective actions must be implemented as soon as practicable. Monitoring conducted as part of remediation or as a condition of establishing a no action required classification may be used to the extent it meets these criteria. Soil monitoring is required at least annually for all applicable pathways in accordance with 135.12(5)*"d."* All drinking water wells and non-drinking water wells within 100 feet of the largest actual plume (defined to the appropriate target level for the receptor type) must be tested annually for chemicals of concern. Actual plumes refer to groundwater plumes for all chemicals of concern.

h. Remediation monitoring. Remediation monitoring during operation of a remediation system is required at least four times each year to evaluate effectiveness of the system. A remediation monitoring schedule and plan must be specified in the corrective action design report and approved by the department.

i. Technological controls. The purpose of a technological control is to effectively sever a pathway by use of technologies such that an applicable receptor could not be exposed to chemicals of concern above an applicable target risk level. Technological controls are an acceptable corrective action response either alone or in combination with other remediation systems. The purpose of technological controls may be to control plume migration through use of containment technologies, barriers, etc., both as an interim or permanent corrective action response or to permanently sever a pathway to a receptor. Controls may also be appropriate to treat or control contamination at the point of exposure. Any technological control proposed as a permanent corrective action option without meeting the reduction in contaminant concentrations objectives must establish that the pathway to a receptor will be permanently severed or controlled. The effectiveness of a technological control must be monitored under a department approved plan until concentrations fall below the site-specific target level line or its effectiveness as a permanent response is established, and no adverse effects are created.

j. Following completion of corrective action, the site must meet exit monitoring criteria to be reclassified as no action required as specified in 135.12(6)*"c."* At any point where an institutional or

technological control is implemented and approved by the department, the site may be reclassified as no action required consistent with 135.12(6).

135.12(4) *Low risk classification.* A site shall be classified as low risk if none of the pathways are high risk and if any of the pathways are low risk. A pathway shall be classified low risk if it meets one of the following conditions:

a. For actual and potential receptors, if the modeled data and the actual concentrations are less than the site-specific target level line, and any of the actual concentrations are greater than the simulation line.

b. For potential receptors, if any actual concentrations exceed the site-specific target level line at any point.

c. For the soil leaching to groundwater ingestion pathway where modeling predicts that the Tier 1 levels for potential receptors would be exceeded in groundwater at applicable potential receptor points of compliance and the soil concentration exceeds the soil leaching to groundwater site-specific target level but groundwater concentrations are currently below the Tier 1 level for potential receptors, the site shall be initially classified as low risk and subject to monitoring under subparagraph 135.12(5)*"d"*(2). If at any time during the three-year monitoring period, groundwater concentrations exceed the Tier 1 level for potential receptors, the site shall be classified as high risk requiring soil remediation in accordance with paragraph 135.12(3)*"d."*

135.12(5) *Low risk corrective action response.*

a. Purpose. For sites or pathways classified as low risk, the purpose of monitoring is to determine if concentrations are decreasing such that reclassification to no action required may be appropriate or if the contaminant plume is stable such that reclassification to no action required can be achieved with implementation of an institutional control in accordance with 135.12(8), or if concentrations are increasing above the site-specific target level line such that reclassification to high risk is appropriate. Monitoring is necessary to evaluate impacts to actual receptors and assess the continued status of potential receptor conditions. Low risk monitoring shall be conducted and reported by a certified groundwater professional.

b. For sites or pathways classified as low risk, provide a best management practices plan. The plan must include maintenance procedures, schedule of activities, prohibition of practices, and other management practices, or a combination thereof, which, after problem assessment, are determined to be the most effective means of monitoring and preventing additional contamination of the groundwater and soil. The plan will also contain a contamination monitoring proposal containing sufficient sampling points to ensure the detection of any significant movement of or increase in contaminant concentration.

c. Groundwater monitoring. For groundwater pathways, samples must be taken at a minimum of once per year: (1) from a monitoring well at the maximum source concentration; (2) a transitional well meaning a well with detected levels of contamination closest to the leading edge of the groundwater plume as defined to the pathway-specific target level and between the source and the receptor; and (3) a guard well meaning a monitoring well between the source and the point of exposure with concentrations below the SSTL line. (NOTE: Monitoring under this provision may be used to satisfy exit monitoring if it otherwise meets the criteria in 135.12(6).)

d. Soil monitoring.

(1) For the soil vapor to enclosed space pathway potential receptors, soil gas samples must be taken at a minimum of once per year in the area(s) of expected maximum vapor concentrations where an institutional control is not in place.

(2) For the soil leaching to groundwater pathway potential receptors, annual groundwater monitoring is required for a minimum of three years as provided in *"c"* above. If groundwater concentrations are below the applicable SSTL line for all three years, no further action is required. If groundwater concentrations exceed the applicable SSTL line in any of the three years, corrective action is required to reduce soil concentrations to below the Tier 1 levels for soil leaching to groundwater. Therefore, annual monitoring of soil is not applicable.

(3) For the soil to water line pathway potential receptors, notification of the utility company is required. Notification will result in reclassification to no action required. Therefore, annual monitoring of soil is not applicable.

e. Receptors must be evaluated at least annually to ensure no actual or modeled data are above the site-specific target level line for any actual receptors. Potential receptor areas of concern must be evaluated at least annually and the presence of no actual receptors confirmed. If actual receptors are present or reasonably expected to be brought into existence, the owner or operator must report this fact to the department as soon as practicable. Annual monitoring which also meets the exit criteria under 135.12(6) may be used for that purpose.

f. The site or pathway must meet exit monitoring criteria to be reclassified as no action required as specified in 135.12(6)*"b."* If concentrations for actual receptors increase above the site-specific target level line or potential receptor status changes to actual receptor status, the site must be reclassified as high risk and further corrective action required in accordance with 135.12(3).

135.12(6) *No action required classification.* A site shall be classified as no action required if all of the pathways are classified as no action required as provided below:

a. Soil pathways shall be classified as no action required if samples are less than the applicable target levels as defined for each pathway and confirmational sampling requirements have been met.

b. For initial classification, groundwater pathways shall be classified as no action required if the contaminant concentrations are below the site-specific target level line and all concentrations are at or less than the simulation line, and confirmation monitoring has been completed successfully. Confirmation sampling for groundwater is a second sample which confirms the no action required criteria.

c. A groundwater pathway shall be reclassified from high risk to no action required if all contaminant concentrations are below the site-specific target level and if exit monitoring criteria have been met. Exit monitoring criteria means that the three most recent consecutive groundwater samples from all monitoring wells must show a steady or declining trend and the most recent samples are below the site-specific target level. Other criteria include the following: The first of the three samples for the source well and transition well must be more than detection limits; concentrations cannot increase more than 20 percent from the first of the three samples to the third sample; concentrations cannot increase more than 20 percent of the previous sample; and samples must be separated by at least six months.

d. A low risk site shall be reclassified as "no action required" if contaminant concentrations are below the site-specific target level and if exit monitoring criteria have been met pursuant to paragraph 135.12(6)*"c"* or if the site has maintained less than the applicable target level for four consecutive sampling events separated by at least six months as defined in the monitoring plan regardless of exit monitoring criteria and guidance.

e. Confirmation sampling for soil gas and indoor vapor. For the enclosed space pathways, confirmation sampling is required to reasonably establish that the soil gas and indoor vapor samples represent the highest expected levels. A groundwater professional must obtain two samples taken at least two weeks apart. One of the samples should be collected beneath the frost line depth during a seasonal period of lowest groundwater elevation.

f. As a condition of obtaining site classification as no action required, all groundwater monitoring wells must be properly plugged in accordance with 567—Chapters 39 and 49 unless the department requires selected wells to be maintained or a written request with justification and a plan for properly maintaining the wells are submitted to the department for approval. Approval to maintain wells shall be deemed granted if not disapproved with reason within 30 days of request.

g. Prior to acceptance of a request to classify the site as no action required, and in the event there is a question of validity of the data or sampling methods, laboratory analysis procedures, indication of plume movement, or the department obtains information about new conditions at the site, the department may conduct or require the owner to conduct confirmation sampling of the soil, groundwater, soil gas, or indoor vapor to confirm that the no action required criteria have been met.

h. The department may waive, at its discretion, the exit monitoring criteria based on a certified groundwater professional's written justification to support a no action required classification for the site based on a reasoned assessment of data, trends, receptor status, and corrective actions performed. One example is when steady and declining criteria have not been met due solely to variations among a laboratory's lowest achievable detection limits.

135.12(7) *Reclassification.* Any site or pathway which is classified as high risk may be reclassified to low risk if in the course of corrective action the criteria for low risk classification are established. Any site or pathway which is classified as low risk may be reclassified to high risk if in the course of monitoring the conditions for high risk classification are established. Sites subject to department-approved institutional or technological controls are classified as no action required if all other criteria for no action required classification are satisfied.

135.12(8) *Use of institutional and technological controls.*

a. Purpose. The purpose of an institutional control is to restrict access to or use of property such that an applicable receptor could not be exposed to chemicals of concern for as long as the target level is exceeded at applicable points of exposure and compliance. Institutional controls include:

1. A law of the United States or the state;
2. A regulation issued pursuant to federal or state laws;
3. An ordinance or regulation of a political subdivision in which real estate subject to the institutional control is located;
4. An environmental covenant as provided in 2005 Iowa Code Supplement section 455B.474(1)*"f"*(4)(f) and in accordance with the provisions of 2005 Iowa Code Supplement chapter 455I and 567—Chapter 14;
5. Any other institutional control the owner or operator can reasonably demonstrate to the department will reduce the risk from a release throughout the period necessary to ensure that no applicable target level is likely to be exceeded.

b. Modification or termination of institutional and technological controls. At a point when the department determines that an institutional or technological control has been removed or is no longer effective for the purpose intended, regardless of the issuance of a no further action certification or previous site classification, it may require owners and operators to undertake such reevaluation of the site conditions as necessary to determine an appropriate site classification and corrective action response. If the owner or operator is in control of the affected property, the department may require reimplementation of the institutional or technological control or may require a Tier 2 assessment of the affected pathway(s) be conducted to reevaluate the site conditions and determine alternative corrective action response. An owner or operator subject to an institutional or technological control may request modification or termination of the control by conducting a Tier 2 assessment of the affected pathway or conduct such other assessment as required by the department to establish that the control is no longer required given current site conditions.

c. If the owner or operator is not in control of the affected property or cannot obtain control and the party in control refuses to continue implementation of an institutional control, the department may require the owner or operator to take such legal action as available to enforce institution of the control or may require the owner or operator to undertake a Tier 2 assessment to determine site classification and an alternative corrective action response. If a person in control of the affected property appears to be contractually obligated to maintain an institutional or technological control, the department may, but is not required to, attempt enforcement of the contractual obligation as an alternative to requiring corrective action by the owner or operator.

d. If a site is classified no action required, subject to the existence of an institutional control or technological control, the holder of the fee interest in the real estate subject to the institutional control or technological control may request, at any time, that the department terminate the institutional control or technological control requirement. The department shall terminate the requirement for an institutional control if the holder demonstrates by completion of a Tier 2 assessment of the applicable pathway or other assessment as required by the department that the site conditions warranting the control no longer exist and that the site or pathway has met exit criteria for no action required classification under 135.12(6).

135.12(9) *Corrective action design report submission and review procedures.*

a. Owners and operators must submit a corrective action design report (CADR) within 60 days of the date the department approves or is deemed to approve a Tier 2 assessment report under 135.10(11) or a Tier 3 assessment is to be conducted. The department may establish an alternative schedule for submittal. As an alternative to submitting a CADR, owners or operators may participate in a corrective action

meeting process to develop a corrective action plan which would be incorporated into a memorandum of agreement or other written agreement approved by the department. Owners or operators shall implement the terms of an approved CADR, memorandum of agreement or other corrective action plan agreement.

b. Corrective action design report completeness and accuracy. A CADR is considered to be complete if it contains all the information and data required by this rule and the department's guidance. The report is considered accurate if the information and data are reasonably reliable based first on the standards in these rules and department guidance, and second, on generally accepted industry standards.

c. The certified groundwater professional responsible for completion of the CADR must provide the following certification with the CADR:

I, _____, groundwater professional certification number _____, am familiar with all applicable requirements of Iowa Code section 455B.474 and all rules and procedures adopted thereunder including, but not limited to, the Department of Natural Resources' guidance and specifications for corrective action design reports. Based on my knowledge of those documents and the information I have prepared and reviewed regarding this site, UST registration number _____, LUST No._____, I certify that this document is complete and accurate as provided in 135.12(9) and meets the applicable requirements of the corrective action design report, and that the recommended corrective action can reasonably be expected to meet its stated objectives.

Signature

Date

d. Review. A CADR submitted by a groundwater professional shall be accepted by the department and shall be primarily relied upon by the department to determine the corrective action response requirements of the site. However, if within 90 days of receipt of a CADR, the department identifies material information in the CADR that is inaccurate or incomplete, and if based upon information in the report the appropriate corrective action response cannot be reasonably determined by the department based on industry standards, the department may reject the report and require modifications. If the department does not reject the report within 90 days of receipt, the report shall be deemed approved as submitted unless changes to the report are requested by the groundwater professional. The department shall work with the groundwater professional and the owner or operator to correct any materially inaccurate information or to obtain the additional information necessary to determine the appropriate corrective action response as soon as practicable.

e. Memorandums of agreement. Owners or operators that fail to implement the actions or meet the activity schedule in a memorandum of agreement resulting from a corrective action meeting or other written corrective action plan agreement or that fail to implement the actions or meet the schedule outlined in an approved CADR are subject to legal action.

135.12(10) *Monitoring certificates and no further action certificates.*

a. Monitoring certificate. The department of natural resources will issue a monitoring certificate to the owner or operator of an underground storage tank from which a release has occurred, the current property owner, or other responsible party who has undertaken the corrective action warranting issuance of the certificate. Sites classified as low risk or sites classified as high risk/monitoring shall be eligible for a monitoring certificate. The monitoring certificate will be valid until the site is reclassified to a high risk requiring active remediation or no action required site. A site which has been issued a monitoring certificate shall not be eligible to receive a certificate evidencing completion of remediation until the site is reclassified as no action required. The monitoring certificate will be invalidated and the site reclassified to high risk if it is determined by the department that the owner of the site is not in compliance with the requirements specified in the monitoring certificate.

b. No further action certificate. When the no action required site classification has been determined based on a recommendation of the certified groundwater professional as provided in subrules 135.9(11), 135.10(11) and 135.12(6) (see also Iowa Code section 455B.474(1)*"a"*(8)(a) and (c)), the department shall issue a no further action certificate.

The department will issue a no further action certificate to an owner or operator of an underground storage tank from which a release has occurred, the current property owner, or other responsible party

who has undertaken the corrective action warranting classification of the site as no action required. Prior to the issuance of a no further action certificate, an accurate legal description of the property on which the underground storage tanks are or were formerly located shall be submitted to the department. The following conditions apply:

(1) If free product is present, the department shall not issue a no further action certificate until the department has approved termination of all free product assessment and recovery in accordance with 135.7(5).

(2) The site has been determined by a certified groundwater professional not to present an unreasonable risk to the public health and safety or the environment.

(3) A person issued the certificate or a subsequent purchaser of the site cannot be required to perform further corrective action because action standards are changed at a later date. Action standards refer to applicable standards under this rule.

(4) The certified groundwater professional has certified that all groundwater monitoring wells have been permanently closed in accordance with 135.12(6)*"f"* with the exception of wells that are allowed to be maintained pursuant to 135.12(6)*"f."* Wells not properly maintained shall be referred to the water supply section of the department that enforces 567—Chapter 39 and 567—Chapter 49.

(5) The certificate shall not prevent the department from ordering remediation of a release identified subsequent to the release for which the no further action certificate was issued. The certificate shall not prevent the department from requiring corrective action of a release of a regulated substance from an unregulated tank.

(6) The certificate will not constitute a warranty of any kind to any person as to the condition, marketability or value of the described property.

(7) The certificate shall reflect any institutional control utilized to ensure compliance with any applicable Tier 2 level; and may include a notation that the classification is based on the fact that designated potential receptors are not in existence.

(8) The certificate shall be in a form which is recordable in accordance with Iowa Code section 558.1 et seq., and substantially in the form as provided in Appendix C.

(9) The owner or operator or other persons conducting corrective action shall be responsible for recording the no further action certificate with the county recorder and return a file-stamped copy to the department within 30 days of the issue date. At its discretion, the department may record the no further action certificate with the appropriate county recorder as authorized in Iowa Code section 455B.474(1)*"a"*(8)(c).

c. The department shall modify any issued no further action certificates containing institutional controls once the owner, operator or their successor or assign has demonstrated that the institutional control is no longer necessary to meet the applicable Tier 2 level as provided in 135.12(10).

135.12(11) *Expedited corrective action.* An owner, operator or responsible party of a site at which a release of regulated substance is suspected to have occurred may carry out corrective actions at the site so long as the department receives notice of the expedited cleanup activities prior to 30 calendar days of their commencement; the owner, operator, or responsible party complies with the provisions of these rules; and the corrective action does not include active treatment of groundwater other than:

a. As previously approved by the department; or

b. Free product recovery pursuant to subrule 135.7(5).

c. Soil overexcavation. When undertaking overexcavation of contaminated soils, adequate field screening methods must be used to identify maximum concentrations during excavation. At a minimum one soil sample must be taken for field screening every 100 square feet of the base and each sidewall. Soil samples must be taken for laboratory analysis at least every 400 square feet of the base and each sidewall of the excavated area to confirm remaining concentrations are below Tier 1 levels. If the excavation is less than 400 square feet, a minimum of one sample must be analyzed for each sidewall and the base. The owner or operator must maintain adequate records of the excavation area to document compliance with this procedure unless submitted to the department and must provide it to the department upon request.

[**ARC 9011B**, IAB 8/25/10, effective 9/29/10; **ARC 9331B**, IAB 1/12/11, effective 2/16/11; **ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.13(455B) Public participation.

135.13(1) For each confirmed release that is classified as high or low risk, the department must provide notice to the public by means designated to reach those members of the public directly affected by the release and the recommended corrective action response. This notice may include, but is not limited to, public notice in local newspapers, block advertisements, public service announcements, publication in a state register, letters to individual households, or personal contacts by the staff.

135.13(2) The department must ensure site release information and decisions concerning the Tier 1 assessment report, Tier 2 and Tier 3 site cleanup reports are made available to the public for inspection upon request.

135.13(3) Before approving the Tier 2 or Tier 3 site cleanup report, the department may hold a public meeting to consider comments on the proposed corrective action response if there is sufficient public interest, or for any other reason.

135.13(4) The department must give a public notice that complies with subrule 135.13(1) above if the implementation of the approved Tier 2 or Tier 3 site cleanup report does not achieve the established cleanup levels in the report and the termination of that report is under consideration by the department.

567—135.14(455B) Action levels. The following corrective action levels apply to petroleum-regulated substances as regulated by this chapter. These action levels shall be used to determine if further corrective action under rules 567—135.6(455B) through 567—135.12(455B) or rule 567—135.15(455B) is required as the result of tank closure sampling under subrule 135.15(3) or other analytical results submitted to the department. The contaminant concentrations must be determined by laboratory analysis as stated in rule 567—135.16(455B). Final cleanup determination is not limited to these contaminants. The contamination corrective action levels are:

	Soil (mg/kg)	**Groundwater (ug/L)**
Benzene	0.54	5
Toluene	3.2	1,000
Ethylbenzene	15	700
Xylenes	52	10,000
Total Extractable Hydrocarbons—Diesel	3,800	1,200
Total Extractable Hydrocarbons—Waste Oil		400

[**ARC 9011B**, IAB 8/25/10, effective 9/29/10; **ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.15(455B) Out-of-service UST systems, temporary closure, and permanent closure.

135.15(1) *Out-of-service UST systems and temporary closure.*

a. UST systems not meeting either the performance standards in subrule 135.3(1) for new UST systems or the upgrading requirements in subrule 135.3(2) by December 22, 1998, must be permanently closed according to subrule 135.15(2). The tanks cannot be brought back into use.

b. When a UST system in compliance with new tank standards is out of service for less than three months, owners and operators must:

(1) Continue operation and maintenance of corrosion protection in accordance with subrule 135.4(2);

(2) Continue operation and maintenance of any release detection in accordance with rule 567—135.5(455B) unless the system is empty. The UST system is empty when all materials have been removed using commonly employed practices. No more than 2.5 centimeters (1 inch) of residue, or 0.3 percent by weight of the total capacity of the UST system, may remain in the system;

(3) Comply with rules 567—135.6(455B) to 567—135.12(455B) if a release is suspected or confirmed;

(4) Maintain financial responsibility (e.g., insurance) in accordance with 567—Chapter 136. If at any time financial responsibility coverage is or will be terminated, a site check for contamination must be completed before coverage is terminated. A site check must use the closure-in-place sampling procedures in paragraphs 135.15(3)*"b"* and *"d"* or the Tier 1 site assessment in rule 567—135.9(455B). If the tanks are located in a contaminated area with active monitoring and remediation, the tank owner may request the department waive the site check providing justification.

(5) Continue to pay the tank management fee as required in subrule 135.3(5).

(6) Continue to have compliance inspections conducted as required in rule 567—135.20(455B).

c. When a UST system is out of service for three months or more, an owner must submit a notification of temporary closure form to the department. Owners and operators must complete the requirements in paragraph 135.15(1)*"b"* for temporary closure and certify the following:

(1) The UST system is empty of all regulated substances (e.g., receipt of product removal).

(2) Vent lines are open and functioning.

(3) All other piping, pumps, accesses, and ancillary equipment are capped and locked.

(4) The corrosion protection system is being maintained in accordance with subrule 135.4(2). Include documentation that electricity is being maintained to operate the impressed current cathodic protection system if present.

(5) For lined tanks, provide a copy of the last internal inspection.

(6) Provide proof of financial responsibility (e.g., insurance) according to 567—Chapter 136.

d. When a tank system is temporarily closed for more than 12 months, the owner must remain in compliance with the department's temporary closure requirements in paragraph 135.15(1)*"c."* The department may provide an extension to the 12-month temporary closure period. Owners and operators must complete a site check in accordance with paragraph 135.6(3)*"b"* before such an extension can be applied for.

e. If a tank system is temporarily closed for more than 12 months, but the tank system has not been temporarily closed according to the requirements of paragraph 135.15(1)*"c,"* or the owner or operator has failed to maintain out-of-service requirements in paragraph 135.15(1)*"b,"* the UST system must be permanently closed in accordance with subrule 135.15(2).

f. Prior to returning a temporarily closed tank back into service, the owner or operator must complete and submit the department's return-to-service form signed by a licensed installer and provide the following documentation. The tank system cannot be operated or receive fuel until current tank tags have been issued.

(1) Documentation that the tanks were temporarily closed in accordance with subrule 135.15(1).

(2) Where applicable, documentation that corrosion protection has been maintained continuously in accordance with subrule 135.4(2). The owner or operator must provide an inspection log of the cathodic protection system and the inspection report of the cathodic protection system completed by an Iowa-licensed corrosion tester.

(3) For lined tanks, provide a lining and tank integrity inspection report.

(4) Results of precision tightness tests (0.1 gph) conducted on tanks in accordance with rule 567—135.5(455B).

(5) Results of precision tightness tests (0.1 gph) conducted on lines in accordance with rule 567—135.5(455B). This includes piping used for remote fill.

(6) Function test (3.0 gph) results of mechanical or electronic leak detectors conducted in accordance with rule 567—135.5(455B).

NOTE: Function tests are not required on confirmed "safe suction" dispensing lines.

(7) Tank and piping leak detection is operational and in good condition.

(8) Secondary containment is installed where necessary in accordance with subrule 135.3(9).

(9) Spill containment, overfill prevention and all containment sumps are in good condition and operating in accordance with subrule 135.4(1). Tightness tests conducted within the last 12 months must be provided for secondary containment of tanks, piping, sumps, under dispenser containment and spill containment.

(10) Copy of the financial responsibility (e.g., UST insurance) mechanism in accordance with 567—Chapter 136.

(11) Certification from an Iowa-licensed installer that the UST system and equipment are installed correctly, are in good operable condition and meet all regulatory requirements for startup and operation.

(12) Copies of Class A and Class B operator training certificates.

(13) Change of ownership form (if the UST facility was sold).

135.15(2) *Permanent closure and changes-in-service.* Permanent closure of an underground storage tank system must be conducted by an Iowa-licensed tank remover. Closure sampling must be conducted by or under the supervision of an Iowa-certified groundwater professional.

a. At least 30 days before beginning either permanent closure or a change-in-service under paragraphs *"b"* and *"c"* below, owners and operators must notify the department of their intent to permanently close or make the change-in-service. An owner or operator must seek prior approval to permanently close a tank in a time frame shorter than the 30-day notice. The required assessment of the excavation zone under 135.15(3) must be performed after notifying the department but before completion of the permanent closure or a change-in-service.

b. To permanently close a tank or piping, owners and operators must empty and clean them by removing all liquids and accumulated sludge. All tanks taken out of service permanently must also be removed from the ground, filled with an inert solid material, or closed in place by a method approved by the department. Piping must be removed from the ground or have the ends plugged with an inert solid material.

When permanently closing a tank by filling with inert solid material, the tank may not be filled until a closure report is approved by the department. The tank must be filled within 30 days after department approval. The owner and operator must notify the department within 15 days after filling the tank with inert solid material.

c. Continued use of a UST system to store a nonregulated substance is considered a change-in-service. Before a change-in-service, owners and operators must empty and clean the tank by removing all liquid and accumulated sludge and conduct a site assessment in accordance with 135.15(3).

d. Permanent closure procedures must be followed in the replacement of tanks or piping. Notification must be made using DNR Form 542-1308, "Notification of Tank Closure or Change-in-Service." The form must include the date scheduled for the closure. Oral confirmation of the closure date must be given to the DNR field office 24 hours prior to the actual closure. The required assessment of the excavation zone under subrule 135.15(3) must be performed after notifying the department but before completion of the permanent closure or change-in-service.

NOTE: The following cleaning and closure procedures may be used to comply with subrule 135.15(2):

- American Petroleum Institute Recommended Practice RP 1604, "Closure of Underground Petroleum Storage Tanks";
- American Petroleum Institute Standard 2015, "Safe Entry and Cleaning of Petroleum Storage Tanks, Planning and Managing Tank Entry From Decommissioning Through Recommissioning";
- American Petroleum Institute Recommended Practice 2016, "Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks";
- American Petroleum Institute Recommended Practice RP 1631, "Interior Lining and Periodic Inspection of Underground Storage Tanks," may be used as guidance for compliance with this subrule;
- National Fire Protection Association Standard 326, "Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair"; and
- National Institute for Occupational Safety and Health Publication 80-106, "Criteria for a Recommended Standard...Working in Confined Space" may be used as guidance for conducting safe closure procedures at some hazardous substance tanks.

135.15(3) *Assessing the site at closure or change-in-service.*

a. Before permanent closure or a change-in-service is completed, owners or operators must measure for the presence of a release where contamination is most likely to be present at the UST site. This soil and groundwater closure investigation must be conducted or supervised by a groundwater professional certified under 567—Chapter 134, Part A, unless the department in its discretion grants

an exemption and provides direct supervision of the closure investigation. In selecting the 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.

At UST sites with a history of petroleum storage, soil and groundwater samples shall in every case be analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) with each compound reported separately in accordance with rule 567—135.16(455B). If there has been a history or suspected history of petroleum storage other than gasoline or gasoline blends (i.e., all grades of diesel fuels, fuel oil, kerosene, oil and mineral spirits), or such storage history is unknown or uncertain, soil and groundwater samples shall also be analyzed for total extractable hydrocarbons in accordance with rule 567—135.16(455B).

All such samples shall be collected separately and shipped to a laboratory certified under 567—Chapter 83 within 72 hours of collection. Samples shall be refrigerated and protected from freezing during shipment to the laboratory.

When a UST is removed from an area of confirmed contamination, the department may waive closure sampling if written documentation is submitted with the closure notification. Documentation should include laboratory analytical reports and a site map showing tank and piping locations along with contamination plume and sampling locations.

b. For all permanent tank and piping closures or changes-in-service, at least one water sample must be taken from the first saturated groundwater zone via a developed monitoring well except as provided in paragraph 135.15(3)*"g."* The well must be located downgradient from and as close as possible to the UST system but no farther away than 20 feet from system components. At some tank and piping closures, a minimum of one monitoring well may not be sufficient to represent a release where it is most likely to be present. An additional groundwater monitoring well or wells may be necessary.

If, however, the first saturated groundwater zone is not encountered within 10 feet below the lowest elevation of the tank excavation, the requirement for groundwater sampling shall not apply unless:

(1) Sands or highly permeable soils are encountered within 10 feet below the lowest level of the tank excavation which together with the underlying geology would, in the judgment of the department, pose the reasonable possibility that contamination may have reached groundwaters deeper than 10 feet below the lowest level of the tank excavation. The method of determining highly permeable soil is found in the departmental guidance documents entitled "Underground Storage Tank Closure Procedures for Tank and Piping Removal" and "Underground Storage Tank Closure for Filling in Place."

(2) Indications of potential groundwater contamination, including petroleum products in utility lines, petroleum products in private wells, petroleum product vapors in basements or other structures, occur in the area of the tank installation undergoing closure or change-in-service.

c. For permanent closure by tank removal, the departmental guidance document entitled "Underground Storage Tank Closure Guidance" must be followed. The minimum number of soil samples that must be taken depends on the tank size and length of product piping. Samples must be taken at a depth of 1 to 2 feet beneath the tank fill area below the base of the tank along the tank's centerline. Soil samples must also be taken at least every 10 feet along the product piping at a depth of 1 to 2 feet beneath the piping fill area below the piping, unless alternate sampling is approved by the department.

If sands or other highly permeable soils are encountered, alternative sampling methods may be required.

If contamination is suspected or found in any area within the excavation (i.e., sidewall or bottom), a soil sample must be taken at that location.

The numbers of samples required for tanks are as follows:

Nominal Tank Capacity (gallons)	Number of Samples	Location on Centerline
1,000 or less	1	center of tank
1,001 - 8,000	2	1/3 from ends
8,001 - 30,000	3	5 feet from ends and at center of tank
30,001 - 40,000	4	5 and 15 feet from ends
40,001 and more	5	5 and 15 feet from ends and at center of tank

d. For closing a tank in place by filling with an inert solid material or for a change-in-service, the departmental guidance document entitled "Underground Storage Tank Closure for Filling in Place" must be followed. The minimum number of soil borings required for sampling depends on the size of the tank and the length of the product piping. Soil samples must be taken within 5 feet of the sides and ends of the tank at a depth of 2 to 4 feet below the base of the tank, but outside the backfill material, at equal intervals around the tank. Soil samples must also be taken at least every 10 feet along the product piping at a depth of 1 to 2 feet beneath the piping fill area below the piping, unless alternate sampling is approved by the department. If sands or other highly permeable soils are encountered, alternative sampling methods may be required.

The minimum numbers of soil borings and samples required are as follows:

Nominal Tank Capacity (gallons)	Number of Samples	Location of Samples
6,000 or less	4	1 each end and each side
6,001 - 12,000	6	1 each end and 2 each side
12,001 or more	8	1 each end and 3 each side

e. A closure report in a format prescribed by the department must be submitted to the department within 45 days of the tank removal or sampling for a closure in place. Refer to the Underground Storage Tank Closure Guidance for reporting format. The tank tags must be returned with the closure report.

f. The requirements of this subrule are satisfied if one of the external release detection methods allowed in 135.5(4)*"e"* and *"f"* is operating in accordance with the requirements in 135.5(4) at the time of closure and indicates no release has occurred.

g. If contaminated soils, contaminated groundwater, or free product as a liquid or vapor is discovered during the site assessment or by any other manner, contact the department in accordance with 135.6(1). Normal closure procedures no longer apply. Owners and operators must begin corrective action in accordance with rules 567—135.7(455B) to 567—135.12(455B).

Identification of free product requires immediate response in accordance with 135.7(5). If contamination appears extensive or the groundwater is known to be contaminated, a full assessment of the contamination will be required. When a full assessment is required or anticipated, collection of the required closure samples is not required. If contamination appears limited to soils, overexcavation of the contaminated soils in accordance with 135.15(4) may be allowed at the time of closure.

135.15(4) *Overexcavation of contaminated soils at closure.*

a. If contaminated soils are discovered while assessing a site at closure in accordance with 135.15(3), owners and operators may overexcavate up to one foot of the contaminated soils surrounding the tank pit. The contamination and overexcavation must be reported to the department in accordance with the requirements of 135.6(4)*"a"* prior to backfilling the excavation. If excavation is limited to one foot of contaminated soils, a soil sample shall be taken and laboratory analyzed in accordance with 567—135.16(455B) from the area showing the greatest contamination. Any overexcavation of contaminated soils beyond one foot of contaminated soils is considered expedited corrective action and must be conducted by a certified groundwater professional in accordance with the procedures in 135.12(11).

b. Excavated contaminated soils must be properly disposed in accordance with 567—Chapters 100, 101, 102, 120, and 121, Iowa Administrative Code.

c. A report must be submitted to the department within 30 days of completion of the laboratory analysis. The report must include the requirements of 135.15(3)*"e"* and a dimensional drawing showing the depth and area of the excavation prior to and after overexcavation. The area of contamination must be shown.

135.15(5) *Applicability to previously closed UST systems.* When directed by the department, the owner and operator of a UST system permanently closed before October 24, 1988, must assess the excavation zone and close the UST system in accordance with this rule if releases from the UST may, in the judgment of the department, pose a current or potential threat to human health and the environment.

135.15(6) *Closure records.* Owners and operators must maintain records in accordance with 135.4(5) that are capable of demonstrating compliance with closure requirements under this rule. The results of the excavation zone assessment required in 135.15(3) must be maintained for at least three years after completion of permanent closure or change-in-service in one of the following ways:

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

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

c. By mailing these records to the department if they cannot be maintained at the closed facility.

135.15(7) *Applicability to pre-1974 USTs.* The closure provisions of rule 567—135.15(455B) are not applicable to USTs which have been out of operation prior to January 1, 1974. For purposes of this subrule, out of operation means that no regulated substance has been deposited into or dispensed from the tanks and that the tanks do not currently contain an accumulation of regulated substances other than a de minimis amount as provided in paragraph 135.15(1)*"a."*

Owners and operators or other interested parties are not required to submit documentation that USTs meet the exemption conditions and may rely on this subrule as guidance. However, should a question arise as to whether USTs meet the exemption, or owners and operators or other interested parties request acknowledgment by the department that USTs are exempt, they must submit an affidavit on a form provided by the department. The affiant must certify that based on a reasonable investigation and to the best of the affiant's knowledge, the USTs were taken out of operation prior to January 1, 1974, the USTs have not contained a regulated substance since January 1, 1974, and the USTs do not currently contain an accumulation of regulated substances.

If the department has a reasonable basis to suspect a release has occurred, the release investigation and confirmation steps of rule 567—135.6(455B) and the corrective action requirements as provided in rules 567—135.7(455B) through 567—135.12(455B) shall apply.

[**ARC 8124B**, IAB 9/9/09, effective 10/14/09; **ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.16(455B) Laboratory analytical methods for petroleum contamination of soil and water.

135.16(1) *General.* When analyzing for petroleum or hazardous substances, owners and operators of UST systems must use a laboratory certified under 567—Chapter 83. In addition they must ensure that all samples are properly preserved and shipped within 72 hours of collection to a laboratory certified under 567—Chapter 83. This rule provides acceptable analytical procedures for petroleum substances and required information that must be provided in all laboratory reports.

135.16(2) *Laboratory report.* All laboratory reports must contain the following information:

a. Laboratory name, address, telephone number and Iowa laboratory certification number. If analytical work is subcontracted to another laboratory, the analytical report from the certified lab which analyzed the sample must be submitted and include the information required in this subrule.

b. Medium sampled (soil, water).

c. Client submitting sample (name, address, telephone number).

d. Sample collector (name, telephone number).

e. UST site address.

f. Clients sample location identifier.

g. Date sample was collected.

h. Date sample was received at laboratory.

i. Date sample was analyzed.

j. Results of analyses and units of measure.

k. Detection limits.

l. Methods used in sample analyses (preparation method, sample detection method, and quantitative method).

m. Laboratory sample number.

n. Analyst name.

o. Signature of analyst's supervisor.

p. Condition in which the sample was received at the laboratory and whether it was properly sealed and preserved.

q. Note that analytical results are questionable if a sample exceeded an established holding time or was improperly preserved. (The recommended holding time for properly cooled and sealed petroleum contaminated samples is 14 days, except for water samples containing volatile organic compounds which have a 7-day holding time unless acid-preserved.)

r. Laboratory reports required by this chapter for tank closure investigations under 567—135.15(455B) and site checks under 135.6(3) or Tier 1 or Tier 2 assessments under 567—135.9(455B) to 567—135.11(455B) must include a copy of the chromatograms and associated quantitation reports for the waste oil, diesel and gasoline standard used by the laboratory in analyzing submitted samples. The laboratory analytical report for each sample must state whether the sample tested matches the laboratory standard for waste oil, diesel or gasoline or that the sample cannot be reliably matched with any of these standards. A copy of the chromatograms and associated quantitation reports for only the soil and groundwater samples with the maximum concentrations of BTEX and TEH must be included.

135.16(3) *Analysis of soil and water for high volatile petroleum compounds (i.e., gasoline, benzene, ethylbenzene, toluene, xylene).* Sample preparation and analysis shall be by Method OA-1, "Method for Determination of Volatile Petroleum Hydrocarbons (gasoline)," revision 12/01/2019, state hygienic laboratory at the University of Iowa, or EPA Method 8260D, "Test Methods for Evaluating Solid Waste," 3rd Edition–Update 6, July 2018. Copies of Method OA-1 are available from the department.

135.16(4) *Analysis of soil and water for low volatile petroleum hydrocarbon contamination (i.e., all grades of diesel fuel, fuel oil, kerosene, oil, and mineral spirits).* Sample preparation and analysis shall be by Method OA-2, "Determination of Extractable Petroleum Products (and Related Low Volatility Organic Compounds)," revision 12/01/2019, state hygienic laboratory at the University of Iowa. Copies of Method OA-2 are available from the department.

135.16(5) *Analysis of soil gas for volatile petroleum hydrocarbons.* Analysis of soil gas for volatile petroleum hydrocarbons shall be conducted in accordance with the National Institute for Occupational Safety and Health (NIOSH) Method 1501, Issue 3, March 15, 2003, or a department-approved equivalent method.

135.16(6) *Analytical methods for methyl tertiary-butyl ether (MTBE).* Analysis of water for MTBE must be conducted by a laboratory certified under 567—Chapter 83 for petroleum analyses.

a. Sample preparation and analysis shall be by U.S. Environmental Protection Agency Method 8260D, "Test Methods for Evaluating Solid Waste," 3rd Edition–Update 6, July 2018.

b. Laboratories performing the analyses must run standards for MTBE on a routine basis, and standards for other possible compounds like ethyl tertiary-butyl ether (ETBE), tertiary-amyl methyl ether (TAME), di-isopropyl ether (DIPE), and tertiary-butyl alcohol (TBA) to be certain of their identification should they be detected.

c. Laboratories must run a method detection limit study and an initial demonstration of capability for MTBE. These records must be kept on file.

d. The minimum detection level for MTBE in water is 15 ug/L.

[**ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.17(455B) Evaluation of ability to pay.

135.17(1) General. The ability to pay guidance procedures referenced in this rule will be used by the department when an owner or operator of an underground storage tank (UST) claims to be financially unable to comply with corrective action requirements under 567—135.7(455B) to 567—135.12(455B) or closure investigation requirements under 567—135.15(455B). If an owner or operator of a regulated UST claims to be financially unable to meet these departmental requirements, that responsible party must provide documentation of the party's finances on forms provided by the department in order for the department to act on the claim of financial inability. The department may request additional financial documentation to verify or supplement reported information.

135.17(2) Individual claims. The financial ability of individual owners and operators of USTs, with or without an active business (including but not limited to sole proprietorships and general partnerships), may be evaluated using the most current version of "INDIPAY" developed by the U.S. Environmental Protection Agency and generally accepted principles of financial analysis. This guidance is only one tool the department may use in evaluating claims of financial inability.

135.17(3) Corporate claims. The financial ability of corporate owners and operators of USTs may be evaluated using the most current version of "ABEL" developed by the U.S. Environmental Protection Agency and generally accepted principles of financial analysis. This guidance is only one tool the department may use in evaluating claims of financial inability.

135.17(4) Federal LUST Trust Fund. The financial ability of owners and operators of USTs shall be evaluated for the purpose of determining if the department is authorized to use Federal LUST Trust Fund moneys as provided in the current cooperative agreement with the U.S. Environmental Protection Agency, Region VII. A determination of financial inability does not create an entitlement or any expectation interest on behalf of an owner or operator that Federal LUST Trust Fund moneys will be used for corrective action at any individual site.

135.17(5) The evaluation of financial ability will also be used by the department in making other administrative planning decisions including but not limited to decisions as to whether to pursue and when to pursue administrative or judicial enforcement of regulatory and statutory duties and the assessment of penalties. A determination of financial inability does not create an entitlement or expectation interest that enforcement actions will be deferred or suspended. The evaluation of this factor is only one of many affecting the department's fully discretionary decisions regarding enforcement options and program planning.

135.17(6) An evaluation of financial inability as provided in this rule does not relieve any owner or operator of legal liability to comply with department rules or Iowa Code chapter 455B or provide a defense to any legal actions to establish liability or enforce compliance.

[**ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.18(455B) Transitional rules.

135.18(1) *Risk-based corrective action assessment reports, corrective action plans, and corrective action design reports accepted before August 6, 2008.* Any owner or operator who had a Tier 2 site cleanup report, Tier 3 report, or corrective action design report approved by the department before August 6, 2008, may elect to submit a Tier 2 site cleanup report using the Appendix B revised model, department-developed software and rules in effect as of August 6, 2008. The owner or operator shall notify the department that the owner or operator wishes to evaluate the leaking underground storage tank site with the Appendix B revised model, software and rules. If the owner or operator so elects, the site shall be assessed, classified, and, if necessary, remediated, in accordance with the rules of the department as of August 6, 2008. If the leaking underground storage tank site is undergoing active remediation, the remediation system shall remain operating until the reevaluation is completed and accepted or as otherwise approved by the department. Once a site has been evaluated using the Appendix B revised model, software and rules in effect as of August 6, 2008, it can no longer be evaluated with the Appendix B-1 old model and software and rules in effect prior to August 6, 2008.

135.18(2) *Risk-based corrective action assessment reports, corrective action plans, and corrective action design reports in the process of preparation with a submittal schedule established prior to August 6, 2008.* The owner or operator shall notify the department that the owner or operator wishes to use the

Appendix B revised model and department software and rules in effect as of August 6, 2008, to evaluate the leaking underground storage tank site before submitting the next report, and prior to expiration of the previously established submittal schedule. Once a site has been evaluated using the Appendix B revised model, software and rules in effect as of August 6, 2008, it can no longer be evaluated with the Appendix B-1 old model, software and rules existing just prior to August 6, 2008.

135.18(3) *Risk-based corrective action assessment reports, corrective action plans, and corrective action design reports received by the department but not yet reviewed.* The owner or operator will notify the department within 60 days of August 6, 2008, whether the owner or operator is electing to complete a risk-based corrective action assessment using Appendix B revised model, department software and rules effective as of August 6, 2008, or proceeding with the risk-based corrective action assessment using Appendix B-1 old model and department software and rules existing prior to August 6, 2008. Once a site has been evaluated using the Appendix B revised model, software and rules it can no longer be evaluated with the previous Appendix B-1 old model, software and rules.

567—135.19(455B) Analyzing for methyl tertiary-butyl ether (MTBE).

135.19(1) *General.* The objective of analyzing for MTBE is to determine its presence in water samples collected as part of investigation and remediation of contamination for underground storage tank facilities.

135.19(2) *Required MTBE testing.* Water samples must be analyzed for MTBE when collected for risk-based corrective action as required in rules 567—135.8(455B) through 567—135.12(455B). These sampling requirements include but are not limited to Tier 2 and Tier 3 assessments where groundwater ingestion pathway evaluation and subsequent monitoring is required.

135.19(3) *MTBE testing not required.* Analysis for MTBE is not required for the following:

a. Closure sampling under rule 567—135.15(455B).

b. Site checks under subrule 135.6(3).

c. If prior analysis under subrule 135.19(2) has not shown MTBE present.

d. If the department determines MTBE analysis is no longer needed at a site.

135.19(4) *Reporting.* The analytical data must be submitted in a format prescribed by the department.

[**ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.20(455B) Compliance inspection of UST system.

135.20(1) The owner or operator must have the UST system inspected and an inspection report submitted to the department by a UST compliance inspector certified by the department under 567—Chapter 134, Part B. An initial compliance site inspection shall be conducted within two years after new tank installation. All subsequent compliance site inspections conducted after the initial compliance site inspection shall be conducted within 24 months of the prior compliance site inspection. Compliance site inspections must be separated by at least six months.

135.20(2) Compliance inspection requirements. The owner or operator is responsible to ensure the department receives ten days' prior notice by the compliance inspector of the date of a site inspection and the name of the inspector as provided in 567—134.14(455B). The owner and operator must comply with the following as part of the inspection process.

a. Review and respond to the inspection report provided by the certified compliance inspector and complete the corrective actions specified in the compliance inspection report within the specified time frames.

b. Provide all records and documentation required by the certified compliance inspector and this chapter.

c. Upon notification of a suspected release by the certified compliance inspector pursuant to 567—subrule 134.14(1), report the condition to the department and undertake steps to investigate and confirm the suspected release as provided in 567—135.6(455B).

d. Ensure that the compliance inspector completes and submits an electronic inspection form in accordance with 567—134.14(455B).

135.20(3) The owner and operator shall do the following upon receipt of a compliance inspection report as provided in 567—subrule 134.14(1) which finds violations of the department's rules:

a. Take all actions necessary to correct any compliance violations or deficiencies in accordance with this chapter. Corrective action must be taken within the time frame established by rule or, if no time frames are established by rule, within 60 days of receipt of the inspector's report or another reasonable time period approved by the department. The granting of time to remedy a violation does not preclude the department from exercising its discretion to assess penalties for the violation.

b. Within 60 days of receipt of the inspector's report, provide documentation to the compliance inspector that the violation or deficiencies have been corrected.

c. Conduct a follow-up inspection in instances where there are serious problems or a history of repeated violations when required by the department.

135.20(4) Conflict of interest. A compliance site inspection must be conducted by a certified compliance inspector who is not the owner or operator of the UST system being inspected, an employee of the owner or operator of the UST system being inspected, or a person having daily on-site responsibility for the operation and maintenance of the UST system.

[**ARC 8124B**, IAB 9/9/09, effective 10/14/09; **ARC 5625C**, IAB 5/19/21, effective 6/23/21]

567—135.21(455B) UST systems with field-constructed tanks and airport hydrant fuel distribution systems.

135.21(1) *General requirements.*

a. Implementation of requirements. Owners and operators must comply with the requirements of this rule for UST systems with field-constructed tanks and airport hydrant systems as follows:

(1) For UST systems installed on or before June 23, 2021, the requirements are effective according to the following schedule:

Requirement	Effective Date
Upgrading UST systems, general operating requirements, and operator training	October 13, 2021
Release detection	October 13, 2021
Release reporting, response, and investigation; closure; financial responsibility and notification (except as provided in paragraph 135.21(1)*"b"*)	June 23, 2021

(2) For UST systems installed after June 23, 2021, the requirements apply at installation.

b. All owners of previously deferred UST systems must submit a registration form provided by the department. Owners and operators of UST systems must demonstrate financial responsibility at the time of submission of the registration form.

c. Except as provided in subrule 135.21(2), owners and operators must comply with the requirements of rules 567—135.1(455B) through 567—135.20(455B) and 567—Chapter 136.

d. In addition to the codes of practice listed in subrule 135.3(1), owners and operators may use military construction criteria, such as Unified Facilities Criteria (UFC) 3-460-01, Petroleum Fuel Facilities, when designing, constructing, and installing airport hydrant systems and UST systems with field-constructed tanks.

135.21(2) *Additions, exceptions, and alternatives for UST systems with field-constructed tanks and airport hydrant systems.*

a. Exception to piping secondary containment requirements. Owners and operators may use single-walled piping when installing or replacing piping associated with UST systems with field-constructed tanks greater than 50,000 gallons and piping associated with airport hydrant systems. Piping associated with UST systems with field-constructed tanks less than or equal to 50,000 gallons not part of an airport hydrant system must meet the secondary containment requirement when installed or replaced.

b. Upgrade requirements. Not later than October 13, 2021, airport hydrant systems and UST systems with field-constructed tanks where installation commenced on or before June 23, 2021, must meet the following requirements or be permanently closed pursuant to rule 567—135.15(455B).

(1) Corrosion protection. UST system components in contact with the ground that routinely contain regulated substances must meet one of the following:

1. Except as provided in paragraph 135.21(2)*"a,"* the new UST system performance standards for tanks in paragraph 135.3(1)*"a"* and for piping in paragraph 135.3(1)*"b"*; or

2. Be constructed of metal and cathodically protected according to a code of practice developed by a nationally recognized association or independent testing laboratory, and meet the requirements of paragraphs 135.3(1)*"a"*(2)"3" and "4" for tanks, and subparagraphs 135.3(1)*"a"*(2), (3) and (4) for piping. A tank greater than ten years old without cathodic protection must be assessed to ensure the tank is structurally sound and free of corrosion holes prior to adding cathodic protection. The assessment must be by internal inspection or another method determined by the department to adequately assess the tank for structural soundness and corrosion holes.

NOTE regarding paragraph 135.21(2)*"b"*: The following codes of practice may be used to comply with this paragraph:

- NACE International Standard Practice SP 0285, "External Control of Underground Storage Tank Systems by Cathodic Protection";
- NACE International Standard Practice SP 0169, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems";
- National Leak Prevention Association Standard 631, Chapter C, "Internal Inspection of Steel Tanks for Retrofit of Cathodic Protection"; or
- American Society for Testing and Materials Standard G158, "Standard Guide for Three Methods of Assessing Buried Steel Tanks."

(2) Spill and overfill prevention equipment. To prevent spilling and overfilling associated with product transfer to the UST system, all UST systems with field-constructed tanks and airport hydrant systems must comply with new UST system spill and overfill prevention equipment requirements specified in paragraph 135.3(1)*"c."*

c. Walkthrough inspections. In addition to the walkthrough inspection requirements in subrule 135.4(13), owners and operators must inspect the following additional areas for airport hydrant systems at least once every 30 days if confined space entry according to the Occupational Safety and Health Administration (see 29 CFR part 1910) is not required or at least annually if confined space entry is required and keep documentation of the inspection according to paragraph 135.4(13)*"e."*

(1) Hydrant pits: visually check for any damage; remove any liquid or debris; and check for any leaks, and

(2) Hydrant piping vaults: check for any hydrant piping leaks.

d. Release detection. Owners and operators of UST systems with field-constructed tanks and airport hydrant systems must begin meeting the release detection requirements described in this subrule not later than October 13, 2021.

(1) Methods of release detection for field-constructed tanks. Owners and operators of field-constructed tanks with a capacity less than or equal to 50,000 gallons must meet the release detection requirements in rule 567—135.5(455B).

(2) Owners and operators of field-constructed tanks with a capacity greater than 50,000 gallons must meet either the requirements in rule 567—135.5(455B) (except paragraphs 135.5(4)*"e"* and *"f"* must be combined with inventory control as stated below) or use one or a combination of the following alternative methods of release detection:

1. Conduct an annual tank tightness test that can detect a 0.5 gallon per hour leak rate;

2. Use an automatic tank gauging system to perform release detection at least every 30 days that can detect a leak rate less than or equal to 1 gallon per hour. This method must be combined with a tank tightness test that can detect a 0.2 gallon-per-hour leak rate performed at least every three years;

3. Use an automatic tank gauging system to perform release detection at least every 30 days that can detect a leak rate less than or equal to 2 gallons per hour. This method must be combined with a tank tightness test that can detect a 0.2 gallon-per-hour leak rate performed at least every two years;

4. Perform vapor monitoring (conducted in accordance with paragraph 135.5(4)*"e"* for a tracer compound placed in the tank system) capable of detecting a 0.1 gallon-per-hour leak rate at least every two years;

5. Perform inventory control (conducted in accordance with Department of Defense Directive 4140.25; ATA Airport Fuel Facility Operations and Maintenance Guidance Manual; or equivalent procedures) at least every 30 days that can detect a leak equal to or less than 0.5 percent of flow-through; and

- Perform a tank tightness test that can detect a 0.5 gallon per hour leak rate at least every two years; or
- Perform vapor monitoring or groundwater monitoring (conducted in accordance with paragraph 135.5(4)*"e"* or *"f,"* respectively, for the stored regulated substance) at least every 30 days; or

6. Another method approved by the department if the owner and operator can demonstrate that the method can detect a release as effectively as any of the methods allowed in subparagraph 135.21(2)*"d"*(2). In comparing methods, the department shall consider the size of release that the method can detect and the frequency and reliability of detection.

(3) Methods of release detection for piping. Owners and operators of underground piping associated with field-constructed tanks less than or equal to 50,000 gallons must meet the release detection requirements in rule 567—135.5(455B). Owners and operators of underground piping associated with airport hydrant systems and field-constructed tanks greater than 50,000 gallons must follow either the requirements in rule 567—135.5(455B) (except paragraphs 135.5(4)*"e"* and *"f"* must be combined with inventory control as stated below) or use one or a combination of the following alternative methods of release detection:

1. Perform a semiannual or annual line tightness test at or above the piping operating pressure in accordance with the table below.

	Maximum Leak Detection Rate Per Test Section Volume	
Test Section Volume (Gallons)	**Semiannual Test— Leak Detection Rate Not to Exceed (Gallons Per Hour)**	**Annual Test— Leak Detection Rate Not to Exceed (Gallons Per Hour)**
< 50,000	1.0	0.5
≥ 50,000 to < 75,000	1.5	0.75
≥ 75,000 to < 100,000	2.0	1.0
≥ 100,000	3.0	1.5

Piping segment volumes ≥ 100,000 gallons not capable of meeting the maximum 3.0 gallon per hour leak rate for the semiannual test may be tested at a leak rate up to 6.0 gallons per hour according to the following schedule:

Phase in for Piping Segments ≥ 100,000 Gallons in Volume	
First test	Not later than October 13, 2021 (may use up to 6.0 gph leak rate)
Second test	Between October 13, 2021, and October 13, 2024 (may use up to 6.0 gph leak rate)
Third test	Between October 13, 2024, and October 13, 2025 (must use 3.0 gph for leak rate)
Subsequent tests	After October 13, 2025, begin using semiannual or annual line testing according to the Maximum Leak Detection Rate Per Test Section Volume table above

2. Perform vapor monitoring (conducted in accordance with paragraph 135.5(4)*"e"* for a tracer compound placed in the tank system) capable of detecting a 0.1 gallon per hour leak rate at least every two years;

3. Perform inventory control (conducted in accordance with Department of Defense Directive 4140.25, ATA Airport Fuel Facility Operations and Maintenance Guidance Manual; or equivalent procedures) at least every 30 days that can detect a leak equal to or less than 0.5 percent of flow-through, and

- Perform a line tightness test (conducted in accordance with paragraph 135.21(2)*"d"*(3)"1" using the leak rates for the semiannual test) at least every two years; or
- Perform vapor monitoring or groundwater monitoring (conducted in accordance with paragraph 135.5(4)*"e"* or *"f,"* respectively, for the stored regulated substance) at least every 30 days; or

4. Another method approved by the department if the owner and operator can demonstrate that the method can detect a release as effectively as any of the methods allowed in paragraphs 135.21(2)*"d"*(3)"1" to "3." In comparing methods, the department shall consider the size of release that the method can detect and the frequency and reliability of detection.

(4) Record keeping for release detection. Owners and operators must maintain release detection records according to the recordkeeping requirements in subrule 135.5(6).

e. Applicability of closure requirements to previously closed UST systems. When directed by the department, the owner and operator of a UST system with field-constructed tanks or airport hydrant system permanently closed before June 23, 2021, must assess the excavation zone and close the UST system in accordance with rule 567—135.15(455B) if releases from the UST may, in the judgment of the department, pose a current or potential threat to human health and the environment.

[**ARC 5625C**, IAB 5/19/21, effective 6/23/21]

Appendix A - Tier 1 Table, Assumptions, Equations and Parameter Values

Iowa Tier 1 Look-Up Table

Media	Exposure Pathway	Receptor	Group 1				Group 2: TEH	
			Benzene	Toluene	Ethylbenzene	Xylenes	Diesel*	Waste Oil
Groundwater (µg/L)	Groundwater Ingestion	Actual	5	1,000	700	10,000	1,200	400
		Potential	290	7,300	3,700	73,000	75,000	40,000
	Groundwater Vapor to Enclosed Space	All	1,540	20,190	46,000	NA	2,200,000	NA
	Groundwater to Water Line	PVC or Gasketed Mains	7,500	6,250	40,000	48,000	75,000	40,000
		PVC or Gasketed Service Lines	3,750	3,120	20,000	24,000	75,000	40,000
		PE/PB/AC Mains or Service Lines	200	3,120	3,400	19,000	75,000	40,000
	Surface Water	All	290	1,000	3,700	73,000	75,000	40,000
Soil (mg/kg)	Soil Leaching to Groundwater	All	0.54	42	15	NA	3,800	NA
	Soil Vapor to Enclosed Space	All	1.16	48	79	NA	47,500	NA
	Soil to Water Line	All	2.0	3.2	45	52	10,500	NA

NA: Not applicable. There are no limits for the chemical for the pathway, because for groundwater pathways the concentration for the designated risk would be greater than the solubility of the pure chemical in water, and for soil pathways the concentration for the designated risk would be greater than the soil concentration if pure chemical were present in the soil.

TEH: Total Extractable Hydrocarbons. The TEH value is based on risks from naphthalene, benzo(a)pyrene, benz(a)anthracene, and chrysene. Refer to Appendix B for further details.

Diesel*: Standards in the Diesel column apply to all low volatile petroleum hydorcarbons except waste oil.

Assumptions Used for Iowa Tier 1 Look-Up Table Generation

1. Groundwater ingestion pathway. The maximum contaminant levels (MCLs) were used for Group 1 chemicals. The target risk for carcinogens for actual receptors is 10^{-6} and for potential receptors is 10^{-4}. A hazard quotient of one, and residential exposure and building parameters are assumed.

2. Groundwater vapor to enclosed space pathway. Residential exposure and residential building parameters are assumed; no inhalation reference dose is used for benzene; the capillary fringe is assumed to be the source of groundwater vapor; and the hazard quotient is 1 and target risk for carcinogens is $1x10^{-4}$.

3. Groundwater to water line. This pathway uses the same assumptions as the groundwater ingestion pathway for potential receptors, including a target risk for carcinogens of 10^{-4}.

4. Surface water. This pathway uses the same assumptions as the groundwater ingestion pathway for potential receptors, including a target risk for carcinogens of 10^{-4}, except for toluene which has a chronic level for aquatic life of 1,000 as in the definition for surface water criteria in 567—135.2(455B).

5. Soil leaching to groundwater. This pathway assumes the groundwater will be protected to the same levels as the groundwater ingestion pathway for potential receptors, using residential exposure and a target risk for carcinogens of 10^{-4}.

6. Soil vapor to enclosed space pathway. The target risk for carcinogens is $1x10^{-4}$; the hazard quotient is 1; no inhalation reference dose is used for benzene; residential exposure factors are assumed; and the average of the residential and nonresidential building parameters is assumed.

7. Soil to water line pathway. This pathway uses the soil leaching to groundwater model with nonresidential exposure and a target risk for carcinogens of 10^{-4}.

In addition to these assumptions, the equations and parameter values used to generate the Iowa Tier 1 Look-Up Table are described below.

Groundwater Ingestion Equations

Carcinogens:

$$RBSL_w \left[\frac{mg}{L - H_2O}\right] = \frac{TR \times BW \times AT_c \times \frac{365\ days}{year}}{SF_o \times IR_w \times EF \times ED}$$

Noncarcinogens:

$$RBSL_w \left[\frac{mg}{L - H_2O}\right] = \frac{THQ \times RfD_o \times BW \times AT_n \times \frac{365\ days}{year}}{IR_w \times EF \times ED}$$

Soil Leaching to Groundwater Equations

$$RBSL_{sl}\left[\frac{mg}{kg - soil}\right] = \frac{RBSL_w\left[\frac{mg}{L - H_2O}\right]}{LF}$$

$$LF\left[\frac{mg/L - H_2O}{mg/kg - soil}\right] = \frac{\rho_s}{(\theta_{ws} + k_s\rho_s + H\theta_{as})\left(1 + \frac{U\delta}{IW}\right)}$$

Soil Vapor to Enclosed Space Equations

$$RBSL_{sv}\left[\frac{mg}{kg-soil}\right] = \frac{RBSL_{air}\left[\frac{\mu g}{m^3-air}\right]}{VF_{sv}}\left(\frac{mg}{1000\ \mu g}\right)$$

$$VF_{sv}\left[\frac{(mg/m^3-air)}{(mg/kg-soil)}\right] = \frac{\frac{H\rho_s}{(\theta_{ws}+k_s\rho_s+H\theta_{as})}\left[\frac{D_s^{eff}/L_s}{ER\ L_B}\right]}{1+\left[\frac{D_s^{eff}/L_s}{ER\ L_B}\right]+\left[\frac{D_s^{eff}/L_s}{\left(D_{crack}^{eff}/L_{crack}\right)\eta}\right]}\left(10^3\ \frac{cm^3-kg}{m^3-g}\right)$$

$$D_{crack}^{eff}\left[\frac{cm^2}{s}\right] = D^{air}\ \frac{\theta_{acrack}^{3.33}}{\theta_T^2} + D^{wat}\frac{1}{H}\frac{\theta_{wcrack}^{3.33}}{\theta_T^2}$$

$$D_s^{eff}\left[\frac{cm^2}{s}\right] = D^{air}\ \frac{\theta_{as}^{3.33}}{\theta_T^2} + D^{wat}\frac{1}{H}\frac{\theta_{ws}^{3.33}}{\theta_T^2}$$

Indoor Air Inhalation Equations

Carcinogens:

$$RBSL_{air}\left[\frac{\mu g}{m^3 - air}\right] = \frac{TR \times BW \times AT_c \times \frac{365\ days}{year} \times \frac{1000\ \mu g}{mg}}{SF_i \times IR_{air} \times EF \times ED}$$

Noncarcinogens:

$$RBSL_{air}\left[\frac{\mu g}{m^3 - air}\right] = \frac{THQ \times RfD_i \times BW \times AT_n \times \frac{365}{kdays} \times \frac{1000\ \mu g}{mg}}{IR_{air} \times EF \times ED}$$

Groundwater Vapor to Enclosed Space Equations

$$RBSL_{gw}\left[\frac{mg}{L - H_2O}\right] = \frac{RBSL_{air}\left[\frac{\mu g}{m^3 - air}\right]}{VF_{gw}}\left(\frac{mg}{1000\ \mu g}\right)$$

$$VF_{gw}\left[\frac{(mg/m^3 - air)}{(mg/L - H_2O)}\right] = \frac{H\left[\frac{D_s^{eff}/L_{gw}}{ER\ L_B}\right]}{1 + \left[\frac{D_s^{eff}/L_{gw}}{ER\ L_B}\right] + \left[\frac{D_s^{eff}/L_{gw}}{\left(D_{crack}^{eff}/L_{crack}\right)\eta}\right]}\left(\frac{10^3 L}{m^3}\right)$$

Variable Definitions

δ	groundwater mixing zone thickness (cm)
η	areal fraction of cracks in foundation/wall (cm^2-cracks/cm^2-area)
ρ_s	soil bulk density (g/cm^3)
θ_{acrack}	volumetric air content in foundation/wall cracks (cm^3-air/cm^3-soil)
θ_{as}	volumetric air content in vadose zone (cm^3-air/cm^3-soil)
θ_T	total soil porosity (cm^3-voids/cm^3-soil)
θ_{wcrack}	volumetric water content in foundation/wall cracks (cm^3-H_2O/cm^3-soil)
θ_{ws}	volumetric water content in vadose zone (cm^3-H_2O/cm^3-soil)
AT_c	averaging time for carcinogens (years)
AT_n	averaging time for noncarcinogens (years)
BW	body weight (kg)
D^{air}	chemical diffusion coefficient in air (cm^2/s)
D^{wat}	chemical diffusion coefficient in water (cm^2/s)
D^{eff}_{crack}	effective diffusion coefficient through foundation cracks (cm^2/s)
D^{eff}_{s}	effective diffusion coefficient in soil based on vapor-phase concentration (cm^2/s)
ED	exposure duration (years)
EF	exposure frequency (days/year)
ER	enclosed space air exchange rate (s^{-1})
f_{oc}	fraction organic carbon in the soil (kg-C/kg-soil)
H	henry's law constant (L-H_2O)/(L-air)
i	groundwater head gradient (cm/cm)
I	infiltration rate of water through soil (cm/year)
IR_{air}	daily indoor inhalation rate (m^3/day)
IR_w	daily water ingestion rate (L/day)
K	hydraulic conductivity (cm/year)
K_{oc}	carbon-water sorption coefficient (L-H_2O/kg-C)
k_s	soil-water sorption coefficient (L-H_2O/kg-soil), f_{oc} x K_{oc}
L_B	enclosed space volume/infiltration area ratio (cm)
L_{crack}	enclosed space foundation or wall thickness (cm)
LF	leaching factor from soil to groundwater ((mg/L-H_2O)/(mg/kg-soil))
L_{gw}	depth to groundwater from the enclosed space foundation (cm)
L_s	depth to subsurface soil sources from the enclosed space foundation (cm)
$RBSL_{air}$	Risk-Based Screening Level for indoor air ($\mu g/m^3$-air)
$RBSL_{gw}$	Risk-Based Screening Level for vapor from groundwater to enclosed space air inhalation (mg/L-H_2O)
$RBSL_{sl}$	Risk-Based Screening Level for soil leaching to groundwater (mg/kg-soil)
$RBSLs_v$	Risk-Based Screening Level for vapors from soil to enclosed space air inhalation (mg/kg-soil)
$RBSL_w$	Risk-Based Screening Level for groundwater ingestion (mg/L-H_2O)
RfD_i	inhalation chronic reference dose ((mg/(kg-day))
RfD_o	oral chronic reference dose ((mg/(kg-day))
SF_i	inhalation cancer slope factor ((kg-day)/mg)
SF_o	oral cancer slope factor ((kg-day)/mg)
THQ	target hazard quotient for individual constituents (unitless)
TR	target excess individual lifetime cancer risk (unitless)
U	groundwater Darcy velocity (cm/year), U=Ki
VF_{gw}	volatilization factor for vapors from groundwater to enclosed space ((mg/m^3-air)/(mg/L-H_2O))
VF_{sv}	volatilization factor for vapors from soil to enclosed space ((mg/m^3-air)/(mg/kg-soil))
W	width of soil source area parallel to groundwater flow direction (cm)

Soil and Groundwater Parameter Values Used for Iowa Tier 1 Table Generation

Parameter		Iowa Tier 1 Table Value
K	hydraulic conductivity	16060 cm/year
i	groundwater head gradient	0.01 cm/cm
W	width of soil source area parallel to groundwater flow direction	1500 cm
I	infiltration rate of water through soil	7 cm/year
δ	groundwater mixing zone thickness	200 cm
ρ_s	soil bulk density	1.86 g/cm^3
θ_{as}	volumetric air content in vadose zone	0.2 cm^3-air/cm^3-soil
θ_{ws}	volumetric water content in vadose zone	0.1 cm^3-H_2O/cm^3-soil
θ_{acrack}	volumetric air content in foundation/wall cracks	0.2 cm^3-air/cm^3-soil
θ_{wcrack}	volumetric water content in foundation/wall cracks	0.1 cm^3-H_2O/cm^3-soil
θ_T	total soil porosity	0.3 cm^3-voids/cm^3-soil
f_{oc}	fraction organic carbon in the soil	0.01 kg-C/kg-soil
L_s	depth to subsurface soil sources from the enclosed space foundation	1 cm
L_{gw}	depth to groundwater from the enclosed space foundation	1 cm

Exposure Factors Used in Iowa Tier 1 Table Generation

Parameter		Residential	Nonresidential
AT_c (years)	averaging time for carcinogens	70	70
AT_n (years)	averaging time for noncarcinogens	30	25
BW (kg)	body weight	70	70
ED (years)	exposure duration	30	25
EF (days/year)	exposure frequency	350	250
IR_{air} (m^3/day)	daily indoor inhalation rate	15	20
IR_w (L/day)	daily water ingestion rate	2	1
THQ (unitless)	target hazard quotient for individual constituents	1.0	1.0

Building Parameters Used in Iowa Tier 1 Table Generation

Parameter		Residential	Nonresidential
ER (s^{-1})	enclosed space air exchange rate	0.00014	0.00023
L_B (cm)	enclosed space volume/infiltration area ratio	200	300
L_{crack} (cm)	enclosed space foundation or wall thickness	15	15
η	areal fraction of cracks in foundation/wall	0.01	0.01

Chemical-Specific Parameter Values Used for Iowa Tier 1 Table Generation

Chemical	D^{air} (cm^2/s)	D^{wat} (cm^2/s)	H (L-air/L-water)	log(K_{oc}), L/kg
Benzene	0.093	1.1e-5	0.22	1.58
Toluene	0.085	9.4e-6	0.26	2.13
Ethylbenzene	0.076	8.5e-6	0.32	1.98
Xylenes	0.072	8.5e-6	0.29	2.38
Naphthalene	0.072	9.4e-6	0.049	3.11
Benzo(a)pyrene	0.050	5.8e-6	5.8e-8	5.59
Benz(a)anthracene	0.05	9.0e-6	5.74e-7	6.14
Chrysene	0.025	6.2e-6	4.9e-7	5.30

Saturation Values Used to Determine "NA" for the Iowa Tier 1 Table

Chemical	Solubility in Water (mg/L) S	Saturation in Soil (mg/kg) C_s^{sat}
Benzene	1,750	801
Toluene	535	765
Ethylbenzene	152	159
Xylenes	198	492
Naphthalene	31	401
Benzo(a)pyrene	0.0012	4.69
Benz(a)anthracene	0.014	193.3
Chrysene	0.0028	5.59

The maximum solubility of the pure chemical in water is listed in the table above. The equation below is used to calculate the soil concentration (C_s^{sat}) at which dissolved pore-water and vapor phases become saturated. Tier 1 default values are used in the equation. "NA" (for not applicable) is used in the Tier 1 table when the risk-based value exceeds maximum solubility for water (S) or maximum saturation for soil (C_s^{sat}).

$$C_s^{sat}(\text{mg/kg-soil}) = S/\rho_s \times (H\theta_{as} + \theta_{ws} + k_s \rho_s)$$

Slope Factors and Reference Doses Used for Iowa Tier 1 Table Generation

Chemical	SF_i ((kg-day)/mg)	SF_o ((kg-day)/mg)	RfD_i (mg/(kg-day))	RfD_o (mg/(kg-day))
Benzene	0.029	0.029	—	—
Toluene	—	—	0.114	0.2
Ethylbenzene	—	—	0.286	0.1
Xylenes	—	—	2.0	2.0
Naphthalene	—	—	0.004	0.004
Benzo(a)pyrene	6.1	7.3	—	—
Benz(a)anthracene	0.61	0.73	—	—
Chrysene	0.061	0.073	—	—

[**ARC 9011B**, IAB 8/25/10, effective 9/29/10]

Appendix B – Tier 2 Equations and Parameter Values (Revised Model)

All Tier 1 equations and parameters apply at Tier 2 except as specified below.

Equation for Tier 2 Groundwater Contaminant Transport Model

Equation (1)

$$C(x) = C_s \exp\left(\frac{x_m}{2\alpha_x}\left[1-\sqrt{1+\frac{4\lambda\alpha_x}{u}}\right]\right) erf\left(\frac{S_w}{4\sqrt{\alpha_y x_m}}\right) erf\left(\frac{S_d}{4\sqrt{\alpha_z x_m}}\right)$$

Equation (2)

Where $x_m = ax + bx^c$

The value of X_m is computed from Equation (2), where the values for a, b and c in Equation (2) are given in Table 1.

Table 1. Parameter Values for Equation (2)

Chemical	a	b	c
Benzene	1	0.000000227987	3.929438689
Toluene	1	0.000030701	3.133842393
Ethylbenzene	1	0.0001	2.8
Xylenes	1	0.0	0.0
TEH-Diesel	1	0.000000565	3.625804634
TEH-Waste Oil	1	0.000000565	3.625804634
Naphthalene	1	0	0

Variable definitions

x: distance in the x direction downgradient from the source

erf( ): the error function

C(x): chemical concentration in groundwater at x

C_s: Source concentration in groundwater (groundwater concentration at x=0)

S_w: width of the source (perpendicular to x)

S_d: vertical thickness of the source

u: groundwater velocity (pore water velocity); u=Ki/θe

K: hydraulic conductivity

i: groundwater head gradient

θe: effective porosity

λ: first order decay coefficient, chemical specific

αx, αy, αz: dispersivities in the x, y and z directions, respectively

For the following lists of parameters, one of three is required: site-specific measurements, defaults or the option of either (which means the default may be used or replaced with a site-specific measurement).

Soil parameters

Parameter		Default Value	Required
ρ_s	soil bulk density	1.86 g/cm^3	option
f_{oc}	fraction organic carbon in the soil	0.01 kg-C/kg-soil	option
θ_T	total soil porosity	0.3cm^3-voids/cm^3-soil	option
θ_{as}	volumetric air content in vadose zone	0.2cm^3-air/cm^3-soil	default
θ_{ws}	volumetric water content in vadose zone	0.1cm^3-H_2O/cm^3-soil	default

Parameter		Default Value	Required
θ_{acrack}	volumetric air content in foundation/wall cracks	0.2cm^3-air/cm^3-soil	default
I	infiltration rate of water through soil	7 cm/year	default

If the total porosity is measured, assume 1/3 is air filled and 2/3 is water filled for determining the water and air fraction in the vadose zone soil and floor cracks.

Groundwater Transport Modeling Parameters

Parameter		Default Value	Required
K	hydraulic conductivity	16060 cm/year	site-specific
i	groundwater head gradient	0.01 cm/cm	site-specific
S_w	width of the source	use procedure specified in 135.10(2)	site-specific
S_d	vertical thickness of the source	3 m	default
αx	dispersivity in the x direction	0.1x	default
αy	dispersivity in the y direction	0.33αx	default
αz	dispersivity in the z direction	0.05αx	default
θe	effective porosity	0.1	default

where u=Ki/θe

First-order Decay Coefficients

Chemical	Default Valueλ (d-1)	Required
Benzene	0.000127441	default
Toluene	0.0000208066	default
Ethylbenzene	0.0	default
Xylenes	0.0005	default
Naphthalene	0.00013	default
TEH-Diesel	0.0000554955	default
TEH-Waste Oil	0.0000554955	default

Other Parameters for Groundwater Vapor to Enclosed Space

Parameter		Default Value	Required
Lgw	depth to groundwater from the enclosed space foundation	1 cm	option
L_B	enclosed space volume/infiltration area ratio	200 cm	option
ER (s-1)	enclosed space air exchange rate	0.00014	default
Lcrack	enclosed space foundation or wall thickness	15 cm	default
η	areal fraction of cracks in foundation/wall	0.01	default

Other Parameters for Soil Vapor to Enclosed Space

Parameter		Default Value	Required
L_s	depth to subsurface soil sources from the enclosed space foundation	1 cm	option
L_B	enclosed space volume/infiltration area ratio	250 cm *	option
ER (s-1)	enclosed space air exchange rate	0.000185 *	default
Lcrack	enclosed space foundation or wall thickness	15 cm	default
η	areal fraction of cracks in foundation/wall	0.01	default

*These values are an average of residential and nonresidential factors.

Soil Leaching to Groundwater

Parameter		Default Value	Required
δ	groundwater mixing zone	2 m	default

Building Parameters for Iowa Tier 2

Parameter		Residential	Nonresidential
ER (s-1)	enclosed space air exchange rate	0.00014	0.00023
L_B	enclosed space volume/infiltration area ratio	200 cm	300 cm

Other Parameters

For Tier 2, the following are the same as Tier 1 values (refer to Appendix A): chemical-specific parameters, slope factors and reference doses, and exposure factors (except for those listed below).

Exposure Factors for Tier 2 Groundwater Vapor to Enclosed Space Modeling:

Potential Residential: use residential exposure and residential building parameters.

Potential Nonresidential: use nonresidential exposure and nonresidential building parameters.

Diesel and Waste Oil

Diesel and Waste Oil			Chemical-Specific Values for Tier 1			
Media	Exposure Pathway	Receptor	Naphthalene	Benzo(a) pyrene	Benz(a) anthracene	Chrysene
Groundwater (ug/L)	Groundwater Ingestion	actual	150	0.012	0.12	1.2
		potential	150	1.2	12.0	NA
	Groundwater Vapor to Enclosed Space	all	4,440	NA	NA	NA
	Groundwater to Water Line	all	150	1.2	12.0	NA
	Surface Water	all	150	1.2	12.0	NA
Soil (mg/kg)	Soil Leaching to Groundwater	all	7.6	NA	NA	NA
	Soil Vapor to Enclosed Space	all	95	NA	NA	NA
	Soil to Water Line	all	21	NA	NA	NA

Due to difficulties with analytical methods for the four individual chemicals listed in the above table, Total Extractable Hydrocarbon (TEH) default values were calculated for each chemical, using the assumption that diesel contains 0.2% napthalene, 0.001% benzo(a)pyrene, 0.001% benz(a)anthracene, and 0.001% chrysene. Resulting TEH Default Values are shown in the following table.

Diesel			TEH Default Values			
Media	Exposure Pathway	Receptor	Naphthalene	Benzo(a) pyrene	Benz(a) anthracene	Chrysene
Groundwater (ug/L)	Groundwater Ingestion	actual	75,000	1,200	12,000	120,000
		potential	75,000	120,000	1,200,000	NA
	Groundwater Vapor to Enclosed Space	all	2,200,000	NA	NA	NA
	Groundwater to Water Line	all	75,000	120,000	1,200,000	NA
	Surface Water	all	75,000	120,000	1,200,000	NA
Soil (mg/kg)	Soil Leaching to Groundwater	all	3,800	NA	NA	NA
	Soil Vapor to Enclosed Space	all	47,500	NA	NA	NA
	Soil to Water Line	all	10,500	NA	NA	NA

The lowest TEH default value for each pathway (shown as a shaded box) was used in the Tier 1 Table.

Due to difficulties with analytical methods for the four individual chemicals, Total Extractable Hydrocarbon (TEH) default values were calculated for each chemical, using the assumption that waste oil contains no naphthalene, 0.003% benzo(a)pyrene, 0.003% benz(a)anthracene, and 0.003% chrysene. Resulting TEH Default Values are shown in the following table.

Waste Oil			TEH Default Values			
Media	Exposure Pathway	Receptor	Naphthalene	Benzo(a) pyrene	Benz(a) anthracene	Chrysene
Groundwater (ug/L)	Groundwater Ingestion	actual	NA	400	4,000	40,000
		potential	NA	40,000	400,000	NA
Groundwater (ug/L)	Groundwater Vapor to Enclosed Space	all	NA	NA	NA	NA
	Groundwater to Water Line	all	NA	40,000	400,000	NA
	Surface Water	all	NA	40,000	400,000	NA
Soil (mg/kg)	Soil Leaching to Groundwater	all	NA	NA	NA	NA
	Soil Vapor to Enclosed Space	all	NA	NA	NA	NA
	Soil to Water Line	all	NA	NA	NA	NA

The lowest TEH default value for each pathway (shown as a shaded box) was used in the Tier 1 Table.

Water Line Calculations

Explanation of Target Levels for
Petroleum Fuel-Derived BTEX Compounds in Groundwater and Soil

GROUNDWATER

PVC or Gasketed Mains

Benzene: 7,500 µg/L
Gasoline-saturated groundwater was considered to be an extreme condition of environmental contamination, and it was considered unacceptable to leave water lines, regardless of material, in contact with this level of benzene contamination. While Ong et al. (2008) showed that gasoline-saturated groundwater would not pose a significant risk of permeation exceeding the 5 µg/L MCL for benzene of gasketed DI or PVC water mains, a safety factor of 1/8th was applied to the level of benzene in premium gasoline-saturated water determined by Ong et al. (2008). A 1/2 safety factor was compounded for each of four potential safety risks: material defects in the pipe (= 1/2), presence of service line taps (= 1/4), stagnation of water (= 1/6), and water line breaks (= 1/8). This was an average of 67.5 mg/L ± 4.9 mg/L for multiple preparations of gasoline-saturated water and was rounded to 60.0 mg/L to conservatively account for the statistical uncertainty. Hence,

$$\textit{Target Level} = \frac{1}{8} \times 60{,}000\ \mu g/L = 7{,}500\ \mu g/L\ \textit{benzene}$$

Toluene: 6,250 µg/L
The target level for toluene was determined similarly to that for benzene. The level of toluene in premium gasoline-saturated water was determined by Ong et al. (2008) to be 56.2 mg/L ± 4.9 mg/L and conservatively rounded to 50.0 mg/L. Hence,

$$\textit{Target Level} = \frac{1}{8} \times 50{,}000\ \mu g/L = 6{,}250\ \mu g/L\ \textit{toluene}$$

Ethylbenzene: 40,000 µg/L
The target level was set to be double that for PVC or Gasketed Service Lines (20,000 µg/L – see below).

Total Xylenes: 48,000 µg/L
The target level was set to be double that for PVC or Gasketed Service Lines (24,000 µg/L – see below).

PVC or Gasketed Service Lines

Benzene: 3,750 µg/L
The target level was set to be one-half of that for PVC or Gasketed Mains (7,500 µg/L as above) since service lines tend to be of higher risk than mains owing to their smaller diameter and greater potential for stagnation.

Toluene: 3,120 µg/L
Similar to benzene, the target level was set to be one-half of that for PVC or Gasketed Mains (6,250 µg/L as above) since service lines tend to be of higher risk than mains owing to their smaller diameter and greater potential for stagnation. Odd-even rounding to 3 significant figures was applied.

Ethylbenzene: 20,000 µg/L
The target level was based on two observations by Ong et al. (2008): (1) premium gasoline-saturated water has an average concentration of 3.4 mg/L ethylbenzene and (2) ethylene permeates high density polyethylene 46 times slower than does benzene (presumably, this is reasonably representative of other materials such as rubber gaskets). The 1/8 safety factor was also applied, as above. Odd-even rounding to 2 significant figures was applied. Hence:

$$\textit{Target Level} = 3{,}400\ \mu g/L \times 46x \times \frac{1}{8} = 19{,}550\ \mu g/L = 20{,}000\ \mu g/L$$

Total Xylenes: 24,000 µg/L
Similar to ethylbenzene, the target level was based on (1) premium gasoline-saturated water has an average concentration of 19 mg/L total xylenes and (2) total xylenes permeate high density polyethylene 10 times slower than does benzene. The 1/8 safety factor was also applied, as above. Odd-even rounding to 2 significant figures was applied. Hence:

$$\textit{Target Level} = 19{,}000\ \mu g/L \times 10x \times \frac{1}{8} = 23{,}750\ \mu g/L = 24{,}000\ \mu g/L$$

PE/PB/AC

Benzene: 200 µg/L
The target level was set at the concentration of benzene in groundwater surrounding a 1″ HDPE service line (SIDR 9 IPS) that would result in a concentration of 2 µg/L benzene in the service line after a 24 hr stagnation period. This level was chosen because 2 µg/L is generally the minimum reportable concentration of benzene in laboratory reports received by the department.

The permeation rate is a function of the concentration of benzene in the groundwater as described by Ong et al. (2008), equation 3.4a:

$$P_m = 0.0079 C_{bulk}^{1.1323}$$

where P_m is the benzene permeation rate in µg/cm^2/day through the pipe described above (cm^2 refers to the inner surface of the pipe) and C_{bulk} is the concentration of benzene in the groundwater (mg/L).

For any length of exposed 1″ SIDR 9 IPS pipe, l (cm), the concentration in the pipe after 24 hr stagnation, C_{24hr} (µg/L), can be computed from P_m and the ratio of the inner surface of the pipe to the internal volume:

$$C_{24hr} = P_m \times \left(\frac{2\pi r l}{\pi r^2 l/1000}\right) = 0.0079 C_{bulk}^{1.1323} \times \frac{2000}{r}$$

where r is the inside radius of the pipe (cm), l is the length of exposed pipe (cm), and dividing by 1000 converts from cm^3 to liters (and, therefore, 2000/r converts µg/cm^2/day to µg/L/day).

Solving for C_{bulk} (mg/L) with C_{24hr}= 2 µg/L and r = 1.28 cm (per manufacturer's specifications):

$$C_{bulk}^{1.1323} = \frac{2 \times 1.28}{0.0079 \times 2000}$$

and

$$C_{bulk} = \sqrt[1.1323]{0.162} = 0.200 mg/L = 200 \mu g/L$$

While the target level is expressed as 200 µg/L for clarity, the underlying data support only two significant figures. In a stricter treatment of the data, this would be expressed as 20×10^1 µg/L.

Toluene: 3,120 µg/L
The target level was set to be equal to that for PVC or Gasketed Service Lines. Calculations similar to those used above for benzene (Ong et al. (2008), equation 3.4b) indicate that 3,120 µg/L toluene in groundwater would result in 50 µg/L inside a 1" SIDR 9 IPS HDPE pipe after 24 hours of stagnation, which is 1/20th of the 1,000 µg/L MCL for toluene.

Ethylbenzene: 3,400 µg/L
The target level was set to be equal to the concentration of ethylbenzene in premium gasoline-saturated water (see discussion above for PVC or Gasketed Mains/Benzene). Unlike other target levels based on contaminant concentrations in gasoline-saturated water, the 1/8th safety factor was not applied because of the very low permeation rate of ethylbenzene through HDPE, the relatively low solubility of ethylbenzene in water, and the relatively high MCL (700 µg/L). Ong et al. (2008) found that permeation of HDPE by aqueous ethylbenzene was minimal and of no consequence for public health.

Total Xylenes: 19,000 µg/L
The target level was set to be equal to the concentration of ethylbenzene in premium gasoline-saturated water following the same reasoning for ethylbenzene (above). The permeation rate and water solubility are also very low, and the MCL is 10,000 µg/L. Ong et al. (2008) found that permeation of HDPE by aqueous xylenes was minimal and of no consequence for public health.

SOIL

Target levels for soil were set to be the same for mains and service lines of any material discussed above under "Groundwater." The underlying data support two significant figures for target levels in soil. Odd-even rounding was applied where appropriate.

Benzene: 2.0 mg/Kg
The target level was derived from the concentration of benzene (mg/Kg) that would result if soil that was 10% moisture and 1% organic matter was equilibrated with premium gasoline-saturated water (60 mg/L benzene – as per discussion of PVC or Gasketed Mains/Benzene above). The equilibrium concentration in soil was calculated using the approach of Chiou et al. (1983). The 1/8th safety factor discussed previously for groundwater was applied. Accordingly:

$$C_T = C_W K_d + C_W \theta$$

where C_T is the total concentration of benzene in soil (mg/Kg), θ is the fraction of moisture in the soil (Kg/Kg), and K_d is the partition coefficient from water to soil (L/Kg). Further:

$$K_d = K_{om} f_{om}$$

where K_{om} is the partition coefficient from water to organic matter in the soil, which is 16.8 L/Kg for benzene in soils with naturally occurring organic matter (Chiou et al. (1983)), and f_{om} is the fraction of organic matter in the dry soil (Kg/Kg).

For soil containing 1% naturally occurring organic matter and 10% moisture, the total concentration of benzene upon exposure to premium gasoline-saturated groundwater (60 mg/L benzene, as per above discussion of PVC or Gasketed Mains) would be:

$$C_T = \left(\frac{60\ mg}{L} \times \left(\frac{16.8\ L}{Kg} \times \frac{0.01\ Kg}{Kg}\right)\right) + \left(\frac{60\ mg}{L} \times \frac{0.1\ Kg}{Kg}\right) = \frac{16\ mg}{Kg}$$

Applying the 1/8th safety factor:

$$Target\ Level = \frac{1}{8} \times \frac{16\ mg}{Kg} = \frac{2.0\ mg}{Kg}$$

Toluene: 3.2 mg/Kg

The target level was derived in the same manner as for benzene except that the concentration of toluene in premium gasoline-saturated water is 50 mg/L and K_{om} is 42 L/Kg. Accordingly:

$$C_T = \left(\frac{50\ mg}{L} \times \left(\frac{42\ L}{Kg} \times \frac{0.01\ Kg}{Kg}\right)\right) + \left(\frac{50\ mg}{L} \times \frac{0.1\ Kg}{Kg}\right) = \frac{26\ mg}{Kg}$$

and

$$Target\ Level = \frac{1}{8} \times \frac{26\ mg}{Kg} = \frac{3.2\ mg}{Kg}$$

Ethylbenzene: 45 mg/Kg

The target level was based on the target level set for Groundwater/PVC or Gasketed Mains (40,000 µg/L, rounded from 39,100 µg/L, or 39.1 mg/L) and the principles of Chiou et al. (1983) discussed above. In a manner similar to that for benzene in soil, C_W was 3.4 mg/L, K_d was 0.106 L/Kg, and C_T was calculated to be 3.9 mg/Kg. The target level for soil that is equivalent to the target level set for groundwater was calculated as follows:

$$Target\ Level\ mg/Kg = 39.1\ mg/L \times \frac{3.9\ mg/Kg}{3.4\ mg/L} = 45\ mg/Kg$$

Total Xylenes: 52 mg/Kg

The target level was set in the same manner as for ethylbenzene (above), based on the groundwater target level of 48,000 µg/L (rounded from 47.5 mg/L). C_W was 19 mg/L, K_d was 1.001 L/Kg (assuming a mixture of m-, o-, and p-xylenes which is 60%, 20%, and 20%, respectively, which is typical of xylenes derived from petroleum), and C_T was calculated to be 21 mg/Kg. Hence:

$$Target\ Level\ mg/Kg = 47.5\ mg/L \times \frac{21\ mg/Kg}{19\ mg/L} = 52\ mg/Kg$$

NOTE: The 1/8th safety factor was applied above to the target levels for ethylbenzene and total xylenes for Groundwater, PVC or Gasketed Service Lines, thence the target levels for Groundwater, PVC or Gasketed Mains, were derived. Consequently, the 1/8th safety factor has also been applied to the target levels for both ethylbenzene and total xylenes in soil.

REFERENCES

Chiou, C. T., P. E. Porter and D. W. Schmedding. 1983. Partition equilibria of nonionic organic compounds between soil organic matter and water. Environ. Sci. Technol., 17(4)227-231.

Ong, S. K., J. A. Gaunt, F. Mao, C. L. Cheng, L. Esteve-Agelet, and C. R. Hurburgh. 2008. Impact of hydrocarbons on PE/PVC pipes and pipe gaskets, Publication 91204. Awwa Research Foundation (presently Water Research Foundation), Denver, CO.

Appendix B-1 – Tier 2 Equations and Parameter Values (Old Model)

All Tier 1 equations and parameters apply at Tier 2 except as specified below.

Equation for Tier 2 Groundwater Contaminant Transport Model

$$C(x) = C_s \exp\left(\frac{x}{2\alpha_x}\left[1-\sqrt{1+\frac{4\lambda\alpha_x}{u}}\right]\right)\operatorname{erf}\left(\frac{S_w}{4\sqrt{\alpha_y x}}\right)\operatorname{erf}\left(\frac{S_d}{4\sqrt{\alpha_z x}}\right)$$

Variable definitions

x: distance in the x direction downgradient from the source
erf( ): the error function
C(x): chemical concentration in groundwater at x
C_s: Source concentration in groundwater (groundwater concentration at x=0)
S_w: width of the source (perpendicular to x)
S_d: vertical thickness of the source
u: groundwater velocity (pore water velocity); u=Ki/θe
K: hydraulic conductivity
i: groundwater head gradient
θe: effective porosity
λ: first-order decay coefficient, chemical specific
αx, αy, αz: dispersivities in the x, y and z directions, respectively

For the following lists of parameters, one of three is required: site-specific measurements, defaults or the option of either (which means the default may be used or replaced with a site-specific measurement).

Soil parameters

Parameter		Default Value	Required
ρ_s	soil bulk density	1.86 g/cm^3	option
f_{oc}	fraction organic carbon in the soil	0.01 kg-C/kg-soil	option
θ_T	total soil porosity	0.3cm^3-voids/cm^3-soil	option
θ_{as}	volumetric air content in vadose zone	0.2cm^3-air/cm^3-soil	default
θ_{ws}	volumetric water content in vadose zone	0.1cm^3-H_2O/cm^3-soil	default
θ_{acrack}	volumetric air content in foundation/wall cracks	0.2cm^3-air/cm^3-soil	default
θ_{wcrack}	volumetric water content in foundation/wall cracks	0.1cm^3-H_2O/cm^3-soil	default
I	infiltration rate of water through soil	7 cm/year	default

If the total porosity is measured, assume 1/3 is air filled and 2/3 is water filled for determining the water and air fraction in the vadose zone soil and floor cracks.

Groundwater Transport Modeling Parameters

Parameter		Default Value	Required
K	hydraulic conductivity	16060 cm/year	site-specific
i	groundwater head gradient	0.01 cm/cm	site-specific
S_w	width of the source	use procedure specified in 135.10(2)	site-specific
S_d	vertical thickness of the source	3 m	default
αx	dispersivity in the x direction	0.1x	default
αy	dispersivity in the y direction	$0.33\alpha x$	default
αz	dispersivity in the z direction	$0.05\alpha x$	default
θe	effective porosity	0.1	default

where $u=Ki/\theta e$

First-order Decay Coefficients

Chemical	Default Value λ (d-1)	Required
Benzene	0.0005	default
Toluene	0.0007	default
Ethylbenzene	0.00013	default
Xylenes	0.0005	default
Naphthalene	0.00013	default
Benzo(a)pyrene	0	default
Benz(a)anthracene	0	default
Chrysene	0	default

Other Parameters for Groundwater Vapor to Enclosed Space

Parameter		Default Value	Required
Lgw	depth to groundwater from the enclosed space foundation	1 cm	option
L_B	enclosed space volume/infiltration area ratio	200 cm	option
ER (s-1)	enclosed space air exchange rate	0.00014	default
Lcrack	enclosed space foundation or wall thickness	15 cm	default
η	areal fraction of cracks in foundation/wall	0.01	default

Other Parameters for Soil Vapor to Enclosed Space

Parameter		Default Value	Required
L_s	depth to subsurface soil sources from the enclosed space foundation	1 cm	option
L_B	enclosed space volume/infiltration area ratio	250 cm *	option
ER (s-1)	enclosed space air exchange rate	0.000185 *	default
Lcrack	enclosed space foundation or wall thickness	15 cm	default
η	areal fraction of cracks in foundation/wall	0.01	default

*These values are an average of residential and nonresidential factors.

Soil Leaching to Groundwater

Parameter		Default Value	Required
δ	groundwater mixing zone	2 m	default

Building Parameters for Iowa Tier 2

Parameter		Residential	Nonresidential
ER (s-1)	enclosed space air exchange rate	0.00014	0.00023
L_B	enclosed space volume/infiltration area ratio	200 cm	300 cm

Other Parameters

For Tier 2, the following are the same as Tier 1 values (refer to Appendix A): chemical-specific parameters, slope factors and reference doses, and exposure factors (except for those listed below).

Exposure Factors for Tier 2 Groundwater Vapor to Enclosed Space Modeling:

Potential Residential: use residential exposure and residential building parameters.

Potential Nonresidential: use nonresidential exposure and nonresidential building parameters.

Diesel and Waste Oil

Diesel and Waste Oil			Chemical-Specific Values for Tier 1			
Media	Exposure Pathway	Receptor	Naphthalene	Benzo(a) pyrene	Benz(a) anthracene	Chrysene
Groundwater (ug/L)	Groundwater Ingestion	actual	150	0.012	0.12	1.2
		potential	150	1.2	12.0	NA
	Groundwater Vapor to Enclosed Space	all	4,440	NA	NA	NA
	Groundwater to Plastic Water Line	all	150	1.2	12.0	NA
	Surface Water	all	150	1.2	12.0	NA
Soil (mg/kg)	Soil Leaching to Groundwater	all	7.6	NA	NA	NA
	Soil Vapor to Enclosed Space	all	95	NA	NA	NA
	Soil to Plastic Water Line	all	21	NA	NA	NA

Due to difficulties with analytical methods for the four individual chemicals listed in the above table, Total Extractable Hydrocarbon (TEH) default values were calculated for each chemical, using the assumption that diesel contains 0.2% napthalene, 0.001% benzo(a)pyrene, 0.001% benz(a)anthracene, and 0.001% chrysene. Resulting TEH Default Values are shown in the following table.

Diesel			TEH Default Values			
Media	Exposure Pathway	Receptor	Naphthalene	Benzo(a) pyrene	Benz(a) anthracene	Chrysene
Groundwater (ug/L)	Groundwater Ingestion	actual	75,000	1,200	12,000	120,000
		potential	75,000	120,000	1,200,000	NA
	Groundwater Vapor to Enclosed Space	all	2,200,000	NA	NA	NA
	Groundwater to Plastic Water Line	all	75,000	120,000	1,200,000	NA
	Surface Water	all	75,000	120,000	1,200,000	NA
Soil (mg/kg)	Soil Leaching to Groundwater	all	3,800	NA	NA	NA
	Soil Vapor to Enclosed Space	all	47,500	NA	NA	NA
	Soil to Plastic Water Line	all	10,500	NA	NA	NA

The lowest TEH default value for each pathway (shown as a shaded box) was used in the Tier 1 Table.

Due to difficulties with analytical methods for the four individual chemicals, Total Extractable Hydrocarbon (TEH) default values were calculated for each chemical, using the assumption that waste oil contains no naphthalene, 0.003% benzo(a)pyrene, 0.003% benz(a)anthracene, and 0.003% chrysene. Resulting TEH Default Values are shown in the following table.

Waste Oil			TEH Default Values			
Media	Exposure Pathway	Receptor	Naphthalene	Benzo(a) pyrene	Benz(a) anthracene	Chrysene
Groundwater (ug/L)	Groundwater Ingestion	actual	NA	400	4,000	40,000
		potential	NA	40,000	400,000	NA
Groundwater (ug/L)	Groundwater Vapor to Enclosed Space	all	NA	NA	NA	NA
	Groundwater to Plastic Water Line	all	NA	40,000	400,000	NA
	Surface Water	all	NA	40,000	400,000	NA
Soil (mg/kg)	Soil Leaching to Groundwater	all	NA	NA	NA	NA
	Soil Vapor to Enclosed Space	all	NA	NA	NA	NA
	Soil to Plastic Water Line	all	NA	NA	NA	NA

The lowest TEH default value for each pathway (shown as a shaded box) was used in the Tier 1 Table.
[**ARC 9011B**, IAB 8/25/10, effective 9/29/10]

APPENDIX C
DECLARATION OF RESTRICTIVE COVENANTS
Rescinded IAB 7/19/06, effective 8/23/06

APPENDIX D
IOWA DEPARTMENT OF NATURAL RESOURCES

NO FURTHER ACTION CERTIFICATE

This document certifies that the referenced underground storage tank site has been classified by the Iowa Department of Natural Resources (IDNR) as "no action required" as provided in the 1995 Iowa Code Supplement 455B.474(1)"h"(1). This certificate may be recorded as provided by law.

ISSUED TO: OWNERS/OPERATORS OF TANKS
DATE OF ISSUANCE:
IDNR FILE REFERENCES: LUST # REGISTRATION #
LEGAL DESCRIPTION OF UNDERGROUND STORAGE TANK SITE:

Issuance of this certificate does not preclude the IDNR from requiring further corrective action due to new releases and is based on the information available to date. The department is precluded from requiring additional corrective action solely because governmental action standards are changed. See 1995 Iowa Code Supplement 455B.474(1)"h"(1).

This certificate does not constitute a warranty or a representation of any kind to any person as to the environmental condition, marketability or value of the above referenced property other than that certification required by 1995 Iowa Code Supplement 455B.474(1)"h".

These rules are intended to implement Iowa Code sections 455B.304, 455B.424 and 455B.474.

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1 July 15, 1987, effective date of 135.9(4) delayed 70 days by Administrative Rules Review Committee at its June 1987 meeting.

2 August 6, 2008, effective date of **ARC 6892B** delayed 70 days by Administrative Rules Review Committee at its July 2008 meeting. At its meeting held October 14, 2008, the Committee delayed until adjournment of the 2009 Session of the General Assembly the following provisions: **567—135.2(455B)**, definition of "Sensitive area"; **135.9(4)"f"**; **135.10(4)"a,"** last sentence: "A public water supply screening and risk assessment must be conducted in accordance with 135.10(4)"f" for this pathway" and **135.10(4)"b,"** last sentence of the first paragraph: "The certified groundwater professional or the department may request additional sampling of drinking water wells and non-drinking water wells as part of its evaluation"; **135.10(4)"f"**; **135.10(11)"h."**

3 February 17, 2010, effective date of 135.5(1)"e" delayed 70 days by the Administrative Rules Review Committee at its meeting held February 8, 2010. At its meeting held April 13, 2010, the Committee delayed the effective date of 135.5(1)"e" until adjournment of the 2011 Session of the General Assembly.