

567—101.107(455B) MSWLF unit design and construction standards. MSWLF units shall be designed and constructed in accordance with this rule.

101.107(1) Plans and specifications.

a. Unless otherwise requested by the department, one copy of plans, specifications, and supporting documents shall be provided to the department for review.

b. 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 Previous department approval of plans and specifications for MSWLF units not yet constructed shall be superseded by the promulgation of new rules and regulations, after which plans and specifications shall be resubmitted to the department for approval prior to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.

101.107(2) 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 101.107(4) "b" and "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.

101.107(3) 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 101.107(5) "a"(1) or an alternative liner system that complies with the requirements of 101.107(5) "a"(2). Liners utilizing compacted soil must place the compacted soil in lifts no thicker than eight inches after compaction.

(1) Composite liner systems.

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

2. The upper component must consist of a minimum 30 mil flexible membrane liner. Flexible membrane liner components consisting of high-density polyethylene (HDPE) shall be at least 60 mil thick. The flexible membrane liner 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 two-foot layer of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} centimeters per second (cm/sec). The compacted soil must be placed in lifts no thicker than eight 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 101.102(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 567—101.107(455B) will not be exceeded in the uppermost aquifer at the relevant point of compliance, as specified pursuant to 101.107(5) "a"(2) "2." Alternative liners utilizing compacted soil must place the compacted soil in lifts no thicker than eight 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 101.110(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 101.102(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-Trichloroethane.	0.2
Trichloroethylene.	0.005
2,4,5-Trichlorophenoxy acetic acid.	0.01
Vinyl chloride.	0.002

b. Leachate collection system. 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 post-closure 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 post-closure 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 (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 101.102(11) (relating to equivalency review procedure), the following design requirements shall apply:

1. A geotextile cushion over the flexible membrane liner if the system utilizes such a liner 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 four inches in diameter at the base of the liner slope(s), surrounded by the high hydraulic-conductivity material listed in 101.107(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 1×10^{-2} cm/sec; or

- A geosynthetic drainage media (e.g., geonet). The transmissivity of geonets shall be tested 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 1×10^{-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 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 101.102(11) (relating to equivalency review procedure), the leachate storage structures shall be able to store at least seven 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 seven-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 seven 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 101.110(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 National Pollutant Discharge Elimination System (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.

101.107(4) *Quality control and assurance program (QC&A).* MSWLF units shall be constructed under the supervision of a QC&A program to ensure that MSWLF units are constructed in accordance with the requirements of 567—101.107(455B) and the approved plans and specifications. At a minimum, such QC&A program shall consist of the following.

a. The owner or operator shall designate a QC&A officer. The QC&A officer shall be an Iowa-licensed professional engineer. 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 aspects of the QC&A program.

b. The QC&A officer shall document compliance with 567—101.107(455B), and the approved plans and specifications, for the following aspects of construction:

(1) The MSWLF unit's subgrade.

(2) The liner system, as follows:

1. For a flexible membrane liner, destructive testing of the flexible membrane liner shall be kept to side slopes when continuous seams are utilized. Patches over destructive testing areas shall be checked with nondestructive methods.

2. For the compacted clay component of the liner system, a minimum of five field moisture density tests per eight-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, 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 567—101.107(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 567—101.107(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 567—101.107(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 567—101.107(455B) and the department-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 567—101.107(455B) and the approved plans and specifications.

101.107(5) *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:

- 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 101.107(4), 101.107(5) and 101.107(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 101.107(7) “b,” if approved by the department.
- b. Vertical expansions shall, at a minimum, comply with the following:
 - (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 101.107(8).
 - (5) The proposed vertical expansion shall be in compliance with the final slopes required at closure pursuant to 101.112(1) “e.”

101.107(6) *Run-on and runoff control systems.*

a. Owners or operators of 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 25-year, 24-hour storm.

b. Runoff from the active portion of the MSWLF unit must be handled in accordance with 101.110(1) “*a.*”

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