TCEQ REGULATORY GUIDANCE
Waste Permits Division
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Exiting Post-Closure Care for Municipal Solid Waste Landfills

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Post-Closure Care for Municipal Solid Waste Landfills

This document offers guidance about how to assess conditions at a municipal solid waste (MSW) landfill facility in Texas that has reached the end of its post-closure care (PCC) period. This document also includes criteria on when a facility can exit PCC, and procedures for submitting a request to exit PCC.

This guidance assumes a landfill facility has a single landfill unit, however, this guidance can also be applied to individual units at facilities with multiple units, as long as the permit is revoked only after the last unit exits PCC.

What is Post-Closure Care?

PCC ensures that a closed landfill is properly monitored, maintained, and managed after the facility has ceased accepting waste. This care is necessary to mitigate potential impacts on human health and the environment.

Required Activities During Post-Closure Care

During PCC, the owner or operator of a MSW landfill facility is required to:

- Operate, maintain, monitor, and analyze the landfill gas collection, leachate collection, and groundwater monitoring systems.
- Maintain the integrity and effectiveness of all final cover, facility vegetation, and drainage control systems.
- Follow facility-specific requirements listed in their permit.

Procedures for implementing PCC activities are included in the PCC plan approved for the facility.

Length of the Post-Closure Care Period

The PCC period for MSW landfills, including arid exempt (AE) landfills, is 30 years for Type I and Type IAE landfills and 5 years for Type IV and Type IVAE landfills. MSW facility types are detailed in Title 30, Texas Administrative Code (30 TAC), Section 330.5. PCC periods are detailed in 30 TAC 330.463. In accordance with 30 TAC 330.453 and 330.455, MSW landfill units that stopped receiving waste prior to October 9, 1993, are also subject to a PCC period of 5 years.

Determining When to Exit Post-Closure Care

TCEQ rules specify a 30-year PCC period for Type I landfill units, and a 5-year PCC period for Type IV units, Pre-Subtitle-D units, and other units subject to 30 TAC 330.453 and 330.455. However, these periods may not be sufficient to demonstrate

that there are no potential threats to human health and the environment. Additionally, the full 30- or 5-year period may not always be necessary. TCEQ rules allow for the owner or operator of an MSW landfill to conduct a facility-specific review of their facility to demonstrate the appropriate length of their PCC period.

A facility may exit PCC when:

1) the requirements of a PCC plan are met,
2) a demonstration can be made that a landfill does not pose a threat to human health and the environment,
3) TCEQ approves the request for a facility to exit PCC, and
4) TCEQ revokes the landfill's permit.

The process for a landfill to exit PCC includes data collection, analysis, and report generation, conducted by or on behalf of the owner or operator. The data and reports then need to be sent to TCEQ. The procedures for data collection, analysis, and report generation are discussed further in the Assessing Facility Conditions section (page 6).

Extending the Post-Closure Care Period

At the end of the 30-year PCC period, the owner or operator may determine the landfill is not ready to exit PCC. If this occurs, the owner or operator should notify TCEQ's MSW program[1] in writing that PCC activities will continue. In addition, they should propose a time frame for the extended PCC period. This notification helps TCEQ track the status of permitted landfill facilities. TCEQ will respond to and acknowledge this notification.

In accordance with 30 TAC 330.463(b)(2), TCEQ may increase the length of a PCC period if TCEQ determines that a lengthened period is necessary to protect human health and the environment. In accordance with rule[2], TCEQ may require changes to the monitoring activities beyond the requirements specified in the approved PCC plan during the extended period. The length of the PCC period extension will be determined by TCEQ on a case-by-case basis. Owners and operators should continue to conduct all activities required for PCC during the extended PCC period.

Reducing the Post-Closure Care Period and Ending It Early

The length of a PCC period may be reduced or ended early if a landfill owner or operator can demonstrate that the reduced period is sufficient to protect human health and the environment. When proposing a reduced PCC period, the owner or operator should submit an independent engineer certification with a landfill assessment report as a supporting document (page 5). TCEQ will review and make a decision on reducing the PCC period.

To end PCC early, follow the procedures described in the Process to Exit Post-Closure Care section (page 5).

[1] www.tceq.texas.gov/permitting/waste_permits/msw_permits/msw_contact.html
[2] 30 TAC 330.371(f), 330.371(k), 330.407(a)(2), 330.407(b)(4), and 330.407(c)(6)

Suspending Certain Activities During Post-Closure Care

Leachate management, as well as gas monitoring and control, may be suspended early (or reduced), before the end of the PCC period, as allowed by rule. The owner or operator must successfully demonstrate that the leachate or landfill gas no longer poses a threat to human health and the environment, in accordance with 30 TAC 330.463(b)(1)(B) for leachate and 30 TAC 330.371(e) for gas monitoring. The owner or operator does not have to submit a landfill assessment report or certification, but it is recommended that they follow the guidelines in the Assessing Facility Conditions section (page 6) for their specific system.

To request the suspension of leachate management or the reduction of gas monitoring and control, submit a letter requesting suspension with any applicable demonstration documentation to TCEQ. MSW Permits Section staff will review the request and any supporting justification, and make a decision on suspending the required activities early.

The request to suspend (or stop) leachate management during the PCC period may not use the approaches described as liner criteria in 30 TAC 330.331-341.

Impact of Exiting PCC on Other TCEQ Authorizations and Activities at the Landfill Site

Typically, a landfill also has air or water quality authorizations from other TCEQ programs. It is possible that by the end of the PCC period, an MSW landfill may not be ready to stop operation of the landfill gas collection and control system required under 30 TAC 330.993(a). In these situations, owners or operators must follow the authorization conditions and contact the relevant TCEQ program for questions related to the continuation of the separately authorized or required activities.

Some MSW landfill sites may have non-disposal waste processing activities allowed under the landfill permit or with separate authorizations, including, recycling, mulching, and composting. Owners and operators should contact MSW Permits staff, before the permit is revoked, to discuss continuing processing activities at the facility after the landfill exits PCC. MSW Permits staff will discuss options for continuing those activities under the current permit or a new authorization.

Process to Exit Post-Closure Care

When an owner or operator is ready to request their facility exit PCC, they should follow these procedures. Steps 1A, 1B, and 1C may occur concurrently:

Step 1A: Independent Engineer Certification

A certification signed by an independent professional engineer licensed in the state of Texas is required as part of the application to exit PCC. The certification verifies that PCC has been completed in accordance with the approved PCC plan as required by

30 TAC 330.465(a). The certification must include a landfill assessment report as supporting documentation. A suggestion for the certification is provided:

> I, [insert name], P.E., certify that I am a licensed professional engineer in the state of Texas (#insert PE number). To the best of my personal observations of the facility, information, and knowledge, I certify that the post-closure care for [insert landfill name and permit number] has been completed in accordance with the approved post-closure care plan. All applicable documentation necessary for the certification of completion of post-closure care is included.

Step 1B: Landfill Assessment Report

The landfill assessment report should contain information and data demonstrating that landfill conditions are stable and that the landfill is not a threat to human health and the environment. The landfill assessment report must describe conditions related to landfill gas, groundwater, leachate, final cover, and surface drainage control systems. The facility conditions and the criteria for their assessment are detailed in the Assessing Facility Conditions section (page 6).

The landfill assessment report may be prepared by staff under the supervision of an independent engineer licensed in the state of Texas, as long as the final report is signed and sealed by the engineer who signed the certification in Step 1A.

Step 1C: Inspection by a TCEQ Regional Office

Before applying to exit PCC, the owner or operator must contact the TCEQ regional office that oversees the region where the facility is located to schedule an inspection that confirms all PCC activities have been completed. If deficiencies are noted, the owner or operator must work with the TCEQ regional office staff to resolve any issues. TCEQ regional office staff will then issue a completed inspection report. A completed inspection report is required as part of the PCC application. The contact information for the regional offices can be found on[TCEQ's Region Directory webpage](#)[3].

The owner or operator must have the required documents available as part of the inspection. These documents include, but are not limited to:

- Facility permits.
- The site operating plan.
- The post closure care plan.
- Site operating records.
- Final cover inspection and maintenance reports.
- Landfill gas monitoring records, including remediation status for exceedances.
- Groundwater monitoring records, including the corrective action status.
- An affidavit to the public in accordance with 30 TAC 330.19(c).

[3] www.tceq.texas.gov/agency/directory/region/reglist.html

Step 2: Application for Exiting Post-Closure Care

TCEQ does not have a form for applying to exit PCC. Instead, the owner or operator of a landfill must submit the following to TCEQ's MSW Permits Section[4]:

- An inspection report completed by a TCEQ regional office.
- A certification by an independent engineer that verifies that PCC has been completed in accordance with the PCC plan.
- A landfill assessment report that discusses and assesses the facility conditions.
- Any additional documentation specified in the permit conditions and closure authorization.

TCEQ will review these documents and information and make a preliminary determination if the landfill can exit PCC. Owners or operators will have opportunities to address any identified deficiencies and provide supplemental information before the preliminary determination is made.

Step 3: Voluntary Revocation

After preliminary approval from TCEQ is granted, the owner or operator must submit a *Request for Voluntary Revocation of a Municipal Solid Waste Permit or Registration* form (TCEQ-10359)[5] to request the revocation of their permit. If the voluntary revocation form is not submitted, the facility will not be approved to exit PCC and PCC activities will have to continue. After the voluntary revocation form is received and approved, TCEQ will revoke the permit.

Assessing Facility Conditions

The following sections specify the facility conditions that must be assessed and reported in the landfill assessment report, and detail how an assessment should be performed.

Conditions for Exiting Post-Closure Care

As part of the PCC application, the facility owner or operator should assess the conditions of their facility to determine if the facility is ready to exit PCC. For a landfill facility to exit PCC, all of the following factors should be in an acceptable condition and detailed in the landfill assessment report:

- Landfill gas generation amounts and indications of landfill gas migration.
- Groundwater monitoring conditions.
- Leachate generation quantity and quality.
- Final cover stability.

[4] www.tceq.texas.gov/permitting/waste_permits/msw_permits/msw_contact.html
[5] www.tceq.texas.gov/downloads/permitting/waste-permits/msw/forms/10359.pdf

- Surface drainage control.
- Consideration of permit conditions and other factors.

Sources of Information About Facility Conditions

Potential sources of information about facility conditions include:

- Site Operating Records [30 TAC 330.125(b)].
- Permit conditions.
- Relevant information included in the permit application.
- Landfill gas monitoring reports.
- Gas collection and control system operating records.
- Landfill gas emission monitoring records.
- Groundwater monitoring reports.
- Leachate removal, analysis, and disposal records.
- Landfill cover inspection and maintenance records.
- Surface drainage system inspection and maintenance records.
- Other operation and maintenance records.

TCEQ recommends using the most recent 10 years of available data for each condition when preparing your assessment report. If 10 years of data is not available, clearly explain the reasons for the missing data for each condition. It is important to include the date range of the data used in the assessment. The report should contain sufficient data to allow for an evaluation over time.

Landfill Gas Generation and Migration

The owner or operator should investigate whether the landfill is generating gas and if there is indication of landfill gas migration. To exit PCC, landfill gas generation and migration should be minimal or non-existent and within the standards described in 30 TAC 330.371.

Use available information derived from gas collection and control system measurements, or gas sampling points within the landfill, to assess the amount (or rate) of landfill gas generation. Data points include, but are not limited to, methane concentration, landfill gas generation and removal rate, and other parameters appropriate for the facility.

Provide an explanation of the gas generation rate and gas monitoring data. TCEQ suggests compiling landfill gas monitoring data in tables and time-series plots for each gas monitoring probe to assess whether there is active, recent, or periodic landfill gas migration.

If methane gas concentrations in gas monitoring probes are greater than 5% by volume during the period used for the assessment report, provide further information about the range and trend of methane concentrations detected, and the potential for future

gas migration. Explain whether detections are episodic and describe any possible causes you've identified for them. Statistical methods may be used to evaluate the data. If statistical methods are used, explain how the methods are appropriate for the evaluation purpose and, if applicable, the type of the data distribution. For Type I landfills, the period of data evaluation is 10 years. For Type IV and Type IVAE landfills, the period of data evaluation is 5 years.

Methane gas exceedances, a trend of increasing methane concentrations at the end of the PCC period, and evidence of landfill gas migration could be indicators that the buried waste in the landfill is continuing to decompose and has not stabilized. If this is the case, a longer PCC period may be needed, as determined by TCEQ.

Groundwater Conditions

All Type I Landfills and MSW landfills that have particular requirements specified in their permit are required to monitor groundwater quality for statistically significant changes from background conditions. For a facility to exit PCC, there should not be groundwater conditions that require enhanced monitoring or corrective actions. The owner or operator should evaluate available groundwater monitoring results and investigate trends in groundwater data.

TCEQ suggests compiling historical groundwater analytical data in tables and time-series plots for each monitored constituent at each monitor well, and evaluating the trends of the data obtained for the assessment report. Increasing trends may be indicative of potential future background exceedances. Statistical methods should be used to evaluate trends when trends are difficult to determine visually. If statistical methods are used to evaluate data, explain how the methods are appropriate for the evaluation purpose and, if applicable, the distribution type of the data. For Type I landfills, the period of data evaluation is 10 years. For Type IV landfills, the monitoring data evaluation period is 5 years.

Provide the following for the groundwater data during the period used for the assessment report:

- Current groundwater monitoring status of each well, detailing which wells are in detection monitoring, assessment monitoring, or corrective action stages.
- Trends in constituent concentrations.
- Constituent concentrations that exceed background concentrations.
- Wells with constituent concentrations that exceed a groundwater protection standard.

If a monitoring well is in assessment monitoring or corrective action status at the proposed end of the PCC period due to ongoing monitoring and response actions, as required by 30 TAC 330.409 and 30 TAC 330.419, the PCC period will need to be extended.

If a monitor well is in assessment monitoring or corrective action status in the two years preceding the end of the PCC period, or if a constituent exhibits an increasing trend during the period used for the assessment report, the length of the PCC period may need to be increased, as determined by TCEQ.

AE landfills are typically exempt from groundwater monitoring requirements but may include the sampling of nearby wells or springs as part of the required certification. TCEQ suggests providing the results of this sampling, if this sampling occurred.

Leachate Quantity and Quality

For a facility to exit PCC, leachate generation rates should be minimal. The composition of leachate should also be stable. The owner or operator should evaluate the relevant data on leachate removal, analysis, and disposal from the site operating records.

Typically, only Type I landfills have leachate collection systems, but other landfill types may also have these systems if required by their permit. Any landfill with a leachate collection system should evaluate leachate generation.

TCEQ suggests compiling leachate data (removal amounts, disposal amounts, and composition) in tables and time-series plots for each leachate collection area during each quarter or other specified period, if available. Otherwise, use the annual data for each leachate collection area. For purposes of this guidance, the leachate collection area is a discreet liner area served by one leachate sump, a group of leachate sumps, or all leachate sumps at a landfill unit. When determining a leachate collection area, you should use the smallest area for which the relevant data is available.

For landfills where leachate sampling and analysis is performed due to MSW permit conditions or other obligations (for example, an agreement with the publicly-owned treatment works), the sampling locations need to comply with the conditions specified in the permit or agreement. Regardless of the specific sampling locations chosen, the leachate sample must be taken before the leachate is commingled with non-leachate streams (such as contaminated surface runoff) if commingling or mixing is allowed by the permit. If available, include an explanation of how concentrations of monitored leachate constituents have varied during the period used for the assessment report.

Provide an explanation of the leachate data during the period used for the assessment report. Include information about the quantity of leachate removed and disposed of from each leachate collection area during each quarter or other specified period.

Statistical methods should be used to evaluate the trends when trends are difficult to determine visually. If statistical methods are used to evaluate the data, explain how the methods are appropriate for the evaluation purpose and, if applicable, the distribution type of the data.

Increasing or unstable leachate generation amounts, or unstable concentrations of monitored constituents, can be indicators of conditions that warrant further monitoring and evaluation, and a longer PCC period, as determined by TCEQ.

Final Cover Stability

Final cover should be stable and require minimal maintenance for a landfill to exit PCC. To determine if final cover is functioning as designed, the owner or operator should conduct an inspection of the cover, review past inspections, and review maintenance records. Provide an explanation of findings from the current inspection, past inspections, and maintenance records. Include information about the numbers

and types of final cover repairs performed each year in the five-year period prior to the proposed end of PCC.

Examples of final cover not being stable include slope failures or slides, erosion, leachate outbreaks, grass coverage not meeting the required percentage, and excessive subsidence or settlement that compromises the final cover integrity and slope stability. If the final cover is not stable and requires maintenance and repairs, the length of the PCC period may need to be increased.

Surface Drainage Control

Surface drainage control systems should be functioning as designed in order for a landfill to exit PCC. Generally, these surface drainage control systems should manage stormwater run-on and runoff, prevent erosion, and prevent the discharge of waste. The owner or operator should inspect drainage features, review past inspections, and review maintenance records. Include information about the numbers and types of drainage system repairs performed each year in the five-year period prior to the proposed end of PCC. Maintenance issues include, but are not limited to, silted-in drainage structures, breaches in berms or dikes, erosion, trash in outfalls, and ponded water. The length of the PCC period may need to be increased if the landfill has ongoing surface drainage maintenance issues or is not managing drainage adequately.

Other Factors and Permit Conditions

The owner or operator should review facility permit documents to determine if there are other conditions or facility-specific factors that could impact the facility's ability to exit PCC.

Contact Us

If you have questions, please contact the MSW Permits Section by phone at 512-239-2335, or by email to mswper@tceq.texas.gov.