

ODOR MANAGEMENT PLAN
AND
MALFUNCTION ABATEMENT PLAN

For:

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1.0 INTRODUCTION

This plan presents various procedures and protocols for detecting, preventing, and correcting odor events. Attachments are also included with targeted checklists for evaluating odor potential. In addition, various schedules for implementation have been included. **It is the intent of this plan that observation for potential off-site odor is an integral part of landfill operations. If a particular odor inspection is being conducted on a particular day during a weekly frequency, that does not mean that odor observation and minimization will not be undertaken the other 6 days in any given week.**

This Plan has been prepared to provide guidance for procedures developed to enhance odor prevention, detection, and correction, as well as, public relations regarding odors from XXXXX. More specifically, this Plan provides detailed information and descriptions of the following items regarding off-site odor from XXXXX:

1. Identification of the major sources contributing to off-site odor;
2. Operational responsibilities related to the prevention, detection, and correction of off-site odor (including preventative maintenance procedures for XXXXX landfill gas system components);
3. Monitoring procedures for conditions causing off-site odor;
4. Response to an off-site odor event;
5. Employee Training
6. Record Keeping;
7. Community/Complaint response action.

"Nuisance" is defined in R 299.4104 (h) of the Part 115 Rules, as conditions that unreasonably interfere with the enjoyment of life and property, such as noise, blowing debris, odors, vectors, or pest animals. R 336.1901 of Part 55 prohibits the emission of an air contaminant in quantities that cause unreasonable interference with comfortable enjoyment of life and property. For purposes of this Plan, reference to off-site odor shall be considered an odor which has the potential to cause a nuisance condition.

The supervisory personnel ultimately responsible for overseeing the inspection, maintenance, and repair of air cleaning devices will be XXXXX General Manager.

Citizen Concern Hotline

XXXXX has established a dedicated staffed hotline phone number for citizen concerns. Citizens may call ##### to contact a representative regarding odor issues. This number is also posted near the site entrance. Use of this number will result in timely review of the concern and appropriate response.

2.0 ODOR SOURCE IDENTIFICATION

A description of the materials and sources which have the greatest potential to contribute to off-site odor is included in the following list:

- A. Incoming waste - The waste stream at XXXXX which includes MSW, industrial waste, industrial sludges, contaminated soil, etc., could potentially contribute to off-site odor. The likelihood of off-site odor due to incoming waste is higher as the incoming loads are dumped at the active landfill face.
- B. Landfilled Waste - If additional waste is to be placed in an area that has already received waste, landfill operators will scrape-back the previously applied daily cover. If in-place waste is exposed, it has the potential to contribute to off-site odor. In-place waste can also contribute to off-site odor if daily or interim cover is inadequate.
- C. Landfill Gas - Landfill gas has the potential to contribute to off-site odor if the landfill gas collection system is inadequate, or the gas collection system controls have not been properly maintained. Insufficient daily or interim cover could also lead to gas emissions which can cause off-site odor. Gas emissions from leachate collection and cleanout risers can also contribute to off-site odor.
- D. Yard Waste/Composting - Composting operations at XXXXX could also contribute to off-site odor especially on warm, humid days where decomposition of the compost is occurring more rapidly. Disturbing the pile(s) of yard waste could also increase the off-site odor potential.
- E. Waste Container and Vehicle Parking Areas - The waste container and-waste hauling vehicle parking areas have the potential to contribute to off-site odor. The potential is increased if the vehicles contain residual waste.

3.0 OPERATION

3.1 Landfill Operation

Operations at XXXXX will be conducted in an effort to minimize potential for off-site odor and to promptly detect and correct any deficiencies that have led to an off-site odor event. The "Targeted Odor Inspection Checklist" included in Appendix A is designed to prevent possible odor emissions from occurring. Prevention, detection, and correction of off-site odors due to incoming waste, activities at the active landfill face, and activities associated with the yard waste area shall be the responsibility of XXXXX management and operators and will include:

- A. The landfill will maintain a weather station consisting of a windsock or an electronic weather station. In addition publicly available websites such as www.noaa.gov or www.wunderground.com publish and maintain tabulated data such as wind speed, direction, temperature, humidity, and barometric pressure. This information can be used to aid in odor complaint investigations.
- B. Operators will be responsible for observation of and advance preparation for any waste that has the potential to contribute to off-site odor, upon disposal at the active landfill face. Preparation may include utilization of pre-dug pits, immediate burial of odorous waste, or the utilization of odor controlling soil covers as deemed necessary based on site conditions. In the case of odorous wastewater treatment plant biosolids (i.e. sewage sludge) mixing biosolids and other non-sludge municipal solid waste (MSW) at a 1:9 ratio (by volume) followed by daily cover application may be appropriate; ratios may vary based on biosolids moisture content.
- C. If site conditions such as wind, type of waste being received, and proximity to neighbors are contributing to off-site odor, operators shall alter the size and configuration of the active landfill face to reduce such potential.
- D. Daily and interim covers shall be placed in conformance with the facility's Daily Cover Plan. Interim cover shall be placed as soon as possible and in conformance with R 299.4429 of the Part 115 Rules, to reduce the potential for off-site odor from areas that will not receive additional waste for 90 days.
- E. Compost will be managed in conformance with the facility's Yard Waste Management Plan to reduce the potential for off-site odor emanating from the facility's composting area.

3.2 Landfill Gas Collection System Operation

The landfill gas collection and control system will be expanded when waste is of sufficient depth. Drawings in the engineering plan set include additional details for the gas system installation included interim collection system components.

A proactive annual review of the landfill gas collection system monitoring and performance will be conducted to determine the need for installation of additional system components to minimize potential for future problems.

Routine landfill gas wellfield operations and maintenance services can be divided into the following subcategories:

1. Routine Monitoring and Tuning
2. Routine Maintenance
3. Data Management
4. Flare System Maintenance

Routine Monitoring and Tuning

Landfill gas typically has steady state concentrations of 55% Methane, 45% Carbon Dioxide and minute amounts of trace gases. In order to maintain and operate the collection system effectively and efficiently with the ultimate goal of limiting compliance issues, XXXXX will perform routine wellfield tuning at least once per month.

EGLE Permits and Rules require the efficient operation of the landfill gas collection system and the control of landfill gas to prevent nuisance creation.

40 CFR 60.756 (a) requires that the following three parameters be measured on a monthly basis at each gas extraction point for NSPS compliance (the normal operating range for monitoring is indicated in parentheses):

- Temperature (<135 F)
- Nitrogen or Oxygen (<5% Oxygen)
- Vacuum (<0)

These parameters will be measured each month as required by future applicable regulations. The NSPS has established trigger values for each of these parameters as indicators for possible system problems, such as landfill fires, air leaks or flooded wells. Should these operational triggers be exceeded an immediate correction will be undertaken by valve adjustment, and if necessary additional monitoring will be performed.

If a problem is noted with the wellfield or flare station during the monitoring event, O&M Staff will verbally communicate this to the site.

Should the monitoring data show the need for additional tuning services, or if field conditions change, additional tuning services will be performed during the anticipated re-monitoring efforts mentioned above.

A typical tuning event will consist of the following:

1. Record measurements at the flare station
 - Gas Temperature
 - Flow
 - Inlet Pressure.
 - Discharge Pressure
 - Gas Quality
2. Take a round of wellfield measurements
 - Oxygen
 - Methane
 - Temperature
 - Well Pressure
 - Header Pressure

Flow

3. Evaluate the wellfield data and decide on tuning adjustments
4. Make adjustments (tuning)

Following the monitoring and tuning events, the monitoring/tuning data will be filed in the operating record.

Routine System Maintenance

Routine maintenance for the landfill gas collection and control system will be provided.

Routine Maintenance for the LFG collection system will include:

- Replacement of sample ports,
- Replacement of flex hose,
- Repair of above ground air leaks located exclusively in the extraction wellhead assembly.

Replacement parts such as flex hose, clamps, pipe couplings, and sample ports crucial to allow for timely repairs are readily available from third party vendors and are stocked by the contractor responsible for operation of the collection system.

Discovery of Water Response

If condensate is discovered to be completely preventing gas collection in a specific well or in a particular header pipe, a pump will be acquired to dewater the well or header within 30 days. The cause of the condensate accumulation will be evaluated and a corrective action will be taken as soon as reasonably possible. For liquid accumulation in a well, manual pumping can generally be accomplished within 30 days weather permitting. For repairs that requires extensive construction activities (such as header excavation), repairs could take as long as 6 months). If header system blockages are contributing to off-site odor temporary measures such as jumper line installation will be installed generally within 60 days.

Flare System Maintenance

Routine maintenance for the landfill gas flare system will be provided as described in Appendix D.

4.0 ODOR MONITORING

The first step in the process of controlling odors is to determine if odors are present. For the purpose of this Plan, the presence of odor is identified in one of the two following ways:

1. Odors identified by XXXXX personnel, through self-inspection or on-the-job observations.
2. Odors identified by sources other than XXXXX personnel. These odors are often identified through an "odor complaint."

These two methods of identifying odors and how they are managed as part of the Plan are discussed in the following sections.

4.1. Odors Identified Through Self-Inspection

The primary objective of the Plan is to identify and mitigate odors from the facility before the odors can have an impact on the local community, i.e., to eliminate odor complaints. This is accomplished through the use of self-inspections.

Self-inspection will be performed on a weekly basis by the Lead Operator, Operations Supervisor, General Manager, or Area Engineer. It consists of one or more of these individuals touring the facility specifically to identify odors. Weather conditions will be considered when planning odor observations (early AM/PM, low wind conditions) to increase opportunities to locate odor sources. The results of the inspection will be documented on the form provided in Appendix A or a similar form. Any odors identified through self-inspection will be mitigated in accordance with the guidance for mitigation provided later in this Plan. An odor crossing the property boundary is the criteria for mitigation, i.e., if the individual performing the self-inspection is standing on the property boundary and an odor from the facility can be detected, then mitigation of the odor is required.

If XXXXX has received more complaints regarding off-site odor on 2 occasions in any 10-day period (or is notified by the EGLE or Township officials of odor complaints on more than 2 occasions in this same time period), monitoring for off-site odor shall be conducted daily (daily means days when the facility is accepting waste) until the potential problem is corrected and there have been no complaints for 30 days. Once the problem has been corrected and no complaints have been received for 30 days, the facility shall suspend daily odor monitoring activities and resume the weekly monitoring schedule.

4.2 Odors Identified by Other Individuals Who Are Not XXXXX Employees

If the Plan is not implemented properly, then the primary goal of mitigating odors before odors can impact the local community may not be achieved. When this happens, it is likely that odor complaints will be generated. Odors brought to the attention of the facility management by individuals other than XXXXX employees must be properly investigated.

Upon receipt of an odor complaint, the following actions will be taken:

1. Upon receipt of an odor complaint, the complaint should be investigated by the Lead Operator, Operations Supervisor, General Manager, or Area Engineer.
2. If the complaint is made verbally and the odor is ongoing, the complaint should be investigated immediately. The investigation should include interviewing the complainant, completing the form in Appendix B, and an immediate visit to the site of the alleged odor. During the visit to the site where the alleged odor was noted, the XXXXX employee investigating the odor will try to verify the existence of the odor.
3. If some time has elapsed since the occurrence of the odor, the complaint must still be investigated. The investigation should include interviewing the complainant, completing the form in Appendix B, and a visit to the site where the complainant states that the odor was detected. If the complainant is not available or is not comfortable being identified when making the complaint, the form in Appendix B should be noted as such.

Monitoring for off-site odor shall be conducted by landfill personnel who have been trained to recognize the odors and identify their potential sources. If an odor is detected which is likely contributing to off-site odors, the following additional monitoring shall be conducted as necessary based on the type of odor, to determine the source:

- Leachate system - Leachate collection system risers and manholes shall be monitored for spills and gas leaks. Riser lids and end caps should be examined for potential landfill gas emissions.
- Landfill gas collection system - The landfill gas collection system tuning and maintenance is conducted at least monthly by the facility's landfill gas consultant. However, if landfill gas is detected during the perimeter odor monitoring event, landfill personnel shall monitor the gas collection system for leaks in the different system components such as flares, wellheads, couplings, etc.
- Active landfill face - The active landfill face will be continually monitored during operating hours for conditions that have the potential to contribute to off-site odors including but not limited to odorous incoming waste stream and odorous in-place waste.
- Daily and interim cover - Daily and interim cover shall be inspected in accordance with the facility's Daily Cover Plan. However, if the detection of off-site odor warrants, landfill personnel will monitor daily and interim cover for leachate outbreaks, erosion rills, settlement, adequate vegetation, stressed vegetation, depth, and cover.
- Waste container and collection vehicle parking area - Landfill personnel will monitor the waste container and vehicle parking areas for presence of residual waste in waste containers and hauling vehicles.

The employee conducting the odor monitoring shall complete a " Odor Survey Form" (Form) which includes the name of the inspector, the time and date of the inspection, a description of any odor observed during the inspection either at or near the disposal area or at the perimeter of the facility, and a targeted odor inspection checklist with corrective action section. A copy of the form is included as Appendix A of this Plan.

5.0 RESPONSE TO DETECTION/NOTIFICATION OF OFF-SITE ODOR

If the facility detects or is notified of off-site odors from XXXXX, the following response procedures will be implemented by landfill personnel:

- A. To the extent possible, identify the odor type as landfill gas, decomposing waste, or odor due to an incoming waste stream.
- B. Determine the odor source using the following method:
 1. Using the available weather data (or an on-site weather station), determine the wind direction at the time the odor is identified.
 2. Using an aerial photograph or plan of the facility, draw a line in the same direction as the Wind and intersecting the location where the odor was identified.
 3. If the vector crosses the facility and the facility is in an upwind position compared to the location where the odor is identified, then determine the facility features and activities that lie along the vector.
 4. Compare the identified odor to any odors generated along the wind vector in an upwind position and determine the source of the odor.
- C. Perform the following mitigation measures based on the source of the odor:

If the odor originates from an incoming waste stream, one or more of the following methods will be selected to mitigate the odor:

- Require that the waste stream generator treat the objectionable waste stream to eliminate odors prior to delivery to the facility
- Change the disposal location of the waste on site (e.g. move farther upwind, behind a windbreak, or other spatial mitigation method)
- Immediately cover objectionable waste stream upon delivery to the facility
- Restrict the times when an objectionable waste stream can be delivered to the facility
- Stop taking the waste stream
- Use odor masking or neutralizing agents at the facility¹

If the odor originates from the decomposing waste in general, one or more of the following methods will be selected to mitigate the odor:

- Utilize compost as a cover material
- Place additional soil as cover material
- Repair cracking and erosion in daily and interim cover
- Suspend the turning of compost if required

¹ It should be noted that the last option, use of masking or neutralizing agents, should be considered as a last resort for a landfill. Experience has shown that the use of odor masking or neutralizing agents has proven to be extremely difficult in a landfill environment.

If the odor originates from the landfill gas collection and control system, one or more of the following methods will be selected to mitigate the odor:

| <i>Routine Landfill Gas Emission Sources and Corrective Actions</i> | |
|--|--|
| Condition | Response |
| Damage to Wellfield | Correct damaged wellfield component as soon as possible. |
| Watered in (flooded) landfill gas well | Remove condensate from well with a pump (see section 3.2) |
| Condensate Blockage in Header System | Remove blockage or install jumper line (see section 3.2) |
| Breach in Interim Cover | Repair area of cover (within 24 hours provided weather allows\ |
| Disconnected Wellfield component | Reconnect Wellfield component (within 24 hours, if possible) |
| Leachate Collection System Emission | Seal component to the atmosphere, apply vacuum to component or install solar vent flare or install carbon filter |
| Landfill Gas System Construction - exposed waste | Cover exposed waste, and or apply odor neutralizer to exposed waste |
| Landfill Gas System Construction - gas from waste excavation | If feasible, suspend construction activities until weather conditions are more favorable |

If the implementation of the routine measures in the table results in continued offsite odor conditions that cannot be traced to the known conditions described in the table above on 3 occasions in a 30-day period related to landfill gas, a surficial sweep of the surface of the landfill shall be conducted over constructed areas of the landfill according to the surficial monitoring procedures specified in the New Source Performance Standard (NSPS) 40 CFR 60.755(c) and (d) and 40 CFR 60, Appendix A, Method 21 in order to determine the source of off-site odor of the unresolved odor episode. The surficial scan will be used to pinpoint the source of landfill gas odor as evidenced by surface concentrations of methane greater than 500 parts per million (ppm). Additional landfill gas collection will be designed and installed at the source of the off-site odor in the form of a vertical landfill gas extraction well or a horizontal collection well or other suitable mitigation measure. For conditions requiring extended construction (such as watered in headers or new well installation) construction activities can generally be conducted with 6 months, weather permitting. Temporary mitigation measures such as cover enhancement or jumper line installation will be installed as soon as reasonably possible.

6.0 TRAINING

Operators and employees **will** be trained annually on the contents of this Plan. Employees will be trained to recognize conditions at the working face which could contribute to off-site odor as discussed. Employees. will also be trained to respond accordingly to objectionable waste being disposed of at the working face. One or more employees at XXXXX will be trained to conduct odor monitoring. The training to conduct odor monitoring shall include a discussion about recognizing odors types, determining the source of the odor, completing an odor monitoring survey, and responding accordingly as discussed in this Plan. **A** memo which includes the topics discussed and the employees present at the training will be completed by the person(s) responsible for the training, and a copy will be maintained in the site Operating Record.

7.0 RECORD KEEPING

As discussed in Section 4.0, following EGLE approval of this plan, Odor Survey Forms shall be completed on a weekly basis and maintained in the site Operating Record. If XXXXX has received complaints regarding off-site odor, monitoring for off-site odor shall be conducted daily until the problem is corrected and there have been no complaints for 30 days. If this is the case, landfill personnel shall complete an Odor Survey Form daily and the form shall be maintained in the site Operating Record. Daily and interim cover inspection documentation will be completed and maintained in the site Operating Record in conformance with the site's Daily Cover Plan.

Odor survey forms and complaint investigation forms will be maintained in the Operating Record for 1 calendar year after which time they will be discarded.

Wellhead monitoring data will be maintained in the Operating Record for 5 years.

XXXXX Operating Record is available to EGLE staff upon request.

8.0 PUBLIC RELATIONS

If the effort to prevent off-site odor is unsuccessful, then the primary goal of mitigating odors before they can impact the local community will not be achieved. When this happens, it is likely that odor complaints will be generated. All odors brought to the attention of the facility management by individuals other than XXXXX employees must be investigated and documented. XXXXX has an "open-door" policy in regard to odor complaints. A site employee will be available to interview odor complainants during operating hours and complainants may leave a message regarding off-site odor, at any time, on the facility's phone message system.

9.0 · PLAN MODIFICATION

The plan and future revisions will be forwarded to the EGLE for review and approval, which will not be unduly withheld.

ODOR SURVEY FORM

Date: _____

Time of inspection: _____

Name of inspector: _____

Weather Conditions at Time of inspection:

Temperature: _____

Barometric Pressure: _____

Wind Direction: _____

Wind Speed: _____

Precipitation: _____

Humidity: _____

Were there any odor detections at facility perimeter? _____ Yes No

If yes, describe:

Were there any odors detected at or near the existing disposal area? __ Yes No

If yes, describe:

Complete the attached "Targeted Odor Inspection Checklist"

| TARGETED ODOR INSPECTION CHECKLIST | | |
|---|--|---|
| LOCATION | OBJECTIONAL ODOR NOTED? (If yes indicate Corrective Action) | DESCRIPTION OF CORRECTIVE ACTION |
| North, South, East, and West Property Boundary | Yes No | |
| Composting Area | Yes No | |
| Cells 1, 2, 3, and 4 Manholes | Yes No | |
| Cells 4, 5, 6, etc... Side slope risers | Yes No | |
| Cell Leachate Cleanouts | Yes No | |
| Flare Station | Yes No | |
| Condensate Structure | Yes No | |
| Landfill Gas Collection Wells | Yes No | |
| Leachate Loadout Area | Yes No | |
| Waste Container Storage Area | Yes No | |
| Waste Collection Vehicle Parking Area | Yes No | |

| | | | |
|----------------------------------|-----|----|--|
| Daily Cover (from previous day) | Yes | No | |
| Interim Cover | Yes | No | |
| Erosion Areas (rills of gullies) | Yes | No | |
| Landfill Working Face | Yes | No | |

COMPLAINANT INVESTIGATION/ INTERVIEW

Interviewer Name: _____

Complainant Name: _____

Inspection/Interview Date: _____ Complaint Date and Time: _____

Inspection/Interview Time: _____

Complainant Address:

Location of Complaint (including Direction and Distance): -----'-----
--

Weather Conditions at time of complaint:

Wind direction and speed at time of complaint:

1. What time was the odor initially observed?

2. Describe the characteristics of the odor. What did it smell like?

3. Did the odor disturb or annoy you? In What way?

4. Do you know of anyone else who was disturbed by the odor? How do you know?

5. Besides making a complaint, did you take any action in response to the odor? (For example, did the complainant go and/or stay indoors on a pleasant day? Shut windows? Cancel outdoor activities?)

6. Do you detect the odor now? If not, when did you last detect the odor?

7. How often do you experience the odor?

8. Is the odor always basically the same, or does it differ in intensity or characteristics?

9. How long does each odor incident typically last?

10. Do you know where the odor is coming from? How do you know?

11. How does the current odor intensity compare to the intensity when the complaint was initiated?

Verified Complaint _____

Unverified Complaint _____

Did the complainant request feedback and was feedback provided? Give date

feedback was provided: _____

Landfill Gas Collection System Maintenance Schedule

| Item | Activity | Minimum Frequency |
|--|---|---------------------------|
| Isolation Valves | Verm, Operation | Semi-Annually |
| Extraction Well Casing | Inspect Physical integrity | During Monthly Monitoring |
| | Verify labeling | During Monthly Monitoring |
| Extraction Wellhead | Inspect Physical Integrity of wellhead | During Monthly Monitoring |
| | Verify operation of wellhead | During Monthly Monitoring |
| | Check Monitoring Ports for proper Operation | During Monthly Monitoring |
| Ground Surface Around Extraction Well Casing | Check for settlement around area of well | During Monthly Monitoring |
| Verify System Pressures | Monitor Vacuum Availability | During Monthly Monitoring |
| Extraction Well Operation | Monitor Extraction Well Performance | During Monthly Monitoring |
| Header System Integrity | Monitor LFG constituents at Flare Station | During Monthly Monitoring |
| | Monitor Vacuum Availability | During Monthly Monitoring |

Landfill Gas Flare System Maintenance Schedule

| Item | Activity | Minimum Frequency} |
|----------------------------------|---|-----------------------|
| Valves | Verify Operation | Quarterly |
| Actuator | Verify Operation | Quarterly |
| Flame Arresters | Check Operation by checking system back pressure | Monthly |
| | Clean debris from element | As/needed or annually |
| UV Scanner | Clean lens and sight tube and check operation | As/needed or annually |
| Chart Recorder | Verify Operation | Weekly |
| Condensate Knockout or separator | Check condensate level | Weekly |
| Air Dampers | Verify Operation | Monthly |
| Spark Plug | Visual Inspection or operation during system start up | Annually |
| Solenoid Valves | Verify Operation by activating | Monthly |
| Landfill Gas Blower | Verify Operation by monitoring system pressures | Annually |
| | Inspect and Grease according to manufacturers specifications or as needed | Quarterly |
| | Manually rotate if not being used | Bi-Weekly |
| | Alternate use if other units available | Monthly |
| Electric Blower Motor | Verify Operation | Monthly |
| | Inspect and Grease according to manufacturers specifications | Quarterly |
| | Manually rotate if not being used | Bi-Weekly |
| | Alternate use if other units available | Monthly |
| Nitrogen Supply | Monitor system pressure | Monthly |
| Propane Supply | Monitor tank level. | Monthly |
| Thermocouple | Verify Operation | Monthly |
| Condensate Pump | Verify operation | Weekly |

