

# 2018 Annual Groundwater Monitoring and Corrective Action Report

Newton Primary Ash Pond – CCR Unit ID 501

Newton Power Station

6725 North 500<sup>th</sup> Street

Newton, Illinois 62448

**Illinois Power Generating Company**

January 31, 2019



JANUARY 31, 2019 | PROJECT #70092

# 2018 Annual Groundwater Monitoring and Corrective Action Report

Newton Primary Ash Pond – CCR Unit ID 501  
Newton Power Station  
Newton, Illinois

Prepared for:  
*Illinois Power Generating Company*



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## ACRONYMS AND ABBREVIATIONS

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ASD	Alternate Source Demonstration
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
mg/L	milligrams per liter
NRT/OBG	Natural Resource Technology, an OBG Company
OBG	O'Brien & Gere Engineers, part of Ramboll
SSI	Statistically Significant Increase
S.U.	Standard Units
TDS	Total Dissolved Solids

Newton

## SECTION 1: INTRODUCTION

This report has been prepared on behalf of Illinois Power Generating Company by O'Brien & Gere Engineers, part of Ramboll (OBG), to provide the information required by the Code of Federal Regulations (CFR) found in 40 CFR 257.90(e) for the Newton Primary Ash Pond located at Newton Power Station near Newton, Illinois.

In accordance with 40 CFR § 257.90(e), the owner or operator of an existing 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 statistically significant increase over background levels).
5. Other information required to be included in the annual report as specified in §§ 257.90 through 257.98<sup>1</sup>.

This report provides the required information for the Newton Primary Ash Pond for calendar year 2018.

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<sup>1</sup> For calendar year 2018, corrective action and other information required to be included in the annual report as specified in §§ 257.96 through 257.98 is not applicable.

**SECTION 2: MONITORING AND CORRECTIVE ACTION PROGRAM STATUS**

Detection Monitoring Program sampling event dates and parameters collected are provided in the detection monitoring program summary table below. One sample was collected from each background and downgradient well in the monitoring system during the sampling events in November 2017, May 2018, and November 2018. Resampling was conducted in August 2018 on a subset of the Appendix III parameters. Analytical data was evaluated after each event in accordance with the Statistical Analysis Plan, Newton Power Station, Illinois Power Generating Company (NRT/OBG, 2017a) to identify any statistically significant increases (SSIs) of Appendix III parameters over background concentrations. The dates the SSIs were evaluated are provided in the detection monitoring program summary table below.

<b>Detection Monitoring Program Summary</b>			
Sampling Dates	Parameters Collected	SSIs	ASD Completion
<b>November 17 and 18, 2017</b>	Appendix III	Yes	4/9/18
<b>May 18, 2018</b>	Appendix III	No	Not Applicable
<b>August 17 and 18, 2018</b>	SSI parameters	Not Applicable	Not Applicable
<b>November 9, 2018</b>	Appendix III	To Be Determined	To Be Determined

Potential alternate sources were evaluated as outlined in the 40 CFR § 257.94(e)(2). An Alternate source demonstration (ASD) was completed and certified by a qualified professional engineer. The date the ASD was completed is provided in the detection monitoring program summary table. The ASD is included in Appendix A.

Statistical background values are provided in Table 1. Analytical results from the events summarized in the detection monitoring program summary table above are included in Table 2.

The Newton Primary Ash Pond remains in the Detection Monitoring Program in accordance with 40 CFR § 257.94.

### SECTION 3: KEY ACTIONS COMPLETED IN 2018

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Three groundwater monitoring events were completed in 2018 under the Detection Monitoring Program. These events occurred in May, August, and November and are detailed in Section 2. One sample was collected from each background and downgradient well in the monitoring system during the sampling events in May 2018 and November 2018. In accordance with the Statistical Analysis Plan (NRT/OBG, 2017a), the wells were resampled for a subset of the Appendix III parameters in August 2018. All samples were collected and analyzed in accordance with the Sampling and Analysis Plan (NRT/OBG, 2017b). All monitoring data obtained under 40 CFR §§ 257.90 through 257.98 (as applicable) in 2018 are presented in Table 2.

The groundwater monitoring system, including the CCR unit and all background and downgradient monitoring wells, is presented in Figure 1.

Newton

#### SECTION 4: PROBLEMS ENCOUNTERED AND ACTIONS TO RESOLVE THE PROBLEMS

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No problems were encountered with the groundwater monitoring program during 2018. Groundwater samples were collected and analyzed in accordance with the Sampling and Analysis Plan (NRT/OBG, 2017b), and all data was accepted.

Newton



## SECTION 5: KEY ACTIVITIES PLANNED FOR 2019

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The following key activities are planned for 2019:

- Continuation of the Detection Monitoring Program with semi-annual sampling scheduled for the first and third quarters of 2019.
- Complete evaluation of analytical data from the downgradient wells, using background data to determine whether an SSI of Appendix III parameters over 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 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 annual groundwater monitoring and corrective action report for 2019.
  - » If an alternate source(s) is not identified to be the cause of the SSI, the applicable requirements of 40 CFR §§ 257.94 through 257.98 (e.g., assessment monitoring) as may apply in 2019 will be met, including associated recordkeeping/notifications required by 40 CFR §§ 257.105 through 257.108.

Newton

## REFERENCES

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

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

Newton

Figures




Newton



Y:\Mapping\Projects\222285\MXD\2018\_AnnualGWM\_CAR\Figure\_1\_CWS\_WellLoc\_NewtonPAP.mxd Author:stb:esd Date/Time:1/28/2019, 2:01:37 PM



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

-  UPGRADIENT MONITORING WELL LOCATION
-  DOWNGRADIENT MONITORING WELL LOCATION
-  CCR MONITORED UNIT

DRAWN BY/DATE:  
SDS 11/28/18  
REVIEWED BY/DATE:  
AJB 1/24/19  
APPROVED BY/DATE:  
NMP 1/28/19

GROUNDWATER SAMPLING WELL LOCATION MAP  
 NEWTON PRIMARY ASH POND  
 UNIT ID: 501  
 2018 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT  
 VISTRA CCR RULE GROUNDWATER MONITORING  
 NEWTON POWER STATION  
 NEWTON, ILLINOIS

PROJECT NO: 70092  
 FIGURE NO: 1





Tables

Newton

**Table 1. Statistical Background Values**

2018 Annual Groundwater Monitoring and Corrective Action Report

Newton Power Station

Unit ID 501 - Newton Primary Ash Pond

Parameter	Statistical Background Value
<b>Appendix III</b>	
Boron (mg/L)	0.141
Calcium (mg/L)	65.32
Chloride (mg/L)	58
Fluoride (mg/L)	0.692
pH (S.U.)	6.6 / 8.0
Sulfate (mg/L)	15
TDS (mg/L)	1000

[O: KLS 8/29/18, C: RAB 8/30/18]

**Notes:**

mg/L = milligrams per liter

S.U. = Standard Units

TDS = Total Dissolved Solids

Newton

**Table 2. Appendix III Analytical Results**

2018 Annual Groundwater Monitoring and Corrective Action Report

Newton Power Station

Unit ID 501 - Newton Primary Ash Pond

Sample Location	Date Sampled	B, total (mg/L)	Ca, total (mg/L)	Cl, total (mg/L)	F, total (mg/L)	pH (field) (S.U.)	SO4, total (mg/L)	TDS (mg/L)
<b>Background / Upgradient Monitoring Wells</b>								
APW5	11/17/2017	0.099	51	43	0.634	6.9	<1	480
	5/18/2018	0.10	48	48	0.525	7.1	2.1	480
	8/17/2018	NA	54	56	NA	7.0	1.4	NA
	11/9/2018	0.098	50	51	0.427	7.0	5.1	500
APW6	11/17/2017	0.094	50	23	0.617	7.2	1.9	470
	5/18/2018	0.087	51	25	0.564	7.3	1.7	420
	8/17/2018	NA	52	25	NA	7.3	1.7	NA
	11/9/2018	0.083	51	24	0.459	7.2	2.1	440
<b>Downgradient Monitoring Wells</b>								
APW7	11/17/2017	0.097	72	73	0.508	7.2	3.8	530
	5/18/2018	0.082	97	75	0.435	7.1	4.9	500
	8/18/2018	NA	100	77	NA	7.1	3.2	NA
	11/9/2018	0.080	92	71	0.343	7.0	4.5	500
APW8	11/17/2017	0.11	83	50	0.474	7.1	39	490
	5/18/2018	0.088	92	56	0.448	7.2	37	520
	8/18/2018	NA	82	57	NA	7.2	43	NA
	11/9/2018	0.086	110	56	0.373	7.1	42	580
APW9	11/18/2017	0.08	68	84	0.655	7.4	4.5	720
	5/18/2018	0.098	80	120	0.467	7.4	1	710
	8/17/2018	NA	81	130	NA	7.5	2.4	NA
	11/9/2018	0.055	44	44	0.73	7.4	62	300
APW10	11/18/2017	0.072	120	47	0.414	6.9	390	910
	5/18/2018	0.08	130	51	0.335	7.2	440	900
	8/17/2018	NA	130	51	NA	6.9	420	NA
	11/9/2018	0.078	140	47	0.281	7	410	900

[O: RAB 12/27/18, C: JQW 12/27/18][U: RAB 1/26/19]

**Notes:**

mg/L = milligrams per liter

S.U. = Standard Units

TDS = Total Dissolved Solids

NA = Not Analyzed

< = concentration is less than the reporting limit

**Appendix A**  
**Alternate Source**  
**Demonstration**

Newton



April 9, 2018

This alternate source demonstration has been prepared on behalf of Illinois Power Generating Company by O'Brien & Gere Engineers, Inc. (OBG) to provide pertinent information pursuant to 40 CFR § 257.94(e)(2) for the Newton Primary Ash Pond located at Newton Power Station near Newton, Illinois.

Initial background groundwater monitoring consisting of a minimum of eight samples as required under 40 CFR § 257.94(b) was initiated in December 2015 and completed prior to October 17, 2017. The first semi-annual detection monitoring samples were collected on November 17 and 18, 2017. Evaluation of analytical data from the first detection monitoring sample for statistically significant increases (SSIs) of 40 CFR Part 257 Appendix III parameters over background concentrations was completed within 90 days of collection and analysis of the sample (January 9, 2018). That evaluation identified SSIs at downgradient monitoring wells as follows:

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

40 CFR § 257.94(e)(2) allows the owner or operator 90 days from the date of an SSI determination to complete a written demonstration that a source other than the CCR unit caused the SSI, or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality ("alternate source demonstration"). Pursuant to 40 CFR § 257.94(e)(2), the following demonstrates that sources other than the Newton Primary Ash Pond were the cause of the SSIs listed above. This alternate source demonstration (ASD) was completed within 90 days of determination of the SSIs (April 9, 2018) as required by 40 CFR § 257.94(e)(2).

#### ALTERNATE SOURCE DEMONSTRATION: LINES OF EVIDENCE

This ASD is based on the following lines of evidence (LOE):

1. The Newton Primary Ash Pond is not the source because it is not in contact with groundwater based upon analysis of ionic composition in samples of leachate and groundwater.
2. Concentrations of calcium in the Newton Primary Ash Pond are lower than those observed in the groundwater.
3. Concentrations of chloride in the Newton Primary Ash Pond are lower than those observed in the groundwater.
4. Concentrations of sulfate in the Newton Primary Ash Pond are lower than those observed in the groundwater.
5. Boron, a primary indicator parameter for CCR impacts to groundwater, has concentrations in downgradient wells that are stable and at, or below, concentrations observed in background monitoring wells.

These lines of evidence are described and supported in greater detail below. Monitoring wells and leachate sample locations are shown on Figure 1.

#### **LOE #1: THE NEWTON PRIMARY ASH POND IS NOT THE SOURCE BECAUSE IT IS NOT IN CONTACT WITH GROUNDWATER BASED UPON ANALYSIS OF IONIC COMPOSITION IN SAMPLES OF LEACHATE AND GROUNDWATER**

Piper diagrams graphically represent ionic composition of aqueous solutions. Figure 2 is a Piper diagram that displays the ionic composition of samples of groundwater from the background and downgradient wells associated with the Primary Ash Pond, monitoring wells associated with the Newton Phase 1 Landfill, and leachate samples from the Primary Ash Pond. The Phase I Landfill is unlined and was closed with a geomembrane cover in 1999. The groupings identified are shown in the green, blue, and purple ellipses. These are discussed in more detail below.

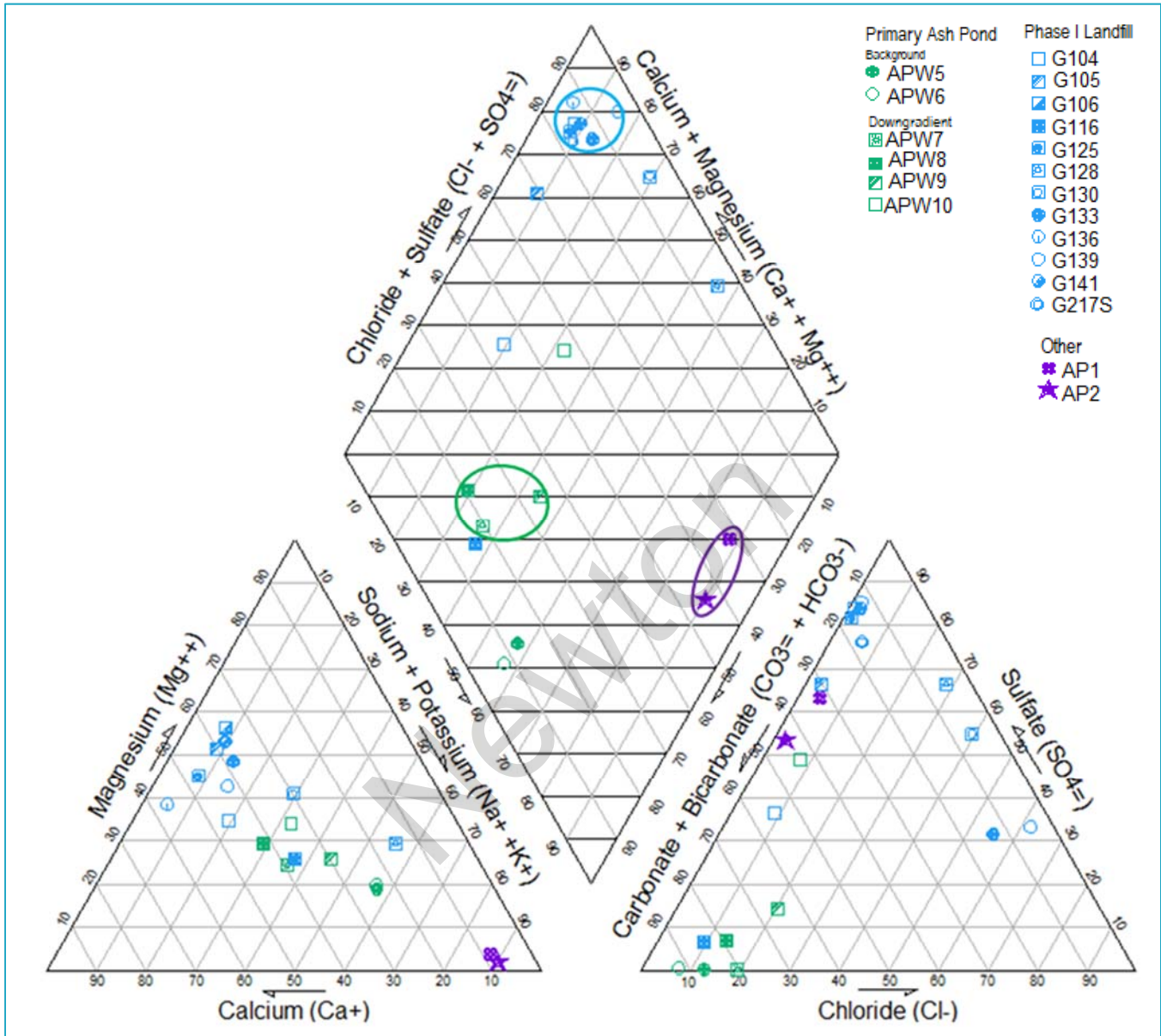


Figure 2 Piper diagram showing ionic composition of samples of background and downgradient groundwater associated with the Primary Ash Pond, groundwater associated with the Phase I Landfill, as well as leachate from the Primary Ash Pond

The ionic characteristics of these samples are provided in Table 1 below:

Grouping	Green	Blue	Purple
Locations	Primary Ash Pond Groundwater	Phase I Landfill Groundwater	Primary Ash Pond Leachate
Dominant Cation	No dominant cation	No dominant cation	Very High Sodium-Potassium
Dominant Anion	Very High Carbonate-Bicarbonate	High Sulfate	No dominant anion

Table 1. Summary of Ionic Classification

The results can be categorized into three distinct groups. The Primary Ash Pond groundwater (green grouping) is very high in carbonate-bicarbonate waters with no dominant cation. The Phase I Landfill groundwater (blue grouping) also has no dominant cation, but is high in sulfate. The Primary Ash Pond leachate (purple grouping) is very high in sodium-potassium with no dominant anion. There is a mixing zone evident between the Primary Ash Pond groundwater and the Phase I Landfill groundwater, as shown with the blue and green arrows on the diagram. Neither of these two groups is trending towards, or mixing with, the Primary Ash Pond leachate. The lack of apparent mixing between the Primary Ash Pond leachate and underlying groundwater in the Uppermost Aquifer demonstrates that there is no impact to groundwater from the Primary Ash Pond. However, the presence of a potential mixing zone between Primary Ash Pond groundwater and Phase I Landfill groundwater suggests that the Phase I Landfill is a source of the elevated major cation calcium and elevated major anions chloride and sulfate.

**LOE #2: CONCENTRATIONS OF CALCIUM IN THE NEWTON PRIMARY ASH POND ARE LOWER THAN THOSE OBSERVED IN THE GROUNDWATER**

Calcium concentrations in water sampled from the Primary Ash Pond are lower than calcium concentrations in all groundwater samples from downgradient ash pond wells from 2015 through 2017. A time series for calcium concentrations is provided in Figure 3 below.

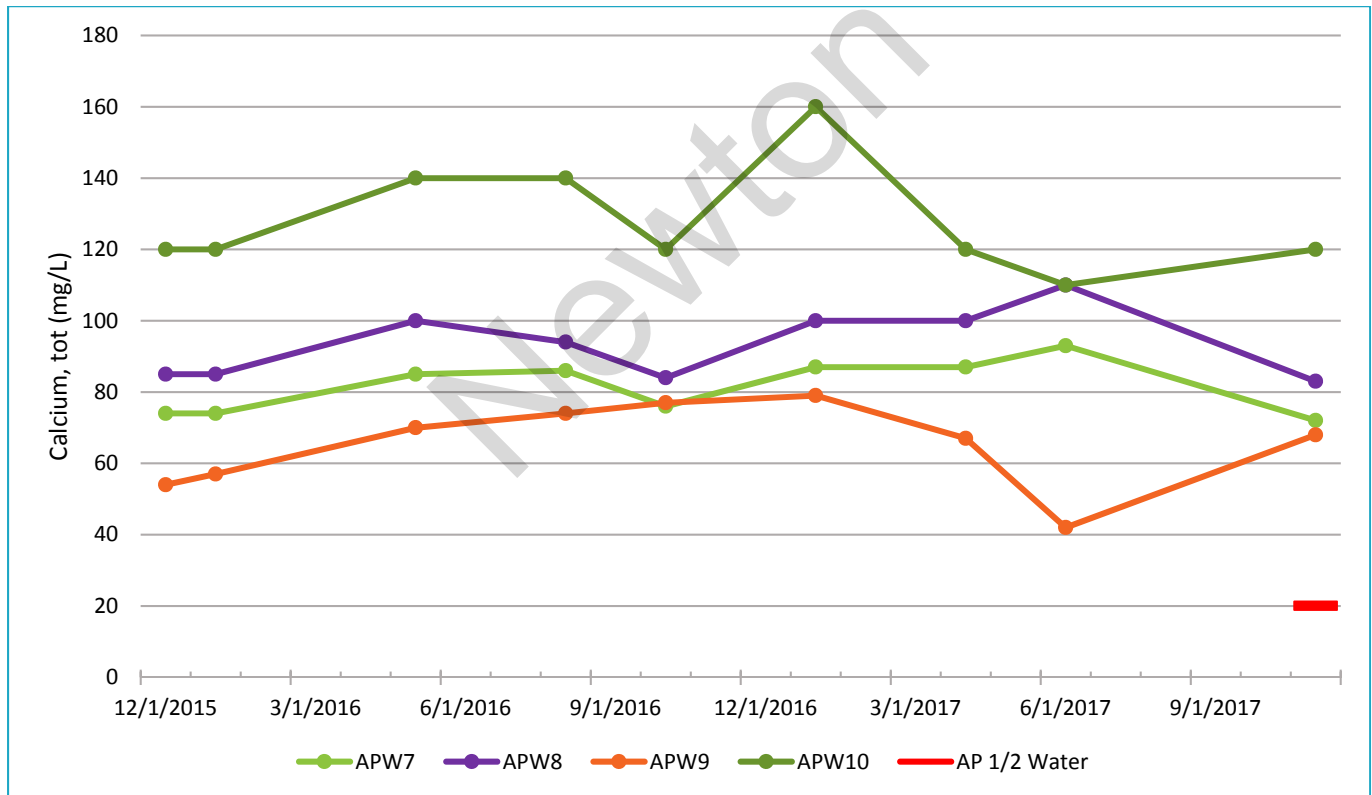


Figure 3. Calcium time series

The following observations can be made from Figure 3:

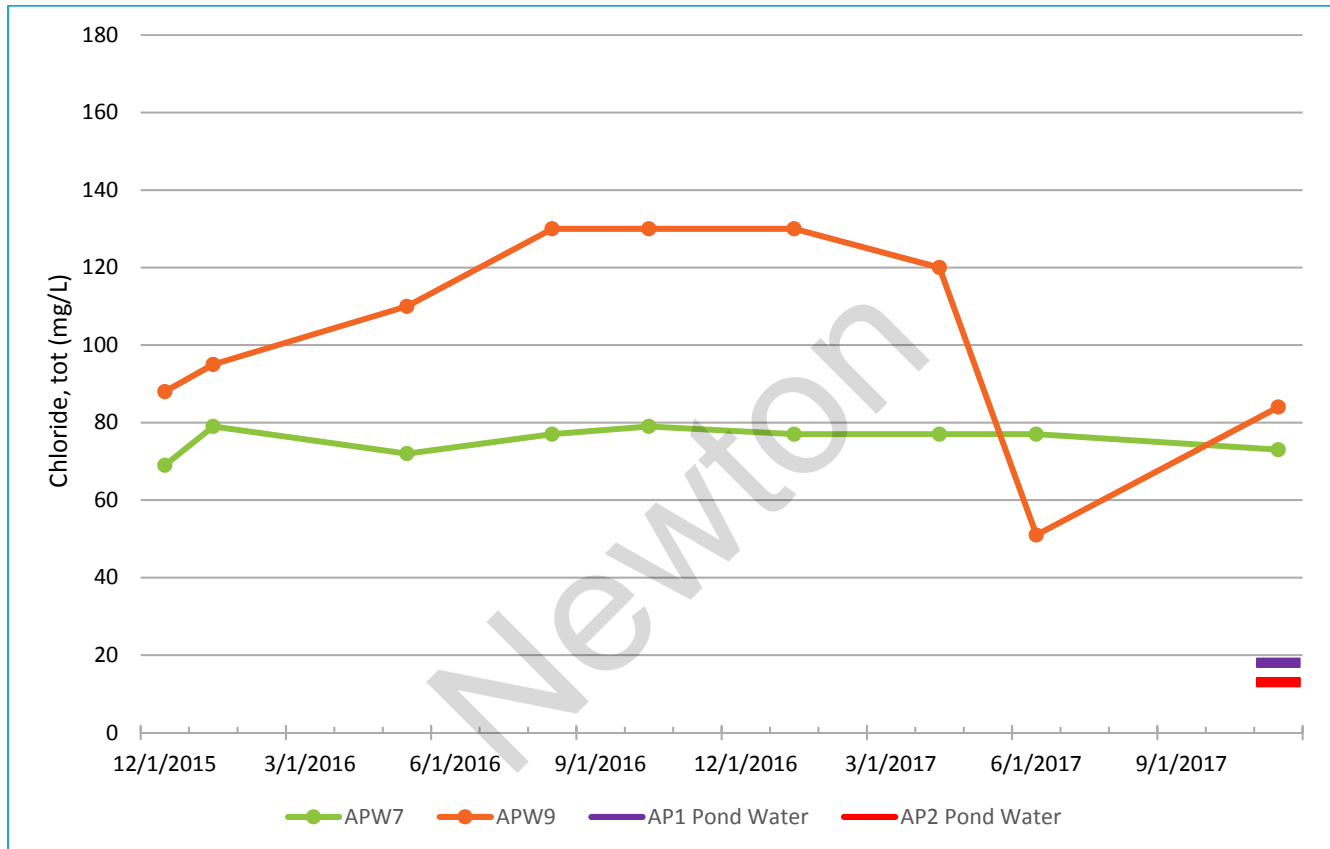
- Water from the Primary Ash Pond contains 20 mg/L of calcium.
- Groundwater from wells APW7, APW8, APW9, and APW10 has two to eight times greater concentrations than the Primary Ash Pond water.

If the Primary Ash Pond were the source of calcium in groundwater, groundwater concentrations in downgradient monitoring wells would be lower than the water in the pond; therefore, the Primary Ash Pond is not the source of the calcium observed in the Uppermost Aquifer. Elevated concentrations of calcium are most

likely naturally occurring due to geochemical variations within the Uppermost Aquifer, although some level of impacts from upgradient anthropogenic sources (i.e. Phase I Landfill) may also be present.

**LOE #3: CONCENTRATIONS OF CHLORIDE IN THE NEWTON PRIMARY ASH POND ARE LOWER THAN THOSE OBSERVED IN THE GROUNDWATER**

Chloride concentrations in water sampled from the Primary Ash Pond are lower than chloride in all groundwater samples from downgradient ash pond wells, inclusive of wells APW7 and APW 9, from 2015 through 2017. A time series for chloride concentrations is provided in Figure 4 below.



**Figure 4. Chloride time series**

The following observations can be made from Figure 4:

- Primary Ash Pond water samples, AP1 and AP2, contain 18 and 13 mg/L of chloride, respectively.
- Groundwater from wells APW7 and APW9 has two to seven times greater concentrations than the Primary Ash Pond water.

If the Primary Ash Pond was the source of chloride, groundwater concentrations in downgradient monitoring wells APW7 and APW9 would be lower than the water in the pond; therefore, the Primary Ash Pond is not the source of the chloride observed in the Uppermost Aquifer. Elevated chloride concentrations are most likely naturally occurring due to geochemical variations within the Uppermost Aquifer, although some level of impacts from upgradient anthropogenic sources (i.e. Phase I Landfill) may also be present.

**LOE #4: CONCENTRATIONS OF SULFATE IN THE NEWTON PRIMARY ASH POND ARE LOWER THAN THOSE OBSERVED IN THE GROUNDWATER**

Sulfate concentrations in water sampled from the Primary Ash Pond are lower than sulfate in all groundwater samples from downgradient ash pond wells from 2015 through 2017. A time series for sulfate concentrations is provided in Figure 5 below.

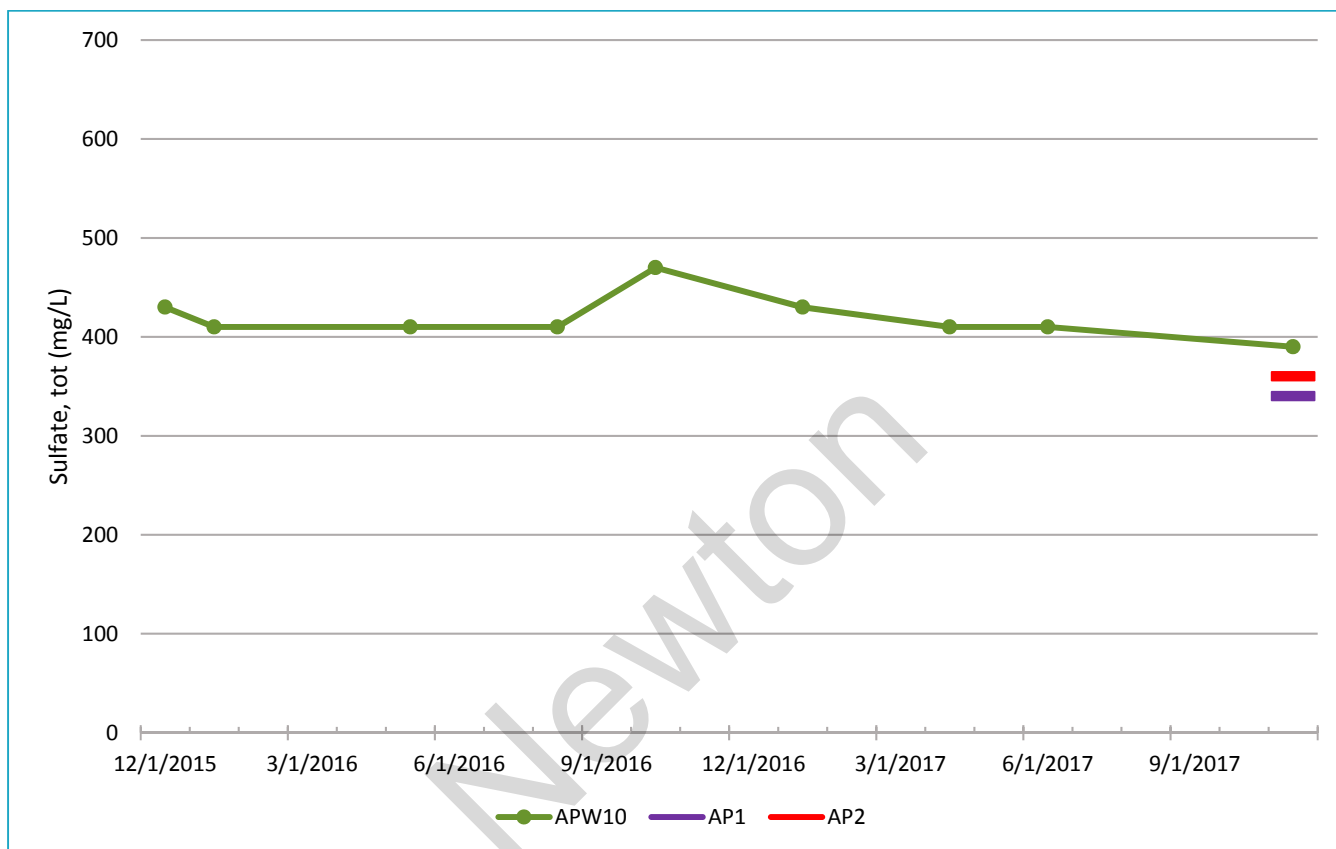


Figure 5. Sulfate time series

The following observations can be made from Figure 5:

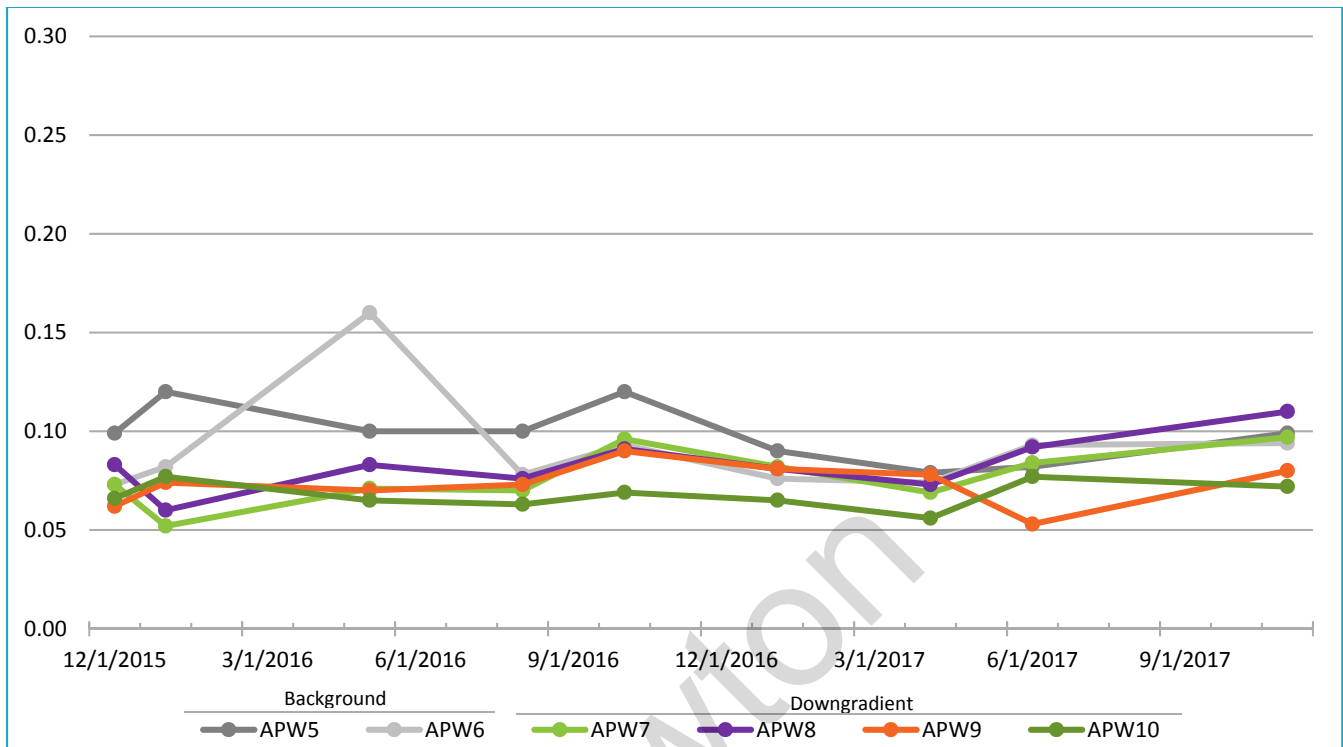
- Primary Ash Pond water samples, AP1 and AP2, contain 340 and 360 mg/L of sulfate, respectively.
- Groundwater from well APW10 has a higher sulfate concentration, ranging from 390 to 470 mg/L from 2015 through 2017, than the Primary Ash Pond water.

If the Primary Ash Pond were the source of sulfate, the groundwater concentrations in downgradient monitoring well APW10 would be lower than the water in the pond; therefore, the Primary Ash Pond is not the source of the sulfate observed in the Uppermost Aquifer. Alternate sources of sulfate are most likely present from upgradient anthropogenic sources, principally the Phase I Landfill, although naturally occurring geochemical variations within the Uppermost Aquifer may also be affecting sulfate concentrations.

**LOE #5: BORON, A PRIMARY INDICATOR PARAMETER OF CCR IMPACTS TO GROUNDWATER, HAS CONCENTRATIONS IN DOWNGRADIENT WELLS THAT ARE STABLE AND AT, OR BELOW, CONCENTRATIONS OBSERVED IN BACKGROUND MONITORING WELLS**

Boron is a primary indicator of CCR impacts to groundwater. Concentrations of boron in all downgradient monitoring wells are below prediction limits established using background monitoring wells (i.e. SSI limits) and

are lower than median concentrations observed in background wells APW5 and APW6 from 2015 through 2017, as shown on Figure 6.



**Figure 6. Boron time series** (indicate up/downgradient wells)

From Figure 6 the following observations can be made:

- Boron is stable. A Mann-Kendall trend analysis (Attachment A) was performed to determine whether the concentration trend for each downgradient well is statistically significant. None were determined to be statistically significant using the Mann-Kendall test.
- Boron concentrations in downgradient monitoring wells range from 0.052 to 0.11 mg/L versus 0.073 to 0.16 mg/L in background wells. Overall median boron concentration in downgradient wells from 2015 through 2017 is 0.073 mg/L versus 0.092 mg/L in background wells.

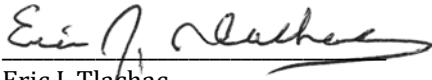
Elevated boron concentrations are most likely naturally occurring due to geochemical variations within the Uppermost Aquifer, although some level of impacts from upgradient anthropogenic sources may also be present.

***Based on these five lines of evidence, it has been demonstrated that the Newton Primary Ash Pond has not caused the SSIs in APW7, APW8, APW9, and APW10.***

This information serves as the written alternate source demonstration prepared in accordance with 40 CFR § 257.94(e)(2) that SSIs observed during the detection monitoring program were not due to the CCR unit, but were from a combination of naturally occurring conditions and potential anthropogenic impacts from the closed Phase I Landfill. Therefore, an assessment monitoring program is not required and the Newton Primary Ash Pond will remain in detection monitoring.

Attachment A Boron Trend Analysis for APW7, APW8, APW9, and APW10

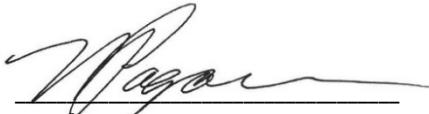
I, Eric J. Tlachac, a qualified professional engineer in good standing in the State of Illinois, certify that the information in this report is accurate as of the date of my signature below. The content of this report is not to be used for other than its intended purpose and meaning, or for extrapolations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



Eric J. Tlachac  
Qualified Professional Engineer  
062-063091  
Illinois  
O'Brien & Gere Engineers, Inc.  
Date: April 9, 2018



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  
O'Brien & Gere Engineers, Inc.  
Date: April 9, 2018



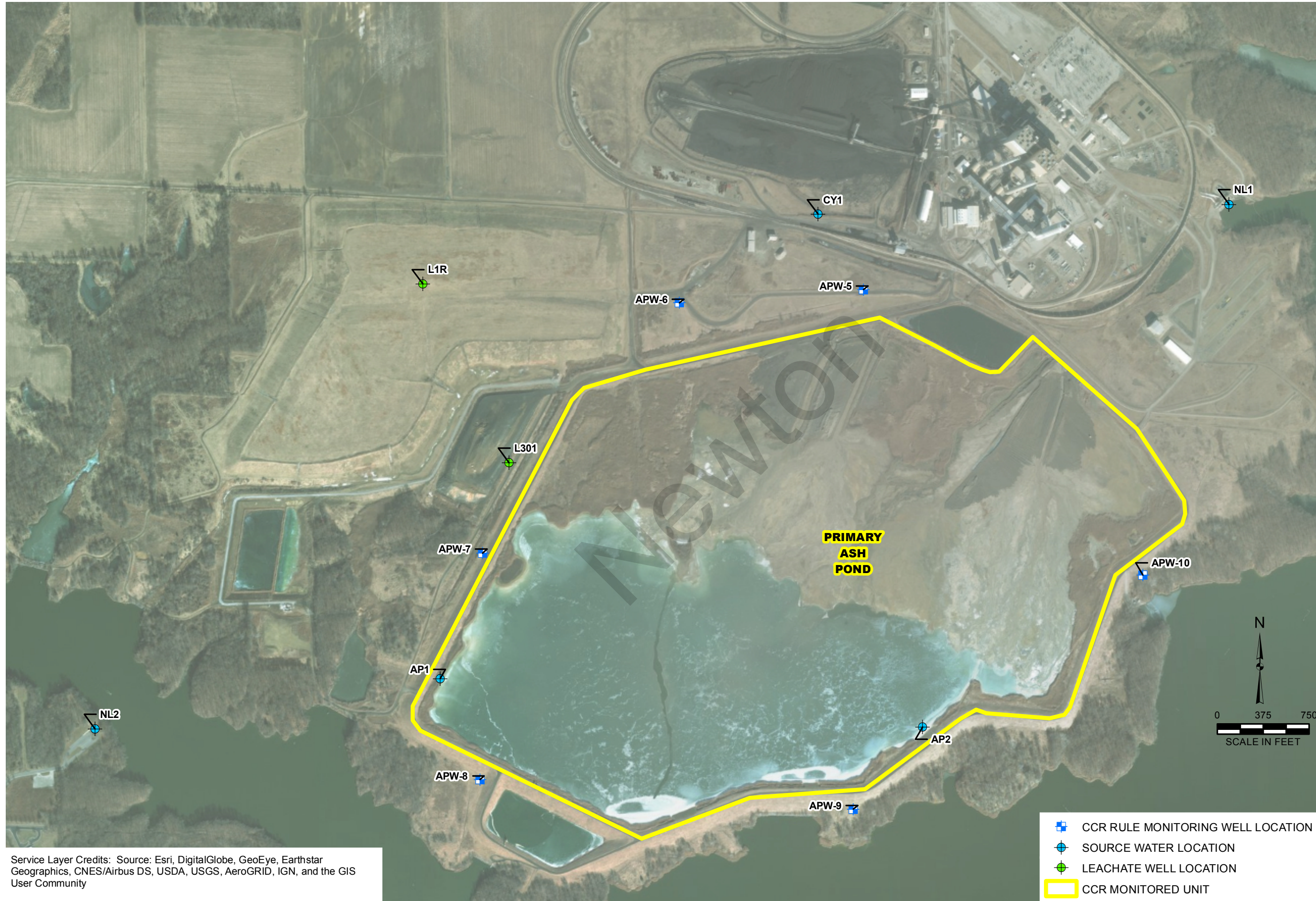


Figures





Newton



Y:\Mapping\Projects\222285\MXD\ALT\_Source\_Demifigure\_1\_Newton Landfill Phases\_PAP.mxd Author: slolozsd Date/Time: 4/6/2018, 3:34:21 PM



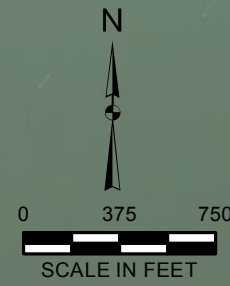
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

-  CCR RULE MONITORING WELL LOCATION
-  SOURCE WATER LOCATION
-  LEACHATE WELL LOCATION
-  CCR MONITORED UNIT

DRAWN BY/DATE:  
SDS 3/28/18  
REVIEWED BY/DATE:  
JJW 3/28/18  
APPROVED BY/DATE:  
NMP 3/30/18

MONITORING WELL AND SOURCE WATER LOCATION MAP  
NEWTON PRIMARY ASH POND

ALTERNATE SOURCE DEMONSTRATION  
NEWTON POWER STATION  
NEWTON, ILLINOIS



PROJECT NO: 67719

FIGURE NO: 1





**Attachment A**

**Boron Trend Analysis for  
APW7, APW8, APW9, and  
APW10**

Newton

## Newton Primary Ash Pond Mann-Kendall Trend Analysis

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### User Supplied Information

<b>Location ID:</b>	APW7	<b>Parameter Code:</b>	01022
<b>Location Class:</b>		<b>Parameter:</b>	B, tot
<b>Location Type:</b>		<b>Units:</b>	mg/L
<b>Confidence Level:</b>	95.00%	<b>Period Length:</b>	1 month(s)
<b>Date Range:</b>	12/14/2015 to 11/29/2017	<b>Limit Name:</b>	
		<b>Averaged:</b>	No

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### Trend Analysis

Trend of the least squares straight line

Slope (fitted to data):	0.000040	mg/L per day
R-Squared error of fit:	0.446753	

Sen's Non-parametric estimate of the slope (One-Sided Test)

Median Slope:	0.000039	mg/L per day
Lower Confidence Limit of Slope, M1:	-0.000005	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000072	mg/L per day

Non-parametric Mann-Kendall Test for Trend

S Statistic:	1.355	
Z test:	1.645	
At the 95.0 % Confidence Level (One-Sided Test):	None	

Newton

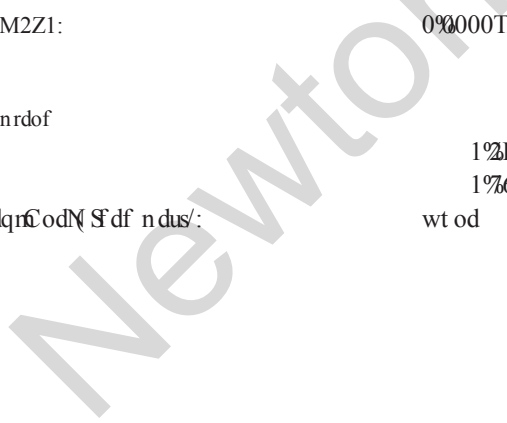
## Newton Primary Ash Pond Mann-Kendall Trend Analysis

### User Supplied Information

Location ID:	APW8	Parameter Code:	01022
Location Class:		Parameter:	B, tot
Location Type:		Units:	mg/L
Confidence Level:	95.00%	Period Length:	1 month(s)
Date Range:	12/14/2015 to 11/29/2017	Limit Name:	
		Averaged:	No

### Trend Analysis

nrdof t l shd qlaus ui gardu usra Sphs qd		
( q ) d n h S d f s t f a s a /:	0%00038	L pyR ) dr f a-
' N i g a r d f d r r t r t l l S:	0%30018	
( do 0 wt o N a r a L d s r S d u s L a s d t l s h d u q ) d n C o d N S f d f n d u s /		
M d f S i o ( q ) d:	0%00033	L pyR ) dr f a-
R t U d r + t o l S d o c d R S L S t l ( q ) d, M1:	N%0000T	L pyR ) dr f a-
K ) d r + t o l S d o c d R S L S t l ( q ) d, M2Z1:	0%000TP	L pyR ) dr f a-
wt o N a r a L d s r S M a o o N d o f a q n d u s l t r n r d o f		
( ( s a s i s S:	1%P8	
9 s d u s:	1%6P	
5 s s h d . P % v + t o l S d o c d R d 4 d q n C o d N S f d f n d u s /:		wt od



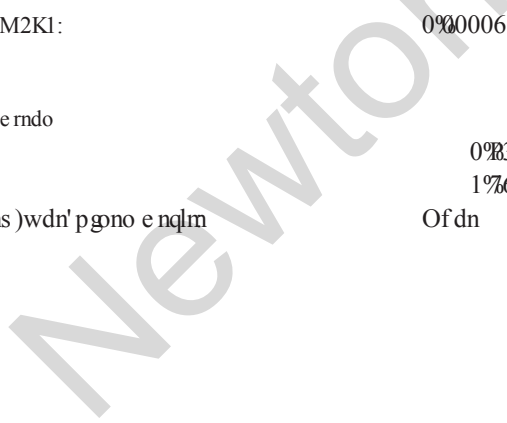
**Newton Primary Ash Pond  
Mann-Kendall Trend Analysis**

**User Supplied Information**

<b>Location ID:</b>	APW7	<b>Parameter Code:</b>	01022
<b>Location Class:</b>		<b>Parameter:</b>	B, tot
<b>Location Type:</b>		<b>Units:</b>	mg/L
<b>Confidence Level:</b>	75.00%	<b>Period Length:</b>	1 month(s)
<b>Date Range:</b>	12/14/2015 to 11/27/2019	<b>Limit Name:</b>	
		<b>Averaged:</b>	No

**Trend Analysis**

e rndo ft lhn snaql qui arnq qlragShl sgdh psf(n)tgIno lf oalam - 'pui arno rrrfr ft tg:	0%00008 / Sly (nr oaR 0%2P162
pnDOf d' ( ara/ nlrq nqlg' aln ft lhn qsf(n)wdn' pgon e nqlm Mnogad psf(n): yfCnr Uf dtgondcn yg' g ft psf(n, M1: +((nr Uf dtgondcn yg' g ft psf(n, M2K1:	0%000017 / Sly (nr oaR '0%000032 / Sly (nr oaR 0%00006. / Sly (nr oaR
Of d' ( ara/ nlrq Madd' Zndoass e nql tfr e rndo p plalgqg: A Inql: 9 l lhn 5. %v Uf dtgondcn yn4ns )wdn' pgon e nqlm	0%30 1%6. Of dn



## Newton Primary Ash Pond Mann-Kendall Trend Analysis

### User Submitted Information

Location ID:	APW70	Parameter Code:	07011
Location Name:		Parameter:	CBot
Location Type:		Units:	2 g/L
Confidence Level:	54.00%	Period Length:	7 2 month(s)
Date Range:	7/1/07 to 7/15/09	Limit Na2e:	
		Averaged:	No

### Trend Analysis

Trend of the least squares straight line		
Slope (fitted to data):	0.000001	mg/L per day
R-Squared error of fit:	0.000360	
Sen's Non-parametric estimate of the slope (One-Sided Test)		
Median Slope:	0.000000	mg/L per day
Lower Confidence Limit of Slope, M1:	-0.000026	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000022	mg/L per day
Non-parametric Mann-Kendall Test for Trend		
S Statistic:	0.000	
Z test:	1.645	
At the 95.0 % Confidence Level (One-Sided Test):	None	

Newton

Newton

