Prepared for
Illinois Power Generating Company

Date
January 31, 2021

Project No.
1940074923

2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

NEWTON PRIMARY ASH POND, NEWTON POWER STATION

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NEWTON PRIMARY ASH POND, NEWTON POWER STATION

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Prepared by	**Kristen L. Theesfeld**
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Approved by	**Lauren D. Cook**
Description	**Annual Report in Support of the CCR Rule Groundwater Monitoring Program**

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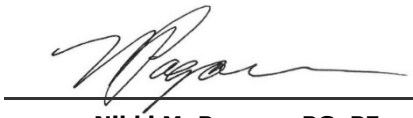

Nikki M. Pagano, PG, PE
Senior Managing Engineer

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ACRONYMS AND ABBREVIATIONS

40 C.F.R.	Title 40 of the Code of Federal Regulations
ASD	Alternate Source Demonstration
CCR	Coal Combustion Residuals
CMA	Corrective Measures Assessment
PAP	Primary Ash Pond
SAP	Sampling and Analysis Plan
SSI	Statistically Significant Increase
SSL	Statistically Significant Level

EXECUTIVE SUMMARY

This report has been prepared to provide the information required by Title 40 of the Code of Federal Regulations (40 C.F.R.) § 257.90(e) for the Newton Primary Ash Pond (PAP) located at Newton Power Station near Newton, Illinois.

Groundwater is being monitored at Newton PAP in accordance with the Detection Monitoring Program requirements specified in 40 C.F.R. § 257.94.

No changes were made to the monitoring system in 2020 (no wells were installed or decommissioned).

The following Statistically Significant Increases (SSIs) of 40 C.F.R. Part 257 Appendix III parameter concentrations greater than background concentrations were determined:

- Calcium at wells APW7, APW8, APW9, and APW10
- Chloride at wells APW7, APW8, and APW9
- Sulfate at wells APW7, APW8, APW9, and APW10

Alternate Source Demonstrations (ASDs) were completed for the SSIs referenced above and Newton PAP remains in the Detection Monitoring Program.

1. INTRODUCTION

This report has been prepared by Ramboll on behalf of Illinois Power Generating Company, to provide the information required by 40 C.F.R. § 257.90(e) for Newton PAP located at Newton Power Station near Newton, Illinois.

In accordance with 40 C.F.R. § 257.90(e), the owner or operator of a Coal Combustion Residuals (CCR) unit must prepare an Annual Groundwater Monitoring and Corrective Action Report for the preceding calendar year that documents the status of the Groundwater Monitoring and Corrective Action Program for the CCR unit, summarizes key actions completed, describes any problems encountered, discusses actions to resolve the problems, and projects key activities for the upcoming year. At a minimum, the annual report must contain the following information, to the extent available:

1. A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit.
2. Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken.
3. In addition to all the monitoring data obtained under §§ 257.90 through 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the Detection Monitoring or Assessment Monitoring Programs.
4. A narrative discussion of any transition between monitoring programs (*e.g.*, the date and circumstances for transitioning from Detection Monitoring to Assessment Monitoring in addition to identifying the constituent(s) detected at a SSI relative to background levels).
5. Other information required to be included in the Annual Report as specified in §§ 257.90 through 257.98.
6. A section at the beginning of the annual report that provides an overview of the current status of groundwater monitoring and corrective action programs for the CCR unit. At a minimum, the summary must specify all of the following:
   i. At the start of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in §257.94 or the assessment monitoring program in §257.95.
   ii. At the end of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in §257.94 or the assessment monitoring program in §257.95.
   iii. If it was determined that there was a SSI over background for one or more constituents listed in Appendix III of §257 pursuant to §257.94(e):
      A. Identify those constituents listed in Appendix III of §257 and the names of the monitoring wells associated with the SSI(s).
      B. Provide the date when the assessment monitoring program was initiated for the CCR unit.

iv. If it was determined that there was a Statistically Significant Level (SSL) above the Groundwater Protection Standard (GWPS) for one or more constituents listed in Appendix IV of §257 pursuant to §257.95(g) include all of the following:

   A. Identify those constituents listed in Appendix IV of §257 and the names of the monitoring wells associated with the SSL(s).

   B. Provide the date when the Corrective Measures Assessment (CMA) was initiated for the CCR unit.

   C. Provide the date when the public meeting was held for CMA for the CCR unit.

   D. Provide the date when the CMA was completed for the CCR unit.

v. Whether a remedy was selected pursuant to §257.97 during the current annual reporting period, and if so, the date of remedy selection.

vi. Whether remedial activities were initiated or are ongoing pursuant to §257.98 during the current annual reporting period.

This report provides the required information for Newton PAP for calendar year 2020.

2. MONITORING AND CORRECTIVE ACTION PROGRAM STATUS

No changes have occurred to the monitoring program status in calendar year 2020, and Newton PAP remains in the Detection Monitoring Program in accordance with 40 C.F.R. § 257.94.

3. KEY ACTIONS COMPLETED IN 2020

The Detection Monitoring Program is summarized in Table A. The groundwater monitoring system, including the CCR unit and all background and downgradient monitoring wells, is presented in Figure 1. No changes were made to the monitoring system in 2020. In general, one groundwater sample was collected from each background and downgradient well during each monitoring event.[1] All samples were collected and analyzed in accordance with the Sampling and Analysis Plan (SAP) (NRT/OBG, 2017a). All monitoring data obtained under 40 C.F.R. §§ 257.90 through 257.98 (as applicable) in 2020, and analytical results for the August 2019 sampling event, are presented in Table 1. Analytical data were evaluated in accordance with the Statistical Analysis Plan (NRT/OBG, 2017b) to determine any SSIs of Appendix III parameters relative to background concentrations.

Statistical background values are provided in Table 2.

Potential alternate sources were evaluated as outlined in the 40 C.F.R. § 257.94(e)(2). ASDs were completed and certified by a qualified professional engineer. The dates the ASDs were completed are provided in Table A. The ASDs are included in Appendix A.

[1] Sampling was limited to APW8 during the October 2020 sampling event to confirm Appendix III parameters initially detected at concentrations greater than statistical background values in the preceding sampling event to confirm SSIs, as allowed by the Statistical Analysis Plan.

Table A – 2019–2020 Detection Monitoring Program Summary

Sampling Date	Analytical Data Receipt Date	Parameters Collected	SSI(s)	SSI(s) Determination Date	ASD Completion Date
August 22 - 23, 2019	October 28, 2019	Appendix III	Calcium at wells APW8 and APW10; Chloride at well APW8; Sulfate at wells APW7, APW8, APW9, and APW10	January 27, 2020	April 27, 2020
February 4 - 19, 2020	April 16, 2020	Appendix III	Calcium at wells APW7, APW8, APW9, and APW10; Chloride at wells APW7 and APW9; Sulfate at wells APW8 and APW10	July 15, 2020	October 13, 2020
June 11, 2020	June 19, 2020	Appendix III Greater than Background [1]			
July 28, 2020	October 15, 2020	Appendix III	TBD	TBD	TBD
October 28, 2020 [2]	November 3, 2020	Appendix III Greater than Background [1]			

Notes:

NA: Not Applicable
TBD: To Be Determined
1. Groundwater sample analysis was limited to Appendix III parameters initially detected at concentrations greater than statistical background values in the preceding sampling event to confirm SSIs, as allowed by the Statistical Analysis Plan.
2. Sampling was limited to APW8 during the October 2020 sampling event to confirm Appendix III parameters initially detected at concentrations greater than statistical background values in the preceding sampling event to confirm SSIs, as allowed by the Statistical Analysis Plan.

4. PROBLEMS ENCOUNTERED AND ACTIONS TO RESOLVE THE PROBLEMS

No problems were encountered with the Groundwater Monitoring Program during 2020. Groundwater samples were collected and analyzed in accordance with the SAP (NRT/OBG, 2017a), and all data were accepted.

5. KEY ACTIVITIES PLANNED FOR 2021

The following key activities are planned for 2021:

- Continuation of the Detection Monitoring Program with semi-annual sampling scheduled for the first and third quarters of 2021.
- Complete evaluation of analytical data from the downgradient wells, using background data to determine whether an SSI of Appendix III parameters detected at concentrations greater than background concentrations has occurred.
- If an SSI is identified, potential alternate sources (*i.e.*, a source other than the CCR unit caused the SSI or that that SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality) will be evaluated. If an alternate source is demonstrated to be the cause of the SSI, a written demonstration will be completed within 90 days of SSI determination and included in the 2021 Annual Groundwater Monitoring and Corrective Action Report.
- If an alternate source(s) is not identified to be the cause of the SSI, the applicable requirements of 40 C.F.R. §§ 257.94 through 257.98 as may apply in 2021 (*e.g.*, Assessment Monitoring) will be met, including associated recordkeeping/notifications required by 40 C.F.R. §§ 257.105 through 257.108.

6. REFERENCES

Natural Resource Technology, an OBG Company (NRT/OBG), 2017a. Sampling and Analysis Plan, Newton Primary Ash Pond, Newton Power Station, Newton, Illinois, Project No. 2285, Revision 0, October 17, 2017.

Natural Resource Technology, an OBG Company (NRT/OBG), 2017b, Statistical Analysis Plan, Coffeen Power Station, Newton Power Station, Illinois Power Generating Company, October 17, 2017.

TABLES

TABLE 1.
ANALYTICAL RESULTS - GROUNDWATER ELEVATION AND APPENDIX III PARAMETERS
2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
NEWTON POWER STATION
501 - PRIMARY ASH POND
NEWTON, IL

Well ID	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date	Depth to Groundwater (ft) 6020A	Groundwater Elevation (ft NAVD88) 6020A	Boron, total (mg/L) 6020A	Calcium, total (mg/L) 6020A	Chloride, total (mg/L) 9251	Fluoride, total (mg/L) 9214	pH (field) (STD) SM4500 H+B	Sulfate, total (mg/L) 9036	Total Dissolved Solids (mg/L) SM 2540C
APW05 Background	38.933958	-88.280983	8/21/2019	16.04	528.03							
			8/22/2019			0.12	49	50	<0.25	7.0	2.3	530
			2/3/2020	14.05	530.02							
			2/4/2020			0.091	51	54	0.48	7.5	2.3	600
			6/11/2020	14.36	529.71					7.4		
			7/27/2020	14.3	529.77							
			7/28/2020			0.1	53	52	0.544	7.7	1.8	530
APW06 Background	38.933746	-88.286276	8/21/2019	16.39	529.68							
			8/23/2019			0.11	55	26	0.314	7.3	5.8	500
			2/3/2020	19.31	526.76							
			2/4/2020			0.08	53	27	0.483	7.5	<1	640
			6/11/2020	19.33	526.74					7.4		
			7/27/2020	19.29	526.78							
			7/28/2020			0.091	55	24	0.564	7.8	3.2	510
APW07 Downgradient	38.928233	-88.292076	8/21/2019	43	495.37							
			8/23/2019			0.075	58	46	0.632	7.1	62	350
			2/3/2020	45.77	492.6							
			2/5/2020			0.092	100	68	0.332	7.4	5.7	640
			6/11/2020	46.47	491.9			68		7.3		
			7/27/2020	46.4	491.97							
			7/28/2020			0.086	94	77	0.412	7.3	6.7	530
APW08 Downgradient	38.923154	-88.292286	8/21/2019	34.2	494.77							
			8/23/2019			0.1	82	59	0.337	7.2	48	570
			2/3/2020	36.47	492.5							
			2/5/2020			0.1	120	55	0.331	7.4	45	700
			6/11/2020	37.32	491.65					7.3		
			7/27/2020	37.15	491.82							
			7/28/2020			0.087	110	62	0.441	7.3	47	620
			10/22/2020	37.69	491.28							

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TABLE 1.
ANALYTICAL RESULTS - GROUNDWATER ELEVATION AND APPENDIX III PARAMETERS
2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
NEWTON POWER STATION
501 - PRIMARY ASH POND
NEWTON, IL

Well ID	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date	Depth to Groundwater (ft) 6020A	Groundwater Elevation (ft NAVD88) 6020A	Boron, total (mg/L) 6020A	Calcium, total (mg/L) 6020A	Chloride, total (mg/L) 9251	Fluoride, total (mg/L) 9214	pH (field) (STD) SM4500 H+B	Sulfate, total (mg/L) 9036	Total Dissolved Solids (mg/L) SM 2540C
	38.923154	-88.292286	10/28/2020					55		7.4		
APW09 Downgradient	38.922319	-88.281585	8/21/2019	22.09	509.43							
			8/23/2019			0.055	41	51	0.621	7.4	51	360
			2/3/2020	26.48	505.04							
			2/19/2020			0.1	88	130	0.453	7.5	7.5	790
			6/11/2020	26.88	504.64			130		7.4		870
			7/27/2020	26.21	505.31							
			7/28/2020			0.1	84	140	0.537	7.4	3.2	810
APW10 Downgradient	38.927435	-88.273127	8/21/2019	16.08	508.17							
			8/23/2019			0.096	130	50	0.359	7.0	390	1000
			2/3/2020	17.52	506.73							
			2/5/2020			0.094	140	44	<0.25	7.1	400	1200
			6/11/2020	17.94	506.31					7.2		1000
			7/27/2020	17.49	506.76							
			7/28/2020			0.076	140	53	0.356	7.1	410	1000

Notes:
40 C.F.R. = Title 40 of the Code of Federal Regulations
ft = foot/feet
mg/L = milligrams per liter
NAVD88 = North American Vertical Datum of 1988
S.U. = Standard Units
< = concentration is less than the concentration shown, which corresponds to the reporting limit for the method; estimated concentrations below the reporting limit and associated qualifiers are not provided since not utilized in statistics to determine Statistically Significant Increases (SSIs) over background.
4-digit numbers below parameter represent SW-846 analytical methods and alpha-numeric values that begin with SM represent Standard Methods for the Examination of Water and Wastewater.

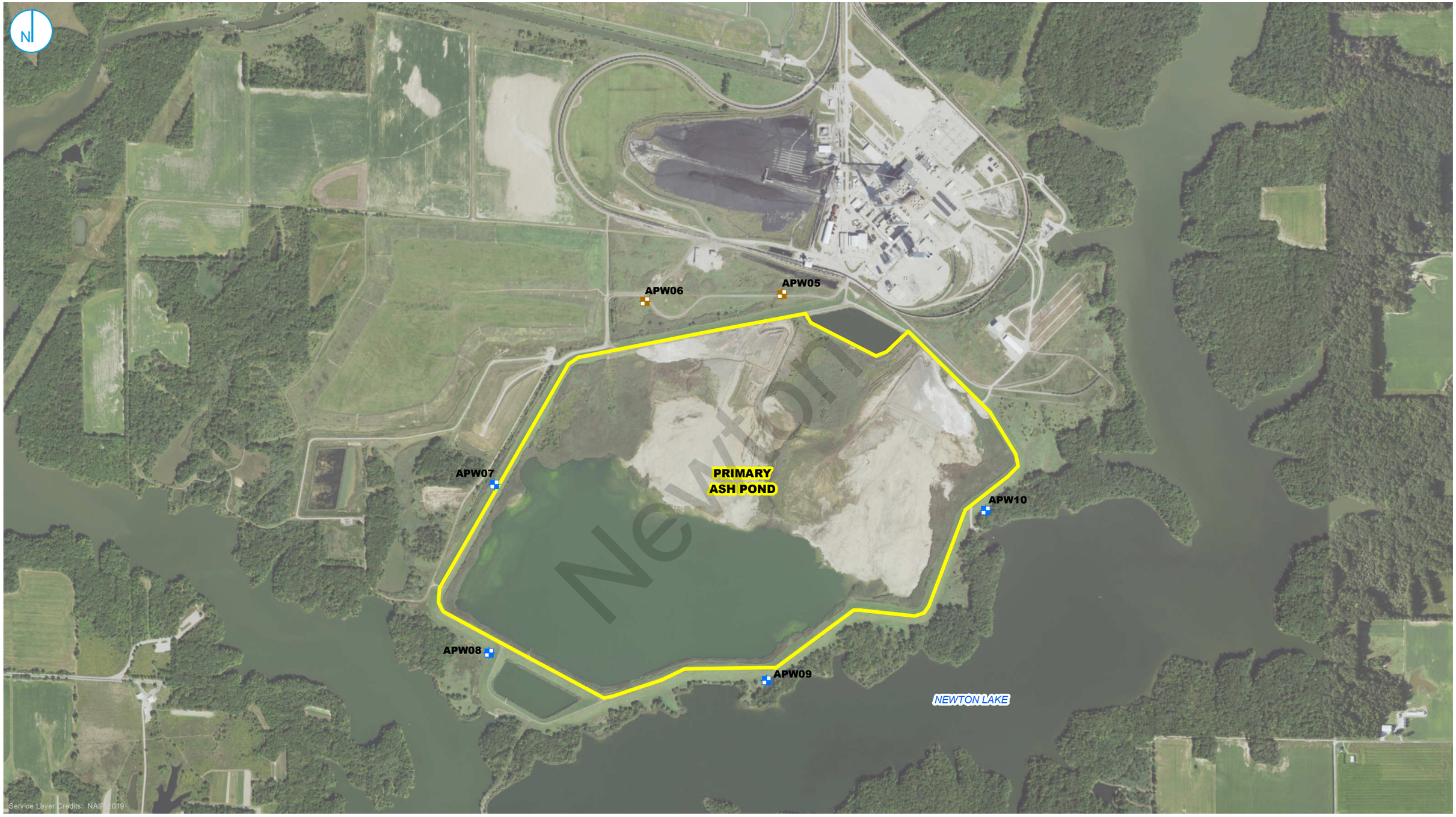
TABLE 2.
STATISTICAL BACKGROUND VALUES
2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
NEWTON POWER STATION
501 - PRIMARY ASH POND
NEWTON, ILLINOIS
DETECTION MONITORING PROGRAM

Parameter	Statistical Background Value (UPL)
40 C.F.R. Part 257 Appendix III	
Boron (mg/L)	0.14
Calcium (mg/L)	65
Chloride (mg/L)	58
Fluoride (mg/L)	0.692
pH (S.U.)	6.6 / 8.0
Sulfate (mg/L)	15
Total Dissolved Solids (mg/L)	1000

[O: RAB 12/23/19, C: KLT 12/26/19]

Notes:
40 C.F.R. = Title 40 of the Code of Federal Regulations
mg/L = milligrams per liter
S.U. = Standard Units
UPL = Upper Prediction Limit

FIGURES



BACKGROUND MONITORING WELL LOCATION
DOWNGRADIENT MONITORING WELL LOCATION
CCR MONITORED UNIT

0 500 1,000 Feet

MONITORING WELL LOCATION MAP
NEWTON PRIMARY ASH POND
UNIT ID:501

2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
VISTRA CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

FIGURE 1

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ENGINEERING SOLUTIONS, INC.

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APPENDICES

Intended for
Illinois Power Generating Company

Date
April 27, 2020

Project No.
74923

40 C.F.R. § 257.94(e)(2): ALTERNATE SOURCE DEMONSTRATION

NEWTON PRIMARY ASH POND

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CERTIFICATIONS

I, Nicole M. Pagano, 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 for other than its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

Nicole M. Pagano
Professional Geologist
196-000750
Illinois
O'Brien & Gere Engineers, Inc., a Ramboll Company
Date: April 27, 2020

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 for other than its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

Eric J. Tlachac
Qualified Professional Engineer
062-063091
Illinois
O'Brien & Gere Engineers, Inc., a Ramboll Company
Date: April 27, 2020

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CONTENTS

TABLES (IN TEXT)

FIGURES (IN TEXT)

FIGURES (ATTACHED)

ACRONYMS AND ABBREVIATIONS

40 C.F.R.	Title 40 of the Code of Federal Regulations
ASD	Alternate Source Demonstration
bgs	below ground surface
CCR	Coal Combustion Residuals
ft	foot/feet
LF2	Phase II Landfill 2
msl	mean sea level
NRT/OBG	Natural Resource Technology, an OBG Company
PAP	Primary Ash Pond
Site	Newton Power Station
SSIs	Statistically Significant Increases
UPL	Upper Prediction Limit

1. INTRODUCTION

Title 40 of the Code of Federal Regulations (40 C.F.R.) § 257.94(e)(2) allows the owner or operator of a Coal Combustion Residuals (CCR) unit 90 days from the date of determination of a Statistically Significant Increase (SSI) over background for groundwater constituents listed in Appendix III of 40 C.F.R. Part 257 to complete a written demonstration that a source other than the CCR unit being monitored caused the SSI(s), or that the SSI(s) resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality (Alternate Source Demonstration [ASD]).

This ASD has been prepared on behalf of Illinois Power Generating Company, by O'Brien & Gere Engineers, Inc., a Ramboll Company (Ramboll), to provide pertinent information pursuant to 40 C.F.R. § 257.94(e)(2) for the Newton Primary Ash Pond (PAP) located near Newton, Illinois.

The most recent Detection Monitoring sampling event (Detection Monitoring Round 5 [D5]) was completed on August 22 and 23, 2019, and analytical data were received on October 28, 2019. Analytical data from D5 were evaluated in accordance with the Statistical Analysis Plan (NRT/OBG 2017a) to determine any SSIs of Appendix III parameters over background concentrations. That evaluation identified SSIs at downgradient monitoring wells as follows:

- Calcium at wells APW8 and APW10
- Sulfate at wells APW7, APW8, APW9, and APW10
- Chloride at APW8

Pursuant to 40 C.F.R. § 257.94(e)(2), the following lines of evidence (LOE) demonstrate that sources other than the Newton PAP were the cause of the calcium, sulfate, and chloride SSIs listed above. This ASD was completed by April 27, 2020, within 90 days of determination of the SSIs (January 27, 2020), as required by 40 C.F.R. § 257.94(e)(2).

2. BACKGROUND

2.1 Site Location and Description

The Newton Power Station (Site) is located in Jasper County in the southeastern part of central Illinois, approximately 7 miles southwest of the town of Newton. The plant is located on the north side of Newton Lake. The area is bounded by Newton Lake and agricultural land to the west, south, and east, and agricultural land to the north. Beyond the lake is additional agricultural land.

2.2 Description of Primary Ash Pond CCR Unit

The Newton Power Station's sole CCR surface impoundment, the Primary Ash Pond (PAP), was constructed in 1977 and has a design capacity of approximately 9,715 acre-feet. The PAP has a surface area of 400 acres and a height of approximately 71 feet above grade. The PAP currently receives bottom ash, fly ash, and low-volume wastewater from the plant's two coal-fired boilers, and is operated per NPDES Permit IL0049191, Outfall 001. The PAP was not excavated during construction, except for native materials used to build the containment berms.

2.3 Geology and Hydrogeology

The information used to describe the hydrogeology is based on the local geology obtained from published sources, hydrogeologic investigation data, and boring data collected during monitoring well installation.

Quaternary deposits in the Newton area consist mainly of diamictons and outwash deposits that were deposited during Illinoian and Pre-Illinoian glaciations (Lineback, 1979; Willman et al., 1975). The unconsolidated deposits occurring at Newton Power Station include the following units (beginning at the ground surface):

- Ash/Fill Units – CCR and fill within the various CCR Units.
- Upper Confining Unit – Low permeability clays and silts, including the Peoria Silt (Loess Unit) in upland areas and the Cahokia Formation in the flood plain and channel areas to the south and east, underlain by the Sangamon Soil, and the predominantly clay diamictons of the Hagarstown (Till) and Vandalia (Till) Members of the Glasford Formation.
- Uppermost Aquifer – Thin to moderately thick (3 to 17 feet [ft]), moderate to high permeability sand, silty sand, and sandy silt/clay units of the Mulberry Grove Member of the Glasford Formation.
- Lower Confining Unit – Thick, very low permeability silty clay diamictons of the Smithboro (Till) Member of the Glasford Formation and the silty clay diamictons of the Banner Formation.

The bedrock beneath the unconsolidated deposits consists of Pennsylvanian-age Mattoon Formation (Willman et al., 1967) that is mostly shale near the bedrock surface but is characterized at depth by a complex sequence of shales, thin limestones, coals, underclays, and several sandstones (Willman et al., 1975). The erosional surface of the Pennsylvanian-age Mattoon Formation bedrock ranges widely in depth in the vicinity of the Site but is typically encountered at 90 to 120 ft below ground surface (bgs).

Groundwater elevations across the PAP ranged from approximately 495 to 525 ft msl (mean sea level) during D5 (Figure 1). Depths to groundwater used to generate the groundwater elevation contours shown on Figure 1 were measured on August 21, 2019. Groundwater flow in the Uppermost Aquifer beneath the eastern portion of PAP is generally to the south toward Newton Lake. The flow direction diverges to the southwest beneath the western portion of the PAP, toward LF2, where groundwater flow in the area is converging along the major axis of LF2 Cells 1 and 2.

2.4 Groundwater and PAP Monitoring

The Uppermost Aquifer monitoring system for the PAP is shown on Figure 1. Monitoring wells APW5 and APW6 are used to monitor background water quality for the PAP. These wells are located north of the PAP. The downgradient monitoring wells are APW7, APW8, APW9, and APW10. PAP surface water samples were collected from locations AP1 in the southwest corner of the PAP and AP2 in the southeast corner of the PAP.

3. ALTERNATE SOURCE DEMONSTRATION: LINES OF EVIDENCE

As allowed by 40 C.F.R. § 257.94(e)(2), this ASD demonstrates that sources other than Newton PAP (the CCR unit) caused the SSIs. Lines of evidence supporting this ASD include the following:

1. The PAP is separated from the uppermost aquifer by a thick, low-permeability glacial till.
2. Concentrations of calcium and chloride in the PAP are lower than those observed in the groundwater.
3. Boron, a primary indicator parameter for CCR impacts to groundwater, has concentrations in downgradient wells that are near or below concentrations observed in background monitoring wells.

3.1 LOE #1: The PAP Is Separated from the Uppermost Aquifer by a Thick, Low-Permeability Glacial Till

As noted above, the Uppermost Aquifer at the Site is the Mulberry Grove Member of the Glasford Formation. Based on boring logs for monitoring wells installed around the perimeter of the Site, the Uppermost Aquifer is confined and the top of the Mulberry Grove Member ranges from 461.8 ft msl in APW-8 to 482.8 ft msl in APW-10 (Figure 2). The bottom elevation of the PAP is situated within the Hagarstown Member of the Glasford Formation at 508 ft msl, approximately 25 ft above the top of the Uppermost Aquifer (Figure 2). The Hagarstown Member, a thick, low-permeability glacial till, with hydraulic conductivities ranging from 2.4×10^{-6} to 6.1×10^{-5} centimeters per second (cm/s), separates the PAP from the uppermost aquifer. The lack of connection between the PAP and the Uppermost Aquifer demonstrates that there is no complete pathway for transport of CCR constituents in groundwater beneath the PAP, thus the PAP is not the source of CCR constituents in the Uppermost Aquifer.

3.2 LOE #2: Concentrations of Calcium and Chloride in the PAP Are Lower Than Those Observed in the Groundwater

Box plots graphically represent the first quartile, median, and third quartile of a given dataset using lines to construct a box where the lower line, midline and upper line of the box represent the values of the first quartile, median, and third quartile, respectively. The minimum and maximum values of the dataset (excluding outliers) are illustrated by whisker lines extending beyond the first and third quartiles of the box plot.

A box plot of calcium concentrations in downgradient monitoring wells and surface water samples is provided in Figure A. Calcium concentrations are lower in PAP surface water samples (collected in November 2017 and November 2019) than in all downgradient groundwater samples collected between 2015 and 2019. The maximum concentration of calcium detected in PAP surface water (36 milligrams per liter [mg/L]) is lower than the minimum concentration of calcium in a downgradient well (38 mg/L at APW10).

If the PAP were the source of calcium detected in groundwater, calcium concentrations in PAP surface water would be higher than the calcium concentrations detected in downgradient monitoring wells. Because the reverse is true (i.e., PAP calcium concentrations are lower than in the groundwater), the PAP is not likely the source of the calcium observed in downgradient wells.

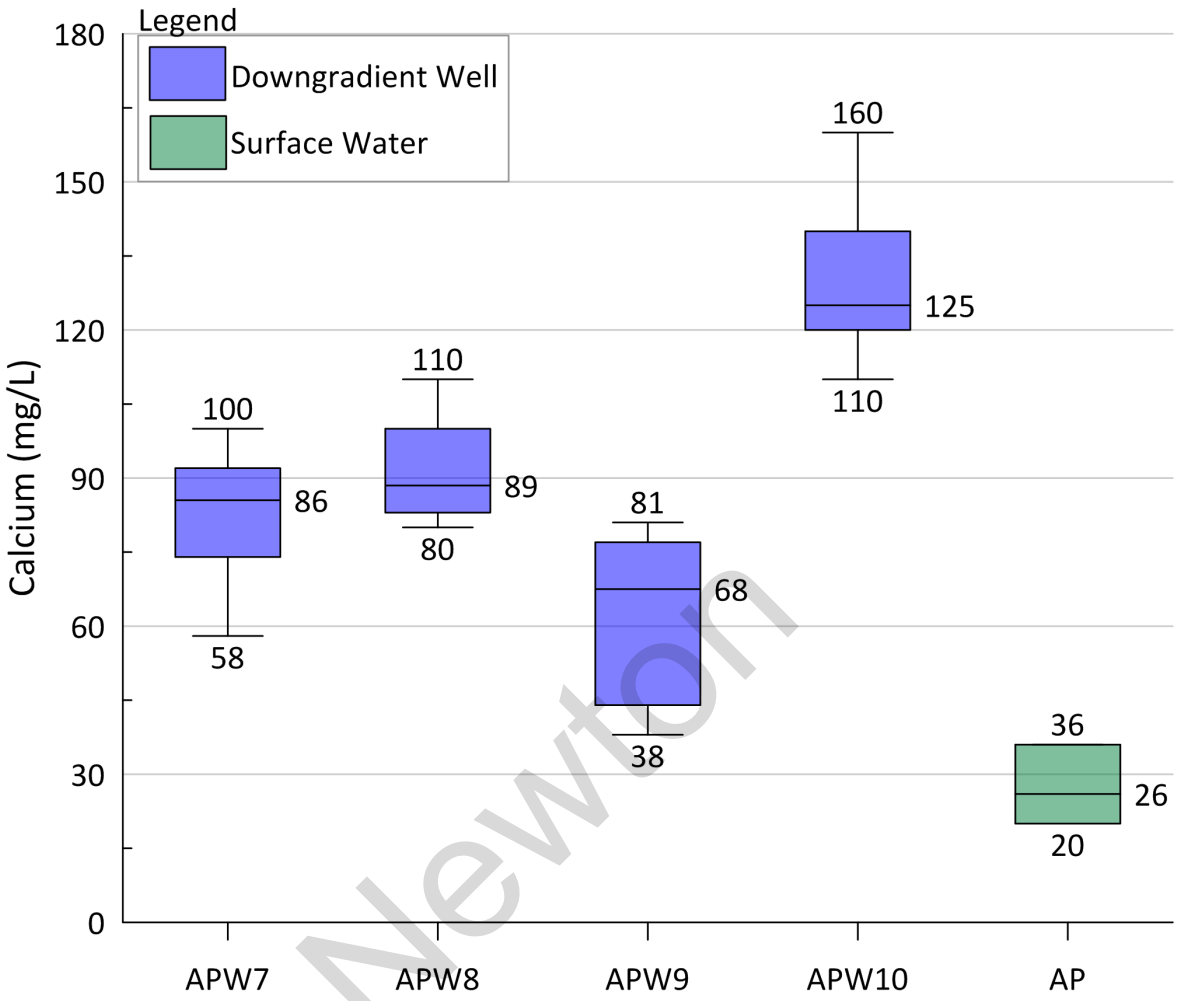


Figure A. Calcium Box Plot. The maximum, minimum, and median values are noted.

Similarly, chloride concentrations are lower in PAP water samples (collected in November 2017 and November 2019) than in all downgradient groundwater samples collected between 2015 and 2019. A box plot of chloride concentrations is provided in Figure B. The maximum concentration of chloride detected in PAP surface water (18 mg/L) is lower than the minimum concentration of calcium in a downgradient well (44 mg/L at APW9 and APW10).

If the PAP were the source of chloride detected in groundwater, chloride concentrations in PAP water would be higher than the chloride concentrations detected in downgradient groundwater. Because the reverse is true, the PAP is not likely the source of the chloride observed in downgradient wells.

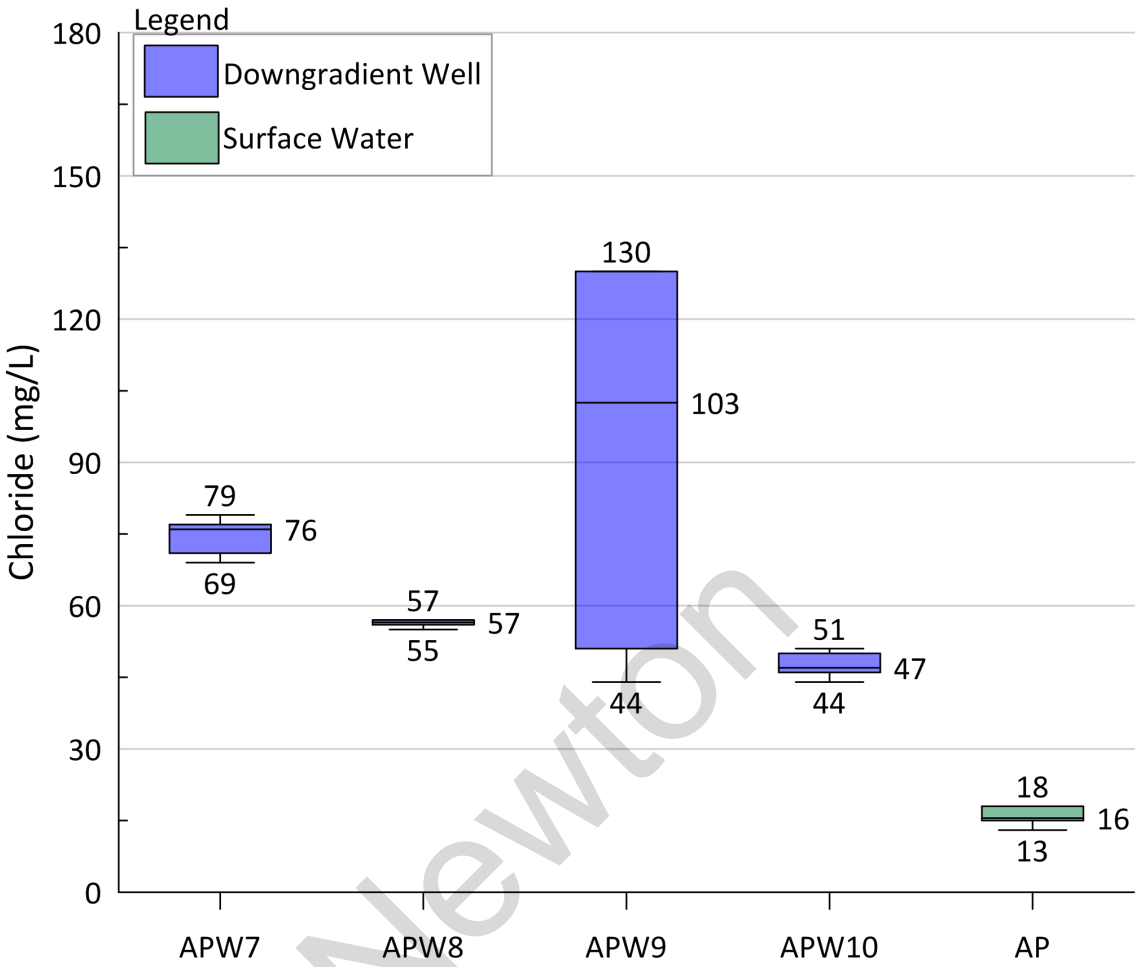


Figure B. Chloride Box Plot. The maximum, minimum, and median values are noted.

3.3 LOE #3: Boron, a Primary Indicator Parameter for CCR Impacts to Groundwater, Has Concentrations in Downgradient Wells That Are Near or Below Concentrations Observed in Background Monitoring Wells

Boron is a primary indicator of CCR impacts to groundwater. If the source of the SSIs in the downgradient monitoring wells were the PAP, boron would be anticipated to be elevated above background concentrations. Concentrations of boron in all downgradient monitoring wells are below the boron Upper Prediction Limit (UPL) (0.141 milligrams per liter [mg/L]) established using background monitoring wells (i.e. SSI limits) (Figure C).

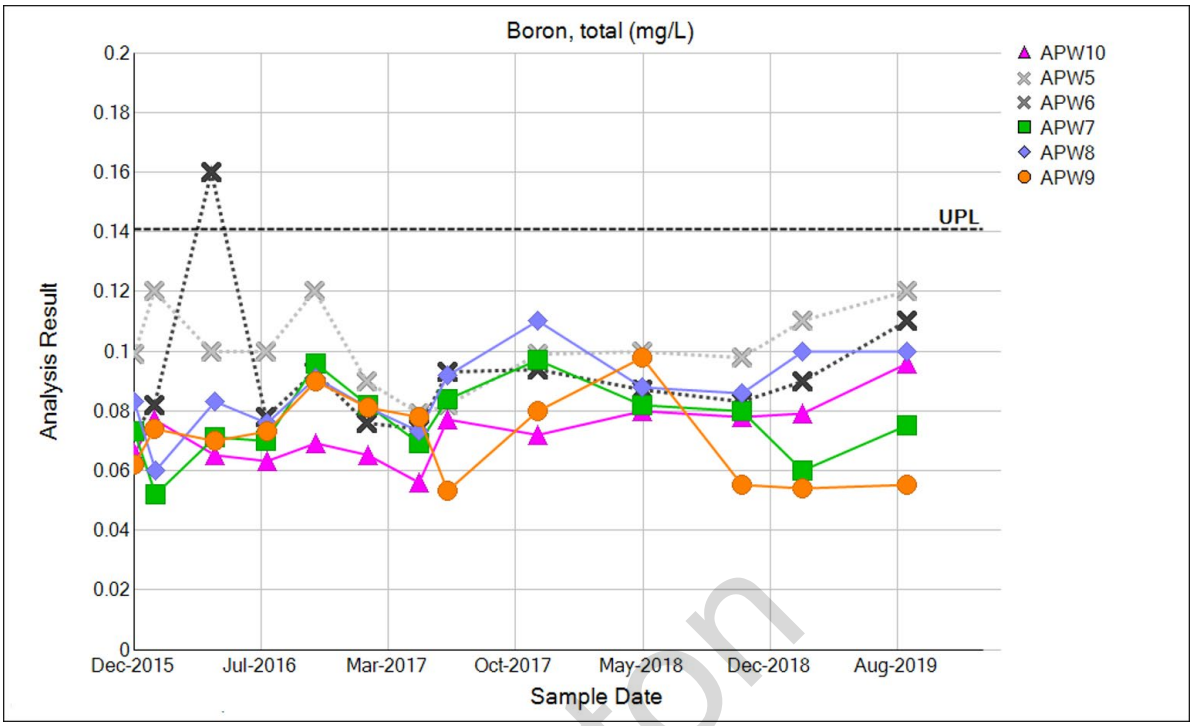


Figure C. Boron Time Series. The time series shows boron concentrations in background wells (represented by gray "X"s) are greater or similar to concentrations in downgradient wells.

Mann-Kendall (M-K) trend analysis tests were performed to determine the boron concentration trend in each well, if there was a trend. If the Mann-Kendall test identified a trend, the coefficient of variation (CV) was used to determine if the trend was of high or low magnitude. The CV is a measure of data spread calculated by dividing the standard deviation by the mean. CV values less than 1 indicate that the data is grouped closely around the mean and that is there is little variation in the data. Thus, a M-K analysis result of a trend with a CV less than 1 indicates that the data varies only slightly, and that the magnitude of the slope is low. No trends in boron concentrations were identified in background wells APW5 and APW6 and downgradient wells APW7 and APW9; and upward trends were identified at APW8 and APW10. However, the CV values for upward trends in APW8 and APW10 are well below 1, indicating that there is little variation in the data and that the trends are low magnitude. Table A provides summary statistics, including the CV and trend per well.

Table A – Summary Statistics and Trend Analysis of Boron in Groundwater.

Monitoring Well	Boron (mg/L)					
	Minimum	Maximum	Median	Standard Deviation	Trend	CV
APW5	0.079	0.12	0.10	0.013	None	0.13
APW6	0.073	0.16	0.087	0.023	None	0.25
APW7	0.052	0.097	0.075	0.013	None	0.17
APW8	0.060	0.11	0.086	0.013	Upward	0.15
APW9	0.053	0.098	0.073	0.015	None	0.20
APW10	0.056	0.096	0.072	0.010	Upward	0.14

The low concentrations of boron in downgradient monitoring wells relative to the UPL suggests that the source of the of the SSIs is not the PAP.

4. CONCLUSIONS

Based on the three lines of evidence below, it has been demonstrated that the Newton PAP is not the source of SSIs of calcium at APW8 and APW10; chloride at APW8; and sulfate at APW7, APW8, APW9, and APW10.

1. The PAP is separated from the uppermost aquifer by a thick, low-permeability glacial till.
2. Concentrations of calcium and chloride in the PAP are lower than those observed in the groundwater.
3. Boron, a primary indicator parameter for CCR impacts to groundwater, has concentrations in downgradient wells that are near or below concentrations observed in background monitoring wells.

This information serves as the written ASD prepared in accordance with 40 CFR § 257.94(e)(2) that the SSIs observed during the D5 sampling event were not due to the Newton PAP. Therefore, an assessment monitoring program is not required, and the Newton PAP will remain in detection monitoring.

5. REFERENCES

Lineback, J., 1979, Quaternary Deposits of Illinois: Illinois State Geological Survey map, scale 1:500,000.

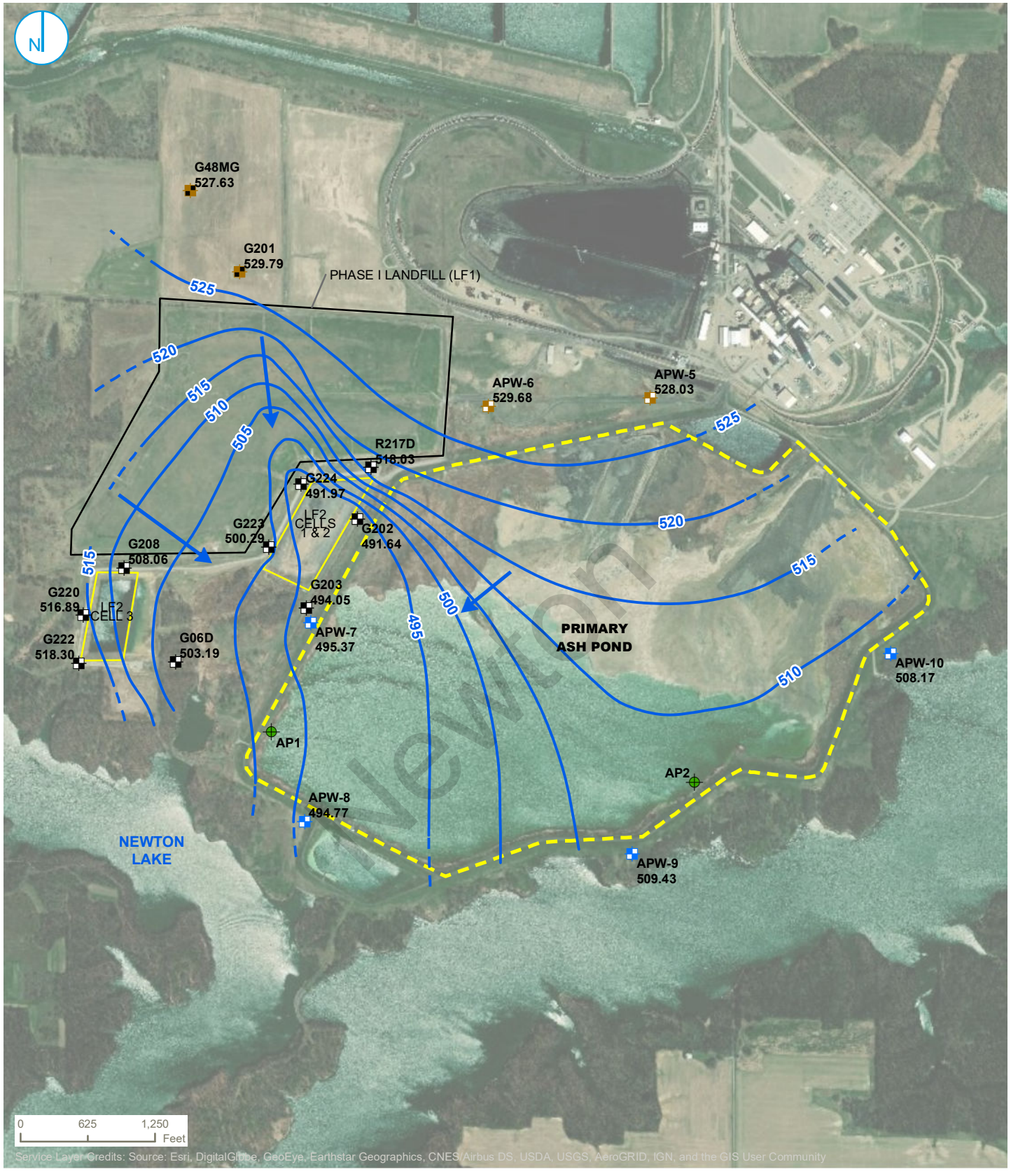
Natural Resource Technology, an OBG Company (NRT/OBG), 2017a, Statistical Analysis Plan, Coffeen Power Station, Newton Power Station, Illinois Power Generating Company, October 17, 2017.

Natural Resource Technology, an OBG Company (NRT/OBG), 2017b, Hydrogeologic Monitoring Plan, Newton Primary Ash Pond – CCR Unit ID 501, Newton Landfill 2 – CCR Unit ID 502, Newton Power Station, Canton, Illinois, Illinois Power Generating Company, October 17, 2017.

Willman, H.B., J.C. Frye, J.A. Simon, K.E. Clegg, D.H. Swann, E. Atherton, C. Collinson, J.A. Lineback, T.C. Buschbach, and H.B. Willman, 1967, Geologic Map of Illinois: Illinois State Geological Survey map, scale 1:500,000.

Willman, H.B., E. Atherton, T.C. Buschbach, C. Collinson, J.C. Frye, M.E. Hopkins, J.A. Lineback, and J.A. Simon, 1975, Handbook of Illinois Stratigraphy: Illinois State Geological Survey, Bulletin 95, 261 p.

FIGURES



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PROJECT: 169000XXXX | DATED: 4/3/2020 | DESIGNER: STOLZSD

- PRIMARY ASH POND CCR MONITORING WELL
- PRIMARY ASH POND BACKGROUND CCR MONITORING WELL
- LF2 CCR MONITORING WELL
- LF2 BACKGROUND CCR MONITORING WELL
- SOURCE WATER LOCATION
- GROUNDWATER ELEVATION CONTOUR (5-FOOT INTERVAL)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- PRIMARY ASH POND CCR UNIT BOUNDARY
- LF2 CCR UNIT BOUNDARY
- LF1 UNIT BOUNDARY

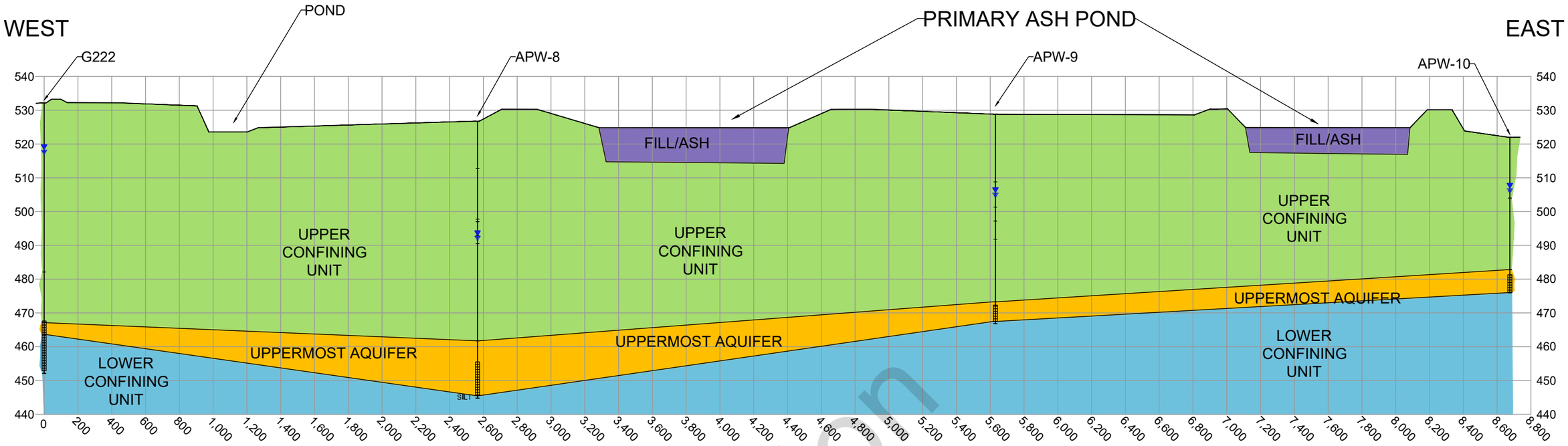
SAMPLING LOCATION AND GROUNDWATER ELEVATION CONTOUR MAP AUGUST 21, 2019

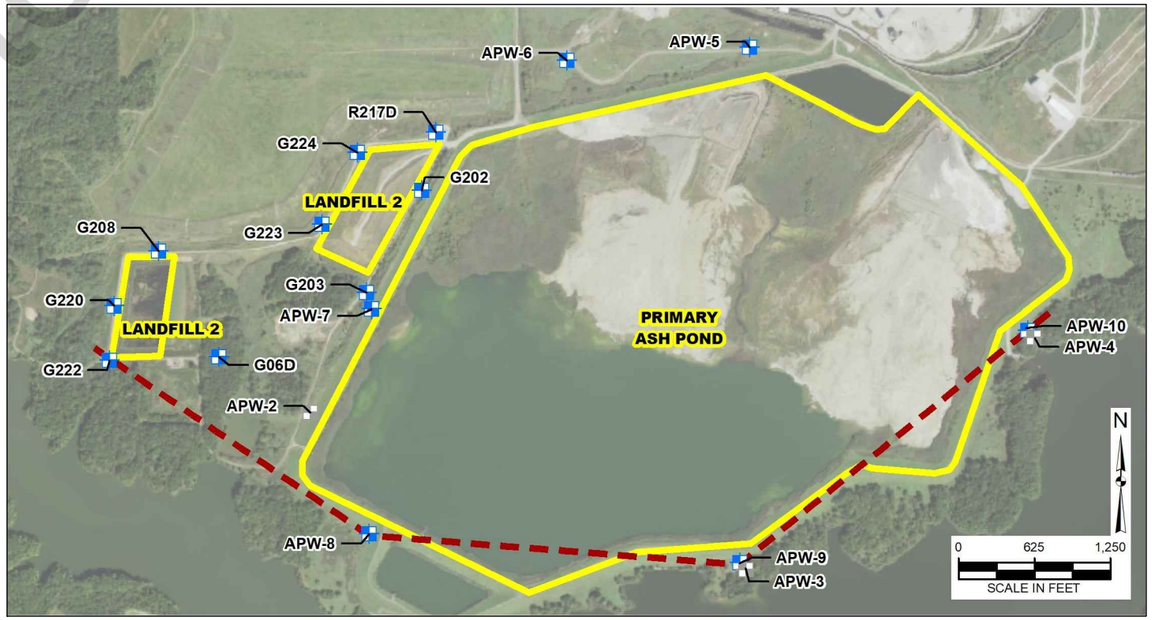
NEWTON PRIMARY ASH POND (UNIT ID: 501)
ALTERNATE SOURCE DEMONSTRATION
VISTRA ENERGY
NEWTON POWER STATION
NEWTON, ILLINOIS

FIGURE 1

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL





LEGEND

- FILL / ASH
- UPPER CONFINING UNIT
- UPPERMOST AQUIFER
- LOWER CONFINING UNIT
- WELL SCREEN
- GROUNDWATER ELEVATION

VERTICAL SCALE IN FEET: 30
HORIZONTAL SCALE IN FEET: 600
VERTICAL EXAGGERATION =20

GEOLOGIC CROSS SECTION

NEWTON PRIMARY ASH POND (UNIT ID: 501)
40 C.F.R § 257.94(e)(2): ALTERNATE SOURCE DEMONSTRATION
NEWTON POWER STATION
NEWTON, ILLINOIS

FIGURE 2

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL

Intended for
Illinois Power Generating Company

Date
October 13, 2020

Project No.
1940074923

40 C.F.R. § 257.94(e)(2): ALTERNATE SOURCE DEMONSTRATION

NEWTON PRIMARY ASH POND

RAMBOLL Bright ideas. Sustainable change.

CERTIFICATIONS

I, Nicole M. Pagano, 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 for other than its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

Nicole M. Pagano
Professional Geologist
196-000750
Illinois
Ramboll Americas Engineering Solutions, Inc., f/k/a O'Brien & Gere Engineers, Inc.
Date: October 13, 2020

I, Anne Frances Ackerman, 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 for other than its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

Anne Frances Ackerman
Qualified Professional Engineer
062-060586
Illinois
Ramboll Americas Engineering Solutions, Inc., f/k/a O'Brien & Gere Engineers, Inc.
Date: October 13, 2020

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CONTENTS

TABLES (IN TEXT)

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FIGURES (ATTACHED)

ACRONYMS AND ABBREVIATIONS

40 C.F.R.	Title 40 of the Code of Federal Regulations
ASD	Alternate Source Demonstration
bgs	below ground surface
CCR	Coal Combustion Residuals
f/k/a	formerly known as
ft	foot/feet
LF2	Phase II Landfill 2
M-K	Mann-Kendall
msl	mean sea level
NRT/OBG	Natural Resource Technology, an OBG Company
PAP	Newton Primary Ash Pond
Site	Newton Power Station
SSIs	Statistically Significant Increases
UPL	Upper Prediction Limit

1. INTRODUCTION

Title 40 of the Code of Federal Regulations (40 C.F.R.) § 257.94(e)(2) allows the owner or operator of a Coal Combustion Residuals (CCR) unit 90 days from the date of determination of a Statistically Significant Increase (SSI) over background for groundwater constituents listed in Appendix III of 40 C.F.R. Part 257 to complete a written demonstration that a source other than the CCR unit being monitored caused the SSI(s), or that the SSI(s) resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality (Alternate Source Demonstration [ASD]).

This ASD has been prepared on behalf of Illinois Power Generating Company, by Ramboll Americas Engineering Solutions, Inc., formerly known as (f/k/a) O'Brien & Gere Engineers, Inc., to provide pertinent information pursuant to 40 C.F.R. § 257.94(e)(2) for the Newton Primary Ash Pond (PAP) located near Newton, Illinois.

The most recent Detection Monitoring sampling event (Detection Monitoring Round 6 [D6]) was completed on February 5, 6, and 19, 2020, and analytical data were received on April 15, 2020. Analytical data from D6 were evaluated in accordance with the Statistical Analysis Plan (Natural Resource Technology, an OBG Company [NRT/OBG] 2017a) to determine any SSIs of Appendix III parameters over background concentrations. That evaluation identified SSIs at downgradient monitoring wells as follows:

- Calcium at wells APW7, APW8, APW9, and APW10
- Chloride at APW7 and APW9
- Sulfate at wells APW8 and APW10
- TDS at APW10

In accordance with the Statistical Analysis Plan, APW7, APW9, and APW10 were resampled on June 11, 2020 and analyzed only for chloride (APW7 and APW9) and TDS (APW10) to confirm the SSIs. Following evaluation of analytical data from the resample event, the following SSIs remained:

- Calcium at wells APW7, APW8, APW9, and APW10
- Chloride at APW7 and APW9
- Sulfate at wells APW8 and APW10

Pursuant to 40 C.F.R. § 257.94(e)(2), the following lines of evidence (LOE) demonstrate that sources other than the PAP were the cause of the calcium, chloride, and sulfate SSIs listed above. This ASD was completed by October 13, 2020, within 90 days of determination of the SSIs (July 15, 2020), as required by 40 C.F.R. § 257.94(e)(2).

2. BACKGROUND

2.1 Site Location and Description

The Newton Power Station (Site) is located in Jasper County in the southeastern part of central Illinois, approximately 7 miles southwest of the town of Newton. The plant is located on the north side of Newton Lake. The area is bounded by Newton Lake and agricultural land to the west, south, and east, and agricultural land to the north. Beyond the lake is additional agricultural land.

2.2 Description of Primary Ash Pond CCR Unit

The Newton Power Station's sole CCR surface impoundment, the PAP, was constructed in 1977 and has a design capacity of approximately 9,715 acre-feet. The PAP has a surface area of 400 acres and a height of approximately 71 feet (ft) above grade. The PAP currently receives bottom ash, fly ash, and low-volume wastewater from the plant's two coal-fired boilers, and is operated per NPDES Permit IL0049191, Outfall 001. The PAP was not excavated during construction, except for native materials used to build the containment berms.

2.3 Geology and Hydrogeology

The information used to describe the hydrogeology is based on the local geology obtained from published sources, hydrogeologic investigation data, and boring data collected during monitoring well installation.

Quaternary deposits in the Newton area consist mainly of diamictons and outwash deposits that were deposited during Illinoian and Pre-Illinoian glaciations (Lineback, 1979; Willman et al., 1975). The unconsolidated deposits occurring at Newton Power Station include the following units (beginning at the ground surface):

- Upper Confining Unit – Low permeability clays and silts, including the Peoria Silt (Loess Unit) in upland areas and the Cahokia Formation in the flood plain and channel areas to the south and east, underlain by the Sangamon Soil, and the predominantly clay diamictons of the Hagarstown (Till) and Vandalia (Till) Members of the Glasford Formation. The Hagarstown Member till have low hydraulic conductivities, ranging from 2.4×10^{-6} to 6.1×10^{-5} centimeters per second (cm/s) (OBG/NRT 2017b).
- Uppermost Aquifer – Thin to moderately thick (3 to 17 ft), moderate to high permeability sand, silty sand, and sandy silt/clay units of the Mulberry Grove Member of the Glasford Formation.
- Lower Confining Unit – Thick, very low permeability silty clay diamictons of the Smithboro (Till) Member of the Glasford Formation and the silty clay diamictons of the Banner Formation.

The bedrock beneath the unconsolidated deposits consists of Pennsylvanian-age Mattoon Formation (Willman et al., 1967) that is mostly shale near the bedrock surface but is characterized at depth by a complex sequence of shales, thin limestones, coals, underclays, and several sandstones (Willman et al., 1975). The erosional surface of the Pennsylvanian-age Mattoon Formation bedrock ranges widely in depth in the vicinity of the Site but is typically encountered at 90 to 120 ft below ground surface (bgs).

Groundwater elevations across the PAP ranged from approximately 492 to 530 ft mean sea level (msl) during D6 (Figure 1). Depth to groundwater measurements used to generate the groundwater elevation contours shown on Figure 1 were collected on February 3, 2020. Groundwater flow in the Uppermost Aquifer beneath the eastern portion of PAP is generally to the south toward Newton Lake. The flow direction diverges to the southwest beneath the western portion of the PAP, toward Phase II Landfill 2 (LF2), where groundwater flow in the area is converging along the major axis of LF2 Cells 1 and 2.

2.4 Groundwater and PAP Monitoring

The Uppermost Aquifer monitoring system for the PAP is shown on Figure 1. Monitoring wells APW5 and APW6 are used to monitor background water quality for the PAP. These wells are located north of the PAP. The downgradient monitoring wells are APW7, APW8, APW9, and APW10. PAP surface water samples were collected from locations AP1 in the southwest corner of the PAP and AP2 in the southeast corner of the PAP.

3. ALTERNATE SOURCE DEMONSTRATION: LINES OF EVIDENCE

As allowed by 40 C.F.R. § 257.94(e)(2), this ASD demonstrates that sources other than the PAP (the CCR unit) caused the SSIs. LOE supporting this ASD include the following:

1. The PAP is separated from the uppermost aquifer by a thick, low-permeability glacial till.
2. Concentrations of calcium and chloride in the PAP are lower than those observed in the groundwater.
3. Boron, a primary indicator parameter for CCR impacts to groundwater, has concentrations in downgradient wells that are below concentrations observed in background monitoring wells.

These LOEs are described and supported in greater detail below.

3.1 LOE #1: The PAP Is Separated from the Uppermost Aquifer by a Thick, Low-Permeability Glacial Till

Based on groundwater elevations and information on the boring logs for monitoring wells installed around the perimeter of the Site, the Uppermost Aquifer ranges from 461.8 ft msl in APW-8 to 482.8 ft msl in APW-10 and is overlain by a low-permeability unit (Figure 2). The bottom elevation of the PAP is situated within the Upper Confining Unit at 508 ft msl, approximately 25 ft above the top of the Uppermost Aquifer (Figure 2). Thus, a low-permeability glacial till layer separates the PAP from the uppermost aquifer. The lack of connection between the PAP and the Uppermost Aquifer demonstrates that there is no complete pathway for transport of CCR constituents in groundwater beneath the PAP, thus the PAP is not the source of CCR constituents in the Uppermost Aquifer.

3.2 LOE #2: Concentrations of Calcium and Chloride in the PAP Are Lower Than Those Observed in the Groundwater

A box plot of calcium concentrations in downgradient monitoring wells and surface water samples is provided in Figure A. Box plots graphically represent the range of a given dataset using lines to construct a box where the lower line, midline, and upper line of the box represent the values of the first quartile, median, and third quartile values, respectively. The minimum and maximum values of the dataset (excluding outliers) are illustrated by whisker lines extending beyond the first and third quartiles of (*i.e.*, below and above) the box plot. The interquartile range (IQR) is the distance between the first and third quartiles. Outliers (values that are at least 1.5 times the IQR away from the edges of the box) are represented by single points plotted outside of the range of the whiskers.

Calcium concentrations are lower in all PAP surface water samples (collected in November 2017, November 2019, and February 2020) than in all downgradient groundwater samples collected between 2015 and 2020. The maximum concentration of calcium detected in PAP surface water (36 milligrams per liter [mg/L]) is lower than the minimum concentration of calcium in any downgradient well (38 mg/L at APW10).

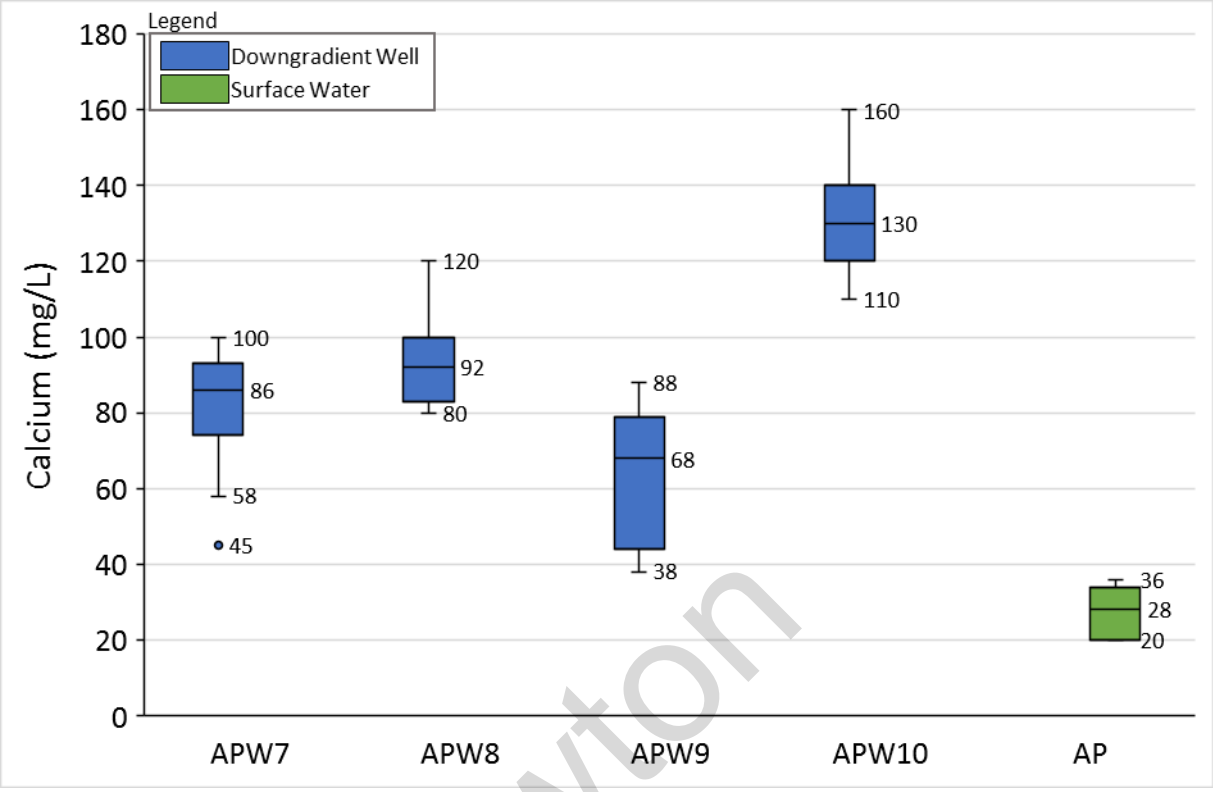

Figure A. Calcium Box Plot. The maximum, minimum, and median values are noted. AP includes data from both AP1 and AP2.

Similarly, chloride concentrations are lower in all PAP surface water samples (collected in November 2017, November 2019, and February 2020) than in all downgradient groundwater samples collected between 2015 and 2020. A box plot of chloride concentrations is provided in Figure B. The maximum concentration of chloride detected in PAP surface water (18 mg/L) is lower than the minimum concentration of calcium in any downgradient well (43 mg/L at APW9).

The concentrations of calcium and chloride in the PAP surface water are lower than those observed in the groundwater, indicating that the PAP is not the source of calcium and chloride to groundwater in the vicinity of the PAP. If the PAP were the source of calcium and chloride detected in groundwater, concentrations in PAP water would be higher than concentrations detected in groundwater.

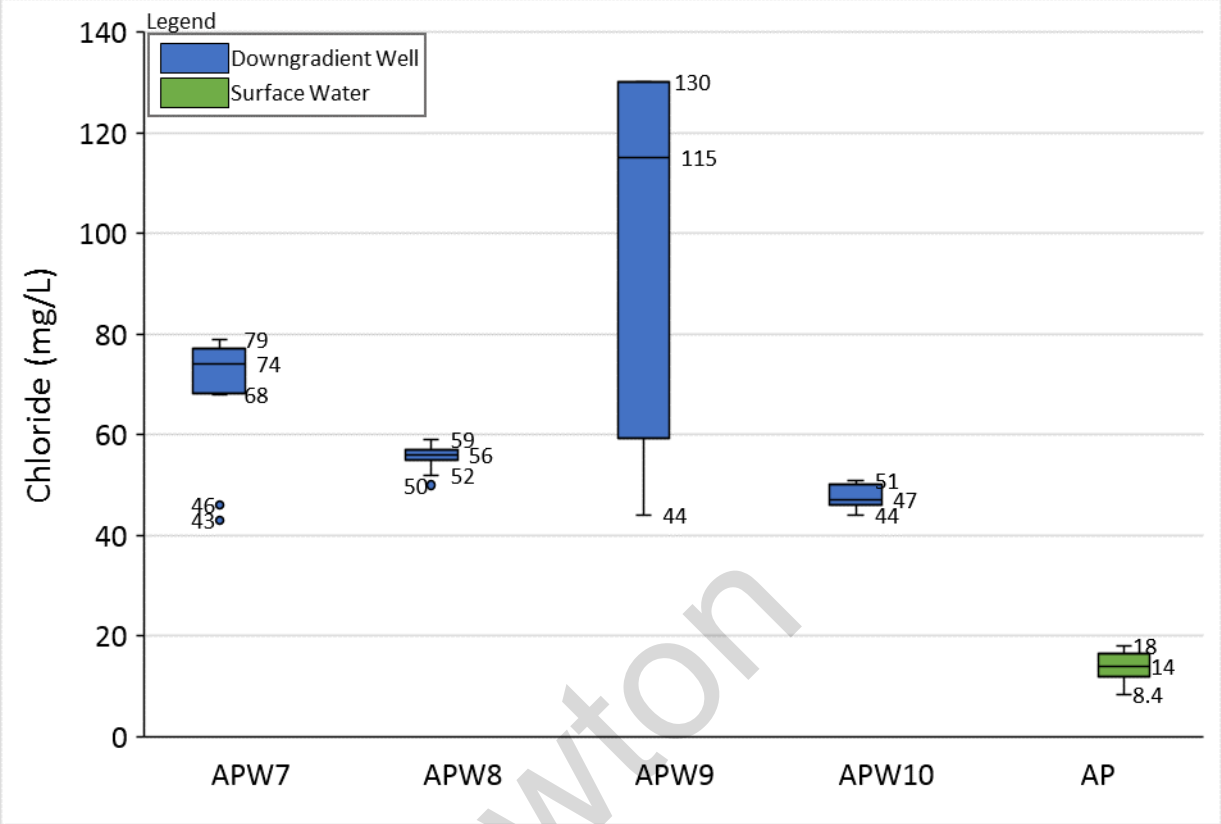

Figure B. Chloride Box Plot. The maximum, minimum, and median values are noted. AP includes data from both AP1 and AP2.

3.3 LOE #3: Boron, a Primary Indicator Parameter for CCR Impacts to Groundwater, Has Concentrations in Downgradient Wells That Are Below Concentrations Observed in Background Monitoring Wells

Boron is a primary indicator of CCR impacts to groundwater. If the groundwater downgradient of the PAP had been impacted by discharge of CCR from the PAP, boron would be expected to be elevated above background concentrations. Concentrations of boron in all downgradient monitoring wells are below the boron Upper Prediction Limit (UPL) (0.141 mg/L) established using background monitoring wells (i.e. SSI limits) (Figure C). Therefore, the PAP is not the source of the SSIs detected in groundwater.

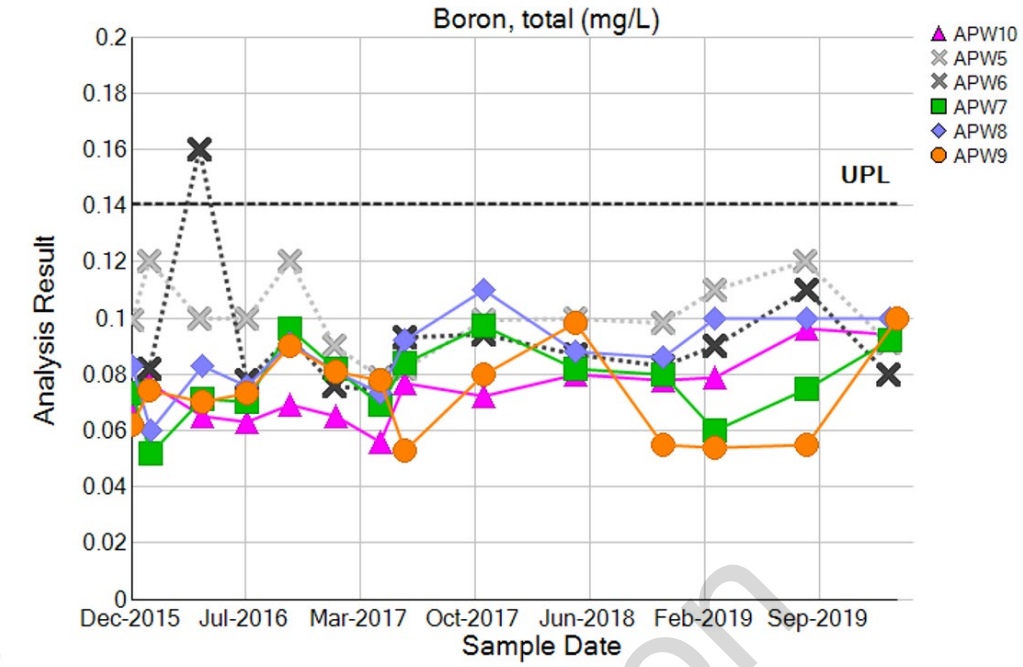

Figure C. Boron Time Series. The time series shows boron concentrations in downgradient wells are less than concentrations in background wells (represented by gray "X"s).

Mann-Kendall (M-K) trend analysis tests were performed to determine the boron concentration trend in each well, if there was a trend. If the M-K test identified a trend, the coefficient of variation (CV) was used to determine if the trend was of high or low magnitude. The CV is a measure of data spread calculated by dividing the standard deviation by the mean. CV values less than 1 indicate that the data is grouped closely around the mean and that is there is little variation in the data. Thus, a M-K analysis result of a trend with a CV less than 1 indicates that the data varies only slightly, and that the magnitude of the slope is low. No trends in boron concentrations were identified in background wells APW5 and APW6 and downgradient wells APW7 and APW9; and upward trends were identified at APW8 and APW10. However, the CV values for upward trends in APW8 and APW10 are well below 1, indicating that there is little variation in the data and that the trends are low magnitude. Table A provides summary statistics, including the CV and trend per well.

Table A – Summary Statistics and Trend Analysis of Boron in Groundwater.

Monitoring Well	Boron (mg/L)					
	Minimum	Maximum	Median	Standard Deviation	Trend	CV
APW5	0.079	0.12	0.10	0.013	None	0.13
APW6	0.073	0.16	0.085	0.022	None	0.24
APW7	0.052	0.097	0.078	0.013	None	0.17
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APW9	0.053	0.10	0.074	0.016	None	0.22
APW10	0.056	0.096	0.074	0.011	Upward	0.15

The low concentrations of boron in downgradient monitoring wells relative to the UPL suggests that the source of the of the SSIs is not the PAP.

4. CONCLUSIONS

Based on these three LOEs, it has been demonstrated that the SSLs at APW7, APW8, APW9, and APW10 are not due to the PAP but are from a source other than the CCR unit being monitored.

1. The PAP is separated from the uppermost aquifer by a thick, low-permeability glacial till.
2. Concentrations of calcium and chloride in the PAP are lower than those observed in the groundwater.
3. Boron, a primary indicator parameter for CCR impacts to groundwater, has concentrations in downgradient wells that are below concentrations observed in background monitoring wells.

This information serves as the written ASD prepared in accordance with 40 CFR § 257.94(e)(2) that the SSIs observed during the D6 sampling event were not due to the PAP. Therefore, an assessment monitoring program is not required, and the PAP will remain in detection monitoring.

5. REFERENCES

Lineback, J., 1979, Quaternary Deposits of Illinois: Illinois State Geological Survey map, scale 1:500,000.

Natural Resource Technology, an OBG Company (NRT/OBG), 2017a, Statistical Analysis Plan, Coffeen Power Station, Newton Power Station, Illinois Power Generating Company, October 17, 2017.

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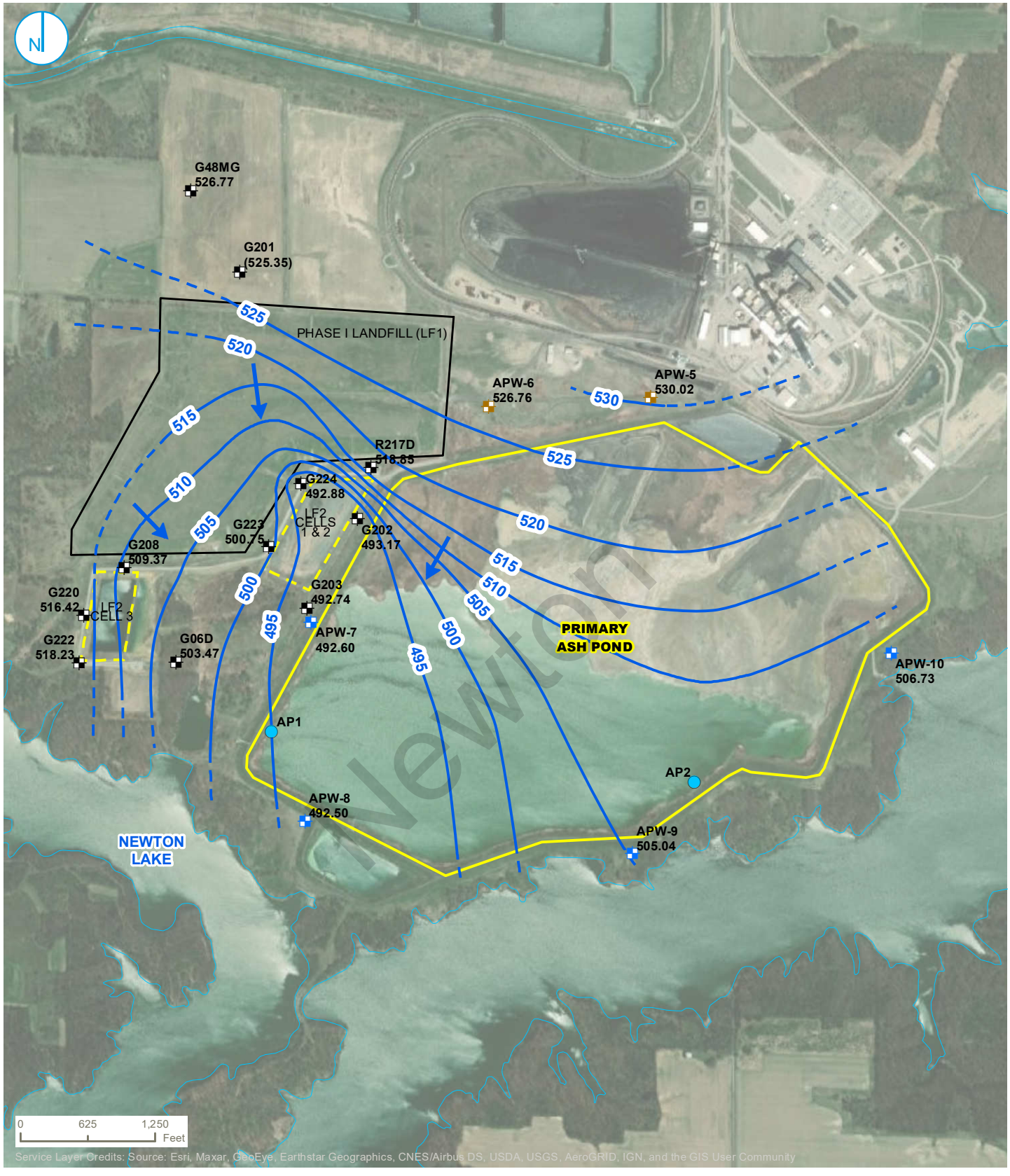
FIGURES



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PROJECT: 169000XXXX | DATED: 7/6/2020 | DESIGNER: galanmc

- PRIMARY ASH POND DOWNGRADIENT MONITORING WELL
- PRIMARY ASH POND UPGRADIENT MONITORING WELL
- LF2 CCR RULE MONITORING WELL
- SOURCE WATER LOCATION
- GROUNDWATER ELEVATION CONTOUR (5-FT CONTOUR INTERVAL, NAVD 88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- SURFACE WATER FEATURE
- PRIMARY ASH POND CCR UNIT BOUNDARY
- LF2 CCR UNIT BOUNDARY
- LF1 UNIT BOUNDARY

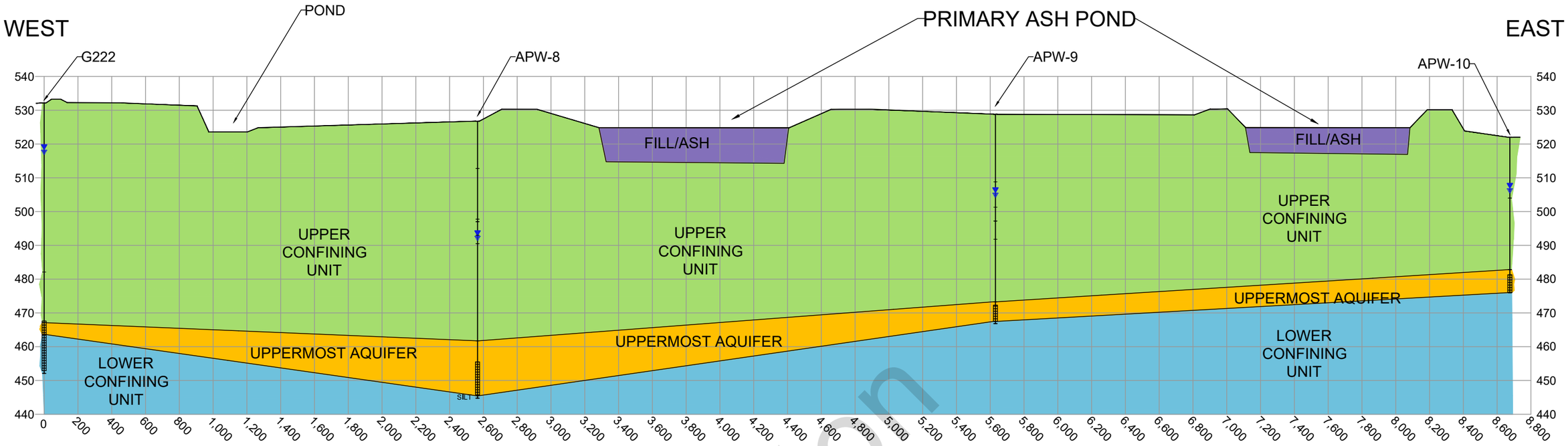
SAMPLING LOCATION AND GROUNDWATER ELEVATION CONTOUR MAP FEBRUARY 3, 2020

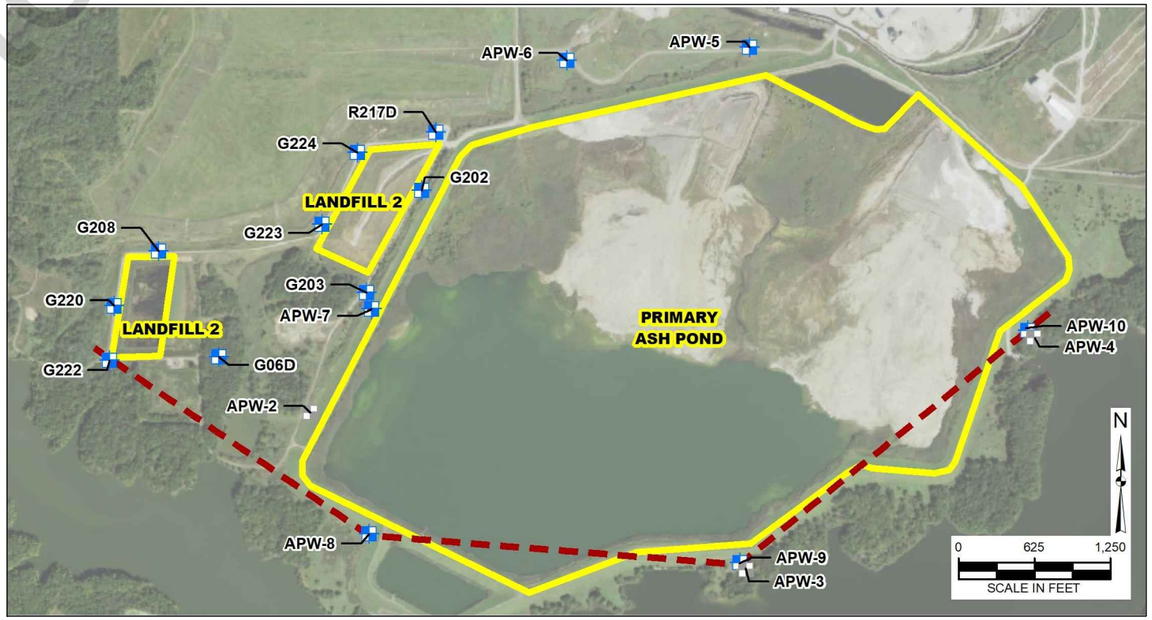
NEWTON PRIMARY ASH POND (UNIT ID: 501)
ALTERNATE SOURCE DEMONSTRATION
VISTRA ENERGY
NEWTON POWER STATION
NEWTON, ILLINOIS

FIGURE 1

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL





LEGEND

- FILL / ASH
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- UPPERMOST AQUIFER
- LOWER CONFINING UNIT
- WELL SCREEN
- GROUNDWATER ELEVATION

VERTICAL SCALE IN FEET: 30
HORIZONTAL SCALE IN FEET: 600
VERTICAL EXAGGERATION =20

GEOLOGIC CROSS SECTION

NEWTON PRIMARY ASH POND (UNIT ID: 501)
40 C.F.R § 257.94(e)(2): ALTERNATE SOURCE DEMONSTRATION
NEWTON POWER STATION
NEWTON, ILLINOIS

FIGURE 2

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL