SECTION 5: SANITARY LANDFILLS

(NOTE: This section applies only to landfills that accept household waste.)

A. SITING

1. Sanitary landfill facilities shall be located only in areas where the potential for degradation of the quality of air, land, and water is minimal.

2. All sanitary landfill facilities shall be constructed to at least minimum design requirements as contained in Section 5.B. More stringent designs will be required where deemed necessary by the Department for the protection of ground water resources.

3. The owner or operator of any proposed sanitary landfill within a 5-mile radius of any airport runway must notify the airport and the Federal Aviation Administration (and provide proof of notification to the Department).

4. No new cell of a sanitary landfill shall be located:
   a. Within the 100-year flood plain as delineated by the Federal Emergency Management Agency.
   b. In an area that may cause or contribute to the degradation of any state or federally regulated wetlands unless the owner or operator can demonstrate to the satisfaction of the appropriate wetlands regulatory agency that:
      (1) there is no impact to any regulated wetlands on the site, or
      (2) any impact will be mitigated as required.
   c. Within one mile of any state or federal wildlife refuge, wildlife area, or park, unless specifically exempted from this requirement by the Department.
   d. Within 10,000 feet of any airport runway currently used by turbojet aircraft or 5,000 feet of any airport runway currently used by piston-type aircraft, unless a waiver is granted by the Federal Aviation Administration.
   e. So as to be in conflict with any locally adopted land use plan or zoning requirement.
   f. Within the wellhead protection area of a public water supply well or well field or a formally designated aquifer resource protection area.
   g. Within 200 feet of a fault that has had displacement during Holocene time (unless it can be demonstrated that a lesser setback distance would prevent damage to the structural integrity of the landfill unit and be protective of human health and the environment.)
   h. Within a seismic impact zone unless it can be demonstrated that all containment structures, including liners, leachate collection systems and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site.

For the purposes of this section:
Sec. 5.A.4.h Sanitary Landfills - Siting

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

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

(3) Lithified earth material means all rock, including all naturally occurring and naturally formed aggregates or masses of minerals or small particles of older rock that formed by crystallization of magma or by induration of loose sediments. This term does not include man-made materials, such as fill, concrete and asphalt or unconsolidated earth materials, soil or regolith lying at or near the earth surface.

i. In unstable areas, unless engineering measures have been incorporated in the design to insure the integrity of the structural components of the waste facility (including liners, leachate collection systems, run-on/run-off control, capping and anything affecting the containment and/or possible release of contaminants.) Unstable areas include those of (1) poor foundation conditions (possible subsidence), (2) susceptibility to mass movement or (3) Karst terrane.

j. In areas where valuable aquifers would be threatened by contaminant releases, unless viable alternatives have been dismissed and stringent design measures have been incorporated to minimize the possibility and magnitude of releases.

k. Within 200 feet of the facility property boundary unless otherwise approved by the Department.

B. DESIGN

1. General

Sanitary landfills shall be planned and designed by a Professional Engineer registered in Delaware. Planning and design of these facilities shall be consistent with the declared purpose and intent and in accordance with the provisions of this regulation and based on empirically derived data and state of the art technology.

2. Minimum design requirements

a. All sanitary landfills shall be designed to minimize contaminant releases and to prevent significant adverse impacts on human health or the environment and to achieve the following performance standards:

(1) Ensure that the contaminant concentrations do not prevent appropriate use of the ground water in the uppermost aquifer at the relevant point of compliance (examples are water supply, potability, stream flow maintenance, etc., as appropriate).

(a) The point of compliance shall be specified by the Department and shall be no more than 150 meters from the landfill cell boundary and shall be located on property owned by the owner of the landfill.
(b) In determining the relevant point of compliance, the Department shall consider at least the following factors:

(i) The hydrogeologic characteristics of the landfill and surrounding land;

(ii) The volume and physical and chemical characteristics of the leachate;

(iii) The quantity, quality, availability and direction of flow of ground water;

(iv) The proximity and withdrawal rate of ground water users;

(v) The availability of alternate drinking water supplies;

(vi) The existing quality of ground water, including other sources of contamination and their cumulative impacts on ground water, and whether the ground water is currently used or reasonably expected to be used for drinking water;

(vii) Public health, safety and welfare effects; and

(viii) Practical capability of the landfill owner or operator.

(2) Ensure that surface water quality standards will not be violated (except within designated mixing zones) as a result of contaminant discharges from the landfill.

b. All sanitary landfills shall be designed to have:

(1) A liner and internal leachate collection system which meet the requirements of Sections 5.C. and 5.D. of these regulations respectively,

(2) A setback area, including a buffer zone with appropriate screening,

(3) A gas control system that meets the requirements of Section 5.E.,

(4) A surface water management system that meets the requirements of Section 5.F.,

(5) A ground water monitoring system that meets the requirements of Section 5.G., and

(6) A capping system that meets the requirements of Section 5.H.

C. LINER

1. General provisions

a. An impermeable liner shall be provided at every sanitary landfill to restrict the migration of leachate from the landfill and to prevent contamination of the underlying ground water.

b. The Department reserves the right to set a more stringent liner requirement when it determines that a composite liner is not sufficient to protect human health and the environment.
c. The bottom of the liner (or the secondary liner, in a double liner system) shall be at least five (5) feet above the seasonal high water table as measured in the uppermost aquifer beneath the landfill. This 5-foot requirement may be reduced for a more stringent liner system design which provides enhanced protection of ground water.

d. All liners shall be prepared, constructed, and installed in accordance with a quality assurance plan included in the engineering report [Section 4.B.1.a (4)] and approved by the Department. For synthetic liners, the plan shall incorporate the manufacturer’s recommendations.

e. Qualifications of the construction quality assurance staff (CQA) and the geosynthetic installer, including master seamers, on-site supervisor, and construction quality control (CQC) personnel, shall meet the requirements of the approved Quality Assurance plan and be submitted to the Department for review prior to their performing these duties on site.

f. All conformance and destructive samples taken as part of the construction quality assurance plan shall be tested at an independent laboratory which is accredited by the Geosynthetics Institute’s Laboratory Accreditation Program (by applicable test method) or other accreditation program acceptable to the Department.

2. Liner characteristics

a. Composite liner

A composite liner must have, as a minimum:

(1) A primary (upper) liner which meets the following:

(a) Is at least 45 mils thick.

(b) Is constructed of materials that have appropriate chemical properties and sufficient strength and thickness to prevent failure due to physical contact with the leachate to which it is exposed, climatic conditions, the stresses of installation, and the stresses of daily operation.

(c) Is made of synthetic material that meets minimum requirements of the National Sanitation Foundation’s publication, "Standard Number 54-1993, Flexible Membrane Liners" for membrane materials covered by this standard, or of other materials of equal or better performance as approved by the Department.

(d) Is chemically resistant to the waste and leachate managed at the facility. The EPA Test Method 9090 shall be performed using a solid waste leachate (a synthetic leachate mix approved by the Department may be substituted if existing leachate is not available). The specified physical parameters shall be tested before and after liner exposure. Any significant change in test properties shall be considered to be indicative of incompatibility.

(e) Is compounded from first quality virgin materials. No reground or reprocessed materials containing encapsulated scrim shall be used in the manufacturing of the liner.

(f) Is free of pinholes, blisters, holes, and contaminants, which include, but are not
limited to, wood, paper, metal and non-dispersed ingredients.

(2) A secondary (lower) liner composed of:

(a) Compacted clay at least two feet thick with a hydraulic conductivity no greater than $1 \times 10^{-7}$ cm/sec, or

(b) An equivalent material or combination of materials acceptable to the Department.

b. Natural liner

(1) Use of natural material for liners is restricted to those areas where:

(a) Underlying ground water is not used and is not reasonably expected to be used for water supplies, and

(b) The landfill subbase is subject to compaction and settlement such that a synthetic membrane would not be feasible.

(2) A natural liner must meet the following requirements as a minimum:

(a) It shall consist of compacted clay or equivalent material having a hydraulic conductivity no greater than $1 \times 10^{-7}$ cm/sec.

(b) The material shall be at least five (5) feet thick, and thicker if necessary to prevent any leachate from migrating through the liner at any time during the active life and through the post-closure care period of the facility.

(c) The material proposed for use shall be tested by ASTM or equivalent methods for the following:

- Grain size
- Classification
- Compaction
- Specific gravity
- Hydraulic conductivity
- Porosity
- pH
- Cation exchange capacity
- Pinhole test (if required)
- Mineralogy (if required)

All data shall be submitted to the Department prior to construction.

(d) Testing of the saturated hydraulic conductivity and the effect of leachate on soil hydraulic conductivity shall be performed in accordance with test methods given in the most recent edition of EPA publication SW-846, ASTM test procedures, or other tests approved by the Department.

(e) If on-site soils are to be used as a natural liner, the uppermost five (5) feet of soil shall be excavated and recompacted to ensure homogeneity of the liner, provided, however, that with respect to dredge spoil soils, the excavation and recompaction requirement shall not apply if the applicant can demonstrate that
the dredge spoil soils have acceptable characteristics as indicated above.

c. Double liner system

(1) A double liner system shall meet the following requirements:

(a) It shall consist of two single liners separated by a drainage layer containing a leak detection system.

(b) The primary (upper) liner shall be a synthetic liner which is at least 30 mils thick and which meets the requirements of Section 5.C.2.a(1)(b)-(f).

(c) The secondary (lower) liner may be either synthetic or natural. If synthetic, it must be at least 30 mils thick and must meet the requirements of Section 5.C.2.a(1)(b)-(f). If natural, it must meet the requirements of Section 5.C.2.b.

(d) The drainage layer separating the two liners shall consist of at least 12 inches of soil having a hydraulic conductivity greater than $1 \times 10^{-2}$ cm/sec based on laboratory and field testing.

Alternate material may be used for the drainage layer with prior written approval of the Department.

(e) The leak detection system shall be capable of detecting and intercepting liquid within the drainage layer and conveying the liquid to a collection sump or monitoring point where the quantity of flow can be measured and the liquid can be sampled. The operator or designer shall calculate the Action Leakage Rate. The proposed Action Leakage Rate and a response plan if the Action Leakage Rate is exceeded shall be submitted to the Department as part of the application package. The system shall be designed to operate without clogging through the post-closure care period of the facility.

(f) The upper synthetic liner membrane shall be underlain by either a geosynthetic clay or 2 feet of natural material with a permeability no greater than $10^{-7}$ cm/sec.

Alternate liner designs may be used with prior written approval of the Department.

(2) A double liner system will be required where landfills are underlain by aquifers which are reasonably expected sources of water supply and/or capable of significant contaminant transport to adjacent surface waters.

3. Liner construction

a. Construction/installation of composite liner

(1) At least 15 working days prior to installation of the liner, the owner or operator shall notify the Department of the installation date.

(2) The liner shall be installed upon a subbase which meets the following requirements:
Sec. 5.C.3.a   Sanitary Landfills - Liner

(a) It shall be capable of supporting the loads and withstanding the stresses that will be imposed on it through the active life and post-closure care period of the facility and of resisting the pressure gradient above and below the liner caused by settlement, compression, or uplift.

(b) It shall have a smooth surface that is free of all rocks, stones, roots, sharp objects, or debris of any kind.

(c) It shall be certified in writing by the liner installer as an acceptable subbase for the liner. Written certification of acceptability shall be submitted to the Department prior to installation of the liner. However, submittal of written acceptance may proceed incrementally according to installation schedule.

(3) The minimum post-loading slopes of the liner shall either be:

(a) two (2) percent on controlling slopes and one-half (0.5) percent on remaining slopes, OR

(b) the controlling and remaining slopes shall be designed to prevent the head on the liner, excluding sump areas, from exceeding a depth of twelve (12) inches including post settlement conditions.

(4) The landfill shall be designed to minimize penetrations through the liner. If a penetration is essential, a liquid-tight seal must be accomplished between the penetrating structure and the synthetic membrane. Compaction of areas adjacent to the penetrating structure shall be to the same density as the surrounding soil to minimize differential settlement. Sharp edges on the penetrating structure must not come in contact with the synthetic material.

(5) Bridging or stressed conditions in the liner shall be avoided with proper slack allowances for shrinkage of the liner during installation and before the placement of a protective soil layer.

(6) Synthetic liners shall have factory and field seams that equal or exceed the strength requirements defined by the National Sanitation Foundation's "Standard Number 54-1993" for that liner material. All seams must be visually inspected and tested along their entire length for seam continuity using suitable nondestructive techniques. Seams shall also be tested for strength, at a frequency specified in the quality assurance plan. In addition, field seams shall meet the following requirements:

(a) Field seaming shall provide a dry sealing surface.

(b) Seaming shall not be done when wind conditions prevail.

(c) Seams shall be made and bonded in accordance with the supplier's recommended procedures.

(7) Proper equipment shall be used in placing drainage material over the synthetic liner to avoid stress.

(8) The synthetic membrane shall be protected from the waste by at least two (2) feet of drainage material incorporating the leachate collection system.
(9) The synthetic membrane must be underlain by a secondary liner as described in Section 5.C.2.a(2).

b. Construction of natural liner

(1) All lenses, cracks, channels, root holes, or other structural non-uniformities that can increase the saturated hydraulic conductivity above $1 \times 10^{-7}$ cm/sec shall be removed.

(2) Natural liners shall be constructed in lifts not exceeding six (6) inches after compaction to maximize the effectiveness of the compaction throughout the lift thickness. Each lift shall be properly interfaced by scarification between lifts to ensure the bonding.

(3) Clods shall be broken up and the material shall be homogenized before compaction of each lift using mixing devices such as pug mills or rotary tillers.

(4) The maximum slope of the sidewalls shall not be so great as to preclude effective compaction.

c. Construction/installation of double liner

(1) The secondary liner shall be constructed in accordance with Section 5.C.3.b (if it is a natural liner) or Section 5.C.3.a.(1)-(7) (if it is synthetic).

(2) The primary liner shall be constructed in accordance with Section 5.C.3.a.(1) and (3)-(8).

D. LEACHATE COLLECTION, TREATMENT, DISPOSAL, AND MONITORING

1. General provisions

a. All sanitary landfills shall be designed and constructed to include a leachate collection system, a leachate treatment and disposal system, and a leachate monitoring system.

b. The leachate systems shall be constructed, installed, and maintained in accordance with a Department-approved quality assurance plan.

c. The owner or operator shall keep and maintain documentation for the quality assurance procedures through the post-closure care period of the facility.

2. Leachate collection

a. Minimum design specifications

(1) The leachate collection system shall be designed to operate without clogging through the post-closure care period of the facility.

(2) All elements of the system (pipes, sumps, pumps, etc.) shall be sized according to water balance calculations and shall be capable of handling peak flows.

(3) Collection pipes shall be sized and spaced to efficiently remove leachate from the bottom of the waste and the side walls of the cell. The capacity of the mains shall be at least equal to the sum of the capacities of the laterals.
(4) The pipes shall be designed to withstand the weight, stresses, and disturbances from the overlying wastes, waste cover materials, equipment operation, and vehicular traffic.

(5) The collection pipes shall be designed to drain by gravity to a sump system. Sumps must function automatically and shall contain a conveyance system for the removal of leachate.

(6) Manholes or cleanout risers shall be located along the perimeter of the leachate collection system. The number and spacing of the manholes shall be sufficient to insure proper maintenance of the system by water jet flushing or an equivalent method.

(7) Innovative leachate collection systems incorporating alternative designs may be used, after approval by the Department, if they are shown to be equivalent to or more effective than the specified design.

(8) The leachate collection system must be designed to prevent the leachate head on the liner from exceeding a depth of 12 inches.

b. Construction standards

(1) The leachate collection system shall be installed immediately above an impermeable liner and at the bottom of a drainage layer. The drainage layer shall be at least 12 inches thick with a hydraulic conductivity not less than $1 \times 10^{-2}$ cm/sec and a minimum controlling slope of two (2) percent.

Alternate materials may be used for the drainage layer with prior written approval of the Department.

(2) The following tests shall be performed on the soil proposed for use in the drainage layer, and all data shall be submitted to the Department prior to construction of the drainage layer. These tests shall be performed in accordance with current ASTM, AASHTO, or equivalent methods:

- Classification
- Porosity
- Relative density or compaction
- Specific gravity
- Hydraulic conductivity

(3) The leachate collection system and manholes or cleanout risers shall be constructed of materials that can withstand the chemical attack that results from leachates.

c. Operational procedures

(1) The leachate collection system shall operate automatically, whenever leachate is present in the sump, to remove accumulated leachate.

(2) Inspections shall be conducted weekly to verify proper functioning of the leachate collection system and to detect the presence of leachate in the removal sump.

The owner or operator shall keep records on the system to provide sufficient information that the leachate collection system is functional and operating.
properly. The amount of leachate collected from each cell shall be recorded on a weekly basis.

(3) Collection lines shall be cleaned according to a Department-approved scheduled maintenance program and more frequently if required.

3. Leachate treatment and disposal

The permittee must maintain all necessary permits and approvals for leachate storage and discharge activities.

a. The leachate treatment and disposal system shall be designed in accordance with one of the following options:

(1) Complete treatment on-site with or without direct discharge to surface water,

(2) Pretreatment on-site with discharge to an off-site treatment works for final treatment,

(3) Storage on-site with discharge to an off-site treatment works for complete treatment,

(4) Direct discharge to an off-site treatment works, or

(5) Pretreatment on site with discharge on site.

b. Leachate storage prior to treatment shall be within tanks constructed and installed in accordance with the following standards:

(1) The tank shall be placed above ground.

(2) The storage tank shall be designed in accordance with American Petroleum Institute (API), Underwriters Laboratory (UL), or an equivalent standard appropriate to the material being used, and shall be constructed of or lined with material which has a demonstrated chemical resistance to the leachate.

(3) The storage tank area shall have a liner capable of preventing any leachate which may escape from the tank from coming into contact with the underlying soil.

(4) The storage tank area shall be surrounded by a berm, and the bermed area shall have a capacity at least ten percent greater than the capacity of the tank.

(5) All storage tanks shall be equipped with a venting system.

(6) All storage tanks shall be equipped with a high liquid level alarm or warning device. The alarm system shall be wired to the location where assistance will be available to respond to the emergency.

c. On-site complete treatment or pretreatment facilities shall be designed and constructed in accordance with the following:

(1) The on-site treatment unit shall be designed based on the results of a treatability study, the results of the operations of a pilot plant, or written information documenting the performance of an equivalent leachate treatment system.
(2) On-site treatment units shall be designed and constructed by staging of the units to allow for on-line modification of the treatment system to account for variability of the leachate quality and quantity.

d. For all leachate discharges planned for publicly owned treatment works (POTW), the owner or operator of the landfill shall notify the receiving POTW of intent to discharge leachate into the collection system and shall provide the POTW with analysis of the leachate as required by the POTW.

e. All leachate treatment and disposal systems shall be designed and constructed to control odors.

f. Residuals from the on-site treatment and disposal systems shall be sampled and analyzed for hazardous waste characteristics in accordance with the Delaware Regulations Governing Hazardous Waste.

g. Recirculation of leachate may be allowed, subject to approval by the Department, to accelerate decomposition of the waste. At new facilities and expansions of existing facilities, recirculation will be allowed only in areas constructed with a composite liner system or a double liner system. The method of recirculation at all facilities must be approved by the Department in advance and annually so long as the recirculation continues. Records of leachate collected and recirculated must be kept and reported and any resultant problems reported to the Department and remedied as soon as practicable and included in the annual report.

4. Leachate monitoring

a. The leachate monitoring system shall be capable of measuring the quantity of the flow and sampling the leachate from each landfill cell. The volume of leachate collected from each cell shall be determined at least monthly and reported quarterly.

b. Leachate monitoring shall be performed according to a Department-approved plan which includes quality control and quality assurance procedures.

c. In addition to the requirement in Section 5.D.4.b above, samples of leachate shall be collected and analyzed from each waste cell as follows:

   (1) monthly, during the active life of a cell, and at an interval specified by the Department after closure of the cell, for the following parameters:

   pH
   Alkalinity (Alk)
   Chemical Oxygen Demand (COD)
   Biochemical Oxygen Demand (BOD)
   Total Organic Carbon (TOC)
   Specific Conductance (SpC)
   Total Dissolved Solids (TDS)
   Total Iron (Fe)
   Total Manganese (Mn)
   Chloride (Cl)
   Nitrate (NO\textsubscript{3}-N), Nitrate (NO\textsubscript{2}-N), and Ammonia (NH\textsubscript{3}-N)
   Sulfate (SO\textsubscript{4}), and
(2) at an interval specified by the Department for additional parameters specified by the
Department.

d. Leachate monitoring results shall be submitted to the Department as part of the annual
monitoring report or more frequently as directed by the Department.

e. For a double liner system, if the Action Leakage Rate of the leak detection system is
exceeded, the owner or operator of the landfill shall notify the Department within five
(5) working days. The owner or operator shall also sample and analyze the liquid in the
leak detection system for the same parameters listed in Section 5.D.4.c.(1) and any
additional parameters as required by the Department.

E. GAS CONTROL

1. General provisions

a. Gas control system shall be installed at all sanitary landfills.

b. The gas control system shall be designed and constructed to:

(1) Evacuate gas from within the waste to prevent the accumulation of gas on-site or off-
site.

(2) Prevent and control damage to vegetation.

(3) Prevent odors from the facility being detectable at the facility property line in
sufficient quantities to cause or create a condition of air pollution.

c. The concentration of landfill gas in facility structures (except gas recovery system
components) and at the facility boundary shall not exceed 25% of the Lower Explosive
Limit (LEL).

2. Design and construction standards

a. The owner or operator of a sanitary landfill shall consider both active and passive gas
control systems and shall provide an evaluation of the proposed system for Department
approval.

b. The owner or operator shall perform an analysis to establish the required spacing of gas
control vents to provide an effective system.

c. The gas control system shall be designed to evacuate gas from all levels within the
waste.

d. The system shall not interfere with or cause failure of the liner or leachate systems.

3. Monitoring

a. A sufficient number of gas monitoring wells shall be installed to evaluate gas production
rates in the landfill.

b. The owner or operator shall sample the gas monitoring wells at least quarterly and
provide analytical results [as required by conditions specified in the facility permit] as
part of the annual report.
Sec. 5.E.3.c

Sanitary Landfills - Gas Control

c. At sanitary landfills utilizing natural liners, gas monitoring probes must be installed in the soil outside the lined area to evaluate any lateral migration of landfill gas.

d. Emissions from active and passive gas control systems may require a permit from the Air Resources Section of the Division of Air and Waste Management.

4. Response Actions

a. If methane gas levels exceeding the limits specified in Section 5.E.1.c are detected, the owner or operator must:

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

(2) Within seven days of detection, place in the operating record the methane gas levels detected and a description of the steps taken to protect human health.

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

b. For purposes of this section, lower explosive limit means the lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25 degrees C and atmospheric pressure.

F. SURFACE WATER MANAGEMENT

1. General provision

An owner or operator of a sanitary landfill shall design, construct, and maintain a surface water management system to:

a. Prevent erosion of the waste and cover,

b. Prevent the collection of standing water, and

c. Minimize surface water run-off onto and into the waste.

2. Design requirements

An owner or operator of a sanitary landfill shall include:

a. A run-on control system to prevent flow onto the active portion of the landfill during the peak discharge from a 24-hour, 25-year storm.

b. A run-off control system from the active portion of the landfill to collect and control at least the water volume resulting from a 24-hour, 25-year storm. The system shall be designed to include:

(1) Detention basins to provide temporary storage of the expected run-off from the design storm with sufficient reserve capacity to contain accumulated precipitation and sediment prior to discharge.
(2) Diversion structures designed to prevent run-off generated within the active areas from moving off site of the lined areas.

3. Channeling of run-off

   a. Run-off from the active areas within the active cell(s) must be channeled to the leachate treatment and disposal system.

   b. Run-off from the unused portion of the active cell(s) that has not been in contact with waste shall be channeled to the detention basins or other approved sedimentation control devices.

   c. Until vegetative cover has been established, run-off from closed cells will be directed to the detention basins or other approved sedimentation control devices.

4. Discharge

   Discharge from the detention basins shall be in compliance with all applicable federal and state regulations.

G. GROUND WATER MONITORING AND CORRECTIVE ACTION

1. General provision

   Owners or operators of all sanitary landfill facilities shall install maintain and operate a ground water monitoring program to evaluate facility impact upon ground water quality.

2. Design and construction of monitoring system

   a. The ground water monitoring system shall be designed by, constructed under the direction of, and attested to by, a Professional Geologist registered in Delaware.

   b. The system shall consist of a sufficient number of wells, installed at appropriate locations and depths, to define the ground water flow system and shall be developed in accordance with Departmental requirements to yield ground water samples that are representative of the aquifer water quality, both unaffected by (background) and potentially impacted by downgradient contaminant leakage from the facility. The downgradient monitor wells (which are points of compliance for ground water performance standards) must be no further than 150 meters from the edge of the sanitary landfill cell, and on the waste facility property.

   c. The number, spacing, location, depth, and screened interval of the monitoring wells shall be approved by the Department prior to installation.

   d. All monitoring wells shall be constructed in accordance with the Regulations Governing the Construction of Water Wells and any subsequently approved guidelines. Variation from the existing guidelines must be approved by the Department in writing prior to construction.

   e. Monitoring of surface water, into which ground water flowing from beneath the landfill discharges, may also be required as part of the ground water monitoring program. Parameter analysis may include all those required for the ground water sampling plus any additional parameters or tests the Department deems necessary.
3. Ground water sampling and analyses
   
a. The owner or operator shall submit a ground water sampling plan to the Department at the time of permit application. The sampling plan must include procedures and techniques for:

   (1) Sample collection, preservation, and transport

      (a) Samples will be collected at low flow rates (<1 l/min) to minimize turbidity of the samples.

      (b) Samples will be field filtered only when turbidity exceeds 10 NTU. Repeated sampling of any well where turbidity exceeds 10 NTU is not permitted without Department approval. Approval will only be granted in cases where turbidity cannot be controlled by careful well construction, development and sampling.

   (2) Analytical procedures and quality assurance, and

   (3) Chain of custody control

b. Sample parameters

   (1) Water levels will be measured prior to sample collection

   (2) Ground water samples will be analyzed for the following list of parameters:

      pH
      Alkalinity (Alk)
      Chemical Oxygen Demand (COD)
      Total Organic Carbon (TOC)
      Specific Conductance (SpC)
      Total Dissolved Solids (TDS)
      Iron (Fe)
      Manganese (Mn)
      Chloride (Cl)
      Nitrate (NO₃-N) and Ammonia (NH₃-N)
      Sulfate (SO₄)
      Dissolved Oxygen (DO)
      Oxidation-Reduction Potential (ORP) or Eh

      The parameters listed in Table I when requested by the Department.
      Any additional parameters specified by the Department.
      The Department may delete the requirement for any constituents where appropriate. Such deletions will be based on:

      (a) The results of leachate monitoring (constituent is not a significant constituent of the leachate),

      (b) Local geochemical considerations (immobility in subsurface), and

      (c) Other relevant factors.
Table 1

<table>
<thead>
<tr>
<th>Substance</th>
<th>Compounds</th>
</tr>
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<tbody>
<tr>
<td>Antimony</td>
<td>trans-1,4-Dichloro-2-butene</td>
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<tr>
<td>Arsenic</td>
<td>1,1-Dichloroethane; Ethylidene chloride</td>
</tr>
<tr>
<td>Barium</td>
<td>1,2-Dichloroethane; Ethylene dichloride</td>
</tr>
<tr>
<td>Beryllium</td>
<td>1,1-Dichloroethylene; 1,1-Dichloroethene</td>
</tr>
<tr>
<td>Cadmium</td>
<td>cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene</td>
</tr>
<tr>
<td>Chromium</td>
<td>trans-1,2-Dichloroethylene</td>
</tr>
<tr>
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</tr>
<tr>
<td>Copper</td>
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</tr>
<tr>
<td>Lead</td>
<td>trans-1,3-Dichloropropene</td>
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<tr>
<td>Nickel</td>
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<tr>
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<td>2-Hexanone; Methyl butyl ketone</td>
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<tr>
<td>Silver</td>
<td>Methyl bromide; Bromomethane</td>
</tr>
<tr>
<td>Thallium</td>
<td>Methylene chloride; Dichloromethane</td>
</tr>
<tr>
<td>Vanadium</td>
<td>Methylene bromide; Dibromomethane</td>
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<td>Zinc</td>
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</tr>
<tr>
<td>Acetone</td>
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<td>Acrylonitride</td>
<td>Methyl iodide; Iodomethane</td>
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<td>Benzene</td>
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<tr>
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</tr>
<tr>
<td>Carbon disulfide</td>
<td>Tetrachloroethylene; Tetrachloroethene</td>
</tr>
<tr>
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<td>Toluene</td>
</tr>
<tr>
<td>Chlorobenzene</td>
<td>1,1,1-Trichloroethane; Methylchloroform</td>
</tr>
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<td>1,1,2-Trichloroethane</td>
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<tr>
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<td>Trichloroethylene</td>
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<td>Trichlorofluoromethane; CFC-11</td>
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<td>1,2-Dibromo-3-chloropropane; DBCP</td>
<td>1,2,3-Trichloropropane</td>
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<td>1,2-Dibromoethane; Ethylene dibromide; EDB</td>
<td>Vinyl acetate</td>
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<td>Vinyl chloride</td>
</tr>
<tr>
<td>p-Dichlorobenzene; 1,4-Dichlorobenzene</td>
<td>Xylenes</td>
</tr>
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</table>

(3) Test methods used to determine the parameters of Section 5.G.3.b.(2) shall be those described in the most current legal edition of EPA Publication Number SW-846, "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods." If SW-846 does not contain test methods for a required parameter, that parameter shall be tested according to methods described in the most recent edition of the EPA publication "Methods of Chemical Analysis for Water and Wastes" or of Standard Methods for the Examination of Water and Wastewater.

c. Monitoring frequency will be at least semi-annual. An alternate frequency may be specified by the Department based on consideration of the following conditions:

(1) Lithology of the aquifer and unsaturated zone,

(2) Hydraulic conductivity of the aquifer and unsaturated zone,

(3) Ground water flow rates,
(4) Distance and travel time between the waste unit(s) and the downgradient monitor wells and possible points of exposure to any landfill-derived contaminants in wells or receiving surface waters, and

(5) Resource value of the aquifer.

d. The Department may observe the ground water sampling conducted by the permittee or his/her designee and may request split samples for analysis.

4. Data evaluation

a. The owner or operator must establish the background quality for each sampling parameter or constituent. The background quality is that which would be expected with no impact by contaminant releases from the waste cells.

b. The owner or operator must specify in the operating record the methods to be used for statistical evaluation of the monitoring data. These may include:

(1) A tolerance or prediction interval procedure in which a range for each constituent is established from the distribution of the background data and the level of each constituent in each compliance (downgradient) monitor well is compared to the upper tolerance or prediction limit,

(2) A control chart approach that plots concentrations of each constituent versus the background range, or

(3) Any other statistical method chosen to meet the following requirements and approved by the Department:

(a) Appropriate in distribution and number of available data to meet the requirements of the statistical test chosen;

(b) Capable of limiting individual constituent comparisons to Type I error levels less than 0.01 or multiple constituent comparisons to Type I error levels less than 0.05, for each testing period. (This requirement does not apply to tolerance intervals, prediction intervals, or control charts.)

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

d. The owner or operator must determine whether or not there is a statistically significant increase over background values for each parameter or constituent required in the monitoring program by comparisons using the chosen method of evaluation. This evaluation must be performed within a reasonable period of sampling and analysis - normally within 30 days of obtaining sampling results.

e. If any statistically significant increase occurs, the permittee must:

(1) notify the Department and place the result in the operating record within 14 days, and

(2) assess the probable accuracy and possible risk associated with the finding in the annual report.
f. Performance standards will be established at each site which are intended to provide adequate protection for human health and the environment. The performance standards may be proposed by the permittee, but must be approved by the Department, and shall be incorporated in the facility permit. In general, performance standards will be the maximum contaminant levels (MCLs) for public drinking water. However, the Department may specify performance levels which are more stringent to protect adjacent surface water (and prevent violation of surface water quality standards) or less stringent (where ground water at the site will not threaten existing or reasonably expected sources of drinking water or cause violation of surface water quality standards) as appropriate.

g. The points of compliance at which performance standards must be met must be no more than 150 meters from the edge of the furthest downgradient waste cell and must be on the waste management facility property.

h. If any release of contaminants from the landfill to the groundwater is detected, either by exceedance of background concentrations or violation of a performance standard in the downgradient wells (points of compliance), the owner or operator must:

(1) Notify the Department and place the result in the operating record within 14 days,

(2) Re-sample to confirm the result and/or demonstrate that the result was an error or that the increase was due to a source other than the permitted waste facility within 90 days,

(3) Notify the Department of the result of confirmation within 14 days of availability of the result, and

(4) If a release is confirmed, perform an assessment of corrective measure as described in Section 5.G.6.

5. Reporting

a. The owner or operator will compile and evaluate all ground water data within a reasonable period of time following sampling and analysis. A tabulation of water elevations and quality will be submitted to the Department within 60 days of each sampling event. Reports of any statistically significant increases in downgradient wells or violation of performance standards in wells or streams must be reported to the Department within 14 days as noted above.

b. An annual monitoring report must be submitted by the permittee to the Department which includes the following:

(1) Maps showing the locations of sampling points, water elevations, and ground water flow directions and approximate rates for each sampling period;

(2) Tabulation of all ground water levels and elevations, leachate volumes collected and treated and leachate and water quality data;

(3) Presentation of statistical results and graphs depicting water quality parameter concentrations with time;

(4) Identification of any statistically significant increases in compliance wells and/or exceedances of performance standards;
(5) Confirmation results and conclusions related to the accuracy of these results and/or reasonable explanation for the results;

(6) Recommendations for any changes in the monitoring program including changes in the number, location of sampling points, sampling frequency, parameters or procedures;

(7) An evaluation of the significance of the results including whether they indicate a contaminant release has occurred and any recommendations for corrective measures, if appropriate.

c. In addition to paper copies of reports, the Department may require all or part of any required report to be submitted on machine-readable media in a format mutually acceptable to the Department and the permittee. With the approval of the Department, reports submitted on machine-readable media may be substituted for paper reports.

6. Assessment of Corrective Measures

a. An assessment (re-assessment) of corrective measures by the owner or operator is required (within 90 days) of confirmation of a contaminant release or an exceedance of a performance standard. The owner or operator must perform this assessment which must include:

(1) Identification of the nature and extent of the release (which may require construction and sampling of additional wells, analysis for additional constituents including those required for leachate, geophysical surveys and/or other measures);

(2) Re-assessment of contaminant fate and potential contaminant receptors (wells and/or receiving streams);

(3) Evaluation of feasible corrective measures to:

   (a) Prevent exposure to potentially harmful levels of contaminants (exceeding performance standards);

   (b) Reduce, minimize or prevent further contaminant releases;

   (c) Reduce, minimize or prevent the offsite migration of contaminants.

(4) The implementability (and time to implement) and costs of the feasible alternatives;

(5) Recommendations for remedial action.

b. The owner or operator must present the results of the corrective measures assessment, including a proposed remedy, (with a schedule for initiation and completion) for public comment at a public meeting.

7. Selection of Remedy

a. Based on the results of the corrective measures assessment and public meeting, the owner/operator will select a remedial action.
b. Remedies must:

   (1) Be protective of human health and the environment;

   (2) Control source(s) of contaminant releases so as to reduce or eliminate (to the maximum extent practicable), further releases of contaminants that pose a threat to human health or the environment;

   (3) Comply with the site performance standards at the points of compliance (to the extent feasible); and

   (4) Comply with standards for the management of wastes.

b. Remedies must:

   (1) Be protective of human health and the environment;

   (2) Control source(s) of contaminant releases so as to reduce or eliminate (to the maximum extent practicable), further releases of contaminants that pose a threat to human health or the environment;

   (3) Comply with the site performance standards at the points of compliance (to the extent feasible); and

   (4) Comply with standards for the management of wastes.

c. The Department may determine that remediation of a contaminant release is not necessary if the permittee can demonstrate to the satisfaction of the Department (or the Department certifies that it is satisfied) that the ground water is not currently or reasonably expected to be a source of drinking water, will not migrate so as to threaten a source of drinking water or will not cause violation of surface water quality standards, (i.e. does not represent a significant threat to human health or the environment).

8. Implementation of Corrective Action

a. Based on the schedule established under Section 5.G.6.b. for initiation of remedial activities, the owner or operator must:

   (1) Implement the corrective action remedy;

   (2) Take any interim measures necessary to ensure protection of human health and the environment (such as replacement of contaminated or imminently threatened water supplies); and

   (3) Perform ground water and/or surface water monitoring to demonstrate the effectiveness of the remedy including whether or not compliance is achieved with the performance standards.

b. If the owner or operator determines, based on information obtained after implementation of the remedy has begun or other information that compliance with remediation objectives (including achievement of performance standards) cannot be practically achieved with the remedy selected, the owner or operator must notify the Department and request authorization to proceed with another feasible method consistent with the overall objective of the remedy.

c. If the permittee determines that compliance with remedial action objectives (Section 5.G.7) cannot be practically achieved, the permittee must notify the Department and implement alternate methods to control exposure of humans or the environment to residual contamination and implement alternative control measures.

d. Remedies selected shall be considered complete when:

   (1) All actions required to implement the remedy have been achieved; and

   (2) The ground water protection standards or alternate requirements agreed upon have been achieved for a period of three years or alternate period approved by the Department.
e. Upon completion of the remedy, the owner or operator must notify the Department that a certification of the remedy has been completed in compliance with the requirement and placed in the operating records. This certification must be signed by a Professional Geologist registered in Delaware.

f. Upon completion of the remedy, the owner or operator will continue ground water monitoring as required by provisions of Section 5.G.3 and approved by the Department.

H. CAPPING SYSTEM

1. Requirement for a capping system

   a. Upon closure of the landfill or landfill cell the permittee shall install a capping system that will control the emission of gas, promote the establishment of vegetative cover, and minimize infiltration and percolation of water into, and prevent erosion of, the waste throughout the post-closure care period.

   b. The capping system shall be in place 180 days following final waste disposal activity unless the Department approves a longer period of time.

   c. The capping system shall extend beyond the edge of the lined area.

   d. The proposed design of the capping system must be approved by the Department prior to installation.

2. Composition of the capping system

   The capping system shall consist of at least the following components:

   a. A final grading layer on the waste, consisting of at least twelve inches of soil, to attain the final slope and provide a stable base for subsequent system components. Daily and intermediate cover may be used for this purpose.

   b. A low permeability layer to minimize infiltration, that has a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present. This infiltration control layer must consist of at least the following:

      (1) A 30 mil synthetic geomembrane underlain by a geotextile, or

      (2) 24 inches of fine-textured soil with a hydraulic conductivity no greater than $1 \times 10^{-7}$ cm/sec.

   If the landfill has a synthetic liner system, it must have a synthetic infiltration control layer. Alternative materials that achieve an equivalent performance may be used for the infiltration control layer with prior written approval of the Department.

   c. A final cover to provide plant roofing and prevent erosion consisting of:

      (1) Eighteen (18) inches of soil to provide rooting depth and moisture for plant growth; and

      (2) Six (6) inches of topsoil or other material approved by the Department to support the proposed vegetation; or
(3) A suitable layer of alternative material or combination thereof to assure adequate rooting and moisture retention to support the proposed vegetation.

The permittee shall propose a suitable vegetation dependent upon the quality and characteristics of the topsoil and compatible with the intended final use of the facility. Maintenance schedules and application rates for fertilizer and mulch shall also be submitted for approval.

3. Final slopes

a. The grades of the final slope shall be constructed in accordance with the following minimum standards:

(1) The final grade of the top slope, after allowing for settlement and subsidence, shall be designed to promote run-off;

(2) The final grades of the side slopes shall be, at a maximum, three horizontal to one vertical (3:1).

b. The top and side slopes shall be maintained to prevent erosion of the capping system and to insure complete vegetation cover.

I. LANDFILL OPERATION AND MAINTENANCE STANDARDS

1. General

a. Sanitary landfills shall be operated so as to create an aesthetically desirable environment and to prevent degradation of land, air, surface water, or ground water.

b. Sanitary landfills shall be maintained and operated to conform with the approved Plan of Operation.

2. Details of operation and maintenance

a. Spreading and compacting

The working face shall be confined to the smallest practical area, as is consistent with the proper operation of trucks and equipment.

The waste shall be spread in layers and compacted by repeated passes of the compacting equipment to obtain the degree of compaction specified in the Solid Waste permit.

b. Lift depth

The lift depth shall not exceed the limit specified in the Solid Waste permit.

c. Cover

(1) **Daily cover**: A layer of suitable cover material shall be placed over all solid waste by the end of each working day. This layer shall be of such depth that when compacted it produces a cover layer at least six inches in depth.
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(2) Intermediate cover: Any area that receives daily cover and is not expected to receive either additional solid waste or a capping system within six months shall receive intermediate cover consisting of at least six inches of suitable compacted cover material (in addition to the daily cover). Intermediate cover may be required more frequently if deemed necessary by the Department.

(3) Cover material: The soil used as daily and intermediate cover material shall be of such character that it can be compacted to minimize percolation of water through the cover, does not crack excessively when dry, and is free of putrescible materials and large objects.

(4) Alternate cover materials: The Department may approve the use of other materials as daily and intermediate cover if they can be shown to be at least as effective as the required depths of compacted soil at preventing migration of the waste and controlling flies, rodents, and fires.

d. Control of nuisances and hazards

(1) Odor: The operation of the landfill shall not result in odors associated with solid waste being detected off site.

(2) Litter: The scattering of refuse and wind-blown litter shall be controlled by the use of portable fences, natural barriers, or other suitable methods. No refuse or litter shall be allowed to migrate off site.

(3) Vectors, dust, fires: The operation of the landfill shall be conducted in a manner which eliminates to the extent possible insect and rodent breeding, dust problems, and fires.

e. Bulky waste

Adequate provision shall be made for the handling and compaction of bulky wastes when such wastes are not excluded from the site. Tires in quantities greater than ten per truckload shall be sliced or shredded before being landfilled.

f. Special solid wastes

The permittee may make provision for the limited disposal of specified special solid wastes. Disposal of these wastes shall be conducted pursuant to a plan submitted to and approved by the Department.

g. Access

Access roads to the point of waste discharge shall be designed, constructed, and maintained so that traffic will flow smoothly and will not be interrupted by inclement weather.

Access to the site shall be limited to those times when an attendant is on duty and to those persons authorized to use the site for the disposal of solid waste. This section shall not be construed to limit right of entry by the Secretary or his duly authorized designee pursuant to 7 Del. Code, Section 6024.

Access to the site by unauthorized persons shall be prevented by the use of barriers, fences and gates, or other suitable means.
h. Salvaging

Salvage operations shall be so organized that they will not interfere with the proper disposal of any solid waste. No salvage operation shall be allowed which creates unsightliness, nuisances, health hazards, or potential safety hazards.

i. Personnel

Sufficient numbers and types of personnel shall be available at the site to insure capability for operation in accordance with these regulations.

j. Equipment

Adequate numbers and types of equipment commensurate with the size of the operation shall be available at the site to insure operation of the landfill in accordance with the provisions of these regulations and the plan of operation. Substitute equipment shall be obtained when maintenance or breakdown renders normal operating equipment inoperative for more than 24 hours. All refuse moving equipment shall be cleaned routinely and maintained according to the manufacturer’s recommendations.

k. Employee health and safety

Employees at the site shall work under all appropriate health and safety guidelines established by the Occupational Safety and Health Administration.

The owner or operator of the landfill shall provide suitable shelter, sanitary facilities, and safe drinking water for personnel at the site.

A reliable telephone or radio communication system shall be provided for site personnel.

First aid equipment shall be available at the site.

l. Procedures for excluding the receipt of hazardous waste

(a) Owners or operators of all sanitary landfill cells must implement a program at the facility for detecting and preventing the disposal of regulated hazardous wastes and polychlorinated biphenyls (PCB) wastes. This program must include, at a minimum:

(1) Random inspections of incoming loads unless the owner or operator takes other steps to ensure that incoming loads do not contain regulated hazardous wastes or PCB wastes;

(2) Records of any inspections;

(3) Training of facility personnel to recognize regulated hazardous waste and PCB wastes; and

(4) Notification of the Department if a regulated hazardous waste or PCB waste is discovered at the facility.
(b) For purposes of this section, regulated hazardous waste means a solid waste that is a hazardous waste, as defined in 40 CFR 261.3 that is not excluded from regulation as a hazardous waste under 40 CFR 261.4(b) or was not generated by a conditionally exempt small quantity generator.

3. Recordkeeping

The following information must be recorded, as it becomes available, and retained by the owner or operator of any new or existing sanitary landfill until the end of the post-closure care period of the landfill:

a. Records demonstrating that liners, leachate control systems, gas control systems, capping systems, and all monitoring systems are constructed or installed in accordance with the design criteria required in Section 5, Subsections C, D, E, F, G, and H.

b. Monitoring, testing, or analytical data where required by Section 5, Subsections D, E, F, G, and H.

c. Volume and/or weight of wastes received quarterly.

d. Types of waste received quarterly (industrial waste, asbestos-containing waste, and other wastes which require Department approval prior to being landfilled).

e. Location of any monofilled waste.

f. Any additional records specified by the Department.

4. Reporting

The permittee shall submit to the Department on an annual basis a report summarizing facility operations for the preceding calendar year. The report shall describe and summarize all solid waste disposal, environmental monitoring, and construction activities conducted within the year covered by the report. The report shall include, but not necessarily be limited to, the following:

a. The volume or tonnage of solid waste landfilled at the facility;

b. The estimated remaining capacity of the facility, in both tonnage and years;

c. The volumes (or tonnages) and types of specified special solid wastes landfilled at the facility;

d. Leachate quantity and quality data as required in Section 5.D.4, and specified in the Solid Waste permit;

e. Gas monitoring data as required in Section 5.E.3, and specified in the Solid Waste permit;

f. An updated estimate of the cost of closure and post-closure care of the facility, as required in Section 5.J.3.d;

g. Any intentional or accidental deviations from the approved Plan of Operation, and any unusual situations encountered during the year;
h. All construction or corrective work conducted on the site in accordance with approved plans or to achieve compliance with these regulations.

The permittee must also submit any additional reports specified in the Solid Waste permit.

5. Prohibitions

a. The owner or operator of a sanitary landfill shall not knowingly accept for disposal any hazardous waste. See Section 5.I.2.l.

b. Open burning of any solid waste is prohibited within the active portion of the sanitary landfill.

c. Sanitary landfills are prohibited from accepting bulk or non-containerized liquid waste unless the waste is a household waste other than septic waste.

d. Scavenging is prohibited on any landfill site.

J. CLOSURE

1. General

The owner or operator of a sanitary landfill must close the completed landfill or landfill cell in a manner that:

a. Minimizes the need for further maintenance, and

b. Minimizes the post-closure escape of solid waste constituents, leachate, and landfill gases to the surface water, ground water, or atmosphere.

2. Required submittals; notification

a. An owner or operator of a new sanitary landfill must submit a conceptual closure plan for the facility at the time of initial permit application.

b. At least 180 days prior to the projected date when wastes will no longer be accepted at the landfill or cell, the landfill owner or operator shall submit to the Department written notification of intent to close the facility or cell, a closure plan, and a closure schedule.

c. If the Department determines that the closure plan and closure schedule are sufficient to ensure closure in accordance with the performance standards described in Section 5.J.1, it will modify the solid waste permit to allow closure to take place.

d. The owner or operator shall not commence closure activities before receiving the necessary modifications to the solid waste permit.

e. A copy of the closure plan must be maintained at the facility or at some other location designated by the owner or operator through the post-closure care period of the facility.

3. Closure plan contents

Closure plans for sanitary landfills must include, as a minimum, the following:
Sec. 5.J.3.a

Sanitary Landfills - Closure

a. A description of the methods, procedures, and processes that will be used to close a landfill and each individual cell thereof in accordance with the closure performance standard in Section 5.J.1.

b. A description of the capping system required under Section 5.H. This shall include a description of the system design, the type of material to be used, and a discussion of how the capping system will achieve the objectives of Section 5.J.1, above.

c. A description of other activities necessary to satisfy the closure performance standard including, but not limited to, the removal or disposal of all non-landfilled wastes located on site (e.g., wastes from landfill run-off collection ponds).

d. An estimate of the cost of closing the facility or cell and of the cost of post-closure monitoring and maintenance throughout the post-closure care period. These estimates shall be updated yearly and submitted to the Department as part of the annual report described in Section 5.I.4.

e. A plan for post-closure care of the facility sufficient to ensure that the standards described in Section 5.J.1 will be met. This will include:

(1) A description of the monitoring and maintenance activities required and the frequency at which these activities will be performed.

(2) The name, address, and telephone number of the person or office to contact about the facility during the post-closure period.

(3) A description of the planned uses of the property during the post-closure period.

f. A plan for control and/or recovery of landfill gases.

g. A closure construction quality assurance plan.

4. Minimum closure requirements

a. The permittee shall notify the Department at least 30 working days prior to commencing closure activities. The Department shall inspect the site, and the permittee shall perform any corrective work which the Department deems necessary.

b. Finished portions of the landfill shall receive a capping system which meets the requirements of Section 5.H.

c. Finished portions of the landfill shall be planted with appropriate vegetation to promote stabilization of the cover.

d. The closure shall be carried out in accordance with the approved closure plan and according to the approved closure schedule. Any significant deviations from the plan or the schedule must be approved by the Department prior to being initiated.

e. Upon closure of an entire landfill, all non-landfilled wastes located on site shall be removed or disposed of in a manner approved by the Department.

f. After closure of the facility, the site shall be returned to an acceptable appearance consistent with the surrounding area and the intended use of the land.
g. When closure is completed, the owner or operator shall submit a final report for the Department’s approval. The final report shall certify that the closure of the landfill or cell was completed in accordance with the closure plan to include the construction quality assurance plan, construction and material specifications, and design drawings. The final report shall be certified correct by the construction quality assurance engineer, who must be a Professional Engineer registered in Delaware. The landfill or cell will not be considered closed until the Department has provided its written notification that the closure construction and the final report meet the requirements of the solid waste permit and these regulations. The Department will inspect the cell or facility and will either:

(1) Issue a letter of approval to certify that the site has been closed in accordance with the solid waste permit, the closure plan, and all applicable regulations; or

(2) Determine that the site is not in compliance with the solid waste permit, the closure plan, or applicable regulations; identify the areas of deficiency; and require the owner or operator to take the necessary actions to bring the site into compliance.

h. Facilities entering the post-closure period will be issued a post-closure permit based upon the approved post-closure plan, monitoring requirements, gas and leachate control, maintenance, and corrective actions (if required).

K. POST-CLOSURE CARE

1. General

   a. The owner or operator of a sanitary landfill must continue post-closure care for 30 years after the completion of closure.

   b. At any time during the post-closure care period the Department may remove one or more of the post-closure care requirements described in Section 5.K.2 below if it determines that the requirement(s) is/are no longer necessary for the protection of human health and the environment.

   c. At any time after the first five years of the post-closure care period, the Department may reduce the length of the post-closure care period or terminate post-closure care if it determines that such care is no longer necessary.

   d. Prior to the time that the post-closure care period is due to expire, the Department may extend the post-closure care period if it determines that the extended period is necessary to protect human health and the environment.

   e. If at any time during the post-closure care period there is evidence of a contaminant release from the landfill that presents a significant threat to human health or the environment, action to mitigate the threat will be required of the owner or operator of the facility.

2. Minimum post-closure care requirements

   Post-closure care shall be in accordance with the post-closure permit and must consist of at least the following:

   a. Maintaining the integrity and effectiveness of the capping system, including making
repairs as necessary to correct the effects of settling, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the cap.

b. Reseeding the cover if insufficient vegetation exists to stabilize the surface.

c. Maintaining and operating the leachate collection and treatment systems until the Department determines that the leachate no longer poses a threat to human health or the environment. The permittee shall submit leachate quantity and quality data to the Department for those parameters and at such frequencies as specified by the Department.

d. Maintaining and operating the ground water monitoring system in accordance with Section 5.G. The permittee shall submit ground water quality data as specified by the Department.

e. Maintaining and monitoring the gas control and/or recovery system in accordance with Section 5.E and the closure plan. The permittee shall submit gas data as specified by the Department.

f. Maintaining and monitoring the surface water management system in accordance with Section 5.F.

3. Prohibitions

a. Standing water shall not be allowed on the closed landfill.

b. Open burning shall not be allowed on the closed landfill.

c. Unless approved in advance by the Department, no activity shall be conducted on a closed landfill.

d. Access to the closed landfill shall be limited to those persons who are engaging in activities which are compatible with the intended post-closure use of the site.

4. Post-closure land use

The owner or operator shall implement the post-closure land use plan approved by the Department.

5. Notice in deed to property

a. The owner of the property on which a sanitary landfill is located must record a notation on the deed to the facility property, or on some other instrument that is normally examined during title search, that will in perpetuity notify any potential purchaser of the property that:

1. The land has been used as a solid waste disposal site, and

2. The use of the land is restricted under this regulation.

b. Included with the notation shall be a map or description clearly specifying the area that was used for disposal.