

CHAPTER 101
SANITARY DISPOSAL PROJECTS

DIVISION III
INDUSTRIAL LANDFILLS

567—101.200(455B) Purpose. The purpose of this division is to implement Iowa Code Chapter 455B, Division IV “Solid Waste Disposal,” for the siting, designing, and operating of a sanitary landfill accepting only industrial solid waste or a sanitary landfill accepting only construction and demolition debris (C&D).

567—101.201(455B) Applicability.

101.201(1) Pursuant to Iowa Code subsection 455B.305(1), a sanitary landfill shall not be constructed or operated without first obtaining a permit from the department pursuant to this division, the requirements set forth in 567—Chapter 100, and division I of this chapter.

101.201(2) The issuance of a sanitary landfill permit by the department in no way relieves the applicant of the responsibility of complying with all other local, state, or federal statutes, ordinances, and rules or other requirements applicable to the construction and operation of a sanitary landfill.

101.201(3) All sanitary landfill permits issued prior to *[effective date of the rule]*, shall remain in effect until the expiration date of the permit in accordance with rules in effect at the time of permit issuance, until the applicant is issued a permit in accordance with this division.

567—101.202(455B) Definitions. For the purposes of this division, the definitions in 567—Chapter 100 and those found in Iowa Code section 455B.301 shall apply.

567—101.203(455B) Permits. For purposes of this division, the permit requirements in 567—Chapter 100 shall apply.

567—101.204(455B) Permit applications. Unless otherwise authorized by the department, a permit applicant shall submit on a form prescribed by the department, the requirements in 567 – Chapter 100 and division I of this chapter, and the following information:

101.204(1) A detailed description of the disposal process to be used.

101.204(2) A table listing the equipment to be used, its design capacities and expected loads.

101.204(3) A closure/post-closure plan shall be submitted in accordance with 101.213(14) and 101.215(4) and the following.

a. A closure/post-closure plan shall be submitted which:

(1) Details how and when the facility will be closed in accordance with applicable requirements of this division.

(2) Describes the proposed groundwater monitoring plan, leachate control system, and site inspection and maintenance activities necessary to comply with this division.

(3) States the name, address and telephone number of the person or office to serve as a

Commented [RBL1]: SIDEBAR: Source is current Chapter 115.

Commented [RBL2]: SIDEBAR: The rule numbering may not be sequential or referenced correctly in this initial rough draft due to changes, moves, deletions, etc. This will be resolved in future drafts.

Commented [RBL3R2]: SIDEBAR: In general, sequential numbering has not been updated to reflect deletions or additions. This will occur after receipt of initial workgroup comments.

Not all changes were tracked. Especially if minor (i.e. spelling) or when rewording of a phrase or sentence occurred.

References to other Chapters/Divisions has not been updated/made. This will occur after receipt of initial workgroup comments.

An asterisk has been added as a prefix (i.e. “*SIDEBAR”) to notes that have been added or updated since the last draft.

Commented [RBL4]: *SIDEBAR: Moved from proposed Division II to here (Division III). The current Chapter 114 (C&D) are essentially identical to the industrial landfill rules.

Commented [BLR5]: *SIDEBAR: Definitions moved to Chapter 100.

Commented [RBL6]: *SIDEBAR: Updated to reflect current division I.

Commented [RBL7]: SIDEBAR: Permit items moved to Chapter 100 and Division I unless noted.

Commented [RBL8]: SIDEBAR: Moved to Chapter 100.

contact with regard to the facility during the post-closure period.

101.204(4) Such other information as may be required by the director.

567--101.205(455B) Soil and hydrogeologic investigations. A sanitary landfill shall have a qualified groundwater scientist conduct a soil investigation, hydrogeologic investigation, and evaluation of hydrogeologic conditions. The purpose is to obtain data to determine potential routes of contaminant migration via groundwater. Such information is vital for development of the hydrologic monitoring system plan and design. This division sets forth the minimum requirements for this work, including reporting. A sanitary landfill shall comply with this division unless the department issues written approval due to specific site conditions.

567—101.206(455B) Soil investigation.

101.206(1) Soil borings.

a. Number of borings. A sufficient number of soil borings shall be made to accurately identify the hydrogeologic variations of the site. For new sites, the minimum number of borings required is 10 for sites of less than 10 acres, 20 for sites of 10 to 50 acres, and 20 plus an additional boring for every 10 acres above 50 acres for sites larger than 50 acres. Fewer borings may be needed for existing sites, depending on previous work done at the site. Also, no borings will be required in existing fill areas. The department may require additional borings based on the geological complexity of the site.

b. Depth of borings. All borings must extend a minimum of 25 feet deep and at least 10 feet deep below the water table. However, borings in proposed fill areas shall be terminated 10 feet above the uppermost aquifer or be grouted to provide such separation. At least half the borings located outside the existing or proposed fill area shall extend either 10 feet into the uppermost aquifer, 50 feet below the water table, or 10 feet into bedrock. At least one boring shall extend 10 feet into bedrock or 100 feet below the lowest ground surface elevation.

c. Boring method. Borings shall comply with the applicable portions of rule 567—101(455B). The preferred boring method is hollow stem auger, although it may be necessary to use other methods at greater depths and in bedrock. When wet drilling methods are used for boring in which monitoring wells or piezometers are installed, the drilling fluid and methods and development procedures shall be approved by and documented with the department.

d. Assurance that soil boring samples have been taken at the site. The soil boring samples must be kept by the permit applicant until the permit is issued and must be made available to the department if the department requests them.

101.206(2) Soil samples. Samples shall be collected at 5-foot intervals and at every change in stratum. These samples shall be obtained using a split spoon sampler and the procedures of the standard penetration test. A minimum of one undisturbed Shelby tube sample shall be obtained in the uppermost cohesive stratum at or below the lowest depth at which solid waste will be disposed of. Samples shall be clearly marked, preserved, and maintained for future inspection. Samples selected for laboratory analysis shall be properly preserved.

101.206(3) Laboratory test of discrete soil samples. Laboratory tests of discrete soil samples shall be conducted to correlate strata between soil borings, obtain permeability data on each stratum, and design monitoring wells.

Commented [RBL9]: SIDEBAR: Reworded to clarify requirements.

Commented [RBL10]: SIDEBAR: Testing standards change over time and require rule changes to correct the references, so we removed specific test requirements.

92 a. *Hydraulic conductivity tests.* Tests using a constant-head or falling-head
93 permeameter shall be run on a minimum of one sample from each Shelby tube sample.
94 Each sample shall be from a different soil boring representing a different area of the site.
95 b. *Grain size distribution.* Grain size distribution tests shall be conducted on a
96 minimum of one sample from each distinct stratum.
97

Commented [RBL11]: *SIDEBAR: Permeability was replaced by hydraulic conductivity.

98 **567—101.207(455B) Hydrogeologic investigation.**

99 **101.207(1) Groundwater level measurements.** The elevation of the water table shall be
100 determined at or near the location of each soil boring which penetrates the water table. The
101 water table may be determined using a completed water table monitoring well, or
102 piezometer. The bottom of a piezometer used to measure water table elevation shall be no
103 more than five feet below the water table. The apparent horizontal groundwater flow
104 direction shall be determined based on water table measurements. Vertical groundwater
105 flow shall then be assessed in at least two profiles approximately parallel to the apparent
106 horizontal flow direction. Vertical groundwater flow shall be assessed using at least two
107 well clusters per profile. Each well cluster shall contain a water table monitoring well or
108 piezometer and additional water level monitoring points based on site conditions as
109 follows:

110 a. If the water table is in the uppermost aquifer, one additional water level monitoring
111 point shall be located near the base of the aquifer or at least 20 feet below the base of the
112 water table monitoring point. This additional monitoring point may not be required if the
113 aquifer is less than 20 feet thick.

114 b. If the uppermost aquifer is less than 50 feet below the water table, an additional
115 water level monitoring point shall be located at the top of the aquifer.

116 c. If the uppermost aquifer is more than 50 feet below the water table, additional water
117 level monitoring points shall be placed at depths of 30 feet and 50 feet below the water
118 table.

119 d. If required, the one deeper soil boring into bedrock shall be used as a site for one
120 well cluster. Water table monitoring points in this cluster shall correspond to the other well
121 cluster used for a profile. In addition, water level monitoring points shall be placed at the
122 bottom of the boring and, if possible, at the top and bottom of the uppermost aquifer.
123 Groundwater level measurements shall be made after the water levels have stabilized in the
124 monitoring point; at least 24 hours after completion and bailing of the monitoring well, or
125 installation of the piezometer. The water level in existing wells shall be observed and
126 recorded prior to bailing. Each set of water level measurements shall be made in as short a
127 time frame as possible not to exceed eight hours.

128 **101.207(2) In-situ permeability tests.** In-situ permeability tests shall be conducted on
129 each monitoring well and piezometer in each well cluster.

130 a. *Pumping test.* If more than one monitoring point is located in the uppermost aquifer,
131 a pumping test shall be conducted at one or more upper aquifer monitoring points. A
132 pumping test involves pumping at a constant rate from one well while observing water
133 levels in other wells. The pumping rate shall be as high as possible without dewatering the
134 well. Water level measurements in other uppermost aquifer wells shall be measured at
135 frequent intervals near the start of the test and then at progressively longer intervals (e.g.,
136 1-minute intervals to 10 minutes, 5-minute intervals to an hour, 15-minute intervals to 2
137 hours, and half-hour intervals thereafter). Continuous water level recording is preferable.

Commented [RBL12]: *SIDEBAR: Removed redundant subrule since redundant with hydraulic conductivity test above.

Water levels in wells not located in the uppermost aquifer shall be recorded throughout the test at regular intervals (e.g., every half hour). Water levels in all wells shall be measured 24 hours prior to the test and just before the test. The test duration shall be at least 4 hours and continue until a stabilized drawdown condition is observed. Longer tests may be necessary if other uppermost aquifer monitoring points are slow to respond. Water level readings shall be recorded through the recovery phase of the water table.

b. Bail and slug tests. Monitoring wells and piezometers located in materials with low hydraulic conductivities shall be tested using bail or slug tests. These tests involve rapidly removing or adding a known volume of water to a well and then recording water levels in the well as the well recovers to its original level. Typically, the necessary frequency of measurements will be similar to that required of pumping tests. In materials of very low hydraulic conductivities, less frequent measurements are necessary. In materials of higher hydraulic conductivities, more frequent measurements may be necessary.

101.207(3) Existing well research. A reasonable effort to inventory all active, unused, and abandoned water wells within one mile of the facility; and the identification of all water wells within three miles of the permitted waste boundary shall be conducted. Well logs, other available information on well construction, static water levels, and usage shall be obtained. The well inventory shall be based on thorough reviews of state and local collections of well logs and, when possible, interviews or surveys of well owners. Also, to be included are maps showing the location of soil borings, other field tests/measurements, and existing wells.

567—101.208(455B) Evaluation of hydrogeologic conditions.

101.208(1) Based on soil boring and other available information, a description of the site geology shall be made. This description shall include preparation of geologic cross sections of sufficient number and spacing (no fewer than four at every site) to adequately define all areas of the site and of sufficient detail to adequately depict major stratigraphic and structural trends and reflect geologic structural features in relation to groundwater flow. Each pair of cross sections must be as near to perpendicular as possible to adequately portray the site geology.

101.208(2) A description of the hydrogeologic unit(s) within the saturated zone shall be made including thickness; depth; hydraulic properties, such as transmissivity and storage coefficient or specific yield; description of the role of each as confining bed, aquifer, or perched saturated zone and its actual or potential use as a water supply aquifer.

101.208(3) All groundwater flow paths from the site shall be identified, including both horizontal and vertical components of flow. A contour map of the water table shall be presented showing horizontal flow paths. A potentiometric surface map of the uppermost aquifer showing horizontal flow paths shall also be presented, if different from the water table. Vertical flow paths shall be shown in at least two profiles approximately parallel to the direction of horizontal flow. Vertical flow paths shall be determined by water level measurements from clustered wells at different depths, if possible. An evaluation of vertical groundwater flow based on the hydrologic properties of the various strata encountered at the site, estimated groundwater flow and recharge rates, and known information on hydraulic head shall also be made.

101.208(4) The seasonal, temporal and artificially induced variations in groundwater flow shall be evaluated. Temporal variations occur due to natural events, such as rainfall. The addition of tile lines, removal of overburden, or deposition of wastes would constitute

Commented [RBL13]: SIDEBAR: "Water wells" is the term used in other rules.

artificially induced variations.

101.208(5) Surface water flow paths from the site shall be identified on topographic contour maps.

567—101.209(455B) Monitoring system plan. A hydrologic monitoring system shall be designed to intercept the groundwater and surface water flow paths from the site including proposed locations and depths for monitoring wells in accordance with monitoring well siting criteria in rule 567—101.212(455B). The surface water monitoring plan shall include monitoring points on all standing and flowing bodies of water which will receive surface runoff or groundwater discharge from the site. For streams, sampling points upstream and downstream of areas of potential impact from the site shall be selected. The monitoring system plan shall also include sampling protocols and monitoring well maintenance and performance reevaluation procedures.

Commented [RBL14]: Clarification of what is included in the plan.

567—101.210(455B) Sampling protocol. At a minimum, the sampling protocol must include the following:

101.210(1) Order in which monitoring points are to be sampled, all tests and procedures needed at each monitoring point and the order in which these procedures will be carried out, equipment and containers to be used, procedures and precautions for their use; precautions to avoid introducing contaminants from outside sources into monitoring wells or samples; and how equipment must be cleaned between uses;

101.210(1) Procedures for evacuating, if applicable, each monitoring well prior to each water quality sampling;

101.210(2) Procedures for handling field blanks and other quality assurance samples at the facility and in transit to and from the laboratory;

101.210(3) Procedures for sample preservation;

101.210(4) Procedures for sample collection, labeling and handling at the facility and during transport to the laboratory;

101.210(5) Procedures for recording field observations and measurements;

101.210(6) Procedures for records maintenance and data analysis; and

101.210(7) Procedures for sampling surface water monitoring points including exact sampling locations and depths.

Commented [RBL15]: SIDEBAR: The DNR does not allow field filtration per current permit conditions.

567—101.211(455B) Monitoring well maintenance and performance reevaluation plan.

101.211(1) 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.

101.211(2) The plan shall provide for the following:

a. 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.

b. 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.

c. Annual measurement of well depths to ensure that wells are physically intact and not filling with sediment.

d. Every five years conduct in-situ permeability tests on monitoring wells to compare test data with those collected originally to determine if well deterioration is occurring or other methods approved by the department.

Commented [RBL16]: SIDEBAR: Allows the DNR to approve other methods without requiring a waiver request.

567—101.212(455B) Monitoring well siting requirements.

101.212(1) Downgradient monitoring wells. Downgradient monitoring wells must be located to provide 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. 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.

101.212(2) Water table wells. At least three downgradient water table monitoring wells shall be installed at each facility. The maximum spacing between wells shall be 600 feet.

101.212(3) Uppermost aquifer monitoring wells. If different from water table monitoring wells, at least three uppermost aquifer monitoring wells shall be installed at each facility. Uppermost aquifer monitoring wells shall be spaced no more than 600 feet apart. If the uppermost aquifer is located more than 50 feet below the water table, this requirement may be relaxed, although at least one downgradient uppermost aquifer monitoring well will be required.

101.212(4) Other downgradient monitoring wells. Additional downgradient monitoring wells will be required if the water table and uppermost aquifer monitoring wells do not intercept most vertical flow paths from the site. In such situations, monitoring wells shall be placed at the appropriate depths to intercept the remaining flow paths and shall be spaced at no more than 600 feet apart.

101.212(5) Upgradient monitoring wells. Upgradient monitoring wells shall not be affected by the site. At least one upgradient monitoring well shall be installed into each stratum being monitored by downgradient monitoring wells. If it is not possible to actually locate a monitoring well upgradient of the site, the well shall be placed as near the site as feasible without being affected by the site.

567—101.213(455B) General requirements.

101.213(1) Plan requirements. The plans for sanitary landfills shall include the following:

a. The map and aerial photograph of sufficient scale to show all homes, buildings, lakes, ponds, watercourses, wetlands, dry runs, rock outcroppings, roads, and other applicable details including topography and drainage patterns. All wells shall be identified on the map or aerial photograph and a benchmark shall be indicated.

b. A plot drawing in appropriate scale of the site and the immediately adjacent area showing dimensions, topography with appropriate contour intervals, drainage patterns, known existing drainage tiles, locations where any geologic samples were taken, all water wells with their uses, and present and planned pertinent features including but not limited to roads, fencing, and borrow areas.

c. Detailed engineering drawing of the site showing all initial and permanent roads,

buildings and equipment to be installed; unloading and holding areas; fences and gates; landscaping and screening devices; personnel and maintenance facilities; and sewer and water lines.

d. Solid waste landfills shall have a soil liner consisting of at least four feet of recompacted soil. The description, source and volume of the material to be used for the landfill liner, including the method of installation, must be provided. The hydraulic conductivity must be 1×10^{-7} cm/sec (0.00028 ft/day) or less as determined by appropriate laboratory analysis. The percent of standard or modified proctor density at moisture contents consistent with expected field conditions and corresponding to a measured coefficient of permeability equal to or less than 1×10^{-7} cm/sec shall be determined in the laboratory. The soil shall be placed in lifts not to exceed 8 inches in thickness. A minimum of one field density test shall be performed per lift per acre to verify that the density determined by the laboratory analysis as correlated to permeability has been achieved. Results of field density tests shall be submitted to the department prior to the placement of solid waste.

e. Alternative liner systems. An alternative liner system to that required in subparagraph 101.213(1) "d" may be approved by the director if the design of the liner system is equivalent to the soil liner required in subparagraph 101.213(1) "d" in performance, longevity and protection of the groundwater; or based on the specific type of waste to be disposed of, the design of the liner system offers equivalent protection of the groundwater. Undisturbed soil shall not be used as liner material.

f. Diversion and drainage structures designed to prevent ponding, infiltration, inundation, erosion, slope failure and washout from surface runoff due to a 25-year, 24-hour rainfall event,

g. A leachate collection, storage and treatment and disposal system designed to protect the soils, surface water, and groundwater from leachate contamination. This system shall be designed to operate during the active life of the site and during the post-closure period.

(1) The design and construction of the system must be in accordance with subrule 101.213(10) and be coordinated with the planned phase development of the site and the timing of leachate generation.

(2) The potential for leachate generation shall be evaluated in determining the design for the facility.

(3) The plan must include proposed quality assurance and quality control testing to be performed during installation and operation of the system. This plan shall include procedures that will be followed during installation of the leachate collection system and during normal landfill operations to ensure the system's integrity and design standards.

h. A drawing of the scheme of development shown progressively with time. The methods to be used to ensure compliance with the scheme and to provide vertical and horizontal controls shall be described.

i. Cross-sectional drawings showing progressively with time the original and proposed elevation of excavating, trenching, and fill.

k. An ultimate land use proposal, including intermediate stages, with time schedules indicating the total and complete land use. Final elevations, grades, permanent drainage structures, monitoring or treatment facilities and permanent improvements of the completed landfill shall be included. Any supporting drawings to the ultimate land use proposal shall be in appropriate scale.

Commented [RBL17]: *SIDEBAR: Only the alternative approach in current subrule (2) is applicable, so removed (1)

Commented [RBL18]: SIDEBAR: Th reference in current rule is outdated, and the DNR does not wish to dictate sources as they will change in the future.

l. Information describing:

(1) Source, volume, and characteristics of cover material;

(2) Area of site in acres;

m. A report consisting of information verifying that the portion of the site to be filled is:

(1) So situated as to obviate any predictable lateral movement of significant quantities of leachate from the site to standing or flowing surface water or to shallow aquifers that are in actual use or are deemed to be of potential use as a water resource.

(2) At least 50 feet from the adjacent property line unless there is a written agreement with the owner of the abutting property. The report shall verify that the portion to be filled is at least 50 feet from the adjacent property line. The written agreement shall be filed with the county recorder and shall become a permanent record of the property.

(3) Beyond 500 feet from any existing habitable residence unless there is written agreement with the owner of the residence and the site is screened by natural objects, plantings, fences or by other appropriate means. The residence must be in existence on the date of application for the original permit from the department. The written agreement shall be filed with the county recorder and recorded for abstract of title purposes, and a copy submitted to the department.

a. Such additional data and information as may be deemed necessary by the director to evaluate a proposed sanitary landfill.

b. When a new landfill or lateral expansion is located within 200 feet of a fault that has had displacement in Holocene time, the plan must contain a notice that the facility's official files will include the following demonstration: that an alternative setback distance of less than 200 feet will prevent damage to the structural integrity of the site and will be protective of human health and the environment.

c. When a new landfill or a lateral expansion is located in seismic impact zones, the plan must contain a notice that the facility's official files will include the following demonstration: that all containment structures, including liners, leachate collection systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in the lithified earth material for the site.

d. When a new landfill or lateral expansion is located in an unstable area, the plan must contain a notice that the facility's official files will include the following demonstration: that engineering measures have been incorporated into the site design to ensure that the integrity of the structural components of the site will not be disrupted. The demonstration must consider the on-site or local soil conditions that may result in significant differential settling, on-site or local geologic or geomorphologic features, and on-site or local human-made features or events (both surface and subsurface). For existing facilities located in an unstable area, the owner or operator must prepare the above demonstration required in this paragraph and notify the director that it has been placed in the facility's official files.

101.213(2) Operating requirements. The plan submitted shall detail how the sanitary landfill will comply with these requirements.

a. Solid waste shall be unloaded at the working face only when an operator is on duty at that area. Solid waste may be deposited in storage containers inside the site under the supervision of an attendant or operator.

b. A copy of the permit, engineering plans, and reports shall be kept at the site at all

Commented [RBL19]: SIDEBAR: Burning is not allowed. Other regulations regulate yard waste. So current subrule removed.

Commented [RBL20]: *SIDEBAR: The intent was for both to be 50 feet.

Commented [RBL21]: SIDEBAR: Not applicable to landfill rules.

Commented [RBL22]: SIDEBAR: This requirement is only applicable to MSW landfills.

times.

c. Each site shall be graded and provided with drainage facilities to minimize flow of surface water onto and into the portion of the site being filled, and to prevent soil erosion and ponding of water.

d. The finished surface of the site shall be repaired as required, covered with soil, and seeded with native grasses or other suitable vegetation immediately upon completion or promptly in the spring on areas terminated during winter conditions. If necessary, seeded slopes shall be covered with straw or similar material to prevent erosion.

e. Each sanitary landfill shall be staked as necessary and inspected annually, or as otherwise specified in the permit, by an Iowa-licensed professional engineer. A brief report by the engineer indicating areas of conformance or nonconformance with the approved plans and specifications shall be submitted to the department by the permit holder within 30 days of the inspections. In specifying alternate inspection frequencies or schedules, the department shall consider the types and quantities of waste disposed of, the rate of development of the site, the degree of control over site development inherent in the design and topography of the site and the quality of prior operation.

f. If any pockets, seams or layers of sand or other highly permeable material are encountered at the sanitary landfill, the permit holder shall promptly notify the department and shall ensure that a professional engineer registered in Iowa has certified that all sands encountered were totally excavated or sealed off properly or otherwise handled as explicitly provided for in the permit before solid waste is disposed of in that area of the site.

g. The total volume of leachate collected for each month shall be recorded, and the elevation and thickness of leachate in the landfill shall be provided to the department in accordance with the schedule specified in the permit.

101.213(3) Hydrologic monitoring system. The owner or operator of a solid waste disposal facility shall operate and maintain a hydrologic monitoring system which includes a sufficient number of groundwater monitoring wells and surface water monitoring points to determine the impact, if any, that the sanitary disposal project is having on the adjacent water.

The hydrologic monitoring systems shall enable early detection of the escape of pollutants from a sanitary landfill. The hydrologic monitoring system shall be planned, designed, and constructed in accordance with the provisions of rules 567—101.213(3) through 567—101.213(9)(455B), and implemented in accordance with the following schedule:

a. A hydrologic monitoring system plan shall be submitted to the department for review and approval with any application for a new permit. Installation of the approved system shall be completed prior to the deposition of solid waste into the landfill.

b. A hydrologic monitoring system plan shall be submitted with applications for permit renewal

c. Upon notice by the department, a hydrologic monitoring system plan may be required to be submitted within six months of such notification.

d. Completion of installation and operation of the approved plan shall be completed within one year of the date of department approval.

101.213(4) Hydrologic monitoring system operating requirements.

a. *Operational sampling requirements.* All sampling shall be conducted in accordance

Commented [RBL23]: SIDEBAR: The department expects documents to be maintained on-site for all landfills.

Commented [RBL24]: SIDEBAR: This is included in Division I.

Commented [RBL25]: *SIDEBAR: Changed to align with Iowa code.

with an approved sampling protocol, components of which are described in rule 567—
101.210(455B).

b. Groundwater levels. The elevation of water in each monitoring well shall be measured during sampling events and recorded to the nearest 0.01 foot. Level measurements must be made before a well is evacuated for sample collection.

c. Surface water levels. The water level or flow rate of each surface water body sampled shall be measured and recorded at the time of sample collection.

d. First-year water sampling. During the first year of operation of the hydrologic monitoring system, a sample shall be collected quarterly from each groundwater monitoring well and surface water monitoring point. The purpose of this sample is to determine baseline water quality information and enable initial estimation of water quality variability. Each sample shall be analyzed for the following parameters in addition to the parameters listed in paragraph “e” of this subrule and any additional parameter deemed necessary by the department.

- (1) Arsenic
- (2) Barium
- (3) Cadmium
- (4) Chromium, total.
- (5) Lead.
- (6) Mercury.
- (7) Magnesium.
- (8) Zinc.
- (9) Copper.
- (10) Benzene.
- (11) Carbon tetrachloride.
- (12) 1,2-Dichloroethane.
- (13) Trichloroethylene.
- (14) 1,1,1-Trichloroethane.
- (15) 1,1-Dichloroethylene.
- (16) Paradichlorobenzene.

e. Routine semiannual water sampling. After the first year, each monitoring point must be sampled semiannually as specified in the facility’s operation permit and analyzed for the following parameters.

- (1) Chloride.
- (2) Specific conductance (field measurement).
- (3) pH (field measurement).
- (4) Ammonia nitrogen.
- (5) Iron, dissolved.
- (6) Chemical oxygen demand.
- (7) Temperature (field measurement).
- (8) Any additional parameters deemed necessary by the department.

f. Routine annual water sampling. One sample per year from each monitoring point collected in a quarter specified in the facility’s operation permit must be analyzed for the following parameters.

- (1) Total organic halogen.
- (2) Phenols.

Commented [RBL26]: *SIDEBAR: Changed to reflect how it has been applied in permits.

Commented [RBL27]: *SIDEBAR: Removed testing for dissolved metals since current permit requirements are for totals.

(3) Any additional parameters deemed necessary by the department.

101.213(5) Laboratory procedures. All analyses of parameters not covered in the Safe Drinking Water Act (SDWA) must be performed according to methods specified in SW-846 or approved by the United States Environmental Protection Agency. Any analytical method used on non-SDWA parameters deviating from those specified in SW-846 or approved by EPA must be approved by the department.

All analyses must be recorded on forms which, in addition to the analytical results, show the precision of the data set, bias, and limit of detection.

101.213(6) Analysis of sampling data. For each parameter analyzed during the first year of operation of the hydrologic monitoring system, as listed in paragraph 101.213(4) “d” above, the mean and standard deviation for each upgradient monitoring well shall be determined using the first year of data. For routine semiannual monitoring parameters, as listed in paragraph 101.213(4) “e” above, mean and standard deviation shall be recalculated annually using all available analytical data. If the analytical results for a downgradient monitoring point do not fall within the control limits of two standard deviations above the mean parameter(s) level in a corresponding upgradient monitoring point, the owner or operator shall submit this information to the department within 30 days of receipt of the analytical results. If the analytical results from an upgradient monitoring point do not fall within two standard deviations of the mean parameter(s) level for that monitoring point, the department shall also be notified within 30 days.

101.213(7) Additional sampling. The department will determine if additional sampling is warranted, after receipt of information indicating a possible release as required in subrule 101.213(6) above. The department may require any additional samples to be split and analyzed to determine if the values obtained outside the control limits were the result of laboratory or sampling error. Any additional analytical results shall be submitted to the department by the owner or operator within seven days of receipt. The department will review the information and determine if additional monitoring or preparation of a groundwater quality assessment plan, in accordance with subrule 101.213(9), is necessary.

101.213(8) Record keeping and recording.

a. The persons conducting the sampling must record the procedures, measurements, and observations at the time of sampling. The field records must be sufficient to document whether the procedures and requirements specified in the sampling protocol have been followed. The records must also contain the names of the persons conducting the sampling, the time and date each monitoring point was sampled, the required field measurement or test result. The owner or operator must submit copies of these field records to the department if requested.

b. The owner or operator shall keep records of analyses and the associated groundwater surface elevations for the active life and post-closure period of the facility. These records shall be kept at the site or in the administrative files of the owner or operator, and shall be available for review by the department upon request in the county in which the landfill is located.

c. The owner or operator shall provide the department with copies of the quarterly monitoring analytical results by the dates specified in the facility’s operation permit.

d. An annual report summarizing the effect of the facility on groundwater and surface water quality shall be submitted to the department by November 30 each year. The summary is to be prepared by qualified groundwater scientist and incorporated in the

November annual engineer inspection report. The contents of this summary are to include the following items:

(1) A narrative describing the effects of the facility on surrounding surface water and groundwater quality and any changes made or maintenance needed in the monitoring network.

(2) Graphs showing concentrations versus time for all monitoring parameters for each well for as long as records exist for that parameter. Control limits (two standard deviations from the initial background value) must be shown in each graph.

(3) Results of activities and tests required by the well maintenance and performance reevaluation plan described in rule 567—101.211(455B).

101.213(9) Groundwater quality assessment plan.

a. If leachate migration occurs, the owner or operator, as required by the department, shall develop and submit for approval a specific plan to conduct a groundwater quality assessment study at the facility to determine the rate of migration and the extent and constituent composition of the leachate release. At a minimum, the assessment monitoring plan must contain the following elements:

(1) Discussion of the hydrogeologic conditions at the site with an identification of potential contaminant pathways.

(2) Description of the present detection monitoring system.

(3) A description of the approach the owner or operator will take to substantiate any contention that the contamination may have been falsely indicated.

(4) Description of the investigatory approach used to characterize the rate and extent of leachate migration.

(5) Discussion of the number, location and depth of wells that will be initially installed as well as a strategy for installing more wells in subsequent investigatory phases.

(6) Information on well design and construction.

(7) Description of the sampling and analytical program used to obtain and analyze groundwater monitoring data.

(8) Description of data collection and analysis procedures.

(9) Schedule for the implementation of each phase of the assessment study.

b. After the plan has been approved by the department, the owner or operator shall implement the plan according to the schedule in the plan.

c. Within 90 days after the activities prescribed in the groundwater assessment plan have been completed, the owner or operator shall submit a written groundwater quality assessment report to the department.

d. If the department determines that no waste or waste constituents from the facility have entered the groundwater, the owner or operator shall reinstate the routine monitoring program.

If the department determines that waste or waste constituents have been released from the facility and have entered the groundwater, the owner or operator shall continue to make the determinations described by the assessment plan and develop a remedial action/mitigation plan to alleviate or reduce contamination to the fullest extent possible.

101.213(10) Leachate control system and liner design. New sanitary landfills or expansions of existing sanitary landfills must have a leachate collection, storage, and treatment and discharge system in place prior to accepting waste. This system shall be operated in conformance with the approved design during the active life of the site and

Commented [RBL28]: *SIDEBAR: Corrected to match the inspection frequency above.

Commented [RBL29]: SIDEBAR: Monitoring during post-closure is required elsewhere.

during the post-closure period.

a. Leachate collection system.

(1) The leachate collection system shall be designed to allow not more than 1 foot of head above the top of the landfill liner. The collection system must include a method for measuring the leachate head in the landfill at the lowest area(s) of the collection system.

(2) The landfill liner must be graded toward the leachate collection pipe at a slope greater than 2 percent, but not to exceed 10 percent. The side slopes of the landfill liner must be less than 25 percent.

(3) A drainage layer must be placed immediately above the landfill liner. This drainage layer shall consist of a minimum of 1 foot of soil with a coefficient of permeability of 1E-3 cm/sec (2.8 ft/day) or greater.

(5) Leachate collection pipe shall be surrounded by a gravel protection and drainage layer

(6) The collection pipe must be perforated, of a sufficient diameter to handle the expected flow, but not less than 4 inches in inside diameter; capable of being cleaned throughout the active life of the site and during the post-closure period; chemically resistant to the wastes and the expected leachate; and of sufficient strength to support maximum static and dynamic loads imposed by the overlying wastes, cover materials, and equipment used during the construction and operation of the site. Documentation shall be submitted which includes methods and specifications for cleaning of the pipes, chemical compatibility of the pipes, and calculations and specifications for pipe strength.

(7) The leachate collection system shall be equipped with valves to enable the flow of leachate from the facility to be shut off during periods of maintenance.

(8) The leachate collection system shall be cleaned out once every three years, or more frequently if conditions warrant. A report of the methods and results of the cleanout shall be submitted at the time of permit renewal.

b. Leachate storage system. The leachate storage system must be:

(1) Capable of storing at least seven days' accumulation of leachate;

(2) Constructed of materials which are compatible with the expected leachate; and

(3) Accessible at all times of the year and under all weather conditions.

c. Leachate recirculation. The primary goal of the leachate recirculation system is to help stabilize the waste. The leachate recirculation system shall not contaminate waters of the state, contribute to erosion, damage cover material, harm vegetation, or spray persons. Leachate recirculation shall be limited to areas satisfying the requirements of subrule 101.213(10). The department shall approve areas for leachate recirculation.

d. Construction certification report. Prior to inspection and start up, a construction certification report must be submitted discussing quality assurance and quality control testing done to ensure that all materials and equipment for the leachate control system have been placed in accordance with the approved engineering plans, reports and specifications. The results of all testing must be included, along with documentation of any failed tests, a description of the procedures used to correct the failures, and results of any retesting performed.

101.213(11) Closure requirements. The owner or operator of the sanitary landfill must close the site in a manner that minimizes the potential for post-closure release of pollutants to the air, groundwater or surface waters.

a. A minimum of two permanent surveying monuments must be installed by a

Commented [RBL30]: SIDEBAR: Burrito-wrapping of pipes is generally not a good practice if bio-fouling is a concern. Therefore, the DNR does not want to require this. Instead, infiltration into the pipe should be a design consideration.

Commented [RBL31]: *SIDEBAR: Revised to reflect current permitting requirements and expectations.

595 registered land surveyor from which the location and elevation of wastes, containment
596 structures, and monitoring facilities can be determined throughout the post-closure period.

597 *b.* The final cover of a sanitary landfill shall consist of:

598 (1) Not less than 2 feet of compacted soil. The permeability must be $1 \times 10E-7$ cm/sec
599 or less as determined by appropriate laboratory analysis. The percent of standard or
600 modified proctor density at moisture content consistent with expected field conditions and
601 corresponding to a measured coefficient of permeability equal to or less than $1 \times 10E-7$
602 cm/sec shall be determined in the laboratory. The soil shall be placed in lifts not to exceed
603 8 inches in thickness. A minimum of one field density test shall be performed per lift per
604 acre to verify that the density determined by the laboratory analysis as correlated to
605 permeability has been achieved. Results of field density tests shall be submitted to the
606 department. The compacted soil shall be keyed into the bottom liner at the waste cell
607 boundary.

608 (2) Not less than 2 feet of uncompacted soil, containing sufficient organic matter to
609 support vegetation. The thickness of this soil layer must be at least the root depth of the
610 planned vegetative cover to prevent root penetration into the underlying soil layers. This
611 layer shall be placed as soon as possible to prevent desiccation, cracking and freezing of
612 the compacted soil layer described in subparagraph 101.213(11)“*b*”(1).

613 (3) A layer of compacted soil, incinerator ash, or similar material permitted by the
614 department may be used to prepare the site for placement of the compacted soil layer
615 described in subparagraph 101.213(11)“*b*”(1). The use of such material will not serve as a
616 replacement for the compacted soil layer described in subparagraph 101.213(11)“*b*”(1).

617 (4) Alternate methods and materials may be permitted if shown to provide equivalent
618 or superior performance.

619 *c.* The final cover shall be designed and graded to meet the drainage requirements of
620 paragraph 101.213(11)“*c*.” The final cover must have a minimum slope of 5 percent, and
621 shall not exceed a slope of 25 percent. Those portions of existing landfills demonstrating
622 placement of final cover in conformance with previously approved plans and specifications
623 shall not be required to reconstruct the cover to meet either the minimum or maximum
624 slope established by this subrule.

625 *d.* The final cover shall be seeded with native grasses or other suitable vegetation as
626 soon as practical upon completion to prevent soil erosion. If seeding must be delayed due
627 to summer or winter conditions, silt fences or other structures shall be used to minimize
628 erosion of the final cover until the next season suitable for planting. The placement of cover
629 in conformance with paragraphs 101.213(13)“*b*” and “*c*” shall not be delayed due to
630 season and shall be placed as soon as the solid waste has reached its maximum design
631 elevation within the cell. Vegetation type shall be based on density and root depth, nutrient
632 availability, soil thickness, and soil type. Alternatives to vegetative cover may be
633 considered to control erosion and promote runoff.

634 **101.213(14) Post-closure care requirements.** Sanitary landfills shall comply with the
635 following post-closure care requirements for 30 years.

636 *a.* The diversion and drainage system must be maintained to approved specifications
637 to prevent run-on and runoff from eroding or otherwise damaging the final cover.

638 *b.* The integrity and effectiveness of the final cover must be maintained by making
639 repairs as necessary to correct the effects of settling, subsidence, erosion, or other events.
640 If damage to the compacted soil layer described in subparagraph 101.213(11)“*b*”(1)

Commented [RBL32]: *SIDEBAR: Equivalent provides more flexibility.

Commented [RBL33]: SIDEBAR: The department has required a composite liner system at landfills with groundwater impact associated with a soil-only liner.

occurs, repairs shall be made to correct the damage and return it to its original specifications.

c. The vegetative cover shall be reseeded as necessary to maintain good vegetative growth. Any invading vegetation whose root system could damage the compacted soil layer shall be removed or destroyed immediately.

d. The groundwater monitoring system shall be operated and maintained and shall comply with all applicable rules and closure permit requirements.

e. The leachate collection, removal and treatment systems shall be operated and maintained and shall comply with all applicable rules and closure permit requirements.

f. The landfill gas monitoring and collection systems shall be operated and maintained and shall comply with all applicable rules and closure permit requirements.

g. Semiannual reports shall be submitted to the department. These reports shall contain information concerning the general conditions at the site, groundwater monitoring results, amount of leachate collected and treated, information concerning the landfill gas monitoring and collection system, and other information as may be required by the closure permit. In addition, locations and elevations of all permanent monuments, required in paragraph 101.213(2) "e," shall be determined at least once every three years or more frequently in the event of obvious disturbance of the monument. The reports are due by April 30 and October 31 for the preceding six-month period.

h. The permanent surveying monuments required in paragraph 101.213(2) "e," shall be maintained.

101.213(15) Landfill gas. This subrule shall not apply to sanitary landfills that do not pose a risk to generating explosive gases.

a. Owners or operators of sanitary landfills 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 gas in facility structures (excluding gas control or recovery system components); and

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

b. Owners or operators of sanitary landfills must monitor quarterly for compliance with paragraph "a" of this subrule. An annual report shall be submitted by November 30 summarizing the methane gas monitoring results and any action taken resulting from gas levels exceeding the limits during the previous year.

c. If methane gas levels exceeding the limits specified in paragraph "a" of this subrule are detected, the owner or operator must:

(1) Immediately take all necessary steps to ensure protection of human health and notify the director;

(2) Within seven days after detection, submit to the director a report stating the methane gas levels detected and a description of the steps taken to protect human health;

(3) Within 60 days of detection, implement a plan for remediation of the methane gas releases and send a copy of the remediation plan to the director. The plan shall describe the nature and extent of the problem and the proposed remedy.

567—101.214(455B) Operating requirements. Every application for any permit issued by the department shall detail the means by which the applicant will comply with the operating requirements.

101.214(1) Open burning shall be prohibited within the permitted boundary.

Commented [RBL34]: SIDEBAR: Clarifying how it has been implemented.

Commented [RBL35]: SIDEBAR: This is how it has been implemented and enforced. Stating compliance with Chapter 23 (i.e. air quality rules) is redundant.

687 **101.214(2)** Free liquids or waste containing free liquids. No free liquids or waste
688 containing free liquids shall be disposed of in a sanitary landfill.

689 **101.214(3)** The requirements for a sanitary landfill accepting a specific type or a set of
690 specific types of solid waste will vary on the nature of the solid waste. Therefore, the no
691 single standard is practical, and the following information shall be submitted.

692 a. The source of the solid waste and a description of the process which produces it.

693 b. A detailed analysis of the solid waste to be deposited at the site, including such tests
694 as may be required by the department to evaluate the potential impact of disposal of the
695 solid waste on the environment if it is disposed of in the manner described in the plans.

696 c. Design, construction, and operational requirements specific to the waste to protect
697 groundwater and surface water resources, including equipment, processing, and cover
698 requirements.

699 **101.215(4) Closure requirements.**

700 a. The owner or operator shall notify the department in writing at least 180 days prior
701 to closure of the facility or suspension of operations.

702 b. Notice of closure shall be posted at the facility at least 180 days prior to closure
703 indicating the date of closure and alternative solid waste management facilities. Notice of
704 closure shall also be published at least 180 days prior to closure in a newspaper of local
705 circulation. This notice shall include the date of closure and alternative solid waste
706 management facilities if open to the public.

707 c. Implementation of the closure/post-closure plan shall be completed within 90 days
708 of the closure of the facility. The owner and an engineer registered in Iowa shall certify
709 that the closure/post-closure plan has been implemented in compliance with the rules, the
710 closure/post-closure plan and the permit.

711 d. Upon completion of closure activities, a construction certification report must be
712 submitted discussing quality assurance and quality control testing done to ensure that all
713 materials for the cap have been placed in accordance with the approved engineering plans,
714 reports and specifications. The results of all testing must be included, along with
715 documentation of any failed tests, a description of the procedures used to correct the
716 failures, and results of any retesting performed. In addition, the following documentation
717 shall be submitted: as-built plans showing changes from the original design plans; a copy
718 of the notation filed with the county recorder; and other forms of documentation as
719 required.

720
721 **567—101.215(455B) Financial assurance requirements.** The owner or operator of a
722 sanitary landfill pursuant to this division must establish financial assurance for closure,
723 post-closure and corrective action, if applicable, in accordance with 567—Chapter 101,
724 division VIII.

725 These rules are intended to implement Iowa Code section 455B.304.

726
727 **567—101.216 to 101.299** Reserved.

Commented [RBL36]: *SIDEBAR: This wording was inadvertently deleted in the prior draft.

Commented [RBL37]: SIDEBAR: This is not applicable if the landfill is not open to the public.

Commented [RBL38]: SIDEBAR: Clarifying how this has been implemented.