

567—101.213(455B) General requirements.

101.213(1) Plan requirements. The plans for industrial 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 landfill 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 landfill 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. CCR 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 $1 \times 10E^{-7}$ 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 hydraulic conductivity equal to or less than $1 \times 10E^{-7}$ cm/sec shall be determined in the laboratory. The soil shall be placed in lifts not to exceed eight inches in thickness. A minimum of one field moisture and density test shall be performed per lift per acre to verify that the moisture and density determined by the laboratory analysis as correlated to permeability has been achieved. Results of field moisture and density tests shall be submitted to the department prior to the placement of solid waste.

e. Alternative liner systems. An alternative liner system may be approved by the director if the design of the liner system is equivalent to the soil liner required in 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 a liner.

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 also be designed to operate during the active life of the landfill site and during the post-closure period.

(1) The design and construction of the system must be in accordance with 101.213(10) and be coordinated with the planned phase development of the landfill 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.

j. 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.

k. Information describing:

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

(2) Area of landfill site in acres.

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

(1) Situated to obviate any predictable lateral movement of significant quantities of leachate from the landfill 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 landfill site is screened by natural objects, plantings, or 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.

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

n. 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 demonstration that an alternative setback distance of less than 200 feet will prevent damage to the structural integrity of the landfill site and will be protective of human health and the environment.

o. 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 landfill site.

p. 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 landfill site design to ensure that the integrity of the structural components of the landfill 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 industrial 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 facility under the supervision of an attendant or operator.

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

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

d. The finished surface of the landfill 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 industrial 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 landfill site, the degree of control over landfill site development inherent in the design and topography of the landfill 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 industrial 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 landfill 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 that 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 groundwater and surface water.

The hydrologic monitoring systems shall enable early detection of the escape of pollutants from an industrial landfill. The hydrologic monitoring system shall be planned, designed, and constructed in accordance with the provisions of 101.213(3) through 101.213(9), 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 with an approved sampling protocol, components of which are described in 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 101.213(4)“e” 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.
- (3) Any additional parameters deemed necessary by the department.

101.213(5) Laboratory procedures. Analyses for a contaminant regulated under this division must be performed by a laboratory certified for the analyte(s) and applicable method pursuant to 567—Chapter 83.

a. 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.

b. All analyses must be recorded on forms that, 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 101.213(4)“d,” 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 101.213(4)“e,” 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 101.213(6). The department may require any additional samples to be split and analyzed to determine whether 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 101.213(9), is necessary.

101.213(8) Recordkeeping 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, and the required field measurement or test result. The owner or operator must submit copies of these field records to the department upon request.

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 landfill site or in the administrative files of the owner or operator and shall be available for review by the department.

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 567—101.211(455B).

101.213(9) *Groundwater quality assessment plan.*

a. If leachate migration occurs, the owner or operator 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 landfill 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.

e. 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 industrial landfills or expansions of existing industrial 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 landfill site and during the post-closure period.

a. *Leachate collection system.*

(1) The leachate collection system shall be designed to allow not more than one 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 minimum slope of two percent and 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 1×10^{-3} cm/sec (2.8 ft/day) or greater.

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

(5) The collection pipe must be perforated of a sufficient internal diameter to handle the expected flow but not less than four inches in diameter; capable of being cleaned throughout the active life of the landfill 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 landfill site. Documentation shall be submitted that includes methods and specifications for cleaning of the pipes, chemical compatibility of the pipes, and calculations and specifications for pipe strength.

(6) 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.

(7) 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 that 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 101.213(10). The department shall approve areas for leachate recirculation.

d. Construction certification report. Prior to inspection and startup, 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 industrial landfill must close the landfill site in a manner that minimizes the potential for post-closure release of pollutants to the air, groundwater, and surface waters.

a. A minimum of two permanent surveying monuments must be installed by a registered land surveyor from which the location and elevation of wastes, containment structures, and monitoring facilities can be determined throughout the post-closure period.

b. Contents of final cover.

(1) The final cover of an industrial landfill shall consist of:

1. Not less than two feet of compacted soil. The hydraulic conductivity must be 1×10^{-7} cm/sec or less as determined by appropriate laboratory analysis. The percent of standard or modified proctor density at moisture content consistent with expected field conditions and corresponding to a measured hydraulic conductivity 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 eight inches in thickness. A minimum of one field moisture and density test shall be performed per lift per acre to verify that the density determined by the laboratory analysis as correlated to the hydraulic conductivity has been achieved. Results of field moisture and density tests shall be submitted to the department. The compacted soil shall be keyed into the bottom liner at the waste cell boundary.

2. Not less than two feet of uncompacted soil, containing sufficient organic matter to support vegetation. The thickness of this soil layer must be at least the root depth of the planned vegetative cover

to prevent root penetration into the underlying soil layers. This layer shall be placed as soon as possible to prevent desiccation, cracking, and freezing of the compacted soil layer described in 101.213(11) "b"(1)"1."

(2) A layer of compacted soil, incinerator ash, or similar material permitted by the department may be used to prepare the landfill site for placement of the compacted soil layer described in 101.213(11) "b"(1)"1." The use of such material will not serve as a replacement for the compacted soil layer described in 101.213(11) "b"(1)"1."

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

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

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

101.213(12) *Post-closure care.* Industrial landfills shall comply with the following post-closure care requirements for 30 years.

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

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

e. The leachate collection, removal and treatment systems shall be operated and maintained.

f. The landfill gas monitoring and collection systems shall be operated and maintained.

g. Semiannual reports shall be submitted to the department. These reports shall contain information concerning the general conditions at the landfill 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 101.213(11) "a," 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 101.213(11) "a" shall be maintained.

101.213(13) *Landfill gas.* This subrule shall not apply to industrial landfills that do not pose a risk to generating explosive gases.

a. Owners or operators of industrial landfills must ensure that:

(1) The concentration of explosive gases 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 industrial landfills must monitor quarterly for compliance with 101.213(13)“*a.*” 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 101.213(13)“*a.*” 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.

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