

**Iowa Department of Natural Resources
Land Quality Bureau
Solid Waste and Contaminated Sites Section
Related to:
Request to Reduce or End Post-Closure Care and
Preparation of Post-Closure Care Reduction/Termination Plan**

April 2023

Overview

This document provides guidance to municipal solid waste landfill operators who are seeking to terminate their post-closure care (PCC) requirements. This guidance is only applicable to closed Municipal Solid Waste Landfill (MSWLF) units in accordance with 567 Iowa Administrative Code (IAC) [Chapter 113](#).

Pursuant to the Iowa Code and the administrative rules implementing the Solid Waste PCC program, the Iowa Department of Natural Resources (DNR) is afforded the discretion to terminate the PCC requirements prior to the end of the typical 30-year post-closure period if it deems the facility to have satisfied the requirements to protect human health and the environment.¹

In order to seek termination of the PCC requirements, the operator should submit a termination plan to the DNR for review. The information that should be included in a termination plan is summarized in this guidance document. If based on the information provided, the DNR determines that the facility has satisfied the requirements to protect human health and the environment, then the DNR has the authority to terminate the PCC requirements.

Finally, it is recognized that each facility is unique. Therefore, each determination by the DNR will also be unique and based on the site-specific features, potential risks, etc.

¹ The DNR is also afforded the authority to extend the post-closure care period as necessary to protect human health and the environment.

Section 1: Preparatory Action Items

The following action items should be completed, as applicable, prior to submitting a Reduction/Termination Plan (RTP) to reduce or terminate PCC requirements.

1. Consider how leachate, gas, water quality, and final cover stability will be assessed, as well as the proposed site-specific criteria that must be met in order to reduce or end PCC requirements and meet the proposed end-use goals for the facility.
2. Identify present and future site conditions, if any, which are not conducive to reducing PCC. Establish a work plan and schedule for the mitigation of existing conditions, if needed.
3. Conduct a review of ongoing supplemental activities initiated to end or reduce PCC requirements to determine if the goals have been met or modifications to the supplemental activities and schedule are needed.
4. Compare the mitigation and supplemental activities schedules to the closure permit ending date and request a permit extension, if needed.
5. Conduct an on-site inspection with DNR Central Office and Field Office staff to observe conditions prior to requesting significant reductions of PCC requirements.

Section 2: RTP Preparation

Section 2.1 describes the content requirements of an RTP. In general, the RTP should address the following:

1. Do the proposed measurements, schedule, and evaluation methods demonstrate the equilibrium of the MSWLF unit based on trends in Sections 2.1.1 through 2.1.6?
2. Does the trend analysis demonstrate equilibrium for at least five years prior to a reduction in PCC for any activity?

The determination of equilibrium for leachate and landfill gas emissions can be accomplished by sampling over a five-year demonstration period, during which there is no statistically significant difference in key parameter values with time. If there is a statistically significant difference in any of the key parameters, a new five-year demonstration period must begin. After one demonstration period in which key parameters are shown to be in equilibrium, the reduction of appropriate activities may begin, after approval by DNR. After three consecutive demonstration periods in which key parameters are shown to be in equilibrium, appropriate activities may be terminated, after approval by DNR.

Section 2.1 Plan Contents

The RTP should address the following:

1. Status of Preparatory Action Items.
2. Compatibility with the approved Post-Closure Plan and the proposed end use for the facility.
3. The proposed site-specific criteria that will be used to determine when a particular PCC activity can be reduced or terminated,
4. Key monitoring parameters that will be used to determine the degree of the stability of the waste,
5. Supplemental monitoring parameters that will be used to interpret and validate trends in the key monitored parameters,
6. Sampling points and sampling frequencies,
7. Equipment and methods that will be used to collect the samples,
8. Methods (sampling and laboratory) that will be used to provide quality assurance and quality control,
9. Statistical methods that will be used to evaluate the data, and
10. Modeling, as applicable, that will be used to evaluate impact at the Point of Exposure (POE).

Section 2.1.1 Leachate Monitoring and System Termination

The RTP should characterize leachate composition and quantity/flow rate (which together define the mass flow rate of a contaminant) that can signal the potential reduction and/or termination of PCC activities. Key leachate parameters for demonstrating the degree of MSWLF stability include:

1. Quantity
2. Temperature
3. Five-day biochemical oxygen demand

4. Chemical oxygen demand
5. Ammonia
6. pH
7. Total suspended solids

Routine leachate sampling typically measures leachate composition from combined landfill units prior to the leachate leaving the MSWLF site, but it does not necessarily represent the actual character of the leachate produced by an individual disposal unit. Samples that accurately represent the individual disposal unit are the best indicators of MSWLF unit stabilization.

If the request of the permit holder includes terminating the Leachate Collection System (LCS), then a minimum of an additional five years of PCC monitoring after terminating the LCS must occur to allow the landfill to reach a new equilibrium. Measurements from leachate piezometers must support the position that five years is an adequate length of time after LCS shutdown to reach a new equilibrium, or the monitoring must continue until equilibrium is demonstrated.

Termination of a LCS is also contingent on demonstrating that the maximum measured concentrations of constituents in leachate are less than the Ground Water Protection Standards (GWPS), 567 Iowa Administrative Code paragraph 113.10(6) "h" or "i," for all compounds of concern at the Point of Compliance (POC) and POE. This demonstration should be made assuming worst case leachate head levels and current leachate quality measured from samples collected in the waste (not sampled from storage structures). If needed, the DNR will review submitted fate and transport modeling (using only dilution and dispersion modeling) results to determine if these criteria are met. The POC is the same location as the downgradient monitoring system. The POE is a location where the public may be exposed to leachate seeps. If leachate quality in the landfill meets all GWPS, then the LCS can be terminated. The DNR may consider fate and transport modeling, or other appropriate modeling techniques, to help decide criteria for curtailing the LCS.

In addition, the LCS cannot be shutdown if it is a component to any corrective action measures being implemented for documented groundwater contamination, unless it can be demonstrated that it is no longer necessary for corrective action.

Please also note that the DNR may require continued operation of the LCS, depending on the status of other criteria.

Section 2.1.2. Landfill Gas Collection System (GCS) Monitoring

The permit holder of any MSWLF unit that has a GCS may use data collected from the system to demonstrate the degree of MSWLF stabilization. The RTP should define the leveling out of landfill gas composition and flow rates which, either on their own or in combination with an evaluation of leachate generation, can show that stabilization has been reached and the PCC activities can be reduced or terminated without adversely affecting public health and the environment. Key landfill gas parameters for demonstrating the degree of achieving stabilization include:

1. Flow rate
2. Methane (CH₄)
3. Non-methane organic compounds (NMOC)
4. Carbon dioxide (CO₂)
5. Oxygen (O₂)

Ideally, the landfill gas sampling frequency should match the leachate sampling effort since both leachate and landfill gas generation are typically the result of the same reactions within the waste mass. The coordination of the two sampling efforts will allow comparison of the sampling results to provide a better confirmation of the trend analysis. Samples that accurately represent the individual disposal unit are the best indicator that the MSWLF unit has reached stabilization.

If the request of the permit holder includes terminating the landfill gas collection system, then a minimum of five years of PCC monitoring after terminating gas collection must occur to allow the landfill to reach a new equilibrium. If testing with gas probes indicates that that equilibrium has not been reached at the end of five years, the PCC monitoring period will continue until equilibrium is achieved. The GCS can be considered for shutdown if current flow rate is less than 10 percent of modeled peak flow, and the remaining methane generation potential is less than 10 percent of modeled total generation potential.

In addition, the GCS cannot be shutdown if it is a component to any corrective action measures being implemented for documented groundwater contamination, unless it can be demonstrated that it is no longer necessary for corrective action.

The shutdown of the GCS must also be in compliance with any approval from the Air Quality Bureau of the DNR.

Section 2.1.3. Groundwater Quality

Any MSWLF unit that seeks to reduce or terminate PCC must demonstrate that if a contamination plume exists:

1. The parameters of concern are trending down in concentration levels and are below the GWPS (as determined following 567 IAC 113.10(6)"h" and "l"),
2. That monitoring data has been collected for a sufficient time period after termination of LCS and/or GCS,
3. The plume is not advancing even when an LCS and/or GCS or a remedial system is shut down, and
4. Institutional controls and/or environmental covenants that restrict land use and/or provide for continued monitoring are in place to protect human health and the environment.
5. The permit holder may seek to reduce a PCC activity if they can demonstrate that the reduced activity in no manner affects groundwater quality.

The permit holder should evaluate the impact on groundwater quality at the POC assuming that leachate head on the liner reaches a maximum level after termination of the LCS. Fate and transport modeling, using only dispersion and dilution modeling, may be used to determine the dilution factor of detected constituents in the leachate to the POC.

In addition, monitoring wells should be either properly abandoned in accordance with 567 IAC [Chapter 113](#) or maintained in the post permit period. If the permit holder wishes to maintain monitoring wells, a plan to maintain the wells that will remain must accompany the RTP.

Section 2.1.4. Storm Water Quality

The RTP should show how storm water quality is not impacted by the MSWLF unit for the following aspects:

1. Erosion rates must be sustainable as determined by an approved erosion model such as the Revised Universal Soil Loss Equation 2 or by direct measurement of sediment transport,
2. Leachate seeps, both existing and theoretical due to termination of the LCS,
3. Contamination plumes to a gaining stream or drainageway.

Section 2.1.5. Settlement/Ponding/Slope Stability

The RTP needs to demonstrate that the rate of settlement will not cause ponding, erosion (e.g. terrace flow line failure or letdown failure) or unsafe conditions (e.g. unsafe slopes). It is recommended that topographic survey data be used to make an evaluation. A stabilized final grade should indicate a surface that has a uniform slope that is 3% or greater, show no evidence of differential settlement, and that annual settlement is less than 10% of cumulative settlement.

The DNR expects the permit holder to demonstrate that all final slopes and planar surfaces are safe using a Factor of Safety (FOS) of 1.5. The DNR may accept a lower FOS if an Environmental Covenant (See Section 2.5) restricts exposure to the public.

Section 2.1.6. Vegetation

Noxious weeds are required to be eliminated from vegetated final caps. A relatively stable and undisturbed biological community of species should be established and trees should be regularly removed.

Section 2.1.7 Annual Reporting

The RTP should include an annual progress reporting requirement. This should also include any proposed changes to the RTP as a result of data/information collection and evaluation.

Section 2.2 Collection of Supplemental Data

In addition to the key monitoring parameters described in this document, collection of the following supplemental data may be necessary in order to interpret and confirm trends related to MSWLF equilibrium, and to facilitate the establishment of an RTP.

1. Landfill inputs, including:
 - a. MSWLF disposal data, including:
 - i. Quantity (tonnage)
 - ii. Composition
 - iii. Disposal sequence
 - iv. Disposal locations
 - b. Added moisture data, including, as available:
 - i. Quantity
 - ii. Composition
 - iii. Temperature

Examples of added moisture sources include: active area precipitation and storm water run-on; infiltration through intermediate and final cover; research, development, and demonstration (RD&D) liquids; and recirculated leachate and/or storm water.
2. Landfill outputs including:
 - a. Toe drain, cleanout, and landfill gas (LFG) condensate data including:
 - i. Quantity
 - ii. Composition
 - iii. Temperature
 - b. Leachate seep and fugitive LFG emission data including:
 - i. Flow rate estimates
 - ii. Composition
 - iii. Locations
3. State of the waste, including:
 - a. Temperature of the MSWLF
 - b. Topographic changes in the surface of the landfill
4. Climatic data including:
 - a. Wind velocity
 - b. Temperature
 - c. Atmospheric pressure

Section 2.3 Environmental Covenant

As part of reducing or ending PCC requirements, the permit holder may consider working with the DNR to prepare and record an environmental covenant. Prior to that, it must be confirmed that the facility is located subject to an Environmental Covenant that complies with Iowa Code [455I].