Cynthia Vodopivec
Illinois Power Generating Company
Luminant
6555 Sierra Dr.
Irving, TX 75039

September 29, 2020

Sent via email

Mr. Andrew R. Wheeler, EPA Administrator
Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Mail Code 5304-P
Washington, DC 20460

Re: Newton Power Station Alternative Closure Demonstration

Dear Administrator Wheeler:

Illinois Power Generating Company (IPGC) hereby submits this request to the U.S. Environmental Protection Agency (EPA) for approval of a site-specific alternative deadline to initiate closure pursuant to 40 C.F.R. § 257.103(f)(2) for the Primary Ash Pond located at the Newton Power Station near Newton, Illinois. IPGC is requesting an extension pursuant to 40 C.F.R. § 257.103(f)(2) so that the Primary Ash Pond may continue to receive CCR and non-CCR wastestreams after April 11, 2021, and complete closure no later than October 17, 2028.

Enclosed is a demonstration prepared by Burns & McDonnell that addresses all of the criteria in 40 C.F.R. § 257.103(f)(2)(i)-(iv) and contains the documentation required by 40 C.F.R. § 257.103(f)(2)(v). As allowed by the agency, in lieu of hard copies of these documents, electronic files were submitted to Kirsten Hillyer, Frank Behan, and Richard Huggins via email. If you have any questions regarding this submittal, please contact Phil Morris at 618-343-7794 or phil.morris@vistracorp.com.

Sincerely,

Cynthia E Vodopivec

Cynthia Vodopivec
VP - Environmental Health & Safety

Enclosure

cc: Kirsten Hillyer
Frank Behan
Richard Huggins

CCR Surface Impoundment Demonstration for a Site-Specific Alternative to Initiation of Closure Deadline

Illinois Power Generating Company

Newton Power Station
Project No. 122702

Revision 0
9/28/2020

CCR Surface Impoundment Demonstration for a Site-Specific Alternative to Initiation of Closure Deadline

prepared for

Illinois Power Generating Company
Newton Power Station
Newton, Illinois

Project No. 122702

Revision 0
9/28/2020

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

INDEX AND CERTIFICATION

Illinois Power Generating Company
CCR Surface Impoundment
Demonstration for a Site-Specific Alternative to Initiation of Closure Deadline
Project No. 122702

Report Index

Certification

I hereby certify, as a Professional Engineer in the state of Illinois, that the information in this document as noted in the above Report Index was assembled under my direct personal charge. This report is not intended or represented to be suitable for reuse by the Illinois Power Generating Company or others without specific verification or adaptation by the Engineer.

Edward T. Tohill, P.E., (Illinois License No. 062-056915)

Date: 09/20/20

LICENSED PROFESSIONAL ENGINEER
EDWARD T. TOHILL
062-056915
STATE OF ILLINOIS

09/20/20
LIC-EXPIRES 11/30/21

TABLE OF CONTENTS

LIST OF TABLES

Page No.

LIST OF ABBREVIATIONS

Abbreviation	**Term/Phrase/Name**
CCR	Coal Combustion Residual
CFR	Code of Federal Regulations
ELG Rule	Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category
EPA	Environmental Protection Agency
IPGC	Illinois Power Generating Company
Newton	Newton Power Station
RCRA	Resource Conservation and Recovery Act
SWPPP	Stormwater Pollution Prevention Plan

1.0 EXECUTIVE SUMMARY

Illinois Power Generating Company (IPGC) submits this request to the U.S. Environmental Protection Agency (EPA) for approval of a site-specific alternative deadline to initiate closure pursuant to 40 C.F.R. § 257.103(f)(2) —"Permanent Cessation of a Coal-Fired Boiler(s) by a Date Certain"— for the Primary Ash Pond located at the Newton Power Station (Newton) in Illinois. The Primary Ash Pond is a 404-acre CCR surface impoundment used to manage CCR and non-CCR wastestreams at Newton. As discussed herein, the boilers at the station will retire and the impoundment will complete closure no later than October 17, 2028. Therefore, IPGC is requesting an extension pursuant to 40 C.F.R. § 257.103(f)(2) so that the Primary Ash Pond may continue to receive CCR and non-CCR waste streams after April 11, 2021, and complete closure no later than October 17, 2028.

2.0 INTRODUCTION

Newton is a 615-megawatt coal-fueled electric generating station near Newton, Illinois. Unit 1 remains in operation; however, Unit 2 has already been retired. Newton uses the 404-acre Primary Ash Pond, which was constructed in 1977, to manage sluiced bottom ash, fly ash, economizer ash, and mill rejects, as well as non-marketable dry fly ash and non-CCR wastewaters. Fly ash is typically collected dry and either hauled offsite for beneficial use or disposed of in the Primary Ash Pond; however, there are certain operating conditions, typically associated with silo maintenance activities that require use of the hydrovactor to sluice fly ash to the impoundment. The various non-CCR wastewaters received originate from the coal pile runoff pond, oil water separator, wastewater sump (including ash hopper overflows, air heater wash water, boiler blowdown, boiler wash, other non-chemical metal cleaning and miscellaneous plant drains and sumps), water treatment building sump (including microfilter backwash, reverse osmosis reject, demineralizer regeneration flows, and condensate polisher regeneration flows), polisher pre-coat sump, and miscellaneous stormwater sources (including overflow from Lake Jake which does not receive any process flows). A site plan is provided in Appendix A, and the plant water balance diagram is included in Appendix B. Note that Lake Jake is not depicted on the water balance diagram.

On April 17, 2015, the Environmental Protection Agency (EPA) issued the federal Coal Combustion Residual (CCR) Rule, 40 C.F.R. Part 257, Subpart D, to regulate the disposal of CCR materials generated at coal-fueled units. The rule is being administered under Subtitle D of the Resource Conservation and Recovery Act (RCRA, 42 U.S.C. § 6901 et seq.). On August 28, 2020, the EPA Administrator issued revisions to the CCR Rule that require all unlined surface impoundments to initiate closure by April 11, 2021, unless an alternative deadline is requested and approved. 40 C.F.R. § 257.101(a)(1) (85 Fed. Reg. 53,516 (Aug. 28, 2020)). Specifically, owners and operators of a CCR surface impoundment may continue to receive CCR and non-CCR wastestreams if the facility will cease operation of the coal-fired boiler(s) and complete closure of the impoundments within certain specified timeframes. 40 C.F.R. § 257.103(f)(2). To qualify for an alternative closure deadline under § 257.103(f)(2), a facility must meet the following four criteria:

1. **§ 257.103(f)(2)(i)** – No alternative disposal capacity is available on-site or off-site. An increase in costs or the inconvenience of existing capacity is not sufficient to support qualification.
2. **§ 257.103(f)(2)(ii)** - Potential risks to human health and the environment from the continued operation of the CCR surface impoundment have been adequately mitigated;
3. **§ 257.103(f)(2)(iii)** - The facility is in compliance with the CCR rule, including the requirement to conduct any necessary corrective action; and

4. **§ 257.103(f)(2)(iv) -** The coal-fired boilers must cease operation and closure of the impoundment must be completed within the following timeframes:
    a. For a CCR surface impoundment that is 40 acres or smaller, the coal-fired boiler(s) must cease operation and the CCR surface impoundment must complete closure no later than October 17, 2023.
    b. For a CCR surface impoundment that is larger than 40 acres, the coal-fired boiler(s) must cease operation, and the CCR surface impoundment must complete closure no later than October 17, 2028.

Section 257.103(f)(2)(v) sets out the documentation that must be provided to EPA to demonstrate that the four criteria set out above have been met. Therefore, this demonstration is organized based on the documentation requirements of §§ 257.103(f)(2)(v)(A) – (D).

3.0 DOCUMENTATION OF NO ALTERNATIVE DISPOSAL CAPACITY

To demonstrate that the criteria in § 257.103(f)(2)(i) has been met, the following provides documentation that no alternative disposal capacity is currently available on-site or off-site for each CCR and non-CCR wastestream that IPGC seeks to continue placing into the Primary Ash Pond after April 11, 2021. Consistent with the regulations, neither an increase in costs nor the inconvenience of existing capacity was used to support qualification under this criteria. Instead, as EPA explained in the preamble to the proposed Part A revisions, "it would be illogical to require [] facilities [ceasing power generation] to construct new capacity to manage CCR and non-CCR wastestreams." 84 Fed. Reg. 65,941, 65,956 (Dec. 2, 2019). EPA again reiterated in the preamble to the final revisions that "[i]n contrast to the provision under § 257.103(f)(1), the owner or operator does not need to develop alternative capacity because of the impending closure of the coal fired boiler. Since the coal-fired boiler will shortly cease power generation, it would be illogical to require these facilities to construct new capacity to manage CCR and non-CCR wastestreams." 85 Fed. Reg. at 53,547. Thus, new construction or the development of new alternative disposal capacity was not considered a viable option for any wastestream discussed below.

3.1 Site-Layout and Wastewater Processes

The Primary Ash Pond receives all CCR sluice flows and a majority of the non-CCR wastewater flows onsite before discharging to the Secondary Pond and eventually to Newton Lake. The remaining plant process flows (non-contact cooling water) are routed through the Cooling Basin or Construction Runoff Pond, as shown on the water balance diagram in Appendix B. Sewage treatment flows and intake screen backwash are discharged to Newton Lake. The other onsite impoundments (Coal Pile Runoff Pond, Cooling Basin, Lake Jake, landfill ponds, the Secondary Pond, and Construction Runoff Pond) are not authorized to receive the CCR material and are not large enough to independently treat the total volume of the plant process water flows. The existing, active on-site landfill operates with one open landfill cell. The existing landfill cell is substantially filled with CCR with limited long-term available airspace (less than one year of capacity) to accept an increased volume of CCR for disposal. A separate landfill cell was constructed for the disposal of gypsum materials from the plant scrubber system, but the scrubber was ultimately not installed at Newton and the landfill cell was never placed into operation and therefore is currently inactive. Since the cell has been inactive for several years and having never been placed into service, it is currently unusable due to deterioration of the landfill cell freeze protection layer, and damage to the leachate collection system and cell separation tie-in berm. Neither landfill cell can accept sluiced materials and they are not currently permitted to receive bottom ash material (only fly ash and gypsum).

3.2 CCR Wastestreams

IPGC evaluated each CCR wastestream placed in the Primary Ash Pond at Newton. For the reasons discussed below in Table 3-1, each of the following CCR wastestreams must continue to be placed in the Primary Ash Pond due to lack of alternative capacity both on and off-site.

Table 3-1: Newton CCR Wastestreams

CCR Wastestreams	Average Flow (MGD)	Alternative Disposal Capacity Currently Available? YES/NO	Details
Bottom Ash Sluice (includes economizer ash and non-CCR mill rejects)	1.7	NO	There is no potential alternative for on or off-site disposal of this wet-generated CCR wastestream.
Dry Fly Ash	NA (Dry)	YES (Limited)	The fly ash is initially collected dry, conditioned, and either sent off-site for beneficial reuse or placed in the Primary Ash Pond or landfill. The conditioned fly ash placed in the Primary Ash Pond will facilitate pond closure in the near future. This beneficial reuse of the fly ash will be reflected in the pond closure plan. As discussed above, the active on-site landfill operates with one open landfill cell. The existing cell is nearly full, with less than one year of capacity available. The inactive landfill cell is not currently operational and would require extensive work before waste placement could begin. IPGC does not have a contract with an off-site landfill for this material. Development of alternate offsite capacity would raise both safety and environmental concerns associated with transporting and disposing of significant amounts of material off-site.

CCR Wastestreams	Average Flow (MGD)	Alternative Disposal Capacity Currently Available? YES/NO	Details
Fly Ash Hydrovactor Flow	0.7	NO	This flow is used to create vacuum upstream of the cyclone separators that remove the dry fly ash. This water must continue to be routed to the Primary Ash Pond as there is no other vacuum source available onsite to remove fly ash from the unit and no other ponds are large enough to treat these surges of water or receive any potential CCR carryover.
Fly Ash Sluice	Intermittent	NO	The sluicing system is used as a back-up to the dry system during maintenance of that equipment or to empty the silos for maintenance at those locations. There is no potential alternative for on or off-site disposal of this wet-generated CCR wastestream; however, IPGC will cease sluicing fly ash no later than December 31, 2023 to comply with the ELG rule.

For the bottom ash and fly ash sluice flows, there is no currently available onsite infrastructure to support dry handling of the ash or elimination of the wastestreams. As stated previously, since IPGC has elected to pursue the option to permanently cease the use of the coal fired boilers by a date certain, developing alternative disposal capacity is "illogical," to use EPA's words, and also counterproductive to the work to retire the boilers and close the impoundments. As long as IPGC continues to wet handle the ash materials, there are no other onsite CCR impoundments available to receive and treat these flows and it is not feasible to dispose of the wet-handled material offsite. The remaining impoundments onsite (Coal Pile Runoff Pond, Cooling Basin, Lake Jake, landfill ponds, the Secondary Pond, and Construction Runoff Pond) are not authorized to receive the CCR material. As EPA explained in the preamble of the 2015 rule, it is not possible for sites that sluice CCR material to an impoundment to eliminate the impoundment and dispose of the material offsite. *See* 80 Fed. Reg. 21,301, 21,423 (Apr. 17, 2015) ("[W]hile it is possible to transport dry ash off-site to [an] alternate disposal facility that is simply not feasible for wet-generated CCR. Nor can facilities immediately convert to dry handling systems."). As a result, the conditions at Newton satisfy the demonstration requirement in § 257.103(f)(2)(i).

For the site-specific reasons discussed above, the dry fly ash materials that cannot be sold must continue to be placed in either the Newton Primary Ash Pond or in the limited space available in the onsite CCR landfill due to lack of alternative capacity both on and off-site. Consequently, in order to continue to operate and generate electricity, Newton must continue to use the Primary Ash Pond to manage the CCR wastestreams discussed above.

3.3 Non-CCR Wastestreams

IPGC evaluated each non-CCR wastestream placed in the Primary Ash Pond at Newton. For the reasons discussed below in Table 3-2, each of the following non-CCR wastestreams must continue to be placed in the Primary Ash Pond due to lack of alternative capacity both on and off-site.

Table 3-2: Newton Non-CCR Wastestreams

<table>
<tr><th>Non-CCR Wastestreams</th><th>Average Flow (MGD)</th><th>Alternative Disposal Capacity Currently Available? YES/NO</th><th>Details</th></tr>
<tr><td>Coal Pile Runoff Pond (including Rotary Car Dumper Sump, Coal handling equipment wash water, and stormwater)</td><td>Intermittent (1.4 max)</td><td>NO</td><td>Additional piping would need to be installed to a new pond with large surge capacity and then rerouted to a new or existing permitted outfall.</td></tr>
<tr><td>Unit 1 Oil Water Separator</td><td>0.01</td><td>NO</td><td rowspan="4">Additional piping would need to be installed to reroute to a new effluent tank or pond for treatment prior to discharging to a new or existing permitted outfall.</td></tr>
<tr><td>Wastewater Sump (including Air Heater Wash, Boiler wash, other non-chemical metal cleaning wastewaters, ash hopper overflow, boiler sumps, boiler blowdown, and miscellaneous plant drains)</td><td>3.35</td><td>NO</td></tr>
<tr><td>Water Treatment Building Sump (including microfilter backwash, RO Reject, demineralizer regeneration flows, and condensate polisher regeneration flows)</td><td>0.09</td><td>NO</td></tr>
<tr><td>Polisher Precoat Sump</td><td>Intermittent (0.2 max)</td><td>NO</td></tr>
<tr><td>Miscellaneous Stormwater (including Lake Jake Overflow)</td><td>Intermittent</td><td>NO</td><td>Additional piping would need to be installed to a new pond with large surge capacity and then rerouted to a new or existing permitted outfall.</td></tr>
</table>

As noted in Table 3-2, there is potential to discharge a portion of these flows to other locations; however, this would require permit modifications and installation of new pumps and/or piping and potentially a new treatment system including non-CCR ponds, clarifiers, and/or storage tank(s). As stated previously, since IPGC has elected to pursue the option to permanently cease the use of the coal fired boilers by a certain date, developing alternative disposal capacity is “illogical,” to use EPA’s words, and also counterproductive to the work to retire the boilers and close the impoundments. There is currently no available infrastructure at the plant to support reroute of these flows. For the reasons discussed above, each of the non-CCR wastestreams must continue to be placed in the Primary Ash Pond due to lack of alternative capacity both on and off-site. Consequently, in order to continue to operate and generate electricity, Newton must continue to use the Primary Ash Pond to manage the non-CCR wastestreams discussed above. a

4.0 RISK MITIGATION PLAN

To demonstrate that the criteria in § 257.103(f)(2)(ii) has been met, IPGC has prepared and attached a Risk Mitigation Plan for the Newton Primary Ash Pond (see Attachment 1).

5.0 DOCUMENTATION AND CERTIFICATION OF COMPLIANCE

In the Part A rule preamble, EPA reiterates that compliance with the CCR rule is a prerequisite to qualifying for an alternative closure extension, as it "provides some guarantee that the risks at the facility are properly managed and adequately mitigated." 85 Fed. Reg. at 53,543. EPA further stated that it "must be able to affirmatively conclude that facility meets this criterion prior to any continued operation." 85 Fed. Reg. at 53,543. Accordingly, EPA "will review a facility's current compliance with the requirements governing groundwater monitoring systems." 85 Fed. Reg. at 53,543. In addition, EPA will also "require and examine a facility's corrective action documentation, structural stability documents and other pertinent compliance information." 85 Fed. Reg. at 53,543. Therefore, EPA is requiring a certification of compliance and specific compliance documentation be submitted as part of the demonstration. 40 C.F.R. § 257.103(f)(2)(v)(C).

To demonstrate that the criteria in § 257.103(f)(2)(iii) has been met, IPGC is submitting the following information as required by § 257.103(f)(2)(v)(C):

5.1 Owner's Certification of Compliance - § 257.103(f)(2)(v)(C)(1)

I hereby certify that, based on my inquiry of those persons who are immediately responsible for compliance with environmental regulations for the Primary Ash Pond at Newton, the facility is in compliance with all of the requirements contained in 40 C.F.R. Part 257, Subpart D – Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments. The Newton CCR compliance website is up-to-date and contains all the necessary documentation and notification postings.

On behalf of IPGC:

Cynthia E Vodopivec

Cynthia Vodopivec
VP - Environmental Health & Safety
September 28, 2020

5.2 Visual representation of hydrogeologic information - § 257.103(f)(2)(v)(C)(2)

Consistent with the requirements of § 257.103(f)(2)(v)(C)(2)(i) – (iii), IPGC has attached the following items to this demonstration:

- Map(s) of groundwater monitoring well locations in relation to the CCR unit (Attachment 2)
- Well construction diagrams and drilling logs for all groundwater monitoring wells (Attachment 3)
- Maps that characterize the direction of groundwater flow accounting for seasonal variations (Attachment 4)

5.3 Groundwater monitoring results - § 257.103(f)(2)(v)(C)(3)

Tables summarizing constituent concentrations at each groundwater monitoring well through the first 2020 semi-annual monitoring period are included as Attachment 5.

5.4 Description of site hydrogeology including stratigraphic cross-sections - § 257.103(f)(2)(v)(C)(4)

A description of the site hydrogeology and stratigraphic cross-sections of the site are included as Attachment 6.

5.5 Corrective measures assessment - § 257.103(f)(2)(v)(C)(5)

Background sampling began at Newton in late 2015 and continued for eight consecutive quarters. The first semiannual detection monitoring samples were collected in November 2017. These samples, and those collected since, have been analyzed and SSIs were identified for calcium, chloride, fluoride, and sulfate (all Appendix III constituents). Alternate Source Demonstrations were completed in January 2019, July 2019, October 2019, and April 2020 for the SSIs referenced. The Newton Primary Ash Pond remains in detection monitoring. Accordingly, an assessment of corrective measures is not currently required at the site. Newton will continue to conduct groundwater monitoring in accordance with all state and federal requirements.

5.6 Remedy selection progress report - § 257.103(f)(2)(v)(C)(6)

As noted above, an assessment of corrective measures and the resulting selection of remedy are not currently required for the Primary Ash Pond.

5.7 Structural stability assessment - § 257.103(f)(2)(v)(C)(7)

Pursuant to § 257.73(d), the initial structural stability assessment for the Primary Ash Pond was prepared in October 2016 and is included as Attachment 7.

5.8 Safety factor assessment - § 257.103(f)(2)(v)(C)(8)

Pursuant to § 257.73(e), the initial safety factor assessment for the Primary Ash Pond was prepared in October 2016 and is included as Attachment 8.

6.0 DOCUMENTATION OF CLOSURE COMPLETION TIMEFRAME

To demonstrate that the criteria in § 257.103(f)(2)(iv) has been met, "the owner or operator must submit the closure plan required by § 257.102(b) and a narrative that specifies and justifies the date by which they intend to cease receipt of waste into the unit in order to meet the closure deadlines An addendum to the closure plan for the Primary Ash Pond is included as Attachment 9.

In order for a CCR surface impoundment over 40 acres to continue to receive CCR and non-CCR wastestreams after the initial April 11, 2021 deadline, the coal-fired boiler(s) at the facility must cease operation and the CCR surface impoundment must complete closure no later than October 17, 2028. As discussed below, Newton will begin construction of the Primary Ash Pond closure by July 17, 2024, and cease placing wastestreams into the Primary Ash Pond by July 17, 2027 in order for closure to be completed by this deadline.

Table 6-1 is included below to summarize the major tasks and estimated durations associated with closing the Primary Ash Pond in place. These durations are consistent with the durations experienced in the closure of over 500 acres of other CCR impoundments already completed by IPGC and its affiliates to date. The design, permitting, and procurement efforts will take place while the unit is still in operation. The first major construction effort will be to modify the pond operations by relocating the influent lines, minimizing the pond water levels, and isolating flow to a smaller portion of the current 404-acre impoundment that can be closed during the last two construction seasons. IPGC expects that the impoundment operating area will be reduced to approximately 40-50 acres during this effort. This reduction in footprint may require the addition of chemical feeds to provide adequate treatment with the reduction in residence time; however, it will simultaneously allow for continued operation of the plant to maintain generating capacity for the MISO markets and minimize the risk to the environment both by minimizing the potential for any impacts to groundwater and by opening up a significant portion of the remaining impoundment to allow for dewatering, grading, and closure.

Table 6-1 provides estimates for the durations required to close a portion of the pond footprint after the date noted to begin construction of closure (Phase 1), as well as the current estimates for the closure of the active area (Phase 2, remaining 40-50 acres). In order to dewater the impoundment, IPGC will likely release pond water through the existing Outfall 001 and employ pumps as necessary, and potentially an engineered dewatering system such as wellpoints to aid in stabilizing the material. As the water level is lowered and the material is stabilized, the contractor will work across the pond re-grading the existing CCR material to achieve positive drainage. As grading is completed in certain areas, the contractor may begin placing the final cover system which will consist of an 18-inch infiltration layer and 6-inch erosion layer in accordance with the requirements of the CCR Rule (or an alternative cover system that meets these minimum standards). The Phase 1 cover installation schedule will overlap with the Phase 1 grading schedule and is expected to finish approximately two months after the grading effort is completed. Once cover is placed, the area will be seeded and stabilized. The schedule for this activity will overlap with the cover installation schedule and finish one month after the cover system is placed. Closure is essentially completed once the erosion control layer is placed, so the final month of this activity will provide additional float to the schedule.

Table 6-1: Newton Primary Ash Pond Closure Schedule

Action	Estimated Timeline (Months)
Spec, bid, and Award Engineering Services for CCR Impoundment Closure	3
Finalize CCR unit closure plan and seek IEPA approval for CCR unit closure	12
Obtain environmental permits (based on IEPA approval of closure plan): • State Waste Pollution Control Construction/Operating Permit • NPDES Industrial Wastewater Permit Modification • General NPDES Permit for Storm Water Discharges from Construction Site Activities and Storm Water Pollution Prevention Plan (SWPPP) • Proposed 35 Ill. Admin Code 845 operating permit application is due NLT September 2021. Construction permit application is anticipated to be due NLT July 2022.	21
Spec, bid, and Award Construction Services for CCR Impoundment Closure	3
Begin Construction of Closure Date	July 17, 2024
Minimize Active Area of Impoundment / Dewater Phase 1 Area	9
Regrade CCR Material in Phase 1 Area	24
Install Cover System – Phase 1 Area*	18
Establish Vegetation – Phase 1 Area**	2

Action	Estimated Timeline (Months)
Cease Placement of Waste	July 17, 2027
Dewater Impoundment – Phase 2 Area	3
Regrade CCR Material – Phase 2 Area	6
Install Cover System – Phase 2 Area	5
Establish Vegetation, Perform Site Restoration Activities, Complete Closure, and Initiate Post-Closure Care**	2
Total Estimated Time to Complete Closure	90 months
Date by Which Closure Must be Complete	October 17, 2028

* Activity expected to overlap with grading operations, finishing 2 months after grading is completed.

** Activity expected to overlap with cover system installation, finishing 1 month after cover installation is completed.

7.0 CONCLUSION

Based upon the information included in and attached to this demonstration, IPGC has demonstrated that the requirements of 40 C.F.R. § 257.103(f)(2) are satisfied for the 404-acre Primary Ash Pond at Newton. This CCR surface impoundment is needed to continue to manage the CCR and non-CCR wastestreams identified in Section 3.2 and 3.3 above, is larger than 40 acres, and the boilers at the station will cease coal-fired operation and the Primary Ash Pond will be closed by the October 17, 2028 deadline. Therefore, this CCR unit qualifies for the site-specific alternative deadline for the initiation of closure authorized by 40 C.F.R. § 257.103(f)(2).

Therefore, it is requested that EPA approve IPGC's demonstration and authorize the Primary Ash Pond at Newton to continue to receive CCR and non-CCR wastestreams notwithstanding the deadline in § 257.101(a)(1) and to grant the alternative deadline of October 17, 2028, by which to complete closure of the impoundment.

APPENDIX A – SITE PLAN

PRELIMINARY - NOT FOR CONSTRUCTION

0 1500' 3000'
SCALE IN FEET

N

BURNS McDONNELL

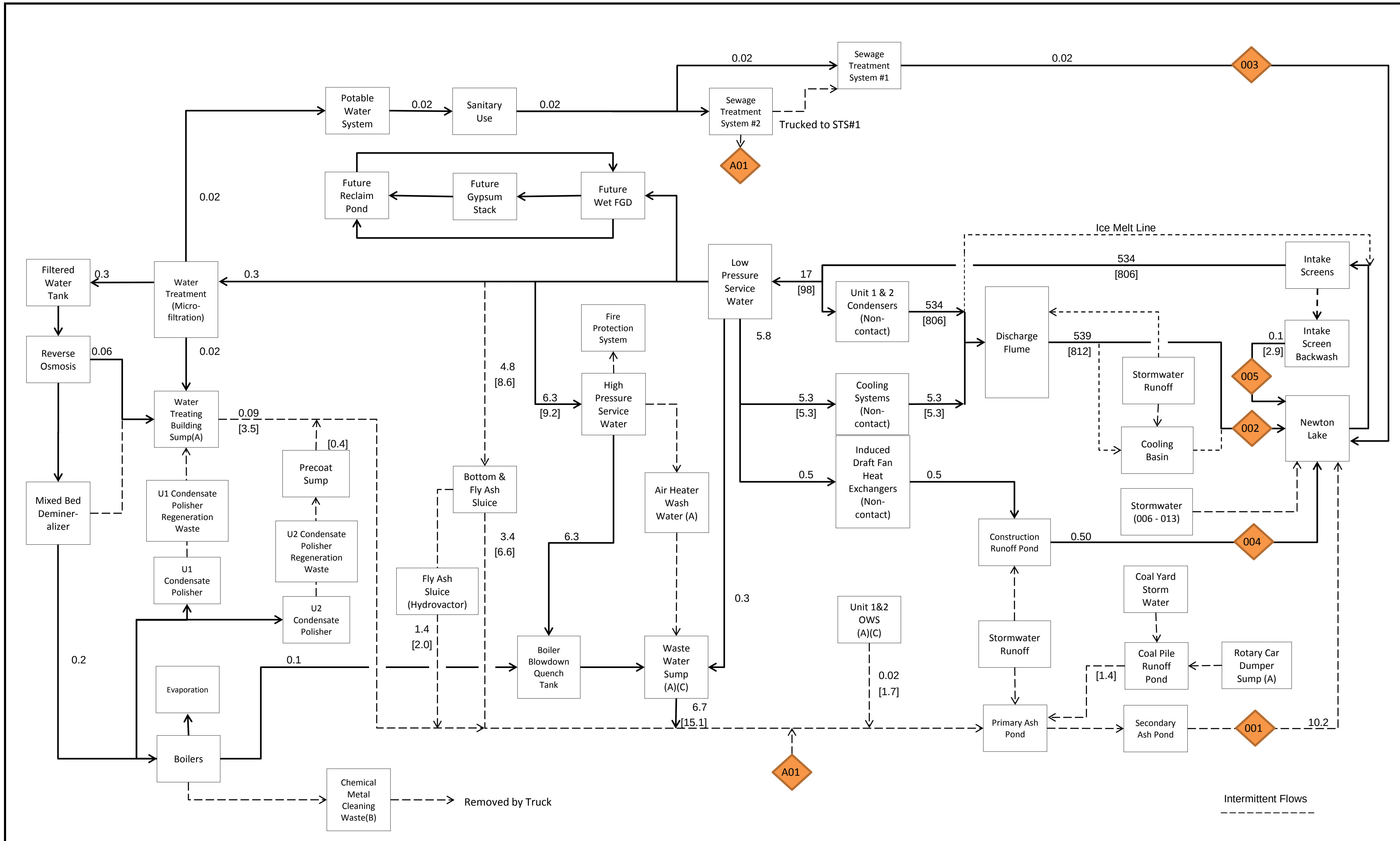
date 3/30/2020
designed A, MYERS

LUMINANT
NEWTON POWER STATION
SITE PLAN

project 122702
contract -
dwg **FIGURE 1**

3/31/2020 \\bmcd\dfs\Clients\ENR\VistraEnergy\122702_ALTuseDisposal\Design\Civil\Dwgs\Sketches\Newton_Figure1.dgn

APPENDIX B – WATER BALANCE DIAGRAM



Notes:

1 Flows shown as: Average [Maximum]

2 Flow units = Million Gallons per Day

3 Maximum Ash Sluicing Flow from 2 x 3000 gpm Ash Sluicing Pump Capacity.

4 Average Ash Sluicing Pump Flow from Ash Sluicing Pump Capacity and Hours of Operation data, 1/1/14 through 8/6/15

5 Contributors to Maximum Circulating Water Flow from Engineering Data Book. Flow assumes that the 8 x 70,000 gpm pumps are shared.

6 CCW HX service water flow, Screen Wash Pumps, LP Service Water Pumps, HP Service Water Pumps, Vertical Coal Yard Pumps, Oil Separator Sump Pumps, Waste Water Sump Pumps, Water Treatment Building Sump Pumps, Precoat Sump Pumps, from Engineering Data Book.

7 Source of average flows not otherwise indicated is the Newton ICR Water Balance, effective January 1, 2015.

8 Average Outfall 001 & 002 flow from DMR data 4/30/2012 through 6/30/2015.

9 Components representing the Water Treatment Plant Sump, Precoat Sump, Waste Water Sump, and Rotary Car Dumper Sump have been added to clarify how waste water streams are collected before discharge to the Ash Pond.

(A) Non-Chemical Metal Cleaning Includes:
Precipitator Cleaning
Boiler Fireside Cleaning
Economizer Cleaning
Air Heater Cleaning
Boiler Water Side Rinse Water
Condenser Tube Cleaning
Misc. Non-Chemical Cleaning

(B) Chemical Metal Cleaning Wastewater Includes:
Boiler Tube Cleaning
Condenser Tube Cleaning
Misc. Chemical Metal Cleaning

(C) Includes:
Soot Blower Thermal Drains
Ash Hopper Overflow
Ash Pit Sumps
Boiler House Floor Drains
Strainer Backwash
Misc. Contributory Flows

OWS Oil/Water Separator
SCR Selective Catalytic Reduction
U1 Unit 1
U2 Unit 2

Owner: Engineer:

Dynegy

Effluent Limitation Guidelines Compliance Planning Study
Preliminary Water Balance - Newton

MSK-NEW-WB-001

Drawing Release Record

Rev	Date	Prepared	Reviewed	Approved	Purpose
A0	4-Sep-15	M. Heermann	M. Rosen	A. Baker	Initial Issue
A1	12-Oct-15	M. Heermann	M. Rosen	A. Baker	Incorporated Client Comments
A2	10-Nov-15	M. Cruz	M. Heermann	A. Baker	Incorporated Plant Comments

Project No: 12160-162

ATTACHMENT 1 – RISK MITIGATION PLAN

RISK MITIGATION PLAN - 40 C.F.R. § 257.103(f)(2)(v)(B)

INTRODUCTION

To demonstrate that the criteria in 40 C.F.R. § 257.103(f)(2)(ii) has been met, Illinois Power Generating Company (IPGC) has prepared this Risk Mitigation Plan for the Newton Primary Ash Pond located in Newton, Illinois.

- EPA is requiring a risk mitigation plan to "address the potential risk of continued operation of the CCR surface impoundment while the facility moves towards closure of their coal-fired boiler(s), to be consistent with the court's holding in *USWAG* that RCRA requires EPA to set minimum criteria for sanitary landfills that prevent harm to either human health or the environment." 85 Fed. Reg. at 53,516, 53,548 (Aug. 28, 2020).

As required by § 257.103(f)(2)(v)(B), the Risk Mitigation Plan must describe the "measures that will be taken to expedite any required corrective action," and contain the three following elements:

- First, "a discussion of any physical or chemical measures a facility can take to limit any future releases to groundwater during operation." § 257.103(f)(2)(v)(B)(1). In promulgating this requirement, EPA explained that this "might include stabilization of waste prior to disposition in the impoundment or adjusting the pH of the impoundment waters to minimize solubility of contaminants [and that] [t]his discussion should take into account the potential impacts of these measures on Appendix IV constituents." 85 Fed. Reg. at 53,548.

- Second, "a discussion of the surface impoundment's groundwater monitoring data and any found exceedances; the delineation of the plume (if necessary based on the groundwater monitoring data); identification of any nearby receptors that might be exposed to current or future groundwater contamination; and how such exposures could be promptly mitigated." § 257.103(f)(2)(v)(B)(2).

- Third, "a plan to expedite and maintain the containment of any contaminant plume that is either present or identified during continued operation of the unit." § 257.103(f)(2)(v)(B)(3). In promulgating this final requirement, EPA explained that "the purpose of this plan is to demonstrate that a plume can be fully contained and to define how this could be accomplished in the most accelerated timeframe feasible to prevent further spread and eliminate any potential for exposures." 85 Fed. Reg. at 53,549. In addition, EPA stated that "this plan will be based on relevant site data, which may include groundwater chemistry, the variability of local hydrogeology, groundwater elevation and flow rates, and the presence of any surface water features that would influence rate and direction of contamination movement. For example, based on the rate and direction of groundwater flow and potential for diffusion of the plume, this plan could identify the design and spacing of extraction wells necessary to prevent further downgradient migration of contaminated groundwater." 85 Fed. Reg. at 53,549.

Consistent with these requirements and guidance, IPGC plans to continue to mitigate the risks to human health and the environment from the Newton Primary Ash Pond as detailed in this Risk Mitigation Plan.

1 OPERATIONAL MEASURES TO LIMIT FUTURE RELEASES TO GROUNDWATER– 40 C.F.R. § 257.101(F)(2)(V)(B)(1)

The Newton Primary Ash Pond is a 404-acre CCR surface impoundment. Consistent with the requirements of the CCR rule, compliance documents on Newton's CCR public website reflect the characterization of the Primary Ash Pond as a single unit for purposes of groundwater monitoring and closure activities.

The Newton CCR surface impoundment receives CCR transport waters from bottom ash and economizer ash plus non-CCR process waters onsite before discharging to the Newton Cooling Pond via Outfall 001 in accordance with NPDES Permit No. IL0049191.

At the Newton Primary Ash Pond, none of the Appendix IV parameter have reported SSLs, or SSLs above their respective Ground Water Protection Standards (GWPSs) as sampled and analyzed per the CCR surface impoundment's groundwater monitoring program. Therefore, Newton's current physical treatment operation adequately limits potential risks to human health and the environment during operation. Newton will continue this treatment process for the CCR surface impoundment until such time as closure is required per 40 CFR 257. The facility's current physical treatment process is discussed below.

1.1 CURRENT OPERATION OF PHYSICAL TREATMENT

Fly ash and economizer ash are normally captured dry and either hauled offsite for beneficial use or disposed of in the CCR surface impoundment. Therefore, during normal operations, fly ash transport waters are not conveyed to the CCR surface impoundment.

Also, as part of normal operations, bottom ash and economizer ash are transported through the sluice lines into the CCR surface impoundment where some of the bottom ash goes offsite for beneficial reuse. The CCR surface impoundment is also a wastewater treatment settling system which allows the solids to settle.

Therefore, since fly ash transport water is not normally conveyed to the CCR surface impoundment and some of the bottom ash solids are removed from the CCR surface impoundment, the current operation of Newton's CCR surface impoundment limits future releases to groundwater during operation, and consequently no potential safety impacts or exposure to human health or environmental receptors are expected to result.

If Appendix IV releases are discovered per the facility's groundwater monitoring program, IPGC will test, evaluate, and implement a chemical treatment method (i.e. pH adjustment, coagulation, precipitation, or other method as determined) for the Newton CCR Impoundment to limit potential risks to human health and the environment during operation.

2 GROUNDWATER IMPACTS, RECEPTORS, AND POTENTIAL EXPOSURE MITIGATION - 40 C.F.R. § 257.101(F)(2)(V)(B)(2)

The Newton Primary Ash Pond, with a footprint of approximately 404 acres (Figure 1), currently remains in detection monitoring. Any statistically significant increases (SSIs) of Appendix III parameter concentrations have previously been addressed through alternate source demonstrations (ASDs) (see Attachment 1, 2019 Annual Groundwater Monitoring and Corrective Action Report, Newton Primary Ash Pond, Newton Power Station [Ramboll,2020]). A summary of the detection monitoring program, including constituents with reported SSIs and ASD completions, are provided in Table 1. Since there have been no SSLs or GWPS exceedances to date, no plume delineation maps have been necessary.

<u>Receptors</u>

Should a release to groundwater for one or more Appendix IV constituents occur in the future, the two primary risks to human health and environmental receptors are via impacted groundwater and surface water. Groundwater potentially impacted by CCR constituents from the Newton Primary Ash Pond that is used for residential purposes, including for drinking water, is likely an incomplete pathway. There are no industrial, commercial or domestic use water wells located in a downgradient or cross-gradient groundwater flow direction relative to the Primary Ash Pond that are at risk of impacts from a release.

Impacted groundwater potentially migrating to nearby surface water bodies - specifically Newton Lake located east, south and southwest – could be an exposure pathway, but does not pose a risk to human health as there are no surface water intakes within 2,500 feet of the Newton property line.

Ambient groundwater flow beneath the Primary Ash Pond is generally south to southwest towards Newton Lake. Although there are localized variations in groundwater flow directions beneath different areas of the ash pond – west, east and south - the overall flow direction is towards Newton Lake. The hydraulic gradient beneath the impoundment under normal ambient conditions is approximately 0.007 ft/ft with a flow velocity of approximately 0.12 ft/day (refer to the description of hydrogeology attached to the alternative closure demonstration letter).

<u>Exposure Mitigation</u>

Mitigation of future potential exposures to groundwater contamination from continued operation of the Primary Ash Pond is discussed in detail in the following section.

3 CONTAMINANT PLUME CONTAINMENT: OPTIONS EVALUATION AND PLAN - 40 C.F.R. § 257.101(F)(2)(V)(B)(3)

Appropriate corrective measure(s) to address future potential impacted groundwater associated with the Newton Primary Ash Pond are based on impacts to the Uppermost Aquifer. The Uppermost Aquifer is the Mulberry Grove Member, which typically consists of fine to coarse sand with varying amounts of clay, silt, and fine to coarse gravel. The portion of the Mulberry Grove Member at the site that is defined as a sand layer ranges in thickness from 3 to 17 ft with an average thickness of 8 ft and with only a few exceptions occurs between depths of 55 to 88 ft below ground surface. Overlying units consist predominantly of low permeability clays and silts with occasional and discontinuous lenses of silt, sand, and gravel (refer to the description of hydrogeology attached to the alternative closure demonstration letter).

Since there has been no release of Appendix IV constituents to groundwater above GWPS(s), which would trigger a Corrective Measures Assessment (CMA) under 40 C.F.R. § 257.96 based on specific parameter concentrations and contaminant plume dimensions, several options are evaluated to address potential future plume containments. The evaluation criteria for assessing remedial options are the following: performance; reliability; ease of implementation; potential impacts of the remedies (safety, cross-media, and control of exposure to residual contamination); time required to begin and complete the remedy; and, institutional requirements that may substantially affect implementation of the remedy(s), such as permitting, environmental or public health requirements.

Although future potential source control measures (e.g. closure in place, closure by removal to on-site or off-site landfill, in-situ solidification/stabilization) to mitigate groundwater impacts are typically considered as part of a CMA process, the shorter-term options considered for mitigating groundwater impacts relative to a potential future release of one or more Appendix IV constituents at Newton are as follows:

- Monitored Natural Attenuation (MNA)
- Groundwater Cutoff Wall
- In-Situ Chemical Treatment
- Permeable Reactive Barrier
- Groundwater Extraction

These same groundwater remedial corrective measures will be evaluated for all Appendix IV constituents that present a future risk to human health or the environment.

<u>Monitored Natural Attenuation (MNA)</u>
Upon notification of a release of one or more Appendix IV parameter(s) to groundwater, MNA will be evaluated with site-specific characterization data and geochemical analysis as a long term remedial option, combined with source control measures, through application of the USEPA's tiered approach to MNA (USEPA 1999, 2007 and 2015):

1. Demonstrate that the area of groundwater impacts is not expanding.

2. Determine the mechanisms and rates of attenuation.

3. Determine that the capacity of the aquifer is sufficient to attenuate the mass of constituents in groundwater and that the immobilized constituents are stable and will not remobilize.

4. Design a performance monitoring program based on the mechanisms of attenuation and establish contingency remedies (tailored to site-specific conditions) should MNA not perform adequately.

MNA is not regarded as a short-term remedial option for contaminant plume containment, but as a potential long-term option following implementation of shorter term control measures.

<u>Groundwater Extraction</u>

This corrective measure includes installation of a series of groundwater pumping wells or trenches to control and extract impacted groundwater. Groundwater extraction captures and contains impacted groundwater and can limit plume expansion and/or off-site migration. Construction of a groundwater extraction system typically includes, but is not limited to, the following primary project components:

- Designing and constructing a groundwater extraction system consisting of a series of extraction wells or trenches located around the perimeter of the contaminant plume and operating at a rate to allow capture of CCR impacted groundwater.
- Designing a system to manage extracted groundwater, which may include modification to the existing NPDES permit, including treatment prior to discharge, if necessary.
- Ongoing inspection and maintenance of the groundwater extraction system.

Installation of a groundwater extraction system, whether wells or trenches, can be expedited with the assumption that there is a good conceptual site model (CSM) of the hydrogeological system around the CCR unit, groundwater flow and transport model, and aquifer test if a well system is the best option for intercepting the groundwater contaminant plume. Upon notification of an SSL exceedance of a GWPS for one or more Appendix IV constituents, an aquifer test will be conducted, and groundwater model developed for designing a groundwater extraction system for optimization of contaminant plume capture.

A schematic of a typical groundwater extraction well is shown on Figure 2. Based on site specific hydrogeology and future potential plume width and depth, a groundwater extraction system will typically consist of one to three extraction wells with pitless adapter's manifolded together with HDPE conveyance pipe to a common tank or lined collection vault prior to treatment at the on-site wastewater treatment plant and discharge via the NPDES permitted outfall.

<u>Groundwater Cutoff Wall</u>

Vertical cutoff walls are used to control and/or isolate impacted groundwater. Low permeability cutoff walls can be used to prevent horizontal off-site migration of potentially impacted groundwater. Cutoff walls act as barriers to migration of impacted groundwater and can isolate soils that have been impacted by CCR to prevent contact with unimpacted groundwater. Cutoff walls are often used in conjunction with an interior pumping system to establish a reverse gradient within the cutoff wall. The reverse gradient maintains an inward flow through the wall, keeping it from acting as a groundwater dam and controlling potential end-around or breakout flow of contaminated groundwater.

A commonly used cutoff wall construction technology is the slurry trench method, which consists of excavating a trench and backfilling it with a soil-bentonite mixture, often created with the soils excavated from the trench. The trench is temporarily supported with bentonite slurry that is pumped into the trench as it is excavated. Excavation for cutoff walls is conducted with conventional hydraulic excavators, hydraulic excavators equipped with specialized booms to extend their reach (*i.e.*, long-stick excavators), or chisels and clamshells, depending upon the depth of the trench and the material to be excavated. For a cutoff wall to be technically feasible, there must be a low-permeability lower confining layer into which the barrier can be keyed, and it must be at a technically feasible depth.

Permeable Reactive Barrier

Chemical treatment via a Permeable Reactive Barrier (PRB) is defined as an emplacement of reactive materials in the subsurface designed to intercept a contaminant plume, provide a flow path through the reactive media, and transform or otherwise render the contaminant(s) into environmentally acceptable forms to attain remediation concentration goals downgradient of the barrier (EPRI, 2006).

As groundwater passes through the PRB under natural gradients, dissolved constituents in the groundwater react with the media and are transformed or immobilized. A variety of media have been used or proposed for use in PRBs. Zero-valent iron has been shown to effectively immobilize CCR constituents, including arsenic, chromium, cobalt, molybdenum, selenium and sulfate. Zero-valent iron has not been proven effective for boron, antimony, or lithium (EPRI, 2006).

System configurations include continuous PRBs, in which the reactive media extends across the entire path of the contaminant plume; and funnel-and-gate systems, where barrier walls are installed to control groundwater flow through a permeable gate containing the reactive media. Continuous PRBs intersect the entire contaminant plume and do not materially impact the groundwater flow system. Design may or may not include keying the PRB into a low-permeability unit at depth. Funnel-and-gate systems utilize a system of barriers to groundwater flow (funnels) to direct the contaminant plume through the reactive gate. The barriers, typically some form of cutoff wall, are keyed into a low-permeability unit at depth to prevent short circuiting of the plume. Funnel-and-gate design must consider the residence time to allow chemical reactions to occur. Directing the contaminant plume through the reactive gate can significantly increase the flow velocity, thus reducing residence time.

Design of PRB systems requires rigorous site investigation to characterize the site hydrogeology and to delineate the contaminant plume. A thorough understanding of the geochemical and redox characteristics of the plume is critical to assess the feasibility of the process and select appropriate reactive media. Laboratory studies, including batch studies and column studies using samples of site groundwater, are needed to determine the effectiveness of the selected reactive media at the site (EPRI, 2006).

This is a potential viable option for groundwater corrective measures, to be evaluated further, but is not a short-term solution that can be implemented expeditiously.

In-Situ Chemical Treatment

In-situ chemical treatment for inorganics are being tested and applied with increasing frequency. In-situ chemical treatment includes the targeted injection of reactive media into the subsurface to mitigate groundwater impacts. Inorganic contaminants are typically remediated through immobilization by reduction or oxidation followed by precipitation or adsorption (EPRI, 2006). Chemical reactants that have been applied or are in development for application in treating inorganic contaminants include ferrous sulfate, nanoscale zero-valent iron, organo-phosphorus nutrient mixture (PrecipiPHOS™) and sodium dithionite (EPRI, 2006). Zero-valent iron has been shown to effectively immobilize cobalt and molybdenum. Implementation of in-situ chemical treatment requires detailed technical analysis of field hydrogeological and geochemical conditions along with laboratory studies.

This is a potential viable option for groundwater corrective measures, to be evaluated further, but is not a short-term solution that can be implemented expeditiously.

3.1 CONTAINMENT PLAN

Based on the options evaluated for containment of a future potential groundwater contaminant plume originating from the Newton Primary Ash Pond for one or more Appendix IV constituents exceeding their GWPS(s), the most viable short-term option of those evaluated is a groundwater extraction or recovery trench system, which would allow for capture of impacted groundwater and prevention of further plume migration towards the principal receptor, which has been identified as Newton Lake to the south.

In circumstances where there is not an immediate concern of endangerment to human health or the environment, other longer-term corrective measures may be more viable. The principal method under consideration for controlling potential future Appendix IV parameter releases is MNA. MNA is a potentially viable corrective measure that will be further evaluated for use at the Newton Primary Ash Pond.

Depending on the location, depth, and plume geometry of any future potential Appendix IV exceedances of GWPSs, the specific parameter(s) with exceedances, and distance from potential receptors, the other groundwater corrective measures discussed as part of the corrective options evaluation – groundwater cutoff wall, permeable reactive barrier, and in-situ chemical treatment – are all secondary remedial alternatives available for consideration following the current primary options of groundwater extraction for short-term application and MNA for long-term application.

4 REFERENCES

Electric Power Research Institute (EPRI), 2006. Groundwater Remediation of Inorganic Constituents at Coal Combustion Product Management Sites, Overview of Technologies, Focusing on Permeable Reactive Barriers. Electric Power Research Institute, Palo Alto, California. Final Report 1012584, October 2006.

Ramboll, 2020. 2019 Annual Groundwater Monitoring and Corrective Action Report, Newton Primary Ash Pond, Newton Power Station, Newton, Illinois. January 31, 2020.

USEPA, 1999. Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. Directive No. 9200.U-17P. Washington, D.C.: EPA, Office of Solid Waste and Emergency Response.

USEPA, 2007. Monitored Natural Attenuation of Inorganic Contaminants in Ground Water, Volume 1 – Technical Basis for Assessment. EPA/600/R-07/139. National Risk Management Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio. October 2007.

USEPA, 2015. Use of Monitored Natural Attenuation for Inorganic Contaminants in Groundwater at Superfund Sites. Directive No. 9283.1-36. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. August 2015.

TABLES

Table 1 - Detection Monitoring Program Summary, Newton Primary Ash Pond

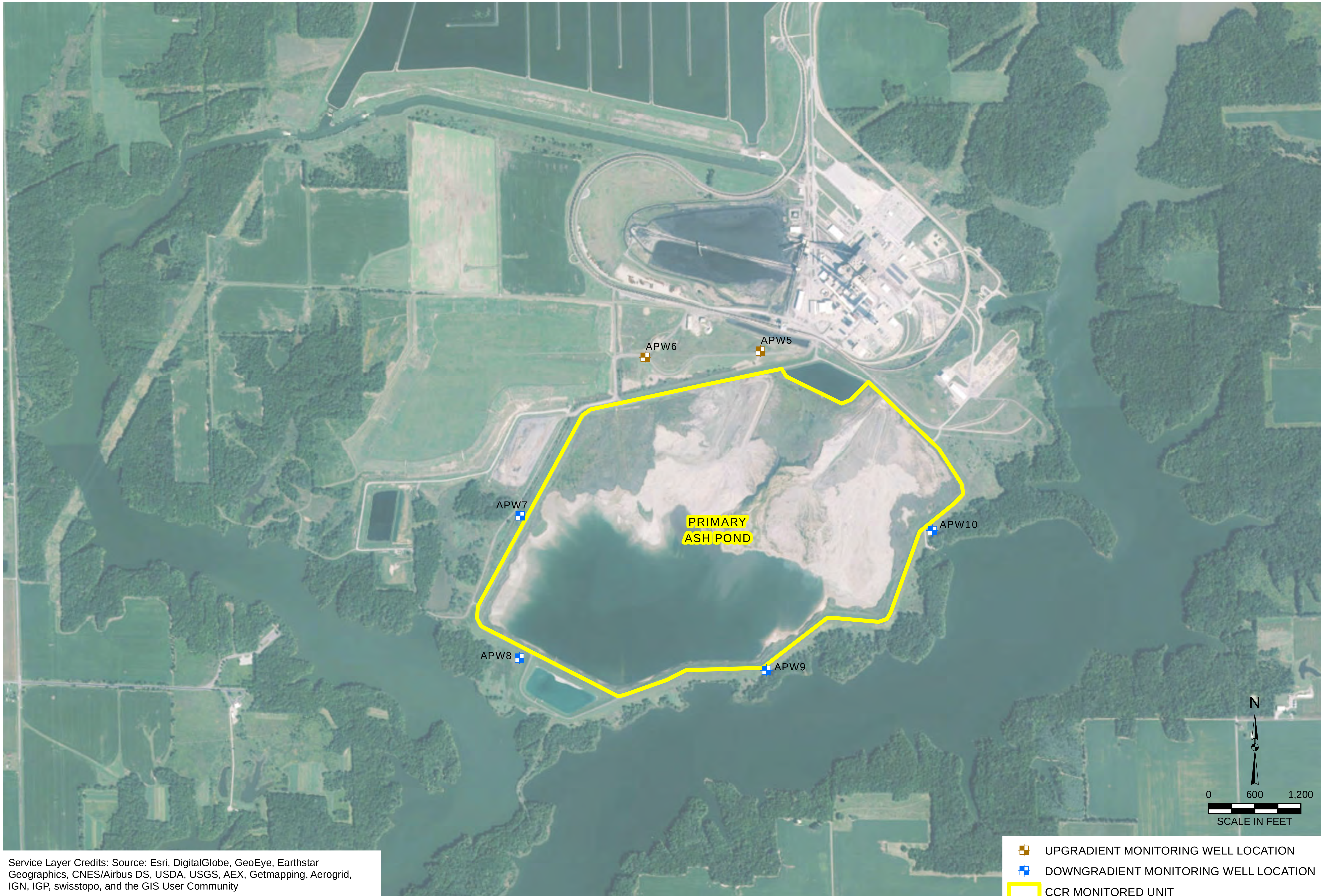
Sampling Dates	Analytical Data Receipt Date	Parameters Collected	SSI(s) Appendix III	SSI(s) Determination Date	ASD Completion Date	CMA Completion / Status
November 17-18, 2017	December 5, 2017	Appendix III	Calcium (APW7, APW8, APW9, APW10) Chloride (APW7, APW9) Sulfate (APW8, APW10)	January 9, 2018	April 9, 2018	NA
May 18, 2018	July 9, 2018	Appendix III	Calcium (APW7, APW8, APW9, APW10) Chloride (APW7, APW9) Sulfate (APW8, APW10)	October 7, 2018	January 7, 2019	NA
August 17-18, 2018	October 8, 2018	Appendix III Greater than Background[1]	above confirmed	NA	NA	NA
November 9, 2018	January 16, 2019	Appendix III	Calcium (APW8, APW10) Fluoride (APW9) Sulfate (APW8, APW9, APW10)	April 15, 2019	July 15, 2019	NA
February 22, 2019	April 15, 2019	Appendix III	Calcium (APW8, APW10) Fluoride (APW7, APW9) Sulfate (APW7, APW8, APW9, APW10)	July 15, 2019	October 14, 2019	NA
August 22-23, 2019	October 28, 2019	Appendix III	Calcium (APW8, APW10) Chloride (APW8) Sulfate (APW7, APW8, APW9, APW10)	January 27, 2020	April 27, 2020	NA
February 4-5, 19, 2020	April 16, 2020	Appendix III	Calcium (APW7, APW8, APW9, APW10) Chloride (APW7, APW9) Sulfate (APW8, APW10)	July 14, 2020	TBD (October 2020)	NA
June 11, 2020	June 19, 2020	Appendix III Greater than Background[1]	Chloride (APW7, APW9)	NA	NA	NA

[O: RAB 9/11/20; C: EJT 9/16/20]

Notes:

CMA = Corrective Measures Assessment
NA = Not Applicable
TBD = To Be Determined
1. To confirm SSIs, as allowed by the Statistical Analysis Plan, groundwater samples were collected and analyzed for Appendix III parameters initially detected at concentrations greater than statistical background values in the preceding sampling event.

FIGURES



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

UPGRADIENT MONITORING WELL LOCATION
DOWNGRADIENT MONITORING WELL LOCATION
CCR MONITORED UNIT

DRAWN BY/DATE:
MDM 10/13/15
REVIEWED BY/DATE:
YAD 10/14/15
APPROVED BY/DATE:
SJC 10/16/15

SITE AND WELL LOCATION MAP
NEWTON PRIMARY ASH POND
UNIT ID: 501

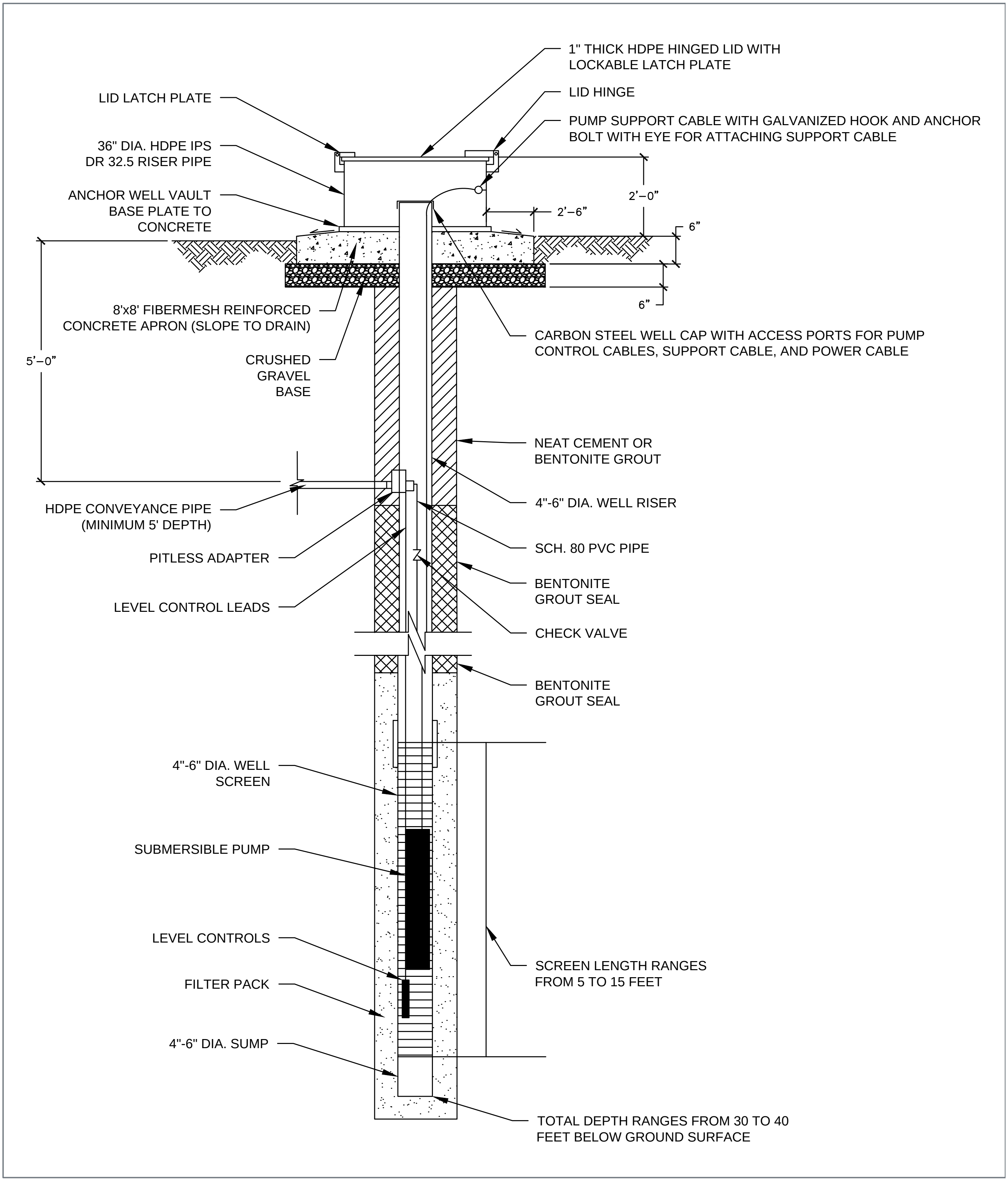
SAMPLING AND ANALYSIS PLAN
DYNEGY CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

PROJECT NO: 2285/4.3

FIGURE NO: 1

NATURAL RESOURCE TECHNOLOGY

Y:\Mapping\Projects\22\2285\MXD\SAP\Figure 1_Site and Well Location Map - Newton Primary Ash Pond.mxd Author: mmejac; Date/Time: 10/16/2015, 9:32:33 AM



PROJECT: RAMBOLL PROJECT NUMBER DATED: 9/10/2020 5:12 PM DESIGNER: ENGELHSA \\ramboll.sharepoint.com@SSL\DavWWWRoot\sites\vistra\Shared Documents\-CCR GW\Drawings\CAD\Gradient Control Well.dwg

NOTES
1. NOT TO SCALE

TYPICAL HYDRAULIC GRADIENT CONTROL WELL DETAIL

FIGURE 2

ILLINOIS POWER GENERATING COMPANY
NEWTON PRIMARY ASH POND
NEWTON, ILLINOIS

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

ATTACHMENT 1

Prepared for

Illinois Power Generating Company

Document type

2019 Annual Groundwater Monitoring and Corrective Action Report

Date

January 31, 2020

2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

NEWTON PRIMARY ASH POND, NEWTON POWER STATION

Bright ideas. Sustainable change.

2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT NEWTON PRIMARY ASH POND, NEWTON POWER STATION

Project name	**Newton Power Station**
Project no.	**72760**
Recipient	**Illinois Power Generating Company**
Document type	**Annual Groundwater Monitoring and Corrective Action Report**
Version	**FINAL**
Date	**January 31, 2020**
Prepared by	**Kristen L. Theesfeld**
Checked by	**Nicole M. Pagano**
Approved by	**Eric J. Tlachac**
Description	**Annual Report in Support of the CCR Rule Groundwater Monitoring Program**

Ramboll
234 W. Florida Street
Fifth Floor
Milwaukee, WI 53204
USA

T 414-837-3607
F 414-837-3608
https://ramboll.com

Kristen L. Theesfeld
Hydrogeologist

Nicole M. Pagano
Senior Managing Engineer

CONTENTS

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

ASD	Alternate Source Demonstration
CCR	Coal Combustion Residuals
PAP	Primary Ash Pond
SAP	Sampling and Analysis Plan
SSI	Statistically Significant Increase

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 2019 (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 during one or more sampling events in 2019:

- Calcium at wells APW7, APW8, APW9, and APW10
- Chloride at wells APW7 and APW9
- Fluoride at wells APW7 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 Statistically Significant Increase relative to background levels).
5. Other information required to be included in the Annual Report as specified in §§ 257.90 through 257.98.

This report provides the required information for Newton PAP for calendar year 2019.

2. MONITORING AND CORRECTIVE ACTION PROGRAM STATUS

No changes have occurred to the monitoring program status in calendar year 2019, and Newton PAP remains in the Detection Monitoring Program in accordance with 40 C.F.R. § 257.94.

3. KEY ACTIONS COMPLETED IN 2019

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 2019 (no wells were installed or decommissioned). 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 2019 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.

Analytical results for the May, August, and November 2018 sampling events were provided in the 2018 Annual Groundwater Monitoring and Corrective Action Report.

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 completed in 2019 are included in Appendix A.

[1] Sampling was limited to APW7, APW8, APW9, and APW10 during the August 2018 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 – 2018–2019 Detection Monitoring Program Summary

Sampling Date	Analytical Data Receipt Date	Parameters Collected	SSI(s)	SSI(s) Determination Date	ASD Completion Date
May 18, 2018	July 9, 2018	Appendix III	Calcium (APW7, APW8, APW9, APW10) Chloride (APW7, APW9) Sulfate (APW8, APW10)	October 7, 2018	January 7, 2019
August 17-18, 2018	July 9, 2018	Appendix III Greater than Background [1]	NA	NA	NA
November 9, 2018	January 16, 2019	Appendix III	Calcium (APW8, APW10) Fluoride (APW9) Sulfate (APW8, APW9, APW10)	April 15, 2019	July 15, 2019
February 22, 2019	April 15, 2019	Appendix III	Calcium (APW8, APW10) Fluoride (APW7, APW9) Sulfate (APW7, APW8, APW9, APW10)	July 15, 2019	October 14, 2019
August 22-23, 2019	October 28, 2019	Appendix III	TBD	TBD	TBD

Notes:

NA: Not Applicable
TBD: To Be Determined
1. To confirm SSIs, as allowed by the Statistical Analysis Plan, groundwater samples were collected and analyzed for Appendix III parameters initially detected at concentrations greater than statistical background values in the preceding sampling event.

4. PROBLEMS ENCOUNTERED AND ACTIONS TO RESOLVE THE PROBLEMS

No problems were encountered with the Groundwater Monitoring Program during 2019. Groundwater samples were collected and analyzed in accordance with the SAP (NRT/OBG, 2017a), and all data were accepted.

5. KEY ACTIVITIES PLANNED FOR 2020

The following key activities are planned for 2020:

- Continuation of the Detection Monitoring Program with semi-annual sampling scheduled for the first and third quarters of 2020.
- 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 2020 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 2020 (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.
2019 ANALYTICAL RESULTS - GROUNDWATER ELEVATION AND APPENDIX III PARAMETERS
2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
NEWTON POWER STATION
UNIT ID 501 - NEWTON PRIMARY ASH POND
NEWTON, ILLINOIS
DETECTION MONITORING PROGRAM

Well Identification Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date & Time Sampled	Depth to Groundwater (ft)[1]	Groundwater Elevation (ft NAVD88)	40 C.F.R. Part 257 Appendix III						
						Boron, total (mg/L) 6020A[2]	Calcium, total (mg/L) 6020A[2]	Chloride, total (mg/L) 9251[2]	Fluoride, total (mg/L) 9214[2]	pH (field) (S.U.) SM 4500 H+B[2]	Sulfate, total (mg/L) 9036[2]	Total Dissolved Solids (mg/L) SM 2540C[2]
Background / Upgradient Monitoring Wells												
APW5	38.933964	-88.280989	2/22/2019 10:00	15.00	529.07	0.11	50	48	0.374	6.9	3.5	600
			8/22/2019 16:46	16.04	528.03	0.12	49	50	<0.250	7.0	2.3	530
APW6	38.933753	-88.286281	2/22/2019 11:07	15.49	530.58	0.09	45	24	0.386	7.3	1.7	480
			8/23/2019 8:14	16.39	529.68	0.11	55	26	0.314	7.3	5.8	500
Downgradient Monitoring Wells												
APW7	38.928239	-88.292081	2/22/2019 15:38	42.18	496.19	0.060	45	43	0.734	7.2	66	340
			8/23/2019 11:30	43.00	495.37	0.075	58	46	0.632	7.1	62	350
APW8	38.923161	-88.292292	2/22/2019 13:12	35.06	493.91	0.10	80	56	0.393	7.2	46	600
			8/23/2019 9:01	34.20	494.77	0.10	82	59	0.337	7.2	48	570
APW9	38.922325	-88.281036	2/22/2019 13:56	20.77	510.75	0.054	38	47	0.714	7.5	61	320
			8/23/2019 9:50	22.09	509.43	0.055	41	51	0.621	7.4	51	360
APW10	38.927442	-88.273133	2/22/2019 14:42	14.85	509.40	0.079	110	50	0.276	6.9	420	990
			8/23/2019 10:42	16.08	508.17	0.10	130	50	0.359	7.0	390	1000

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

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.
[1]All depths to groundwater were measured on the first day of the sampling event.
[2]4-digit numbers represent SW-846 analytical methods.

TABLE 2.
STATISTICAL BACKGROUND VALUES
2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
NEWTON POWER STATION
UNIT ID 501 - NEWTON 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

UPGRADIENT 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

2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
VISTRA CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

FIGURE 1

O'BRIEN & GERE ENGINEERS, INC.
A RAMBOLL COMPANY

RAMBOLL

PROJECT: 169000XXXX | DATED: 1/14/2020 | DESIGNER: GALARNMC

APPENDIX A
ALTERNATE SOURCE DEMONSTRATIONS

40 C.F.R. § 257.94(e)(2): ALTERNATE SOURCE DEMONSTRATION
NEWTON PRIMARY ASH POND
JANUARY 7, 2019

January 7, 2019

Title 40 of the Code of Federal Regulations (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 statistically significant increases (SSIs) 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., part of Ramboll (OBG) 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 second semi-annual detection monitoring samples (Detection Monitoring Round 2 [D2]) were collected on May 18, 2018 and analytical data were received on July 9, 2018. In accordance with 40 C.F.R. § 257.93(h)(2), statistical analysis of the data to identify SSIs of 40 C.F.R. Part 257 Appendix III parameters over background concentrations was completed by October 7, 2018, within 90 days of receipt of the analytical data. The statistical determination identified the following SSIs at downgradient monitoring wells:

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

In accordance with the Statistical Analysis Plan[1], to confirm the SSIs, wells APW7, APW8, APW9, and APW10 were resampled on August 17-18, 2018 and analyzed only for the SSI parameters at each well. Following evaluation of analytical data from the resample, the following SSIs were confirmed:

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

Pursuant to 40 C.F.R. § 257.94(e)(2), the following demonstrates that sources other than the Newton PAP were the cause of the SSIs listed above. This ASD was completed by January 7, 2019, within 90 days of determination of the SSIs, as required by 40 C.F.R. § 257.94(e)(2).

ALTERNATE SOURCE DEMONSTRATION: LINES OF EVIDENCE

Lines of evidence supporting these ASDs include the following:

1. The ionic composition of Newton PAP water is different from the ionic composition of groundwater.
2. Concentrations of calcium in the Newton PAP are lower than those observed in the groundwater.
3. Concentrations of chloride in the Newton PAP are lower than those observed in the groundwater.

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

4. Concentrations of sulfate in the Newton PAP are lower than those observed in the groundwater.
5. Concentrations of boron, a common indicator for CCR impacts to groundwater, in downgradient wells are stable and at or below concentrations in the background wells.

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

LINE OF EVIDENCE #1: THE IONIC COMPOSITION OF NEWTON PAP WATER IS DIFFERENT FROM THE IONIC COMPOSITION OF GROUNDWATER

Piper diagrams graphically represent ionic composition of aqueous solutions. A Piper diagram displays the position of water samples relative to their major cation and anion content, providing the information needed to identify compositional categories or groupings. Figure 2 is a Piper diagram that displays the ionic composition of groundwater samples from the background and downgradient monitoring wells associated with the Phase I Landfill (LF1), Phase II Landfill (LF2), and Primary Ash Pond (PAP) and LF1 leachate and PAP water based on Quarter 2 2017 and Quarter 3 2018 samples. The ionic compositional groupings identified are shown in the green, blue, purple, brown, and turquoise ellipses on the diamond portion of the Piper diagram. These are discussed in more detail below.

The results show that there are three distinct groups. Groundwater samples from the PAP background and downgradient wells (enclosed within a green ellipse) and LF2 groundwater samples (enclosed within a blue ellipse) have a very high percentage of carbonate-bicarbonate cations and no dominant cation. Groundwater samples from the LF1 wells (enclosed within a turquoise ellipse) also have no dominant cation, but these waters have a high percentage of sulfate. Surface water samples from the PAP (enclosed within a purple ellipse) and the landfill leachate (enclosed within a brown ellipse) have a very high percentage of sodium-potassium and no dominant anion and a high percentage of sulfate, respectively.

The groundwater samples for both the PAP and LF2 (enclosed within the green and blue ellipses, respectively) are tightly clustered on the Piper diagram. This tight grouping indicates either an apparent lack of outside influences on the groundwater or the apparent influence of a constant, steady-state source, such as LF1, that is influencing all the wells equally and simultaneously.

The potential presence of a mixing zone between LF2 groundwater, PAP groundwater, and LF1 groundwater suggests that LF1 is an alternate source of the elevated major anion chloride.

Neither PAP groundwater nor LF2 groundwater is trending towards, or mixing with, the PAP leachate. The apparent lack of mixing between the PAP leachate and underlying groundwater in the Uppermost Aquifer demonstrates that there is no impact to groundwater from the PAP. However, the presence of a potential mixing zone between PAP groundwater and LF1 groundwater suggests that LF1 is a source of the elevated major cation calcium and elevated major anions chloride and sulfate.

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

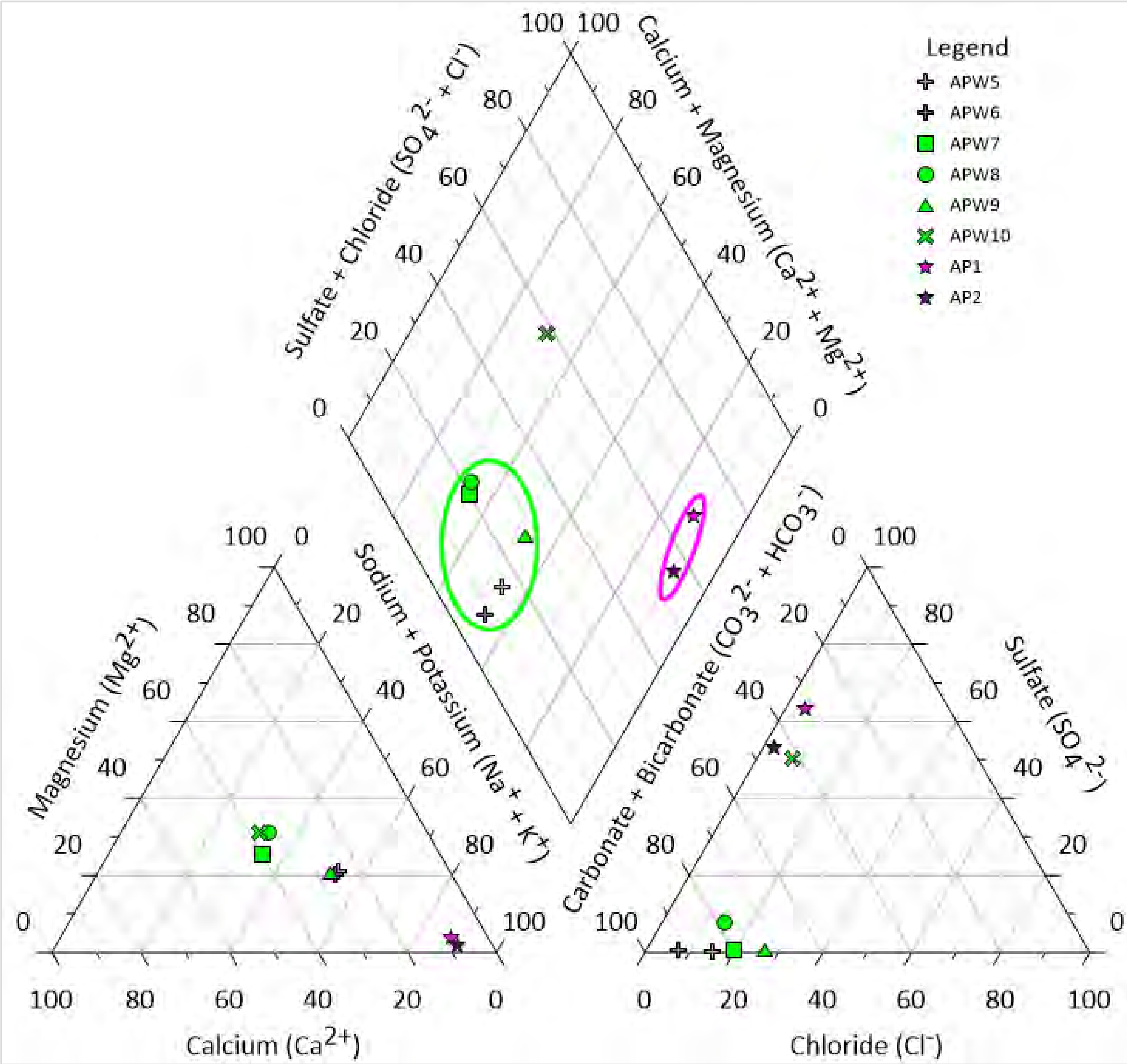


Figure 2 Piper Diagram Showing Ionic Composition of Samples of Background and Downgradient Groundwater Associated with LF1, LF2, and PAP.

Grouping	Green	Blue	Purple	Brown	Turquoise
Locations	PAP Wells Groundwater	LF2 Wells Groundwater	PAP Surface Water	LF1 Leachate	LF1 Wells Groundwater
Dominant Cation	No dominant cation	No dominant cation	**Very High Sodium-Potassium**	**Very High Sodium-Potassium**	No dominant cation
Dominant Anion	**Very High Carbonate-Bicarbonate**	**Very High Carbonate-Bicarbonate**	**No dominant anion**	**High Sulfate**	**High Sulfate**

Table 1. Summary of Ionic Classification

LINE OF EVIDENCE #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 PAP are lower than calcium concentrations in all groundwater samples from downgradient ash pond wells from 2015 through 2018. A time series for calcium concentrations is provided in Figure 3 below.

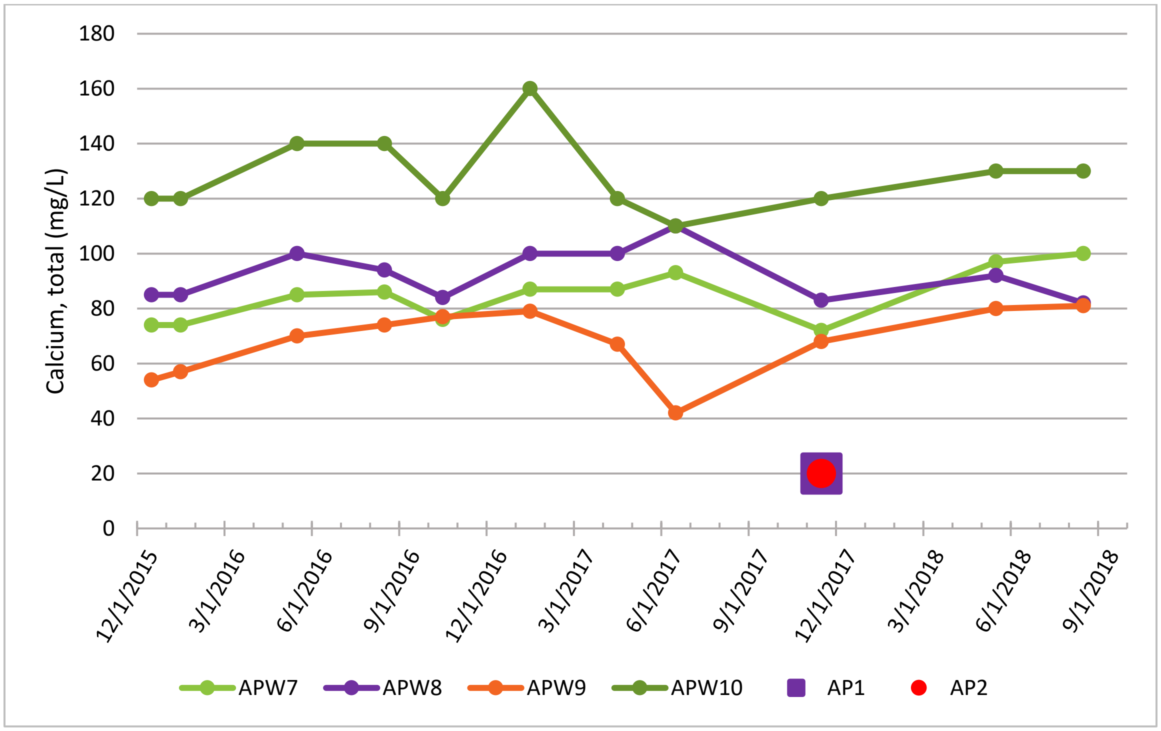


Figure 3. Calcium time series

The following observations can be made from Figure 3:

- PAP water samples AP1 and AP2 each contain 20 mg/L of calcium.
- Groundwater samples from wells APW7, APW8, APW9, and APW10 have two to eight times greater concentrations than the PAP water.

If the PAP were the source of calcium in groundwater, calcium concentrations in downgradient monitoring wells would be lower than calcium concentrations in the water in the pond; therefore, the PAP 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.

LINE OF EVIDENCE #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 PAP are lower than chloride concentrations in all groundwater samples from downgradient ash pond wells from 2015 through 2018, inclusive of wells APW7 and APW9. A time series for chloride concentrations is provided in Figure 4 below.

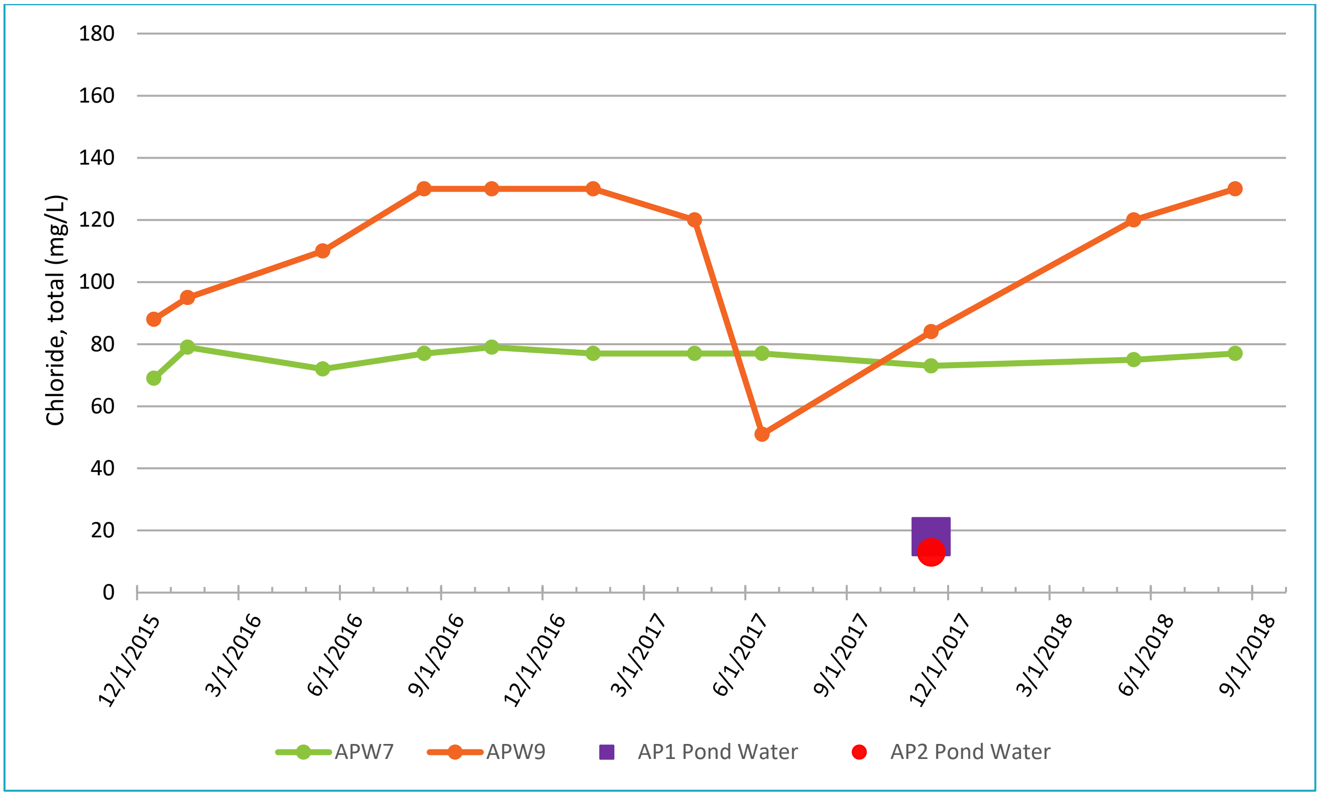


Figure 4. Chloride time series

The following observations can be made from Figure 4:

- PAP water samples AP1 and AP2 contain 18 and 13 mg/L of chloride, respectively.
- Groundwater samples from wells APW7 and APW9 have two-and-a-half to seven times greater concentrations than the PAP water.

If the PAP was the source of chloride observed in groundwater, chloride concentrations in downgradient monitoring wells APW7 and APW9 would be lower than chloride concentrations in the water in the pond; therefore, the PAP 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.

LINE OF EVIDENCE #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 PAP are lower than sulfate concentrations in all groundwater samples from downgradient ash pond well APW10 from 2015 through 2018. A time series for sulfate concentrations is provided in Figure 5 below.

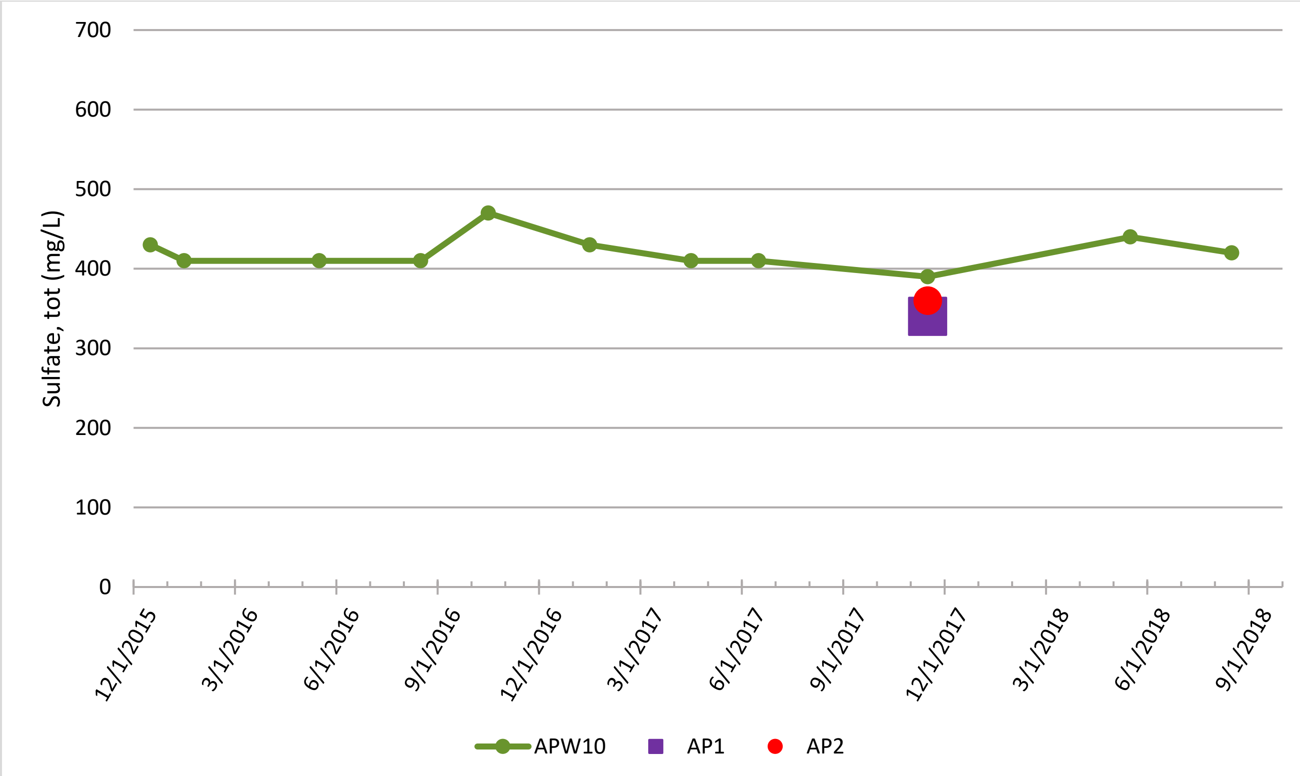


Figure 5. Sulfate time series

The following observations can be made from Figure 5:

- PAP water samples AP1 and AP2 contain 340 and 360 mg/L of sulfate, respectively.
- Groundwater samples from well APW10 have higher sulfate concentrations than the PAP water, ranging from 390 to 470 mg/L from 2015 through 2018.

If the PAP were the source of sulfate observed in groundwater samples from APW10, the sulfate concentrations in downgradient monitoring well APW10 would be lower than sulfate concentrations in the water in the pond; therefore, the PAP 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.

LINE OF EVIDENCE #5: CONCENTRATIONS OF BORON, A COMMON INDICATOR FOR CCR IMPACTS TO GROUNDWATER, IN DOWNGRADIENT WELLS ARE STABLE AND AT OR BELOW CONCENTRATIONS IN THE BACKGROUND WELLS

Boron is a primary indicator of CCR impacts to groundwater. Concentrations of boron in all downgradient monitoring wells are below upper prediction limits established using background monitoring wells (i.e. thresholds for SSIs) and are lower than median concentrations observed in background wells APW5 and APW6 from 2015 through 2018, as shown on Figure 6.

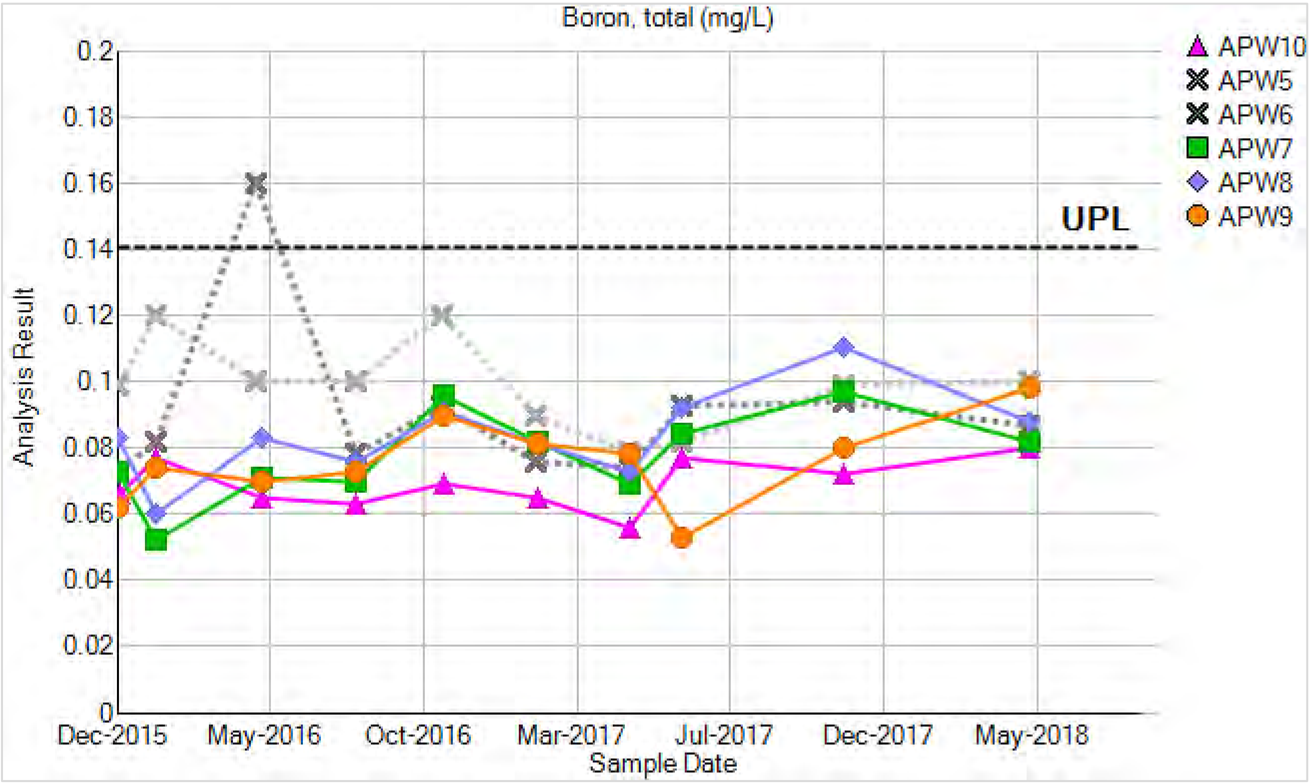


Figure 6. Boron time series showing boron concentrations in groundwater samples from background wells (gray "X"s) are higher or similar to concentrations in groundwater samples from downgradient wells.

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.
  - » If a Mann-Kendall test did not identify a trend, the coefficient of variation (CV) was calculated (Attachment B) to determine if the concentrations are stable (i.e., CV less than or equal to 1), or if there is too much data variability to draw a conclusion. All calculated CVs were less than 1, indicating concentrations are stable.
- Boron concentrations in groundwater samples from downgradient monitoring wells range from 0.052 to 0.11 mg/L and 0.073 to 0.16 mg/L in groundwater samples from background wells. The overall median boron concentration in groundwater samples collected from downgradient wells from 2015 through 2018 is 0.077 mg/L and 0.093 mg/L in groundwater samples collected from 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 C.F.R. § 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.

Attachments:

Figure 1	Monitoring Well and Source Water Location Map Newton Primary Ash Pond
Attachment A	Boron Mann-Kendall Trend Analyses
Attachment B	Coefficient of Variation Evaluation

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., part of Ramboll
Date: January 7, 2019

LICENSED PROFESSIONAL ENGINEER
ERIC J. TLACHAC
062-063091
STATE OF ILLINOIS

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., part of Ramboll
Date: January 7, 2019

LICENSED PROFESSIONAL GEOLOGIST
NICOLE M. PAGANO
196-000750
ILLINOIS

Attachments

Figures

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

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

Y:\Mapping\Projects\22\2285\MXD\Alt_Source_Dem\Figure 1_Newton Landfill Phases_PAP.mxd Author: stolzsd;

Attachment A

Boron Mann-Kendall Trend Analyses

Newton
Mann-Kendall Trend Analysis

User Supplied Information

Location ID:	**APW7**	**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 08/31/2018		**Limit Name:**	
		Averaged:	**No**

<u>Trend Analysis</u>

Trend of the least squares straight line

Slope (fitted to data):	0.000028	mg/L per day
R-Squared error of fit:	0.350024	

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

Median Slope:	0.000032	mg/L per day
Lower Confidence Limit of Slope, M1:	-0.000005	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000061	mg/L per day

Non-parametric Mann-Kendall Test for Trend

S Statistic:	1.347
Z test:	1.645
At the 95.0 % Confidence Level (One-Sided Test):	None

Newton
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 08/31/2018		**Limit Name:**	
		Averaged:	**No**

Trend Analysis

Trend of the least squares straight line

Slope (fitted to data):	0.000027	mg/L per day
R-Squared error of fit:	0.338419	

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

Median Slope:	0.000025	mg/L per day
Lower Confidence Limit of Slope, M1:	-0.000005	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000055	mg/L per day

Non-parametric Mann-Kendall Test for Trend

S Statistic:	1.347
Z test:	1.645
At the 95.0 % Confidence Level (One-Sided Test):	None

Newton
Mann-Kendall Trend Analysis

User Supplied Information

Location ID:	**APW9**	**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 08/31/2018		**Limit Name:**	
		Averaged:	**No**

Trend Analysis

Trend of the least squares straight line

Slope (fitted to data):	0.000021	mg/L per day
R-Squared error of fit:	0.226829	

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

Median Slope:	0.000022	mg/L per day
Lower Confidence Limit of Slope, M1:	-0.000005	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000044	mg/L per day

Non-parametric Mann-Kendall Test for Trend

S Statistic:	1.431
Z test:	1.645
At the 95.0 % Confidence Level (One-Sided Test):	None

Newton
Mann-Kendall Trend Analysis

User Supplied Information

Location ID:	**APW10**	**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 08/31/2018		**Limit Name:**	
		Averaged:	**No**

<u>Trend Analysis</u>

Trend of the least squares straight line

Slope (fitted to data):	0.000009	mg/L per day
R-Squared error of fit:	0.110910	

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

Median Slope:	0.000009	mg/L per day
Lower Confidence Limit of Slope, M1:	-0.000017	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000023	mg/L per day

Non-parametric Mann-Kendall Test for Trend

S Statistic:	0.721
Z test:	1.645
At the 95.0 % Confidence Level (One-Sided Test):	None

Attachment B

Coefficient of Variation Evaluation

Newton

Coefficient of Variation
Date Range: 12/14/2015 to 8/31/2018

Boron, total (mg/L)

Location	Count	Mean	Std Dev	% Non-Detects	CV
APW5	10	0.099	0.014	0.00	0.14
APW6	10	0.091	0.026	0.00	0.29
APW7	10	0.078	0.014	0.00	0.18
APW8	10	0.084	0.013	0.00	0.15
APW9	10	0.076	0.013	0.00	0.17
APW10	10	0.069	0.007	0.00	0.10

CV=Std Dev/ Mean

Newton

Coefficient of Variation
Date Range: 12/14/2015 to 8/31/2018

Boron, total (mg/L)

Location	Count	Mean	Std Dev	% Non-Detects	CV
APW5	10	0.099	0.014	0.00	0.14
APW6	10	0.091	0.026	0.00	0.29
APW7	10	0.078	0.014	0.00	0.18
APW8	10	0.084	0.013	0.00	0.15
APW9	10	0.076	0.013	0.00	0.17
APW10	10	0.069	0.007	0.00	0.10

CV=Std Dev/ Mean

40 C.F.R. § 257.94(e)(2): ALTERNATE SOURCE DEMONSTRATION
NEWTON PRIMARY ASH POND
JULY 15, 2019

July 15, 2019

Title 40 of the Code of Federal Regulations (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 Statistically Significant Increases (SSIs) 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., part of Ramboll (OBG), 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 third round of semi-annual detection monitoring samples (Detection Monitoring Round 3 [D3]) were collected on November 9, 2018 and analytical data were received on January 16, 2019. In accordance with 40 C.F.R. Section 257.93(h)(2), statistical analysis of the data to identify SSIs of 40 C.F.R. Part 257 Appendix III parameters over background concentrations was completed by April 16, 2019 within 90 days of receipt of the analytical data. The statistical determination identified the following SSIs at downgradient monitoring wells:

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

Because the Detection Monitoring Round 4 (D4) was completed on February 22, 2019, prior to SSIs referenced above being determined for D3, results from D4 were used to verify the D3 SSIs in accordance with the Statistical Analysis Plan[1]. Following evaluation of analytical data from D4, the following SSIs were confirmed:

- Calcium at wells APW8 and APW10
- Fluoride at well APW9
- Sulfate at wells APW8, APW9, and APW10

Pursuant to 40 C.F.R. § 257.94(e)(2), the following demonstrates that sources other than the PAP were the cause of the SSIs listed above. This ASD was completed by July 15, 2019, within 90 days of determination of the SSIs, as required by 40 C.F.R. § 257.94(e)(2).

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 area is surrounded by Newton Lake. Beyond the lake is agricultural land.

GEOLOGY AND HYDROGEOLOGY

The site geology and hydrogeology are summarized below from the Hydrogeologic Monitoring Plan (NRT/OBG, 2017a)[2].

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

GEOLOGY

Quaternary deposits in the Newton area consist mainly of diamictons and outwash deposits that were deposited during Illinoian and Pre-Illinoian glaciations. 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 (Groundwater Monitoring Zone) – 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 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. 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).

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. CCR monitoring well locations are shown in Figure 1.

Uppermost Aquifer

The Uppermost Aquifer, the Mulberry Grove Member, typically consists of fine to coarse sand with varying amounts of clay, silt, and fine to coarse gravel. The portion of the Mulberry Grove Member at the site that is defined as a sand layer ranges in thickness from 3 to 17 ft with an average thickness of 8 ft. With only a few exceptions, the sand layer occurs between depths of 55 to 88 ft bgs.

Lower Limit of Aquifer

The lower hydrostratigaphic units, which comprise the lower limit of the Uppermost Aquifer, consist of the Smithboro Member and the Banner Formation, both of which are predominantly low permeability clay diamictons with varying amounts of silt, sand, and gravel. The lower hydrostratigraphic units are 30 ft to more than 50 ft thick above the underlying bedrock.

Groundwater Elevation and Flow Direction

Groundwater elevations across PAP ranged from approximately 495 to 530 ft MSL (NAVD88) during D3 (Figure 2). The groundwater elevation contours shown on Figure 2 were measured on November 8, 2018, the first day of a combined sampling event at the Site for LF2 and the Primary Ash Pond and for multiple monitoring programs required by both federal and state regulatory agencies. Overall groundwater flow within the Uppermost Aquifer in this area is southward toward Newton Lake, but with a predominantly southwesterly flow under the PAP.

[2] Natural Resource Technology, an OBG Company (NRT), October 17, 2017. *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.

GROUNDWATER AND PAP WATER 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 water samples have been collected from locations AP1 in the southwest corner of the PAP and AP2 in the southeast corner of the PAP.

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 caused the SSIs, or that the SSIs were a result of natural variation in groundwater quality. Lines of evidence supporting this ASD include the following:

1. The ionic composition of Newton PAP water is different from the ionic composition of groundwater.
2. The Newton PAP is not hydraulically connected to the Uppermost Aquifer.
3. Concentrations of calcium in the Newton PAP are lower than those observed in the groundwater.
4. 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.

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

LINE OF EVIDENCE #1: THE IONIC COMPOSITION OF NEWTON PAP WATER IS DIFFERENT FROM THE IONIC COMPOSITION OF GROUNDWATER

Piper diagrams graphically represent ionic composition of aqueous solutions. A Piper diagram displays the position of water samples relative to their major cation and anion content, providing the information needed to identify compositional categories or groupings. Figure 2, below, is a Piper diagram that displays the ionic composition of groundwater samples from the background and downgradient monitoring wells associated with the PAP and PAP water based on Quarter 2 2017 and Quarter 3 2018 samples.

Groundwater samples from the PAP downgradient wells (enclosed within a green ellipse) have a very high percentage of carbonate-bicarbonate anions and no dominant cation. Surface water samples from the PAP (enclosed within a purple ellipse) have a very high percentage of sodium-potassium cations and no dominant anion. The dissimilar ionic compositions of the PAP downgradient groundwater and the PAP surface water indicates that the PAP is not the source of CCR constituents detected in PAP groundwater.

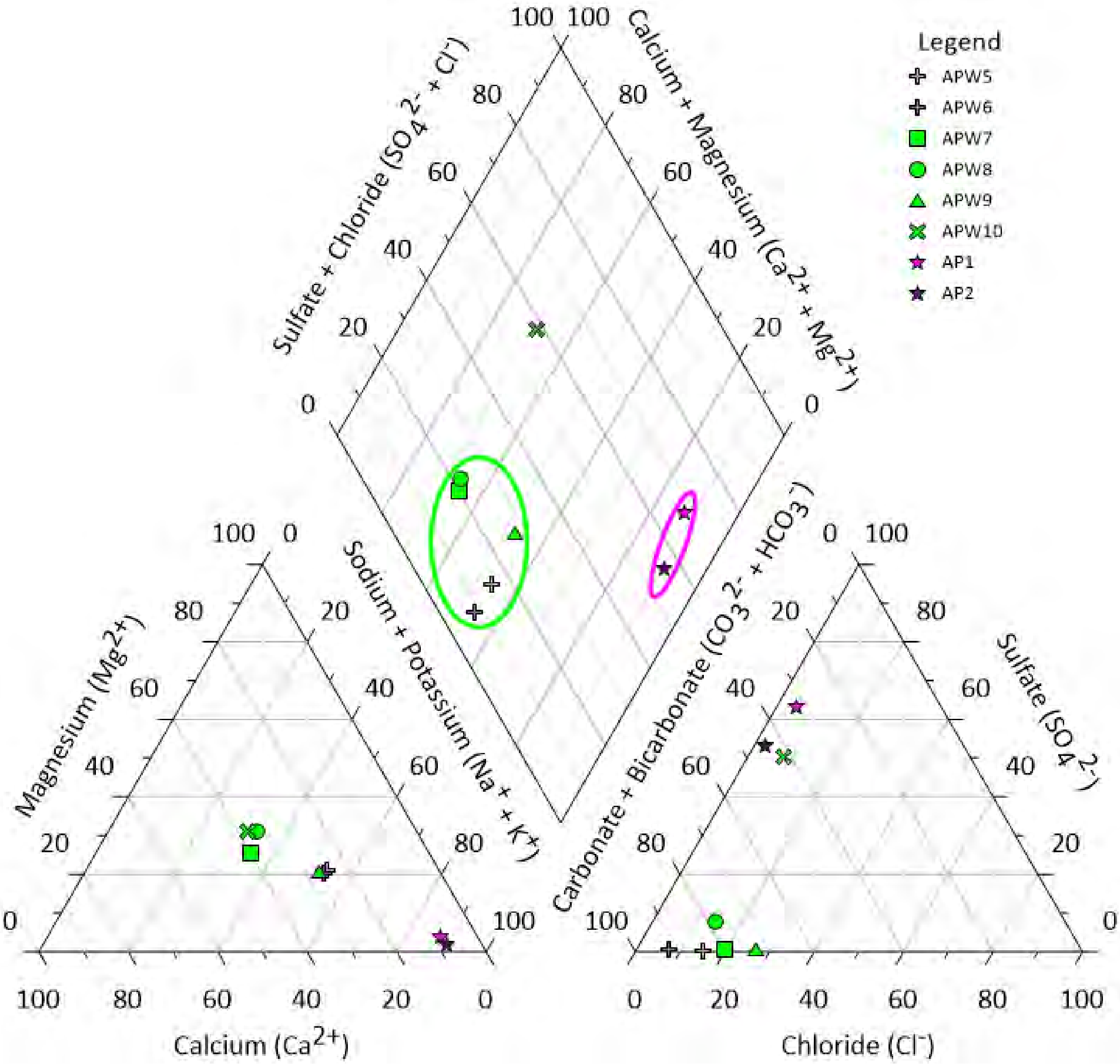


Figure 2 Piper Diagram Showing Ionic Composition of Samples of Background and Downgradient Groundwater Associated with PAP and Samples of PAP Surface Water.

LINE OF EVIDENCE #2: THE NEWTON PRIMARY ASH POND IS NOT HYDRAULICALLY CONNECTED TO THE UPPERMOST AQUIFER

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 this unit ranges from 461.8 ft msl in APW-8 to 482.8 ft msl in APW-10 (Attachment A). The bottom elevation of the PAP is within the Hagarstown Member of the Glasford Formation at 508 ft msl, approximately 25 ft above the top of the Uppermost Aquifer (Attachment B). The Hagarstown Member functions as an aquitard, with hydraulic conductivity ranging from 2.4×10^{-6} to 6.1×10^{-5} centimeters per second (cm/s). Based upon these hydraulic conductivity values and the fact that the Uppermost Aquifer is confined, the PAP is not hydraulically connected to 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.

LINE OF EVIDENCE #3: CONCENTRATIONS OF CALCIUM IN THE NEWTON PRIMARY ASH POND ARE LOWER THAN THOSE OBSERVED IN THE GROUNDWATER

Calcium concentrations are lower in PAP water samples than in all downgradient groundwater samples collected between 2015 and 2019. A time series for calcium concentrations is provided in Figure 3 below.

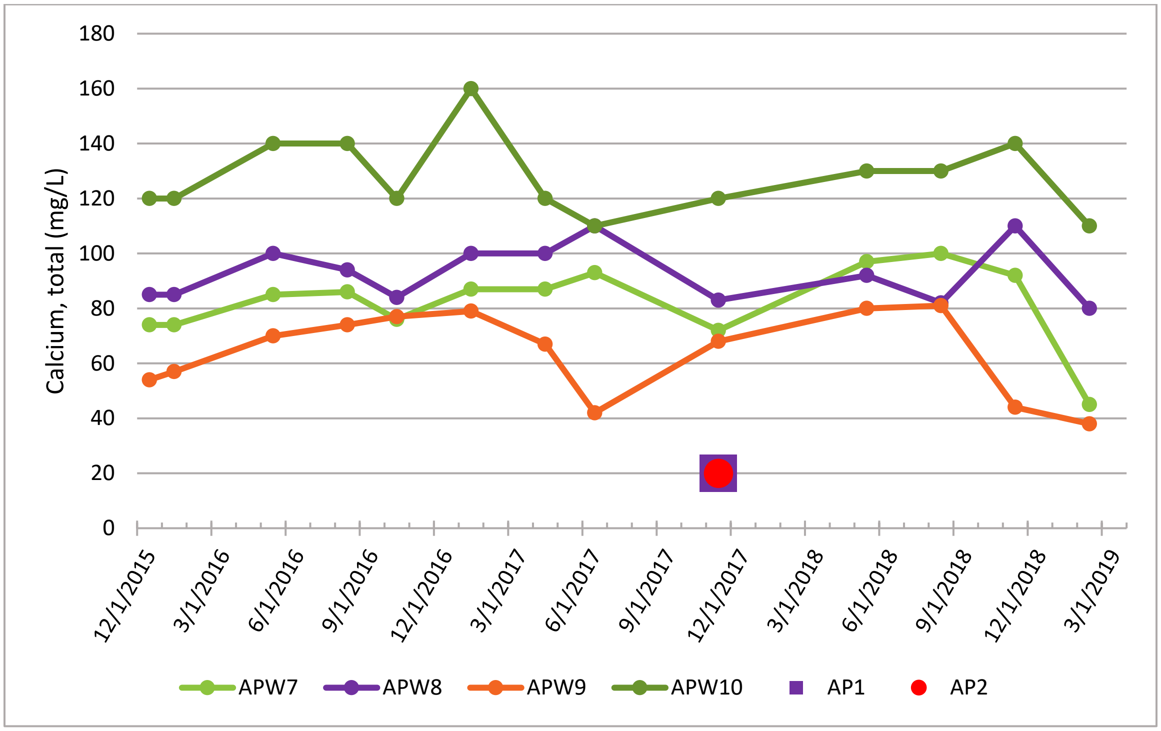


Figure 3. Calcium time series

The following observations can be made from Figure 3:

- PAP water samples AP1 and AP2 each contained 20 mg/L of calcium.
- Groundwater from downgradient wells APW7, APW8, APW9, and APW10 had higher calcium concentrations than the PAP water.

If the PAP were the source of calcium in groundwater, groundwater concentrations in PAP water would be higher than the downgradient groundwater; therefore, the PAP is not likely the source of the calcium observed in the Uppermost Aquifer.

LINE OF EVIDENCE #4: BORON, A PRIMARY INDICATOR PARAMETER OF CCR IMPACTS TO GROUNDWATER, HAS CONCENTRATIONS IN DOWNGRADIENT WELLS THAT ARE STABLE AND 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 present at elevated concentrations, as well. Concentrations of boron in all downgradient monitoring wells are below upper 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 2019, as shown on Figure 4.

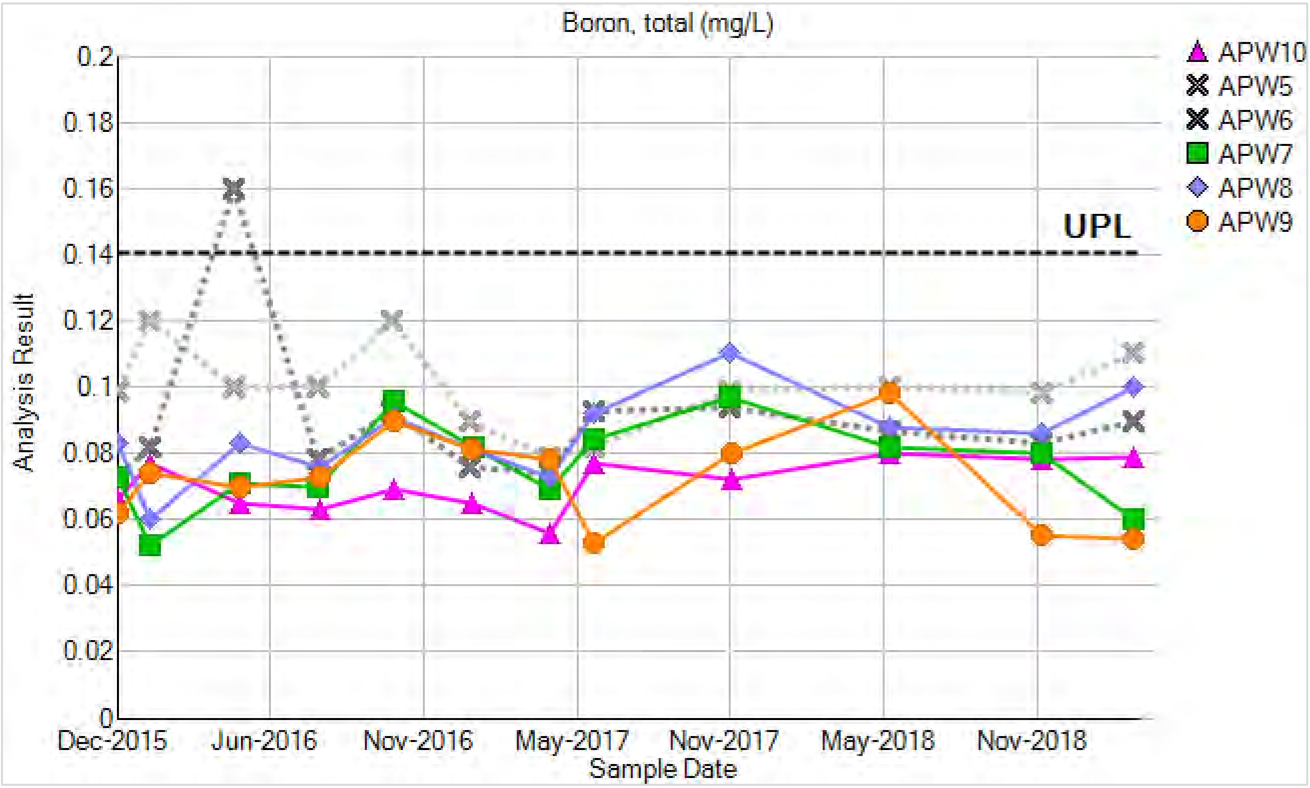


Figure 4. Boron time series showing boron concentrations in background wells (gray "X"s) are higher or similar to concentrations in downgradient wells.

From Figure 4 the following observations can be made:

- Boron concentrations in downgradient monitoring wells range from 0.052 mg/L to 0.11 mg/L, versus 0.073 mg/L to 0.16 mg/L in background wells.
- Overall median boron concentration in downgradient wells from 2015 through 2019 is 0.077 mg/L versus 0.093 mg/L in background wells.

Mann-Kendall trend analysis tests were performed (Attachment C) to determine if boron concentrations at each well were increasing, decreasing or stable (i.e., no statistically significant upward or downward trend). If the Mann-Kendall test did not identify a trend, the coefficient of variation (CV) was calculated (Attachment D) to determine if the concentrations were too variable to identify a trend (i.e. CV greater than or equal to 1). If a trend was identified, the CV was calculated to indicate whether data used to establish the trend were suggestive of a low or high magnitude trend. Data with a CV less than or equal to 1 suggest a lower magnitude trend. Boron concentrations are stable in background wells and downgradient wells APW7 and APW9. Upward trends were identified at APW8 and APW10, however, coefficient of variation evaluations identified minimal variation at all wells, suggesting a low-magnitude trend. Table 2 provides summary statistics, including variability and trend per well.

The low concentrations of boron in downgradient monitoring wells, relative to background concentrations, and the relatively stable boron concentrations in both background and downgradient monitoring wells suggests that the source of the of the SSIs in those wells is not the PAP.

Monitoring Well	Boron (mg/L)					
	Minimum	Maximum	Median	Standard Deviation	Trend	CV
APW5	0.079	0.12	0.100	0.0127	stable	0.13
APW6	0.073	0.16	0.085	0.0232	stable	0.26
APW7	0.052	0.097	0.077	0.0133	stable	0.17
APW8	0.060	0.11	0.085	0.0129	upward	0.15
APW9	0.053	0.098	0.074	0.0143	stable	0.20
APW10	0.056	0.08	0.071	0.0077	upward	0.11

Table 2. Minimum, maximum, median, standard deviation, trend, and coefficient of variation of boron concentrations in groundwater

Based on these four 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 C.F.R. § 257.94(e)(2) that SSIs observed during the detection monitoring program were not due to the PAP. Therefore, an assessment monitoring program is not required and the PAP will remain in detection monitoring.

Attachments

Figure 1 Monitoring Well and Source Water Location Map Newton Primary Ash Pond
Figure 2 Groundwater Elevation Contour Map – November 8, 2018
Attachment A Boring Logs for Monitoring Wells APW8 and APW10
Attachment B Geologic Cross Section B-B'
Attachment C Mann-Kendall Trend Analysis
Attachment D Coefficient of Variation Evaluation
.

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: July 15, 2019

LICENSED PROFESSIONAL ENGINEER
ERIC J. TLACHAC
062-063091
STATE OF ILLINOIS

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., a Ramboll Company
Date: July 15, 2019

LICENSED PROFESSIONAL GEOLOGIST
NICOLE M. PAGANO
196-000750
ILLINOIS

Attachments

Figures

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

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

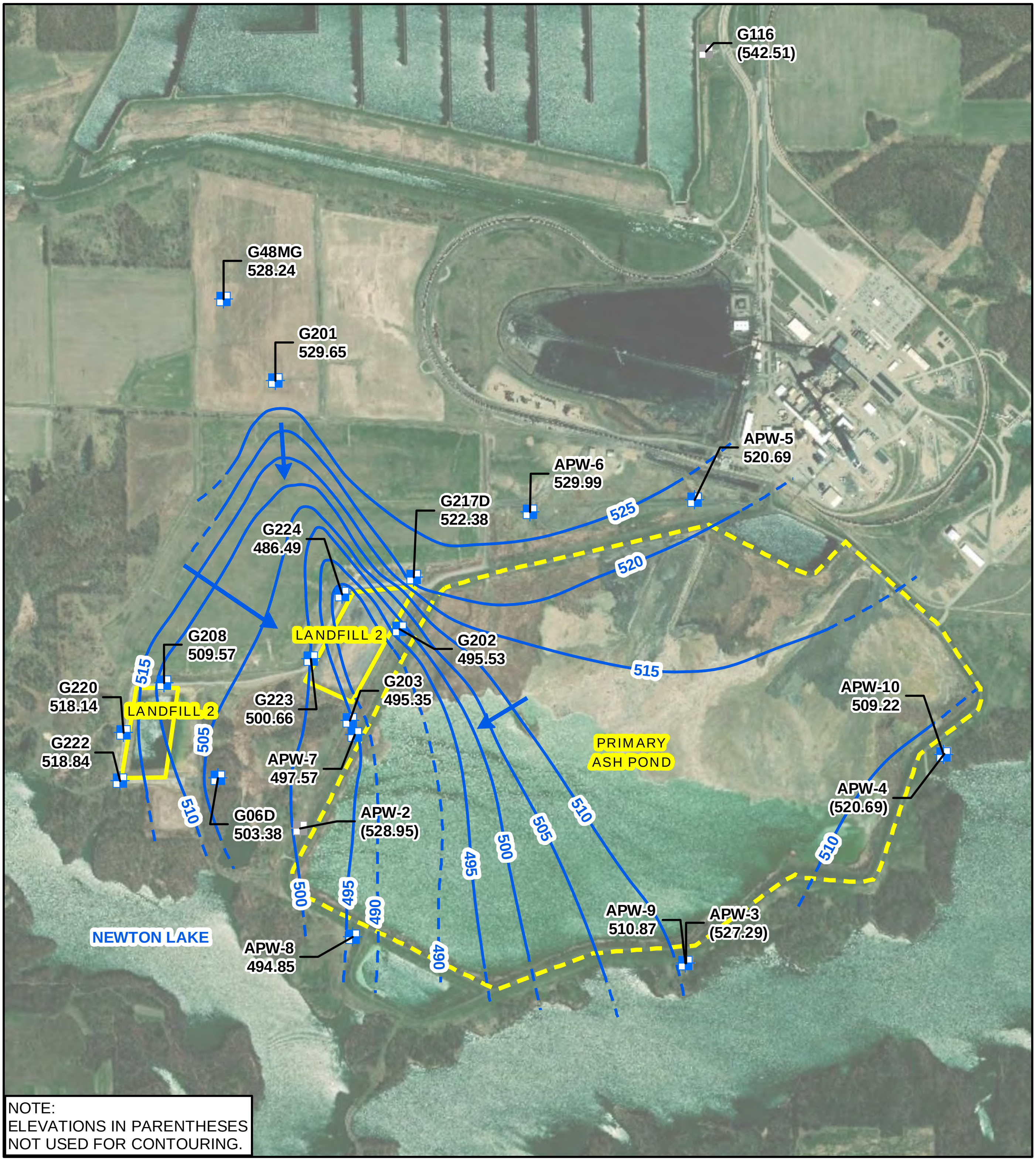
ALTERNATE SOURCE DEMONSTRATION
NEWTON POWER STATION
NEWTON, ILLINOIS

PROJECT NO: 67719

FIGURE NO: 1

Y:\Mapping\Projects\22\2285\MXD\Alt_Source_Dem\Figure 1_Newton Landfill Phases_PAP.mxd Author: stolzsd;

FIGURE NO. 2



CCR RULE MONITORING WELL LOCATION

NON-CCR RULE MONITORING WELL LOCATION

GROUNDWATER ELEVATION CONTOUR (5-FOOT INTERVAL)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

LANDFILL 2 CCR MONITORED UNIT

PRIMARY ASH POND CCR MONITORED UNIT

NEWTON PRIMARY ASH POND (UNIT ID: 501)
GROUNDWATER ELEVATION CONTOUR MAP
NOVEMBER 8, 2018

ALTERNATE SOURCE DEMONSTRATION
NEWTON POWER STATION
NEWTON, ILLINOIS

0 325 650 1,300
Feet

N

O'BRIEN & GERE ENGINEERS, INC.

Y:\Mapping\Projects\22\2285\MXD\Alt_Source_Dem\Figure 2_D3 Newton GW Contours.mxd

Attachment A

Boring Logs for Monitoring Wells APW8 and APW10

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/28/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW8
Well ID: APW8
Surface Elev: 526.75 ft. MSL
Completion: 82.00 ft. BGS
Station: 3,839.59N
6,082.37E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 33.70 - During Drilling
▼ =
▽ =

Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Remarks
1A	60/60 *100%*	DP		13		*4.50*	
1B				21		*3.00*	
2A	60/60 *100%*	DP		18		*2.50*	
2B				28		*2.00*	
3A	20/24 *83%*	DP		8		*2.00*	
4A	0/17 *0%*	SS	*23-43 50/5"*				Rock in shoe of sampler.
5A	21/24 *88%*	SS	*13-20 24-28* N=44	10		*4.50*	
6A	24/24 *100%*	SS	*7-14 20-48* N=34	11		*4.50*	
7A	24/24 *100%*	SS	*14-21 26-32* N=47	10			

Depth ft. BGS	Lithologic Description
0–0.6	Black (10YR2/1), moist, very stiff, SILT with little clay and trace very fine- to medium-grained sand, roots.
0.6–2.5	Yellowish brown (10YR5/4) with 30% light gray (10YR7/2) mottles, dry, hard, SILT with little clay and trace very fine- to medium-grained sand.
2.5–8.2	Grayish brown (10YR5/2) with 15% dark yellowish brown (10YR4/6) and 10% black (10YR2/1) mottles, moist, very stiff, silty CLAY with few very fine- to coarse-grained sand and trace small gravel.
8.2–10	Grayish brown (10YR5/2) with 15% dark yellowish brown mottles, moist, stiff, silty CLAY with few very fine- to coarse-grained sand and trace small gravel.
10–14	Brown (10YR5/3) with 20% dark yellowish brown (10YR5/6) mottles, dry, stiff, SILT with little clay and trace very fine- to coarse-grained sand.
14–20	Dark gray (10YR4/1), moist, hard, SILT with little clay, trace very fine- to coarse-grained sand and small gravel.

Depth scale: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 ft. BGS; Elevation scale: 526, 524, 522, 520, 518, 516, 514, 512, 510, 508 ft. MSL

NOTE(S): APW8 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/28/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW8
Well ID: APW8
Surface Elev: 526.75 ft. MSL
Completion: 82.00 ft. BGS
Station: 3,839.59N
6,082.37E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 33.70 - During Drilling
▼ =
▽ =

Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
8A	24/24 *100%*	SS	*7-13 19-23* N=32	11		*4.50*		Dark gray (10YR4/1), moist, hard, SILT with little clay, trace very fine- to coarse-grained sand and small gravel. *[Continued from previous page]*	506	
9A	24/24 *100%*	SS	*7-14 19-27* N=33	11		*4.50*	22		504	
10A	24/24 *100%*	SS	*8-15 30-37* N=45	11		*4.50*	24		502	
11A	24/24 *100%*	SS	*8-16 24-33* N=40	11		*4.50*	26		500	
12A	24/24 *100%*	SS	*9-31 33-30* N=64	11			28		498	
12B				12		*4.50*		Gray (10YR5/1), moist, dense, silty, very fine- to medium-grained SAND.		
13A	24/24 *100%*	SS	*10-23 40-35* N=63	11		*4.50*	30	Dark gray (10YR4/1), moist, hard SILT with little clay, few very fine- to coarse-grained sand, and trace small gravel.	496	
14A	21/24 *88%*	SS	*16-16 29-50* N=45	10		*4.50*	32		494	
15A	20/24 *83%*	SS	*9-24 34-41* N=58	13			34 ▼	Dark gray (10YR4/1), wet, very dense, silty, very fine- to coarse-grained SAND with trace small gravel.	492	
16A	22/24 *92%*	SS	*16-18 29-35* N=47	11		*4.50*	36	Dark gray (10YR4/1), moist, hard, SILT with little clay, few very fine- to coarse-grained sand, and trace small gravel.	490	
17A	21/24 *88%*	SS	*10-17 21-31* N=38	11		*4.50*	38		488	
							40			

NOTE(S): APW8 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/28/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW8
Well ID: APW8
Surface Elev: 526.75 ft. MSL
Completion: 82.00 ft. BGS
Station: 3,839.59N
6,082.37E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 33.70 - During Drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
18A	24/24 *100%*	SS	*9-16 26-32* N=42	11		*4.50*	40–42	Dark gray (10YR4/1), moist, hard, SILT with little clay, few very fine- to coarse-grained sand, and trace small gravel. *[Continued from previous page]*	486	
19A	24/24 *100%*	SS	*10-16 23-34* N=39	12		*4.50*	42–44		484	
20A	24/24 *100%*	SS	*10-15 26-44* N=41	13		*4.50*	44–46		482	
21A	24/24 *100%*	SS	*12-21 32-48* N=53	12		*4.50*	46–48		480	
22A	24/24 *100%*	SS	*11-17 22-31* N=39	13		*4.50*	48–50		478	
23A	24/24 *100%*	SS	*10-13 21-32* N=34	13		*4.50*	50–52		476	
24A	24/24 *100%*	SS	*8-13 50-26* N=63	13		*4.50*	52–54		474	
25A	24/24 *100%*	SS	*8-11 19-28* N=30	14		*4.25*	54–56		472	
26A	24/24 *100%*	SS	*10-12 18-26* N=30	13		*4.50*	56–58		470	
27A	22/24 *92%*	SS	*7-10 15-22* N=25	21		*4.50*	58–60	Olive gray (5Y4/2), moist, hard, silty CLAY with few very fine- to coarse-grained sand and trace small gravel.	468	

NOTE(S): APW8 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/28/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW8
Well ID: APW8
Surface Elev: 526.75 ft. MSL
Completion: 82.00 ft. BGS
Station: 3,839.59N 6,082.37E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 33.70 - During Drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL
28A	20/24 *83%*	SS	*7-15 19-20* N=34	14		*4.50*		Dark gray (10YR4/1), moist, hard, SILT with little clay, few very fine- to coarse-grained sand and trace small gravel.	466
							62		
29A	21/24 *88%*	SS	*7-8 11-16* N=19	11		*3.75*		Dark gray (10YR4/1), moist, very stiff, SILT with little clay, few very fine- to coarse-grained sand and trace small gravel.	464
							64		
30A	21/24 *88%*	SS	*6-13 14-11* N=27	14		*4.00*			462
30B				10				Gray (10YR6/1), wet, medium dense, silty, very fine- to coarse-grained SAND with trace small to large gravel.	
							66	Dark gray (10YR4/1), moist, very stiff, SILT with little clay and few very fine- to coarse-grained sand.	
31A	18/24 *75%*	SS	*4-3 4-3* N=7	28				Dark gray (10YR4/1), wet, loose, silty, very fine- to coarse-grained SAND with trace small gravel and trace wood fragments.	460
31B				15		*3.25*		Dark gray (10YR4/1), moist, very stiff, SILT with little clay, few very fine- to coarse-grained sand, and trace small gravel, trace wood fragments.	
							68		
32A	20/24 *83%*	SS	*1-3 3-2* N=6	17				Dark gray (10YR4/1), wet, loose, SILT with little very fine- to fine-grained sand.	458
32B				28				Dark gray (10YR4/1), wet, loose, silty, very fine- to coarse-grained SAND.	
							70	Dark gray (10YR4/1), wet, loose, SILT with little very fine- to fine-grained sand, trace wood fragments.	
33A	15/24 *63%*	SS	*woh-2 6-6* N=8	17				Dark gray (10YR4/1), wet, loose, silty, very fine- to coarse-grained SAND, trace wood fragments.	456
							72		
34A	16/24 *67%*	SS	*9-11 15-20* N=26	9				Dark gray (10YR4/1), wet, medium dense, silty, very fine- to coarse-grained SAND with trace small gravel.	454
								Dark gray (10YR4/1), wet, medium dense, silty, very fine- to coarse-grained SAND with few small to large gravel.	
							74		
35A	15/24 *63%*	SS	*16-21 23-24* N=44	9				Dark gray (10YR4/1), wet, dense, silty, very fine- to coarse-grained SAND with few small to large gravel.	452
							76		
36A	14/24 *58%*	SS	*11-20 25-24* N=45	11					450
							78	Dark gray (10YR4/1), wet, dense, silty, very fine- to coarse-grained SAND with trace small gravel.	
37A	15/24 *63%*	SS	*20-25 24-25* N=49	10					448
							80		

Borehole Detail | Remarks

NOTE(S): APW8 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/28/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW8
Well ID: APW8
Surface Elev: 526.75 ft. MSL
Completion: 82.00 ft. BGS
Station: 3,839.59N
6,082.37E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 33.70 - During Drilling
▼ =
▽ =

SAMPLE: Number	Recov / Total (in) *% Recovery*	Type	TESTING: *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
38A	18/24 *75%*	SS	*26-26* *26-31* N=52	8				Dark gray (10YR4/1), wet, dense, silty, very fine- to coarse-grained SAND with trace small gravel. *[Continued from previous page]*		446	
38B				11		*4.50*	82	Dark gray (10YR4/1), moist, hard, SILT with little clay and few very fine- to coarse-grained sand.			

End of boring = 82.0 feet

NOTE(S): APW8 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/27/2015
WEATHER: Cool, rainy, lo-50s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA

FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW10a
Well ID: APW10
Surface Elev: 521.98 ft. MSL
Completion: 45.94 ft. BGS
Station: 5,371.32N
11,541.23E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 25, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 36.00 - During Drilling
▼ =
▽ =

SAMPLE			TESTING									
Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
							2			520	
							4			518	
							6			516	
							8			514	
							10	Blind drill - see APW4 boring log for lithology, sample, and testing data		512	
							12			510	
							14			508	
							16			506	
							18			504	
							20			502	

NOTE(S): APW10 installed in borehole.
Lithology, sample, and testing data can be found on APW-4 Field Boring Log.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.	**CONTRACTOR:** Bulldog Drilling, Inc.		
Site: Newton Energy Center	**Rig mfg/model:** CME-550X ATV Drill	**BOREHOLE ID:** APW10a	
Location: Newton, Illinois	**Drilling Method:** 4¼" HSA	**Well ID:** APW10	
Project: 15E0030		**Surface Elev:** 521.98 ft. MSL	
DATES: Start: 10/27/2015	**FIELD STAFF: Driller:** C. Dutton	**Completion:** 45.94 ft. BGS	
Finish: 10/27/2015	**Helper:** C. Jones	**Station:** 5,371.32N	
WEATHER: Cool, rainy, lo-50s	**Eng/Geo:** S. Keim	11,541.23E	

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 25, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 36.00 - During Drilling
▼ =
▽ =

SAMPLE: Number	Recov / Total (in) *% Recovery*	Type	TESTING: *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
							22	Yellowish brown (10YR5/6) with 5% gray (N6/1) mottles, moist, hard, SILT with little clay, few very fine-grained sand, and trace small gravel.		500	
							24–32	Yellowish brown (10YR5/4) with 5% dark yellowish brown (10YR4/6) and 5% gray (N6/1) mottles, moist, hard, SILT with little clay, few very fine-grained sand, and trace small gravel.		498–490	
							32–39.2 (▼ 36)	Brown (10YR5/3) with 5% gray (N6/1) mottles, moist, hard, SILT with little clay, few very fine-grained sand, and trace small gravel.		490–483	
							40	Brown (10YR5/3), wet, very dense, silty, very fine- to medium-grained SAND with trace small gravel.		482	

NOTE(S): APW10 installed in borehole.
Lithology, sample, and testing data can be found on APW-4 Field Boring Log.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.	**CONTRACTOR:** Bulldog Drilling, Inc.		
Site: Newton Energy Center	**Rig mfg/model:** CME-550X ATV Drill	**BOREHOLE ID:** APW10a	
Location: Newton, Illinois	**Drilling Method:** 4¼" HSA	**Well ID:** APW10	
Project: 15E0030		**Surface Elev:** 521.98 ft. MSL	
DATES: Start: 10/27/2015	**FIELD STAFF: Driller:** C. Dutton	**Completion:** 45.94 ft. BGS	
Finish: 10/27/2015	**Helper:** C. Jones	**Station:** 5,371.32N	
WEATHER: Cool, rainy, lo-50s	**Eng/Geo:** S. Keim	11,541.23E	

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 25, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 36.00 - During Drilling
▼ =
▽ =

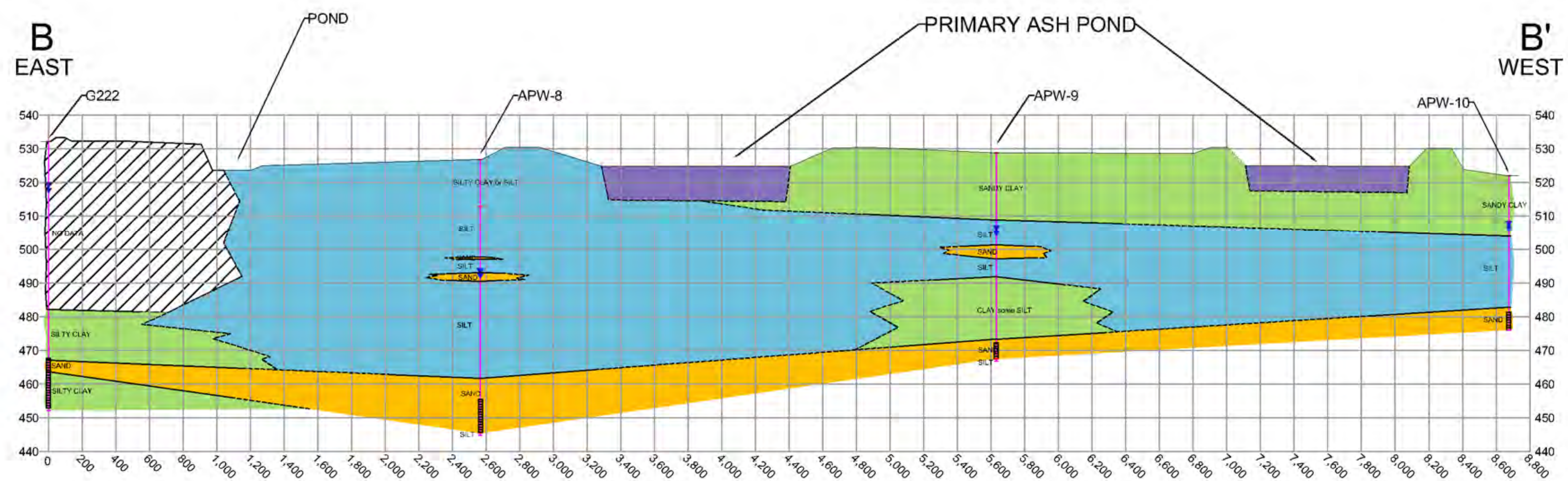
SAMPLE			TESTING								
Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
							42	Brown (10YR5/3), wet, very dense, silty, very fine- to medium-grained SAND with trace small gravel. *[Continued from previous page]*		480	
							44			478	

End of boring = 45.94 feet

NOTE(S): APW10 installed in borehole.
Lithology, sample, and testing data can be found on APW-4 Field Boring Log.

Attachment B

Geologic Cross Section B-B’

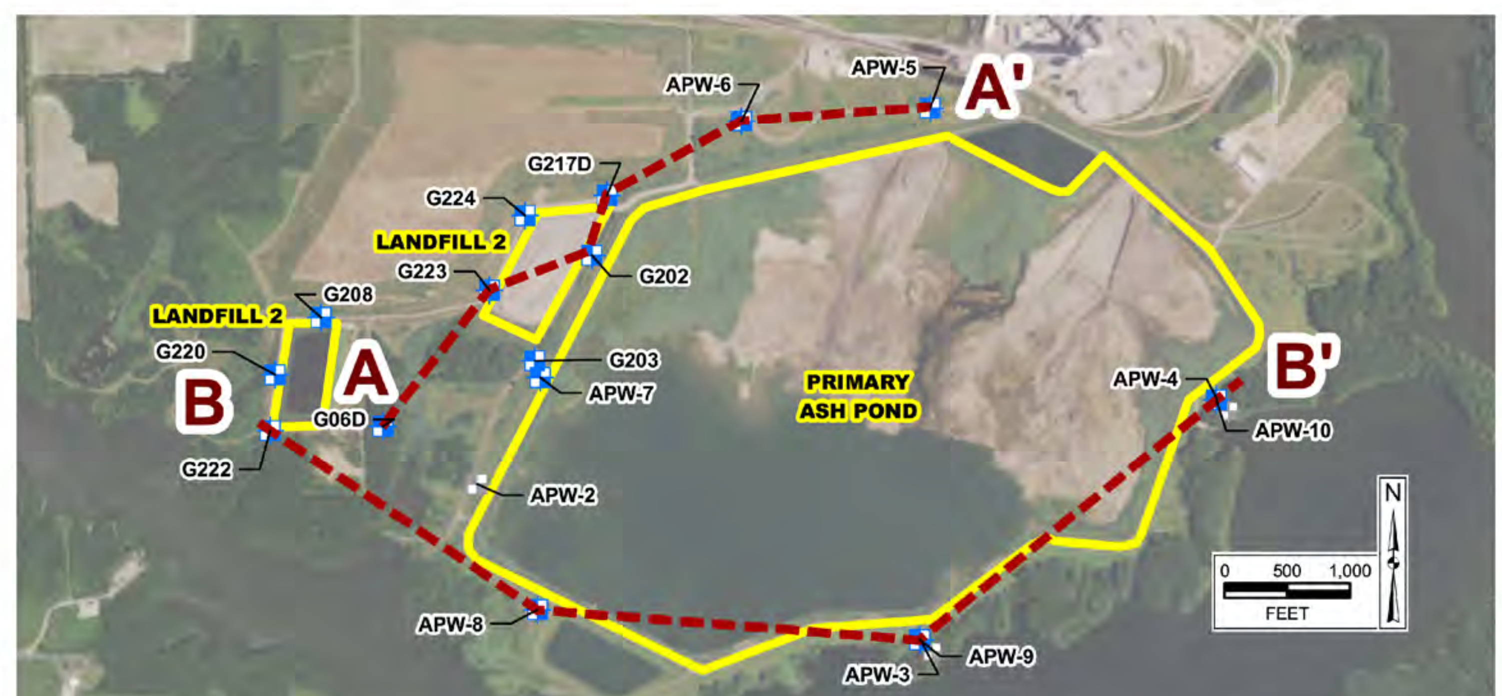


NO DATA		WELL SCREEN	
ASH		GROUNDWATER ELEVATION	
CLAY			
SILT		NOTE THAT THE DEPTH OF THE ASH IN THE ASH POND IS APPROXIMATE.	
SAND			

VERTICAL SCALE IN FEET 40

HORIZONTAL SCALE IN FEET 800

VERTICAL EXAGGERATION =20



DRAWN BY: JMO DATE: 08/29/2017

CHECKED BY: TBN DATE: 10/2/2017

APPROVED BY: SJC DATE: 10/2/2017

DRAWING NO: Fig X_Geologic Cross-Section A-A'

REFERENCE:

GEOLOGIC CROSS-SECTION B-B'

HYDROGEOLOGIC MONITORING PLAN

NEWTON POWER STATION
NEWTON, ILLINOIS

Natural Resource Technology
AN OBG COMPANY

PROJECT NO. 2285

FIGURE NO. APPENDIX A-2

Attachment C

Mann-Kendall Trend Analysis

Newton
Mann-Kendall Trend Analysis

User Supplied Information

Location ID:	**APW5**	**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 03/31/2019		**Limit Name:**	
		Averaged:	**No**

Trend Analysis

Trend of the least squares straight line

Slope (fitted to data):	-0.000004	mg/L per day
R-Squared error of fit:	0.016425	

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

Median Slope:	-0.000001	mg/L per day
Lower Confidence Limit of Slope, M1:	-0.000031	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000011	mg/L per day

Non-parametric Mann-Kendall Test for Trend

S Statistic:	-0.417
Z test:	1.645
At the 95.0 % Confidence Level (One-Sided Test):	None

Newton
Mann-Kendall Trend Analysis

User Supplied Information

Location ID:	**APW6**	**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 03/31/2019		**Limit Name:**	
		Averaged:	**No**

Trend Analysis

Trend of the least squares straight line

Slope (fitted to data):	-0.000008	mg/L per day
R-Squared error of fit:	0.018309	

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

Median Slope:	0.000006	mg/L per day
Lower Confidence Limit of Slope, M1:	-0.000015	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000018	mg/L per day

Non-parametric Mann-Kendall Test for Trend

S Statistic:	0.687
Z test:	1.645
At the 95.0 % Confidence Level (One-Sided Test):	None

Newton
Mann-Kendall Trend Analysis

User Supplied Information

Location ID:	**APW7**	**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 03/31/2019		**Limit Name:**	
		Averaged:	**No**

Trend Analysis

Trend of the least squares straight line		
Slope (fitted to data):	0.000006	mg/L per day
R-Squared error of fit:	0.033439	
Sen's Non-parametric estimate of the slope (One-Sided Test)		
Median Slope:	0.000008	mg/L per day
Lower Confidence Limit of Slope, M1:	-0.000011	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000034	mg/L per day
Non-parametric Mann-Kendall Test for Trend		
S Statistic:	0.412	
Z test:	1.645	
At the 95.0 % Confidence Level (One-Sided Test):	None	

Newton
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 03/31/2019		**Limit Name:**	
		Averaged:	**No**

Trend Analysis

Trend of the least squares straight line

Slope (fitted to data):	0.000019	mg/L per day
R-Squared error of fit:	0.342389	

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

Median Slope:	0.000017	mg/L per day
Lower Confidence Limit of Slope, M1:	0.000003	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000039	mg/L per day

Non-parametric Mann-Kendall Test for Trend

S Statistic:	1.787
Z test:	1.645
At the 95.0 % Confidence Level (One-Sided Test):	Upward

Newton
Mann-Kendall Trend Analysis

User Supplied Information

Location ID:	**APW9**	**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 03/31/2019		**Limit Name:**	
		Averaged:	**No**

<u>Trend Analysis</u>

Trend of the least squares straight line

Slope (fitted to data):	-0.000006	mg/L per day
R-Squared error of fit:	0.028627	

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

Median Slope:	-0.000001	mg/L per day
Lower Confidence Limit of Slope, M1:	-0.000026	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000028	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
Mann-Kendall Trend Analysis

User Supplied Information

Location ID:	**APW10**	**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 03/31/2019		**Limit Name:**	
		Averaged:	**No**

Trend Analysis

Trend of the least squares straight line

Slope (fitted to data):	0.000011	mg/L per day
R-Squared error of fit:	0.304448	

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

Median Slope:	0.000011	mg/L per day
Lower Confidence Limit of Slope, M1:	0.000000	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000019	mg/L per day

Non-parametric Mann-Kendall Test for Trend

S Statistic:	1.722
Z test:	1.645
At the 95.0 % Confidence Level (One-Sided Test):	Upward

Attachment D

Coefficient of Variation Evaluation

Newton

Coefficient of Variation
Date Range: 12/14/2015 to 3/31/2019

Boron, total (mg/L)

Location	Count	Mean	Std Dev	% Non-Detects	CV
APW5	12	0.100	0.013	0.00	0.13
APW6	12	0.090	0.023	0.00	0.26
APW7	12	0.076	0.013	0.00	0.17
APW8	12	0.085	0.013	0.00	0.15
APW9	12	0.072	0.014	0.00	0.20
APW10	12	0.071	0.008	0.00	0.11

CV=Std Dev/ Mean

40 C.F.R. § 257.94(e)(2): ALTERNATE SOURCE DEMONSTRATION
NEWTON PRIMARY ASH POND
OCTOBER 14, 2019

October 14, 2019

Title 40 of the Code of Federal Regulations (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 Statistically Significant Increases (SSIs) 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., part of Ramboll (OBG) 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 fourth semi-annual detection monitoring samples (Detection Monitoring Round 4 [D4]) were collected on February 22, 2019 and analytical data were received on April 15, 2019. In accordance with 40 C.F.R. § 257.93(h)(2), statistical analysis of the data to identify SSIs of 40 C.F.R. Part 257 Appendix III parameters over background concentrations was completed by July 15, 2019, within 90 days of receipt of the analytical data. The statistical determination identified the following SSIs at downgradient monitoring wells:

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

Pursuant to 40 C.F.R. § 257.94(e)(2), the following demonstrates that sources other than the Newton PAP were the cause of the SSIs listed above. This ASD was completed by October 14, 2019, within 90 days of determination of the SSIs, as required by 40 C.F.R. § 257.94(e)(2).

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 area is surrounded by Newton Lake. Beyond the lake is agricultural land.

GEOLOGY AND HYDROGEOLOGY

The site geology and hydrogeology are summarized below from the Hydrogeologic Monitoring Plan (NRT/OBG, 2017a)[1].

GEOLOGY

Quaternary deposits in the Newton area consist mainly of diamictons and outwash deposits that were deposited during Illinoian and Pre-Illinoian glaciations. 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

[1] Natural Resource Technology, an OBG Company (NRT), October 17, 2017. *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.

- 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 (Groundwater Monitoring Zone) – 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 diamicton 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 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. 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).

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. CCR monitoring well locations are shown in Figure 1.

Uppermost Aquifer

The Uppermost Aquifer is the Mulberry Grove Member, typically consisting of fine to coarse sand with varying amounts of clay, silt, and fine to coarse gravel. The portion of the Mulberry Grove Member at the site that is defined as a sand layer ranges in thickness from 3 to 17 ft with an average thickness of 8 ft. With only a few exceptions, the sand layer occurs between depths of 55 to 88 ft bgs.

Lower Limit of Aquifer

The lower hydrostratigraphic units, which comprise the lower limit of the Uppermost Aquifer, consist of the Smithboro Member and the Banner Formation, both of which are predominantly low permeability clay diamictons with varying amounts of silt, sand, and gravel. The lower hydrostratigraphic units are 30 to more than 50 ft thick above the underlying bedrock.

Groundwater Elevation and Flow Direction

Groundwater elevations across PAP ranged from approximately 494 to 531 ft MSL (NAVD88) during D4 (Figure 2). The groundwater elevation contours shown on Figure 2 were measured on February 18, 2019, the first day of a combined sampling event at the Site for LF2 and the Primary Ash Pond and for multiple monitoring programs required by both federal and state regulatory agencies. Overall groundwater flow within the Uppermost Aquifer in this area is southward toward Newton Lake, but with a predominantly southwesterly flow under the PAP.

GROUNDWATER AND PAP WATER 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 water samples have been collected from locations AP1 in the southwest corner of the PAP and AP2 in the southeast corner of the PAP.

ALTERNATE SOURCE DEMONSTRATION: LINES OF EVIDENCE

Lines of evidence supporting these ASDs include the following:

1. The ionic composition of Newton PAP water is different from the ionic composition of groundwater.
2. The Newton PAP is not hydraulically connected to the Uppermost Aquifer.
3. Concentrations of calcium in the Newton PAP are lower than those observed in the groundwater.
4. 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.

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

LINE OF EVIDENCE #1: THE IONIC COMPOSITION OF NEWTON PAP WATER IS DIFFERENT FROM THE IONIC COMPOSITION OF GROUNDWATER

Piper diagrams graphically represent ionic composition of aqueous solutions. A Piper diagram displays the position of water samples relative to their major cation and anion content, providing the information needed to identify compositional categories or groupings. Figure 2 is a Piper diagram that displays the ionic composition of groundwater samples from the background and downgradient monitoring wells associated with the Phase I Landfill (LF1), Phase II Landfill (LF2), and Primary Ash Pond (PAP) and LF1 leachate and PAP water based on Quarter 2 2017 and Quarter 3 2018 samples.

Groundwater samples from the PAP downgradient wells (enclosed within a green ellipse) have a very high percentage of carbonate-bicarbonate cations and no dominant cation. Surface water samples from the PAP (enclosed within a purple ellipse) have a very high percentage of sodium-potassium cations and no dominant anion. The dissimilar ionic compositions of the PAP downgradient groundwater and the PAP surface water indicates that the PAP is not the source of CCR constituents detected in PAP groundwater.

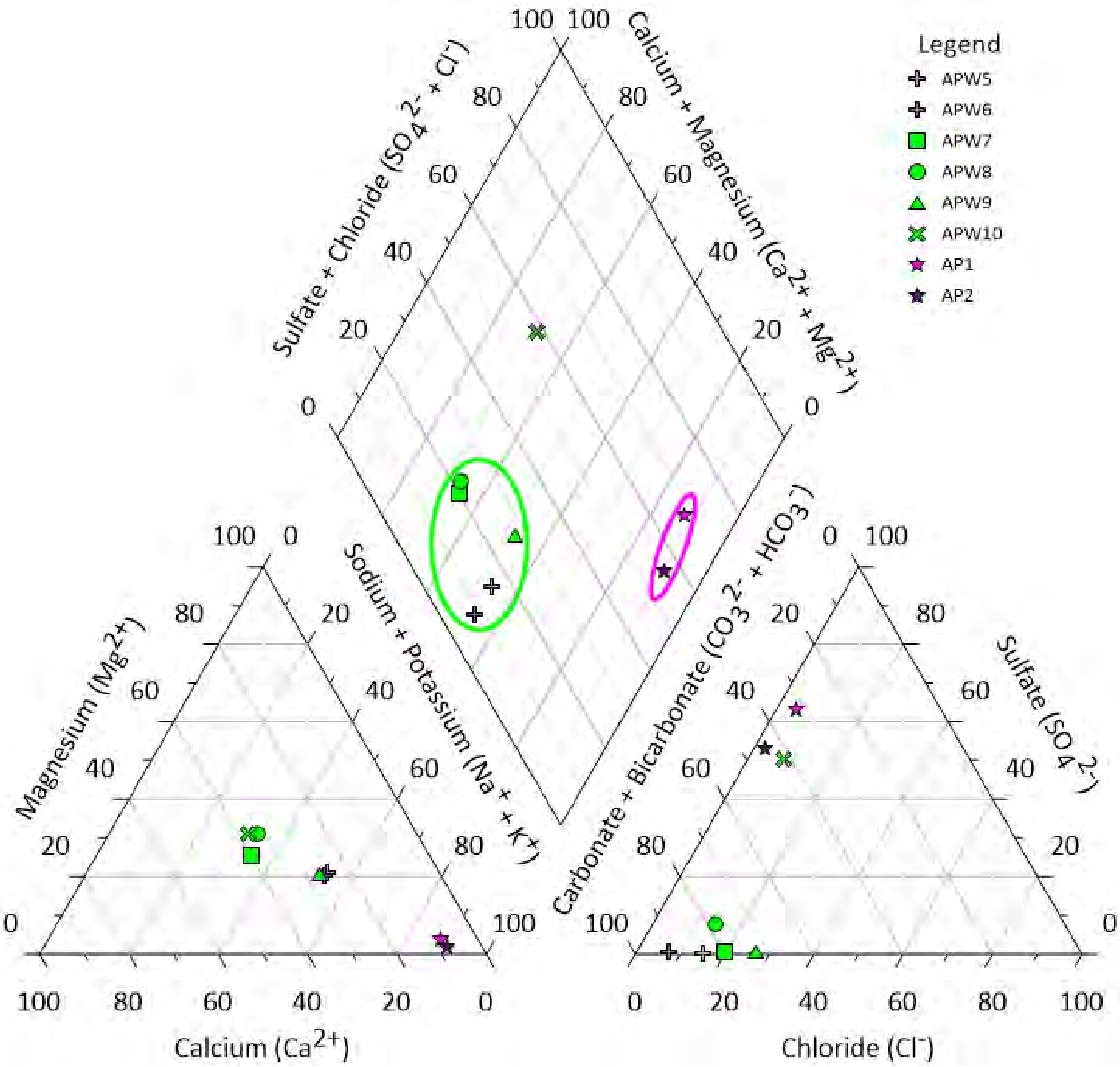


Figure 2 Piper Diagram Showing Ionic Composition of Samples of Background and Downgradient Groundwater Associated with LF1, LF2, and PAP and Samples of LF1 Leachate and PAP Surface Water.

LINE OF EVIDENCE #2: THE NEWTON PRIMARY ASH POND IS NOT HYDRAULICALLY CONNECTED TO THE UPPERMOST AQUIFER

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 this unit ranges from 461.8 ft msl in APW-8 to 482.8 ft msl in APW-10 (Attachment A). 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 (Attachment B). The Hagarstown Member functions as an aquitard with hydraulic conductivities ranging from 2.4 x 10^{-6} to 6.1 x 10^{-5} centimeters per second (cm/s)[2]. Based upon these hydraulic conductivity values and the fact that the Uppermost Aquifer is confined, the PAP is not hydraulically connected to 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.

LINE OF EVIDENCE #3: CONCENTRATIONS OF CALCIUM IN THE NEWTON PRIMARY ASH POND ARE LOWER THAN THOSE OBSERVED IN THE GROUNDWATER

Calcium concentrations are lower in PAP water samples than in all downgradient groundwater samples collected between 2015 and 2019. A time series for calcium concentrations is provided in Figure 3 below.

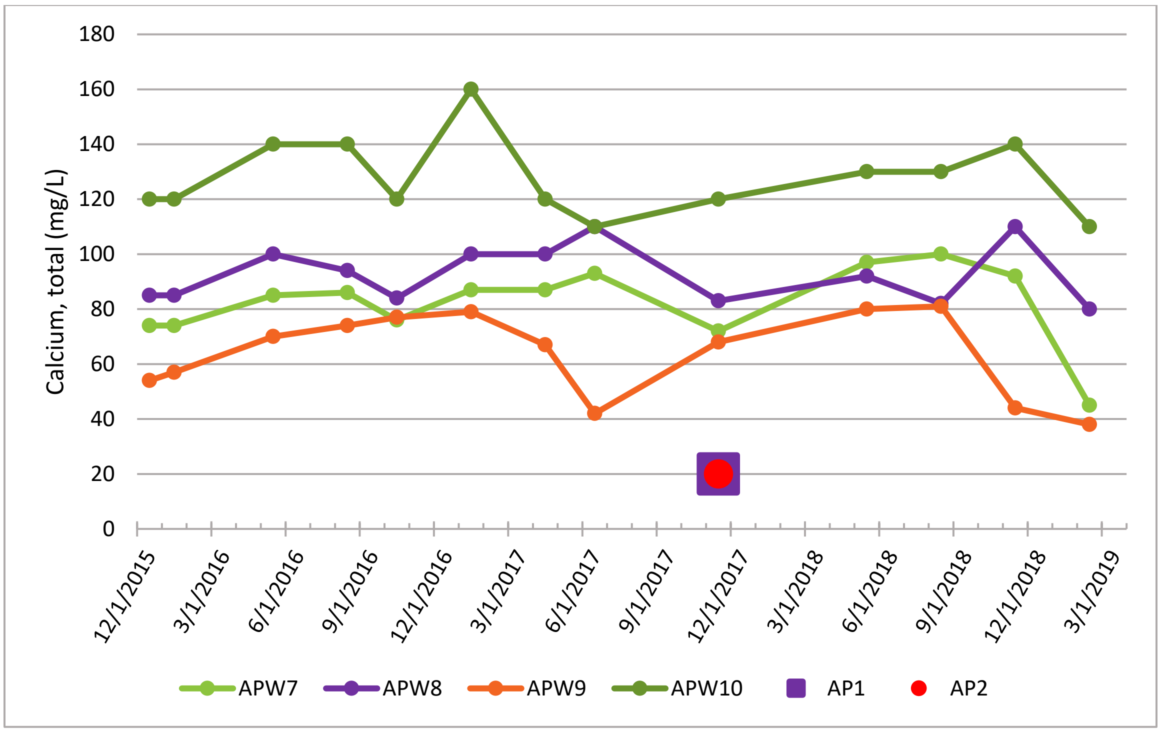


Figure 3. Calcium time series

The following observations can be made from Figure 3:

- PAP water samples AP1 and AP2 each contained 20 mg/L of calcium.
- Groundwater from downgradient wells APW7, APW8, APW9, and APW10 had higher calcium concentrations than the PAP water.

[2] Natural Resource Technology, an OBG Company (NRT), October 17, 2017. *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.

If the PAP were the source of calcium in groundwater, groundwater concentrations in PAP water would be higher than the downgradient groundwater; therefore, the PAP is not likely the source of the calcium observed in the Uppermost Aquifer.

LINE OF EVIDENCE #4: BORON, A PRIMARY INDICATOR PARAMETER OF CCR IMPACTS TO GROUNDWATER, HAS CONCENTRATIONS IN DOWNGRADIENT WELLS THAT ARE STABLE AND 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 present at elevated concentrations, as well. Concentrations of boron in all downgradient monitoring wells are below upper 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 2019, as shown on Figure 4.

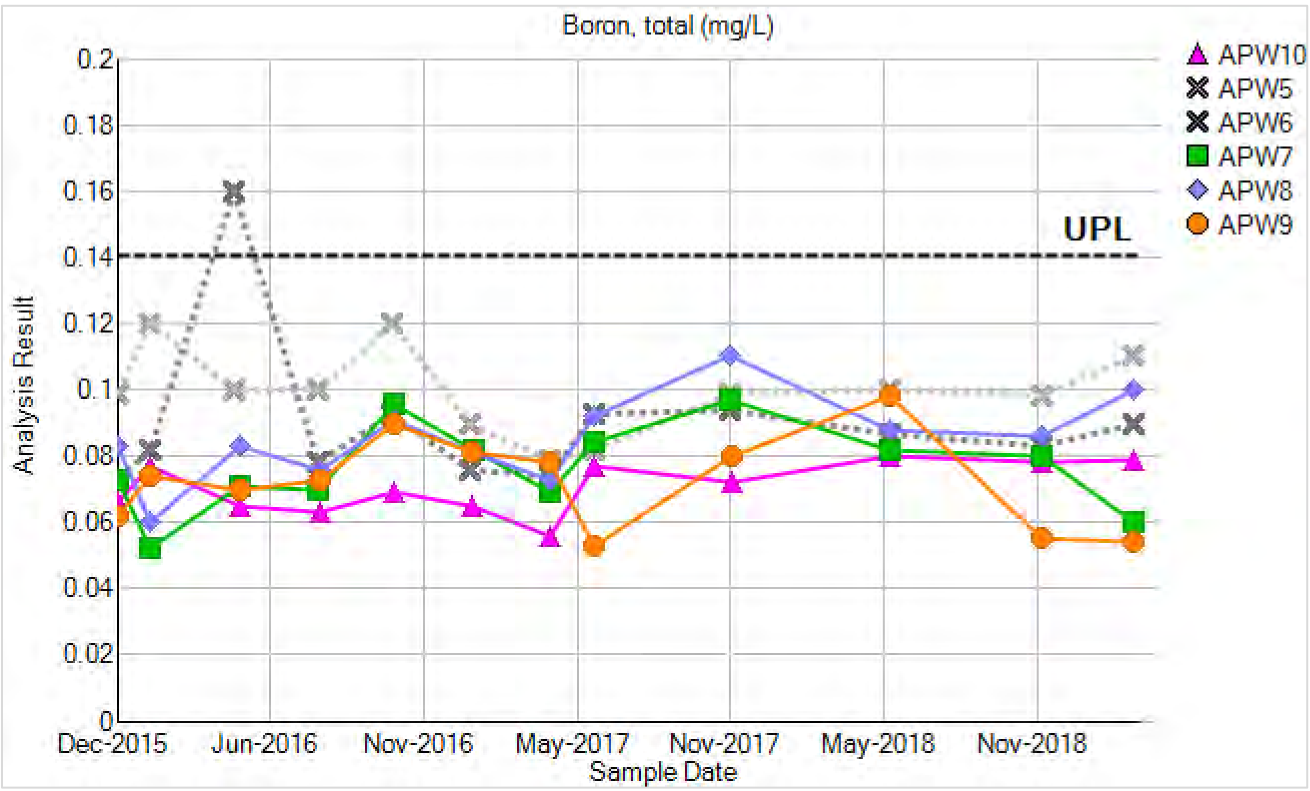


Figure 4. Boron time series showing boron concentrations in background wells (gray "X"s) are higher or similar to concentrations in downgradient wells.

From Figure 6 the following observations can be made:

- 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 2019 is 0.077 mg/L versus 0.093 mg/L in background wells.

Mann-Kendall trend analysis tests were performed (Attachment D) to determine if concentrations at each well were increasing, decreasing or stable (i.e., no statistically significant upward or downward trend). If the Mann-Kendall test did not identify a trend the coefficient of variation (CV) was calculated (Attachment E) to determine if the concentrations are too variable to identify a trend (i.e. CV greater than or equal to 1). If a trend was identified, the CV was calculated to indicate whether data used to establish the trend are suggestive of a low or high magnitude trend. Data with a CV less than or equal to 1 suggest a lower magnitude trend. Boron concentrations are stable in background wells and downgradient wells APW7 and APW9. Upward trends were identified at APW8 and APW10, however, coefficient of variation evaluations identified minimal variation at all wells, suggesting a low-magnitude trend. Table 2 provides summary statistics, including variability and trend per well.

Monitoring Well	Boron (mg/L)					
	Minimum	Maximum	Median	Standard Deviation	Trend	CV
APW5	0.079	0.12	0.100	0.0127	stable	0.13
APW6	0.073	0.16	0.085	0.0232	stable	0.26
APW7	0.052	0.097	0.077	0.0133	stable	0.17
APW8	0.060	0.11	0.085	0.0129	upward	0.15
APW9	0.053	0.098	0.074	0.0143	stable	0.20
APW10	0.056	0.08	0.071	0.0077	upward	0.11

Table 2. Maximum, minimum, median, variance and trend of boron in groundwater

The low concentrations of boron in downgradient monitoring wells, relative to background concentrations, and the relatively stable boron concentrations in both background and downgradient monitoring wells suggests that the source of the of the SSIs in those wells is not the PAP.

Based on these four 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 C.F.R. § 257.94(e)(2) that SSIs observed during the detection monitoring program were not due to the PAP. Therefore, an assessment monitoring program is not required and the Newton Primary Ash Pond will remain in detection monitoring.

Attachments

Figure 1 Monitoring Well and Source Water Location Map Newton Primary Ash Pond
Figure 2 Groundwater Elevation Contour Map – February 18, 2019
Attachment A Boring Logs for Monitoring Wells APW8 and APW10
Attachment B Geologic Cross Section B-B’
Attachment C Boron Trend Analysis for APW7, APW8, APW9, and APW10
Attachment D Coefficient of Variation Evaluation

.

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: October 14, 2019

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., a Ramboll Company
Date: October 14, 2019

Attachments

Figures

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

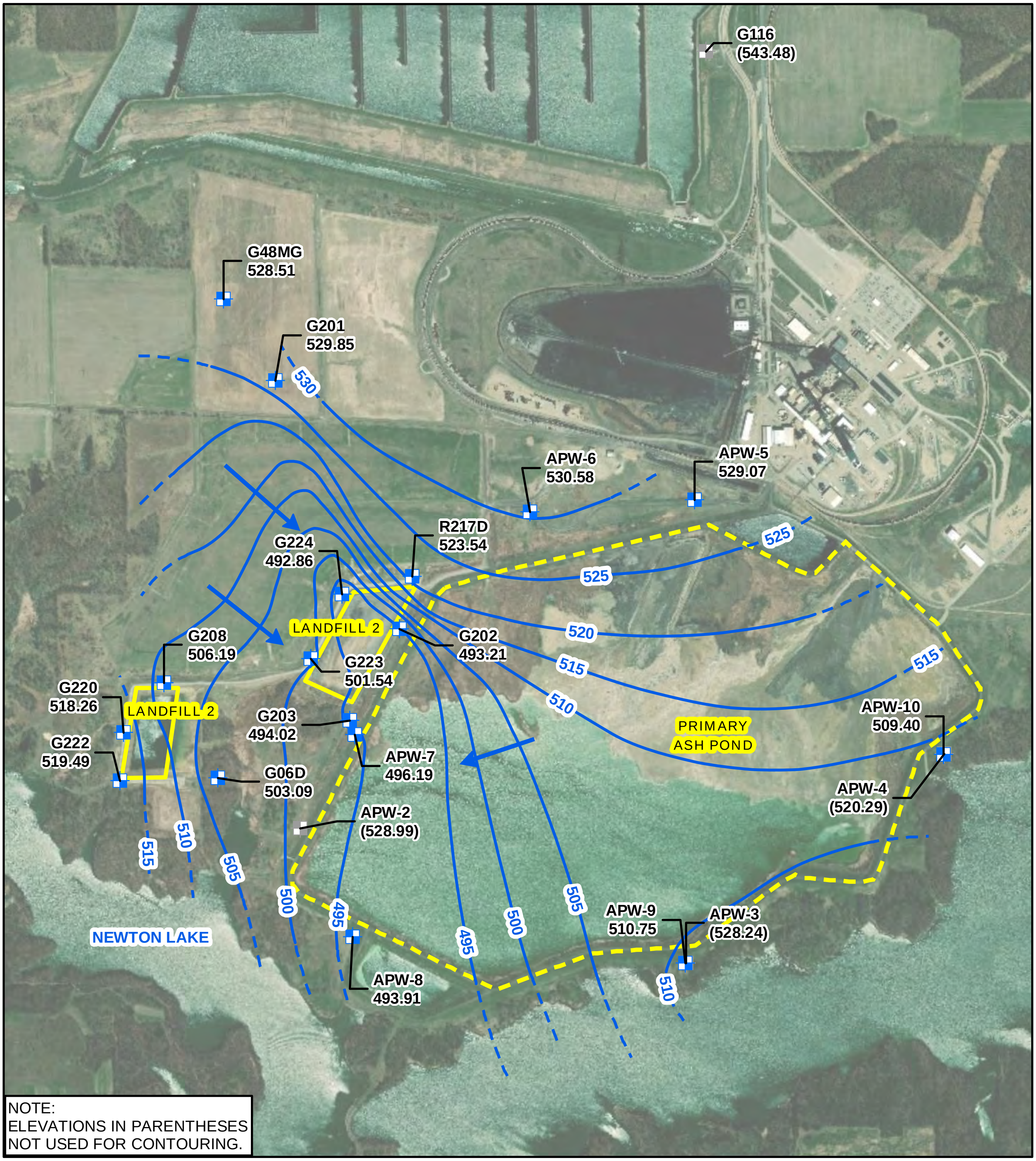
ALTERNATE SOURCE DEMONSTRATION
NEWTON POWER STATION
NEWTON, ILLINOIS

PROJECT NO: 67719

FIGURE NO: 1

Y:\Mapping\Projects\22\2285\MXD\Alt_Source_Dem\Figure 1_Newton Landfill Phases_PAP.mxd Author: stolzsd;

FIGURE NO. 2



NOTE:
ELEVATIONS IN PARENTHESES NOT USED FOR CONTOURING.

CCR RULE MONITORING WELL LOCATION

NON-CCR RULE MONITORING WELL LOCATION

GROUNDWATER ELEVATION CONTOUR (5-FOOT INTERVAL)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

LANDFILL 2 CCR MONITORED UNIT

PRIMARY ASH POND CCR MONITORED UNIT

NEWTON PRIMARY ASH POND (UNIT ID: 501)
GROUNDWATER ELEVATION CONTOUR MAP
FEBRUARY 18, 2019

ALTERNATE SOURCE DEMONSTRATION
NEWTON POWER STATION
NEWTON, ILLINOIS

0 325 650 1,300
Feet

N

O'BRIEN & GERE ENGINEERS, INC.

Y:\Mapping\Projects\22\2285\MXD\Alt_Source_Dem\Figure 2_D4 Newton GW Contours.mxd

Attachment A

Boring Logs for Monitoring Wells APW8 and APW10

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/28/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW8
Well ID: APW8
Surface Elev: 526.75 ft. MSL
Completion: 82.00 ft. BGS
Station: 3,839.59N
6,082.37E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 33.70 - During Drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	TESTING *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
1A	60/60 *100%*	DP		13		*4.50*	0–0.6	Black (10YR2/1), moist, very stiff, SILT with little clay and trace very fine- to medium-grained sand, roots.		
1B				21		*3.00*	0.6–2.5	Yellowish brown (10YR5/4) with 30% light gray (10YR7/2) mottles, dry, hard, SILT with little clay and trace very fine- to medium-grained sand.		
2A	60/60 *100%*	DP		18		*2.50*	2.5–8.2	Grayish brown (10YR5/2) with 15% dark yellowish brown (10YR4/6) and 10% black (10YR2/1) mottles, moist, very stiff, silty CLAY with few very fine- to coarse-grained sand and trace small gravel.		
2B				28		*2.00*	8.2–10	Grayish brown (10YR5/2) with 15% dark yellowish brown mottles, moist, stiff, silty CLAY with few very fine- to coarse-grained sand and trace small gravel.		
3A	20/24 *83%*	DP		8		*2.00*	10–14	Brown (10YR5/3) with 20% dark yellowish brown (10YR5/6) mottles, dry, stiff, SILT with little clay and trace very fine- to coarse-grained sand.		
4A	0/17 *0%*	SS	*23-43 50/5"*							Rock in shoe of sampler.
5A	21/24 *88%*	SS	*13-20 24-28* N=44	10		*4.50*	14–20	Dark gray (10YR4/1), moist, hard, SILT with little clay, trace very fine- to coarse-grained sand and small gravel.		
6A	24/24 *100%*	SS	*7-14 20-48* N=34	11		*4.50*				
7A	24/24 *100%*	SS	*14-21 26-32* N=47	10						

Depth scale: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20
Elevation scale: 526, 524, 522, 520, 518, 516, 514, 512, 510, 508

Borehole Detail

NOTE(S): APW8 installed in borehole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/28/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

HANSON

BOREHOLE ID: APW8
Well ID: APW8
Surface Elev: 526.75 ft. MSL
Completion: 82.00 ft. BGS
Station: 3,839.59N
6,082.37E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 33.70 - During Drilling
▼ =
▽ =

Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
8A	24/24 *100%*	ss	*7-13 19-23* N=32	11		*4.50*		Dark gray (10YR4/1), moist, hard, SILT with little clay, trace very fine- to coarse-grained sand and small gravel. *[Continued from previous page]*	506	
9A	24/24 *100%*	ss	*7-14 19-27* N=33	11		*4.50*	22		504	
10A	24/24 *100%*	ss	*8-15 30-37* N=45	11		*4.50*	24		502	
11A	24/24 *100%*	ss	*8-16 24-33* N=40	11		*4.50*	26		500	
12A	24/24 *100%*	ss	*9-31 33-30* N=64	11			28	Gray (10YR5/1), moist, dense, silty, very fine- to medium-grained SAND.	498	
12B				12		*4.50*				
13A	24/24 *100%*	ss	*10-23 40-35* N=63	11		*4.50*	30	Dark gray (10YR4/1), moist, hard SILT with little clay, few very fine- to coarse-grained sand, and trace small gravel.	496	
14A	21/24 *88%*	ss	*16-16 29-50* N=45	10		*4.50*	32		494	
15A	20/24 *83%*	ss	*9-24 34-41* N=58	13			34 ▼	Dark gray (10YR4/1), wet, very dense, silty, very fine- to coarse-grained SAND with trace small gravel.	492	
16A	22/24 *92%*	ss	*16-18 29-35* N=47	11		*4.50*	36	Dark gray (10YR4/1), moist, hard, SILT with little clay, few very fine- to coarse-grained sand, and trace small gravel.	490	
17A	21/24 *88%*	ss	*10-17 21-31* N=38	11		*4.50*	38		488	
							40			

NOTE(S): APW8 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/28/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW8
Well ID: APW8
Surface Elev: 526.75 ft. MSL
Completion: 82.00 ft. BGS
Station: 3,839.59N
6,082.37E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 33.70 - During Drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	TESTING *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type
18A	24/24 *100%*	SS	*9-16 26-32* N=42	11		*4.50*
19A	24/24 *100%*	SS	*10-16 23-34* N=39	12		*4.50*
20A	24/24 *100%*	SS	*10-15 26-44* N=41	13		*4.50*
21A	24/24 *100%*	SS	*12-21 32-48* N=53	12		*4.50*
22A	24/24 *100%*	SS	*11-17 22-31* N=39	13		*4.50*
23A	24/24 *100%*	SS	*10-13 21-32* N=34	13		*4.50*
24A	24/24 *100%*	SS	*8-13 50-26* N=63	13		*4.50*
25A	24/24 *100%*	SS	*8-11 19-28* N=30	14		*4.25*
26A	24/24 *100%*	SS	*10-12 18-26* N=30	13		*4.50*
27A	22/24 *92%*	SS	*7-10 15-22* N=25	21		*4.50*

Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
40–58.5	Dark gray (10YR4/1), moist, hard, SILT with little clay, few very fine- to coarse-grained sand, and trace small gravel. *[Continued from previous page]*			
58.5–60	Olive gray (5Y4/2), moist, hard, silty CLAY with few very fine- to coarse-grained sand and trace small gravel.			

Depth scale: 42, 44, 46, 48, 50, 52, 54, 56, 58, 60
Elevation scale: 486, 484, 482, 480, 478, 476, 474, 472, 470, 468

NOTE(S): APW8 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/28/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW8
Well ID: APW8
Surface Elev: 526.75 ft. MSL
Completion: 82.00 ft. BGS
Station: 3,839.59N 6,082.37E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 33.70 - During Drilling
▼ =
▽ =

Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
28A	20/24 *83%*	SS	*7-15 19-20* N=34	14		*4.50*	60–62	Dark gray (10YR4/1), moist, hard, SILT with little clay, few very fine- to coarse-grained sand and trace small gravel.	466	
29A	21/24 *88%*	SS	*7-8 11-16* N=19	11		*3.75*	62–65	Dark gray (10YR4/1), moist, very stiff, SILT with little clay, few very fine- to coarse-grained sand and trace small gravel.	464	
30A	21/24 *88%*	SS	*6-13 14-11* N=27	14		*4.00*			462	
30B				10			65–66	Gray (10YR6/1), wet, medium dense, silty, very fine- to coarse-grained SAND with trace small to large gravel.		
							66	Dark gray (10YR4/1), moist, very stiff, SILT with little clay and few very fine- to coarse-grained sand.		
31A	18/24 *75%*	SS	*4-3 4-3* N=7	28				Dark gray (10YR4/1), wet, loose, silty, very fine- to coarse-grained SAND with trace small gravel and trace wood fragments.	460	
31B				15		*3.25*	68	Dark gray (10YR4/1), moist, very stiff, SILT with little clay, few very fine- to coarse-grained sand, and trace small gravel, trace wood fragments.		
32A	20/24 *83%*	SS	*1-3 3-2* N=6	17				Dark gray (10YR4/1), wet, loose, SILT with little very fine- to fine-grained sand.	458	
32B				28				Dark gray (10YR4/1), wet, loose, silty, very fine- to coarse-grained SAND.		
							70	Dark gray (10YR4/1), wet, loose, SILT with little very fine- to fine-grained sand, trace wood fragments.		
33A	15/24 *63%*	SS	*woh-2 6-6* N=8	17			70–72	Dark gray (10YR4/1), wet, loose, silty, very fine- to coarse-grained SAND, trace wood fragments.	456	
34A	16/24 *67%*	SS	*9-11 15-20* N=26	9			72	Dark gray (10YR4/1), wet, medium dense, silty, very fine- to coarse-grained SAND with trace small gravel.	454	
							74	Dark gray (10YR4/1), wet, medium dense, silty, very fine- to coarse-grained SAND with few small to large gravel.		
35A	15/24 *63%*	SS	*16-21 23-24* N=44	9			74–76	Dark gray (10YR4/1), wet, dense, silty, very fine- to coarse-grained SAND with few small to large gravel.	452	
36A	14/24 *58%*	SS	*11-20 25-24* N=45	11			76–80	Dark gray (10YR4/1), wet, dense, silty, very fine- to coarse-grained SAND with trace small gravel.	450	
37A	15/24 *63%*	SS	*20-25 24-25* N=49	10			80		448	

NOTE(S): APW8 installed in borehole.

FIELD BOREHOLE LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/28/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW8
Well ID: APW8
Surface Elev: 526.75 ft. MSL
Completion: 82.00 ft. BGS
Station: 3,839.59N 6,082.37E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 33.70 - During Drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
38A	18/24 *75%*	SS	*26-26 26-31* N=52	8				Dark gray (10YR4/1), wet, dense, silty, very fine- to coarse-grained SAND with trace small gravel. *[Continued from previous page]*		446	
38B				11		*4.50*	82	Dark gray (10YR4/1), moist, hard, SILT with little clay and few very fine- to coarse-grained sand.			

End of boring = 82.0 feet

NOTE(S): APW8 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/27/2015
WEATHER: Cool, rainy, lo-50s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA

FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW10a
Well ID: APW10
Surface Elev: 521.98 ft. MSL
Completion: 45.94 ft. BGS
Station: 5,371.32N
11,541.23E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 25, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 36.00 - During Drilling
▼ =
▽ =

SAMPLE			TESTING								
Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
							2			520	
							4			518	
							6			516	
							8			514	
							10	Blind drill - see APW4 boring log for lithology, sample, and testing data		512	
							12			510	
							14			508	
							16			506	
							18			504	
							20			502	

NOTE(S): APW10 installed in borehole.
Lithology, sample, and testing data can be found on APW-4 Field Boring Log.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/27/2015
WEATHER: Cool, rainy, lo-50s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW10a
Well ID: APW10
Surface Elev: 521.98 ft. MSL
Completion: 45.94 ft. BGS
Station: 5,371.32N
11,541.23E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 25, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 36.00 - During Drilling
▼ =
▽ =

SAMPLE: Number	Recov / Total (in) *% Recovery*	Type	TESTING: *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
							22	Yellowish brown (10YR5/6) with 5% gray (N6/1) mottles, moist, hard, SILT with little clay, few very fine-grained sand, and trace small gravel.		500	
							24, 26, 28, 30	Yellowish brown (10YR5/4) with 5% dark yellowish brown (10YR4/6) and 5% gray (N6/1) mottles, moist, hard, SILT with little clay, few very fine-grained sand, and trace small gravel.		498, 496, 494, 492	
							32, 34, ▼ 36, 38	Brown (10YR5/3) with 5% gray (N6/1) mottles, moist, hard, SILT with little clay, few very fine-grained sand, and trace small gravel.		490, 488, 486, 484	
							40	Brown (10YR5/3), wet, very dense, silty, very fine- to medium-grained SAND with trace small gravel.		482	

NOTE(S): APW10 installed in borehole.
Lithology, sample, and testing data can be found on APW-4 Field Boring Log.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.	**CONTRACTOR:** Bulldog Drilling, Inc.		
Site: Newton Energy Center	**Rig mfg/model:** CME-550X ATV Drill	**BOREHOLE ID:** APW10a	
Location: Newton, Illinois	**Drilling Method:** 4¼" HSA	**Well ID:** APW10	
Project: 15E0030		**Surface Elev:** 521.98 ft. MSL	
DATES: Start: 10/27/2015	**FIELD STAFF: Driller:** C. Dutton	**Completion:** 45.94 ft. BGS	
Finish: 10/27/2015	**Helper:** C. Jones	**Station:** 5,371.32N	
WEATHER: Cool, rainy, lo-50s	**Eng/Geo:** S. Keim	11,541.23E	

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 25, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 36.00 - During Drilling
▼ =
▽ =

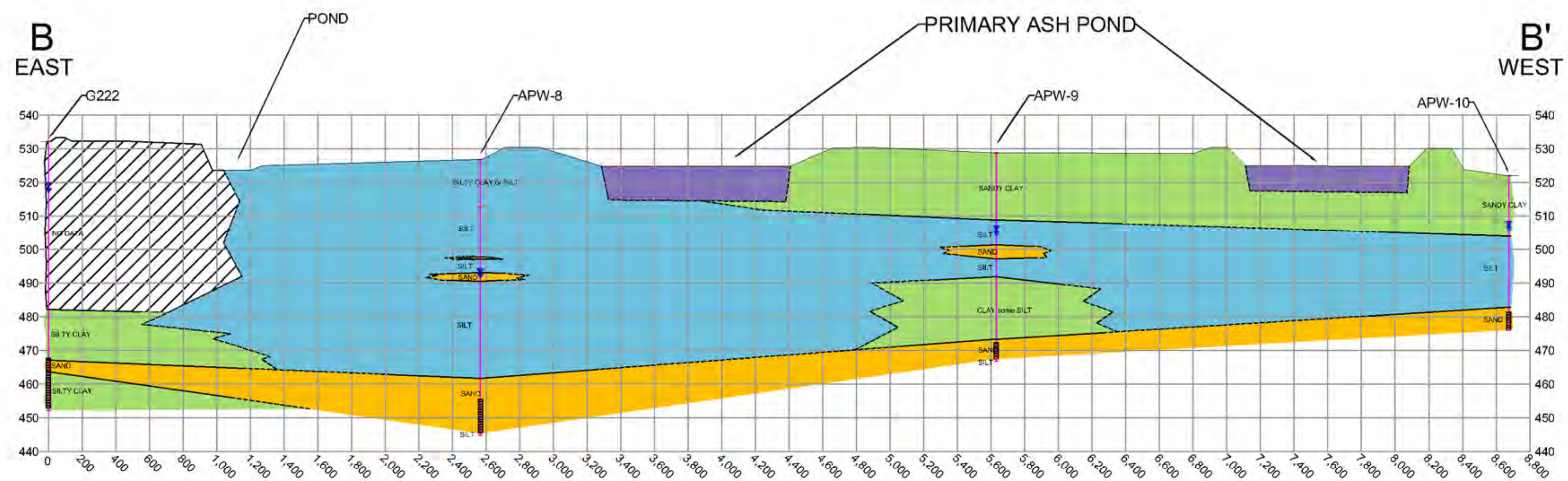
SAMPLE			TESTING								
Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
							42			480	
								Brown (10YR5/3), wet, very dense, silty, very fine- to medium-grained SAND with trace small gravel. *[Continued from previous page]*			
							44			478	

End of boring = 45.94 feet

NOTE(S): APW10 installed in borehole.
Lithology, sample, and testing data can be found on APW-4 Field Boring Log.

Attachment B

Geologic Cross Section B-B’



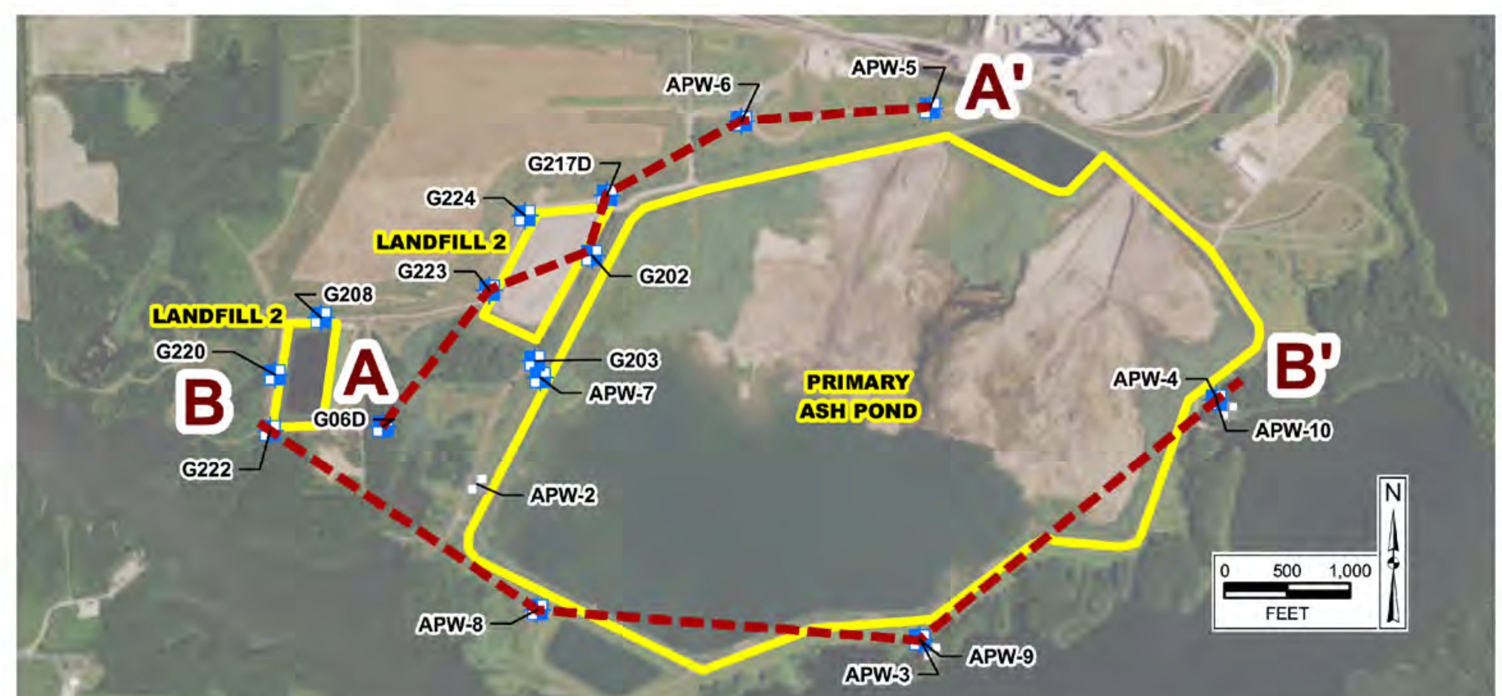
	NO DATA		WELL SCREEN
	ASH		GROUNDWATER ELEVATION
	CLAY		
	SILT		
	SAND		

NOTE THAT THE DEPTH OF THE ASH IN THE ASH POND IS APPROXIMATE.

VERTICAL SCALE IN FEET 40

HORIZONTAL SCALE IN FEET 800

VERTICAL EXAGGERATION =20



DRAWN BY: JMO DATE: 08/29/2017

CHECKED BY: TBN DATE: 10/2/2017

APPROVED BY: SJC DATE: 10/2/2017

DRAWING NO.: Fig X_Geologic Cross-Section A-A'

REFERENCE:

GEOLOGIC CROSS-SECTION B-B'

HYDROGEOLOGIC MONITORING PLAN

NEWTON POWER STATION
NEWTON, ILLINOIS

Natural Resource Technology
AN OBG COMPANY

PROJECT NO. 2285

FIGURE NO. APPENDIX A-2

Attachment C

Mann-Kendall Trend Analysis

Newton
Mann-Kendall Trend Analysis

User Supplied Information

Location ID:	**APW5**	**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 03/31/2019		**Limit Name:**	
		Averaged:	**No**

Trend Analysis

Trend of the least squares straight line

Slope (fitted to data):	-0.000004	mg/L per day
R-Squared error of fit:	0.016425	

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

Median Slope:	-0.000001	mg/L per day
Lower Confidence Limit of Slope, M1:	-0.000031	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000011	mg/L per day

Non-parametric Mann-Kendall Test for Trend

S Statistic:	-0.417
Z test:	1.645
At the 95.0 % Confidence Level (One-Sided Test):	None

Newton
Mann-Kendall Trend Analysis

User Supplied Information

Location ID:	**APW6**	**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 03/31/2019		**Limit Name:**	
		Averaged:	**No**

Trend Analysis

Trend of the least squares straight line

Slope (fitted to data):	-0.000008	mg/L per day
R-Squared error of fit:	0.018309	

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

Median Slope:	0.000006	mg/L per day
Lower Confidence Limit of Slope, M1:	-0.000015	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000018	mg/L per day

Non-parametric Mann-Kendall Test for Trend

S Statistic:	0.687
Z test:	1.645
At the 95.0 % Confidence Level (One-Sided Test):	None

Newton
Mann-Kendall Trend Analysis

User Supplied Information

Location ID:	**APW7**	**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 03/31/2019		**Limit Name:**	
		Averaged:	**No**

Trend Analysis

Trend of the least squares straight line

Slope (fitted to data):	0.000006	mg/L per day
R-Squared error of fit:	0.033439	

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

Median Slope:	0.000008	mg/L per day
Lower Confidence Limit of Slope, M1:	-0.000011	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000034	mg/L per day

Non-parametric Mann-Kendall Test for Trend

S Statistic:	0.412
Z test:	1.645
At the 95.0 % Confidence Level (One-Sided Test):	None

Newton
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 03/31/2019		**Limit Name:**	
		Averaged:	**No**

<u>Trend Analysis</u>

Trend of the least squares straight line

Slope (fitted to data):	0.000019	mg/L per day
R-Squared error of fit:	0.342389	

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

Median Slope:	0.000017	mg/L per day
Lower Confidence Limit of Slope, M1:	0.000003	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000039	mg/L per day

Non-parametric Mann-Kendall Test for Trend

S Statistic:	1.787
Z test:	1.645
At the 95.0 % Confidence Level (One-Sided Test):	Upward

Newton
Mann-Kendall Trend Analysis

User Supplied Information

Location ID:	**APW9**	**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 03/31/2019		**Limit Name:**	
		Averaged:	**No**

Trend Analysis

Trend of the least squares straight line

Slope (fitted to data):	-0.000006	mg/L per day
R-Squared error of fit:	0.028627	

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

Median Slope:	-0.000001	mg/L per day
Lower Confidence Limit of Slope, M1:	-0.000026	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000028	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
Mann-Kendall Trend Analysis

User Supplied Information

Location ID:	**APW10**	**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 03/31/2019		**Limit Name:**	
		Averaged:	**No**

Trend Analysis

Trend of the least squares straight line

Slope (fitted to data):	0.000011	mg/L per day
R-Squared error of fit:	0.304448	

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

Median Slope:	0.000011	mg/L per day
Lower Confidence Limit of Slope, M1:	0.000000	mg/L per day
Upper Confidence Limit of Slope, M2+1:	0.000019	mg/L per day

Non-parametric Mann-Kendall Test for Trend

S Statistic:	1.722
Z test:	1.645
At the 95.0 % Confidence Level (One-Sided Test):	Upward

Attachment D

Coefficient of Variation Evaluation

Newton

Coefficient of Variation
Date Range: 12/14/2015 to 3/31/2019

Boron, total (mg/L)

Location	Count	Mean	Std Dev	% Non-Detects	CV
APW5	12	0.100	0.013	0.00	0.13
APW6	12	0.090	0.023	0.00	0.26
APW7	12	0.076	0.013	0.00	0.17
APW8	12	0.085	0.013	0.00	0.15
APW9	12	0.072	0.014	0.00	0.20
APW10	12	0.071	0.008	0.00	0.11

CV=Std Dev/ Mean

ATTACHMENT 2 – MAP OF GROUNDWATER MONITORING WELL LOCATIONS

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

UPGRADIENT MONITORING WELL LOCATION

DOWNGRADIENT MONITORING WELL LOCATION

CCR MONITORED UNIT

DRAWN BY/DATE:
MDM 10/13/15
REVIEWED BY/DATE:
YAD 10/14/15
APPROVED BY/DATE:
SJC 10/16/15

SITE AND WELL LOCATION MAP
NEWTON PRIMARY ASH POND
UNIT ID: 501

SAMPLING AND ANALYSIS PLAN
DYNEGY CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

PROJECT NO: 2285/4.3

FIGURE NO: 1

NATURAL RESOURCE TECHNOLOGY

Y:\Mapping\Projects\22\2285\MXD\SAP\Figure 1_Site and Well Location Map - Newton Primary Ash Pond.mxd Author: mmejac; Date/Time: 10/16/2015, 9:32:33 AM

ATTACHMENT 3 – WELL CONSTRUCTION DIAGRAMS AND DRILLING LOGS

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/22/2015
Finish: 10/22/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW5
Well ID: APW5
Surface Elev: 541.57 ft. MSL
Completion: 68.00 ft. BGS
Station: 7,758.02N 9,318.19E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 58.00 - During Drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL
							0–0.8	Very dark grayish brown (10YR3/2), dry, very stiff, SILT with little clay and trace very fine- to medium-grained sand, roots.	
1A	60/60 *100%*	DP		7		*3.00*	0.8–3.2	Yellowish brown (10YR5/6), dry, very stiff, SILT with little clay and few very fine- to medium-grained sand.	540
1B				13		*2.50*	3.2–6.4	Yellowish brown (10YR5/6) with 10% gray (10YR6/1) mottles, moist, very stiff, silty CLAY with few very fine- to medium-grained sand and trace small gravel.	538, 536
2A	60/60 *100%*	DP		25		*3.25*	6.4–9.6	Gray (10YR5/1) with 20% dark yellowish brown (10YR4/6) mottles, moist, very stiff, CLAY with some silt, trace very fine- to fine-grained sand.	534
2B				22		*2.25*	9.6–10.2	Dark grayish brown (10YR4/2), moist, stiff, CLAY with little silt and trace very fine- to fine-grained sand.	532
3A				19		*1.50*	10.2–11.8	Gray (10YR6/1), moist, medium dense, very fine- to fine-grained SAND and SILT with little clay.	530
3B	60/60 *100%*	DP		19		*3.00*	11.8–16.2	Gray (10YR5/1) with 5% yellowish brown (10YR5/6) mottles, moist, very stiff, silty CLAY with few fine- to coarse-grained sand and trace small gravel.	528, 526
4A	36/36 *100%*	DP		9		*2.00*	16.2–18	Yellowish brown (10YR5/6) with 15% grayish brown (10YR5/2) mottles, moist, stiff, SILT with little clay and trace fine- to coarse-grained sand and small gravel.	524
5A	23/24 *96%*	SS	*14-28 40-50* N=68	9		*4.50*	18–20	Brown (10YR5/3), moist, hard, SILT with little clay, few very fine- to coarse-grained sand, and trace small gravel.	522

NOTE(S): APW5 installed in borehole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/22/2015
Finish: 10/22/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

HANSON

BOREHOLE ID: APW5
Well ID: APW5
Surface Elev: 541.57 ft. MSL
Completion: 68.00 ft. BGS
Station: 7,758.02N
9,318.19E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 58.00 - During Drilling
▼ =
∇ =

Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL
6A	21/24 *88%*	SS	*11-26 21-14* N=47	9		*4.50*	to 22	Brown (10YR5/3), moist, hard, SILT with little clay, few very fine- to coarse-grained sand, and trace small gravel. *[Continued from previous page]*	520
7A	24/24 *100%*	SS	*5-5 8-13* N=13	16		*4.25*	22–23.8	Brown (10YR5/3) with 5% gray (10YR6/1) and 5% yellowish brown (10YR5/6) mottles, moist, hard, SILT with some clay and trace very fine- to fine-grained sand and small gravel.	518
8A	22/24 *92%*	SS	*18-31 43-27* N=74	9		*4.50*	23.8–26.4	Brown (10YR5/3), moist, hard, SILT with little clay, few very fine- to coarse-grained sand, and trace small gravel.	516
9A	21/24 *88%*	SS	*4-5 11-11* N=16	14		*2.75*	26.4–30.4	Brown (10YR5/3) with 5% gray (10YR6/1) and 5% yellowish brown (10YR5/6) mottles, moist, hard, SILT with some clay and trace very fine- to fine-grained sand and small gravel.	514
10A	22/24 *92%*	SS	*3-6 9-12* N=15	15		*3.75*			512
11A	24/24 *100%*	SS	*4-7 13-16* N=20	14		*4.50*	30.4–34.2	Dark gray (10YR4/1), moist, hard, SILT with some clay, few very fine- to coarse-grained sand and trace small gravel.	510
12A	24/24 *100%*	SS	*4-7 11-17* N=18	16		*4.50*			508
13A	24/24 *100%*	SS	*5-9 12-15* N=21	18		*4.50*	34.2–36.7	Light olive brown (2.5Y5/3) with 5% gray (10YR5/1) mottles, moist, hard, SILT with little clay and trace very fine- to medium-grained sand.	506
14A	24/24 *100%*	SS	*4-8 11-14* N=19	16		*4.50*	36.7–40	Olive brown (2.5Y4/3) with 10% gray (N6/1) mottles, moist, hard, silty CLAY with little fine- to coarse-grained sand and trace small gravel.	504
15A	24/24 *100%*	SS	*5-13 16-23* N=29	12		*4.50*	40		502

NOTE(S): APW5 installed in borehole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/22/2015
Finish: 10/22/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

HANSON

BOREHOLE ID: APW5
Well ID: APW5
Surface Elev: 541.57 ft. MSL
Completion: 68.00 ft. BGS
Station: 7,758.02N 9,318.19E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 58.00 - During Drilling
▼ =
▽ =

Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
16A	24/24 *100%*	SS	*6-13 16-30* N=29	12		*4.50*		Olive brown (2.5Y4/3) with 10% gray (N6/1) mottles, moist, hard, silty CLAY with little fine- to coarse-grained sand and trace small gravel. *[Continued from previous page]*	500	
17A	24/24 *100%*	SS	*5-10 13-22* N=23	15		*4.50*	42		498	
18A	24/24 *100%*	SS	*7-13 17-25* N=30	13		*4.50*	44	Olive brown (2.5Y4/3) with 10% gray (N6/1) mottles, moist, hard, SILT with little clay, few very fine- to coarse-grained sand and trace small gravel.	496	
19A	24/24 *100%*	SS	*6-13 20-28* N=33	13		*4.50*	46		494	
20A	24/24 *100%*	SS	*5-10 16-21* N=26	13		*4.50*	48		492	
21A	24/24 *100%*	SS	*6-10 18-21* N=28	13		*4.50*	50		490	
22A	24/24 *100%*	SS	*7-14 19-26* N=33	13		*4.50*	52		488	
23A	24/24 *100%*	SS	*6-10 17-24* N=27	13		*4.50*	54		486	
24A	24/24 *100%*	SS	*12-16 28-36* N=44	11		*4.50*	56	Olive gray (5Y5/2) with 40% olive brown (2.5Y4/4) mottles, moist, hard, SILT with little clay, few very fine- to coarse-grained sand and trace small gravel.	484	
25A	24/24 *100%*	SS	*2-6 12-15* N=18	23			▼ 58	Greenish gray (10G5/1) with 40% olive gray (5Y4/2) mottles, moist, medium dense, SILT with few clay and trace very fine- to fine-grained sand.		
25B				15			60	Very dark gray (10YR3/1), wet, medium dense, very fine- to coarse-grained SAND with few silt.	482	

NOTE(S): APW5 installed in borehole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/22/2015
Finish: 10/22/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

HANSON

BOREHOLE ID: APW5
Well ID: APW5
Surface Elev: 541.57 ft. MSL
Completion: 68.00 ft. BGS
Station: 7,758.02N
9,318.19E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 58.00 - During Drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
26A	19/24 *79%*	SS	*3-19 34-48* N=53	13						480	
27A	20/24 *83%*	SS	*22-38 33-34* N=71	16			62				
							64	Very dark gray (10YR3/1), wet, very dense, very fine- to coarse-grained SAND with few silt.		478	
28A	22/24 *92%*	SS	*18-28 31-33* N=59	14						476	
29A	24/24 *100%*	SS	*21-27 24-23* N=51	16			66				
29B				14		*4.50*	68	Dark gray (10YR4/1), moist, hard, SILT with little clay and few very fine- to coarse-grained sand.		474	

End of boring = 68.0 feet

NOTE(S): APW5 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/20/2015
Finish: 10/21/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW6
Well ID: APW6
Surface Elev: 543.38 ft. MSL
Completion: 74.00 ft. BGS
Station: 7,688.54N
7,811.93E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 14.00 - During Drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	TESTING *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type
1A	60/60 *100%*	DP		15		*4.00*
1B				26		*3.00*
2A	60/60 *100%*	DP		18		*2.50*
2B				18		*1.00*
3A	60/60 *100%*	DP		27		*1.50*
3B				21		*1.50*
4A	12/12 *100%*	DP		10		
5A	22/24 *92%*	SS	*15-29 41-50* N=70	8		*4.50*
6A	21/24 *88%*	SS	*14-30 40-50* N=70	8		*4.50*

Depth ft. BGS | Lithologic Description | Borehole Detail | Elevation ft. MSL | Remarks

Gray (10YR6/1), dry, very stiff, SILT with few clay and trace very fine- to coarse- grained sand, trace roots.

Brown (10YR5/3) with 5% dark yellowish brown (10YR4/6) and 5% gray (10YR6/1) mottles, dry, very stiff, SILT with few clay and very fine- to coarse-grained sand, trace small gravel, trace roots.

Gray (10YR5/1) with 35% dark yellowish brown (10YR4/6) mottles, moist, very stiff, CLAY with little silt and trace very fine- to fine-grained sand.

Gray (10YR5/1) with 40% dark yellowish brown (10YR3/6) mottles, moist, very stiff, SILT with little clay and trace very fine- to medium-grained sand.

Gray (10YR5/1) with 30% dark yellowish brown (10YR4/6) mottles, moist, stiff, SILT with some clay and few very fine- to medium-grained sand.

Dark yellowish brown (10YR4/6) with 25% gray (10YR5/1) mottles, moist, stiff, CLAY with some silt and few very fine- to medium-sand.

Dark yellowish brown (10YR3/4), wet, soft, fine- to coarse grained sandy CLAY with little silt.

Brown (10YR4/3), moist, stiff, SILT with little clay and few very fine- to coarse-grained sand.

Grayish brown (10YR5/2) with 15% dark gray (10YR4/1) mottles, dry, hard, SILT with little clay, few very fine- to coarse-grained sand and trace small gravel.

Depth scale: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20
Elevation scale: 542, 540, 538, 536, 534, 532, 530, 528, 526, 524

NOTE(S): APW6 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/20/2015
Finish: 10/21/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW6
Well ID: APW6
Surface Elev: 543.38 ft. MSL
Completion: 74.00 ft. BGS
Station: 7,688.54N 7,811.93E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 14.00 - During Drilling
▼ =
▽ =

Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
7A	15/17 *88%*	SS	*16-46 50/5"*	9		*4.50*		Brown (10YR5/3), moist, very dense, silty, very fine- to medium-grained SAND with trace small gravel.	522	
8A	12/24 *50%*	SS	*14-37 45-50* N=82	7		*4.50*	22–24	Brown (10YR5/3), dry, hard, SILT with little clay and few very fine- to coarse-grained sand.	520	
9A	24/24 *100%*	SS	*8-17 23-32* N=40	10		*4.50*	26	Dark gray (10YR4/1), moist, hard, SILT with little clay, few very fine- to coarse-grained sand and trace small gravel.	518	
10A	24/24 *100%*	SS	*10-22 26-36* N=48	11		*4.50*	28		516	
11A	24/24 *100%*	SS	*10-18 23-26* N=41	10		*4.50*	30		514	
12A	24/24 *100%*	SS	*6-13 17-23* N=30	13		*4.50*	32		512	
13A	24/24 *100%*	SS	*5-7 12-19* N=19	17		*4.50*	34	Dark gray (10YR4/1) with 30% dark greenish gray (10Y4/1) mottles, moist, hard, SILT with some clay, few very fine- to coarse-grained sand and trace small gravel.	510	
14A	24/24 *100%*	SS	*5-9 13-19* N=22	16		*4.50*	36	Dark gray (10YR4/1), moist, hard, SILT with little clay, few very fine- to coarse-grained sand and trace small to large gravel.	508	
15A	24/24 *100%*	SS	*5-10 15-22* N=25	15		*4.50*	38		506	
16A	24/24 *100%*	SS	*5-9 15-22* N=24	15		*4.50*	40		504	

NOTE(S): APW6 installed in borehole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/20/2015
Finish: 10/21/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

HANSON

BOREHOLE ID: APW6
Well ID: APW6
Surface Elev: 543.38 ft. MSL
Completion: 74.00 ft. BGS
Station: 7,688.54N 7,811.93E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 14.00 - During Drilling
▼ =
▽ =

Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
17A	21/24 *88%*	SS	*4-14 18-25* N=32	12		*4.25*	40–46.3	Dark gray (10YR4/1), moist, hard, SILT with little clay, few very fine- to coarse-grained sand and trace small to large gravel. *[Continued from previous page]*		
18A	24/24 *100%*	SS	*8-12 16-22* N=28	15		*4.50*				
19A	22/24 *92%*	SS	*7-11 15-18* N=26	16		*4.25*				
20A	22/24 *92%*	SS	*7-16 26-45* N=42	13		*4.50*	46.3–54.6	Olive gray (5Y4/2) with 20% dark gray (10YR4/1) mottles, moist, hard, SILT with little clay and trace very fine- to coarse- grained sand and small gravel.		
21A	21/24 *88%*	SS	*11-19 30-37* N=49	13		*4.50*				
22A	19/24 *79%*	SS	*5-13 26-38* N=39	14						
23A	24/24 *100%*	SS	*12-18 29-40* N=47	13		*4.50*				
24A	24/24 *100%*	SS	*7-18 30-37* N=48	13			54.6–56.7	Dark gray brown (2.5Y4/2) with 15% dark gray (10YR4/1) mottles, moist, hard, SILT with little clay and trace very fine- to coarse-grained sand.		
25A	24/24 *100%*	SS	*11-18 27-38* N=45	14		*4.50*	56.7–58	Olive brown (2.5Y4/3) with 5% gray (N6/1) mottles, moist, hard, SILT with little clay and trace very fine- to medium-grained sand.		
26A	24/24 *100%*	SS	*10-15 23-33* N=38	17		*4.50*	58–60	Olive brown (2.5Y4/3) with 5% gray (N6/1) mottles, moist, hard, SILT with little clay and trace very fine- to coarse-grained sand and small gravel.		

Depth scale: 42, 44, 46, 48, 50, 52, 54, 56, 58, 60
Elevation scale: 502, 500, 498, 496, 494, 492, 490, 488, 486, 484

NOTE(S): APW6 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/20/2015
Finish: 10/21/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW6
Well ID: APW6
Surface Elev: 543.38 ft. MSL
Completion: 74.00 ft. BGS
Station: 7,688.54N 7,811.93E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 14.00 - During Drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	TESTING *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
27A	24/24 *100%*	SS	*5-4 21-32* N=25	13		*4.50*	60–63	Olive brown (2.5Y4/3) with 5% gray (N6/1) mottles, moist, hard, SILT with little clay and trace very fine- to coarse-grained sand and small gravel. *[Continued from previous page]*	482	
28A	24/24 *100%*	SS	*7-18 23-31* N=41	12		*4.50*	63–64	Dark gray (10YR4/1) with 5% dark olive brown (2.5Y3/3) mottles, moist, hard, SILT with little clay and trace very fine- to coarse-grained sand and small gravel.	480	
29A	24/24 *100%*	SS	*7-14 18-30* N=32	13		*4.25*	64–66.4	Dark gray (10YR4/1), moist, hard, SILT with little clay and trace very fine- to coarse-grained sand and small gravel.	478	
30A	24/24 *100%*	SS	*13-21 33-33* N=54	14			66.4–70.5	Dark gray (10YR4/1), wet, very dense, silty, very fine- to coarse-grained SAND with trace small gravel.	476	
31A	16/23 *70%*	SS	*3-27 49-50/5"* N=76	13					474	
32A	20/23 *87%*	SS	*6-29 38-50/5"* N=67	22			70.5–72	Gray (10YR5/1), wet, very dense, SILT with few very fine- to fine-grained sand.	472	
							72–72.8	Dark gray (10YR4/1), wet, very dense, silty, very fine- to medium-grained SAND with trace small gravel.		
33A	20/24 *83%*	SS	*26-28 34-37* N=62	12		*4.50*	72.8–74	Dark gray (10YR4/1), moist, hard, SILT with little clay and few very fine- to coarse-grained sand.	470	

End of boring = 74.0 feet

NOTE(S): APW6 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 11/3/2015
Finish: 11/5/2015
WEATHER: Sunny, warm, lo-70s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA
FIELD STAFF: Driller: J. Gates
Helper: C. Clines
Eng/Geo: R. Hasenyager

BOREHOLE ID: APW7a
Well ID: APW7
Surface Elev: 536.21 ft. MSL
Completion: 83.10 ft. BGS
Station: 5,688.85N
6,151.60E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = Dry - During Drilling
▼ =
▽ =

SAMPLE: Number	Recov / Total (in) / % Recovery	Type	TESTING: Blows / 6 in / N - Value / RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) / Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
							0–2.9	Yellowish brown (10YR5/6), moist, medium, CLAY with some silt and trace very fine- to fine-grained sand, roots.		536, 534	
							2.9–4.1	Light gray (10YR7/2), moist, medium, SILT with few very fine-grained sand and trace roots.			
							4.1–7	Gray (10YR5/1) with 30% yellowish brown (10YR5/8) mottles, moist, medium, CLAY with some silt, trace very fine-grained sand, and trace roots.		532, 530	
							7–13.1	Gray (10YR5/1) with 30% yellowish brown (10YR5/8) mottles, moist, medium, CLAY with some silt and trace very fine- to medium-grained sand, trace small gravel, and trace roots.		528, 526, 524	
							13.1–16.2	Yellowish brown (10YR5/4), moist, hard, SILT with few clay, little very fine- to coarse-grained sand, and trace small to medium gravel.		522	
							16.2–17	Yellowish brown (10YR5/6), wet, dense, fine- to coarse-grained SAND with little silt.		520	
							17–18	Gray (10YR5/1), moist, hard, SILT with few clay, little very fine- to very coarse-grained sand, and trace small to medium gravel.			
							18–20	Yellowish brown (10YR5/6) with 20% gray (10YR5/1) mottles, dry, hard, SILT with few clay, little very fine- to very coarse-grained sand, and trace small to medium gravel.		518	

NOTE(S): APW7 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 11/3/2015
Finish: 11/5/2015
WEATHER: Sunny, warm, lo-70s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA
FIELD STAFF: Driller: J. Gates
Helper: C. Clines
Eng/Geo: R. Hasenyager

BOREHOLE ID: APW7a
Well ID: APW7
Surface Elev: 536.21 ft. MSL
Completion: 83.10 ft. BGS
Station: 5,688.85N
6,151.60E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = Dry - During Drilling
▼ =
▽ =

SAMPLE: Number	Recov / Total (in) *% Recovery*	Type	TESTING: *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
								Yellowish brown (10YR5/6) with 20% gray (10YR5/1) mottles, dry, hard, SILT with few clay, little very fine- to very coarse-grained sand, and trace small to medium gravel. *[Continued from previous page]*		516	
							22	Yellowish brown (10YR5/6) with 20% gray (10YR5/1) mottles, dry, hard, SILT with few clay, little very fine- to very coarse-grained sand, and trace small to medium gravel, horizontal and vertical fractures with dark brown (10YR3/3) oxidized faces.		514	
							24	Gray (10YR5/1), moist, hard, SILT with few clay, little very fine- to very coarse-grained sand, and trace small to medium gravel, horizontal and vertical fractures with dark brown (10YR3/3) oxidized faces.		512, 510, 508, 506	
							32	Gray (10YR5/1), moist, hard, SILT with few clay, little very fine- to very coarse-grained sand, and trace small to medium gravel.		504, 502, 500	
								Gray (10YR5/1), moist, dense, very fine- to fine-grained SAND with trace silt.		498	
								Gray (10YR5/1), moist, dense, very fine- to very coarse-grained SAND with trace silt and small gravel.			
							40	Gray (10YR5/1), moist, dense, very fine- to fine-grained SAND with trace silt.			

NOTE(S): APW7 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 11/3/2015
Finish: 11/5/2015
WEATHER: Sunny, warm, lo-70s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA

FIELD STAFF: Driller: J. Gates
Helper: C. Clines
Eng/Geo: R. Hasenyager

BOREHOLE ID: APW7a
Well ID: APW7
Surface Elev: 536.21 ft. MSL
Completion: 83.10 ft. BGS
Station: 5,688.85N
6,151.60E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = Dry - During Drilling
▼ =
▽ =

SAMPLE: Number	Recov / Total (in) % Recovery	Type	TESTING: Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
							40–46.7	Gray (10YR5/1), moist, hard, CLAY with some silt, little very fine- to very coarse-grained sand, trace small gravel, and trace wood fragments.		496–490	
							46.7–60	Gray (10YR5/1), moist, hard, CLAY with some silt, little very fine- to very coarse-grained sand, and trace small gravel, trace wood fragments.		490–476	

Depth scale: 42, 44, 46, 48, 50, 52, 54, 56, 58, 60
Elevation scale: 496, 494, 492, 490, 488, 486, 484, 482, 480, 478

NOTE(S): APW7 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 11/3/2015
Finish: 11/5/2015
WEATHER: Sunny, warm, lo-70s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA
FIELD STAFF: Driller: J. Gates
Helper: C. Clines
Eng/Geo: R. Hasenyager

BOREHOLE ID: APW7a
Well ID: APW7
Surface Elev: 536.21 ft. MSL
Completion: 83.10 ft. BGS
Station: 5,688.85N
6,151.60E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = Dry - During Drilling
▼ =
▽ =

SAMPLE: Number	Recov / Total (in) *% Recovery*	Type	TESTING: *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
							60–71.1	Gray (10YR5/1), moist, hard, CLAY with some silt, little very fine- to very coarse-grained sand, and trace small gravel, trace wood fragments. *[Continued from previous page]*			
							71.1–71.6	Gray (10YR5/1), moist, dense, very fine- to very coarse-grained SAND with some clay and silt.			
							71.6–76	Gray (10YR5/1), moist, hard, CLAY with some silt, little very fine- to very coarse-grained sand, trace small gravel, and trace wood fragments.			
							76–80	Gray (10YR5/1), wet, loose, very fine- to very coarse-grained SAND with trace small gravel.			

Depth scale (ft. BGS): 62, 64, 66, 68, 70, 72, 74, 76, 78, 80
Elevation scale (ft. MSL): 476, 474, 472, 470, 468, 466, 464, 462, 460, 458

NOTE(S): APW7 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 11/3/2015
Finish: 11/5/2015
WEATHER: Sunny, warm, lo-70s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA
FIELD STAFF: Driller: J. Gates
Helper: C. Clines
Eng/Geo: R. Hasenyager

BOREHOLE ID: APW7a
Well ID: APW7
Surface Elev: 536.21 ft. MSL
Completion: 83.10 ft. BGS
Station: 5,688.85N
6,151.60E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = Dry - During Drilling
▼ =
▽ =

SAMPLE			TESTING								
Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
							82	Gray (10YR5/1), wet, loose, very fine- to very coarse-grained SAND with trace small gravel. *[Continued from previous page]*		456 454	
								Bluish black (10B2.5/1), wet dense, very fine- to very coarse-grained SAND with little silt and trace small gravel.			

End of boring = 83.1 feet

NOTE(S): APW7 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/28/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW8
Well ID: APW8
Surface Elev: 526.75 ft. MSL
Completion: 82.00 ft. BGS
Station: 3,839.59N
6,082.37E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 33.70 - During Drilling
▼ =
▽ =

Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
							0–0.6	Black (10YR2/1), moist, very stiff, SILT with little clay and trace very fine- to medium-grained sand, roots.		
1A	60/60 *100%*	DP		13		*4.50*	0.6–2.5	Yellowish brown (10YR5/4) with 30% light gray (10YR7/2) mottles, dry, hard, SILT with little clay and trace very fine- to medium-grained sand.	526	
1B				21		*3.00*	2.5–8.2	Grayish brown (10YR5/2) with 15% dark yellowish brown (10YR4/6) and 10% black (10YR2/1) mottles, moist, very stiff, silty CLAY with few very fine- to coarse-grained sand and trace small gravel.	524, 522, 520	
2A	60/60 *100%*	DP		18		*2.50*				
2B				28		*2.00*	8.2–10	Grayish brown (10YR5/2) with 15% dark yellowish brown mottles, moist, stiff, silty CLAY with few very fine- to coarse-grained sand and trace small gravel.	518	
3A	20/24 *83%*	DP		8		*2.00*	10–14	Brown (10YR5/3) with 20% dark yellowish brown (10YR5/6) mottles, dry, stiff, SILT with little clay and trace very fine- to coarse-grained sand.	516	
4A	0/17 *0%*	SS	*23-43 50/5"*						514	Rock in shoe of sampler.
5A	21/24 *88%*	SS	*13-20 24-28* N=44	10		*4.50*	14–20	Dark gray (10YR4/1), moist, hard, SILT with little clay, trace very fine- to coarse-grained sand and small gravel.	512	
6A	24/24 *100%*	SS	*7-14 20-48* N=34	11		*4.50*			510	
7A	24/24 *100%*	SS	*14-21 26-32* N=47	10					508	

NOTE(S): APW8 installed in borehole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/28/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

HANSON

BOREHOLE ID: APW8
Well ID: APW8
Surface Elev: 526.75 ft. MSL
Completion: 82.00 ft. BGS
Station: 3,839.59N
6,082.37E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 33.70 - During Drilling
▼ =
▽ =

Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type
8A	24/24 *100%*	SS	*7-13 19-23* N=32	11		*4.50*
9A	24/24 *100%*	SS	*7-14 19-27* N=33	11		*4.50*
10A	24/24 *100%*	SS	*8-15 30-37* N=45	11		*4.50*
11A	24/24 *100%*	SS	*8-16 24-33* N=40	11		*4.50*
12A	24/24 *100%*	SS	*9-31 33-30* N=64	11		
12B				12		*4.50*
13A	24/24 *100%*	SS	*10-23 40-35* N=63	11		*4.50*
14A	21/24 *88%*	SS	*16-16 29-50* N=45	10		*4.50*
15A	20/24 *83%*	SS	*9-24 34-41* N=58	13		
16A	22/24 *92%*	SS	*16-18 29-35* N=47	11		*4.50*
17A	21/24 *88%*	SS	*10-17 21-31* N=38	11		*4.50*

Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
~20.0–29.0	Dark gray (10YR4/1), moist, hard, SILT with little clay, trace very fine- to coarse-grained sand and small gravel. *[Continued from previous page]*	506, 504, 502, 500, 498	
29.0–29.7	Gray (10YR5/1), moist, dense, silty, very fine- to medium-grained SAND.		
29.7–33.7	Dark gray (10YR4/1), moist, hard SILT with little clay, few very fine- to coarse-grained sand, and trace small gravel.	496, 494	
33.7–36.3	Dark gray (10YR4/1), wet, very dense, silty, very fine- to coarse-grained SAND with trace small gravel.	492	
36.3–40	Dark gray (10YR4/1), moist, hard, SILT with little clay, few very fine- to coarse-grained sand, and trace small gravel.	490, 488	

Depth scale: 22, 24, 26, 28, 30, 32, 34, 36, 38, 40

NOTE(S): APW8 installed in borehole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/28/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

HANSON

BOREHOLE ID: APW8
Well ID: APW8
Surface Elev: 526.75 ft. MSL
Completion: 82.00 ft. BGS
Station: 3,839.59N
6,082.37E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 33.70 - During Drilling
▼ =
∇ =

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
18A	24/24 *100%*	SS	*9-16 26-32* N=42	11		*4.50*		Dark gray (10YR4/1), moist, hard, SILT with little clay, few very fine- to coarse-grained sand, and trace small gravel. *[Continued from previous page]*	486	
19A	24/24 *100%*	SS	*10-16 23-34* N=39	12		*4.50*	42		484	
20A	24/24 *100%*	SS	*10-15 26-44* N=41	13		*4.50*	44		482	
21A	24/24 *100%*	SS	*12-21 32-48* N=53	12		*4.50*	46		480	
22A	24/24 *100%*	SS	*11-17 22-31* N=39	13		*4.50*	48		478	
23A	24/24 *100%*	SS	*10-13 21-32* N=34	13		*4.50*	50		476	
24A	24/24 *100%*	SS	*8-13 50-26* N=63	13		*4.50*	52		474	
25A	24/24 *100%*	SS	*8-11 19-28* N=30	14		*4.25*	54		472	
26A	24/24 *100%*	SS	*10-12 18-26* N=30	13		*4.50*	56		470	
27A	22/24 *92%*	SS	*7-10 15-22* N=25	21		*4.50*	58	Olive gray (5Y4/2), moist, hard, silty CLAY with few very fine- to coarse-grained sand and trace small gravel.	468	
							60			

NOTE(S): APW8 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/28/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW8
Well ID: APW8
Surface Elev: 526.75 ft. MSL
Completion: 82.00 ft. BGS
Station: 3,839.59N 6,082.37E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 33.70 - During Drilling
▼ =
▽ =

Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
28A	20/24 *83%*	SS	*7-15 19-20* N=34	14		*4.50*		Dark gray (10YR4/1), moist, hard, SILT with little clay, few very fine- to coarse-grained sand and trace small gravel.	466	
							62			
29A	21/24 *88%*	SS	*7-8 11-16* N=19	11		*3.75*		Dark gray (10YR4/1), moist, very stiff, SILT with little clay, few very fine- to coarse-grained sand and trace small gravel.	464	
							64			
30A	21/24 *88%*	SS	*6-13 14-11* N=27	14		*4.00*			462	
30B				10				Gray (10YR6/1), wet, medium dense, silty, very fine- to coarse-grained SAND with trace small to large gravel.		
							66	Dark gray (10YR4/1), moist, very stiff, SILT with little clay and few very fine- to coarse-grained sand.		
31A	18/24 *75%*	SS	*4-3 4-3* N=7	28				Dark gray (10YR4/1), wet, loose, silty, very fine- to coarse-grained SAND with trace small gravel and trace wood fragments.	460	
31B				15		*3.25*		Dark gray (10YR4/1), moist, very stiff, SILT with little clay, few very fine- to coarse-grained sand, and trace small gravel, trace wood fragments.		
							68			
32A	20/24 *83%*	SS	*1-3 3-2* N=6	17				Dark gray (10YR4/1), wet, loose, SILT with little very fine- to fine-grained sand.	458	
32B				28				Dark gray (10YR4/1), wet, loose, silty, very fine- to coarse-grained SAND.		
							70	Dark gray (10YR4/1), wet, loose, SILT with little very fine- to fine-grained sand, trace wood fragments.		
33A	15/24 *63%*	SS	*woh-2 6-6* N=8	17				Dark gray (10YR4/1), wet, loose, silty, very fine- to coarse-grained SAND, trace wood fragments.	456	
							72			
34A	16/24 *67%*	SS	*9-11 15-20* N=26	9				Dark gray (10YR4/1), wet, medium dense, silty, very fine- to coarse-grained SAND with trace small gravel.	454	
								Dark gray (10YR4/1), wet, medium dense, silty, very fine- to coarse-grained SAND with few small to large gravel.		
							74			
35A	15/24 *63%*	SS	*16-21 23-24* N=44	9				Dark gray (10YR4/1), wet, dense, silty, very fine- to coarse-grained SAND with few small to large gravel.	452	
							76			
36A	14/24 *58%*	SS	*11-20 25-24* N=45	11					450	
							78	Dark gray (10YR4/1), wet, dense, silty, very fine- to coarse-grained SAND with trace small gravel.		
37A	15/24 *63%*	SS	*20-25 24-25* N=49	10					448	
							80			

NOTE(S): APW8 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/28/2015
WEATHER: Sunny, breezy, warm, lo-80s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, macro-core sampler, split spoon sampler
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW8
Well ID: APW8
Surface Elev: 526.75 ft. MSL
Completion: 82.00 ft. BGS
Station: 3,839.59N
6,082.37E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 33.70 - During Drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	TESTING *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
38A	18/24 *75%*	SS	*26-26 26-31* N=52	8				Dark gray (10YR4/1), wet, dense, silty, very fine- to coarse-grained SAND with trace small gravel. *[Continued from previous page]*		446	
38B				11		*4.50*	82	Dark gray (10YR4/1), moist, hard, SILT with little clay and few very fine- to coarse-grained sand.			

End of boring = 82.0 feet

NOTE(S): APW8 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 11/2/2015
Finish: 11/3/2015
WEATHER: Foggy, mild, lo-50s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, split spoon sampler

FIELD STAFF: Driller: J. Gates
Helper: C. Clines
Eng/Geo: R. Hasenyager

BOREHOLE ID: APW9
Well ID: APW9
Surface Elev: 528.82 ft. MSL
Completion: 62.00 ft. BGS
Station: 3,519.59N
9,125.33E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 27.00 - During Drilling
▼ = 26.10 - 11/3/15
▽ =

SAMPLE: Number	Recov / Total (in) *% Recovery*	Type	TESTING: *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
1	0/60 *0%*	BD					2, 4			528, 526, 524	
2	0/60 *0%*	BD					6, 8			522, 520	
3	0/60 *0%*	BD					10, 12, 14	Blind drill - see APW3 boring log for lithology, sample, and testing data		518, 516, 514	
4	0/60 *0%*	BD					16, 18, 20			512, 510	

NOTE(S): APW9 installed in borehole.
Lithology, sample, and testing data can be found on APW-3 Field Boring Log.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 11/2/2015
Finish: 11/3/2015
WEATHER: Foggy, mild, lo-50s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, split spoon sampler

FIELD STAFF: Driller: J. Gates
Helper: C. Clines
Eng/Geo: R. Hasenyager

BOREHOLE ID: APW9
Well ID: APW9
Surface Elev: 528.82 ft. MSL
Completion: 62.00 ft. BGS
Station: 3,519.59N
9,125.33E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 27.00 - During Drilling
▼ = 26.10 - 11/3/15
▽ =

Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
5A	24/24 *100%*	SS	*10-13 21-28* N=34	10		*4.25*	22	Gray (10YR5/1), moist, hard, SILT with some very fine-grained sand, little clay, and trace small to medium gravel. Vertical and horizontal fractures with yellowish brown (10YR5/8) faces.	508	
6A	24/24 *100%*	SS	*13-15 21-29* N=36	10		*4.50*			506	
7A	2/24 *8%*	SS	*15-28 33-39* N=61	11		*4.50*	24	Gray (10YR5/1), moist, hard, SILT with some very fine-grained sand, little clay, and trace small to medium gravel.	504	Rock in shoe of sampler.
8A	23/23 *100%*	SS	*9-15 39-50/5"* N=54	11			26 ▼ ▼		502	
8B				11			28	Gray (10YR5/1), wet, dense, very fine- to very coarse-grained SAND with some silt, few clay and trace small to medium gravel.		
9A	24/24 *100%*	SS	*12-22 28-27* N=50	11					500	
9B				12		*4.50*	30	Gray (10YR5/1), moist, hard, SILT with little clay and very fine-grained sand and trace small gravel.		
10A	24/24 *100%*	SS	*14-22 32-44* N=54	11		*4.50*	32		498	
11A	23/24 *96%*	SS	*8-16 24-35* N=40	11		*4.50*	34		496	
12A	16/24 *67%*	SS	*12-25 35-32* N=60	12		*4.50*	36		494	
13A	24/24 *100%*	SS	*6-12 24-25* N=36	11		*4.50*	38	Gray (10YR5/1) moist, stiff, CLAY with some silt, little very fine-grained sand and trace small gravel.	492	
14A	24/24 *100%*	SS	*4-7 16-32* N=23	14		*4.50*	40		490	

NOTE(S): APW9 installed in borehole.
Lithology, sample, and testing data can be found on APW-3 Field Boring Log.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 11/2/2015
Finish: 11/3/2015
WEATHER: Foggy, mild, lo-50s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, split spoon sampler

FIELD STAFF: Driller: J. Gates
Helper: C. Clines
Eng/Geo: R. Hasenyager

BOREHOLE ID: APW9
Well ID: APW9
Surface Elev: 528.82 ft. MSL
Completion: 62.00 ft. BGS
Station: 3,519.59N
9,125.33E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 27.00 - During Drilling
▼ = 26.10 - 11/3/15
▽ =

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp (tsf)* Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
15A	24/24 *100%*	SS	*5-11 19-23* N=30	14		*4.50*		Gray (10YR5/1) moist, stiff, CLAY with some silt, little very fine-grained sand and trace small gravel, trace wood fragments.	488	
16A	24/24 *100%*	SS	*4-8 14-29* N=22	15		*4.50*	42		486	
16B				12			44	Light olive brown (2.5Y5/3), moist, stiff, CLAY with some silt, few very fine- to very coarse-grained sand, and trace small gravel.	484	
17A	24/24 *100%*	SS	*8-17 24-34* N=41	11		*4.50*	46	Light olive brown (2.5Y5/3) with 30% yellowish brown (10YR5/8) mottles, moist, stiff, CLAY with some silt, few very fine- to very coarse-grained sand, and trace small gravel.		
18A	24/24 *100%*	SS	*7-13 20-29* N=33	12		*4.50*	48		482	
19A	24/24 *100%*	SS	*6-12 18-24* N=30	12		*4.50*	50	Grayish brown (2.5Y5/2) with 10% gray (2.5Y5/3) mottles, moist, hard, SILT with little very fine- to very coarse-grained sand, few clay and trace small to large gravel.	480	
20A	24/24 *100%*	SS	*7-12 17-22* N=29	15		*4.50*	52		478	
21A	24/24 *100%*	SS	*5-11 12-18* N=23	14		*4.25*	54	Yellowish brown (10YR5/6) with 25% gray (10YR6/1) mottles, moist, stiff, CLAY with some silt, little very fine- medium-grained sand, and trace small gravel.	476	
22A	23/23 *100%*	SS	*6-14 24-50/5"* N=38	13		*4.50*			474	
22B				13			56	Dark gray (10YR4/1), moist, dense, very fine- to fine-grained SAND with few silt.		
23A	24/24 *100%*	SS	*7-15 21-30* N=36	13			58	Gray (10YR5/1), wet, loose, very fine- to very coarse-grained SAND with trace small gravel.	472	
24A	18/24 *75%*	SS	*13-38 43-40* N=81	15			60	Gray (10YR5/1), wet, loose, very fine- to coarse-grained SAND.	470	

NOTE(S): APW9 installed in borehole.
Lithology, sample, and testing data can be found on APW-3 Field Boring Log.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 11/2/2015
Finish: 11/3/2015
WEATHER: Foggy, mild, lo-50s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA, split spoon sampler
FIELD STAFF: Driller: J. Gates
Helper: C. Clines
Eng/Geo: R. Hasenyager

HANSON

BOREHOLE ID: APW9
Well ID: APW9
Surface Elev: 528.82 ft. MSL
Completion: 62.00 ft. BGS
Station: 3,519.59N
9,125.33E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 26, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 27.00 - During Drilling
▽ = 26.10 - 11/3/15
▽ =

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	TESTING *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
25A	24/24 *100%*	SS	*4-18* *25-30* N=43	21				Gray (10YR5/1), wet, loose, very fine- to coarse-grained SAND. *[Continued from previous page]*		468	
25B				16				Gray (10YR5/1), moist, stiff, CLAY with some silt and trace very fine-grained sand.			
							62	Gray (10YR5/1), wet, dense, SILT and very fine-grained SAND.			

End of boring = 62.0 feet

NOTE(S): APW9 installed in borehole.
Lithology, sample, and testing data can be found on APW-3 Field Boring Log.

Surface Elevation: 528.47

Datum: msl

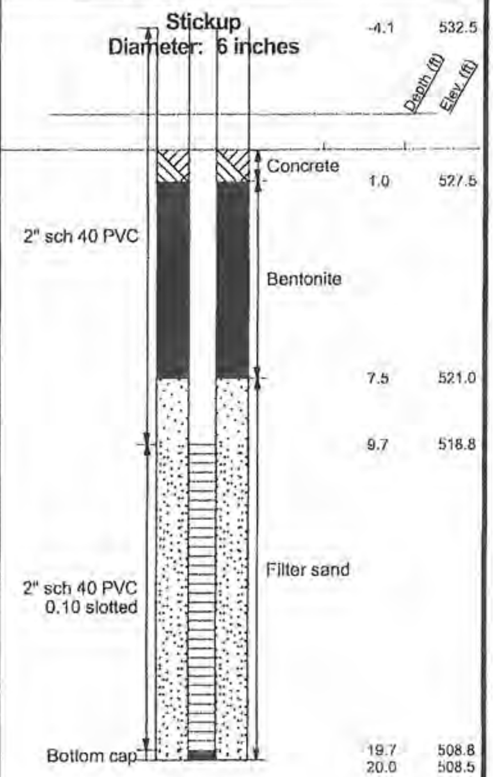
Completion Date: 6/18/10

Northing: 821379.76

Easting: 998975.74

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GRAPHIC LOG	DRY UNIT WEIGHT (pcf) SPT BLOW COUNTS CORE RECOVERY/RQD	SAMPLES
0	Soft, brown, silty CLAY - CL			
6	Soft, brown, sandy CLAY with gravel - CL			
9	Hard, brown, sandy CLAY with gravel - CL			
13	Hard, brownish-gray, sandy CLAY with gravel - CL			
20	Boring terminated at 20 feet.			

WELL DIAGRAM



GROUNDWATER DATA

X FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

4 1/4" AUGER __ HOLLOW STEM

WASHBORING FROM __ FEET

MVU DRILLER KCR LOGGER

CME 750X DRILL RIG

HAMMER TYPE Auto

REMARKS:

Drawn by: KA | Date: 6/29/10

Checked by: RSP | Date: 2/7/11

App'vd. by: DTK | Date: 2-7-11

GEOTECHNOLOGY INC FROM THE GROUND UP

Ameren Power Plant
Newton, Illinois

LOG OF BORING: APW-3

Project No. J017150.01

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL. GRAPHIC LOG FOR ILLUSTRATION PURPOSES ONLY.

LOG OF BORING 2002 WL J017150.01ENV - AMEREN-NEWTON.GPJ GTINC 0638301.GPJ 2/22/11

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/27/2015
WEATHER: Cool, rainy, lo-50s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA

FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW10a
Well ID: APW10
Surface Elev: 521.98 ft. MSL
Completion: 45.94 ft. BGS
Station: 5,371.32N
11,541.23E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 25, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 36.00 - During Drilling
▼ =
▽ =

SAMPLE			TESTING								
Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
							0–20	Blind drill - see APW4 boring log for lithology, sample, and testing data		522–502	

Depth scale (ft. BGS): 2, 4, 6, 8, 10, 12, 14, 16, 18, 20
Elevation scale (ft. MSL): 520, 518, 516, 514, 512, 510, 508, 506, 504, 502

NOTE(S): APW10 installed in borehole.
Lithology, sample, and testing data can be found on APW-4 Field Boring Log.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.	**CONTRACTOR:** Bulldog Drilling, Inc.		
Site: Newton Energy Center	**Rig mfg/model:** CME-550X ATV Drill	**BOREHOLE ID:**	APW10a
Location: Newton, Illinois	**Drilling Method:** 4¼" HSA	**Well ID:**	APW10
Project: 15E0030		**Surface Elev:**	521.98 ft. MSL
DATES: Start: 10/27/2015	**FIELD STAFF: Driller:** C. Dutton	**Completion:**	45.94 ft. BGS
Finish: 10/27/2015	**Helper:** C. Jones	**Station:**	5,371.32N
WEATHER: Cool, rainy, lo-50s	**Eng/Geo:** S. Keim		11,541.23E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 25, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 36.00 - During Drilling
▼ =
▽ =

SAMPLE: Number	Recov / Total (in) *% Recovery*	Type	TESTING: *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
							22	Yellowish brown (10YR5/6) with 5% gray (N6/1) mottles, moist, hard, SILT with little clay, few very fine-grained sand, and trace small gravel.		500	
							24, 26, 28, 30	Yellowish brown (10YR5/4) with 5% dark yellowish brown (10YR4/6) and 5% gray (N6/1) mottles, moist, hard, SILT with little clay, few very fine-grained sand, and trace small gravel.		498, 496, 494, 492	
							32, 34, ▼ 36, 38	Brown (10YR5/3) with 5% gray (N6/1) mottles, moist, hard, SILT with little clay, few very fine-grained sand, and trace small gravel.		490, 488, 486, 484	
							40	Brown (10YR5/3), wet, very dense, silty, very fine- to medium-grained SAND with trace small gravel.		482	

NOTE(S): APW10 installed in borehole.
Lithology, sample, and testing data can be found on APW-4 Field Boring Log.

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Newton Energy Center
Location: Newton, Illinois
Project: 15E0030
DATES: Start: 10/27/2015
Finish: 10/27/2015
WEATHER: Cool, rainy, lo-50s

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" HSA
FIELD STAFF: Driller: C. Dutton
Helper: C. Jones
Eng/Geo: S. Keim

BOREHOLE ID: APW10a
Well ID: APW10
Surface Elev: 521.98 ft. MSL
Completion: 45.94 ft. BGS
Station: 5,371.32N
11,541.23E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Latona
Township: North Muddy
Section 25, **Tier** 6N; **Range** 8E

WATER LEVEL INFORMATION:
▼ = 36.00 - During Drilling
▼ =
▽ =

SAMPLE: Number	Recov / Total (in) *% Recovery*	Type	TESTING: *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
							42			480	
								Brown (10YR5/3), wet, very dense, silty, very fine- to medium-grained SAND with trace small gravel. *[Continued from previous page]*			
							44			478	

End of boring = 45.94 feet

NOTE(S): APW10 installed in borehole.
Lithology, sample, and testing data can be found on APW-4 Field Boring Log.

Surface Elevation: 521.56

Datum msl

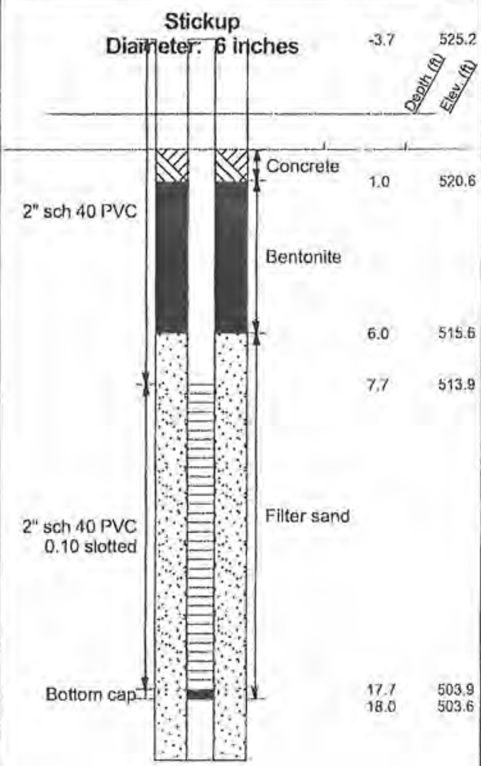
Completion Date: 6/19/10

Northing: 823246.45

Easting: 1001379.56

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GRAPHIC LOG	DRY UNIT WEIGHT (pcf) SPT BLOW COUNTS CORE RECOVERY/RQD	SAMPLES
0	Soft, brown, silty CLAY - CL			
7	Soft, brown, sandy CLAY - CL ∇			
12	Stiff, brown, sandy CLAY with gravel - CL			
18	Boring terminated at 18 feet.			

WELL DIAGRAM



NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL. GRAPHIC LOG FOR ILLUSTRATION PURPOSES ONLY.

LOG OF BORING 2002 WL J017150.01ENV - AMEREN-NEWTON.GPJ GTINC 0638301.GPJ 2/22/11

GROUNDWATER DATA

ENCOUNTERED AT 8 FEET ∇

DRILLING DATA

4 1/4" AUGER __ HOLLOW STEM

WASHBORING FROM __ FEET

MVU DRILLER KCR LOGGER

CME 750X DRILL RIG

HAMMER TYPE Auto

REMARKS:

Drawn by: KA	Checked by: RJP	App'vd. by: DRK
Date: 6/29/10	Date: 2-7-11	Date: 2-7-11

GEOTECHNOLOGY INC

FROM THE GROUND UP

Ameren Power Plant

Newton, Illinois

LOG OF BORING: APW-4

Project No. J017150.01

Illinois Environmental Protection Agency — Well Completion Report

Site #: ______ County: Jasper County Well #: APW5

Site Name: Newton Energy Center Borehole #: APW5

~~State~~ Plant ~~Plane~~ Coordinate: X 9,318.2 Y 7,758.0 (or) Latitude: 38° 56' 2.270" Longitude: -88° 16' 51.560"

Surveyed By: Michael J. Graminski IL Registration #: 035-002901

Drilling Contractor: Bulldog Drilling, Inc. Driller: C. Dutton

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): Water

Logged By: Suzanna L. Keim Date Started: 10/22/2015 Date Finished: 10/22/2015

Report Form Completed By: Suzanna L. Keim Date: 11/6/2015

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >48 hours

Type of Bentonite Seal -- Granular Pellet Slurry (choose one) — selected: Pellet

Installation Method: Gravity

Setting Time: 45 minutes

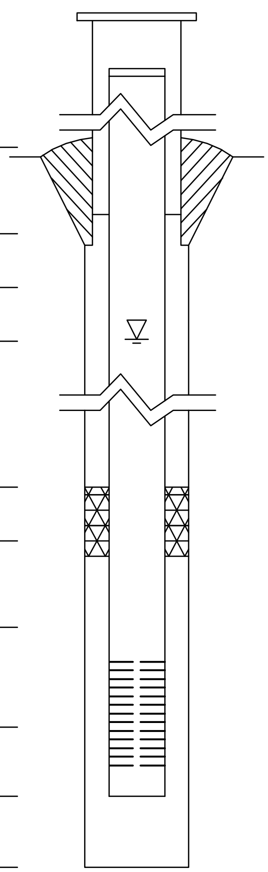
Type of Sand Pack: Quartz Sand

Grain Size: 10-20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: ______



Elevations (MSL)*	Depths (BGS)	(0.01 ft.)
545.00	-3.43	Top of Protective Casing
544.56	-2.99	Top of Riser Pipe
541.57	0.00	Ground Surface
539.57	2.00	Top of Annular Sealant
527.06	14.51	Static Water Level (After Completion) 12/15/2015
484.39	57.18	Top of Seal
480.62	60.95	Top of Sand Pack
478.93	62.64	Top of Screen
474.13	67.44	Bottom of Screen
473.73	67.84	Bottom of Well
473.57	68.00	Bottom of Borehole

* Referenced to a National Geodetic Datum

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	65.63
Bottom of Screen to End Cap	(feet)	0.40
Screen Length (1st slot to last slot)	(feet)	4.80
Total Length of Casing	(feet)	70.83
Screen Slot Size **	(inches)	0.010

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: Steel
Riser Pipe Above W.T.	SS304	SS316	PTFE	PVC (selected)	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	PVC (selected)	OTHER:
Screen	SS304	SS316	PTFE	PVC (selected)	OTHER:

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: ______ County: Jasper County Well #: APW6

Site Name: Newton Energy Center Borehole #: APW6

~~State~~ Plant ~~Plane~~ Coordinate: X 7,811.9 Y 7,688.5 (or) Latitude: 38° 56' 1.510" Longitude: -88° 17' 10.610"

Surveyed By: Michael J. Graminski IL Registration #: 035-002901

Drilling Contractor: Bulldog Drilling, Inc. Driller: C. Dutton

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): Water

Logged By: Suzanna L. Keim Date Started: 10/20/2015 Date Finished: 10/21/2015

Report Form Completed By: Suzanna L. Keim Date: 11/6/2015

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >48 hours

Type of Bentonite Seal -- Granular **Pellet** Slurry (choose one)

Installation Method: Gravity

Setting Time: 30 minutes

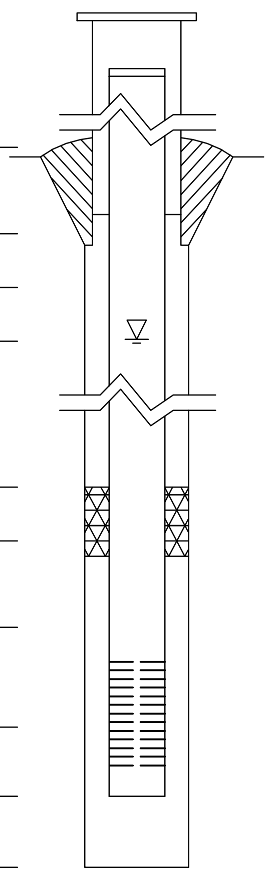
Type of Sand Pack: Quartz Sand

Grain Size: 10-20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: Quartz Sand (if applicable)

Installation Method: gravity



Elevations (MSL)*	Depths (BGS)	(0.01 ft.)
546.88	-3.50	Top of Protective Casing
546.56	-3.18	Top of Riser Pipe
543.38	0.00	Ground Surface
541.38	2.00	Top of Annular Sealant
523.45	19.93	Static Water Level (After Completion) 12/15/2015
478.48	64.90	Top of Seal
477.28	66.10	Top of Sand Pack
475.71	67.67	Top of Screen
470.90	72.48	Bottom of Screen
470.50	72.88	Bottom of Well
469.38	74.00	Bottom of Borehole

* Referenced to a National Geodetic Datum

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	70.85
Bottom of Screen to End Cap	(feet)	0.40
Screen Length (1st slot to last slot)	(feet)	4.81
Total Length of Casing	(feet)	76.06
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: **Steel**
Riser Pipe Above W.T.	SS304	SS316	PTFE	**PVC**	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	**PVC**	OTHER:
Screen	SS304	SS316	PTFE	**PVC**	OTHER:

Illinois Environmental Protection Agency — Well Completion Report

Site #: ______ County: Jasper County Well #: APW7

Site Name: Newton Energy Center Borehole #: APW7a

~~State~~ Plant ~~Plane~~ Coordinate: X 6,151.6 Y 5,688.8 (or) Latitude: 38° 55' 41.660" Longitude: -88° 17' 31.490"

Surveyed By: Michael J. Graminski IL Registration #: 035-002901

Drilling Contractor: Bulldog Drilling, Inc. Driller: J. Gates

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): Water

Logged By: Rhonald W. Hasenyager Date Started: 11/3/2015 Date Finished: 11/5/2015

Report Form Completed By: Suzanna L. Keim Date: 11/9/2015

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >48 hours

Type of Bentonite Seal -- Granular Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 120 minutes

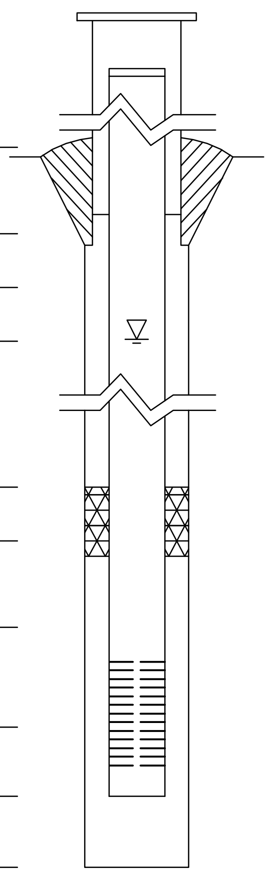
Type of Sand Pack: Quartz Sand

Grain Size: 10-20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: Quartz Sand (if applicable)

Installation Method: gravity



Elevations (MSL)*	Depths (BGS)	(0.01 ft.)
539.24	-3.03	Top of Protective Casing
538.86	-2.65	Top of Riser Pipe
536.21	0.00	Ground Surface
534.21	2.00	Top of Annular Sealant
490.68	45.53	Static Water Level (After Completion) 12/15/2015
462.06	74.15	Top of Seal
460.21	76.00	Top of Sand Pack
458.32	77.89	Top of Screen
453.51	82.70	Bottom of Screen
453.11	83.10	Bottom of Well
453.11	83.10	Bottom of Borehole

* Referenced to a National Geodetic Datum

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	80.54
Bottom of Screen to End Cap	(feet)	0.40
Screen Length (1st slot to last slot)	(feet)	4.81
Total Length of Casing	(feet)	85.75
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: Steel
Riser Pipe Above W.T.	SS304	SS316	PTFE	PVC	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	PVC	OTHER:
Screen	SS304	SS316	PTFE	PVC	OTHER:

Illinois Environmental Protection Agency — Well Completion Report

Site #: ______ County: Jasper County Well #: APW8

Site Name: Newton Energy Center Borehole #: APW8

~~State~~ Plant ~~Plane~~ Coordinate: X 6,082.4 Y 3,839.6 (or) Latitude: 38° 55' 23.380" Longitude: -88° 17' 32.250"

Surveyed By: Michael J. Graminski IL Registration #: 035-002901

Drilling Contractor: Bulldog Drilling, Inc. Driller: C. Dutton

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): Water

Logged By: Suzanna L. Keim Date Started: 10/27/2015 Date Finished: 10/28/2015

Report Form Completed By: Suzanna L. Keim Date: 11/6/2015

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >48 hours

Type of Bentonite Seal -- Granular Pellet Slurry (choose one) — Pellet

Installation Method: Gravity

Setting Time: 55 minutes

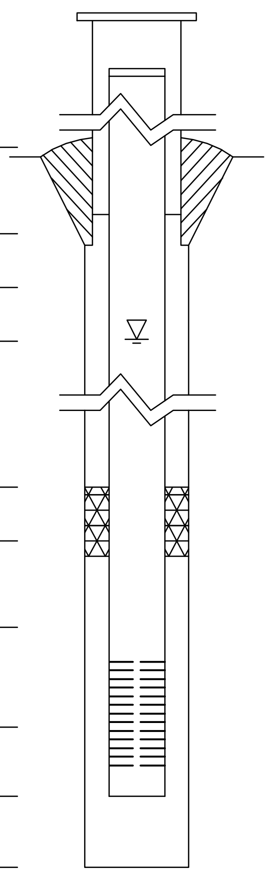
Type of Sand Pack: Quartz Sand

Grain Size: 10-20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: ______



Elevations (MSL)*	Depths (BGS)	(0.01 ft.)
529.86	-3.11	Top of Protective Casing
529.46	-2.71	Top of Riser Pipe
526.75	0.00	Ground Surface
524.75	2.00	Top of Annular Sealant
490.50	36.25	Static Water Level (After Completion) 12/15/2015
462.45	64.30	Top of Seal
458.70	68.05	Top of Sand Pack
455.35	71.40	Top of Screen
445.69	81.06	Bottom of Screen
445.22	81.53	Bottom of Well
444.75	82.00	Bottom of Borehole

* Referenced to a National Geodetic Datum

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	74.11
Bottom of Screen to End Cap	(feet)	0.47
Screen Length (1st slot to last slot)	(feet)	9.66
Total Length of Casing	(feet)	84.24
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: Steel
Riser Pipe Above W.T.	SS304	SS316	PTFE	PVC	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	PVC	OTHER:
Screen	SS304	SS316	PTFE	PVC	OTHER:

Illinois Environmental Protection Agency — Well Completion Report

Site #: ______ County: Jasper County Well #: APW9

Site Name: Newton Energy Center Borehole #: APW9

~~State~~ ~~Plane~~ Plant Coordinate: X 9,125.3 Y 3,519.6 (or) Latitude: 38° 55' 20.370" Longitude: -88° 16' 53.730"

Surveyed By: Michael J. Graminski IL Registration #: 035-002901

Drilling Contractor: Bulldog Drilling, Inc. Driller: J. Gates

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): Water

Logged By: Rhonald W. Hasenyager Date Started: 11/2/2015 Date Finished: 11/3/2015

Report Form Completed By: Suzanna L. Keim Date: 11/9/2015

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >48 hours

Type of Bentonite Seal -- Granular **Pellet** Slurry (choose one)

Installation Method: Gravity

Setting Time: 65 minutes

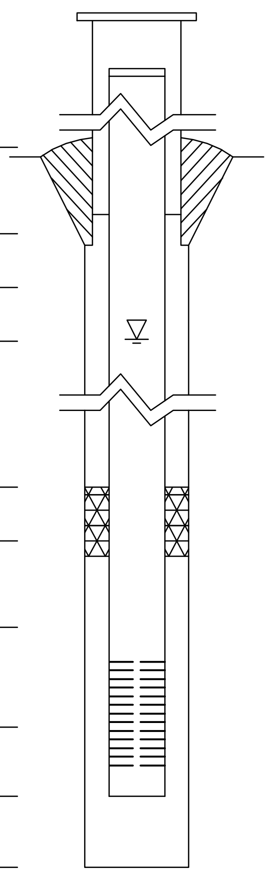
Type of Sand Pack: Quartz Sand

Grain Size: 10-20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: ______



Elevations (MSL)*	Depths (BGS)	(0.01 ft.)
532.43	-3.61	Top of Protective Casing
532.01	-3.19	Top of Riser Pipe
528.82	0.00	Ground Surface
526.82	2.00	Top of Annular Sealant
502.18	26.64	Static Water Level (After Completion) 12/15/2015
475.91	52.91	Top of Seal
474.20	54.62	Top of Sand Pack
472.16	56.66	Top of Screen
467.36	61.46	Bottom of Screen
466.97	61.85	Bottom of Well
466.82	62.00	Bottom of Borehole

* Referenced to a National Geodetic Datum

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	59.85
Bottom of Screen to End Cap	(feet)	0.39
Screen Length (1st slot to last slot)	(feet)	4.80
Total Length of Casing	(feet)	65.04
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: **Steel**
Riser Pipe Above W.T.	SS304	SS316	PTFE	**PVC**	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	**PVC**	OTHER:
Screen	SS304	SS316	PTFE	**PVC**	OTHER:

Illinois Environmental Protection Agency — Well Completion Report

Site #: ______ County: Jasper County Well #: APW10

Site Name: Newton Energy Center Borehole #: APW10a

~~State~~ Plant ~~Plane~~ Coordinate: X 11,541.2 Y 5,371.3 (or) Latitude: 38° 55' 38.790" Longitude: -88° 16' 23.280"

Surveyed By: Michael J. Graminski IL Registration #: 035-002901

Drilling Contractor: Bulldog Drilling, Inc. Driller: C. Dutton

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): Water

Logged By: Suzanna L. Keim Date Started: 10/27/2015 Date Finished: 10/27/2015

Report Form Completed By: Suzanna L. Keim Date: 11/6/2015

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >48 hours

Type of Bentonite Seal -- Granular Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 50 minutes

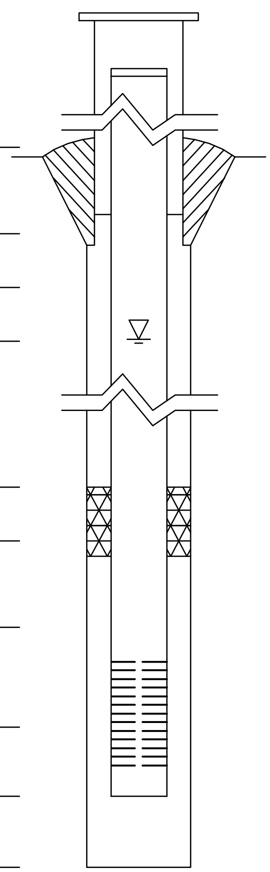
Type of Sand Pack: Quartz Sand

Grain Size: 10-20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: ______



Elevations (MSL)*	Depths (BGS)	(0.01 ft.)
525.12	-3.14	Top of Protective Casing
524.74	-2.76	Top of Riser Pipe
521.98	0.00	Ground Surface
519.98	2.00	Top of Annular Sealant
504.12	17.86	Static Water Level (After Completion) 12/15/2015
484.66	37.32	Top of Seal
483.22	38.76	Top of Sand Pack
481.24	40.74	Top of Screen
476.44	45.54	Bottom of Screen
476.04	45.94	Bottom of Well
476.04	45.94	Bottom of Borehole

* Referenced to a National Geodetic Datum

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	43.50
Bottom of Screen to End Cap	(feet)	0.40
Screen Length (1st slot to last slot)	(feet)	4.80
Total Length of Casing	(feet)	48.70
Screen Slot Size **	(inches)	0.010

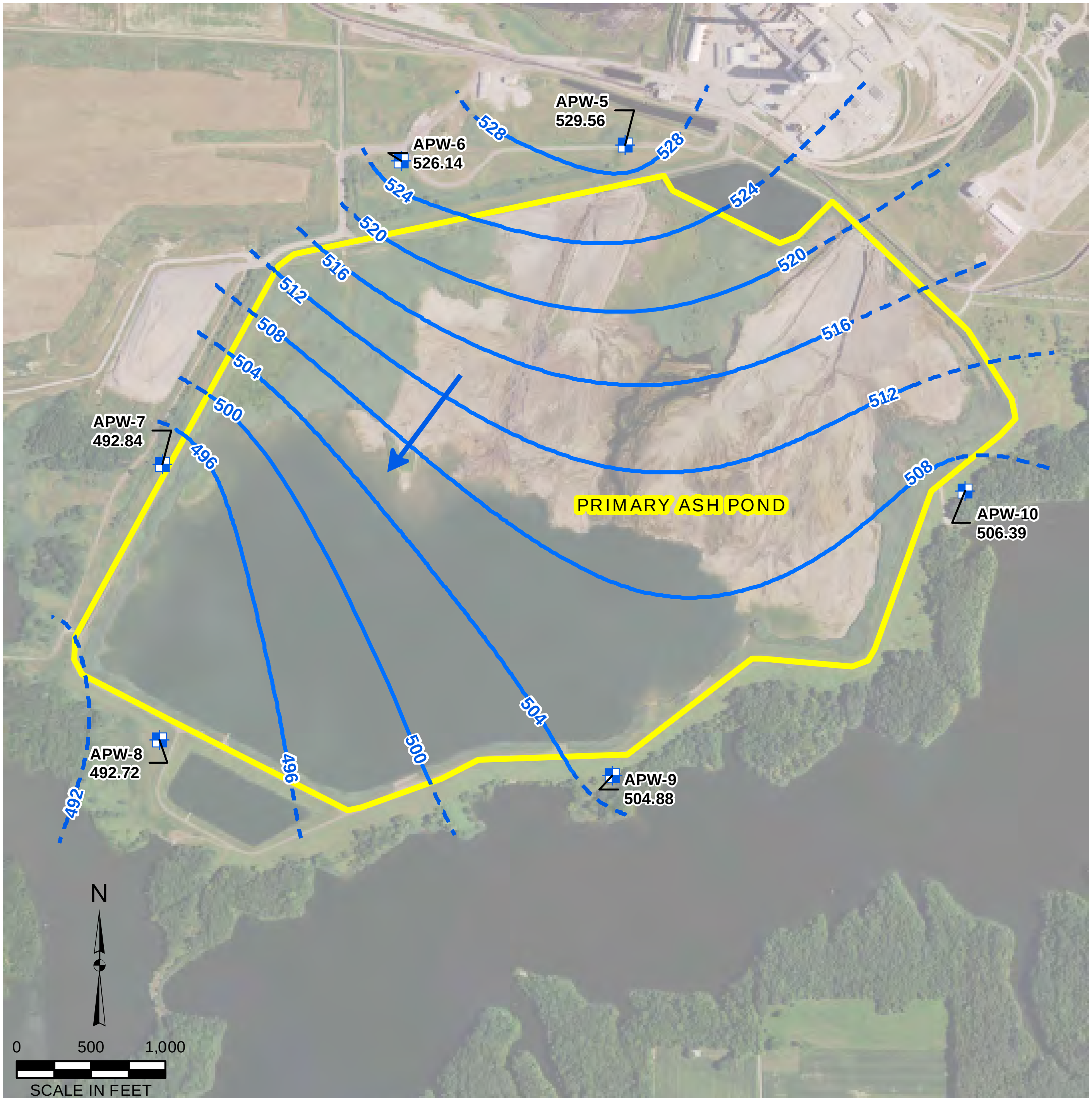
**Hand-Slotted Well Screens Are Unacceptable

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: Steel
Riser Pipe Above W.T.	SS304	SS316	PTFE	PVC	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	PVC	OTHER:
Screen	SS304	SS316	PTFE	PVC	OTHER:

ATTACHMENT 4 – MAPS OF THE DIRECTION OF GROUNDWATER FLOW



CCR RULE MONITORING WELL LOCATION
GROUNDWATER ELEVATION CONTOUR (4-FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
CCR MONITORED UNIT

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

Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_01\R1_NewtonPAP_GW_Contours.mxd Author: sstolz; Date/Time: 3/2/2017, 3:09:40 PM

DRAWN BY/DATE:
SDS 1/23/17
REVIEWED BY/DATE:
TBN 1/25/17
APPROVED BY/DATE:
JJW 2/7/17

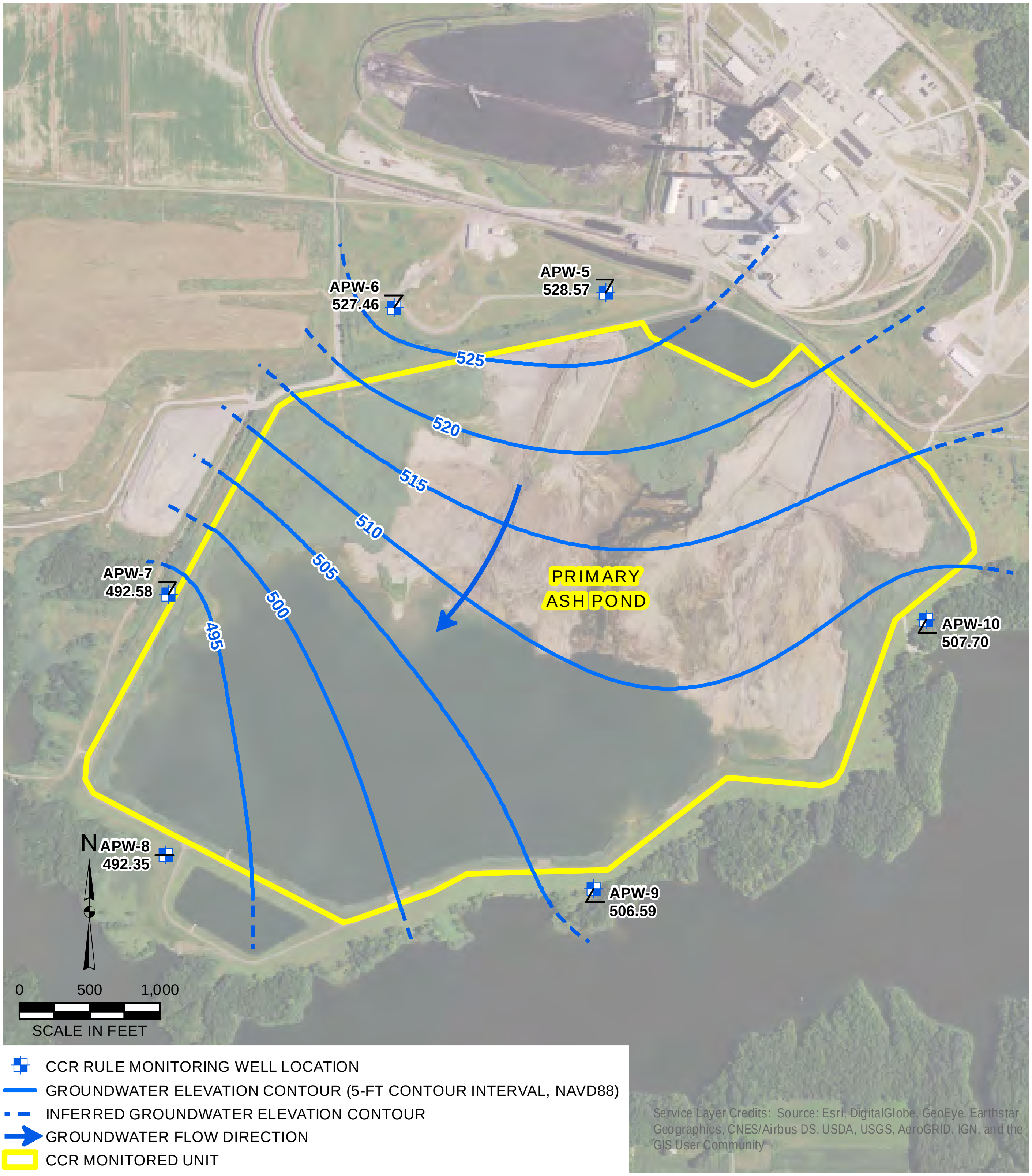
NEWTON PRIMARY ASH POND (UNIT ID: 501)
UPPERMOST AQUIFER UNIT
GROUNDWATER ELEVATION CONTOUR MAP
ROUND 1: DECEMBER 14, 2015

DYNEGY CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



DRAWN BY/DATE:
SDS 1/23/17
REVIEWED BY/DATE:
TBN 1/25/17
APPROVED BY/DATE:
JJW 2/8/17

NEWTON PRIMARY ASH POND (UNIT ID: 501)
UPPERMOST AQUIFER UNIT
GROUNDWATER ELEVATION CONTOUR MAP
ROUND 2: JANUARY 18, 2016

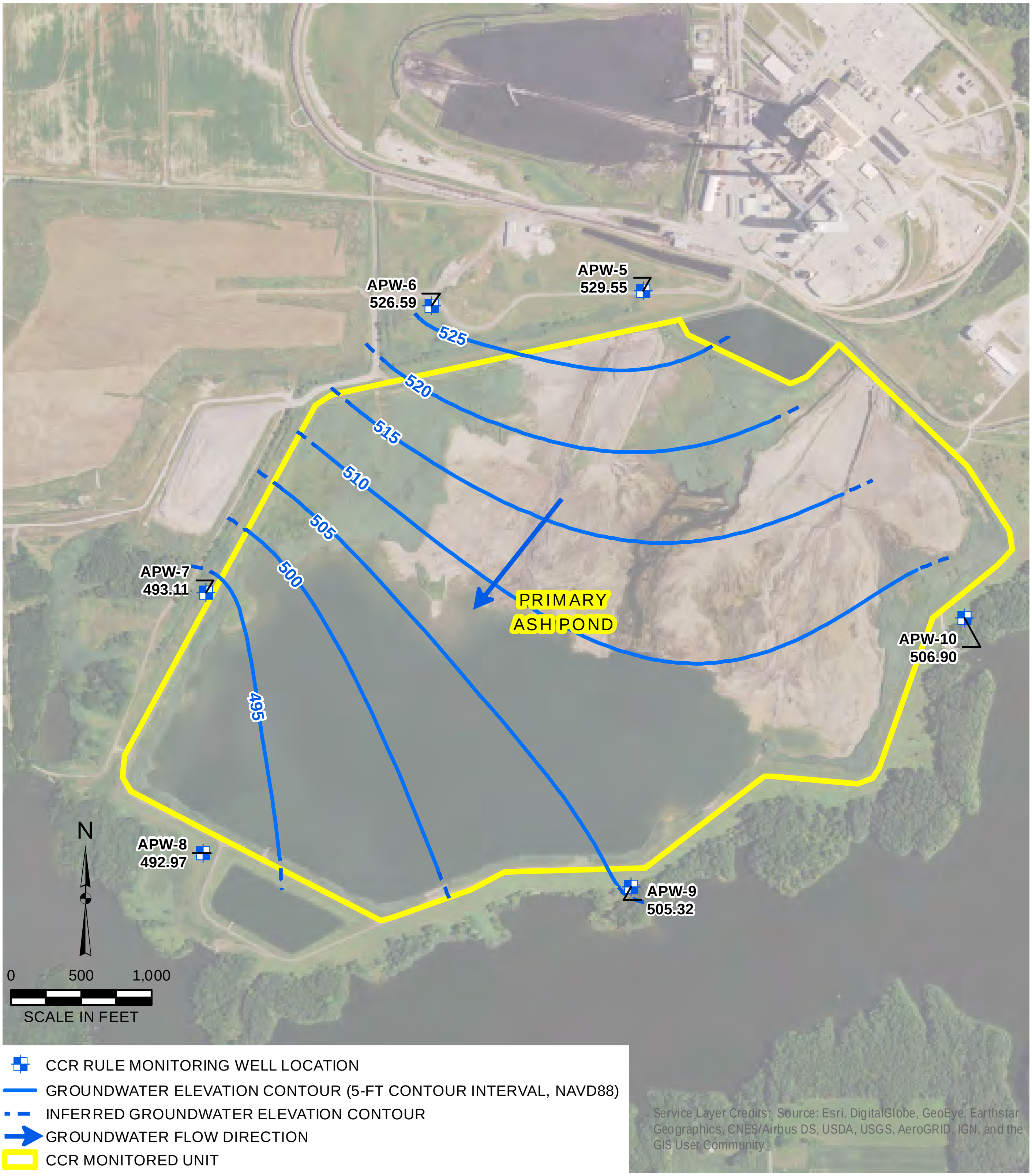
DYNEGY CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY

Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_02\R2_NewtonPAP_GW_Contours.mxd Author: sstolz; Date/Time: 3/2/2017, 6:15:37 PM



CCR RULE MONITORING WELL LOCATION
GROUNDWATER ELEVATION CONTOUR (5-FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
CCR MONITORED UNIT

Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_03\R3_NewtonPAP_GW_Contours.mxd Author: sstolz; Date/Time: 3/3/2017, 1:12:20 PM

DRAWN BY/DATE:
SDS 1/23/17
REVIEWED BY/DATE:
TBN 1/25/17
APPROVED BY/DATE:
JJW 2/8/17

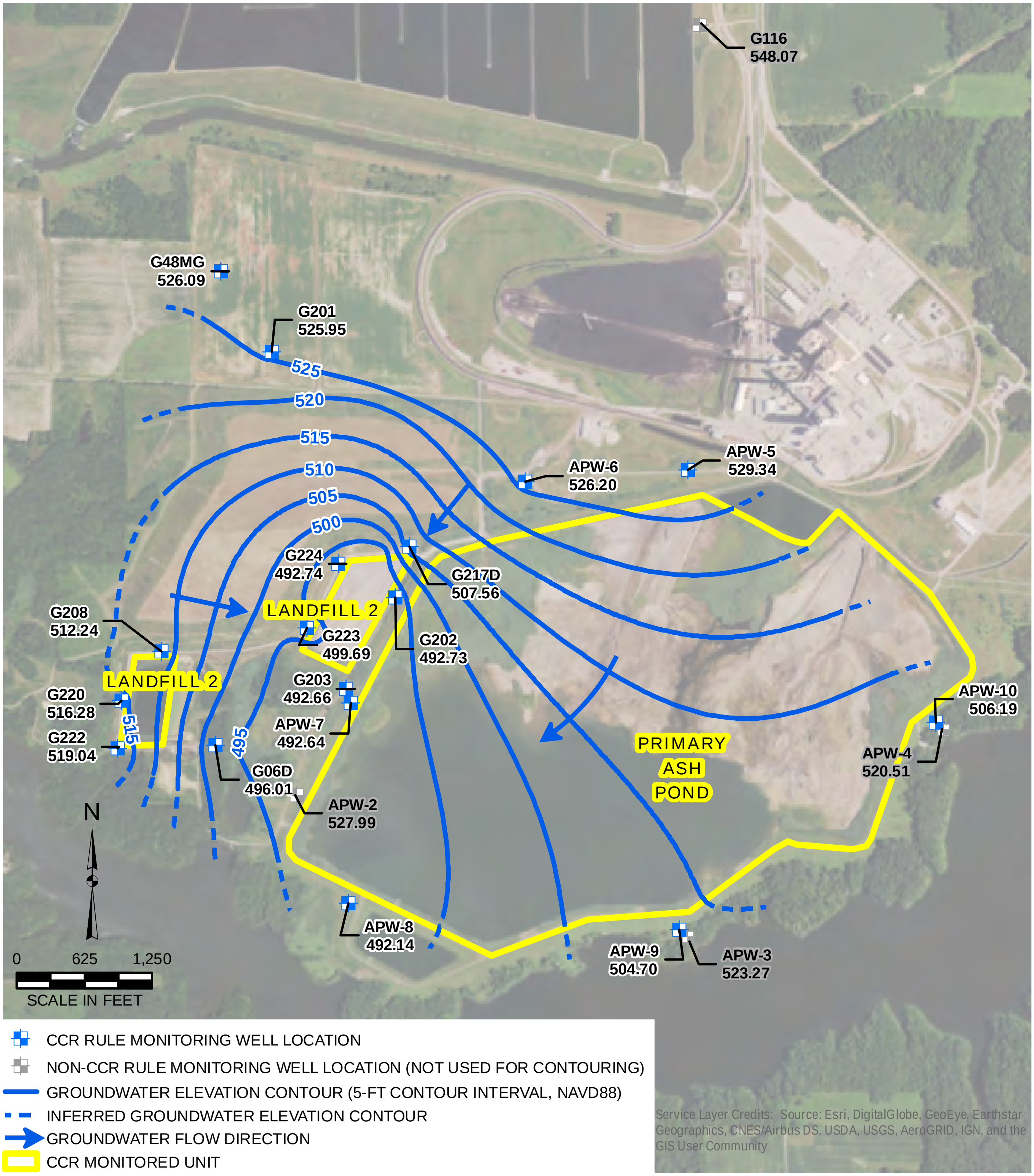
NEWTON PRIMARY ASH POND (UNIT ID: 501)
UPPERMOST AQUIFER UNIT
GROUNDWATER ELEVATION CONTOUR MAP
ROUND 3: APRIL 25, 2016

DYNEGY CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



DRAWN BY/DATE:
SDS 1/23/17
REVIEWED BY/DATE:
TBN 1/25/17
APPROVED BY/DATE:
JJW 2/8/17

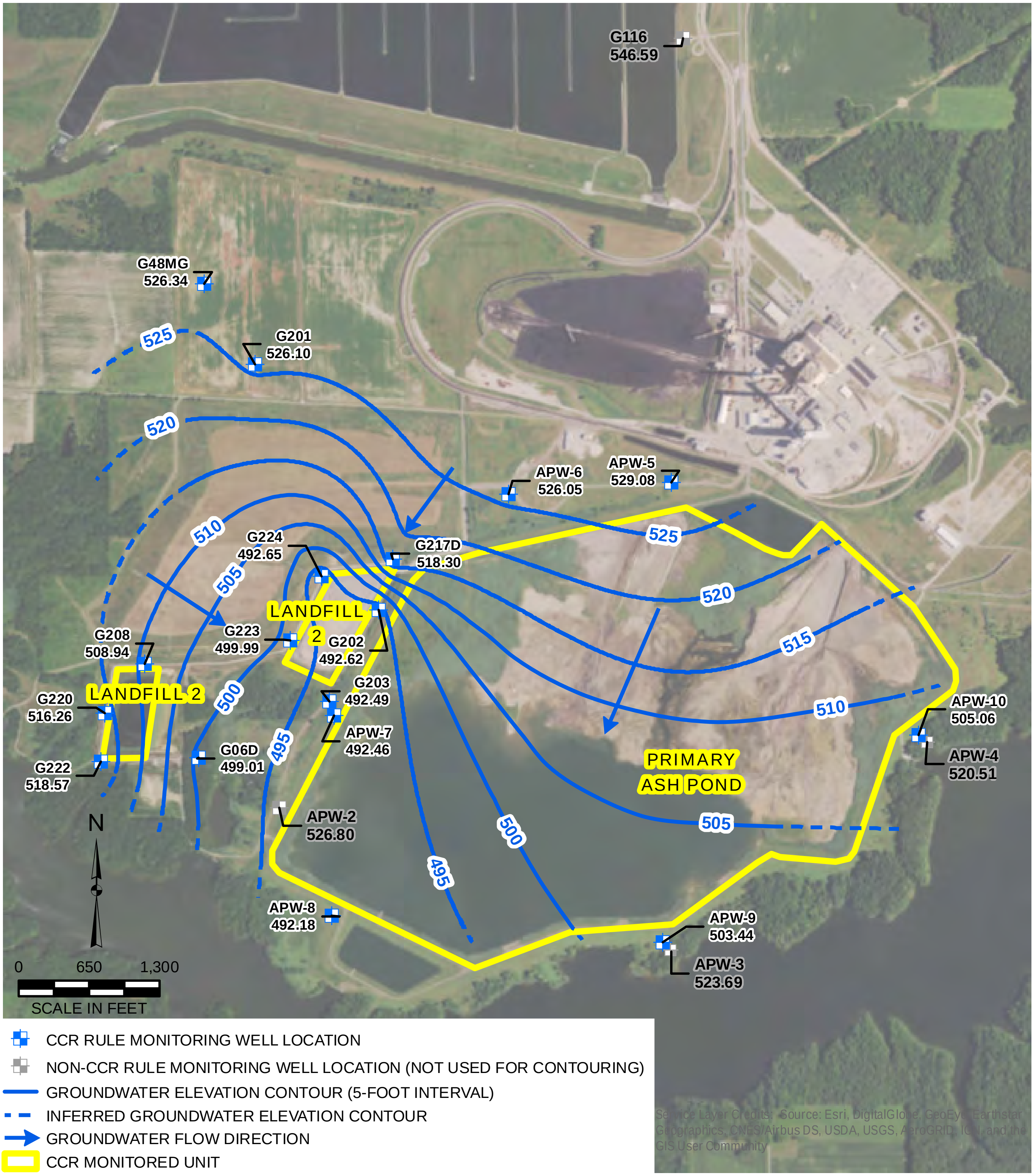
NEWTON PRIMARY ASH POND (UNIT ID: 501) AND NEWTON LANDFILL 2 (UNIT ID: 502)
UPPERMOST AQUIFER UNIT
GROUNDWATER ELEVATION CONTOUR MAP
ROUND 4: JULY 25, 2016

DYNEGY CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_05\R5_Newton_GW_Contours.mxd Author: stolzsd; Date/Time: 9/1/2017, 4:39:30 PM

DRAWN BY/DATE:
SDS 3/6/17
REVIEWED BY/DATE:
TBN 3/6/17
APPROVED BY/DATE:
JJW 8/30/17

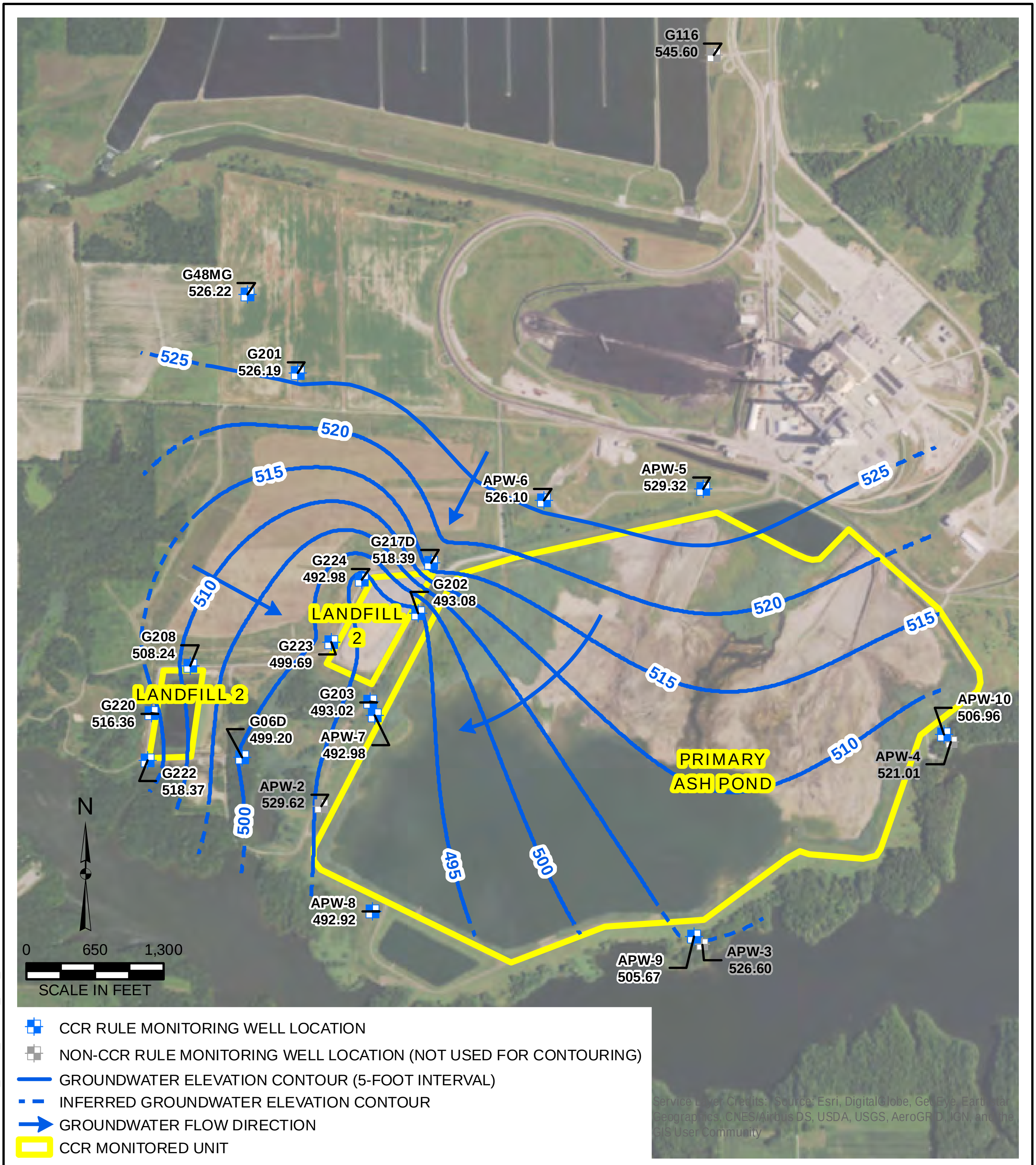
NEWTON PRIMARY ASH POND (UNIT ID: 501) AND LANDFILL 2 (UNIT ID: 502)
UPPERMOST AQUIFER UNIT
GROUNDWATER ELEVATION CONTOUR MAP
ROUND 5: OCTOBER 17, 2016

DYNEGY CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

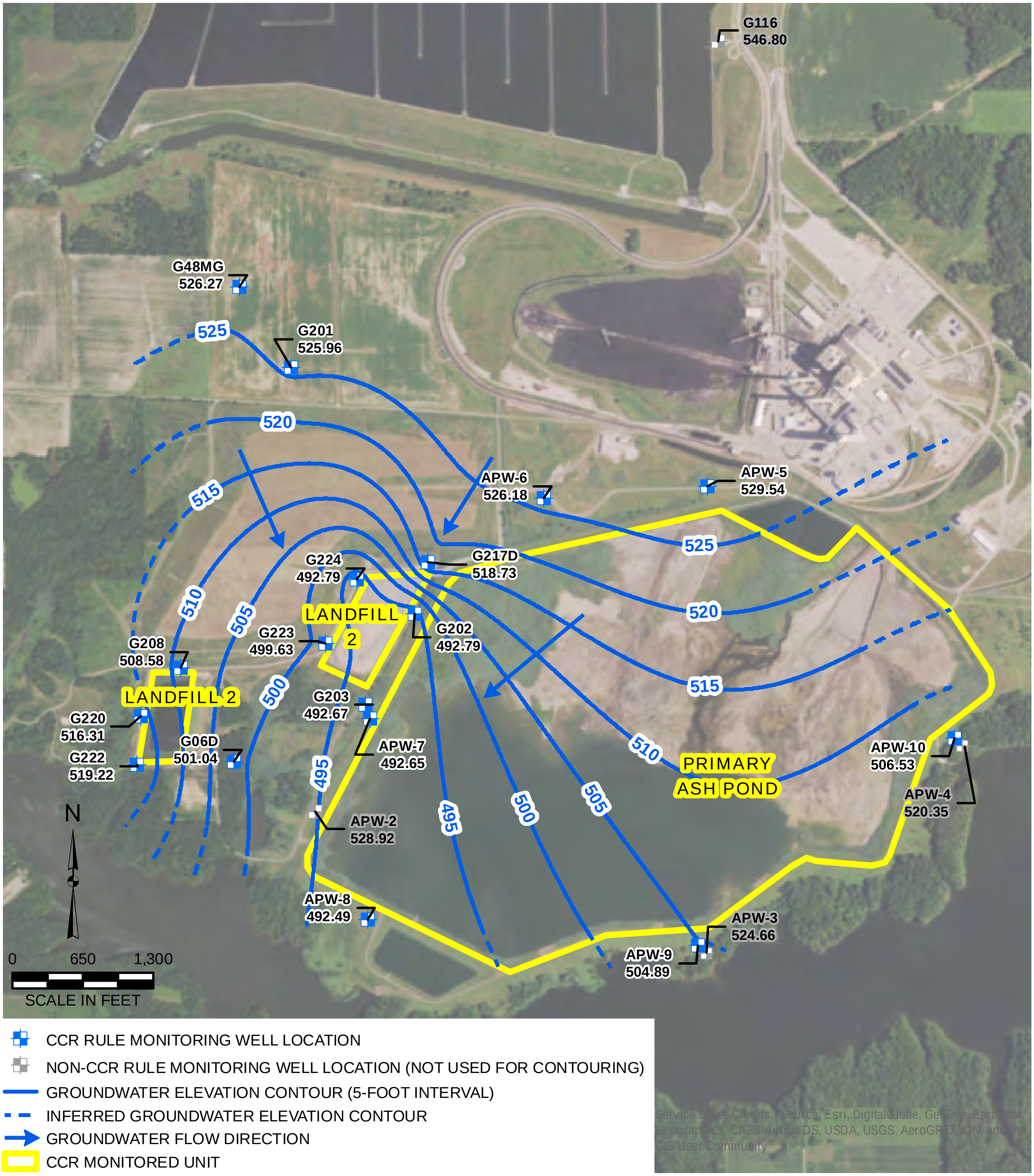
PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



DRAWN BY/DATE: SDS 3/6/17 REVIEWED BY/DATE: TBN 3/6/17 APPROVED BY/DATE: JJW 8/30/17	**NEWTON PRIMARY ASH POND (UNIT ID: 501) AND LANDFILL 2 (UNIT ID: 502)** **UPPERMOST AQUIFER UNIT** **GROUNDWATER ELEVATION CONTOUR MAP** **ROUND 6: JANUARY 16, 2017** DYNEGY CCR RULE GROUNDWATER MONITORING NEWTON POWER STATION NEWTON, ILLINOIS	PROJECT NO: 2285 FIGURE NO: 1 Natural Resource Technology AN OBG COMPANY



DRAWN BY/DATE:
SDS 7/10/17
REVIEWED BY/DATE:
TBN 7/10/17
APPROVED BY/DATE:
JJW 8/30/17

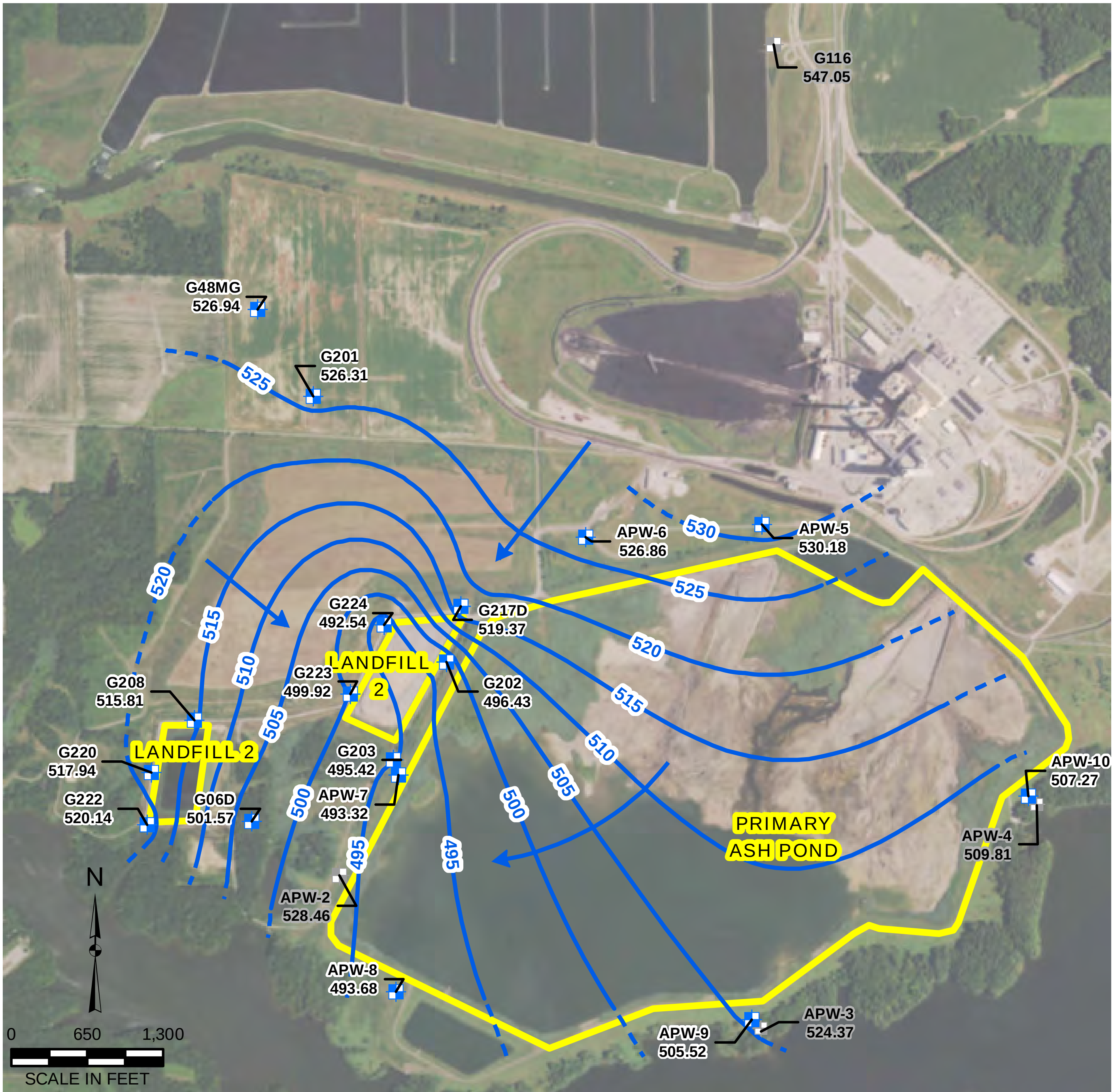
NEWTON PRIMARY ASH POND (UNIT ID: 501) AND LANDFILL 2 (UNIT ID: 502)
UPPERMOST AQUIFER UNIT
GROUNDWATER ELEVATION CONTOUR MAP
ROUND 7: APRIL 17, 2017

DYNEGY CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



CCR RULE MONITORING WELL LOCATION

NON-CCR RULE MONITORING WELL LOCATION (NOT USED FOR CONTOURING)

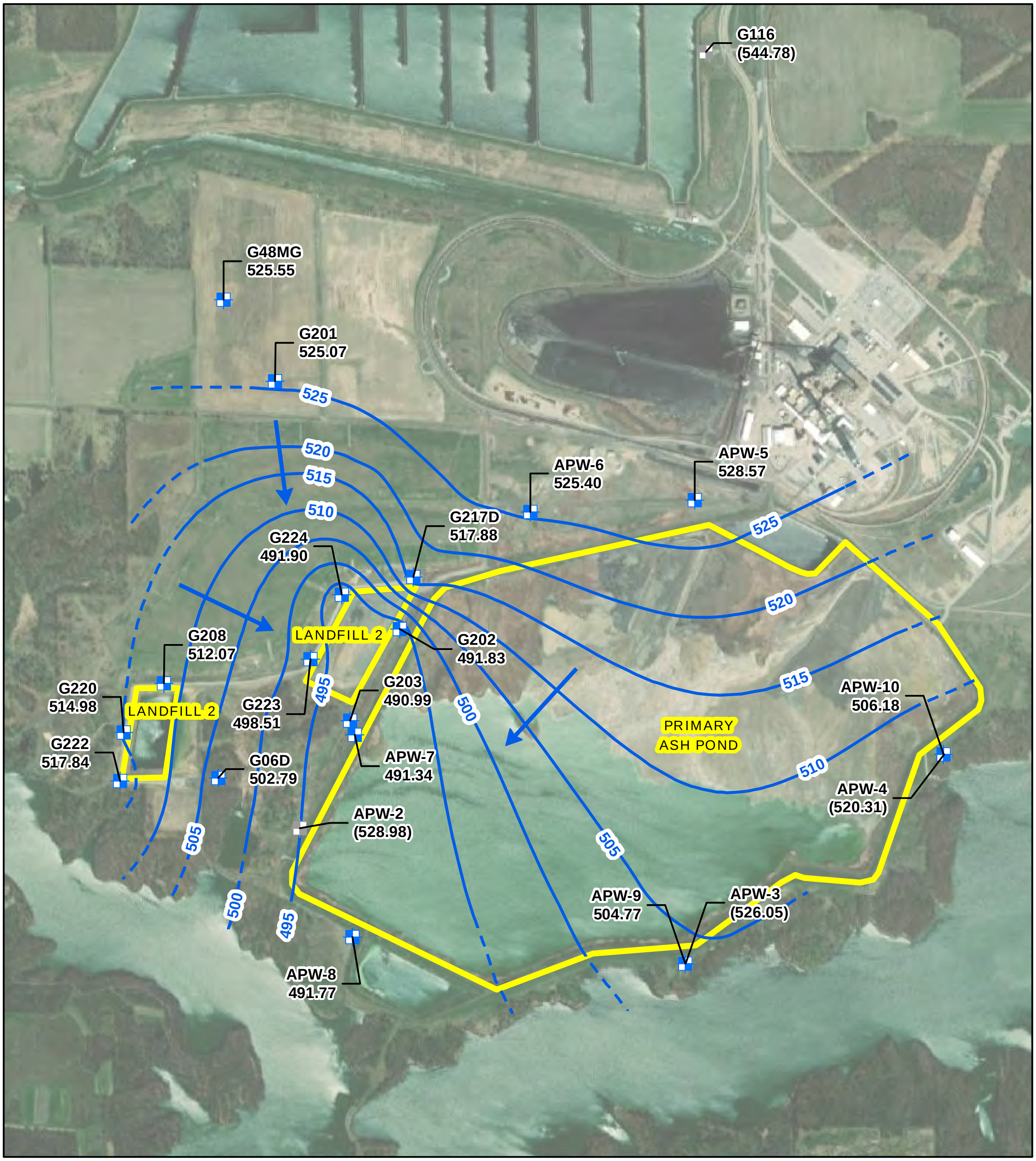
GROUNDWATER ELEVATION CONTOUR (5-FOOT INTERVAL)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

CCR MONITORED UNIT

DRAWN BY/DATE: SDS 8/12/17 REVIEWED BY/DATE: TBN 8/12/17 APPROVED BY/DATE: JJW 8/30/17	**NEWTON PRIMARY ASH POND (UNIT ID: 501) AND LANDFILL 2 (UNIT ID: 502) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP ROUND 8: JUNE 12, 2017** DYNEGY CCR RULE GROUNDWATER MONITORING NEWTON POWER STATION NEWTON, ILLINOIS	PROJECT NO: 2285 FIGURE NO: 1 Natural Resource Technology AN OBG COMPANY



CCR RULE MONITORING WELL LOCATION

NON-CCR RULE MONITORING WELL LOCATION

GROUNDWATER ELEVATION CONTOUR (5-FOOT CONTOUR INTERVAL, NAVD88)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

CCR MONITORED UNIT

NEWTON PRIMARY ASH POND (UNIT ID: 501)
AND LANDFILL 2 (UNIT ID: 502)
GROUNDWATER ELEVATION CONTOUR MAP
NOVEMBER 14, 2017

CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

0 325 650 1,300
Feet

N

O'BRIEN & GERE ENGINEERS, INC.

Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_09\R9_Newton_GW_Contours.mxd

8/14/2020 12:15:02 AM

CCR RULE MONITORING WELL LOCATION

NON-CCR RULE MONITORING WELL LOCATION

GROUNDWATER ELEVATION CONTOUR (5-FOOT CONTOUR INTERVAL, NAVD88)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW

CCR MONITORED UNIT

NEWTON PRIMARY ASH POND (UNIT ID: 501)
AND LANDFILL 2 (UNIT ID: 502)
GROUNDWATER ELEVATION CONTOUR MAP
MAY 17, 2018

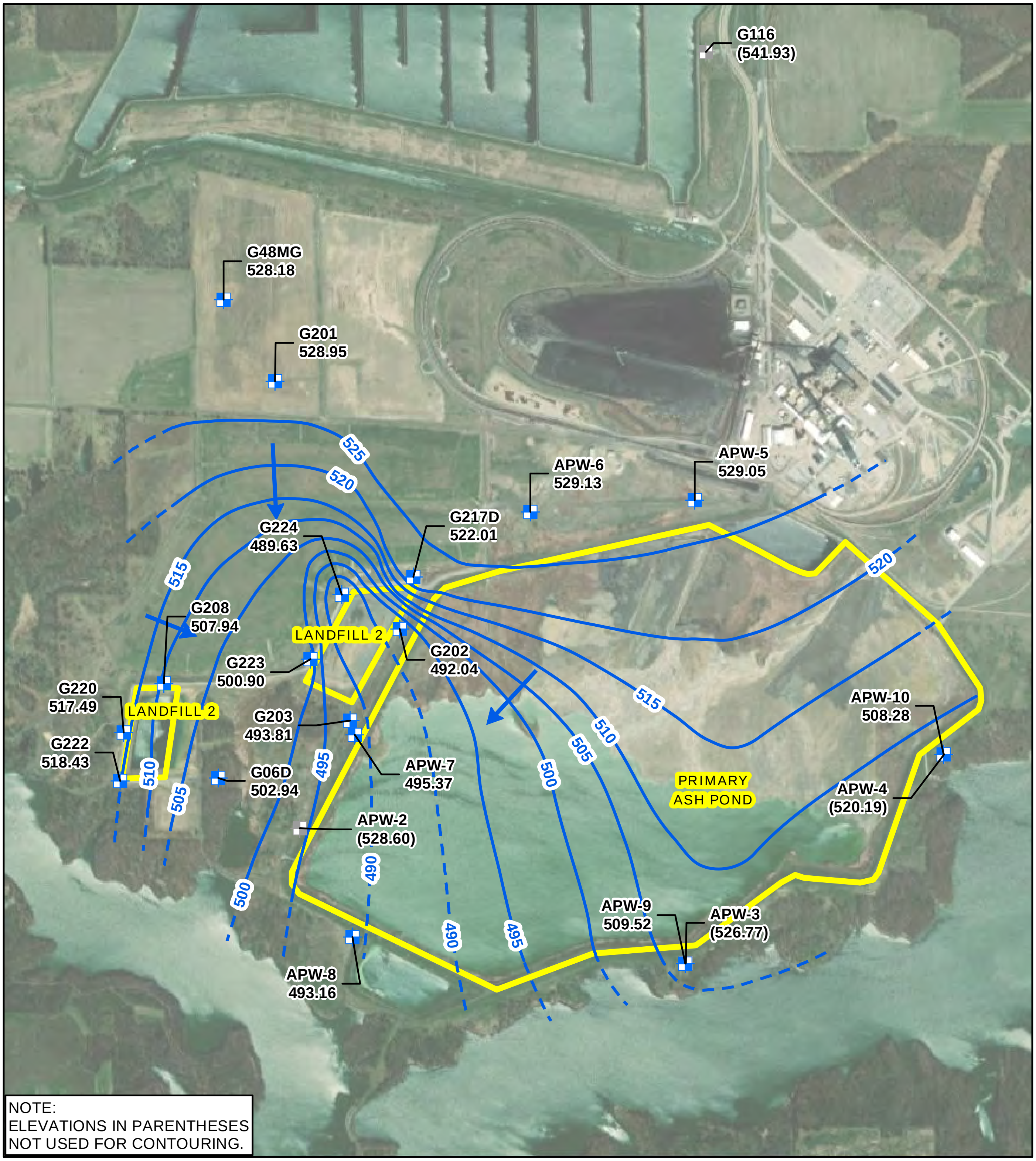
CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

0 325 650 1,300
Feet

N

O'BRIEN & GERE ENGINEERS, INC.

8/14/2020 12:15:54 AM
Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_2018_2Q\R2018_2Q_Newton_GW_Contours.mxd



CCR RULE MONITORING WELL LOCATION

NON-CCR RULE MONITORING WELL LOCATION

GROUNDWATER ELEVATION CONTOUR (5-FOOT CONTOUR INTERVAL, NAVD88)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW

CCR MONITORED UNIT

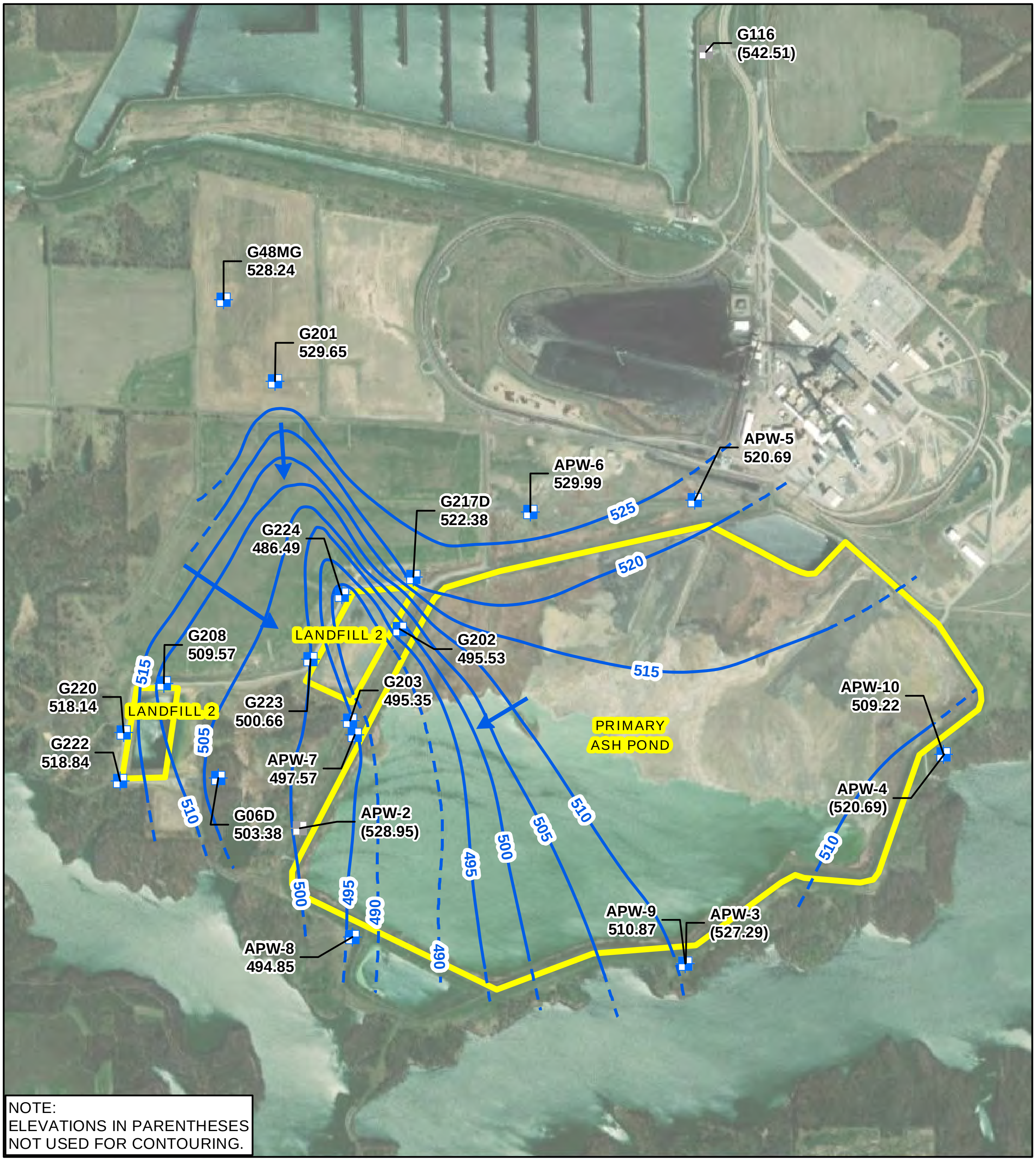
NEWTON PRIMARY ASH POND (UNIT ID: 501)
AND LANDFILL 2 (UNIT ID: 502)
GROUNDWATER ELEVATION CONTOUR MAP
AUGUST 14, 2018

CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

0 325 650 1,300
Feet

N

O'BRIEN & GERE ENGINEERS, INC.



CCR RULE MONITORING WELL LOCATION

NON-CCR RULE MONITORING WELL LOCATION

GROUNDWATER ELEVATION CONTOUR (5-FOOT CONTOUR INTERVAL, NAVD88)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

CCR MONITORED UNIT

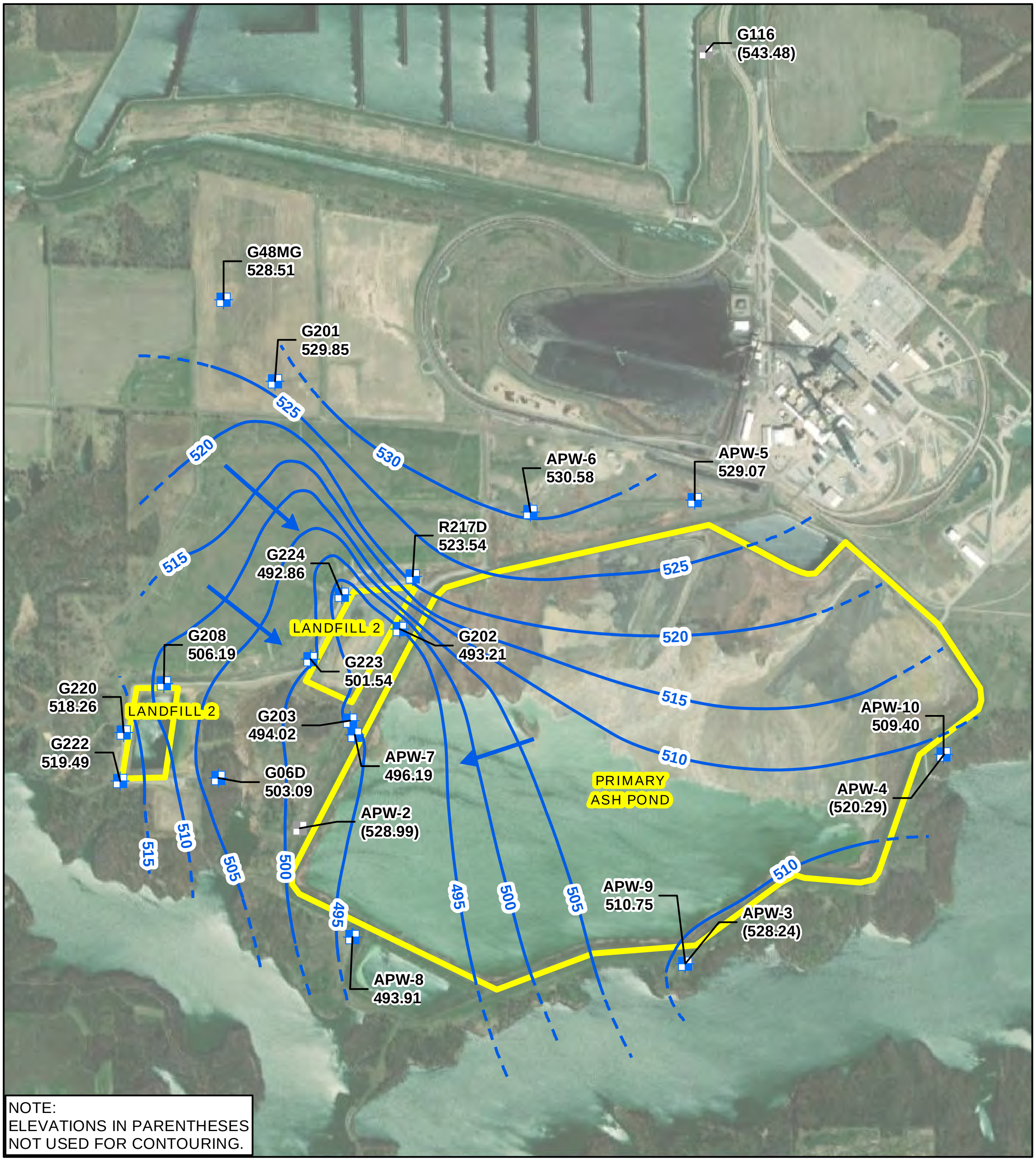
NEWTON PRIMARY ASH POND (UNIT ID: 501)
AND LANDFILL 2 (UNIT ID: 502)
GROUNDWATER ELEVATION CONTOUR MAP
NOVEMBER 8, 2018

CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

0 325 650 1,300
Feet

N

O'BRIEN & GERE ENGINEERS, INC.



CCR RULE MONITORING WELL LOCATION

NON-CCR RULE MONITORING WELL LOCATION

GROUNDWATER ELEVATION CONTOUR (5-FOOT CONTOUR INTERVAL, NAVD88)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

CCR MONITORED UNIT

NEWTON PRIMARY ASH POND (UNIT ID: 501)
AND LANDFILL 2 (UNIT ID: 502)
GROUNDWATER ELEVATION CONTOUR MAP
FEBRUARY 18, 2019

CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

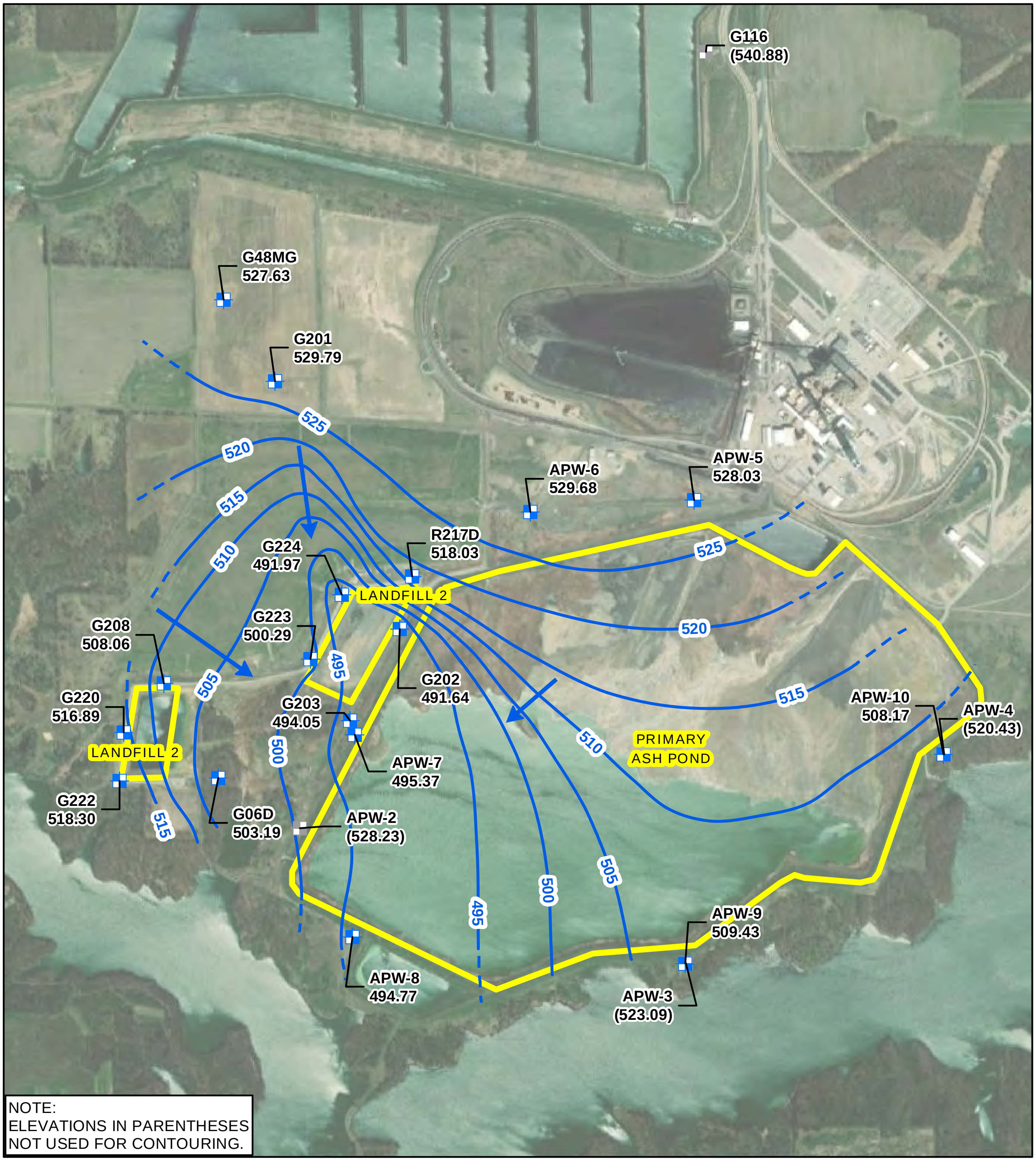
0 325 650 1,300
Feet

N

O'BRIEN & GERE ENGINEERS, INC.

8/14/2020 12:24:31 AM

Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_2019_1Q\R2019_1Q_Newton_GW_Contours.mxd



CCR RULE MONITORING WELL LOCATION

NON-CCR RULE MONITORING WELL LOCATION

GROUNDWATER ELEVATION CONTOUR (5-FOOT CONTOUR INTERVAL, NAVD88)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

CCR MONITORED UNIT

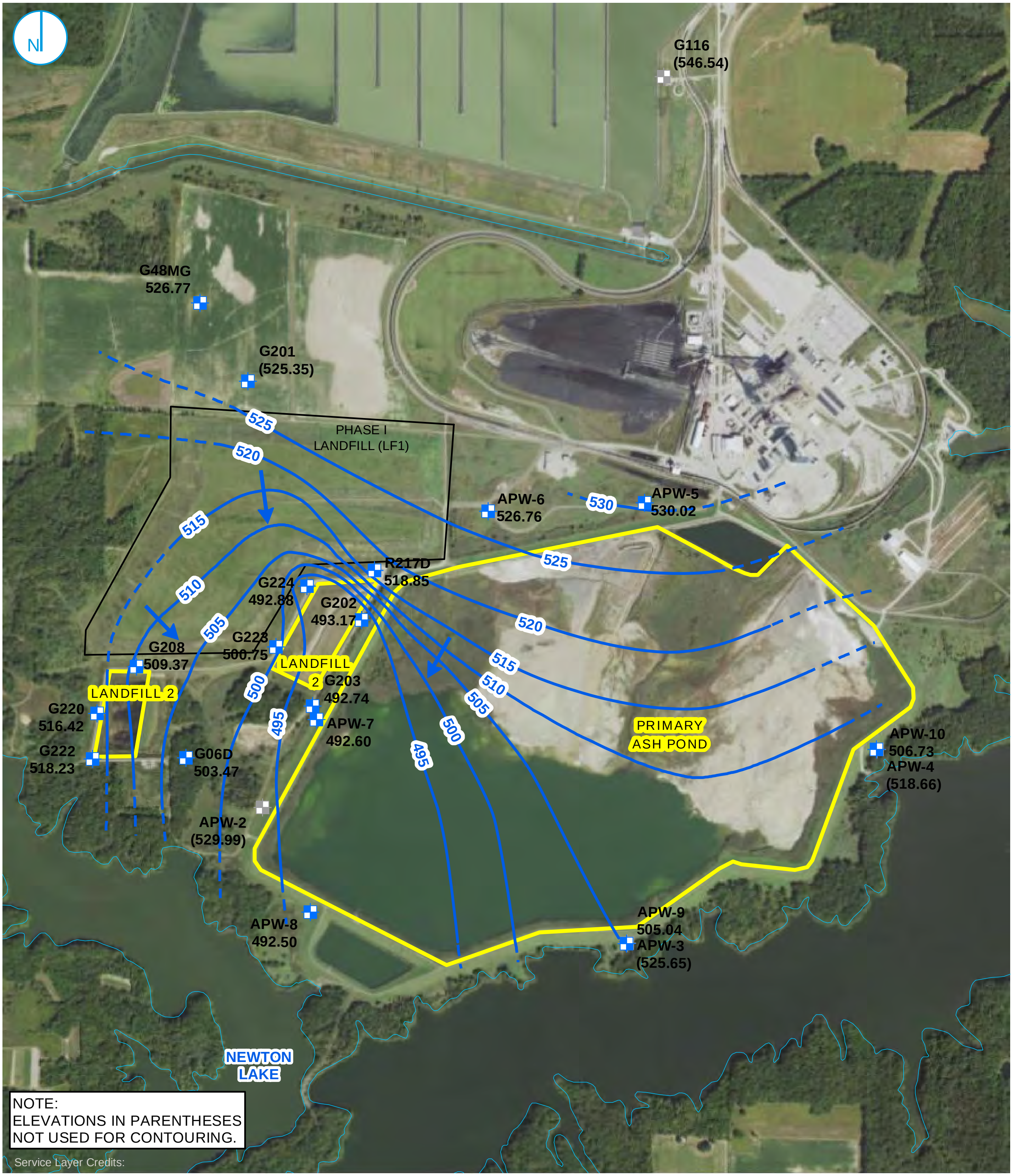
NEWTON PRIMARY ASH POND (UNIT ID: 501)
AND LANDFILL 2 (UNIT ID: 502)
GROUNDWATER ELEVATION CONTOUR MAP
AUGUST 21, 2019

CCR RULE GROUNDWATER MONITORING
NEWTON POWER STATION
NEWTON, ILLINOIS

0 325 650 1,300
Feet

N

O'BRIEN & GERE ENGINEERS, INC.



NOTE:
ELEVATIONS IN PARENTHESES
NOT USED FOR CONTOURING.

Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_2020_1Q\R2020_1Q_Newton_GW_Contours.mxd

PROJECT: 169000XXXX | DATED: 8/14/2020 | DESIGNER: STOLZSD

- CCR RULE MONITORING WELL
- NON-CCR RULE MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR (5-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- SURFACE WATER FEATURE
- CCR MONITORED UNIT
- NON-CCR UNIT

0 650 1,300 Feet

GROUNDWATER ELEVATION CONTOUR MAP
FEBRUARY 3, 2020

NEWTON PRIMARY ASH POND (UNIT ID: 501)
AND LANDFILL 2 (UNIT ID: 502)
NEWTON POWER STATION
NEWTON, ILLINOIS

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

ATTACHMENT 5 – TABLES SUMMARIZING CONSTITUENT CONCENTRATIONS AT EACH MONITORING WELL

Analytical Results - Appendix III
Newton Primary Ash Pond

Sample Location	Date Sampled	Boron, total (mg/L)	Calcium, total (mg/L)	Chloride, total (mg/L)	Fluoride, total (mg/L)	pH (s.u.)	Sulfate, total (mg/L)	Total Dissolved Solids (mg/L)
Background Wells								
APW5	12/15/2015	0.099	51	48	0.486	7.5	15	560
APW5	1/20/2016	0.12	52	50	0.409	7.5	15	510
APW5	4/27/2016	0.10	71	58	0.494	7.7	14	520
APW5	8/1/2016	0.10	49	52	0.540	7.5	1.8	500
APW5	10/25/2016	0.12	50	50	0.660	7.6	<1	1000
APW5	1/23/2017	0.090	45	50	0.418	7.4	<1	550
APW5	4/24/2017	0.079	44	46	0.437	7.0	1.2	600
APW5	6/13/2017	0.082	48	47	0.508	7.1	<1	540
APW5	11/17/2017	0.099	51	43	0.634	6.9	<1	480
APW5	5/18/2018	0.10	48	48	0.525	7.1	2.1	480
APW5	8/17/2018	NA	54	56	NA	7.0	1.4	NA
APW5	11/9/2018	0.098	50	51	0.427	7.0	5.1	500
APW5	2/22/2019	0.11	50	48	0.374	6.9	3.5	600
APW5	8/22/2019	0.12	49	50	<0.25	7.0	2.3	530
APW5	2/4/2020	0.091	51	54	0.480	7.5	2.3	600
APW5	6/11/2020	NA	NA	NA	NA	7.4	NA	NA
APW5	7/28/2020	0.10	53	52	0.544	7.7	1.8	530
APW6	12/15/2015	0.073	53	26	0.509	7.5	9.9	480
APW6	1/20/2016	0.082	53	24	0.393	7.4	9.9	500
APW6	4/27/2016	0.16	64	29	0.564	6.5	7.4	450
APW6	8/1/2016	0.078	50	27	0.650	7.4	1.2	520
APW6	10/25/2016	0.093	50	26	0.686	7.5	<1	560
APW6	1/23/2017	0.076	46	26	0.448	6.9	<1	530
APW6	4/24/2017	0.074	43	50	0.470	7.2	<1	540
APW6	6/13/2017	0.093	51	25	0.567	7.1	2.3	460
APW6	11/17/2017	0.094	50	23	0.617	7.2	1.9	470
APW6	5/18/2018	0.087	51	25	0.564	7.3	1.7	420
APW6	8/17/2018	NA	52	25	NA	7.3	1.7	NA
APW6	11/9/2018	0.083	51	24	0.459	7.2	2.1	440
APW6	2/22/2019	0.090	45	24	0.386	7.3	1.7	480
APW6	8/23/2019	0.11	55	26	0.314	7.3	5.8	500
APW6	2/4/2020	0.080	53	27	0.483	7.5	<1	640
APW6	6/11/2020	NA	NA	NA	NA	7.4	NA	NA
APW6	7/28/2020	0.091	55	24	0.564	7.8	3.2	510
Downgradient Wells								
APW7	12/15/2015	0.073	74	69	0.467	7.4	13	520
APW7	1/21/2016	0.052	74	79	0.380	7.4	8.6	440
APW7	5/3/2016	0.071	85	72	0.545	7.5	7.5	500
APW7	8/1/2016	0.070	86	77	0.462	7.3	2.8	490
APW7	10/26/2016	0.096	76	79	0.425	7.2	<1	590
APW7	1/26/2017	0.082	87	77	0.352	7.2	<1	520
APW7	4/24/2017	0.069	87	77	0.367	7.3	<1	600
APW7	6/13/2017	0.084	93	77	0.425	7.2	<1	560
APW7	11/17/2017	0.097	72	73	0.508	7.2	3.8	530
APW7	5/18/2018	0.082	97	75	0.435	7.1	4.9	500
APW7	8/18/2018	NA	100	77	NA	7.1	3.2	NA
APW7	11/9/2018	0.080	92	71	0.343	7.0	4.5	500
APW7	2/22/2019	0.060	45	43	0.734	7.2	66	340
APW7	8/23/2019	0.075	58	46	0.632	7.1	62	350
APW7	2/5/2020	0.092	100	68	0.332	7.4	5.7	640
APW7	6/11/2020	NA	NA	68	NA	7.3	NA	NA
APW7	7/28/2020	0.086	94	77	0.412	7.3	6.7	530

Analytical Results - Appendix III
Newton Primary Ash Pond

Sample Location	Date Sampled	Boron, total (mg/L)	Calcium, total (mg/L)	Chloride, total (mg/L)	Fluoride, total (mg/L)	pH (s.u.)	Sulfate, total (mg/L)	Total Dissolved Solids (mg/L)
APW8	12/15/2015	0.083	85	52	0.441	7.4	35	560
APW8	1/21/2016	0.060	85	59	0.414	7.5	34	510
APW8	5/3/2016	0.083	100	55	0.566	7.4	30	560
APW8	8/2/2016	0.076	94	56	0.504	7.2	35	520
APW8	10/26/2016	0.091	84	59	0.463	7.4	37	600
APW8	1/25/2017	0.081	100	57	0.404	7.2	36	600
APW8	4/25/2017	0.073	100	57	0.418	7.5	38	590
APW8	6/13/2017	0.092	110	57	0.449	7.3	38	600
APW8	11/17/2017	0.11	83	50	0.474	7.1	39	490
APW8	5/18/2018	0.088	92	56	0.448	7.2	37	520
APW8	8/18/2018	NA	82	57	NA	7.2	43	NA
APW8	11/9/2018	0.086	110	56	0.373	7.1	42	580
APW8	2/22/2019	0.10	80	56	0.393	7.2	46	600
APW8	8/23/2019	0.10	82	59	0.337	7.2	48	570
APW8	2/5/2020	0.10	120	55	0.331	7.4	45	700
APW8	6/11/2020	NA	NA	NA	NA	7.3	NA	NA
APW8	7/28/2020	0.087	110	62	0.441	7.3	47	620
APW9	12/15/2015	0.062	54	88	0.574	7.5	25	630
APW9	1/20/2016	0.074	57	95	0.468	7.6	27	540
APW9	5/3/2016	0.070	70	110	0.746	7.6	18	590
APW9	8/2/2016	0.073	74	130	0.532	7.2	4.2	640
APW9	10/26/2016	0.090	77	130	0.528	7.6	1.5	770
APW9	1/25/2017	0.081	79	130	0.468	7.5	<1	740
APW9	4/25/2017	0.078	67	120	0.515	7.5	1.1	840
APW9	6/13/2017	0.053	42	51	0.755	7.5	48	300
APW9	11/18/2017	0.080	68	84	0.655	7.4	4.5	720
APW9	5/18/2018	0.098	80	120	0.467	7.4	1.0	710
APW9	8/17/2018	NA	81	130	NA	7.5	2.4	NA
APW9	11/9/2018	0.055	44	44	0.730	7.4	62	300
APW9	2/22/2019	0.054	38	47	0.714	7.5	61	320
APW9	8/23/2019	0.055	41	51	0.621	7.4	51	360
APW9	2/19/2020	0.10	88	130	0.453	7.5	7.5	790
APW9	6/11/2020	NA	NA	130	NA	7.4	NA	870
APW9	7/28/2020	0.10	84	140	0.537	7.4	3.2	810
APW10	12/16/2015	0.066	120	46	0.328	7.1	430	1000
APW10	1/20/2016	0.077	120	48	<0.25	7.2	410	950
APW10	5/3/2016	0.065	140	46	0.448	7.1	410	930
APW10	8/2/2016	0.063	140	45	0.367	7.1	410	840
APW10	10/26/2016	0.069	120	48	0.371	7.1	470	960
APW10	1/25/2017	0.065	160	46	0.258	7.1	430	1000
APW10	4/25/2017	0.056	120	44	0.289	7.0	410	1000
APW10	6/13/2017	0.077	110	46	0.344	6.9	410	920
APW10	11/18/2017	0.072	120	47	0.414	6.9	390	910
APW10	5/18/2018	0.080	130	51	0.335	7.2	440	900
APW10	8/17/2018	NA	130	51	NA	6.9	420	NA
APW10	11/9/2018	0.078	140	47	0.281	7.0	410	900
APW10	2/22/2019	0.079	110	50	0.276	6.9	420	990
APW10	8/23/2019	0.096	130	50	0.359	7.0	390	1000
APW10	2/5/2020	0.094	140	44	<0.25	7.1	400	1200
APW10	6/11/2020	NA	NA	NA	NA	7.2	NA	1000
APW10	7/28/2020	0.076	140	53	0.356	7.1	410	1000

Notes:
1. Abbreviations: mg/L - milligrams per liter; NA - not analyzed; s.u. - standard units.

Analytical Results - Appendix IV
Newton Primary Ash Pond

Sample Location	Date Sampled	Antimony, total (mg/L)	Arsenic, total (mg/L)	Barium, total (mg/L)	Beryllium, total (mg/L)	Cadmium, total (mg/L)	Chromium, total (mg/L)	Cobalt, total (mg/L)	Fluoride, total (mg/L)	Lead, total (mg/L)	Lithium, total (mg/L)	Mercury, total (mg/L)	Molybdenum, total (mg/L)	Radium-226 + Radium 228, tot (pCi/L)	Selenium, total (mg/L)	Thallium, total (mg/L)
Background Wells																
APW5	12/15/2015	<0.003	0.018	0.19	<0.001	<0.001	<0.004	<0.002	0.486	0.0017	0.023	<0.0002	0.023	0.311	<0.001	<0.001
APW5	1/20/2016	<0.003	0.017	0.19	<0.001	<0.001	<0.004	<0.002	0.409	0.0016	0.017	0.00020	0.023	0.235	<0.001	<0.001
APW5	4/27/2016	<0.003	0.021	0.24	<0.001	<0.001	<0.004	<0.002	0.494	0.0012	0.020	0.002	0.032	0.281	0.001	<0.001
APW5	8/1/2016	<0.003	0.014	0.21	<0.001	<0.001	<0.004	<0.002	0.540	<0.001	0.016	<0.0002	0.027	0.616	<0.001	<0.001
APW5	10/25/2016	<0.003	0.013	0.22	<0.001	<0.001	<0.004	<0.002	0.660	<0.001	0.015	<0.0002	0.027	0.654	<0.001	<0.001
APW5	1/23/2017	<0.003	0.015	0.21	<0.001	<0.001	<0.004	<0.002	0.418	<0.001	0.013	<0.0002	0.021	0.0999	<0.001	<0.001
APW5	4/24/2017	<0.003	0.014	0.20	<0.001	<0.001	0.004	<0.002	0.437	0.0014	0.015	<0.0002	0.016	1.19	<0.001	<0.001
APW5	6/13/2017	<0.003	0.016	0.23	<0.001	<0.001	<0.004	<0.002	0.508	<0.001	0.014	<0.0002	0.018	1.32	<0.001	<0.001
APW5	11/17/2017	NA	NA	NA	NA	NA	NA	NA	0.634	NA	NA	NA	NA	NA	NA	NA
APW5	5/18/2018	NA	NA	NA	NA	NA	NA	NA	0.525	NA	NA	NA	NA	NA	NA	NA
APW5	11/9/2018	NA	NA	NA	NA	NA	NA	NA	0.427	NA	NA	NA	NA	NA	NA	NA
APW5	2/22/2019	NA	NA	NA	NA	NA	NA	NA	0.374	NA	NA	NA	NA	NA	NA	NA
APW5	8/22/2019	NA	NA	NA	NA	NA	NA	NA	<0.25	NA	NA	NA	NA	NA	NA	NA
APW5	2/4/2020	NA	NA	NA	NA	NA	NA	NA	0.480	NA	NA	NA	NA	NA	NA	NA
APW5	7/28/2020	NA	NA	NA	NA	NA	NA	NA	0.544	NA	NA	NA	NA	NA	NA	NA
APW6	12/15/2015	<0.003	0.017	0.16	<0.001	<0.001	<0.004	<0.002	0.509	<0.001	0.019	0.00023	0.012	0.591	0.006	<0.001
APW6	1/20/2016	<0.003	0.0091	0.17	<0.001	<0.001	<0.004	<0.002	0.393	<0.001	0.012	<0.0002	0.013	0.236	<0.001	<0.001
APW6	4/27/2016	<0.003	0.019	0.21	<0.001	<0.001	<0.004	<0.002	0.564	0.0012	0.019	<0.0002	0.028	0.984	<0.001	<0.001
APW6	8/1/2016	<0.003	0.0045	0.20	<0.001	<0.001	<0.004	<0.002	0.650	<0.001	0.016	<0.0002	0.0066	0.690	<0.001	<0.001
APW6	10/25/2016	<0.003	0.0041	0.22	<0.001	<0.001	<0.004	<0.002	0.686	<0.001	0.015	<0.0002	0.0087	0.329	<0.001	<0.001
APW6	1/23/2017	<0.003	0.0036	0.21	<0.001	<0.001	<0.004	<0.002	0.448	<0.001	0.014	<0.0002	0.0086	0.316	<0.001	<0.001
APW6	4/24/2017	<0.003	0.0042	0.20	<0.001	0.0012	<0.004	<0.002	0.470	0.0012	0.015	<0.0002	0.011	0.859	<0.001	0.0011
APW6	6/13/2017	<0.003	0.0057	0.22	0.0025	0.0017	<0.004	0.002	0.567	0.0025	0.014	<0.0002	0.014	0.932	0.0014	0.0025
APW6	11/17/2017	NA	NA	NA	NA	NA	NA	NA	0.617	NA	NA	NA	NA	NA	NA	NA
APW6	5/18/2018	NA	NA	NA	NA	NA	NA	NA	0.564	NA	NA	NA	NA	NA	NA	NA
APW6	11/9/2018	NA	NA	NA	NA	NA	NA	NA	0.459	NA	NA	NA	NA	NA	NA	NA
APW6	2/22/2019	NA	NA	NA	NA	NA	NA	NA	0.386	NA	NA	NA	NA	NA	NA	NA
APW6	8/23/2019	NA	NA	NA	NA	NA	NA	NA	0.314	NA	NA	NA	NA	NA	NA	NA
APW6	2/4/2020	NA	NA	NA	NA	NA	NA	NA	0.483	NA	NA	NA	NA	NA	NA	NA
APW6	7/28/2020	NA	NA	NA	NA	NA	NA	NA	0.564	NA	NA	NA	NA	NA	NA	NA
Downgradient Wells																
APW7	12/15/2015	<0.003	0.0039	0.35	<0.001	<0.001	<0.004	<0.002	0.467	<0.001	<0.01	<0.0002	0.014	1.16	<0.001	<0.001
APW7	1/21/2016	<0.003	0.0065	0.40	<0.001	<0.001	<0.004	<0.002	0.38	0.0015	<0.01	<0.0002	0.0083	1.06	<0.001	<0.001
APW7	5/3/2016	<0.003	0.0040	0.41	<0.001	<0.001	<0.004	<0.002	0.545	<0.001	<0.01	<0.0002	0.0086	1.74	<0.001	<0.001
APW7	8/1/2016	<0.003	0.0049	0.45	<0.001	<0.001	<0.004	<0.002	0.462	<0.001	<0.01	<0.0002	0.0060	1.32	<0.001	<0.001
APW7	10/26/2016	<0.003	0.0058	0.50	<0.001	<0.001	<0.004	<0.002	0.425	<0.001	<0.01	<0.0002	0.0054	2.02	<0.001	<0.001
APW7	1/26/2017	<0.003	0.0062	0.45	<0.001	<0.001	<0.004	<0.002	0.352	<0.001	<0.01	<0.0002	0.0072	1.82	<0.001	<0.001
APW7	4/24/2017	<0.003	0.0077	0.45	<0.001	<0.001	0.0049	<0.002	0.367	0.0022	<0.01	<0.0002	0.0029	1.26	<0.001	<0.001
APW7	6/13/2017	<0.003	0.0087	0.48	<0.001	<0.001	<0.004	<0.002	0.425	0.0046	<0.01	<0.0002	0.0039	1.69	<0.001	<0.001
APW7	11/17/2017	NA	NA	NA	NA	NA	NA	NA	0.508	NA	NA	NA	NA	NA	NA	NA
APW7	5/18/2018	NA	NA	NA	NA	NA	NA	NA	0.435	NA	NA	NA	NA	NA	NA	NA
APW7	11/9/2018	NA	NA	NA	NA	NA	NA	NA	0.343	NA	NA	NA	NA	NA	NA	NA
APW7	2/22/2019	NA	NA	NA	NA	NA	NA	NA	0.734	NA	NA	NA	NA	NA	NA	NA
APW7	8/23/2019	NA	NA	NA	NA	NA	NA	NA	0.632	NA	NA	NA	NA	NA	NA	NA
APW7	2/5/2020	NA	NA	NA	NA	NA	NA	NA	0.332	NA	NA	NA	NA	NA	NA	NA
APW7	7/28/2020	NA	NA	NA	NA	NA	NA	NA	0.412	NA	NA	NA	NA	NA	NA	NA
APW8	12/15/2015	<0.003	0.0083	0.24	<0.001	<0.001	<0.004	<0.002	0.441	0.0016	0.013	<0.0002	0.0075	1.95	<0.001	<0.001
APW8	12/16/2015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
APW8	1/20/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
APW8	1/21/2016	<0.003	0.016	0.30	<0.001	<0.001	0.0049	<0.002	0.414	0.0023	0.012	<0.0002	0.0055	2.27	<0.001	<0.001
APW8	4/27/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Analytical Results - Appendix IV
Newton Primary Ash Pond

Sample Location	Date Sampled	Antimony, total (mg/L)	Arsenic, total (mg/L)	Barium, total (mg/L)	Beryllium, total (mg/L)	Cadmium, total (mg/L)	Chromium, total (mg/L)	Cobalt, total (mg/L)	Fluoride, total (mg/L)	Lead, total (mg/L)	Lithium, total (mg/L)	Mercury, total (mg/L)	Molybdenum, total (mg/L)	Radium-226 + Radium 228, tot (pCi/L)	Selenium, total (mg/L)	Thallium, total (mg/L)
APW8	5/3/2016	<0.003	0.012	0.32	<0.001	<0.001	0.0045	<0.002	0.566	0.0021	<0.01	<0.0002	0.0063	1.88	0.0016	<0.001
APW8	8/2/2016	<0.003	0.013	0.32	<0.001	<0.001	<0.004	<0.002	0.504	<0.001	<0.01	<0.0002	0.0054	0.857	<0.001	<0.001
APW8	10/26/2016	<0.003	0.013	0.35	<0.001	<0.001	<0.004	<0.002	0.463	<0.001	<0.01	<0.0002	0.0055	0.812	<0.001	<0.001
APW8	1/25/2017	<0.003	0.017	0.37	<0.001	<0.001	<0.004	<0.002	0.404	<0.001	<0.01	<0.0002	0.0057	0.499	<0.001	<0.001
APW8	4/25/2017	<0.003	0.020	0.36	<0.001	<0.001	0.016	0.0056	0.418	0.0097	0.017	<0.0002	0.0074	1.80	<0.001	<0.001
APW8	6/13/2017	<0.003	0.017	0.39	<0.001	<0.001	0.010	0.0043	0.449	0.0075	0.012	<0.0002	0.0081	2.08	<0.001	<0.001
APW8	11/17/2017	NA	NA	NA	NA	NA	NA	NA	0.474	NA	NA	NA	NA	NA	NA	NA
APW8	5/18/2018	NA	NA	NA	NA	NA	NA	NA	0.448	NA	NA	NA	NA	NA	NA	NA
APW8	11/9/2018	NA	NA	NA	NA	NA	NA	NA	0.373	NA	NA	NA	NA	NA	NA	NA
APW8	2/22/2019	NA	NA	NA	NA	NA	NA	NA	0.393	NA	NA	NA	NA	NA	NA	NA
APW8	8/23/2019	NA	NA	NA	NA	NA	NA	NA	0.337	NA	NA	NA	NA	NA	NA	NA
APW8	2/5/2020	NA	NA	NA	NA	NA	NA	NA	0.331	NA	NA	NA	NA	NA	NA	NA
APW8	7/28/2020	NA	NA	NA	NA	NA	NA	NA	0.441	NA	NA	NA	NA	NA	NA	NA
APW9	12/15/2015	<0.003	0.0070	0.24	<0.001	<0.001	<0.004	<0.002	0.574	0.0011	<0.01	<0.0002	0.021	0.612	<0.001	<0.001
APW9	1/20/2016	<0.003	0.0067	0.24	<0.001	<0.001	<0.004	<0.002	0.468	0.0044	<0.01	<0.0002	0.023	0.743	<0.001	<0.001
APW9	5/3/2016	<0.003	0.0080	0.32	<0.001	<0.001	<0.004	<0.002	0.746	0.0051	<0.01	<0.0002	0.021	1.54	<0.001	<0.001
APW9	8/2/2016	<0.003	0.014	0.41	<0.001	<0.001	<0.004	<0.002	0.532	<0.001	<0.01	<0.0002	0.011	1.137	<0.001	<0.001
APW9	10/26/2016	<0.003	0.016	0.47	<0.001	<0.001	<0.004	<0.002	0.528	<0.001	<0.01	<0.0002	0.010	1.18	<0.001	<0.001
APW9	1/25/2017	<0.003	0.018	0.44	<0.001	<0.001	<0.004	<0.002	0.468	<0.001	<0.01	<0.0002	0.0075	1.78	<0.001	<0.001
APW9	4/25/2017	<0.003	0.017	0.38	<0.001	<0.001	<0.004	<0.002	0.515	<0.001	<0.01	0.00023	0.0053	1.07	<0.001	<0.001
APW9	6/13/2017	<0.003	0.0039	0.11	<0.001	<0.001	<0.004	<0.002	0.755	<0.001	<0.01	<0.0002	0.016	0.984	<0.001	<0.001
APW9	11/18/2017	NA	NA	NA	NA	NA	NA	NA	0.655	NA	NA	NA	NA	NA	NA	NA
APW9	5/18/2018	NA	NA	NA	NA	NA	NA	NA	0.467	NA	NA	NA	NA	NA	NA	NA
APW9	11/9/2018	NA	NA	NA	NA	NA	NA	NA	0.73	NA	NA	NA	NA	NA	NA	NA
APW9	2/22/2019	NA	NA	NA	NA	NA	NA	NA	0.714	NA	NA	NA	NA	NA	NA	NA
APW9	8/23/2019	NA	NA	NA	NA	NA	NA	NA	0.621	NA	NA	NA	NA	NA	NA	NA
APW9	2/19/2020	NA	NA	NA	NA	NA	NA	NA	0.453	NA	NA	NA	NA	NA	NA	NA
APW9	7/28/2020	NA	NA	NA	NA	NA	NA	NA	0.537	NA	NA	NA	NA	NA	NA	NA
APW10	12/16/2015	<0.003	0.0034	0.038	<0.001	<0.001	<0.004	<0.002	0.328	<0.001	0.030	<0.0002	0.0094	0.755	<0.001	<0.001
APW10	1/20/2016	<0.003	0.0043	0.042	<0.001	<0.001	<0.004	<0.002	<0.25	<0.001	0.021	<0.0002	0.011	1.16	<0.001	<0.001
APW10	5/3/2016	<0.003	0.0083	0.040	<0.001	<0.001	<0.004	<0.002	0.448	<0.001	0.023	<0.0002	0.010	0.799	<0.001	<0.001
APW10	8/2/2016	<0.003	0.0092	0.037	<0.001	<0.001	<0.004	<0.002	0.367	<0.001	0.026	<0.0002	0.0091	0.600	<0.001	<0.001
APW10	10/26/2016	<0.003	0.0090	0.040	<0.001	<0.001	<0.004	<0.002	0.371	<0.001	0.027	<0.0002	0.0093	0.556	<0.001	<0.001
APW10	1/25/2017	<0.003	0.010	0.035	<0.001	<0.001	<0.004	<0.002	0.258	<0.001	0.023	<0.0002	0.0085	0.430	<0.001	<0.001
APW10	4/25/2017	<0.003	0.0084	0.031	<0.001	<0.001	<0.004	<0.002	0.289	<0.001	0.026	<0.0002	0.0071	0.604	<0.001	<0.001
APW10	6/13/2017	<0.003	0.0035	0.027	<0.001	<0.001	<0.004	<0.002	0.344	<0.001	0.026	<0.0002	0.0091	0.897	<0.001	<0.001
APW10	11/18/2017	NA	NA	NA	NA	NA	NA	NA	0.414	NA	NA	NA	NA	NA	NA	NA
APW10	5/18/2018	NA	NA	NA	NA	NA	NA	NA	0.335	NA	NA	NA	NA	NA	NA	NA
APW10	11/9/2018	NA	NA	NA	NA	NA	NA	NA	0.281	NA	NA	NA	NA	NA	NA	NA
APW10	2/22/2019	NA	NA	NA	NA	NA	NA	NA	0.276	NA	NA	NA	NA	NA	NA	NA
APW10	8/23/2019	NA	NA	NA	NA	NA	NA	NA	0.359	NA	NA	NA	NA	NA	NA	NA
APW10	2/5/2020	NA	NA	NA	NA	NA	NA	NA	<0.25	NA	NA	NA	NA	NA	NA	NA
APW10	7/28/2020	NA	NA	NA	NA	NA	NA	NA	0.356	NA	NA	NA	NA	NA	NA	NA

Notes:
1. Abbreviations: mg/L - milligrams per liter; NA - not analyzed; pCi/L - picocurie per liter;

ATTACHMENT 6 – SITE HYDROGEOLOGY AND STRATIGRAPHIC CROSS-SECTIONS OF THE SITE

CONCEPTUAL SITE MODEL AND DESCRIPTION OF SITE HYDROGEOLOGY (PRIMARY ASH POND)

The Newton Power Station (Power Station) conceptual site model (CSM) and Description of Site Hydrogeology for the Primary Ash Pond (PAP) located near Newton, Illinois is described in the following sections.

REGIONAL SETTING

The PAP is located in Jasper County in the southeastern part of central Illinois, approximately 7 miles southwest of the town of Newton. The PAP lies at the southeastern portion of the Springfield Plain of the Till Plains section, the largest physiographic division in Illinois, covering approximately four-fifths of the state. It is characterized by its flatness and shallowly entrenched drainage. The unlithified geologic deposits in the region range from 100 to 120 feet (ft) thick and are derived from recent river deposition (alluvium), glacial outwash, and glacial till deposits. The unlithified deposits directly overly Pennsylvanian Mattoon Formation bedrock.

The Mattoon Formation is the youngest formation in the Pennsylvanian System in Illinois. It is underlain by the Bond Formation, while the top is mostly an erosional surface overlain by Pleistocene glacial deposits. The Mattoon Formation has a maximum thickness of more than 600 feet in the central part of the Illinois Basin in Jasper County. It is characterized by a complex sequence of thin limestones, coals, black fissile shales, underclays, thick gray shales, and several well-developed sandstones. 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). Borings advanced at the Power Station indicate that the elevation of the top of the bedrock surface at the PAP is approximately 400 to 450 ft above mean sea level (msl). The depth to bedrock varies widely in the area owing to the undulatory nature of the eroded upper bedrock surface and ranges from approximately 90 to 120 ft. Logs indicate that the lithology of the uppermost bedrock is mostly shale.

SITE GEOLOGY

The unconsolidated deposits occurring at the PAP 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.
- 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.
- Bedrock – Pennsylvanian-age Mattoon Formation 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. The erosional surface of the Pennsylvanian-age Mattoon Formation bedrock ranges widely in depth in the vicinity of the PAP, but is typically encountered at 90 to 120 ft below ground surface (bgs).

Two cross-sections showing the subsurface materials encountered at the PAP is included as an attachment to this demonstration.

SITE HYDROGEOLOGY

The CCR groundwater monitoring system consists of six monitoring wells installed in the uppermost aquifer and adjacent to the PAP (APW5, APW6, APW7, APW8, APW9 and APW10) (see Monitoring Well Location Map, and Well Construction Diagrams and Drilling Logs attached to this demonstration). The unit utilizes two background monitoring wells (APW5 and APW6) as part of the CCR groundwater monitoring system.

Hydraulic Conductivity

Hydraulic conductivity/slug tests were completed in wells screened in the unlithified material during prior site investigations and by NRT in April 2017. The hydraulic conductivity values determined from 15 individual monitoring wells within the uppermost aquifer ranged from 3.9×10^{-8} to 3.6×10^{-2} centimeters per second (cm/s). The geometric mean of the hydraulic conductivity for NRT tested monitoring wells in the Uppermost Aquifer, excluding one outlier, is 2.5×10^{-4} cm/s.

The uppermost unit intercepted in the area of the PAP is the silty to sandy clay of the “Upper Drift”, or aquitard, as identified in the Rapps’ 1997 landfill investigation and consists of Peoria Silt, Sangamon Soil, and/or Hagarstown Member. The hydraulic conductivity of this unit, as tested at monitoring wells near the landfill with screen depths between 8 and 36 ft bgs (Rapps, 1997), ranged from 2.4×10^{-6} to 6.1×10^{-5} cm/s with a geometric mean of 1.7×10^{-5} cm/s. Three in-situ tests conducted by NRT of the uppermost materials near the Primary Ash Pond, on wells screened between 7 and 20 ft bgs, had a geometric mean hydraulic conductivity of 1.3×10^{-5} cm/s.

Groundwater Elevations, Flow Direction and Velocity

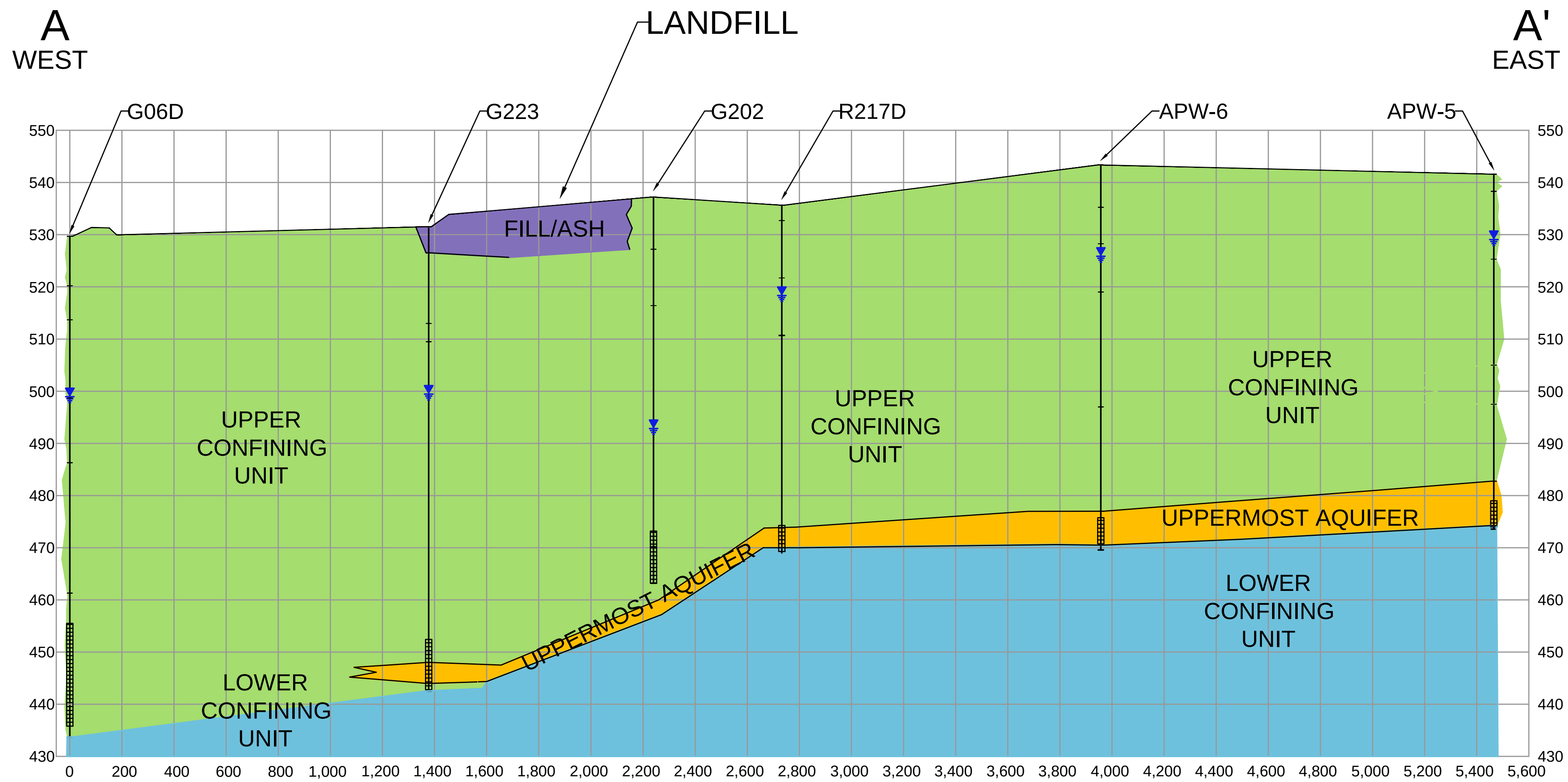
Groundwater elevations across the PAP ranged from 491 to 530 ft msl from December 2015 to June 2020. Groundwater flow in the Uppermost Aquifer beneath the eastern portion of PAP is generally to the south toward Newton Lake. The flow direction diverges to the southwest beneath the western portion of the PAP, consistent with groundwater flow in the area converging between the PAP and the Phase 2 Landfill to the west (see Groundwater Contour Maps attached to this demonstration). Calculated groundwater flow velocity based on the January and June 2017 groundwater contours was 0.12 ft/day.

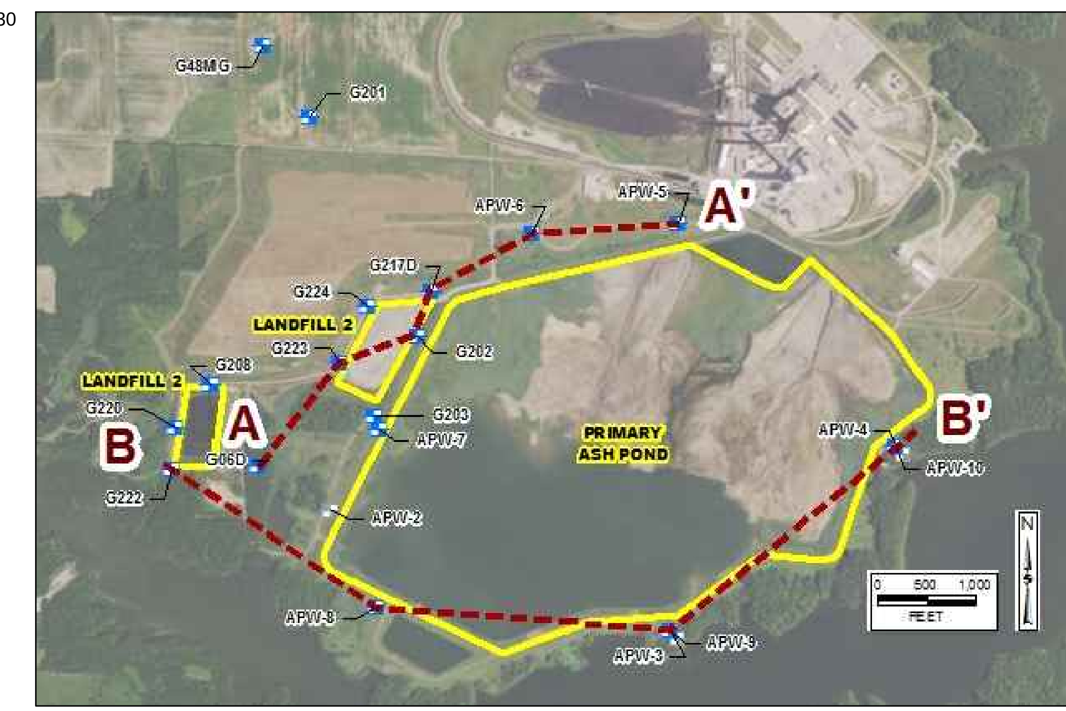
REFERENCES

Lineback, J., 1979, Quaternary Deposits 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.

Rapps Engineering and Applied Science, 1997, Hydrogeologic Investigation and Groundwater Monitoring Program, CIPS – Newton Power Station Landfill, Jasper County, Illinois, in Newton Power Station Landfill, Application for Landfill Permit.





LEGEND

FILL / ASH

UPPER CONFINING UNIT

UPPERMOST AQUIFER

LOWER CONFINING UNIT

WELL SCREEN

GROUNDWATER ELEVATION

VERTICAL SCALE IN FEET 30

600 HORIZONTAL SCALE IN FEET

VERTICAL EXAGGERATION =20

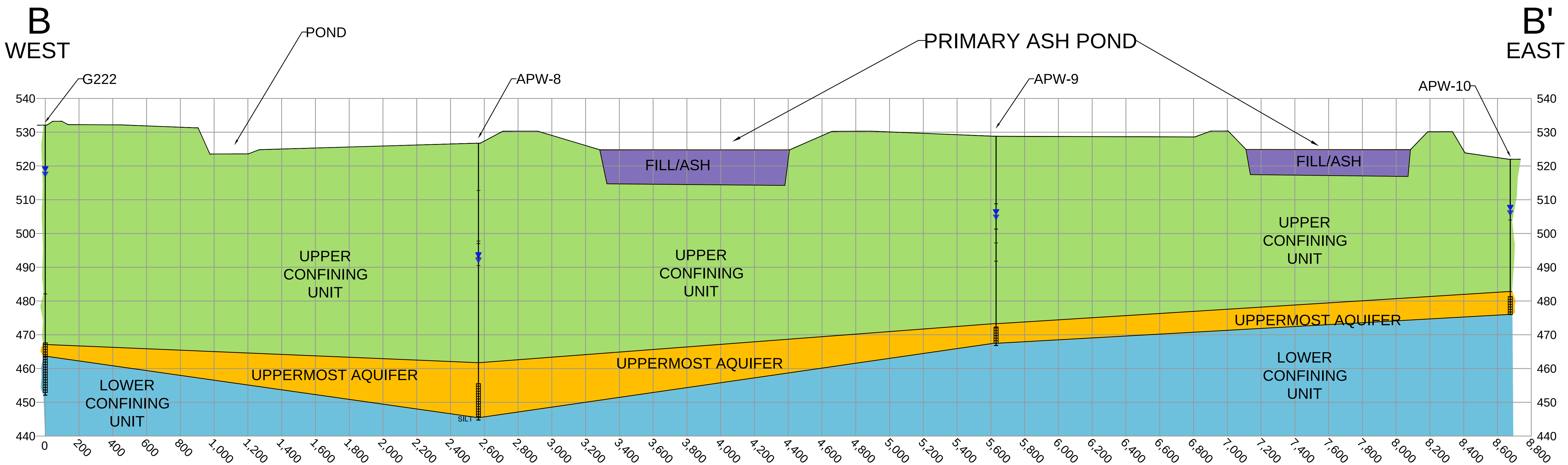
GEOLOGIC CROSS SECTION A-A'

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

FIGURE X

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

PROJECT: 74923 DATED: 4/3/2020 1:46 PM DESIGNER: ENGELHSA \\ramboll.sharepoint.com@SSL\DavWWWRoot\sites\vistra\Shared Documents\-CCR GW\Deliverables\Part A\Newton\Cross Sections\CAD\Geologic Cross-Sections A&B.dwg



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 B-B'

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

FIGURE X

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

ATTACHMENT 7 – STRUCTURAL STABILITY ASSESSMENT

Submitted to
Illinois Power Generating Company
6725 North 500th Street
Newton, IL 62448

Submitted by
AECOM
1001 Highlands Plaza Drive West
Suite 300
St. Louis, MO 63110

October 2016

CCR Rule Report: Initial Structural Stability Assessment

For

Primary Ash Pond

At Newton Power Station

1 Introduction

This Coal Combustion Residual (CCR) Rule Report documents that the Primary Ash Pond at the Illinois Power Generating Company Newton Power Station meets the structural stability assessment requirements specified in 40 Code of Federal Regulations (CFR) §257.73(d). The Primary Ash Pond is located near Newton, Illinois in Jasper County, approximately 0.2 miles southwest of the Newton Power Station. The Primary Ash Pond serves as the wet impoundment basin for CCR produced by the Newton Power Station.

The Primary Ash Pond is an existing CCR surface impoundment as defined by 40 CFR §257.53. The CCR Rule requires that an initial structural stability assessment for an existing CCR surface impoundment be completed by October 17, 2016. In general, the initial structural stability assessment must document that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices.

The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial structural stability assessment was conducted in accordance with the requirements of 40 CFR § 257.73(d). The owner or operator must prepare a periodic structural stability assessment every five years.

2 Initial Structural Stability Assessment

40 CFR §257.73(d)(1)
The owner or operator of the CCR unit must conduct initial and periodic structural stability assessments and document whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. The assessment must, at a minimum, document whether the CCR unit has been designed, constructed, operated, and maintained with [the standards in (d)(1)(i)-(vii)].

An initial structural stability assessment has been performed to document that the design, construction, operation and maintenance of the Primary Ash Pond is consistent with recognized and generally accepted good engineering practices and meets the standards in 257.73(d)(1)(i)-(vii). The results of the structural stability assessment are discussed in the following sections. Based on the assessment and its results, the design, construction, operation, and maintenance of the Primary Ash Pond were found to be consistent with recognized and generally accepted good engineering practices.

2.1 Foundations and Abutments (§257.73(d)(1)(i))

CCR unit designed, constructed, operated, and maintained with stable foundations and abutments.

The stability of the foundations was evaluated using soil data from field investigations and reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM. Additionally, slope stability analyses were performed to evaluate slip surfaces passing through the foundations. The Primary Ash Pond is a ring dike structure and does not have abutments.

The foundation consists of stiff to hard soil, which indicates stable foundations. Slope stability analyses exceed the criteria listed in §257.73(e)(1) for slip surfaces passing through the foundation. The slope stability analyses are discussed in the *CCR Rule Report: Initial Safety Factor Assessment for Primary Ash Pond at Newton Power Station* (October 2016). A review of operational and maintenance procedures as well as current and past performance of the dikes has determined appropriate processes are in place for continued operational performance.

Based on the conditions observed by AECOM, the Primary Ash Pond was designed and constructed with stable foundations. Operational and maintenance procedures are in place to address any issues related to the stability of foundations; therefore, the Primary Ash Pond meets the requirements in §257.73(d)(1)(i).

2.2 Slope Protection (§257.73(d)(1)(ii))

CCR unit designed, constructed, operated, and maintained with adequate slope protection to protect against surface erosion, wave action and adverse effects of sudden drawdown.

The adequacy of slope protection was evaluated by reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM.

Based on this evaluation, adequate slope protection was designed and constructed at the Primary Ash Pond. No evidence of significant areas of erosion or wave action were observed. The interior and exterior slopes are protected with vegetation. Where the exterior slopes are adjacent to Newton Lake, they are protected with crushed stone erosion protection. Crushed stone erosion protection is also located on the interior slopes in limited areas. Operational and maintenance procedures are in place to repair the vegetation as needed to protect against surface erosion or wave action. Sudden drawdown of the pool in the Primary Ash Pond is not expected to occur due to operational controls associated with lowering the pool level. Therefore, slope protection to protect against the adverse effects of sudden drawdown is not required as sudden drawdown conditions are not expected to occur. Therefore, the Primary Ash Pond meets the requirements in §257.73(d)(1)(ii).

2.3 Dike Compaction (§257.73(d)(1)(iii))

CCR unit designed, constructed, operated, and maintained with dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit.

The density of the dike materials was evaluated using soil data from field investigations and reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM. Additionally, slope stability analyses were performed to evaluate slip surfaces passing through the dike over the range of expected loading conditions as defined within §257.73(e)(1).

Based on this evaluation, the dike consists of stiff material, with isolated zones of soft, medium stiff, and very stiff material, which is indicative of mechanically compacted dikes. Slope stability analyses exceed the criteria listed in §257.73(e)(1) for slip surfaces passing through the dike; therefore, the original design and construction of the Primary Ash Pond included sufficient dike compaction. The slope stability analyses are discussed in the *CCR Rule Report: Initial Safety Factor Assessment for Primary Ash Pond at Newton Power Station* (October 2016); Operational and maintenance procedures are in place to identify and mitigate deficiencies in order to maintain sufficient density and compaction of the dikes to withstand the range of loading conditions. Therefore, the Primary Ash Pond meets the requirements in §257.73(d)(1)(iii).

2.4 Vegetated Slopes (§257.73(d)(1)(iv))[1]

CCR unit designed, constructed, operated, and maintained with vegetated slopes of dikes and surrounding areas, except for slopes which have an alternate form or forms of slope protection.

The adequacy of slope vegetation was evaluated by reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM.

Based on this evaluation, the vegetation on the interior and exterior slopes is adequate as no substantial bare or overgrown areas were observed. Crushed stone erosion protection is present on portions of the exterior slopes adjacent to Newton Lake and is used as an alternative form of slope protection, which is adequate as significant areas of erosion were not observed. Therefore, the original design and construction of the Primary Ash Pond included adequate vegetation of the dikes and surrounding areas. Adequate operational and maintenance procedures are in place to regularly manage vegetation growth, including mowing and seeding any bare areas, as evidenced by the conditions observed by AECOM. Therefore, the Primary Ash Pond meets the requirements in §257.73(d)(1)(iv).

[1] As modified by court order issued June 14, 2016, Utility Solid Waste Activities Group v. EPA, D.C. Cir. No. 15-1219 (order granting remand and vacatur of specific regulatory provisions).

2.5 Spillways (§257.73(d)(1)(v))

CCR unit designed, constructed, operated, and maintained with a single spillway or a combination of spillways configured as specified in [paragraph (A) and (B)]:

(A) All spillways must be either:

(1) of non-erodible construction and designed to carry sustained flows; or

(2) earth- or grass-lined and designed to carry short-term, infrequent flows at non-erosive velocities where sustained flows are not expected.

(B) The combined capacity of all spillways must adequately manage flow during and following the peak discharge from a:

(1) Probable maximum flood (PMF) for a high hazard potential CCR surface impoundment; or

(2) 1000-year flood for a significant hazard potential CCR surface impoundment; or

(3) 100-year flood for a low hazard potential CCR surface impoundment.

The spillways were evaluated using design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM. Additionally, hydrologic and hydraulic analyses were completed to evaluate the capacity of the spillway relative to inflow estimated for the 1,000-year flood event for the significant hazard potential Primary Ash Pond. The hazard potential classification assessment was performed by Stantec in 2016 in accordance with §257.73(a)(2).

The spillways are comprised of concrete and sliplined corrugated metal pipes, which are non-erodible materials designed to carry sustained flows. The capacity of the spillway was evaluated using hydrologic and hydraulic analysis performed per §257.82(a). The analysis found that the spillways can adequately manage flow during peak discharge resulting from the 1,000-year storm event without overtopping of the embankments. The hydrologic and hydraulic analyses are discussed in the *CCR Rule Report: Initial Inflow Design Flood Control System Plan for Primary Ash Pond at Newton Power Station* (October 2016). Operational and maintenance procedures are in place to repair any issues with the spillways and remove debris or other obstructions from the spillways, as evidenced by the conditions observed by AECOM. As a result, these procedures are appropriate for maintaining the spillways. Therefore, the Primary Ash Pond meets the requirements in §257.73(d)(1)(v).

2.6 Stability and Structural Integrity of Hydraulic Structures (§257.73(d)(1)(vi))

CCR unit designed, constructed, operated, and maintained with hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit that maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the hydraulic structure.

The stability and structural integrity of the slip-lined corrugated metal pipe (CMP) outflow pipes passing through the dike of the Primary Ash Pond were evaluated using design drawings, operational and maintenance procedures, closed-circuit television (CCTV) pipe inspection, and conditions observed in the field by AECOM. No other hydraulic structures are known to pass through the dike of or underlie the base of the Primary Ash Pond.

The CCTV pipe inspection of the slip-lined CMP outflow pipes covered the complete length of both pipes and found the pipes to be free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris that may negatively affect the operation of the hydraulic structure. Operational and maintenance procedures are in place to repair any issues with the spillway and remove debris or other obstructions from the spillways, as evidenced by the conditions observed by AECOM. As a result, these procedures are appropriate for maintaining the spillway. Therefore, the Primary Ash Pond meets the requirements in §257.73(d)(1)(vi).

2.7 Downstream Slope Inundation/Stability (§257.73(d)(1)(vii))

CCR unit designed, constructed, operated, and maintained with, for CCR units with downstream slopes which can be inundated by the pool of an adjacent water body, such as a river, stream or lake, downstream slopes that maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body.

The structural stability of the downstream slopes of the Primary Ash Pond was evaluated by comparing the location of the Primary Ash Pond relative to adjacent water bodies using published Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), aerial imagery, conditions observed in the field by AECOM, and sudden drawdown slope stability analyses.

Based on this evaluation, Newton Lake is adjacent to the southern downstream slopes of the Primary Ash Pond. No other rivers, streams, or lakes are adjacent to the downstream slopes of the Primary Ash Pond. Sudden drawdown slope stability analyses were performed at 4 cross sections adjacent to Newton Lake, and considered a drawdown from a normal pool to empty pool condition, thereby evaluating both sudden drawdown and empty and low pool conditions. The resulting factors of safety were found to satisfy the criteria listed in United States Army Corps of Engineers Engineer Manual 1110-2-1902 for drawdown from normal to low pool, as factor of safety criteria for sudden drawdown slope stability is not expressly stated as a requirement of §257.73(d)(1)(vii). Therefore, the Primary Ash Pond meets the requirements listed in §257.73(d)(1)(vii).

3 Certification Statement

CCR Unit: Illinois Power Generating Company; Newton Power Station; Primary Ash Pond

I, Victor A. Modeer, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this CCR Rule Report, and the underlying data in the operating record, has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the initial structural stability assessment dated October 13, 2016 was conducted in accordance with the requirements of 40 CFR § 257.73(d).

VICTOR A MODEER JR

Printed Name

10/13/16

Date

VICTOR ALBERT MODEER JR.
062-043112
REGISTERED
PROFESSIONAL
ENGINEER
OF
ILLINOIS

11/30/17

About AECOM

AECOM (NYSE: ACM) is a global provider of professional technical and management support services to a broad range of markets, including transportation, facilities, environmental, energy, water and government. With nearly 100,000 employees around the world, AECOM is a leader in all of the key markets that it serves. AECOM provides a blend of global reach, local knowledge, innovation, and collaborative technical excellence in delivering solutions that enhance and sustain the world's built, natural, and social environments. A Fortune 500 company, AECOM serves clients in more than 100 countries and has annual revenue in excess of $19 billion.

More information on AECOM and its services can be found at www.aecom.com.

1001 Highlands Plaza Drive West
Suite 300
St. Louis, MO 63110
1-314-429-0100

ATTACHMENT 8 – SAFETY FACTOR ASSESSMENT

AECOM

Submitted to
Illinois Power Generating Company
6725 North 500th Street
Newton, IL 62448

Submitted by
AECOM
1001 Highlands Plaza Drive West
Suite 300
St. Louis, MO 63110

October 2016

CCR Rule Report: Initial Safety Factor Assessment

For

Primary Ash Pond

At Newton Power Station

1 Introduction

This Coal Combustion Residual (CCR) Rule Report documents that the Primary Ash Pond at the Illinois Power Generating Company Newton Power Station meets the safety factor assessment requirements specified in 40 Code of Federal Regulations (CFR) §257.73(e). The Primary Ash Pond is located near Newton, Illinois in Jasper County, approximately 0.2 miles southwest of the Newton Power Station. The Primary Ash Pond serves as the wet impoundment basin for CCR produced by the Newton Power Station.

The Primary Ash Pond is an existing CCR surface impoundment as defined by 40 CFR §257.53. The CCR Rule requires that the initial safety factor assessment for an existing CCR surface impoundment be completed by October 17, 2016.

The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial safety factor assessment meets the requirements of 40 CFR § 257.73(e). The owner or operator must prepare a safety factor assessment every five years.

2 Initial Safety Factor Assessment

40 CFR §257.73(e)(1)
The owner or operator must conduct initial and periodic safety factor assessments for each CCR unit and document whether the calculated factors of safety for each CCR unit achieve the minimum safety factors specified in (e)(1)(i) through (iv) of this section for the critical cross section of the embankment. The critical cross section is the cross section anticipated to be the most susceptible of all cross sections to structural failure based on appropriate engineering considerations, including loading conditions. The safety factor assessments must be supported by appropriate engineering calculations.

(i) The calculated static factor of safety under the long-term, maximum storage pool loading condition must equal or exceed 1.50.
(ii) The calculated static factor of safety under the maximum surcharge pool loading condition must equal or exceed 1.40.
(iii) The calculated seismic factor of safety must equal or exceed 1.00.
(iv) For dikes constructed of soils that have susceptibility to liquefaction, the calculated liquefaction factor of safety must equal or exceed 1.20.

A geotechnical investigation program and stability analyses were performed to evaluate the design, performance, and condition of the earthen dikes of the Primary Ash Pond. The exploration consisted of hollow-stem auger borings, cone penetration testing, piezometer installation and laboratory program including strength, hydraulic conductivity, consolidation, and index testing. Data collected from the geotechnical investigation, available design drawings, construction records, inspection reports, previous engineering investigations, and other pertinent historic documents were utilized to perform the safety factor assessment and geotechnical analyses.

In general, the subsurface conditions at the Primary Ash Pond consist of medium stiff to stiff embankment fill (clay) overlying stiff to hard clay, which in turn overlies very stiff to very hard glacial till. Phreatic water is above the embankment/foundation of the Primary Ash Pond.

Ten (10) representative cross sections were analyzed using limit equilibrium slope stability analysis software to evaluate stability of the perimeter dike system and foundations. The cross sections were located to represent critical surface geometry, subsurface stratigraphy, and phreatic conditions across the site. Each cross section was evaluated for each of the loading conditions stipulated in §257.73(e)(1).

The Soils Susceptible to Liquefaction loading condition, §257.73(e)(1)(iv), was not evaluated because a liquefaction susceptibly evaluation did not find soils susceptible to liquefaction within the Primary Ash Pond dikes. As a result, this loading condition is not applicable to the Primary Ash Pond at the Newton Power Station.

Results of the Initial Safety Factor Assessments for the critical cross-section for each loading condition (i.e., the lowest calculated factor of safety out of the 10 cross sections analyzed for each loading condition) are listed in Table 1.

Table 1 – Summary of Initial Safety Factor Assessments

Loading Conditions	§257.73(e)(1) Subsection	Minimum Factor of Safety	Calculated Factor of Safety
Maximum Storage Pool Loading	(i)	1.50	1.66
Maximum Surcharge Pool Loading	(ii)	1.40	1.66
Seismic	(iii)	1.00	1.07
Soils Susceptible to Liquefaction	(iv)	1.20	Not Applicable

Based on this evaluation, the Primary Ash Pond meets the requirements in §257.73(e)(1).

3 Certification Statement

CCR Unit: Illinois Power Generating Company; Newton Power Station; Primary Ash Pond

I, Victor A. Modeer, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this CCR Rule Report, and the underlying data in the operating record, has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the initial safety factor assessment dated October 13, 2016 meets the requirements of 40 CFR §257.73(e).

VICTOR A MODEER JR.

Printed Name

10/13/16

Date

VICTOR ALBERT MODEER JR.
062-043112
REGISTERED
PROFESSIONAL
ENGINEER
OF
ILLINOIS
11/30/17

About AECOM

AECOM (NYSE: ACM) is a global provider of professional technical and management support services to a broad range of markets, including transportation, facilities, environmental, energy, water and government. With nearly 100,000 employees around the world, AECOM is a leader in all of the key markets that it serves. AECOM provides a blend of global reach, local knowledge, innovation, and collaborative technical excellence in delivering solutions that enhance and sustain the world's built, natural, and social environments. A Fortune 500 company, AECOM serves clients in more than 100 countries and has annual revenue in excess of $19 billion.

More information on AECOM and its services can be found at www.aecom.com.

1001 Highlands Plaza Drive West
Suite 300
St. Louis, MO 63110
1-314-429-0100

ATTACHMENT 9 – ADDENDUM TO THE CLOSURE PLAN (SEPTEMBER 2020)

RAMBOLL

ENVIRONMENT
& HEALTH

ADDENDUM NO. 1
NEWTON PRIMARY ASH POND CLOSURE PLAN

This Addendum No. 1 to the Closure Plan for Existing Coal Combustion Residuals (CCR) Impoundment for the Newton Primary Ash Pond at the Newton Power Station, Revision 0 - October 17, 2016 has been prepared to meet the requirements of Title 40 of the Code of Federal Regulations (40 C.F.R.) Section 257.103(f)(2)(v)(D) as a component of the demonstration that the Newton Primary Ash Pond qualifies for a site-specific alternative deadline to initiate closure due to permanent cessation of a coal-fired boiler by a certain date.

The Newton Primary Ash Pond will begin construction of closure by July 17, 2024 and cease receipt and placement of CCR and non-CCR wastestreams no later than July 17, 2027 as indicated in the Newton Power Station Alternative Closure Demonstration dated September 29, 2020. Closure will be completed by October 17, 2028 within the 5-year timeframe included in the Closure Schedule identified in the Newton Primary Ash Pond Closure Plan in accordance with 40 C.F.R. § 257.102(f)(ii).

All other aspects of the Closure Plan remain unchanged.

CERTIFICATION

I, Eric J. Tlachac, a Qualified Professional Engineer in good standing in the State of Illinois, certify that the information in this addendum 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
Ramboll Americas Engineering Solutions, Inc., f/k/a O'Brien & Gere Engineers, Inc.
Date: September 29, 2020

CREATE AMAZING.

Burns & McDonnell World Headquarters
9400 Ward Parkway
Kansas City, MO 64114
O 816-333-9400
F 816-333-3690
www.burnsmcd.com