Luminant

Dynegy Midwest Generation, LLC
1500 Eastport Plaza Drive
Collinsville, IL 62234

November 10, 2023
Illinois Environmental Protection Agency
DWPC – Permits MC#15
Attn: 35 I.A.C. § 845.650(e) Alternative Source Demonstration Submittal
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

Re: Hennepin Power Plant West Ash Pond System; IEPA ID # W1550100002-01-03

Dear Mr. LeCrone:

In accordance with Title 35 of the Illinois Administrative Code (35 I.A.C.) Section (§) 845.650(e), Dynegy Midwest Generation, LLC (DMG) is submitting this Alternative Source Demonstration (ASD) for exceedances observed from the Quarter 2 2023 sampling event at the Hennepin West Ash Pond System, identified by Illinois Environmental Protection Agency (IEPA) ID No. W1550100002-01-03.

This ASD is being submitted within 60 days from the date of determination of an exceedance of a groundwater protection standard (GWPS) for constituents listed in 35 I.A.C. § 845.600. As required by 35 I.A.C. § 845.650 (e)(1), the ASD was placed on the facility's website within 24 hours of submittal to the agency.

One hard copy is provided with this submittal.

Sincerely,

Phil Morris, PE
Senior Director, Environmental

Enclosures
Alternate Source Demonstration, Quarter 2 2023, Bottom Ash Pond Baldwin Power Plant, Baldwin Illinois

Prepared for
Dynegy Midwest Generation, LLC

Date
November 10, 2023

Project No.
1940103649-010

35 I.A.C. § 845.650(E): ALTERNATIVE SOURCE DEMONSTRATION

WEST ASH POND SYSTEM
HENNEPIN POWER PLANT
HENNEPIN, ILLINOIS
IEPA ID: W1550100002-01 AND W1550100002-03

RAMBOLL Bright ideas. Sustainable change.

CERTIFICATIONS

I, Eric J. Tlachac, a qualified professional engineer in good standing in the State of Illinois, certify that the information in this report is accurate as of the date of my signature below. The content of this report is not to be used other than for its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

Eric J. Tlachac
Qualified Professional Engineer
062-063091
Illinois
Ramboll Americas Engineering Solutions, Inc.
Date: November 10, 2023

I, Brian G. Hennings, a professional geologist in good standing in the State of Illinois, certify that the information in this report is accurate as of the date of my signature below. The content of this report is not to be used other than for its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

Brian G. Hennings
Professional Geologist
196-001482
Illinois
Ramboll Americas Engineering Solutions, Inc.
Date: November 10, 2023

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FIGURES (ATTACHED)

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ACRONYMS AND ABBREVIATIONS

35 I.A.C.	Title 35 of the Illinois Administrative Code
AP2/AP4	Ash Pond No. 2/ Ash Pond No. 4
ASD	Alternative Source Demonstration
CCR	coal combustion residuals
Closure Plan	Closure and Post-Closure Care Plan
CMA	Corrective Measures Assessment
DMG	Dynegy Midwest Generation, LLC
E001	Event 1
EPRI	Electric Power Research Institute
Geosyntec	Geosyntec Consultants, Inc.
GWPS	Groundwater Protection Standard
Hennepin East	includes Landfill, AP2, AP4, and East Ash Pond
HPP	Hennepin Power Plant
IEPA	Illinois Environmental Protection Agency
LOE(s)	line(s) of evidence
mg/L	milligrams per liter
NAVD88	North American Vertical Datum of 1988
No.	Number
NRT/OBG	Natural Resource Technology, an OBG Company
OWAP	Old West Ash Pond (Pond Number No. 1 and Pond No. 3)
OWPP	Old West Polishing Pond
Ramboll	Ramboll Americas Engineering Solutions, Inc.
RL	reporting limit
UA	Uppermost Aquifer
USEPA	United States Environmental Protection Agency
WAPS	West Ash Pond System CCR multi-unit, includes OWAP and OWPP

1. INTRODUCTION

Under Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845.650(e), within 60 days from the date of determination of an exceedance of a groundwater protection standard (GWPS) for constituents listed in 35 I.A.C. § 845.600, an owner or operator of a coal combustion residuals (CCR) surface impoundment may complete a written demonstration that a source other than the CCR surface impoundment caused the contamination and the CCR surface impoundment did not contribute to the contamination, or that the exceedance of the GWPS resulted from error in sampling, analysis, statistical evaluation, natural variation in groundwater quality, or a change in the potentiometric surface and groundwater flow direction (Alternative Source Demonstration [ASD]).

This ASD has been prepared on behalf of Dynegy Midwest Generation, LLC (DMG), by Ramboll Americas Engineering Solutions, Inc. (Ramboll) to provide pertinent information pursuant to 35 I.A.C. § 845.650(e) for the West Ash Pond System (WAPS), located at Hennepin Power Plant (HPP) near Hennepin, Illinois. The WAPS is comprised of two units: the Old West Ash Pond (Pond Number [No.] 1 and Pond No. 3) (OWAP) and Old West Polishing Pond (OWPP).

The most recent quarterly sampling event (Event 1 [E001]) was completed on June 1, 2023, and analytical data were received on July 13, 2023. In accordance with 35 I.A.C. § 845.610(b)(3)(C), comparison of statistically derived values with the GWPSs described in 35 I.A.C. § 845.600 to determine exceedances of the GWPS was completed by September 11, 2023, within 60 days of receipt of the analytical data (Ramboll, 2023a). The statistical determination identified the following GWPS exceedances at compliance groundwater monitoring wells:

- Arsenic at wells 21R and 51
- Boron at wells 21R, 22, 23, and 35
- Cadmium at well 22
- Sulfate at wells 23 and 35

Pursuant to 35 I.A.C. § 845.650(e), the lines of evidence (LOEs) presented in **Section 3** demonstrate that sources other than the WAPS were the cause of the cadmium GWPS exceedance listed above and the WAPS has not contributed to the exceedances. Cadmium is demonstrated to be naturally occurring in aquifer solids and mobilized to groundwater by declining pH conditions. This ASD was completed by November 10, 2023, within 60 days of determination of the exceedances (September 11, 2023), as required by 35 I.A.C. § 845.650(e). This ASD has been completed in conformance with guidance provided in the Electric Power Research Institute (EPRI) guidance for development of ASDs at CCR sites (EPRI, 2017), and the United States Environmental Protection Agency (USEPA)'s Solid Waste Disposal Facility Criteria: Technical Manual (USEPA, 1993).

Arsenic, boron, and sulfate GWPS exceedances at the WAPS will be addressed in accordance with 35 I.A.C. § 845.660.

2. BACKGROUND

2.1 Site Location and Description

The HPP is located in the northwest quarter of Section 26, Township 33 North, Range 2 West, Putnam County, Illinois and approximately 3 miles north-northeast of the Village of Hennepin.

The WAPS is one of three CCR units at the HPP regulated under 35 I.A.C. § 845. The other two CCR units regulated under 35 I.A.C. § 845 (Ash Pond No. 2 and No. 4 multi-unit [AP2/AP4] and the East Ash Pond) are located adjacent to each other and the Landfill, east of the HPP, and are collectively known as Hennepin East. The WAPS is located west of the HPP. Areas surrounding the WAPS include agricultural land with scattered groupings or rows of trees to the southeast and low-lying floodplains of the Donnelley Wildlife Management Area to the southwest and west. The WAPS and surrounding properties are shown on **Figure 1**.

2.2 Groundwater Monitoring

The WAPS groundwater monitoring system consists of two background monitoring wells (32 and 34) and nine compliance monitoring wells (21R, 22, 22D, 23, 27, 35, 49, 50, and 51) (Ramboll, 2021). A map showing the groundwater monitoring system, including the CCR unit and monitoring wells, is presented in **Figure 1**.

Groundwater samples are collected and analyzed in accordance with the Multi-Site Sampling and Analysis Plan (Ramboll, 2023b). Statistical evaluation of analytical data is performed in accordance with Multi-Site Statistical Analysis Plan (Ramboll, 2022).

2.3 Site History

The HPP has two coal-fired generating units constructed in 1953 and 1959 with a total capacity of 210 Megawatts. Operations ceased in November 2019.

DMG operated the WAPS from 1952 through 1996. It consists of two closed units, the OWAP and the OWPP (**Figure 1**). The OWAP consists of the 9.3-acre Pond No. 1 at the eastern end of the impoundment and the 16.4-acre Pond No. 3 within the central portion of the impoundment. The 4.7-acre OWPP is situated at the western end of the impoundment. All ponds were previously bermed to approximately 15 feet above grade using locally occurring sandy soils. A portion of the OWPP berm was removed after CCR material was removed during closure of this unit in 2020.

During operation, service water was used to sluice fly ash, bottom ash, and low-volume wastes to the WAPS. At the time it was removed from service in late 1996, there was no surface water discharge. Coal ash sluiced to the WAPS was a by-product of the combustion of high-sulfur Illinois coal. The operational history of the WAPS is summarized in **Table A** on the following page.[1]

[1] A more detailed description of the operational history can be found in the Hydrogeologic Site Characterization Report, submitted as part of the Closure Plan (NRT/OBG, 2017).

Table A. Operational History of the West Ash Pond System

Date	Event
1952-1955	Construction of OWAP, Pond No. 1. Berms were constructed from locally sandy materials to an original elevation (since modified) of 457 feet NAVD88.
1968	Construction of OWAP, Pond No. 3. Berms were constructed to an original elevation (since modified) of 457 feet NAVD88.
1979	Berms surrounding the OWAP Ponds No. 1 and No. 3 were raised by three feet to an elevation of 460 feet NAVD88.
1988-1989	Ponds No. 1 and No. 3 within the OWAP were consolidated and divided into primary and secondary cells, and the berm around the primary portion was raised five feet to an elevation of 465 feet NAVD88. It was after this consolidation that surface water discharge from the impoundment ceased.
1996	OWAP Ponds No. 1 and No. 3 were removed from service.
2020	OWAP Ponds No. 1 and No. 3 were closed in place and OWPP was closed by removal (CCR consolidated into Ponds No. 1 and No. 3) in accordance with the IEPA-approved closure plan.

IEPA = Illinois Environmental Protection Agency
NAVD88 = North American Vertical Datum of 1988

The *Closure and Post-Closure Care Plan, Old West Ash Pond, Old West Polishing Pond at DMG, Hennepin Power Station* (Closure Plan) was submitted to IEPA in 2017 (Geosyntec Consultants, Inc. [Geosyntec], 2017). The Closure Plan was approved by IEPA in a letter dated June 19, 2018. The approved Closure Plan summarized the planned closure of the WAPS, which included dewatering the CCR, if needed, mechanical excavation of material from the OWPP for use as structural fill in the WAPS, grading within the WAPS, constructing an alternative cover system consisting of geomembrane and vegetated cover soils in direct contract with the graded CCR, and establishment of a vegetative cover. Closure construction was completed on November 17, 2020.

2.4 Site Hydrogeology and Stratigraphy

While information pertinent to this ASD is included in this report, a detailed hydrogeological assessment of the site hydrogeology and stratigraphy was completed and included in the October 25, 2021 operating permit application (Burns & McDonnell, 2021) and the Hydrogeologic Site Characterization Report, submitted as part of the Closure Plan (NRT/OBG, 2017). Those materials are incorporated herein.

There are three dominant geomorphic features in the immediate vicinity of the HPP: an upper river terrace at an elevation of about 500 to 550 feet NAVD88, a lower river terrace at an elevation of about 450 to 460 feet NAVD88, and the current river valley filled with alluvium to an elevation of about 445 feet NAVD88. The HPP and the eastern portion of the WAPS (OWAP Pond No. 1) are on the lower terrace. The western portion of the WAPS (OWAP Pond No. 3 and OWPP) overlies alluvium.

The hydrogeological assessment identified that the stratigraphy within and immediately surrounding the WAPS consists of fill, unlithified river alluvium, and Pleistocene-age glacial outwash deposits overlying Pennsylvanian-age shale bedrock. The perimeter berms of the WAPS contain variable amounts of CCR and re-worked native silt, clay, and sand. Where undisturbed or

partially excavated, the native surficial soil at the site is poorly drained, moderately permeable silty clay loam formed as alluvium in floodplains.

There are two hydrogeologic units present at the HPP: alluvium and Henry Formation sands and gravels. The river laid deposits are identified as Cahokia Alluvium. The Henry Formation sands and gravels make up the upper and lower terraces and fill the valley beneath the alluvium. The Henry Formation and alluvium together comprise the Uppermost Aquifer (UA) at the WAPS and extend from the water table to the bedrock.

The WAPS overlies both glacial deposits (Henry Formation) and alluvium (Cahokia Alluvium). The WAPS, specifically OWAP Pond No. 1, rests on top of lower terrace glacial deposits, and the eastern portion of Pond No. 3 overlies alluvial sand. The western portion of Pond No. 3 and the OWPP overlie silty clay alluvial channel fill deposits.

The Pennsylvanian-age bedrock consists of interbedded layers of shale with thin limestone, sandstone, and coal beds. The shale bedrock unit has low hydraulic conductivity and defines the lower boundary of the UA.

The direction of groundwater flow and hydraulic gradient within the UA varies with the elevation of the Illinois River (select groundwater elevation contour maps are provided in **Appendix A**). During normal river stage the direction of groundwater flow is most often toward the river, but comparison of groundwater and river elevation data indicate reversals in this flow direction during times of high river elevations. The relative duration of these events is short, which leads to the determination of a predominant groundwater flow direction toward the river.

Groundwater elevations for the WAPS during the E001 sampling event on May 30, 2023 are shown in **Figure 2** and ranged from 440.90 feet NAVD88 (in well 34) to 446.70 feet NAVD88 (in wells 26 and 36). The groundwater flow direction was northwest toward the river at this time.

3. ALTERNATIVE SOURCE DEMONSTRATION: LINES OF EVIDENCE

As allowed by 35 I.A.C. § 845.650(e), this ASD demonstrates that sources other than the WAPS (the CCR unit) caused the cadmium exceedance at well 22 and did not contribute to the contamination. LOEs supporting this ASD include the following:

1. Concentrations of cadmium in WAPS porewater samples are lower than those observed in well 22.
2. Cadmium concentrations in groundwater are inversely correlated with concentrations of CCR indicator parameters.
3. An aquifer solids and geochemical evaluation identified naturally occurring cadmium associated with the subsurface alluvium as a source of cadmium in the Uppermost Aquifer that can be mobilized under declining pH conditions observed at the WAPS.

Data and information supporting these LOEs are discussed in more detail below.

3.1 LOE #1: Concentrations of Cadmium in WAPS Porewater Samples are Lower Than Those Observed in Well 22

Porewater samples were collected from multiple locations shown on **Figure 3** within the WAPS in April and September of 2017 (**Appendix B**). As presented above, closure construction of the WAPS was completed on November 17, 2020 and hydrogeologic characterization of the WAPS was completed prior to closure as documented in the operating permit application and the Hydrogeologic Site Characterization Report, submitted as part of the Closure Plan (NRT/OBG, 2017). Porewater wells L4, LPZ1, LPZ3, and LPZ17 are distributed across the WAPS from east to west (**Figure 3**) and each of the wells were screened at the base of CCR material (see boring logs and well construction information provided in **Appendix B**). More recent data from these wells is not available[2]. CCR porewater most accurately represents the mobile constituents associated with the waste management activity within the CCR SI (EPRI, 2017). The spatial distribution of the wells and screen intervals at the base of the observed CCR material in 2017 provide sample results that are representative of porewater at the WAPS.

Analytical results from locations L4, LPZ1, LPZ3, and LPZ17, sampled on April 25, 2017, indicate that total cadmium concentrations in porewater within the WAPS were less than laboratory reporting limits (RL) (less than 0.001 milligrams per liter [mg/L]). Analytical results of porewater within the WAPS locations L4 and LPZ17, sampled on September 6, 2017, indicate that the total cadmium concentration in the sample from L4 was below the RL (less than 0.001 mg/L) and the total cadmium concentration in the sample from LPZ17 was 0.0013 mg/L. Samples were not collected from LPZ1 and LPZ3 on September 6, 2017 due to these porewater wells being dry.

The cadmium concentrations detected in the porewater samples collected within the WAPS are less than the lower confidence limit of cadmium concentrations observed in well 22 (0.00614 mg/L) therefore the WAPS cannot be the source of the concentrations observed in well 22.

[2] During closure construction three porewater locations were modified to extend up through the final cover system (LPZ1, LPZ3, and LPZ5). Water level measurements collected from these three wells are similar to the total depths of the wells with little variation, indicating the wells are dry and water levels within the WAPS are below the well screens of these porewater wells.

Analytical data used to support the calculation of lower confidence limits are included in **Appendix C**.

3.2 LOE #2: Cadmium Concentrations in Groundwater are Inversely Correlated with Concentrations of CCR Indicator Parameters

Boron and sulfate are common indicators of CCR impacts to groundwater due to their leachability from CCR and mobility in groundwater (Electric Power Research Institute [EPRI], 2012). Porewater from the WAPS is elevated in both boron and sulfate (**Appendix B**), indicating that these parameters are site-specific key indicators for CCR. If an exceedance is identified for a monitored parameter, but concentrations of boron and sulfate are not directly correlated with that parameter, it is unlikely that the CCR unit is the source of the exceedance.

Figure A on the following page provides a scatter plot of cadmium versus boron and sulfate concentrations (collected from 2015 through the E001 sampling event) in monitoring well 22 (the location of the cadmium exceedance), along with the results of a Kendall correlation test for non-parametric data (these data were determined to be not normally distributed). The results of the test at each well are described by the p-value and tau (Kendall correlation coefficient) included in each plot. Typically, a p-value greater than 0.05 is considered to be a statistically insignificant relationship. The range of tau falls between -1 and 1, with a perfect correlation equal to -1 or 1. The closer tau is to 0, the less of a correlation exists in the data.

The results of the correlation analyses indicate that concentrations of cadmium observed at monitoring well 22 are inversely correlated with concentrations of boron and sulfate, common indicators of CCR impacts to groundwater. **Figure A** illustrates the inverse relationship between cadmium concentrations and boron or sulfate concentrations in groundwater at monitoring well 22, where the p-values are less than 0.001 and tau values are negative.

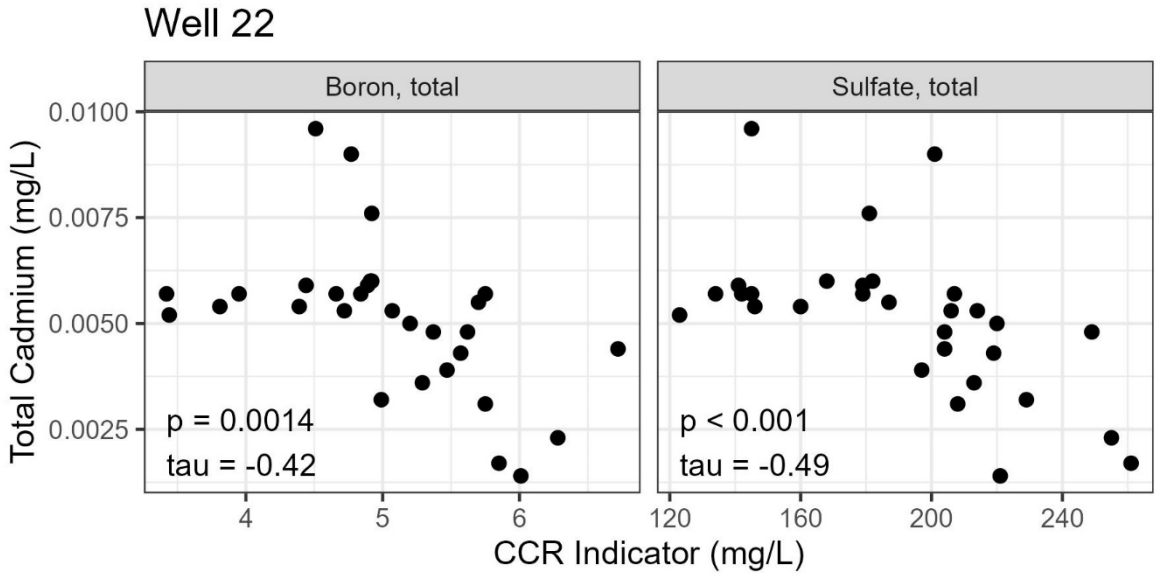

Figure A. Scatter Plot of Cadmium Versus Boron and Sulfate Concentrations at Monitoring Well 22

Cadmium concentrations are inversely correlated with boron and sulfate concentrations in compliance monitoring well 22, indicating the WAPS is not the source of the cadmium exceedance. Analytical data used to support this correlation analysis is included in **Appendix C**.

3.3 LOE #3: An Aquifer Solids and Geochemical Evaluation Identified Naturally Occurring Cadmium Associated with the Subsurface Alluvium as a Source of Cadmium in the Uppermost Aquifer that can be Mobilized Under Declining pH Conditions Observed at the WAPS

Solid phase analyses were completed on samples of UA materials collected from the Site to support the conclusion that cadmium concentrations in groundwater observed in well 22 are associated with naturally occurring cadmium in the UA materials. A review of the geochemical and site conditions to evaluate the influence of the UA solid-phase mineralogy and geochemistry on groundwater composition was completed by Geosyntec and is included as **Appendix D**. The following conclusions were made based on the results of the aquifer solids evaluation and geochemical modeling:

- Solid-phase samples collected from soil borings completed adjacent to background well 34 and compliance well 22 contained cadmium, with the highest total cadmium concentrations observed in samples collected from the screened interval of well 22.
- The majority of cadmium in the solid phase is associated with the weak acid extractable fraction (which includes carbonates) and the reducing agent extractable fraction (which includes iron/manganese oxides). Carbonate minerals make up approximately 18-25% of the solid phase materials and magnetite (an iron oxide mineral) was present in all solid phase samples.
- Literature supports two potential mechanisms of cadmium mobilization under declining pH conditions observed at the WAPS: the dissolution of calcite containing coprecipitated cadmium, and the desorption of cadmium from iron oxide mineral surfaces.
- There has been a downward shift in pH in groundwater at well 22 since approximately 2013 with a corresponding increase in cadmium concentrations.
- Thermodynamic reaction pathway modeling supports the conclusion that both mechanisms of cadmium mobilization (dissolution of cadmium-substituted carbonate minerals and desorption from iron oxides) should occur within the range of the observed groundwater pH decrease at well 22.

Evaluation of the solid phase material and geochemical modeling results using site-specific solid-phase data suggest that naturally occurring cadmium associated with the subsurface alluvium comprising the UA at the Site is the alternative source of the cadmium concentrations at well 22 under changing geochemical conditions.

4. CONCLUSIONS

Based on these three LOEs, it has been demonstrated that the WAPS is not the source of and has not contributed to the cadmium exceedance identified in well 22.

1. Concentrations of cadmium in WAPS porewater samples are lower than those observed in well 22.
2. Cadmium concentrations in groundwater are inversely correlated with concentrations of CCR indicator parameters.
3. An aquifer solids and geochemical evaluation identified naturally occurring cadmium associated with the subsurface alluvium as a source of cadmium in the Uppermost Aquifer that can be mobilized under declining pH conditions observed at the WAPS.

Based on the LOEs presented, the following alternative sources are the cause of the exceedance observed in the WAPS compliance well 22:

- Cadmium: exceedance for cadmium is caused by mobilization of naturally occurring cadmium out of aquifer solids due to favorable geochemical conditions.

This information serves as the written ASD report prepared in accordance with 35 I.A.C. § 845.650(e), that the cadmium exceedance observed during the E001 monitoring event was not caused by the WAPS but was from other sources.

5. REFERENCES

Burns & McDonnell, 2021. Initial Operating Permit, Hennepin West Ash Pond System, October 25, 2021.

Electric Power Research Institute (EPRI), 2012. Groundwater Quality Signatures for Assessing Potential Impacts from Coal Combustion Product Leachate. EPRI, Palo Alto, CA. 1017923.

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Geosyntec Consultants, Inc. (Geosyntec), 2017. Closure and Post Closure Care Plan, Old West Ash Pond, Old West Polishing Pond at Dynegy Midwest Generation, LLC, Hennepin Power Station.

Geosyntec Consultants, Inc., 2023. Technical Memorandum – Evaluation of Cadmium Sources within Aquifer Solids, Hennepin Power Plant – West Ash Pond System, October 26, 2023.

Natural Resource Technology, an OBG Company (NRT/OBG), 2017. Hydrogeologic Site Characterization Report, West Ash Pond System, Hennepin Power Station, Hennepin, Illinois. December 20, 2017.

Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2021. Groundwater Monitoring Plan Addendum for the West Ash Pond System, Hennepin Power Plant, Hennepin, Illinois. October 25, 2021.

Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2022. Multi-Site Statistical Analysis Plan. December 28, 2022.

Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2023a. 35 I.A.C. § 845.610(B)(3)(D) Groundwater Monitoring Data and Detected Exceedances, 2023 Quarter 2, West Ash Pond System, Hennepin Power Plant, Hennepin, Illinois. September 11, 2023.

Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2023b. Multi-Site Sampling and Analysis Plan, Revision 1. October 10, 2023.

United States Environmental Protection Agency (USEPA), 1993. Solid Waste Disposal Facility Criteria: Technical Manual EPA530-R-93-017. Solid Waste and Emergency Response (5305). November 1993.

FIGURES

COMPLIANCE MONITORING WELL
BACKGROUND MONITORING WELL
MONITORING WELL
35 I.A.C. § 845 REGULATED UNIT (SUBJECT UNIT)
LIMITS OF FINAL COVER
SITE FEATURE
PROPERTY BOUNDARY

0 200 400
Feet

MONITORING WELL LOCATION MAP

ALTERNATIVE SOURCE DEMONSTRATION
WEST ASH POND SYSTEM
HENNEPIN POWER PLANT
HENNEPIN, ILLINOIS

FIGURE 1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22\22851\MXD\2021_Annual\GWM_CAR\Hennepin\OWAP_804\Figure 1 HEN OWAP MW Location Map.mxd

PROJECT: 169000XXXX | DATED: 1/5/2022 | DESIGNER: galarmmc

COMPLIANCE MONITORING WELL
BACKGROUND MONITORING WELL
MONITORING WELL
GROUNDWATER ELEVATION CONTOUR (1 FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
REGULATED UNIT (SUBJECT UNIT)
LIMITS OF FINAL COVER
PROPERTY BOUNDARY

NOTES:

1.ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.

2. ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

*ILLINOIS RIVER ELEVATION OBTAINED FROM STAFF GAGE SG02, LOCATED AT THE HENNEPIN POWER PLANT

0 200 400 Feet

POTENTIOMETRIC SURFACE MAP MAY 30, 2023

ALTERNATIVE SOURCE DEMONSTRATION
WEST ASH POND SYSTEM
HENNEPIN POWER PLANT
HENNEPIN, ILLINOIS

FIGURE 2

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

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Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_2023\Hennepin\OWAP_804\HEN 804 OWAP Pot Surface 20230530.mxd

PROJECT: 169000XXXX | DATED: 7/6/2023 | DESIGNER: GALARNMC

LEACHATE WELL
REGULATED UNIT (SUBJECT UNIT)
LIMITS OF FINAL COVER
PROPERTY BOUNDARY

0 200 400
Feet

POREWATER SAMPLE LOCATION MAP

ALTERNATIVE SOURCE DEMONSTRATION
WEST ASH POND SYSTEM
HENNEPIN POWER PLANT
HENNEPIN, ILLINOIS

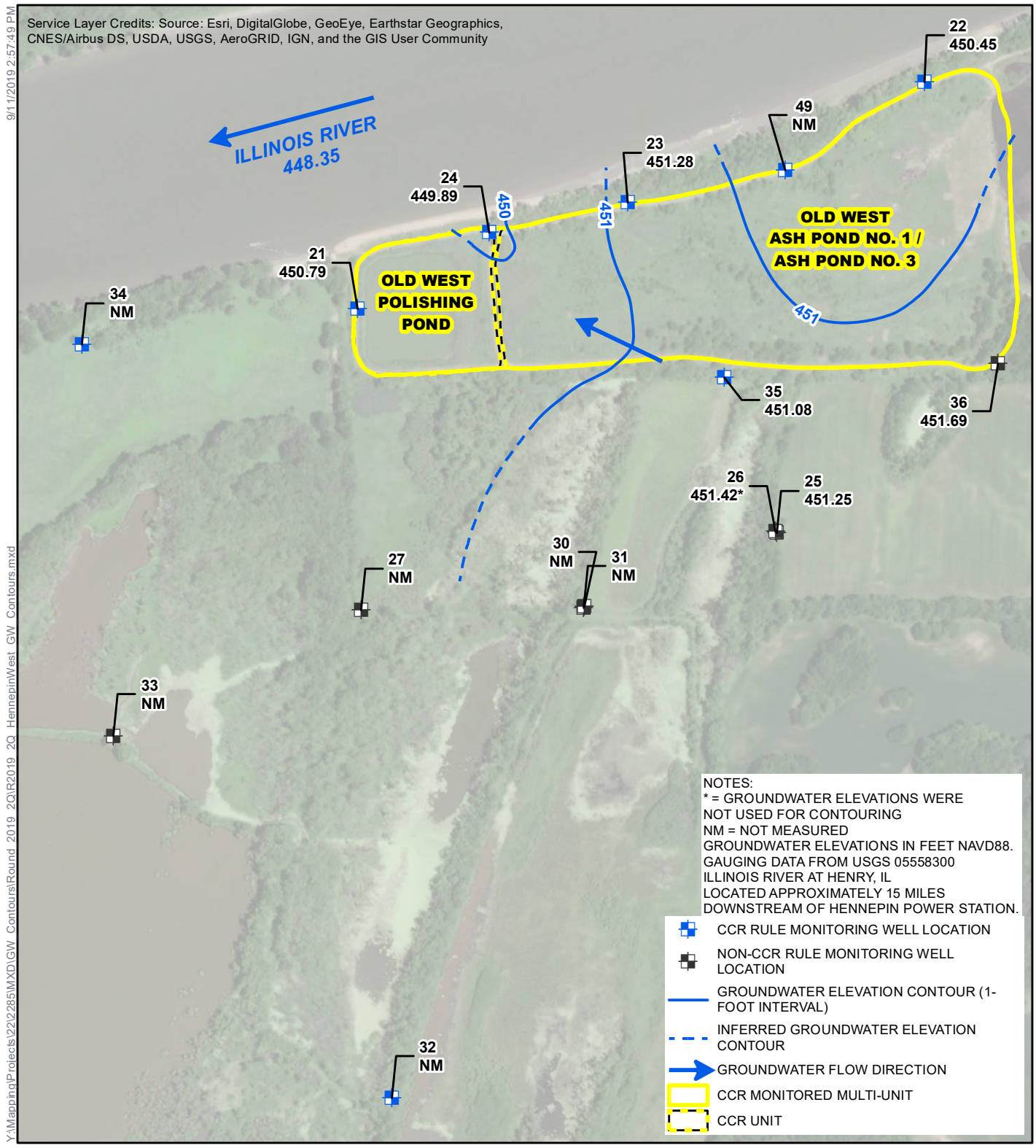
FIGURE 3

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

APPENDICES

APPENDIX A
GROUNDWATER ELEVATION CONTOUR MAPS



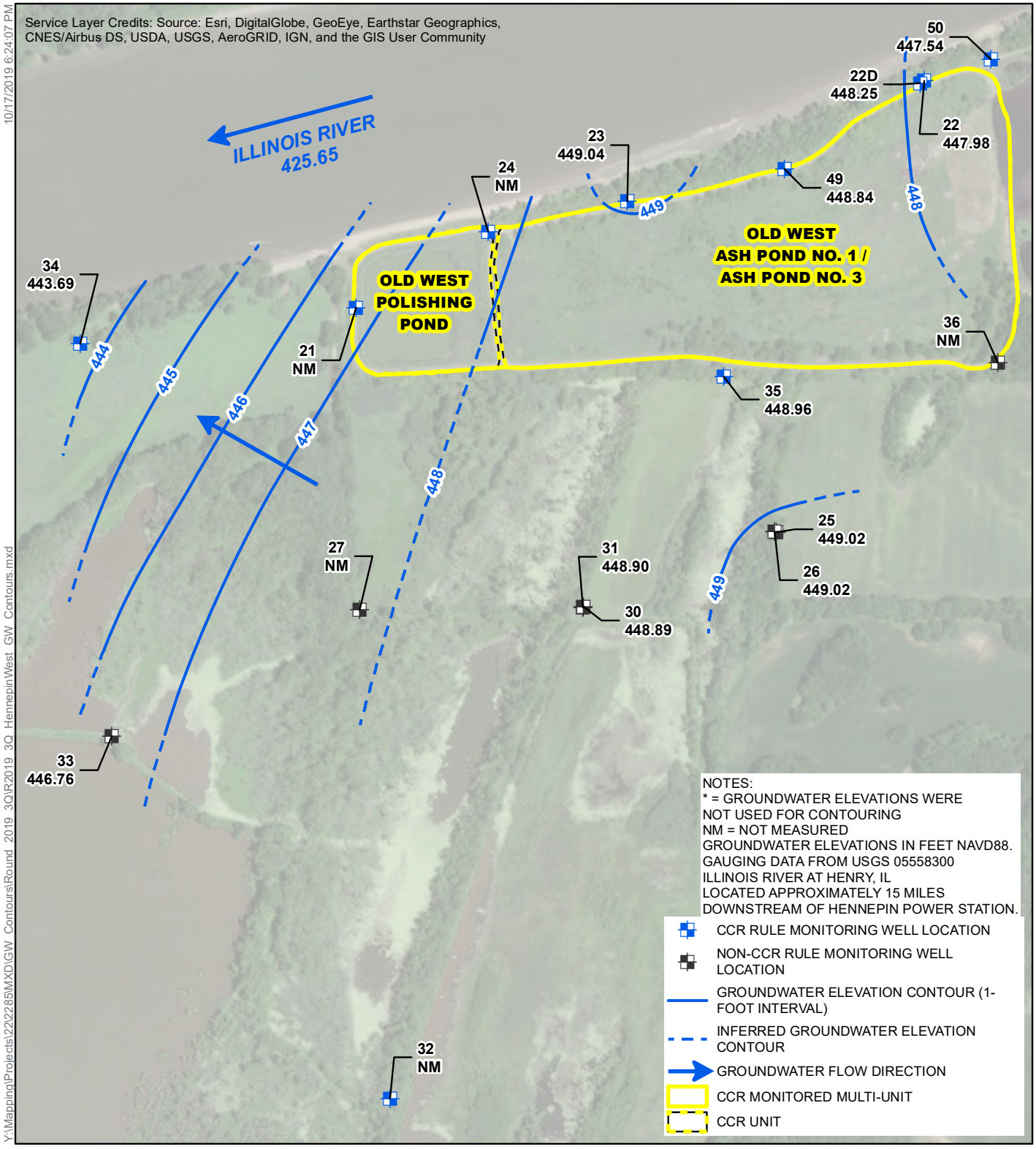
HENNEPIN OLD WEST ASH POND (POND NO.1 AND POND NO. 3) AND HENNEPIN OLD WEST POLISHING POND (UNIT ID: 804) GROUNDWATER ELEVATION CONTOUR MAP JUNE 18, 2019

CCR RULE GROUNDWATER MONITORING
HENNEPIN POWER STATION
HENNEPIN, ILLINOIS

0 125 250 500
Feet

N

O'BRIEN & GERE ENGINEERS, INC.



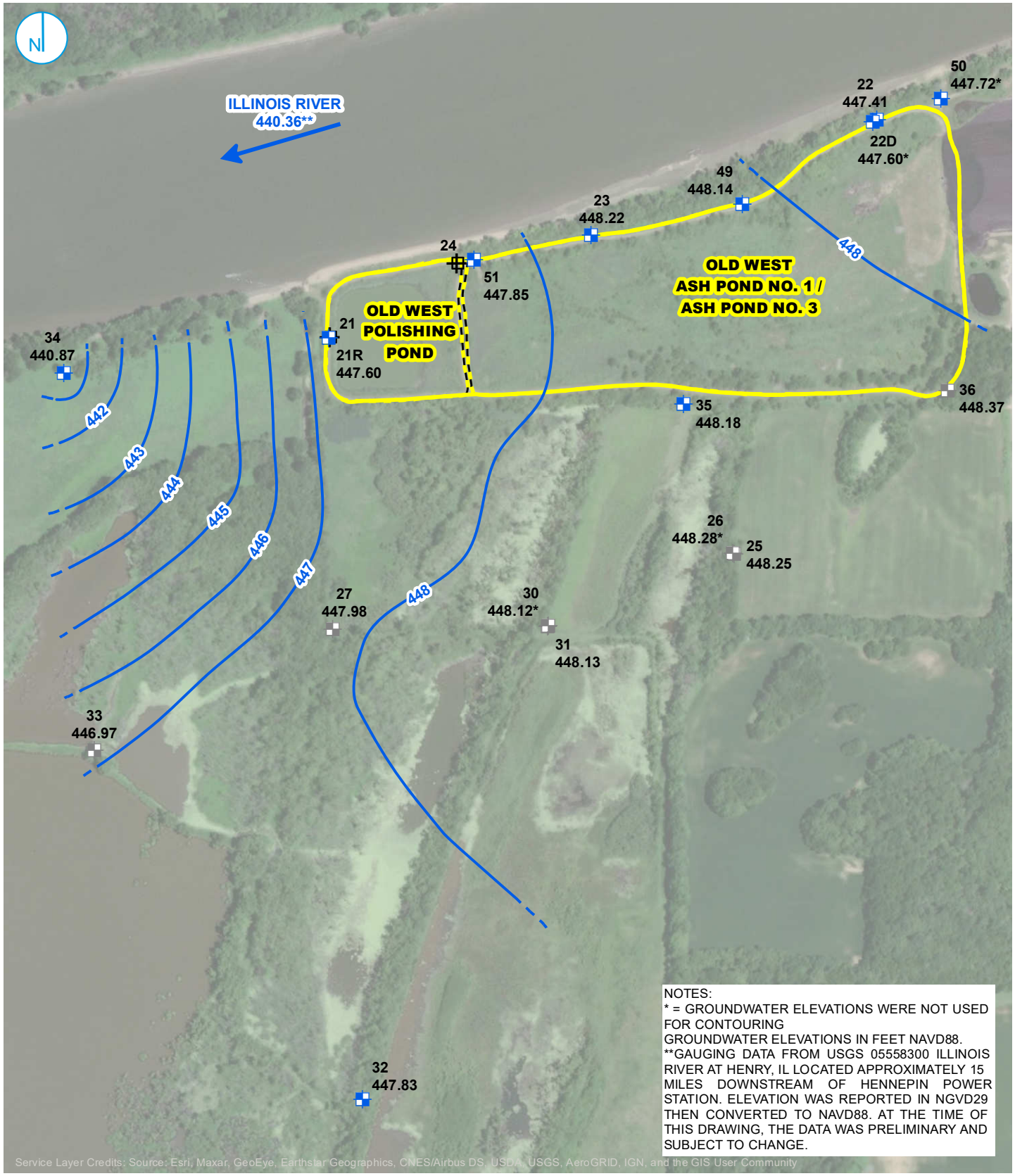
HENNEPIN OLD WEST ASH POND (POND NO.1 AND POND NO. 3) AND HENNEPIN OLD WEST POLISHING POND (UNIT ID: 804)
GROUNDWATER ELEVATION CONTOUR MAP
SEPTEMBER 17, 2019

CCR RULE GROUNDWATER MONITORING
HENNEPIN POWER STATION
HENNEPIN, ILLINOIS

0 125 250 500
Feet

N

O'BRIEN & GERE ENGINEERS, INC.



Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_2020_3Q\R2020_3Q_HennepinWest_GW_Contours.mxd

PROJECT: 169000XXXX | DATED: 12/16/2020 | DESIGNER: MARRAMJ

- CCR RULE MONITORING WELL
- NON-CCR RULE MONITORING WELL
- ABANDONED MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR (1-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- CCR MONITORED MULTI-UNIT
- CCR MONITORED UNIT

0 250 500 Feet

GROUNDWATER ELEVATION CONTOUR MAP
SEPTEMBER 2, 2020

HENNEPIN OLD WEST ASH POND (POND NO.1 AND POND NO. 3) AND HENNEPIN OLD WEST POLISHING POND (UNIT ID: 804)
HENNEPIN POWER STATION
HENNEPIN, ILLINOIS

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL

BACKGROUND WELL
COMPLIANCE WELL
MONITORING WELL
GROUNDWATER ELEVATION CONTOUR (1 FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
PART 257 REGULATED UNIT (SUBJECT UNIT)
LIMITS OF FINAL COVER
PROPERTY BOUNDARY

NOTES:
1.ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
2. ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
*ILLINOIS RIVER ELEVATION OBTAINED FROM STAFF GAGE SG02, LOCATED AT THE HENNEPIN POWER PLANT

0 200 400
Feet

GROUNDWATER CONTOUR ELEVATION MAP MARCH 17, 2021

2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
OLD WEST ASH POND
HENNEPIN POWER PLANT
HENNEPIN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

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PROJECT: 169000XXXX | DATED: 3/25/2022 | DESIGNER: galammc

BACKGROUND WELL
COMPLIANCE WELL
MONITORING WELL
GROUNDWATER ELEVATION CONTOUR (1 FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW ARROW
PART 257 REGULATED UNIT (SUBJECT UNIT)
LIMITS OF FINAL COVER
PROPERTY BOUNDARY

NOTES:
1.ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
2.ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
3.NM - NOT MEASURED

0 200 400
Feet

GROUNDWATER CONTOUR ELEVATION MAP SEPTEMBER 8, 2021

2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
OLD WEST ASH POND
HENNEPIN POWER PLANT
HENNEPIN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

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PROJECT: 169000XXXX | DATED: 3/25/2022 | DESIGNER: galammc

BACKGROUND WELL

COMPLIANCE WELL

MONITORING WELL

GROUNDWATER ELEVATION CONTOUR (1 FT CONTOUR INTERVAL, NAVD88)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

PART 257 REGULATED UNIT (SUBJECT UNIT)

LIMITS OF FINAL COVER

PROPERTY BOUNDARY

NOTES:

1.ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.

2. ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

*ILLINOIS RIVER ELEVATION OBTAINED FROM STAFF GAGE SG02, LOCATED AT THE HENNEPIN POWER PLANT

0 200 400 Feet

GROUNDWATER CONTOUR ELEVATION MAP MARCH 21, 2022

ALTERNATE SOURCE DEMONSTRATION
OLD WEST ASH POND

HENNEPIN POWER PLANT
HENNEPIN, ILLINOIS

FIGURE 2

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

PROJECT: 169000XXXX | DATED: 10/13/2022 | DESIGNER: galarnmc

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COMPLIANCE MONITORING WELL

BACKGROUND MONITORING WELL

MONITORING WELL

GROUNDWATER ELEVATION CONTOUR (1 FT CONTOUR INTERVAL, NAVD88)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

PART 257 REGULATED UNIT (SUBJECT UNIT)

LIMITS OF FINAL COVER

PROPERTY BOUNDARY

NOTES:

1.ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.

2. ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

*ILLINOIS RIVER ELEVATION OBTAINED FROM STAFF GAGE SG02, LOCATED AT THE HENNEPIN POWER PLANT

0 200 400 Feet

GROUNDWATER CONTOUR ELEVATION MAP SEPTEMBER 13 AND 14, 2022

2022 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
OLD WEST ASH POND
HENNEPIN POWER PLANT
HENNEPIN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

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PROJECT: 169000XXXX | DATED: 1/3/2023 | DESIGNER: galarnmc

APPENDIX B
POREWATER ANALYTICAL DATA, BORING LOGS, AND WELL CONSTRUCTION INFORMATION

POREWATER ANALYTICAL DATA

May 08, 2017

Steve Wiskes
Natural Resource Technology, Inc.
2422 East Washington Street
Suite 104
Bloomington, IL 61704
TEL: (414) 837-3614
FAX: (414) 837-3608

RE: Hennepin Pond 1 & 2 Additional Testing **WorkOrder:** 17040224

Dear Steve Wiskes:

TEKLAB, INC received 9 samples on 4/27/2017 4:40:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Michael L. Austin
Project Manager
(618)344-1004 ex 16
MAustin@teklabinc.com

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

This reporting package includes the following:

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Abbr Definition

CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilutions factors.
DNI	Did not ignite
DUP	Laboratory duplicate is an aliquot of a sample taken from the same container under laboratory conditions for independent processing and analysis independently of the original aliquot.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample, spiked with verified known amounts of analytes, is analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. The acceptable recovery range is in the QC Package (provided upon request).
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	Method detection limit means the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero.
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions. The acceptable recovery range is listed in the QC Package (provided upon request).
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Qualifiers

# -	Unknown hydrocarbon	B -	Analyte detected in associated Method Blank
E -	Value above quantitation range	H -	Holding times exceeded
I -	Associated internal standard was outside method criteria	M -	Manual Integration used to determine area response
ND -	Not Detected at the Reporting Limit	R -	RPD outside accepted recovery limits
S -	Spike Recovery outside recovery limits	T -	TIC(Tentatively identified compound)
X -	Value exceeds Maximum Contaminant Level		

Case Narrative

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.
Work Order: 17040224
Client Project: Hennepin Pond 1 & 2 Additional Testing
Report Date: 08-May-17

Cooler Receipt Temp: 4.62 °C

An employee of Teklab, Inc. collected the sample(s).

LPZ-5 will not be reported; the well was dry. TM/EAH 4/27/17

LPZ-17 to be used as alternate sampling point for LPZ-5. MLA 5/1/17

Locations and Accreditations

	Collinsville	Springfield	Kansas City	Collinsville Air
Address	5445 Horseshoe Lake Road	3920 Pintail Dr	8421 Nieman Road	5445 Horseshoe Lake Road
	Collinsville, IL 62234-7425	Springfield, IL 62711-9415	Lenexa, KS 66214	Collinsville, IL 62234-7425
Phone	(618) 344-1004	(217) 698-1004	(913) 541-1998	(618) 344-1004
Fax	(618) 344-1005	(217) 698-1005	(913) 541-1998	(618) 344-1005
Email	jhriley@teklabinc.com	KKlostermann@teklabinc.com	KNelson@teklabinc.com	EHurley@teklabinc.com

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2018	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2018	Collinsville
Louisiana	LDEQ	166493	NELAP	6/30/2017	Collinsville
Louisiana	LDEQ	166578	NELAP	6/30/2017	Collinsville
Texas	TCEQ	T104704515-12-1	NELAP	7/31/2017	Collinsville
Arkansas	ADEQ	88-0966		3/14/2018	Collinsville
Illinois	IDPH	17584		5/31/2017	Collinsville
Indiana	ISDH	C-IL-06		1/31/2018	Collinsville
Kentucky	KDEP	98006		12/31/2017	Collinsville
Kentucky	UST	0073		1/31/2018	Collinsville
Missouri	MDNR	00930		5/31/2017	Collinsville
Missouri	MDNR	930		1/31/2018	Collinsville
Oklahoma	ODEQ	9978		8/31/2017	Collinsville

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Lab ID: 17040224-001 **Client Sample ID:** L4

Matrix: LEACHATE **Collection Date:** 04/25/2017 17:22

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Depth to leachate from measuring point		0		**11.10**	ft	1	04/25/2017 0:00	R232332
STANDARD METHOD 4500-H B FIELD								
pH		1.00		**7.60**		1	04/25/2017 17:22	R232332
STANDARD METHODS 2130 B FIELD								
Turbidity		1.0		**< 1.0**	NTU	1	04/25/2017 17:22	R232332
STANDARD METHODS 18TH ED. 2580 B FIELD								
Oxidation-Reduction Potential		-300		**-149**	mV	1	04/25/2017 17:22	R232332
STANDARD METHODS 2510 B FIELD								
Conductivity		1		**940**	µS/cm	1	04/25/2017 17:22	R232332
STANDARD METHODS 2550 B FIELD								
Temperature		0		**19.54**	°C	1	04/25/2017 17:22	R232332
STANDARD METHODS 4500-O G FIELD								
Oxygen, Dissolved		1.00		**< 1.00**	mg/L	1	04/25/2017 17:22	R232332
STANDARD METHODS 2320 B								
Alkalinity, Carbonate (as CaCO3)	NELAP	0		**0**	mg/L	1	05/02/2017 16:21	R232320
STANDARD METHODS 2320 B (TOTAL)								
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0		**316**	mg/L	1	05/02/2017 16:21	R232319
STANDARD METHODS 2540 C (TOTAL)								
Total Dissolved Solids	NELAP	20		**900**	mg/L	1	04/28/2017 14:54	R232219
SW-846 9036 (TOTAL)								
Sulfate	NELAP	100		**370**	mg/L	10	05/02/2017 1:02	R232246
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.28**	mg/L	1	04/28/2017 16:21	R232156
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		**10**	mg/L	1	05/02/2017 0:54	R232262
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Calcium	NELAP	0.050		**190**	mg/L	1	04/28/2017 18:45	129686
Magnesium	NELAP	0.050		**26.9**	mg/L	1	04/28/2017 18:45	129686
Potassium	NELAP	0.500		**9.33**	mg/L	5	05/01/2017 18:38	129686
Sodium	NELAP	0.050		**58.4**	mg/L	1	04/28/2017 18:45	129686
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**3.0**	µg/L	5	05/02/2017 12:07	129687
Arsenic	NELAP	1.0		**35.1**	µg/L	5	05/02/2017 12:07	129687
Barium	NELAP	1.0		**50.6**	µg/L	5	05/02/2017 12:07	129687
Beryllium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:07	129687
Boron	NELAP	25.0		**21200**	µg/L	5	05/04/2017 10:28	129687
Cadmium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:07	129687
Chromium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:07	129687
Cobalt	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:07	129687
Lead	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:07	129687
Lithium		1.0		**45.5**	µg/L	5	05/02/2017 12:07	129687
Molybdenum	NELAP	1.0		**77.9**	µg/L	5	05/02/2017 12:07	129687
Selenium	NELAP	1.0		**1.4**	µg/L	5	05/02/2017 12:07	129687
Thallium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:07	129687

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Lab ID: 17040224-001 **Client Sample ID:** L4

Matrix: LEACHATE **Collection Date:** 04/25/2017 17:22

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	05/01/2017 12:14	129695

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Lab ID: 17040224-002 **Client Sample ID:** LPZ-1

Matrix: LEACHATE **Collection Date:** 04/25/2017 17:34

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Depth to leachate from measuring point		0		**3.94**	ft	1	04/25/2017 0:00	R232332
STANDARD METHOD 4500-H B FIELD								
pH		1.00		**9.10**		1	04/25/2017 17:34	R232332
STANDARD METHODS 2130 B FIELD								
Turbidity		1.0		**5.6**	NTU	1	04/25/2017 17:34	R232332
STANDARD METHODS 18TH ED. 2580 B FIELD								
Oxidation-Reduction Potential		-300		**-177**	mV	1	04/25/2017 17:34	R232332
STANDARD METHODS 2510 B FIELD								
Conductivity		1		**1550**	µS/cm	1	04/25/2017 17:34	R232332
STANDARD METHODS 2550 B FIELD								
Temperature		0		**18.67**	°C	1	04/25/2017 17:34	R232332
STANDARD METHODS 4500-O G FIELD								
Oxygen, Dissolved		1.00		**< 1.00**	mg/L	1	04/25/2017 17:34	R232332
STANDARD METHODS 2320 B								
Alkalinity, Carbonate (as CaCO3)	NELAP	0		**84**	mg/L	1	05/02/2017 16:29	R232320
STANDARD METHODS 2320 B (TOTAL)								
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0		**0**	mg/L	1	05/02/2017 16:29	R232319
STANDARD METHODS 2540 C (TOTAL)								
Total Dissolved Solids	NELAP	20		**1600**	mg/L	1	04/28/2017 14:55	R232219
SW-846 9036 (TOTAL)								
Sulfate	NELAP	200		**926**	mg/L	20	05/03/2017 15:57	R232369
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**< 0.10**	mg/L	1	04/28/2017 16:25	R232156
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		**39**	mg/L	1	05/02/2017 1:02	R232262
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Calcium	NELAP	0.050	S	**370**	mg/L	1	04/28/2017 18:49	129686
Magnesium	NELAP	0.050		**8.46**	mg/L	1	04/28/2017 18:49	129686
Potassium	NELAP	1.00		**45.6**	mg/L	10	05/01/2017 18:42	129686
Sodium	NELAP	0.050	S	**65.1**	mg/L	1	04/28/2017 18:49	129686
MS QC limits for Ca & Na are not applicable due to high sample/spike ratio.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**3.2**	µg/L	5	05/02/2017 12:15	129687
Arsenic	NELAP	1.0		**31.1**	µg/L	5	05/02/2017 12:15	129687
Barium	NELAP	1.0		**59.6**	µg/L	5	05/02/2017 12:15	129687
Beryllium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:15	129687
Boron	NELAP	500	S	**28300**	µg/L	100	05/03/2017 12:18	129687
Cadmium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:15	129687
Chromium	NELAP	1.0		**2.1**	µg/L	5	05/02/2017 12:15	129687
Cobalt	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:15	129687
Lead	NELAP	1.0		**1.2**	µg/L	5	05/02/2017 12:15	129687
Lithium		1.0		**109**	µg/L	5	05/02/2017 12:15	129687
Molybdenum	NELAP	20.0	S	**3400**	µg/L	100	05/03/2017 12:18	129687
Selenium	NELAP	1.0		**8.6**	µg/L	5	05/02/2017 12:15	129687
Thallium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:15	129687

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Lab ID: 17040224-002 **Client Sample ID:** LPZ-1

Matrix: LEACHATE **Collection Date:** 04/25/2017 17:34

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
MS QC limits for B and Mo are not applicable due to high sample/spike ratio.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	05/01/2017 8:10	129707

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Lab ID: 17040224-003 **Client Sample ID:** LPZ-3

Matrix: LEACHATE **Collection Date:** 04/25/2017 18:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Depth to leachate from measuring point		0		**11.02**	ft	1	04/25/2017 0:00	R232332
STANDARD METHOD 4500-H B FIELD								
pH		1.00		**10.0**		1	04/25/2017 18:00	R232332
STANDARD METHODS 2130 B FIELD								
Turbidity		1.0		**< 1.0**	NTU	1	04/25/2017 18:00	R232332
STANDARD METHODS 18TH ED. 2580 B FIELD								
Oxidation-Reduction Potential		-300		**-87**	mV	1	04/25/2017 18:00	R232332
STANDARD METHODS 2510 B FIELD								
Conductivity		1		**688**	µS/cm	1	04/25/2017 18:00	R232332
STANDARD METHODS 2550 B FIELD								
Temperature		0		**17.93**	°C	1	04/25/2017 18:00	R232332
STANDARD METHODS 4500-O G FIELD								
Oxygen, Dissolved		1.00		**< 1.00**	mg/L	1	04/25/2017 18:00	R232332
STANDARD METHODS 2320 B								
Alkalinity, Carbonate (as CaCO3)	NELAP	0		**52**	mg/L	1	05/02/2017 16:35	R232320
STANDARD METHODS 2320 B (TOTAL)								
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0		**0**	mg/L	1	05/02/2017 16:35	R232319
STANDARD METHODS 2540 C (TOTAL)								
Total Dissolved Solids	NELAP	20		**768**	mg/L	1	04/28/2017 14:55	R232219
SW-846 9036 (TOTAL)								
Sulfate	NELAP	100		**375**	mg/L	10	05/02/2017 1:37	R232246
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**< 0.10**	mg/L	1	04/28/2017 16:29	R232156
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		**7**	mg/L	1	05/02/2017 1:10	R232262
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Calcium	NELAP	0.050		**214**	mg/L	1	04/28/2017 19:00	129686
Magnesium	NELAP	0.050		**0.956**	mg/L	1	04/28/2017 19:00	129686
Potassium	NELAP	0.500		**13.4**	mg/L	5	05/01/2017 18:53	129686
Sodium	NELAP	0.050		**7.40**	mg/L	1	04/28/2017 19:00	129686
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**4.1**	µg/L	5	05/02/2017 12:47	129687
Arsenic	NELAP	1.0		**12.3**	µg/L	5	05/02/2017 12:47	129687
Barium	NELAP	1.0		**25.4**	µg/L	5	05/02/2017 12:47	129687
Beryllium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:47	129687
Boron	NELAP	25.0		**21900**	µg/L	5	05/04/2017 10:36	129687
Cadmium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:47	129687
Chromium	NELAP	1.0		**31.7**	µg/L	5	05/02/2017 12:47	129687
Cobalt	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:47	129687
Lead	NELAP	1.0		**8.9**	µg/L	5	05/02/2017 12:47	129687
Lithium		1.0		**52.0**	µg/L	5	05/02/2017 12:47	129687
Molybdenum	NELAP	1.0		**264**	µg/L	5	05/02/2017 12:47	129687
Selenium	NELAP	1.0		**112**	µg/L	5	05/02/2017 12:47	129687
Thallium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:47	129687

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Lab ID: 17040224-003 **Client Sample ID:** LPZ-3

Matrix: LEACHATE **Collection Date:** 04/25/2017 18:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	05/01/2017 8:12	129707

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Lab ID: 17040224-005 **Client Sample ID:** LPZ-13

Matrix: LEACHATE **Collection Date:** 04/25/2017 13:07

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Depth to leachate from measuring point		0		**5.59**	ft	1	04/25/2017 0:00	R232332

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Lab ID: 17040224-006 **Client Sample ID:** LPZ-15

Matrix: LEACHATE **Collection Date:** 04/25/2017 13:10

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Depth to leachate from measuring point		0		**5.59**	ft	1	04/25/2017 0:00	R232332

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Lab ID: 17040224-007 **Client Sample ID:** LPZ-17

Matrix: LEACHATE **Collection Date:** 04/25/2017 18:44

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Depth to leachate from measuring point		0		**13.93**	ft	1	04/25/2017 0:00	R232332
STANDARD METHOD 4500-H B FIELD								
pH		1.00		**10.0**		1	04/25/2017 18:44	R232332
STANDARD METHODS 2130 B FIELD								
Turbidity		1.0		**28**	NTU	1	04/25/2017 18:44	R232332
STANDARD METHODS 18TH ED. 2580 B FIELD								
Oxidation-Reduction Potential		-300		**-163**	mV	1	04/25/2017 18:44	R232332
STANDARD METHODS 2510 B FIELD								
Conductivity		1		**1780**	µS/cm	1	04/25/2017 18:44	R232332
STANDARD METHODS 2550 B FIELD								
Temperature		0		**20.48**	°C	1	04/25/2017 18:44	R232332
STANDARD METHODS 4500-O G FIELD								
Oxygen, Dissolved		1.00		**< 1.00**	mg/L	1	04/25/2017 18:44	R232332
STANDARD METHODS 2320 B								
Alkalinity, Carbonate (as CaCO3)	NELAP	0		**80**	mg/L	1	05/02/2017 16:42	R232320
STANDARD METHODS 2320 B (TOTAL)								
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0		**0**	mg/L	1	05/02/2017 16:42	R232319
STANDARD METHODS 2540 C (TOTAL)								
Total Dissolved Solids	NELAP	20		**2090**	mg/L	1	05/01/2017 13:34	R232278
SW-846 9036 (TOTAL)								
Sulfate	NELAP	500		**1270**	mg/L	50	05/03/2017 16:24	R232369
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**< 0.10**	mg/L	1	05/02/2017 13:17	R232279
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		**< 5**	mg/L	1	05/02/2017 1:45	R232262
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Calcium	NELAP	0.050	S	**578**	mg/L	1	05/02/2017 10:20	129737
Magnesium	NELAP	0.050		**1.32**	mg/L	1	05/02/2017 10:20	129737
Potassium	NELAP	0.500	S	**26.5**	mg/L	5	05/02/2017 12:51	129737
Sodium	NELAP	0.050		**16.1**	mg/L	1	05/02/2017 10:20	129737
MS QC limits for K are not applicable due to high sample/spike ratio.								
MS QC limits for Ca are not applicable due to high sample/spike ratio.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**1.0**	µg/L	5	05/02/2017 18:08	129738
Arsenic	NELAP	1.0		**26.5**	µg/L	5	05/02/2017 18:08	129738
Barium	NELAP	1.0		**92.0**	µg/L	5	05/02/2017 18:08	129738
Beryllium	NELAP	1.0		**< 1.0**	µg/L	5	05/03/2017 14:13	129738
Boron	NELAP	25.0	S	**26900**	µg/L	5	05/03/2017 14:13	129738
Cadmium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 18:08	129738
Chromium	NELAP	1.0		**3.8**	µg/L	5	05/03/2017 14:13	129738
Cobalt	NELAP	1.0		**1.2**	µg/L	5	05/03/2017 14:13	129738
Lead	NELAP	1.0		**7.7**	µg/L	5	05/02/2017 18:08	129738
Lithium		1.0		**97.5**	µg/L	5	05/03/2017 14:13	129738
Molybdenum	NELAP	1.0		**289**	µg/L	5	05/02/2017 18:08	129738
Selenium	NELAP	1.0		**118**	µg/L	5	05/02/2017 18:08	129738

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Lab ID: 17040224-007 **Client Sample ID:** LPZ-17

Matrix: LEACHATE **Collection Date:** 04/25/2017 18:44

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Thallium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 18:08	129738
MS QC limits for B are not applicable due to high sample/spike ratio.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	05/01/2017 14:18	129736

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Lab ID: 17040224-008 **Client Sample ID:** L4 DUP

Matrix: LEACHATE **Collection Date:** 04/25/2017 17:22

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Depth to leachate from measuring point		0		**11.10**	ft	1	04/25/2017 0:00	R232332
STANDARD METHOD 4500-H B FIELD								
pH		1.00		**7.60**		1	04/25/2017 17:22	R232332
STANDARD METHODS 2130 B FIELD								
Turbidity		1.0		**< 1.0**	NTU	1	04/25/2017 17:22	R232332
STANDARD METHODS 18TH ED. 2580 B FIELD								
Oxidation-Reduction Potential		-300		**-149**	mV	1	04/25/2017 17:22	R232332
STANDARD METHODS 2510 B FIELD								
Conductivity		1		**940**	µS/cm	1	04/25/2017 17:22	R232332
STANDARD METHODS 2550 B FIELD								
Temperature		0		**19.54**	°C	1	04/25/2017 17:22	R232332
STANDARD METHODS 4500-O G FIELD								
Oxygen, Dissolved		1.00		**< 1.00**	mg/L	1	04/25/2017 17:22	R232332
STANDARD METHODS 2320 B								
Alkalinity, Carbonate (as CaCO3)	NELAP	0		**0**	mg/L	1	05/02/2017 16:47	R232320
STANDARD METHODS 2320 B (TOTAL)								
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0		**282**	mg/L	1	05/02/2017 16:47	R232319
STANDARD METHODS 2540 C (TOTAL)								
Total Dissolved Solids	NELAP	20		**926**	mg/L	1	04/28/2017 14:56	R232219
SW-846 9036 (TOTAL)								
Sulfate	NELAP	100		**388**	mg/L	10	05/02/2017 2:01	R232246
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.26**	mg/L	1	04/28/2017 16:34	R232156
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		**11**	mg/L	1	05/02/2017 1:53	R232262
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Calcium	NELAP	0.050		**185**	mg/L	1	04/28/2017 19:03	129686
Magnesium	NELAP	0.050		**27.6**	mg/L	1	04/28/2017 19:03	129686
Potassium	NELAP	0.500		**9.87**	mg/L	5	05/01/2017 18:56	129686
Sodium	NELAP	0.050		**48.8**	mg/L	1	04/28/2017 19:03	129686
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**3.0**	µg/L	5	05/02/2017 12:55	129687
Arsenic	NELAP	1.0		**27.0**	µg/L	5	05/02/2017 12:55	129687
Barium	NELAP	1.0		**46.3**	µg/L	5	05/02/2017 12:55	129687
Beryllium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:55	129687
Boron	NELAP	25.0		**23900**	µg/L	5	05/04/2017 10:44	129687
Cadmium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:55	129687
Chromium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:55	129687
Cobalt	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:55	129687
Lead	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:55	129687
Lithium		1.0		**48.9**	µg/L	5	05/02/2017 12:55	129687
Molybdenum	NELAP	1.0		**83.0**	µg/L	5	05/02/2017 12:55	129687
Selenium	NELAP	1.0		**1.4**	µg/L	5	05/02/2017 12:55	129687
Thallium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 12:55	129687

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Lab ID: 17040224-008 **Client Sample ID:** L4 DUP

Matrix: LEACHATE **Collection Date:** 04/25/2017 17:22

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	05/01/2017 8:14	129707

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Lab ID: 17040224-009 **Client Sample ID:** Field Blank

Matrix: LEACHATE **Collection Date:** 04/25/2017 19:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
STANDARD METHODS 2320 B								
Alkalinity, Carbonate (as CaCO3)	NELAP	0		**0**	mg/L	1	05/02/2017 16:55	R232320
STANDARD METHODS 2320 B (TOTAL)								
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0		**2**	mg/L	1	05/02/2017 16:55	R232319
STANDARD METHODS 2540 C (TOTAL)								
Total Dissolved Solids	NELAP	20		**< 20**	mg/L	1	04/28/2017 14:56	R232219
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		**< 10**	mg/L	1	05/02/2017 2:04	R232246
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**< 0.10**	mg/L	1	04/28/2017 16:41	R232156
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		**< 5**	mg/L	1	05/02/2017 2:02	R232262
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Calcium	NELAP	0.050		**0.068**	mg/L	1	04/28/2017 19:07	129686
Magnesium	NELAP	0.050		**< 0.050**	mg/L	1	04/28/2017 19:07	129686
Potassium	NELAP	0.100		**< 0.100**	mg/L	1	04/28/2017 19:07	129686
Sodium	NELAP	0.050		**< 0.050**	mg/L	1	04/28/2017 19:07	129686
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 13:03	129687
Arsenic	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 13:03	129687
Barium	NELAP	1.0		**1.1**	µg/L	5	05/02/2017 13:03	129687
Beryllium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 13:03	129687
Boron	NELAP	25.0		**< 25.0**	µg/L	5	05/03/2017 12:10	129687
Cadmium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 13:03	129687
Chromium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 13:03	129687
Cobalt	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 13:03	129687
Lead	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 13:03	129687
Lithium		1.0		**< 1.0**	µg/L	5	05/02/2017 13:03	129687
Molybdenum	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 13:03	129687
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 13:03	129687
Thallium	NELAP	1.0		**< 1.0**	µg/L	5	05/02/2017 13:03	129687
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	05/01/2017 8:17	129707

Client: Natural Resource Technology, Inc.
Work Order: 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing
Report Date: 08-May-17

Lab Sample ID	Client Sample ID	Matrix	Fractions	Collection Date
17040224-001	L4	Leachate	2	04/25/2017 17:22
17040224-002	LPZ-1	Leachate	2	04/25/2017 17:34
17040224-003	LPZ-3	Leachate	2	04/25/2017 18:00
17040224-004	LPZ-5	Leachate	2	04/25/2017 13:30
17040224-005	LPZ-13	Leachate	1	04/25/2017 13:07
17040224-006	LPZ-15	Leachate	1	04/25/2017 13:10
17040224-007	LPZ-17	Leachate	2	04/25/2017 18:44
17040224-008	L4 DUP	Leachate	2	04/25/2017 17:22
17040224-009	Field Blank	Leachate	2	04/25/2017 19:00

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
17040224-001A	L4	04/25/2017 17:22	04/27/2017 16:40		
	Field Elevation Measurements				04/25/2017 0:00
	Standard Method 4500-H B Field				04/25/2017 17:22
	Standard Methods 2130 B Field				04/25/2017 17:22
	Standard Methods 18th Ed. 2580 B Field				04/25/2017 17:22
	Standard Methods 2320 B				05/02/2017 16:21
	Standard Methods 2320 B (Total)				05/02/2017 16:21
	Standard Methods 2510 B Field				04/25/2017 17:22
	Standard Methods 2540 C (Total)				04/28/2017 14:54
	Standard Methods 2550 B Field				04/25/2017 17:22
	Standard Methods 4500-O G Field				04/25/2017 17:22
	SW-846 9036 (Total)				05/02/2017 1:02
	SW-846 9214 (Total)				04/28/2017 16:21
	SW-846 9251 (Total)				05/02/2017 0:54
17040224-001B	L4	04/25/2017 17:22	04/27/2017 16:40		
	SW-846 3005A, 6010B, Metals by ICP (Total)			04/28/2017 9:04	04/28/2017 18:45
	SW-846 3005A, 6010B, Metals by ICP (Total)			04/28/2017 9:04	05/01/2017 18:38
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			04/28/2017 9:09	05/02/2017 12:07
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			04/28/2017 9:09	05/04/2017 10:28
	SW-846 7470A (Total)			04/28/2017 11:25	05/01/2017 12:14
17040224-002A	LPZ-1	04/25/2017 17:34	04/27/2017 16:40		
	Field Elevation Measurements				04/25/2017 0:00
	Standard Method 4500-H B Field				04/25/2017 17:34
	Standard Methods 2130 B Field				04/25/2017 17:34
	Standard Methods 18th Ed. 2580 B Field				04/25/2017 17:34
	Standard Methods 2320 B				05/02/2017 16:29
	Standard Methods 2320 B (Total)				05/02/2017 16:29
	Standard Methods 2510 B Field				04/25/2017 17:34
	Standard Methods 2540 C (Total)				04/28/2017 14:55
	Standard Methods 2550 B Field				04/25/2017 17:34
	Standard Methods 4500-O G Field				04/25/2017 17:34
	SW-846 9036 (Total)				05/03/2017 15:57
	SW-846 9214 (Total)				04/28/2017 16:25
	SW-846 9251 (Total)				05/02/2017 1:02
17040224-002B	LPZ-1	04/25/2017 17:34	04/27/2017 16:40		
	SW-846 3005A, 6010B, Metals by ICP (Total)			04/28/2017 9:04	04/28/2017 18:49
	SW-846 3005A, 6010B, Metals by ICP (Total)			04/28/2017 9:04	05/01/2017 18:42

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			04/28/2017 9:09	05/02/2017 12:15
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			04/28/2017 9:09	05/03/2017 12:18
	SW-846 7470A (Total)			04/28/2017 15:10	05/01/2017 8:10
17040224-003A	LPZ-3	04/25/2017 18:00	04/27/2017 16:40		
	Field Elevation Measurements				04/25/2017 0:00
	Standard Method 4500-H B Field				04/25/2017 18:00
	Standard Methods 2130 B Field				04/25/2017 18:00
	Standard Methods 18th Ed. 2580 B Field				04/25/2017 18:00
	Standard Methods 2320 B				05/02/2017 16:35
	Standard Methods 2320 B (Total)				05/02/2017 16:35
	Standard Methods 2510 B Field				04/25/2017 18:00
	Standard Methods 2540 C (Total)				04/28/2017 14:55
	Standard Methods 2550 B Field				04/25/2017 18:00
	Standard Methods 4500-O G Field				04/25/2017 18:00
	SW-846 9036 (Total)				05/02/2017 1:37
	SW-846 9214 (Total)				04/28/2017 16:29
	SW-846 9251 (Total)				05/02/2017 1:10
17040224-003B	LPZ-3	04/25/2017 18:00	04/27/2017 16:40		
	SW-846 3005A, 6010B, Metals by ICP (Total)			04/28/2017 9:04	04/28/2017 19:00
	SW-846 3005A, 6010B, Metals by ICP (Total)			04/28/2017 9:04	05/01/2017 18:53
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			04/28/2017 9:09	05/02/2017 12:47
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			04/28/2017 9:09	05/04/2017 10:36
	SW-846 7470A (Total)			04/28/2017 15:10	05/01/2017 8:12
17040224-004A	LPZ-5	04/25/2017 13:30	04/27/2017 16:40		
	Standard Methods 2320 B (Total)				05/02/2017 14:13
	Standard Methods 2540 C (Total)				04/28/2017 14:56
17040224-005A	LPZ-13	04/25/2017 13:07	04/27/2017 16:40		
	Field Elevation Measurements				04/25/2017 0:00
17040224-006A	LPZ-15	04/25/2017 13:10	04/27/2017 16:40		
	Field Elevation Measurements				04/25/2017 0:00
17040224-007A	LPZ-17	04/25/2017 18:44	04/27/2017 16:40		
	Field Elevation Measurements				04/25/2017 0:00
	Standard Method 4500-H B Field				04/25/2017 18:44
	Standard Methods 2130 B Field				04/25/2017 18:44
	Standard Methods 18th Ed. 2580 B Field				04/25/2017 18:44
	Standard Methods 2320 B				05/02/2017 16:42
	Standard Methods 2320 B (Total)				05/02/2017 16:42

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			**Prep Date/Time**	**Analysis Date/Time**
	Standard Methods 2510 B Field				04/25/2017 18:44
	Standard Methods 2540 C (Total)				05/01/2017 13:34
	Standard Methods 2550 B Field				04/25/2017 18:44
	Standard Methods 4500-O G Field				04/25/2017 18:44
	SW-846 9036 (Total)				05/03/2017 16:24
	SW-846 9214 (Total)				05/02/2017 13:17
	SW-846 9251 (Total)				05/02/2017 1:45
17040224-007B	LPZ-17	04/25/2017 18:44	04/27/2017 16:40		
	SW-846 3005A, 6010B, Metals by ICP (Total)			05/01/2017 11:23	05/02/2017 10:20
	SW-846 3005A, 6010B, Metals by ICP (Total)			05/01/2017 11:23	05/02/2017 12:51
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			05/01/2017 11:25	05/02/2017 18:08
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			05/01/2017 11:25	05/03/2017 14:13
	SW-846 7470A (Total)			05/01/2017 11:03	05/01/2017 14:18
17040224-008A	L4 DUP	04/25/2017 17:22	04/27/2017 16:40		
	Field Elevation Measurements				04/25/2017 0:00
	Standard Method 4500-H B Field				04/25/2017 17:22
	Standard Methods 2130 B Field				04/25/2017 17:22
	Standard Methods 18th Ed. 2580 B Field				04/25/2017 17:22
	Standard Methods 2320 B				05/02/2017 16:47
	Standard Methods 2320 B (Total)				05/02/2017 16:47
	Standard Methods 2510 B Field				04/25/2017 17:22
	Standard Methods 2540 C (Total)				04/28/2017 14:56
	Standard Methods 2550 B Field				04/25/2017 17:22
	Standard Methods 4500-O G Field				04/25/2017 17:22
	SW-846 9036 (Total)				05/02/2017 2:01
	SW-846 9214 (Total)				04/28/2017 16:34
	SW-846 9251 (Total)				05/02/2017 1:53
17040224-008B	L4 DUP	04/25/2017 17:22	04/27/2017 16:40		
	SW-846 3005A, 6010B, Metals by ICP (Total)			04/28/2017 9:04	04/28/2017 19:03
	SW-846 3005A, 6010B, Metals by ICP (Total)			04/28/2017 9:04	05/01/2017 18:56
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			04/28/2017 9:09	05/02/2017 12:55
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			04/28/2017 9:09	05/04/2017 10:44
	SW-846 7470A (Total)			04/28/2017 15:10	05/01/2017 8:14
17040224-009A	Field Blank	04/25/2017 19:00	04/27/2017 16:40		
	Standard Methods 2320 B				05/02/2017 16:55
	Standard Methods 2320 B (Total)				05/02/2017 16:55
	Standard Methods 2540 C (Total)				04/28/2017 14:56

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			**Prep Date/Time**	**Analysis Date/Time**
	SW-846 9036 (Total)				05/02/2017 2:04
	SW-846 9214 (Total)				04/28/2017 16:41
	SW-846 9251 (Total)				05/02/2017 2:02
17040224-009B	Field Blank	04/25/2017 19:00	04/27/2017 16:40		
	SW-846 3005A, 6010B, Metals by ICP (Total)			04/28/2017 9:04	04/28/2017 19:07
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			04/28/2017 9:09	05/02/2017 13:03
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			04/28/2017 9:09	05/03/2017 12:10
	SW-846 7470A (Total)			04/28/2017 15:10	05/01/2017 8:17

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

STANDARD METHOD 4500-H B FIELD

Batch R232332 **SampType:** LCS Units

SampID: LCS-R232332

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	1.00		**7.02**	7.000	0	100.3	99.1	100.9	04/25/2017
pH	1.00		**7.00**	7.000	0	100.0	99.1	100.9	04/26/2017
pH	1.00		**7.00**	7.000	0	100.0	99.1	100.9	04/27/2017

STANDARD METHODS 2510 B FIELD

Batch R232332 **SampType:** LCS Units **µS/cm**

SampID: LCS-R232332

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Conductivity	1		**1420**	1409	0	100.6	90	110	04/27/2017
Conductivity	1		**1410**	1409	0	100.3	90	110	04/25/2017

STANDARD METHODS 2510 B FIELD

Batch R232332 **SampType:** LCS Units **µmhos/cm**

SampID: LCS-R232332

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Conductivity	10		**1410**	1412	0	100.1	90	110	04/26/2017

STANDARD METHODS 2540 C (TOTAL)

Batch R232219 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids	20		**< 20**						04/28/2017
Total Dissolved Solids	20		**< 20**						04/28/2017
Total Dissolved Solids	20		**< 20**						04/28/2017
Total Dissolved Solids	20		**< 20**						04/28/2017
Total Dissolved Solids	20		**< 20**						04/28/2017

Batch R232219 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids	20		**1000**	1000	0	100.2	90	110	04/28/2017

Batch R232219 **SampType:** LCSQC Units **mg/L**

SampID: LCSQC

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids	20		**986**	1000	0	98.6	90	110	04/28/2017
Total Dissolved Solids	20		**998**	1000	0	99.8	90	110	04/28/2017
Total Dissolved Solids	20		**984**	1000	0	98.4	90	110	04/28/2017
Total Dissolved Solids	20		**988**	1000	0	98.8	90	110	04/28/2017

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

STANDARD METHODS 2540 C (TOTAL)

Batch R232219 **SampType:** DUP Units **mg/L** RPD Limit **5**

SampID: 17040224-001ADUP

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids	20		**908**				900.0	0.88	04/28/2017

Batch R232278 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids	20		**< 20**						05/01/2017
Total Dissolved Solids	20		**< 20**						05/01/2017

Batch R232278 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids	20		**988**	1000	0	98.8	90	110	05/01/2017

Batch R232278 **SampType:** LCSQC Units **mg/L**

SampID: LCSQC

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids	20		**972**	1000	0	97.2	90	110	05/01/2017

Batch R232278 **SampType:** DUP Units **mg/L** RPD Limit **5**

SampID: 17040224-007ADUP

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids	20		**2110**				2094	0.86	05/01/2017

SW-846 9036 (TOTAL)

Batch R232246 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		**< 10**						05/01/2017

Batch R232246 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		**19**	20.00	0	93.6	90	110	05/01/2017

Batch R232246 **SampType:** MS Units **mg/L**

SampID: 17040224-003AMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	100		**469**	100.0	375.4	93.2	85	115	05/02/2017

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

SW-846 9036 (TOTAL)

Batch R232246 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 17040224-003AMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate	100		**485**	100.0	375.4	109.9	468.7	3.50	05/02/2017

Batch R232369 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		**< 10**						05/03/2017

Batch R232369 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		**20**	20.00	0	100.0	90	110	05/03/2017

SW-846 9214 (TOTAL)

Batch R232156 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	0.10		**< 0.10**						04/28/2017

Batch R232156 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	0.10		**1.00**	1.000	0	100.4	90	110	04/28/2017

Batch R232156 **SampType:** MS Units **mg/L**

SampID: 17040224-008AMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	0.10		**2.30**	2.000	0.2570	102.0	85	115	04/28/2017

Batch R232156 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 17040224-008AMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	0.10		**2.22**	2.000	0.2570	98.0	2.298	3.54	04/28/2017

Batch R232279 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	0.10		**< 0.10**						05/02/2017

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

SW-846 9214 (TOTAL)

Batch R232279 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	0.10		**0.98**	1.000	0	97.6	90	110	05/02/2017

Batch R232279 **SampType:** MS Units **mg/L**
SampID: 17040224-007AMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	0.10		**1.89**	2.000	0.05300	92.0	85	115	05/02/2017

Batch R232279 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 17040224-007AMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	0.10		**1.94**	2.000	0.05300	94.6	1.892	2.76	05/02/2017

SW-846 9251 (TOTAL)

Batch R232262 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride	5		**< 5**						05/01/2017

Batch R232262 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride	5		**20**	20.00	0	99.9	90	110	05/01/2017

Batch R232262 **SampType:** MS Units **mg/L**
SampID: 17040224-003AMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride	5		**25**	20.00	6.820	92.5	85	115	05/02/2017

Batch R232262 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 17040224-003AMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride	5		**25**	20.00	6.820	92.8	25.32	0.24	05/02/2017

Batch R232398 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride	5		**< 5**						05/03/2017

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

SW-846 9251 (TOTAL)

Batch R232398 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride	5		**21**	20.00	0	104.6	90	110	05/03/2017

SW-846 3005A, 6010B, METALS BY ICP (TOTAL)

Batch 129686 **SampType:** MBLK Units **mg/L**

SampID: MBLK-129686

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium	0.050		**< 0.050**	0.05000	0	0	-100	100	04/28/2017
Calcium	0.0500		**< 0.0500**	0.05000	0	0	-100	100	04/28/2017
Magnesium	0.0500		**< 0.0500**	0.05000	0	0	-100	100	04/28/2017
Magnesium	0.050		**< 0.050**	0.05000	0	0	-100	100	04/28/2017
Potassium	0.100		**< 0.100**	0.1000	0	0	-100	100	04/28/2017
Potassium	0.100		**< 0.100**	0.1000	0	0	-100	100	04/28/2017
Sodium	0.0500		**< 0.0500**	0.05000	0	0	-100	100	04/28/2017
Sodium	0.050		**< 0.050**	0.05000	0	0	-100	100	04/28/2017

Batch 129686 **SampType:** LCS Units **mg/L**

SampID: LCS-129686

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium	0.0500		**2.55**	2.500	0	102.0	85	115	04/28/2017
Calcium	0.050		**2.55**	2.500	0	102.0	85	115	04/28/2017
Magnesium	0.0500		**2.56**	2.500	0	102.4	85	115	04/28/2017
Magnesium	0.050		**2.56**	2.500	0	102.4	85	115	04/28/2017
Potassium	0.100		**2.32**	2.500	0	92.6	85	115	04/28/2017
Potassium	0.100		**2.32**	2.500	0	92.6	85	115	04/28/2017
Sodium	0.050		**2.34**	2.500	0	93.4	85	115	04/28/2017
Sodium	0.0500		**2.34**	2.500	0	93.4	85	115	04/28/2017

Batch 129686 **SampType:** MS Units **mg/L**

SampID: 17040224-002BMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium	0.050	S	**368**	2.500	370.2	-84.0	75	125	04/28/2017
Magnesium	0.050		**10.8**	2.500	8.455	93.8	75	125	04/28/2017
Potassium	1.00		**47.7**	2.500	45.62	84.8	75	125	05/01/2017
Sodium	0.050	S	**66.6**	2.500	65.09	62.0	75	125	04/28/2017

Batch 129686 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 17040224-002BMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium	0.050	S	**374**	2.500	370.2	152.0	368.1	1.59	04/28/2017
Magnesium	0.050		**11.0**	2.500	8.455	102.6	10.80	2.02	04/28/2017
Potassium	1.00		**47.6**	2.500	45.62	79.2	47.74	0.29	05/01/2017
Sodium	0.050		**67.6**	2.500	65.09	102.0	66.64	1.49	04/28/2017

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

SW-846 3005A, 6010B, METALS BY ICP (TOTAL)

Batch 129737 **SampType:** MBLK Units **mg/L**

SampID: MBLK-129737

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium	0.050		**< 0.050**	0.05000	0	45.6	-100	100	05/02/2017
Magnesium	0.050		**< 0.050**	0.05000	0	0	-100	100	05/02/2017
Potassium	0.100		**< 0.100**	0.1000	0	0	-100	100	05/02/2017
Sodium	0.050		**< 0.050**	0.05000	0	49.6	-100	100	05/02/2017

Batch 129737 **SampType:** LCS Units **mg/L**

SampID: LCS-129737

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium	0.050		**2.55**	2.500	0	102.2	85	115	05/02/2017
Magnesium	0.050		**2.54**	2.500	0	101.5	85	115	05/02/2017
Potassium	0.100		**2.37**	2.500	0	94.8	85	115	05/02/2017
Sodium	0.050		**2.34**	2.500	0	93.4	85	115	05/02/2017

Batch 129737 **SampType:** MS Units **mg/L**

SampID: 17040224-007BMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium	0.050	S	**579**	2.500	577.9	44.0	75	125	05/02/2017
Magnesium	0.050		**3.89**	2.500	1.323	102.7	75	125	05/02/2017
Potassium	0.500	S	**29.8**	2.500	26.53	131.2	75	125	05/02/2017
Sodium	0.050		**18.6**	2.500	16.12	97.6	75	125	05/02/2017

Batch 129737 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 17040224-007BMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium	0.050	S	**581**	2.500	577.9	128.0	579.0	0.36	05/02/2017
Magnesium	0.050		**3.91**	2.500	1.323	103.4	3.890	0.44	05/02/2017
Potassium	0.500		**29.6**	2.500	26.53	121.2	29.81	0.84	05/02/2017
Sodium	0.050		**18.7**	2.500	16.12	102.0	18.56	0.59	05/02/2017

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)

Batch 129687 **SampType:** MBLK Units **µg/L**

SampID: MBLK-129687

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony	1.0		**< 1.0**	1.000	0	0	-100	100	05/01/2017
Arsenic	1.0		**< 1.0**	1.000	0	0	-100	100	05/01/2017
Barium	1.0		**< 1.0**	1.000	0	0	-100	100	05/01/2017
Beryllium	1.0		**< 1.0**	1.000	0	0	-100	100	05/01/2017
Boron	25.0		**< 25.0**	25.00	0	0	-100	100	05/01/2017
Cadmium	1.0		**< 1.0**	1.000	0	0	-100	100	05/01/2017
Chromium	1.0		**< 1.0**	1.000	0	0	-100	100	05/01/2017
Cobalt	1.0		**< 1.0**	1.000	0	0	-100	100	05/01/2017
Lead	1.0		**< 1.0**	1.000	0	0	-100	100	05/01/2017
Lithium	1.0		**< 1.0**	1.000	0	81.2	-100	100	05/01/2017
Molybdenum	1.0		**< 1.0**	1.000	0	0	-100	100	05/01/2017
Selenium	1.0		**< 1.0**	1.000	0	0	-100	100	05/01/2017
Thallium	1.0		**< 1.0**	1.000	0	66.4	-100	100	05/01/2017

Batch 129687 **SampType:** LCS Units **µg/L**

SampID: LCS-129687

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony	1.0		**519**	500.0	0	103.8	80	120	05/01/2017
Arsenic	1.0		**544**	500.0	0	108.9	80	120	05/01/2017
Barium	1.0		**2110**	2000	0	105.6	80	120	05/01/2017
Beryllium	1.0		**57.5**	50.00	0	115.0	80	120	05/01/2017
Boron	25.0		**575**	500.0	0	115.0	80	120	05/01/2017
Cadmium	1.0		**52.5**	50.00	0	105.0	80	120	05/01/2017
Chromium	1.0		**203**	200.0	0	101.6	80	120	05/01/2017
Cobalt	1.0		**508**	500.0	0	101.7	80	120	05/01/2017
Lead	1.0		**545**	500.0	0	108.9	80	120	05/01/2017
Lithium	1.0		**536**	500.0	0	107.2	80	120	05/02/2017
Molybdenum	1.0		**514**	500.0	0	102.9	80	120	05/01/2017
Selenium	1.0		**540**	500.0	0	108.0	80	120	05/01/2017
Thallium	1.0		**264**	250.0	0	105.5	80	120	05/01/2017

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)

Batch 129687 **SampType:** MS Units **µg/L**

SampID: 17040224-002BMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony	1.0		**515**	500.0	3.232	102.4	75	125	05/02/2017
Arsenic	1.0		**553**	500.0	31.11	104.4	75	125	05/02/2017
Barium	1.0		**2130**	2000	59.60	103.4	75	125	05/02/2017
Beryllium	1.0		**49.7**	50.00	0	99.3	75	125	05/02/2017
Boron	500	S	**27000**	500.0	28330	-273.2	75	125	05/03/2017
Cadmium	1.0		**51.2**	50.00	0.6986	101.1	75	125	05/02/2017
Chromium	1.0		**192**	200.0	2.088	95.0	75	125	05/02/2017
Cobalt	1.0		**475**	500.0	0.3738	94.9	75	125	05/02/2017
Lead	1.0		**522**	500.0	1.153	104.2	75	125	05/02/2017
Lithium	1.0		**638**	500.0	109.4	105.7	75	125	05/02/2017
Molybdenum	20.0		**3810**	500.0	3403	80.7	75	125	05/03/2017
Selenium	1.0		**498**	500.0	8.572	97.9	75	125	05/02/2017
Thallium	1.0		**252**	250.0	0	100.8	75	125	05/02/2017

Batch 129687 **SampType:** MSD Units **µg/L** RPD Limit **20**

SampID: 17040224-002BMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony	1.0		**515**	500.0	3.232	102.3	515.5	0.17	05/02/2017
Arsenic	1.0		**550**	500.0	31.11	103.9	553.3	0.52	05/02/2017
Barium	1.0		**2120**	2000	59.60	103.1	2127	0.26	05/02/2017
Beryllium	1.0		**48.9**	50.00	0	97.8	49.67	1.53	05/02/2017
Boron	500	S	**26700**	500.0	28330	-321.1	26960	0.89	05/03/2017
Cadmium	1.0		**50.9**	50.00	0.6986	100.4	51.23	0.65	05/02/2017
Chromium	1.0		**192**	200.0	2.088	95.2	192.1	0.20	05/02/2017
Cobalt	1.0		**474**	500.0	0.3738	94.7	474.9	0.22	05/02/2017
Lead	1.0		**519**	500.0	1.153	103.6	522.2	0.55	05/02/2017
Lithium	1.0		**650**	500.0	109.4	108.2	638.0	1.89	05/02/2017
Molybdenum	20.0	S	**3770**	500.0	3403	74.3	3806	0.84	05/03/2017
Selenium	1.0		**504**	500.0	8.572	99.0	498.3	1.06	05/02/2017
Thallium	1.0		**250**	250.0	0	99.8	252.0	0.96	05/02/2017

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)

Batch 129738 **SampType:** MBLK Units **µg/L**

SampID: MBLK-129738

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony	1.0		**< 1.0**	1.000	0	0	-100	100	05/02/2017
Arsenic	1.0		**< 1.0**	1.000	0	0	-100	100	05/02/2017
Barium	1.0		**< 1.0**	1.000	0	0	-100	100	05/02/2017
Beryllium	1.0		**< 1.0**	1.000	0	0	-100	100	05/03/2017
Boron	25.0		**< 25.0**	25.00	0	0	-100	100	05/03/2017
Cadmium	1.0		**< 1.0**	1.000	0	0	-100	100	05/02/2017
Chromium	1.0		**< 1.0**	1.000	0	0	-100	100	05/03/2017
Cobalt	1.0		**< 1.0**	1.000	0	0	-100	100	05/03/2017
Lead	1.0		**< 1.0**	1.000	0	0	-100	100	05/02/2017
Lithium	1.0		**< 1.0**	1.000	0	59.6	-100	100	05/03/2017
Molybdenum	1.0		**< 1.0**	1.000	0	0	-100	100	05/02/2017
Selenium	1.0		**< 1.0**	1.000	0	0	-100	100	05/02/2017
Thallium	1.0		**< 1.0**	1.000	0	0	-100	100	05/02/2017

Batch 129738 **SampType:** LCS Units **µg/L**

SampID: LCS-129738

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony	1.0		**457**	500.0	0	91.3	80	120	05/02/2017
Arsenic	1.0		**478**	500.0	0	95.5	80	120	05/02/2017
Barium	1.0		**1890**	2000	0	94.6	80	120	05/02/2017
Beryllium	1.0		**51.3**	50.00	0	102.5	80	120	05/03/2017
Boron	25.0		**502**	500.0	0	100.3	80	120	05/03/2017
Cadmium	1.0		**45.6**	50.00	0	91.1	80	120	05/02/2017
Chromium	1.0		**183**	200.0	0	91.7	80	120	05/03/2017
Cobalt	1.0		**468**	500.0	0	93.6	80	120	05/03/2017
Lead	1.0		**476**	500.0	0	95.1	80	120	05/02/2017
Lithium	1.0		**550**	500.0	0	110.0	80	120	05/03/2017
Molybdenum	1.0		**449**	500.0	0	89.9	80	120	05/02/2017
Selenium	1.0		**462**	500.0	0	92.4	80	120	05/02/2017
Thallium	1.0		**229**	250.0	0	91.7	80	120	05/02/2017

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)

Batch 129738 **SampType:** MS Units **µg/L**

SampID: 17040224-007BMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony	1.0		**472**	500.0	1.019	94.2	75	125	05/02/2017
Arsenic	1.0		**501**	500.0	26.45	94.8	75	125	05/02/2017
Barium	1.0		**2020**	2000	91.99	96.6	75	125	05/02/2017
Beryllium	1.0		**49.7**	50.00	0	99.4	75	125	05/03/2017
Boron	25.0	S	**28200**	500.0	26930	245.2	75	125	05/03/2017
Cadmium	1.0		**46.7**	50.00	0.6973	92.1	75	125	05/02/2017
Chromium	1.0		**185**	200.0	3.761	90.8	75	125	05/03/2017
Cobalt	1.0		**458**	500.0	1.193	91.5	75	125	05/03/2017
Lead	1.0		**493**	500.0	7.712	97.1	75	125	05/02/2017
Lithium	1.0		**627**	500.0	97.46	105.9	75	125	05/03/2017
Molybdenum	1.0		**753**	500.0	289.0	92.7	75	125	05/02/2017
Selenium	1.0		**567**	500.0	118.1	89.7	75	125	05/02/2017
Thallium	1.0		**232**	250.0	0	92.8	75	125	05/02/2017

Batch 129738 **SampType:** MSD Units **µg/L** RPD Limit **20**

SampID: 17040224-007BMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony	1.0		**465**	500.0	1.019	92.8	472.2	1.54	05/02/2017
Arsenic	1.0		**499**	500.0	26.45	94.5	500.7	0.29	05/02/2017
Barium	1.0		**1990**	2000	91.99	94.9	2024	1.65	05/02/2017
Beryllium	1.0		**48.9**	50.00	0	97.7	49.72	1.73	05/03/2017
Boron	25.0	S	**27900**	500.0	26930	192.9	28160	0.93	05/03/2017
Cadmium	1.0		**46.2**	50.00	0.6973	91.0	46.75	1.17	05/02/2017
Chromium	1.0		**186**	200.0	3.761	91.2	185.3	0.48	05/03/2017
Cobalt	1.0		**464**	500.0	1.193	92.6	458.5	1.25	05/03/2017
Lead	1.0		**487**	500.0	7.712	95.9	493.5	1.26	05/02/2017
Lithium	1.0		**617**	500.0	97.46	103.8	627.1	1.68	05/03/2017
Molybdenum	1.0		**745**	500.0	289.0	91.1	752.7	1.08	05/02/2017
Selenium	1.0		**567**	500.0	118.1	89.7	566.7	0.03	05/02/2017
Thallium	1.0		**231**	250.0	0	92.3	232.0	0.55	05/02/2017

SW-846 7470A (TOTAL)

Batch 129695 **SampType:** MBLK Units **µg/L**

SampID: MBLK-129695

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury	0.20		**< 0.20**	0.2000	0	0	-100	100	05/01/2017

Batch 129695 **SampType:** LCS Units **µg/L**

SampID: LCS-129695

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury	0.20		**5.14**	5.000	0	102.8	85	115	05/01/2017

Client: Natural Resource Technology, Inc. **Work Order:** 17040224

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 08-May-17

SW-846 7470A (TOTAL)

Batch 129707 **SampType: MBLK** Units **µg/L**
SampID: MBLK-129707

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury	0.20		**< 0.20**	0.2000	0	0	-100	100	05/01/2017

Batch 129707 **SampType: LCS** Units **µg/L**
SampID: LCS-129707

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury	0.20		**4.64**	5.000	0	92.8	85	115	05/01/2017

Batch 129707 **SampType: MS** Units **µg/L**
SampID: 17040224-009BMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury	0.20		**4.66**	5.000	0	93.2	75	125	05/01/2017

Batch 129707 **SampType: MSD** Units **µg/L** RPD Limit **15**
SampID: 17040224-009BMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury	0.20		**4.64**	5.000	0	92.8	4.661	0.40	05/01/2017

Batch 129736 **SampType: MBLK** Units **µg/L**
SampID: MBLK-129736

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury	0.20		**< 0.20**	0.2000	0	0	-100	100	05/01/2017

Batch 129736 **SampType: LCS** Units **µg/L**
SampID: LCS-129736

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury	0.20		**5.26**	5.000	0	105.2	85	115	05/01/2017

Batch 129736 **SampType: MS** Units **µg/L**
SampID: 17040224-007BMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury	0.20		**5.05**	5.000	0	101.0	75	125	05/01/2017

Batch 129736 **SampType: MSD** Units **µg/L** RPD Limit **15**
SampID: 17040224-007BMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury	0.20		**4.96**	5.000	0	99.2	5.049	1.79	05/01/2017

Receiving Check List

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.
Work Order: 17040224
Client Project: Hennepin Pond 1 & 2 Additional Testing
Report Date: 08-May-17

Carrier: Tim Mathis
Received By: AMD

Completed by: Amber M. Dilallo
On: 27-Apr-17

Reviewed by: Elizabeth A. Hurley
On: 27-Apr-17

Pages to follow: Chain of custody 1 Extra pages included 8

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 4.62
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☐	No ☑		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☑	No ☐		
Reported field parameters measured:	Field ☑	Lab ☐	NA ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐		

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☑	NA ☐
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑

Any No responses must be detailed below or on the COC.

Additional Nitric Acid was needed in L4, LPZ-3, and LPZ-17 upon arrival at the laboratory. AMD 4/27/17

No containers were labeled as LPZ-17. Per Tim Mathis, LPZ-17 was collected in containers labeled as LPZ-5 which was dry. EAH 5/1/17

CHAIN OF CUSTODY

pg. 1 of 1 Work order # 17040224

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

Client:	Natural Resource Technology, Inc.
Address:	2422 East Washington Street
City / State / Zip	Bloomington, IL 61704
Contact:	Steve Wiskes
Phone:	(414) 837-3614
E-Mail:	steve.wiskes@obg.com
Fax:	

Samples on: ☒ ICE ☐ BLUE ICE ☐ NO ICE 4.0 °C

Preserved in: ☒ LAB ☐ FIELD

FOR LAB USE ONLY

Lab Notes: ★ HNO3 gmb 4/27/17

Are these samples known to be involved in litigation? If yes, a surcharge will apply ☐ Yes ☒ No

Are these samples known to be hazardous? ☐ Yes ☒ No

Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section. ☐ Yes ☒ No

Client Comments

Total Metals: ICP/MS 6020A Sb As Ba Be B Cd Cr Co Pb Li Mo Se Tl, ICP 6010 Ca Mg K Na, and Hg 7470A.

★LPZ-17: Alternate sampling point if LPZ-5 is dry.

✱ D24 ~~★ SAMPLE ID ON CONTAINERS SHOULD~~ TM TE

Project Name/Number	Sample Collector's Name
Hennepin Pond 1 & 2 Additional Testing	Tim/MIKE

Results Requested

☒ Standard ☐ 1-2 Day (100% Surcharge) ☐ Other ____ ☐ 3 Day (50% Surcharge)

Billing Instructions

Lab Use Only	Sample Identification	Date/Time Sampled	# and Type of Containers: UNP	HNO3	MATRIX: Leachate	Alkalinity, Carb (as CaCO3)	Alkalinity, Hyd (as CaCO3)	Chloride 9251	Field Conductivity SM 2510-B	Field DO SM 4500-O	Field Leachate Elevations	Field ORP SM 2580-B	Field pH SM 4500-H+B	Field Temperature SM 2550	Field Turbidity SM 2130-B	Fluoride 9214	Sulfate 9036	TDS SM 2540C	Total Metals
17040224-001	L4 ★	4.25.17 1722	1	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
-002	LPZ-1	1734	1	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
-003	LPZ-3 ★	1800	1	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
-004	LPZ-5 ✱ ★	1330	1	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
-005	LPZ-13	1307 ~~1310~~ TM TE	0		X						X								
-006	LPZ-15	1310	0		X						X								
-007	LPZ-17★	1844 ~~1310~~	0		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
-008	L4 DUP	1722	1	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
-009	Field Blank	1900	1	1	X	X	X	X								X	X	X	X

Relinquished By	Date/Time	Received By	Date/Time
	4/27/17 1640	Amber Dicello	4/27/17 1640

The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions.

BottleOrder: 37016

gmb 4/27/17

September 22, 2017

Steve Wiskes
Natural Resource Technology, Inc.
2422 East Washington Street
Suite 104
Bloomington, IL 61704
TEL: (414) 837-3614
FAX: (414) 837-3608

RE: Hennepin Pond 1 & 2 Additional Testing **WorkOrder:** 17081821

Dear Steve Wiskes:

TEKLAB, INC received 9 samples on 9/8/2017 1:10:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Michael L. Austin
Project Manager
(618)344-1004 ex 16
MAustin@teklabinc.com

Report Contents

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.
Work Order: 17081821
Client Project: Hennepin Pond 1 & 2 Additional Testing
Report Date: 22-Sep-17

This reporting package includes the following:

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

Abbr Definition

CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilutions factors.
DNI	Did not ignite
DUP	Laboratory duplicate is an aliquot of a sample taken from the same container under laboratory conditions for independent processing and analysis independently of the original aliquot.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample, spiked with verified known amounts of analytes, is analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. The acceptable recovery range is in the QC Package (provided upon request).
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	Method detection limit means the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero.
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions. The acceptable recovery range is listed in the QC Package (provided upon request).
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Qualifiers

# -	Unknown hydrocarbon	B -	Analyte detected in associated Method Blank
E -	Value above quantitation range	H -	Holding times exceeded
I -	Associated internal standard was outside method criteria	J -	Analyte detected below quantitation limits
M -	Manual Integration used to determine area response	ND -	Not Detected at the Reporting Limit
R -	RPD outside accepted recovery limits	S -	Spike Recovery outside recovery limits
T -	TIC(Tentatively identified compound)	X -	Value exceeds Maximum Contaminant Level

Case Narrative

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.
Work Order: 17081821
Client Project: Hennepin Pond 1 & 2 Additional Testing
Report Date: 22-Sep-17

Cooler Receipt Temp: 1.02 °C

An employee of Teklab, Inc. collected the sample(s).

LPZ-1, LPZ-3, and LPZ-5 will not be reported; wells were dry. TM/EAH 9/8/17

LPZ-17 to be used as alternate sampling point for LPZ-5. MLA 9/8/17

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email jhriley@teklabinc.com

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2018	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2018	Collinsville
Louisiana	LDEQ	166493	NELAP	6/30/2018	Collinsville
Louisiana	LDEQ	166578	NELAP	6/30/2018	Collinsville
Texas	TCEQ	T104704515-12-1	NELAP	7/31/2018	Collinsville
Arkansas	ADEQ	88-0966		3/14/2018	Collinsville
Illinois	IDPH	17584		5/31/2019	Collinsville
Indiana	ISDH	C-IL-06		1/31/2018	Collinsville
Kentucky	KDEP	98006		12/31/2017	Collinsville
Kentucky	UST	0073		1/31/2018	Collinsville
Louisiana	LDPH	LA170027		12/31/2017	Collinsville
Missouri	MDNR	930		1/31/2018	Collinsville
Missouri	MDNR	00930		5/31/2017	Collinsville
Oklahoma	ODEQ	9978		8/31/2018	Collinsville
Tennessee	TDEC	04905		1/31/2018	Collinsville

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

Lab ID: 17081821-001 **Client Sample ID:** L4

Matrix: LEACHATE **Collection Date:** 09/06/2017 15:15

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Depth to leachate from measuring point		0		**14.57**	ft	1	09/06/2017 15:15	R237731
STANDARD METHOD 4500-H B FIELD								
pH		1.00		**7.85**		1	09/06/2017 15:15	R237731
STANDARD METHODS 2130 B FIELD								
Turbidity		1.0		**8.5**	NTU	1	09/06/2017 15:15	R237731
STANDARD METHODS 18TH ED. 2580 B FIELD								
Oxidation-Reduction Potential		-300		**-85**	mV	1	09/06/2017 15:15	R237731
STANDARD METHODS 2510 B FIELD								
Conductivity		1		**1130**	µS/cm	1	09/06/2017 15:15	R237731
STANDARD METHODS 2550 B FIELD								
Temperature		0		**14.72**	°C	1	09/06/2017 15:15	R237731
STANDARD METHODS 4500-O G FIELD								
Oxygen, Dissolved		1.00		**< 1.00**	mg/L	1	09/06/2017 15:15	R237731
STANDARD METHODS 2320 B								
Alkalinity, Total (as CaCO3)	NELAP	0		**220**	mg/L	1	09/11/2017 15:05	R237563
STANDARD METHODS 2320 B								
Alkalinity, Carbonate (as CaCO3)	NELAP	0		**0**	mg/L	1	09/11/2017 15:05	R237566
STANDARD METHODS 2320 B (TOTAL)								
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0		**220**	mg/L	1	09/11/2017 15:05	R237565
STANDARD METHODS 2540 C (TOTAL)								
Total Dissolved Solids	NELAP	20		**972**	mg/L	1	09/12/2017 16:16	R237592
SW-846 9036 (TOTAL)								
Sulfate	NELAP	200		**419**	mg/L	20	09/12/2017 15:46	R237579
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.19**	mg/L	1	09/08/2017 18:28	R237461
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		**21**	mg/L	1	09/12/2017 15:08	R237578
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Calcium	NELAP	0.050		**202**	mg/L	1	09/11/2017 14:25	133977
Magnesium	NELAP	0.050		**35.1**	mg/L	1	09/11/2017 14:25	133977
Potassium	NELAP	0.200		**12.7**	mg/L	2	09/12/2017 14:25	133977
Sodium	NELAP	0.050		**35.1**	mg/L	1	09/11/2017 14:25	133977
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**5.1**	µg/L	5	09/11/2017 15:16	133980
Arsenic	NELAP	1.0		**61.0**	µg/L	5	09/11/2017 15:16	133980
Barium	NELAP	1.0		**51.8**	µg/L	5	09/11/2017 15:16	133980
Beryllium	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:16	133980
Boron	NELAP	25.0		**32000**	µg/L	5	09/11/2017 15:16	133980
Cadmium	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:16	133980
Chromium	NELAP	1.0	J	**0.3**	µg/L	5	09/11/2017 15:16	133980
Cobalt	NELAP	1.0	J	**0.3**	µg/L	5	09/11/2017 15:16	133980
Lead	NELAP	1.0		**< 1.0**	µg/L	5	09/12/2017 14:29	133980
Lithium		1.0		**62.7**	µg/L	5	09/11/2017 15:16	133980
Molybdenum	NELAP	1.0		**77.3**	µg/L	5	09/11/2017 15:16	133980
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:16	133980

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

Lab ID: 17081821-001 **Client Sample ID:** L4

Matrix: LEACHATE **Collection Date:** 09/06/2017 15:15

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Thallium	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:16	133980
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	09/11/2017 9:32	133984

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

Lab ID: 17081821-005 **Client Sample ID:** LPZ-13

Matrix: LEACHATE **Collection Date:** 09/07/2017 15:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Depth to leachate from measuring point		0		**12.85**	ft	1	09/07/2017 15:00	R237731

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

Lab ID: 17081821-006 **Client Sample ID:** LPZ-15

Matrix: LEACHATE **Collection Date:** 09/07/2017 15:45

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Depth to leachate from measuring point		0		**15.05**	ft	1	09/07/2017 15:45	R237731

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

Lab ID: 17081821-007 **Client Sample ID:** LPZ-17

Matrix: LEACHATE **Collection Date:** 09/06/2017 15:01

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Depth to leachate from measuring point		0		**15.92**	ft	1	09/06/2017 15:01	R237731
STANDARD METHOD 4500-H B FIELD								
pH		1.00		**10.46**		1	09/06/2017 15:01	R237731
STANDARD METHODS 2130 B FIELD								
Turbidity		1.0		**9.8**	NTU	1	09/06/2017 15:01	R237731
STANDARD METHODS 18TH ED. 2580 B FIELD								
Oxidation-Reduction Potential		-300		**-230**	mV	1	09/06/2017 15:01	R237731
STANDARD METHODS 2510 B FIELD								
Conductivity		1		**1820**	µS/cm	1	09/06/2017 15:01	R237731
STANDARD METHODS 2550 B FIELD								
Temperature		0		**16.84**	°C	1	09/06/2017 15:01	R237731
STANDARD METHODS 4500-O G FIELD								
Oxygen, Dissolved		1.00		**< 1.00**	mg/L	1	09/06/2017 15:01	R237731
STANDARD METHODS 2320 B								
Alkalinity, Total (as CaCO3)	NELAP	0		**162**	mg/L	1	09/11/2017 15:20	R237563
STANDARD METHODS 2320 B								
Alkalinity, Carbonate (as CaCO3)	NELAP	0		**68**	mg/L	1	09/11/2017 15:20	R237566
STANDARD METHODS 2320 B (TOTAL)								
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0		**0**	mg/L	1	09/11/2017 15:20	R237565
STANDARD METHODS 2540 C (TOTAL)								
Total Dissolved Solids	NELAP	20		**1910**	mg/L	1	09/12/2017 16:16	R237592
SW-846 9036 (TOTAL)								
Sulfate	NELAP	500		**1120**	mg/L	50	09/12/2017 16:03	R237579
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10	J	**0.05**	mg/L	1	09/08/2017 18:30	R237461
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		**16**	mg/L	1	09/12/2017 15:54	R237578
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Calcium	NELAP	0.050	S	**538**	mg/L	1	09/11/2017 14:31	133977
Magnesium	NELAP	0.050		**2.63**	mg/L	1	09/11/2017 14:31	133977
Potassium	NELAP	0.500		**25.5**	mg/L	5	09/12/2017 14:35	133977
Sodium	NELAP	0.050		**21.6**	mg/L	1	09/11/2017 14:31	133977
MS QC limits for Ca are not applicable due to high sample/spike ratio.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**1.3**	µg/L	5	09/11/2017 15:24	133980
Arsenic	NELAP	1.0		**38.1**	µg/L	5	09/11/2017 15:24	133980
Barium	NELAP	1.0		**97.2**	µg/L	5	09/11/2017 15:24	133980
Beryllium	NELAP	1.0	J	**0.8**	µg/L	5	09/11/2017 15:24	133980
Boron	NELAP	25.0	S	**28600**	µg/L	5	09/11/2017 15:24	133980
Cadmium	NELAP	1.0		**1.3**	µg/L	5	09/11/2017 15:24	133980
Chromium	NELAP	1.0		**8.3**	µg/L	5	09/11/2017 15:24	133980
Cobalt	NELAP	1.0		**2.3**	µg/L	5	09/11/2017 15:24	133980
Lead	NELAP	1.0		**15.3**	µg/L	5	09/12/2017 14:37	133980
Lithium		1.0		**90.3**	µg/L	5	09/11/2017 15:24	133980
Molybdenum	NELAP	1.0		**299**	µg/L	5	09/11/2017 15:24	133980

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

Lab ID: 17081821-007 **Client Sample ID:** LPZ-17

Matrix: LEACHATE **Collection Date:** 09/06/2017 15:01

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Selenium	NELAP	1.0		**7.0**	µg/L	5	09/11/2017 15:24	133980
Thallium	NELAP	1.0	J	**0.5**	µg/L	5	09/11/2017 15:24	133980
MS QC limits for B are not applicable due to high sample/spike ratio.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	09/11/2017 9:46	133984

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

Lab ID: 17081821-008 **Client Sample ID:** L4 DUP

Matrix: LEACHATE **Collection Date:** 09/06/2017 15:15

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Depth to leachate from measuring point		0		**14.57**	ft	1	09/06/2017 15:15	R237731
STANDARD METHOD 4500-H B FIELD								
pH		1.00		**7.85**		1	09/06/2017 15:15	R237731
STANDARD METHODS 2130 B FIELD								
Turbidity		1.0		**8.5**	NTU	1	09/06/2017 15:15	R237731
STANDARD METHODS 18TH ED. 2580 B FIELD								
Oxidation-Reduction Potential		-300		**-85**	mV	1	09/06/2017 15:15	R237731
STANDARD METHODS 2510 B FIELD								
Conductivity		1		**1130**	µS/cm	1	09/06/2017 15:15	R237731
STANDARD METHODS 2550 B FIELD								
Temperature		0		**14.72**	°C	1	09/06/2017 15:15	R237731
STANDARD METHODS 4500-O G FIELD								
Oxygen, Dissolved		1.00		**< 1.00**	mg/L	1	09/06/2017 15:15	R237731
STANDARD METHODS 2320 B								
Alkalinity, Total (as CaCO3)	NELAP	0		**226**	mg/L	1	09/11/2017 15:28	R237563
STANDARD METHODS 2320 B								
Alkalinity, Carbonate (as CaCO3)	NELAP	0		**0**	mg/L	1	09/11/2017 15:28	R237566
STANDARD METHODS 2320 B (TOTAL)								
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0		**226**	mg/L	1	09/11/2017 15:28	R237565
STANDARD METHODS 2540 C (TOTAL)								
Total Dissolved Solids	NELAP	20		**954**	mg/L	1	09/12/2017 16:46	R237592
SW-846 9036 (TOTAL)								
Sulfate	NELAP	100		**439**	mg/L	10	09/12/2017 16:11	R237579
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.19**	mg/L	1	09/08/2017 18:34	R237461
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		**22**	mg/L	1	09/12/2017 16:02	R237578
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Calcium	NELAP	0.050		**210**	mg/L	1	09/11/2017 14:48	133977
Magnesium	NELAP	0.050		**35.2**	mg/L	1	09/11/2017 14:48	133977
Potassium	NELAP	0.200		**12.5**	mg/L	2	09/12/2017 14:53	133977
Sodium	NELAP	0.050		**35.3**	mg/L	1	09/11/2017 14:48	133977
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**4.5**	µg/L	5	09/11/2017 15:33	133980
Arsenic	NELAP	1.0		**66.4**	µg/L	5	09/11/2017 15:33	133980
Barium	NELAP	1.0		**59.1**	µg/L	5	09/11/2017 15:33	133980
Beryllium	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:33	133980
Boron	NELAP	25.0		**33300**	µg/L	5	09/11/2017 15:33	133980
Cadmium	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:33	133980
Chromium	NELAP	1.0	J	**0.3**	µg/L	5	09/11/2017 15:33	133980
Cobalt	NELAP	1.0	J	**0.3**	µg/L	5	09/11/2017 15:33	133980
Lead	NELAP	1.0		**< 1.0**	µg/L	5	09/12/2017 14:45	133980
Lithium		1.0		**63.8**	µg/L	5	09/11/2017 15:33	133980
Molybdenum	NELAP	1.0		**74.4**	µg/L	5	09/11/2017 15:33	133980
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:33	133980

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

Lab ID: 17081821-008 **Client Sample ID:** L4 DUP

Matrix: LEACHATE **Collection Date:** 09/06/2017 15:15

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Thallium	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:33	133980
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	09/11/2017 9:49	133984

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

Lab ID: 17081821-009 **Client Sample ID:** Field Blank

Matrix: LEACHATE **Collection Date:** 09/06/2017 15:25

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
STANDARD METHODS 2320 B								
Alkalinity, Total (as CaCO3)	NELAP	0		**2**	mg/L	1	09/11/2017 15:33	R237563
STANDARD METHODS 2320 B								
Alkalinity, Carbonate (as CaCO3)	NELAP	0		**0**	mg/L	1	09/11/2017 15:33	R237566
STANDARD METHODS 2320 B (TOTAL)								
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0		**2**	mg/L	1	09/11/2017 15:33	R237565
STANDARD METHODS 2540 C (TOTAL)								
Total Dissolved Solids	NELAP	20	J	**10**	mg/L	1	09/12/2017 16:46	R237592
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		**< 10**	mg/L	1	09/12/2017 16:13	R237579
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**< 0.10**	mg/L	1	09/08/2017 18:35	R237461
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		**< 5**	mg/L	1	09/12/2017 16:10	R237578
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Calcium	NELAP	0.050		**< 0.050**	mg/L	1	09/11/2017 14:54	133977
Magnesium	NELAP	0.050		**< 0.050**	mg/L	1	09/11/2017 14:54	133977
Potassium	NELAP	0.100		**< 0.100**	mg/L	1	09/12/2017 15:02	133977
Sodium	NELAP	0.050		**< 0.050**	mg/L	1	09/11/2017 14:54	133977
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:41	133980
Arsenic	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:41	133980
Barium	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:41	133980
Beryllium	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:41	133980
Boron	NELAP	25.0	J	**21**	µg/L	5	09/12/2017 14:21	133980
Cadmium	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:41	133980
Chromium	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:41	133980
Cobalt	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:41	133980
Lead	NELAP	1.0		**< 1.0**	µg/L	5	09/12/2017 14:21	133980
Lithium		1.0		**< 1.0**	µg/L	5	09/11/2017 15:41	133980
Molybdenum	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:41	133980
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:41	133980
Thallium	NELAP	1.0		**< 1.0**	µg/L	5	09/11/2017 15:41	133980
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	09/11/2017 9:52	133984

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

Lab Sample ID	Client Sample ID	Matrix	Fractions	Collection Date
17081821-001	L4	Leachate	2	09/06/2017 15:15
17081821-002	LPZ-1	Leachate	1	09/06/2017 13:48
17081821-003	LPZ-3	Leachate	1	09/06/2017 13:40
17081821-004	LPZ-5	Leachate	1	09/06/2017 13:36
17081821-005	LPZ-13	Leachate	1	09/07/2017 15:00
17081821-006	LPZ-15	Leachate	1	09/07/2017 15:45
17081821-007	LPZ-17	Leachate	2	09/06/2017 15:01
17081821-008	L4 DUP	Leachate	2	09/06/2017 15:15
17081821-009	Field Blank	Leachate	2	09/06/2017 15:25

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
17081821-001A	L4	09/06/2017 15:15	09/08/2017 13:10		
	Field Elevation Measurements				09/06/2017 15:15
	Standard Method 4500-H B Field				09/06/2017 15:15
	Standard Methods 2130 B Field				09/06/2017 15:15
	Standard Methods 2320 B				09/11/2017 15:05
	Standard Methods 18th Ed. 2580 B Field				09/06/2017 15:15
	Standard Methods 2320 B				09/11/2017 15:05
	Standard Methods 2320 B (Total)				09/11/2017 15:05
	Standard Methods 2510 B Field				09/06/2017 15:15
	Standard Methods 2540 C (Total)				09/12/2017 16:16
	Standard Methods 2550 B Field				09/06/2017 15:15
	Standard Methods 4500-O G Field				09/06/2017 15:15
	SW-846 9036 (Total)				09/12/2017 15:46
	SW-846 9214 (Total)				09/08/2017 18:28
	SW-846 9251 (Total)				09/12/2017 15:08
17081821-001B	L4	09/06/2017 15:15	09/08/2017 13:10		
	SW-846 3005A, 6010B, Metals by ICP (Total)			09/08/2017 14:09	09/11/2017 14:25
	SW-846 3005A, 6010B, Metals by ICP (Total)			09/08/2017 14:09	09/12/2017 14:25
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/08/2017 14:31	09/11/2017 15:16
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/08/2017 14:31	09/12/2017 14:29
	SW-846 7470A (Total)			09/08/2017 14:51	09/11/2017 9:32
17081821-005A	LPZ-13	09/07/2017 15:00	09/08/2017 13:10		
	Field Elevation Measurements				09/07/2017 15:00
17081821-006A	LPZ-15	09/07/2017 15:45	09/08/2017 13:10		
	Field Elevation Measurements				09/07/2017 15:45
17081821-007A	LPZ-17	09/06/2017 15:01	09/08/2017 13:10		
	Field Elevation Measurements				09/06/2017 15:01
	Standard Method 4500-H B Field				09/06/2017 15:01
	Standard Methods 2130 B Field				09/06/2017 15:01
	Standard Methods 2320 B				09/11/2017 15:20
	Standard Methods 18th Ed. 2580 B Field				09/06/2017 15:01
	Standard Methods 2320 B				09/11/2017 15:20
	Standard Methods 2320 B (Total)				09/11/2017 15:20
	Standard Methods 2510 B Field				09/06/2017 15:01
	Standard Methods 2540 C (Total)				09/12/2017 16:16
	Standard Methods 2550 B Field				09/06/2017 15:01
	Standard Methods 4500-O G Field				09/06/2017 15:01

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			**Prep Date/Time**	**Analysis Date/Time**
	SW-846 9036 (Total)				09/12/2017 16:03
	SW-846 9214 (Total)				09/08/2017 18:30
	SW-846 9251 (Total)				09/12/2017 15:54
17081821-007B	LPZ-17	09/06/2017 15:01	09/08/2017 13:10		
	SW-846 3005A, 6010B, Metals by ICP (Total)			09/08/2017 14:09	09/11/2017 14:31
	SW-846 3005A, 6010B, Metals by ICP (Total)			09/08/2017 14:09	09/12/2017 14:35
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/08/2017 14:31	09/11/2017 15:24
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/08/2017 14:31	09/12/2017 14:37
	SW-846 7470A (Total)			09/08/2017 14:51	09/11/2017 9:46
17081821-008A	L4 DUP	09/06/2017 15:15	09/08/2017 13:10		
	Field Elevation Measurements				09/06/2017 15:15
	Standard Method 4500-H B Field				09/06/2017 15:15
	Standard Methods 2130 B Field				09/06/2017 15:15
	Standard Methods 2320 B				09/11/2017 15:28
	Standard Methods 18th Ed. 2580 B Field				09/06/2017 15:15
	Standard Methods 2320 B				09/11/2017 15:28
	Standard Methods 2320 B (Total)				09/11/2017 15:28
	Standard Methods 2510 B Field				09/06/2017 15:15
	Standard Methods 2540 C (Total)				09/12/2017 16:46
	Standard Methods 2550 B Field				09/06/2017 15:15
	Standard Methods 4500-O G Field				09/06/2017 15:15
	SW-846 9036 (Total)				09/12/2017 16:11
	SW-846 9214 (Total)				09/08/2017 18:34
	SW-846 9251 (Total)				09/12/2017 16:02
17081821-008B	L4 DUP	09/06/2017 15:15	09/08/2017 13:10		
	SW-846 3005A, 6010B, Metals by ICP (Total)			09/08/2017 14:09	09/11/2017 14:48
	SW-846 3005A, 6010B, Metals by ICP (Total)			09/08/2017 14:09	09/12/2017 14:53
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/08/2017 14:31	09/11/2017 15:33
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/08/2017 14:31	09/12/2017 14:45
	SW-846 7470A (Total)			09/08/2017 14:51	09/11/2017 9:49
17081821-009A	Field Blank	09/06/2017 15:25	09/08/2017 13:10		
	Standard Methods 2320 B				09/11/2017 15:33
	Standard Methods 2320 B				09/11/2017 15:33
	Standard Methods 2320 B (Total)				09/11/2017 15:33
	Standard Methods 2540 C (Total)				09/12/2017 16:46
	SW-846 9036 (Total)				09/12/2017 16:13
	SW-846 9214 (Total)				09/08/2017 18:35

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			**Prep Date/Time**	**Analysis Date/Time**
	SW-846 9251 (Total)				09/12/2017 16:10
17081821-009B	Field Blank	09/06/2017 15:25	09/08/2017 13:10		
	SW-846 3005A, 6010B, Metals by ICP (Total)			09/08/2017 14:09	09/11/2017 14:54
	SW-846 3005A, 6010B, Metals by ICP (Total)			09/08/2017 14:09	09/12/2017 15:02
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/08/2017 14:31	09/11/2017 15:41
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/08/2017 14:31	09/12/2017 14:21
	SW-846 7470A (Total)			09/08/2017 14:51	09/11/2017 9:52

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

STANDARD METHOD 4500-H B FIELD

Batch R237731 **SampType:** LCS Units

SampID: LCS-R237731

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	1.00		**7.00**	7.000	0	100.0	99.1	100.9	09/06/2017

STANDARD METHODS 2510 B FIELD

Batch R237731 **SampType:** LCS Units **µmhos/cm**

SampID: LCS-R237731

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Conductivity	1		**1410**	1412	0	99.9	90	110	09/06/2017

STANDARD METHODS 2320 B

Batch R237563 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Alkalinity, Total (as CaCO3)	0		**0**						09/11/2017

Batch R237563 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Alkalinity, Total (as CaCO3)	0		**230**	232.0	0	99.1	90	110	09/11/2017

Batch R237563 **SampType:** MS Units **mg/L**

SampID: 17081821-001AMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Alkalinity, Total (as CaCO3)	0		**310**	93.00	220.0	96.8	85	115	09/11/2017

Batch R237563 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 17081821-001AMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Alkalinity, Total (as CaCO3)	0		**308**	93.00	220.0	94.6	310.0	0.65	09/11/2017

STANDARD METHODS 2540 C (TOTAL)

Batch R237592 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids	20		**< 20**						09/12/2017
Total Dissolved Solids	20		**< 20**						09/12/2017
Total Dissolved Solids	20	J	**12**						09/12/2017

Batch R237592 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids	20		**990**	1000	0	99.0	90	110	09/12/2017

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

STANDARD METHODS 2540 C (TOTAL)

Batch R237592 **SampType:** LCSQC Units **mg/L**

SampID: LCSQC

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids	20		**932**	1000	0	93.2	90	110	09/12/2017
Total Dissolved Solids	20		**984**	1000	0	98.4	90	110	09/12/2017

Batch R237592 **SampType:** DUP Units **mg/L** RPD Limit **5**

SampID: 17081821-001ADUP

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids	20		**984**				972.0	1.23	09/12/2017

SW-846 9036 (TOTAL)

Batch R237579 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		**< 10**						09/12/2017

Batch R237579 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		**20**	20.00	0	98.9	90	110	09/12/2017

Batch R237579 **SampType:** MS Units **mg/L**

SampID: 17081821-001AMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	200		**597**	200.0	418.6	89.2	85	115	09/12/2017

Batch R237579 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 17081821-001AMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate	200		**611**	200.0	418.6	96.4	597.0	2.37	09/12/2017

SW-846 9214 (TOTAL)

Batch R237461 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	0.10		**< 0.10**						09/08/2017

Batch R237461 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	0.10		**1.06**	1.000	0	105.5	90	110	09/08/2017

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

SW-846 9214 (TOTAL)

Batch R237461 **SampType:** MS Units **mg/L**

SampID: 17081821-007AMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	0.10		**2.16**	2.000	0.05000	105.6	85	115	09/08/2017

Batch R237461 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 17081821-007AMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	0.10		**2.21**	2.000	0.05000	107.8	2.162	2.01	09/08/2017

SW-846 9251 (TOTAL)

Batch R237578 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride	5		**< 5**						09/12/2017

Batch R237578 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride	5		**21**	20.00	0	105.3	90	110	09/12/2017

Batch R237578 **SampType:** MS Units **mg/L**

SampID: 17081821-001AMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride	5		**38**	20.00	20.81	86.4	85	115	09/12/2017

Batch R237578 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 17081821-001AMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride	5		**38**	20.00	20.81	86.4	38.08	0.05	09/12/2017

SW-846 3005A, 6010B, METALS BY ICP (TOTAL)

Batch 133977 **SampType:** MBLK Units **mg/L**

SampID: MBLK-133977

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium	0.0500		**< 0.0500**	0.05000	0	0	-100	100	09/11/2017
Calcium	0.0500		**< 0.0500**	0.05000	0	0	-100	100	09/11/2017
Magnesium	0.0500		**< 0.0500**	0.05000	0	0	-100	100	09/11/2017
Magnesium	0.0500		**< 0.0500**	0.05000	0	0	-100	100	09/11/2017
Potassium	0.100		**< 0.100**	0.1000	0	0	-100	100	09/12/2017
Sodium	0.0500		**< 0.0500**	0.05000	0	0	-100	100	09/11/2017
Sodium	0.0500		**< 0.0500**	0.05000	0	0	-100	100	09/11/2017

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

SW-846 3005A, 6010B, METALS BY ICP (TOTAL)

Batch 133977 **SampType:** LCS Units **mg/L**

SampID: LCS-133977

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium	0.0500		**2.68**	2.500	0	107.4	85	115	09/11/2017
Calcium	0.0500		**2.61**	2.500	0	104.3	85	115	09/11/2017
Magnesium	0.0500		**2.63**	2.500	0	105.0	85	115	09/11/2017
Magnesium	0.0500		**2.68**	2.500	0	107.3	85	115	09/11/2017
Potassium	0.100		**2.38**	2.500	0	95.4	85	115	09/12/2017
Sodium	0.0500		**2.39**	2.500	0	95.6	85	115	09/11/2017
Sodium	0.0500		**2.47**	2.500	0	98.7	85	115	09/11/2017

Batch 133977 **SampType:** MS Units **mg/L**

SampID: 17081821-007BMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium	0.050	S	**536**	2.500	538.2	-100.0	75	125	09/11/2017
Magnesium	0.050		**5.24**	2.500	2.627	104.3	75	125	09/11/2017
Potassium	0.500		**27.9**	2.500	25.48	95.8	75	125	09/12/2017
Sodium	0.050		**23.7**	2.500	21.56	85.2	75	125	09/11/2017

Batch 133977 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 17081821-007BMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium	0.050	S	**525**	2.500	538.2	-532.0	535.7	2.04	09/11/2017
Magnesium	0.050		**5.22**	2.500	2.627	103.9	5.235	0.19	09/11/2017
Potassium	0.500		**27.7**	2.500	25.48	89.8	27.88	0.54	09/13/2017
Sodium	0.050		**23.8**	2.500	21.56	90.4	23.69	0.55	09/11/2017

SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)

Batch 133980 **SampType:** MBLK Units **µg/L**

SampID: MBLK-133980

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony	1.0		**< 1.0**	1.000	0	0	-100	100	09/11/2017
Arsenic	1.0		**< 1.0**	1.000	0	0	-100	100	09/11/2017
Barium	1.0		**< 1.0**	1.000	0	0	-100	100	09/11/2017
Beryllium	1.0		**< 1.0**	1.000	0	0	-100	100	09/11/2017
Boron	25.0		**< 25.0**	25.00	0	0	-100	100	09/11/2017
Cadmium	1.0		**< 1.0**	1.000	0	0	-100	100	09/11/2017
Chromium	1.0		**< 1.0**	1.000	0	0	-100	100	09/11/2017
Cobalt	1.0		**< 1.0**	1.000	0	0	-100	100	09/11/2017
Lead	1.0		**< 1.0**	1.000	0	0	-100	100	09/12/2017
Lithium	1.0		**< 1.0**	1.000	0	0	-100	100	09/11/2017
Molybdenum	1.0		**< 1.0**	1.000	0	0	-100	100	09/11/2017
Selenium	1.0		**< 1.0**	1.000	0	0	-100	100	09/11/2017
Thallium	1.0		**< 1.0**	1.000	0	0	-100	100	09/11/2017

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)

Batch 133980 **SampType:** LCS Units **µg/L**

SampID: LCS-133980

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony	1.0		**487**	500.0	0	97.4	80	120	09/11/2017
Arsenic	1.0		**522**	500.0	0	104.3	80	120	09/11/2017
Barium	1.0		**2020**	2000	0	101.0	80	120	09/11/2017
Beryllium	1.0		**52.8**	50.00	0	105.7	80	120	09/11/2017
Boron	25.0		**569**	500.0	0	113.8	80	120	09/11/2017
Cadmium	1.0		**48.8**	50.00	0	97.7	80	120	09/11/2017
Chromium	1.0		**203**	200.0	0	101.6	80	120	09/11/2017
Cobalt	1.0		**513**	500.0	0	102.7	80	120	09/11/2017
Lead	1.0		**514**	500.0	0	102.9	80	120	09/11/2017
Lithium	1.0		**514**	500.0	0	102.7	80	120	09/11/2017
Molybdenum	1.0		**491**	500.0	0	98.2	80	120	09/11/2017
Selenium	1.0		**518**	500.0	0	103.6	80	120	09/11/2017
Thallium	1.0		**238**	250.0	0	95.1	80	120	09/11/2017

Batch 133980 **SampType:** MS Units **µg/L**

SampID: 17081821-007BMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony	1.0		**485**	500.0	1.257	96.8	75	125	09/11/2017
Arsenic	1.0		**556**	500.0	38.14	103.5	75	125	09/11/2017
Barium	1.0		**2080**	2000	97.21	99.0	75	125	09/11/2017
Beryllium	1.0		**52.5**	50.00	0.8463	103.3	75	125	09/11/2017
Boron	25.0	S	**29800**	500.0	28580	241.2	75	125	09/11/2017
Cadmium	1.0		**49.2**	50.00	1.346	95.7	75	125	09/11/2017
Chromium	1.0		**204**	200.0	8.319	97.8	75	125	09/11/2017
Cobalt	1.0		**494**	500.0	2.264	98.4	75	125	09/11/2017
Lead	1.0		**520**	500.0	15.27	101.0	75	125	09/12/2017
Lithium	1.0		**595**	500.0	90.27	101.0	75	125	09/11/2017
Molybdenum	1.0		**794**	500.0	299.0	99.1	75	125	09/11/2017
Selenium	1.0		**494**	500.0	7.005	97.4	75	125	09/11/2017
Thallium	1.0		**241**	250.0	0.5254	96.2	75	125	09/11/2017

Client: Natural Resource Technology, Inc. **Work Order:** 17081821

Client Project: Hennepin Pond 1 & 2 Additional Testing **Report Date:** 22-Sep-17

SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)

Batch 133980 **SampType:** MSD Units **µg/L** RPD Limit **20**

SampID: 17081821-007BMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony	1.0		**482**	500.0	1.257	96.2	485.5	0.64	09/11/2017
Arsenic	1.0		**544**	500.0	38.14	101.1	555.9	2.22	09/11/2017
Barium	1.0		**2060**	2000	97.21	98.0	2077	0.94	09/11/2017
Beryllium	1.0		**51.5**	50.00	0.8463	101.4	52.50	1.87	09/11/2017
Boron	25.0	S	**28300**	500.0	28580	-54.8	29790	5.09	09/11/2017
Cadmium	1.0		**48.8**	50.00	1.346	94.9	49.20	0.82	09/11/2017
Chromium	1.0		**202**	200.0	8.319	96.7	204.0	1.16	09/11/2017
Cobalt	1.0		**487**	500.0	2.264	97.0	494.1	1.37	09/11/2017
Lead	1.0		**521**	500.0	15.27	101.1	520.4	0.06	09/12/2017
Lithium	1.0		**584**	500.0	90.27	98.7	595.1	1.93	09/11/2017
Molybdenum	1.0		**777**	500.0	299.0	95.5	794.3	2.24	09/11/2017
Selenium	1.0		**485**	500.0	7.005	95.7	494.2	1.80	09/11/2017
Thallium	1.0		**241**	250.0	0.5254	96.1	241.0	0.12	09/11/2017

SW-846 7470A (TOTAL)

Batch 133984 **SampType:** MBLK Units **µg/L**

SampID: MBLK-133984

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury	0.20		**< 0.20**	0.2000	0	0	-100	100	09/11/2017

Batch 133984 **SampType:** LCS Units **µg/L**

SampID: LCS-133984

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury	0.20		**5.32**	5.000	0	106.3	85	115	09/11/2017

Batch 133984 **SampType:** MS Units **µg/L**

SampID: 17081821-001BMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury	0.20		**4.43**	5.000	0	88.7	75	125	09/11/2017

Batch 133984 **SampType:** MSD Units **µg/L** RPD Limit **15**

SampID: 17081821-001BMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury	0.20		**4.36**	5.000	0	87.2	4.435	1.66	09/11/2017

Receiving Check List

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.
Work Order: 17081821
Client Project: Hennepin Pond 1 & 2 Additional Testing
Report Date: 22-Sep-17

Carrier: Tim Mathis
Received By: AMD

Completed by: Amber M. Dilallo
On: 08-Sep-17

Reviewed by: Marvin L. Darling
On: 08-Sep-17

Pages to follow: Chain of custody 1 Extra pages included 16

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 1.02
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☑	No ☐		
Reported field parameters measured:	Field ☑	Lab ☐	NA ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐		

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	NA ☐
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑

Any No responses must be detailed below or on the COC.

CHAIN OF CUSTODY

pg. 1 of 1 Work order # 1708182l

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

Client:	Natural Resource Technology, Inc.
Address:	2422 East Washington Street
City / State / Zip	Bloomington, IL 61704
Contact:	Steve Wiskes
Phone:	(414) 837-3614
E-Mail:	steve.wiskes@obg.com
Fax:	

Samples on: [X] ICE [ ] BLUE ICE [ ] NO ICE 1.02 °C

Preserved in: [ ] LAB [X] FIELD

Lab Notes: * Dry 9/8/17

FOR LAB USE ONLY

Are these samples known to be involved in litigation? If yes, a surcharge will apply [ ] Yes [X] No

Are these samples known to be hazardous? [ ] Yes [X] No

Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section. [ ] Yes [X] No

Client Comments

Total Metals: ICP/MS 6020A Sb As Ba Be B Cd Cr Co Pb Li Mo Se Tl, ICP 6010 Ca Mg K Na, and Hg 7470A.

LPZ-17: Depth to Leachate only, analyze as Alternate sampling point if LPZ-5 is dry.

Project Name/Number	Sample Collector's Name
Hennepin Pond 1 & 2 Additional Testing	TW / ZDZ

Results Requested

[X] Standard [ ] 1-2 Day (100% Surcharge) [ ] Other ____ [ ] 3 Day (50% Surcharge)

Billing Instructions

Lab Use Only	Sample Identification	Date/Time Sampled	# and Type of Containers: UNP	HNO3	MATRIX: Leachate	Alkalinity Total	Alkalinity, Bicarb (as CaCO3)	Alkalinity, Carb (as CaCO3)	Chloride 9251	Field Conductivity SM 2510-B	Field DO SM 4500-O	Field Leachate Elevations	Field ORP SM 2580-B	Field pH SM 4500-H+B	Field Temperature SM 2550	Field Turbidity SM 2130-B	Fluoride 9214	Sulfate 9036	TDS SM 2540C	Total Metals
1708182l-001	L4	9.6.17 1515	1	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
002	LPZ-1 *	1348	1	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
003	LPZ-3 *	1340	1	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
004	LPZ-5 *	1336	1	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
005	LPZ-13	9.7.17 1500	0		X							X								
006	LPZ-15	9.7.17 1545	0		X							X								
007	LPZ-17	1501	1	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
008	L4 DUP	1515	1	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
009	Field Blank	1525	1	1	X	X	X	X									X	X	X	X

Relinquished By	Date/Time	Received By	Date/Time
	9.8.17 1310	Amber Dilcus	9/8/17 1310

The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions.

BottleOrder: 38544

BORING LOGS AND WELL CONSTRUCTION INFORMATION

Leachate Well Construction Details
West Ash Ponds 1 and 3
Hennepin Power Station

Monitoring Well:	TOP to TOC (ft)	TOP to GS (ft)	Bottom of Well to TOC (ft)	$ELEV_{GS}$	$ELEV_{BOT}$	$ELEV_{TOP}$	$ELEV_{TOC}$
LPZ-1	0.05	3	14.4	454.9	443.5	457.9	457.9
LPZ-3	0.0625	4.25	14.35	460.2	450.0	464.5	464.4
LPZ-5	0.05	3	10.46	463.1	455.6	466.1	466.0
LPZ-13	0.05	2.8	14.25	455.3	443.8	458.1	458.1
LPZ-15	0.05	3	15.3	460.8	448.5	463.8	463.8
LPZ-17	0.05	3	21.1	460.9	442.8	463.9	463.9

Notes:

GS	Ground Surface
BOT	Bottom of Well
TOC	Top of Well Casing
TOP	Top of Protective Pipe
GW	Ground Water

Civil & Environmental Consultants, Inc.
555 Butterfield Road, Suite 300
Lombard, Illinois 60148
Telephone: 630-963-6026

BORING NUMBER B1/LPZ-1

CLIENT Dynegy Inc. - Hennepin Station
PROJECT NAME Old West Ash Pond System: Data Gap Analysis
PROJECT NUMBER 164-478
PROJECT LOCATION Hennepin Station, Hennepin, Illinois
DATE STARTED 3/15/17 **COMPLETED** 3/15/17
GROUND ELEVATION 454.928 ft **BACKFILL** Monitoring Well MW-1
DRILLING CONTRACTOR Holcomb Foundation Engineering, Co
GROUND WATER LEVELS:
DRILLING METHOD HSA with Auto Hammer
WHILE DRILLING 1.0 ft / Elev 453.9 ft
CEC REP CAC **CHECKED BY** MDJ
AT END OF DRILLING 3.0 ft / Elev 451.9 ft
NOTES
24hrs AFTERDRILLING 3.0 ft / Elev 451.9 ft

Elevation (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
	ASH: Gray SILT - FLY ASH, moist to wet, very loose, **(ASH)**	0				
			SS 1	0	1-0-1-0 (1)	NP
			SS 2A	50	0-0-2 (2)	NP
450		5	SS 2B	50	4-0-0 (0)	NP
	% Gravel ~ 0.1% % Sand ~ 9.1% % Silt ~ 85.3% % Clay ~ 5.4%		SS 3	50	0-0-0-0 (0)	NP
	ASH: Gray and brown SANDY SILT - BOTTOM ASH, moist to wet, very loose, **(ASH)**		SS 4A	50	0-0-0 (0)	NP
	ASH: Gray SILT - FLY ASH, moist to wet, very loose, **(ASH)**					
445		10	SS 4B	50	0-0-0 (0)	NP
	Black SILTY CLAY, moist, medium stiff, **(CL)**		SS 5	100	2-3-3-3 (6)	1.0 P
	End of boring at 13.0 feet.					

SPT N VALUE: 20 40 60 80
PL MC LL: 20 40 60 80
UCS (tsf): 1 2 3 4

Civil & Environmental Consultants, Inc.
555 Butterfield Road, Suite 300
Lombard, Illinois 60148
Telephone: 630-963-6026

BORING NUMBER B3/LPZ-3

CLIENT Dynegy Inc. - Hennepin Station
PROJECT NAME Old West Ash Pond System: Data Gap Analysis
PROJECT NUMBER 164-478
PROJECT LOCATION Hennepin Station, Hennepin, Illinois
DATE STARTED 3/16/17 **COMPLETED** 3/16/17
GROUND ELEVATION 460.19 ft **BACKFILL** Monitoring Well MW-3
DRILLING CONTRACTOR Holcomb Foundation Engineering, Co
GROUND WATER LEVELS:
DRILLING METHOD HSA with Auto Hammer
▽ **WHILE DRILLING** 3.0 ft / Elev 457.2 ft
CEC REP CAC **CHECKED BY** MDJ
AT END OF DRILLING ---
NOTES
▼ **24hrs AFTERDRILLING** 10.7 ft / Elev 449.5 ft

Elevation (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
460	ASH: Dark gray SANDY SILT - BOTTOM ASH, trace gravel, moist to wet, loose to dense, **(ASH)**	0				
			SS 1	100	2-3-3-3 (6)	NP
			SS 2A	100	3-7-11 (18)	NP
455		5	SS 2B	100	9-10-11 (21)	NP
			SS 3	100	3-3-4-7 (7)	NP
			SS 4A	93	2-8-20 (28)	NP
450		10	SS 4B	93	14-13-10 (23)	NP
	▼ ASH: Dark gray SILT - FLY ASH, wet, loose, **(ASH)**					
	Black SILTY CLAY, moist, stiff, **(CL)**		SS 5	85	0-1-4-4 (5)	NP 1.5 P 2.5 P
	End of boring at 13.0 feet.					

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
UCS (tsf)
1 2 3 4

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BORING NUMBER B17/LPZ-17

CLIENT Dynegy Inc. - Hennepin Station
PROJECT NAME Old West Ash Pond System: Data Gap Analysis
PROJECT NUMBER 164-478
PROJECT LOCATION Hennepin Station, Hennepin, Illinois
DATE STARTED 3/14/17 **COMPLETED** 3/14/17
GROUND ELEVATION 460.931 ft **BACKFILL** Monitoring Well MW-17
DRILLING CONTRACTOR Holcomb Foundation Engineering, Co
GROUND WATER LEVELS:
DRILLING METHOD CME Continuous Sampler
WHILE DRILLING 8.0 ft / Elev 452.9 ft
CEC REP CAC **CHECKED BY** MDJ
AT END OF DRILLING ---
NOTES
48hrs AFTERDRILLING 13.0 ft / Elev 447.9 ft

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	SPT N VALUE / PL MC LL / UCS (tsf)
460		ASH: Dark gray SILTY SAND - BOTTOM ASH, trace gravel, moist, medium dense to dense, **(ASH)**	0	SS 1	54		NP	
			5					
455		ASH: Gray SILT - FLY ASH, wet, **(ASH)**		SS 2	72		NP	
		ASH: Dark gray SILTY SAND - BOTTOM ASH, trace gravel, moist to wet, **(ASH)**	10					
450		ASH: Gray SILT - FLY ASH, wet, **(ASH)**		SS 3	84		NP	
			15					
445		Brown SAND, wet, **(SP)** % Gravel ~ 3.2% % Sand ~ 79.2% % Silt ~ 14.7%		SS 4	58		NP	
			20					

SPT N VALUE: 20 40 60 80
PL MC LL: 20 40 60 80
UCS (tsf): 1 2 3 4

GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17

(Continued Next Page)

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Lombard, Illinois 60148
Telephone: 630-963-6026

BORING NUMBER B17/LPZ-17

CLIENT Dynegy Inc. - Hennepin Station **PROJECT NAME** Old West Ash Pond System: Data Gap Analysis

PROJECT NUMBER 164-478 **PROJECT LOCATION** Hennepin Station, Hennepin, Illinois

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ UCS (tsf) ☐ 1 2 3 4
		% Clay ~ 2.9%						
		End of boring at 20.0 feet.						

Monitoring Well No. L4

PROJECT Title: Hennepin West Ash Impoundment
DRILL RIG: Hollow Stem Auger
DRILLER: Boart Longyear

DATE: 08-21-95
HOLE DIA.: 7 in.
FINAL GW: 13.25 ft.

LOGGED BY: Hensel/Tu
SAMPLER: Split spoon
HOLE ELEV.: 461.95 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
Blind Drilling (Refer to boring log for MW 24 for lithologic description)			0–13		well cap; Bentonite Seal; 2 in. Schedule 40 PVC; #7 Fine Sands; Formation Collapse and #5 Fine Sands
Dark brown, dry fine silty sand, some gravel well sorted			13–20	SS-1	.01 Slotted Well Screen

STMI
2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No. 135-1.31

Monitoring Well No. L4

PROJECT Title: Hennepin West Ash Impoundment
DRILL RIG: Hollow Stem Auger
DRILLER: Boart Longyear

DATE: 08-21-95
HOLE DIA.: 7 in.
FINAL GW: 13.25 ft.

LOGGED BY: Hensel/Tu
SAMPLER: Split spoon
HOLE ELEV.: 461.95 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE		WELL CONSTRUCTION DETAIL
Blind Drilling (Refer to boring log for MW 24 for lithologic description)			20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40			Sediment Trap

STMI
2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-1.31

RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
JOB NO. 82-1293

BORING W-4
SHEET 1 OF 2

24

DEPTH (ft)	SAMPLE NUMBER	SAMPLE INTERVAL AND TYPE	SAMPLE ADVANCED / RECOVERED (in)	SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification)	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)
	1	AS			Soil Classification System Unified Surface Elevation 460.6' Brown Sandy CLAY w/Gravel, CL		
					Dark Gray FLYASH w/Bottom Ash, ML		
-5-	2	SS	18/16			3-4-5	
-10-	3	SS	18/18			2-5-6	
-15-	4	SS	18/18			1-2-3	
					Dark Gray Silty CLAY, CL		
-20-	5	SS	18/9			1-1-2	
-25-	6	SS	18/18			WH-2-2	
-30-	7	SS	18/16			WH-2-3	
					Dark Gray CLAY w/Silt Trace Sand, OH		
-35-	8	SS	18/18			WH-1-2	

Shear Strength, tsf
SV△ QP/2□ QU/2○
0 ½ 1 1½ 2 2½
PL + NMC • LL x
0 50 100
Rock Quality Designation
0 50 100

DRILLING METHOD Hollow Auger
DATE DRILLED 12/10, 13/82
DRILLED BY Roberts
LOGGED BY Maxeiner
PIEZOMETER Yes

GROUNDWATER LEVELS
66 Hours after completion 14.0 Feet
2 Days after completion 6.0 Feet
— after completion — Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.

RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
JOB NO. 82-1293

BORING W-4 (24)
SHEET 2 OF 2

DEPTH (ft)	SAMPLE NUMBER	SAMPLE INTERVAL AND TYPE	SAMPLE ADVANCED / RECOVERED (in)	SEE REMARK #	DESCRIPTION OF MATERIALS	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)
					(Color Modifier MATERIAL Classification) Soil Classification System Unified Surface Elevation 460.6'		
					Dark Gray CLAY w/Silt Trace Sand, OH		
40		SS	18/18			WH-WH-2	
45	10	SS	18/18			WH-2-1	
50	11	SS	18/12			WH-3-8	
					Dark Gray Fine SAND w/Clay, SC		
55	12	SS	18/4	1		1-4-7	
					Dark Gray Gravelly Fine SAND Trace Silt, SP-SM		
60	13	SS	18/18			8-15-5	
					Gray GRAVEL w/Sand Trace Clay, GP-GC		
65	14	SS	18/16		TOB	14-17-22	
					Remarks: 1. Water level approximately 6.0' appears same as river level.		
70							

Shear Strength, tsf
SV△ QP/2□ QU/2○
0 ½ 1 1½ 2 2½
PL + NMC • LL x
0 50 100
Rock Quality Designation
0 50 100

DRILLING METHOD Hollow Auger
DATE DRILLED 12/10, 13/82
DRILLED BY Roberts
LOGGED BY Maxeiner
PIEZOMETER Yes

GROUNDWATER LEVELS
Encountered at – Feet
66 Hours after completion 14.0 Feet
2 Days after completion 6.7 Feet
___ after completion ___ Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.

John Mathes & Associates, Inc.

APPENDIX C
SUPPORTING GROUNDWATER ANALYTICAL DATA

APPENDIX C.
SUPPORTING GROUNDWATER ANALYTICAL DATA
35 I.A.C. § 845: ALTERNATIVE SOURCE DEMONSTRATION
HENNEPIN POWER PLANT
OLD WEST ASH POND
HENNEPIN, IL

Well ID	Well Type	Date	Parameter	Result	Unit
22	Compliance	12/10/2015	Boron, total	6.01	mg/L
22	Compliance	03/09/2016	Boron, total	5.85	mg/L
22	Compliance	06/07/2016	Boron, total	6.28	mg/L
22	Compliance	09/15/2016	Boron, total	5.75	mg/L
22	Compliance	12/07/2016	Boron, total	6.72	mg/L
22	Compliance	02/21/2017	Boron, total	5.47	mg/L
22	Compliance	04/25/2017	Boron, total	5.29	mg/L
22	Compliance	06/08/2017	Boron, total	4.99	mg/L
22	Compliance	06/13/2018	Boron, total	5.57	mg/L
22	Compliance	09/12/2018	Boron, total	4.66	mg/L
22	Compliance	12/12/2018	Boron, total	4.92	mg/L
22	Compliance	03/13/2019	Boron, total	5.75	mg/L
22	Compliance	06/19/2019	Boron, total	5.62	mg/L
22	Compliance	09/17/2019	Boron, total	5.37	mg/L
22	Compliance	12/11/2019	Boron, total	5.70	mg/L
22	Compliance	03/11/2020	Boron, total	5.20	mg/L
22	Compliance	06/03/2020	Boron, total	5.07	mg/L
22	Compliance	09/02/2020	Boron, total	4.72	mg/L
22	Compliance	12/09/2020	Boron, total	4.77	mg/L
22	Compliance	03/19/2021	Boron, total	4.89	mg/L
22	Compliance	06/23/2021	Boron, total	4.91	mg/L
22	Compliance	09/08/2021	Boron, total	4.39	mg/L
22	Compliance	12/08/2021	Boron, total	3.81	mg/L
22	Compliance	03/22/2022	Boron, total	4.84	mg/L
22	Compliance	06/07/2022	Boron, total	3.95	mg/L
22	Compliance	09/13/2022	Boron, total	3.42	mg/L
22	Compliance	12/27/2022	Boron, total	4.44	mg/L
22	Compliance	02/28/2023	Boron, total	4.51	mg/L
22	Compliance	05/31/2023	Boron, total	3.44	mg/L
22	Compliance	12/10/2015	Cadmium, total	0.00140	mg/L
22	Compliance	03/09/2016	Cadmium, total	0.00170	mg/L
22	Compliance	06/07/2016	Cadmium, total	0.00230	mg/L
22	Compliance	09/15/2016	Cadmium, total	0.00310	mg/L
22	Compliance	12/07/2016	Cadmium, total	0.00440	mg/L
22	Compliance	02/21/2017	Cadmium, total	0.00390	mg/L
22	Compliance	04/25/2017	Cadmium, total	0.00360	mg/L
22	Compliance	06/08/2017	Cadmium, total	0.00320	mg/L
22	Compliance	06/13/2018	Cadmium, total	0.00430	mg/L
22	Compliance	09/12/2018	Cadmium, total	0.00570	mg/L
22	Compliance	12/12/2018	Cadmium, total	0.00760	mg/L
22	Compliance	03/13/2019	Cadmium, total	0.00570	mg/L
22	Compliance	06/19/2019	Cadmium, total	0.00480	mg/L
22	Compliance	09/17/2019	Cadmium, total	0.00480	mg/L
22	Compliance	12/11/2019	Cadmium, total	0.00550	mg/L
22	Compliance	03/11/2020	Cadmium, total	0.00500	mg/L
22	Compliance	06/03/2020	Cadmium, total	0.00530	mg/L

APPENDIX C.
SUPPORTING GROUNDWATER ANALYTICAL DATA
35 I.A.C. § 845: ALTERNATIVE SOURCE DEMONSTRATION
HENNEPIN POWER PLANT
OLD WEST ASH POND
HENNEPIN, IL

Well ID	Well Type	Date	Parameter	Result	Unit
22	Compliance	09/02/2020	Cadmium, total	0.00530	mg/L
22	Compliance	12/09/2020	Cadmium, total	0.00900	mg/L
22	Compliance	03/19/2021	Cadmium, total	0.00590	mg/L
22	Compliance	06/23/2021	Cadmium, total	0.00600	mg/L
22	Compliance	09/08/2021	Cadmium, total	0.00540	mg/L
22	Compliance	12/08/2021	Cadmium, total	0.00540	mg/L
22	Compliance	03/22/2022	Cadmium, total	0.00570	mg/L
22	Compliance	06/07/2022	Cadmium, total	0.00570	mg/L
22	Compliance	09/13/2022	Cadmium, total	0.00570	mg/L
22	Compliance	12/27/2022	Cadmium, total	0.00590	mg/L
22	Compliance	02/28/2023	Cadmium, total	0.00960	mg/L
22	Compliance	05/31/2023	Cadmium, total	0.00520	mg/L
22	Compliance	12/10/2015	Sulfate, total	221	mg/L
22	Compliance	03/09/2016	Sulfate, total	261	mg/L
22	Compliance	06/07/2016	Sulfate, total	255	mg/L
22	Compliance	09/15/2016	Sulfate, total	208	mg/L
22	Compliance	12/07/2016	Sulfate, total	204	mg/L
22	Compliance	02/21/2017	Sulfate, total	197	mg/L
22	Compliance	04/25/2017	Sulfate, total	213	mg/L
22	Compliance	06/08/2017	Sulfate, total	229	mg/L
22	Compliance	06/13/2018	Sulfate, total	219	mg/L
22	Compliance	09/12/2018	Sulfate, total	207	mg/L
22	Compliance	12/12/2018	Sulfate, total	181	mg/L
22	Compliance	03/13/2019	Sulfate, total	179	mg/L
22	Compliance	06/19/2019	Sulfate, total	249	mg/L
22	Compliance	09/17/2019	Sulfate, total	204	mg/L
22	Compliance	12/11/2019	Sulfate, total	187	mg/L
22	Compliance	03/11/2020	Sulfate, total	220	mg/L
22	Compliance	06/03/2020	Sulfate, total	214	mg/L
22	Compliance	09/02/2020	Sulfate, total	206	mg/L
22	Compliance	12/09/2020	Sulfate, total	201	mg/L
22	Compliance	03/19/2021	Sulfate, total	179	mg/L
22	Compliance	06/23/2021	Sulfate, total	168	mg/L
22	Compliance	09/08/2021	Sulfate, total	160	mg/L
22	Compliance	12/08/2021	Sulfate, total	146	mg/L
22	Compliance	03/22/2022	Sulfate, total	145	mg/L
22	Compliance	06/07/2022	Sulfate, total	134	mg/L
22	Compliance	09/13/2022	Sulfate, total	142	mg/L
22	Compliance	12/27/2022	Sulfate, total	141	mg/L
22	Compliance	02/28/2023	Sulfate, total	145	mg/L
22	Compliance	05/31/2023	Sulfate, total	123	mg/L

APPENDIX C.
SUPPORTING GROUNDWATER ANALYTICAL DATA
35 I.A.C. § 845: ALTERNATIVE SOURCE DEMONSTRATION
HENNEPIN POWER PLANT
OLD WEST ASH POND
HENNEPIN, IL

Notes:
mg/L = milligrams per liter

APPENDIX D
TECHNICAL MEMORANDUM
EVALUATION OF CADMIUM SOURCES WITHIN AQUIFER SOLIDS, HENNEPIN POWER PLANT - WEST ASH POND SYSTEM

Geosyntec consultants

500 W. Wilson Bridge Road, Suite 250
Worthington, Ohio 43085
PH 614.468.0421
FAX 614.468.0416
www.geosyntec.com

TECHNICAL MEMORANDUM

Date:	October 26, 2023
To:	Brian Voelker, Dynegy Midwest Generation, LLC
Copies to:	Stu Cravens and Phil Morris, Dynegy Midwest Generation, LLC Eric Tlachac and Brian Hennings, Ramboll
From:	Allison Kreinberg and Ryan Fimmen, PhD, Geosyntec Consultants
Subject:	Evaluation of Cadmium Sources within Aquifer Solids Hennepin Power Plant – West Ash Pond System

This document serves as an Appendix to the November 10, 2023, Alternative Source Demonstration (ASD) for the Hennepin (HEN) Power Plant West Ash Pond System (WAPS) (Site) for the Quarter 2 2023 sampling event completed to fulfill the requirements of Title 35 of the Illinois Administrative Code (IAC) § 845.650(e). A previous ASD prepared by Ramboll Americas Engineering Solutions, Inc. (Ramboll) in May 2023 concluded that an exceedance of cadmium above the groundwater protection standard (GWPS) at downgradient monitoring well #22 could be attributed to sources other than the WAPS and was potentially related to changing groundwater pH (Ramboll 2023). Geosyntec Consultants, Inc. (Geosyntec) has completed a review of geochemical and site conditions at the Site to evaluate the influence of the uppermost aquifer solid-phase mineralogy and geochemistry on groundwater composition. Using additional evidence from laboratory analyses and geochemical modeling, this technical memorandum demonstrates that naturally occurring cadmium associated with aquifer solids throughout the Site is a source of elevated cadmium in Site groundwater.

SITE CONDITIONS

Site geology consists primarily of unlithified alluvial and glacial deposits overlying shale bedrock. These alluvial deposits consist of the fine-grained Cahokia Alluvium, and the gravelly, glacially deposited Henry Formation. The Cahokia Alluvium deposits at the Site extend to depths of less than 20 feet and are composed of sandy silts and clays that are interbedded with sand and gravel (OBG 2017). Henry Formation deposits at the Site underlie the Cahokia Alluvium. These deposits

extend in depth to the uppermost bedrock (to a maximum of 130 feet dependent upon location at the Site) and are composed of coarse-grained materials that include gravel, coarse sands, and cobbles. The Pennsylvanian-age bedrock consists of interbedded layers of shale with thin limestone, sandstone, and coal beds.

The Henry Formation and alluvium together comprise the Uppermost Aquifer (UA) at the WAPS and extend from the water table to the bedrock. The UA is unconfined and extends from the water table to the bedrock. Additional information regarding site hydrogeology and stratigraphy is provided in the ASD prepared by Ramboll.

AQUIFER SOLIDS EVALUATION

The previous ASD report for cadmium at well #22 completed by Ramboll (2023) identified naturally occurring cadmium within soil samples collected from soil borings near the Hennepin East Ash Pond System. Additional aquifer solids samples were collected near the WAPS by Geosyntec and analyzed to evaluate whether subsurface material in the vicinity of the WAPS may account for reported cadmium concentrations in groundwater. The analytical results of the aquifer solids demonstrate that the aqueous groundwater cadmium concentrations at monitoring well #22 in excess of the GWPS are derived from the native mineralogy.

Samples were collected from soil borings advanced in March 2021 adjacent to background well #34 and compliance well #22[1]. One sample was collected from the screened interval of monitoring well #34 (32–33 feet bgs) and two samples were collected from the screened interval of monitoring well #22 (26–27 feet bgs and 29–30 feet bgs). Well construction forms for both wells are provided in **Attachment 1**. Field observations of the sample lithologies (provided in Table 1) were generally consistent with the lithologies for the screened intervals of well #34 and well #22 provided in the boring logs (**Attachment 1**).

Samples were submitted for analysis of total cadmium, cadmium distribution within the aquifer solids using sequential extraction procedure (SEP), and mineralogy via X-ray diffraction (XRD). Results for total and SEP analyses of cadmium in these samples are presented in **Table 1**, and the analytical laboratory reports are provided as **Attachment 2**.

SEP is an analytical technique that uses progressively stronger reagents to solubilize metals from specific phases within the solid matrix and is used to infer associations between constituents and different classes of solids (Tessier et al. 1979). These classes of solids are identified based on their

[1] An aquifer solids sample was also collected from the screened interval of well #51 during this sampling event. Results of this sample are excluded from subsequent results tables and discussion to emphasize relevant findings. Analytical results of this sample are included in the Attachments section.

solubility under different reagents and include the exchangeable fraction, the carbonate-bound fraction, the iron/manganese oxide-bound fraction, the organic matter-bound fraction, and the residual fraction. To evaluate data quality in an SEP analysis, first the sum of individual extraction steps from the SEP was compared to the total cadmium concentration. The sum of the SEP is not expected to be exactly equal to the total metals analysis but should be generally consistent with the total metals result. The total cadmium concentrations ranged from 0.53 to 2.9 micrograms per gram of soil (µg/g). The summed concentrations of cadmium from the SEP analyses ranged from 0.45 to 2.6 µg/g. The results were generally consistent between the total metals analyses and the summed SEP steps, indicating good metals recovery and data quality.

These results indicate that cadmium is naturally present in both background and compliance well solid-phase samples at the Site. The highest cadmium concentrations were observed in the samples from monitoring well #22. The largest components of cadmium in all three samples were found to be associated with the weak-acid extractable fraction (including carbonates) and the reducing agent extractable fraction (including iron and manganese oxides) (**Table 1**). Smaller components of cadmium were found to be associated with the other fractions, although 69%–83% of cadmium from all three samples was associated with a combination of carbonates and iron/manganese oxides.

Mineralogical analyses were completed using XRD to evaluate the mineralogy of the aquifer solids. Mineralogy of the samples analyzed consists primarily of quartz, various carbonate minerals (dolomite, calcite, and ankerite), various feldspar minerals (albite and microcline), and muscovite (mica). Of the mineral groups identified as present within the aquifer solids via XRD, SEP testing quantified the largest component of cadmium was leached from the weak-acid extractable and reducing agent extractable fractions, which are often associated with carbonates and oxides, respectively (**Table 1**). Carbonate minerals were found in each sample analyzed at abundances of 18 to 25 weight percent (wt. %) (**Table 2**). Magnetite, an iron oxide mineral, was detected in every sample analyzed (**Table 2**). Based on the XRD results, these minerals are abundant in samples from both well #22 and well #34 of the WAPS, suggesting that these cadmium-associated minerals occur in the UA throughout the Site and constitute a natural source of cadmium. Mineralogy results are provided in **Table 2** and the laboratory analytical report is included as **Attachment 3**.

The association of cadmium with carbonate minerals, specifically calcite, is a well-studied phenomenon. Cadmium ions can readily substitute for calcium ions in the calcite crystal structure due to similarities in charge and ionic radii between the two ions (Lorens 1981, Tesoriero and Pankow 1996). This process is known to occur via initial sorption of aqueous cadmium ions to the hydrated surface layer of calcite crystals, which then become incorporated into the calcite crystal structure during new layer growth in a process known as co-precipitation (Papadopoulos and

Rowell 1988, Reeder 1996, Horner et al. 2011, Callagon et al. 2017). The primary control on calcite solubility in groundwater is pH, with calcite solubility increasing at lower pH.

Sorption of cadmium to iron oxide minerals is also well documented, as divalent transition metals such as cadmium are known to bind strongly to iron and manganese oxides (Cowan et al. 1991, Loganathan et al. 2012). Cadmium sorption to iron oxides is primarily a function of pH, aqueous cadmium concentrations, and aqueous concentrations of competitive divalent cations such as calcium and magnesium (Cowan et al. 1991).

Aquifer solids analyses completed for well #34 and well #22 show that aquifer solids are composed of approximately 18-25% carbonate minerals. SEP results indicate the dissolution of cadmium from aquifer solids with a weak acid, consistent with cadmium association with carbonate minerals. Therefore, cadmium co-precipitation with or dissolution from carbonate minerals would influence concentrations of aqueous cadmium. Dissolution of naturally occurring cadmium-bearing carbonates constitutes a potential alternative source of cadmium. SEP results also indicated that cadmium is associated with iron/manganese oxides such as magnetite, which was detected in the samples from both wells #34 and #22. Desorption of cadmium from magnetite constitutes an additional potential alternative source of cadmium in groundwater.

While it is possible that cadmium associated with the CCR could be mobilized, released, and then re-adsorbed onto iron oxides or accumulated in carbonate minerals within the aquifer downgradient of the unit, this is not likely at the WAPS because: 1.) cadmium is not detected or detected at very low-level concentrations (i.e., 0.0013 mg/L) in the porewater, and 2.) cadmium was identified in aquifer solids from adjacent to background well #34, which is unimpacted by the unit. These observations suggests that the cadmium is likely naturally occurring at the Site.

GEOCHEMICAL MODELING

The previous ASD report prepared by Ramboll (2023) for cadmium at well #22 noted a downward shift in pH values of groundwater at well #22 since approximately 2013 with a corresponding increase in cadmium concentrations (**Figure 1**). A decline in pH conditions may affect aqueous cadmium concentrations due to changes in cadmium speciation by destabilizing cadmium-substituted carbonate minerals in the UA. A decrease in pH could also result in mobilization of cadmium from the existing iron oxide mineral phases such as magnetite via desorption of cadmium from mineral surfaces and dissolution of these iron oxide minerals.

Geochemical equilibrium speciation modeling was used to evaluate the impact of pH changes on aqueous cadmium concentrations at well #22. Thermodynamic reaction pathway modeling was conducted using the React module of Geochemist's Workbench (GWB) geochemical modeling

software package (version 17.0.1). The purpose of the model is to show the relationship between pH and aqueous cadmium concentrations as a function of the dissolution of cadmium-bearing carbonates and the desorption of cadmium from iron oxides.

The initial aqueous component of the geochemical model was populated using the groundwater composition of the most recent sample collected at well #22 on May 31, 2023 (**Table 3**). The pH value of the aqueous component was not defined and was set as a sliding scale to test the hypothesis that pH changes may cause changes to aqueous cadmium concentrations. Solid-phase reactants were defined based on XRD results of the well #22 samples (**Table 3**). Magnetite was included in the system with an abundance of 0.5 wt. % to evaluate the influence of sorption and desorption of cadmium from the iron oxide fraction. To represent the cadmium-bearing carbonate phase, a cadmium-calcite source phase was included as a reactant at an abundance of 5.25 wt. % (averaged from calcite abundances of the two well #22 samples) to evaluate the impact that the dissolution of calcite with co-precipitated cadmium has on aqueous cadmium concentrations. This source phase was defined with a mineral formula of $(Ca_{0.85}Cd_{0.15})CO_3$, which was determined by calibrating the model output to the May 31, 2023, well #22 analytical results for aqueous cadmium and calcium. The calcite-otavite (cadmium carbonate) solid-solution series can occur in nature across all proportion ranges depending upon geochemical conditions. This can include either 100% calcium carbonate, 100% cadmium carbonate, or any proportion of calcium and cadmium carbonate in between these two end member compositions. The selected mineral formula contains a reasonable proportion of cadmium within the crystal structure to represent coprecipitation while still retaining the general calcite crystal structure and thermodynamic traits (Ma et al. 2022).

The WATEQ4F thermodynamic database developed by the United States Geological Survey was modified to include the cadmium-calcite source phase and was used in model calculations. Thermodynamic information for the cadmium-calcite source phase was populated using the experimentally derived solubility constants of the calcite-otavite solid-solution series from Ma et al. (2022). Sorption to iron oxides was incorporated into model calculations using the Dzombak and Morel (1990) two-layer surface complexation model, which is provided in GWB as sorption dataset FeOH.sdat. This sorption dataset was modified to include magnetite as an iron oxide mineral containing sorption sites. Iron minerals hematite, goethite, and $Fe(OH)_3(s)$ were suppressed during model simulations due to their absence in XRD results. Pure (*i.e.*, non-substituted) calcite was suppressed in favor of using of the cadmium-calcite source phase in calculations. A porosity value of 20% was used for the UA, as indicated in the *Hydrogeologic Monitoring Plan* (OBG 2017).

The geochemical model was used to show predictions of cadmium and calcium concentrations over the pH range observed in groundwater at well #22 from 2013 to the present (**Figure 2**). Calcium concentrations are shown to illustrate the effects of dissolution of the cadmium-calcite

source phase on aqueous conditions. Generally, both calcium and cadmium concentrations are predicted to increase as pH decreases toward neutral. Aqueous concentrations of cadmium are predicted to increase with decreasing pH within the pH range of 8.2 standard units (SU) to approximately 7.2 SU due to dissolution of the cadmium-calcite source phase, which decreases from approximately 3.4 wt. % to 2.3 wt. % (**Figure 3A**). Around a pH value of 7.7 SU, the model predicts that desorption of cadmium from iron oxide minerals (magnetite) will begin to occur. As pH continues to decrease, aqueous concentrations of cadmium are predicted to increase due to the concurrent effects of the dissolution of the cadmium-calcite phase and desorption of cadmium from magnetite (**Figure 3B**).

The geochemical model was calibrated by adjusting the cadmium-calcium ratio of the source phase to align (as near as possible) with the predicted aqueous cadmium and calcium concentrations at a pH of 7.58 SU (pH measured at well #22 on May 31, 2023 used for the aqueous input) with reported values. At a pH of 7.58 SU, the model predicted aqueous cadmium and calcium concentrations of 0.0024 and 71.74 mg/L respectively, compared to reported well #22 concentrations of 0.0052 and 87.1 mg/L (**Figure 2**). These results indicate that the model output aligns closely with observed values and that the model predictions are reasonable when compared to previously reported cadmium substitution rates (Ma et. al 2022).

CONCLUSION

Naturally occurring cadmium associated with the minerals of the UA solids at the Site was identified as a source for cadmium in Site groundwater. Solid-phase samples collected from background well #34 and compliance well #22 contained cadmium, with the highest total cadmium concentrations observed in samples collected from the screened interval of the well #22. SEP analyses of the solid-phase samples determined that the majority of cadmium in the solid phase is associated with the carbonate and iron/manganese oxide fractions. XRD confirmed the presence of magnetite (an iron oxide mineral) in all samples analyzed and identified carbonate minerals that make up approximately 18-25% of the solid phase. These solid phase results verify the presence of naturally occurring cadmium within the UA and suggest dual mechanisms of cadmium mobilization that are strongly supported by literature: (1) the dissolution of calcite containing coprecipitated cadmium within the crystal structure, and (2) the desorption of cadmium from iron oxide mineral surfaces (such as magnetite).

These potential mechanisms of cadmium mobilization were evaluated using a thermodynamic reaction pathway model. Groundwater analytical data and mineralogy results were used as model inputs to assess the impact that shifts in pH values of groundwater at monitoring well #22 are predicted to have on aqueous cadmium concentrations. Model results were successfully calibrated to observed concentrations, and the model supports the conclusion that both mechanisms of

cadmium mobilization should occur within the pH range of groundwater observed at well #22 and may result in increases in aqueous cadmium concentrations as a function of observed decreases in pH of groundwater at the well.

The solid-phase assessment and geochemical modeling efforts support the determination that aqueous cadmium concentration increases at downgradient monitoring well #22 are related to naturally occurring mineral-water interactions within the UA and not a release from the WAPS.

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TABLES

Table 1 - Cadmium SEP Results Summary
Hennepin Power Plant

Geosyntec Consultants, Inc.

Well ID			SB-22		SB-22		SB-34	
Depth (ft)			(26-27)		(29-30)		(32-33)	
Location			Downgradient		Downgradient		Background	
Total Cadmium			0.76		2.9		0.53	
SEP Fraction	SEP Reagent		SEP Results					
			Concentration	% of Total	Concentration	% of Total	Concentration	% of Total
1	Deionized Water	Water Soluble Fraction	<0.02	--	0.04	3%	<0.02	--
2	$MgCl_2$	Exchangeable Metals Fraction	<0.02	--	0.24	9%	<0.02	--
3	Sodium acetate, acetic acid	Metals Bound to Carbonates Fraction	0.37	56%	0.69	27%	0.12	27%
4	Hydroxylamine HCl and acetic acid	Metals Bound to Fe/Mn Oxides Fraction	0.16	24%	1.1	42%	0.25	56%
5	HNO_3, H_2O_2, and ammonium acetate	Bound to Organic Material Fraction	0.03	5%	0.25	10%	0.03	7%
6	HNO_3, HCl, and HF	Residual Metals Fraction	0.10	15%	0.23	9%	0.05	11%
SEP Total			0.66	100%	2.6	100%	0.45	100%

Notes:
SEP - sequential extraction procedure
All results shown in microgram of cadmium per gram of soil (µg/g).
Non-detect values are shown as less than the detection limit.
The cadmium fraction associated with each SEP phase is shown.
% of total cadmium is calculated from the sum of the SEP fractions.

Table 2 - Summary of X-Ray Diffraction Analysis
Hennepin Power Plant

Geosyntec Consultants, Inc.

Well ID			**MW-22**	**MW-22**	**MW-34**
Depth (ft bgs)			**(26-27)**	**(29-30)**	**(32-33)**
Location			**Downgradient**	**Downgradient**	**Upgradient**
Boring Log Description			**Fine sand**	**Gravel with sand and trace clay**	**Fine-medium sand**
Mineral/Compound	**Formula**	**Mineral Type**	(wt %)	(wt %)	(wt %)
Quartz	SiO_2	Silicate	57.0	54.5	53.0
Dolomite	$CaMg(CO_3)_2$	Carbonate	14.4	11.4	2.6
Albite	$NaAlSi_3O_8$	Feldspar	7.3	9.8	7.1
Calcite	$CaCO_3$	Carbonate	7.2	3.3	11.1
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$	Mica	2.1	7.4	7.9
Microcline	$KAlSi_3O_8$	Feldspar	5.2	5.2	5.1
Ankerite	$Ca(Fe,Mg)(CO_3)_2$	Carbonate	2.9	2.8	6.0
Chlorite	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$	Clay	1.9	2.7	3.4
Kaolinite	$Al_2Si_2O_5(OH)_4$	Clay	0.6	2.5	3.4
Pyrite	FeS_2	Sulfide	-	-	0.2
Magnetite	Fe_3O_4	Oxide	0.5	0.4	0.4
Actinolite	$Ca_2(Mg,Fe)_3Si_8O_{22}(OH)_2$	Amphibole	0.8	-	-
Carbonate Total			25	18	20

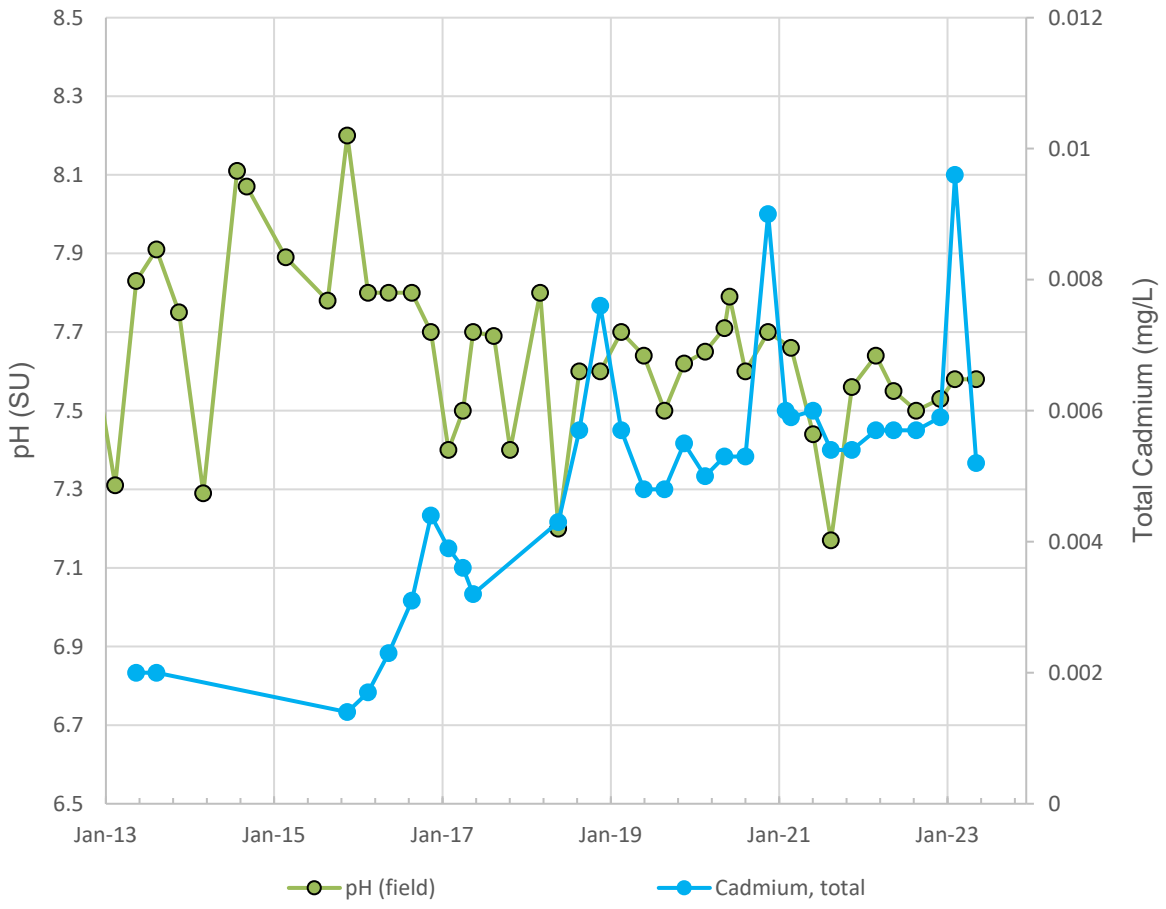
Notes:
Dashes indicate that the mineral was not identified by the analyst and not included in the refinement calculation for the sample
The weight percent quantities indicated have been normalized to a sum of 100%. The quantity of amorphous material has not been determined.
Sample depths are shown in feet below ground surface (ft bgs).
wt %: percentage by weight

Table 3 - Summary of Geochemical Model Inputs *Geosyntec Consultants, Inc.*
Hennepin Power Plant

Aqueous Phase			
Parameter	**Unit**	**Input Value**	**Source**
Calcium	mg/L	87.1	May 31, 2023 sampling event
Cadmium	mg/L	0.00520	May 31, 2023 sampling event
Chloride	mg/L	97.0	May 31, 2023 sampling event
Iron	mg/L	0.0200	May 31, 2023 sampling event
Magnesium	mg/L	32.0	May 31, 2023 sampling event
Manganese	mg/L	0.0511	May 31, 2023 sampling event
Potassium	mg/L	11.4	May 31, 2023 sampling event
Sodium	mg/L	55.8	May 31, 2023 sampling event
Sulfate	mg/L	123	May 31, 2023 sampling event
Total Alkalinity	mg/L	243	May 31, 2023 sampling event
Eh	V	0.249	May 31, 2023 sampling event
Temperature	°C	15.7	May 31, 2023 sampling event
pH	SU	6.5-9	Model variable
Solid Phase			
Reactant	**Unit**	**Input Value**	**Source**
Magnetite	wt. %	0.5	March 2021 sample XRD
Cadmium-Calcite Source Phase[1,2]	wt. %	5.25	March 2021 sample XRD (calcite)
Porosity	%	20	OBG, 2017

Notes:
mg/L: milligrams per liter
V: volts
°C: degrees Celsius
SU: standard units
wt. %: weight percentage
1. Mineral formula $(Ca_{0.85}Cd_{0.25})CO_3$
2: A log K value of -8.98 at 25°C, interpolated from experimental results of Ma et al. (2022), was used for thermodynamic calculations

FIGURES



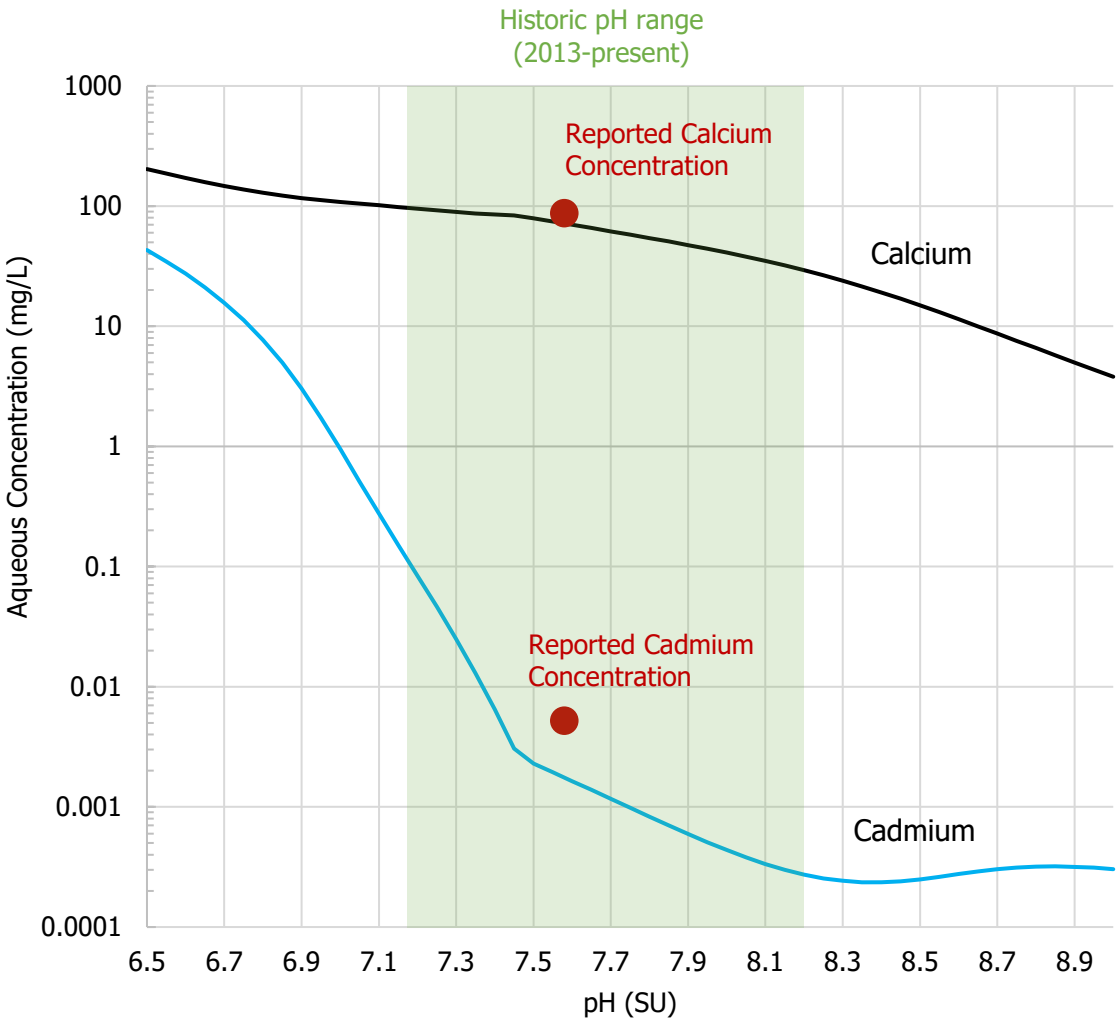
Notes: pH values are measured in the field during sampling events and are shown in standard units (SU). Cadmium results are shown for unfiltered samples in units of milligrams per liter (mg/L).

pH and Cadmium Time Series Graph: Monitoring Well 22

Geosyntec consultants

Columbus, OH | October 2023

Figure **1**



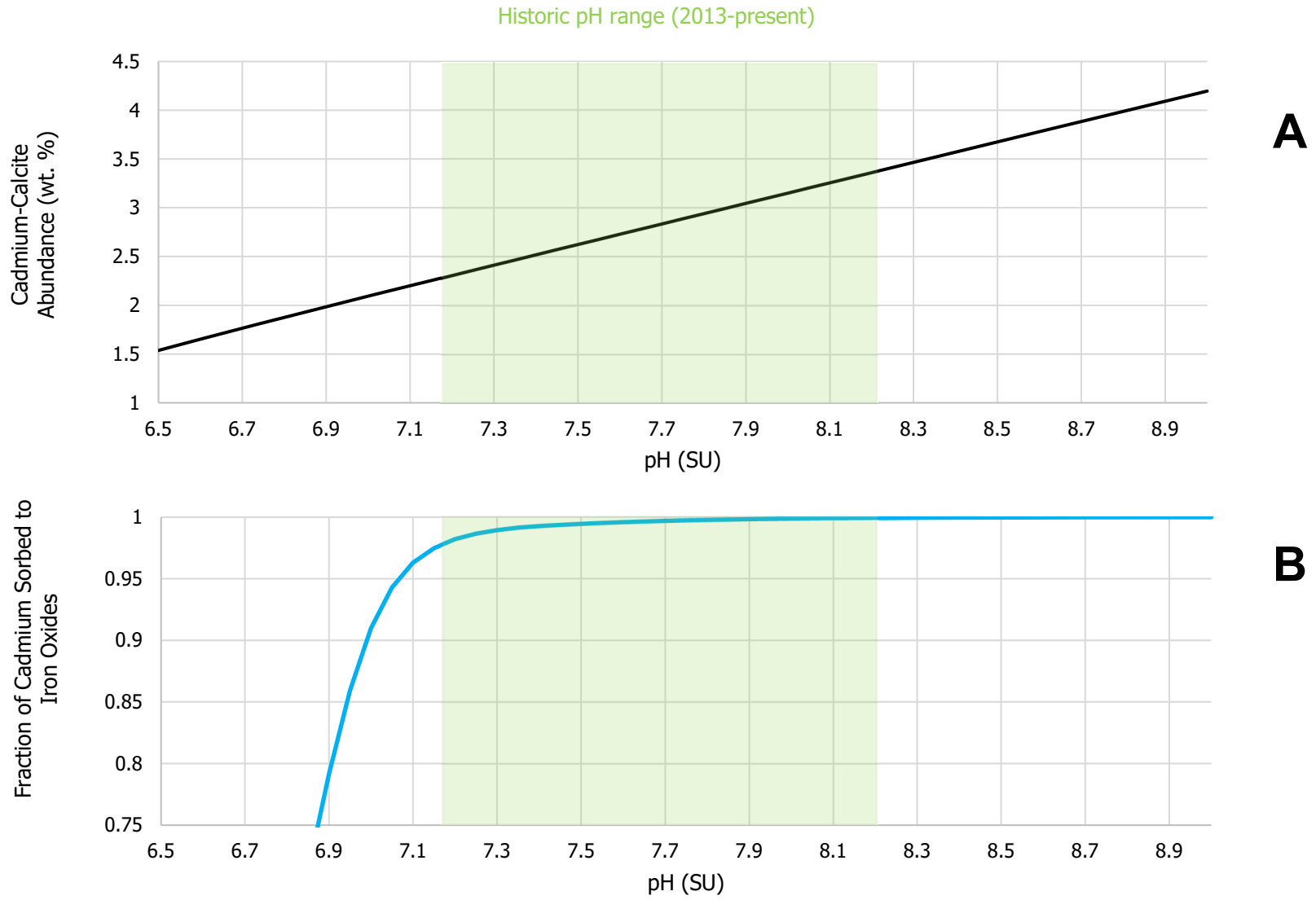
Notes: pH values are shown in standard units (SU). Predicted concentrations of cadmium and calcium are shown in units of milligrams per liter (mg/L) on a log scale. The historic range of measured pH values at monitoring well 22 groundwater from 2013 to the present is indicated by the green shading. Reported concentrations of calcium and cadmium from the May 31, 2023, groundwater sample collected at monitoring well 22 are indicated by red dots

Geochemical Model Output – Aqueous Cadmium and Calcium Concentrations

Geosyntec consultants

Columbus, OH | October 2023

Figure **2**



Notes: pH values are shown in standard units (SU). Plot A displays predicted abundances of the cadmium-calcite source phase in units of weight percentage (wt. %).
The historic range of measured pH values at monitoring well 22 groundwater from 2013 to the present in indicated by the green shading. Plot B displays the fraction of cadmium in the system that is predicted to sorb to iron oxide minerals.

Geochemical Model Output – Source Phase Abundance and Sorbed Cadmium Fraction

Geosyntec consultants

Columbus, OH | October 2023

Figure 3

ATTACHMENT 1
Boring Logs - Wells 22 and 34

PROJECT Hydrogeologic Study
Hennepin Power Plant
JOB NO. 82-1293

BORING W-2
SHEET 1 OF 1

22

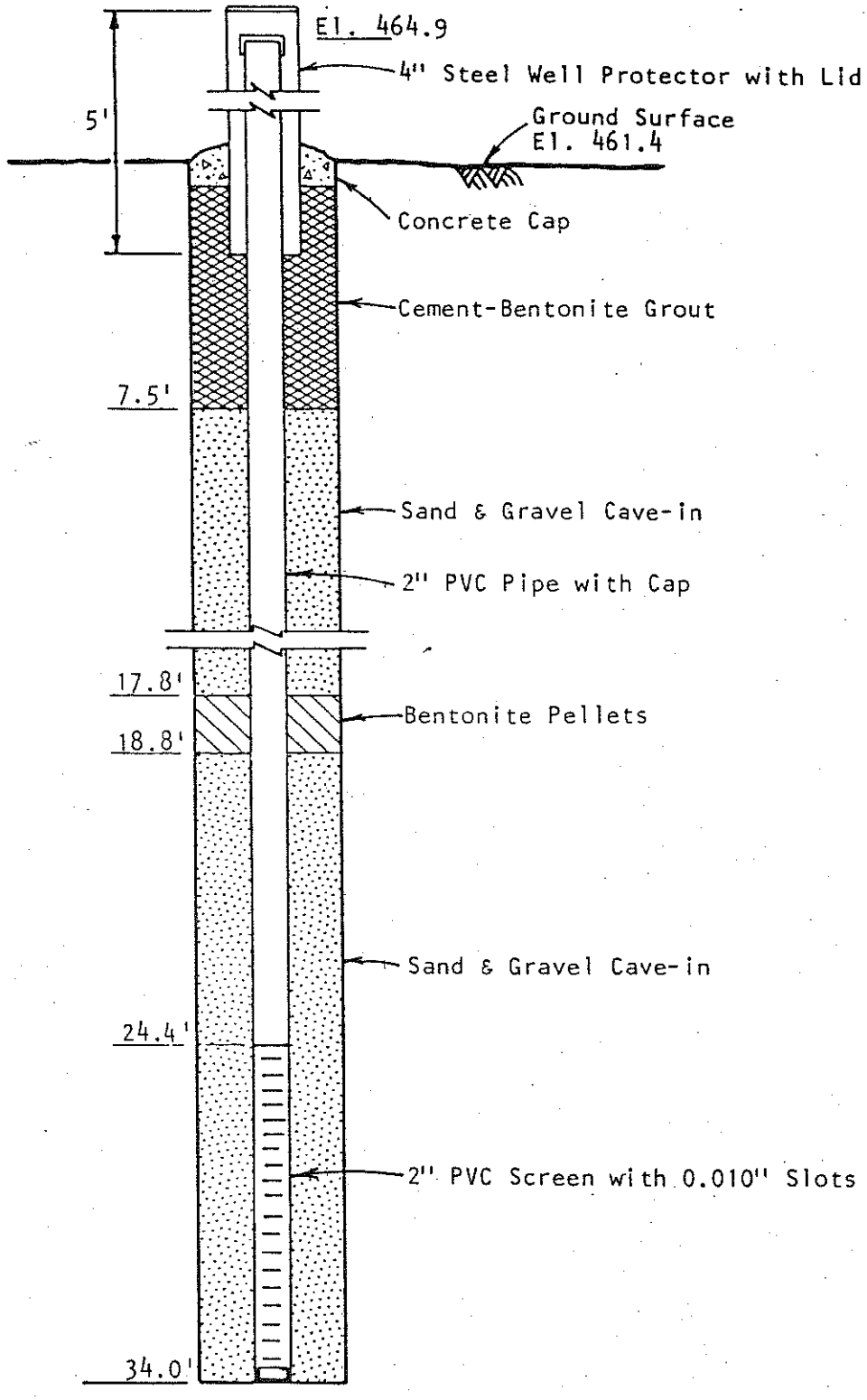
DEPTH (ft)	SAMPLE NUMBER	SAMPLE INTERVAL AND TYPE	SAMPLE ADVANCED / RECOVERED (in)	SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL. Classification)	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)
					Soil Classification System Unified Surface Elevation 461.4'		
	1	AS			Brown Sandy CLAY, CL		
-5-	2	SS	18/9		Gray - Brown Silty CLAY Trace Sand, CL	3-5-5	
					Brown Fine SAND w/Silt Trace Gravel, SM		
-10-	3	SS	18/16			5-7-5	
-15-	4	SS	18/16			19-20-28	
					Gray-Brown GRAVEL w/Sand Trace Clay, GP		
-20-	5	SS	18/18			17-27-38	
-25-	6	SS	18/13		-Coal @ 25.4'	23-18-12	
					Brown Fine SAND, SP		
-30-	7	SS	18/15			6-11-11	
					Brown GRAVEL w/Sand Trace Clay, GP-GC		
-35-	8	SS	18/6		TOB	0-4-6	

Shear Strength, tsf
SV△ QP/2□ QU/2○
0 ½ 1 1½ 2 2½
PL + NMC • LL x
0 50 100
Rock Quality Designation
0 50 100

DRILLING METHOD Hollow Auger
DATE DRILLED 12/9/82
DRILLED BY Roberts
LOGGED BY Maxeiner
PIEZOMETER Yes

GROUNDWATER LEVELS
Encountered at 8.0 Feet
___ Hours after completion ___ Feet
6 Days after completion 8.0 Feet
___ after completion ___ Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.



6" Borehole to Termination Depth

Not to Scale

22

PIEZOMETER W-2

John Mathes & Associates, Inc.

PLATE 16

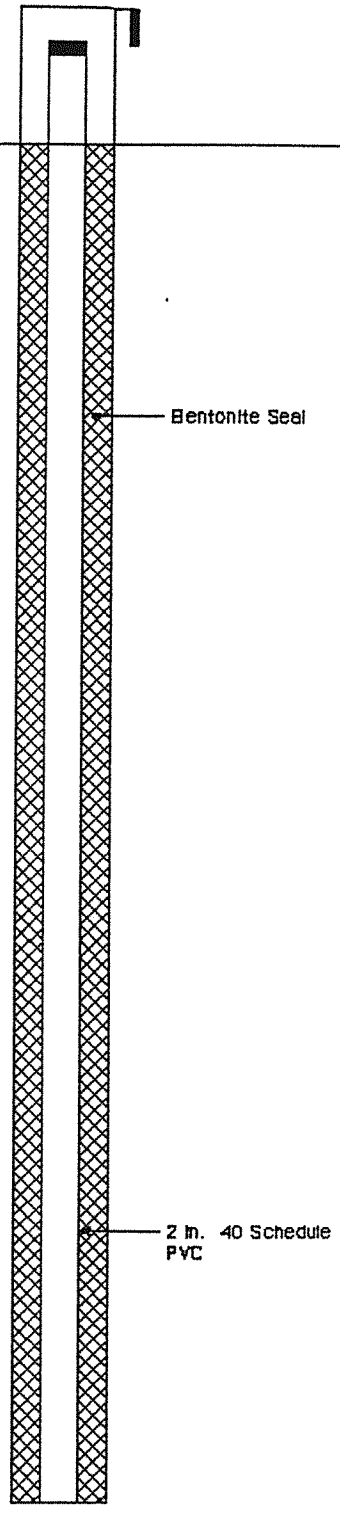
Monitoring Well No. 34

PROJECT Title: Hennepin West Ash Impoundment
DRILL RIG: Hollow Stem Auger
DRILLER: Boart Longyear

DATE: 8-22-96
HOLE DIA.: 7 in.
FINAL GW: 7.54 ft.

LOGGED BY: Mueller/Tu
SAMPLER: Split Spoon
HOLE ELEV.: 448.19 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE
Silty clay, trace of plant debris, little fine-grained sand, very dark brown in color, medium to high plasticity (alluvium).			0	C-1A
			5	C-1B
			10	C-1C
			15	C-1D
			20	



STMI
2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No. 135-1.31

Monitoring Well No. 34

PROJECT TITLE: Hennepin West Ash Impoundment
DRILL RIG: Hollow Stem Auger
DRILLER: Boart Longyear

DATE: 8-22-96
HOLE DIA.: 7 in.
FINAL GW: 7.54 ft.

LOGGED BY: Mueller/Tu
SAMPLER: Split Spoon
HOLE ELEV.: 448.19 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
Clayey silt, trace to little fine-grained sand and shell fragments, soft, olive-gray. Wet.			20–26	C-1E, C-1F	Bentonite Seal; 2 in. 40 Schedule PVC
Sand, fine-grained to medium-grained, well-sorted, quartz, trace of silt, loose. Yellowish brown color grades to olive gray below 31 ft.			27–38	C-1G	#7 Fine Sand; #5 Fine Sand; 0.01 Slotted Well Screen; Holeplug

STMI
2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No. 135-1.31

ATTACHMENT 2
Sequential Extraction Procedure Laboratory Analytical Reports

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Project : Hennepin MNA

06-April-2021

SiREM Laboratory
Attn : Michael Healey

130 Stone Road W
Guelph, ON
N1G 3Z2, Canada

Phone: 519-822-2265
Fax:519-822-3151

Date Rec. : 05 March 2021
LR Report: **CA14198-MAR21**
Reference: P.O# 80003210A

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: SB-34 32-33'	6: SB-51 42-43'	7: SB-22 26-27'	8: SB-22 29-30'
Sample Date & Time					04-Mar-21 12:15	04-Mar-21 12:30	04-Mar-21 12:40	04-Mar-21 13:00
Sulphide [%]	22-Mar-21	12:31	22-Mar-21	17:06	0.09	0.18	< 0.04	0.06
SO4 [%]	23-Mar-21	07:20	25-Mar-21	09:13	< 0.1	< 0.1	< 0.1	< 0.1
TOC [%]	22-Mar-21	02:08	22-Mar-21	17:06	1.92	3.55	0.339	4.55
TS LOI [mg/L]	11-Mar-21	19:34	16-Mar-21	09:39	64100	70500	15400	74800
Ag [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	< 0.05	0.06	< 0.05	0.08
Al [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	5000	8200	2800	3700
As [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	2.7	3.5	5.1	8.4
Ba [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	47	84	20	31
Be [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	0.29	0.50	0.20	0.87
B [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	5	10	6	7
Bi [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	0.23	0.59	0.13	0.26
Ca [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	52000	91000	56000	36000
Cd [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	0.53	0.89	0.76	2.9
Co [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	6.9	9.3	5.2	9.8
Cr [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	45	27	79	130
Cu [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	8	14	11	25
Fe [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	10000	14000	9400	12000
K [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	1200	1900	910	1200
Li [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	6	12	4	6
Mg [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	13000	15000	21000	16000
Mn [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	260	350	310	220
Mo [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	0.9	2.0	3.1	5.0
Na [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	180	170	190	160
Ni [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	12	19	15	43
Pb [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	6.1	11	7.7	28
P [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	380	430	350	330
Se [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	< 0.7	1.1	< 0.7	0.8
Si [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	7200	4500	5400	1600
Sb [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	< 0.8	< 0.8	< 0.8	< 0.8
Sn [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	1.1	0.6	< 0.5	0.5
Tl [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	0.16	0.25	0.13	0.26
U [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	0.65	1.2	1.3	1.8
V [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	12	18	17	41

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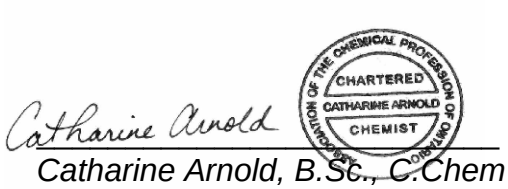
Project : Hennepin MNA

LR Report : **CA14198-MAR21**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: SB-34 32-33'	6: SB-51 42-43'	7: SB-22 26-27'	8: SB-22 29-30'
W [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	0.06	0.05	0.07	0.10
Y [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	5.7	8.0	6.1	7.6
Zn [µg/g]	05-Apr-21	14:43	06-Apr-21	11:29	40	67	46	91



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SiREM Laboratory
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water soluble

Project : Hennepin MNA

30-March-2021

Date Rec. : 05 March 2021
LR Report: **CA14201-MAR21**
Reference: P.O# 800003210A

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: SB-34 32-33'	6: SB-51 42-43'	7: SB-22 26-27'	8: SB-22 29-30'
Sample Date & Time					04-Mar-21 12:15	04-Mar-21 12:30	04-Mar-21 12:40	04-Mar-21 13:00
Ag [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 0.05	< 0.05	< 0.05	< 0.05
Al [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	120	140	32	310
As [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 0.5	< 0.5	< 0.5	< 0.5
Ba [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	0.8	0.9	0.2	1.5
Be [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 0.02	< 0.02	< 0.02	0.02
B [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 1	1	< 1	1
Bi [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 0.09	< 0.09	< 0.09	< 0.09
Ca [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	500	600	220	410
Cd [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 0.02	< 0.02	< 0.02	0.04
Co [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	0.03	0.04	0.02	0.23
Cr [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 0.5	< 0.5	< 0.5	1.6
Cu [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 0.1	< 0.1	< 0.1	0.5
Fe [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	72	68	22	310
K [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	110	140	99	220
Li [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 2	< 2	< 2	< 2

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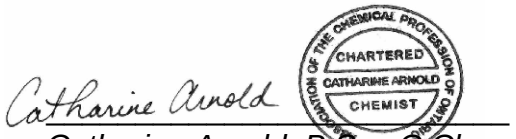
water soluble

Project : Hennepin MNA

LR Report : **CA14201-MAR21**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: SB-34 32-33'	6: SB-51 42-43'	7: SB-22 26-27'	8: SB-22 29-30'
Mg [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	89	120	100	140
Mn [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	1.4	1.3	0.5	4.0
Mo [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	0.1	0.6	0.1	0.3
Na [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	28	35	40	52
Ni [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 0.5	< 0.5	< 0.5	0.7
P [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	4	4	< 3	10
Pb [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 0.1	< 0.1	< 0.1	0.7
Si [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	300	290	120	740
Sb [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 0.8	< 0.8	< 0.8	< 0.8
Se [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 0.5	< 0.5	< 0.5	< 0.5
Tl [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	0.016	0.043	0.004	0.069
V [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 3	< 3	< 3	4
W [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 0.04	< 0.04	< 0.04	< 0.04
Y [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	0.045	0.042	0.029	0.15
Zn [µg/g]	26-Mar-21	11:11	26-Mar-21	17:50	< 0.7	< 0.7	< 0.7	2.5

Fraction 1 - Water Soluble



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Fraction 1 Exchangeable Metals

Project : Hennepin MNA

30-March-2021

SiREM Laboratory
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Date Rec. : 05 March 2021
LR Report: **CA14202-MAR21**
Reference: P.O# 800003210A

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: SB-34 32-33'	6: SB-51 42-43'	7: SB-22 26-27'	8: SB-22 29-30'
Sample Date & Time					04-Mar-21 12:15	04-Mar-21 12:30	04-Mar-21 12:40	04-Mar-21 13:00
Ag [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.05	< 0.05	< 0.05	< 0.05
Al [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	3	4	< 1	3
As [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.5	< 0.5	< 0.5	< 0.5
Ba [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	4.0	4.7	1.5	5.0
Be [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.02	< 0.02	< 0.02	< 0.02
B [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 1	< 1	< 1	< 1
Bi [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.09	< 0.09	< 0.09	< 0.09
Ca [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	2200	3200	1000	3500
Cd [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.02	< 0.02	< 0.02	0.24
Co [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	0.02	0.03	< 0.01	0.10
Cr [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.5	< 0.5	< 0.5	< 0.5
Cu [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	0.1	< 0.1	< 0.1	< 0.1
Fe [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	5	6	< 1	2
K [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	57	88	58	92
Li [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 2	< 2	< 2	< 2

OnLine LIMS

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Fraction 1 Exchangeable Metals

Project : Hennepin MNA

LR Report : CA14202-MAR21

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: SB-34 32-33'	6: SB-51 42-43'	7: SB-22 26-27'	8: SB-22 29-30'
Mn [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	6.5	8.5	1.5	17
Mo [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.1	0.1	< 0.1	< 0.1
Na [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	8	9	11	12
Ni [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.5	< 0.5	< 0.5	< 0.5
Pb [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.1	< 0.1	< 0.1	< 0.1
P [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 3	< 3	< 3	< 3
Sb [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.8	< 0.8	< 0.8	< 0.8
Se [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.7	< 0.7	< 0.7	< 0.7
Si [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	32	30	45	30
Sn [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.5	< 0.5	< 0.5	< 0.5
Tl [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	0.017	0.061	0.021	0.024
V [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 3	< 3	< 3	< 3
W [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.04	< 0.04	< 0.04	< 0.04
Y [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	0.006	0.006	0.004	0.008
Zn [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.7	< 0.7	< 0.7	< 0.7

Exchangeable Metals

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Fraction 2 Metals Bound to Carbonates

Project : Hennepin MNA

30-March-2021

SiREM Laboratory
Attn : Michael Healey

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Date Rec. : 05 March 2021
LR Report: **CA14203-MAR21**
Reference: P.O# 800003210A

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CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: SB-34 32-33'	6: SB-51 42-43'	7: SB-22 26-27'	8: SB-22 29-30'
Sample Date & Time					04-Mar-21 12:15	04-Mar-21 12:30	04-Mar-21 12:40	04-Mar-21 13:00
Ag [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.05	< 0.05	< 0.05	< 0.05
Al [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	5	2	28	6
As [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.5	< 0.5	< 0.5	< 0.5
Ba [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	20	22	6.0	7.5
Be [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.02	< 0.02	< 0.02	0.03
B [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 1	< 1	< 1	1
Bi [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.09	< 0.09	< 0.09	< 0.09
Ca [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	30000	30000	24000	13000
Cd [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	0.12	0.11	0.37	0.69
Co [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	0.39	0.39	1.1	1.1
Cr [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.5	< 0.5	2.6	9.6
Cu [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.1	< 0.1	0.2	< 0.1
Fe [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	8	4	41	32
K [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	41	49	45	67
Li [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 2	< 2	< 2	< 2

OnLine LIMS

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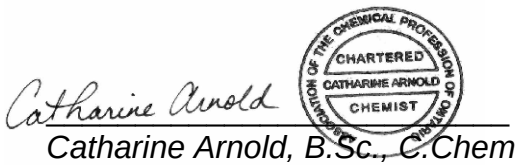
Fraction 2 Metals Bound to Carbonates

Project : Hennepin MNA

LR Report : CA14203-MAR21

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: SB-34 32-33'	6: SB-51 42-43'	7: SB-22 26-27'	8: SB-22 29-30'
Mg [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	2800	4700	2200	7000
Mn [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	78	74	140	69
Mo [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.1	< 0.1	< 0.1	< 0.1
Ni [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.5	< 0.5	2.7	1.9
Pb [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	0.2	0.2	0.3	0.6
P [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 3	< 3	< 3	< 3
Sb [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.8	< 0.8	< 0.8	< 0.8
Se [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.7	< 0.7	< 0.7	< 0.7
Si [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	90	77	70	110
Sn [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.5	< 0.5	< 0.5	< 0.5
Tl [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	0.039	0.15	0.089	0.030
V [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 3	< 3	< 3	< 3
W [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	< 0.04	< 0.04	< 0.04	< 0.04
Y [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	0.57	0.26	1.0	0.23
Zn [µg/g]	26-Mar-21	11:11	26-Mar-21	17:51	1.4	1.4	1.6	1.7

Fraction 2 Metals Bound to Carbonates



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Fraction 3 Metals Bound to Fe and Mn Oxides

Project : Hennepin MNA

30-March-2021

Date Rec. : 05 March 2021
LR Report: **CA14204-MAR21**
Reference: P.O# 800003210A

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	3: Analysis Completed Date	4: Analysis Completed Time	5: SB-34 32-33'	6: SB-51 42-43'	7: SB-22 26-27'	8: SB-22 29-30'
Sample Date & Time			04-Mar-21 12:15	04-Mar-21 12:30	04-Mar-21 12:40	04-Mar-21 13:00
Ag [µg/g]	26-Mar-21	17:51	< 0.05	< 0.05	< 0.05	< 0.05
Al [µg/g]	26-Mar-21	17:51	270	320	270	230
As [µg/g]	26-Mar-21	17:51	0.8	0.9	< 0.5	< 0.5
Ba [µg/g]	26-Mar-21	17:51	8.6	29	3.4	5.9
Be [µg/g]	26-Mar-21	17:51	0.14	0.22	0.07	0.48
B [µg/g]	26-Mar-21	17:51	1	2	2	2
Bi [µg/g]	26-Mar-21	17:51	0.12	0.29	< 0.09	< 0.09
Ca [µg/g]	26-Mar-21	17:51	18000	49000	30000	18000
Cd [µg/g]	26-Mar-21	17:51	0.25	0.59	0.16	1.1
Co [µg/g]	26-Mar-21	17:51	1.4	2.2	0.70	2.6
Cr [µg/g]	26-Mar-21	17:51	14	5.3	30	28
Cu [µg/g]	26-Mar-21	17:51	0.1	< 0.1	1.6	0.3
Fe [µg/g]	26-Mar-21	17:51	3100	2500	1600	1100
K [µg/g]	26-Mar-21	17:51	54	73	61	82
Li [µg/g]	26-Mar-21	17:51	< 2	< 2	< 2	< 2

OnLine LIMS

0002446262

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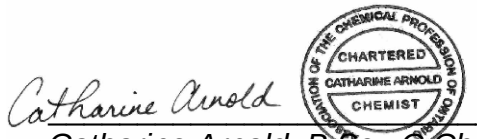
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Project : Hennepin MNA

LR Report : CA14204-MAR21

Analysis	3: Analysis Completed Date	4: Analysis Completed Time	5: SB-34 32-33'	6: SB-51 42-43'	7: SB-22 26-27'	8: SB-22 29-30'
Mg [µg/g]	26-Mar-21	17:51	9000	7000	17000	10000
Mn [µg/g]	26-Mar-21	17:51	110	170	90	65
Mo [µg/g]	26-Mar-21	17:51	0.1	0.2	0.5	0.2
Na [µg/g]	26-Mar-21	17:51	850	3700	540	2200
Ni [µg/g]	26-Mar-21	17:51	2.9	3.7	3.1	9.9
Pb [µg/g]	26-Mar-21	17:51	3.1	5.7	3.1	7.7
P [µg/g]	26-Mar-21	17:51	100	71	59	35
Sb [µg/g]	26-Mar-21	17:51	< 0.8	< 0.8	< 0.8	< 0.8
Se [µg/g]	26-Mar-21	17:51	< 0.7	< 0.7	< 0.7	< 0.7
Si [µg/g]	26-Mar-21	17:51	480	450	410	410
Sn [µg/g]	26-Mar-21	17:51	< 0.5	< 0.5	< 0.5	< 0.5
Tl [µg/g]	26-Mar-21	17:51	0.02	0.03	0.03	< 0.02
U [µg/g]	26-Mar-21	17:51	0.095	0.19	0.27	0.31
V [µg/g]	26-Mar-21	17:51	< 3	< 3	< 3	4
W [µg/g]	26-Mar-21	17:51	< 0.04	< 0.04	< 0.04	< 0.04
Y [µg/g]	26-Mar-21	17:51	1.8	2.6	1.8	1.4
Zn [µg/g]	26-Mar-21	17:51	14	24	7.4	26

Fraction 3 Metals Bound to Fe and Mn Oxides



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30-March-2021

SiREM Laboratory
Attn : Michael Healey

130 Stone Road W
Guelph, ON
N1G 3Z2, Canada

Phone: 519-822-2265
Fax:519-822-3151

Date Rec. : 08 March 2021
LR Report: **CA14205-MAR21**
Reference: P.O# 800003210A

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	3: Analysis Completed Date	4: Analysis Completed Time	5: SB-34 32-33'	6: SB-51 42-43'	7: SB-22 26-27'	8: SB-22 29-30'
Sample Date & Time			04-Mar-21 12:15	04-Mar-21 12:30	04-Mar-21 12:40	04-Mar-21 13:00
Ag [µg/g]	26-Mar-21	17:51	< 0.05	< 0.05	< 0.05	< 0.05
Al [µg/g]	26-Mar-21	17:51	77	120	150	630
As [µg/g]	26-Mar-21	17:51	< 0.5	< 0.5	< 0.5	< 0.5
Ba [µg/g]	26-Mar-21	17:51	1.5	5.5	1.1	2.4
Be [µg/g]	26-Mar-21	17:51	< 0.02	< 0.02	< 0.02	0.18
B [µg/g]	26-Mar-21	17:51	< 1	1	< 1	< 1
Bi [µg/g]	26-Mar-21	17:51	< 0.09	< 0.09	< 0.09	< 0.09
Ca [µg/g]	26-Mar-21	17:51	1800	3700	600	1300
Cd [µg/g]	26-Mar-21	17:51	0.03	0.03	0.03	0.25
Co [µg/g]	26-Mar-21	17:51	1.0	0.87	0.12	1.1
Cr [µg/g]	26-Mar-21	17:51	3.8	2.5	3.3	20
Cu [µg/g]	26-Mar-21	17:51	2.0	3.4	1.0	11
Fe [µg/g]	26-Mar-21	17:51	170	180	34	1100
K [µg/g]	26-Mar-21	17:51	12	22	24	45
Li [µg/g]	26-Mar-21	17:51	< 2	< 2	< 2	< 2

SGS Canada Inc.
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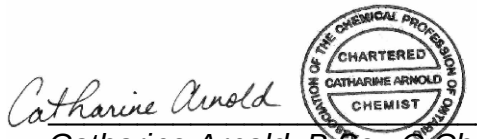
Phone: 705-652-2000 FAX: 705-652-6365

LR Report : **CA14205-MAR21**

Analysis	3: Analysis Completed Date	4: Analysis Completed Time	5: SB-34 32-33'	6: SB-51 42-43'	7: SB-22 26-27'	8: SB-22 29-30'
Mg [µg/g]	26-Mar-21	17:51	1800	3400	240	490
Mn [µg/g]	26-Mar-21	17:51	5.1	7.5	3.5	11
Mo [µg/g]	26-Mar-21	17:51	0.2	0.1	0.3	1.0
Na [µg/g]	26-Mar-21	17:51	10	65	15	36
Ni [µg/g]	26-Mar-21	17:51	1.1	1.8	0.7	15
Pb [µg/g]	26-Mar-21	17:51	0.2	0.2	0.2	1.9
P [µg/g]	26-Mar-21	17:51	70	51	23	24
Sb [µg/g]	26-Mar-21	17:51	< 0.8	< 0.8	< 0.8	< 0.8
Se [µg/g]	26-Mar-21	17:51	< 0.7	0.9	< 0.7	< 0.7
Si [µg/g]	26-Mar-21	17:51	130	160	220	480
Sn [µg/g]	26-Mar-21	17:51	< 0.5	< 0.5	< 0.5	< 0.5
Tl [µg/g]	26-Mar-21	17:51	0.03	0.04	< 0.02	0.02
U [µg/g]	26-Mar-21	17:51	0.097	0.086	0.12	0.48
V [µg/g]	26-Mar-21	17:51	< 3	< 3	< 3	8
W [µg/g]	26-Mar-21	17:51	< 0.04	< 0.04	< 0.04	< 0.04
Y [µg/g]	26-Mar-21	17:51	0.42	0.31	1.0	3.0
Zn [µg/g]	26-Mar-21	17:51	2.5	2.8	1.7	9.7

Fraction 4 Bound to Organic Material



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SiREM Laboratory
Attn : Michael Healey

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Guelph, ON
N1G 3Z2, Canada

Phone: 519-822-2265
Fax:519-822-3151

Fraction 5 Residual metals

Project : Hennepin MNA

30-March-2021

Date Rec. : 05 March 2021
LR Report: **CA14206-MAR21**
Reference: P.O# 800003210A

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	3: Analysis Completed Date	4: Analysis Completed Time	5: SB-34 32-33'	6: SB-51 42-43'	7: SB-22 26-27'	8: SB-22 29-30'
Sample Date & Time			04-Mar-21 12:15	04-Mar-21 12:30	04-Mar-21 12:40	04-Mar-21 13:00
Ag [µg/g]	26-Mar-21	17:52	0.06	0.09	0.07	0.09
Al [µg/g]	26-Mar-21	17:52	22000	24000	14000	17000
As [µg/g]	26-Mar-21	17:52	1.9	2.7	3.9	6.6
Ba [µg/g]	26-Mar-21	17:52	190	170	130	130
Be [µg/g]	26-Mar-21	17:52	0.46	0.74	0.29	0.47
B [µg/g]	26-Mar-21	17:52	13	26	10	18
Bi [µg/g]	26-Mar-21	17:52	< 0.09	0.21	< 0.09	0.16
Ca [µg/g]	26-Mar-21	17:52	3000	4400	1800	1700
Cd [µg/g]	26-Mar-21	17:52	0.05	0.07	0.10	0.23
Co [µg/g]	26-Mar-21	17:52	3.9	5.4	2.9	3.9
Cr [µg/g]	26-Mar-21	17:52	37	39	54	98
Cu [µg/g]	26-Mar-21	17:52	5.7	9.6	7.4	9.7
Fe [µg/g]	26-Mar-21	17:52	8800	14000	8500	10000
K [µg/g]	26-Mar-21	17:52	9500	10000	6500	7500
Li [µg/g]	26-Mar-21	17:52	11	18	5	13

OnLine LIMS

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Fraction 5 Residual metals

Project : Hennepin MNA

LR Report : CA14206-MAR21

Analysis	3: Analysis Completed Date	4: Analysis Completed Time	5: SB-34 32-33'	6: SB-51 42-43'	7: SB-22 26-27'	8: SB-22 29-30'
Mg [µg/g]	26-Mar-21	17:52	1900	2300	1100	1100
Mn [µg/g]	26-Mar-21	17:52	68	95	60	54
Mo [µg/g]	26-Mar-21	17:52	0.5	0.9	1.8	3.4
Na [µg/g]	26-Mar-21	17:52	4100	3200	3600	3900
Ni [µg/g]	26-Mar-21	17:52	8.2	14	7.4	11
Pb [µg/g]	26-Mar-21	17:52	5.2	6.5	5.3	17
P [µg/g]	26-Mar-21	17:52	130	210	160	200
Sb [µg/g]	26-Mar-21	17:52	< 0.8	< 0.8	< 0.8	1.0
Se [µg/g]	26-Mar-21	17:52	< 0.7	< 0.7	< 0.7	< 0.7
Si [µg/g]	26-Mar-21	17:52	8500	25000	34000	31000
Sn [µg/g]	26-Mar-21	17:52	2.9	3.6	2.9	4.3
Tl [µg/g]	26-Mar-21	17:52	0.23	0.34	0.15	0.29
U [µg/g]	26-Mar-21	17:52	0.84	1.4	1.0	1.3
V [µg/g]	26-Mar-21	17:52	28	49	25	78
W [µg/g]	26-Mar-21	17:52	0.24	0.40	0.15	0.23
Y [µg/g]	26-Mar-21	17:52	4.1	4.1	3.3	3.1
Zn [µg/g]	26-Mar-21	17:52	24	39	33	62

Fraction 5 Residual metals

Catharine Arnold

CHARTERED CATHARINE ARNOLD CHEMIST — THE CHEMICAL PROFESSION OF ONTARIO

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OnLine LIMS

00024462 70

ATTACHMENT 3
X-Ray Diffraction
Laboratory Analytical Report

Quantitative X-Ray Diffraction by Rietveld Refinement

Report Prepared for:	*Environmental Services*
Project Number/ LIMS No.	*Custom XRD/MI4516-MAR21*
Sample Receipt:	*March 12, 2021*
Sample Analysis:	*March 25, 2021*
Reporting Date:	*April 8, 2021*

Instrument:	BRUKER AXS D8 Advance Diffractometer
Test Conditions:	Co radiation, 35 kV, 40 mA Regular Scanning: Step: 0.02°, Step time: 1s, 2θ range: 3-80°
Interpretations :	PDF2/PDF4 powder diffraction databases issued by the International Center for Diffraction Data (ICDD). DiffracPlus Eva and Topas software.
Detection Limit :	0.5-2%. Strongly dependent on crystallinity.

Contents:

Kim Gibbs, H.B.Sc., P.Geo.
Senior Mineralogist

Huyun Zhou, Ph.D., P.Geo.
Senior Mineralogist

ACCREDITATION: SGS Minerals Services Lakefield is accredited to the requirements of ISO/IEC 17025 for specific tests as listed on our scope of accreditation, including geochemical, mineralogical and trade mineral tests. To view a list of the accredited methods, please visit the following website and search SGS Canada - Minerals Services - Lakefield: http://palcan.scc.ca/SpecsSearch/GLSearchForm.do.

Method Summary

The Rietveld Method of Mineral Identification by XRD (ME-LR-MIN-MET-MN-D05) method used by SGS Minerals Services is accredited to the requirements of ISO/IEC 17025.

Mineral Identification and Interpretation:

Mineral identification and interpretation involves matching the diffraction pattern of an unknown material to patterns of single-phase reference materials. The reference patterns are compiled by the Joint Committee on Powder Diffraction Standards - International Center for Diffraction Data (JCPDS-ICDD) database and released on software as Powder Diffraction Files (PDF).

Interpretations do not reflect the presence of non-crystalline and/or amorphous compounds, except when internal standards have been added by request. Mineral proportions may be strongly influenced by crystallinity, crystal structure and preferred orientations. Mineral or compound identification and quantitative analysis results should be accompanied by supporting chemical assay data or other additional tests.

Quantitative Rietveld Analysis:

Quantitative Rietveld Analysis is performed by using Topas 4.2 (Bruker AXS), a graphics based profile analysis program built around a non-linear least squares fitting system, to determine the amount of different phases present in a multicomponent sample. Whole pattern analyses are predicated by the fact that the X-ray diffraction pattern is a total sum of both instrumental and specimen factors. Unlike other peak intensity-based methods, the Rietveld method uses a least squares approach to refine a theoretical line profile until it matches the obtained experimental patterns.

Rietveld refinement is completed with a set of minerals specifically identified for the sample. Zero values indicate that the mineral was included in the refinement calculations, but the calculated concentration was less than 0.05wt%. Minerals not identified by the analyst are not included in refinement calculations for specific samples and are indicated with a dash.

Summary of Rietveld Quantitative Analysis X-Ray Diffraction Results

Mineral/Compound	SB-34 32-33' MAR4516-01 (wt %)	SB-51 42-43' MAR4516-02 (wt %)	SB-22 26-27' MAR4516-03 (wt %)	SB-22 29-30' MAR4516-04 (wt %)
Quartz	53.0	33.1	57.0	54.5
Microcline	5.1	9.8	5.2	5.2
Chlorite	3.4	6.8	1.9	2.7
Kaolinite	3.4	3.4	0.6	2.5
Muscovite	7.9	12.5	2.1	7.4
Calcite	11.1	20.9	7.2	3.3
Dolomite	2.6	5.0	14.4	11.4
Ankerite	6.0	1.3	2.9	2.8
Pyrite	0.2	0.3	-	-
Magnetite	0.4	0.2	0.5	0.4
Albite	7.1	6.6	7.3	9.8
Actinolite	-	-	0.8	-
TOTAL	100	100	100	100

Zero values indicate that the mineral was included in the refinement, but the calculated concentration is below a measurable value.

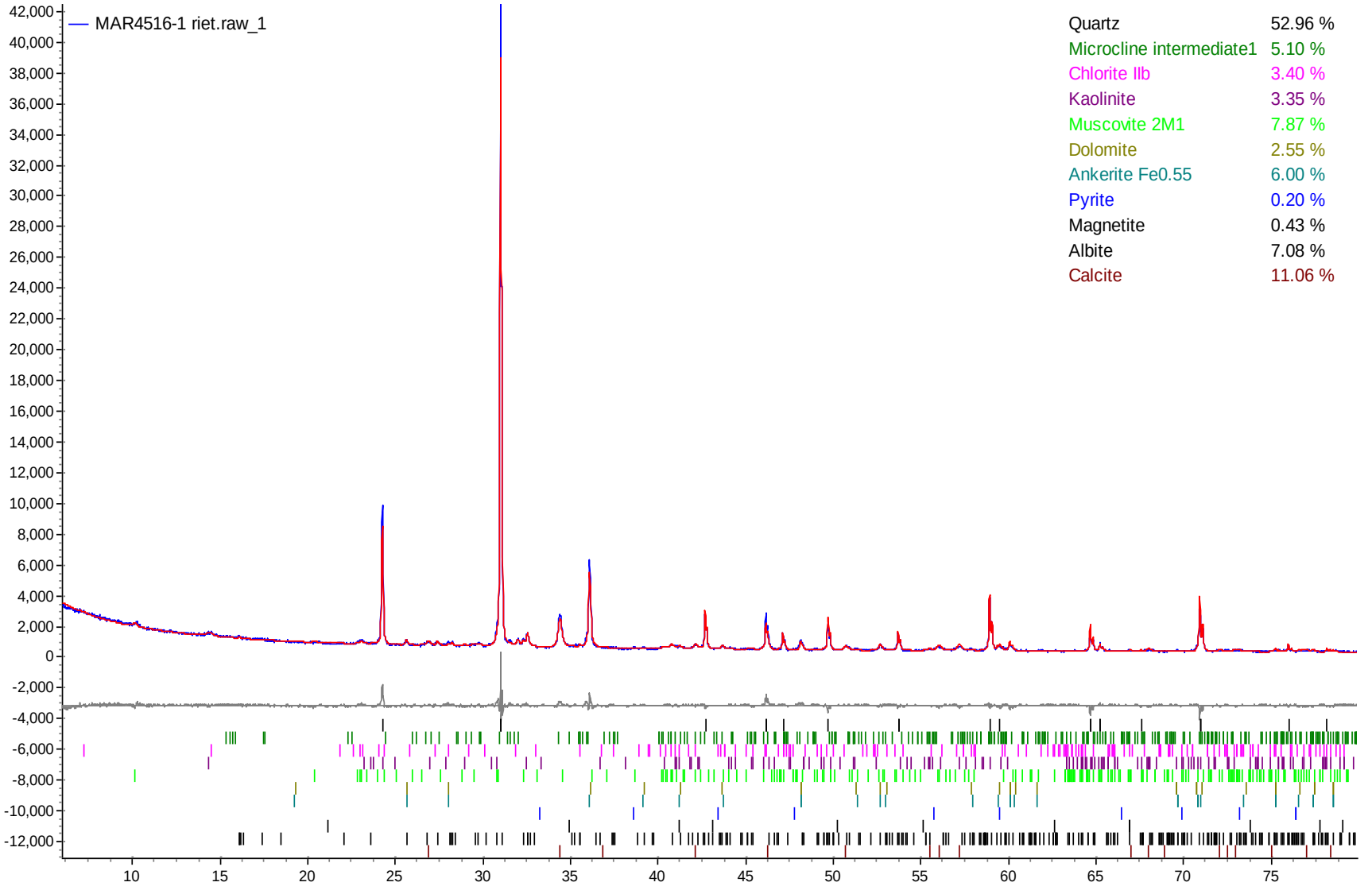
Dashes indicate that the mineral was not identified by the analyst and not included in the refinement calculation for the sample.

The weight percent quantities indicated have been normalized to a sum of 100%. The quantity of amorphous material has not been determined.

Mineral/Compound	Formula
Quartz	SiO_2
Microcline	$KAlSi_3O_8$
Chlorite	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$
Kaolinite	$Al_2Si_2O_5(OH)_4$
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$
Calcite	$CaCO_3$
Dolomite	$CaMg(CO_3)_2$
Ankerite	$CaFe(CO_3)_2$
Pyrite	FeS_2
Magnetite	Fe_3O_4
Albite	$NaAlSi_3O_8$
Actinolite	$Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$

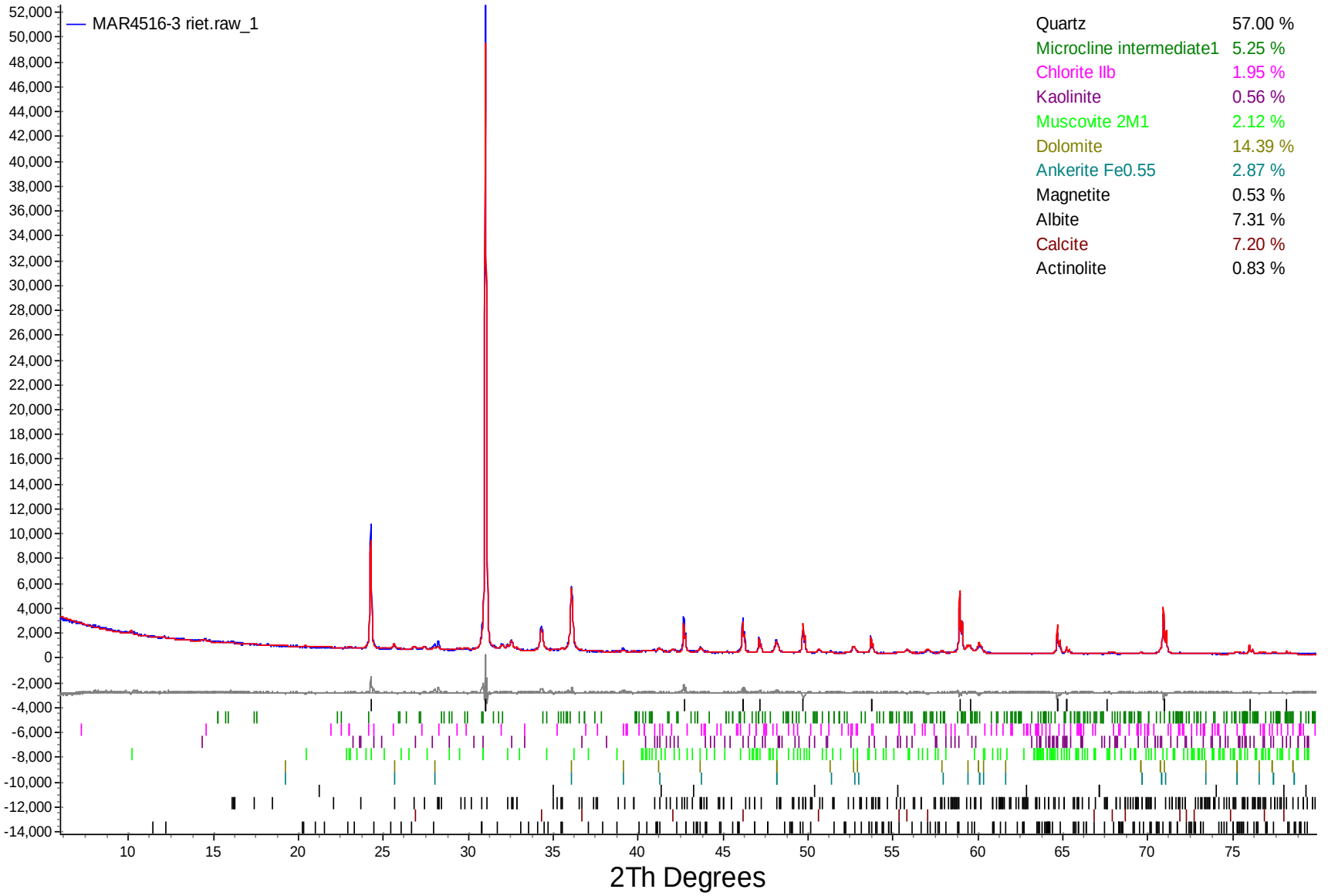
Environmental Services
Custom XRD/MI4516-MAR21
04/08/2021

SB-34 32-33'



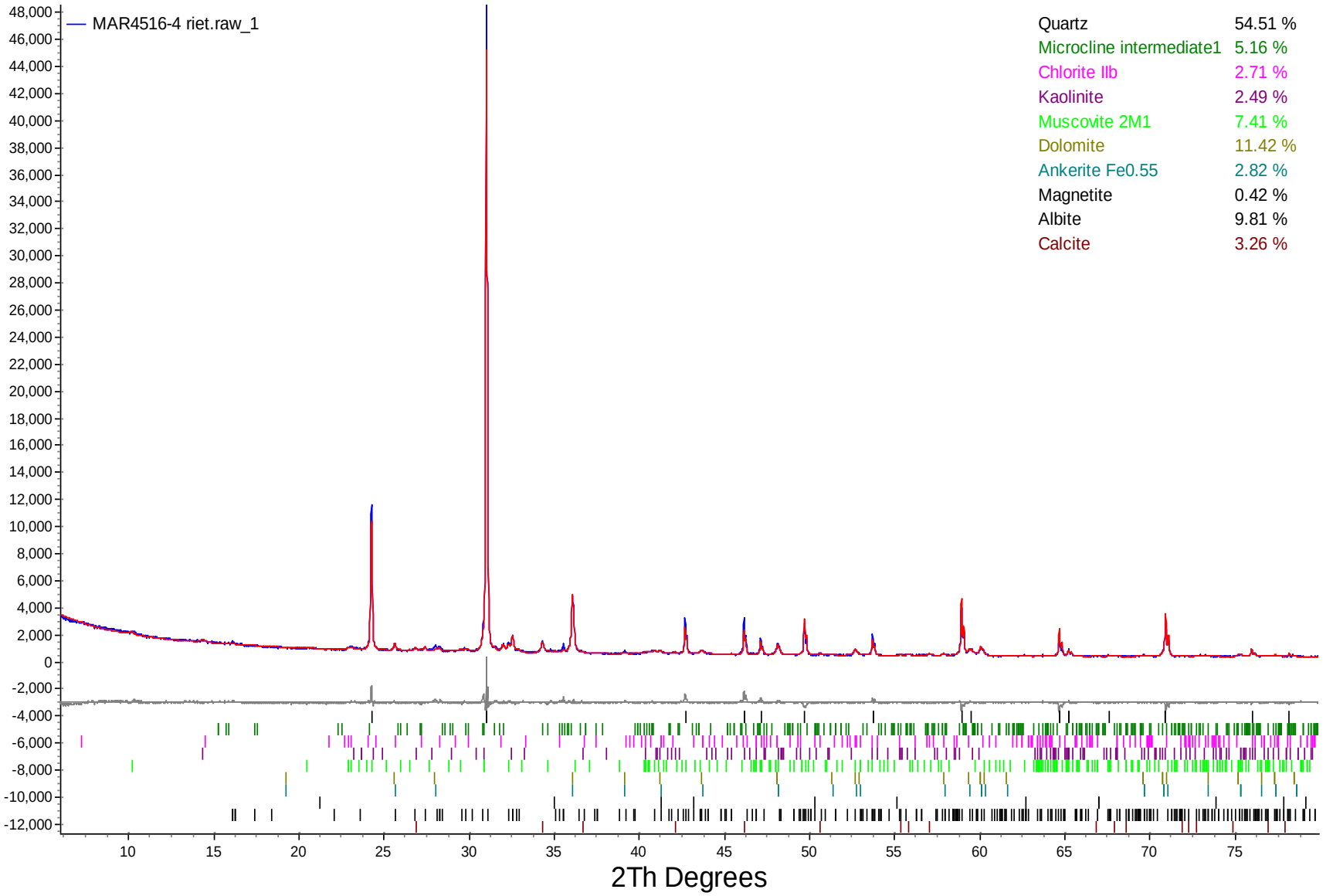
Quartz	52.96 %
Microcline intermediate1	5.10 %
Chlorite IIb	3.40 %
Kaolinite	3.35 %
Muscovite 2M1	7.87 %
Dolomite	2.55 %
Ankerite Fe0.55	6.00 %
Pyrite	0.20 %
Magnetite	0.43 %
Albite	7.08 %
Calcite	11.06 %

SB-22 26-27'



Quartz	57.00 %
Microcline intermediate1	5.25 %
Chlorite IIb	1.95 %
Kaolinite	0.56 %
Muscovite 2M1	2.12 %
Dolomite	14.39 %
Ankerite Fe0.55	2.87 %
Magnetite	0.53 %
Albite	7.31 %
Calcite	7.20 %
Actinolite	0.83 %

SB-22 29-30'



Quartz	54.51 %
Microcline intermediate1	5.16 %
Chlorite IIb	2.71 %
Kaolinite	2.49 %
Muscovite 2M1	7.41 %
Dolomite	11.42 %
Ankerite Fe0.55	2.82 %
Magnetite	0.42 %
Albite	9.81 %
Calcite	3.26 %