ALTERNATIVE SOURCE DEMONSTRATION REPORT

2024 FIRST SEMIANNUAL EVENT
TEXAS STATE CCR RULE

Welsh Power Plant
Bottom Ash Storage Pond
Registration No. CCR 110
Pittsburg, Texas

Prepared for

American Electric Power
1 Riverside Plaza
Columbus, Ohio 43215-2372

Prepared by

Geosyntec Consultants, Inc.
500 West Wilson Bridge Road, Suite 250
Worthington, Ohio 43085

Project CHA8495

December 2024

Geosyntec consultants

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

LIST OF ACRONYMS AND ABBREVIATIONS

AEP	American Electric Power
ASD	alternative source demonstration
BASP	Bottom Ash Storage Pond
CCR	coal combustion residuals
EPRI	Electric Power Research Institute
HDPE	high-density polyethylene
LPL	lower prediction limit
meq/kg	milliequivalents per kilogram
mg/L	milligrams per liter
PBAP	Primary Bottom Ash Pond
SSI	statistically significant increase
SU	standard units
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
UPL	upper prediction limit

1. INTRODUCTION AND SUMMARY

This alternative source demonstration (ASD) report has been prepared to address statistically significant increases (SSIs) for boron, calcium, and chloride in the groundwater monitoring network at the Bottom Ash Storage Pond (BASP) located at the Welsh Power Plant (Welsh Plant) in Pittsburg, Texas, following the first semiannual detection monitoring event of 2024. The Welsh Plant has three coal combustion residuals (CCR) storage units regulated by the Texas Commission on Environmental Quality (TCEQ) under Registration No. CCR 110, including the BASP (**Figure 1**). The BASP was being closed by CCR removal at the time of the detection monitoring event, and the other two CCR units were still active.

Background groundwater values for the BASP were originally calculated in January 2018 and have been updated periodically in accordance with the *Statistical Analysis Plan* prepared for the Welsh Plant (Geosyntec 2021). Under this plan, prediction limits were calculated for each well using intrawell comparisons. Applicable background values for the first semiannual event of 2024 are the revised upper prediction limits (UPLs) calculated in January 2024 for each Appendix III parameter (Geosyntec 2024). Revised lower prediction limits (LPLs) were also calculated for pH. Prediction limits were calculated based on a one-of-two retesting procedure to maintain an appropriate site-wide false positive rate. With this procedure, an SSI is concluded only if both samples in a series of two have reported results above the UPL or, in the case of pH, are below the LPL. In practice, if the initial result was not above the UPL or was not below the LPL, a second sample was not collected or analyzed.

The first semiannual detection monitoring event of 2024 was performed in April 2024 (initial sampling event), and the results were compared to the calculated prediction limits. Where initial values were identified above the UPL or below the LPL, verification resampling was completed in June 2024. Following verification resampling, intrawell comparisons identified SSIs for boron and calcium at monitoring well AD-4C and chloride at monitoring well AD-3. A summary of the detection monitoring analytical results for the downgradient compliance wells and the calculated prediction limits to which they were compared is provided in **Table 1**.

1.1 CCR Rule Requirements

TCEQ regulations regarding detection monitoring programs for CCR landfills and surface impoundments provide owners and operators with the option to make an ASD when an SSI is identified (Title 30 §352.941(c)(2) of the Texas Administrative Code (TAC) [30 TAC §352.941(c)(2)]):

> In making a demonstration under this section, the owner or operator must . . . within 90 days of making a determination of an SSI over the background value for any Appendix III constituent adopted by reference in §352.1421 of this title, submit a report prepared and certified in accordance with §352.4 of this title (relating to Engineering and Geoscientific Information), to the executive director, and any local pollution agency with jurisdiction that has requested to be notified, demonstrating that a source other than a coal combustion residuals unit caused the SSI or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.

Pursuant to this regulation, Geosyntec Consultants, Inc. (Geosyntec) has prepared this ASD report on behalf of American Electric Power (AEP) to document that the SSIs identified for boron and calcium at well AD-4C and chloride at well AD-3 are from sources other than a release from the BASP at the Welsh Plant.

1.2 Demonstration of Alternative Sources

An evaluation was completed to assess possible alternative sources to which each identified SSI could be attributed. Alternative sources were categorized into the following five types, based on methods provided by the Electric Power Research Institute (EPRI 2017):

- ASD Type I: Sampling Causes
- ASD Type II: Laboratory Causes
- ASD Type III: Statistical Evaluation Causes
- ASD Type IV: Natural Variation
- ASD Type V: Anthropogenic Sources

A demonstration was conducted to show that the identified SSIs at AD-3 and AD-4C were based on Type IV (natural variation) causes and not by a release from the BASP.

2. SUMMARY OF SITE CONDITIONS

The site background summary included in this section was primarily taken from Arcadis (2022), unless otherwise noted.

2.1 BASP Location and Design

The BASP was a 22-acre CCR surface impoundment located in the southern portion of the Welsh Plant, immediately south of the Landfill and Primary Bottom Ash Pond (PBAP) (**Figure 1**). It was designed with approximately 20-foot-high compacted-clay perimeter embankments and a 60-mil-thick high-density polyethylene (HDPE) liner placed over the base of the pond and the interior embankment slopes. The BASP was constructed and placed into operation in 2000 to receive bottom ash and economizer ash dredged and sluiced from the PBAP.

A Closure Plan for the BASP was developed in October 2016 and revised in February 2021 (AEP 2021a). This document details the closure activities which are to take place throughout the closure of the BASP. AEP submitted a certified notification that as of April 6, 2021, the BASP ceased receipt of CCR and non-CCR waste streams and closure activities had been initiated in accordance with the certified Closure Plan (AEP 2021b). Thus, the BASP no longer received CCR material or transport waters and no longer received non-CCR wastewaters such as stormwater runoff from the landfill and surrounding areas. In November 2021, removal of the CCR material from the BASP began with the CCR material stockpiled in the northern portion of the BASP (AEP 2022a). Dewatering activities began in early 2022 and included installation of dewatering pumps and trenches. As a result of the closure activities, the BASP no longer contained impounded water as of November 3, 2022 (AEP 2022b). The removal of all CCR materials from the BASP as part of closure activities was completed in September 2024.

2.2 Regional Geology and Site Hydrogeology

The Welsh Plant is located within the West Gulf Coastal Plain. The BASP is immediately underlain by the Eocene-age Recklaw Formation, which consists of very-fine- to fine-grained sand and clay (Flawn 1966). The Recklaw Formation ranges in thickness from approximately 10 to 110 feet in Titus County, where the Welsh Plant is located. This formation is underlain by the Eocene-age Carrizo Sand, consisting of fine to coarse sand, silt, and clay.

The uppermost aquifer in the vicinity of the BASP consists of an interval of the Recklaw Formation that is approximately 12-feet thick and composed of very-fine- to fine-grained silty sand and sandy silt. This aquifer is first encountered approximately 8 feet below the base of the BASP (Arcadis 2022). It is recharged primarily through infiltration of regional precipitation. Groundwater flow velocities in the uppermost aquifer in the vicinity of the BASP have been reported as approximately 1–20 feet per year (AEP 2022a).

Monitoring well AD-3 is screened from 7-17 feet below ground surface and monitoring well AD-4C is screened from 5-15 feet below ground surface. Both monitoring wells AD-3 and AD-4C are screened within the Recklaw Formation. Subsurface lithology at and near monitoring wells AD-3 and AD-4C are shown on geologic cross sections from Arcadis (2022) (**Attachment A**).

2.3 BASP Monitoring Well Network and Flow Conditions

The BASP monitoring well sampling network consists of background monitoring wells AD-1, AD-5, and AD-17 and downgradient compliance monitoring wells AD-3, AD-4C, and AD-16R (**Figure 1**). The groundwater flow direction near the BASP is generally to the southeast (**Figure 2**). Potentiometric groundwater flow maps from sampling events completed within the past year are provided as **Attachment B**. Seasonal variability in groundwater flow direction has not been observed in the immediate vicinity of the BASP.

3. ALTERNATIVE SOURCE DEMONSTRATION

The ASD evaluation method and proposed alternative source of boron and calcium at well AD-4C and chloride at well AD-3 are described below.

3.1 Proposed Alternative Sources

An initial review of groundwater sampling field forms did not identify alternative sources due to a Type I (sampling) issue. A review of the laboratory quality assurance and quality control data and the statistical analyses did not identify any Type II (laboratory) or Type III (statistical evaluation) issues. Groundwater sampling, laboratory analysis, and statistical evaluations were generally completed in accordance with 30 TAC §352.941(a) and draft TCEQ guidance for groundwater monitoring (TCEQ 2020).

As described below, the SSIs for boron, calcium, and chloride have been attributed to natural variation, which is a Type IV issue.

3.1.1 Comparison to Background Concentrations - Boron

Recent fluctuations of aqueous boron concentrations at downgradient well AD-4C are attributed to natural variability of boron in the uppermost aquifer. The maximum boron concentration observed at AD-4C of 0.217 milligrams per liter (mg/L) falls within the range of boron concentrations observed in the background wells also screened within the Recklaw Formation and located upgradient or cross-gradient of the BASP (**Figure 3; Attachment A**). Background monitoring well AD-1 has consistently contained boron concentrations greater than the AD-4C maximum reported value of 0.217 mg/L. Background monitoring well AD-17 has reported boron concentrations greater than or comparable to the AD-4C maximum as well. Groundwater boron concentrations at all locations discussed are lower than the Texas Risk Reduction Program (TRRP) Class I residential ingestion pathway limit ($^{GW}GW_{Ing}$) of 4.9 mg/L (TCEQ 2009; updated TCEQ 2023), and groundwater boron concentrations at AD-4C are more than 50 times less than the TRPP limit. Historical data indicate that the recent boron concentrations observed at AD-4C are still within the expected range associated with site background conditions. TCEQ established a Texas-specific soil background concentration of 30 milligrams per kilogram of boron in 30 TAC §350.51(m). Given the abundance of boron in Texas soils, some contribution of boron to groundwater from the aquifer is anticipated. Variable boron concentrations observed in recently collected samples are greater than historical tendencies, but concentrations in these samples fluctuate between increasing and decreasing over the previous five events and do not display a definitive increasing trend.

3.1.2 Comparison to Background Concentrations - Calcium

Calcium concentrations at background wells AD-1, AD-5, and AD-17, which are located upgradient or cross-gradient of the BASP and AD-4C, have historically been much higher than those observed at AD-4C (**Figure 4**). Since background monitoring was initiated in 2016, calcium concentrations at AD-1, which is the closest background well as well as an upgradient well, have been subject to significant variability, with a peak concentration of 147 mg/L in June 2017 and a minimum of 3.88 mg/L in October 2020. In contrast, calcium concentrations at AD-4C have ranged between 0.341 in December 2020 and 1.83 mg/L in April 2024. Calcium concentrations at background cross-gradient wells AD-5 and AD-17 have also been consistently above those observed at AD-4C. Protective concentration levels have not been established for calcium in groundwater through the TRRP program (TCEQ 2023). Given that the concentrations of calcium at AD-4C have consistently been one to two orders of magnitude lower than those of the background wells, the recently observed higher calcium concentrations at AD-4C may represent the migration of groundwater from upgradient locations such as AD-1 within the uppermost aquifer which contain geogenic calcium at concentrations exceeding the UPL for AD-4C.

Regional scale sampling data from shallow wells located in Titus County (**Attachment C**; Texas Water Commission 1965) further support the existence of naturally occurring calcium concentrations exceeding the UPL of 1.44 mg/L. At the time of publication in 1965, calcium concentrations were reported for 38 samples from 27 wells within Titus County screened at shallow (60 feet or less) depths. Of these 38 samples, only 1 contained reported calcium concentrations below the UPL of 1.44 mg/L (**Figure 5**). This dataset contained an average calcium concentration of 46.73 mg/L, a median concentration of 13 mg/L, and a maximum of 308 mg/L. Both the average and the median values exceed the calcium UPL of 1.44 mg/L at well AD-4C. These data demonstrate the common natural calcium concentrations in regional groundwater and contextualize the calcium SSI relative to what would be expected within the surrounding region.

3.1.3 Comparison to Background Concentrations - Chloride

Chloride concentrations at downgradient well AD-3 have remained generally consistent since monitoring began in 2016 and are within the range of values observed at monitoring wells located upgradient of the BASP (**Figure 6**). The maximum chloride concentration observed at AD-3 of 10.3 mg/L falls within the range of chloride concentrations observed in background wells screened within the Recklaw Formation and located cross-gradient or upgradient of the BASP (**Figure 3; Attachment A**). Cross-gradient monitoring wells AD-5 and AD-17 have consistently contained chloride concentrations greater than the AD-3 maximum reported value of 10.3 mg/L. Protective concentration levels have not been established for chloride in groundwater through the TRRP program (TCEQ 2023). Chloride concentrations at AD-3, the well of concern, are comparable to and often lower than those observed at the downgradient monitoring well AD-4C. This indicates that the recent chloride concentration exists naturally in the groundwater of the uppermost aquifer at concentrations which exceed the UPL for AD-3.

Historical data from AD-3 indicate that chloride concentrations can range from 7.0 to 10.3 mg/L. Regional scale sampling data from shallow wells located in Titus County (**Attachment C**; Texas Water Commission 1965) further support the existence of naturally occurring chloride concentrations exceeding the UPL of 9.40 mg/L. At the time of publication in 1965, chloride concentrations were reported for 44 samples from 27 wells within Titus County screened at shallow (60 feet or less) depths. Of these 44 samples, only 6 contained reported chloride concentrations below the UPL of 9.40 mg/L (**Figure 7**). This dataset contained an average chloride concentration of 130.4 mg/L, a median concentration of 39.5 mg/L, and a maximum of 450 mg/L. Both the average and the median values exceed the chloride UPL of 9.40 mg/L at well AD-3. These data indicate that chloride concentrations vary within groundwater at comparable depths at the regional scale.

3.1.4 AD-3 and AD-4C Aqueous Geochemical Stability

A CCR unit release would be expected to impact the major ion chemical signature of downgradient groundwater. A Piper diagram was created to visualize major ion chemistry of AD-3 and AD-4C groundwater (**Figure 8**). Piper diagrams represent the relative proportions of major cations and anions in water samples in the lower left and right triangles respectively and provide a combined view in the middle diamond which is created by projecting each triangle's axes onto a singular plot. Placement of data on the diamond therefore does not incorporate the full extent of the data plotted in individual triangles (i.e., movement along one axis in each triangle is not reflected in the diamond). The BASP sample included on **Figure 8**, which was collected in August 2020, is the most recently collected water sample from the unit and represents the final geochemical composition prior to the initiation of closure activities. No additional BASP samples can be collected due to closure activities.

The geochemical signature of AD-4C groundwater has displayed some variability (particularly among anion proportions) but has remained generally similar throughout the monitoring period, as illustrated by the clustering of sample results on the Piper diagram. In the event of a BASP release, AD-4C groundwater chemistry would be expected to shift to reflect the major ion signature of the BASP sample. The cation signature of AD-4C groundwater has remained consistent, and the anion signature has diverged further from the BAP sample since installation. The lack of a temporal shift towards the BASP sample suggests a lack of influence from the BASP on the groundwater chemistry. This conclusion reinforces the determination that recently observed chemical concentrations at AD-4C are associated with natural variability in groundwater composition of the uppermost aquifer.

AD-3 groundwater has also displayed some variability (particularly among anion proportions) throughout the monitoring period but has remained generally consistent. In the event of a BASP release, AD-3 groundwater chemistry would be expected to shift to reflect the major ion signature of the BASP sample. The cation signature of AD-3 has remained consistent except for one sample collected in 2019, and the anion signature does not display a clear temporal trend among the minor variability. This observation reinforces the determination that chloride concentrations at AD-3 are not associated with a BASP release, but rather due to natural variability in groundwater composition of the uppermost aquifer.

4. CONCLUSIONS AND RECOMMENDATIONS

The preceding information serves as the ASD prepared in accordance with 30 TAC §352.941(c)(2) and supports the position that the boron and calcium SSIs at AD-4C and the chloride SSI at AD-3 identified during the first semiannual detection monitoring event of 2024 should be attributed to natural variation and not to a release from the Welsh BASP. Therefore, no further action is warranted. Certification of this ASD by a qualified professional engineer is provided in **Attachment D**.

5. REFERENCES

AEP. 2021a. *Closure Plan, Bottom Ash Storage Pond, Welsh Power Plant, Pittsburg, Texas*. February.

AEP, 2021b. Notification of Intent to Close a CCR Unit. Pirkey Power Plant, East Bottom Ash Pond. April 6, Revised June 1.

AEP. 2022a. *Annual Groundwater Monitoring Report, Bottom Ash Storage Pond CCR Management Unit*. American Electric Power. January.

AEP. 2022b. *2022 Annual Dam and Dike Inspection Report, CCR Ash Ponds, Welsh Power Plant*. American Electric Power. December.

Arcadis. 2022. *Bottom Ash Storage Pond – CCR Groundwater Monitoring Well Network Evaluation. J. Robert Welsh Power Plant*. November.

EPRI. 2017. *Guidelines for Development of Alternative Source Demonstrations at Coal Combustion Residual Sites*. Electric Power Research Institute. 3002010920. October.

Flawn, P. T. 1966. *Geologic Atlas of Texas, Texarkana Sheet*. The University of Texas at Austin Bureau of Economic Geology. July.

Geosyntec. 2021. *Statistical Analysis Plan – J. Robert Welsh Plant*. Revision 2. December.

Geosyntec. 2024. *Statistical Analysis Summary – Background Update Calculations. Bottom Ash Storage Pond – J. Robert Welsh Plant*. January.

TAC. 2020. "Coal Combustion Residuals Waste Management." Texas Administrative Code. Title 30, Part 1, Chapter 352. May 22.

TCEQ. 2009. *Toxicity Factors and Chemical/Physical Properties*. Texas Commission on Environmental Quality, Remediation Division. RG-366/TRRP-19. March.

TCEQ. 2020. *Topic: Coal Combustion Residuals (CCR) Groundwater Monitoring and Corrective Action*. Coal Combustion Residuals Groundwater Monitoring and Corrective Action Draft Technical Guideline No. 32. Texas Commission on Environmental Quality, Waste Permits Division. May.

TCEQ. 2023. *Update to Texas Risk Reduction Program (TRRP) Protective Concentration Limits and Chemical/Physical Properties*. Texas Commission on Environmental Quality, Remediation Division. May 10.

Texas Water Commission. 1965. *Ground-Water Resources of Camp, Franklin, Morris and Titus Counties, Texas*. Texas Water Commission Bulletin 6517. July.

TABLES

Table 1. Detection Monitoring Data Summary
Alternative Source Demonstration Report - 2024 First Semiannual Event
Welsh Plant, Bottom Ash Storage Pond

Analyte	Unit	Description	AD-3		AD-4C		AD-16R	
			4/1/2024	6/10/2024	4/1/2024	6/10/2024	4/2/2024	6/10/2024
Boron	mg/L	Intrawell Background Value (UPL)	0.0407		0.0882		0.0577	
		Analytical Result	0.027	--	**0.217**	**0.176**	0.033	--
Calcium	mg/L	Intrawell Background Value (UPL)	1.38		1.44		2.90	
		Analytical Result	0.65	--	**1.83**	**1.56**	0.54	--
Chloride	mg/L	Intrawell Background Value (UPL)	9.40		18.6		8.00	
		Analytical Result	**10.3**	**10.1**	14.0	--	6.68	--
Fluoride	mg/L	Intrawell Background Value (UPL)	0.263		0.180		0.296	
		Analytical Result	0.12	--	0.12	--	0.10	--
pH	SU	Intrawell Background Value (UPL)	5.2		5.7		4.6	
		Intrawell Background Value (LPL)	3.8		4.0		2.8	
		Analytical Result	**3.7**	4.4	4.6	4.2	**2.7**	3.6
Sulfate	mg/L	Intrawell Background Value (UPL)	10.6		123		73.4	
		Analytical Result	2.4	--	120	--	66.5	--
Total Dissolved Solids	mg/L	Intrawell Background Value (UPL)	136		332		242	
		Analytical Result	100	--	320	--	170	--

Notes:
1. Bold values exceed the background value.
2. Background values are shaded gray.
LPL: Lower prediction limit
mg/L: milligrams per liter
SU: standard units
UPL: Upper prediction limit

FIGURES

Legend

- Downgradient Sampling Location
- Background Sampling Location
- CCR Units

Notes

- Monitoring well coordinates provided by AEP.
- Site features based on information available in CCR Groundwater Monitoring Well Network Evaluation (Arcadis, 2022).
- Satellite imagery provided by ESRI (Updated on December 19, 2024).
- AEP: American Electric Power
- CCR: Coal combustion residuals

Site Layout
Bottom Ash Storage Pond

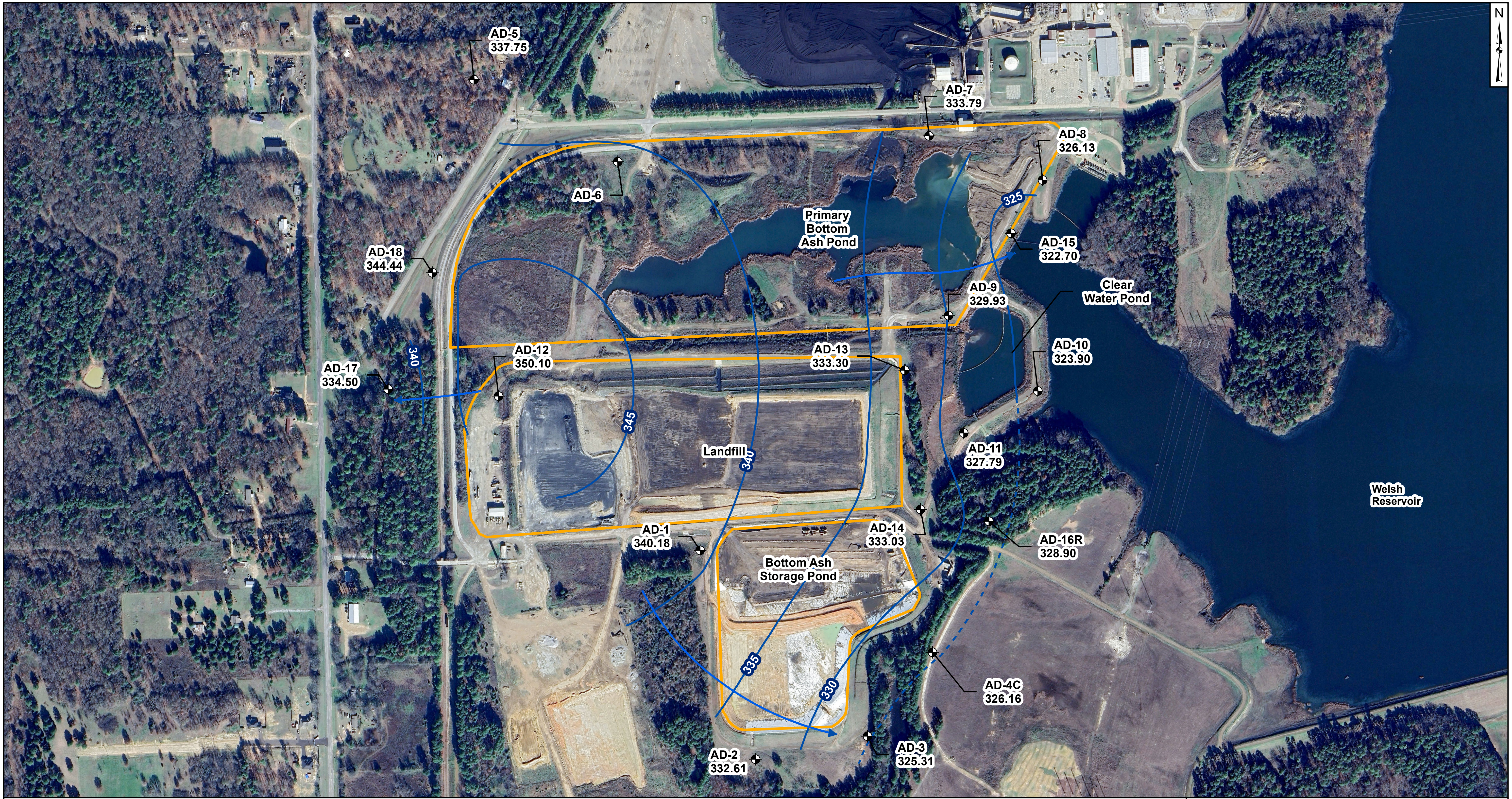
AEP Welsh Power Plant
Cason, Texas

Geosyntec consultants

Columbus, Ohio | December 2024

Figure 1

A:\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Welsh\AEP-Welsh_Updated_BASP_Site_Layout.mxd. Okiemute.Commander. 12/19/2024. CHA8423/14/08.



Legend

- Groundwater Monitoring Well
- Groundwater Elevation Contour
- Groundwater Elevation Contour (Inferred)
- Approximate Groundwater Flow Direction
- CCR Units

Notes

1. Monitoring well coordinates and water level data (collected on April 1 and 2, 2024) provided by AEP.
2. AD-6 was not gauged during the April 2024 event
3. Site features based on information available in CCR Groundwater Monitoring Well Network Evaluation (Arcadis 2022).
4. Groundwater elevation units are feet above mean sea level (ft amsl).
5. Satellite imagery provided by ESRI (updated February 19, 2024).

500 250 0 500
Feet

Beth Ann Gross

August 19, 2024
Geosyntec Consultants, Inc.
Texas Firm Registration
No. 1182

STATE OF TEXAS
BETH ANN GROSS
79864
LICENSED
PROFESSIONAL ENGINEER

Groundwater Potentiometric Map
April 2024

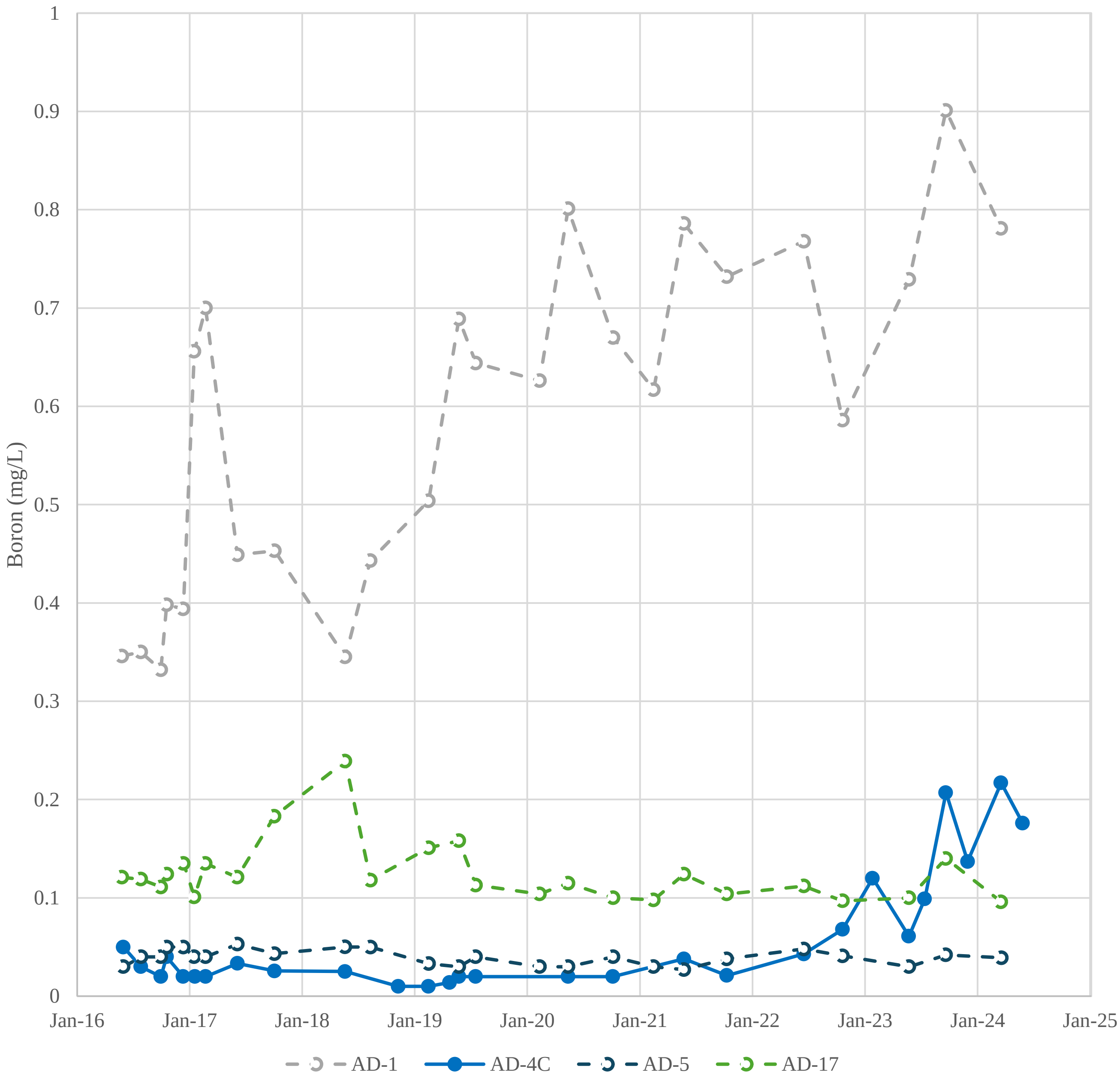
AEP Welsh Power Plant
Cason, Texas

Geosyntec consultants

Figure
2

Columbus, Ohio | 2024/06/14

A:\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Welsh\2024\AEP-Welsh_GW_2024-04Apr.mxd. Okiemute.Commander. 6/14/2024. CHA8423/14/08.



Notes: Boron time series diagram for BASP background wells AD-1, AD-5, and AD-17 (dashed lines) and downgradient well AD-4C (solid line). Data collected as part of the federal coal combustion residuals (CCR) program. Results are shown in milligrams per liter (mg/L).

Boron Time Series Graph
Welsh Bottom Ash Storage Pond

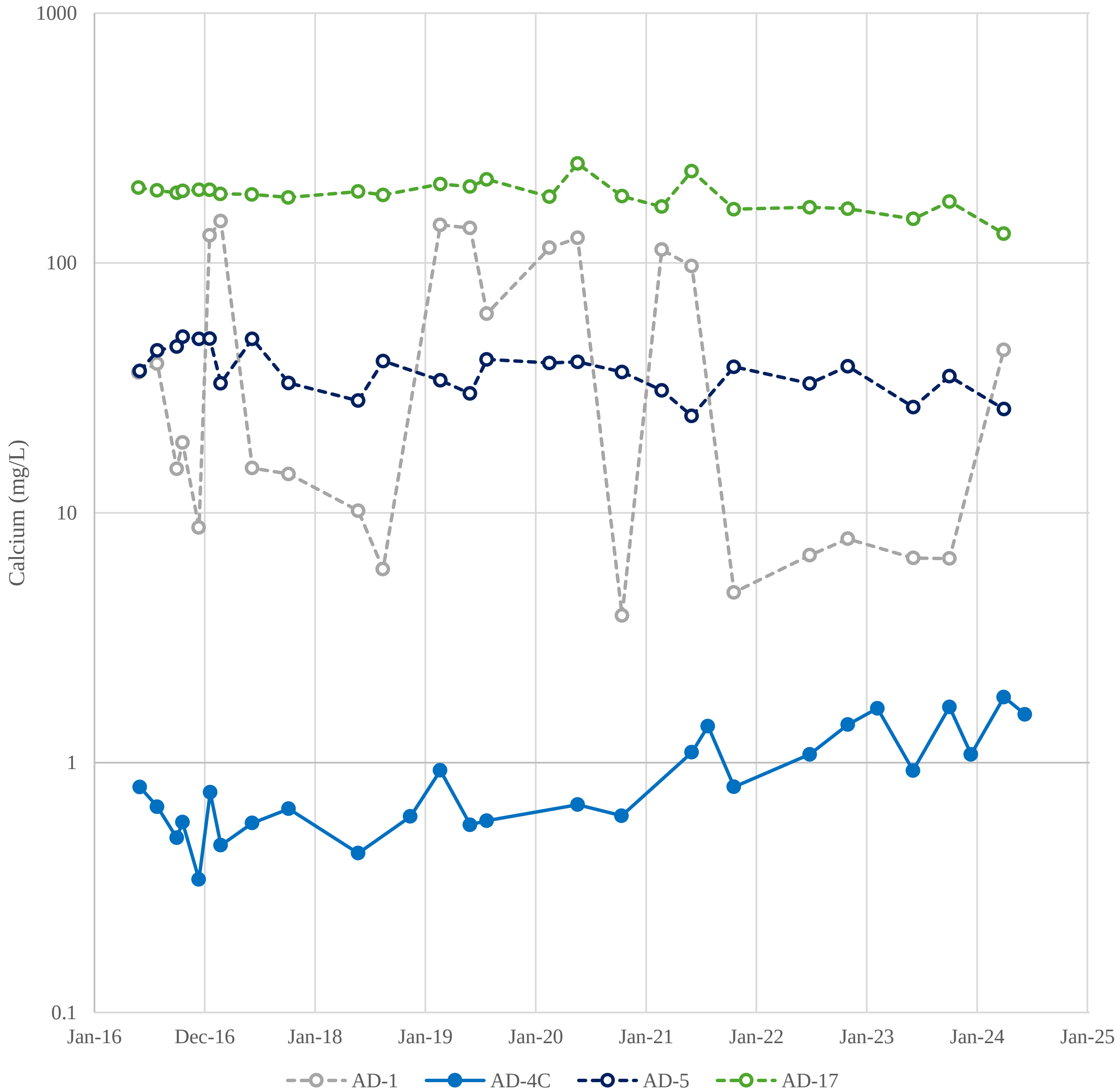
Geosyntec consultants

AMERICAN ELECTRIC POWER

Figure 3

Columbus, Ohio

December 2024



Notes: Calcium time series diagram for BASP background wells AD-1, AD-5, and AD-17 (dashed lines) and downgradient well AD-4C (solid line). Data collected as part of the federal coal combustion residuals (CCR) program. Results are shown in milligrams per liter (mg/L).

Calcium Time Series Graph

Welsh Bottom Ash Storage Pond

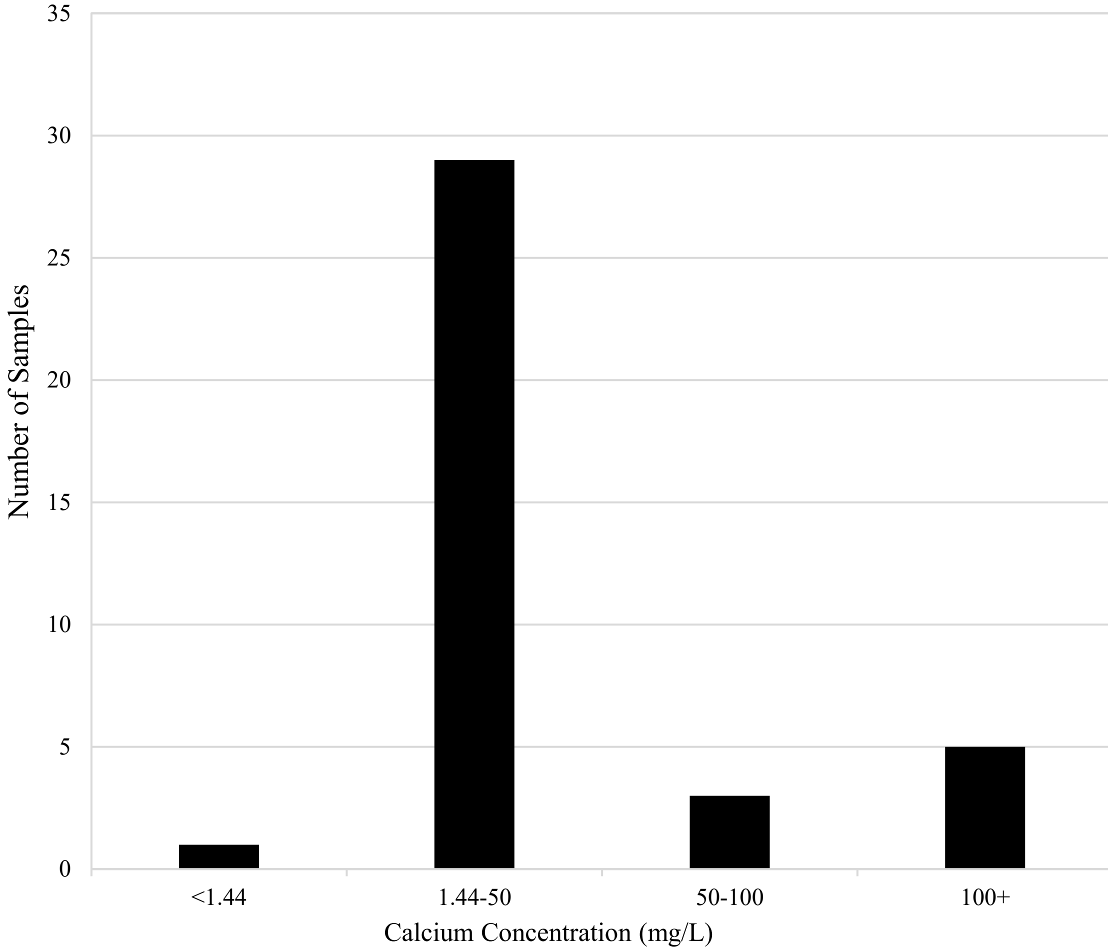
Geosyntec consultants

AMERICAN ELECTRIC POWER

Figure 4

Columbus, Ohio

December 2024



Notes: Calcium analytical data is shown for 38 groundwater samples collected from 27 groundwater wells screened at a depth of less than 60 feet below ground surface (bgs). Results are grouped in bins in units of milligrams per liter (mg/L). From Texas Water Commission 1965 (provided as **Attachment C**).

Titus County Calcium Concentrations in Shallow (<60' Depth) Wells

Welsh Bottom Ash Storage Pond

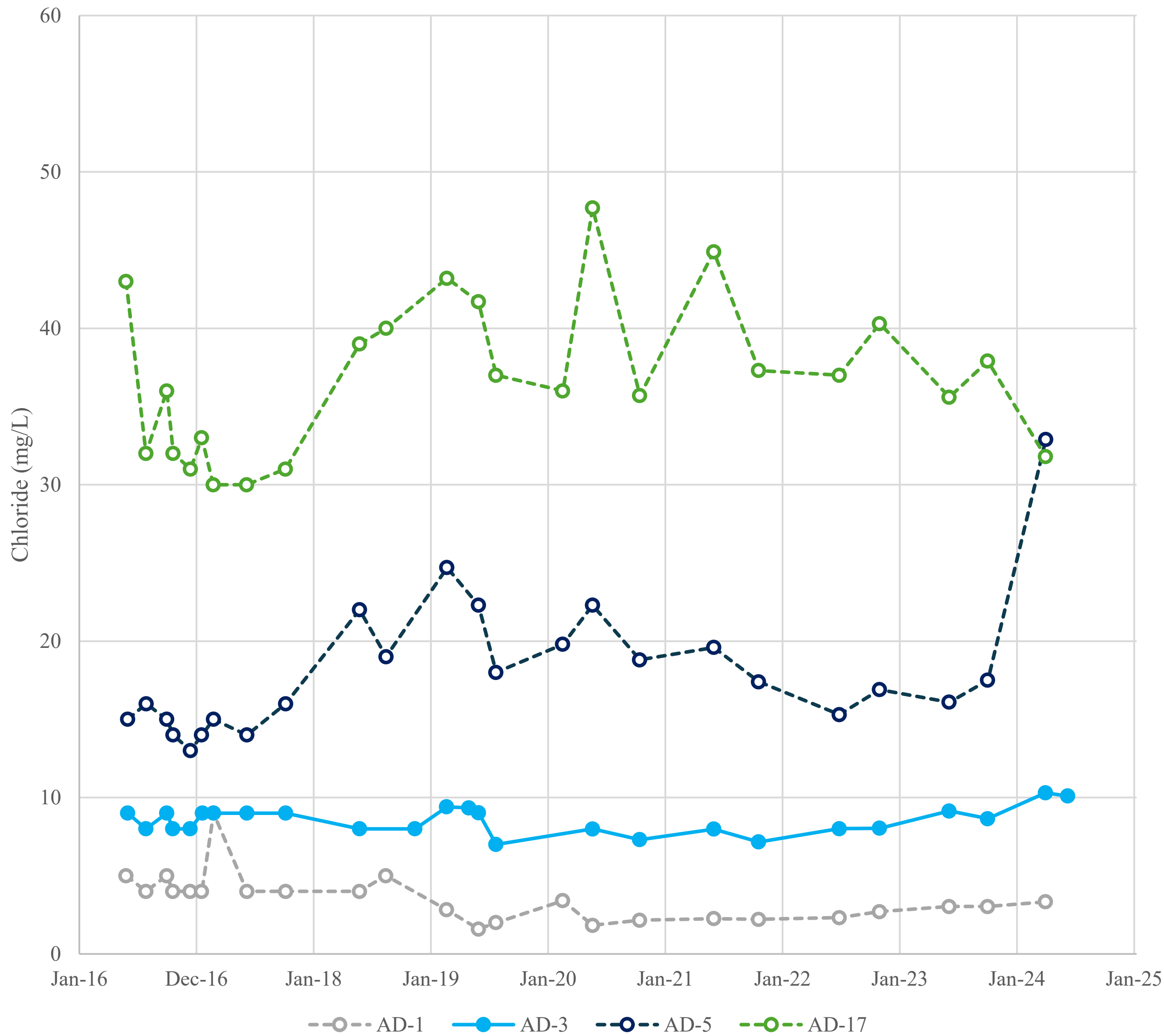
Geosyntec consultants

AMERICAN ELECTRIC POWER

Figure **5**

Columbus, Ohio

December 2024



Notes: Chloride time series diagram for BASP background wells AD-1, AD-5, and AD-17 (dashed lines) and downgradient well AD-3 (solid line). Data collected as part of the federal coal combustion residuals (CCR) program. Results are shown in milligrams per liter (mg/L).

Chloride Time Series Graph

Welsh Bottom Ash Storage Pond

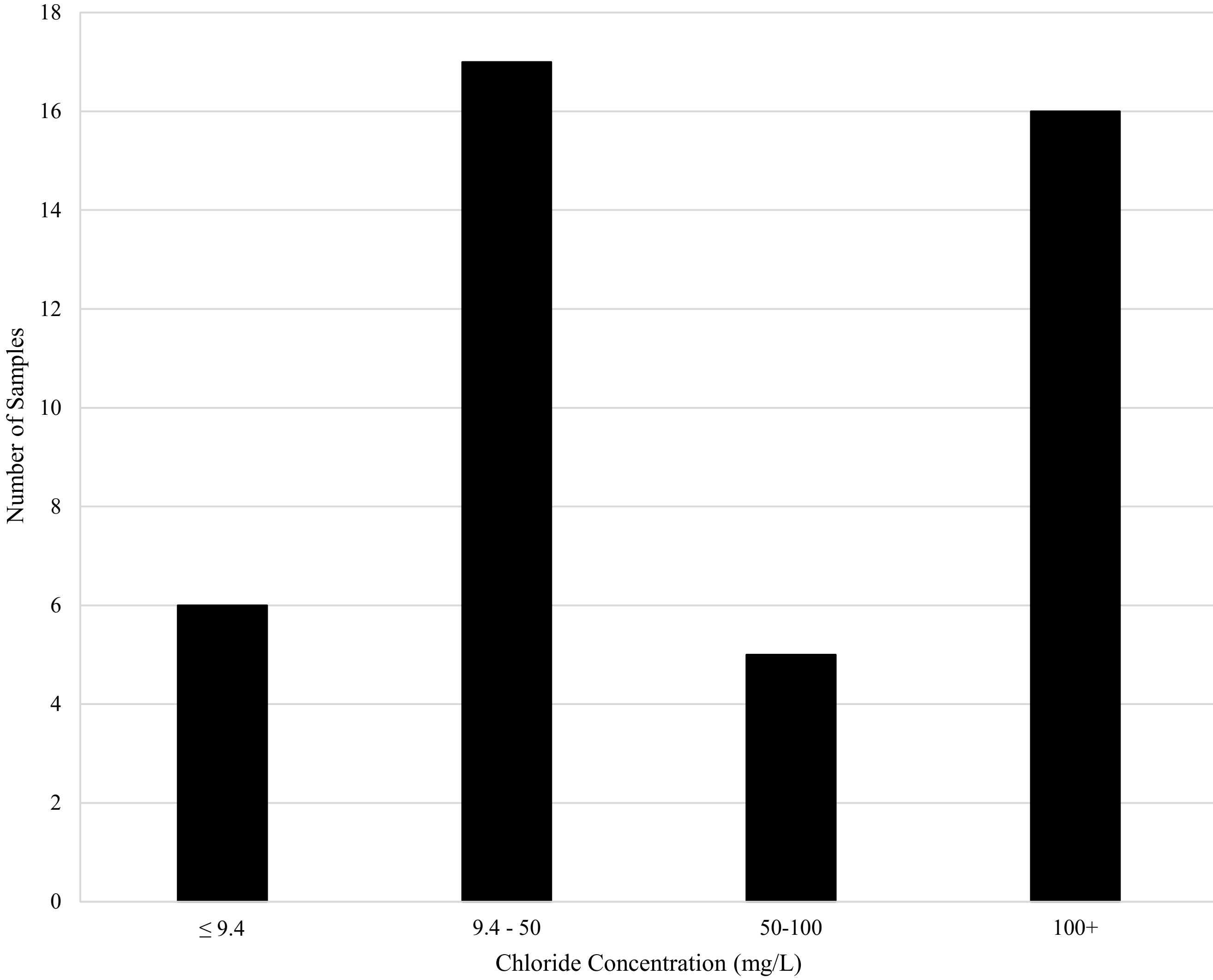
Geosyntec consultants

AMERICAN ELECTRIC POWER

Figure 6

Columbus, Ohio

December 2024



Notes: Chloride analytical data is shown for 44 groundwater samples collected from 27 groundwater wells screened at a depth of less than 60 feet below ground surface (bgs). Results are grouped in bins in units of milligrams per liter (mg/L). From Texas Water Commission 1965 (provided as **Attachment C**).

Titus County Chloride Concentrations in Shallow (<60' Depth) Wells

Welsh Bottom Ash Storage Pond

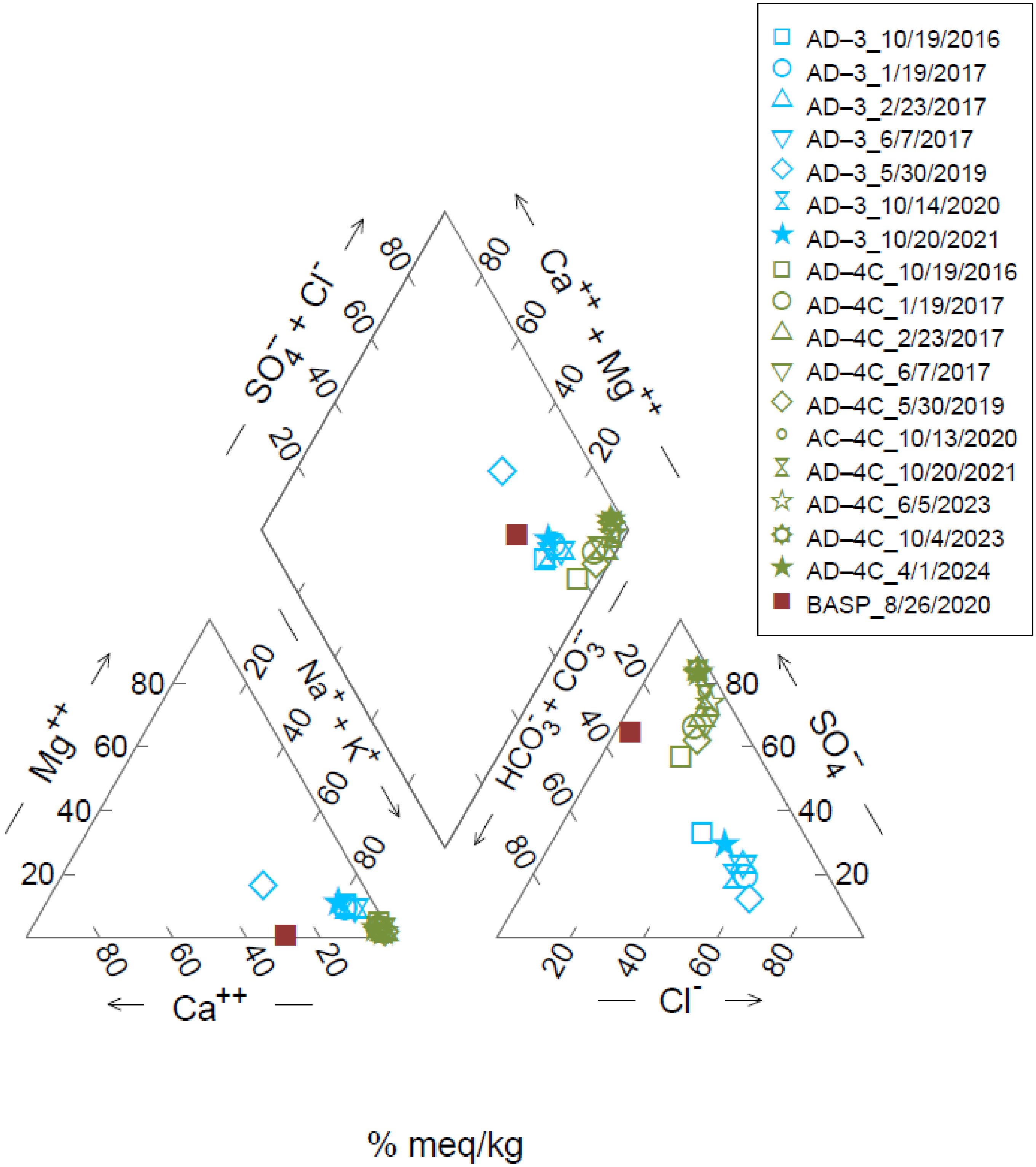
Geosyntec consultants

AMERICAN ELECTRIC POWER

Figure 7

Columbus, Ohio

December 2024



Notes: Groundwater samples from monitoring wells AD-3 and AD-4C which contain analytical results for all major ions are plotted on the Piper diagram with the most recent BASP water sample collected. Results are shown in milliequivalents per kilogram (meq/kg). In instances where the total alkalinity and potassium analytical results were not detected, the method detection limit was provided for the Piper diagram.

AD-3 and AD-4C Piper Diagram

Welsh Bottom Ash Storage Pond

Geosyntec consultants

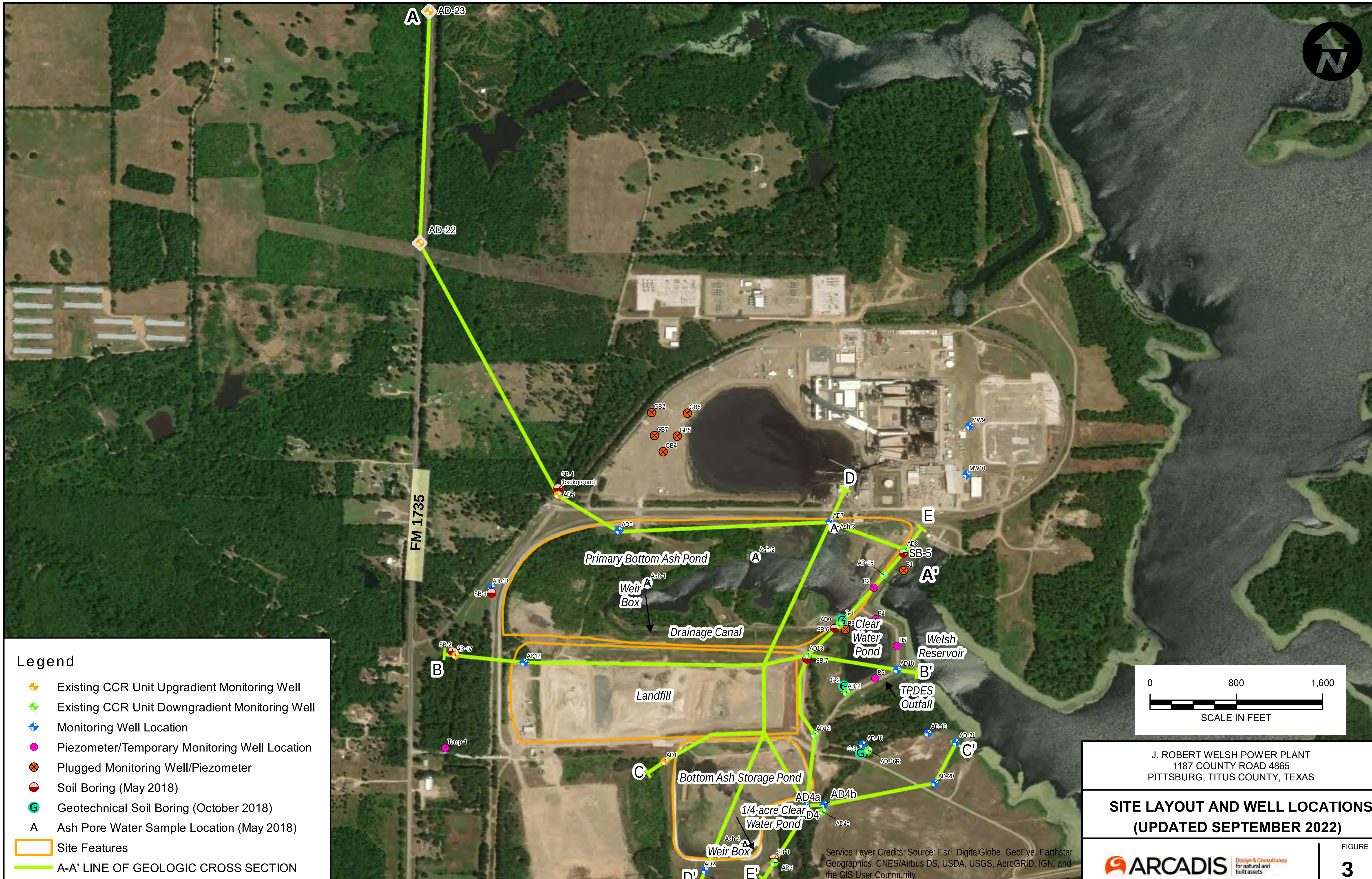
AMERICAN ELECTRIC POWER

Figure 8

Columbus, Ohio

December 2024

ATTACHMENT A
Geologic Cross Sections

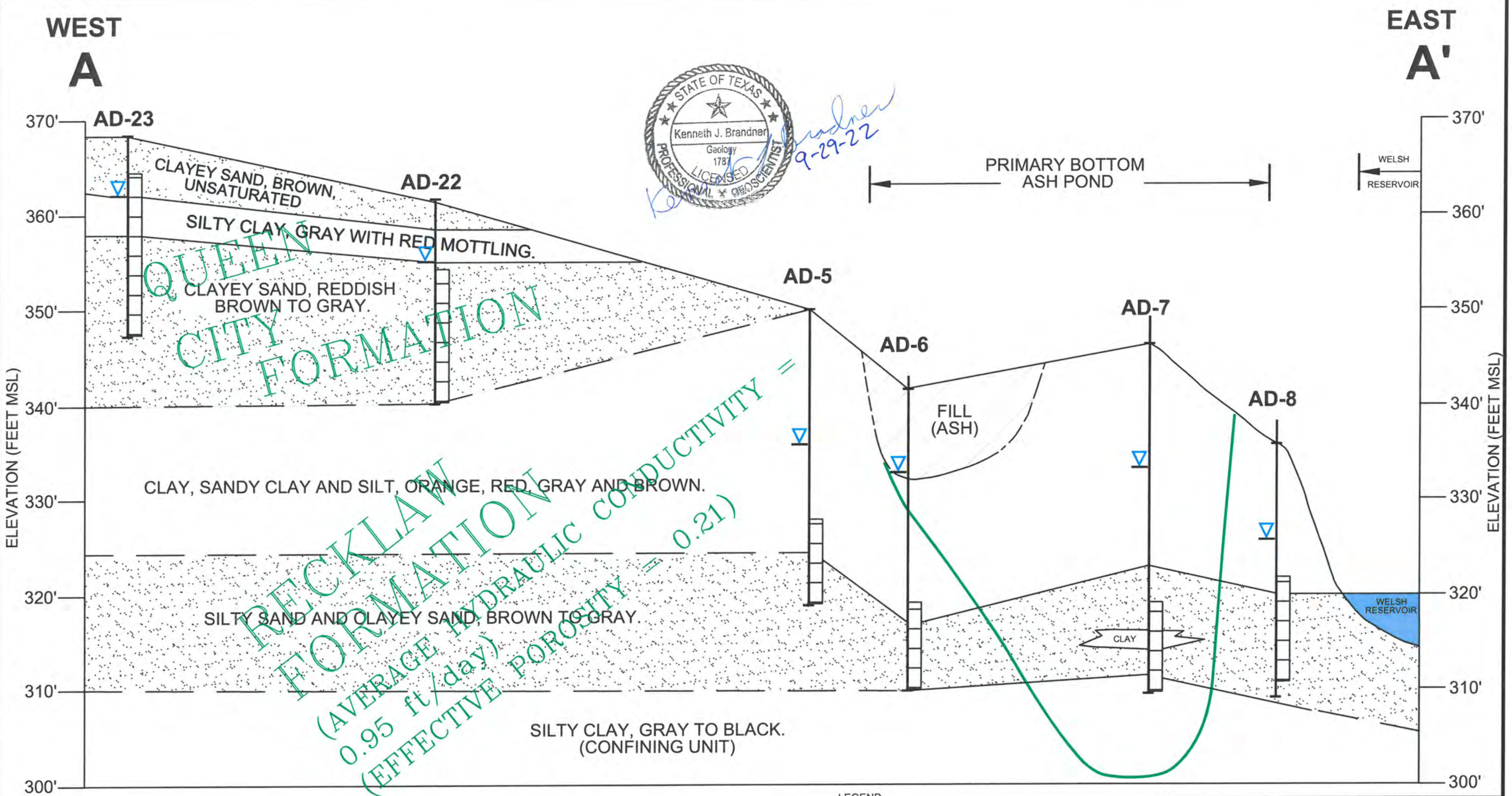


J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

SITE LAYOUT AND WELL LOCATIONS (UPDATED SEPTEMBER 2022)

ARCADIS Design & Consultancy for natural and built assets

FIGURE 3



NOTES:

1. BASE OF ASH POND TAKEN FROM "WELSH POWER PLANT-UNIT 1 FLY ASH STORAGE AREA PHASE I" DRAWING ID WEPX-88, DATED 12-3-76; AND U.S. GEOLOGICAL SURVEY 7 1/2 MINUTE SERIES TOPOGRAPHIC MAP, CASON, TX QUADRANGLE, 1964 (PHOTO REVISED 1980).
2. HYDRAULIC CONDUCTIVITY CALCULATED BASED ON ON-SITE AQUIFER TEST OF MONITORING WELL AD-6 ON 9-17-21; AND SLUG TESTING OF MONITORING WELLS AD-6, AD-9, AD-13, AD-17, AND AD-19 DURING OCTOBER 2018.
3. EFFECTIVE POROSITY ESTIMATED AT 0.21 BASED ON SITE LITHOLOGY. SITE SPECIFIC YIELD FOR FINE SAND, REFERENCE: C. W. FETTER, "APPLIED HYDROGEOLOGY", UNIVERSITY OF WISCONSIN - OSHKOSH, 1980.

LEGEND

- MONITORING WELL SCREENED INTERVAL
- WATER LEVEL IN EVALUATION (6/19/19)
- PROJECTED BASE OF PRIMARY BOTTOM ASH POND (SEE NOTE)

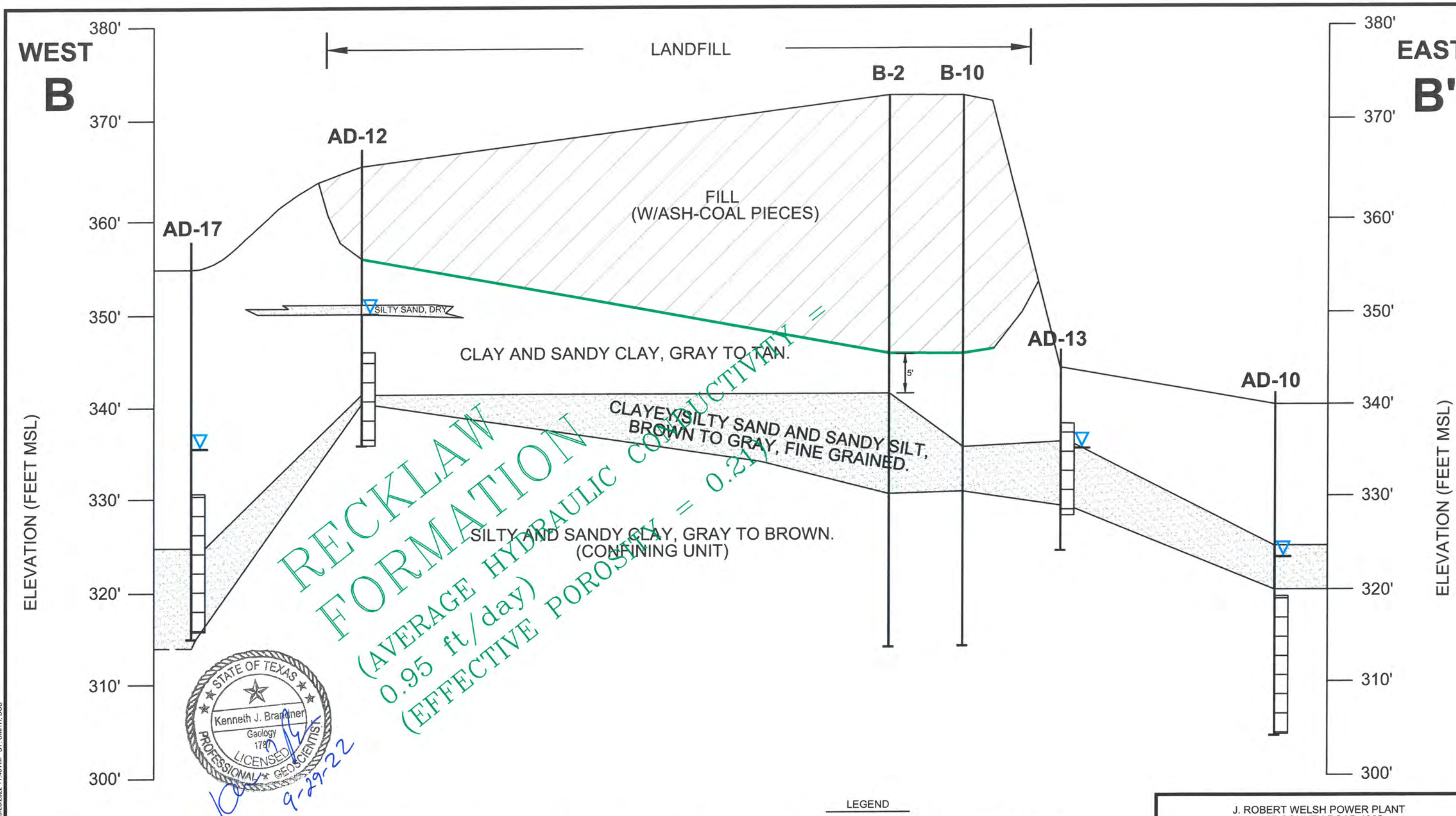
0 600'
HORIZONTAL SCALE

J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

CROSS SECTION A - A' (UPDATED SEPTEMBER 2022)

ARCADIS

FIGURE 4



NOTES:

1. BASE OF LANDFILL ELEVATION TAKEN FROM "WELSH POWER PLANT-UNIT 1 FLY ASH STORAGE AREA PHASE I" DRAWING ID WEPX-88, DATED 12/3/76.
2. HYDRAULIC CONDUCTIVITY CALCULATED BASED ON ON-SITE AQUIFER TEST OF MONITORING WELL AD-6 ON 9-21-17; AND SLUG TESTING OF MONITORING WELLS AD-6, AD-9, AD-13, AD-17, AND AD-19 DURING OCTOBER 2018.
3. EFFECTIVE POROSITY ESTIMATED AT 0.21 BASED ON SITE LITHOLOGY. SITE SPECIFIC YIELD FOR FINE SAND, REFERENCE: C. W. FETTER, "APPLIED HYDROGEOLOGY", UNIVERSITY OF WISCONSIN - OSHKOSH, 1980.

LEGEND

- MONITORING WELL SCREENED INTERVAL
- WATER LEVEL IN MONITORING WELL (3/4/16)
- BASE OF LANDFILL (SEE NOTE)

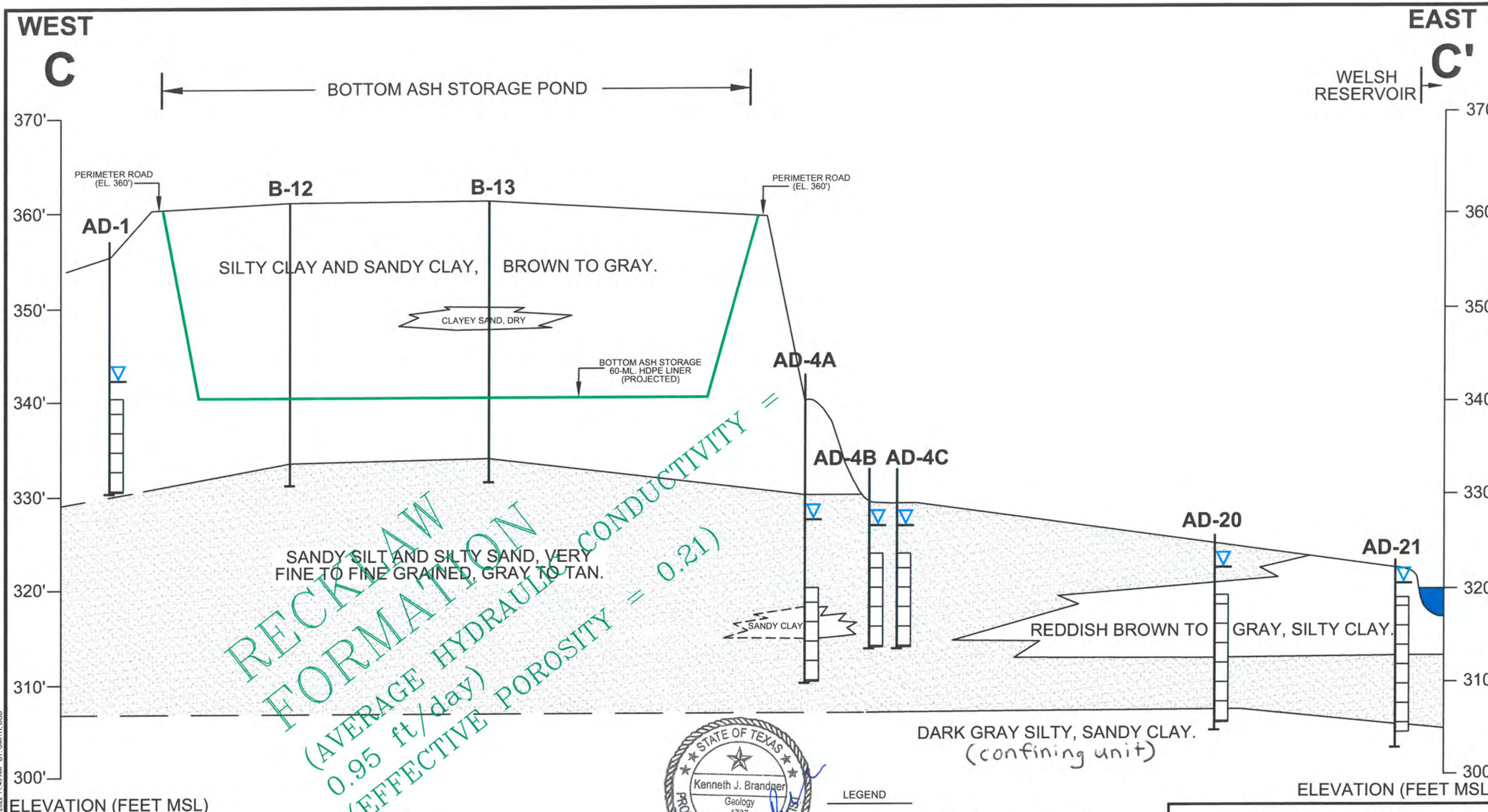
0 300'
HORIZONTAL SCALE

J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

CROSS SECTION
B - B'
(UPDATED SEPTEMBER 2022)

ARCADIS

FIGURE
5



NOTES:
1. BASE OF BOTTOM ASH STORAGE HAS A 60-MIL. HDPE LINER AT ELEVATION 340.0', TAKEN FROM FREESE AND NICHOLS "HYDRAULIC ANALYSIS OF WELSH POWER PLANT ASH PONDS, AMERICAN ELECTRIC POWER COMPANY", DATED DECEMBER 2010.
2. HYDRAULIC CONDUCTIVITY CALCULATED BASED ON ON-SITE AQUIFER TEST OF MONITORING WELL AD-6 ON 9-17-21; AND SLUG TESTING OF MONITORING WELLS AD-6, AD-9, AD-13, AD-17, AND AD-19 DURING OCTOBER 2018.
3. EFFECTIVE POROSITY ESTIMATED AT 0.21 BASED ON SITE LITHOLOGY. SITE SPECIFIC YIELD FOR FINE SAND, REFERENCE: C. W. FETTER, "APPLIED HYDROGEOLOGY", UNIVERSITY OF WISCONSIN - OSHKOSH, 1980.

LEGEND

- MONITORING WELL SCREENED INTERVAL
- WATER LEVEL IN MONITORING WELL (10/29/18)
- PROJECTED BASE OF ASH STORAGE (SEE NOTE)

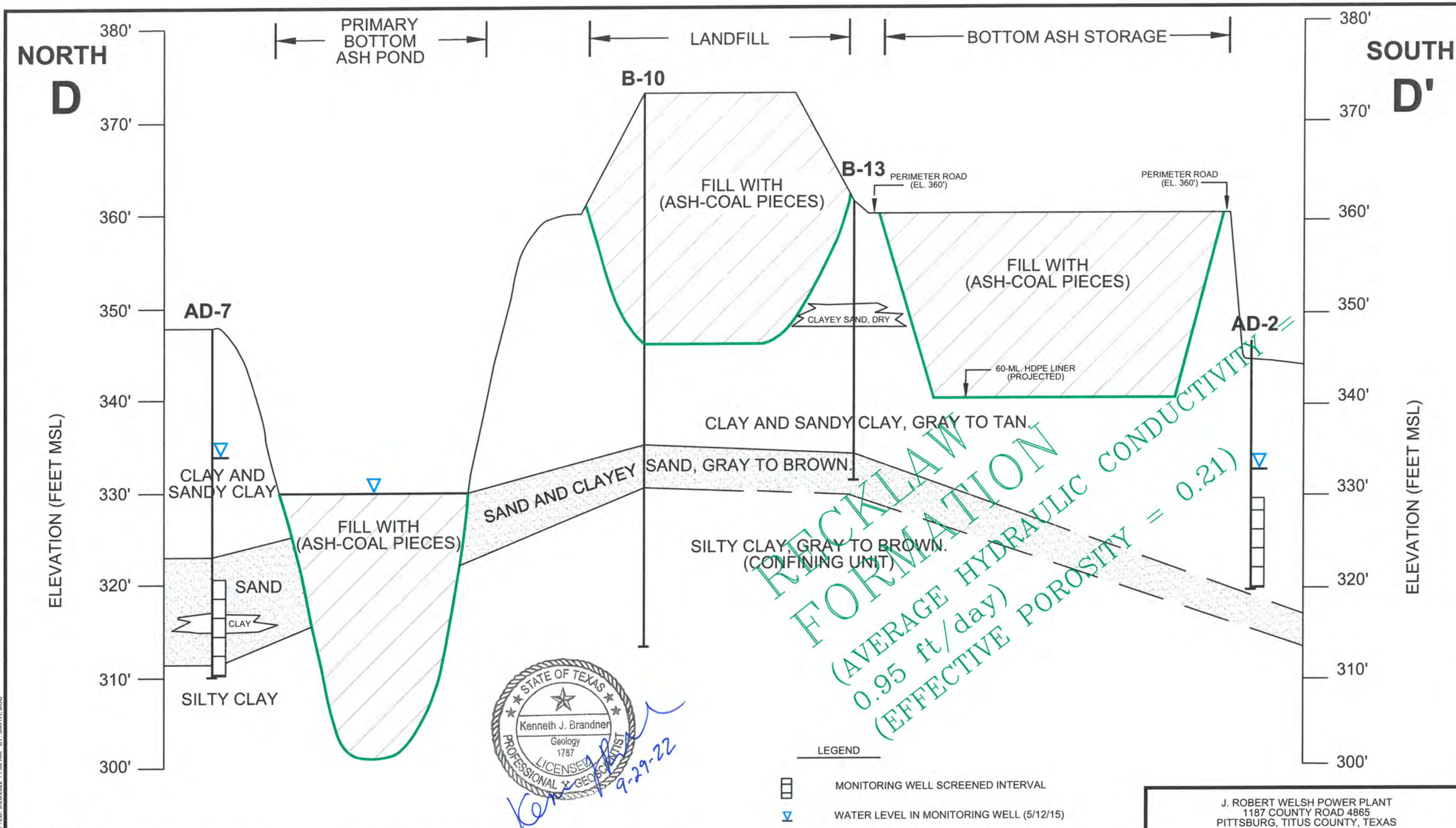
0 200'
HORIZONTAL SCALE

J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

CROSS SECTION C - C' (UPDATED SEPTEMBER 2022)

ARCADIS

FIGURE 6



LEGEND

- MONITORING WELL SCREENED INTERVAL
- WATER LEVEL IN MONITORING WELL (5/12/15)
- BASE OF CCR UNIT

0 — 300'
HORIZONTAL SCALE

NOTES:
1. BASE OF ASH POND TAKEN FROM "WELSH POWER PLANT-UNIT 1 FLY ASH STORAGE AREA PHASE I " DRAWING ID WEPX-88, DATED 12-3-76; AND U.S. GEOLOGICAL SURVEY 7 1/2 MINUTE SERIES TOPOGRAPHIC MAP, CASON, TX QUADRANGLE, 1964 (PHOTO REVISED 1980).
2. HYDRAULIC CONDUCTIVITY CALCULATED BASED ON ON-SITE AQUIFER TEST OF MONITORING WELL AD-6 ON 9-17-21; AND SLUG TESTING OF MONITORING WELLS AD-6, AD-9, AD-13, AD-17, AND AD-19 DURING OCTOBER 2018.
3. EFFECTIVE POROSITY ESTIMATED AT 0.21 BASED ON SITE LITHOLOGY. SITE SPECIFIC YIELD FOR FINE SAND, REFERENCE: C. W. FETTER, "APPLIED HYDROGEOLOGY", UNIVERSITY OF WISCONSIN - OSHKOSH, 1980.

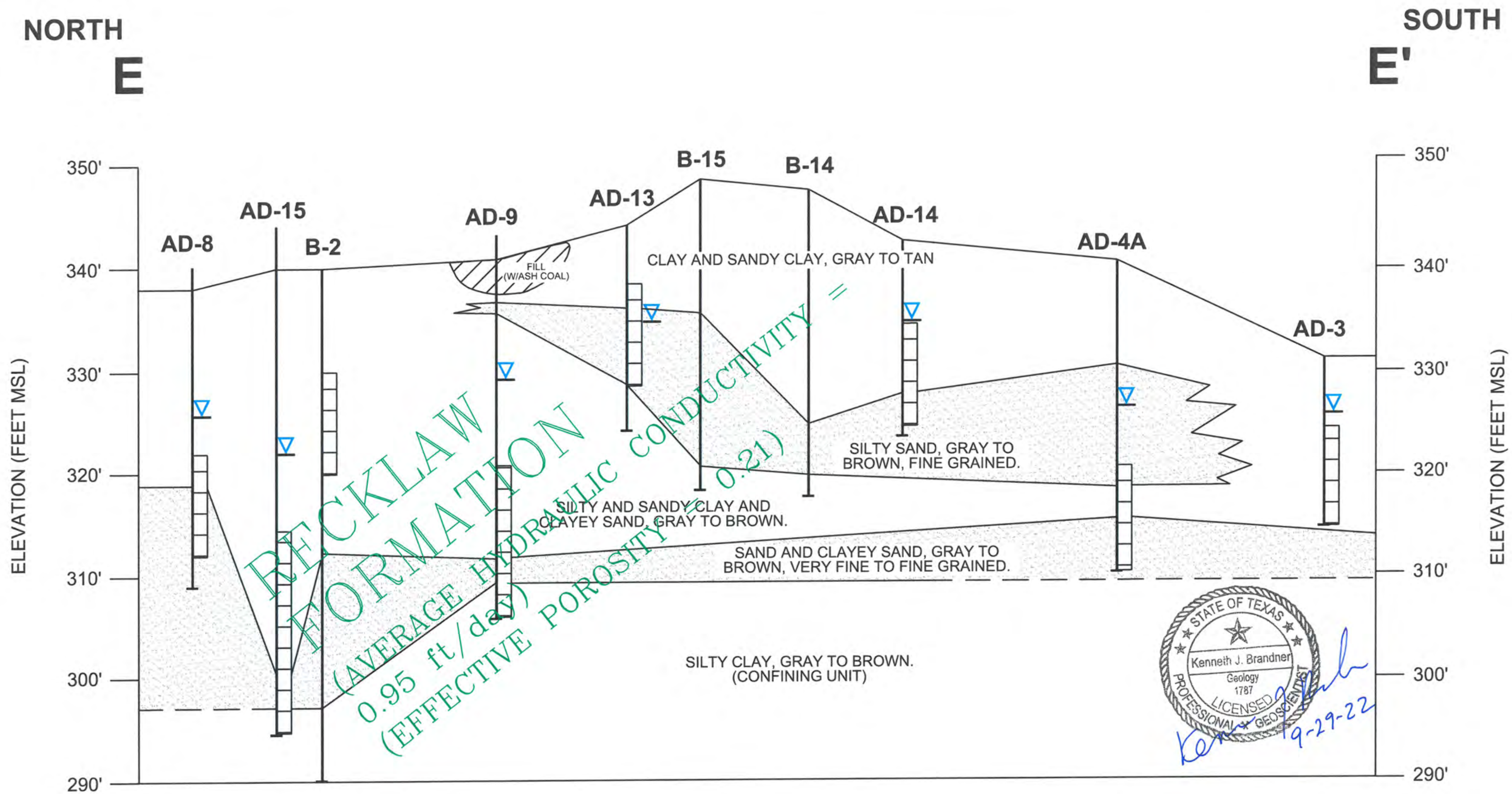
J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

CROSS SECTION D - D' (UPDATED SEPTEMBER 2022)

ARCADIS

FIGURE 7

CITY: DIV/GROUP: DB: LD: AM: PD: TM: TR: LYR:ON=*;OFF=*REF*
C:\Users\bsmith\OneDrive - ARCADIS\BIM360 - OneDrive Sync Location\AUS-AEP-J. ROBERT WELSH POWER PLANT-PITTSBURG Texas\2022\01-In Progress\01-DWG\Figure 7 Cross Section D-D'.dwg LAYOUT: D-D SAVED: 9/28/2022 11:41 AM ACADVER: 24.2S (LMS TECH) PAGESETUP: ---
PLOTSTYLETABLE: ACAD.CTB PLOTTED: 9/28/2022 11:50 AM BY: SMITH, BOB



NOTES:

1. BASE OF ASH POND TAKEN FROM "WELSH POWER PLANT-UNIT 1 FLY ASH STORAGE AREA PHASE I " DRAWING ID WEPX-88, DATED 12-3-76; AND U.S. GEOLOGICAL SURVEY 7 1/2 MINUTE SERIES TOPOGRAPHIC MAP, CASON, TX QUADRANGLE, 1964 (PHOTO REVISED 1980).
2. HYDRAULIC CONDUCTIVITY CALCULATED BASED ON ON-SITE AQUIFER TEST OF MONITORING WELL AD-6 ON 9-17-21; AND SLUG TESTING OF MONITORING WELLS AD-6, AD-9, AD-13, AD-17, AND AD-19 DURING OCTOBER 2018.
3. EFFECTIVE POROSITY ESTIMATED AT 0.21 BASED ON SITE LITHOLOGY. SITE SPECIFIC YIELD FOR FINE SAND, REFERENCE: C. W. FETTER, "APPLIED HYDROGEOLOGY", UNIVERSITY OF WISCONSIN - OSHKOSH, 1980.

LEGEND

- MONITORING WELL SCREENED INTERVAL
- ▽ WATER LEVEL IN MONITORING WELL (3/4/16)

0 — 300'
HORIZONTAL SCALE

J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

CROSS SECTION
E - E'
(UPDATED SEPTEMBER 2022)

ARCADIS

FIGURE 8

CITY: DIV/GROUP: DB: LD: AM: PD: TM: TR: LYR:ON=*;OFF=*REF*
C:\Users\bsmith\OneDrive - ARCADIS\BIM360 - OneDrive Sync Location\AUS-AEP-J. ROBERT WELSH POWER PLANT-PITTSBURG Texas\2022\01-In Progress\01-DWG\Figure 8 Cross Section E-E'.dwg LAYOUT: E-E SAVED: 9/27/2022 10:43 AM ACADVER: 24.2S (LMS TECH) PAGESETUP: ---
PLOTSTYLETABLE: ACAD.CTB PLOTTED: 9/28/2022 11:46 AM BY: SMITH, BOB

ATTACHMENT B
Historical Potentiometric Maps

Legend

- Groundwater Monitoring Well
- Groundwater Elevation Contour
- Groundwater Elevation Contour (Inferred)
- Approximate Groundwater Flow Direction
- CCR Units

Notes

1. Monitoring well coordinates and water level data (collected on February 6 and 7, 2023) provided by AEP.
2. Site features based on information available in CCR Groundwater Monitoring Well Network Evaluation (Arcadis 2022).
3. Groundwater elevation units are feet above mean sea level.
4. Satellite imagery provided by ESRI.

500 250 0 500 Feet

STATE OF TEXAS
BETH ANN GROSS
79864
LICENSED
PROFESSIONAL ENGINEER

Beth Ann Gross
November 30, 2023

Geosyntec Consultants, Inc.
Texas Firm Registration No. 1182

Groundwater Potentiometric Map
February 2023

AEP Welsh Power Plant
Cason, Texas

Geosyntec consultants

Figure **1**

Columbus, Ohio	2023/11/30

\\annarbor-01\Data\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Welsh\2023\AEP-Welsh_GW_2023-02Feb.mxd. ASoltero. 11/30/2023. CHA8423/14/08.

Legend

- Groundwater Monitoring Well
- Groundwater Elevation Contour
- Groundwater Elevation Contour (Inferred)
- Approximate Groundwater Flow Direction
- CCR Units

Notes

1. Monitoring well coordinates and water level data (collected on June 6, 2023) provided by AEP.
2. AD-12 was not gauged during the June 2023 event.
3. Site features based on information available in CCR Groundwater Monitoring Well Network Evaluation (Arcadis 2022).
4. Groundwater elevation units are feet above mean sea level.
5 Satellite imagery provided by ESRI.

500 250 0 500
Feet

STATE OF TEXAS
BETH ANN GROSS
79864
LICENSED
PROFESSIONAL ENGINEER

Beth Ann Gross
November 30, 2023

Geosyntec Consultants, Inc.
Texas Firm Registration No. 1182

Groundwater Potentiometric Map
June 2023

AEP Welsh Power Plant
Cason, Texas

Geosyntec
consultants

Figure
2

Columbus, Ohio | 2023/11/30

\\annarbor-01\Data\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Welsh\2023\AEP-Welsh_GW_2023-06June.mxd. ASoltero. 11/30/2023. CHA8423/14/08.

Legend
- Groundwater Monitoring Well
- Groundwater Elevation Contour
- Groundwater Elevation Contour (Inferred)
- Approximate Groundwater Flow Direction
- CCR Units

Notes
1. Monitoring well coordinates and water level data (collected on July 27, 2023) provided by AEP.
2. Only well AD-04C was gauged during the July 2023 verification event.Groundwater contours based on June 2023 sampling event.
3. Site features based on information available in CCR Groundwater Monitoring Well Network Evaluation (Arcadis, 2018).
4. Groundwater elevation units are feet above mean sea level.
5 Satellite imagery provided by ESRI.

500 250 0 500 Feet

STATE OF TEXAS
BETH ANN GROSS
79864
LICENSED
PROFESSIONAL ENGINEER

Beth Ann Gross

November 29, 2023

Geosyntec Consultants, Inc.
Texas Firm Registration No. 1182

Groundwater Potentiometric Map
July 2023

AEP Welsh Power Plant
Cason, Texas

Geosyntec consultants

Columbus, Ohio | 2023/11/29

Figure 3

\\annarbor-01\Data\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Welsh\2023\AEP-Welsh_GW_2023-07July_ver.mxd. ASoltero. 11/29/2023. CHA8423/14/08.

Legend

- Groundwater Monitoring Well
- Groundwater Elevation Contour
- Groundwater Elevation Contour (Inferred)
- Approximate Groundwater Flow Direction
- CCR Units

Notes

1. Monitoring well coordinates and water level data (collected on October 3 and 4, 2023) provided by AEP.
2. Site features based on information available in CCR Groundwater Monitoring Well Network Evaluation (Arcadis 2022).
3. Groundwater elevation units are feet above mean sea level.
4. Satellite imagery provided by ESRI.

500 250 0 500 Feet

STATE OF TEXAS BETH ANN GROSS 79864 LICENSED PROFESSIONAL ENGINEER

Beth Ann Gross

November 30, 2023

Geosyntec Consultants, Inc.
Texas Firm Registration No. 1182

Groundwater Potentiometric Map
October 2023

AEP Welsh Power Plant
Cason, Texas

Geosyntec consultants

Figure
4

Columbus, Ohio | 2023/11/30

\\annarbor-01\Data\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Welsh\2023\AEP-Welsh_GW_2023-10Oct.mxd. ASoltero. 11/30/2023. CHA8423/14/08.

Legend

- Groundwater Monitoring Well
- Groundwater Elevation Contour
- Groundwater Elevation Contour (Inferred)
- Approximate Groundwater Flow Direction
- CCR Units

Notes

1. Monitoring well coordinates and water level data (collected on December 14, 2023) provided by AEP.
2. Only wells AD-3, AD-4C, and AD-16R were gauged during the December 2023 verification event. Groundwater contours based on October 2023 sampling event.
3. Site features based on information available in CCR Groundwater Monitoring Well Network Evaluation (Arcadis, 2018).
4. Groundwater elevation units are feet above mean sea level.
5 Aerial imagery provided by Google Earth Pro, dated December 29, 2023.

500 250 0 500 Feet

STATE OF TEXAS BETH ANN GROSS 79864 LICENSED PROFESSIONAL ENGINEER

Beth Ann Gross

December 23, 2024

Geosyntec Consultants, Inc.
Texas Firm Registration No. 1182

Groundwater Potentiometric Map
December 2023

AEP Welsh Power Plant
Cason, Texas

Geosyntec consultants

Figure **5**

Columbus, Ohio	2024/12/23

A:\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Welsh\2023\AEP-Welsh_GW_2023-12Dec_ver.mxd. Okiemute.Commander. 12/23/2024. CHA8423/14/08.

ATTACHMENT C
Chemical Analysis of Wells in Titus County

Table 11.--Chemical analyses of water from wells and springs in Camp, Franklin, Morris, Titus, and adjoining counties--Continued

Titus County

Well	Depth of well (ft)	Date of collection	Silica (SiO_2)	Iron (Fe) (total)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Boron (B)	Dissolved solids	Hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Residual sodium carbonate (RSC)	Specific conductance (micromhos at 25°C)	pH
YA-16-41-101	22	Aug. 20, 1963	--	--	--	--	--	*17		7	0.0	18	--	40	--	--	--	27	57	1.4	0.00	149	5.1
102	34	do	--	--	--	--	--	--		34	--	358	--	--	--	--	--	324	--	--	--	1,250	5.8
201	30	May 26, 1942	--	--	--	12	1.2	*32		55	15	24	--	15	--	--	127	36	--	--	--	--	--
301	60	do	--	--	--	179	126	*126		12	1,025	115	0	3.0	--	--	1,580	968	--	--	--	--	--
302	60	do	--	--	--	134	39	*152		116	211	361	--	1.0	--	--	955	494	--	--	--	--	--
801	200	Feb. 25, 1963	13	0.13	--	6.8	2.0	*147		308	.0	65	.4	.0	--	--	385	25	93	13	4.55	703	7.3
802	31	do	--	--	--	--	--	--		22	4.0	238	--	44	--	--	--	181	--	--	.00	955	5.2
902	470	July 30, 1963	11	.13	--	3.2	.7	*326		406	.0	272	.9	1.5	--	--	815	11	98	43	6.43	1,410	7.5
903	27	May 26, 1942	--	--	--	82	63	*155		268	296	191	0	3.0	--	--	922	464	--	--	--	--	--
42-401	48	June 3, 1942	--	--	--	226	63	*421		549	33	890	--	0	--	--	1,903	824	--	--	--	--	--
702	22	do	--	--	--	12	5.8	*58		55	18	77	--	10	--	--	208	54	--	--	--	--	--
49-103	20	May 22, 1942	--	--	--	.8	1.0	*12		18	11	3.0	--	1.5	--	--	38	6	--	--	--	--	--
202	315	Feb. 20, 1963	51	22	--	9.8	3.2	*24		91	.0	11	.1	.0	--	--	144	38	58	1.7	.74	215	5.8
203	30	do	--	--	--	--	--	*275		64	1,420	700	--	--	--	--	--	1,920	24	2.7	.00	4,090	5.5
206	485	Feb. 25, 1963	14	.68	--	20	.7	*58		122	13	13	.2	1.0	--	--	162	8	94	8.9	1.84	284	7.3
301	24	May 26, 1942	--	--	--	2.4	1.2	*28		31	7	22	--	10	--	--	86	11	--	--	--	--	--
401	24	May 22, 1942	--	--	--	21	3.6	*13		43	26	20	--	7.0	--	--	112	67	--	--	--	--	--
402	395	Mar. 12, 1963	50	11	--	9.0	3.9	16	2.6	64	3.4	14	.2	0	--	0.00	130	38	45	1.1	.28	156	5.9
503	360	Feb. 20, 1963	54	12	--	9	3.2	*26		78	4.6	16	.1	.0	--	--	151	36	61	1.9	.57	218	5.8
601	22	May 25, 1942	--	--	--	49	19	*109		171	74	138	.2	33	--	--	506	202	--	--	--	--	--
603	350	July 30, 1963	11	.12	--	1.5	.1	*86		204	.0	16	.2	1.8	--	--	217	4	98	19	3.26	353	7.4
701	437	May 27, 1942	20	.07	--	3.7	1.2	*231		370	2	149	.2	2.0	--	--	594	14	--	--	--	--	8.2
701	437	June 22, 1949	15	.14	--	1.6	.7	196	1.6	a/337	1.6	109	.1	2.2	--	.79	509	--	--	--	--	869	8.5
701	437	Feb. 19, 1963	12	2.8	--	1.5	.5	170	1.1	322	3.2	74	.2	.0	--	.20	421	6	98	30	5.17	758	7.4
702	597	May 27, 1942	20	.05	--	3.8	1.0	224	--	380	2	132	0	.0	--	--	567	14	--	--	--	--	8.4
702	597	Feb. 19, 1963	12	1.4	--	2.5	.7	218	1.2	368	.0	126	.3	.0	--	.27	542	9	98	32	5.85	991	7.7
706	430	May 14, 1942	39	5.6	--	14	6.6	30	--	126	2	15	.1	.5	--	--	176	62	--	--	--	--	--

See footnotes at end of table.

Table 11.--Chemical analyses of water from wells and springs in Camp, Franklin, Morris, Titus, and adjoining counties--Continued

Titus County

Well	Depth of well (ft)	Date of collection	Silica (SiO_2)	Iron (Fe) (total)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Boron (B)	Dissolved solids	Hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Residual sodium carbonate (RSC)	Specific conductance (micromhos at 25°C)	pH
YA-16-49-708	460	Mar. 14, 1963	13	0.13	--	1.5	0.2	152	.8	298	3.2	62	0.2	0.0	--	0.10	380	5	98	30	4.78	651	8.0
804	18	May 14, 1942	--	--	--	10	1.2	*7.4		24	18	6.0	--	0	--	--	55	31	--	--	--	--	--
924	300	Apr. 25, 1963	33	2.7	--	20	4.0	*55		156	13	31	.5	.0	--	--	234	66	64	2.9	1.23	352	7.1
50-101	35	June 3, 1942	--	--	--	13	2.4	*46		49	12	14	--	86	--	--	197	42	--	--	--	--	--
102	31	do	--	--	--	79	35	*44		110	11	141	--	169	--	--	533	342	--	--	--	--	--
202	48	do	--	--	--	47	12	*38		49	2	125	--	39	--	--	287	168	--	--	--	--	--
403	310	July 30, 1963	18	.09	--	27	6.9	*107		284	57	26	.2	.0	--	--	382	96	71	4.8	2.73	601	7.2
404	10	May 25, 1942	--	--	--	31	28	*6.4		18	74	78	--	5.0	--	--	231	192	--	--	--	--	--
409	300	July 30, 1963	12	.05	--	4.2	.9	*116		270	23	13	.2	2.0	--	--	304	14	95	13	4.15	485	7.3
501	37	May 25, 1942	--	--	--	308	97	*76		488	274	460	0	2.0	--	--	1,457	1,170	--	--	--	--	--
703	18	June 3, 1942	--	--	--	1.6	3.2	*2.3		12	4	4.0	.3	2.0	--	--	23	17	--	--	--	--	--
57-102	246	Aug. 22, 1963	34	2.9	--	45	9.7	*34		130	75	29	.2	.2	--	--	291	152	33	1.2	.00	452	6.6
110	700	June 3, 1963	12	.09	--	4.5	1.2	*420		396	0	425	.5	.7	--	--	1,060	16	98	46	6.17	1,890	7.6
114	475	Aug. 22, 1963	13	.06	--	6.0	.7	*56		155	.0	8.5	.2	.5	--	--	161	18	87	5.7	2.18	272	7.2
301	20	May 13, 1942	--	--	--	4.8	3.6	*10		12	26	7.0	.2	2.0	--	--	60	27	--	--	--	--	--
302	420	July 31, 1963	13	.22	--	3.5	.5	*104		266	.2	15	.2	2.2	--	.06	271	11	95	14	4.14	440	7.3
401	300	Aug. 22, 1963	13	--	--	4.8	1.0	*157		286	.0	86	.6	.0	--	--	403	16	96	17	4.37	688	7.7
402	300	May 1, 1963	13	1.1	0.00	5.0	1.1	157	1.6	296	.2	88	.5	.0	0.94	.28	414	17	95	17	4.51	708	7.5
601	18	May 13, 1942	--	--	--	8.8	2.4	*11		18	5	18	.2	12	--	--	67	32	--	--	--	--	--
58-101	9	May 14, 1942	--	--	--	12	6.1	*31		12	63	29	.2	6.0	--	--	153	54	--	--	--	--	--
103	24	do	--	--	--	8.8	3.6	*13		6	12	20	--	25	--	--	85	37	--	--	--	--	--
203	21	do	--	--	--	13	2.4	*29		61	5	28	--	12	--	--	119	42	--	--	--	--	--
401	13	May 13, 1942	--	--	--	4.8	2.4	*8.1		18	2	10	.1	10	--	--	47	22	--	--	--	--	--
701	25	May 14, 1942	--	--	--	13	12	*38		12	2	35	--	130	--	--	236	83	--	--	--	--	--
17-48-102	26	Aug. 21, 1963	--	--	--	--	--	--		53	--	38	--	--	--	--	--	53	--	--	.00	299	5.6
202	18	Mar. 22, 1942	--	--	--	11	1.0	*104		12	30	84	--	120	--	--	356	31	--	--	--	--	--
202	18	Aug. 21, 1963	--	--	--	--	--	--		22	--	89	--	--	--	--	--	86	--	--	.00	696	5.6

See footnotes at end of table.

Table 11.--Chemical analyses of water from wells and springs in Camp, Franklin, Morris, Titus, and adjoining counties--Continued

Titus County

Well	Depth of well (ft)	Date of collection	Silica (SiO_2)	Iron (Fe) (total)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Boron (B)	Dissolved solids	Hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Residual sodium carbonate (RSC)	Specific conductance (micromhos at 25°C)	pH
YA-17-48-801	13	May 22, 1942	--	--	--	11	4.9	*37		43	12	40	--	29	--	--	155	48	--	--	--	--	--
802	18	May 20, 1942	--	--	--	5.6	6.1	*17		31	7	12	--	33	--	--	96	39	--	--	--	--	--
901	25	May 22, 1942	--	--	--	13	4.9	*37		12	22	39	--	55	--	--	177	53	--	--	--	--	--
56-201	40	May 27, 1942	--	--	--	22	15	*17		12	2	18	--	141	--	--	221	114	--	--	--	--	--
303	20	May 20, 1942	--	--	--	26	4.6	*34		55	11	65	--	10	--	--	178	83	--	--	--	--	--
304	310	Aug. 13, 1963	18	1.8	--	7.5	2.6	*117		190	74	35	0.2	.0	--	--	347	29	90	9.4	2.53	560	7.2
401	11	May 27, 1942	--	--	--	16	7.3	*134		31	122	102	--	82	--	--	478	70	--	--	--	--	--
402	30	do	--	--	--	4.4	1.2	*19		18	30	4.0	.2	6.0	--	--	74	16	--	--	--	--	--
415	225	Jan. 17, 1963	12	.37	--	3.5	1.2	*132		248	71	15	.1	2.8	--	--	360	14	96	15	3.79	526	7.5
601	28	May 20, 1942	--	--	--	98	55	*67		171	185	199	.1	1.5	--	--	690	469	--	--	--	--	--
701	38	May 15, 1942	--	--	--	6.0	0	*5.1		18	4	5.0	0	0	--	--	29	15	--	--	--	--	--
† 707	260	Oct. 15, 1962	22	.1	--	6.7	2.5	*191.1		201.3	198	50.0	--	--	--	--	--	27	--	--	--	892	8.02
707	260	July 27, 1963	7.8	1.7	0.00	8.2	2.3	182	2.4	184	202	50	.1	2.8	0.24	0.09	548	30	92	14	2.42	866	7.0
801	Spring	May 15, 1942	--	--	--	8.8	2.4	*1.2		37	2	1.0	--	1.5	--	--	35	32	--	--	--	--	--
901	502	May 29, 1942	--	--	--	5.2	4.9	*297		323	2	288	.2	7.0	--	--	764	33	--	--	--	--	--
64-101	380	July 31, 1963	14	.09	--	3.8	.9	*82		187	1.8	24	.2	1.2	--	--	220	13	93	9.9	2.80	356	7.5
102	17	May 15, 1942	--	--	--	4.8	2.4	*22		49	3	15	.1	6.0	--	--	77	22	--	--	--	--	--
201	48	do	--	--	--	48	22	*124		43	30	254	--	66	--	--	565	208	--	--	--	--	--
301	40	do	--	--	--	205	126	*239		580	418	450	0	9.0	--	--	1,732	1,033	--	--	--	--	--
401	32	do	--	--	--	24	18	*127		98	30	195	--	32	--	--	474	136	--	--	--	--	--

* Sodium and potassium calculated as sodium (Na).
† Analyses by Curtis Laboratories.
a/ Includes the equivalent of 5 ppm as carbonate (CO_3).

ATTACHMENT D

Certification by a Qualified Professional Engineer

CERTIFICATION BY A QUALIFIED PROFESSIONAL ENGINEER

I certify that the selected and above described alternative source demonstration is appropriate for evaluating the groundwater monitoring data for the Welsh Bottom Ash Storage Pond CCR management area and that the requirements of 30 TAC §352.941(c) have been met.

Beth Ann Gross
Printed Name of Licensed Professional Engineer

Signature

Geosyntec Consultants
2039 Centre Pointe Blvd, Suite 103
Tallahassee, Florida 32308

Texas Registered Engineering Firm
No. F-1182

79864	Texas	December 23, 2024
License Number	Licensing State	Date