

# BETHLEHEM LANDFILL

## Enhanced Odor Mitigation Plan

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Bethlehem Landfill Company (BLC) takes odor control very seriously and has implemented measures to identify the source and address odors before they become a nuisance. BLC conducts both on and off site inspections to monitor for fugitive odors.

BLC understands that fugitive emissions off-site are possible. To minimize this, frequent on-site inspections are conducted daily to investigate possible sources of odor, and implement the mitigation efforts when needed.

BLC personnel patrol the site perimeter and nearby public roads daily to identify errant odors. These odor patrols include Applebutter Road, Riverside Drive and the Steel City Area. These inspections may increase in frequency upon evaluation of patrol results. The site maintains a log of these inspections and notes the location traveled and any observations.

In addition, BLC has implemented an Enhanced Odor Monitoring Program which conducts on site nuisance patrols to find potential odors on site and commences mitigation measures immediately eliminating any potential for off-site complaints.

Should an odor be observed one or more of the following may be implemented:

- Odor neutralizer misters will be turned on.
- Portable misters will be moved to the source of the odor and also placed directly around the working face.
- Daily cover placement is started over the odorous wastes.

Potential odors from landfill gas are primarily controlled through a network of gas extraction wells that are maintained under vacuum. The number of gas wells and collection piping network will continue to expand as the landfill mass increases to ensure proper capture of landfill gas and control potential odors.

For each partial lift that BLC does not intend to place additional waste material for six (6) months, intermediate cover will be installed. Furthermore, as an enhanced monitoring and nuisance management practice, BLC will perform monthly surface emissions monitoring (SEM) of uncapped intermediate (cover) slopes. The monitoring will be performed using the same general procedures currently followed for the quarterly NSPS surface emissions monitoring event, with the exception that the monthly surveys will only be performed in uncapped intermediate grade slope areas. Additionally, monitoring results, survey observations, and any improvement actions taken will be documented on BLC Landfill Enhanced Surface Monitoring Follow-up Forms (attached). These forms will be kept on file at the site for DEP or Township review upon request. The SEM data will be reviewed by BLC as outlined below to identify the presence of potentially odorous emissions not being contained by the intermediate cover.

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This enhanced monitoring is being implemented as a best management practice associated with nuisance odor control and gas management system operation/performance optimization. Accordingly, BLC will trigger emissions reduction efforts if either the 500 ppm threshold is exceeded or an increasing month to month concentration trend is observed from the color coded isopach/contouring maps, both as detailed below.

SEM procedures and parameters consist of the following:

- Monitoring along a pattern that traverses the area of interest at 30-meter intervals.
- Monitoring will be performed using an organic vapor analyzer, flame ionization detector (FID) or similar portable monitoring device held just above the ground surface (e.g. 2" – 4").
- The location of each monitored location above the 500 ppm threshold will be marked and location recorded.
- Cover maintenance, adjustments to the vacuum of the adjacent well(s) to increase the gas collection in the vicinity of each threshold reading, or other options as described below shall be made. Each location above the threshold will be re-monitored within 10 calendar days of detecting the >500 ppm action threshold.
- Any location that initially showed a reading above the 500 ppm threshold but has a concentration less than 500 ppm at the 10-day re-monitoring will be checked 1 month from the initial exceedance. If the 1-month re-monitoring shows a concentration less than 500 parts per million above background methane levels, no further monitoring of that location will be performed until the next monitoring period. If the re-monitoring shows a level above the threshold, actions detailed below will be taken.

Monitoring will not be performed when dangerous/unsafe conditions exist. These conditions are typically temporary, and BLC will resume monitoring as soon as practical. BLC personnel will also use their discretion in determining dangerous/unsafe conditions for performing enhanced monitoring on intermediate slopes steeper than 3:1 (H:V). BLC's determination that an area is dangerous and/or unsafe to monitor will be documented and maintained on-site for Department review upon request.

To review and evaluate the monthly monitoring results, the collected readings, logged with a GPS location stamp, will be uploaded into a site map in AutoCAD® or similar mapping software, and overlain with the existing gas management system (e.g. as-built gas collectors and conveyance piping). Isopach/contouring tools will be used to graphically contour and colorize the map based on SEM concentrations. The range of contour colors representing the surface emission concentrations will be selected within the software as follows:

- 0-100 ppm = Green
- 101-199 ppm = Yellow
- 200-499 ppm = Orange
- 500+ = Red

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The colors will be used to graphically highlight differences in the SEM concentrations across the uncapped intermediate grade slopes. By colorizing the surface emissions data set, site personnel will be able to more easily identify potential problem areas for assessment. Further, these maps will be created on a monthly basis allowing BLC to complete month to month comparisons for trend identification, as well as determine the effectiveness of the gas management system and any optimization actions taken. The isopach map data will be reviewed in conjunction with the gas management system performance data (e.g. individual gas collector quality and flow parameters) and any odor observations in the corresponding area, and evaluated to assess opportunities for improvement. This process will be completed regardless of the individual concentrations recorded, although an action threshold is established with procedures for follow-up as further outlined below.

BLC will evaluate the month to month data isopach maps to determine if the overall trend in any intermediate grade slope areas exhibits increasing surface emissions. An increasing trend in the area of yellow and/or orange hatch coverage will also result in further investigation and emission reduction action including any or all of the following, as appropriate:

1. Investigate area for signs of surface emissions (cracked cover material, leachate seeps, distressed vegetation, rills, gas migration pathways, etc.);
2. Repair breaks in the intermediate cover, add intermediate cover and re-compact with a roller or plate tamper to seal the surface;
3. Strip vegetation and topsoil and install seep control measures as necessary; and
4. Increase the vacuum to nearby LFG collection devices, install additional LFG collection device(s), or perform other operational or engineering controls based on an analysis of the isopach mapping and gas management system performance data.

If BLC is unable to reduce the emissions below 500 ppm or reverse observed adverse month to month trend in the isopach maps through implementation of the actions described above, a temporary geosynthetic cap will be installed. In addition, BLC will initiate temporary cap construction activities on intermediate grade slopes within eighteen (18) months of establishing the slope regardless of the presence of SEM readings at or above the 500 ppm action level.

Following installation of temporary cap, areas will be periodically inspected to ensure they are functioning as intended and to identify area requiring maintenance/repair. Temporary cap will remain in place until the area receives additional waste or the area will be final capped. When removing areas of temporary cap, the material will be removed in sections to minimize the amount of intermediate slope exposed.

**BETHLEHEM LANDFILL  
EMHANCED SURFACE MONITORING  
FOLLOW-UP FORM**

Survey Date	Data Download	Isopach Completed	Observations	Improvements (If Applicable)
	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>		
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