Waste and Materials Management Program

Guidance for Landfill Organic Stability Plans

NR 514.07(9), Wis. Adm. Code

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Introduction

Municipal solid waste delivered to landfills in Wisconsin typically contains more than 50 percent organic materials. Most of this material is decomposable under the right conditions. During the past decade, the waste management industry worldwide has experienced a growing awareness of the problems decomposable organic materials cause when disposed of in landfills. These problems include:

- the generation of methane and other landfill gases, which can lead to odors and to emissions of greenhouse gases;
- the production of organic acids that may mobilize metals, increasing the toxicity of leachate; and
- problems with physical stability and damaged engineered systems as organics decompose and settlement occurs.

These problems must be managed through engineering controls to ensure the protection of human health and the environment.

Since the advent of improved landfill containment systems in the 1980s and 1990s, landfilled waste is, by design, subject to lower moisture concentrations, decreased microbiological activity and slower decomposition. Although modern landfill designs reduce the short-term potential for gas, leachate and settlement impacts, the organic materials in the landfill remain potentially bioactive for an extended period of time beyond closure and beyond the period for which proof of financial responsibility is required.

To address this situation and reduce the risks and liabilities caused by the presence of significant quantities of undecomposed organic matter in municipal solid waste landfills, the Wisconsin Department of Natural Resources worked with landfill owners and operators, engineering consultants, researchers, and public interest stakeholders to develop requirements in subsection NR 514.07(9), Wis. Adm. Code. This subsection requires MSW landfill owners and operators to submit a plan for significantly reducing the amount of degradable organic material remaining after their facility closes. The basic planning requirement took effect in November 2005. Rule changes with details on required plan contents became effective on December 1, 2006.

This guidance is intended to assist landfill owners, landfill operators, consultants and department staff in preparing and reviewing landfill organic stability plans required under the new rule provisions.

Overview of the Rule

The landfill organic stability rule requires landfill owners and operators to:

- submit an organic stability plan for department approval;
- implement the plan;
- monitor the implementation;
- evaluate the performance; and
- change the plan if necessary.

The landfill organic stability planning rule does *not* require landfill owners and operators to achieve specific quantitative targets or a certain degree of organic stability. There are no enforceable numerical standards in the rule. Many of the processes and tactics to achieve organic stability have not been as thoroughly investigated as landfill containment technology, although the theory and concepts are well grounded. Instead, the rule establishes a framework within which landfill owners and operators can apply their expertise, in a manner tailored for their own facilities, to substantially eliminate the risk and liability caused by the long-term presence of undecomposed organics in their landfills.

Likewise, the rule does not specify the measures owners/operators must take in pursuit of organic stability. Some owners/operators will likely choose techniques that speed degradation of the waste after it has been landfilled. Now that we are reasonably certain about landfills' capabilities as containment facilities, we are in a position to allow landfill operators to employ or experiment with operational methods that, in essence, utilize landfills as large reaction chambers. Other owners/operators may choose a more direct approach, either diverting organic waste away from land disposal or rendering the waste nondegradable prior to landfilling.

Compliance with the rule depends on whether the landfill owner and operator has followed the planning and implementation process, not whether specific results are achieved. This puts an added burden on the department plan reviewer to ensure that the plan is legitimate—i.e., that it can be implemented and that it has a reasonable chance of achieving the purpose of the rule—before approving it.

The transition to organically stable landfilling in Wisconsin will occur over a period of many years and will require landfill owners, landfill operators, consultants and department staff to develop new ideas, experiment in an informed manner with new technologies and learn from each other. Not every plan will achieve the desired results. The rule is designed to accommodate these realities while spurring the collective and gradual reduction of undecomposed organic material in Wisconsin's landfills.

Applicability – NR 514.07(9)(a)

The landfill organic stability rule is designed to be phased in statewide over a five year period, from January 1, 2007, to January 1, 2012. By 2012, all municipal solid waste landfills in Wisconsin with significant remaining capacity should have organic stability plans in place.

The first plans were required to be submitted by January 1, 2007, from facilities that received a plan of operation approval between January 1, 2004, and January 1, 2007. These plans were to be submitted as plan modifications. The purpose of requiring plans from landfills approved since 2004 was to extend the stability planning requirement to facilities that were proposing expansions during the time the department was developing the landfill organic stability rule, as a means of minimizing the overall amount of time needed to transition the state's landfills to an organic stability mode of operation.

Note that the landfill organic stability plan requirement applies to *MSW facilities only*, and *only to waste not yet in place at the time the plan is approved.*

After January 1, 2007, plans of operation for new MSW landfills or landfill expansions will have to include organic stability plans. Department checklists for review of plans of operation will be updated to include the new rule provisions.

MSW landfills whose plans of operation were approved prior to January 1, 2004, do not need to submit an organic stability plan *unless they plan to operate beyond January 1, 2012, and have 50 percent or more of their approved capacity left at that time.* If such a landfill has more than 50 percent or more of its approved capacity left on January 1, 2012, its organic stability plan is due on that date.

Questions & Answers

Does the rule affect waste that has already been disposed of?

No. The rule specifically excludes from the planning requirement all waste that has been disposed of prior to the date the organic stability plan is approved by the department. This exclusion applies even if the waste was disposed of in accordance with a plan of operation approved within the January 1, 2004, to January 1, 2007, time window.

The rule was designed to apply prospectively, i.e., to allow owners and operators to incorporate organic stability concepts into the design and operation of their facilities, prior to the acceptance of waste at those facilities. Many of the techniques owners and operators are likely to use do not work well when applied retroactively to waste already in place. By the same token, the rule allows in-place waste to be included in the plan, and the department encourages owners and operators to consider doing so, where feasible, as a way of further limiting future costs and liabilities.

Contents of Plans – NR 514.07(9)(b)

The rule lists seven items that must be included in landfill organic stability plans. These should be included in plans submitted as plan modifications as well as plans incorporated into plans of operation.

1. Overview of the Plan – A brief summary of how the landfill owner and operator propose to significantly reduce the amount of degradable organic material remaining after the landfill closes.

2. Analysis of Waste Composition – Information on the type and quantity of material that the landfill will accept once the plan is in place. The rule specifies that organic materials be classified, that the percentage of organically inert materials be indicated and that the method of analysis be described.

The primary purpose of the waste composition analysis is to provide enough information to support modeling of landfill gas production. Landfill gas production models generally need inputs on the gas production potential of waste materials that will be subjected to decomposition. The gas production potential is affected by the type and proportion of organic material placed in the landfill.

For existing landfills, waste acceptance records can be used to determine approximate percentages of the organic materials and the organically inert fraction. Generally this level of description should be adequate for modeling landfill gas production. For a more in-depth analysis, classification of organic materials might be based on the cellulose + hemicellulose content; materials with higher cellulose + hemicellulose content tend to have higher methane generation potentials (Eleazer et al., 1997).

Questions & Answers

Does the landfill owner/operator need to perform a physical waste composition study (a "waste sort") in order to provide the required waste composition data?

No. The composition data needed for organic stability plans are typically not that detailed. For modeling purposes, the owner/operator must either confirm that the default values for potential methane generation capacity properly apply to the facility in question, or justify the choice of a different input value. This justification can be based on waste acceptance records.

Can a landfill owner/operator propose an alternative value for the default gas production potential parameter in a gas production model?

Yes. The Wisconsin landfill in question may accept a different mix of materials than the landfills used to calibrate the gas production model being used. The mix would need to be significantly different than a typical MSW landfill (i.e., a much higher or lower proportion of organic wastes) in order to justify developing a site-

specific input value. We would typically require more detailed information about the types and quantities of organic materials anticipated for disposal. For existing landfills, it may be possible to derive the necessary information from waste acceptance records maintained by the landfill operator.

3. Description of Stability Measures to be Taken – A more detailed description of the specific methods the landfill owner/operator will implement to shorten the time the landfill will take to achieve organic stability. The rule identifies three general categories of methods:

- diversion of organics to non-landfill management (*examples: source separation for recycling, compostin, or in-vessel anaerobic digestion; the diverted material does not end up in the landfill after processing*);
- pre-landfill mechanical or biological treatment (*examples: waste shredding, digestion for volume reduction or incineration; the material residues are landfilled after processing*); and
- in-landfill treatment (*examples: leachate recirculation; aerobic, anaerobic, or hybrid bioreactors*).

More information on available methods for reducing degradable organic wastes in landfills is available on the DNR's website at:

https://dnr.wi.gov/topic/Landfills/documents/stabilizationstrategies-rev.pdf

The description of stability measures should provide sufficient detail for the department to evaluate its likely effectiveness, any secondary impacts and regulatory constraints (e.g., applicable rules; licenses or approvals required). It should clearly indicate what portion of the overall waste stream to the landfill will be affected, where the activity will take place and who will implement the stability measure. Plan sheets or diagrams may be needed to completely describe the stability measures, particularly for in-landfill measures.

An owner/operator may want to use additional liquids as part of a stability plan. Additional liquids are any free-liquids-containing waste introduced into the waste mass, other than leachate and gas condensate generated within that waste mass. The mechanism for using additional liquids is a Research, Development and Demonstration plan under NR 514.10. The RD&D plan can be submitted jointly with, or separately from, the organic stability plan. RD&D plans and landfill organic stability plans should be handled using separate approvals because RD&D plans are subject to separate federally based requirements for certain aspects such as valid time periods, renewals and reporting requirements.

Wisconsin's authority to issue RD&D plan approvals is subject to federal rules administered by the U.S. EPA. The EPA may revise its rules in the future to allow Wisconsin and other states permanent authority to grant facilities permission to use additional liquids, if data from states' RD&D projects supports such a decision.

Landfill organic stability plans based on liquids addition to accelerate decomposition in the landfill should describe how the liquid is to be introduced and distributed throughout the waste mass, and how sufficient liquid will be obtained and incorporated so as to achieve meaningful moisture increases that will accelerate microbial action in the waste mass. The landfill's special waste acceptance plan may need to be modified to accommodate wastes containing free liquids.

Addition of liquids is likely to dramatically increase and accelerate gas production; this increase can cause significant operational problems if it is not planned for. The plan should indicate how accelerated gas production will be managed to minimize fugitive emissions of methane, production of odors and related problems. *Collecting and measuring landfill gas is essential to generating gas flow and volume data that demonstrate the facility is on track to fulfill the goals of the approved stability plan and to avoid having to implement a contingency plan.*

4. Schedule for Implementing the Plan – The plan should clearly indicate when its provisions will be implemented. If implementation is to occur in stages, the schedule should be itemized.

Implementation may need to be timed to correspond to logical milestones in the development of a landfill, such as the development of a new phase, or the acquisition of machinery or infrastructure. In some cases (e.g., a small landfill that has recently opened a new phase), implementation may not be possible for some time. However, landfill owners and operators are expected to implement organic stability measures as soon as it is reasonably practicable to do so. Significant delays should be clearly justified.

5. Anticipated Outcome of Implementing the Plan – The landfill owner/operator must forecast the results of implementing the landfill organic stability plan *relative to the landfill stability goals and the definition of landfill organic stability in s. NR 500.03(120g), Wis. Adm. Code*. In other words, the plan should provide enough information to conclude that the proposed measures will be sufficient to meet the goals in NR 514.07(9)(c). Plans that do not indicate the goals will be reached should not be approved.

Typically, this forecast will rely on modeling of gas production through the life of the landfill and the post-closure period. One standard model for landfill gas production is EPA's Landfill Gas Emissions Model, or LandGEM. This is a relatively simple first-order decomposition rate model that uses a Microsoft Excel spreadsheet interface to predict air emissions from landfilled municipal solid waste. As of the publication of this guidance, LandGEM Version 3.02 is the current version of the model. LandGEM's outputs can be easily assessed to determine whether a proposed organic stability strategy is likely to achieve the goals and can be approved. LandGEM is available at the following link:

https://www.epa.gov/ttn/catc/dir1/landgem-v302.xls

LandGEM requires only a handful of user inputs:

- landfill opening and closing year;
- landfill waste design capacity *or* estimated year-by-year waste tonnages;
- methane generation rate (k);
- potential methane generation capacity (L_0);
- non-methane organic compound (NMOC) concentration in the gas; and
- methane content of the gas.

Time and Capacity Inputs: Because LandGEM is a gas production model, the inputs for landfill opening and closing year should correspond to the years of waste acceptance in the portion of the facility contributing gas to the flow monitoring point in the gas collection system. For example, if flow is monitored at the gas extraction blower, all areas of the landfill served by the blower constitute the landfill system for LandGEM purposes. The landfill opening and closing years should be the first and last years of waste acceptance in that system. Note that this may mean that the model is accounting for gas generated by waste already in place and not subject to the landfill organic stability rule.

The waste design capacity or waste acceptance rate should correspond to the same landfill area as that chosen for the opening and closing years. Generally, all waste accepted by the landfill should be included in the waste acceptance rate. LandGEM was calibrated to typical MSW landfills that accept a variety of waste streams in addition to household waste. Waste that is truly not typical of MSW landfills, such as large volumes of inert industrial waste, dredge material or combustor ash, may be excluded from the waste tonnage accepted for modeling purposes.

Default k and L_0 Inputs: Default values exist for the model inputs k and L_0. There are two sets of default values, the "inventory" defaults and the Clean Air Act defaults. The Clean Air Act defaults are intended for use in determining whether a landfill is subject to the control requirements in the New Source Performance Standards and are conservative in the sense that they yield very high estimates of landfill gas production. The inventory defaults are based on emission factors in EPA's AP-42 publication and reflect experience from a number of actual landfills in the U.S. For purposes of landfill organic stability plans, operators should use the inventory defaults, unless they propose site-specific model inputs.

Within the inventory defaults, a k value of 0.04/year, reflecting non-arid conventional landfilling, is most appropriate for Wisconsin landfills that are not adding significant additional liquids to the waste mass. For those adding liquids, a higher k may be appropriate (see "Site-Specific k and L_0 Inputs," below).

L_0 should be set at the inventory value of 100 m^3/Mg, also reflecting non-arid conventional landfilling, unless a site-specific L_0 value is proposed.

Model runs using default values may also be useful in establishing a baseline gas generation value against which to compare the effects on gas generation of organic stability measures. Additionally, it may be necessary to use default values to model portions of the landfill that are not subject to the organic stability plan, to distinguish the

gas generated by these areas from the gas generated in the area covered by the stability plan.

Site-Specific *k* and L_0 Inputs: LandGEM allows the input of site-specific values for *k* and L_0. A site-specific *k* value may be appropriate for a landfill that adds liquids to the waste mass through leachate recirculation or the acceptance (through an RD&D plan approval) of outside liquid wastes. A site-specific L_0 should be considered if the landfill accepts an unusually large or small proportion of organic waste relative to the typical Wisconsin municipal solid waste landfill.

For *k*, EPA has published Method 2E (US EPA, 2000) for determining landfill gas production flow rate using field measurements and data. Although LandGEM offers a default *k* value of 0.7 for bioreactor operation, this value is based on waste samples in laboratory test containers and might only be appropriate for a true bioreactor in which waste is maintained at approximate field capacity and process controls are in place to ensure optimum bioreactor operation through time. More realistic values based on full-scale, operating wet landfill cells are provided in the EPA publication *First-Order Kinetic Gas Generation Model Parameters for Wet Landfills* (Reinhart et al., 2005). The empirical *k* values derived in this study of facilities in generally humid temperate climates range from 0.11/year to 0.21/year. Wisconsin values might be expected to be somewhat lower based on low average annual air temperatures relative to the sites included in the study. Unless other documentation is provided, a maximum *k* value of 0.08 is recommended for use in organic stability plans in Wisconsin.

It may be possible to approximate a site-specific L_0 based on knowledge of waste composition for a given landfill. Waste tonnages can be classified and compared to the results of the DNR's 2002 Statewide Waste Composition Study to determine if the landfill can justify an L_0 that departs from the norm. For organic stability strategies that rely on diversion of organics, landfill owners/operators will need to determine alternative L_0 values in order to forecast gas emission changes resulting from the diversion. However, the department has no guidance on how to vary site-specific values for these parameters. More information will become available as experience is gained and research advances in this area.

NMOC and Methane Inputs: For purposes of assessing organic stability plans, the key inputs are *k* and L_0. The inputs for NMOC and methane contents are primarily for air pollution permitting and do not affect predicted waste decomposition rates. Typically, the default for NMOC concentration is 600 ppmv (reflecting no or unknown co-disposal of hazardous waste), and a default of 50 percent is used for methane content. If desired, methane concentrations can be adjusted to reflect site-specific gas monitoring data. However, such adjustments should have only a minor effect on calculated gas generation rates.

LandGEM is more completely described in the LandGEM Version 3.02 User Guide (Alexander et al., 2005). Other models for estimating landfill gas production also exist (Reinhart et al., 2005 contains a list). Some of these models may be proprietary to landfill

companies or environmental consultants. It is possible that these models will take advantage of site-specific data more appropriate to Wisconsin than LandGEM, which is designed to serve as a nationwide model, or have other advantages that recommend their use. If another model is used, the model and associated documentation should be provided as part of the organic stability plan.

6. Description of Monitoring and Evaluation – The plan should specify what devices and techniques will be used to monitor the progress of the facility in implementing the plan and the effectiveness of the implementation. Regardless of the type of approach used to achieve landfill organic stability, monitoring of gas flows and conversion to volume will be necessary to show progress against the predicted results and the goals. Landfills with organic stability plans will likely have to install additional valves and flow meters to assure that all gas flows are being quantified.

Fugitive gas emissions are likely to be unknown. The landfill should be operated to reduce fugitive gas emissions to a minimum. It may not be practicable to capture 100 percent of the gas generated, but an aggressive inspection program should be implemented to detect and correct uncontrolled gas emissions and landfill gas odors. The landfill owner/operator will want credit for the collection of as much gas as possible in comparing implementation of the organic stability plan to the calculated gas generation rates. For LandGEM modeling purposes, an assumption of zero fugitive gas emissions results in a conservative estimate of gas collection; if there are fugitive emissions, it means more gas is being produced than is being accounted for.

Other aspects of monitoring will vary depending on the measures to be implemented. For waste diversion, waste composition should be evaluated periodically to ensure that organic waste is not getting into the landfill in excessive quantities. For in-landfill measures such as bioreactor operation, process indicators such as waste mass temperature and moisture content may need monitoring (e.g., moisture content can be measured during gas well construction events). Buildup of ammonia in leachate over time is a particular concern in landfills subjected to liquid additions, as ammonia is toxic to the microorganisms that degrade waste, and there is no attenuation mechanism for ammonia in the anaerobic landfill environment. Monitoring requirements for leachate, gas, gas condensate and other processes such as settlement should be included in any organic stability plan approval unless the monitoring requirements have already been sufficiently detailed in the plan of operation.

Monitoring requirements specified in NR 507.215 and 514.07(7) generally represent a minimum level of monitoring for liquid addition strategies in the absence of site-specific requirements approved in conjunction with a leachate recirculation plan approval. A more complete discussion of monitoring at landfills applying liquids is available in Tolaymat et al., 2004.

NR 514.07(9)(d) requires the owner or operator to continually evaluate the performance of the implemented landfill organic stability plan and to report to the department annually.

Operational adjustments to the plan may be made on an ongoing basis, subject to the conditions in the applicable approvals, and should be summarized in the annual report.

7. Contingency Plan – The rule requires that each plan include a description of the measures to be taken if monitoring and evaluation indicate the landfill is unlikely to achieve the goals in the rule. Every five years after plan implementation, the facility owner or operator is required by NR 514.07(9)(e) to examine progress against the approved plan and to determine whether the contingency plan needs to be implemented in place of the original plan.

The contingency plan should represent an alternative strategy for meeting the organic stability plan goals, not just minor adjustments to the primary strategy. Since the contingency plan would be invoked only if the primary plan were clearly not working and ongoing adjustments to the plan had been ineffective, the contingency plan should outline a different approach to accelerating organic stability.

The contingency plan does not have to contain as much detail as the primary plan. It should, however, (1) identify one or more alternative strategies for pursuing the landfill organic stability goals that would be suitable for the facility, and (2) provide enough analysis to demonstrate that it would be sufficient to meet the landfill organic stability goals in NR 514.07(9)(c). Annual reports provide an opportunity to refine or change the contingency approach based on more current technologies or developments in the marketplace.

Questions & Answers

For landfills at which moisture addition is the stability strategy, won't the inclusion in the model of waste already in place at the time of plan implementation affect the gas curves and make it difficult to demonstrate that the plan will achieve the stability goals?

Yes. Without an increase in the moisture content, waste will not generate gas as quickly as predicted by a model that uses a relatively high *k* value to predict gas generation for the entire waste mass. Facilities that have been practicing leachate recirculation prior to the implementation of a stability plan may not experience this problem. For other facilities, it may be possible to model the cumulative behavior of the waste by dividing the waste mass into wet and dry fractions and modeling each separately. It may be necessary to upgrade or install meters to quantify gas flows from old waste versus waste subject to the organic stability plan requirement or to assess the older waste by use of default model parameters instead of those suited for waste with higher moisture content. Owners/operators and department staff should take this issue into account when evaluating plan progress.

For landfills at which moisture addition is the stability strategy, should the model use a different* k *value for the years after the landfill receives final cover to reflect diminished input of liquids?

The LandGEM model does not accommodate varied *k* values as a function of time. Moreover, researchers believe that microbial activity that drives the *k* value may not change significantly if the waste is sufficiently wet when final cover is placed.

Can the landfill owner or operator claim that gas generation is not meeting plan goals because of significant unaccounted-for fugitive emissions?

No. The owner or operator must support the claim of fugitive emissions with data (e.g., from ambient air monitoring). The owner/operator should be eliminating routes of egress for fugitive gas and should be operating the gas extraction system to minimize or eliminate fugitive gas emissions throughout the operational and post-closure life of the landfill.

Why does the contingency plan have to involve a different approach for achieving landfill stability?

If, for example, the addition of outside liquid wastes or recirculated leachate became impossible to continue at a facility due to insurmountable operational problems (e.g., odors that cannot be controlled), the landfill operator needs to have identified an alternative that does not depend on liquid additions to show compliance with the organic stability plan requirement. The alternative might be based on waste diversion or pre-processing of waste.

Organic Stability Plan Goals – NR 514.07(9)(c)

NR 514.07(9)(c) lists four goals that landfill owners and operators are expected to incorporate into their organic stability plans. These goals are based on landfill gas production, which serves as an indirect measure of organic matter decomposition. The goals are set at a theoretical point during the life of the landfill when landfill organic stability, as defined in s. NR 500.03(120g), Wis. Adm. Code, is very close to being achieved:

> "Landfill organic stability" means a landfill has reached an organically stable state when landfill gas production has effectively ceased, landfill leachate levels have no significant organic component, the organic fraction of the waste mass will not readily decompose when placed in ideal moisture and temperature conditions, and there is no longer any measurable settlement of the landfill surface.

The goals are:

- **A monthly average total methane plus carbon dioxide gas production rate less than or equal to 5 percent of the maximum monthly average total gas production rate observed during the life of the facility, or less than 7.5 cubic feet of total gas per year for each cubic yard of waste in the facility.**

  This goal is intended to ensure that the decomposition of organic waste in the facility is producing gas at the low end of the gas generation curve. The *de minimis* rate of 7.5 cf-gas/cy-waste is included to ensure that facilities from which significant organic waste is diverted do not have such a low maximum monthly average that the 5 percent goal cannot be met.

- **A steady downward trend in the rate of total methane plus carbon dioxide gas production.**

  This goal establishes that the waste decomposition has peaked and is actually following a consistent diminishing trend.

- **Production of total methane plus carbon dioxide gas cumulatively representing 75 percent or greater of the projected total gas production of the landfilled waste.**

  This goal ensures that there is not a significant reservoir of undecomposed organic material in the facility that could resume decomposition if moisture were introduced, for example in the event of a failure in the final cover.

- **Reduction of the time necessary to reach landfill organic stability to 40 years or less after site closing.**

This goal sets a target of 40 years for achieving the preceding three goals based on the current Wisconsin requirement for proof of financial responsibility of 40 years.

Questions & Answers

Is there a penalty for failing to meet the goals within 40 years?

No. The goals are not to be used as enforceable environmental standards. They are more properly regarded as planning targets. However, a landfill owner is expected to adjust the plan as necessary throughout the life of the landfill and the post-closure period if monitoring data indicate the landfill is unlikely to meet the goals.

Will the achievement of the goals entitle a landfill owner/operator to shut down gas collection, discontinue leachate collection, or otherwise alter the long-term care of the facility?

No. Landfill owners remain responsible for long-term care in perpetuity. Reaching stability goals does not indicate the landfill is safe without its engineered systems. Decisions to alter long-term care requirements would be made separately and in accordance with engineering judgment and site-specific factors, including the presence of sensitive receptors, the performance of the engineered systems, environmental monitoring results, an evaluation of risk, and other considerations. Achievement of stability goals would be relevant to the judgment, but not decisive.

Is there a leachate quality goal corresponding to the gas production goals?

No. The goals are based on gas production because of the close association between gas production and organic decomposition. Leachate quality may be more variable and may be affected by non-organic substances in the landfill. For example, current research indicates ammonia concentrations in leachate may be elevated once the waste in a landfill is heavily degraded. Leachate may need to be treated even after the organic stability goals have been met. The achievement of the stability goals in the rule is not by itself an indication that the landfill's engineered systems can be shut down.

Evaluation – NR 514.07(9)(d) and (e)

Landfill owners and operators are expected to evaluate the implemented plan to determine whether progress is being made toward reaching the goals. The basic requirements are submittal of an annual report and, every five years, a more in-depth evaluation. The primary purpose of the five year evaluation is to determine whether it is necessary to implement the contingency plan.

The annual report is due one year after department approval of the plan, unless the approval sets forth an alternate schedule. It is not expected that the owner/operator or the department will be able to draw firm conclusions about the success of the implemented plan based on the first few annual reports, due to the lengthy timescales involved. However, the annual reports provide an opportunity for the owner/operator to document operational issues, implementation steps and data needs.

Landfill owners and operators should be encouraged to incorporate organic stability annual reports into the general annual report for their facility, where applicable. Landfill organic stability annual reports submitted separately should not be charged a separate annual report review fee.

The landfill owner/operator can implement the contingency plan at any time. Typically the department would only require implementation of the contingency plan as the result of a review of the facility's five year report. In reviewing these reports – and in particular the first five year report – department staff should recognize the practical limitations of much of the data and modeling associated with landfill stability measures and should be prepared to exercise reasonable discretion regarding the progress being made in implementing the plan.

The department recognizes that the concept of landfill organic stability planning is evolving and that changes may be needed to the rule based on experience gained during its implementation. Other states and jurisdictions may also develop useful approaches to the issue of landfill organic stability. For that reason, the Natural Resources Board, at the suggestion of department staff, directed the Waste & Materials Management Program to form a panel of independent experts for the purpose of conducting a formal review of the rule after it has been in place for five years. The department expects to establish this panel so that it can participate in structuring data collection during the first five years of rule implementation.

As directed by the Natural Resources Board upon its approval of the detailed landfill organic stability rule provisions, the department may not require that an owner/operator implement a contingency plan until the expert panel has completed its review.

Department Review and Fees – NR 514.07(9)(f)

Landfill organic stability plans submitted as part of plans of operation are reviewed in the context of the plan of operation, not separately, and are subject to the same review timeframes. There is no separate fee or written approval for a landfill organic stability plan submitted as part of a plan of operation.

Plans submitted as modifications to the plan of operation must be either approved or disapproved within 90 days of submittal of a complete plan. There is no formal completeness step as for feasibility reports or plans of operation, but reviewers should notify the owner/operator in writing as soon as possible after receipt of the plan if it is incomplete. An incomplete plan is one that does not address one or more elements of the rule requirements for contents of a plan. If a plan is complete but more information is needed for the department to issue its decision, the information should be requested in writing from the owner/operator; the letter should note that the plan is complete but cannot be approved without the information being requested.

Department staff should follow the steps below in their review of landfill organic stability plans that are submitted as plan modifications:

1. Enter into the DNR's Field Investigator Site Tracking (FIST) system.
2. Generate/send an acknowledgement letter and fee invoice (note: fee is currently $2,500, as specified in ch. NR 520, Table 5, Wis. Adm. Code).
3. Review the submitted plan for completeness. Consult with the central office plan review experts, the Recycling and Solid Waste Section Chief and the regional supervisor as necessary.
4. If incomplete, notify the preparer and the facility in writing regarding what is missing; wait for submittal of missing information.
5. Once complete, the department has 90 calendar days to approve or disapprove the plan modification. Department staff should, however, consult with the facility operator or representative to address problems with the submittal and avoid having to issue a decision disapproving a proposed organic stability plan modification.
6. Prepare a draft approval and send it to the central office plan review experts for comment prior to final signature and mailing.
7. Log the decision into the FIST system.

Plan modification approvals should be in Findings-of-Fact, Conclusions-of-Law format. Examples of previous approvals will be posted on the Waste and Materials Management common drive (the W: drive), or on the FIST system, for reference by department staff.

Annual reports related to landfill organic stability plans are subject to the $500 annual report fee specified in NR 520, Table 5 if they are received as submittals separate from other annual reports that might be required for the facility.

Questions & Answers

Can the owner/operator combine the stability plan submittal with other related submittals such as an RD&D plan? How many review fees apply? Should department staff combine approvals?

We anticipate that many owners/operators will find it efficient to submit stability plans at the same time that they submit related proposals necessary to implement the stability approach they have chosen. These may include not only RD&D plans but also processing facility applications, leachate recirculation plan modifications, and other applications and plan modifications necessary to carry out the stability plan.

The department encourages owners/operators to coordinate submittal of these plans to allow review of all related elements of the overall proposal at once. However, for the convenience of the reviewer in comparing plan contents to rule requirements, the department recommends that these plans be submitted as separate documents, under one cover letter, since discrete rule sections govern these submittals.

If multiple plans are included in the plan of operation, the normal review fee for the plan of operation is the only applicable fee. Otherwise, separate fees generally apply for each separate plan modification or facility application, as specified in NR 520, Tables 2 and 3. One exception to this guideline is the coordinated submittal of an RD&D plan with a landfill organic stability plan. More often than not, the reason for submittal of the RD&D plan will be to support the landfill organic stability plan. Therefore, if these plans are submitted together, as plan modifications, one review fee – the $2,500 stability plan fee – is charged.

Department staff should write a stand-alone approval for any plan that requires a separate license, such as a processing facility. An RD&D plan approval should be separate from other approvals for the project to maintain clarity in defining the approval periods and reporting requirements. Some consolidation of other approvals may be warranted for efficiency's sake, depending on the specifics of the proposed plans and facilities.

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