Chapter 17
Storage Tanks

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Part A

STORAGE TANK SYSTEMS: INTRODUCTION

Section 1. **Authority.** These standards are promulgated pursuant to the Wyoming Environmental Quality Act Statutes 35-11- 101 through 35-11-1802, specifically, but not limited to, Wyoming Statutes 35-11-302, and 35-11-1414 through 35-11-1428.

Section 2. **Codes and standards referenced in this Chapter.** There are a number of places within this chapter where codes and standards are referenced. There are also references to regulations issued by other agencies. The following apply to all such references in this chapter:

(a) In all cases, the referenced codes, standards and regulations are lengthy documents in and of themselves. Inserting the entire text of these documents into this chapter would be unduly cumbersome and expensive;

(b) The references to these codes, standards and regulations in this Chapter fully identifies the material by title, facility, or statutory reference. All such referenced materials are incorporated as they stand on the day that this chapter is adopted into law, and any later amendments or editions are specifically not incorporated into this chapter;

(c) The department has obtained a complete copy of the current edition of every code, standard, or regulation referenced in this chapter and placed them in the Wyoming State Library. These materials can be checked out either directly from the State Library or through interlibrary loan from any Wyoming library which is part of that system;

(d) Each code, standard, or regulation referenced in this chapter is published independently and is available from the publisher. The name, address and contact information for all such publishers is contained in the definition section of this chapter. Copies may be obtained from the publisher;

(e) Copies of the codes, standards, or regulations referenced in this chapter are also available at cost by contacting the Storage Tank Program, 122 West 25th Street, Cheyenne, WY 82002.

Section 3. **Purpose.** The purpose of these rules and regulations is to:

(a) Establish a storage tank leak prevention program to prevent releases and to minimize health hazards and environmental damage should a release occur;

(b) Allow Wyoming to assume primacy of the U.S. Environmental Protection Agency (EPA) underground storage tank (UST) program;

(c) Establish priorities for cleaning up releases from storage tank systems; and

(d) Establish a procedure to determine environmental restoration standards.

Section 4. **Applicability.** The requirements of this chapter apply to all owners and/or operators of storage tank systems as defined in W.S. 35-11-1415; except that Parts B, C, D, E, and G of this chapter do not apply for any of the following types of UST systems:

(a) Wastewater treatment tank systems;

(b) Any UST system containing radioactive materials that are regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 and following);

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

(d) Airport hydrant fuel distribution systems; and

(e) UST systems with field-constructed tanks.

Section 5. **Definitions.** The following definitions supplement those found in W.S. 35-11-103, the “Environmental Quality Act, and W.S. 35-11-1415, the “Storage Tank Act of 2007.”

(a) "Above ground release" means any release to the surface of the land or to surface water. This includes, but is not limited to, releases from the above ground portion of any regulated storage tank system and above ground releases associated with overfills and transfer operations as the regulated substance moves to or from any regulated storage tank system.

(b) “ALLD” means an automatic line leak detector. This is a device that either restricts the flow through a line or sounds an audible or visible alarm if the connected piping has a leak in it.

(c) "ANSI” means the American National Standards Institute 25 West 43rd Street, Forth Floor, New York, NY 10036, telephone: (212) 642-4900.

(d) "API" means the American Petroleum Institute , 1220 L Street NW, Washington, DC 20005, telephone: (202)682-8000.

(e) “AST” means an above ground storage tank as defined by W.S. 35-11-1415(a)(xi) which is used by a fuel dealer to dispense gasoline or diesel to the public.

(f) “AST System” means the above ground storage tank and all connected piping.

(g) "ASTM” means the American Society for Testing and Materials, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959 (610) 832-9585, (610) 832-9555 (FAX).

(h) "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 storage tank.

(i) "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 a storage tank system and below ground releases associated with overfills and transfer operations as the regulated substance moves to or from a storage tank.

(j) “Biodiesel” means a fuel composed of mono-alkyl esters of long fatty chain acids derived from vegetable oils or animal fats, meeting the requirements of ASTM specification D6751. “Biodiesel” is interchangeable with Diesel for all purposes of this chapter.

(k) “CAP” means a “corrective action plan” designed to restore a site contaminated by regulated substances from a storage tank release to a condition which is protective of the public health and safety and consistent with published standards found in this chapter.

(l) “CP” means cathodic protection which is a technique to prevent corrosion of a metal surface by making that surface the cathode of an electrochemical cell. CP may be provided by either galvanic anodes or impressed current.

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

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

(o) "Compatible" means the ability of two (2) 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 storage tank system.

(p) "Connected piping" means all underground piping including valves, elbows, joints, unions, flanges, and flexible connectors attached to a storage tank system through which regulated substances flow and which routinely contains the regulated substance. The piping that joins two (2) storage tank

systems should be allocated equally between them for purposes of determining how much piping is connected to any individual storage tank system.

(q) "Contaminated Site" means a site at which releases from storage tank systems have resulted in concentrations of regulated substances in environmental media which exceed criteria for the protection of human health or the environment.

(r) "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 shall be accredited or certified as being qualified by the NACE or be a registered professional engineer who has certification or licensing that includes education and experience in corrosion control of buried or submerged metal piping systems and metal tanks.

(s) "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 underground storage system from each other (e.g., tank from piping).

(t) "Drinking water equivalent level or DWEL” means the maximum concentration of a contaminant established by the Wyoming Department of Environmental Quality, Water Quality Division, pursuant to this chapter or Chapter 8, Water Quality Rules and Regulations, Quality Standards for Wyoming Groundwaters, for which no known or anticipated adverse effects on human health will occur.

(u) “Ethanol” means an alcohol derived from the fermentation of sugar, grain, or other biomass and used as fuel for internal combustion engines. Ethanol is usually denatured using gasoline, petroleum condensate, or some other petroleum prior to being marketed for fuel. For purposes of this chapter, “Ethanol” will be treated interchangeably with “gasoline.”

(v) "Emergency" means a situation where replacement or

retrofit of ancillary equipment to an existing storage tank system because of a sudden release or existing ancillary equipment failure is essential to continued operation of any facility and the owner and/or operator can easily and quickly replace or retrofit the equipment to remain in operation.

(w) "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.

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

(y) "Hazardous substance UST system" means an UST system that contains a hazardous substance listed in Appendix A of this chapter, (but not including any substance regulated as a hazardous waste under Subtitle C of the Resource conservation and Recovery Act of 1984) or any mixture of such substances and petroleum, and which is not a petroleum UST system.

(z) "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.

(aa) "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, or other similar devices.

(bb) “Licensed Operator” means a human being, employed by the “Operator,” who is in responsible charge of the storage tanks at one or more locations. “Licensed Operator” refers to the holder of any of the licenses referred to in Section 46 of this chapter.

(cc) "Maintenance" means the normal operational upkeep to prevent a storage tank system from releasing a regulated substance.

(dd) "Maximum contaminant level or MCL" means the maximum allowed concentration of a contaminant established by the U.S. Environmental Protection Agency under the Safe Drinking Water Act and published in 40 CFR Part 141.

(ee) “Minimum Site Assessment” or “MSA” means a limited subsurface investigation performed at a storage tank facility to determine whether a regulated substance has been released from a storage tank system(s) which has caused, or is causing, soil and/or ground water contamination that exceeds applicable standards.

(ff) "NACE" means the National Association of Corrosion Engineers 1440 South Creek Drive, P.O. Box 201009, Houston, TX 77216-1009 telephone (281) 228-6200, FAX (281) 228-6300.

(gg) "NFPA" means the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269, telephone: (800)344-3555.

(hh) "Operational life" means the period beginning when installation of the storage tank system has commenced until the time the storage tank system is properly closed under Part G.

(ii) "Overfill release" means a release that occurs when a storage tank system is filled beyond its capacity resulting in a discharge of the regulated substance to the environment.

(jj) "PEI” means the Petroleum Equipment Institute , P O Box 2380, Tulsa, OK 74101, telephone: (918)494-9696.

(kk) "Pipe or piping" means a hollow cylinder or tubular conduit that is constructed of non-earthen materials.

(ll) "RCRA" means the Resource Conservation and Recovery Act of 1984, as amended.

(mm) "Repair" means to restore a tank or storage tank system component that has caused a release of a regulated substance from the storage tank system.

(nn) "STI” means the Steel Tank Institute , 570 Oakwood Road, Lake Zurich, IL 60047, telephone: (847) 438-8265.

(oo) “Statistical Inventory Reconciliation” or “SIR” means a method using statistics as well as simple inventory reconciliation to determine if a tank system is leaking. SIR providers must use a method which has been approved in writing for use in the UST program by the Environmental Protection Agency.

(pp) “Storage Tank” means either a regulated above ground storage tank or an underground storage tank.

(qq) "Substantial modification" means the addition or retrofit (not routine maintenance) of any fundamental portion of a storage tank system which would affect the daily operation of the storage tank system, including, but not limited to, CP, internal or external piping system(s), liners, leak detection equipment, spill and overfill controls, manhole installation, etc., to improve or upgrade the storage tank system. Substantial modifications also include the addition of canopies, new electrical conduits, and other items which may not be directly related to the storage tank system, but where the construction could adversely affect the storage tank system.

(rr) "Upgrade" means the addition or retrofit of some systems such as CP, lining, spill and overfill controls, or secondary containment systems, to improve the ability of a storage tank system to prevent the release of a regulated substance.

(ss) "UST” means underground storage tank.

(tt) "UST system" means an underground storage tank, connected underground piping, underground ancillary equipment, and a containment system, if any.

(uu) "UL” means the Underwriters Laboratories, Inc. , 333 Pfingsten Road, Northbrook, IL 60062, telephone: (631) 271-6200.

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

PART B

STORAGE TANK SYSTEMS: TECHNICAL SPECIFICATIONS

Section 6. **Design and Construction Standards for 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/or operators of UST systems shall meet the following requirements.

(a) *Tanks.* Each tank shall be properly designed, constructed, and installed, and any underground component that routinely contains regulated substances shall be protected from corrosion, in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory as specified below:

(i) Fiberglass-Reinforced Plastic tanks shall be manufactured and installed in accordance with one or more of the following industry standards or practices:

(A) UL Standard 1316, "Standard for Glass-Fiber-Reinforced Plastic underground storage tanks for Petroleum Products"; or

(B) ASTM Standard D 4021-1992, "Standard Specification for Glass-Fiber-Reinforced Polyester underground storage tanks."

(ii) Cathodically Protected Steel USTs shall be manufactured and installed to meet the following requirements:

(A) The outside surface of all steel tanks installed after the date of these regulations shall be coated with a suitable dielectric material;

(B) Field-installed CP systems shall be designed by a corrosion expert;

(C) Impressed current CP systems shall be designed to allow determination of current operating status as required in Section 11, including a voltage meter, an amperage meter, and an hour meter showing the hours that the rectifier actually operated; and

(D) CP systems shall be operated and maintained in accordance with Section 11. Once installed, CP systems shall not be removed as long at the steel UST system exists.

(E) In addition to the above requirements, all cathodically protected steel USTs shall be manufactured and installed in accordance with one or more of the following industry standards or practices:

(I) STI, "Specification for STI-P3 System of External Corrosion Protection of Underground Storage Tanks"; or

(II) UL Standard 1746, "Corrosion Protection Systems for underground storage tanks"; or

(III) NACE Standard RP0285-2002, "Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems"; and UL Standard 58, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids."

(iii) Steel-Fiberglass-Reinforced-Plastic Composite tanks shall be manufactured and installed in accordance with one or more of the following industry standards or practices:

(A) UL Standard 1746, "Corrosion Protection Systems for Underground Storage Tanks"; or

(B) Association for Composite Tanks ACT-100, "Specification for the Fabrication of FRP Clad Underground Storage Tanks".

(iv) Interior lining: Owners and/or operators may continue to operate tanks upgraded with an internal lining without added CP if:

(A) Within ten (10) years after lining, and every five (5) years thereafter, the lined tank is internally inspected and found to be structurally sound with the lining still performing in accordance with original design specifications. This requires that the tank be entered and cleaned out to allow an internal inspection; and

(B) The lining was installed in accordance with the requirements of API Publication 1631, “Recommended Practice for the Interior Lining of Existing Underground Storage Tanks”, or

(C) The lining was installed in accordance with the requirements of the National Leak Prevention Association Standard 631, “Spill Prevention, Minimum 10 Year Life Extension of Existing Steel Underground Tanks by Lining Without the Addition of CP”.

(v) New steel tanks shall not be installed with a liner without the addition of CP. No existing steel tank with a liner and added CP shall be modified to remove the CP.

(vi) After the effective date of these regulations, no UST may be installed for any purpose regulated by this program with any penetration into the UST except in the top.

(vii) All USTs installed in Wyoming after the effective date of these regulations shall be anchored using deadmen to prevent flotation. No tank shall be installed without providing for the maximum possible buoyancy force assuming that the tank is completely under the local groundwater table. No tank shall be installed using a concrete slab above the tank as the primary method of resisting buoyancy forces.

(b) *Piping.* Piping that routinely contains regulated substances and is in contact with the ground shall be properly designed, constructed, installed, and protected from corrosion in accordance with the following applicable industry standards or practices:

(i) Fiberglass-Reinforced Plastic piping shall be manufactured and installed in accordance with one or more of the following industry standards or practices:

(A) UL Subject 971, "UL Listed Non-Metal Pipes"; or

(B) UL Standard 567, "Pipe Connectors for Flammable and Combustible and LP Gas."

(ii) Steel piping shall be cathodically protected in the following manner:

(A) The piping shall be coated with a suitable dielectric material;

(B) Field-installed CP systems shall be designed by a corrosion expert;

(C) Impressed current CP systems shall be designed to allow determination of current operating status as required in Section 11; and

(D) CP systems shall be operated and maintained in accordance with Section 11.

(E) In addition to the above, cathodically protected steel pipe shall be manufactured and installed in accordance with one or more of the following industry standards or practices:

(I) NFPA Standard 30, "Flammable and Combustible Liquids Code";

(II) API Publication 1615, "Installation of Underground Petroleum Storage Systems";

(III) API Publication 1632, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems"; or

(IV) NACE Standard RP0169-2002, "Control of External Corrosion of Submerged Metallic Piping Systems";

(iii) Other Piping systems will be allowed if they are determined by the department, pursuant to Section 33 of this chapter, to be designed to prevent the release of any regulated substance in a manner that is no less protective than the requirements in Section 6(b).

(c) *Spill and overfill prevention equipment*.

(i) Except as provided in Section 6 (c) (ii), to prevent spilling and overfilling associated with regulated

substance transfer to the UST system, owners and/or operators shall use the following spill and overfill prevention equipment:

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

(B) Overfill prevention equipment that will:

(I) Automatically shut off flow into the tank when the tank is no more than ninety-five percent (95%) full; or

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

(ii) Owners and/or Operators are not required to use the spill and overfill prevention equipment specified in Section 6(c)(i) if the UST system is filled by transfers of no more than twenty-five (25) gallons at one time.

(d) *Installation*. All tanks and piping shall be properly installed in accordance with one of the following industry standards or practices and in accordance with the manufacturer's instructions:

(i) API Publication 1615, "Installation of Underground Petroleum Storage Systems"; or

(ii) PEI Publication RP100, "Recommended Practices for Installation for Underground Liquid Storage Systems".

(iii) ANSI Standard B31.3, "Petroleum Refinery Piping," and ANSI Standard B31.4 "Liquid Petroleum Transportation Piping System."

(e) *Certification of Installation*. No storage tank system shall be operated until the department determines the installation or substantial modification meets the applicable standards of this part. The department shall not issue any such determination until all construction on the site of the storage tank system is complete. Owners and/or operators shall:

(i) Notify the department by telephone or in writing at least thirty (30) days prior to the installation, repair or substantial modification of any storage tank system. Installations, repair or substantial modifications shall be scheduled at mutually acceptable times so that the department can ensure a representative is on site at various phases of installation or substantial modification. Inspections shall be completed within ten (10) days of the date when the department is notified that the installation, repair or substantial modification is complete; and

(ii) Pay the department a fee for each storage tank system or multiple storage tank systems installed, repaired or substantially modified at the same time and at the same site pursuant to W.S. 35-11-1420(c). The department will invoice the owner and/or operator upon completion of the final installation, repair or substantial modification inspection. The owner and/or operator shall remit payment to the department within thirty (30) days of receipt of the department's invoice; and

(iii) Ensure that the installation or substantial modification of all USTs meets the performance standards of this part; and

(iv) Obtain a certification from the installer, or person modifying the UST, certifying that the tank was installed or modified to meet the requirements of this part. Such certification shall be provided on the UST notification form required under Section 9; and

(v) In the case of an emergency where the owner and/or operator cannot comply with the notification requirement of Section 6(e)(i), notify the department by telephone as soon as the emergency is found. Before proceeding with any substantial modification or installation:

(A) The department shall determine whether an inspection can be made within the owner and/or operator's schedule of work; or

(B) If the department cannot make the inspection, the owner and/or operator shall provide by mail, the specifications of materials and industry standards or practices

used to accomplish the installation or substantial modification and documentation of any tests required within five (5) days of completion.

Section 7. **Substandard USTs.** UST systems which do not meet the standards of Section 6 shall not be placed back into service if they have been out of use for more than one year. Substandard USTs shall be permanently closed or removed from the ground in accordance with Part G of this chapter.

Section 8. **Repairs Allowed.**

(a) Owners and/or operators of storage tank systems shall ensure that repairs will prevent releases due to structural failure or corrosion as long as the storage tank system is used to store regulated substances. The repairs shall meet the following requirements:

(i) Repairs to UST systems shall be properly conducted in accordance with one or more of the following industry standards or practices:

(A) NFPA Standard 30, "Flammable and Combustible Liquids Code";

(B) API Publication 2200, "Repairing Crude Oil, Liquified Gas, and Product Pipelines"; or

(C) API Publication 1631, "Recommended Practice for the Interior Lining of Existing underground storage tanks";

(ii) Repairs to above ground storage tank systems shall be properly conducted in accordance with one or more of the following industry standards or practices:

(A) NFPA Standard 30, "Flammable and Combustible Liquids Code";

(B) API Standard 620, “Design and Construction of Large, Welded Low-Pressure Storage Tanks";

(C) API Standard 650, "Welded Steel Tank for Oil Storage";

(D) API Standard 653, "Tank Inspection, Repair, Alteration, and Reconstruction"; or

(E) PEI Recommended Practice 200-2003, “Recommended Practices of Installation of Aboveground Storage Systems for Motor Vehicle Fueling”.

(iii) Repairs to fiberglass-reinforced plastic USTs 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.

(iv) Pipe sections and fittings that have released regulated substances as a result of corrosion or other damage shall be replaced.

(v) Repaired storage tank systems shall be tightness tested in accordance with Sections 14(f) and 16(b) within thirty (30) days following the date of the completion of the repair unless:

(A) The repaired storage tank system is internally inspected in accordance with a code of practice listed in this section; or

(B) The repaired portion of any UST system is monitored monthly for releases in accordance with a method specified in Section 16 (b) through (k); or

(C) Another test method is used that is determined by the department, pursuant to Section 33, to be no less protective of human health and the environment than those listed above.

(v) storage tank system owners and/or operators shall maintain records of each repair for the remaining operating life of the UST system that demonstrate compliance with the requirements of this section.

(b) All owners and/or operators of repaired UST systems shall ensure the modifications meet the performance standards for design and repair, as set forth in Section 6.

(c) Costs associated with remediation of any release from a storage tank system during tank installation or repair work by a tank installer, tester, owner and/or operator, etc., are not eligible for the state's corrective action account funds.

(d) Any time steel connected piping is repaired or modified by replacing the pipe with a non-corrodible pipe, all of the connected piping on that run shall be replaced. Any time steel piping which is not cathodically protected is repaired or replaced, the entire run of pipe shall be replaced with a non-corrodible pipe.

PART C

STORAGE TANK SYSTEMS: GENERAL OPERATING REQUIREMENTS

Section 9. **Notification Requirements.**

(a) *New UST Systems.* Any owner and/or operator who brings an underground storage tank system into use after May 8, 1986, shall, within thirty (30) days of bringing such tank into use, submit, on the form prescribed by the department, a notice of the existence of such tank system to the department.

(b) *Existing Storage Tank Systems.* Owners and operators of an UST(s) that has been used to store regulated substances since January 1, 1974, and that was in the ground as of May 8, 1986, shall immediately submit, on the form prescribed by the department, a notice of the existence of such tank(s) to the department. Owners and/or operators of any AST that has been used to sell fuel to the public since July 1, 1994 shall immediately submit, on the form prescribed by the department, a notice of the existence of such tank(s) to the department. All storage tanks located at the same facility shall be registered under the same facility identification number.

(c) *Fees*. Owners and/or operators of storage tank systems shall pay the annual fees specified by W.S. 35-11-1425 no later than January 1 of each year or thirty (30) days after the first invoice, whichever is the later date. Fees are not prorated, the fee is assessed based on a calendar year. Fees begin on the date when the tank is first filled with a regulated substance and end on the date when the tank is placed permanently out of service or converted to a non-regulated use under these regulations.

(d) *Certification.* All owners and/or operators of new UST systems shall certify on the notification form conformance with the following requirements:

(i) Installation of tanks and piping under Section 6(d);

(ii) CP of steel tanks and piping under Section 6(a) and (b);

(iii) Financial responsibility under Chapter 19, Water Quality Rules and Regulations, UST Program Financial Responsibility;

(iv) Release detection under Sections 14 through 17; and

(v) Overfill and spill prevention under Section 6(c).

(e) *Installer Certification.* All owners and/or operators of new UST systems shall ensure that the installer certifies on the notification form that the methods used to install the tanks and piping complies with the requirements in Section 6(d).

(f) *Requirements for sellers.* After the effective date of these regulations, any person who sells a tank intended to be used as a regulated storage tank, and any person who transfers an existing storage tank system shall notify the purchaser of such tank of the owner's notification obligations in accordance with this section. After the effective date of these regulations, any person who sells a contaminated site shall notify the purchaser that the site is a contaminated site subject to requirements of this chapter.

(g) *Transfer of Control.* Prior to the transfer of control of a storage tank system to a different owner and/or operator, notification of the transfer shall be provided to the department pursuant to W.S. 35-11-1420(a). Such notifications shall be provided on a form developed and provided by the department.

Section 10. **Spill and Overfill Control.**

(a) Owners and/or operators of storage tank systems shall ensure that releases due to spilling or overfilling do not occur. The owner and/or operator shall ensure that the volume available in the tank is greater than the volume of regulated substance to be transferred to the tank before the transfer is made. The owner and/or operator shall also insure that the transfer operation is monitored constantly to prevent overfilling and spilling.

(b) Owners and/or operators shall report, investigate, and clean up any spills and overfills in accordance with Section 22.

(c) Surface spills that occur at a storage tank facility during the transfer of a regulated substance to the tank are required to be reported and cleaned up by any person owning or having controlled the regulated substance pursuant to Section 22(a) of this Chapter, and Chapter 4, Water Quality Rules and Regulations.

Section 11. **Operation and Maintenance of Corrosion Protection (CP).** All owners and/or operators of steel storage tank systems with CP shall comply with the following requirements to ensure that releases due to corrosion are prevented for as long as the storage tank system is used to store regulated substances:

(a) *Continuous Operation*. All CP systems shall 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. Once installed, CP systems shall not be removed, even if the tank has also been internally lined, as long as steel tanks or connected piping exist on that site. This does not preclude replacement of parts of the CP system which have become defective.

(b) *Periodic Inspections.* All storage tank systems equipped with CP systems shall be inspected for proper operation by a qualified CP tester in accordance with the following requirements:

(i) All CP systems shall be tested within six (6) months of installation and at least once every three (3) years thereafter.

(ii) The criteria that are used to determine that CP is adequate shall be in accordance with the NACE Standard RP0285-2002, "Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems."

(iii) All CP systems shall be tested within six months of any repair or substantial modification to the storage tank system, or any other installation on the facility requiring excavation, in accordance with NACE Standard RP0285-2002.

(c) *Impressed Current Systems.* Storage tank systems with

impressed current CP systems shall also be inspected by the owner and/or operator every sixty (60) days to ensure the equipment is running properly. The owner and/or operator shall make a record of these inspections, including the date of the inspection, the voltage reading on the rectifier, the amperage reading on the rectifier, and the hour reading on a properly connected hour meter showing how long the system has operated since the last inspection. The owner and/or operator shall compare those readings to the readings determined to be correct during the last inspection required under paragraph (b) of this section. Large changes in the voltage or amperage readings, or zero readings, shall be investigated by the owner and/or operator.

(d) *Records.* For storage tank systems using CP, records of the operation of the CP system shall be maintained in accordance with Section 13(c), to demonstrate compliance with the performance standards in this section. These records shall provide the following:

(i) The results of testing from the last two (2) CP inspections required in accordance with paragraph (b) of this section; and

(ii) The results of the last three (3) CP inspections required in accordance with paragraph (c) of this section.

Section 12. **Compatibility.**

(a) Storage tank system(s) shall be made of, or lined with, materials that are compatible with the regulated substance stored.

(b) Owners and/or operators storing alcohol blended gasoline shall use the following industry standards or practices to comply with this section:

(i) API Publication 1626, "Storing and Handling Ethanol and Gasoline-Ethanol Blends at Distribution Terminals and Service Stations"; and

(ii) API Publication 1627, "Storage and Handling of Gasoline-Methanol Blends at Distribution Terminals and Service Stations".

Section 13. **Inspection and Right of Entry, Reporting, and Recordkeeping.**

(a) *Inspection and Right of Entry*. Any authorized agent of the State of Wyoming has the right of entry for inspection, assessments and corrective actions in accordance with the provisions of W.S. 35-11-1422.

(b) *Reporting*. Owners and/or operators of storage tank systems shall cooperate fully with inspections, monitoring, and testing conducted by the department, as well as requests by the department for the following document submission(s), testing, and monitoring information:

(i) Notification for all storage tank systems (Section 9), which includes certification of installation for new storage tank systems (Section 6(e) for USTs and Part I for ASTs);

(ii) Reports of all releases including suspected releases (Section 19), spills and overfills (Section 22), and confirmed releases (Sections 23 through 25);

(iii) A notification before permanent closure, change of status, or change-in-service Part G);

(iv) Owners and/or operators eligible for the state corrective action program shall comply with the requirements contained in Section 25.

(v) Owners and/or operators not eligible for the state corrective action program shall comply with the requirements contained in Section 24.

(vi) Owners and/or operators shall cooperate fully with inspections, including providing access to all manholes, dispenser cabinets, CP rectifiers, and tank monitoring equipment. Compliance with this section will require that owners and/or operators open manholes and other access points so that DEQ inspectors may see the condition of all equipment.

(c) *Recordkeeping*. Owners and/or operators shall submit the following information to the department:

(i) Documentation of operation of CP Systems (Section

11);

(ii) Documentation of storage tank system repairs (Section 8);

(iii) Compliance with release detection requirements (Section 14 through 18 for USTs and Sections 36 and 37 for ASTs); and

(iv) Results of the site investigation conducted at permanent closure and changes in service (Section 31).

(d) *Availability and maintenance of records*. Owners and/or operators of UST systems shall keep the records required either:

(i) At the storage tank site and immediately available for inspection by the department; or

(ii) At a readily available alternate site and be provided for inspection to the department, upon request. The readily available alternative site shall be within the boundaries of the State of Wyoming. If records are to be kept at an alternate site, the department shall be notified in writing of the name, address and telephone number for that alternate facility.

(e) *Operator's Annual Inspection*. Storage tank system owners and/or operators shall provide an annual report of inspection for the entire facility. An annual inspection is to be conducted either by the owner, the operator, or a qualified consultant. The inspector shall meet all of the qualifications as a CP tester if he or she inspects a CP system. This inspection shall:

(i) test all of the CP systems on site which are due for testing in accordance with Section 11;

(ii) provide for pressure tests of pressurized piping or U.S. Suction piping in accordance with Section 14(g);

(iii) test all Automatic Line Leak Detectors as follows:

(A) provide a simulated leak test for Mechanical

Line Leak Detectors that will demonstrate that the leak detector meets the requirements of Section 14(g).

(B) for Electronic Line Leak Detectors a simulated leak is required that demonstrates that the leak detector meets the requirements of Section 14(g). An internal electrical test of the system is not sufficient to meet this requirement.

(C) When sump sensors are used to meet the requirement for an Automatic Line Leak Detector, they shall be configured to meet the requirements of Section 14(g) and the annual inspection shall include a manual tripping of each sump sensor. The automatic device used to monitor sump sensors shall be triggered by the manual tripping of the sensors, and a record shall be made showing the date when the test was done, the facility number, and recording the fact that the sensor operated as required.

(iv) document that all Automatic Tank Gauges (ATG), interstitial monitoring systems, vapor monitoring systems, or other automatic systems are properly calibrated and functioning. This includes a check to determine if probes are clean and are the proper ones for the regulated substance being stored.

(v) provide an annual summary for all inventory control calculations, statistical inventory reconciliation reports, or other leak detection methods which shows compliance for each month of the preceding year. Records of the operation of all leak detection systems for the past three (3) years are required to be kept.

(vi) include a physical inspection of all sumps, manholes, dispensers, and other openings provided on the storage tank system. Any leaks found shall be immediately eliminated.

PART D

UST SYSTEMS: RELEASE DETECTION

Section 14. **Requirements for All UST Systems.**

(a) *Release Detection.* Owners and/or operators of UST systems shall provide a method, or combination of methods, of release detection that:

(i) Can detect a release from any portion of the tank and the connected piping that routinely contains a regulated substance;

(ii) Is installed, calibrated, operated, and maintained in accordance with the manufacturer's instructions, including routine maintenance and service checks showing that the leak detection equipment is fully operational and in proper calibration; and

(iii) Meets the performance requirements in Sections 15, 16, or 17, with any performance claims and their manner of determination described in writing by the equipment manufacturer or installer. Methods used shall be capable of detecting the leak rate or quantity specified for that method in Sections 15, 16, or 17 with a probability of detection of 0.95 and a probability of false alarm of 0.05.

(b) *Release Reporting.* When a release detection method operated in accordance with the performance standards in Sections 15, 16, or 17 indicates a release may have occurred, owners and/or operators shall notify the department in accordance with Part E.

(c) *Timing.* Owners and/or operators of new or existing UST systems shall comply with the release detection requirements of this part immediately upon installation.

(d) *USTs without leak detection.* Any owner and/or operator of an UST system that cannot apply a method of release detection that complies with the requirements of this part shall complete the closure procedures in Part G.

(e) *Petroleum USTs less than 1000 gallons.* Owners and/or operators of USTs with a capacity of one thousand (1,000) gallons or less may use manual tank gauging as the sole leak detection

method for the tank. Manual tank gauging shall be conducted weekly in accordance with Section 15 (a).

(f) *Petroleum USTs with a throughput of less than 15,000 gallons per month*. Not withstanding any other provision of this chapter, owners and/or operators of USTs with a throughput of less than 15,000 gallons per month may use inventory control as a monthly monitoring technique provided that:

(i) the inventory control balances within 150 gallons per month. In the event that a single month fails to balance within 150 gallons, the operator shall immediately submit that month to an outside vendor for Statistical Inventory Reconciliation;

(ii) the USTs are secured against theft in such a way that any theft is readily obvious; and

(iii) all of the requirements listed under Section 16(a) are met.

(g) *Piping*. Connected piping that routinely contains regulated substances shall be monitored for releases in a manner that meets one (1) of the following requirements:

(i) Pressurized piping systems shall:

(A) Be monitored in accordance with Section 14(g)(i)(B) below. Whenever pressure systems have multiple dispensers hooked up to dispense product through a single meter, the pressurized piping between the first dispenser and the slave dispenser must also be monitored and tested; and

(B) Be equipped with an automatic line leak detector in accordance with the following: Methods which alert the owner and/or operator to the presence of a leak by restricting or shutting off the flow of regulated substances through piping or triggering an audible or visual alarm, may be used only if they detect leaks of three (3) gallons per hour at ten (10) pounds per square inch line pressure within one (1) hour. An annual test of the operation of the leak detector shall be conducted. Manufacturers are required to recommend procedures to be used for testing their own equipment, but all automatic line leak detectors shall be tested annually. No manufacturer shall recommend that its equipment not be tested nor interfere with the testing of its equipment in any way. In addition all

underground pressurized piping shall:

(1) have an annual line tightness test. 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 (1 1/2) times the operating pressure. Tests performed by automatic systems are specifically allowed in meeting this requirement; or

(2) be tested using any of the methods listed in Section 16(d), (e), (f), (g), (h) or (j). Methods not specifically named in these regulations shall be approved prior to use by the department, pursuant to Section 33, and that approval must state that the method will detect a leak in lines.

(ii) A U.S. Suction system is a system of underground piping which conveys a regulated substance using suction and which has more than one check valve in the line. All U.S. Suction systems shall:

(A) have a line tightness test performed once every three (3) years. 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 (1 1/2) times the operating pressure; or

(B) be tested using any of the methods listed in Section 16 (d), (e), (f), (g) or (j). Methods not specifically named in these regulations may be used if they are approved prior to use by the department, pursuant to Section 33 and that approval must state that the method will detect a leak in the lines.

(iii) Underground piping that conveys regulated substances using an exempt suction system is not required to have a release detection system. An exempt suction system is one that is designed and constructed to meet the following requirements:

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

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

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

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

(E) A method shall be provided that allows compliance with this section to be readily determined.

(h) *New UST installations and repairs.* Regardless of any other section in this chapter, after the effective date of this chapter, all new and replacement installations and repairs of existing piping shall meet the following secondary containment criteria:

(i) New or replacement tanks shall be provided with full secondary containment in the form of:

(a) Double Walled tanks; or

(b) Single wall tanks with a polyethylene tank jacket.

(ii) New or replacement connected piping shall be provided with full secondary containment in the form of:

(a) Double wall lines; or

(b) Single wall lines with secondary containment piping. And

(iii) All dispensers must be equipped with full secondary containment in the form of dispenser pans.

(iv) All secondary containment systems shall be monitored in accordance with Section 16(f).

Section 15. **Petroleum USTs with a capacity of 2,000 gallons or less.**

(a) *Manual tank gauging.* Manual tank gauging shall meet the following requirements:

(i) Tank liquid level measurements shall be taken at the beginning and ending of a period of at least thirty-six (36) hours during which no liquid is added to or removed from the tank;

(ii) Level measurements shall be based on an average of

two (2) consecutive stick readings at both the beginning and end of the period;

(iii) The equipment used shall be capable of measuring the depth of the regulated substance over the full range of the USTs height to the nearest one-eighth (1/8) of an inch;

(iv) A suspected release shall be declared and the requirements of Part E shall be followed if the variation between beginning and ending measurements exceeds the weekly or monthly standards in Table 1;

TABLE 1
MANUAL TANK GAUGING VARIATION STANDARDS

Nominal Tank Capacity	Weekly Standard (one test)	Monthly Standard (average of four tests)	Minimum Test Duration Hours*
If Manual Tank Gauging is the ONLY leak detection method used:			
550 gallons or less	10 gallons	5 gallons	36
551-1,000 gallons (when the tank is 64" x 73" or less)	9 gallons	4 gallons	44
1,000 gallons (if tank is 48" x 128")	12 gallons	6 gallons	58
If Manual Tank Gauging is combined with tank tightness testing:			
1,001-2,000 gallons	26 gallons	13 gallons	36

* Nothing can be added to or removed from the UST for the duration of the test.

(v) Owners and/or operators of USTs of one thousand (1000) gallons or less nominal capacity may use Manual Tank Gauging as the sole method of release detection. Owners and/or operators of USTs of one thousand one (1001) to two thousand (2,000) gallons may use manual tank gauging, combined with tank

tightness testing at least every five (5) years until ten (10) years after the UST itself first met the requirements of Section 6(a). After ten (10) years, owners and/or operators of these tanks may not use manual tank gauging. Owners and/or operators of USTs of greater than two thousand (2,000) gallons nominal capacity may not use manual tank gauging.

(b) *Other Methods*. Owners and/or operators of petroleum USTs with a capacity of 2,000 gallons or less may also use any of the methods listed in Section 16(a) through (k).

Section 16. **Petroleum UST Systems with a capacity of more than 2,000 gallons.** Petroleum USTs with a capacity of more than 2,000 gallons shall be monitored at least every thirty (30) days for releases using one or more of the following methods:

(a) *Inventory control*. Inventory control is never acceptable as a leak detection method except when it is combined with another method. Product inventory control (or another test of equivalent performance) shall be conducted monthly to detect a release of at least 1.0 percent (1%) of throughput plus one hundred thirty (130) gallons in the following manner:

(i) Inventory volume measurements for regulated substance inputs, withdrawals, and the amount still remaining in the UST shall be recorded each operating day;

(ii) The equipment used shall be capable of measuring the depth of regulated substance over the full range of the USTs height to the nearest one-eighth (1/8) of an inch;

(iii) The regulated substance inputs shall be reconciled with delivery receipts by measurement of the UST inventory volume before and after delivery;

(iv) Deliveries shall be made through a drop tube that extends to within six (6) inches of the Storage Tank bottom;

(v) Dispensing of regulated substances shall be metered and recorded within the local standards for meter calibration or an accuracy of six (6) cubic inches for every five (5) gallons of regulated substance withdrawn; and

(vi) Water in the bottom of the UST shall be measured to the nearest one-eighth (1/8) of an inch at least once a month.

(vii) Owners and/or operators using inventory control may combine this method with tank tightness testing at least every five (5) years until December 22, 2008, or until ten (10) years after the UST itself first met the requirements of Section 6(a), whichever is sooner;

(viii) Owners and/or operators using inventory control shall report a suspected release under Section 19(c) of this chapter whenever:

(A) The inventory control fails to balance within 1.0 percent (1%) of total throughput plus one hundred thirty (130) gallons for the second consecutive month;

(B) More than 20 daily readings are either positive or negative for the second consecutive month; or

(C) A graph of the daily over/short readings shows a consistent non-zero trend for two (2) consecutive months.

(ix) The following methods are methods of equivalent performance to inventory control:

(A) Vapor Monitoring conducted in accordance with section 16(d) of this chapter;

(B) Groundwater Monitoring conducted in accordance with section 16(e) of this chapter;

(C) Interstitial Monitoring conducted in accordance with Section 16(f) of this chapter;

(D) Statistical Inventory Reconciliation conducted in accordance with Section 16(g) of this chapter;

(E) Tracer Surveys conducted in accordance with Section 16(h) of this chapter;

(F) Passive Acoustical Sensing conducted in accordance with Section 16(k) of this chapter; and

(G) Other methods approved under Section 16(j) of this chapter, providing that the approval of the method specifically states that the method is of equivalent performance to inventory control.

(b) *Tank tightness testing*. Tank tightness testing shall be capable of detecting a 0.1 gallon per hour leak rate from any portion of the UST that routinely contains regulated substance while accounting for the effects of thermal expansion or contraction of the regulated substance, vapor pockets, tank deformation, evaporation or condensation, and the facility of the water table. Whenever a tank tightness test shows a failing result, the owner and/or operator shall report a suspected release and follow Section 20(a)(i) and (ii) of this chapter.

(c) *Automatic tank gauging (ATG).* Equipment for automatic tank gauging that tests for the loss of a regulated substance shall detect a 0.2 gallon per hour leak rate from any portion of the tank that routinely contains a regulated substance. Owners and/or operators using automatic tank gauging shall also:

(i) conduct inventory control in conformance with paragraph (a) of this section, unless:

(A) the regulated substance is placed in the UST in batches of twenty-five (25) gallons or less;

(B) the tank is used only to fuel an emergency power generator;

(C) a passing result is obtained monthly from the Automatic Tank Gauge with the tank at least 85% full;

(D) the automatic tank gauge itself reconciles the inventory to the same levels as required by paragraph (a)(i) of this section; or

(E) a method of equivalent performance to inventory control is also used.

(ii) report a suspected release and follow the requirements of Section 19(c) of this chapter whenever:

(A) Any calendar month goes by when a passing result cannot be obtained from the ATG sometime during the month; or

(B) A pattern becomes evident that the ATG produces a failing result whenever the level of a regulated

substance in the tank is high, even if passing results can be obtained when the level is low.

(C) Inventory control fails for the second consecutive month.

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

(i) 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 zone;

(ii) The stored regulated substance, or a tracer compound placed in the UST system, is sufficiently volatile 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;

(iii) 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 thirty (30) days;

(iv) The soil and backfill material immediately surrounding the UST system shall not be contaminated with the regulated product in such a way as to interfere with the method used to detect releases from the UST system;

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

(vi) In the UST excavation zone , the site is assessed to ensure compliance with the requirements in this section and to establish the number and positioning of vapor monitoring wells that will detect releases within the excavation from any portion of the tank that routinely contains regulated substance; and

(vii) Vapor monitoring wells shall be clearly marked for identification and secured to avoid unauthorized

access and tampering.

(viii) Owners and/or operators using vapor monitoring wells for leak detection shall report a suspected release under Section 19(c) of this chapter whenever a vapor monitoring device detects a leak and cannot be made to reset within forty-eight (48) hours.

(ix) After the effective date of these regulations, no new UST facility shall be installed using vapor monitoring as the only leak detection method. Owners and/or operators may install vapor monitoring wells as a secondary method. In the event that vapor monitoring wells are installed in the backfill, a permit to construct under Chapter 3, Wyoming Water Quality Rules and Regulations is not required.

(e) *Groundwater monitoring*. Testing or monitoring for liquids on the groundwater shall meet the following requirements:

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

(ii) Groundwater is never more than twenty (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);

(iii) The slotted portion of the monitoring well casing or well screen shall 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;

(iv) Monitoring wells shall be sealed from the ground surface to the top of the filter pack with hydrated bentonite and concrete;

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

(vi) The continuous monitoring devices or manual methods used shall be capable of detecting the presence of at

least one-eighth (1/8) of an inch of free product on top of the groundwater in the monitoring wells;

(vii) Within and immediately below the UST excavation zone, the site shall be assessed to ensure compliance with the requirements in Section 16(e)(i) through (v) and to establish the number and positioning of monitoring wells or devices that will detect releases from any portion of the UST system that routinely contains a regulated substance;

(viii) Monitoring wells shall be clearly marked for identification and secured to avoid unauthorized access and tampering; and

(ix) Groundwater monitoring shall not be used when the ambient groundwater is already contaminated with the regulated substance being stored in the UST system.

(x) Owners and/or operators using groundwater monitoring shall report a suspected release and follow the requirements of Section 19(c) and (d) of this chapter whenever any regulated substance is observed in any monitor well at any level whatsoever.

(xi) After the effective date of these regulations, no new UST facility shall be installed using groundwater monitoring as the only leak detection method. Owners and/or operators may install groundwater monitoring wells as a secondary method. In the event that groundwater monitoring wells are installed in the backfill, a permit to construct under Chapter 3, Wyoming Water Quality Rules and Regulations is not required.

(f) *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 a regulated substance and also meets one of the following requirements:

(i) For double-walled UST systems, the sampling or testing method shall be capable of detecting a release through the inner wall in any portion of the tank that routinely contains a regulated substance;

(ii) For UST systems with a secondary barrier within the excavation zone, the sampling or testing method used shall be capable of detecting a release between the UST system and the secondary barrier;

(A) The secondary barrier around or beneath the UST system shall consist of artificially constructed material that is sufficiently thick and impermeable to direct a release to the monitoring point and permit its detection. The permeability of this barrier to the regulated substance stored shall be no more than 10^{-6} cm/sec;

(B) The barrier shall be compatible with the regulated substance stored so that a release from the UST system will not cause a deterioration of the barrier allowing a release to pass through undetected;

(C) For cathodically protected USTs, the secondary barrier shall be installed so that it does not interfere with the proper operation of the CP system;

(D) Groundwater, soil moisture, or rainfall shall not render the testing or sampling method used inoperative so that a release could go undetected for more than thirty (30) days;

(E) The site shall be 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

(F) Monitoring wells shall be clearly marked for identification and secured to avoid unauthorized access and tampering.

(iii) For USTs with internally fitted liners, an automated device shall be capable of detecting a release between the inner wall of the UST and the liner. The liner shall also be compatible with the regulated substance stored.

(iv) Owners and/or operators using interstitial monitoring shall report a suspected release and follow the requirements of Section 19(c) of this chapter whenever any monitoring device indicates a leak and the device itself cannot

be shown to be defective within forty-eight (48) hours of the initial alarm.

(g) *Statistical Inventory Reconciliation* (SIR). All SIR methods shall:

(i) meet the requirements found in Section 16(a) for inventory control

(ii) be capable of detecting a 0.2 gallon per hour leak rate or a release of one hundred fifty (150) gallons within a month with a probability of detection of at least 0.95 and a probability of false alarm of no more than 0.05; and

(iii) be approved, in writing, by the department prior to use.

(iv) All "inconclusive" results shall be investigated by the owner and/or operator as soon as they are reported by the SIR company, including a complete audit of all input data. The owner and/or operator shall make every effort to resolve all "inconclusive" results as soon as they are reported. If the inventory for an entire month fails to balance within two thousand (2,000) gallons, that month shall be treated as inconclusive. A month with an un-resolved inconclusive result is a month when no valid leak detection was provided.

(v) Owners and/or operators using SIR shall report a suspected release and follow the requirements of Section 19(c) of this chapter whenever:

(A) Any single month is reported as a failure for the UST system by the SIR company;

(B) Any month is reported by the SIR company as "inconclusive" unless that inconclusive result has been resolved by re-submission of audited inventory numbers to the SIR company.

(vi) UST Systems with a throughput of more than 500,000 gallons per month in any single system shall not be monitored using SIR as the only release detection method.

(h) *Tracer Surveys*. Owners and/or operators may use tracer surveys as an approved monthly monitoring technique if:

(i) The tracer method can detect a 0.2 gallon per hour leak rate or a release of one hundred fifty (150) gallons within a month with a probability of detection of 0.95 and a probability of false alarm of 0.05; and

(ii) The tanks are inoculated with the same tracer each month;

(iii) The tanks are inoculated each month before the 10th day of the month;

(iv) The Tracer Survey is completed before the 25th day of each month;

(v) The report for each month includes the calculations of the amount of tracer needed, the amount actually added to each tank, and the calculated leak detection limit in gallons per day; and

(vi) The report for each test clearly states that the tank(s) either passed or failed the test.

(vii) Any failing test using tracer surveys shall be treated as a suspected release under Section 24 or 25.

(i) *Passive Acoustic Sensing*. Owners and/or operators of Storage Tanks using this method shall be equipped with a continuous sensing system capable of detecting a release of 0.2 gallons per hour or a release of 150 gallons per month with a probability of detection of 0.95 and a probability of false alarm of 0.05. All passive acoustic sensing systems shall produce a written record showing that the system is on and operable. All passive acoustic sensing systems shall be calibrated annually;

(j) *Other technology*. With prior department authorization, pursuant to Section 33, other types of release detection methods, or combination of methods, may be used if:

(i) The method can detect a 0.2 gallon per hour leak rate or a release of one hundred fifty (150) gallons within a month with a probability of detection of 0.95 and a probability of false alarm of 0.05; or

(ii) The owner and/or operator can demonstrate that the method can detect a release as effectively as any of the methods allowed in Section 16 (b) through (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/or operator shall comply with any conditions imposed by the department to ensure the protection of human health and the environment.

(k) *Multiple Methods*. Whenever these regulations require the use of more than one leak detection method, the owners and/or operators shall meet all of the requirements for all of the leak detection methods required.

Section 17. **Hazardous Substance UST Systems.** USTs containing any substance listed in Appendix A of this chapter are hazardous substance USTs. Owners and/or operators of hazardous substance UST systems shall provide release detection that meets the following requirements:

(a) *Release detection*: Hazardous substance UST systems shall have a secondary containment system, be constructed with double walled tanks, or be constructed with an external liner or vault surrounding the entire tank system. These systems shall meet the following requirements:

(i) Secondary containment systems shall:

(A) be designed, constructed and installed to contain regulated substances released from the tank system until those substances are detected and removed;

(B) be designed, constructed and installed to prevent the release of regulated substances to the environment at any time during the operational life of the UST system; and

(C) be inspected for evidence of a release at least once every thirty (30) days.

(ii) Double-walled tanks shall:

(A) Be designed, constructed, and installed to contain a release from any portion of the inner tank within the outer wall;

(B) Be designed, constructed, and installed to detect the failure of the inner wall; and

(C) Be inspected for evidence of a release at least once every thirty (30) days.

(iii) External liners, (including vaults) shall:

(A) Be designed, constructed, and installed to contain one hundred percent (100%) of the capacity of the largest tank within its boundary;

(B) Be designed, constructed, and installed to prevent the interference of precipitation or groundwater intrusion with the ability to contain or detect a release of regulated substances;

(C) Be designed, constructed, and installed to surround the tank completely (i.e., it is capable of preventing lateral as well as vertical migration of regulated substances); and

(D) Be inspected for evidence of a release at least every thirty (30) days.

(b) *Connected Piping*: Connected piping shall be equipped with secondary containment that satisfies the requirements of this section. Trench liners and double-walled pipe are examples of secondary containment systems. Connected piping that conveys regulated substances under pressure shall be equipped with an automatic line leak detector in accordance with Section 14(g)(i).

(c) *Other methods:* Other methods of release detection may be used if owners and/or operators:

(i) Demonstrate to the department that an alternate method can detect a release of the stored regulated substance as effectively as any of the methods allowed in Section 16(b) through (h) can detect a release of petroleum;

(ii) 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

(iii) Obtain authorization from the department to use the alternate release detection method before the installation and operation of the new or modified UST system.

Section 18. **Release Detection Recordkeeping for UST Owners and/or Operators.** All UST system owners and/or operators shall maintain records in accordance with Section 13 demonstrating compliance with all applicable requirements of this part. These records shall include the following:

(a) *Performance Claims*: 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, shall be maintained for three (3) years, from the date of installation;

(b) *Test Results:* The results of any sampling, testing, or monitoring shall be maintained for at least three (3) years; and

(c) *Calibration, Maintenance and Repair:* Written documentation of all calibration, maintenance, and repair of release detection equipment permanently located on-site shall be maintained for the operational life of the tank in accordance with W.S. 35-11-1416(a)(vi). Any schedules of required calibration and maintenance provided by the release detection equipment manufacturer shall be retained for the operational life of the tank.

PART E

STORAGE TANK SYSTEMS:
RELEASE REPORTING, INVESTIGATION, CONFIRMATION AND RESPONSE

Section 19. **Reporting of Suspected Releases.** Owners and/or operators of storage tank systems shall orally report to the department within twenty-four (24) hours all releases or suspected releases in accordance with Section 22 and follow the procedures of Section 22. Owners of sites where storage tanks were formerly located shall also report within seven (7) days after discovering any new evidence of a release. These reports shall be made for any of the following conditions:

(a) *Released Regulated Substances:* The discovery by owners and/or operators or others of released regulated substances at the storage tank site or in the surrounding area (such as the presence of free product or vapors in soils, basements, utility lines, nearby surface water and/or groundwater);

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

(c) *Monitoring results*: Monitoring results from a release detection method required under Section 14 through 17 that indicate a release may have occurred unless the monitoring device is found to be defective, and is immediately repaired, recalibrated or replaced, and additional monitoring does not confirm the initial result.

(d) *Off-site Impacts.* Owners and/or operators of storage tank systems, and owners of former storage tank sites, shall follow the applicable procedures in Section 20 or 21 to determine if the storage tank 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, utility lines, nearby surface water and groundwater) that have been observed by the department or brought to its attention by another party.

Section 20. **Release Investigation and Confirmation for Eligible Owners and/or Operators.** Owners and/or operators of storage tanks who are eligible for cleanup under the Corrective Action Account shall immediately investigate and confirm all suspected releases of regulated substances requiring reporting under Section 19 within seven (7) days of detection as follows:

(a) *System test*. Owners and/or operators shall conduct tests, according to the requirements for tightness testing in Section 14 (g) and Section 16 (b), that determine whether a leak exists in that portion of the storage tank system that routinely contains a regulated substance. Owners and/or operators of all storage tanks shall also audit one year's inventory control required by Section 16(a) or 36(e).

(i) Owners and/or operators shall repair, replace, or permanently close the storage tank system if the test results for the system, tank, or delivery piping indicate that a leak exists.

(ii) Owners and/or operators shall also conduct a thorough audit of all of their leak detection methods for the preceding year. This audit shall be performed by a qualified third party, employed for this purpose by the owner and/or operator. In the event that the audit indicates a pattern of releases over several months, then the department will accomplish the site check as described in Section 20 (c).

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

(b) *Further Action.* If the test results required under Section 20 (a) do not indicate a release, but environmental contamination is the basis for suspecting a release, the department will accomplish the site check as required under Section 20 (c) and all other required Part E activities, as determined by the administrator.

(c) *Site check*. The department shall test for the presence of a release where contamination is most likely to be present at the storage tank site. In selecting sample types, sample locations, and measurement methods, the department shall consider

the nature of the stored regulated 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. If the test results for the site check do not indicate that a release has occurred, further investigation is not required.

(d) *Plans and Specifications*, All plans, specifications and reports filed under this section with the department shall also be signed and sealed by a Registered Professional Engineer under W.S. 33-29-114 through 33-29-149 and/or a Registered Professional Geologist under W.S. 33-41-101 through 33-41-121, as applicable.

Section 21. **Release Investigation and Confirmation for Owners and/or Operators Not Eligible for the Corrective Action Account.** Owners of contaminated sites and Owners and/or Operators of storage tanks may become ineligible for cleanup under the Corrective Action Account for any of the reasons listed in W.S. 35-11-1424. Owners and/or Operators who are not eligible for cleanup under the Corrective Action Account shall immediately investigate and confirm all suspected releases of regulated substances requiring reporting under Section 19 within seven (7) days of detection as follows:

(a) *System test*. Owners and/or operators shall conduct tests, according to the requirements for tightness testing in Section 14(g) and Section 16(b), that determine whether a leak exists in that portion of the tank that routinely contains regulated substance, or the connected piping, or both. Storage tank Owners and/or operators shall also audit all inventory control required under Sections 16(a) or 36(e) for the year prior to the suspected release.

(i) Owners and/or operators shall repair, replace, or permanently close the storage tank system if the test results for the system indicate that a leak exists.

(ii) When environmental contamination is the basis for suspecting a release, owners and/or operators shall also conduct a thorough audit of all of their leak detection methods for the preceding year. This audit shall be performed by a qualified third party, employed for this purpose by the owner and/or operator. In the event that the audit indicates a pattern of

releases over several months, owners and/or operators shall conduct a site check as described in Section 20(c).

(iii) Owners and/or operators shall conduct a minimum site assessment as described in Section 29 any_time that the results of the system test described in Section 21(a) indicate that a leak exists, or if environmental contamination is the basis for suspecting a release.

(b) *Further Action*. Further investigation is not required if the system test results required under Section 21(a) do not indicate that a leak exists and if environmental contamination is not the basis for suspecting a release. If the test results for the excavation zone at an UST site or the results for the area immediately adjacent to the storage tank system at an above ground storage tank site indicate that a release has occurred, owners and/or operators shall begin corrective action in accordance with Part E;

(c) *Permits Required*. Owners of contaminated sites and/or owners and/or operators of storage tank systems shall also ensure that all necessary department permits for groundwater monitoring or product recovery wells have been issued prior to initiating site check activities.

(d) *Plans and Specifications.* All plans, specifications and reports filed this section with the department shall also be signed and sealed by a Registered Professional Engineer under W.S. 33-29-114 through 33-29-149 and/or a Registered Professional Geologist under W.S. 33-41-101 through 33-41-121, as applicable.

Section 22. **Reporting and Cleanup of Spills and Overfills.**

(a) *Cleanup and 24 hour reporting:* Owners and/or Operators of storage tank systems shall contain and immediately clean up a spill or overfill and orally report to the department within twenty-four (24) hours all spills or overfills by telephone to (307) 777-7781, by FAX transmission to (307) 777-5973, or by electronic mail to deq@wyo.gov and begin corrective action in accordance with Sections 23 through 25 in the following cases:

(i) Spill or overfill of petroleum that results in a release to the environment that exceeds 25 gallons or that causes a sheen on nearby surface water; and/or

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

(b) *Owners and/or operators Costs:* Costs incurred by owners and/or operators to contain and/or cleanup surface spills and/or overfills are not eligible for the state correction action program funds. Leaks that occur within a dispenser cabinet at or above the fire valve are considered surface spills and are not eligible for cleanup under the Corrective Action Account. Leaks that occur below the fire valve are leaks from piping and are eligible for cleanup under the Corrective Action Account.

(c) *Small Spills*: Owners and/or operators of storage tank systems shall contain and immediately cleanup a spill or overfill of petroleum that is less than 25 gallons and a spill or overfill of a hazardous substance that is less than the reportable quantity. If cleanup cannot be accomplished within twenty-four (24) hours, owners and/or operators shall immediately notify the department.

Section 23. **General.** Owners and/or operators of storage tank systems , and owners of former storage tank sites, shall, in response to a confirmed release from the storage tank system, comply with the requirements of this part except for USTs excluded under Section 4(b) of this chapter.

Section 24. **Owners and/or Operators Not Eligible for the State Corrective Action Program.**

(a) *Initial Response*. Upon confirmation of a release in accordance with Section 21 or after a release from the storage tank system is confirmed in any other manner, owners and/or operators shall perform the following initial response actions within twenty-four (24) hours of a release:

(i) Orally report the release to the department by telephone, (307)777-7781, by electronic mail to deq@wyo.gov, or by FAX to (307)777-5973;

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

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

(b) *Initial Abatement Measures and Site Check*. Owners and/or operators of storage tank systems shall accomplish the following abatement measures:

(i) Remove as much of the regulated substance from the storage tank system as is necessary to prevent further release to the environment;

(ii) Visually inspect any above ground or exposed below ground releases and prevent further migration of the released substance into surrounding soils and ground or surface waters;

(iii) Continue to monitor and mitigate any additional fire and safety hazards posed by vapors or free product that have migrated from an UST excavation zone or from under an above ground storage tank and entered into subsurface structures (such as sewers or basements);

(iv) 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/or operator shall comply with the applicable department requirements;

(v) Measure for the presence of a release where contamination is most likely to be present at the storage tank site, unless the presence and source of the release have been confirmed in accordance with the site check required by Section 21 or the closure site assessment of Section 31. In selecting sample types, sample locations, and measurement methods, the owner and/or operator shall consider the nature of the stored regulated substance, the type of backfill, depth to groundwater and other factors as appropriate for identifying the presence and source of the release;

(vi) Investigate to determine the possible presence of free product, and begin free product removal as soon as practicable and in accordance with this section; and

(vii) Submit a report, within thirty (30) days after release confirmation, to the department summarizing the initial abatement steps taken and any resulting information or data required by this section.

(c) *Initial Site Characterization*. Owners and/or operators shall assemble information about the site and the nature of the release, including information gained while confirming the release or completing the initial abatement measures of this section. This information shall include, but is not limited to, the following:

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

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

(iii) Results of the site check required under Section 24(b);

(iv) The results of the free product investigations required under Section 24 (b), shall be used by owners and/or operators to determine whether free product shall be recovered under Section 24 (d);

(v) Within sixty (60) days of release confirmation, owners and/or operators shall submit the information collected in compliance with this section to the department in a manner that demonstrates its applicability and technical adequacy; and

(vi) Information necessary to classify the affected groundwater under Chapter 8, Wyoming Water Quality Rules and Regulations.

(d) *Free Product Removal*. When free product is discovered, owners and/or operators shall contact the department within twenty-four (24) hours of the discovery by telephone, (307) 777-7781, by electronic mail to deq@wyo.gov, or by FAX to (307) 777-5973. Owners and/or operators shall present a CAP for product removal at sites where investigations under Section 24 (b) indicate the presence of free product. Owners and/or operators shall remove free product to the maximum extent practicable as determined by the department. In meeting the requirements of this section, owners and/or operators shall:

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

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

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

(iv) Prepare and submit to the department, within forty-five (45) days after confirming a release, a free product removal report that provides at least the following information:

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

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

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

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

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

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

(G) The disposition of the recovered free product.

(e) *Investigation for Soil and Groundwater Cleanup*. In order to determine the full extent and location of soils contaminated by the release and the presence and concentrations of dissolved product contamination in the groundwater, owners and/or operators shall conduct a subsurface investigation of the release, the release site, and the surrounding area possibly affected by the release to determine if any of the following conditions exist:

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

(ii) Free product is discovered on the groundwater table in compliance with this section;

(iii) There is evidence that contaminated soils may be in contact with groundwater (e.g., as found during the initial response measures or investigations required under this section);

(iv) The department requests an investigation based on the potential threats of contaminated soil or groundwater on nearby surface water and groundwater resources;

(v) Owners and/or operators shall submit the information collected under this section in accordance with a schedule established by the administrator.

(f) *Corrective Action Plan (CAP)*.

(i) Any owner and/or operator, the department, or other person, taking a corrective action required by this regulation, shall restore the environment to a condition and quality consistent with the standards established in Sections 38 and 39.

(ii) At any point after reviewing the information submitted in compliance with Sections 24 through 26, the department may require owners and/or operators to submit additional information, or to develop and submit a CAP for responding to contaminated soils and groundwater. If a plan is required, owners and/or operators shall submit the plan according to a schedule and format established by the department. Alternatively, owners and/or operators may, after fulfilling the requirements of Sections 24 through 26, choose to submit a CAP for responding to contaminated soil and groundwater. In either case, owners and/or operators are responsible for submitting a plan that provides for adequate protection of human health and/or restoration of the environment, as determined by the department, and shall modify their plan as necessary to meet the requirements of this regulation.

(A) The department will authorize and issue applicable department permits for the CAP only after ensuring that implementation of the plan will adequately protect human health, safety, and the environment, and the plan is in compliance with other applicable department rules and regulations. In making this determination, the department will consider the following factors:

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

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

(III) The proximity, quality, and current and future uses of nearby surface water and groundwater;

(IV) The potential effects of residual contamination on nearby surface water and groundwater;

(V) An exposure assessment; and

(VI) Any information assembled in compliance with this section.

(B) Upon authorization and issuance of applicable department permits for the CAP, owners and/or operators shall implement the plan, including modifications to the plan made by the department. They shall monitor, evaluate, and report the results of implementing the plan in accordance with the schedule and a format established by the department.

(C) Owners and/or operators may, in the interest of minimizing environmental contamination, remediating an imminent health and/or safety hazard, and promoting more effective cleanup, begin cleanup of soil and groundwater before the CAP is authorized and permitted by the department provided that they:

(I) Notify the department of their intention to begin cleanup;

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

(III) Incorporate these self-initiated cleanup measures in the CAP that is submitted to the department for authorization and permitting.

Section 25. **Owners and/or Operators Eligible for the State Corrective Action Program.**

(a) *Initial Response*. Upon confirmation of a release in accordance with Section 20 or after a release from the storage tank system is identified in any other manner, owners and/or operators shall perform the following initial response actions within twenty-four (24) hours of a release:

(i) Orally report the release to the department (e.g., by telephone, (307-777-7781, 24 hour telephone), or by electronic mail to deq@wyo.gov, by FAX to, (307-777-5973, 24 hour FAX machine);

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

(iii) Orally notify the department immediately of any fire, explosion, or vapor hazards. The department shall begin resolving these hazards as soon as practicable.

(b) *Initial Abatement Measures and Site Check*. Owners and/or operators shall accomplish the following abatement measures:

(i) Remove as much of the regulated substance from the storage tank system as is necessary to prevent further release to the environment; and

(ii) Visually inspect any above ground or exposed below ground releases and prevent further migration of the released substance into surrounding soils and ground or surface waters;

(c) *Site Characterization and Corrective Action.* The department will prioritize the site pursuant to Section 28 after completion of initial abatement measures. The department will also collect data on affected groundwater sufficient to classify the affected groundwater under Chapter 8, Wyoming Water Quality Rules and Regulations.

Section 26. **Public Participation.**

(a) *Notice Provided*: Whenever a confirmed release from an storage tank system occurs that requires a CAP for soil or groundwater remediation, the department shall provide notice to the public by means designed to reach those members of the public directly affected by the release and the planned corrective action. This notice may include, but is not limited to, public notice in local newspapers, block advertisements, public service announcements, or personal contacts by field staff.

(b) *Content of Notices*: All public notices issued under this chapter shall contain the following minimum information:

(i) Name and address of facility where release occurred;

(ii) Name and address of owner and/or operator;

(iii) Name and address of the department;

(iv) Name and phone number of department representative where additional information can be obtained;

(v) Type and estimated volume of the release, if known; and

(vi) The Class of Use of all affected groundwater as determined under Chapter 8, Wyoming Water Quality Rules and Regulations.

(c) *Information Requests*~~:~~. Upon request, the department shall provide or make available information concerning the nature of the release and corrective actions planned or taken.

(d) *Public Meetings*~~:~~. A public meeting may be held to consider comments on a proposed CAP or at the termination of a CAP if the administrator determines there is sufficient public interest or whenever such a meeting may clarify issues involved in a CAP.

Section 27. **Corrective Action Prioritization Ranking System.**

(a) *Criteria.* This ranking system establishes criteria for use by the department in determining priorities for conducting state corrective actions at leaking storage tank sites. The ranking is based upon the following primary factors:

(i) Degree of immediate adverse health exposure and/or safety hazards to people in nearby occupied buildings or to public utilities.

(ii) Water quality protection.

(iii) Potential for contaminant(s) migration.

(iv) Ecological protection.

(b) *Scoring.* The scoring system provides that the sites with the highest scores shall be of the highest priority in conducting department corrective actions. The following listing and point values compose the department's corrective action prioritization ranking system. Points will be applied to each site, as appropriate, depending upon local circumstances. The

total score for each leaking storage tank site is the sum of all applicable categories as follows:

TABLE 3
Corrective Action Scoring

Free product on the surface of either surface or groundwater	Point Value
Presence of free product unknown, but possible	100
Presence of free product unknown, but probable	225
Free product in any amount, on groundwater	350
Water contaminated by dissolved chemical substances	**Point Value**
Greater than ten (10) times the MCL for drinking water or the Wyoming DWEL	300
Less than ten (10) times or equal to the MCL for drinking water or the Wyoming DWEL	100
The above two (2) values shall be doubled if measurements were made in wells used for drinking water.	
Potential to contaminate groundwater	**Point Value**
Unknown, but probable	175
Unknown, but possible	75
Soil Type	**Point Value**
High permeability (coarse gravel, silty sands, etc.)	150
Moderate permeability (loamy sands, silty clays, etc.)	75
Low permeability (clays)	25

TABLE 3
Corrective Action Scoring

Soil Contamination	Point Value
Heavily contaminated soils. Fails paint filter test or produces a free product layer when mixed with water and allowed to settle for ten (10) minutes	150
Moderately contaminated soils. Observed greasy feel, strong petroleum odor, black discoloration	80
Slightly contaminated soils. Any visible contamination or weak petroleum odor	40

Section 28. **Termination of Corrective Actions.** Corrective actions that have not met the applicable standard(s) in Sections 39 and 40 may be stopped if the administrator determines that continued operation of those systems is not technically and economically feasible.

PART F

MINIMUM SITE ASSESSMENTS

Section 29. **MSA Requirements**

(a) *When a MSA is Required.* MSAs are utilized to determine whether a regulated substance has been released from a storage tank system and, if so, to determine if soil and/or ground water contamination is present in exceedance of applicable standards. The MSA results will determine the site's eligibility for the corrective action fund. MSAs are required when any of the following conditions are met:

(i) Unless the site is already listed as a contaminated site, all owners and/or operators of regulated ASTs shall, by October 1, 2007, provide a MSA to the department. This MSA shall be done at the owners and/or operators expense and shall meet all of the requirements of this part.

(ii) Unless the site is already listed as a contaminated site, all UST owners and/or operators which have not previously performed a MSA shall perform a MSA. This MSA shall be performed no sooner than eighteen (18) years, and no later than twenty (20) years, after the tanks were installed, at the owners and/or operators expense. This requirement applies to all USTs installed after September 22, 1988.

(iii) After the effective date of this chapter, owners and/or operators who remove storage tanks without obtaining the required department inspection shall complete a MSA at their own expense and within forty-five (45) days of the tank removal.

(iv) After the effective date of this chapter, owners and/or operators who change the use of a regulated tank to a non-regulated use in accordance with Section 31 of this chapter, or change the use of a non-regulated tank to a regulated use shall complete a MSA at their own expense and within forty-five (45) days of the change of use.

(v) Any owner and/or operator of a storage tank system which was abandoned prior to the program and who now elects to participate in the state program, shall:

(A) Provide written documentation that the site actually had a storage tank system at some time;

(B) In the case where the storage tank was an AST, provide documentary evidence that the storage tank was used to dispense gasoline and diesel fuels to the public;

(C) Complete an MSA in accordance with this part and prove that the site has been contaminated by a storage tank system; and

(D) Pay one year's storage tank fee for all storage tanks on the site at the time of the initial site registration. If all of the tanks were removed and it is not possible to determine how many storage tanks were on the site, pay the fee for one tank.

(vi) Owners of former storage tank sites that are not on the contaminated site list shall perform a MSA any time that soil and/or ground water contamination is discovered on the property or adjacent properties.

(vii) A MSA shall be accomplished by an owner and/or operator before permanently closing a storage tank in place in accordance with the procedures contained in this part.

(b) *MSA Work Plan.* At least thirty (30) days prior to performing a MSA, the owner and/or operator shall submit a Work Plan to the appropriate Water Quality Division Storage Tank Program District Office for review and approval. The department will review the work plan to insure that the proposed MSA will meet the requirements of this part. The Work Plan shall include at least the following information:

(i) Facility name, address and identification number, if applicable.

(ii) Name, address and telephone of person(s) who will be conducting the MSA;

(iii) Number of storage tanks, whether they are AST or UST, and how many are regulated versus unregulated;

(iv) Description of MSA methodology to be utilized for storage tanks and connected piping, including borehole and/or soil excavation installation and closure and monitor well installation and closure, equipment decontamination, contaminated soil and ground water disposal;

(v) Soil and ground water Sampling and Analysis Plan, including proposed sample collection and shipment protocols and analytical methods. ;

(vi) A plan map showing the location of property lines, drainages, buildings, tanks, connected piping and proposed boreholes/monitor wells and/or soil excavations. All maps shall be to scale and provide a north arrow.

(c) *MSA Performance and Information Requirements.*

(i) The MSA shall be inclusive for all storage tanks located on a site.

(ii) MSAs for Storage Tanks.

(A) The MSA for storage tanks shall consist of boreholes and/or soil excavations accomplished within five (5) horizontal feet of the UST basin or AST secondary containment structure. For USTs, these boreholes/ soil excavations shall extend to a minimum of three (3) feet below the bottom of the tank. For ASTs, the boreholes or soil excavations shall extend to a minimum of fifteen (15) feet below the bottom of the AST. USTs with secondary containment shall have the above distances measured from the outside and bottom of the secondary containment.

(B) To the extent possible, the boreholes/soil excavations shall surround the tank area and provide an adequate representation of any potential contamination that may have been released from the storage tank system(s). The total number and locations of the boreholes or soil excavations will vary dependant upon the number of storage tanks and the total storage tank capacity at any location.

(C) Whenever a groundwater table is encountered, the depth of the borehole or soil excavation shall be accomplished to a depth necessary to provide for the collection of a groundwater sample.

(iii) MSAs for Connected Piping and dispensers. The MSA for connected piping shall consist of boreholes or soil excavations accomplished within three (3) horizontal feet of the piping and shall extend to a minimum of three (3) feet below the bottom of the piping. For dispensers, boreholes or soil excavations shall extend to ten (10) feet below the bottom of the dispenser sump. The total number and locations of the boreholes or soil excavations will vary dependant upon the length of the piping and the number of dispensers.

(iv) Borehole/Soil Excavation Completion Requirements.

(A) Either borehole drilling or soil excavation are acceptable techniques for accomplishing the MSA as long as the results meet the purpose of the MSA in (a) above. The particular MSA technique shall be proposed in the work plan for review and approval by the department.

(B) For boreholes, at least one borehole shall be advanced to the ground water table or a maximum of thirty (30) feet below ground surface, whichever is first. At least one borehole shall be completed as a monitor well whenever groundwater is encountered during the drilling. For soil excavations, the maximum excavation depth shall be fifteen (15) feet below ground surface.

(C) An accurate log of subsurface conditions shall be provided for all boreholes and/or soil excavations. This documentation shall be provided by a person qualified and experienced to describe soils based on the Unified Soil Classification System.

(D) All boreholes shall be abandoned in accordance with the approved work plan. Shallow boreholes that do not penetrate the ground water table may be abandoned with uncontaminated drill cuttings to within two (2) feet of the surface. The upper two (2) feet of the borehole shall consist of a hydrated bentonite plug. All other boreholes shall be

abandoned with a bentonite slurry from the bottom of the borehole up.

(E) Soil excavations shall be closed in accordance with the approved work plan.

(v) Monitor Wells.

(A) All boreholes that penetrate the ground water table shall be completed as monitor wells or abandoned in accordance with this part and the approved work plan.

(B) Any monitor wells installed as part of a MSA are exempt from the requirements of Chapter 11, Part G, Wyoming Water Quality Rules and Regulations.

(C) All monitor wells shall be constructed in accordance with the approved work plan and the issued State Engineer's permit. Monitor wells shall be capable of providing a representative sample of formation ground water for chemical analysis.

(D) All monitor wells shall be abandoned in accordance with the approved work plan.

(vi) Soil Sampling.

(A) All borehole and/or soil excavation samples shall be collected in a manner to ensure that the soil collected is representative of the in-place soil at the sampling location.

(B) Based on field instrument measurements, the most heavily contaminated soil sample will be properly packaged and submitted to a chemical laboratory for analysis. If field instrument measurements do not indicate a contaminated soil layer, the soil sample submitted to the laboratory shall be from three (3) feet below the base of the storage tank or the connected piping and dispenser.

(vii) Ground water Sampling.

(A) Ground water samples shall be collected in accordance with the approved work plan and in a manner that

ensures that the samples are representative of the in-place formation ground water.

(B) All ground water samples shall be properly preserved and packaged prior to submitting to the analytical laboratory.

(d) *Documented contamination*. Any contamination documented during this MSA process requires the owner of the contaminated site and/or the owner and/or operator of the storage tanks to implement Part E of this chapter, if the storage tank system is currently in use.

(e) *MSA Report.* Within forty-five (45) days after the completion of the MSA, the owner and/or operator shall submit two (2) copies of a summary report of the MSA to the department on a form provided by the department or a consultant's report which at a minimum includes the following information:

(i) Facility name, address and ID number , owners name and address and name of person(s) performing the MSA;

(ii) Date assessment was accomplished;

(iii) Storage tank(s) information, including tank number, capacity, regulated substance stored and depth to top and bottom of tank(s);

(iv) Borehole and/or soil excavation information, including borehole/soil excavation identification, total depth, depth to ground water and description of soils and/or ground water;

(v) Discussion of any contamination noting depths encountered or lack of contamination discovered;

(vi) All analytical results.

(vii) Plan map of the location indicating structures, drainages, property lines, location of boreholes or soil excavations, monitor wells tank(s), piping and dispensing pumps. Drawings shall include title, north arrow and scale;

The summary report shall be submitted to the appropriate Water Quality Division Storage Tank Program District Office for review and approval.

PART G

STORAGE TANK SYSTEMS: OUT-OF-SERVICE SYSTEMS AND CLOSURES

Section 30. **Temporary Closure.**

(a) *General Requirements.* When an storage tank system is temporarily closed, owners and/or operators shall continue operation and maintenance of CP systems in accordance with Section 11. Owners and/or operators shall continue release detection in accordance with Part D as long as the tank contains more than one inch of regulated substance at the measuring point directly under the fill tube. Parts E and F shall be complied with if a release is suspected or confirmed.

(b) *Six (6) months or more.* When a storage tank system is temporarily closed for six (6) months or more, owners and/or operators shall also comply with the following requirements:

(i) Leave vent piping open and functioning; and

(ii) Drain, cap and secure all other connected piping, pumps, manways, and ancillary equipment; and

(iii) Continue to pay the annual tank fee and maintain financial responsibility pursuant to Chapter 19, Wyoming Water Quality Rules and Regulations, Financial Responsibility for USTs.

(c) *Three (3) years or more*. When a storage tank system is temporarily closed for more than three (3) years, the owner and/or operator shall complete a minimum site assessment in accordance with Section 29.

Section 31. **Permanent Closure and Changes In Service.**

(a) *Notification.* At least thirty (30) days before beginning either permanent closure or changing a storage tank system to a non-regulated use under Section 31(b) or (c), owners and/or operators shall notify the department of their intent, unless such action is in response to corrective action. The required permanent site closure or Minimum Site Assessment of the excavation zone under Section 29 shall be performed after

notifying the department but before completion of the permanent closure or changing a storage tank system to a non-regulated use.

(b) *Permanent Closure.* To permanently close a storage tank system, owners and/or operators shall empty and clean it by removing all liquids and accumulated sludges and performing a Minimum Site Assessment as defined in Section 29. All USTs taken out of service permanently shall also be removed from the ground or filled with an inert solid material. The tank cleaning and closure procedures shall be properly conducted in accordance with one of the following industry standards or practices:

(i) API Recommended Practice 1604, "Removal and Disposal of Used Underground Petroleum Storage Tanks";

(ii) API Publication 2015, "Cleaning Petroleum Storage Tanks";

(iii) API Recommended Practice 1631, "Interior Lining of USTs";

(iv) The National Institute for Occupational Safety and Health "Criteria for a Recommended Standard *** Working in Confined Space"; and,

(v) Section 33 provides a process for evaluating and permitting designs or procedures which deviate from recognized industry standards or practices.

(c) *Change of Service.* Before converting any regulated storage tank to store a non-regulated substance, owners and/or operators shall empty and clean the tank by removing all liquid and accumulated sludge in accordance with Section 31(b)(i) through (v) unless the non-regulated substance happens to be the same as the regulated substance. Before converting any regulated storage tank to store a non-regulated substance, owners and/or operators shall conduct a Minimum Site Assessment in accordance with Section 29.

(d) *Records*. Results of the Minimum Site Assessments required under this section shall be submitted to the department within ninety (90) days of completion.

Section 32. **Applicability to Previously Closed or Abandoned Storage Tank Systems.**

(a) UST systems permanently closed after December 22, 1988 and AST systems permanently closed after the date of these regulations, shall comply with the state requirements for closure by either removing the storage tank system from the ground or permanently closing it in place in accordance with Section 31 and 33.

(b) When directed by the administrator, the owner and/or operator of a storage tank system or an owner of a site upon which such a system was located that was permanently closed *before* the effective date of these regulations shall accomplish a Minimum Site Assessment in accordance with Section 29. When directed by the administrator, abandoned storage tank systems shall be permanently closed in accordance with Sections 31 and 33. The administrator may take action under this section if the department determines that releases from the storage tank system may pose a current or potential threat to human health and/or the environment. Owners and/or operators of UST systems permanently closed before December 22, 1988, shall have complied with the practice of API Bulletin No. 1604, Recommended Practice for Abandonment or Removal of Underground Tanks.

PART H

STORAGE TANK SYSTEMS:
TECHNOLOGY AND PROCEDURES NOT SPECIFICALLY AUTHORIZED

Section 33. **General.** This part is provided to encourage new technology, procedures, or equipment that are not specially authorized, and provide a process for evaluating and authorizing those that deviate from the regulations in this chapter. The proposed use of technologies, systems, or processes not in compliance with these regulations will be authorized provided that they function or comply with the intent or purpose of this chapter.

(a) *Application Contents.* Each application for authorization to utilize new technology, systems, or processes under this section shall be evaluated on a case-by-case basis using the best available scientific information. The following information shall be included with a written application to the department for review and authorization:

(i) Data obtained from a full scale, comparable installation or process which demonstrates compliance with the intent or acceptability of the technology, or;

(ii) Data obtained from a pilot project operated under the design condition for a sufficient length of time to demonstrate the acceptability of the design, or;

(iii) Data obtained from a theoretical evaluation of the technology or procedure which demonstrates a reasonable probability of compliance with the intent of this chapter, and;

(iv) An evaluation of the flexibility of making corrective changes in the event the technology or process does not function as planned.

(b) *Pilot facility*. If an applicant wishes to construct a pilot facility, to demonstrate a particular technology or to generate the data necessary to prove the technology, a permit to construct under Chapter 3, Wyoming Water Quality Rules and Regulations shall be obtained prior to construction.

PART I

AST SYSTEMS

Section 34. **Tanks Covered by this Part.** This part covers all ASTs that meet the requirements found in W.S. 35-11-1415(a)(xi).

Section 35. **Construction requirements for AST Systems.**

(a) *Tanks.* All tanks regulated by this part, whether existing or new, shall be welded steel tanks. Bolted or riveted steel tanks or tanks made of any material other than steel shall not be used as a regulated AST after the effective date of these regulations. After the effective date of these regulations, no tank intended for use as an UST shall be installed as an AST.

(b) *Secondary Containment.* All ASTs regulated under this section shall be constructed with secondary containment equal to at least 110% of storage capacity of the largest single AST within the secondary containment wall. The owner and/or operator of any AST shall control runoff captured inside the secondary containment system and insure that runoff is free of floating oils prior to discharge from the secondary containment structure. Secondary containment shall be constructed of materials that are:

(i) Fireproof;

(ii) Compatible with the regulated substance stored.

(c) *Vehicle impact protection.* All ASTs regulated under this section shall be protected against vehicle impact by barriers. Barriers are required on any side subject to impact by a vehicle traveling on any surface accessible to the public. Barriers shall meet one of the following specifications:

(i) Guard posts constructed of steel no less than four (4) inches in diameter and concrete filled, spaced not more than four (4) feet apart, and set not less than three (3) feet above ground in a concrete filled footing 15 inches minimum diameter and a minimum of three feet deep. Posts shall not be located less than five (5) feet from the tanks.

(ii) Concrete secondary containment walls if the wall is at least five (5) feet from the tanks, and extends at least three (3) feet above ground level on the outside of the structure, and contains a minimum of two 5/8 inch reinforcing rods placed in the concrete as a continuous band within one foot of the top of the structure. Secondary containment structures constructed of concrete block, lightweight steel, or earth do not meet this requirement. Concrete secondary containment structures which do not meet this requirement may be approved by the department on a case by case basis.

(iii) Concrete barriers constructed to DOT specifications for use as a barrier along highways. These barriers are commonly called “jersey barriers”.

(iv) UL-2085 tanks do not require separate vehicle impact protection, provided that the manufacturer certifies that the tank provides vehicle impact protection.

(d) *Corrosion protection.* All AST systems regulated under this section shall be protected against corrosion using one of the following methods:

(i) A sacrificial anode CP system. Such systems shall be checked annually for proper operation by a CP tester, and shall be designed by a corrosion expert. Owners and/or operators of all ASTs protected by sacrificial anode systems shall also comply with Section 11 of this Chapter;

(ii) An impressed current CP system. Such systems shall be checked monthly by the owner and/or operator and annually for proper operation by a CP tester, and shall be designed by a corrosion expert. Owners and/or operators of all ASTs protected by impressed current systems shall also comply with Section 11 of this Chapter; or

(iii) Isolation of the AST System from the ground by placing the tank on a bed of dry and freely draining gravel at least three (3) inches thick on a concrete floor within a concrete secondary containment system. Horizontal cylindrical tanks on saddles, and tanks that meet the requirements of UL 2085 are also isolated from ground contact.

(e) *Additional requirements for cathodic protection*.

(i) Both sacrificial anode and impressed current CP systems on ASTs shall be designed and installed with test stations to enable the owners and/or operators to monitor the operation of the CP system.

(ii) All CP systems installed on ASTs shall be installed, inspected and maintained to meet or exceed one or more of the following industry standards and practices:

(A) NACE Standard RP0193-2001, “External Cathodic Protection of On-Grade Carbon Steel Storage Tank Bottoms”;

(B) NACE Standard RP0285-2002, "Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems".; or

(C) API Recommended Practice 651, “Cathodic Protection of Aboveground Storage Tanks.”

(f) *Overfill protection.* All ASTs regulated under this section shall have overfill protection as follows:

(i) systems shall sound an audible or visible alarm at the filling rack when the AST is 90% full;

(ii) systems shall close valves and prevent overfilling the tank before the AST is 95% full; and

(iii) For tanks larger than 100,000 gallons, the following shall also be provided: a system shall sound a second audible and visible alarm at the filling rack when the AST is 95% full.

(g) *Spill prevention.* All AST Systems regulated under this section shall have spill prevention equipment as follows:

(i) all fill lines shall be protected with a double check valve to prevent backflow from the tank and a self closing fire valve, activated by a frangible, fusible link;

(ii) the fill lines shall be completely enclosed within the secondary containment system; or

(iii) each fill line shall have its own system to control spillage.

(h) *Connected Lines.* All underground pipe lines connected to ASTs regulated under this section shall be non-corrodible, double walled lines equipped with working leak detection equipment. All above ground lines shall be steel. All connections between above ground lines and underground lines shall be made inside accessible leak proof sumps.

(i) *Applicable Standards for new ASTs.* All new AST systems installed after the date of these regulations must meet the requirements of one or more of the following industry standards or practices:

(i) Field Constructed Steel Tanks.

(A) API Standard 12D, “Specification for Field Welded Tanks for Storage of Production Liquids”;

(B) API Standard 620, “Design and Construction of Large, Welded Low-Pressure Storage Tanks";

(C) API Standard 650, "Welded Steel Tank for Oil Storage";

(D) NFPA Standard 30, "Flammable and Combustible Liquids Code";

(E) NFPA Standard 30A, "Motor Vehicle Fueling Stations and Repair Garages Code";

(F) API Standard 653, "Tank Inspection, Repair, Alteration, and Reconstruction";

(G) PEI Recommended Practice 200-2003, “Recommended Practices of Installation of Aboveground Storage Systems for Motor Vehicle Fueling”; and/or

(H) Other standards approved by the department.

(ii) Shop Constructed Tanks.

(A) UL 2085, “Protected Aboveground Tanks for Flammable and Combustible Liquids;

(B) UL 142, “Standard for Aboveground Flammable and Combustible Liquid Storage Tanks”; or

(C) API Standard 650 Appendix J, "Shop-Assembled Storage Tanks";

(D) NFPA Standard 30, "Flammable and Combustible Liquids Code";

(E) ASME, “Boiler & Pressure Vessel Code, Section VIII, Division 1, Design and Fabrication of Pressure Vessels

(F) API Standard 653, "Tank Inspection, Repair, Alteration, and Reconstruction";

(G) PEI Recommended Practice 200-2003, “Recommended Practices of Installation of Aboveground Storage Systems for Motor Vehicle Fueling”;

(j) *ASTs installed after the effective date of these regulations.*

(i) ASTs installed after the effective date of these regulations shall have a suitable foundation capable of supporting the tank full of the regulated substance without excessive differential settlement as defined in API Standard 653 or the manufacturer’s recommendation. The foundation shall be designed by a Registered Professional Engineer, licensed in the State of Wyoming. The foundation design shall provide positive drainage of water away from the base. ASTs located in areas subject to flooding shall be anchored to prevent flotation.

(ii) All ASTs installed or re-installed after the date of these regulations shall meet all the requirements of Part I before being placed in service.

(iii) All ASTs installed after the effective date of these regulations shall be placed on a release prevention barrier. The integrity of the barrier shall not deteriorate due to exposure to the elements or soil in the presence of regulated substances. The following are acceptable release prevention barriers:

(A) An impermeable geosynthetic clay liner with a permeability of 10^{-6} cm/sec or less;

(B) An impermeable geosynthetic liner installed in accordance with manufacturer’s recommendations such as a 60 mil unreinforced liner or a 40 mil reinforced liner, or a material of similar or more stringent specifications that is compatible with the regulated substance stored;

(C) A double bottom tank equipped with a leak detection system that will detect the presence of the regulated substance in the space between the bottoms; or

(D) For tanks of less than 100,000 gallons capacity, an impermeable reinforced concrete slab.

(E) For double walled, vaulted tanks with an interstitial monitoring device, the tank structure meets, by itself, all requirements for both the secondary containment and the release detection barrier.

(iv) The owner and/or operator of every field constructed AST installed after the effective date of these regulations shall keep on file for the life of the tank, and make available to the department upon request, the following baseline data:

(A) Floor and wall/shell thickness measurements;

(B) Material certifications for all materials used in the construction of the AST system, including secondary containment and release prevention barriers; and

(C) A report including welding procedures, welding certification reports, and any non-destructive testing performed on the AST.

(v) The owner and/or operator of all shop fabricated ASTs installed after the effective date of these regulations shall keep on file and make available to the department on request:

(A) the floor and wall/shell thickness measurement if a UL label does not exist on the tank; and

(B) material certifications for all materials used in the construction of the entire AST system.

(vi) All exposed exterior surfaces of all field constructed ASTs installed after the effective date of these regulations shall be protected against corrosion. For surfaces that are visible with the tank in operation, this requirement may be met using field applied coatings that are compatible with the stored regulated substance.

(vii) The completed installation of all metallic Field Constructed ASTs installed after the effective date of these regulations shall be inspected and certified by a certified API 653 inspector.

(viii) The owner and/or operator of any shop fabricated AST shall keep on file for the life of the AST and provide to the department on request, a report including welding procedures, welding certification reports, and any non-destructive testing performed on the AST.

(ix) The owner and/or operator of every AST installed after the effective date of these regulations shall provide a certificate of installation to the department that meets the requirements of Section 6(e) of this chapter.

(k) *Existing ASTs.* Tanks do not need to be UL labeled but must be designed, constructed, and tested to the approved standards. Non-UL labeled tanks shall bear an all weather label with the following information: name and address of the tank manufacturer, year the tank was built or date of re-certification, capacity of the tank in US gallons, and the tank construction or inspection standard used. Existing ASTs must meet the substantial requirements of Section 35 no later than October 1, 2008.

(l) *Operational venting.* Normal operation vents are required to prevent the development of vacuum or pressure within ASTs. Such vents shall be sized in accordance with IFC 3404.2.7.3 and shall be at least the size of the fill or withdrawal connection but not less than 1 and 1/4 (one and one-quarter) inches inside diameter. Flammable liquid vents must terminate not less than twelve (12) feet above grade and five (5) feet from a building opening or property line. They must discharge upwards and outward. Operational venting shall comply with API-2000, NFPA 30, UL-142 and UL-2085 as applicable.

(m) *Emergency venting.* Each AST shall be equipped with adequate additional emergency venting that will relieve excessive internal pressure caused by fire exposure. Emergency venting shall comply with API-2000, NFPA 30, UL-142 and UL-2085 as applicable.

(n) *Warning signs.* Signs, placarding of product and no smoking signs shall be properly posted in accordance with IFC 3404.2.3.2, 3404.2.3.2 and 3403.5.

(o) *Upgrading existing tanks.* All existing ASTs that do not meet the requirements of this chapter must be upgraded no later than October 1, 2008, to meet all of the requirements of this chapter for new ASTs.

(p) *Fire Marshall plan review.* All AST systems installed or modified after the date of these rules shall provide documentary proof to the department that the plans have been reviewed and passed by the appropriate authorizing authority under the State Fire Marshall. This “plan review” insures compliance with the applicable fire code as adopted into Wyoming State Statutes.

(q) *Installation and modification inspections.* AST system upgrades required by this part shall be inspected by the Water Quality Division.

(r) *Access to tank tops.* Access shall be provided to the top of all ASTs for inspection of venting, overfill equipment and other required equipment. Access shall be by way of permanently mounted, solidly constructed, non-combustible ladders, stairs, catwalks and platforms which comply with Occupational Safety and Health Administration standards.

(s) *Tank openings.* No AST regulated under this section, which is eleven (11) feet high or less, shall be connected to piping through any opening in a location other than the top. This means that all fill lines and product delivery lines must exit the tank through the top. All lines shall be equipped with anti-syphon devices. ASTs which are higher than eleven (11) feet high, and have penetrations near the bottom of the tank shall be equipped with internal fire valves on all openings which are not in the top of the tank.

(t) *Emergency switches.* Emergency disconnect switches shall be provided at prominent locations to stop the transfer of fuel

to the fuel dispenser in the event of a spill or other emergency. These switches shall be within one-hundred (100) feet but not less than twenty (20) feet of dispensers. All emergency disconnect switches shall be labeled: "EMERGENCY FUEL SHUT OFF" using a durable, weatherproof, sign with letters a minimum of 6" (six inches) high.

(u) *Direct connection between USTs and ASTs.* Any existing UST directly connected to an AST must have an automatic tank gauging system equipped with an audible and visual alarm system which will sound when the underground tank is 95% full or automatically shut off the flow to the UST when the UST is 95% full. This system shall be separate from any control system which controls the filling of the UST. After the effective date of these regulations no new connection shall be made between any UST and any AST.

(v) *Repairs.* Repairs to ASTs shall be performed in accordance with Section 8 of this chapter.

(w) *Submerged ASTs*. After the effective date of these regulations, no AST shall be operated submerged in water.

(x) *Site Security*. All ASTs shall be protected from vandalism and unauthorized product release by security fencing. Security fences shall be galvanized wire mesh no less than six (6) feet high topped with three (3) strands of barbed wire on an angled support bracket. Fencing shall be no less than five (5) feet from any of the tanks within the secondary containment structure. At facilities where wire fencing is not allowed by any other authority, the owner/operator may substitute other types of fencing at least six (6) feet high.

Section 36. **AST Leak Detection Requirements.**

(a) *Methods.* No later than October 1, 2008, all owners and/or operators of ASTs covered by this chapter shall provide leak detection for the tank itself using one of the following methods:

(i) *Automatic tank gauging.* All owners and/or operators of ASTs using this method shall conduct Automatic Tank Gauging in accordance with Section 16(c) of this chapter. All automatic tank gauges used for above ground tanks must be third

party certified to meet this requirement in an above ground storage tank application.

(ii) *Manual Tank Gauging.* Owners and/or operators of ASTs with a capacity of less than 1,320 gallons may be monitored using manual tank gauging as defined by Section 15(a).

(iii) *Interstitial Monitoring.* Owners and/or operators of ASTs that were constructed under the UL-2085 standard shall monitor the interstitial space between the inner tank and the outer shell. Records shall be kept showing the date of the monitoring, the name of the person doing the monitoring and the results. An automatic system that monitors this method shall be printed out monthly and kept for three (3) years;

(iv) *Visual Monitoring of Tank Bottoms.* Owners and/or operators of ASTs that are elevated above ground where the entire surface of the tank is visible from beneath shall monitor the tanks monthly for visible signs of leakage. Records of these inspections shall be made showing the date of the inspection, the name of the person doing the inspection, and any sign of leakage noted. Records shall be kept by the owner and/or operator for three (3) years;

(v) *Passive Acoustic Sensing.* Owners and/or operators of ASTs using this method shall be equipped with a continuous sensing system capable of detecting a release of .2 gallons per hour or a release of 150 gallons per month with a probability of detection of .95 and a probability of false alarm of 0.05. All passive acoustic sensing systems shall produce a written record showing that the system is on and operable. All passive acoustic sensing systems shall be calibrated annually;

(vi) *Tracer Surveys* conducted on a monthly basis in accordance with Section 16(h) of this Chapter; or

(vii) Other methods approved in accordance with Section 16(j) of this Chapter.

(b) *ASTs larger than 100,000 gallons.* Owners and/or operators of ASTs with a capacity of 100,000 gallons or more shall follow the inspection requirements of API standard 653.

(c) *SPCC Plans.* Owners and/or operators of any single AST or combination of more than one AST, with a capacity of 1,320

gallons or more, must have a Spill Prevention Control and Countermeasures (SPCC) plan on file with the department. This is the same document required by the Environmental Protection Agency under 40 CFR 112.

(d) *Additional requirements for large facilities*. Facilities with above ground capacity of 100,000 gallons or more shall provide at least one additional leak detection method beyond the requirements for Section 36(a). Such methods may be custom designed for the facility at the option of the owner and/or operator, or may be a second method named in Section 36(a). Department approval is required before implementing methods in compliance with this section.

(e) *Inventory Control*. All owners and/or operators of ASTs shall conduct inventory control in accordance with Section 16(a). This does not meet the additional requirement imposed by Section 36(d).

(f) *Operator's Annual Inspection*. Owners and/or operators of ASTs shall conduct an annual inspection of all AST systems in accordance with Section 13(e).

Section 37. **Leak Detection Requirements for Underground Lines Connected to ASTs.**

(a) *Sump Sensors.* Owners and/or operators shall provide for leak detection using sump sensors to monitor the space between the double wall systems. Sump sensors shall be wired to shut down all pumps and dispensers in the event of an alarm. On an annual basis, the owners and/or operators shall trip all sump sensors and record that they shut down the pumps and dispensers as required; or

(b) *Automatic Line Leak Detectors.* Owners and/or operators shall provide pressurized piping and automatic line leak detectors. Pressurized piping shall meet all of the requirements found in Section 14(g)(i).

(c) *Suction Piping with single wall pipe.* Owners and/or operators shall not use suction systems with single walled pipe on AST Systems after October 1, 2008.

PART J

ENVIRONMENTAL RESTORATION STANDARDS FOR
LEAKING STORAGE TANK REMEDIATION ACTIONS

Section 38 **Soil Remediation.**

Soil remediation criteria shall be based on the evaluation of two (2) aspects. The first aspect is the potential to contaminate existing groundwater quality. Groundwater quality impact will be accomplished by evaluating the subsurface fate and transport characteristics of the regulated substance using unique site soil conditions. Secondly, potential adverse public health impacts will be evaluated using an environmental risk assessment process for contaminated soil ingestion and inhalation.

Section 39. **Water Quality Standards.**

(a) *Surface Water*. Storage tank program remediation actions shall protect surface water quality to the standards contained in Chapter 1, Wyoming Water Quality Rules and Regulations, Quality Standards for Wyoming Surface Waters.

(b) *Groundwater*. Storage tank program remediation actions shall protect:

(i) All Class I, II, III, IV(a), IV(b) or Special A groundwater quality to the most stringent of the:

(A) federal primary MCL contained in 40 CFR 136 as of the date of this chapter,

(B) water quality standards contained in this section when there is no federal MCL for a substance; or

(C) groundwater quality standards found in Chapter 8, Wyoming Water Quality Rules and Regulations, Quality Standards for Wyoming Groundwaters.

(D) cleanup of groundwater which is Class I groundwater by use, shall address contaminants in the groundwater which originated from the storage tanks system. Cleanup of parameters which are naturally occurring, or are from sources

other than the storage tank system, which do not meet the standards for Class I groundwater shall not be accomplished.

(ii) All class VI groundwater to the groundwater quality standards found in Chapter 8, Wyoming Water Quality Rules and Regulations, "Quality Standards for Wyoming Groundwaters."

(c) *Free Product.* Whenever any free phase liquid layer of a regulated substance is encountered in groundwater or floating on the groundwater surface with a thickness in excess of 0.05 inches, restoration shall begin as soon as possible to remove the regulated substance(s) and prevent contaminant migration into previously uncontaminated areas.

(d) *Drinking Water Equivalent Levels*. For those chemical substances where a MCL does not exist and where there is no standard in either Chapter 1 or 8, Wyoming Water Quality Rules and Regulations, the following procedures will be used to calculate a state Drinking Water Equivalent Level (DWEL). Because storage tank remediation actions may require several years to complete and since groundwater quality in Wyoming shall be protected as a potential drinking water source(s), these calculations will be based on chronic exposure.

(i) Non-carcinogenic substances:

$$DWEL = \frac{(RfD_O)(ABW)(HQ)}{(DWI)(AB)(FOE)}$$ (Equation 1)

(ii) Carcinogenic substances:

$$DWEL = \frac{(RISK)(ABW)(LIFE)}{(CPF_O)(DWI)(AB)(FOE)(DUR)}$$ (Equation 2)

where;

DWEL = Drinking water equivalent level, mg/L.
RISK = Cancer risk for drinking water, (1×10^{-6}).
ABW = Average adult body weight over exposure period (70 kg).
CPF_o = Oral cancer potency factor $(mg/kg\text{-}day)^{-1}$; chemical specific.

RfD_o = Oral reference dose (mg/kg-day); chemical specific.
DWI = Adult drinking water intake, 2 L/day.
AB = Gastrointestinal absorption rate (1.0).
LIFE = Lifetime (70 years).
DUR = Duration of exposure (30 years).
FOE = Frequency of exposure, (350 days/365 days = 0.96).
HQ = Hazard quotient (1).

Values for oral toxicological reference doses (RfD_o) and/or cancer potency factors (CPF_o) will be obtained from current data in the U.S. Environmental Protection Agency's Integrated Risk Information System (IRIS), the EPA Health Effects Assessment Summary Tables (HEAST) toxicity data sources, or the EPA Region IX Preliminary Remediation Goals Data Base. If an oral reference dose or cancer potency factor is not listed in the above data base sources, the administrator will determine a state DWEL using the latest available toxicological data.

(e) When more than one standard exists in the above sections for any parameter, the most stringent standard shall be used.

Section 40. **Soil Human Health Risk Assessment Calculations.**

(a) *Introduction*. A risk assessment for potential human health impacts is required for storage tank remediation actions to evaluate the risk component from a release and to develop quantitative soil cleanup concentrations directly related to the environmental risk. The human health risk assessment model is based on existing EPA methodologies and exposure constant values. The routes of potential exposure are soil ingestion and inhalation from volatile organic hydrocarbons and total petroleum hydrocarbons.

(b) *Risk Assessment Calculation Model*. With the soil properties data collected during the subsurface investigation and/or extended remedial design investigation phases, site specific soil risk assessment calculations shall be made using equations in this section. This model estimates chronic exposure(s) on a site specific basis by combining an average exposure point concentration with reasonably conservative values for human intake and exposure duration. Thus, all site specific soil parameters used to calculate risk assessment remedial

concentrations at each site should reflect average or typical site conditions. In addition to site specific soil conditions and chemical compounds, default values have been established for other equation input parameters.

(i) Combined Oral Ingestion and Inhalation Exposures to Carcinogenic Contaminants in Residential Soil:

$$C_s(mg/kg) = \frac{(RISK)(AT_c)}{EF\left[\frac{\{IFS_{adj}\}\{CPFo\}}{10^6 mg/kg} + \frac{\{INHF_{adj}\}\{CPF_i\}}{VF_s}\right]} \qquad \text{(Equation 3)}$$

(ii) Combined Oral Ingestion and Inhalation Exposures to Non-carcinogenic Contaminants in Residual Soil:

$$C_s(mg/kg) = \frac{(HQ)(BW_c)(ED_c)(365/yr)}{(EF)(ED_c)\left[\frac{IRS_c}{(RfD_o)(10^6)} + \frac{(IRA_c)}{(RfD_i)(VF_s)}\right]} \qquad \text{(Equation 4)}$$

where:

$$VF_s(m^3/kg) = (Q/C)\left[\frac{10^{-4}(m^2/cm^2)\sqrt{\pi(D_A)(T)}}{(2)(\rho_b)(D_A)}\right] \qquad \text{(Equation 5)}$$

and;

$$D_A = \frac{\{\theta_a^{10/3}\}\{D_i H'\} + \{\theta_w^{10/3}\}\{D_w\}}{n^2\{(\rho_b)(K_d) + \theta_w + (\theta_a)(H')\}} \qquad \text{(Equation 6)}$$

and;

C_s = Soil contaminant cleanup concentration, mg/kg.
RISK = Cancer risk for soil cleanup actions, 1×10^{-6}.
AT_c = Averaging time, carcinogens, 25,550 d.
EF = Exposure frequency, residential, 350 d.
IFS_{adj} = Ingestion factor, soil, 114 (mg-yr)/(kg-d).
CPF_o = Cancer potency factor, oral, chemical specific, $(mg/kg\text{-}d)^{-1}$.
CPF_i = Cancer potency factor, inhalation, chemical specific, $(mg/kg\text{-}d)^{-1}$.
$INHF_{adj}$ = Inhalation factor, air, 11 $(m^3\text{-}yr)/(kg\text{-}d)$.
VF_s = Volatilization factor, soil, m^3/kg.

HQ	=	Hazard quotient, 1
BW_c	=	Body weight, child, 15 kg.
ED_c	=	Exposure duration, child, 6 yrs.
IRS_c	=	Soil ingestion rate, child, 200 mg/d.
IRA_c	=	Soil inhalation rate, child, 10 m^3/d.
RfD_o	=	Reference dose, oral, mg/kg-d.
RfD_i	=	Reference dose, inhalation, mg/kg-d.
Q/C	=	Inverse of the mean concentration at the center of a 0.5 acre square source in Wyoming, 100.13 (g/m^2-s per kg/m^3).
D_A	=	Apparent diffusivity, cm^2/s.
D_i	=	Chemical diffusivity in air, cm^2/s, chemical specific.
D_w	=	Chemical diffusivity in water, cm^2/s, chemical specific.
T	=	Exposure interval, s, 9.5E08.
ρ_b	=	Soil density, g/cm^3, 1.5 or actual value.
ρ_s	=	Soil particle density, g/cm^3, 2.65.
Θ_a	=	Air filled soil porosity, L_{air}/L_{soil} , 0.28 or, n - Θ_w
Θ_w	=	Water filled soil porosity, L_{water}/L_{soil} , 0.15.
n	=	Total soil porosity, L_{pore}/L_{soil}, 0.43 or, 1 - (ρ_b/ρ_s).
H′	=	Dimensionless Henry's Law constant, H(41), chemical specific.
K_d	=	Soil-water partition coefficient cm^3/g, $K_{oc}f_{oc}$, chemical specific.
K_{oc}	=	Soil organic carbon-water partition coefficient, cm^3/g, chemical specific.
f_{oc}	=	Fraction organic carbon in soil, g/g, 0.001 or site specific value.

Values for oral toxicological reference doses (RfD_o) and/or oral cancer potency factors (CPF_o) are obtained from current data in the U.S. Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS), the EPA Health Effects Assessment Summary Tables (HEAST), or the EPA Region IX Preliminary Remediation Goals Data Base. If an oral reference dose or cancer potency factor is not listed in the above data base sources, the administrator will determine an acceptable soil cleanup concentration using the latest available toxicological information from other appropriate sources.

Section 41. **Soil Environmental Fate and Transport Evaluation.**

(a) *Conceptual organic compound fate and transport model.*

(i) The model is based on the following set of assumptions:

(A) A finite amount of soil contamination exists at variable depths beneath a leaking storage tank site. It may extend from the surface to below the groundwater table, or it may be confined to a discrete zone. There is an uppermost aquifer beneath the site which is not adequately protected by an impermeable barrier between the contaminated soil and the aquifer. Percolating rainfall, or snow melt, moves through the contaminated soil, mobilizes some of the contamination as a leachate and carries the contamination towards the aquifer. A portion of the contamination remains strongly adsorbed to the soil. The portion of the contaminants that are not permanently adsorbed are available for biodegradation and a limited amount of leaching.

(B) The point of compliance for protecting groundwater quality is directly below the contaminated soils at the surface of the aquifer.

(C) The rate of leaching from the soil has reached a steady state.

(D) The soils beneath the leaking storage tank(s) represent the only source of contamination to the groundwater.

(E) Vapors emanating from the contaminants in the soil are moving *primarily* upwards to the ground surface, and there is no perched saturated zone above the contaminated soils. Based on existing program experience, the potential does exist for some lateral movement of contaminant vapors; however, this movement is not the primary direction.

(F) A leachate plume beneath the contaminated zone has not yet reached the groundwater table.

(ii) The model for calculating soil cleanup concentrations involves a set of mathematical equations designed to calculate soil remediation concentrations. The equations have been modified and simplified to make it possible to calculate soil cleanup concentrations using as much site specific data/information as possible. The site specific data that are used in the equations should be available from the subsurface investigations and are preferred over using the default values.

(iii) The equations are a mathematical expression of the conceptual model. The organic contaminant concentration in the soil is reduced by a fractional amount that has been biodegraded by natural bacteria in the soil system. Therefore, a biodegradation factor, e^{-kt}, has been included in the evaluation process. Because the biodegradation factor will reduce the amount of contaminant available for leachate generation, the soil cleanup concentration can be adjusted upward by a calculated amount. The amount, which is adsorbed, is calculated using the chemical specific adsorption coefficient, K_d.

(iv) The adsorption coefficient, K_d, is calculated from the following equation using site specific data:

$$K_d = (f_{oc})(K_{oc}) \qquad \text{(Equation 7)}$$

where,

f_{oc} = site specific fraction of organic carbon, mg organic carbon/mg soil in the uncontaminated subsurface site soil. Normal range of f_{oc} in Wyoming soils is 0.1-3%. If a site specific f_{oc} value is not determined, use a default value of 0.1%.

K_{oc} = chemical specific organic carbon partition coefficient, mL/gm.

(v) The conceptual model discussed above is represented by the following series of equations with further explanation, as necessary:

(A) Determine travel time to reach groundwater table, *t*.

(1) Subsurface soil contamination separated from the groundwater table by more than one (1) foot of depth is calculated as follows: Because subsurface organic carbon content below one foot is expected to approach a very low number in Wyoming soils, the following contaminant travel time equation has been developed:

$$t = \frac{(d)[(K_d)(\rho) + \Theta]}{0.5(\alpha)} \qquad \text{(Equation 8)}$$

where,

t = time of contaminant(s) to travel from the bottom of the contaminated zone to the groundwater table, yrs.

$_d$ = depth to the groundwater table from the bottom of the contaminated zone(s), cm.

Θ = volumetric soil moisture content(s) at field capacity, mL/cm^3.

0.5 = 50% infiltration rate for precipitation (worst case).

α = average annual precipitation, cm/yr.

ρ = bulk soil density, gm/cm^3.

(2) If more than one soil type exists at a contaminated site or remediation project location where the organic carbon content differs by 0.5% or greater and the different soil type is one foot or greater in thickness, individual soil type specific values for K_d ,Θ, and ρ shall be used in the time of travel calculation for *each* soil type. Further, the individual values for depth, *d*, to the groundwater table from the bottom of *each* contaminated soil type zone shall be used in the calculation. If the depth, *d*, from the bottom of the contaminated soil type zone to the groundwater table is less than twelve (12) inches, this method for determining contaminated soil remediation concentrations is not valid. In these cases, cleanup of contaminated groundwater will govern the satisfactory remediation of contaminated soil within this 12 inch interval. The final time of travel, *t*, is the sum of the individual soil type segments.

(3) Surface contamination extending from the ground surface to depths greater than two (2) feet. In order for the following equation to be used, the subsurface soil within the two (2) foot distance must contain at least three (3) percent total organic carbon, otherwise equation 8 applies for the time of travel calculation. While using two (2) different K_d values for different soil organic carbon concentrations, the equation is derived in the same manner as

$$t = \frac{(Z)[(K'_d)(\rho') + \Theta'] + (d)[(K_d)(\rho) + \Theta]}{0.5(\alpha)}$$ (Equation 9)

where,

Z = thickness of soil containing three (3) percent or greater organic carbon, cm.

K'_d = adsorption coefficient in the top two (2) feet of soil which is equal to the measured fraction of organic carbon, f_{oc}, times the K_{oc} value

K_d = soil adsorption coefficient in the remaining soil column calculated from Equation 7, mL/gm.

ρ' = bulk soil density of soil containing three (3) percent or greater organic carbon, gm/cm^3.

Θ' = volumetric soil moisture content at field capacity of soil containing three (3) percent or greater organic carbon, mL/cm^3.

The parameter, Z, takes into account natural organic carbon which may be present at the ground surface, and it may extend for a limited vertical distance [. 0-60 cm (0-24 inches)] into the ground. Development of site specific soil adsorption coefficient isotherms *may* be required for complex surface environments where f_{oc} is greater than three (3) percent. If the uppermost two (2) foot zone contains less than three (3) percent natural organic carbon, the Z portion of the time of travel calculation drops out, thus leaving equation 8 to apply for the time of travel calculation. This portion of the calculation provides a mechanism to account for higher surface contaminant adsorption by naturally occurring organic carbon within this zone.

(B) Calculate the soil remediation concentration for the *biodegradation potential,* $C_{s,org}$, for the organic compound(s) using the following derived equation:

$$C_{s,org} = \frac{(C_{st,org})(K_d)}{e^{-kt}} \qquad \text{(Equation 10)}$$

where,

k = biodegradation rate constant, $0.693/T_{½}$, 1/yr.

$T_{½}$ = half-life for the specific chemical substance in groundwater in years.

t = contaminant travel time to reach groundwater table, yrs.

$C_{st,org}$ = organic compound drinking water maximum contaminant level, MCL, or state DWEL, mg/L.

$C_{s,org}$ = soil cleanup concentration for organic chemical compound , mg/kg.

K_d = soil adsorption coefficient calculated from Equation 7, mL/gm. Where more than one K_d value is used for two (2) or more different organic carbon soil types, use the lowest individual K_d value.

Equation 10 establishes the leaking storage tank site soil remediation concentration for each organic chemical compound which could be allowed to remain in soil without threatening degradation of groundwater quality even if groundwater seasonally passes through the contaminated zone.

(vi) The soil saturation limit is the contaminant concentration at which soil pore air and pore water are saturated with the chemical and the adsorptive limits of the soil particles have been reached. Above this limit, the contaminant may be present in the free phase. Equation 11 is used to calculate the soil saturation limit for each organic chemical at leaking storage tank sites.

$$C_{sat} = \frac{S(k_d \rho_b + \Theta_w + H'\Theta_a)}{\rho_b} \qquad \text{(Equation 11)}$$

(b) *Conceptual Metal, Inorganic Compound, and Total Petroleum Hydrocarbon Fate and Transport Model*.

The conceptual model for metals, inorganic compounds, and total petroleum hydrocarbons (TPH) assumes that these substances are distributed in subsurface soils around, or below, the level of a storage tank which had contained leaded regular gasoline or a hazardous substance. Some of these substances will be mobilized in percolating rainfall, or snow melt, and may be transported to the groundwater table as a leachate. That portion of these substances which remains adsorbed to the soil particles is determined by the adsorptive properties of both the substance and

soil. It is calculated using the adsorption coefficient, K_d. The factor, $e^{\lambda t}$, is used as a leaching rate factor in this model to determine the rate at which leachate is released from the contaminated soil.

The conceptual model for metals, inorganic compounds, and TPH is represented by the following series of equations.

(i) Determine the *leaching rate constant,* λ

$$\lambda = \frac{(0.5)(\alpha)}{[\Theta][\tau][1+\frac{\rho(K_d)}{\Theta}]} \qquad \text{(Equation 12)}$$

where,

λ = leaching rate constant, 1/yr.

α(alpha) = average annual precipitation, cm/yr.

Θ = volumetric soil moisture content at field capacity, mL/cm^3.

ρ = bulk soil density, gm/cm^3.

K_d = soil metal, inorganic compound, or TPH adsorption coefficient, mL/gm.

τ = thickness of contaminated soil seam, cm.

If more than one soil type exists at a contaminated site where the organic carbon content differs by 0.5% or more and the different soil type is one foot or greater in thickness, individual specific soil type values for K_d, Θ and ρ shall be used in the leaching rate constant calculation for <u>each</u> soil type. The final leaching rate constant, λ, is the sum of the individual soil type segments.

(ii) Calculate *travel time* to reach groundwater table, t

(A) Subsurface soil contamination separated from the groundwater table by more than one (1) foot is handled in the following way:

Because subsurface organic carbon content below one foot is expected to approach a very low number in Wyoming soils, contaminant travel time is calculated by:

$$t = \frac{[d][(K_d)(\rho) + \Theta]}{0.5(\alpha)}$$ (Equation 13)

where,

t = time of contaminant to travel from the bottom of the contaminated zone to the groundwater table, yrs.

d = depth to the groundwater table from the bottom of the contaminated zone, cm.

Θ = volumetric soil moisture content at field capacity, mL/cm^3.

0.5 = 50% infiltration rate for precipitation (worst case).

α = average annual precipitation, cm/yr.

ρ = bulk soil density, gm/cm^3.

If more than one soil type exists at a contaminated site where the organic carbon content differs by 0.5% or greater and the different soil type is one foot or greater in thickness, individual soil type specific values for K_d, Θ, and ρ shall be used in the time of travel calculation for <u>each</u> soil type. Further, the individual values for depth, d, to the groundwater table from the bottom of <u>each</u> contaminated soil type zone shall be used in the calculation. If the depth, d, from the bottom of the contaminated soil type zone to the groundwater table is less than twelve (12) inches or groundwater travel fluctuates this distance, this method for determining contaminated soil remediation concentrations is not valid. In these cases, cleanup of contaminated groundwater will govern the satisfactory remediation of contaminated soil within this 12 inch interval. The final time of travel, t, is the sum of the individual soil type segments.

(iii) Calculate the soil remediation concentration for the **leaching potential** of the metal, inorganic compound, or TPH using the following derived equation:

$$C_{s,inorg} = \frac{(C_{stm})(K_d)}{e^{-\lambda t}}$$ (Equation 14)

where,

$C_{s,inorg}$ = soil cleanup concentration due to metal, inorganic compound, or TPH leaching potential, mg/kg.

C_{stm} = environmental standard concentration, primary MCL, or state DWEL, mg/L.

λ = chemical leaching rate, 1/yr.

t = contaminant travel time to reach groundwater table, yrs.

K_d = soil metal, inorganic compound, or TPH adsorption coefficient ,ml/gm.

The soil cleanup concentration for metals, inorganic compounds, or TPH is determined by evaluating the above calculations and the natural background concentration. Information concerning the natural subsurface concentration may be available from either (1) a subsurface investigation report, or (2) site specific subsurface soil samples from an uncontaminated, up-gradient location immediately near the leaking storage tank site shall be collected and analyzed for the appropriate constituent. Soil metal remediation is not required for concentrations that are below natural background concentration(s).

(c) *Final Storage Tank Cleanup Concentration*. The final numerical leaking storage tank site soil cleanup concentration for organic chemical compounds shall be the lower numerical value of: the total petroleum hydrocarbon concentration, the human health risk assessment, the soil saturation concentration, and the environmental fate and transport considerations. The final numerical leaking storage tank site soil cleanup concentration value for metals, inorganic compounds, and total petroleum hydrocarbons shall be the lower numerical value of: the environmental fate and transport calculation and the human health risk assessment component. The goal of the final cleanup concentration(s) is to ensure that the remedial action will result in an acceptable cleanup for organic chemical compounds, inorganic compounds, TPH, and metals.

Section 42. **Vapor Hazards Evaluation.**

(a) Petroleum and/or hazardous substance vapors in either soil, vadose zone, or groundwater resulting from a storage tank release and that has caused, or has a potential to cause, an explosive atmosphere in a private residence, business, or other occupied structure, or in a confined space such as utility conduits, sewer mains, etc., shall be evaluated and remediated according to this section. Monitoring for explosive atmosphere action levels shall be accomplished using a properly calibrated and operating combustible gas meter. Explosive atmosphere action levels for volatile substances are defined as 25% of the substance lower explosive limit (LEL).

When an explosive action level is exceeded, immediate measures shall be taken to reduce the explosive environment below the action level. The immediate action system will be operated and/or maintained until such time as a soil and/or groundwater restoration action(s) has eliminated the explosive atmosphere, or the immediate action system is not required to maintain the environment below the explosive atmosphere action level. Atmospheric monitoring shall be required for any immediate action system.

(b) After remediation or immediate response, soil or groundwater contamination caused by a storage tank release shall not contain any contaminant concentration which causes a release of vapors to the vadose zone or atmosphere which could present a human health hazard in an indoor structure or confined space where people or animals may work or live and receive an exposure.

Chemical substance airborne concentrations in *occupational* environments are regulated by Chapter 7, Occupational Health and Environmental Control, General Rules and Regulations, Wyoming Occupational Health and Safety Division, Department of Employment, for protection of employees in a work place.

Hazardous substance *indoor* air quality action levels will be calculated using the following equations.

(i) *Carcinogens:*

$$IAAL(\mu g / m_3) = \frac{(RISK)(ABW)(LIFE)(UCF)}{(CPF_i)(BR)(ABS)(DUR)} \quad \text{(Equation 15)}$$

(ii) *Non-carcinogens:*

$$IAAL(\mu g / m^3) = \frac{(RfD_i)(ABW)(UCF)(HQ)}{(BR)(ABS)} \quad \text{(Equation 16)}$$

where;

$IAAL$	=	Indoor Air Action Level, μg/m^3.
$RISK$	=	Cancer risk (1 x 10^{-6}).
RfD_i	=	Inhalation Reference dose ; chemical specific.
CPF_i	=	Inhalation Cancer Potency Factor; chemical specific.
ABW	=	Average body weight (70 kg).
UCF	=	Unit conversion factor (1,000 μg/mg).
BR	=	Indoor breathing rate (15 m^3/day).
ABS	=	Absorption percentage (100%).
HQ	=	Hazard quotient (1).
$LIFE$	=	Lifetime exposure (70 years).
DUR	=	Duration of exposure (30 years).

Values for *inhalation* toxicological reference doses (RfDi) and/or cancer potency factors (CPFi) shall be obtained from current data in the U.S. Environmental Protection Agency's Integrated Risk Information System (IRIS), the Health Effects Assessment Summary Tables (HEAST), or the EPA Region IX Preliminary Remediation Goals Data Base. Where toxicological data is not listed in these references, the administrator will establish the appropriate airborne concentration standard.

When an airborne concentration is confirmed in any building that equals or exceeds calculated concentrations and the source of the

contaminant airborne concentration is known to be associated with a leaking storage tank release, immediate action will be implemented to eliminate the airborne health hazard to the applicable airborne occupational or indoor air quality action level. Immediate action will continue until the airborne concentration(s) is below those levels specified in this section.

Section 43. **Default Organic Compound and Total Petroleum Hydrocarbon Soil Cleanup Concentrations.** When site specific geological data/information are not available to calculate acceptable soil cleanup concentrations, default remediation standards shall be based on a child's exposure using both oral ingestion and inhalation pathways, and the potential for soil contamination to migrate to groundwater. The default soil condition for organic compounds has been established as a sandy clay formation with a minimal organic carbon content of 0.1% and a depth to the first groundwater table from the bottom of the default contaminated soil zone equal to one foot. The default thickness of contaminated soil is five (5) feet. The annual precipitation rate is fourteen (14) inches per year with a 50% infiltration rate. These conservative default soil conditions indicate residential exposures with protection of groundwater quality to EPA/WDEQ drinking water or equivalent drinking water levels.

PART K

PROHIBITION OF DELIVERIES
AT NON-COMPLIANT FACILITIES

Section 44. **Prohibition of Deliveries**

(a) *Reasons for Restricting Delivery.* Prohibition of delivery of regulated substances to a storage tank system shall be required when the department becomes aware that:

(i) The owner and/or operator has not performed leak detection on the tanks as required in Part D of this chapter for any period exceeding sixty (60) days;

(ii) The most recently required cathodic protection test has not been done within ninety (90) days of the date when due under Section 11(b) of this chapter;

(iii) A cathodic protection test done in accordance with Section 11 has failed and has not been repaired and re-tested within ninety (90) days of the date when the original failing result was obtained;

(iv) The most recently required pressure test of the lines has not been done as required under Sections 14(g)(i)(B) or Section 14(g)(ii) of this chapter (as applicable) within sixty (60) days of the date due;

(v) The most recently required functional test of automatic line leak detectors has not been done as required under Sections 14(g)(i)(B), Section 37(a), or Section 37(b) of this chapter within sixty (60) days of the date due;

(vi) The owner and/or operator has failed to report a suspected release under Section 19 when required by Sections 14(b), 15(a)(iv), 16(a)(viii), 16(b), 16(c)(ii), 16(d)(viii), 16(e)(x), 16(f)(iv), 16(g)(v), 16(h)(vii), or 19 of this chapter;

(vii) The owner and/or operator has reported a suspected release under Section 19 but has failed to initiate the release investigation required under Section 20 of this chapter;

(viii) The owner and/or operator has reported a confirmed release, but repairs have not been made to the storage tank system;

(ix) The owner and/or operator has failed to pay the storage tank registration fee which is due on January 1 of each year by September 1 of the year when due;

(x) The owner and/or operator has failed to follow any Order issued by the department, unless that Order is under appeal to the Environmental Quality Council;

(xi) Any required monitoring device has been purposely tampered with or turned off (except if it is being worked on); or any record required to be kept under this chapter has been falsified;

(xii) Any regulated tank is discovered without overfill and spill prevention devices in place as required by Section 6(c) of this chapter;

(xiii) Any regulated tank is discovered without cathodic protection equipment in place as required by Sections 6(a)(ii) or 6(b)(ii) of this chapter;

(xiv) Any regulated above ground storage tank has not been fully upgraded under Part I of this chapter after October 1, 2007;

(xv) The operator’s annual inspection has not been performed, as required by Section 13(e) or Section 36(f) of this chapter, within ninety (90) days of the date when due; or

(xvi) The department becomes aware that there has been no Licensed Class B Operator for a facility for ninety (90) days or more beyond the initial grace period of six (6) months for a new employee, or one year from enactment of this section, whichever is the later date.

(b) *Procedures for Prohibiting Deliveries of Regulated Substances*. When any of the causes for prohibition of delivery exist as shown in paragraph (a) of this section the department shall issue an Administrative Order to prohibit deliveries of the regulated substance.

The Wyoming Fuel Tax Administration tracks fuel suppliers of record for all storage tank facilities selling gasoline or diesel. The department shall obtain, from the Wyoming Fuel Tax Administration, the names of suppliers of record for any facility which is the subject of an Administrative Order under this subsection. When there are suppliers of record with the Wyoming Fuel Tax Administration, those suppliers shall also be ordered not to deliver regulated substances in the Administrative Order.

(i) Administrative Orders issued under this Part shall include the following information:

(A) The name of the Owner and/or Operator of the storage tank system;

(B) The street address of the facility where the storage tank system is located;

(C) The Storage Tank Program Facility ID Number;

(D) The specific tanks at the facility which are restricted, or if all tanks at the facility are restricted; and

(E) The reason for the restriction;

(ii) An Administrative Order issued under this section is final as soon as signed by the Director. Administrative Orders may be appealed to the Environmental Quality Council under W.S. 35-11-701;

(iii) The department shall immediately issue a Notice of Compliance to all entities covered by the Administrative Order that lifts the prohibition whenever the facility has been returned to compliance. Such notice shall include the same information found in Section 44(b)(i)(A) through (D);

(c) *Posting on the internet.* The department shall immediately post a copy of the Administrative Order on its website whenever a facility is prohibited from accepting deliveries of regulated substances. The department shall also post a Notice of Compliance on its website when the prohibition has been lifted. The notices will state which tanks at the facility are affected.

(d) *Red Tagging.* The department may, at any time after issuing an Administrative Order under this Part, place a tag on the affected tanks stating:

"DELIVERY PROHIBITION
Deliveries of any regulated substance to this tank have been prohibited by the State of Wyoming, Storage Tank Program. Delivery of any regulated substance to this tank while the delivery prohibition exists is a violation of Chapter 17, Part K, Wyoming Water Quality Rules and Regulations."

(e) *Violation of this Part.* It is a violation of this Part for any person to purchase a regulated substance for delivery to, or to deliver a regulated substance to, any storage tank that is the subject of any Administrative Order issued under this Part.

PART L

LICENSING OF STORAGE TANK OPERATORS,
INSTALLERS, AND TESTERS

Section 45. **Licensing of Installers**

(a) *License Required*. During the installation or modification of any UST or AST regulated by this chapter, at least one person, present on the job site, shall be licensed by the department to install or modify fuel tanks. To obtain these licenses, each person shall submit documentary evidence that he or she has passed the following tests within the three (3) years preceding the application date:

(i) All Licensed Installers:

(A) The International Code Council test on Wyoming State Specific Storage Tank Laws.

(B) A current certificate for Hazardous Waste Operations and Emergency Response as required by the Wyoming Department of Employment, Occupational Health and Safety, Chapter 7, Section 1910.120.

(ii) Licensed UST Installers. UST installers shall pass the International Code Council UST Installation and Retrofitting test;

(iii) Licensed AST Installers. AST installers shall pass the International Code Council test entitled AST Installation and Retrofitting test;

(b) *License Renewal*. Persons who are licensed as UST or AST installers shall renew their license every three (3) years.

(c) *Reciprocity with Other States and Cities.* After evaluation of the other state or city's licensing requirements, the State of Wyoming Storage Tank Program may accept a license from any adjacent state, or any city in Wyoming, in lieu of the International Code Council tests required in Section 45(a)(ii) and (iii).

Section 46. **Reserved.**

Section 47. **Licensing of Cathodic Protection Testers and Corrosion Experts.**

(a) *Cathodic Protection Testers*. Persons who perform any cathodic protection testing shall obtain a license from the department. To obtain this license, each person shall submit documentary evidence that he or she is:

(i) certified by NACE as a cathodic protection tester within the three (3) years preceding the application date; or

(ii) certified by the Steel Tank Institute as a cathodic protection tester within two (2) years preceding the application date.

(b) *Corrosion Experts*. Persons who design any impressed current system or any sacrificial anode system or design any repair to these systems shall first be licensed by the department. To obtain a license, each person shall submit documentary evidence that he or she:

(i) is certified as a corrosion expert by NACE, or

(ii) possesses a current Professional Engineer's license issued by the Wyoming Board of Registration for Professional Engineers and three (3) years experience in the field of cathodic protection.

(c) *License Renewal*. Licenses issued for Cathodic Protection Testers and Corrosion Experts shall expire on the date when the underlying certification by NACE or STI expires, or on the same date when an underlying license issued by another state or city expires. Persons holding those licenses shall renew their license within ninety (90) days prior to the date when the license expires.

(d) *Reciprocity with Other States and Cities.* After evaluation of the other state or city's licensing requirements, the State of Wyoming Storage Tank Program, may accept a license from any adjacent state, or any city in Wyoming, in lieu of the NACE certification or STI certification required in Section 47(a) and (b).

Section 48. **Licensing of Tank and Line Testers.**

(a) *License Required*. Before performing tests in Wyoming, all tank and line testers shall obtain a license from the department. To obtain a license, each person shall submit documentary evidence that he or she has passed:

(i) the International Code Council test entitled "Tank Tightness Testing – ICC Test U-3" within the preceding two (2) years before the date of the application; and

(ii) The manufacturers' training certification for the type of tank and line tests performed.

(b) *License Renewal*. Persons who are licensed as Tank and Line Testers shall renew their license every two (2) years.

(c) *Reciprocity with Other States and Cities.* After evaluation of the other state or city's licensing requirements, the State of Wyoming Storage Tank Program, may accept a license from any adjacent state, or any city in Wyoming, in lieu of the International Code Council test on Tank Tightness Testing required by Section 48(a)(i).

Section 49. **Revocation of Licenses.** The department may revoke or refuse to issue any of the licenses required under Sections 45 through 47 of this chapter for the following reasons:

(a) *Submission of Falsified Data.* Whenever the department has documentary proof that any of the information submitted to the department for the purpose of obtaining a license was falsified or misrepresented;

(b) *False Reporting*. Submission of any report to the department which is shown by the tester as passing when the test actually shows a failing result; or

(c) *License Revoked.* Whenever any of the issuing agencies (ICC, NACE, the Board of Registration for Professional Engineers, or the manufacturer of test equipment) revokes the certifications necessary that are required for a license.

(d) *Continuation of Expiring Licenses*. When a licensee has made timely and sufficient application for the renewal of a license or a new license with reference to any activity of a continuing nature, the existing license does not expire until the application has been finally determined by the agency, and, in case the application is denied or the terms of the new license limited, until the last day for seeking review of the agency order or a later date fixed by order of the reviewing court.

(e) *Notification*. Whenever the department intends to revoke any license issued under this section the department shall notify the licensee by certified mail (return receipt requested) or by process server, stating the facts or conduct which warrants the intended action. The licensee was given an opportunity to show compliance with all lawful requirements for the retention of the license. The licensee shall have fifteen (15) days from the date of his receipt of the notice to provide additional evidence or information with respect the revocation of the license. Revocation of licenses is a final agency action subject to appeal to the Environmental Quality Council under Chapter 1, Section 6, Wyoming Environmental Quality Council, Rules of Practice and Procedure.

Section 50. **Implementation of Part L.** All persons required to have licenses under Part L shall obtain those licenses within one (1) year of the effective date of this chapter or the date when they would otherwise be required to obtain those licenses, whichever is the later date.

APPENDIX A

Hazardous Substances.

The following is a list of chemical compounds considered to be hazardous substances by the tank program. Any tank containing any of these substances shall meet the standards found in Section 17 of this chapter.

TABLE 6
REGULATED HAZARDOUS SUBSTANCES

CAS Number	Substance Name	Synonyms
630206	1,1,1,2-Tetrachloroethane	Ethane, 1,1,1,2-tetrachloro-
79345	1,1,2,2-Tetrachloroethane	Ethane, 1,1,2,2-tetrachloro-
79005	1,1,2-Trichloroethane	Ethane, 1,1,2-trichloro-
78999	1,1-Dichloropropane	
120821	1,2,4-Trichlorobenzene	
156605	1,2-Dichloroethylene	Ethene, 1,2-dichloro- (E)
122667	1,2-Diphenylhydrazine	Hydrazine, 1,2-diphenyl-
106887	1,2-Epoxybutane	
106990	1,3,-Butadiene	
142289	1,3-Dichloropropane	
542756	1,3-Dichloropropene	1-Propene, 1,3-dichloro-
1120714	1,3-Propane sultone	1,2-Oxathiolane, 2,2-dioxide
764410	1,4-Dichloro-2-butene	2-Butene, 1,4-dichloro-
123911	1,4-Dioxane	1,4-Diethylenedioxide
130154	1,4-Naphthoquinone	1,4-Naphthalenedione
5344821	1-(o-Chlorophenyl)thiourea	Thiourea, (2-chlorophenyl)-
591082	1-Acetyl-2-thiourea	Acetamide, N-(aminothioxomethyl)-
71363	1-Butanol	n-Butyl alcohol
504609	1-Methylbutadiene	1,3-Pentadiene
1464535	2,2'-Bioxirane	1,2:3,4-Diepoxybutane
540841	2,2,4-Trimethylpentane	

CAS Number	Substance Name	Synonyms
75990	2,2-Dichloropropionic acid	
15950660	2,3,4-Trichlorophenol	
933788	2,3,5-Trichlorophenol	
933755	2,3,6-Trichlorophenol	
1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	
78886	2,3-Dichloropropene	
1319728	2,4,5-T amines	
6369977	2,4,5-T amines	
3813147	2,4,5-T amines	
6369966	2,4,5-T amines	
2008460	2,4,5-T amines	
1928478	2,4,5-T esters	
61792072	2,4,5-T esters	
2545597	2,4,5-T esters	
93798	2,4,5-T esters	
25168154	2,4,5-T esters	
13560991	2,4,5-T salts	
32534955	2,4,5-TP esters	
1320189	2,4-D Ester	
1928616	2,4-D Ester	
53467111	2,4-D Ester	
94791	2,4-D Ester	
94804	2,4-D Ester	
1928387	2,4-D Ester	
1929733	2,4-D Ester	
2971382	2,4-D Ester	
94111	2,4-D Ester	
25168267	2,4-D Ester	
94757	2,4-D, salts and esters	Acetic acid (2,4-dichlorophenoxy)-2,4-D Acid
120832	2,4-Dichlorophenol	Phenol, 2,4-dichloro-
105679	2,4-Dimethylphenol	Phenol, 2,4-dimethyl-

CAS Number	Substance Name	Synonyms
121142	2,4-Dinitrotoluene	Benzene, 1-methyl-2,4-dinitro-
329715	2,5-Dinitrophenol	
87650	2,6-Dichlorophenol	Phenol, 2,6-dichloro-
573568	2,6-Dinitrophenol	
606202	2,6-Dinitrotoluene	Benzene, 2-methyl-1,3-dinitro-
532274	2-Chloroacetophenone	
95578	2-Chlorophenol	o-Chlorophenol; Phenol, 2-chloro-
88755	2-Nitrophenol	o-Nitrophenol
79469	2-Nitropropane	Propane, 2-nitro-
91941	3,3'-Dichlorobenzidine	[1,1'-Biphenyl]-4,4'diamine,3,3' dichloro-
119904	3,3'-Dimethoxybenzidine	[1,1'-Biphenyl]-4,4'diamine,3,3'dimethoxy-
119937	3,3'-Dimethylbenzidine	[1,1'Biphenyl]-4,4'-diamine,3,3'-dimethyl-
609198	3,4,5-Trichlorophenol	
610399	3,4-Dinitrotoluene	
542767	3-Chloropropionitrile	Propanenitrile, 3-chloro-
56495	3-Methylcholanthrene	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-
101779	4,4'-Methylenedianiline	
534521	4,6-Dinitro-o-cresol and salts	Phenol, 2-methyl-4,6-dinitro-
92671	4-Aminobiphenyl	
504245	4-Aminopyridine	4-Pyridinamine
101553	4-Bromophenyl phenyl ether	Benzene, 1-bromo-4-phenoxy-
3165933	4-Chloro-o-toluidine, hydrochloride	Benzenamine, 4-chloro-2-methyl-, hydrochloride
7005723	4-Chlorophenyl phenyl ether	
92933	4-Nitrobiphenyl	
83329	Acenaphthene	
208968	Acenaphthylene	

CAS Number	Substance Name	Synonyms
60355	Acetamide	
53963	Acetamide, N-9H-fluoren-2-yl-	2-Acetylaminofluorene
71432	Acetic Acid	
64197	Acetic Acid	
93765	Acetic acid, (2,4, -trichlorophenoxy)	2,4,5-T; 2,4,5-T acid
108247	Acetic anhydride	
67641	Acetone	2-Propanone
75865	Acetone cyanohydrin	Propanenitrile, 2-hydroxy-2-methyl-2-Methyllactonitril
75058	Acetonitrile	
98862	Acetophenone	Ethanone, 1-phenyl-
506967	Acetyl bromide	
75365	Acetyl chloride	
107028	Acrolein	2-Propenal
79061	Acrylamide	2-Propenamide
79107	Acrylic acid	2-Propenoic acid
107131	Acrylonitrile	2-Propenenitrile
124049	Adipic acid	
116063	Aldicarb	Propanal, 2-methyl-2-(methylthio)- ,O-[(methylamino)carbonyl]oxime
309002	Aldrin	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha, 4alpha, 4abeta, 5alpha, 8alpha, 8abeta)-
107186	Allyl alcohol	2-Propen-1-ol
107051	Allyl chloride	
959988	alpha - Endosulfan	
122098	alpha,alpha-Dimethylphenethylamine	Benzeneethanamine, alpha,alpha-dimethyl-
319846	alpha-BHC	
134327	alpha-Naphthylamine	1-Naphthalenamine

CAS Number	Substance Name	Synonyms
20859738	Aluminum phosphide	
10043013	Aluminum sulfate	
61825	Amitrole	1H-1,2,4-Triazol-3-amine
7664417	Ammonia	
631618	Ammonium acetate	
1863634	Ammonium benzoate	
1066337	Ammonium bicarbonate	
7789095	Ammonium bichromate	
1341497	Ammonium bifluoride	
10192300	Ammonium bisulfite	
1111780	Ammonium carbamate	
506876	Ammonium carbonate	
12125029	Ammonium chloride	
7788989	Ammonium chromate	
3012655	Ammonium citrate, dibasic	
13826830	Ammonium fluoborate	
12125018	Ammonium fluoride	
1336216	Ammonium hydroxide	
5972736	Ammonium oxalate	
6009707	Ammonium oxalate	
14258492	Ammonium oxalate	
131748	Ammonium picrate	Phenol, 2,4,6-trinitro-, ammonium salt
16919190	Ammonium silicofluoride	
7773060	Ammonium sulfamate	
12135761	Ammonium sulfide	
10196040	Ammonium sulfite	
14307438	Ammonium tartrate	
3164292	Ammonium tartrate	
1762954	Ammonium thiocyanate	
7803556	Ammonium vanadate	Vanadic acid, ammonium salt
628637	Amyl acetate	
62533	Aniline	Benzenamine
120127	Anthracene	

CAS Number	Substance Name	Synonyms
7440360	Antimony **	
7647189	Antimony pentachloride	
28300745	Antimony potassium tartrate	
7789619	Antimony tribromide	
10025919	Antimony trichloride	
7783564	Antimony trifluoride	
1309644	Antimony trioxide	
12674112	Aroclor 1016	POLYCHLORINATED BIPHENYLS (PCBs)
11104282	Aroclor 1221	POLYCHLORINATED BIPHENYLS (PCBs)
11141165	Aroclor 1232	POLYCHLORINATED BIPHENYLS (PCBs)
53469219	Aroclor 1242	POLYCHLORINATED BIPHENYLS (PCBs)
12672296	Aroclor 1248	POLYCHLORINATED BIPHENYLS (PCBs)
11097691	Aroclor 1254	POLYCHLORINATED BIPHENYLS (PCBs)
11096825	Aroclor 1260	POLYCHLORINATED BIPHENYLS (PCBs)
7440382	Arsenic **	
7778394	Arsenic acid	Arsenic acid H3AsO4
1327522	Arsenic acid	Arsenic acid H3AsO4
1303328	Arsenic disulfide	
1303282	Arsenic pentoxide	Arsenic oxide As2O5
7784341	Arsenic trichloride	
1327533	Arsenic trioxide	Arsenic oxide As2O3
1303339	Arsenic trisulfide	
1332214	Asbestos ***	
492808	Auramine	Benzenamine, 4,4'-carbonimidoylbis (N,N-dimethyl-
115026	Azaserine	L-Serine, diazoacetate (ester)

CAS Number	Substance Name	Synonyms
151564	Aziridine	Ethylenimine
75558	Aziridine, 2-methyl-	1,2-Propylenimine
542621	Barium cyanide	
57976	Benz[a]anthracene, 7,12-dimethyl-.	7,12-Dimethylbenz[a]anthracene
225514	Benz[c]acridine	
98873	Benzal chloride	Benzene, dichloromethyl-
95534	Benzenamine, 2-methyl-	o-Toluidine
99558	Benzenamine, 2-methyl-5-nitro-	5-Nitro-o-toluidine
101144	Benzenamine, 4,4'-methylenebis(2-chloro-	4,4'-Methylenebis(2-chloroaniline)
100016	Benzenamine, 4-nitro-	p-Nitroaniline
60117	Benzenamine, N,N-dimethyl-4-(phenylazo-)	p-Dimethylaminoazobenzene
65850	Benzene	
95943	Benzene, 1,2,4,5-tetrachloro-	1,2,4,5-Tetrachlorobenzene
95501	Benzene, 1,2-dichloro-	o-Dichlorobenzene; 1,2-Dichlorobenzene
99354	Benzene, 1,3,5-trinitro-	1,3,5-Trinitrobenzene
98099	Benzenesulfonyl chloride	Benzenesulfonic acid chloride
92875	Benzidine	(1,1'-Biphenyl)-4,4'diamine
207089	Benzo(k)fluoranthene	
56553	Benzo[a]anthracene	Benz[a]anthracene; 1,2-Benzanthracene
50328	Benzo[a]pyrene	3,4-Benzopyrene
205992	Benzo[b]fluoranthene	
191242	Benzo[ghi]perylene	
100470	Benzonitrile	
98077	Benzotrichloride	Benzene, (trichloromethyl)-
98884	Benzoyl chloride	
100447	Benzyl chloride	Benzene, chloromethyl-
7440417	Beryllium **	Beryllium dust **
7787475	Beryllium chloride	

CAS Number	Substance Name	Synonyms
7787497	Beryllium fluoride	
13597994	Beryllium nitrate	
7787555	Beryllium nitrate	
319857	beta-BHC	
33213659	beta-Endosulfan	
91598	beta-Naphthylamine	2-Naphthalenamine
57573	beta-Propiolactone	
92524	Biphenyl	
598312	Bromoacetone	2-Propanone, 1-bromo-
75252	Bromoform	Methane, tribromo-
357573	Brucine	Strychnidin-10-one, 2,3-dimethoxy-
123864	Butyl acetate	
85687	Butyl benzyl phthalate	
109739	Butylamine	
107926	Butyric acid	
75605	Cacodylic acid	Arsenic acid, dimethyl-
7440439	Cadmium **	
543908	Cadmium acetate	
7789426	Cadmium bromide	
10108642	Cadmium chloride	
7778441	Calcium arsenate	
52740166	Calcium arsenite	
75207	Calcium carbide	
13765190	Calcium chromate	Chromic acid H2CrO4, calcium salt.
156627	Calcium cyanamide	
592018	Calcium cyanide	Calcium cyanide Ca(CN)2
26264062	Calcium dodecylbenzenesulfonate	
7778543	Calcium hypochlorite	
105602	Caprolactam	
133062	Captan	

CAS Number	Substance Name	Synonyms
615532	Carbamic acid, methylnitroso-, ethyl ester	N-Nitroso-N-methylurethane
63252	Carbaryl	
1563662	Carbofuran	
75150	Carbon disulfide	
353504	Carbon oxyfluoride	Carbonic difluoride
56235	Carbon tetrachloride	Methane, tetrachloro-
463581	Carbonyl sulfide	
120809	Catechol	
75876	Chloral	Acetaldehyde, trichloro-
133904	Chloramben	
305033	Chlorambucil	Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-
57749	Chlordane	Chlordane, alpha & gamma isomers; Chlordane, technical 2,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-
7782505	Chlorine	
494031	Chlornaphazine	Naphthalenamine, N,N'-bis(2-chloroethyl)-
107200	Chloroacetaldehyde	Acetaldehyde, chloro-
79118	Chloroacetic acid	
108907	Chlorobenzene	Benzene, chloro-
510156	Chlorobenzilate	Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-, ethyl ester
124481	Chlorodibromomethane	
75003	Chloroethane	
67663	Chloroform	Methane, trichloro-
107302	Chloromethyl methyl ether	Methane, chloromethoxy-
126998	Chloroprene	

CAS Number	Substance Name	Synonyms
7790945	Chlorosulfonic acid	
2921882	Chlorpyrifos	
1066304	Chromic acetate	
11115745	Chromic acid	
7738945	Chromic acid	
10101538	Chromic sulfate	
7440473	Chromium **	
10049055	Chromous chloride	
218019	Chrysene	1,2-Benzphenanthrene
7789437	Cobaltous bromide	
544183	Cobaltous formate	
14017415	Cobaltous sulfamate	
7440508	Copper **	
544923	Copper cyanide	Copper cyanide CuCN
56724	Coumaphos	
8001589	Creosote	
1319773	Cresol(s)	Cresylic acid; Phenol, methyl-
4170303	Crotonaldehyde	2-Butenal
123739	Crotonaldehyde	2-Butenal
98828	Cumene	Benzene, 1-methylethyl-
142712	Cupric acetate	
12002038	Cupric acetoarsenite	
7447394	Cupric chloride	
3251238	Cupric nitrate	
5893663	Cupric oxalate	
7758987	Cupric sulfate	
10380297	Cupric sulfate, ammoniated	
815827	Cupric tartrate	
57125	Cyanides (soluble salts and complexes) not otherwise specified	
460195	Cyanogen	Ethanedinitrile

CAS Number	Substance Name	Synonyms
506683	Cyanogen bromide	Cyanogen bromide (CN)Br
506774	Cyanogen chloride	Cyanogen chloride (CN)Cl
110827	Cyclohexane	Benzene, hexahydro-
108941	Cyclohexanone	
50180	Cyclophosphamide	2H-1,3,2-Oxazaphosphorin-2-amine, N,N-bis(2-chloroethyl)tetrahydro-, 2-oxide
20830813	Daunomycin	5,12-Naphthacenedione, 8-acetyl-10-[3-amino-2,3,6-trideoxy-alpha-L-lyxooo-hexo- pyranosyl)oxy]-7,8,9,10- tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-
72548	DDD	Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro-; TDE; 4,4'DDD
3547044	DDE	
72559	DDE	4,4' DDE
50293	DDT	Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-chloro-; 4,4'DDT
319868	delta-BHC	
117840	Di-n-octyl phthalate	1,2-Benzenedicarboxylic acid, dioctyl ester
621647	Di-n-propylnitrosamine	1-Propanamine, N-nitroso-N-propyl-
2303164	Diallate	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester
333415	Diazinon	
334883	Diazomethane	
189559	Dibenz[a,i]pyrene	Benzo[rst]pentaphene
53703	Dibenzo[a,h]anthracene	Dibenz[a,h]anthracene; 1,2:5,6-Dibenzanthracene

CAS Number	Substance Name	Synonyms
132649	Dibenzofuran	
84742	Dibutyl phthalate	Di-n-butyl phthalate; n-Butyl phthalate; 1,2-Benzenedicarboxylic acid, dibutyl ester
1918009	Dicamba	
1194656	Dichlobenil	
117806	Dichlone	
25321226	Dichlorobenzene	
75274	Dichlorobromomethane	
75718	Dichlorodifluoromethane	Methane, dichlorodifluoro-
111444	Dichloroethyl ether	Bis (2-chloroethyl) ether; Ethane, 1,1'-oxybis[2-chloro-
108601	Dichloroisopropyl ether	Propane, 2,2'-oxybis[2-chloro-
111911	Dichloromethoxy ethane	Bis(2-chloroethoxy) methane; Ethane, 1,1'-[methylenebis(oxy)] bis(2-chloro-
542881	Dichloromethyl ether	Methane, oxybis(chloro-
696286	Dichlorophenylarsine	Arsonous dichloride, phenyl-
26638197	Dichloropropane	
8003198	Dichloropropane-Dichloropropene (mixture)	
26952238	Dichloropropene	
62737	Dichlorvos	
115322	Dicofol	
60571	Dieldrin	2,7:3,6-Dimethanonaphth[2,3-b]; oxirene, 3,4,5,6,9,9-hexachloro-; 1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2aalpha,3beta,6beta, 6aalpha,7beta, 7aalpha)-

CAS Number	Substance Name	Synonyms
111422	Diethanolamine	
84662	Diethyl phthalate	1,2-Benzenedicarboxylic acid, diethyl ester
64675	Diethyl sulfate	
109897	Diethylamine	
692422	Diethylarsine	Arsine, diethyl-
117817	Diethylhexyl phthalate	Bis (2-ethylhexyl)phthalate; 1,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)] ester
56531	Diethylstilbestrol	Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E)
94586	Dihydrosafrole	1,3-Benzodioxole, 5-propyl-
55914	Diisopropylfluorophosphate	Phosphorofluoridic acid, bis(1-methylethyl) ester
60515	Dimethoate	Phosphorodithioic acid, O,O-dimethyl S-[2(methylamino)-2-oxoethyl] ester
68122	Dimethyl formamide	
131113	Dimethyl phthalate	1,2-Benzenedicarboxylic acid, dimethyl ester
77781	Dimethyl sulfate	Sulfuric acid, dimethyl ester
124403	Dimethylamine	Methanamine, N-methyl-
79447	Dimethylcarbamoyl chloride	Carbamic chloride, dimethyl-
25154545	Dinitrobenzene (mixed)	
25550587	Dinitrophenol	
25321146	Dinitrotoluene	
88857	Dinoseb	Phenol, 2-(1-methylpropyl)-4,6-dinitro
142847	Dipropylamine	1-Propanamine, N-propyl-
2764729	Diquat	
85007	Diquat	

CAS Number	Substance Name	Synonyms
298044	Disulfoton	Phosphorodithioic acid, o,o-diethyl S-[2-(ethylthio)ethyl] ester
541537	Dithiobiuret	Thioimidodicarbonic diamide [(H2N)C(S)]2NH
330541	Diuron	
27176870	Dodecylbenzenesulfonic acid	
115297	Endosulfan	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide
1031078	Endosulfan sulfate	
145733	Endothall	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid
72208	Endrin	Endrin, & metabolites; 2,7:3,6-Dimethanonaphth[2,3-b] oxirene, 3,4,5,6,9,9 - hexachloro-1a,2,2a,3, 6,6a,7,7a-octa-hydro-, (1aalpha, 2beta,2abeta,3alpha,6alpha,6abeta,7beta, 7aalpha)-
7421934	Endrin aldehyde	
106898	Epichlorohydrin	Oxirane, (chloromethyl)-
51434	Epinephrine	1,2-Benzenediol,4-[1-hydroxy-2-(methylamino)ethyl]-
75070	Ethanal	Acetaldehyde
55185	Ethanamine, N-ethyl-N-nitroso-	N-Nitrosodiethylamine
110758	Ethene, 2-chloroethoxy-	2-Chloroethyl vinyl ether
563122	Ethion	
141786	Ethyl acetate	Acetic acid, ethyl ester
140885	Ethyl acrylate	2-Propenoic acid, ethyl ester

CAS Number	Substance Name	Synonyms
51796	Ethyl carbamate (urethane)	Carbamic acid, ethyl ester
107120	Ethyl cyanide	Propanenitrile
60297	Ethyl ether	Ethane, 1,1'-oxybis-
97632	Ethyl methacrylate	2-Propenoic acid, 2-methyl-, ethyl ester
62500	Ethyl methanesulfonate	Methanesulfonic acid, ethyl ester
100414	Ethylbenzene	
106934	Ethylene dibromide	Ethane, 1,2-dibromo-
107062	Ethylene dichloride	Ethane, 1,2-dichloro- 1,2-Dichloroethane
107211	Ethylene glycol	
110805	Ethylene glycol monoethyl ether	Ethanol, 2-ethoxy-
111546	Ethylenebisdithiocarbamic acid, salts & esters	Carbamodithioic acid, 1,2-ethanediylbis, salts & esters
107153	Ethylenediamine	
60004	Ethylenediamine-tetraacetic acid (EDTA)	
96457	Ethylenethiourea	2-Imidazolidinethione
75343	Ethylidene dichloride	Ethane, 1,1-dichloro- 1,1-Dichloroethane
52857	Famphur	Phosphorothioic acid, O,[4-[(di-methylamino) sulfonyl] phenyl] O, O-dimethyl ester
1185575	Ferric ammonium citrate	
55488874	Ferric ammonium oxalate	
2944674	Ferric ammonium oxalate	
7705080	Ferric chloride	
7783508	Ferric fluoride	
10421484	Ferric nitrate	
10028225	Ferric sulfate	
10045893	Ferrous ammonium sulfate	
7758943	Ferrous chloride	

CAS Number	Substance Name	Synonyms
7720787	Ferrous sulfate	
7782630	Ferrous sulfate	
206440	Fluoranthene	Benzo[j,k]fluorene
86737	Fluorene	
7782414	Fluorine	
640197	Fluoroacetamide	Acetamide, 2-fluoro-
62748	Fluoroacetic acid, sodium salt	Acetic acid, fluoro-, sodium salt
50000	Formaldehyde	
64186	Formic acid	
110178	Fumaric acid	
110009	Furan	Furfuran
98011	Furfural	2-Furancarboxaldehyde
765344	Glycidylaldehyde	Oxiranecarboxyaldehyde
86500	Guthion	
76448	Heptachlor	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-
1024573	Heptachlor epoxide	
118741	Hexachlorobenzene	Benzene, hexachloro-
87683	Hexachlorobutadiene	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-
608731	Hexachlorocyclohexane (all isomers)	
77474	Hexachlorocyclopentadiene	1,3-Cyclopentadiene,1,2,3,4,5,5-hexachloro-
67721	Hexachloroethane	Ethane, hexachloro-
70304	Hexachlorophene	Phenol, 2,2'-methylenebis[3,4,6-trichloro-
1888717	Hexachloropropene	1-Propene, 1,1,2,3,3,3-hexachloro-
757584	Hexaethyl tetraphosphate	Tetraphosphoric acid, hexaethyl ester

CAS Number	Substance Name	Synonyms
822060	Hexamethylene-1,6-diisocyanate	
680319	Hexamethylphosphoramide	
110543	Hexane	
302012	Hydrazine	
57147	Hydrazine, 1,1-dimethyl-	1,1-Dimethylhydrazine
540738	Hydrazine, 1,2-dimethyl-	1,2-Dimethylhydrazine
7647010	Hydrochloric acid	Hydrogen chloride
7664393	Hydrofluoric acid	Hydrogen fluoride
74908	Hydrogen cyanide	Hydrocyanic acid
7783064	Hydrogen sulfide	Hydrogen sulfide H2S
80159	Hydroperoxide, 1-methyl-1-phenylethyl-	alpha,alpha-Dimethylbenzylhydroperoxide
123319	Hydroquinone	
193395	Indeno(1,2,3-cd)pyrene	1,10-(1,2-Phenylene)pyrene
123922	iso-Amyl acetate	
110190	iso-Butyl acetate	
78819	iso-Butylamine	
79312	iso-Butyric acid	
78831	Isobutyl alcohol	1-Propanol, 2-methyl-
465736	Isodrin	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro, (1alpha,4alpha,4abeta,5beta,8beta,8abeta)-
78591	Isophorone	
78795	Isoprene	
42504461	Isopropanolamine dodecylbenzenesulfonate	
120581	Isosafrole	1,3-Benzodioxole, 5-)1-propenyl)-

CAS Number	Substance Name	Synonyms
143500	Kepone	1,3,4-Metheno-2H-cyclobutal[cd] pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachloroctahydro-
303344	Lasiocarpine	2-Butenoic acid, 2-methyl-, 7[[2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester, [1S-[1alpha(Z), 7(2S*,3R*),7aalpha]]-
7439921	Lead **	
301042	Lead acetate	Acetic acid, lead(2+) salt
7645252	Lead arsenate	
10102484	Lead arsenate	
7784409	Lead arsenate	
7758954	Lead chloride	
13814965	Lead fluoborate	
7783462	Lead fluoride	
10101630	Lead iodide	
10099748	Lead nitrate	
7446277	Lead phosphate	Phosphoric acid, lead(2+) salt (2:3)
7428480	Lead stearate	
52652592	Lead stearate	
56189094	Lead stearate	
1072351	Lead stearate	
1335326	Lead subacetate	Lead, bis(acetato-O)tetrahydroxytri
15739807	Lead sulfate	
7446142	Lead sulfate	
1314870	Lead sulfide	
592870	Lead thiocyanate	

CAS Number	Substance Name	Synonyms
58899	Lindane	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1alpha,2alpha,3beta,4alpha,5alpha,6beta)-; gamma-BHC; Hexachlorocyclohexane (gamma isomer)
14307358	Lithium chromate	
108394	m-Cresol	m-Cresylic acid
541731	m-Dichlorobenzene	Benzene, 1,3-dichloro; 1,3-Dichlorobenzene
99650	m-Dinitrobenzene	
554847	m-Nitrophenol	
99081	m-Nitrotoluene	
108383	m-Xylene	m-Benzene, dimethyl
121755	Malathion	
110167	Maleic acid	
108316	Maleic anhydride	2,5-Furandione
123331	Maleic hydrazide	3,6-Pyridazinedione, 1,2-dihydro-
109773	Malononitrile	Propanedinitrile
148823	Melphalan	L-Phenylalanine, 4-[bis(2-chloroethyl) aminol]
2032657	Mercaptodimethur	
592041	Mercuric cyanide	
10045940	Mercuric nitrate	
7783359	Mercuric sulfate	
592858	Mercuric thiocyanate	
10415755	Mercurous nitrate	
7782867	Mercurous nitrate	
7439976	Mercury	
628864	Mercury fulminate	Fulminic acid, mercury (2+) salt
126987	Methacrylonitrile	2-Propenenitrile, 2-methyl-
67561	Methanol	Methyl alcohol

CAS Number	Substance Name	Synonyms
91805	Methapyrilene	1,2-Ethanediamine, N,N-dimethyl-N' -2-pyridinyl-N'-(2-thienylmethyl)-
16752775	Methomyl	Ethanimidothioic acid, N-[[(methyl-amino)carbonyl]oxy]-, methyl ester
72435	Methoxychlor	Benzene, 1,1'-(2,2,2-trichloroethylidene) bis[4-methoxy-
74839	Methyl bromide	Methane, bromo-
74873	Methyl chloride	Methane, chloro-
79221	Methyl chlorocarbonate	Carbonochloridic acid, methyl ester; Methyl chloroformate
71556	Methyl chloroform	Ethane, 1,1,1-trichloro-; 1,1,1-Trichloroethane
78933	Methyl ethyl ketone (MEK)	2-Butanone
1338234	Methyl ethyl ketone peroxide	2-Butanone peroxide
60344	Methyl hydrazine	Hydrazine, methyl-
74884	Methyl iodide	Methane, iodo-
108101	Methyl isobutyl ketone	4-Methyl-2-pentanone
624839	Methyl isocyanate	Methane, isocyanato-
80626	Methyl methacrylate	2-Propenoic acid, 2-methyl-, methyl ester
298000	Methyl parathion	Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester
1634044	Methyl tert-butyl ether	
74953	Methylene bromide	Methane, dibromo-
75092	Methylene chloride	Methane, dichloro-
101688	Methylene diphenyl diisocyanate	MDI
56042	Methylthiouracil	4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-

CAS Number	Substance Name	Synonyms
7786347	Mevinphos	
315184	Mexacarbate	
50077	Mitomycin C	Azirino[2',3':3,4]pyrrolo[1, 2-a] indole-4,7-dione,6-amino-8-[[(aminocarbonyl)oxy] methyl]-1,1a, 2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-, [1aS-(1aalpha, 8beta, 8aalpha, 8balpha)]-
70257	MNNG	Guanidine, N-methyl-N'-nitro-N-nitroso-
75047	Monoethylamine	
74895	Monomethylamine	
2763964	Muscimol	3(2H)-Isoxazolone, 5-(aminomethyl)-; 5-(Aminomethyl)-3-isoxazolol
1615801	N,N'-Diethylhydrazine	Hydrazine, 1,2-diethyl-
121697	N,N-Diethyl aniline	N,N-Dimethylaniline
759739	N-Nitroso-N-ethylurea	Urea, N-ethyl-N-nitroso-
924163	N-Nitrosodi-n-butylamine	1-Butanamine, N-butyl-N-nitroso-
1116547	N-Nitrosodiethanolamine	Ethanol, 2,2'-(nitrosoimino)bis-
62759	N-Nitrosodimethylamine	Methanamine, N-methyl-N-nitroso-
86306	N-Nitrosodiphenylamine	
4549400	N-Nitrosomethylvinylamine	Vinylamine, N-methyl-N-nitroso-
59892	N-Nitrosomorpholine	
100754	N-Nitrosopiperidine	Piperidine, 1-nitroso-
930552	N-Nitrosopyrrolidine	Pyrrolidine, 1-nitroso-
107108	n-Propylamine	1-Propanamine
300765	Naled	
91203	Naphthalene	

CAS Number	Substance Name	Synonyms
91587	Naphthalene, 2-chloro-	beta-Chloronaphthalene 2-Chloronaphthalene
1338245	Naphthenic acid	
7440020	Nickel **	
15699180	Nickel ammonium sulfate	
13463393	Nickel carbonyl	Nickel carbonyl Ni(CO)4, (T-4)-
37211055	Nickel chloride	
7718549	Nickel chloride	
557197	Nickel cyanide	Nickel cyanide Ni(CN)2
12054487	Nickel hydroxide	
14216752	Nickel nitrate	
7786814	Nickel sulfate	
54115	Nicotine, & salts	Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-
7697372	Nitric acid	
10102439	Nitric oxide	Nitrogen oxide NO
98953	Nitrobenzene	Benzene, nitro-
10544726	Nitrogen dioxide	Nitrogen oxide NO3
10102440	Nitrogen dioxide	Nitrogen oxide NO2
55630	Nitroglycerine	1,2,3-Propanetriol, trinitrate-
25154556	Nitrophenol (mixed)	
1321126	Nitrotoluene	
3288582	O,O-Diethyl S-methyl dithiophosphate	Phosphorodithioic acid, O,O-diethyl S-methyl ester
90040	o-Anisidine	
95476	o-Benzene, dimethyl	o-Xylene
95487	o-Cresol	o-Cresylic acid
528290	o-Dinitrobenzene	
88722	o-Nitrotoluene	
636215	o-Toluidine hydrochloride	Benzenamine, 2-methyl-, hydrochloride

CAS Number	Substance Name	Synonyms
152169	Octamethylpyrophosphoramide	Diphosphoramide, octamethyl-
20816120	Osmium tetroxide	Osmium oxide OsO4 (T-4)-
75218	Oxirane	Ethylene oxide
106514	p-Benzoquinone	2,5-Cyclohexadiene-1,4-dione
106478	p-Chloroaniline	Benzenamine, 4-chloro-
106445	p-Cresol	p-Cresylic acid
106467	p-Dichlorobenzene	Benzene,1,4-dichloro 1,4-Dichlorobenzene
100254	p-Dinitrobenzene	
99990	p-Nitrotoluene	
106503	p-Phenylenediamine	
106490	p-Toluidine	Benzenamine, 4-methyl-
106423	p-Xylene	p-Benzene, dimethyl
30525894	Paraformaldehyde	
123637	Paraldehyde	1,3,5-Trioxane, 2,4,6-trimethyl-
56382	Parathion	Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester
608935	Pentachlorobenzene	Benzene, pentachloro-
76017	Pentachloroethane	Ethane, pentachloro-
82688	Pentachloronitrobenzene (PCNB)	Benzene, pentachloronitro-
87865	Pentachlorophenol	Phenol, pentachloro-
62442	Phenacetin	Acetamide, N-(4-ethoxyphenyl)-
85018	Phenanthrene	
108952	Phenol	Benzene, hydroxy-
58902	Phenol, 2,3,4,6-tetrachloro-	2,3,4,6-Tetrachlorophenol
95954	Phenol, 2,4,5-trichloro-	2,4,5-Trichlorophenol
88062	Phenol, 2,4,6-trichloro-	2,4,6-Trichlorophenol
51285	Phenol, 2,4-dinitro-	2,4-Dinitrophenol

CAS Number	Substance Name	Synonyms
131895	Phenol, 2-cyclohexyl-4,6-dinitro-.	2-Cyclohexyl-4,6-dinitrophenol
59507	Phenol, 4-chloro-3-methyl-	p-Chloro-m-cresol; 4-Chloro-m-cresol
100027	Phenol, 4-nitro-	p-Nitrophenol; 4-Nitrophenol
62384	Phenylmercury acetate	Mercury, (acetato-O)phenyl-
103855	Phenylthiourea	Thiourea, phenyl-
298022	Phorate	Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester
75445	Phosgene	Carbonic dichloride
7803512	Phosphine	
7664382	Phosphoric acid	
311455	Phosphoric acid, diethyl 4-nitrophenyl ester	Diethyl-p-nitrophenyl phosphate
297972	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	O,O-Diethyl O-pyrazinyl phosphorothioate
7723140	Phosphorus	
7719122	Phosphorus trichloride	
10025873	Phosphrous oxycloride	
85449	Phthalic anhydride	1,3-Isobenzofurandione
1336363	Polychlorinated Biphenyls (PCBs)	
7784410	Potassium arsenate	
10124502	Potassium arsenite	
7778509	Potassium bichromate	
7789006	Potassium chromate	
151508	Potassium cyanide	Potassium cyanide K (CN)
1310583	Potassium hydroxide	
7722647	Potassium permanganate	
506616	Potassium silver cyanide	Argentate (1-), bis(cyano-C)-, potassium
23950585	Pronamide	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-

CAS Number	Substance Name	Synonyms
96128	Propane, 1,2-dibromo-3-chloro-	1,2-Dibromo-3-chloropropane
2312358	Propargite	
107197	Propargyl alcohol	2-Propyn-1-ol
123386	Propionaldehyde	
79094	Propionic acid	
123626	Propionic anhydride	
114261	Propoxur	
78875	Propylene dichloride	Propane, 1,2-dichloro-; 1,2-Dichloropropane
75569	Propylene oxide	
129000	Pyrene	
8003347	Pyrethrins	
121211	Pyrethrins	
121299	Pyrethrins	
110861	Pyridine	
109068	Pyridine, 2-methyl-	2-Picoline
91225	Quinoline	
50555	Reserpine	Yohimban-16-carboxylic acid, 11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy-, methyl ester (3beta, 16beta,17alpha,18beta,20alpha)-
108463	Resorcinol	1,3-Benzenediol
81072	Saccharin and salts	1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide
94597	Safrole	1,3-Benzodioxole, 5-(2-propenyl)-.
626380	sec-Amyl acetate	
105464	sec-Butyl acetate	
13952846	sec-Butylamine	
513495	sec-Butylamine	
7783008	Selenious acid	

CAS Number	Substance Name	Synonyms
7782492	Selenium **	
7446084	Selenium dioxide	Selenium oxide
7488564	Selenium sulfide	Selenium sulfide SeS2
630104	Selenourea	
7440224	Silver **	
506649	Silver cyanide	Silver cyanide Ag (CN)
7761888	Silver nitrate	
93721	Silvex (2,4,5-TP)	Propionic acid, 2-(2,4,5-trichlorophenoxy)- 2,4,5-TP acid
7440235	Sodium	
7631892	Sodium arsenate	
7784465	Sodium arsenite	
26628228	Sodium azide	
10588019	Sodium bichromate	
1333831	Sodium bifluoride	
7631905	Sodium bisulfite	
7775113	Sodium chromate	
143339	Sodium cyanide	Sodium cyanide Na (CN)
25155300	Sodium dodecylbenzenesulfonate	
7681494	Sodium fluoride	
16721805	Sodium hydrosulfide	
1310732	Sodium hydroxide	
7681529	Sodium hypochlorite	
10022705	Sodium hypochlorite	
124414	Sodium methylate	
7632000	Sodium nitrite	
10140655	Sodium phosphate, dibasic	
10039324	Sodium phosphate, dibasic	
7558794	Sodium phosphate, dibasic	
10124568	Sodium phosphate, tribasic	
7785844	Sodium phosphate, tribasic	

CAS Number	Substance Name	Synonyms
7601549	Sodium phosphate, tribasic	
7758294	Sodium phosphate, tribasic	
10361894	Sodium phosphate, tribasic	
10101890	Sodium phosphate, tribasic	
10102188	Sodium selenite	
7782823	Sodium selenite	
18883664	Streptozotocin	D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-; Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-
7789062	Strontium chromate	
57249	Strychnine, & salts	Strychnidin-10-one
100425	Styrene	
96093	Styrene oxide	
12771083	Sulfur monochloride	
1314803	Sulfur phosphide	Phosphorus pentasulfide; Phosphorus sulfide
7664939	Sulfuric acid	
8014957	Sulfuric acid	
625161	tert-Amyl acetate	
540885	tert-Butyl acetate	
75649	tert-Butylamine	
127184	Tetrachloroethylene	Ethene, tetrachloro-; Perchloroethylene; Tetrachloroethene
78002	Tetraethyl lead	Plumbane, tetraethyl-
107493	Tetraethyl pyrophosphate	Diphosphoric acid, tetraethyl ester
3689245	Tetraethyldithiopyrophosphate	Thiodiphosphoric acid, tetraethyl ester
109999	Tetrahydrofuran	Furan, tetrahydro-
509148	Tetranitromethane	Methane, tetranitro-
1314325	Thallic oxide	Thallium oxide Tl203

CAS Number	Substance Name	Synonyms
563688	Thallium (I) acetate	Acetic acid, thallium(1+) salt
6533739	Thallium (I) carbonate	Carbonic acid, dithallium(1+) salt
7791120	Thallium (I) chloride	Thallium chloride TlCl
10102451	Thallium (I) nitrate	Nitric acid, thallium (1+) salt
10031591	Thallium (I) sulfate	Sulfuric acid, dithallium (1+) salt
7446186	Thallium (I) sulfate	Sulfuric acid, dithallium(1+) salt
7440280	Thallium **	
12039520	Thallium selenite	Selenious acid, dithallium(1+) salt
62555	Thioacetamide	Ethanethioamide
39196184	Thiofanox	2-Butanone, 3,3-dimethyl-1-(methylthio)-, O[(methylamino)carbonyl) oxime
74931	Thiomethanol	Methanethiol; Methylmercaptan
108985	Thiophenol	Benzenethiol
79196	Thiosemicarbazide	Hydrazinecarbothioamide
62566	Thiourea	
86884	Thiourea, 1-naphthalenyl-	alpha-Naphthylthiourea
137268	Thiram	Thioperoxydicarbonic diamide [(H2N)C(S)] 2S2, tetramethyl-
7550450	Titanium tetrachloride	
108883	Toluene	Benzene, methyl-
584849	Toluene diisocyanate	Benzene, 1,3-diisocyanatomethyl-
91087	Toluene diisocyanate	
26471625	Toluene diisocyanate	
95807	Toluenediamine	Benzenediamine, ar-methyl-

CAS Number	Substance Name	Synonyms
823405	Toluenediamine	
25376458	Toluenediamine	
496720	Toluenediamine	
8001352	Toxaphene	Camphene, octachloro-
52686	Trichlorfon	
79016	Trichloroethylene	Ethene, trichloro-; Trichloroethene
594423	Trichloromethanesulfenyl chloride	Methanesulfenyl chloride, trichloro-
75694	Trichloromonofluoromethane	Methane, trichlorofluoro-
25167822	Trichlorophenol	
27323417	Triethanolamine dodecylbenzenesulfonate	
121448	Triethylamine	
1582098	Trifluralin	
75503	Trimethylamine	
126727	Tris(2,3-dibromopropyl) phosphate.	1-Propanol, 2,3-dibromo-, phosphate [(3:1)
72571	Trypan blue	2,7-Naphthalenedisulfonic acid, 3,3'-3,3'-dimethyl-(1,1'-biphenyl)-4,4'-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt
66751	Uracil mustard	2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-
541093	Uranyl acetate	
10102064	Uranyl nitrate	
36478769	Uranyl nitrate	
684935	Urea, N-methyl-N-nitroso	N-Nitroso-N-methylurea
1314621	Vanadium pentoxide	Vanadium oxide V205
27774136	Vanadyl sulfate	
108054	Vinyl acetate	Vinyl acetate monomer
593602	Vinyl bromide	
75014	Vinyl chloride	Ethene, chloro-

CAS Number	Substance Name	Synonyms
75354	Vinylidene chloride	Ethene, 1,1-dichloro-; 1,1-Dichloroethylene
81812	Warfarin, & salts, when present at concentrations greater than 0.3%	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl-butyl)-, & salts, when present at concentrations >0.3%
1330207	Xylene (mixed)	Benzene, dimethyl
1300716	Xylenol	
7440666	Zinc **	
557346	Zinc acetate	
52628258	Zinc ammonium chloride	
14639986	Zinc ammonium chloride	
14639975	Zinc ammonium chloride	
1332076	Zinc borate	
7699458	Zinc bromide	
3486359	Zinc carbonate	
7646857	Zinc chloride	
557211	Zinc cyanide	Zinc cyanide Zn(CN)2
7783495	Zinc fluoride	
557415	Zinc formate	
7779864	Zinc hydrosulfite	
7779886	Zinc nitrate	
127822	Zinc phenosulfonate	
1314847	Zinc phosphide	Zinc phosphide Zn3P2, when present at concentrations greater than 10%
16871719	Zinc silicofluoride	
7733020	Zinc sulfate	
13746899	Zirconium nitrate	
16923958	Zirconium potassium fluoride	
14644612	Zirconium sulfate	
10026116	Zirconium tetrachloride	