

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Regional Director, Region 1

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November 21, 2016

Ms. Adrienne Esposito
Executive Director
Citizens Campaign for the Environment
225A Main Street
Farmingdale, NY 11735

Re: Brookhaven Landfill Community Request for Air Quality Monitoring

Dear Ms. Esposito:

Commissioner Seggos has asked me to respond to your letter regarding the development and implementation of an air quality monitoring program in communities surrounding the Brookhaven Landfill (Landfill, Facility). Your letters also requested that the Department-issued authorization to use ash as capping material at the Landfill be rescinded, and mentioned a FOIL request that took several weeks to satisfy. Department staff have spent a considerable amount of time reviewing existing data, as well as collecting and analyzing additional ambient air samples, in order to evaluate those requests. We have identified issues that need to be addressed and are currently working with the Town of Brookhaven (Town) to improve air quality in the impacted neighborhoods. A summary of our effort and findings is presented below.

Existing Monitoring around the Landfill

The Town and the Department have been monitoring the impacts of landfilling activities on air quality in adjacent communities. To measure the migration of dust, the Town installed a particulate monitoring network around the perimeter of the Landfill in September 2015. Its consultant, RTP Environmental Associates, Inc. (RTP), has also been collecting ambient air samples at various nearby locations, to test for the presence of other air contaminants. The results of those surveys are reported to the Department regularly. In addition, the Department has recently conducted its own investigation both on- and off-site to identify areas of concern.



Department of
Environmental
Conservation

Ambient Air Quality Data Review

The Department reviewed the air quality data collected by RTP, with an emphasis on the benzene issue raised in your letters. The data also identified hydrogen sulfide odor episodes both on and off site.

Benzene-

The RTP-reported benzene concentrations are difficult to interpret from a public health standpoint since the samples were collected for only a one minute duration. We thus looked at test results from one-hour samples collected by community members who participated in the Department's Community Air Screen Program (CAS): Ambient Air Quality Screening Report Brookhaven Community in 2013 and 2014. The CAS Program results were within the range of what would be expected in this area. And not surprisingly, the sample collected near Sunrise Highway had shown an elevated benzene concentration, indicative of emissions from motor vehicles. To eliminate interference from the highway, follow-up sampling was conducted on Sundial Lane, in an area downwind to the Landfill. The results from that follow-up one-hour sample were similar to the other results from samples collected near the landfill, and the concentration of benzene was similar to levels found in suburban areas of the State. The full report is accessible at <http://www.dec.ny.gov/public/98473.html>.

The one hour concentrations of benzene measured during the CAS Program, and recently measured at the Frank P. Long Intermediate School by a private consultant, are within the levels that would be expected given the population density of the area and the presence of a major highway. The US Environmental Protection Agency's 2011 National Air Toxics Assessment (NATA) provides an overview of the ambient annual concentrations and risk from hazardous air pollutants, including benzene, for every area of the United States. NATA accounts for all sources of air toxics pollution in the local area and uses air dispersion modeling to predict ambient concentrations. The modeled results were compared to actual measured concentrations for benzene, and that evaluation showed the modeled results to be reasonably accurate. The 2011 NATA modeled annual benzene concentrations for the Brookhaven area (0.41 to 0.54 $\mu\text{g}/\text{m}^3$) are very close to the recent one-hour measurements (0.45 to 0.73 $\mu\text{g}/\text{m}^3$) detected in air samples collected in the communities around the landfill. The 2011 NATA identifies on-road motor vehicles as the predominant source of benzene in the area around the landfill.

DEC's Recent Ambient Air Quality Investigation

Following the data review discussed above, the Department decided to further investigate the levels of benzene, hydrogen sulfide, and dust at and around the Facility.

Benzene-

We inspected the landfill flare, since it could be a source of benzene emissions if it's not operating properly. We used a Forward Looking Infrared Optical Gas Imaging Camera to qualitatively evaluate the combustion efficiency of the flare; we found no issues. At no times did we observe large plumes of volatile organic compounds (VOCs) trailing off-site, which would indicate poor landfill gas combustion – a potential source of benzene and other VOCs in the community.

Hydrogen Sulfide-

We confirmed that hydrogen sulfide was a concern during site visits in June and October 2016. We identified an uncapped portion of Cell 5 and the leachate collection tanks as two problem areas that must be addressed. I have attached two reports that will provide the details of the Department's investigations to date: (1) Brookhaven Landfill Trip Report, and (2) Brookhaven Landfill Hydrogen Sulfide Sampling Survey Report, July 2016.

Particulate Matter-

Our investigation of particulate migration from the Facility is ongoing. We recently provided petri dishes to area residents to collect falling particles. Initial analysis showed inconclusive results; the Department will be conducting another round of testing in the near future. We believe that collecting physical particulate samples is necessary to determine whether the landfill is a source of particulate matter in the community.

Existing Control Measures at the Landfill

Over the years, several measures have been put in place to control gas migration from the landfill. Cells 1 through 4, which contain municipal solid waste, are capped, and a gas collection system carries landfill gas to the flare. Those cells have been closed and capped since 1996. RTP inspects the gas wells monthly and performs ambient surface methane monitoring annually. The wells are monitored for methane, carbon dioxide, and oxygen levels to determine whether leaks exist. The monitoring results are summarized in a compliance report submitted semi-annually to the EPA and DEC's Division of Air Resources. Cell 5, which contains construction and demolition debris and ash, is currently being capped, and leachate is being collected from that area. To enhance gas collection, horizontal pipes were installed as landfilling progressed; the system was completed in April 1998. Cell 6 is active and is also fitted with horizontal gas collectors. Once the final elevation is reached, and the cell is ready for final capping, vertical gas collection wells will also be added. The intricate network of gas collection systems installed over time has reduced the potential community exposure to benzene and other VOCs.

Existing Health Studies Related to the Landfill

Historically, there has been concerns over the possible detrimental health effects from pollutant releases from the landfill. A health consultation was prepared in 2005 by the New York State Department of Health under a cooperative agreement with the U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry. That health consultation classified the Brookhaven Landfill as posing no apparent public health hazard. At the time the consultation was prepared, the 24-hour measurements of benzene taken at the western boundary of the landfill averaged $2.1 \mu\text{g}/\text{m}^3$. As you can see, the measured one-hour benzene concentrations and modeled annual concentrations discussed earlier are well below the concentrations which were evaluated during the health consultation.

Ash Management at the Facility

The Brookhaven Landfill is not permitted to use ash in lieu of sand or soil as capping material. When a cell reaches its maximum elevation, 6 NYCRR Part 360 requires placement of a final cover system consisting of a soil barrier protection layer over a geosynthetic liner. The Landfill has been in compliance with the final cover system requirements. The Facility is also required to place daily cover on its working face; however, it has an approved variance from 6NYCRR Part 360-2.17(c), eliminating the need to place daily cover over ash. The Town uses a Dust Trak Monitor to take hourly measurements of particulate matter (total PM, PM₁₀, and PM_{2.5}) around the perimeter of the landfill. The data collected shows some spikes of PM; however, the 24 hour average does not exceed the National Ambient Air Quality Standard of $150 \mu\text{g}/\text{m}^3$ and $35 \mu\text{g}/\text{m}^3$ for PM₁₀ and PM_{2.5}, respectively. This monitoring of particulate matter will continue until the Department agrees to end it.

FOIL Requests Made to DEC

As for the matter of transparency, the Department responds to all FOIL requests received. Unfortunately, workload and other circumstances sometimes delay those responses. The air quality test results mentioned in your letters have been provided. The Department will try its best to handle future requests as expeditiously as possible.

Corrective Measures Underway

The Department is actively working with the Town to mitigate the problems that were identified during the data review and investigation. Earlier this year, the Town installed ten new vertical gas extraction wells at the top plateau of Cell 5 to capture more landfill gas. More recently, the Town has also started placement of a final cap on a 20-acre area on top of Cell 5, to prevent further release of hydrogen sulfide from degrading construction and demolition debris such as drywall; capping is expected to be

completed by December 2016. In addition, the Town is now using potassium permanganate in the leachate tanks to control hydrogen sulfide in that area.

DEC's Position

The Department takes seriously the community's concerns about air quality. We have investigated the situation, identified problems, and are working with the Town to mitigate those issues. We do not believe implementation of a large-scale multipollutant community air quality monitoring program, as requested in your letters, is necessary at this time. Comparing the current conditions to the findings of the 2005 health consultation and the 2011 NATA revealed no cause for such program. We have evaluated the landfill flare, and it is currently operating as designed. The Town has begun to permanently cap Cell 5 to reduce any fugitive emissions from that area. Additionally, the Town is operating a particulate monitoring network which encompasses the entire perimeter of the landfill. We have located the landfill operations which are sources of odors and are actively working to address the quality of life concerns that have been raised in your letters. Finally, the DEC has notified the Town of the Landfill's H₂S issue and the need to further reduce emissions from the Facility. We requested a Corrective Action Plan from the Town and will continue to evaluate remedial measures as they are implemented. If those measures do not result in adequate reductions in H₂S levels, the establishment of an air monitoring network for that contaminant will be re-evaluated.

The Department agrees there needs to be improvements in the air quality around the landfill and, together with the Town, it is actively pursuing remedies that will bring on those improvements and reduce odor episodes in the community. If you have any further questions please contact me at (631) 444-0345.

Sincerely,



Carrie Meek Gallagher
Regional Director

Enclosures (2)

Brookhaven Landfill Trip Report (June 28-29, 2016)

Introduction

Numerous odor and dust fall complaints from the surrounding community have been received by the Region 1 Office. In response to public complaints, the Town of Brookhaven established a particulate matter monitoring network around the landfill, measured hydrogen sulfide concentrations on-site at different locations at the landfill and off-site in the community, and sampled for volatile organic chemicals (VOCs) at locations on and off-site using SUMMA canisters (one minute samples). The community requested the establishment of a larger scale community air quality monitoring network by the Department as a result of the air quality monitoring conducted by the town.

The air quality data collected by the Town of Brookhaven was reviewed by central office staff. The on-site air quality data for hydrogen sulfide indicated the occurrence of odor episodes at various locations within the landfill, especially at the top of cell 5 and the leachate tank area. The on-site air quality data for particulate matter (PM) indicated there were short-term instances of elevated PM measurements recorded at the landfill perimeter monitors. The on-site and off-site air quality data for benzene is difficult to interpret from a public health standpoint since the samples are only for a one minute duration. One hour samples collected during the Community Air Screen Program were within what would be expected in this area, with the exception of one sample collected near the Sunrise Highway. This location is in an area that would represent the impacts of benzene emissions from motor vehicles. However, this resulted in follow up sampling in the area near the landfill when the wind was blowing across the landfill toward the sample collection site to assess the benzene concentrations. The benzene results from this follow-up one hour sample were not unusual.

At the request of the Regional Engineer and Regional Air Pollution Control Engineer in Region 1, Division of Air Resources central office and regional staff visited the Brookhaven Landfill to assess the operation of the landfill gas flares and other potential air contaminant sources at the landfill with the Forward Looking Infrared (FLIR) Optical Gas Imaging Camera. We also conducted an odor surveillance in the surrounding neighborhoods and potential sources at the landfill to assess potential hydrogen sulfide impacts. A Jerome 631-X hydrogen sulfide analyzer was used to collect air samples and provide instantaneous readings. We were also accompanied on-site by a regional Division of Materials Management staffer, who also had a Jerome meter.

Hydrogen Sulfide Air Sampling

On June 28th the first day of sampling, staff drove the perimeter of the landfill, through surrounding neighborhoods and athletic fields and around Frank P. Long School located southwest of the landfill. Because the winds were from the south-southeast during the scoping, staff positioned the initial air collection at the potential maximum impact, offsite location at the northwest corner of the landfill site on Woodside

Avenue. Hydrogen sulfide odors were detected at this location and air sample collection took place on both the west- and eastbound lanes of Woodside Avenue. The highest readings were obtained offsite, approximately 100 ft. from the leachate tanks (on 6/28 between 5:08 – 5:42 PM). During the sampling the spray misters were running on the leachate tank and the pump-out area. Also, during this sampling the landfill operations were closed, therefore no activities such as the loading of leachate in trucks were taking place at the leachate tanks. The readings on the eastbound lanes, ranged from 81 to 379 ppb. Offsite readings on the westbound lane of Woodside Ave, ranged from 0 to 148 ppb, with most of the readings being detects. These locations are shown in Figure 1. Staff returned on June 29th to collect samples outside the facility at this location. The readings on the eastbound lane of Woodside Ave, ranged from 0 to 147 ppb.

On June 29th, onsite air sample collection was conducted in three locations, the top of Cell 5, the base of the main flare and at the SulfaTreat area. No samples were taken at the new leachate tank area because an odor was not present at the time of sampling, since we were not located downwind from the leachate tanks. Onsite readings were lower in these areas, zero at the base of the flare, ranging from 0 – 103 ppb at the SulfaTreat area and 4 – 27 ppb on top of landfill cell 5, which was being readied for closure.

Forward Looking Infrared (FLIR) Optical Gas Imaging Camera Observations – Enclosed Flare, Above Ground Landfill Gas Piping & SulfaTreat Area

We arrived at the landfill and met staff from Region 1 Divisions of Air Resources and Materials Management at 9:00 AM on June 29th. It was a sunny day with a scattered cloud covering. We proceeded to the main flare area located in the southeast corner of the property to observe the facility's enclosed John Zink flare (Emission Unit E-Flare) using the FLIR camera. The flare is used to destruct pollutants in the landfill gas after it has been routed through the SulfaTreat system. The flare was in full operation burning landfill gas, the control panel indicated the flare set point was 1625°F and the gas flow meter indicated a flow rate between 1890 to 1915 standard cubic foot per minute. A heat rise could be observed from the flare and there were no emissions visible to the naked eye. Using the camera's High Sensitivity Mode (HSM), the outlet of the flare was viewed from several observation locations.

We began to observe the flare at 9:33 AM from approximately 30 yards away. The heat plume from the flare was clearly visible and we tracked the plume after the heat dissipated but the clouds made it difficult to observe the entire tail of the flare plume clearly. At 9:38 AM, we positioned ourselves closer to the flare (15 yards) and observed the flare from a different angle to avoid the clouds in the background. At each viewing location, a heat plume was observed spanning approximately ten feet from the outlet of the stack. After the heat dissipated, a small VOC plume was observed traveling a short distance upward before it was no longer visible. During the flare observation, there were no times at which large VOC plumes were seen trailing off-site that would be

indicative of poor landfill gas flare combustion which could be a possible source of benzene and other VOCs. At 9:43 AM, we surveyed the piping into the enclosed flare with the FLIR camera and did not observe any leaks.

We were not initially accompanied by any employees from the landfill into the flare area. A worker from the landfill arrived as we were filming the flare who was familiar with the flare operation. He informed us that the main flare had undergone full scale maintenance a couple of months ago. The entire interior of the flare was cleaned, the burners were removed and power washed, the thermocouples were cleaned to remove any residues and the draft mechanisms were inspected. The work was performed by the contractor who installed the SulfaTreat system after consultation with manufacturer of the flare (John Zink Company). He stated the back pressure on the blowers was reduced and an improvement in the landfill gas flow rates to the flare was clearly noticeable after the cleaning. Regional staff indicated that we would receive this information in the annual 2016 compliance report at the end of the year.

We repositioned ourselves by the SulfaTreat area at 9:49 AM and used the FLIR camera to evaluate if there were any leaks in this area. We did not observe any leaks of the piping in this area. We did not use the FLIR camera in any other locations at the landfill during this visit.

Overall Observations

We continued our observations of the landfill operations by travelling to the top of the landfill to cell 5. This portion of the landfill was being prepared for closure and they were actively grading the top area of cell 5 to prepare for the final cap. Odors were noticeable in this area, but were not very strong. We proceeded to the active part of the landfill, cell 6 where construction and demolition debris and ash from the resource recovery facilities were being unloaded and graded into the landfill surface. The area was wet and large watering trucks were observed traversing the landfill roads and surface of cell 6. The ash being unloaded was wet, prior to being removed from the resource recovery plant the ash is watered down for transport to the landfill. A slight odor of wet cement or ash odor was present and not all of us could smell it in this area. However, olfactory fatigue could have been setting in at this point of the day. Source samples were collected from the top of cells 5 and 6 and delivered to NYSDEC's Air Pollution Microscopy Program. Petri dishes and forms were provided to regional staff to be used in future off-site complaint investigations.

We then proceeded to the leachate tank area where we measured elevated hydrogen sulfide concentrations during the previous day after the landfill was closed. There are two newly constructed leachate tanks (49 and 50) and a covered hanger where the leachate from the tanks is loaded onto tanker trucks. We were told there could be as many as 20 to 30 trucks a day removing leachate. Misters were active in the hanger and around the top of leachate tank 50. We also observed construction activity near tank 49 where they were laying piping to transfer leachate from newly

constructed phases to the tank. Only intermittent hydrogen sulfide odors were detected, because the wind was constantly changing directions. Based on our odor surveillance work from the previous evening, this area appears to be the source of the public odor complaints. Regional staff indicated that numerous odor complaints come from the Atlantic Point community (residential neighborhood in Figure 1). Because Atlantic Point is a gated community, access was not attempted during odor surveillance the previous evening when strong hydrogen sulfide odors were detected on nearby Woodside Avenue. At the time of that odor surveillance, the wind was carrying the odors toward the residential area. Although the predominant odor detected around the landfill was hydrogen sulfide, occasional odors of stale garbage were noted by staff. The origin of the garbage odors appear to be from the on-site transfer station where residential waste is dropped off. We also encountered the stale garbage smell on Old Dock Road near the landfill and the source was the Winter Bros. Waste Transfer Station.

We observed one of the perimeter particulate monitoring stations in the flare area which was located near the landfill perimeter service road. We noticed the monitor was covered with dust from the nearby unpaved service road. When fast moving vehicles drove by, huge dust clouds were created. This may explain some of the high short-term particulate matter peaks observed at this monitor.

We had a brief conversation with the Town's chief deputy commissioner about the hydrogen sulfide odors. He informed us they are working on a solution for the leachate tank area which involves the introduction of potassium permanganate into the leachate tanks to remove hydrogen sulfide from the leachate water. They piloted the process in the laboratory and were preparing to run the test on the actual leachate tanks. They are actively looking for solutions to the hydrogen sulfide odor issue.

In summary, all of the equipment (flares, SulfaTreat area, landfill gas piping, and leachate tanks) appeared to be well maintained.

Next Steps and Recommendations

We need to continue to monitor the progress of the town as they attempt to reduce the odors from the leachate collection tank area. Another site off-site visit will be made after operating hours in the next month after the on-going construction is complete. This was the source of strongest hydrogen sulfide odors during our visit.

The leachate tank area should be identified as an emission unit when the Title V permit is reissued.

If any additional air quality monitoring is conducted by NYSDEC in the communities around this landfill, it should be for hydrogen sulfide.

Hydrogen Sulfide Sampling Survey Report – Brookhaven Landfill

Introduction

In response to several residents' complaints about odors, the New York State Department of Environmental Conservation (Department) sampled for hydrogen sulfide for two weeks at the Town of Brookhaven Landfill from June 22 to July 7, 2016. Nearby residents have specifically requested the Department conduct a continuous air monitoring program around the landfill to ensure that their health is not at risk as a result of odors from landfill operations. The Town of Brookhaven initiated the capping of 20 acres of the top of Cell 5 in accordance with the Intent to Modify Permit (DIM) the Department issued on April 28, 2016. Preparations for capping involved excavation and grading which disturbed decaying waste and resulted in odor releases including the release of hydrogen sulfide. The Department conducted air sampling for two weeks during the period of excavation to determine the instantaneous levels of hydrogen sulfide both offsite and on landfill property.

Hydrogen Sulfide Air Sampling

A Jerome 631-X hydrogen sulfide analyzer was used to collect air samples and provide instantaneous readings. Samples were collected at eight locations as shown in Figure 1. Five sample locations were outside the landfill property at locations near residential odor complaints and three sample locations were onsite. Two measurements were taken daily, in the morning and afternoon. Some additional readings were taken at other locations depending on the wind direction and speed. These are identified as locations 9 – 13 in Figure 1.

Results:

The average and range for eight locations sampled twice per day are shown in Table 1. The highest offsite concentrations of hydrogen sulfide were recorded near the leachate tanks on June 28th and June 29th at 44 and 137 ppb, respectively. During this time, some excavation was taking place to connect new leachate piping from Cell 6 (currently being constructed) to the leachate tank. Other high readings of hydrogen sulfide were detected on the top plateau of Cell 5 near active excavation and grading in preparation for the capping project (Phase F). Several sequential samples were collected and the concentrations of hydrogen sulfide and noticeable odors were very dependent on the wind speed, direction, and location. The hydrogen sulfide readings varied greatly even though the separation in sample distance was only ten to twenty feet. The facility's capping plan is to excavate, grade, and cover small sections at a time, to minimize the exposure to air of decayed landfill material. During excavation and grading, two trucks

sprayed odor neutralizers to prevent odors from moving off the property and reaching the nearby residents.

The average hydrogen sulfide reading next to Wehran Gas Recovery Facility was 4.90 ppb. Most readings taken in this area ranged between 0 to 2 ppb. The highest reading at this location was 112 ppb on July 5th. During that sample period, three sequential readings were taken and the results were; 0 ppb, 1 ppb, and 112 ppb.

The samples from locations 9 – 13 were taken in complaint areas when the wind was blowing across the landfill toward these areas. The results ranged from 0 to 2 ppb.

Staff from the Department's Division of Air Resources conducted their own evaluation at the Wehran Gas Recovery Facility on June 29th using a Forward Looking Infrared Optical Gas Imaging Camera to qualitatively determine if any volatile organic compounds were released from the flare system. Additionally staff evaluated hydrogen sulfide levels with their own Jerome meter (June 28th & 29th). A separate report is available with the findings of that investigation.

Conclusions:

The majority of the hydrogen sulfide concentrations obtained offsite were non-detect or at the detection limit of 1 ppb. The average concentrations at the offsite locations were below the New York State 1-hour air quality standard for hydrogen sulfide of 10 ppb with the exception of the leachate tank area. The ability to smell the odor of hydrogen sulfide varies widely but 8 ppb is the level at which the average person would detect an odor. Since some of the offsite concentrations were above this level, nearby residents are likely to periodically smell hydrogen sulfide. The low levels detected during this two week sampling would not be expected to cause long-term or lasting health effects.

The two areas of concern onsite are the top plateau of Cell 5 and Horseblock Road, by the leachate tanks. The top plateau of the landfill will soon be capped, which should significantly reduce hydrogen sulfide releases and other odorous gases. It is difficult to conclude whether the sporadic higher readings of hydrogen sulfide was a result of the construction work or operations at the leachate tanks. Continuous observation and attention should be given to the operations at the leachate tanks to ensure that it is not releasing high levels of hydrogen sulfide.

Table 1. Hydrogen Sulfide Average Concentration over Two Week Sampling

Location	Hydrogen Sulfide Average and (Range Concentrations) in ppb
Offsite – outside property boundary	
Point 1: On Woodside Avenue, by the leachate tanks	12.5 (0– 137)
Point 2: On Woodside avenue	0.68 (0-3)
Point 3: On Yaphank Avenue, entrance to Sunrise highway West	0.37 (0-2)
Point 4: Service Road of Sunrise Highway West, close to Horizon Village	0.26 (0-2)
Point 5: On Martha Avenue	0.17 (0-1)
Onsite	
Point 6: Back of Brookhaven Materials Recycling Facility	0.68 (0- 2)
Point 7: Next to Wehran Gas Recovery Facility	4.90 (0-112)
Point 8: At the top of Cell 5 (where excavation is taking place)	4.78 (0-83)

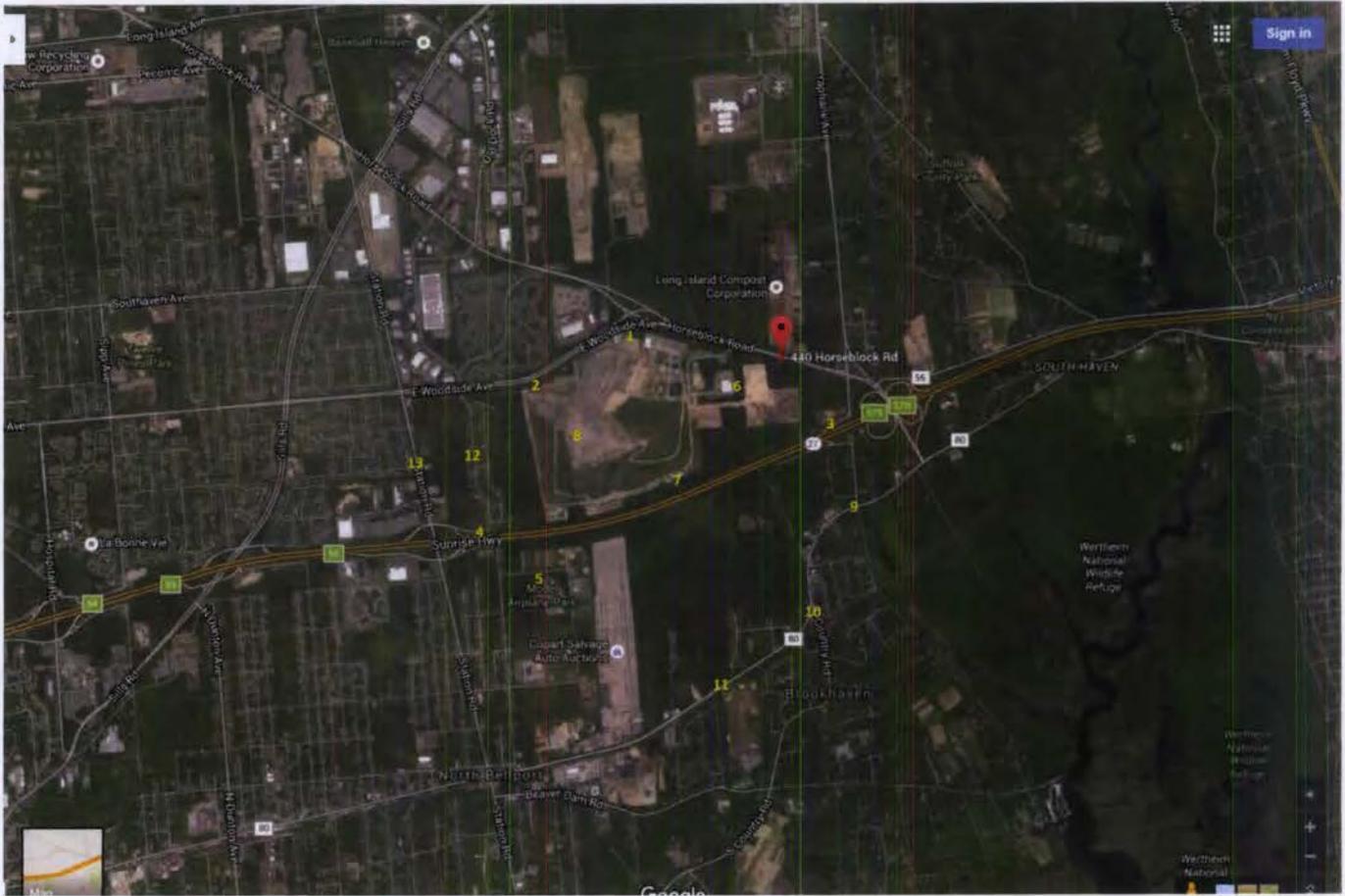


Figure 1. Map of Hydrogen Sulfide Sampling Locations