Annual Groundwater Monitoring Report

Kentucky Power Company

Big Sandy Plant

Fly Ash Pond CCR Unit

Louisa, Kentucky

January 2025

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KENTUCKY POWER
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I. Overview

This *Annual Groundwater Monitoring Report* has been prepared to report the status of activities for the preceding year for an existing CCR unit at Kentucky Power Company's Big Sandy Power Plant. Kentucky Power Company is a wholly owned subsidiary of American Electric Power Company (AEP). 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.

In general, the following activities were completed:

- The CCR unit was in Assessment monitoring at the beginning and end of 2024. The assessment monitoring program was initiated on April 13, 2018;
- All monitoring wells that were installed and developed to establish a certified groundwater monitoring system around the CCR unit, in accordance with the requirements of 40 CFR 257.91 and documented in AEP's *Groundwater Monitoring Network Evaluation, Revision 1 (Geosyntec, October 2023)* were sampled pursuant to 40 CFR 257.95(b) on March 12, 13, and 14, 2024. All monitoring wells were subsequently sampled pursuant to 40 CFR 257.95(d)(1) on May 7, 8, and 9, 2024. Upon a review of the data collected in May 2024, it was discovered that the groundwater sampling team neglected to collect samples for total dissolved solids, chloride, and sulfate. Thus, an extra round of sampling for only these three parameters at all wells was completed on August 6 and 7, 2024. Pursuant to 40 CFR 257.95(d)(1), a second semiannual sampling event occurred on September 23 and 24, 2024. All samples collected during the March 2024 sampling event were analyzed for all constituents in Appendix IV of the CCR rules. All samples collected during the May/August 2024 sampling event were analyzed for all constituents in Appendix III of the CCR rules and for those Appendix IV constituents detected during the March 2024 sampling event. All samples collected during the May/August 2024 sampling event were analyzed for all constituents in Appendix III of the CCR rules and for those Appendix IV constituents detected during the March 2024 sampling event. All sampling and analyses were in accordance with 40 CFR 257.94 *et seq.*, AEP's *Groundwater Sampling and Analysis Plan (AEP and EHS Support, October 2016), and AEP's Statistical Analysis Plan (Geosyntec, January 2017)*. The statistical process was guided by USEPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* ("Unified Guidance", USEPA, 2009);
- Groundwater monitoring data underwent various validation tests, including tests for completeness, valid values, transcription errors, and consistent units;
- Statistical analysis of the background and assessment monitoring data was conducted in accordance with *AEP's Statistical Analysis Plan (Geosyntec, January 2017)* to establish groundwater protection standards and to determine whether or not one or more Appendix IV constituents were detected at statistically significant levels (SSLs) above the

corresponding groundwater protection standards in assessment monitoring samples collected during an October 2023 sampling event and the aforementioned March and May 2024 sampling events. (The three parameters not collected during the May 2024 sampling by mistake then collected in August 2024 were all Appendix III parameters.) Statistical analysis of the background and assessment monitoring data was conducted in accordance with *AEP's Statistical Analysis Plan (Geosyntec, January 2017)* to determine whether or not one or more Appendix III constituents were detected at statistically significant increases (SSIs) above background during the October 2023 and the May/August 2024 sampling events. The corresponding statistical analyses were completed on March 2, 2024 and October 18, 2024, respectively. Statistical analyses of samples collected during the September 2024 sampling event will be completed in 2025;

- The statistical evaluation of data collected during the October 2023 sampling event, and data collected during the March and May/August 2024 sampling events concluded that no Appendix IV constituents were detected at SSLs above the corresponding groundwater protection standard. The statistical evaluation of data collected during the October 2023 sampling event concluded that boron concentrations were above the interwell upper prediction limit (UPL) of 0.244 milligrams per liter (mg/L) at MW-1606 (2.07 mg/L), chloride concentrations were above the interwell UPL of 6.22 mg/L at MW-1602 (18.5 mg/L) and MW-1606 (31.4 mg/L), and sulfate concentrations were above the interwell UPL of 106 mg/L at MW-1602 (206 mg/L). The statistical evaluation of data collected during the May/August 2024 sampling event concluded that the boron concentration was above the interwell UPL of 0.244 milligrams per liter (mg/L) at MW-1606 (2.17 mg/L), chloride concentrations were above the interwell UPL of 6.22 mg/L at MW-1602 (17.1 mg/L) and MW-1606 (31.7 mg/L), sulfate concentrations were above the interwell UPL of 106 mg/L at MW-1601 (109 mg/L) and MW-1602 (222 mg/L), and the TDS concentration was above the interwell UPL of 590 mg/L at MW-1602 (640 mg/L) These statistical evaluations are discussed further in Section V of this report;
- Because no Appendix IV constituents were detected at SSLs above the corresponding groundwater protection standard by statistical analysis for any sampling event, no alternative source demonstration (ASD) studies were conducted. Based on the results of statistical analysis of data from both the October 2023 and the May/August 2024 sampling events, data concentrations of Appendix III constituents appeared to be above background levels and the unit remained in assessment monitoring.

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

- 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 required by the detection monitoring or assessment monitoring programs (attached as Appendixes 1 and 2);

- A figure showing the CCR unit, all groundwater monitoring wells, and monitoring well identification numbers (attached as Appendix 2);
- Results of the required statistical analysis of groundwater monitoring results (attached as Appendix 3, where applicable);
- Results of alternative source demonstrations (attached as Appendix 4, where applicable);
- A summary of any transition between monitoring programs or an alternate monitoring frequency (notices attached as Appendix 5, where applicable);
- Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a statement regarding the rationale for the installation/decommission (attached as Appendix 6, where applicable); and
- Other information required in the annual report such as an assessment of corrective measures, if applicable.

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

A figure depicting the PE-certified groundwater monitoring network, with the monitoring well locations and their corresponding identification numbers, is in Appendix 2.

III. Monitoring Wells Installed or Decommissioned

There were no monitoring wells installed or decommissioned in 2024. The network design, as summarized in the *Groundwater Monitoring Network Evaluation, Revision 1* (*Geosyntec, October 2023*) posted at the CCR web site for Big Sandy Plant at the following link: https://www.aep.com/environment/ccr/, did not change. The report discusses the facility location, the hydrogeological setting, the hydrostratigraphic units, the uppermost aquifer, downgradient monitoring well locations, and upgradient monitoring well locations.

IV. Groundwater Quality Data, Static Water Elevation Data, Flow Rate, and Direction

Appendix 1 contains Table 1 showing the data analyzed from the samples collected during the assessment monitoring events in 2024, including the number of samples collected per well, the sample collection dates, and the groundwater velocities for each sampling event. Table 1 also includes background data collected during the eight background sampling events and previous detection and assessment monitoring data. Static water elevation data and groundwater flow

directions, in the form of potentiometric surface maps, from each monitoring event in 2024 are shown in Appendix 2.

V. Statistical Analysis of Groundwater Monitoring Data

Statistical analyses of data collected during the October 2023 sampling event for determination of SSLs detected above (or outside for pH) the corresponding groundwater protection standard and for determination of SSIs above background, statistical limits were completed and documented in the March 2, 2024 *Statistical Analysis Summary (Geosyntec, March 2024)*. Statistical analyses of data collected during the March and May/August 2024 sampling events for determination of SSLs detected above (or outside for pH) the corresponding groundwater protection standard statistical limits were completed and documented in the October 18, 2024 *Statistical Analysis Summary (Geosyntec, October 2024)*. The statistical analysis summaries contain full statistical evaluations in Attachment B of each corresponding summary and are provided in Appendix 3 of this report. No SSLs were identified during either statistical evaluation; however, some Appendix III parameters remained above background, as detailed in the overview section of this report, and the unit remained in the assessment monitoring program.

VI. Alternative Source Demonstration

No alternative source demonstration reports were written in 2024 because no SSLs above the corresponding groundwater protection standard were detected in any samples.

VII. Discussion about Transition between Monitoring Requirements or Alternate Monitoring Frequency

No transition between monitoring requirements occurred in 2024; the CCR unit remained in assessment monitoring. A statement to this effect is provided in Appendix 5.

The fly ash pond would return to a detection monitoring program if all Appendix III and IV constituents are below background values for two consecutive monitoring events; however, this did not occur and the CCR unit remained in assessment monitoring for the entire year.

Regarding defining an alternate monitoring frequency, the groundwater velocity and monitoring well production are high enough at this facility that no modification to the semiannual assessment monitoring frequency is needed at this time.

VIII. Other Information Required

The CCR unit has progressed from detection monitoring to its current status in assessment monitoring. All required information has been included in this annual groundwater monitoring report. At the appropriate time, hydrogeological, geochemical, and statistical analyses of the groundwater assessment monitoring data will continue to attempt demonstrations of whether or not an alternative source or sources other than the CCR unit are causing the detection of SSLs above (or outside for pH) the corresponding groundwater protection standard statistical limits, or if the SSLs resulted from error in sampling, analysis, statistical evaluation or natural variation in groundwater quality, if warranted. In those cases where an alternative source demonstration is made, the analyses and supporting information will be presented as well.

The unit was dewatered of all ponded surface water prior to completion of the geomembrane liner installation within the final cover system on November 24, 2020. Ponded surface water no longer remains within the CCR unit.

IX. Description of Any Problems Encountered in 2024 and Actions Taken

No significant problems were encountered. Through previous, proper construction of monitoring wells and use of low-flow purging and sampling methodology, samples representative of uppermost aquifer groundwater, with low turbidity, were obtained and the schedule to support preparation of this annual groundwater monitoring report was met. It is possible, however, that future necessary monitoring wells may not encounter earth materials with grain sizes coarse enough to produce low turbidity monitoring well samples no matter how carefully the monitoring wells are constructed and groundwater samples collected.

X. A Projection of Key Activities for the Upcoming Year

Key activities for 2025 include the following:

- Continued assessment monitoring sampling of CCR wells for all Appendix IV constituents annually pursuant to 40 CFR 257.95(b) and, pursuant to 40 CFR 257.95(d)(1), for all Appendix III constituents and those Appendix IV constituents detected during the previous sampling performed pursuant to 40 CFR 257.95(b);
- Continued establishment of groundwater protection standard statistical limits for all Appendix IV constituents and statistical comparison of Appendix IV concentrations in downgradient monitoring wells to those standards;
- If a groundwater protection standard is exceeded in a downgradient well that is not demonstrated to be due to a source other than the CCR unit or resulting from errors in sampling, analysis, statistical evaluation, or natural variations in groundwater quality by a successful alternative source demonstration, the following activities will be undertaken:

- Prepare a notification identifying the constituents in Appendix IV that have exceeded the groundwater protection standard and place the notification in the facility's operating record;
- Characterize the nature and extent of the potential release by installing additional monitoring wells as necessary, including at least one additional monitoring well at the facility boundary in the direction of potential contaminant migration;
- Sample all wells in accordance with 40 CFR 257.95(d)(1) to characterize the nature and extent of the potential release.
- Estimate the quantity of material potentially released including specific information on the Appendix IV constituents and the levels at which they are present in the material;
- If contaminants have migrated off-site, notify all persons who own or reside on land that directly overlies any part of the plume of contamination and place the notification in the facility's operating record;
- Initiate an assessment of corrective measures to prevent further releases, to remediate any releases, and to restore affected areas to original conditions;

- Respond to any new data received in light of CCR rule requirements;
- Prepare an eighth annual groundwater monitoring report documenting activities that were undertaken in 2025.

APPENDIX 1—Tables

Tables follow showing the groundwater monitoring data collected, the rate of groundwater flow each time groundwater was sampled, the number of samples collected per monitoring well, dates that the samples were collected, and whether each sample was collected as part of a detection monitoring or an assessment monitoring program.

Table 1. Groundwater Data Summary: MW-1011
Big Sandy - FAP
Appendix III Constituents

Geosyntec Consultants, Inc.

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
9/27/2016	Background	0.071	79.1	3.39	0.19	7.0	79.5	388
11/9/2016	Background	0.081	74.6	3.43	0.21	7.0	74.4	360
1/12/2017	Background	0.103	75.4	2.83	0.25	6.9	72.8	363
2/21/2017	Background	0.098	75.8	2.68	0.21	7.1	72.5	371
4/25/2017	Background	0.148	78.0	2.71	0.23	6.7	74.7	358
5/24/2017	Background	0.156	85.2	2.86	0.20	6.7	73.8	370
6/21/2017	Background	0.129	72.6	2.19	0.22	6.7	69.4	338
7/13/2017	Background	0.111	78.1	2.31	0.21	7.1	78.2	371
9/18/2017	Detection	0.146	80.1	2.85	0.18	6.9	78.0	372
4/26/2018	Assessment	0.139	105	4.71	0.20	6.3	106	456
9/20/2018	Assessment	0.165	72.7	3.43	0.28	7.0	76.3	386
3/13/2019	Assessment	0.101	80.5	5.22	0.24	6.5	84.2	411
6/27/2019	Assessment	0.119	75.3	4.20	0.27	7.0	75.2	386
8/21/2019	Assessment	0.117	86.2	4.41	0.26	7.1	76.2	385
3/17/2020	Assessment	--	--	--	0.24	7.5	--	--
6/29/2020	Assessment	0.111	82.8	5.10	0.24	6.9	82.8	--
8/26/2020	Assessment	--	--	--	--	4.3	--	443
10/5/2020	Assessment	0.105	82.7	4.86	0.26	7.2	81.5	388
3/9/2021	Assessment	--	--	--	0.29	6.9	--	--
6/9/2021	Assessment	0.092	81.2	5.02	0.28	6.8	82.0	380
10/5/2021	Assessment	0.118	79.0	3.74	0.28	6.9	78.1	380
3/23/2022	Assessment	0.052	123 M1, P3	6.11	0.23	8.1	80.8	380
6/13/2022	Assessment	0.105	82.4	4.02	0.26	7.6	85.1	390
10/10/2022	Assessment	0.117	80.4	3.17	0.26	6.8	81.4	390
3/13/2023	Assessment	--	--	--	0.27	6.9	--	--
6/13/2023	Assessment	0.105	75.3	3.44	0.26	6.9	80.6	380 P2
10/18/2023	Assessment	0.094	75.0	5.03	0.22	7.1	77.7	400
3/13/2024	Assessment	--	--	--	0.23	7.3	--	--
5/8/2024	Assessment	0.053	102	--	0.21	6.7	--	--
8/7/2024	Assessment	--	--	3.85	--	--	121	530
9/24/2024	Assessment	0.126	77.5 M1	2.81	0.28	6.9	75.3	360

Table 1. Groundwater Data Summary: MW-1011
Big Sandy - FAP
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
9/27/2016	Background	1.01	17.8	52.0	< 0.005 U1	0.02	0.5	2.85	2.56	0.19	0.214	0.011	< 0.002 U1	1.80	0.09 J1	0.229
11/9/2016	Background	0.75	9.93	48.1	< 0.005 U1	0.02 J1	0.744	1.12	3.56	0.21	0.297	0.017	< 0.002 U1	1.51	0.07 J1	0.162
1/12/2017	Background	0.36	10.5	47.7	< 0.005 U1	0.01 J1	0.369	1.47	5.24	0.25	0.026	0.009	< 0.002 U1	1.39	0.03 J1	0.160
2/21/2017	Background	0.28	11.1	49.5	< 0.005 U1	0.008 J1	0.189	1.09	3.43	0.21	0.024	0.016	< 0.002 U1	1.21	< 0.03 U1	0.153
4/25/2017	Background	0.26	11.9	53.0	< 0.004 U1	0.01 J1	0.223	1.23	2.65	0.23	0.035	0.003	< 0.002 U1	1.23	< 0.03 U1	0.102
5/24/2017	Background	0.22	9.46	54.7	< 0.004 U1	0.008 J1	0.318	1.15	2.566	0.20	0.020	0.005	< 0.002 U1	0.99	< 0.03 U1	0.134
6/21/2017	Background	0.24	5.57	45.7	< 0.004 U1	0.006 J1	0.294	0.413	2.576	0.22	0.01 J1	0.014	0.004 J1	1.34	0.05 J1	0.098
7/13/2017	Background	0.24	5.92	46.0	< 0.004 U1	0.01 J1	0.223	0.444	2.353	0.21	0.054	0.010	< 0.002 U1	1.39	0.03 J1	0.091
4/26/2018	Assessment	0.16	13.5	63.1	< 0.004 U1	< 0.005 U1	0.207	3.25	5.69	0.20	0.095	0.010	< 0.002 U1	0.82	< 0.03 U1	0.121
9/20/2018	Assessment	0.18	7.25	44.8	< 0.02 U1	< 0.01 U1	0.588	0.683	2.56	0.28	0.08	0.009	--	0.8	< 0.03 U1	< 0.1 U1
10/23/2018	Assessment	--	--	--	--	--	--	--	--	--	--	--	< 0.002 U1	--	--	--
3/13/2019	Assessment	0.15	7.53	49.2	< 0.02 U1	< 0.01 U1	0.576	0.709	2.425	0.24	0.217	0.02 J1	< 0.002 U1	0.9 J1	< 0.03 U1	< 0.1 U1
6/27/2019	Assessment	0.15	5.17	47.5	< 0.02 U1	< 0.01 U1	0.304	0.438	2.582	0.27	0.181	< 0.009 U1	< 0.002 U1	0.7 J1	< 0.03 U1	< 0.1 U1
8/21/2019	Assessment	0.18	5.31	49.2	< 0.02 U1	0.01 J1	0.341	0.421	2.54	0.26	0.1 J1	0.00973	< 0.002 U1	0.7 J1	< 0.03 U1	< 0.1 U1
3/17/2020	Assessment	0.14	6.96	51.5	< 0.02 U1	< 0.01 U1	0.253	0.724	4.44	0.24	< 0.05 U1	0.00871	< 0.002 U1	0.7 J1	< 0.03 U1	< 0.1 U1
6/29/2020	Assessment	0.18	6.72	49.2	< 0.02 U1	0.01 J1	0.203	0.339	3.02	0.24	0.05 J1	0.00993	< 0.002 U1	0.8 J1	0.06 J1	< 0.1 U1
10/5/2020	Assessment	0.18	5.31	46.3	< 0.02 U1	< 0.01 U1	0.09 J1	0.321	2.57	0.26	< 0.05 U1	0.00926	< 0.002 U1	0.8 J1	0.04 J1	< 0.1 U1
3/9/2021	Assessment	0.14	7.71	50.0	< 0.007 U1	< 0.004 U1	0.481	0.438	2.81	0.29	0.06 J1	0.00977	< 0.002 U1	0.7 J1	< 0.09 U1	0.06 J1
6/9/2021	Assessment	0.17	4.84	46.4	< 0.007 U1	0.012 J1	0.35	0.452	4.09	0.28	0.10 J1	0.00852	< 0.002 U1	0.8	< 0.09 U1	0.06 J1
10/5/2021	Assessment	0.19	4.42	46.1	< 0.007 U1	0.012 J1	0.22	0.305	3.19	0.28	0.10 J1	0.00987	< 0.002 U1	0.9	< 0.09 U1	0.06 J1
3/23/2022	Assessment	0.37	19.3	57.5	0.007 J1	0.007 J1	0.36	1.12	3.69	0.23	0.15 J1	0.0106	< 0.002 U1	0.7	< 0.09 U1	0.06 J1
6/13/2022	Assessment	0.16	3.55	47.2	< 0.007 U1	< 0.004 U1	0.21	0.284	3.29	0.26	< 0.05 U1	0.00948	< 0.002 U1	0.9	< 0.09 U1	0.06 J1
10/10/2022	Assessment	0.13	3.68	44.0	< 0.007 U1	< 0.004 U1	0.30	0.223	2.73	0.26	< 0.05 U1	0.0111	< 0.004 U1	0.8	< 0.09 U1	0.04 J1
3/13/2023	Assessment	0.14	3.32	41.4	< 0.007 U1	< 0.004 U1	0.29	0.229	2.67	0.27	< 0.05 U1	0.00976	< 0.002 U1	0.8	< 0.09 U1	0.05 J1
6/13/2023	Assessment	0.161	2.87	42.0	< 0.007 U1	0.008 J1	0.54	0.197	2.05	0.26	0.09 J1	0.00880	< 0.002 U1	0.9	0.10 J1	0.06 J1
10/18/2023	Assessment	0.105	2.21	42.8	< 0.007 U1	< 0.004 U1	0.37	0.235	3.66	0.22	< 0.05 U1	0.00922	< 0.002 U1	1	0.07 J1	0.05 J1
3/13/2024	Assessment	0.244	8.02	52.2	0.009 P2, J1	0.034	0.71	1.28	3.29	0.23	0.23	0.00764 P2	< 0.002 U1	0.9	0.05 J1	0.07 J1
5/8/2024	Assessment	0.090 J1	3.05	56.0	< 0.007 U1	0.006 J1	0.78	0.395	3.31	0.21	0.32	0.00810	< 0.002 U1	0.8	< 0.04 U1	0.06 J1
9/24/2024	Assessment	0.148	2.24	40.6	< 0.007 U1	0.006 J1	0.27 J1	0.140	3.29	0.28	< 0.05 U1	0.00983	< 0.002 U1	1.1	0.13 J1	0.08 J1

Table 1. Groundwater Data Summary: MW-1012
Big Sandy - FAP
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
9/27/2016	Background	0.176	1.48	1.19	0.71	8.9	35.2	547
11/9/2016	Background	0.159	1.21	1.15	0.70	9.1	35.6	535
1/12/2017	Background	0.182	1.19	1.24	0.73	9.1	40.1	553
2/22/2017	Background	0.171	1.45	1.14	0.68	9.4	36.8	554
4/26/2017	Background	0.183	1.20	1.17	0.71	8.7	37.4	546
5/24/2017	Background	0.244	1.20	1.24	0.71	8.8	36.8	540
6/22/2017	Background	0.174	1.07	1.14	0.64	8.9	38.1	547
7/13/2017	Background	0.172	1.16	1.12	0.66	9.0	38.0	558
9/19/2017	Detection	0.205	1.11	1.10	0.67	9.1	38.5	546
4/26/2018	Assessment	0.227	1.13	1.34	0.82	9.0	36.6	541
9/20/2018	Assessment	0.236	1.11	1.27	0.75	9.1	36.6	561
3/13/2019	Assessment	0.189	1.15	1.26	0.73	8.8	35.6	572
6/25/2019	Assessment	0.169	1.10	1.19	0.74	9.3	35.9	559
8/21/2019	Assessment	0.176	1.38	1.26	0.79	9.4	36.8	583
3/18/2020	Assessment	--	--	--	0.76	10.9	--	--
6/30/2020	Assessment	0.181	1.72	5.21	0.72	9.2	36.7	--
8/27/2020	Assessment	--	--	--	--	9.3	--	582
10/6/2020	Assessment	0.175	1.37	1.32	0.68	9.2	37.0	577
3/10/2021	Assessment	--	--	--	0.85	9.0	--	--
6/9/2021	Assessment	0.174	1.2	1.32	0.80	9.3	35.4	550
10/6/2021	Assessment	0.192	1.2	1.40	0.80	9.2	33.5	570
3/24/2022	Assessment	--	--	--	0.82	8.7	--	--
6/15/2022	Assessment	0.237	1.46	1.41	0.77	10.3	38.6	570
10/12/2022	Assessment	0.196	1.53	1.35	0.76	8.7	38.7	550
3/15/2023	Assessment	--	--	--	0.90	9.1	--	--
6/14/2023	Assessment	0.171	1.41	2.05	0.90	9.0	49.4	580
10/18/2023	Assessment	0.194	1.58	1.66	0.85	9.1	47.4	590
3/14/2024	Assessment	--	--	--	0.90	9.0	--	--
5/9/2024	Assessment	0.196	1.92	--	0.91	8.4	--	--
8/7/2024	Assessment	--	--	1.87	--	--	53.0	630
9/24/2024	Assessment	0.175	1.90	1.71	0.85	9.1	51.4	610

Table 1. Groundwater Data Summary: MW-1012
Big Sandy - FAP
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
9/27/2016	Background	0.79	24.0	37.6	0.044	0.05	1.1	0.346	1.592	0.71	1.84	0.006	< 0.002 U1	3.25	0.2	0.03 J1
11/9/2016	Background	1.20	28.9	24.4	0.027	0.04	0.903	0.113	0.548	0.70	0.872	0.014	0.002 J1	1.68	0.05 J1	0.02 J1
1/12/2017	Background	0.79	24.7	23.8	0.01 J1	0.04	0.395	0.066	0.542	0.73	0.439	0.008	< 0.002 U1	1.12	0.04 J1	0.02 J1
2/22/2017	Background	0.99	28.8	29.5	0.026	0.14	0.578	0.184	0.452	0.68	1.17	0.009	0.002 J1	1.52	0.07 J1	0.04 J1
4/26/2017	Background	0.89	22.9	29.9	0.025	0.02	0.512	0.131	0.148	0.71	0.632	0.004	0.003 J1	1.25	0.04 J1	0.02 J1
5/24/2017	Background	0.97	23.2	23.7	0.01 J1	0.01 J1	7.84	0.078	1.72	0.71	0.334	< 0.0002 U1	0.004 J1	1.41	0.07 J1	0.01 J1
6/22/2017	Background	0.91	21.6	21.1	0.008 J1	0.007 J1	0.293	0.046	0.3575	0.64	0.261	0.018	< 0.002 U1	1.18	0.04 J1	0.02 J1
7/13/2017	Background	0.96	22.1	25.7	0.022	0.008 J1	0.449	0.102	1.301	0.66	0.546	0.004	< 0.002 U1	1.43	0.09 J1	0.02 J1
4/26/2018	Assessment	0.65	15.8	24.1	0.01 J1	0.006 J1	0.262	0.062	1.135	0.82	0.287	0.006	0.003 J1	0.89	0.05 J1	0.02 J1
9/20/2018	Assessment	0.62	14.0	24.2	0.02	< 0.01 U1	0.442	0.079	0.291	0.75	0.346	< 0.009 U1	0.013	0.8	0.08 J1	< 0.1 U1
3/13/2019	Assessment	0.60	15.2	27.2	0.03 J1	< 0.01 U1	0.459	0.106	0.3959	0.73	0.354	0.01 J1	< 0.004 U1	0.9 J1	0.09 J1	< 0.1 U1
6/25/2019	Assessment	0.67	13.4	28.0	0.03 J1	< 0.01 U1	0.252	0.097	0.506	0.74	0.352	< 0.009 U1	< 0.002 U1	0.8 J1	0.08 J1	< 0.1 U1
8/21/2019	Assessment	0.77	19.0	41.9	0.06 J1	< 0.01 U1	0.625	0.260	0.354	0.79	0.924	0.00536	< 0.002 U1	1 J1	0.3	< 0.1 U1
3/18/2020	Assessment	0.60	19.6	61.7	0.130	0.01 J1	0.850	0.519	3.47	0.76	1.97	0.00588	0.002 J1	1 J1	0.3	< 0.1 U1
6/30/2020	Assessment	0.58	19.1	68.2	0.116	0.01 J1	0.912	0.527	2.62	0.72	1.86	0.00593	0.002 J1	1 J1	0.4	< 0.1 U1
10/6/2020	Assessment	0.89	23.0	34.7	0.06 J1	0.02 J1	0.468	0.229	1.04	0.68	0.851	0.00531	< 0.002 U1	1 J1	0.2 J1	< 0.1 U1
3/10/2021	Assessment	0.76	21.2	30.5	0.03 J1	0.01 J1	0.489	0.159	0.815	0.85	0.629	0.00552	0.002 J1	2.87	0.1 J1	< 0.04 U1
6/9/2021	Assessment	0.74	18.6	30.6	0.024 J1	0.014 J1	0.44	0.117	0.58	0.80	0.47	0.00540	< 0.002 U1	1.6	< 0.09 U1	< 0.04 U1
10/6/2021	Assessment	0.77	17.8	30.5	0.026 J1	0.010 J1	0.25	0.113	0.98	0.80	0.48	0.00564	< 0.002 U1	1.8	< 0.09 U1	0.05 J1
3/24/2022	Assessment	1.52	49.9	32.6	0.018 J1	0.012 J1	0.24	0.124	1.31	0.82	0.41	0.00552	< 0.002 U1	5.5	< 0.09 U1	< 0.04 U1
6/15/2022	Assessment	1.14	45.4	28.2	0.013 J1	0.012 J1	0.52	0.084	0.50	0.77	2.4	0.00493	< 0.002 U1	4.0	0.12 J1	0.05 J1
10/12/2022	Assessment	1.08	38.6	31.2	0.016 J1	0.018 J1	0.43	0.102	2.37	0.76	0.54	0.00534	< 0.002 U1	2.9	< 0.09 U1	< 0.04 U1
3/15/2023	Assessment	3.08	94.2	32.5	0.014 J1	0.008 J1	0.35	0.121	1.16	0.90	0.43	0.00637	< 0.002 U1	8.6	< 0.09 U1	< 0.04 U1
6/14/2023	Assessment	3.18	118	29.9	0.011 J1	0.008 J1	0.39	0.090	0.79	0.90	0.31	0.00546	< 0.002 U1	9.1	0.07 J1	0.02 J1
10/18/2023	Assessment	3.07	107	32.1	0.013 J1	0.006 J1	0.48	0.086	0.47	0.85	0.40	0.00612	< 0.002 U1	8.4	< 0.04 U1	< 0.02 U1
3/14/2024	Assessment	8.54	229	31.8	< 0.007 P2, U1	< 0.004 U1	0.28 J1	0.026	0.81	0.90	0.06 J1	0.00687 P2	< 0.002 U1	13.4	< 0.04 U1	0.03 J1
5/9/2024	Assessment	5.01	208	60.9	0.061	0.051	1.18	0.382	1.67	0.91	1.76	0.00698	0.006	23.0	0.25 J1	0.04 J1
9/24/2024	Assessment	4.12	182	51.7	0.047 J1	0.052	0.81	0.327	1.78	0.85	1.77	0.00639	0.092	13.6	0.22 J1	0.05 J1

Table 1. Groundwater Data Summary: MW-1203
Big Sandy - FAP
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
9/26/2016	Background	0.097	60.5	5.72	0.15	7.8	28.4	261
11/9/2016	Background	0.088	56.8	5.35	0.13	6.9	26.5	273
1/12/2017	Background	0.110	59.9	5.69	0.13	7.0	33.4	278
2/21/2017	Background	0.092	55.8	5.23	0.12	7.0	30.2	248
4/26/2017	Background	0.122	55.6	5.18	0.12	6.6	29.0	265
5/23/2017	Background	0.160	55.6	5.08	0.12	6.5	29.6	279
6/21/2017	Background	0.137	62.3	4.74	0.11	6.7	28.0	264
7/13/2017	Background	0.089	56.7	5.05	0.10	6.7	33.0	261
9/18/2017	Detection	0.116	57.0	4.92	0.13	6.8	29.3	255
4/26/2018	Assessment	0.147	57.4	5.66	0.14	6.0	37.5	253
9/20/2018	Assessment	0.125	53.4	5.37	0.12	6.7	32.3	253
3/14/2019	Assessment	0.09 J1	54.9	5.53	0.11	6.2	38.7	259
6/27/2019	Assessment	0.1 J1	54.3	5.28	0.12	6.8	39.0	273
8/21/2019	Assessment	0.097	60.8	5.14	0.13	7.0	32.4	283
3/17/2020	Assessment	--	--	--	0.12	7.4	--	--
6/30/2020	Assessment	0.104	64.9	5.17	0.12	6.7	30.6	--
8/27/2020	Assessment	--	--	--	--	6.9	--	263
10/5/2020	Assessment	0.100	64.2	5.24	0.14	7.1	30.4	266
3/9/2021	Assessment	--	--	--	0.15	6.7	--	--
6/9/2021	Assessment	0.096	57.8	5.32	0.15	6.6	29.4	260
10/6/2021	Assessment	0.099	59.1	5.13	0.14	6.9	27.8	270
3/23/2022	Assessment	0.098	60.2	5.40	0.12	8.9	42.9	260
6/13/2022	Assessment	0.10	59.4	4.95	0.13	7.6	28.4	290 S7
10/10/2022	Assessment	0.099	59.4	4.91	0.12	6.0	28.7	260
3/13/2023	Assessment	--	--	--	0.11	6.7	--	--
6/13/2023	Assessment	0.091	57.3	5.07	0.13	7.0	28.6	270 P2
10/18/2023	Assessment	0.103	61.0	4.86	0.14	7.0	26.6	260
3/13/2024	Assessment	--	--	--	0.11	7.2	--	--
5/8/2024	Assessment	0.091	56.2	--	0.12	6.5	--	--
8/6/2024	Assessment	--	--	4.98	--	--	27.9	280
9/24/2024	Assessment	0.101	61.3	4.97	0.13	6.8	27.5	270

Table 1. Groundwater Data Summary: MW-1203
Big Sandy - FAP
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
9/26/2016	Background	0.02 J1	0.26	95.3	0.022	< 0.004 U1	0.4	1.04	1.334	0.15	0.103	0.011	< 0.002 U1	0.21	0.04 J1	0.01 J1
11/9/2016	Background	0.03 J1	0.43	110	0.126	0.009 J1	1.50	1.04	1.473	0.13	1.28	0.017	< 0.002 U1	0.28	0.2	0.02 J1
1/12/2017	Background	0.03 J1	0.42	102	0.089	< 0.004 U1	0.718	1.15	1.657	0.13	0.748	0.014	< 0.002 U1	0.15	0.2	0.03 J1
2/21/2017	Background	0.02 J1	0.39	94.8	0.077	< 0.004 U1	0.365	0.989	2.509	0.12	0.509	0.017	< 0.002 U1	0.20	0.1	0.063
4/26/2017	Background	0.03 J1	0.45	113	0.099	< 0.005 U1	0.648	1.05	1.293	0.12	0.697	0.009	< 0.002 U1	0.20	0.2	0.02 J1
5/23/2017	Background	0.05 J1	0.61	99.9	0.149	< 0.005 U1	0.960	1.07	3.44	0.12	1.22	0.020	0.002 J1	0.15	0.3	0.02 J1
6/21/2017	Background	0.04 J1	0.63	101	0.116	< 0.005 U1	0.422	0.994	3.224	0.11	0.793	0.020	< 0.002 U1	0.62	0.3	0.03 J1
7/13/2017	Background	0.02 J1	0.44	93.8	0.062	< 0.005 U1	0.377	1.16	1.707	0.10	0.312	0.011	< 0.002 U1	0.59	0.05 J1	0.01 J1
4/26/2018	Assessment	0.03 J1	0.30	89.1	0.033	< 0.005 U1	0.171	0.886	2.476	0.14	0.034	0.013	< 0.002 U1	0.12	< 0.03 U1	0.03 J1
9/20/2018	Assessment	0.03 J1	0.51	90.1	0.08	< 0.01 U1	0.240	0.916	1.252	0.12	0.05	0.01	--	< 0.4 U1	< 0.03 U1	< 0.1 U1
10/22/2018	Assessment	--	--	--	--	--	--	--	--	--	--	--	< 0.002 U1	--	--	--
3/14/2019	Assessment	0.03 J1	0.23	88.0	0.02 J1	< 0.01 U1	0.391	0.953	1.399	0.11	0.124	< 0.009 U1	< 0.004 U1	< 0.4 U1	< 0.03 U1	< 0.1 U1
6/27/2019	Assessment	< 0.02 U1	0.34	86.8	0.06 J1	< 0.01 U1	0.1 J1	0.909	1.341	0.12	0.1 J1	0.01 J1	< 0.002 U1	< 0.4 U1	< 0.03 U1	< 0.1 U1
8/21/2019	Assessment	< 0.02 U1	0.27	95.4	0.04 J1	< 0.01 U1	0.304	0.774	1.471	0.13	0.06 J1	0.0118	< 0.002 U1	< 0.4 U1	< 0.03 U1	< 0.1 U1
3/17/2020	Assessment	0.02 J1	0.35	91.0	0.06 J1	< 0.01 U1	0.265	0.859	7.524	0.12	0.08 J1	0.0130	< 0.002 U1	< 0.4 U1	< 0.03 U1	< 0.1 U1
6/30/2020	Assessment	0.02 J1	0.47	101	0.08 J1	< 0.01 U1	0.1 J1	0.547	2.29	0.12	0.1 J1	0.0121	< 0.002 U1	< 0.4 U1	< 0.03 U1	< 0.1 U1
10/5/2020	Assessment	0.02 J1	0.59	94.6	0.08 J1	< 0.01 U1	0.2 J1	0.672	1.539	0.14	0.212	0.0114	< 0.002 U1	< 0.4 U1	< 0.03 U1	< 0.1 U1
3/9/2021	Assessment	< 0.02 U1	0.39	93.9	0.05 J1	< 0.004 U1	0.390	0.849	1.287	0.15	0.2 J1	0.0120	< 0.002 U1	< 0.1 U1	< 0.09 U1	< 0.04 U1
6/9/2021	Assessment	0.03 J1	0.22	89.5	0.037 J1	< 0.004 U1	0.11 J1	0.603	1.98	0.15	0.06 J1	0.0109	< 0.002 U1	< 0.1 U1	< 0.09 U1	< 0.04 U1
10/6/2021	Assessment	0.02 J1	0.23	92.7	0.041 J1	< 0.004 U1	0.11 J1	0.677	2.10	0.14	0.08 J1	0.0122	< 0.002 U1	< 0.1 U1	< 0.09 U1	< 0.04 U1
3/23/2022	Assessment	< 0.02 U1	0.24	89.4	0.041 J1	< 0.004 U1	0.13 J1	0.885	3.33	0.12	0.05 J1	0.0137	< 0.002 U1	0.1 J1	< 0.09 U1	< 0.04 U1
6/13/2022	Assessment	0.03 J1	0.32	96.8	0.090	< 0.004 U1	0.09 J1	0.577	1.63	0.13	0.11 J1	0.0132	< 0.002 U1	< 0.1 U1	< 0.09 U1	< 0.04 U1
10/10/2022	Assessment	0.04 J1	0.58	99.6	0.171	< 0.004 U1	0.31	0.651	1.27	0.12	0.09 J1	0.0127	< 0.004 U1	< 0.1 U1	< 0.09 U1	< 0.04 U1
3/13/2023	Assessment	0.03 J1	0.39	85.5	0.085	< 0.004 U1	0.25	0.838	2.35	0.11	0.16 J1	0.0112	< 0.002 U1	< 0.1 U1	< 0.09 U1	< 0.04 U1
6/13/2023	Assessment	0.023 J1	0.30	92.6	0.053	< 0.004 U1	0.29 J1	0.548	1.62	0.13	0.07 J1	0.0105	< 0.002 U1	< 0.1 U1	< 0.04 U1	< 0.02 U1
10/18/2023	Assessment	0.032 J1	0.35	98.4	0.109	< 0.004 U1	0.30	0.603	1.42	0.14	0.07 J1	0.0123	< 0.002 U1	0.1 J1	< 0.04 U1	0.04 J1
3/13/2024	Assessment	0.042 J1	0.68	94.6	0.168 P2	< 0.004 U1	0.45	0.929	2.15	0.11	0.15 J1	0.0122 P2	< 0.002 U1	0.1 J1	< 0.04 U1	< 0.02 U1
5/8/2024	Assessment	0.037 J1	0.39	89.0	0.073	< 0.004 U1	0.60	0.769	1.87	0.12	0.18 J1	0.0115	< 0.002 U1	0.1 J1	< 0.04 U1	< 0.02 U1
9/24/2024	Assessment	0.015 J1	0.24	97.0	0.048 J1	< 0.004 U1	0.22 J1	0.641	1.78	0.13	0.10 J1	0.0116	< 0.002 U1	0.1 J1	< 0.04 U1	< 0.02 U1

Table 1. Groundwater Data Summary: MW-1601
Big Sandy - FAP
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
9/27/2016	Background	0.317	63.0	25.6	0.32	7.6	122	448
11/9/2016	Background	0.263	55.7	31.2	0.33	7.3	120	438
1/12/2017	Background	0.283	63.5	25.0	0.32	7.5	128	474
2/22/2017	Background	0.241	61.0	23.9	0.29	7.4	111	430
4/26/2017	Background	0.216	50.9	23.8	0.33	6.9	97.4	372
5/24/2017	Background	0.240	55.9	21.5	0.29	7.0	91.7	370
6/22/2017	Background	0.196	47.5	21.0	0.27	7.3	90.6	367
7/13/2017	Background	0.175	51.3	17.4	0.27	7.1	84.6	364
9/18/2017	Detection	0.183	51.5	15.8	0.29	7.2	82.7	362
1/31/2018	Detection	--	--	15.4	--	7.5	84.4	--
4/25/2018	Assessment	0.177	50.4	15.2	0.36	6.9	72.6	326
9/20/2018	Assessment	0.196	68.8	16.1	0.22	7.1	167	448
3/12/2019	Assessment	0.117	54.3	9.09	0.18	6.3	88.5	316
6/25/2019	Assessment	0.1 J1	50.7	8.23	0.15	7.0	86.4	312
8/21/2019	Assessment	0.097	52.1	8.43	0.15	7.1	82.9	326
3/18/2020	Assessment	--	--	--	0.17	8.3	--	--
3/9/2021	Assessment	--	--	--	0.18	6.8	--	--
6/9/2021	Assessment	0.109	62.5	6.58	0.18	6.8	98.0	340
10/6/2021	Assessment	0.069	59.7	3.00	0.24	7.1	105	360
3/22/2022	Assessment	--	--	--	0.16	7.9	--	--
6/15/2022	Assessment	0.119	70.2	3.95	0.17	8.3	96.0	340
10/10/2022	Assessment	0.067	59.0	3.19	0.18	6.9	110	350
3/15/2023	Assessment	--	--	--	0.13	6.8	--	--
6/13/2023	Assessment	0.077	54.4	4.54	0.13	6.8	104	340 P2
3/14/2024	Assessment	--	--	--	0.13	7.3	--	--
5/9/2024	Assessment	0.097	68.4	--	0.13	6.7	--	--
8/7/2024	Assessment	--	--	3.59	--	--	109	350

Table 1. Groundwater Data Summary: MW-1601
Big Sandy - FAP
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
9/27/2016	Background	0.13	5.03	81.7	0.026	0.009 J1	0.7	1.96	1.22	0.32	0.143	0.040	< 0.002 U1	27.7	0.2	0.124
11/9/2016	Background	0.08	5.49	85.4	0.01 J1	0.01 J1	0.863	1.46	2.335	0.33	0.321	0.035	< 0.002 U1	20.5	0.2	0.02 J1
1/12/2017	Background	0.05 J1	5.24	79.1	0.009 J1	0.01 J1	0.390	1.78	1.695	0.32	0.050	0.038	< 0.002 U1	37.5	0.08 J1	0.03 J1
2/22/2017	Background	0.08	5.15	74.0	0.009 J1	0.006 J1	0.380	1.54	1.603	0.29	0.044	0.037	< 0.002 U1	31.5	0.1	0.02 J1
4/26/2017	Background	0.17	5.48	80.4	0.009 J1	0.006 J1	0.411	1.23	1.300	0.33	0.034	0.025	< 0.002 U1	27.3	0.2	0.02 J1
5/24/2017	Background	0.09	4.30	68.1	0.007 J1	0.006 J1	0.807	0.941	1.317	0.29	0.037	0.026	< 0.002 U1	27.0	0.09 J1	0.01 J1
6/22/2017	Background	0.08	4.19	60.1	< 0.004 U1	< 0.005 U1	0.247	0.926	0.802	0.27	0.02 J1	0.037	< 0.002 U1	27.1	0.07 J1	0.01 J1
7/13/2017	Background	0.11	5.18	64.5	0.009 J1	0.008 J1	0.300	1.02	1.077	0.27	0.081	0.023	< 0.002 U1	28.3	0.07 J1	0.01 J1
4/25/2018	Assessment	0.17	4.58	56.4	0.005 J1	< 0.005 U1	0.245	0.794	2.783	0.36	0.024	0.033	< 0.002 U1	20.6	0.1	0.02 J1
9/20/2018	Assessment	0.29	3.54	75.9	< 0.02 U1	< 0.01 U1	0.378	1.21	0.698	0.22	0.04	0.031	--	19.6	0.2	< 0.1 U1
10/23/2018	Assessment	--	--	--	--	--	--	--	--	--	--	--	< 0.002 U1	--	--	--
3/12/2019	Assessment	0.20	1.39	49.0	< 0.02 U1	< 0.01 U1	0.438	0.395	0.769	0.18	0.05 J1	0.009 J1	< 0.002 U1	7.00	0.2 J1	< 0.1 U1
6/25/2019	Assessment	0.17	1.04	55.5	< 0.02 U1	< 0.01 U1	0.2 J1	0.629	0.689	0.15	< 0.02 U1	< 0.009 U1	< 0.002 U1	4.89	0.2	< 0.1 U1
8/21/2019	Assessment	0.09 J1	1.58	56.6	< 0.02 U1	0.02 J1	0.351	0.831	0.855	0.15	< 0.05 U1	0.0172	< 0.002 U1	5.64	0.09 J1	< 0.1 U1
3/18/2020	Assessment	0.59	0.63	62.9	< 0.02 U1	0.01 J1	0.298	0.152	1.250	0.17	0.07 J1	0.0302	< 0.002 U1	15.6	0.5	< 0.1 U1
3/9/2021	Assessment	0.61	0.76	44.7	0.02 J1	0.02 J1	0.768	0.329	1.227	0.18	0.2 J1	0.0206	< 0.002 U1	10.0	1.0	< 0.04 U1
6/9/2021	Assessment	0.61	0.41	41.6	< 0.007 U1	0.022	0.33	0.195	0.87	0.18	0.06 J1	0.0229	< 0.002 U1	12.1	0.54	< 0.04 U1
10/6/2021	Assessment	0.92	0.53	41.4	< 0.007 U1	0.022	0.49	0.051	1.70	0.24	0.10 J1	0.0132	< 0.002 U1	4.3	0.37 J1	< 0.04 U1
3/22/2022	Assessment	0.49	0.31	39.2	< 0.007 U1	0.015 J1	0.30	0.046	2.19	0.16	< 0.05 U1	0.0205	< 0.002 U1	8.6	0.64	0.06 J1
6/15/2022	Assessment	0.54	0.40	41.3	0.01 J1	0.023	0.85	0.069	2.52	0.17	0.9 J1	0.0171	< 0.002 U1	7.7	0.52	0.04 J1
10/10/2022	Assessment	0.50	0.40	36.9	< 0.007 U1	0.009 J1	0.60	0.073	0.74	0.18	0.19 J1	0.0150	< 0.004 U1	4.3	0.21 J1	< 0.04 U1
3/15/2023	Assessment	0.47	0.30	40.2	< 0.007 U1	0.015 J1	0.33	0.067	1.00	0.13	0.06 J1	0.0197	< 0.002 U1	7.5	0.58	< 0.04 U1
6/13/2023	Assessment	0.439	0.47	35.9	0.020 J1	0.019 J1	0.60	0.272	0.46	0.13	0.25	0.0165	< 0.002 U1	6.7	0.49 J1	0.03 J1
3/14/2024	Assessment	0.416	0.32	39.0	< 0.007 P2, U1	0.064	0.84	0.045	1.11	0.13	0.43	0.0179 P2	< 0.002 U1	6.0	0.79	0.02 J1
5/9/2024	Assessment	0.459	0.47	41.5	0.018 J1	0.023	0.77	0.372	1.47	0.13	0.24	0.0183	< 0.002 U1	7.4	0.60	< 0.02 U1

Table 1. Groundwater Data Summary: MW-1602
Big Sandy - FAP
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
9/27/2016	Background	0.054	72.5	10.6	0.19	7.7	106	400
11/9/2016	Background	0.037	63.1	8.77	0.18	7.5	86.1	360
1/12/2017	Background	0.039	65.4	7.20	0.17	7.8	81.6	362
2/22/2017	Background	0.041	69.4	8.13	0.14	7.7	96.3	399
4/26/2017	Background	0.052	73.8	7.74	0.13	6.8	83.6	382
5/24/2017	Background	0.074	74.7	9.90	0.12	6.9	103	394
6/21/2017	Background	--	--	--	--	7.5	--	--
6/22/2017	Background	0.062	70.4	10.7	0.11	--	106	416
7/13/2017	Background	0.052	81.9	12.1	0.09 J1	7.0	132	484
10/19/2017	Detection	0.058	72.5	13.0	0.11	7.1	110	434
1/31/2018	Detection	--	--	15.3	--	7.5	128	--
4/26/2018	Assessment	0.143	75.2	13.9	0.14	8.0	106	416
9/20/2018	Assessment	0.070	72.1	15.2	0.11	7.0	150	492
3/13/2019	Assessment	0.07 J1	79.4	12.6	0.10	6.9	133	444
6/25/2019	Assessment	0.06 J1	69.8	12.2	0.11	7.5	111	436
8/20/2019	Assessment	0.04 J1	74.5	13.2	0.10	7.5	117	434
3/18/2020	Assessment	--	--	--	0.09	8.8	--	--
6/30/2020	Assessment	0.05 J1	79.0	17.6	0.09	7.2	--	--
8/26/2020	Assessment	--	--	--	--	4.8	121	454
10/6/2020	Assessment	0.05 J1	82.5	19.2	0.10	7.7	143	479
3/9/2021	Assessment	--	--	--	0.11	7.4	--	--
6/9/2021	Assessment	0.050	83.9	17.1	0.11	7.5	165	500
10/6/2021	Assessment	0.057	86.1	18.3	0.10	7.5	167	510
3/22/2022	Assessment	--	--	--	0.08	8.2	--	--
6/14/2022	Assessment	0.062	91.1	18.9	0.09	7.6	187	550 S7
10/11/2022	Assessment	0.064	82.8	20.2	0.08	7.3	181	540
3/15/2023	Assessment	--	--	--	0.08	7.4	--	--
6/13/2023	Assessment	0.078	92.3	18.3	0.08	7.2	206	610 P2
10/18/2023	Assessment	0.052	92.2	18.5	0.09	7.6	206	570
3/13/2024	Assessment	--	--	--	0.09	7.5	--	--
5/8/2024	Assessment	0.203	114	--	0.08	6.7	--	--
8/7/2024	Assessment	--	--	17.1	--	--	222	640
9/24/2024	Assessment	0.100	99.3	17.0	0.08	7.3	204	610

Table 1. Groundwater Data Summary: MW-1602
Big Sandy - FAP
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
9/27/2016	Background	0.16	0.50	50.7	< 0.005 U1	0.005 J1	0.8	0.060	1.233	0.19	0.067	0.008	0.002 J1	3.41	2.0	0.02 J1
11/9/2016	Background	0.13	0.42	51.1	< 0.005 U1	0.01 J1	0.590	0.028	1.143	0.18	0.059	0.013	0.002 J1	2.63	2.2	0.01 J1
1/12/2017	Background	0.10	0.45	50.2	< 0.005 U1	0.01 J1	0.666	0.043	1.545	0.17	0.030	0.004	< 0.002 U1	2.44	2.2	0.03 J1
2/22/2017	Background	0.09	0.42	48.2	< 0.005 U1	0.009 J1	0.547	0.020	0.712	0.14	0.02 J1	0.008	< 0.002 U1	2.79	2.0	0.02 J1
4/26/2017	Background	0.10	0.47	59.2	< 0.004 U1	0.01 J1	0.692	0.024	0.534	0.13	0.026	0.006	0.002 J1	1.88	2.2	0.03 J1
5/24/2017	Background	0.08	0.37	54.6	< 0.004 U1	0.009 J1	0.703	0.01 J1	1.68	0.12	0.239	0.002	0.004 J1	1.51	1.5	0.02 J1
6/22/2017	Background	0.07	0.50	55.0	< 0.004 U1	0.01 J1	0.566	0.205	0.812	0.11	0.047	0.021	0.002 J1	2.12	1.3	0.02 J1
7/13/2017	Background	0.07	0.71	57.6	< 0.004 U1	< 0.005 U1	0.482	0.850	1.138	0.09 J1	0.031	0.005	0.003 J1	2.29	1.0	0.01 J1
4/26/2018	Assessment	0.05 J1	3.15	60.9	< 0.004 U1	< 0.005 U1	0.290	0.552	1.754	0.14	0.049	0.008	0.003 J1	1.64	0.4	0.01 J1
9/20/2018	Assessment	0.03 J1	3.92	55.1	< 0.02 U1	< 0.01 U1	0.328	0.312	1.044	0.11	0.03	< 0.009 U1	< 0.004 U1	1	0.4	< 0.1 U1
3/13/2019	Assessment	0.06 J1	1.06	52.5	< 0.02 U1	< 0.01 U1	1.03	0.03 J1	0.504	0.10	0.122	0.009 J1	< 0.002 U1	2 J1	1.6	< 0.1 U1
6/25/2019	Assessment	0.07 J1	1.06	52.5	< 0.02 U1	< 0.01 U1	0.632	0.02 J1	0.5359	0.11	0.05 J1	< 0.009 U1	< 0.002 U1	1 J1	1.4	< 0.1 U1
8/20/2019	Assessment	0.06 J1	1.16	49.3	< 0.02 U1	0.01 J1	1.15	0.080	0.543	0.10	0.1 J1	0.00637	< 0.002 U1	1 J1	1.1	< 0.1 U1
3/18/2020	Assessment	0.06 J1	1.36	55.4	< 0.02 U1	< 0.01 U1	0.511	0.04 J1	1.517	0.09	0.08 J1	0.00736	< 0.002 U1	1 J1	1.1	< 0.1 U1
6/30/2020	Assessment	0.04 J1	1.59	55.9	< 0.02 U1	< 0.01 U1	0.679	0.04 J1	0.488	0.09	0.07 J1	0.00717	< 0.002 U1	1 J1	1.0	< 0.1 U1
10/6/2020	Assessment	0.04 J1	1.53	52.4	< 0.02 U1	< 0.01 U1	1.05	0.04 J1	2.003	0.10	< 0.05 U1	0.00707	< 0.002 U1	1 J1	1.1	< 0.1 U1
3/9/2021	Assessment	0.06 J1	1.72	56.9	< 0.007 U1	0.006 J1	1.26	0.075	1.018	0.11	0.1 J1	0.00787	< 0.002 U1	1 J1	2.0	< 0.04 U1
6/9/2021	Assessment	0.06 J1	0.92	53.2	< 0.007 U1	< 0.004 U1	0.62	0.014 J1	2.31	0.11	< 0.05 U1	0.00629	< 0.002 U1	1.2	2.57	< 0.04 U1
10/6/2021	Assessment	0.08 J1	0.99	61.9	< 0.007 U1	< 0.004 U1	0.59	0.009 J1	0.95	0.10	0.11 J1	0.00815	< 0.002 U1	1.3	3.19	< 0.04 U1
3/22/2022	Assessment	0.15	0.66	62.0	< 0.007 U1	0.005 J1	0.53	0.014 J1	2.25	0.08	< 0.05 U1	0.0106	0.002 J1	1	1.88	< 0.04 U1
6/14/2022	Assessment	0.18	0.91	61.9	< 0.007 U1	< 0.004 U1	0.47	0.019 J1	0.82	0.09	< 0.05 U1	0.00760	< 0.002 U1	1.1	4.10	0.05 J1
10/11/2022	Assessment	0.22	0.93	64.3	< 0.007 U1	0.007 J1	0.56	0.038	1.27	0.08	0.06 J1	0.00944	< 0.004 U1	1.1	3.37	< 0.04 U1
3/15/2023	Assessment	0.14	0.88	68.4	< 0.007 U1	0.004 J1	0.65	0.026	0.78	0.08	< 0.05 U1	0.0103	< 0.002 U1	1	2.94	< 0.04 U1
6/13/2023	Assessment	0.180	1.31	66.6	< 0.007 U1	0.017 J1	0.72	0.127	0.79	0.08	0.21	0.00862	< 0.002 U1	0.9	2.62	< 0.02 U1
10/18/2023	Assessment	0.085 J1	0.81	68.8	< 0.007 U1	0.005 J1	0.73	0.018 J1	0.82	0.09	< 0.05 U1	0.00910	< 0.002 U1	0.8	3.51	< 0.02 U1
3/13/2024	Assessment	0.059 J1	0.59	64.2	< 0.007 P2, U1	0.005 J1	0.66	0.013 J1	1.45	0.09	< 0.05 U1	0.00954 P2	< 0.002 U1	0.8	1.74	< 0.02 U1
5/8/2024	Assessment	0.057 J1	0.47	64.1	< 0.007 M1, U1	0.014 J1	0.85	0.025	1.48	0.08	0.15 J1	0.0123 M1	< 0.002 U1	0.5	0.74	< 0.02 U1
9/24/2024	Assessment	0.060 J1	0.70	73.1	< 0.007 U1	0.012 J1	0.50	0.014 J1	1.37	0.08	0.17 J1	0.0103	< 0.002 U1	0.8	3.01	< 0.02 U1

Table 1. Groundwater Data Summary: MW-1603
Big Sandy - FAP
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
9/26/2016	Background	0.054	105	3.37	1.24	4.3	801	1,060
11/9/2016	Background	0.053	94.7	3.22	1.10	5.6	733	1,010
1/12/2017	Background	0.037	92.7	3.45	1.11	3.6	636	948
2/21/2017	Background	0.085	91.9	2.93	0.90	4.5	720	1,020
4/26/2017	Background	0.052	90.5	3.28	1.04	3.3	678	994
5/24/2017	Background	0.096	93.9	3.34	0.98	3.3	646	936
6/22/2017	Background	0.051	90.6	3.10	0.98	3.0	873	1,040
7/13/2017	Background	0.039	90.2	3.32	0.93	3.2	694	1,000
10/19/2017	Detection	< 0.002 U1	91.0	3.24	0.93	3.5	784	962
1/31/2018	Detection	--	82.2	--	0.94	3.5	714	915
4/26/2018	Assessment	0.088	83.6	4.12	1.16	2.9	661	926
9/20/2018	Assessment	0.08	97.5	3.92	1.15	3.1	747	974
3/13/2019	Assessment	0.05 J1	84.6	4.42	0.92	3.2	709	896
6/27/2019	Assessment	0.05 J1	83.3	4.13	0.87	3.7	658	954
8/20/2019	Assessment	< 0.1 U1	95.8	3.93	0.84	3.5	704	1,010
3/17/2020	Assessment	--	--	--	0.85	3.5	--	--
6/30/2020	Assessment	0.05 J1	96.6	4.18	0.71	3.4	--	--
8/26/2020	Assessment	--	--	--	--	3.3	798	1,040
10/6/2020	Assessment	0.05 J1	94.5	4.10	0.47	4.1	794	1,020
3/9/2021	Assessment	--	--	--	0.82	3.4	--	--
6/9/2021	Assessment	0.036 J1	79.0	4.16	0.76	3.6	618	880
10/6/2021	Assessment	0.054	93.1	3.93	0.96	3.3	735	1,040
3/22/2022	Assessment	--	--	--	0.65	4.9	--	--
6/15/2022	Assessment	0.071	94.4	4.07	0.69	3.1	675	970
10/11/2022	Assessment	0.051	90.3	3.78	1.11	3.7	841	1,080
3/15/2023	Assessment	--	--	--	--	3.3	--	--
3/17/2023	Assessment	--	--	--	0.71	3.4	--	--
6/14/2023	Assessment	0.033 J1	72.8	4.30	0.71	3.2	665	880

Table 1. Groundwater Data Summary: MW-1603
Big Sandy - FAP
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
9/26/2016	Background	0.01 J1	1.51	13.4	18.6	0.84	1.1	101	6.04	1.24	9.75	0.242	< 0.002 U1	0.15	5.4	1.29
11/9/2016	Background	< 0.01 U1	1.19	15.4	18.3	0.93	1.12	94.4	6.6	1.10	8.18	0.237	< 0.002 U1	0.17	4.8	1.55
1/12/2017	Background	< 0.01 U1	1.40	11.4	17.1	0.79	0.731	89.6	5.86	1.11	6.11	0.225	< 0.002 U1	0.06 J1	5.6	1.39
2/21/2017	Background	< 0.01 U1	1.26	10.3	18.9	0.75	0.771	93.2	4.03	0.90	6.30	0.208	< 0.002 U1	0.11	4.9	1.20
4/26/2017	Background	0.01 J1	1.30	12.4	16.7	0.87	0.829	97.1	5.72	1.04	6.41	0.216	0.002 J1	0.18	6.1	1.41
5/24/2017	Background	< 0.01 U1	1.34	11.5	16.4	0.77	0.620	85.3	6.4	0.98	4.96	0.221	< 0.002 U1	0.07 J1	6.3	1.35
6/22/2017	Background	< 0.01 U1	1.29	11.4	16.4	0.86	0.821	92.4	6.00	0.98	6.47	0.263	< 0.002 U1	0.32	6.1	1.43
7/13/2017	Background	< 0.01 U1	0.89	11.3	18.0	0.80	0.485	92.5	6.36	0.93	3.72	0.217	< 0.002 U1	0.22	2.7	1.43
4/26/2018	Assessment	0.04 J1	1.60	10.5	18.7	0.74	0.771	91.1	5.09	1.16	5.27	0.187	< 0.002 U1	0.03 J1	8.1	1.39
9/20/2018	Assessment	< 0.02 U1	1.40	11.4	19.6	0.83	0.713	93.8	6.75	1.15	4.39	0.255	--	< 0.4 U1	6.3	1.70
10/23/2018	Assessment	--	--	--	--	--	--	--	--	--	--	--	< 0.002 U1	--	--	--
3/13/2019	Assessment	< 0.2 U1	1.26	12.0	24.4	0.78	1 J1	87.9	4.80	0.92	4.28	0.209	< 0.002 U1	< 4 U1	4.0	1 J1
6/27/2019	Assessment	< 0.04 U1	1.36	11.0	21.8	0.70	0.618	84.7	7.149	0.87	3.68	0.192	< 0.002 U1	< 0.8 U1	4.9	1.40
8/20/2019	Assessment	< 0.1 U1	1.39	13.6	25.0	0.89	0.8 J1	96.6	10.92	0.84	4.17	0.226	< 0.002 U1	< 2 U1	5.6	2 J1
3/17/2020	Assessment	< 0.02 U1	0.83	9.92	16.4	0.64	0.560	72.0	7.19	0.85	3.95	0.156	< 0.002 U1	< 0.4 U1	4.0	1.34
6/30/2020	Assessment	< 0.04 U1	1.12	12.2	21.1	0.85	0.694	93.2	6.22	0.71	4.67	0.192	< 0.002 U1	< 0.8 U1	6.2	1.57
10/6/2020	Assessment	< 0.02 U1	1.12	14.6	17.5	0.87	0.743	90.5	2.681	0.47	4.85	0.165	< 0.002 U1	< 0.4 U1	5.8	1.82
3/9/2021	Assessment	< 0.02 U1	0.84	10.1	14.0	0.62	0.659	71.4	3.73	0.82	3.37	0.125	0.002 J1	< 0.1 U1	3.9	1.39
6/9/2021	Assessment	0.04 J1	0.69	13.1	13.3	0.709	0.51	76.8	7.18	0.76	3.39	0.135	0.002 J1	< 0.1 U1	3.30	1.62
10/6/2021	Assessment	< 0.02 U1	1.01	17.1	17.4 M1	0.913	0.59	95.1 M1	10.51	0.96	6.10	0.186 M1	0.003 J1	< 0.1 U1	4.26	2.20
3/22/2022	Assessment	< 0.02 U1	0.96	13.3	14.9	0.690	0.36	79.7	17.94	0.65	3.37	0.151	< 0.002 U1	< 0.1 U1	4.01	1.66
6/15/2022	Assessment	< 0.02 U1	1.55	8.77	15.0	0.734	0.78	98.3	6.22	0.69	6.5	0.153	< 0.002 U1	0.2 J1	6.56	1.71
10/11/2022	Assessment	< 0.02 U1	1.40	15.4	19.5	0.869	0.85	95.2	7.47	1.11	6.03	0.196	< 0.004 U1	< 0.1 U1	6.25	2.02
3/15/2023	Assessment	< 0.02 U1	0.94	10.7	15.7	0.743	0.58	79.5	6.21	--	4.13	0.167	< 0.002 U1	< 0.1 U1	3.75	1.57
3/17/2023	Assessment	--	--	--	--	--	--	--	--	0.71	--	--	--	--	--	--
6/14/2023	Assessment	0.012 J1	1.12	11.9	12.9	0.714	0.66	73.4	5.74	0.71	3.22	0.135	< 0.002 U1	< 0.1 U1	5.98	1.56

Table 1. Groundwater Data Summary: MW-1604
Big Sandy - FAP
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
9/27/2016	Background	0.031	6.48	6.20	0.27	7.5	16.6	182
11/8/2016	Background	0.030	4.26	6.22	0.29	3.4	9.1	180
1/11/2017	Background	0.016	3.27	4.07	0.23	6.2	5.9	186
2/21/2017	Background	0.040	3.21	2.60	0.12	6.5	5.7	102
4/25/2017	Background	0.010	3.15	1.71	0.08	5.9	8.6	78
5/23/2017	Background	0.038	2.93	1.56	0.06	5.8	8.2	68
6/21/2017	Background	0.017	2.88	1.41	0.03 J1	5.6	10.5	49
7/12/2017	Background	0.054	3.06	1.84	0.06	5.5	9.8	85
9/18/2017	Detection	0.034	2.81	2.22	0.12	6.5	4.0	124
4/25/2018	Assessment	0.052	2.96	1.58	0.06	5.4	8.4	52
9/18/2018	Assessment	0.056	2.69	1.43	0.06 J1	6.1	7.8	62
3/12/2019	Assessment	0.02 J1	3.55	1.34	0.04 J1	5.2	10.0	46
6/25/2019	Assessment	0.02 J1	2.97	1.21	0.05 J1	6.0	9.5	50
8/20/2019	Assessment	< 0.02 U1	3.42	1.17	0.03 J1	5.4	10.5	50 J1
3/17/2020	Assessment	--	--	--	0.03 J1	5.8	--	--
6/29/2020	Assessment	< 0.02 U1	3.56	1.03	< 0.01 U1	5.2	11.1	--
8/27/2020	Assessment	--	--	--	--	5.7	--	63
10/5/2020	Assessment	< 0.02 U1	3.31	1.09	0.03 J1	6.8	10.3	50 J1
3/10/2021	Assessment	--	--	--	0.03 J1	5.1	--	--
6/8/2021	Assessment	0.018 J1	3.4	1.15	0.03 J1	5.7	10.4	60
10/5/2021	Assessment	0.016 J1	3.2	1.11	0.03 J1	5.7	9.42	60
3/24/2022	Assessment	--	--	--	< 0.02 U1	7.0	--	--
6/14/2022	Assessment	0.017 J1	3.28	1.05	0.02 J1	5.0	10.4	50
10/11/2022	Assessment	0.012 J1	2.97	1.06	0.02 J1	5.6	10.0	60
3/14/2023	Assessment	--	--	--	0.02 J1	6.1	--	--
6/12/2023	Assessment	0.011 J1	2.44	1.30	< 0.02 U1	6.3	8.2	30 P2, J1
10/17/2023	Assessment	0.012 J1	2.03	1.33	0.03 J1	5.8	6.2	36 J1
3/12/2024	Assessment	--	--	--	0.04 J1	6.1	--	--
5/7/2024	Assessment	0.013 J1	2.11	--	0.03 J1	5.6	--	--
8/6/2024	Assessment	--	--	1.47	--	--	4.7	50
9/24/2024	Assessment	0.008 J1	1.79	1.46	0.02 J1	5.7	3.8	30 J1

Table 1. Groundwater Data Summary: MW-1604
Big Sandy - FAP
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
9/27/2016	Background	0.05 J1	2.74	67.1	0.029	0.007 J1	0.6	3.47	1.105	0.27	0.154	0.004	< 0.002 U1	3.48	0.2	0.01 J1
11/8/2016	Background	0.04 J1	3.61	59.0	0.048	0.008 J1	0.583	1.55	1.277	0.29	0.265	0.005	< 0.002 U1	2.34	0.1	< 0.01 U1
1/11/2017	Background	0.08	4.28	54.8	0.027	0.06	0.551	2.02	0.707	0.23	0.188	0.005	< 0.002 U1	2.23	0.2	0.119
2/21/2017	Background	0.02 J1	3.64	52.9	0.028	0.009 J1	0.427	2.78	0.927	0.12	0.103	0.009	< 0.002 U1	1.51	0.1	0.175
4/25/2017	Background	0.03 J1	3.54	65.1	0.034	0.006 J1	0.365	5.59	0.478	0.08	0.01 J1	< 0.0002 U1	< 0.002 U1	0.57	0.08 J1	< 0.01 U1
5/23/2017	Background	0.02 J1	2.24	54.8	0.040	0.03	0.401	4.18	6.707	0.06	0.062	< 0.0002 U1	< 0.002 U1	0.51	0.2	0.01 J1
6/21/2017	Background	0.03 J1	1.28	66.1	0.063	0.05	0.183	5.61	16.848	0.03 J1	0.049	0.002	0.003 J1	0.57	0.2	0.01 J1
7/12/2017	Background	0.04 J1	1.73	59.8	0.041	0.02	0.322	3.67	0.636	0.06	0.097	0.004	< 0.002 U1	15.9	0.1	< 0.01 U1
4/25/2018	Assessment	0.08	0.74	58.9	0.053	0.09	0.285	3.75	0.1535	0.06	0.263	0.010	< 0.002 U1	0.54	0.3	0.04 J1
9/18/2018	Assessment	0.06	1.47	63.5	0.061	0.07	0.388	4.53	0.951	0.06 J1	0.092	0.003	--	0.86	0.2	0.04 J1
10/22/2018	Assessment	--	--	--	--	--	--	--	--	--	--	--	< 0.002 U1	--	--	--
3/12/2019	Assessment	0.03 J1	0.16	66.8	0.06 J1	0.08	0.547	0.844	0.458	0.04 J1	0.04 J1	< 0.009 U1	< 0.002 U1	< 0.4 U1	0.3	< 0.1 U1
6/25/2019	Assessment	0.03 J1	0.12	68.3	0.07 J1	0.09	0.231	0.503	0.799	0.05 J1	0.03 J1	< 0.009 U1	< 0.002 U1	< 0.4 U1	0.2	< 0.1 U1
8/20/2019	Assessment	< 0.02 U1	0.09 J1	78.3	0.117	0.08	0.612	0.246	0.641	0.03 J1	< 0.05 U1	0.00104	< 0.002 U1	< 0.4 U1	0.4	< 0.1 U1
3/17/2020	Assessment	< 0.02 U1	0.05 J1	82.7	0.159	0.08	0.632	0.119	2.93	0.03 J1	< 0.05 U1	0.00113	< 0.002 U1	< 0.4 U1	0.4	< 0.1 U1
6/29/2020	Assessment	< 0.02 U1	0.05 J1	90.0	0.182	0.09	0.681	0.130	1.121	< 0.01 U1	< 0.05 U1	0.00106	< 0.002 U1	< 0.4 U1	0.5	< 0.1 U1
10/5/2020	Assessment	< 0.02 U1	0.10	75.8	0.149	0.09	0.589	0.289	0.491	0.03 J1	0.2 J1	0.000964	< 0.002 U1	< 0.4 U1	0.4	< 0.1 U1
3/10/2021	Assessment	< 0.02 U1	0.07 J1	75.3	0.129	0.09	0.850	0.148	0.2279	0.03 J1	< 0.05 U1	0.000944	< 0.002 U1	< 0.1 U1	0.4	< 0.04 U1
6/8/2021	Assessment	0.02 J1	0.07 J1	82.3	0.167	0.086	0.77	0.257	1.07	0.03 J1	0.06 J1	0.00095	< 0.002 U1	< 0.1 U1	0.36 J1	< 0.04 U1
10/5/2021	Assessment	< 0.02 U1	0.06 J1	70.2	0.143	0.079	0.61	0.154	1.67	0.03 J1	0.06 J1	0.00101	< 0.002 U1	0.1 J1	0.31 J1	< 0.04 U1
3/24/2022	Assessment	< 0.02 U1	0.05 J1	78.5	0.177	0.070	0.76	0.229	1.03	< 0.02 U1	0.08 J1	0.00101	< 0.002 U1	< 0.1 U1	0.42 J1	< 0.04 U1
6/14/2022	Assessment	< 0.02 U1	< 0.03 U1	78.4	0.182	0.070	0.91	0.124	0.83	0.02 J1	< 0.05 U1	0.00100	< 0.002 U1	< 0.1 U1	0.35 J1	< 0.04 U1
10/11/2022	Assessment	< 0.02 U1	< 0.03 U1	69.7	0.148	0.060	0.87	0.096	0.96	0.02 J1	< 0.05 U1	0.00117	< 0.004 U1	< 0.1 U1	0.31 J1	< 0.04 U1
3/14/2023	Assessment	< 0.02 U1	0.04 J1	47.9	0.086	0.077	0.67	0.321	0.93	0.02 J1	< 0.05 U1	0.00071	< 0.002 U1	< 0.1 U1	0.18 J1	< 0.04 U1
6/12/2023	Assessment	0.009 J1	0.03 J1	56.4	0.123	0.049	0.93	0.130	0.67	< 0.02 U1	< 0.05 U1	0.00080	< 0.002 U1	< 0.1 U1	0.31 J1	< 0.02 U1
10/17/2023	Assessment	0.008 J1	< 0.03 U1	44.9	0.103	0.036	0.81	0.084	0.44	0.03 J1	< 0.05 U1	0.00083	< 0.002 U1	< 0.1 U1	0.33 J1	< 0.02 U1
3/12/2024	Assessment	0.020 J1	0.22	43.1	0.074 P2	0.049	0.34	5.22	1.21	0.04 J1	< 0.05 U1	0.00056 P2	< 0.002 U1	0.2 J1	0.06 J1	< 0.02 U1
5/7/2024	Assessment	0.028 J1	0.07 J1	41.6	0.105	0.062	0.98	0.516	0.88	0.03 J1	0.22	0.00072	< 0.002 U1	< 0.1 U1	0.24 J1	0.03 J1
9/24/2024	Assessment	< 0.008 U1	0.06 J1	39.7	0.094	0.039	0.82	0.190	1.68	0.02 J1	0.07 J1	0.00078	< 0.002 U1	< 0.1 U1	0.20 J1	< 0.02 U1

Table 1. Groundwater Data Summary: MW-1605
Big Sandy - FAP
Appendix III Constituents

Geosyntec Consultants, Inc.

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
9/27/2016	Background	0.008	1.00	0.43	< 0.02 U1	5.7	5.2	30 J1
11/8/2016	Background	0.005	1.01	0.43	< 0.02 U1	2.3	4.2	40
1/11/2017	Background	< 0.002 U1	0.979	0.62	< 0.02 U1	4.6	5.7	35
2/21/2017	Background	0.061	1.37	1.49	< 0.02 U1	5.1	7.4	74
4/25/2017	Background	0.025	1.31	1.21	< 0.02 U1	4.9	6.0	30 J1
5/23/2017	Background	0.063	1.21	1.00	< 0.02 U1	4.8	5.4	30 J1
6/21/2017	Background	0.017	1.15	0.90	< 0.02 U1	4.9	5.8	25
7/12/2017	Background	0.075	1.11	1.32	< 0.02 U1	4.7	4.5	37
9/14/2017	Detection	0.102	1.01	1.72	< 0.02 U1	4.7	4.9	20 J1
4/25/2018	Assessment	0.070	1.30	0.69	< 0.02 U1	4.6	6.5	37
9/18/2018	Assessment	0.036	0.930	0.62	< 0.02 U1	4.0	4.3	29
3/12/2019	Assessment	0.02 J1	1.27	0.53	0.02 J1	4.3	7.2	33
6/25/2019	Assessment	< 0.02 U1	1.20	0.43	< 0.01 U1	5.2	5.7	37
8/20/2019	Assessment	< 0.02 U1	1.01	0.46	0.01 J1	5.5	5.5	30 J1
3/17/2020	Assessment	--	--	--	0.01 J1	5.0	--	--
6/29/2020	Assessment	< 0.02 U1	1.24	0.43	< 0.01 U1	5.0	5.3	--
8/27/2020	Assessment	--	--	--	--	5.1	--	30 J1
10/5/2020	Assessment	< 0.02 U1	1.04	0.39	< 0.01 U1	5.6	5.3	40 J1
3/10/2021	Assessment	--	--	--	0.02 J1	4.6	--	--
6/8/2021	Assessment	0.009 J1	1.2	0.59	0.01 J1	5.2	5.08	50
10/5/2021	Assessment	0.011 J1	1.2	0.41	< 0.02 U1	5.1	4.59	40 J1
3/23/2022	Assessment	0.011 J1	1.60	0.65	< 0.02 U1	6.5	9.21	30 J1
6/14/2022	Assessment	< 0.009 U1	1.18	0.56	< 0.02 U1	4.5	5.24	50
10/12/2022	Assessment	0.010 J1	1.15	0.36	< 0.02 U1	5.2	5.27	< 20 S12, U1
3/14/2023	Assessment	--	--	--	0.03 J1	6.5	--	--
6/12/2023	Assessment	0.014 J1	3.52	0.50	< 0.02 U1	6.2	7.9	64 P2
10/17/2023	Assessment	0.011 J1	1.30	0.36	< 0.02 U1	5.3	4.8	46 J1
3/13/2024	Assessment	--	--	--	0.04 J1	6.4	--	--
5/8/2024	Assessment	0.016 J1	4.71	--	0.04 J1	6.1	--	--
8/6/2024	Assessment	--	--	0.50	--	--	5.7	40 J1
9/23/2024	Assessment	0.009 J1	1.31	0.50	< 0.02 U1	4.8	4.5	50

Table 1. Groundwater Data Summary: MW-1605
Big Sandy - FAP
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
9/27/2016	Background	< 0.01 U1	0.04 J1	30.3	0.091	0.06	2.7	0.897	0.679	< 0.02 U1	0.126	0.002	< 0.002 U1	0.08 J1	0.2	0.01 J1
11/8/2016	Background	0.01 J1	0.08	30.5	0.121	0.06	2.50	0.917	1.986	< 0.02 U1	0.210	0.007	< 0.002 U1	0.05 J1	0.2	0.01 J1
1/11/2017	Background	0.01 J1	0.07	32.2	0.111	0.07	2.53	1.64	0.1382	< 0.02 U1	0.190	0.008	< 0.002 U1	0.1 J1	0.2	0.01 J1
2/21/2017	Background	< 0.01 U1	0.03 J1	42.6	0.138	0.09	2.61	1.45	0.904	< 0.02 U1	0.107	0.005	< 0.002 U1	0.10	0.2	0.03 J1
4/25/2017	Background	0.01 J1	0.06	39.1	0.119	0.09	2.57	0.991	0.2779	< 0.02 U1	0.121	< 0.0002 U1	< 0.002 U1	0.13	0.2	0.01 J1
5/23/2017	Background	< 0.01 U1	0.03 J1	35.0	0.114	0.07	2.39	0.667	6.077	< 0.02 U1	0.104	0.008	< 0.002 U1	0.07 J1	0.2	0.01 J1
6/21/2017	Background	< 0.01 U1	0.05 J1	33.4	0.105	0.07	2.44	0.592	10.864	< 0.02 U1	0.110	0.002	< 0.002 U1	0.09 J1	0.3	< 0.01 U1
7/12/2017	Background	< 0.01 U1	0.23	31.7	0.103	0.07	2.33	0.495	0.3796	< 0.02 U1	0.107	0.0003 J1	< 0.002 U1	23.7	0.2	0.01 J1
4/25/2018	Assessment	0.04 J1	0.07	37.1	0.123	0.08	2.70	0.434	0.421	< 0.02 U1	0.193	0.009	< 0.002 U1	0.07 J1	0.3	0.03 J1
9/18/2018	Assessment	0.02 J1	0.04 J1	29.7	0.104	0.06	2.58	0.265	0.694	< 0.02 U1	0.092	0.002	--	0.04 J1	0.2	0.03 J1
10/22/2018	Assessment	--	--	--	--	--	--	--	--	--	--	--	< 0.002 U1	--	--	--
3/12/2019	Assessment	< 0.02 U1	0.17	36.6	0.131	0.08	2.91	0.483	0.2025	0.02 J1	0.305	< 0.009 U1	0.003 J1	< 0.4 U1	0.3	< 0.1 U1
6/25/2019	Assessment	< 0.02 U1	0.05 J1	34.8	0.123	0.08	2.53	0.253	0.9023	< 0.01 U1	0.164	< 0.009 U1	< 0.002 U1	< 0.4 U1	0.2	< 0.1 U1
8/20/2019	Assessment	< 0.02 U1	0.03 J1	29.1	0.09 J1	0.06	2.41	0.215	0.268	0.01 J1	0.09 J1	0.000637	< 0.002 U1	< 0.4 U1	0.2	< 0.1 U1
3/17/2020	Assessment	< 0.02 U1	< 0.03 U1	40.9	0.130	0.08	2.47	0.272	1.1942	0.01 J1	0.1 J1	0.000757	< 0.002 U1	< 0.4 U1	0.3	< 0.1 U1
6/29/2020	Assessment	< 0.02 U1	< 0.03 U1	36.5	0.119	0.07	2.41	0.222	0.11	< 0.01 U1	0.05 J1	0.000694	< 0.002 U1	< 0.4 U1	0.3	< 0.1 U1
10/5/2020	Assessment	< 0.02 U1	0.04 J1	33.7	0.113	0.07	2.55	0.219	4.041	< 0.01 U1	0.1 J1	0.000695	< 0.002 U1	< 0.4 U1	0.3	< 0.1 U1
3/10/2021	Assessment	< 0.02 U1	0.06 J1	56.7	0.160	0.11	2.71	0.398	2.826	0.02 J1	0.2 J1	0.000806	0.002 J1	< 0.1 U1	0.2	< 0.04 U1
6/8/2021	Assessment	< 0.02 U1	< 0.03 U1	34.8	0.102	0.067	2.27	0.236	1.12	0.01 J1	0.08 J1	0.00063	< 0.002 U1	< 0.1 U1	0.20 J1	< 0.04 U1
10/5/2021	Assessment	< 0.02 U1	0.04 J1	36.9	0.118	0.074	2.68	0.184	0.97	< 0.02 U1	0.1 J1	0.00075	< 0.004 U1	< 0.1 U1	0.24 J1	< 0.04 U1
3/23/2022	Assessment	< 0.02 U1	0.05 J1	47.9	0.152	0.101	2.55	0.341	1.36	< 0.02 U1	0.14 J1	0.00089	< 0.002 U1	< 0.1 U1	0.22 J1	< 0.04 U1
6/14/2022	Assessment	< 0.02 U1	0.03 J1	34.5	0.111	0.071	2.41	0.242	0.41	< 0.02 U1	0.09 J1	0.00068	< 0.002 U1	< 0.1 U1	0.21 J1	< 0.04 U1
10/12/2022	Assessment	< 0.02 U1	0.04 J1	36.6	0.116	0.069	3.26	0.194	0.77	< 0.02 U1	0.08 J1	0.00071	< 0.002 U1	< 0.1 U1	0.25 J1	< 0.04 U1
3/14/2023	Assessment	0.09 J1	1.42	41.9	0.243	0.025	5.05	1.17	1.05	0.03 J1	2.16	0.00260	0.005	0.3 J1	0.56	0.07 J1
6/12/2023	Assessment	0.033 J1	0.69	30.3	0.155	0.044	2.89	0.737	0.69	< 0.02 U1	1.04	0.00153	0.003 J1	< 0.1 U1	0.51	0.06 J1
10/17/2023	Assessment	0.046 J1	1.00	57.2	0.349	0.082	6.60	1.91	1.10	< 0.02 U1	2.55	0.00403	0.002 J1	0.1 J1	1.04	0.07 J1
3/13/2024	Assessment	0.074 J1	0.83	32.6	0.155 P2	0.035	5.29	0.649	0.87	0.04 J1	1.20	0.00186 P2	0.003 J1	0.2 J1	0.65	0.04 J1
5/8/2024	Assessment	0.063 J1	0.69	33.9	0.149	0.044	4.20	0.665	0.61	0.04 J1	1.12	0.00129	0.004 J1	0.2 J1	0.58	0.02 J1
9/23/2024	Assessment	0.028 J1	0.93	57.8	0.313	0.087	5.47	1.90	0.78	< 0.02 U1	2.43	0.00288	0.007	0.1 J1	0.72	0.05 J1

Table 1. Groundwater Data Summary: MW-1606
Big Sandy - FAP
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
9/27/2016	Background	1.92	78.6	31.3	0.17	7.4	54.0	362
11/8/2016	Background	1.80	75.9	31.5	0.19	7.2	54.5	400
1/12/2017	Background	1.77	75.1	31.2	0.21	7.3	58.8	396
2/22/2017	Background	1.63	76.7	30.4	0.18	7.2	53.9	358
4/26/2017	Background	1.78	73.8	31.7	0.19	6.7	56.1	380
5/23/2017	Background	1.87	78.1	31.7	0.19	6.8	56.2	360
6/21/2017	Background	1.89	78.1	31.1	0.17	6.7	55.3	369
7/12/2017	Background	1.79	75.7	31.4	0.17	6.5	57.0	382
9/18/2017	Detection	1.83	77.0	31.3	0.19	6.9	58.1	380
1/31/2018	Detection	1.63	--	32.0	--	7.2	--	--
4/25/2018	Assessment	1.81	73.7	31.3	0.26	6.6	56.0	350
9/19/2018	Assessment	1.82	71.8	31.1	0.24	6.6	56.9	380
3/13/2019	Assessment	1.93	74.2	31.7	0.22	6.9	58.8	389
6/25/2019	Assessment	1.84	74.5	30.8	0.23	7.1	58.7	384
8/20/2019	Assessment	1.74	75.1	31.4	0.21	7.0	58.3	385
3/18/2020	Assessment	--	--	--	0.20	9.1	--	--
6/30/2020	Assessment	2.04	79.7	31.8	0.18	6.8	61.2	--
8/26/2020	Assessment	--	--	--	--	6.5	--	392
10/6/2020	Assessment	2.00	78.7	32.0	0.22	6.7	62.8	363
3/10/2021	Assessment	--	--	--	0.26	6.9	--	--
6/8/2021	Assessment	1.99	74.1	31.8	0.24	7.5	61.6	370
10/5/2021	Assessment	2.04	74.5	31.4	0.22	7.0	60.7	400
3/23/2022	Assessment	2.22	81.3	32.7	0.21	7.7	63.3	370
6/14/2022	Assessment	2.08	73.6	31.7	0.21	7.3	64.9	430
10/11/2022	Assessment	2.11	75.9	32.3	0.20	6.7	64.7	390
3/14/2023	Assessment	--	--	--	0.20	7.5	--	--
6/12/2023	Assessment	1.97	73.2	32.3	0.19	7.6	65.6	380 P2
10/17/2023	Assessment	2.07	75.9	31.4	0.20	7.0	63.3	390
3/12/2024	Assessment	--	--	--	0.20	7.1	--	--
5/7/2024	Assessment	2.17	76.9	--	0.20	6.7	--	--
8/6/2024	Assessment	--	--	31.7	--	--	64.5	400
9/23/2024	Assessment	2.13	75.7	31.8	0.20	6.6	65.5	380

Table 1. Groundwater Data Summary: MW-1606
Big Sandy - FAP
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
9/27/2016	Background	0.03 J1	0.85	1,030	0.064	0.009 J1	1.7	0.814	2.76	0.17	1.19	0.006	< 0.002 U1	0.68	0.2	0.04 J1
11/8/2016	Background	0.04 J1	1.24	994	0.114	0.01 J1	2.34	1.26	4.082	0.19	1.88	0.014	< 0.002 U1	0.51	0.3	0.03 J1
1/12/2017	Background	0.07	1.19	883	0.058	0.06	1.52	0.919	3.35	0.21	1.02	0.010	< 0.002 U1	0.67	0.2	0.110
2/22/2017	Background	< 0.01 U1	0.97	875	0.025	< 0.004 U1	0.747	0.381	2.289	0.18	0.330	0.008	0.002 J1	0.91	0.2	0.01 J1
4/26/2017	Background	0.03 J1	1.40	1,080	0.053	0.007 J1	1.33	0.951	2.398	0.19	0.862	0.003	< 0.002 U1	0.84	0.1	0.02 J1
5/23/2017	Background	0.01 J1	1.03	949	0.023	< 0.005 U1	0.790	0.411	3.37	0.19	0.341	0.006	0.002 J1	0.54	0.09 J1	< 0.01 U1
6/21/2017	Background	< 0.01 U1	0.98	884	0.01 J1	< 0.005 U1	0.385	0.209	2.79	0.17	0.159	0.004	0.003 J1	0.60	0.06 J1	< 0.01 U1
7/12/2017	Background	0.01 J1	1.14	773	0.01 J1	< 0.005 U1	0.353	0.153	3.37	0.17	0.103	0.008	< 0.002 U1	7.56	0.06 J1	< 0.01 U1
4/25/2018	Assessment	0.05	0.97	767	0.008 J1	< 0.005 U1	0.301	0.101	3.71	0.26	0.077	0.014	< 0.002 U1	0.58	0.06 J1	0.01 J1
9/19/2018	Assessment	0.03 J1	0.97	797	0.01 J1	< 0.005 U1	0.366	0.155	3.28	0.24	0.126	0.001	--	0.58	0.07 J1	0.03 J1
10/22/2018	Assessment	--	--	--	--	--	--	--	--	--	--	--	< 0.002 U1	--	--	--
3/13/2019	Assessment	< 0.02 U1	1.22	764	< 0.02 U1	< 0.01 U1	0.535	0.208	2.63	0.22	0.123	< 0.009 U1	< 0.002 U1	2.60	0.05 J1	< 0.1 U1
6/25/2019	Assessment	< 0.02 U1	0.94	843	< 0.02 U1	< 0.01 U1	0.1 J1	0.055	2.366	0.23	0.05 J1	< 0.009 U1	< 0.002 U1	0.6 J1	0.06 J1	< 0.1 U1
8/20/2019	Assessment	< 0.02 U1	0.85	768	< 0.02 U1	< 0.01 U1	0.304	0.05 J1	3.12	0.21	< 0.05 U1	0.00301	< 0.002 U1	0.6 J1	0.05 J1	< 0.1 U1
3/18/2020	Assessment	< 0.02 U1	1.00	828	< 0.02 U1	< 0.01 U1	0.343	0.196	2.49	0.20	0.1 J1	0.00340	< 0.002 U1	0.6 J1	0.08 J1	< 0.1 U1
6/30/2020	Assessment	< 0.02 U1	0.92	816	< 0.02 U1	< 0.01 U1	0.2 J1	0.068	3.16	0.18	0.1 J1	0.00364	< 0.002 U1	0.5 J1	0.07 J1	< 0.1 U1
10/6/2020	Assessment	< 0.02 U1	1.00	750	< 0.02 U1	< 0.01 U1	0.1 J1	0.060	2.91	0.22	< 0.05 U1	0.00329	< 0.002 U1	0.5 J1	0.07 J1	< 0.1 U1
3/10/2021	Assessment	< 0.02 U1	1.04	739	0.009 J1	< 0.004 U1	0.433	0.100	1.92	0.26	0.08 J1	0.00306	< 0.002 U1	0.5 J1	< 0.09 U1	< 0.04 U1
6/8/2021	Assessment	< 0.02 U1	0.96	768 M1, P3	< 0.007 U1	< 0.004 U1	0.59	0.066	4.12	0.24	0.08 J1	0.00317	< 0.002 U1	0.6	< 0.09 U1	< 0.04 U1
10/5/2021	Assessment	< 0.02 U1	0.98	757 M1, P3	0.007 J1	< 0.004 U1	0.16 J1	0.086	4.15	0.22	0.08 J1	0.00354	< 0.002 U1	0.5	< 0.09 U1	< 0.04 U1
3/23/2022	Assessment	< 0.02 U1	0.80	783	< 0.007 U1	< 0.004 U1	0.09 J1	0.049	2.66	0.21	< 0.05 U1	0.00394	< 0.002 U1	0.5	< 0.09 U1	< 0.04 U1
6/14/2022	Assessment	< 0.02 U1	0.88	764	< 0.007 U1	< 0.004 U1	0.1 J1	0.047	2.75	0.21	< 0.05 U1	0.00328	< 0.002 U1	0.5	< 0.09 U1	< 0.04 U1
10/11/2022	Assessment	< 0.02 U1	0.90	730	0.009 J1	< 0.004 U1	0.91	0.079	2.96	0.20	0.05 J1	0.00378	< 0.004 U1	0.5	< 0.09 U1	< 0.04 U1
3/14/2023	Assessment	< 0.02 U1	0.95	769	0.007 J1	< 0.004 U1	0.32	0.103	3.35	0.20	0.09 J1	0.00331	< 0.002 U1	0.5	< 0.09 U1	< 0.04 U1
6/12/2023	Assessment	0.912	0.88	731	0.01 J1	0.005 J1	0.39	0.135	2.69	0.19	0.23	0.00392	< 0.002 U1	0.5	0.06 J1	< 0.02 U1
10/17/2023	Assessment	< 0.008 U1	0.73	739	0.009 J1	< 0.004 U1	0.30	0.088	3.43	0.20	0.08 J1	0.00381	< 0.002 U1	0.5	< 0.04 U1	< 0.02 U1
3/12/2024	Assessment	0.013 J1	0.85	722	0.015 P2, J1	< 0.004 U1	0.53	0.218	2.57	0.20	0.21	0.00364 P2	< 0.002 U1	0.5	0.07 J1	< 0.02 U1
5/7/2024	Assessment	0.025 J1	0.74	742	0.011 J1	0.007 J1	0.67	0.079	3.15	0.20	0.29	0.00353	< 0.002 U1	0.5	0.07 J1	< 0.02 U1
9/23/2024	Assessment	0.010 J1	0.74	730	< 0.007 U1	0.007 J1	0.25 J1	0.065	2.64	0.20	0.13 J1	0.00350	< 0.002 U1	0.5	0.04 J1	< 0.02 U1

Table 1. Groundwater Data Summary: MW-1607
Big Sandy - FAP
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
9/27/2016	Background	0.159	97.6	3.34	0.04 J1	6.9	132	406
11/8/2016	Background	0.202	76.3	15.5	0.06	6.8	88.4	368
1/11/2017	Background	0.171	99.0	5.96	0.06	6.0	171	474
2/21/2017	Background	0.195	105	3.47	0.06	6.5	150	470
4/25/2017	Background	0.273	80.8	10.2	0.07	6.3	85.3	332
5/23/2017	Background	0.186	89.4	3.24	0.06 J1	6.3	114	338
6/21/2017	Background	0.164	92.5	2.42	0.05 J1	6.3	119	368
7/12/2017	Background	0.167	86.0	2.28	0.05 J1	5.8	105	358
9/18/2017	Detection	0.155	90.7	2.73	0.07	6.4	125	398
1/31/2018	Detection	--	110	--	--	6.6	159	--
4/25/2018	Assessment	0.234	101	3.66	0.08	6.2	137	430
9/19/2018	Assessment	0.255	95.6	7.52	0.08	6.0	144	428
3/13/2019	Assessment	0.209	93.7	5.17	0.06	6.1	135	415
6/25/2019	Assessment	0.208	91.9	5.22	0.08	6.6	120	388
8/20/2019	Assessment	0.160	101	3.84	0.07	6.5	141	419
3/18/2020	Assessment	--	--	--	0.06	8.1	--	--
6/30/2020	Assessment	0.195	85.4	8.26	0.06 J1	6.3	94.1	--
8/26/2020	Assessment	--	--	--	--	6.0	--	372
10/6/2020	Assessment	0.155	99.4	4.76	0.07	6.9	129	381
3/10/2021	Assessment	--	--	--	0.08	6.4	--	--
6/8/2021	Assessment	0.151	81.2	3.56	0.09	6.9	89.2	330
10/5/2021	Assessment	0.161	97.0	4.05	0.08	6.5	112	420
3/24/2022	Assessment	--	--	--	0.06	7.7	--	--
6/14/2022	Assessment	0.152	87.0	3.21	0.07	6.9	87.7	370
10/11/2022	Assessment	0.144	83.0	4.12	0.06	6.3	85.2	350
3/14/2023	Assessment	--	--	--	0.06	7.0	--	--
6/12/2023	Assessment	0.144	87.9	3.23	0.06	7.4	97.1	400 P2
10/17/2023	Assessment	0.141	89.4	3.29	0.07	6.6	99.6	370
3/12/2024	Assessment	--	--	--	0.08	6.6	--	--
5/7/2024	Assessment	0.236	98.2	--	0.07	6.6	--	--
8/6/2024	Assessment	--	--	2.53	--	--	78.5	340
9/23/2024	Assessment	0.206	73.4	6.52	0.07	6.2	69.5	310

Table 1. Groundwater Data Summary: MW-1607
Big Sandy - FAP
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
9/27/2016	Background	0.02 J1	7.36	34.3	0.01 J1	< 0.004 U1	0.6	1.41	1.551	0.04 J1	0.156	0.003	< 0.002 U1	0.52	0.1 J1	0.03 J1
11/8/2016	Background	0.02 J1	11.6	42.3	0.025	0.007 J1	0.619	1.45	1.683	0.06	0.376	0.002	< 0.002 U1	0.62	0.1	0.02 J1
1/11/2017	Background	0.06	12.5	53.5	0.01 J1	0.05	0.456	1.31	0.577	0.06	0.129	0.007	< 0.002 U1	0.83	0.1	0.119
2/21/2017	Background	0.01 J1	8.71	34.3	0.01 J1	< 0.004 U1	0.359	1.24	1.339	0.06	0.030	0.005	< 0.002 U1	0.54	0.05 J1	0.055
4/25/2017	Background	0.03 J1	15.4	38.1	0.028	0.006 J1	0.682	1.34	1.080	0.07	0.416	0.003	< 0.002 U1	0.53	0.2	0.02 J1
5/23/2017	Background	0.02 J1	8.87	33.9	0.01 J1	0.008 J1	0.350	1.30	6.76	0.06 J1	0.081	0.009	0.004 J1	0.42	0.1	0.02 J1
6/21/2017	Background	0.02 J1	9.22	27.5	0.01 J1	< 0.005 U1	0.324	1.39	1.274	0.05 J1	0.123	0.004	< 0.002 U1	0.45	0.1	0.02 J1
7/12/2017	Background	0.02 J1	7.59	25.0	0.01 J1	< 0.005 U1	0.293	1.13	0.33	0.05 J1	0.070	0.004	< 0.002 U1	9.02	0.1	0.02 J1
4/25/2018	Assessment	0.27	68.5	37.2	0.111	< 0.005 U1	0.851	1.57	3.217	0.08	0.799	0.012	< 0.002 U1	0.90	0.7	0.04 J1
9/19/2018	Assessment	0.04 J1	23.6	42.6	0.02 J1	< 0.005 U1	0.423	1.59	0.611	0.08	0.159	0.001	--	0.59	0.1	0.04 J1
10/22/2018	Assessment	--	--	--	--	--	--	--	--	--	--	--	< 0.002 U1	--	--	--
3/13/2019	Assessment	< 0.02 U1	7.67	31.6	< 0.02 U1	< 0.01 U1	0.424	1.43	0.18541	0.06	0.05 J1	< 0.009 U1	< 0.002 U1	1 J1	0.08 J1	< 0.1 U1
6/25/2019	Assessment	0.02 J1	19.3	38.1	< 0.02 U1	< 0.01 U1	0.250	1.39	0.501	0.08	0.09 J1	< 0.009 U1	< 0.002 U1	0.7 J1	0.1 J1	< 0.1 U1
8/20/2019	Assessment	< 0.02 U1	14.4	29.1	< 0.02 U1	< 0.01 U1	0.347	1.19	0.685	0.07	< 0.05 U1	0.0001 J1	< 0.002 U1	0.6 J1	0.09 J1	< 0.1 U1
3/18/2020	Assessment	0.02 J1	14.2	34.6	< 0.02 U1	< 0.01 U1	0.305	1.34	2.1757	0.06	0.1 J1	0.000332	< 0.002 U1	0.8 J1	0.2 J1	0.1 J1
6/30/2020	Assessment	0.03 J1	17.7	25.7	< 0.02 U1	< 0.01 U1	0.209	1.33	1.398	0.06 J1	0.08 J1	0.0001 J1	< 0.002 U1	0.6 J1	0.1 J1	< 0.1 U1
10/6/2020	Assessment	0.16	24.9	30.2	< 0.02 U1	< 0.01 U1	0.352	1.22	1.017	0.07	0.1 J1	0.0002 J1	< 0.002 U1	0.6 J1	0.1 J1	< 0.1 U1
3/10/2021	Assessment	< 0.02 U1	12.3	54.7	0.01 J1	0.009 J1	0.276	1.75	0.2646	0.08	0.09 J1	0.000310	< 0.002 U1	0.6 J1	0.1 J1	< 0.04 U1
6/8/2021	Assessment	0.02 J1	14.3	24.3	0.009 J1	< 0.004 U1	0.23	0.946	0.88	0.09	0.05 J1	0.00012 J1	< 0.002 U1	0.6	< 0.09 U1	0.05 J1
10/5/2021	Assessment	0.03 J1	16.7	32.4	0.012 J1	0.004 J1	0.20	1.05	2.20	0.08	0.07 J1	0.00018 J1	< 0.002 U1	0.7	< 0.09 U1	< 0.04 U1
3/24/2022	Assessment	< 0.02 U1	16.7	30.2	0.012 J1	0.009 J1	0.22	1.30	0.87	0.06	0.11 J1	0.00013 J1	< 0.002 U1	0.7	0.12 J1	< 0.04 U1
6/14/2022	Assessment	0.02 J1	17.7	31.7	0.011 J1	< 0.004 U1	0.22	1.08	0.73	0.07	0.09 J1	0.00013 J1	< 0.002 U1	0.6	< 0.09 U1	< 0.04 U1
10/11/2022	Assessment	< 0.02 U1	18.7	36.7	0.008 J1	< 0.004 U1	0.33	0.913	0.49	0.06	< 0.05 U1	0.00013 J1	< 0.004 U1	0.6	< 0.09 U1	< 0.04 U1
3/14/2023	Assessment	< 0.02 U1	15.4	41.7	0.01 J1	< 0.004 U1	0.32	1.08	1.81	0.06	0.09 J1	0.00012 J1	< 0.002 U1	0.5	0.12 J1	< 0.04 U1
6/12/2023	Assessment	0.023 J1	17.8	37.6	0.013 J1	< 0.004 U1	0.40	0.916	1.38	0.06	0.12 J1	0.00011 J1	< 0.002 U1	0.6	0.15 J1	0.02 J1
10/17/2023	Assessment	0.015 J1	12.2	41.7	0.012 J1	< 0.004 U1	0.30	0.739	0.82	0.07	0.06 J1	0.00013 J1	< 0.002 U1	0.4 J1	0.12 J1	0.03 J1
3/12/2024	Assessment	0.026 J1	27.8	98.0	0.015 P2, J1	0.008 J1	0.42	0.876	1.42	0.08	0.20	0.00024 P2, J1	< 0.002 U1	0.7	0.14 J1	< 0.02 U1
5/7/2024	Assessment	0.028 J1	16.4	60.5	0.018 J1	< 0.004 U1	0.71	0.921	1.45	0.07	0.78	0.00029 J1	< 0.002 U1	0.5	0.14 J1	< 0.02 U1
9/23/2024	Assessment	0.021 J1	12.0	40.9	0.012 J1	0.016 J1	0.23 J1	0.892	1.71	0.07	0.16 J1	0.00031	< 0.002 U1	0.4 J1	0.07 J1	< 0.02 U1

Notes:
Combined radium values were calculated from the sum of the reported radium-226 and radium-228 results.
Radium data quality flags were not included. Reported negative radium-226 or radium-228 results were replaced with zero.
--: Not analyzed
<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag.
In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.
J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.
In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.
M1: The associated matrix spike (MS) or matrix spike duplicate (MSD) recovery was outside acceptance limits.
mg/L: milligrams per liter
P2: The precision on the laboratory control sample duplicate (LCSD) was above acceptance limits.
P3: The precision on the matrix spike duplicate (MSD) was above acceptance limits.
pCi/L: picocuries per liter
S7: Sample did not achieve constant weight.
S12: Residue weight is below the method criteria but was already analyzed with 100mL.
SU: standard unit
µg/L: micrograms per liter

Table 1: Residence Time Calculation Summary
Big Sandy Fly Ash Pond

Geosyntec Consultants, Inc.

			2024-03		2024-05		2024-09	
CCR Management Unit	Monitoring Well	Well Diameter (inches)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)
Fly Ash Pond	MW-1011 [1]	2.0	33.0	1.8	33.0	1.8	33.0	1.8
	MW-1012 [1]	2.0	33.0	1.8	33.0	1.8	33.0	1.8
	MW-1203 [1]	2.0	33.0	1.8	33.0	1.8	33.0	1.8
	MW-1601 [2]	4.0	33.0	3.7	33.0	3.7	33.0	3.7
	MW-1602 [2]	4.0	33.0	3.7	33.0	3.7	33.0	3.7
	MW-1603 [2]	4.0	33.0	3.7	33.0	3.7	33.0	3.7
	MW-1604 [3]	4.0	85.3	1.4	13.9	8.8	65.3	1.9
	MW-1605 [3]	4.0	85.3	1.4	13.9	8.8	65.3	1.9
	MW-1606 [2]	4.0	85.3	1.4	13.9	8.8	65.3	1.9
	MW-1607 [2]	4.0	85.3	1.4	13.9	8.8	65.3	1.9

Notes:
[1] - Upgradient Well
[2] - Downgradient Well
[3] - Background Well

APPENDIX 2—Figures

Figures follow showing the PE-certified groundwater monitoring network with the corresponding well identifications along with static water elevation data and groundwater flow directions each time groundwater was sampled in the form of annotated satellite images.

Legend

- Fly Ash Pond (Approximate)
- Monitoring Well
- Gauging Well

Notes

1. Monitoring well locations based on 2016 coordinates.
2. MW-1206 and MW-1207 were abandoned during construction to close the BSFAP.

- BSFAP: Big Sandy Fly Ash Pond

750 375 0 750 Feet

Revised Groundwater Monitoring Well Network of the Uppermost Aquifer

AEP Big Sandy Plant - Fly Ash Pond
Louisa, Kentucky

Geosyntec consultants

Columbus, Ohio | 2023/10/04

Figure 1

P:\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Big Sandy\2023\20230914_BigSandy_FAP_MW_Gauging Locations.mxd. hduff. 10/4/2023. CHA8423/05/08.

Legend

- Groundwater Monitoring Well
- Inferred Groundwater Flow Direction

Notes

1. Monitoring well coordinates and water level data (collected on March 12, 2024) provided by AEP.
2. Site features based on information available in Groundwater Monitoring Network Evaluation - Big Sandy Fly Ash Pond (Geosyntec 2016) provided by AEP.
3. Groundwater elevation units are feet above mean sea level (ft amsl).
4. Well MW-1603 was removed from the groundwater monitoring network in accordance with the Groundwater Monitoring Network Evaluation - Big Sandy Fly Ash Pond, Revision 1 (Geosyntec 2023).
5. Fly Ash Pond cap liner construction completed in November 2020.

1,000 500 0 1,000 Feet

Potentiometric Surface Map - Uppermost Aquifer
March 2024

AEP Big Sandy Plant - Fly Ash Pond
Louisa, Kentucky

Geosyntec consultants

Columbus, Ohio | 2025/01/10

Figure 2

\\annarbor-01\Data\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Big Sandy\2024\AEP-BigSandy_FAP_GW_2024-03-Mar.mxd. ASoltero. 1/10/2025. CHA8423/05/08.

Legend

- Groundwater Monitoring Well
- Inferred Groundwater Flow Direction

Notes

1. Monitoring well coordinates and water level data (collected on May 7, 2024) provided by AEP.
2. Site features based on information available in Groundwater Monitoring Network Evaluation - Big Sandy Fly Ash Pond, Revision 1 (Geosyntec 2023) provided by AEP.
3. Groundwater elevation units are feet above mean sea level (ft amsl) (Datum: KY SP North NAD83, NAVD88).
4. Well MW-1603 was removed from the groundwater monitoring network in accordance with the Groundwater Monitoring Network Evaluation - Big Sandy Fly Ash Pond, Revision 1 (Geosyntec 2023).
5. Fly Ash Pond cap liner construction completed in November 2020.

1,000 500 0 1,000 Feet

Potentiometric Surface Map - Uppermost Aquifer
May 2024

AEP Big Sandy Plant - Fly Ash Pond
Louisa, Kentucky

Geosyntec consultants

Columbus, Ohio | 2025/01/10

Figure 3

\\annarbor-01\Data\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Big Sandy\2024\AEP-BigSandy_FAP_GW_2024-05-May.mxd. ASoltero. 1/10/2025. CHA8423/05/08.

Legend

- Groundwater Monitoring Well
- Inferred Groundwater Flow Direction

Notes

1. Monitoring well coordinates and water level data (collected on September 23, 2024) provided by AEP.
2. Site features based on information available in Groundwater Monitoring Network Evaluation - Big Sandy Fly Ash Pond, Revision 1 (Geosyntec 2023) provided by AEP.
3. Groundwater elevation units are feet above mean sea level (ft amsl) (Datum: KY SP North NAD83, NAVD88).
4. Well MW-1603 was removed from the groundwater monitoring network in accordance with the Groundwater Monitoring Network Evaluation - Big Sandy Fly Ash Pond, Revision 1 (Geosyntec 2023).
5. Fly Ash Pond cap liner construction completed in November 2020.

1,000 500 0 1,000 Feet

Potentiometric Surface Map - Uppermost Aquifer
September 2024

AEP Big Sandy Plant - Fly Ash Pond
Louisa, Kentucky

Geosyntec consultants

Columbus, Ohio | 2025/01/10

Figure 4

\\annarbor-01\Data\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Big Sandy\2024\AEP-BigSandy_FAP_GW_2024-09-Sep.mxd. ASoltero. 1/10/2025. CHA8423/05/08.

APPENDIX 3—Statistical Analysis Summaries

The March 2024 and October 2024 statistical analysis summaries follow. No SSLs above the corresponding groundwater protection standard were detected during either evaluation.

Geosyntec consultants

engineers | scientists | innovators

STATISTICAL ANALYSIS SUMMARY, FLY ASH POND

Big Sandy Plant

Louisa, Kentucky

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 Number: CHA8500B

March 1, 2024

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LIST OF ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

CCR	coal combustion residuals
CFR	code of federal regulations
FAP	Fly Ash Pond
GWPS	groundwater protection standard
LPL	lower prediction limit
MCL	maximum contaminant level
mg/L	milligrams per liter
PQL	practical quantitation limit
QA/QC	quality assurance/quality control
SSI	statistically significant increase
SSL	statistically significant level
TDS	total dissolved solids
UPL	upper prediction limit

1. INTRODUCTION

In accordance with United States Environmental Protection Agency regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (Code of Federal Regulations [CFR] Title 40, Section 257, Subpart D), groundwater monitoring has been conducted at the Fly Ash Pond (FAP), an existing CCR unit at the Big Sandy Power Plant in Louisa, Kentucky. Recent groundwater monitoring results were used to identify any concentrations of Appendix IV constituents that are above the groundwater protection standards (GWPSs).

Based on detection monitoring conducted in 2017 and 2018, statistically significant increases (SSIs) over background were concluded for boron, calcium, chloride, fluoride, sulfate, and total dissolved solids (TDS) at the FAP. An alternative source was not identified following the detection monitoring events; thus, the FAP has been in assessment monitoring since 2018. During the most recent assessment monitoring event, completed in December 2023, no statistically significant levels (SSLs) were identified and the unit remained in assessment monitoring (Geosyntec 2023a).

A semiannual sampling event for Appendix III parameters and Appendix IV parameters, as required by 40 CFR 257.95(d)(1), was completed in October 2023. The results of the October 2023 assessment sampling event are documented in this report.

Before the statistical analyses were conducted, the 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 that would impact data usability were identified.

The monitoring data were submitted to Groundwater Stats Consulting, LLC for statistical analysis. GWPSs were reestablished for the Appendix IV parameters following calculation of site-specific background values. Confidence intervals were calculated from the Appendix IV parameter data at the compliance wells to assess whether any were present at SSLs above the corresponding GWPS. No SSLs were identified; however, concentrations of Appendix III parameters remained above background. Therefore, the unit will remain in assessment monitoring. Certification of the selected statistical methods by a qualified professional engineer is documented in Attachment A.

2. FLY ASH POND EVALUATION

2.1 Data Validation and QA/QC

One set of samples was collected for analysis from each upgradient and downgradient well, except MW-1601, to meet the requirements of 40 CFR 257.95(d)(1) in October 2023 as part of the assessment monitoring program. Downgradient well MW-1601 was dry during the October 2023 event and a sample could not be collected from that location. Samples from the October 2023 sample event were analyzed for all Appendix III and Appendix IV parameters. A summary of data collected during this assessment monitoring event is presented in Table 1.

Chemical analysis was completed by a National Environmental Laboratory Accreditation Program-certified analytical laboratory. The laboratory completed analysis of quality assurance and quality control (QA/QC) samples such as laboratory reagent blanks, continuing calibration verification samples, and laboratory fortified blanks.

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.10.0.15 statistics software. The export file was checked against the analytical data for transcription errors and completeness. No QA/QC issues that would impact data usability were noted.

2.2 Statistical Analysis

Statistical analyses for the FAP were conducted in accordance with the October 2020 *Statistical Analysis Plan* (Geosyntec 2020). Time series plots and results for all completed statistical tests are provided in Attachment B.

The data obtained in October 2023 were screened for potential outliers. Outliers were identified at background wells MW-1012 for arsenic, MW-1012 for boron, MW-1605 for chromium, MW-1605 for cobalt, MW-1011 for combined radium, MW-1012 for fluoride, MW-1011 for sulfate, and MW-1012 for TDS. The arsenic value at background well MW-1012 was flagged and removed from the dataset due to elevated levels. The remaining identified values were either similar to upgradient concentrations or below their respective maximum contaminant level (MCL); therefore, no additional outliers were flagged for this event.

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 (Geosyntec 2020). The established GWPS was determined to be the greater value of the background concentration and either the 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 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 cobalt and combined radium. Nonparametric tolerance limits were calculated for antimony, arsenic, barium, beryllium, cadmium, chromium, fluoride, lead, lithium, molybdenum, selenium, and

thallium due to apparent nonnormal distributions. A nonparametric tolerance limit was calculated for mercury because greater than 50% of the data was composed of nondetect results. Upper 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, nonparametric confidence limits were calculated in some cases (e.g., when the data were not normally distributed or when the nondetect frequency was too high). An SSL was concluded if the lower confidence limit exceeded the GWPS (i.e., if the entire confidence interval exceeded the GWPS). The calculated confidence limits (Attachment B) were compared to the GWPSs provided in Table 2.

No SSLs were identified at the Big Sandy FAP.

2.2.3 Updating Appendix III Prediction Limits

Upper prediction limits (UPLs) were originally established for all Appendix III parameters following the background monitoring period. Intrawell tests were used to evaluate potential SSIs for pH, whereas interwell tests were used to evaluate potential SSIs for boron, calcium, chloride, fluoride, sulfate, and TDS. Prediction limits have been updated periodically during the assessment monitoring period as sufficient data became available.

For intrawell tests, insufficient data was available to compare against the existing background dataset, and so the prediction limits were not updated for the intrawell tests at this time. The intrawell prediction limits were previously calculated using historical data through June 2022 (Geosyntec 2023b). The established intrawell prediction limits were used to evaluate potential SSIs for pH.

Prediction limits for the interwell tests were recalculated using data collected during the 2023 assessment monitoring events. New upgradient well data were tested for outliers prior to being added to the background dataset. Upgradient well data were also evaluated for statistically significant trends using the Sen's Slope/Mann-Kendall trend test, and the results are included in Attachment B. The revised interwell prediction limits were used to evaluate potential SSIs for boron, calcium, chloride, fluoride, sulfate, and TDS.

After the revised background set was established, a parametric or nonparametric analysis was selected based on the distribution of the data and the frequency of nondetect data. Estimated results less than the reporting limit (practical quantitation limit, [PQL]) but above the method detection limit – i.e., "J-flagged" data – were considered detections and the estimated results were used in the statistical analyses. Nonparametric analyses were selected for datasets with at least 50% nondetect data or datasets that could not be normalized by transformation. Parametric analyses were selected for datasets (either transformed or untransformed) that passed the Shapiro-Wilk / Shapiro-Francía test for normality. The Kaplan-Meier nondetect adjustment was applied to datasets with between 15% and 50% nondetect data. For datasets with fewer than 15% nondetect data, nondetect data were replaced with one half of the PQL. The selected analysis (i.e., parametric or nonparametric) and transformation (where applicable) for each background dataset are shown in Attachment B.

The updated interwell prediction limits for boron, calcium, chloride, fluoride, sulfate, and TDS and the previously established intrawell prediction limits for pH are summarized in Table 3. The UPLs were calculated for a one-of-two retesting procedure; i.e., if at least one sample in a series of two does not exceed the UPL, or in the case of pH, is neither less than the lower prediction limit (LPL) nor greater than the UPL, then it can be concluded that an SSI has not occurred. In practice, where the initial result does not exceed the UPL, or in the case of pH, is neither less than the LPL nor greater than the UPL, a second sample will not be collected. The retesting procedures allow achieving an acceptably high statistical power to detect changes at downgradient wells for constituents evaluated using intrawell prediction limits.

2.2.4 Evaluation of Potential Appendix III SSIs

The Appendix III results were analyzed to assess whether concentrations of Appendix III parameters at the compliance wells were above background concentrations. Data collected during the October 2023 assessment monitoring event from each compliance well were compared to updated prediction limits to assess whether the results were statistically above background values. The results from these events and the prediction limits are summarized in Table 3. The following exceedances of the UPLs were noted:

- Boron concentrations were above the interwell UPL of 0.244 milligrams per liter (mg/L) at MW-1606 (2.07 mg/L).

- Chloride concentrations were above the interwell UPL of 6.22 mg/L at MW-1602 (18.5 mg/L) and MW-1606 (31.4 mg/L).

- Sulfate concentrations were above the interwell UPL of 106 mg/L at MW-1602 (206 mg/L).

While the prediction limits were calculated for a one-of-two retesting procedure, SSIs were conservatively assumed if the October 2023 sample was above the UPL or, in the case of pH, below the LPL. Based on this evaluation, concentrations of Appendix III constituents appear to be above background concentrations and the unit will remain in assessment monitoring.

2.3 Conclusions

A semiannual 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 prevented data usage. While eight potential outliers were identified in the October 2023 data, seven of the identified values were not removed from the dataset due to their similarity to other background locations or their relative concentration below their respective MCL. One outlier at background well MW-1012 for arsenic was removed from the dataset. GWPSs were reestablished 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 was above the GWPSs. No SSLs were identified. Appendix III parameters were compared to updated prediction limits; concentrations of boron, chloride, and sulfate were identified above the prediction limits.

Based on this evaluation, the Big Sandy FAP CCR unit will remain in assessment monitoring.

3. REFERENCES

Geosyntec. 2020. Statistical Analysis Plan – Big Sandy Plant. Geosyntec Consultants, Inc. October.

Geosyntec. 2023a. Statistical Analysis Summary – Fly Ash Pond, Big Sandy Plant, Louisa, Kentucky. Geosyntec Consultants, Inc. December.

Geosyntec. 2023b. Statistical Analysis Summary – Fly Ash Pond, Big Sandy Plant, Louisa, Kentucky. Geosyntec Consultants, Inc. February.

TABLES

Table 1. Groundwater Data Summary
Statistical Analysis Summary
Big Sandy Plant – Fly Ash Pond

Parameter	Unit	MW-1011	MW-1012	MW-1203	MW-1602	MW-1604	MW-1605	MW-1606	MW-1607
		10/18/2023	10/18/2023	10/18/2023	10/18/2023	10/17/2023	10/17/2023	10/17/2023	10/17/2023
Antimony	µg/L	0.105	3.07	0.032 J1	0.085 J1	0.008 J1	0.046 J1	0.1 U1	0.015 J1
Arsenic	µg/L	2.21	107	0.35	0.81	0.1 U1	1.00	0.73	12.2
Barium	µg/L	42.8	32.1	98.4	68.8	44.9	57.2	739	41.7
Beryllium	µg/L	0.05 U1	0.013 J1	0.109	0.05 U1	0.103	0.349	0.009 J1	0.012 J1
Boron	mg/L	0.094	0.194	0.103	0.052	0.012 J1	0.011 J1	2.07	0.141
Cadmium	µg/L	0.02 U1	0.006 J1	0.02 U1	0.005 J1	0.036	0.082	0.02 U1	0.02 U1
Calcium	mg/L	75.0	1.58	61.0	92.2	2.03	1.30	75.9	89.4
Chloride	mg/L	5.03	1.66	4.86	18.5	1.33	0.36	31.4	3.29
Chromium	µg/L	0.37	0.48	0.30	0.73	0.81	6.60	0.30	0.30
Cobalt	µg/L	0.235	0.086	0.603	0.018 J1	0.084	1.91	0.088	0.739
Combined Radium	pCi/L	3.66	0.47	1.42	0.82	0.44	1.1	3.43	0.82
Fluoride	mg/L	0.22	0.85	0.14	0.09	0.03 J1	0.06 U1	0.20	0.07
Lead	µg/L	0.2 U1	0.40	0.07 J1	0.2 U1	0.2 U1	2.55	0.08 J1	0.06 J1
Lithium	mg/L	0.00922	0.00612	0.0123	0.00910	0.00083	0.00403	0.00381	0.00013 J1
Mercury	µg/L	0.005 U1	0.005 U1	0.005 U1	0.005 U1	0.005 U1	0.002 J1	0.005 U1	0.005 U1
Molybdenum	µg/L	1	8.4	0.1 J1	0.8	0.5 U1	0.1 J1	0.5	0.4 J1
Selenium	µg/L	0.07 J1	0.5 U1	0.5 U1	3.51	0.33 J1	1.04	0.5 U1	0.12 J1
Sulfate	mg/L	77.7	47.4	26.6	206	6.2	4.8	63.3	99.6
Thallium	µg/L	0.05 J1	0.2 U1	0.04 J1	0.2 U1	0.2 U1	0.07 J1	0.2 U1	0.03 J1
Total Dissolved Solids	mg/L	400	590	260	570	36 J1	46 J1	390	370
pH	SU	7.1	9.1	7.0	7.6	5.8	5.3	7.0	6.6

Notes:
J1: Estimated value. Parameter was detected in concentrations below the reporting limit.
mg/L: milligrams per liter
pCi/L: picocuries per liter
SU: standard unit
U1: Non-detect value. For statistical analysis, parameters that were not detected were replaced with the reporting limit.
µg/L: micrograms per liter

Table 2. Appendix IV Groundwater Protection Standards
Statistical Analysis Summary
Big Sandy Plant - Fly Ash Pond

Constituent Name	MCL	CCR Rule-Specified	Calculated UTL	GWPS
Antimony, Total (mg/L)	0.00600		0.00318	0.00600
Arsenic, Total (mg/L)	0.0100		0.0289	0.0289
Barium, Total (mg/L)	2.00		0.113	2.00
Beryllium, Total (mg/L)	0.00400		0.000349	0.00400
Cadmium, Total (mg/L)	0.00500		0.000140	0.00500
Chromium, Total (mg/L)	0.100		0.00660	0.100
Cobalt, Total (mg/L)	n/a	0.00600	0.00354	0.00600
Combined Radium, Total (pCi/L)	5.00		4.52	5.00
Fluoride, Total (mg/L)	4.00		0.900	4.00
Lead, Total (mg/L)	n/a	0.0150	0.00255	0.0150
Lithium, Total (mg/L)	n/a	0.0400	0.0200	0.0400
Mercury, Total (mg/L)	0.00200		0.0000130	0.00200
Molybdenum, Total (mg/L)	n/a	0.100	0.00910	0.100
Selenium, Total (mg/L)	0.0500		0.00104	0.0500
Thallium, Total (mg/L)	0.00200		0.000229	0.00200

Notes:
1. Calculated UTL (upper tolerance limit) represents site-specific background values.
2. Grey cells indicate the GWPS is based on the calculated UTL, which is higher than the MCL or CCR Rule-specified value.
CCR: coal combustion residuals
GWPS: groundwater protection standard
MCL: maximum contaminant level
mg/L: milligrams per liter
pCI/L: picocuries per liter

Table 3. Appendix III Data Summary
Statistical Analysis Summary
Big Sandy Plant – Fly Ash Pond

Geosyntec Consultants, Inc.

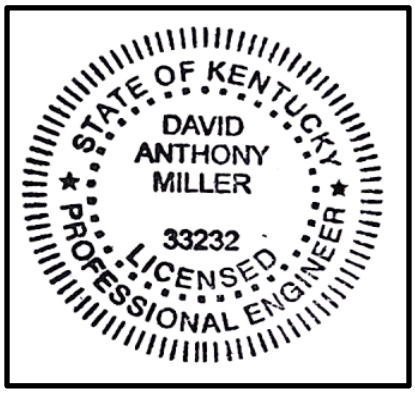
Analyte	Unit	Description	MW-1602	MW-1606	MW-1607
			10/18/2023	10/17/2023	10/17/2023
Boron	mg/L	Interwell Background Value (UPL)	0.244		
		Analytical Result	0.052	**2.07**	0.141
Calcium	mg/L	Interwell Background Value (UPL)	123		
		Analytical Result	92.2	75.9	89.4
Chloride	mg/L	Interwell Background Value (UPL)	6.22		
		Analytical Result	**18.5**	**31.4**	3.29
Fluoride	mg/L	Interwell Background Value (UPL)	0.900		
		Analytical Result	0.09	0.20	0.07
pH	SU	Intrawell Background Value (UPL)	8.5	7.6	7.6
		Intrawell Background Value (LPL)	5.9	6.3	5.5
		Analytical Result	7.6	7.0	6.6
Sulfate	mg/L	Interwell Background Value (UPL)	106		
		Analytical Result	**206**	63.3	99.6
Total Dissolved Solids	mg/L	Interwell Background Value (UPL)	590		
		Analytical Result	570	390	370

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

ATTACHMENT A
Certification by Qualified Professional Engineer

Certification by Qualified Professional Engineer

I certify that selected and above described statistical method is appropriate for evaluating the groundwater monitoring data for the Big Sandy Fly Ash Pond 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

33232	Kentucky	03.02.2024
License Number	Licensing State	Date

ATTACHMENT B
Statistical Analysis Output

GROUNDWATER STATS CONSULTING

February 20, 2024

Geosyntec Consultants
Attn: Ms. Allison Kreinberg
500 W. Wilson Bridge Road, Suite 250
Worthington, OH 43085

Re: Big Sandy Fly Ash Pond
Assessment Monitoring & Background Update – October 2023

Dear Ms. Kreinberg,

Groundwater Stats Consulting (GSC), formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the background update and analysis of 2023 groundwater data for American Electric Power Company's Big Sandy Bottom Ash Pond. The analysis complies with the federal rule for the Disposal of Coal Combustion Residuals (CCR) from Electric Utilities (CCR Rule, 2015) as well as with the United States Environmental Protection Agency (USEPA) Unified Guidance (2009).

Sampling began at site for the CCR program in 2016. The monitoring well network, as provided by Geosyntec Consultants, consists of the following:

- **Upgradient wells:** MW-1011, MW-1012, MW-1203, MW-1604, and MW-1605
- **Downgradient wells:** MW-1601, MW-1602, MW-1606, and MW-1607

Note that downgradient well MW-1601 was dry during the October 2023 event. Additionally, downgradient well MW-1603 was historically sampled; however, the groundwater monitoring well network was revised in October 2023 to remove MW-1603 from the network due to the presence of coal in the screened interval.

Data were sent electronically, and the statistical analysis was conducted according to the Statistical Analysis Plan and screening evaluation prepared by GSC and approved by Dr. Kirk Cameron, PhD Statistician with MacStat Consulting, primary author of the USEPA Unified Guidance, and Senior Advisor to GSC. The analysis was reviewed by Andrew Collins, Project Manager of Groundwater Stats Consulting.

The CCR program consists of the following constituents listed below. The terms "constituent" and "parameter" are interchangeable.

- **Appendix III** (Detection Monitoring) **-** boron, calcium, chloride, fluoride, pH, sulfate, and TDS
- **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 and box plots for Appendix III and IV parameters are provided for all wells and constituents, and are used to evaluate concentrations over the entire record (Figures A & B, respectively). A summary of the values identified as outliers in this report and through previous screenings follows this letter. These values are deselected prior to the statistical analysis. All flagged values may also be seen in a lighter font and disconnected symbol on the time series graphs.

Note that when there are no detections present in downgradient wells for a given constituent, statistical analyses are not required. A summary of well/constituent pairs with 100% non-detects follows this letter. For all constituents, a substitution of the most recent reporting limit is used for non-detect data. When calculating intrawell prediction limits, the substitution is performed for individual wells and may differ across wells. This generally gives the most conservative limit in each case.

For regulatory comparison of current observations against statistical limits for Appendix III constituents, the annual site-wide false positive rate is based on the USEPA Unified Guidance (2009) recommendation of 10% (5% for each semi-annual sample event or 2.5% for quarterly sample events). The EPA suggests the selected statistical method should provide at least 55% power at 3 standard deviations or at least 80% power at 4 standard deviations. Power curves were based on the following:

Semi-Annual Sampling
1-of-2 resample plan
Constituents: 7
Downgradient wells: 5

Data at all wells were evaluated during the initial background screening conducted in December 2017 for the following: 1) outliers; 2) trends; 3) most appropriate statistical method for Appendix III parameters based on site characteristics of groundwater data upgradient of the facility; and 4) eligibility of downgradient wells when intrawell statistical methods are recommended. Power curves were provided in the previous report and demonstrated that the selected statistical methods for Appendix III parameters comply with the USEPA Unified Guidance recommendations as discussed below.

Summary of Statistical Methods – Appendix III Parameters

Based on the original background screening described below, the following statistical methods were selected for Appendix III parameters:

- Intrawell prediction limits, combined with a 1-of-2 resample plan for pH
- Interwell prediction limits combined with a 1-of-2 resample plan for boron, calcium, chloride, fluoride, sulfate and TDS

Parametric prediction limits are utilized when the screened historical data follow a normal or transformed-normal distribution. When data cannot be normalized or the majority of data are non-detects, a nonparametric test is utilized. While the annual false positive rate associated with parametric limits is fixed at 10% as recommended by the EPA Unified Guidance (2009), the false positive rate associated with nonparametric limits is not fixed and depends upon the available background sample size, number of future comparisons, and verification resample plan. The distribution of data is tested using the Shapiro-Wilk/Shapiro-Francia test for normality. After testing for normality and performing any adjustments as discussed below (US EPA, 2009), data are analyzed using either parametric or non-parametric prediction limits as appropriate. Non-detects are handled as follows:

- No statistical analyses are required on wells and analytes containing 100% non-detects (USEPA Unified Guidance, 2009, Chapter 6).
- When data contain <15% non-detects, simple substitution of one-half the reporting limit is utilized in the statistical analysis. The reporting limit utilized for non-detects is the practical quantification limit (PQL) as reported by the laboratory.
- When data contain between 15-50% non-detects, the Kaplan-Meier non-detect adjustment is applied to the background data for parametric limits. This technique adjusts the mean and standard deviation of the historical concentrations to account for concentrations below the reporting limit.
- Nonparametric prediction limits are used on data containing greater than 50% non-detects.

Natural systems continuously evolve due to physical changes made to the environment. Examples include capping a landfill, paving areas near a well, or lining a drainage channel to prevent erosion. Periodic updating of background statistical limits is necessary to accommodate these types of changes.

In the intrawell case, data for all wells and constituents may be re-evaluated when a minimum of 4 new data points are available to determine whether earlier concentrations are representative of present-day groundwater quality. In the interwell case, prediction limits are updated with upgradient well data following each sampling event after screening for any new outliers. In some cases, deselecting the earlier portion of data may be necessary prior to construction of limits so that resulting statistical limits are conservative (lower) from a regulatory perspective and capable of rapidly detecting changes in groundwater quality. Even though the data are excluded from the calculation, the values will continue to be reported and shown in tables and graphs.

Summary of Background Screening – Conducted in December 2017

Outlier Analysis

All proposed background data were screened for outliers and trends during the background screening. The findings of those reports were submitted with that analysis. Interwell prediction limits utilize all upgradient well data for construction of statistical limits. During each sample event, upgradient well data are screened for any newly suspected outliers or obvious trending patterns using time series plots. Intrawell prediction limits utilized the background data set that was originally screened in 2017. As recommended in the EPA Unified Guidance (2009), the background data sets are evaluated for the purpose of updating statistical limits, as described below, using the Mann-Whitney two-sample test when an additional four to eight measurements are available.

Seasonality

No true seasonal patterns were observed on the time series plots for any of the detected data; therefore, no deseasonalizing adjustments were made to the data. When seasonal patterns are observed, data may be deseasonalized so that the resulting limits will correctly account for the seasonality as a predictable pattern rather than random variation or a release. It was noted that for each constituent evaluated, the highest concentrations are reported in the upgradient wells.

Trend Test Evaluation

While trends may be visual, a quantification of the trend and its significance is needed. The Sen's Slope/Mann Kendall trend test was used to evaluate all data at each well to identify statistically significant increasing or decreasing trends. In the absence of suspected contamination, significant trending data are typically not included as part of the background data used for construction of prediction limits. This step serves to eliminate the trend and, thus, reduce variation in background. When statistically significant decreasing trends are present, earlier data are evaluated to determine whether earlier concentration levels are significantly different than current reported concentrations and will be deselected as necessary. When the historical records of data are truncated for the reasons above, a summary report will be provided to show the date ranges used in construction of the statistical limits. No adjustments were required at the time, and results of the trend tests were included with the 2017 screening.

Appendix III – Determination of Spatial Variation

The Analysis of Variance (ANOVA) was used to statistically evaluate differences in average concentrations among upgradient wells, which assists in identifying the most appropriate statistical approach. Interwell tests, which compare downgradient well data to statistical limits constructed from pooled upgradient well data, are appropriate when average concentrations are similar across upgradient wells. Intrawell tests, which compare compliance data from a single well to screened historical data within the same well, are appropriate when upgradient wells exhibit spatial variation; when statistical limits constructed from upgradient wells would not be conservative from a regulatory perspective; and when downgradient water quality is unimpacted compared to upgradient water quality for the same parameter.

The results of the 2017 screening demonstrated that intrawell background limits, based on a 1-of-2 resample plan, were appropriate for pH and that interwell background limits, based on a 1-of-2 resample plan, were appropriate for boron, calcium, chloride, fluoride, sulfate, and TDS. A summary of the ANOVA results was included with the 2017 screening.

Appendix III Background Update Summary – Conducted in February 2024

Prior to updating background data during this analysis, Tukey's outlier test was used to evaluate data through October 2023 at upgradient wells for boron, calcium, chloride, fluoride, sulfate, and TDS, which are tested using interwell prediction limits. For pH, which uses intrawell prediction limits, values were not re-evaluated for new outliers as these records had insufficient samples for updating background at this time.

Outlier Analysis

Tukey's outlier test on pooled upgradient well data for boron, calcium, chloride, fluoride, sulfate, and TDS identified several potential outliers and confirmed previously flagged outliers (Figure C). Any values identified by Tukey's but not flagged in the database were similar to historical data within the same well for and/or were similar to or lower than measurements in neighboring upgradient wells. No new values were flagged during this analysis among upgradient wells for Appendix III parameters. A summary of all flagged outliers follows this report (Figure C).

Intrawell – Prediction Limits

Intrawell prediction limits for pH, constructed using all historical data through June 2022 with a 1-of-2 resample plan, remain unchanged for this event as the limits were updated in a prior analysis. A summary of the limits follows this letter (Figure D) and no comparison of the October 2023 compliance data was performed in this analysis.

Interwell – Trend Test Evaluation

The Sen's Slope/Mann Kendall trend test was used to evaluate data at upgradient wells for boron, calcium, chloride, fluoride, sulfate and TDS to identify statistically significant increasing or decreasing trends at the 99% confidence level (Figure E). The results of the trend analyses showed statistically significant increasing trends for chloride, fluoride, and TDS in upgradient wells MW-1011 and MW-1012. Statistically significant decreasing trends were noted for chloride, fluoride, and TDS in upgradient well MW-1604 and chloride at upgradient well MW-1605. However, the magnitudes of the trends are low relative to average concentrations and reported measurements are consistent with those reported at one or more neighboring upgradient wells. Additionally, the resulting statistical limits were representative of present-day groundwater quality conditions, were a nonparametric prediction limits constructed based on the highest report concentration among the upgradient wells, and were not influenced by the magnitude of the trend Therefore, no adjustments were made to the records at this time. All records will be re-evaluated during the next background update and, if earlier measurements are no longer representative of present-day conditions, the historical portion of the records may be deselected prior to construction of statistical limits.

Interwell – Prediction Limits

Interwell prediction limits, combined with a 1-of-2 resample plan, were constructed using all pooled upgradient well data through October 2023 for boron, calcium, chloride,

fluoride, sulfate and TDS (Figure F). Time series graphs are included with the statistical limits for graphical representation of concentrations over time at upgradient wells. A summary table of the updated limits may be found following this letter in the Prediction Limit Summary Tables. No comparison of the October 2023 compliance data to statistical limits was made in this analysis.

Evaluation of Appendix IV Parameters – October 2023

Prior to evaluating Appendix IV parameters, all background data at upgradient wells are screened through visual screening and Tukey's outlier test for potential outliers.

Outlier Analysis

For the current analysis, Tukey's outlier test on pooled upgradient well data through October 2023 identified outliers for arsenic, barium, chromium, cobalt, combined radium 226 + 228, fluoride, and lithium (Figure C). Any values identified by Tukey's test but not flagged in the database were either similar to concentrations from neighboring upgradient wells or were lower than the respective Maximum Contaminant Level (MCL). No new outliers were flagged during this analysis, except for the highest reported measurements of arsenic at upgradient well MW-1012. Flagging these values results in statistical limits that are conservative (i.e., lower) from a regulatory perspective. All flagged measurements from previous background updates were confirmed during this analysis by Tukey's outlier test and visual screening.

Additionally, downgradient well data through October 2023 were screened through visual screening using time series graphs. Since the downgradient well data are used to construct confidence intervals, a regulatory conservative approach is taken in that values that are marginally high relative to the rest of the data are retained unless there is particular justification for excluding them. No new outliers among downgradient wells were flagged during this analysis. All flagged values may be seen on the Outlier Summary following this letter (Figure C).

Interwell Upper Tolerance Limits

Interwell upper tolerance limits were used to calculate background limits from all available pooled upgradient well data through October 2023 (Figure G). These limits are updated on an annual basis and will be updated again during the Fall 2024 sample event. Parametric limits use a target of 95% confidence and 95% coverage, when data follow a normal or transformed-normal distribution such as cobalt and combined radium 226 + 228. When data contained greater than 50% non-detects or did not follow a normal or

transformed-normal distribution, non-parametric tolerance limits were used. The confidence and coverage levels for nonparametric tolerance limits are dependent upon the number of background samples.

Groundwater Protection Standards

These limits were compared to the MCLs and CCR-Rule specified levels, as shown in the Groundwater Protection Standards (GWPS) table following this letter (Figure H), to determine the highest limit for use as the GWPS in the confidence Interval comparisons.

Confidence Intervals

Confidence intervals were then constructed using data through October 2023 on downgradient wells for each Appendix IV constituent (Figure I). The confidence intervals were then compared against the GWPS (i.e., the highest limit of the MCL or background limit as discussed above). These intervals were constructed as either parametric or nonparametric confidence intervals depending on the data distribution and percentage of non-detects. When data followed a normal or transformed-normal distribution, parametric confidence intervals were used for Appendix IV parameters. Nonparametric confidence intervals were constructed when data did not follow a normal or transformed-normal distribution or when there were greater than 50% non-detects. The lower confidence limit, which is constructed with 99% confidence for parametric confidence intervals, is compared to the GWPS prepared as described above. The confidence level associated with nonparametric confidence intervals is dependent upon the number samples available.

Only when the entire confidence interval is above a GWPS is the well/constituent pair considered to exceed its respective standard. Complete results of the confidence interval analysis follow this letter and no exceedances were identified.

Trend Test Evaluation – Appendix IV

When confidence interval exceedances are identified in downgradient wells, data are further evaluated using the Sen's Slope/Mann Kendall trend test to determine whether concentrations are statistically increasing, decreasing, or stable at the 95% confidence level. Utilizing the 95% confidence level for trend tests readily identifies significant trends and is more sensitive than the 99% confidence level without drastically increasing the false negative rate. Upgradient wells are included in the trend analyses for all parameters found to exceed their confidence interval in downgradient wells. When similar patterns exist upgradient of the site, it is an indication of variability in groundwater which may be

unrelated to practices at the site. Since no exceedances were identified, no trend tests were required.

Thank you for the opportunity to assist you in the statistical analysis of groundwater quality for Big Sandy Fly Ash Pond. If you have any questions or comments, please feel free to contact us.

For Groundwater Stats Consulting,

Abdul Diane
Groundwater Analyst

Andrew T. Collins
Project Manager

100% Non-Detects: Appendix IV Downgradient

Analysis Run 1/26/2024 1:38 PM View: Confidence Intervals
Big Sandy FAP Data: Big Sandy FAP

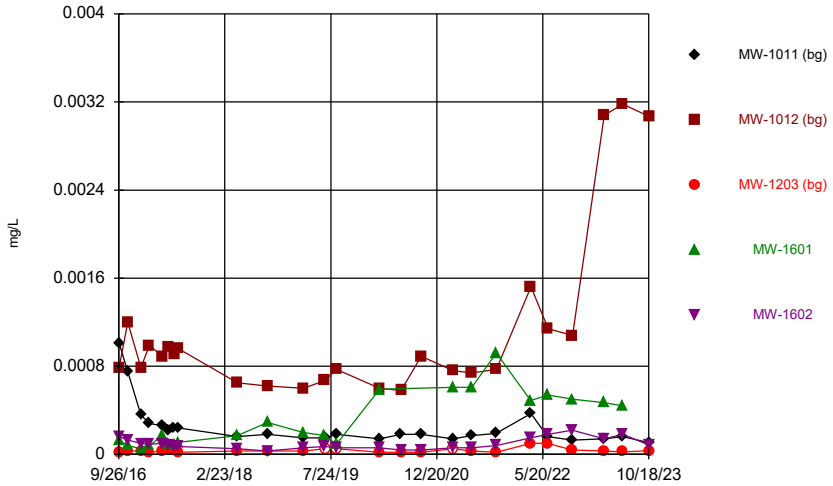
Beryllium (mg/L)
MW-1602

FIGURE A

Time Series

Sanitas™ v.10.0.15 . UG
Hollow symbols indicate censored values.

Time Series



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Big Sandy FAP Data: Big Sandy FAP

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Hollow symbols indicate censored values.

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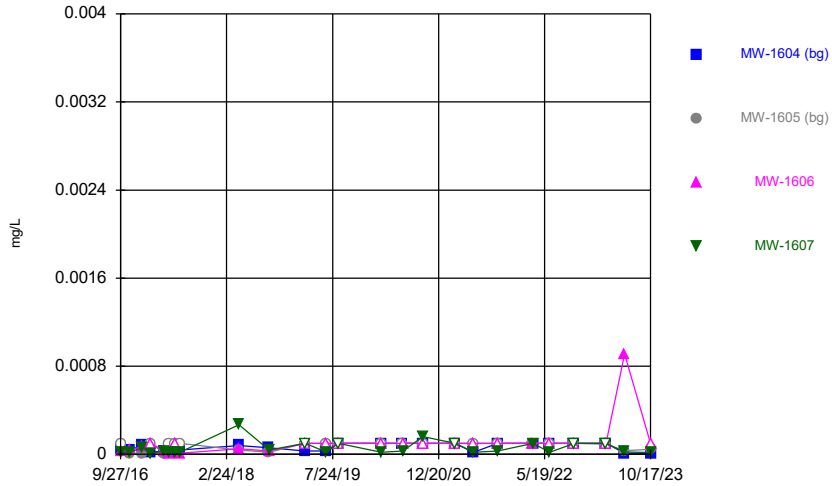

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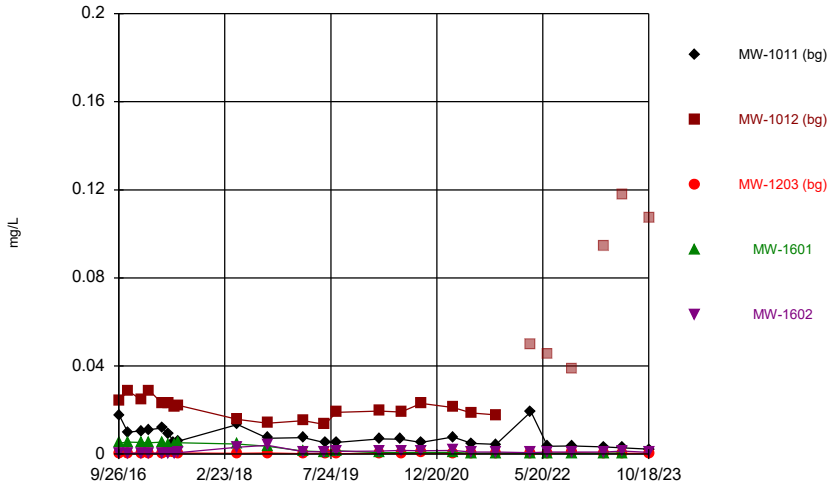

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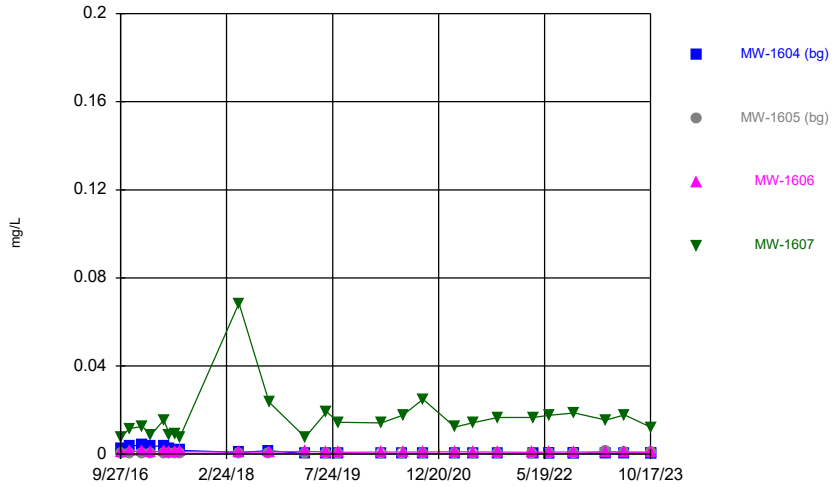

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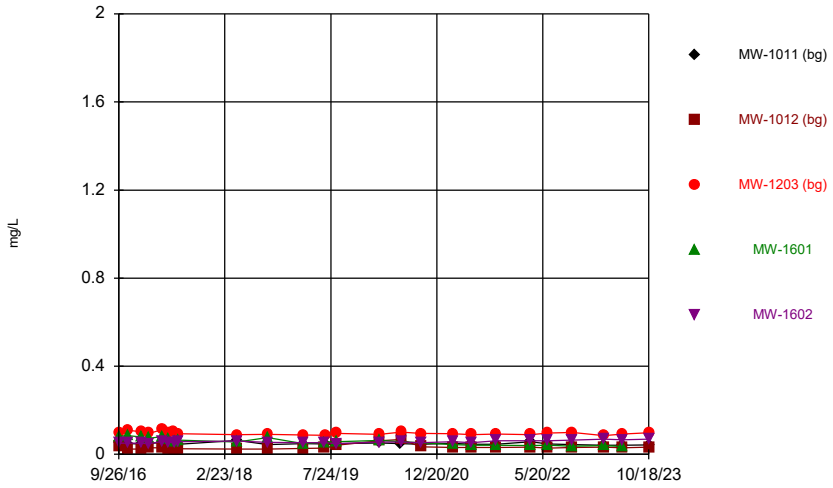

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Sanitas™ v.10.0.15 . UG

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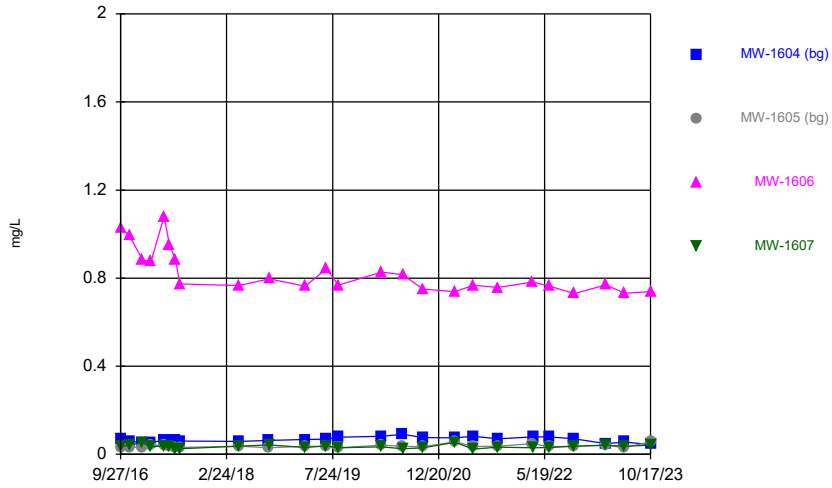

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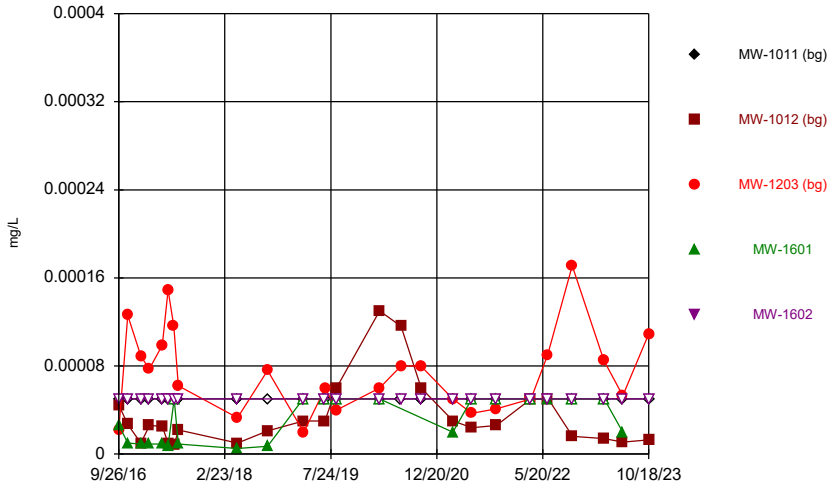

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Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

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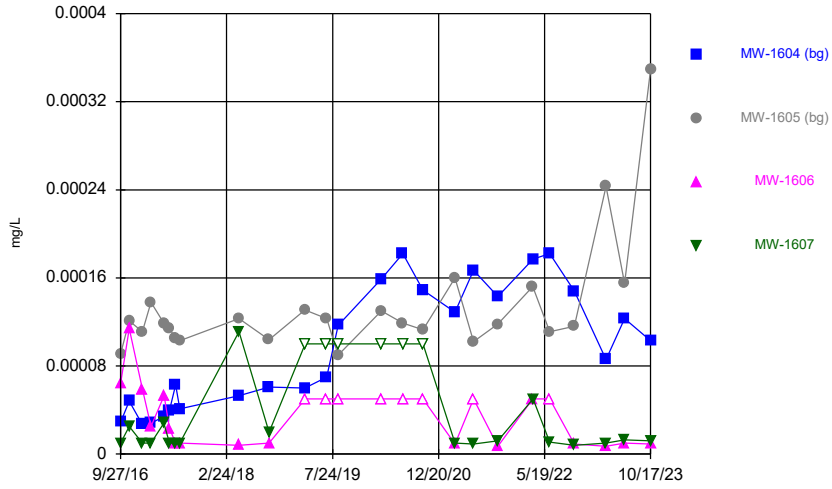

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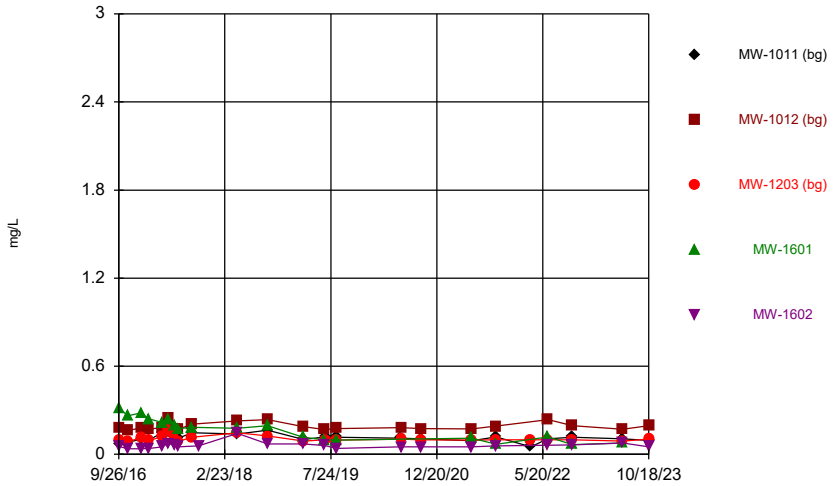
Sanitas™ v.10.0.15 . UG

Time Series



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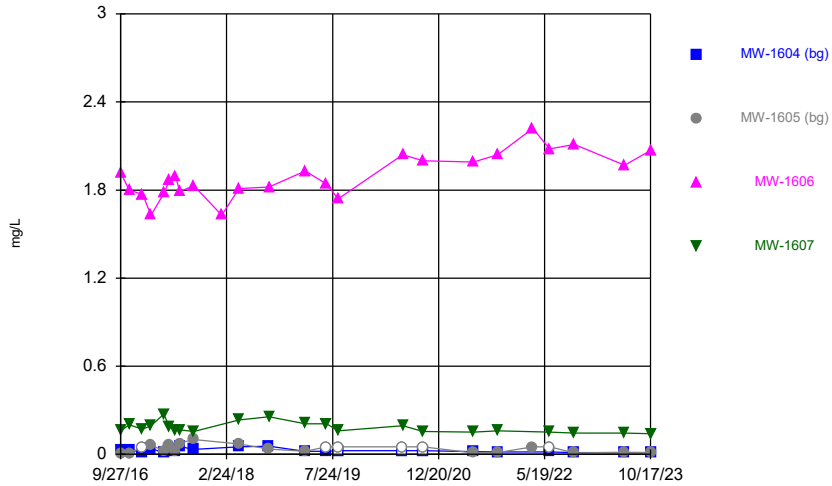

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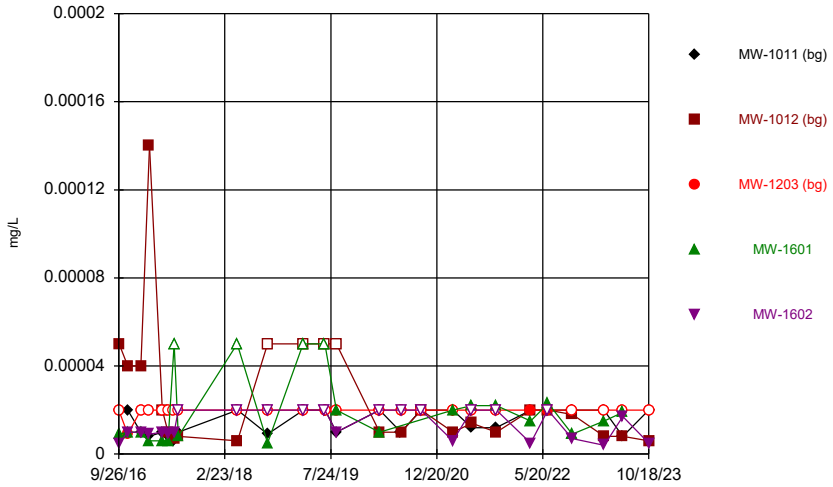

Constituent: Cadmium Analysis Run 1/31/2024 11:59 AM

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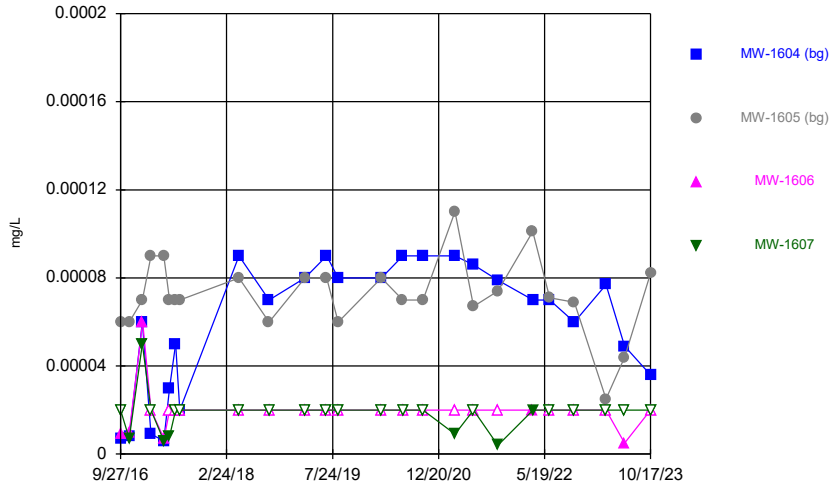

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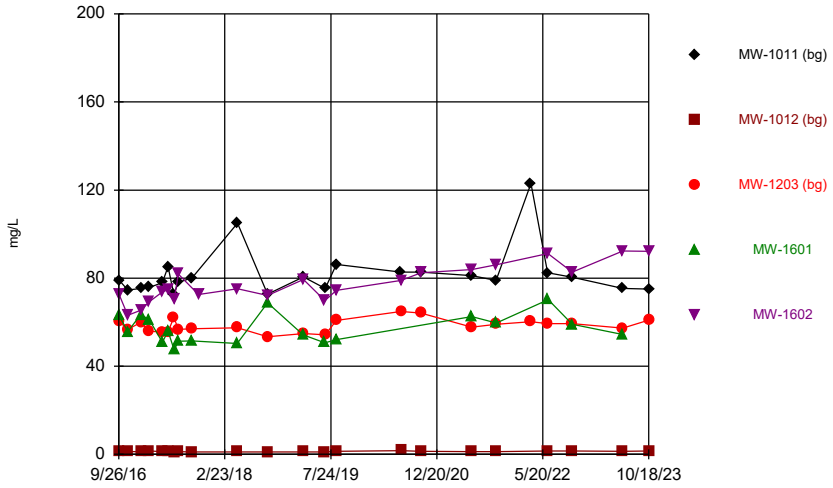
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Time Series



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Big Sandy FAP Data: Big Sandy FAP

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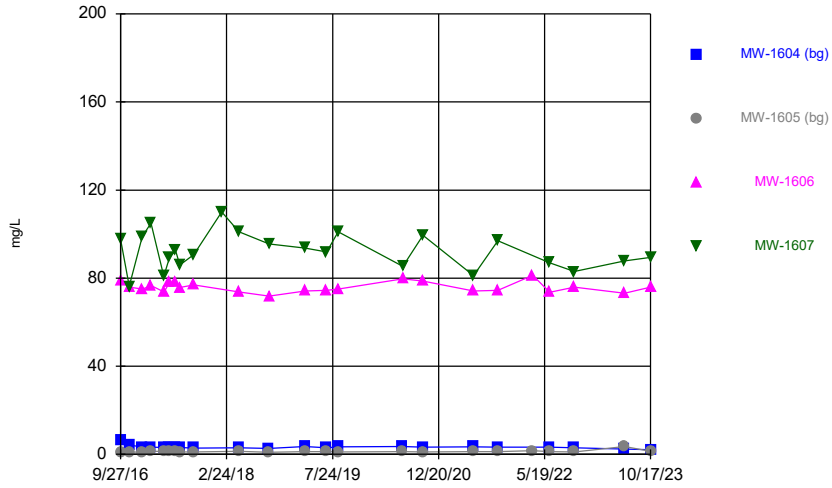
Time Series



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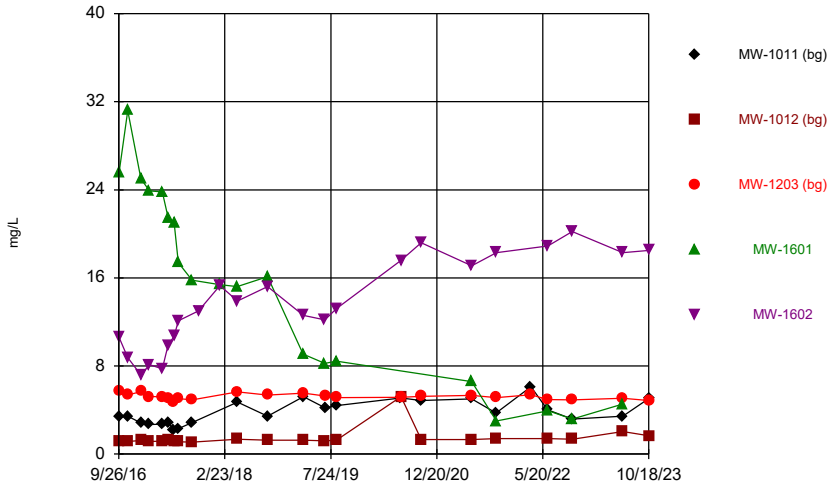

Constituent: Chloride Analysis Run 1/31/2024 11:59 AM
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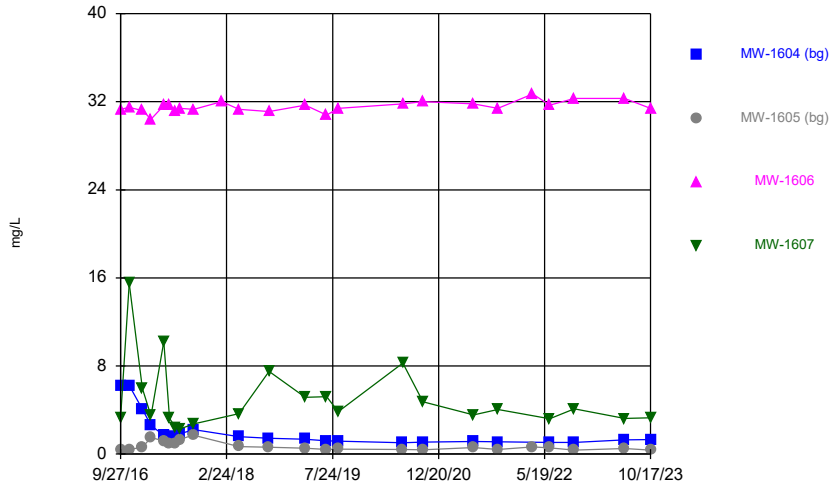
Time Series



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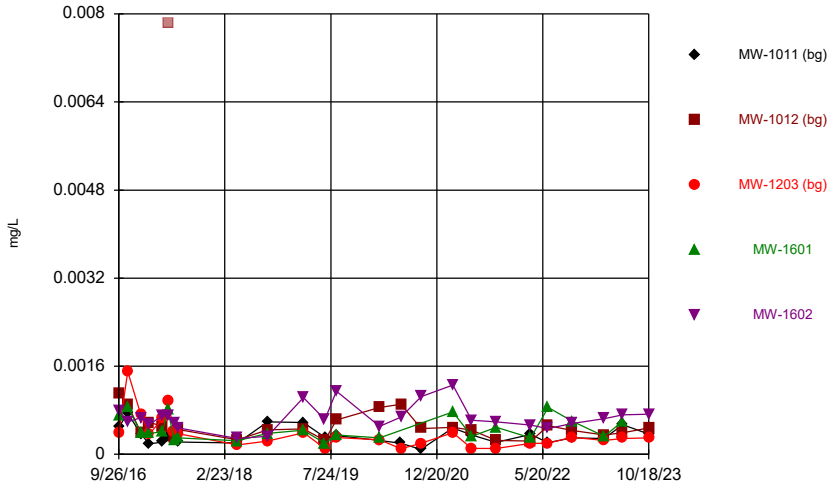
Time Series



Constituent: Chromium Analysis Run 1/31/2024 11:59 AM
Big Sandy FAP Data: Big Sandy FAP

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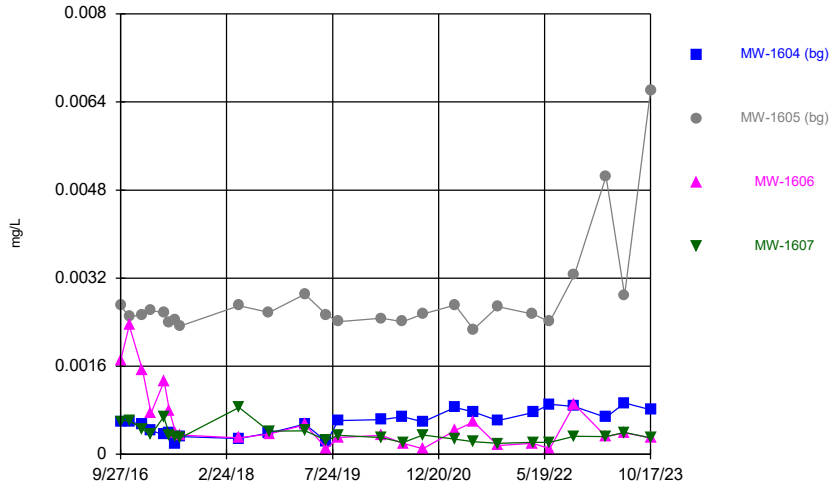
Time Series



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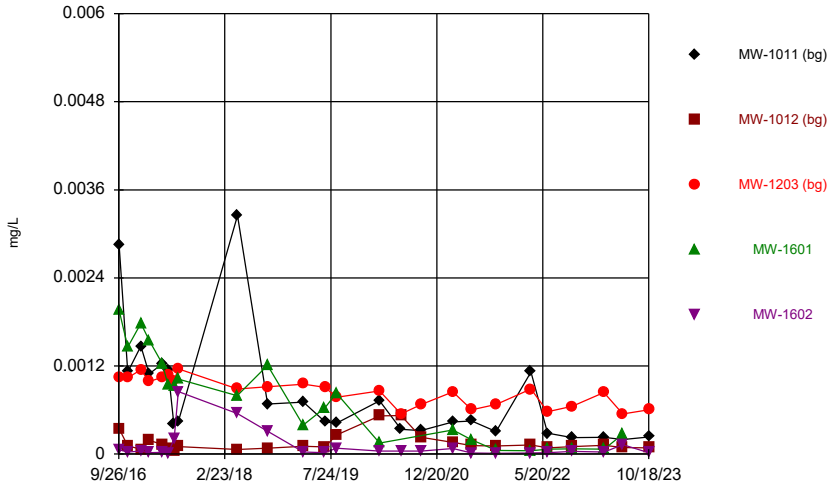
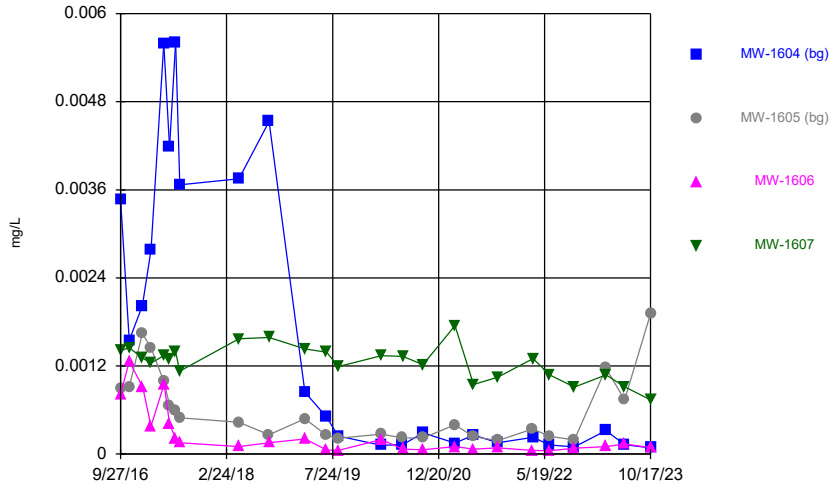
Time Series



Constituent: Cobalt Analysis Run 1/31/2024 11:59 AM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Time Series



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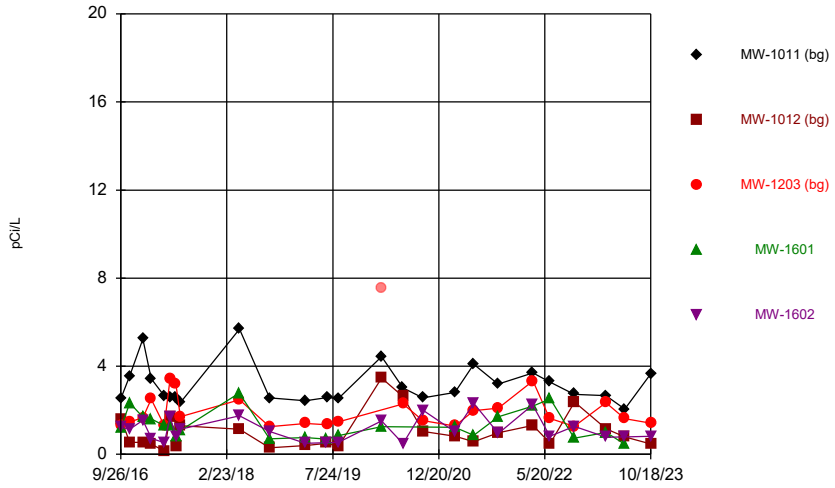
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

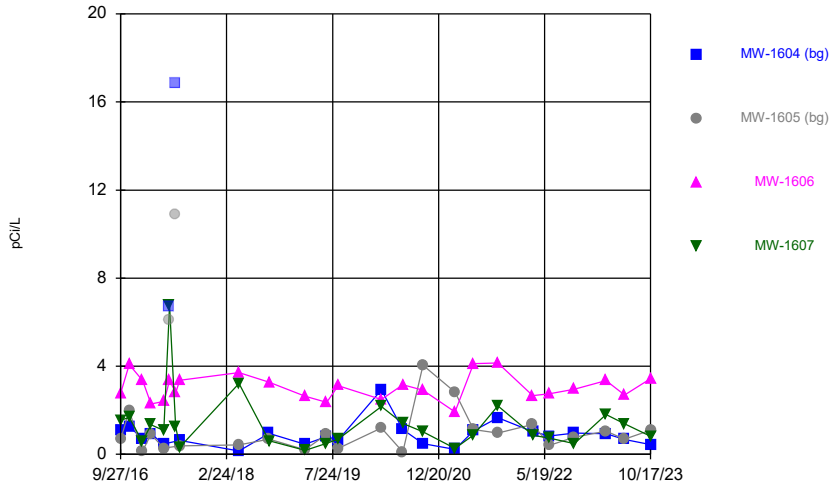
Time Series



Constituent: Combined Radium 226 + 228 Analysis Run 1/31/2024 11:59 AM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

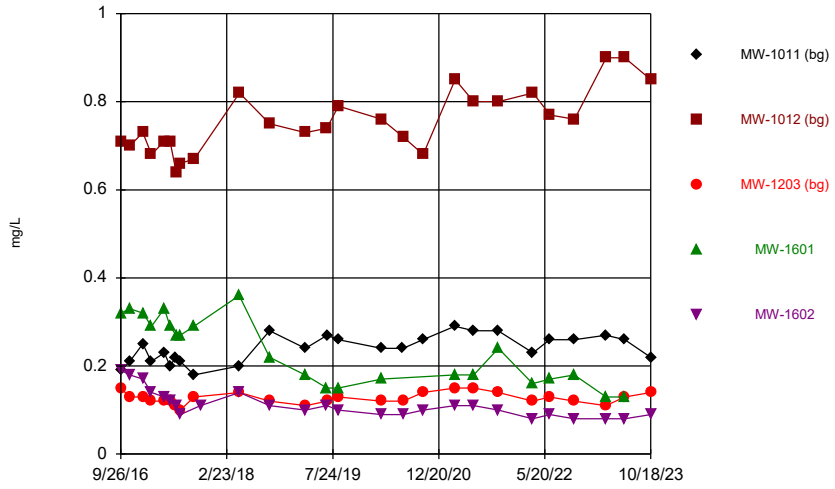
Time Series



Constituent: Combined Radium 226 + 228 Analysis Run 1/31/2024 11:59 AM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

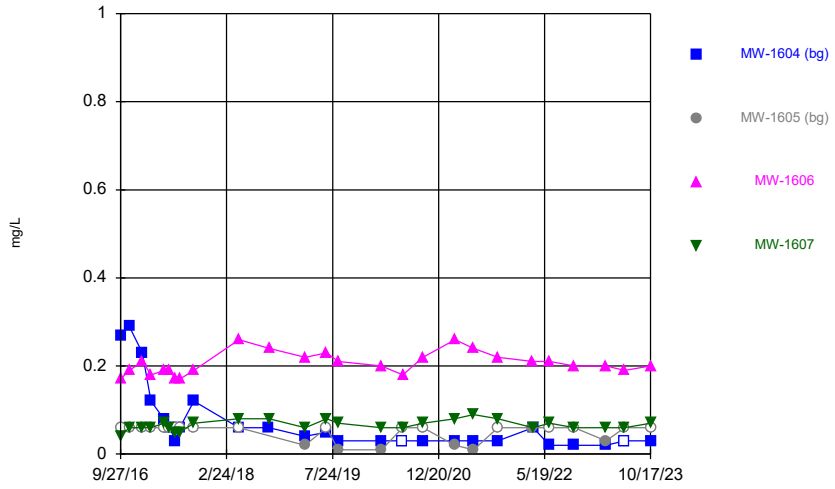
Time Series



Constituent: Fluoride Analysis Run 1/31/2024 11:59 AM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG
Hollow symbols indicate censored values.

Time Series



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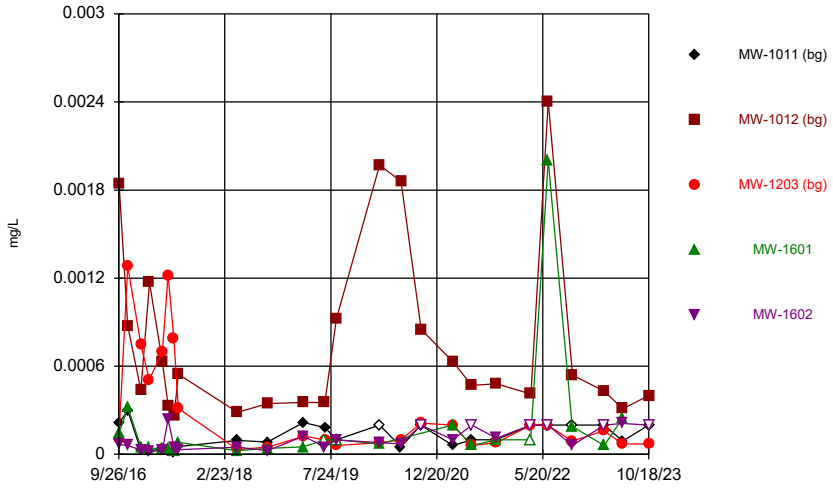
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG
Hollow symbols indicate censored values.

Time Series



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Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG
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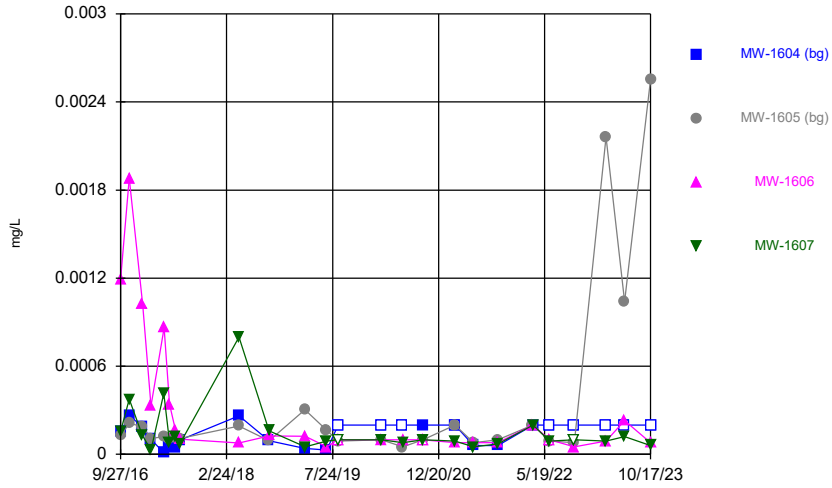
Time Series



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Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG
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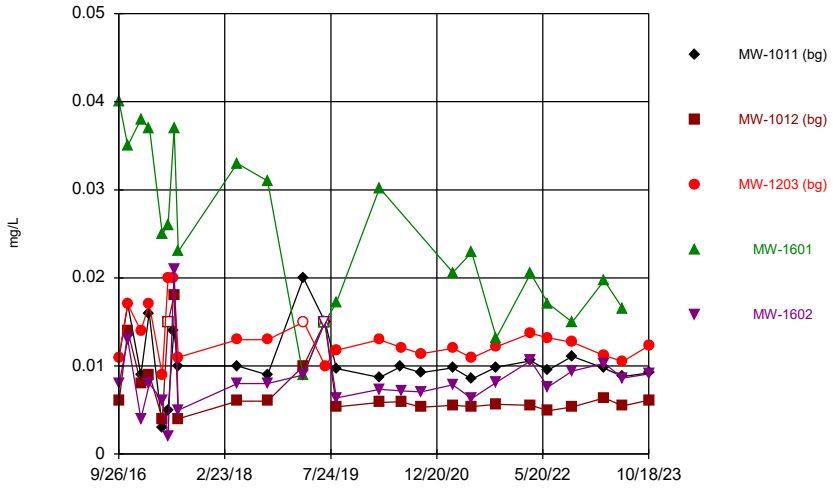
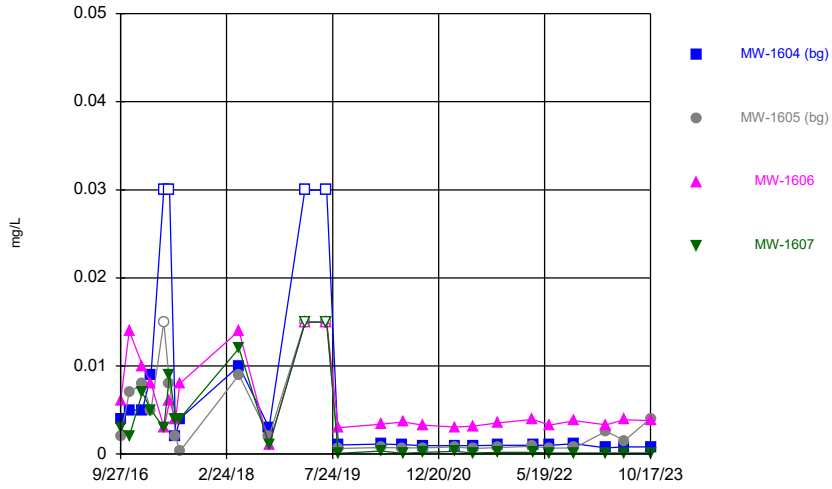
Time Series



Constituent: Lithium Analysis Run 1/31/2024 11:59 AM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG
Hollow symbols indicate censored values.

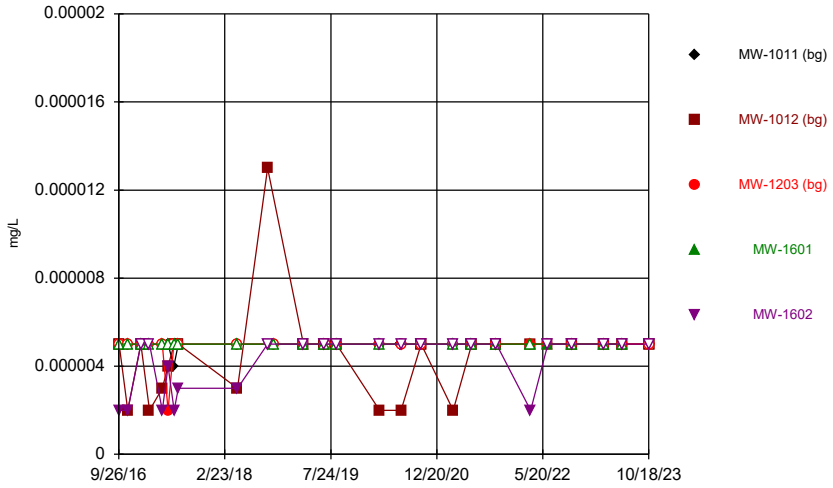
Time Series



Constituent: Lithium Analysis Run 1/31/2024 11:59 AM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG
Hollow symbols indicate censored values.

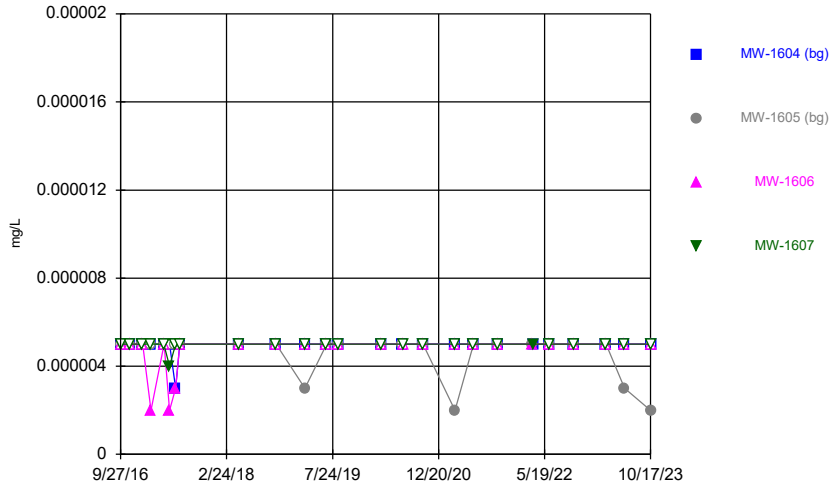
Time Series



Constituent: Mercury Analysis Run 1/31/2024 11:59 AM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG
Hollow symbols indicate censored values.

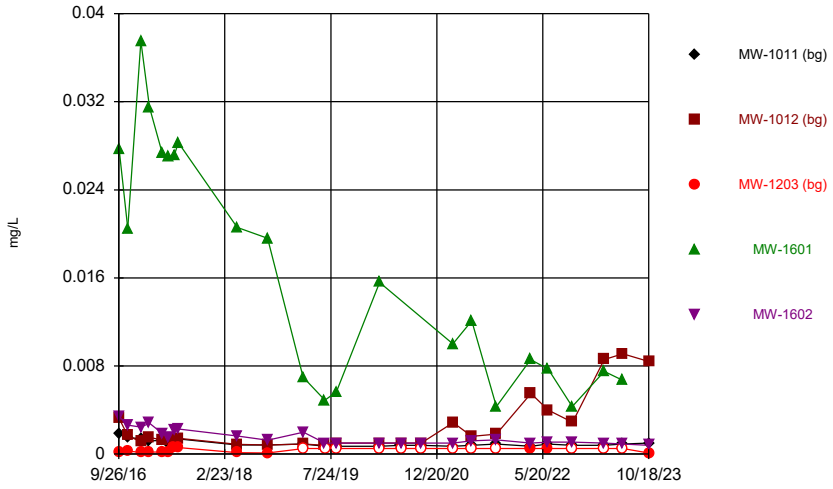
Time Series



Constituent: Mercury Analysis Run 1/31/2024 11:59 AM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG
Hollow symbols indicate censored values.

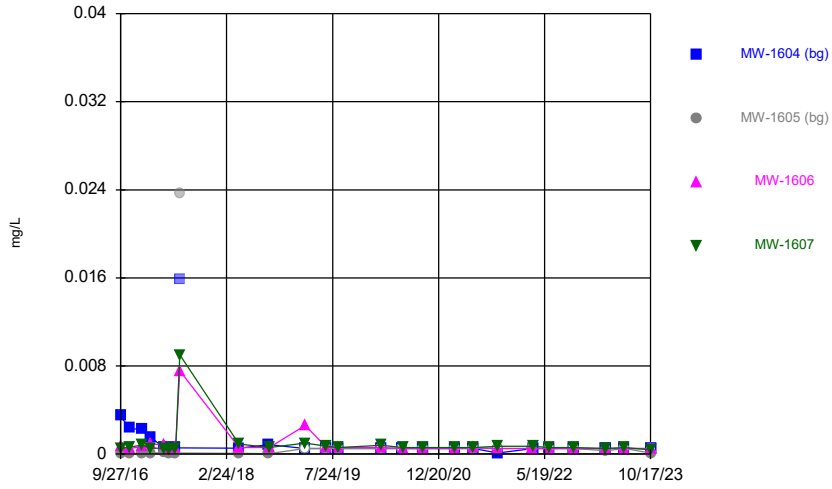
Time Series



Constituent: Molybdenum Analysis Run 1/31/2024 11:59 AM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG
Hollow symbols indicate censored values.

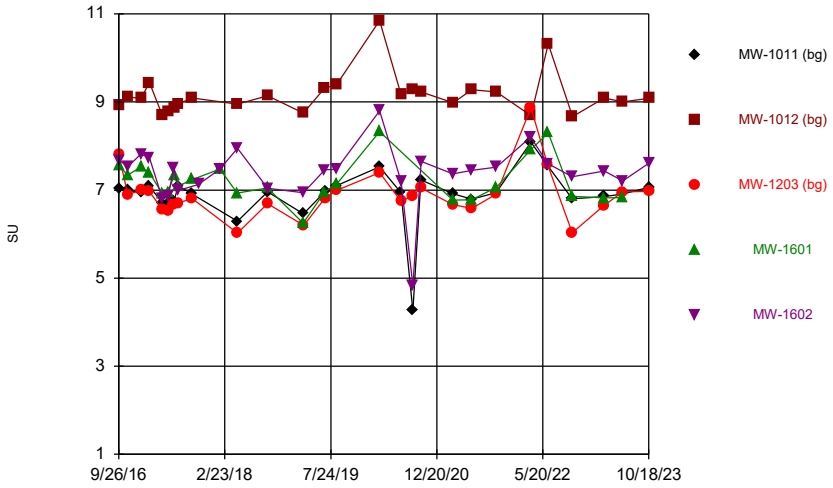
Time Series



Constituent: Molybdenum Analysis Run 1/31/2024 11:59 AM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

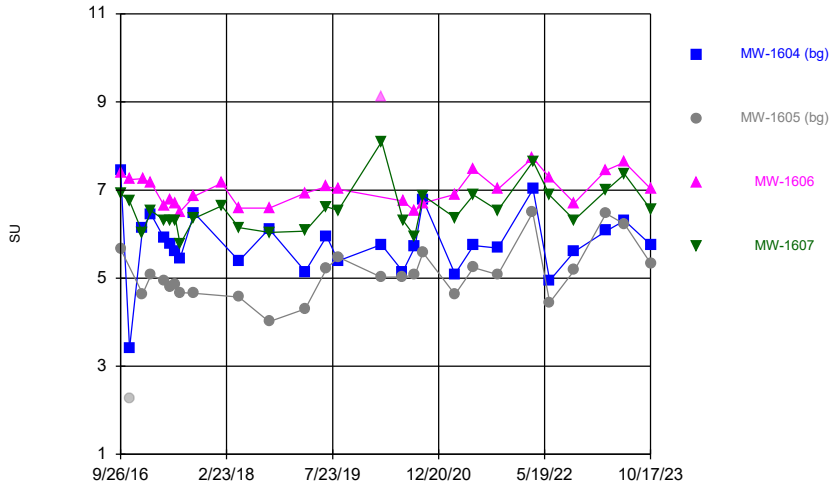
Time Series



Constituent: pH Analysis Run 1/31/2024 11:59 AM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

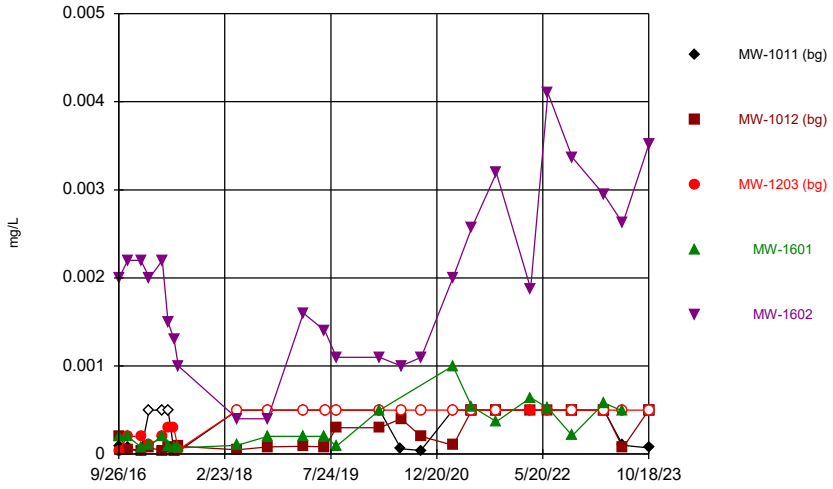
Time Series



Constituent: pH Analysis Run 1/31/2024 11:59 AM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG
Hollow symbols indicate censored values.

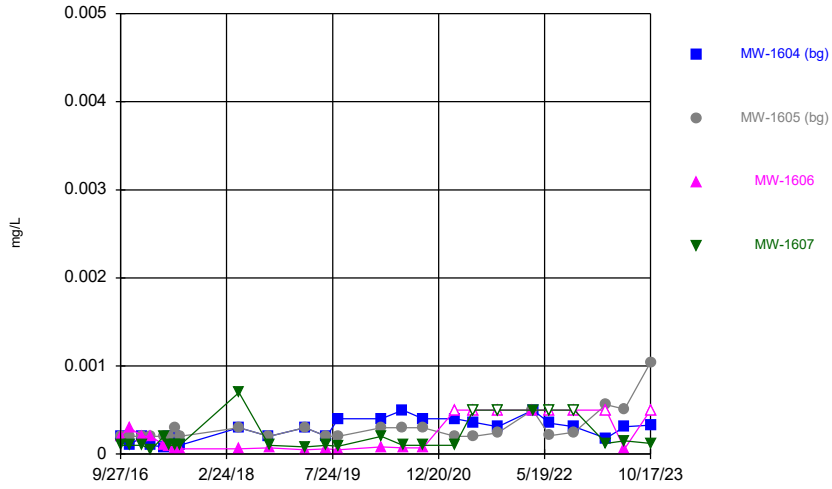
Time Series



Constituent: Selenium Analysis Run 1/31/2024 11:59 AM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG
Hollow symbols indicate censored values.

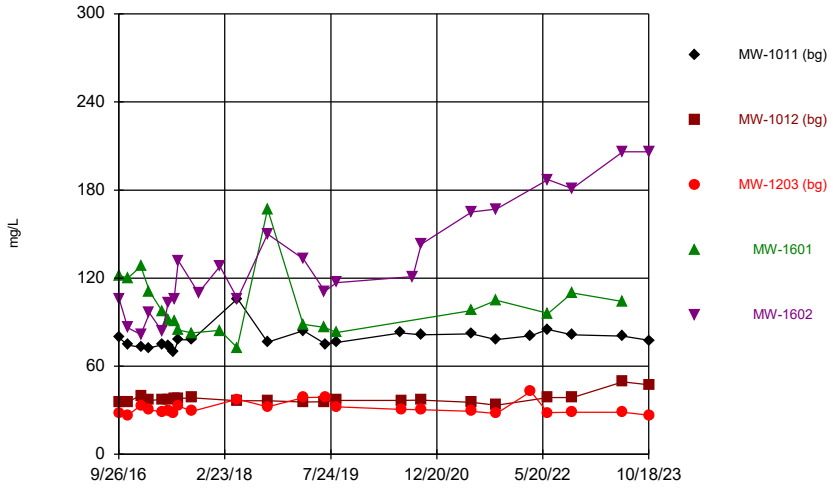
Time Series



Constituent: Selenium Analysis Run 1/31/2024 11:59 AM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Time Series

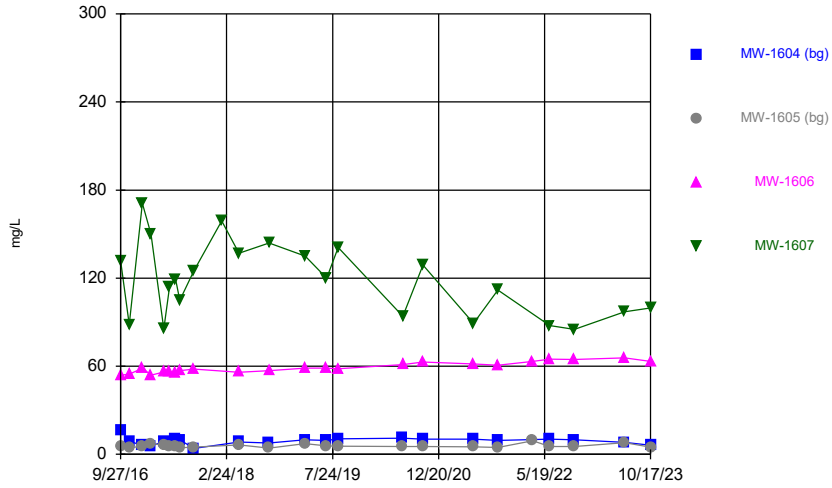


Constituent: Sulfate Analysis Run 1/31/2024 11:59 AM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Time Series



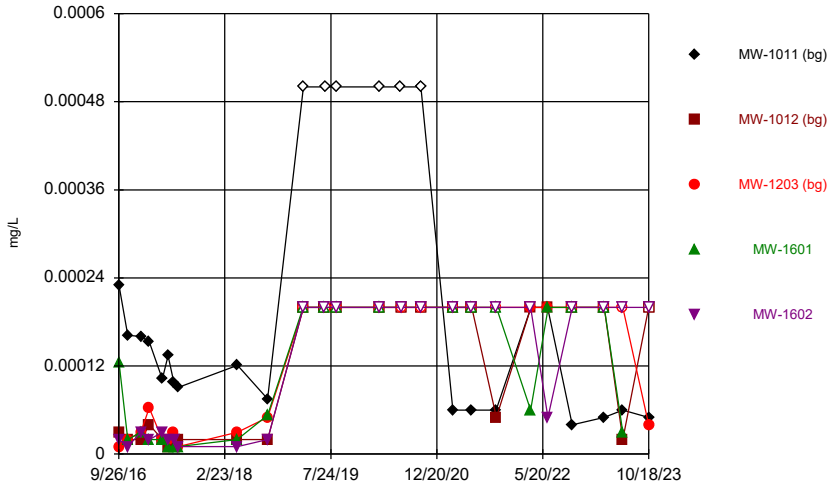
Constituent: Sulfate Analysis Run 1/31/2024 11:59 AM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Hollow symbols indicate censored values.

Time Series



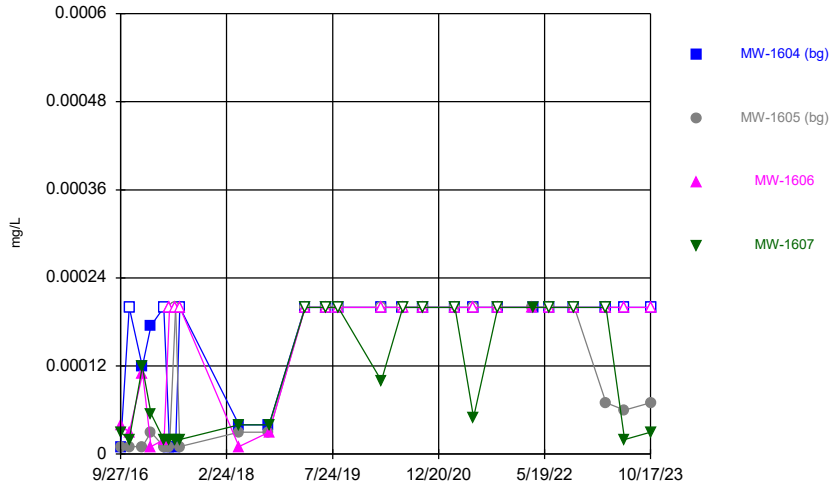
Constituent: Thallium Analysis Run 1/31/2024 11:59 AM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Hollow symbols indicate censored values.

Time Series

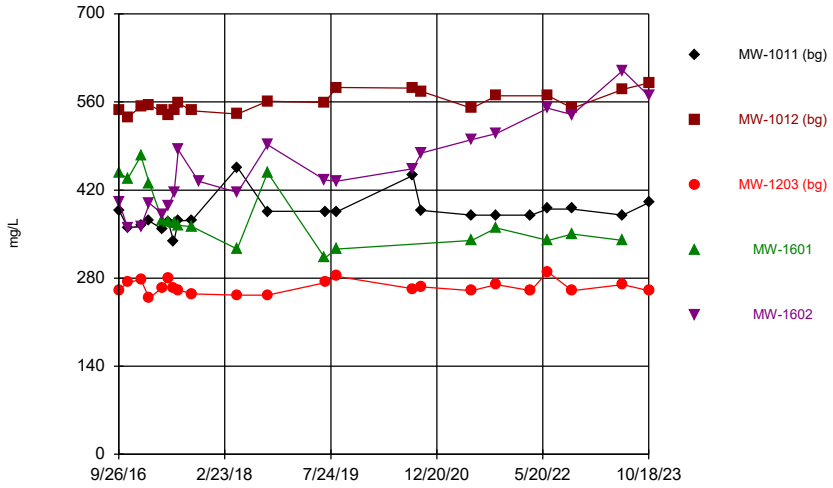


Constituent: Thallium Analysis Run 1/31/2024 11:59 AM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Time Series



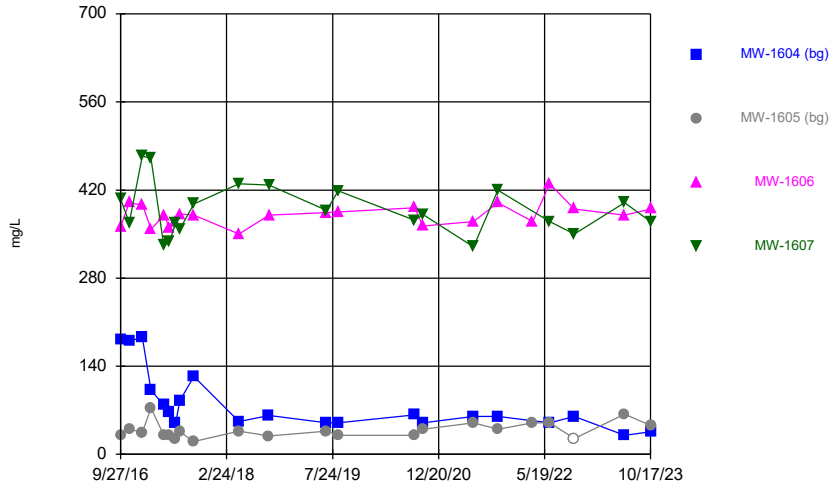
Constituent: Total Dissolved Solids Analysis Run 1/31/2024 11:59 AM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Hollow symbols indicate censored values.

Time Series



Constituent: Total Dissolved Solids Analysis Run 1/31/2024 11:59 AM

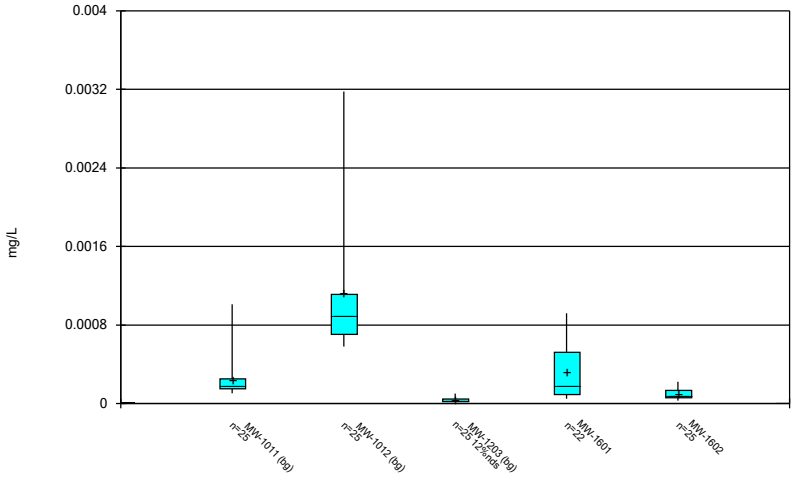
Big Sandy FAP Data: Big Sandy FAP

FIGURE B

Box Plots

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

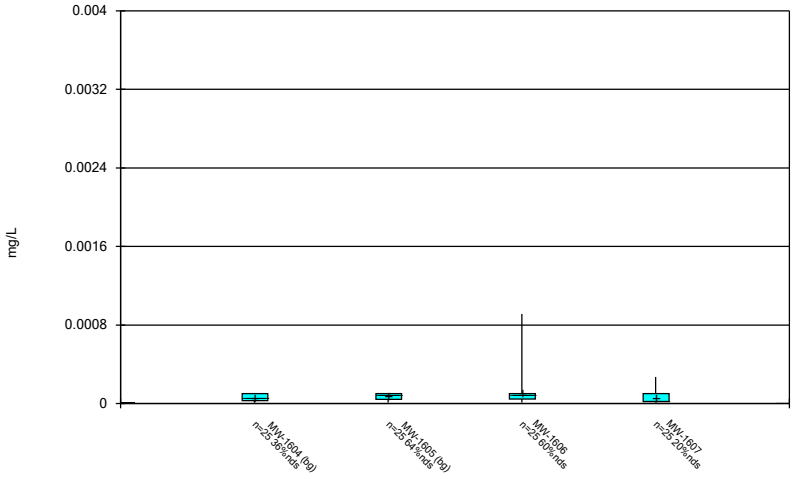


Constituent: Antimony Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

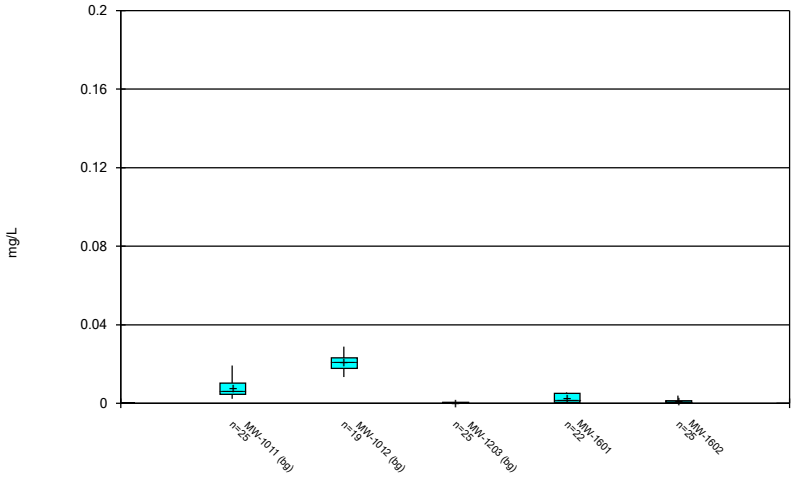


Constituent: Antimony Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

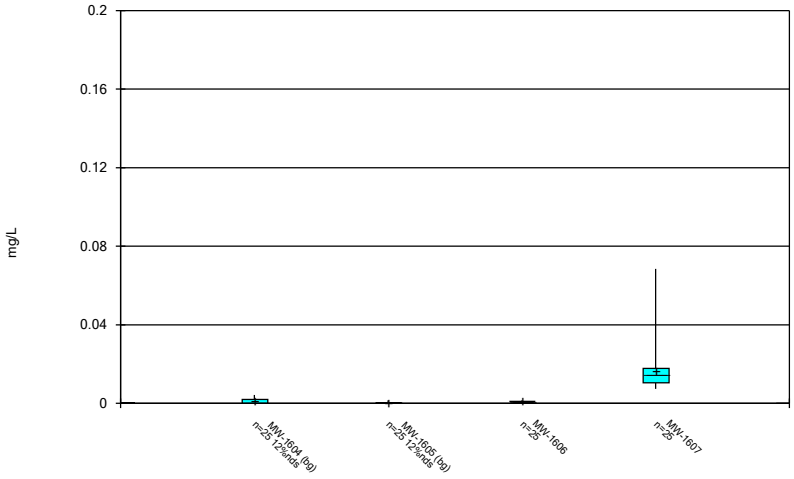


Constituent: Arsenic Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

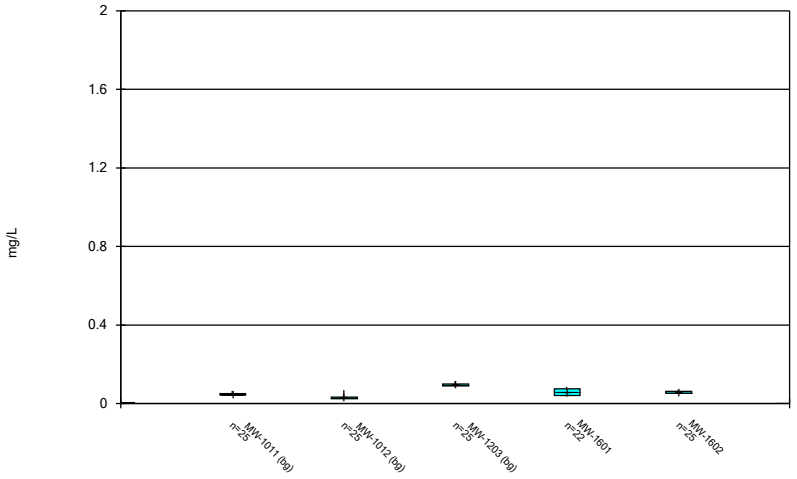


Constituent: Arsenic Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

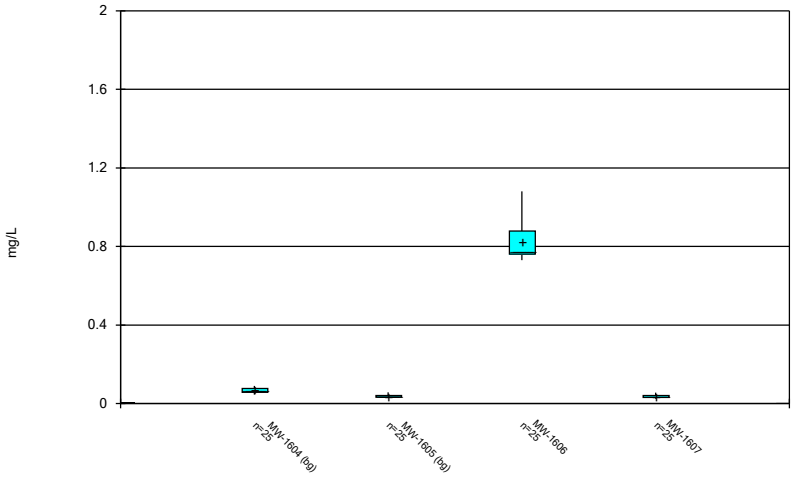


Constituent: Barium Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

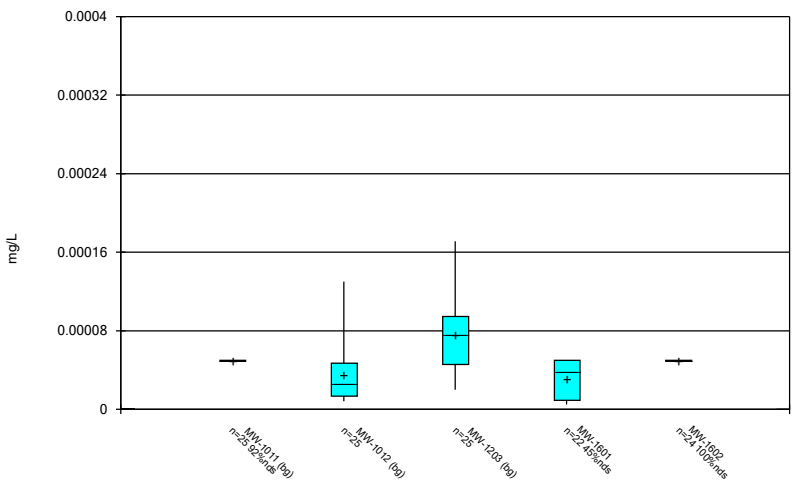


Constituent: Barium Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

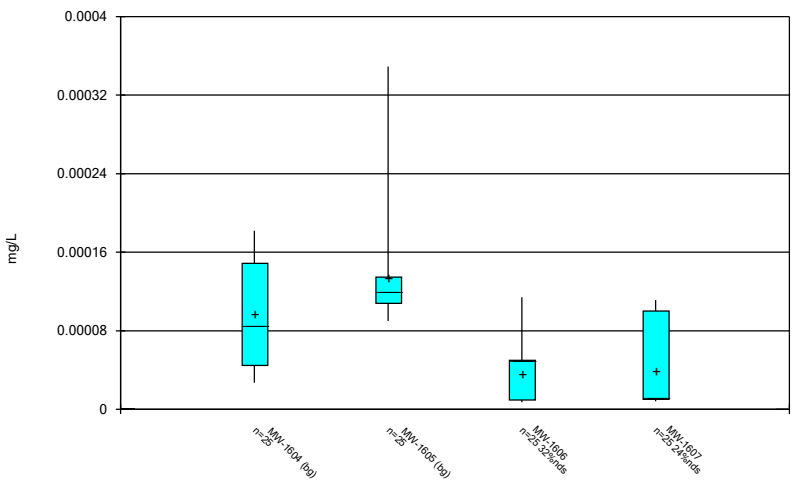


Constituent: Beryllium Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

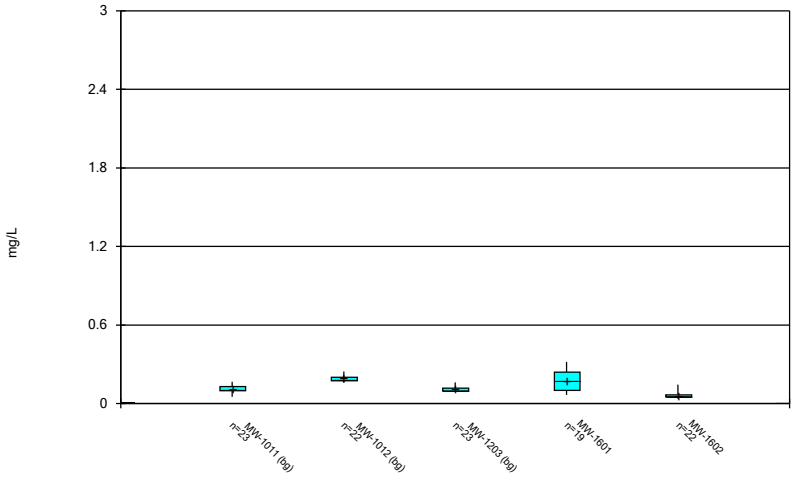


Constituent: Beryllium Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

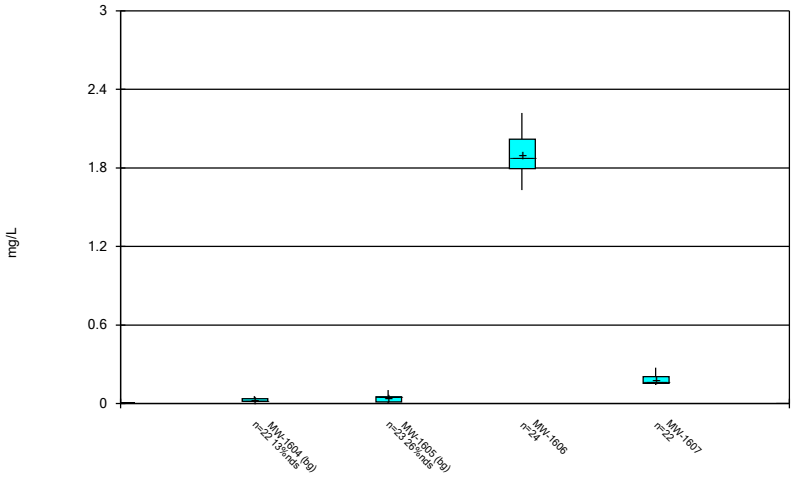


Constituent: Boron Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

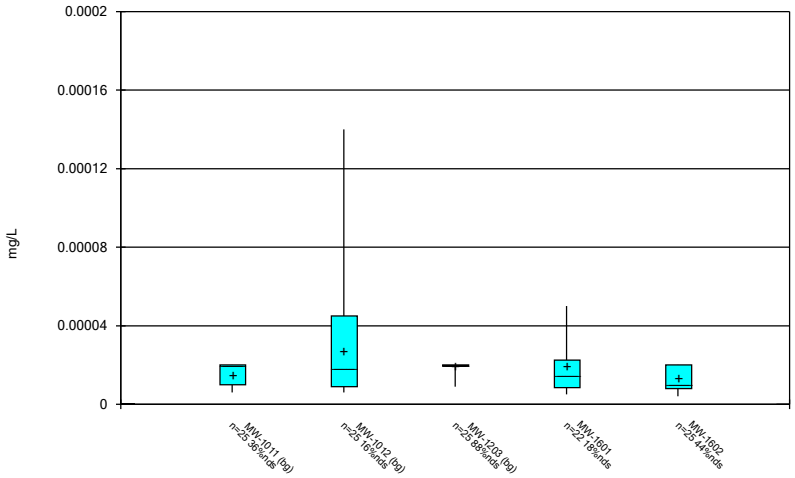


Constituent: Boron Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

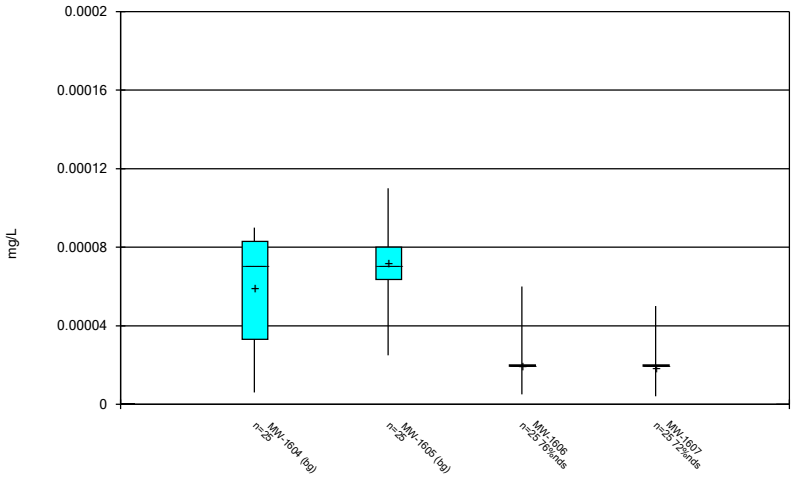


Constituent: Cadmium Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

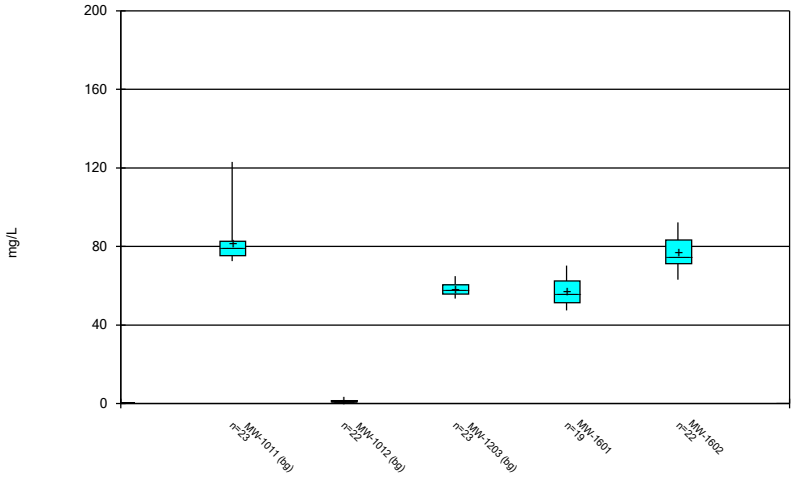


Constituent: Cadmium Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

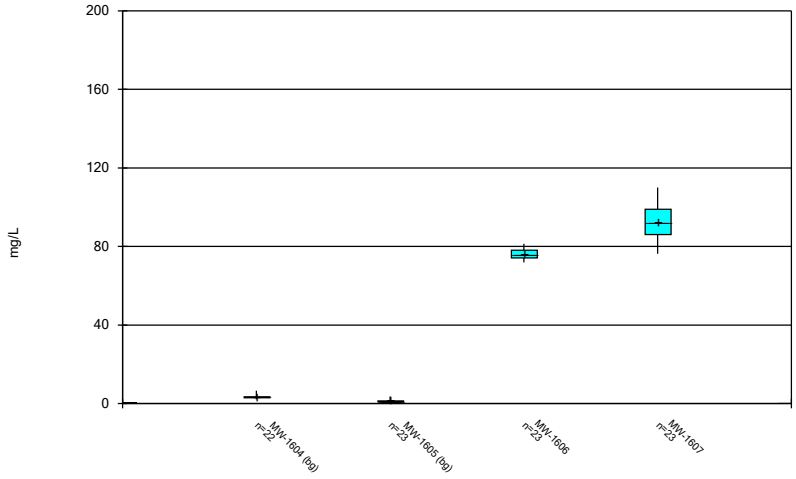


Constituent: Calcium Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

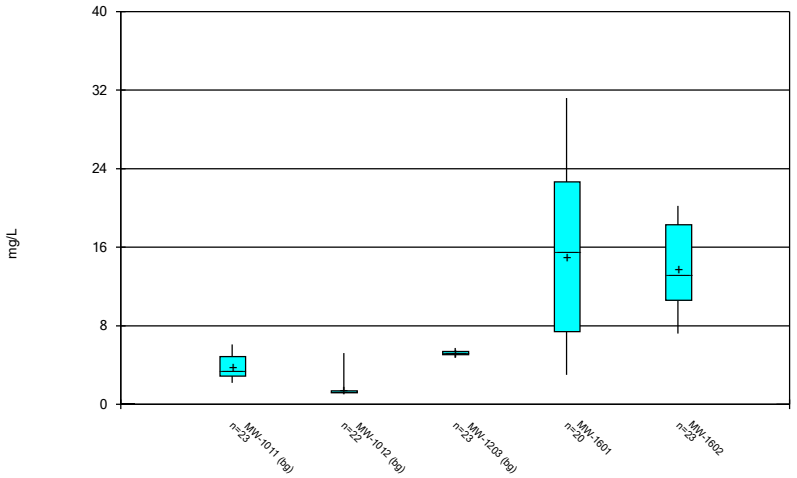


Constituent: Calcium Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

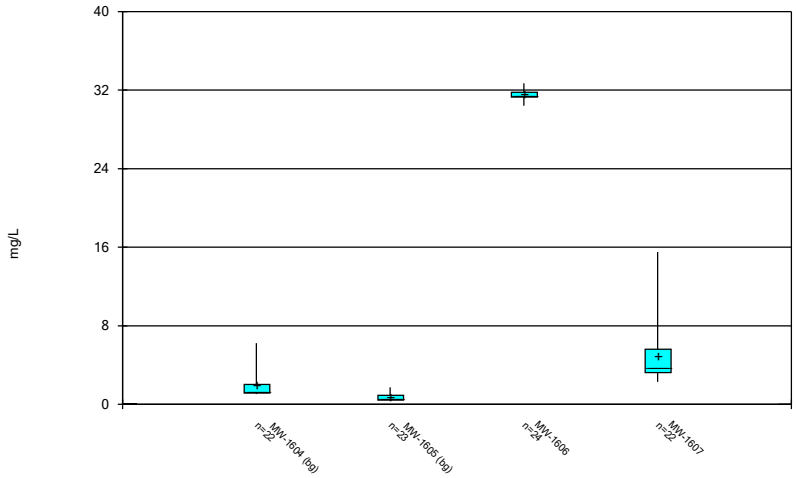


Constituent: Chloride Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

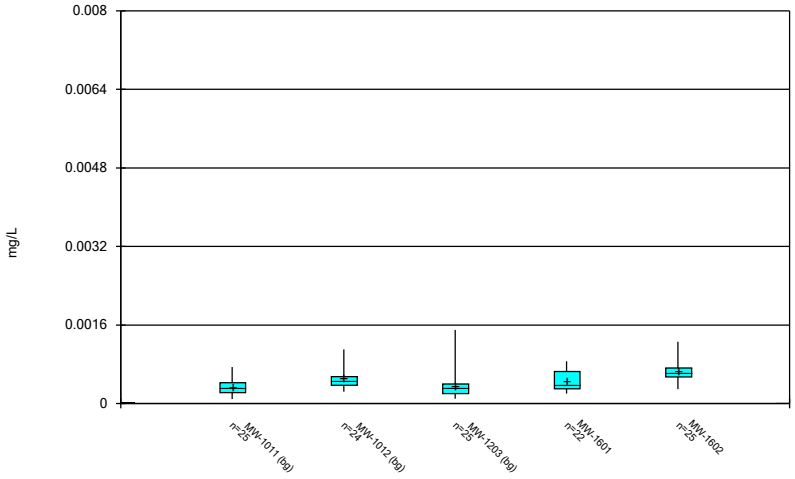


Constituent: Chloride Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

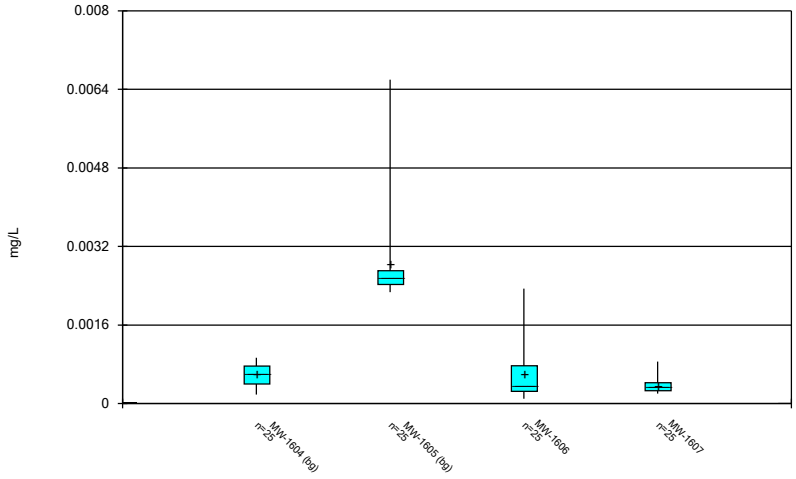


Constituent: Chromium Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

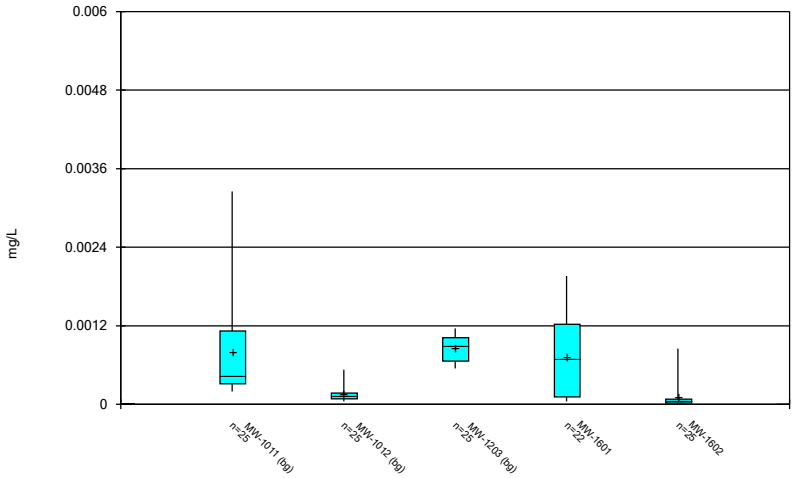


Constituent: Chromium Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

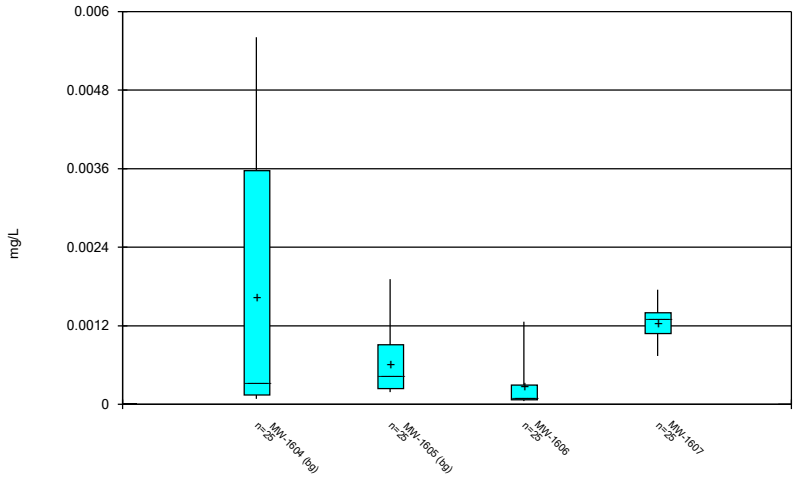


Constituent: Cobalt Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

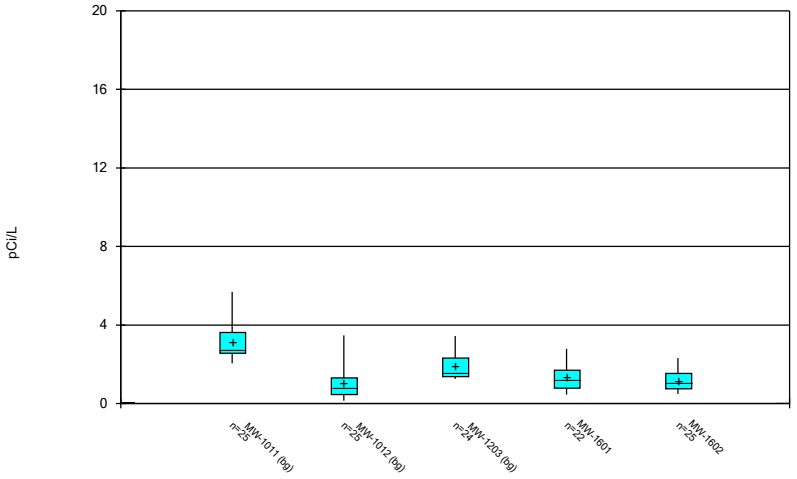


Constituent: Cobalt Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

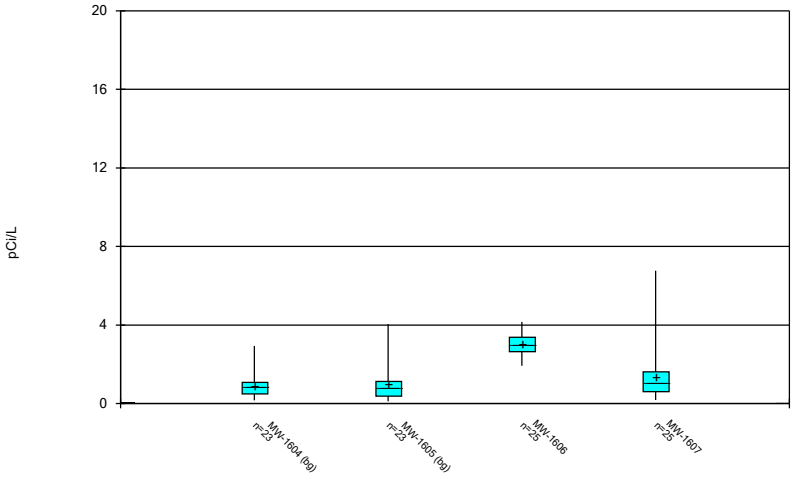


Constituent: Combined Radium 226 + 228 Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

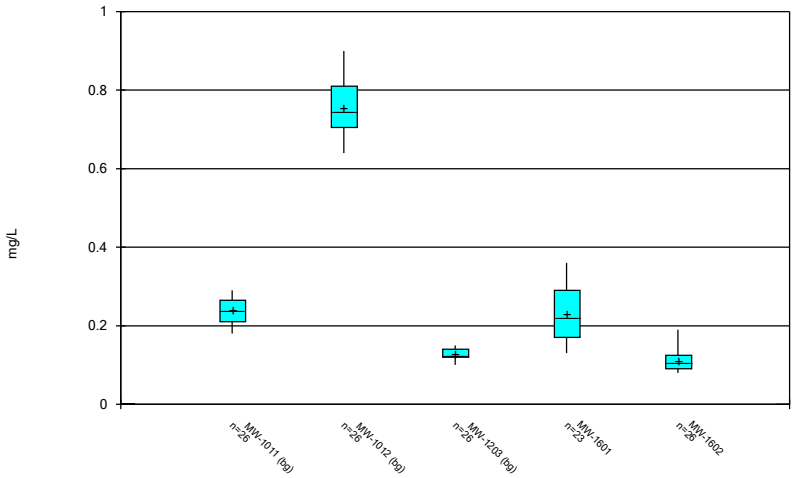


Constituent: Combined Radium 226 + 228 Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

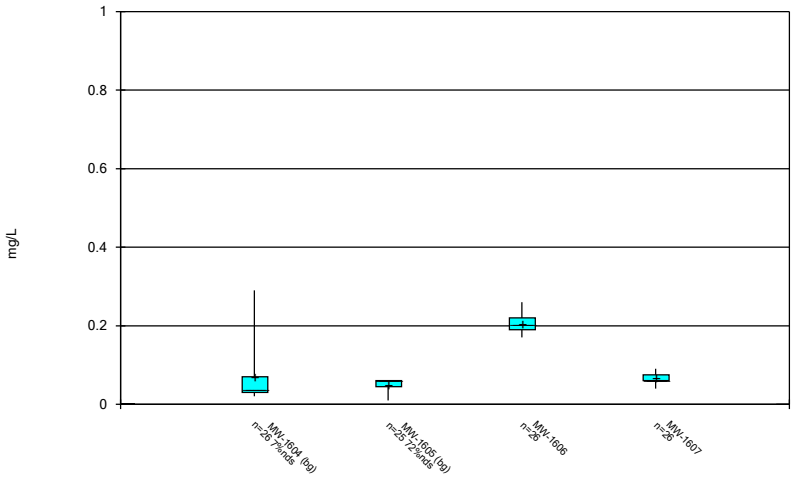


Constituent: Fluoride Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

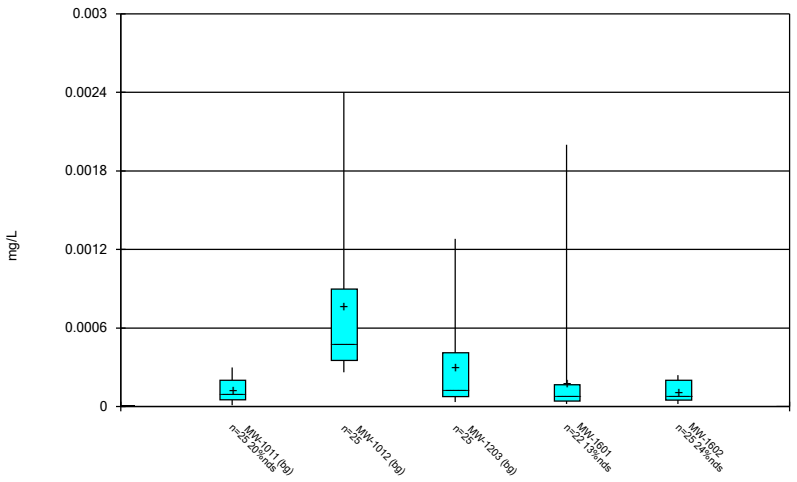


Constituent: Fluoride Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

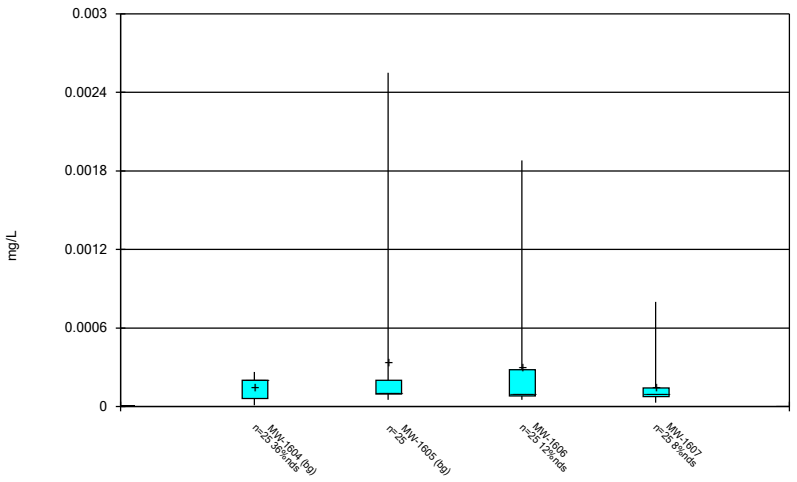


Constituent: Lead Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

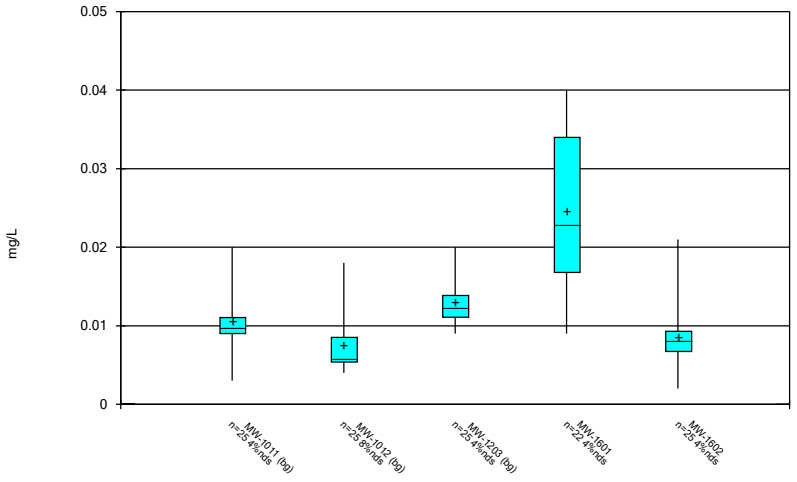


Constituent: Lead Analysis Run 1/31/2024 12:01 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

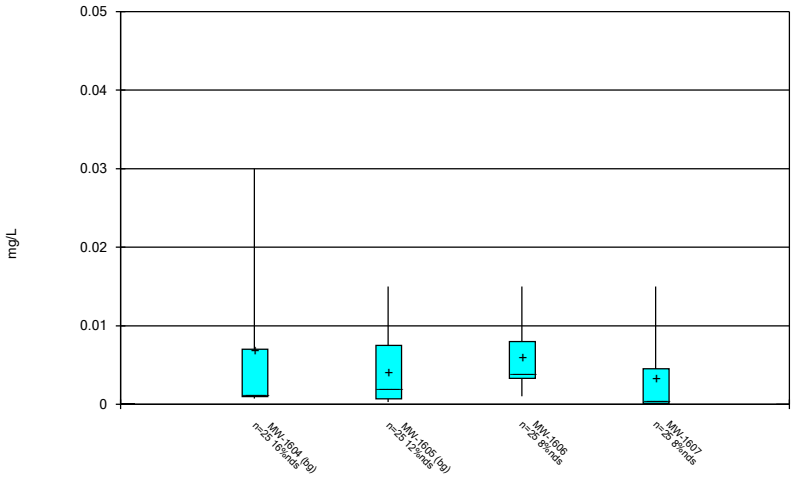


Constituent: Lithium Analysis Run 1/31/2024 12:02 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

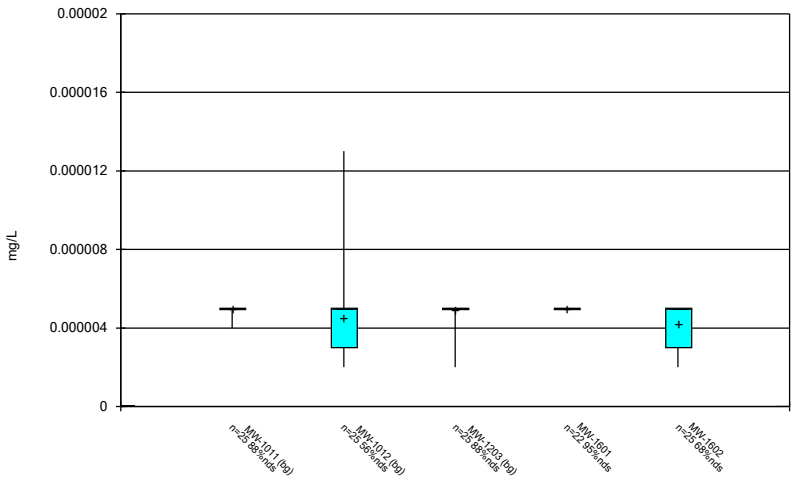


Constituent: Lithium Analysis Run 1/31/2024 12:02 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

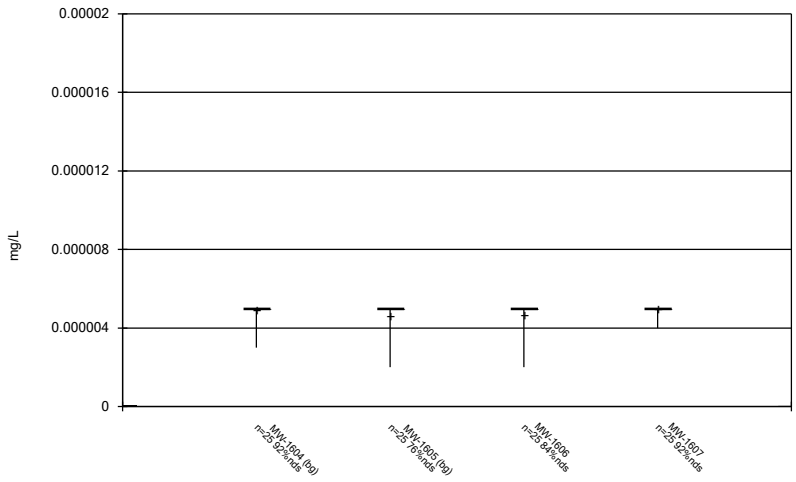
Box & Whiskers Plot



Constituent: Mercury Analysis Run 1/31/2024 12:02 PM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

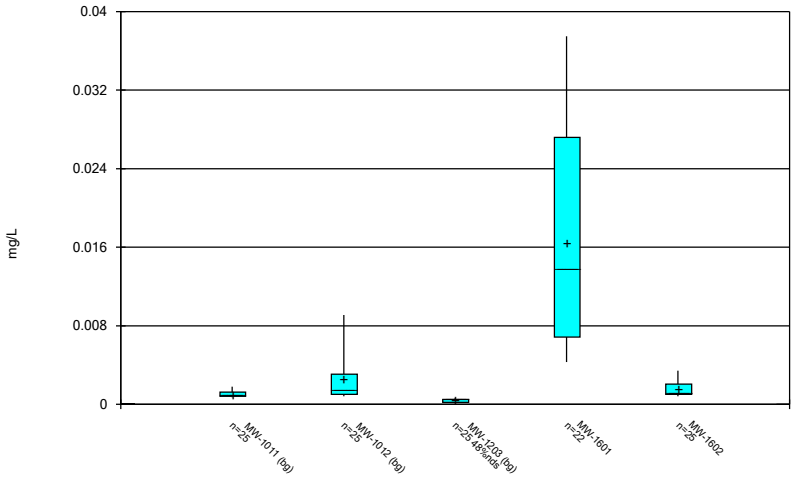
Box & Whiskers Plot



Constituent: Mercury Analysis Run 1/31/2024 12:02 PM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

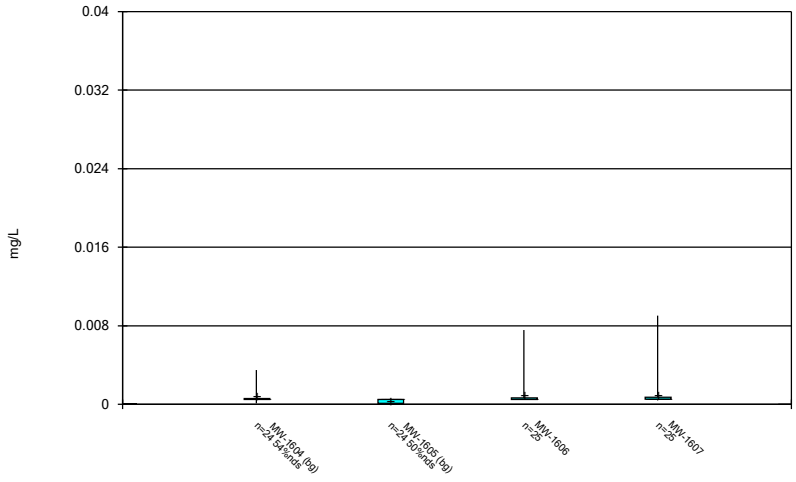
Box & Whiskers Plot



Constituent: Molybdenum Analysis Run 1/31/2024 12:02 PM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

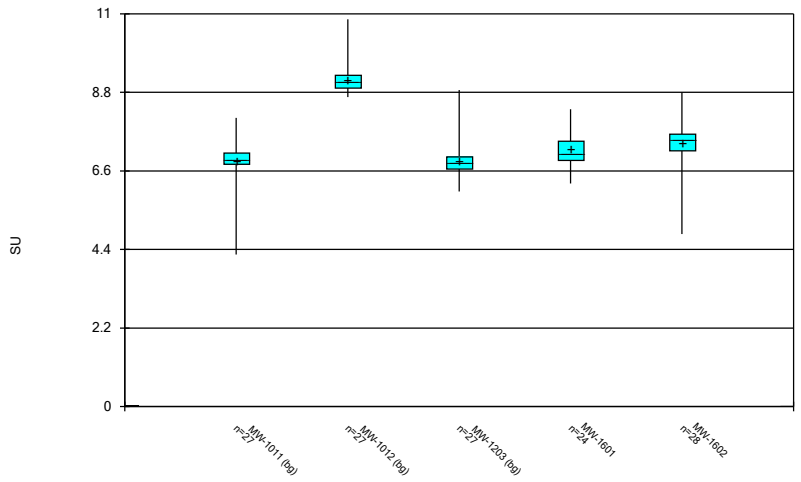
Box & Whiskers Plot



Constituent: Molybdenum Analysis Run 1/31/2024 12:02 PM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

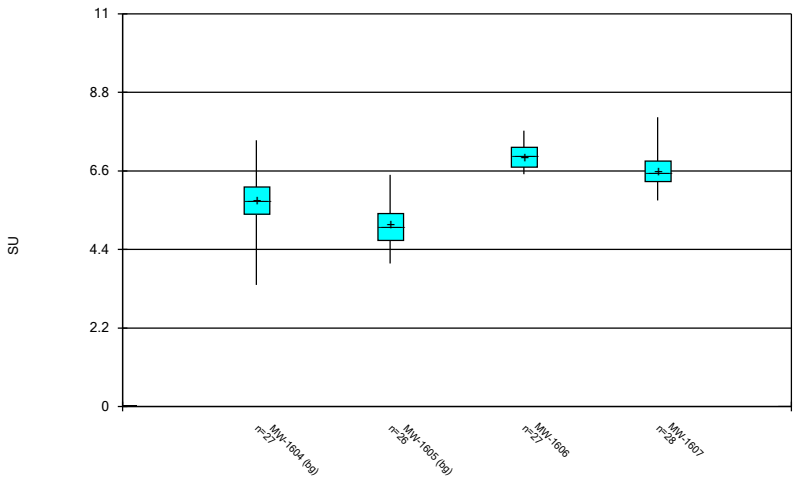
Box & Whiskers Plot



Constituent: pH Analysis Run 1/31/2024 12:02 PM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

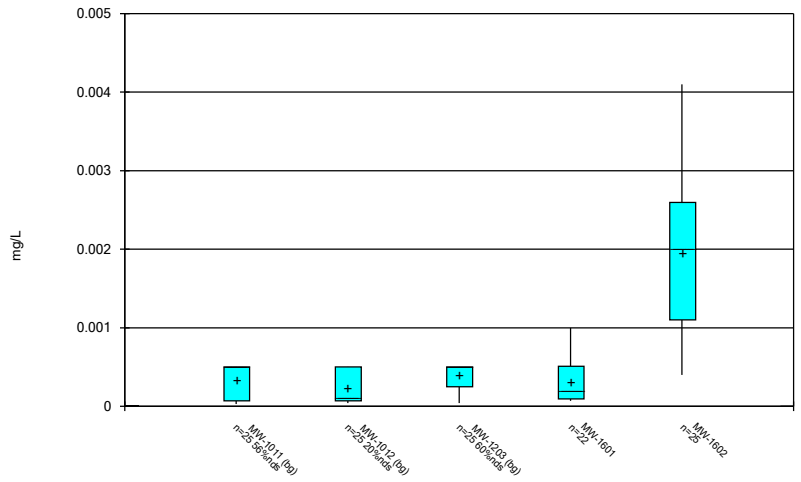
Box & Whiskers Plot



Constituent: pH Analysis Run 1/31/2024 12:02 PM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

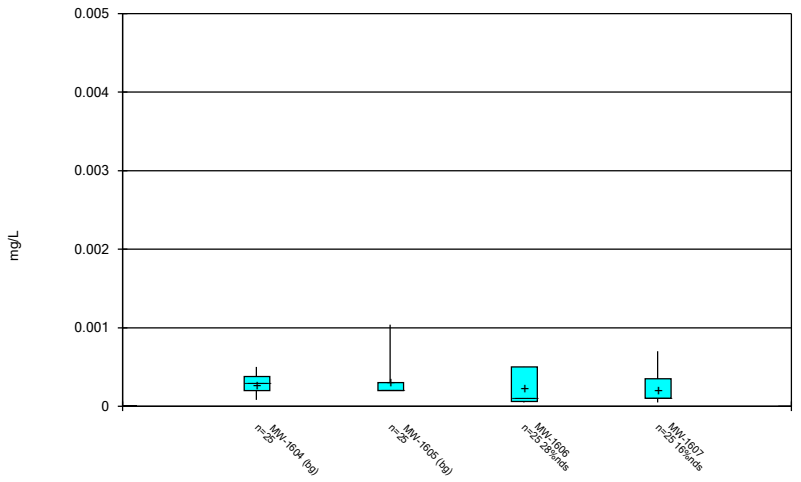
Box & Whiskers Plot



Constituent: Selenium Analysis Run 1/31/2024 12:02 PM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

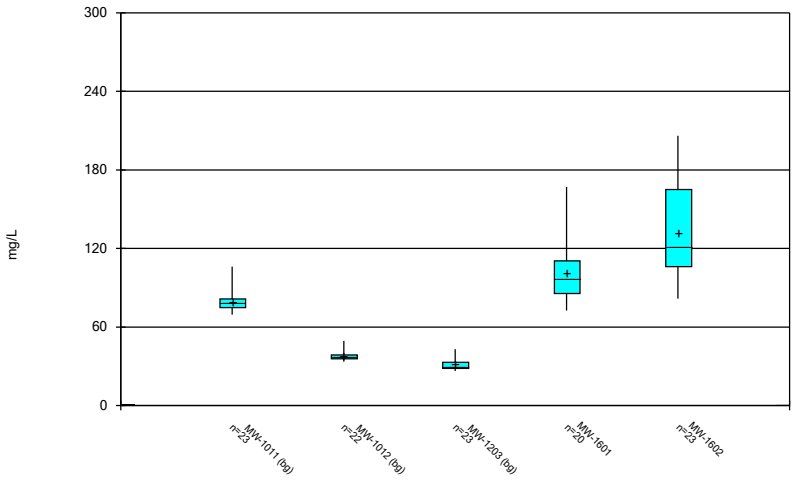
Box & Whiskers Plot



Constituent: Selenium Analysis Run 1/31/2024 12:02 PM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

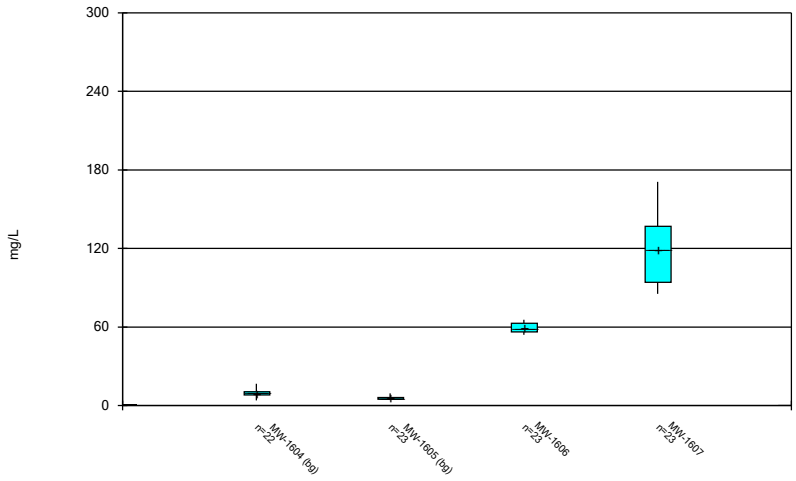


Constituent: Sulfate Analysis Run 1/31/2024 12:02 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

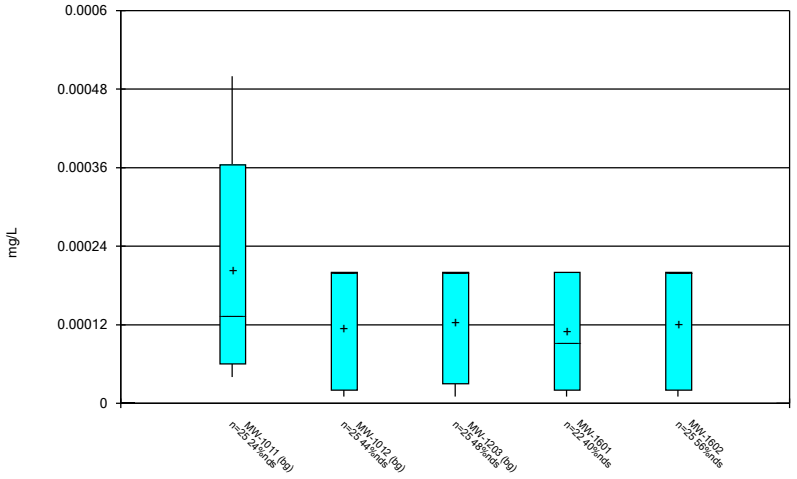


Constituent: Sulfate Analysis Run 1/31/2024 12:02 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot

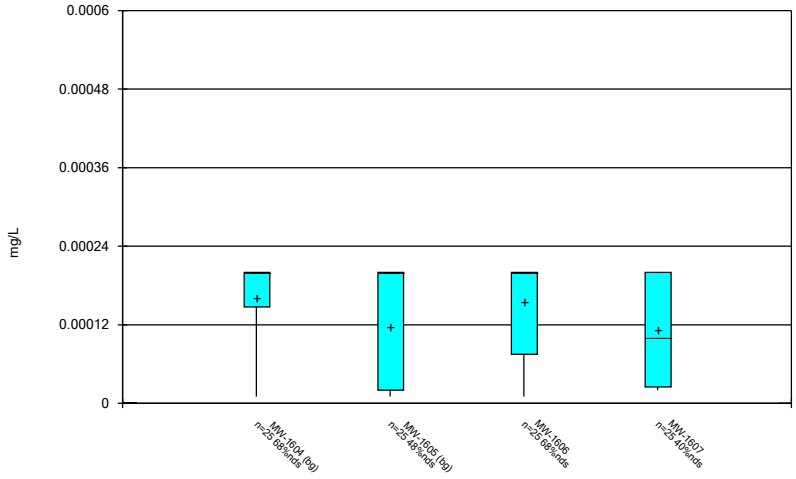


Constituent: Thallium Analysis Run 1/31/2024 12:02 PM

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

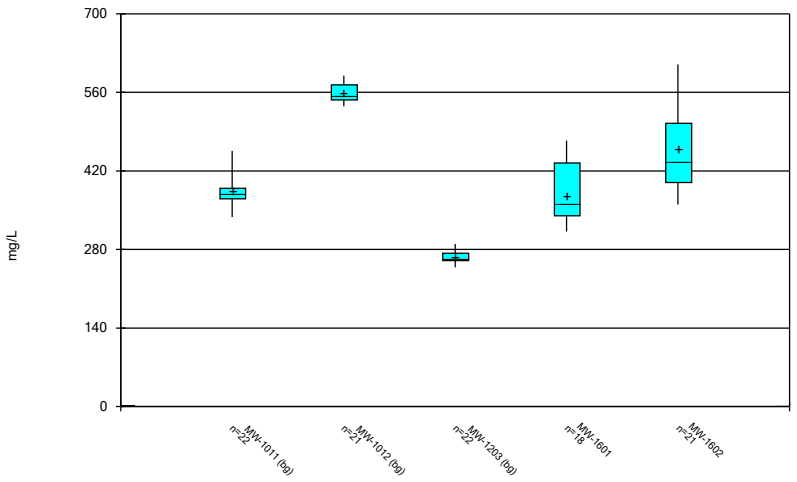
Box & Whiskers Plot



Constituent: Thallium Analysis Run 1/31/2024 12:02 PM

Big Sandy FAP Data: Big Sandy FAP

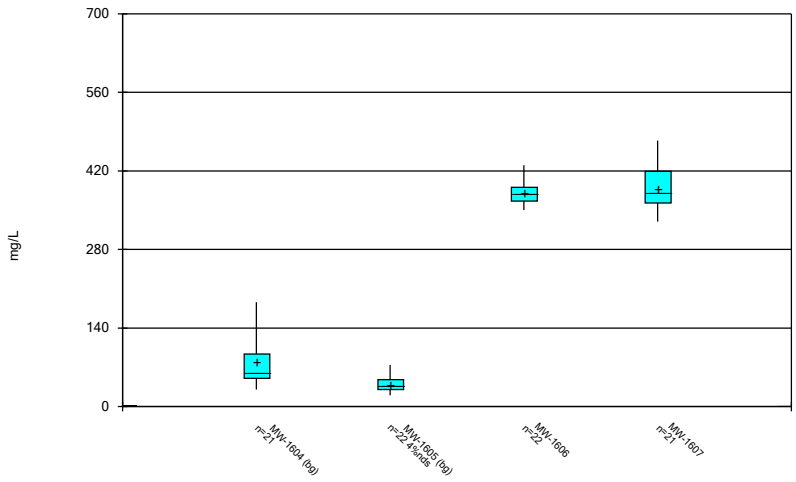
Box & Whiskers Plot



Constituent: Total Dissolved Solids Analysis Run 1/31/2024 12:02 PM
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Box & Whiskers Plot



Constituent: Total Dissolved Solids Analysis Run 1/31/2024 12:02 PM
Big Sandy FAP Data: Big Sandy FAP

FIGURE C

Outlier Summary and Tukey's Outlier Test

Outlier Summary

Big Sandy FAP Data: Big Sandy FAP Printed 1/31/2024, 12:04 PM

	MW-1012 Arsenic (mg/L)	MW-1012 Chromium (mg/L)	MW-1203 Combined Radium 226 + 228 (pCi/L)	MW-1604 Combined Radium 226 + 228 (pCi/L)	MW-1605 Combined Radium 226 + 228 (pCi/L)	MW-1604 Molybdenum (mg/L)	MW-1605 Molybdenum (mg/L)	MW-1605 pH (SU)	MW-1606 pH (SU)
11/8/2016								2.26 (o)	
5/23/2017				6.707 (o)	6.077 (o)				
5/24/2017		0.00784 (o)							
6/21/2017				16.848 (o)	10.864 (o)				
7/12/2017						0.0159 (o)	0.0237 (o)		
3/17/2020			7.524 (o)						
3/18/2020									9.11 (o)
3/24/2022	0.0499 (o)								
6/15/2022	0.0454 (o)								
10/12/2022	0.0386 (o)								
3/15/2023	0.0942 (o)								
6/14/2023	0.118 (o)								
10/18/2023	0.107 (o)								

Tukey's Outlier Test - Upgradient Wells - Significant Results

Big Sandy FAP Data: Big Sandy FAP Printed 1/26/2024, 12:42 PM

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Arsenic (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**0.0178,0.0178,0.0135,0.0193,0.024,0.0289,0.0247,0**	**NP**	**NaN**	**125**	**0.008627**	**0.01829**	**x^5**	**ChiSquared**
Barium (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**0.11,0.102,0.113**	**NP**	**NaN**	**125**	**0.056**	**0.02461**	**x^5**	**ChiSquared**
Boron (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**0.182,0.183,0.244,0.205,0.227,0.236,0.189,0.181,0**	**NP**	**NaN**	**113**	**0.09329**	**0.06404**	**x^6**	**ChiSquared**
Chromium (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**0.00784,0.0015,0.0027,0.0027,0.0025,0.00253,0.002**	**NP**	**NaN**	**125**	**0.0009874**	**0.001235**	**x^5**	**ChiSquared**
Cobalt (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**0.00285,0.00147,0.00123,0.00325,0.00347,0.00155,0**	**NP**	**NaN**	**125**	**0.0008125**	**0.00106**	**x^6**	**ChiSquared**
Combined Radium 226 + 228 (pCi/L)	**MW-1011,MW-1012,M...**	**Yes**	**3.56,5.24,3.43,5.69,4.44,4.09,3.69,3.29,3.66,3.47**	**NP**	**NaN**	**125**	**1.926**	**2.105**	**x^6**	**ChiSquared**
Fluoride (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**0.71,0.71,0.71,0.7,0.73,0.73,0.68,0.68,0.64,0.66,**	**NP**	**NaN**	**129**	**0.2508**	**0.2676**	**x^3**	**ChiSquared**
Lithium (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**0.017,0.017,0.016,0.02,0.02,0.02,0.018**	**NP**	**NaN**	**125**	**0.007975**	**0.005356**	**x^6**	**ChiSquared**
Sulfate (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**79.5,74.4,72.8,72.5,74.7,73.8,69.4,78.2,78,106,76**	**NP**	**NaN**	**113**	**32.82**	**26.95**	**x^6**	**ChiSquared**
Total Dissolved Solids (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**547,547,535,553,554,546,546,540,558,541,561,559,5**	**NP**	**NaN**	**108**	**264.3**	**194.3**	**x^6**	**ChiSquared**

Tukey's Outlier Test - Upgradient Wells - All Results

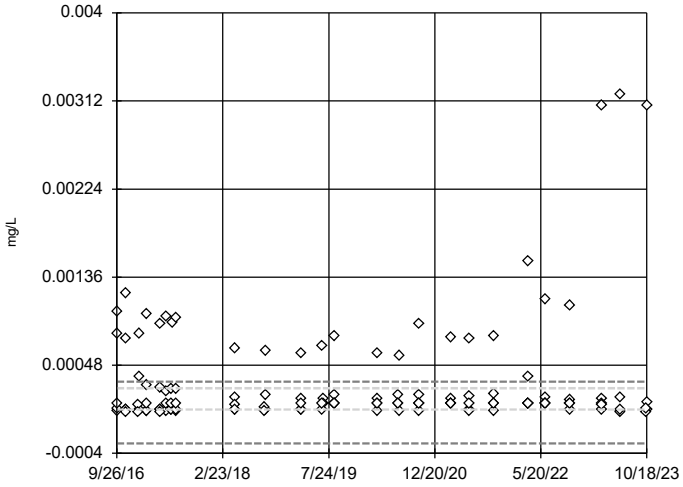
Big Sandy FAP Data: Big Sandy FAP Printed 1/26/2024, 12:42 PM

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony (mg/L)	MW-1011,MW-1012,M...	n/a	n/a	NP	NaN	125	0.0003123	0.0005471	unknown	ChiSquared
Arsenic (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**0.0178,0.0178,0.0135,0.0193,0.024,0.0289,0.0247,0**	**NP**	**NaN**	**125**	**0.008627**	**0.01829**	**x^5**	**ChiSquared**
Barium (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**0.11,0.102,0.113**	**NP**	**NaN**	**125**	**0.056**	**0.02461**	**x^5**	**ChiSquared**
Beryllium (mg/L)	MW-1011,MW-1012,M...	n/a	n/a	NP	NaN	125	0.00007798	0.00005345	unknown	ChiSquared
Boron (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**0.182,0.183,0.244,0.205,0.227,0.236,0.189,0.181,0**	**NP**	**NaN**	**113**	**0.09329**	**0.06404**	**x^6**	**ChiSquared**
Cadmium (mg/L)	MW-1011,MW-1012,M...	n/a	n/a	NP	NaN	125	0.00003758	0.00003048	unknown	ChiSquared
Calcium (mg/L)	MW-1011,MW-1012,M...	No	n/a	NP	NaN	113	29.68	34.85	normal	ChiSquared
Chloride (mg/L)	MW-1011,MW-1012,M...	No	n/a	NP	NaN	113	2.655	1.902	x^5	ChiSquared
Chromium (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**0.00784,0.0015,0.0027,0.0027,0.0025,0.00253,0.002**	**NP**	**NaN**	**125**	**0.0009874**	**0.001235**	**x^5**	**ChiSquared**
Cobalt (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**0.00285,0.00147,0.00123,0.00325,0.00347,0.00155,0**	**NP**	**NaN**	**125**	**0.0008125**	**0.00106**	**x^6**	**ChiSquared**
Combined Radium 226 + 228 (pCi/L)	**MW-1011,MW-1012,M...**	**Yes**	**3.56,5.24,3.43,5.69,4.44,4.09,3.69,3.29,3.66,3.47**	**NP**	**NaN**	**125**	**1.926**	**2.105**	**x^6**	**ChiSquared**
Fluoride (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**0.71,0.71,0.71,0.7,0.73,0.73,0.68,0.68,0.64,0.66,**	**NP**	**NaN**	**129**	**0.2508**	**0.2676**	**x^3**	**ChiSquared**
Lead (mg/L)	MW-1011,MW-1012,M...	n/a	n/a	NP	NaN	125	0.000326	0.0004848	unknown	ChiSquared
Lithium (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**0.017,0.017,0.016,0.02,0.02,0.02,0.018**	**NP**	**NaN**	**125**	**0.007975**	**0.005356**	**x^6**	**ChiSquared**
Mercury (mg/L)	MW-1011,MW-1012,M...	n/a	n/a	NP	NaN	125	0.000004776	0.000001106	unknown	ChiSquared
Molybdenum (mg/L)	MW-1011,MW-1012,M...	n/a	n/a	NP	NaN	125	0.00133	0.002818	unknown	ChiSquared
Selenium (mg/L)	MW-1011,MW-1012,M...	n/a	n/a	NP	NaN	125	0.0003091	0.0001853	unknown	ChiSquared
Sulfate (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**79.5,74.4,72.8,72.5,74.7,73.8,69.4,78.2,78,106,76**	**NP**	**NaN**	**113**	**32.82**	**26.95**	**x^6**	**ChiSquared**
Thallium (mg/L)	MW-1011,MW-1012,M...	n/a	n/a	NP	NaN	125	0.0001302	0.00008144	unknown	ChiSquared
Total Dissolved Solids (mg/L)	**MW-1011,MW-1012,M...**	**Yes**	**547,547,535,553,554,546,546,540,558,541,561,559,5**	**NP**	**NaN**	**108**	**264.3**	**194.3**	**x^6**	**ChiSquared**

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 125

No outliers found.
Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

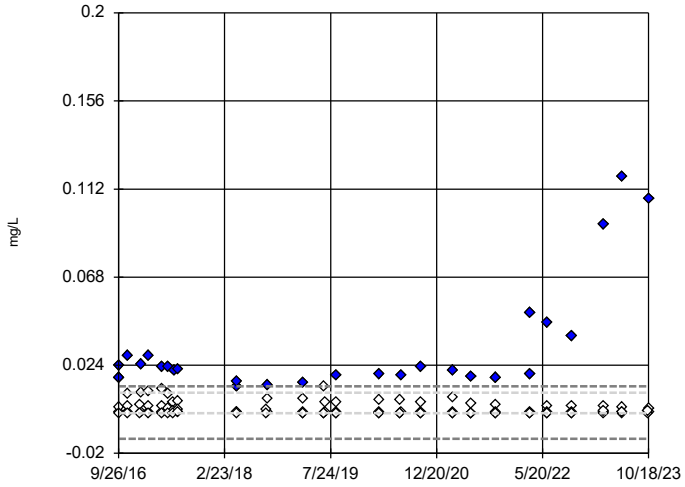
The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Antimony Analysis Run 1/26/2024 12:40 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 125

Outliers are drawn as solid.
Tukey's method selected by user.

Data were x^5 transformed to achieve best W statistic (graph shown in original units).

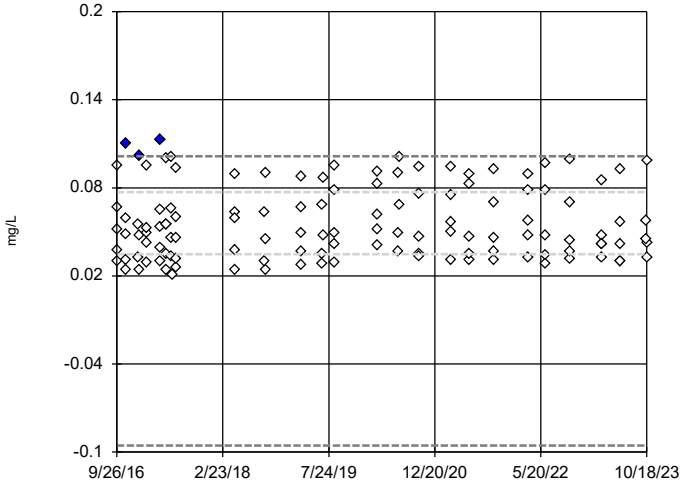
High cutoff = 0.0135, low cutoff = -0.01274, based on IQR multiplier of 3.

Constituent: Arsenic Analysis Run 1/26/2024 12:40 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 125

Outliers are drawn as solid.
Tukey's method selected by user.

Data were x^5 transformed to achieve best W statistic (graph shown in original units).

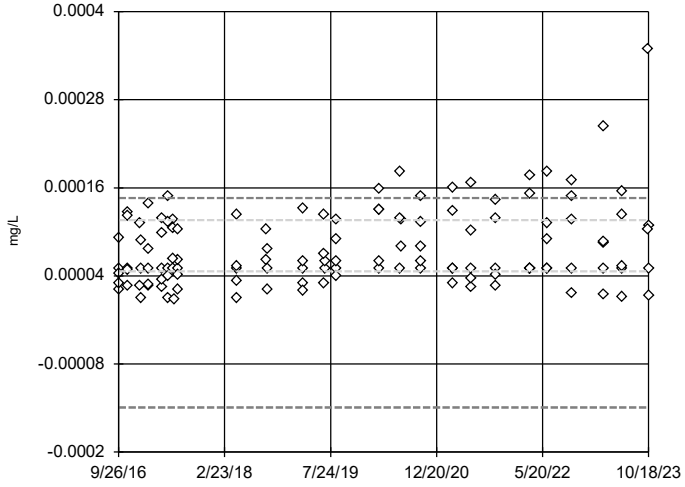
High cutoff = 0.1014, low cutoff = -0.09555, based on IQR multiplier of 3.

Constituent: Barium Analysis Run 1/26/2024 12:40 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 125

No outliers found.
Tukey's method selected by user.

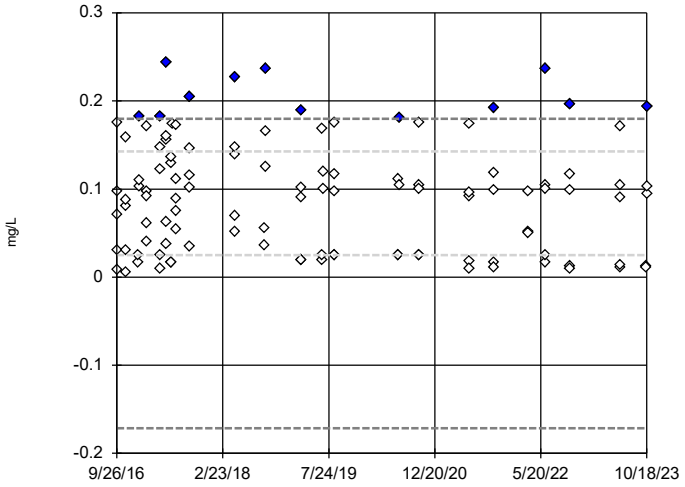
Data were x^6 transformed to achieve best W statistic (graph shown in original units).

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Beryllium Analysis Run 1/26/2024 12:40 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 113

Outliers are drawn as solid.
Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

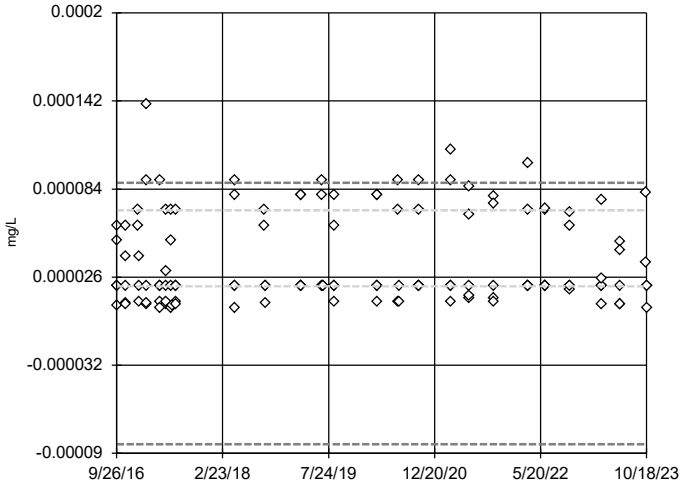
High cutoff = 0.1798, low cutoff = -0.1714, based on IQR multiplier of 3.

Constituent: Boron Analysis Run 1/26/2024 12:40 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 125

No outliers found.
Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

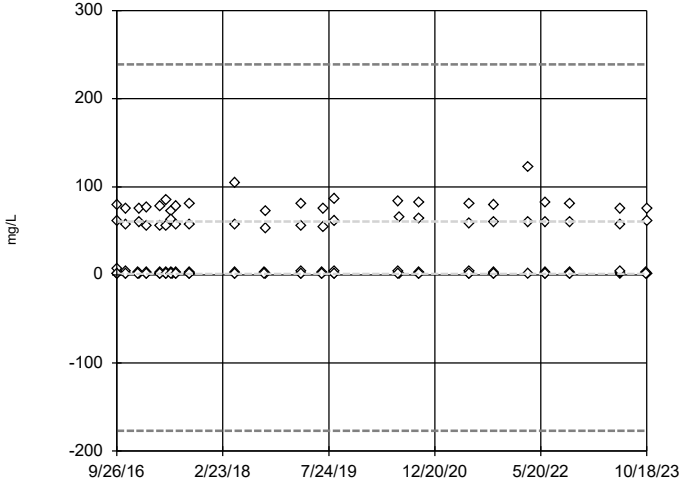
The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Cadmium Analysis Run 1/26/2024 12:40 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 113

No outliers found.
Tukey's method selected by user.

Ladder of Powers transformations did not improve normality; analysis run on raw data.

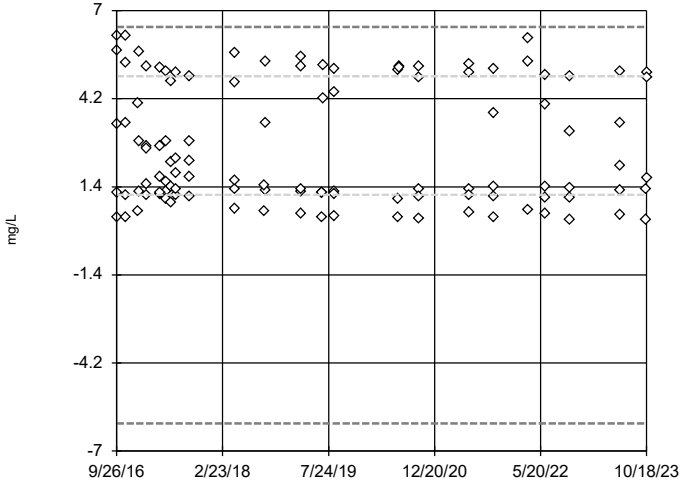
High cutoff = 238.9, low cutoff = -177.1, based on IQR multiplier of 3.

Constituent: Calcium Analysis Run 1/26/2024 12:40 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 113

No outliers found.
Tukey's method selected by user.

Data were x^5 transformed to achieve best W statistic (graph shown in original units).

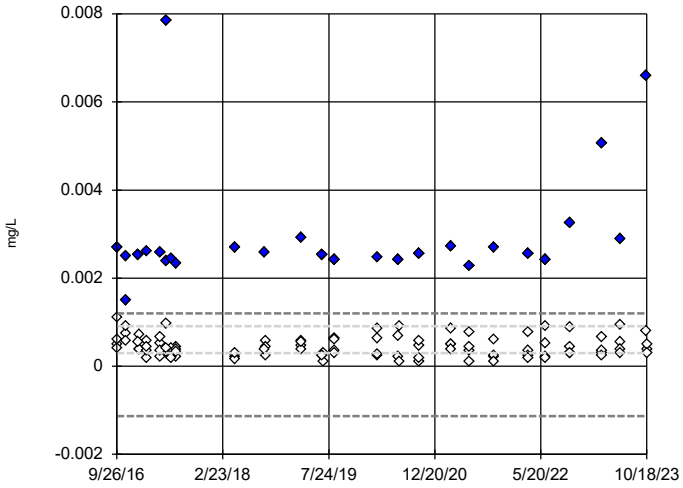
High cutoff = 6.485, low cutoff = -6.122, based on IQR multiplier of 3.

Constituent: Chloride Analysis Run 1/26/2024 12:40 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 125

Outliers are drawn as solid.
Tukey's method selected by user.

Data were x^5 transformed to achieve best W statistic (graph shown in original units).

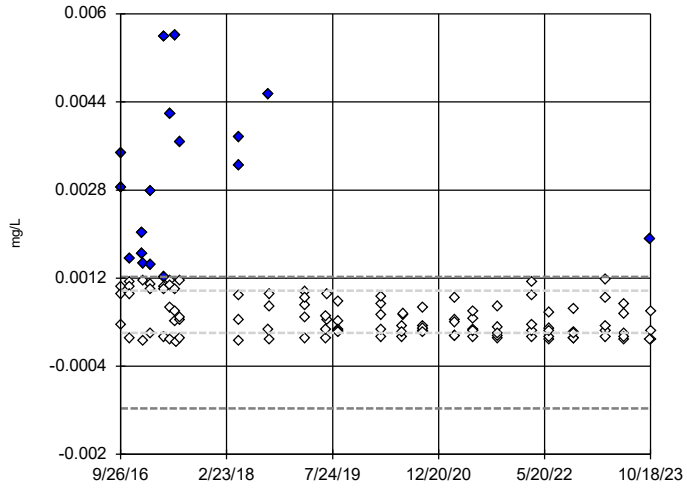
High cutoff = 0.001201, low cutoff = -0.001134, based on IQR multiplier of 3.

Constituent: Chromium Analysis Run 1/26/2024 12:40 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 125

Outliers are drawn as solid.
Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

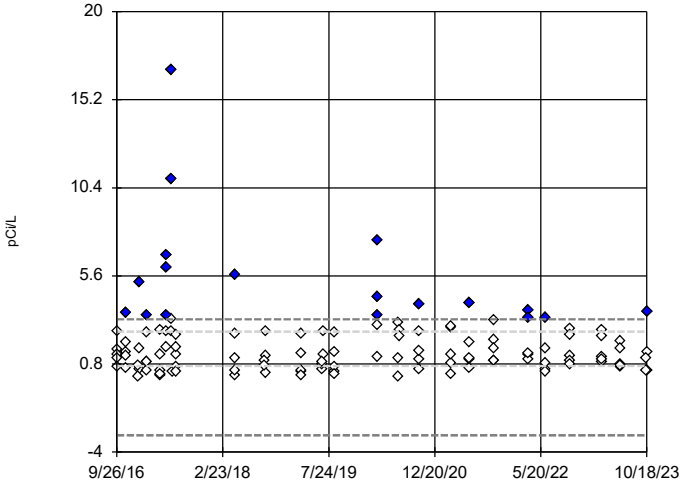
High cutoff = 0.001224, low cutoff = -0.001167, based on IQR multiplier of 3.

Constituent: Cobalt Analysis Run 1/26/2024 12:40 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 125

Outliers are drawn as solid.
Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

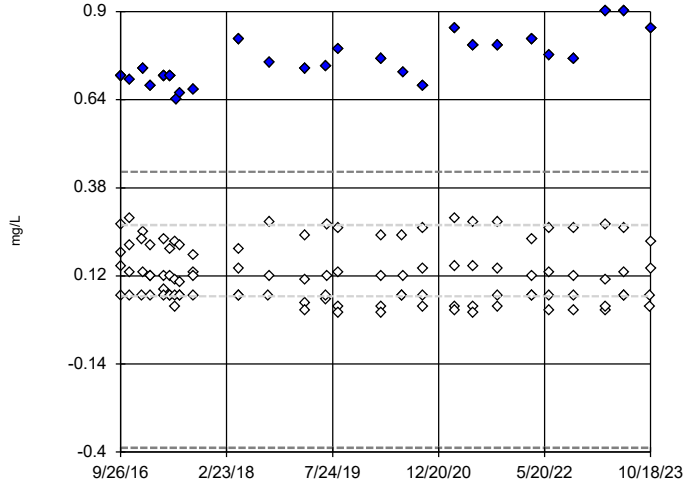
High cutoff = 3.235, low cutoff = -3.084, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 1/26/2024 12:41 PM View: Tukey's Outlier Upgra
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 129

Outliers are drawn as solid.
Tukey's method selected by user.

Data were cube transformed to achieve best W statistic (graph shown in original units).

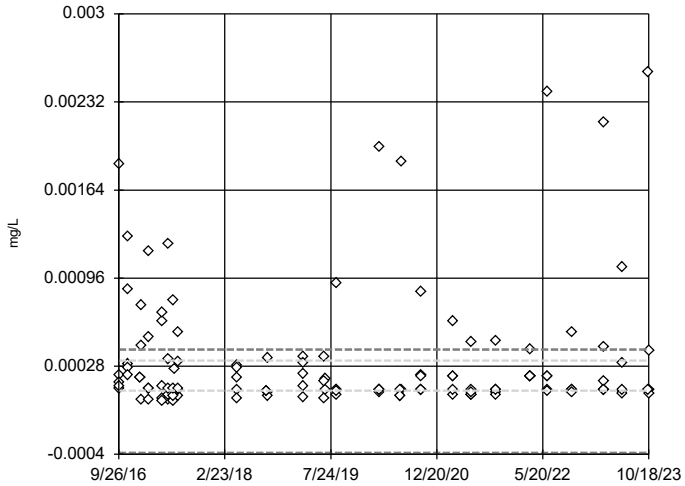
High cutoff = 0.4274, low cutoff = -0.3875, based on IQR multiplier of 3.

Constituent: Fluoride Analysis Run 1/26/2024 12:41 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 125

No outliers found.
Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

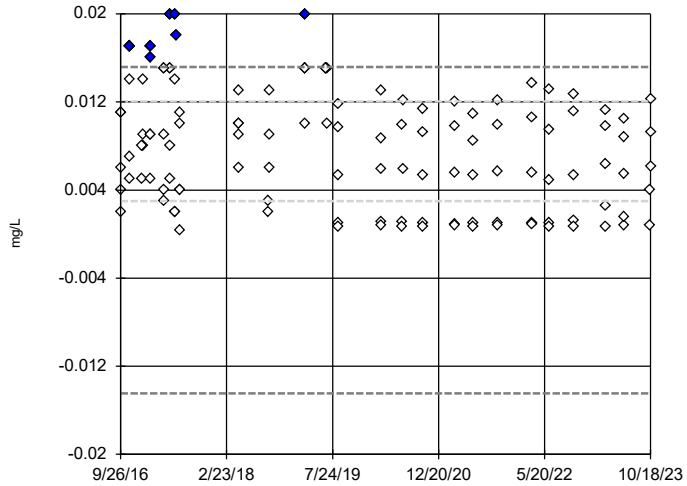
The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Lead Analysis Run 1/26/2024 12:41 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 125

Outliers are drawn as solid.
Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

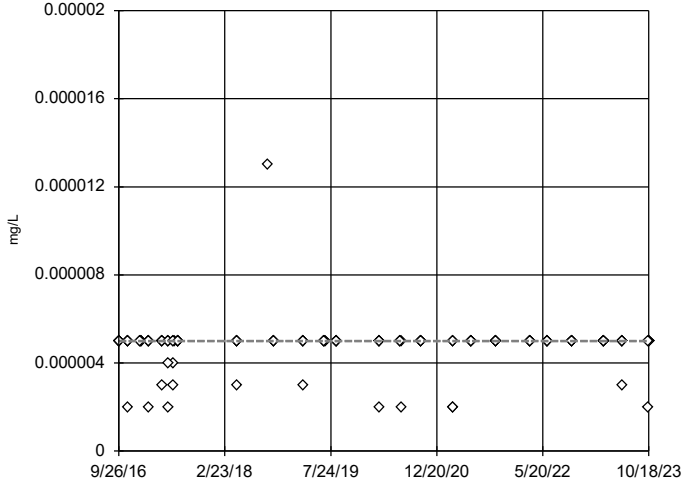
High cutoff = 0.01518, low cutoff = -0.01447, based on IQR multiplier of 3.

Constituent: Lithium Analysis Run 1/26/2024 12:41 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 125

No outliers found.
Tukey's method selected by user.

Data were x^5 transformed to achieve best W statistic (graph shown in original units).

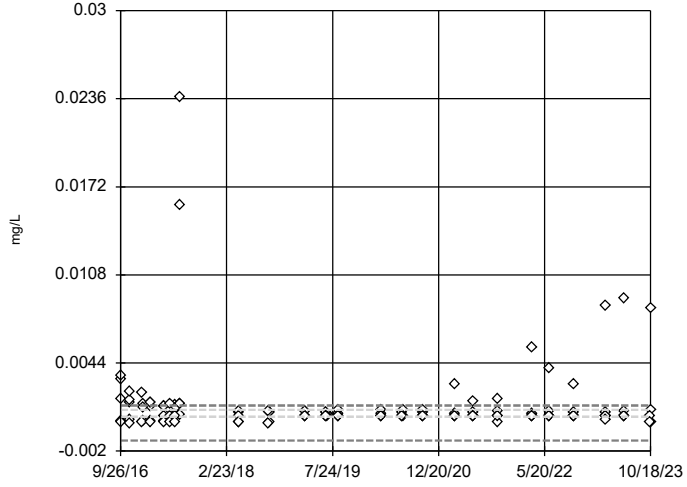
The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury Analysis Run 1/26/2024 12:41 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 125

No outliers found.
Tukey's method selected by user.

Data were x^5 transformed to achieve best W statistic (graph shown in original units).

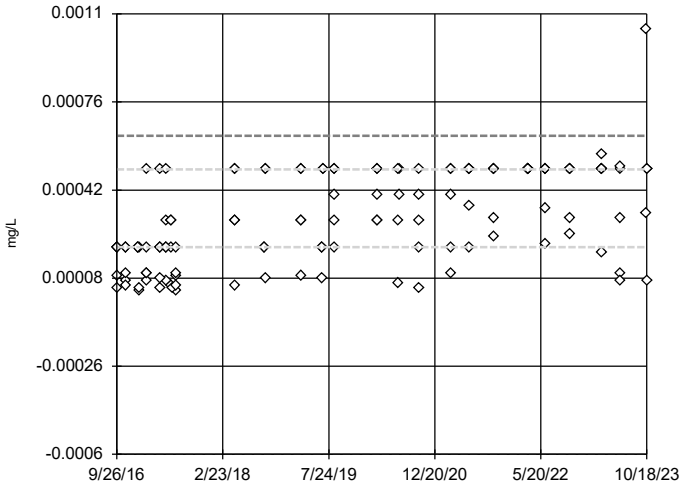
The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Molybdenum Analysis Run 1/26/2024 12:41 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 125

No outliers found.
Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

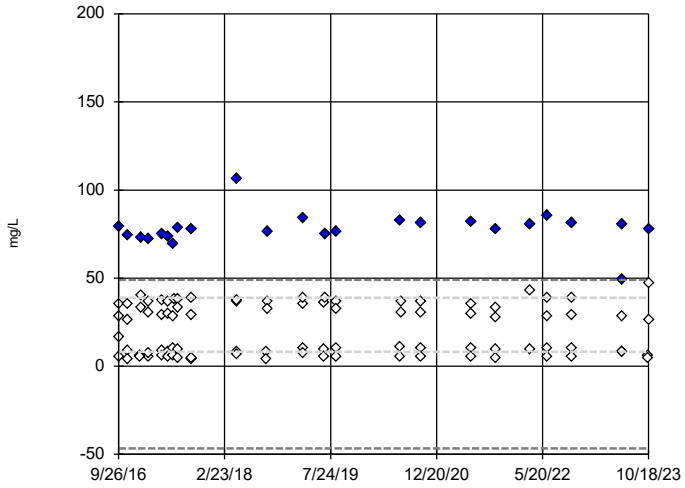
The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Selenium Analysis Run 1/26/2024 12:41 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 113

Outliers are drawn as solid.
Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

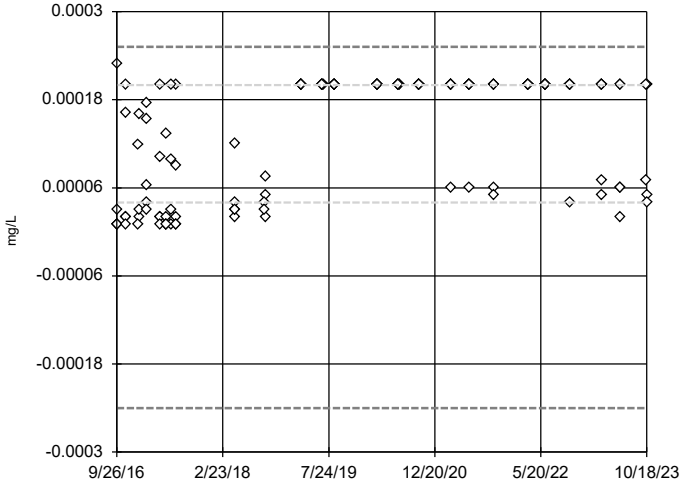
High cutoff = 48.95, low cutoff = -46.66, based on IQR multiplier of 3.

Constituent: Sulfate Analysis Run 1/26/2024 12:41 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 125

No outliers found.
Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

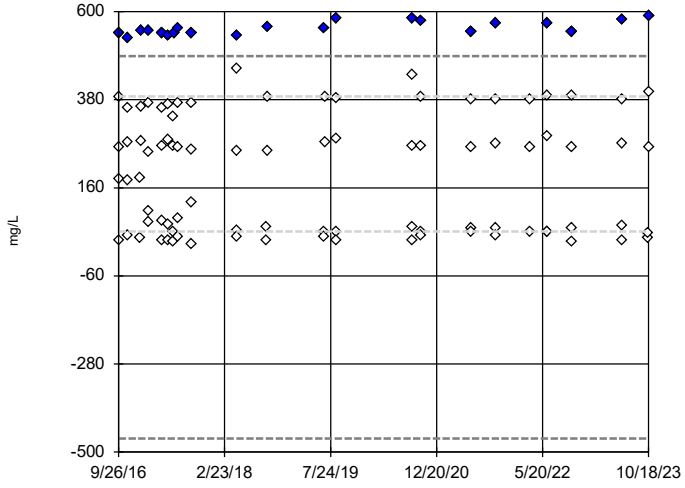
The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Thallium Analysis Run 1/26/2024 12:41 PM View: Tukey's Outlier Upgradient Test
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tukey's Outlier Screening, Pooled Background

MW-1011,MW-1012,MW-1203,MW-1604,MW-16...



n = 108

Outliers are drawn as solid.
Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 488.8, low cutoff = -466, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids Analysis Run 1/26/2024 12:41 PM View: Tukey's Outlier Upgradient T
Big Sandy FAP Data: Big Sandy FAP

FIGURE D

Intrawell PLs

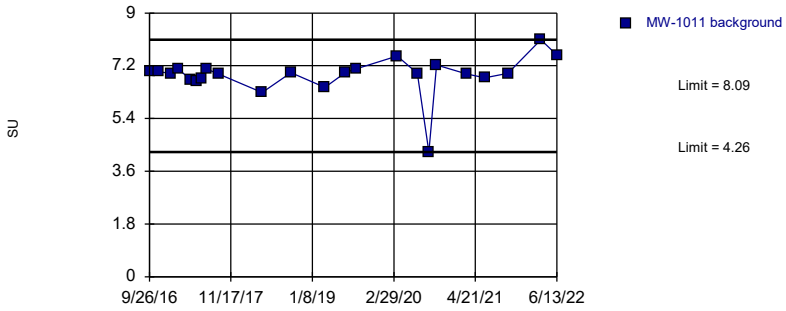
Appendix III - Interwell Prediction Limits - All Results

Big Sandy FAP Data: Big Sandy FAP Printed 1/31/2024, 11:58 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
pH (SU)	MW-1011	8.09	4.26	n/a	1 future	n/a	23	n/a	n/a	0	n/a	n/a	0.006831	NP Intra (normality) 1 of 2
pH (SU)	MW-1012	10.85	8.69	n/a	1 future	n/a	23	n/a	n/a	0	n/a	n/a	0.006831	NP Intra (normality) 1 of 2
pH (SU)	MW-1203	8.87	6.02	n/a	1 future	n/a	23	n/a	n/a	0	n/a	n/a	0.006831	NP Intra (normality) 1 of 2
pH (SU)	MW-1601	8.266	6.24	n/a	1 future	n/a	21	7.253	0.4956	0	None	No	0.000752	Param Intra 1 of 2
pH (SU)	MW-1602	8.502	5.92	n/a	1 future	n/a	24	411.1	101.6	0	None	x^3	0.000752	Param Intra 1 of 2
pH (SU)	MW-1604	7.409	4.12	n/a	1 future	n/a	23	5.764	0.8154	0	None	No	0.000752	Param Intra 1 of 2
pH (SU)	MW-1605	6.047	3.904	n/a	1 future	n/a	22	4.975	0.5277	0	None	No	0.000752	Param Intra 1 of 2
pH (SU)	MW-1606	7.635	6.304	n/a	1 future	n/a	23	6.97	0.33	0	None	No	0.000752	Param Intra 1 of 2
pH (SU)	MW-1607	7.588	5.488	n/a	1 future	n/a	24	6.538	0.5242	0	None	No	0.000752	Param Intra 1 of 2

Prediction Limit

Intrawell Non-parametric, MW-1011 (bg)



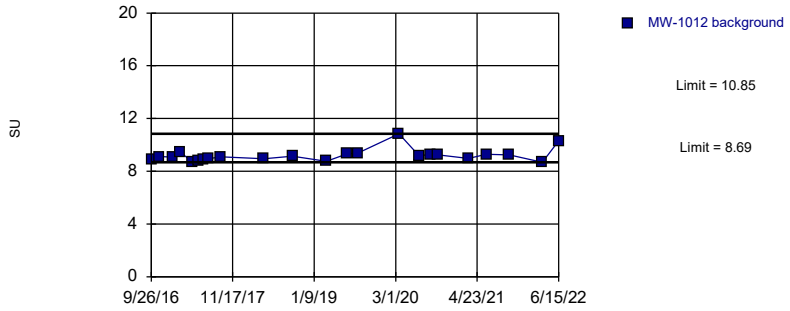
Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limits are highest and lowest of 23 background values. Well-constituent pair annual alpha = 0.01364. Individual comparison alpha = 0.006831 (1 of 2). Assumes 1 future value.

Constituent: pH Analysis Run 1/31/2024 11:57 AM View: Appendix III - Intrawell
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Prediction Limit

Intrawell Non-parametric, MW-1012 (bg)



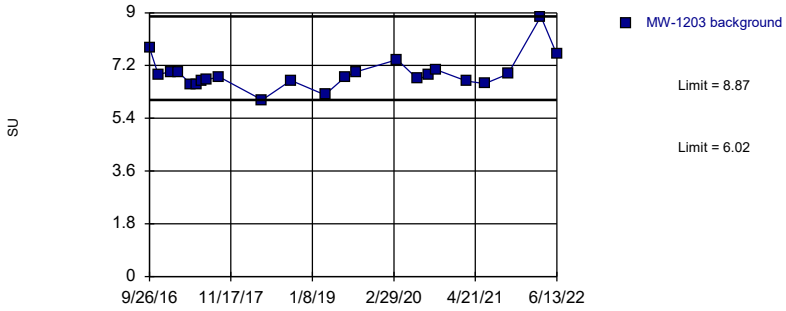
Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limits are highest and lowest of 23 background values. Well-constituent pair annual alpha = 0.01364. Individual comparison alpha = 0.006831 (1 of 2). Assumes 1 future value.

Constituent: pH Analysis Run 1/31/2024 11:57 AM View: Appendix III - Intrawell
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Prediction Limit

Intrawell Non-parametric, MW-1203 (bg)



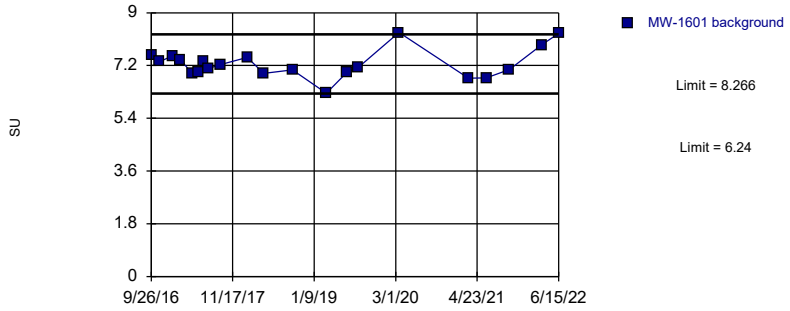
Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limits are highest and lowest of 23 background values. Well-constituent pair annual alpha = 0.01364. Individual comparison alpha = 0.006831 (1 of 2). Assumes 1 future value.

Constituent: pH Analysis Run 1/31/2024 11:57 AM View: Appendix III - Intrawell
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Prediction Limit

Intrawell Parametric, MW-1601

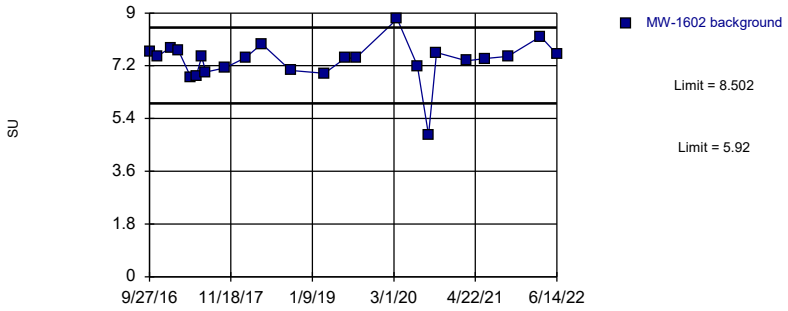


Background Data Summary: Mean=7.253, Std. Dev.=0.4956, n=21. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9369, critical = 0.873. Kappa = 2.044 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504. Assumes 1 future value.

Constituent: pH Analysis Run 1/31/2024 11:57 AM View: Appendix III - Intrawell
Big Sandy FAP Data: Big Sandy FAP

Prediction Limit

Intrawell Parametric, MW-1602



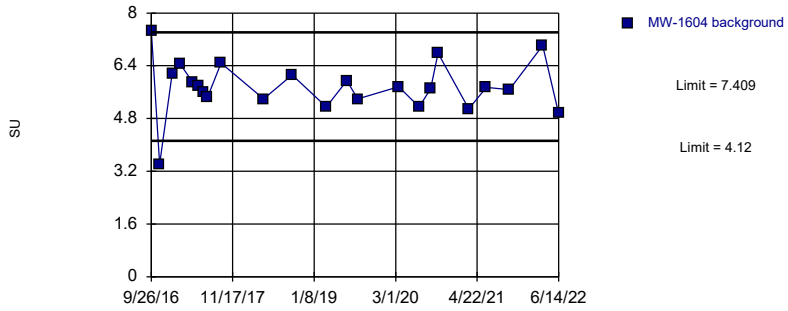
Background Data Summary (based on cube transformation): Mean=411.1, Std. Dev.=101.6, n=24. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9036, critical = 0.884. Kappa = 2.004 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504. Assumes 1 future value.

Constituent: pH Analysis Run 1/31/2024 11:57 AM View: Appendix III - Intrawell
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Prediction Limit

Intrawell Parametric, MW-1604 (bg)



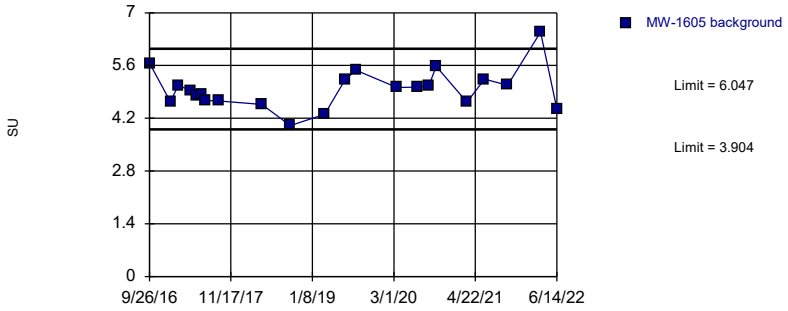
Background Data Summary: Mean=5.764, Std. Dev.=0.8154, n=23. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9412, critical = 0.881. Kappa = 2.017 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504. Assumes 1 future value.

Constituent: pH Analysis Run 1/31/2024 11:57 AM View: Appendix III - Intrawell
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Prediction Limit

Intrawell Parametric, MW-1605 (bg)



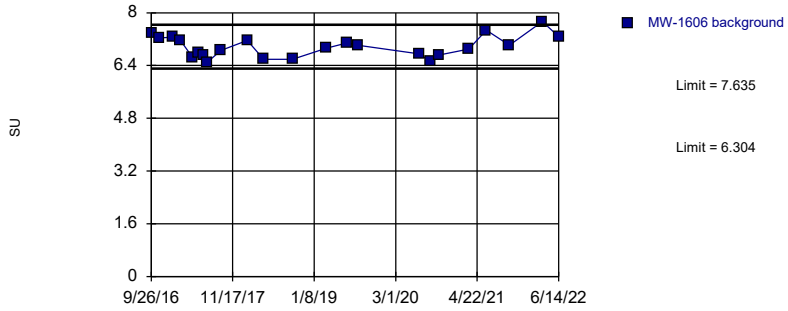
Background Data Summary: Mean=4.975, Std. Dev.=0.5277, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9452, critical = 0.878. Kappa = 2.031 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504. Assumes 1 future value.

Constituent: pH Analysis Run 1/31/2024 11:57 AM View: Appendix III - Intrawell
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Prediction Limit

Intrawell Parametric, MW-1606

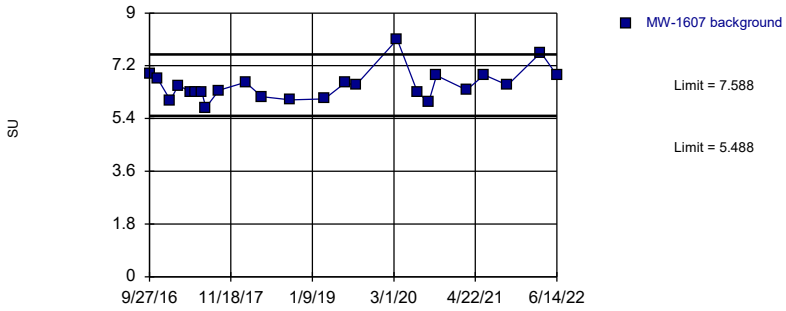


Background Data Summary: Mean=6.97, Std. Dev.=0.33, n=23. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9598, critical = 0.881. Kappa = 2.017 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504. Assumes 1 future value.

Constituent: pH Analysis Run 1/31/2024 11:57 AM View: Appendix III - Intrawell
Big Sandy FAP Data: Big Sandy FAP

Prediction Limit

Intrawell Parametric, MW-1607



Background Data Summary: Mean=6.538, Std. Dev.=0.5242, n=24. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8903, critical = 0.884. Kappa = 2.004 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504. Assumes 1 future value.

Constituent: pH Analysis Run 1/31/2024 11:57 AM View: Appendix III - Intrawell
Big Sandy FAP Data: Big Sandy FAP

FIGURE E
Upgradient Trend Tests

Appendix III - Upgradient Wells Trend Test - Significant Results

Big Sandy FAP Data: Big Sandy FAP Printed 1/26/2024, 1:22 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Chloride (mg/L)	**MW-1011 (bg)**	**0.2937**	**100**	**98**	**Yes**	**23**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Chloride (mg/L)	**MW-1012 (bg)**	**0.04701**	**130**	**92**	**Yes**	**22**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Chloride (mg/L)	**MW-1604 (bg)**	**-0.1908**	**-159**	**-92**	**Yes**	**22**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Chloride (mg/L)	**MW-1605 (bg)**	**-0.05482**	**-99**	**-98**	**Yes**	**23**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Fluoride (mg/L)	**MW-1011 (bg)**	**0.008147**	**122**	**118**	**Yes**	**26**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Fluoride (mg/L)	**MW-1012 (bg)**	**0.02186**	**173**	**118**	**Yes**	**26**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Fluoride (mg/L)	**MW-1604 (bg)**	**-0.01009**	**-212**	**-118**	**Yes**	**26**	**7.692**	**n/a**	**n/a**	**0.01**	**NP**
Total Dissolved Solids (mg/L)	**MW-1011 (bg)**	**3.604**	**93**	**92**	**Yes**	**22**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Total Dissolved Solids (mg/L)	**MW-1012 (bg)**	**5.322**	**102**	**87**	**Yes**	**21**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Total Dissolved Solids (mg/L)	**MW-1604 (bg)**	**-9.878**	**-123**	**-87**	**Yes**	**21**	**0**	**n/a**	**n/a**	**0.01**	**NP**

Appendix III - Upgradient Wells Trend Test - All Results

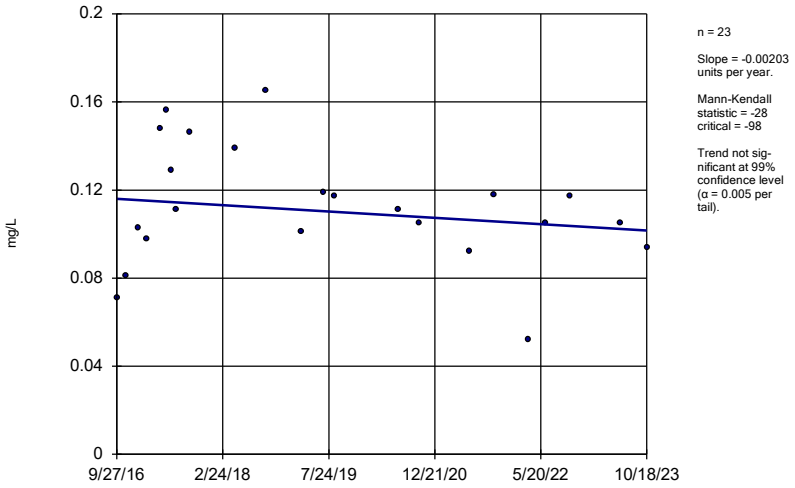
Big Sandy FAP Data: Big Sandy FAP Printed 1/26/2024, 1:22 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Boron (mg/L)	MW-1011 (bg)	-0.00203	-28	-98	No	23	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-1012 (bg)	0.001819	32	92	No	22	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-1203 (bg)	-0.00073	-20	-98	No	23	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-1604 (bg)	-0.002852	-82	-92	No	22	13.64	n/a	n/a	0.01	NP
Boron (mg/L)	MW-1605 (bg)	-0.001398	-31	-98	No	23	26.09	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-1011 (bg)	0.4855	40	98	No	23	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-1012 (bg)	0.02704	46	92	No	22	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-1203 (bg)	0.4647	47	98	No	23	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-1604 (bg)	-0.1272	-58	-92	No	22	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-1605 (bg)	0.02658	55	98	No	23	0	n/a	n/a	0.01	NP
Chloride (mg/L)	**MW-1011 (bg)**	**0.2937**	**100**	**98**	**Yes**	**23**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Chloride (mg/L)	**MW-1012 (bg)**	**0.04701**	**130**	**92**	**Yes**	**22**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Chloride (mg/L)	MW-1203 (bg)	-0.05678	-83	-98	No	23	0	n/a	n/a	0.01	NP
Chloride (mg/L)	**MW-1604 (bg)**	**-0.1908**	**-159**	**-92**	**Yes**	**22**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Chloride (mg/L)	**MW-1605 (bg)**	**-0.05482**	**-99**	**-98**	**Yes**	**23**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Fluoride (mg/L)	**MW-1011 (bg)**	**0.008147**	**122**	**118**	**Yes**	**26**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Fluoride (mg/L)	**MW-1012 (bg)**	**0.02186**	**173**	**118**	**Yes**	**26**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Fluoride (mg/L)	MW-1203 (bg)	0	24	118	No	26	0	n/a	n/a	0.01	NP
Fluoride (mg/L)	**MW-1604 (bg)**	**-0.01009**	**-212**	**-118**	**Yes**	**26**	**7.692**	**n/a**	**n/a**	**0.01**	**NP**
Fluoride (mg/L)	MW-1605 (bg)	0	-33	-111	No	25	72	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-1011 (bg)	1.07	85	98	No	23	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-1012 (bg)	0.2179	40	92	No	22	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-1203 (bg)	-0.1193	-14	-98	No	23	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-1604 (bg)	0.1227	21	92	No	22	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-1605 (bg)	-0.01641	-7	-98	No	23	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	**MW-1011 (bg)**	**3.604**	**93**	**92**	**Yes**	**22**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Total Dissolved Solids (mg/L)	**MW-1012 (bg)**	**5.322**	**102**	**87**	**Yes**	**21**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Total Dissolved Solids (mg/L)	MW-1203 (bg)	0	-3	-92	No	22	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	**MW-1604 (bg)**	**-9.878**	**-123**	**-87**	**Yes**	**21**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Total Dissolved Solids (mg/L)	MW-1605 (bg)	1.978	59	92	No	22	4.545	n/a	n/a	0.01	NP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1011 (bg)



n = 23

Slope = -0.00203 units per year.

Mann-Kendall statistic = -28
critical = -98

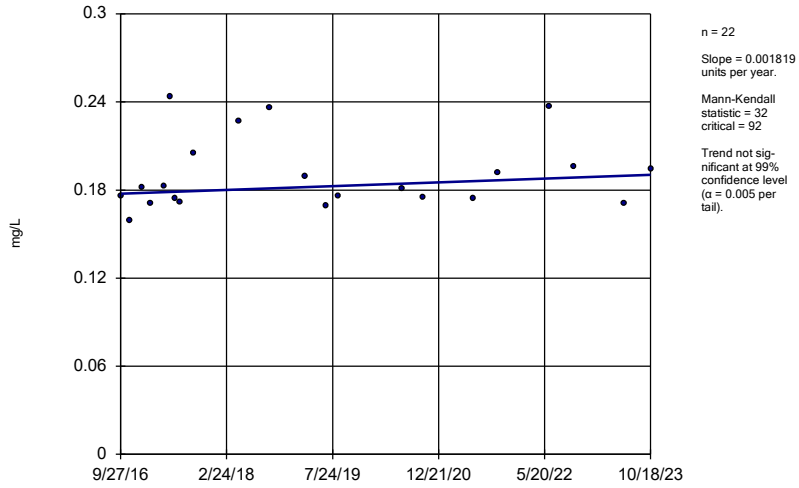
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Boron Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1012 (bg)



n = 22

Slope = 0.001819 units per year.

Mann-Kendall statistic = 32
critical = 92

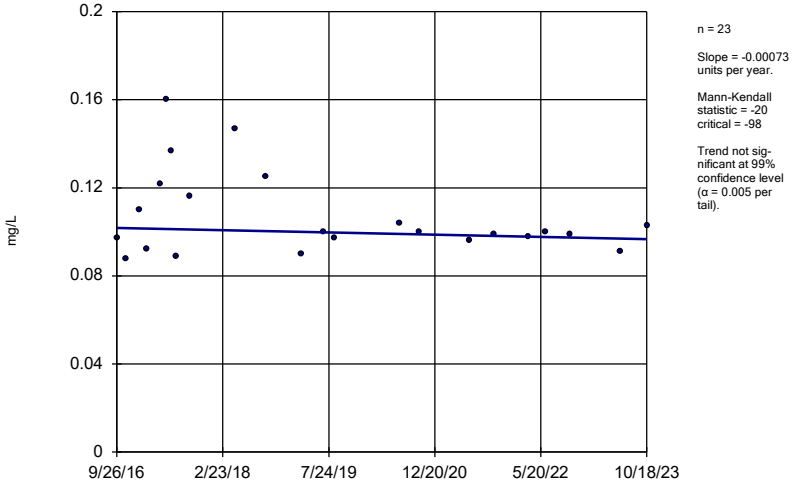
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Boron Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1203 (bg)



n = 23

Slope = -0.00073 units per year.

Mann-Kendall statistic = -20
critical = -98

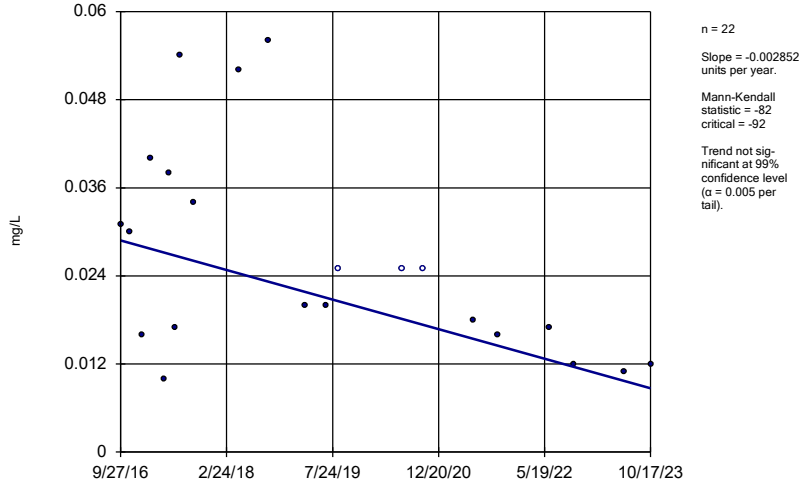
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Boron Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-1604 (bg)



n = 22

Slope = -0.002852 units per year.

Mann-Kendall statistic = -82
critical = -92

Trend not significant at 99% confidence level (α = 0.005 per tail).

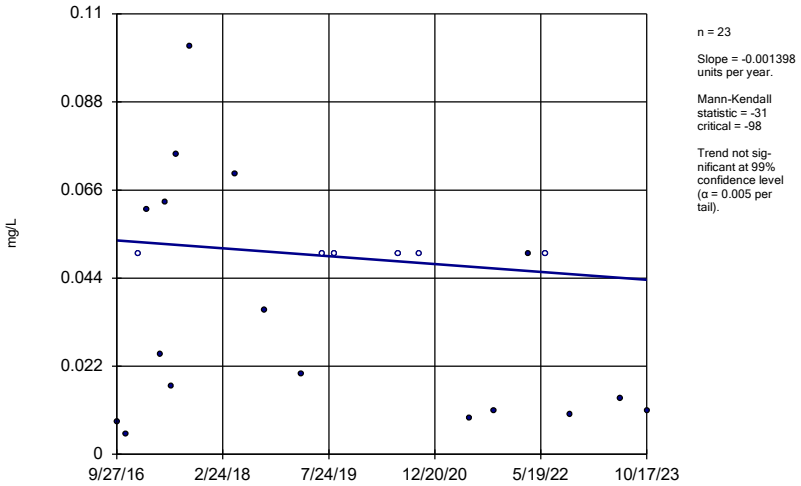
Constituent: Boron Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-1605 (bg)



n = 23

Slope = -0.001398 units per year.

Mann-Kendall statistic = -31
critical = -98

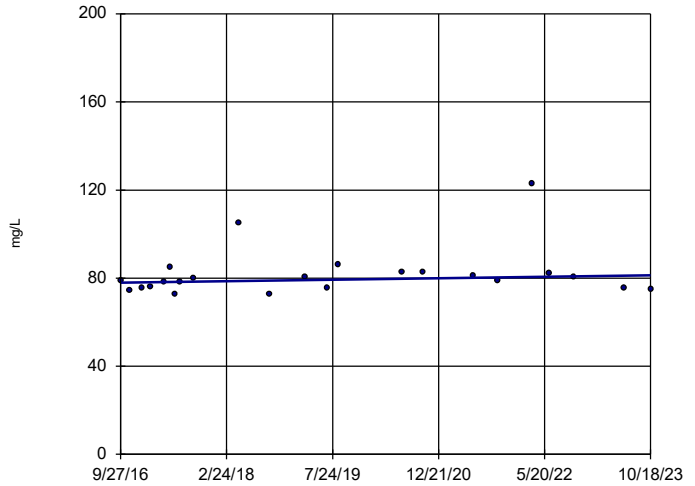
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Boron Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1011 (bg)



n = 23

Slope = 0.4855 units per year.

Mann-Kendall statistic = 40
critical = 98

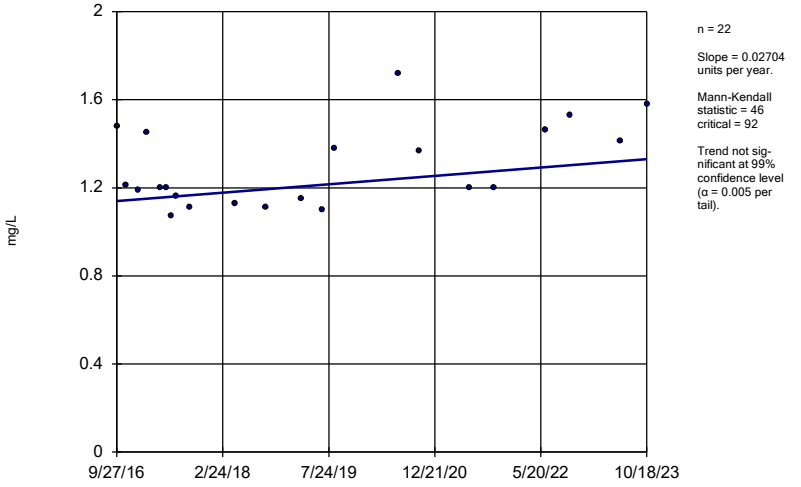
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Calcium Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1012 (bg)



n = 22

Slope = 0.02704 units per year.

Mann-Kendall statistic = 46
critical = 92

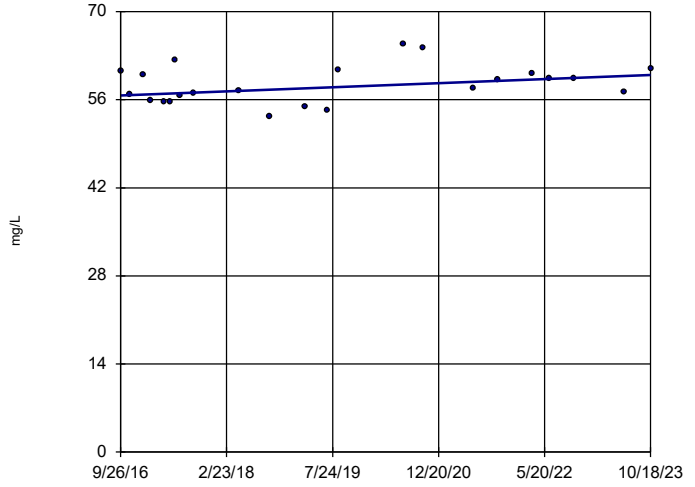
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Calcium Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1203 (bg)



n = 23

Slope = 0.4647 units per year.

Mann-Kendall statistic = 47
critical = 98

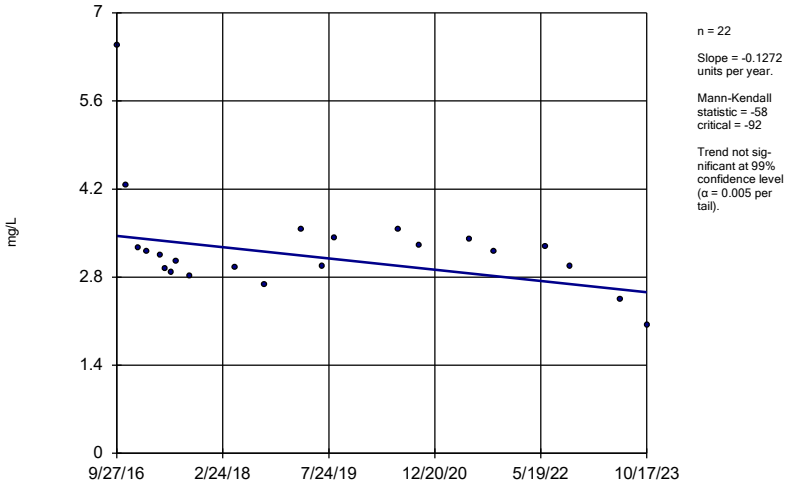
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Calcium Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1604 (bg)



n = 22

Slope = -0.1272 units per year.

Mann-Kendall statistic = -58 critical = -92

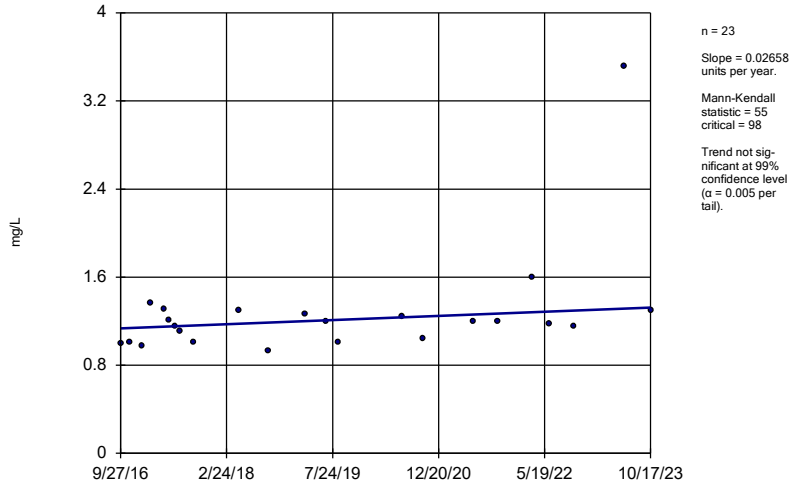
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Calcium Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1605 (bg)



n = 23

Slope = 0.02658 units per year.

Mann-Kendall statistic = 55 critical = 98

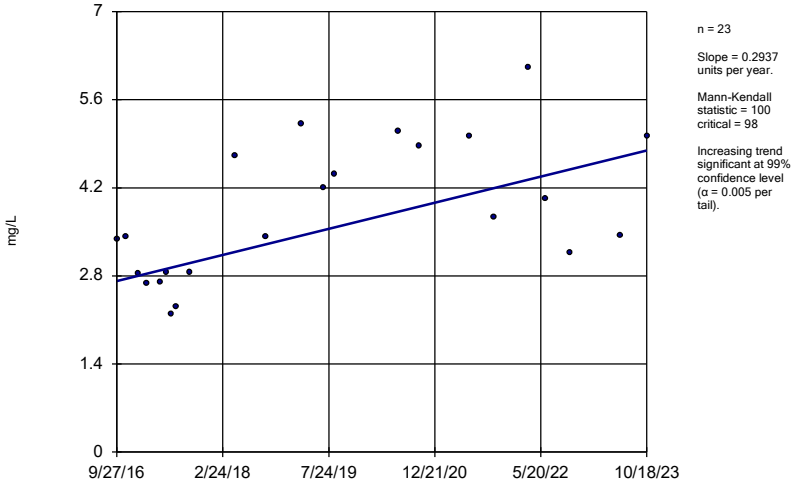
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Calcium Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1011 (bg)



n = 23

Slope = 0.2937 units per year.

Mann-Kendall statistic = 100 critical = 98

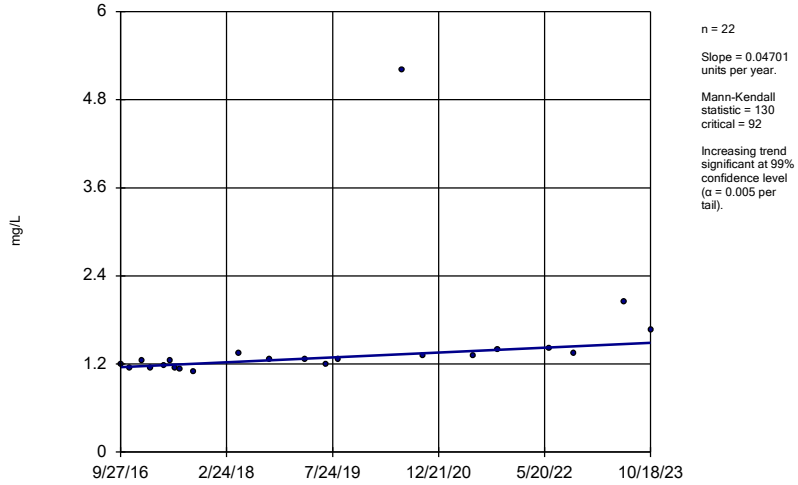
Increasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1012 (bg)



n = 22

Slope = 0.04701 units per year.

Mann-Kendall statistic = 130 critical = 92

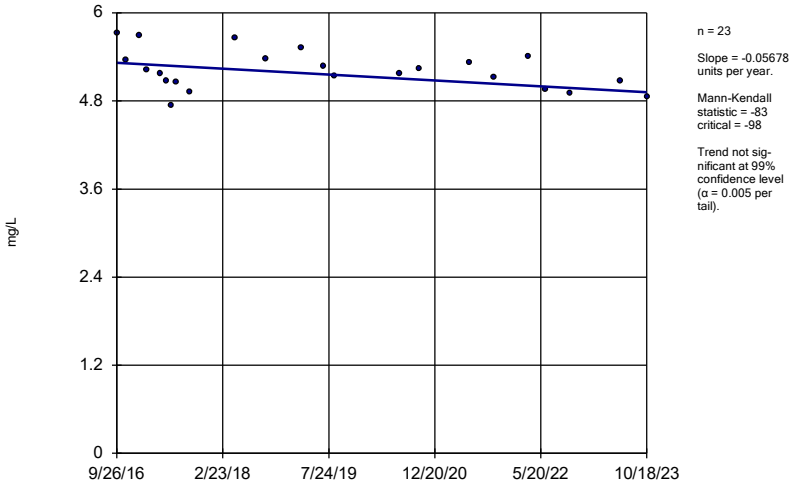
Increasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1203 (bg)



n = 23

Slope = -0.05678 units per year.

Mann-Kendall statistic = -83
critical = -98

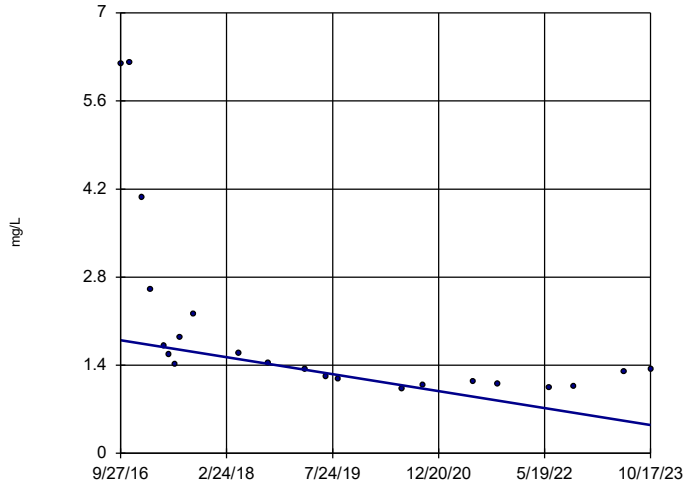
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1604 (bg)



n = 22

Slope = -0.1908 units per year.

Mann-Kendall statistic = -159
critical = -92

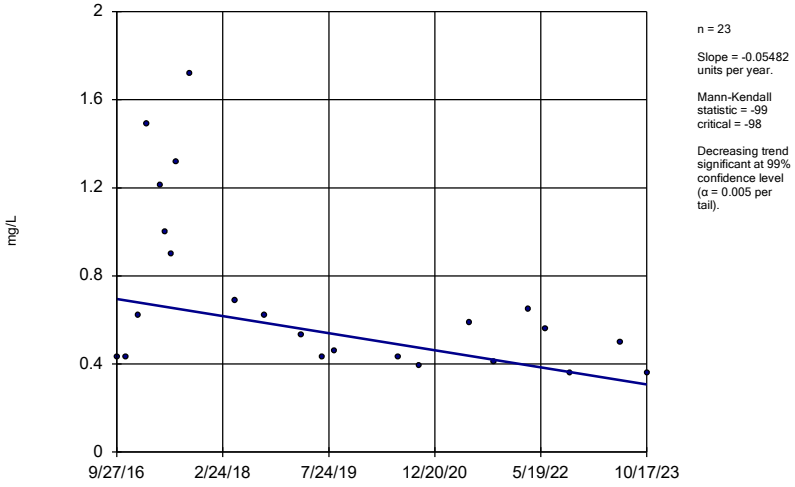
Decreasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1605 (bg)



n = 23

Slope = -0.05482 units per year.

Mann-Kendall statistic = -99
critical = -98

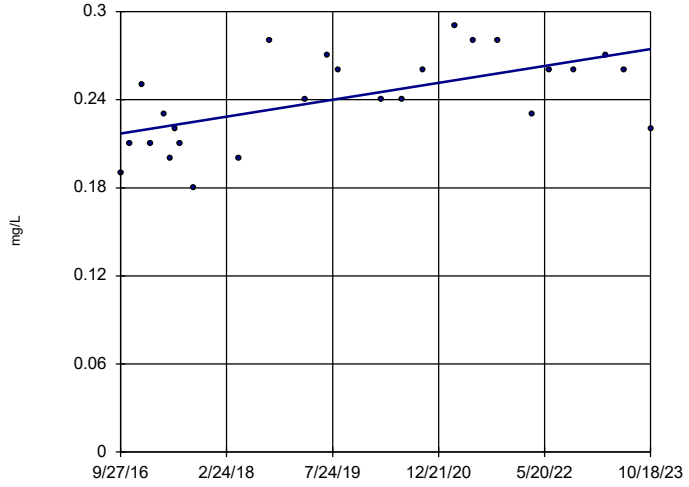
Decreasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1011 (bg)



n = 26

Slope = 0.008147 units per year.

Mann-Kendall statistic = 122
critical = 118

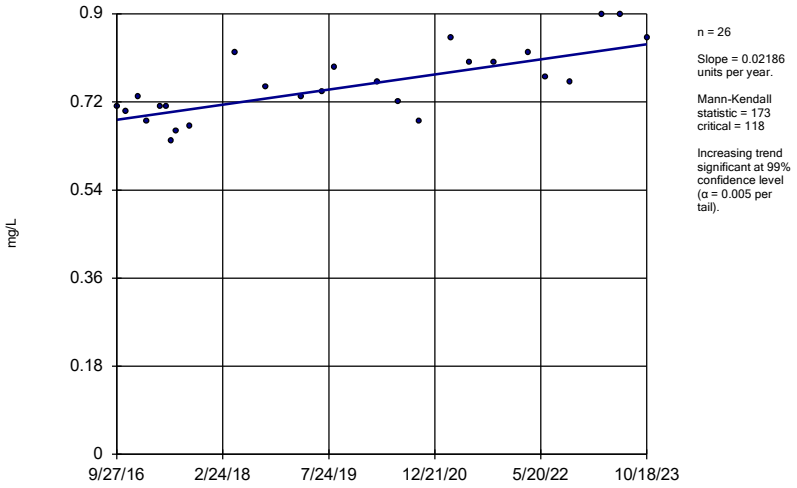
Increasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Fluoride Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1012 (bg)



n = 26

Slope = 0.02186 units per year.

Mann-Kendall statistic = 173
critical = 118

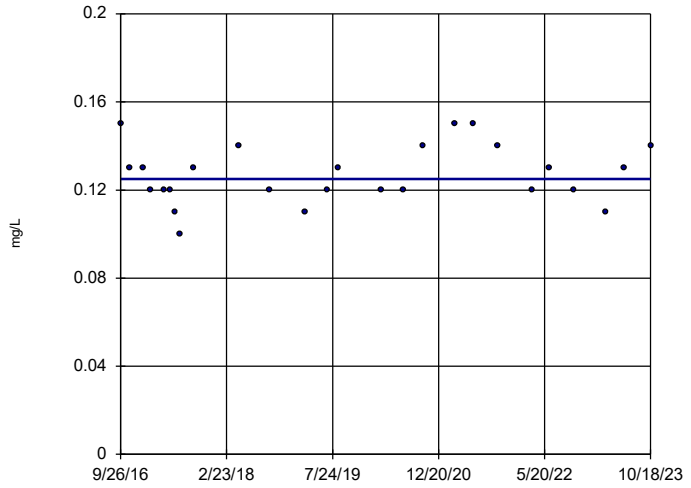
Increasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Fluoride Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1203 (bg)



n = 26

Slope = 0 units per year.

Mann-Kendall statistic = 24
critical = 118

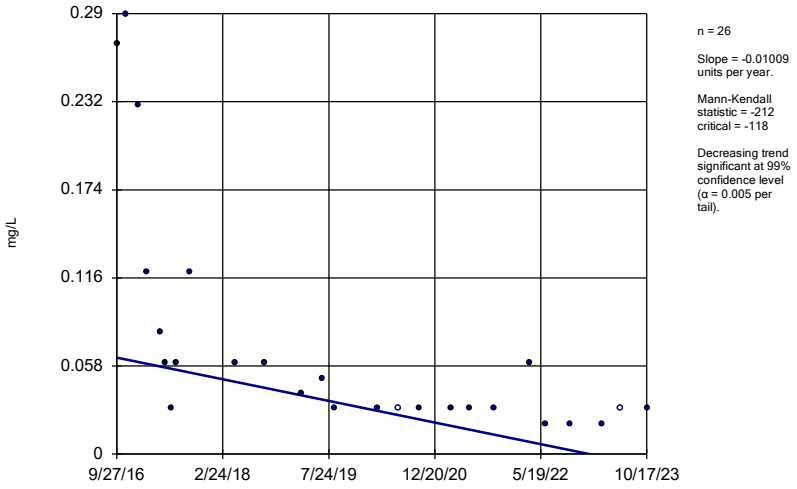
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Fluoride Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-1604 (bg)



n = 26

Slope = -0.01009 units per year.

Mann-Kendall statistic = -212
critical = -118

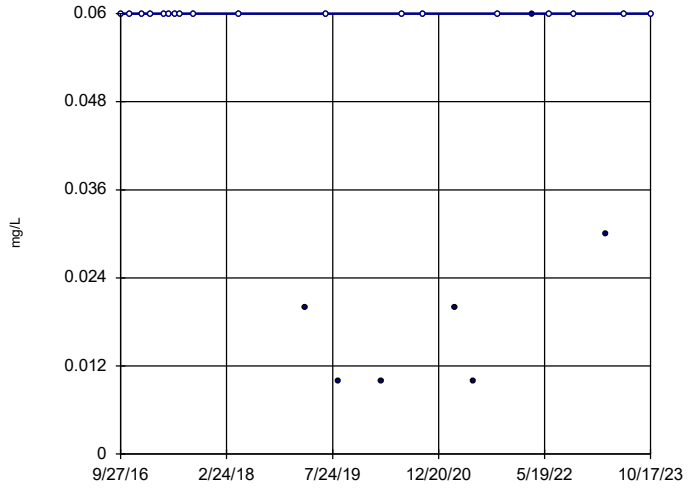
Decreasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Fluoride Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-1605 (bg)



n = 25

Slope = 0 units per year.

Mann-Kendall statistic = -33
critical = -111

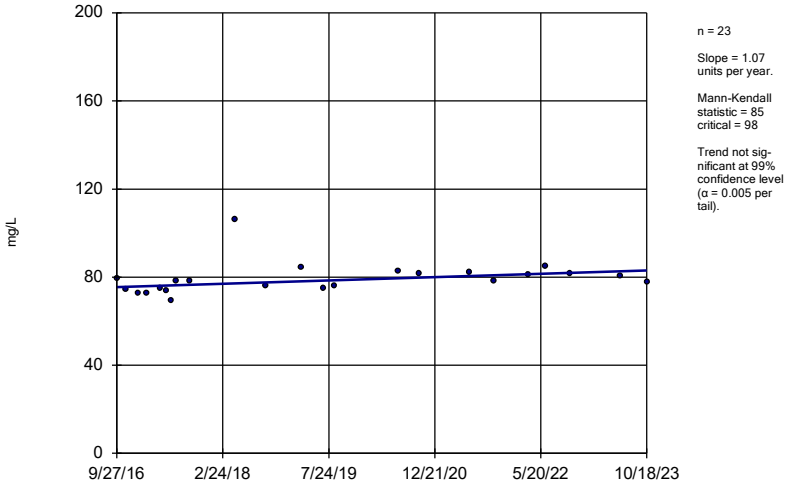
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Fluoride Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1011 (bg)



n = 23

Slope = 1.07 units per year.

Mann-Kendall statistic = 85 critical = 98

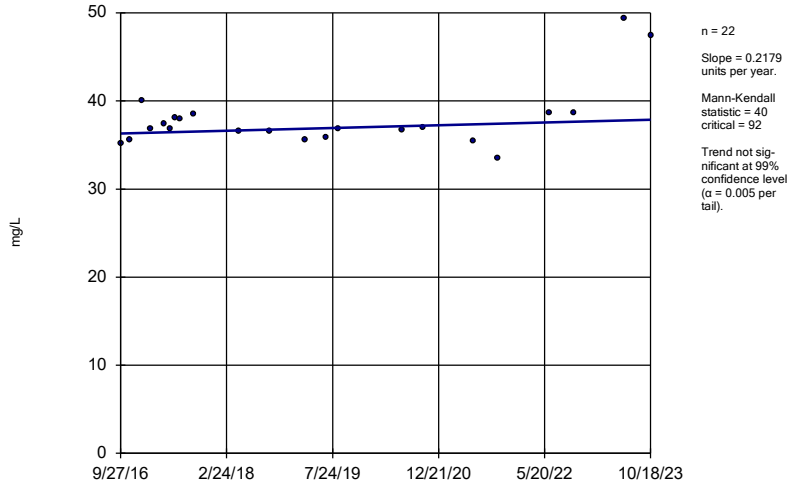
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Sulfate Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1012 (bg)



n = 22

Slope = 0.2179 units per year.

Mann-Kendall statistic = 40 critical = 92

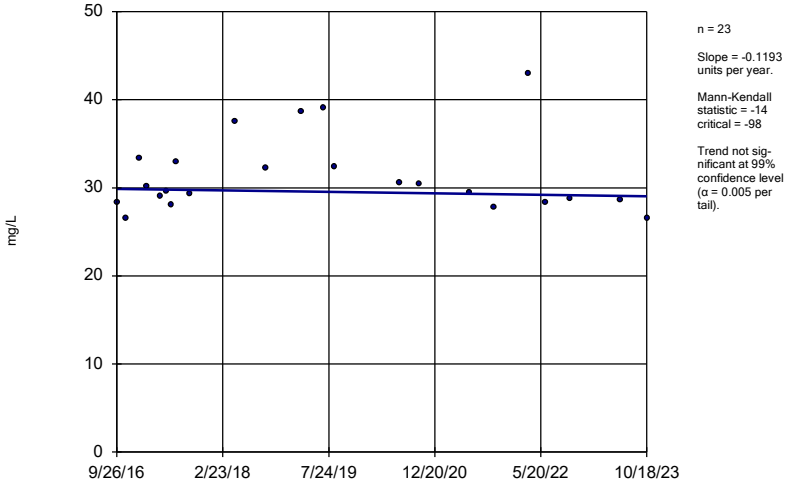
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Sulfate Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1203 (bg)



n = 23

Slope = -0.1193 units per year.

Mann-Kendall statistic = -14 critical = -98

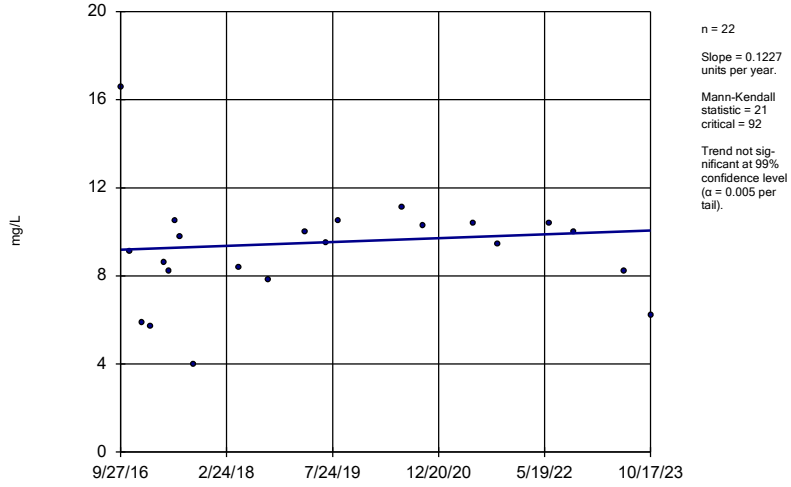
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Sulfate Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1604 (bg)



n = 22

Slope = 0.1227 units per year.

Mann-Kendall statistic = 21 critical = 92

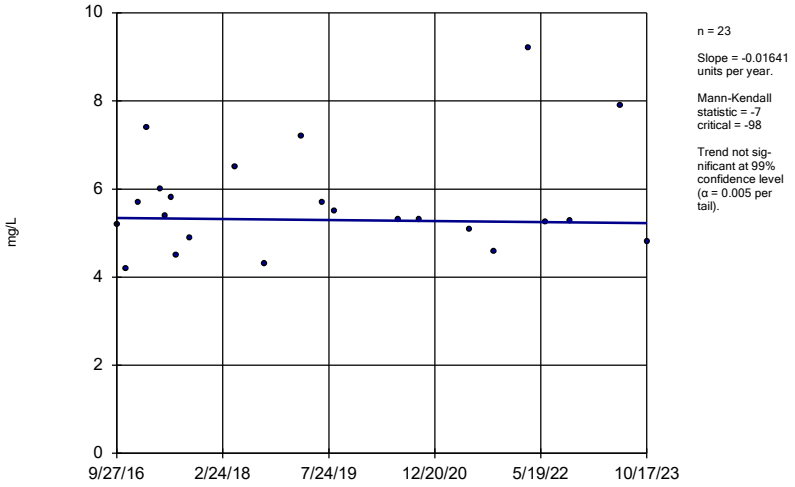
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Sulfate Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1605 (bg)



n = 23

Slope = -0.01641 units per year.

Mann-Kendall statistic = -7
critical = -98

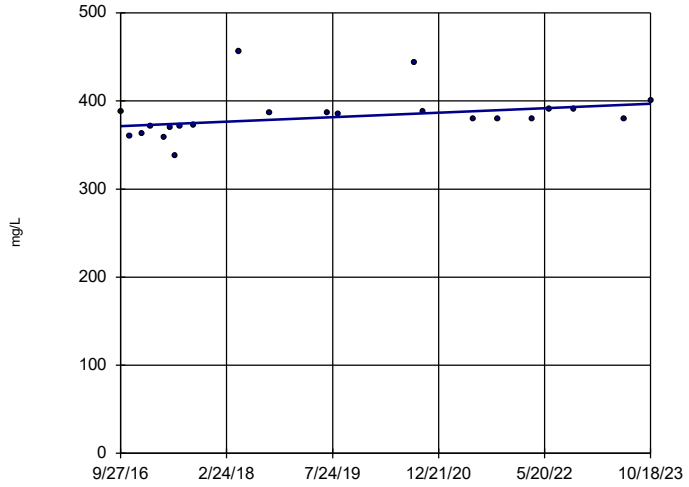
Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Sulfate Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Wells
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1011 (bg)



n = 22

Slope = 3.604 units per year.

Mann-Kendall statistic = 93
critical = 92

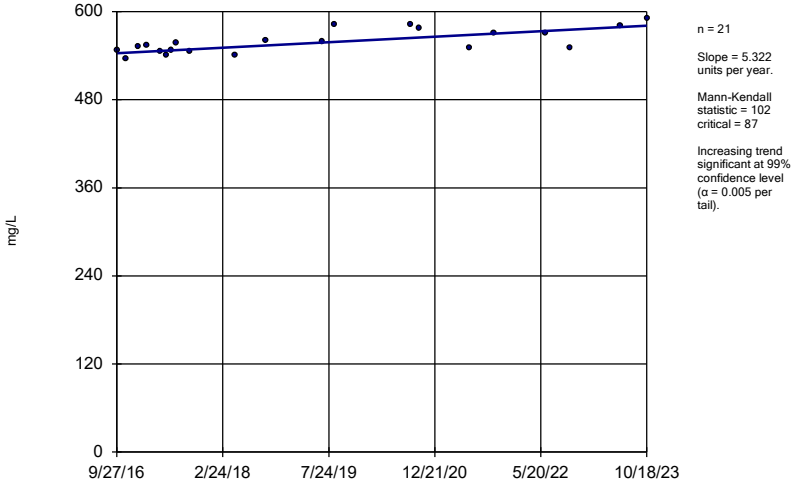
Increasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Total Dissolved Solids Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Well
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1012 (bg)



n = 21

Slope = 5.322 units per year.

Mann-Kendall statistic = 102
critical = 87

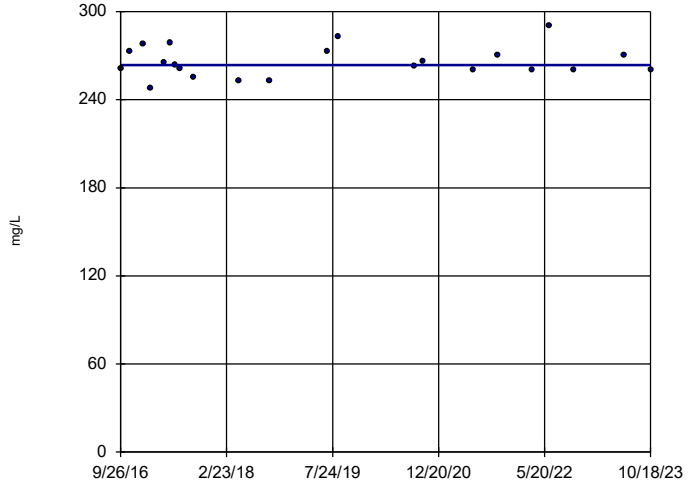
Increasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Total Dissolved Solids Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Well
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Sen's Slope Estimator

MW-1203 (bg)



n = 22

Slope = 0 units per year.

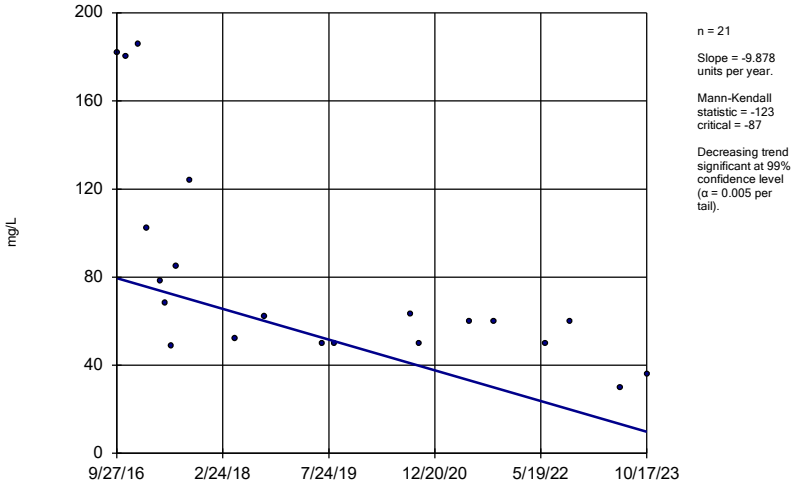
Mann-Kendall statistic = -3
critical = -92

Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Total Dissolved Solids Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Well
Big Sandy FAP Data: Big Sandy FAP

Sen's Slope Estimator

MW-1604 (bg)

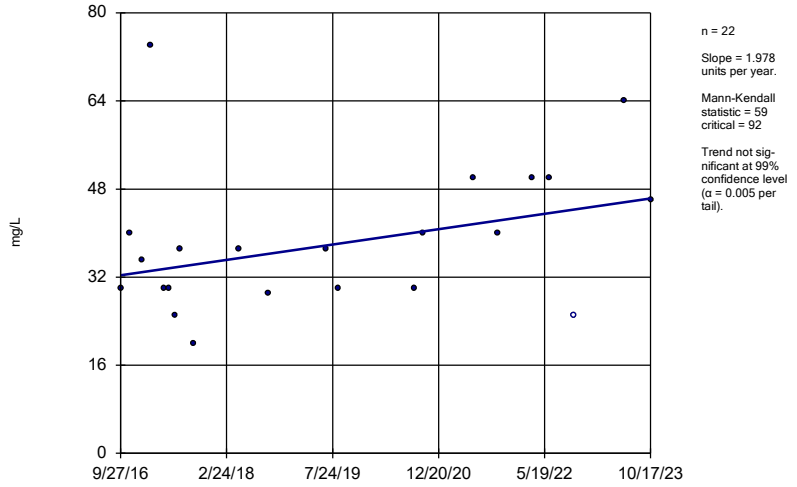


Constituent: Total Dissolved Solids Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Well
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-1605 (bg)



Constituent: Total Dissolved Solids Analysis Run 1/26/2024 1:21 PM View: Appendix III - Upgradient Well
Big Sandy FAP Data: Big Sandy FAP

FIGURE F

Interwell PLs

Appendix III - Interwell Prediction Limits - All Results

Big Sandy FAP Data: Big Sandy FAP Printed 1/26/2024, 1:28 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Boron (mg/L)	n/a	0.244	n/a	n/a	5 future	n/a	113	n/a	n/a	7.965	n/a	n/a	0.0001555	NP Inter (normality) 1 of 2
Calcium (mg/L)	n/a	123	n/a	n/a	5 future	n/a	113	n/a	n/a	0	n/a	n/a	0.0001555	NP Inter (normality) 1 of 2
Chloride (mg/L)	n/a	6.22	n/a	n/a	5 future	n/a	113	n/a	n/a	0	n/a	n/a	0.0001555	NP Inter (normality) 1 of 2
Fluoride (mg/L)	n/a	0.9	n/a	n/a	5 future	n/a	129	n/a	n/a	15.5	n/a	n/a	0.0001191	NP Inter (normality) 1 of 2
Sulfate (mg/L)	n/a	106	n/a	n/a	5 future	n/a	113	n/a	n/a	0	n/a	n/a	0.0001555	NP Inter (normality) 1 of 2
Total Dissolved Solids (mg/L)	n/a	590	n/a	n/a	5 future	n/a	108	n/a	n/a	0.9259	n/a	n/a	0.0001701	NP Inter (normality) 1 of 2

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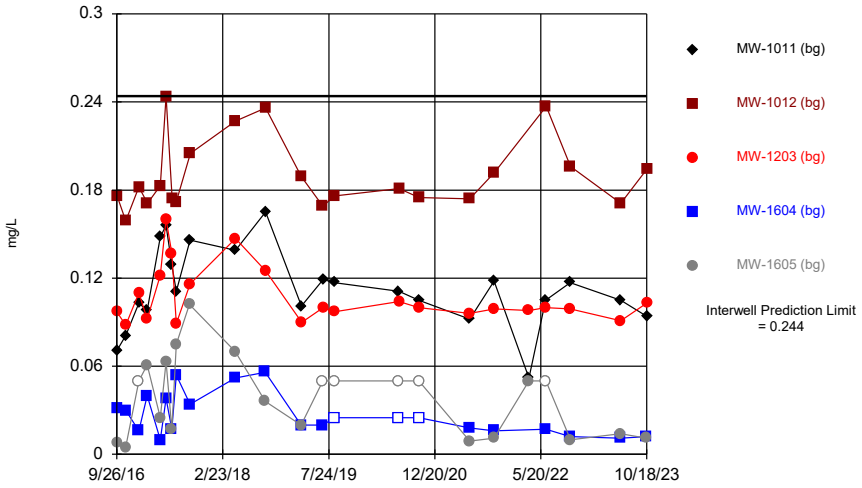
Hollow symbols indicate censored values.

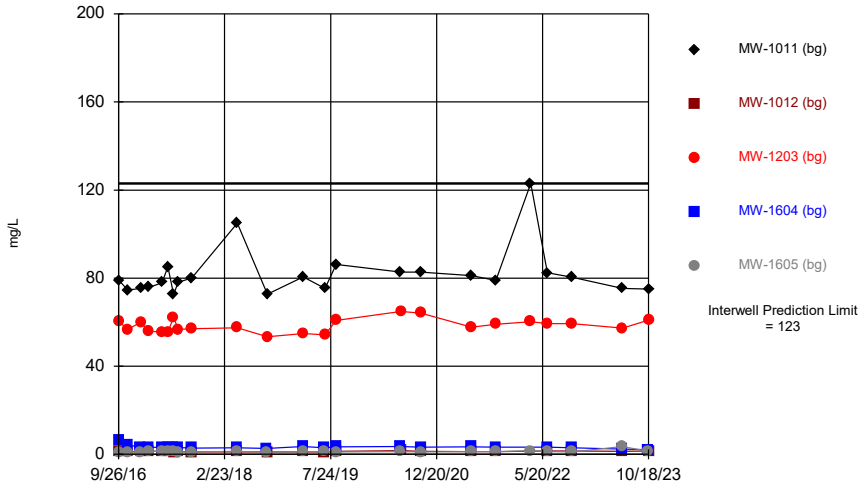
Time Series



Constituent: Boron Analysis Run 2/2/2024 10:47 AM View: Appendix III - Interwell
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 Software licensed to . UG

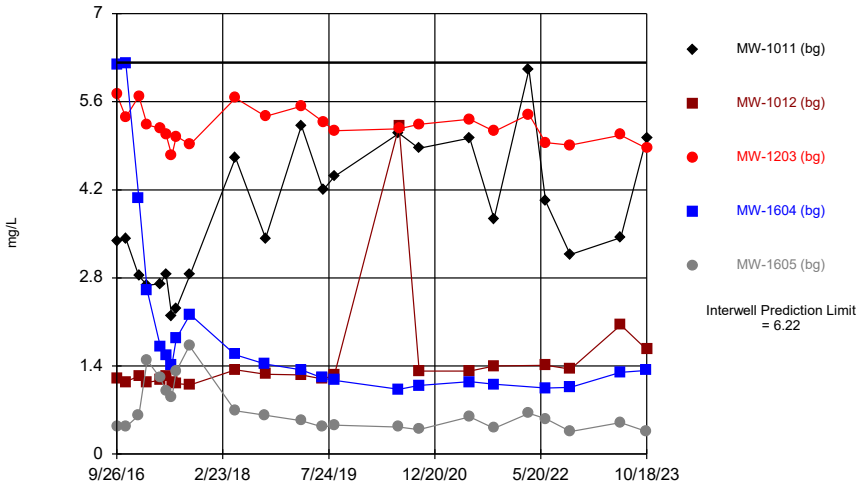
Time Series



Constituent: Calcium Analysis Run 2/2/2024 10:47 AM View: Appendix III - Interwell
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 Software licensed to . UG

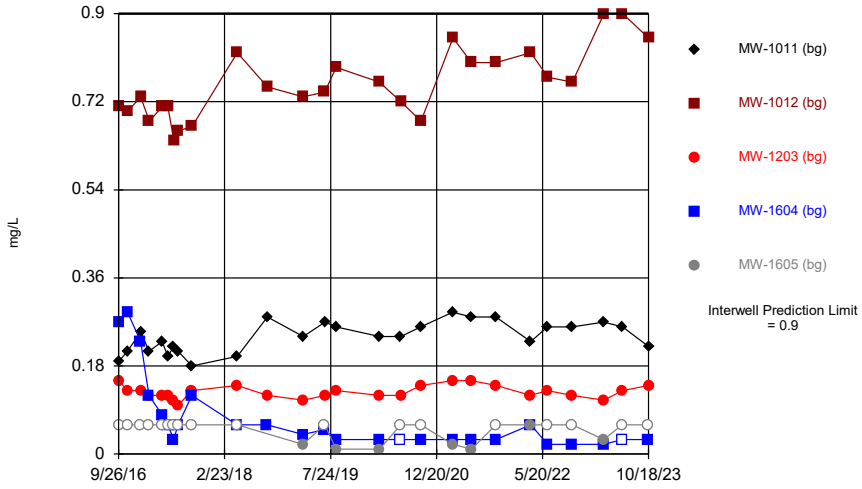
Time Series



Constituent: Chloride Analysis Run 2/2/2024 10:47 AM View: Appendix III - Interwell
Big Sandy FAP Data: Big Sandy FAP

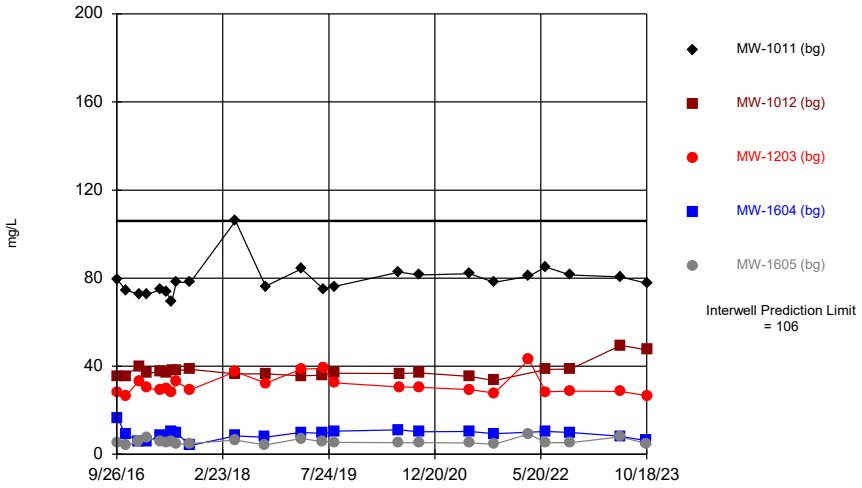
Sanitas™ v.10.0.15 Software licensed to . UG
Hollow symbols indicate censored values.

Time Series



Constituent: Fluoride Analysis Run 2/2/2024 10:47 AM View: Appendix III - Interwell
Big Sandy FAP Data: Big Sandy FAP

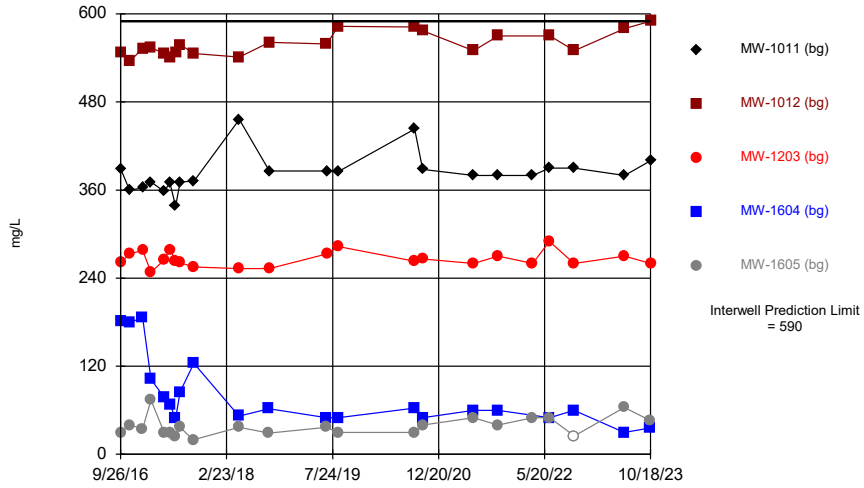
Time Series



Constituent: Sulfate Analysis Run 2/2/2024 10:47 AM View: Appendix III - Interwell
Big Sandy FAP Data: Big Sandy FAP

Hollow symbols indicate censored values.

Time Series

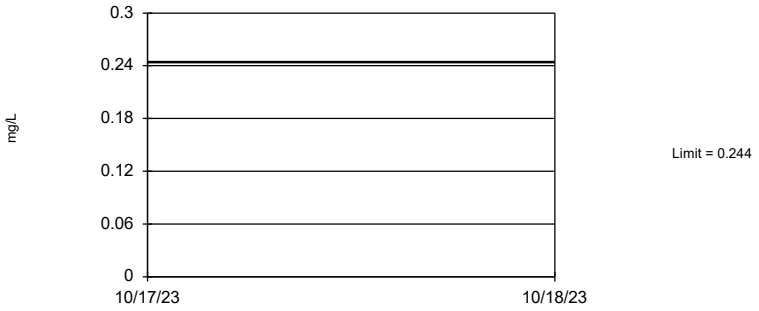


Constituent: Total Dissolved Solids Analysis Run 2/2/2024 10:47 AM View: Appendix III - Interwell
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Prediction Limit

Interwell Non-parametric



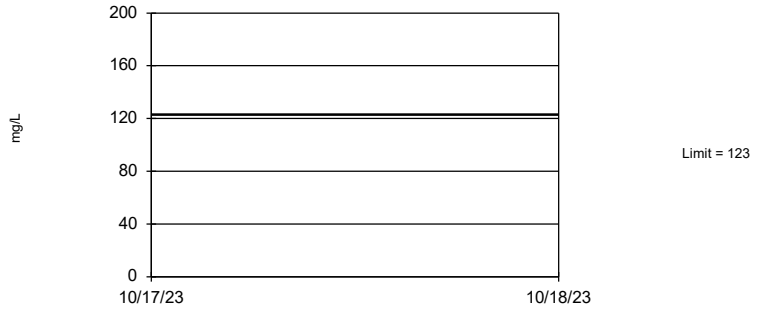
Non-parametric test used in lieu of parametric prediction limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 113 background values. 7.965% NDs. Annual per-constituent alpha = 0.001554. Individual comparison alpha = 0.0001555 (1 of 2). Assumes 5 future values.

Constituent: Boron Analysis Run 1/26/2024 1:26 PM View: Appendix III - Interwell
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Prediction Limit

Interwell Non-parametric



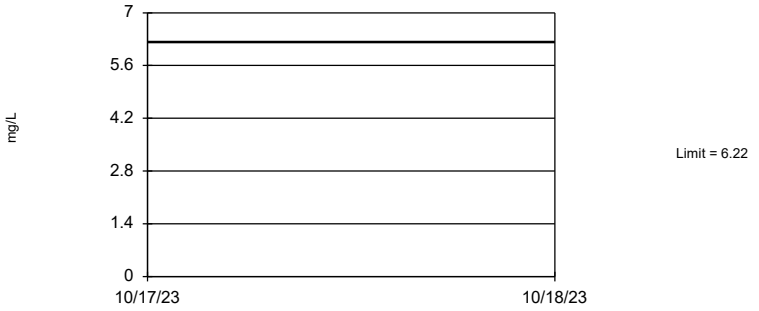
Non-parametric test used in lieu of parametric prediction limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 113 background values. Annual per-constituent alpha = 0.001554. Individual comparison alpha = 0.0001555 (1 of 2). Assumes 5 future values.

Constituent: Calcium Analysis Run 1/26/2024 1:26 PM View: Appendix III - Interwell
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Prediction Limit

Interwell Non-parametric



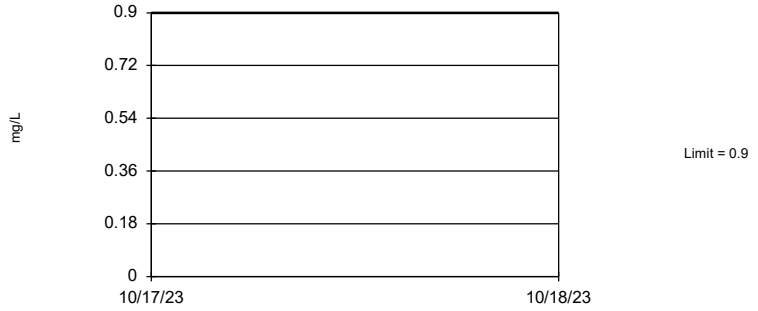
Non-parametric test used in lieu of parametric prediction limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 113 background values. Annual per-constituent alpha = 0.001554. Individual comparison alpha = 0.0001555 (1 of 2). Assumes 5 future values.

Constituent: Chloride Analysis Run 1/26/2024 1:26 PM View: Appendix III - Interwell
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Prediction Limit

Interwell Non-parametric

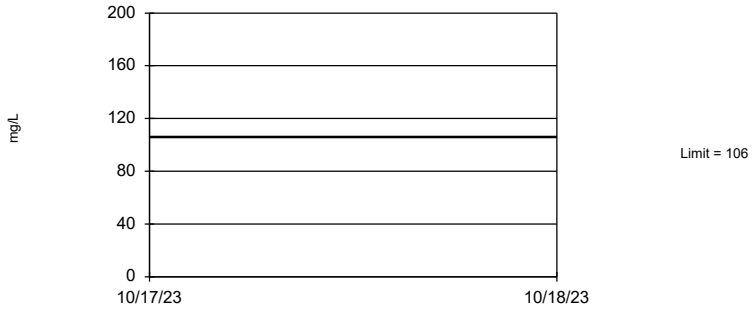


Non-parametric test used in lieu of parametric prediction limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 129 background values. 15.5% NDs. Annual per-constituent alpha = 0.001191. Individual comparison alpha = 0.0001191 (1 of 2). Assumes 5 future values.

Constituent: Fluoride Analysis Run 1/26/2024 1:26 PM View: Appendix III - Interwell
Big Sandy FAP Data: Big Sandy FAP

Prediction Limit

Interwell Non-parametric



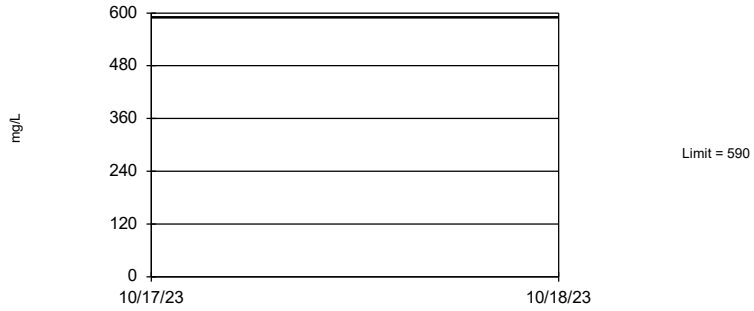
Non-parametric test used in lieu of parametric prediction limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 113 background values. Annual per-constituent alpha = 0.001554. Individual comparison alpha = 0.0001555 (1 of 2). Assumes 5 future values.

Constituent: Sulfate Analysis Run 1/26/2024 1:26 PM View: Appendix III - Interwell
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 108 background values. 0.9259% NDs. Annual per-constituent alpha = 0.001699. Individual comparison alpha = 0.0001701 (1 of 2). Assumes 5 future values.

Constituent: Total Dissolved Solids Analysis Run 1/26/2024 1:26 PM View: Appendix III - Interwell
Big Sandy FAP Data: Big Sandy FAP

FIGURE G

UTLs

Upper Tolerance Limits Summary Table

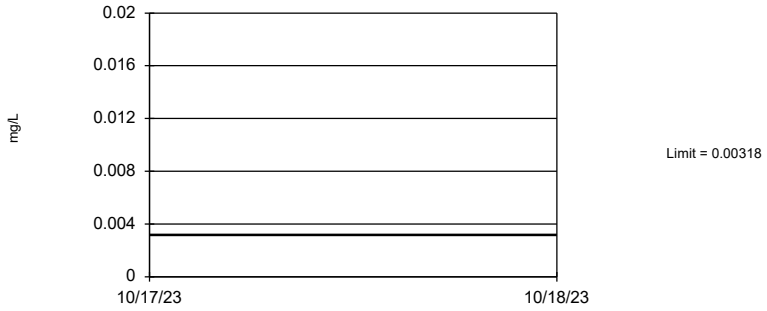
Big Sandy FAP Data: Big Sandy FAP Printed 1/29/2024, 2:30 PM

Constituent	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Antimony (mg/L)	0.00318	n/a	n/a	n/a	n/a	125	22.4	n/a	0.001642	NP Inter(normality)
Arsenic (mg/L)	0.0289	n/a	n/a	n/a	n/a	119	5.042	n/a	0.002234	NP Inter(normality)
Barium (mg/L)	0.113	n/a	n/a	n/a	n/a	125	0	n/a	0.001642	NP Inter(normality)
Beryllium (mg/L)	0.000349	n/a	n/a	n/a	n/a	125	18.4	n/a	0.001642	NP Inter(normality)
Cadmium (mg/L)	0.00014	n/a	n/a	n/a	n/a	125	28	n/a	0.001642	NP Inter(normality)
Chromium (mg/L)	0.0066	n/a	n/a	n/a	n/a	124	0	n/a	0.001729	NP Inter(normality)
Cobalt (mg/L)	0.003536	n/a	n/a	n/a	n/a	125	0	ln(x)	0.05	Inter
Combined Radium 226 + 228 (pCi/L)	4.521	n/a	n/a	n/a	n/a	120	0	x^(1/3)	0.05	Inter
Fluoride (mg/L)	0.9	n/a	n/a	n/a	n/a	129	15.5	n/a	0.001338	NP Inter(normality)
Lead (mg/L)	0.00255	n/a	n/a	n/a	n/a	125	11.2	n/a	0.001642	NP Inter(normality)
Lithium (mg/L)	0.02	n/a	n/a	n/a	n/a	125	8.8	n/a	0.001642	NP Inter(normality)
Mercury (mg/L)	0.000013	n/a	n/a	n/a	n/a	125	80	n/a	0.001642	NP Inter(NDs)
Molybdenum (mg/L)	0.0091	n/a	n/a	n/a	n/a	123	30.08	n/a	0.00182	NP Inter(normality)
Selenium (mg/L)	0.00104	n/a	n/a	n/a	n/a	125	27.2	n/a	0.001642	NP Inter(normality)
Thallium (mg/L)	0.000229	n/a	n/a	n/a	n/a	125	46.4	n/a	0.001642	NP Inter(normality)

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 22.4% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

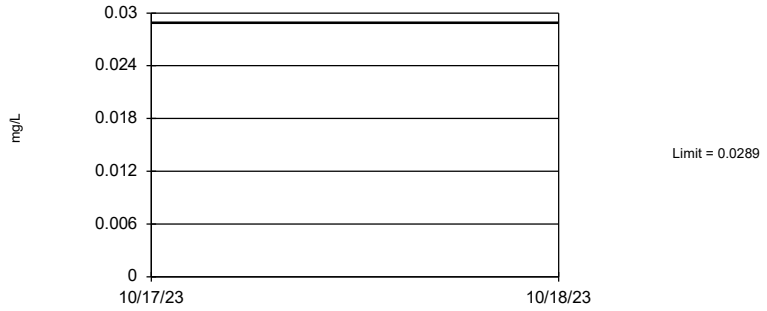
Constituent: Antimony Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 119 background values. 5.042% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.002234.

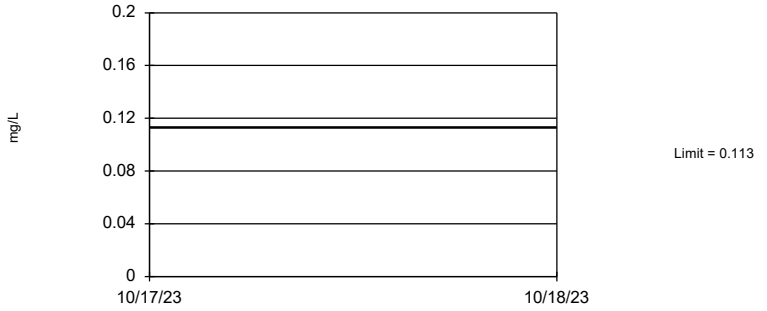
Constituent: Arsenic Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

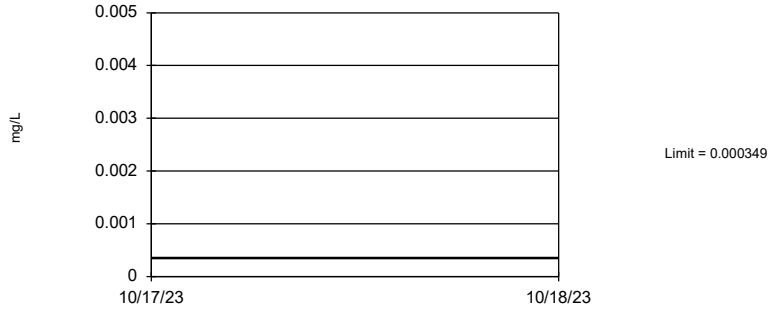
Constituent: Barium Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



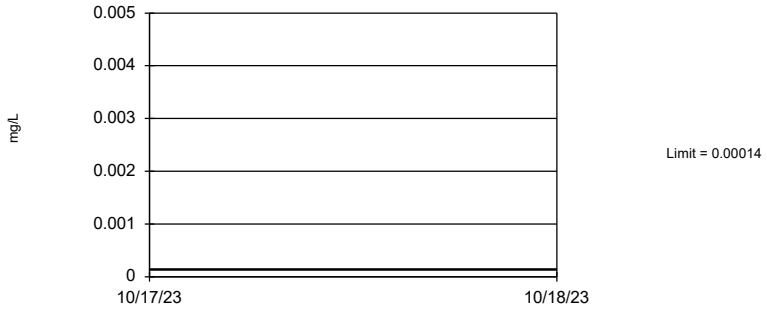
Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 18.4% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

Constituent: Beryllium Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Tolerance Limit

Interwell Non-parametric



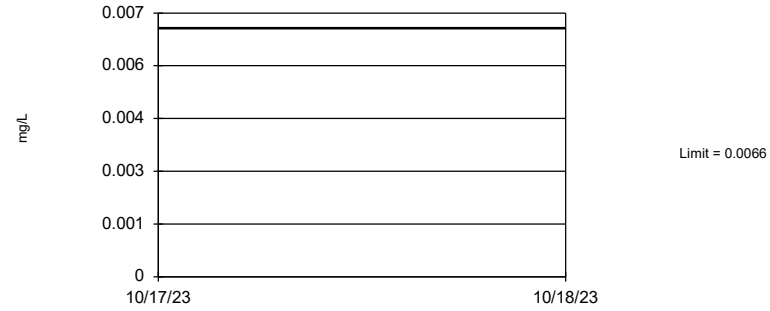
Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 28% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

Constituent: Cadmium Analysis Run 1/29/2024 2:29 PM View: UTLs
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



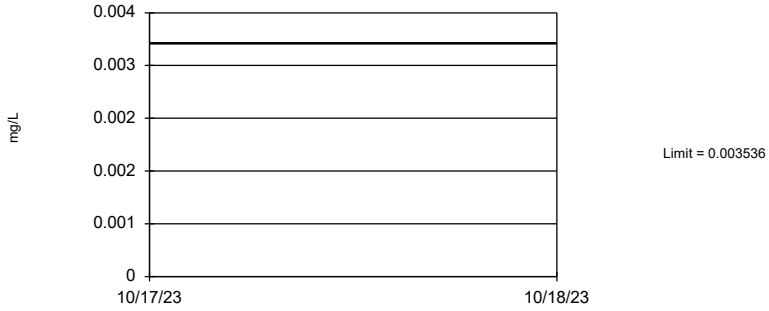
Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 124 background values. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001729.

Constituent: Chromium Analysis Run 1/29/2024 2:29 PM View: UTLs
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Parametric



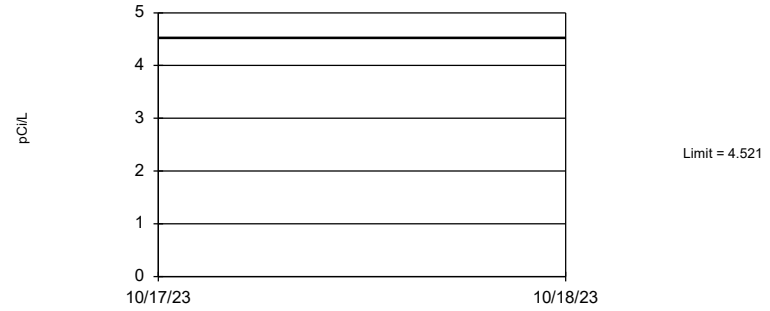
95% coverage. Background Data Summary (based on natural log transformation): Mean=-7.712, Std. Dev.=1.093, n=125. Normality test: Chi Squared @alpha = 0.01, calculated = 10.44, critical = 14.07. Report alpha = 0.05.

Constituent: Cobalt Analysis Run 1/29/2024 2:29 PM View: UTLs
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Parametric



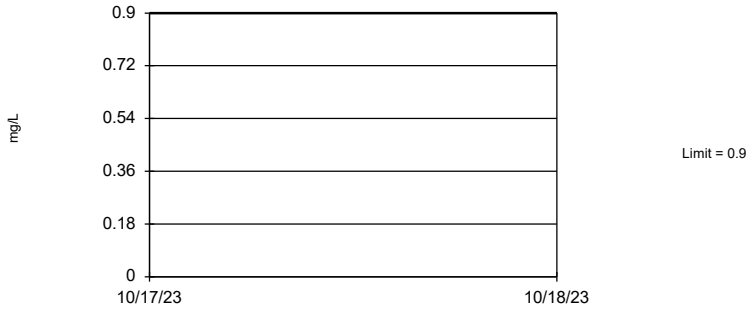
95% coverage. Background Data Summary (based on cube root transformation): Mean=1.099, Std. Dev.=0.2924, n=120. Normality test: Chi Squared @alpha = 0.01, calculated = 10.17, critical = 14.07. Report alpha = 0.05.

Constituent: Combined Radium 226 + 228 Analysis Run 1/29/2024 2:29 PM View: UTLs
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 129 background values. 15.5% NDs. 96.68% coverage at alpha=0.01; 97.85% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001338.

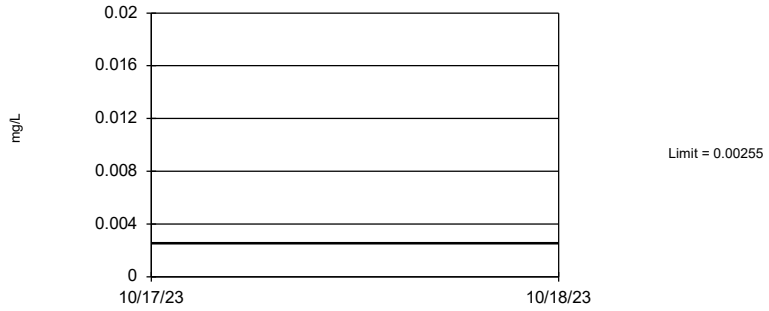
Constituent: Fluoride Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 11.2% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

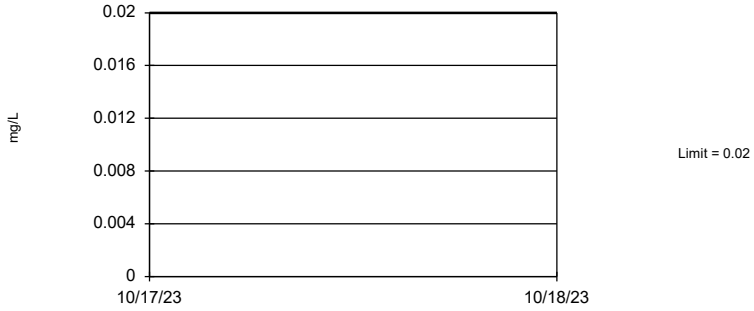
Constituent: Lead Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 8.8% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

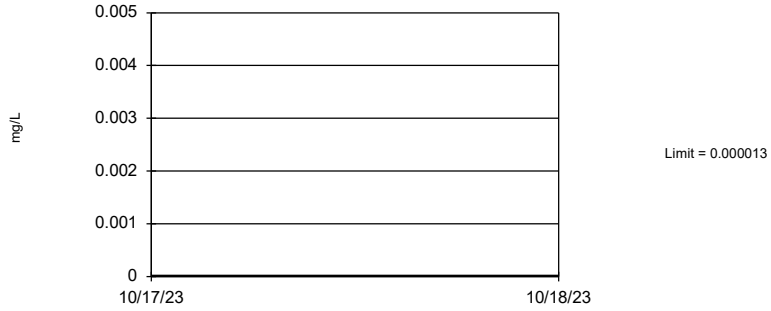
Constituent: Lithium Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 125 background values. 80% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

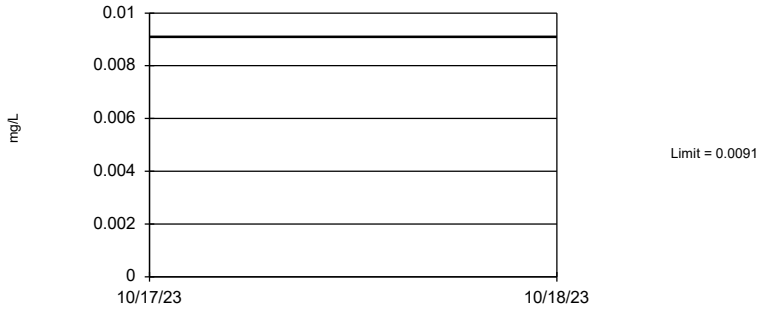
Constituent: Mercury Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 123 background values. 30.08% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.00182.

Constituent: Molybdenum Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric

Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 27.2% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

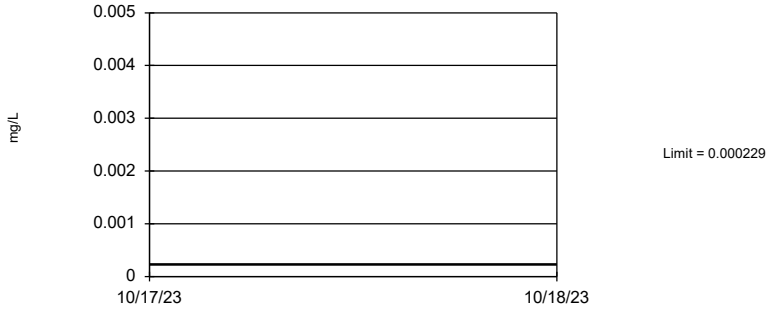
Constituent: Selenium Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 46.4% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

Constituent: Thallium Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

FIGURE H

GWPS

BIG SANDY FAP GWPS				
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		0.029	0.029
Barium, Total (mg/L)	2		0.11	2
Beryllium, Total (mg/L)	0.004		0.00035	0.004
Cadmium, Total (mg/L)	0.005		0.00014	0.005
Chromium, Total (mg/L)	0.1		0.0066	0.1
Cobalt, Total (mg/L)	n/a	0.006	0.0035	0.006
Combined Radium, Total (pCi/L)	5		4.52	5
Fluoride, Total (mg/L)	4		0.9	4
Lead, Total (mg/L)	0.015		0.0026	0.015
Lithium, Total (mg/L)	n/a	0.04	0.02	0.04
Mercury, Total (mg/L)	0.002		0.000013	0.002
Molybdenum, Total (mg/L)	n/a	0.1	0.0091	0.1
Selenium, Total (mg/L)	0.05		0.001	0.05
Thallium, Total (mg/L)	0.002		0.00023	0.002

**Grey cell indicates Background is higher than MCL or CCR-Rule Specified Level*

**GWPS = Groundwater Protection Standard*

**MCL = Maximum Contaminant Level*

**CCR = Coal Combustion Residual*

FIGURE I
Confidence Intervals

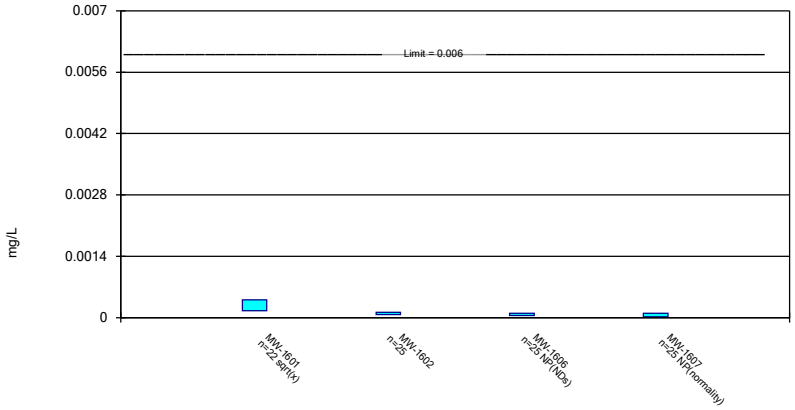
Appendix IV - Confidence Intervals - All Results (No Significant)

Big Sandy FAP Data: Big Sandy FAP Printed 1/29/2024, 2:34 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony (mg/L)	MW-1601	0.0004022	0.0001593	0.006	No	22	0.000245	0	None	sqrt(x)	0.01	Param.
Antimony (mg/L)	MW-1602	0.0001198	0.00006937	0.006	No	25	0.00005062	0	None	No	0.01	Param.
Antimony (mg/L)	MW-1606	0.0001	0.00005	0.006	No	25	0.0001701	60	None	No	0.01	NP (NDs)
Antimony (mg/L)	MW-1607	0.0001	0.00002	0.006	No	25	0.0000602	20	None	No	0.01	NP (normality)
Arsenic (mg/L)	MW-1601	0.00503	0.00047	0.029	No	22	0.00217	0	None	No	0.01	NP (normality)
Arsenic (mg/L)	MW-1602	0.00132	0.0006914	0.029	No	25	0.0008333	0	None	x^(1/3)	0.01	Param.
Arsenic (mg/L)	MW-1606	0.001066	0.0009171	0.029	No	25	0.0001495	0	None	No	0.01	Param.
Arsenic (mg/L)	MW-1607	0.01833	0.01144	0.029	No	25	0.01181	0	None	ln(x)	0.01	Param.
Barium (mg/L)	MW-1601	0.06661	0.04892	2	No	22	0.01648	0	None	No	0.01	Param.
Barium (mg/L)	MW-1602	0.05997	0.054	2	No	25	0.005982	0	None	No	0.01	Param.
Barium (mg/L)	MW-1606	0.875	0.757	2	No	25	0.09774	0	None	No	0.01	NP (normality)
Barium (mg/L)	MW-1607	0.0394	0.03172	2	No	25	0.00771	0	None	No	0.01	Param.
Beryllium (mg/L)	MW-1601	0.00005	0.000009	0.004	No	22	0.00002005	45.45	None	No	0.01	NP (normality)
Beryllium (mg/L)	MW-1606	0.00005	0.000009	0.004	No	25	0.00002664	32	None	No	0.01	NP (normality)
Beryllium (mg/L)	MW-1607	0.00005	0.00001	0.004	No	25	0.00004073	24	None	No	0.01	NP (normality)
Cadmium (mg/L)	MW-1601	0.00001158	0.000006344	0.005	No	22	0.00001568	18.18	Kaplan-Meier	x^(1/3)	0.01	Param.
Cadmium (mg/L)	MW-1602	0.00002	0.000007	0.005	No	25	0.000006404	44	None	No	0.01	NP (normality)
Cadmium (mg/L)	MW-1606	0.00002	0.00001	0.005	No	25	0.0000096	76	None	No	0.01	NP (NDs)
Cadmium (mg/L)	MW-1607	0.00002	0.000009	0.005	No	25	0.0000085	72	None	No	0.01	NP (NDs)
Chromium (mg/L)	MW-1601	0.00058	0.0003542	0.1	No	22	0.0002104	0	None	No	0.01	Param.
Chromium (mg/L)	MW-1602	0.0007904	0.0005572	0.1	No	25	0.0002339	0	None	No	0.01	Param.
Chromium (mg/L)	MW-1606	0.0007442	0.0002948	0.1	No	25	0.0005658	0	None	sqrt(x)	0.01	Param.
Chromium (mg/L)	MW-1607	0.0004355	0.0002908	0.1	No	25	0.0001611	0	None	sqrt(x)	0.01	Param.
Cobalt (mg/L)	MW-1601	0.001053	0.0003984	0.006	No	22	0.0006101	0	None	No	0.01	Param.
Cobalt (mg/L)	MW-1602	0.00008116	0.00002462	0.006	No	25	0.0001959	0	None	ln(x)	0.01	Param.
Cobalt (mg/L)	MW-1606	0.0002534	0.00009222	0.006	No	25	0.0003391	0	None	ln(x)	0.01	Param.
Cobalt (mg/L)	MW-1607	0.001374	0.001139	0.006	No	25	0.0002355	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1601	1.669	0.9759	5	No	22	0.6459	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1602	1.398	0.857	5	No	25	0.5425	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1606	3.336	2.752	5	No	25	0.5861	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1607	1.693	0.718	5	No	25	1.33	0	None	sqrt(x)	0.01	Param.
Fluoride (mg/L)	MW-1601	0.2698	0.1919	4	No	23	0.07452	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-1602	0.1219	0.09589	4	No	26	0.03042	0	None	ln(x)	0.01	Param.
Fluoride (mg/L)	MW-1606	0.2181	0.1934	4	No	26	0.02533	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-1607	0.07131	0.06023	4	No	26	0.01137	0	None	No	0.01	Param.
Lead (mg/L)	MW-1601	0.0001504	0.00005051	0.015	No	22	0.0004128	13.64	None	ln(x)	0.01	Param.
Lead (mg/L)	MW-1602	0.00008804	0.00004384	0.015	No	25	0.00007394	24	Kaplan-Meier	sqrt(x)	0.01	Param.
Lead (mg/L)	MW-1606	0.00023	0.00008	0.015	No	25	0.0004506	12	None	No	0.01	NP (normality)
Lead (mg/L)	MW-1607	0.0001565	0.00007742	0.015	No	25	0.0001629	8	None	ln(x)	0.01	Param.
Lithium (mg/L)	MW-1601	0.02957	0.0197	0.04	No	22	0.009191	4.545	None	No	0.01	Param.
Lithium (mg/L)	MW-1602	0.009973	0.006549	0.04	No	25	0.003684	4	None	sqrt(x)	0.01	Param.
Lithium (mg/L)	MW-1606	0.008	0.00329	0.04	No	25	0.004263	8	None	No	0.01	NP (normality)
Lithium (mg/L)	MW-1607	0.005	0.00013	0.04	No	25	0.004719	8	None	No	0.01	NP (normality)
Mercury (mg/L)	MW-1601	0.000005	0.000005	0.002	No	22	2.7e-14	95.45	None	No	0.01	NP (NDs)
Mercury (mg/L)	MW-1602	0.000005	0.000003	0.002	No	25	0.000001258	68	None	No	0.01	NP (NDs)
Mercury (mg/L)	MW-1606	0.000005	0.000003	0.002	No	25	9.0e-7	84	None	No	0.01	NP (NDs)
Mercury (mg/L)	MW-1607	0.000005	0.000004	0.002	No	25	2.0e-7	92	None	No	0.01	NP (NDs)
Molybdenum (mg/L)	MW-1601	0.02209	0.01077	0.1	No	22	0.01054	0	None	No	0.01	Param.
Molybdenum (mg/L)	MW-1602	0.002	0.001	0.1	No	25	0.0007135	0	None	No	0.01	NP (normality)
Molybdenum (mg/L)	MW-1606	0.00067	0.0005	0.1	No	25	0.001441	0	None	No	0.01	NP (normality)
Molybdenum (mg/L)	MW-1607	0.0007	0.00054	0.1	No	25	0.001685	0	None	No	0.01	NP (normality)
Selenium (mg/L)	MW-1601	0.0003879	0.0001577	0.05	No	22	0.0002451	0	None	sqrt(x)	0.01	Param.
Selenium (mg/L)	MW-1602	0.002429	0.001465	0.05	No	25	0.0009672	0	None	No	0.01	Param.
Selenium (mg/L)	MW-1606	0.0005	0.00006	0.05	No	25	0.0001975	28	None	No	0.01	NP (normality)
Selenium (mg/L)	MW-1607	0.0005	0.0001	0.05	No	25	0.0001904	16	None	No	0.01	NP (normality)
Thallium (mg/L)	MW-1601	0.0002	0.00002	0.002	No	22	0.00008787	40.91	None	No	0.01	NP (normality)
Thallium (mg/L)	MW-1602	0.0002	0.00002	0.002	No	25	0.00009059	56	None	No	0.01	NP (NDs)
Thallium (mg/L)	MW-1606	0.0002	0.00011	0.002	No	25	0.00007724	68	None	No	0.01	NP (NDs)
Thallium (mg/L)	MW-1607	0.0002	0.00003	0.002	No	25	0.00008343	40	None	No	0.01	NP (normality)

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: Antimony Analysis Run 1/29/2024 2:33 PM View: Confidence Intervals
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Parametric and Non-Parametric (NP) Confidence Interval

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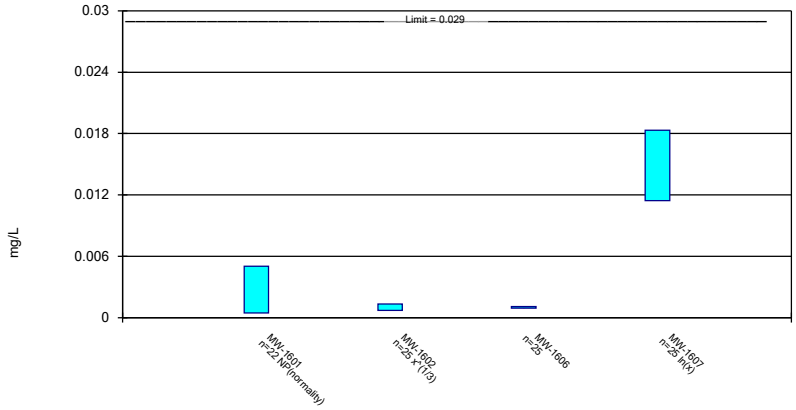

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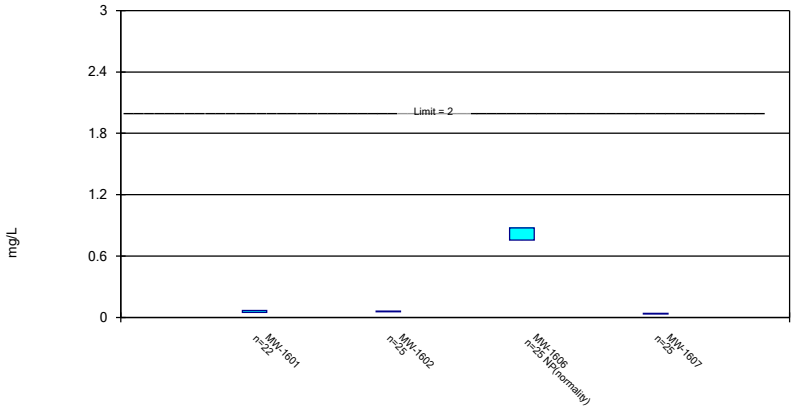

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Sanitas™ v.10.0.15 . UG

Non-Parametric Confidence Interval

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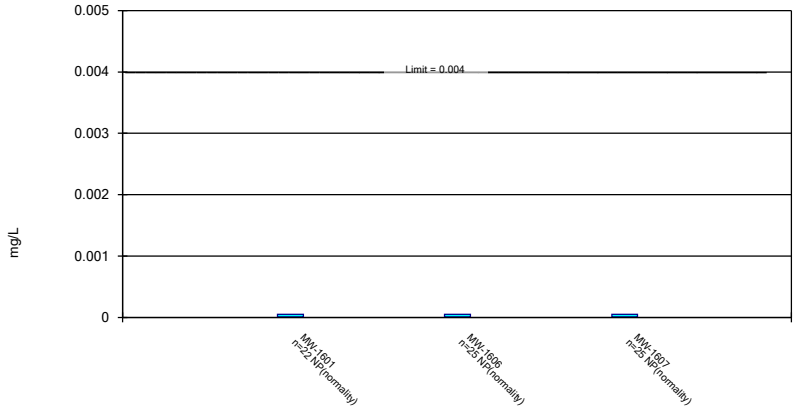

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Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Parametric and Non-Parametric (NP) Confidence Interval

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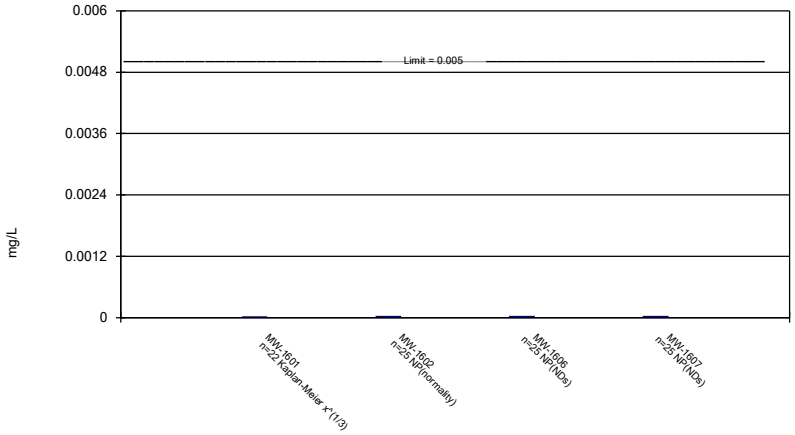

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Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Parametric Confidence Interval

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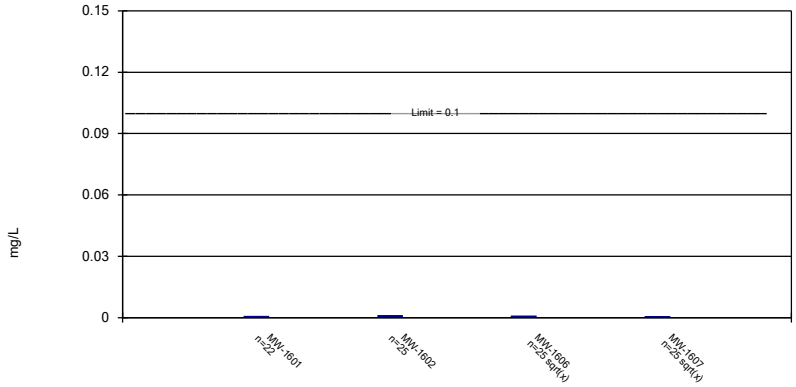

Constituent: Chromium Analysis Run 1/29/2024 2:33 PM View: Confidence Intervals
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Parametric Confidence Interval

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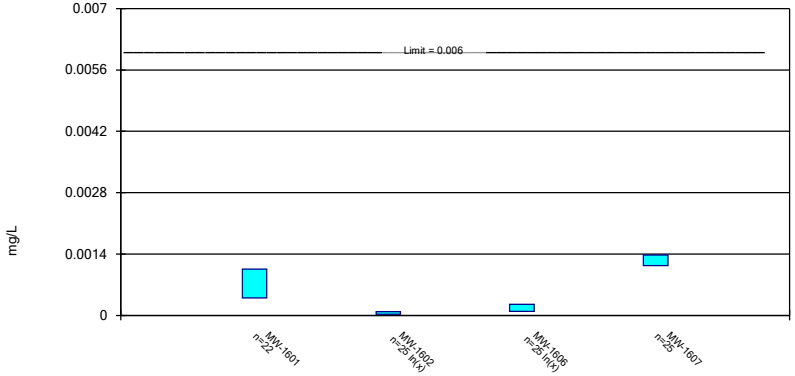

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Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Parametric Confidence Interval

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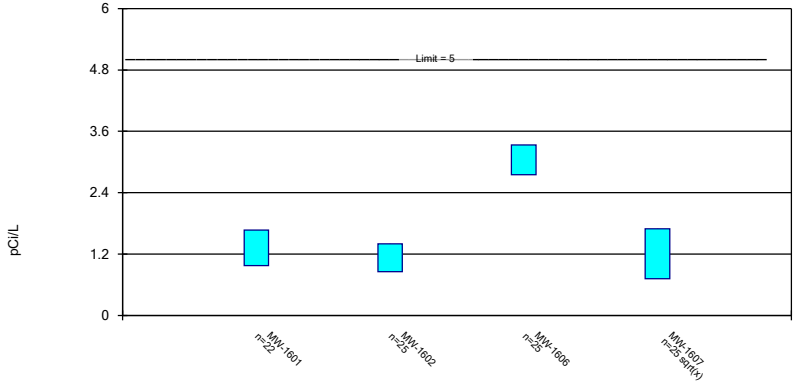

Constituent: Combined Radium 226 + 228 Analysis Run 1/29/2024 2:34 PM View: Confidence Intervals
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Parametric Confidence Interval

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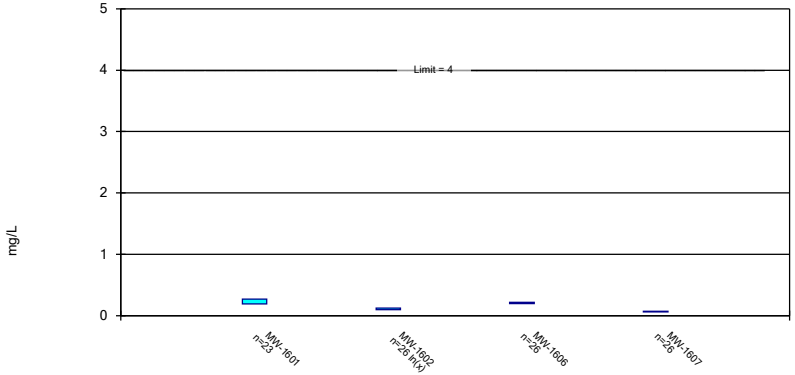

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Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Parametric and Non-Parametric (NP) Confidence Interval

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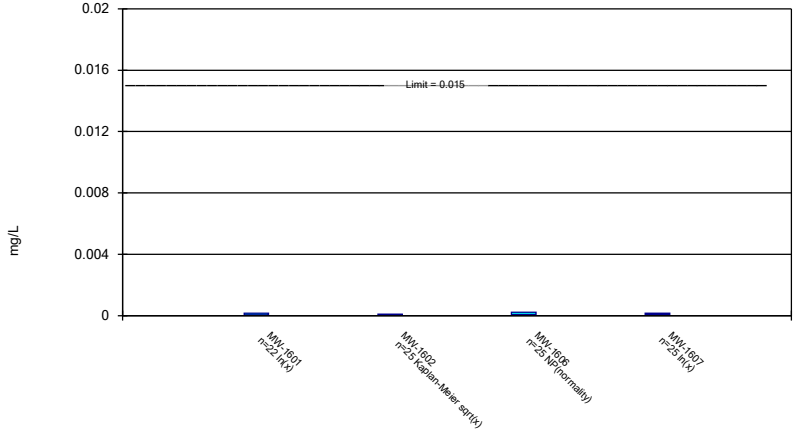

Constituent: Lead Analysis Run 1/29/2024 2:34 PM View: Confidence Intervals
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Parametric and Non-Parametric (NP) Confidence Interval

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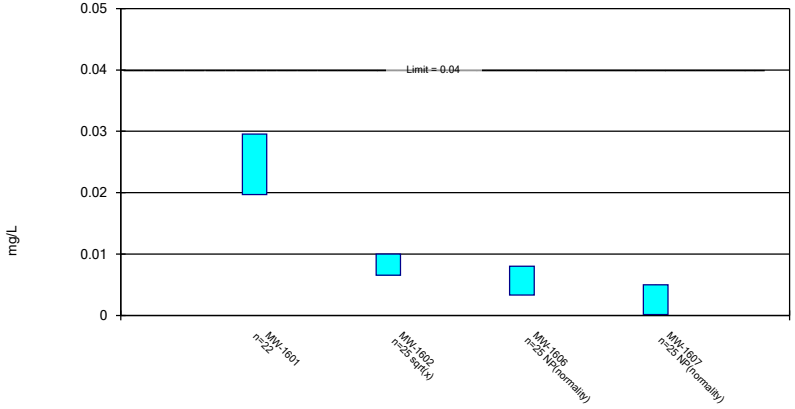

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Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Non-Parametric Confidence Interval

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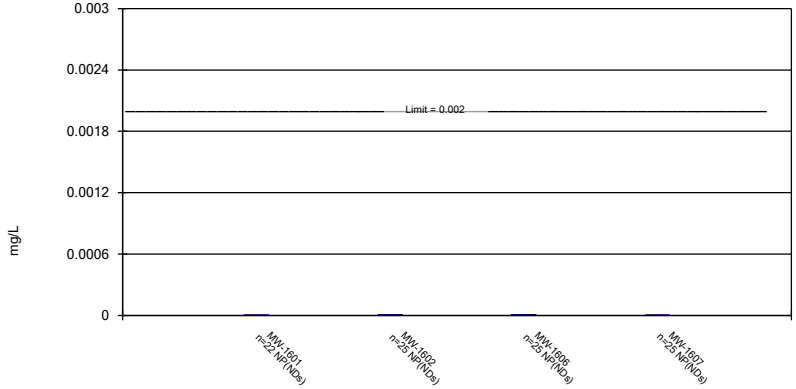

Constituent: Mercury Analysis Run 1/29/2024 2:34 PM View: Confidence Intervals
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Parametric and Non-Parametric (NP) Confidence Interval

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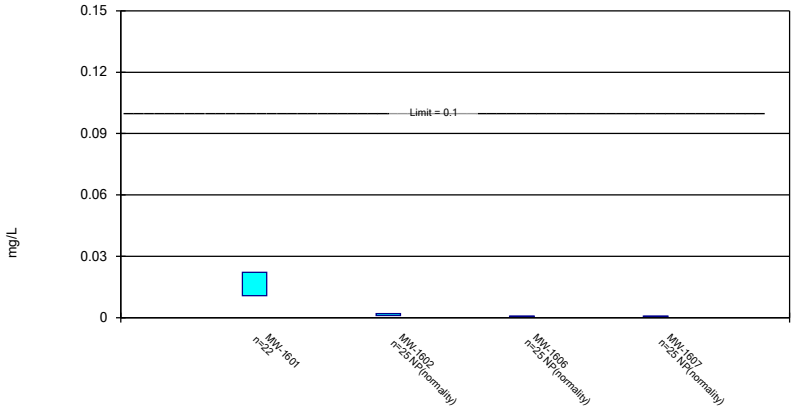

Constituent: Molybdenum Analysis Run 1/29/2024 2:34 PM View: Confidence Intervals
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Parametric and Non-Parametric (NP) Confidence Interval

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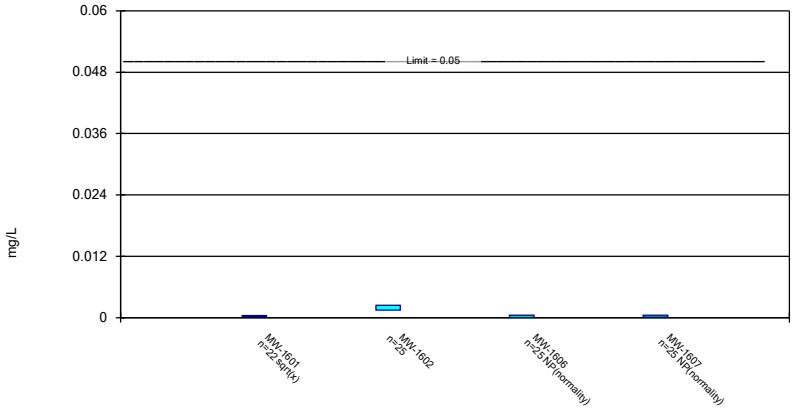

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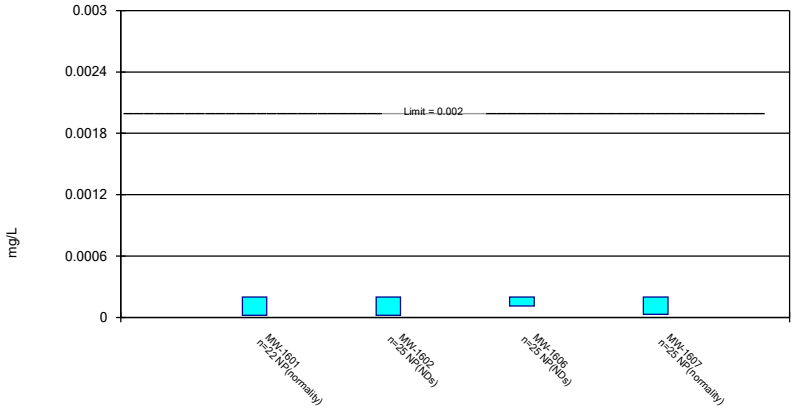
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Non-Parametric Confidence Interval

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



Constituent: Thallium Analysis Run 1/29/2024 2:34 PM View: Confidence Intervals
Big Sandy FAP Data: Big Sandy FAP

Geosyntec consultants

engineers | scientists | innovators

STATISTICAL ANALYSIS SUMMARY
2024 1ST SEMIANNUAL EVENT
FLY ASH POND

Big Sandy Plant

Louisa, Kentucky

Prepared for

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

Prepared by

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500 West Wilson Bridge Road, Suite 250
Worthington, Ohio 43085

Project Number: CHA8500B

October 11, 2024

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

CCR	coal combustion residuals
CFR	code of federal regulations
FAP	Fly Ash Pond
GWPS	groundwater protection standard
mg/L	milligrams per liter
QA/QC	quality assurance and quality control
SSI	statistically significant increase
SSL	statistically significant level
TDS	total dissolved solids
UPL	upper prediction limit

1. INTRODUCTION

In accordance with the United States Environmental Protection Agency regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (Code of Federal Regulations [CFR] Title 40, Section 257, Subpart D), groundwater monitoring has been conducted at the Fly Ash Pond (FAP), an existing CCR unit at the Big Sandy Power Plant in Louisa, Kentucky. Recent groundwater monitoring results were used to identify any concentrations of Appendix IV constituents that are above site-specific groundwater protection standards (GWPSs).

Based on detection monitoring conducted in 2017 and 2018, statistically significant increases (SSIs) over background were concluded for boron, calcium, chloride, fluoride, sulfate, and total dissolved solids (TDS) at the FAP. An alternative source was not identified following the detection monitoring events; thus, the FAP has been in assessment monitoring since 2018. During the most recent assessment monitoring event, no statistically significant levels (SSLs) were identified and the unit remained in assessment monitoring (Geosyntec 2024).

An annual sampling event at the FAP for the Appendix IV parameters required by 40 CFR 257.95(b) was completed in March 2024, and a semiannual sampling event for the Appendix III and Appendix IV parameters required by 40 CFR 257.95(d)(1) was completed in May and August 2024. The results of these annual and semiannual assessment monitoring events are documented in this report.

Before statistical analyses were conducted, the 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 that would impact data usability were identified.

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

2. FLY ASH POND EVALUATION

2.1 Data Validation and QA/QC

Samples were collected for analysis from each upgradient and downgradient well to meet the requirements of 40 CFR 257.95b (March 2024) and 257.95(d)(1) (May and August 2024) as part of the assessment monitoring program. Samples from March 2024 were analyzed for Appendix IV parameters only, whereas samples from May 2024 were analyzed for all Appendix IV parameters and partial Appendix III parameters. Additional samples from August 2024 were analyzed for the remaining Appendix III parameters, which were inadvertently not sampled during the May 2024 effort. A summary of data collected during these assessment monitoring events is presented in Table 1.

Chemical analysis was completed by a National Environmental Laboratory Accreditation Program–certified analytical laboratory. The laboratory completed analysis of quality assurance and quality control (QA/QC) samples such as laboratory reagent blanks, continuing calibration verification samples, and laboratory fortified blanks.

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.10.0.19h statistics software. The export file was checked against the analytical data for transcription errors and completeness. No QA/QC issues that would impact data usability were noted.

2.2 Statistical Analysis

Statistical analyses for the FAP were conducted in accordance with the October 2020 *Statistical Analysis Plan* (Geosyntec 2020). Time series plots and results for all completed statistical tests are provided in Attachment B.

The data obtained in March, May, and August 2024 were screened for potential outliers; however, no outliers were identified in these sets of data (Attachment B).

2.2.1 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, nonparametric confidence limits were calculated in some cases (e.g., when the data were not normally distributed or when the nondetect frequency was too high). An SSL was concluded if the lower confidence limit was above the GWPS (i.e., if the entire confidence interval was above the GWPS). The calculated confidence limits (Attachment B) were compared to the GWPSs provided in Table 2. The GWPSs were established during a previous statistical analysis as either (a) the background concentration or (b) the maximum contaminant level and risk-based levels specified in 40 CFR 257.95(h)(2), whichever was greater (Geosyntec 2024).

No SSLs were identified at the Big Sandy FAP.

2.2.2 Evaluation of Potential Appendix III SSIs

The Appendix III results were analyzed to assess whether concentrations of Appendix III parameters at the compliance wells were above background concentrations. Data collected during the May and August 2024 assessment monitoring event from each compliance well were compared to previously established prediction limits to assess whether the results are above background values (Table 3). The following concentrations were above the upper prediction limits (UPLs):

- The boron concentration was above the interwell UPL of 0.244 milligrams per liter (mg/L) at MW-1606 (2.17 mg/L).
- Chloride concentrations were above the interwell UPL of 6.22 mg/L at MW-1602 (17.1 mg/L) and MW-1606 (31.7 mg/L).
- Sulfate concentrations were above the interwell UPL of 106 mg/L at MW-1601 (109 mg/L) and MW-1602 (222 mg/L).
- The TDS concentration was above the interwell UPL of 590 mg/L at MW-1602 (640 mg/L).

While the prediction limits were calculated for a one-of-two retesting procedure, SSIs were conservatively assumed if the May or August 2024 sample was above the UPL or, in the case of pH, below the lower prediction limit. Based on these results, concentrations of Appendix III constituents appear to be above background levels and the unit will remain in assessment monitoring.

2.3 Conclusions

Annual and semiannual assessment monitoring events were conducted in accordance with the CCR Rule. The laboratory and field data were reviewed prior to statistical analysis, and no QA/QC issues that impacted data usability were identified. A review of outliers identified no potential outliers in the March, May, or August 2024 data. 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. Appendix III parameters were compared to established prediction limits with exceedances identified for boron, chloride, sulfate, and TDS at select downgradient wells.

Based on this evaluation, the Big Sandy FAP CCR unit will remain in assessment monitoring.

3. REFERENCES

Geosyntec. 2020. *Statistical Analysis Plan – Big Sandy Plant*. Geosyntec Consultants, Inc. October.

Geosyntec. 2024. *Statistical Analysis Summary – Fly Ash Pond, Big Sandy Plant, Louisa, Kentucky*. Geosyntec Consultants, Inc. March.

TABLES

Table 1. Groundwater Data Summary
Statistical Analysis Summary
Big Sandy Plant – Fly Ash Pond

Parameter	Unit	MW-1011			MW-1012			MW-1203		
		3/13/2024	5/8/2024	8/7/2024	3/14/2024	5/9/2024	8/7/2024	3/13/2024	5/8/2024	8/6/2024
Antimony	µg/L	0.244	0.090 J1	--	8.54	5.01	--	0.012 J1	0.037 J1	--
Arsenic	µg/L	8.02	3.05	--	229	208	--	0.17	0.39	--
Barium	µg/L	52.2	56.0	--	31.8	60.9	--	89.0	89.0	--
Beryllium	µg/L	0.009 P2, J1	0.05 U1	--	0.05 P2, U1	0.061	--	0.025 J1	0.073	--
Boron	mg/L	--	0.053	--	--	0.196	--	--	0.091	--
Cadmium	µg/L	0.034	0.006 J1	--	0.02 U1	0.051	--	0.02 U1	0.02 U1	--
Calcium	mg/L	--	102	--	--	1.92	--	--	56.2	--
Chloride	mg/L	--	--	3.85	--	--	1.87	--	--	4.98
Chromium	µg/L	0.71	0.78	--	0.28 J1	1.18	--	0.30	0.60	--
Cobalt	µg/L	1.28	0.395	--	0.026	0.382	--	0.739	0.769	--
Combined Radium	pCi/L	3.29	3.31	--	0.81	1.67	--	1.57	1.87	--
Fluoride	mg/L	0.23	0.21	--	0.90	0.91	--	0.12	0.12	--
Lead	µg/L	0.23	0.32	--	0.06 J1	1.76	--	0.2 U1	0.18 J1	--
Lithium	mg/L	0.00764 P2	0.00810	--	0.00687 P2	0.00698	--	0.0120	0.0115	--
Mercury	µg/L	0.005 U1	0.005 U1	--	0.005 U1	0.006	--	0.005 U1	0.005 U1	--
Molybdenum	µg/L	0.9	0.8	--	13.4	23.0	--	0.5 U1	0.1 J1	--
Selenium	µg/L	0.05 J1	0.5 U1	--	0.5 U1	0.25 J1	--	0.5 U1	0.5 U1	--
Sulfate	mg/L	--	--	121	--	--	53.0	--	--	27.9
Thallium	µg/L	0.07 J1	0.06 J1	--	0.03 J1	0.04 J1	--	0.2 U1	0.2 U1	--
Total Dissolved Solids	mg/L	--	--	530	--	--	630	--	--	280
pH	SU	7.3	6.7	--	9.0	8.4	--	7.2	6.5	--

Table 1. Groundwater Data Summary
Statistical Analysis Summary
Big Sandy Plant – Fly Ash Pond

Parameter	Unit	MW-1601			MW-1602			MW-1604		
		3/14/2024	5/9/2024	8/7/2024	3/13/2024	5/8/2024	8/7/2024	3/12/2024	5/7/2024	8/6/2024
Antimony	µg/L	0.416	0.459	--	0.059 J1	0.057 J1	--	0.020 J1	0.028 J1	--
Arsenic	µg/L	0.32	0.47	--	0.59	0.47	--	0.22	0.07 J1	--
Barium	µg/L	39.0	41.5	--	64.2	64.1	--	43.1	41.6	--
Beryllium	µg/L	0.05 P2, U1	0.018 J1	--	0.05 P2, U1	0.05 M1, U1	--	0.074 P2	0.105	--
Boron	mg/L	--	0.097	--	--	0.203	--	--	0.013 J1	--
Cadmium	µg/L	0.064	0.023	--	0.005 J1	0.014 J1	--	0.049	0.062	--
Calcium	mg/L	--	68.4	--	--	114	--	--	2.11	--
Chloride	mg/L	--	--	3.59	--	--	17.1	--	--	1.47
Chromium	µg/L	0.84	0.77	--	0.66	0.85	--	0.34	0.98	--
Cobalt	µg/L	0.045	0.372	--	0.013 J1	0.025	--	5.22	0.516	--
Combined Radium	pCi/L	1.11	1.47	--	1.45	1.48	--	1.21	0.88	--
Fluoride	mg/L	0.13	0.13	--	0.09	0.08	--	0.04 J1	0.03 J1	--
Lead	µg/L	0.43	0.24	--	0.2 U1	0.15 J1	--	0.2 U1	0.22	--
Lithium	mg/L	0.0179 P2	0.0183	--	0.00954 P2	0.0123 M1	--	0.00056 P2	0.00072	--
Mercury	µg/L	0.005 U1	0.005 U1	--	0.005 U1	0.005 U1	--	0.005 U1	0.005 U1	--
Molybdenum	µg/L	6.0	7.4	--	0.8	0.5	--	0.2 J1	0.5 U1	--
Selenium	µg/L	0.79	0.60	--	1.74	0.74	--	0.06 J1	0.24 J1	--
Sulfate	mg/L	--	--	109	--	--	222	--	--	4.7
Thallium	µg/L	0.02 J1	0.2 U1	--	0.2 U1	0.2 U1	--	0.2 U1	0.03 J1	--
Total Dissolved Solids	mg/L	--	--	350	--	--	640	--	--	50
pH	SU	7.3	6.7	--	7.5	6.7	--	6.1	5.6	--

Table 1. Groundwater Data Summary
Statistical Analysis Summary
Big Sandy Plant – Fly Ash Pond

Parameter	Unit	MW-1605			MW-1606			MW-1607		
		3/13/2024	5/8/2024	8/6/2024	3/12/2024	5/7/2024	8/6/2024	3/12/2024	5/7/2024	8/6/2024
Antimony	µg/L	0.044 J1	0.063 J1	--	0.013 J1	0.025 J1	--	0.026 J1	0.028 J1	--
Arsenic	µg/L	0.28	0.69	--	0.85	0.74	--	27.8	16.4	--
Barium	µg/L	22.0	33.9	--	722	742	--	98.0	60.5	--
Beryllium	µg/L	0.032 J1	0.149	--	0.015 P2, J1	0.011 J1	--	0.015 P2, J1	0.018 J1	--
Boron	mg/L	--	0.016 J1	--	--	2.17	--	--	0.236	--
Cadmium	µg/L	0.028	0.044	--	0.02 U1	0.007 J1	--	0.008 J1	0.02 U1	--
Calcium	mg/L	--	4.71	--	--	76.9	--	--	98.2	--
Chloride	mg/L	--	--	0.50	--	--	31.7	--	--	2.53
Chromium	µg/L	2.82	4.20	--	0.53	0.67	--	0.42	0.71	--
Cobalt	µg/L	0.091	0.665	--	0.218	0.079	--	0.876	0.921	--
Combined Radium	pCi/L	0.48	0.61	--	2.57	3.15	--	1.42	1.45	--
Fluoride	mg/L	0.05 J1	0.04 J1	--	0.20	0.20	--	0.08	0.07	--
Lead	µg/L	0.05 J1	1.12	--	0.21	0.29	--	0.20	0.78	--
Lithium	mg/L	0.00033	0.00129	--	0.00364 P2	0.00353	--	0.00024 P2, J1	0.00029 J1	--
Mercury	µg/L	0.005 U1	0.004 J1	--	0.005 U1	0.005 U1	--	0.005 U1	0.005 U1	--
Molybdenum	µg/L	0.1 J1	0.2 J1	--	0.5	0.5	--	0.7	0.5	--
Selenium	µg/L	0.43 J1	0.58	--	0.07 J1	0.07 J1	--	0.14 J1	0.14 J1	--
Sulfate	mg/L	--	--	5.7	--	--	64.5	--	--	78.5
Thallium	µg/L	0.2 U1	0.02 J1	--	0.2 U1	0.2 U1	--	0.2 U1	0.2 U1	--
Total Dissolved Solids	mg/L	--	--	40 J1	--	--	400	--	--	340
pH	SU	6.4	6.1	--	7.1	6.7	--	6.6	6.6	--

Notes:
--: not measured
J1: Estimated value. Parameter was detected in concentrations below the reporting limit.
M1: The associated matrix spike (MS) or matrix spike duplicate (MSD) recovery was outside acceptance limits.
mg/L: milligrams per liter
P2: The precision on the laboratory control sample duplicate (LCSD) was above acceptance limits.
pCi/L: picocuries per liter
SU: standard unit
U1: Non-detect value. For statistical analysis, parameters that were not detected were replaced with the reporting limit.
µg/L: micrograms per liter

Table 2. Appendix IV Groundwater Protection Standards
Statistical Analysis Summary
Big Sandy Plant – Fly Ash Pond

Constituent Name	MCL	CCR Rule-Specified	Calculated UTL	GWPS
Antimony, Total (mg/L)	0.00600		0.00318	0.00600
Arsenic, Total (mg/L)	0.0100		0.0289	0.0289
Barium, Total (mg/L)	2.00		0.113	2.00
Beryllium, Total (mg/L)	0.00400		0.000349	0.00400
Cadmium, Total (mg/L)	0.00500		0.000140	0.00500
Chromium, Total (mg/L)	0.100		0.00660	0.100
Cobalt, Total (mg/L)	n/a	0.00600	0.00354	0.00600
Combined Radium, Total (pCi/L)	5.00		4.52	5.00
Fluoride, Total (mg/L)	4.00		0.900	4.00
Lead, Total (mg/L)	n/a	0.0150	0.00255	0.0150
Lithium, Total (mg/L)	n/a	0.0400	0.0200	0.0400
Mercury, Total (mg/L)	0.00200		0.0000130	0.00200
Molybdenum, Total (mg/L)	n/a	0.100	0.00910	0.100
Selenium, Total (mg/L)	0.0500		0.00104	0.0500
Thallium, Total (mg/L)	0.00200		0.000229	0.00200

Notes:
1. Calculated UTL (upper tolerance limit) represents site-specific background values.
2. Grey cells indicate the GWPS is based on the calculated UTL, which is higher than the MCL or CCR Rule-specified value.
CCR: coal combustion residuals
GWPS: groundwater protection standard
MCL: maximum contaminant level
mg/L: milligrams per liter
n/a: not applicable
pCi/L: picocuries per liter

Table 3. Appendix III Data Summary
Statistical Analysis Summary
Big Sandy Plant – Fly Ash Pond

Geosyntec Consultants, Inc.

Analyte	Unit	Description	MW-1601		MW-1602		MW-1606		MW-1607	
			5/9/2024	8/7/2024	5/8/2024	8/7/2024	5/7/2024	8/6/2024	5/7/2024	8/6/2024
Boron	mg/L	Interwell Background Value (UPL)	0.244							
		Analytical Result	0.097	--	0.203	--	**2.17**	--	0.236	--
Calcium	mg/L	Interwell Background Value (UPL)	123							
		Analytical Result	68.4	--	114	--	76.9	--	98.2	--
Chloride	mg/L	Interwell Background Value (UPL)	6.22							
		Analytical Result	--	3.59	--	**17.1**	--	**31.7**	--	2.53
Fluoride	mg/L	Interwell Background Value (UPL)	0.900							
		Analytical Result	0.13	--	0.08	--	0.20	--	0.07	--
pH	SU	Intrawell Background Value (UPL)	8.3		8.5		7.6		7.6	
		Intrawell Background Value (LPL)	6.2		5.9		6.3		5.5	
		Analytical Result	6.7	--	6.7	--	6.7	--	6.6	--
Sulfate	mg/L	Interwell Background Value (UPL)	106							
		Analytical Result	--	**109**	--	**222**	--	64.5	--	78.5
Total Dissolved Solids	mg/L	Interwell Background Value (UPL)	590							
		Analytical Result	--	350	--	**640**	--	400	--	340

Notes:

1. Bold values exceed the background value.

2. Background values are shaded gray.

--: not measured

LPL: lower prediction limit

mg/L: milligrams per liter

SU: standard units

UPL: upper prediction limit

ATTACHMENT A
Certification by Qualified Professional Engineer

Certification by Qualified Professional Engineer

I certify that selected and above described statistical method is appropriate for evaluating the groundwater monitoring data for the Big Sandy Fly Ash Pond 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

Signature

33232	Kentucky	10.18.2024
License Number	Licensing State	Date

ATTACHMENT B
Statistical Analysis Output

GROUNDWATER STATS CONSULTING

October 10, 2024

Geosyntec Consultants
Attn: Ms. Allison Kreinberg
500 W. Wilson Bridge Road, Suite 250
Worthington, OH 43085

Re: Big Sandy Fly Ash Pond
Assessment Monitoring Summary – March & May 2024

Dear Ms. Kreinberg,

Groundwater Stats Consulting (GSC), formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the statistical analysis of groundwater data for the March and May 2024 Assessment Monitoring sample events at American Electric Power Company's Big Sandy Fly Ash Pond. The analysis complies with the federal rule for the Disposal of Coal Combustion Residuals (CCR) from Electric Utilities (CCR Rule, 2015) as well as with the United States Environmental Protection Agency (USEPA) Unified Guidance (2009).

Sampling began at the site for the CCR program in 2016. The monitoring well network, as provided by Geosyntec Consultants, consists of the following:

- **Upgradient wells:** MW-1011, MW-1012, MW-1203, MW-1604, and MW-1605
- **Downgradient wells:** MW-1601, MW-1602, MW-1606, and MW-1607

Downgradient well MW-1603 was historically sampled; however, the groundwater monitoring well network was revised in October 2023 to remove MW-1603 from the network due to the presence of coal in the screened interval.

Data were sent electronically, and the statistical analysis was conducted according to the Statistical Analysis Plan and screening evaluation prepared by GSC and approved by Dr. Kirk Cameron, PhD Statistician with MacStat Consulting, primary author of the USEPA

Unified Guidance, and Senior Advisor to GSC. The statistical analysis was reviewed by Dr. Jim Loftis, Civil & Environmental Engineering professor emeritus at Colorado State University and Senior Advisor to Groundwater Stats Consulting.

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 and box plots for Appendix IV parameters are provided for all wells and constituents; and are used to evaluate concentrations over the entire record (Figures A and B, respectively). Values in background which have previously been flagged as outliers may be seen in a lighter font and disconnected symbol on the graphs. Additionally, a summary of flagged values follows this letter (Figure C).

Note that when there are no detections present in downgradient wells for a given constituent, statistical analyses are not required. A summary of Appendix IV downgradient well/constituent pairs containing 100% non-detects follows this letter.

Summary of Statistical Methods – Appendix IV Parameters

Parametric tolerance limits are utilized when the screened historical data follow a normal or transformed-normal distribution. When data cannot be normalized or the majority of data are non-detects, a nonparametric test is utilized. The distribution of data is tested using the Shapiro-Wilk/Shapiro-Francia test for normality. After testing for normality and performing any adjustments as discussed below (USEPA, 2009), data are analyzed using either parametric or non-parametric tolerance limits as appropriate.

- No statistical analyses are required on wells and analytes containing 100% non-detects (USEPA Unified Guidance, 2009, Chapter 6).
- When data contain <15% non-detects in background, simple substitution of one-half the reporting limit is utilized in the statistical analysis. The reporting limit utilized for non-detects is the most recent practical quantification limit (PQL) as reported by the laboratory.
- When data contain between 15-50% non-detects, the Kaplan-Meier non-detect adjustment is applied to the background data for parametric limits. This technique adjusts the mean and standard deviation of the historical concentrations to account for concentrations below the reporting limit.

- Nonparametric tolerance limits are used on data containing greater than 50% non-detects.

Summary of Background Update – Conducted in February 2024

Outlier Analysis

Prior to constructing tolerance limits, background data were screened through visual screening and Tukey's outlier test for potential outliers and extreme trending patterns that would lead to artificially elevated statistical limits. A discussion of those findings is provided below.

Tukey's outlier test on pooled upgradient well data through October 2023 identified outliers for arsenic, barium, chromium, cobalt, combined radium 226 + 228, fluoride, and lithium. Any values identified by Tukey's test but not flagged in the database were either similar to concentrations from neighboring upgradient wells or were lower than the respective Maximum Contaminant Level (MCL). No new outliers were flagged during the update, except for the highest reported measurements of arsenic at upgradient well MW-1012. Flagging these values reduces the variation resulting in lower statistical limits. All flagged measurements from previous background updates were confirmed during the update by Tukey's outlier test and visual screening. All flagged values may be seen on the Outlier Summary following this letter.

Additionally, downgradient well data through October 2023 were screened through visual screening using time series graphs. Since the downgradient well data are used to construct confidence intervals, measurements that are marginally high relative to the rest of the data are retained unless there is particular justification for excluding them. No outliers among downgradient wells were flagged. The Tukey's test results from February 2024 screening were included with the report.

Interwell Upper Tolerance Limits

Interwell upper tolerance limits were used to calculate background limits from all available pooled upgradient well data through October 2023 (Figure D). These limits are updated on an annual basis and will be updated again during the Fall 2024 sample event analysis. Parametric limits use a target of 95% confidence and 95% coverage, when data follow a normal or transformed-normal distribution such as cobalt and combined radium 226 + 228. When data contained greater than 50% non-detects or did not follow a normal or transformed-normal distribution, non-parametric tolerance limits were used. The

confidence and coverage levels for nonparametric tolerance limits are dependent upon the number of background samples.

Groundwater Protection Standards

The upper tolerance 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).

Evaluation of Appendix IV Parameters – March & May 2024

Time series plots were used to visually identify potential outliers in downgradient wells for through the March and May 2024 sample events. When suspected outliers are identified, Tukey's outlier test may be used to formally test whether measurements are statistically significant. As mentioned above, high outliers are 'cautiously' flagged in the downgradient wells when measurements are clearly much different from remaining data within a given well. This approach reduces the variance and thus reduces the width of parametric confidence intervals; although it will also reduce the mean and thus lower the entire interval. The intent is to better represent the actual downgradient mean. No suspected outliers among downgradient wells were identified.

Note that while upgradient well data are plotted on the time series and box plots through May 2024, the statistical limits are based only on background data through October 2023. Therefore, potential outliers such as measurements observed for antimony, arsenic, and molybdenum at upgradient well MW-1012 during the 2024 samples events were not flagged for this analysis since these measurements are not included in construction of the tolerance limits at this time. All upgradient well data will be reevaluated during the next background update.

Confidence intervals were then constructed with data through May 2024 on downgradient wells for each of the Appendix IV parameters. These confidence intervals are compared against GWPS using the highest limit of the MCL, CCR-Rule specified levels, or background limit as the GWPS as discussed above (Figure F). When data followed a normal or transformed-normal distribution, parametric confidence intervals were used for Appendix IV parameters. Nonparametric confidence intervals, which use the largest and smallest order statistics depending on the sample size as interval limits, were constructed when data did not follow a normal or transformed-normal distribution or when there were greater than 50% non-detects. The lower confidence limit, which is constructed with 99% confidence for parametric confidence intervals, is compared to the GWPS prepared as

described above. The confidence level associated with nonparametric confidence intervals is dependent upon the number samples available.

Only when the entire confidence interval is above a GWPS is the well/constituent pair considered to exceed its respective standard. A summary of the confidence interval results follows this letter. No exceedances were identified.

Trend Test Evaluation – Appendix IV

When confidence interval exceedances are identified in downgradient wells, data are further evaluated using the Sen's Slope/Mann Kendall trend test to determine whether concentrations are statistically increasing, decreasing, or stable at the 95% confidence level. Utilizing the 95% confidence level for trend tests readily identifies significant trends and is more sensitive than the 99% confidence level without drastically increasing the false negative rate. Upgradient wells are included in the trend analyses for all parameters found to exceed their confidence interval in downgradient wells. When similar patterns exist upgradient of the site, it is an indication of variability in groundwater which may be unrelated to practices at the site. Since no exceedances were identified, no trend tests were required.

Thank you for the opportunity to assist you in the statistical analysis of groundwater quality for the Big Sandy Fly Ash Pond. If you have any questions or comments, please feel free to contact us.

For Groundwater Stats Consulting,

Tristan Clark
Groundwater Analyst

Andrew Collins
Project Manager

100% Non-Detects

Analysis Run 8/14/2024 2:38 PM View: Confidence Intervals
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

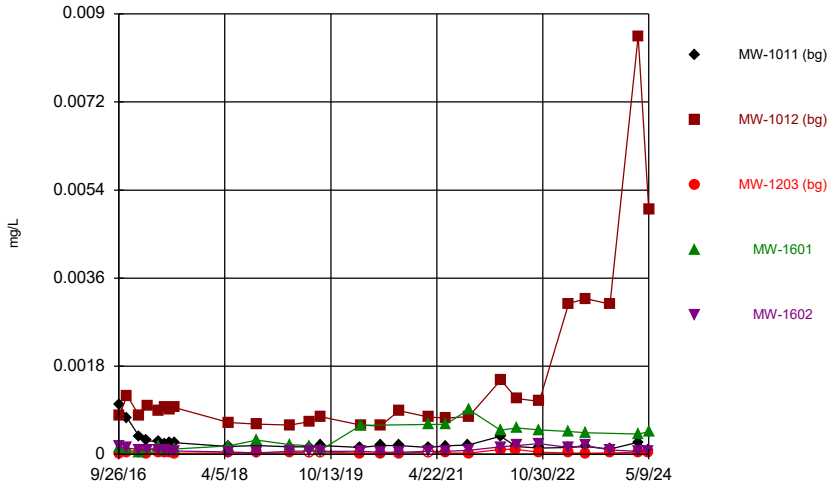
Beryllium (mg/L)
MW-1602

FIGURE A

Time Series

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

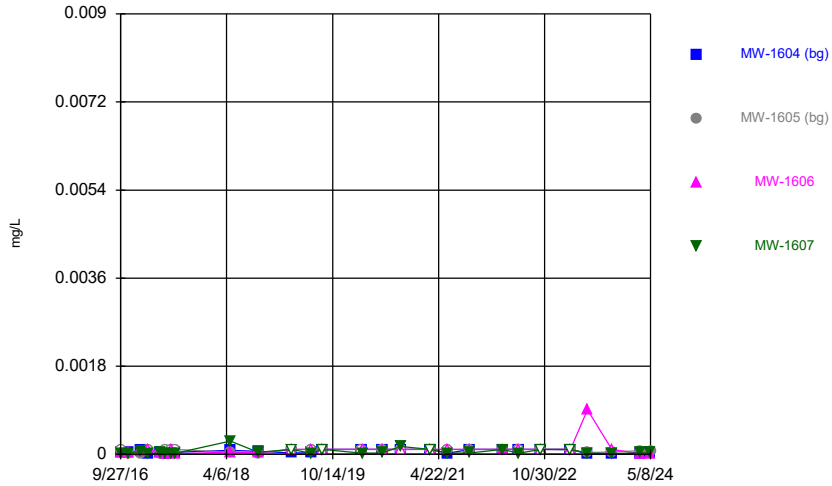
Time Series



Constituent: Antimony Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

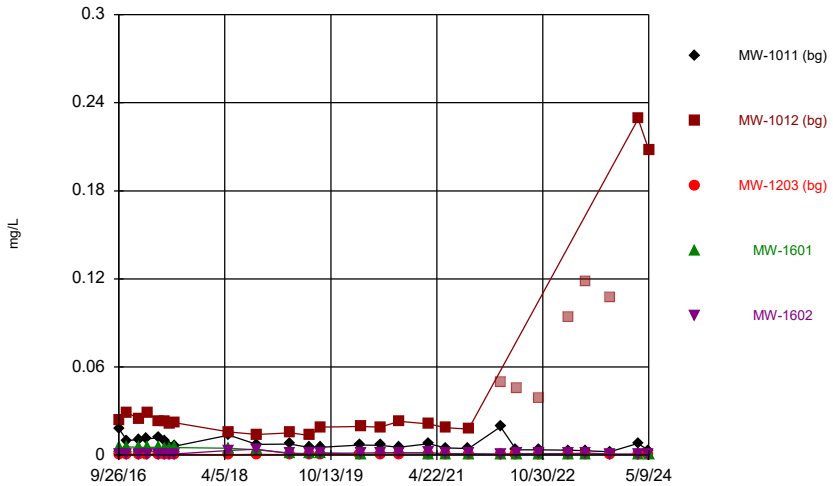
Time Series



Constituent: Antimony Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

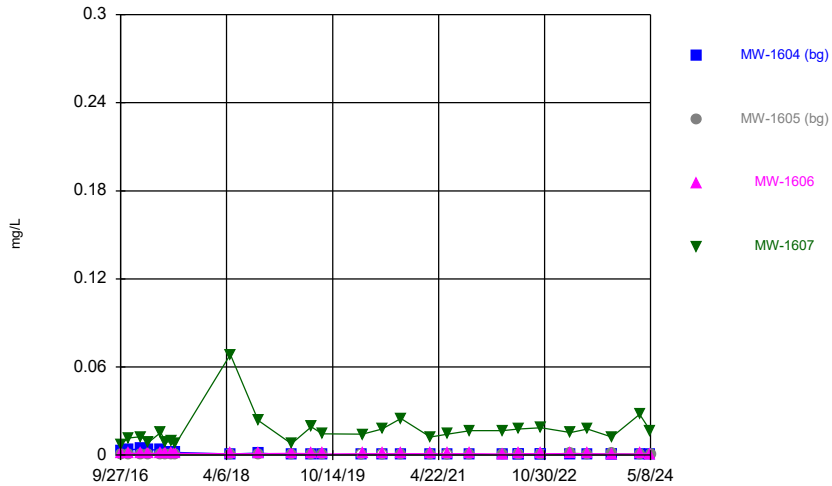
Time Series



Constituent: Arsenic Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

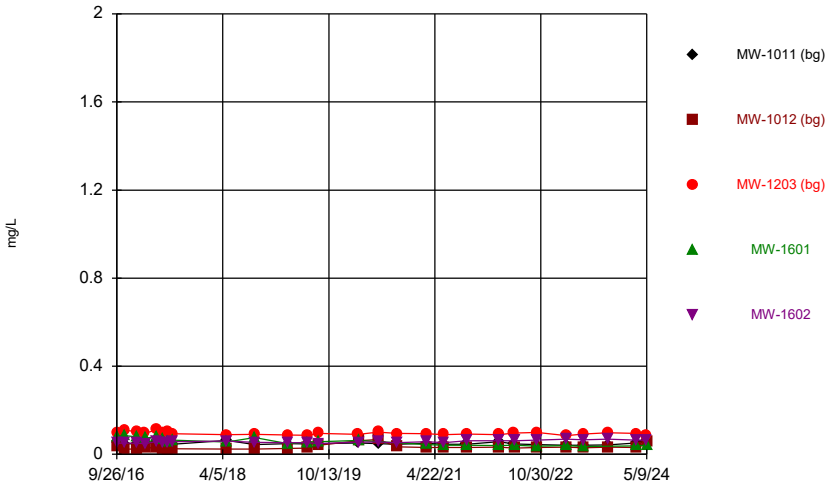
Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Time Series



Constituent: Arsenic Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

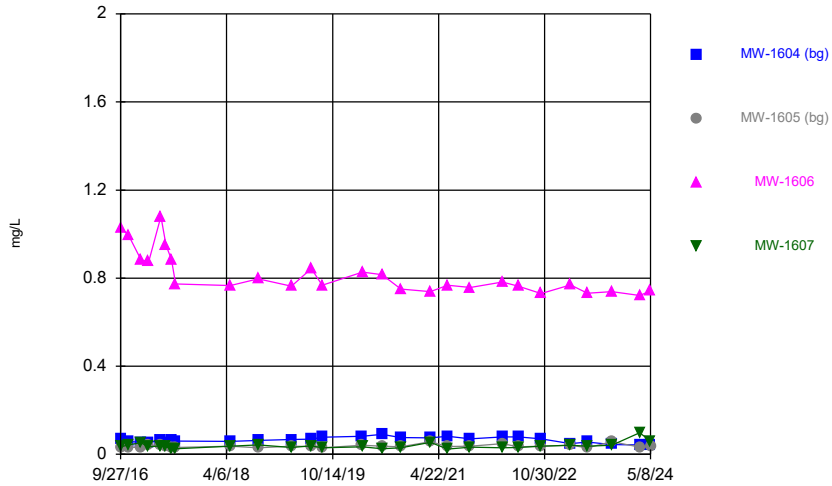
Time Series



Constituent: Barium Analysis Run 8/23/2024 4:23 PM

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Time Series

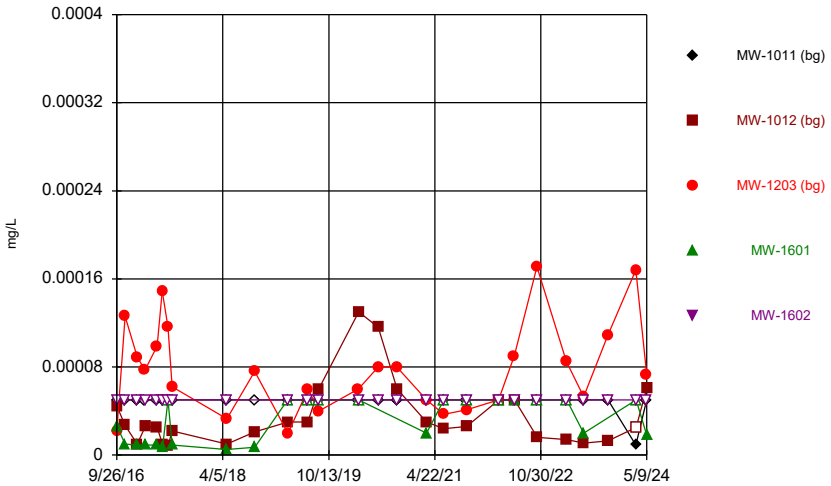


Constituent: Barium Analysis Run 8/23/2024 4:23 PM

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Hollow symbols indicate censored values.

Time Series

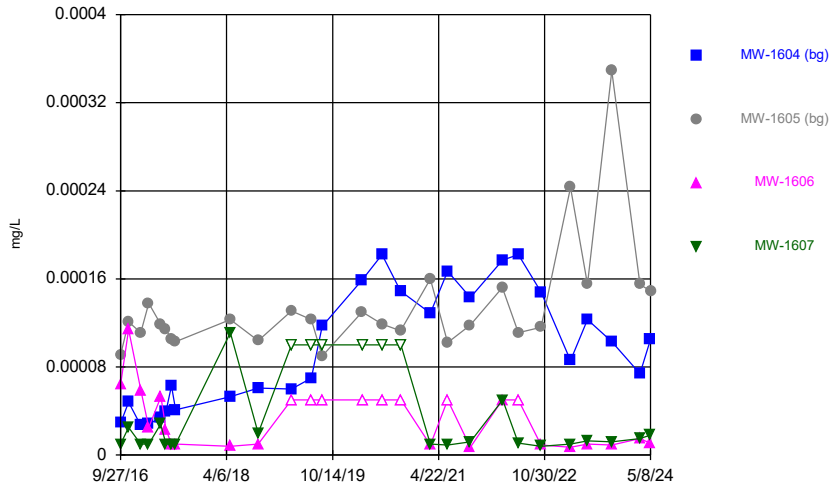


Constituent: Beryllium Analysis Run 8/23/2024 4:23 PM

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Hollow symbols indicate censored values.

Time Series

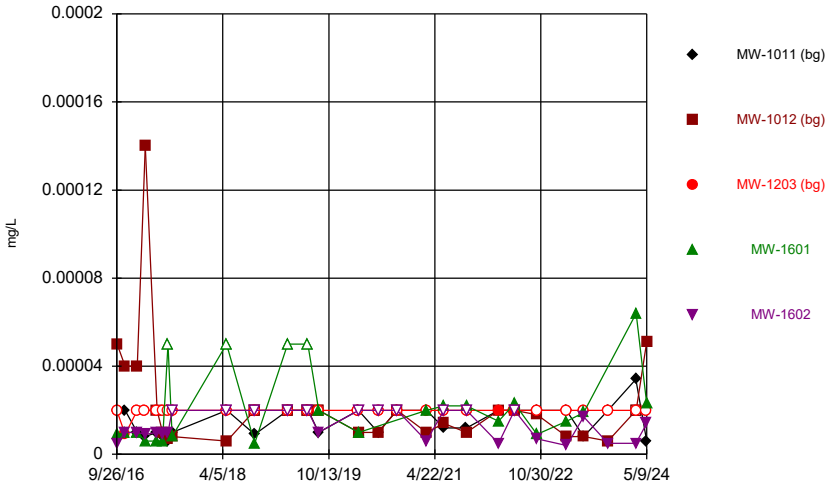


Constituent: Beryllium Analysis Run 8/23/2024 4:23 PM

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

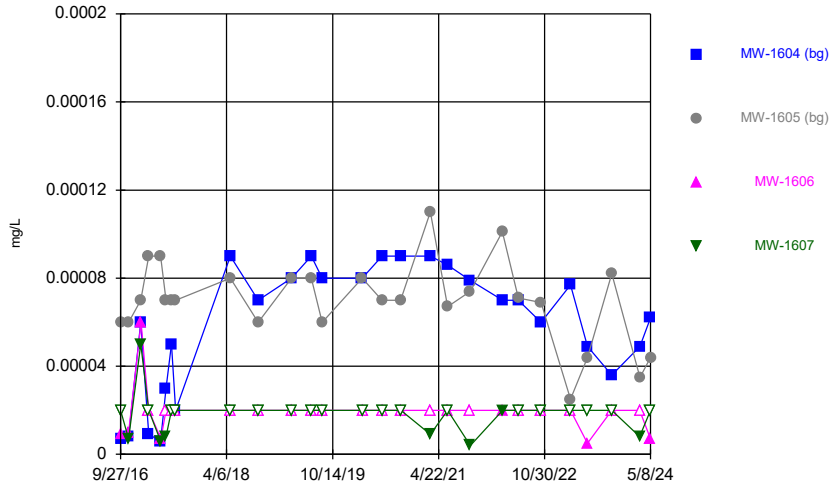
Time Series



Constituent: Cadmium Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

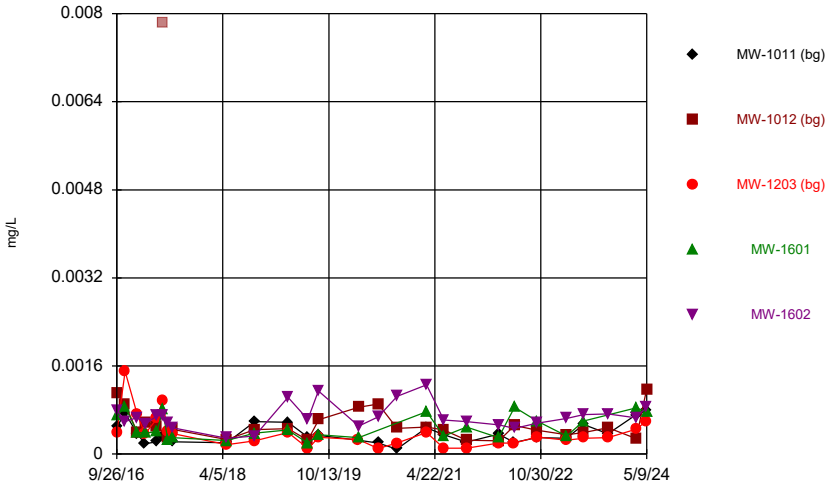
Time Series



Constituent: Cadmium Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

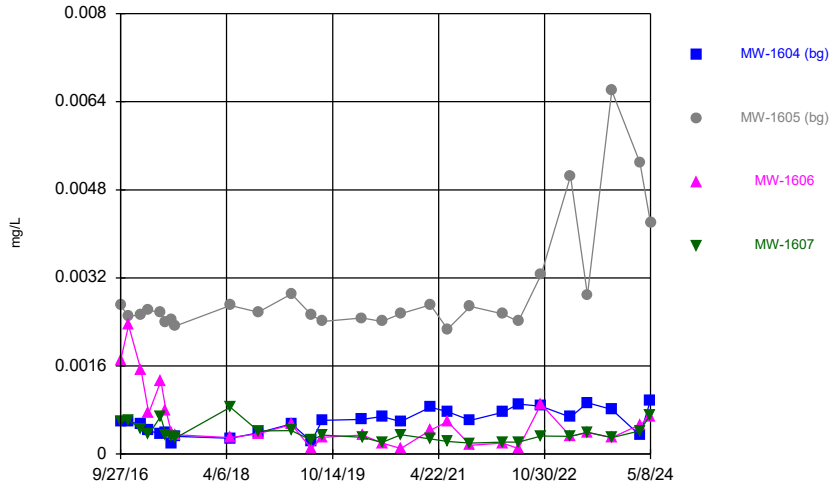
Time Series



Constituent: Chromium Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

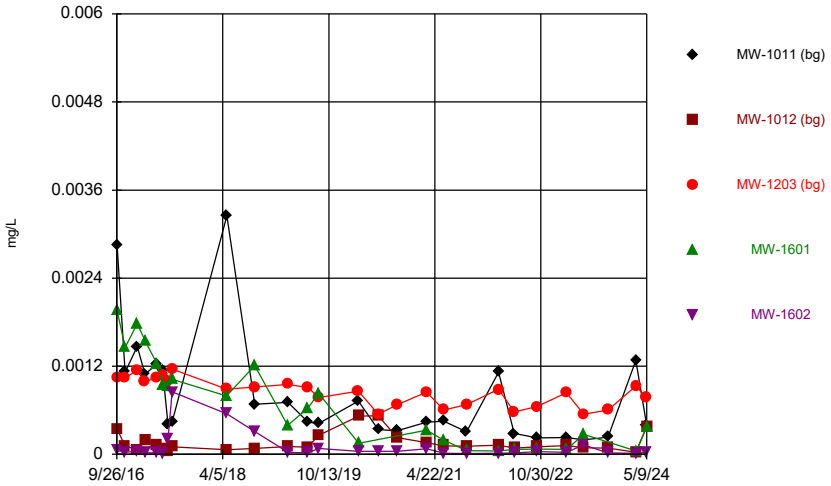
Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

Time Series



Constituent: Chromium Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Time Series



Constituent: Cobalt Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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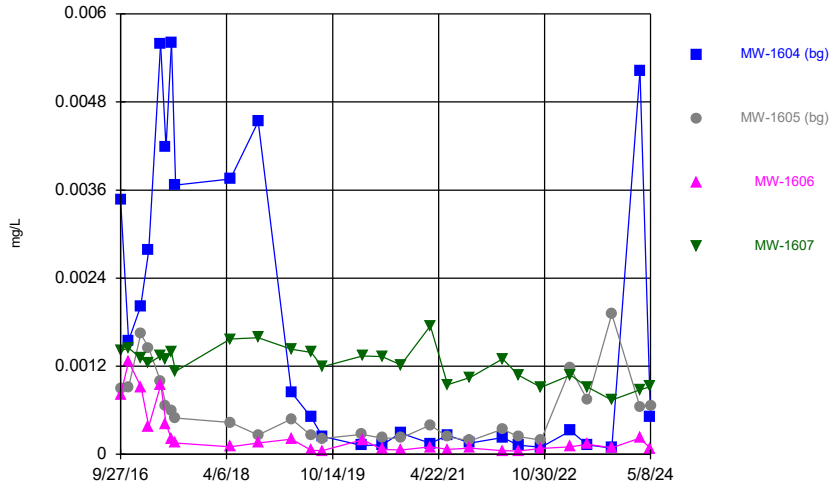
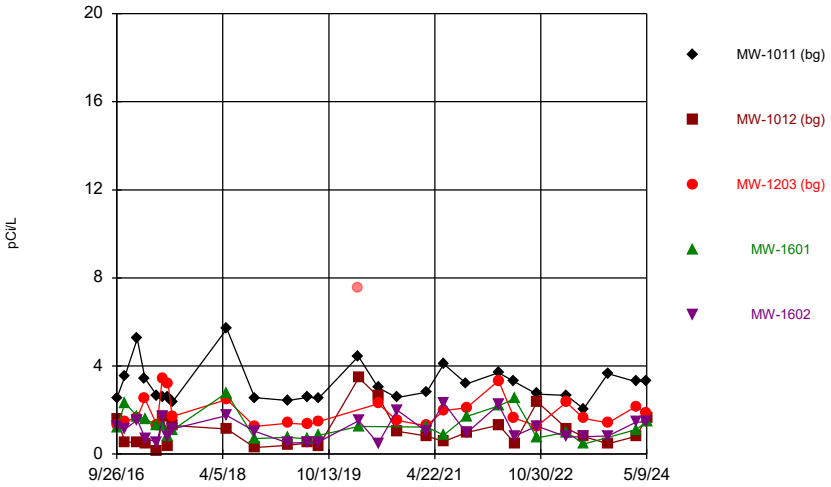
Time Series



Constituent: Cobalt Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

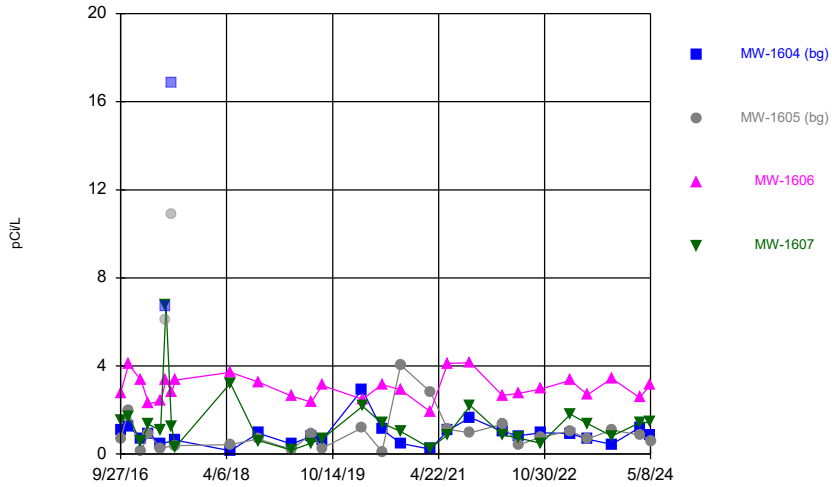
Time Series



Constituent: Combined Radium 226 + 228 Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

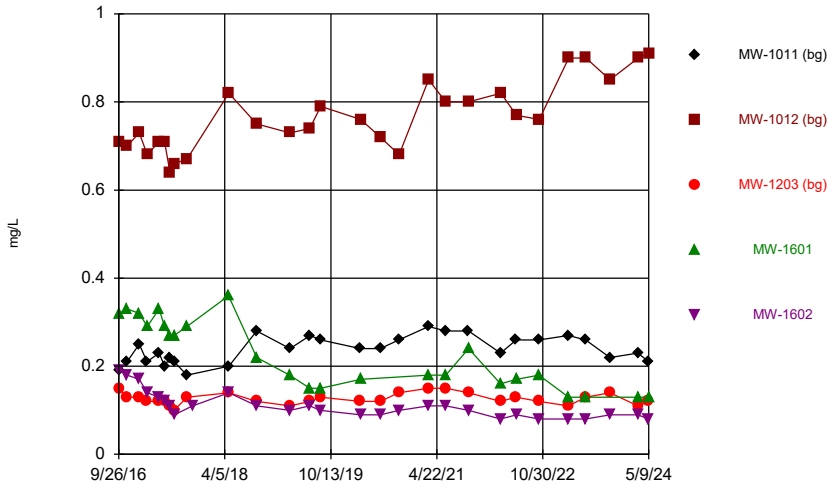
Time Series



Constituent: Combined Radium 226 + 228 Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

Time Series



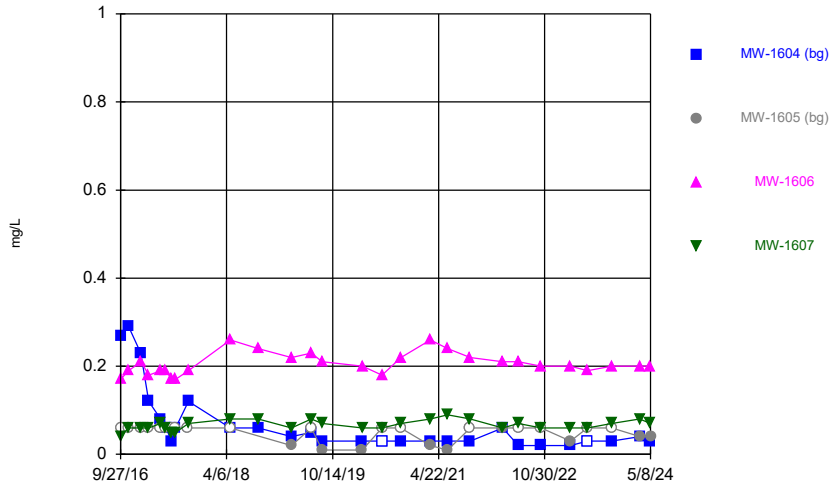
Constituent: Fluoride Analysis Run 8/23/2024 4:23 PM

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

Hollow symbols indicate censored values.

Time Series



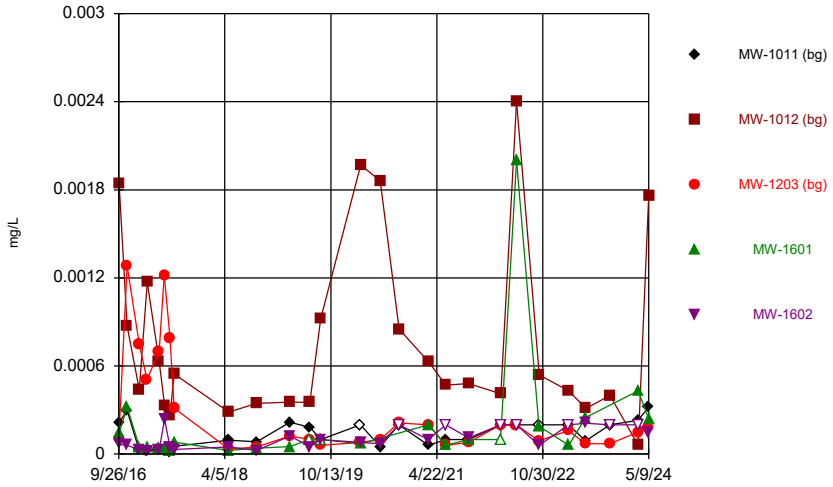
Constituent: Fluoride Analysis Run 8/23/2024 4:23 PM

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

Hollow symbols indicate censored values.

Time Series



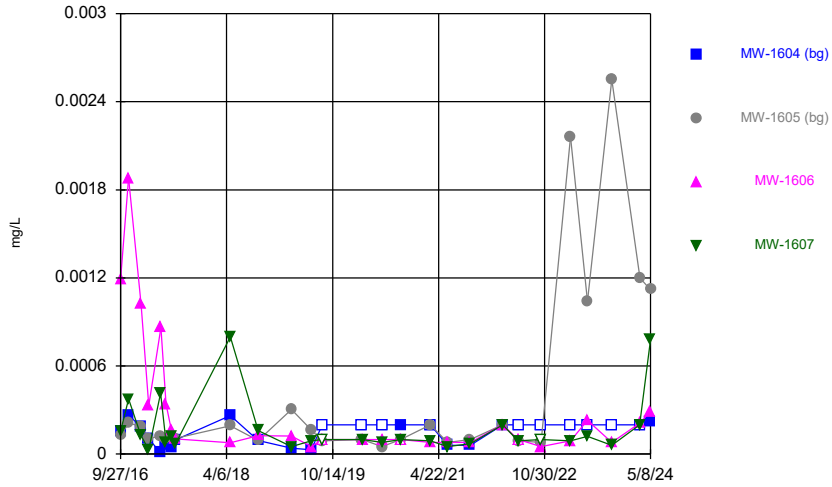
Constituent: Lead Analysis Run 8/23/2024 4:23 PM

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

Hollow symbols indicate censored values.

Time Series

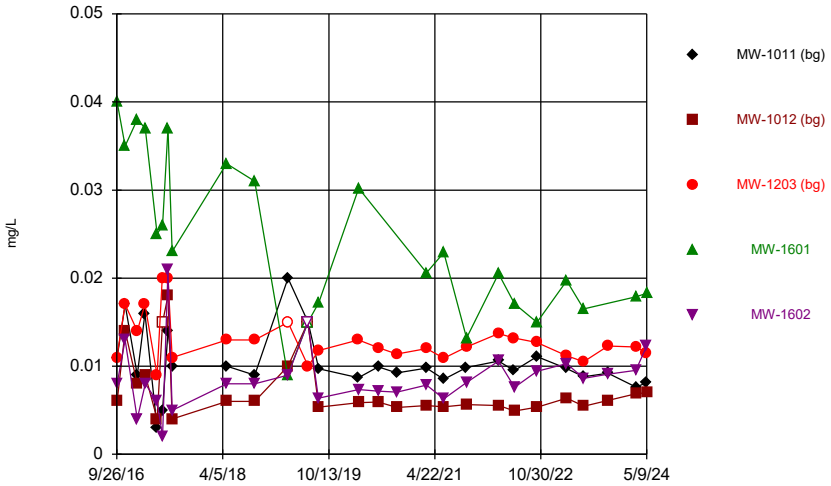


Constituent: Lead Analysis Run 8/23/2024 4:23 PM

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

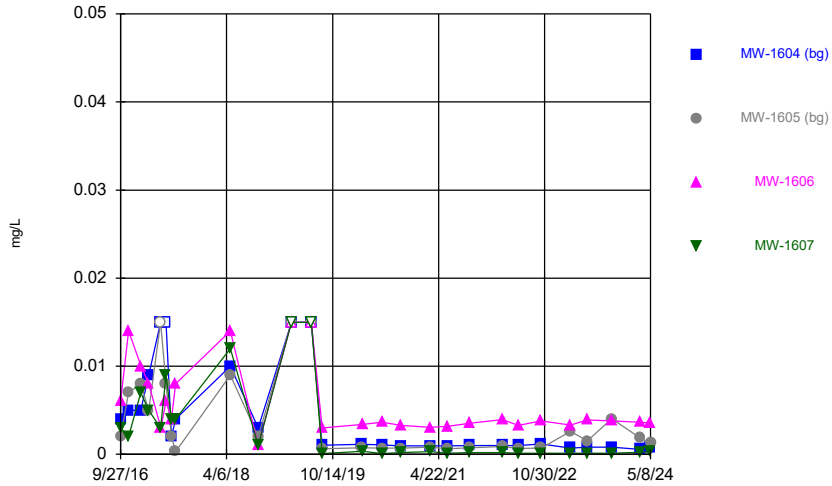
Time Series



Constituent: Lithium Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Time Series



Constituent: Lithium Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG
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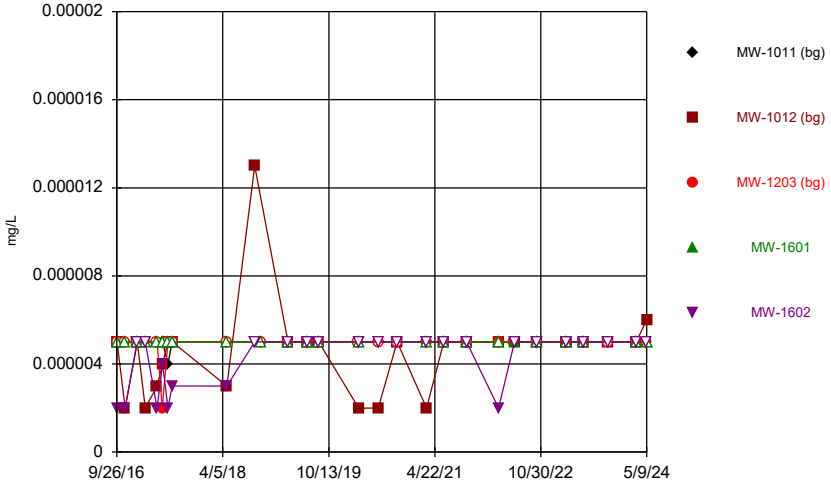
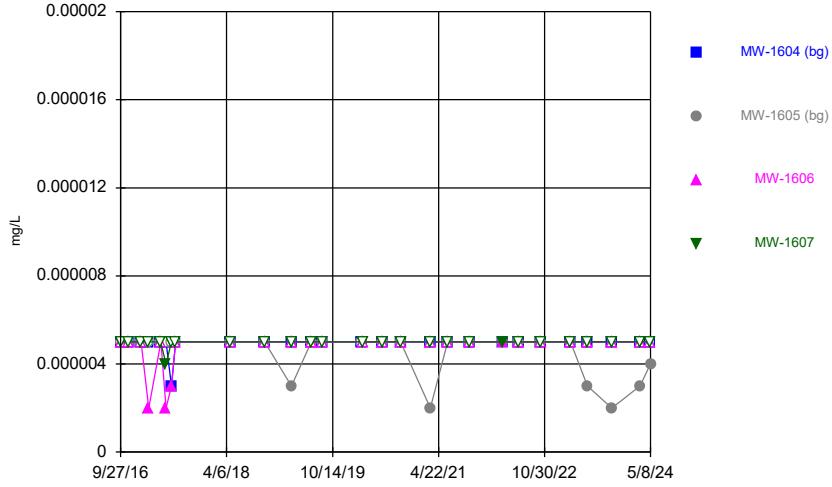
Time Series



Constituent: Mercury Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Time Series



Constituent: Mercury Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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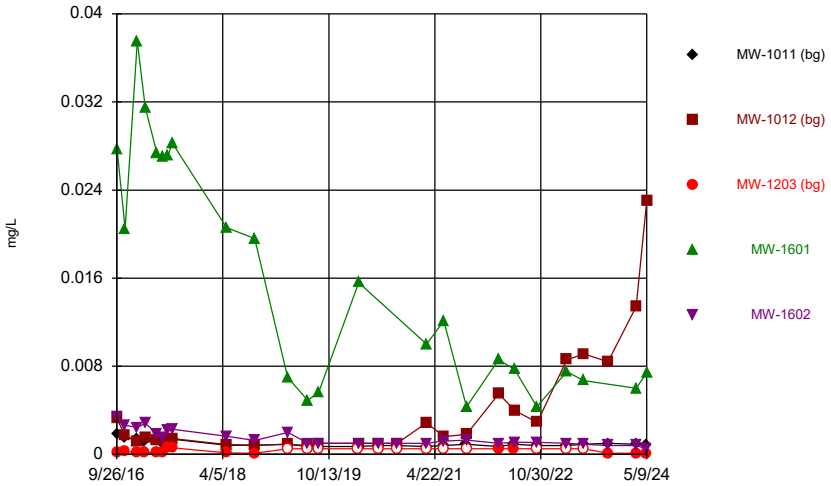
Hollow symbols indicate censored values.

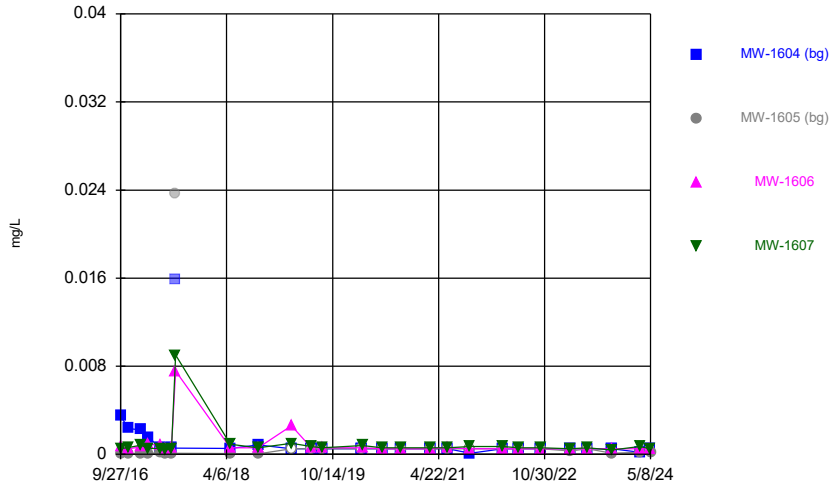
Time Series



Constituent: Molybdenum Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

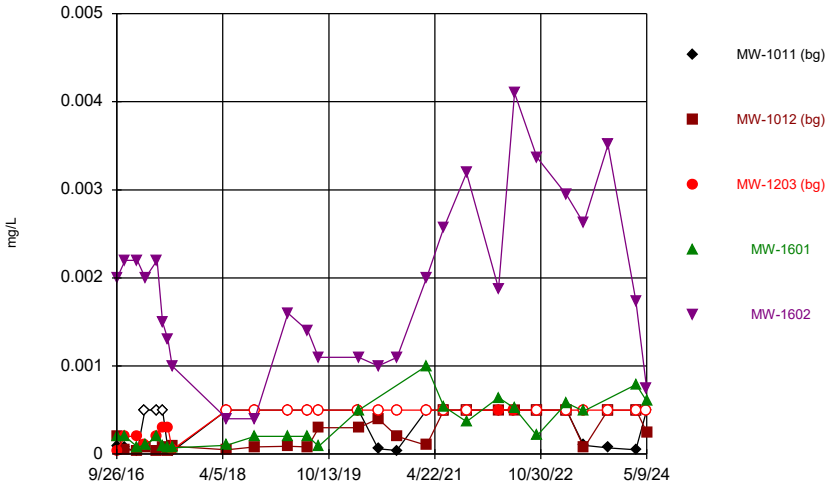
Time Series



Constituent: Molybdenum Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

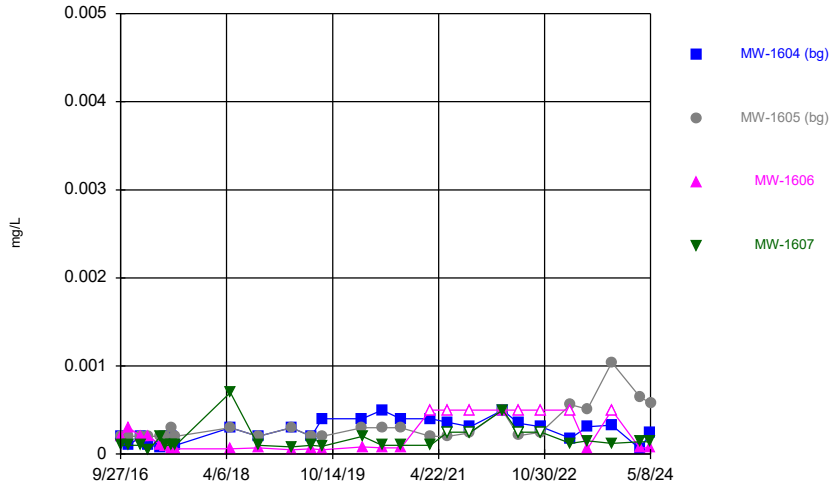
Time Series



Constituent: Selenium Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

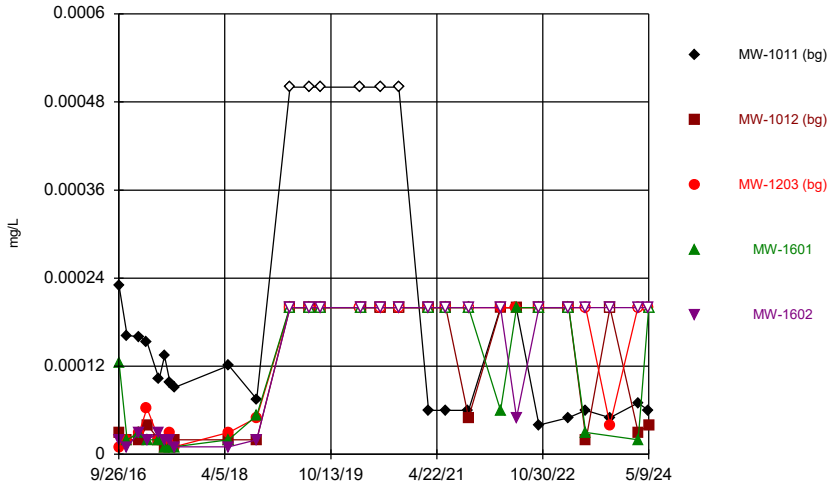
Time Series



Constituent: Selenium Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

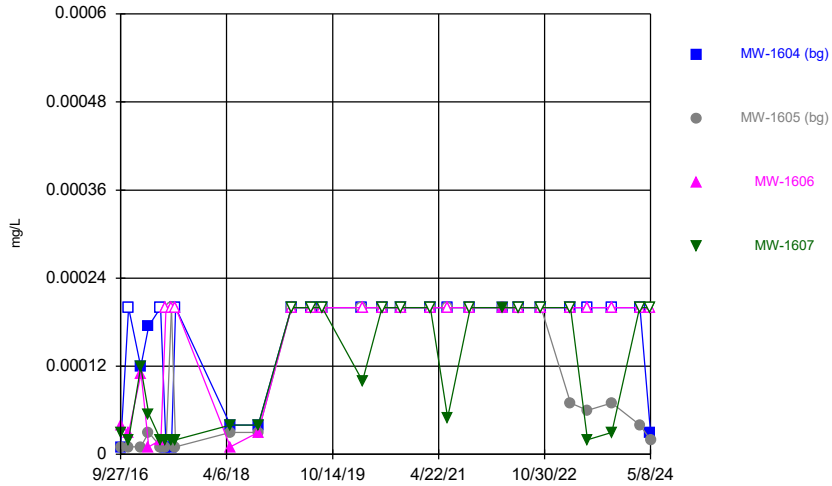
Time Series



Constituent: Thallium Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Time Series

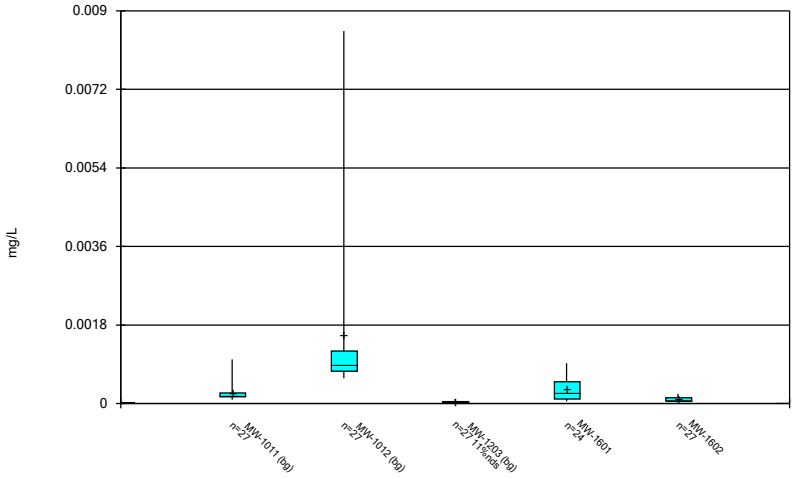


Constituent: Thallium Analysis Run 8/23/2024 4:23 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

FIGURE B

Box Plots

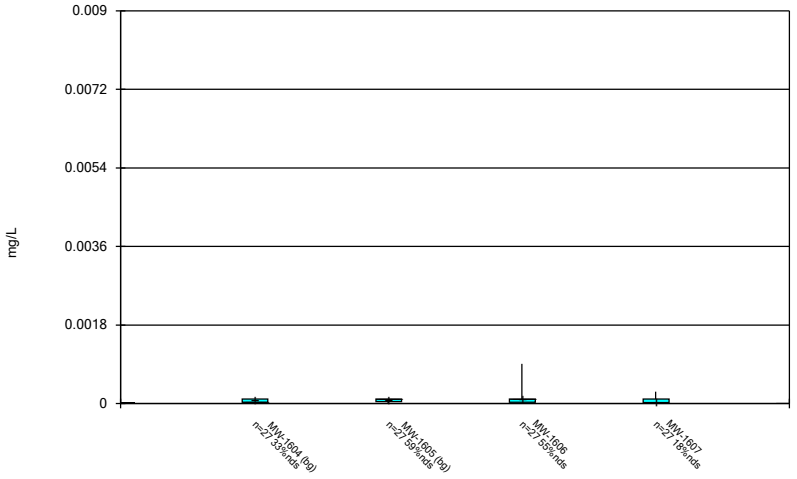
Box & Whiskers Plot



Constituent: Antimony Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

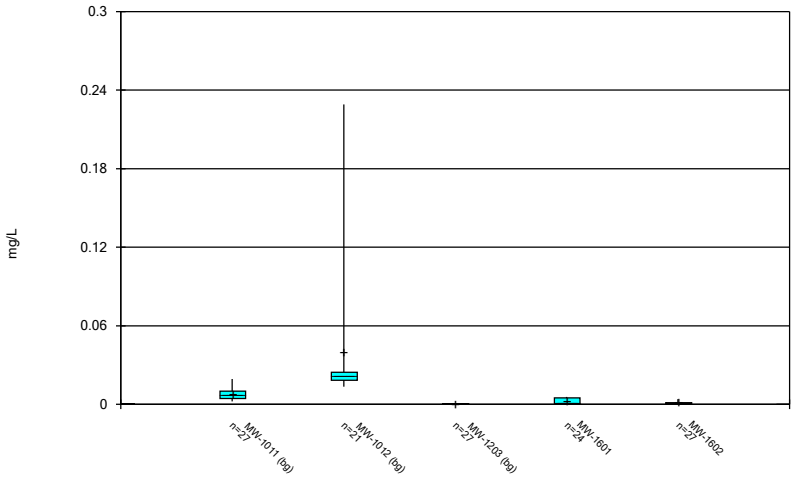
Box & Whiskers Plot



Constituent: Antimony Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

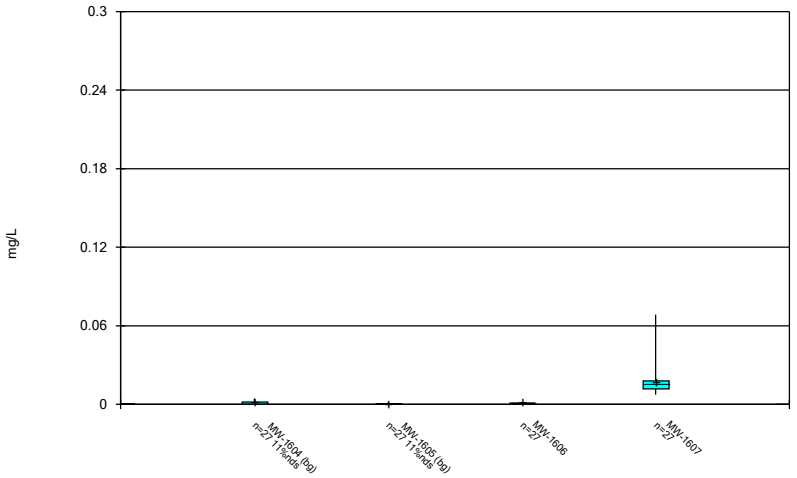
Box & Whiskers Plot



Constituent: Arsenic Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

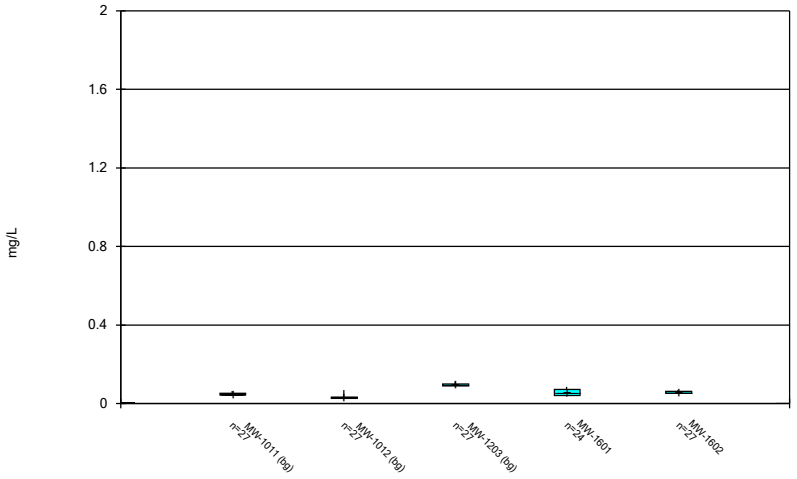
Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

Box & Whiskers Plot



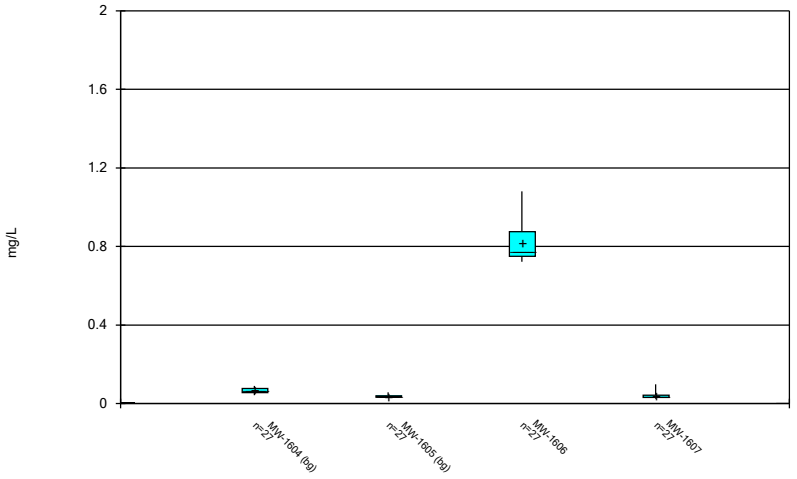
Constituent: Arsenic Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Box & Whiskers Plot



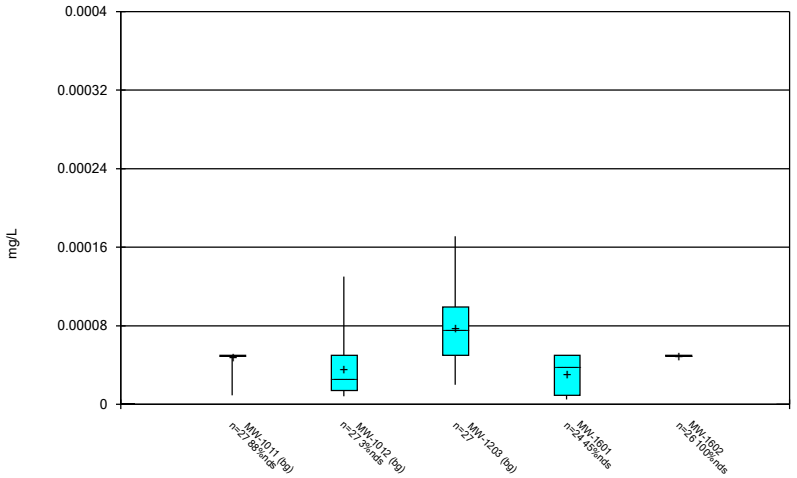
Constituent: Barium Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Box & Whiskers Plot



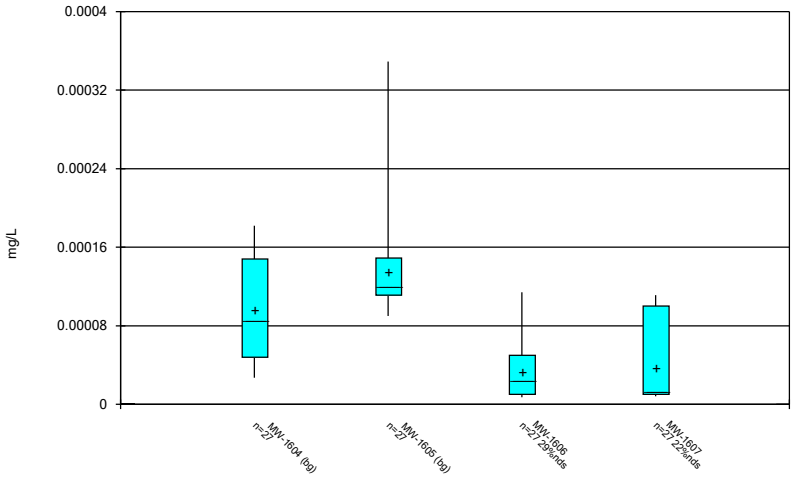
Constituent: Barium Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Box & Whiskers Plot



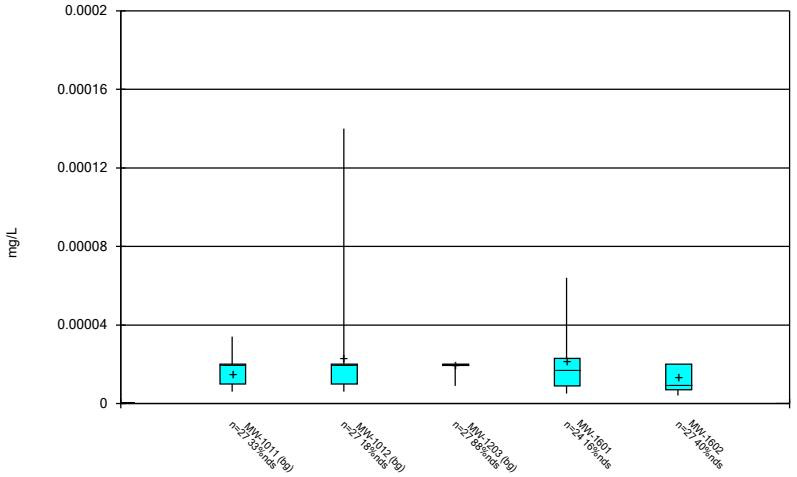
Constituent: Beryllium Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Box & Whiskers Plot



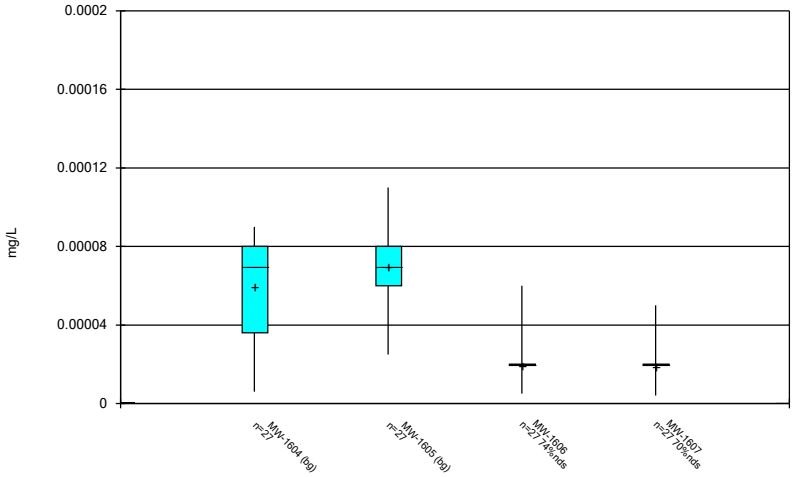
Constituent: Beryllium Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Box & Whiskers Plot



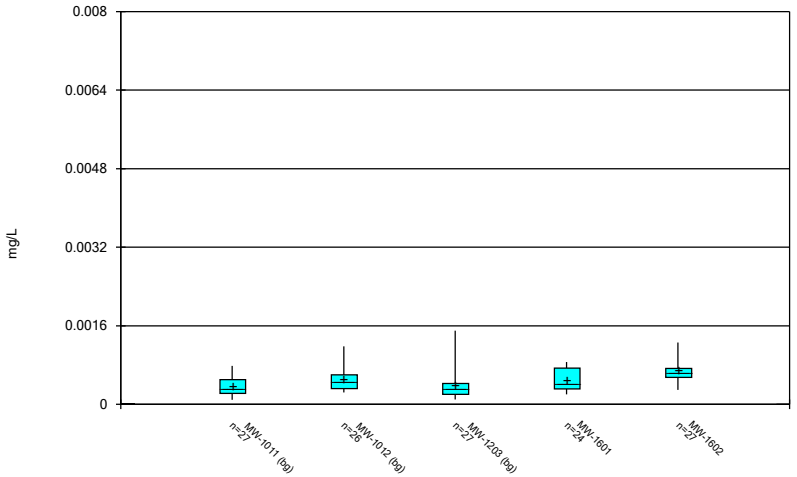
Constituent: Cadmium Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Box & Whiskers Plot



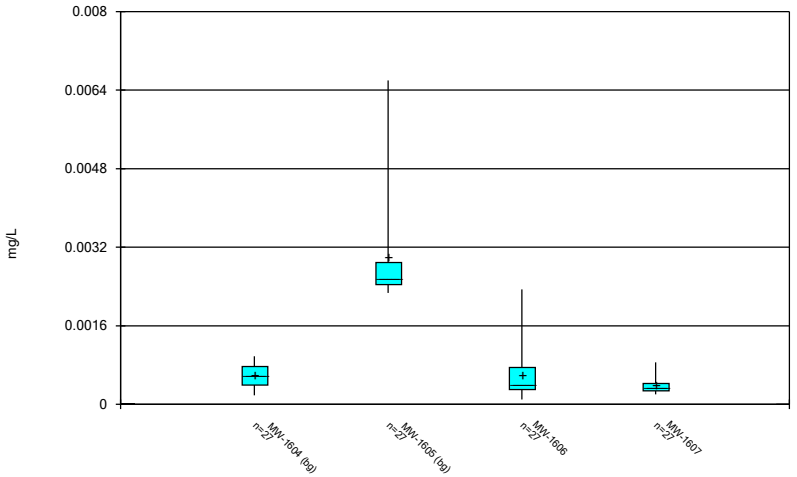
Constituent: Cadmium Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Box & Whiskers Plot



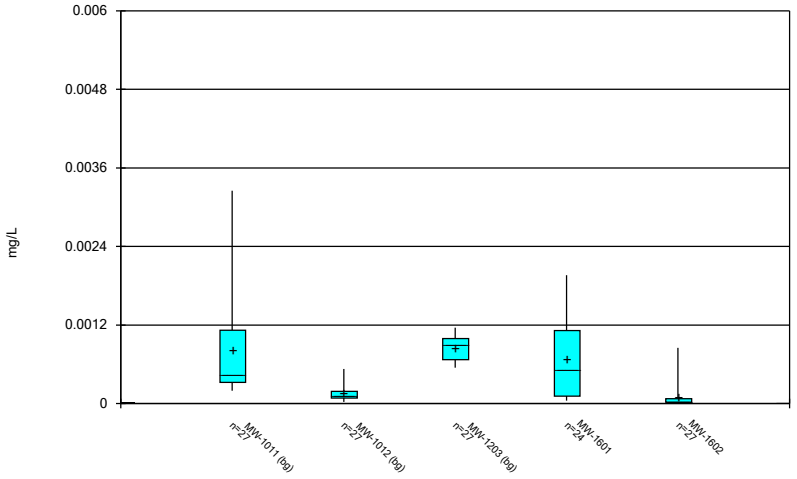
Constituent: Chromium Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Box & Whiskers Plot



Constituent: Chromium Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Box & Whiskers Plot



Constituent: Cobalt Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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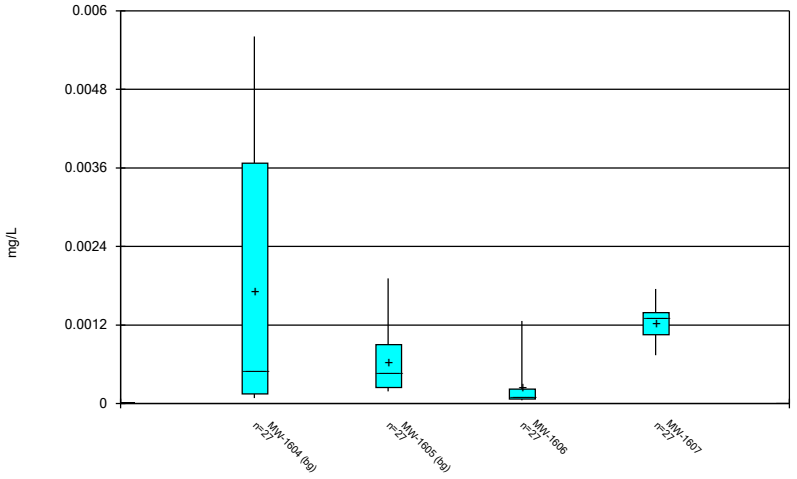
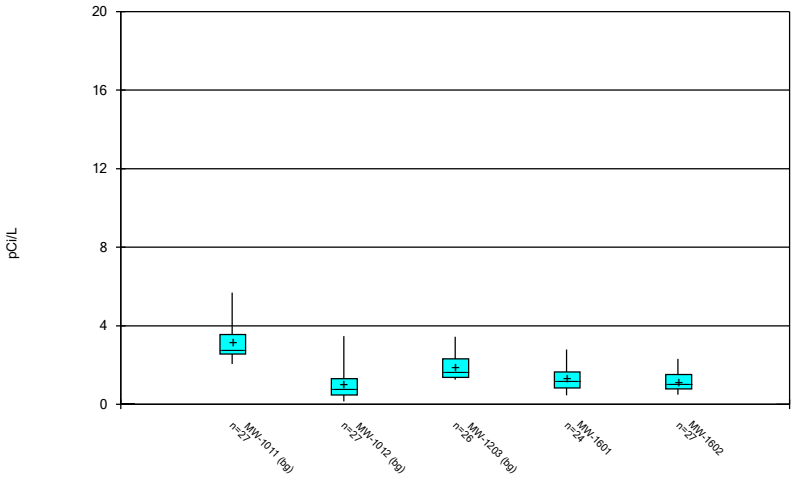
Box & Whiskers Plot



Constituent: Cobalt Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

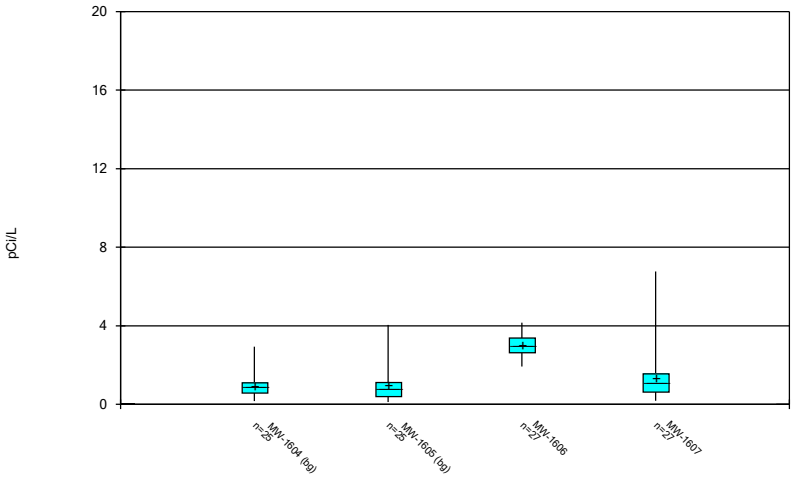
Box & Whiskers Plot



Constituent: Combined Radium 226 + 228 Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

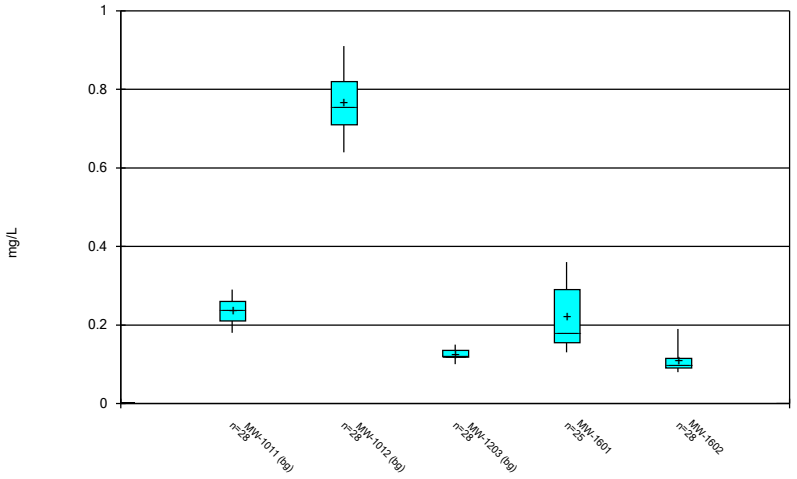
Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

Box & Whiskers Plot



Constituent: Combined Radium 226 + 228 Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Box & Whiskers Plot



Constituent: Fluoride Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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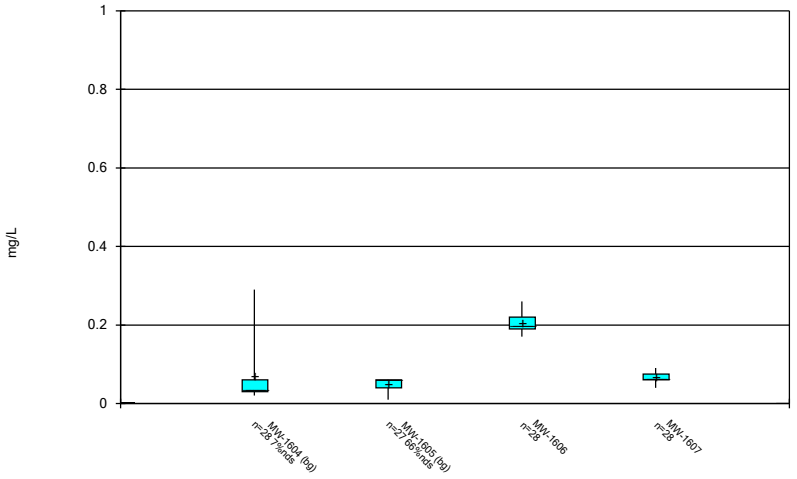
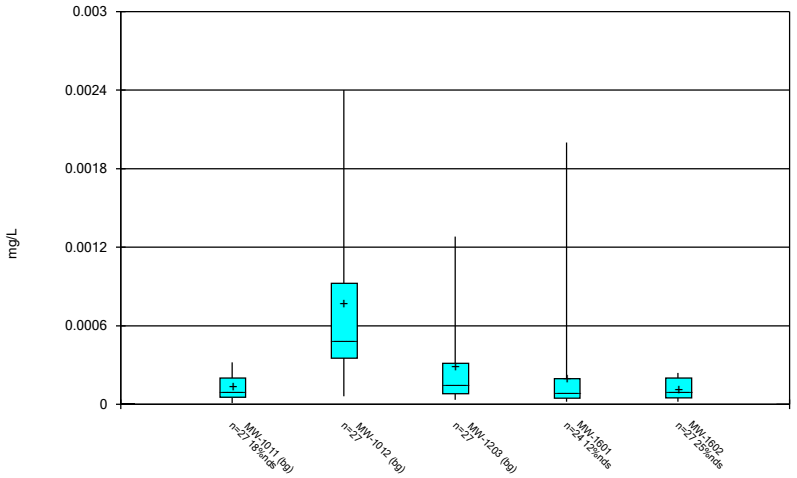
Box & Whiskers Plot



Constituent: Fluoride Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

Box & Whiskers Plot



Constituent: Lead Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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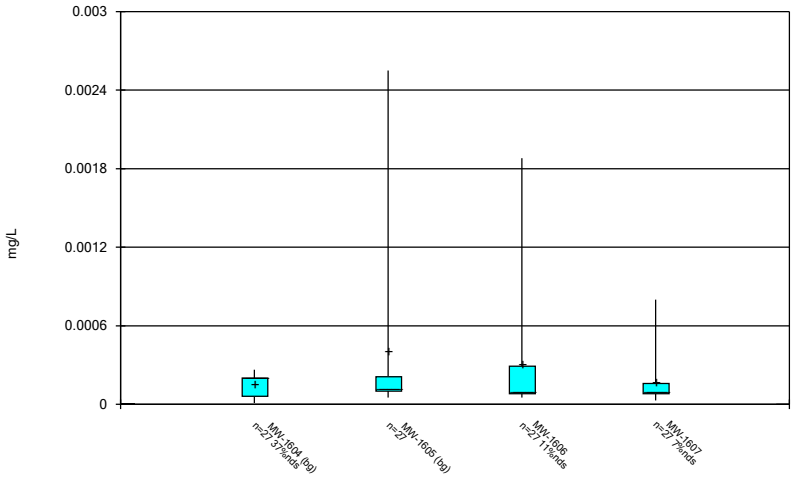
Box & Whiskers Plot



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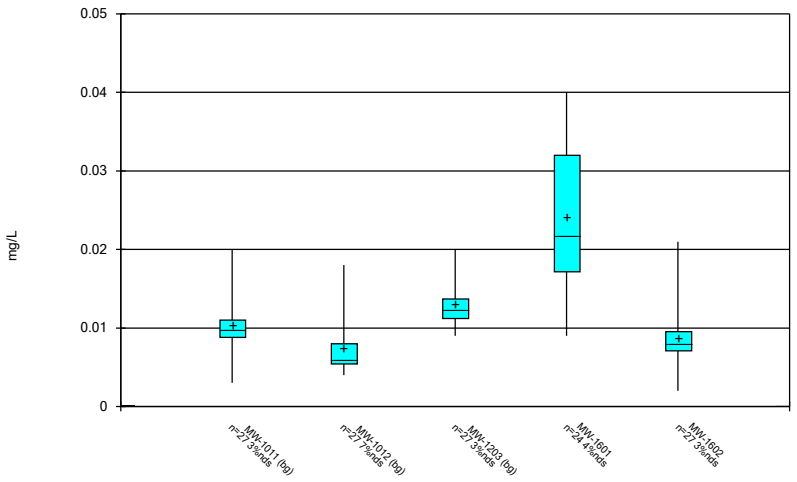
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Box & Whiskers Plot



Constituent: Lithium Analysis Run 8/23/2024 4:25 PM

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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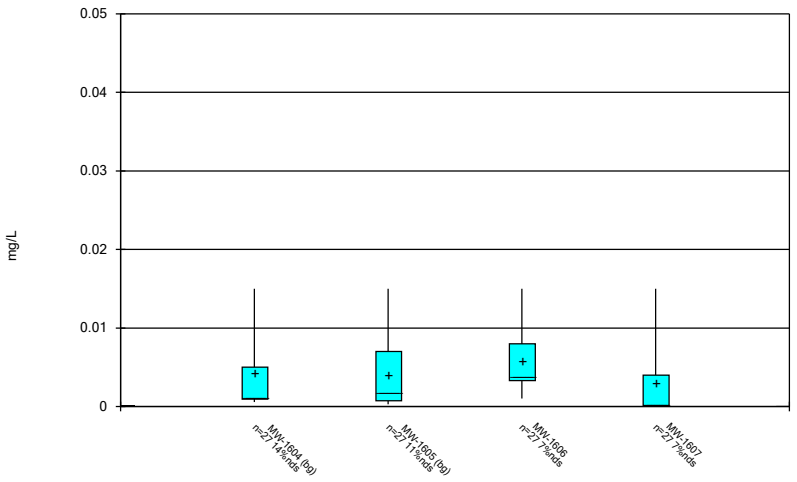
Box & Whiskers Plot

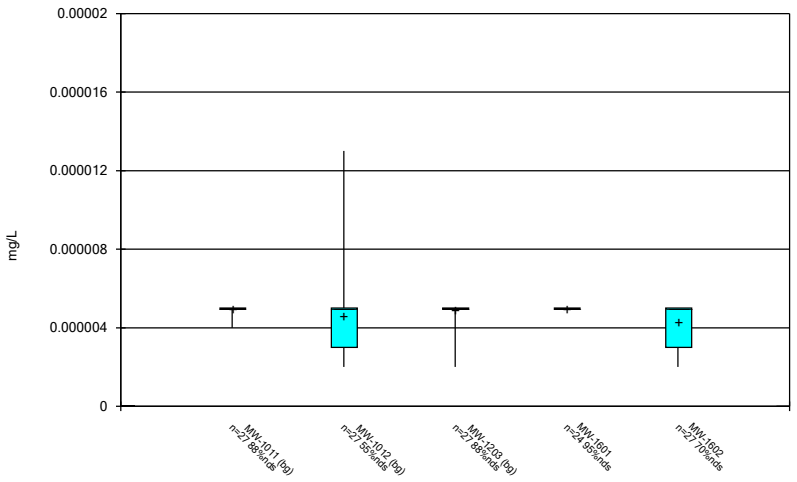


Constituent: Lithium Analysis Run 8/23/2024 4:25 PM

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

Box & Whiskers Plot



Constituent: Mercury Analysis Run 8/23/2024 4:25 PM

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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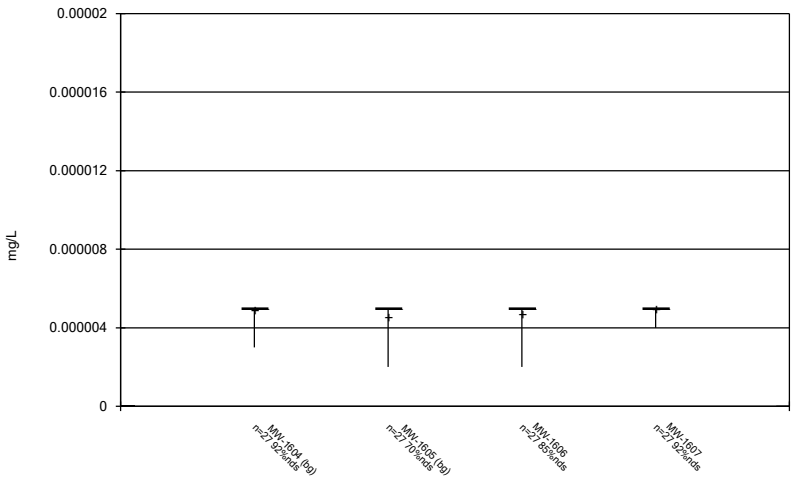
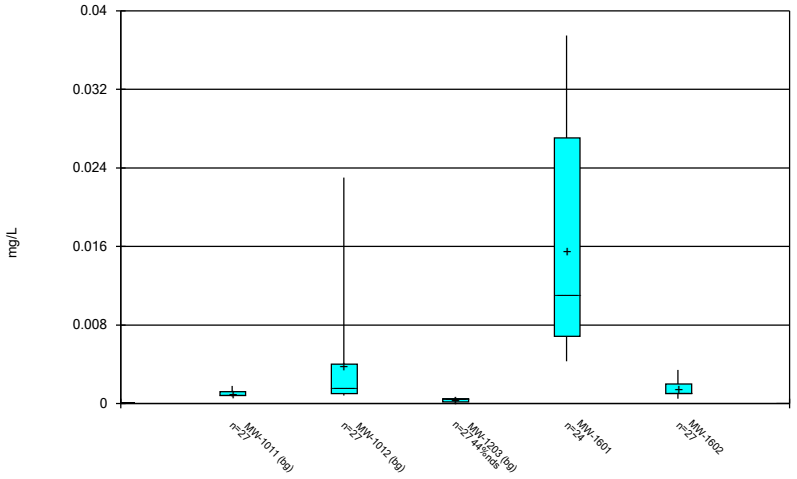
Box & Whiskers Plot



Constituent: Mercury Analysis Run 8/23/2024 4:25 PM

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

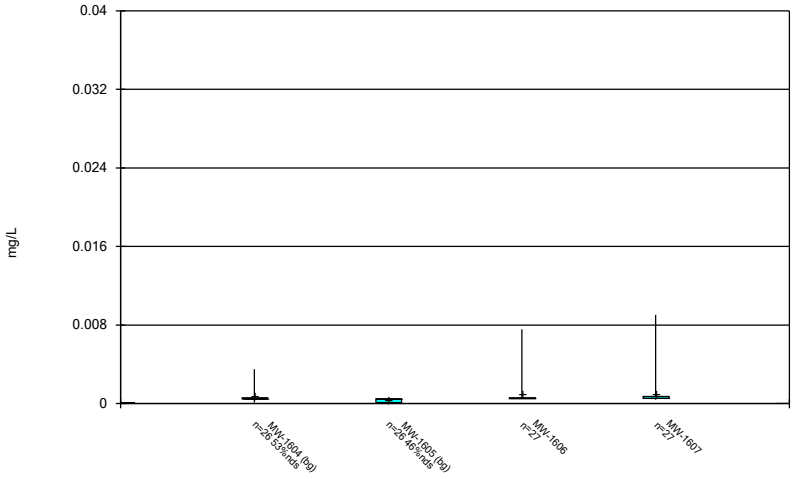
Box & Whiskers Plot



Constituent: Molybdenum Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Sanitas™ v.10.0.19h Software licensed to Groundwater Stats Consulting. UG

Box & Whiskers Plot



Constituent: Molybdenum Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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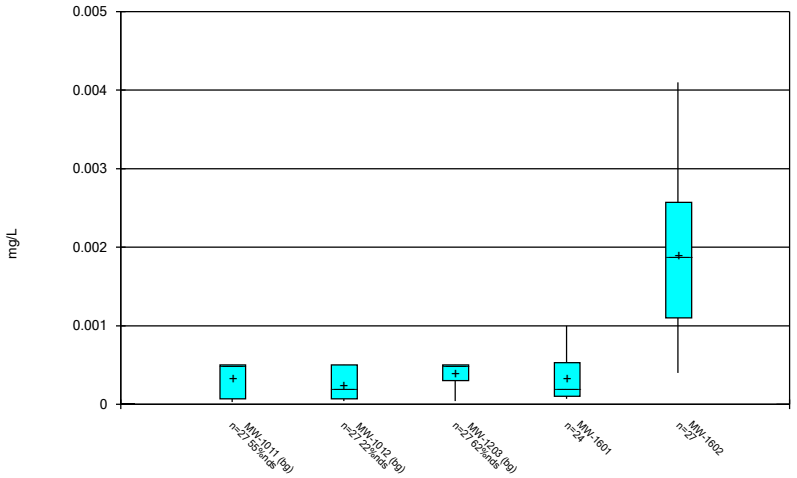
Box & Whiskers Plot



Constituent: Selenium Analysis Run 8/23/2024 4:25 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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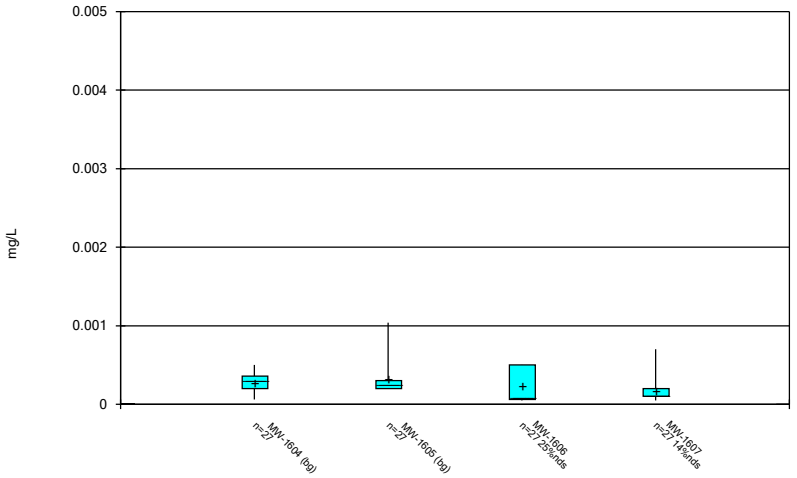
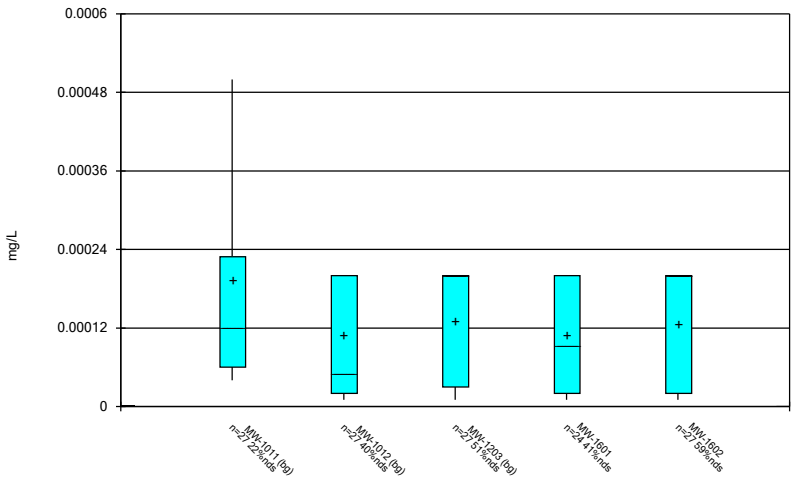
Box & Whiskers Plot



Constituent: Selenium Analysis Run 8/23/2024 4:26 PM
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Box & Whiskers Plot



Constituent: Thallium Analysis Run 8/23/2024 4:26 PM

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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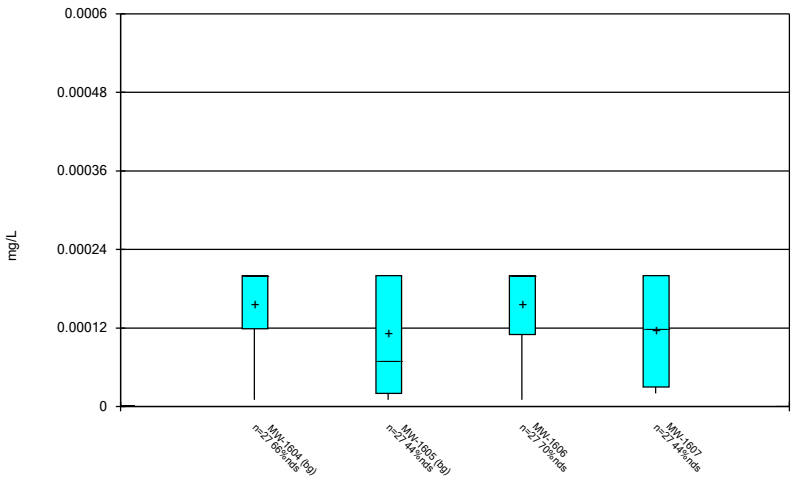
Box & Whiskers Plot



Constituent: Thallium Analysis Run 8/23/2024 4:26 PM

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

FIGURE C
Outlier Summary

Outlier Summary

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP Printed 8/20/2024, 3:12 PM

	MW-1012 Arsenic (mg/L)	MW-1012 Chromium (mg/L)	MW-1203 Combined Radium 226 + 228 (pCi/L)	MW-1604 Combined Radium 226 + 228 (pCi/L)	MW-1605 Combined Radium 226 + 228 (pCi/L)	MW-1604 Molybdenum (mg/L)	MW-1605 Molybdenum (mg/L)
5/23/2017			6.707 (o)	6.077 (o)			
5/24/2017		0.00784 (o)					
6/21/2017			16.848 (o)	10.864 (o)			
7/12/2017						0.0159 (o)	0.0237 (o)
3/17/2020			7.524 (o)				
3/24/2022	0.0499 (o)						
6/15/2022	0.0454 (o)						
10/12/2022	0.0386 (o)						
3/15/2023	0.0942 (o)						
6/14/2023	0.118 (o)						
10/18/2023	0.107 (o)						

FIGURE D

UTLs

Upper Tolerance Limits Summary Table

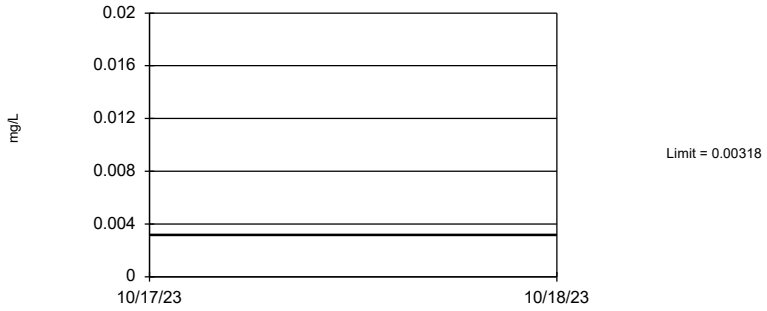
Big Sandy FAP Data: Big Sandy FAP Printed 1/29/2024, 2:30 PM

Constituent	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Antimony (mg/L)	0.00318	n/a	n/a	n/a	n/a	125	22.4	n/a	0.001642	NP Inter(normality)
Arsenic (mg/L)	0.0289	n/a	n/a	n/a	n/a	119	5.042	n/a	0.002234	NP Inter(normality)
Barium (mg/L)	0.113	n/a	n/a	n/a	n/a	125	0	n/a	0.001642	NP Inter(normality)
Beryllium (mg/L)	0.000349	n/a	n/a	n/a	n/a	125	18.4	n/a	0.001642	NP Inter(normality)
Cadmium (mg/L)	0.00014	n/a	n/a	n/a	n/a	125	28	n/a	0.001642	NP Inter(normality)
Chromium (mg/L)	0.0066	n/a	n/a	n/a	n/a	124	0	n/a	0.001729	NP Inter(normality)
Cobalt (mg/L)	0.003536	n/a	n/a	n/a	n/a	125	0	ln(x)	0.05	Inter
Combined Radium 226 + 228 (pCi/L)	4.521	n/a	n/a	n/a	n/a	120	0	x^(1/3)	0.05	Inter
Fluoride (mg/L)	0.9	n/a	n/a	n/a	n/a	129	15.5	n/a	0.001338	NP Inter(normality)
Lead (mg/L)	0.00255	n/a	n/a	n/a	n/a	125	11.2	n/a	0.001642	NP Inter(normality)
Lithium (mg/L)	0.02	n/a	n/a	n/a	n/a	125	8.8	n/a	0.001642	NP Inter(normality)
Mercury (mg/L)	0.000013	n/a	n/a	n/a	n/a	125	80	n/a	0.001642	NP Inter(NDs)
Molybdenum (mg/L)	0.0091	n/a	n/a	n/a	n/a	123	30.08	n/a	0.00182	NP Inter(normality)
Selenium (mg/L)	0.00104	n/a	n/a	n/a	n/a	125	27.2	n/a	0.001642	NP Inter(normality)
Thallium (mg/L)	0.000229	n/a	n/a	n/a	n/a	125	46.4	n/a	0.001642	NP Inter(normality)

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 22.4% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

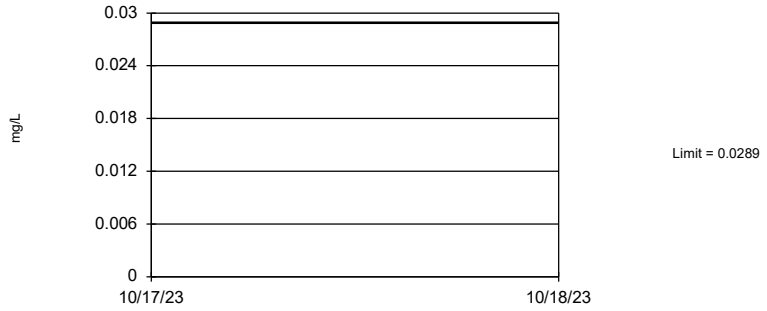
Constituent: Antimony Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 119 background values. 5.042% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.002234.

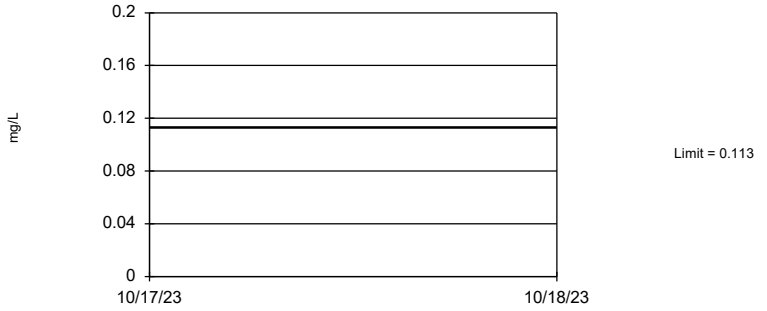
Constituent: Arsenic Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

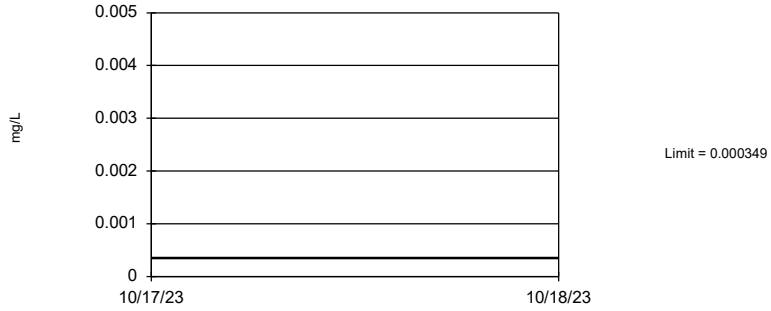
Constituent: Barium Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



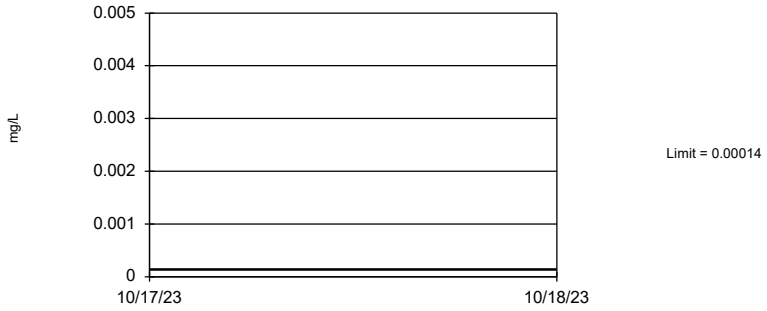
Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 18.4% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

Constituent: Beryllium Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Tolerance Limit

Interwell Non-parametric



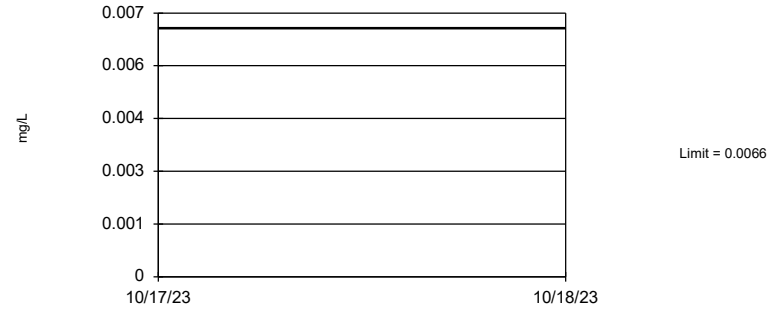
Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 28% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

Constituent: Cadmium Analysis Run 1/29/2024 2:29 PM View: UTLs
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



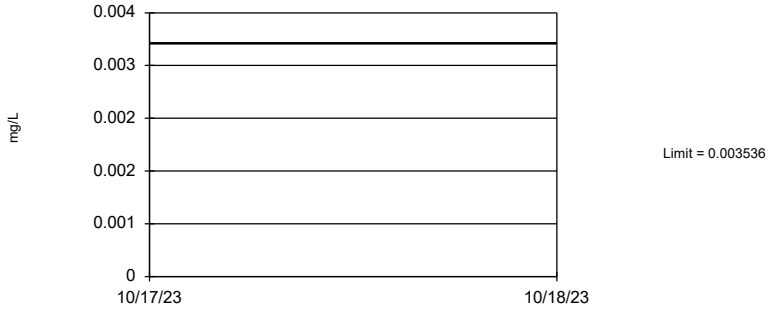
Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 124 background values. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001729.

Constituent: Chromium Analysis Run 1/29/2024 2:29 PM View: UTLs
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Parametric



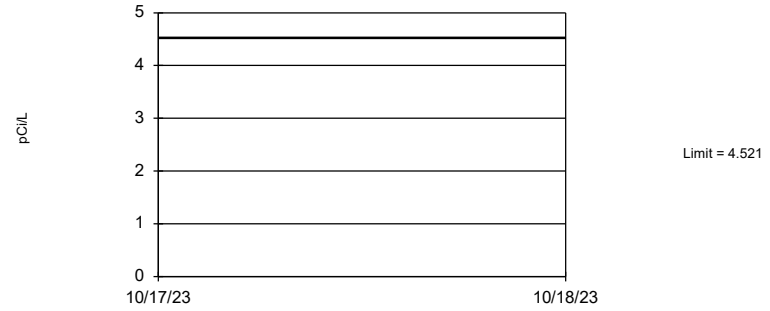
95% coverage. Background Data Summary (based on natural log transformation): Mean=-7.712, Std. Dev.=1.093, n=125. Normality test: Chi Squared @alpha = 0.01, calculated = 10.44, critical = 14.07. Report alpha = 0.05.

Constituent: Cobalt Analysis Run 1/29/2024 2:29 PM View: UTLs
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Parametric



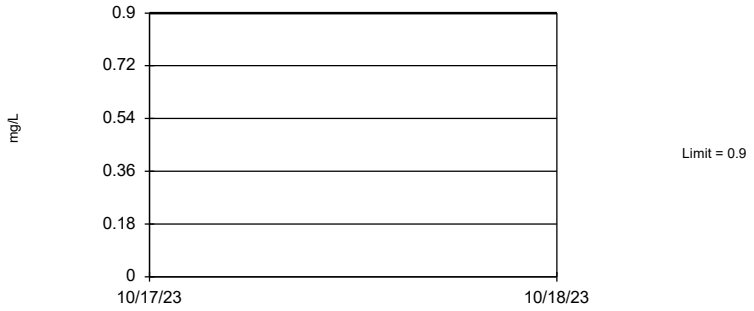
95% coverage. Background Data Summary (based on cube root transformation): Mean=1.099, Std. Dev.=0.2924, n=120. Normality test: Chi Squared @alpha = 0.01, calculated = 10.17, critical = 14.07. Report alpha = 0.05.

Constituent: Combined Radium 226 + 228 Analysis Run 1/29/2024 2:29 PM View: UTLs
Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 129 background values. 15.5% NDs. 96.68% coverage at alpha=0.01; 97.85% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001338.

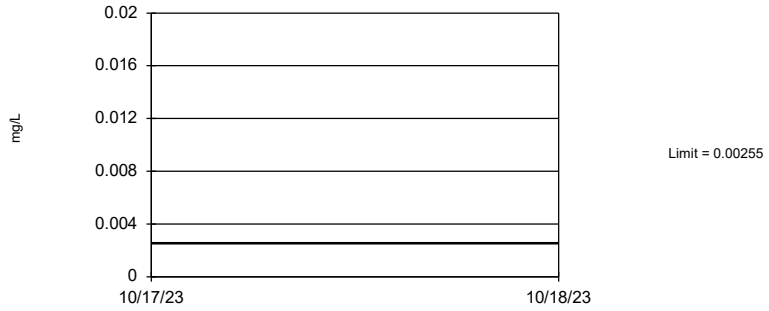
Constituent: Fluoride Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 11.2% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

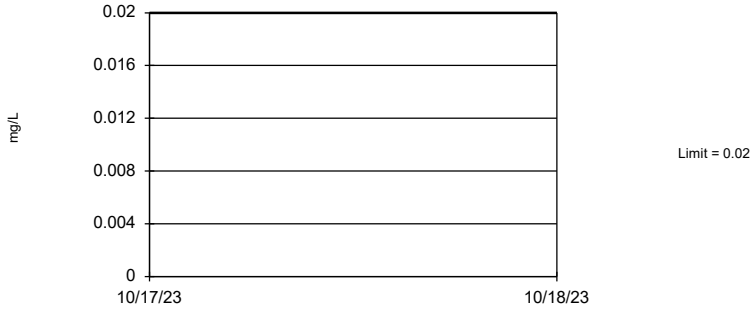
Constituent: Lead Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 8.8% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

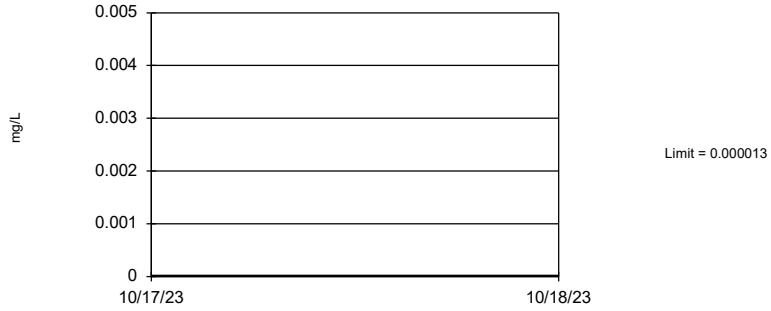
Constituent: Lithium Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 125 background values. 80% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

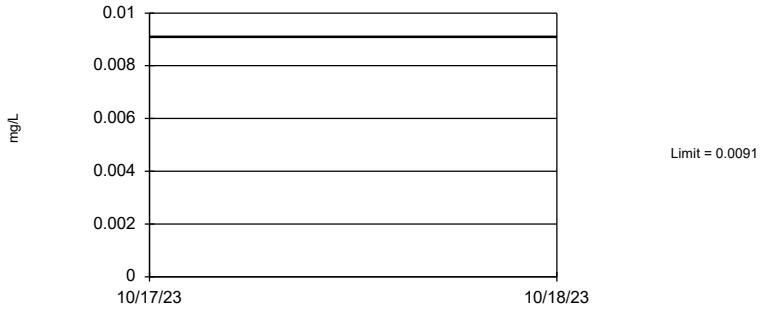
Constituent: Mercury Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 123 background values. 30.08% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.00182.

Constituent: Molybdenum Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric

Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 27.2% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

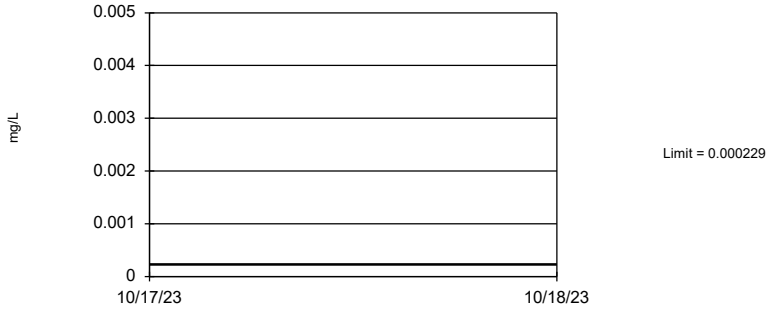
Constituent: Selenium Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

Sanitas™ v.10.0.15 . UG

Tolerance Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Chi Squared normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 125 background values. 46.4% NDs. 96.29% coverage at alpha=0.01; 97.46% coverage at alpha=0.05; 99.41% coverage at alpha=0.5. Report alpha = 0.001642.

Constituent: Thallium Analysis Run 1/29/2024 2:29 PM View: UTLs

Big Sandy FAP Data: Big Sandy FAP

FIGURE E

GWPS

BIG SANDY FAP GWPS				
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		0.029	0.029
Barium, Total (mg/L)	2		0.11	2
Beryllium, Total (mg/L)	0.004		0.00035	0.004
Cadmium, Total (mg/L)	0.005		0.00014	0.005
Chromium, Total (mg/L)	0.1		0.0066	0.1
Cobalt, Total (mg/L)	n/a	0.006	0.0035	0.006
Combined Radium, Total (pCi/L)	5		4.52	5
Fluoride, Total (mg/L)	4		0.9	4
Lead, Total (mg/L)	0.015		0.0026	0.015
Lithium, Total (mg/L)	n/a	0.04	0.02	0.04
Mercury, Total (mg/L)	0.002		0.000013	0.002
Molybdenum, Total (mg/L)	n/a	0.1	0.0091	0.1
Selenium, Total (mg/L)	0.05		0.001	0.05
Thallium, Total (mg/L)	0.002		0.00023	0.002

**Grey cell indicates Background is higher than MCL or CCR-Rule Specified Level*

**GWPS = Groundwater Protection Standard*

**MCL = Maximum Contaminant Level*

**CCR = Coal Combustion Residual*

FIGURE F
Confidence Intervals

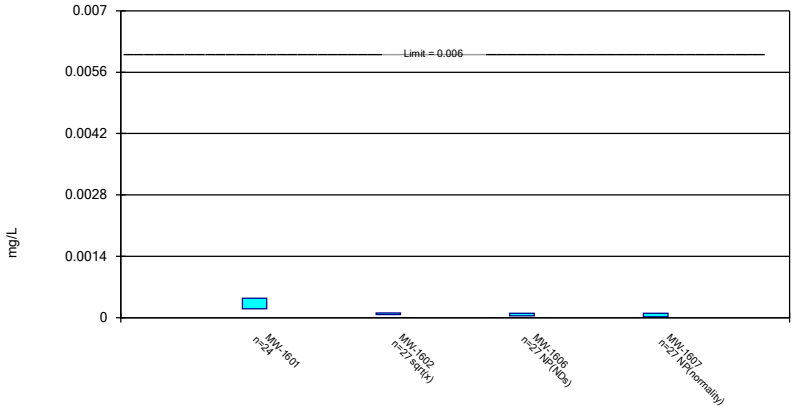
Confidence Interval - All Results (No Significant)

Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP Printed 8/23/2024, 1:06 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony (mg/L)	MW-1601	0.0004439	0.0002022	0.006	No	24	0.0003231	0.0002369	0	None	No	0.01	Param.
Antimony (mg/L)	MW-1602	0.0001091	0.00006596	0.006	No	27	0.00009189	0.00004961	0	None	sqrt(x)	0.01	Param.
Antimony (mg/L)	MW-1606	0.0001	0.00004	0.006	No	27	0.0001044	0.0001652	55.56	None	No	0.01	NP (NDs)
Antimony (mg/L)	MW-1607	0.0001	0.00002	0.006	No	27	0.00005563	0.00005843	18.52	None	No	0.01	NP (normality)
Arsenic (mg/L)	MW-1601	0.00503	0.00041	0.029	No	24	0.002383	0.002162	0	None	No	0.01	NP (normality)
Arsenic (mg/L)	MW-1602	0.001171	0.0006579	0.029	No	27	0.001069	0.0008157	0	None	ln(x)	0.01	Param.
Arsenic (mg/L)	MW-1606	0.00105	0.0009037	0.029	No	27	0.000977	0.0001537	0	None	No	0.01	Param.
Arsenic (mg/L)	MW-1607	0.01866	0.0119	0.029	No	27	0.01695	0.01155	0	None	ln(x)	0.01	Param.
Barium (mg/L)	MW-1601	0.06473	0.04788	2	No	24	0.0563	0.01651	0	None	No	0.01	Param.
Barium (mg/L)	MW-1602	0.0604	0.05463	2	No	27	0.05751	0.006057	0	None	No	0.01	Param.
Barium (mg/L)	MW-1606	0.875	0.75	2	No	27	0.8165	0.09705	0	None	No	0.01	NP (normality)
Barium (mg/L)	MW-1607	0.04258	0.03201	2	No	27	0.0388	0.01476	0	None	ln(x)	0.01	Param.
Beryllium (mg/L)	MW-1601	0.00005	0.000009	0.004	No	24	0.00003121	0.00001975	45.83	None	No	0.01	NP (normality)
Beryllium (mg/L)	MW-1606	0.00005	0.00001	0.004	No	27	0.00003341	0.00002627	29.63	None	No	0.01	NP (normality)
Beryllium (mg/L)	MW-1607	0.00005	0.00001	0.004	No	27	0.00003748	0.0000396	22.22	None	No	0.01	NP (normality)
Cadmium (mg/L)	MW-1601	0.00001401	0.000006443	0.005	No	24	0.00002175	0.00001749	16.67	Kaplan-Meier	x^(1/3)	0.01	Param.
Cadmium (mg/L)	MW-1602	0.00002	0.000007	0.005	No	27	0.00001319	0.000006367	40.74	None	No	0.01	NP (normality)
Cadmium (mg/L)	MW-1606	0.00002	0.00001	0.005	No	27	0.00001919	0.00000954	74.07	None	No	0.01	NP (NDs)
Cadmium (mg/L)	MW-1607	0.00002	0.000009	0.005	No	27	0.00001822	0.000008423	70.37	None	No	0.01	NP (NDs)
Chromium (mg/L)	MW-1601	0.0005877	0.0003687	0.1	No	24	0.0004953	0.0002228	0	None	sqrt(x)	0.01	Param.
Chromium (mg/L)	MW-1602	0.0007883	0.0005714	0.1	No	27	0.0006799	0.0002273	0	None	No	0.01	Param.
Chromium (mg/L)	MW-1606	0.0007317	0.0003144	0.1	No	27	0.0005932	0.0005439	0	None	sqrt(x)	0.01	Param.
Chromium (mg/L)	MW-1607	0.0004493	0.000303	0.1	No	27	0.0003878	0.0001678	0	None	sqrt(x)	0.01	Param.
Cobalt (mg/L)	MW-1601	0.0009904	0.0003751	0.006	No	24	0.0006828	0.0006029	0	None	No	0.01	Param.
Cobalt (mg/L)	MW-1602	0.00007332	0.00002383	0.006	No	27	0.0001012	0.0001897	0	None	ln(x)	0.01	Param.
Cobalt (mg/L)	MW-1606	0.000218	0.000068	0.006	No	27	0.0002608	0.000328	0	None	No	0.01	NP (normality)
Cobalt (mg/L)	MW-1607	0.001347	0.001112	0.006	No	27	0.00123	0.0002456	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1601	1.636	1.004	5	No	24	1.32	0.6195	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1602	1.405	0.9001	5	No	27	1.152	0.529	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1606	3.303	2.758	5	No	27	3.031	0.5709	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1607	1.593	0.7498	5	No	27	1.359	1.278	0	None	x^(1/3)	0.01	Param.
Fluoride (mg/L)	MW-1601	0.261	0.1846	4	No	25	0.2228	0.07662	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-1602	0.12	0.09	4	No	28	0.1096	0.03012	0	None	No	0.01	NP (normality)
Fluoride (mg/L)	MW-1606	0.2168	0.1939	4	No	28	0.2054	0.02442	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-1607	0.07171	0.06115	4	No	28	0.06643	0.01129	0	None	No	0.01	Param.
Lead (mg/L)	MW-1601	0.0001653	0.00005709	0.015	No	24	0.0001977	0.0003977	12.5	None	ln(x)	0.01	Param.
Lead (mg/L)	MW-1602	0.00009146	0.00004693	0.015	No	27	0.0001128	0.0000736	25.93	Kaplan-Meier	sqrt(x)	0.01	Param.
Lead (mg/L)	MW-1606	0.00029	0.00009	0.015	No	27	0.0003019	0.0004333	11.11	None	No	0.01	NP (normality)
Lead (mg/L)	MW-1607	0.0001758	0.00008332	0.015	No	27	0.0001744	0.0001981	7.407	None	ln(x)	0.01	Param.
Lithium (mg/L)	MW-1601	0.02867	0.01951	0.04	No	24	0.02409	0.008974	4.167	None	No	0.01	Param.
Lithium (mg/L)	MW-1602	0.01007	0.006806	0.04	No	27	0.008696	0.003618	3.704	None	sqrt(x)	0.01	Param.
Lithium (mg/L)	MW-1606	0.008	0.00329	0.04	No	27	0.00579	0.004145	7.407	None	No	0.01	NP (normality)
Lithium (mg/L)	MW-1607	0.004	0.00013	0.04	No	27	0.003063	0.004605	7.407	None	No	0.01	NP (normality)
Mercury (mg/L)	MW-1601	0.000005	0.000005	0.002	No	24	0.000005	2.6e-14	95.83	None	No	0.01	NP (NDs)
Mercury (mg/L)	MW-1602	0.000005	0.000004	0.002	No	27	0.000004259	0.000001228	70.37	None	No	0.01	NP (NDs)
Mercury (mg/L)	MW-1606	0.000005	0.000003	0.002	No	27	0.000004704	8.7e-7	85.19	None	No	0.01	NP (NDs)
Mercury (mg/L)	MW-1607	0.000005	0.000004	0.002	No	27	0.000004963	1.9e-7	92.59	None	No	0.01	NP (NDs)
Molybdenum (mg/L)	MW-1601	0.01944	0.009358	0.1	No	24	0.01562	0.01044	0	None	sqrt(x)	0.01	Param.
Molybdenum (mg/L)	MW-1602	0.001728	0.001094	0.1	No	27	0.00147	0.0007262	0	None	sqrt(x)	0.01	Param.
Molybdenum (mg/L)	MW-1606	0.00067	0.0005	0.1	No	27	0.0009063	0.00139	0	None	No	0.01	NP (normality)
Molybdenum (mg/L)	MW-1607	0.0007	0.00053	0.1	No	27	0.0009341	0.001622	0	None	No	0.01	NP (normality)
Selenium (mg/L)	MW-1601	0.000422	0.0001797	0.05	No	24	0.000335	0.0002606	0	None	sqrt(x)	0.01	Param.
Selenium (mg/L)	MW-1602	0.002352	0.001438	0.05	No	27	0.001895	0.0009583	0	None	No	0.01	Param.
Selenium (mg/L)	MW-1606	0.0005	0.00006	0.05	No	27	0.0002193	0.0001945	25.93	None	No	0.01	NP (normality)
Selenium (mg/L)	MW-1607	0.0002	0.0001	0.05	No	27	0.00017	0.0001397	14.81	None	No	0.01	NP (normality)
Thallium (mg/L)	MW-1601	0.0002	0.00002	0.002	No	24	0.0001095	0.00008806	41.67	None	No	0.01	NP (normality)
Thallium (mg/L)	MW-1602	0.0002	0.00002	0.002	No	27	0.0001274	0.00008951	59.26	None	No	0.01	NP (NDs)
Thallium (mg/L)	MW-1606	0.0002	0.00011	0.002	No	27	0.0001574	0.00007522	70.37	None	No	0.01	NP (NDs)
Thallium (mg/L)	MW-1607	0.0002	0.00003	0.002	No	27	0.0001179	0.00008358	44.44	None	No	0.01	NP (normality)

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: Antimony Analysis Run 8/23/2024 1:03 PM View: Confidence Intervals
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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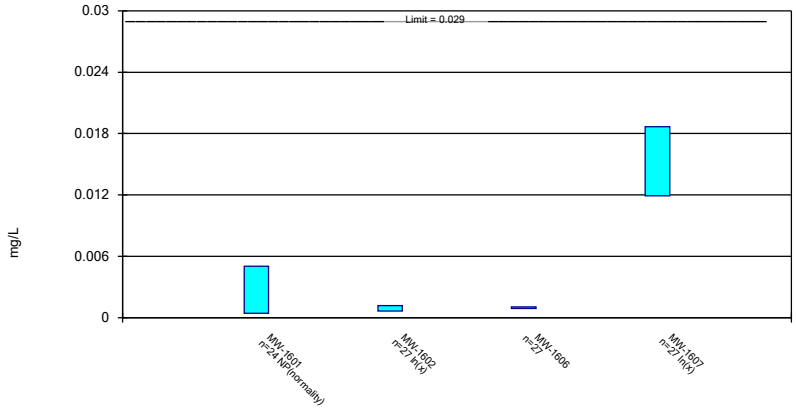
Parametric and Non-Parametric (NP) Confidence Interval

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



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Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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Parametric and Non-Parametric (NP) Confidence Interval

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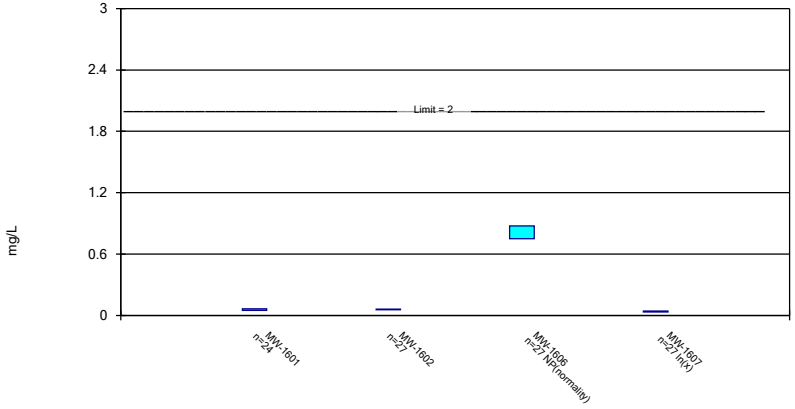

Constituent: Barium Analysis Run 8/23/2024 1:03 PM View: Confidence Intervals
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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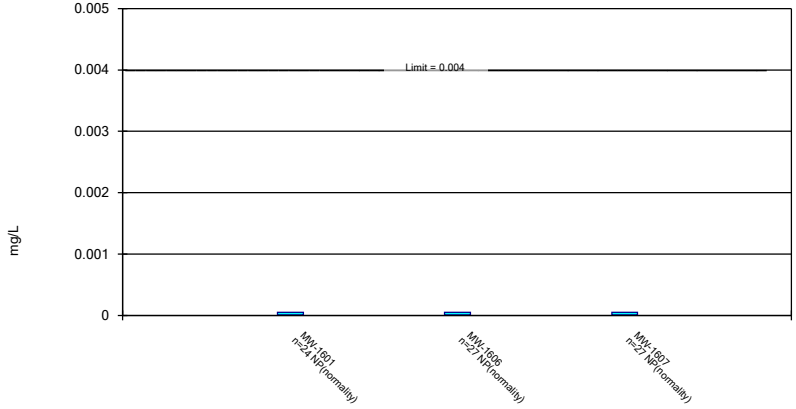
Non-Parametric Confidence Interval

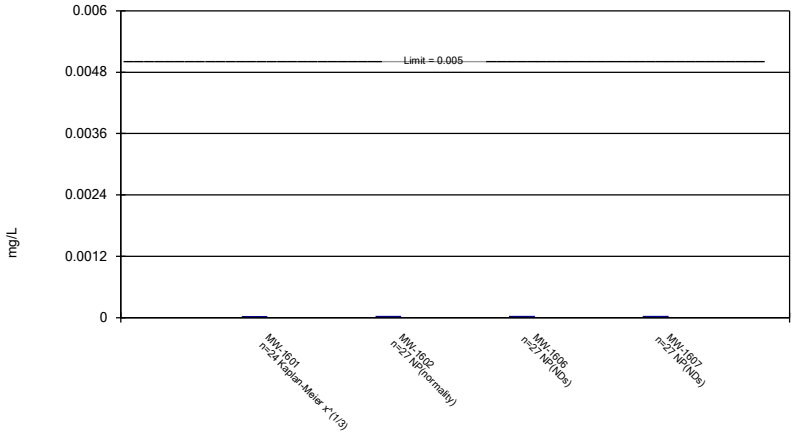
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Beryllium Analysis Run 8/23/2024 1:03 PM View: Confidence Intervals
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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 Analysis Run 8/23/2024 1:03 PM View: Confidence Intervals
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Parametric Confidence Interval

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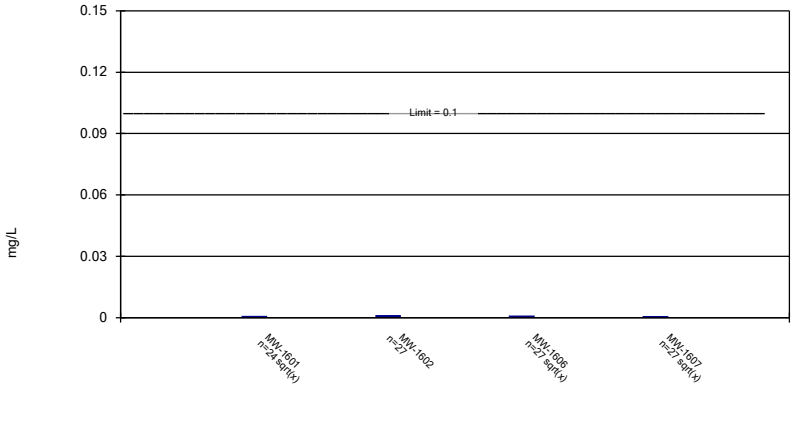

Constituent: Chromium Analysis Run 8/23/2024 1:03 PM View: Confidence Intervals
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Parametric and Non-Parametric (NP) Confidence Interval

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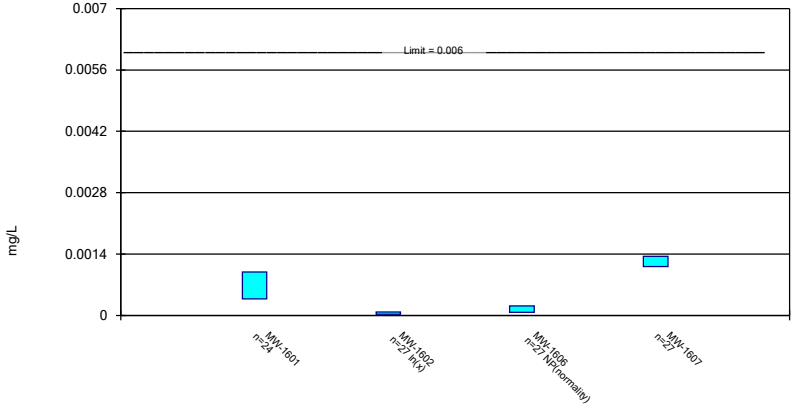

Constituent: Cobalt Analysis Run 8/23/2024 1:04 PM View: Confidence Intervals
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Parametric Confidence Interval

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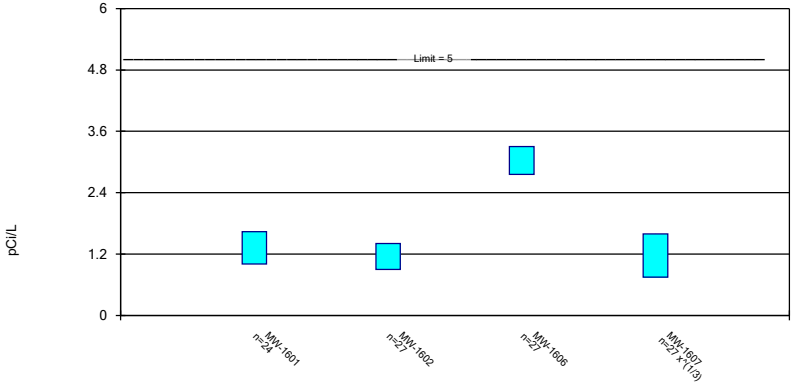

Constituent: Combined Radium 226 + 228 Analysis Run 8/23/2024 1:04 PM View: Confidence Intervals
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Parametric and Non-Parametric (NP) Confidence Interval

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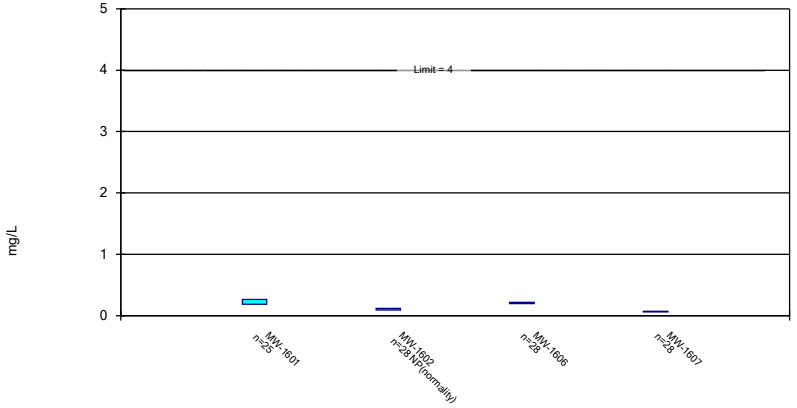

Constituent: Fluoride Analysis Run 8/23/2024 1:04 PM View: Confidence Intervals
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Parametric and Non-Parametric (NP) Confidence Interval

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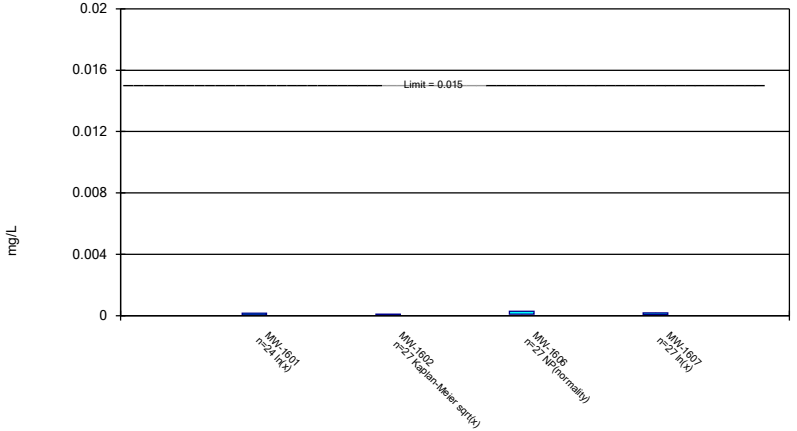
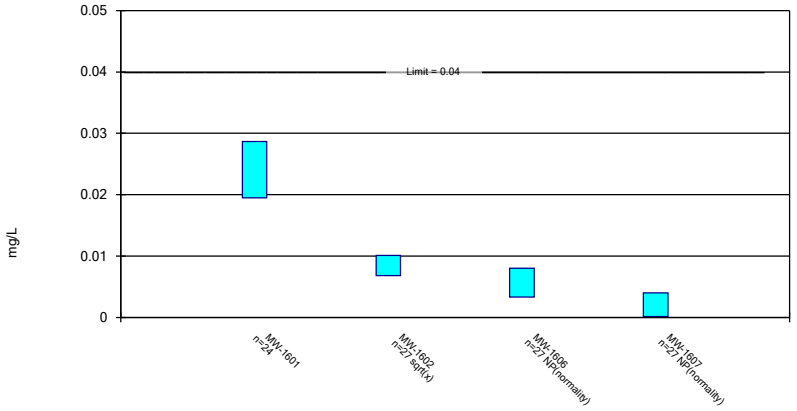


Constituent: Lead Analysis Run 8/23/2024 1:04 PM View: Confidence Intervals
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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 Analysis Run 8/23/2024 1:04 PM View: Confidence Intervals
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

Non-Parametric Confidence Interval

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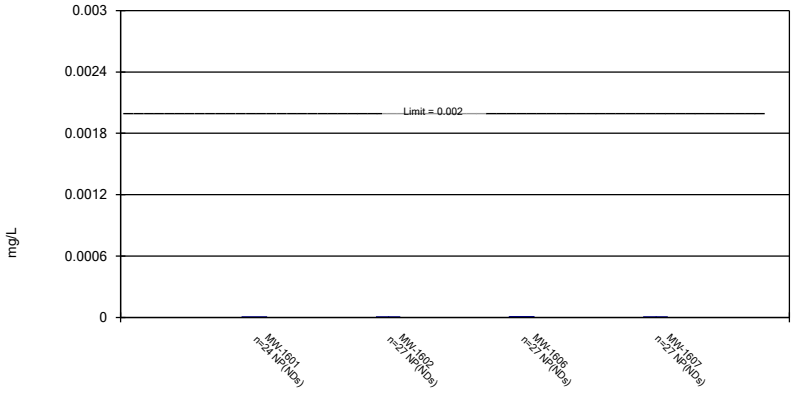
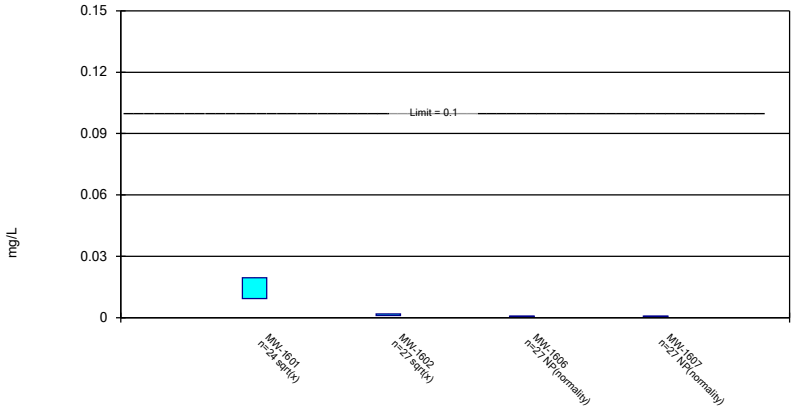


Constituent: Mercury Analysis Run 8/23/2024 1:04 PM View: Confidence Intervals
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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: Molybdenum Analysis Run 8/23/2024 1:04 PM View: Confidence Intervals
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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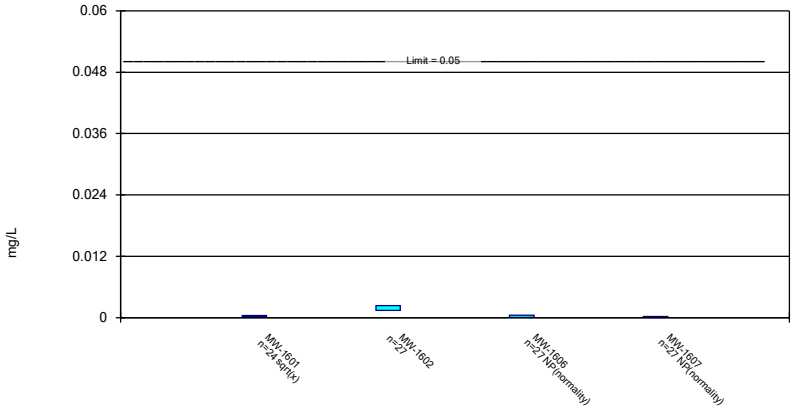
Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Selenium Analysis Run 8/23/2024 1:04 PM View: Confidence Intervals
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

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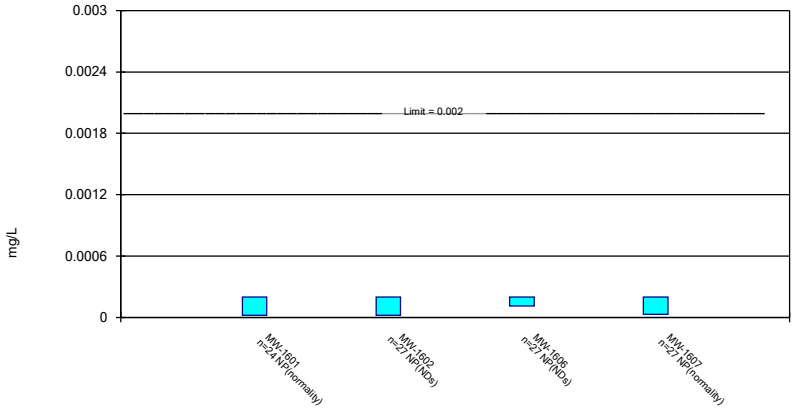
Non-Parametric Confidence Interval

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



Constituent: Thallium Analysis Run 8/23/2024 1:04 PM View: Confidence Intervals
Big Sandy FAP Client: Geosyntec Data: Big Sandy FAP

APPENDIX 4—Alternative Source Demonstration Reports

No alternative source demonstration reports were written in 2024 because no SSLs above the corresponding groundwater protection standard were detected in any samples.

APPENDIX 5 - Notices for Monitoring Program Transitions

No transition between monitoring requirements occurred in 2024; the CCR unit remained in assessment monitoring. Notices for monitoring program transitions are not applicable at this time.

APPENDIX 6 - Well Installation/Decommissioning Logs

No wells were installed or decommissioned in 2024. Well installation/decommissioning logs are not applicable at this time.