Davidson, Tyler

From: Joe Gay <John.Gay@casella.com>
Sent: Friday, October 11, 2024 5:55 PM
To: McKenna, Leah; DES: Solid Waste Management Bureau Enforcement
Cc: Colby, Jaime; Harrison, Joshua; Kevin Roy; Lindsey Menard; Kimberly Crosby; Melissa Stevens
Subject: NCES Response to NHDES August 30, 2024 Electronic Mail Request - LOD No. SWMB 24-006
Attachments: A-6 Verdantas Mass Balance Analysis.pdf; A-7 Activities Planned-Completed Status (2024 10 11).pdf; A-8 Site Plan.pdf; A-9 Action Item 4 Template FNL (2024 10 11).pdf; A-10 NCES Pipe Inspection Summary Report RCAC.pdf; Figure 1-Base Liner Section.pdf; Figure 2-Overlay Liner Section.pdf; Oct 11 NCES Cover Letter Responding to August 30 Request for Information.pdf; 2024 10 11 Casella Response to DES FNL.pdf; A-1 NCES Incident Report 1(a) Revised (2024 10 11).pdf; A-1 Revised Partial Q2 2024 Sump Levels.pdf; A-1 Revised Q1 2024 Sump Levels.pdf; A-1 Revised Q3 2023 Sump Levels.pdf; A-1 Revised Q4 2023 Sump Levels.pdf; A-2 NCES Incident Report 1(b) Revised.pdf; A-3 NCES Secondary Flow Rates - Action Item 1 Part 2.pdf; A-4 NCES Leachate Data June 1st 30 Day AVG.pdf; A-5 Sanborn Head Evaluation Amended 10 7 24.pdf

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Attachment A - 6
Mass Balance Analysis

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October 11, 2024

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North Country Environmental Services, Inc. Landfill
NHDES Permit No. DES-SW-SP-03-002
Letter of Deficiency No. SWMB 24-006 – Action Item 3 Evaluation

Dear Attorney Sayward:

As requested by North Country Environmental Services, Inc. (NCES), Verdantas LLC (Verdantas) has performed an evaluation of leachate management system data from the NCES Landfill (Landfill) located in Bethlehem, New Hampshire. This evaluation was performed in response to the New Hampshire Department of Environmental Services' (NHDES') Letter of Deficiency (LoD) No. SWMB 24-006, dated June 14, 2024. As part of the LoD, NHDES required that NCES submit an analysis of the cause(s) of the leachate head buildup on the primary liner system, which includes the amount of leachate generated per day from the primary leachate collection system, and the capabilities of the facility to manage, store, and dispose of such leachate (Action Item #3). NCES submitted a response to the LoD Items #2, #3, #4, and #5 on July 15, 2024.

In an email response to these documents provided by NHDES on August 30, 2024, NHDES requested that certain additional documentation be provided. This letter has been prepared in response to one of these requests, specifically:

"…analysis of the cause(s) of excess leachate head on the liner, including the requested leachate system evaluation.

- *For clarity, NHDES anticipates that the leachate system evaluation will review the conditions immediately prior to and during the time of excess leachate head, including an assessment of the quantity of leachate in storage, the capacity of the system to manage additional leachate during the subject time period, the rates at which leachate could be removed from the liner system and leachate storage tanks, and a review of precipitation events during the subject time period, including a comparison to design storm precipitation (i.e., 25-year storm event, 100-year storm event). A mass balance analysis on select dates during the subject time period is one of many suitable approaches to conducting the requested evaluation."*

OBJECTIVE

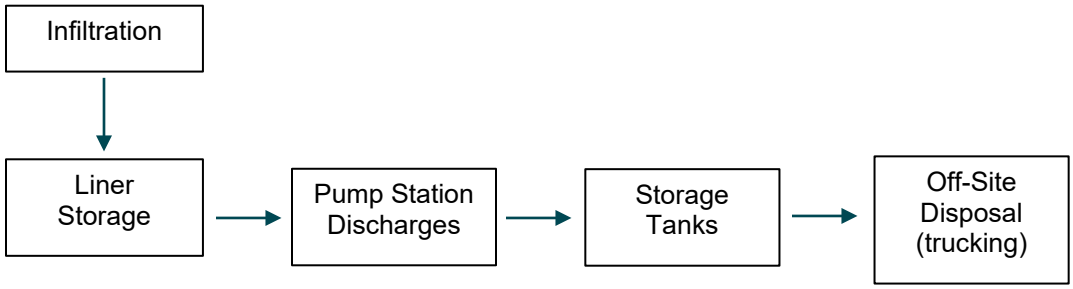
Verdantas was tasked with completing an independent evaluation of leachate system data at NCES and included evaluation of data for the period from July 1, 2023 through June 30, 2024. Leachate system data was provided to Verdantas by NCES. The independent analysis included an assessment of leachate head on the primary liner, pumping station flow rates, potential infiltration from precipitation (including rainfall and snowmelt), tank storage capacity, off-site

disposal trucking rates, and other data. Mass balance analysis was performed using the available data in response to NHDES' request.

APPROACH

To better understand potential root cause(s) of excess head on the primary liner, a simplified Process Flow Diagram (PFD) was prepared to illustrate significant flow pathways and storage mechanisms for the primary leachate system at the NCES Landfill. This simplified PFD illustrates portions of the leachate collection system that may have caused excess head buildup on the primary liner. These individual elements of the leachate system were targeted for further evaluation using a data-driven and/or mass balance approach, as applicable. Mass balance calculations and other metrics were calculated on a daily basis in Microsoft Excel, using the procedures described below.

Simplified Process Flow Diagram – NCES Primary Leachate System



Infiltration

Infiltration represents the input mechanism for water into the primary leachate collection system. A potential infiltration rate was calculated using meteorological data with the following procedure. Potential infiltration rate was calculated daily as the sum of precipitation minus potential evapotranspiration and runoff. Site measurements of daily precipitation, including rainfall and snowfall, were used for the analysis. Most of these measurements were provided by NCES, although temperature data were augmented with publicly available data from a local station. Runoff from snow was accounted for using daily temperature data. During times with below freezing temperatures the snowfall accumulates as snowpack. During periods with above freezing temperatures any snowpack was converted to meltwater. Potential evaporation was calculated using the Hamon equation (Hamon, 1963) with temperature record and daylength as input variables to the analysis. The daily infiltration rate was multiplied by the area of the landfill cell(s) contributing to each pump station to give a daily infiltration volume. To account for potential surface runoff, an adjustment factor was applied to the calculated infiltration volume (precipitation minus evapotranspiration) such that on an annual basis the total infiltration volume for the year balanced with the total volume of leachate removed at the sumps.

Actual infiltration into the landfill waste mass is a complex mechanism, affected by layers of lower permeable soils and wastes, existing moisture levels within the waste mass, potential channeling and area of void spaces that can retain liquids, and other factors. The assumptions of infiltration from the surface are approximate and imperfect but are believed to be representative of a total mass balance, especially over time.

Liner Storage

Leachate storage on the liner is measured through hydraulic head measurements collected at each of three pump houses. Changes in liner storage were identified through analysis of the hydraulic head measurements provided by NCES. Liner storage is dependent on the mass balance between the rate of infiltration and the rate of discharge from the pump stations. A mass balance analysis was also performed to evaluate the potential cause(s) of excess storage on the liner.

Pump Station Discharges

Each of the three pump stations discharge via a pump to storage tanks. These pumps are operated on a level switch. Flows are calculated through an inline flow metering device. NCES informed Verdantas that some totalizer measurements from Pump Station 1 and Pump Station 3 were overstated because of temporary changes necessitated by construction of Stage VI Phase II between June 2023 and November 2023. During this period of construction, flows from Pump Station 3 were temporarily routed to Pump Station 1. The temporary pipeline between the pump stations did not have a check valve, causing a significant quantity of liquid to backflow from Pump Station 1 into the sump of Pump Station 3 when the pump cycled off. This caused a sizable increase in the apparent quantify of liquid measured by the flow totalizer in Pump Station 3. In addition, during this period the flow totalizer readings in Pump Station 1 included the additional flow from Pump Station 3.

To account for this overstated flow data, Verdantas compared the total volume of leachate that was trucked off-site with the total volume recorded at the pump stations. Based upon this comparison, Verdantas calculated that erroneous flow measurements totaling almost 3 million gallons were recorded during the period from June 2023 to November 2023. Verdantas used an adjustment factor based upon a mass balance approach to correct the data recorded from Pump Station 1 and Pump Station 3 for use in our evaluation.

Storage Tanks

The total volume of the primary leachate system storage tanks at the NCES Landfill is approximately 210,000 gallons (“UST A” has a capacity of approximately 30,000 gallons, “UST B” has a capacity of approximately 30,000 gallons, and the “AST” has a capacity of approximately 150,000 gallons). Verdantas’ evaluation includes a mass balance for each of the storage tanks.

Off-Site Disposal

Leachate is transported by truck for off-site disposal and represents the ultimate discharge mechanism out of the leachate collection system. NCES provided Verdantas with the off-site disposal information, including the number of trucks, volumes, and destinations used in our evaluation.

Mass Balance Calculations

Three separate mass balance calculations were performed to evaluate the operation of the leachate system as defined by the components in the simplified process flow diagram:

- To evaluate conditions associated with individual pump stations, a daily mass balance was performed by comparing the calculated potential infiltration into the Landfill with the volume of leachate recorded by the pump station flow totalizers.
- To evaluate the tank storage system, a daily mass balance was performed by comparing the total inflow from the pump stations with the recorded change in tank storage and the volume of leachate removed by truck.

- To evaluate the overall leachate system, a daily mass balance of the inputs and outputs of the leachate system was performed by comparing the calculated potential infiltration into the Landfill with the volume of leachate removed by truck for off-site disposal.

ANALYSIS

Verdantas performed mass balance calculations and other analyses described above in Microsoft Excel®. The results from the analyses are represented on a series of figures, also attached to this memorandum as Exhibits 1 through 6. As depicted in Exhibits 1 through 6, several factors likely contributed to excess head measurements on the liner in the primary leachate system during the period between July 2023 and June 2024. A summary of these findings is provided below.

FINDINGS

Infiltration

Exhibits 1, 2, and 3 provide a comparison between mass balance for each of the pump stations (1, 2, and 3), hydraulic head on the liner, and a 7-day moving average of calculated infiltration. As depicted on these figures, an evaluation of the mass balance over the span of this time period (blue lines) indicates a positive mass balance trend (i.e., more leachate volume entering the system than being removed) beginning in approximately August 2023 and ending in approximately June 2024.

- Total precipitation in 2023 in New Hampshire was significantly above average (2023 was the wettest overall year in over a decade)[1]. Several storm events between July and October 2023 resulted in infiltration (gray lines), which is atypical for summer and fall conditions, initiating a positive increase in mass balance for each of the three pumping stations.
- Evaluation of the 7-day moving average for calculated infiltration (gray lines) and hydraulic head measurements (orange lines) indicates that individual elevated infiltration periods generally appear to trigger elevated hydraulic heads on the liner and head exceedances. Once these elevated heads begin, recovery to baseline conditions is not attained for months as a result of the limitation on NCES' ability to remove leachate from the system and dispose of it off-site.
- The overall impact of infiltration on elevated hydraulic heads on the liner and head exceedances throughout the period is a contributing factor exacerbated by the effect of the limitations on NCES' ability to remove leachate from the system and dispose of it off-site.
- Construction activities completed beginning in May 2023 appear to have exacerbated excess leachate volume into the system that required time to overcome. Specifically, the following operations and maintenance changes are correlated with overall increases in head/head exceedances and/or positive trends in the mass balance.
    - According to NCES, construction activities beginning in May 2023 likely resulted in excess stormwater infiltration. For example, in October 2023, new construction activities resulted in the primary and secondary liners being directly impacted by rainfall. The secondary was sealed off early in November 2023 but the primary remained open and subject to direct generation from rain events and high

[1] Average Precipitation in New Hampshire by Year (extremeweatherwatch.com)

infiltration periods until NCES began waste placement. These construction activities are correlated with the positive trend in the mass balance observed in several analyses of the data provided by NCES.

- NCES completed a liner repair on April 10, 2024, and stormwater improvements continued in Spring 2024. These changes are correlated with the beginning of the decreasing trend in the mass balance, which can be seen particularly clearly in the mass balance for Pump Station 2 following the peak in April 2024. The additional flow from the secondary liner effectively caused a temporary reduction in the capacity of the system to handle leachate.
- NCES was able to establish and sustain a decreasing trend in the mass balance associated with Pump Station 2 following an increase in the sump pump pumping rate (almost to the maximum rate for the pump at this pumping station) between mid-April and mid-May 2024. This increase in pumping rate at this location was only possible due to increased capacity in the system because of an increase in outbound leachate (Exhibit 6) resulting from NHDES granting emergency approval to haul leachate off-site beyond permitted hours between April 19 and May 3, 2024.
- Additional operations and maintenance changes may also have impacted leachate volumes at levels that are not readily observable at the resolution of the data provided for analysis.

As shown in Exhibit 1, 2, and 3, NCES was able to establish a decreasing trend in overall mass balance (i.e., removing more leachate than is generated) beginning in approximately November 2023. Several large infiltration events (end of October 2023, beginning of December 2023, and beginning of March 2023) resulted in temporary reversal of this trend. NCES was able to reestablish a decreasing trend in the overall mass balance between mid-April 2024 and mid-May 2024 which was possible in part due to fewer large infiltration events and due to NHDES granting emergency approval to haul beyond permitted hours between April 19 and May 3, 2024.

Pump Station Pumping Rates

Exhibit 4 illustrates average daily pumping rates for each of the Pump Stations, with the bold/solid line indicating the approximate maximum pumping rate for each Pump Station pump. As shown on Exhibit 4, during the period evaluated, pumping rates were not limited by the upper capacity of the Pump Stations to remove water from the liner. As discussed below, we note that when the storage tanks are full, NCES' ability to remove leachate from the system becomes limited. NCES' ability to dispose leachate off-site is, therefore, a notable limitation on overall system performance and system mass balance.

Storage Tanks

Exhibit 5 illustrates the capacity of each of the storage tanks during the period of performance. As noted previously, the total volume of the primary leachate system storage tanks at the NCES Landfill is approximately 210,000 gallons. UST A, UST B, and the AST represent a storage buffer in the system. Exhibit 5 illustrates that storage tank capacity was full from approximately January through April 2024. During the period when the storage tanks are full, the ability to remove leachate from the system is limited by the ability to remove leachate via off-site disposal. The increase in capacity of the storage tanks only returned once a notable increase in off-site disposal occurred between mid-April 2024 and early-May 2024 due to NHDES granting emergency approval to haul beyond permitted hours between April 19 and May 3, 2024.

Off-Site Disposal

As depicted in Exhibit 6, in the period November 2023 through January 2024, NCES was able to slightly increase the volume of off-site leachate disposal relative to the period July 2023 through October 2023. A more notable increase in off-site disposal occurred between mid-April 2024 and early-May 2024 due to NHDES granting emergency approval to haul beyond permitted hours between April 19 and May 3, 2024.

The following table summarizes the changing circumstances relative to NCES' ability to dispose leachate off-site as reported to Verdantas by NCES:

Date	Off-Site Disposal Change
11/01/2023	NCES is notified by Franklin, NH WWTF that no Saturday leachate disposal is allowed. (Restarted 02/03/2023)
01/24/2024	Concord, NH WWTF notifies NCES that it cannot accept leachate between 2/3/23-2/26/23
02/03/2023	NCES is notified by Franklin, NH WWTF that leachate disposal is restarted
02/05/2024	NCES receives approval and begins hauling leachate into Allenstown, NH WWTF (limited capacity 189,000 gallons/month). Ended 02/29/2024.
02/06/2024	NCES receives approval to begin hauling leachate into Manchester, NH WWTF (limited capacity 30,000 gallons/day). Ended 03/02/2024.
02/21/2024	NCES is notified by Franklin, NH WWTF that no Saturday leachate disposal is allowed through 3/9/2024.
02/26/2024	Concord, NH WWTF allows 2 loads per day of NCES leachate disposal
02/29/2024	Allenstown, NH WWTF notifies NCES that it cannot accept leachate
03/02/2024	Manchester, NH WWTF stops accepting NCES leachate
03/14/2024	NCES is notified that Concord, NH WWTF will continue to limit leachate disposal to two loads per day
03/14/2024	NCES receives approval to begin hauling to Anson Madison, ME
04/22/2024	Manchester, NH WWTF allows NCES leachate disposal
04/22/2024	NCES receives unlimited into Anson Madison, ME on weekends
04/19 – 05/03/2024	NHDES grants emergency approval to haul beyond permitted hours
05/01/2024	NCES receives approval to resume hauling to Allenstown, NH WWTF through 12/2024
05/01 – 05/10/2024	Allenstown, NH WWTF limits leachate disposal
05/15/2024	Manchester, NH WWTF stops accepting NCES leachate
06/04/2024	NCES receives approval and begins hauling to Passaic Valley Sewer Commission WWTP

Date	Off-Site Disposal Change
07/29/2024	Franklin, NH WWTF limits NCES to one load per day (still no Saturdays)
08/29/2024	Concord, NH WWTF notifies NCES that it cannot accept leachate

CONCLUSIONS

Exhibit 7 represents an illustration that helps to summarize conclusions noted above and the root causes for the excess head measurements on the Primary Leachate System liner. The year 2023 was the wettest year in over a decade in New Hampshire. Excess infiltration through the spring of 2023 was exacerbated by ongoing construction between May and December 2023, resulted in a positive mass balance trend (i.e., more leachate entering the system than being removed) in the second half of 2023.

The trend began to be reversed starting in November 2023 as a result of slight increases in off-site disposal capacity, however, several large infiltration events (end of October 2023, beginning of December 2023, and beginning of March 2024) and the fact that the liners were subject to direct impact from these rain events/high infiltration periods due to construction activities temporarily reversed the mass balance trend. Following NCES' liner repair on April 10, 2024, stormwater improvements in Spring 2024, and an increase in off-site disposal capacity (including NHDES' emergency authorization to transport additional leachate during off-hours), the NCES facility was able to reverse the positive mass balance (i.e., remove more leachate than generated) and correct the elevated head measurements.

Andrew Ashton, PG
Senior Hydrogeologist

Zack Smith
AVP, EAR Practice Leader

Nikki Delude Roy, PG
VP, Area Leader

Attachments

Exhibit 1

Mass Balance, Head, and Calculated Infiltration – Pump Station 1

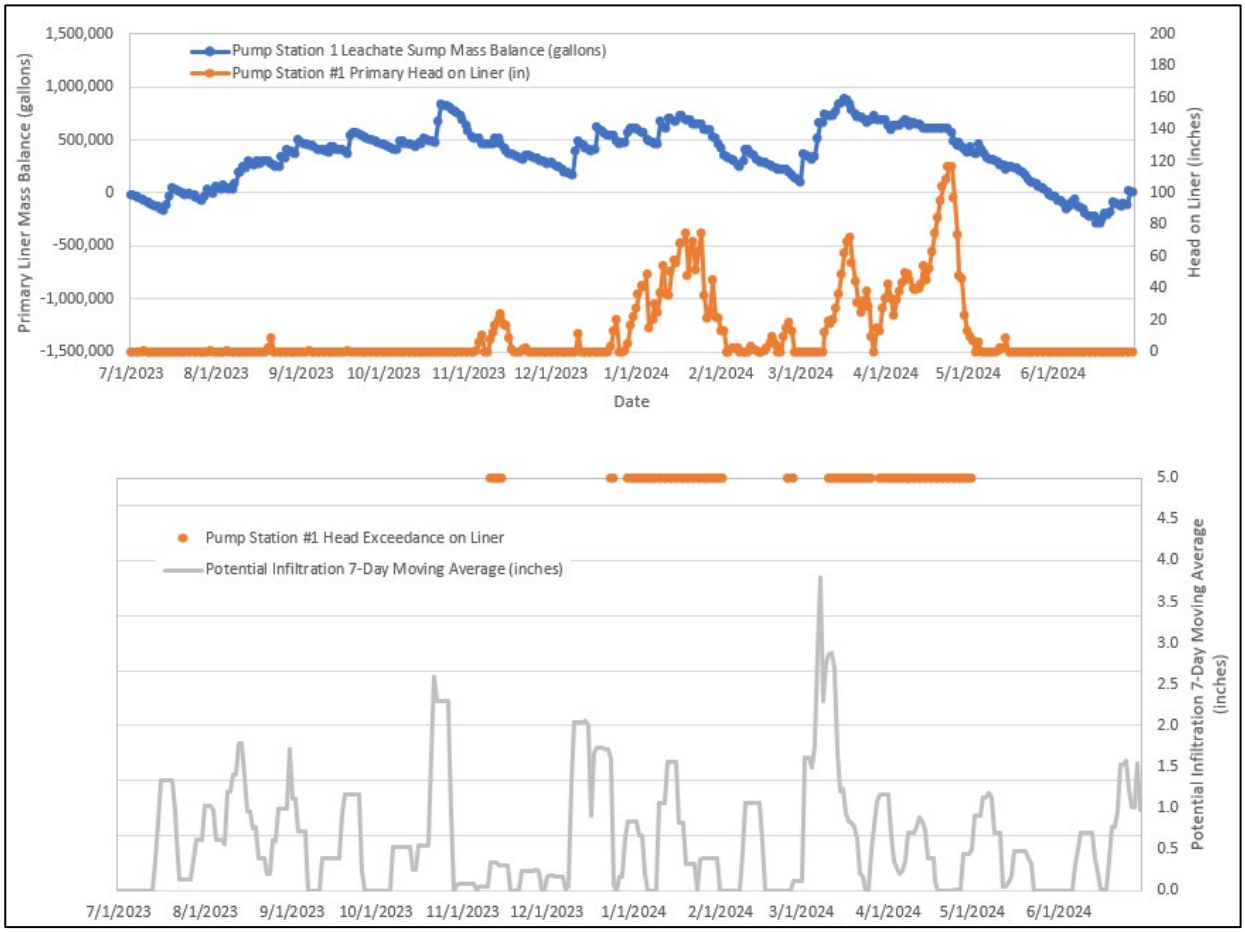


Exhibit 2

Mass Balance, Head, and Calculated Infiltration – Pump Station 2

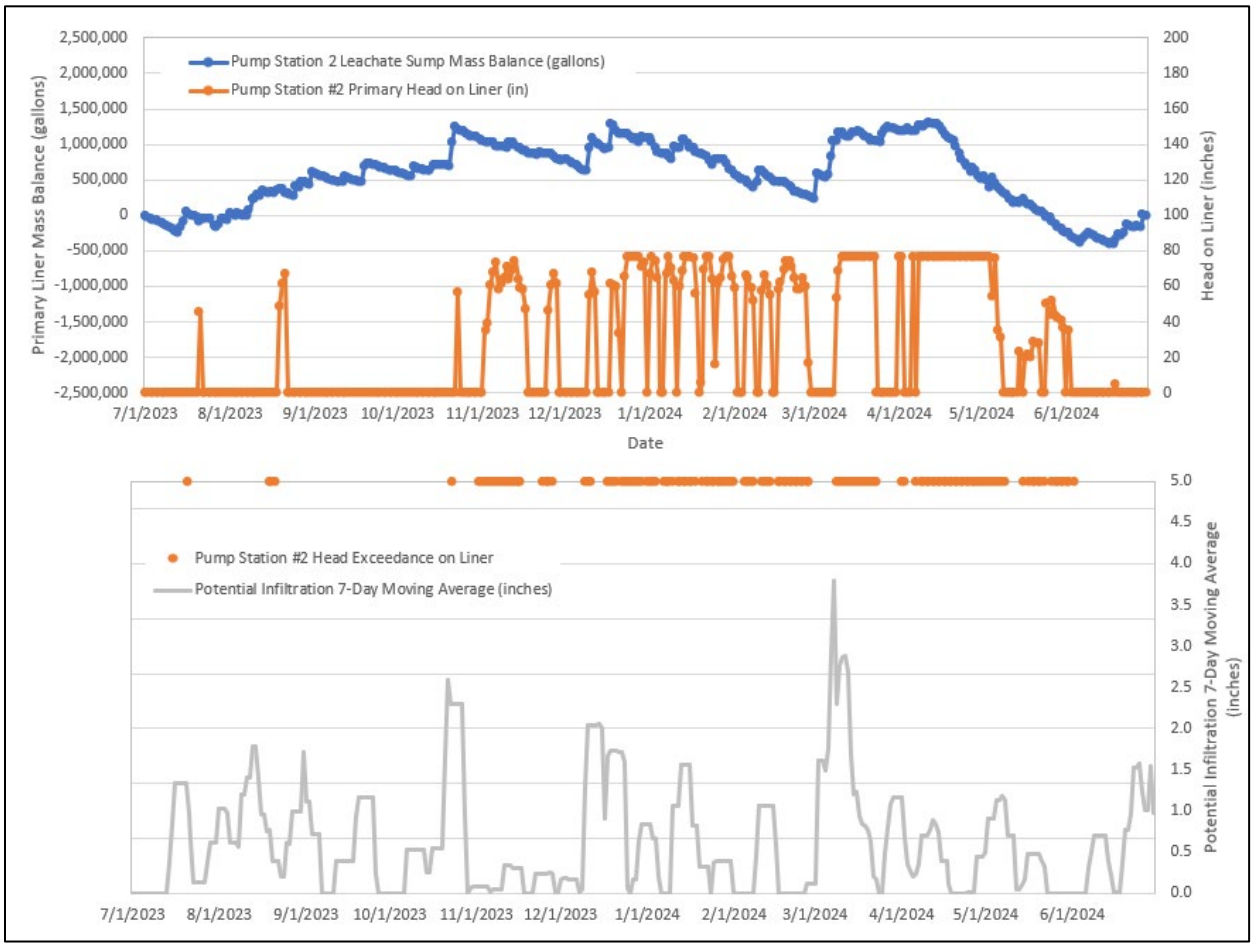


Exhibit 3

Mass Balance, Head, and Calculated Infiltration – Pump Station 3

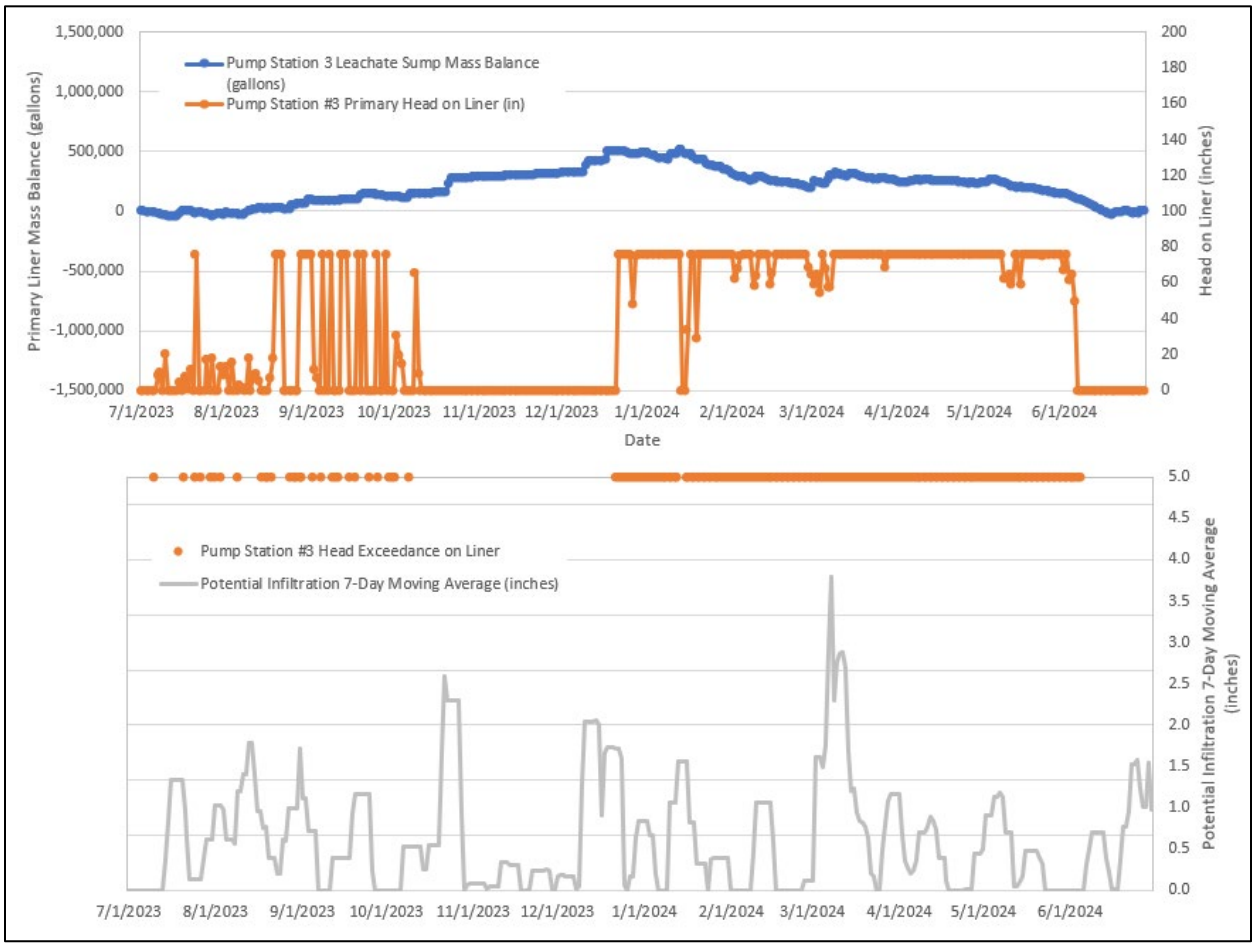


Exhibit 4

Pumping Rates and Maximum Pumping Rates – Pump Stations 1, 2, and 3

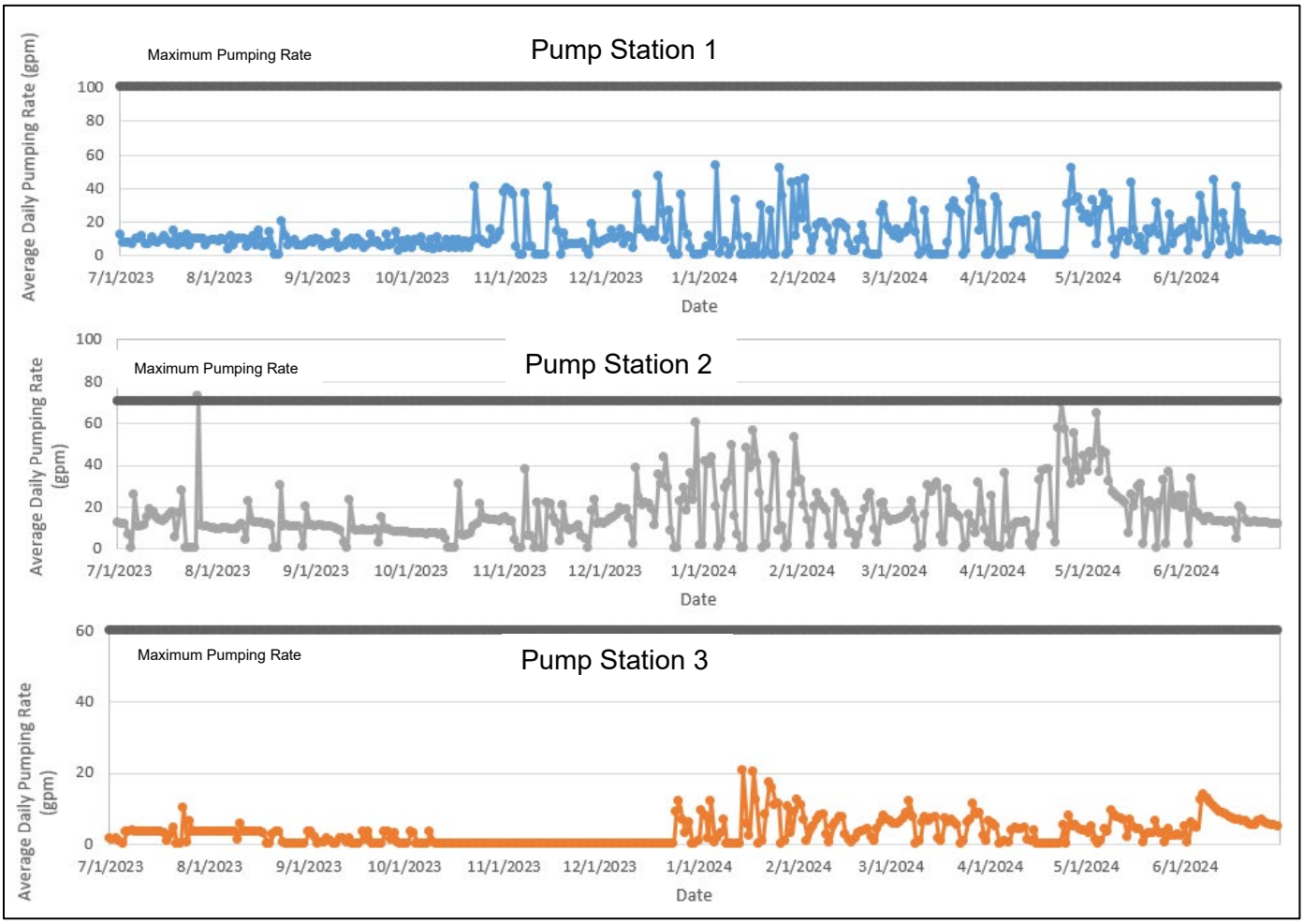


Exhibit 5

Individual Storage Tank Volumes

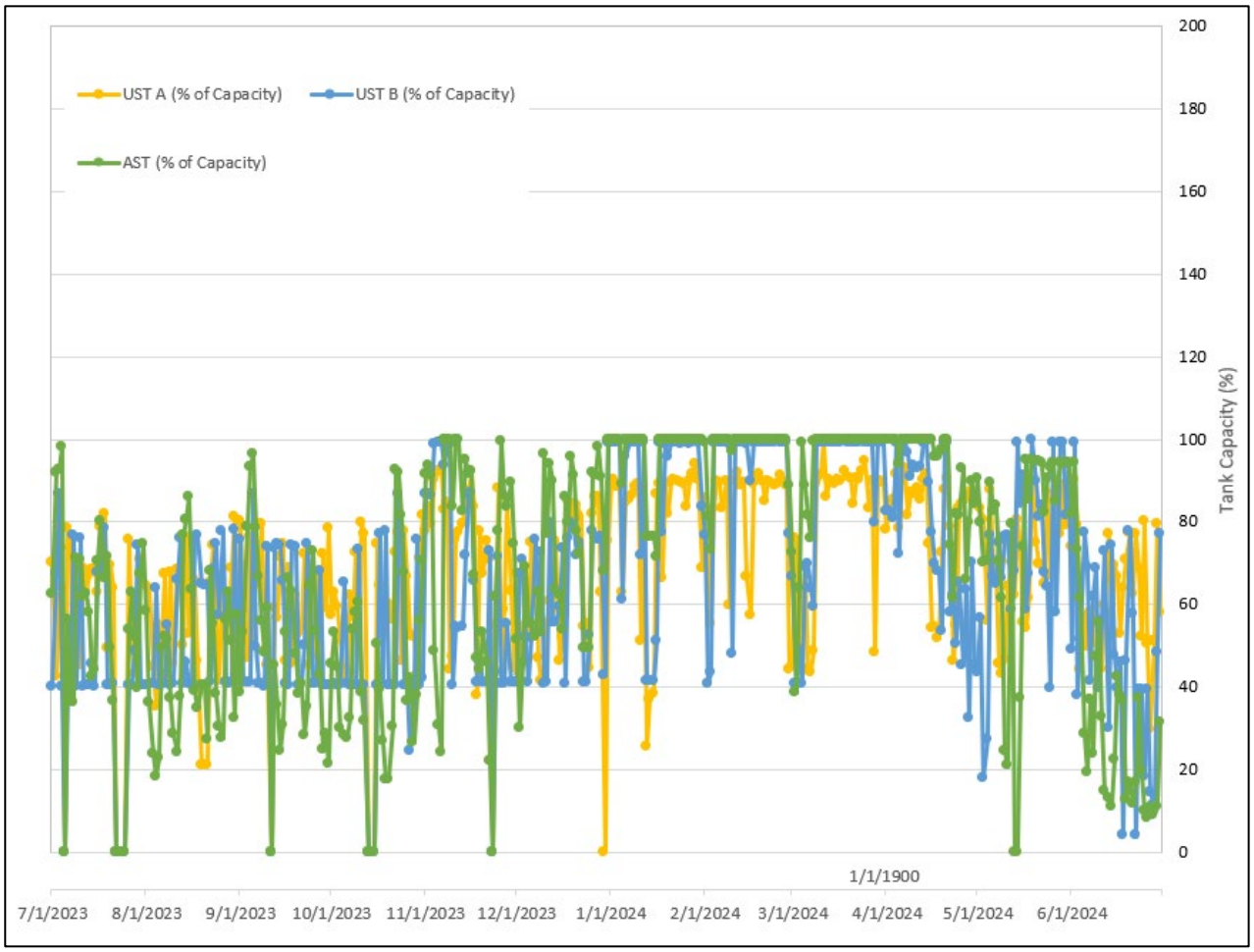


Exhibit 6

Outbound Leachate

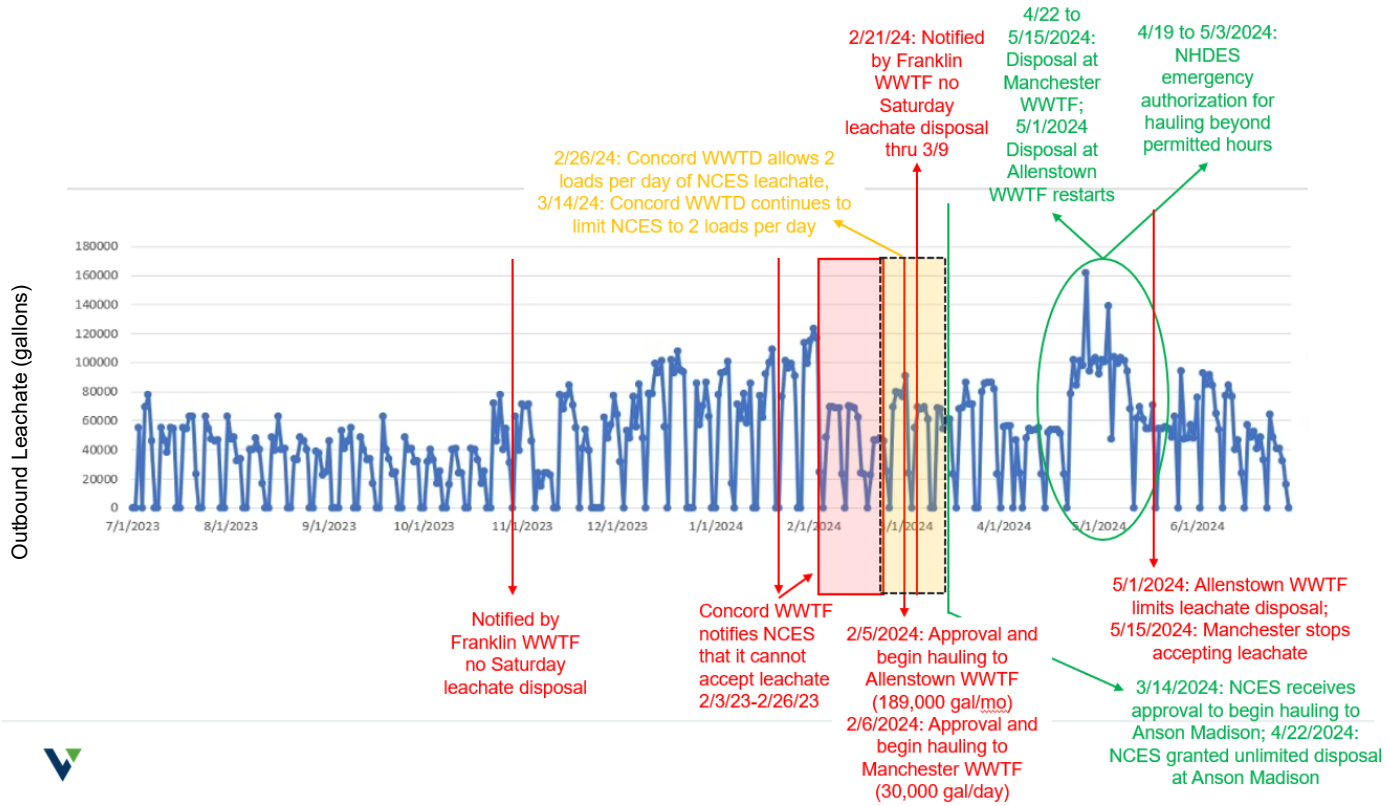
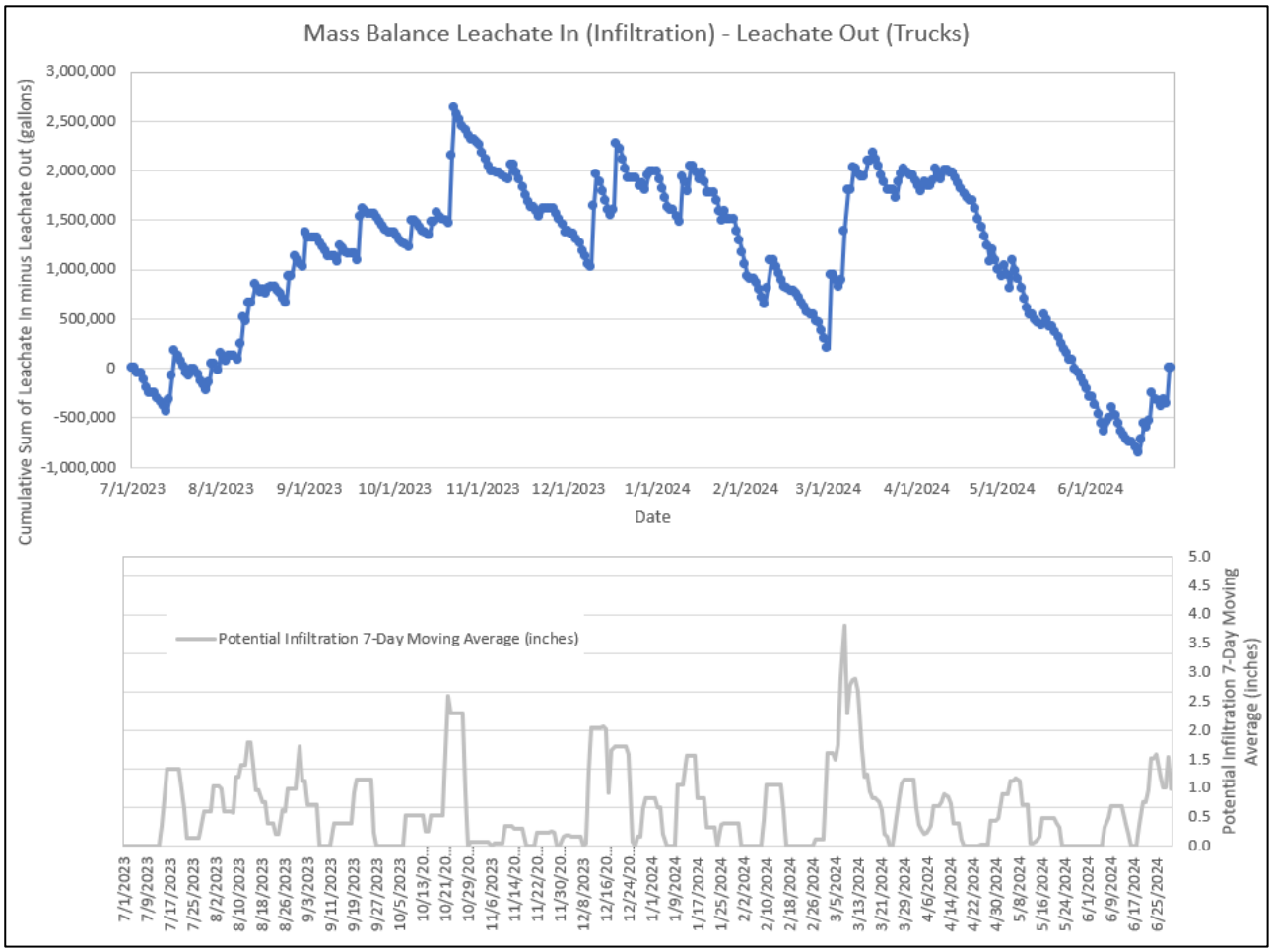


Exhibit 7

Mass Balance – Infiltration and Off-Site Storage, Calculated Infiltration



Attachment A-7 – Activities Completed/Planned Status

Repair anchor trench defect, April 10, 2024

Repairs to the anchor trench shown in Figure 1 were determined necessary in the course of investigation into causation of excess head on the liner. This work was accomplished by JA McDonald Construction of Middlesex, Vermont, and RTD Enterprises LLC of Madison, Maine, and inspected by CMA Engineers of Portsmouth, New Hampshire as described in our July 15, 2024 report to NHDES. Reference is made to Figure 1.

Finished installation of 140,000 square feet of scrim over majority of Stage VI Phase II to reduce leachate generation, April 27, 2024

This work began on April 22, 2024 and was completed on April 27, 2024 by RTD Enterprises LLC of Madison, Maine. The scrim was installed over the northern 2/3 of Stage VI Phase II in an effort to divert stormwater from becoming leachate.

Received approval to bring leachate to Anson Madison WWTF in Maine, April 23, 2024

After several discussions and the sharing of leachate analytical data, Anson Madison wastewater treatment facility agreed to accept delivery of leachate from NCES, resulting in increased leachate disposal capacity for the facility.

Began cleaning primary and secondary piping, May 14-16, 2024

Precision Industrial Maintenance, LLC of Schenectady, New York was contracted by NCES to perform annual pipe cleaning services at the NCES site. The cleaning was performed around the perimeter of the landfill at various locations where clean out access points are located.

Field verified sumps were dry by pumping to break suction, June 17, 2024

NCES staff worked at each pump station throughout the day to check sump levels, and if necessary, adjust levels for “pump on” and “pump off” control. The data acquisition system was utilized to determine levels, each primary pump was then manually turn on until pump cavitation was observed. This confirmed that the sump levels were as low as the pumps could draw down in each cell. If a sump level was reading incorrectly (pump cavitation observed) after the test was complete, the transducer was replaced. This work was completed at pump stations #1, #2 & #3.

Repaired Pump Station 3 transducer signal, June 18, 2024

Testing on June 17, 2024 identified an error in the transducer reading. Gates Electric, Inc. repaired the signal from the Pump Station 3 transducer

Continued cleaning, primary & secondary June 17-19, 2024 along with video inspection of Stage IV Phase I secondary

Precision Industrial Maintenance, LLC was contracted to continue annual pipe cleaning services at the NCES site. Cleaning was performed around the perimeter of the landfill at various locations where clean out access points are located.

Field verified transducer location in sumps, June 19, 2024

NCES and Precision Industrial Maintenance, LLC worked together to pull the primary pump in Pump Station 1 and verified transducer location. Gates Electric later confirmed all transducers are located in the same location.

Field tested flowmeters, July 11, 2024

Gates Electric, Inc. performed on-site testing of flow meter operation. The testing was performed adjacent to each side riser building.

Video inspection of secondary piping at Pump Station 2 (Precision) July 18, 2024

Precision Industrial Maintenance, LLC was contracted by NCES to perform a video inspection of the Stage VI phase I secondary piping. Access to secondary piping was accomplished by inserting the robotic camera tractor into cleanout pipes adjacent to Pump Station 2.

Dewatering GW 202, July 18, 2024

NCES staff along with the assistance of Gates Electric installed a pneumatic QED pump into gas well 202. The pump discharge was placed into the vacuum side of a gas main header. The pump was operated by a remote generator and compressor.

Video inspect Pump Station 2 secondary piping, July 29, 2024

NCES contracted with RCAC, Inc. of Balston Spa, New York to perform a video inspection of the Stage IV Phase I secondary drain pipe.

Dewatering GW 146 commences, August 14, 2024

Similar to gas well 202, NCES staff along with the assistance of Gates Electric installed a pneumatic QED pump into gas well 146. The pump discharge was placed into the vacuum side of a gas main header. The pump was operated by a remote generator and compressor.

NCES revised gas well dewatering operation, August 20, 2024

NCES upgraded dewatering system by installing larger compressor sizing and adding air dryer so GW 202 & GW 146 could be pumped 24/7.

NCES revised gas well dewatering operation, August 30, 2024

NCES with the assistance of Blue Granite Environmental Consultants, LLC installed new QED pumps, new wellheads and tubing on GW 202 & GW 146 to improve efficiency.

Grouting of Stage IV Phase I secondary drain pipe, October 8, 2024

NCES removed the test ball from the secondary drain pipe on October 7, 2024, in preparation for Alex E. Paris Contracting Company, Inc.'s plugging and grouting of a section of Stage IV Phase I solid secondary drain pipe. Reference is made to Figure 3 for approximate location.

Grouting sections of GW 146, 148 & 202 completed, October 11, 2024

Camera Pump Station 2 secondary drain pipe to success of grouting of secondary drain pipe / plug seal, October 11, 2024

Attachment 8

Overlay Liner Plan View

Scale: 1" = 200'

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North Country Environmental Services, Inc.
Bethlehem, New Hampshire

Overlay Site Plan

Figure 7

Attachment A-9

A-9 Investigation Summary

Beginning in mid-October 2023, the NCES facility began experiencing elevated flows in the secondary detection system in Stage IV, Phase I, that fluctuated up and down over the next ten to eleven months. These flows remained elevated above the regulatory limit of 25 g/a/d throughout this period. The flows spiked during the 17-day period beginning October 17, 2023 when the secondary liner was exposed to connect the new liner of Stage VI to the existing liner. The temporal correlation between the liner tie-in and increased secondary flows led NCES to conclude that the increased flow was likely the result of stormwater infiltration directly into the secondary detection system because of temporary construction conditions which were concluded in early November of 2023. After significant rainfall in December and January of this year, however, the flows in the secondary spiked again, with a more pronounced spike in March following another period of more intense precipitation. These findings suggested that there was another source of the liquid being detected in the secondary collection system beyond stormwater infiltration during the construction phase.

Throughout 2024, NCES considered multiple possible sources of liquid contributing to the elevated flows in the secondary detection layer. The site proceeded in a systematic fashion to investigate the potential factors or causes even though at times it was complicated by the discovery of other potential factors or causes that appeared to also be contributing to the elevated flows.

In late July, Casella enlisted the help of additional internal personnel to take a fresh look at the cause of the elevated flows in the secondary layer and to formulate a solution. As of the date of this submission, NCES has considered these potential contributing factors or causes to the elevated secondary detection flows:

1. Landfill Gas Condensate Line Tie-In into Secondary Cleanout Pipe
2. Construction Related Stormwater Infiltration
3. Defect in the Primary Liner at the Anchor Trench
4. Excessive Leachate Head on the Primary Liner
5. Landfill Gas Well Penetrations in the Overliner

In this submission, NCES addresses each of these potential contributing factors or causes.

1. Landfill Gas Condensate Trap Tie-In into Secondary Cleanout Pipe

In 2017, NCES notified the NHDES that during the installation of additional landfill gas collection infrastructure in Stage IV area, a landfill gas condensate trap was accidently tied into the secondary cleanout pipe. Following installation of the landfill gas condensate trap, secondary flows in Stage IV began to increase. In accordance with a remedial action plan submitted to NHDES, NCES installed pneumatic pipe plug into the secondary cleanout pipe to block flow from the condensate trap into the secondary detection layer. Once this was accomplished, there was a decrease in the secondary flow rates. In addition to the pneumatic plug in the in the

secondary cleanout pipe, NCES contracted to have the drain line on the landfill gas condensate trap grouted closed.

Conclusion – The landfill gas condensate trap and drain line that had been tied into the Stage IV secondary cleanout pipe was increasing flow rates in the secondary detection layer.

Solution – Prevent the condensate drain line from flowing into the secondary cleanout pipe by grouting closed the drain line. In addition, the installation of the pneumatic plug had proven to prohibit leachate flow from the upper end of the secondary cleanout so in October 2024, NCES completed a permanent plug by grouting this section of cleanout pipe closed.

2. **Construction Related Infiltration**

The construction of the final disposal cell, Stage VI Phase II, began in May 2023 and continued through the end of the year. Around August 1, secondary flows in Stage IV began to increase gradually. These increased flows were investigated by site management and the engineering consultant with the conclusion that the construction activities were causing the elevated flows. There were no other evident contributing site conditions at that time.

The secondary flows substantially increased in at the end of October after the anchor trench was opened to start the tie in of the Stage VI, Phase 2, and Stage IV liners Around November 3, the connections were completed. The Stage VI landfill floor was exposed to the weather through the duration of the remaining construction activities.

Conclusion – It is normal to have increased secondary detection system flows during construction activities surrounding the tie-in of liner systems.

Solution –Complete the tie in and seal off the secondary layer. Continue to monitor and report the flow rates in the secondary layer until they normalize and become compliant with the regulated flow rate.

3. Defect in the Primary Liner at the Anchor Trench

Due to the increases in the secondary flows that NCES experienced in the beginning of January 2024, the site management began to investigate additional possible contributing factors or causes to the elevated flow rates. In February 2024, after the cell construction was completed, NCES began investigating whether ponding stormwater in Stage IV Phase I at the anchor trench was causing stormwater infiltration into the secondary detection layer.

Before the construction of Stage VI, stormwater entering the area of the anchor trench flowed directly down the landfill's sideslope. As part of the construction of Stage VI, however, an earthen berm was constructed adjacent to the anchor trench and stormwater began to collect over the anchor trench area. In the spring of 2024, site management began removing soil from the liner in the anchor trench area and discovered an approximate ¼" hole in the primary liner over which stormwater had been ponding to varying depths since the construction of the earthen berm. On

April 10, 2024, the ¼" hole in the primary liner was repaired and sealed off by the liner installer under the observation of site management.

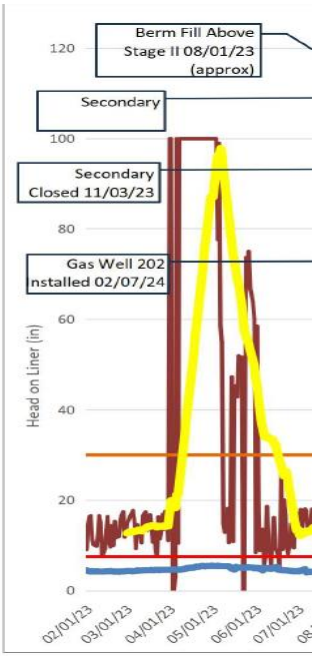
NCES requested that CMA Engineers research and determine the volume of stormwater that could infiltrate into the secondary detection layer through this ¼" hole. CMA concluded that with a head of 12-inches, the ¼" hole could allow over 3,000 gallons of stormwater to pass through the hole each day.

Conclusion – After determining the potential impacts that stormwater infiltration could have from a ¼" hole and the subsequent decline in the secondary flow rates after the hole was repaired, NCES concluded that the hole was the predominant source or cause of the elevated flow rates in the secondary layer.

Solution – Repair the hole in the primary liner, continue to monitor and report the flow rates in the secondary layer until they normalize and become compliant with the regulated flow rate.

4. **Excessive Leachate Head on the Primary Liner**

   During periods of time in 2023, and the early part of 2024, there were extended periods of elevated leachate head levels on the primary liner system in Stage IV. Because it is well-established that increased head on the primary liner can cause leachate to infiltrate the secondary liner system through small imperfections, NCES considered whether the data from the NCES site supported this possible source of secondary flows. An examination of the site's primary liner head levels and the flows in the secondary liner system ruled out head on the primary liner as a contributing cause to secondary flows. As represented below in the Figure, during the period from April 1st through June 1st in 2023 during elevated leachate levels on the primary liner, the secondary flow rates were unaffected.



Conclusion – Elevated or increased leachate head on the primary liner was not a contributing factor or cause of the elevated secondary flows.

Solution – Since the primary leachate levels were determined not to be a contributing factor or cause on the elevated secondary flows, NCES focused on the other factors and resolutions.

5. **Landfill Gas Well Penetrations in the Overliner**

After monitoring the secondary flows for several months after the primary liner defect in the anchor trench had been repaired, the flow rates had significantly declined but were still elevated above the compliance level.

In February 2024, Gas Well 202 was drilled and installed to replace existing Gas Well 148 that was no longer producing sufficient landfill gas flow. In July 2024, Sanborn Head & Associates reviewed the drilling log of Gas Well 202 and determined that the well had in fact penetrated the overliner portion of Stage IV Phase I during the installation. This initiated a further review by Sanborn Head which revealed that the overliner had been penetrated in prior years during similar installations of 10 other previous gas wells dating back to 2014.

The site management began to take water depth measurements in all available gas wells in the overliner area and discovered that the liquid level in Gas Well 202 was approximately 10 feet above the elevation of estimated overliner penetration. Pumps were installed in Gas Well 202 and 146 to remove liquid volumes and lower the liquid levels below the estimated elevations of the overliner penetrations.

The pumps were operated on a temporary basis for several days which appeared to have influence on the secondary flow rates. The pump in Gas Well 202 was then converted over to a permanent basis which further slowed the secondary flow rate to drop below the compliance level where it remains in compliance today. Gas Well 146 was determined to have minimal influence on the secondary flow rates as once the initial liquid levels were removed it never recharged above the overliner elevation.

Conclusion – Gas Well 202 was determined to have influence on the secondary flow rates once the liquid levels were lowered to be below the elevation of the estimated overliner penetrations. On August 20th, the pumps were equipped to run 24/7 to maintain a low liquid level and has confirmed that Gas Well 202 was contributing to the secondary flow. Gas Well 146 liquid level was well below the anticipated penetration elevation and was not believed to be contributing to any measurable extent.

Solution – In order to prevent liquid levels from exceeding the elevations of the overliner penetrations where liquids could infiltrate the secondary detection layer, NCES permanently grouted Gas Wells 146, 148 and 202 to an elevation above the calculated overliner penetration to seal off the secondary system with a cement/bentonite mix.

Attachment A-10

Rehabilitation Consulting And Construction, Inc.
298 Malta Avenue, Ballston Spa, NY 12020 Kathy J. Kerr Caputo (Mobile: 518/312-8870)
Phone: 518/885-3430 Fax: 518/885-3430 Mark F. Caputo (Mobile: 518/469-7282)

R.C.A.C., Inc.

A NYS Certified WBE Company

9 October 2024

Mr. Kevin Roy
General Manager

North Country Environmental Services
581 Trudeau Road
Bethlehem, NH

Reference: Stage VI Phase 1 Secondary LCRS
Subject: Internal CCTV Findings

Kevin,

On 29 July 24, RCAC performed an internal CCTV inspection of this Secondary Pipe. The piping materials were 8" SDR 11 High Density Polyethylene (HDPE), consisting of solid wall at each up slope and perforated along the floor of the cell.

The purpose of this inspection was to determine the approximate location of incoming liquids. The pipeline was constructed with solid pipe at each end of the run and perforated pipe along the floor of the cell. The downgradient perforated pipe terminated at a Wye connection dumping liquid into the Side Slope Riser Pumping System.

Please note when reviewing the video, distance measurements are shown in Meters on the screen. For the purpose of this report, we have listed both meters and feet in the following summary.

CCTV Results are as follows:

Distance from Start	**Observation**
000M - 000F	Start of inspection at cleanout (Solid Wall Pipe)
36.4M - 119F	Wye Connection To sump
38.4M - 126F	End of solid pipe and start of Perforated Pipe Visual flow in invert of pipe
61.0M - 200F	Camera at 200 feet
108.5M - 356F	Gradient change producing rapid flow
115M - 377F	Gradient back to normal pitch

Rehabilitation Consulting And Construction, Inc.
298 Malta Avenue, Ballston Spa, NY 12020 Kathy J. Kerr Caputo (Mobile: 518/312-8870)
Phone: 518/885-3430 Fax: 518/885-3430 Mark F. Caputo (Mobile: 518/469-7282)

122M - 400F	Camera at 400 feet
213M - 700F	Camera at 700 feet
215M - 710F	End of perforated pipe, back into solid pipe
242M - 794F	Start into loss of grade and into a depression
243.8M - 800F	Fully into depression with ½ Pipe full of water
245M - 804F	Camera 90% under water and heavy gurgling of water at crown of pipe

At this point the CCTV was terminated, with the recording continuing as we retracted the CCTV unit. A flash drive of the recording was provided for your use and records.

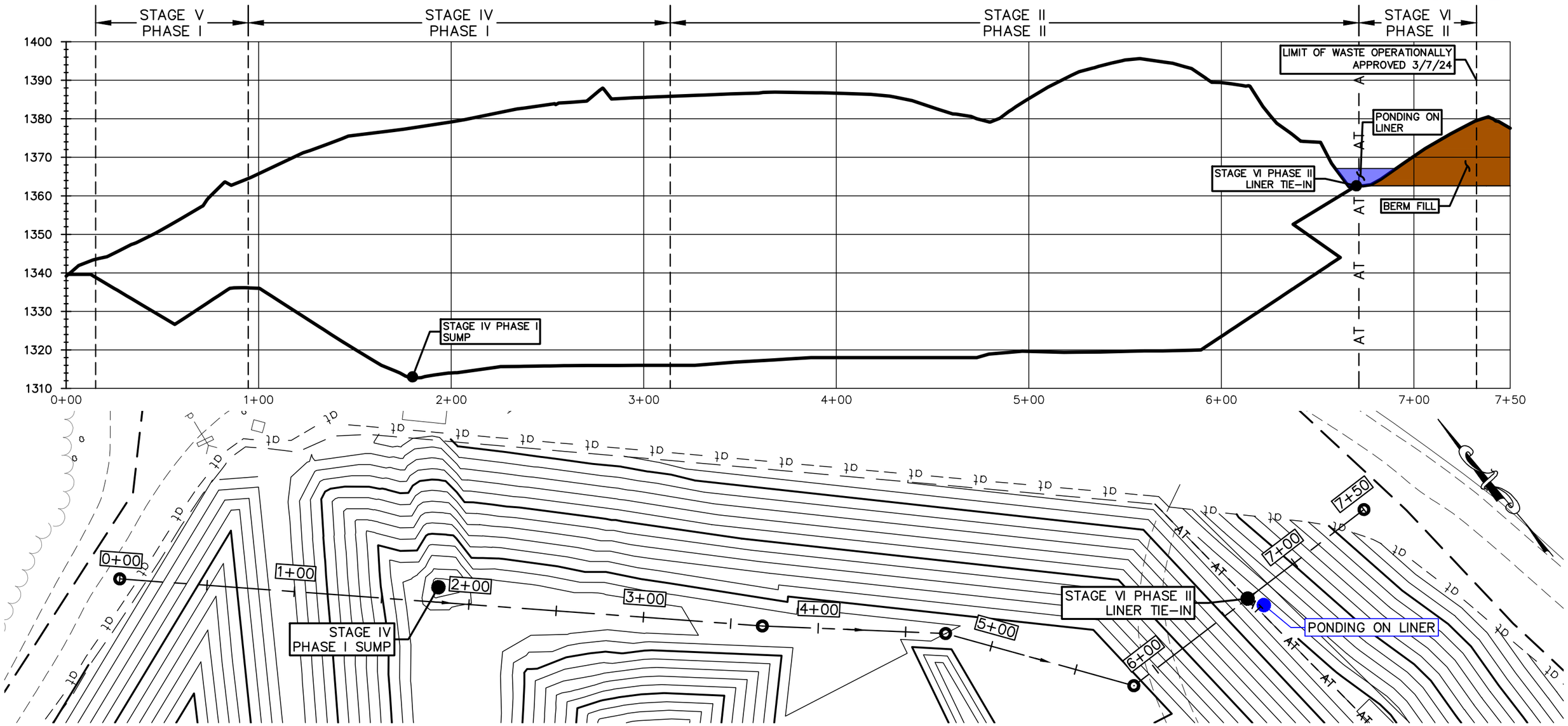
We trust this meets with your request. If you require any additional information. please contact us and we will respond accordingly.

Respectfully yours,

RCAC, Inc.
Mark Caputo
Technical Advisor

mfcaputo@nycap.rr.com
518/469-7282 mobile

FIGURE 1



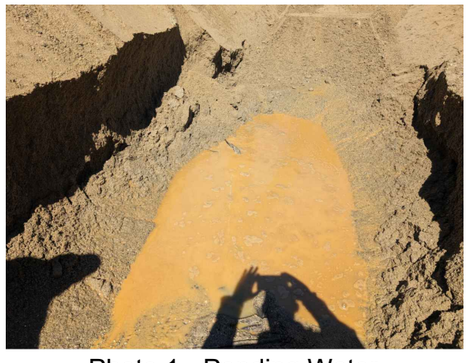


Photo 1 - Ponding Water

Photo 2 - Liner Leak

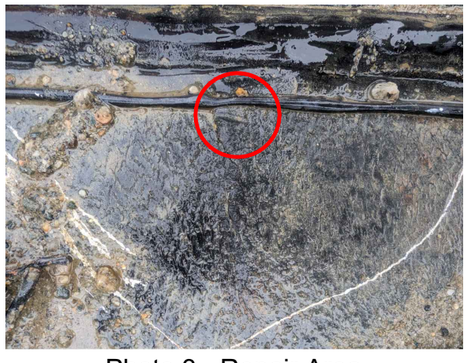


Photo 3 - Repair Area

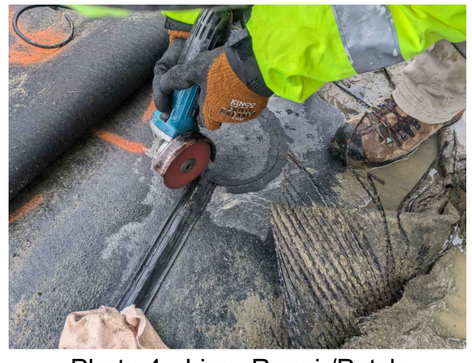


Photo 4 - Liner Repair/Patch

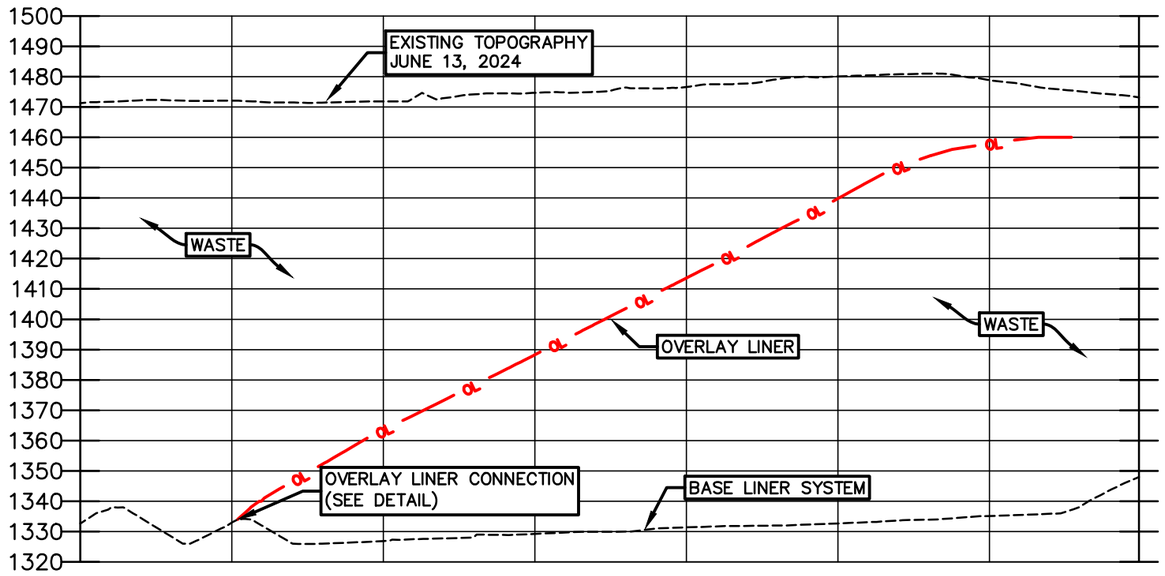
CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • 603/431-6196
Manchester, NH • 603/627-0708
Portland, ME • 207/541-4223
cmaengineers.com

North Country Environmental Services, Inc.
Bethlehem, New Hampshire

Base Liner Plan & Profile View

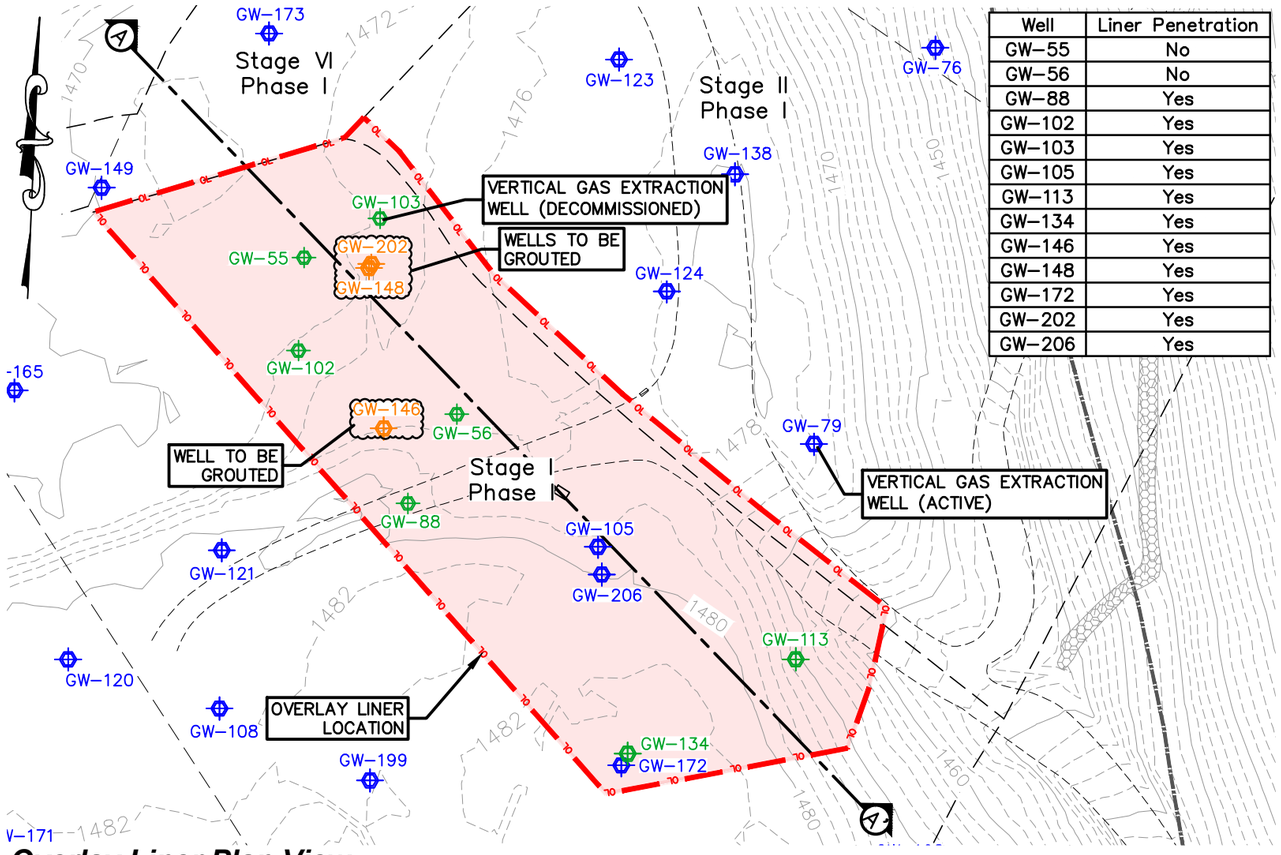
Figure 1

FIGURE 2



Section A-A'

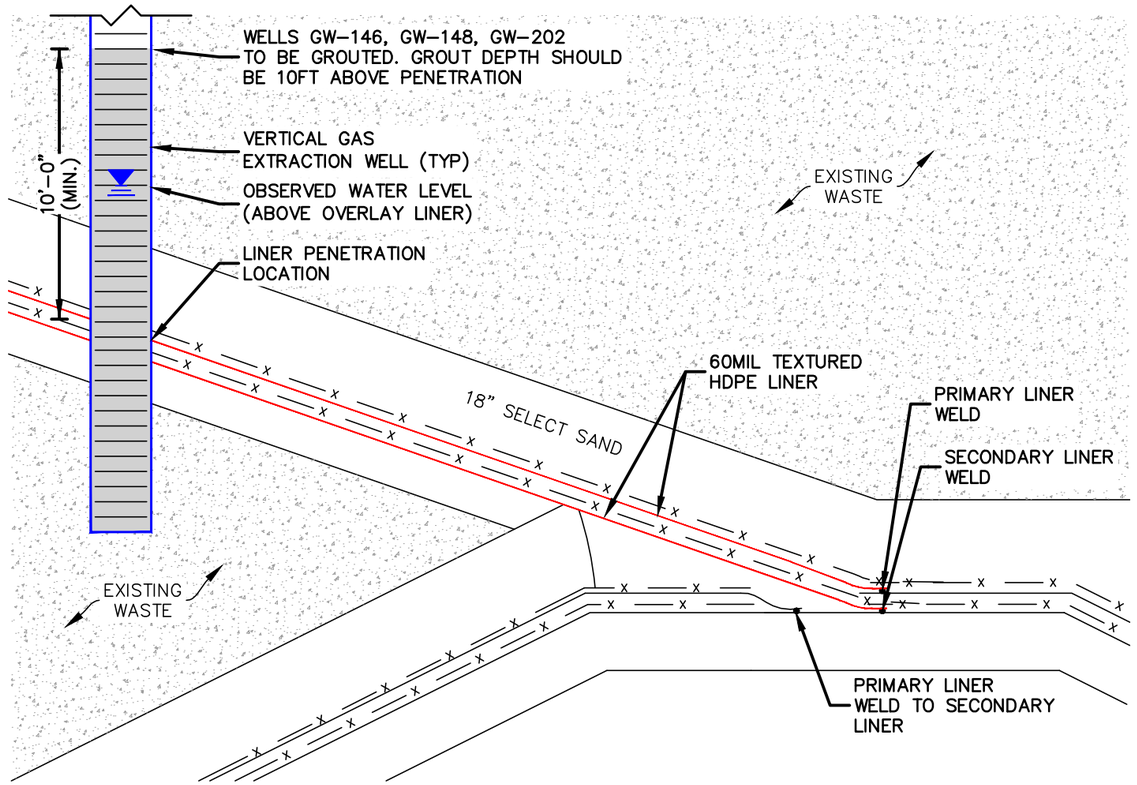
Scale: 1"=100' (Horizontal) / 1"=50'(Vertical)



Well	Liner Penetration
GW-55	No
GW-56	No
GW-88	Yes
GW-102	Yes
GW-103	Yes
GW-105	Yes
GW-113	Yes
GW-134	Yes
GW-146	Yes
GW-148	Yes
GW-172	Yes
GW-202	Yes
GW-206	Yes

Overlay Liner Plan View

Scale: 1" = 100'



Overlay Liner - Connection Detail

Not to Scale

Legend

- Existing 2' Contour
- 1440 — Existing 10' Contour
- Existing Edge of Gravel
- Existing Phase Division
- OL OL OL — Existing Overlay Liner
- GW-202 — Active Gas Extraction Well
- GW-113 — Decommissioned Gas Extraction Well
- GW-146 — Gas Extraction Well – To Be Grouted

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North Country Environmental Services, Inc.
Bethlehem, New Hampshire

Overlay Liner Section

Figure 2

ESTABLISHED 1975

October 11, 2024

Leah McKenna, Administrator
NH Department of Environmental Services
Solid Waste Management Bureau
29 Hazen Dr. / P.O. Box 95
Concord, NH 03302-0095
swmbenforcement@des.nh.gov

RE: North Country Environmental Services, Inc.
Lined Landfill Facility – Bethlehem, New Hampshire
Response to NHDES Electronic Mail; August 30, 2024

Dear Ms. McKenna,

North Country Environmental Services writes to provide the requested information as outlined in an August 30, 2024 electronic mail from the Department. The original deadline of October 1, 2024 for responding was extended to October 11, 2024 by the Department on September 24, 2024.

If you have any questions or concerns, please contact me at (802) 651-5454.

Sincerely,

NORTH COUNTRY ENVIRONMENTAL SERVICES, INC.

John Gay
Permits, Compliance, & Engineering

c. Jaime Colby, NHDES – SWMB
Joshua Harrison, NHDOJ
Kevin Roy, NCES (via email w/ enc.)
Lindsey Menard, NCES (via. email w/ enc.)
Kim Crosby, NCES (via. email w/ enc.)

Action Item #1

NHDES has reviewed the incident reports relating to hydraulic head elevations on the primary liner and 30-day average secondary leachate collection system flow rates, respectively, as requested in Action Items 1(a) and 1(b) of the LOD:

- 7/1/2023 – 6/12/2024 Primary Liner Incident Report:
  - **Item 10, The quantity and types of wastes and material(s) involved in the incident or situation and in the clean-up activities - Section incomplete.**
    - Please provide a list identifying the dates, pump stations, and values of primary liner hydraulic head levels recorded during this timeframe, as well as the regulatory threshold referenced. In lieu of providing the aforementioned list, you may provide a listing of the specific tables/pages and quarterly reports in which these values can be found.

Response:

A revised Primary Liner Incident Report with list of dates, pump stations, values of primary liner and hydraulic head levels, as well as the regulatory threshold referenced is attached (A-1).

- 8/31/2023 – 6/12/2024 Secondary Flows Incident Report:
  - **Item 10, The quantity and types of wastes and material(s) involved in the incident or situation and in the clean-up activities - Section incomplete.**
    - Please provide a list identifying the dates, pump stations, and values of 30-day average secondary flow rates greater than 25 gallons per acre per day (G/A/D) and 100 G/A/D recorded during this timeframe and re-submit the revised reports.

Response:

A revised Secondary Flows Incident Report with a list identifying the dates, pump stations, and values of 30-day average secondary flow rates greater than 25 gallons per acre per day (G/A/D) and 100 G/A/D is attached (A-2).

- Please provide a list identifying each date that a secondary flow rate exceeded 100 G/A/D, the pump station at which the exceedance occurred, and the recorded secondary flow rate.

Response:

A list identifying each date that a secondary flow rate exceeded 100 G/A/D, the pump station at which the exceedance occurred, and the recorded secondary flow rate is attached (A-3).

  - **Item 12, Assessment of actual or potential hazards to the environment, safety and human health related to the incident – Section incomplete.**

    - Env-Sw 1005.09(c)(4)(d) requires an assessment of actual or potential hazards to the environment, safety, and human health related to the incident. Provide the required assessment.

Response:

A revised Secondary Flows Incident Report indicating a revised response to Item 12 requesting an assessment of actual or potential hazards to the environment, safety, and human health related to the incident is attached (A-1).

Action Item #2

NHDES has identified that the secondary flow rates in the July 15 response are inconsistent with data previously provided by NCES.

- For each pump station, please provide a table with secondary flow rate measurements starting June 1, 2024, and rolling 30-day averages starting no later than July 1, 2024.

  Response:

  A table with the requested secondary flow measures is attached (A-4).

- Please identify any changes or updates to Facility operations implemented to reduce secondary leachate flow rates.

  Response:

  Changes and/or updates to operations implemented to reduce secondary flows are described in our response to Action Item #4.

Action Item #3

The July 15 response included a design analysis of the leachate collection and storage system, as well as a list of operational and maintenance improvements NCES has made or intends to make. The response did not include the requested analysis of the cause(s) of the excess leachate head on the liner (leachate head >12 inches on the liner, excluding sumps), which NHDES requested include an evaluation of the leachate collection, storage and disposal system capacity as well as proposed operational and maintenance changes.

- Please provide the requested analysis of the cause(s) of excess leachate head on the liner, including the requested leachate system evaluation.

  - For clarity, NHDES anticipates that the leachate system evaluation will review the conditions immediately prior to and during the time of excess leachate head, including an assessment of the quantity of leachate in storage, the capacity of the system to manage additional leachate during the subject time period, the rates at which leachate could be removed from the liner system and leachate storage tanks, and a review of precipitation events during the subject time period, including a comparison to design storm precipitation (i.e., 25-year storm event, 100-year storm event). A mass balance analysis on select dates during the subject time period is one of many suitable approaches to conducting the requested evaluation.

  Response:

Sanborn, Head and Associates, Inc. (SHA) conducted an evaluation of the leachate management system, and its report of that evaluation was previously submitted to NHDES on July 15, 2024. The SHA evaluation demonstrates that the design of the leachate management system is adequate to handle the volume of leachate generated at the facility if leachate can be removed from the storage tanks for trucking and disposal in a timely manner. SHA concluded that during the period at issue the accumulation of leachate on the liner was attributable to constraints on NCES's ability to remove leachate from the tanks caused, in turn, by reductions

in leachate acceptance rates at the WWTFs NCES was using at the time. See the attached amended report of SHA, dated October 7, 2024 (A-5)[1].

NCES also retained Verdantas to conduct an independent mass balance analysis as suggested by NHDES. A copy of Verdantas's analysis is attached hereto (A-6). The findings of the mass balance analysis support the SHA evaluation, and demonstrate that the accumulation of leachate on the liner was not a result of any design deficiency but was attributable to constraints on NCES's ability to remove leachate from the facility. The analysis examines contributing factors to exceedances of head on the liner for the relevant period and includes an evaluation of leachate collection, storage and disposal system capacity.

NHDES notes that certain pumps were required to be upgraded as part of the Stage VI Phase II construction project in accordance with the Type IA permit modification application initially received March 24, 2020 and approved October 9, 2020.

- Please confirm the make and model of pumps in use at all pump stations for both primary and secondary leachate systems, including:

Response:

Primary System	Make/Model		Secondary System	Make/Model
Pump Station 1	**EPG Series 17 SurePump**		**Pump Station 1**	**EPG Series 8 SurePump**
Pump Station 2	**EPG Series 18 SurePump**		**Pump Station 2**	**EPG Series 8 SurePump**
Pump Station 3	**EPG Series 18 SurePump**		**Pump Station 3**	**EPG Series 8 SurePump**
			Pump Station 4 (Stage V)	**EPG Series 8 SurePump**

  - Dates of pump upgrades that occurred on or after the start of Stage VI Phase II construction.

Response:

As part of the Stage VI Phase II construction, the pumps required by the approved construction plans were installed on October 26, 2023.

Further, NCES identified in its response a list of items/activities that are "planned or completed."

- Please identify which items/activities have been completed and which are planned.

Response:

A description of items and activities that have been completed and which are planned is attached (A-7).

[1] **Amendment clarifies that the build-up of leachate on the liner system resulted from wastewater treatment facilities not being available for disposal. It was not a result of inadequate leachate collection, storage, or disposal system capacity.**

- Include a site plan identifying areas of the facility where improvements have been completed or are planned, as appropriate.

Response:

A site plan is attached (A-8).

- Please also identify how the system described in the last bullet point in the July 15 response [leachate tracking system] is different than the existing system.

Response:

The centralized tracking system developed by the company is not a replacement of existing on-site systems used site at the landfill to collect and monitor leachate levels and flow rates. The leachate readings and flow rates maintained in the centralized tracking system are collected and reported out from the existing on-site systems at the landfill. The centralized tracking system has been implemented company-wide to consolidate leachate readings from primary collection sumps, secondary detection sumps, and storage tanks at each of the company's landfills. This centralized tracking system enhances the visibility into leachate levels and flow rates at each of the company's landfills to ensure effective leachate management and compliance with regulatory requirements. This visibility to the leachate levels and flow rates extends from the landfill level to home office management, enabling routine assessment and response, as necessary, to any potential concerns.

Action Item #4

The investigation report/response action plan for Pump Station #2 is incomplete. The purpose of the investigation is to identify the potential cause(s) of elevated secondary flow rates and the response action(s) needed to address those flows. The report provided focuses almost exclusively on the discovery of a single hole along the Stage II / Stage VI Phase II connection, but it also mentions bench testing of secondary pump station flow meters and a planned camera inspection of secondary leachate pipes.

- Please provide a detailed description of the investigation performed in response to the elevated secondary flow rates per Env-Sw 806.09(e)-(f). In this description, please provide the dates of the investigation, who performed the investigation, and where/how the investigation was performed. Ensure that all potential causes investigated have been described in the report/plan.

  Response:

  A detailed description of the investigation is attached (A-9).

- Please provide the equation(s), assumption(s), and input value(s) used to estimate the 3,000 gallons per day of potential flow through the ¼-inch hole.

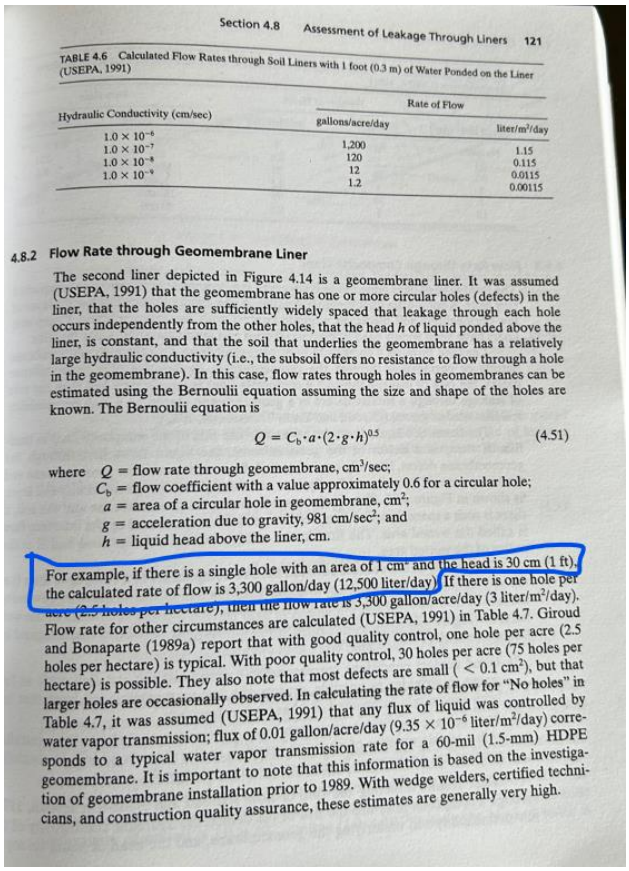
  Response:

  Geotechnical Aspects of Landfill Design and Construction, Qian, Koerner and Gray, 2002, Equation 4.51, p. 121),

  Bernoulli Equation: Q = Cb*a*(2*g*h)^0.5

  Q = Flow rate through geomembrane (cm3/s)

Cb = flow coefficient with value approximately 0.6 for a circular hole
a = area of a circular hole in geomembrane, cm2
g = acceleration due to gravity, 981 cm/s2
h = liquid head above the liner, cm
Q = (0.6)*(1 cm2)*(2*981 cm/s2*30 cm)^0.5
Q = 145.6 cm3/s = 3,322 gallons/day



Section 4.8 Assessment of Leakage Through Liners 121

TABLE 4.6 Calculated Flow Rates through Soil Liners with 1 foot (0.3 m) of Water Ponded on the Liner (USEPA, 1991)

Hydraulic Conductivity (cm/sec)	Rate of Flow	
	gallons/acre/day	liter/m²/day
1.0×10^{-6}	1,200	1.15
1.0×10^{-7}	120	0.115
1.0×10^{-8}	12	0.0115
1.0×10^{-9}	1.2	0.00115

4.8.2 Flow Rate through Geomembrane Liner

The second liner depicted in Figure 4.14 is a geomembrane liner. It was assumed (USEPA, 1991) that the geomembrane has one or more circular holes (defects) in the liner, that the holes are sufficiently widely spaced that leakage through each hole occurs independently from the other holes, that the head h of liquid ponded above the liner, is constant, and that the soil that underlies the geomembrane has a relatively large hydraulic conductivity (i.e., the subsoil offers no resistance to flow through a hole in the geomembrane). In this case, flow rates through holes in geomembranes can be estimated using the Bernoulii equation assuming the size and shape of the holes are known. The Bernoulii equation is

$$Q = C_b \cdot a \cdot (2 \cdot g \cdot h)^{0.5} \quad (4.51)$$

where Q = flow rate through geomembrane, cm³/sec;
C_b = flow coefficient with a value approximately 0.6 for a circular hole;
a = area of a circular hole in geomembrane, cm²;
g = acceleration due to gravity, 981 cm/sec²; and
h = liquid head above the liner, cm.

For example, if there is a single hole with an area of 1 cm² and the head is 30 cm (1 ft), the calculated rate of flow is 3,300 gallon/day (12,500 liter/day). If there is one hole per acre (2.5 holes per hectare), then the flow rate is 3,300 gallon/acre/day (3 liter/m²/day). Flow rate for other circumstances are calculated (USEPA, 1991) in Table 4.7. Giroud and Bonaparte (1989a) report that with good quality control, one hole per acre (2.5 holes per hectare) is typical. With poor quality control, 30 holes per acre (75 holes per hectare) is possible. They also note that most defects are small (< 0.1 cm²), but that larger holes are occasionally observed. In calculating the rate of flow for "No holes" in Table 4.7, it was assumed (USEPA, 1991) that any flux of liquid was controlled by water vapor transmission; flux of 0.01 gallon/acre/day (9.35×10^{-6} liter/m²/day) corresponds to a typical water vapor transmission rate for a 60-mil (1.5-mm) HDPE geomembrane. It is important to note that this information is based on the investigation of geomembrane installation prior to 1989. With wedge welders, certified technicians, and construction quality assurance, these estimates are generally very high.

- Provide a description of how flow meter bench testing is performed and the results of the testing.

<u>Response</u>:

Description of how flow meter bench testing is performed:

Materials Used:

- **250 gallon graduated test tank**
- **Flexible 2" cam lock hose**
- **Stop watch (timer)**

Testing Steps:

Step 1: Connect test tank to 2" pipe bypass port in pump station with flexible hose.
Step 2: Close 2" valve downstream in piping from test port (preventing flow to collection tank A) and open test port valve for discharge into the test tank.
Step 3: Record totalizer reading from the control display.
Step 4: Activate secondary pump while monitoring flow meter GPM reading on control display.
Step 5: Start timer when liquid begins to enter the test tank, this will coincide with the control beginning to display a GPM reading
Step 6: Once control reading stabilizes, record GPM
Step 7: Fill tank to 150 gallons, once reached deactivate pump and stop timer simultaneously.
Step 8: Record new totalizer figure, this should be 150 (+/-) gallons more than the original figure from Step 3.
Step 9: Calculate actual GPM by dividing 150 by the time it took to achieve 150 gallons in the test tank. Example: 150gal/2.3min=65.2GPM. This should be a similar figure that the control displayed during Step 6.
Step 10: Reopen valve downstream of the test port and discharge liquid back into the system.
Step 11: Close test port valve and disassemble test tank and hose.

Testing Results:

Recorded flow meter reading start: 1,470,665.3
Recorded GPM = 26 gpm
Filled tank to 140 gallons (All that was available to pump)
Elapsed time = 5 minutes
New Totalizer flow Reading = 1,470,791.8
Totalized flow = 1,470,665.3 – 1,470,791.8 = 126.5 total gallons
126.5 gallons / 5 minutes = 25.3 gpm // checks @ 26 gpm

- Provide the results of the camera inspection.
  Response:

Two camera inspections were performed of the secondary leachate piping for Pump House 2 (Stage VI, Phase 1). The first inspection was performed on July 18, 2024 by Precision Industrial Maintenance, LLC. Based on a desire to visually inspect further into the pipe, a second inspection was performed on July 29, 2024 by Rehabilitation, Consulting, and Construction, Inc. (RCAC). Both inspections were visual using camera systems, with variation in the wheeled systems to navigate through the pipe. Both inspections start at the solid-pipe exterior clean-out, go through the sump, along the main perforated secondary collection pipe of the landfill cell, and then upward through the solid-pipe along the interior slope of the cell. During both inspections, the cleanout ball plug in the upper portion of the solid piping was removed in order to facilitate the work.

The results of the camera inspection confirmed the integrity and function of the secondary piping, with no evidence of damage or excessive build-up of solids. Flow was observed along the bottom of the pipe, consistent with the secondary system measurements derived from the pump flowmeters. Although the secondary collection piping perforations are visible in the inspections, variations in flow are not discernable at individual perforations, which is consistent with the low quantities of flow. Flow was visible along the solid section of piping above the perforated collection piping, confirming the presence of liquids beyond the cleanout ball plug.

A copy of a written narrative provided by RCAC for their inspection work is also attached to this letter (A-10).

A DVD of the camera footage is being provided under separate cover of Sanborn Head Associates (SHA).

Attachment List

A-1 Revised Primary Liner Incident Report (7/1/23-06/12/24)

A-2 Revised Secondary Flows Incident Report (08/31/23-06/12/24)

A-3 Secondary Flow Rate Exceedances (over 100 G/A/D)

A-4 Secondary Flow Measures

A-5 Sanborn Head Evaluation, Amended 10/07/2024

A-6 Verdantas Mass Balance Analysis

A-7 Activities Completed/Planned

A-8 Site Plan

A-9 Investigation Summary

A-10 Camera Inspection Narrative

Figure 1 Base Liner Section

Figure 2 Overlay Liner Section

Figure 8 Sampling of Primary and Secondary

Attachment A-1

Incident Report Form for Solid Waste Management Facilities –

Permitted and Permit-Exempt Facilities

Waste Management Division, SWMB

RSA/Rule: Env-Sw 1005.09(c)

Instructions: Complete form in its entirety, utilizing additional pages, as necessary. Maps and diagrams are recommended for clarity. A written report is due within 5 working days of the incident / situation date. Form meets the requirements of Env-Sw 1005.09(c) for "written report" if completed in its entirety and submitted in accordance with submission timeframe requirements.

Section I – General Information		
1. Date & Time of Incident / Situation:	**2. Date of Report Submission to NHDES:**	**3. Name of Person Preparing Report:**
7/1/2023-6/12/2024 (periodic incidents)	revised 10/11/24	Kim Crosby
4. Facility Name:	**5a. Affected Area Within Facility**	**5b. Physical Address, Town / City:**
North Country Environmental Services	North Country Environmental Services	581 Trudeau Road Bethlehem, NH 03574
6. NHDES SW Permit Number:	**7. Permittee Name on Permit:**	**8. Mailing Address:**
DES-SW-SP-03-002	North Country Environmental Services	P.O.Box 9 Bethlehem,NH 03574

Section II – Parties Involved in Incident / Situation			
9. Persons:			
	Name:	**Title:**	**Affiliation:**
a.	Joe Gay	Engineer	NCES
b.	Kevin Roy	General Manager	NCES
c.	Kim Crosby	Director of Compliance	Casella
d.			
e.			
f.			

Section III – Details
10. The quantity and types of wastes and material(s) involved in the incident or situation and in the clean-up activities:
For the period beginning July 1, 2023, through June 12, 2024, leachate at times exceeded the regulatory threshold on the primary liner system. After an investigation of the levels of the pressure transducers in each sump, it was determined that the sump levels that had been previoulsy reported to NHDES were incorrect. The adjusted compliance thresholds and how the levels are calculated, was discussed during the meeting with NHDES on July 2nd. Please see the attached revised reports for the referenced time period that include the dates, pump stations, and values of primary liner hydraulic head levels and the revised regulatory thresholds for each sump as well as an evaluation of the hydraulic head level on the primary liner included in the NHDES LOD dated June 14th. Please note that the adjusted compliance thresholds reduce the number of occasions where NCES experienced hydraulic head elevations on the primary liner that were greater than 12 inches from 450 to 417.

11. Measures employed to contain releases caused by the incident or situation:

No releases to the environment occurred.

12. Assessment of actual or potential hazards to the environment, safety and human health related to the incident:

An assessment of actual or potential hazards to the environment, safety & human health was conducted and determined to be absent. The accumulation of leachate on the primary liner creates a highly attenuated hazard (meaning potential for harm) to the environment in the sense that increased hydraulic head can increase the chance of a leak through the liner if there is an imperfection in the liner. The hazard is very remote, however, because not only would there have to be an imperfection that escaped detection upon liner installation and inspection and sufficient head to force leachate through the imperfection, but any such leachate would be contained by the secondary liner where there is typically no hydraulic head. Increased flows in the secondary system from construction-related infiltration of stormwater or dewatering would also dilute contaminants in any such leachate beyond non-detectable levels after which it would be removed from the secondary liner system. In short, the redundancies incorporated in the design of modern landfills by rule have successfully eliminated releases to the environment from the liner systems for all practical purposes.

13. Measures the permittee has or intends to apply to reduce, eliminate, and prevent a recurrence of the incident or situation:

NCES has and is in the process of taking the following measures to reduce, eliminate and prevent recurrence:

1. NCES is submitting a Type II permit modification to NHDES on June 21, 2024 to extend the Facility's operating hours for the ability to haul leachate beyond the current permitted hours.

2. NCES has obtained disposal capacity at additional wastewater treatment facilities.

3. NCES has contracted with additional haulers to haul more leachate off-site.

4. NCES has evaluated the level of the transducers in all of the sumps and has re-calculated the actual depth of leachate on the liner that occurred during this time period using the known transducer levels (see attached drawings prepapred by SHA).

5. NCES has requested a meeting with NHDES to discuss how levels are being reported at the site and to establish appropriate reporting of such levels.

6. NCES will report exceedances using the NHDES Incident Report Form within the time prescribed by rule.

7. As observed by DES staff on June 11, 2024, NCES deployed temporary scrim in the new cell on April 22, 2024 to minimize stormwater infiltration into the leachate collection system until a fluff layer was completed (in progress). In addition, NCES has placed additional intermediate cover, hydroseeded areas, and incorporated additional stormwater controls to minimize stormwater infiltration into the landfill. NCES is in the process of capping approximately six acres which will reduce the amount of leachate generated at the site (ongoing).

8. NCES will provide additional training on leachate management systems, operations and the requirements of the rules to the Operations Team on July 2024.

In addition to the action items listed above, site wide calibration of sump levels and telemetry adjustments are being made and cleaning of the leachate collection systems will be completed by the end of June.

14. If measures not completed by time of report submission, expected date of completion:	See above

Section IV – Signatures		
15a. Person Preparing Report:		
Name:	**Title / Affiliation:**	**Signature:**
Kim Crosby	Director of Compliance	Kim Crosby
Phone Number:		**Email Address:**
802-585-5442		kimberly.crosby@casella.com

15b. Permittee:		
Name:	**Title / Affiliation:**	**Signature:**
Kevin Roy	General Manager/Casella	
Phone Number:		**Email Address:**
603-361-6477		Kevin.Roy@Casella.com

Form Submittal Instructions:
Submit the completed report in PDF via email to SolidWasteInfo@des.nh.gov.

Attachment to Incident Report A-1

Evaluation of NCES and NHDES Primary Sump Levels									
	Stage III			Stage IV Phase I			Stage IV Phase II		
	As Previously Reported for Q2-2024 (April)		Updated Actual Q2-2024 (April)	As Previously Reported for Q2-2024 (April)		Updated Actual Q2-2024 (April)	As Previously Reported for Q2-2024 (April)		Updated Actual Q2-2024 (April)
Regulatory Threshold Measured from Pressure Transducer (in)	36	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	45	35.4	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	44.4	34.08	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	43.08
Date	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)
4/1/2024	100.000	76.000	100.000	100.000	76.600	100.000	55.425	33.345	55.425
4/2/2024	100.000	76.000	100.000	100.000	76.600	100.000	64.895	42.815	64.895
4/3/2024	100.000	76.000	100.000	0.000	-23.400	0.000	55.679	33.599	55.679
4/4/2024	100.000	76.000	100.000	0.000	-23.400	0.000	44.306	22.226	44.306
4/5/2024	100.000	76.000	100.000	3.053	-20.347	3.053	54.791	32.711	54.791
4/6/2024	100.000	76.000	100.000	100.000	76.600	100.000	60.076	37.996	60.076
4/7/2024	100.000	76.000	100.000	10.470	-12.930	10.470	65.487	43.407	65.487
4/8/2024	100.000	76.000	100.000	100.000	76.600	100.000	72.040	49.960	72.040
4/9/2024	100.000	76.000	100.000	100.000	76.600	100.000	71.279	49.199	71.279
4/10/2024	100.000	76.000	100.000	100.000	76.600	100.000	66.417	44.337	66.417
4/11/2024	100.000	76.000	100.000	100.000	76.600	100.000	62.105	40.025	62.105
4/12/2024	100.000	76.000	100.000	100.000	76.600	100.000	61.175	39.095	61.175
4/13/2024	100.000	76.000	100.000	100.000	76.600	100.000	61.598	39.518	61.598
4/14/2024	100.000	76.000	100.000	100.000	76.600	100.000	64.853	42.773	64.853
4/15/2024	100.000	76.000	100.000	100.000	76.600	100.000	75.676	53.596	75.676
4/16/2024	100.000	76.000	100.000	100.000	76.600	100.000	66.756	44.676	66.756
4/17/2024	100.000	76.000	100.000	100.000	76.600	100.000	74.873	52.793	74.873
4/18/2024	100.000	76.000	100.000	100.000	76.600	100.000	84.808	62.728	84.808
4/19/2024	100.000	76.000	100.000	100.000	76.600	100.000	96.646	74.566	96.646
4/20/2024	100.000	76.000	100.000	100.000	76.600	100.000	107.046	84.966	107.046
4/21/2024	100.000	76.000	100.000	100.000	76.600	100.000	117.742	95.662	117.742
4/22/2024	100.000	76.000	100.000	100.000	76.600	100.000	126.113	104.033	126.113
4/23/2024	100.000	76.000	100.000	100.000	76.600	100.000	130.002	107.922	130.002
4/24/2024	100.000	76.000	100.000	100.000	76.600	100.000	138.500	116.420	138.500
4/25/2024	100.000	76.000	100.000	100.000	76.600	100.000	138.500	116.420	138.500
4/26/2024	100.000	76.000	100.000	100.000	76.600	100.000	118.883	96.803	118.883
4/27/2024	100.000	76.000	100.000	100.000	76.600	100.000	95.716	73.636	95.716
4/28/2024	100.000	76.000	100.000	100.000	76.600	100.000	69.546	47.466	69.546
4/29/2024	100.000	76.000	100.000	100.000	76.600	100.000	68.531	46.451	68.531
4/30/2024	100.000	76.000	100.000	100.000	76.600	100.000	44.983	22.903	44.983
Total Instances	30	30	30	26	26	26	30	30	30

Notes:
1. The highlighted cells represent the instances where the head-on-liner threshold was exceeded.
2. Data represents daily readings from 00:00 within the Telemetry system. For instances when the data was unavailable at 00:00 the nearest available reading was used from the same day.

Evaluation of NCES and NHDES Primary Sump Levels									
	Stage III			Stage IV Phase I			Stage IV Phase II		
	As Previously Reported for Q2-2024 (May)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q2-2024 (May)	As Previously Reported for Q2-2024 (May)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q2-2024 (May)	As Previously Reported for Q2-2024 (May)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q2-2024 (May)
Regulatory Threshold Measured from Pressure Transducer (in)	36		45	35.4		44.4	34.08		43.08
Date	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)
5/1/2024	100.000	76.000	100.000	100.000	76.600	100.000	34.879	12.799	34.879
5/2/2024	100.000	76.000	100.000	100.000	76.600	100.000	32.131	10.051	32.131
5/3/2024	100.000	76.000	100.000	100.000	76.600	100.000	28.918	6.838	28.918
5/4/2024	100.000	76.000	100.000	100.000	76.600	100.000	19.913	-2.167	19.913
5/5/2024	100.000	76.000	100.000	77.564	54.164	77.564	27.269	5.189	27.269
5/6/2024	100.000	76.000	100.000	98.962	75.562	98.962	19.025	-3.055	19.025
5/7/2024	100.000	76.000	100.000	58.578	35.178	58.578	17.165	-4.915	17.165
5/8/2024	100.000	76.000	100.000	54.792	31.392	54.792	15.220	-6.860	15.220
5/9/2024	100.000	76.000	100.000	14.866	-8.534	14.866	16.869	-5.211	16.869
5/10/2024	86.661	62.661	86.661	12.912	-10.488	12.912	12.345	-9.735	12.345
5/11/2024	86.783	62.783	86.783	14.896	-8.504	14.896	13.360	-8.720	13.360
5/12/2024	88.553	64.553	88.553	18.162	-5.238	18.162	22.745	0.665	22.745
5/13/2024	83.486	59.486	83.486	10.562	-12.838	10.562	24.225	2.145	24.225
5/14/2024	100.000	76.000	100.000	11.508	-11.892	11.508	23.844	1.764	23.844
5/15/2024	100.000	76.000	100.000	47.253	23.853	47.253	30.693	8.613	30.693
5/16/2024	83.150	59.150	83.150	10.836	-12.564	10.836	17.418	-4.662	17.418
5/17/2024	100.000	76.000	100.000	42.827	19.427	42.827	17.503	-4.577	17.503
5/18/2024	100.000	76.000	100.000	45.360	21.960	45.360	15.685	-6.395	15.685
5/19/2024	100.000	76.000	100.000	42.857	19.457	42.857	16.699	-5.381	16.699
5/20/2024	100.000	76.000	100.000	51.923	28.523	51.923	20.293	-1.787	20.293
5/21/2024	100.000	76.000	100.000	51.465	28.065	51.465	19.913	-2.167	19.913
5/22/2024	100.000	76.000	100.000	51.618	28.218	51.618	19.025	-3.055	19.025
5/23/2024	100.000	76.000	100.000	0.000	-23.400	0.000	18.813	-3.267	18.813
5/24/2024	98.840	74.840	98.840	0.000	-23.400	0.000	17.291	-4.789	17.291
5/25/2024	100.000	76.000	100.000	73.565	50.165	73.565	17.460	-4.620	17.460
5/26/2024	100.000	76.000	100.000	67.125	43.725	67.125	15.304	-6.776	15.304
5/27/2024	100.000	76.000	100.000	74.939	51.539	74.939	21.392	-0.688	21.392
5/28/2024	100.000	76.000	100.000	66.728	43.328	66.728	17.038	-5.042	17.038
5/29/2024	100.000	76.000	100.000	65.446	42.046	65.446	16.742	-5.338	16.742
5/30/2024	100.000	76.000	100.000	63.858	40.458	63.858	17.207	-4.873	17.207
5/31/2024	100.000	76.000	100.000	60.043	36.643	60.043	17.207	-4.873	17.207
Total Instances	31	31	31	22	22	20	1	1	0

Notes:
1. The highlighted cells represent the instances where the head-on-liner threshold was exceeded.
2. Data represents daily readings from 00:00 within the Telemetry system. For instances when the data was unavailable at 00:00 the nearest available reading was used from the same day.

Evaluation of NCES and NHDES Primary Sump Levels									
	Stage III			Stage IV Phase I			Stage IV Phase II		
	As Previously Reported for Q2-2024 (June)		Updated Actual Q2-2024 (June)	As Previously Reported for Q2-2024 (June)		Updated Actual Q2-2024 (June)	As Previously Reported for Q2-2024 (June)		Updated Actual Q2-2024 (June)
Regulatory Threshold Measured from Pressure Transducer (in)	36	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	45	35.4	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	44.4	34.08	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	43.08
Date	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)
6/1/2024	100.000	76.000	91.300	59.585	36.185	8.425	16.911	-5.169	15.347
6/2/2024	90.232	66.232	100.000	11.661	-11.739	58.455	15.558	-6.522	15.304
6/3/2024	100.000	76.000	85.501	61.355	37.955	17.033	16.784	-5.296	15.431
6/4/2024	89.591	65.591	88.431	13.645	-9.755	8.822	15.135	-6.945	15.135
6/5/2024	73.077	49.077	73.077	12.546	-10.854	12.546	14.966	-7.114	14.966
6/6/2024	9.280	-14.720	9.280	13.614	-9.786	13.614	1.860	-20.220	1.860
6/7/2024	18.987	-5.013	18.987	5.830	-17.570	5.830	7.187	-14.893	7.187
6/8/2024	13.797	-10.203	13.797	7.662	-15.738	7.662	10.738	-11.342	10.738
6/9/2024	2.442	-21.558	2.442	18.620	-4.780	18.620	12.725	-9.355	12.725
6/10/2024	19.750	-4.250	19.750	9.249	-14.151	9.249	14.966	-7.114	14.966
6/11/2024	20.085	-3.915	20.085	8.364	-15.036	8.364	12.979	-9.101	12.979
6/12/2024	10.928	-13.072	10.928	5.495	-17.905	5.495	11.246	-10.834	11.246
6/13/2024									
6/14/2024									
6/15/2024									
6/16/2024									
6/17/2024									
6/18/2024									
6/19/2024									
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6/23/2024									
6/24/2024									
6/25/2024									
6/26/2024									
6/27/2024									
6/28/2024									
6/29/2024									
6/30/2024									
Total Instances	5	5	5	2	2	1	0	0	0

Notes:

1. The highlighted cells represent the instances where the head-on-liner threshold was exceeded.
2. Previously reported data from 6/1/24 to 6/4/24 represents daily readings from 00:00 and data from 6/5/24 to 6/12/2024 represents daily readings from 14:30 within the Telemetry system.
3. Updated Actual Q2-2024 (June) data represents daily readings from 14:30 within the Telemetry system.

Attachment to Incident Report A-1

Evaluation of NCES and NHDES Primary Sump Levels									
	Stage III			Stage IV Phase I			Stage IV Phase II		
	As Previously Reported for Q1-2024 (January)		Updated Actual Q1-2024 (January)	As Previously Reported for Q1-2024 (January)		Updated Actual Q1-2024 (January)	As Previously Reported for Q1-2024 (January)		Updated Actual Q1-2024 (January)
Regulatory Threshold Measured from Pressure Transducer (in)	36	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	45	35.4	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	44.4	34.08	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	43.08
Date	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)
1/1/2024	100.000	76.000	100.000	90.446	67.046	90.446	49.084	27.004	49.084
1/2/2024	100.000	76.000	100.000	100.000	76.600	100.000	58.300	36.220	58.300
1/3/2024	100.000	76.000	100.000	97.985	74.585	97.985	63.839	41.759	63.839
1/4/2024	100.000	76.000	100.000	88.400	65.000	88.400	62.274	40.194	62.274
1/5/2024	100.000	76.000	100.000	13.980	-9.420	13.980	70.645	48.565	70.645
1/6/2024	100.000	76.000	100.000	11.996	-11.404	11.996	36.908	14.828	36.908
1/7/2024	100.000	76.000	100.000	90.263	66.863	90.263	42.573	20.493	42.573
1/8/2024	100.000	76.000	100.000	100.000	76.600	100.000	51.451	29.371	51.451
1/9/2024	100.000	76.000	100.000	93.468	70.068	93.468	47.054	24.974	47.054
1/10/2024	100.000	76.000	100.000	86.325	62.925	86.325	59.103	37.023	59.103
1/11/2024	100.000	76.000	100.000	13.797	-9.603	13.797	75.676	53.596	75.676
1/12/2024	100.000	76.000	100.000	83.211	59.811	83.211	57.920	35.840	57.920
1/13/2024	100.000	76.000	100.000	92.033	68.633	92.033	57.286	35.206	57.286
1/14/2024	0.000	-24.000	0.000	100.000	76.600	100.000	72.632	50.552	72.632
1/15/2024	0.000	-24.000	0.000	100.000	76.600	100.000	79.566	57.486	79.566
1/16/2024	57.875	33.875	57.875	100.000	76.600	100.000	77.452	55.372	77.452
1/17/2024	100.000	76.000	100.000	99.328	75.928	99.328	90.346	68.266	90.346
1/18/2024	100.000	76.000	100.000	79.396	55.996	79.396	90.177	68.097	90.177
1/19/2024	52.717	28.717	52.717	17.491	-5.909	17.491	96.688	74.608	96.688
1/20/2024	100.000	76.000	100.000	28.907	5.507	28.907	69.842	47.762	69.842
1/21/2024	100.000	76.000	100.000	92.582	69.182	92.582	86.161	64.081	86.161
1/22/2024	100.000	76.000	100.000	100.000	76.600	100.000	91.150	69.070	91.150
1/23/2024	100.000	76.000	100.000	100.000	76.600	100.000	73.266	51.186	73.266
1/24/2024	100.000	76.000	100.000	87.149	63.749	87.149	85.400	63.320	85.400
1/25/2024	100.000	76.000	100.000	39.225	15.825	39.225	96.857	74.777	96.857
1/26/2024	100.000	76.000	100.000	84.951	61.551	84.951	57.793	35.713	57.793
1/27/2024	100.000	76.000	100.000	88.187	64.787	88.187	43.123	21.043	43.123
1/28/2024	100.000	76.000	100.000	98.382	74.982	98.382	47.139	25.059	47.139
1/29/2024	100.000	76.000	100.000	100.000	76.600	100.000	66.460	44.380	66.460
1/30/2024	100.000	76.000	100.000	100.000	76.600	100.000	44.264	22.184	44.264
1/31/2024	100.000	76.000	100.000	88.736	65.336	88.736	43.250	21.170	43.250
Total Instances	**29**	**29**	**29**	**26**	**26**	**25**	**31**	**31**	**29**

Notes:
1. The highlighted cells represent the instances where the head-on-liner threshold was exceeded.
2. Data represents daily readings from 00:00 within the Telemetry system. For instances when the data was unavailable at 00:00 the nearest available reading was used from the same day.
3. Data for Stage III, Stage IV Phase I, and Stage IV Phase II on 1/14/2024 is from 06:30.

Evaluation of NCES and NHDES Primary Sump Levels									
	Stage III			Stage IV Phase I			Stage IV Phase II		
	As Previously Reported for Q1-2024 (February)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q1-2024 (February)	As Previously Reported for Q1-2024 (February)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q1-2024 (February)	As Previously Reported for Q1-2024 (February)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q1-2024 (February)
Regulatory Threshold Measured from Pressure Transducer (in)	36		45	35.4		44.4	34.08		43.08
Date	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)
2/1/2024	100.000	76.000	100.000	82.662	59.262	82.662	34.710	12.630	34.710
2/2/2024	86.020	62.020	86.020	11.416	-11.984	11.416	34.836	12.756	34.836
2/3/2024	91.667	67.667	91.667	15.110	-8.290	15.110	20.504	-1.576	20.504
2/4/2024	99.481	75.481	99.481	10.806	-12.594	10.806	20.674	-1.406	20.674
2/5/2024	100.000	76.000	100.000	89.408	66.008	89.408	24.690	2.610	24.690
2/6/2024	100.000	76.000	100.000	88.523	65.123	88.523	24.605	2.525	24.605
2/7/2024	100.000	76.000	100.000	82.967	59.567	82.967	23.717	1.637	23.717
2/8/2024	100.000	76.000	100.000	75.061	51.661	75.061	21.857	-0.223	21.857
2/9/2024	82.204	58.204	82.204	17.613	-5.787	17.613	20.674	-1.406	20.674
2/10/2024	87.576	63.576	87.576	13.706	-9.694	13.706	20.082	-1.998	20.082
2/11/2024	100.000	76.000	100.000	80.708	57.308	80.708	21.857	-0.223	21.857
2/12/2024	100.000	76.000	100.000	89.896	66.496	89.896	25.620	3.540	25.620
2/13/2024	100.000	76.000	100.000	84.096	60.696	84.096	23.337	1.257	23.337
2/14/2024	100.000	76.000	100.000	77.961	54.561	77.961	22.322	0.242	22.322
2/15/2024	83.578	59.578	83.578	17.094	-6.306	17.094	20.969	-1.111	20.969
2/16/2024	89.377	65.377	89.377	17.308	-6.092	17.308	20.124	-1.956	20.124
2/17/2024	100.000	76.000	100.000	82.326	58.926	82.326	22.322	0.242	22.322
2/18/2024	100.000	76.000	100.000	85.867	62.467	85.867	24.478	2.398	24.478
2/19/2024	100.000	76.000	100.000	93.101	69.701	93.101	28.537	6.457	28.537
2/20/2024	100.000	76.000	100.000	97.741	74.341	97.741	32.088	10.008	32.088
2/21/2024	100.000	76.000	100.000	97.619	74.219	97.619	25.831	3.751	25.831
2/22/2024	100.000	76.000	100.000	94.170	70.770	94.170	16.361	-5.719	16.361
2/23/2024	100.000	76.000	100.000	88.278	64.878	88.278	19.786	-2.294	19.786
2/24/2024	100.000	76.000	100.000	81.716	58.316	81.716	31.031	8.951	31.031
2/25/2024	100.000	76.000	100.000	82.265	58.865	82.265	36.443	14.363	36.443
2/26/2024	100.000	76.000	100.000	88.675	65.275	88.675	40.206	18.126	40.206
2/27/2024	100.000	76.000	100.000	83.303	59.903	83.303	34.414	12.334	34.414
2/28/2024	100.000	76.000	100.000	40.537	17.137	40.537	18.729	-3.351	18.729
2/29/2024	92.582	68.582	92.582	12.729	-10.671	12.729	18.982	-3.098	18.982
Total Instances	29	29	29	21	21	20	5	5	0

Notes:
1. The highlighted cells represent the instances where the head-on-liner threshold was exceeded.
2. Data represents daily readings from 00:00 within the Telemetry system. For instances when the data was unavailable at 00:00 the nearest available reading was used from the same day.

Evaluation of NCES and NHDES Primary Sump Levels									
	Stage III			Stage IV Phase I			Stage IV Phase II		
	As Previously Reported for Q1-2024 (March)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q1-2024 (March)	As Previously Reported for Q1-2024 (March)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q1-2024 (March)	As Previously Reported for Q1-2024 (March)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q1-2024 (March)
Regulatory Threshold Measured from Pressure Transducer (in)	36		45	35.4		44.4	34.08		43.08
Date	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)
3/1/2023	88.736	64.736	88.736	14.530	-8.870	14.530	15.812	-6.268	15.812
3/2/2023	83.394	59.394	83.394	13.492	-9.908	13.492	17.630	-4.450	17.630
3/3/2023	88.736	64.736	88.736	9.707	-13.693	9.707	16.404	-5.676	16.404
3/4/2023	78.358	54.358	78.358	16.331	-7.069	16.331	17.376	-4.704	17.376
3/5/2023	99.847	75.847	99.847	15.934	-7.466	15.934	16.826	-5.254	16.826
3/6/2023	91.514	67.514	91.514	9.676	-13.724	9.676	17.376	-4.704	17.376
3/7/2023	81.716	57.716	81.716	17.277	-6.123	17.277	17.630	-4.450	17.630
3/8/2023	81.532	57.532	81.532	15.995	-7.405	15.995	16.361	-5.719	16.361
3/9/2023	100.000	76.000	100.000	77.228	53.828	77.228	17.587	-4.493	17.587
3/10/2023	100.000	76.000	100.000	92.369	68.969	92.369	33.822	11.742	33.822
3/11/2023	100.000	76.000	100.000	100.000	76.600	100.000	40.882	18.802	40.882
3/12/2023	100.000	76.000	100.000	100.000	76.600	100.000	39.656	17.576	39.656
3/13/2023	100.000	76.000	100.000	100.000	76.600	100.000	42.108	20.028	42.108
3/14/2023	100.000	76.000	100.000	100.000	76.600	100.000	49.295	27.215	49.295
3/15/2023	100.000	76.000	100.000	100.000	76.600	100.000	57.962	35.882	57.962
3/16/2023	100.000	76.000	100.000	100.000	76.600	100.000	70.772	48.692	70.772
3/17/2023	100.000	76.000	100.000	100.000	76.600	100.000	83.582	61.502	83.582
3/18/2023	100.000	76.000	100.000	100.000	76.600	100.000	91.107	69.027	91.107
3/19/2023	100.000	76.000	100.000	100.000	76.600	100.000	93.898	71.818	93.898
3/20/2023	100.000	76.000	100.000	100.000	76.600	100.000	77.156	55.076	77.156
3/21/2023	100.000	76.000	100.000	100.000	76.600	100.000	66.121	44.041	66.121
3/22/2023	100.000	76.000	100.000	100.000	76.600	100.000	52.339	30.259	52.339
3/23/2023	100.000	76.000	100.000	100.000	76.600	100.000	47.097	25.017	47.097
3/24/2023	100.000	76.000	100.000	8.883	-14.517	8.883	53.903	31.823	53.903
3/25/2023	100.000	76.000	100.000	20.085	-3.315	20.085	59.273	37.193	59.273
3/26/2023	100.000	76.000	100.000	11.477	-11.923	11.477	50.606	28.526	50.606
3/27/2023	100.000	76.000	100.000	11.905	-11.495	11.905	31.962	9.882	31.962
3/28/2023	92.521	68.521	92.521	15.110	-8.290	15.110	17.545	-4.535	17.545
3/29/2023	100.000	76.000	100.000	11.508	-11.892	11.508	37.035	14.955	37.035
3/30/2023	100.000	76.000	100.000	17.094	-6.306	17.094	34.836	12.756	34.836
3/31/2023	100.000	76.000	100.000	6.563	-16.837	6.563	49.084	27.004	49.084
Total Instances	31	31	31	15	15	15	19	19	14

Notes:
1. The highlighted cells represent the instances where the head-on-liner threshold was exceeded.
2. Data represents daily readings from 00:00 within the Telemetry system. For instances when the data was unavailable at 00:00 the nearest available reading was used from the same day.

Attachment to Incident Report A-1

Evaluation of NCES and NHDES Primary Sump Levels									
	Stage III			Stage IV Phase I			Stage IV Phase II		
	As Previously Reported for Q3-2023 (July)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q3-2023 (July)	As Previously Reported for Q3-2023 (July)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q3-2023 (July)	As Previously Reported for Q3-2023 (July)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q3-2023 (July)
Regulatory Threshold Measured from Pressure Transducer (in)	36		45	35.4		44.4	34.08		43.08
Date	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)
7/1/2023	15.415	-8.585	15.415	17.094	-6.306	17.094	21.942	-0.138	21.942
7/2/2023	24.054	0.054	24.054	15.476	-7.924	15.476	16.277	-5.803	16.277
7/3/2023	20.330	-3.670	20.330	17.888	-5.512	17.888	18.179	-3.901	18.179
7/4/2023	17.094	-6.906	17.094	14.164	-9.236	14.164	21.561	-0.519	21.561
7/5/2023	No Data Available	-	No Data Available	No Data Available	-	No Data Available	17.503	-4.577	17.503
7/6/2023	23.077	-0.923	23.077	18.010	-5.390	18.010	22.153	0.073	22.153
7/7/2023	32.631	8.631	32.631	17.613	-5.787	17.613	16.657	-5.423	16.657
7/8/2023	33.761	9.761	33.761	13.034	-10.366	13.034	17.291	-4.789	17.291
7/9/2023	17.552	-6.448	17.552	14.042	-9.358	14.042	17.630	-4.450	17.630
7/10/2023	43.864	19.864	43.864	14.560	-8.840	14.560	17.756	-4.324	17.756
7/11/2023	10.562	-13.438	10.562	17.979	-5.421	17.979	21.900	-0.180	21.900
7/12/2023	19.719	-4.281	19.719	17.247	-6.153	17.247	16.911	-5.169	16.911
7/13/2023	15.476	-8.524	15.476	8.059	-15.341	8.059	18.264	-3.816	18.264
7/14/2023	6.349	-17.651	6.349	16.148	-7.252	16.148	16.108	-5.972	16.108
7/15/2023	27.991	3.991	27.991	10.165	-13.235	10.165	19.236	-2.844	19.236
7/16/2023	9.005	-14.995	9.005	14.011	-9.389	14.011	16.234	-5.846	16.234
7/17/2023	31.044	7.044	31.044	16.178	-7.222	16.178	15.389	-6.691	15.389
7/18/2023	24.481	0.481	24.481	15.293	-8.107	15.293	16.404	-5.676	16.404
7/19/2023	35.012	11.012	35.012	14.316	-9.084	14.316	17.883	-4.197	17.883
7/20/2023	6.654	-17.346	6.654	11.966	-11.434	11.966	16.615	-5.465	16.615
7/21/2023	100.000	76.000	100.000	68.559	45.159	68.559	17.038	-5.042	17.038
7/22/2023	No Data Available	-	No Data Available	No Data Available	-	No Data Available	18.306	-3.774	18.306
7/23/2023	No Data Available	-	No Data Available	No Data Available	-	No Data Available	15.896	-6.184	15.896
7/24/2023	10.195	-13.805	10.195	No Data Available	-	No Data Available	16.234	-5.846	16.234
7/25/2023	41.117	17.117	41.117	No Data Available	-	No Data Available	21.773	-0.307	21.773
7/26/2023	23.901	-0.099	23.901	10.836	-12.564	10.836	17.883	-4.197	17.883
7/27/2023	41.270	17.270	41.270	8.852	-14.548	8.852	17.080	-5.000	17.080
7/28/2023	13.492	-10.508	13.492	10.012	-13.388	10.012	16.234	-5.846	16.234
7/29/2023	12.821	-11.179	12.821	13.614	-9.786	13.614	18.560	-3.520	18.560
7/30/2023	36.874	12.874	36.874	15.812	-7.588	15.812	22.322	0.242	22.322
7/31/2023	31.685	7.685	31.685	12.454	-10.946	12.454	21.815	-0.265	21.815
Total Instances	**5**	**5**	**1**	**1**	**1**	**1**	**0**	**0**	**0**

Notes:

1. The highlighted cells represent the instances where the head-on-liner threshold was exceeded.
2. Data represents daily readings from 07:30 within the LFGMS Telemetry system. For instances when the data was unavailable at 07:30 the nearest available reading was used from the same day.
3. Data for Stage IV Phase I and Stage V on 7/6/2023 is from 10:05.
4. Data for Stage III on 7/6/2023 is from 11:55.
5. Data for Stage IV Phase I and Stage V on 7/20/2023 is from 08:05.
6. Data for Stage III on 7/20/2023 is from 08:10.
7. Data for Stage III, Stage IV Phase I, and Stage V on 7/21/2023 is from 11:55.
8. Data for Stage III on 7/24/2023 is from 13:40.
9. Data for Stage III on 7/26/2023 is from 10:50.
10. Data is unavailable in the telemetry database on 7/5/2023 for Stage III, Stage IV Phase I, and Stage V.
11. Data is unavailable in the telemetry database on 7/22/2023 and 7/23/2023 for Stage III.
12. Data is unavailable in the telemetry database from from 7/22/2023 through 7/25/2023 for Stage IV Phase I and Stage V.

Evaluation of NCES and NHDES Primary Sump Levels									
	Stage III			Stage IV Phase I			Stage IV Phase II		
	As Previously Reported for Q3-2023 (August)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q3-2023 (August)	As Previously Reported for Q3-2023 (August)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q3-2023 (August)	As Previously Reported for Q3-2023 (August)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q3-2023 (August)
Regulatory Threshold Measured from Pressure Transducer (in)	36		45	35.4		44.4	34.08		43.08
Date	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)
8/1/2023	37.241	13.241	37.241	17.705	-5.695	17.705	21.773	-0.307	21.773
8/2/2023	16.422	-7.578	16.422	11.966	-11.434	11.966	21.857	-0.223	21.857
8/3/2023	39.316	15.316	39.316	15.934	-7.466	15.934	17.376	-4.704	17.376
8/4/2023	16.606	-7.394	16.606	8.394	-15.006	8.394	17.207	-4.873	17.207
8/5/2023	20.971	-3.029	20.971	17.125	-6.275	17.125	22.407	0.327	22.407
8/6/2023	26.679	2.679	26.679	15.507	-7.893	15.507	17.080	-5.000	17.080
8/7/2023	25.214	1.214	25.214	10.867	-12.533	10.867	22.069	-0.011	22.069
8/8/2023	14.683	-9.317	14.683	15.079	-8.321	15.079	20.885	-1.195	20.885
8/9/2023	41.667	17.667	41.667	10.989	-12.411	10.989	18.306	-3.774	18.306
8/10/2023	7.418	-16.582	7.418	14.499	-8.901	14.499	17.376	-4.704	17.376
8/11/2023	32.540	8.540	32.540	15.171	-8.229	15.171	21.308	-0.772	21.308
8/12/2023	33.516	9.516	33.516	17.949	-5.451	17.949	21.900	-0.180	21.900
8/13/2023	28.571	4.571	28.571	16.026	-7.374	16.026	18.602	-3.478	18.602
8/14/2023	9.524	-14.476	9.524	14.042	-9.358	14.042	21.773	-0.307	21.773
8/15/2023	17.430	-6.570	17.430	11.203	-12.197	11.203	16.530	-5.550	16.530
8/16/2023	14.866	-9.134	14.866	11.111	-12.289	11.111	17.841	-4.239	17.841
8/17/2023	30.922	6.922	30.922	15.110	-8.290	15.110	21.054	-1.026	21.054
8/18/2023	41.911	17.911	41.911	12.393	-11.007	12.393	17.756	-4.324	17.756
8/19/2023	100.000	76.000	100.000	72.466	49.066	72.466	18.179	-3.901	18.179
8/20/2023	100.000	76.000	100.000	84.707	61.307	84.707	24.478	2.398	24.478
8/21/2023	100.000	76.000	100.000	90.110	66.710	90.110	30.270	8.190	30.270
8/22/2023	11.447	-12.553	11.447	14.988	-8.412	14.988	18.095	-3.985	18.095
8/23/2023	22.863	-1.137	22.863	17.308	-6.092	17.308	15.812	-6.268	15.812
8/24/2023	8.272	-15.728	8.272	14.011	-9.389	14.011	18.179	-3.901	18.179
8/25/2023	No Data Available	-	No Data Available	11.783	-11.617	11.783	16.573	-5.507	16.573
8/26/2023	No Data Available	-	No Data Available	12.729	-10.671	12.729	17.883	-4.197	17.883
8/27/2023	No Data Available	-	No Data Available	11.874	-11.526	11.874	17.418	-4.662	17.418
8/28/2023	100.000	76.000	100.000	11.020	-12.380	11.020	17.418	-4.662	17.418
8/29/2023	100.000	76.000	100.000	16.270	-7.130	16.270	17.376	-4.704	17.376
8/30/2023	100.000	76.000	100.000	16.636	-6.764	16.636	17.672	-4.408	17.672
8/31/2023	100.000	76.000	100.000	16.667	-6.733	16.667	17.503	-4.577	17.503
Total Instances	**11**	**11**	**7**	**3**	**3**	**3**	**0**	**0**	**0**

Notes:

1. The highlighted cells represent the instances where the head-on-liner threshold was exceeded.
2. Data represents daily readings from 07:30 within the LFGMS Telemetry system. For instances when the data was unavailable at 07:30 the nearest available reading was used from the same day.
3. Data for Stage III on 8/11/2023 is from 13:35.
4. Data for Stage IV Phase I and Stage V on 8/11/2023 is from 13:40.
5. Data for Stage III on 8/28/2023 is from 10:05.
6. Data for Stage III on 8/29/2023 is from 16:25.
7. Data for Stage IV Phase I and Stage V on 8/29/2023 is from 08:20.
8. Data for Stage III on 8/30/2023 is from 10:45.
9. Data is unavailable in the telemetry database from 8/25/2023 through 8/27/2023 for Stage III.

Evaluation of NCES and NHDES Primary Sump Levels									
	Stage III			Stage IV Phase I			Stage IV Phase II		
	As Previously Reported for Q3-2023 (September)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q3-2023 (September)	As Previously Reported for Q3-2023 (September)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q3-2023 (September)	As Previously Reported for Q3-2023 (September)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q3-2023 (September)
Regulatory Threshold Measured from Pressure Transducer (in)	36		45	35.4		44.4	34.08		43.08
Date	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)
9/1/2023	100.000	76.000	100.000	17.613	-5.787	17.613	16.530	-5.550	16.530
9/2/2023	34.921	10.921	34.921	7.845	-15.555	7.845	17.376	-4.704	17.376
9/3/2023	30.617	6.617	30.617	10.867	-12.533	10.867	17.756	-4.324	17.756
9/4/2023	No Data Available	-	No Data Available	13.156	-10.244	13.156	22.196	0.116	22.196
9/5/2023	100.000	76.000	100.000	13.645	-9.755	13.645	17.249	-4.831	17.249
9/6/2023	No Data Available	-	No Data Available	13.309	-10.091	13.309	21.265	-0.815	21.265
9/7/2023	19.902	-4.098	19.902	15.842	-7.558	15.842	18.052	-4.028	18.052
9/8/2023	100.000	76.000	100.000	15.476	-7.924	15.476	16.911	-5.169	16.911
9/9/2023	No Data Available	-	No Data Available	17.491	-5.909	17.491	20.969	-1.111	20.969
9/10/2023	No Data Available	-	No Data Available	15.385	-8.015	15.385	21.857	-0.223	21.857
9/11/2023	17.186	-6.814	17.186	No Data Available	-	No Data Available	18.856	-3.224	18.856
9/12/2023	100.000	76.000	100.000	12.332	-11.068	12.332	17.038	-5.042	17.038
9/13/2023	100.000	76.000	100.000	16.636	-6.764	16.636	16.277	-5.803	16.277
9/14/2023	100.000	76.000	100.000	14.133	-9.267	14.133	17.630	-4.450	17.630
9/15/2023	No Data Available	-	No Data Available	8.639	-14.761	8.639	16.108	-5.972	16.108
9/16/2023	No Data Available	-	No Data Available	13.065	-10.335	13.065	15.854	-6.226	15.854
9/17/2023	No Data Available	-	No Data Available	12.302	-11.098	12.302	18.391	-3.689	18.391
9/18/2023	100.000	76.000	100.000	14.621	-8.779	14.621	22.787	0.707	22.787
9/19/2023	7.784	-16.216	7.784	11.752	-11.648	11.752	17.418	-4.662	17.418
9/20/2023	100.000	76.000	100.000	16.972	-6.428	16.972	16.234	-5.846	16.234
9/21/2023	23.596	-0.404	23.596	16.911	-6.489	16.911	16.361	-5.719	16.361
9/22/2023	No Data Available	-	No Data Available	17.186	-6.214	17.186	19.786	-2.294	19.786
9/23/2023	No Data Available	-	No Data Available	15.568	-7.832	15.568	21.984	-0.096	21.984
9/24/2023	No Data Available	-	No Data Available	15.171	-8.229	15.171	17.503	-4.577	17.503
9/25/2023	100.000	76.000	100.000	14.683	-8.717	14.683	17.841	-4.239	17.841
9/26/2023	6.868	-17.132	6.868	18.071	-5.329	18.071	16.742	-5.338	16.742
9/27/2023	11.416	-12.584	11.416	17.888	-5.512	17.888	17.291	-4.789	17.291
9/28/2023	100.000	76.000	100.000	14.652	-8.748	14.652	18.644	-3.436	18.644
9/29/2023	19.261	-4.739	19.261	14.774	-8.626	14.774	18.264	-3.816	18.264
9/30/2023	No Data Available	-	No Data Available	11.081	-12.319	11.081	18.771	-3.309	18.771
Total Instances	**10**	**10**	**10**	**0**	**0**	**0**	**0**	**0**	**0**

Notes:

1. The highlighted cells represent the instances where the head-on-liner threshold was exceeded.
2. Data represents daily readings from 07:30 within the LFGMS Telemetry system. For instances when the data was unavailable at 07:30 the nearest available reading was used from the same day.
3. Data for Stage III on 9/1/2023 is from 08:35.
4. Data for Stage III on 9/5/2023 is from 10:50.
5. Data for Stage III on 9/12/2023 is from 08:05.
6. Data for Stage IV Phase I and Stage V on 9/12/2023 is from 08:15.
7. Data for Stage III on 9/13/2023 is from 12:05.
8. Data for Stage III on 9/14/2023 is from 07:45.
9. Data for Stage III on 9/18/2023 is from 08:30.
10. Data for Stage III on 9/20/2023 is from 07:40.
11. Data for Stage IV Phase I and Stage V on 9/22/2023 is from 08:35.
12. Data for Stage III on 9/25/2023 is from 08:20.
13. Data for Stage III on 9/28/2023 is from 09:25.
14. Data is unavailable in the telemetry database on 9/4/2023, 9/6/2023, 9/9/2023, 9/10/2023, 9/15/2023, 9/16/2023, 9/17/2023, 9/22/2023, 9/23/2023, 9/24/2023, and 9/30/2023 for Stage III.
15. Data is unavailable in the telemetry database on 9/11/2023 for Stage IV Phase 1 and Stage V.

Attachment to Incident Report A-1

Evaluation of NCES and NHDES Primary Sump Levels									
	Stage III			Stage IV Phase I			Stage IV Phase II		
	As Previously Reported for Q4-2023 (October)		Updated Actual Q4-2023 (October)	As Previously Reported for Q4-2023 (October)		Updated Actual Q4-2023 (October)	As Previously Reported for Q4-2023 (October)		Updated Actual Q4-2023 (October)
Regulatory Threshold Measured from Pressure Transducer (in)	36	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	45	35.4	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	44.4	34.08	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	43.08
Date	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)
10/1/2023	No Data Available	-	No Data Available	12.973	-10.427	12.973	18.264	-3.816	18.264
10/2/2023	54.762	30.762	54.762	10.287	-13.113	10.287	17.926	-4.154	17.926
10/3/2023	43.162	19.162	43.162	16.880	-6.520	16.880	18.179	-3.901	18.179
10/4/2023	39.255	15.255	39.255	17.613	-5.787	17.613	17.418	-4.662	17.418
10/5/2023	No Data Available	-	No Data Available	17.277	-6.123	17.277	17.672	-4.408	17.672
10/6/2023	No Data Available	-	No Data Available	15.476	-7.924	15.476	18.095	-3.985	18.095
10/7/2023	No Data Available	-	No Data Available	13.095	-10.305	13.095	18.856	-3.224	18.856
10/8/2023	No Data Available	-	No Data Available	11.416	-11.984	11.416	19.574	-2.506	19.574
10/9/2023	89.957	65.957	89.957	12.363	-11.037	12.363	19.447	-2.633	19.447
10/10/2023	32.967	8.967	32.967	10.195	-13.205	10.195	16.108	-5.972	16.108
10/11/2023	-	-	-	15.324	-8.076	15.324	17.714	-4.366	17.714
10/12/2023	-	-	-	12.729	-10.671	12.729	17.418	-4.662	17.418
10/13/2023	-	-	-	No Data Available	-	No Data Available	16.446	-5.634	16.446
10/14/2023	-	-	-	No Data Available	-	No Data Available	17.080	-5.000	17.080
10/15/2023	-	-	-	No Data Available	-	No Data Available	16.911	-5.169	16.911
10/16/2023	-	-	-	12.943	-10.457	12.943	17.926	-4.154	17.926
10/17/2023	-	-	-	16.789	-6.611	16.789	16.234	-5.846	16.234
10/18/2023	-	-	-	12.332	-11.068	12.332	16.530	-5.550	16.530
10/19/2023	-	-	-	13.492	-9.908	13.492	15.812	-6.268	15.812
10/20/2023	-	-	-	10.653	-12.747	10.653	17.207	-4.873	17.207
10/21/2023	-	-	-	17.766	-5.634	17.766	17.799	-4.281	17.799
10/22/2023	-	-	-	15.354	-8.046	15.354	15.896	-6.184	15.896
10/23/2023	-	-	-	79.823	56.423	79.823	13.486	-8.594	13.486
10/24/2023	-	-	-	8.547	-14.853	8.547	15.558	-6.522	15.558
10/25/2023	-	-	-	8.364	-15.036	8.364	16.404	-5.676	16.404
10/26/2023	-	-	-	10.897	-12.503	10.897	17.503	-4.577	17.503
10/27/2023	-	-	-	12.637	-10.763	12.637	15.981	-6.099	15.981
10/28/2023	-	-	-	15.904	-7.496	15.904	15.727	-6.353	15.727
10/29/2023	-	-	-	15.568	-7.832	15.568	16.869	-5.211	16.869
10/30/2023	-	-	-	11.813	-11.587	11.813	16.869	-5.211	16.869
10/31/2023	-	-	-	11.966	-11.434	11.966	13.064	-9.016	13.064
Total Instances	**4**	**4**	**2**	**1**	**1**	**1**	**0**	**0**	**0**

Notes:

1. The highlighted cells represent the instances where the head-on-liner threshold was exceeded.
2. Data represents daily readings from 07:30 within the LFGMS Telemetry system. For instances when the data was unavailable at 07:30 the nearest available reading was used from the same day.
3. The Stage III sump was temporarily disconnected from the leachate management system for construction of a new cell during the month of October; therefore, no data is available for 10/1/2023, 10/5/2023 through 10/8/2023, and 10/11/2023 through 10/31/2023.
4. Data for Stage III on 10/2/2023 is from 08:25.
5. Data for Stage III on 10/9/2023 is from 08:35.
6. There was no data available for Stage IV Phase I from 10/13/2023 through 10/15/2023.
7. Data for Stage IV Phase I on 10/16/2023 is from 09:45.

Evaluation of NCES and NHDES Primary Sump Levels									
	Stage III			Stage IV Phase I			Stage IV Phase II		
	As Previously Reported for Q4-2023 (November)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q4-2023 (November)	As Previously Reported for Q4-2023 (November)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q4-2023 (November)	As Previously Reported for Q4-2023 (November)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q4-2023 (November)
Regulatory Threshold Measured from Pressure Transducer (in)	36		45	35.4		44.4	34.08		43.08
Date	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)
11/1/2023	-	-	-	13.553	-9.847	13.553	16.065	-6.015	16.065
11/2/2023	-	-	-	58.181	34.781	58.181	17.630	-4.450	17.630
11/3/2023	-	-	-	62.302	38.902	62.302	18.687	-3.393	18.687
11/4/2023	-	-	-	84.188	60.788	84.188	22.787	0.707	22.787
11/5/2023	-	-	-	90.995	67.595	90.995	27.861	5.781	27.861
11/6/2023	-	-	-	96.734	73.334	96.734	32.300	10.220	32.300
11/7/2023	-	-	-	81.563	58.163	81.563	19.321	-2.759	19.321
11/8/2023	-	-	-	84.341	60.941	84.341	17.545	-4.535	17.545
11/9/2023	-	-	-	88.675	65.275	88.675	29.636	7.556	29.636
11/10/2023	-	-	-	94.231	70.831	94.231	33.695	11.615	33.695
11/11/2023	-	-	-	87.302	63.902	87.302	39.064	16.984	39.064
11/12/2023	-	-	-	92.705	69.305	92.705	42.066	19.986	42.066
11/13/2023	-	-	-	97.558	74.158	97.558	45.533	23.453	45.533
11/14/2023	-	-	-	87.118	63.718	87.118	37.923	15.843	37.923
11/15/2023	-	-	-	82.967	59.567	82.967	38.937	16.857	38.937
11/16/2023	-	-	-	81.227	57.827	81.227	30.355	8.275	30.355
11/17/2023	-	-	-	70.604	47.204	70.604	23.295	1.215	23.295
11/18/2023	-	-	-	13.950	-9.450	13.950	17.080	-5.000	17.080
11/19/2023	-	-	-	17.521	-5.879	17.521	21.646	-0.434	21.646
11/20/2023	-	-	-	14.408	-8.992	14.408	20.504	-1.576	20.504
11/21/2023	-	-	-	16.361	-7.039	16.361	23.548	1.468	23.548
11/22/2023	-	-	-	16.514	-6.886	16.514	23.717	1.637	23.717
11/23/2023	-	-	-	No Data Available	-	No Data Available	No Data Available	-	No Data Available
11/24/2023	-	-	-	15.446	-7.954	15.446	18.813	-3.267	18.813
11/25/2023	-	-	-	70.024	46.624	70.024	14.501	-7.579	14.501
11/26/2023	-	-	-	84.066	60.666	84.066	21.942	-0.138	21.942
11/27/2023	-	-	-	90.018	66.618	90.018	16.742	-5.338	16.742
11/28/2023	-	-	-	84.585	61.185	84.585	18.813	-3.267	18.813
11/29/2023	-	-	-	9.310	-14.090	9.310	17.460	-4.620	17.460
11/30/2023	-	-	-	17.247	-6.153	17.247	17.756	-4.324	17.756
Total Instances				**20**	**20**	**20**	**5**	**5**	**1**

Notes:

1. The highlighted cells represent the instances where the head-on-liner threshold was exceeded.
2. Data represents daily readings from 07:30 within the LFGMS Telemetry system. For instances when the data was unavailable at 07:30 the nearest available reading was used from the same day.
3. The Stage III sump was temporarily disconnected from the leachate management system for construction of a new cell during the month of November; therefore, no data is available.
4. Data for Stage IV Phase I and Stage IV Phase II on 11/12/2023 is from 08:30.
5. Data for Stage IV Phase I and Stage IV Phase II on 11/14/2023 is from 09:15.
6. Data for Stage IV Phase I and Stage IV Phase II on 11/18/2023 is from 08:00.
7. Data for Stage IV Phase I and Stage IV Phase II on 11/19/2023 is from 08:40.
8. Data for Stage IV Phase I and Stage IV Phase II on 11/21/2023 is from 08:10.
9. Data is unavailable in the telemetry database on 11/23/2023 for Stage IV Phase I and Stage IV Phase II.
10. Data for Stage IV Phase I and Stage IV Phase II on 11/24/2023 is from 08:25.
11. Data for Stage IV Phase I and Stage IV Phase II on 11/25/2023 is from 08:00.
12. Data for Stage IV Phase I and Stage IV Phase II on 11/26/2023 is from 07:35.
13. Data for Stage IV Phase I and Stage IV Phase II on 11/29/2023 is from 08:30.
14. Data for Stage IV Phase I and Stage IV Phase II on 11/30/2023 is from 08:35.

Evaluation of NCES and NHDES Primary Sump Levels									
	Stage III			Stage IV Phase I			Stage IV Phase II		
	As Previously Reported for Q4-2023 (December)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q4-2023 (December)	As Previously Reported for Q4-2023 (December)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q4-2023 (December)	As Previously Reported for Q4-2023 (December)	NHDES Hydraulic Head on Liner Included in Letter of Deficiency on June 14, 2024	Updated Actual Q4-2023 (December)
Regulatory Threshold Measured from Pressure Transducer (in)	36		45	35.4		44.4	34.08		43.08
Date	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)	Primary Sump Liquid Level above Pressure Transducer (in)		Primary Sump Liquid Level above Pressure Transducer (in)
12/1/2023	-	-	-	13.919	-9.481	13.919	17.841	-4.239	17.841
12/2/2023	-	-	-	11.538	-11.862	11.538	17.207	-4.873	17.207
12/3/2023	-	-	-	17.033	-6.367	17.033	17.630	-4.450	17.630
12/4/2023	*135.800*	111.800	135.800	17.125	-6.275	17.125	17.883	-4.197	17.883
12/5/2023	*137.500*	113.500	137.500	8.608	-14.792	8.608	17.714	-4.366	17.714
12/6/2023	*137.500*	113.500	137.500	17.460	-5.940	17.460	17.968	-4.112	17.968
12/7/2023	*9.000*	-15.000	9.000	14.011	-9.389	14.011	16.869	-5.211	16.869
12/8/2023	*14.400*	-9.600	14.400	16.392	-7.008	16.392	16.277	-5.803	16.277
12/9/2023	-	-	-	17.186	-6.214	17.186	18.010	-4.070	18.010
12/10/2023	-	-	-	77.900	54.500	77.900	17.756	-4.324	17.756
12/11/2023	*137.500*	113.500	137.500	90.934	67.534	90.934	33.188	11.108	33.188
12/12/2023	*137.700*	113.700	137.700	80.159	56.759	80.159	18.391	-3.689	18.391
12/13/2023	*137.700*	113.700	137.700	16.270	-7.130	16.270	17.249	-4.831	17.249
12/14/2023	*137.600*	113.600	137.600	17.155	-6.245	17.155	17.545	-4.535	17.545
12/15/2023	*9.300*	-14.700	9.300	9.493	-13.907	9.493	17.714	-4.366	17.714
12/16/2023	-	-	-	17.430	-5.970	17.430	17.714	-4.366	17.714
12/17/2023	-	-	-	17.643	-5.757	17.643	17.545	-4.535	17.545
12/18/2023	-	-	-	84.707	61.307	84.707	17.038	-5.042	17.038
12/19/2023	*139.100*	115.100	139.100	83.700	60.300	83.700	20.716	-1.364	20.716
12/20/2023	*139.000*	115.000	139.000	83.455	60.055	83.455	19.321	-2.759	19.321
12/21/2023	*139.000*	115.000	139.000	57.173	33.773	57.173	17.968	-4.112	17.968
12/22/2023	100.000	76.000	100.000	12.179	-11.221	12.179	17.545	-4.535	17.545
12/23/2023	100.000	76.000	100.000	89.011	65.611	89.011	25.705	3.625	25.705
12/24/2023	100.000	76.000	100.000	100.000	76.600	100.000	35.471	13.391	35.471
12/25/2023	100.000	76.000	100.000	100.000	76.600	100.000	41.812	19.732	41.812
12/26/2023	100.000	76.000	100.000	100.000	76.600	100.000	20.547	-1.533	20.547
12/27/2023	*72.222*	48.222	72.222	100.000	76.600	100.000	21.350	-0.730	21.350
12/28/2023	99.390	75.390	99.390	100.000	76.600	100.000	22.618	0.538	22.618
12/29/2023	100.000	76.000	100.000	93.956	70.556	93.956	26.973	4.893	26.973
12/30/2023	100.000	76.000	100.000	96.978	73.578	96.978	38.853	16.773	38.853
12/31/2023	100.000	76.000	100.000	9.676	-13.724	9.676	43.926	21.846	43.926
Total Instances	**20**	**20**	**20**	**15**	**15**	**15**	**4**	**4**	**1**

Notes:

1. The highlighted cells represent the instances where the head-on-liner threshold was exceeded.
2. Data represents daily readings from 07:30 within the LFGMS Telemetry system. For instances when the data was unavailable at 07:30 the nearest available reading was used from the same day.
3. The Stage III sump was temporarily disconnected from the leachate management system for construction of a new cell during December; therefore, no data is available from 12/1/2023 through 12/3/2023. For 12/4/23 through 12/22/2023, Stage III sump data was provided by NCES in daily logs.
4. Data for Stage IV Phase I and Stage IV Phase II on 12/4/2023 is from 08:30.
5. Data for Stage IV Phase I and Stage IV Phase II on 12/5/2023 is from 07:35.
6. Data for Stage IV Phase I and Stage IV Phase II on 12/6/2023 is from 08:10.
7. Data for Stage IV Phase I and Stage IV Phase II on 12/7/2023 is from 11:05.
8. Data for Stage IV Phase I and Stage IV Phase II on 12/8/2023 is from 08:00.
9. Data for Stage IV Phase I and Stage IV Phase II on 12/10/2023 is from 10:20.
10. Data for Stage IV Phase I and Stage IV Phase II on 12/13/2023 is from 08:00.
11. Data for Stage IV Phase I and Stage IV Phase II on 12/14/2023 is from 08:45.
12. Data for Stage IV Phase I and Stage IV Phase II on 12/15/2023 is from 08:10.
13. Data for Stage III on 12/22/2023 is from 15:20.

Attachment A-2

Incident Report Form for Solid Waste Management Facilities –

Permitted and Permit-Exempt Facilities

Waste Management Division, SWMB

RSA/Rule: Env-Sw 1005.09(c)

Instructions: Complete form in its entirety, utilizing additional pages, as necessary. Maps and diagrams are recommended for clarity. A written report is due within 5 working days of the incident / situation date. Form meets the requirements of Env-Sw 1005.09(c) for "written report" if completed in its entirety and submitted in accordance with submission timeframe requirements.

Section I – General Information		
1. Date & Time of Incident / Situation:	**2. Date of Report Submission to NHDES:**	**3. Name of Person Preparing Report:**
8/21/2023-6/12/2024 (periodic incidents)	Revised 10/11/24	Kim Crosby
4. Facility Name:	**5a. Affected Area Within Facility**	**5b. Physical Address, Town / City:**
North Country Environmental Services	North Country Environmental Services	581 Trudeau Road. Bethlehem, NH 03574
6. NHDES SW Permit Number:	**7. Permittee Name on Permit:**	**8. Mailing Address:**
DES-SW-SP-03-002	North Country Environmental Services	P.O.Box 9 Bethlehem,NH 03574

Section II – Parties Involved in Incident / Situation			
9. Persons:			
	Name:	**Title:**	**Affiliation:**
a.	Joe Gay	Engineer	NCES
b.	Kevin Roy	General Manager	NCES
c.	Kim Crosby	Director of Compliance	Casella
d.			
e.			
f.			

Section III – Details
10. The quantity and types of wastes and material(s) involved in the incident or situation and in the clean-up activities:
For the period beginning 8/21/23 through 6/12/24 at pump station 2 flow rates in the secondary collection system exceeded 25 g/a/d & 100 g/a/d over a rolling 30-day average. Beginning 1/1/2024, pump stations 1, 2, 3, & 4 flow rates in the secondary collection system at times, exceeded 25 g/a/d & 100 g/a/d over a rolling 30-day average. Please reference the attached tables that lists the dates, pump stations and values of 30-day average secondary flow rates greater than 25 gallons per acre per day and 100 gallons per acre per day recorded during the timeframe referenced in section #1 of this report.

11. Measures employed to contain releases caused by the incident or situation:
Flow rates in the secondary leachate collection system did not result in a release to the environment.

12. Assessment of actual or potential hazards to the environment, safety and human health related to the incident:
An assessment of actual or potential hazards to the environment, safety and human health was conducted and determined to be absent. All leachate was contained within the secondary leachate collection system.

13. Measures the permittee has or intends to apply to reduce, eliminate, and prevent a recurrence of the incident or situation:
NCES has implemented operational improvements and capping identified in a separate Incident Report on leachate levels in the landfill's primary liner system. These measures will substantially diminish the production of leachate in the primary system. When leachate storage reaches capacity, the priority is removing leachate from the storage tank and primary liner, and pumping of liquid in the secondary system is deferred. The operational and capping initiatives NCES is implementing, together with the emergency approval of extended operating hours for leachate removal, has resulted in the removal of accumulated leachate and enabled NCES to resume its ordinary pumping of liquid in the secondary system, preventing flow rates above permissible levels. NCES has submitted a request for approval to amend its facility operating plan to extend operating hours for leachate load-out and transportation. This will enable NCES to maintain regular pumping of liquid in the secondary system, thereby preventing a recurrence of the incident.

14. If measures not completed by time of report submission, expected date of completion:	6/21/2024

Section IV – Signatures		
15a. Person Preparing Report:		
Name:	**Title / Affiliation:**	**Signature:**
Kim Crosby	Director of Compliance	Kim Crosby
Phone Number:	**Email Address:**	
802-585-5442	kimberly.crosby@casella.com	

15b. Permittee:		
Name:	**Title / Affiliation:**	**Signature:**

Kevin Roy	General Manager/Casella	S. Gay FOR
Phone Number:	**Email Address:**	
603-361-6477	Kevin.Roy@Casella.com	

Form Submittal Instructions:
Submit the completed report in PDF via email to SolidWasteInfo@des.nh.gov.

Pump House #2									
Aug-23	30 Day Average Gal/AC/Day	Sep-23	30 Day Average Gal/AC/Day	Oct-23	30 Day Average Gal/AC/Day	Nov-23	30 Day Average Gal/AC/Day	Dec-23	30 Day Average Gal/AC/D
8/21/2023	26	9/1/2023	26	10/1/2023	29	11/1/2023	86	12/1/2023	58
8/22/2023	27	9/2/2023	27	10/2/2023	29	11/2/2023	89	12/2/2023	56
8/23/2023	28	9/3/2023	27	10/3/2023	29	11/3/2023	89	12/3/2023	58
8/24/2023	29	9/4/2023	27	10/4/2023	29	11/4/2023	88	12/4/2023	60
8/25/2023	26	9/5/2023	27	10/5/2023	29	11/5/2023	88	12/5/2023	62
8/26/2023	26	9/6/2023	28	10/6/2023	28	11/6/2023	96	12/6/2023	55
8/27/2023	26	9/7/2023	28	10/7/2023	28	11/7/2023	96	12/7/2023	57
8/28/2023	25	9/8/2023	28	10/8/2023	28	11/8/2023	95	12/8/2023	59
8/29/2023	26	9/9/2023	29	10/9/2023	28	11/9/2023	94	12/9/2023	61
8/30/2023	26	9/10/2023	28	10/10/2023	29	11/10/2023	95	12/10/2023	61
8/31/2023	27	9/11/2023	27	10/11/2023	30	11/11/2023	94	12/11/2023	69
		9/12/2023	28	10/12/2023	28	11/12/2023	94	12/12/2023	75
		9/13/2023	29	10/13/2023	27	11/13/2023	94	12/13/2023	80
		9/14/2023	28	10/14/2023	26	11/14/2023	102	12/14/2023	76
		9/15/2023	29	10/15/2023	25	11/15/2023	105	12/15/2023	72
	>25 g/a/d	9/16/2023	28	10/16/2023	28	11/16/2023	107	12/16/2023	72
	>100 g/a/d	9/17/2023	28	10/17/2023	28	11/17/2023	107	12/17/2023	75
		9/18/2023	29	10/18/2023	28	11/18/2023	109	12/18/2023	79
Q3 2023	12.64 acres	9/19/2023	30	10/19/2023	28	11/19/2023	110	12/19/2023	90
Q4 2023	13.01 acres	9/20/2023	28	10/20/2023	28	11/20/2023	107	12/20/2023	115
		9/21/2023	27	10/21/2023	33	11/21/2023	95	12/21/2023	123
		9/22/2023	28	10/22/2023	44	11/22/2023	79	12/22/2023	125
		9/23/2023	28	10/23/2023	60	11/23/2023	74	12/23/2023	123
		9/24/2023	28	10/24/2023	66	11/24/2023	71	12/24/2023	121
		9/25/2023	29	10/25/2023	69	11/25/2023	67	12/25/2023	121
		9/26/2023	29	10/26/2023	72	11/26/2023	65	12/26/2023	121
		9/27/2023	30	10/27/2023	74	11/27/2023	65	12/27/2023	118
		9/28/2023	29	10/28/2023	75	11/28/2023	67	12/28/2023	115
		9/29/2023	29	10/29/2023	76	11/29/2023	65	12/29/2023	114
		9/30/2023	29	10/30/2023	79	11/30/2023	60	12/30/2023	141
				10/31/2023	84			12/31/2023	139

Pump House #1 (24.6 Acres)							
Jan 24 - March 24	30 Day Average G/A/D	Apr-24	30 Day Average G/A/D	May-24	30 Day Average G/A/D	Jun-24	30 Day Average G/A/D
1/24/2024	25	4/2/2024	26	5/1/2024	42	6/1/2024	33
1/25/2024	27	4/3/2024	27	5/2/2024	41	6/2/2024	31
1/26/2024	26	4/4/2024	26	5/3/2024	41	6/3/2024	31
1/29/2024	25	4/7/2024	26	5/4/2024	40	6/6/2024	34
1/30/2024	27	4/8/2024	27	5/5/2024	40	6/7/2024	38
1/31/2024	25	4/9/2024	28	5/6/2024	38	6/8/2024	31
2/1/2024	27	4/10/2024	29	5/7/2024	38	6/9/2024	31
2/2/2024	27	4/11/2024	28	5/8/2024	36	6/10/2024	28
2/3/2024	28	4/12/2024	29	5/9/2024	42	6/11/2024	29
2/4/2024	28	4/13/2024	29	5/10/2024	41	6/12/2024	31
2/5/2024	28	4/14/2024	29	5/11/2024	42		
2/6/2024	28	4/15/2024	29	5/12/2024	41		
2/7/2024	26	4/16/2024	29	5/13/2024	41		
2/8/2024	26	4/17/2024	30	5/14/2024	43		
2/9/2024	26	4/18/2024	31	5/15/2024	43		
2/10/2024	27	4/19/2024	34	5/16/2024	41		
2/11/2024	26	4/20/2024	33	5/17/2024	42		
2/12/2024	27	4/21/2024	33	5/18/2024	41		
2/13/2024	28	4/22/2024	33	5/19/2024	38		
2/14/2024	26	4/23/2024	32	5/20/2024	38		
2/15/2024	28	4/24/2024	31	5/21/2024	38		
2/16/2024	28	4/25/2024	39	5/22/2024	38		
2/17/2024	26	4/26/2024	39	5/23/2024	38		
2/18/2024	26	4/27/2024	40	5/24/2024	43		
2/19/2024	26	4/28/2024	42	5/25/2024	33		
2/20/2024	26	4/29/2024	43	5/26/2024	33		
2/21/2024	25	4/30/2024	42	5/27/2024	34		
2/22/2024	26			5/28/2024	32		
3/26/2024	26			5/29/2024	31		
3/27/2024	26			5/30/2024	29		
3/28/2024	28			5/31/2024	33		
3/29/2024	28						
3/31/2024	26						

> 25 g/a/d

Pump House #2 (13.01 Acres)											
Jan-24	30 Day Average G/A/D	Feb-24	30 Day Average G/A/D	Mar-24	30 Day Average G/A/D	Apr-24	30 Day Average G/A/D	May-24	30 Day Average G/A/D	Jun-24	30 Day Average G/A/D
1/1/2024	137	2/1/2024	229	3/1/2024	114	4/1/2024	204	5/1/2024	380	6/1/2024	112
1/2/2024	135	2/2/2024	234	3/2/2024	115	4/2/2024	236	5/2/2024	349	6/2/2024	108
1/3/2024	132	2/3/2024	205	3/3/2024	116	4/3/2024	249	5/3/2024	335	6/3/2024	104
1/4/2024	162	2/4/2024	204	3/4/2024	121	4/4/2024	254	5/4/2024	329	6/4/2024	100
1/5/2024	165	2/5/2024	208	3/5/2024	123	4/5/2024	259	5/5/2024	323	6/5/2024	97
1/6/2024	163	2/6/2024	212	3/6/2024	125	4/6/2024	260	5/6/2024	318	6/6/2024	93
1/7/2024	161	2/7/2024	216	3/7/2024	131	4/7/2024	264	5/7/2024	314	6/7/2024	90
1/8/2024	159	2/8/2024	206	3/8/2024	133	4/8/2024	276	5/8/2024	307	6/8/2024	86
1/9/2024	171	2/9/2024	194	3/9/2024	130	4/9/2024	290	5/9/2024	298	6/9/2024	83
1/10/2024	179	2/10/2024	188	3/10/2024	126	4/10/2024	304	5/10/2024	290	6/10/2024	80
1/11/2024	180	2/11/2024	193	3/11/2024	124	4/11/2024	309	5/11/2024	280	6/11/2024	77
1/12/2024	175	2/12/2024	198	3/12/2024	129	4/12/2024	306	5/12/2024	268	6/12/2024	75
1/13/2024	171	2/13/2024	202	3/13/2024	143	4/13/2024	308	5/13/2024	253		
1/14/2024	168	2/14/2024	206	3/14/2024	157	4/14/2024	316	5/14/2024	238		
1/15/2024	165	2/15/2024	209	3/15/2024	164	4/15/2024	321	5/15/2024	237		
1/16/2024	162	2/16/2024	201	3/16/2024	161	4/16/2024	351	5/16/2024	210		
1/17/2024	167	2/17/2024	156	3/17/2024	157	4/17/2024	365	5/17/2024	198		
1/18/2024	200	2/18/2024	144	3/18/2024	157	4/18/2024	379	5/18/2024	188		
1/19/2024	190	2/19/2024	149	3/19/2024	153	4/19/2024	379	5/19/2024	191		
1/20/2024	180	2/20/2024	152	3/20/2024	148	4/20/2024	379	5/20/2024	194		
1/21/2024	177	2/21/2024	156	3/21/2024	145	4/21/2024	379	5/21/2024	197		
1/22/2024	177	2/22/2024	159	3/22/2024	142	4/22/2024	379	5/22/2024	200		
1/23/2024	177	2/23/2024	127	3/23/2024	138	4/23/2024	374	5/23/2024	202		
1/24/2024	212	2/24/2024	123	3/24/2024	139	4/24/2024	332	5/24/2024	205		
1/25/2024	217	2/25/2024	128	3/25/2024	181	4/25/2024	316	5/25/2024	208		
1/26/2024	217	2/26/2024	132	3/26/2024	192	4/26/2024	318	5/26/2024	198		
1/27/2024	217	2/27/2024	135	3/27/2024	198	4/27/2024	356	5/27/2024	153		
1/28/2024	216	2/28/2024	139	3/28/2024	204	4/28/2024	356	5/28/2024	140		
1/29/2024	188	2/29/2024	121	3/29/2024	215			5/29/2024	131		
1/30/2024	211			3/30/2024	213			5/30/2024	124		
1/31/2024	224			3/31/2024	207			5/31/2024	117		

> 25 g/a/d

>100 g/a/d

Pump House #3 (10.38 Acres)									
24-Jan	30 Day Average G/A/D	Feb-24	30 Day Average G/A/D	Mar-24	30 Day Average G/A/D	Apr-24	30 Day Average G/A/D	May-24	30 Day Average G/A/D
1/15/2024	28	2/1/2024	48	3/12/2024	26	4/1/2024	56	5/1/2024	67
1/16/2024	28	2/2/2024	40	3/13/2024	27	4/2/2024	59	5/2/2024	64
1/17/2024	31	2/3/2024	41	3/14/2024	28	4/3/2024	60	5/3/2024	62
1/18/2024	36	2/4/2024	40	3/15/2024	30	4/4/2024	61	5/4/2024	61
1/19/2024	36	2/5/2024	40	3/16/2024	29	4/5/2024	61	5/5/2024	59
1/20/2024	36	2/6/2024	40	3/17/2024	32	4/6/2024	60	5/6/2024	60
1/21/2024	36	2/7/2024	41	3/18/2024	33	4/7/2024	61	5/7/2024	59
1/22/2024	38	2/8/2024	38	3/19/2024	34	4/8/2024	64	5/8/2024	58
1/23/2024	41	2/9/2024	38	3/20/2024	35	4/9/2024	67	5/9/2024	56
1/24/2024	42	2/10/2024	39	3/21/2024	35	4/10/2024	66	5/10/2024	55
1/25/2024	43	2/11/2024	39	3/22/2024	36	4/11/2024	63	5/11/2024	53
1/26/2024	43	2/12/2024	40	3/23/2024	35	4/12/2024	65	5/12/2024	50
1/27/2024	43	2/13/2024	41	3/24/2024	34	4/13/2024	67	5/13/2024	46
1/28/2024	43	2/14/2024	28	3/25/2024	39	4/14/2024	69	5/14/2024	43
1/29/2024	45	2/15/2024	28	3/26/2024	41	4/15/2024	72	5/15/2024	41
1/30/2024	46			3/27/2024	42	4/16/2024	72	5/16/2024	39
1/31/2024	47			3/28/2024	46	4/17/2024	72	5/17/2024	38
				3/29/2024	50	4/18/2024	73	5/18/2024	36
				3/30/2024	50	4/19/2024	74	5/19/2024	35
				3/31/2024	54	4/20/2024	76	5/20/2024	33
						4/21/2024	77	5/21/2024	32
						4/22/2024	78	5/22/2024	31
						4/23/2024	80	5/23/2024	29
						4/24/2024	76	5/24/2024	28
						4/25/2024	76	5/25/2024	27
						4/26/2024	76	5/26/2024	26
						4/27/2024	72	5/27/2024	26
						4/28/2024	70		
						4/29/2024	70		
						4/30/2024	67		

> 25 g/a/d

Pump House #3 (10.38 Acres)			
Apr-24	30 Day Average G/A/D	May-24	30 Day Average G/A/D
4/14/2024	29	5/1/2024	40
4/15/2024	34	5/2/2024	40
4/16/2024	38	5/3/2024	38
4/17/2024	44	5/4/2024	38
4/18/2024	46	5/5/2024	38
4/19/2024	46	5/6/2024	37
4/20/2024	46	5/7/2024	36
4/21/2024	46	5/8/2024	35
4/22/2024	46	5/9/2024	40
4/23/2024	44	5/10/2024	39
4/24/2024	43	5/11/2024	37
4/25/2024	43	5/12/2024	32
4/26/2024	43	5/13/2024	28
4/27/2024	42		
4/28/2024	41		
4/29/2024	41		
4/30/2024	41		

>25 g/a/d

Totalizer Flows for NCES (Readings Taken at 7:30am)

DATE	Stage III & Stage VI Phase I (Pump 3) (10.38 Acres)		Stage IV Phase I (Pump 2) (13.01 Acres)		Stage IV Phase II & Stage VI Phase I (Pump 1) (24.6 Acres)		Stage V (Pump 4) (8.23 Acres)	
	Detection Flow (gal)	30 Day Average	Detection Flow (gal)	30 Day Average	Detection Flow (gal)	30 Day Average	Detection Flow (gal)	30 Day Average
6/1/2024	129	21.3	827.0	112.1	0.0	32.7	0.0	9.6
6/2/2024	132	20.9	840.0	107.7	0.0	30.9	145.0	10.2
6/3/2024	127	21.3	822.0	103.9	0.0	30.9	0.0	10.2
6/4/2024	129	21.7	803.0	100.3	2,616.0	34.5	0.0	10.2
6/5/2024	127	19.4	795.0	97.0	0.0	34.5	148.0	10.8
6/6/2024	129	18.1	828.0	93.2	0.0	34.5	0.0	10.8
6/7/2024	126	17.2	696.0	89.6	2,554.0	37.9	0.0	10.8
6/8/2024	128	16.4	836.0	86.5	0.0	30.9	153.0	6.4
6/9/2024	129	16.0	697.0	83.0	0.0	30.9	0.0	6.4
6/10/2024	65	15.1	563.0	79.8	0.0	27.6	40.0	6.0
6/11/2024	65	14.7	703.0	77.4	698.0	28.5	0.0	6.0
6/12/2024	131	14.2	722.0	74.9	1,915.0	31.1	107.0	5.8
6/13/2024	118	13.8	558.0	72.1	42.0	28.0	0.0	5.1
6/14/2024	131	13.3	698.0	70.0	0.0	28.0	0.0	5.1
6/15/2024	65	12.5	560.0	68.4	13.0	28.0	0.0	5.1
6/16/2024	65	12.5	707.0	67.0	2,602.0	28.5	0.0	5.1
6/17/2024	126	12.5	522.0	65.0	21.0	28.5	449.0	6.9
6/18/2024	0	11.6	530.0	63.1	383.0	29.0	0.0	6.9
6/19/2024	129	11.6	466.0	61.4	9.0	29.0	0.0	6.9
6/20/2024	704	13.0	505.0	59.9	427.0	29.6	20.0	7.0
6/21/2024	0	12.6	623.0	58.6	7.0	29.6	0.0	7.0
6/22/2024	0	12.2	620.0	57.3	0.0	29.6	0.0	5.8
6/23/2024	0	11.8	619.0	56.0	0.0	22.6	0.0	5.8
6/24/2024	0	11.4	464.0	54.7	0.0	22.5	0.0	5.8
6/25/2024	0	11.0	617.0	54.1	2,583.0	26.0	0.0	5.8
6/26/2024	0	10.1	614.0	52.8	80.0	22.6	0.0	4.9
6/27/2024	127	10.1	462.0	51.9	0.0	22.6	0.0	4.9
6/28/2024	126	10.1	615.0	51.3	0.0	22.6	0.0	4.9
6/29/2024	0	10.1	611.0	50.7	0.0	22.6	187.0	5.7
6/30/2024	130	10.1	458.0	49.7	0.0	18.9	0.0	5.1
Monthly Total	**3,137**	--	**19,381**	--	**13,950**	--	**1,249**	--
Monthly Average G/A/D	**10**	--	**50**	--	**19**	--	**5**	--

Totalizer Flows for NCES (Readings Taken at 7:30am)

DATE	Stage III & Stage VI Phase I (Pump 3) (10.38 Acres)		Stage IV Phase I (Pump 2) (13.01 Acres)		Stage IV Phase II & Stage VI Phase I (Pump 1) (24.6 Acres)		Stage V (Pump 4) (8.23 Acres)	
	Detection Flow (gal)	30 Day Average	Detection Flow (gal)	30 Day Average	Detection Flow (gal)	30 Day Average	Detection Flow (gal)	30 Day Average
7/1/2024	128.0	10.1	611.0	49.1	2,592.0	22.4	0.0	5.1
7/2/2024	15.0	9.7	610.0	48.5	0.0	22.4	0.0	4.5
7/3/2024	131.0	9.7	604.0	48.0	0.0	22.4	0.0	4.5
7/4/2024	129.0	9.7	601.0	47.4	0.0	18.9	0.0	4.5
7/5/2024	243.0	10.1	749.0	47.3	2,526.0	22.3	0.0	3.9
7/6/2024	0.0	9.7	597.0	46.7	0.0	22.3	0.0	3.9
7/7/2024	0.0	9.3	746.0	46.9	0.0	18.8	0.0	3.9
7/8/2024	26.0	8.9	760.0	46.7	0.0	18.8	160.0	3.9
7/9/2024	133.0	8.9	740.0	46.8	0.0	18.8	0.0	3.9
7/10/2024	132.0	9.4	742.0	47.2	2,367.0	22.0	150.0	4.3
7/11/2024	0.0	9.0	742.0	47.3	135.0	21.3	16.0	4.4
7/12/2024	128.0	8.9	756.0	47.4	0.0	18.7	0.0	4.0
7/13/2024	0.0	8.6	753.0	47.9	0.0	18.6	0.0	4.0
7/14/2024	132.0	8.6	754.0	48.1	0.0	18.6	0.0	4.0
7/15/2024	132.0	9.0	750.0	48.5	2,439.0	21.9	190.0	4.7
7/16/2024	0.0	8.6	750.0	48.7	0.0	18.4	0.0	4.7
7/17/2024	130.0	8.6	749.0	49.2	0.0	18.4	0.0	2.9
7/18/2024	125.0	9.0	1,172.0	50.9	0.0	17.8	0.0	2.9
7/19/2024	0.0	8.6	603.0	51.2	0.0	17.8	0.0	2.9
7/20/2024	130.0	6.7	752.0	51.9	0.0	17.2	0.0	2.8
7/21/2024	0.0	6.7	749.0	52.2	2,580.0	20.7	0.0	2.8
7/22/2024	132.0	7.2	748.0	52.5	5.0	20.7	151.0	3.5
7/23/2024	129.0	7.6	749.0	52.9	19.0	20.8	0.0	3.5
7/24/2024	0.0	7.6	594.0	53.2	0.0	20.8	0.0	3.5
7/25/2024	128.0	8.0	299.0	52.4	3.0	17.3	0.0	3.5
7/26/2024	126.0	8.4	452.0	52.0	119.0	17.3	0.0	3.5
7/27/2024	0.0	8.0	451.0	51.9	2,440.0	20.6	0.0	3.5
7/28/2024	129.0	8.0	597.0	51.9	0.0	20.6	144.0	4.0
7/29/2024	126.0	8.4	1,616.0	54.5	0.0	20.6	0.0	3.3
7/30/2024	0.0	8.0	899.0	55.6	0.0	20.6	0.0	3.3
7/31/2024	128.0	8.0	858.0	56.2	0.0	17.1	0.0	3.3
Monthly Total	**2,612**	--	**22,553**	--	**15,225**	--	**811**	--
Monthly Average G/A/D	**8**	--	**56**	--	**20**	--	**3**	--

Totalizer Flows for NCES (Readings Taken at 7:30am)

DATE	Stage III & Stage VI Phase I (Pump 3) (10.38 Acres)		Stage IV Phase I (Pump 2) (13.01 Acres)		Stage IV Phase II & Stage VI Phase I (Pump 1) (24.6 Acres)		Stage V (Pump 4) (8.23 Acres)	
	Detection Flow (gal)	30 Day Average	Detection Flow (gal)	30 Day Average	Detection Flow (gal)	30 Day Average	Detection Flow (gal)	30 Day Average
8/1/2024	0.0	7.9	727.0	56.5	1,099.0	18.6	163.0	3.9
8/2/2024	129.0	7.9	730.0	56.8	1,504.0	20.6	0.0	3.9
8/3/2024	126.0	7.9	733.0	57.2	0.0	20.6	0.0	3.9
8/4/2024	0.0	7.1	591.0	56.8	0.0	17.2	0.0	3.9
8/5/2024	130.0	7.5	294.0	56.0	0.0	17.2	0.0	3.9
8/6/2024	0.0	7.5	203.0	54.6	0.0	17.2	0.0	3.9
8/7/2024	127.0	7.9	296.0	53.4	2,501.0	20.6	0.0	3.3
8/8/2024	121.0	7.8	151.0	51.9	0.0	20.6	0.0	3.3
8/9/2024	127.0	7.8	405.0	51.0	0.0	17.4	297.0	3.9
8/10/2024	0.0	7.8	451.0	50.3	0.0	17.2	0.0	3.8
8/11/2024	123.0	7.8	448.0	49.5	0.0	17.2	0.0	3.8
8/12/2024	0.0	7.8	606.0	49.1	0.0	17.2	0.0	3.8
8/13/2024	118.0	7.8	599.0	48.7	2,634.0	20.8	0.0	3.8
8/14/2024	0.0	7.3	596.0	48.3	0.0	17.5	0.0	3.1
8/15/2024	126.0	7.7	594.0	47.9	0.0	17.5	0.0	3.1
8/16/2024	122.0	7.7	591.0	47.5	0.0	17.5	0.0	3.1
8/17/2024	0.0	7.3	587.0	46.0	0.0	17.5	0.0	3.1
8/18/2024	123.0	7.7	585.0	46.0	2,557.0	20.9	154.0	3.7
8/19/2024	125.0	7.7	585.0	45.6	0.0	20.9	0.0	3.7
8/20/2024	0.0	7.7	295.0	44.4	0.0	17.5	0.0	3.7
8/21/2024	120.0	7.7	149.0	42.9	0.0	17.4	0.0	3.1
8/22/2024	0.0	7.2	300.0	41.7	0.0	17.4	0.0	3.1
8/23/2024	125.0	7.6	150.0	40.6	0.0	17.4	0.0	3.1
8/24/2024	0.0	7.2	151.0	40.2	2,600.0	20.9	0.0	3.1
8/25/2024	125.0	7.2	302.0	39.8	3.0	20.8	0.0	3.1
8/26/2024	126.0	7.6	153.0	39.1	0.0	17.5	0.0	3.1
8/27/2024	0.0	7.2	152.0	37.9	0.0	17.5	149.0	3.1
8/28/2024	0.0	6.8	151.0	34.2	0.0	17.5	0.0	3.1
8/29/2024	123.0	7.2	306.0	32.6	0.0	17.5	0.0	3.1
8/30/2024	123.0	7.2	153.0	30.8	2,492.0	20.9	0.0	3.1
8/31/2024	119.0	7.6	151.0	29.4	0.0	19.4	162.0	3.1
Monthly Total	**2,358**	--	**12,185**	--	**15,390**	--	**925**	--
Monthly Average G/A/D	**7**	--	**30**	--	**20**	--	**4**	--

Totalizer Flows for NCES (Readings Taken at 7:30am)

DATE	Stage III & Stage VI Phase I (Pump 3) (10.38 Acres)		Stage IV Phase I (Pump 2) (13.01 Acres)		Stage IV Phase II & Stage VI Phase I (Pump 1) (24.6 Acres)		Stage V (Pump 4) (8.23 Acres)	
	Detection Flow (gal)	30 Day Average	Detection Flow (gal)	30 Day Average	Detection Flow (gal)	30 Day Average	Detection Flow (gal)	30 Day Average
9/1/2024	0.0	7.2	298.0	28.3	0.0	17.3	0.0	3.1
9/2/2024	0.0	6.8	150.0	26.8	0.0	17.3	0.0	3.1
9/3/2024	117.0	7.1	190.0	25.7	0.0	17.3	0.0	3.1
9/4/2024	121.0	7.1	150.0	25.4	2,573.0	20.8	0.0	3.1
9/5/2024	0.0	7.1	151.0	25.2	0.0	20.8	0.0	3.1
9/6/2024	119.0	7.1	152.0	24.9	0.0	17.4	0.0	3.1
9/7/2024	121.0	7.1	303.0	25.2	0.0	17.4	0.0	3.1
9/8/2024	0.0	6.7	152.0	24.6	0.0	17.4	0.0	1.9
9/9/2024	118.0	7.0	148.0	23.8	0.0	17.4	0.0	1.9
9/10/2024	0.0	6.7	152.0	23.1	2,528.0	20.8	0.0	1.9
9/11/2024	120.0	7.0	0.0	21.5	0.0	20.8	0.0	1.9
9/12/2024	52.0	6.8	313.0	20.8	1.0	17.3	155.0	2.5
9/13/2024	0.0	6.8	154.0	19.6	0.0	17.3	0.0	2.5
9/14/2024	118.0	6.8	152.0	18.5	0.0	17.3	0.0	2.5
9/15/2024	121.0	6.8	152.0	17.4	0.0	17.3	0.0	2.5
9/16/2024	116.0	7.2	151.0	16.3	2,559.0	20.7	0.0	2.5
9/17/2024	117.0	7.1	151.0	15.2	0.0	17.3	150.0	2.5
9/18/2024	116.0	7.1	152.0	14.1	0.0	17.3	0.0	2.5
9/19/2024	118.0	7.5	151.0	13.7	0.0	17.3	0.0	2.5
9/20/2024	117.0	7.5	153.0	13.7	0.0	17.3	0.0	2.5
9/21/2024	115.0	7.9	0.0	12.9	0.0	17.3	0.0	2.5
9/22/2024	115.0	7.8	151.0	12.9	2,691.0	20.9	0.0	2.5
9/23/2024	116.0	8.2	151.0	12.9	0.0	17.4	0.0	2.5
9/24/2024	0.0	7.8	153.0	12.5	0.0	17.4	150.0	3.1
9/25/2024	114.0	7.8	152.0	12.5	0.0	17.4	0.0	3.1
9/26/2024	113.0	8.1	457.0	13.3	0.0	17.4	0.0	2.5
9/27/2024	114.0	8.5	619.0	14.5	0.0	17.4	0.0	2.5
9/28/2024	117.0	8.5	310.0	14.5	2,675.0	21.0	146.0	3.1
9/29/2024	111.0	8.42967	309.0	14.93	0.0	17.7	0.0	3.1
9/30/2024	0.0	8.04753	151.0	14.93	0.0	17.7	0.0	2.4
Monthly Total	**2,506**	--	**5,828**	--	**13,027**	--	**601**	--
Monthly Average G/A/D	**8**	--	**15**	--	**18**	--	**2**	--

SANBORN HEAD

6 Bedford Farms Drive
Bedford, New Hampshire, 03110

Mr. Joe Gay
Engineer
North Country Environmental Services, Inc.
P.O. Box 9
Bethlehem, NH 03574

Revised October 7, 2024
File No. 2493.25

Re: Action Item 3a Evaluation
Letter of Deficiency No. SWMB 24-006
North Country Environmental Services, Inc. Landfill
Bethlehem, NH

Dear Joe:

Sanborn, Head & Associates (Sanborn Head) has performed an evaluation of the North Country Environmental Services, Inc. (NCES) Landfill located in Bethlehem, New Hampshire. This evaluation was performed in response to the New Hampshire Department of Environmental Services (NHDES) Letter of Deficiency (LoD) No. SWMB 24-006, dated June 14, 2024. As part of the LoD, NHDES requires that NCES submit an analysis of the cause(s) of the excessive leachate head buildup on the primary liner system, which includes the amount of leachate generated per day from the primary leachate collection system, and the capabilities of the facility to manage, store, and dispose of such leachate (Action Item 3a).

OBJECTIVES

Sanborn Head was tasked with evaluating the capabilities of the facility to manage, store, and dispose of such leachate. The evaluation includes taking historic site-specific leachate generation data, and evaluating whether the existing primary and contingency leachate storage infrastructure are adequately sized, given the anticipated maximum off-site disposal trucking rate, in accordance with the New Hampshire Code of Administrative Rules, Chapter Env-Sw 800, Section Env-Sw 805.06.

ASSUMPTIONS

To effectively and efficiently evaluate the capabilities of the facility regarding leachate management, some assumptions have been made. They include, but are not limited to, the following:

1. Leachate generation data from the facility (from January 1, 2023 to June 30, 2024) was used to assess an operational peak daily leachate generation rate for the facility.
2. Using time of concentration values provided by CMA Engineers (CMA) for prior leachate collection system design calculations for the facility as a guide, we assumed the leachate generation time of concentration of the drainage area to be 48-hours. In accordance with the regulations in Section Env-Sw 805.06, the storm duration for the 100-year storm event is to be equivalent to the time of concentration. Therefore, the 100-year

storm event duration is 48-hours. Because the 100-year storm event duration is 48-hours, or two days, the peak daily leachate generation rate from the facility data was multiplied by 2, to be representative of a 48-hour storm duration.

3. The Hydrologic Evaluation of Landfill Performance (HELP) Model (Version 4.0) was used to estimate a peak daily leachate generation rate for the 48-hour 100-year storm event of 165,798 gallons per day (gpd). Because the HELP Model peak daily leachate generation rate is less than the peak rate from the leachate generation data provided of 186,927 gpd, it was not used in this evaluation.
4. By assuming a peak flow contingency volume of 373,854 gallons (two times the peak leachate generation rate of 186,927 gpd) as representative of a 48-hour storm event in the calculations, we are conservatively comparing the regulatory requirements to a leachate volume well in excess of the 48-hour 100-year storm event volume from the HELP model.

RESULTS

The build-up of leachate on the liner system in excess of 12 inches of head was simply a function of wastewater treatment facilities not being available for disposal. It was not a result of inadequate leachate collection, storage, or disposal system capacity. To evaluate the capabilities of the facility to manage, store, and dispose of leachate, a calculation package was prepared (Calculation C.1 – Leachate Storage) which is enclosed with this letter. In summary, the calculation demonstrates that the NCES facility maintains more leachate storage capacity than required by Env-Sw-805.06(f) and (g), specifically:

- The largest volume of leachate to be generated by a contingency event and the anticipated base flow of the facility is about 373,854 gallons, which can be pumped from the sumps at a rate of 37 gallons per minute to evacuate the Landfill within seven (7) days, which is well within the capacity of the existing sump primary pumps;
- The existing tanks and sumps at the NCES facility provide a combined primary leachate storage volume of 210,000 gallons, which exceeds the required 15% of the 100-year storm event (peak flow contingency) volume of 373,854 gallons [Env-SW 805.06(g)(1)];
- The existing primary and contingency leachate storage volume provided at the NCES facility is approximately 472,000 gallons [253,600 gallons (primary storage) + 218,400 gallons (contingency storage)] which is significantly more storage capacity than the 100-year storm event (peak flow contingency) volume of 373,854 gallons [Env-SW 805.06(g)(3)]; and
- Subject to availability of disposal capacity, NCES will be able to transport collected leachate off-site for disposal at a rate of approximately 96,000 gpd which is based on an anticipated daily trucking rate of 12 tanker truck loads per day, at 8,000 gallons per truck, which is below the actual observed peak daily transported amount between January 1, 2022 and March 31, 2024 of 16 tanker truck loads transporting a total of 123,500 gpd. The anticipated 96,000 gpd off-site transport rate is significantly more than the contingency event requirement which was calculated to be about 17,200 gpd [Env-SW 805.06(g)(3)].

We appreciate the opportunity to be of service to NCES. Please let us know if you require additional information.

Very truly yours,
SANBORN, HEAD & ASSOCIATES, INC.

Derek T. Long, P.E.
Senior Project Manager

Brian J. Beaudoin
Senior Vice President

MCP/DTL/BJB: mcp

Encl. Attachment A – Calculation C-1: Leachate Management

cc: Robert Cox, NCES
Kevin Roy, NCES

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C-1: Leachate Management

PURPOSE:

Section Env-Sw 805.06(f) and (g) of the New Hampshire Solid Waste Rules requires that leachate collection and removal systems be designed to manage the quantity of leachate generated by the 100-year storm event (i.e., contingency storm) with a duration equivalent to the time of concentration (T_c) of the drainage area that contributes to leachate generation, in a manner that:

(1) Does not allow a hydraulic head greater than one foot to exist on any portion of the liner system, excluding the leachate collection sumps, if any, for longer than 7 days;

(2) Provides at least 15% of the 100-year storm storage volume in primary storage units located outside the waste deposition area or sumps located within the waste deposition area; and

(3) Does not rely on leachate recirculation as a factor in assessing the required storage and removal capabilities, even if leachate recirculation will be a routine operating procedure at the facility.

This calculation considers the following critical components of the leachate management system:

(1) Storage capacity required to contain at least 15% of the 100-year storm storage volume in primary storage units outside the landfill or sumps located within the waste deposition area;

(2) Pumping capacity required to remove leachate generated by the 100-year storm event during operations from the liner system within a 7-day period; and

(3) Disposal capacity required to manage the volume of leachate generated by the 100-year storm event.

ASSUMPTIONS AND DATA:

- NCES daily primary leachate flow data from January 1, 2023 to June 30, 2024 (See Exhibit C-1.1).
- NCES daily leachate hauling data from January 1, 2022 to March 31, 2024 (See Exhibit C-1.2).
- Section Env-Sw 805.06(f) of the New Hampshire Solid Waste Rules requires that leachate collection and removal systems be designed to manage the quantity of leachate generated by the 100-year storm event (i.e., contingency storm) with a duration equivalent to the Tc of the drainage area that contributes to leachate generation. Prior leachate collection system calculations performed by CMA Engineers, Inc. calculated the Tc for Stages IV, V, and VI to be 36 hours, 48 hours, and 41 hours respectively (See Exhibit C-1.3). Therefore, we're conservatively assuming the storm duration for the 100-year storm event to be 48 hours.
- The Hydrologic Evaluation of Landfill Performance (HELP) Model (Version 4.0) was used to estimate a peak daily leachate generation rate for the 48-hour 100-year storm event of 165,798 gallons/day. Since this rate is less than the peak daily leachate generation rate in the NCES daily primary leachate flow data provided of 186,927 gallons/day, it was not used in this evaluation.

METHOD:

Use the provided existing leachate generation data and compare it to the available leachate storage in accordance with Section Env-Sw 805.06.

CALCULATION:

The following steps were performed to evaluate if the existing leachate storage provided at the North Country Environmental Services, Inc. (NCES) Landfill is adequate in accordance with the New Hampshire Code of Administrative Rules, Chapter Env-Sw 800, Section Env-Sw 805.06:

Step 1: Peak Daily Leachate Flow

The peak daily primary leachate flow, in the data provided, was 186,927 gallons on July 26, 2023 (See Exhibit C-1.1).

$$Q_{Peak} = 186{,}927 \text{ gallons/day}$$

Step 2: Volume of Leachate Generated by the 100-Year Storm

As stated above in the assumptions, we're conservatively assuming the storm duration for the 100-year storm event to be 48 hours (2 days). Therefore, the volume of leachate generated by the 100-year storm event can be estimated to be representative of two times the peak daily leachate flow.

$$V_{100} = 186{,}927 \frac{gallons}{day} \times 48 \text{ hours} \times \frac{1\ day}{24\ hours} = 373{,}854 \text{ gallons}$$

$$V_{100} \approx 373{,}900 \text{ gallons}$$

Step 3: Required Sump Pumping Rates

The pumping rate required to remove leachate from the sumps due to the 100-year storm event within a 7-day period is:

$$Q_{pump} = V_{100} \,/\, 7\ days$$

$$Q_{pump} = 373{,}900\ gal \,/\, 7\ days = 53{,}414\ gpd$$

$$Q_{pump} = 53{,}414\ gpd\ x\ \frac{1\ day}{24\ hours}\ x \frac{1\ hour}{60\ minutes} = 37\ gpm$$

Estimating the maximum head to be 100 ft, based on the elevation difference between the sump and adjacent perimeter road for Sump 3, the existing primary leachate pumps in all three sumps are rated for a flow of 80 gpm or more (See Exhibit C-1.4). Therefore, the existing pumps are adequately sized to handle the contingency event.

Step 4: Existing Primary Leachate Storage Capacity

Per Section Env-Sw 805.06(g)(1) of the New Hampshire Solid Waste Rules, primary leachate storage capacity includes both primary storage units outside the landfill or sumps located within the waste deposition area. The total available existing primary leachate storage capacity is calculated below:

Primary storage units outside the Landfill (See Exhibit C-1.5):
Aboveground Storage Tank – 150,000 gallons
Tank A – 30,000 gallons
Tank B – 30,000 gallons

Sumps (See Exhibit C-1.6):
Sump 1 – 29,780 gallons
Sump 2 – 5,663 gallons
Sump 3 – 8,132 gallons

$$V_{primary} = 150{,}000\ gallons + 30{,}000\ gallons + 30{,}000\ gallons + 29{,}780\ gallons + 5{,}663\ gallons + 8{,}132\ gallons\ = 253{,}575\ gallons$$

$$V_{primary} \approx 253{,}600 \text{ gallons}$$

Section Env-Sw 805.06(g) of the New Hampshire Solid Waste Rules requires that leachate collection and removal systems provides at least 15% of the 100-year storm event volume in primary storage units located outside the waste deposition area or sumps located within the waste deposition area:

$$V_{req,primary} = 373{,}900 \text{ gallons} \times 15\% = 56{,}085 \text{ gallons}$$

$$56{,}085 \text{ gallons} < 253{,}600 \text{ gallons} \ \therefore \text{OKAY}$$

Step 5: Existing Contingency Leachate Storage Capacity

Per Section Env-Sw 805.06(g)(3) of the New Hampshire Solid Waste Rules, contingency leachate storage capacity includes both contingency storage units outside the landfill or on the uppermost liner within a waste deposition area provided that storage on the liner in excess of one-foot of hydraulic head shall be limited to a period of 7 days or less. The total available existing contingency leachate storage capacity is calculated below:

Area Tributary to Sump 1 *(from CMA Engineers January 2009 Leachate Collection System Calculations for Stage IV – Phase II area – See Exhibit C-1.7)*
Leachate Pipes – 3,923 gallons
12-inches above the sump in the 18-inch-thick Select Sand/Crushed Stone Layer – 157,105 gallons

Area Tributary to Sump 2 (*from CMA Engineers November 2013 Leachate Collection System Calculations for Stage V – See Exhibit C-1.7)*[1]
Leachate Pipes – 799 gallons
12-inches above the sump in the 18-inch-thick Select Sand/Crushed Stone Layer – 4,331 gallons

Area Tributary to Sump 3 *(from CMA Engineers November 2022 Leachate Collection System Calculations for Stage III area – See Exhibit C-1.7)*

[1] Information related to Stage II and Stage IV Phase I contingency leachate storage capacity was not ~~available~~. It's omission conservatively reduces the contingency leachate storage capacity from what is actually provided.

Leachate Pipes – 1,003 gallons
12-inches above the sump in the 18-inch-thick Select Sand/Crushed Stone Layer – 51,282 gallons

$$V_{contingency} = 3{,}923\ gallons + 157{,}105\ gallons + 799\ gallons + 4{,}331\ gallons + 1{,}003\ gallons + 51{,}282\ gallons = 218{,}443\ gallons$$

$$V_{contingency} \approx 218{,}400 \text{ gallons}$$

The required contingency leachate storage volume is calculated by taking the 100-year storm event volume and subtracting the existing primary leachate storage unit capacity volume:

$$V_{100} - V_{primary} = V_{req,contingency}$$

$$373{,}900\ gallons - 253{,}600\ gallons = 120{,}300\ gallons$$

$$V_{req,contingency} \approx 120{,}300 \text{ gallons}$$

$$120{,}300 \text{ gallons} < 218{,}400 \text{ gallons} \ \therefore \text{OKAY}$$

Step 6: Check Leachate Hauling Capacity

In the NCES daily leachate hauling data, the maximum number of tanker truck loads of leachate removed from the site in one day was 16 loads on February 1, 2024, with total gallons transported off-site that day of 123,521 (See Exhibit C-1.2). Conservatively, we anticipate a more realistic daily trucking rate that can be maintained over a period of 7 days to be 12 tanker truck loads per day, at 8,000 gallons per truck, which equates to a total of 96,000 gallons per day of leachate transported off-site. Using this assumption, the disposal capacity was evaluated:

$$Q_{disposal} = \frac{120{,}300\ gal}{7\ days} = 17{,}186\ \frac{gal}{day}$$

$$Q_{disposal} \approx 17{,}200 \text{ gallons/day}$$

$$17{,}200 \text{ gallons/day} < 96{,}000 \text{ gallons/day} \ \therefore \text{OKAY}$$

RESULTS:

This calculation confirms that the existing leachate management system meets the following design requirements from Section Env-Sw 805.06(f) and (g) of the New Hampshire Solid Waste Rules:

(1) Storage capacity required to contain at least 15% of the 100-year storm storage volume in primary storage units outside the landfill or sumps located within the waste deposition area;

(2) Pumping capacity required to remove leachate generated by the 100-year storm event during operations from the liner system within a 7-day period; and

(3) Disposal capacity required to manage the volume of leachate generated by the 100-year storm event during initial operations.

North Country Environmental Services, Inc. Landfill
Leachate Storage Evaluation
Daily Primary Leachate Flow Data Summary

2023 Summary		
Month	Max. Daily Combined Flow (gallons)	Avg. Daily Combined Flow (gallons)
January	57,619	29,581
February	43,469	29,695
March	75,183	30,439
April	73,684	29,851
May	87,372	28,629
June	55,429	32,683
July	186,927	65,331
August	109,381	53,034
September	71,149	39,540
October	102,979	39,005
November	130,597	38,224
December	118,186	49,839

2024 Summary		
Month	Max. Daily Combined Flow (gallons)	Avg. Daily Combined Flow (gallons)
January	123,056	61,448
February	110,234	48,935
March	95,039	50,041
April	132,519	58,007
May	121,029	67,701
June	97,572	50,401

EXHIBIT C-1.2

NORTH COUNTRY ENVIRONMENTAL SERVICES INC

Destination Report

Transactions from 2/01/2024 through
2/29/2024
Outbound Tickets Only
Third Party and Intercompany Customers

Ticket	Date	Truck	Trailer	In/Out	Gallons
CONCORD - CONCORD WASTE TREATMENT PLANT					
545659	2/1/2024	2503L	2842	O	8,297
545662	2/1/2024	4JF	2056	O	6,923
545664	2/1/2024	30JC	12	O	7,669
545668	2/1/2024	2302L	TK-02	O	7,662
545673	2/1/2024	940L	1708	O	7,859
545677	2/1/2024	2097L	2383	O	7,624
545679	2/1/2024	2096L	2402	O	8,343
545681	2/1/2024	2503L	2842	O	8,153
545685	2/1/2024	4JF	2056	O	7,034
545687	2/1/2024	30JC	12	O	7,547
545690	2/1/2024	1466L	2383	O	7,451
545693	2/1/2024	2302L	TK-02	O	7,662
545697	2/1/2024	940L	1708	O	7,832
545704	2/2/2024	2503L	2842	O	8,297
545712	2/2/2024	2302L	TK-02	O	7,657
545719	2/2/2024	30JC	12	O	7,600
545725	2/2/2024	940L	1708	O	7,918
545731	2/2/2024	23JC	10	O	7,381
545734	2/2/2024	2097L	2388	O	7,614
545738	2/2/2024	2096L	2402	O	8,300
545747	2/2/2024	2302L	TK02	O	7,659
545750	2/2/2024	30JC	12	O	8,007
545752	2/2/2024	1466L	2383	O	7,597
545758	2/2/2024	940L	1708	O	7,882
545759	2/2/2024	23JC	10	O	7,381
546666	2/26/2024	2503L	2842	O	8,317
546686	2/26/2024	2957L	2388	O	7,556
546701	2/26/2024	2503L	2842	O	8,235
546712	2/26/2024	2462L	2056	O	6,089
546755	2/27/2024	2503L	2842	O	8,168
546762	2/27/2024	2956L	2402	O	8,302
546773	2/27/2024	2957L	2388	O	7,518
546778	2/27/2024	2503L	2842	O	8,230
546799	2/28/2024	2503L	2842	O	8,293
546804	2/28/2024	1421L	2383	O	7,619
546826	2/28/2024	2503L	2842	O	8,362
546834	2/28/2024	1421L	2383	O	7,664
546877	2/29/2024	2956L	2842	O	8,424
546887	2/29/2024	2503L	2842	O	8,189
546895	2/29/2024	2462L	2056	O	6,811
546899	2/29/2024	1421L	2383	O	7,516
CONCORD - CONCORD WASTE TREATMENT PLANT					**318,642**

16 truckloads totaling 123,521 gallons

FRANKLIN - FRANKLIN WASTE WATER TREATMENT PLANT

545654	2/1/2024	2097L	2388	O	7,554
545657	2/1/2024	2096L	2402	O	8,271
545670	2/1/2024	1466L	2383	O	7,640
545702	2/2/2024	2096L	2402	O	8,211
545718	2/2/2024	1466L	2383	O	7,444
545743	2/2/2024	2503L	2842	O	8,173
545764	2/3/2024	2096L	2402	O	8,662
545765	2/3/2024	2097L	2388	O	7,595
545766	2/3/2024	2503L	2842	O	8,436
545767	2/5/2024	2096L	2402	O	8,273
545770	2/5/2024	2503L	2842	O	8,168
545789	2/5/2024	2096L	2402	O	8,362
545823	2/6/2024	2096L	2402	O	8,293
545836	2/6/2024	2462L	2388	O	7,360
545859	2/6/2024	2503L	2842	O	8,012
545879	2/7/2024	2097L	2388	O	7,588
545881	2/7/2024	2096L	2402	O	8,329
545917	2/7/2024	2503L	2842	O	8,086
545934	2/8/2024	2097L	2388	O	7,612
545937	2/8/2024	2096L	2402	O	8,173
545973	2/8/2024	2503L	2842	O	7,926
545994	2/9/2024	2096L	2402	O	8,350
546008	2/9/2024	1396L	2383	O	7,506
546027	2/9/2024	2503L	2842	O	7,710
546052	2/10/2024	2096L	2402	O	8,592
546053	2/10/2024	5JF	2056	O	7,127
546054	2/10/2024	2097L	2388	O	7,585
546055	2/12/2024	2097L	2388	O	7,621
546056	2/12/2024	2096L	2402	O	8,180
546082	2/12/2024	2096L	2402	O	8,278
546117	2/13/2024	2503L	2842	O	8,254
546118	2/13/2024	2096L	2402	O	8,192
546124	2/13/2024	2097L	2388	O	7,535
546175	2/14/2024	2097L	2388	O	7,614
546176	2/14/2024	2096L	2402	O	8,161
546218	2/14/2024	2503L	2842	O	7,878
546246	2/15/2024	2097L	2388	O	7,571
546249	2/15/2024	2096L	2402	O	8,185
546252	2/15/2024	2503L	2842	O	8,177
546451	2/20/2024	2097L	2388	O	7,573
546471	2/20/2024	2503L	2842	O	8,002
546481	2/20/2024	2096L	2402	O	8,175
546502	2/21/2024	2957L	2388	O	7,588
546506	2/21/2024	2096L	2402	O	8,338
546513	2/21/2024	1421L	2383	O	7,034
546559	2/22/2024	2957L	2388	O	7,657
546561	2/22/2024	2956L	2402	O	8,158
546593	2/22/2024	2503L	2383	O	8,170
546604	2/23/2024	2956L	2402	O	8,355
546630	2/23/2024	2957L	2388	O	7,585
546648	2/23/2024	1421L	2383	O	6,650

546659	2/26/2024	2957L	2388	O	7,576
546661	2/26/2024	2956L	2402	O	8,269
546676	2/26/2024	1421L	2383	O	7,535
546725	2/27/2024	2503L	2842	O	8,252
546729	2/27/2024	2956L	2402	O	8,261
546749	2/27/2024	2957L	2388	O	7,535
546791	2/28/2024	2957L	2388	O	7,590
546794	2/28/2024	2956L	2802	O	8,317
546821	2/28/2024	2956L	2402	O	8,422
546850	2/29/2024	2957L	2388	O	7,535
546852	2/29/2024	2956L	2402	O	8,225
546868	2/29/2024	2462L	2056	O	6,782
FRANKLIN - FRANKLIN WASTE WATER TREATMEN					**498,268**

ALLENSTOWN - ALLENSTOWN WASTE WATER TREATMENT PLANT

545779	2/5/2024	1466L		O	7,554
545795	2/5/2024	2503L	2842	O	8,165
545814	2/5/2024	2096L	2402	O	8,427
545825	2/6/2024	2503L	2842	O	8,199
545852	2/6/2024	2097L	2383	O	7,360
545868	2/6/2024	2462L	2388	O	7,504
545886	2/7/2024	2503L	2842	O	8,002
545900	2/7/2024	2097L	2388	O	7,609
545922	2/7/2024	1396L		O	7,585
545943	2/8/2024	2503L	2842	O	7,928
545949	2/8/2024	1396L	2383	O	7,319
545956	2/8/2024	2097L	2388	O	7,532
545988	2/9/2024	2503L	2842	O	8,194
546010	2/9/2024	2097L	2388	O	7,564
546035	2/9/2024	1396L	2383	O	7,468
546062	2/12/2024	2503L	2842	O	8,019
546100	2/12/2024	2503L	2842	O	7,933
546108	2/12/2024	2097L	2388	O	7,535
546141	2/13/2024	2503L	2842	O	7,998
546152	2/13/2024	2097L	2056	O	7,588
546156	2/13/2024	1421L	2383	O	7,331
546182	2/14/2024	2503L	2842	O	7,878
546192	2/14/2024	1421L	2383	O	7,360
546198	2/14/2024	2097L	2388	O	7,564
546264	2/15/2024	1421L	2383	O	7,113
546304	2/15/2024	1421L	2383	O	7,559
ALLENSTOWN - ALLENSTOWN WASTE WATER TRE					**200,288**

MANCHESTER - MANCHESTER WASTE WATER TREATMENT PLANT

545831	2/6/2024	5JF	2056	O	7,161
545845	2/6/2024	2096L	2402	O	8,331
545863	2/6/2024	5JF	2056	O	7,177
545892	2/7/2024	4JF	2056	O	6,988
545907	2/7/2024	2096L	2402	O	8,317
545926	2/7/2024	4JF		O	7,017
545945	2/8/2024	4JF	2056	O	6,921
545961	2/8/2024	2096L	2402	O	8,336
545979	2/8/2024	4JF	2056	O	6,990

545997	2/9/2024	4JF		O	7,019
546022	2/9/2024	2096L	2402	O	8,211
546033	2/9/2024	4JF		O	7,038
546066	2/12/2024	4JF	2056	O	6,993
546104	2/12/2024	4JF	2056	O	6,969
546110	2/12/2024	2096L	2402	O	8,350
546129	2/13/2024	4JF	2056	O	6,995
546146	2/13/2024	2096L	2402	O	8,293
546159	2/13/2024	4JF	2056	O	7,022
546187	2/14/2024	4JF	2056	O	6,856
546204	2/14/2024	2096L	2402	O	8,249
546229	2/14/2024	4JF	2056	O	6,954
546267	2/15/2024	2097L	2388	O	7,585
546280	2/15/2024	2096L	2402	O	8,170
546281	2/15/2024	2503L	2842	O	8,125
546315	2/16/2024	2096L	2402	O	8,302
546316	2/16/2024	2097L	2388	O	7,552
546321	2/16/2024	2503L	2842	O	7,839
546381	2/17/2024	2096L	2402	O	8,585
546382	2/17/2024	2097L	2388	O	7,659
546383	2/17/2024	1421L	2383	O	7,276
546384	2/19/2024	2097L	2388	O	7,602
546385	2/19/2024	2503L	2402	O	8,141
546403	2/19/2024	1421L	2383	O	7,134
546433	2/20/2024	2503L	2842	O	8,158
546435	2/20/2024	2096L	2402	O	8,091
546448	2/20/2024	1421L	2383	O	6,796
546522	2/21/2024	2957L	2388	O	7,643
546528	2/21/2024	2096L	2402	O	8,314
546546	2/21/2024	1421L	2383	O	7,633
546565	2/22/2024	2503L	2842	O	8,209
546578	2/22/2024	2957L	2388	O	7,525
546584	2/22/2024	2956L	2402	O	8,379
546615	2/23/2024	2503L	2842	O	8,115
546623	2/23/2024	1421L	2383	O	7,451
546642	2/23/2024	2956L	2402	O	8,180
546656	2/24/2024	2956L	2402	O	8,683
546657	2/24/2024	2957L	2388	O	7,755
546658	2/24/2024	2503L	2842	O	8,516
546692	2/26/2024	2956L	2402	O	8,283
546715	2/26/2024	1421L	2383	O	7,640
546744	2/27/2024	1421L	2383	O	7,376
546781	2/27/2024	1421L		O	7,578
546789	2/27/2024	2956L	2402	O	8,307
546815	2/28/2024	2957L	2388	O	7,573
546843	2/28/2024	2956L	2942	O	8,360
546848	2/28/2024	2462L	2156	O	6,811
546857	2/29/2024	2503L	2842	O	8,283
546863	2/29/2024	1421L	2383	O	7,566
546872	2/29/2024	2957L	2388	O	7,504
MANCHESTER - MANCHESTER WASTE WATER TRE/					**454,886**

Report Grand Totals **1,472,084**

EXHIBIT C-1.3

CMA ENGINEERS, Inc. Civil/Environmental Engineers 35 Bow Street Portsmouth, NH 03801	Project: NCES Stage IV - Phase II Project No: 656 Date: January 2009 Calc. By: JSM Chkd. By: RJG

LEACHATE COLLECTION SYSTEM CALCULATIONS

100 Year Storm - Base Area and Base Flow

Input Variables:			
Cell area (Ac)	0.98	acres	Base Expansion Area
Run-on area (Ar)	2.00	acres	Phase II Side Slope & Overlay Liner
Percent from run-on area Ar (Pr)	40%		*
Time of Concentration	2161	min	
Rainfall Intensity	0.2	in/hr	Figure 6-3 (Appendix A-1-8)
Base flow	7,474	gpd	Site Data (See Base Flow Calculation)

Total Inflow Stage IV, Phase I Volume (Vb)

Vb = I*Tc * Ac			
Vb =	46,424	CF	
	347,254	gal	
Total Volume (Vb + Base flow)	**354,728**	**gal**	Stage IV, Phase II, Stage I Base Flow

100 Year Storm - Overlay Liner

Input Variables:			
Overlay Liner Area (Ac)	2.50	acres	**Southern Overlay Exposed Select Sand
Time of Concentration	121	min	
Rainfall Intensity	1.5	in/hr	Figure 6-3 (Appendix A-1-8)

Total Overlay Liner Flow			
Rainfall Intensity	1.06E-03	cm/s	
Drainage Sand Permeability	3.10E-03	cm/s	Permeability >> Intensity; all Infiltration
Total Overlay Liner Volume (Vo)	27,400	CF	through Sand and into Composite
	204,953	gal	

Total Stage I, Phase II Volume			
Vt = Vb + Vo + Vbase	**559,682**	**gal**	Stage IV, Phase II, Stage I
	0.85	**cfs**	< 2.436 cfs pipe capacity

Available Storage on Liner in Stage IV, Phase I w/2ft Freeboard:

Sump and Header	33,703	gal
Drainage Sand	157,105	gal
MSW	919,674	gal
Total Available Storage on Liner, Stage IV, Phase II	**1,110,482**	**gal**

CMA ENGINEERS, Inc. Civil/Environmental Engineers 35 Bow Street Portsmouth, NH 03801	Project: NCES Stage V Project No: 833 Date: November 2013 Calc. By: LBK Chkd. By: RJG

LEACHATE COLLECTION SYSTEM CALCULATIONS

100 Year Storm - Base Area and Base Flow

Input Variables:			
Cell area (Ac)	4.03	acres	1/2 New Cell Area
Run-on area (Ar)	2.50	acres	Stage I and V Side Slopes
Percent from run-on area Ar (Pr)	40%		*
Time of Concentration	2863	min	
Rainfall Intensity	0.16	in/hr	Figure 6-3 (Appendix A-1-8)
Base Flow	5950	gal/day	

Total Inflow Stage V

Vb = I*Tc * Ac			
Vb =	139,385	CF	
	1,042,602	gal	
Total Volume (Vb + Base flow)	**1,048,552**	**gal**	Stage V, Run-on

Total Stage V Volume			
Vt = Vb + Vbase	**1,048,552**	**gal**	Stage V
	1.61	**cfs**	< 2.25 cfs pipe capacity

Available Storage on Liner in Stage V w/2ft Freeboard:

Drainage Sand	564,455	gal
MSW	1,882,095	gal
Total Available Storage on Liner, Stage V	**2,446,550**	**gal**

Total Leachate Generation

Stage V	**1,048,552**	**gal**
Total Landfill Inflow	**1,048,552**	**gal**

Available Tank Storage:

Existing Stage III Tanks	60,000	gal
150,000 gal AST	150,000	gal
Sump Storage	**10,794**	gal
Total Storage	**220,794**	**gal**

15% of Total Leachate Volume	**157,283**	**gal**	Meets Regulations

CMA ENGINEERS
35 Bow Street
Portsmouth, NH 03801

Project:	NCES Stage VI Phase II
Project No:	1063
Date:	Nov-22
Calc. By:	AJS
Chkd. By:	

LEACHATE COLLECTION SYSTEM CALCULATIONS

Stage VI-Phase II, 100 Year Storm - Base Area and Base Flow
Flow to Pump Station 3

Input Variables:			
S6P2 Cell area to Phase III (Ac)	2.16	acres	
Run-on area (Ar)	1.25	acres	Area under lowest swale draining to Stage III
Percent from run-on area Ar (Pr)	40%		*
Time of Concentration	2474	min	
Rainfall Intensity	0.16	in/hr	Figure 6-3 (Appendix A-1-8)
Base Flow (Stsage III)	5,000	gal/day	

Total Inflow Phase III

Vb = I*Tc * Ac		
Vb =	63,701	CF
	476,485	gal
Total Volume (Vb + Base flow)	**481,485**	**gal**

Total Stage VI Volume			
Vt = Vb + Vbase	**481,485**	**gal**	
	0.74	**cfs**	< 0.79 cfs pipe capacity

Available Storage on Liner in Stage III, 6' assumed MSW Depth:

1.5" Sump Stone and Sand	59,414	gal
6' MSW Layer	1,515,965	gal
Pipe	1,003	gal
Total Available Storage on Liner, Stage III	**1,576,382**	**gal**

Total Leachate Generation

Stage VI-Phase II	**476,485**	**gal**
Base Flow, Stage III	**5,000**	**gal**
Total Inflow (Stage III)	**481,485**	**gal**

Available Tank Storage:

Existing Stage III Tanks	60,000	gal
150,000 gal AST	150,000	gal
Total Storage Outside Landfill	**210,000**	gal
Sump Storage	**59,414**	gal
Total Storage	**269,414**	**gal**

15% of Total Leachate Volume	**72,223**	**gal**	Meets Regulations

Leachate Removal Rates:

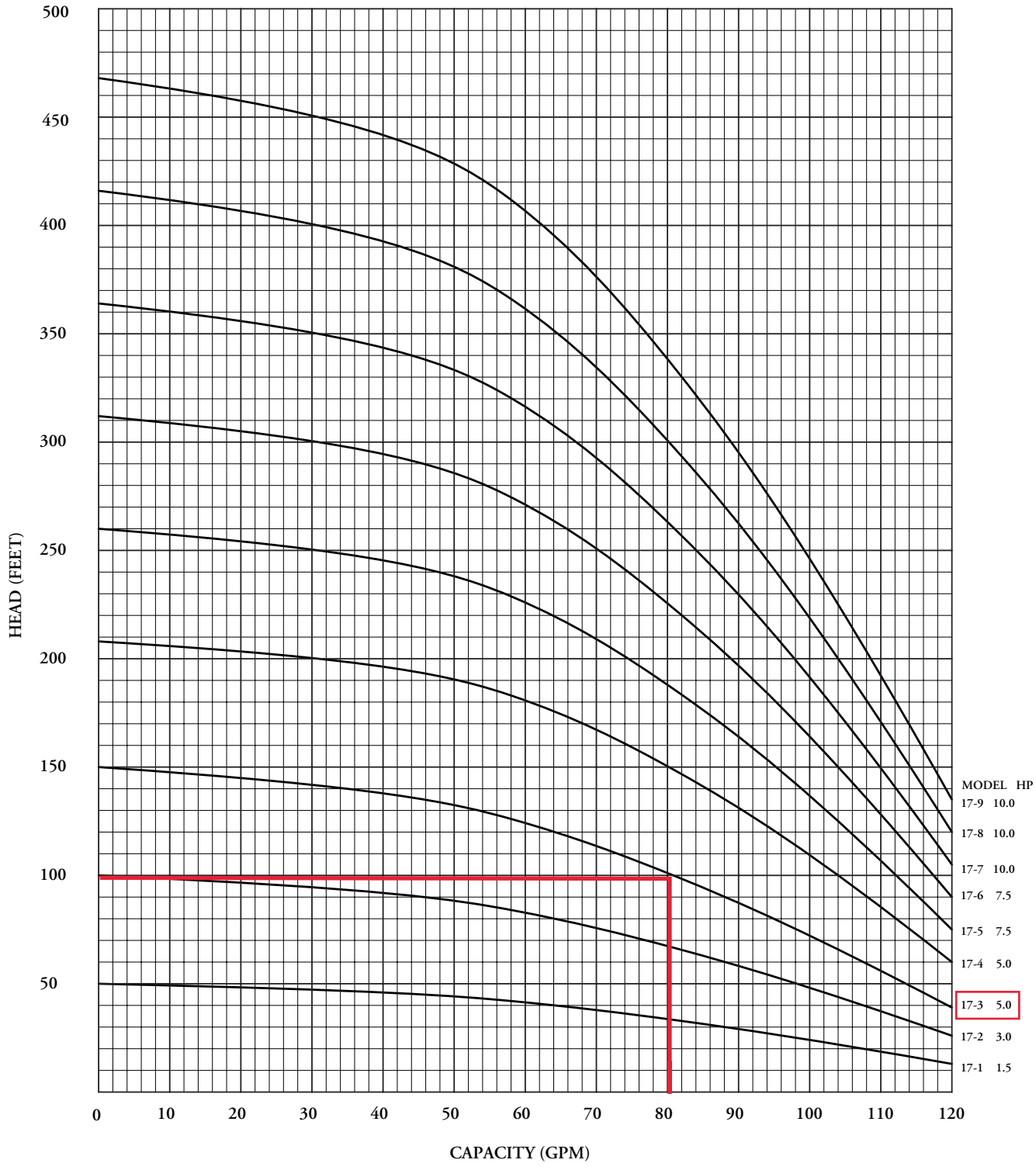
Tanker Trucks	5		
Volume per Truck	5,000	gal/truck	
	0.29	trip/hr	1 per 3.5 hours round trip to Concord
	85,714	gal/day	(12 hours/day per Operating Plan)
	6	days	

* Remaining percent is stored in drainage sand or infiltrates to geocomposite and collection pipe sooner than precipitation and run-off infiltrates through waste, and would be managed prior to other flow.

SERIES 17 SurePump™

Flow Range 20-120 GPM

60 Hz

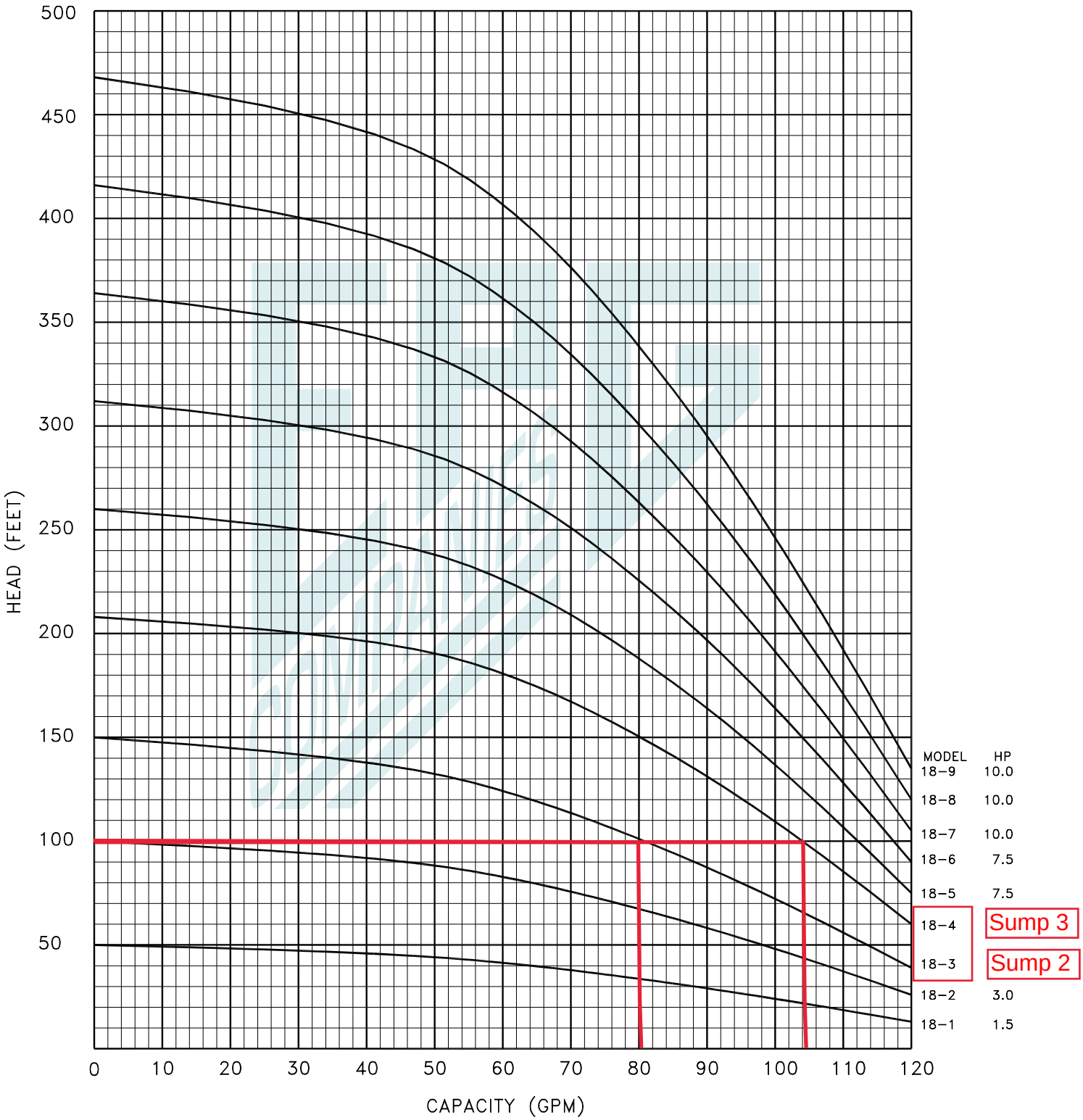


DATA SUBJECT TO CHANGE WITHOUT NOTICE

SERIES 18 SurePump™

Flow Range 20–120 GPM

60 Hz



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

09766–0000

EXHIBIT C-1.5

CMA ENGINEERS 35 Bow Street Portsmouth, NH 03801	Project: NCES Stage VI Phase II Project No: 1063 Date: Nov-22 Calc. By: AJS Chkd. By:

LEACHATE COLLECTION SYSTEM CALCULATIONS

Stage VI-Phase II, 100 Year Storm - Base Area and Base Flow
Flow to Pump Station 3

Input Variables:			
S6P2 Cell area to Phase III (Ac)	2.16	acres	
Run-on area (Ar)	1.25	acres	Area under lowest swale draining to Stage III
Percent from run-on area Ar (Pr)	40%		*
Time of Concentration	2474	min	
Rainfall Intensity	0.16	in/hr	Figure 6-3 (Appendix A-1-8)
Base Flow (Stsage III)	5,000	gal/day	

Total Inflow Phase III

Vb = I*Tc * Ac		
Vb =	63,701	CF
	476,485	gal
Total Volume (Vb + Base flow)	**481,485**	**gal**

Total Stage VI Volume			
Vt = Vb + Vbase	**481,485**	**gal**	
	0.74	**cfs**	< 0.79 cfs pipe capacity

Available Storage on Liner in Stage III, 6' assumed MSW Depth:

1.5" Sump Stone and Sand	59,414	gal
6' MSW Layer	1,515,965	gal
Pipe	1,003	gal
Total Available Storage on Liner, Stage III	**1,576,382**	**gal**

Total Leachate Generation

Stage VI-Phase II	**476,485**	**gal**
Base Flow, Stage III	**5,000**	**gal**
Total Inflow (Stage III)	**481,485**	**gal**

Tank A - 30,000 gallons
Tank B - 30,000 gallons

Available Tank Storage:

Existing Stage III Tanks	60,000	gal
150,000 gal AST	150,000	gal
Total Storage Outside Landfill	**210,000**	gal
Sump Storage	**59,414**	gal
Total Storage	**269,414**	**gal**

15% of Total Leachate Volume	**72,223**	**gal**	Meets Regulations

Leachate Removal Rates:

Tanker Trucks	5		
Volume per Truck	5,000	gal/truck	
	0.29	trip/hr	1 per 3.5 hours round trip to Concord
	85,714	gal/day	(12 hours/day per Operating Plan)
	6	days	

* Remaining percent is stored in drainage sand or infiltrates to geocomposite and collection pipe sooner than precipitation and run-off infiltrates through waste, and would be managed prior to other flow.

EXHIBIT C-1.6

CMA ENGINEERS, Inc.	Project:	NCES Stage IV - Phase II
Civil/Environmental Engineers	Project No:	656
35 Bow Street	Date:	January 2009
Portsmouth, NH 03801	Calc. By:	JSM
	Chkd. By:	RJG

100 Year Storm Event Leachate Storage Capacity
Porosity of Class D Stone 0.45
Porosity of MSW: 0.671

Elevation (ft)	Area (ft^2)	Avg Area (ft^2)	Total Volume (ft^3)	Total Volume (gal)	Total Storage Volume (gal)
In Leachate Pipes					
Primary Risers	3.14	-	132	987	987
Primary Header	0.79	-	393	2,936	2,936
Pipe Max Storage			**524**	**3,923**	**3,923**
In D-Stone in Sump					
2' Deep Sump w/2' Risers	45.72	-	960	7,183	3,232
1'Deep Sump w/1' Header	19.72	-	7,886	58,995	26,548
Sump Max Storage			**960**	**7,183**	**29,780**
In 1.5' D-Stone Over Liner					
1322	13,935	31,112	46,668	349,123	157,105
1324	48,289				
Drainage Sand Max Storage			**46,668**	**349,123**	**157,105**
In 4.5' Waste					
1324	48,289	91,606	183,211	1,370,601	919,674
1326	134,922				
Max Storage in Waste			**183,211**	**1,370,601**	**919,674**
				Total Storage	**1,110,482**

Sump 1

CMA ENGINEERS, Inc. Civil/Environmental Engineers 35 Bow Street Portsmouth, NH 03801	Project: NCES Stage V Project No: 833 Date: November 2013 Calc. By: LBK Chkd. By: RJG

100 Year Storm Event Leachate Storage Capacity
Porosity of Class D Stone 0.4
Porosity of MSW: 0.671

Sump Storage

Elevation (ft)	Area (ft^2)	Avg Area (ft^2)	Total Volume (ft^3)	Total Volume (gal)	Total Storage Volume (gal)
In Leachate Pipes					
Primary Risers	3.14	-	107	799	799
Pipe Max Storage			**107**	**799**	**799**
In D-Stone in Sump					
2.5' Deep Sump w/2' Risers	63.9	-	1,725	12,902	5,161
1.0' Deep Sump Over Seconondary Risers	7.00		168	1,257	503
Sump Max Storage			**1,893**	**14,159**	**5,663**
In 1.5' D-Stone Over Liner					
1315.5	965	-	1,448	10,829	4,331
Drainage Sand Max Storage			**1,448**	**10,829**	**4,331**
				Total Storage	**10,794**

Sump 2

Total Storage

In 6' of MSW					
1320	5087				
		19787	39,574	296053	198652
1322	34487				
		61025	122,049	913049	612656
1324	87562				
		106658	213,315	1595810	1070788
1326	125753				
MSW Max Storage			**374,938**	**2,804,911**	**1,882,095**
In 1.5' of Drainage Sand					
	125753	-	188,630	1,411,137	564455
Drainage Sand Max Storage			**188,630**	**1,411,137**	**564,455**
				Total Storage	2,446,550

CMA ENGINEERS
35 Bow Street
Portsmouth, NH 03801

Project:	NCES Stage VI Phase II
Project No:	1063
Date:	Nov-22
Calc. By:	AJS
Chkd. By:	

LEACHATE COLLECTION SYSTEM CALCULATIONS

100 Year Storm Event Leachate Storage Capacity

Porosity of Drainage Sand	0.457
Porosity of Pipe Trench Stone (3/4")	0.450
Porosity of Class D Stone (1.5")	0.400
Porosity of MSW:	0.671

Stage III

1-ft Sump Storage - Stage VI South (Stage VI Phase II Sump)

Elevation (ft)	Area (ft^2)	Avg Area (ft^2)	Total Volume (ft^3)	Total Volume (gal)	Total Storage Volume (gal)
In Leachate Pipes					
Primary Leachate Pipe	0.31	-	93	699	699
18" Primary Riser Pipe (1)	1.35		20	152	152
18" Primary Riser Pipe (2)	1.35		20	152	152
Pipe Max Storage			**134**	**1,003**	**1,003**
In Sump (3 feet of 1.5" stone)					
1323.5 (bottom of sump)	180	-			
1326.5 (top of sump)	900	540	1,620	12,119	8,132
Sump Max Storage			**1,620**	**12,119**	**8,132**
In 1.5' Drainage Sand Layer					
Drainage Sand Layer (1326.5 to 1328)	10,000	-	**15,000**	**112,215**	**51,282**
Storage in Drainage Sand			**15,000**	**112,215**	**51,282**
In 6-foot MSW Layer					
1328	20,000				
1330	44,000	32,000	64,000	478,784	**321,264**
1332	62,000	53,000	106,000	792,986	**532,094**
1334	70,000	66,000	132,000	987,492	**662,607**
Storage through 6-feet MSW Depth			**302,000**	**2,259,262**	**1,515,965**

Sump 3

EXHIBIT C-1.7

CMA ENGINEERS, Inc.	Project:	NCES Stage IV - Phase II
Civil/Environmental Engineers	Project No:	656
35 Bow Street	Date:	January 2009
Portsmouth, NH 03801	Calc. By:	JSM
	Chkd. By:	RJG

100 Year Storm Event Leachate Storage Capacity
Porosity of Class D Stone 0.45
Porosity of MSW: 0.671

Elevation (ft)	Area (ft^2)	Avg Area (ft^2)	Total Volume (ft^3)	Total Volume (gal)	Total Storage Volume (gal)	
In Leachate Pipes						
Primary Risers	3.14	-	132	987	987	
Primary Header	0.79	-	393	2,936	2,936	
Pipe Max Storage			**524**	**3,923**	**3,923**	Sump 1
In D-Stone in Sump						
2' Deep Sump w/2' Risers	45.72	-	960	7,183	3,232	
1'Deep Sump w/1' Header	19.72	-	7,886	58,995	26,548	
Sump Max Storage			**960**	**7,183**	**29,780**	
In 1.5' D-Stone Over Liner						
1322	13,935	31,112	46,668	349,123	157,105	
1324	48,289					
Drainage Sand Max Storage			**46,668**	**349,123**	**157,105**	Sump 1
In 4.5' Waste						
1324	48,289	91,606	183,211	1,370,601	919,674	
1326	134,922					
Max Storage in Waste			**183,211**	**1,370,601**	**919,674**	
				Total Storage	**1,110,482**	

CMA ENGINEERS, Inc. Civil/Environmental Engineers 35 Bow Street Portsmouth, NH 03801	Project: NCES Stage V Project No: 833 Date: November 2013 Calc. By: LBK Chkd. By: RJG

100 Year Storm Event Leachate Storage Capacity
Porosity of Class D Stone 0.4
Porosity of MSW: 0.671

Sump Storage

Elevation (ft)	Area (ft^2)	Avg Area (ft^2)	Total Volume (ft^3)	Total Volume (gal)	Total Storage Volume (gal)	
In Leachate Pipes						
Primary Risers	3.14	-	107	799	799	
Pipe Max Storage			**107**	**799**	**799**	Sump 2 (assumed)
In D-Stone in Sump						
2.5' Deep Sump w/2' Risers	63.9	-	1,725	12,902	5,161	
1.0' Deep Sump Over Seconondary Risers	7.00		168	1,257	503	
Sump Max Storage			**1,893**	**14,159**	**5,663**	
In 1.5' D-Stone Over Liner						
1315.5	965	-	1,448	10,829	4,331	
Drainage Sand Max Storage			**1,448**	**10,829**	**4,331**	Sump 2 (assumed)
				Total Storage	**10,794**	

Total Storage

In 6' of MSW						
1320	5087					
		19787	39,574	296053	198652	
1322	34487					
		61025	122,049	913049	612656	
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		106658	213,315	1595810	1070788	
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MSW Max Storage			**374,938**	**2,804,911**	**1,882,095**	
In 1.5' of Drainage Sand						
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Drainage Sand Max Storage			**188,630**	**1,411,137**	**564,455**	
				Total Storage	2,446,550	

CMA ENGINEERS
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Project:	NCES Stage VI Phase II
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LEACHATE COLLECTION SYSTEM CALCULATIONS

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Porosity of Pipe Trench Stone (3/4")	0.450
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Stage III

1-ft Sump Storage - Stage VI South (Stage VI Phase II Sump)

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Pipe Max Storage			**134**	**1,003**	**1,003**	Sump 3
In Sump (3 feet of 1.5" stone)						
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Sump Max Storage			**1,620**	**12,119**	**8,132**	
In 1.5' Drainage Sand Layer						
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Storage in Drainage Sand			**15,000**	**112,215**	**51,282**	Sump 3
In 6-foot MSW Layer						
1328	20,000					
1330	44,000	32,000	64,000	478,784	**321,264**	
1332	62,000	53,000	106,000	792,986	**532,094**	
1334	70,000	66,000	132,000	987,492	**662,607**	
Storage through 6-feet MSW Depth			**302,000**	**2,259,262**	**1,515,965**	