BIANNUAL SURFACE WATER AND BIOLOGICAL STREAM SAMPLING AROUND RUMPKE AND BOND ROAD LANDFILLS

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HAMILTON COUNTY
PUBLIC HEALTH

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For more information, please contact:
Hamilton County Public Health
Department of Environmental Health Services
250 William Howard Taft, 2nd Floor
Cincinnati, Ohio 45219
(513) 946-7800
www.hamiltoncountyhealth.org

Introduction

Hamilton County Public Health conducted biannual sampling of the surface water streams around the Rumpke Colerain Sanitary Landfill on May 26 and October 22, 2021. Additionally, biannual sampling of Bond Road Sanitary Landfill was conducted on June 4 and November 18, 2021.

Sampling Locations

Rumpke Colerain Sanitary Landfill, located in Colerain Township, Hamilton County, Ohio, is situated at the northeast intersection of US-27 and Struble Road. The landfill is bordered by Struble Road to the south, US-27 to the west, Bank Road to the northwest and Hughes Road to the east/northeast.

Two sedimentation ponds are located on the site, identified as the NW Pond and SE Pond. The sedimentation ponds collect rainwater run-off from the landfill and settle out the suspended solids/silt prior to discharging into the adjacent streams and creeks.

Generally, two watersheds surround the landfill: the western watershed and the eastern watershed. The NW Pond discharges into the western watershed, while the SE Pond discharges into the eastern watershed. The sampling locations around the landfill consists of the two sedimentation pond outfalls, and their respective upstream and downstream locations (Figure 1).

Western Watershed Sampling Locations:

NW Pond

The discharge/outfall location for the sedimentation pond located on the west/northwest portion of the landfill. The pond discharges into the western watershed surrounding the landfill where Banklick creek borders the landfill and flows north/northeasterly along Bank Road.

S-1 The furthest downstream location from the NW Pond outfall at the northern end of the landfill in Banklick creek along Bank Road. This is generally a creek with a series of riffles and pools. The bottom is silty in the pool areas and rocky in the riffle areas.

S-2 Located downstream from the NW Pond outfall and at the western edge of the landfill, upstream from S-1, in Banklick creek along Bank Road. The sampling location is west of the overpass below the culvert in a small, shallow pool. The bottom is silty in the pool areas and rocky to solid bedrock in the shallow riffle areas.

S-3 Located upstream, above the NW pond outfall, in an unnamed stream west of Banklick creek. The sampling location is a series of very small, shallow pools and riffles. The bottom is solid rock to rocky with some silt.

S-11 Located upstream, above the NW pond discharge, in a stream west/southwest of the landfill, across US-27. The stream consists of very small shallow pools. The sampling location was added in 2014 as an additional upstream location.

Eastern Watershed Sampling Locations:

SE Pond

The discharge/outfall location for the sedimentation pond located on the southeast portion of the landfill. The pond discharges into the eastern watershed surrounding the landfill in an unnamed stream east of the landfill, across Hughes Road.

S-9 Located upstream, above the SE Pond outfall, and east of the landfill in an unnamed stream east of Hughes Road and west of Buell Road. The sample location consists of a series of very small, shallow pools with a rocky bottom. The sample location was added in 2008 due to the southern expansion of the landfill.

S-10 Located downstream from the SE Pond outfall, in an unnamed stream east of the landfill. The sample location consists of a series of small, shallow pools with a rocky bottom. The sample location was added in 2008 due to the southern expansion of the landfill.

S-12 The furthest downstream location from the SE Pond outfall, located at the northern end of the landfill, in an unnamed stream that flows along Buell Road to Crest Road and eventually into Banklick Creek. The sample location was added in 2019 due to the eastern expansion of the landfill and consists of ponding pools and rocky bottom.

Bond Road Sanitary Landfill, located in Whitewater Township, is situated in western Hamilton County, Ohio. The landfill borders Indiana to the west and Bond Road to the north. In 2021, Rumpke purchased 466 acres of land south of the existing landfill for purposes of future development and improvements to the site. Sampling locations around the Bond Road Sanitary Landfill consists of the following two sites (Figure 2):

B-1 Located at the east end of the sedimentation pond which discharges to a tributary to Fox Run.

B-2 Located on the south end of the landfill near the leachate sumps. Most water is generated from storm swales from the landfill and is typically dry. This area channels down to an unnamed tributary to Fox Run, which exits the property near the sampling location.

Methods

Surface water sampling was conducted in the Spring and Fall by obtaining grab samples in streams around each of the landfills where possible. Generally, Spring sampling is more

influenced by precipitation and Fall sampling is more influenced by groundwater. Efforts are made to collect the samples during low flow times where groundwater contributions are considered to be greater. This monitoring was performed to serve as an indicator of water quality above and below each landfill.

Samples were collected in polyethylene wide-mouth jars ranging in size from 250 mL to 500 mL and two set of hypovials for sampling volatile organic compounds. Depending on the sampling parameter, samples were either unpreserved or preserved with hydrochloric acid, sulfuric acid, nitric acid, or sodium hydroxide (as required). All samples were placed in a cooler on ice. Samples were analyzed by TestAmerica Laboratories. Chain-of-custody protocols were followed. Water temperature was recorded using a Taylor thermometer near the sampling location.

Biological water samples were collected at each of the sampling locations. Biological samples were collected using an aquatic kick net with 1000-micron mesh. A kick technique was used to loosen organisms from riffle areas of the streams and then the area was swept with the net. Hand picking of organisms off the rock surfaces was also employed at the sample locations. Biological samples in need of further observation for identification were placed in appropriately labeled 4 oz. Nalgene wide-mouth jars and preserved in 70% isopropyl alcohol and later identified with the aid of a magnifying glass and a Swift instrument variable magnification (1X-4X) binocular microscope.

Results and Discussion

Water Quality Monitoring

Rumpke Sanitary Landfill

The surface water sampling results from the 2021 sample events are presented in Table 1, which include sampling results dating back to 2010.

<u>Western watershed</u>:
The western watershed surrounding the landfill consists of upstream sample locations S-3 and S-11, the NW Pond outfall, and downstream sample locations S-1 and S-2. During both 2021 sampling events, the NW Pond outfall was flowing and sampled.

Sampling results comparing the NW Pond outfall with upstream sample locations (S-3 & S-11) and downstream sample locations (S-1 & S-2) are illustrated on Figures 3 & 4 and narrated below:

- Chloride was not detected above the secondary maximum contaminant level (SMCL) of 250 mg/l in upstream sample locations, S-11 and S-3, during either 2021 sampling event. Nor was chloride detected above the SCML from the samples collected from the NW Pond outfall in 2021. However, chloride was detected above the SCML in downstream sample location S-2 in May and in both downstream samples, S-1 & S-2, during the October 2021 sampling event.

- Sulfate was detected above the SMCL of 250 mg/l in upstream sample S-11 (276 mg/L) during the May sampling event, but not detected above the SMCL during the October sampling event. Sulfate was not detected above the SCML in the NW Pond outfall samples and upstream sample S-3 during 2021. And similarly to chloride, sulfate was detected above the SCML in downstream sample location S-2 in May and in both downstream samples, S-1 & S-2, during the October 2021 sampling event.

- With the exception of the NW Pond outfall sample collected in May, all sample locations were above the SMCL of 500 mg/L for total dissolved solids (TDS) during both 2021 sampling events.

- Iron was detected above the SMCL of 0.3 mg/l in the NW Pond outfall sample location and in upstream sample location S-3 during both 2021 sampling events. Additionally, iron was detected above the SCML for iron in upstream sample location S-11 and downstream sample location S-1 during the May sampling event. Downstream sample location S-2 was below the SMCL for iron during both 2021 sampling events.

- Manganese was detected above the SMCL of 0.05 mg/l in upstream sample location S-11 in May and during both 2021 samples collected from the NW Pond outfall. Manganese was detected above the SCML in downstream sample S-1 during both 2021 sampling events. Downstream sample location S-2 was below the SMCL for manganese during both 2021 sampling events.

- Thalium was detected above the MCL of 0.002 mg/l in upstream sample location S-11 during the May 2021 sampling event. No other parameters were above the MCL/SMCL/Action Level.

- Ammonia was not detected (<0.2 mg/L) in either of the upstream or downstream sample locations during the 2021 sampling events. Ammonia was slightly detected over the laboratory limits at 0.227 mg/L from the NW Pond outfall during the May sampling event. Less than 1.0 mg/L ammonia is considered usual for natural waters.

- Comparing sampling analytical results with years' past, concentrations of TDS, chloride and sulfate at downstream samples S-1 and S-2 were slightly elevated during both 2021 sampling events, but not elevated in the two upstream sample locations, or the sample collected from the NW Pond.

  In determining a potential source of the elevated concentrations, Hamilton County Public Health surveyed areas upstream from S-2 to an existing headwall where the stream continues along the western landfill through an underground culvert. At the base of the headwall, a seep was identified coming from the weep holes installed to keep moisture from accumulating behind it. The seep was clear, but areas of discoloration were noted on the headwall where it had been continuously flowing; the seep also smelled of sulphur.

The headwall seep was sampled on December 12, 2021, and the results identified similarly increased concentrations of TDS (4,140 mg/L), chloride (1,690 mg/L) and sulfate (469 mg/L) compared to S-1 and S-2, and an ammonia concentration of 3.56 mg/L.

Hamilton County Public Health is currently in communication with the Ohio EPA and Rumpke to further evaluate the headwall seep and determine its origin, whether it be groundwater, surface water or possibly landfill derived. The Ohio EPA, Hamilton County Public Health, and third-party consultants have determined that the headwall seep is not an imminent threat to public health or the environment as further sampling and investigation continues.

Eastern watershed:

The eastern watershed surrounding the landfill consists of upstream sample location S-9, the SE Pond discharge point, and downstream sample locations S-10 and S-12. During both 2021 sampling events, the SE Pond outfall was not flowing. Therefore, the SE Pond outfall was not sampled in 2021. Sampling results comparing the upstream sample location (S-9) and downstream sample locations (S-10 & S-12) are illustrated on Figures 5 & 6 and narrated below:

- Chloride was detected above the secondary maximum contaminant level (SMCL) of 250 mg/l in upstream sample location, S-9, and in downstream sample locations S-10 and S-12 during the May sampling event. In October, chloride was only detected above the SMCL in downstream sample location, S-10.

- Sulfate was detected above the SMCL of 250 mg/l in downstream sample location S-10 during both 2021 sampling events.

- All sample locations were above the SMCL of 500 mg/L for total dissolved solids (TDS) during both 2021 sampling events.

- With the exception of the downstream sample collected from S-10 in October, iron was detected above the SMCL of 0.3 mg/l in all sample locations during both 2021 sampling events.

- Manganese was detected above the SMCL of 0.05 mg/l in all sample locations during both 2021 sampling events.

- No other parameters were above the MCL/SMCL/Action Level.

- Ammonia was not detected (<0.2 mg/L) in either 2021 sampling events.

- All results were within historical values.

Bond Road Landfill

Surface water sampling at the Bond Road Landfill was conducted at the B-1 location for both sample periods (Table 2). Iron was detected above the SMCL of 0.30 mg/L during the June sampling event and manganese was detected above the SMCL of 0.05 mg/L during both 2021 sampling events. No other parameters were above the MCL/SMCL/Action Level. Additionally, ammonia was not detected (<0.2 mg/L) in the June 2021 sampling event, while it was detected slightly over the laboratory reporting limits at 0.216 mg/L in November. All results were within historical values.

The B-2 location continues to have no flow. Therefore, a sample was not collected.

The water quality continues to appear acceptable in the sedimentation pond on site. This is reflected in the biological monitoring as well (see below).

Biological Monitoring

Biological organisms can provide an indication of water quality based on their typical habitat requirements. For example, organisms such as isopods (sowbugs) inhabit relatively unpolluted shallows. Amphipods (sideswimmers), plecopterans (stoneflies), ephemeropterans (mayflies), some odonatans (dragonflies and damselflies), trichopterans (caddisflies), and turbellarians (flatworms) need an abundance of dissolved oxygen (DO) to survive and are indicative of good stream quality. Hemipterans (water boatman bugs) and some gastropods (pouch snails) are semi-tolerant to low DO. Dipterans (flies, mosquitos, and midges) are able to live in low DO environments and are much more tolerant of pollution. Some of these organisms can live in only low current streams; in unpolluted clear waters; occur in debris (masses of leaves and algae); occur under stones; occur in vegetation; occur in mud; found in decaying vegetation; or occur only in ponds. These ecological characteristics can provide an indication of a clean versus a polluted environment. Some organisms have specific physical features such as respiratory tubes (Dipteran larva), which enable those organisms to survive in low DO environments or in highly polluted waters.

Table 3 presents the results of biological monitoring around each licensed landfill over both sampling periods. Data is also presented from the 2010 through 2021 monitoring events for comparison.

Rumpke Sanitary Landfill

The Rumpke landfill streams were biologically monitored two times in 2021. In May, the day was mostly cloudy with a temperature around 76^{o} F. In October, the day was cloudy with a temperature around 50^{o} F.

During both 2021 sampling events, the NW Pond outfall was open and discharging into the western watershed of Banklick creek. The stream flow in upstream sample locations of S-3 and S-11 was low with shallow pools of water in the unnamed streams. And

downstream sample locations, S-1 and S-2, along Banklick creek was faster with larger pools of water.

- Caddisflies, water pennies, a salamander and sow bugs were among the organisms observed in May at upstream sample location S-3. Salamanders, water pennies, and sowbugs were also observed in October.

- Sample location S-11 was added as a sampling station in 2014 as an upstream sample from the landfill. Stream flow at this location was low with very shallow pools of water. Six types of organisms were observed in May, including salamanders and sowbugs. Six types of organisms were also observed in October, including caddisflies, a water penny and sowbugs.

- Seven types of organisms were identified in May at downstream sample location S-1, while six types of organisms were identified in October. Water pennies, riffle beetle, caddisflies and sowbugs were observed in May, while water pennies, caddisflies, damselflies and sowbugs were observed in October.

- Downstream sample location S-2 recorded five organism types in May, including a water penny, caddisflies, damselflies and sowbugs. In October, nine types of organisms were identified, including water pennies, caddisflies, damselflies, and sowbugs.

During both 2021 sampling events, the SE Pond outfall was closed. The stream flow in upstream sample locations S-9 was very slow with ponding pools, while downstream sample locations, S-10 and S-12, was slow with larger pools of water.

- Five types of organisms were identified during the May and October sampling events at upstream sample location S-9. Salamanders, water pennies, and sowbugs were observed during both sampling events.

- Six types of organisms were observed in May at downstream sample location S-10, including a salamander, water pennies, and greater than 100 sowbugs. Five types of organisms were observed in October, including water pennies, damselfly and sowbugs.

- Downstream sample location S-12 was added as a sampling station in 2019 due to the landfill's eastern expansion. The stream is located downstream from where the eastern expansion of the landfill will exist. Water pennies, caddisflies, and sowbugs were observed during both sampling events.

Bond Road Landfill

The Bond Road landfill sedimentation pond, identified as sample location B-1 was biologically monitored two times in 2020. In June, the day was partly cloudy with a temperature around 59° F. In November, the day was cloudy with a temperature around 41° F. Samples are typically taken at the southeast corner of the sedimentation pond and

in the dissipater box below the pond. Sowbugs were observed in June, while water pennies and caddisflies were observed in November.

A B-2 sample could not be collected during either 2021 sample period because the water was not flowing enough to take a sample.

Conclusions

The results of the water quality and biological monitoring conducted in 2021 at Rumpke Sanitary Landfill and Bond Road Landfill are consistent with past sampling periods. The continued presence of certain key organisms in the downstream sample locations indicate an unpolluted environment, although stream conditions and seasons seem to primarily affect the number and types of organisms sampled.

Hamilton County Public Health, Ohio EPA and third-party consultants have determined that the identified seep along the headwall is not an imminent threat to public health or the environment.