Illinois
Environmental
Protection Agency

Bureau of Land
2520 West Iles Avenue
Box 19276
Springfield, IL 62794-9276

APPENDIX A TO LPC-PA2

INSTRUCTIONS FOR PREPARING AN APPLICATION FOR AN INERT WASTE LANDFILL

This Appendix sets out the type of information needed in addition to the general information requested in the LPC-PA2 Instructions. You should review Appendices A-G and Section VI of LPC-PA2 form to determine which are applicable to your facility. This Appendix explains the requirements in 35 IAC 811 Subpart B for inert waste landfills.

I. Inert Waste Determination

A. Waste Description

1. The applicant shall demonstrate that his waste will not decompose biologically, burn, serve as a food for vectors, form a gas, cause odor or form a contaminated leachate.

2. The applicant shall provide a written description of the waste characteristics that demonstrates that the waste is inert.

B. Leachate Analysis

Laboratory analysis must be provided demonstrating that the waste does not produce a contaminated leachate. That is, none of the constituents of the leachate may exceed the public and food processing water standards described in 35 IAC, Subtitle C, 302.301, 302.304 and 302.305 and the Class I groundwater standards of 35 IAC, Subtitle G, 620. In making this demonstration, either leachate produced in the field or the lab may be used (see 35 IAC 811.202(b) and (c)). The laboratory procedure ASTM D3987 or equivalent may be used if it is believed to represent actual conditions.

II. Design Considerations

A. Design Period

Provide the design period of all waste disposal units pursuant to 35 IAC 811.203. The design period is defined as the facility operating life plus five (5) years but not to be less than fifteen years.

B. Final Cover System

For the design of the final cover system, pursuant to 35 IAC 811.204, see "Closure Plan and Postclosure Care Plan" for Inert Waste Landfills, Item III(A)(9)(c).

C. Final Slope and Stabilization

For the design of the final slopes and a demonstration that the waste disposal unit shall be designed and constructed in accordance with 35 IAC 811.205, see "Closure Plan and Postclosure Care Plan" for Inert Waste Landfills, Item III(A)(9)(a) and (b).

D. Leachate Sampling

The following information must be included in a leachate sampling plan in conformance with 35 IAC 811.206:

1. Monitoring System Design

   a. A scale map(s) (1" = 200' or greater) showing the location of the monitoring system intended to collect samples of leachate;

   b. A description of the methods to collect the samples of leachate;

   c. The design of all collection devices and of all monitoring points;

   d. A demonstration that the monitoring system, collection methods and devices are capable of collecting the most representative and undiluted samples of leachate generated by the facility.

2. Leachate Monitoring Reports

   a. Describe the procedure to collect and analyze leachate samples once every six months, including:

      i. A laboratory test procedure in accordance with 35 IAC 811.202 and the Inert Waste determination;

      ii. A statistical procedure for evaluating leachate data pursuant to 35 IAC 811.320(e);

      iii. A test method to determine if the leachate is a contaminated leachate pursuant to 35 IAC 811.202;

      iv. A description of the notification procedure pursuant to 35 IAC 811.206(d) if the leachate is found to be contaminated;

      v. A plan describing, if the facility is found to be generating a contaminated leachate, how the facility shall comply with the design requirements and performance standards for Putrescible and Chemical Waste Landfills as set forth in 35 Ill. Admin Code, Part 811, Subpart C, including closure and remedial action.

   b. Describe the procedure to collect and analyze leachate samples once every two years and test for the presence of organic chemicals pursuant to 35 IAC 811.319(a)(3), including:

      i. A laboratory test procedure in accordance with 35 IAC 811.202 and the Inert Waste Determination;

      ii. A statistical procedure for evaluating leachate data pursuant to 35 IAC 811.320(e);

      iii. A test method to determine if the leachate contains organic chemicals in accordance with, 35 IAC 811.319(a)(3);

      iv. A description of the notification procedure pursuant to 35 IAC 811.206(c) if the leachate is found to contain organic chemicals.

c. A schedule for submitting the chemical analysis tests requested in Part II.D.2 above to the Agency in accordance with 35 IAC 813.502.

E. Load Checking

The following information must be included in a load check plan in conformance with 35 IAC 811.207:

1. A procedure by which all waste loads entering the facility are accompanied by documentation and certification by a representative of the generator that the waste is an inert waste and has been tested in accordance with the requirements of 35 IAC 811.202.

2. A description of a random load checking program which complies with the requirements of 35 IAC 811.323 and also contains a procedure to:

   a. detect and discourage attempts to dispose non-inert wastes at the landfill;

   b. requires 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

   c. requires the operator to test one randomly selected waste sample in accordance with 35 IAC 811.202(a) and (b) to determine if the waste is inert.

F. Construction Quality Assurance

The application of final cover and construction of ponds, ditches, lagoons and berms are subject the requirements of Subpart E: Construction Quality Assurance Programs. Refer to Appendix E of the instructions to determine the information necessary to comply with these requirements for these type of structures. Attach your construction document to this report.

III. Closure Plan and Post Closure Care Plans for Inert Waste Landfills

A. The closure plan must at a minimum include the following:

1. A map showing the configuration of the facility after closure of all units, with the following:

   a. The contours of the proposed final topography (after placement of the final cover) of all disturbed areas and showing how the final contours blend with the surrounding topography;

   b. A scale no smaller than 1" = 200 and a contour interval of two feet; and

   c. The location of all facility-related structures to remain as permanent features after closure;

2. Identification of the "assumed closure date" (i.e. the date during the next permit term on which the costs of premature final closure of the facility will be greatest);

3. Steps necessary for the premature final closure of the site at the assumed closure date;

4. Steps necessary for the final closure of the site at the end of its intended operating life;

5. Steps necessary to prevent damage to the environment during temporary suspension of waste acceptance. (This is necessary only if the operator wants a permit which would allow temporary suspension of waste acceptance at the site without initiating final closure);

6. A description of the steps necessary to decontaminate equipment during closure;

7. An estimate of the expected year of closure;

8. Schedules for the premature and final closure, which shall include, at a minimum:

   a. Total time required to close the site; and

   b. Time required for closure activities which will allow tracking of the progress of closure; and

9. A description of methods for compliance with all closure requirements of 35 IAC 811 applicable to the facility. This will necessitate the following information:

   a. A demonstration (i.e., calculations) that the final slope will have a Static Safety Factor of at least 1.5 and a Seismic Safety Factor of at least 1.3 throughout the design period.

   b. A demonstration that the proposed vegetation and other surface stabilization procedures meet the following standards:

      i. Vegetation shall be compatible with (i.e. grow and survive under) the local climatic conditions;

      ii. Vegetation shall require little maintenance;

      iii. Vegetation shall consist of a diverse mix of native and introduced species consistent with the post-closure land use; and

      iv. 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 following information must be provided regarding final cover:

      i. Specification of the thickness of the final cover (minimum: 3 feet);

      ii. A description of the soil including a demonstration that it can support the proposed vegetation;

      iii. Identification of the source of final cover and a demonstration that the proposed source contains an adequate volume of suitable soil; and

      iv. A sampling program based on statistical sampling techniques which establishes criteria for acceptance or rejection of materials, and the construction operations to be used in the construction quality assurance program.

   d. Calculations demonstrating that all drainage control structures have been designed to accommodate runoff from a 100 year, 24-hour precipitation event without scouring or erosion.

B. The "Post Closure Care Plan" must, at a minimum, include the following:

1. Descriptions of the inspection and monitoring schedules, the inspections themselves, and the quantitative criteria for performing maintenance for the final cover.

2. Criteria for reducing the frequency of inspection of the final cover.

3. Criteria for ceasing to inspect the final cover.

   NOTE: If any of the postclosure care information is contained in other reports submitted with this Application it may be included in the postclosure care plan by reference.

C. The following information regarding cost estimates must be provided:

1. Closure Cost

   a. The itemized cost of applying final cover to the entire area that will be filled during the period starting at the beginning of the permit term and ending on the assumed closure date.

   b. The cost of construction an adequate drainage control system.

   c. The cost of equipment decontamination.

   d. The cost of certification of closure.

2. Post Closure Care Cost

   a. The itemized cost of carrying out all of the activities described in the postclosure care plan.

   b. Calculations determining the present value of providing postclosure care based on the following assumptions:

      i. Landfill operations will cease on the assumed closure date.

      ii. Postclosure care shall continue throughout the remainder of the design period with no reduction in the frequency or stringency of any postclosure care activity, except as allowed by 35 IAC 811.111(c)(1)(a).

      iii. The discount rate shall be 4 percent per annum and that there shall be no inflation.

3. Sum of the closure cost plus the present value of the post-closure cost.

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APPENDIX B TO LPC-PA2

INSTRUCTIONS FOR DEMONSTRATING LOCATION STANDARDS FOR CHEMICAL AND PUTRESCIBLE WASTE LANDFILL

This Appendix sets out the type of information needed in addition to the general information requested in the LPC-PA2 Instructions. You should review Appendices A-G and Section VI of LPC-PA-2 form to determine which are applicable to your facility. This Appendix explains the requirements in 35 IAC 811.302.

I. Facility Location Map*

On a map (or maps) with a scale no smaller than 1 inch = 1,000 feet show all of the features required by 35 Ill. Adm. Code 812.303(a), which exist within 1 mile of the facility.

*Note: The Facility Location Map, required by 35 Ill. Adm. Code 812.303(a), is different than the Site Location Map, required by 35 Ill. Adm. Code 812.107. Thus, the Facility Location features should be shown on a separate map (or set of maps).

II. Documentation on Facility Location

Documentation including narratives must be provided which in conjunction with the Facility Location Map demonstrate that the following location standards described in 35 Ill. Adm. Code 811.303(b) will not be violated.

A. That no part of the unit is located within 1,000 ft. of a public well as established pursuant to Section 14.2 or 14.3 of the Act. (You may contact the Division of Public Water Supplies for well location information at 217/785-8653.)

B. That no part of the unit is located within the recharge zone of a sole-source aquifer.

C. That either no part of the unit is located within 1,200 feet of a sole-source aquifer described by 35 IAC 811.302(b) or that a confining stratum meeting the minimum requirements of 35 IAC 811.301(b) is present beneath the unit.

D. How any part of the facility located within 500 feet of the right of way of a township or county road or state or interstate highway has its operations screened from view by a barrier of natural objects, fences, barricades, or plants no less than 8 feet in height.

E. That no part of a unit is located closer than 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 closer distance. Permission statements must include:

1. That name of the owner of building giving permission

2. The name of the operator requesting permission

3. The date the owner occupies the building

4. The date the operator first applied for permit to develop the unit or facility containing the unit

5. The new minimum distance that the approval is being granted for

6. The typewritten name and signature of the person granting permission

F. That the facility is not located closer than 5,000 feet of any runway used by piston type aircraft or within 10,000 feet of any runway used by turbojet aircraft unless the Federal Aviation Administration provides the operator with written permission, including technical justification, for a closer distance

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APPENDIX C TO LPC-PA2

INSTRUCTIONS FOR THE GROUNDWATER PROTECTION EVALUATION FOR PUTRESCIBLE AND CHEMICAL WASTE LANDFILLS
(rev. 10/21/92)

This Appendix sets out the type of information needed in addition to the general information requested in the LPC-PA2 Instructions. You should review Appendices A-G and Section VI of LPC-PA2 form to determine which are applicable to your facility. This Appendix explains the information required for the GROUNDWATER PROTECTION EVALUATION which shall describe the hydrogeologic site investigation, groundwater impact assessment, groundwater monitoring systems, and groundwater quality standards of the site.

I. HYDROGEOLOGIC SITE INVESTIGATIONS

The information compiled during the hydrogeologic investigation provides the foundation of data on which the monitoring system, groundwater impact assessment and groundwater quality standards are developed. Therefore, before starting the investigation, a field implementation plan should be developed which includes a schedule of implementation, a system for the collection and management of data, quality control and contingency planning for acceptable alternatives to preferred methods, practices or equipment. Reports to the Agency upon completion of each phase of the investigation are not necessary.

The study shall include the entire area occupied by the facility and any adjacent areas, if necessary for the purposes of the hydrogeologic investigation. [Section 811.315(b)(2)]

All borings should be continuously sampled. However, where a sufficient number of continuously sampled borings are drilled to document the continuity of a unit or formation, additional borings which are not continuously sampled are acceptable pursuant to 811.315(b)(3).

A. Phase One

The first phase consists of a literature survey and establishment of the regional geologic and hydrogeologic characteristics. A minimum of one continuously sampled boring near the geographic center of the site is required to confirm the literature evaluation. The borings must extend at least 50 feet (15.2 meters) below the bottom of the uppermost aquifer or through the confining layer below the bottom of the uppermost aquifer, or to bedrock, if the bedrock is below the uppermost aquifer, whichever elevation is higher.

The Agency realizes that in parts of the State, this may require boring 300 to 500 feet below ground surface to fulfill the minimum requirement of Phase I when the uppermost aquifer is a considerable thickness. Section 811.315(f) allows the Agency to consider alternate ways of collecting the hydrogeologic site information provided that the information is collected in a manner equal or superior to the requirements of this Section. Considering the purpose of the hydrogeologic investigation (i.e., to provide information to perform a groundwater impact assessment and establish a groundwater monitoring system), boring to excessive depths on site would yield data of limited use at extraordinary expense. For these extreme field conditions, the Agency recommends the following:

> If the bedrock is part of or below the uppermost aquifer, borings through the entire thickness of the bedrock will not be required if supporting documentation such as that required in 811.315(c)(2)(A) can be correlated with the site data. However the borings must characterize the permeable portion of the bedrock, (usually described as being weathered, vuggy, desiccated or fractured, etc.) and include coring a minimum of 15 to 20 feet of the bedrock. Similar logic can be applied to characterizing the uppermost aquifer and confining layer when the former is a considerable thickness of unconsolidated material. The borings must extend at least 100’ into the uppermost aquifer and correlate with the supporting documentation in 811.315(c)(2)(A).

A complete search of the published documents and a request for preliminary site information from the Illinois State Geologic Survey and/or State Water Survey at a minimum is also required. This should be followed by a sufficient number of preliminary borings to evaluate the proposed site and define the study area.

[ADD ILLUSTRATIONS not yet available]

B. Phase Two

The second phase consists of exploratory borings drilled at the site to establish the stratigraphy and general groundwater characteristics. A complex or unpredictable site may require a large number of borings to confirm the stratigraphic information. These borings and soil sampling techniques must comply with the procedures from the American Society for Testing and Materials (ASTM) standards D1586 (split-barrel), D1587 (thin walled tube), and D2113 (diamond core drilling) or an equivalent procedure. The information required in the investigation includes the structural, chemical, physical properties and classification of the subsurface materials in accordance with the United Soil Classification System (USCS).

Phase two requirements for the site-specific geologic and hydrogeologic information include hydraulic conductivities, extent of aquifers and the direction and velocities of groundwater movement as determined by field methods. An investigation of the subsurface conditions over the entire site should be conducted to determine the structural and lithologic characteristics of the site. Use of a site grid pattern to initially determine the boring locations is strongly recommended. The number of borings should be adequate to represent the variability in subsurface characteristics at the proposed site. No less than 20 borings per site will be acceptable when in a simple geologic setting. Additional borings will be required in areas of complex or transitional stratigraphy. Not all of the borings are required to penetrate the entire depth of the uppermost aquifer, but a sufficient number of the borings should be conducted to demonstrate the continuity or discontinuity of the uppermost aquifer and confining layer beneath the site. Wells should be located near each corner of the study area. Additional wells may be located at intermediate points within the study area to determine the hydrogeologic characteristics of the study area. Section 811.315(b)(2) requires hydrogeologic investigation of areas adjacent to but outside of the area occupied by the facility, if necessary.

All borings must be properly plugged upon abandonment of the borehole and the procedures used should be carefully documented. In addition to the requirements of Section 811.316, all borings (i.e. drill holes) and wells shall be plugged and abandoned in accordance with current Agency procedures and applicable sections of the Department of Public Health (DPH) requirements given at 35 IAC Part 920 Illinois Water Well construction code (1/92). See Part IV of these instructions for well/piezometer construction and abandonment requirements.

C. Phase Three

The third phase includes gathering information to confirm the initial information and to validate the characterization of all known hydrogeologic units by actual field tests. The information required in this part includes identification of zones with high hydraulic conductivity, potential pathways for contaminant migration, final identification of aquifers and their confining layers, identification of any variations in groundwater quality and flow, and identification of any unusual features which may affect hydrogeologic systems. Piezometers should be installed in each hydrogeologic unit to allow testing by the use of rising or falling head techniques and pump tests. Monitoring wells should be installed in each hydrogeologic unit to begin sampling to establish the applicable groundwater quality standards for the site.

A narrative description of the site geology should be prepared which includes a detailed description of each geologic unit found within the study area, including physical and geochemical properties and a description of all water bearing strata within the study area including potentiometric maps, groundwater flow velocities, gradients, and directions.

The application should include geologic cross sections of the permit area illustrating all water bearing strata, water elevations, uppermost aquifer, confining units and all discernable geologic formations.

Documentation of all activities and supporting references should be contained in the permit application. Data should be presented in summary form such as tables and graphs with the row data organized and presented in appendices.

The hydrogeologic site investigation within the application should include, but is not limited to:

- Climatic Conditions
- Regional Geology
- Regional Groundwater
- Structural Characteristics
- Chemical and Physical Properties of Strata
- Soil Characteristics
- Hydraulic Conductivities

- Vertical Extent of Aquifers
- Direction and Rate of Groundwater Flow
- Characterization of Potential Pathways
- Hydrodynamic Dispersion
- Correlation of Stratigraphic Units
- Petrographic Features
- Identification of Zones with
- High Hydraulic Conductivity
- Concentrations of Chemical Constituents In the Groundwater Below the Unit
- Characterization of Variations in the Groundwater Quality and Flow
- Identification of Unusual Features

D. General Comments

A general three-phase investigation is suggested but, in order to allow for flexibility in conducting the studies, a performance standard was developed as Section 811.315(f) allowing the applicant to select an alternative approach. However, the information must be collected in a systematic manner that is equal to or superior to the investigation procedures discussed in this section.

II. GROUNDWATER QUALITY

The owner or operator is required to determine groundwater quality spatially throughout the “uppermost aquifer” within the study area; characterize the seasonal and temporal, naturally and artificially induced variations in groundwater quality; include in the application an evaluation of the background concentrations; and identify each constituent monitored. Proper identification of the “Uppermost Aquifer” is therefore essential before proceeding with the installation of a groundwater quality monitoring system.

A. Uppermost Aquifer

“Aquifers” as defined in Part 810 means saturated (with groundwater) soils and geologic materials which are sufficiently permeable to readily yield economically useful quantities of water to wells, springs, or streams under ordinary hydraulic gradients and whose boundaries can be identified and mapped from hydrogeologic data. [Section 3(b) of the Illinois Groundwater Protection Act (Ill. Rev. Stat. 1989, ch. 111 ½, par. 7453).]

The “Uppermost Aquifer” means the first geologic formation above or below the bottom elevation of a constructed liner, or waste where no liner is present, which is an aquifer, and includes any lower aquifer that is hydraulically connected with this aquifer within the facility’s permit area.

Groundwater within the uppermost aquifer must be classified as Class I, II, III or IV by the owner or operator in accordance with the criteria of 35 IAC Part 620.

The identification of the hydrogeologic conditions within the study area are essential to the definition of uppermost aquifer. Distinctions between the hydraulic properties of the units shall be supported by insitu testing as required during Phases 2 and 3 of the hydrogeologic investigation.

B. Establishment of the Applicable Groundwater Quality Standards

The applicable groundwater quality standards for the facility are the background concentrations determined for each parameter pursuant to 811.320(d).

The background concentrations shall be based on the chemical analysis of groundwater samples taken from an appropriate number of wells within the study area at least quarterly for one year, resulting in a minimum of 4 samples per parameter per well. The main objective of gathering background is to determine existing groundwater quality throughout the uppermost aquifer upgradient and below the unit. It is not required that all test wells be utilized to achieve this goal, however a multi-level monitoring system is usually necessary. Variations in background groundwater quality shall be determined within the three dimensional limits of the study area. The background groundwater parameter list is determined by the following criteria and are given in Attachment 1 to this Appendix:

1. The parameter is a constituent or is expected to be a constituent of the leachate and the Illinois Pollution Control Board has established a standard for the constituent [see Sections 811.315(e)(1)(G)(i), 811.319(a)(2)(A) and 811.319(a)(3)(A)(ii)]; or

2. The parameter is included on the list of 51 organic chemicals in drinking water described at 40 CFR 141.40; or

3. Any other constituent which is expected to be in the leachate, that may cause or contribute to groundwater contamination [see Sections 811.315(e)(1)(G)(ii) and 811.319(a)(2)(A)(ii)].

Any parameter not specifically listed in 2 may be excluded if a justification of why it is not expected to be present in the leachate is provided. The justification should include the information from leachate testing as described in part III.A.6. of these instructions.

Statistical tests and procedures shall be employed to establish the background concentrations. Specific requirements for choosing the statistical tests are included in Section 811.320(e). The data needs for the statistical methods considered must be determined and incorporated into the sampling schedule before sampling begins. For statistical purposes, the recommended minimum number of pieces of data for naturally occurring constituents is twenty (20) values. An equal number of samples must be taken from each well to ensure equal weighting. The minimum number of pieces of data for non-naturally occurring constituents is four (4) values assuming they are not detected during the background monitoring period. However for any non-naturally occurring constituent detected, additional analyses is necessary to establish the background concentration for that constituent.

The operator must submit a list of the background concentrations and the applicable groundwater standards for the site with the permit application and provide updates to the Agency within 10 days of any change to the list thereafter.

If the background concentration for a groundwater constituent exceeds a "Board established standard" as defined in 811.320(a)(3)(B) an adjusted groundwater quality standard is not required. The background concentration is the applicable standard. However, if the owner or operator determines an adjusted groundwater quality standard is appropriate for a constituent, for example in lieu of the established background, the adjusted standard shall be included in the permit application with documentation of the Board decision.

C. Groundwater Monitoring Wells for the Establishment of Background

Monitoring wells should only be installed with proper design, materials, quality control, and sufficient understanding of the geologic and hydrogeologic conditions present on site. See Part IV of these instructions for well construction and abandonment requirements.

Specific requirements include piezometers and groundwater monitoring wells installed in all strata and extending down to the bottom of the uppermost aquifer. Wells should be located near each corner of the study area and near the site boundary in the area of upgradient groundwater flow. The number of sampling points required for establishing background is dependent on the geologic and geochemical complexity of the study area.

D. Sample Collection

Monitoring groundwater quality is a difficult task because of the complex interaction of many factors including site hydrogeology, well construction, sampling materials and methods. Monitoring programs must be designed in such a manner that sources of error or bias are minimized or controlled. A monitoring program must include a carefully designed plan, appropriate sampling protocol, applicable chemical parameters and data evaluation techniques.

The sampling protocol includes methods of development and purging and determination of optimum purge volume. Because the response of a well is controlled by transmissivity of the geologic materials near the well and by the design of the well, each well must be analyzed individually to determine the optimum number of well volumes that must be removed to obtain representative samples prior to sampling. Low-yield wells must be evacuated to dryness once, then as the well recovers measure sample pH, temperature, and specific conductance, followed by collection of samples in the order of most volatile first, followed by the remaining organics, metals, etc.

Samples shall be analyzed for both the dissolved and total concentrations of inorganic parameters during the initial background sampling period. General practice for dissolved concentrations is field filtering prior to preservation through a 0.45 micron membrane filter. The difference between total and dissolved concentrations may vary due to well construction, sampling procedures or natural physical or geochemical processes occurring in the aquifer. If the difference between total and dissolved metals is greater than one magnitude, then both analyses may be required individually for routine monitoring after the establishment of background concentrations. Groundwater quality standards are generally based on total concentrations. Therefore when comparing to a numerical standard, analytical results from unfiltered (total) samples should be used.

III. GROUNDWATER IMPACT ASSESSMENT

The purpose of the groundwater impact assessment is to provide an integrated evaluation of the acceptability of the physical setting and design of the landfill units through contaminant transport modeling. The impacts of leachate seepage from the unit must be addressed (i.e., modeled) in a systematic fashion using the techniques described in 35 IAC 811.317 and 812.316.

A written evaluation and analysis of the results of the groundwater impact assessment must be submitted with the permit application. Every application requiring a groundwater impact assessment should include a report addressing the following issues:

A. Groundwater Impact Assessment

This portion of the instructions provides a systematic method to assess the impacts of leachate seepage from the unit, as referenced under 35 IAC 811.317. This is essentially an outline of the modeling process presented as an organized sequence of events, along with a brief description of what the Agency is looking for under each outline topic. Applications that follow this format will facilitate Agency review of the application.

1. Conceptual Model

The conceptual model used to simulate contaminant transport at the facility should be described in the groundwater impact assessment portion of the Groundwater Protection Evaluation report. This should include both a diagrammatic representation of the hydrogeologic setting being modeled, and a narrative description of the concepts or processes of contaminant transport used to assess the impacts of leakage from the unit accounted for in the model.

The diagrammatic representation of the facility should present the hydrogeologic setting in a simplified form, as it will be viewed by the model, versus the more complex features of the site that may have been discovered during the hydrogeologic site investigations but which are not accounted for in the model.

The narrative description of the conceptual model should elaborate on the simplifications inherent in modeling the site (e.g., how the hydrogeologic setting can be represented in this simplified manner and still adequately assess the impacts of leakage from the unit).

The narrative description should also discuss and describe the transport processes that are considered as leachate constituents move through each of the hydrogeologic units considered in the model.

This section of the report should allow the Agency reviewer an understanding of exactly which transport processes and site conditions were considered in the model and how these were modeled. It should be readily apparent to the Agency reviewer that the facility is adequately represented in the model and that releases from unit(s) will be adequately simulated.

2. Translation to Mathematical Model

The conceptual model should be translated into a mathematical model, expressed in the same terms as those presented in the transport model user's guide and/or associated model documentation. This should include equations for each transport process under consideration. These equations should then be coupled into the full mathematical model that will be used to simulate contaminant transport at the facility.

From this point, the Agency reviewer should be able to use the documentation provided with the model to assess the theoretical basis of those equations (see instructions regarding model documentation below). Any modifications or deviations from the generic expression(s) of these equations, as presented in the model documentation, that may be needed for site-specific application of the model should be fully explained and theoretically justified.

3. Model Input Values

The report should provide a narrative description of how model input values (e.g., dispersivities, leachate concentrations, hydraulic conductivities, etc.) were obtained, their applicability to conditions at the proposed site, and an assessment of any uncertainty in the selection of those values. If confidence in the selection of a parameter value is low, particularly for those parameters to which the model is sensitive, conservative values must be used for model input.

4. Seepage from the Unit

The procedures for performing the groundwater impact assessment require the operator to estimate the amount of seepage from the unit using the minimum design standards for slope configuration, cover, liner, leachate drainage and leachate collection, and assuming that the actual design standards planned for the unit apply. For example, if the actual design of the landfill includes leachate withdrawal during the active life and during the entire 100 year period following closure, this can be accounted for in estimates of seepage from the unit.

[Note: Additional financial assurance for leachate collection beyond the minimum design period would be required under the example given above.]

5. Site-Specific Values

Site-specific data should be used for model input whenever possible. Hydrogeologic site investigations should provide most of the input data required for contaminant transport modeling. Sampling strategies should be designed to obtain estimates of both the magnitude and variability of site hydrogeologic characteristics and landfill data.

If it is not practical to obtain site-specific data during the hydrogeologic site investigations, the Agency will consider use of other data for model input. The validity of any model input parameter values which are not based on site-specific data must be well documented. Sensitivity analyses must be performed on these parameters. In this case, site-specific data will not be required, provided that the applicant selects reasonably conservative values for model input (i.e., conservative in the sense that the values used generate the greatest predicted contaminant concentrations at or beyond the limit of the zone of attenuation). The conservative nature of the selected value must be demonstrated by the sensitivity analysis. However, if the applicant does not wish to use a reasonably conservative value in the baseline model, then the selected value for that parameter must be based on site-specific data.

6. Leachate Constituents and Concentrations

The concentrations of chemical constituents in leachate to be used as inputs in modeling and in performing the groundwater impact assessment need to reflect the relatively conservative estimates of concentrations expected at the specific facility during the design period. These may be developed in any of the following three ways:

a. Testing leachate from an existing landfill;

i. The samples should be from the subject landfill or from a landfill which would be analogus with regards to expected leachate generation.

ii. The landfill must be sampled to accurately reflect the expected leachate quality, accounting for both spatial and temporal variability (i.e., location in the landfill, the types of waste placed there, and the age of the leachate). Conservative leachate quality estimates for model input values may be calculated using the average of the leachate sampling results for a given constituent.

However the method of calculation must account for the full range of concentrations detected for each constituent. The same statistical approach used for calculating the background groundwater concentrations should be used to calculate the leachate input values. For instance the mean plus two standard deviations or an upper confidence limit is acceptable if justified.

iii. Testing of actual leachate or synthetic leachate in (b) below must include at a minimum all of those parameters listed in Attachment 1 as expected to be in leachate. Again, the concentrations to be used as inputs shall be calculated with the goal of evaluating the greatest concentrations expected during the life of the landfill. Landfills which do not receive municipal waste must consider actual types of waste received and the expected resultant leachate.

b. Testing a “Synthetic Leachate” (i.e., laboratory derived extract of a representative sample of the waste expected to be disposed in the proposed unit). Once again the overall estimate should consider the greatest expected concentration of each parameter during the design period; or

c. Using the values shown in Attachment 1 (pages A-1.1 through A-1.3) of Appendix C (Note: in instances where the proposed unit is not analogus to the landfills from which the values were derived (municipal waste landfills), the Agency may require adjustments to the concentrations and the parameter list.

Note: If actual sampling data show less strength for any parameter shown in Attachment 1 an explanation of why it is expected to be less at the facility being permitted should be included.

7. Surrogate Modeling

Every chemical constituent expected to be present in leachate must be modeled in the groundwater impact assessment. However, surrogate models representing groups of leachate constituents may be used in lieu of modeling each leachate constituent individually. The following procedure should be used if the applicant wishes to conduct surrogate modeling for a given group of leachate constituents:

a. Make a list of the group of leachate constituents to be represented in the surrogate model.

b. Tabulate all of the chemical data required for model input for each of those leachate constituents (e.g., leachate concentrations, partitioning coefficients, etc). This table should also include the groundwater standard for each of the leachate constituents to be represented by the surrogate model.

c. Select the most conservative value for each input parameter, from the entire table of values, for use in the surrogate model. The conservative nature of that value must be supported by sensitivity analysis.

d. Using this data, run the surrogate model just as if it were an individual leachate constituent and compare the results to the lowest groundwater standard in the table.

e. The groundwater impact assessment is considered acceptable for those leachate constituents represented by the surrogate model only if the lowest groundwater standard is not exceeded at or beyond the zone of attenuation at any time during the modeling period.

While the surrogate modeling approach can optimize the use of resources, the conservative nature of surrogate modeling can also make it more difficult for the applicant to demonstrate an acceptable groundwater impact assessment. Any combination of surrogate groups and/or individual leachate constituents may be used for groundwater impact assessments, depending on the needs of the applicant, as long as all leachate constituents are modeled.

8. Dispersivity

Model input parameters related to the processes of dispersion are particularly problematic in conducting groundwater impact assessments. Unfortunately, this situation is far from simple. Site-specific dispersivity tests are not routinely conducted during the hydrogeologic site investigations. Published literature values for longitudinal dispersivities show a range of over six orders of magnitude, from less than 1 mm to greater than 100 meters, with the higher dispersivity values accounting for the apparent empirical relationship between dispersion and flow distance (i.e., scaling). Furthermore, the observed scaling relationship also exhibits a high degree of variability, from about 1% to greater than 100% of the flow distance (e.g., see Neuman, 1990: Universal scaling of hydraulic conductivities and dispersivities in geologic media. Water Resources Research 26(8):1749-1758). To even further complicate this issue, different models show differing sensitivities to dispersivity parameters, in both degree and direction, and these sensitivities can change within a given model depending on how the model is applied.

Therefore, longitudinal dispersivity values used for model input may be based on site-specific dispersivity tests or on published literature values. Transverse dispersivities may be estimated as 20% of the longitudinal dispersivity value. Obviously, no single “rule-of-thumb” for selection of dispersivity values from the literature is universally applicable for all models, and, without site-specific data, the Agency has no idea what the appropriate values for model input might be. Therefore, if literature values are used to estimate dispersivity, reasonably conservative values must be selected for model input. This must be based on sensitivity analysis conducted by the applicant. The more sensitive the model, the greater the degree of conservatism required for model input.

Some models require use of larger dispersivities (scaled dispersivities) in order to accurately simulate contaminant transport. This appears to be the case for the majority of the models used for groundwater impact assessments submitted to the Agency so far. For these types of models, additional guidance on modeling dispersivity is given below:

If the model is not sensitive to dispersivity, a reasonably conservative value for longitudinal dispersivity could be estimated using 5% of the flow distance as the scaling factor. For example, if increasing longitudinal dispersivity over a flow distance of 200 feet decreases the maximum predicted concentration at or beyond the limit of the zone of attenuation during the modeling period, but that predicted decrease is only slight, longitudinal dispersivity may be estimated to be 10 feet. If the model is sensitive to dispersivity, selection of a value to use in the baseline model becomes that much more critical, and a reasonably conservative value for longitudinal dispersivity should then be based on the entire range of reasonable values determined by scaling. For example, if increasing longitudinal dispersivity decreases maximum predicted concentrations over a flow distance of 200 feet, a reasonably conservative value would be 2 feet.

In both of the situations described above, the longitudinal dispersivity values that would be selected fall within the actual range of apparent dispersivity values presented by Neuman (1990) and, therefore, are considered reasonable. We will also be fairly confident that using the selected dispersivity value will not underestimate the concentrations of leachate constituents in groundwater at or beyond the zone of attenuation during the modeling period.

9. Retardation

The process of retardation of leachate constituents may be considered in the groundwater impact assessment. Most contaminant transport models account for this process through the use of distribution or partitioning coefficients (K_d). For inorganic leachate constituents, the applicant may use K_d values from literature sources as input to the model. For organic leachate constituents, K_d values must be calculated according to the formula:

$$K_d = K_{oc} \times f_{oc}$$

where, K_{oc} = the organic carbon partitioning coefficient

f_{oc} = the organic carbon fraction of the medium

Literature values for K_{oc} may be used in these calculations, but the organic carbon fraction of the medium must be based on site-specific sampling results that account for spatial variability. The horizontal and vertical variability of organic carbon content should be determined for each of the hydrogeologic units in which retardation is simulated, with equal weighting for each sampling depth. The lower 95% confidence limit of the organic carbon fraction should then be used to calculate the K_d value for each organic leachate constituent using the formula given above.

10. Table of Values

Summary table(s) of all input parameter values used in the model should be provided in the Groundwater Impact Assessment Report.

A set of default parameter values (presented below) may be used to model sanitary landfill leachate constituents as an alternative to leachate sampling procedures described in Section 6 above. Model parameters with missing K_d or K_{oc} values should ignore the process of retardation (i.e., set the distribution coefficient equal to zero). The leachate constituents presented below may be modeled individually or in accordance with guidelines for surrogate modeling presented in Section 7 above.

The default values presented below may be used to model the effects of leakage from sanitary landfills that accept municipal waste only. Landfills accepting other types of waste must consider the actual types of waste received and the expected resultant leachate in accordance with the guidelines presented in Section 6 above.

Inorganic Leachate Constituents

Constituent	Conc (mg/l)	K_d (cm^3/g)
Sulfate	980	---
Ammonia	910	---
Potassium	660	3.3
Sodium	1800	---
Calcium	1725	---
Chloride	2300	0
Cyanide	1.3	---
Antimony	0.06	---
Arsenic	0.51	1.8
Barium	1.56	---
Cadmium	0.24	2.7
Chromium	0.3	4.1
Copper	0.12	7.4
Iron	852	10
Lead	0.45	18
Magnesium	723	3.3
Nickel	0.93	---
Selenium	0.06	1.3
Silver	0.03	30
Thallium	0.04	---
Zinc	11.67	6.7

Organic Leachate Constituents

Constituent	Conc (mg/l)	K_{oc} (ml/g)
Acetone	6393	2.2
Benzene	46	83
Methyl Ethyl Ketone	7356	4.5
Carbon Disulfide	9	54
Chlorobenzene	19	330
Chloroethane	164	35
Chloroform	8	31
1,1-Dichloroethane	200	30
1,2-Dichloroethane	10	14
1,4-Dichlorobenzene	10	1700
1,2-t-Dichloroethylene	192	59
Ethyl Benzene	191	1100

2-Hexanone	184	19
Methylene Chloride	1656	8.8
4-Methyl-2-Pentanone	203	---
Tetrachloroethylene	26	364
Toluene	981	300
Trichloroethylene	84	126
Trichlorofluoromethane	11	159
1,1,1-Trichloroethane	179	152
Vinyl Chloride	45	57
Xylenes	1176	240

11. Model Calibration

The model should be calibrated to observed site-specific field conditions. Generally, it will only be practical to calibrate the model to groundwater flow conditions, particularly at new landfills, since releases to groundwater in the vicinity will not have occurred, or due to lack of knowledge of the nature of previous releases that may have occurred.

12. Sensitivity Analysis

Sensitivity analyses must be conducted to measure the response of the model to change in the values of assigned to major model input parameters, boundary conditions, specified error tolerances, and numerically assigned space and time discretions. The results of the sensitivity analyses must be presented in the groundwater impact assessment report.

Sensitivity analysis should be conducted separately for each model input parameter, boundary condition, etc., using baseline model results (i.e., results of models used to demonstrate an acceptable groundwater impact assessment) as the standard for comparison. Each sensitivity analysis should include the full range of reasonable values or model options potentially considered for use in the model. The range of values investigated should include values both greater than and less than those used in baseline models.

13. Model Reliability

This section of the application should present a narrative discussion of the reliability of the modeling results. How reliable are the results? Discussion of model reliability should include an assessment of model uncertainty, particularly with regard to selection of model input parameter values and the results of the sensitivity analyses conducted. This section should also assess the effects of any deviations from the assumptions inherent in the model (see section on model documentation below).

14. Groundwater Standards

The groundwater standards used to determine the acceptability of the groundwater impact assessment are background concentrations as determined in accordance with 35 IAC 811.320(d). Board established standards are not directly applicable unless they have been adjusted by the IPCB in accordance with requirements of 35 IAC 811.320(b).

15. Concentration vs. Time Profiles

Concentration vs. time profiles should be presented graphically for at least three points within the zone of attenuation for each leachate constituent. Surrogate modeling results may be used to represent corresponding groups of leachate constituents. The selected locations should include points of greatest predicted concentrations at the limit of the zone of attenuation, and 1/3 and 2/3 of the distance between the waste management boundary and the limit of the zone of attenuation.

16. Concentration vs. Distance Profiles

Concentration vs. distance profiles should be presented graphically for each leachate constituent modeled at five year increments covering the entire modeling period. These should be presented along a line parallel to the direction of groundwater flow that intersects the points of greatest predicted concentrations over time. The distance covered should be from the limit of the waste management boundary, to the zone of attenuation or to the point at which the predicted concentration is lower than the detection limit for that leachate constituent, whichever is greater. Surrogate modeling results may be used to represent corresponding groups of leachate constituents.

B. Groundwater Impact Assessment Report

The results of the groundwater impact assessment should be summarized and presented in a report in the application to show that it is acceptable. This should include summary tables and graphs, and well as a narrative discussion of the results. An acceptable groundwater impact assessment must demonstrate that the concentrations of leachate constituents in groundwater will be less than the applicable groundwater quality standards of Section 811.320 at any point at or beyond the limit of the zone of attenuation at any time during operation and within 100 years following closure of the unit.

Raw data must also be submitted to verify the accuracy of the data summaries. Raw data may be submitted either in hard copy or on computer disks (either 5.25” or 3.5”, and high or low density floppy disks may be utilized). The application should include a clear explanation identifying what each of the raw data points represent and the units in which they are presented. Templates may be presented as an identification guide for highly repetitive data.

C. Model Selection

The selected model must be able to adequately represent and simulate groundwater flow and contaminant transport in the specific hydrogeologic setting at the proposed site, considering such features as water table vs. confined aquifer conditions, porous media vs.

fracture flow, homogeneous vs. heterogeneous conditions, dispersivity characteristics, and multi-dimensional components of groundwater flow and contaminant transport.

[Note: Additional guidance on model selection can be found in USEPA's "Selection Criteria for Mathematical Models used in Exposure Assessments: Groundwater Models." EPA/600/8-88/075. Office of Health and Environmental Assessment. Washington, D.C. May 1988.]

D. Model Documentation

A contaminant transport model must be utilized in the groundwater impact assessment, in accordance with the requirements of Sections 811.317 and 812.316. Agency review of model acceptability will be gauged on a site-specific basis. Documentation must be provided to show that the selected model is capable of simulating groundwater flow and contaminant transport under the conditions identified in the hydrogeologic site investigations.

1. Software and User Support

If a commercially available model is utilized, a copy of that model along with full documentation and user support must be provided to the Agency (unless one has been previously provided) directly from the vendor as part of the application.

2. Groundwater Flow & Contaminant Transport

The applicant must submit documentation that establishes the ability of the model to represent groundwater flow and contaminant transport. This documentation should include validation and verification studies, and any history of it's previous applications. Studies published in professional journals are preferable and should be used for model documentation when possible. When using a model without a great deal of supporting documentation, a greater burden is placed on the applicant in terms of site-specific validation and/or verification of the model.

3. Equations and Numerical Solution Techniques

The applicant must provide documentation to support the validity of the equations used to simulate groundwater flow and contaminant transport, and the numerical solution techniques. Usually this type of information will be detailed in model documentation supplied from the commercial vendor, along with a copy of the software. If this is not the case, the applicant must supply this documentation with the groundwater impact assessment report. Any modifications or deviations from the generic expression(s) of these equations and solution techniques that may be needed for site-specific application of the model should be fully explained and theoretically justified.

4. Model Assumptions

The applicant should summarize the set of assumptions that are inherent in the selected model. This should also include an assessment of the applicability of these assumptions to the setting at the facility. Any deviations from these assumptions should be addressed in terms of model reliability.

E. Maximum Allowable Predicted Concentrations

Maximum allowable predicted concentrations (MAPCs) are projected concentrations of leachate constituents in the uppermost aquifer that, when exceeded within the zone of attenuation, indicate potential for exceedance of a groundwater quality standard at the limit of the zone of attenuation. The applicant must use the same calculation methods, data and assumptions used in the groundwater impact assessment to predict the concentration over time and space of all constituents chosen to be monitored in accordance with Section 811.319 at all monitoring points. The predicted values must be used to establish MAPCs for each monitoring point within the zone of attenuation. MAPCs must be developed for all constituents monitored in accordance with Section 811.319.

This assumes that the applicant has demonstrated an acceptable groundwater impact. In order to obtain predicted concentrations that, when exceeded within the zone of attenuation, would indicate future exceedance of the groundwater standard at zone of attenuation, the applicant must adjust the baseline model until the predicted concentration at the limit of the zone of attenuation just equals the groundwater standard. The manner by which this can be accomplished may vary depending on the contaminant transport model being utilized. There is no single correct method. The most generally accepted method of accomplishing this task is by altering model input to affect an increase in leakage rate. Once a model scenario that accomplishes this task has been developed, this same model should be used to establish predicted concentrations for each monitoring well located within the zone of attenuation. These will be the MAPCs for those monitoring points.

If modeling for the groundwater impact assessment fails to predict significant attenuation to occur within the zone of attenuation, then the applicant may use the established background concentrations described in Part II.A. of these instructions as MAPCs for monitoring points within the zone of attenuation. For leachate constituents which were not detected during the background sampling period, an Agency approved method detection limit (MDL) or practical quantitation limit (PQL) will be accepted as the MAPC.

F. Updated Groundwater Impact Assessments

The applicant must conduct a new groundwater impact assessment as described above if any of the following changes in the facility or its operation will result in an increase in the probability of exceeding a groundwater standard beyond the zone of attenuation:

1. New or changed operating conditions;

2. Changes in the design and operation of the liner and leachate collection system;

3. Changes due to more accurate geological data;

4. Changes due to modified groundwater conditions due to off-site activity;

5. Changes due to leachate characteristics.

IV. GROUNDWATER MONITORING SYSTEMS

The purpose of the groundwater monitoring system is to assess the success of the design of the facility, to confirm the results of the groundwater impact assessment over time, and to detect any discharge of contaminants from any part of a potential source. The groundwater monitoring system is the network of groundwater monitoring wells established within and at the edge of the zone of attenuation, throughout the uppermost aquifer, in accordance with Sections 811.318 and 811.319.

The initial monitoring shall commence during the hydrogeologic site investigation to establish the background concentrations and it is recommended that routine monitoring continue during the application period when a permit is issued and must continue throughout the design period. The design period includes the active phase of the operation of the unit and the post closure care period.

The monitoring system will monitor all potential sources of discharges within the facility, including all waste disposal units and leachate collection and storage systems. The wells must be located in zones identified during the investigation phase that could serve as contaminant migration pathways. The groundwater monitoring wells must be capable of yielding samples of a sufficient quantity for the completion of the required analysis.

Wells must be installed hydraulically upgradient and downgradient from the facility. All wells must be screened to access groundwater from a specific interval. The number and location of the monitoring wells is determined on a site specific basis. The Agency recommends using a hypothetical liner failure combined with the advective-dispersive calculation to determine plume dimensions to justify well spacing. The water quality will be statistically compared to the established background concentrations over time.

A. Modeling for Well Spacing

The applicant may use contaminant transport modeling to design a groundwater monitoring program, or to demonstrate the adequacy of an existing program.

1. Criterion for Acceptability

The groundwater monitoring well system should be capable of detecting a contaminant plume that exceeds the groundwater standard by the time it would reach the limit of the zone of attenuation. Contaminant transport modeling must demonstrate that the proposed monitoring system has a reasonable chance of meeting this goal.

2. Modeling Procedures

a. The modeling procedures used to assess well spacing are the same as those described above for the groundwater impact assessment, except that design failures are included in the model (i.e., the groundwater impact assessment assumes that the landfill design does not fail).

b. Attenuation within the aquifer should not be considered in the model.

c. A small areal source (e.g., 1 sq. meter), located near the downgradient boundary of the potential leachate source area, should be used to simulate the effect of a tear in a synthetic liner, or a crack or fissure in a clay liner.

d. Other reasonable failure scenarios may be used as needed to affect a significant release from the unit.

e. Once a release from the unit has been effectively simulated, a contaminant plume is defined as a specific concentration contour with a downgradient boundary at the limit of the zone of attenuation. The specific concentration used to define the plume is not consequential, as long as the plume width is defined by the same concentration.

f. Maximum allowable well spacing is then determined by the predicted width of the plume.

B. Monitor Well Construction

The application must provide detailed documentation of the monitoring well and piezometer construction. Casing and screen material must be inert to avoid contributing contamination or causing interference with the analysis of the water sample. Teflon, Stainless Steel 316, and Stainless Steel 304 are recommended as durable, corrosion-resistant materials. Since plastic (PVC) may have a significant effect on the ability to obtain a “representative” sample, the Agency only allows the use of plastic casing for piezometers or through the unsaturated zone for wells.

The well casing must have a minimum inside diameter of not less than two inches. The joints must be flush threaded and water-tight. The well casing must be straight and free of any obstructions. The wells must be screened at appropriate intervals to monitor the permeable zones encountered. The well screens must be not less than 2 feet or more than 10 feet in length. The slot size must be compatible with the grain size of the annular filter pack to prevent silting in by the surrounding formation. Screens must be continuous slot wire wound or machine cut.

Annular space along the screened section must be packed with silica sand or gravel 2 ½ - 3 times larger than the 50% grain size of the zone being monitored. The top of the sand pack shall not extend past 2 feet above the well screen. A clean, well rounded and uniform (mainly one grain size) filter pack is preferred; however, in sand and gravel deposits where cave-ins occur, the natural sand and gravel is acceptable.

To insure that the sealing material does not interfere with the screen, the filter pack shall extend two feet above the top of the well screen. The sealing material above the filter pack must prevent the migration of fluids from the surface and between subsurface sediments. A pure bentonite seal must be installed above the filter pack and extend no less than 2 feet above the filter pack extension. Pure bentonite should be hydrated at the surface and installed from the bottom of the annular opening upward in one continuous operation using a “tremie tube” or “tremie pipe”. A sealing material of expanding cement grout with 1% bentonite, by weight, added to the appropriate amount of water before being added to the cement or 5% bentonite, by volume, added to the cement before mixing with water should be used above the bentonite seal. This also should be installed using the tremie method as formerly described. No quick setting cements that contain additives will be allowed. Any bentonite used must also be free of additives.

At the surface, a concrete cap shall be installed around the protective casing. The cap shall extend below the frost zone and slope away from the well casing on the surface so that rain water will be diverted away from the well casing and bore hole. The portion of the well casing above the ground surface must be protected to minimize damage or tampering. These precautions should include a locking cap. Wells must be identified by a monitor point number, using an Agency approved designation. The location of the wells in relation to the waste management area must be located on a topographic map (scale 1”=200’ or larger). This map must include county, site name, township, range, and section.

The Illinois Department of Public Health Water Well Construction Code, 77 IAC Part 920 (effective 1/1/92) contains minimum standards for groundwater monitoring wells and piezometers. The code also includes reporting well construction and decommissioning to the IDPH within specified timeframes. Alternate designs may be submitted for Agency approval in writing, prior to installation.

C. Sampling Frequency

The monitoring programs can consist of routine quarterly, biannual, and annual lists of parameters. For example, if a constituent is not detected during the first 2 consecutive sampling events, it may be assigned to a biannual or annual monitoring list based upon the remaining possibility of its detection (i.e. transport characteristics or degradation/transformation rate). The operator shall monitor for a routine list of indicator parameters on a quarterly schedule that will provide a means for immediate detection of groundwater contamination.

D. Monitor Well Development

After the monitor well has been constructed and allowed to sit for 24 hours, the well must be adequately developed to minimize turbidity within the well and increase flow into the well. To be effective, development procedures require reversal or surges in flow to avoid bridging by particles, which is common when flow is continuous in one direction. This action can be created by using surge blocks, bailers, or pumps. An insitu test must be conducted for each monitor well to determine hydraulic conductivity near the well. The test method (i.e., slug tests, pumping tests) used, calculations and interpretations must be submitted to the Agency. The tests shall be conducted after the well is properly developed.

E. Monitor Well Plugging and Abandonment

Monitoring wells and borings, which are no longer being used, must be properly plugged/sealed and abandoned so that groundwater is protected from surface contamination and potential degradation between stratigraphic units. Procedures which have been developed for guidance in the plugging of monitoring wells are based upon geologic materials and well construction.

All open drill holes must be marked and covered until properly abandoned. Soil borings and test wells are to be plugged upon abandonment of the borehole using the procedures for monitoring wells if they penetrate a water bearing sediment. Those that do not contain water can be filled from the surface, as long as methods are used which ensure that pure cement slurry will reach the bottom of the hole. There may also be abandoned drinking water wells onsite that should be plugged because they can serve as routes for contamination.

When a well has been damaged, such as when the casing has been broken off at or below the surface, it should be bailed to remove any material that entered it before plugging is initiated. The depth of the well should be checked to detect the presence of any obstructions that may interfere with sealing. Any obstructions in the well must be retrieved and the well casing and screen removed prior to plugging. The operator is to restore the areas around the drill holes to their original condition.

Accurate records of plugging and abandonment procedures should be maintained for future reference and documentation for closure. See Part B. Monitor Well Construction in this Part.

F. Monitoring Well Construction Reports

Boring logs must be completed for all test borings and monitor wells. Also, all test boring should be continuously sampled and have the elevations surveyed and reported in relation to Mean Sea Level (MSL) to the nearest 0.01 ft. Well completion (“as-built”) diagrams which have been surveyed by a registered surveyor must be submitted to the Agency on Agency forms, as in Attachments.

A scale drawing showing monitor well and test boring locations must be submitted to the Agency. The drawing should also show buildings, roads, the site’s property boundary, permitted waste boundary and currently filled area. In addition, a Cartesian coordinate grid for the site should be established, shown on the map, and all test borings and monitor wells should have coordinates surveyed and reported.

All necessary permits, licenses, and reporting regarding well construction, operation and plugging must be in accordance with the requirements of the Illinois Department of Public Health and the Illinois Department of Mines and Minerals if applicable.

V. <u>GROUNDWATER MONITORING PROGRAM</u>

A groundwater monitoring program must be included in the application. The program must include a sampling and analysis plan (SAP) describing the procedures for collecting and analyzing data in accordance with Section 811.318(e). The program must also describe the parameters and frequency of sampling for each location and the evaluation method(s) of data.

A. Parameters

For new facilities establishing background in accordance with Section 811.320(d), groundwater samples will be collected and analyzed for the parameter list given in Attachment 1 to this appendix at a minimum frequency of quarterly for one year, plus any additional parameters which may be unique to the waste handled by the facility or site conditions.

Routine parameters will be proposed by the applicant based on leachate quality in accordance with Section 811.319. The list must include the parameters represented in the contaminant transport model of the groundwater impact assessment (MAPCs). Attachment 2 to this appendix lists additional routine parameters.

The analytical method or methods must be cited for each parameter listed.

B. Sampling Frequency

Routine parameters will be sampled and analyzed quarterly. Once a permit is issued, the list of parameters used for establishing background concentrations (Attachment 1) will be sampled and analyzed at least once every two years until leachate is generated, then annually thereafter.

C. Quality Assurance/Quality Control (QA/QC)

A sufficient number of QA/QC samples will be prepared for evaluating field, transport and laboratory procedures. The samples such as equipment, trip and lab blanks must be fully described in the facility sampling and analysis plan. The Agency recommends QA/QC for groundwater sampling and analysis as described in SW846.

D. Statistics

All groundwater sample results will be evaluated to determine if an increase in a constituent has occurred in accordance with Section 811.319(a)(4). Statistical methods must meet the minimum standards of Section 811.320(e). The Agency is providing a statistical method of general applicability for normally distributed data as Attachment 3.

E. Groundwater Quality Reporting

Groundwater data will be reported in a format prescribed by the Agency within the following time periods:

Sampling Quarter	Report Due Date
January-February (1st)	April 15
April-May (2nd)	July 15
July-August (3rd)	October 15
October-November (4th)	January 15

Statistical data need not be reported unless there is a change to the established background concentrations (811.320(d)) or a significant increase identified as described in D above has occurred. All QA/QC sample data must be reported for each sampling event.

VI. ELECTRONIC REPORTING OF DATA

The Agency is currently developing a means to accept permit information and routine monitoring data electronically using CAD software and the newly introduced GRITS software developed by the USEPA. The GRITS software is expected to be published as public domain in November or December of 1992.

References

1. Scientific/Technical Section, 1990, Response to Additional Comments on proposed Part 807, and 810 through 815, Illinois Pollution Control Board.

2. ASTM, 1990, Design and Installation of Ground Water Monitoring Wells in Aquifers, Designation: D 5092-90.

3. USEPA, 1991, "Handbook of Suggested Practices for the Design and Installation of Groundwater Wells", EPA/600/4-89/034, Office of Research and Development, Washington, DC.

4. IEPA, 1991, Groundwater Quality Standards, 35 Ill. Adm. Code 620, R89-14 (Rulemaking), Proposed Rule, Second Notice, Illinois Pollution Control Board.

5. USEPA, 1986, "RCRA Groundwater Monitoring Technical Enforcement Guidance Document (TEGD)", OSWER-9950.1.

6. USEPA, 1986, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", EPA Publication SW846 (Third Edition and updates), Document number PB89-148076.

Attachment 1 to Appendix C
Chemical Parameters Associated with Putrescible and Chemical Landfills

Parameters	General Predicted Values for Municipal Solid Waste Landfills* ug/l	40 CFR Appx. II	Basis for Inclusion on List: Expected in Leachate	35 IAC Part 620	35 IAC Part 302	40 CFR 141.40	4- CFR** Appx. I
1,1,1,2-tetrachloroethane		X				X	51
1,1,1-trichloroethane	2,000	X	X				55
1,1,2,2-tetrachloroethane	400	X	X	X		X	52
1,1,2-trichloroethane	630	X	X			X	56
1,1-dichloroethane	3,000	X	X			X	33
1,1-dichloroethene (or ethylene)		X		X			35
1,1-dichloropropene		X				X	
1,2,3-trichlorobenzene						X	
1,2,3-trichloropropane	500	X	X	X		X	59
1,2,4-trichlorobenzene		X				X	
1,2,4-trimethylbenzene						X	
1,2-dibromo-3-chloropropane		X		X		X	28
1,2-dichloroethylene (or ethene)							
cis-1,2-dichloroethylene	500	X	X	X	X		36
trans-1,2-dichloroethylene	1,000	X	X	X	X		37
1,2-dichloroethane	4,000	X	X	X			34
1,2-dichloropropane	200	X	X	X		X	38
1,3,5-trimethylbenzene						X	
1,3-dichloropropane		X				X	
1,3-dichloropropene						X	
cis-1,3-dichloropropene		X				X	39
trans-1,3-dichloropropene		X				X	40
1,4-dichloro-2-butene							32
1,4-diflurobenzene							
2,2-dichloropropane		X				X	
2,4,5-tp (silvex)		X		X	X		
2,4-dichlorophenoxyacetic acid (2,4-D)		X		X	X		
2,4-dimethyl phenol	30	X	X				
1-butanol phenol	400		X				
1-propanol	200,000		X				
2-butanone (methyl ethyl ketone)	8,000	X	X				47
2-chloroethyl vinyl ether	1,100		X				
2-chloronaphthalene	100	X	X				
2-hexanone	500	X	X				42
2-propanol	20,000		X				
4-bromofluorobenzene							
4-methyl-2-pentanone	700	X	X				49
4-nitrophenol	40	X	X				
acetone	5,000	X	X				16
acrolein	400	X	X				
acrylonitrile		X					17
alachor				X			
aldicarb				X			
aldrin		X			X		
aluminum	6,000		X				
ammonia (as N)	600,000		X				
antimony	9,000	X	X	X			1
arsenic	100	X	X	X	X		2
atrazine				X			
barium	10	X	X	X	X		3
benzene	500	X	X	X			18
benzo(a)pyrene		X		X			
beryllium		X		X			4
bicarbonate							
BOD	5,000,000		X				
boron	200		X	X			
bromobenzene			X			X	
bromochloromethane		X	X			X	19
bromodichloromethane		X	X			X	20
bromoform		X	X			X	21

bromomethane	400	X	X			X	43

Parameters	General Predicted Values for Municipal Solid Waste Landfills* ug/l	40 CFR Appx. II	Basis for Inclusion on List Expected in Leachate	35 IAC Part 620	35 IAC Part 302	40 CFR 141.40	4- CFR** Appx. I
butanol	15,000	X	X				
n-butylbenzene						X	
sec-butylbenzene						X	
butyl benzyl phthalate	150	X	X				
cadmium (total)	100	X	X	X	X		5
calcium	1,200,000		X				
carbofuran				X			
carbon disulfide	6	X	X				22
carbon tetrachloride	400	X	X	X			23
chemical oxygen demand	10,000,000		X				
chlordane		X		X	X		
chloride	3,000,000		X	X	X		
chlorobenzene	400	X	X	X		X	24
chloroethane	400	X	X			X	25
bis (2-chloroethoxy)methane	25	X	X				
chloroform	400	X	X			X	26
chloromethane	400	X	X			X	44
bis (chloromethyl)ether	400	X	X			X	
o-chlorotoluene						X	
p-chlorotoluene						X	
chromium (total)	50	X	X	X	X		6
chlorodibromomethane		X				X	27
cobalt	130	X	X	X			7
copper	1,000	X	X	X	X		8
p-cresol		X					
cyanide	300	X	X	X	X		
dalapon							
DDT		X		X	X		
dibromomethane	10	X	X			X	45
m-dichlorobenzene		X				X	
o-dichlorobenzene		X				X	30
p-dichlorobenzene		X		X			31
dichlorodifluoromethane	450	X	X			X	
dichloromethane		X		X		X	46
dieldrin		X			X		
diethyl phthalate	200	X	X				
dimethyl phthalate	60	X	X				
di-n-butyl phthalate	150		X				
dinoseb		X		X			
endothall		X		X			
endrin		X	X				
ethyl acetate	130		X				
bis(2-ethylhexyl)phthalate	400		X				
ethyl methacrylate		X					
ethylbenzene	500	X	X	X		X	41
ethylene dibromide (EDB)		X		X		X	29
fluoride				X			
fluorotrichloromethane						X	
gross alpha (pCi/l)				X			
heptachlor		X		X	X		
heptachlor epoxide		X		X	X		
hexachlorobutadiene		X				X	
hexachlorocyclopentadiene		X		X			
iodomethane		X		X	X		48
iron	500,000		X	X	X		
isophorone	2,500	X	X				
isopropylbenzene						X	
p-isopropyltoluene						X	
lead	500	X	X	X	X		9
lindane	025		X	X	X		
magnesium	500,000		X				
manganese	20,000		X	X	X		
mercury	10	X	X	X			
methoxychlor				X	X		

methylene chloride (Chloromethene)	46	X	X				
naphthalene	75	X	X			X	
	General Predicted		Basis for Inclusion on List				
Parameters	Values for Municipal Solid Waste Landfills* ug/l	40 CFR Appx. II	Expected in Leachate	35 IAC Part 620	35 IAC Part 302	40 CFR 141.40	4- CFR** Appx. I
nickel	1,000	X	X	X			10
nitrate				X	X		
nitrobenzene	120	X	X				
oil (hexane-soluable or equivalent)					X		
parathion		X			X		
pentachlorophenol	400	X	X	X			
pH	5-9		X	X			
phenanthrene	3	X	X				
phenols	5,000	X	X	X	X		
picloram				X			
polychlorinated biphenyls		X		X			
potassium	500,000		X				
n-propylbenzene						X	
radium				X			
selenium	50	X	X	X	X		11
silver	50	X	X	X			12
simazene							
sodium	1,500,000		X	X			
strontium - 90				X			
styrene		X		X		X	50
sulfate	1,000,000		X	X	X		
TDS	10,000,000		X	X	X		
TOC	6,000,000		X				
tert-butylbenzene						X	
tetrachloroethylene	300	X	X	X		X	53
tetrahydrofuran	1,000		X				
thallium	500	X	X	X			13
tin	2,000	X	X				
toluene	2,000	X	X	X		X	54
toxaphene	2	X	X	X	X		
trichloroethylene(or ethene)	400	X	X	X			57
trichlorofluoromethane	150	X	X				58
tritium				X			
vanadium	30	X	X				14
vinyl chloride	60	X	X	X			61
vinyl acetate							60
xylenes (total)	300	X	X	X			62
m-xylene	200	X	X			X	
o-xylene						X	
p-xylene						X	
zinc	20,000	X	X	X			15

* References

1. Gasper, James A. and Jeff M. Harris, Management of Leachate from Sanitary Landfills (for Browning Ferris Industries).

2. Dolan, David, Helen Keougl, R.L. O'Hara and Kevin O'Leary, 1991, A Comparison of Chemical Constituents in Industrial Hazardous Waste Municipal Waste Landfill Leachates (for Waste Management of North America, Inc.).

** From 40 CFR Part 258 Appendix I & II numbered as presented in Federal Register, Vol. 56, No. 196, October 9, 1991 pages 51032-51038.

Attachment 2 to Appendix C
Routine Parameters

FIELD PARAMETERS	STORET NUMBER
*Bottom of Well Elevation (ft. ref MSL)	72020
Depth to Water (ft. below land surface)	72019
Depth to Water (ft. from measuring point)	72109
Elevation of Groundwater Surface (ft. ref. MSL)	71993
pH (units, unfiltered)	00400
Specific Conductance (umhos/cm, unfiltered)	00094
Temperature of Water Sample (deg F)	00011

(* = Reported Annually)

ROUTINE INDICATOR PARAMETERS	STORET NUMBERS	CAS NUMBER
Filtered**		
Ammonia as (N)	00608	7664-41-7
Arsenic	01000	7440-38-2
Cadmium	01025	7440-43-9
Chloride	00941	6887-00-6
Iron	01046	7439-89-6
Lead	01049	7439-92-1
Manganese	01056	7439-96-5
Mercury	71890	7439-97-6
Sulfate	00946	4808-79-8
Total Dissolved Solids (TDS, mg/l)	70300	
Unfiltered		
Cyanide (Total)	00720	57-12-5
Phenols (Total Recoverable)	32730	179-80-5
Total Organic Carbon (TOC)	00680	
Total Organic Halogens (TOX)	78115	

(**Samples shall be analyzed for both the dissolved and total concentrations of inorganic parameters during the initial background sampling period.)

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Illinois
Environmental
Protection Agency

Bureau of Land
2520 West Iles Avenue
Box 19276
Springfield, IL 62794-9276

Appendix D to LPC-PA2

INSTRUCTIONS FOR CHEMICAL AND PUTRESCIBLE WASTE LANDFILL DESIGN FEATURES

This Appendix sets out the type of information needed in addition to the general information requested in the LPC-PA2 Instructions. You should review Appendices A-G and Section VI of LPC PA2 form to determine which are applicable to your facility. This Appendix explains how to document the detailed design features of all components of the site.

I. Design & Design Period

Provide the design period for all waste disposal units pursuant to 35 IAC 811.303. Also, if the unit is being designed as a chemical waste landfill (i.e. a facility which accepts only chemical waste), analyses must be provided demonstrating that all wastes to be disposed at the landfill meet the definition of chemical wastes. These analyses must further show that all wastes entering the unit shall be compatible and will not react to form a hazardous substance or gaseous products.

II. Foundation and Mass Stability Analysis and Design

A. Provide a foundation study and analysis performed by or under the supervision of a Registered Professional Engineer showing that the unit demonstrates compliance with 35 IAC 811.304 and 811.305.

B. Provide the following information in connection with the foundation study and analysis:

1. Results of tests performed on foundation materials and include the justification for the appropriateness of the test;

2. Estimated depth of settlement or swell of the foundation of the unit;

3. Diagrams and cross sections of any proposed sub-base or foundation construction;

4. Specifications for the soil to be used for the foundation construction shall include, but not to be limited to, soil classification, permeability, moisture content, moisture-density relationship, plasticity, and strength; and

5. Discuss how the construction quality assurance program will be implemented for the foundation pursuant to 35 IAC 811.Subpart E. (Refer to Appendix E.)

III. Design of Liner System

A. Demonstrate the minimum requirements of 35 IAC 811.306 for compacted clay liners are met by providing the following information:

1. Cross sections and plan views of the liner system;

2. Results of any field or laboratory tests demonstrating that the liner material complies with 35 IAC 811.306(d).

3. A description of the test liner, including:

    a. Diagrams and any supporting documentation showing that the test liner will be constructed and evaluated in accordance with 35 IAC 811.507(a); or

    b. A detailed description of the results of the test liner constructed in accordance with 35 IAC 811.507(a), if constructed prior to permit application;

(Note: A test liner constructed after initial permitting may require a permit modification to incorporate construction quality assurance requirements).

4. A description of construction methods and equipment to be utilized;

5. Side slope stability calculations;

6. A demonstration that the liner has been designed such that it shall remain functional throughout the design period; and

7. Discuss how the construction quality assurance plan will be implemented pursuant to 35 IAC 811, Subpart E. (Refer to Appendix E.)

B. To use geomembranes, the application must demonstrate compliance with 35 IAC 811.306(e) by providing the following minimum information:

1. A description of the physical properties of the geomembrane;

2. Documentation showing that the design of the geomembrane meets the minimum requirements of 35 IAC 811.306(e).

3. A description of the methods to seam the geomembrane in the field in compliance with 35 IAC 811.306(e)(5).

    a. A plan showing the proposed layout of the individual panels and the locations of all openings through the geomembrane;

    b. A cross section and description of how opening in the geomembrane will be constructed to minimize leaks; and

    c. Discuss the construction quality assurance program pursuant to 35 IAC 811, Subpart E for proper construction, seaming and inspection of the geomembrane. (Refer to Appendix E.)

C. For Slurry Trenches and Cutoff Walls provide the following information:

1. A description of the slurry trench or cutoff wall, including documentation of cross sections, material specifications and methods of construction to demonstrate compliance with 35 IAC 811.306(f). Also provide a short narrative describing how the following tests will be accomplished:

Note: All tests shall be performed in accordance with appropriate ASTM, API, Corps of Engrs., or equivalent methods.

a. Laboratory testing of slurry wall material prior to the placement of each 300 linear feet of slurry wall for the following:

   i. Bentonite

      - Swelling index
      - Layer permeability
      - Colloidal yield
      - Cation exchange capacity

   ii. Bentonite/Soil Mixture, with site water

      - Grain size analysis of aggregate
      - Bentonite content
      - Hydraulic conductivity
      - Wet density test

b. Testing the bentonite slurry proposed for use mixed under field conditions with site water for the following:

   i. Bentonite slurry

      - Bentonite content
      - Apparent viscosity, plastic viscosity and yield
      - Density
      - Gel strength and ten minute strength
      - pH
      - Filtration loss
      - Filter cake - thickness and visual description of filter cake strength
      - Sand content

   ii. Water - free of oil and organic matter (weekly test)

      - pH
      - Chloride

- Specific Conductance
- Alkalinity/Hardness
- Volatile Organic Compounds

c. Testing of backfill material each 300 linear feet of cut-off wall for the following.

- Mixing Process
- Grain size analysis
- Slump

d. Testing procedure and frequency to determine the backfill material has achieved a hydraulic conductivity equal to or less than 1×10^{-7} cm/sec.

e. Show that a minimum of three feet of slurry head shall be maintained in the excavation above the maximum anticipated groundwater level and the slurry head should not fall one foot below the ground surface elevation.

2. Location and description of the boreholes, including the results of any testing; and

3. Discuss the construction quality assurance plan, pursuant to 35 IAC 811, Subpart E. (Refer to Appendix E.)

D. For Alternative Liner Technology provide the following information:

Provide a complete description of the technology, including documentation demonstrating that the technology will perform as required by 35 IAC 811.306(g).

IV. Leachate Control System

A. Provide documentation for the leachate drainage and collection system to show how it will comply with 35 IAC 811.307 and 811.308. All applications to develop putrescible and chemical waste landfills must include a leachate drainage and collection system plan.

1. A plan view of the leachate collection system showing: piping locations, leachate level monitoring locations, cleanouts, manholes, sumps, leachate storage structures and other related information.

2. Cross sections of manholes, sumps, cleanouts, connections and other appurtenances.

3. A description of the design including all calculations, assumptions and information which were used in the design. A stability analysis should be included which demonstrates that the side slopes will maintain the necessary static and seismic safety factors during all phases of operation.

4. A maintenance plan which describes the methods used to clean and maintain the system.

5. A discussion of how the construction quality assurance program will be implemented. (Refer to Appendix E.)

B. Leachate Management System

Every landfill which is required to have a leachate drainage/collection system must also submit a leachate management plan for the disposal of collected leachate. The leachate management system may consist of any combination of storage, treatment, pretreatment and disposal options which satisfy the requirements of 35 IAC 811.309. The following should be included:

1. A description of the management system which should include any required documentation such as:

   a. The approved NPDES permit or, if the permit is pending, a copy of the NPDES permit application;

   b. Documentation to demonstrate that the off-site treatment works meets the requirements of 35 IAC 811.309(e)(1); or

   c. Pretreatment authorization, if necessary from the off-site publicly owned treatment works pursuant to 35 IAC 310.

   d. Requests for authorization to recycle leachate must include the following:

      i. A demonstration that the unit satisfies the criteria of 35 IAC 811.309(f)(1);

      ii. Estimates of the expected volume of excess leachate, as defined in 35 IAC 811.309(f)(3);

      iii. A plan for the disposal of excess leachate, as defined in 35 IAC 811.309(f)(3);

      iv. Layout and design of the leachate distribution system; and

      v. Pursuant to 35 IAC 811.309(f)(6), a demonstration that the daily and intermediate cover is permeable, or a plan to remove daily and intermediate cover prior to additional waste disposal.

   e. Design of tanks, lagoons, and all other treatment or storage units;

   f. A map showing the location of all units, piping and monitoring stations; and

   g. A description of the leachate monitoring system, the location of the sampling points, including all parameters to be monitored and the frequency of monitoring. Note: 35 IAC 811.309(g) mandates the minimum initial monitoring frequency and testing for certain parameters.

V. Landfill Gas System

A. For putrescible facilities, provide documentation for the landfill gas monitoring system to show how it will comply with 35 IAC 811.310 and include the following:

All putrescible waste disposal facilities must have a gas monitoring system to monitor the buildup and composition of landfill gas.

1. A narrative and plan sheets describing the most likely paths of migration for gas generated by the unit and demonstrating that the proposed gas monitoring program will detect any gas buildup

and/or migration. A predictive gas flow model may be used as part of this description and demonstration -- 812.309(a) and 811.310(b)(1), (2) and (3).

2. Detail drawings and material specifications of the four types of gas monitoring devices required (i.e., devices within the waste unit, below ground devices around the unit, air ambient monitoring devices and continuous air monitoring devices within buildings) on site or near the facility if there is an indication of gas.

3. A map showing the locations of the below ground monitoring devices and the continuous air monitoring devices.

4. Documentation that the below ground gas monitoring devices satisfy the following requirements:

   a. Gas monitoring devices shall be placed at intervals and elevations within the waste to provide a representative sampling of the composition and buildup of gases within the unit.

   b. Gas monitoring devices shall be placed around the unit at locations and elevations capable of detecting migrating gas from the ground surface to the lowest elevation of the liner system or the top elevation of the groundwater, whichever is higher.

   c. Gas monitoring devices shall be constructed from materials that will not react with or be corroded by the landfill gas.

   d. Gas monitoring devices shall be designed and constructed to measure pressure and allow collection of a representative sample of gas.

   e. Gas monitoring devices shall be constructed and maintained to minimize gas leakage.

   f. The gas monitoring system shall not interfere with the operation of the liner, leachate collection system or delay the construction of the final cover system.

5. A description of the procedures and prerequisite weather conditions for performing ambient air monitoring including the location standards for placement of the monitoring devices and maximum wind speed.

6. A description (narrative or graphic) of the location of the continuous air monitoring devices inside the buildings within the facility (and nearby buildings if applicable).

7. A schedule specifying the frequency and minimum duration of gas monitoring.

8. Identification of the parameters that each type of monitoring device will be testing.

9. For applications that do not propose a gas collection system, the criteria that will be used to determine when a landfill gas management system must be installed.

B. Landfill Gas Collection System

Landfill gas collection systems are optional for putrescible waste landfills except for those which have experienced problems with gas migration or odors and those which recycle leachate (see 35 IAC 811.311). Permit applications which propose landfill gas collection systems must include the following information:

1. A map and detail drawings showing the location of the collection points and the layout and design of the collection system;

2. A description of and specifications for all machinery, compressors, flares, piping and appurtenances necessary to the system;

3. Documentation or assurance that the gas collection system meets the following standards:

    a. The system is designed and will be operated such that the limits described in 35 IAC 811.311(a)(1), (a)(2) and (a)(3) will not be exceeded;

    b. The gas collection system shall transport gas to a central point or points for processing for beneficial uses or disposal in accordance with the requirements of 35 IAC 811.312;

    c. The gas collection system has been designed to function for the entire design period;

    d. All materials and equipment used in construction of the system have been rated by the manufacturer as safe for use in hazardous or explosive environments and shall be resistant to corrosion by constituents of the landfill gas;

    e. The gas collection system has been designed to withstand all landfill operating conditions, including settlement;

    f. Provisions have been made for collecting and draining gas condensate to a management system meeting the requirements of 35 IAC 811.309;

    g. The gas collection system shall not compromise the integrity of the liner, leachate collection or cover systems; and

    h. The gas collection system shall be equipped with a mechanical device, such as a compressor, capable of withdrawing gas, or has been designed so that a mechanical device can be easily installed;

4. A description of the criteria that will be used to determine when operation of the gas collection system shall be discontinued;

5. A description of the testing procedures that will be used to assure that the lines from the collection points to the gas processing or disposal facility are air tight; and

6. A plan for disposal of the condensate.

C. Landfill Gas Disposal or Processing System

All permit applications which propose a gas collection system must also propose a gas disposal system. The gas disposal system can be either an on-site or an off-site facility.

1. For on-site facilities (either flare systems or facilities which process the gas for beneficial use) the following information must be provided:

    a. A map showing the location of the facility;

b. Engineered drawings showing the layout and details of landfill gas processing and disposal system, including compressors, blowers, raw gas monitoring systems, devices used to control the flow of gas from the unit, flares, gas treatment devices, air pollution control devices and monitoring equipment;

c. A copy of the approved air discharge permit or, if the permit is pending, a copy of the air discharge permit application required pursuant to 35 IAC 200 thru 245; and

d. A list of the parameters and constituents for which the gas shall be monitored.

2. For off-site processing the facilities the following information must be provided:

a. A list of the parameters and constituents for which the gas shall be monitored;

b. A description of the means by which the gas shall be conveyed from the landfill to the off-site processing facility; and

c. Documentation that the off-site processing facility meets the following requirements:

i. The solid waste disposal facility will contribute less than 50 percent of the total volume of gas accepted by the gas processing facility. (Otherwise, the processing facility must be considered a part of the solid waste management facility.) and

ii. The gas processing facility is sized to handle the expected volume of gas.

D. Construction Quality Assurance Program

The landfill gas monitoring system (and the collection and disposal/processing systems, if proposed) must be constructed in accordance with a construction quality assurance program. Accordingly, the permit application must include a sampling program based upon statistical sampling techniques and establishing criteria for acceptance or rejection of materials and construction operations.

VI. Surface Water Control

Describe how the landfill design controls surface water and demonstrates the following:

A. Runoff From Disturbed Areas

1. Runoff from disturbed areas resulting from precipitation events less than or equal to the 25-year, 24-hour precipitation event that is discharged to waters of the State will meet the requirements of 35 IAC 304.

2. All discharges of runoff from disturbed areas to waters of the State shall be permitted by the Agency in accordance with 35 IAC 309.

3. The design of discharge structures are such that flow velocities will not cause erosion and scouring of the natural or constructed lining, i.e. the bottom and sides of the receiving stream channel.

4. All drainage ways and swales are designed to safely pass the runoff from the 100-year, 24-hour precipitation event without scouring or erosion.

B. Diversion of Runoff From Undisturbed Areas

1. Runoff from undisturbed areas shall be diverted around disturbed areas unless it is impractical based on site-specific conditions.

2. Diversion facilities shall be designed to prevent runoff from the 25-year, 24-hour precipitation event from entering disturbed areas.

3. Runoff from undisturbed areas which becomes commingled with runoff from disturbed areas shall be handled as runoff from disturbed areas and treated accordingly.

4. All diversion structures shall be designed to have flow velocities that will not cause erosion and scouring of the natural or constructed lining, i.e., the bottom and sides, of the diversion channel and downstream channels.

5. All diversion structures shall be operated until the final cover is placed and erosion stability is provided by the vegetative or other cover meeting the requirements of 35 IAC 811.205 or 811.322.

C. Information on the location and construction schedule must be provided as follows:

1. Provide a map(s) with a scale of 1" = 200 feet showing the location of all surface water control structures. Indicate both disturbed and undisturbed areas and water sheds.

2. Provide detailed designs of all structures to be constructed during development of the facility and during the first five year operating period; and

3. Provide the estimated construction dates of all structures to be constructed beyond the first five year operating period.

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Illinois
Environmental
Protection Agency

Bureau of Land
2520 West Iles Avenue
Box 19276
Springfield, IL 62794-9276

APPENDIX E TO LPC-PA2

INSTRUCTIONS FOR PREPARING A CONSTRUCTION DOCUMENT FOR A CHEMICAL AND PUTRESCIBLE WASTE LANDFILL

This Appendix sets out the type of information needed in addition to the general information requested in the LPC-PA2 Instructions. You should review Appendices A-G and Section VI of LPC-PA2 form to determine which are applicable to your facility. This Appendix explains what should be provided in a Quality Assurance Program.

I. Applicability and Qualifications

A. Identify each structure subject to the procedures and organizational framework for testing, observation, monitoring and documentation of the quality assurance requirements in 35 IAC 811 Subpart E.

B. Provide assurance that the operator will designate a third party contractor as the Construction Quality Assurance Officer (CQA officer) with the following responsibilities and qualifications:

1. The CQA officer will be responsible for inspections, testing and other required activities.

2. That the CQA officer will be an Illinois Registered professional engineer.

II. Activities

A. Describe activities which will demonstrate compliance with the following provisions:

1. How the CQA officer will provide supervision and explain the procedures for writing a daily summary report. It is recommended at minimum the officer personally be present on a weekly basis and more often during critical construction activities. Structures subject to quality assurance are:

   a. Compaction of foundations and subgrades.

   b. Installation of clay liners, geomembrane liner component, slurry trenches, cutoff walls; leachate collection system and gas control facilities.

   c. Application of final cover.

   d. Construction of ponds, ditches, lagoons and berms.

2. When the CQA officer is absent that the following document will be provided:

   a. A written explanation for the CQA officer's absence.

b. A written designation of the person who will exercise professional judgement for the CQA officer and documentation that this person can function effectively.

c. A written statement by the CQA officer that he assumes full personal responsibility for inspections and reports prepared by the CQA designate.

3. Provide for each structure subject to this program, the activities an inspector will be responsible for.

III. Sampling

A. Provide a detailed description of a sampling program for each covered structure. Include the statistical sampling techniques and specific criteria for the acceptance or rejection of materials or structures and operations.

IV. Reports

A. Provide the information to be included in the daily summary report for each covered structure in accordance with 35 IAC 811.505(a). Include sample report forms, list of test equipment, materials etc.

B. Provide the information to be included in the daily inspection report for each covered structure in accordance with 35 IAC 811.505(b) and (c). Include sample report forms, inspection activities, sampling etc.

C. Provide the information to be included in the acceptance reports for each covered structure in accordance with 35 IAC 811.505(d). Include sample reports and any other applicable information.

V. Additional Information is Required for Consideration of Foundations and Subbases

A. A site investigation must include how it was carried out in accordance with the plans and how any unexpected conditions or modifications are to be shown and explained on as built plans.

B. The CQA officer must observe the soil and rock surfaces for joints, fractures, depressions and sound deposits and has documented their filling or replacement.

C. Documentation must ensure there were no moisture seeps and that soft, organic or other undesirable material was removed.

VI. Additional Information is Required for the Construction of the Test Liner and Fill Before Construction F the Actual, Full-Scale Compacted Earth Liner

A. A plan to document how the following were or will be met must be provided:

1. The test liner was constructed from the same soil material, design specifications, equipment and procedures as proposed for the full-scale liner;

2. The test fill was at least four times the width of the widest piece of equipment to be used;

3. The test fill was long enough to allow the equipment to reach normal operating speed before reaching the test area;

4. At least three lifts were construct;

5. The test fill were tested as described below for each of the following physical properties using tests to ensure a statistically valid sample size:

   a. Field testing techniques shall be used to determine the hydraulic conductivity.

   b. Samples shall also be tested in the laboratory for hydraulic conductivity. The laboratory results shall be evaluated to determine if there is a statistical correlation to the field testing results.

   c. Other engineering parameters, including but not limited to particle size distribution, plasticity, water content, and in-place density, that are needed to evaluate the full-scale liner shall be determined; and

6. Additional test fills were constructed for each time the material properties of a new borrow source changes or for each admixture or change in equipment or procedures.

B. If documentation is available to demonstrate that a previously constructed liner meets the requirements of Part VI above construction of a test fill or the requirements for an additional test fill may be omitted. Documentation of how a full-scale liner or a test fill has been previously constructed should be provided.

C. State how the CQA officer will inspect the construction and testing of test fills to ensure that these requirements are met. During construction of the actual, full-scale compacted liner, the CQA officer shall ensure the following:

   a. Use of same compaction equipment as used in test fill;

   b. Use of same procedures, such as number of passes and speed;

   c. Uniformity of coverage by compaction equipment;

   d. Consistent achievement of density, water content and permeability of each successive lift;

   e. Use of methods to bond successive lifts together;

   f. Achievement of liner strength on sidewalls;

   g. Contemporaneous placement of protective covering to prevent drying and desiccation, where necessary;

   h. Prevention of the placement of frozen material or the placement of material on frozen ground.

   i. Prevention of damage to completed liner sections; and

   j. That construction proceeds only during favorable climatic conditions.

VII. Additional Information Required for the Construction of a Geomembrane Liner. Describe the Information Which Will be Provided to Ensure the Following Requirements Have Been Met:

A. That the bedding material contains no undesirable objects;

B. That the placement plan has been followed;

C. That the anchor trench and back-fill are constructed to prevent damage to the geomembrane;

D. That all tears, rips, punctures, and other damage are repaired, and

E. That all geomembrane seams are properly constructed and tested in accordance with the manufacturer's specifications.

VIII. Additional Information is Required for the Construction of Leachate Collection System. Describe the Information Which Will be Provided to Ensure the Following Have Been Met:

A. That pipe sizes, material, perforations, placement and pipe grades are in accordance with the design.

B. That all soil materials used for the drainage blanket and graded filters met the required size and gradation specifications in the design plan are placed in accordance with the design plant.

C. That all prefabricated structures are inspected for conformity with design specifications and for defective manufacturing.

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Bureau of Land
2520 West Iles Avenue
Box 19276
Springfield, IL 62794-9276

APPENDIX F TO LPC-PA2

INSTRUCTION FOR CLOSURE PLAN AND POST-CLOSURE CARE PLANS FOR PUTRESCIBLE AND CHEMICAL WASTE LANDFILLS

This Appendix sets out the type of information needed in addition to the general information requested in the LPC-PA2 Instructions. You should review Appendices A-G and Section VI of LPC-PA2 form to determine which are applicable to your facility. This Appendix explains the information required in the Closure and Post-Closure Plans.

I. Closure Plan

The closure plan must at a minimum include the following:

A. A map showing the configuration of the facility after closure of all units, with the following:

1. The contours of the proposed final topography (after placement of the final cover) of all disturbed areas and showing how the final contours blend with the surrounding topography;

2. A scale of 1" = 200' (or greater) and a contour interval of two feet (5 foot or 10 foot contour intervals may be used on slopes steeper than 5:1); and

3. The location of all facility-related structures to remain as permanent features after closure;

B. Identification of the "assumed closure date" (i.e. the date during the next permit term on which the costs of premature final closure of the facility will be greatest);

C. Steps necessary for the premature final closure of the site at the assumed closure date;

D. Steps necessary for the final closure of the site at the end of its intended operating life;

E. Steps necessary to prevent damage to the environment during temporary suspension of waste acceptance. (This is necessary only if the operator wants a permit which would allow temporary suspension of waste acceptance at the site without initiating final closure.);

F. A description of the steps necessary to decontaminate equipment during closure;

G. An estimate of the expected year of closure;

H. Schedules for the premature and final closure, which shall include, at a minimum:

1. Total time required to close the site; and

2. Time required for closure activities which will allow tracking of the progress of closure; and

I. A description of methods for compliance with all closure requirements of 35 IAC, Part 811. This will necessitate the following information:

1. Provide estimates of settling rates as they relate to design, construction, and maintenance of the final cover system.

2. A demonstration (i.e., calculations) that the final slope will have a Static Safety Factor of at least 1.5 and a Seismic Safety Factor of at least 1.3. Both short term (i.e., the design period) and long term (tens or hundreds of years) Safety Factors must be calculated.

3. Documentation must be provided that shows that the final slope vegetation and other stabilization procedures will meet the following standards:

   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 shall be compatible with (i.e. grow and survive under) the local climatic conditions;

   d. Vegetation shall require little maintenance;

   e. Vegetation shall consist of a diverse mix of native and introduced species consistent with the post-closure land use; and

   f. 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.

   g. Vegetation shall be tolerant of the landfill gas expected to be generated;

   h. The root depth of the vegetation shall not exceed the depth of the final protective cover system; and

   i. Structures Constructed Over the Unit:

      i. Structures constructed over the unit must be compatible with the land use;

      ii. Such structures shall be designed to vent gasses away from the interior; and

      iii. Such structures must in no way interfere with the operation of a cover system, gas collection system, leachate collection system or any monitoring system.

4. Final cover must have two layers (i.e. a final protective layer on top of a low permeability layer). The following information must be provided:

   a. For Final Protective Layer:

      i. Specification of the thickness of the final cover (minimum: 3 feet);

ii. A description of the soil including a demonstration that it can support the proposed vegetation;

iii. Identification of the source of final cover and a demonstration that the proposed source contains an adequate volume of suitable soil; and

iv. A sampling program, based on statistical sampling techniques, that establishes criteria for acceptance or rejection of materials and construction operations to be used in the construction quality assurance program.

v. A demonstration that the final protective layer is sufficiently thick to protect the low permeability layer from root penetration and freezing and support the proposed final land use.

vi. Assurance that the final protective layer shall be installed soon enough after the low permeability layer is constructed to prevent desiccation, cracking, freezing or other damage to the low permeability layer.

b. Low Permeability Layer (may be soil, geomembrane or other material):

i. Design specifications (i.e., material specifications, thickness, hydraulic conductivity, and compaction, if applicable);

ii. A demonstration that a low permeability layer meeting the design specifications will also meet or exceed the performance of a compacted soil layer 3 feet thick with a hydraulic conductivity of 1 x 10^{-7} cm/sec.

iii. Identification of the source and a demonstration that the proposed source contains an adequate volume suitable soil (if soil is going to be used to construct the low permeability layer).

iv. If the low permeability layer will be a geomembrane, a demonstration that it will have the strength to withstand the stress imposed by the waste stabilization process and a description of the prepared base over which the geomembrane will be placed.

v. A description of the construction techniques that will be used in installing the low permeability layer.

vi. A description showing how the low permeability layer will tie into the liner system.

vii. A sampling program based on statistical sampling techniques and establishing criteria for acceptance or rejection of materials and construction operations to be used in the construction quality assurance program.

5. Calculations demonstrating that all drainage ways and swales have been designed to accommodate runoff from a 100 year, 24-hour precipitation event without scouring or erosion.

II. Post-Closure Care Plan

The post-closure care plan must, at a minimum, include the following:

A. Descriptions of the inspection and monitoring schedules, the inspections themselves, and the criteria for performing maintenance for the following systems:

1. Final cover.

2. Landfill gas monitoring program.

3. Landfill gas collection and disposal/processing facilities (if proposed).

4. Leachate monitoring, collection and disposal systems.

5. Groundwater monitoring program.

B. Criteria for reducing the frequency of inspection of the final cover and the frequency of monitoring gas, leachate and groundwater.

C. Criteria for ceasing to inspect the final cover, ceasing to monitor gas, leachate and groundwater; and ceasing to operate the gas and leachate management systems.

NOTE: If any of the post-closure care information is contained in other reports it may be included in the post-closure care plan by reference.

III. Cost Estimates

The following information must be provided:

A. Closure Cost

1. The itemized cost of applying final cover to the entire area that will be filled during the period starting at the beginning of the permit term and ending on the assumed closure date.

2. The cost of completing the gas monitoring and collection systems and the runoff control structures.

3. The cost of equipment decontamination.

4. The cost of certification of closure.

B. Post-Closure Care Cost

1. The itemized cost of carrying out all of the activities described in the post-closure care plan.

2. Calculations determining the present value of providing post-closure care based on the following assumptions:

a. Landfill operations will cease on the assumed closure date.

b. Post-closure care shall continue throughout the remainder of the design period with no reduction in the frequency or stringency of any post-closure care activity except as allowed by 35 IAC 811.111(c)(1)(A).

c. The interest rate shall be 4 percent per annum and there shall be no inflation.

3. The present value of the post-closure care cost estimate should be calculated as follows:

a. Present Worth on the Assumed Closure Date of Annual Costs Based on First of the Year Payments

$$P_1 = A + A \frac{(1 + i)^n - 1}{i (1 + i)^n}$$

Where: P_1 = Present Worth on the Assumed Closure Date

A = Annual Cost of Post-Closure Care

i = Interest Rate = 4% = 0.04

n = Number of Years in the Post-Closure Care Period -1

Note: If the assumed closure date is within one (1) year of the present, P_1 is the Post-Closure Cost Estimate. If the assumed closure date is more than one (1) year from the present, go on to the next step.

b. Current Present Worth

$$P_2 = F \frac{1}{(1 + i)^N}$$

Where: P = Current Present Worth

F = Present Worth on Assumed Closure Date = P_1

i = Interest Rate = 4% = 0.04

N = Number of Years from Assumed Closure Date to Present -1

c. Example

Let's calculate the present value of the post-closure care cost estimate for a situation in which the annual cost estimate for post-closure care is $50,000/year; the post-closure care period is 30 years; and the assumed closure date is 4 years, 6 months from the present.

i. Step 1

$$P_1 = 50{,}000 + 50{,}000 \frac{(1 + 0.04)^{29} - 1}{0.04\,(1 + 0.04)^{29}}$$

P_1 = $899,186.00

ii. Step 2

$$P_2 = 899{,}186.00 \frac{1}{(1 + 0.04)^{3.5}}$$

P_2 = $783,850.00

4. If the reduction described in Step 3(b) is used (and a permit is issued), the permit letter will include a schedule requiring the operator to post additional financial assurance on the anniversary of the date that the permit is issued. This will be done until the amount of financial assurance reaches the P_1, value calculated in Step 3(a). Using the situation given in 3c., the schedule would be as shown in the table on the next page.

Date for Post-Closure Care*	Amount of Financial Assurance Required
Day Permit is Issued #	$783,850
First Anniversary	$815,204
Second Anniversary	$847,812
Third Anniversary	$881,725
Fourth Anniversary	$899,186

* Financial Assurance is also required for closure. However, since the closure cost estimate is not reduced to its present value, an annual adjustment is not needed.

\# Financial Assurance does not need to be posted with the Agency until the Significant Modification to Obtain Operating Authorization has been submitted. Nevertheless, the day, that the permit approving development of the facility to 35 IAC 811 and 812 (and 814 for existing facilities) standards is issued, shall be the anniversary date for adjusting the post-closure care financial assurance.

C. Sum of the Closure Cost Plus the Present Value of the Post-Closure Cost.

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Bureau of Land
2520 West Iles Avenue
Box 19276
Springfield, IL 62794-9276

APPENDIX G TO LPC-PA2

INSTRUCTIONS FOR PREPARING OPERATING AND REPORTING PLANS FOR CHEMICAL AND PUTRESCIBLE WASTE LANDFILLS

This Appendix sets out the type of information needed in addition to the general information requested in the LPC-PA2 Instructions. You should review Appendices A-G and Section VI of LPC-PA2 form to determine which are applicable to your facility. This Appendix explains how to describe an operating and reporting plan for the facility.

I. Operating Plan

Provide a written description of the facility with supporting documentation describing the procedures and plans that will be used at the facility to comply with the requirements of 35 IAC 811 and any other applicable Parts of 35 IAC: Chapter I. Such description shall include, but not be limited to the following information:

A. The type of waste disposal units and the types of wastes expected in each unit. If the landfilling of shredded waste is planned, include documentation to demonstrate compliance with 35 IAC 811.303(b), including a description of the mechanical shredder proposed for use.

B. The manner in which waste will be placed and compacted to comply with 35 IAC 811.105 and 811.321(a) and (b). Describe equipment to be used, number of passes, density of waste received, compacted density, daily volume, etc.

C. A description of how units will be developed to allow contemporaneous closure and stabilization pursuant to 35 IAC 811.110, 811.111, 811.204, 811.205 or 811.322. The description shall include the filling sequence for each disposal unit and the closure sequence for the facility as a whole.

D. Describe how wastes are loaded, unloaded and moved within the site; provide the estimated traffic volume, number and types of transporting vehicles and other equipment and identify any safety procedures used to prevent accidents during waste transfer operations;

E. The number and duties of employees - including person(s) directly responsible for operations of the facility.

F. The days and hours of operation (include both "business" and other operating hours);

G. Operation of the leachate collection system:

   1. Describe the method and frequency for monitoring leachate. Include personnel, equipment and record keeping procedures.

   2. Describe the maintenance plan. Include procedures and scheduling for routine maintenance, inspection programs and corrective action.

   3. Describe the management of leachate. Provide the protocol and schedules for inspection, handling and removal.

H. Operation of the gas monitoring and management system:

1. Describe the method and frequency for monitoring for gas migration and generation. Include personnel, equipment and record keeping procedures.

2. Describe the maintenance plan. Include procedures and scheduling for routine maintenance, inspection programs and corrective action.

3. Describe the management of gas and condensate, when collected. Provide the protocol and schedules for inspection, handling and removal.

I. Operation of the groundwater and surface water monitoring systems:

1. Describe the method and frequency for sample collection. Include personnel, equipment and record keeping procedures.

2. Describe the routine inspection and maintenance plan to ensure samples are collected and representative of the water being monitored.

J. A method used to screen loads of waste coming into the facility to assure only permitted waste is received. Include a demonstration of compliance with 35 IAC 811.323 and Part 811, Subpart D. NOTE: The load checking program must screen all wastes which are banned from landfilling (such as batteries, landscape waste, etc.) as well as screening for hazardous wastes. Also, a description of the procedure, that will be used in managing any banned or hazard wastes which are discovered by the load checking program, must be included.

K. Intermediate Cover

1. Provide a description of the soil that will be used for intermediate cover including its classification and approximate hydraulic conductive, unless only alternative intermediate cover material is going to be used.

2. If an alternate material (i.e. something other than soil) is proposed for intermediate cover, provide a description of the material and a demonstration that it will be as effective as 1 foot of compacted clean soil.

3. Describe when the intermediate cover will be applied, how thick it will be, how it will be graded and how it will be maintained.

Note: The intermediate cover may not be substituted for any part of the low permeability layer of the final cover system.

II. Reporting

A. A description of the method by which a representative sample of leachate is collected and tested in accordance with 35 IAC 811.309;

B. A description of the method by which a representative sample of landfill gas is collected and tested in accordance with 35 IAC 811.310;

C. A description of the method by which a representative sample of groundwater is collected and tested in accordance with 35 IAC 811.318(e).

D. A description of the reports to be filed in accordance with 35 IAC 811.403(c).

E. A description how the recordkeeping requirements of 35 IAC 811.405 for special waste related information will be satisfied.

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