GEO-HYDRO, INC.
Consulting in Geology and Hydrogeology

16 Mesa Oak
Littleton, Colorado 80127
(720) 320-2060

January 5, 2025

Ms. Faith Bugel
Attorney
1004 Mohawk Rd.
Wilmette, Il 60091

Subject: Review of Closure Permit Application and Other Pertinent Materials
City, Water, Light and Power Coal Combustion Residual Impoundments
Springfield, IL

Introduction

This report was prepared following a request from Sierra Club to review available information and provide my expert opinions on options for closing the City, Water, Light and Power (CWLP) coal combustion residuals (CCR) impoundments located at the Dallman Station (Dallman) in Springfield, Illinois. CCR storage and disposal facilities associated with Dallman are located on the floodplain of Sugar Creek immediately downstream of Lake Springfield and Spalding Dam.

I recommend that waste be excavated from the site and be either beneficially reused or disposed in a secure facility. The proposed cap-in-place remedy for the Lakeside and Dallman Ash Ponds does not meet the Illinois performance standard for CCR closures[1] which requires the facility to take measures, such as engineering controls that will control, minimize, or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste as well as post-closure releases to groundwater from the sides and bottom of the unit. Closing the impoundments by capping them in place fails to meet performance standard for because waste located at or below the potentiometric surface would continue to be in regular contact with groundwater. Capping waste in place would also leave the units susceptible to damage or releases during flood events. For these reasons I cannot recommend simply leaving the waste in place beneath a cap.

Because the CWLP CCR units are located immediately adjacent to Sugar Creek and waste is in regular contact with groundwater, there are few options that will be effective at containing the CCR waste and eliminating potential release of contaminants into the environment. Other remedial options may reduce contaminant concentrations to some extent for as long as one or more systems are operated and maintained. The overarching problem with this site would however remain. The CWLP impoundments were constructed in a location that is very poorly suited for waste disposal facilities. The CWLP ash is currently contained in:

[1] 35 Ill. Admin. Code Section 845.750(a)(1)

- impoundments that have been poorly designed and constructed,
- impoundments known to be releasing ash-related contaminants to groundwater in concentrations well above Illinois Class I Groundwater Quality Standards,
- impoundments with bottoms located at or below the water table, and
- impoundments located on the Sugar Creek 100-year floodplain.

Throughout this report, I cite to certain documents and evidence upon which I base my observations, opinions and conclusions. That does not mean, however, that the cited materials are the only sources of supporting evidence. For example, I often draw upon information in technical papers and textbooks as well as my decades of experience working on environmental contamination from waste disposal facilities, including numerous coal ash disposal facilities, to focus my review and inform my opinions.

A central tenet of responsible waste management is that it be prevention-based. The United States Environmental Protection Agency (EPA) articulated this tenet in its 1993 guidance for owners and operators of solid waste disposal facilities stating: "Ground water is … used extensively for agricultural, industrial, and recreational purposes. Landfills can contribute to the contamination of this valuable resource if they are not designed to prevent waste releases into ground water … Cleaning up contaminated ground water is a long and costly process and in some cases may not be totally successful."[2] Simply said, preventing groundwater contamination uses far fewer resources that cleaning up contamination that has already reached groundwater.

Unlike other forms of solid waste such as municipal solid waste (MSW), inorganic coal combustion residuals (CCR) and the metals contained in inorganic CCR do not biodegrade. Coal ash that is left in unlined ash basins will be capable of leaching toxic metals into Illinois groundwater and/or surface water at any time in the present, the near, or distant future for as long as soluble metals in the ash come into contact with water. This is true for unlined facilities[3] where waste is in contact with groundwater, whether or not a cap is placed on the top of the disposal area.

Therefore, effective closure of coal ash storage sites requires that the coal ash waste be securely and permanently isolated from water: including precipitation, surface water, and groundwater. Concerns over the adequacy of proposed coal ash impoundment closures typically center on the proposals ability to isolate the waste from water. Failure to isolate coal ash waste from water will result in leaching of contaminants, i.e. formation of leachate. "Leachate" "includes liquid, including any suspended or dissolved constituents in the liquid, that has percolated through or drained from waste or other materials placed in a landfill, or that passes through the containment

---

[2] EPA (1993), Criteria for Solid Waste Disposal Facilities, A Guide for Owners/Operators, EPA/530-SW-91-089, March 1993, p. 3, available at https://www.epa.gov/sites/production/files/2016-03/documents/landbig.pdf

[3] Facilities constructed with no low-permeability bottom liner that adequately restricts subsurface water flow.

structure (e.g., bottom, dikes, berms) of a surface impoundment."[4] If released to groundwater or surface water, leachate from coal ash impoundments impairs and degrades water quality. Due to the lack of a bottom liner, unlined coal ash impoundments "allow the leachate to potentially migrate to nearby groundwater, drinking water wells, or surface waters."[5]

Background

CWLP has notified IEPA of intent to initiate closure of the Lakeside and Dallman CCR impoundments under the requirements of 35 Illinois Administrative Code Section 845.750, Closure with a Final Cover System.[6] This letter documents the results of my review to date and identifies several significant findings that the Illinois Pollution Control Board should take into consideration when making its remedy decision to this matter. I reserve the right to amend, supplement or clarify my opinions based on the review of additional data and evidence, including any evidence contained in any additional disclosures by CWLP concerning closure of the Lakeside and Dallman ash ponds.

Summary of Significant Findings

The following are the major findings that resulted from my review to date:

- The cap-in-place closure proposed by CWLP would leave unlined ash ponds in place on the floodplain of Sugar Creek and over the original Sugar Creek channel where the disposed waste will remain in contact with groundwater.
- The proposed cap-in-place remedy for the Lakeside and Dallman Ash Ponds does not meet the Illinois performance standard for CCR closures[7] which requires the facility to take measures, such as engineering controls that will control, minimize, or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste as well as post-closure releases to groundwater from the sides and bottom of the unit.
- Coal ash contained within the impoundments is saturated by, and degrading the quality of groundwater within, beneath, and downgradient of the impoundments. This impairment and degradation of groundwater quality will continue post-closure unless ash and ash-constituents are effectively segregated from the groundwater flow system.
- Exceedances of background arsenic concentrations are being systematically under-reported by including data from an impacted downgradient monitoring well (AP-4) in the background data. Maintaining AP-4 as an upgradient monitoring well creates an

[4] EPA (2015), Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category, 80 Fed. Reg. (November 3, 2015) (40 C.F.R. Part 423), at pp. 67,838 and 67,847, available at https://www.govinfo.gov/content/pkg/FR-2015-11-03/pdf/2015-25663.pdf

[5] EPA (2015), at p. 67,847

[6] Andrews Engineering (2022), Final Closure Plan for Coal Combustion Residuals Surface Impoundments, contained in Attach. 13 to CWLP Closure Construction Permit Application (Feb. 2022)

[7] 35 Illinois Administrative Code Section 845.750(a)(1)

artificially high background value and minimizes the number of exceedances of groundwater protection standards.

- The bottom of the ash impoundment is and would remain unlined under the proposed closure plan. The lack of a bottom liner and high groundwater elevation beneath the impoundments will result in some CCR being permanently submerged, and additional CCR being periodically re-wetted during flood events or periods of unusually high groundwater elevation.
- CCR contaminants will be released to the groundwater as long as soluble CCR constituents are allowed to be in continuous or intermittent contact with groundwater. Given the close proximity to the CWLP CCR impoundments, released contaminants must be expected to enter the surface water and accumulate in sediments within Sugar Creek.
- Even under a now routine flood event such as the 100-year flood[8], the Federal Emergency Management Administration (FEMA) predicts water will flow over the top Spalding Dam drop down the perimeter berm around the Lakeside Ash Pond into Sugar Creek. Catastrophic release of some portion of the CCR waste stored in the impoundment will become increasingly likely over time as storm events increase in intensity and become more common.
- As utilities have reluctantly realized that capping waste in contact with groundwater does not meet applicable performance standards, CCR closures are now being planned using alternative methods. CWLP must recognize that its proposed closure plan does not meet the performance standard and select a closure technique that is actually protective of the environment.
- Coal ash is known to be buried outside of the berms surrounding the Lakeside Ash Pond. Construction of a cap over the Lakeside Ash Pond would do nothing to eliminate contamination from wastes located outside of the berm. The appropriate closure method for the CWLP Coal Ash Ponds must address all of the disposed ash. The proposed Cap-in-Place closure does not achieve this goal.
- I recommend that waste be excavated from the site and be either beneficially reused or disposed in a secure facility. Closing the impoundments by capping them in place would reduce the amount of waste in contact with groundwater by reducing infiltration from above, but waste located at or below the potentiometric surface will continue to contaminate groundwater. Capping waste in place would also leave the units susceptible to damage or releases during flood events.

Qualifications

I express the opinions in this letter based on my formal education in geology and over 44 years of experience on a wide range of environmental characterization and remediation sites. My

[8] A 100-year flood is a flood event with a 1% annual chance of occurrence.

education includes Bachelor of Science and Masters of Science degrees in geology from Northern Illinois University and the University of Illinois at Chicago, respectively. My entire professional career has been focused on regulatory, site characterization, and remediation issues related to waste handling and disposal practices and facilities for regulatory agencies and in private practice. I have worked on contaminated sites in over 35 states and the Caribbean. My site characterization and remediation experience includes activities at sites located in a full range of geologic conditions, including soil and groundwater contamination in both consolidated and unconsolidated geologic media, and a wide range of contaminants. I have served in various technical and managerial roles in conducting all aspects of site characterization and remediation including definition of the nature and extent of contamination (including developing and implementing monitoring plans to accurately characterize groundwater contamination), directing human health and ecological risk assessments, conducting feasibility studies for selection of appropriate remedies to meet remediation goals, and implementing remedial strategies. Much of my consulting activity over the last 18 years has been related to groundwater contamination and permitting issues at coal ash storage and disposal sites in numerous states. I am a registered Professional Geologist (PG) in Georgia, Kansas, Illinois, Indiana, and Wisconsin, and am a Past President of the Colorado Ground Water Association. My current resume is provided in the Appendix to this report.

Discussion

Impoundment Location and Construction

Over several decades CWLP has constructed CCR disposal facilities on alluvial sediments in the floodplain of Sugar Creek, immediately downstream of Spalding Dam. The original meandering channel of Sugar Creek was abandoned and relocated westward to its current location to facilitate construction. The original Creek channel was reportedly abandoned by filling the abandoned channel with a wide variety of soils, ranging from silty clays to organic clays to silty sands.

CCR was first placed on the Lakeside Ash Pond property in the middle 1930's. It was not until some later time prior to 1958 that berms to contain disposed ash were constructed and the 44-acre Lakeside Ash Pond was placed into service.[9] The Lakeside Ash Pond is bounded by Spaulding Dam to the south and by earthen berms on the east, north, and west. The Lakeside Pond was expanded vertically in 1988 by building berms on top and inside of the existing embankments. The 1988 vertical expansion also included construction of internal berms over disposed ash to create lime softening ponds on the southern section of the Lakeside Ash Pond. Available drawings indicate that the top of existing embankments around the Lakeside Ash Pond

[9] Andrews Engineering (2016), History of Construction Report for Coal Combustion Residuals Surface Impoundments, October, 2016, p.3, contained in Attach. 14 to CWLP Initial Operating Permit Application (Oct. 2021)

are at an elevation of approximately 565-feet (msl).[10] The bottom elevation of the Lakeside Ash Pond is often not specified, but is identified on a Closure Plan drawing to be at an elevation of approximately 537 feet above mean sea level (msl).[11]

The 34.5 acre Dallman Ash Pond was put into operation in 1976. The Dallman Ash Pond is bounded by the Clarification Pond on the South, the FGDS landfill on the east, and by Sugar Creek on the north and west. The Dallman Ash Pond is contained by embankments constructed of natural soils. Available drawings indicate that the existing perimeter embankments around the Dallman Ash Pond are at an elevation of approximately 554-feet (msl).[12] In locations where the perimeter dikes crossed the former creek bed, the native materials were reportedly excavated to at least 4-feet below the existing channel banks and bottom, and backfilled with compacted cohesive soils.[13] Material from the center of the ash pond was excavated and utilized in the construction of the embankments, lowering the elevation of the base of the ash fill.[14] The bottom elevation of the Dallman Ash Pond has been routinely identified to be at an elevation of approximately 527-feet msl.[15]

Recent responses to comments from the Illinois Environmental Protection Agency (IEPA) on the Operating and Construction Application show that CWLP directed that borings be advanced at four locations each in both the Lakeside and Dallman Ash ponds for the apparent purpose of collecting porewater analyses.[16] In addition to sampling porewater, borings through the waste disposal units provide actual measurements of the bottom of fill elevation at these eight locations. The elevation of the base of CCR fill placed in the CWLP impoundments is a critical piece of information needed to evaluate the effectiveness on the proposed in-place closure. Two of the four borings through the Lakeside Ash Pond showed that the bottom of the disposed ash is at elevations of 530.0 to 530.5-feet msl rather than the 537-foot pond bottom previously reported by CWLP. Borings through the Dallman Ash Pond showed the bottom of ash at elevations as low as 523 feet msl, rather than the previously reported 527-foot pond bottom. Since only four borings in each impoundment were advanced it remains unclear if other, other lower elevation areas also exist in either impoundment. The fact that CCR waste is now known to have been placed deeper than had previously been identified has severe implications for site closure evaluations and modeling, and for the ability of the eventual remedy to protect environmental quality.

[10] Andrews Engineering (2022), Closure Plans, City Water, Light, And Power, Springfield, Sangamon County, Illinois, Sheet 7, contained in Attachment 8 to the Closure Construction Permit Application, February 2022

[11] Andrews Engineering (2022), Closure Plans, City Water, Light, And Power, Springfield, Sangamon County, Illinois, Sheet 7, contained in Attachment 8 to the Closure Construction Permit Application, February 2022

[12] Andrews Engineering (2022), Closure Plans, City Water, Light, And Power, Springfield, Sangamon County, Illinois, Sheet 7, contained in Attachment 8 to the Closure Construction Permit Application, February 2022

[13] Andrews Engineering (2021a), Initial Operating Permit Application, October, 2021, p.5

[14] Andrews Engineering (2021a), p.7

[15] Andrews Engineering (2022), Closure Plans, City Water, Light, And Power, Springfield, Sangamon County, Illinois, Sheet 7 contained in Attachment 8 to the Closure Construction Permit Application, February 2022

[16] CWLP (2024), Coal Combustion Residuals Surface Impoundment Operating and Construction Permit Application Review Letter, September 9, 2024, Response to Item 1.7.15

Site Geology

The CWLP ash ponds are located in the alluvial valley of Sugar Creek. In fact, both the Lakeside and Dallman Ash Ponds were constructed within the floodplain and over the previous location of the meandering channel of Sugar Creek.[17] The creek channel was relocated to the west of the Lakeside and Dallman Ash Ponds to allow construction of waste storage facilities.[18]

Various alluvial units and placed fill materials overlie the Pennsylvanian Shale bedrock. Characterization of alluvial sediments is an extremely difficult task due to the very irregular thickness, discontinuous extent, and propensity for abrupt lithology changes that are all characteristics of alluvial sediments. As is typical of alluvial sediments, the unconsolidated sediments that overlie bedrock include various combinations of sands, gravels, silts and clays in generally fining upward sequences of highly variable thickness. The placed fill and naturally occurring sediments have been described in various characterization reports and grouped into the general units described below. However, boring logs through these units show widely varying sediment compositions and unit thicknesses rather than laterally continuous sediment layers. Highly variable sediment composition and layer thickness are common characteristics of alluvial sediments.

Creek Fill Material

Fill materials were used during site development to increase the elevation of low areas, specifically including the former channel of Sugar Creek. Borings completed into the Channel Fill materials show that fill consists of variable cohesive and granular soils classified as silty clays, clayey-silt, silt, or sand.[19] The field horizontal hydraulic conductivity of the fill materials is highly variable, ranging from 6.1×10^{-2} cm/sec in granular fill to 7.1×10^{-5} cm/sec in cohesive fill. The presence of creek fill has a profound effect on site hydrogeology and transport of contaminants from the impoundments. The flow of groundwater between the various geologic units is facilitated where granular fill materials extend down from the existing grade to the bedrock surface, interconnecting the Channel Fill with the Upper Sand Unit and the Basal Sand Unit.[20] This interconnection of the sand units creates a direct conduit for transfer of water and CCR contaminants between impounded CCR waste and the uppermost aquifer (Basal Sand) at the CWLP site. Recharge of overlying CCR and sediments by groundwater flowing upward from the Basal Sand Unit will maintain saturation of waste placed below the elevation of the potentiometric surface and facilitate migration of soluble metals.

[17] CWLP (1976), Sugar Creek Relocation Application, p.11, Bates 19.6

[18] CWLP (1976), p. 11, Bates 19.6

[19] Andrews Engineering (2021b), Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures, October 2021, p. 7, contained in Attach. 11 to CWLP Initial Operating Permit Application (Oct. 2021)

[20] Andrews Engineering (2021b), Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures, October 2021, p. 7, contained in Attach. 11 to CWLP Initial Operating Permit Application (Oct. 2021)

Upper Cohesive Deposit

The uppermost naturally occurring sediment unit generally encountered at the site is the Upper Cohesive Deposit but this unit is missing in areas underlain by the abandoned creek. In these areas both the Upper Cohesive Deposit and underlying Shallow Sand Unit are absent.[21] The remaining thickness of this unit in other areas of the impoundments may be significantly reduced in many locations as material from this unit was excavated and used in berm construction.

Where present this unit consists of silt, silty clays and clayey silts. The thickness of the Upper Cohesive Deposit was reported to vary from 2.5 to 16 feet. Laboratory tests of samples from this unit indicate that hydraulic conductivity is relatively low with laboratory tests of vertical conductivity values ranging between 5.2×10^{-7} cm/sec and 1.6×10^{-5} cm/sec.[22] However, the Upper Cohesive Deposit is an alluvial deposit and it is expected that horizontal hydraulic conductivity will be greater than the vertical conductivity.[23] Horizontal hydraulic conductivity should be expected to be at least one and likely more orders of magnitude higher than the laboratory test results indicate. The difference between vertical and horizontal hydraulic conductivities means that groundwater will flow more freely in the lateral direction Upper Cohesive Deposit than vertically through the Upper Cohesive Deposit. This observation conflicts with the assumption made during development of the Site Conceptual Model indicating that groundwater flows only vertically through sediment layers above the Basal Sand.[24]

Shallow Sand Unit

The Shallow Sand Unit often underlies the Upper Cohesive Deposit. This unit was not encountered at all locations across the site, but where encountered it was found to underlie the Upper Cohesive Deposit. Where present, this unit consists of silty to clayey fine sand that varies in thickness from one to three feet. Slug tests conducted on two piezometers completed in this unit show high horizontal hydraulic conductivities of 3.6×10^{-3} cm/sec and 2.9×10^{-2} cm/sec.[25] As is the case with the Upper Cohesive Deposit, the high horizontal conductivity of the Shallow Sand Unit conflicts with the with assumptions made in the Site Conceptual Model indicating that groundwater flows only vertically through sediment layers above the Basal Sand.[26]

Lower Cohesive Deposit

The Lower Cohesive Deposit ranges in thickness from 0 to 22 feet and is missing in some locations above the abandoned creek bed where it has likely been removed by erosion.[27] The acknowledgement in CWLP documents that the Lower Cohesive Deposit and overlying natural sediments are missing above some sections of the abandoned creek bed is a critical piece of

[21] Andrews Engineering (2021b), p. 6
[22] Andrews Engineering (2021b), p. 6
[23] Andrews Engineering (2021b), p. 6
[24] Andrews Engineering (2021c), Closure Alternatives Assessment – Contaminant Transport Model, Figure 4, contained in Attachment 2 of the Closure Construction Permit Application
[25] Andrews Engineering (2021b), p. 6
[26] Andrews Engineering (2021c), Figure 4
[27] Andrews Engineering (2021b), p. 6

information. This information must be recognized in order to understand not only how CCR contaminants have migrated from the impoundment during operation, but also why capping the impoundments in place is very unlikely to control the release of CCR contaminants.

Where present, the Lower Cohesive Deposit consists of clays, silty clays, and clayey silts that range in thickness from 0 to 22 feet. The average thickness is reported to be approximately 15 feet. The vertical hydraulic conductivity of the Lower Cohesive Deposit has been reported to range from 1.3×10^{-8} cm/sec to 1.8×10^{-6} cm/sec. The horizontal hydraulic conductivity ranges from 4.6×10^{-5} cm/sec to 7.6×10^{-5} cm/sec.[28] These results show that the horizontal hydraulic conductivity through the Lower Cohesive Deposit is two to three orders of magnitude higher than vertical conductivity and conflict with assumptions of only vertical flow through unconsolidated sediments made in the Site Conceptual Model.[29]

Basal Sand Unit

The Basal Sand Unit is composed of silty to clayey fine sands to sand with some gravel. It generally overlies the bedrock surface and underlies the Lower Cohesive Deposit. This unit is not present everywhere, but its thickness generally varies from 0 to 12.3 feet with a top elevation of from 491 to 513 feet above msl.[30] The Basal Sand Unit is the most conductive of any material encountered on site with an average field hydraulic conductivity of 1.73×10^{-2} cm/sec.[31] CWLP has identified the Basal Sand Unit as the Uppermost Aquifer on the site. This is the unit that is targeted by the groundwater monitoring system.

Bedrock

The uppermost bedrock that underlies the CWLP site is Pennsylvanian Shale. Bedrock is reportedly encountered at approximately 500 feet msl along the downgradient edge of the Dallman Ash Pond. The bedrock surface is known to slope from the east and west toward the center of the landfill area. The measured elevation varies from a low of 492 feet above msl near the center of the Landfill, to a high of approximately 554 feet above msl on a bedrock outcrop located near the southeast corner of Landfill Cell 1.[32] Two tests of the hydraulic conductivity of the upper portions of the shale returned values of 1.8×10^{-7} cm/sec and 1.3×10^{-5} cm/sec.[33] Vertical flow through the bedrock unit is not expected to be significant unless currently unidentified fracture zones were identified.

The above summary descriptions[34] of the geologic materials known to be on site clearly show that, as expected, the alluvial sediments that underlie the CWLP impoundments are highly

[28] Andrews Engineering (2021b), Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures, October 2021, p. 6, contained in Attach. 11 to CWLP Initial Operating Permit Application (Oct. 2021)

[29] Andrews Engineering (2021c), Figure 4

[30] Andrews Engineering (2021b), p. 7

[31] Andrews Engineering (2017), Groundwater Monitoring Program, p. 6, Bates 10.15

[32] Andrews Engineering (2021b), p. 8

[33] Andrews Engineering (2021b), p. 8

[34] Descriptions are based on information contained in referenced CWLP documents.

variable in terms of composition, hydraulic conductivity and both lateral and vertical extent. Both the Upper and Lower Cohesive Deposits are acknowledged to be thin in some areas and missing altogether in locations above the abandoned creek channel. Areas where these units are thin or missing function as conduits allowing groundwater to move into and out of the impoundments. The lack of continuously present cohesive units explains why contaminants have been shown to be migrating away from the impoundments and why closing the impoundments in place with waste in contact with groundwater will not be protective of the environment.

Site Hydrogeology

Potentiometric surface maps depicting the groundwater potential in the basal sand unit beneath the CWLP Ash ponds were included in an updated 2021 Hydrogeologic Report[35] and are provided as Attachment A. The potentiometric maps do not reflect the elevation of standing water held within the unlined ash ponds. Rather, the potentiometric maps reflect groundwater elevations measured in monitoring wells completed in the Basal Sand Unit and located around the perimeter of the ponds.

The highest groundwater potential on the site is consistently measured on the highland area off the southeast corner of the south side of the Lakeside Ash Pond near Lake Springfield. The potentiometric surface maps show that hydraulic head drops at regular intervals as groundwater flows from the southeast corner of the Lakeside Ash Pond toward areas of lower groundwater head to the north and west toward Sugar Creek.[36] The maps also show that groundwater reaches the upgradient (southeast) corner of the Dallman Pond with a measured head of approximately 535-feet above msl. Groundwater heads along the north and west (downgradient) sides of the pond are typically indicated to be between 525 and 530-feet above msl.

Under current conditions mounding of groundwater within the basal sand unit beneath the Dallman Pond is indicated by the local northward shift of the 535-foot contour line beneath the Dallman Ash Pond.[37] Identification of mounded groundwater beneath the pond confirms that there is a hydraulic connection between the impoundment and underlying sand units. Leakage of impoundment leachate into the underlying Basal Sand Unit is currently driving groundwater flow from the Dallman Ash Pond toward the north, east, and west. Flow toward the north and west is moving water from the ash pond toward discharge areas along Sugar Creek. Eastward flow from the Dallman Ash Pond moves groundwater toward the FGDS Landfill where it contributes to the shallow saturated conditions on that site before flowing northward toward the creek.

[35] Andrews Engineering (2021b), Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures, October 2021, Appendix C, contained in Attach. 11 to CWLP Initial Operating Permit Application (Oct. 2021)

[36] Andrews Engineering (2021b), Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures, October 2021, Appendix C, contained in Attach. 11 to CWLP Initial Operating Permit Application (Oct. 2021)

[37] See potentiometric surface maps in Attachment A to this report.

Once waste in the Dallman Ash Pond is dewatered, mounding of groundwater would be expected to slowly dissipate and head within the basal sand will return to the regular contour orientation observed upgradient of the pond, with head steadily decreasing from approximately 535-feet above msl on the southeast corner of the impoundment to 525 to 530-feet above msl along Sugar Creek.

Documents prepared at the direction of CWLP and posted in compliance with applicable CCR rules have historically identified the elevations of the bottom of the Lakeside and Dallman ponds to be at approximately 537 and 527 feet above msl, respectively.[38] But borings installed at the direction of CWLP to facilitate collection of porewater samples, and discussed above, indicate that at least some portion of the unlined Lakeside Ash Pond bottom is actually located at an elevation of 530 feet.[39]

Potentiometric surface maps provided in Attachment A show the groundwater elevation in the Basal Sand Unit beneath the Lakeside Ash Pond decreases from a high of 565 feet above msl beneath the southeast corner of the pond to approximately 540 feet above msl along the northern berm. Comparing the lowest elevation of the base of the Lakeside pond (530 feet) to the elevation of the potentiometric surface beneath the impoundment shows that 10 to 35-feet of the waste in the Lakeside Ash Pond is saturated by groundwater flowing through the waste. Capping the Lakeside Ash Pond wastes in place will not stop groundwater from flowing laterally through 10 to 35-feet of waste as it migrates toward discharge areas along Sugar Creek.

Similarly, we now know that at least some portion of the Dallman Ash Pond bottom is actually located at an elevation of 523 feet above msl.[40] The potentiometric surface maps (Attachment A) show the groundwater elevation in the Basal Sand Unit beneath the Dallman Ash Pond is will range in elevation from 525 and 535 feet above msl. Comparing the lowest elevation of the base of the Dallman Ash Pond (523 feet) to the potentiometric surface elevation shows that between 2 and 12-feet of waste in the Dallman Ash Pond is expected to remain saturated even if a cap is installed. Since neither of the ponds have been dewatered to date, the current elevation of the zone of saturation and thickness of saturated waste within ponds is very likely much greater than estimated here.

Vertical flow of groundwater between the Basal Sand Unit and the Lakeside and Dallman Ash Pond wastes has largely gone unaddressed in reports and submittals to regulators for many years. However, vertical flow was addressed in the hydrogeologic investigation conducted for the Flue Gas Desulfurization Sludge Landfill which is located immediately adjacent to both the Lakeside and Dallman CCR impoundments.[41] The hydrogeologic report compared hydraulic heads

---

[38] Andrews Engineering (2022), Closure Plans, City Water, Light, And Power, Springfield, Sangamon County, Illinois, Sheet 7, contained in Attachment 8 to the Closure Construction Permit Application, February 2022

[39] CWLP (2024), Coal Combustion Residuals Surface Impoundment Operating and Construction Permit Application Review Letter, September 9, 2024, Response to Item 1.7.15

[40] CWLP (2024), Coal Combustion Residuals Surface Impoundment Operating and Construction Permit Application Review Letter, September 9, 2024, Response to Item 1.7.15

[41] Patrick Engineering (1995), 1995 FGDS Hydrogeological Report Volume 4 or 5, Hydrogeologic Investigation, Addendum #2 to Attachment 28, CWLP - 007359

measured in shallow soils to heads measured in the Basal Sand Unit.[42] CWLP's own consultants concluded that:

> "… water level elevations in the basal sand generally appear to be one to two feet higher than the shallow water level elevations. This is consistent with the original interpretation of groundwater conditions that water within the near surface geologic layers is being recharged by the groundwater within the Basal Sand Unit."[43]

The absence of low conductivity materials above the Basal Sand Unit over some portions of the abandoned creek channel facilitates saturation of wastes located below the potentiometric surface. Placement of waste below the potentiometric surface in both CWLP ash ponds indicates that that the proposed cap-in place closure cannot be expected to eliminate the flow of groundwater through disposed waste, nor the downgradient migration of CCR-related contaminants. The Lakeside and Dallman Ash Ponds must not be allowed to close in place in the absence of additional actions to eliminate interaction between groundwater and waste.

Capping the CWLP impoundments in place will restrict infiltration from above, but will do nothing to eliminate inflow of groundwater through the side and bottom of either the Lakeside or Dallman Ash Ponds. As was described above, natural low conductivity materials have been replaced with fill beneath portions of the impoundments, especially over sections of abandoned creek channel segments.[44] The groundwater head within the basal sand must be expected to maintain saturation of 10 to 35 feet of waste in the Lakeside impoundment, and 2 to 12 feet of waste in the Dallman impoundment, even after the observed groundwater mounding has dissipated.

The proposed closure of the CWLP Dallman CCR impoundments leaving waste in contact with groundwater fails to meet either the federal or Illinois performance standards for CCR facility closures specified in 40 C.F.R. 257.102(d)(2)(i), and Illinois Title 35, Section 845.750, respectively. The United States Environmental Protection Agency (EPA) has repeatedly notified the owners of CCR facilities that proposed closure plans that cap CCR in place while leaving waste in contact with groundwater are insufficient. EPA has clearly stated that the performance standard requires the facility to take measures,

> "such as engineering controls that will "control, minimize, or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste" as well as "post-closure releases to the groundwater" from the sides and bottom of the unit."[45]

Further, EPA has recently denied approval of the Alabama Department of Environmental Management (ADEM) CCR program due to recurring failures of ADEM to require each CCR

[42] Patrick Engineering (1995), Addendum #2 to Attachment 28, Hydrogeologic Investigation, CWLP - 007359

[43] Patrick Engineering (1995), Addendum #2 to Attachment 28, Hydrogeologic Investigation, CWLP - 007359

[44] Stabilize (2010), City Water , Light, and Power – 35 IAC 620 Ash Pond Assessment, p. 8, CWLP - 001702

[45] For example see: EPA (2022), Letter from USEPA to Duke Energy, January 11, 2022, p. 3

unit in the State to achieve compliance with this minimum standard.[46] Approving closure of the CWLP impoundments by capping the waste in place without meeting the minimum performance standard could open Illinois EPA to similar action.

Illinois CCR regulations include a performance standard that is nearly identical to the federal standard.[47] The Illinois standard states:

> "The owner or operator of a CCR surface impoundment must ensure that, at a minimum, the CCR surface impoundment is closed in a manner that will:
>
> 1) Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere;"[48]

Capping the CWLP CCR in place with waste in regular contact with groundwater in no way meets either the federal or Illinois performance standards for CCR closures.

Flow and Transport Modeling

There are many disconnects between real world hydrogeologic conditions and the assumptions made in the overly simplistic and flawed contaminant transport modeling that was performed to support selection of the CWLP proposed in place closure.[49] For example:

- The model assumptions state that all geologic units are homogenous and isotropic[50] with respect to all lithologic and hydrogeologic parameters. The descriptions of the various geologic materials contained in CWLP submittals clearly show that this assumption is not met because the composition and hydraulic properties of individual units vary widely.
- The model assumptions state that all layers are laterally extensive and the thickness of each layer is uniform. Actual site conditions do not conform to these assumptions. Investigations done to date have all shown that thickness and composition of each of the alluvial sediment layers vary widely, including areas where cohesive deposits are completely missing from above the abandoned creek channel.
- The model assumes that the liquid head within the closed impoundments will be controlled by the rates of infiltration through the proposed cap and vertical (downward) seepage rates through the pond bottom calculated by the HELP model. These

[46] EPA (2024), Alabama: Denial of State Coal Combustion Residuals Permit Program, 89 Fed. Reg. (June 7, 2024) (40 C.F.R. Part 257), p. 48774, available at https://www.govinfo.gov/content/pkg/FR-2024-06-07/pdf/2024-11692.pdf

[47] https://www.ilga.gov/commission/jcar/admincode/035/035008450G07500R.html

[48] 35 Ill. Administrative Code, Section 845.750(a)(1)

[49] Andrews Engineering (2021), Closure Alternatives Assessment- Contaminant Transport Model, October 2021, p. 10, contained in Attachment 11 of the Closure Construction Permit Application

[50] Isotropic means that the properties of the materials do not change between locations, something that is known to be incorrect.

calculations assume that there is no recharge of impounded wastes from the sides and/or from below, something that is known to be false as discussed above. Groundwater is clearly in contact with impounded wastes and recharge from the underlying Basal Sand Unit will continue to maintain saturation of several feet of the disposed waste.

- The conceptual model for the modeling[51] assumes that groundwater flows only downward through the alluvial sediments that overlie the Basal Sand Unit even though the horizontal hydraulic conductivity of the overlying sedimentary units is typically one to three orders of magnitude higher in the horizontal direction and hydraulic head within the Basal Sand drives recharge of the overlying sediments from below.
- The modeling[52] predicts that once capped, leachate head within the Dallman Ash Pond will drop to within 0.12-feet above the pond bottom to an elevation of 527.12 feet. This modeled result indicates that the elevation of leachate within the impoundment is predicted to drop below the assumed elevation of surrounding groundwater (528 feet) and far below the real world potentiometric head (530 to 535-feet msl) in the basal sand unit (Attachment A), neither of which are correct. Capping the waste in place in the CWLP ash ponds without further engineering intervention (e.g. engineered barriers to prevent groundwater flow into the waste from the sides and bottom) will not reduce the leachate head within the impoundments to below the elevation of the underlying and surrounding groundwater.

Groundwater Quality Monitoring

The Annual Groundwater Monitoring and Corrective Action Report,[53] dated January 31, 2024, shows that impacts to groundwater quality downgradient of the ash ponds continue. The groundwater monitoring system at the Lakeside and Dallman Ash Ponds has been expanded over time to consist of two upgradient monitoring wells (AP-4 and AP-5) and six downgradient monitoring wells (AP-1, AP-2, AP-3, AP-6, AP-7, and RW-3). Upgradient wells are supposed to be purposefully placed in areas where there is no evidence of impacts from the facility where they provide information about naturally occurring concentrations of chemical parameters. Downgradient monitoring wells are placed hydraulically downgradient of the waste unit, between the ash ponds and Sugar Creek, in order to detect changes in water chemistry. Each of the compliance wells in the Lakeside and Dallman groundwater monitoring system was constructed with screened intervals set to monitor the quality of water flowing immediately above the bedrock in the Basal Sand (Uppermost Aquifer).

[51] Andrews Engineering (2021), Closure Alternatives Assessment- Contaminant Transport Model, October 2021, Fig. 4 contained in Attachment 11 of the Closure Construction Permit Application

[52] Andrews Engineering (2021), Closure Alternatives Assessment- Contaminant Transport Model, October 2021, Fig. 4 contained in Attachment 11 of the Closure Construction Permit Application

[53] Andrews Engineering (2024), Annual Groundwater Monitoring and Corrective Action Report, January 31, 2024

A regular systematic groundwater monitoring program was initiated in February 2012 and continues to the present.[54] Water from all of the tested wells is sampled and analyzed for a wide range of ash-related parameters including antimony, arsenic, barium, boron, beryllium, cadmium, calcium, chloride, chromium, cobalt, fluoride, lead, lithium, mercury, molybdenum, pH, selenium, sulfate, thallium, total dissolved solids (TDS), and radium 226 & 228. Analytical results are compared to statistically derived background concentrations and relevant water quality standards to determine if groundwater quality has been significantly impacted by site operations.

Detection monitoring conducted during 2023 continued to show Statistically Significant Increases (SSIs) in the concentration of parameters at wells shown below.

Parameters and Wells with SSI's in 2023 Detection Monitoring	
Boron	AP-1, AP-2, AP-3, AP-7, RW-3
Calcium	AP-1, AP-2
Chloride	AP-1, AP-2, AP-3, AP-4, AP-6, AP-7, RW-3
pH	AP-1, AP-2, AP-3
Sulfate	AP-1, AP-3
Total Dissolved Solids	AP-1, AP-2, AP-3

Assessment monitoring conducted during 2023 continued to show exceedances of Ground Water Protection Standards (GWPS) for two parameters in three different wells shown below.

Parameters and Wells with GWPS Exceedences in 2023 Assessment Monitoring	
Arsenic	AP-7, RW-3
Cobalt	AP-2

The monitoring report for 2023 also indicates that during the following year three additional monitoring wells (AP-14, AW-1, and G120) will be added to the monitoring program and that CWLP will be proposing to revise (increase) the background concentration for arsenic utilizing lower laboratory reporting limits. A letter submitted to the Illinois Environmental Protection Agency (IEPA) dated October 30, 2024 provided proposed arsenic background data based on 8 recent sampling events at background wells AP-4 and AP-5, as follows:[55]

Wells	Parameter	Units	7/7/23	10/26/23	2/22/24	4/25/24	5/13/24	6/12/24	7/26/24	8/12/24	Distribution	Proposed Background Value
AP-4	Arsenic, Total	ug/l	23.9	22.5	37.5	19.8	22.9	21.8	21.3	20.7	Non-Parametric – Propose Highest Detected Concentration as Prediction Limit/Background	37.50
AP-5	Arsenic, Total	ug/l	<1	<1	<1	<1	<1	<1	<1	<1		

[54] CWLP Ash Pond Groundwater Laboratory Reports 2010 to present. Bates 6.6
[55] CWLP (2024), Coal Combustion Residuals Surface Impoundment Operating and Construction Permit, Application Review Letter, Supplemental Response, dated October 30, 2024

Data from monitoring well AP-4, which is located downgradient of the Lakeside Ash Pond, shows total arsenic concentration ranging from 19.8 to 37.5 ug/l. The same document[56] provided porewater analyses from the Dallman and Lakeside Ash ponds. The total arsenic concentrations detected in Lakeside waste porewater ranged from 32.8 to 139 ug/l. This data clearly indicates that porewater contained in the Lakeside Ash Pond is an apparent source of arsenic that is impacting groundwater quality downgradient of the impoundment at AP-4. The data also show that unimpacted background groundwater quality from monitoring well AP-5 contains no reportable concentrations of arsenic. The new proposed background value (37.50 ug/l) is based on detections of high concentrations of arsenic only found in well AP-4 which is clearly located downgradient of a source of arsenic contamination.

Utilization of monitoring well AP-4 as a supposed "background" monitoring well has always been problematic. This supposedly "background" monitoring well is located on the Sugar Creek floodplain outside of the western berm and downgradient of the Lakeside Ash Pond. CWLP acknowledges that monitoring well AP-4 is:

> "not upgradient of the subject CCR impoundments in a hydrologic sense but is located on available CWLP property where it provides representative background groundwater quality, as allowed under 35 Ill. Adm. Code 845.630(a)."[57]

Westward flow of groundwater from the southeast corner of the property toward Sugar Creek indicates that monitoring well AP-4 is actually located downgradient of the Lakeside Ash Pond. That AP-4 is located hydraulically downgradient of the CWLP CCR impoundments was acknowledged in the 2021 Hydrogeologic and Monitoring Report.[58] The wells presence "on available CWLP property" in no way indicates that it is an appropriate background monitoring location. Inclusion of arsenic data from AP-4 in the background data creates an artificially high background value, designates what would appropriately be a downgradient well as a background well, and inappropriately masks exceedances of the Ground Water Protection Standard (GWPS) for arsenic in other downgradient locations. The data summary from the 2023 groundwater monitoring report (Attachment B) shows that, monitoring wells AP-3, AP-4, AP-7 and RW-3 would all have shown exceedances of the published Ground Water Protection Standard (0.01 ug/l) during 2023 had high arsenic concentration in AP-4 been appropriately treated as a downgradient well rather than as background.

Also problematic is the fact that the boring log for well AP-4 (Attachment C) shows that the borehole was advanced through approximately 10-feet of black fly ash. The presence of 10-feet of CCR outside of the Lakeside berm is a clear indication ash has been disposed of outside of the current footprint of the Lakeside Ash Pond and that the current footprint of the pond appears to

---

[56] CWLP (2024), Coal Combustion Residuals Surface Impoundment Operating and Construction Permit, Application Review Letter, Supplemental Response, dated October 30, 2024

[57] Andrews Engineering (2021b), Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures, October 2021, p. 12

[58] Andrews Engineering (2021b), p. 12

be smaller than the historical footprint of the pond.[59] The Closure Plan approved for implementation at the CWLP Coal Ash Ponds must address ash within the entire historical footprint of the pond and areas affected by releases of ash from the impoundment.[60]

Monitoring well AP-4 should never have been used to establish background groundwater quality. The inappropriate and unsupported identification of well AP-4 as a background location creates an artificially high background value and minimize the number of exceedances of groundwater protection standards. Data from AP-4 must be recognized as representing downgradient water quality. The result of this action would be to that another downgradient well (AP-4) would consistently show highly elevated arsenic adjacent to Sugar Creek and provide realistic background values for use in evaluating other downgradient monitoring points.

Proposed Closure Plan

CWLP continues to pursue closure of the Lakeside and Dallman Ash Ponds by capping the material in place. The most recent description of proposed construction[61] indicates that installation of the final cover system will include:

- Dewatering of the CCR as necessary to promote final grading of the CCR to establish a final slope to promote precipitation runoff of the final cover.
- Placement of a 40 mil low density polyethylene (LDPE) cover
- Placement of a geomembrane to promote lateral drainage on top of the LDPE
- Placement of a three-foot soil protective layer, or as otherwise approved
- Establishment of final vegetation on the protective layer
- Stormwater management structures

CWLP is currently proposing to perform no actions to control or remove groundwater contaminants that are known to be migrating from the ash ponds. They propose to dewater the CCR "as necessary" to establish a surficial crust capable of supporting the machinery needed to grade and construct the cap.[62] The Closure plan indicates that no corrective action for groundwater is needed since the overly simplistic and flawed groundwater contaminant transport model discussed above predicts that water quality standards will be achieved by capping the waste,[63] and that contamination has been retained on CWLP property, conveniently ignoring the probability of cross media transfer of contaminants from groundwater to surface water. Based on groundwater monitoring reports submitted by CWLP, ash-related contaminants have been

---

59 Hanson Engineers (1987), Engineering Report, Proposed Embankment Modifications, CWLP Ash Disposal Area, p. 17, contained in Attachment 2 of the Closure Construction Permit Application

60 35 Illinois Administrative Code 845.740(a)

61 Andrews Engineering (2022), Closure Construction Permit Application, February 2022

62 Andrews Engineering (2022), Closure Construction Permit Application, February 2022, p. 10

63 Andrews Engineering (2022), Closure Construction Permit Application, February 2022, p. 12

present in the groundwater that flows from the CWLP impoundments and into Sugar Creek for many years.

EPA has repeatedly stated that the performance standard requires the facility to take measures, such as engineering controls that will control, minimize, or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste as well as post-closure releases to groundwater from the sides and bottom of the unit.[64] Similarly, the Illinois CCR regulations require that a facility "Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters."[65] The proposed closure of the CWLP Dallman CCR impoundments leaving waste in contact with groundwater fails to meet these performance standards.

The Post-Closure Care Plan for the capped ash ponds[66] indicates that the owner will maintain the closed impoundments for a minimum of 30 years. Unfortunately, the location of the Lakeside and Dallman Ash Ponds immediately downstream of Spalding Dam and on the floodplain of Sugar Creek continue the need for cap maintenance far into the future and creating a long-term risk of catastrophic release of wastes.

Flood Damage Potential

In responses IEPA comments on the Operating and Construction Permit[67] CWLP repeatedly claimed that because the Dallman Ash Pond Berms and accumulated ash is now higher than predicted water elevation north of the site during the 100-year flood there should somehow be no concern about flood induced damage or release of waste. The berms around the Dallman impoundment are not however the locations in most jeopardy during severe flooding.

FEMA flood mapping (Attachment D) indicates that the elevation of the 100-year flood in Lake Springfield is 562 feet above msl. The FEMA map also shows that floodwaters are expected to overtop Spalding Dam and drop to an elevation of 547 feet above msl immediately below the dam. Water from Lake Springfield is shown to cross the dam and flow onto the Lakeside Ash Pond and the overlying Lime Ponds. Flood water flowing across the surface of the Lakeside Pond is correctly called inundation by floodwaters. Water that flows across the Lakeside Pond will rapidly drop down the side of the embankments to creek level. The force of floodwater flowing down the exterior embankment will create significant erosive potential.

We can also assume that the proposed cap is in place prior to the next major storm event. In that case, floodwater that crosses the dam would likely enter the planned drainage ditch that closure drawings show would be located along the south and west edges of the cap. The combined flow

[64] For example see: EPA (2022), Letter from USEPA to Duke Energy, January 11, 2022, p. 3

[65] 35 Illinois Administrative Code Section 845.750(a)(1)

[66] Andrews Engineering (2022), Post-Closure Care Plan for Coal Combustion Residuals Surface Impoundments, February 2022

[67] CWLP (2024), Coal Combustion Residuals Surface Impoundment Operating and Construction Permit Application Review Letter, September 9, 2024

of normal run-off from the cap and water flowing across the dam from Lake Springfield has the potential to cause significant erosion of the western berm of the Lakeside Ash Pond.

It is well established that storm-related flooding currently considered to have a 1% chance of occurrence in any particular year is becoming more frequent and of course, there are flood events that are more intense than 100-year events. The potential for significant impacts to CCR containment structures during significant flood events must be recognized when considering the proposed cap-in-place Closure. The proposed closure would essentially transform a temporary waste storage impoundment into a permanent waste disposal cell on the floodplain of Sugar Creek. Floodplains are unsuitable locations for waste disposal facilities, either closed or open.

Closure Alternatives

Many sites located across the country initially proposed to close their impoundments by capping the waste in place, even though waste would remain in contact with groundwater. As utilities have reluctantly realized that capping waste in contact with groundwater does not meet the EPA performance standard, CCR closures are now being planned using alternative methods. Some the alternative closure methods now being planned for use where waste is in contact with groundwater include:

Leachate Collection and Treatment

Installation and operation of leachate collection systems such as sumps or wells inside the impoundments could lower the leachate head within the impoundment and reduce the flux of contaminants out of the impoundments. Collection of leachate from within an ash impoundment has been proposed for implementation at the Gallagher Generating Station in Indiana.[68] At Gallagher a combination of capping the waste, construction of low conductivity cut-off walls, and pumping and treatment of leachate that enters the impoundment from below to maintain an inward gradient is being pursued.[69]

Leachate collection and treatment is not recommended for implementation at the CWLP Ash Ponds. Collecting leachate within the impoundments would only be useful if waste disposal units were allowed to be closed in place on the floodplain with waste in continual contact with groundwater (which is not recommended). Collection of leachate from the CWLP impoundments would have to continue indefinitely since the waste would remain in contact with groundwater. Active operation and maintenance of the leachate collection and water treatment systems would be necessary for as long as leachate continues to be generated. This option also does nothing to reduce the risk of catastrophic release of ash during flood events.

[68] ATC (2020), Response to Request for Additional Information & Addendum No. 5, Proposed Ash Pond Closure and Post-Closure Plans, June 3, 2020.

[69] Duke Energy (2024), Closure Plan, Gallagher Generating Station, Primary Pond, North Ash Pond, Primary Pond Ash Fill, April 22,2024

Collection and Treatment of Contaminated Groundwater

Installation and operation of groundwater collection wells or trenches installed through high permeability materials below or outside of the impoundments could potentially be used to capture contaminated groundwater. Applicability of this option would need to be carefully evaluated to determine its feasibility given the proximity of Sugar Creek, as well as to determine the number of wells, spacing of trenches, and/or pumping rates necessary to capture contaminants released from the leaking impoundments.

In practice, it has often been difficult to intercept or contain all of the contaminants in a plume using wells or trenches installed in alluvial sediments. The highly variable composition, orientation, and discontinuous nature of alluvial sediments can hinder the ability of wells and trenches to capture enough of the contaminated groundwater to halt plume migration. For example, at the Colstrip generating station in Montana efforts to control the spread of CCR-related contamination utilizing both capture wells and interceptor trenches have been utilized for over 20 years in an effort to stop the spread of multiple contaminant plumes. [70] [71] The location of facilities on alluvial bedrock and sediments with highly variable composition and thickness, has limited the effectiveness of these measures.[72] The inherent natural variability of alluvial sediments is acknowledged by a limitation in the Colstrip Assessment of Corrective Actions that states:

> "…results of assessments made based on hydrogeological and hydrogeochemical conditions consistent with those of the complex depositional environment and suite of inorganic constituents found at the Colstrip SES are subject to and limited by the high degree of natural variability."[73]

Installation and operation of groundwater collection wells or trenches installed below or outside of the CWLP impoundments is not recommended for the CWLP Ash Ponds. Collecting leachate within the impoundments may be useful when units are closed in place, but closing the CWLP units in place is not recommended since they are located on the Sugar Creek floodplain and waste is in contact with groundwater. There is very little distance between the edge of the impoundments and Sugar Creek in some locations[74] on the site. Wells or trenches placed between the impoundments and Sugar Creek could unintentionally capture significant amounts of water from Sugar Creek rather than impacted groundwater flowing from the leaking

---

[70] Limitations of using groundwater collection and treatment systems to control migration of contaminants through alluvial materials are illustrated by experiences at the Colstrip Generating Station in Montana

[71] Geo-Hydro, Inc. (2014), Litigation Support, Montana Environmental Information Center et.al. v. Montana Department of Environmental Quality, et. al,. 16th Jud. Dist. No. DV 12-42, p. 8, available at https://apiproxy.utc.wa.gov/cases/GetDocument?docID=49&year=2015&docketNumber=151500

[72] Geo-Hydro, Inc. (2014), Litigation Support, Montana Environmental Information Center et.al. v. Montana Department of Environmental Quality, et. al,. 16th Jud. Dist. No. DV 12-42, p. 11, available at https://apiproxy.utc.wa.gov/cases/GetDocument?docID=49&year=2015&docketNumber=151500

[73] Hydrometrics (2019), Assessment of Corrective Measures, Colstrip 3&4 EP CCR Units, April 2019

[74] Figure 1 and observations made during a site visit conducted on March 1, 2019 indicate that the distance from the outside of the impoundment berms to Sugar Creek are on the order of a few tens of feet in the vicinity of the clarification pond and the northwest corner of the Dallman Pond.

impoundments. Active operation and maintenance of the leachate collection and water treatment systems would be necessary for as long as leachate continues to be generated and migrating from the impoundments, a time period that may continue for many decades following the last placement of waste. Groundwater collection and treatment alone is not a final closure remedy and does not reduce the risk of damage or catastrophic release of ash. For all of these reasons, I do not recommend collection and treatment of groundwater for the closure remedy at the CWLP Ash Ponds.

Physical Barriers

Construction of physical barriers such as low permeability walls around the perimeter of the impoundments could restrict lateral flow of groundwater. As is the case for groundwater collection wells and trenches, construction of an effective low permeability barrier in alluvial sediments can be problematic. The effectiveness of these remedies is often dependent on construction quality, the ability to obtain a positive seal between the barrier and underlying low permeability unit, and the ability of underlying low permeability unit to prevent flow beneath the barrier. Low permeability barriers are being planned to cut-off lateral migration from the Primary pond at the Gallagher Generating Station in Indiana in an effort to both minimize inward flow toward leachate collection wells and to control the spread of contaminants. [75]

Installation of low permeability barriers is only part of a potential final closure remedy because it must be combined with other remedies meant to eliminate or control the formation of leachate within the impoundments. Installation of physical barriers is not recommended for the CWLP Ash Ponds since the waste would remain on the floodplain and remain at risk of release of ash during a major flood event.

Retrofit Impoundments

In an evaluation of compliance with CCR Rule surface impoundment location restrictions[76] prepared for CWLP, Andrews Engineering concluded that;

> "unlined ponds are placed directly above and within 5 feet of the high water table for the uppermost aquifer. Either it must be demonstrated that there will not be intermittent, recurring or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer, or cessation of disposal and closure must begin."[77]

It goes on to state that "Hydraulic separation can be shown by retrofitting the ponds. A composite liner consisting of a two-foot (minimum) low hydraulic conductivity (< 1.0×10^{-7} cm/sec) clayey material overlain by a minimum 30 mil geomembrane (or equivalent) will be adequate to demonstrate hydraulic separation."[78]

---

[75] Duke Energy (2024), Closure Plan, Gallagher Generating Station, Primary Pond, North Ash Pond, Primary Pond Ash Fill, April 22,2024

[76] Andrews Engineering (2018), p. 3

[77] Andrews Engineering (2018), p. 3

[78] Andrews Engineering, 2018, p. 3

Retrofitting the impoundments at the CWLP site to the specifications identified by Andrews would require that the waste that is currently located in the impoundments be removed so that a new composite liner system could be constructed. Low hydraulic conductivity clay soils would then be trucked to the impoundment, spread and compacted. Following placement of the low conductivity base material a synthetic liner system would be installed. Once completed, the retrofitted impoundments could again be utilized for waste disposal, if desired. The newly retrofitted impoundments would however remain potentially susceptible to damage or catastrophic release of wastes during flood events.

Retrofitting the impoundments is not recommended for implementation. While retrofitting the impoundments may have made operational and economic sense in the past, I know of no current need for waste storage capacity as coal ash is no longer being disposed in the impoundments. CWLP would incur the costs of removing existing wastes in preparation for retrofitting the impoundments with a liner system. Once the waste is removed from the current leaking impoundments, disposal should be at an appropriately located and constructed disposal facility.

In-Situ Stabilization

Chemically treating disposed wastes in-situ within the Lakeside and Dallman Ash ponds could be considered. In-situ stabilization (ISS) (a.k.a. encapsulation) is done by drilling closely spaced boreholes through the waste and mixing/injecting reagents (typically Portland cement and/or others) that site-specific testing shows is capable reducing hydraulic conductivity and/or leachability of the treated waste and/or soil.

This method is currently planned for implementation in discrete locations in the North Ash Basin at the Gibson Generating Station in Indiana.[79] The intent at Gibson is to perform ISS on soils and CCR in discrete locations on the impoundment bottom to increase strength and reduce the permeability of soil and CCR materials on the bottom of the impoundment that are or have the potential to be in contact with groundwater.

Although I have seen no indication that this alternative has been seriously considered, I recommend that ISS on disposed materials in the Lakeside and Dallman ponds be evaluated for its potential to reduce the hydraulic conductivity and leachability of disposed CCR. Laboratory and bench-scale testing with various treatment reagents would be needed to establish the feasibility of this option. In addition in reducing contaminant release, the increased strength of treated materials could also have the benefit of reducing potential for catastrophic releases during a major flood event.

Cap in Place

After years of detecting groundwater contamination in downgradient compliance monitoring wells[80] CWLP has proposed closing the Ash Ponds by capping the materials in place as the only

[79] Atlas Technical Consultants (2023), Closure Plan Revision, North Ash Basin System, Gibson Generating Station, March 7, 2023

[80] Andrews Engineering (2024), Annual Groundwater Monitoring and Corrective Action Report, January 2024, p.4

proposed remedy. Closure in place is proposed even though groundwater would continue to interact with the waste beneath the cap. This remedial option is only effective in locations where there is separation between the bottom of the waste and the groundwater, which is not the case at CWLP. Inflow of water through the bottom and sides of the Lakeside and Dallman ash impoundments will maintain leachate within the disposed CCR up to the elevation of the potentiometric surface measured in the Basal Sand.

Capping the CWLP Ash Ponds in place is an inappropriate remedy that I recommend be rejected for the CWLP Ash Pond closures for a variety of reasons, including:

- The CWLP impoundments are described as being "unlined ponds are placed directly above and within 5 feet of the high water table for the uppermost aquifer."[81]
- New information developed by CWLP in the past year shows that the bottoms of the impoundments are actually deeper than has previously been reported. The elevations of the bottom of the Lakeside and Dallman ponds are now known to be as deep as 530 and 524 feet, respectively.[82]
- The potentiometric surface elevation in the Basal Sand Unit beneath the Lakeside Ash Pond decreases from a high of 565 feet above msl beneath the southeast corner of the pond to approximately 540 feet above msl along the northern berm.[83] The potentiometric surface elevation beneath the Dallman Ash Pond is generally between 530 and 535 feet above msl.[84]
- Comparing the groundwater head within the basal sand to the new pond bottom data shows that we could expect 10 to 35 feet of saturated waste in the Lakeside impoundment, and 2 to 12 feet of saturated waste in the Dallman impoundment, even after the observed groundwater mounding has dissipated.
- Waste placed below the potentiometric surface will be continually saturated with groundwater even though the cap may function as planned.
- Contaminants mobilized from saturated CCR will continue to move downgradient from the impoundments toward discharge areas along and/or beneath Sugar Creek.

[81] Andrews Engineering, 2018, Evaluation of CCR Location Restrictions, contained in Attachment 6 to the CWLP Initial Operating Permit Application (Oct. 2021)

[82] CWLP (2024), Coal Combustion Residuals Surface Impoundment Operating and Construction Permit Application Review Letter, September 9, 2024, Response to Item 1.7.15

[83] Andrews Engineering (2021b), Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures, October 2021, Appendix C, contained in Attach. 11 to CWLP Initial Operating Permit Application (Oct. 2021)

[84] Andrews Engineering (2021b), Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures, October 2021, Appendix C, contained in Attach. 11 to CWLP Initial Operating Permit Application (Oct. 2021)

- The proposed cap-in-place remedy for the Lakeside and Dallman Ash Ponds does not meet the Illinois performance standard for CCR closures[85] which requires the facility to take measures, such as engineering controls that will control, minimize, or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste as well as post-closure releases to groundwater from the sides and bottom of the unit.
- Capping waste in place would also leave the units susceptible to damage or releases during flood events.

Excavation and Beneficial Reuse

Excavation and beneficial reuse of the waste stored in the Dallman impoundment is a final closure option that should be carefully evaluated when the site is closed. Beneficial reuse of some of the coal combustion wastes that are currently being produced and disposed in the CWLP impoundments has occurred in the past and continues to occur. In fact, William Antonacci indicated in his deposition that most of the ash contained in the Dallman Ash Pond was taken for beneficial use in rebuilding a highway interchange as recently as 2008 or 2009. [86] It is currently unclear if an appropriate use for all of the waste stored in the CWLP impoundments could readily be found, however it is clear that beneficial reuse opportunities are occasionally available. Excavation and disposal in an appropriately located and constructed disposal facility could be pursued to supplement beneficial reuse opportunities.

Benefits of excavation and beneficial reuse include: eliminate the source of groundwater and surface water contaminants, eliminate the risk of a catastrophic release to the environment in the event of flooding, elimination of at least 30 years of site monitoring and maintenance costs, and elimination potential liabilities of disposing of waste in another disposal facility. Excavation and beneficial reuse could be periodically supplemented with excavation and disposal when reuse opportunities are not available. For all of these reasons excavation and beneficial reuse of the CCR in the CWLP impoundments should be considered the most appropriate closure method.

Excavation and Disposal

Excavation and disposal of CCR in a properly lined, permitted landfill that meets all regulatory requirements and doesn't create further environmental liability is recommended as an appropriate and effective closure alternative. Disposal of excavated ash in a new or existing landfill capable of minimizing contact between ash and water, and containing ash contaminants would: eliminate the source of groundwater and surface water contaminants, eliminate the risk of a catastrophic release to the environment in the event of flooding, and eliminate at least 30 years of site monitoring and maintenance costs.

Utilities across the country have chosen to implement excavation and removal of waste as a technically effective and economically reasonable closure method. This method is most often used in locations, such as at the CWLP Ash Ponds, where there is inadequate separation between

---

[85] 35 Ill. Admin. Code Section 845.750(a)(1)
[86] See page 47 of transcript of William Antonacci deposition dated January 16, 2016.

the bottom of the impoundments and groundwater, or where disposal areas are located near surface water bodies. Identification of 100 different units where excavation and removal of waste was selected as the appropriate closure method is provided in Table 1.

I recommend that excavation and disposal of the CWLP waste in an appropriately located and constructed disposal facility be implemented as an alternative, or as a supplement, to excavation and beneficial reuse. In the event that beneficial ruse opportunities are not continuously available, excavation and disposal could occur between beneficial reuse opportunities. Excavation and disposal or excavation and beneficial reuse are the only closure options that remove ash from the Sugar Creek floodplain and remove the sources of known sources of groundwater contaminants from the environment.

Summary
Closing the impoundments by capping them in place would likely reduce infiltration into the waste from above, but waste located at or below the potentiometric surface will continue to release contaminants. Closed-in-place impoundments would also be susceptible to damage or release of wastes during flood events. For all of the reasons discussed in this report I recommend that capping the waste in place on the Sugar Creek floodplain be rejected as a final closure remedy

Other remedial options may reduce contaminant concentrations to some extent for as long as one or more systems are operated and maintained. The overarching problem with this site would however remain. The CWLP impoundments were constructed in a location that is very poorly suited to waste disposal facilities. Because they are located immediately adjacent to Sugar Creek and in regular contact with groundwater, there are few that will be effective at containing the CCR waste and controlling the release of contaminants into the environment. The CWLP ash is currently contained in:

- impoundments that have been inadequately designed and constructed,
- impoundments known to be releasing ash-related contaminants to groundwater in concentrations well above Illinois Class I Groundwater Quality Standards,
- impoundments with bottoms located at or below the water table, and
- impoundments located on the Sugar Creek 100-year floodplain.

For these reasons I see no responsible choices other than to recommend that the wastes either be excavated and beneficially reused or disposed in a properly located and constructed disposal facility.

Concluding Remarks

This report sets forth my opinions and the information upon which I relied in forming those opinions. I recommend that the Illinois pollution Control Board require that the groundwater monitoring system at the CWLP ash ponds be updated to address the inappropriate inclusion of an impact downgradient well in the monitoring system and direct that closure of the impoundments be done in a manner that will meet the EPA Performance Standard for CCR site closures. I reserve the right to supplement this report and/or my opinions as new or additional information is brought to light in the future.

Mark A. Hutson, P.G.
Illinois Licensed Professional Geologist No. 196.001465

LICENSED PROFESSIONAL GEOLOGIST
Mark
A.
Hutson
196.001465
ILLINOIS

Table 1

Units Closed by Removal of CCR

Table 1[1]

Units Closed by Removal of CCR

Name of Plant or Site	CCR Unit	Operator	CCR Website	State	City	Closure Status	Closure Method
AES Somerset LLC	Sludge Stabilization Basin	Somerset Operating Company, LLC	https://scoc1.weebly.com/	NY	Barker	Closed	Removal
Asheville Steam Electric Plant	1982 Ash Basin	Duke Energy	https://www.duke-energy.com/our-company/environment/compliance-and-reporting/ccr-rule-compliance-data	NC	Arden	Closed, no certification	Removal
Big Bend Power Station	Economizer Ash and Pyrite Pond System	TECO Energy	https://www.tampaelectric.com/communityresponsibility/environment/ccr-compliance/	FL	Apollo Beach	Closed	Removal
Big Bend Power Station	West Slag Disposal Pond	TECO Energy	https://www.tampaelectric.com/communityresponsibility/environment/ccr-compliance/	FL	Apollo Beach	Closed	Removal
Big Sandy Plant	Bottom Ash Pond	American Electric Power, Kentucky Power Co.	https://www.aep.com/about/codeofconduct/CCRRule/	KY	Louisa	Closed	Removal
Big Stone Plant	Slag Pond Area	Otter Tail Power Company	http://www.ccr-bsp.net/	SD	Big Stone City	Closed	Removal
Black Dog Plant	Inactive Ash Pond 1	Xcel Energy	https://corporate.my.xcelenergy.com/s/energy/sources/coal/coal-ash-management	MN	Burnsville	Closed	Removal
Black Dog Plant	Inactive Ash Pond 2	Xcel Energy	https://corporate.my.xcelenergy.com/s/energy/sources/coal/coal-ash-management	MN	Burnsville	Closed	Removal

[1] Contents of Table 1 updated on October 15, 2022, data obtained from https://earthjustice.org/coalash/data-2022

Name of Plant or Site	CCR Unit	Operator	CCR Website	State	City	Closure Status	Closure Method
Black Dog Plant	Inactive Ash Pond 3	Xcel Energy	https://corporate.my.xcelenergy.com/s/energy/sources/coal/coal-ash-management	MN	Burnsville	Closed	Removal
Boswell Energy Center	Old Bottom Ash Surface Impoundment	Minnesota Power	http://mp-ccr.azurewebsites.net/Boswell	MN	Cohasset	Closed	Removal
Brayton Point Power Station	Basin A	Brayton Point LLC	http://www.cdcco.com/ccr/brayton-point/	MA	Somerset	Closed	Removal
Brayton Point Power Station	Basin B	Brayton Point LLC	http://www.cdcco.com/ccr/brayton-point/	MA	Somerset	Closed	Removal
Brayton Point Power Station	Basin C	Brayton Point LLC	http://www.cdcco.com/ccr/brayton-point/	MA	Somerset	Closed	Removal
Bremo Power Station	East Ash Pond, Inactive	Dominion Energy	https://www.dominionenergy.com/projects-and-facilities/electric-projects/coal-ash/ccr-rule-compliance-data-and-information	VA	Bremo Bluff	Closed, no certification	Removal
Bremo Power Station	West Ash Pond, Inactive	Dominion Energy	https://www.dominionenergy.com/projects-and-facilities/electric-projects/coal-ash/ccr-rule-compliance-data-and-information	VA	Bremo Bluff	Closed, no certification	Removal
Cherokee Station	Center Ash Pond	Xcel Energy	https://corporate.my.xcelenergy.com/s/energy/sources/coal/coal-ash-management	CO	Denver	Closed, no certification	Removal
Cherokee Station	Cooling Tower Retention Pond	Xcel Energy	https://corporate.my.xcelenergy.com/s/energy/sources/coal/coal-ash-management	CO	Denver	Closed, no certification	Removal
Cherokee Station	East Ash Pond	Xcel Energy	https://corporate.my.xcelenergy.com/s/energy/sources/coal/coal-ash-management	CO	Denver	Closed, no certification	Removal
Cherokee Station	West Ash Pond	Xcel Energy	https://corporate.my.xcelenergy.com/s/energy/sources/coal/coal-ash-management	CO	Denver	Closed, no certification	Removal

Name of Plant or Site	CCR Unit	Operator	CCR Website	State	City	Closure Status	Closure Method
Cheswick Generating Station	Bottom Ash Emergency Pond	GenOn	https://www.genon.com/ccr-rule-compliance	PA	Cheswick	Closed	Removal
Cheswick Generating Station	Bottom Ash Recycle Pond	GenOn	https://www.genon.com/ccr-rule-compliance	PA	Cheswick	Closed	Removal
Columbia Municipal Power Plant	More's Lake Surface Impoundment	City of Columbia	https://www.como.gov/utilities/coal-combustion/	MO	Columbia	Closed	Removal
Coyote Station	Slag Pond	Otter Tail Power Company	http://www.ccr-cs.net/	ND	Beulah	Closed	Removal
Coyote Station	Sluice Outfall	Otter Tail Power Company	http://www.ccr-cs.net/	ND	Beulah	Closed	Removal
Coyote Station	Nelsen Pond	Otter Tail Power Company	http://www.ccr-cs.net/	ND	Beulah	Closed	Removal
Cross Generating Station	Gypsum Pond	Santee Cooper	https://www.santeecooper.com/About/CCR-Data-Rule/Cross/Index.aspx	SC	Cross	Closed	Removal
Crystal River Energy Complex	Backup FGD Blowdown Treatment Pond	Duke Energy	https://www.duke-energy.com/our-company/environment/compliance-and-reporting/ccr-rule-compliance-data	FL	Crystal River	Closed	Removal
Crystal River Energy Complex	Primary FGD Blowdown Treatment Pond	Duke Energy	https://www.duke-energy.com/our-company/environment/compliance-and-reporting/ccr-rule-compliance-data	FL	Crystal River	Closed	Removal
Dan River Steam Station	Secondary Ash Basin	Duke Energy	https://www.duke-energy.com/our-company/environment/compliance-and-reporting/ccr-rule-compliance-data	NC	Eden	Closed	Removal

Name of Plant or Site	CCR Unit	Operator	CCR Website	State	City	Closure Status	Closure Method
East Bend Electric Plant	Ash Basin	Duke Energy	https://www.duke-energy.com/our-company/environment/compliance-and-reporting/ccr-rule-compliance-data	KY	Union	Closed	Removal
Fox Lake Generating Station	Inactive Surface Impoundment	Interstate Power and Light Company	http://ccr.alliantenergy.com/FoxLake/index.htm	MN	Sherburn	Closed	Removal
Gallagher Generating Station	Secondary Settling Pond	Duke Energy	https://www.duke-energy.com/our-company/environment/compliance-and-reporting/ccr-rule-compliance-data	IN	New Albany	Closed, no certification	Removal
Ghent Generating Station	Reclaim Pond/Gypsum Stack Surge Pond	Kentucky Utilities Company	https://lge-ku.com/CCR/GH	KY	Ghent	Closed	Removal
Gibson Generating Station	East Settling Basin	Duke Energy	https://www.duke-energy.com/our-company/environment/compliance-and-reporting/ccr-rule-compliance-data	IN	Owensville	Closed	Removal
Gibson Generating Station	South Settling Basin	Duke Energy	https://www.duke-energy.com/our-company/environment/compliance-and-reporting/ccr-rule-compliance-data	IN	Owensville	Closed	Removal
Hennepin Power Station	Hennepin Old West Polishing Pond	Luminant (formerly Dynegy Inc.)	http://www.luminant.com/ccr	IL	Hennepin	Closed	Removal
Hudson Generating Station	Bottom Ash Pond	HRP Hudson, LLC (formerly PSEG Power LLC)	https://www.hilcoredev.com/former-hudson-generating-station	NJ	Jersey City	Closed, no certification	Removal
Hudson Generating Station	North Fly Ash Pond	HRP Hudson, LLC (formerly PSEG Power LLC)	https://www.hilcoredev.com/former-hudson-generating-station	NJ	Jersey City	Closed, no certification	Removal

Name of Plant or Site	CCR Unit	Operator	CCR Website	State	City	Closure Status	Closure Method
Hudson Generating Station	South Fly Ash Pond	HRP Hudson, LLC (formerly PSEG Power LLC)	https://www.hilcoredev.com/former-hudson-generating-station	NJ	Jersey City	Closed, no certification	Removal
James DeYoung Power Plant	Ash Pond 1	Holland Board of Public Works	https://hollandbpw.com/en/about-us/publications	MI	Holland	Closed	Removal
James DeYoung Power Plant	Ash Pond 2	Holland Board of Public Works	https://hollandbpw.com/en/about-us/publications	MI	Holland	Closed	Removal
James DeYoung Power Plant	Ash Pond 3	Holland Board of Public Works	https://hollandbpw.com/en/about-us/publications	MI	Holland	Closed	Removal
James River Power Station	East Pond	City Utilities of Springfield	https://www.cityutilities.net/corporate/legal/ccr/	MO	Springfield	Closed	Removal
James River Power Station	West Pond	City Utilities of Springfield	https://www.cityutilities.net/corporate/legal/ccr/	MO	Springfield	Closed	Removal
JB Sims Power Generation Plant	Unit 3 Ash Ponds East (A) and West (B)	Grand Haven Board of Light and Power	https://ghblp.org/environmental-compliance-reports/coal-combustion-residuals-compliance/	MI	Grand Haven	Closed, no certification	Removal
JC Weadock Power Plant	Bottom Ash Pond	Consumers Energy Co.	https://www.consumersenergy.com/community/sustainability/environment/waste-management/coal-combustion-residuals	MI	Essexville	Closed, no certification	Removal
JH Campbell Power Plant	Unit 3 North & 3 South	Consumers Energy Co.	https://www.consumersenergy.com/community/sustainability/environment/waste-management/coal-combustion-residuals	MI	West Olive	Closed, no certification	Removal
JH Campbell Power Plant	Units 1-2 North and 1-2 South	Consumers Energy Co.	https://www.consumersenergy.com/community/sustainability/environment/waste-management/coal-combustion-residuals	MI	West Olive	Closed, no certification	Removal

Name of Plant or Site	CCR Unit	Operator	CCR Website	State	City	Closure Status	Closure Method
John Twitty Energy Center	East Pond	City Utilities of Springfield	https://www.cityutilities.net/corporate/legal/ccr/	MO	Springfield	Closed	Removal
John Twitty Energy Center	West Pond	City Utilities of Springfield	https://www.cityutilities.net/corporate/legal/ccr/	MO	Springfield	Closed	Removal
L.V. Sutton Energy Complex	1971 Ash Basin	Duke Energy	https://www.duke-energy.com/our-company/environment/compliance-and-reporting/ccr-rule-compliance-data	NC	Wilmington	Closed, no certification	Removal
L.V. Sutton Energy Complex	1984 Ash Basin	Duke Energy	https://www.duke-energy.com/our-company/environment/compliance-and-reporting/ccr-rule-compliance-data	NC	Wilmington	Closed, no certification	Removal
La Cygne Generating Station	Bottom Ash Impoundment	Evergy	https://www.evergy.com/ccr	KS	La Cygne	Closed	Removal
Lawrence Energy Center	Area 2 Pond	Evergy	https://www.evergy.com/ccr	KS	Lawrence	Closed, no certification	Removal
Lawrence Energy Center	Area 3 Pond	Evergy	https://www.evergy.com/ccr	KS	Lawrence	Closed, no certification	Removal
Lawrence Energy Center	Area 4 Pond	Evergy	https://www.evergy.com/ccr	KS	Lawrence	Closed, no certification	Removal
Limestone Electric Generating Station	Secondary E Pond Unit (Unit 003)	NRG	http://www.nrg.com/legal/coal-combustion-residuals/	TX	Jewett	Closed	Removal
Mayo Steam Electric Plant	FGD Forward Flush Pond	Duke Energy	https://www.duke-energy.com/our-company/environment/compliance-and-reporting/ccr-rule-compliance-data	NC	Roxboro	Closed	Removal

Name of Plant or Site	CCR Unit	Operator	CCR Website	State	City	Closure Status	Closure Method
Mayo Steam Electric Plant	FGD Settling Pond	Duke Energy	https://www.duke-energy.com/our-company/environment/compliance-and-reporting/ccr-rule-compliance-data	NC	Roxboro	Closed	Removal
Mercer Generating Station	North Fly Ash Pond	HRP Mercer, LLC (formerly PSEG Power LLC)	https://www.hilcoredev.com/former-mercer-generating-station	NJ	Hamilton Township	Closed, no certification	Removal
Mercer Generating Station	South Fly Ash Pond	HRP Mercer, LLC (formerly PSEG Power LLC)	https://www.hilcoredev.com/former-mercer-generating-station	NJ	Hamilton Township	Closed, no certification	Removal
Mill Creek Generating Station	Dead Storage Pond	Louisville Gas & Electric Company	https://lge-ku.com/CCR/MC	KY	Louisville	Closed	Removal
Mill Creek Generating Station	Clearwell Pond	Louisville Gas & Electric Company	https://lge-ku.com/CCR/MC	KY	Louisville	Closed	Removal
Mill Creek Generating Station	Construction Runoff Pond	Louisville Gas & Electric Company	https://lge-ku.com/CCR/MC	KY	Louisville	Closed	Removal
Mill Creek Generating Station	Emergency Pond	Louisville Gas & Electric Company	https://lge-ku.com/CCR/MC	KY	Louisville	Closed	Removal
Montrose Generating Station	North Ash Impoundment	Evergy	https://www.evergy.com/ccr	MO	Clinton	Closed	Removal
Montrose Generating Station	South Ash Impoundment	Evergy	https://www.evergy.com/ccr	MO	Clinton	Closed	Removal

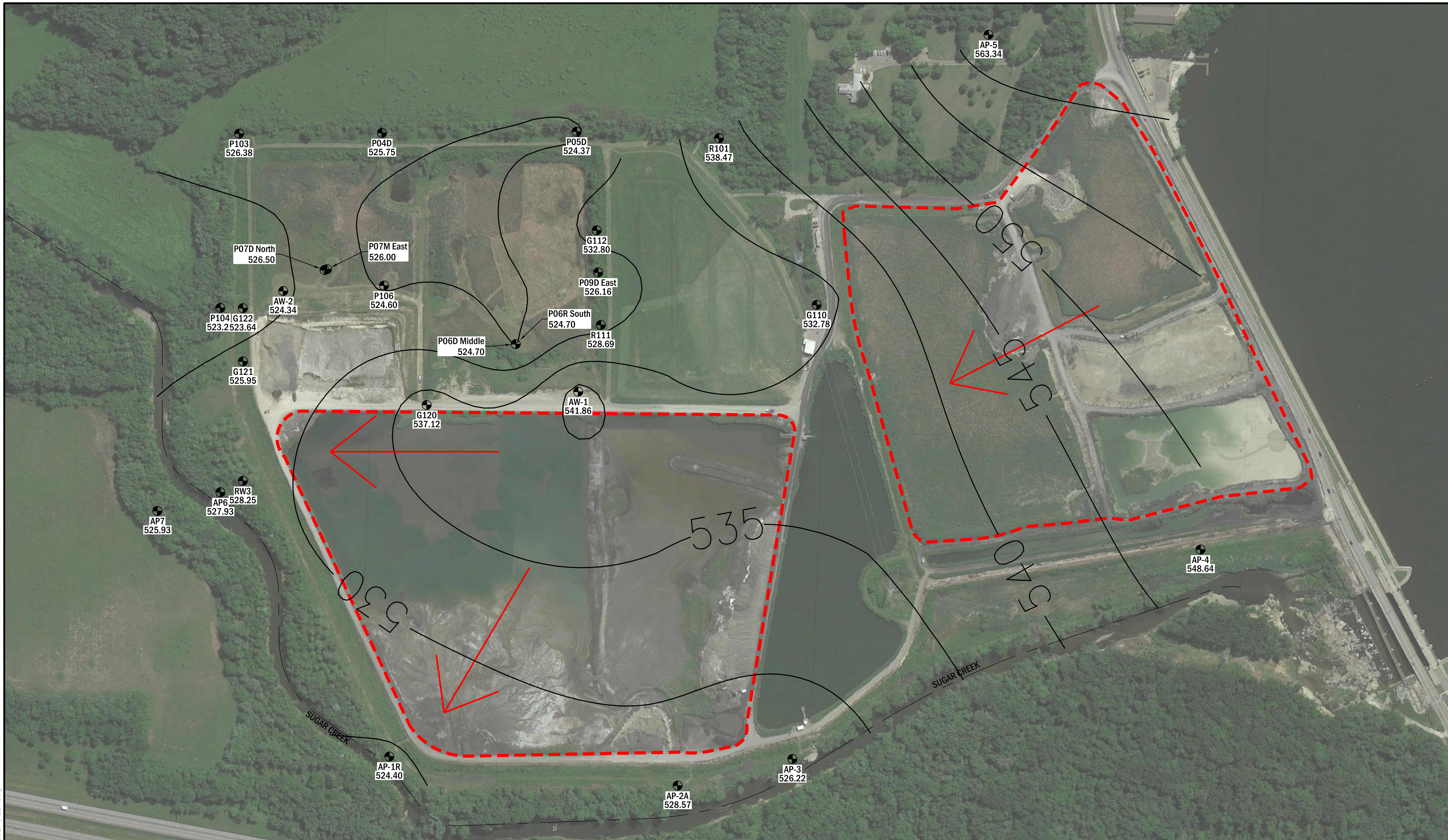
Name of Plant or Site	CCR Unit	Operator	CCR Website	State	City	Closure Status	Closure Method
Muskogee Generating Station	Emergency Ash Basin	OG&E Energy Corp.	https://www.oge.com/wps/portal/ord-hidden/coal-combustion	OK	Fort Gibson	Closed, no certification	Removal
Neal North Energy Center	Impoundment 1 N & S	MidAmerican Energy Co.	https://berkshirehathawayenergyco.com/ccr/mec.html	IA	Sergeant Bluff	Closed, no certification	Removal
Neal North Energy Center	Impoundment 2	MidAmerican Energy Co.	https://berkshirehathawayenergyco.com/ccr/mec.html	IA	Sergeant Bluff	Closed, no certification	Removal
Neal North Energy Center	Impoundment 3A	MidAmerican Energy Co.	https://berkshirehathawayenergyco.com/ccr/mec.html	IA	Sergeant Bluff	Closed, no certification	Removal
Nearman Creek Power Station	Bottom Ash Pond	Kansas City Board of Public Utilities	https://www.bpu.com/ccr-surface-impoundment-groundwater-monitoring.aspx	KS	Kansas	Closed	Removal
Nelson Dewey Station	WPDES Pond	Wisconsin Power & Light Co.	https://ccr.alliantenergy.com/NelsonDewey?utm_source=WS&utm_campaign=NelsonDewey/index.htm	WI	Cassville	Closed	Removal
New Castle Generating Station	North Ash Pond	GenOn	https://www.genon.com/ccr-rule-compliance	PA	West Pittsburg	Closed	Removal
New Madrid Power Plant	Pond 004	Associated Electric Coop.	https://www.aeci.org/responsible/ccr/	MO	New Madrid	Closed	Removal
Pawnee Station	Ash Water Recovery Pond	Xcel Energy	https://corporate.my.xcelenergy.com/s/energy/sources/coal/coal-ash-management	CO	Brush	Closed, no certification	Removal
Pawnee Station	Bottom Ash Storage Pond	Xcel Energy	https://corporate.my.xcelenergy.com/s/energy/sources/coal/coal-ash-management	CO	Brush	Closed, no certification	Removal
Plant Jack McDonough	Ash Pond 2	Georgia Power Company	https://www.georgiapower.com/company/environmental-compliance/ccr-rule-compliance-data/ccr-rule-compliance-plant-list.html	GA	Smyrna	Closed, no certification	Removal

Name of Plant or Site	CCR Unit	Operator	CCR Website	State	City	Closure Status	Closure Method
Plant McManus	AP-1, inactive	Georgia Power Company	https://www.georgiapower.com/company/environmental-compliance/ccr-rule-compliance-data/ccr-rule-compliance-plant-list.html	GA	Brunswick	Closed, no certification	Removal
Plant Yates	Ash Pond 1	Georgia Power Company	https://www.georgiapower.com/company/environmental-compliance/ccr-rule-compliance-data/ccr-rule-compliance-plant-list.html	GA	Newman	Closed, no certification	Removal
Plant Yates	Ash Pond A	Georgia Power Company	https://www.georgiapower.com/company/environmental-compliance/ccr-rule-compliance-data/ccr-rule-compliance-plant-list.html	GA	Newman	Closed, no certification	Removal
Possum Point Power Station	Pond A	Dominion Energy	https://www.dominionenergy.com/projects-and-facilities/electric-projects/coal-ash/ccr-rule-compliance-data-and-information	VA	Dumfries	Closed	Removal
Possum Point Power Station	Pond B	Dominion Energy	https://www.dominionenergy.com/projects-and-facilities/electric-projects/coal-ash/ccr-rule-compliance-data-and-information	VA	Dumfries	Closed	Removal
Possum Point Power Station	Pond C	Dominion Energy	https://www.dominionenergy.com/projects-and-facilities/electric-projects/coal-ash/ccr-rule-compliance-data-and-information	VA	Dumfries	Closed	Removal
Possum Point Power Station	Pond E	Dominion Energy	https://www.dominionenergy.com/projects-and-facilities/electric-projects/coal-ash/ccr-rule-compliance-data-and-information	VA	Dumfries	Closed	Removal
R.D. Morrow, Sr. Generating Station	Emergency Scrubber Surge Pond	Cooperative Energy	https://cooperativeenergy.com/energy-resources/ccr-documentation/	MS	Purvis	Closed	Removal
R.D. Morrow, Sr. Generating Station	Scrubber Supply Pond	Cooperative Energy	https://cooperativeenergy.com/energy-resources/ccr-documentation/	MS	Purvis	Closed	Removal
Reid Gardner Generating Station	SI B-2	NV Energy	http://www.berkshirehathawayenergyco.com/ccr/nve.html	NV	Moapa	Closed	Removal

Name of Plant or Site	CCR Unit	Operator	CCR Website	State	City	Closure Status	Closure Method
Reid Gardner Generating Station	SI B-3	NV Energy	http://www.berkshirehathawayenergyco.com/ccr/nve.html	NV	Moapa	Closed	Removal
Reid Gardner Generating Station	SI E-1	NV Energy	http://www.berkshirehathawayenergyco.com/ccr/nve.html	NV	Moapa	Closed	Removal
Reid Gardner Generating Station	SI B-1	NV Energy	http://www.berkshirehathawayenergyco.com/ccr/nve.html	NV	Moapa	Closed	Removal
Sibley Generating Station	Slag Settling Impoundment	Evergy	https://www.evergy.com/ccr	MO	Sibley	Closed	Removal
St. Clair Power Plant	Scrubber Impoundment	DTE Electric Co.	https://www.dteenergy.com/us/en/residential/community-and-news/environment/Coal-Combustion-Residual-Rule-Compliance-Data-and-Information.html	MI	East China Twp	Closed	Removal
Tecumseh Energy Center	Bottom Ash Settling Pond	Evergy	https://www.evergy.com/ccr	KS	Tecumseh	Closed	Removal
Thomas Hill Energy Center	Cell 2 West	Associated Electric Coop.	https://www.aeci.org/responsible/ccr/	MO	Clifton Hill	Closed	Removal
Valmont Station	CCR Impoundment 3A	Xcel Energy	https://corporate.my.xcelenergy.com/s/energy/sources/coal/coal-ash-management	CO	Boulder	Closed, no certification	Removal
Valmont Station	CCR Impoundment 3B	Xcel Energy	https://corporate.my.xcelenergy.com/s/energy/sources/coal/coal-ash-management	CO	Boulder	Closed, no certification	Removal
Valmont Station	EPRI Ash Settling Pond	Xcel Energy	https://corporate.my.xcelenergy.com/s/energy/sources/coal/coal-ash-management	CO	Boulder	Closed, no certification	Removal
Wateree Generating Station	Ash Pond	Dominion Energy	https://www.dominionenergy.com/projects-and-facilities/electric-projects/coal-ash/ccr-rule-compliance-data-and-information	SC	Eastover	Closed, no certification	Removal

Name of Plant or Site	CCR Unit	Operator	CCR Website	State	City	Closure Status	Closure Method
Winyah Generating Station	Slurry Pond 2	Santee Cooper	https://www.santeecooper.com/About/CCR-Data-Rule/Winyah/Index.aspx	SC	Georgetown	Closed, no certification	Removal

Attachment A
2021 Potentiometric Surface Maps



LEGEND

MONITORING WELL LOCATION

CCR SURFACE IMPOUNDMENT

GROUNDWATER FLOW DIRECTION

NOTES

1. SAMPLING DATE: 1/22/2021
2. CONTOUR INTERVAL = 5 FEET
3. IMAGE SOURCE: GOOGLE EARTH PRO, IMAGE DATE MAY 15, 2012
4. ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM (1988).

N

0 150 300 600

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING

3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: BJH DESIGNED BY: MTH DRAWN BY: BCK

POTENTIOMETRIC SURFACE MAP
1ST QUARTER 2021

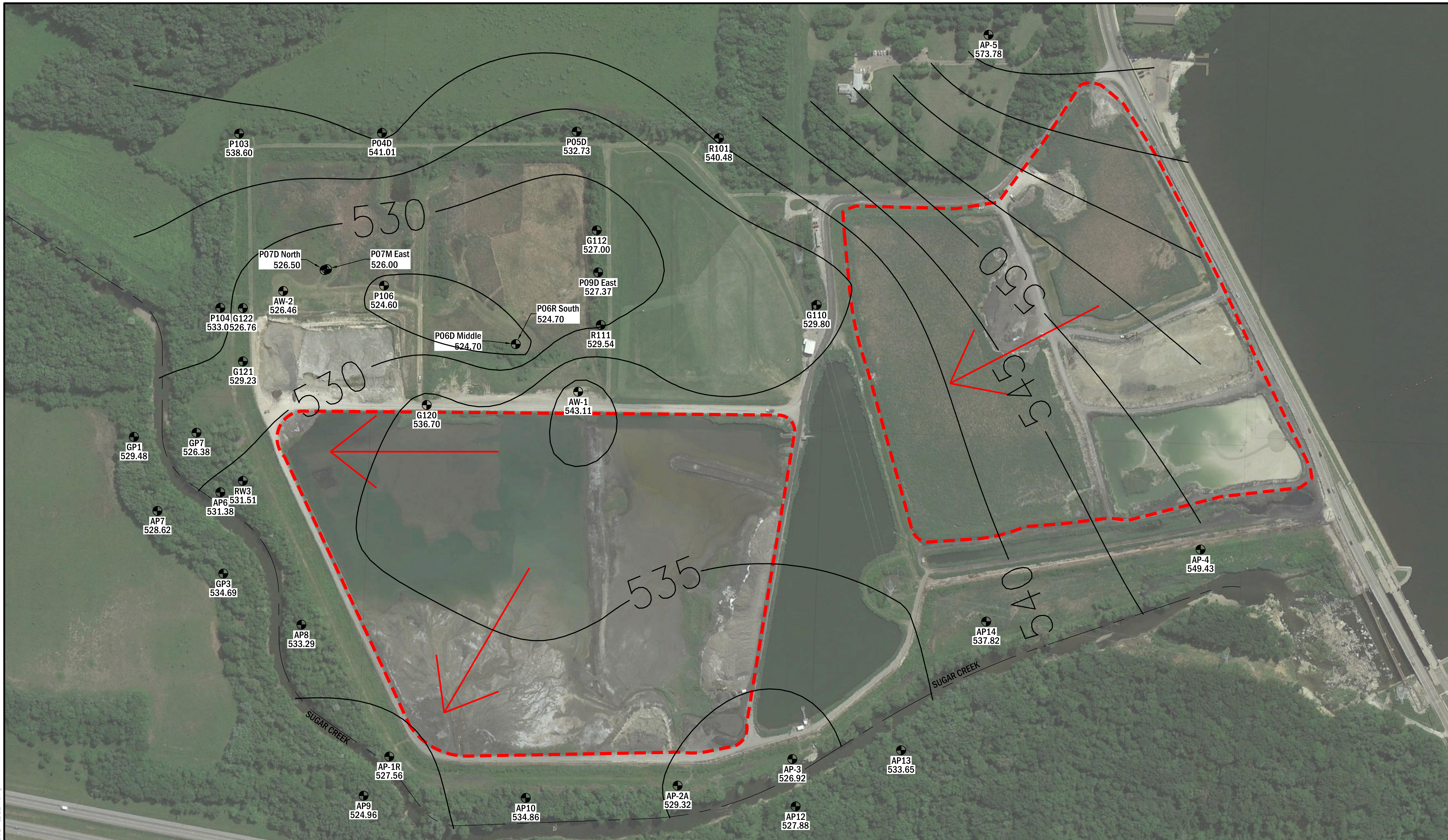
PLANS PREPARED FOR
CITY, WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: OCTOBER 2021

PROJECT ID: 150077/0021

SHEET NUMBER:

1Q21



LEGEND

- MONITORING WELL LOCATION
- CCR SURFACE IMPOUNDMENT
- GROUNDWATER FLOW DIRECTION

NOTES

1. SAMPLING DATE: 5/27/2021
2. CONTOUR INTERVAL = 5 FEET
3. IMAGE SOURCE: GOOGLE EARTH PRO, IMAGE DATE MAY 15, 2012
4. ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM (1988).

N

0 150 300 600

SCALE: IN FEET

NO. | DATE | REVISION DESCRIPTION | BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: BJH DESIGNED BY: MTH DRAWN BY: BCK

POTENTIOMETRIC SURFACE MAP
2ND QUARTER 2021

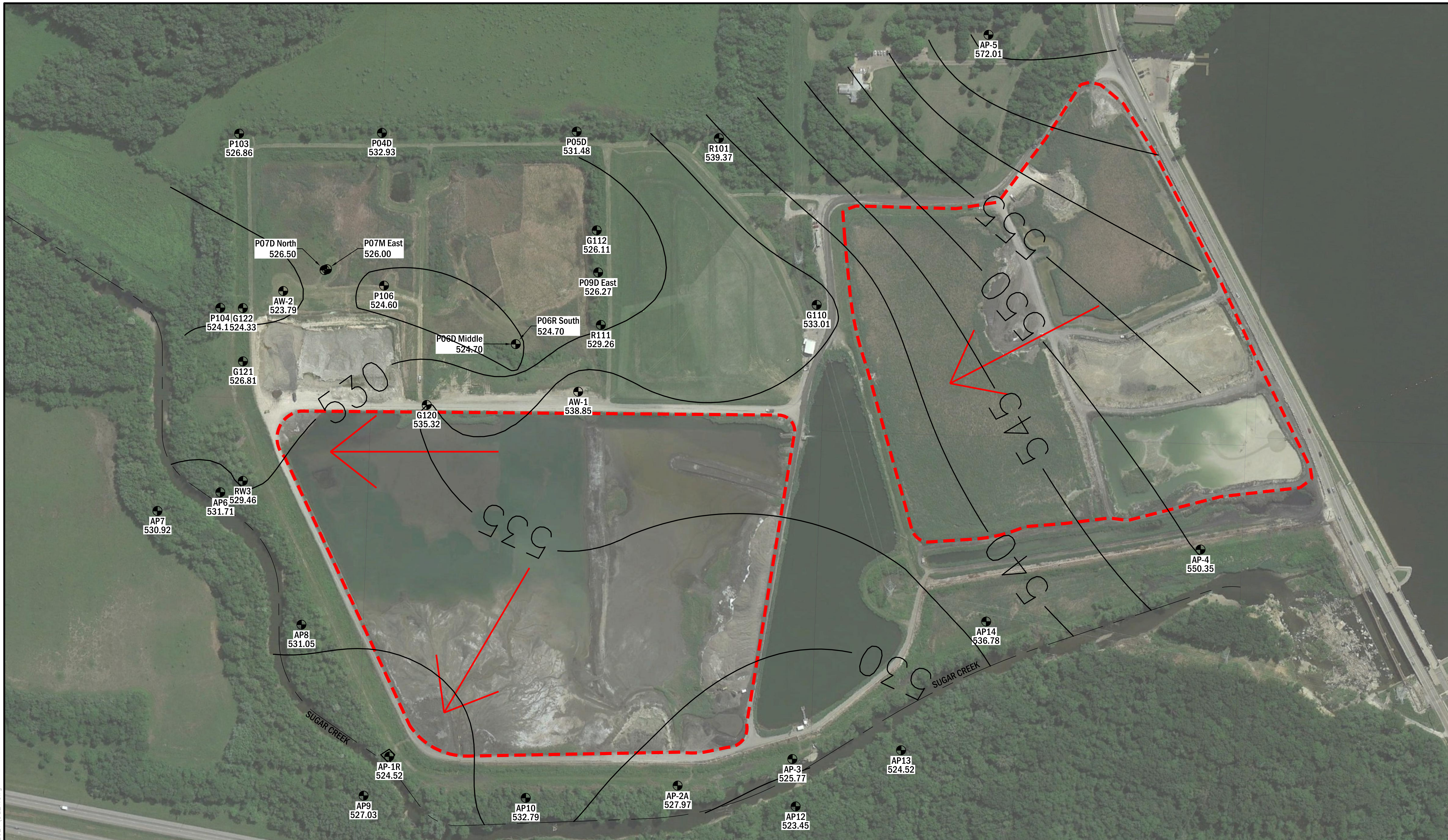
PLANS PREPARED FOR
CITY, WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: OCTOBER 2021

PROJECT ID: 150077/0021

SHEET NUMBER:

2Q21



LEGEND

- MONITORING WELL LOCATION
- CCR SURFACE IMPOUNDMENT
- GROUNDWATER FLOW DIRECTION

NOTES

1. SAMPLING DATE: 8/25/2021
2. CONTOUR INTERVAL = 5 FEET
3. IMAGE SOURCE: GOOGLE EARTH PRO, IMAGE DATE MAY 15, 2012
4. ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM (1988).

N

0 150 300 600

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: BJH DESIGNED BY: MTH DRAWN BY: BCK

POTENTIOMETRIC SURFACE MAP
3RD QUARTER 2021

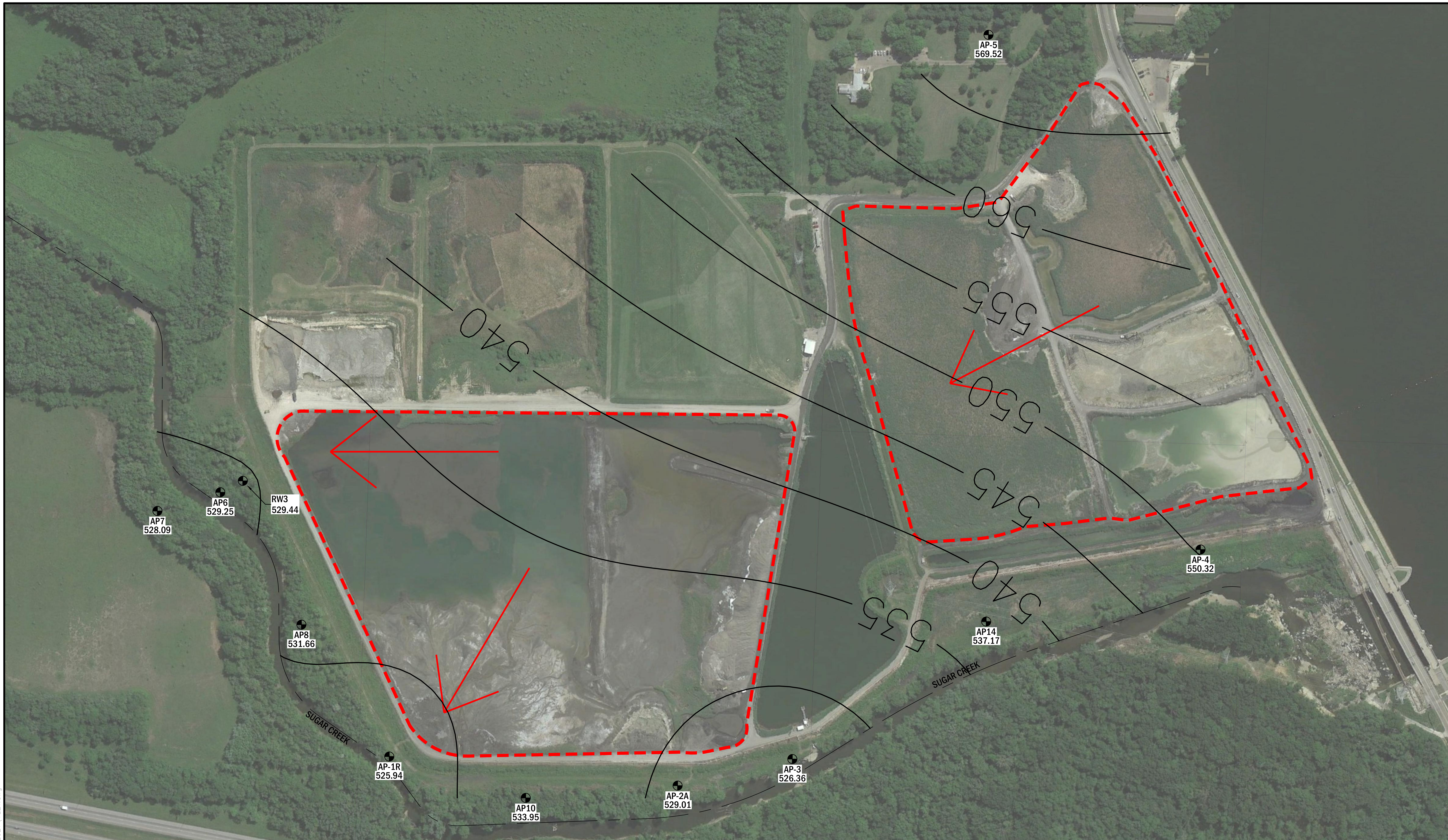
PLANS PREPARED FOR
CITY, WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: OCTOBER 2021

PROJECT ID: 150077/0021

SHEET NUMBER:

3Q21



LEGEND

- MONITORING WELL LOCATION
- CCR SURFACE IMPOUNDMENT
- GROUNDWATER FLOW DIRECTION

NOTES

1. SAMPLING DATE: 10/21/2021
2. CONTOUR INTERVAL = 5 FEET
3. IMAGE SOURCE: GOOGLE EARTH PRO, IMAGE DATE MAY 15, 2012
4. ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM (1988).

N

0 150 300 600

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: BJH DESIGNED BY: MTH DRAWN BY: BCK

POTENTIOMETRIC SURFACE MAP
4TH QUARTER 2021

PLANS PREPARED FOR
CITY, WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: OCTOBER 2021

PROJECT ID: 150077/0021

SHEET NUMBER:

4Q21

Attachment B
2022 Monitoring Data Summary

City Water, Light and Power
Power Plant Ash Impoundment
2023 Groundwater Analytical Summary Data

Well	Parameter	Units	MCL[1]	Published GWPS[2]	Site-Specific Background	Final GWPS	2023-Q1 Jan 26-27, 2023	2023-Q2 Apr 11-17, 2023	2023-Q3 Jul 6-7, 2023	2023-Q4 Oct 25-26, 2023
AP-7	Sulfate, total	mg/L	na	na	55.5	55.5	16		20	
RW-3	Sulfate, total	mg/L	na	na	55.5	55.5	< 10		22	
AP-1	Total Dissolved Solids	mg/L	na	na	609	609	1520	1540	1190	1360
AP-2	Total Dissolved Solids	mg/L	na	na	609	609	1180	1100	1600	1020
AP-3	Total Dissolved Solids	mg/L	na	na	609	609	1040	984	990	1080
AP-4	Total Dissolved Solids	mg/L	na	na	609	609	515		560	
AP-5	Total Dissolved Solids	mg/L	na	na	609	609	374		400	
AP-6	Total Dissolved Solids	mg/L	na	na	609	609	322		268	
AP-7	Total Dissolved Solids	mg/L	na	na	609	609	328		300	
RW-3	Total Dissolved Solids	mg/L	na	na	609	609	420		290	
Appendix IV										
AP-1	Antimony, total	mg/L	na	0.006	0.001	0.006	< 0.001		< 0.001	
AP-2	Antimony, total	mg/L	na	0.006	0.001	0.006	< 0.001		< 0.001	
AP-3	Antimony, total	mg/L	na	0.006	0.001	0.006	< 0.001		< 0.001	
AP-4	Antimony, total	mg/L	na	0.006	0.001	0.006	< 0.001		< 0.001	
AP-5	Antimony, total	mg/L	na	0.006	0.001	0.006	< 0.001		< 0.001	
AP-6	Antimony, total	mg/L	na	0.006	0.001	0.006	< 0.001		< 0.001	
AP-7	Antimony, total	mg/L	na	0.006	0.001	0.006	< 0.001		< 0.001	
RW-3	Antimony, total	mg/L	na	0.006	0.001	0.006	< 0.001		< 0.001	
AP-1	Arsenic, total	mg/L	na	0.01	0.0266	0.0266	< 0.025		< 0.001	
AP-2	Arsenic, total	mg/L	na	0.01	0.0266	0.0266	< 0.025		0.002	
AP-3	Arsenic, total	mg/L	na	0.01	0.0266	0.0266	< 0.025		0.0109	
AP-4	Arsenic, total	mg/L	na	0.01	0.0266	0.0266	< 0.025		0.0239	
AP-5	Arsenic, total	mg/L	na	0.01	0.0266	0.0266	< 0.025		< 0.001	
AP-6	Arsenic, total	mg/L	na	0.01	0.0266	0.0266	< 0.025		0.004	
AP-7	Arsenic, total	mg/L	na	0.01	0.0266	0.0266	< 0.025		0.0412	0.075
RW-3	Arsenic, total	mg/L	na	0.01	0.0266	0.0266	0.169	0.185	0.0831	0.74
AP-1	Barium, total	mg/L	na	2	0.519	2	0.236		0.271	
AP-2	Barium, total	mg/L	na	2	0.519	2	0.0744		0.0719	
AP-3	Barium, total	mg/L	na	2	0.519	2	0.111		0.0993	
AP-4	Barium, total	mg/L	na	2	0.519	2	0.39		0.396	
AP-5	Barium, total	mg/L	na	2	0.519	2	0.0408		0.0461	
AP-6	Barium, total	mg/L	na	2	0.519	2	0.0938		0.0844	
AP-7	Barium, total	mg/L	na	2	0.519	2	0.111		0.106	
RW-3	Barium, total	mg/L	na	2	0.519	2	0.168		0.106	
AP-1	Beryllium, total	mg/L	na	0.004	0.0025	0.004	< 0.0005		< 0.0005	
AP-2	Beryllium, total	mg/L	na	0.004	0.0025	0.004	< 0.0005		< 0.0005	
AP-3	Beryllium, total	mg/L	na	0.004	0.0025	0.004	< 0.0005		< 0.0005	
AP-4	Beryllium, total	mg/L	na	0.004	0.0025	0.004	< 0.0005		< 0.0005	
AP-5	Beryllium, total	mg/L	na	0.004	0.0025	0.004	< 0.0005		< 0.0005	

Attachment C
AP-4 Boring Log

Professional Service Industries, Inc.
480 North Street
Springfield, Illinois 62704
Telephone: 217/544-6663
Fax: 217/544-6143

LOG OF BORING AP-4

PSI Job No.: 0020522
Project: Piezometer Installation
Location: CWLP Ash Pond, East Lake Shore Drive, Springfield, Illinois

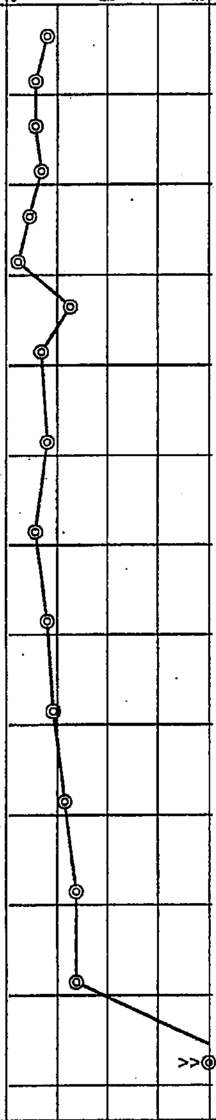
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon
Hammer Type: CME Automatic; ETR = 86%
Boring Location: See attached boring location plan.

WATER LEVELS	
While Drilling	11 feet
Upon Completion	N/A
Delay	N/A

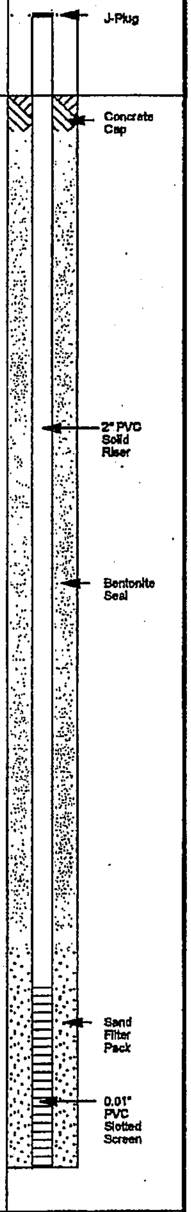
Station: N/A
Offset: N/A

Depth (feet)	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)
0				Brown silty CLAY, some brown sand, firm to stiff, slightly moist (FILL)	CL	
	Split-Spoon	1	17			4-4-3 N_{60}=10
				Brown silty CLAY, trace roots, firm to stiff, moist (FILL)	CL	
5	Split-Spoon	2	18			4-3-2 N_{60}=7
	Split-Spoon	3	10	Brown SILT, trace gray, firm to stiff, moist (FILL)	ML	6-3-2 N_{60}=7
10	Split-Spoon	4	12	5" Brown SAND transitioning to Black FLY ASH at 9.4', stiff to very stiff, slightly moist (FILL)	SAND/FLY ASH	2-2-4 N_{60}=9
	Split-Spoon	5	18			2-2-2 N_{60}=6
15	Split-Spoon	6	16			2-1-1 N_{60}=3
	Split-Spoon	7	16			6-6-5 N_{60}=16
				Black FLY ASH, some fine sub-round gravel, stiff to very stiff, moist to saturated (FILL)	FLY ASH	
20	Split-Spoon	8	18			3-3-3 N_{60}=9
				Gray/green (organic?) CLAY, stiff, trace fine sand, moist to saturated	CL	
25	Split-Spoon	9	1			3-3-4 N_{60}=10
30	Split-Spoon	10	18	Brown/gray silty CLAY, fiorm to stiff, saturated	CL	2-2-3 N_{60}=7
35	Split-Spoon	11	18	Gray SILT, stiff to very stiff, saturated	ML	3-3-4 N_{60}=10
40	Split-Spoon	12	18			4-4-4 N_{60}=11
45	Split-Spoon	13	18			4-4-6 N_{60}=14
50	Split-Spoon	14	18			4-5-7 N_{60}=17
				Gray fine to coarse SAND, medium dense, saturated	SW	
55	Split-Spoon	15	18			5-5-7 N_{60}=17
				Gray SHALE, hard, moist	CL	
		16	1			50/1"
60				Boring terminated at -60'		

STANDARD PENETRATION TEST DATA — N in blows/ft; Moisture; PL; LL (0, 25, 50). STRENGTH, tsf — Qu; Qp (0, 2.0, 4.0)



Well Diagram



Completion Depth: 60.0 ft
Date Boring Started: 4/20/10
Date Boring Completed: 4/20/10
Logged By: Rob Preuss
Drilling Contractor: PSI, Inc.

Sample Types: Auger Cutting; Split-Spoon; Rock Core; Shelby Tube; Hand Auger; Texas Cone

Latitude:
Longitude:
Drill Rig: ATV D50
Remarks: N_{60} denotes the normalization to 60% efficiency as described in ASTM D4633. Moistures determined by visual methods.

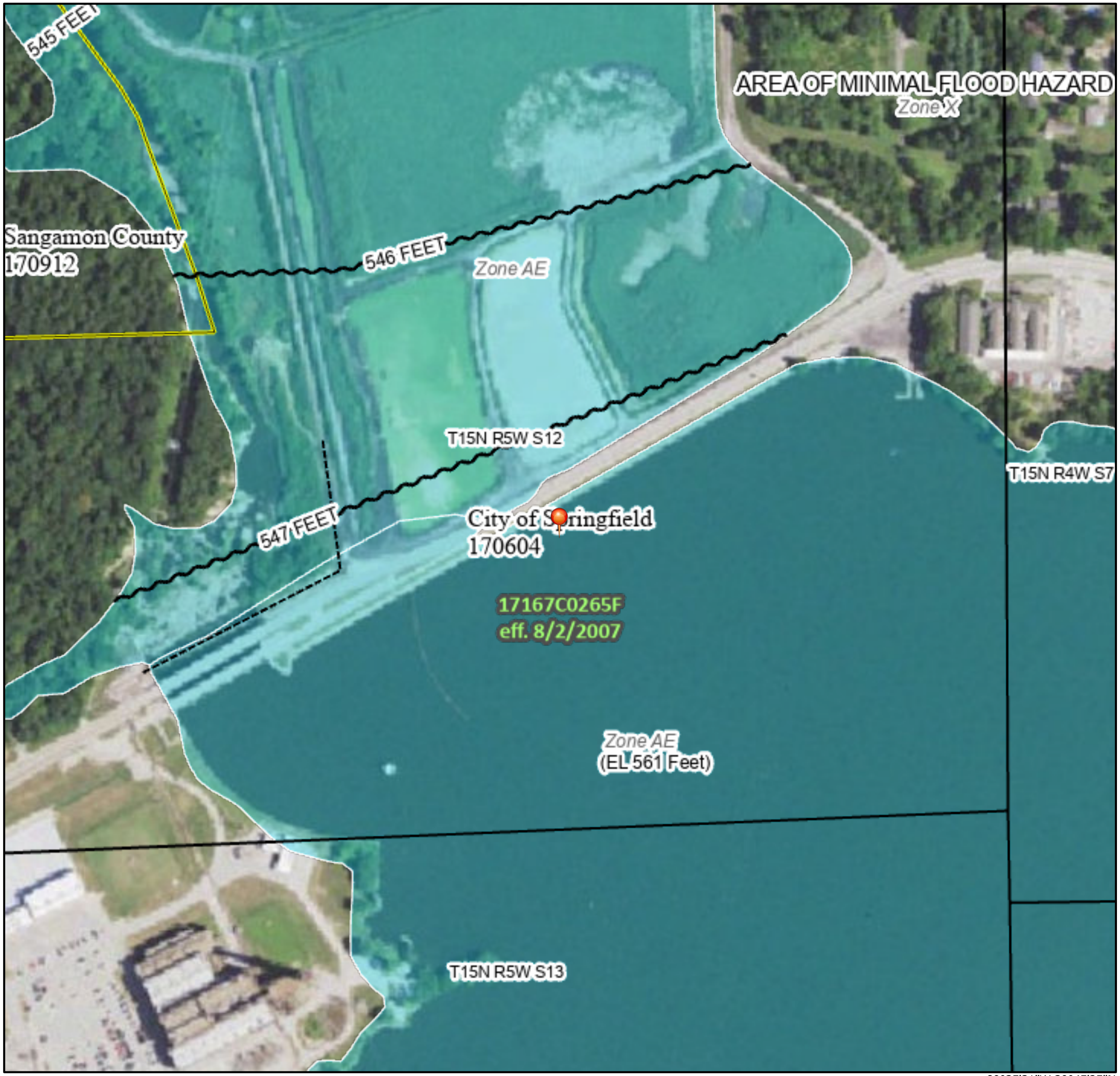
The stratification lines represent approximate boundaries. The transition may be gradual.

Attachment D
FEMA Flood Map

National Flood Hazard Layer FIRMette

FEMA

89°36'8"W 39°45'52"N



89°35'31"W 39°45'25"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/17/2024 at 4:39 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix
Resume of Mark A. Hutson, P.G.

Mark A. Hutson, P.G.

Summary of Qualifications

Over 40 years professional experience performing and managing site characterization, RI/FS's, RFI's, and soil and/or groundwater remediation projects. Management experience includes all aspects of projects for industrial, governmental, and non-profit clients. I have provided technical review, comments, and oversight on preparation of numerous permit applications and a wide array of projects.

Professional Experience

Geo-Hydro, Inc., 2006-Present, Principal/Senior Scientist

Weston Solutions, Inc., 2002-2006, Senior Project Manager/Business Line Operations Manager

Ellis Environmental Group, LLC, 2001-2002, Senior Project Manager

Foothill Engineering Consultants, 1997-2001, Senior Project Manager

Burns & McDonnell Waste Consultants, Inc., 1996-1997, Senior Project Manager

Hydro-Search, Inc., 1990-1996, Senior Project Manager/Operations Manager

Roy F. Weston, Inc., 1984-1990, Senior Geologist/ Project Manager

University of Illinois at Chicago, 1982-1984, Teaching Assistant

Ecology and Environment, Inc., 1980-1982, Hydrogeologist

Illinois Environmental Protection Agency, 1978-1980, Environmental Protection Specialist

Professional Registrations, Memberships, and Affiliation

Professional Geologist - Georgia (No. PG-002341), Illinois (196.001465), Indiana (No. 754), Kansas (No. 709), Wisconsin (No. 889)

Colorado Ground Water Association - (Past-President 2015-2016), President 2014-2015, Vice President 2013-2014, Education Committee Chair, 2011-2020)

Education

M.S., Geology, University of Illinois at Chicago, 1989

B.S., Geology, Northern Illinois University, 1978

Graduate Studies in Business, Northern Illinois University, 1979-81

Various courses on computer software and geographic information systems

Select Project Experience
Technical Oversight and Consulting

- Consultant engaged by client to review documents and provide support to the community surrounding the Valmont Generating Plant in Boulder, CO. Documents reviewed included but is not limited to, facility construction history, monitoring system design and implementation reports, hydrogeologic reports, permit applications and regulatory comments and permitting/closure documents.

- Consultant engaged by client to review and provide technical comments on documents prepared and submitted by several generating facilities. Generating facilities reviewed included Michigan City Generating Station, Baily Generating Station, Four Corners Power Plant, Cardinal Generating Station, H.L. Spurlock Power Station. Documents reviewed included but is not limited to, facility construction history, monitoring system design and implementation reports, hydrogeologic reports, permit applications and regulatory comments and permitting documents.

- Consultant tasked with reviewing and preparing comments on several CCR disposal units at generating facilities in Georgia and Alabama. Sites reviewed included Plants Hammond, McDonough, Scherer, Wansley, and Yates in Georgia. Alabama sites reviewed included Plant Barry, Gaston, and Gorgas. Reviewed documentation required by the 2015 CCR rule, prepared comments, and in some cases presented findings to regulators and others interested parties.

- Consultant retained to review and provide comments on the proposed Twin Pines titanium mine in Georgia. The mine is proposed for construction on Trail Ridge, a sandy dune feature that restricts flow to the east from the Okefenokee Swamp. Presented findings and discussed likely environmental impacts of the proposed mine at meetings with state and federal regulators.

- Consultant retained by client to review documents and prepare technical comments on several CCR disposal sites in Indiana including the Gibson, Wabash, Harding Street, and Eagle Valley Generating Stations. Documents reviewed included but is not limited to, facility construction history, monitoring system design and implementation reports, hydrogeologic reports, permit applications and regulatory comments and permitting/closure documents.

- Consultant retained by client to review documents and prepare an Expert Report on conditions at the Springfield CWLP CCR disposal ponds in Illinois. Participated in a site inspection and review documents including, but is not limited to, facility construction history, monitoring system design and implementation reports, hydrogeologic reports, permit applications and regulatory comments and permitting/closure documents.

- Consultant tasked with reviewing and summarizing water quality data from 66 Coal Combustion Residual sites to gain insight into the nature and magnitude of the documented impacts that CCR units have on groundwater quality. Results were submitted to EPA by my client during the public comment period on proposed revisions to the 2015 Coal Combustion Residual Rules.

- Consultant tasked with reviewing and providing my Expert Opinions on EPA's proposed revisions to the 2015 Coal Combustion Residual rules. Opinions were submitted to EPA by my client during the public comment period.

- Consultant tasked with reviewing and providing comments on Site Assessment Plans, Comprehensive Site Assessments, and Corrective Action Plans for coal ash impoundments at the Mayo, Roxboro, and Belews Creek Generating Stations in North Carolina. Coal ash impoundments at each of these sites were constructed in stream valleys and resulted in burying perennial streams below sluiced ash.

- Consultant for the Western Environmental Law Center initially tasked with reviewing and providing comments on the mine permit application for the Bull Mountains Mine, Montana. I was subsequently asked to provide testimony about concerns over inadequate evaluation of potential impacts to springs and seeps as well as water supplies on surrounding properties.

- Consultant tasked with reviewing closure plan information and monitoring reports from the Santee Cooper Grainger Generating Station ash pond closure. The site is located near Conway, SC. Documents were reviewed to evaluate the effectiveness of the proposed closure plan and comments were provided to counsel for use in negotiations with the company.

- Technical Consultant tasked with reviewing and preparing comments on the Draft Environmental Impact Statement for the Four Corners Power Plant and Navajo Mine Energy Project in New Mexico. Reviewed documentation from Office of Surface Mining Reclamation and Enforcement sources and prepared comments covering the effects of current and previous mining and coal ash disposal practices and identifying proposed activities likely to adversely impact environmental quality.

- Consultant providing support to counsel by reviewing and providing comments on Groundwater Assessment Work Plans and Drinking Water Supply Well and Receptor Surveys at 14 coal ash disposal facilities located in the southeast. The document reviews were conducted in order to evaluate the appropriateness of proposed characterization, make recommendations to improve characterization, and identify any sites that showed a particularly high risk to off-site receptors.

- Consultant tasked with reviewing and preparing comments on the 2012 reports covering the Plant Area, Stage One and Stage Two Evaporation Ponds Area, and Units 3 & 4 Evaporation Holding Ponds Area of the Colstrip Steam Electric Station located at Colstrip, MT. Reviewed documents and prepared comments and talking points that were submitted subsequently submitted to regulators.

- Consultant on the Pines Groundwater Plume Site through a USEPA Technical Assistance Program grant from PRPs to local citizens' group. The Pines site is a coal combustion waste landfill with significant spread of contaminants. Provide assistance to the citizens through grant to provide assessment and feedback on site work products as they are developed and implemented, explain the remediation processes and activities to the citizens, and serve as technical liaison between citizens and remediation team.

- Technical Consultant tasked by with reviewing a variety of documents and monitoring data from the Rosebud Mine located near Colstrip, MT. Document and data reviews included groundwater monitoring data, MPDES permits and discharge monitoring reports, and permit renewal documents. In each case, documentation and data were reviewed and comments were prepared and submitted to counsel.

- Technical Consultant providing support at the Massachusetts Military Reservation (MMR) on Cape Cod, MA. Under contract to the Corps of Engineers, provided third-party technical support services for the Selectmen of four towns surrounding MMR from 1998 thru 2011. The project involved oversight of impact area characterization and remediation activities including UXO location and disposal, and characterization of explosive impacted soil and groundwater, volatile organics, and perchlorate. Provided technical review of remediation data as well as comments and advice to the Selectmen on technical issues.

- Environmental Consultant to the City of Afton, MN to review and provide comments on an application to develop a coal combustion waste landfill on the site of a former sand and gravel mining operation. On behalf of the City of Afton, GHI reviewed the available materials, identified data gaps and potential concerns, and submitted detailed comments on the plan. Major concerns included the susceptibility of the local water supply to contamination from the facility, the unacceptable geologic characteristics of the site for construction of a waste disposal facility, poor characterization of wastes to be placed in the facility, improper modeling of the site conducted in support of the EIS, and the location of many potential receptors downgradient of the facility.

- Project Manager and Consultant tasked with reviewing and providing technical comments on the Faulkner, Westland and Brandywine coal combustion waste disposal facilities in rural Maryland. Provided comments on the adequacy of characterization of the nature and extent of contaminants released from these facilities. Subsequently supported the legal team in negotiating the details of necessary actions to be taken during closure of these facilities to protect human health and the environment.

- Consultant tasked with reviewing and preparing comments on a permit amendment application for the Savage Mine located in eastern Montana. Comments submitted to counsel primarily concerned the adequacy of the site characterization, the hydrologic balance and probable hydrologic consequences of proposed application.

- Project Manager and Consultant on the review and preparation of technical comments on an application by a major utility to develop an unlined coal combustion waste (CCW) disposal facility in western Kansas. Major issues included the leachability of CCW in the landfill environment, inadequacy of the proposed groundwater monitoring plan and the lack of necessary groundwater protection systems in the design. Comments were provided to counsel for inclusion in the public review process.

- Environmental Consultant tasked with reviewing and preparing comments on a permit application for a proposed lignite mine located near South Heart, North Dakota. Comments submitted to counsel included identification of inadequacies in the site characterization, the monitoring plan, the Probable Hydrologic Consequences, and the evaluation of potential alluvial valley floors. Comments were submitted to counsel.

- Project Manager and Consultant for Robinson Township and Environmental Integrity Project on a review of a permit application submitted to the State of Pennsylvania to mine coal refuse, generate electricity and dispose of coal combustion waste at the location of a large coal refuse pile. Services included permit application review and preparation of comments. Review identified deficiencies in the characterization of geologic materials, groundwater, surface water, and the hydrologic balance provided in the permit application.

- Geologist on a geologic and hydrogeologic assessment of a proposed regional landfill in Kendall County, Il. Research documented problems with the geologic and hydrogeologic characterization, including karst features in the area that had not been noted or anticipated in the permit application materials.

Site Characterization and Remediation

- Lead author on a Groundwater Impact Assessment at a coal combustion waste disposal facility in Illinois. This project was conducted to assist an electric generating station investigate the nature and extent of contaminants that had been released to the groundwater and to investigate remedial options necessary to minimize future releases. Results of this study are currently being implemented by the company and are projected to adequately contain contamination and avoid exposures to surrounding residents.

- PCP Contaminated Soil Remediation, Beaver Wood Products, Columbia Falls, MT, Project Manager. Manager of a project to investigate, excavate and bio-remediate PCP impacted soils at a former pole treatment site. Soil treatment was conducted via an on-site Land Treatment Unit (LTU). At the time of project completion over 20,000 cubic yards of impacted soil had been excavated, treated, and returned to the site. Responsible for project planning and execution, budget and schedule tracking, and cost control.

- Project Manager of a project to remediate and remove an oil interceptor pond containing PCB-contaminated sediment at a generating facility in North Dakota. Oily sludge in the pond contained PCB's in sufficient concentrations to require special handling and disposal. Responsible for all aspects of the project including evaluating remedial action alternatives, preparing construction plans, representing the client with regulatory agencies, and implementation of the approved site closure. Fly ash was added as a stabilizing agent to stabilize the sediment within the pond. Stabilized and characterized sediment was shipped to a permitted TSCA facility for disposal.

- Remediation of hydrocarbon contaminated soils at natural gas collection and pumping Stations, KN Energy, Project Manager. The project consisted of identification of areas of visually impacted soils, excavation of soils to visually clean, screening soils with field instrumentation, collecting verification samples for laboratory analysis, directing contaminated soil excavation, and replacing excavated soil with clean backfill. Impacted soil was transported to pre-existing landfarm areas for treatment by the client.

- Project Manager and Principal Investigator on a mixed waste treatability study performed for Kerr-McGee Corporation to investigate methods of making radiologically impacted hydrocarbon sludge acceptable for disposal without increasing the total volume. The project included characterization of the physical, chemical, and radiologic composition of the available waste materials, and evaluating the feasibility of combining wastes to produce an acceptable material. Pilot scale testing was conducted on the most promising materials to identify the proportions necessary to produce an optimum mixture.

- Project Manager on a groundwater remedial design project at a Phillips Petroleum facility in Beatrice, Nebraska. Project tasks included a general site characterization, geophysical surveys, soil borings and chemical analysis, pump testing, and design of ground water remediation system. Remedial technologies selected utilized air stripping and carbon absorption.

- Project Geologist involved in the installation of a petroleum hydrocarbon recovery system at the Hess Oil refinery on St. Croix US Virgin Islands. Activities included daily coordination with refinery personnel and drilling contractors, logging and installing recovery wells, and performing recovery tests on completed installations.

- Project Manager of a program to investigate, design and construct ground water remediation systems at three Chevron facilities in Puerto Rico. Project included ground water characterization, pump testing and conceptual and detailed designs of remediation systems. Systems were constructed, operated for a period of approximately 2 years and have now been removed.

- Prepared Detailed Plans and Specifications for construction and operation of a land treatment unit to remove hydrocarbon and volatile organics from soil in North Dakota, Project Manager. Managed a team of people involved in preparation of a complete design and specifications package for construction and operation of a land treatment unit to treat soils impacted with petroleum hydrocarbon and chlorinated solvents. This project was completed on schedule, has been built and was successfully completed.

- Project Manager and author of a revised and updated Site Decommissioning Plan for the Kerr-McGee facility in Cushing, OK. Plan preparation included summarizing site conditions, establishing clean-up criteria, specifying remedial actions for each of 16 radioactive materials areas (RMAs) including measurement and sorting of materials, and planning final survey procedures. The scope of the remediation was negotiated with Nuclear Regulatory Commission headquarters and regional personnel as the document was being drafted to attempt to minimize the time for subsequent review and approval.

- Project Manager of a multi-million dollar U.S. Army program to identify and properly abandon wells located on Rocky Mountain Arsenal (RMA) that could possibly be conduits for downward migration of contamination. This work was conducted in accordance with an Administrative Order ceasing remedial activities at RMA. Over 350 wells were identified and abandoned under this program.

- Project Manager on the characterization of Bombing Target 5 for the Pueblo of Laguna, NM. Portions of the Laguna Pueblo were used during WWII as a bombing practice area. The project consisted of preparation of detailed UXO planning documents, surface clearance of the area around the target, and excavation of the target to a depth of 5-feet below the surface. Material found to potentially present and explosive hazard were collected on-site and detonated on-site at the end of the project. The Pueblo of Laguna and the Corps of Engineers approved all procedures and field activities.

- Multi-phase AFCEE Soil And Groundwater Investigation And Monitoring Program at the Former Bergstrom Air Force Base in Austin, Texas, Project Manager. Investigation areas included an oil-water separator at an engine test facility, a former maintenance facility, and the base landfills. Soils were contaminated with heavy metals including lead and solvents. Contaminated soils were excavated and disposed at an off-site facility. Closure reports for all three areas were submitted and approved by TNRCC.

- Project Manager on a contract to the Department of Energy to perform a surface clearance for UXO at three former bombing targets at the Tonopah Test Site in Nevada. Materials encountered included practice bombs and rockets that had been fired several decades ago. UXO technicians inspected each piece of material for potential explosive hazards. Materials that potentially contained explosive hazards were blown-in-place by Tonopah personnel. Scrap material was secured on-site and disposed appropriately at the end of the project.

- Project Manager for the investigation of subsurface contamination at several high priority solid waste management units at Rocky Flats Plant. Work included identification and characterization of surface and subsurface soil contamination, source characterization, and evaluation of ground water quality and movement.

- Project Manager under contract to Rockwell International to develop usable and defensible background geochemical data sets for various media at the Rocky Flats Plant. The occurrence of low-level radioactive material contamination from many years of plant operations, surrounding land uses, and atomic test fallout necessitated an extensive program to develop data and apply statistical analysis to describe background conditions. Additional statistical testing was performed to identify investigative results that showed results above defensible background values.

- Project Manager on a multi-phase soil and groundwater investigation and monitoring program at the former Bergstrom Air Force Base in Austin, Texas. Investigation areas included an oil-water separator at an engine test facility, a former maintenance facility, and the base landfills. Closure reports for all three areas are currently being prepared.

- Project Manager on a geophysical survey program at the Rocky Flats Plant designed to identify sources of chemical and radiological contamination at high priority solid waste management units. Surveys included electromagnetic, magnetic, and electrical resistivity methods used in conjunction with aerial photographs to identify possible source areas.

- Project Manager on a contract for USEPA Region 5 to plan and execute an investigation of the Federal Marine Terminals site near Detroit, Michigan. The investigation included a detailed review of historical aerial photographs, geophysical surveys of potential burial sites, soil sampling, monitoring well construction and sampling, and preparation of a site investigation report. Documentation and depositions on findings were provided to Region 5 enforcement.

- Project Geologist on a preliminary investigation of possible JP-4 impacts to soil and groundwater from the fueling system at Forbes Field Air National Guard base in Topeka, KS. The investigation included drilling through runway and ramp areas, around fuel storage facilities, and evaluation of possible migration pathways.

- Project Geologist on a project to use electromagnetic geophysical techniques to trace the lateral migration of shallow, high TDS groundwater plumes associated with three DOE uranium mill tailings sites located in different parts of the western U.S. Results of these surveys showed that electromagnetics was useful for tracing the plumes and allowed a minimal number of subsequent monitoring wells to be installed to quantify leading edge impacts.

Remedial Investigations/Feasibility Studies

- Project Manager for the Remedial Investigation at a former Atlas Missile site located near Holton, Kansas, Responsible for completion of a site investigation and risk assessment for the Kansas City District. Direct push soil sampling, sonic drilling and well installation, and indoor air, surface water, sediment, and groundwater sampling have been conducted in and around the former facility to determine the level and extent of contamination that may be present. An ecological and human health risk assessment was conducted to evaluate the potential health risks associated with the site.

- Project Manager on a Remedial Investigation and Focused Feasibility Study of JP-4 contaminated soils at the Fire Protection Training Area at Minot Air Force Base. Performed under contract to the U.S. Corp of Engineers, this project utilized Laser Induced Fluorescence, an innovative investigation technique, to characterize the extent of subsurface contamination. The Focused Feasibility Study examined eight potential remedial actions and was successful in gaining State acceptance of on-site land treatment as the chosen remedial alternative.

- Project Manager for the Remedial Investigation/Feasibility Study (RI/FS) of the Landfill Solids and Gases Operable Units at the Lowry Landfill CERCLA site. This project involves the characterization and assessment of the extent of potential contamination within the unsaturated solid and gaseous phases of the materials at this high profile site. Responsible for coordinating the activities of up to 30 project staff assigned to multiple concurrent tasks. Responsibilities also included extensive coordination and interaction with multiple clients and PRP groups as well as the Colorado Department of Health and Environment and USEPA Region 8 personnel.

- Technical Advisor under contract to EPA Region V on the Remedial Investigation at the Marion Bragg Landfill CERCLA site. Provided technical assistance to the project team related to investigation techniques to be used in characterizing the landfill and surrounding areas, including evaluating and providing remedies to difficult well installation encountered during the remedial investigation.

- Project Manager on a Feasibility Study/Risk Assessment program at a former Rocketdyne fuel test facility located near Spanish Springs, NV. This program included performing a risk assessment on an impacted groundwater plume, performing a feasibility study to evaluate appropriate remedial options, and performing treatability studies on two alternatives to verify and quantify effectiveness and estimate costs.

- Project Geologist and Site Manager on contract to USEPA Region V on the Remedial Investigation of the Skinner Landfill CERCLA site located near Cincinnati, OH. Prepared planning documents including the Sampling and Analysis Plan, Quality Assurance Project Plan, and Health and Safety Plan. Managed implementation of the remedial investigation that included geophysical surveys, aquatic biology surveys, well installation, and soil and groundwater sampling.

Testimony and Depositions

Littleton, CO, 2021 - Indiana Office of Environmental Adjudication, 20-S-J-5107, Objection to the Issuance of Approval of Closure/Post Closure Plan, Tanners Creek Fly Ash Pond, Tanners Creek Development LLC, Floyd County, Indiana. Qualified as an expert witness in the areas of geology and hydrogeology, and provided testimony concerning opinions expressed in Expert Report.

Littleton, CO, 2021 - Indiana Office of Environmental Adjudication, 20-S-J-5107, Objection to the Issuance of Approval of Closure/Post Closure Plan, Tanners Creek Fly Ash Pond, Tanners Creek Development LLC, Floyd County, Indiana. Deposition concerning opinions expressed in Expert Report.

Littleton, CO, 2020, Illinois Pollution Control Board, R 20-19, Standards For The Disposal Of Coal Combustion Residuals in Surface Impoundments: Proposed New 35 Ill. Adm. Code 845. Provided Expert Report and Testimony to the Illinois Pollution Control Board concerning the proposed Illinois CCR rules.

Littleton CO, 2020, Indiana Office of Environmental Adjudication, 20-S-J-5095, Objection to the Issuance of Partial Approval of Closure/Post Closure Plan, Duke Gallagher Generating Station Ash Pond System, Duke Energy Indiana LLC, Floyd County Indiana. Deposition concerning opinions expressed in Expert Report.

Littleton, CO, 2020, Montana Board of Environmental Review, Cause No. BER 2016-07 SM, Appeal Amendment Application AM3, Signal Peak Energy LLC's Bull Mountain Mine No. 1, Permit No. C1993017. Qualified as an expert witness in the areas of geology, hydrogeology, and fluvial sedimentology, and provided testimony concerning opinions expressed in Expert Report.

Chapel Hill, NC, 2017, Roanoke River Basin Association vs. Duke Energy Progress, LLC, United States District Court for the Middle District of North Carolina, Civil Action Nos. 1:16-cv-607 and 1:17-cv-0042. Deposition concerning opinions expressed in Expert Report.

Chapel Hill, NC, February 2017, State of North Carolina, ex rel, North Carolina Department of Environmental Quality, et. al. v. Duke Energy Progress, LLC., Civil Action No. 13-CVS-11032 and 13-CVS-14461. Deposition concerning opinions expressed in Expert Report.

Chapel Hill, NC, July 2016, State of North Carolina, ex rel, North Carolina Department of Environmental Quality, et. al. v. Duke Energy Progress, LLC., Civil Action No. 13-CVS-11032 and 13-CVS-14461. Deposition concerning opinions expressed in Expert Report.

Denver, CO, 2015, Montana Environmental Information Center et. al. v. Montana Department of Environmental Quality, et. al., 16th Jud. Dist. No. DV 12-42. Deposition concerning opinions expressed in Expert Report.

Denver, CO, 2015, City of Loves Park, IL vs. Browning Ferris Industries. Deposition on behalf of Browning Ferris Industries regarding meetings held and documents produced during employment at the Illinois Environmental Protection Agency.

Chicago, IL, 1982, United States Environmental Protection Agency vs. Federal Marine Terminals. Deposition on behalf of USEPA regarding findings of site investigation at a Federal Marine Terminals site in Detroit, Mi.

Dixon, IL, 1980, Illinois Environmental Protection Agency vs. Lee County Landfill, Testified in state court on behalf of the IEPA regarding violations of state environmental laws at the Lee County landfill.

Publications and Presentations

Hutson, M.A., " Oil Interceptor Pond Closure, Sediment, PCB's and Groundwater on a Budget", presented at the 2005 Air Force Environmental Symposium, Louisville, KY, March 2005.

Holliway, K.D., Witt, M.E., and M.A. Hutson, "Abandoned Well Closure Program at a Hazardous Waste Facility, Rocky Mountain Arsenal, Denver, Colorado" Hazardous Materials Control, vol. 5, no.1, January 1992.

Karnauskas, R.J., Deigan, G.J., Schoenberger, R.J., and M. A. Hutson, "Closure of Lead Contaminated Glass Manufacturing Waste Lagoons" Proceedings of HAZMACON 87, April 1987.

Hutson, M.A., and R. J. Karnauskas, "Groundwater Contamination Study, Forbes Field Air National Guard Based, Shawnee County Kansas, Defense Technical Information Center, 1985.