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Part III, Attachment III-G
Landfill Gas Management Plan

**Part III
Attachment III-G**

LANDFILL GAS MANAGEMENT PLAN

**Pescadito Environmental Resource Center
MSW No. 2374
Webb County, Texas**

PESCADITO
ENVIRONMENTAL RESOURCE CENTER

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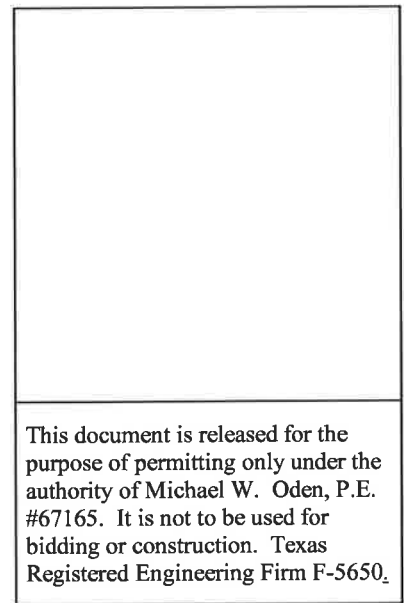
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1.0 INTRODUCTION - §330.371(a)

This landfill gas management plan (LFGMP) has been developed for Rancho Viejo Waste Management, LLC (RVWM) in accordance with 30 Texas Administrative Code (TAC) §330.63(g) and Chapter 330, Subchapter I, for the Pescadito Environmental Resource Center (PERC) in Webb County, Texas. This plan provides a site-specific approach to implementing landfill gas management, including gas control and monitoring. Landfill gas contains approximately equal amounts of flammable methane and non-flammable carbon dioxide and various other trace gases, and is produced by micro-organisms that biologically decompose organic wastes in the landfill. The purpose of this plan is to provide systems and controls so that landfill gas will be managed to mitigate the potential for methane to exceed 1.25 percent by volume in on-site structures (excluding gas control or recovery system components), or 5 percent by volume in monitoring points, landfill gas probes or subsurface soils at the facility boundary. These concentrations correspond to 25 percent and 100 percent, respectively, of the lower explosive limit (LEL) of methane, which is the lowest percent by volume of a mixture of methane and air that will propagate a flame in air at or above 25° C and atmospheric pressure.

The following maximum allowable methane gas concentrations have been established in accordance with 30 TAC 330.371(a)(1) and (2) for facility structures, excluding gas control or recovery systems, and the facility boundary:

Location	Maximum Allowable Percent of the LEL	Equivalent Methane Concentration by Volume
Structures	25%	1.25%
Facility Boundary	100%	5.0%

The PERC landfill will comply with all applicable federal and state regulations. These include the Environmental Protection Agency's (EPA) - Clean Air Act, New Source Performance Standards (NSPS) for municipal solid waste (MSW) landfills, and the applicable requirements of the TCEQ, including standard permit requirements and 30 TAC Chapter 330, Subchapter U.

2.0 METHANE MONITORING PROGRAM - §330.371(b)

RVWM will establish a routine methane monitoring program at the PERC landfill to make sure the methane concentrations do not exceed 1.25% by volume in facility structures or 5% by volume at the facility boundary, as discussed in Section 1.0 above. This program will be based on establishing a series of monitoring probes or other methane detection devices and checking the methane concentration (if any) in these monitoring systems on a periodic basis.

2.1 Site Conditions

In developing this methane monitoring system, a number of site-specific factors were considered. The type and frequency of monitoring has been based on these factors, which are discussed below.

Soil Conditions – Soil conditions at the site were thoroughly explored and tested by licensed professional geoscientists and geotechnical engineers. Their findings and conclusions are presented in the Geology Report in Part III (Attachment III-E). These findings clearly state that this landfill is located in a predominantly clay-rich subsurface environment with overall low transmissive characteristics. Occasional lenses or layers of somewhat coarser-grained materials, where present, would provide a preferential flow path for subsurface gas migration.

Hydrogeologic Conditions – The Geology Report also describes the hydrogeologic conditions at the site. Exploration of the site found that groundwater exists within the upper 160 feet below grade, but further studies indicate that this groundwater appears to be perched, or isolated, within the slightly more porous sediments while the surrounding clay limits the movement of groundwater. Excavation for the landfill is expected to result in dewatering or draining these small water-bearing lenses or layers that may extend outward from the excavation.

Hydraulic Conditions – The site is located in a semi-arid area with limited rainfall and a high evaporation rate. The relocation of surface ponds will remove local recharge in the vicinity of the landfill and decrease moisture conditions immediately beneath the site. This will result in a more efficient environment for monitoring potential landfill gas. Therefore, hydraulic conditions at the site will change somewhat with the development of the landfill. Several existing livestock watering tanks within the proposed landfill footprint will eventually be replaced with tanks farther away. A series of detention or conveyance channels around the perimeter will drain the site. These features are not expected to result in local recharge of the shallow groundwater system. There are no impacts to landfill gas monitoring anticipated from these hydraulic conditions.

Location of Facility Structures – Proposed facility structures and the property boundary will not interfere with the landfill gas monitoring system, as shown on Figure III-G.1-1.

Utility Lines and Pipelines – No existing or proposed utility lines will impact the landfill gas monitoring system. Several pipeline easements and/or pipelines exist [within](#) the [permit boundary but none are in](#)

[proximity to the](#) landfill footprint. All of these are for oil or gas gathering lines. See Figure 1 in Appendix III-G.1 (III-G.1-1). None of the lines are transmission lines. Gathering lines typically move produced hydrocarbons from the many wellheads in an oil or gas production field to some central “gathering” point, such as storage tanks or transmission lines. There are no gathering points on the landfill site. Typically, easements and lease agreements for oil and gas production allow the landowner to relocate active pipelines at his expense. Also, when pipelines are no longer being used, they are considered abandoned, whereby the easement becomes void and the pipeline may be removed.

Buried pipelines at or adjacent to a [waste disposal unit](#)~~landfill~~ are a concern because the trench created for the pipeline can become a conduit for landfill gas migration. Such trenches characteristically do not achieve a permeability that is as low as surrounding undisturbed soil. Therefore, special attention will be given at the facility to locate and manage pipelines and pipeline easements at this site, to protect the interests of the pipeline owners or operators, to provide safety to landfill construction workers, and to effectively monitor the site for gas migration. [Currently no pipeline or pipeline easement is in close proximity to the waste disposal unit.](#)

The types of monitoring to be used at the facility are discussed below in Section 6.

2.2 Accommodations for Pipelines

The following steps will be taken to implement landfill gas monitoring with respect to pipelines [should it become necessary](#):

1. The facility owner or operator will have the location of all pipeline easement boundaries at the site marked by placing stakes or other markers at the property and landfill footprint boundaries; these markers will be incorporated into the system of site markers,
2. The owners or operators of all pipelines on the facility will be required to physically mark the actual locations of all of their pipelines in the area described above, whether such pipelines were installed in an easement or not,
3. PERC will require the owner or operator of all pipelines on site to declare which pipelines are active and which are no longer used and thus are abandoned,
4. PERC will cause all abandoned pipelines to be removed at some time prior to construction of the landfill in that area of the site,
5. PERC will cause a notation to be placed in the deed records of Webb County, or other similar place, to state that every specific easement for abandoned pipelines is vacated or nullified, and will place a similar notation in the Site Operating Record,
6. Where pipelines remain at or adjacent to the [waste disposal unit\(s\)](#)~~landfill~~, the PERC owner or operator will install a gas monitor vent into the backfill around the pipe near the property boundary, and
7. Where pipelines have been removed, the trench area will be over-excavated to undisturbed soil and backfilled with well-compacted clay for a distance of at least 10 feet along the axis of the pipeline from the facility boundary.

3.0 ACTION PLAN - §330.371(c-d)

The action plan will be implemented if methane readings at any location exceed:

Location	Maximum Allowable Percent of the LEL	Equivalent Methane Concentration by Volume
Structures	25%	1.25%
Permit Boundary	100%	5.0%

In this context, “structures” does not include landfill gas control or recovery systems.

3.1 Immediate Actions to Protect Human Health

It should be recognized that a single event exceedance of allowable limits on a gas indicator or alarm does not necessarily mean that the concentration of methane has actually exceeded allowable levels; however if concentrations exceeding the allowable limits are observed, the following actions will be taken immediately per §330.371(c)(1):

1. If limits are confirmed to have been exceeded in a facility structure, the structure will be evacuated in an orderly fashion according to the following procedures:
 - All persons shall leave the structure immediately.
 - Electrical equipment will NOT be turned on or off, or unplugged or operated in any manner (i.e., lights, fans, overhead doors, drills, etc.).
 - Once out of the building, someone shall notify the General Manager or designated alternate.
 - If possible without re-entering the building, disconnect electrical power to the building.
 - Personnel shall not re-enter the building until authorized by the General Manager or designated alternate.

4.0 LANDFILL GAS PROGRAM IMPLEMENTATION - §330.371(e)-(f)

PERC will continue to operate and maintain the gas monitoring and control program for a minimum period of 30 years following the certification of final closure of the landfill, or until PERC has been issued a written authorization from TCEQ to reduce or eliminate the program. TCEQ may issue authorization to reduce or eliminate gas monitoring and control activities based on a demonstration that there is no potential for gas migration into on-site structures or beyond the landfill property boundary, based on appropriate data collection and additional studies.

The owner or operator of the PERC landfill may revise the gas monitoring and control systems during the operating life of the landfill and throughout the 30-year post-closure period. Revisions may be necessary to produce a current, effective system for monitoring landfill gas (LFG) and to implement an effective control system. Plans for post-closure use of the site and all post-closure activities will take into account the need to have an ongoing LFG monitoring and control system, and shall not interfere with the function or effective operation of the LFG monitoring and control systems. Any underground utility trenches, including gas or oil gathering or transmission pipelines, that cross the landfill facility boundary [in the vicinity of the waste disposal unit\(s\)](#) will be vented and monitored for the presence of LFG as a part of the routine monitoring program. However, any such underground utility trenches that are effectively eliminated will not be required to be monitored. Effective elimination of a buried utility at the landfill boundary shall mean removal of the pipeline and associated backfill to undisturbed soil for a distance of at least 10 feet from the facility boundary, and filling the resulting excavation with moisture-conditioned compacted clay soil. [There are currently no pipeline or pipeline easements in close proximity to the waste disposal unit.](#)

6.0 Perimeter and Continuous Monitoring Network - §330.371(h-i)

This plan provides the procedures for monitoring for the presence of landfill gas along the site permit boundary, and to monitor the potential for gas accumulation within on-site structures. This gas monitoring system will be modified as needed to reflect changing on-site and adjacent land uses.

The potential for explosive gases to migrate underground is affected by pressure gradients caused by the generation of landfill gas, the site geology, and hydrogeology. Coarse, porous soils such as sand and gravel allow greater lateral gas migration than finer grained soils such as clay. Engineered systems, including liner and cover systems, and gas vent or extraction systems will limit, eliminate, or control the movement of landfill gas to desired locations for collection. Landfill gas moves both laterally and upward through the solid waste.

6.1 Perimeter Monitoring

Landfill perimeter boundary monitoring will consist of sampling of permanently installed gas monitoring probes on a quarterly or more frequent basis if necessary or otherwise required by TCEQ. The gas monitoring probe network will be installed in phases as new disposal units are constructed such that there is, as a general guide, at least one permanent probe installed along the boundary of newly constructed cell areas prior to placement of waste in that cell. The installation and certification of the proposed gas monitoring probes will follow the development of waste disposal cells throughout the landfill.

6.2 Gas Monitoring Probe Placement

A network of permanently installed gas monitoring probes is planned to monitor for the presence of explosive gases in the unsaturated zone. A total of Up to 1028 probes (see Figure III-G.1-1) are proposed for landfill gas monitoring around the perimeter of the landfill units. The probes will be installed in phases as new cells are constructed and waste placement in these cells is initiated.

The depth of gas monitoring probes is determined to be equal to the seasonal low groundwater table, or the maximum depth of waste as measured within 1,000 feet of the monitoring point, whichever is shallower. The liner in the disposal cells near the probes is located at various

Equipment Inspection and Maintenance

Routine inspection and testing of the alarm is the only routine maintenance recommended by the manufacturer. Verification can be performed by releasing calibration gas of known concentration into the air in the vicinity of the unit in accordance with the manufacturer's instructions. The permanent gas monitors will be inspected once per quarter. The permanent gas monitors will be operated and tested in accordance with the manufacturer's specifications.

6.8 Utility Trench Vent Monitoring

A number of pipeline trenches are located within the permit boundary at the site for gathering of oil or natural gas. In accordance with 30 TAC §330.371(f), ~~any~~the pipeline trenches that are in close proximity to the waste disposal units(s) will be vented and monitored regularly (during quarterly perimeter gas monitoring events) at each location where a utility trench crosses the facility boundary. No vents are currently proposed as there are no pipelines or pipeline easements in close proximity to the waste disposal unit. ~~The locations of the proposed utility vents are not shown because PERC officials or the owner or operator of the facility will work with the owner or operator of every pipeline to have every such pipeline abandoned and removed or relocated outside the landfill prior to its construction. However, some pipelines may remain on the facility property after landfill construction begins, either because the pipeline route does not exist within 25 feet of the landfill footprint, or the landfill construction will not approach the pipeline for many years. In these or similar circumstances, utility trench monitoring will be used. A detail of the vents is provided on Figure III-G.1-2.~~

Safety Considerations

Care will be exercised in order to prevent contact of the sampling probes or drilling equipment with buried electric utility lines. This is particularly important in areas around buildings. Therefore, subsurface sampling will not be attempted near buildings until the following precautions are taken:

The locations of any underground utility lines will be clearly marked.

A person familiar with buried utility lines at the facility will be present. This may require contracting local utility companies.