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Transmitted Via Electronic Mail

March 31, 2021

Tara Blum, P.E.
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 2020 Annual Report

Dear Ms. Blum:

On behalf of Lockwood Hills LLC, please find enclosed the 2020 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 2020 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,

EnSol, Inc.

Ryan Elliott

Ryan Elliott, M.S.
Staff Scientist

ec: Bureau of Water Permits, NYSDEC – Central Office
Jonathan Tamargo - NYSDEC
Christopher Gill, Lockwood Hills LLC
Bethany Acquisto, Ph.D., EnSol, Inc.

Attachment: (1) Mercury Minimization Program 2020 Annual Report
(Lockwood Ash Disposal Site)

Mercury Minimization Plan Annual Report

2020

Lockwood Ash Disposal Site

Lockwood Hills LLC
Dresden, New York

March 2021

Prepared by

EnSol
ENGINEERING +
ENVIRONMENTAL

Mercury Minimization Plan Annual Report
2020
Lockwood Ash Disposal Site

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661 Main Street
Niagara Falls, New York 14301

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1. 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 (Treatment Pond) via Outfall 001 to the Keuka Lake Outlet. The SPDES permit expired on November 30, 2015 and is currently effective under a State Administrative Procedures Act (SAPA) extension. Stormwater was separated from the Treatment 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 2020 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 Treatment 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.

2. Monitoring Results

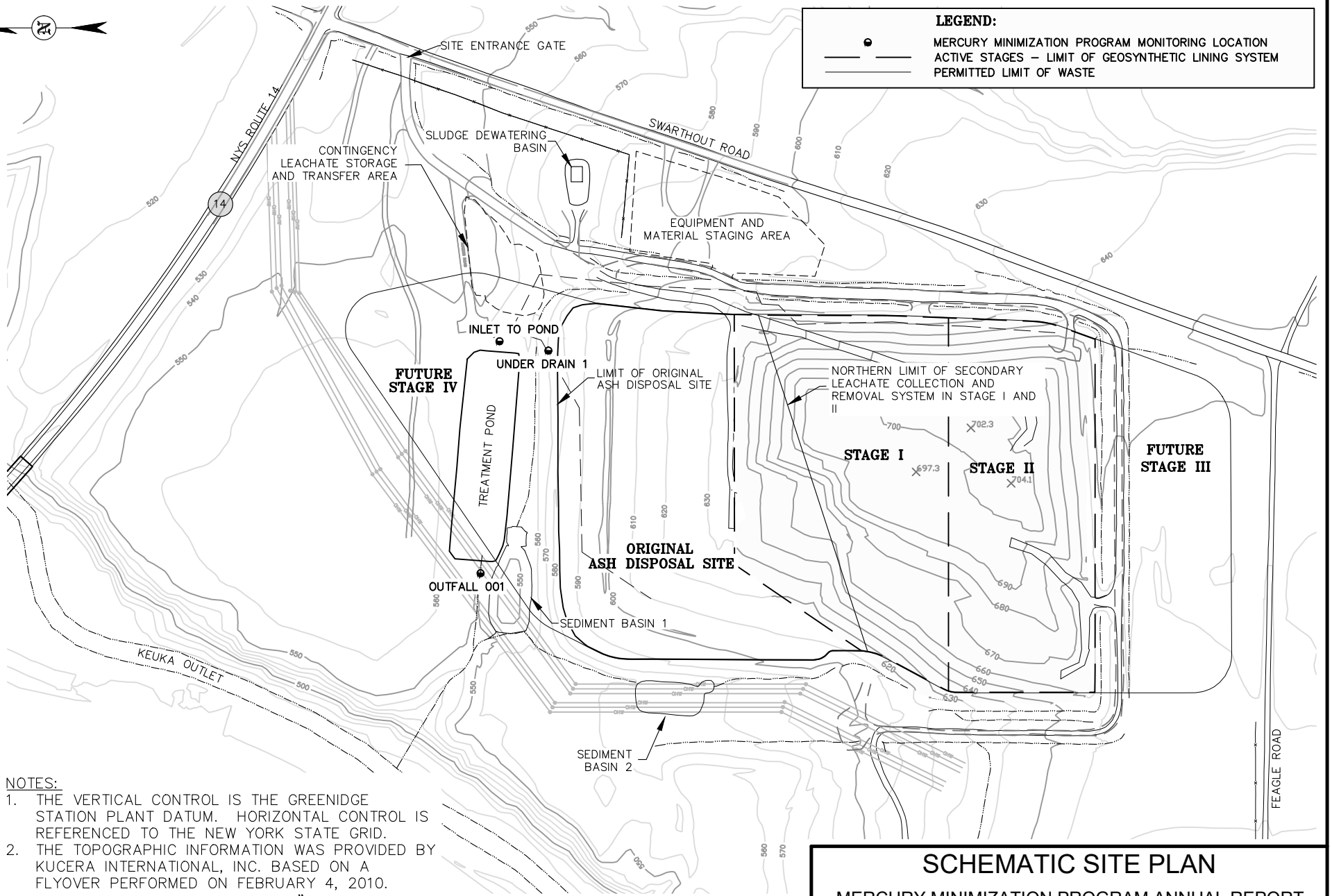
The monitoring of mercury is designed to quantify, and over time, track trending associated with the parameter. Sampling of the Treatment Pond effluent for low-level mercury is performed by Adirondack Environmental Services, Inc (ADK) of Albany, New York at Outfall 001 during batch discharges. Historically, one grab sample per discharge was analyzed for low-level mercury in accordance with the site's SPDES permit. Starting with the May 2019 batch discharge event, a minimum of two grab samples per batch discharge event are to be collected and analyzed for low-level mercury per correspondence with the New York State Department of Environmental Conservation (NYSDEC; Gregory MacLean and Karis Manning) to Bethany Acquisto dated March 12, 2019. As detailed in this letter, Lockwood Hills is now required to perform sampling of each future discharge event both at the onset of discharge and again within 30 minutes of the end of discharge. In addition, if the duration of a batch discharge exceeds 14 days, an additional sample must be taken as required by the site's SPDES permit. There were six batch discharge events of the Treatment Pond during 2020. None of the event exceeded 14 days.

Sampling of the influent is performed quarterly by ADK at the Treatment Pond inlet (i.e., Inlet to Pond) in coordination with the site's Part 360 environmental monitoring plan. Monitoring of low-level mercury in manhole MH OADS 3 (Under Drain 1) still occurs as part of Part 360 environmental monitoring but results are no longer included in this report since the Inlet to Pond now includes the discharge from Under Drain 1. Monitoring locations are shown on Figure 1. Laboratory analysis, also conducted by ADK, is performed using EPA Method 1631, as required. Table 1 shows the results of mercury monitoring for 2020 at Outfall 001 and at the Inlet to Pond.

TABLE 1: MERCURY CONCENTRATION AND SAMPLE COLLECTION DATE SUMMARY

Quarter	*Outfall 001*	*Inlet to Pond*
1	1.5 ng/L (02/12/2020) 2.0 ng/L (2/25/2020)	0.8 ng/L (03/11/2020)
2	2.0 ng/L (04/10/2020) 2.1 ng/L (04/23/2020) 2.2 ng/L (05/28/2020)	<0.5 ng/L (06/22/2020)
3	9.5 ng/L (06/10/2020) 2.2 ng/L (08/06/2020) 2.2 ng/L (8/19/2020)*	0.7 ng/L (09/22/2019)
4	1.5 ng/L (09/24/2020) 1.6 ng/L (9/29/2020) 2.0 ng/L (12/17/2020) 1.8 ng/L (12/23/2020)	<0.5 ng/L (11/20/2019)

* Matrix spike was below acceptable limits



NOTES:

1. THE VERTICAL CONTROL IS THE GREENIDGE STATION PLANT DATUM. HORIZONTAL CONTROL IS REFERENCED TO THE NEW YORK STATE GRID.
2. THE TOPOGRAPHIC INFORMATION WAS PROVIDED BY KUCERA INTERNATIONAL, INC. BASED ON A FLYOVER PERFORMED ON FEBRUARY 4, 2010. PLANIMETRIC INFORMATION FROM "EXISTING SITE CONDITIONS" BY FAGAN ENGINEERS (FILE NUMBER 2K003-1) DATED APRIL 2000.
3. THE TOPOGRAPHIC INFORMATION ON THE ACTIVE STAGES OF THE LANDFILL WERE UPDATED WITH GROUND SURVEY FROM RICHARD WILLSON, PLS OBTAINED IN APRIL 2011 AND SUPPLEMENTED WITH SURVEY FROM WILLSON ASSOCIATES IN AUGUST 2019.

SCALE: 175' 0' 175' 350'

SCHEMATIC SITE PLAN

MERCURY MINIMIZATION PROGRAM ANNUAL REPORT

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MARCH 2021 | PN: 31-0020-12

FIGURE 1

All 2020 results were less than the 50 ng/L permit limit but nearly 90% of these samples were greater than or equal to the 0.7 ng/L state-wide WQBEL.

The graph below includes all available data for the sampling locations from the beginning of 2012 to the end of 2020. Open markers represent non-detect data. Changes in the leachate system were made between the second and third quarter sampling events in 2016. Prior to the changes, leachate entered the Treatment Pond through two separate pipes, Under Drain 1 and the 21" Inlet to Pond. Following the changes, all leachate discharges to the Treatment Pond through the Inlet to Pond. As can be seen, mercury concentrations in Outfall 001 were elevated during 2020.

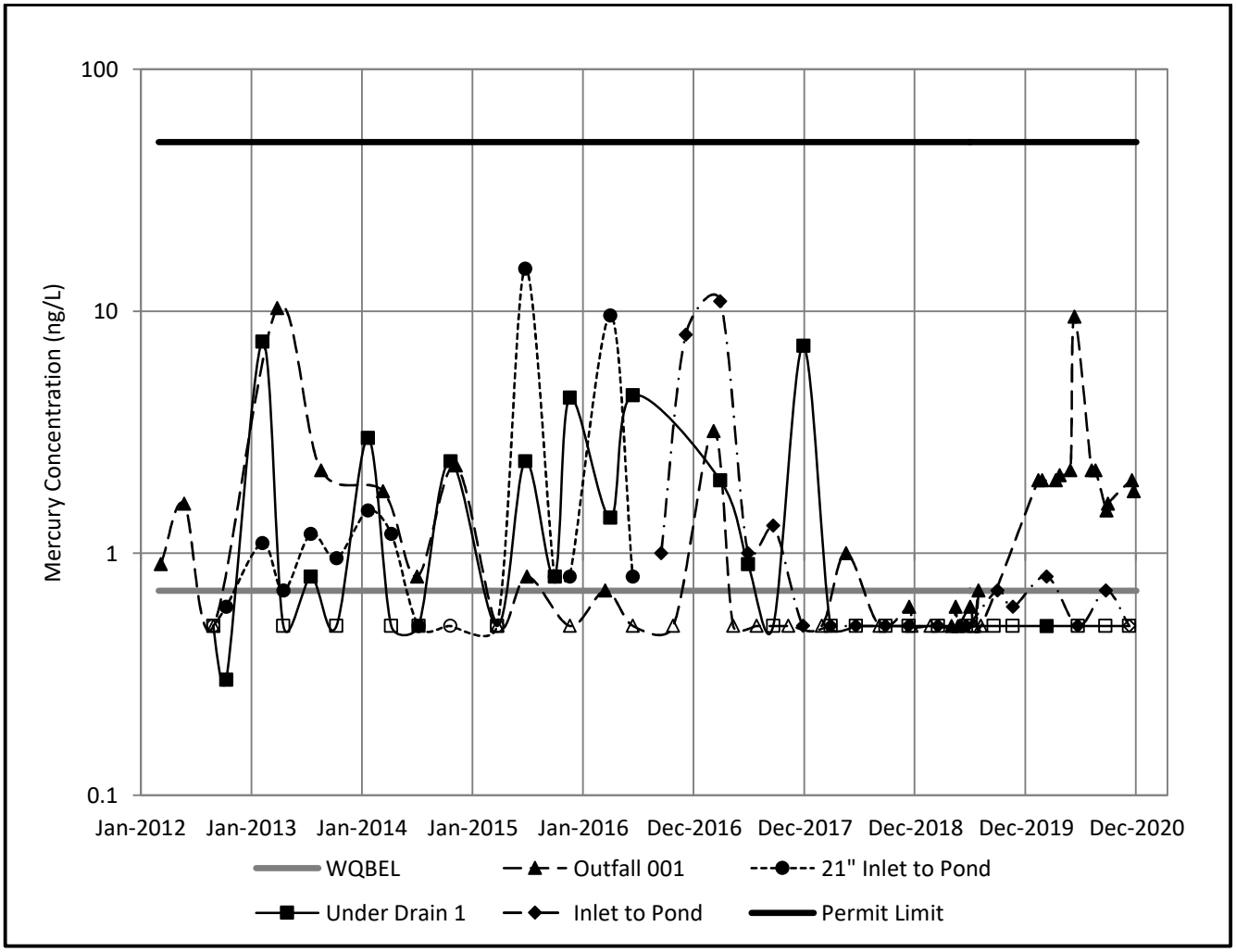

FIGURE 2: MERCURY TIME-SERIES PLOT

3. Sources of Mercury

The potential sources of mercury at the Landfill include fly ash and other coal combustion residuals (CCR) historically disposed of in the Landfill. Only a limited amount of materials have been accepted at the Landfill since being placed under protective layup in 2011. The majority of the Landfill is under intermediate cover as defined in Lockwood's Operations & Maintenance Manual. In 2005 and again in 2007 when the Landfill was in full operation, the fly ash was sampled using EPA Method 245.1 which has a significantly higher method detection limit (200 ng/L) than EPA Method 1631 (0.5 ng/L). Both sampling results from 2005 and 2007 resulted in mercury being less than the detection limit, or less than 200 ng/L. The 2011 MMP Plan indicated that typical mercury concentrations in coal range from 100 ng/L to 600 ng/L. This suggests that the concentration of mercury that remains in the ash is less than that of the parent material, as expected since mercury is known to partition into the air during combustion. In December 2015, samples of sediment from the Treatment Pond were taken and analyzed for Toxicity Characteristic Leaching Procedure (TCLP) mercury. Analysis of the samples determined the TCLP mercury concentration in the Pond sediment to be <0.12 µg/L (<120 ng/L), well below the regulatory level listed in 40 CFR 261.24 (0.2 mg/L). This sediment was deposited in the Landfill during 2019.

4. Mass Balance

As precipitation and runoff infiltrates through the Landfill, mercury is transported from the source (i.e., historic landfilled CCR) through the leachate sewer system to the Treatment Pond. Within the Treatment 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. The flow rate of the Inlet to Pond is 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.

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

A table of the calculated mass of mercury for each quarter of 2020 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. The quarterly results for mercury in Outfall 001 in all four quarters and discharge volumes for the second and third quarters were averaged. The annual mass of mercury entering and exiting the Pond was substituted into the mass balance equation and the "Mass Deposited in Pond" term was determined.

Quarter* (2020)	**Mass of Mercury (Hg) [Concentration] × Flow Volume per Quarter**	
	Outfall 001	*Inlet to Pond*
1st Quarter	8.40 mg	6.99 mg
2nd Quarter	37.58 mg	2.54 mg
3rd Quarter	12.51 mg	5.15 mg
4th Quarter	4.53 mg	1.53 mg
Annual Total	**63.02 mg**	**16.21 mg**

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

2020: 16.21 mg Hg + 0 mg Hg – Mass Deposited in Pond = 63.02 mg Hg

Mass Deposited in Pond = -46.81 mg Hg

The negative value for the "Mass Deposited in Pond" term indicates that the mass of mercury entering the Treatment Pond through the leachate influent pipe was less than the mass of mercury discharged through Outfall 001 during 2020. Complex factors such as atmospheric deposition, chemical transformation of mercury, the possibility of measurable quantities of mercury in stormwater or in direct precipitation were not quantified. A combination of these or other factors likely contributed to the negative deposition. In October 2019, work was completed on a containment liner system for the Treatment Pond consisting of soil subgrade, 60-mil textured

HDPE geomembrane liner, 16 oz. non-woven cushion geotextile, and a protective 12-inch (minimum) Type 2 stone layer. Therefore, resuspension of mercury from sediments is not currently considered to be a potential source of mercury in Treatment Pond effluent. It is notable that all mercury concentrations in Outfall 001 since completion of the Treatment Pond improvements have been elevated. Perhaps the elevated mercury concentrations are the result of construction practices and/or the construction materials used. Should this be the case, the elevated mercury concentrations in Outfall 001 are expected to decline over time. Concentrations in the 4th quarter already show evidence of such a decline.

5. 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 NYSDEC. 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. Weekly 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. No such upsets were reported in 2020.

The work completed on the Treatment Pond in 2019 included removal of sediments from and reconstruction of the Pond. When sediments were removed, adsorbed pollutants, including mercury, were removed as well. This should have reduced the total mass of mercury present in the Treatment Pond, thus reducing the probability of discharges of mercury due to a resuspension of sediments. It is possible that atmospheric deposition, chemical transformation of mercury, measurable quantities of mercury in stormwater or in direct precipitation, and/or mercury deposits from the construction methods or construction materials contributed to a net loss of mercury from the Treatment Pond during 2020, though these sources were not quantified.

The above monitoring activities will continue in the upcoming year

6. Summary

All results for the 2020 calendar year remained well below the SPDES effluent limit of 50 ng/L. Mercury concentrations measured at Outfall 001 were greater than the WQBEL of 0.7 ng/L for all sampling dates, while mercury concentrations in the influent to the Treatment Pond were at or below the WQBEL three out of four quarters.

During 2020 the results of the mass balance equation indicate that there was a net loss of mercury from the Treatment Pond during this time period. Possible causes of this net loss include atmospheric deposition, chemical transformation of mercury, measurable quantities of mercury in stormwater or in direct precipitation, and/or mercury from the construction methods or construction materials used during installation of a containment liner system completed in October 2019, though these sources were not quantified. Resuspension of mercury from sediments was not considered to be a potential source of mercury in Treatment Pond effluent this year because of the recent sediment removal and liner installation.

It was expected that the dredging and removal of sediments would ultimately help decrease the concentration of mercury in the effluent discharged offsite. The monitoring results for the first year following installation of the containment liner system show that the Treatment Pond improvements have not had an immediate effect. However, mercury effluent concentrations have generally declined following a peak in June of 2020, suggesting that the decreased mercury effluent concentrations expected may be realized in the coming years.