

Arbor Hills Landfill Operations Evaluation Report

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The purpose of this report is to present the results of a landfill operations review that was conducted at the Arbor Hills Landfill on May 1-2, 2018. The report describes the activities conducted during the site visit and presents key observations with associated recommendations.

Activity Summary:

I visited the Arbor Hills Landfill on May 1-2, 2018. During this visit the weather was clear to partly cloudy with temperatures generally in the range of 70 to 85 degree F. Winds were generally from the SW and typically in the range of 10 to 20 mph. Dry conditions persisted each day.

On May 1 I toured the landfill separately with the General Manager, the Site Manager along with a third party engineering representative, and the Operations Manager. I was also accompanied during these tours by the Regional Landfill Manager. The tours covered the entire landfill and compost facility and allowed me to discuss various facets of the operation with the team as viewed from different perspectives. During these tours and continuing into that evening and also on May 2, we were able to walk portions of the site including the landfill perimeter, side slopes, active landfill areas, new cell construction, compost area and gas management infrastructure. Observations at the landfill took place both during and outside of normal operating hours. On May 1 from about 9 to 10 AM and from about 8 to 9 PM, and on May 2 from about 1 to 2 PM, we toured some of the nearby neighborhoods. During or within about an hour of these time frames five odor complaints were received by the landfill. However, during my time in the neighborhoods I was unable to detect the presence of any odors.

On the evening of May 1, from about 7:00 to 9:00 PM I was able to accompany the Barr personnel as they conducted their evening odor monitoring circuit.

On May 2 I reviewed the complaint log with the Site Manager. Also on May 2 I reviewed relevant landfill gas system monitoring data with the Site Manager, the Regional Landfill Manager and the Regional Landfill Gas Manager (who joined by phone). We utilized the ADS landfill gas database during this review.

Key Observations and Recommendations:

Under each of the following headings is a description of the relevant observations followed by bulleted recommendations.

Active Area

During this visit MSW landfilling was being conducted at two working face locations (one for tippers and one for other trucks). Contaminated soils were being separately stockpiled nearby for use as cover. The tipper working area was quite large and waste was being pushed for unusually long distances. Site management was working to configure the operations such that the working faces can be combined into one area. Compaction equipment was being used routinely to clear tippers and may not have been able to apply as much compactive effort to the working face as desirable. Notably very few birds were present at the active faces or on site in general. The site employs bird mitigation techniques that appear to be effective.

- Strive to keep operations to one main compact active area as much as practical. Multiple working faces and large areas can over stress manpower and equipment resources.
- Minimize the size of the working face. Define boundaries daily if possible to help prevent working face size creep.
- Consider performing quarterly or semi annual surveys to monitor density at the landfill and verify that compaction effort is being appropriately applied.

Litter

Litter was observed to be leaving the working faces during the windy parts of each day. Multiple personnel were observed actively collecting such litter and bagging it to be returned to the working face. No litter was observed leaving the facility boundary. Portable litter fencing was available near the working face.

- More effectively deploy the portable litter fencing to minimize the extent to which litter can leave the active area.
- Continue aggressive litter collection, which is clearly very effective.

Dust

Conditions at the site both days was warm, dry, and breezy. Dust was being generated by the large amount of truck traffic, heavy equipment movement and general landfilling operations. One water truck was actively watering haul roads and one was being used by the contractor in the new cell construction area. More than once, noticeable dust was observed near the top of the landfill. Although not observed to be leaving the site boundary there existed the potential for

off site migration of dust. Ditches were in various stages of being cleaned throughout the site and grading of some of the roads and slopes to prepare for additional hard surfacing or seeding was in progress.

- Continue to aggressively water roads during dry and breezy conditions. Ensure that the water truck is active as much as possible and directed to areas of most need given the conditions existing each day. Minimize refill time as practical. Bring in additional dust control equipment if necessary to minimize the potential for dust to leave the site.
- Complete ongoing grading, ditch cleaning and surface treatments (including vegetation) to further minimize the areas of potential dust generation

Daily Cover

Observed the daily cover after placement had been completed for the day. Portions of the cover did not appear to be as thick as would be desired. Flagging was noted. Some MSW had not been adequately removed from the tipper equipment and consequently was uncovered. Garbage odor was noted to be present in certain locations in the area on which waste had been placed that day.

- Increase the focus on applying sufficient soil thickness to cover all waste and minimize garbage odors. In addition, tarps or other ADCs could be used as appropriate to ensure complete coverage.
- Ensure that cover is adequately stripped each morning before disposal operations begin to prevent lensing in the landfill.

Liquid Seeps

While walking along the landfill perimeter and side slopes some liquid seeps were noted. These were isolated in extent, generally contained, and did not appear to be gas driven. In all cases the site management was aware of the issue and had a fix in process or planned. The most significant issue appeared to be in the vicinity of TS-1. Odor was noted in this area. Seepage from an abandoned portion of a final cover drainage system along the west slope had the most potential to directly impact the stormwater system due to its location. Observed an area near the southern portion of the top of the landfill that could pond stormwater and potentially recharge side slope seeps. During on site discussions there was mention of filling to be conducted on the south slope to bring the area to final grade.

- Move forward quickly with a comprehensive fix for the area near TS-1. This will likely involve upgrading the pumping capacity to better handle liquids present within the landfill in this vicinity. Current liquid containment strategies in this area can not be relied upon for the longer term.
- Continue to look for and quickly remediate any seeps that express themselves along the slopes. Track locations and look for trends.

- Along the west toe of slope dig out the abandoned drainage system outlet pipes and plug them to eliminate seepage.
- Be vigilant to maintain positive drainage on flatter slopes of the landfill such that significant ponding does not occur. Such ponding can feed additional liquid seeps on landfill side slopes. Coordinate required grading improvements with other planned stormwater and interim cover related construction to promote effective runoff.
- A stability assessment is recommended prior to commencing filling on the south slope given the amount of liquid apparently present within that area of the landfill.

Landfill Gas Management

Observed 24 inch header being installed along the west side of the site (outside of waste) and 36 inch already installed under tracks to provide gas feed to powerplant/flare area. Was told that the flare in NW corner is to be removed once the new header is operational and flare compound modifications are completed (scheduled for August). Gas extraction well drilling was underway and some completed wells were awaiting connection to the collection system. Noted odors emanating from blower building and site management described the repairs that are currently planned to mitigate the odors.

- Providing additional vacuum to the NW portion of the landfill will be a significant improvement to gas collection efforts in that area. No general gas odors were noted there during the site visit, but in review of the data it is clear that this is an area of odor risk.
- Connect all new gas extraction points to vacuum as soon as practical. Construct lateral piping in advance of well drilling when possible to allow for quicker connections to be made once gas extraction wells are completed.
- Repair the issues in the blower building that are leading to odors as soon as practical.
- Implement a more formal process for the internal reporting and timely resolution of any issues of concern identified regarding the landfill gas management system. Assign an individual to act as a focal point (champion) for gas management performance. Track all identified issues and ensure timely resolution.
- Educate all landfill personnel regarding the critical nature of the landfill gas management system. Train everyone on site regarding how to be watchful for issues that could compromise excellent landfill gas management and how to report any observations for resolution.
- Use currently available onboard GPS more effectively to ensure that gas extraction and collection infrastructure is not damaged by equipment during landfill operations.
- Continue the routine use of the currently available laser surface scan tool to help identify areas that need additional cover or gas collection. Focus on maximizing gas collection efficiency.

Exposed Geomembrane Cap

Visually evaluated exposed geomembrane cap on the west and north slopes. Generally the cap is in good condition and functioning effectively. Observed the evidence of a gas bubble under a portion of the north slope where undercap gas collection is not functioning properly.

- Complete repairs to the undercap gas collection system on the north slope as soon as practical.
- Continue to monitor the performance of the exposed cap to ensure that any issues are identified and repaired as quickly as possible.

Cell Construction

Construction of a new landfill cell area was ongoing during this site visit. Gas odor was observed emanating from the exposed tie in area. This is a typical for connections to older lined areas. No leachate issues in the tie in area were noted.

- When practical consider the option of using a shallow buried perforated pipe, connected to the gas collection system and subjected to low applied vacuum, to capture and remove gas from the tie in area.
- Investigate the value of using portable odor mitigation equipment near such tie in locations in the future. This may especially be of value as cell construction moves closer to the intersection of Napier and Six Mile roads in future years.

Odor Mitigation System

A fence mounted odor mitigation system was observed to be in place along Napier Road near the site entrance. Site management discussed continuing to evaluate the effectiveness of this system and the potential for expanding or relocating it in the future. The evaluation of other alternative systems was also being discussed.

- Conduct smoke tests periodically to ensure that odor mitigation systems are located in a manner to be most effective.
- Consideration should be given to the use of portable odor mitigation devices that could be used closer to the working face or to other areas of concern (especially during invasive construction activities) as needed to reduce odor migration.

Conclusions:

Overall the landfill and compost operations appear to be well managed. The compost area is receiving the operational attention needed and has appropriately sized and spaced windrows that are being turned regularly. Some landfill slope areas, especially on the south side, were being prepared for seeding. This will further improve the appearance and performance of the landfill. Very slight odors were noted to be present very infrequently along Napier and Six Mile roads and when present were transient in nature. Litter and dust from working areas was being managed on site and only minimal bird activity was noted.

As a result of my observations during my time on site, it is my judgment the most significant initiatives that the operating team could implement are as follows:

1. Keep the landfill working face as small as practical. This will likely increase density, reduce equipment costs, improve the ability to apply effective daily cover, and generally reduce potential odor generation due to smaller open area.
2. Enlist the entire Arbor Hills team in the effort to minimize any potential for odors to impact the local community. In particular train the team to how to look for and then internally report, for timely resolution, any issues with the landfill gas management system that they observe since that system is so critical for effective odor control. In my experience a system champion is essential, but the most effective gas management strategies involve an actively engaged and empowered team that is willing to hold each other accountable for positive results.
3. Urgently and effectively address any and all liquid seeps from the landfill. These are often immediate sources of odor and can also quickly become storm water concerns. Tracking locations of seeps can help identify trends that may allow for proactive actions in some cases.

I appreciate the opportunity to assist with this evaluation. If there are any questions regarding the content of this report, please let me know.