

CHAPTER 113  
SANITARY LANDFILLS FOR MUNICIPAL  
SOLID WASTE: GROUNDWATER PROTECTION SYSTEMS FOR THE DISPOSAL OF  
NONHAZARDOUS WASTES

[Prior to 12/11/02, see 567—Chs 102, 103, 110]

**567—113.1(455B) Purpose.** The purpose of this chapter is to protect human health and the environment through the implementation of minimum national standards pursuant to the Resource Conservation and Recovery Act (“RCRA” or “the Act”) for all municipal solid waste landfill (MSWLF) units and under the Clean Water Act for MSWLFs that are used to dispose of sewage sludge.

This chapter details the permitting, siting, design, operating, monitoring, corrective action, reporting, record-keeping, closure, and postclosure requirements for all sanitary landfills accepting municipal solid waste (MSW).

Groundwater is a precious natural resource. The vast majority of citizens in Iowa depend on groundwater as a drinking water source. Agriculture, industry and commerce also depend heavily on groundwater. It is essential to the health, welfare, and economic prosperity of all citizens in Iowa that groundwater is protected and that the prevention of groundwater contamination is of paramount importance. Therefore, the intent of this chapter is to prevent groundwater contamination from MSWLF units to the maximum extent practical, and if necessary to restore the groundwater to a potable state, regardless of present condition, use, or characteristics.

**567—113.2(455B) Applicability and compliance.**

**113.2(1)** All sanitary landfills accepting municipal solid waste must comply with the provisions of this chapter.

**113.2(2)** These rules do not encompass the beneficial use of by-products as alternative cover material. For rules pertaining to the beneficial use of by-products as alternative cover material, see 567—Chapter 108.

**113.2(3)** These rules do not encompass the management and disposal of special wastes. For rules pertaining to the management and disposal of special wastes, see 567—Chapter 109.

**113.2(4)** This chapter does not apply to MSWLF units that did not receive waste after October 9, 1994. The closure permit issued or the rules in effect at the time of closure shall govern postclosure activities for such MSWLF units.

**113.2(5)** This chapter does not apply to MSWLF units that stop receiving waste before October 1, 2007, and are not contiguous with MSWLF units that will continue to accept waste after October 1, 2007. For the purpose of this subrule, contiguous MSWLF units are those that adjoin, abut or have a common boundary or edge with one another or that utilize the same groundwater monitoring network system. The permit issued and the rules in effect at the time waste acceptance ceased shall govern postclosure activities for such MSWLF units except as follows:

*a.* Financial assurance in accordance with rule 567—113.14(455B) shall be required.

*b.* Owners or operators of MSWLF units described in this subrule that fail to complete cover installation within one year after October 1, 2007, will be subject to all the requirements of this chapter, unless otherwise specified.

*c.* Surface water sampling in accordance with subrule 113.10(3) shall be required.

*d.* MSWLF units subject to this rule shall perform groundwater sampling for the following parameters:

(1) Routine semiannual water sampling parameters:

1. Chloride.
2. Specific conductance (field measurement).
3. pH (field measurement).
4. Ammonia nitrogen.
5. Iron, dissolved.
6. Chemical oxygen demand.

7. Any additional parameters deemed necessary by the department.

(2) Routine annual water sampling parameters:

1. Total organic halogen.

2. Phenols.

3. Any additional parameters deemed necessary by the department.

*e.* If the analytical results for a downgradient groundwater monitoring point do not fall within the control limits of two standard deviations above (or below for pH) the mean parameters, listed in subparagraphs 113.2(5) “*d*”(1) and (2), in a corresponding upgradient groundwater monitoring point and it cannot be demonstrated that a source other than an MSWLF unit caused the control limit exceedence, then the owner or operator shall comply with the groundwater assessment monitoring program requirements in subrule 113.10(6) and corrective action requirements in subrules 113.10(7), 113.10(8) and 113.10(9), if necessary.

**113.2(6)** MSWLF units containing sewage sludge and failing to satisfy the requirements of this chapter violate Sections 309 and 405(e) of the Clean Water Act.

**113.2(7)** Consideration of other laws. The issuance of an MSWLF permit by the department in no way relieves the permit holder of the responsibility of complying with all other local, state, or federal statutes, ordinances, and rules and other applicable requirements.

**113.2(8)** Closure of existing MSWLF units.

*a.* Existing MSWLF units that cannot make the demonstration specified in paragraph 113.6(2) “*a*,” pertaining to airports, in 113.6(2) “*b*,” pertaining to floodplains, or in 113.6(2) “*f*,” pertaining to unstable areas, must close in accordance with rule 113.12(455B) and conduct postclosure activities in accordance with rule 113.13(455B).

*b.* Existing MSWLF units that do not have an approved leachate collection system and a composite liner or a leachate collection system and an alternative liner modeled at an approved point of compliance shall cease accepting waste by October 1, 2007.

*c.* Rescinded IAB 12/31/08, effective 2/4/09.

*d.* Those portions of existing MSWLF units demonstrating placement of final cover in conformance with previously approved plans and specifications or regulations in effect at the time of such closure shall not be required to apply additional cover solely to achieve compliance with rule 113.12(455B).

**113.2(9)** Existing MSWLF units that continue accepting waste after October 1, 2007, shall submit an implementation plan to the department by January 31, 2008, that identifies how the MSWLF shall achieve compliance with these rules. The plan shall include a compliance schedule which shall not extend beyond January 31, 2011. This subrule shall not preclude compliance with subrule 113.2(8).

**113.2(10)** Compliance with amendments to these rules.

*a.* Owners or operators of existing MSWLF units that have an approved leachate collection system and a composite liner or a leachate collection system and an alternative liner modeled at an approved point of compliance shall not be required to redesign or reconstruct the MSWLF units due to amendments to these rules subsequent to such approval unless the department finds that such facilities are causing pollution or that continued use of such facilities results in a vertical expansion on top of or against the side slopes of a previously filled noncompliant MSWLF unit. Prior to waste placement in the vertical expansion area, revised design plans shall be submitted to include construction of a separatory liner and leachate collection system that comply with all the requirements of subrule 113.7(5) to be placed between the area of vertical expansion and the underlying noncompliant MSWLF unit. The department, in conjunction with the MSWLF owner or operator, shall determine the maximum amount of time necessary for continued waste placement on top of or against the previously filled noncompliant MSWLF unit to achieve an adequate slope in order to maintain drainage of leachate to the leachate collection system after expected settlement.

*b.* Except as authorized by subrule 113.2(9) and paragraph 113.2(10) “*a*,” if any new requirement conflicts with a provision of or an operating procedure prescribed in the engineering plans or the MSWLF permit, the facility shall conform to the new rule.

**113.2(11)** Equivalency review procedure.

a. In approving a permit application under this chapter, the department may authorize, in writing, alternatives to the design requirements in this chapter only if, and only to the extent that, specific rules in this chapter expressly state that alternatives may be authorized under this chapter.

b. An owner or operator requesting an alternative design under this chapter shall submit a request to the department prepared by an Iowa-licensed professional engineer. The request shall:

(1) Identify the specific rule for which an equivalency alternative is being sought.

(2) Demonstrate, through supporting technical documentation, justification and quality control procedures, that the requested alternative to the design requirements in the rules of this chapter will, for the life of operations at the facility, achieve the performance standards in that rule.

c. No equivalency alternative will be approved unless the application affirmatively demonstrates that the following conditions are met:

(1) The request is complete and accurate and the requirements of this subrule have been met.

(2) The proposed alternative will, for the life of operations at the facility, achieve the performance standards in the rule for which the alternative to the design requirements in that rule is sought.

(3) The proposed alternative will provide protection equivalent to the design requirements in this chapter for the air, water or other natural resources of the state of Iowa, and will not harm or endanger the public health, safety or welfare.

**567—113.3(455B) Definitions.** Unless otherwise noted, the definitions set forth in Iowa Code section 455B.301 and 567—Chapter 100, which are incorporated by reference; the definitions that appear in specific rules within this chapter; and the following definitions shall apply to this chapter:

*“Active life”* means the period of operation beginning with the initial receipt of solid waste and ending at completion of closure activities in accordance with rule 113.12(455B).

*“Active portion”* means that part of a facility or unit that has received or is receiving wastes and that has not been closed in accordance with rule 113.12(455B).

*“Aquifer”* has the same meaning as in 567—Chapter 100.

*“Commercial solid waste”* means all types of solid waste generated by stores, offices, restaurants, warehouses, and other nonmanufacturing activities, excluding residential and industrial wastes.

*“Existing MSWLF unit”* means any municipal solid waste landfill unit that has received solid waste as of the most recent permit renewal.

*“Facility”* means all contiguous land and structures, other appurtenances, and improvements on the land used for the disposal of solid waste. The facility is formally defined in the permit issued by the department. Buffer lands around a facility are not required to be included in the permitted boundary of a facility.

*“High water table”* has the same meaning as in 567—Chapter 100.

*“Household waste”* means any solid waste (including garbage, trash, and sanitary waste in septic tanks) derived from households (including single and multiple residences, hotels and motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds, and day-use recreation areas).

*“Industrial solid waste”* means solid waste generated by manufacturing or industrial processes that is not a hazardous waste regulated under Subtitle C of RCRA. Such waste may include, but is not limited to, waste resulting from the following manufacturing processes: electric power generation; fertilizer and agricultural chemicals; food and related products and by-products; inorganic chemicals; iron and steel manufacturing; leather and leather products; nonferrous metals manufacturing and foundries; organic chemicals; plastics and resins manufacturing; pulp and paper industry; rubber and miscellaneous plastic products; stone, glass, clay, and concrete products; textile manufacturing; transportation equipment; and water treatment. “Industrial solid waste” does not include mining waste or oil and gas waste.

*“Lateral expansion”* means a horizontal expansion of the waste boundaries of an existing MSWLF unit.

*“Municipal solid waste landfill (MSWLF) unit”* means a discrete area of land or an excavation that receives household waste, and that is not a land application site, surface impoundment, injection well, or waste pile, as those terms are defined under 40 CFR Part 257.2. An MSWLF unit also may receive other types of RCRA Subtitle D wastes, such as commercial solid waste, nonhazardous sludge, construction

and demolition debris, and industrial solid waste. An MSWLF unit may be publicly or privately owned. An MSWLF unit may be a new MSWLF unit, an existing MSWLF unit, or a lateral expansion. A construction and demolition landfill that receives residential lead-based paint waste and does not receive any other household waste is not an MSWLF unit.

“*New MSWLF unit*” means any municipal solid waste landfill unit that has not received waste prior to the most recent permit renewal.

“*Open burning*” has the same meaning as in 567—Chapter 100.

“*Operator*” has the same meaning as in 567—Chapter 100.

“*Owner*” means the person(s) who owns a facility or part of a facility.

“*Point of compliance*” or “*POC*” means the point at which the MSWLF owner or operator demonstrates compliance with the liner performance standard, if applicable, and with the groundwater protection standard. The point of compliance is a vertical surface located hydraulically downgradient of the waste management area that extends down into the uppermost aquifer underlying the regulated MSWLF unit(s) and where groundwater monitoring shall be conducted.

“*Residential lead-based paint waste*” means waste containing lead-based paint that is generated as a result of activities such as abatement, rehabilitation, renovation and remodeling in homes and other residences. “Residential lead-based paint waste” includes, but is not limited to, lead-based paint debris, chips, dust, and sludges.

“*Runoff*” means any rainwater, leachate, or other liquid that drains over land from any part of a facility.

“*Run-on*” means any rainwater, leachate, or other liquid that drains over land onto any part of a facility.

“*Saturated zone*” means that part of the earth’s crust in which all voids are filled with water.

“*Sewage sludge*” has the same meaning as in 567—Chapter 67.

“*Sludge*” means any solid, semisolid, or liquid waste generated from a commercial or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility, or any other such waste having similar characteristics and effects exclusive of the treated effluent from a wastewater treatment plant.

“*Statistically significant increase*” or “*SSI*” means a statistical difference large enough to account for data variability and not thought to be due to chance alone.

“*Uppermost aquifer*” means the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected with this aquifer within the facility’s property boundary.

“*Vertical expansion*” means additional waste placement on top of or against the side slopes of a previously filled MSWLF unit, whether active, closed, or inactive.

“*Waste management unit boundary*” means a vertical surface located at the hydraulically downgradient limit of the unit. This vertical surface extends down into the uppermost aquifer.

#### **567—113.4(455B) Permits.**

**113.4(1) *Permit required.*** An MSWLF unit shall not be constructed or operated without a permit from the department.

**113.4(2) *Construction and operation.*** An MSWLF unit shall be constructed and operated according to this chapter, any plans and specifications approved by the department, and the conditions of the permit. Any approved plans and specifications shall constitute a condition of the permit.

**113.4(3) *Transfer of title and permit.*** If title to an MSWLF unit is transferred, then the department shall transfer the permit within 60 days if the department has found that the following requirements have been met:

*a.* The title transferee has applied in writing to the department to request a transfer of the permit within 30 days of the transfer of the title.

*b.* The permitted facility is in compliance with Iowa Code chapters 455B and 455D, this chapter and the conditions of the permit.

c. The transferee possesses the equipment and personnel to operate the project in conformance with Iowa Code chapter 455B and these rules and the terms of the permit.

**113.4(4) Permit conditions.** Any permit may be issued subject to conditions specified in writing by the department that are necessary to ensure that the facility is constructed and operated in a safe and effective manner, and in compliance with Iowa Code chapters 455B and 455D, this chapter and the conditions of the permit.

**113.4(5) Effect of revocation.** If an MSWLF permit held by any public or private agency is revoked by the department, then no new permit shall be issued to that agency for that MSWLF for a period of one year from the date of revocation. Such revocation shall not prohibit the issuance of a permit for the facility to another public or private agency.

**113.4(6) Inspection of site and operation.** The department shall be notified when the construction of a new facility or MSWLF unit or significant components thereof have been completed so that the department may inspect the facility to determine if the project has been constructed in accordance with the design approved by the department. The department shall inspect and approve a new facility or MSWLF unit before MSW may be accepted. The department shall inspect a facility and its operations on a regular basis to determine if the facility is in compliance with this chapter.

**113.4(7) Duration and renewal of permits.**

a. *Operating permits.* An MSWLF permit shall be issued and may be renewed for a period no longer than five years, unless the MSWLF adopts research, development and demonstration (RD&D) provisions pursuant to subrule 113.4(10). An MSWLF permit with RD&D provisions pursuant to subrule 113.4(10) shall be issued and may be renewed for a period no longer than three years.

b. *Closure permits.* An MSWLF closure permit shall be issued only after a facility no longer accepts solid waste. A closure permit shall initially be issued for a period of 30 years. If the department extends the postclosure period beyond 30 years, then the duration of the subsequent closure permit will be determined on a site-specific basis. An MSWLF requires a closure permit until the department determines that postclosure operations are no longer necessary.

**113.4(8) Request for permit renewal.**

a. *Operating permits.* A request for an operating permit renewal shall be in writing and filed at least 90 days before the expiration of the current permit. If the applicant is found not to be in compliance with this chapter or the permit requirements, then the applicant shall achieve compliance or be placed on a compliance schedule approved by the department before the permit may be renewed.

b. *Closure permits.* A request for a closure permit renewal or termination shall be filed at least 180 days before the expiration of the current permit. If the department finds that an MSWLF has completed all required postclosure activities and no longer presents a significant risk to human health or the environment, then the department shall issue written notification that a closure permit is no longer required for the facility.

**113.4(9) Request for permit amendment.** Requests for permit amendments must be submitted in writing to the department with supporting documentation and justification.

**113.4(10) RD&D permits.** The department may issue an RD&D permit that overrides the applicable portions of this chapter, as listed below, without issuing a variance. A permit amendment from the department for leachate recirculation only does not require an RD&D permit.

a. The department may issue an RD&D permit for a new MSWLF unit, existing MSWLF unit, or lateral expansion, for which the owner or operator proposes to utilize innovative and new methods which vary from either or both of the following criteria, provided that the MSWLF unit has a leachate collection system designed and constructed to maintain less than a 30-cm (i.e., 12-inch) depth of leachate on the liner:

- (1) The run-on control systems in subrule 113.7(8); and
- (2) The liquids restrictions in subparagraph 113.8(1)“b”(3).

b. The department may issue a permit for a new MSWLF unit, existing MSWLF unit, or lateral expansion, for which the owner or operator proposes to utilize innovative and new methods which vary from the final cover criteria of subrules 113.12(1) and 113.12(2), provided that the MSWLF unit owner or operator demonstrates that the infiltration of liquid through the alternative cover system will not cause

contamination of groundwater or surface water, or cause leachate depth on the liner to exceed 30 cm (i.e., 12 inches).

c. Any permit issued under subrule 113.4(10) must include such terms and conditions at least as protective as the criteria for MSWLFs to ensure protection of human health and the environment. Such permits shall:

(1) Provide for the construction and operation of such facilities as necessary, for not longer than three years, unless renewed as provided in paragraph 113.4(10)“e”;

(2) Provide that the MSWLF unit must receive only those types and quantities of municipal solid waste and nonhazardous wastes which the department deems appropriate for the purposes of determining the efficacy and performance capabilities of the technology or process;

(3) Include such requirements as necessary to protect human health and the environment, including such requirements as necessary for testing and providing information to the department with respect to the operation of the facility;

(4) Require the owner or operator of an MSWLF unit permitted under subrule 113.4(10) to submit an annual report to the department showing whether and to what extent the site is progressing in attaining project goals. The report shall also include a summary of all monitoring and testing results, as well as any other operating information specified by the department in the permit; and

(5) Require compliance with all criteria in this chapter, except as permitted under subrule 113.4(10).

d. The department may order an immediate termination of all operations at the facility allowed under subrule 113.4(10) or other corrective measures at any time the department determines that the overall goals of the project are not being attained, including protection of human health or the environment.

e. Any permit issued under subrule 113.4(10) shall not exceed 3 years, and each renewal of a permit may not exceed 3 years.

(1) The total term for a permit for a project including renewals may not exceed 12 years; and

(2) During permit renewal, the applicant shall provide a detailed assessment of the project showing the status with respect to achieving project goals, a list of problems and the status with respect to problem resolutions, and any other requirements that the department determines necessary for permit renewal.

**113.4(11) Factors in permit issuance decisions.** The department may request that additional information be submitted for review to make a permit issuance decision. The department may review and inspect the facility, its agents and operators, and compliance history. The department may consider compliance with related requirements, such as financial assurance and comprehensive planning. The department may review whether or not a good-faith effort to maintain compliance and protect human health and the environment is being made, and whether a compliance schedule is being followed.

**113.4(12) Notice and public participation in the MSWLF permit issuance and postpermit actions process.**

a. For the purposes of this subrule, “postpermit actions” includes permit renewals and requests for major facility modifications as defined below:

(1) Change in an MSWLF facility boundary or an MSWLF unit.

(2) Application for an RD&D permit pursuant to subrule 113.4(10).

(3) Installation of a landfill gas collection system.

(4) Application for a closure permit for a MSWLF unit.

(5) Transfer of an MSWLF permit to a new owner.

(6) Variance from this chapter under rule 567—113.15(455B).

(7) Change in the postclosure land use of the property.

(8) Other significant permit actions that are determined by the department to require public notice and participation. Such actions may include requests to change any of the requirements set forth as special provisions in the permit.

b. Prior to the issuance of approval or denial for an MSWLF permit or postpermit action, public notice shall be circulated in a manner designed to inform interested and potentially interested persons of the permit or postpermit action request. Procedures for the circulation of public notice shall include at least the following procedures:

(1) Upon receipt of the permit application or postpermit action request, the department shall make a determination of whether public notice is required in accordance with this subrule. If the determination is made that public notice is required, then the department shall prepare the public notice which shall be circulated by the owner or operator within the service area of the MSWLF by posting the public notice near the entrance to the MSWLF; and by publishing the public notice in periodicals or, if appropriate, in a newspaper(s) of general circulation.

(2) The public notice shall be mailed by the department to any person upon request and posted on the department's Web site.

*c.* The department shall provide a period of not less than 30 days following the date of the public notice during which time interested persons may submit their written views with respect to the MSWLF permit application or postpermit action request. All written comments submitted during the 30-day comment period shall be retained by the department and considered by the department in the formulation of the department's final determinations with respect to the permit application or postpermit action request. The period for comment may be extended at the discretion of the department.

*d.* The contents of the public notice shall include at least the following:

(1) The name, address, and telephone number of the department.

(2) The name and address of each applicant.

(3) A brief description of each applicant's activities or operations which result in the submittal of the permit application or postpermit action request.

(4) A statement that any person may submit written and signed comments, or may request a public hearing, or both, on the proposed permit or postpermit action request. A statement of procedures to request a public hearing pursuant to paragraph 113.4(12) "e" shall be included.

(5) Locations where copies of the permit application or postpermit action request may be reviewed, including the closest department field office, and the times at which the copies shall be available for public inspection.

*e.* The applicant, any interested agency, person or group of persons may request or petition for a public hearing with respect to an MSWLF permit application or postpermit action request. Any such request shall clearly state issues and topics to be addressed at the hearing. Any such request or petition for public hearing must be filed with the department within the 30-day period prescribed in paragraph 113.4(12) "c" and shall indicate the interest of the party filing such request and the reasons why a hearing is warranted. The department shall hold an informal and noncontested case hearing if there is a significant public interest (including the filing of requests or petitions for such hearing) in holding such a hearing. Frivolous or insubstantial requests for hearing may be denied by the department. Instances of doubt should be resolved in favor of holding the hearing. Any hearing requested pursuant to this subrule shall be held in the service area of the MSWLF, or other appropriate area at the discretion of the department.

*f.* If the department determines that a public hearing is warranted, then the department shall prepare the public notice of the hearing. Public notice of any hearing held shall be circulated at least as widely as was the notice of the permit application or postpermit action request.

*g.* The contents of public notice of any hearing held pursuant to paragraph 113.4(12) "e" shall include at least the following:

(1) The name, address, and telephone number of the department;

(2) The name and address of each applicant whose application will be considered at the hearing;

(3) A brief reference to the public notice issued for each permit application and postpermit action request;

(4) Information regarding the time and location for the hearing;

(5) The purpose of the hearing;

(6) A concise statement of the issues raised by the person requesting the hearing;

(7) Locations where copies of the permit application or postpermit action may be reviewed, including the closest department field office, and the times at which the copies shall be available for public inspection; and

(8) A brief description of the nature of the hearing, including the rules and procedures to be followed.

*h.* The department shall keep a record of the commenters and of the issues raised during the public participation process and shall prepare written responses to all comments received. At the time a final decision is made, the record and copies of the department's responses shall be made available to the public.

**567—113.5(455B) Permit application requirements.**

**113.5(1)** Unless otherwise authorized by the department, an MSWLF permit applicant shall submit, at a minimum, the following permit application information to the department:

- a.* The name, address and telephone number of:
  - (1) Owner of the site where the facility will be located.
  - (2) Permit applicant.
  - (3) Official responsible for the facility.
  - (4) Certified operator (i.e., "operator") responsible for operation of the facility.
  - (5) Professional engineer(s) (P.E.) licensed in the state of Iowa and retained for the design of the facility.
  - (6) Agency to be served by the facility, if any.
  - (7) Responsible official of agency to be served, if any.
- b.* An organizational chart.
- c.* A site exploration and characterization report for the facility that complies with the requirements of subrule 113.6(4).
- d.* Plans and specifications for the facility, and quality control and assurance (QC&A) plans, that comply with the requirements of subrule 113.7(6).
- e.* A development and operations (DOPs) plan for the facility, an emergency response and remedial action plan (ERRAP), and proof of MSWLF operator certification that comply with the requirements of rule 113.8(455B).
- f.* An environmental monitoring plan that complies with the requirements of rules 113.9(455B) and 113.10(455B).
- g.* The project goals and time lines, and other documentation as necessary to comply with subrule 113.4(10) and other requirements of the department if an RD&D permit is being requested or renewed.
- h.* Proof of financial assurance in compliance with rule 113.14(455B).
- i.* A closure and postclosure plan that complies with the requirements of rules 113.12(455B) and 113.13(455B).

**113.5(2)** Incomplete permit applications. If the department finds the permit application information to be incomplete, the department shall notify the applicant of that fact and of the specific deficiencies. If the applicant fails to correct the noted deficiencies within 30 days, the department may reject the application and return the application materials to the applicant. The applicant may reapply without prejudice.

**567—113.6(455B) Siting and location requirements for MSWLFs.** This rule applies to new MSWLF units and horizontal expansions of existing MSWLF units. Except for paragraphs 113.6(2) "a," 113.6(2) "b" and 113.6(2) "f," this rule does not apply to permitted MSWLF units which have been approved prior to October 1, 2007. Information required to document compliance with the requirements of rule 113.6(455B) shall be consolidated and maintained in a site exploration and characterization report pursuant to subrule 113.6(4).

**113.6(1)** *Local siting approval.* The department will not consider a permit application for a new MSWLF unless local siting approval pursuant to Iowa Code section 455B.305A, if applicable, has been obtained.

**113.6(2)** *Location restrictions.* All MSWLFs shall comply with the following location restrictions.

*a. Airports.* For purposes of this chapter:

"*Airport*" means public-use airport open to the public without prior permission and without restrictions within the physical capacities of available facilities.



“*Bird hazard*” means an increase in the likelihood of bird-aircraft collisions that may cause damage to the aircraft or injury to its occupants.

(1) A prohibition on locating a new MSWLF near certain airports was enacted in Section 503 of the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (Ford Act), Pub. L. 106-181 (49 U.S.C. 44718 note). Section 503 prohibits the “construction or establishment” of new MSWLFs after April 5, 2000, within six miles of certain smaller public airports. The Federal Aviation Administration (FAA) administers the Ford Act and has issued guidance in FAA Advisory Circular 150/5200-34A, dated January 26, 2006.

(2) Owners or operators of new MSWLF units, existing MSWLF units, and lateral expansions that are located within 10,000 feet (3,048 meters) of any airport runway end used by turbojet aircraft or within 5,000 feet (1,524 meters) of any airport runway end used by piston-type aircraft only must demonstrate to the FAA that the units are designed and operated so that the MSWLF unit does not pose a bird hazard to aircraft. The owner or operator must place the demonstration of this requirement in the operating record and submit to the department a copy of the demonstration approved by the FAA.

(3) Owners or operators proposing to site new MSWLF units and lateral expansions within a five-mile radius of any airport runway end used by turbojet or piston-type aircraft must notify the affected airport and the FAA. A copy of these notifications shall be submitted to the department.

*b. Floodplains.* For purposes of this chapter:

“*Floodplain*” means the lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands that may be inundated by a 100-year flood.

“*100-year flood*” means a flood that has a 1 percent or greater chance of recurring in any given year or a flood of a magnitude equaled or exceeded once in 100 years on the average over a significantly long period.

“*Washout*” means the carrying away of solid waste by waters of the base flood.

Owners or operators of new MSWLF units, existing MSWLF units, and lateral expansions located in 100-year floodplains must demonstrate to the department that the unit will not restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste so as to pose a hazard to human health and the environment. The owner or operator must place the demonstration in the operating record and submit a copy of the demonstration to the department.

*c. Wetlands.* For purposes of this chapter:

“*Wetlands*” means those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

New MSWLF units and lateral expansions shall not be located in wetlands, unless the owner or operator can make the following demonstrations to the department:

(1) Where applicable under Section 404 of the Clean Water Act or applicable state wetlands laws, the presumption that a practicable alternative to the proposed landfill is available which does not involve wetlands is clearly rebutted;

(2) The construction and operation of the MSWLF unit will not:

1. Cause or contribute to violations of any applicable state water quality standard;

2. Violate any applicable toxic effluent standard or prohibition under Section 307 of the Clean Water Act;

3. Jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of a critical habitat protected under the Endangered Species Act of 1973; and

4. Violate any requirement under the Marine Protection, Research, and Sanctuaries Act of 1972 for the protection of a marine sanctuary;

(3) The MSWLF unit will not cause or contribute to significant degradation of wetlands. The owner or operator must demonstrate the integrity of the MSWLF unit and its ability to protect ecological resources by addressing the following factors:

1. Erosion, stability, and migration potential of native wetland soils, muds and deposits used to support the MSWLF unit;
2. Erosion, stability, and migration potential of dredged and fill materials used to support the MSWLF unit;
3. The volume and chemical nature of the waste managed in the MSWLF unit;
4. Impacts on fish, wildlife, and other aquatic resources and their habitats from release of the solid waste;
5. The potential effects of catastrophic release of waste to wetlands and the resulting impacts on the environment; and
6. Any additional factors, as necessary, to demonstrate that ecological resources in the wetland are sufficiently protected;

(4) To the extent required under Section 404 of the Clean Water Act or applicable state wetlands laws, steps have been taken to attempt to achieve no net loss of wetlands (as defined by acreage and function) by first avoiding impacts to wetlands to the maximum extent practicable as required by subparagraph 113.6(2)“c”(1), then minimizing unavoidable impacts to the maximum extent practicable, and finally offsetting remaining unavoidable wetland impacts through all appropriate and practicable compensatory mitigation actions (e.g., restoration of existing degraded wetlands or creation of human-made wetlands); and

(5) Sufficient information is available to make a reasonable determination with respect to these demonstrations.

*d. Fault areas.* For the purposes of this chapter:

“*Fault*” means a fracture or a zone of fractures in any material along which strata on one side have been displaced with respect to that on the other side.

“*Displacement*” means the relative movement of any two sides of a fault measured in any direction.

“*Holocene*” means the most recent epoch of the Quaternary Period, extending from the end of the Pleistocene Epoch to the present.

New MSWLF units and lateral expansions shall not be located within 200 feet (60 meters) of a fault that has had displacement in Holocene time unless the owner or operator demonstrates to the department that an alternative setback distance of less than 200 feet (60 meters) will prevent damage to the structural integrity of the MSWLF unit and will be protective of human health and the environment.

*e. Seismic impact zones.* For the purposes of this chapter:

“*Seismic impact zone*” means an area with a 10 percent or greater probability that the maximum horizontal acceleration in lithified earth material, expressed as a percentage of the earth’s gravitational pull (g), will exceed 0.10g in 250 years.

“*Maximum horizontal acceleration in lithified earth material*” means the maximum expected horizontal acceleration depicted on a seismic hazard map, with a 90 percent or greater probability that the acceleration will not be exceeded in 250 years, or the maximum expected horizontal acceleration based on a site-specific seismic risk assessment.

“*Lithified earth material*” means all rock, including all naturally occurring and naturally formed aggregates or masses of minerals or small particles of older rock that formed by crystallization of magma or by induration of loose sediments. “Lithified earth material” does not include human-made materials, such as fill, concrete, and asphalt, or unconsolidated earth materials, soil, or regolith lying at or near the earth’s surface.

New MSWLF units and lateral expansions shall not be located in seismic impact zones, unless the owner or operator demonstrates to the department that all containment structures, including liners, leachate collection systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site. The owner or operator must place the demonstration in the operating record and submit a copy of the demonstration to the department.

*f. Unstable areas.* For purposes of this chapter:

“*Unstable area*” means a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all of the landfill structural components responsible for

preventing releases from a landfill. Unstable areas may include poor foundation conditions, areas susceptible to mass movements, and karst terranes.

*“Structural components”* means liners, leachate collection systems, final covers, run-on systems, runoff systems, and any other component used in the construction and operation of the MSWLF that is necessary for protection of human health and the environment.

*“Poor foundation conditions”* means those areas where features exist which indicate that a natural or human-induced event may result in inadequate foundation support for the structural components of an MSWLF unit.

*“Areas susceptible to mass movement”* means those areas of influence (i.e., areas characterized as having an active or substantial possibility of mass movement) where the movement of earth material at, beneath, or adjacent to the MSWLF unit, because of natural or human-induced events, results in the downslope transport of soil and rock material by means of gravitational influence. Areas of mass movement include, but are not limited to, landslides, avalanches, debris slides and flows, soil fluction, block sliding, and rock fall.

*“Karst terranes”* means areas where karst topography, with its characteristic surface and subterranean features, is developed as the result of dissolution of limestone, dolomite, or other soluble rock. Characteristic physiographic features present in karst terranes include, but are not limited to, sinkholes, sinking streams, caves, large springs, and blind valleys.

Owners or operators of new MSWLF units, existing MSWLF units, and lateral expansions located in an unstable area must demonstrate to the department that engineering measures have been incorporated into the MSWLF unit’s design to ensure that the integrity of the structural components of the MSWLF unit will not be disrupted. The owner or operator must place the demonstration in the operating record and submit a copy of the demonstration to the department. The owner or operator must consider the following factors, at a minimum, when determining whether an area is unstable:

- (1) On-site or local soil conditions that may result in significant differential settling;
- (2) On-site or local geologic or geomorphologic features; and
- (3) On-site or local human-made features or human-induced events (both surface and subsurface).

*g. Threatened or endangered flora and fauna.*

(1) All MSWLF owners or operators shall contact the department’s Iowa Natural Areas Inventory with a request to search its records to determine the presence of, or habitat for, any threatened or endangered species or communities of flora or fauna on the proposed site. In the event that the department’s Iowa Natural Areas Inventory does not contain records of threatened or endangered species or communities but their presence is suspected, then the permit applicant shall conduct a site survey.

(2) Should any threatened or endangered species be identified pursuant to subparagraph 113.6(2)“g”(1), the permit applicant shall demonstrate to the department that the MSWLF unit will not cause or contribute to significant degradation of the threatened or endangered species or communities.

*h. Cultural resources.*

(1) All MSWLF owners and operators shall prepare a comprehensive listing of, and assessment of the impact on, any archaeologically, historically, or architecturally significant properties on the proposed site. To assess the impact, the permit applicant shall consult with the historic preservation bureau of the state historical society of Iowa.

(2) Should any significant cultural resources be identified pursuant to subparagraph 113.6(2)“h”(1), the permit applicant shall demonstrate to the department that the MSWLF unit will not cause or contribute to significant degradation of those cultural resources.

*i. Separation from groundwater.* The base of an MSWLF unit shall be situated so that the base of the waste within the proposed unit is at least 5 feet above the high water table unless a greater separation is required to ensure that there will be no significant adverse effect on groundwater or surface waters or a lesser separation is unlikely to have a significant adverse effect on groundwater or surface waters. Artificial means of lowering the high water table are acceptable. The separation of the base of an MSWLF unit from the high water table shall be measured and maintained in a manner acceptable to the department.

*j. Wells and community water systems.* An MSWLF unit shall not be within 1,000 feet of any potable well or community water system in existence at the time of receipt of the original permit application or application to laterally expand the permitted MSWLF unit for the facility that is being used for human or livestock consumption. Groundwater monitoring wells are exempt from this requirement. The department may also exempt extraction wells utilized as part of a remediation system from this requirement. A new MSWLF unit shall not be within 1,000 feet of a downgradient agricultural drainage well.

*k. Property line setback.* An MSWLF unit shall be at least 50 feet from the adjacent property line.

*l. Housing and sensitive populations.* An MSWLF unit shall not be within 500 feet of an occupied residence, recreational area, child care facility, educational facility, or health care facility in existence at the time of receipt of the original permit application or application to laterally expand the permitted MSWLF unit, unless there is a written agreement between the MSWLF owner and such facility. The written agreement shall be filed with the county recorder for abstract of title purposes, and a copy submitted to the department.

**113.6(3) Soil and hydrogeologic investigations.** An MSWLF shall have a qualified groundwater scientist, as defined in paragraph 113.10(1)“d,” to conduct a soil and hydrogeologic investigation in accordance with this subrule. The purpose of this investigation is to obtain data to determine potential routes of contaminant migration via groundwater. Such information is vital for completion of the site exploration and characterization report, and the hydrologic monitoring system plan and design. This subrule sets forth the minimum requirements for soil and hydrogeologic investigations. The MSWLF shall comply with this subrule unless the department issues written approval due to specific site conditions.

*a. Number of borings.* A sufficient number of borings shall be made to accurately identify the stratigraphic and hydrogeologic conditions at the site.

*b. Depth of borings.* Unless otherwise approved by the department in writing, the following requirements shall apply to the depth of borings.

(1) All borings shall be a minimum of 25 feet deep and at least 10 feet below the water table.

(2) At a minimum, half of all borings shall extend 20 feet into the uppermost aquifer, 50 feet below the water table, or 10 feet into bedrock.

(3) At a minimum, one boring shall extend 10 feet into bedrock or 100 feet below the lowest ground surface elevation.

(4) All borings shall be of sufficient depth to correlate strata between borings.

*c. Boring method and soil samples.*

(1) Continuous samples shall be collected for all borings, unless otherwise approved by the department in writing.

(2) Boring logs shall be as detailed as possible in describing each stratum.

(3) Samples shall be clearly marked, preserved and transported in accordance with laboratory procedures.

(4) The permit applicant shall keep and preserve samples until at least 30 days after the permit is issued.

(5) Soil samples from each stratum shall be tested for falling-head permeability and grain size distribution.

*d. Conversion of or plugging borings.*

(1) Borings may be converted to piezometers or monitoring wells. However, the conversion of such borings does not guarantee that more piezometers or monitoring wells will not be required in the department-approved hydrologic monitoring system plan and design.

(2) Borings not converted to piezometers or monitoring wells shall be plugged and properly sealed so as not to create pathways for subsurface or surface pollution migration. Borings converted to piezometers or monitoring wells may still need to be partially plugged depending on the depth of the boring. Plugging shall be performed pursuant to paragraph 113.10(2)“d.”

*e. Soil and hydrogeologic investigation description and analysis.* A soil and hydrogeologic investigation description and analysis shall be completed and maintained and, at a minimum, shall contain the following:

- (1) The boring logs pursuant to subparagraph 113.6(3) "c"(2).
- (2) A description of the properties of each soil and bedrock stratum as appropriate, including:
  1. Soil texture and classification.
  2. Particle size distribution.
  3. Mineral composition, cementation, and soil structure.
  4. Permeability, including horizontal and vertical permeability, and porosity.
  5. Geologic structure, including strike, dip, folding, faulting and jointing.
  6. Previous activities and infrastructure at the site that could affect geology and hydrogeology, such as but not limited to mining, quarry operations, borrow pits, waste disposal, storage tanks, pipelines, utilities and tile lines.
  7. Lenses and other discontinuous units, voids, solution openings, layering, fractures, other heterogeneity, and the scale or frequency of the heterogeneity.
  8. Correlation and continuity of strata between borings.
- (3) Descriptions of the hydrogeologic units within the saturated zone, including:
  1. Thickness.
  2. Hydraulic properties, including as appropriate, conductivity, transmissivity, storativity, and effective porosity.
  3. Concentrations of chemical constituents listed in Appendix I present in the groundwater of hydrogeologic units and the source of those constituents, if known.
  4. Role and effect of each hydrogeologic unit as an aquifer, aquitard, or perched saturated zone.
  5. The actual or potential use of the aquifers as water supplies.
- (4) Plan view maps, and a series of cross sections with two oriented perpendicular and two oriented parallel to the predominant directions of groundwater flow through the MSWLF unit, showing:
  1. The extent of soil and bedrock strata.
  2. The position of the water table.
  3. The position of the uppermost aquifer.
  4. Measured values of hydraulic head.
  5. Equipotential lines and inferred groundwater streamlines of the water table, and the uppermost aquifer if different from the water table.
  6. Location of soil and bedrock borings.
  7. Location of piezometers and monitoring points, if any.
- (5) A description and evaluation of horizontal and vertical groundwater flow which specifically addresses the following and their significance to the movement of pollutants carried by groundwater:
  1. Local, intermediate and regional groundwater systems.
  2. Groundwater recharge and discharge areas within and immediately surrounding the facility, including interactions with perennial and intermittent surface waters and how the facility affects recharge rates.
  3. Existing and proposed groundwater and surface water withdrawals.
  4. The effects of heterogeneity, fractures or directional differences in permeability on groundwater movement.
  5. Directions of groundwater movement, including vertical components of flow, specific discharge rates and average linear velocities within the hydrologic strata.
  6. Seasonal or other temporal fluctuations in hydraulic head.
  7. The effect of existing and proposed MSWLF units.
- (6) An analysis of potential impacts on groundwater and surface water quality, and water users, in the event of a theoretical release at the most downgradient portion of each MSWLF unit. The analysis shall at a minimum utilize contaminants and indicator parameters with high mobility in groundwater (e.g., chlorides, organic solvents). This analysis shall include:
  1. Assumptions and approximations utilized, and why they were utilized.

2. If a model is utilized, a thorough description of models used and each model's capabilities and limitations, including the reliability and accuracy of the models in actual field tests.

3. Projected paths and rates of movement of contaminants found in leachate.

(7) Recommendations for the location of the proposed MSWLF unit and conceptual design based on hydrogeologic information.

**113.6(4) *Site exploration and characterization report.*** An MSWLF shall maintain a site exploration and characterization report. At a minimum, the site exploration and characterization report shall detail compliance with the requirements of rule 113.6(455B) and shall contain the following components.

a. A title page and index.

b. A legal description of the site.

c. Proof of the applicant's ownership of the site and legal entitlement to use the site as an MSWLF.

If the applicant does not own the site, then proof of legal entitlement to the site, such as, for example, a lease, must be submitted. Such legal entitlement must include the following:

(1) Provisions that allow continued disposal operations until closure of the facility.

(2) Provisions for the performance of facility closure operations.

(3) Provisions for postclosure care for at least a 30-year period after facility closure.

d. Proof of the applicant's local siting approval pursuant to Iowa Code section 455B.305A, if applicable.

e. Scaled maps or aerial photographs locating the boundaries of the facility and identifying:

(1) North and other principal compass points.

(2) Section lines and other legal boundaries.

(3) Zoning and land use within 0.5 miles.

(4) Haul routes to and from the facility, including load limits or other restrictions on those routes.

(5) Topography within 0.5 miles.

(6) Applicable setback distances and location requirements pursuant to rule 113.6(455B),

including:

1. Airports within 6 miles of existing, new and planned MSWLF units.

2. Floodplains within or adjacent to the facility.

3. Wetlands within or adjacent to the facility.

4. Fault areas within 200 feet of existing, new and planned MSWLF units.

5. Seismic impact zones within or adjacent to the facility.

6. Unstable areas within or adjacent to the facility.

7. Location of threatened or endangered species within or adjacent to the facility.

8. Location of cultural resources within or adjacent to the facility.

9. Wells within 1,000 feet of upgradient existing, new and planned MSWLF units.

10. Community water systems within 1 mile of upgradient existing, new and planned MSWLF units.

11. Boundaries of the existing, new and planned MSWLF units and the facility property line.

12. Housing and sensitive populations within 500 feet of existing, new and planned MSWLF units.

f. The bird-aircraft hazard demonstration pursuant to paragraph 113.6(2) "a," if applicable.

g. The floodplain demonstration pursuant to paragraph 113.6(2) "b," if applicable.

h. The wetlands demonstration pursuant to paragraph 113.6(2) "c," if applicable.

i. The fault area demonstration pursuant to paragraph 113.6(2) "d," if applicable.

j. The seismic impact zone demonstration pursuant to paragraph 113.6(2) "e," if applicable.

k. The unstable area demonstration pursuant to paragraph 113.6(2) "f," if applicable.

l. The threatened or endangered flora and fauna demonstration pursuant to paragraph 113.6(2) "g," if applicable.

m. The cultural resources demonstration pursuant to paragraph 113.6(2) "h," if applicable.

n. Copies of written agreements with surrounding property owners pursuant to paragraph 113.6(2) "i," if applicable.

o. The soil and hydrogeologic investigation description and analysis pursuant to paragraph 113.6(3) "e."

**567—113.7(455B) MSWLF unit design and construction standards.** All MSWLF units shall be designed and constructed in accordance with this rule.

**113.7(1) *Pre-design meeting with the department.*** A potential applicant for a new MSWLF unit may schedule a pre-design meeting with the department's landfill permitting staff prior to beginning work on the plans and specifications of a modified or new MSWLF. The purpose of this meeting is to help minimize the need for revisions upon submittal of the official designs and specifications.

**113.7(2) *Plans and specifications.***

*a.* Unless otherwise requested by the department, one copy of plans, specifications and supporting documents shall be sent to the department for review. Upon written department approval, the documents shall be submitted in triplicate to the department for proper distribution.

*b.* All new MSWLF units shall be constructed in compliance with the rules and regulations in effect at the time of construction. Previous department approval of plans and specifications for MSWLF units not yet constructed shall be superseded by the promulgation of new rules and regulations, after which plans and specifications shall be resubmitted to the department for approval prior to construction and operation.

**113.7(3) *General site design and construction requirements.*** An MSWLF shall have the following:

- a.* All-weather access roads to the facility.
- b.* A perimeter fence with a lockable gate(s) to help prevent unauthorized access.
- c.* A sign at the entrance to the facility specifying:
  - (1) Name and permit number of the facility.
  - (2) Days and hours that the facility is open to the public or a statement that the facility is not open to the public.
  - (3) A general list of materials that are not accepted.
  - (4) Telephone number of the official responsible for operation of the facility and the emergency contact person(s).

*d.* All-weather access roads within the facility.

*e.* Signs or pavement markings clearly indicating safe and proper on-site traffic patterns.

*f.* Adequate queuing distance for vehicles entering and exiting the property.

*g.* A scale certified by the Iowa department of agriculture and land stewardship.

**113.7(4) *MSWLF unit subgrade.*** The subgrade for a new MSWLF unit shall be constructed as follows:

*a.* All trees, stumps, roots, boulders, debris, and other material capable of deteriorating in situ material strength or of creating a preferential pathway for contaminants shall be completely removed or sealed off prior to construction of the MSWLF unit.

*b.* The material beneath the MSWLF unit shall have sufficient strength to support the weight of the unit during all phases of construction and operation. The loads and loading rate shall not cause or contribute to failure of the liner and leachate collection system.

*c.* The total settlement or swell of the MSWLF unit's subgrade shall not cause or contribute to failure of the liner and leachate collection system.

*d.* If the in situ material of the MSWLF unit's subgrade cannot meet the requirements of paragraphs 113.7(4) "b" and 113.7(4) "c," then such material shall be removed and replaced with material capable of compliance.

*e.* The subgrade of an MSWLF unit shall be constructed and graded to provide a smooth working surface on which to construct the liner.

*f.* The subgrade of an MSWLF unit shall not be constructed in or with frozen soil.

**113.7(5) *MSWLF unit liners and leachate collection systems.*** The liner and leachate collection system for a new MSWLF unit shall be constructed in accordance with the requirements of this subrule. All active portions must have a composite liner or an alternative liner approved by the department. An MSWLF unit must have a functioning leachate collection system during its active life.

*a. *Liner systems.** An MSWLF unit shall have a liner system that complies with either the composite liner requirements of subparagraph 113.7(5) "a"(1) or an alternative liner system that

complies with the requirements of subparagraph 113.7(5)“a”(2). Liners utilizing compacted soil must place the compacted soil in lifts no thicker than 8 inches after compaction.

(1) Composite liner systems.

1. A composite liner consists of two components, an upper flexible membrane liner (FML) and a lower compacted soil liner.

2. The upper component must consist of a minimum 30-mil flexible membrane liner (FML). FML components consisting of high-density polyethylene (HDPE) shall be at least 60 mil thick. The FML component must be installed in direct and uniform contact with the lower compacted soil component.

3. The lower component must consist of at least a 2-foot layer of compacted soil with a hydraulic conductivity of no more than  $1 \times 10^{-7}$  centimeters per second (cm/sec). The compacted soil must be placed in lifts no thicker than 8 inches after compaction.

4. The composite liner must be adequately sloped toward the leachate collection pipes to provide drainage of leachate. Unless alternative design requirements to this performance standard are approved as part of the permit under subrule 113.2(11) (relating to equivalency review procedure), the leachate collection system shall have a slope greater than or equal to 2 percent and not exceeding 33 percent.

(2) Alternative liner systems.

1. The design must ensure that the concentration values listed in Table I of rule 113.7(455B) will not be exceeded in the uppermost aquifer at the relevant point of compliance, as specified pursuant to numbered paragraph 113.7(5)“a”(2)“2.” Alternative liners utilizing compacted soil must place the compacted soil in lifts no thicker than 8 inches.

2. The relevant point of compliance specified by the department must be within 50 feet of the planned liner or waste boundary, unless site conditions dictate otherwise, downgradient of the facility with respect to the hydrologic unit being monitored in accordance with subparagraph 113.10(2)“a”(2), and located on land owned by the owner of the MSWLF unit. The relevant point of compliance specified by the department shall be at least 50 feet from the property line of the facility.

3. When approving an alternative liner design, the department shall consider at least the following factors:

- The hydrogeologic characteristics of the facility and surrounding land.
- The climatic factors of the area.
- The volume and physical and chemical characteristics of the leachate.
- The sensitivities and limitations of the modeling demonstrating the applicable point of compliance.
- Practicable capability of the owner or operator.

4. The alternative liner must be adequately sloped toward the leachate collection pipes to provide drainage of leachate. Unless alternative design requirements to this performance standard are approved as part of the permit under subrule 113.2(11) (relating to equivalency review procedure), the leachate collection system shall have a slope greater than or equal to 2 percent and not exceeding 33 percent.

Table I

Chemical	MCL (mg/l)
Arsenic . . . . .	0.01
Barium . . . . .	1.0
Benzene . . . . .	0.005
Cadmium . . . . .	0.01
Carbon tetrachloride . . . . .	0.005
Chromium (hexavalent) . . . . .	0.05
2,4-Dichlorophenoxy acetic acid . . . . .	0.1
1,4-Dichlorobenzene . . . . .	0.075
1,2-Dichloroethane . . . . .	0.005
1,1-Dichloroethylene . . . . .	0.007



Endrin .....	0.0002
Fluoride .....	4.0
Lindane .....	0.004
Lead .....	0.05
Mercury .....	0.002
Methoxychlor .....	0.1
Nitrate .....	10.0
Selenium .....	0.01
Silver .....	0.05
Toxaphene .....	0.005
1,1,1-Trichloromethane .....	0.2
Trichloroethylene .....	0.005
2,4,5-Trichlorophenoxy acetic acid .....	0.01
Vinyl chloride .....	0.002

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*b. Leachate collection system.* All MSWLF units shall have a leachate collection system that complies with the following requirements:

(1) The leachate collection system shall be designed and constructed to function for the entire active life of the facility and the postclosure period.

(2) The leachate collection system shall be of a structural strength capable of supporting waste and equipment loads throughout the active life of the facility and the postclosure period.

(3) The leachate collection system shall be designed and constructed to minimize leachate head over the liner at all times. An MSWLF unit shall have a leachate collection system that maintains less than a 30-centimeter (i.e., 12-inch) depth of leachate over the liner. The leachate collection system shall have a method for accurately measuring the leachate head on the liner at the system's lowest point(s) within the MSWLF unit (e.g., sumps). Furthermore, an additional measuring device shall be installed to measure leachate directly on the liner in the least conductive drainage material outside of the sump and collection trench. Leachate head measurements from cleanout lines or manholes are not acceptable for the second measurement. All such measurement devices shall be in place before waste is placed in the MSWLF unit.

(4) If the leachate collection system is not designed and constructed factoring in leachate recirculation or bioreactor operations, the department may prohibit such activities within the MSWLF unit.

(5) The collection pipes shall be of a length and cross-sectional area that allow for cleaning and inspection through the entire length of all collection pipes at least once every three years. The collection pipes shall not be designed or constructed with sharp bends that prevent cleaning or inspection along any section of the collection pipe or that may cause the collection pipe to be damaged during cleaning or inspection.

(6) Leachate collection system designs shall attempt to minimize the potential for clogging due to mass loading.

(7) Unless alternative design requirements are approved as part of the permit under subrule 113.2(11) (relating to equivalency review procedure), the following design requirements shall apply:

1. A geotextile cushion over the flexible membrane liner (FML), if the liner utilizes an FML and granular drainage media. A geotextile cushion is not required if the granular drainage media is well rounded and less than 3/8 inch in diameter. The geotextile's mass shall be determined based on the allowable pressure on the geomembrane.

2. Collection pipe(s) at least 4 inches in diameter at the base of the liner slope(s), surrounded by the high hydraulic-conductivity material listed in numbered paragraph 113.7(5) "b"(7)"3" below. The collection pipe shall have slots or holes large enough to minimize the potential for clogging from fines conveyed by incoming leachate.

3. One of the following high hydraulic-conductivity materials:

- High hydraulic-conductivity material (e.g., gravel) of uniform size and a fines content of no more than 5 percent by weight passing a #200 sieve. The high hydraulic-conductivity material shall be at least 12 inches in depth and have a hydraulic conductivity of at least  $1 \times 10^{-2}$  cm/sec; or

- A geosynthetic drainage media (e.g., geonet). The transmissivity of geonets shall be tested with method ASTM D4716, or an equivalent test method, to demonstrate that the design transmissivity will be maintained for the design period of the facility. The testing for the geonet in the liner system shall be conducted using actual boundary material intended for the geonet at the maximum design normal load for the MSWLF unit, and at the design load expected from one lift of waste. At the maximum design normal load, testing shall be conducted for a minimum period of 100 hours unless data equivalent of the 100-hour period is provided, in which case the test shall be conducted for a minimum period of one hour. In the case of the design load from one lift of waste, the minimum period shall be one hour. For geonets used in final covers, only one test shall be conducted for a minimum period of one hour using the expected maximum design normal load from the cover soils and the actual boundary materials intended for the geonet. A granular layer at least 12 inches thick with a hydraulic conductivity of at least  $1 \times 10^{-3}$  cm/sec shall be placed above the geosynthetic drainage material that readily transmits leachate and provides separation between the waste and liner.

(8) Manholes within the MSWLF unit shall be designed to minimize the potential for stressing or penetrating the liner due to friction on the manhole exterior from waste settlement.

(9) The leachate drainage and collection system within the MSWLF unit shall not be used for the purpose of storing leachate. If leachate is to be stored, it shall be stored in designated storage structures outside of the MSWLF unit.

(10) All of the facility's leachate storage and management structures outside of the MSWLF unit (e.g., tanks, holding ponds, pipes, sumps, manholes, lift stations) and operations shall have containment structures or countermeasures adequate to prevent seepage to groundwater or surface water. The containment structures and countermeasures for leachate storage shall be at least as protective of groundwater at the liner of the MSWLF unit on a performance basis.

(11) Unless alternative design requirements are approved as part of the permit under subrule 113.2(11) (relating to equivalency review procedure), the leachate storage structures shall be able to store at least 7 days of accumulated leachate at the maximum generation rate used in designing the leachate collection system. Such minimum storage capacity may be constructed in phases over time so long as the 7-day accumulation capacity is maintained. The storage facility shall also have the ability to load tanker trucks in case sanitary sewer service is unavailable for longer than 7 days.

(12) The leachate collection system shall be equipped with valves or devices similar in effectiveness so that leachate can be controlled during maintenance.

(13) The leachate collection system shall be accessible for maintenance at all times and under all weather conditions.

(14) The permit holder shall annually submit a Leachate Control System Performance Evaluation (LCSPE) Report as a supplement to the facility Annual Water Quality Report, as defined in subrule 113.10(10). The report shall include an evaluation of the effectiveness of the system in controlling the leachate, leachate head levels and elevations, the volume of leachate collected and transported to the treatment works or discharged under any NPDES permits, records of leachate contaminants testing required by the treatment works, proposed additional leachate control measures, and an implementation schedule in the event that the constructed system is not performing effectively.

**113.7(6) *Quality control and assurance programs.*** All MSWLF units shall be constructed under the supervision of a strict quality control and assurance (QC&A) program to ensure that MSWLF units are constructed in accordance with the requirements of rule 113.7(455B) and the approved plans and specifications. At a minimum, such a QC&A program shall consist of the following.

*a.* The owner or operator shall designate a quality control and assurance (QC&A) officer. The QC&A officer shall be a professional engineer (P.E.) registered in Iowa. The QC&A officer shall not be an employee of the facility, the construction company or construction contractor. The owner or operator shall notify the department of the designated QC&A officer and provide the department with that person's

contact information. The QC&A officer may delegate another person or persons who are not employees of the facility to supervise or implement an aspect of the QC&A program.

b. The QC&A officer shall document compliance with rule 113.7(455B), and the approved plans and specifications, for the following aspects of construction:

(1) The MSWLF unit's subgrade.

(2) The liner system, as applicable, below:

1. The flexible membrane liner (FML). Destructive testing of the FML shall be kept to side slopes when continuous seams are utilized. Patches over FML destructive testing areas shall be checked with nondestructive methods.

2. The compacted clay component of the liner system. A minimum of five field moisture density tests per 8-inch lift per acre shall be performed to verify that the correct density, as correlated to permeability by a laboratory analysis, has been achieved. Laboratory hydraulic conductivity testing of Shelby tube samples from the constructed soil liner or test pad, or field hydraulic conductivity testing of the constructed soil liner or test pad, or other methods approved by the department, shall be utilized as a QC&A test.

(3) The leachate collection, conveyance and storage systems.

(4) Any other aspect of construction as required by the department.

c. A sampling and testing program shall be implemented by the QC&A officer as part of the QC&A program. The sampling and testing program shall:

(1) Verify full compliance with the requirements of rule 113.7(455B), and the approved plans and specifications.

(2) Be approved by the department prior to construction of the MSWLF unit.

(3) Detail how each stage of construction will be verified for full compliance with the requirements of rule 113.7(455B), and the approved plans and specifications.

(4) Be based on statistically significant sampling techniques and establish criteria for the acceptance or rejection of materials and constructed components of the MSWLF unit.

(5) Detail what actions will take place to remedy and verify any material or constructed component that is not in compliance with the requirements of rule 113.7(455B), and the approved plans and specifications.

d. The QC&A officer shall document the QC&A program. Upon completion of the MSWLF unit construction, the QC&A officer shall submit a final report to the department that verifies compliance with the requirements of rule 113.7(455B), and the approved plans and specifications. A copy of the final report shall also be maintained by the facility in the operating record. At a minimum, the final report shall include the following.

(1) A title page and index.

(2) The name and permit number of the facility.

(3) Contact information for the QC&A officer and persons delegated by the QC&A officer to supervise or implement an aspect of the QC&A program.

(4) Contact information for all construction contractors.

(5) Copies of daily reports containing the following information.

1. The date.

2. Summary of weather conditions.

3. Summary of locations on the facility where construction was occurring.

4. Summary of equipment, materials and personnel utilized in construction.

5. Summary of meetings held regarding the construction of the MSWLF unit.

6. Summary of construction progress.

7. Photographs of the construction progress, with descriptions of the time, subject matter and location of each photograph.

8. Details of sampling and testing program for that day. At a minimum, this report shall include details of where sampling and testing occurred, the methods utilized, personnel involved and test results.

9. Details of how any material or constructed component that was found not to be in compliance via the sampling and testing program was remedied.

(6) A copy of detailed as-built drawings with supporting documentation and photographic evidence. This copy shall also include a narrative explanation of changes from the original department-approved plans and specifications.

(7) A signed and sealed statement by the QC&A officer that the MSWLF unit was constructed in accordance with the requirements of rule 113.7(455B), and the approved plans and specifications.

**113.7(7) Vertical and horizontal expansions of MSWLF units.** All vertical and horizontal expansions of disposal airspace over existing and new MSWLF units shall comply with the following requirements.

*a.* Horizontal expansions shall, at a minimum, comply with the following requirements:

(1) Horizontal expansions are new MSWLF units and, at a minimum, shall be designed and constructed in accordance with subrules 113.7(4), 113.7(5) and 113.7(6).

(2) The slope stability of the horizontal expansion between the existing unit and new MSWLF unit shall be analyzed. The interface between two MSWLF units shall not cause a slope failure of either of the MSWLF units.

(3) A horizontal expansion may include a vertical elevation increase of an existing MSWLF unit, pursuant to paragraph 113.7(7) “*b*,” if approved by the department.

*b.* Vertical expansions shall, at a minimum, comply with the following requirements:

(1) A vertical expansion of an MSWLF unit shall not be allowed if the MSWLF unit does not have an approved leachate collection system and a composite liner or a leachate collection system and an alternative liner modeled at an approved point of compliance.

(2) An analysis of the structural impacts of the proposed vertical expansion on the liner and leachate collection system shall be completed. The vertical expansion shall not contribute to the structural failure of the liner and leachate collection system.

(3) An analysis of the impact of the proposed vertical expansion on leachate generation shall be completed. The vertical expansion shall not overload the leachate collection system or contribute to excess head on the liner.

(4) An analysis of the effect of the proposed vertical expansion on run-on, runoff and discharges into waters of the state shall be completed. The vertical expansion shall not cause a violation of subrule 113.7(8).

(5) The proposed vertical expansion shall be in compliance with the final slopes required at closure pursuant to paragraph 113.12(1) “*e*.”

(6) An analysis of the potential impact of the proposed vertical expansion on litter generation shall be completed. Landfill management strategies may need to be amended to help prevent increased litter.

(7) An analysis of the impact of the proposed vertical expansion on lines-of-sight and any visual buffering utilized by the landfill shall be completed.

**113.7(8) Run-on and runoff control systems.**

*a.* Owners or operators of all MSWLF units must design, construct, and maintain the following:

(1) A run-on control system to prevent flow onto the active portion of the landfill during the peak discharge from a 25-year storm;

(2) A runoff control system from the active portion of the landfill to collect and control at least the water volume resulting from a 24-hour, 25-year storm.

*b.* Runoff from the active portion of the MSWLF unit must be handled in accordance with paragraph 113.10(1) “*a*.”

**567—113.8(455B) Operating requirements.** The requirements of this rule shall be consolidated in a development and operations plan (DOPs) pursuant to subrule 113.8(4) and the emergency response and remedial action plan (ERRAP) pursuant to subrule 113.8(5), as applicable.

**113.8(1) Prohibited operations and activities.** For the purposes of this subrule, “regulated hazardous waste” means a solid waste that is a hazardous waste, as defined in Iowa Code section 455B.411.

*a. Waste screening for prohibited materials.* Owners or operators of all MSWLF units must implement a program at the facility for detecting and preventing the disposal of regulated hazardous wastes, polychlorinated biphenyls (PCB) wastes and other prohibited wastes listed in paragraph 113.8(1) “*b*.” This program must include, at a minimum:

(1) Random inspections of incoming loads unless the owner or operator takes other steps to ensure that incoming loads do not contain regulated hazardous wastes, PCB wastes or other prohibited wastes listed in paragraph 113.8(1)“b”;

(2) Records of any inspections;

(3) Training of facility personnel to recognize regulated hazardous wastes, PCB wastes and other prohibited wastes listed in paragraph 113.8(1)“b”; and

(4) Notification of the EPA regional administrator if regulated hazardous wastes or PCB wastes are discovered at the facility.

*b. Materials prohibited from disposal.* The following wastes shall not be accepted for disposal by an MSWLF. Some wastes may be banned from disposal via the multiple categories listed below.

(1) Hazardous waste, whether it is a chemical compound specifically listed by EPA as a regulated hazardous waste or a characteristic hazardous waste pursuant to the characteristics below:

1. Ignitable in that the waste has a flash point (i.e., it will ignite) at a temperature of less than 140 degrees Fahrenheit.

2. Corrosive in that the waste has a pH less than 2 or greater than 12.5.

3. Reactive in that the waste is normally unstable; reacts violently with water; forms an explosive mixture with water; contains quantities of cyanide or sulfur that could be released into the air in sufficient quantity to be a danger to human health; or can easily be detonated or exploded.

4. Toxicity characteristic leaching procedure (TCLP) (EPA Method 1311) toxic, in that a TCLP listed chemical constituent exceeds the EPA assigned concentration standard in 40 CFR Part 261 or the department assigned concentration standard in Table I of rule 113.7(455B). Waste from a residential building that is contaminated by lead-based paint (i.e., the waste fails the TCLP test for lead only) may be disposed of in an MSWLF unit. The purpose of this exclusion is to help prevent the exposure of children to lead-based paint. Therefore, the meaning of “residential building” in regard to this TCLP exclusion shall be interpreted broadly and include any building which children or parents may utilize as a residence (temporarily or permanently). Such residential buildings include, but are not limited to, single-family homes, apartment buildings, townhomes, condominiums, public housing, military barracks, nursing homes, hotels, motels, bunkhouses, and campground cabins.

(2) Polychlorinated biphenyl (PCB) wastes with a concentration equal to or greater than 50 parts per million (ppm).

(3) Free liquids, liquid waste and containerized liquids. For purposes of this subparagraph, “liquid waste” means any waste material that is determined to contain “free liquids” as defined by Method 9095B (Paint Filter Liquids Test), as described in Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods (EPA Pub. No. SW-846). For the purposes of this subparagraph, “gas condensate” means the liquid generated as a result of the gas recovery process(es) at the MSWLF unit. However, free liquids and containerized liquids may be placed in MSWLF units if:

1. The containerized liquid is household waste other than septic waste. The container must be a small container similar in size to that normally found in household waste;

2. The waste is leachate or gas condensate derived from the MSWLF unit, whether it is a new or existing MSWLF unit or lateral expansion, and is designed with a composite liner and leachate collection system as described in paragraph 113.7(5)“a.” The owner or operator must demonstrate compliance with this subparagraph and place the demonstration in the operating record; or

3. The MSWLF unit is a research, development and demonstration (RD&D) project in which the department has authorized the addition of liquids and meets the applicable requirements of subrule 113.4(10).

(4) Septage, which is the raw material, liquids and pumpings from a septic system, unless treated pursuant to 567—Chapter 68.

(5) Appliances as defined pursuant to 567—Chapter 118, unless there is documentation that the appliance has been demanufactured pursuant to 567—Chapter 118.

(6) Radioactive waste, excluding luminous timepieces and other items using very small amounts of tritium.

(7) Infectious waste, unless managed and disposed of pursuant to 567—Chapter 109.

(8) Hot loads, meaning solid waste that is smoking, smoldering, emitting flames or hot gases, or otherwise indicating that the solid waste is in the process of combustion or close to igniting. Ash that has not been fully quenched or cooled is considered a hot load. Such wastes may be accepted at the gate, but shall be segregated and completely extinguished and cooled in a manner as safe and responsible as practical before disposal.

(9) Asbestos-containing material (ACM) waste with greater than 1 percent asbestos, unless managed and disposed of pursuant to 567—Chapter 109.

(10) Petroleum-contaminated soil, unless managed and remediated pursuant to 567—Chapter 120.

(11) Grit and bar screenings, and grease skimmings, unless managed and disposed of pursuant to 567—Chapter 109.

(12) Waste tires, unless each tire is processed into pieces no longer than 18 inches on any side. The department encourages the recycling of all waste tires, even if processed to disposal standards.

(13) Yard waste.

(14) Lead-acid batteries.

(15) Waste oil and materials containing free-flowing waste oil. Materials contaminated with waste oil may be disposed of if no free-flowing oil is retained in the material, and the material is not a hazardous waste.

(16) Baled solid waste, unless the waste is baled on site after the waste has been visually inspected for prohibited materials.

*c. Open burning and fire hazards.* No open burning of any type shall be allowed within the permitted boundary of an MSWLF facility. The fueling of vehicles and equipment, and any other activity that may produce sparks or flame, shall be conducted at least 50 feet away from the working face.

*d. Scavenging and salvaging.* Scavenging shall not be allowed at the MSWLF facility. However, salvaging by MSWLF operators may be allowed.

*e. Animal feeding and grazing.* Feeding animals MSW shall not be allowed at an MSWLF facility. The grazing of domestic animals on fully vegetated areas of the MSWLF facility not used for disposal, including closed MSWLF units, may be allowed by the department so long as the animals do not cause damage or interfere with operations, inspections, environmental monitoring and other required activities. Large, hooved animals (including but not limited to buffalo, cattle, llamas, pigs, and horses) shall not be allowed on closed MSWLF units.

**113.8(2) Disposal operations and activities.** All MSWLFs shall comply with the following requirements.

*a. Survey controls and monuments.* Survey controls and monuments shall be maintained as follows.

(1) The property boundary, the permitted boundary and the boundaries of all MSWLF units shall be surveyed and marked by a professional land surveyor at least once prior to closure.

(2) Prior to waste placement, all new MSWLF unit boundaries shall be surveyed and marked by a professional engineer.

(3) Survey monuments shall be established to check vertical elevations and the progression of fill sequencing. The survey monuments shall be established and maintained by a professional land surveyor.

(4) All survey stakes and monuments shall be clearly marked.

(5) A professional engineer shall biennially inspect all survey monuments and replace missing or damaged survey monuments.

*b. First lift.* The first lift and initial placement of MSW over a new MSWLF unit liner and leachate collection system shall comply with the following requirements.

(1) Waste shall not be placed in the new MSWLF unit until the QC&A officer has submitted a signed and sealed final report to the department pursuant to paragraph 113.7(6)“d” and that report has been approved by the department.

(2) Construction and earth-moving equipment shall not operate directly on the liner and leachate management system. Waste disposal operations shall begin at the edge of the new MSWLF unit by pushing MSW out over the liner and leachate collection system. Compactors and other similarly heavy

equipment shall not operate directly on the leachate collection system until a minimum of 4 feet of waste has been mounded over the top of the leachate collection system.

(3) Construction and demolition debris and materials clearly capable of spearing through the leachate collection system and liner shall not be placed in the first 4 feet of waste over the top of the leachate collection system. The first 4 feet of waste shall consist of select waste that is unlikely to damage the liner and performance of the leachate collection system.

(4) The owner or operator must place documentation in the operating record and submit a copy to the department that adequate cover material was placed over the top of the leachate collection system in the MSWLF unit or that freeze/thaw effects had no adverse impact on the compacted clay component of the liner.

*c. Fill sequencing.* The rate and phasing of disposal operations shall comply with the following requirements.

(1) The fill sequencing shall be planned and conducted in a manner and at a rate that do not cause a slope failure, lead to extreme differential settlement, or damage the liner and leachate collection system.

(2) The fill sequencing shall be planned and conducted in a manner compliant with the run-on and runoff requirements of subrule 113.7(8) and surface water requirements of rule 113.10(455B).

*d. Working face.* The working face shall comply with the following requirements.

(1) The working face shall be no larger than necessary to accommodate the rate of disposal in a safe and efficient manner.

(2) The working face shall not be so steep as to cause heavy equipment and solid waste collection vehicles to roll over or otherwise lose control.

(3) Litter control devices of sufficient size to help prevent blowing litter shall be utilized at the working face. The operation of the working face shall attempt to minimize blowing litter.

(4) The operation of the working face shall prevent the harborage of vectors and attempt to minimize the attraction of vectors.

(5) Employees at the working face shall be trained to visually recognize universal symbols, markings and indications of prohibited wastes pursuant to paragraph 113.8(1) "b."

*e. Special wastes.* Special wastes shall be managed and disposed of pursuant to 567—Chapter 109.

*f. Cover material and alternative cover material.* Pursuant to 567—Chapter 108, alternative cover material of an alternative thickness (e.g., tarps, spray covers) may be authorized if the owner or operator demonstrates to the approval of the department that the alternative material and thickness control vectors, fires, odors, blowing litter, and scavenging without presenting a threat to human health and the environment. Cover material or alternative cover material shall be available for use during all seasons in all types of weather. Cover material and alternative cover material shall be utilized as follows unless otherwise approved by the department pursuant to 567—Chapter 108:

(1) Daily cover. Six inches of cover material or an approved depth or application of alternative cover material shall be placed and maintained over waste in the active portion at the end of each operating day, or at more frequent intervals if necessary, to control vectors, fires, odors, blowing litter, and scavenging.

(2) Intermediate cover. At least 1 foot of compacted cover material or an approved depth or application of alternative cover material shall be placed and maintained over waste in the active portion that has not or will not receive more waste for at least 30 days. At least 2 feet of compacted cover material or alternative cover material shall be placed and maintained over waste in the active portion that has not or will not receive waste for at least 180 days. Such active portions shall be graded to manage run-on and runoff pursuant to subrule 113.7(8). Such active portions shall be seeded if they will not receive waste for a full growing season.

(3) Scarification of cover. To help prevent leachate seeps by aiding the downward flow of leachate, cover material or alternative cover material, which prevents the downward flow of leachate and is at least 5 feet from the outer edge of the MSWLF unit, shall be scarified prior to use of that area as a working face. Cover material or alternative cover material that does not impede the downward flow of leachate, as approved by the department, does not require scarification. Scarification may be as simple as the

spearing or breaking up of a small area of the cover. Areas of intermediate cover may require removal of some of the cover material or alternative cover material to aid the downward flow of leachate.

(4) Final cover. Final cover over an MSWLF unit that is to be closed shall be constructed and maintained according to the closure and postclosure requirements of rules 113.12(455B) and 113.13(455B).

*g. Leachate seeps.* Leachate seeps shall be contained and plugged upon being identified. Leachate seeps shall not be allowed to reach waters of the state. Soils outside of the MSWLF unit that are contaminated by a leachate seep shall be excavated and then disposed of within the MSWLF unit. Such soils may be used for daily cover material.

*h. Leachate recirculation.* The department must approve an MSWLF unit for leachate recirculation. The primary goal of the leachate recirculation system is to help stabilize the waste in a more rapid, but controlled, manner. The leachate recirculation system shall not contaminate waters of the state, contribute to erosion, damage cover material, harm vegetation, or spray persons at the MSWLF facility. Leachate recirculation shall be limited to MSWLF units constructed with a composite liner.

*i. Differential settlement.* Areas of differential settlement sufficient to interfere with runoff and run-on shall be brought back up to the contours of the surrounding active portion. Differential settlement shall not be allowed to cause ponding of water on the active portion.

**113.8(3) Facility operations and activities.** All MSWLFs shall comply with the following requirements.

*a. Controlled access.* Owners or operators of all MSWLF units must control public access and prevent unauthorized vehicular traffic and illegal dumping of wastes by using artificial barriers, natural barriers, or both, as appropriate to protect human health and the environment.

*b. Scales and weights.* A scale certified by the Iowa department of agriculture and land stewardship shall weigh all solid waste collection vehicles and solid waste transport vehicles. The owner or operator shall maintain a record of the weight of waste disposed of.

*c. All-weather access to disposal.* A disposal area shall be accessible during all weather conditions.

*d. Salvaged and processed materials.* Salvaged and processed materials (e.g., scrap metal, compost, mulch, aggregate, tire chips) shall be managed and stored in an orderly manner that does not create a nuisance or encourage the attraction or harborage of vectors.

*e. Vector control.* Owners or operators must prevent or control the on-site populations of vectors using techniques appropriate for the protection of human health and the environment.

*f. Litter control.* The operator shall take steps to minimize the production of litter and the release of windblown litter off site of the facility. All windblown litter off site of the facility shall be collected daily unless prevented by unsafe working conditions. On-site litter shall be collected daily unless prevented by working conditions. A dated record of unsafe conditions that prevented litter collection activities shall be maintained by the facility.

*g. Dust.* The operator shall take steps to minimize the production of dust so that unsafe or nuisance conditions are prevented. Leachate shall not be used for dust control purposes.

*h. Mud.* The operator shall take steps to minimize the tracking of mud by vehicles exiting the facility so that slick or unsafe conditions are prevented.

*i. Leachate and wastewater treatment.* The leachate management system shall be managed and maintained pursuant to the requirements of paragraph 113.7(5) "b." Leachate collection pipes shall be cleaned and inspected as necessary, but not less than once every three years. Leachate and wastewater shall be treated as necessary to meet the pretreatment limits, if any, imposed by an agreement between the MSWLF and a publicly owned wastewater treatment works (POTW) or by the effluent discharge limits established by an NPDES permit. Documentation of the POTW agreement or NPDES permit must be submitted to the department. All leachate and wastewater treatment systems shall conform to department wastewater design standards.

*j. Financial assurance.* Financial assurance shall be maintained pursuant to rule 113.14(455B).

**113.8(4) Development and operations plan (DOPs).** An MSWLF unit shall maintain a development and operations plan (DOPs). At a minimum, the DOPs shall detail how the facility will operate and how



compliance with the requirements of rule 113.8(455B) will be maintained. The DOPs shall contain at least the following components.

- a. A title page and table of contents.
- b. Telephone number of the official responsible for the operation of the facility and an emergency contact person if different.
- c. Service area of the facility and political jurisdictions included in that area.
- d. Days and hours of operation of the facility.
- e. Details of how the site will comply with the prohibited operations and activity requirements of subrule 113.8(1) and any related permit conditions.
- f. Details of how the site will comply with the disposal operation and activity requirements of subrule 113.8(2) and any related permit conditions.
- g. Details of how the site will comply with the facility operations and activity requirements of subrule 113.8(3), any related permit conditions, and any leachate and wastewater treatment requirements.

**113.8(5) Emergency response and remedial action plan (ERRAP).** All MSWLFs shall develop, submit to the department for approval, and maintain on site an ERRAP.

- a. *ERRAP submittal requirements.* An updated ERRAP shall be submitted to the department with any permit modification or renewal request that incorporates facility changes that impact the ERRAP.
- b. *Content.* The ERRAP is intended to be a quick reference during an emergency. The content of the ERRAP shall be concise and readily usable as a reference manual by facility managers and operators during emergency conditions. The ERRAP shall contain and address at least the following components, unless facility conditions render the specific issue as not applicable. To facilitate department review, the rationale for exclusion of any issues that are not applicable must be provided either in the body of the plan or as a supplement. Additional ERRAP requirements unique to the facility shall be addressed as applicable.

- (1) Facility information.
  1. Permitted agency.
  2. DNR permit number.
  3. Responsible official and contact information.
  4. Certified operator and contact information.
  5. Facility description.
  6. Site and environs map.
- (2) Regulatory requirements.
  1. Iowa Code section 455B.306(6)“d” criteria citation.
  2. Reference to provisions of the permit.
- (3) Emergency conditions, response activities and remedial action.
  1. Failure of utilities.
    - Short-term (48 hours or less).
    - Long-term (over 48 hours).
  2. Evacuation procedures during emergency conditions.
  3. Weather-related events.
    - Tornado and wind events.
    - Snow and ice.
    - Intense rainstorms, mud, and erosion.
    - Lightning strikes.
    - Flooding.
    - Event and postevent conditions.
  4. Fire and explosions.
    - Waste materials.
    - Buildings and site.
    - Equipment.
    - Fuels.
    - Utilities.

- Facilities.
- Working area.
- Hot loads.
- Waste gases.
- Explosive devices.
- 5. Regulated waste spills and releases.
  - Waste materials.
  - Leachate.
  - Waste gases.
  - Waste stockpiles and storage facilities.
  - Waste transport systems.
  - Litter and airborne particulate.
  - Site drainage system.
  - Off-site releases.
- 6. Hazardous material spills and releases.
  - Load-check control points.
  - Mixed waste deliveries.
  - Fuels.
  - Waste gases.
  - Site drainage systems.
  - Off-site releases.
- 7. Mass movement of land and waste.
  - Earthquakes.
  - Slope failure.
  - Waste shifts.
  - Waste subsidence.
- 8. Emergency and release notification and reporting.
  - Federal agencies.
  - State agencies.
  - County and city agencies including emergency management services.
  - News media.
  - Public and private facilities with special populations within five miles.
  - Reporting requirements and forms.
- 9. Emergency waste management procedures.
  - Communications.
  - Temporary discontinuation of services—short-term and long-term.
  - Facilities access and rerouting.
  - Waste acceptance.
  - Wastes in process.
- 10. Primary emergency equipment inventory.
  - Major equipment.
  - Fire hydrants and water sources.
  - Off-site equipment resources.
- 11. Emergency aid.
  - Responder contacts.
  - Medical services.
  - Contracts and agreements.
- 12. ERRAP training requirements.
  - Training providers.
  - Employee orientation.
  - Annual training updates.
  - Training completion and record keeping.

13. Reference tables, figures and maps.

**113.8(6) MSWLF operator certification.** Sanitary landfill operators shall be trained, tested, and certified by a department-approved certification program.

a. A sanitary landfill operator shall be on duty during all hours of operation of a sanitary landfill, consistent with the respective certification.

b. To become a certified operator, an individual shall complete a basic operator training course that has been approved by the department or an alternative, equivalent training approved by the department and shall pass a departmental examination as specified by this subrule. An operator certified by another state may have reciprocity subject to approval by the department.

c. A sanitary landfill operator certification is valid until June 30 of the following even-numbered year.

d. The required basic operator training course for a certified sanitary landfill operator shall have at least 25 contact hours and shall address the following areas, at a minimum:

- (1) Description of types of wastes.
- (2) Interpreting and using engineering plans.
- (3) Construction surveying techniques.
- (4) Waste decomposition processes.
- (5) Geology and hydrology.
- (6) Landfill design.
- (7) Landfill operation.
- (8) Environmental monitoring.
- (9) Applicable laws and regulations.
- (10) Permitting processes.
- (11) Leachate control and treatment.

e. Alternate basic operator training must be approved by the department. The applicant shall be responsible for submitting any documentation the department may require to evaluate the equivalency of alternate training.

f. Fees.

(1) The examination fee for each examination is \$20.

(2) The initial certification fee is \$8 for each one-half year of a two-year period from the date of issuance to June 30 of the next even-numbered year.

- (3) The certification renewal is \$24.
- (4) The penalty fee is \$12.

g. Examinations.

(1) The operator certification examinations shall be based on the basic operator training course curriculum.

(2) All individuals wishing to take the examination required to become a certified operator of a sanitary landfill shall complete the Operator Certification Examination Application, Form 542-1354. A listing of dates and locations of examinations is available from the department upon request. The application form requires the applicant to indicate the basic operator training course taken. Evidence of training course completion must be submitted with the application for certification. The completed application and the application fee shall be sent to the department and addressed to the central office in Des Moines. Application for examination must be received by the department at least 30 days prior to the date of examination.

(3) A properly completed application for examination shall be valid for one year from the date the application is approved by the department.

(4) Upon failure of the first examination, the applicant may be reexamined at the next scheduled examination. Upon failure of the second examination, the applicant shall be required to wait a period of 180 days between each subsequent examination.

(5) Upon each reexamination when a valid application is on file, the applicant shall submit to the department the examination fee at least ten days prior to the date of examination.

(6) Failure to successfully complete the examination within one year from the date of approval of the application shall invalidate the application.

(7) Completed examinations will be retained by the department for a period of one year after which they will be destroyed.

(8) Oral examinations may be given at the discretion of the department.

*h.* Certification.

(1) All operators who passed the operator certification examination by July 1, 1991, are exempt from taking the required operator training course. Beginning July 1, 1991, all operators are required to take the basic operator training course and pass the examination in order to become certified.

(2) Application for certification must be received by the department within 30 days of the date the applicant receives notification of successful completion of the examination. All applications for certification shall be made on a form provided by the department and shall be accompanied by the certification fee.

(3) Applications for certification by examination which are received more than 30 days but less than 60 days after notification of successful completion of the examination shall be accompanied by the certification fee and the penalty fee. Applicants who do not apply for certification within 60 days of notice of successful completion of the examination will not be certified on the basis of that examination.

(4) For applicants who have been certified under other state mandatory certification programs, the equivalency of which has been previously reviewed and accepted by the department, certification without examination will be recommended.

(5) For applicants who have been certified under voluntary certification programs in other states, certification will be considered. The applicant must have successfully completed a basic operator training course and an examination generally equivalent to the Iowa examination. The department may require the applicant to successfully complete the Iowa examination.

(6) Applicants who seek Iowa certification pursuant to subparagraphs 113.8(6) "h"(4) and (5) shall submit an application for examination accompanied by a letter requesting certification pursuant to those subparagraphs. Application for certification pursuant to those subparagraphs shall be received by the department in accordance with subparagraphs 113.8(6) "h"(2) and (3).

*i.* Renewals. All certificates shall expire every two years, on even-numbered years, and must be renewed every two years to maintain certification. Application and fee are due prior to expiration of certification.

(1) Late application for renewal of a certificate may be made, provided that such late application shall be received by the department or postmarked within 30 days of the expiration of the certificate. Such late application shall be on forms provided by the department and accompanied by the penalty fee and the certification renewal fee.

(2) If a certificate holder fails to apply for renewal within 30 days following expiration of the certificate, the right to renew the certificate automatically terminates. Certification may be allowed at any time following such termination, provided that the applicant successfully completes an examination. The applicant must then apply for certification in accordance with paragraph 113.8(6) "h."

(3) An operator shall not continue to operate a sanitary landfill after expiration of a certificate without renewal thereof.

(4) Continuing education must be earned during the two-year certification period. All certified operators must earn ten contact hours per certificate during each two-year period. The two-year period will begin upon issuance of certification.

(5) Only those operators fulfilling the continuing education requirements before the end of each two-year period will be allowed to renew their certificates. The certificates of operators not fulfilling the continuing education requirements shall be void upon expiration, unless an extension is granted.

(6) All activities for which continuing education credit will be granted must be related to the subject matter of the particular certificate to which the credit is being applied.

(7) The department may, in individual cases involving hardship or extenuating circumstances, grant an extension of time of up to three months within which the applicant may fulfill the minimum continuing education requirements. Hardship or extenuating circumstances include documented

health-related confinement or other circumstances beyond the control of the certified operator which prevent attendance at the required activities. All requests for extensions must be made 60 days prior to expiration of certification.

(8) The certified operator is responsible for notifying the department of the continuing education credits earned during the period. The continuing education credits earned during the period shall be shown on the application for renewal.

(9) A certified operator shall be deemed to have complied with the continuing education requirements of this subrule during periods that the operator serves honorably on active duty in the military service; or for periods that the operator is a resident of another state or district having a continuing education requirement for operators and meets all the requirements of that state or district for practice there; or for periods that the person is a government employee working as an operator and is assigned to duty outside the United States; or for other periods of active practice and absence from the state approved by the department.

*j.* Discipline of certified operators.

(1) Disciplinary action may be taken on any of the following grounds:

1. Failure to use reasonable care or judgment or to apply knowledge or ability in performing the duties of a certified operator. Duties of certified operators include compliance with rules and permit conditions applicable to landfill operation.

2. Failure to submit required records of operation or other reports required under applicable permits or rules of the department, including failure to submit complete records or reports.

3. Knowingly making any false statement, representation, or certification on any application, record, report or document required to be maintained or submitted under any applicable permit or rule of the department.

(2) Disciplinary sanctions allowable are:

1. Revocation of a certificate.

2. Probation under specified conditions relevant to the specific grounds for disciplinary action. Additional education or training or reexamination may be required as a condition of probation.

(3) The procedure for discipline is as follows:

1. The department shall initiate disciplinary action. The commission may direct that the department investigate any alleged factual situation that may be grounds for disciplinary action under subparagraph 113.8(6)“j”(1) and report the results of the investigation to the commission.

2. A disciplinary action may be prosecuted by the department.

3. Written notice shall be given to an operator against whom disciplinary action is being considered. The notice shall state the informal and formal procedures available for determining the matter. The operator shall be given 20 days to present any relevant facts and indicate the operator's position in the matter and to indicate whether informal resolution of the matter may be reached.

4. An operator who receives notice shall communicate verbally, in writing, or in person with the department, and efforts shall be made to clarify the respective positions of the operator and department.

5. The applicant's failure to communicate facts and positions relevant to the matter by the required date may be considered when determining appropriate disciplinary action.

6. If agreement as to appropriate disciplinary sanction, if any, can be reached with the operator and the commission concurs, a written stipulation and settlement between the department and the operator shall be entered into. The stipulation and settlement shall recite the basic facts and violations alleged, any facts brought forth by the operator, and the reasons for the particular sanctions imposed.

7. If an agreement as to appropriate disciplinary action, if any, cannot be reached, the department may initiate formal hearing procedures. Notice and formal hearing shall be in accordance with 567—Chapter 7 related to contested and certain other cases pertaining to license discipline.

*k.* Revocation of certificates. Upon revocation of a certificate, application for certification may be allowed after two years from the date of revocation. Any such applicant must successfully complete an examination and be certified in the same manner as a new applicant.

*l.* Temporary certification. A temporary operator of a sanitary landfill may be designated for a period of six months when an existing certified operator is no longer available to the facility. The facility

must make application to the department, explain why a temporary certification is needed, identify the temporary operator, and identify the efforts which will be made to obtain a certified operator. A temporary operator designation shall not be approved for greater than a six-month period except for extenuating circumstances. In any event, not more than one six-month extension to the temporary operator designation may be granted. Approval of a temporary operator designation may be rescinded for cause as set forth in paragraph 113.8(6) "j." All MSWLFs shall have at least one MSWLF operator trained, tested and certified by a department-approved program.

**567—113.9(455B) Environmental monitoring and corrective action requirements for air quality and landfill gas.** All MSWLFs shall comply with the following environmental monitoring and corrective action requirements for air quality and landfill gas.

**113.9(1) Air criteria.** Owners or operators of all MSWLFs must ensure that the units do not violate any applicable requirements developed under a state implementation plan (SIP) approved or promulgated by the department pursuant to Section 110 of the Clean Air Act.

**113.9(2) Landfill gas.** All MSWLFs shall comply with the following requirements for landfill gas. For purposes of this subrule, "lower explosive limit" means the lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25°C and atmospheric pressure.

*a.* Owners or operators of all MSWLF units must ensure that:

(1) The concentration of methane gas generated by the facility does not exceed 25 percent of the lower explosive limit for methane in facility structures (excluding gas pipeline, control or recovery system components);

(2) The concentration of methane gas does not exceed the lower explosive limit for methane at the facility property boundary; and

*b.* Owners or operators of all MSWLF units must implement a routine methane-monitoring program to ensure that the standards of paragraph 113.9(2) "a" are met. Such a program shall include routine subsurface methane monitoring (e.g., at select groundwater wells, at gas monitoring wells).

(1) The type and frequency of monitoring must be determined based on the following factors:

1. Soil conditions;

2. The hydrogeologic conditions surrounding the facility;

3. The hydraulic conditions surrounding the facility;

4. The location of facility structures (including potential subsurface preferential pathways such as, but not limited to, pipes, utility conduits, drain tiles and sewers) and property boundaries; and

5. The locations of structures near the outside of the facility to which or along which subsurface migration of methane gas may occur. Examples of such structures include, but are not limited to, houses, buildings, basements, crawl spaces, pipes, utility conduits, drain tiles and sewers.

(2) The minimum frequency of monitoring shall be quarterly.

*c.* If methane gas levels exceeding the limits specified in paragraph 113.9(2) "a" are detected, the owner or operator must:

(1) Immediately take all necessary steps to ensure protection of human health and notify the department and department field office with jurisdiction over the MSWLF;

(2) Within 7 days of detection, place in the operating record and notify the department and department field office with jurisdiction over the MSWLF of the methane gas levels detected and a description of the steps taken to protect human health; and

(3) Within 60 days of detection, implement a remediation plan for the methane gas releases, place a copy of the plan in the operating record, and notify the department and department field office with jurisdiction over the MSWLF that the plan has been implemented. The plan shall describe the nature and extent of the problem and the proposed remedy.

*d.* The owner or operator shall submit an annual report to the department detailing the gas monitoring sampling locations and results, any action taken, and the results of steps taken to address gas levels exceeding the limits of paragraph 113.9(2) "a" during the previous year. This report shall include a site map that delineates all structures, perimeter boundary locations, and other monitoring points where gas readings were taken. The site map shall also delineate areas of landfill gas migration

outside the MSWLF units, if any. The report shall contain a narrative explaining and interpreting all of the data collected during the previous year. The report shall be due each year at a date specified by the department in the facility's permit.

**567—113.10(455B) Environmental monitoring and corrective action requirements for groundwater and surface water.** All MSWLFs shall comply with the following environmental monitoring and corrective action requirements for groundwater and surface water.

**113.10(1) General requirements for environmental monitoring and corrective action for groundwater and surface water.** The following general requirements apply to all provisions of this rule.

*a.* Surface water requirements. MSWLF units shall not:

(1) Cause a discharge of pollutants into waters of the United States, including wetlands, that violates any requirements of the Clean Water Act, including, but not limited to, the National Pollutant Discharge Elimination System (NPDES) requirements, pursuant to Section 402 of the Clean Water Act.

(2) Cause the discharge of a nonpoint source of pollution into waters of the United States, including wetlands, that violates any requirement of an areawide or statewide water quality management plan that has been approved under Section 208 or 319 of the Clean Water Act.

*b.* A new MSWLF unit must be in compliance with the groundwater monitoring requirements specified in subrules 113.10(2), 113.10(4), 113.10(5) and 113.10(6) before waste can be placed in the unit.

*c.* Once established at an MSWLF unit, groundwater monitoring shall be conducted throughout the active life and postclosure care period of that MSWLF unit as specified in rule 113.13(455B).

*d.* For the purposes of this rule, a "qualified groundwater scientist" means a scientist or an engineer who has received a baccalaureate or postgraduate degree in the natural sciences or engineering and has sufficient training and experience in groundwater hydrology and related fields demonstrated by state registration, professional certifications, or completion of accredited university programs that enable that individual to make sound professional judgments regarding groundwater monitoring, contaminant fate and transport, and corrective action.

*e.* The department may establish alternative schedules for demonstrating compliance with:

(1) Subparagraph 113.10(2) "e"(3), pertaining to notification of placement of certification in operating record;

(2) Subparagraph 113.10(5) "c"(1), pertaining to notification that statistically significant increase (SSI) notice is in operating record;

(3) Subparagraphs 113.10(5) "c"(2) and (3), pertaining to an assessment monitoring program;

(4) Paragraph 113.10(6) "b," pertaining to sampling and analyzing Appendix II constituents;

(5) Subparagraph 113.10(6) "d"(1), pertaining to placement of notice (Appendix II constituents detected) in record and notification of placement of notice in record;

(6) Subparagraph 113.10(6) "d"(2), pertaining to sampling for Appendices I and II;

(7) Paragraph 113.10(6) "g," pertaining to notification (and placement of notice in record) of SSI above groundwater protection standard;

(8) Numbered paragraph 113.10(6) "g"(1) "4" and paragraph 113.10(7) "a," pertaining to assessment of corrective measures;

(9) Paragraph 113.10(8) "a," pertaining to selection of remedy and notification of placement in record;

(10) Paragraph 113.10(9) "f," pertaining to notification of placement in record (certification of remedy completed).

**113.10(2) Groundwater monitoring systems.** All MSWLFs shall have a groundwater monitoring system that complies with the following requirements:

*a.* A groundwater monitoring system must be installed that meets the following objectives:

(1) Yields groundwater samples from the uppermost aquifer that represent the quality of background groundwater that has not been affected by leakage from a unit. A determination of background quality may include sampling of wells that are not hydraulically upgradient of the waste management area where either:

1. Hydrogeologic conditions do not allow the owner or operator to determine which wells are hydraulically upgradient; or

2. Sampling at other wells will provide an indication of background groundwater quality that is as representative as or more representative than that provided by the upgradient wells.

(2) Yields groundwater samples from the uppermost aquifer that represent the quality of groundwater passing the relevant point of compliance specified by the department under numbered paragraph 113.7(5)“a”(2)“2.” The downgradient monitoring system must be installed at the relevant point of compliance specified by the department under numbered paragraph 113.7(5)“a”(2)“2” that ensures detection of groundwater contamination in the uppermost aquifer. When physical obstacles preclude installation of groundwater monitoring wells at the relevant point of compliance at existing units, the downgradient monitoring system may be installed at the closest practicable distance, hydraulically downgradient from the relevant point of compliance specified by the department under numbered paragraph 113.7(5)“a”(2)“2,” that ensures detection of groundwater contamination in the uppermost aquifer.

(3) Provides a high level of certainty that releases of contaminants from the site can be promptly detected. Downgradient monitoring wells shall be placed along the site perimeter, within 50 feet of the planned liner or waste boundary unless site conditions dictate otherwise, downgradient of the facility with respect to the hydrologic unit being monitored. Each groundwater underdrain system shall be included in the groundwater detection monitoring program under subrule 113.10(5). The maximum drainage area routed through each outfall shall not exceed 10 acres unless it can be demonstrated that site-specific factors such as drain flow capacity or site development sequencing require an alternative drainage area. If contamination is identified in the groundwater underdrain system pursuant to subrule 113.10(5), the owner or operator shall manage the underdrain discharge as leachate in lieu of assessment monitoring and corrective action.

(4) Be designed and constructed with the theoretical release evaluation pursuant to subparagraph 113.6(3)“e”(6) taken into consideration.

*b.* For those facilities which are long-term, multiphase operations, the department may establish temporary waste boundaries in order to define locations for monitoring wells. The convergence of groundwater paths to minimize the overall length of the downgradient dimension may be taken into consideration in the placement of downgradient monitoring wells provided that the multiphase unit groundwater monitoring system meets the requirements of paragraphs 113.10(2)“a,” 113.10(2)“c,” 113.10(2)“d” and 113.10(2)“e” and will be as protective of human health and the environment as the individual monitoring systems for each MSWLF unit, based on the following factors:

- (1) Number, spacing, and orientation of the MSWLF units;
- (2) Hydrogeologic setting;
- (3) Site history;
- (4) Engineering design of the MSWLF units; and
- (5) Type of waste accepted at the MSWLF units.

*c.* Monitoring wells must be constructed and cased by a well contractor certified pursuant to 567—Chapter 82 in a manner that maintains the integrity of the monitoring well borehole. This casing must be screened or perforated and packed with gravel or sand, where necessary, to enable collection of groundwater samples. The annular space (i.e., the space between the borehole and well casing) above the sampling depth must be sealed to prevent contamination of samples and the groundwater. Monitoring wells constructed in accordance with the rules in effect at the time of construction shall not be required to be abandoned and reconstructed as a result of subsequent amendments to these rules unless the department finds that the well is no longer providing representative groundwater samples. See Figure 1 for a general diagram of a properly constructed monitoring well.

(1) The owner or operator must notify the department that the design, installation, development, and decommission of any monitoring wells, piezometers and other measurement, sampling, and analytical devices documentation has been placed in the operating record.



(2) The monitoring wells, piezometers, and other measurement, sampling, and analytical devices must be operated and maintained so that they perform to design specifications throughout the life of the monitoring program.

(3) Each groundwater monitoring point must have a unique and permanent number, and that number must never change or be used again at the MSWLF. The types of groundwater monitoring points shall be identified as follows:

1. Monitoring wells by “MW# (Insert unique and permanent number)”.
2. Piezometers by “PZ# (Insert unique and permanent number)”.
3. Groundwater underdrain systems by “GU# (Insert unique and permanent number)”.

(4) Monitoring well construction shall be performed by a certified well contractor (pursuant to 567—Chapter 82) and shall comply with the following requirements:

1. In all phases of drilling, well installation and completion, the methods and materials used shall not introduce substances or contaminants that may alter the results of water quality analyses.

2. Drilling equipment that comes into contact with contaminants in the borehole or aboveground shall be thoroughly cleaned to avoid spreading contamination to other depths or locations. Contaminated materials or leachate from wells must not be discharged onto the ground surface or into waters of the state so as to cause harm in the process of drilling or well development.

3. The owner or operator must ensure that, at a minimum, the well design and construction log information is maintained in the facility’s permanent record using DNR Form 542-1277 and that a copy is sent to the department.

(5) Monitoring well casings shall comply with the following requirements:

1. The diameter of the inner well casing (see Figure 1) of a monitoring well shall be at least 2 inches.

2. Plastic-cased wells shall be constructed of materials with threaded and nonglued joints that do not allow water infiltration under the local subsurface pressure conditions and when the well is evacuated for sampling.

3. Well casing shall provide sufficient structural stability so that a borehole or well collapse does not occur. Flush joint casing is required for small diameter wells installed through hollow stem augers.

(6) Monitoring well screens shall comply with the following requirements:

1. Slot size shall be based on sieve analysis of the sand and gravel stratum or filter pack. The slot size must keep out at least 90 percent of the filter pack.

2. Slot configuration and open area must permit effective development of the well.

3. The screen shall be no longer than 10 feet in length, except for water table wells, in which case the screen shall be of sufficient length to accommodate normal seasonal fluctuations of the water table. The screen shall be placed 5 feet above and below the observed water table, unless local conditions are known to produce greater fluctuations. Screen length for piezometers shall be 2 feet or less. Multiple-screened, single-cased wells are prohibited.

(7) Monitoring well filter packs shall comply with the following requirements:

1. The filter pack shall extend at least 18 inches above and 12 inches below the well screen.

2. The size of the filter pack material shall be based on sieve analysis when sand and gravel are screened. The filter pack material must be 2.5 to 3 times larger than the 50 percent grain size of the zone being monitored.

3. In stratum that is neither sand nor gravel, the size of the filter pack material shall be selected based on the particle size of the zone being monitored.

(8) Monitoring well annular space shall comply with the following requirements:

1. Grouting materials must be installed from the top of the filter pack up in one continuous operation with a tremie tube.

2. The annular space between the filter pack and the frostline must be backfilled with bentonite grout.

3. The remaining annular space between the protective casing and the monitoring well casing must be sealed with bentonite grout from the frostline to the ground surface.

(9) Monitoring well heads shall be protected as follows:

1. Monitoring wells shall have a protective metal casing installed around the upper portion of the monitoring well casing as follows:

- The inside diameter of the protective metal casing shall be at least 2 inches larger than the outer diameter of the monitoring well casing.
- The protective metal casing shall extend from a minimum of 1 foot below the frostline to slightly above the well casing top; however, the protective casing shall be shortened if such a depth would cover a portion of the well screen.
- The protective casing shall be sealed and immobilized with a concrete plug around the outside. The bottom of the concrete plug must extend at least 1 foot below the frostline; however, the concrete plug shall be shortened if such a depth would cover a portion of the well screen. The top of the concrete plug shall extend at least 3 inches above the ground surface and slope away from the well. Soil may be placed above the plug and shall be at least 6 inches below the cap to improve runoff.
- The inside of the protective casing shall be sealed with bentonite grout from the frostline to the ground surface.
- A vented cap shall be placed on the monitoring well casing.
- A vented, locking cap shall be placed on the protective metal casing. The cap must be kept locked when the well is not being sampled.

2. All monitoring wells shall have a ring of brightly colored protective posts or other protective barriers to help prevent accidental damage.

3. All monitoring wells shall have a sign or permanent marking clearly identifying the permanent monitoring well number (MW#).

4. Run-on shall be directed away from all monitoring wells.

(10) Well development is required prior to the use of the monitoring well for water quality monitoring purposes. Well development must loosen and remove fines from the well screen and gravel pack. Any water utilized to stimulate well development must be of sufficient quality that future samples are not contaminated. Any gases utilized in well development must be inert gases that will not contaminate future samples. Following development, the well shall be pumped until the water does not contain significant amounts of suspended solids.

*d.* Groundwater monitoring points that are no longer functional must be sealed. Groundwater monitoring points that are to be sealed and are in a future waste disposal area shall be reviewed to determine if the method utilized to seal the monitoring point needs to be more protective than the following requirements. All abandoned groundwater-monitoring points (e.g., boreholes, monitoring wells, and piezometers) shall be sealed by a well contractor certified pursuant to 567—Chapter 82 and in accordance with the following requirements.

(1) The following information shall be placed in the operating record and a copy sent to the department:

1. The unique, permanent monitoring point number.
2. The reasons for abandoning the monitoring point.
3. The date and time the monitoring point was sealed.
4. The method utilized to remove monitoring point materials.
5. The method utilized to seal the monitoring point.
6. Department Form 542-1226 for Water Well Abandonment Plugging Record.

(2) The monitoring point materials (e.g., protective casing, casing, screen) shall be removed. If drilling is utilized to remove the materials, then the drilling shall be to the maximum depth of the previously drilled monitoring point. All drilling debris shall be cleaned from the interior of the borehole.

(3) The cleared borehole shall be sealed with impermeable bentonite grout via a tremie tube. The end of the tremie tube shall be submerged in the grout while filling from the bottom of the borehole to the top of the ground surface. Uncontaminated water shall be added from the surface as needed to aid grout expansion.

(4) After 24 hours, the bentonite grout shall be retopped if it has settled below the ground surface.

*e.* Hydrologic monitoring system plan (HMSP). Unless otherwise approved by the department in writing, the number, spacing, and depth of groundwater monitoring points shall be:

(1) Determined based upon site-specific technical information, including but not limited to the soil and hydrogeologic investigation pursuant to subrule 113.6(3) and the site exploration and characterization report pursuant to subrule 113.6(4), that must include thorough characterization of:

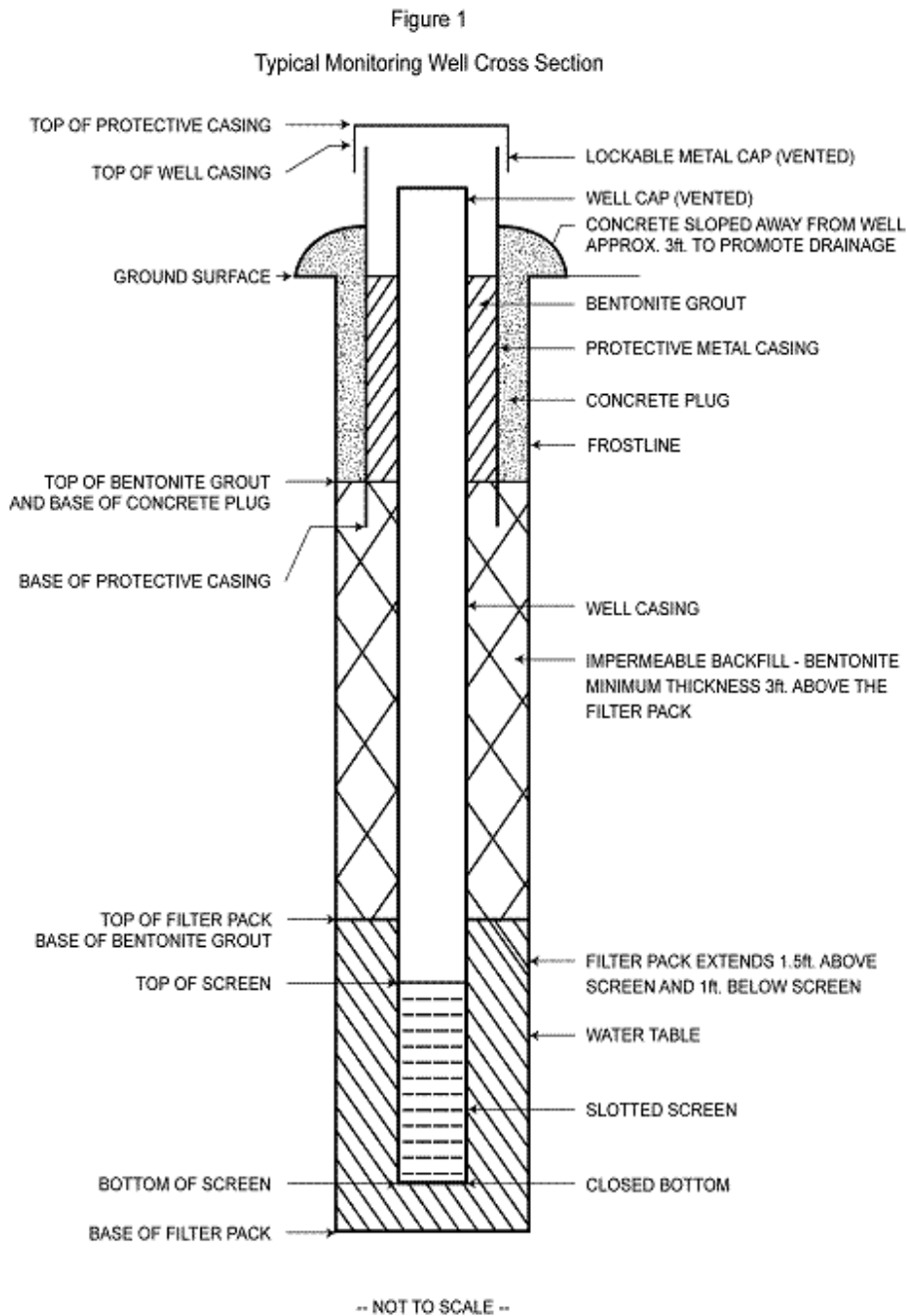
1. Aquifer thickness, groundwater flow rate, and groundwater flow direction including seasonal and temporal fluctuations in groundwater flow; and

2. Saturated and unsaturated geologic units and fill materials overlying the uppermost aquifer, materials comprising the uppermost aquifer, and materials comprising the confining unit defining the lower boundary of the uppermost aquifer, including, but not limited to: thicknesses, stratigraphy, lithology, hydraulic conductivities, porosities and effective porosities; and

3. Projected paths and rates of movement of contaminants found in leachate pursuant to subparagraph 113.6(3)“e”(6).

(2) Designed and constructed with a maximum of 300 feet between downgradient groundwater monitoring wells, unless it is demonstrated by site-specific analysis or modeling that an alternative well spacing is justified. The convergence of groundwater paths to minimize the overall length of the downgradient dimension may be taken into consideration in the placement of downgradient monitoring wells provided that the groundwater monitoring system meets the requirements of paragraphs 113.10(2)“a,” 113.10(2)“c,” 113.10(2)“d,” and 113.10(2)“e.”

(3) Certified by a qualified groundwater scientist, as defined in paragraph 113.10(1)“d,” and approved by the department. Within 14 days of this certification and approval by the department, the owner or operator must notify the department that the certification has been placed in the operating record.



*f.* Monitoring well maintenance and performance reevaluation plan. A monitoring well maintenance and performance reevaluation plan shall be included as part of the hydrologic monitoring system plan. The plan shall ensure that all monitoring points remain reliable. The plan shall provide for the following:

(1) A biennial examination of high and low water levels accompanied by a discussion of the acceptability of well location (vertically and horizontally) and exposure of the screened interval to the atmosphere.

(2) A biennial evaluation of water level conditions in the monitoring wells to ensure that the effects of waste disposal or well operation have not resulted in changes in the hydrologic setting and resultant flow paths.

(3) Measurements of well depths to ensure that wells are physically intact and not filling with sediment. Measurements shall be taken annually in wells which do not contain dedicated sampling pumps and every five years in wells containing dedicated sampling pumps.

(4) A biennial evaluation of well recharge rates and chemistry to determine if well deterioration is occurring.

**113.10(3) Surface water monitoring systems.** The department may require an MSWLF facility to implement a surface water monitoring program if there is reason to believe that a surface water of the state has been impacted as a result of facility operations (i.e., leachate seeps, sediment pond discharge) or a groundwater SSI over background has occurred.

a. A surface water monitoring program must be developed that consists of a sufficient number of monitoring points, designated at appropriate locations, to yield surface water samples that:

(1) Provide a representative sample of the upstream quality of a surface water of the state if the surface water being monitored is a flowing body of water.

(2) Provide a representative sample of the downstream quality of a surface water of the state if the surface water being monitored is a flowing body of water.

b. Surface water levels must be measured at a frequency specified in the facility's permit, within 1/10 of a foot at each surface water monitoring point immediately prior to sampling, each time surface water is sampled. The owner or operator must determine the rate and direction of surface water flow, if any, each time surface water is sampled. Surface water level and flow measurements for the same surface water of the state must be measured on the same day to avoid temporal variations that could preclude accurate determination of surface water flow and direction.

c. The owner or operator must notify and receive approval from the department for the designation or decommission of any surface water monitoring point, and must place that approval in the operating record.

d. The surface water monitoring points shall be designated to maintain sampling at that monitoring point throughout the life of the surface water monitoring program.

e. Each surface water monitoring point must have a unique and permanent number, and that number must never change or be used again at the MSWLF. Surface water monitoring points shall be identified by "SW# (Insert unique and permanent number)".

f. The number, spacing, and location of the surface water monitoring points shall be determined based upon site-specific technical information, including:

(1) Water level, including seasonal and temporal fluctuations in water level; and

(2) Flow rate and flow direction, including seasonal and temporal fluctuations in flow.

g. The MSWLF may discontinue the surface water monitoring program if monitoring data indicates that facility operations are not impacting surface water.

**113.10(4) Groundwater sampling and analysis requirements.**

a. The groundwater monitoring program must include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide an accurate representation of groundwater quality at the background and downgradient wells installed in compliance with subrule 113.10(2). The groundwater monitoring program shall utilize a laboratory certified by the department. The owner or operator must notify the department that the sampling and analysis program documentation has been placed in the operating record, and the program must include procedures and techniques for:

(1) Sample collection;

(2) Sample preservation and shipment;

(3) Analytical procedures;

(4) Chain of custody control; and

(5) Quality assurance and quality control.

b. The groundwater monitoring programs must include sampling and analytical methods that are appropriate for groundwater sampling and that accurately measure hazardous constituents and other monitoring parameters in groundwater samples. Groundwater samples shall not be field-filtered prior to laboratory analysis.

c. The sampling procedures and frequency must be protective of human health and the environment, and consistent with subrule 113.10(5).

d. Groundwater elevations must be measured at a frequency specified in the facility's permit, within 1/100 of a foot in each well immediately prior to purging, each time groundwater is sampled. The owner or operator must determine the rate and direction of groundwater flow each time groundwater is sampled. Groundwater elevations in wells which monitor the same waste management area must be measured within a period of time short enough to avoid temporal variations in groundwater flow which could preclude accurate determination of groundwater flow rate and direction.

e. The owner or operator must establish background groundwater quality in a hydraulically upgradient or background well(s) for each of the monitoring parameters or constituents required in the particular groundwater monitoring program that applies to the MSWLF unit, as determined under paragraph 113.10(5) "a" or 113.10(6) "a." Background groundwater quality may be established at wells that are not located hydraulically upgradient from the MSWLF unit if the wells meet the requirements of subparagraph 113.10(2) "a"(1).

f. The number of samples collected to establish groundwater quality data must be consistent with the appropriate statistical procedures determined pursuant to paragraph 113.10(4) "g." The sampling procedures shall be those specified under paragraphs 113.10(5) "b" for detection monitoring, 113.10(6) "b" and 113.10(6) "d" for assessment monitoring, and 113.10(7) "b" for corrective action.

g. The owner or operator must specify in the operating record which of the following statistical methods will be used in evaluating groundwater monitoring data for each hazardous constituent. The statistical test chosen shall be conducted separately for each hazardous constituent in each well.

(1) A parametric analysis of variance (ANOVA) followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's mean and the background mean levels for each constituent.

(2) An analysis of variance (ANOVA) based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's median and the background median levels for each constituent.

(3) A tolerance or prediction interval procedure in which an interval for each constituent is established from the distribution of the background data, and the level of each constituent in each compliance well is compared to the upper tolerance or prediction limit.

(4) A control chart approach that gives control limits for each constituent.

(5) Another statistical test method that meets the performance standards of paragraph 113.10(4) "h." The owner or operator must place a justification for this alternative in the operating record and notify the department of the use of this alternative test. The justification must demonstrate that the alternative method meets the performance standards of paragraph 113.10(4) "h."

h. The statistical method required pursuant to paragraph 113.10(4) "g" shall comply with the following performance standards:

(1) The statistical method used to evaluate groundwater monitoring data shall be appropriate for the distribution of chemical parameters or hazardous constituents. If the distribution of the chemical parameters or hazardous constituents is shown by the owner or operator to be inappropriate for a normal theory test, then the data shall be transformed or a distribution-free theory test shall be used. If the distributions for the constituents differ, more than one statistical method may be needed.

(2) If an individual well comparison procedure is used to compare an individual compliance well constituent concentration with background constituent concentrations or a groundwater protection standard, the test shall be done at a Type I error level not less than 0.01 for each testing period. If a multiple comparisons procedure is used, the Type I experimentwise error rate for each testing period shall be not less than 0.05; however, the Type I error level of not less than 0.01 for individual well comparisons must be maintained.

(3) If a control chart approach is used to evaluate groundwater monitoring data, the specific type of control chart and its associated parameter values shall be protective of human health and the

environment. The parameters shall be determined after the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern have been considered.

(4) If a tolerance interval or a predictional interval is used to evaluate groundwater monitoring data, the levels of confidence and, for tolerance intervals, the percentage of the population that the interval must contain, shall be protective of human health and the environment. These parameters shall be determined after the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern have been considered.

(5) The statistical method shall account for data below the limit of detection (LD) by recording such data at one-half the limit of detection (i.e., LD/2) or as prescribed by the statistical method. Any practical quantitation limit (pql) that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.

(6) If necessary, the statistical method shall include procedures to control or correct for seasonal and spatial variability as well as temporal correlation in the data.

*i.* The owner or operator must determine whether or not there is an SSI over background values for each parameter or constituent required in the particular groundwater monitoring program that applies to the MSWLF unit, as determined under paragraph 113.10(5) "a" or 113.10(6) "a."

(1) In determining whether an SSI has occurred, the owner or operator must compare the groundwater quality of each parameter or constituent at each monitoring well designated pursuant to subrule 113.10(2) to the background value of that constituent, according to the statistical procedures and performance standards specified under paragraphs 113.10(4) "g" and 113.10(4) "h."

(2) Within 45 days after completing sampling and analysis, the owner or operator must determine whether there has been an SSI over background at each monitoring well.

**113.10(5) Detection monitoring program.**

*a.* Detection monitoring is required at MSWLF units at all groundwater monitoring wells defined under subrule 113.10(2). At a minimum, a detection monitoring program must include the monitoring for the constituents listed in Appendix I and any additional parameters required by the department on a site-specific basis. An alternative list of constituents may be used if it can be demonstrated that the constituents removed are not reasonably expected to be in or derived from the waste contained in the unit and if the alternative list of constituents is expected to provide a reliable indication of leachate leakage or gas impact from the MSWLF unit.

(1) The department may establish an alternative list of inorganic indicator parameters for an MSWLF unit within Appendix I, in lieu of some or all of the heavy metals (constituents 1 to 15 in Appendix I), if the alternative parameters provide a reliable indication of inorganic releases from the MSWLF unit to the groundwater. In determining alternative parameters, the department shall consider the following factors:

1. The types, quantities and concentrations of constituents in wastes managed at the MSWLF unit;
2. The mobility, stability and persistence of waste constituents or their reaction products in the unsaturated zone beneath the MSWLF unit;
3. The detectability of indicator parameters, waste constituents and reaction products in the groundwater; and
4. The concentration or values and coefficients of variation of monitoring parameters or constituents in the groundwater background.

(2) Reserved.

*b.* The monitoring frequency for all constituents listed in Appendix I or in the alternative list approved in accordance with subparagraph 113.10(5) "a"(1) shall be at least semiannual (i.e., every six months) during the active life of the facility (including closure) and the postclosure period. Where insufficient background data exist, a minimum of five independent samples from each well, collected at intervals to account for seasonal and temporal variation, must be analyzed for the constituents in Appendix I or in the alternative list approved in accordance with subparagraph 113.10(5) "a"(1) during the first year. At least one sample from each well must be collected and analyzed during subsequent

semiannual sampling events. The department may specify an appropriate alternative frequency for repeated sampling and analysis for constituents in Appendix I or in the alternative list approved in accordance with subparagraph 113.10(5)“a”(1) during the active life (including closure) and the postclosure care period. The alternative frequency during the active life (including closure) shall be not less than annually. The alternative frequency shall be based on consideration of the following factors:

- (1) Lithology of the aquifer and unsaturated zone;
- (2) Hydraulic conductivity of the aquifer and unsaturated zone;
- (3) Groundwater flow rates;
- (4) Minimum distance between upgradient edge of the MSWLF unit and downgradient monitoring well screen (minimum distance of travel); and
- (5) Resource value of the aquifer.

c. If the owner or operator determines, pursuant to paragraph 113.10(4)“i,” that there is an SSI over background for one or more of the constituents listed in Appendix I or in the alternative list approved in accordance with subparagraph 113.10(5)“a”(1) at any monitoring well specified under subrule 113.10(2), then the owner or operator:

(1) Must, within 14 days of this finding, place a notice in the operating record indicating which constituents have shown statistically significant changes from background levels, and notify the department that this notice was placed in the operating record.

(2) Must establish within 90 days an assessment monitoring program meeting the requirements of subrule 113.10(6) except as provided in subparagraph 113.10(5)“c”(3).

(3) The owner or operator may demonstrate that a source other than an MSWLF unit caused the contamination or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. A report documenting this demonstration must be certified by a qualified groundwater scientist, approved by the department, and placed in the operating record. If resampling is a part of the demonstration, resampling procedures shall be specified prior to initial sampling. If a successful demonstration to the department is made and documented, the owner or operator may continue detection monitoring as specified in subrule 113.10(5). If, after 90 days, a successful demonstration is not made, the owner or operator must initiate an assessment monitoring program as required in subrule 113.10(6).

**113.10(6) Assessment monitoring program.**

a. Assessment monitoring is required whenever an SSI over background has been confirmed pursuant to paragraph 113.10(5)“c” to be the result of a release from the facility.

b. Within 90 days of triggering an assessment monitoring program, and annually thereafter, the owner or operator must sample and analyze the groundwater for all constituents identified in Appendix II. A minimum of one sample from each downgradient well shall be collected and analyzed during each sampling event. For any constituent detected in the downgradient wells as a result of the complete Appendix II analysis, a minimum of four independent samples from each well must be collected and analyzed to establish background for the constituents. The department may specify an appropriate subset of wells to be sampled and analyzed for Appendix II constituents during assessment monitoring. The department may delete any of the Appendix II monitoring parameters for an MSWLF unit if it can be shown that the removed constituents are not reasonably expected to be in or derived from the waste contained in the unit.

c. The department may specify an appropriate alternate frequency for repeated sampling and analysis for the full set of Appendix II constituents required by paragraph 113.10(6)“b” during the active life (including closure) and postclosure care period of the unit. The following factors shall be considered:

- (1) Lithology of the aquifer and unsaturated zone;
- (2) Hydraulic conductivity of the aquifer and unsaturated zone;
- (3) Groundwater flow rates;
- (4) Minimum distance between upgradient edge of the MSWLF unit and downgradient monitoring well screen (minimum distance of travel);
- (5) Resource value of the aquifer; and



(6) Nature (fate and transport) of any constituents detected in response to this paragraph.

*d.* After obtaining the results from the initial or subsequent sampling events required in paragraph 113.10(6)“*b*,” the owner or operator must:

(1) Within 14 days, place a notice in the operating record identifying the Appendix II constituents that have been detected and notify the department that this notice has been placed in the operating record;

(2) Within 90 days, and on at least a semiannual basis thereafter, resample all wells specified by subrule 113.10(2) and conduct analyses for all constituents in Appendix I or in the alternative list approved in accordance with subparagraph 113.10(5)“*a*”(1), and for those constituents in Appendix II that are detected in response to the requirements of paragraph 113.10(6)“*b*.” Concentrations shall be recorded in the facility operating record. At least one sample from each well must be collected and analyzed during these sampling events. The department may specify an alternative monitoring frequency during the active life (including closure) and the postclosure period for the constituents referred to in this subparagraph. The alternative frequency for constituents in Appendix I or in the alternative list approved in accordance with subparagraph 113.10(5)“*a*”(1) during the active life (including closure) shall be no less than annual. The alternative frequency shall be based on consideration of the factors specified in paragraph 113.10(6)“*c*”;

(3) Establish background concentrations for any constituents detected pursuant to paragraph 113.10(6)“*b*” or subparagraph 113.10(6)“*d*”(2); and

(4) Establish groundwater protection standards for all constituents detected pursuant to paragraph 113.10(6)“*b*” or 113.10(6)“*d*.” The groundwater protection standards shall be established in accordance with paragraph 113.10(6)“*h*” or 113.10(6)“*i*.”

*e.* If the concentrations of all Appendix II constituents are shown to be at or below background values, using the statistical procedures in paragraph 113.10(4)“*g*” for two consecutive sampling events, the owner or operator must notify the department of this finding and may return to detection monitoring.

*f.* If the concentrations of any Appendix II constituents are above background values, but all concentrations are below the groundwater protection standard established under paragraph 113.10(6)“*h*” or 113.10(6)“*i*,” using the statistical procedures in paragraph 113.10(4)“*g*,” the owner or operator must continue assessment monitoring in accordance with this subrule.

*g.* If one or more Appendix II constituents are detected at statistically significant levels above the groundwater protection standard established under paragraph 113.10(6)“*h*” or 113.10(6)“*i*” in any sampling event, the owner or operator must, within 14 days of this finding, place a notice in the operating record identifying the Appendix II constituents that have exceeded the groundwater protection standard and notify the department and all other appropriate local government officials that the notice has been placed in the operating record. The owner or operator also:

(1) Must, within 90 days of this finding, comply with the following requirements or the requirements in subparagraph 113.10(6)“*g*”(2):

1. Characterize the nature and extent of the release by installing additional monitoring wells as necessary until the horizontal and vertical dimensions of the plume have been defined to background concentrations;

2. Install at least one additional monitoring well at the facility boundary in the direction of contaminant migration and sample this well in accordance with subparagraph 113.10(6)“*g*”(2);

3. Notify all persons who own the land or reside on the land that directly overlies any part of the plume of contamination if contaminants have migrated off site when indicated by sampling of wells in accordance with subparagraph 113.10(6)“*g*”(1); and

4. Initiate an assessment of corrective measures as required by subrule 113.10(7).

(2) May demonstrate that a source other than an MSWLF unit caused the contamination, or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. A report documenting this demonstration must be certified by a qualified groundwater scientist, approved by the department, and placed in the operating record. If a successful demonstration is made, the owner or operator must continue monitoring in accordance with the assessment monitoring program pursuant to subrule 113.10(6), and may return to detection monitoring if the Appendix II constituents are at or below background as specified in paragraph 113.10(6)“*e*.” Until a successful demonstration

is made, the owner or operator must comply with paragraph 113.10(6)“g” including initiating an assessment of corrective measures.

*h.* The owner or operator must establish a groundwater protection standard for each Appendix II constituent detected in the groundwater. The groundwater protection standard shall be:

(1) For constituents for which a maximum contaminant level (MCL) has been promulgated under Section 1412 of the Safe Drinking Water Act (codified) under 40 CFR Part 141, the MCL for that constituent;

(2) For constituents for which MCLs have not been promulgated, the background concentration for the constituent established from wells in accordance with subrule 113.10(2); or

(3) For constituents for which the background concentration is higher than the MCL identified under subparagraph 113.10(6)“h”(1) or health-based concentrations identified under paragraph 113.10(6)“i,” the background concentration.

*i.* The department may establish an alternative groundwater protection standard for constituents for which MCLs have not been established. These groundwater protection standards shall be appropriate health-based concentrations that comply with the statewide standards for groundwater established pursuant to 567—Chapter 137.

*j.* In establishing alternative groundwater protection standards under paragraph 113.10(6)“i,” the department may consider the following:

(1) The policies set forth by the Groundwater Protection Act;

(2) Multiple contaminants in the groundwater with the assumption that the effects are additive regarding detrimental effects to human health and the environment;

(3) Exposure threats to sensitive environmental receptors; and

(4) Other site-specific exposure or potential exposure to groundwater.

**113.10(7) *Assessment of corrective measures.***

*a.* Within 90 days of finding that any of the constituents listed in Appendix II have been detected at a statistically significant level exceeding the groundwater protection standards defined under paragraph 113.10(6)“h” or 113.10(6)“i,” the owner or operator must initiate an assessment of corrective measures. Such an assessment must be completed and submitted to the department for review and approval within 180 days of the initial finding unless otherwise authorized or required by the department.

*b.* The owner or operator must continue to monitor in accordance with the assessment monitoring program as specified in subrule 113.10(6).

*c.* The assessment shall include an analysis of the effectiveness of potential corrective measures in meeting all of the requirements and objectives of the remedy as described under subrule 113.10(8), addressing at least the following:

(1) The performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to any residual contamination;

(2) The time required to begin and complete the remedy;

(3) The costs of remedy implementation; and

(4) The institutional requirements such as state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the remedy(ies).

*d.* Within 60 days of approval from the department of the assessment of corrective measures, the owner or operator must discuss the results of the corrective measures assessment, prior to the selection of a remedy, in a public meeting with interested and affected parties. The department may establish an alternative schedule for completing the public meeting requirement. Notice of public meeting shall be sent to all owners and occupiers of property adjacent to the permitted boundary of the facility, the department, and the department field office with jurisdiction over the facility. A copy of the minutes of this public meeting and the list of community concerns must be placed in the operating record and submitted to the department.

**113.10(8) *Selection of remedy.***

*a.* Based on the results of the corrective measures assessment conducted under subrule 113.10(7), the owner or operator must select a remedy within 60 days of holding the public meeting that, at a

minimum, meets the standards listed in paragraph 113.10(8)“b.” The department may establish an alternative schedule for selecting a remedy after holding the public meeting. The owner or operator must submit a report to the department, within 14 days of selecting a remedy, describing the selected remedy, stating that the report has been placed in the operating record, and explaining how the selected remedy meets the standards in paragraph 113.10(8)“b.”

*b.* Remedies must:

- (1) Be protective of human health and the environment;
- (2) Attain the groundwater protection standards specified pursuant to paragraph 113.10(6)“h” or 113.10(6)“i”;
- (3) Control the source(s) of releases so as to reduce or eliminate, to the maximum extent practicable, further releases of Appendix II constituents into the environment that may pose a threat to human health or the environment; and
- (4) Comply with standards for management of wastes as specified in paragraph 113.10(9)“d.”

*c.* In selecting a remedy that meets the standards of paragraph 113.10(8)“b,” the owner or operator shall consider the following evaluation factors:

(1) The long-term and short-term effectiveness and protectiveness of the potential remedy(ies), along with the degree of certainty that the remedy will prove successful based on consideration of the following:

1. Magnitude of reduction of existing risks;
2. Magnitude of residual risks in terms of likelihood of further releases due to waste remaining following implementation of a remedy;
3. The type and degree of long-term management required, including monitoring, operation, and maintenance;
4. Short-term risks that might be posed to the community, workers, or the environment during implementation of such a remedy, including potential threats to human health and the environment associated with excavation, transportation, redisposal, or containment;
5. Time period until full protection is achieved;
6. Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, redisposal, or containment;
7. Long-term reliability of the engineering and institutional controls; and
8. Potential need for replacement of the remedy.

(2) The effectiveness of the remedy in controlling the source to reduce further releases based on consideration of the following factors:

1. The extent to which containment practices will reduce further releases; and
2. The extent to which treatment technologies may be used.

(3) The ease or difficulty of implementing a potential remedy(ies) based on consideration of the following factors:

1. Degree of difficulty associated with constructing the technology;
2. Expected operational reliability of the technology;
3. Need to coordinate with and obtain necessary approvals and permits from other agencies;
4. Availability of necessary equipment and specialists; and
5. Available capacity and location of needed treatment, storage, and disposal services.

(4) Practicable capability of the owner or operator, including a consideration of technical and economic capabilities.

(5) The degree to which community concerns, including but not limited to the concerns identified at the public meeting required pursuant to paragraph 113.10(7)“d,” are addressed by a potential remedy(ies).

*d.* The owner or operator shall specify as part of the selected remedy a schedule(s) for initiating and completing remedial activities. Such a schedule must require the initiation of remedial activities within a reasonable period of time taking into consideration the factors set forth in subparagraphs 113.10(8)“d”(1)

to (8). The owner or operator must consider the following factors in determining the schedule of remedial activities:

- (1) Extent and nature of contamination;
- (2) Practical capabilities of remedial technologies in achieving compliance with groundwater protection standards established under paragraph 113.10(6) "h" or 113.10(6) "i" and other objectives of the remedy;
- (3) Availability of treatment or disposal capacity for wastes managed during implementation of the remedy;
- (4) Desirability of utilizing alternative or experimental technologies that are not widely available, but which may offer significant advantages over already available technologies in terms of effectiveness, reliability, safety, or ability to achieve remedial objectives;
- (5) Potential risks to human health and the environment from exposure to contamination prior to completion of the remedy;
- (6) Resource value of the aquifer including:
  1. Current and future uses;
  2. Proximity and withdrawal rate of users;
  3. Groundwater quantity and quality;
  4. The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents;
  5. The hydrogeologic characteristics of the facility and surrounding land;
  6. Groundwater removal and treatment costs; and
  7. The cost and availability of alternative water supplies;
- (7) Practicable capability of the owner or operator; and
- (8) Other relevant factors.

**113.10(9) *Implementation of the corrective action plan.***

a. Based on the schedule established under paragraph 113.10(8) "d" for initiation and completion of remedial activities, the owner or operator must:

- (1) Establish and implement a corrective action groundwater monitoring program that:
  1. At a minimum, meets the requirements of an assessment monitoring program under subrule 113.10(6);
  2. Indicates the effectiveness of the corrective action remedy; and
  3. Demonstrates compliance with groundwater protection standards pursuant to paragraph 113.10(9) "e";
- (2) Implement the corrective action remedy selected under subrule 113.10(8); and
- (3) Take any interim measures necessary to ensure the protection of human health and the environment. Interim measures should, to the greatest extent practicable, be consistent with the objectives of and contribute to the performance of any remedy that may be required pursuant to subrule 113.10(8). The following factors must be considered by an owner or operator in determining whether interim measures are necessary:
  1. Time period required to develop and implement a final remedy;
  2. Actual or potential exposure of nearby populations or environmental receptors to hazardous constituents;
  3. Actual or potential contamination of drinking water supplies or sensitive ecosystems;
  4. Further degradation of the groundwater that may occur if remedial action is not initiated expeditiously;
  5. Weather conditions that may cause hazardous constituents to migrate or be released;
  6. Risk of fire or explosion, or potential for exposure to hazardous constituents as a result of an accident or the failure of a container or handling system; and
  7. Other factors that may pose threats to human health and the environment.

b. An owner or operator may determine, based on information developed after implementation of the remedy has begun or other information, that compliance with the requirements of paragraph 113.10(8) "b" is not being achieved through the remedy selected. In such cases, the owner or operator

must notify the department and implement other methods or techniques that could practicably achieve compliance with the requirements, unless the owner or operator makes the determination under paragraph 113.10(9)“c.” The notification shall explain how the proposed alternative methods or techniques will meet the standards in paragraph 113.10(8)“b,” or the notification shall indicate that the determination was made pursuant to paragraph 113.10(9)“c.” The notification shall also specify a schedule(s) for implementing and completing the remedial activities to comply with paragraph 113.10(8)“b” or the alternative measures to comply with paragraph 113.10(9)“c.” Within 90 days of approval by the department for the proposed alternative methods or techniques or the determination of impracticability, the owner or operator shall implement the proposed alternative methods or techniques meeting the standards of paragraph 113.10(8)“b” or implement alternative measures meeting the requirements of subparagraphs 113.10(9)“c”(2) and (3).

c. If the owner or operator determines that compliance with requirements under paragraph 113.10(8)“b” cannot be practicably achieved with any currently available methods, the owner or operator must:

(1) Obtain certification of a qualified groundwater scientist and approval by the department that compliance with requirements under paragraph 113.10(8)“b” cannot be practicably achieved with any currently available methods;

(2) Implement alternate measures to control exposure of humans or the environment to residual contamination, as necessary to protect human health and the environment;

(3) Implement alternate measures for control of the sources of contamination, or for removal or decontamination of equipment, units, devices, or structures that are:

1. Technically practicable; and

2. Consistent with the overall objective of the remedy; and

(4) Notify the department within 14 days that a report justifying the alternate measures prior to implementation has been placed in the operating record.

d. All solid wastes that are managed pursuant to a remedy required under subrule 113.10(8), or an interim measure required under subparagraph 113.10(9)“a”(3), shall be managed in a manner:

(1) That is protective of human health and the environment; and

(2) That complies with applicable RCRA, state and local requirements.

e. Remedies selected pursuant to subrule 113.10(8) shall be considered complete when:

(1) The owner or operator complies with the groundwater protection standards established under paragraph 113.10(6)“h” or 113.10(6)“i” at all points within the plume of contamination that lie beyond the groundwater monitoring well system established under subrule 113.10(2).

(2) Compliance with the groundwater protection standards established under paragraph 113.10(6)“h” or 113.10(6)“i” has been achieved by demonstrating that concentrations of Appendix II constituents have not exceeded the groundwater protection standard(s) for a period of three consecutive years using the statistical procedures and performance standards in paragraphs 113.10(4)“g” and 113.10(4)“h.” The department may specify an alternative length of time during which the owner or operator must demonstrate that concentrations of Appendix II constituents have not exceeded the groundwater protection standard(s), taking into consideration:

1. The extent and concentration of the release(s);

2. The behavior characteristics of the hazardous constituents in the groundwater;

3. The accuracy of monitoring or modeling techniques, including any seasonal, meteorological, or other environmental variables that may affect accuracy; and

4. The characteristics of the groundwater.

(3) All actions required by the department to complete the remedy have been satisfied.

f. Upon completion of the remedy, the owner or operator must notify the department within 14 days that a certification has been placed in the operating record verifying that the remedy has been completed in compliance with the requirements of paragraph 113.10(9)“e.” The certification must be signed by the owner or operator and by a qualified groundwater scientist and approved by the department.

g. When, upon completion of the certification, the owner or operator determines that the corrective action remedy has been completed in accordance with the requirements under paragraph 113.10(9)“e,”

the owner or operator shall be released from the requirements for financial assurance for corrective action pursuant to subrule 113.14(5).

**113.10(10) Annual water quality reports.** The owner or operator shall submit an annual report to the department detailing the water quality monitoring sampling locations and results, assessments, selection of remedies, implementation of corrective action, and the results of corrective action remedies to address SSIs, if any, during the previous year. This report shall include a site map that delineates all monitoring points where water quality samples were taken, and plumes of contamination, if any. The report shall contain a narrative explaining and interpreting all of the data collected during the previous year. The report shall be due each year on a date set by the department in the facility's permit.

**567—113.11(455B,455D) Record-keeping and reporting requirements.** The primary purpose of the record-keeping and reporting activities is to verify compliance with this chapter and to document the construction and operations of the facility. The department can set alternative schedules for record-keeping and notification requirements as specified in subrules 113.11(1) and 113.11(2), except for the notification requirements in paragraph 113.6(2) "a" and numbered paragraph 113.10(6) "g"(1)"3." All MSWLFs shall comply with the following record-keeping and reporting requirements.

**113.11(1) Record keeping.** The owner or operator of an MSWLF unit must record and retain near the facility in an operating record or in an alternative location approved by the department the following information as it becomes available:

- a. Permit application, permit renewal and permit modification application materials pursuant to rule 113.5(455B);
- b. The site exploration and characterization reports pursuant to subrule 113.6(4);
- c. Design and construction plans and specifications, and related analyses and documents, pursuant to rule 113.7(455B). The QC&A final reports, and related analyses and documents, pursuant to paragraph 113.7(6) "d";
- d. Inspection records, training procedures, and notification procedures required in rule 113.8(455B);
- e. Any MSWLF unit design documentation for placement of leachate or gas condensate in an MSWLF unit as required under numbered paragraphs 113.8(1) "b"(3)"2" and "3";
- f. Gas monitoring results from monitoring and any remediation plans required by rule 113.9(455B);
- g. Any demonstration, certification, finding, monitoring, testing, or analytical data required by rule 113.10(455B);
- h. Closure and postclosure care plans and any monitoring, testing, or analytical data as required by rules 113.12(455B) and 113.13(455B); and
- i. Any cost estimates and financial assurance documentation required by this chapter.

**113.11(2) Reporting requirements.** The owner or operator must notify the department when the documents required in subrule 113.11(1) have been placed in the operating record. All information contained in the operating record must be furnished upon request to the department and be made available at all reasonable times for inspection by the department.

**567—113.12(455B) Closure criteria.** All MSWLFs shall comply with the following closure requirements.

**113.12(1)** Owners or operators of all MSWLF units must install a final cover system that is designed to minimize infiltration and erosion. The final cover system must be designed and constructed to:

- a. Have a permeability less than or equal to the permeability of any bottom liner system (for MSWLFs with some type of liner) or have a permeability no greater than  $1 \times 10^{-7}$  cm/sec, whichever is less;
- b. Minimize infiltration through the closed MSWLF by the use of an infiltration layer that contains a minimum of 18 inches of compacted earthen material;
- c. Minimize erosion of the final cover by the use of an erosion layer that contains a minimum of 24 inches of earthen material that is capable of sustaining native plant growth;

*d.* Have an infiltration layer and erosion layer that are a combined minimum of 42 inches of earthen material at all locations over the closed MSWLF unit; and

*e.* Have a slope between 5 percent and 25 percent. Steeper slopes may be used if it is demonstrated that a steeper slope is unlikely to adversely affect final cover system integrity.

**113.12(2)** The department may approve an alternative final cover design that includes:

*a.* An infiltration layer that achieves reduction in infiltration equivalent to the infiltration layer specified in paragraphs 113.12(1)“*a*” and 113.12(1)“*b*”; and

*b.* An erosion layer that provides protection from wind and water erosion equivalent to the erosion layer specified in paragraphs 113.12(1)“*c*” and 113.12(1)“*d*.”

**113.12(3)** The owner or operator must prepare a written closure plan that describes the steps necessary to close all MSWLF units at any point during the active life in accordance with the cover design requirements in subrule 113.12(1) or 113.12(2), as applicable. The closure plan, at a minimum, must include the following information:

*a.* A description of the final cover including source, volume, and characteristics of cover material, designed in accordance with subrule 113.12(1) or 113.12(2) and the methods and procedures to be used to install the cover;

*b.* An estimate of the largest area of the MSWLF unit requiring a final cover, as required under subrule 113.12(1) or 113.12(2), at any time during the active life;\_

*c.* An estimate of the maximum inventory of wastes on site over the active life of the landfill facility; and

*d.* A schedule for completing all activities necessary to satisfy the closure criteria in rule 113.12(455B).

**113.12(4)** The owner or operator must notify the department that the closure plan has been placed in the operating record no later than the initial receipt of waste in a new MSWLF unit.

**113.12(5)** At least 180 days prior to beginning closure of each MSWLF unit as specified in subrule 113.12(6), an owner or operator must notify the department of the intent to close the MSWLF unit, and that a notice of the intent to close the unit has been placed in the operating record. If the MSWLF facility will no longer be accepting MSW for disposal, then the owner or operator must also notify all local governments utilizing the facility and post a public notice of the intent to close and no longer to accept MSW.

**113.12(6)** The owner or operator must begin closure activities of each MSWLF unit:

*a.* No later than 30 days after the date on which the MSWLF unit receives the known final receipt of wastes; or

*b.* If the MSWLF unit has remaining capacity and there is a reasonable likelihood that the MSWLF unit will receive additional wastes, no later than one year after the most recent receipt of wastes. Extensions beyond the one-year deadline for beginning closure may be granted by the department if the owner or operator demonstrates that the MSWLF unit has the capacity to receive additional wastes and the owner or operator has taken and will continue to take all steps necessary to prevent threats to human health and the environment from the unclosed MSWLF unit.

**113.12(7)** The owner or operator of all MSWLF units must complete closure activities of each MSWLF unit in accordance with the closure plan within 180 days following the beginning of closure as specified in subrule 113.12(6). Extensions of the closure period may be granted by the department if the owner or operator demonstrates that closure will, of necessity, take longer than 180 days and that the owner or operator has taken and will continue to take all steps to prevent threats to human health and the environment from the unclosed MSWLF unit.

**113.12(8)** Following closure of each MSWLF unit, the owner or operator must submit to the department certification, signed by an independent professional engineer (P.E.) registered in Iowa, verifying that closure has been completed in accordance with the closure plan. Upon approval by the department, the certification shall be placed in the operating record.

**113.12(9)** Following closure of all MSWLF units, the owner or operator must record a notation on the deed to the landfill facility property, or some other instrument that is normally examined during title search in lieu of a deed notification, and notify the department that the notation has been recorded and

a copy has been placed in the operating record. The notation on the deed must in perpetuity notify any potential purchaser of the property that:

- a. The land has been used as a landfill facility; and
- b. Its use is restricted under paragraph 113.13(3)“c.”

**113.12(10)** The owner or operator may request permission from the department to remove the notation from the deed if all wastes are removed from the facility.

**567—113.13(455B) Postclosure care requirements.** All MSWLFs shall comply with the following postclosure care requirements.

**113.13(1)** Following closure of each MSWLF unit, the owner or operator must conduct postclosure care. Postclosure care must be conducted for 30 years, except as provided under subrule 113.13(2), and consist of at least the following:

- a. Maintaining the integrity and effectiveness of any final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and runoff from eroding or otherwise damaging the final cover;
- b. Maintaining and operating the leachate collection system in accordance with the requirements in paragraphs 113.7(5)“b” and 113.8(3)“i,” if applicable. The department may allow the owner or operator to stop managing leachate if the owner or operator demonstrates that leachate no longer poses a threat to human health and the environment;
- c. Monitoring the groundwater in accordance with the requirements of rule 113.10(455B) and maintaining the groundwater monitoring system; and
- d. Maintaining and operating the gas monitoring system in accordance with the requirements of rule 113.9(455B).

**113.13(2)** The length of the postclosure care period may be:

- a. Decreased by the department if the owner or operator demonstrates that the reduced period is sufficient to protect human health and the environment and this demonstration is approved by the department; or
- b. Increased by the department if the department determines that the lengthened period is necessary to protect human health and the environment.

**113.13(3)** The owner or operator of all MSWLF units must prepare a written postclosure plan that includes, at a minimum, the following information:

- a. A description of the monitoring and maintenance activities required in subrule 113.13(1) for each MSWLF unit, and the frequency at which these activities will be performed;
- b. Name, address, and telephone number of the person or office to contact about the facility during the postclosure period; and
- c. A description of the planned uses of the property during the postclosure period. Postclosure use of the property shall not disturb the integrity of the final cover, liner(s), or any other components of the containment system, or the function of the monitoring systems unless necessary to comply with the requirements in this chapter. The department may approve any other disturbance if the owner or operator demonstrates that disturbance of the final cover, liner or other component of the containment system, including any removal of waste, will not increase the potential threat to human health or the environment.

**113.13(4)** The owner or operator must notify the department that a postclosure plan has been prepared and placed in the operating record by the date of initial receipt of waste.

**113.13(5)** Following completion of the postclosure care period for each MSWLF unit, the owner or operator must submit to the department a certification, signed by an independent professional engineer (P.E.) registered in Iowa, verifying that postclosure care has been completed in accordance with the postclosure plan. Upon department approval, the certification shall be placed in the operating record.



**567—113.14(455B) Municipal solid waste landfill financial assurance.**

**113.14(1) Purpose.** The purpose of this rule is to implement Iowa Code sections 455B.304(8) and 455B.306(8) by providing the criteria for establishing financial assurance for closure, postclosure care and corrective action at MSWLFs.

**113.14(2) Applicability.** The requirements of this rule apply to all owners and operators of MSWLFs except owners or operators that are state or federal government entities whose debts and liabilities are the debts and liabilities of a state or the United States.

**113.14(3) Financial assurance for closure.** The owner or operator of an MSWLF must establish financial assurance for closure in accordance with the criteria in this rule. The owner or operator must provide continuous coverage for closure until released from this requirement by demonstrating compliance with rule 113.12(455B). Proof of compliance pursuant to paragraphs 113.14(3) "a" through 113.14(3) "e" must be submitted by the owner or operator yearly by April 1 and approved by the department.

a. The owner or operator shall submit the current version of department Form 542-8090, Municipal Solid Waste Sanitary Landfill Financial Assurance Report Form, which contains, but is not limited to, the amount of the financial assurance, the annual financial statement required by Iowa Code sections 455B.306(8) "e" and 455B.306(6) "c," and the current balances of the closure and postclosure accounts at the time of submittal as required by Iowa Code section 455B.306(8) "b."

b. The owner or operator shall submit a copy of the financial assurance instruments or the documents establishing the financial assurance instruments in an amount equal to or greater than the amount specified in subrule 113.14(9). Documentation for the mechanism(s) used to demonstrate financial assurance shall contain, at a minimum, the items required to be submitted as specified in paragraphs 113.14(6) "a" to 113.14(6) "i."

c. The owner or operator shall submit a detailed written estimate, in current dollars, certified by an Iowa-licensed professional engineer, of the cost of hiring a third party to close the MSWLF in accordance with the closure plan as required by paragraph 103.5(1) "i" and rule 113.12(455B). Such estimate must be available at any time during the active life of the landfill.

(1) The cost estimate must equal the cost of closing the MSWLF at any time during the permitted life of the facility when the extent and manner of its operation would make closure the most expensive.

(2) The costs contained in the third-party estimate for closure must be accurate and reasonable when compared to the cost estimates used by other similarly situated landfills in Iowa.

(3) During the active life of the MSWLF, the owner or operator must annually adjust the closure cost estimate for inflation.

(4) The owner or operator must, annually or at the time of application for a permit amendment that increases closure costs, whichever occurs first, increase the closure cost estimate and the amount of financial assurance provided if changes to the closure plan or MSWLF conditions increase the maximum cost of closure at any time during the remaining active life of the facility.

(5) The owner or operator may reduce the amount of financial assurance for closure if the most recent estimate of the maximum cost of closure at any time during the active life of the facility is less than the amount of financial assurance currently provided. Prior to the reduction, the owner or operator must submit to the department the justification for the reduction of the closure cost estimate and the updated documentation required by paragraphs 113.14(3) "a" through 113.14(3) "e" and receive department approval for the reduction. Approval or denial shall be issued within 30 days of receipt of the reduction request.

(6) The third-party estimate submitted to the department must include the site area subject to closure and account for at least the following factors determined by the department to be minimal necessary costs for closure:

1. Closure and postclosure plan document revisions;
2. Site preparation, earthwork and final grading;
3. Drainage control culverts, piping and structures;
4. Erosion control structures, sediment ponds and terraces;
5. Final cap construction;

6. Cap vegetation soil placement;
7. Cap seeding, mulching and fertilizing;
8. Monitoring well, piezometer and gas control modifications;
9. Leachate system cleanout and extraction well modifications;
10. Monitoring well installations and abandonments;
11. Facility modifications to effect closed status;
12. Engineering and technical services;
13. Legal, financial and administrative services; and
14. Closure compliance certifications and documentation.

d. For publicly owned MSWLFs, the owner or operator shall submit to the department a copy of the owner's or operator's most recent annual audit report in the form prescribed by the office of the auditor of the state of Iowa.

e. Privately held MSWLFs shall submit an affidavit from the owner or operator indicating that a yearly review has been performed by a certified public accountant to determine whether the privately owned landfill is in compliance with this chapter. The affidavit shall state the name of the certified public accountant, the dates and conclusions of the review, and the steps taken to rectify any deficiencies identified by the accountant.

**113.14(4) *Financial assurance for postclosure care.*** The owner or operator of an MSWLF must establish financial assurance for the costs of postclosure care in accordance with the criteria in this chapter. The owner or operator must provide continuous coverage for postclosure care until released from this requirement by demonstrating compliance with the postclosure plan and the closure permit. Proof of compliance pursuant to paragraphs 113.14(4) "a" through 113.14(4) "e" must be submitted by the owner or operator yearly by April 1 and approved by the department.

a. The owner or operator shall submit the current version of department Form 542-8090, Municipal Solid Waste Sanitary Landfill Financial Assurance Report Form, which contains, but is not limited to, the amount of the financial assurance, the annual financial statement required by Iowa Code sections 455B.306(8) "e" and 455B.306(6) "c," and the current balances of the closure and postclosure accounts required by Iowa Code section 455B.306(8) "b."

b. The owner or operator shall submit a copy of the documents establishing a financial assurance instrument in an amount equal to or greater than the amount specified in subrule 113.14(9). Documentation for the mechanism(s) used to demonstrate financial assurance shall contain, at a minimum, the items required to be submitted as specified in paragraphs 113.14(6) "a" to 113.14(6) "i."

c. The owner or operator shall submit a detailed written estimate, in current dollars, certified by an Iowa-licensed professional engineer, of the cost of hiring a third party to conduct postclosure care for the MSWLF in compliance with the postclosure plan developed pursuant to paragraph 113.5(1) "i" and rule 113.13(455B). The cost estimate must account for the total cost of conducting postclosure care, as described in the plan, for the entire postclosure care period.

(1) The cost estimate for postclosure care must be based on the most expensive costs of that care during the entire postclosure care period.

(2) The costs contained in the third-party estimate for postclosure care must be accurate and reasonable when compared to the cost estimates used by other similarly situated landfills in Iowa.

(3) During the active life of the MSWLF and during the postclosure care period, the owner or operator must annually adjust the postclosure cost estimate for inflation.

(4) The owner or operator must, annually or at the time of application for a permit amendment that increases postclosure costs, whichever occurs first, increase the estimate and the amount of financial assurance provided if changes in the postclosure plan or MSWLF conditions increase the maximum cost of postclosure care.

(5) The owner or operator may reduce the amount of financial assurance for postclosure care if the most recent estimate of the maximum cost of postclosure care beginning at any time during the active life of the facility is less than the amount of financial assurance currently provided. Prior to the reduction, the owner or operator must submit to the department the justification for the reduction of the postclosure cost estimate and the updated documentation required by paragraphs 113.14(4) "a" through 113.14(4) "e" and

must receive department approval for the reduction. Approval or denial shall be issued within 30 days of receipt of the reduction request.

(6) The third-party estimate submitted to the department must include the site area subject to postclosure care and account for at least the following factors determined by the department to be minimal necessary costs for postclosure care:

1. General site facilities, access roads and fencing maintenance;
2. Cap and vegetative cover maintenance;
3. Drainage and erosion control systems maintenance;
4. Groundwater to waste separation systems maintenance;
5. Gas control systems maintenance;
6. Gas control systems monitoring and reports;
7. Groundwater and surface water monitoring systems maintenance;
8. Groundwater and surface water quality monitoring and reports;
9. Groundwater monitoring systems performance evaluations and reports;
10. Leachate control systems maintenance;
11. Leachate management, transportation and disposal;
12. Leachate control systems performance evaluations and reports;
13. Engineering and technical services;
14. Legal, financial and administrative services; and
15. Financial assurance, accounting, audits and reports.

*d.* For publicly owned MSWLFs, the owner or operator shall submit to the department a copy of the owner's or operator's most recent annual audit report in the form prescribed by the office of the auditor of the state of Iowa.

*e.* Privately held MSWLFs shall submit an affidavit from the owner or operator indicating that a yearly review has been performed by a certified public accountant to determine whether the privately owned landfill is in compliance with this chapter. The affidavit shall state the name of the certified public accountant, the dates and conclusions of the review, and the steps taken to rectify any deficiencies identified by the accountant.

**113.14(5)** *Financial assurance for corrective action.*

*a.* An owner or operator required to undertake corrective action pursuant to rules 113.9(455B) and 113.10(455B) must have a detailed written estimate, in current dollars, prepared by an Iowa licensed professional engineer of the cost of hiring a third party to perform the required corrective action. The estimate must account for the total costs of the activities described in the approved corrective action plan for the entire corrective action period. The owner or operator must submit to the department the estimate and financial assurance documentation within 30 days of department approval of the corrective action plan.

(1) The owner or operator must annually adjust the estimate for inflation until the corrective action plan is completed.

(2) The owner or operator must increase the cost estimate and the amount of financial assurance provided if changes in the corrective action plan or MSWLF conditions increase the maximum cost of corrective action.

(3) The owner or operator may reduce the amount of the cost estimate and the amount of financial assurance provided if the estimate exceeds the maximum remaining costs of the remaining corrective action. The owner or operator must submit to the department the justification for the reduction of the cost estimate and documentation of financial assurance.

*b.* The owner or operator of an MSWLF required to undertake a corrective action plan must establish financial assurance for the most recent corrective action plan by one of the mechanisms prescribed in subrule 113.14(6). The owner or operator must provide continuous coverage for corrective action until released from financial assurance requirements by demonstrating compliance with the following:

(1) Upon completion of the remedy, the owner or operator must submit to the department a certification of compliance with the approved corrective action plan. The certification must be signed by the owner or operator and by a qualified groundwater scientist and approved by the department.

(2) Upon department approval of completion of the corrective action remedy, the owner or operator shall be released from the requirements for financial assurance for corrective action.

**113.14(6) Allowable financial assurance mechanisms.** The mechanisms used to demonstrate financial assurance as required by Iowa Code section 455B.306(8)“a” must ensure that the funds necessary to meet the costs of closure, postclosure care, and corrective action for known releases will be available whenever the funds are needed. Owners or operators must choose from options in paragraphs 113.14(6)“a” to 113.14(6)“i.”

*a. Trust fund.*

(1) An owner or operator may demonstrate financial assurance for closure, postclosure, and corrective action, whichever is applicable, by establishing a trust fund which conforms to the requirements of this subrule. The trustee must be an entity which has the authority to act as a trustee and whose trust operations are regulated and examined by a federal or state agency. A copy of the trust agreement must be submitted pursuant to subrules 113.14(3) and 113.14(4) and placed in the facility’s official files.

(2) Payments into the trust fund must be made annually by the owner or operator over ten years or over the remaining life of the MSWLF, whichever is shorter, in the case of a trust fund for closure or postclosure care; or over one-half of the estimated length of the corrective action plan in the case of response to a known release. This period is referred to as the pay-in period.

(3) For a trust fund used to demonstrate financial assurance for closure and postclosure care, the first payment into the fund must be at least equal to the amount specified in subrule 113.14(9) for closure or postclosure care divided by the number of years in the pay-in period as defined in subparagraph 113.14(6)“a”(2).

The amount of subsequent payments must be determined by the following formula:

$$\text{Next Payment} = \frac{\text{CE} - \text{CB}}{\text{Y}}$$

where CE is the amount specified in 113.14(9) for closure or postclosure care (updated for inflation or other changes), CB is the current balance of the trust fund, and Y is the number of years remaining in the pay-in period.

(4) For a trust fund used to demonstrate financial assurance for corrective action, the first payment into the trust fund must be at least equal to one-half of the current cost estimate for corrective action divided by the number of years in the corrective action pay-in period as defined in subparagraph 113.14(6)“a”(2). The amount of subsequent payments must be determined by the following formula:

$$\text{Next Payment} = \frac{\text{RB} - \text{CV}}{\text{Y}}$$

where RB is the most recent estimate of the required trust fund balance for corrective action, which is the total cost that will be incurred during the second half of the corrective action period, CV is the current value of the trust fund, and Y is the number of years remaining in the pay-in period.

(5) The initial payment into the trust fund must be made before the initial receipt of waste or before the cancellation of an alternative financial assurance mechanism, in the case of closure and postclosure care; or no later than 120 days after the corrective action remedy has been approved by the department.

(6) The owner or operator, or other person authorized to conduct closure, postclosure care, or corrective action activities may request reimbursement from the trustee for these expenditures, including partial closure, as they are incurred. Requests for reimbursement will be granted by the trustee only if sufficient funds are remaining in the trust fund to cover the remaining costs of closure, postclosure care, or corrective action and if justification and documentation of the costs are placed in the operating

record. The owner or operator must submit to the department documentation of the justification for reimbursement and verification that reimbursement has been received.

(7) The trust fund may be terminated by the owner or operator only if the owner or operator substitutes alternative financial assurance as specified in this rule or if the owner or operator is no longer required to demonstrate financial responsibility in accordance with this chapter.

(8) After the pay-in period has been completed, the trust fund shall be adjusted annually to correct any deficiency of the fund with respect to the adjusted cost estimates and may be adjusted annually should the balance in the fund exceed the adjusted cost estimate.

*b. Surety bond guaranteeing payment or performance.*

(1) An owner or operator may demonstrate financial assurance for closure or postclosure care by obtaining a payment or performance surety bond which conforms to the requirements of this subrule. An owner or operator may demonstrate financial assurance for corrective action by obtaining a performance bond which conforms to the requirements of this subrule. The bond must be effective before the initial receipt of waste or before the cancellation of an alternative financial assurance mechanism, in the case of closure and postclosure care; or no later than 120 days after the corrective action remedy has been approved by the department. The owner or operator must submit a copy of the bond to the department and keep a copy in the facility's official files. The surety company issuing the bond must, at a minimum, be among those listed as acceptable sureties on federal bonds in Circular 570 of the U.S. Department of the Treasury. The state shall not be considered a party to the surety bond.

(2) The penal sum of the bond must be in an amount at least equal to the amount specified in subrule 113.14(9) for closure and postclosure or corrective action, whichever is applicable.

(3) Under the terms of the bond, the surety will become liable on the bond obligation when the owner or operator fails to perform as guaranteed by the bond and also upon notice from the department pursuant to subparagraph 113.14(6) "b"(6).

(4) The owner or operator must establish a standby trust fund. The standby trust fund must meet the requirements of paragraph 113.14(6) "a" except the requirements for initial payment and subsequent annual payments specified in subparagraphs 113.14(6) "a"(2) through (5).

(5) Payments made under the terms of the bond will be deposited by the surety directly into the standby trust fund. Payments from the trust fund must be approved by the trustee and the department.

(6) Under the terms of the bond, the surety may cancel the bond by sending notice of cancellation by certified mail to the owner and operator and to the department 120 days in advance of cancellation. When such notice is provided, the owner or operator shall, within 60 days, provide to the department adequate proof of alternative financial assurance, notice from the surety of withdrawal of the cancellation, or proof of a deposit into the standby trust of a sum equal to the amount of the bond. If the owner or operator has not complied with this subparagraph within the 60-day time period, this shall constitute a failure to perform and the department shall notify the surety, prior to the expiration of the 120-day notice period, that such a failure has occurred.

(7) The bond must be conditioned upon faithful performance by the owner or operator of all closure, postclosure, or corrective action requirements of the Code of Iowa and this chapter. A failure to comply with subparagraph 113.14(6) "b"(6) shall also constitute a failure to perform under the terms of the bond.

(8) Liability under the bond shall be for the duration of the operation, closure, and postclosure periods.

(9) The owner or operator may cancel the bond only if alternative financial assurance is substituted prior to cancellation or if the owner or operator is no longer required to demonstrate financial responsibility in accordance with this chapter.

*c. Letter of credit.*

(1) An owner or operator may demonstrate financial assurance for closure, postclosure care, or corrective action, whichever is applicable, by obtaining an irrevocable standby letter of credit which conforms to the requirements of this subrule. The letter of credit must be effective before the initial receipt of waste or before the cancellation of an alternative financial assurance mechanism, in the case of closure and postclosure care; or no later than 120 days after the corrective action plan is approved by the department. The owner or operator must submit to the department a copy of the letter of credit

and place a copy in the facility's official files. The issuing institution must be an entity which has the authority to issue letters of credit and whose letter-of-credit operations are regulated and examined by a federal or state agency.

(2) A letter from the owner or operator referring to the letter of credit by number, issuing institution, and date, and providing the name and address of the facility, and the amount of funds assured, must be included with the letter of credit submitted to the department and placed in the facility's files.

(3) The letter of credit must be irrevocable and issued for a period of at least one year in an amount at least equal to the amount specified in subrule 113.14(9) for closure, postclosure care or corrective action, whichever is applicable. The letter of credit must provide that the expiration date will be automatically extended for a period of at least one year unless the issuing institution has canceled the letter of credit by sending notice of cancellation by certified mail to the owner or operator and to the department 120 days in advance of cancellation. When such notice is provided, the owner or operator shall, within 60 days, provide to the department adequate proof of alternative financial assurance, notice of withdrawal of cancellation, or proof of a deposit of a sum equal to the amount of the letter of credit into the closure and postclosure accounts established pursuant to Iowa Code section 455B.306(8) "b." If the owner or operator has not complied with this subrule within the 60-day time period, the issuer of the letter of credit shall deposit a sum equal to the amount of the letter of credit into the closure and postclosure accounts established by the owner or operator pursuant to Iowa Code section 455B.306(8) "b." The provision of funds by the issuer of the letter of credit shall be considered an issuance of a loan to the owner or operator, and the terms of that loan shall be governed by the letter of credit or subsequent agreement between those parties. The state shall not be considered a party to this credit transaction.

(4) The owner or operator may cancel the letter of credit only if alternative financial assurance is substituted prior to cancellation or if the owner or operator is no longer required to demonstrate financial responsibility in accordance with this chapter.

*d. Insurance.*

(1) An owner or operator may demonstrate financial assurance for closure, postclosure care, or corrective action by obtaining insurance which conforms to the requirements of this subrule. The insurance must be effective before the initial receipt of waste or prior to cancellation of an alternative financial assurance, in the case of closure and postclosure care; or no later than 120 days after the corrective action plan has been approved by the department. At a minimum, the insurer must be licensed to transact the business of insurance, or be eligible to provide insurance as an excess or surplus lines insurer, in one or more states. The owner or operator must submit to the department a copy of the insurance policy and retain a copy in the facility's official files.

(2) The closure or postclosure care insurance policy must guarantee that funds will be available to close the MSWLF unit whenever final closure occurs or to provide postclosure care for the MSWLF unit whenever the postclosure care period begins, whichever is applicable. The policy must also guarantee that once closure or postclosure care begins, the insurer will be responsible for the paying out of funds to the owner or operator or other person authorized to conduct closure or postclosure care, up to an amount equal to the face amount of the policy.

(3) The insurance policy must be issued for a face amount at least equal to the amount specified in subrule 113.14(9) for closure, postclosure care, or corrective action, whichever is applicable. The term "face amount" means the total amount the insurer is obligated to pay under the policy. Actual payments by the insurer will not change the face amount, although the insurer's future liability will be lowered by the amount of the payments.

(4) An owner or operator, or any other person authorized to conduct closure or postclosure care, may receive reimbursements for closure or postclosure expenditures, including partial closure, whichever is applicable. Requests for reimbursement will be granted by the insurer only if the remaining value of the policy is sufficient to cover the remaining costs of closure or postclosure care, and if justification and documentation of the cost are placed in the operating record. The owner or operator must submit to the department documentation of the justification for reimbursement and verification that the reimbursement has been received.

(5) Each policy must contain a provision allowing assignment of the policy to a successor owner or operator. Such assignment may be conditional upon consent of the insurer, provided that such consent is not unreasonably refused.

(6) The insurance policy must provide that the insurer may not cancel, terminate or fail to renew the policy except for failure to pay the premium. The automatic renewal of the policy must, at a minimum, provide the insured with the option of renewal at the face amount of the expiring policy. If there is a failure to pay the premium, the insurer may cancel the policy by sending notice of cancellation by certified mail to the owner and operator and to the department 120 days in advance of cancellation. When such notice is provided, the owner or operator shall, within 60 days, provide to the department adequate proof of alternative financial assurance, notice from the insurer of withdrawal of cancellation, or proof of a deposit of a sum equal to the amount of the insurance coverage into the closure and postclosure accounts established pursuant to Iowa Code section 455B.306(8) "b." If the owner or operator has not complied with this subrule within the 60-day time period, this shall constitute a failure to perform and shall be a covered event pursuant to the terms of the insurance policy. A failure by the owner or operator to comply with this subrule within the 60-day period shall make the insurer liable for the closure and postclosure care of the covered facility up to the amount of the policy limits, which shall be equal to the most recently submitted cost estimates.

(7) For insurance policies providing coverage for postclosure care, commencing on the date that liability to make payments pursuant to the policy accrues, the insurer will thereafter annually increase the face amount of the policy. Such increase must be equivalent to the face amount of the policy, less any payments made, multiplied by an amount equivalent to 85 percent of the most recent investment rate or of the equivalent coupon-issue yield announced by the U.S. Treasury for 26-week treasury securities.

(8) The owner or operator may cancel the insurance only if alternative financial assurance is substituted prior to cancellation or if the owner or operator is no longer required to demonstrate financial responsibility in accordance with this rule.

*e. Corporate financial test.* An owner or operator that satisfies the requirements of this subrule may demonstrate financial assurance up to the amount specified below:

(1) Financial component. The owner or operator must satisfy the requirements of numbered paragraphs 113.14(6) "e"(1)"1" to "3" to meet the financial component of the corporate financial test.

1. The owner or operator must satisfy one of the following three conditions:

- A current rating for its senior unsubordinated debt of AAA, AA, A, or BBB as issued by Standard & Poor's or Aaa, Aa, A or Baa as issued by Moody's; or
- A ratio of less than 1.5 comparing total liabilities to net worth (net worth calculations may not include future permitted capacity of the subject landfill as an asset); or
- A ratio of greater than 0.10 comparing the sum of net income plus depreciation, depletion and amortization, minus \$10 million, to total liabilities;

2. The tangible net worth, excluding future permitted capacity of the subject landfill, of the owner or operator must be greater than:

- The sum of the current closure, postclosure care, and corrective action cost estimates and any other environmental obligations, including guarantees, covered by this financial test plus \$10 million except as provided in the second bulleted paragraph of numbered paragraph 113.14(6) "e"(1)"2"; or
- Net worth of \$10 million, excluding future permitted capacity of the subject landfill, plus the amount of any guarantees that have not been recognized as liabilities on the financial statements, provided that all of the current closure, postclosure care, and corrective action costs and any other environmental obligations covered by a financial test are recognized as liabilities on the owner's or operator's audited financial statements, and are subject to the approval of the department; and

3. The owner or operator must have, located in the United States, assets, excluding future permitted capacity of the subject landfill, amounting to at least the sum of current closure, postclosure care, and corrective action cost estimates and any other environmental obligations covered by a financial test as described in subparagraph 113.14(6) "e"(5).

(2) Record-keeping and reporting requirements. The owner or operator must submit the following records to the department and place a copy in the facility's official files prior to the initial receipt of

solid waste or cancellation of an alternative financial assurance instrument, in the case of closure and postclosure care; or no later than 120 days after the corrective action plan has been approved by the department:

1. A letter signed by a certified public accountant and based upon a certified audit that:
  - Lists all the current cost estimates covered by a financial test including, but not limited to, cost estimates required by subrules 113.14(3) to 113.14(5); cost estimates required for municipal solid waste management facilities pursuant to 40 CFR Part 258; cost estimates required for UIC facilities under 40 CFR Part 144, if applicable; cost estimates required for petroleum underground storage tank facilities under 40 CFR Part 280, if applicable; cost estimates required for PCB storage facilities under 40 CFR Part 761, if applicable; and cost estimates required for hazardous waste treatment, storage, and disposal facilities under 40 CFR Parts 264 and 265, if applicable; and
  - Provides evidence demonstrating that the owner or operator meets the conditions of subparagraph 113.14(6)“e”(1).
2. A copy of the independent certified public accountant’s unqualified opinion of the owner’s or operator’s financial statements for the latest completed fiscal year. To be eligible to use the financial test, the owner’s or operator’s financial statements must receive an unqualified opinion from the independent certified public accountant. An adverse opinion or disclaimer of opinion shall be cause for disallowance of this mechanism. A qualified opinion related to the demonstration of financial assurance may, at the discretion of the department, be cause for disallowance. If the department does not allow use of the corporate financial test, the owner or operator must provide alternative financial assurance that meets the requirements of this rule.
3. If the certified public accountant’s letter providing evidence of financial assurance includes financial data showing that the owner or operator satisfies subparagraph 113.14(6)“e”(1) that differs from data in the audited financial statements referred to in numbered paragraph 113.14(6)“e”(2)“2,” then a special report from the owner’s or operator’s independent certified public accountant to the owner or operator is required. The special report shall be based upon an agreed-upon procedures engagement in accordance with professional auditing standards and shall describe the procedures performed in comparing the data in the certified public accountant’s letter derived from the independently audited, year-end financial statements for the latest fiscal year with the amounts in such financial statements, the findings of that comparison, and the reasons for any differences.
4. If the certified public accountant’s letter provides a demonstration that the owner or operator has assured for environmental obligations as provided in the second bulleted paragraph of numbered paragraph 113.14(6)“e”(1)“2,” then the letter shall include a report from the independent certified public accountant that verifies that all of the environmental obligations covered by a financial test have been recognized as liabilities on the audited financial statements and that documents how these obligations have been measured and reported, and verifies that the tangible net worth of the owner or operator is at least \$10 million plus the amount of any guarantees provided.
  - (3) The owner or operator may cease the submission of the information required by paragraph 113.14(6)“e” only if alternative financial assurance is substituted prior to cancellation or if the owner or operator is no longer required to demonstrate financial responsibility in accordance with this chapter.
  - (4) The department may, based on a reasonable belief that the owner or operator may no longer meet the requirements of subparagraph 113.14(6)“e”(1), require the owner or operator to provide reports of its financial condition in addition to or including current financial test documentation as specified in subparagraph 113.14(6)“e”(2). If the department finds that the owner or operator no longer meets the requirements of subparagraph 113.14(6)“e”(1), the owner or operator must provide alternative financial assurance that meets the requirements of this rule.
  - (5) Calculation of costs to be assured. When calculating the current cost estimates for closure, postclosure care, corrective action, or the sum of the combination of such costs to be covered, and any other environmental obligations assured by a financial test referred to in paragraph 113.14(6)“e,” the owner or operator must include cost estimates required for subrules 113.14(3) to 113.14(5); cost estimates for municipal solid waste management facilities pursuant to 40 CFR Section 258.74; and cost estimates required for the following environmental obligations, if the owner or operator assures



those environmental obligations through a financial test: obligations associated with UIC facilities under 40 CFR Part 144, petroleum underground storage tank facilities under 40 CFR Part 280, PCB storage facilities under 40 CFR Part 761, and hazardous waste treatment, storage, and disposal facilities under 40 CFR Parts 264 and 265.

*f. Local government financial test.* An owner or operator that satisfies the requirements of this subrule may demonstrate financial assurance up to the amount specified below:

(1) Financial component.

1. The owner or operator must satisfy one of the following requirements:

- If the owner or operator has outstanding, rated, general obligation bonds that are not secured by insurance, a letter of credit, or other collateral or guarantee, the owner or operator must have a current rating of Aaa, Aa, A, or Baa, as issued by Moody's, or AAA, AA, A, or BBB, as issued by Standard & Poor's on all such general obligation bonds; or

- The owner or operator must satisfy both of the following financial ratios based on the owner's or operator's most recent audited annual financial statement: a ratio of cash plus marketable securities to total expenditures greater than or equal to 0.05, and a ratio of annual debt service to total expenditures less than or equal to 0.20.

2. The owner or operator must prepare its financial statements in conformity with Generally Accepted Accounting Principles or Other Comprehensive Bases of Accounting and have its financial statements audited by an independent certified public accountant or the office of the auditor of the state of Iowa. The financial statement shall be in the form prescribed by the office of the auditor of the state of Iowa.

3. A local government is not eligible to assure its obligations in paragraph 113.14(6) "f" if it:

- Is currently in default on any outstanding general obligation bonds; or
- Has any outstanding general obligation bonds rated lower than Baa as issued by Moody's or BBB as issued by Standard & Poor's; or
- Operated at a deficit equal to 5 percent or more of total annual revenue in each of the past two fiscal years; or

- Receives an adverse opinion or disclaimer of opinion from the independent certified public accountant or office of the auditor of the state of Iowa auditing its financial statement as required under numbered paragraph 113.14(6) "f"(1) "2." A qualified opinion that is related to the demonstration of financial assurance may, at the discretion of the department, be cause for disallowance of this mechanism.

4. The following terms used in this paragraph are defined as follows:

- "Cash plus marketable securities" means all the cash plus marketable securities held by the local government on the last day of a fiscal year, excluding cash and marketable securities designated to satisfy past obligations such as pensions.

- "Debt service" means the amount of principal and interest due on a loan in a given time period, typically the current year.

- "Deficit" means total annual revenues minus total annual expenditures.

- "Total expenditures" means all expenditures, excluding capital outlays and debt repayment.

- "Total revenues" means revenues from all taxes and fees, excluding revenue from funds managed by local government on behalf of a specific third party, and does not include the proceeds from borrowing or asset sales.

(2) Public notice component. The local government owner or operator must include disclosure of the closure and postclosure care costs assured through the financial test in its next annual audit report prior to the initial receipt of waste at the facility or prior to cancellation of an alternative financial assurance mechanism, whichever is later. A reference to corrective action costs must be placed in the next annual audit report after the corrective action plan is approved by the department. For the first year the financial test is used to assure costs at a particular facility, the reference may instead be placed in the facility's official files until issuance of the next available annual audit report if timing does not permit the reference to be incorporated into the most recently issued annual audit report or budget. For closure and postclosure costs, conformance with Governmental Accounting Standards Board Statement 18 ensures compliance with this public notice component.

(3) Record-keeping and reporting requirements.

1. The local government owner or operator must submit to the department the following items:

- A letter signed by the local government's chief financial officer that lists all the current cost estimates covered by a financial test, as described in subparagraph 113.14(6) "f"(4); provides evidence and certifies that the local government meets the conditions of numbered paragraphs 113.14(6) "f"(1) "1," "2," and "3"; and certifies that the local government meets the conditions of subparagraphs 113.14(6) "f"(2) and (4); and

- The local government's annual financial report indicating compliance with the financial ratios required by numbered paragraph 113.14(6) "f"(1) "1," second bulleted paragraph, if applicable; and the requirements of numbered paragraph 113.14(6) "f"(1) "2" and the third and fourth bulleted paragraphs of numbered paragraph 113.14(6) "f"(1) "3"; and also indicating that the requirements of Governmental Accounting Standards Board Statement 18 have been met.

2. The items required in numbered paragraph 113.14(6) "f"(3) "1" must be submitted to the department and placed in the facility's official files prior to the receipt of waste or prior to the cancellation of an alternative financial mechanism, in the case of closure and postclosure care; or, in the case of corrective action, not later than 120 days after the corrective action plan is approved by the department.

3. After the initial submission of the required items and their placement in the facility's official files, the local government owner or operator must update the information and place the updated information in the facility's official files within 180 days following the close of the owner's or operator's fiscal year.

4. The owner or operator may cease the submission of the information required by paragraph 113.14(6) "f" only if alternative financial assurance is substituted prior to cancellation or if the owner or operator is no longer required to demonstrate financial responsibility in accordance with this rule.

5. A local government must satisfy the requirements of the financial test at the close of each fiscal year. If the local government owner or operator no longer meets the requirements of the local government financial test, the local government must, within 180 days following the close of the owner's or operator's fiscal year, obtain alternative financial assurance that meets the requirements of this rule, place the required submissions for that assurance in the operating record, and notify the department that the owner or operator no longer meets the criteria of the financial test and that alternative financial assurance has been obtained.

6. The department, based on a reasonable belief that the local government owner or operator may no longer meet the requirements of the local government financial test, may require additional reports of financial conditions from the local government at any time. If the department finds, on the basis of such reports or other information, that the owner or operator no longer meets the requirements of the local government financial test, the local government must provide alternative financial assurance in accordance with this rule.

(4) Calculation of costs to be assured. The portion of the closure, postclosure care, and corrective action costs which an owner or operator may assure under this subrule is determined as follows:

1. If the local government owner or operator does not assure other environmental obligations through a financial test, the owner or operator may assure closure, postclosure care, and corrective action costs that equal up to 43 percent of the local government's total annual revenue.

2. If the local government assures other environmental obligations through a financial test, including those associated with UIC facilities under 40 CFR Section 144.62, petroleum underground storage tank facilities under 40 CFR Part 280, PCB storage facilities under 40 CFR Part 761, and hazardous waste treatment, storage, and disposal facilities under 40 CFR Parts 264 and 265, the owner or operator must add those costs to the closure, postclosure care, and corrective action costs it seeks to assure under this subparagraph. The total that may be assured must not exceed 43 percent of the local government's total annual revenue.

3. The owner or operator must obtain an alternative financial assurance instrument for those costs that exceed the limits set in numbered paragraphs 113.14(6) "f"(4) "1" and "2."

*g. Corporate guarantee.*

(1) An owner or operator may meet the requirements of this paragraph by obtaining a written guarantee. The guarantor must be the direct or higher-tier parent corporation of the owner or operator, an owner or operator whose parent corporation is also the parent corporation of the owner or operator, or an owner or operator with a “substantial business relationship” with the owner or operator. The guarantor must meet the requirements for owners or operators in paragraph 113.14(6) “g” and must comply with the terms of the guarantee. A certified copy of the guarantee must be placed in the facility’s operating record along with copies of the letter from a certified public accountant and the accountant’s opinions. If the guarantor’s parent corporation is also the parent corporation of the owner or operator, the letter from the certified public accountant must describe the value received in consideration of the guarantee. If the guarantor is an owner or operator with a “substantial business relationship” with the owner or operator, this letter must describe this “substantial business relationship” and the value received in consideration of the guarantee.

(2) The guarantee must be effective and all required submissions made to the department prior to the initial receipt of waste or before cancellation of an alternative financial mechanism, in the case of closure and postclosure care; or, in the case of corrective action, no later than 120 days after the corrective action plan has been approved by the department.

(3) The terms of the guarantee must provide that:

1. If the owner or operator fails to perform closure, postclosure care, or corrective action of a facility covered by the guarantee, or fails to obtain alternative financial assurance within 90 days of notice of intent to cancel pursuant to numbered paragraphs 113.14(6) “g”(3)“2” and “3,” the guarantor will:

- Perform, or pay a third party to perform, closure, postclosure care, or corrective action as required (performance guarantee);
- Establish a fully funded trust fund as specified in paragraph 113.14(6) “a” in the name of the owner or operator (payment guarantee); or
- Obtain alternative financial assurance as required by numbered paragraph 113.14(6) “g”(3)“3.”

2. The guarantee will remain in force for as long as the owner or operator must comply with the applicable financial assurance requirements of this rule unless the guarantor sends prior notice of cancellation by certified mail to the owner or operator and to the department. Cancellation may not occur, however, during the 120 days beginning on the date of receipt of the notice of cancellation by both the owner or operator and the department, as evidenced by the return receipts.

3. If notice of cancellation is given, the owner or operator must, within 90 days following receipt of the cancellation notice by the owner or operator and the department, provide to the department adequate proof of alternative financial assurance, notice from the guarantor of withdrawal of the cancellation, or proof of the establishment of a fully funded trust fund pursuant to paragraph 113.14(6) “a.” If the owner or operator fails to comply with the provisions of this paragraph within the 90-day period, the guarantor must provide that alternative financial assurance prior to cancellation of the corporate guarantee.

(4) If a corporate guarantor no longer meets the requirements of paragraph 113.14(6) “e,” the owner or operator must, within 90 days, obtain alternative financial assurance and submit proof of alternative financial assurance to the department. If the owner or operator fails to provide alternative financial assurance within the 90-day period, the guarantor must provide that alternative financial assurance within the next 30 days.

(5) The owner or operator is no longer required to meet the requirements of paragraph 113.14(6) “g” upon the submission to the department of proof of the substitution of alternative financial assurance or if the owner or operator is no longer required to demonstrate financial responsibility in accordance with this chapter.

*h. Local government guarantee.* An owner or operator may demonstrate financial assurance for closure, postclosure care, or corrective action by obtaining a written guarantee provided by a local government or jointly provided by the members of an agency established pursuant to Iowa Code chapter 28E. The guarantor must meet the requirements of the local government financial test in paragraph 113.14(6) “f” and must comply with the terms of a written guarantee.

(1) Terms of the written guarantee. The guarantee must be effective before the initial receipt of waste or before the cancellation of alternative financial assurance, in the case of closure and postclosure care; or no later than 120 days after the corrective action plan is approved by the department. The guarantee must provide that:

1. If the owner or operator fails to perform closure, postclosure care, or corrective action of a facility covered by the guarantee or fails to obtain alternative financial assurance within 90 days of notice of intent to cancel pursuant to numbered paragraphs 113.14(6)“h”(1)“2” and “3,” the guarantor will:

- Perform, or pay a third party to perform, closure, postclosure care, or corrective action as required; or

- Establish a fully funded trust fund as specified in paragraph 113.14(6)“a” in the name of the owner or operator; or

- Obtain alternative financial assurance as required by numbered paragraph 113.14(6)“h”(1)“3.”

2. The guarantee will remain in force unless the guarantor sends notice of cancellation by certified mail to the owner or operator and to the department. Cancellation may not occur, however, during the 120 days beginning on the date of receipt of the notice of cancellation by both the owner or operator and the department as evidenced by the return receipts.

3. If notice of cancellation is given, the owner or operator must, within 90 days following receipt of the cancellation notice by the owner or operator and the department, provide to the department adequate proof of alternative financial assurance, notice from the guarantor of withdrawal of the cancellation, or proof of the establishment of a fully funded trust fund pursuant to paragraph 113.14(6)“a.” If the owner or operator fails to comply with the provisions of this paragraph within the 90-day period, the guarantor must provide that alternative financial assurance prior to cancellation of the guarantee.

(2) Record-keeping and reporting requirements.

1. The owner or operator must submit to the department a certified copy of the guarantee along with the items required under subparagraph 113.14(6)“f”(3) and place a copy in the facility’s official files before the initial receipt of waste or before cancellation of alternative financial assurance, whichever is later, in the case of closure and postclosure care; or no later than 120 days after the corrective action plan has been approved by the department.

2. The owner or operator shall no longer be required to submit the items specified in numbered paragraph 113.14(6)“h”(2)“1” when proof of alternative financial assurance has been submitted to the department or the owner or operator is no longer required to provide financial assurance pursuant to this rule.

3. If a local government guarantor no longer meets the requirements of paragraph 113.14(6)“f,” the owner or operator must, within 90 days, submit to the department proof of alternative financial assurance. If the owner or operator fails to obtain alternative financial assurance within the 90-day period, the guarantor must provide that alternative financial assurance within the next 30 days.

*i. Local government dedicated fund.* The owner or operator of a publicly owned MSWLF or local government serving as a guarantor may demonstrate financial assurance for closure, postclosure care, or corrective action, whichever is applicable, by establishing a dedicated fund or account that conforms to the requirements of this subrule. A dedicated fund will be considered eligible if it complies with subparagraph 113.14(6)“i”(1) or (2) below, and all other provisions of this paragraph, and documentation of this compliance has been submitted to the department.

(1) The fund shall be dedicated by state constitutional provision or local government statute, charter, ordinance, or order to pay for closure, postclosure care, or corrective action costs, whichever is applicable, arising from the operation of the MSWLF and shall be funded for the full amount of coverage or funded for part of the required amount of coverage and used in combination with another mechanism(s) that provides the remaining coverage.

(2) The fund shall be dedicated by state constitutional provision or local government statute, charter, ordinance, or order as a reserve fund and shall be funded for no less than the full amount of coverage or funded for part of the required amount of coverage and used in combination with another mechanism(s) that provides the remaining coverage.

(3) Payments into the dedicated fund must be made annually by the owner or operator for ten years or over the permitted life of the MSWLF, whichever is shorter, in the case of a dedicated fund for closure or postclosure care; or over one-half of the estimated length of an approved corrective action plan in the case of a response to a known release. This is referred to as the “pay-in period.” The initial payment into the dedicated fund must be made before the initial receipt of waste in the case of closure and postclosure care or no later than 120 days after the corrective action plan has been approved by the department.

(4) For a dedicated fund used to demonstrate financial assurance for closure and postclosure care, the first payment into the dedicated fund must be at least equal to the amount specified in subrule 113.14(9), divided by the number of years in the pay-in period as defined in this subrule. The amount of subsequent payments must be determined by the following formula:

$$\text{Next Payment} = \frac{\text{CE} - \text{CB}}{\text{Y}}$$

where CE is the total required financial assurance for the owner or operator, CB is the current balance of the fund, and Y is the number of years remaining in the pay-in period.

(5) For a dedicated fund used to demonstrate financial assurance for corrective action, the first payment into the dedicated fund must be at least one-half of the current cost estimate, divided by the number of years in the corrective action pay-in period as defined in this subrule. The amount of subsequent payments must be determined by the following formula:

$$\text{Payment} = \frac{\text{RB} - \text{CF}}{\text{Y}}$$

where RB is the most recent estimate of the required dedicated fund balance, which is the total cost that will be incurred during the second half of the corrective action period, CF is the current amount in the dedicated fund, and Y is the number of years remaining in the pay-in period.

(6) The initial payment into the dedicated fund must be made before the initial receipt of waste or before the cancellation of an alternative financial assurance mechanism, in the case of closure and postclosure care; or no later than 120 days after the corrective action remedy has been approved by the department.

(7) After the pay-in period has been completed, the dedicated fund shall be adjusted annually to correct any deficiency of the fund with respect to the adjusted cost estimates and may be adjusted annually should the balance in the fund exceed the adjusted cost estimate.

**113.14(7) General requirements.**

*a.* Use of multiple financial mechanisms. An owner or operator may satisfy the requirements of this subrule by establishing more than one financial mechanism per facility. The mechanisms must be a combination of those mechanisms outlined in this rule and must provide financial assurance for an amount at least equal to the current cost estimate for closure, postclosure care, or corrective action, whichever is applicable. The financial test and a guarantee provided by a corporate parent, sibling or grandparent may not be combined if the financial statements of the two entities are consolidated.

*b.* Use of one mechanism for multiple facilities. An owner or operator may satisfy the requirements of this subrule for multiple MSWLFs by the use of one mechanism if the owner or operator ensures that the mechanism provides financial assurance for an amount at least equal to the current cost estimates for closure, postclosure care, or corrective action, whichever is applicable, for all MSWLFs covered.

*c.* Criteria. The language of the financial assurance mechanisms listed in this rule must ensure that the instruments satisfy the following criteria:

(1) The financial assurance mechanisms must ensure that the amount of funds assured is sufficient to cover the costs of closure, postclosure care, or corrective action for known releases, whichever is applicable;

(2) The financial assurance mechanisms must ensure that funds will be available in a timely fashion when needed;

(3) The financial assurance mechanisms must be obtained by the owner or operator prior to the initial receipt of solid waste and no later than 120 days after the corrective action plan has been approved by the department until the owner or operator is released from the financial assurance requirements; and

(4) The financial assurance mechanisms must be legally valid, binding, and enforceable under Iowa law.

*d.* No permit shall be issued by the department pursuant to Iowa Code section 455B.305 unless the applicant has demonstrated compliance with rule 113.14(455B).

**113.14(8) Closure and postclosure accounts.** The holder of a permit for an MSWLF shall maintain a separate account for closure and postclosure care as required by Iowa Code section 455B.306(8) "b." The account shall be specific to a particular facility.

*a.* Definitions. For the purpose of this subrule, the following definitions shall apply:

"Account" means a formal, separate set of records.

"Current balance" means cash in an account established pursuant to this rule plus the current value of investments of moneys collected pursuant to subrule 113.14(8) and used to purchase one or more of the investments listed in Iowa Code section 12B.10(5).

"Current cost estimate" means the closure cost estimate prepared and submitted to the department pursuant to subrule 113.14(3) and the postclosure cost estimate prepared and submitted pursuant to subrule 113.14(4).

*b.* Moneys in the accounts shall not be assigned for the benefit of creditors except the state of Iowa.

*c.* Moneys in the accounts shall not be used to pay any final judgment against a permit holder arising out of the ownership or operation of the site during its active life or after closure.

*d.* Withdrawal of funds. Except as provided in paragraph 113.14(8) "e," moneys in the accounts may be withdrawn without departmental approval only for the purpose of funding closure, including partial closure, or postclosure activities that are in conformance with a closure/postclosure plan which has been submitted pursuant to paragraph 113.5(1) "i." Withdrawals for activities not in conformance with a closure/postclosure plan must receive prior written approval from the department. Permit holders using a trust fund established pursuant to paragraph 113.14(6) "a" to satisfy the requirements of this subrule must comply with the requirements of subparagraph 113.14(6) "a"(6) prior to withdrawal.

*e.* Excess funds. If the balance of a closure or postclosure account exceeds the current cost estimate for closure or postclosure at any time, the permit holder may withdraw the excess funds so long as the withdrawal does not cause the balance to be reduced below the amount of the current cost estimate.

*f.* Initial proof of establishment of account. A permit holder shall submit a statement of account, signed by the permit holder, to the department by April 1, 2003, that indicates that accounts have been established pursuant to this subrule. Permit holders for new MSWLFs permitted after April 1, 2003, shall submit to the department prior to the MSWLF's initial receipt of waste a statement of account, signed by the permit holder.

*g.* An account established pursuant to paragraph 113.14(6) "a" for trust funds or paragraph 113.14(6) "i" for local government dedicated funds also satisfies the requirements of this subrule, and the permit holder shall not be required to establish closure and postclosure accounts in addition to said financial assurance accounts. Accounts established pursuant to paragraph 113.14(6) "a" or 113.14(6) "i," which are intended to satisfy the requirements of this subrule, must comply with Iowa Code section 455B.306(8) "b."

*h.* Yearly deposits. Deposits into the closure and postclosure accounts shall be made at least yearly in the amounts specified in this subrule beginning with the close of the facility's first fiscal year that begins after June 30, 2002. The deposits shall be made within 30 days of the close of each fiscal year. The minimum yearly deposit to the closure and postclosure accounts shall be determined using the following formula:

$$\frac{CE - CB}{RPC} \times TR = \text{yearly deposit to account}$$

Where:

“CE” means the current cost estimate of closure and postclosure costs.

“CB” means the current balance of the closure or postclosure accounts.

“RPC” means the remaining permitted capacity, in tons, of the MSWLF as of the start of the permit holder’s fiscal year.

“TR” is the number of tons of solid waste disposed of at the facility in the prior year.

*i.* Closure and postclosure accounts may be commingled with other accounts so long as the amounts credited to each account balance are reported separately pursuant to paragraphs 113.14(3) “a” and 113.14(4) “a.”

*j.* The department shall have full rights of access to all funds existing in a facility’s closure or postclosure account, at the sole discretion of the department, if the permit holder fails to undertake closure or postclosure activities after being directed to do so by a final agency action of the department. These funds shall be used only for the purposes of funding closure and postclosure activities at the site.

**113.14(9) Amount of required financial assurance.** A financial assurance mechanism established pursuant to subrule 113.14(6) shall be in the amount of the third-party cost estimates required by subrules 113.14(3), 113.14(4), and 113.14(5) except that the amount of the financial assurance may be reduced by the sum of the cash balance in a trust fund or local government dedicated fund established to comply with subrule 113.14(8) plus the current value of investments held by said trust fund or local government dedicated fund if invested in one or more of the investments listed in Iowa Code section 12B.10(5).

**567—113.15(455B,455D) Variances.** A request for a variance to this chapter shall be submitted in writing pursuant to 561—Chapter 10. Some provisions of this chapter are minimum standards required by federal law (see 40 CFR 258), and variances to such provisions shall not be granted unless they are as protective as the applicable minimum federal standards.

Appendix I  
Constituents for Detection Monitoring<sup>1</sup>

Inorganic Constituents:	
(1) Antimony	(Total)
(2) Arsenic	(Total)
(3) Barium	(Total)
(4) Beryllium	(Total)
(5) Cadmium	(Total)
(6) Chromium	(Total)
(7) Cobalt	(Total)
(8) Copper	(Total)
(9) Lead	(Total)
(10) Nickel	(Total)
(11) Selenium	(Total)
(12) Silver	(Total)
(13) Thallium	(Total)
(14) Vanadium	(Total)
(15) Zinc	(Total)

Organic Constituents:	
(16) Acetone	67-64-1
(17) Acrylonitrile	107-13-1
(18) Benzene	71-43-2
(19) Bromochloromethane	74-97-5
(20) Bromodichloromethane	75-27-4
(21) Bromoform; Tribromomethane	75-25-2
(22) Carbon disulfide	75-15-0
(23) Carbon tetrachloride	56-23-5
(24) Chlorobenzene	108-90-7
(25) Chloroethane; Ethyl chloride	75-00-3
(26) Chloroform; Trichloromethane	67-66-3
(27) Dibromochloromethane; Chlorodibromomethane	124-48-1
(28) 1,2-Dibromo-3-chloropropane; DBCP	96-12-8
(29) 1,2-Dibromoethane; Ethylene dibromide; EDB	106-93-4
(30) o-Dichlorobenzene; 1,2-Dichlorobenzene	95-50-1
(31) p-Dichlorobenzene; 1,4-Dichlorobenzene	106-46-7
(32) trans-1,4-Dichloro-2-butene	110-57-6
(33) 1,1-Dichloroethane; Ethylidene chloride	75-34-3
(34) 1,2-Dichloroethane; Ethylene dichloride	107-06-2
(35) 1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride	75-35-4
(36) cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene	156-59-2
(37) trans-1,2-Dichloroethylene; trans-1,2-Dichloroethene	156-60-5
(38) 1,2-Dichloropropane; Propylene dichloride	78-87-5
(39) cis-1,3-Dichloropropene	10061-01-5
(40) trans-1,3-Dichloropropene	10061-02-6



Organic Constituents:	
(41) Ethylbenzene	100-41-4
(42) 2-Hexanone; Methyl butyl ketone	591-78-6
(43) Methyl bromide; Bromomethane	74-83-9
(44) Methyl chloride; Chloromethane	74-87-3
(45) Methylene bromide; Dibromomethane	74-95-3
(46) Methylene chloride; Dichloromethane	75-09-2
(47) Methyl ethyl ketone; MEK; 2-Butanone	78-93-3
(48) Methyl iodide; Iodomethane	74-88-4
(49) 4-Methyl-2-pentanone; Methyl isobutyl ketone	108-10-1
(50) Styrene	100-42-5
(51) 1,1,1,2-Tetrachloroethane	630-20-6
(52) 1,1,2,2-Tetrachloroethane	79-34-5
(53) Tetrachloroethylene; Tetrachloroethene; Perchloroethylene	127-18-4
(54) Toluene	108-88-3
(55) 1,1,1-Trichloroethane; Methylchloroform	71-55-6
(56) 1,1,2-Trichloroethane	79-00-5
(57) Trichloroethylene; Trichloroethene	79-01-6
(58) Trichlorofluoromethane; CFC-11	75-69-4
(59) 1,2,3-Trichloropropane	96-18-4
(60) Vinyl acetate	108-05-4
(61) Vinyl chloride	75-01-4
(62) Xylenes	1330-20-7

## Notes:

<sup>1</sup>This list contains 47 volatile organics for which possible analytical procedures provided in EPA Report SW-846 "Test Methods for Evaluating Solid Waste," third edition, November 1986, as revised December 1987, includes Method 8260; and 15 metals for which SW-846 provides either Method 6010 or a method from the 7000 series of methods.

<sup>2</sup>Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

<sup>3</sup>Chemical Abstracts Service registry number. Where "Total" is entered, all species in the groundwater that contain this element are included.

Appendix II  
List of Hazardous Inorganic and Organic Constituents<sup>1</sup>

Common Name <sup>2</sup>	CAS RN <sup>3</sup>	Chemical abstracts index name <sup>4</sup>	Suggested Method <sup>5</sup>	PQL (µg/L) <sup>6</sup>
Acenaphthene	83-32-9	Acenaphthylene, 1,2-dihydro-	8100 8270	200 10
Acenaphthylene	208-96-8	Acenaphthylene	8100 8270	200 10
Acetone	67-64-1	2-Propanone	8260	100
Acetonitrile; Methyl cyanide	75-05-8	Acetonitrile	8015	100
Acetophenone	98-86-2	Ethanone, 1-phenyl-	8270	10
2-Acetylaminofluorene; 2-AAF	53-96-3	Acetamide, N-9H-fluoren-2-yl-	8270	20
Acrolein	107-02-8	2-Propenal	8030 8260	5 100
Acrylonitrile	107-13-1	2-Propenenitrile	8030 8260	5 200
Aldrin	309-00-2	1,4:5,8-Dimethanonaphthalene, 1,2,3,4, 10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-(1α,4α,4aβ,5α,8α,8aβ)-	8080 8270	0.05 10
Allyl chloride	107-05-1	1-Propene, 3-chloro-	8010 8260	5 10
4-Aminobiphenyl	92-67-1	[1,1'-Biphenyl]-4-amine	8270	20
Anthracene	120-12-7	Anthracene	8100 8270	200 10
Antimony	(Total)	Antimony	6010 7040 7041	300 2000 30
Arsenic	(Total)	Arsenic	6010 7060 7061	500 10 20
Barium	(Total)	Barium	6010 7080	20 1000

Common Name <sup>2</sup>	CAS RN <sup>3</sup>	Chemical abstracts index name <sup>4</sup>	Suggested Method <sup>5</sup>	PQL (µg/L) <sup>6</sup>
Benzene	71-43-2	Benzene	8020 8021 8260	2 0.1 5
Benzo[a]anthracene; Benzanthracene	56-55-3	Benz[a]anthracene	8100 8270	200 10
Benzo[b]fluoranthene	205-99-2	Benz[e]acephenanthrylene	8100 8270	200 10
Benzo[k]fluoranthene	207-08-9	Benzo[k]fluoranthene	8100 8270	200 10
Benzo[ghi]perylene	191-24-2	Benzo[ghi]perylene	8100 8270	200 10
Benzo[a]pyrene	50-32-8	Benzo[a]pyrene	8100 8270	200 10
Benzyl alcohol	100-51-6	Benzenemethanol	8270	20
Beryllium	(Total)	Beryllium	6010 7090 7091	3 50 2
alpha-BHC	319-84-6	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4α,5β,6β)-	8080 8270	0.05 10
beta-BHC	319-85-7	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2β,3α,4β,5α,6β)-	8080 8270	0.05 20
delta-BHC	319-86-8	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3α,4β,5α,6β)-	8080 8270	0.1 20
gamma-BHC; Lindane	58-89-9	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4α,5α,6β)-	8080 8270	0.05 20
Bis(2-chloroethoxy)methane	111-91-1	Ethane, 1,1 <sup>1</sup> -[methylene bis(oxy)] bis[2-chloro-	8110 8270	5 10
Bis(2-chloroethyl) ether; Dichloroethyl ether	111-44-4	Ethane, 1,1 <sup>1</sup> -oxybis[2-chloro-	8110 8270	3 10
Bis-(2-chloro-1-methylethyl) ether; 2,2 <sup>1</sup> -Dichlorodiisopropyl ether; DCIP, see Note 7	108-60-1	Propane, 2,2 <sup>1</sup> -oxybis[1-chloro-	8110 8270	10 10

Common Name <sup>2</sup>	CAS RN <sup>3</sup>	Chemical abstracts index name <sup>4</sup>	Suggested Method <sup>5</sup>	PQL (µg/L) <sup>6</sup>
Bis(2-ethylhexyl) phthalate	117-81-7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	8060	20
Bromochloromethane; Chlorobromomethane	74-97-5	Methane, bromochloro-	8021 8260	0.1 5
Bromodichloromethane; Dibromochloromethane	75-27-4	Methane, bromodichloro-	8010 8021 8260	1 0.2 5
Bromoform; Tribromomethane	75-25-2	Methane, tribromo-	8010 8021 8260	2 15 5
4-Bromophenyl phenyl ether	101-55-3	Benzene, 1-bromo-4-phenoxy-	8110 8270	25 10
Butyl benzyl phthalate; Benzyl butyl phthalate	85-68-7	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester	8060 8270	5 10
Cadmium	(Total)	Cadmium	6010 7130 7131	40 50 1
Carbon disulfide	75-15-0	Carbon disulfide	8260	100
Carbon tetrachloride	56-23-5	Methane, tetrachloro-	8010 8021 8260	1 0.1 10
Chlordane	See Note 8	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-	8080 8270	0.1 50
p-Chloroaniline	106-47-8	Benzenamine, 4-chloro-	8270	20
Chlorobenzene	108-90-7	Benzene, chloro-	8010 8020 8021 8260	2 2 0.1 5
Chlorobenzilate	510-15-6	Benzeneacetic acid, 4-chloro- $\alpha$ -(4-chlorophenyl)- $\alpha$ -hydroxy-, ethyl ester	8270	10
p-Chloro-m-cresol; 4-Chloro-3-methylphenol	59-50-7	Phenol, 4-chloro-3-methyl-	8040 8270	5 20

Common Name <sup>2</sup>	CAS RN <sup>3</sup>	Chemical abstracts index name <sup>4</sup>	Suggested Method <sup>5</sup>	PQL (µg/L) <sup>6</sup>
Chloroethane; Ethyl chloride	75-00-3	Ethane, chloro-	8010 8021 8260	5 1 10
Chloroform; Trichloromethane	67-66-3	Methane, trichloro-	8010 8021 8260	0.5 0.2 5
2-Chloronaphthalene	91-58-7	Naphthalene, 2-chloro-	8120 8270	10 10
2-Chlorophenol	95-57-8	Phenol, 2-chloro-	8040 8270	5 10
4-Chlorophenyl phenyl ether	7005-72-3	Benzene, 1-chloro-4-phenoxy-	8110 8270	40 10
Chloroprene	126-99-8	1,3-Butadiene, 2-chloro-	8010 8260	50 20
Chromium	(Total)	Chromium	6010 7190 7191	70 500 10
Chrysene	218-01-9	Chrysene	8100 8270	200 10
Cobalt	(Total)	Cobalt	6010 7200 7201	70 500 10
Copper	(Total)	Copper	6010 7210 7211	60 200 10
m-Cresol; 3-methylphenol	108-39-4	Phenol, 3-methyl-	8270	10
o-Cresol; 2-methylphenol	95-48-7	Phenol, 2-methyl-	8270	10
p-Cresol; 4-methylphenol	106-44-5	Phenol, 4-methyl-	8270	10
Cyanide	57-12-5	Cyanide	9010	200
2,4-D; 2,4-Dichlorophenoxyacetic acid	94-75-7	Acetic acid, (2,4-dichlorophenoxy)-	8150	10
4,4'-DDD	72-54-8	Benzene 1,1'-(2,2-dichloroethyl-idene) bis[4-chloro-	8080 8270	0.1 10

Common Name <sup>2</sup>	CAS RN <sup>3</sup>	Chemical abstracts index name <sup>4</sup>	Suggested Method <sup>5</sup>	PQL (µg/L) <sup>6</sup>
4,4 <sup>1</sup> -DDE	72-55-9	Benzene, 1,1 <sup>1</sup> - (dichloroethenyl-idene) bis[4- chloro-	8080 8270	0.05 10
4,4 <sup>1</sup> -DDT	50-29-3	Benzene, 1,1 <sup>1</sup> -(2,2,2- trichloroethylidene)bis[4- chloro-	8080 8270	0.1 10
Diallate	2303-16-4	Carbamothioic acid, bis(1- methyl-ethyl)-, S-(2,3- dichloro-2-propenyl) ester	8270	10
Dibenz[a,h]anthracene	53-70-3	Dibenz[a,h]anthracene	8100 8270	200 10
Dibenzofuran	132-64-9	Dibenzofuran	8270	10
Dibromochloromethane; Chlorodibromomethane	124-48-1	Methane, dibromochloro-	8010 8021 8260	1 0.3 5
1,2-Dibromo-3-chloropropane; DBCP	96-12-8	Propane, 1,2-dibromo-3- chloro-	8011 8021 8260	0.1 30 25
1,2-Dibromoethane; Ethylene dibromide; EDB	106-93-4	Ethane, 1,2-dibromo-	8011 8021 8260	0.1 10 5
Di-n-butyl phthalate	84-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester	8060 8270	5 10
o-Dichlorobenzene; 1,2-Dichlorobenzene	95-50-1	Benzene, 1,2-dichloro-	8010 8020 8021 8120 8260 8270	2 5 0.5 10 5 10
m-Dichlorobenzene; 1,3-Dichlorobenzene	541-73-1	Benzene, 1,3-dichloro-	8010 8020 8021 8120 8260 8270	5 5 0.2 10 5 10
p-Dichlorobenzene; 1,4-Dichlorobenzene	106-46-7	Benzene, 1,4-dichloro-	8010 8020 8021 8120 8260 8270	2 5 0.1 15 5 10

Common Name <sup>2</sup>	CAS RN <sup>3</sup>	Chemical abstracts index name <sup>4</sup>	Suggested Method <sup>5</sup>	PQL (µg/L) <sup>6</sup>
3,3 <sup>1</sup> -Dichlorobenzidine	91-94-1	[1,1 <sup>1</sup> -Biphenyl]-4,4 <sup>1</sup> -diamine, 3,3 <sup>1</sup> -dichloro-	8270	20
trans-1,4-Dichloro-2-butene	110-57-6	2-Butene, 1,4-dichloro-, (E)-	8260	100
Dichlorodifluoromethane; CFC 12	75-71-8	Methane, dichlorodifluoro-	8021 8260	0.5 5
1,1-Dichloroethane; Ethylidene chloride	75-34-3	Ethane, 1,1-dichloro-	8010 8021 8260	1 0.5 5
1,2-Dichloroethane; Ethylene dichloride	107-06-2	Ethane, 1,1-dichloro-	8010 8021 8260	0.5 0.3 5
1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride	75-35-4	Ethene, 1,1-dichloro-	8010 8021 8260	1 0.5 5
cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene	156-59-2	Ethene, 1,2-dichloro-, (Z)-	8021 8260	0.2 5
trans-1,2-Dichloroethylene; trans-1,2-Dichloroethene	156-60-5	Ethene, 1,2-dichloro-, (E)-	8010 8021 8260	1 0.5 5
2,4-Dichlorophenol	120-83-2	Phenol, 2,4-dichloro-	8040 8270	5 10
2,6-Dichlorophenol	87-65-0	Phenol, 2,6-dichloro-	8270	10
1,2-Dichloropropane; Propylene dichloride	78-87-5	Propane, 1,2-dichloro-	8010 8021 8260	0.5 0.05 5
1,3-Dichloropropane; Trimethylene dichloride	142-28-9	Propane, 1,3-dichloro-	8021 8260	0.3 5
2,2-Dichloropropane; Isopropylidene chloride	594-20-7	Propane, 2,2-dichloro-	8021 8260	0.5 15
1,1-Dichloropropene	563-58-6	1-Propene, 1,1-dichloro-	8021 8260	0.2 5
cis-1,3-Dichloropropene	10061-01-5	1-Propene, 1,3-dichloro-, (Z)-	8010 8260	20 10
trans-1,3-Dichloropropene	10061-02-6	1-Propene, 1,3-dichloro-, (E)-	8010 8260	5 10

Common Name <sup>2</sup>	CAS RN <sup>3</sup>	Chemical abstracts index name <sup>4</sup>	Suggested Method <sup>5</sup>	PQL (µg/L) <sup>6</sup>
Dieldrin	60-57-1	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexa, chloro-1a, 2,2a,3,6,6a,7,7a-octahydro-, (1α, 2β, 2α, 3β, 6β, 6α, 7β, 7α)-	8080 8270	0.05 10
Diethyl phthalate	84-66-2	1,2-Benzenedicarboxylic acid, diethyl ester	8060 8270	5 10
0,0-Diethyl 0-2-pyrazinyl phosphorothioate; Thionazin	297-97-2	Phosphorothioic acid, 0,0-diethyl 0-pyrazinyl ester	8141 8270	5 20
Dimethoate	60-51-5	Phosphorodithioic acid, 0,0-dimethyl S- [2-(methylamino)-2-oxoethyl] ester	8141 8270	3 20
p-(Dimethylamino)azobenzene	60-11-7	Benzenamine, N,N-dimethyl-4-(phenylazo)-	8270	10
7,12-Dimethylbenz[a]anthracene	57-97-6	Benz[a]anthracene, 7,12-dimethyl-	8270	10
3,3 <sup>1</sup> -Dimethylbenzidine	119-93-7	[1,1 <sup>1</sup> -Biphenyl]-4,4 <sup>1</sup> -diamine, 3,3 <sup>1</sup> -dimethyl-	8270	10
2,4-Dimethylphenol; m-Xylenol	105-67-9	Phenol, 2,4-dimethyl-	8040 8270	5 10
Dimethyl phthalate	131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester	8060 8270	5 10
m-Dinitrobenzene	99-65-0	Benzene, 1,3-dinitro-	8270	20
4,6-Dinitro-o-cresol 4,6-Dinitro-2-methylphenol	534-52-1	Phenol, 2-methyl-4,6-dinitro-	8040 8270	150 50
2,4-Dinitrophenol	51-28-5	Phenol, 2,4-dinitro-	8040 8270	150 50
2,4-Dinitrotoluene	121-14-2	Benzene, 1-methyl-2,4-dinitro-	8090 8270	0.2 10
2,6-Dinitrotoluene	606-20-2	Benzene, 2-methyl-1,3-dinitro-	8090 8270	0.1 10
Dinoseb; DNBP; 2-sec-Butyl-4,6-dinitrophenol	88-85-7	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	8150 8270	1 20



Common Name <sup>2</sup>	CAS RN <sup>3</sup>	Chemical abstracts index name <sup>4</sup>	Suggested Method <sup>5</sup>	PQL (µg/L) <sup>6</sup>
Di-n-octyl phthalate	117-84-0	1,2-Benzenedicarboxylic acid, dioctyl ester	8060 8270	30 10
Diphenylamine	122-39-4	Benzenamine, N-phenyl-	8270	10
Disulfoton	298-04-4	Phosphorodithioic acid, 0,0-diethyl S-[2-(ethylthio)ethyl] ester	8140 8141 8270	2 0.5 10
Endosulfan I	959-98-8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide	8080 8270	0.1 20
Endosulfan II	33213-65-9	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide,(3α,5αα,6β,9β,9αα)-	8080 8270	0.05 20
Endosulfan sulfate	1031-07-8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-3-dioxide	8080 8270	0.5 10
Endrin	72-20-8	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-, (1α,2β, 2aβ,4β,3α,6α, 6aβ,7β,7αα)-	8080 8270	0.1 20
Endrin aldehyde	7421-93-4	1,2,4-Methenocyclopenta[cd]pentalene- 5-carboxaldehyde,2,2a,3,3,4,7-hexachlorodecahydro-, (1α,2β, 2aβ,4β,4aβ,5β,6aβ, 6bβ,7R)-	8080 8270	0.2 10
Ethylbenzene	100-41-4	Benzene, ethyl-	8020 8221 8260	2 0.05 5
Ethyl methacrylate	97-63-2	2-Propenoic acid, 2-methyl-, ethyl ester	8015 8260 8270	5 10 10
Ethyl methanesulfonate	62-50-0	Methanesulfonic acid, ethyl ester	8270	20

Common Name <sup>2</sup>	CAS RN <sup>3</sup>	Chemical abstracts index name <sup>4</sup>	Suggested Method <sup>5</sup>	PQL (µg/L) <sup>6</sup>
Famphur	52-85-7	Phosphorothioic acid, 0-[4-[(dimethyl-amino)sulfonyl]phenyl] 0,0-dimethyl ester	8270	20
Fluoranthene	206-44-0	Fluoranthene	8100 8270	200 10
Fluorene	86-73-7	9H-Fluorene	8100 8270	200 10
Heptachlor	76-44-8	4,7-Methano-1H-indene, 1,4,5,6,7, 8,8- heptachloro-3a,4,7, 7a-tetrahydro-	8080 8270	0.05 10
Heptachlor epoxide	1024-57-3	2,5-Methano-2H-indeno[1,2-b] oxirene, 2,3,4,5,6,7,7- heptachloro-1a,1b,5,5a,6,6a-hexahydro-, (1α,1β, 2α, 5α,5αβ, 6β, 6α)	8080 8270	1 10
Hexachlorobenzene	118-74-1	Benzene, hexachloro-	8120 8270	0.5 10
Hexachlorobutadiene	87-68-3	1,3-Butadiene, 1,1,2,3,4, 4-hexachloro-	8021 8120 8260 8270	0.5 5 10 10
Hexachlorocyclopentadiene	77-47-4	1,3-Cyclopentadiene, 1,2,3,4,5,5- hexachloro-	8120 8270	5 10
Hexachloroethane	67-72-1	Ethane, hexachloro-	8120 8260 8270	0.5 10 10
Hexachloropropene	1888-71-7	1-Propene, 1,1,2,3,3,3- hexachloro-	8270	10
2-Hexanone; Methyl butyl ketone	591-78-6	2-Hexanone	8260	50
Indeno(1,2,3-cd)pyrene	193-39-5	Indeno(1,2,3-cd)pyrene	8100 8270	200 10
Isobutyl alcohol	78-83-1	1-Propanol, 2-methyl-	8015 8240	50 100

Common Name <sup>2</sup>	CAS RN <sup>3</sup>	Chemical abstracts index name <sup>4</sup>	Suggested Method <sup>5</sup>	PQL (µg/L) <sup>6</sup>
Isodrin	465-73-6	1,4,5,8-Dimethanonaphthalene, 1,2, 3,4, 10,10- hexachloro-1,4,4a,5,8,8a-hexahydro-(1α,4α,4aβ,5β,8β,8aβ)-	8270 8260	20 10
Isophorone	78-59-1	2-Cyclohexen-1-one, 3,5,5-trimethyl-	8090 8270	60 10
Isosafrole	120-58-1	1,3-Benzodioxole, 5-(1-propenyl)-	8270	10
Kepone	143-50-0	1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one, 1, 1a,3,3a,4,5,5, 5a,5b,6-decachlorooctahydro-	8270	20
Lead	(Total)	Lead	6010 7420 7421	400 1000 10
Mercury	(Total)	Mercury	7470	2
Methacrylonitrile	126-98-7	2-Propenenitrile, 2-methyl-	8015 8260	5 100
Methapyrilene	91-80-5	1,2-Ethanediamine, N,N-dimethyl-N <sup>1</sup> -2-pyridinyl-N <sup>1</sup> /2-thienylmethyl)-	8270	100
Methoxychlor	72-43-5	Benzene,1,1 <sup>1</sup> -(2,2,2, trichloroethylidene)bis[4-methoxy-	8080 8270	2 10
Methyl bromide; Bromomethane	74-83-9	Methane, bromo-	8010 8021	20 10
Methyl chloride; Chloromethane	74-87-3	Methane, chloro-	8010 8021	1 0.3
3-Methylcholanthrene	56-49-5	Benz[j]aceanthrylene, 1,2-dihydro- 3-methyl-	8270	10
Methyl ethyl ketone; MEK; 2-Butanone	78-93-3	2-Butanone	8015 8260	10 100
Methyl iodide; Iodomethane	74-88-4	Methane, iodo-	8010 8260	40 10
Methyl methacrylate	80-62-6	2-Propenoic acid, 2-methyl-, methyl ester	8015 8260	2 30

Common Name <sup>2</sup>	CAS RN <sup>3</sup>	Chemical abstracts index name <sup>4</sup>	Suggested Method <sup>5</sup>	PQL (µg/L) <sup>6</sup>
Methyl methanesulfonate	66-27-3	Methanesulfonic acid, methyl ester	8270	10
2-Methylnaphthalene	91-57-6	Naphthalene, 2-methyl-	8270	10
Methyl parathion; Parathion methyl	298-00-0	Phosphorothioic acid, 0,0-dimethyl	8140 8141 8270	0.5 1 10
4-Methyl-2-pentanone; Methyl isobutyl ketone	108-10-1	2-Pentanone, 4-methyl-	8015 8260	5 100
Methylene bromide; Dibromomethane	74-95-3	Methane, dibromo-	8010 8021 8260	15 20 10
Methylene chloride; Dichloromethane	75-09-2	Methane, dichloro-	8010 8021 8260	5 0.2 10
Naphthalene	91-20-3	Naphthalene	8021 8100 8260 8270	0.5 200 5 10
1,4-Naphthoquinone	130-15-4	1,4-Naphthalenedione	8270	10
1-Naphthylamine	134-32-7	1-Naphthalenamine	8270	10
2-Naphthylamine	91-59-8	2-Naphthalenamine	8270	10
Nickel	(Total)	Nickel	6010 7520	150 400
o-Nitroaniline; 2-Nitroaniline	88-74-4	Benzenamine, 2-nitro-	8270	50
m-Nitroaniline; 3-Nitroaniline	99-09-2	Benzenamine, 3-nitro-	8270	50
p-Nitroaniline; 4-Nitroaniline	100-01-6	Benzenamine, 4-nitro-	8270	20
Nitrobenzene	98-95-3	Benzene, nitro-	8090 8270	40 10
o-Nitrophenol; 2-Nitrophenol	88-75-5	Phenol, 2-nitro-	8040 8270	5 10
p-Nitrophenol; 4-Nitrophenol	100-02-7	Phenol, 4-nitro-	8040 8270	10 50

Common Name <sup>2</sup>	CAS RN <sup>3</sup>	Chemical abstracts index name <sup>4</sup>	Suggested Method <sup>5</sup>	PQL (µg/L) <sup>6</sup>
N-Nitrosodi-n-butylamine	924-16-3	1-Butanamine, N-butyl-N-nitroso-	8270	10
N-Nitrosodiethylamine	55-18-5	Ethanamine, N-ethyl-N-nitroso-	8270	20
N-Nitrosodimethylamine	62-75-9	Methanamine, N-methyl-N-nitroso-	8070	2
N-Nitrosodiphenylamine	86-30-6	Benzenamine, N-nitroso-N-phenyl-	8070	5
N-Nitrosodipropylamine; N-Nitroso-N-dipropylamine; Di-n-propylnitrosamine propyl-	621-64-7	1-Propanamine, N-nitroso-N-	8070	10
N-Nitrosomethylethylamine	10595-95-6	Ethanamine, N-methyl-N-nitroso-	8270	10
N-Nitrosopiperidine	100-75-4	Piperidine, 1-nitroso-	8270	20
N-Nitrosopyrrolidine	930-55-2	Pyrrolidine, 1-nitroso-	8270	40
5-Nitro-o-toluidine	99-55-8	Benzenamine, 2-methyl-5-nitro-	8270	10
Parathion	56-38-2	Phosphorothioic acid, 0,0-diethyl 0-(4-nitrophenyl) ester	8141 8270	0.5 10
Pentachlorobenzene	608-93-5	Benzene, pentachloro-	8270	10
Pentachloronitrobenzene	82-68-8	Benzene, pentachloronitro-	8270	20
Pentachlorophenol	87-86-5	Phenol, pentachloro-	8040 8270	5 50
Phenacetin	62-44-2	Acetamide, N-(4-ethoxyphenyl)	8270	20
Phenanthrene	85-01-8	Phenanthrene	8100 8270	200 10
Phenol	108-95-2	Phenol	8040	1
p-Phenylenediamine	106-50-3	1,4-Benzenediamine	8270	10
Phorate	298-02-2	Phosphorodithioic acid, 0,0-diethyl S-[(ethylthio)methyl]ester	8140 8141 8270	2 0.5 10

Common Name <sup>2</sup>	CAS RN <sup>3</sup>	Chemical abstracts index name <sup>4</sup>	Suggested Method <sup>5</sup>	PQL (µg/L) <sup>6</sup>
Polychlorinated biphenyls; PCBs; Aroclors	See Note 9	1,1[prime]-Biphenyl, chloroderivatives	8080 8270	50 200
Pronamide	23950-58-5	Benzamide, 3,5-dichloro-N- (1,1- dimethyl-2-propynyl)-	8270	10
Propionitrile; Ethyl cyanide	107-12-0	Propanenitrile	8015 8260	60 150
Pyrene	129-00-0	Pyrene	8100 8270	200 10
Safrole	94-59-7	1,3-Benzodioxole, 5-(2- propenyl)-	8270	10
Selenium	(Total)	Selenium	6010 7740 7741	750 20 20
Silver	(Total)	Silver	6010 7760 7761	70 100 10
Silvex; 2,4,5-TP	93-72-1	Propanoic acid, 2-(2,4,5- trichlorophenoxy)-	8150	2
Styrene	100-42-5	Benzene, ethenyl-	8020 8021 8260	1 0.1 10
Sulfide	18496-25-8	Sulfide	9030	4000
2,4,5-T; 2,4,5- Trichlorophenoxyacetic acid	93-76-5	Acetic acid, (2,4,5- trichlorophenoxy)-	8150	2
1,2,4,5-Tetrachlorobenzene	95-94-3	Benzene, 1,2,4,5-tetrachloro-	8270	10
1,1,1,2-Tetrachloroethane	630-20-6	Ethane, 1,1,1,2-tetrachloro-	8010 8021 8260	5 0.05 5
1,1,2,2-Tetrachloroethane	79-34-5	Ethane, 1,1,2,2-tetrachloro-	8010 8021 8260	0.5 0.1 5
Tetrachloroethylene; Tetrachloroethene; Perchloroethylene	127-18-4	Ethene, tetrachloro-	8010 8021 8260	0.5 0.5 5

Common Name <sup>2</sup>	CAS RN <sup>3</sup>	Chemical abstracts index name <sup>4</sup>	Suggested Method <sup>5</sup>	PQL (µg/L) <sup>6</sup>
2,3,4,6-Tetrachlorophenol	58-90-2	Phenol, 2,3,4,6-tetrachloro-	8270	10
Thallium	(Total)	Thallium	6010 7840 7841	400 1000 10
Tin	(Total)	Tin	6010	40
Toluene	108-88-3	Benzene, methyl-	8020 8021 8260	2 0.1 5
o-Toluidine	95-53-4	Benzenamine, 2-methyl-	8270	10
Toxaphene	See Note 10	Toxaphene	8080	2
1,2,4-Trichlorobenzene	120-82-1	Benzene, 1,2,4-trichloro-	8021 8120 8260 8270	0.3 0.5 10 10
1,1,1-Trichloroethane; Methylchloroform	71-55-6	Ethane, 1,1,1-trichloro-	8010 8021 8260	0.3 0.3 5
1,1,2-Trichloroethane	79-00-5	Ethane, 1,1,2-trichloro-	8010 8260	0.2 5
Trichloroethylene; Trichloroethene	79-01-6	Ethene, trichloro-	8010 8021 8260	1 0.2 5
Trichlorofluoromethane; CFC-11	75-69-4	Methane, trichlorofluoro-	8010 8021 8260	10 0.3 5
2,4,5-Trichlorophenol	95-95-4	Phenol, 2,4,5-trichloro-	8270	10
2,4,6-Trichlorophenol	88-06-2	Phenol, 2,4,6-trichloro-	8040 8270	5 10
1,2,3-Trichloropropane	96-18-4	Propane, 1,2,3-trichloro-	8010 8021 8260	10 5 15
0,0,0-Triethyl phosphorothioate	126-68-1	Phosphorothioic acid, 0,0,0-triethyl ester	8270	10
sym-Trinitrobenzene	99-35-4	Benzene, 1,3,5-trinitro-	8270	10

Common Name <sup>2</sup>	CAS RN <sup>3</sup>	Chemical abstracts index name <sup>4</sup>	Suggested Method <sup>5</sup>	PQL (µg/L) <sup>6</sup>
Vanadium	(Total)	Vanadium	6010 7910 7911	80 2000 40
Vinyl acetate	108-05-4	Acetic acid, ethenyl ester	8260	50
Vinyl chloride; Chloroethene	75-01-4	Ethene, chloro-	8010 8021 8260	2 0.4 10
Xylene (total)	See Note 11	Benzene, dimethyl-	8020 8021 8260	5 0.2 5
Zinc	(Total)	Zinc	6010 7950 7951	20 50 0.5

## Notes:

<sup>1</sup>The regulatory requirements pertain only to the list of substances; the right-hand columns (Methods and PQL) are given for informational purposes only. See also footnotes 5 and 6.

<sup>2</sup>Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

<sup>3</sup>Chemical Abstracts Service registry number. Where "Total" is entered, all species in the groundwater that contain this element are included.

<sup>4</sup>CAS index names are those used in the 9th Collective Index.

<sup>5</sup>Suggested Methods refer to analytical procedure numbers used in EPA Report SW-846 "Test Methods for Evaluating Solid Waste," third edition, November 1986, as revised, December 1987. Analytical details can be found in SW-846 and in documentation on file at the agency. CAUTION: The methods listed are representative SW-846 procedures and may not always be the most suitable method(s) for monitoring an analyte under the regulations.

<sup>6</sup>Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in groundwaters that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure. PQLs are based on 5 mL samples for volatile organics and 1 L samples for semivolatile organics. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not a part of the regulation.

<sup>7</sup>This substance is often called Bis(2-chloroisopropyl) ether, the name Chemical Abstracts Service applies to its noncommercial isomer, Propane, 2,2[sec]-oxybis[2-chloro- (CAS RN 39638-32-9).

<sup>8</sup>Chlordane: This entry includes alpha-chlordane (CAS RN 5103-71-9), beta-chlordane (CAS RN 5103-74-2), gamma-chlordane (CAS RN 5566-34-7), and constituents of chlordane (CAS RN 57-74-9 and CAS RN 12789-03-6). PQL shown is for technical chlordane. PQLs of specific isomers are about 20 µg/L by method 8270.

<sup>9</sup>Polychlorinated biphenyls (CAS RN 1336-36-3); this category contains congener chemicals, including constituents of Aroclor 1016 (CAS RN 12674-11-2), Aroclor 1221 (CAS RN 11104-28-2), Aroclor 1232 (CAS RN 11141-16-5), Aroclor 1242 (CAS RN 53469-21-9), Aroclor 1248 (CAS RN 12672-29-6), Aroclor 1254 (CAS RN 11097-69-1), and Aroclor 1260 (CAS RN 11096-82-5). The PQL shown is an average value for PCB congeners.

<sup>10</sup>Toxaphene: This entry includes congener chemicals contained in technical toxaphene (CAS RN 8001-35-2), i.e., chlorinated camphene.



<sup>11</sup>Xylene (total): This entry includes o-xylene (CAS RN 96-47-6), m-xylene (CAS RN 108-38-3), p-xylene (CAS RN 106-42-3), and unspecified xylenes (dimethylbenzenes) (CAS RN 1330-20-7). PQLs for method 8021 are 0.2 µg/L for o-xylene and 0.1 for m- or p-xylene. The PQL for m-xylene is 2.0 µg/L by method 8020 or 8260.

These rules are intended to implement Iowa Code section 455B.304.

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<sup>1</sup> Effective date delayed 70 days by the Administrative Rules Review Committee at its meeting held September 11, 2007.