

March 27, 2019

Karis Manning
Regional Water Engineer
New York State Department of Environmental Conservation-Region 8
6274 East Avon-Lima Road
Avon, New York 14414

**Re: Lockwood Ash Disposal Site SPDES Permit No. NY0107069
Mercury Minimization Program 2018 Annual Report**

Dear Ms. Manning:

On behalf of Lockwood Hills LLC, please find enclosed the Mercury Minimization Program (MMP) Annual Report for the Lockwood Ash Disposal Site located in Torrey, New York. The enclosed report summarizes the monitoring results for the 2018 monitoring period including the required MMP elements listed in the site's SPDES permit. This annual status report is being submitted by April 1st of the following year as required by the facility's SPDES permit.

We trust this report satisfies the SPDES permit requirements for the Mercury Minimization Program. Should you have any questions or comments, please do not hesitate to contact us.

Sincerely,

DAIGLER ENGINEERING, PC

Bethany Acquisto, Ph.D.
Senior Scientist and Group Manager

cc: Bureau of Water Compliance, NYSDEC-Central Office
Dale Irwin, Lockwood Hills LLC

Attachment: (1) Mercury Minimization Program 2018 Annual Report
(Lockwood Ash Disposal Site)

MERCURY MINIMIZATION PROGRAM 2018 ANNUAL REPORT

Lockwood Hills LLC
Lockwood Ash Disposal Site

INTRODUCTION

Lockwood Hills LLC (Lockwood Hills) manages the Lockwood Ash Disposal Site (Lockwood or the Landfill) located on Swarthout Road, in the Town of Torrey, Yates County, New York. Lockwood Hills maintains a State Pollutant Discharge Elimination System (SPDES) permit (No. NY0107069) to discharge a mixture of stormwater and leachate from the sedimentation/neutralization basin (Leachate Pond) via Outfall 001 to the Keuka Lake Outlet. The SPDES permit expired on November 30, 2015 and is currently effective under the State Administrative Procedures Act (SAPA) extension. Stormwater was separated from the Leachate Pond in 2016.

Since the 50 ng/L permit limit exceeds the state-wide calculated Water Quality Based Effluent Limit (WQBEL) of 0.70 ng/L, a Mercury Minimization Program (MMP) was developed and maintained as part of the SPDES permit requirements. This report is intended to satisfy the MMP's annual report requirements for monitoring conducted during calendar year 2018 as described in Lockwood's SPDES permit. Specifically, the following six required elements are included:

1. Summary of the monitoring results from the applicable monitoring period;
2. List of known and potential sources of mercury;
3. Mass balance of mercury on the Leachate Pond;
4. Summary of all actions taken to support the mercury control strategy laid out in the March 2011 MMP Plan prepared by AES Greenidge, LLC;
5. Actions planned for the upcoming year; and,
6. Summary of MMP's progress toward the goal stated in the SPDES permit "to reduce mercury effluent levels in pursuit of the calculated WQBEL" of 0.7 ng/L.

MONITORING RESULTS

The monitoring of mercury is designed to quantify, and over time, track trending associated with the parameter. Sampling of the Leachate Pond effluent for low-level mercury is performed by Adirondack Environmental Services, Inc (ADK) of Albany, New York at Outfall 001 during batch discharges in accordance with the site's SPDES permit. Sampling of the influent is performed quarterly by ADK at the Leachate Pond inlet (i.e., Inlet to Pond) in coordination with the site's Part 360 environmental monitoring plan. Laboratory analysis, also conducted by ADK, is performed using EPA Method 1631, as required.

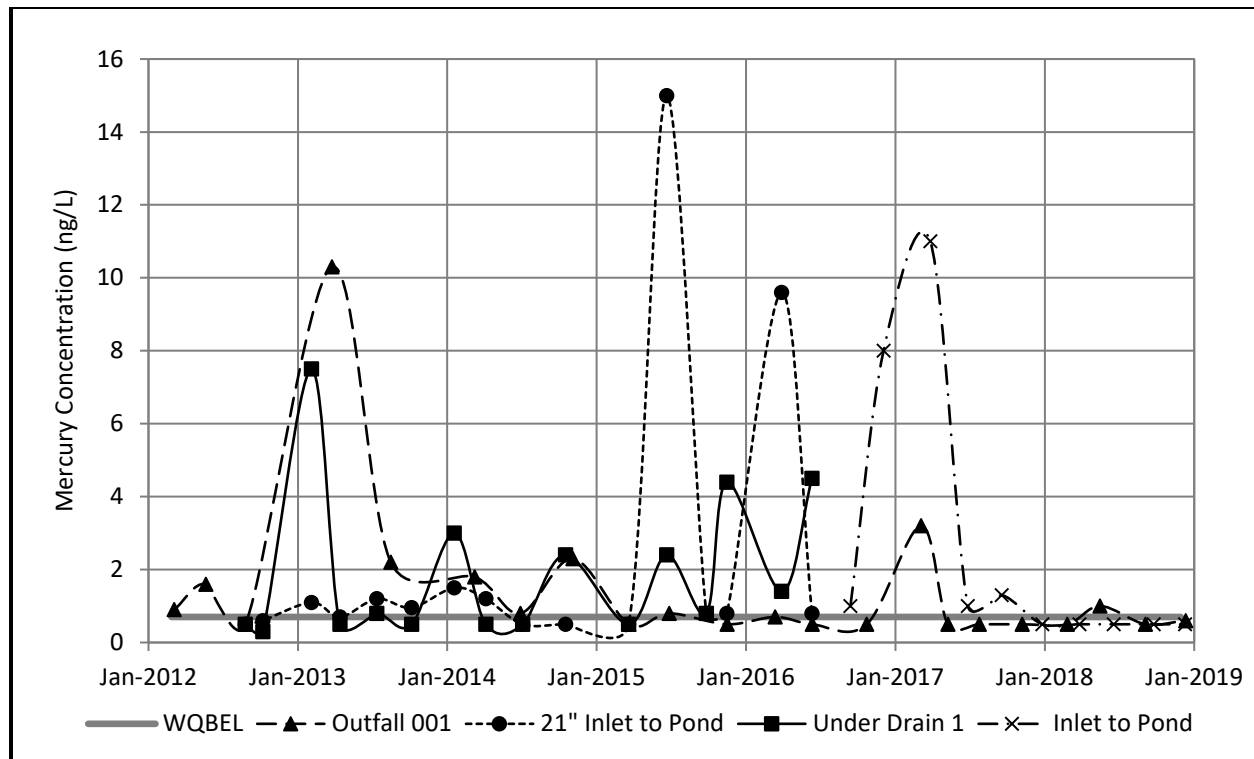
The following table shows the results of mercury monitoring for 2018 at Outfall 001 and at the Inlet to Pond.

Mercury Concentration (Collection Date)		
<i>Quarter</i>	<i>Outfall 001</i>	<i>Inlet to Pond</i>
1	< 0.5 ng/L (02/27/2018)	<0.5 ng/L (03/29/2018)
2	1.0 ng/L (05/18/2018)	<0.5 ng/L (06/20/2018)
3	< 0.5 ng/L (09/06/2018)	<0.5 ng/L (09/26/2018)
4	0.6 ng/L (12/13/2018) < 0.5 ng/L (12/21/2018)*	<0.5 ng/L (12/12/2018)

*Note: As part of a separate investigation a second sample was taken at the end of the batch discharge from Outfall 001 in December 2018.

All 2018 results are less than the 50 ng/L permit limit and 0.7 ng/L state-wide WQBEL, with one exception; that is, the mercury concentration measured at Outfall 001 during the second quarter exceeds the WQBEL. Further, of the nine results, there were only two detections of mercury.

The graph below includes all available data for the sampling locations from the beginning of 2012 to the end of 2018. Changes in the leachate system were made between the second and third quarter sampling events in 2016. Prior to the changes, leachate entered the Leachate Pond through two separate pipes, Under Drain 1 and the 21" Inlet to Pond. Following the changes, all leachate discharges to the Leachate pond through the Inlet to Pond. As can be seen, mercury concentrations in the Leachate Pond influent and effluent were low in 2018.



SOURCES OF MERCURY

The potential sources of mercury at the Landfill include fly ash and other coal combustion byproducts (CCB) historically disposed of in the Landfill.

MASS BALANCE

As precipitation and runoff infiltrates through the Landfill, mercury is transported from the source (i.e., historic landfilled CCB) through the leachate sewer system to the Leachate Pond. Within the Pond, sedimentation occurs, depositing adsorbed mercury. The remaining mass of mercury is discharged through Outfall 001. The following is a general mass balance taking into account the mercury concentration for each sampling location (expressed within brackets) multiplied by the volume. Since the flow rate of the Inlet to Pond is now continuously measured and recorded, a totalized flow volume over each quarter was used. Finally, the total volume of each discharge event is estimated based on beginning and ending water levels.

$$\begin{aligned} & \sum [\text{Inlet to Pond}] \times (\text{Volume from Inlet to Pond}) + \\ & \sum [\text{Direct Precipitation}] \times (\text{Volume of Direct Precipitation}) - \\ & \text{Mass Deposited in Pond} = \\ & \sum [\text{Outfall 001}] \times (\text{Volume of Discharge from Outfall 001}) \end{aligned}$$

A table of the calculated mass of mercury for each quarter of 2018 is provided below. The concentration of mercury in direct precipitation on the Pond was assumed to be zero. For mercury results that were less than the detection limit, a concentration of one half the detection limit (i.e., 0.25 ng/L) was used. Also, the two mercury results for Outfall 001 in the fourth quarter were averaged. The annual mass of mercury entering and exiting the Pond is substituted into the mass balance equation and the “Mass Deposited in Pond” term was determined.

Quarter* (2018)	Mass of Mercury (Hg) [Concentration] × Flow Volume per Quarter	
	Outfall 001	Inlet to Pond
1 st Quarter	1.91 mg	1.90 mg
2 nd Quarter	7.95 mg	2.59 mg
3 rd Quarter	1.70 mg	2.05 mg
4 th Quarter	3.58 mg	2.16 mg
Annual Total	15.1 mg	8.7 mg

*Note: Quarters are consistent with sampling at Inlet to Pond (i.e., 1st Quarter is Jan-March, 2nd Quarter is April-June, etc.)

$$\begin{aligned} \text{Therefore: } & 8.7 \text{ mg Hg} + 0 \text{ mg Hg} - \text{Mass Deposited in Pond} = 15.1 \text{ mg Hg} \\ & \text{Mass Deposited in Pond} = -3.72 \text{ mg Hg} \end{aligned}$$

The negative value of the Mass Deposited in Pond term suggests that the mass discharged through Outfall 001 is greater than the mass input from the leachate influent pipe in 2018. Complex factors such as atmospheric deposition, chemical transformation of mercury, the possibility of measurable quantities of mercury in direct precipitation, or resuspension of mercury from sediments were not quantified. A combination of these or other factors likely contributed to the negative deposition.

CONTROL STRATEGY

The control strategy outlined in the 2011 MMP Plan remains largely effective at the Landfill. The Landfill operates under Part 360 regulations and consists of a lined area with a leachate collection and gravity drain system, and a groundwater monitoring well array. The leachate monitoring points and groundwater wells located upgradient and downgradient of the Landfill are both monitored on a quarterly basis. The results of the sampling and analysis are reported to the New York State Department of Environmental Conservation. Mercury is included in the quarterly analysis. While the analysis method used, EPA method 245.1, is not sensitive enough to be applicable to this discussion, the results are consistently less than 200 ng/L across the site. Any deviation from this expected result can serve as an indication that further investigation is needed. Monthly inspection reports intended to identify upsets in operational controls are completed by Lockwood staff and reported to the NYSDEC in the Part 360 annual report.

The above monitoring activities will continue in the upcoming year. In addition, sediment removal and improvements to the Leachate Pond will be implemented during the 2019 construction season as work related to a Consent Order wraps up by the November 1, 2019 deadline.

SUMMARY

All results for the 2018 calendar year remained less than the SPDES effluent limit of 50 ng/L. Mercury concentrations measured at Outfall 001 were less than or equal to the WQBEL of 0.7 ng/L for all but the second quarter, which was only slightly above the WQBEL, and all results from the landfill leachate were not only less than the WQBEL, but less than the detection limit, as well.

As indicated by the negative mass balance this year, resuspension of sediments may be a source of mercury in Outfall 001. Therefore, it is expected that the implementation of the Consent Order during this construction season will further decrease the concentration of mercury discharged offsite. This will contribute directly to the goal of the MMP to reduce mercury effluent levels in pursuit of the WQBEL of 0.7 ng/L.