FAQS on High Acres issues for Perinton Town Website

Q1-What is the Town doing about the odors?

A. *Click on this link to see a summary of Town actions since August, 2017.*

The Town of Perinton has been in continuing communication with WM and the NYSDEC regarding mitigation of odors from the High Acres landfill. The Town Board requested the Perinton Conservation Board (PCB) to provide a factual explanation for the long-term persistence of landfill odors from the High Acres landfill. Additionally, the PCB was asked by the Town Board to review resident concerns and comments, and lastly, to provide the Town Board with recommendations concerning the Town interaction with the facility regarding odors and other operational issues.

On January 24, 2018, the PCB submitted *recommendations* to the Town Board that included more stringent landfill gas emissions monitoring, coupled with an overarching strategy of communication and reporting to mitigate landfill odors, vibration or other operational variances.

The Town Board approved these recommendations at its meeting on 1/24/2018. The Town and its Special Legal Counsel are meeting with NYSDEC on 1/31/18 to review the PCB's recommendations and discuss the best means for requiring WM's compliance with the same. The Town further intends to work with NYSDEC to establish a schedule with firm completion dates for each action item, and the Town will advocate for NYSDEC's imposition of fines and penalties where WM fails to perform an action item per the schedule. The Town also reserves the right to demand the cessation of filling activities until the delayed action item is completed.

The Town will update residents on the status of these recommended initiatives. In addition, the Town will contract an engineering consultant with solid waste experience to review mitigation actions and monitoring data.

Q2-What is Waste Management doing?

A. WM has developed an odor mitigation plan accepted by the NYSDEC. WM provides updates to the progress of the mitigation on its web site under Neighborhood Updates *(http://highacreslandfill.wm.com/facility/updates.jsp).*

Q3-What is causing the odors?

A. The following are what we believe to be the causes for the increased odors at High Acres Landfill:

1. A change in WM's design strategy for gas well construction, (which was approved by the NYSDEC), relied on the installation of only vertical wells in Cell 11, rather than the use of vertical wells AND horizontal collector pipes. Both horizontal and vertical wells have historically been used at other well locations throughout the landfill (all other cells).

2. After several months of evaluation by WM and their consultants, it was determined that approximately 40% of the available gas collection system in Cell 11 failed. That coupled with the lack of a looped gas collection system around the perimeter of the landfill and a partial blockage of the main collector pipe resulted in a significant loss of vacuum for a large portion of the landfill, in particular cell 11. This resulted in ineffective gas collection and increased gas emissions from the landfill, including hydrogen sulfide, which explains the "rotten egg" smell.

3. WM removed an internal access road in Cell 10, which exposed odorous materials during the summer months of 2017.

4. WM has said there have been occurrences of extended hold times for rail-car waste containers loaded with municipal solid waste, which, once disposed at High Acres, exposed odorous materials.

Odors from a landfill are caused primarily by emissions of various gas. The odors associated with landfill gas are caused primarily by hydrogen sulfide and, to some extent, ammonia. The Agency for Toxic Substances & Disease Registry (ATSDR) in Chapter 2 of their Landfill Gas Primer (https://www.atsdr.cdc.gov/HAC/landfill/html/ch2.html) states that landfill gas typically contains 45% to 60% methane and 40% to 60% carbon dioxide by volume. The landfill gas also includes small amounts of nitrogen, oxygen, ammonia, non-methane organic compounds ("NMOCs"), organic acids and sulfur compounds such as hydrogen sulfide. The NYS Department of Health cites similar percentages of the content of landfill gas.

Landfill gases are produced when bacteria break down organic waste. The actual amount of gas depends on the type of waste present in the landfill, the age of the waste, oxygen content, the amount of moisture, and temperature. The ATSDR Landfill Gas Primer shows that bacteria break down the waste in four phases:

- Phase I - During this phase, bacteria consume oxygen (aerobic bacteria) in the waste while breaking long chain molecules such as carbohydrates, proteins and fat. Carbon dioxide is the primary gaseous byproduct of this phase.
- Phase II – This phase of decomposition begins after all the oxygen is used up during Phase I. Anaerobic bacteria (bacteria that don't require oxygen) convert the compounds created in Phase I to acetic acid, lactic acid and formic acid and alcohols such as methanol and ethanol. The gaseous byproducts of this phase are carbon dioxide and hydrogen.
- Phase III – This phase of decomposition begins when certain anaerobic bacteria consume the organic acids from Phase II and form acetate. This phase causes the establishment of

methane producing bacteria that consume the carbon dioxide and acetate to form methane.

- Phase IV – This phase of decomposition begins when both the composition and production of landfill gas remains relatively constant. In this phase landfill gas contains approximately 45% to 60% methane by volume, 40% to 60% carbon dioxide, and 2% to 9% other gases including hydrogen sulfide. Landfill gas is produced at a stable rate in this phase for about 20 years or more depending on the amount of organic waste in the landfill.

For an active landfill, the four phases described above occur continuously until the landfill is closed. Disposed waste usually begins producing significant amounts of gas in 1 to 3 years. Peak gas production typically occurs in Phase IV decomposition 5 to 7 years after the waste is buried.

Q4-When will the odor issue be resolved?

A. WM has stated that the majority of the mitigation activities being implemented to lessen landfill odors will be complete by mid-February, with all activities finished by the end of March, 2018. It is important to note that all mitigation activities require prior NYSDEC approval and are subject to weather.

Unfortunately, odors may increase at certain times during WM's performance of the required corrective actions. For example, the Town's recommendations call for more monitoring wells, which will be a great asset in the longer term. Creation of the new wells may cause some increased odor in the short term. The Town will demand that WM provide advanced notice of any activities that might increase odors, and the estimated duration of the same.

The strategy of Perinton Town Board and Conservation Board is to reduce odor impacts by recommending that the NYSDEC immediately impose stricter monitoring and inspection standards of landfill gas and gas well performance so that timely reporting of elevated gas levels or poor performing gas wells will ensure timely identification of operational problems and the immediate deployment of mitigation activities before odors are detected by and impact local residents.

Along with stricter monitoring standards, the Town of Perinton and the NYSDEC will work together to hold WM accountable for reaching all milestone goals in a timeframe that all parties agree to.

Q5-Are there health concerns?

A. "As a general statement, the Town and the NYSDEC believe that Waste Management compliance with the recommendations will result in a facility that imposes no health risk. The following paragraphs offer more detail on the matter."

Data provided by WM for the High Acres landfill show the gas generated at this site is composed of approximately 47% methane (CH_4), 33% carbon dioxide (CO_2), 13% nitrogen, 1.4% oxygen, and the remaining 6% a combination of other gases, including non-methane organic compounds (NMOC) and reduced sulfur compounds such a hydrogen sulfide (H_2S). Analytical data provided by WM shows hydrogen sulfide concentration in the High Acres landfill gas ranges from approximately 51 to 470 ppmv. NMOCs in the landfill gas is the reason why the gas must be collected and controlled either through combustion, or treatment and reused as an alternate fuel.

Health effects from landfill gases are determined by their concentration in the air, length of exposure, and the route of exposure (i.e., inhalation, oral, dermal). These factors will be assessed by a third party industry expert in certain Fairport schools based on a recommendation of the Perinton Conservation Board.

The USEPA determined that NMOCs contains organic compounds that can impact human health. To make sure NMOC emissions as well as methane were being properly collected and controlled so as not to impact human health, USEPA established rules (which the NYSDEC has implemented) requiring landfill surface scans for methane to demonstrate that the gas collection system is functioning properly. If the methane concentrations during the surface scan are below 500 ppmv, then the collection system performance is presumed to be acceptable.

The USEPA also established rules requiring that 98% of the NMOC concentration in the collected gas be destroyed or alternately the NMOC concentration in the exhaust gases from the combustion unit be no more than 20 ppmv. High Acres has generally been complying with gas collection and control requirements with the exception of Cell 10 and Cell 11. The PCB recommended to the Town Board that the methane emission level during surface scans at High Acres landfill be lowered to 200 parts per million by volume (ppmv) in air and if the methane emission level at any surface monitoring location is 200 ppmv or greater that monitoring for hydrogen sulfide be required. Corrective action is required to reduce methane and/or hydrogen sulfide concentration if methane concentration is 200 ppmv or greater and if the hydrogen sulfide concentration is greater than 10 parts per billion by volume (ppbv) in air.

According to the New York Department of Health fact sheet "Important Things to Know about Landfill Gas" *(*https://www.health.ny.gov/environmental/outdoors/air/landfill_gas.htm*)*, humans can detect hydrogen sulfide and ammonia odors at very low levels in air, generally below levels that would cause health effects. For example, the odor threshold for hydrogen sulfide is approximately 0.5 to 100 ppbv by volume in air. According to the Agency for Toxic Substances and Disease Registry's (ATSDR)"ToxGuide for Hydrogen Sulfide H_2S"*(https://www.atsdr.cdc.gov/toxguides/toxguide-114.pdf)*, The most likely route of exposure regarding landfill odors is through inhalation. The ATSDR in its ToxGuide describes Minimal Risk Levels (MRLs) for inhalation of hydrogen sulfide as follows:

- An MRL of 0.07 ppmv or 70 ppbv has been derived for acute duration (less than or equal to 14 days) inhalation exposure to hydrogen sulfide.
- An MRL of 0.02 ppmvsdr or 20 ppbv has been derived for intermediate duration (15-365 days) inhalation exposure to hydrogen sulfide.
- No chronic duration (greater than or equal to 365 days) MRL inhalation was derived for hydrogen sulfide.

The USEPA has established acute exposure guideline levels (AEGL) for hydrogen sulfide. AEGLs are threshold exposure limits that apply to the general public. The AEGLs have five emergency exposures periods 10 minutes (min), 30 min, 1 hour (hr.), 4 hr., and 8 hr. Three levels have been developed AGEL-1, AGEL-2 and AGEL-3 and are defined below:

- AEGL-1 is the airborne concentration (expressed as ppmv or mg/m3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of the exposure.

- AEGL-2 is the airborne concentration (expressed as ppmv or mg/m3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

- AEGL-3 is the airborne concentration (expressed as ppm or mg/m3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening adverse health effects or death.

The AEGL values for hydrogen sulfide are as follows:

ppm	**10 min**	**30 min**	**60 min**	**4 hr**	**8 hr**
AEGL 1	0.75	0.60	0.51	0.36	0.33
AEGL 2	41	32	27	20	17
AEGL 3	76	59	50	37	31

https://www.epa.gov/sites/production/files/2014-11/documents/hydrogen_sulfide_final_volume9_2010.pdf

With implementation of the PCB-recommended methane surface scan concentration of 200 ppmv (PCB Recommendation #3) the hydrogen sulfide concentration in the landfill gas emission would be less than 0.20 ppmv (using the maximum hydrogen sulfide concentration of approximately 0.470 ppmv at a landfill surface methane reading of 500 ppmv methane). **Therefore, according to the USEPA AEGL document, no health effects would be expected**, because the hydrogen sulfide level would be below all of the AEGL-1 exposure limits. Even at landfill surface hydrogen sulfide concentration of 0.470 ppmv, with dilution and chemical reactions with oxygen in the air the hydrogen sulfide levels would likely be less than the AEGL-1 exposure levels.

Q6-What is the NYSDEC's role in this?

A. The NYSDEC is the permitting authority responsible for the regulatory and operational oversight of High Acres Landfill. This oversight means that the NYSDEC is to ensure that High Acres adheres to all applicable permit conditions, including odor emissions mandates and other regulatory requirements, as set-forth in New York State Environmental Conservation Law: Solid Waste Management (6 NYCRR Parts 360 and 363). The NYSDEC also has the power to amend WM's current permits. The strategy of the Perinton Conservation Board's recommendations is to make the regulatory standards applicable to WM more stringent.

SUMMARY Q7 & A

We have been asked why the Town and NYSDEC have decided to require Waste Management to perform quarterly landfill surface scans for methane, instead of the monthly monitoring that the Conservation Board and the Town Board had originally recommended. The document contains the technical and legal reasons why we made this decision. The following is a summary of that document:

Earlier this month, the Town, NYSDEC and Waste Management met to discuss how to put the Conservation Board's recommendations into action. Regarding landfill gas monitoring, NYSDEC and the Town agreed that monthly landfill scans for methane are not what is needed to determine whether Waste Management's plan to reduce odor-causing H2S emissions is actually working.

Landfill surface scans are part of what is needed to create a computer model that can show what the actual gas emissions are at the landfill. However, surface scan results don't provide an accurate "picture" of methane and H2S emissions that can leave the landfill and reach residents. The process used to perform surface scans doesn't actually measure the flow of these gasses through the landfill surface to locations that will actually experience odors.

Additionally, after reviewing Waste Management's data on landfill gases, NYSDEC and the Town discovered that methane emission levels and H2S emission levels don't always match up. In other words, we could have a methane emission rate that is well below the Town-imposed lower threshold of 200ppm (rather than the 500ppm threshold that is currently in Waste

Management's permit), but actual H2S emission rates that are way above the odor threshold that the Town and NYSDEC have imposed. And, monthly surface scans aren't always feasible, due to weather conditions.

Given these factors, the Town and NYSDEC have decided it would be far better to couple quarterly landfill surface scans for methane with continuous H2S monitoring at various locations around the landfill's perimeter. In this way, the Town and its residents can have real-time data on H2S emissions that are likely to reach residents. NYSDEC and the Town are also requiring Waste Management to submit a plan for real-time, continuous H2S monitoring in those areas closest to affected neighborhoods (with the same type of monitoring taking place at the Dudley-Northside Elementary School). This data will help the Town, NYSDEC and the Town's residents determine whether Waste Management is fixing the problems.

The currently proposed landfill monitoring plan goes above and beyond what Waste Management would be required to do under its current permit. The Town believes these more stringent requirements are entirely justified, given the present situation.

The Town will provide residents with all of the information that it receives in a format that is understandable to someone without a technical or engineering background. To achieve this, we will publicize the monitoring information and results that we and NYSDEC receive in an annotated, summarized format. As indicated above, this information will form the basis for modeling H2S odor issues going forward, help us pinpoint mitigation issues and provide data-based support for future resident odor complaints.

Q7-Why did the Town (and then DEC) reduce the monitoring request to only quarterly sampling of only methane from weekly sampling including H2S? This seems woefully inadequate given the ongoing odor problems, and the timing can be manipulated.

A. The Town reviewed the recommendations and determined that monthly landfill surface scans were not beneficial because the results would not directly correlate to an emission rate from the landfill. The purpose of the gas collection system mitigation is to control odors through more efficient landfill gas collection and control. Under the current Title V air permit High Acres must perform quarterly landfill surface scans and must operate the collection system so that methane concentration at the surface of the landfill is less than 500 parts per million by volume (ppmv). To better control landfill gas emissions, the PCB recommended that the action level for methane concentrations at the landfill surface be lowered from 500 ppmv to 200 ppmv. If during the landfill surface scans, methane is detected at 200 ppmv or greater corrective action and follow up monitoring will be required as directed in Federal rule 40 CFR 60.755(c)(4), as follows:

(i) The location of each monitored exceedance shall be marked and the location recorded.

(ii) Cover maintenance or adjustments to the vacuum of the adjacent wells to increase the gas collection in the vicinity of each exceedance shall be made and the location shall be re-monitored within 10 calendar days of detecting the exceedance.

(iii) If the re-monitoring of the location shows a second exceedance, additional corrective action shall be taken and the location shall be monitored again within 10 days of the second exceedance. If the re-monitoring shows a third exceedance for the same location, the action specified in paragraph (c)(4)(v) of this section shall be taken, and no further monitoring of that location is required until the action specified in paragraph (c)(4)(v) has been taken.

(iv) Any location that initially showed an exceedance but has a methane concentration less than 200 ppm methane above background at the 10-day re-monitoring specified in paragraph (c)(4) (ii) or (iii) of this section shall be re-monitored 1 month from the initial exceedance. If the 1-month remonitoring shows a concentration less than 200 parts per million above background, no further monitoring of that location is required until the next quarterly monitoring period. If the 1-month remonitoring shows an exceedance, the actions specified in paragraph (c)(4) (iii) or (v) shall be taken.

(v) For any location where monitored methane concentration equals or exceeds 200 parts per million above background three times within a quarterly period, a new well or other collection device shall be installed within 120 calendar days of the initial exceedance. An alternative remedy to the exceedance, such as upgrading the blower, header pipes or control device, and a corresponding timeline for installation may be submitted to the Administrator for approval.

Because High Acres' Title V air permit already references the corrective action criteria in 40 CFR 60.755(c)(4), the PCB and the DEC didn't think it was prudent to change the surface scans from quarterly to monthly given that increasing the frequency of the surface scans wouldn't provide additional public health or environmental protection. In addition, weekly monitoring of the Cell 10 and 11 gas collection wells for temperature, pressure and oxygen/nitrogen will be performed, as these two cells are the main sources of odors. The remaining wells outside Cell 10 and 11 will be monitored twice monthly.

The PCB's original recommendation was to perform hydrogen sulfide (H_2S) monitoring at locations where methane was detected at 200 ppmv or greater. The PCB had considered using methane as an indicator of H_2S emissions as H_2S tends to be present in landfill gas as an odor causing gas with the smell of "rotten eggs". Analytical data of landfill gas samples provided by WM showed H_2S concentration in the landfill gas varied from 51 to 470 ppmv, depending from where the gas sample was obtained. Using the higher value of H_2S in the landfill gas and assuming the landfill gas at High Acres is approximately 50% (i.e., 500,000 ppmv) methane, the PCB estimated the H_2S concentration in a surface scan of 500 ppmv methane would be approximately 0.470 ppmv or 470 ppbv H_2S, which is well above the odor threshold for H_2S. Even at a methane concentration of 200 ppmv, the H_2S could be approximately 200 ppbv. Again, much more than the odor threshold. However, as mentioned previously, the surface scan results don't correlate well to an emission rate estimate because while you have a concentration value for methane or H_2S the scan procedure doesn't measure flow of the gas through the landfill surface. Instead, it was the opinion of the PCB and DEC that the community would be better served by having continuous H_2S monitoring performed at various locations around the landfill perimeter concurrently with the landfill surface scans. This continuous monitoring would provide real time data for H_2S emissions from the landfill.

In addition to continuous real time H_2S monitoring around the perimeter of the landfill, the DEC is requiring WM to submit a plan for real time monitoring in areas close to the most frequently affected neighborhoods, and the collection and analysis of a sample of landfill gas from the main gas collection system header pipe. The results of the real time H_2S monitoring and/or the landfill gas analytical data can be used for landfill emissions modeling.

Therefore, even though the recommended monthly surface scans have been reduced to quarterly, it is our opinion that the data generated from the methane scans will still provide the information needed to show how the landfill gas collection and control system is performing. In addition, the real time H_2S monitoring will provide more accurate information about the concentration of H_2S emissions at the perimeter of the landfill and on property close to the most frequently affected neighborhoods.

Regarding the timing of the quarterly landfill surface scans, as specified in 40 CFR 60.755(c)(3), monitoring must be performed during typical meteorological conditions. Meteorological conditions, the safety of the person(s) performing the surface scans, and their ability to safely access portions of the landfill were additional factors that the PCB had to consider when changing its recommendation for surface scan frequency from monthly to quarterly.

Individuals performing the surface scan monitoring typically must walk a serpentine pattern (approved by the DEC) around the landfill while taking methane concentration readings approximately every 100 feet using an organic vapor analyzer or other device that complies with the regulatory specifications. The probe inlet of the analyzer must be placed within approximately 2 to 4 inches of the ground. Care must be taken not to allow moisture (water) or debris (grass, soil, insects) to enter and plug the probe.

Scheduling the landfill surface scans is typically weather and season dependent, and safety of the person(s) performing the surface scans is paramount. For example, during late fall and winter months the landfill can be covered with snow and ice for months at a time so access to the landfill surface is not possible or safe, and temperatures can be too low for the organic vapor analyzer to function properly. For a landfill the size of High Acres, landfill surface scans can take up to a week to complete depending on the weather conditions and the physical state of the landfill (e.g., snow and ice covered, thunder storms or soggy/muddy landfill surface conditions).

So, given that the monthly surface scans weren't going to provide emission rate data and that monthly surface scans might not always be possible due to inclement weather or unsafe conditions on the landfill, the PCB decided to reconsider its recommendation for monthly surface scans and maintain the quarterly surface scan frequency provided in the High Acres' Title V permit.