

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE G: WASTE DISPOSAL
CHAPTER I: POLLUTION CONTROL BOARD
SUBCHAPTER i: SOLID WASTE AND SPECIAL WASTE HAULING

PART 817
REQUIREMENTS FOR NEW STEEL AND FOUNDRY INDUSTRY WASTES
LANDFILLS

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AUTHORITY: Implementing Sections 5, 21, 21.1, 22, 22.17, 28.1, and authorized by Section 27 of the Environmental Protection Act [415 ILCS 5/5, 5/21, 5/21.1, 5/22, 5/22.17, 5/28.1, and 5/27].

SOURCE: Adopted in R90-26(A) at 18 Ill. Reg. 12411, effective August 1, 1994; amended in R90-26(B) at 18 Ill. Reg. 14370, effective September 13, 1994; amended in R96-3 at 21 Ill. Reg. 1183, effective January 14, 1997; expedited correction in R96-3 at 21 Ill. Reg. 5946, effective January 14, 1997.

SUBPART A: GENERAL REQUIREMENTS

Section 817.101 Scope and Applicability

- a) In addition to the requirements of 35 Ill. Adm. Code 811.Subpart A, the standards of this Part apply exclusively to the non-putrescible wastes produced by the following processes:
 - 1) The steel and foundry processes covered by SIC Codes 331 and 332 with the exception of those industries identified by SIC Code 3313; and

- 2) The foundry processes at business operations whose primary SIC Code is not included within the SIC Code 332.
- b) Landfill units regulated under this Part shall accept waste only from the steel and foundry industries.
- c) This Part shall not apply to the not otherwise prohibited use of iron and steelmaking slags, including the use as a base for road building, but not including use for land reclamation except as allowed under subsection (e).
- d) This part shall not apply to the not otherwise prohibited use of foundry sand which has been demonstrated as suitable for beneficial use under Section 817.105, including the use as a base for road building, but not including use for land reclamation except as allowed under subsection (e).
- e) The Agency may approve the use of iron and steelmaking slags and foundry sands for land reclamation purposes upon a demonstration by the owner or operator that such uses will not cause an exceedence of the applicable groundwater quality standards specified at 35 Ill. Adm. Code 620.
- f) This Part shall not apply to the use or reuse of iron and steelmaking slags and foundry sands as ingredients in an industrial process to make a product.

Section 817.103 Determination of Waste Status

- a) A representative sample of leachate extracted by ASTM Method D3987-85, incorporated by reference in 35 Ill. Adm. Code 810.204, from each waste stream to be disposed of or utilized shall be used to characterize the expected constituents and concentrations of the leachate. Representative samples of waste streams to be tested shall be obtained by use of ASTM Method D2234-76, incorporated by reference in 35 Ill. Adm. Code 810.204.
- b) Actual samples of leachate from an existing solid waste disposal unit or beneficial use site may be utilized under the following conditions:
 - 1) The waste in the existing unit is similar to the waste to be used or disposed;
 - 2) The conditions under which the leachate was formed are similar to those expected to be encountered; and
 - 3) Leachate is sampled so as to be representative of undiluted and unattenuated leachate emanating from the unit.

Section 817.104 Sampling Frequency

- a) All individual wastes streams shall be tested annually pursuant to 817.103(a).

- b) Additional testing on individual waste streams shall be conducted when any of the following occurs:
 - 1) There is a change in the raw materials which could result in a change in the wastes' classification;
 - 2) There is a modification to the process which generates the waste that could result in a change in the wastes' leaching characteristics; or
 - 3) There is an addition of a new process which may generate a new waste material.

Section 817.105 Waste Classification

- a) Wastes regulated by this Part shall be classified on the basis of leaching potential as determined by the procedure at Section 817.103.
- b) Wastes regulated by this Subpart shall fall into one of four classifications:
 - 1) Beneficially usable waste;
 - 2) Potentially usable waste;
 - 3) Low risk waste; or
 - 4) Chemical waste.
- c) Maximum allowable leaching concentration (MALC) for the beneficially usable, potentially usable and low risk classes are presented in the table at Section 817.106. Wastes exceeding the MALCs for the low risk class shall be regulated as chemical wastes under 35 Ill. Adm. Code 811.Subpart C.

Section 817.106 Waste Classification Limits

- a) Maximum allowable leaching concentrations (MALCs) (concentrations in mg/L):

Parameter	Beneficially Usable Waters	Potentially Usable Waters	Low Risk Wastes
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(based on federal National Primary Drinking Water Standards)

Arsenic	0.05	0.1	0.25
Barium	2.0	2.0	5.0
Cadmium	0.005	0.01	0.05
Chromium	0.1	0.2	0.25
Lead	0.0075	0.1	0.25
Nitrate	10.	20.	30.
Selenium	0.05	0.05	0.25
Fluoride	4.	4.	20.

Benzene	0.005	0.01	0.025
Carbon Tetrachloride	0.005	0.01	0.025
1,2-Dichloroethane	0.005	0.01	0.017
1,1-Dichloroethylene	0.007	0.014	0.035
cis-1,2-Dichloroethylene	0.07	0.14	0.35
trans-1,2-Dichloroethylene	0.1	0.2	0.5
1,2-Dichloropropane	0.005	0.01	0.025
Ethylbenzene	0.7	1.	3.5
Monochlorobenzene	0.1	0.2	0.5
Styrene	0.1	0.2	0.5
Tetrachloroethylene	0.005	0.01	0.025
Toluene	1.	2.	5.
1,1,1-Trichloroethane	0.2	0.4	1.
Trichloroethylene	0.005	0.01	0.025
Trihalomethanes (total)	0.1	0.2	0.5
Vinyl Chloride	0.002	0.004	0.01
Xylenes (total)	10.	10.	50.

(based on federal National Secondary Drinking Water Standards)

Chloride	250.	250.	500.
Manganese	0.15	0.75	3.75
Copper	5.	5.	10.
Iron	5.	5.	15.
Sulfates	400.	400.	800.
Zinc	5.	10.	50.
Total Dissolved Solids (TDS)	1,200.	1,200.	3,500.

b) The Agency, upon application by an owner or operator, may allow exceedences of any secondary standard provided that the applicant can make an adequate showing, using the groundwater impact assessment procedures of Section 817.413, that the limit increase will not result in an exceedence of the groundwater quality standards specified in Section 817.416.

Section 817.107 Waste Mining

- a) Owner or operator may mine landfills covered by this Part, including previously abandoned or closed units to recover usable materials, in accordance with this Section. The handling, storage, and ultimate use of the mined wastes shall conform with the requirements of this Part.
- b) Owner or operator shall develop a closure plan for the mined area. The closure plan shall be consistent with the closure requirements of Subpart

- C of this Part. The closure plan shall be submitted to the Agency prior to initiating mining activity.
- c) If the facility is conducting mining operations on the effective date of this rule, the owner or operator shall submit a closure plan to the Agency within 60 days after the effective date of this Part.
 - d) If, during the mining operation, wastes are discovered in the landfill that exceed the MALCs for low risk wastes, the owner or operator shall amend the closure plan to ensure that the closure complies with the standards of 35 Ill. Adm. Code 814.402.
 - e) If no waste is removed from the landfill for a period of greater than one year, the owner or operator shall initiate closure.
 - f) Following completion of the mining activity, those portions of the landfill that were disturbed and that still contain waste shall be closed pursuant to the closure plan.
 - g) No new wastes may be disposed of in the mined areas of the landfill during or after the mining operation unless provided for in the closure plan.

SUBPART B: STANDARDS FOR MANAGEMENT OF BENEFICIALLY USABLE STEEL AND FOUNDRY INDUSTRY WASTES

Section 817.201 Scope and Applicability

The standards of this Subpart, along with 35 Ill. Adm. Code 811.101 and 811.102, shall apply to all steel and foundry industry wastes not exempt under Section 817.101 and which meet the MALC limits for beneficially usable wastes provided in Section 817.106.

Section 817.202 Limitations on Use

- a) Wastes regulated by this Subpart may only be used as substitutes for commercially available materials including soil used for land reclamation purposes. Open dumps containing beneficial waste are prohibited.
- b) Storsers of wastes shall take all necessary precautions to ensure that the waste piles do not present a dust or runoff nuisance or produce violations of the Act or regulations promulgated pursuant thereto.
- c) Access to the open face of the beneficially usable waste storage area and all other areas within the boundaries of the facility shall be restricted to prevent unauthorized entry at all times.

Section 817.203 Notification

- a) The generator of wastes regulated by this Subpart, including persons conducting waste mining under 817.107, shall certify that the waste sent

to an offsite beneficial use meets the Subpart A requirements for beneficial waste. A copy of the certification shall be attached to the Bill of Lading for each shipment.

- b) The generator of wastes regulated by this Subpart shall submit the following information to the Agency for each new recipient of the waste and for each new use location:
- 1) A detailed description of the process generating the material;
 - 2) A demonstration that the proposed material handling activity will not cause a release or threat of release of contaminants to the air or water that will exceed standards promulgated by the Board or would adversely affect or impact human health or the environment;
 - 3) A physical description of the waste stream. This description should include information on size, shape, form, particle size, and volume of the waste;
 - 4) The analytical results of the leaching test completed pursuant to Section 817.103;
 - 5) A physical analysis of the waste including percent moisture, ignitability, corrosivity, solubility, and reactivity;
 - 6) Groundwater monitoring data, if available; and
 - 7) A description of the proposed use or reuse activity and site including location, special handling instructions, and estimated usage timetable.

Section 817.204 Long-Term Storage

- a) A storage pile that is regulated by this Subpart shall be closed as a landfill pursuant to the provisions of Subpart C of this Part unless the owner or operator can demonstrate that wastes have either been added to or removed from the unit within the preceding year. At a minimum, such demonstration shall include photographs, records or other observable or discernable information.
- b) An owner or operator of a storage pile may obtain up to a six month extension of the closure requirement from the Agency upon providing proof, in the form of a past or present sales contract or similar evidence, that a specific market for the material exists.

SUBPART C: STEEL AND FOUNDRY INDUSTRY POTENTIALLY USABLE WASTE LANDFILLS

Section 817.301 Scope and Applicability

The standards of this Subpart, in addition to the requirements of 35 Ill. Adm. Code 811.Subpart A, shall apply to all landfills in which only potentially usable waste is to

be placed. The landfills regulated by this Subpart may accept beneficially usable waste for disposal.

Section 817.302 Design Period

The design period for all potentially usable waste disposal units shall be the estimated operating life of the unit plus a minimum postclosure care period of five years. For landfills, other than those used exclusively for disposing waste generated at the site, the minimum postclosure care period, for purposes of monitoring settling at the site, shall be 15 years.

Section 817.303 Final Cover

Unless otherwise specified in a permit or other written Agency approval, a minimum of 0.46 meters (1.5 feet) of soil material that will support vegetation which prevents or minimizes erosion shall be applied over all disturbed areas.

Section 817.304 Final Slope and Stabilization

- a) The waste disposal unit shall be designed and constructed to achieve a minimum static slope safety factor of 1.5 and a minimum seismic safety factor of 1.3.
- b) Standards for vegetation:
 - 1) Vegetation shall be promoted on all reconstructed surfaces to minimize wind and water erosion;
 - 2) Vegetation shall be compatible with (i.e., grow and survive under) the local climatic conditions;
 - 3) Vegetation shall require little maintenance;
 - 4) Vegetation shall consist of a diverse mix of native and introduced species consistent with the postclosure land use; and
 - 5) Temporary erosion control measures, including, but not limited to, the application, alone or in combination, of mulch, straw, netting, or chemical soil stabilizers, shall be undertaken while vegetation is being established.
- c) The landfill site shall be monitored for settling as specified in Section 817.302 in order to meet the requirements of this Section.

Section 817.305 Leachate Sampling

- a) All potentially usable waste landfills shall be designed to include a monitoring system capable of collecting representative samples of leachate generated by the waste, using methods such as, but not limited to, a pressure-vacuum lysimeter, trench lysimeter or a well point. The sampling locations shall be located so as to collect the most

representative leachate samples. Samples will not be composited but analyzed individually.

- b) Leachate samples shall be collected and analyzed at least once every six months to determine, using the statistical procedures of 35 Ill. Adm. Code 811.320(e)(2) and (e)(3), whether the Section 817.106 limits for potentially usable waste have been exceeded.
- c) If the results of testing of leachate samples in accordance with subsection (b) above indicate that the organic chemical limits for potentially usable waste, as defined in Section 817.10, have not been exceeded for four consecutive sampling periods, the subsection (b) sampling frequency for organics shall be reduced to once every two years.
- d) If the results of testing of leachate samples in accordance with subsection (b) of this Section confirm that the leachate exceeds the limits for potentially usable waste as defined in Section 817.106, the operator shall:
 - 1) notify the Agency in writing of this finding within 10 days following the finding;
 - 2) verify the exceedence by taking additional samples within 45 days after the initial observation;
 - 3) report the results of the verification sampling to the Agency within 60 days after the initial observation;
 - 4) determine the cause of the exceedence which may include, but not be limited to, the waste itself, natural phenomena, sampling or analysis errors, or an offsite source;
 - 5) notify the Agency in writing of a confirmed exceedence and provide the rationale used in such a determination within ten days after the determination; and
 - 6) if the exceedence is attributable to the landfill, return to a quarterly sampling program for organics until such time as the exceedences cease.
- e) If, as a result of further testing of the leachate pursuant to subsection (d)(2) of this Section and statistical analysis of the results in accordance with 35 Ill. Adm. Code 811.320(e), it is determined that the facility leachate exceeds the Section 817.106 limits for potentially usable waste, but does not exceed the limits for low risk waste, the facility shall:
 - 1) no longer be subject to the potentially usable waste landfill requirements of Subpart C of this Part;
 - 2) immediately be subject to the requirements for Low Risk Waste Landfills of 35 Ill. Adm. Code 814.602.
- f) If the results of the retesting completed pursuant to Section 817.305(d)(2) indicate that the leachate exceeds the Section 817.106 limits for low risk waste landfills, the facility shall:
 - 1) no longer be subject to the potentially usable waste landfill requirements of Subpart C of this Part;
 - 2) immediately cease accepting waste;

- 3) within 60 days, develop a closure plan that incorporates the requirements of 35 Ill. Adm. Code 811.Subpart C; and
 - 4) initiate closure within 90 days pursuant to a closure plan and complete closure within one year or pursuant to an alternate closure schedule that has been approved, in writing, by the Agency.
- g) The results of the chemical analysis tests shall be included in the quarterly groundwater reports submitted to the Agency in accordance with 35 Ill. Adm. Code 813.502 for permitted facilities and 35 Ill. Adm. Code 815.Subpart D for non-permitted facilities.

Section 817.306 Load Checking

- a) The operator shall not accept wastes for disposal at a potentially usable waste landfill unless the wastes are accompanied by documentation that they are potentially usable based on testing of the leachate from such wastes performed in accordance with the requirements of Subpart A of this Part.
- b) The operator shall institute and conduct a random load checking program at each potentially usable waste facility in accordance with the requirements of 35 Ill. Adm. Code 811.323, except that this program shall also be designed to:
 - 1) detect and discourage attempts to dispose of non-potentially usable wastes at the landfill;
 - 2) require the facility's inspector to examine at least one random load of solid waste delivered to the landfill on a random day each week; and
 - 3) require the operator to test one randomly selected waste sample from each generator on an annual basis in accordance with Section 817.103(a) to determine if the waste is potentially usable as defined in this Part.
- c) The operator shall include the results of the load checking in the annual report submitted to the Agency in accordance with 35 Ill. Adm. Code 813.501 for permitted facilities and 35 Ill. Adm. Code 815.Subpart C for non-permitted facilities.

Section 817.309 Facility Location

- a) No part of a unit shall be located within a setback zone established pursuant to Section 14.2 or 14.3 of the Act.
- b) No part of a unit shall be located within the recharge zone or within 366 meters (1200 feet), vertically or horizontally, of that portion of a stratigraphic unit containing Class I or Class III groundwater as defined at 35 Ill. Adm. Code 620, unless:

- 1) There is a stratum between the bottom of the waste disposal unit and the top of the Class I or Class III groundwater that meets the following minimum requirements:
 - A) The stratum has a minimum thickness of 15.2 meters (50 feet);
 - B) The maximum hydraulic conductivity in both the horizontal and vertical directions is no more than 1×10^{-7} centimeters per second, as determined by in situ borehole or equivalent tests;
 - C) There is no indication of continuous sand or silt seams, faults, fractures or cracks within the stratum that may provide paths for migration; and
 - D) Age dating of extracted water samples from both the aquifer and the stratum indicates that the time of travel for water percolating downward through the relatively impermeable stratum is no faster than 15.2 meters (50 feet) in 100 years; or
- 2) The owner or operator of the unit has demonstrated to the Agency, through the use of a site-specific groundwater model, or through other appropriate means, such as historical knowledge of local conditions or regional geological and hydrogeological data, that operation of the unit will not adversely impact any existing Class III groundwater or impact any Class I groundwater such that treatment or further treatment will be required to allow reasonable use of such Class I groundwater for potable water supply purposes.
 - A) Factors to be considered in evaluating whether a Class I groundwater may be reasonably used for potable supply purposes include, but are not limited to:
 - i) Physical or technological practicability of development;
 - ii) Existence of deed restrictions or other legal mechanisms for imposing a restriction on land use; and
 - iii) The nature of an existing use of the groundwater.
 - B) In performing groundwater modeling, the owner or operator shall:
 - i) Estimate the amount of seepage from the unit during operations assuming that the actual design standards for the unit apply;
 - ii) Determine the concentration of constituents in the leachate from actual leachate samples from the waste or similar waste, or laboratory-derived extracts;

- iii) Collect information to develop the site-specific groundwater model (e.g., hydraulic conductivity, gradients, hydrogeology, stratigraphy);
 - iv) Develop a conceptual groundwater flow model of the site to determine the soil units through which leachate may migrate;
 - v) If leachate from the unit is expected to contain organic constituents in excess of the MALCs for beneficial useable waste, determine the organic carbon content for soil units through which the leachate constituents may migrate; and
 - vi) Determine the retardation factor for constituents of interest based on traditional hydrogeological methods.
- c) Subsection (b) shall not apply to units that accept only beneficially useable waste.
 - d) A facility located within 152 meters (500 feet) of the right of way of a township or county road or State or interstate highway shall have its operations screened from view by a barrier of natural objects, fences, barricades or plants no less than 2.44 meters (8 feet) in height.
 - e) No part of a unit shall be located closer than 152 meters (500 feet) from an occupied dwelling, school, or hospital that was occupied on the date when the operator first applied for a permit to develop the unit or the facility containing the unit, unless the owner of such dwelling, school, or hospital provides permission to the operator, in writing, for a closer distance.

(Source: Amended at 21 Ill. Reg. 5946, effective January 14, 1997.)

SUBPART D: NEW STEEL AND FOUNDRY INDUSTRY LOW RISK WASTE LANDFILLS

Section 817.401 Scope and Applicability

The standards of this Subpart, along with 35 Ill. Adm. Code 811.Subpart A, shall apply to all new landfills in which only steel and foundry industry low risk wastes are to be placed.

Section 817.402 Facility Location

- a) No part of a unit shall be located within a setback zone established pursuant to Section 14.2 or 14.3 of the Act.
- b) No part of a unit shall be located within the recharge zone or within 366 meters (1200 feet), vertically or horizontally, of a sole-source aquifer

designated by the United States Environmental Protection Agency pursuant to Section 1424(e) of the Safe Drinking Water Act (42 U.S.C. 300h-3(e)), unless there is a stratum between the bottom of the waste disposal unit and the top of the aquifer that meets the following minimum requirements:

- 1) The stratum has a minimum thickness of 15.2 meters (50 feet);
 - 2) The maximum hydraulic conductivity in both the horizontal and vertical directions is no greater than 1×10^{-7} centimeters per second, as determined by in situ borehole or equivalent tests;
 - 3) There is no indication of continuous sand or silt seams, faults, fractures or cracks within the stratum that may provide paths for migration; and
 - 4) Age dating of extracted water samples from both the aquifer and the stratum indicates that the time of travel for water percolating downward through the relatively impermeable stratum is no faster than 15.2 meters (50 feet) in 100 years.
- c) A facility located within 152 meters (500 feet) of the right of way of a township or county road or state or interstate highway shall have its operations screened from view by a barrier of natural objects, fences, barricades, or plants no less than 2.44 meters (8 feet) in height.
- d) No part of a unit shall be located closer than 152 meters (500 feet) from an occupied dwelling, school, or hospital that was occupied on the date when the operator first applied for a permit to develop the unit or the facility containing the unit, unless the owner of such dwelling, school, or hospital provides permission to the operator, in writing, for a closer distance.

Section 817.403 Design Period

The design period for low risk waste disposal units shall be the estimated operating life plus 20 years.

Section 817.404 Foundation and Mass Stability Analysis

- a) The material beneath the 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 the failure of the liner.
- b) The total settlement or swell of the foundation shall not cause or contribute to the failure of the liner.
- c) The solid waste disposal unit shall be designed to achieve a safety factor against bearing capacity failure of at least 2.0 under static conditions and 1.5 under seismic loadings.

- d) The waste disposal unit shall be designed to achieve a factor of safety against slope failure of at least 1.5 for static conditions and 1.3 under seismic loading.
- e) In calculating factors of safety, both long term (in tens or hundreds of years) and short term (over the design period of the facility) conditions expected at the facility shall be considered.
- f) The potential for earthquake or blast induced liquefaction, and its effect on the stability and integrity of the unit, shall be considered and taken into account in the design. The potential for landslides or earthquake induced liquefaction outside the unit shall be considered if such events could affect the unit.

Section 817.405 Foundation Construction

- a) If the in situ material provides insufficient strength to meet the requirements of Section 817.404, then the insufficient material shall be removed and replaced with clean materials sufficient to meet the requirements of Section 817.404.
- b) All trees, stumps, roots, boulders and debris shall be removed.
- c) All material shall be compacted to achieve the strength and density properties necessary to demonstrate compliance with this Part in conformance with a construction quality assurance plan pursuant to 35 Ill. Adm. Code 811.Subpart E.
- d) Placement of frozen soil or soil onto frozen ground is prohibited.
- e) The foundation shall be constructed and graded to provide a smooth, workable surface on which to construct the liner.

Section 817.406 Liner Systems

- a) All units shall be equipped with a leachate drainage and collection system and a compacted earth liner designed as an integrated system in compliance with the requirements of this Section and of Sections 817.407 and 817.408
- b) The liner and leachate collection system shall be stable during all phases of construction and operation. The side slopes shall achieve a minimum static safety factor of 1.3 and a minimum seismic safety factor of 1.0 at all times.
- c) The liner shall be designed to function for the entire design period.
- d) Compacted earth liner standards:
 - 1) The minimum allowable thickness shall be 0.91 meters (3.0 feet).
 - 2) The liner shall be compacted to achieve a maximum hydraulic conductivity of 1×10^{-7} centimeters per second.
 - 3) The construction and compaction of the liner shall be carried out in accordance with the construction quality assurance procedures of 35 Ill. Adm. Code 811.Subpart E so as to reduce void spaces

and allow the liner to support the loadings imposed by the waste disposal operation without settling that causes or contributes to the failure of the leachate collection system.

- 4) The liner shall be constructed from materials whose properties are not affected by contact with the constituents of the leachate expected to be produced.
- e) Slurry trenches and cutoff walls used to prevent migration of leachate:
 - 1) Slurry trenches and cutoff walls built to contain leachate migration shall be used only in conjunction with a compacted earth liner meeting the requirements of subsection (d) above or as part of a remedial action required by 35 Ill. Adm. Code 811.319.
 - 2) Slurry trenches and cutoff walls shall extend into the bottom confining layer to a depth that will establish and maintain a continuous hydraulic connection and prevent seepage.
 - 3) Exploration borings shall be drilled along the route of the slurry trench or cutoff wall to confirm the depth to the confining layer. In situ tests shall be conducted to determine the hydraulic conductivity of the confining layer.
 - 4) Slurry trenches and cutoff walls shall be stable under all conditions during the design period of the facility. They shall not be susceptible to displacement or erosion under stress or hydraulic gradient.
 - 5) Slurry trenches and cutoff walls shall be constructed in conformance to a construction quality assurance plan, pursuant to 35 Ill. Adm. Code 811.Subpart E, that insures that all material and construction methods meet design specifications.
- f) The owner or operator may utilize liner configurations other than those specified in this Section, special construction techniques, and admixtures, provided that:
 - 1) The alternative technology or material provides equivalent, or superior, performance to the requirements of this Section;
 - 2) The technology or material has been successfully utilized in at least one application or pilot facility similar to the proposed application;
 - 3) Methods for manufacturing quality control and construction quality assurance can be implemented; and
 - 4) The owner or operator has received written approval from the Agency prior to the start of construction.

Section 817.407 Leachate Drainage System

- a) The leachate drainage system shall be designed and constructed to be capable of operation throughout the entire design period.

- b) The system shall be designed in conjunction with the leachate collection system required by Section 817.408:
 - 1) To maintain a maximum head of leachate 3.0 meters (10 feet) above the liner; and
 - 2) To operate during the month when the highest average monthly precipitation occurs and, if the liner bottom is located within the saturated zone, under the condition that the groundwater table is at its seasonal high level. In addition, the following design assumptions shall apply:
 - A) The unit is assumed to be at field capacity; and
 - B) The final cover is in place.
- c) A drainage layer shall overlay the entire liner system. This drainage layer shall be no less than 0.30 meter (one foot) thick and shall have a hydraulic conductivity equal to or greater than 1×10^{-3} centimeters per second.
- d) The drainage layer shall be designed to maintain laminar flow throughout the drainage layer under the conditions described in subsection (b).
- e) The drainage layer shall be designed with a graded filter or geotextile as necessary to minimize clogging and prevent intrusion of fine material.
- f) Materials used in the leachate collection system shall be chemically resistant to the wastes and the leachate expected to be produced.

Section 817.408 Leachate Collection System

- a) The leachate collection system shall be designed and constructed to function for the entire design period.
- b) Collection pipes shall be designed for open channel flow to convey leachate under the conditions established in Section 817.407(b).
- c) Collection pipes shall be of a cross-sectional area that allows cleaning.
- d) Materials used in the leachate collection system shall be chemically resistant to the waste and the leachate expected to be produced.
- e) The collection pipe material and bedding materials as placed shall possess structural strength to support the maximum loads imposed by the overlying materials and equipment used at the facility.
- f) Collection pipes shall be constructed within a coarse gravel envelope using a graded filter or geotextile as necessary to minimize clogging.
- g) The system shall be equipped with a sufficient number of manholes and cleanout risers to allow cleaning and maintenance of all pipes throughout the design period.

Section 817.409 Leachate Treatment and Disposal System

- a) Leachate shall be removed from the drainage and collection system when the leachate level in the landfill interferes with landfill operations or

exceeds ten feet, or when the unit is subject to assessment monitoring in accordance with Section 817.415(b). The operator is responsible for the operation of a leachate management system designed to handle all leachate removed from the collection system. The leachate management system shall consist of any combination of storage, treatment, pretreatment, and disposal options designed and constructed in compliance with the requirements of this Section.

- b) The leachate management system shall consist of any combination of multiple treatment and storage structures, to allow the management and disposal of leachate during routine maintenance and repairs.
- c) Standards for on-site treatment and pretreatment:
 - 1) All on-site treatment or pretreatment systems shall be considered part of the facility.
 - 2) The on-site treatment or pretreatment system shall be designed in accordance with the expected characteristics of the leachate. The design may include modifications to the system necessary to accommodate changing leachate characteristics.
 - 3) The on-site treatment or pretreatment system shall be designed to function for the entire design period.
 - 4) All of the facility's unit operations, tanks, ponds, lagoons and basins shall be designed and constructed with liners or containment structures to control seepage to groundwater. The ponds, lagoons, and basins shall be inspected prior to use for cracks and settling and, if leachate is stored in them for more than 60 days, they shall be subject to groundwater monitoring pursuant to this Part.
 - 5) All treated effluent discharged to waters of the State shall meet the requirements of 35 Ill. Adm. Code 309.
 - 6) The treatment system shall be operated by an operator certified under the requirements of 35 Ill. Adm. Code 312.
- d) Standards for leachate storage systems:
 - 1) The leachate storage facility must be able to store a minimum of at least five days' worth of accumulated leachate at the maximum generation rate used in designing the leachate drainage system in accordance with Section 817.407. The minimum storage capacity may be built up over time and in stages, so long as the capacity for five consecutive days of accumulated leachate, during extreme precipitation conditions, is available at any time during the design period of the facility.
 - 2) All leachate storage tanks shall be equipped with secondary containment systems equivalent to the protection provided by a clay liner 0.61 meter (2 feet) thick having a permeability no greater than 10^{-7} centimeters per second.

- 3) Leachate storage systems shall be fabricated from material compatible with the leachate expected to be generated and resistant to temperature extremes.
 - 4) The leachate storage system shall not cause or contribute to a malodor.
- e) Standards for discharge to an off-site treatment works:
- 1) Leachate may be discharged to an off-site treatment works that meets the following requirements:
 - A) All discharges of effluent from the treatment works shall meet the requirements of 35 Ill. Adm. Code 309.
 - B) The treatment system shall be operated by an operator certified under the requirements of 35 Ill. Adm. Code 312.
 - C) No more than 50 percent of the average daily influent flow can be attributable to leachate from the solid waste disposal facility. Otherwise, the treatment works shall be considered a part of the solid waste disposal facility.
 - 2) The operator is responsible for securing permission from the off-site treatment works for authority to discharge to the treatment works.
 - 3) All discharges to a treatment works shall meet the requirements of 35 Ill. Adm. Code 307 and 310.
 - 4) Pumps, meters, valves and monitoring stations that control and monitor the flow of leachate from the unit and which are under the control of the operator shall be considered part of the facility and shall be accessible to the operator at all times.
 - 5) Leachate shall be allowed to flow into the sewerage system at all times; however, if access to the treatment works is restricted or anticipated to be restricted for longer than five days, an alternative leachate management system shall be constructed in accordance with subsection (c) of this Section.
 - 6) Where leachate is not directly discharged into a sewerage system, the operator shall provide storage capacity sufficient to transfer all leachate to an off-site treatment works. The storage system shall meet the requirements of subsection (d) of this Section.
- f) Leachate monitoring:
- 1) Representative samples of leachate shall be collected from each unit and tested in accordance with subsection (f)(2) of this Section at a frequency of once per quarter. The frequency of testing may be changed to once per year for any monitored constituent, if it is not detected in the leachate for four consecutive quarters. However, if such a constituent is detected in the leachate, testing frequency shall return to a quarterly schedule and the constituent added to the groundwater monitoring program requirements of Section 817.415. In such case, the

testing frequency shall remain on a quarterly schedule until such time as the monitored constituent has remained undetected for four additional quarters.

- 2) Leachate and discharges of leachate from units shall be monitored for constituents determined by the characteristics of the waste to be disposed of in the unit. They shall include, at a minimum:
 - A) pH;
 - B) Annually, the MALCs listed in Section 817.106 and the constituents listed in Section 817.Appendix A of this Part;
 - C) Any other constituents listed in the operator's NPDES discharge permit, pursuant to 35 Ill. Adm. Code 304, or required by a publicly owned treatment works, pursuant to 35 Ill. Adm. Code 307 and 310; and
 - D) All of the indicator constituents chosen in accordance with Section 817.415(a)(2)(B) and used by the operator for groundwater monitoring.
 - 3) The operator shall also monitor the leachate head within each unit.
- g) Time of operation of the leachate management system:
- 1) The operator shall collect and dispose of leachate for a minimum period of 5 years after closure until treatment is no longer necessary.
 - 2) Treatment is no longer necessary if the leachate constituents do not exceed the wastewater effluent standards in 35 Ill. Adm. Code 304.124, 304.125, and 304.126.
- h) If the results of testing of leachate samples in accordance with subsection (f) above show that the leachate exceeds the limits for low risk waste as defined in Section 817.106, the operator shall:
- 1) notify the Agency in writing of this finding within 10 days following the finding;
 - 2) verify the exceedence by taking additional samples within 45 days after the initial observation;
 - 3) report the results of the verification sampling to the Agency within 60 days after the initial observation;
 - 4) determine the source of the exceedence, which may include, but not be limited to, the waste itself, natural phenomena, sampling or analysis errors, or an offsite source, within 90 days after the initial observation; and
 - 5) notify the Agency in writing of a confirmed exceedence and provide the rationale used in such a determination within ten days after the determination.
- i) If, as a result of further testing of the leachate and the background groundwater and analysis using the 35 Ill. Adm. Code 811.320(e) statistical procedure, it is determined that the facility leachate exceeds the Section 817.106 limits for low risk waste, the facility shall:

- 1) no longer be subject to the low risk waste landfill requirements of Subpart C of this Part; and
 - 2) be subject to the requirements for chemical waste landfills of 35 Ill. Adm. Code 814.302.
- j) Leachate sampling and analysis shall be completed in accordance with the standards of 35 Ill. Adm. Code 817.414(e)(1), (e)(3), (e)(4), and (e)(5).

Section 817.410 Final Cover System

- a) The unit shall be covered by a final cover consisting of a low permeability layer overlain by a final protective layer constructed in accordance with the requirements of this Section.
- b) Standards for the low permeability layer:
 - 1) Construction of a low permeability layer shall begin not later than 60 days after placement of the final lift of solid waste.
 - 2) The low permeability layer shall cover the entire unit and connect with the liner system.
 - 3) The low permeability layer shall consist of any one of the following:
 - A) A compacted earth layer constructed in accordance with the following standards:
 - i) The minimum allowable thickness shall be 0.61 meters (2.0 feet).
 - ii) The layer shall be compacted to achieve a permeability of 1×10^{-7} centimeters per second and minimize void spaces.
 - iii) Alternative specifications may be utilized provided that the performance of the low permeability layer is equal to or superior to the performance of a layer meeting the requirements of subsections (b)(3)(A)(i) and (b)(3)(A)(ii) above.
 - B) A geomembrane constructed in accordance with the following standards:
 - i) The geomembrane shall provide performance equal or superior to the compacted earth layer described in subsection (b)(3)(A) above.
 - ii) The geomembrane shall have strength to withstand the normal stresses imposed by the waste stabilization process.
 - iii) The geomembrane shall be placed over a prepared base free from sharp objects and other materials which may cause damage.
 - C) Any other low permeability layer construction techniques or materials, provided that they provide equivalent or

superior performance to the requirements of this subsection.

- c) Standards for the final protective layer:
- 1) The final protective layer shall cover the entire low permeability layer.
 - 2) The thickness of the final protective layer shall be sufficient to protect the low permeability layer from freezing and minimize root penetration of the low permeability layer, but shall not be less than 0.46 meter (1.5 feet).
 - 3) The final protective layer shall consist of soil material capable of supporting vegetation.
 - 4) The final protective layer shall be placed as soon as possible after placement of the low permeability layer to prevent desiccation, cracking, freezing or other damage to the low permeability layer.

Section 817.411 Hydrogeologic Site Investigations

- a) Purpose. The operator shall conduct a hydrogeologic investigation to develop hydrogeologic information for the following uses:
- 1) Provide information to perform a groundwater impact assessment; and
 - 2) Provide information to establish a groundwater monitoring system.
- b) General requirements:
- 1) The investigation shall be conducted in a minimum of three phases prior to submission of any application to the Agency for a permit to develop and operate a landfill facility.
 - 2) The study area shall consist of the entire area occupied by the facility and any adjacent areas, if necessary for the purpose of the hydrogeological investigation set forth in subsection (a) above.
 - 3) All borings shall be sampled continuously at all recognizable points of geologic variation, except where non-continuous sampling can provide equivalent information, samples shall be obtained at intervals no greater than 1.52 meters (five feet) in homogeneous strata.
- c) Minimum requirements for a Phase I investigation:
- 1) The operator shall conduct a Phase I investigation to develop the following information:
 - A) Climatic aspects of the study area;
 - B) The regional and study area geologic setting, including a description of the geomorphology and stratigraphy of the area;
 - C) The regional groundwater regime including water table depths and aquifer characteristics; and

- D) Information for the purpose of designing a Phase II hydrogeologic investigation.
- 2) Specific requirements:
 - A) The regional hydrogeologic setting of the unit shall be established by using material available from all possible sources, including, but not limited to, the Illinois State Water Survey, the Illinois Geological Survey, the Agency, other State and Federal organizations, water well drilling logs, and previous investigations.
 - B) A minimum of one continuously sampled boring shall be drilled on the site, as close as feasible to the geographic center, to determine if the available regional hydrogeologic setting information is accurate and to characterize the site-specific hydrogeology to the extent specified by this phase of the investigation. The boring shall extend at least 15.2 meters (50 feet) below the bottom of the uppermost aquifer or through the full depth of the confining layer below the uppermost aquifer, or to bedrock, if the bedrock is below the uppermost aquifer, whichever elevation is higher. The locations of any additional borings required under this subsection may be chosen by the investigator, but shall be sampled continuously.
- d) Minimum requirements for a Phase II hydrogeologic investigation (Phase II investigation):
 - 1) Information to be developed. Using the information developed in the Phase I survey, a Phase II investigation shall be conducted to collect the site-specific information listed below as needed to augment data collected during the Phase I investigation and to prepare for the Phase III investigation:
 - A) Structural characteristics and distribution of underlying strata, including bedrock;
 - B) Chemical and physical properties including, but not limited to, lithology, mineralogy, and hydraulic characteristics of underlying strata, including those below the uppermost aquifer;
 - C) Soil characteristics, including soil types, distribution, geochemical and geophysical characteristics;
 - D) The hydraulic conductivities of the uppermost aquifer and all strata above it;
 - E) The vertical extent of the uppermost aquifer; and
 - F) The direction and rate of groundwater flow.
 - 2) Specific requirements:
 - A) One boring shall be located as close as feasible to the topographical high point, and another shall be located as

close as feasible to the topographical low point of the study area.

- B) At least one boring shall be at or near each corner of the site. Where the property is irregularly shaped, the borings shall be located near the boundary in a pattern and spacing necessary to obtain data over the entire study area.
 - C) Additional borings may be located at intermediate points at locations and spacings necessary to establish the continuity of the stratigraphic units.
 - D) Piezometers and groundwater monitoring wells shall be established to determine the direction and flow characteristics of the groundwater in all strata and extending down to the bottom of the uppermost aquifer. Groundwater samples taken from such monitoring wells shall be used to develop preliminary information needed for establishing background concentrations in accordance with subsection (e)(1)(G) of this Section.
 - E) Other methods may be utilized to confirm or accumulate additional information. Such methods may be used only as a supplement to, not in lieu of, site-specific boring information. Other methods include, but are not limited to, geophysical well logs, geophysical surveys, aerial photography, age dating, and test pits.
- e) Minimum standards for a Phase III investigation:
- 1) Using the information developed during the Phase I and Phase II investigations, the operator shall conduct a Phase III investigation. This investigation shall be conducted to collect or augment the site-specific information needed to carry out the following:
 - A) Verification and reconciliation of the information collected in the Phase I and II investigations;
 - B) Characterization of potential pathways for contaminant migration;
 - C) Correlation of stratigraphic units between borings;
 - D) Continuity of petrographic features including, but not limited to, sorting, grain size distribution, cementation and hydraulic conductivity;
 - E) Identification of zones of potentially high hydraulic conductivity;
 - F) Identification of the confining layer, if present;
 - G) Concentrations of chemical constituents present in the groundwater and expected to appear in the leachate below the unit, down to the bottom of the uppermost aquifer, using a broad range of chemical analysis and detection

- procedures, such as gas chromatographic and mass spectrometric scanning. However, additional measurements and procedures shall be carried out to establish background concentrations, in accordance with Section 817.416(d), for any constituent which is listed in Section 817.106 (MALCs) or Section 817.Appendix A of this Part and which is expected to appear in the leachate;
- H) Characterization of the seasonal and temporal, naturally and artificially induced, variations in groundwater quality and groundwater flow; and
 - I) Identification of unusual or unpredicted geologic features, including: fault zones, fractures traces, facies changes, solution channels, buried stream deposits, cross cutting structures and other geologic features that may affect the ability of the operator to monitor the groundwater or predict the impact of the disposal facility on groundwater.
- 2) In addition to the specific requirements applicable to Phase I and II investigations, the operator shall collect information needed to meet the minimum standards of a Phase III investigation by using methods that may include, but are not limited to, excavation of test pits, additional borings located at intermediate points between boreholes placed during Phase I and II investigations, placement of piezometers and monitoring wells, and institution of procedures for sampling and analysis.
- f) The operator may conduct the hydrogeologic investigation in any number of alternative ways provided that the necessary information is collected in a systematic sequence consisting of at least three phases that is equal to or superior to the investigation procedures of this Section.

Section 817.412 Plugging and Sealing of Drill Holes

All drill holes, including exploration borings that are not converted into monitoring wells, monitoring wells that are no longer necessary to the operation of the site, and other holes that may cause or facilitate contamination of groundwater shall be sealed in accordance with the following standards:

- a) If not sealed or plugged immediately, the drill hole shall be covered to prevent injury to people or animals.
- b) All drill holes no longer intended for use shall be back-filled with materials that are compatible with the geochemistry of the site and with the leachate in sufficient quantities and in such a way as to prevent the creation of a pathway for contaminants to migrate.
- c) For drill holes in gravels and other permeable strata where a watertight seal is not necessary to prevent the creation of pathway, drill cuttings and other earthen materials may be utilized as backfill.

- d) All excess drilling mud, oil, drill cuttings, and any other contaminated materials uncovered during or created by drilling shall be disposed of in accordance with the requirements of 35 Ill. Adm. Code 700 through 749, 807, and 809 through 815.
- e) The operator shall restore the area around the drill hole to its original condition.

Section 817.413 Groundwater Impact Assessment

The impacts of the seepage of leachate from the unit shall be assessed in a systematic fashion using the techniques described in this Section.

- a) Procedures for performing the groundwater impact assessment:
 - 1) The operator shall estimate the amount of seepage from the unit during operations which assume:
 - A) That the minimum design standards for slope configuration, cover, liner, leachate drainage, and collection system apply; and
 - B) That the actual design standards planned for the unit apply. Other designs for the unit may be used if determined by the operator to be appropriate to demonstrate the impacts to groundwater.
 - 2) The concentration of constituents in the leachate shall be determined from actual leachate samples from the waste or similar waste, or laboratory-derived extracts.
 - 3) The operator shall estimate the capability of the geology and hydrology beneath the unit to meet the groundwater quality standards of Section 817.416 at the edge of the zone of attenuation. The estimate shall be made in accordance with the following:
 - A) Determine the aquifer conductivity and gradient using the hydrogeologic information collected pursuant Section 817.411. If the aquifer conductivity is 1×10^{-5} cm/sec or less, no further groundwater impact assessment is required;
 - B) Develop a conceptual groundwater flow model of the site to determine the soil units through which leachate constituents may migrate;
 - C) Determine the organic carbon content for soil units through which the leachate constituents may migrate;
 - D) Determine the retardation factor for constituents of interest based on traditional hydrogeological methods;
 - E) Determine MALC values for constituents of interest required to achieve compliance with the applicable groundwater quality standards specified at Section 817.416;

- F) Compare the calculated MALC values to the leachate values for the expected waste streams to determine whether compliance with groundwater standards can be met.
- b) Acceptable groundwater impact assessment. The groundwater impact shall be considered acceptable if the leachate values for the expected waste streams are less than the MALC values calculated in accordance with subsection 817.413(a)(3)(F).

Section 817.414 Design, Construction and Operation of Groundwater Monitoring Systems

- a) All potential sources of discharges to groundwater within the facility, including, but not limited to, all waste disposal units and the leachate management system, shall be identified and studied through a network of monitoring wells operated during the active life of the unit and for the time after closure specified in accordance with Section 817.415. Monitoring wells designed and constructed as part of the monitoring network shall be maintained along with records that include, but are not limited to, exact well location, well size, type of well, the design and construction practice used in its installation and well and screen depths.
- b) Standards for the location of monitoring points:
 - 1) A network of monitoring points shall be established at sufficient locations downgradient with respect to groundwater flow and not excluding the downward direction, to detect any discharge of contaminants from any part of a potential source of discharge.
 - 2) Monitoring wells shall be located in stratigraphic horizons that could serve as contaminant migration pathways.
 - 3) Monitoring wells shall be established as close to the potential source of discharge as possible without interfering with the waste disposal operations, and within half the distance from the edge of the potential source of discharge to the edge of the zone of attenuation downgradient, with respect to groundwater flow, from the source.
 - 4) The network of monitoring points of several potential sources of discharge within a single facility may be combined into a single monitoring network, provided that discharges from any part of all potential sources can be detected.
 - 5) A minimum of at least one monitoring well shall be established at the edge of the zone of attenuation and shall be located downgradient from the unit with respect to groundwater flow, and not excluding the downward direction. Such well or wells shall be used to monitor any statistically significant increase in the concentration of any constituent, in accordance with Section 817.416(e) and shall be used for determining compliance with an

applicable groundwater quality standard of Section 817.416. An observed statistically significant increase above the applicable groundwater quality standards of Section 817.416 in a well located at or beyond the compliance boundary shall constitute a violation.

- c) Maximum allowable predicted concentrations. For the purposes of this Part, the maximum allowable predicted concentration (MAPC) for each monitored constituent shall be determined as follows:
 - 1) MAPCs for those constituents with a MALC identified as a primary standard shall be background plus 10 percent of the MALC. MAPCs for those constituents with a MALC identified as a secondary standard shall be background plus 50 percent of the MALC. The MAPCs calculated in this subsection shall be applicable within the zone of attenuation.
 - 2) For those constituents listed in Section 817. Appendix A of this Part, the MAPC shall be the practical quantitation limit (PQL) or, if the constituent's background concentration exceeds the PQL, the MAPC shall be the background constituent concentration.
- d) Standards for monitoring well design and construction:
 - 1) All monitoring wells shall be cased in a manner that maintains the integrity of the borehole. The casing material shall be inert so as not to affect the water sample. Casing requiring solvent-cement type coupling shall not be used.
 - 2) Wells shall be screened to allow sampling only at the desired interval. Annular space between the borehole wall and well screen section shall be packed with gravel sized to avoid clogging by the material in the zone being monitored. The slot size of the screen shall be designed to minimize clogging. Screens shall be fabricated from material expected to be inert with respect to the constituents of the groundwater to be sampled.
 - 3) Annular space above the well screen section shall be sealed with a relatively impermeable, expandable material such as a cement/bentonite grout, which does not react with or in any way affect the sample, in order to prevent contamination of samples and groundwater and avoid interconnections. The seal shall extend to the highest known seasonal groundwater level.
 - 4) The annular space shall be back-filled with expanding cement grout from an elevation below the frost line and mounded above the surface and sloped away from the casing so as to divert surface water away.
 - 5) The annular space between the upper and lower seals and in the unsaturated zone may be back filled with uncontaminated cuttings.
 - 6) All wells shall be covered with vented caps and equipped with devices to protect against tampering and damage.

- 7) All wells shall be developed to allow free entry of water, minimize turbidity of the sample, and minimize clogging.
 - 8) The transmissivity of the zone surrounding all well screens shall be established by field testing techniques.
 - 9) Other sampling methods and well construction techniques may be utilized if they meet the water well construction standards of 77 Ill. Adm. Code 920 or if the Agency has issued a written approval.
- e) Standards for Sample Collection and Analysis
- 1) The groundwater monitoring program shall include consistent sampling and analysis procedures to assure that monitoring results can be relied upon to provide data representative of groundwater quality in the zone being monitored.
 - 2) The operator shall utilize procedures and techniques to insure that collected samples are representative of the zone being monitored and that prevent cross contamination of samples from other monitoring wells or from other samples. At least 95 percent of a collected sample shall consist of groundwater from the zone being monitored.
 - 3) The operator shall establish a quality assurance program that provides quantitative detection limits and the degree of error for analysis of each chemical constituent.
 - 4) The operator shall establish a sample preservation and shipment procedure that maintains the reliability of the sample collected for analysis.
 - 5) The operator shall institute a chain of custody procedure to prevent tampering and contamination of the collected samples prior to completion of analysis.
 - 6) At a minimum, the operator shall sample the following parameters at all wells at the time of sample collection and immediately before filtering and preserving samples for shipment:
 - A) The elevation of the water table;
 - B) The depth of the well below ground;
 - C) pH;
 - D) The temperature of the sample; and
 - E) Specific conductance.

Section 817.415 Groundwater Monitoring Programs

- a) Detection monitoring program: Any use of the term "maximum allowable predicted concentration" or "MAPC" in this Section is a reference to Section 817.414(c), as defined in Section 811.102. The operator shall implement a detection monitoring program in accordance with the following requirements:

- 1) Monitoring schedule and frequency:
 - A) The monitoring period shall begin as soon as waste is placed into the unit of a new landfill or within one year after August 1, 1994 for an existing landfill. Monitoring shall continue for a minimum period of fifteen years after closure or, in the case of landfills, other than those used exclusively for disposing waste generated at the site, a minimum of fifteen years after closure. The operator shall sample all monitoring points for all potential sources of contamination on a quarterly basis except as specified in subsection (a)(3) of this Section or may institute more frequent sampling throughout the time the source constitutes a threat to groundwater. For the purposes of this Section, the source shall be considered a threat to groundwater if the results of the monitoring indicate that the concentrations of any of the constituent monitored within the zone of attenuation are above the MAPC for that constituent.
 - B) Beginning five years after closure of the unit, or five years after all other potential sources of discharge no longer constitute a threat to groundwater, as defined in subsection (a)(1)(A) of this Section, the monitoring frequency may change on a well by well basis to an annual schedule if either of the conditions listed in subsection (a)(1)(B)(i) or (a)(1)(B)(ii) of this Section exist. However, monitoring shall return to a quarterly schedule at any well where a statistically significant increase is determined to have occurred in accordance with Section 817.416(e), in the concentration of any constituent with respect to the previous sample.
 - i) All constituents monitored within the zone of attenuation have returned to a concentration less than or equal to ten percent of the MAPC; or
 - ii) All constituents monitored within the zone of attenuation are less than or equal to their MAPC for eight consecutive quarters.
 - C) Monitoring shall be continued for a minimum period of five years after closure or, in the case of landfills, other than those used exclusively for disposing waste generated at the site, a minimum period of fifteen years after closure. Monitoring, beyond the minimum period, may be discontinued under the following conditions:
 - i) No statistically significant increase is detected in the concentration of any constituent above that measured and recorded during the immediately

- preceding scheduled sampling for three consecutive years, after changing to an annual monitoring frequency; or
- ii) Immediately after contaminated leachate is no longer generated by the unit.
- 2) Criteria for choosing constituents to be monitored:
- A) The operator shall monitor each well for constituents that will provide a means for detecting groundwater contamination. Constituents shall be chosen for monitoring if they meet the following requirements:
 - i) The constituent appears in, or is expected to be in, the leachate; and
 - ii) The Board has established a groundwater quality standard at 35 Ill. Adm. Code 620, or the constituent may otherwise cause or contribute to groundwater contamination.
 - B) One or more indicator constituents, representative of the transport processes of constituents in the leachate, may be chosen for monitoring in place of the constituents it represents. The use of such indicator constituents must be included in an Agency approved permit.
- 3) Organic chemicals monitoring:
- A) The operator shall monitor each existing well that is being used as part of the monitoring well network at the facility within one year after August 1, 1994, and monitor each new well within three months after its establishment. The monitoring required by this subsection shall be for the organic chemicals listed in Section 817. Appendix A of this Part. The analysis shall be at least as sensitive as the procedures provided at 40 CFR 141.40 (1992), incorporated by reference at 35 Ill. Adm. Code 810.104.
 - B) At least once every two years, the operator shall monitor each well in accordance with subsection (a)(3)(A) of this Section.
- 4) Confirmation of monitored increase:
- A) The confirmation procedures of this Section shall be used only if the concentrations of the constituents monitored can be measured at or above the practical quantitation limit (PQL). The PQL is defined as the lowest concentration that can be reliably measured within specified limits of precision and accuracy under routine laboratory operating conditions. The operator shall institute the confirmation procedures of subsection (a)(4)(B) after notifying the Agency in writing, within 10 days, of the following observed increases:

- i) The concentration of any constituent monitored in accordance with subsections (a)(1) and (a)(2) of this Section shows a progressive increase over four consecutive quarters;
 - ii) The concentration of any constituent exceeds the MAPC at an established monitoring point within the zone of attenuation;
 - iii) The concentration of any constituent monitored in accordance with subsection (a)(3) of this Section exceeds the preceding measured concentration at any established monitoring point; and
 - iv) The concentration of any constituent monitored at or beyond the zone of attenuation exceeds the applicable groundwater quality standards of Section 817.416.
- B) The confirmation procedures shall include the following:
 - i) The operator shall verify any observed increase by taking additional samples within 45 days after the initial observation and ensure that the samples and sampling protocol used will detect any statistically significant increase in the concentration of the suspect constituent in accordance with 35 Ill. Adm. Code 811.320(e), so as to confirm the observed increase. The operator shall notify the Agency of any confirmed increase before the end of the next business day following the confirmation. The verification procedure shall be completed within 90 days after the initial sampling event.
 - ii) The operator shall determine the source of any confirmed increase, which may include, but shall not be limited to, natural phenomena, sampling or analysis errors, or an off-site source.
 - iii) The operator shall notify the Agency in writing of any confirmed increase and state the source of the confirmed increase and provide the rationale used in such a determination within ten days after the determination.
- b) Assessment monitoring. The operator shall begin an assessment monitoring program in order to confirm the source of the contamination and to provide information needed to carry out a groundwater impact assessment in accordance with subsection (c) of this Section. The assessment monitoring program shall be conducted in accordance with the following requirements:

- 1) The assessment monitoring shall be conducted to collect information to assess the nature and extent of groundwater contamination, which shall consist of, but not be limited to, the following steps:
 - A) More frequent sampling of the wells in which the observation occurred;
 - B) More frequent sampling of any surrounding wells;
 - C) The placement of additional monitoring wells to determine the source and extent of the contamination;
 - D) Monitoring of additional constituents to determine the source and extent of contamination; and
 - E) Any other investigative techniques that will assist in determining the nature and extent of the contamination.
 - 2) The operator of the facility for which assessment monitoring is required shall file the plans for an assessment monitoring program with the Agency. If the facility is permitted by the Agency, then the plans shall be filed for review as a significant permit modification pursuant to 35 Ill. Adm. Code 813.Subpart B. The assessment monitoring program shall be implemented within 90 days after confirmation of any monitored increase in accordance with subsection (a)(4) of this Section or, in the case of permitted facilities, within 90 days after the Agency approval. The assessment monitoring program shall be filed with the Agency within 20 days after an observed increase, as defined in Section 817.415(a)(4)(B)(iii).
 - 3) If the analysis of the assessment monitoring data shows that the concentration of one or more constituents, monitored at or beyond the zone of attenuation, is above the applicable groundwater quality standards of Section 817.416 and is attributable to the solid waste disposal facility, the operator shall determine the nature and extent of the groundwater contamination, including an assessment of the continued impact on the groundwater should additional waste continue to be accepted at the facility, and shall implement remedial action in accordance with subsection (d) of this Section.
 - 4) If the analysis of the assessment monitoring data shows that the concentration of one or more constituents is attributable to the solid waste disposal facility and exceeds the MAPC within the zone of attenuation, then the operator shall conduct a groundwater impact assessment in accordance with the requirements of subsection (c) of this Section.
- c) Assessment of potential groundwater impact. An operator required to conduct a groundwater impact assessment in accordance with subsection (b)(4) of this Section shall assess the potential impacts outside the zone of attenuation that may result from confirmed increases above the MAPC

within the zone of attenuation, attributable to the facility, in order to determine if there is need for remedial action.

- 1) The operator shall utilize any new information developed since the initial assessment and information from the detection and assessment monitoring programs and such information shall be used to develop a groundwater contaminant transport (GCT) model in accordance with 35 Ill. Adm. Code 811.317(c); and
 - 2) The operator shall submit the groundwater impact assessment, GCT modeling and results, and any proposed remedial action plans determined necessary pursuant to subsection (d) to the Agency within 180 days after the start of the assessment monitoring program.
- d) Remedial action:
- 1) The operator shall submit plans for the remedial action to the Agency. Such plans and all supporting information including data collected during the assessment monitoring shall be submitted within 90 days after determination after either of the following:
 - A) The groundwater impact assessment performed in accordance with subsection (c) indicates that remedial action is needed; or
 - B) Any confirmed increase above the applicable groundwater quality standards of Section 817.416 is determined to be attributable to the solid waste disposal facility in accordance with subsection (b).
 - 2) If the facility has been issued a permit by the Agency, then the operator shall submit this information as an application for significant modification to the permit.
 - 3) The operator shall implement the plan for remedial action within 90 days after the following:
 - A) Completion of the groundwater impact assessment under subsection (c) that requires remedial action;
 - B) Establishing that a violation of an applicable groundwater quality standard of Section 817.416 is attributable to the solid waste disposal facility in accordance with subsection (b)(3) above; or
 - C) Agency approval of the remedial action plan, where the facility has been permitted by the Agency.
 - 4) The remedial action program shall consist of one or a combination of the following solutions to meet the requirements of subsection (d)(5) of this Section in a timely and appropriate manner:
 - A) Retrofit additional groundwater protective measures within the unit;

- B) Construct an additional hydraulic barrier, such as a cutoff wall or slurry wall system;
 - C) Pump and treat the contaminated groundwater; or
 - D) Any other Agency approved equivalent technique which will prevent further contamination of groundwater.
- 5) Termination of the remedial action program:
- A) The remedial action program shall continue in accordance with the plan until monitoring shows that the concentrations of all monitored constituents are below the MAPC within the zone of attenuation, and below the applicable groundwater quality standards of Section 817.416 at or beyond the zone of attenuation, over a period of 4 consecutive quarters.
 - B) The operator shall submit to the Agency all information collected under subsection (d)(5)(A). If the facility is permitted, the operator shall submit this information as an application for significant modification of the permit.

Section 817.416 Groundwater Quality Standards

- a) Applicable groundwater quality standards:
 - 1) Groundwater quality shall be maintained at each constituent's applicable groundwater quality standard at or beyond the zone of attenuation. The applicable groundwater quality standard established for any constituent shall be:
 - A) The Board established standard;
 - B) The Board established standard adjusted by the Board in accordance with the justification procedure of subsection (b) of this Section; or
 - C) For those constituents where no Board established standard exists, the background concentration.
 - 2) Any statistically significant increase above an applicable groundwater quality standard established pursuant to subsection (a)(1) that is attributable to the facility and which occurs at or beyond the zone of attenuation within 100 years after closure of the last unit accepting waste within such a facility shall constitute a violation.
 - 3) For the purposes of this Part:
 - A) "Background concentration" means that concentration of a constituent that is established as the background in accordance with subsection (d).
 - B) "Board-established standard" is the concentration of a constituent adopted by the Board as a groundwater quality standard under 35 Ill. Adm. Code 620.
- b) Justification for adjusted groundwater quality standards:

- 1) An operator may petition the Board for an adjusted groundwater quality standard in accordance with the procedures specified in Section 28.1 of the Act and 35 Ill. Adm. Code 106.410 through 106.416.
 - 2) For groundwater which contains naturally occurring constituents which do not meet the standards of 35 Ill. Adm. Code 620, the Board will specify adjusted groundwater quality standards, upon a demonstration by the operator that:
 - A) The groundwater does not presently serve as a source of drinking water;
 - B) The change in standards will not interfere with, or become injurious to, any present or potential beneficial uses for such waters;
 - C) The change in standards is necessary for economic or social development, by providing information including, but not limited to, the impacts of the standards on the regional economy, social disbenefits such as loss of jobs or closing of landfills, and economic analysis contrasting the health and environmental benefits with costs likely to be incurred in meeting the standards; and
 - D) The groundwater cannot presently, and will not in the future, serve as a source of drinking water because:
 - i) It is impossible to remove water in usable quantities;
 - ii) the groundwater is situated at a depth or location such that recovery of water for drinking purposes is not technologically feasible or economically reasonable;
 - iii) The groundwater is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption;
 - iv) The total dissolved solids content of the groundwater is more than 3,000 mg/l and the water will not be used to serve a public water supply system; or
 - v) The total dissolved solids content of the groundwater exceeds 10,000 mg/l.
- c) Determination of the zone of attenuation.
- 1) The zone of attenuation, within which concentrations of constituents in leachate discharged from the unit may exceed the applicable groundwater quality standard of this Section, is a volume bounded by a vertical plane at the property boundary or 100 feet from the edge of the unit, whichever is less, extending from the ground surface to the bottom of the uppermost aquifer and excluding the volume occupied by the waste.

- 2) Zones of attenuation shall not extend to the annual high water mark of navigable surface waters.
 - 3) Overlapping zones of attenuation from units within a single facility may be combined into a single zone for the purposes of establishing a monitoring network.
- d) Establishment of background concentrations:
- 1) The initial monitoring to determine background concentrations shall commence during the hydrogeological assessment required by Section 817.411. The background concentrations for those parameters identified in Sections 817.411(e)(1)(G) and 817.415(a)(2) and (a)(3) shall be established based on quarterly sampling of wells for one year, monitored in accordance with the requirements of subsections (d)(2), (d)(3), and (d)(4) of this Section, which may be adjusted during the operation of a facility. Statistical tests and procedures shall be employed, in accordance with subsection (e) below, depending on the number, type and frequency of samples collected from the wells, to establish the background concentrations. Adjustments to the background concentrations shall be made only if changes in the concentrations of constituents observed in upgradient wells over time are determined, in accordance with subsection (d)(3) below, to be statistically significant. Background concentrations determined in accordance with this subsection shall be used for the purposes of establishing groundwater quality standards, in accordance with subsection (a) above. The operator shall prepare a list of background concentrations established in accordance with this subsection. The operator shall maintain such a list at the facility, shall submit a copy of the list to the Agency for establishing standards in accordance with subsection (a), and shall provide updates to the list within ten days after any change to the list.
 - 2) A network of monitoring wells shall be established upgradient from the unit, with respect to groundwater flow, in accordance with the following standards, in order to determine the background concentrations of constituents in the groundwater:
 - A) The wells shall be located at such a distance that discharges of contaminants from the unit will not be detectable but will be representative of groundwater immediately upgradient of the unit;
 - B) The wells shall be sampled at the same frequency as other monitoring points to provide continuous background concentration data, throughout the monitoring period; and
 - C) The wells shall be located at several depths to provide data on the spatial variability.

- 3) A determination of background concentrations may include the sampling of wells that are not hydraulically upgradient of the waste unit where:
 - A) Hydrogeologic conditions do not allow the owner or operator to determine what wells are hydraulically upgradient of the waste; and
 - B) Sampling at other wells will provide an indication of background concentrations that is representative of that which would have been provided by upgradient wells.
 - 4) If background concentrations cannot be determined on site, then alternative background concentrations may be determined from actual monitoring data from the aquifer of concern, obtained from sample points located as close as is reasonably possible to the site.
- e) Statistical analysis of groundwater monitoring data:
- 1) Statistical tests shall be used to analyze groundwater monitoring data. One or more of the normal theory statistical tests listed in subsection (e)(4) below shall be chosen first for analyzing the data set or transformation of the data set. Where such normal theory tests are demonstrated to be inappropriate, tests listed in subsection (e)(5) or a test in accordance with subsection (e)(6) shall be used. For any statistical test chosen from subsections (e)(4) or (e)(5), the level of significance (Type 1 error level) shall be no less than 0.01, for individual well comparisons, and no less than 0.05, for multiple well comparisons. The statistical analysis shall include, but not be limited to, the accounting of data below, the detection limit of the analytical method used, the establishment of background concentrations and the determination of whether statistically significant changes have occurred in:
 - A) The concentration of any chemical constituent with respect to the background concentration or MAPC; and
 - B) The established background concentration of any chemical constituents over time.
 - 2) The statistical test or tests used shall be based upon the sampling and collection protocol of Sections 817.414 and 817.415.
 - 3) Monitored data that are below the level of detection shall be reported as not detected (ND). The level of detection for each constituent shall be the minimum concentration of that constituent which can be measured and reported with 99 percent confidence that the true value is greater than zero, which is defined as the method detection limit (MDL). The following procedures shall be used to analyze such data, unless an alternative procedure in accordance with subsection (e)(6) is shown to be applicable:
 - A) Where the percentage of nondetects in the data base used is less than 15 percent, the operator shall replace NDs

- with the MDL divided by two, then proceed with the use of one or more of the Normal Theory statistical tests listed in subsection (e)(4);
- B) Where the percentage of nondetects in the data base or data transformations used is between 15 and 50 percent, and the data are normally distributed, the operator shall use Cohen's adjustment to the sample mean and standard deviation, followed by one or more of the tests listed in subsection (e)(4)(C) of this Section. However, where data are not normally distributed, the operator shall use an applicable nonparametric test from subsection (e)(5);
 - C) Where the percentage of nondetects in the data base used is above 50 percent, then the owner or operator shall use the test of proportions listed in subsection (e)(4).
- 4) Normal theory statistical tests:
- A) Student t-test including, but not limited to, Cochran's Approximation to the Behren-Fisher (CABF) t-test and Averaged Replicate (AR) t-test.
 - B) Parametric analysis of variance (ANOVA) followed by one or more of the multiple comparison procedures including, but not limited to, Fisher's Least Significant Difference (LSD), Student Newman-Kuel procedure, Duncan's New Multiple Range Test and Tukey's W procedure.
 - C) Control Charts, Prediction Intervals and Tolerance Intervals, for which the type I error levels shall be specified by the Agency in accordance with the requirements of 35 Ill. Adm. Code 724.197(i).
- 5) Nonparametric statistical tests shall include: Mann-Whitney U-test, Kruskal-Wallis test, a nonparametric analysis of variance (ANOVA) for multiple comparisons or the Wilcoxon Rank Sum test.
- 6) Any other statistical test based on the distribution of the sampling data may be used, if it is demonstrated to meet the requirements of 35 Ill. Adm. Code 724.197(i).

Section 817.417 Waste Placement

- a) Phasing of operations:
 - 1) Waste disposal operations shall move from the lowest portions of the unit to the highest portions. Except as provided in subsection (a)(2) of this Section, the placement of waste shall begin in the lowest part of the active face of the unit, located in the part of the facility most downgradient with respect to groundwater flow.

- 2) The operator may dispose of wastes in areas other than those specified in subsection (a)(1) above only under any of the following conditions:
 - A) Climatic conditions, such as wind and precipitation, are such that the placement of waste in the bottom of the unit would cause water pollution, litter, damage to any part of the liner or damage to equipment;
 - B) The topography of the land surrounding the unit makes the procedure of subsection (a)(1) environmentally unsound, for example, because steep slopes surround the unit;
 - C) When groundwater monitoring wells, constructed in accordance with the requirements of 35 Ill. Adm. Code 811.319, are placed 50 feet or less down gradient from the filled portions of the unit; or
 - D) Equipment required for placement is temporarily unavailable.
- b) Initial waste placement:
 - 1) Construction, compaction and earth moving equipment shall be prohibited from operating directly on the leachate collection piping system until a minimum of five feet of waste has been placed over system.
 - 2) Construction, compaction and earth moving equipment shall be prohibited from operating directly on the leachate drainage blanket. Waste disposal operations shall begin at the edge of the drainage layer by carefully pushing waste out over the drainage layer.
 - 3) An initial layer of waste, a minimum of five feet thick, shall be placed over the entire liner as soon as is practicable after construction, but prior to the onset of weather conditions that may cause the compacted earth liner to freeze.
 - 4) Waste shall not be placed over areas that are subject to freezing conditions until the liner has been inspected, tested, and reconstructed (if necessary) to meet the requirement of 35 Ill. Adm. Code 811.306.

Section 817.418 Final Slope and Stabilization

- a) All final slopes shall be designed and constructed to a grade capable of supporting vegetation and which minimizes erosion.
- b) All slopes shall be designed to drain runoff away from the cover and which prevents ponding. No standing water shall be allowed anywhere in or on the unit.
- c) Vegetation:

- 1) Vegetation shall be promoted on all reconstructed surfaces to minimize wind and water erosion of the final protective cover;
 - 2) Vegetation shall be compatible with the climatic conditions;
 - 3) Vegetation shall require little maintenance;
 - 4) Vegetation shall consist of a diverse mix of native and introduced species that is consistent with the postclosure land use;
 - 5) Vegetation shall be tolerant of the landfill gas expected to be generated;
 - 6) The root depth of the vegetation shall not exceed the depth of the final protective cover system; and
 - 7) Temporary erosion control measures, including but not limited to mulch straw, netting and chemical soil stabilizers, shall be undertaken while vegetation is being established.
- d) Structures constructed over the unit:
- 1) Structures constructed over the unit must be compatible with the land use;
 - 2) Such structures must in no way interfere with the operation of a cover system, leachate collection system or any monitoring system.

Section 817.419 Load Checking

- a) The operator shall not accept wastes for disposal at an offsite low risk waste landfill unless it is accompanied by documentation that such wastes are low risk wastes based on testing of the leachate from such wastes performed in accordance with the requirements of Section 817.103.
- b) The operator shall institute and conduct a random load checking program at each low risk waste facility in accordance with the requirements of 35 Ill. Adm. Code 811.323, except that this program shall also be designed to:
 - 1) detect and discourage attempts to dispose non-low risk wastes at the landfill;
 - 2) require the facility's inspector to examine at least one random load of solid waste delivered to the landfill on a random day each week; and
 - 3) require the operator to test one randomly selected waste sample in accordance with Section 817.103(a) and (b) to determine if the waste is low risk.
- c) The operator shall include the results of the load checking in the Annual Report submitted to the Agency in accordance with 35 Ill. Adm. Code 815.Subpart C for nonpermitted facilities.

SUBPART E: CONSTRUCTION QUALITY ASSURANCE PROGRAMS

Section 817.501 Scope and Applicability

All structures necessary to comply with the requirements of this Part shall be constructed according to a construction quality assurance program that, at a minimum, meets the requirements of 35 Ill. Adm. Code 811.Subpart E.

Section 817.APPENDIX A Organic Chemical Constituents List

1. Acenaphthene
2. 1,2,4-Trichlorobenzene
3. 2,4,6-Trichlorophenol
4. 2-Chlorophenol
5. 2,4-Dichlorophenol
6. 2,4-Dimethylphenol
7. Fluoranthene
8. Trichlorofluoromethane
9. Naphthalene
10. Nitrobenzene
11. 4-Nitrophenol
12. 2,4-Dinitrophenol
13. 4,6-Dinitro-o-cresol
14. n-Nitrosodiphenylamine
15. Pentachlorophenol
16. Phenol
17. bis-(2-ethylhexyl) phthalate
18. Butyl benzyl phthalate
19. Di-n-butyl phthalate
20. Di-n-octyl phthalate
21. Dimethyl phthalate
22. Benzo (a) anthracene
23. Chrysene
24. Acenaphthene
25. Anthracene
26. Fluorene
27. Phenanthrene
28. Pyrene
29. Formaldehyde
30. Formic acid
31. Methanol
32. Methyl ethyl ketone
33. Methyl isobutyl ketone
34. Carbon disulfide
35. Isobutanol

36. Pyridine
37. Chloroform
38. Methylene chloride
39. Methyl chloride
40. Paraldehyde
41. Chloroacetaldehyde
42. Phorate
43. Phosphorodithioic acid
44. Phosphorodithioic acid esters
45. Toluene diisocyanate
46. Urethane
47. Maleic anhydride
48. Benzo(a)pyrene
49. Cresol
50. Acetaldehyde
51. Phthalic acid esters
52. Acetone
53. Benzoic acid
54. 2-Methylnaphthalene
55. sec-Butylbenzene
56. Diethylbenzenes
57. Dimethylnaphthalenes
58. p-Ethyltoluene
59. n-Hexane
60. Isopropylbenzene
61. 1- & 2-Methylnaphthalene
62. 1,2,4-Trimethylbenzene
63. 1,3,5-Trimethylbenzene
64. t-Butylbenzene