

# **Annual Groundwater Monitoring Report**

Southwestern Electric Power Company

J. Robert Welsh Power Plant

CN602843245

RN100213370

## **Landfill CCR Management Unit**

WMU 001

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Titus County

Pittsburg, Texas

**January 2021**

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An **AEP** Company

BOUNDLESS ENERGY™

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**Appendix V** – Other information as needed - NA

## I. Overview

This *Annual Groundwater Monitoring Report* (Report) has been prepared to report the status of activities for the preceding year for an existing CCR unit at Southwestern Electric Power Company's, a wholly-owned subsidiary of American Electric Power Company (AEP), Welsh Power Plant. The USEPA's CCR rules require that the Annual Groundwater Monitoring Report be posted to the operating record for the preceding year no later than January 31, 2021.

In general, the following activities were completed:

- This CCR Unit began and remained in assessment monitoring throughout 2020.
- Annual and Semi-Annual groundwater samples were collected and analyzed for Appendix III and Appendix IV constituents, as specified in 40 CFR 257.95 *et seq.* and AEP's *Groundwater Sampling and Analysis Plan (2016)*;
- A statistical process in accordance with 40 CFR 257.93 to evaluate groundwater data was updated and certified (AEP's *Statistical Analysis Plan (Geosyntec 2020)*). The statistical process was guided by USEPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* ("Unified Guidance," USEPA, 2009);
- Semi-annual groundwater data underwent various validation tests, including tests for completeness, valid values, transcription errors, and consistent units;
- Annual groundwater sampling event was conducted in February;
- First semi-annual groundwater sampling event:
  - Statistically significant increases(SSIs):
    - Boron concentrations exceeded the interwell UPL of 0.700 mg/L at AD-11, AD-13, and AD-14;
    - Calcium concentrations exceeded the intrawell UPL of 12.2 mg/L at AD-14;
  - Statistically significant levels (SSLs):
    - None were identified;
- Second semi-annual groundwater sampling event:
  - Statistical analysis is underway;
- SSIs remain without successful alternate source demonstrations (ASDs), keeping the unit in assessment monitoring.

The major components of this annual report, to the extent applicable at this time, are presented in sections that follow:

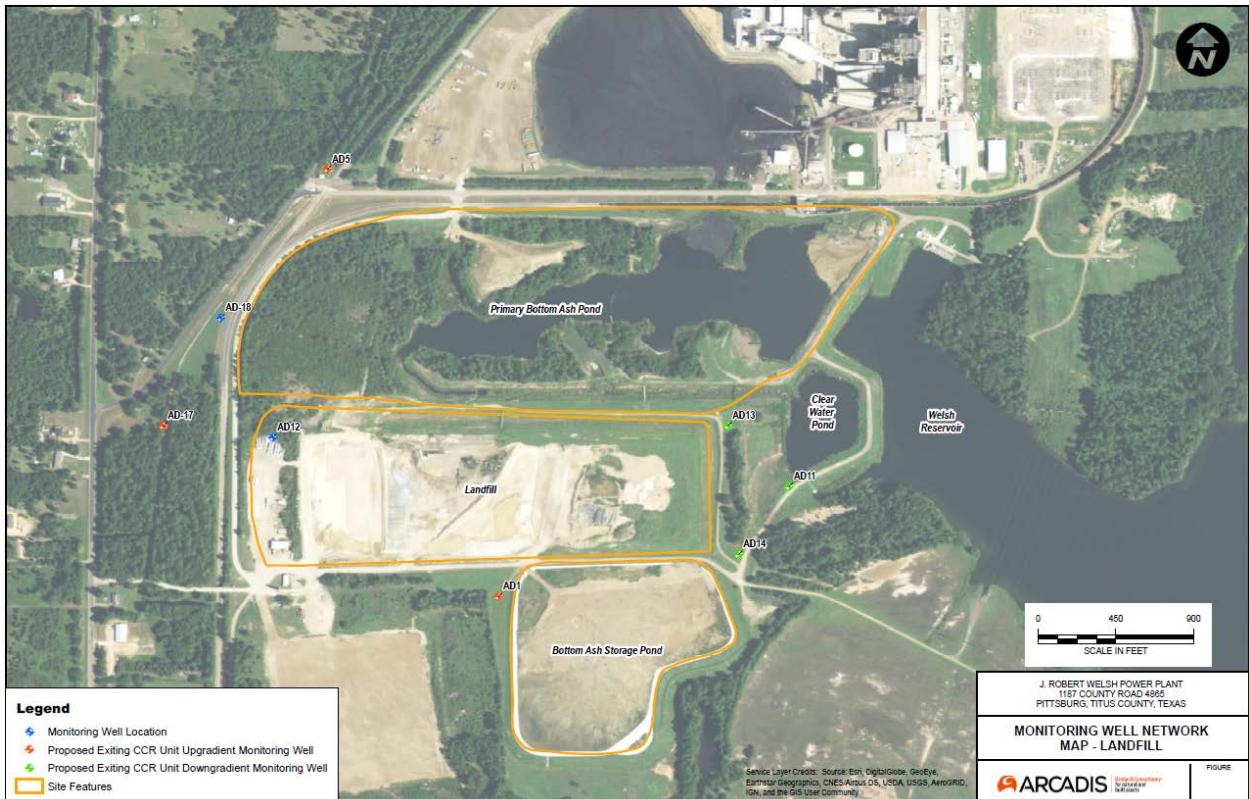
- A map, aerial photograph or a drawing showing the CCR management unit(s), all groundwater monitoring wells and monitoring well identification numbers;
- Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a statement as to why that happened;
- All of the monitoring data collected, including the rate and direction of groundwater flow, plus a summary showing the number of samples collected per monitoring well, the dates the samples were collected and whether the sample was collected as part of detection monitoring or assessment monitoring programs is included in Appendix I;
- Statistical reports are located in Appendix II
- Alternate source demonstration, if any, are presented in Appendix III.
- A summary of any transition between monitoring programs or an alternate monitoring frequency, for example the date and circumstances for transitioning from detection monitoring to assessment monitoring, in addition to identifying the constituents detected at a statistically significant increase over background concentrations (Appendix IV).
- Other information required to be included in the annual report such as program related notification or assessment of corrective measures, if applicable, are presented in Appendix V;

In addition, this report summarizes key actions completed, and where applicable, describes any problems encountered and actions taken to resolve those problems. The report includes a projection of key activities for the upcoming year.

## II. Groundwater Monitoring Well Locations and Identification Numbers

The figure that follows depicts the PE-certified groundwater monitoring network, the monitoring well locations and their corresponding identification numbers.

Landfill Monitoring Wells	
Up Gradient	Down Gradient
AD-1	AD-11
AD-5	AD-13
AD-17	AD-14



**III. Monitoring Wells Installed or Decommissioned**

During 2020, no monitoring wells were installed or decommissioned.

**IV. Groundwater Quality Data and Static Water Elevation Data. With Flow Rate and Direction and Discussion**

Appendix I contains potentiometric maps with the static water elevation, groundwater flow direction for each monitoring event and tables showing groundwater velocity and the groundwater quality data collected under 40 CFR 257.90 through 257.98.

The sampling event conducted February 17, 2020 satisfies the requirement of 257.95(b).

- The groundwater flow rate and direction for the first semi-annual confirmatory sampling event reflects that seen during the initial first semi-annual sampling event.

**V. Statistical Evaluations completed in 2020**

First semi-annual 2020 event conducted in May:

- the following SSIs were determined:
  - Boron concentrations exceeded the interwell UPL of 0.700 mg/L at AD-11, AD-13, and AD-14
  - Calcium concentrations exceeded the intrawell UPL of 12.2 mg/L at AD-14
- No SSLs were determined for the landfill during the First semi-annual 2020 event

Second semi-annual groundwater sampling event was conducted in October:

- statistical analysis is underway

The statistical reports completed in 2020 are found in Appendix II

**VI. Alternate Source Demonstrations completed in 2020**

No ASDs were conducted for the landfill's SSIs.

**VII. Discussion About Transition Between Monitoring Requirements or Alternate Monitoring Frequency**

This unit remains in assessment monitoring.

**VIII. Other Information Required**

As required by the CCR assessment monitoring rules in 40 CFR 257.95 (b) and (d)(1), sampling all CCR wells for the required Appendix III and IV parameters was completed in 2020.

**IX. Description of Any Problems Encountered in 2020 and Actions Taken**

No significant problems were encountered.

**X. A Projection of Key Activities for the Upcoming Year**

- Assessment monitoring will continue;
- Complete the statistical evaluation of the Second 2020 semi-annual groundwater monitoring event.
- Conducted the annual groundwater sampling event, as required.
- Evaluation of the assessment monitoring results from a statistical analysis viewpoint, looking for SSIs above background as well as SSLs above GWPS;
- If needed, ASDs will be conducted to evaluate if the unit can remain in assessment monitoring or the unit will move to an assessment of corrective measures.
- Responding to any new data received in light of CCR rule requirements;
- Preparation of the next annual groundwater report.

## **APPENDIX I**

Potentiometric maps and tables follow, showing the groundwater monitoring data collected, the rate and direction of groundwater flow, and a summary showing the number of samples collected per monitoring well. The dates that the samples were collected also is shown.

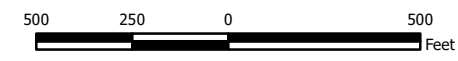




- Legend**
- ◆ Groundwater Monitoring Well
  - ➔ Approximate Groundwater Flow Direction
  - Groundwater Elevation Contour
  - - - Groundwater Elevation Contour (Inferred)
  - ▭ CCR Units

**Notes**

- Monitoring well coordinates and water level data (collected on February 17, 2020) provided by AEP.
- AD-2, AD-3, AD-4C, AD-6, AD-7, AD-10, AD-12, AD-16R, and AD-18 were not gauged during this event.
- Site features based on information available in CCR Groundwater Monitoring Well Network Evaluations (Arcadis, 2016).
- Groundwater elevation units are feet above mean sea level.



**Groundwater Potentiometric Map  
February 2020**

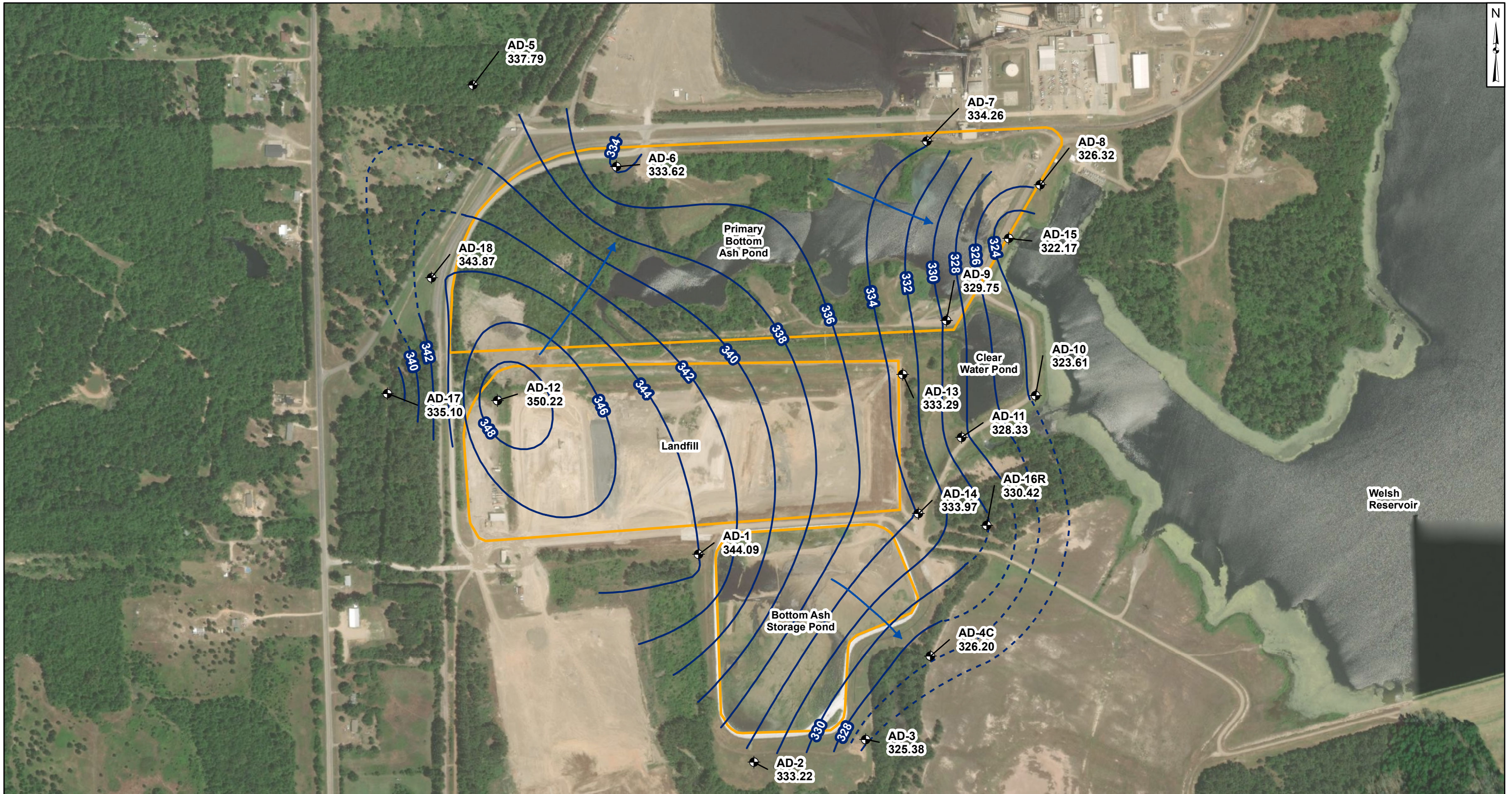
AEP Welsh Power Plant  
Cason, Texas

**Geosyntec**  
consultants

Columbus, Ohio

2020/05/11

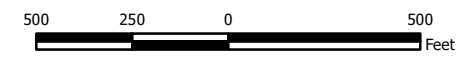
Figure  
**1**



- Legend**
- ⊕ Groundwater Monitoring Well
  - ➔ Approximate Groundwater Flow Direction
  - Groundwater Elevation Contour
  - - - Groundwater Elevation Contour (Inferred)
  - ▭ CCR Units

**Notes**

- Monitoring well coordinates and water level data (collected on May 19-20, 2020) provided by AEP.
- Site features based on information available in CCR Groundwater Monitoring Well Network Evaluations (Arcadis, 2016).
- Groundwater elevation units are feet above mean sea level.



**Groundwater Potentiometric Map  
May 2020**

AEP Welsh Power Plant  
Cason, Texas

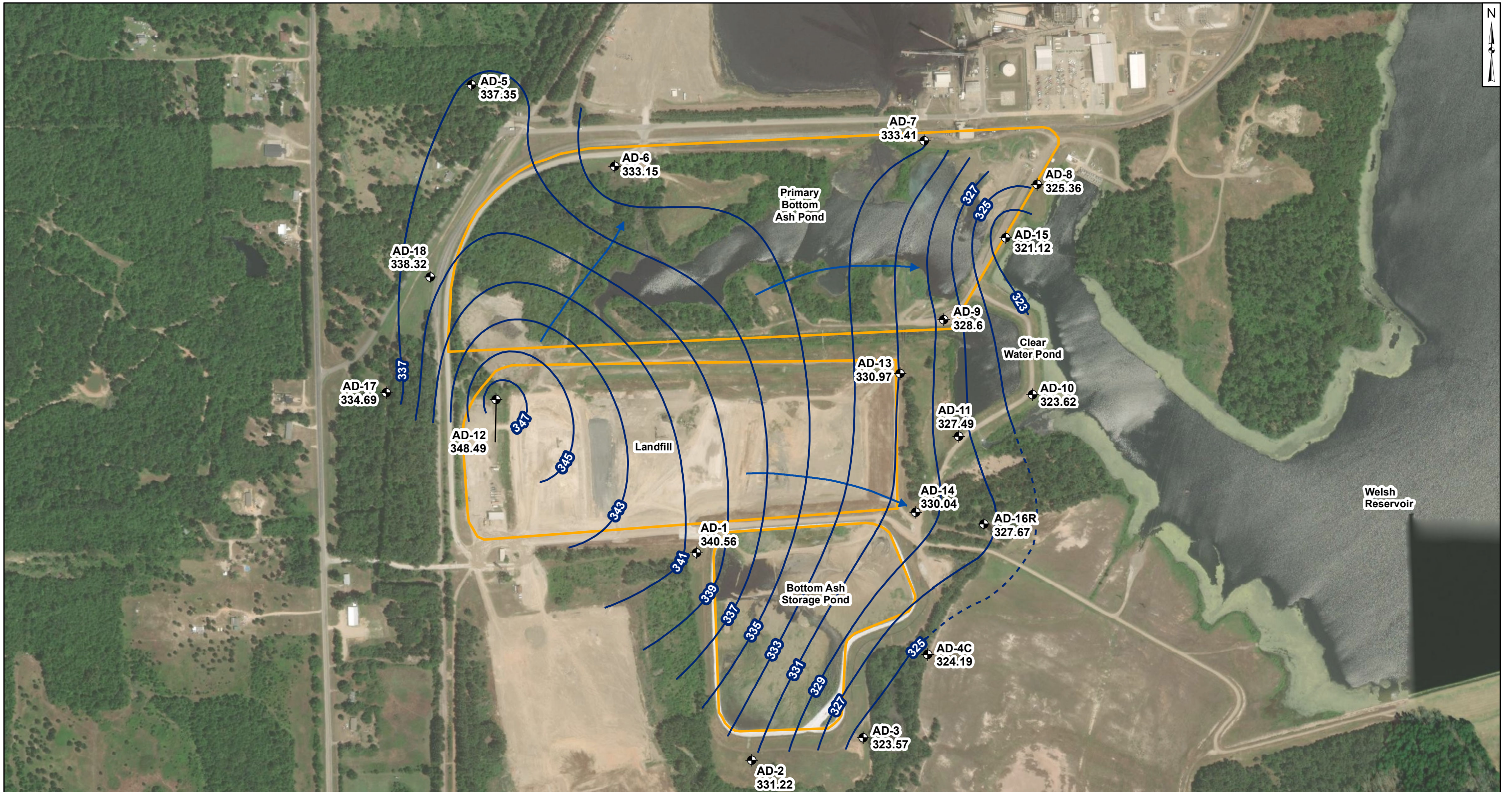
**Geosyntec**  
consultants

Columbus, Ohio

2020/11/04

Figure

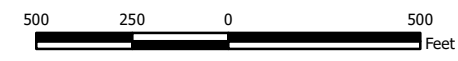
**2**



- Legend**
- ◆ Groundwater Monitoring Well
  - Groundwater Elevation Contour
  - - - Groundwater Elevation Contour (Inferred)
  - ➔ Approximate Groundwater Flow Direction
  - ▭ CCR Units

**Notes**

- Monitoring well coordinates and water level data (collected on October 12-14, 2020) provided by AEP.
- Site features based on information available in CCR Groundwater Monitoring Well Network Evaluations (Arcadis, 2016).
- Groundwater elevation units are feet above mean sea level.



**Groundwater Potentiometric Map  
October 2020**

AEP Welsh Power Plant  
Cason, Texas

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Columbus, Ohio

2021/01/06

Figure  
**3**

**Residence Time Calculation Summary Welsh  
Landfill**

*Geosyntec Consultants, Inc.*

CCR Management Unit	Monitoring Well	Well Diameter (inches)	2020-02		2020-05		2020-07 <sup>[3]</sup>		2020-10	
			Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)
Landfill	AD-5 <sup>[1]</sup>	2.0	1.0	59.3	1.8	34.5	0.8	73.0	2.6	23.5
	AD-11 <sup>[2]</sup>	2.0	5.0	12.1	2.9	20.8	3.7	16.2	2.6	23.8
	AD-13 <sup>[2]</sup>	0.0	4.8	12.7	2.8	21.4	3.3	18.7	3.1	19.5
	AD-14 <sup>[2]</sup>	0.0	3.2	18.9	3.9	15.5	2.2	28.0	2.7	22.9
	AD-1 <sup>[1]</sup>	2.0	4.6	13.1	3.4	17.7	3.8	16.0	3.2	19.0
	AD-17 <sup>[1]</sup>	2.0	2.4	25.1	9.3	6.5	1.3	46.0	7.7	7.9

Notes:

[1] - Upgradient Well

[2] - Downgradient Well

[3] - Two-of-two verification sampling

NC - Not Calculated

**Residence Time Calculation Summary Welsh  
Landfill**

*Geosyntec Consultants, Inc.*

CCR Management Unit	Monitoring Well	Well Diameter (inches)	2019-02		2019-05		2019-07	
			Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)
Landfill	AD-5 <sup>[1]</sup>	2.0	1.5	40.2	2.4	25.4	2.1	29.2
	AD-11 <sup>[2]</sup>	2.0	5.3	11.4	7.4	8.2	4.4	13.9
	AD-13 <sup>[2]</sup>	0.0	2.5	24.7	4.8	12.8	3.8	15.8
	AD-14 <sup>[2]</sup>	0.0	3.5	17.2	1.9	32.2	1.9	32.9
	AD-1 <sup>[1]</sup>	2.0	2.7	22.4	5.3	11.5	4.1	14.9
	AD-17 <sup>[1]</sup>	2.0	8.9	6.9	4.7	13.0	3.5	17.5

Notes:

[1] - Upgradient Well

[2] - Downgradient Well

**Residence Time Calculation Summary Welsh -  
Landfill**

*Geosyntec Consultants, Inc.*

CCR Management Unit	Monitoring Well	Well Diameter (inches)	2018-05		2018-08	
			Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)
Landfill	AD-5 <sup>[1]</sup>	2.0	3.7	16.6	1.5	40.5
	AD-11 <sup>[2]</sup>	2.0	4.0	15.3	2.7	22.9
	AD-13 <sup>[2]</sup>	0.0	2.6	23.8	2.4	25.7
	AD-14 <sup>[2]</sup>	0.0	2.7	22.1	1.8	34.4
	AD-1	2.0	3.7	16.7	3.4	17.6
	AD-17	2.0	1.6	37.4	3.2	18.8

Notes:

[1] - Upgradient Well

[2] - Downgradient Well

**Table 1 - Groundwater Data Summary: AD-1**

**Welsh - LF**

**Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
5/26/2016	Background	0.346	36.5	5	< 0.083 U	5.9	42	252
7/29/2016	Background	0.35	39.6	4	< 0.083 U	5.3	36	239
9/30/2016	Background	0.332	15	5	< 0.083 U	5.4	35	173
10/21/2016	Background	0.398	19.1	4	< 0.083 U	5.2	42	192
12/14/2016	Background	0.394	8.74	4	< 0.083 U	5.2	40	200
1/20/2017	Background	0.656	129	4	< 0.083 U	7.1	68	538
2/24/2017	Background	0.7	147	9	< 0.083 U	6.9	68	612
6/8/2017	Background	0.449	15.1	4	< 0.083 U	5.1	42	176
10/6/2017	Detection	0.453	14.3	4	< 0.083 U	5.3	40	160
5/24/2018	Assessment	0.345	10.2	4	< 0.083 U	2.2	43	150
8/14/2018	Assessment	0.443	5.95	5	< 0.083 U	5.2	44	160
2/20/2019	Assessment	0.504	142	2.82	0.24	7.3	49.2	522
5/30/2019	Assessment	0.689	138	1.59	0.29	6.7	43.3	588
7/24/2019	Assessment	0.644	62.7	2	0.106 J	6.0	58	180
2/17/2020	Assessment	0.626	115	3.41	0.31	5.8	56.3	488
5/20/2020	Assessment	0.801	126	1.83	0.20	7.2	51.4	508
10/14/2020	Assessment	0.670	3.88	2.16	0.25	4.5	66.9	183

Notes:

mg/L: milligrams per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

**Table 1 - Groundwater Data Summary: AD-1  
Welsh - LF  
Appendix IV Constituents**

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
5/26/2016	Background	< 0.93 U	1.39361 J	191	0.271453 J	0.213294 J	0.240267 J	1.15339 J	1.184	< 0.083 U	< 0.68 U	0.01	0.033	0.53149 J	1.74922 J	0.959865 J
7/29/2016	Background	< 0.93 U	< 1.05 U	191	0.315631 J	0.0940357 J	< 0.23 U	0.615933 J	0.9952	< 0.083 U	< 0.68 U	0.019	0.00793 J	< 0.29 U	1.81763 J	< 0.86 U
9/30/2016	Background	< 0.93 U	2.96797 J	141	0.382874 J	< 0.07 U	5	0.850408 J	1.38	< 0.083 U	3.38434 J	0.014	0.01773 J	< 0.29 U	1.02629 J	< 0.86 U
10/21/2016	Background	< 0.93 U	< 1.05 U	114	0.311247 J	< 0.07 U	0.412131 J	0.649606 J	1.141	< 0.083 U	< 0.68 U	0.008	0.00534 J	1.39872 J	2.03168 J	1.25062 J
12/14/2016	Background	< 0.93 U	< 1.05 U	72	0.34133 J	< 0.07 U	< 0.23 U	0.424105 J	0.719	< 0.083 U	< 0.68 U	0.008	0.01521 J	< 0.29 U	1.85825 J	< 0.86 U
1/20/2017	Background	< 0.93 U	< 1.05 U	410	0.0366913 J	< 0.07 U	< 0.23 U	0.480125 J	3.009	< 0.083 U	< 0.68 U	0.000275956 J	< 0.005 U	< 0.29 U	4.04737 J	< 0.86 U
2/24/2017	Background	< 0.93 U	< 1.05 U	488	< 0.02 U	< 0.07 U	< 0.23 U	0.765099 J	4.309	< 0.083 U	< 0.68 U	0.001	< 0.005 U	< 0.29 U	< 0.99 U	< 0.86 U
6/8/2017	Background	< 0.93 U	1.14 J	93.46	0.37 J	< 0.07 U	0.66 J	0.77 J	0.676	< 0.083 U	< 0.68 U	0.00902	0.007 J	< 0.29 U	2.1 J	< 0.86 U
5/24/2018	Assessment	3.17 J	< 1.05 U	79.9	0.39 J	< 0.07 U	< 0.23 U	0.35 J	1.983	< 0.083 U	< 0.68 U	0.00814	0.006 J	< 0.29 U	1.38 J	< 0.86 U
8/14/2018	Assessment	0.03 J	0.21	63.0	0.482	0.02	--	--	1.102	< 0.083 U	0.238	0.00708	0.013 J	0.21	1.7	0.03 J
2/20/2019	Assessment	0.16	0.46	457	0.09 J	0.01 J	0.306	0.399	3.159	0.24	0.124	0.00155	< 0.005 U	1 J	0.7	< 0.1 U
5/30/2019	Assessment	0.16	0.60	512	0.244	0.01 J	0.1 J	0.756	2.717	0.29	0.197	< 0.009 U	< 0.005 U	2.43	1.4	< 0.1 U
7/24/2019	Assessment	0.08 J	0.39	245	0.540	0.02 J	0.1 J	0.789	1.819	0.106 J	0.1 J	0.00557	< 0.005 U	2 J	3.4	< 0.1 U
2/17/2020	Assessment	0.33	0.49	303	0.07 J	0.02 J	0.1 J	0.28	2.665	0.31	0.1 J	0.00105	< 0.002 U	1 J	2.3	< 0.1 U
5/20/2020	Assessment	0.15	0.53	394	0.270	0.02 J	0.1 J	0.490	2.312	0.20	0.1 J	0.00301	< 0.002 U	2 J	2.8	< 0.1 U
10/14/2020	Assessment	< 0.1 U	0.3 J	84.7	0.984	< 0.05 U	0.9 J	2.12	1.552	0.25	0.3 J	0.00932	0.003 J	< 2 U	5.3	< 0.5 U

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

pCi/L: picocuries per liter



**Table 1 - Groundwater Data Summary: AD-5**

**Welsh - LF**

**Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
5/31/2016	Background	0.03	36.9	15	0.3469 J	6.4	123	337
7/29/2016	Background	0.04	44.7	16	< 0.083 U	5.4	163	360
9/30/2016	Background	0.04	46.3	15	0.2436 J	5.3	190	416
10/21/2016	Background	0.05	50.7	14	< 0.083 U	5.9	267	448
12/14/2016	Background	0.05	49.6	13	< 0.083 U	6.2	233	484
1/20/2017	Background	0.04	49.8	14	< 0.083 U	6.3	234	438
2/24/2017	Background	0.04	33	15	< 0.083 U	5.5	127	286
6/8/2017	Background	0.05281	49.7	14	< 0.083 U	6.0	82	300
10/6/2017	Detection	0.04322	33.1	16	< 0.083 U	5.6	82	258
5/24/2018	Assessment	0.05007	28.1	22	< 0.083 U	6.2	60	242
8/15/2018	Assessment	0.050	--	19	< 0.083 U	6.2	240	428
2/21/2019	Assessment	0.033	33.9	24.7	0.21	5.4	46.5	220
5/30/2019	Assessment	0.03 J	30.0	22.3	0.29	6.3	51.3	238
7/24/2019	Assessment	0.04 J	41.1	18	0.112 J	6.3	90	354
2/17/2020	Assessment	0.03 J	39.8	19.8	0.22	5.5	43.7	248
5/20/2020	Assessment	0.03 J	40.2	22.3	0.18	6.8	55.5	264
10/14/2020	Assessment	0.04 J	36.6	18.8	0.18	6.5	148	338

Notes:

mg/L: milligrams per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: AD-5

Welsh - LF

## Appendix IV Constituents

Geosyntec Consultants, Inc.

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
5/31/2016	Background	< 0.93 U	< 1.05 U	57	0.149801 J	0.0765156 J	0.555038 J	14	1.634	0.3469 J	< 0.68 U	0.135	0.01135 J	< 0.29 U	< 0.99 U	< 0.86 U
7/29/2016	Background	2.05116 J	2.90819 J	93	0.518653 J	0.502155 J	0.411466 J	15	4.75	< 0.083 U	< 0.68 U	0.191	0.01516 J	< 0.29 U	1.08901 J	< 0.86 U
9/30/2016	Background	< 0.93 U	4.7609 J	87	0.251584 J	< 0.07 U	0.90676 J	14	3.33	0.2436 J	< 0.68 U	0.186	< 0.005 U	< 0.29 U	< 0.99 U	< 0.86 U
10/21/2016	Background	< 0.93 U	< 1.05 U	70	0.08781 J	0.107488 J	0.248085 J	9	2.319	< 0.083 U	< 0.68 U	0.225	< 0.005 U	1.36984 J	< 0.99 U	< 0.86 U
12/14/2016	Background	< 0.93 U	1.15381 J	53	0.164529 J	0.203546 J	0.747921 J	13	2.182	< 0.083 U	< 0.68 U	0.199	0.00802 J	< 0.29 U	< 0.99 U	< 0.86 U
1/20/2017	Background	< 0.93 U	< 1.05 U	47	0.0574718 J	0.180502 J	< 0.23 U	12	1.023	< 0.083 U	< 0.68 U	0.239	< 0.005 U	< 0.29 U	< 0.99 U	< 0.86 U
2/24/2017	Background	< 0.93 U	< 1.05 U	42	0.0306858 J	< 0.07 U	< 0.23 U	13	1.788	< 0.083 U	< 0.68 U	0.166	< 0.005 U	< 0.29 U	< 0.99 U	< 0.86 U
6/8/2017	Background	< 0.93 U	3.85 J	87.7	0.08 J	0.39 J	0.28 J	11.93	2.32	< 0.083 U	< 0.68 U	0.124	< 0.005 U	< 0.29 U	< 0.99 U	< 0.86 U
5/24/2018	Assessment	< 0.93 U	< 1.05 U	71.16	< 0.02 U	0.23 J	0.8 J	14.24	1.946	< 0.083 U	< 0.68 U	0.121	< 0.005 U	< 0.29 U	< 0.99 U	< 0.86 U
8/15/2018	Assessment	0.01 J	1.69	63.7	0.055	0.008 J	0.072	11.4	0.316	< 0.083 U	0.079	0.147	< 0.005 U	0.13	0.08 J	< 0.01 U
2/21/2019	Assessment	0.02 J	1.59	69.4	0.08 J	< 0.01 U	0.432	8.58	1.267	0.21	0.147	0.0807	< 0.005 U	< 0.4 U	0.1 J	< 0.1 U
5/30/2019	Assessment	< 0.02 U	3.05	60.5	0.08 J	< 0.01 U	0.06 J	11.8	1.431	0.29	0.05 J	0.104	0.006 J	< 0.4 U	0.05 J	< 0.1 U
7/24/2019	Assessment	< 0.02 U	2.48	77.4	0.05 J	< 0.01 U	0.05 J	8.38	2.533	0.112 J	< 0.05 U	0.108	< 0.005 U	< 0.4 U	0.06 J	< 0.1 U
2/17/2020	Assessment	0.03 J	2.17	109	0.09 J	0.02 J	0.336	4.52	2.393	0.22	0.227	0.0732	< 0.002 U	0.9 J	0.2	< 0.1 U
5/20/2020	Assessment	< 0.02 U	1.78	93.1	0.05 J	0.01 J	0.1 J	7.65	1.612	0.18	0.07 J	0.0740	< 0.002 U	< 0.4 U	0.09 J	< 0.1 U
10/14/2020	Assessment	< 0.02 U	6.28	71.7	0.09 J	< 0.01 U	0.09 J	14.9	2.7	0.18	0.05 J	0.134	< 0.002 U	< 0.4 U	0.1 J	< 0.1 U

## Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

&lt;: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

- -: Not analyzed

pCi/L: picocuries per liter

Table 1 - Groundwater Data Summary: AD-11

Geosyntec Consultants, Inc.

Welsh - LF

## Appendix III Constituents

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
5/31/2016	Background	2.47	8.47	9	2	5.2	518	388
7/29/2016	Background	2.83	8.88	10	2	3.8	596	1,000
9/30/2016	Background	3.4	10.7	12	2	4.1	683	1,065
10/21/2016	Background	3.77	8.78	11	3	3.7	706	1,024
12/14/2016	Background	3.36	8.98	10	2	3.8	548	1,044
1/20/2017	Background	2.81	10.3	11	2	4.4	760	1,048
2/24/2017	Background	2.88	9.31	10	2	4.3	558	876
6/8/2017	Background	2.79	9.93	10	1.366	3.9	556	960
10/6/2017	Detection	2.58	6.99	10	< 0.083 U	4.4	527	752
1/18/2018	Detection	1.9	--	--	--	4.5	377	564
5/23/2018	Assessment	--	--	--	< 0.083 U	4.1	--	--
8/15/2018	Assessment	--	--	--	< 0.083 U	4.7	--	--
9/17/2018	Assessment	1.84	6.61	15	--	--	410	720
2/5/2019	Assessment	1.47	4.56	9.47	0.47	4.3	225	--
2/21/2019	Assessment	1.63	19.1	9.23	0.41	4.9	306	542
4/30/2019	Assessment	1.34	7.53	--	--	5.3	--	--
5/29/2019	Assessment	1.40	5.78	6.96	0.47	4.2	367	680
7/23/2019	Assessment	1.56	7.19	6	0.338 J	4.5	342	700
2/17/2020	Assessment	1.47	20.5	8.19	0.42	4.9	350	622
5/19/2020	Assessment	1.54	24.3	6.83	0.51	6.3	419	720
7/22/2020	Assessment	1.81	9.45	--	--	4.0	--	--
10/12/2020	Assessment	1.69	8.57	8.16	0.63	3.9	604	764

## Notes:

mg/L: milligrams per liter

SU: standard unit

&lt;: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: AD-11

Welsh - LF

## Appendix IV Constituents

Geosyntec Consultants, Inc.

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
5/31/2016	Background	< 0.93 U	< 1.05 U	14	4	0.325877 J	3	26	1.773	2	< 0.68 U	0.032	0.02258 J	< 0.29 U	1.54658 J	< 0.86 U
7/29/2016	Background	< 0.93 U	< 1.05 U	12	4	0.453906 J	0.581828 J	26	2.23	2	< 0.68 U	0.047	0.00624 J	< 0.29 U	1.63477 J	1.31673 J
9/30/2016	Background	< 0.93 U	1.77308 J	52	5	0.579196 J	7	30	3.92	2	4.25302 J	0.047	0.01924 J	< 0.29 U	2.09096 J	1.07034 J
10/21/2016	Background	< 0.93 U	< 1.05 U	20	5	0.515668 J	2	27	2.56	3	< 0.68 U	0.047	0.0156 J	1.51918 J	< 0.99 U	< 0.86 U
12/14/2016	Background	< 0.93 U	< 1.05 U	13	4	0.366319 J	0.365212 J	25	1.569	2	< 0.68 U	0.041	0.01212 J	< 0.29 U	1.57203 J	< 0.86 U
1/20/2017	Background	< 0.93 U	< 1.05 U	13	4	0.394925 J	0.749253 J	25	1.082	2	< 0.68 U	0.046	< 0.005 U	< 0.29 U	< 0.99 U	1.23139 J
2/24/2017	Background	< 0.93 U	< 1.05 U	19	4	0.430668 J	2	24	1.45	2	1.18289 J	0.035	0.01613 J	< 0.29 U	< 0.99 U	< 0.86 U
6/8/2017	Background	< 0.93 U	1.23 J	10.12	2.79	0.41 J	0.32 J	22.16	1.902	1.366	< 0.68 U	0.03654	< 0.005 U	< 0.29 U	< 0.99 U	< 0.86 U
5/23/2018	Assessment	< 0.93 U	2.6 J	16.27	0.89 J	0.18 J	0.8 J	8.63	1.912	< 0.083 U	< 0.68 U	0.01875	0.007 J	< 0.29 U	1.34 J	46
8/15/2018	Assessment	0.02 J	1.05	11.9	1.18	0.37	0.257	15.3	2.568	< 0.083 U	1.42	0.0175	< 0.005 U	0.05 J	2.4	0.200
2/21/2019	Assessment	0.03 J	0.51	40.3	0.824	0.19	0.259	8.58	1.506	0.41	0.523	0.0157	< 0.005 U	< 0.4 U	1.5	0.1 J
5/29/2019	Assessment	< 0.02 U	0.78	19.1	1.05	0.20	0.369	9.82	1.473	0.47	0.847	0.02 J	< 0.005 U	< 0.4 U	2.2	0.1 J
7/23/2019	Assessment	< 0.02 U	0.59	16.4	0.987	0.24	0.413	10.5	2.246	0.338 J	0.976	0.0153	< 0.005 U	< 0.4 U	1.0	0.2 J
2/17/2020	Assessment	0.03 J	0.39	57.9	0.431	0.21	0.334	8.41	2.106	0.42	0.493	0.0142	0.007	2 J	0.8	0.1 J
5/19/2020	Assessment	0.04 J	0.55	35.7	0.782	0.26	0.254	11.4	2.352	0.51	0.427	0.0138	0.006	< 0.4 U	1.4	0.1 J
10/12/2020	Assessment	0.02 J	0.64	14.1	1.52	0.31	0.306	14.0	2.651	0.63	1.25	0.0246	0.006	< 0.4 U	1.8	0.2 J

## Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

&lt;: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

- -: Not analyzed

pCi/L: picocuries per liter

**Table 1 - Groundwater Data Summary: AD-13**

**Welsh - LF**

**Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
5/31/2016	Background	1.19	8.02	12	0.4948 J	6.1	177	900
7/29/2016	Background	1.23	3.7	15	0.7416 J	4.5	187	404
9/30/2016	Background	1.37	2.7	17	0.6464 J	4.6	207	431
10/21/2016	Background	1.67	3.66	19	1.1263	4.3	226	482
12/14/2016	Background	1.96	3.77	18	0.4149 J	4.8	287	596
1/20/2017	Background	0.402	33.5	7	< 0.083 U	5.4	90	222
2/24/2017	Background	1.27	10.3	13	< 0.083 U	5.1	183	392
6/8/2017	Background	1.68	3.03	15	0.6679 J	4.2	244	494
10/6/2017	Detection	2.23	5.11	13	< 0.083 U	4.6	345	564
1/18/2018	Detection	2.13	--	--	--	4.7	383	588
5/23/2018	Assessment	--	--	--	0.6534 J	4.5	--	--
8/14/2018	Assessment	--	--	--	0.7442 J	4.8	--	--
9/17/2018	Assessment	1.49	10.1	18	--	--	316	620
2/5/2019	Assessment	0.656	5.85	5.43	0.39	4.5	130	--
2/21/2019	Assessment	0.484	17.7	3.95	0.28	4.9	96.3	234
4/30/2019	Assessment	0.483	--	--	--	4.9	--	--
5/30/2019	Assessment	0.477	9.88	3.60	0.53	5.2	94.0	196
7/23/2019	Assessment	0.780	6.16	5	0.169 J	4.8	146	334
2/17/2020	Assessment	0.929	17.6	7.79	0.69	4.9	236	442
5/19/2020	Assessment	0.936	19.2	8.38	0.44	5.5	193	390
7/22/2020	Assessment	1.44	--	--	--	4.8	--	--
10/12/2020	Assessment	1.52	8.03	18.1	0.33	4.5	278	522

Notes:

mg/L: milligrams per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: AD-13

Welsh - LF

Appendix IV Constituents

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
5/31/2016	Background	< 0.93 U	< 1.05 U	62	0.682114 J	< 0.07 U	0.690428 J	4.11633 J	1.223	0.4948 J	< 0.68 U	0.011	0.01797 J	< 0.29 U	1.4772 J	< 0.86 U
7/29/2016	Background	< 0.93 U	< 1.05 U	36	0.922975 J	0.0850015 J	< 0.23 U	4.46011 J	1.601	0.7416 J	< 0.68 U	0.026	0.00515 J	< 0.29 U	2.00998 J	< 0.86 U
9/30/2016	Background	< 0.93 U	< 1.05 U	40	0.827513 J	0.0965393 J	0.77177 J	4.59287 J	2.213	0.6464 J	< 0.68 U	0.02	< 0.005 U	< 0.29 U	1.03137 J	< 0.86 U
10/21/2016	Background	< 0.93 U	< 1.05 U	30	0.934335 J	0.0913657 J	0.581648 J	4.91926 J	3.662	1.1263	< 0.68 U	0.022	< 0.005 U	0.870491 J	1.03637 J	0.97358 J
12/14/2016	Background	< 0.93 U	3.69546 J	51	1	0.185393 J	7	7	2.27	0.4149 J	1.09698 J	0.025	0.01565 J	0.353324 J	1.64297 J	< 0.86 U
1/20/2017	Background	< 0.93 U	6	112	0.198035 J	< 0.07 U	4	1.76949 J	2.228	< 0.083 U	2.72659 J	0.004	0.00673 J	< 0.29 U	< 0.99 U	< 0.86 U
2/24/2017	Background	< 0.93 U	< 1.05 U	41	0.612394 J	< 0.07 U	< 0.23 U	4.55541 J	1.556	< 0.083 U	< 0.68 U	0.015	< 0.005 U	< 0.29 U	< 0.99 U	< 0.86 U
6/8/2017	Background	1.53 J	< 1.05 U	17.12	0.89 J	0.14 J	< 0.23 U	6.24	1.565	0.6679 J	< 0.68 U	0.02082	< 0.005 U	< 0.29 U	1.03 J	< 0.86 U
5/23/2018	Assessment	< 0.93 U	< 1.05 U	26.53	0.87 J	< 0.07 U	0.73 J	9.37	2.16	0.6534 J	< 0.68 U	0.0291	0.008 J	< 0.29 U	< 0.99 U	< 0.86 U
8/15/2018	Assessment	0.03 J	1.37	16.9	0.971	0.31	0.503	13.1	4.073	0.7442 J	1.00	0.0321	< 0.005 U	0.06 J	1.7	0.277
2/21/2019	Assessment	0.02 J	0.38	55.2	0.302	0.05	0.2 J	2.35	2.534	0.28	0.05 J	0.0094	< 0.005 U	< 0.4 U	0.4	< 0.1 U
5/30/2019	Assessment	0.03 J	0.32	60.9	0.385	0.07	0.310	3.15	3.15	0.53	0.05 J	0.009 J	< 0.005 U	< 0.4 U	0.4	< 0.1 U
7/23/2019	Assessment	0.02 J	0.37	23.6	0.443	0.09	0.283	3.82	1.748	0.169 J	0.204	0.0175	< 0.005 U	< 0.4 U	0.3	0.1 J
2/17/2020	Assessment	0.03 J	0.59	59.4	0.528	0.12	0.354	3.84	3.79	0.69	0.1 J	0.0132	0.012	0.5 J	1.1	< 0.1 U
5/19/2020	Assessment	0.05 J	0.53	50.3	0.533	0.09	0.261	3.87	1.977	0.44	0.06 J	0.0147	0.034	1 J	1.3	< 0.1 U
10/12/2020	Assessment	< 0.02 U	0.55	18.5	0.834	0.17	0.410	8.50	1.546	0.33	0.324	0.0480	< 0.002 U	< 0.4 U	0.5	0.2 J

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

- -: Not analyzed

pCi/L: picocuries per liter

Table 1 - Groundwater Data Summary: AD-14

Geosyntec Consultants, Inc.

Welsh - LF

## Appendix III Constituents

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
5/31/2016	Background	1.28	2.88	4	< 0.083 U	4.8	115	285
7/29/2016	Background	1.14	2.51	5	< 0.083 U	4.2	111	267
9/30/2016	Background	1.14	1.19	5	< 0.083 U	4.2	111	252
10/21/2016	Background	1.25	2.48	4	< 0.083 U	3.9	118	276
12/14/2016	Background	1.25	2.41	5	< 0.083 U	4.1	101	296
1/20/2017	Background	0.915	10.3	4	< 0.083 U	6.1	92	254
2/24/2017	Background	1.06	9.48	4	< 0.083 U	5.4	90	212
6/8/2017	Background	1.26	7.69	6	< 0.083 U	4.8	108	256
10/6/2017	Detection	1.63	3.55	10	< 0.083 U	4.6	143	288
1/18/2018	Detection	1.57	--	6.43	--	5.7	--	--
5/23/2018	Assessment	--	--	--	< 0.083 U	4.2	--	--
8/14/2018	Assessment	--	--	--	< 0.083 U	4.3	--	--
9/17/2018	Assessment	1.51	4.51	12	--	--	204	384
2/5/2019	Assessment	1.10	4.13	3.13	0.15	4.3	99.9	--
2/21/2019	Assessment	1.2	10.3	2.2	0.14	4.3	90.4	236
4/30/2019	Assessment	1.04	--	--	--	4.4	--	--
5/29/2019	Assessment	1.21	9.80	3.65	0.19	4.5	122	274
7/23/2019	Assessment	1.25	9.93	8	0.162 J	5.5	171	440
2/17/2020	Assessment	1.12	38.7	2.00	0.24	5.2	85.6	294
5/19/2020	Assessment	1.22	15.1	1.46	0.15	5.4	88.5	263
7/22/2020	Assessment	1.24	17.3	--	--	5.2	--	--
10/12/2020	Assessment	1.14	9.63	8.59	0.24	4.3	246	469

## Notes:

mg/L: milligrams per liter

SU: standard unit

&lt;: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: AD-14

Welsh - LF

## Appendix IV Constituents

Geosyntec Consultants, Inc.

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
5/31/2016	Background	< 0.93 U	1.89384 J	31	0.65845 J	0.99504 J	0.536293 J	10	0.871	< 0.083 U	< 0.68 U	0.012	0.03	< 0.29 U	2.91711 J	< 0.86 U
7/29/2016	Background	< 0.93 U	< 1.05 U	84	0.653837 J	0.976466 J	1	9	1.487	< 0.083 U	< 0.68 U	0.024	0.02159 J	< 0.29 U	1.93417 J	< 0.86 U
9/30/2016	Background	< 0.93 U	1.45308 J	30	0.473938 J	0.975306 J	0.775009 J	9	4.817	< 0.083 U	< 0.68 U	0.015	0.02217 J	< 0.29 U	2.73939 J	< 0.86 U
10/21/2016	Background	< 0.93 U	< 1.05 U	39	0.543258 J	1	0.640984 J	9	1.972	< 0.083 U	< 0.68 U	0.014	0.02024 J	0.49697 J	2.46916 J	< 0.86 U
12/14/2016	Background	< 0.93 U	< 1.05 U	47	0.536415 J	1	1	9	1.271	< 0.083 U	< 0.68 U	0.013	0.037	< 0.29 U	3.32013 J	< 0.86 U
1/20/2017	Background	< 0.93 U	< 1.05 U	38	0.215525 J	0.226476 J	0.700394 J	2.91252 J	1.825	< 0.083 U	< 0.68 U	0.013	0.01863 J	< 0.29 U	< 0.99 U	< 0.86 U
2/24/2017	Background	< 0.93 U	< 1.05 U	42	0.286071 J	0.187588 J	< 0.23 U	3.50056 J	0.512	< 0.083 U	< 0.68 U	0.012	0.01443 J	< 0.29 U	< 0.99 U	< 0.86 U
6/8/2017	Background	< 0.93 U	< 1.05 U	44.83	0.38 J	0.67 J	1.27	6.78	1.138	< 0.083 U	< 0.68 U	0.0127	0.021 J	< 0.29 U	2.61 J	< 0.86 U
5/23/2018	Assessment	< 0.93 U	< 1.05 U	28.17	0.78 J	1.61	< 0.23 U	14.34	1.601	< 0.083 U	< 0.68 U	0.0152	0.145	< 0.29 U	3.62 J	< 0.86 U
8/15/2018	Assessment	0.01 J	0.39	24.0	0.854	1.99	0.276	17.6	1.502	< 0.083 U	0.174	0.0110	0.181	0.03 J	3.7	0.242
2/21/2019	Assessment	0.03 J	0.34	41.2	0.387	0.35	0.247	4.37	1.172	0.14	0.09 J	0.0114	< 0.005 U	< 0.4 U	0.8	< 0.1 U
5/29/2019	Assessment	0.03 J	0.40	44.8	0.556	0.81	0.2 J	7.82	1.946	0.19	0.137	0.02 J	0.181	< 0.4 U	2.0	< 0.1 U
7/23/2019	Assessment	< 0.02 U	0.43	36.2	0.934	2.49	0.286	18.5	2.731	0.162 J	0.200	0.0155	0.123	< 0.4 U	2.7	0.2 J
2/17/2020	Assessment	0.07 J	0.43	44.4	0.179	0.2	0.2 J	2.32	2.552	0.24	0.07 J	0.0063	0.003 J	2 J	2.5	0.1 J
5/19/2020	Assessment	0.03 J	0.32	35.3	0.396	0.32	0.307	3.81	0.778	0.15	0.1 J	0.00875	0.002 J	1 J	1.5	< 0.1 U
10/12/2020	Assessment	< 0.02 U	0.44	22.9	1.46	3.21	0.357	26.0	4.259	0.24	0.307	0.0195	0.391	< 0.4 U	2.0	0.3 J

## Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

&lt;: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

- -: Not analyzed

pCi/L: picocuries per liter



**Table 1 - Groundwater Data Summary: AD-17**

**Welsh - LF  
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
5/26/2016	Background	0.121	200	43	0.4023 J	7.2	1,166	1,810
7/29/2016	Background	0.119	195	32	0.4135 J	5.7	1,005	1,576
9/30/2016	Background	0.111	191	36	0.3055 J	6.2	1,055	1,663
10/21/2016	Background	0.124	194	32	0.583 J	6.1	1,163	1,612
12/14/2016	Background	0.135	196	31	0.5399 J	6.0	1,096	1,560
1/20/2017	Background	0.101	196	33	< 0.083 U	5.9	1,445	1,686
2/24/2017	Background	0.135	189	30	< 0.083 U	5.7	1,055	1,628
6/8/2017	Background	0.121	188	30	< 0.083 U	5.8	1,105	1,578
10/6/2017	Detection	0.183	183	31	< 0.083 U	5.9	1,090	1,548
5/24/2018	Assessment	0.239	193	39	< 0.083 U	6.3	1,067	1,836
8/15/2018	Assessment	0.118	187	40	< 0.083 U	5.6	1,168	1,748
2/21/2019	Assessment	0.151	207	43.2	0.18	6.9	1,060	1,722
5/30/2019	Assessment	0.158	202	41.7	< 0.04 U	6.1	1,120	1,546
7/24/2019	Assessment	0.113	216	37	0.085 J	6.0	1,127	1,864
2/17/2020	Assessment	0.104	184	36.0	0.16	5.9	1,070	1,750
5/20/2020	Assessment	0.115	250	47.7	0.15	5.7	1,190	1,890
10/14/2020	Assessment	0.100	185	35.7	0.17	5.4	1,060	1,720

Notes:

mg/L: milligrams per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: AD-17

Welsh - LF

## Appendix IV Constituents

Geosyntec Consultants, Inc.

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
5/26/2016	Background	< 0.93 U	1.37501 J	21	0.173275 J	2	1	63	1.525	0.4023 J	< 0.68 U	0.37	0.032	< 0.29 U	< 0.99 U	< 0.86 U
7/29/2016	Background	1.13716 J	< 1.05 U	20	0.307264 J	4	1	68	2.78	0.4135 J	< 0.68 U	0.374	0.02133 J	1.04115 J	4.56733 J	< 0.86 U
9/30/2016	Background	< 0.93 U	< 1.05 U	31	0.175474 J	0.848199 J	3	58	2.358	0.3055 J	< 0.68 U	0.354	< 0.005 U	< 0.29 U	< 0.99 U	< 0.86 U
10/21/2016	Background	< 0.93 U	< 1.05 U	34	0.200656 J	2	4	65	2.224	0.583 J	< 0.68 U	0.394	< 0.005 U	0.322249 J	3.34422 J	< 0.86 U
12/14/2016	Background	< 0.93 U	< 1.05 U	17	0.0498325 J	3	0.816224 J	68	2.384	0.5399 J	< 0.68 U	0.323	0.01485 J	< 0.29 U	< 0.99 U	< 0.86 U
1/20/2017	Background	< 0.93 U	< 1.05 U	14	0.0319852 J	3	68	68	2.436	< 0.083 U	< 0.68 U	0.341	< 0.005 U	< 0.29 U	< 0.99 U	< 0.86 U
2/24/2017	Background	< 0.93 U	< 1.05 U	20	0.0665729 J	2	1	73	2.288	< 0.083 U	< 0.68 U	0.331	< 0.005 U	< 0.29 U	< 0.99 U	< 0.86 U
6/8/2017	Background	< 0.93 U	< 1.05 U	10.33	< 0.02 U	6.06	< 0.23 U	74.8	1.598	< 0.083 U	< 0.68 U	0.329	0.013 J	< 0.29 U	< 0.99 U	< 0.86 U
5/24/2018	Assessment	< 0.93 U	< 1.05 U	9.65	< 0.02 U	6.46	< 0.23 U	71.73	1.939	< 0.083 U	< 0.68 U	0.308	< 0.005 U	< 0.29 U	< 0.99 U	< 0.86 U
8/15/2018	Assessment	0.02 J	1.83	12.8	0.069	0.25	0.604	43.5	2.35	< 0.083 U	1.10	0.243	0.011 J	0.35	0.3	--
2/21/2019	Assessment	0.08 J	2.51	120	0.24	0.27	3.34	64.5	2.657	0.18	2.49	0.268	0.007 J	0.7 J	0.8	< 0.1 U
5/30/2019	Assessment	< 0.02 U	0.41	19.6	0.02 J	0.03 J	0.246	51.1	2.508	< 0.04 U	0.03 J	0.341	< 0.005 U	< 0.4 U	0.06 J	< 0.1 U
7/24/2019	Assessment	< 0.02 U	1.07	14.3	0.130	0.03 J	0.228	57.7	3.45	0.085 J	0.263	0.283	< 0.005 U	< 0.4 U	0.1 J	< 0.1 U
2/17/2020	Assessment	< 0.02 U	0.72	9.6	0.04 J	< 0.01 U	0.08 J	42.3	3.46	0.16	< 0.05 U	0.273	< 0.004 U	< 0.4 U	< 0.03 U	< 0.1 U
5/20/2020	Assessment	< 0.02 U	0.86	11.4	0.07 J	0.02 J	0.231	70.0	2.76	0.15	0.08 J	0.302	< 0.002 U	< 0.4 U	0.09 J	< 0.1 U
10/14/2020	Assessment	< 0.02 U	0.84	10.9	0.04 J	0.01 J	0.327	45.4	2.169	0.17	0.2 J	0.274	< 0.002 U	< 0.4 U	0.06 J	< 0.1 U

## Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

&lt;: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

- -: Not analyzed

pCi/L: picocuries per liter

## **APPENDIX II**

Where applicable, show in this appendix the results from statistical analyses, and a description of the statistical analysis method chosen. These statistical analyses are to be conducted separately for each constituent in each monitoring well.

# STATISTICAL ANALYSIS SUMMARY LANDFILL

**J. Robert Welsh Plant  
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CHA8500

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## LIST OF ATTACHMENTS

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## LIST OF ACRONYMS AND ABBREVIATIONS

AEP	American Electric Power
CCR	Coal Combustion Residuals
CCV	Continuing Calibration Verification
CFR	Code of Federal Regulations
GWPS	Groundwater Protection Standard
LCL	Lower Confidence Limit
LF	Landfill
LFB	Laboratory Fortified Blanks
LRB	Laboratory Reagent Blanks
MCL	Maximum Contaminant Level
NELAP	National Environmental Laboratory Accreditation Program
QA	Quality Assurance
QC	Quality Control
SSI	Statistically Significant Increase
SSL	Statistically Significant Level
TDS	Total Dissolved Solids
UPL	Upper Prediction Limit
USEPA	United States Environmental Protection Agency
UTL	Upper Tolerance Limit

## SECTION 1

### EXECUTIVE SUMMARY

In accordance with the United States Environmental Protection Agency's (USEPA's) regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (40 CFR 257.90-257.98, "CCR rule"), groundwater monitoring has been conducted at the Landfill (LF), an existing CCR unit at the Welsh Power Plant located in Pittsburg, Texas.

Based on detection monitoring conducted in 2017 and 2018, statistically significant increases (SSIs) over background were concluded for boron, total dissolved solids (TDS), and sulfate at the LF. An alternative source was not identified at the time, so the LF has been in assessment monitoring since. Groundwater protection standards (GWPS) were set in accordance with 40 CFR 257.95(d)(2) and a statistical evaluation of the assessment monitoring data was conducted. During the most recent semi-annual assessment monitoring event, completed in July 2019, no statistically significant levels (SSLs) were identified during this event, and the unit remained in assessment monitoring (Geosyntec, 2019). Two assessment monitoring events were conducted at the LF in February 2020 and May 2020, in accordance with 40 CFR 257.95. The results of these assessment events are documented in this report.

Groundwater data underwent several validation tests, including those for completeness, sample tracking accuracy, transcription errors, and consistent use of measurement units. No data quality issues were identified which would impact data usability.

The monitoring data were submitted to Groundwater Stats Consulting, LLC for statistical analysis. GWPSs were re-established for the Appendix IV parameters. Confidence intervals were calculated for Appendix IV parameters at the compliance wells to assess whether Appendix IV parameters were present at an SSL above the GWPS. No SSLs were identified; however, concentrations of Appendix III parameters remained above background. Thus, the unit will remain in assessment monitoring. Certification of the selected statistical methods by a qualified professional engineer is documented in Attachment A.

## SECTION 2

### LANDFILL EVALUATION

#### 2.1 Data Validation & QA/QC

During the assessment monitoring program, two sets of samples were collected for analysis from each upgradient and downgradient well to meet the requirements of 40 CFR 257.95(b) (February 2020) and 257.95(d)(1) (May 2020). Samples from both sampling events were analyzed for the Appendix III and Appendix IV parameters. A summary of data collected during these assessment monitoring events may be found in Table 1.

Chemical analysis was completed by an analytical laboratory certified by the National Environmental Laboratory Accreditation Program (NELAP). Quality assurance and quality control (QA/QC) samples completed by the analytical laboratory included the use of laboratory reagent blanks (LRBs), continuing calibration verification (CCV) samples, and laboratory fortified blanks (LFBs).

The analytical data were imported into a Microsoft Access database, where checks were completed to assess the accuracy of sample location identification and analyte identification. Where necessary, unit conversions were applied to standardize reported units across all sampling events. Exported data files were created for use with the Sanitas™ v.9.6.26 statistics software. The export file was checked against the analytical data for transcription errors and completeness. No QA/QC issues were noted which would impact data usability.

#### 2.2 Statistical Analysis

Statistical analyses for the LF were conducted in accordance with the January 2017 *Statistical Analysis Plan* (AEP, 2017), except where noted below. Time series plots and results for all completed statistical tests are provided in Attachment B.

The data obtained in February and May 2020 were screened for potential outliers. No outliers were identified for these events.

##### 2.2.1 Establishment of GWPSs

A GWPS was established for each Appendix IV parameter in accordance with 40 CFR 257.95(h) and the *Statistical Analysis Plan* (AEP, 2017). The established GWPS was determined to be the greater value of the background concentration and the maximum contaminant level (MCL) or risk-based level specified in 40 CFR 257.95(h)(2) for each Appendix IV parameter. To determine background concentrations, an upper tolerance limit (UTL) was calculated using pooled data from the background wells collected during the background monitoring and assessment monitoring events. Tolerance limits were calculated parametrically with 95% coverage and 95% confidence for barium, chromium, and combined radium. Non-parametric tolerance limits were calculated



for antimony, arsenic, beryllium, cadmium, cobalt, fluoride, lead, lithium, mercury, molybdenum, and selenium due to apparent non-normal distributions and for thallium due to a high non-detect frequency. Tolerance limits and the final GWPSs are summarized in Table 2.

### **2.2.2 Evaluation of Potential Appendix IV SSLs**

A confidence interval was constructed for each Appendix IV parameter at each compliance well. Confidence limits were generally calculated parametrically ( $\alpha = 0.01$ ); however, non-parametric confidence limits were calculated in some cases (e.g., when the data did not appear to be normally distributed or when the non-detect frequency was too high). An SSL was concluded if the lower confidence limit (LCL) exceeded the GWPS (i.e., if the entire confidence interval exceeded the GWPS). Calculated confidence limits are shown in Attachment B.

No SSLs were identified at the Welsh LF.

### **2.2.3 Evaluation of Potential Appendix III SSIs**

The Appendix III results were analyzed to assess whether concentrations of Appendix III parameters at the compliance wells exceeded background concentrations. Data collected during the May 2020 assessment monitoring events from each compliance well were compared to the prediction limits to evaluate results above background values. Where potential exceedances were noted, verification sampling was completed on July 22, 2020. The results from these events and the prediction limits are summarized in Table 3. The following exceedances of the upper prediction limits (UPLs) were noted:

- Boron concentrations exceeded the interwell UPL of 0.700 mg/L at AD-11 (1.54 mg/L and 1.81 mg/L), AD-13 (0.936 mg/L and 1.44 mg/L), and AD-14 (1.22 mg/L and 1.24 mg/L).
- Calcium concentrations exceeded the intrawell UPL of 12.2 mg/L at AD-14 (15.1 mg/L and 17.3 mg/L).

Based on these results, concentrations of boron and calcium appear to be above background concentrations and the unit will remain in assessment monitoring.

## **2.3 Conclusions**

A semi-annual assessment monitoring event was conducted in accordance with the CCR Rule. The laboratory and field data were reviewed prior to statistical analysis, with no QA/QC issues identified that impacted data usability. A review of outliers identified no potential outliers in the February and May 2020 data. GWPSs were re-established for the Appendix IV parameters. A confidence interval was constructed at each compliance well for each Appendix IV parameter; SSLs were concluded if the entire confidence interval exceeded the GWPS. No SSLs were identified.

The Appendix III results were evaluated to assess whether concentrations of Appendix III parameters exceeded background levels. Boron and Calcium results exceeded background levels at select downgradient wells.

Based on this evaluation, the Welsh LF CCR unit will remain in assessment monitoring.

### **SECTION 3**

#### **REFERENCES**

American Electric Power (AEP). 2017. Statistical Analysis Plan – Welsh Plant. January.

Geosyntec Consultants. 2019. Statistical Analysis Summary -Landfill. J. Robert Welsh Plant. December.

# TABLES

**Table 1 - Groundwater Data Summary  
Welsh Plant - Landfill**

Parameter	Unit	AD-1		AD-11		AD-13		AD-14		AD-17		AD-5	
		2/17/2020	5/20/2020	2/17/2020	5/19/2020	2/17/2020	5/19/2020	2/17/2020	5/19/2020	2/17/2020	5/20/2020	2/17/2020	5/20/2020
Antimony	µg/L	0.330	0.15	0.0300 J	0.04 J	0.0300 J	0.05 J	0.0700 J	0.03 J	0.1 U	0.1 U	0.0300 J	0.1 U
Arsenic	µg/L	0.490	0.53	0.390	0.55	0.590	0.53	0.430	0.32	0.720	0.86	2.17	1.78
Barium	µg/L	303	394	57.9	35.7	59.4	50.3	44.4	35.3	9.60	11.4	109	93.1
Beryllium	µg/L	0.0700 J	0.270	0.431	0.782	0.528	0.533	0.179	0.396	0.0400 J	0.07 J	0.0900 J	0.05 J
Boron	mg/L	0.626	0.801	1.47	1.54	0.929	0.936	1.12	1.22	0.104	0.115	0.0300 J	0.03 J
Cadmium	µg/L	0.0200 J	0.02 J	0.210	0.26	0.120	0.09	0.200	0.32	0.05 U	0.02 J	0.0200 J	0.01 J
Calcium	mg/L	115	126	20.5	24.3	17.6	19.2	38.7	15.1	184	250	39.8	40.2
Chloride	mg/L	3.41	1.83	8.19	6.83	7.79	8.38	2.00	1.46	36.0	47.7	19.8	22.3
Chromium	µg/L	0.100 J	0.1 J	0.334	0.254	0.354	0.261	0.200 J	0.307	0.0800 J	0.231	0.336	0.1 J
Cobalt	µg/L	0.280	0.490	8.41	11.4	3.84	3.87	2.32	3.81	42.3	70.0	4.52	7.65
Combined Radium	pCi/L	2.67	2.31	2.11	2.35	3.79	1.98	2.55	0.778	3.46	2.76	2.39	1.61
Fluoride	mg/L	0.31	0.20	0.42	0.51	0.69	0.44	0.24	0.15	0.16	0.15	0.22	0.18
Lead	µg/L	0.100 J	0.1 J	0.493	0.427	0.100 J	0.06 J	0.0700 J	0.1 J	0.2 U	0.08 J	0.227	0.07 J
Lithium	mg/L	0.00105	0.00301	0.0142	0.0138	0.0132	0.0147	0.00630	0.00875	0.273	0.302	0.0732	0.0740
Mercury	µg/L	0.005 U	0.005 U	0.00700	0.006	0.0120	0.034	0.00300 J	0.002 J	0.01 U	0.005 U	0.005 U	0.005 U
Molybdenum	µg/L	1.00 J	2 J	2.00 J	2 U	0.500 J	1 J	2.00 J	1 J	2 U	2 U	0.900 J	2 U
Selenium	µg/L	2.30	2.8	0.800	1.4	1.10	1.3	2.50	1.5	0.2 U	0.09 J	0.200	0.09 J
Sulfate	mg/L	56.3	51.4	350	419	236	193	85.6	88.5	1,070	1,190	43.7	55.5
Thallium	µg/L	0.5 U	0.5 U	0.100 J	0.1 J	0.5 U	0.5 U	0.100 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Total Dissolved Solids	mg/L	488	508	622	720	442	390	294	263	1,750	1,890	248	264
pH	SU	5.8	7.2	4.9	6.3	4.9	5.5	5.2	5.4	5.9	5.7	5.5	6.8

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. For statistical analysis, parameters which were not detected were replaced with the reporting limit.

J: Estimated value. Parameter was detected in concentrations below the reporting limit.

**Table 2: Groundwater Protection Standards  
Welsh Plant - Landfill**

Constituent Name	MCL	CCR Rule-Specified	Background Limit	GWPS
Antimony, Total (mg/L)	0.006		0.0032	0.006
Arsenic, Total (mg/L)	0.01		0.005	0.010
Barium, Total (mg/L)	2		0.69	2
Beryllium, Total (mg/L)	0.004		0.00054	0.004
Cadmium, Total (mg/L)	0.005		0.0065	0.0065
Chromium, Total (mg/L)	0.1		0.0031	0.1
Cobalt, Total (mg/L)	n/a	0.006	0.075	0.075
Combined Radium, Total (pCi/L)	5		4.07	5
Fluoride, Total (mg/L)	4		0.58	4
Lead, Total (mg/L)	0.015		0.0034	0.015
Lithium, Total (mg/L)	n/a	0.04	0.39	0.39
Mercury, Total (mg/L)	0.002		0.000033	0.002
Molybdenum, Total (mg/L)	n/a	0.1	0.0024	0.1
Selenium, Total (mg/L)	0.05		0.005	0.05
Thallium, Total (mg/L)	0.002		0.0013	0.002

Notes:

Grey cell indicates calculated UTL is higher than MCL or CCR Rule-specified value.

MCL = Maximum Contaminant Level

Calculated UTL (Upper Tolerance Limit) represents site-specific background values.

The higher of the calculated UTL or MCL/Rule-Specified Level is used as the GWPS.

**Table 3: Appendix III Data Summary  
Welsh Plant - Landfill**

Geosyntec Consultants, Inc.

Analyte	Unit	Description	AD-11		AD-13		AD-14	
			5/19/2020	7/22/2020	5/19/2020	7/22/2020	5/19/2020	7/22/2020
Boron	mg/L	Interwell Background Value (UPL)	0.700					
		Analytical Result	<b>1.54</b>	<b>1.81</b>	<b>0.936</b>	<b>1.44</b>	<b>1.22</b>	<b>1.24</b>
Calcium	mg/L	Intrawell Background Value (UPL)	17.1		28.4		12.2	
		Analytical Result	<b>24.3</b>	9.45	19.2	-	<b>15.1</b>	<b>17.3</b>
Chloride	mg/L	Intrawell Background Value (UPL)	14.3		24.0		11.5	
		Analytical Result	6.83	-	8.38	-	1.46	-
Fluoride	mg/L	Interwell Background Value (UPL)	0.583					
		Analytical Result	0.51	-	0.44	-	0.15	-
pH	SU	Interwell Background Value (UPL)	7.1					
		Interwell Background Value (LPL)	4.3					
		Analytical Result	6.3	-	5.5	-	5.4	-
Sulfate	mg/L	Intrawell Background Value (UPL)	829		422		189	
		Analytical Result	419	-	193	-	88.5	-
Total Dissolved Solids	mg/L	Intrawell Background Value (UPL)	1330		881		369	
		Analytical Result	720	-	390	-	263	-

Notes:

UPL: Upper prediction limit

LPL: Lower prediction limit

**Bold values exceed the background value.**

Background values are shaded gray.

-: Not analyzed

# ATTACHMENT A

Certification by Qualified Professional Engineer



**Certification by Qualified Professional Engineer**

I certify that the selected and above described statistical method is appropriate for evaluating the groundwater monitoring data for the Welsh Landfill CCR management area and that the requirements of 40 CFR 257.93(f) have been met.

DAVID ANTHONY MILLER

Printed Name of Licensed Professional Engineer

David Anthony Miller

Signature



112498

License Number

TEXAS

Licensing State

09.01.2020

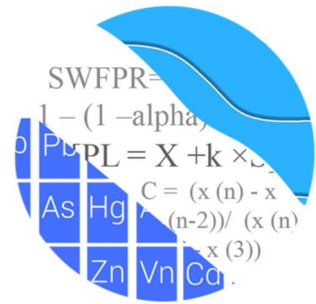
Date

**ATTACHMENT B**  
**Statistical Analysis Output**

# GROUNDWATER STATS CONSULTING

July 3, 2020

Geosyntec Consultants  
Attn: Ms. Allison Kreinberg  
941 Chatham Lane, #103  
Columbus, OH 43221



Re: Welsh Landfill - Assessment Monitoring Report

Dear Ms. Kreinberg,

Groundwater Stats Consulting, formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the statistical analysis of groundwater data for the Assessment Monitoring report for American Electric Power Inc.'s Welsh Landfill. The analysis complies with the federal rule for the Disposal of Coal Combustion Residuals from Electric Utilities (CCR Rule, 2015) as well as with the USEPA Unified Guidance (2009).

Sampling began at the site for the CCR program in 2016. Below is a list of the monitoring well network, as provided by Geosyntec Consultants. Note that originally the network included upgradient well AD-18; however, further research, reportedly, identified that this well was not providing adequate representation of the groundwater quality upgradient of this site and exhibited different chemical properties from the neighboring upgradient wells. Therefore, data from this well is no longer included in the statistical analysis.

- **Upgradient wells:** AD-1, AD-5, and AD-17
- **Downgradient wells:** AD-11, AD-13 and AD-14

Data were sent electronically, and the statistical analysis was reviewed by Kristina Rayner, Groundwater Statistician and Founder of Groundwater Stats Consulting (GWS). The analysis was conducted according to the Statistical Analysis Plan prepared by GWS and approved by Dr. Cameron, PhD Statistician with MacStat Consulting, primary author of the USEPA Unified Guidance, and Senior Advisor to GWS.

The CCR Assessment Monitoring program consists of the following constituents:

- **Appendix IV** (Assessment Monitoring) – antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, combined radium 226 + 228, fluoride, lead, lithium, mercury, molybdenum, selenium, and thallium

Time series plots for Appendix IV parameters are provided for all wells and constituents; and are used to evaluate concentrations over the entire record (Figure A). Additionally, box plots are included for all constituents at upgradient and downgradient wells (Figure B). The time series plots are used to initially screen for suspected outliers and trends, while the box plots provide visual representation of variation within individual wells and between all wells. Values identified and flagged as outliers in previous screening reports may be seen in the Outlier Summary following this letter (Figure C). These values are plotted in a lighter font and disconnected symbol on the time series graphs.

### **Evaluation of Appendix IV Parameters**

Interwell Tolerance limits were used to calculate background limits from all available pooled upgradient well data for Appendix IV parameters to determine the background limits for each constituent (Figure D). Background data are screened for outliers and extreme trending patterns that would lead to artificially elevated statistical limits. Any flagged values may be seen on the Outlier Summary following this letter.

Parametric limits use a target of 95% confidence and 95% coverage. The confidence and coverage levels for nonparametric tolerance limits are dependent upon the number of background samples. These limits were compared to the Maximum Contaminant Levels (MCLs) and CCR-Rule specified levels in the Groundwater Protection Standard (GWPS) table following this letter to determine the highest limit for use as the GWPS in the Confidence Interval comparisons (Figure E).

Confidence intervals were then constructed on downgradient wells for each of the Appendix IV parameters using the highest limit of either the MCL, CCR-rule specified, or background as discussed above (Figure F). Only when the entire confidence interval is above a GWPS is the well/constituent pair considered to exceed its respective standard. No confidence intervals exceedances were found for any of the downgradient wells. A summary of the confidence interval results follows this letter.

Thank you for the opportunity to assist you in the statistical analysis of groundwater quality for the Welsh Landfill. If you have any questions or comments, please feel free to contact me.

For Groundwater Stats Consulting,

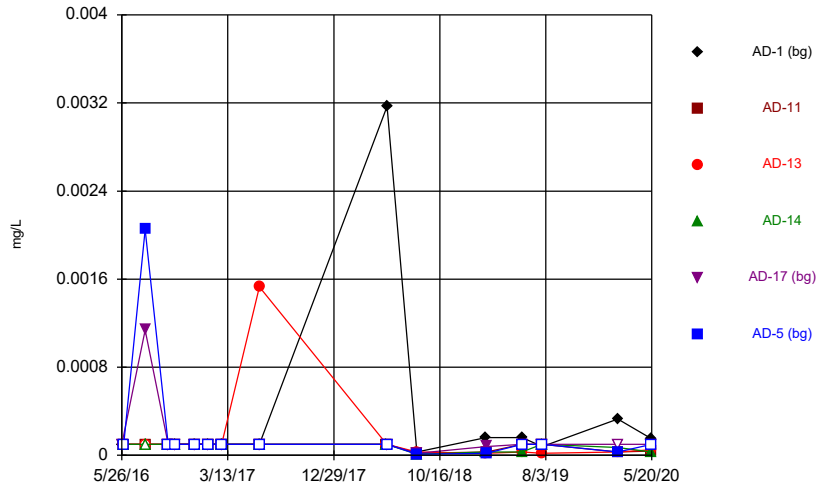
A handwritten signature in black ink, appearing to read 'Easton Rayner', with a long horizontal flourish extending to the right.

Easton Rayner  
Groundwater Analyst

A handwritten signature in black ink, appearing to read 'Kristina Rayner', written in a cursive style.

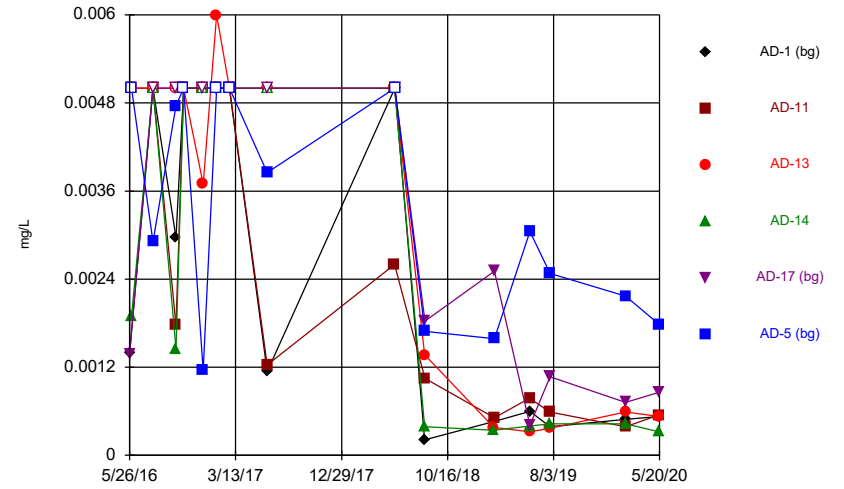
Kristina L. Rayner  
Groundwater Statistician

### Time Series



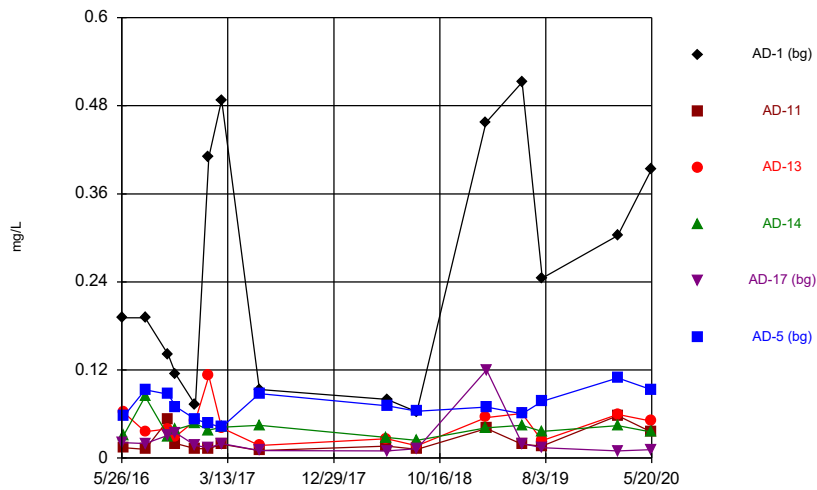
Constituent: Antimony, total Analysis Run 7/2/2020 12:33 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Time Series



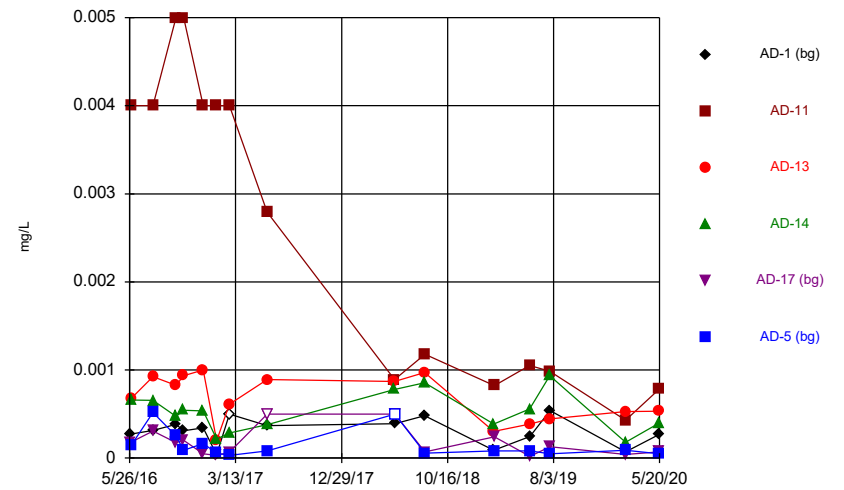
Constituent: Arsenic, total Analysis Run 7/2/2020 12:33 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Time Series



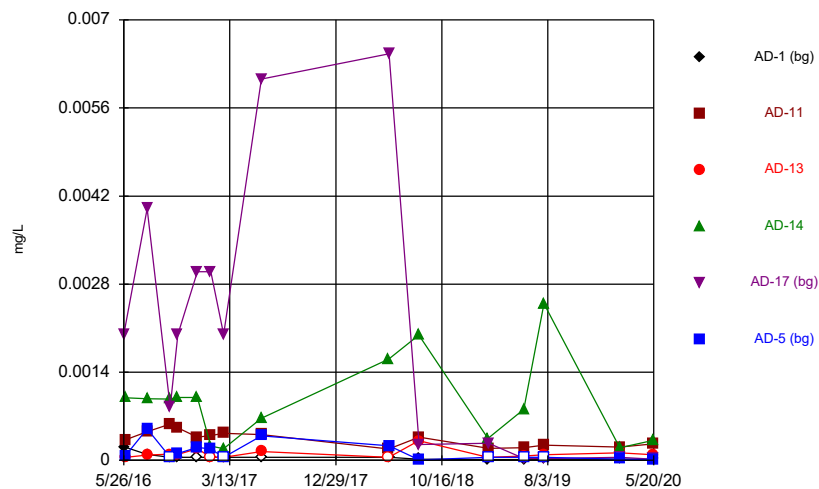
Constituent: Barium, total Analysis Run 7/2/2020 12:33 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Time Series

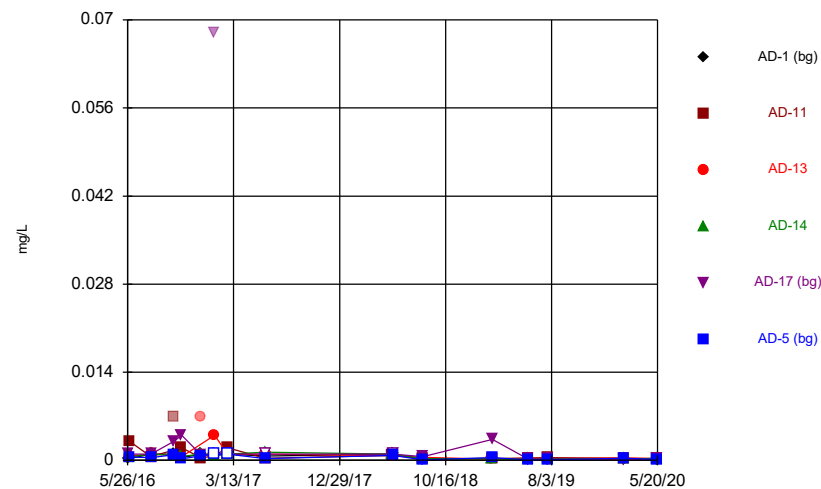


Constituent: Beryllium, total Analysis Run 7/2/2020 12:33 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

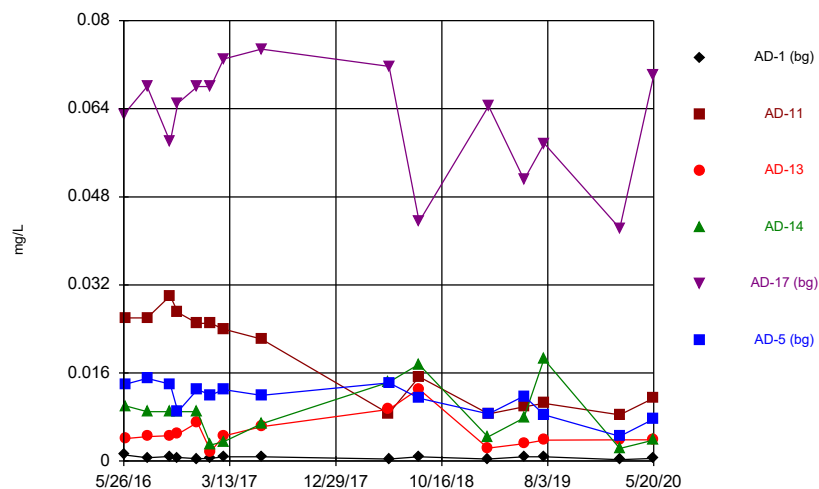
### Time Series



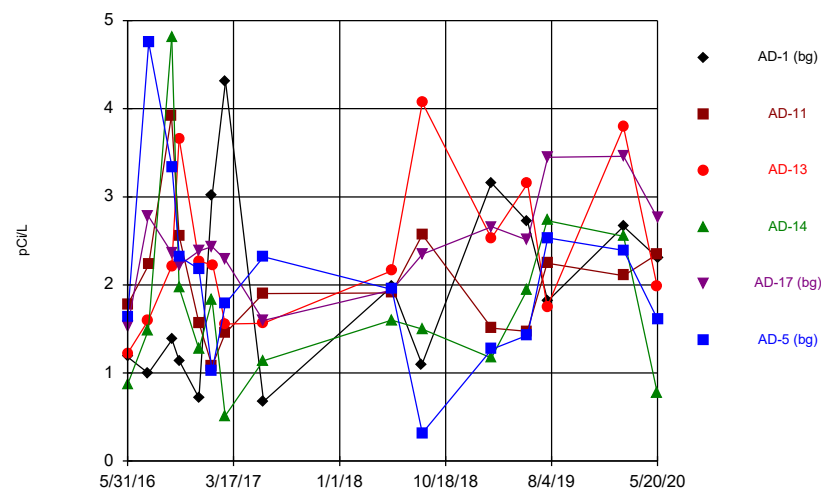
### Time Series



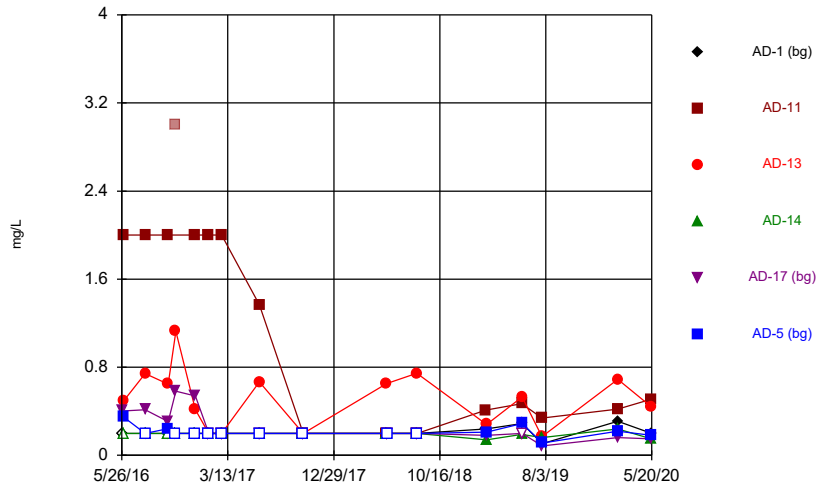
### Time Series



### Time Series

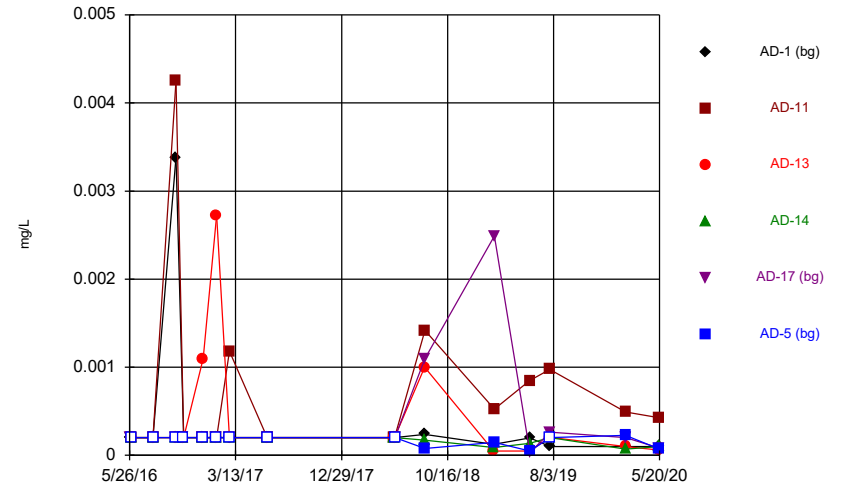


### Time Series



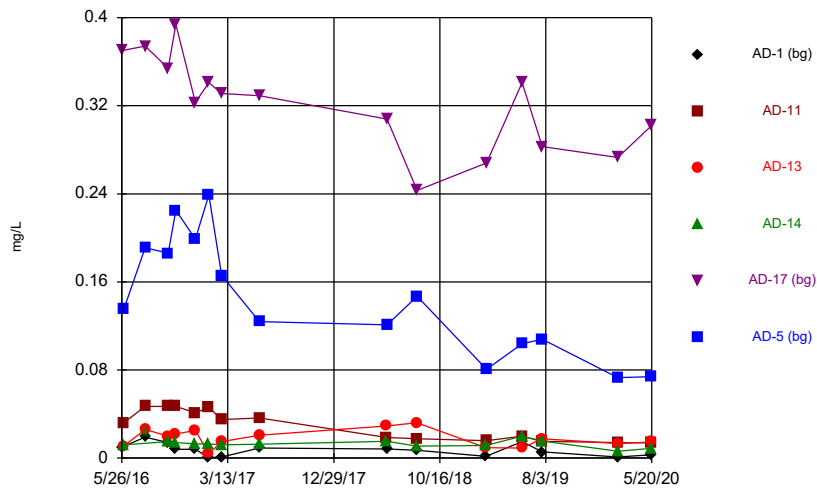
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Welsh Landfill Client: Geosyntec Data: Welsh LF

### Time Series



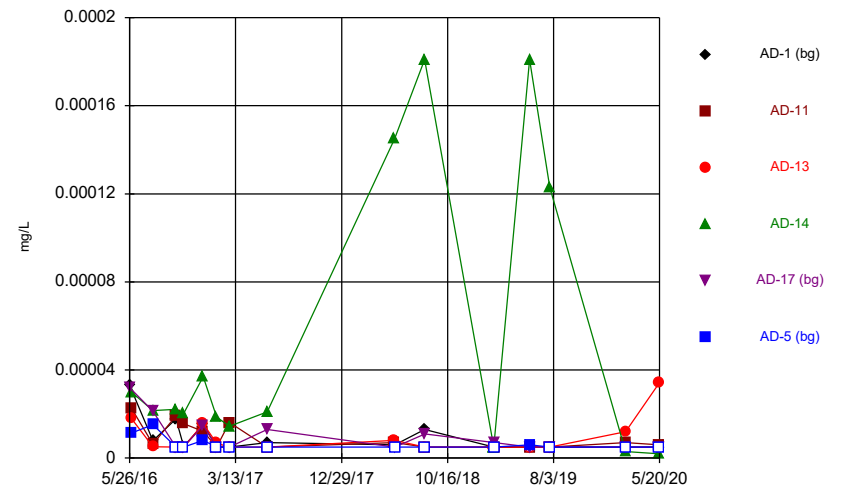
Constituent: Lead, total Analysis Run 7/2/2020 12:33 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Time Series



Constituent: Lithium, total Analysis Run 7/2/2020 12:33 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

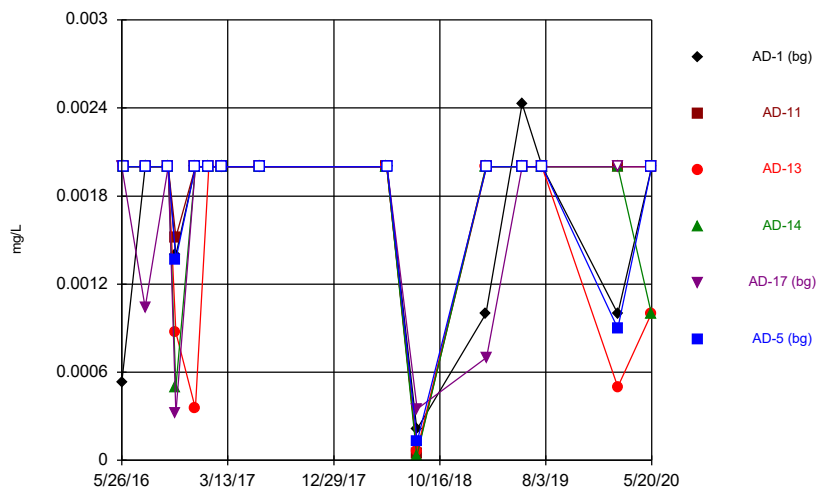
### Time Series



Constituent: Mercury, total Analysis Run 7/2/2020 12:33 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

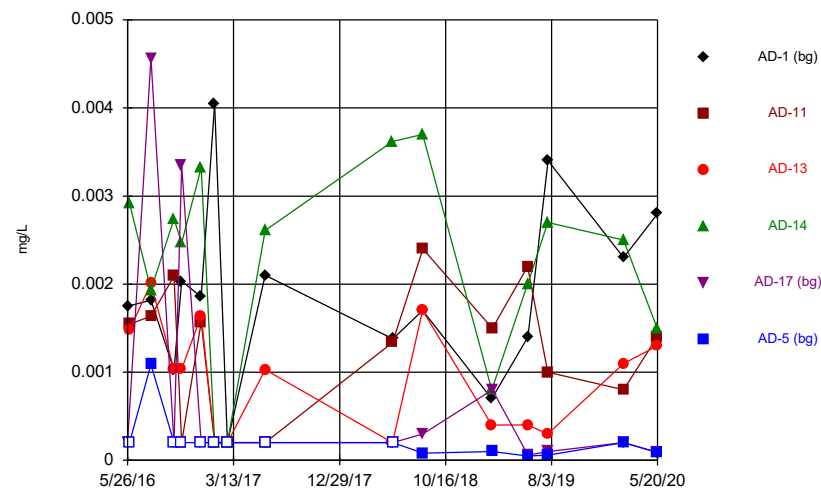


### Time Series



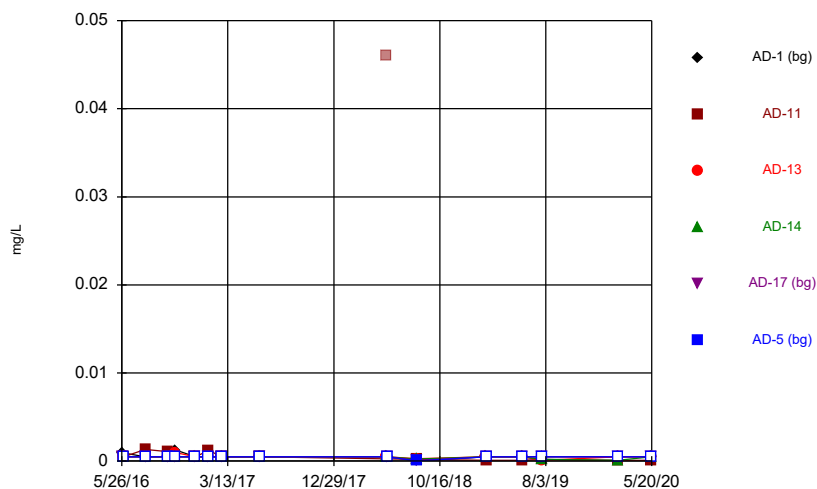
Constituent: Molybdenum, total Analysis Run 7/2/2020 12:33 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Time Series



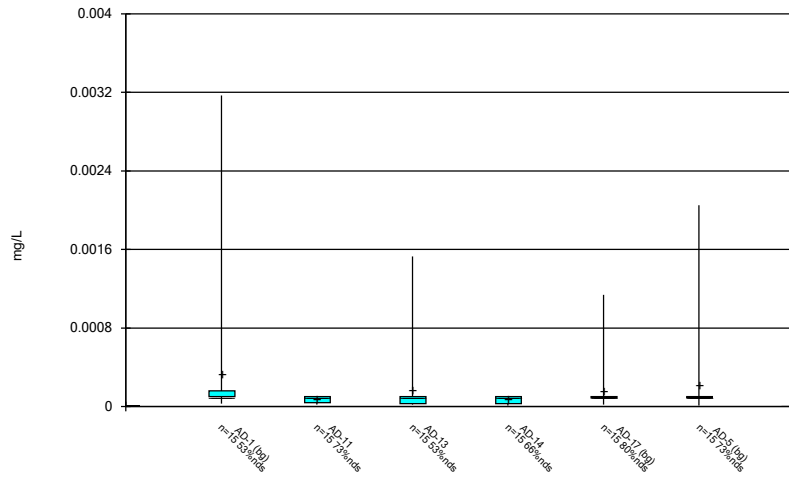
Constituent: Selenium, total Analysis Run 7/2/2020 12:33 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Time Series



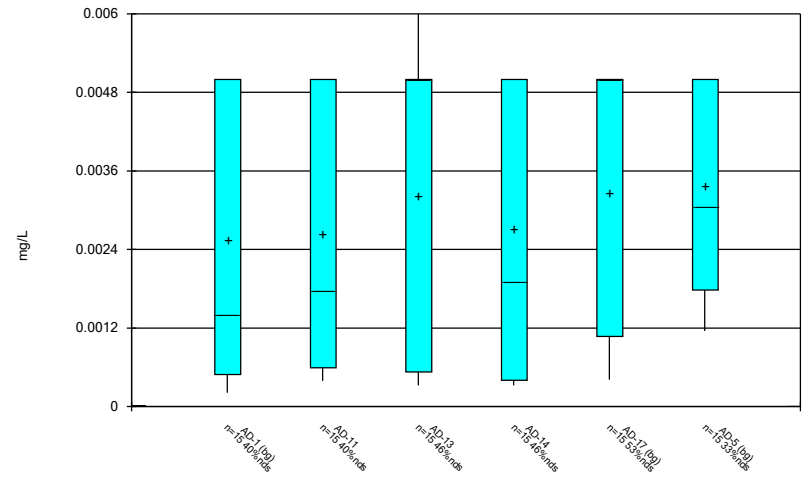
Constituent: Thallium, total Analysis Run 7/2/2020 12:33 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Box & Whiskers Plot



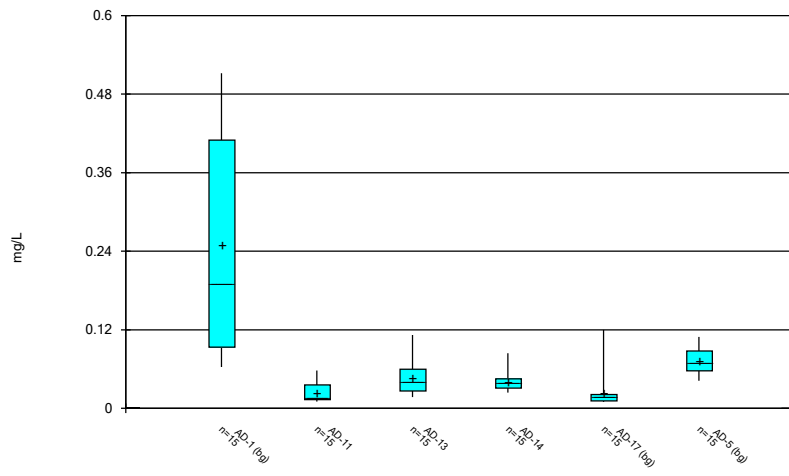
Constituent: Antimony, total Analysis Run 7/2/2020 12:34 PM  
 Welsh Landfill Client: Geosyntec Data: Welsh LF

### Box & Whiskers Plot



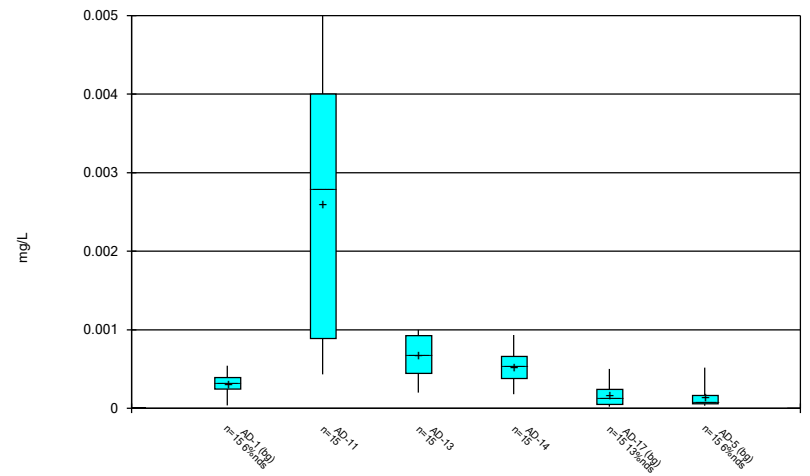
Constituent: Arsenic, total Analysis Run 7/2/2020 12:34 PM  
 Welsh Landfill Client: Geosyntec Data: Welsh LF

### Box & Whiskers Plot



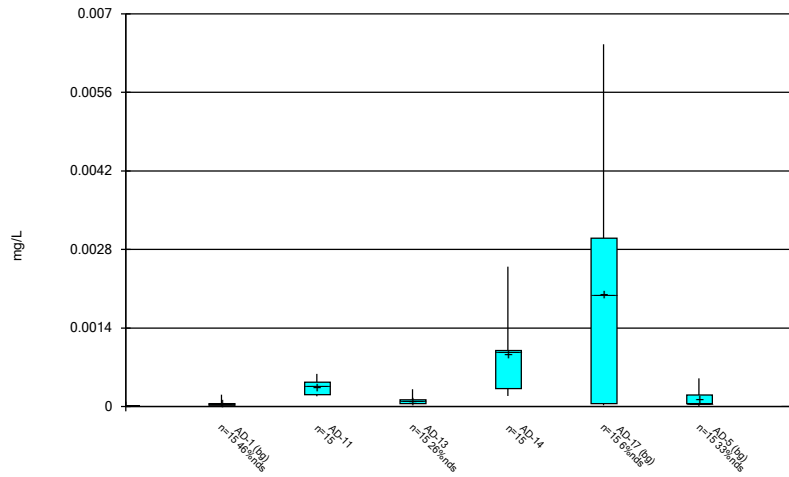
Constituent: Barium, total Analysis Run 7/2/2020 12:34 PM  
 Welsh Landfill Client: Geosyntec Data: Welsh LF

### Box & Whiskers Plot



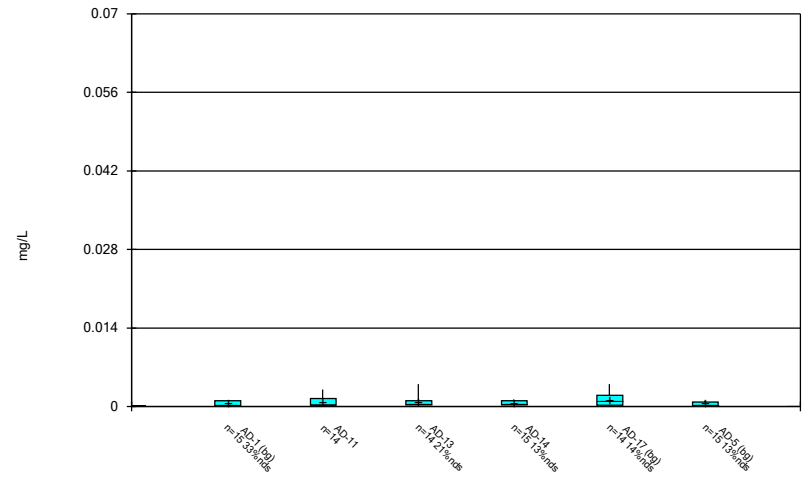
Constituent: Beryllium, total Analysis Run 7/2/2020 12:34 PM  
 Welsh Landfill Client: Geosyntec Data: Welsh LF

Box & Whiskers Plot



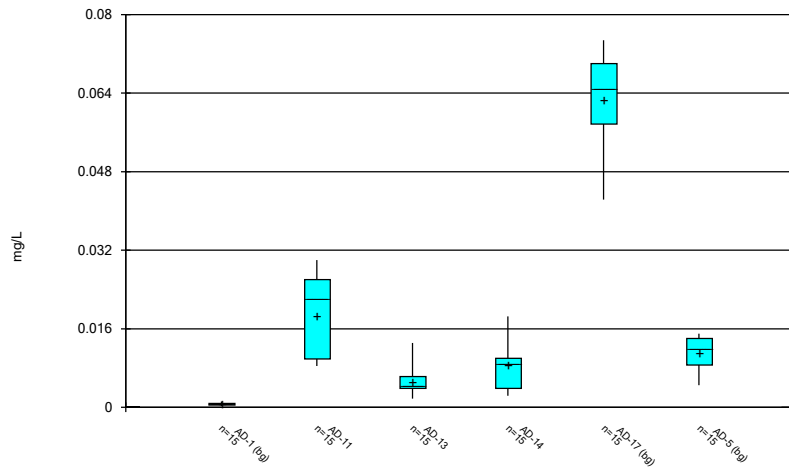
Constituent: Cadmium, total Analysis Run 7/2/2020 12:34 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

Box & Whiskers Plot



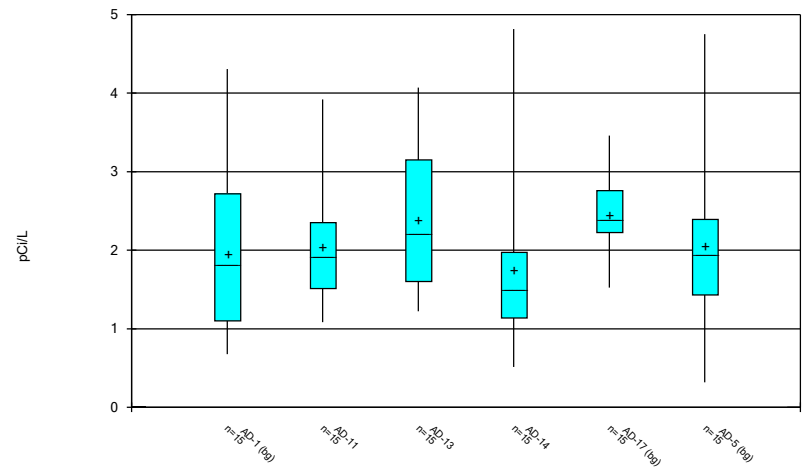
Constituent: Chromium, total Analysis Run 7/2/2020 12:34 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

Box & Whiskers Plot



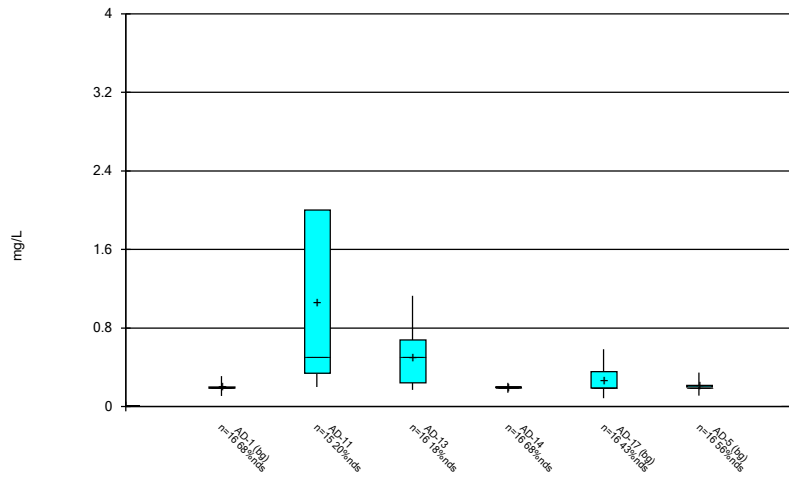
Constituent: Cobalt, total Analysis Run 7/2/2020 12:34 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

Box & Whiskers Plot



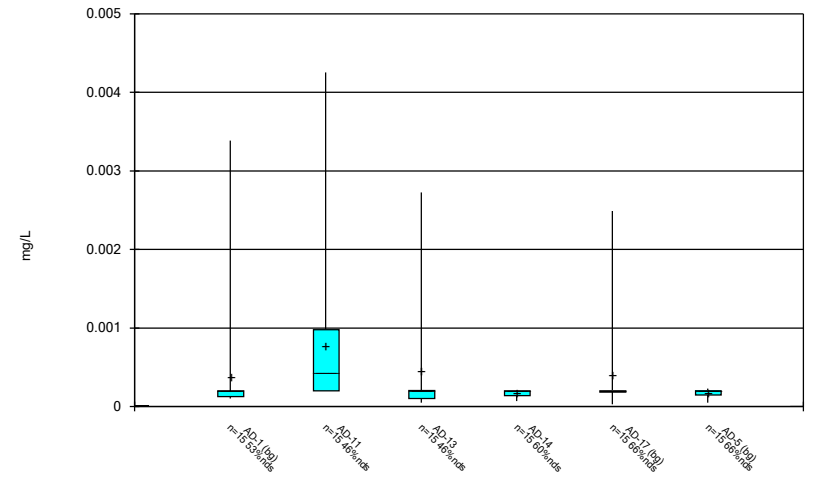
Constituent: Combined Radium 226 + 228 Analysis Run 7/2/2020 12:34 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

Box & Whiskers Plot



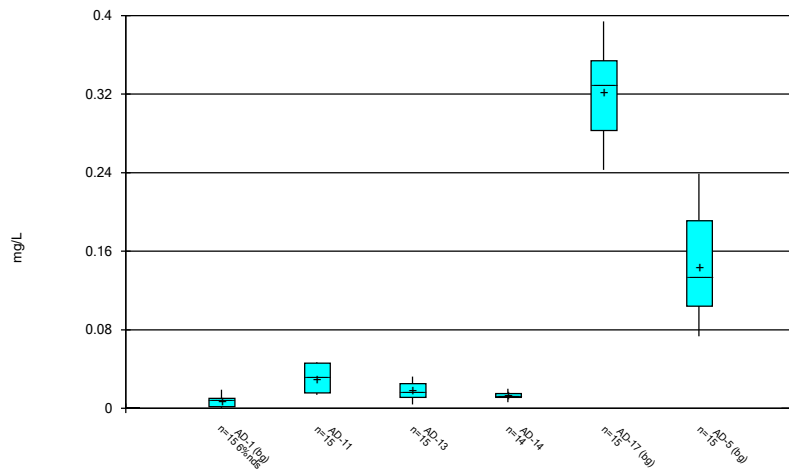
Constituent: Fluoride, total Analysis Run 7/2/2020 12:34 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

Box & Whiskers Plot



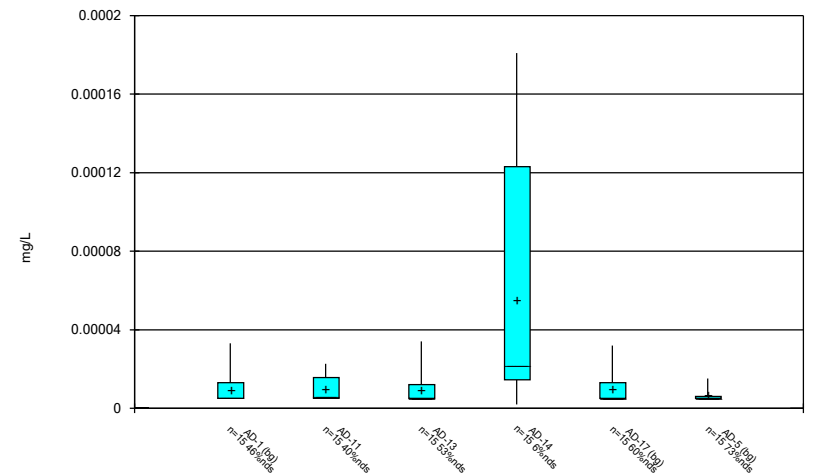
Constituent: Lead, total Analysis Run 7/2/2020 12:34 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

Box & Whiskers Plot



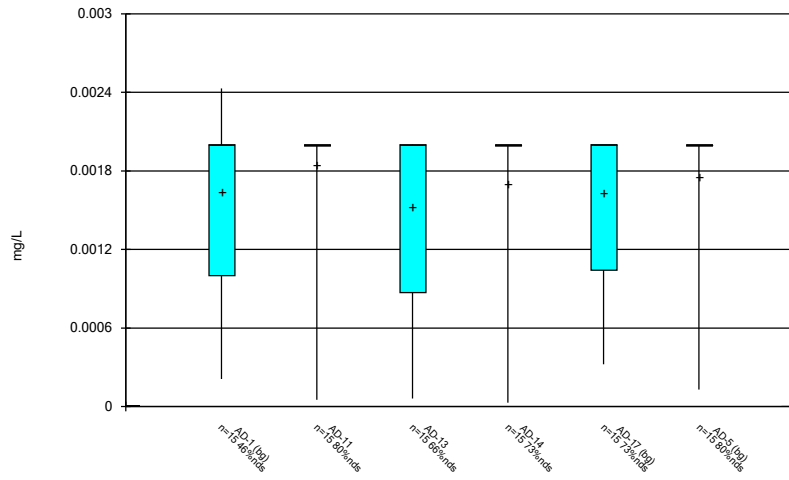
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Welsh Landfill Client: Geosyntec Data: Welsh LF

Box & Whiskers Plot



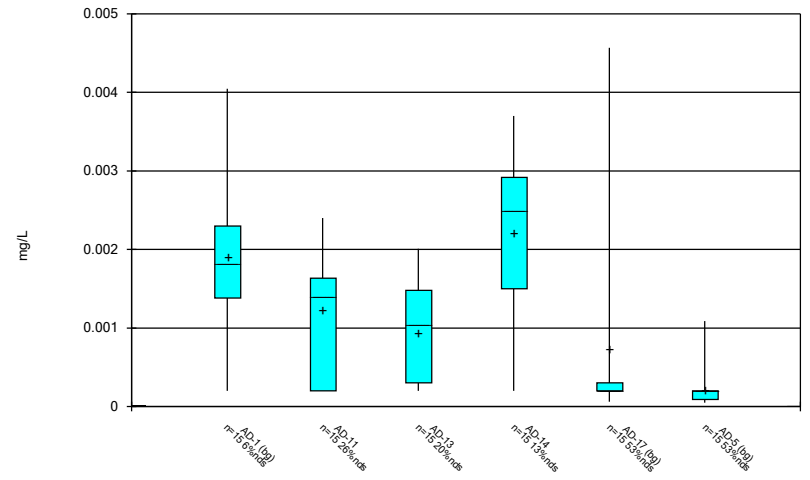
Constituent: Mercury, total Analysis Run 7/2/2020 12:34 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

Box & Whiskers Plot



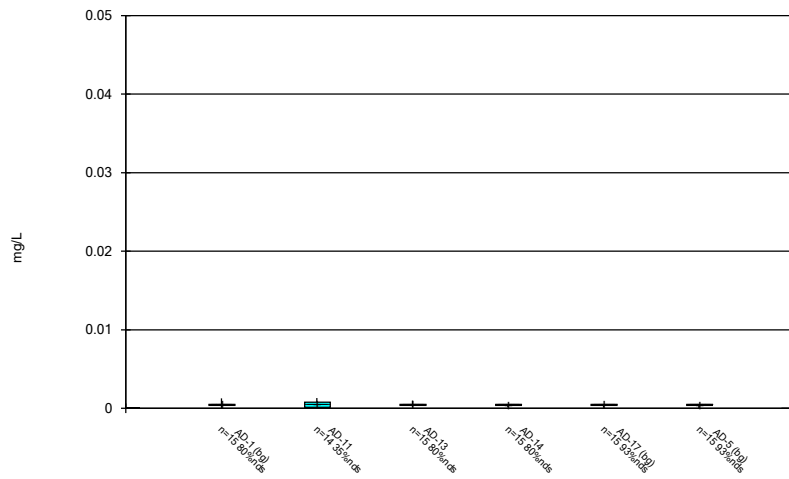
Constituent: Molybdenum, total Analysis Run 7/2/2020 12:34 PM  
 Welsh Landfill Client: Geosyntec Data: Welsh LF

Box & Whiskers Plot



Constituent: Selenium, total Analysis Run 7/2/2020 12:34 PM  
 Welsh Landfill Client: Geosyntec Data: Welsh LF

Box & Whiskers Plot



Constituent: Thallium, total Analysis Run 7/2/2020 12:34 PM  
 Welsh Landfill Client: Geosyntec Data: Welsh LF

# Outlier Summary

Welsh Landfill Client: Geosyntec Data: Welsh LF Printed 7/2/2020, 12:41 PM

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AD-11 Chromium, total (mg/L)  
AD-13 Chromium, total (mg/L)  
AD-17 Chromium, total (mg/L)  
AD-11 Fluoride, total (mg/L)  
AD-14 Lithium, total (mg/L)  
AD-11 Thallium, total (mg/L)

7/29/2016				0.024 (o)		
9/30/2016	0.007 (o)					
10/21/2016			3 (o)			
12/14/2016	0.007 (o)					
1/20/2017		0.068 (O)				
5/23/2018					0.046 (o)	

# Upper Tolerance Limits

Welsh Landfill Client: Geosyntec Data: Welsh LF Printed 7/2/2020, 12:37 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Bg N	Std. Dev.	%NDs	Transform	Alpha	Method
Antimony, total (mg/L)	n/a	0.00317	n/a	n/a	n/a	45	n/a	68.89	n/a	0.09944	NP Inter(normal...
Arsenic, total (mg/L)	n/a	0.005	n/a	n/a	n/a	45	n/a	42.22	n/a	0.09944	NP Inter(normal...
Barium, total (mg/L)	n/a	0.6857	n/a	n/a	n/a	45	1.139	0	ln(x)	0.05	Inter
Beryllium, total (mg/L)	n/a	0.00054	n/a	n/a	n/a	45	n/a	8.889	n/a	0.09944	NP Inter(normal...
Cadmium, total (mg/L)	n/a	0.00646	n/a	n/a	n/a	45	n/a	28.89	n/a	0.09944	NP Inter(normal...
Chromium, total (mg/L)	n/a	0.003134	n/a	n/a	n/a	44	1.145	20.45	ln(x)	0.05	Inter
Cobalt, total (mg/L)	n/a	0.0748	n/a	n/a	n/a	45	n/a	0	n/a	0.09944	NP Inter(normal...
Combined Radium 226 + 228 (pCi/L)	n/a	4.068	n/a	n/a	n/a	45	0.9169	0	No	0.05	Inter
Fluoride, total (mg/L)	n/a	0.583	n/a	n/a	n/a	48	n/a	56.25	n/a	0.08526	NP Inter(normal...
Lead, total (mg/L)	n/a	0.003384	n/a	n/a	n/a	45	n/a	62.22	n/a	0.09944	NP Inter(normal...
Lithium, total (mg/L)	n/a	0.394	n/a	n/a	n/a	45	n/a	2.222	n/a	0.09944	NP Inter(normal...
Mercury, total (mg/L)	n/a	0.000033	n/a	n/a	n/a	45	n/a	60	n/a	0.09944	NP Inter(normal...
Molybdenum, total (mg/L)	n/a	0.00243	n/a	n/a	n/a	45	n/a	66.67	n/a	0.09944	NP Inter(normal...
Selenium, total (mg/L)	n/a	0.004567	n/a	n/a	n/a	45	n/a	37.78	n/a	0.09944	NP Inter(normal...
Thallium, total (mg/L)	n/a	0.001251	n/a	n/a	n/a	45	n/a	88.89	n/a	0.09944	NP Inter(NDs)

<b>WELSH LANDFILL GWPS</b>				
<b>Constituent Name</b>	<b>MCL</b>	<b>CCR Rule Specified</b>	<b>Background Limit</b>	<b>GWPS</b>
Antimony, Total (mg/L)	0.006		0.0032	0.006
Arsenic, Total (mg/L)	0.01		0.005	0.01
Barium, Total (mg/L)	2		0.69	2
Beryllium, Total (mg/L)	0.004		0.00054	0.004
Cadmium, Total (mg/L)	0.005		0.0065	0.0065
Chromium, Total (mg/L)	0.1		0.0031	0.1
Cobalt, Total (mg/L)	n/a	0.006	0.075	0.075
Combined Radium, Total (pCi/L)	5		4.07	5
Fluoride, Total (mg/L)	4		0.58	4
Lead, Total (mg/L)	0.015		0.0034	0.015
Lithium, Total (mg/L)	n/a	0.04	0.39	0.39
Mercury, Total (mg/L)	0.002		0.000033	0.002
Molybdenum, Total (mg/L)	n/a	0.1	0.0024	0.1
Selenium, Total (mg/L)	0.05		0.005	0.05
Thallium, Total (mg/L)	0.002		0.0013	0.002

\*Grey cell indicates Background Limit is higher than MCL.

\*MCL = Maximum Contaminant Level



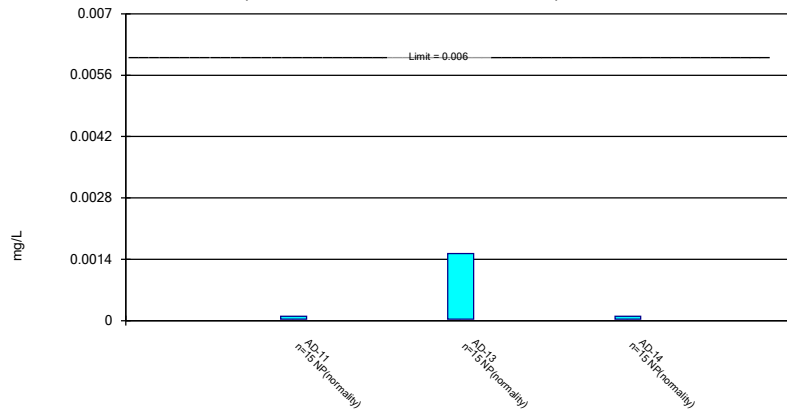
# Confidence Interval Summary Table - All Results (No Significant)

Welsh Landfill Client: Geosyntec Data: Welsh LF Printed 7/2/2020, 12:41 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	%NDs	Transform	Alpha	Method
Antimony, total (mg/L)	AD-11	0.0001	0.00003	0.006	No	15	73.33	No	0.01	NP (normality)
Antimony, total (mg/L)	AD-13	0.00153	0.00003	0.006	No	15	53.33	No	0.01	NP (normality)
Antimony, total (mg/L)	AD-14	0.0001	0.00003	0.006	No	15	66.67	No	0.01	NP (normality)
Arsenic, total (mg/L)	AD-11	0.005	0.00055	0.01	No	15	40	No	0.01	NP (normality)
Arsenic, total (mg/L)	AD-13	0.006	0.00038	0.01	No	15	46.67	No	0.01	NP (normality)
Arsenic, total (mg/L)	AD-14	0.005	0.00039	0.01	No	15	46.67	No	0.01	NP (normality)
Barium, total (mg/L)	AD-11	0.0403	0.012	2	No	15	0	No	0.01	NP (normality)
Barium, total (mg/L)	AD-13	0.05916	0.02902	2	No	15	0	sqrt(x)	0.01	Param.
Barium, total (mg/L)	AD-14	0.04739	0.03205	2	No	15	0	ln(x)	0.01	Param.
Beryllium, total (mg/L)	AD-11	0.005	0.000824	0.004	No	15	0	No	0.01	NP (normality)
Beryllium, total (mg/L)	AD-13	0.0008526	0.000494	0.004	No	15	0	No	0.01	Param.
Beryllium, total (mg/L)	AD-14	0.0006746	0.0003698	0.004	No	15	0	No	0.01	Param.
Cadmium, total (mg/L)	AD-11	0.0004267	0.0002568	0.0065	No	15	0	No	0.01	Param.
Cadmium, total (mg/L)	AD-13	0.0005	0.000085	0.0065	No	15	26.67	No	0.01	NP (normality)
Cadmium, total (mg/L)	AD-14	0.001288	0.0004358	0.0065	No	15	0	sqrt(x)	0.01	Param.
Chromium, total (mg/L)	AD-11	0.002	0.000259	0.1	No	14	0	No	0.01	NP (normality)
Chromium, total (mg/L)	AD-13	0.00073	0.000283	0.1	No	14	21.43	No	0.01	NP (normality)
Chromium, total (mg/L)	AD-14	0.0007879	0.0003372	0.1	No	15	13.33	No	0.01	Param.
Cobalt, total (mg/L)	AD-11	0.026	0.00863	0.075	No	15	0	No	0.01	NP (normality)
Cobalt, total (mg/L)	AD-13	0.006702	0.00327	0.075	No	15	0	sqrt(x)	0.01	Param.
Cobalt, total (mg/L)	AD-14	0.01195	0.005108	0.075	No	15	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	AD-11	2.504	1.583	5	No	15	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	AD-13	2.985	1.781	5	No	15	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	AD-14	2.306	1.06	5	No	15	0	sqrt(x)	0.01	Param.
Fluoride, total (mg/L)	AD-11	2	0.083	4	No	15	20	No	0.01	NP (normality)
Fluoride, total (mg/L)	AD-13	0.684	0.2293	4	No	16	18.75	No	0.01	Param.
Fluoride, total (mg/L)	AD-14	0.162	0.083	4	No	16	68.75	No	0.01	NP (normality)
Lead, total (mg/L)	AD-11	0.005	0.000523	0.015	No	15	46.67	No	0.01	NP (normality)
Lead, total (mg/L)	AD-13	0.005	0.00006	0.015	No	15	46.67	No	0.01	NP (normality)
Lead, total (mg/L)	AD-14	0.005	0.0001	0.015	No	15	60	No	0.01	NP (normality)
Lithium, total (mg/L)	AD-11	0.047	0.0153	0.39	No	15	0	No	0.01	NP (normality)
Lithium, total (mg/L)	AD-13	0.02337	0.01247	0.39	No	15	0	No	0.01	Param.
Lithium, total (mg/L)	AD-14	0.01514	0.01055	0.39	No	14	0	No	0.01	Param.
Mercury, total (mg/L)	AD-11	0.000025	0.000007	0.002	No	15	40	No	0.01	NP (normality)
Mercury, total (mg/L)	AD-13	0.000034	0.000008	0.002	No	15	53.33	No	0.01	NP (normality)
Mercury, total (mg/L)	AD-14	0.00006923	0.00001139	0.002	No	15	6.667	ln(x)	0.01	Param.
Molybdenum, total (mg/L)	AD-11	0.002	0.002	0.1	No	15	80	No	0.01	NP (NDs)
Molybdenum, total (mg/L)	AD-13	0.002	0.0005	0.1	No	15	66.67	No	0.01	NP (normality)
Molybdenum, total (mg/L)	AD-14	0.002	0.001	0.1	No	15	73.33	No	0.01	NP (normality)
Selenium, total (mg/L)	AD-11	0.005	0.00134	0.05	No	15	26.67	No	0.01	NP (Cohens/xfrm)
Selenium, total (mg/L)	AD-13	0.005	0.0004	0.05	No	15	20	No	0.01	NP (Cohens/xfrm)
Selenium, total (mg/L)	AD-14	0.003638	0.00207	0.05	No	15	13.33	No	0.01	Param.
Thallium, total (mg/L)	AD-11	0.00107	0.0001	0.002	No	14	35.71	No	0.01	NP (normality)
Thallium, total (mg/L)	AD-13	0.0009736	0.000277	0.002	No	15	80	No	0.01	NP (NDs)
Thallium, total (mg/L)	AD-14	0.0005	0.000242	0.002	No	15	80	No	0.01	NP (NDs)

### Non-Parametric Confidence Interval

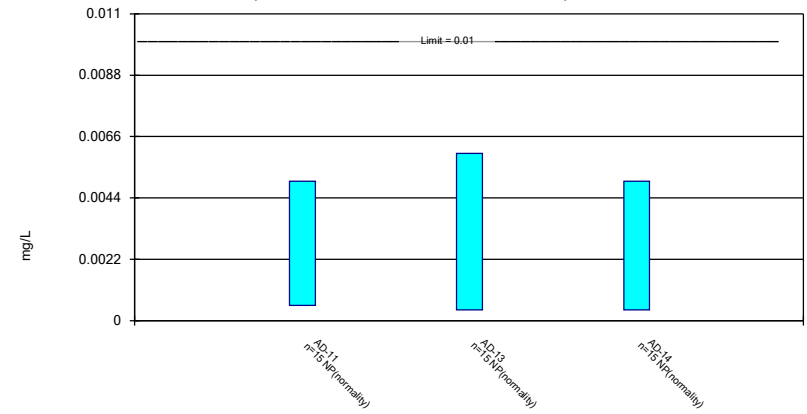
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Antimony, total Analysis Run 7/2/2020 12:39 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Non-Parametric Confidence Interval

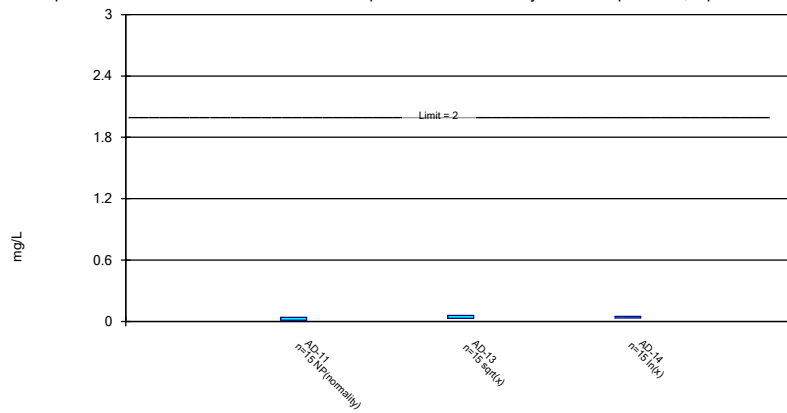
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Arsenic, total Analysis Run 7/2/2020 12:39 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Parametric and Non-Parametric (NP) Confidence Interval

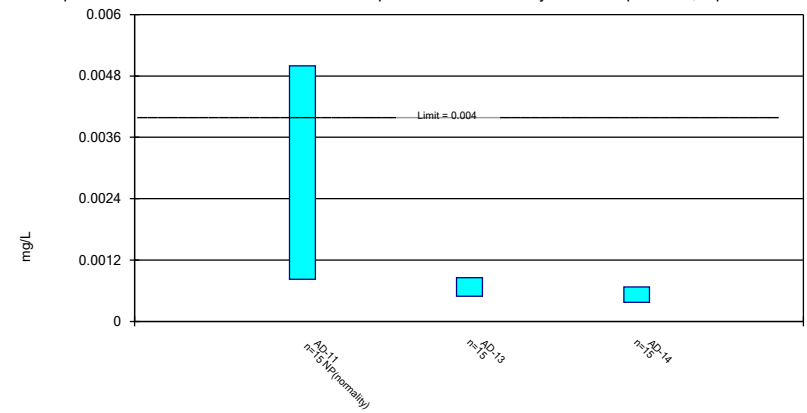
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Barium, total Analysis Run 7/2/2020 12:39 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Parametric and Non-Parametric (NP) Confidence Interval

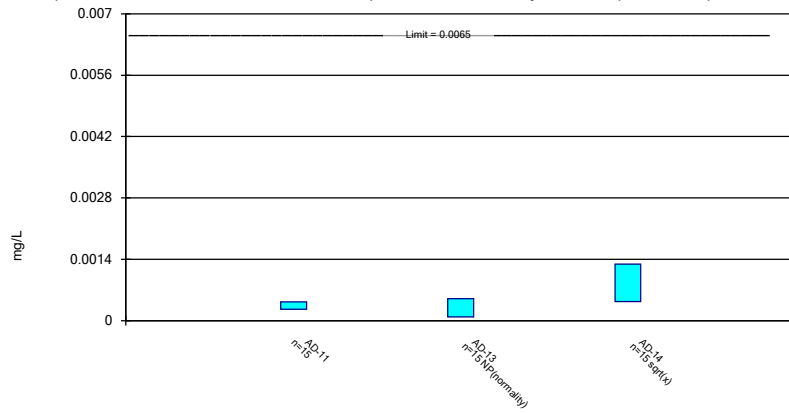
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Beryllium, total Analysis Run 7/2/2020 12:39 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Parametric and Non-Parametric (NP) Confidence Interval

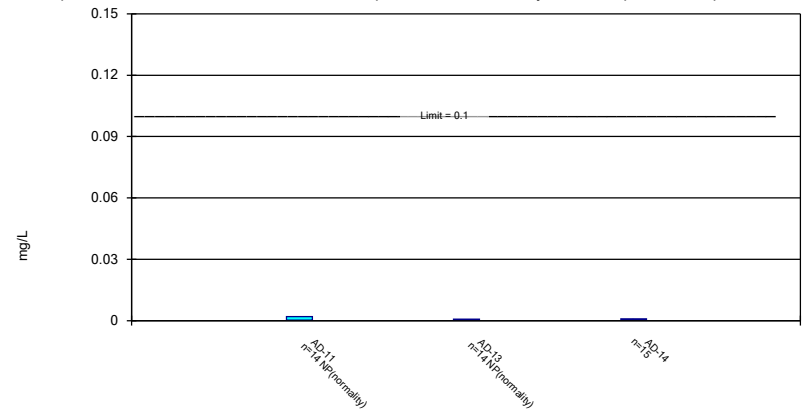
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cadmium, total Analysis Run 7/2/2020 12:39 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Parametric and Non-Parametric (NP) Confidence Interval

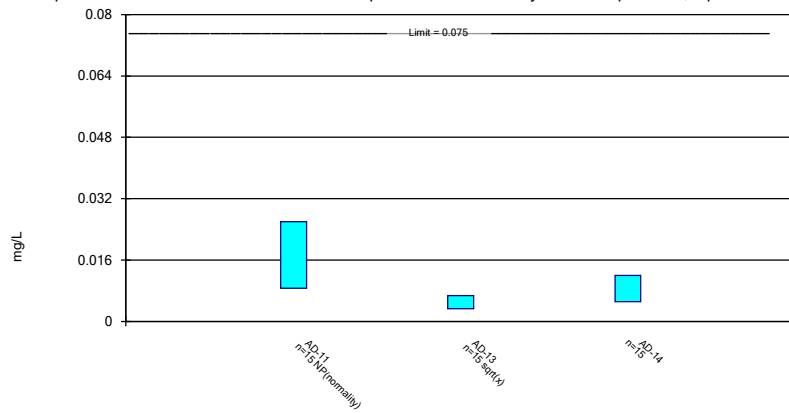
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Chromium, total Analysis Run 7/2/2020 12:39 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Parametric and Non-Parametric (NP) Confidence Interval

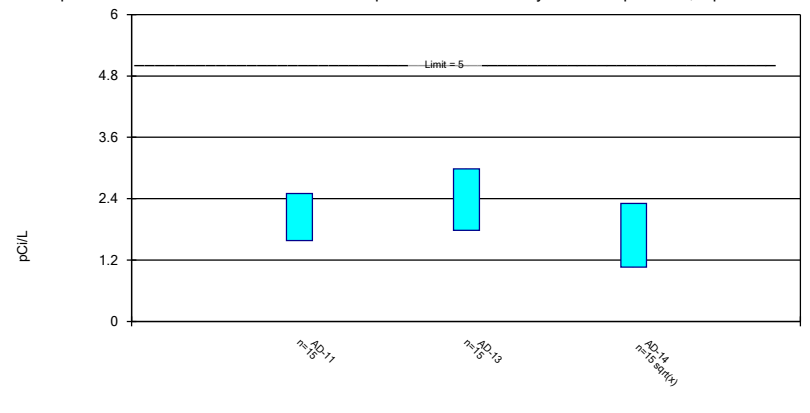
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt, total Analysis Run 7/2/2020 12:39 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Parametric Confidence Interval

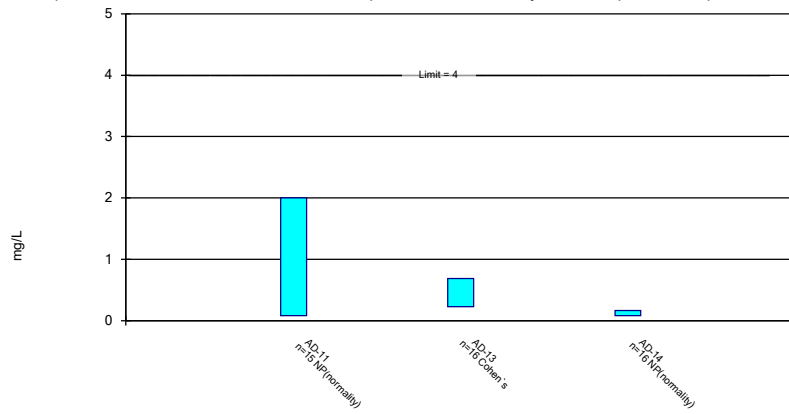
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Combined Radium 226 + 228 Analysis Run 7/2/2020 12:39 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Parametric and Non-Parametric (NP) Confidence Interval

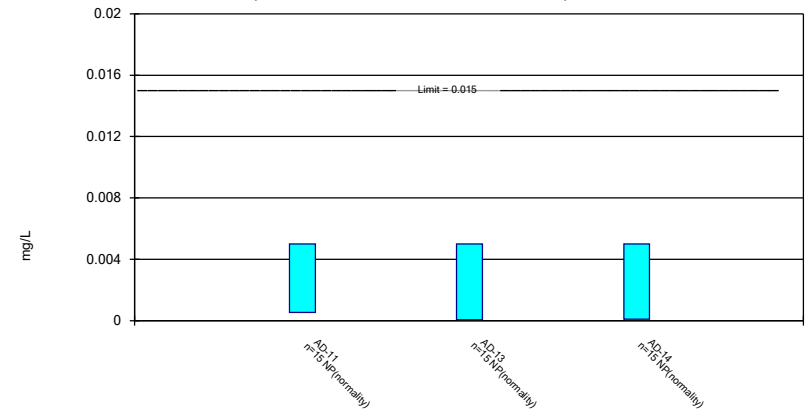
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Fluoride, total Analysis Run 7/2/2020 12:39 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Non-Parametric Confidence Interval

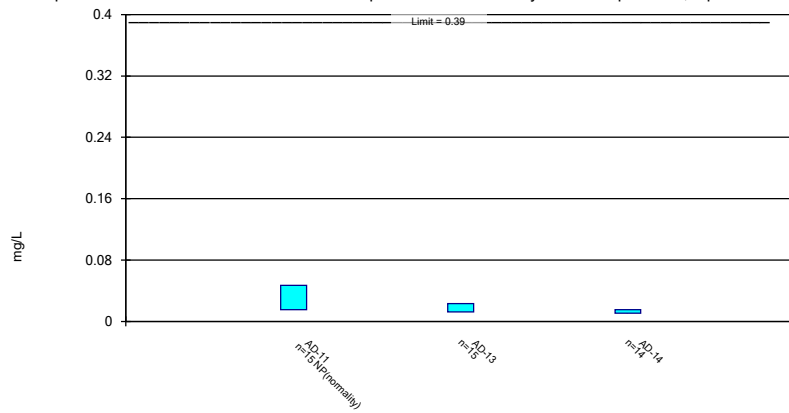
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Lead, total Analysis Run 7/2/2020 12:39 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Parametric and Non-Parametric (NP) Confidence Interval

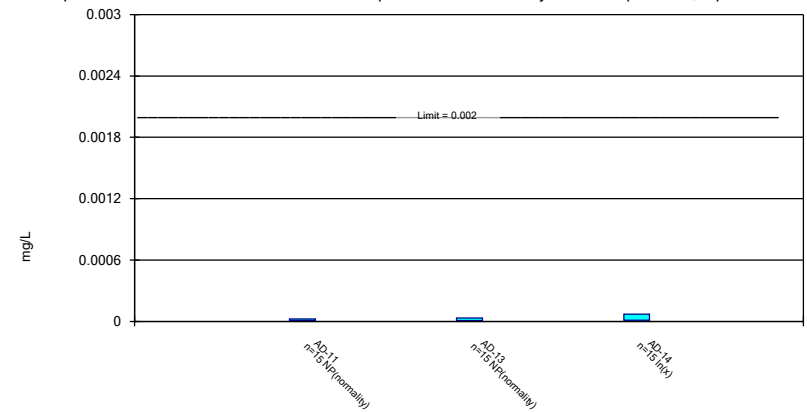
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, total Analysis Run 7/2/2020 12:39 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Parametric and Non-Parametric (NP) Confidence Interval

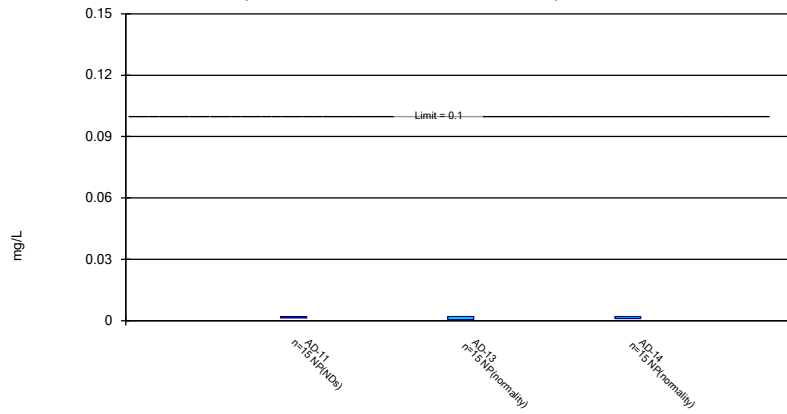
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Mercury, total Analysis Run 7/2/2020 12:39 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Non-Parametric Confidence Interval

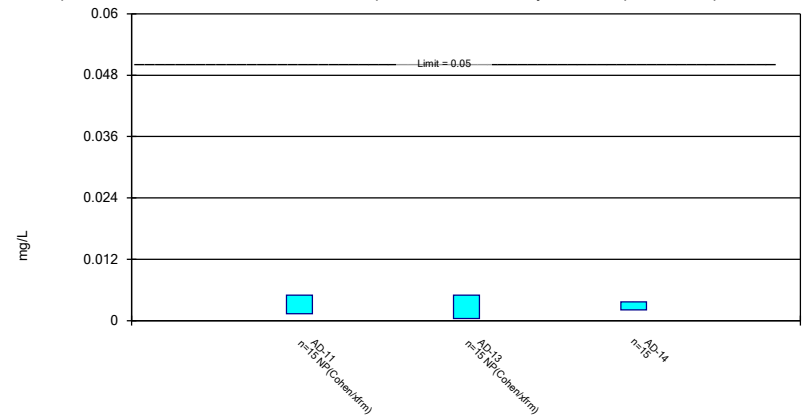
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Molybdenum, total Analysis Run 7/2/2020 12:39 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Parametric and Non-Parametric (NP) Confidence Interval

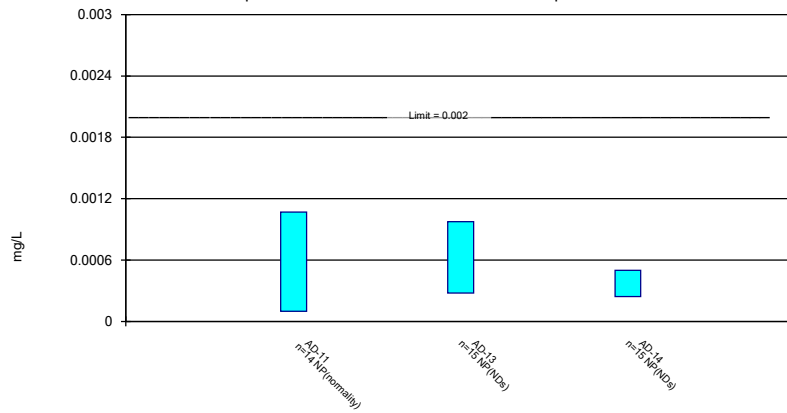
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Selenium, total Analysis Run 7/2/2020 12:39 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

### Non-Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Thallium, total Analysis Run 7/2/2020 12:39 PM  
Welsh Landfill Client: Geosyntec Data: Welsh LF

## **APPENDIX III**

Alternate source demonstrations are included in this appendix. Alternate sources are sources or reasons that explain that statistically significant increases over background or statistically significant levels above the groundwater protection standard are not attributable to the CCR unit.

## **APPENDIX IV**

A summary of any transition between monitoring programs or an alternate monitoring frequency, for example the date and circumstances for transitioning from detection monitoring to assessment monitoring

## **APPENDIX V- NA**

Reports documenting monitoring well plugging and abandonment or well installation are included in the appendix. or other information required to be included in the annual report such as program related notification or assessment of corrective measures.