

## T-9.3 SWANA TECHNICAL POLICY

### **TERMINATION OF MUNICIPAL SOLID WASTE LANDFILL POST-CLOSURE CARE REQUIREMENTS**

#### **I. POLICY**

SWANA supports the use of a performance-based evaluation process for considering the termination of regulatory post-closure care (PCC) of municipal solid waste landfills (MSWLFs), provided that it clearly identifies the criteria for demonstrating protection of human health and the environment (HHE) in the absence of active control systems for leachate and landfill gas. In order to effectively evaluate and determine the requisite length of a MSWLF's PCC period, state programs should incorporate three (3) fundamental principles in developing their guidance and/or regulations.

- (1) The regulatory PCC period should have a finite term with the length determined on a site-specific basis;
- (2) The conduct of a performance-based evaluation of the closed MSWLF that relies on the collection and analysis of site-specific data over a defined period can be an effective means of establishing the requisite length of the PCC period on a scientific basis; and
- (3) The identification and weighting of performance-based criteria should be established along with the technical evaluation approach with input and consensus from appropriate stakeholders.

#### **II. DISCUSSION**

##### **A. Background**

The Resource Conservation and Recovery Act (RCRA), Subtitle D Criteria for Municipal Solid Waste Landfills establishes a required PCC period of thirty (30) years (CFR Title 40 § 258.61). However, the regulations also stipulated that the period can be increased or decreased to protect HHE as determined by an approved state. As written, the regulation does not include guidance on assessing impacts on HHE, nor determining whether or on what basis an increase or decrease to the 30-year PPC period should be made.

In this regard, the development of a concise and widely accepted methodology for measuring potential impacts to HHE and determining how those impacts relate to setting the appropriate PCC period is warranted. Establishing this methodology will allow facility managers to plan effectively for collecting the information necessary to demonstrate the site is protective of HHE and to support the appropriate termination of the PCC period.

While EPA (2016) developed guidelines for evaluating PCC timeframes for hazardous waste disposal facilities under RCRA Subtitle C (CFR Title 40 § 265), it has not prepared similar guidance for evaluating PCC at Subtitle D landfill facilities. Therefore, each approved state remains responsible for developing its own policies and regulations, and, as a result, a number of states have taken different approaches to determining when to terminate PCC. The two most common approaches are to terminate PCC when the waste achieves organic stability, or when the landfill achieves functional stability. Both approaches have significant data collection requirements during a landfill's operating and PCC periods to support termination of the PCC period.

## B. Current Approaches

States are increasingly utilizing landfill stability to determine PCC requirements. Two approaches that are commonly considered to represent protection of HHE are organic stability or functional stability, which are defined as follows:

- **Organic stability** – The goal of organic stability is to ensure that the landfilled waste mass has been biodegraded to the point that human health, environmental, and financial risks associated with the potential exposure to the remaining undecomposed waste are minimal. To achieve organic stability over the planned PCC period, a landfill owner or operator may need to work with their customers to undertake upstream organic waste diversion to reduce the amount of degradable material disposed in the landfill, conduct pre-processing of waste materials through thermal, biological or physical means while the landfill is still accepting waste, and/or complete some form of in-situ treatment via leachate recirculation or bioreactor landfill operation to enhance degradation of the organic materials during its active life.
- **Functional stability** – a landfill is commonly considered to be functionally stable and protective of HHE when it has been demonstrated that HHE will be protected when the landfill's active control systems such as landfill gas collection or leachate collection are turned off and only the landfill's passive control systems – such as the final cover system are functioning. This requires the collection and analysis of data for leachate, landfill gas, and cover settlement to demonstrate a “predictable steady-state” such that an evaluation of a future threat to a potential receptor based upon a specific end-use and surrounding land use can be developed with confidence. Under a functional stability approach, a landfill facility would rely on the natural degradation of the waste materials during operating and PCC periods to achieve the steady state conditions to justify the termination of PCC.

It is important to understand that functional stability relies on the effective and continued operation of the landfill's passive control systems – specifically the final cover system. If the final cover system does not perform as prescribed, the landfill may cease to be functionally stable. In addition, a functional stability analysis is based on certain assumptions regarding land use and population densities and characteristics around the closed site that may change in the future. Evaluation of termination of PCC of a functionally stable landfill should include conservative assumptions for future changes to land use and population with respect to proximity and types of potential receptors.

In the absence of an US EPA-approved approach to terminating PCC, some states have developed their own methods to terminate regulatory PCC. A few examples are included below.

### *Florida*

In 2016, the State of Florida issued a guidance on long-term care (LTC) at solid waste disposal facilities. LTC is essentially the same as the PCC period described by the federal regulations. This guidance applies to municipal solid waste landfills as well as other solid waste facilities such as construction and demolition debris landfills. In considering how to terminate LTC for lined disposal facilities, Florida considers the potential for using performance-based methodology. They acknowledge that the approach focuses on when a facility reaches functional stability. While not completely inert, functional stability is found when the facility does not pose an unacceptable threat to HHE in the absence of active controls (i.e., leachate collection, landfill gas collection and control, etc.). Following achievement of functional stability, a facility can be moved to custodial care. Custodial care is the term used by Florida to describe the property management period following LTC.

Demonstration of functional stability can be achieved by addressing four components: leachate management, gas control, groundwater monitoring and maintenance of the final cover. The guidance provides clear criteria for establishing functional stability for each of the components.

### *Kansas*

The State of Kansas developed one policy and three technical guidance documents in 2013 and 2014 outlining data collection requirements for ultimate reduction or termination of the PCC period with an organic stability target in its current form. Kansas considers achieving stability in the context of key monitoring parameters to be important to reducing or terminating PCC. Part of their analysis would be conducting trend analysis and collecting data to support the determination.

### *Washington*

Washington revised their closure and PCC regulations in November 2012. Under the new regulations, a landfill is functionally stable when it does not present a threat to HHE at the point of exposure (POE) for humans or environmental receptors. To determine this, the landfill should assess potential threats to HHE by considering leachate production and quality, LFG production and composition, cover system integrity, and groundwater quality.

### *Wisconsin*

Wisconsin developed their guidance in 2006, before most of the other states. The state focuses on organic stability instead of functional stability. It proposes organics diversion, mechanical or biological treatment or in-landfill treatment to achieve organic stability. The rule required existing landfills that had not filled 50 percent or more of their approved capacity by January 1, 2012, to submit a plan modification by that date to implement organic stability measures. The rule also required that operation plans include organic stability plans for all new landfills or landfill expansions submitted for review after January 1, 2007.

## **C. Data Requirements**

To implement either functional or organic stability objectives, significant supporting data are required. The type of data and frequency of collection will depend on the site-specific evaluation criteria established. In general, most states with PCC termination programs require that landfills should demonstrate stability in four areas: groundwater quality; landfill gas generation; leachate quantity and quality; and cover integrity. Once a state of long-term protection of HHE is demonstrated, states may approve a reduction or terminate the PCC period, including cessation of data acquisition and active controls.

Below are some considerations for demonstrating stability for groundwater monitoring; landfill gas; leachate; and stability and cover integrity based on the variety of state PCC termination approaches.

Groundwater Monitoring – landfills should provide information over time to demonstrate groundwater parameters are being met or are below the established regulatory threshold. This data should also be used after terminating active controls to confirm continued compliance. Landfills should determine what data are necessary to demonstrate that the other control systems and/or waste mass have achieved stability including:

- Frequency of measurement; and
- Indicator parameters suitable for measuring impact from a relatively degraded waste mass.

Landfill Gas – landfills should demonstrate that gas generation is decreasing, and the facility does not pose an unacceptable risk to HHE at the POE. Landfills should determine what data from the waste mass (e.g., extraction wells, vents, or at a flare) are necessary to be able to demonstrate landfill gas stability, including, but not limited to:

- Methane migration;
- Methane flow;
- Temperature; and
- Methane and carbon dioxide concentrations.

Leachate – landfills should demonstrate that the leachate quality and quantity is stable or improving and that leachate, should it reach the POE, does not pose an unacceptable risk to HHE at that location. The following information represents the minimum data set that should be collected over time from sumps and/or tanks:

- Biochemical oxygen demand (BOD) and chemical oxygen demand (COD);
- Ammonia; and
- pH.

Stability and Cover Integrity – landfills should provide data over a time period demonstrating that the cover is performing well in controlling gas emissions and migration, it has substantially reduced leachate generation, and that settlement rates are within acceptable parameters in order to minimize any impact on the final cover. Provide supporting information that stormwater management system including drainage benches, swales, down chutes and piped let-down structures are adequate for long-term management of stormwater run-off and protect the final cover system from erosion.

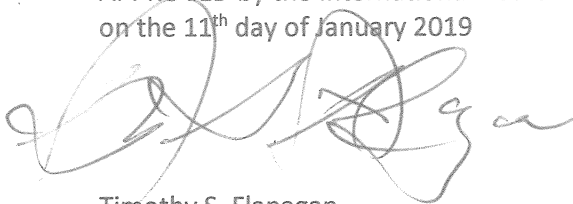
#### **D. References**

- EPA. (2016, December 15). *Guidelines for Evaluating the Post-Closure Care Period for Hazardous Waste Disposal Facilities under Subtitle C of RCRA*. Retrieved from [https://www.epa.gov/sites/production/files/2017-01/documents/pcc\\_guidance\\_508\\_withdateandletterhead.pdf](https://www.epa.gov/sites/production/files/2017-01/documents/pcc_guidance_508_withdateandletterhead.pdf)
- EREF. (2011, March 18). *Determining Critical Data Requirements for Implementation of the EPCC Methodology Prerequisites Module: A Multi-Site Case Study*. Retrieved from [https://erefdn.org/wp-content/uploads/2015/12/PostClosure\\_MD09138.FINAL%20REPORT-geosyntec.pdf](https://erefdn.org/wp-content/uploads/2015/12/PostClosure_MD09138.FINAL%20REPORT-geosyntec.pdf)
- Florida DEP. (2016, February 20). LTC at Solid Waste Disposal Facilities. *Guidance Document SWM-04.45*. Tallahassee, FL.
- ITRC. (2006). *Evaluating, optimizing, or ending post-closure care at municipal solid waste landfills based on site-specific data evaluations*. Washington, DC: Alternatives Landfill Technologies Team, The Interstate Technology & Regulatory Council.
- Kansas DHE. (2014, June 27). *Preparation of Postclosure Care Reduction and/or Termination Plans*. Retrieved from Bureau of Waste Management Technical Guidance Document SW-2014-G1: <http://www.kdheks.gov/waste/techguide/SW-2014-G1.pdf>
- O'Donnell, S. T., Caldwell, M. D., Barlaz, M. A., & Morris, J.W.F. (2018, February 21). Case study comparison of functional vs. organic stability approaches for assessing threat potential at closed landfills in the USA. *Waste Management*, 415-426. Retrieved from <https://doi.org/10.1016/j.wasman.2018.02.001>
- State of Washington Department of Ecology. (2011, February). *Preparing for Termination of Post-Closure Activities at Landfills Closed Under Chapter 173-304 WAC*. Retrieved from [www.ecy.wa.gov/biblio/1107006.html](http://www.ecy.wa.gov/biblio/1107006.html)

Wisconsin DNR. (2007, March). *Guidance for Landfill Organic Stability Plans*. Retrieved from <https://dnr.wi.gov/files/PDF/pubs/wa/wa1125.pdf>

CERTIFIED to be correct and complete statement of the approved policy.

APPROVED by the International Board  
on the 11<sup>th</sup> day of January 2019

A handwritten signature in black ink, appearing to read 'Timothy S. Flanagan', written over a faint circular stamp.

Timothy S. Flanagan  
International Secretary