APPENDIX E –
STATISTICAL ANALYSES

APPENDIX E.1

STATISTICAL ANALYSIS OF BACKGROUND SOIL DATA

Appendix E.1 – Statistical Analysis of Background Soil Data

TDEC Commissioner's Order:
Environmental Assessment Report
John Sevier Fossil Plant
Rogersville, Tennessee

July 3, 2023

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

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Sign-off Sheet

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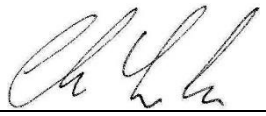
Prepared by 

Chris La Londe, Risk Assessor

Reviewed by 

Melissa Whitfield Aslund, PhD, Environmental Scientist

Approved by 

Rebekah Brooks, PG, Principal Hydrogeologist

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Abbreviations

BGS	Background Soil
BTVs	Background Threshold Values
CASRN	Chemical Abstracts Service Registry Number
JSF Plant	John Sevier Fossil Plant
CCR	Coal Combustion Residuals
CCR Parameter	Constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04
CCR Rule	Title 40, Code of Federal Regulations, Part 257
EAR	Environmental Assessment Report
EI	Environmental Investigation
ft bgs	Feet Below Ground Surface
IQR	Interquartile Range
NA	Not Available
%	Percent
QA/QC	Quality Assurance and Quality Control
SAR	Sampling and Analysis Report
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TVA	Tennessee Valley Authority
UTLs	Upper Tolerance Limits

APPENDIX E.1 – STATISTICAL ANALYSIS OF BACKGROUND SOIL DATA

July 3, 2023

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) prepared this statistical analysis report on behalf of the Tennessee Valley Authority (TVA) to summarize the statistical analyses performed on background soil (BGS) data to support evaluations conducted for the Environmental Assessment Report (EAR) at the John Sevier Fossil Plant (JSF Plant) located in Rogersville, Tennessee. The BGS samples were collected as part of the Tennessee Department of Environment and Conservation (TDEC) Order Environmental Investigation (EI) between January 2019 and October 2019 in the vicinity of the JSF Plant from locations where naturally occurring, in-situ, native soils unaffected by Coal Combustion Residual (CCR) materials were present. Further details regarding the BGS sampling program and results are available in the *JSF Plant Background Soil (BGS) Investigation Sampling and Analysis Report* (SAR) (Appendix F.1), including the BGS investigation boring locations (Exhibit A.2), and a list of the BGS investigation borings and associated soil samples and analyses (Table B.1).

Eight samples were excluded from the statistical analysis datasets for either being collected in the saturated zone or consisting of non-native soils based on the presence of CCR materials or other non-native materials. The Constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04 (CCR Parameters) included in the analysis are presented below in Table E.1-1.

Table E.1-1 – CCR Parameters Evaluated in Statistical Analysis

Parameter	CASRN
CCR Rule Appendix III Parameters	
Boron	7440-42-8
Calcium	7440-70-2
Chloride	16887-00-6
Fluoride[1] (also Appendix IV)	16984-48-8
pH	Not Available (NA)
Sulfate	14808-79-8
TDS	NA
CCR Rule Appendix IV Parameters	
Antimony	7440-36-0
Arsenic	7440-38-2
Barium	7440-39-3
Beryllium	7440-41-7
Cadmium	7440-43-9
Chromium	7440-47-3
Cobalt	7440-48-4
Lead	7439-92-1
Lithium	7439-93-2
Mercury	7439-97-6
Molybdenum	7439-98-7
Radium-226+228	13982-63-3/ 15262-20-1
Selenium	7782-49-2
Thallium	7440-28-0
TDEC Appendix I Parameters	
Copper	7440-50-8
Nickel	7440-02-0
Silver	7440-22-4
Vanadium	7440-62-2
Zinc	7440-66-6
Other	
% Ash	NA

Notes: CASRN - Chemical Abstracts Service Registry Number; CCR Rule - Title 40, Code of Federal Regulations, Part 257; NA - Not available

[1]Fluoride is both a CCR Rule Appendix III and CCR Rule Appendix IV parameter. In this table, and in the results presented herein, fluoride has been grouped with the Appendix III parameters only to avoid duplication.

The following sections present the methods and results from general exploratory data analysis using summary statistics, data plots, outlier screening methods and the calculation of Background Threshold Values (BTVs).

2.0 METHODS

The statistical evaluation for the BGS data collected at the JSF Plant for the EI was conducted in two parts: 1) exploratory data analysis and 2) calculation of site-specific BTVs. The analyses relied on available background soil data collected as part of the BGS EI. Quality assurance and quality control (QA/QC) samples (e.g. field duplicates) were excluded from the statistical analysis.

2.1 EXPLORATORY DATA ANALYSIS

Exploratory data analysis is the initial step of statistical analysis. It utilizes simple summary statistics (e.g. mean, median, standard deviation and percentiles) and graphical representations to identify important characteristics of an analytical dataset, such as the center of the data (mean, median), variation, distribution, spatial patterns, presence of outliers, and randomness.

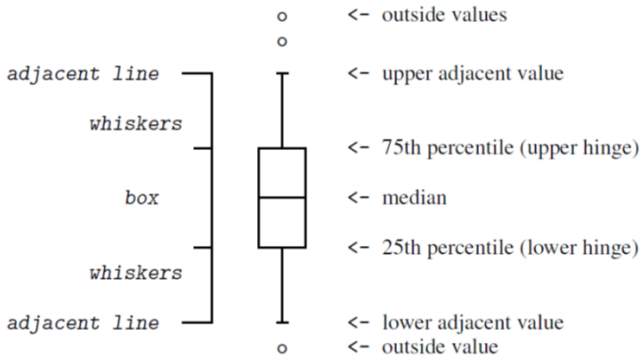
For the EI, surficial soil samples were typically collected at depths ranging from 0.0 to approximately 0.5 feet below ground surface (ft bgs). In addition to the CCR parameters (Table E.1-1), these samples were analyzed for the presence of CCR Material (percent [%] Ash). Along with surficial samples, the field sampling personnel collected approximately two feet of soil from each five-foot soil run (one foot in both directions from the midpoint of the five-foot interval) for the total depth of the boring. For the statistical analysis, soil depths were aggregated into the following depth intervals: surficial (0 to approximately 0.5 ft bgs), approximately 0.5 to less than or equal to 10 ft bgs, and greater than 10 ft bgs.

2.1.1 Summary Statistics

Summary statistics were calculated for each CCR Parameter grouped by depth interval and the entire set of BGS samples (including all depth intervals and boring locations). Summary statistics include information such as the total numbers of available samples, the frequencies of detection, ranges of reporting limits, minimum and maximum detected concentrations, mean concentrations, standard deviations, median concentrations and the 95th percentile concentrations. A summary statistics table is presented in Attachment E.1-A.

2.1.2 Exploratory Data Plots

Exploratory data plots (box plots) were constructed to support a visual review of the data. Box plots identify the center of the data, distribution, variability, and to visually identify potential outliers. The diagram below graphically depicts the basics of the construction of the box plots (StataCorp LLC 2017).



The box portion of the plot is the interquartile range (IQR), which represents the middle 50% of data, with the bottom of the box being the 25th percentile and the top of the box being the 75th percentile. The line inside the box is the median concentration. The top of the upper “whisker” represents the first observed concentration above the 75th percentile, whereas the bottom of the lower “whisker” represents the first

observed concentration below the 25th percentile (upper adjacent value and lower adjacent value, respectively). Values that lie outside of the adjacent values represent outside concentrations (i.e. concentrations at the upper and lower ends of the distribution of the data). The method detection limit was used as the reported value in order to construct the box plot when analytical results were reported as non-detects.

Two sets of side-by-side box plots were constructed for the BGS CCR Parameter data: 1) results by depth interval and 2) results by BGS boring location. These box plots were useful in identifying differences in CCR Parameter concentrations between depth intervals and between boring locations and were especially useful for visually identifying potential outliers. Box plots for CCR Parameters aggregated by depth interval and by boring location are provided in Attachment E.1-B.

2.1.3 Outlier Screening

Outliers are data points that are abnormally high or low as compared to the rest of the measurements and may represent anomalous data or data errors but may also represent natural variation of CCR Parameter concentrations in environmental systems. Screening for outliers is a critical step because outliers can bias statistical estimates, statistical testing results, and inferences. The size of the datasets for each depth interval (a minimum of 10 samples) were sufficiently large to capture natural variation commonly seen in environmental datasets.

Outlier values were initially screened visually using the side-by-side box plots. If suspected visual outliers were identified, then Tukey's procedure was used to identify extreme outliers (Tukey 1977). This method relies on the IQR, which is defined as the 75th percentile value minus the 25th percentile value.

Values were identified as potential outliers as follows:

- **Lower extreme outliers** are less than the 25th percentile minus 3 x IQR
- **Upper extreme outliers** are greater than the 75th percentile plus 3 x IQR.

Multiple potential outliers were identified using Tukey's procedure as indicated in the Summary Statistics Tables in Attachment E.1-A; these values were flagged as potential outliers in the dataset. However, given the heterogeneity of naturally occurring inorganic compounds in soils, statistical outliers were not removed from the datasets prior to statistical analysis, but may be reevaluated if BTVs are used to inform future corrective actions.

2.2 ESTIMATES OF BACKGROUND CONDITIONS

BTVs were calculated as conservative estimates of CCR Parameter concentrations in BGS. Specifically, 95% upper tolerance limits (UTLs) with 95% coverage were calculated for each parameter at each soil depth interval defined for the statistical datasets and with all depths combined to establish conservative estimates of background soil concentrations. The UTL represents the upper bound of a pre-specified proportion of the underlying data population with a specified level of confidence. For example, for a "95% UTL with 95% coverage", there is 95% confidence that, on average, 95% of the data are below the UTL. The upper one-sided UTL is commonly used in environmental monitoring and is constructed using

background data (Ofungwu 2014). In the case of pH, 95% tolerance intervals with 95% coverage were calculated to bound the range of pH values. BTVs aggregated by soil depth interval and with all depths combined are presented in Attachment E.1-A.

2.2.1 Tests for Normality of Background Data

Prior to the calculation of UTLs, the data were evaluated for normality. Parametric methods to establish background conditions (UTLs) can be applied to data that are normally distributed or to data that fit another defined statistical distribution (e.g. gamma distribution), or to data that can be transformed to normal using mathematical transformations (e.g. lognormal transformation). Testing data for normality was done using formal statistical methods, known as goodness-of-fit-testing (e.g. Shapiro-Wilk or Lilliefors tests). If the data did not fit a defined statistical distribution or could not be transformed to normal, then non-parametric methods were used.

2.2.2 Parametric UTLs

Parametric UTLs were used when the background data were normally distributed, gamma distributed or transformed using the lognormal transformation. A background sample size or dataset consisting of at least eight observations was required to generate an adequate tolerance limit.

The calculation of the UTL is straightforward:

$$UTL = \overline{x} + \tau s$$

Where:

$\overline{x}$ = mean CCR parameter concentration in the background dataset

s = standard deviation of CCR parameter in the background dataset

τ = multiplier based on size of dataset, confidence (95%) and desired coverage (95%).

2.2.3 Non-parametric UTLs

When the background data do not fit the normal or gamma distribution or cannot be normalized via the lognormal transformation, non-parametric UTLs were used. The non-parametric UTL is an order statistic, typically the maximum or the second largest observed concentration in the background dataset. Unlike parametric methods, the desired coverage and confidence interval cannot be pre-specified for non-parametric tolerance limits. In the case of non-parametric methods, the level of confidence increases with increasing sample size. If non-parametric methods were used, the approximate level of confidence was reported.

UTLs, especially non-parametric UTLs, are sensitive to outliers and are biased high in the presence of outliers. For this initial analysis, no suspect outliers were removed from the data set. If the UTLs presented in this report are going to be used to inform corrective actions, then additional analysis to account for the presence of outliers is warranted.

3.0 RESULTS AND DISCUSSION

3.1 SUMMARY STATISTICS, EXPLORATORY DATA PLOTS, AND OUTLIER SCREENING

Summary statistics for each CCR Parameter are provided in Attachment E.1-A, with results aggregated by depth interval and with all depths combined. Summary statistics are sorted by CCR Parameter type (i.e., CCR Rule Appendix III Parameters, CCR Rule Appendix IV Parameters, TDEC Appendix I Parameters, and Other). Box plots for each CCR Parameter aggregated by depth and boring location are provided in Attachment E.1-B.

The number of values identified as potential outliers using Tukey's procedure for each depth interval and with all depths combined is identified in Attachment E.1-A. For these potential outliers, no definitive reasons were identified for the outlier values and the values identified were assumed to be representative of natural conditions and natural variation within native soil. These values were flagged as statistical outliers in the dataset and retained for subsequent calculations and analysis if needed for future evaluations (see columns labelled "Number of Statistical Outliers" and "Number of Outliers Removed" in Attachment E.1-A).

3.2 ESTIMATES OF BACKGROUND CONDITIONS

BTVs for the BGS investigation at the JSF Plant were calculated using UTLs (and Tolerance Intervals in the case of pH). The resulting BTV concentrations and the statistical distribution and methods used to calculate the UTLs are identified for each CCR Parameter aggregated by depth interval and with all depths combined in Attachment E.1-A.

4.0 REFERENCES

Ofungwu, J. (2014), Statistical Applications for Environmental Analysis and Risk Assessment. Hoboken, New Jersey: John Wiley and Sons, Inc.

StataCorp. (2017), Stata Graphics Reference Manual Stata: Release 15. Statistical Software. College Station, TX: StataCorp LLC.

Tukey, J.W. (1977), Exploratory data analysis. Reading, Massachusetts: Addison-Wesley, 1977.

ATTACHMENT E.1-A
SUMMARY STATISTICS TABLES

Summary Statistics - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	Soil Depth (ft bgs)	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics for Detected Data Only		Statistics Using Detects & Non-Detects									
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	25th Percentile	50th Percentile	75th Percentile	95th Percentile	Number of Statistical Outliers	Number of Outliers Removed	Background Threshold Value	Statistical Distribution & Method
Percent Ash																
% Ash	Surficial	8/11	(1.0 - 1.0)	27.3%	1.0	3.0	1.6	0.64	1.0	2.0	2.0	2.5	0	0	NA	NA
	0.5' to 10'	4/6	(1.0 - 1.0)	33.3%	1.0	3.0	1.7	0.75	1.0	1.5	2.0	2.8				
	>10'	7/9	(1.0 - 1.0)	22.2%	1.0	2.0	1.6	0.50	1.0	2.0	2.0	2.0				
	All Depths	19/26	(1.0 - 1.0)	26.9%	1.0	3.0	1.6	0.63	1.0	2.0	2.0	2.8				
CCR Rule Appendix III Parameters																
Boron	Surficial	10/11	(1.82 - 1.82)	9.1%	1.78	8.05	3.88	1.85	2.41	3.75	4.67	6.97	0	0	9.07	95% UTL (Normal) 95% Coverage
	0.5' to 10'	26/31	(0.957 - 1.59)	16.1%	0.989	7.13	2.16	1.33	1.48	1.77	2.39	4.63			5.24	95% WH Approximate Gamma UTL 95% Coverage
	>10'	24/24	--	0.0%	1.23	4.97	3.21	1.11	2.35	3.31	3.92	4.90			5.78	95% UTL (Normal) 95% Coverage
	All Depths	60/66	(0.957 - 1.82)	9.1%	0.989	8.05	2.82	1.51	1.65	2.41	3.78	5.38			6.38	95% WH Approximate Gamma UTL 95% Coverage
Calcium	Surficial	11/11	--	0.0%	268	299,000	48,600	86,200	2,120	19,200	50,400	179,000	10	0	483,000	95% WH Approximate Gamma UTL 95% Coverage
	0.5' to 10'	31/31	--	0.0%	33.8	67,600	3,760	12,200	206	1,000	2,280	10,500			33,400	95% (Lognormal) 95% Coverage
	>10'	24/24	--	0.0%	101	23,700	2,700	5,020	486	1,380	2,070	10,300			20,000	95% (Lognormal) 95% Coverage
	All Depths	66/66	--	0.0%	33.8	299,000	10,900	38,900	415	1,300	2,740	51,300			60,300	95% (Lognormal) 95% Coverage
Chloride	Surficial	0/11	(4.01 - 5.26)	100.0%	--	--	--	--	4.70	4.84	5.14	5.21	8	0	5.26	95% UTL (NP-43.1%) 95% Coverage
	0.5' to 10'	7/31	(4.19 - 5.22)	77.4%	6.24	63.1	8.89	13.8	4.48	4.63	5.18	38.6			63.1	95% UTL (NP-79.6%) 95% Coverage
	>10'	4/24	(4.43 - 5.42)	83.3%	6.51	82.3	8.88	15.9	4.66	4.81	5.31	23.8			82.3	95% UTL (NP-70.8%) 95% Coverage
	All Depths	11/66	(4.01 - 5.42)	83.3%	6.24	82.3	7.88	13.7	4.54	4.77	5.20	25.0			63.1	95% UTL (NP-83.8%) 95% Coverage
Fluoride	Surficial	6/11	(0.702 - 0.902)	45.5%	1.11	2.62	1.21	0.591	0.874	1.11	1.43	2.25	4	0	3.71	95% UTL (Normal) 95% Coverage
	0.5' to 10'	9/31	(0.735 - 0.901)	71.0%	0.873	4.45	1.15	0.885	0.801	0.846	1.06	2.94			3.09	95% UTL (NP-79.6%) 95% Coverage
	>10'	11/24	(0.79 - 0.95)	54.2%	0.792	2.63	1.00	0.402	0.843	0.924	1.04	1.53			1.87	95% UTL (NP-70.8%) 95% Coverage
	All Depths	26/66	(0.702 - 0.95)	60.6%	0.792	4.45	1.08	0.712	0.815	0.882	1.20	2.51			3.97	95% UTL (NP-83.8%) 95% Coverage
pH (lab)	Surficial	11/11	--	0.0%	4.6	8.9	7.3	1.3	6.9	7.8	8.1	8.5	0	0	(4.6 - 8.9)	95% Tolerance Interval (NP-43.1%) 95% Coverage
	0.5' to 10'	31/31	--	0.0%	4.2	7.9	6.0	1.2	4.8	6.0	7.0	7.6			(3.2 - 8.8)	95% Tolerance Interval (Normal) 95% Coverage
	>10'	24/24	--	0.0%	4.5	8.2	6.5	1.2	5.5	6.9	7.4	8.0			(3.5 - 9.5)	95% Tolerance Interval (Normal) 95% Coverage
	All Depths	66/66	--	0.0%	4.2	8.9	6.4	1.3	5.3	6.7	7.4	8.1			(4.4 - 8.2)	95% Tolerance Interval (NP-84.8%) 95% Coverage
pH (field)	Surficial	11/11	--	0.0%	5.10	8.92	7.48	1.22	6.88	7.28	8.49	8.86	0	0	(3.66 - 11.3)	95% UTL (Normal) 95% Coverage
	0.5' to 10'	31/31	--	0.0%	4.55	9.14	6.06	1.08	5.25	6.15	6.76	7.69			(3.54 - 8.58)	95% UTL (Normal) 95% Coverage
	>10'	24/24	--	0.0%	4.85	9.67	6.05	1.10	5.03	5.89	6.67	7.05			(3.34 - 8.76)	95% UTL (Normal) 95% Coverage
	All Depths	66/66	--	0.0%	4.55	9.67	6.29	1.22	5.27	6.29	6.87	8.74			(3.77 - 8.82)	95% UTL (Normal) 95% Coverage
Sulfate	Surficial	8/11	(7.01 - 8.97)	27.3%	8.47	70.0	17.9	17.9	8.72	11.1	14.6	51.7	4	0	90.1	95% KM UTL (Lognormal) 95% Coverage
	0.5' to 10'	28/31	(8.75 - 9)	9.7%	8.90	795	114	177	21.8	50.6	98.2	500			736	95% KM UTL (Lognormal) 95% Coverage
	>10'	19/24	(8.77 - 9.28)	20.8%	9.83	149	32.9	31.1	10.7	25.7	44.3	75.9			105	95% UTL (Normal) 95% Coverage
	All Depths	55/66	(7.01 - 9.28)	16.7%	8.47	795	68.3	130	11.0	29.4	66.8	250			305	95% KM UTL (Lognormal) 95% Coverage
CCR Rule Appendix IV Parameters																
Antimony	Surficial	10/11	(0.0663 - 0.0663)	9.1%	0.0964	0.214	0.149	0.0451	0.119	0.148	0.181	0.212	0	0	0.276	95% UTL (Normal) 95% Coverage
	0.5' to 10'	23/31	(0.068 - 0.0852)	25.8%	0.0746	0.258	0.121	0.0507	0.0794	0.112	0.154	0.209			0.233	95% UTL (Normal) 95% Coverage
	>10'	18/24	(0.0679 - 0.0893)	25.0%	0.0823	0.203	0.110	0.0383	0.0889	0.103	0.129	0.183			0.212	95% Approximate Gamma UTL 95% Coverage
	All Depths	51/66	(0.0663 - 0.0893)	22.7%	0.0746	0.258	0.122	0.0478	0.0877	0.112	0.154	0.210			0.245	95% KM UTL (Lognormal) 95% Coverage
Arsenic	Surficial	11/11	--	0.0%	0.915	10.8	4.19	2.49	3.20	3.45	4.34	8.28	0	0	13.8	95% Approximate Gamma UTL 95% Coverage
	0.5' to 10'	31/31	--	0.0%	0.409	8.47	3.67	1.96	2.05	3.86	4.85	6.40			7.97	95% UTL (Normal) 95% Coverage
	>10'	24/24	--	0.0%	1.75	9.24	4.81	2.02	3.46	4.31	5.73	8.51			9.46	95% UTL (Normal) 95% Coverage
	All Depths	66/66	--	0.0%	0.409	10.8	4.17	2.10	2.95	3.97	5.16	8.37			9.75	95% WH Approximate Gamma UTL 95% Coverage
Barium	Surficial	11/11	--	0.0%	3.57	171	53.4	45.3	28.2	32.5	69.8	124	0	0	181	95% UTL (Normal) 95% Coverage
	0.5' to 10'	31/31	--	0.0%	11.4	248	71.2	60.1	31.3	44.3	84.9	180			292	95% (Lognormal) 95% Coverage
	>10'	24/24	--	0.0%	29.9	214	99.2	55.8	52.0	89.7	126	205			228	95% UTL (Normal) 95% Coverage
	All Depths	66/66	--	0.0%	3.57	248	78.4	58.1	32.5	61.3	98.7	190			292	95% (Lognormal) 95% Coverage
Beryllium	Surficial	11/11	--	0.0%	0.0674	1.92	0.676	0.517	0.378	0.486	0.904	1.52	0	0	2.13	95% UTL (Normal) 95% Coverage
	0.5' to 10'	31/31	--	0.0%	0.0872	1.87	0.830	0.577	0.324	0.739	1.33	1.74			2.82	95% WH Approximate Gamma UTL 95% Coverage
	>10'	24/24	--	0.0%	0.466	4.96	1.66	0.996	1.09	1.58	1.97	3.45			4.45	95% WH Approximate Gamma UTL 95% Coverage
	All Depths	66/66	--	0.0%	0.0674	4.96	1.11	0.852	0.452	1.06	1.61	2.12			3.34	95% WH Approximate Gamma UTL 95% Coverage
Cadmium	Surficial	10/11	(0.0182 - 0.0182)	9.1%	0.0216	3.09	0.360	0.866	0.0307	0.0860	0.139	1.67	1	0	4.33	95% KM UTL (Lognormal) 95% Coverage
	0.5' to 10'	15/31	(0.0186 - 0.0234)	51.6%	0.0212	0.321	0.0635	0.0817	0.0203	0.0224	0.052	0.248			0.321	95% UTL (NP-79.6%) 95% Coverage
	>10'	24/24	--	0.0%	0.0315	0.399	0.130	0.104	0.0583	0.0721	0.197	0.305			0.399	95% UTL (NP-70.8%) 95% Coverage
	All Depths	49/66	(0.0182 - 0.0234)	25.8%	0.0212	3.09	0.137	0.378	0.0220	0.0527	0.147	0.302			0.521	95% KM UTL (Lognormal) 95% Coverage

Summary Statistics - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	Soil Depth (ft bgs)	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics for Detected Data Only		Statistics Using Detects & Non-Detects									
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	25th Percentile	50th Percentile	75th Percentile	95th Percentile	Number of Statistical Outliers	Number of Outliers Removed	Background Threshold Value	Statistical Distribution & Method
Chromium	Surficial	11/11	--	0.0%	1.43	21.3	10.2	5.01	7.44	9.97	11.7	17.6	0	0	24.3	95% UTL (Normal) 95% Coverage
	0.5' to 10'	31/31	--	0.0%	4.38	20.8	12.2	4.37	9.90	12.0	15.4	17.8			21.8	95% UTL (Normal) 95% Coverage
	>10'	24/24	--	0.0%	9.29	24.6	15.2	4.36	11.9	13.4	17.3	23.7			26.5	95% UTL (Normal) 95% Coverage
	All Depths	66/66	--	0.0%	1.43	24.6	12.9	4.78	10.2	12.2	16.0	21.2			22.5	95% UTL (Normal) 95% Coverage
Cobalt	Surficial	11/11	--	0.0%	0.419	16.7	5.47	4.90	2.04	4.00	7.24	14.1	0	0	19.3	95% UTL (Normal) 95% Coverage
	0.5' to 10'	31/31	--	0.0%	0.552	27.1	6.62	5.89	2.29	4.40	10.6	13.7			25.3	95% WH Approximate Gamma UTL 95% Coverage
	>10'	24/24	--	0.0%	4.79	32.6	15.2	7.96	9.58	13.1	17.8	31.8			33.6	95% UTL (Normal) 95% Coverage
	All Depths	66/66	--	0.0%	0.419	32.6	9.54	7.80	3.24	8.60	12.9	26.4			31.6	95% WH Approximate Gamma UTL 95% Coverage
Fluoride	Surficial	6/11	(0.702 - 0.902)	45.5%	1.11	2.62	1.21	0.591	0.874	1.11	1.43	2.25	4	0	2.87	95% UTL (Normal) 95% Coverage
	0.5' to 10'	9/31	(0.735 - 0.901)	71.0%	0.873	4.45	1.15	0.885	0.801	0.846	1.06	2.94			4.45	95% UTL (NP-79.6%) 95% Coverage
	>10'	11/24	(0.79 - 0.95)	54.2%	0.792	2.63	1.00	0.402	0.843	0.924	1.04	1.53			2.63	95% UTL (NP-70.8%) 95% Coverage
	All Depths	26/66	(0.702 - 0.95)	60.6%	0.792	4.45	1.08	0.712	0.815	0.882	1.20	2.51			3.68	95% UTL (NP-83.8%) 95% Coverage
Lead	Surficial	11/11	--	0.0%	2.25	35.7	16.4	8.34	12.3	15.7	18.3	29.6	1	0	39.9	95% UTL (Normal) 95% Coverage
	0.5' to 10'	31/31	--	0.0%	5.09	25.3	12.0	4.78	8.73	11.2	15.2	20.2			22.5	95% UTL (Normal) 95% Coverage
	>10'	24/24	--	0.0%	6.48	24.8	13.0	4.62	9.47	13.0	14.9	21.7			23.6	95% UTL (Normal) 95% Coverage
	All Depths	66/66	--	0.0%	2.25	35.7	13.1	5.59	9.48	12.7	15.6	23.1			26.3	95% WH Approximate Gamma UTL 95% Coverage
Lithium	Surficial	11/11	--	0.0%	0.727	16.9	8.97	5.56	5.37	7.85	13.5	16.9	0	0	24.6	95% UTL (Normal) 95% Coverage
	0.5' to 10'	31/31	--	0.0%	3.23	26.2	12.4	7.71	6.23	9.86	17.8	25.3			35.1	95% WH Approximate Gamma UTL 95% Coverage
	>10'	24/24	--	0.0%	5.05	54.3	26.0	14.2	12.5	23.3	38.3	43.8			58.9	95% WH Approximate Gamma UTL 95% Coverage
	All Depths	66/66	--	0.0%	0.727	54.3	16.8	12.4	7.59	12.0	24.0	40.0			49.1	95% WH Approximate Gamma UTL 95% Coverage
Mercury	Surficial	10/11	(0.0148 - 0.0148)	9.1%	0.0257	0.107	0.0477	0.0246	0.0350	0.0420	0.0501	0.0936	1	0	0.140	95% WH Approximate Gamma UTL 95% Coverage
	0.5' to 10'	21/31	(0.014 - 0.0223)	32.3%	0.0199	0.218	0.0403	0.0382	0.0192	0.0342	0.0463	0.0805			0.124	95% WH Approximate Gamma UTL 95% Coverage
	>10'	13/24	(0.0152 - 0.0211)	45.8%	0.0163	0.0628	0.0261	0.0147	0.0179	0.0204	0.0304	0.0606			0.060	95% UTL (Normal) 95% Coverage
	All Depths	44/66	(0.014 - 0.0223)	33.3%	0.0163	0.218	0.0362	0.0306	0.0185	0.0289	0.0435	0.0799			0.0954	95% KM UTL (Lognormal) 95% Coverage
Molybdenum	Surficial	11/11	--	0.0%	0.194	0.811	0.592	0.168	0.503	0.633	0.703	0.769	0	0	1.07	95% UTL (Normal) 95% Coverage
	0.5' to 10'	24/31	(0.18 - 0.585)	22.6%	0.179	1.26	0.494	0.288	0.266	0.480	0.679	0.985			1.13	95% UTL (Normal) 95% Coverage
	>10'	21/24	(0.2 - 0.58)	12.5%	0.191	1.29	0.497	0.268	0.291	0.453	0.675	0.850			1.12	95% UTL (Normal) 95% Coverage
	All Depths	56/66	(0.18 - 0.585)	15.2%	0.179	1.29	0.512	0.265	0.298	0.513	0.704	0.874			1.04	95% UTL (Normal) 95% Coverage
Radium-226+228	Surficial	10/11	(0.124 - 0.124)	9.1%	0.943	2.04	1.51	0.552	1.39	1.53	2.02	2.04	0	0	3.06	95% UTL (Normal) 95% Coverage
	0.5' to 10'	31/31	--	0.0%	0.858	3.72	2.26	0.631	1.87	2.21	2.62	3.27			3.65	95% UTL (Normal) 95% Coverage
	>10'	24/24	--	0.0%	1.17	3.81	2.32	0.579	2.09	2.29	2.67	3.02			3.66	95% UTL (Normal) 95% Coverage
	All Depths	65/66	(0.124 - 0.124)	1.5%	0.858	3.81	2.16	0.659	1.72	2.18	2.55	3.01			3.47	95% UTL (Normal) 95% Coverage
Selenium	Surficial	10/11	(0.131 - 0.131)	9.1%	0.258	1.94	0.715	0.451	0.469	0.686	0.816	1.41	1	0	2.56	95% WH Approximate Gamma UTL 95% Coverage
	0.5' to 10'	31/31	--	0.0%	0.152	1.68	0.713	0.416	0.394	0.646	0.994	1.44			1.63	95% UTL (Normal) 95% Coverage
	>10'	19/24	(0.145 - 0.152)	20.8%	0.145	4.27	1.06	0.986	0.229	1.04	1.24	2.53			4.47	95% WH Approximate Gamma UTL 95% Coverage
	All Depths	60/66	(0.131 - 0.152)	9.1%	0.145	4.27	0.837	0.703	0.336	0.729	1.14	2.10			2.52	95% WH Approximate Gamma UTL 95% Coverage
Thallium	Surficial	11/11	--	0.0%	0.0342	0.356	0.164	0.0928	0.109	0.133	0.188	0.325	1	0	0.425	95% UTL (Normal) 95% Coverage
	0.5' to 10'	31/31	--	0.0%	0.0705	0.448	0.162	0.0825	0.110	0.132	0.220	0.296			0.366	95% WH Approximate Gamma UTL 95% Coverage
	>10'	24/24	--	0.0%	0.0655	0.269	0.136	0.0551	0.0858	0.133	0.170	0.223			0.263	95% UTL (Normal) 95% Coverage
	All Depths	66/66	--	0.0%	0.0342	0.448	0.153	0.0755	0.0992	0.133	0.185	0.293			0.323	95% WH Approximate Gamma UTL 95% Coverage

Summary Statistics - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

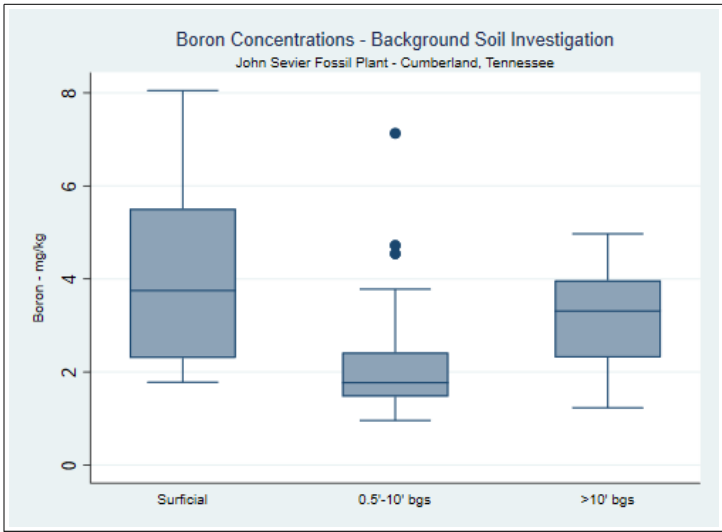
Parameter	Soil Depth (ft bgs)	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics for Detected Data Only		Statistics Using Detects & Non-Detects									
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	25th Percentile	50th Percentile	75th Percentile	95th Percentile	Number of Statistical Outliers	Number of Outliers Removed	Background Threshold Value	Statistical Distribution & Method
TDEC Appendix I Parameters																
Copper	Surficial	11/11	--	0.0%	2.57	13.5	8.78	3.47	6.47	8.36	11.4	13.2	0	0	18.5	95% UTL (Normal) 95% Coverage
	0.5' to 10'	31/31	--	0.0%	1.43	26.6	9.56	6.42	5.34	8.29	12.2	21.8			23.7	95% UTL (Normal) 95% Coverage
	>10'	24/24	--	0.0%	5.79	31.9	17.0	8.03	9.97	14.0	24.4	27.3			48.4	95% (Lognormal) 95% Coverage
	All Depths	66/66	--	0.0%	1.43	31.9	12.1	7.58	6.75	9.98	14.7	26.7			31.8	95% WH Approximate Gamma UTL 95% Coverage
Nickel	Surficial	11/11	--	0.0%	1.48	17.0	7.89	4.50	5.14	6.73	11.4	14.4	0	0	20.6	95% UTL (Normal) 95% Coverage
	0.5' to 10'	31/31	--	0.0%	0.808	27.0	9.46	6.50	4.35	8.01	14.0	19.4			23.8	95% UTL (Normal) 95% Coverage
	>10'	24/24	--	0.0%	7.74	36.5	21.8	10.2	13.1	16.7	32.3	36.3			52.8	95% WH Approximate Gamma UTL 95% Coverage
	All Depths	66/66	--	0.0%	0.808	36.5	13.7	9.88	6.54	11.4	17.1	33.8			40.4	95% WH Approximate Gamma UTL 95% Coverage
Silver	Surficial	1/11	(0.0171 - 0.108)	90.9%	0.0362	0.0362	0.0192	0.00600	0.0189	0.0289	0.0357	0.0723	1	0	0.108	95% UTL (NP-43.1%) 95% Coverage
	0.5' to 10'	3/31	(0.0153 - 0.0364)	90.3%	0.0342	0.0416	0.0175	0.00669	0.0173	0.0187	0.0316	0.0366			0.0416	95% UTL (NP-79.6%) 95% Coverage
	>10'	2/24	(0.0161 - 0.0382)	91.7%	0.0346	0.0422	0.0180	0.00635	0.0191	0.0309	0.0338	0.0379			0.0422	95% UTL (NP-70.8%) 95% Coverage
	All Depths	6/66	(0.0153 - 0.108)	90.9%	0.0342	0.0422	0.0174	0.00663	0.0177	0.0201	0.0335	0.0379			0.0422	95% UTL (NP-83.8%) 95% Coverage
Vanadium	Surficial	11/11	--	0.0%	3.31	31.2	18.2	8.79	12.4	17.9	25.8	29.7	0	0	42.9	95% UTL (Normal) 95% Coverage
	0.5' to 10'	31/31	--	0.0%	7.16	38.9	19.1	7.38	12.8	19.0	24.8	29.4			35.3	95% UTL (Normal) 95% Coverage
	>10'	24/24	--	0.0%	8.54	24.1	18.2	3.98	17.0	18.6	21.0	22.7			27.4	95% UTL (Normal) 95% Coverage
	All Depths	66/66	--	0.0%	3.31	38.9	18.6	6.54	13.3	18.8	22.2	27.9			31.7	95% UTL (Normal) 95% Coverage
Zinc	Surficial	11/11	--	0.0%	3.42	704	89.0	204	21.2	27.1	42.3	375	1	0	704	95% UTL (NP-43.1%) 95% Coverage
	0.5' to 10'	31/31	--	0.0%	3.59	66.9	29.7	19.0	16.7	25.0	37.9	61.5			71.5	95% UTL (Normal) 95% Coverage
	>10'	24/24	--	0.0%	16.4	110	61.4	27.4	41.0	57.7	85.9	101			125	95% UTL (Normal) 95% Coverage
	All Depths	66/66	--	0.0%	3.42	704	51.1	85.8	20.7	36.6	58.5	95.1			191	95% (Lognormal) 95% Coverage

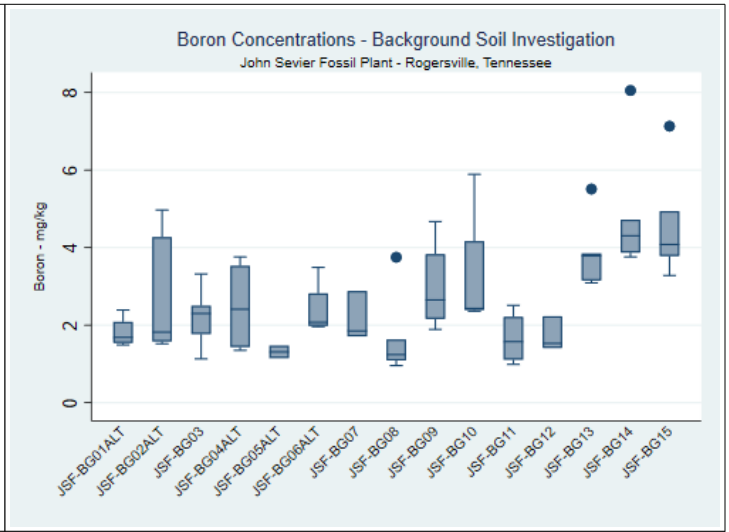
Notes:
CCR Rule - Title 40, Code of Federal Regulations, Part 257
ft bgs - feet below ground surface
KM - Kaplan-Meier, For Parameters with non-detects reported at the method detection limit, the mean, standard deviation, and background threshold values were calculated using Kaplan-Meier methods
"--" - Not Applicable
NP-% - Non-parametric method and associated confidence level of the estimate
TDEC - Tennessee Department of Environment and Conservation
UTL - Upper Tolerance Limit
WH - Background Threshold Limits based on the gamma distribution utilize Wilson Hiferty (WH) estimates
% - Percent

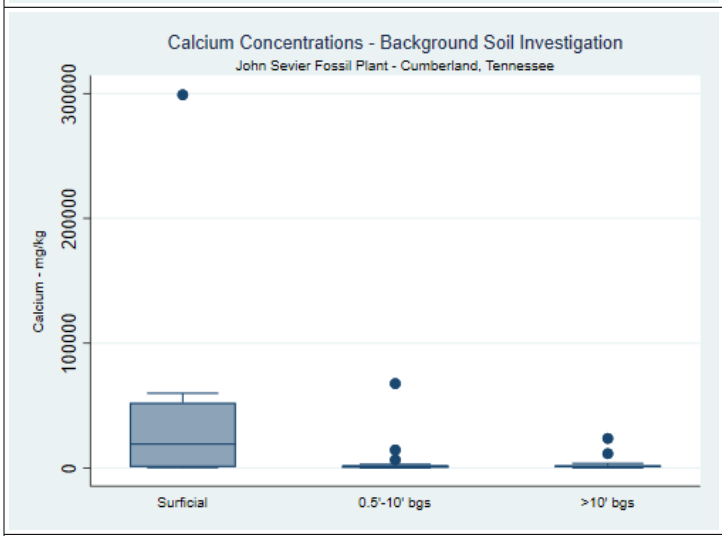
Except for % Ash, pH & Radium 226 + 228, all units in milligrams per kilogram (mg/kg)
Units for Ash are percent (%)
Units for pH are Standard Units (S.U.)
Units for Radium 226+228 are picocuries per gram (pCi/g)
Non-detects reported at the laboratory method detection limit
Surficial soil samples were collected in the 0 to 0.5 feet below ground surface (bgs) soil depth interval

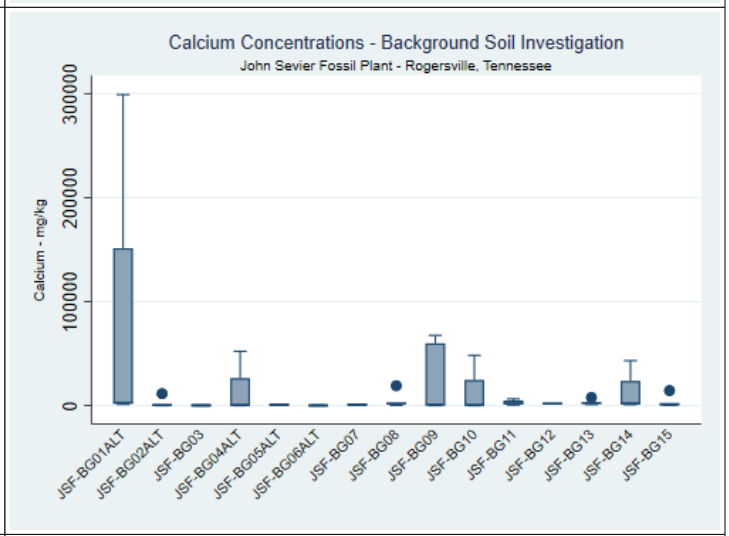
ATTACHMENT E.1-B
BOX PLOTS

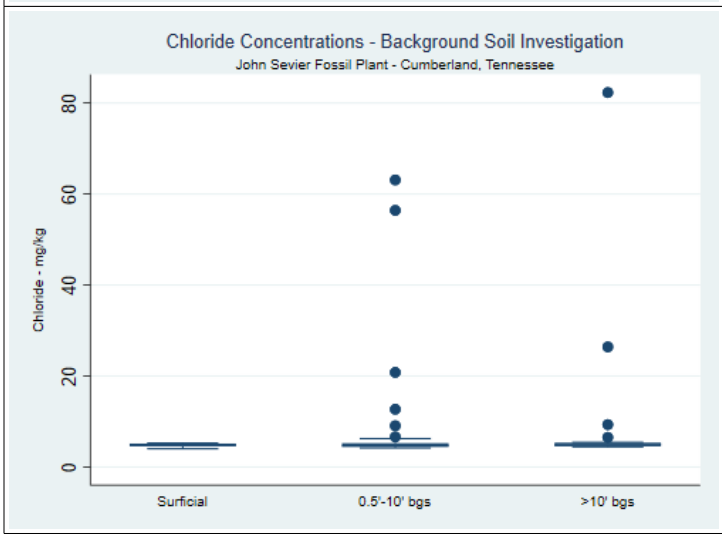
Box Plots
CCR Rule Appendix III Parameters
Background Soil Investigation
John Sevier Fossil Plant, Rogersville Tennessee

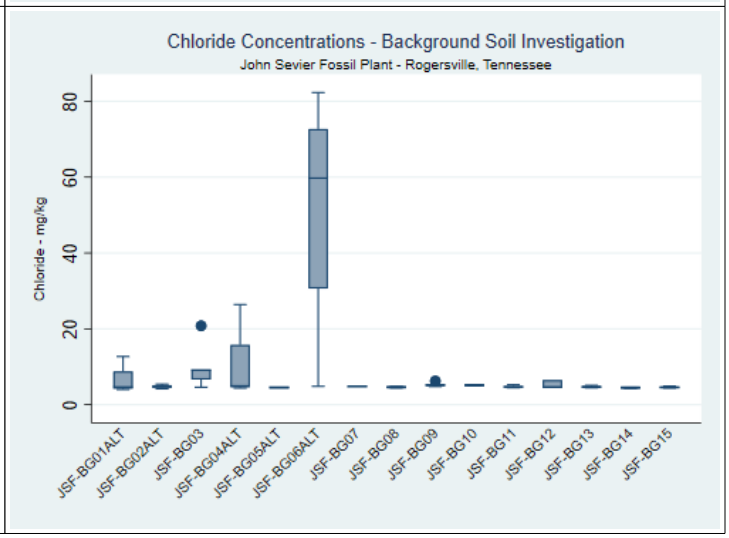


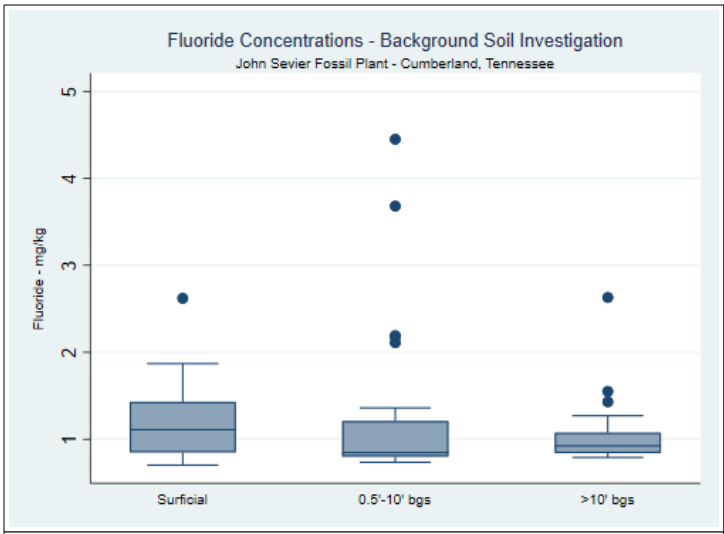


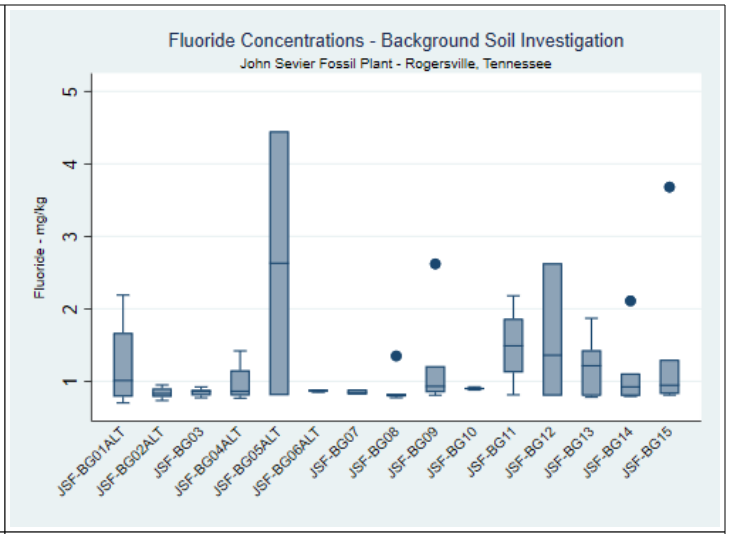


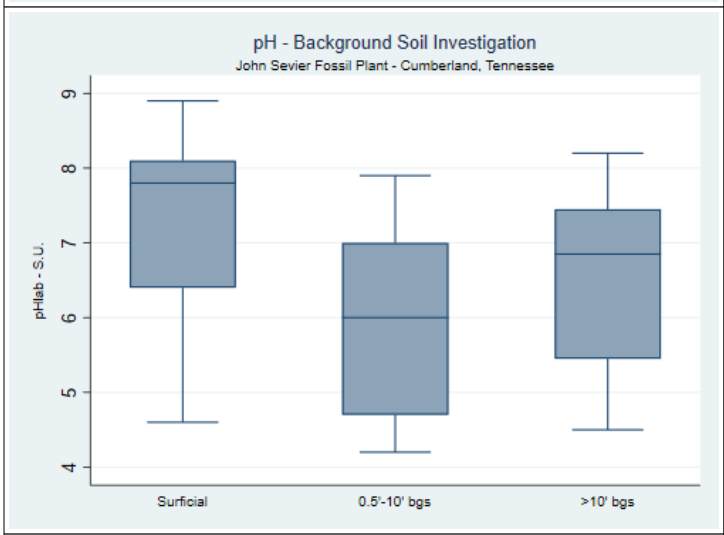


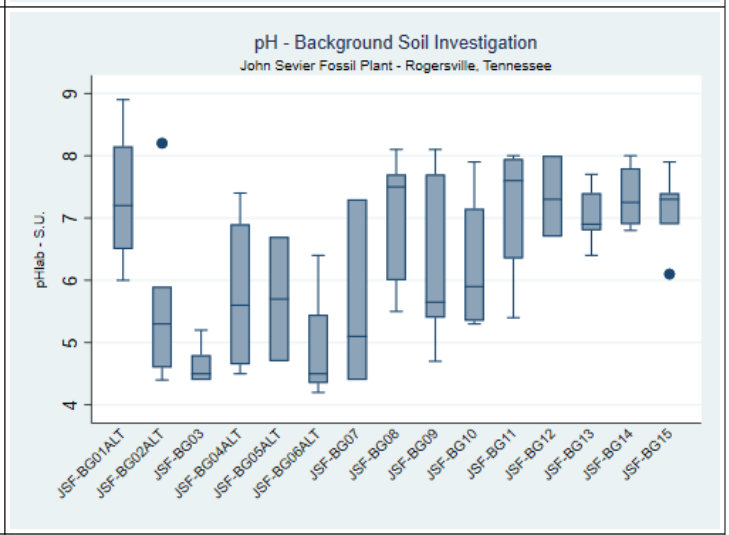


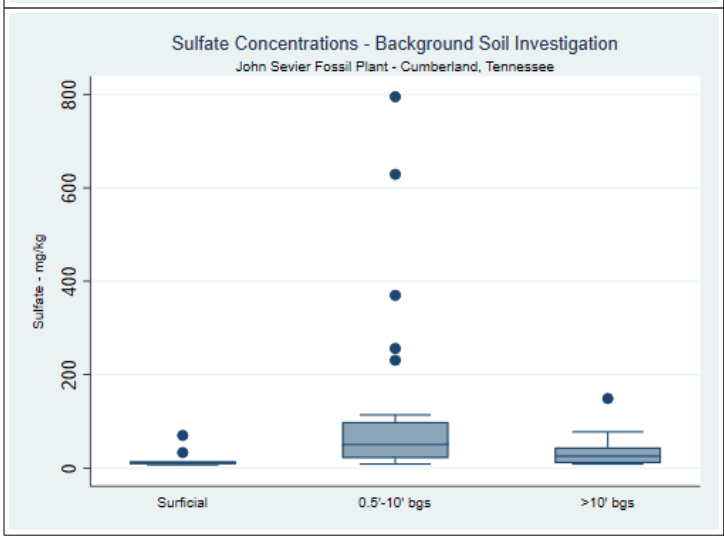


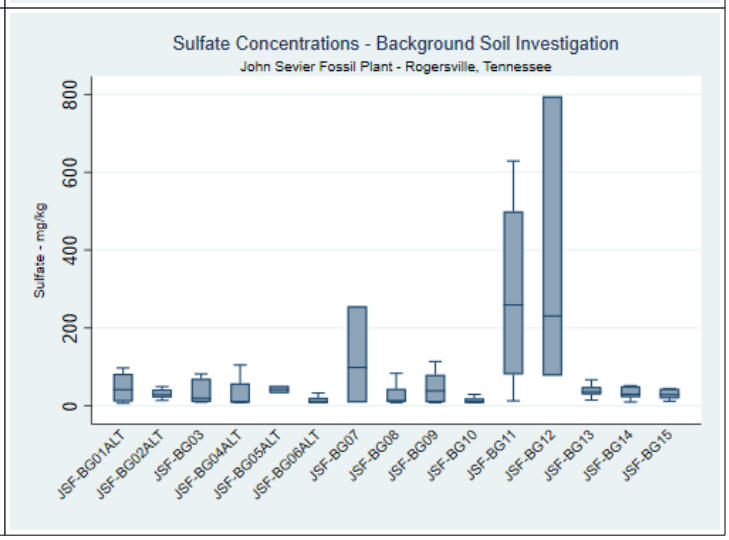

Fluoride Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Cumberland, Tennessee
Fluoride - mg/kg
1
2
3
4
5
Surficial
0.5'-10' bgs
>10' bgs


Fluoride Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Fluoride - mg/kg
1
2
3
4
5
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

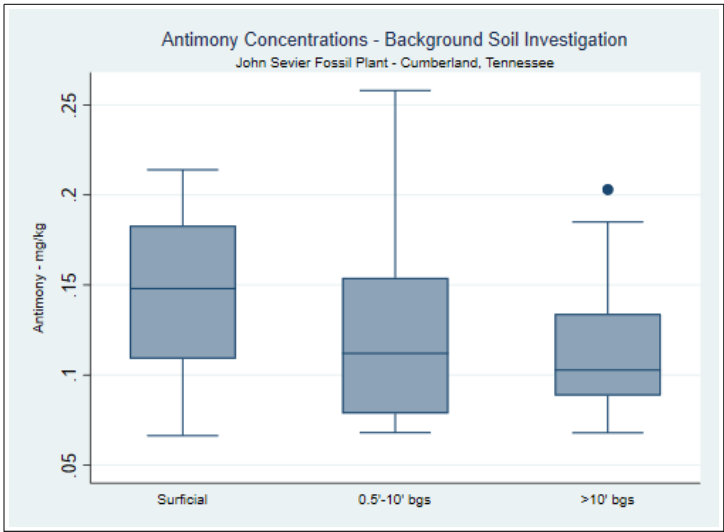

pH - Background Soil Investigation
John Sevier Fossil Plant - Cumberland, Tennessee
pHlab - S.U.
4
5
6
7
8
9
Surficial
0.5'-10' bgs
>10' bgs

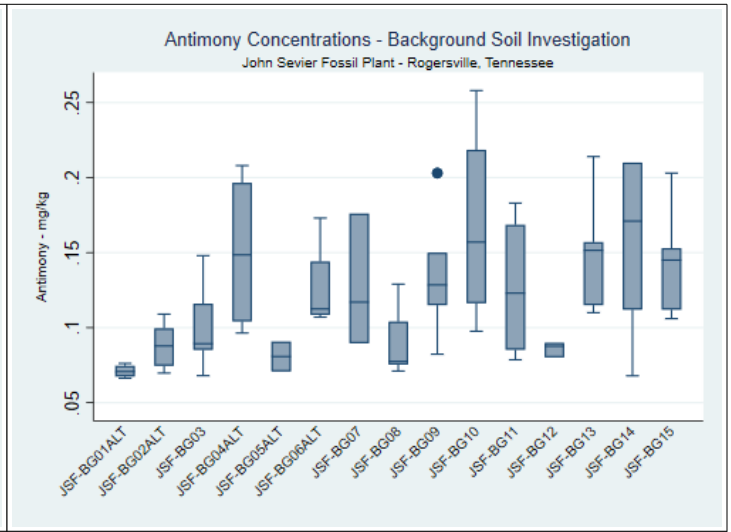

pH - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
pHlab - S.U.
4
5
6
7
8
9
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

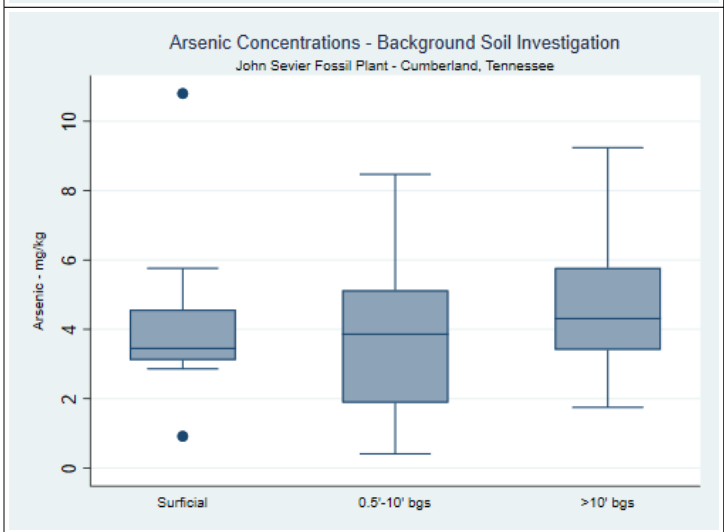

Sulfate Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Cumberland, Tennessee
Sulfate - mg/kg
0
200
400
600
800
Surficial
0.5'-10' bgs
>10' bgs

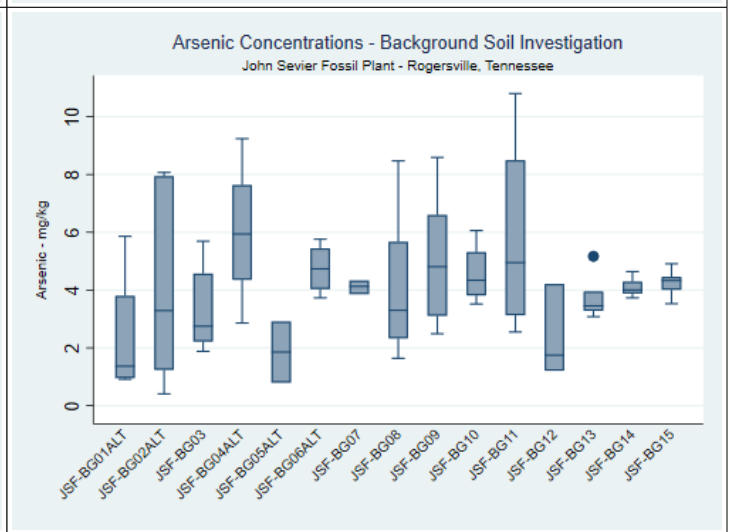

Sulfate Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Sulfate - mg/kg
0
200
400
600
800
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

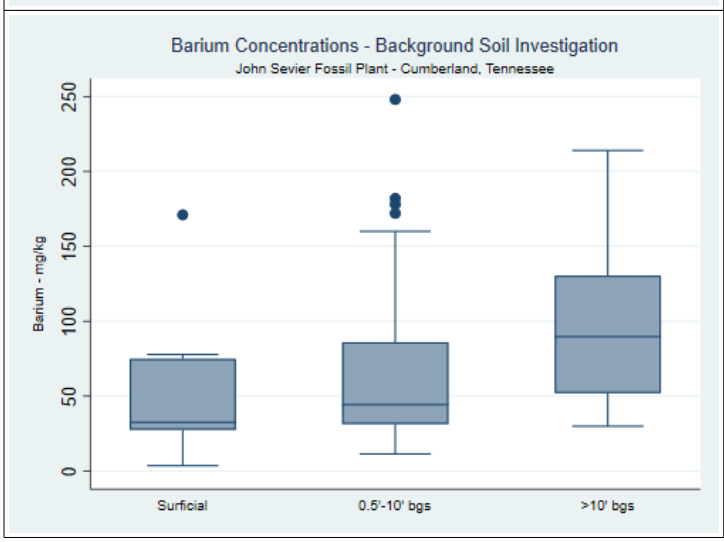
Box Plots - CCR Rule Appendix IV Parameters
CCR Rule Appendix IV Parameters
Background Soil Investigation
John Sevier Fossil Plant, Rogersville Tennessee

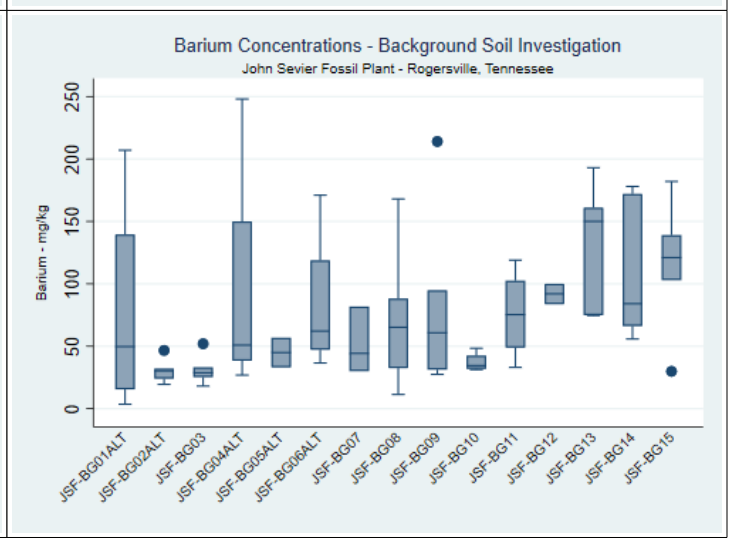


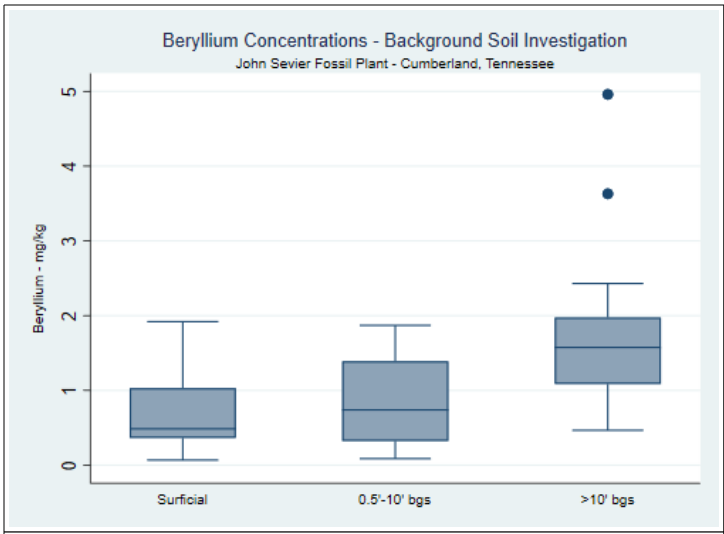


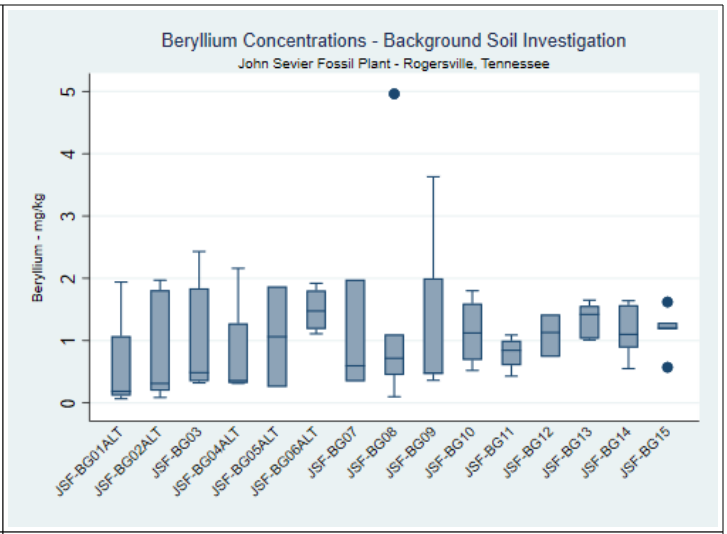


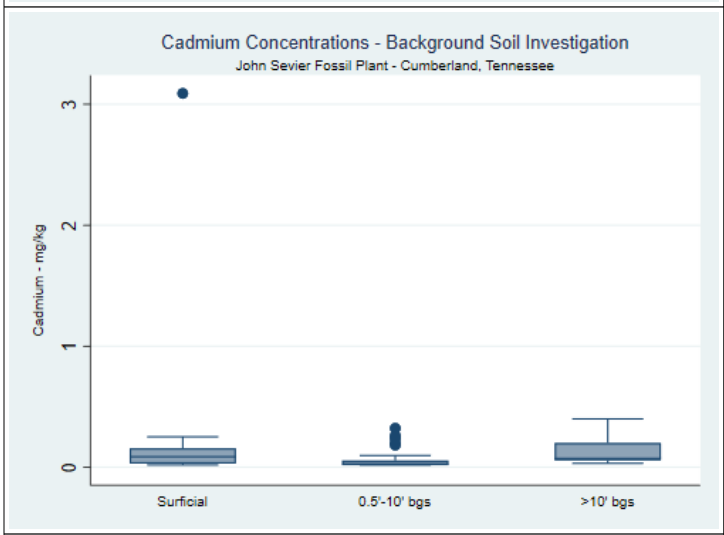


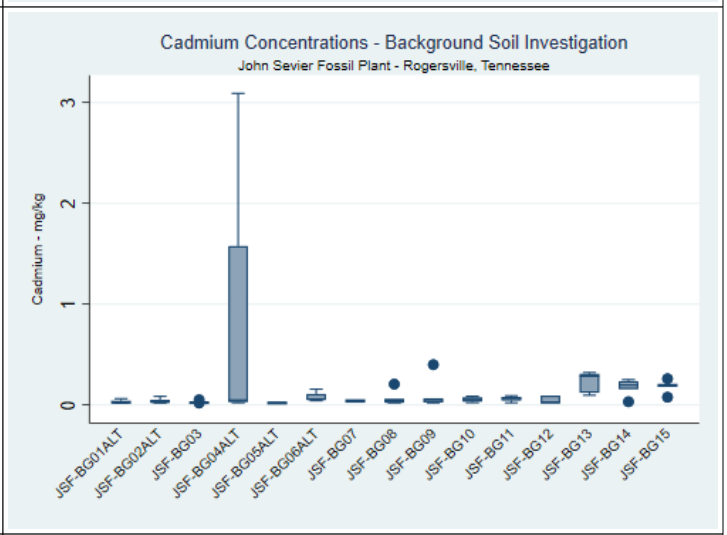


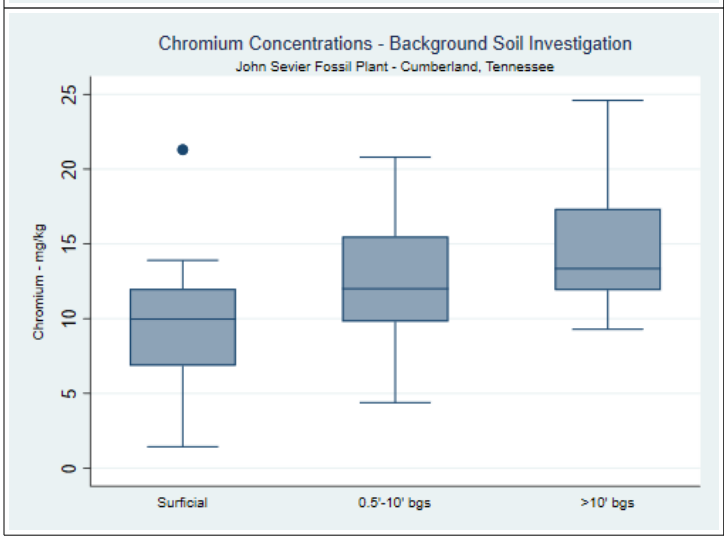


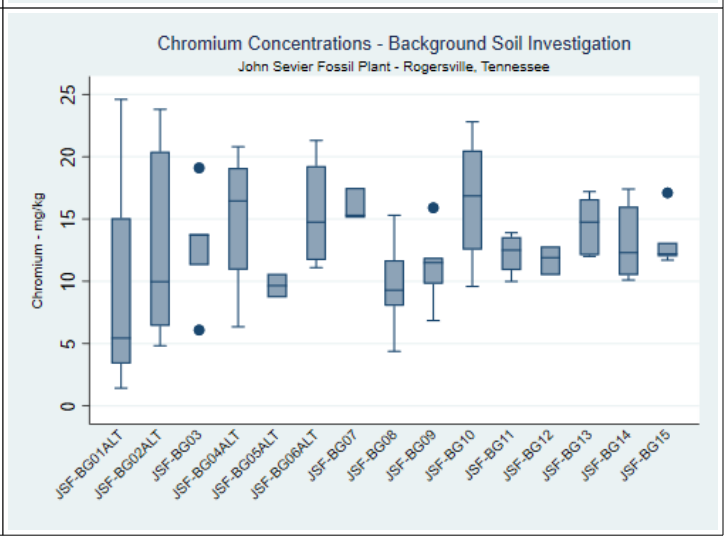

Beryllium Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Cumberland, Tennessee
Beryllium - mg/kg
0
1
2
3
4
5
Surficial
0.5'-10' bgs
>10' bgs

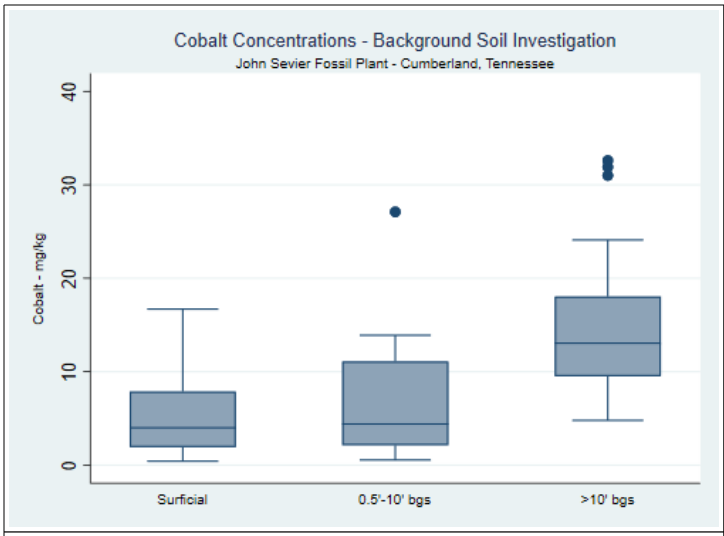

Beryllium Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Beryllium - mg/kg
0
1
2
3
4
5
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

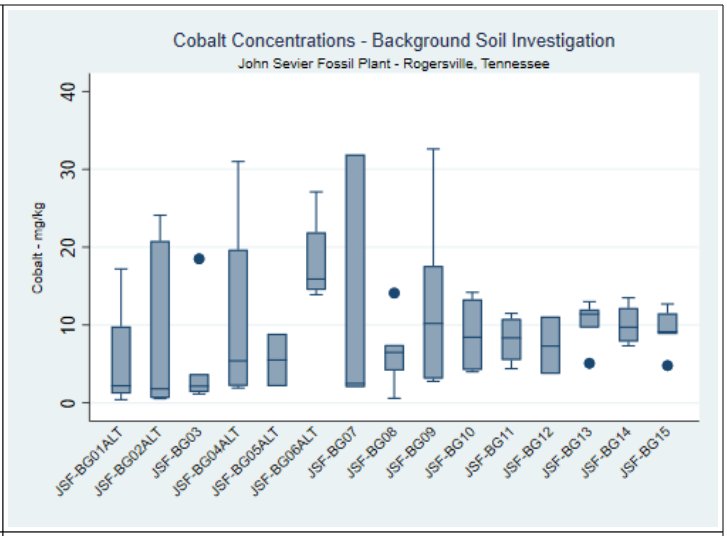

Cadmium Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Cumberland, Tennessee
Cadmium - mg/kg
0
1
2
3
Surficial
0.5'-10' bgs
>10' bgs

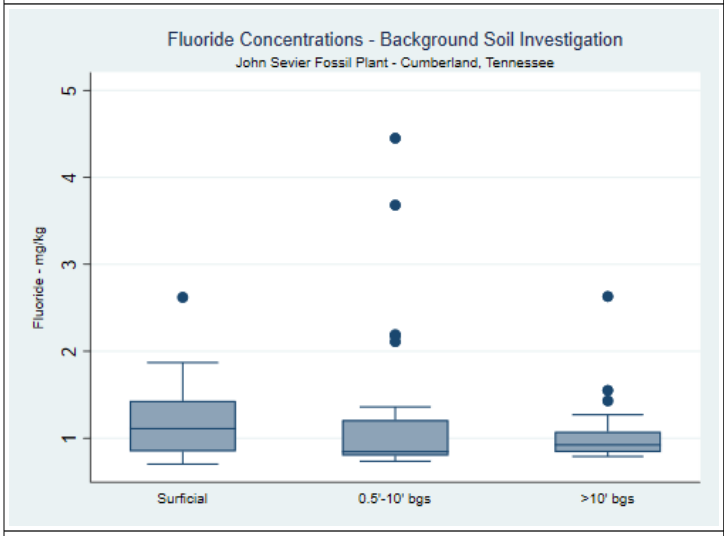

Cadmium Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Cadmium - mg/kg
0
1
2
3
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

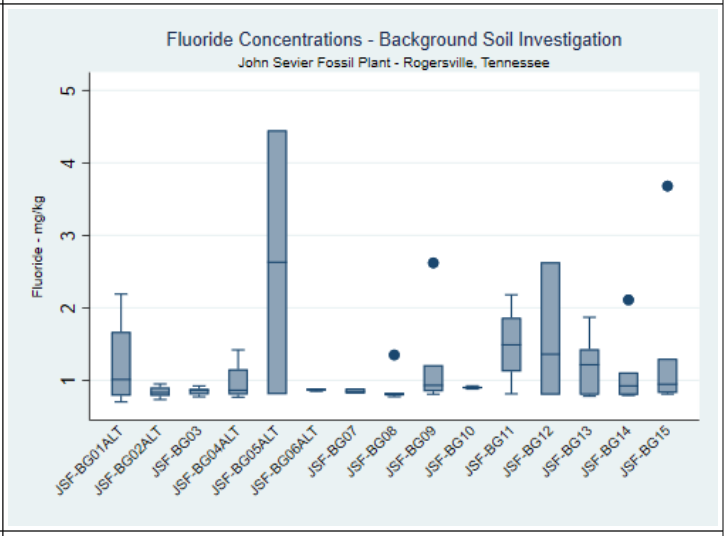

Chromium Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Cumberland, Tennessee
Chromium - mg/kg
0
5
10
15
20
25
Surficial
0.5'-10' bgs
>10' bgs

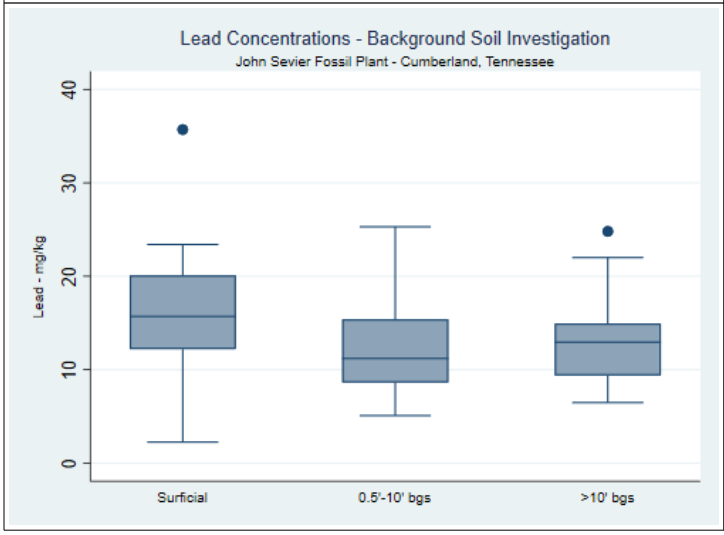

Chromium Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Chromium - mg/kg
0
5
10
15
20
25
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

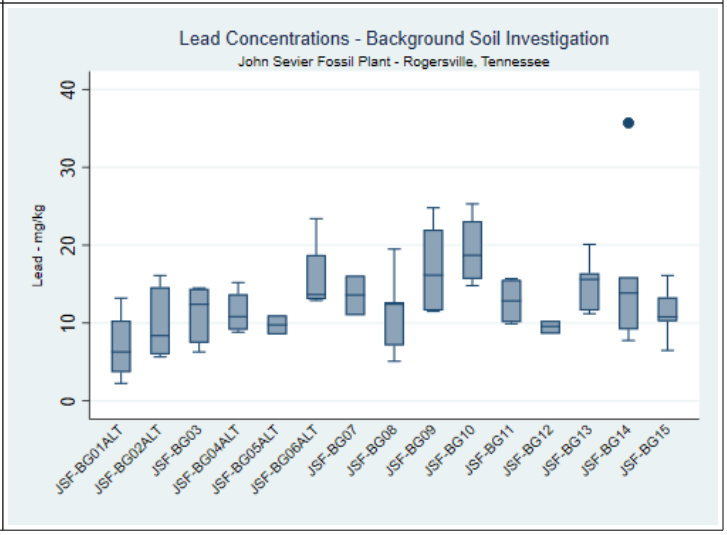

Cobalt Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Cumberland, Tennessee
Cobalt - mg/kg
0
10
20
30
40
Surficial
0.5'-10' bgs
>10' bgs

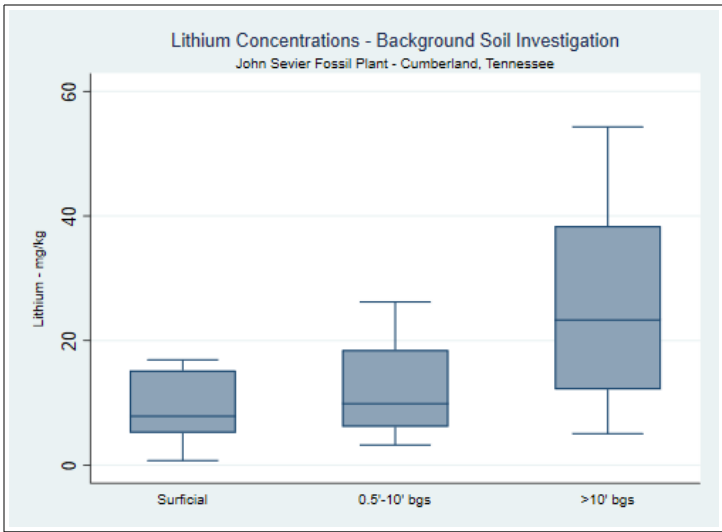

Cobalt Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Cobalt - mg/kg
0
10
20
30
40
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

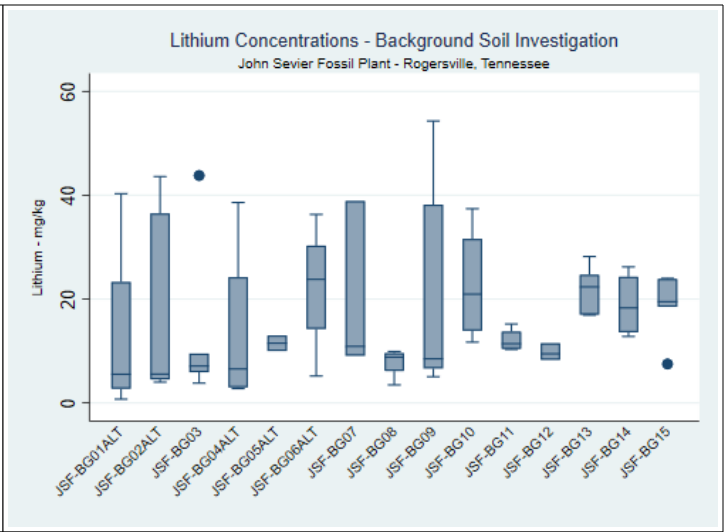

Fluoride Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Cumberland, Tennessee
Fluoride - mg/kg
1
2
3
4
5
Surficial
0.5'-10' bgs
>10' bgs

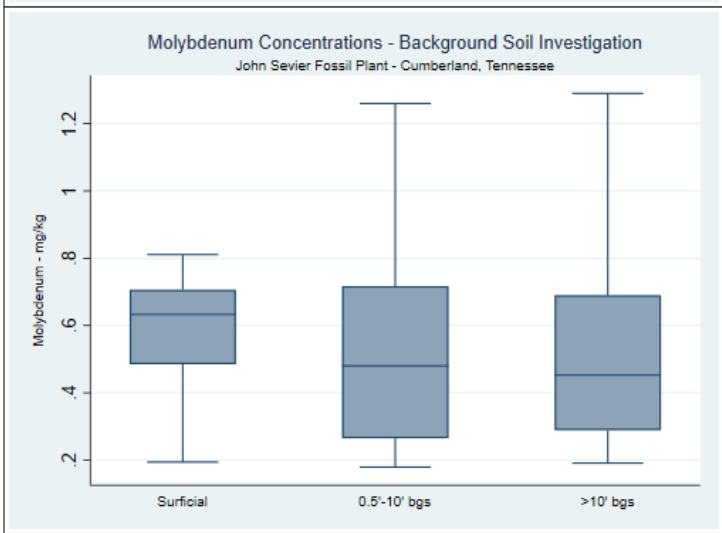

Fluoride Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Fluoride - mg/kg
1
2
3
4
5
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

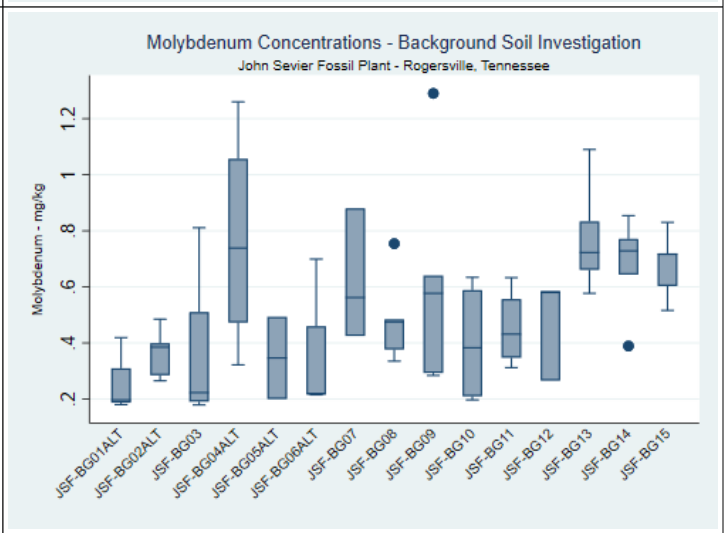

Lead Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Cumberland, Tennessee
Lead - mg/kg
0
10
20
30
40
Surficial
0.5'-10' bgs
>10' bgs

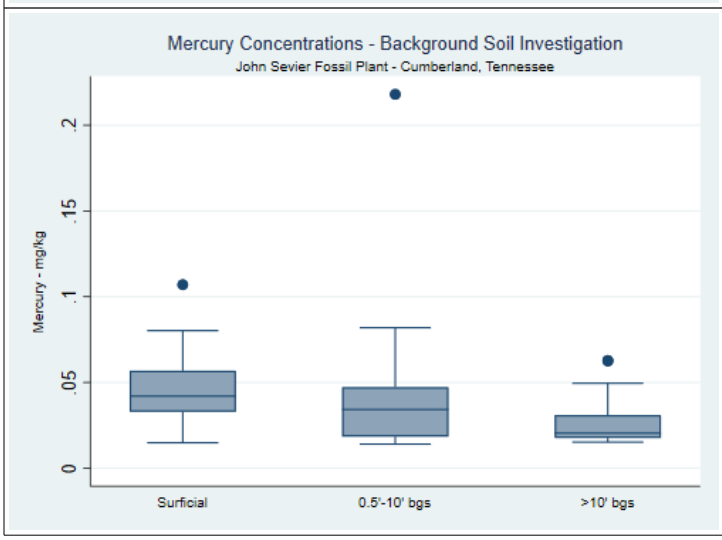

Lead Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Lead - mg/kg
0
10
20
30
40
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

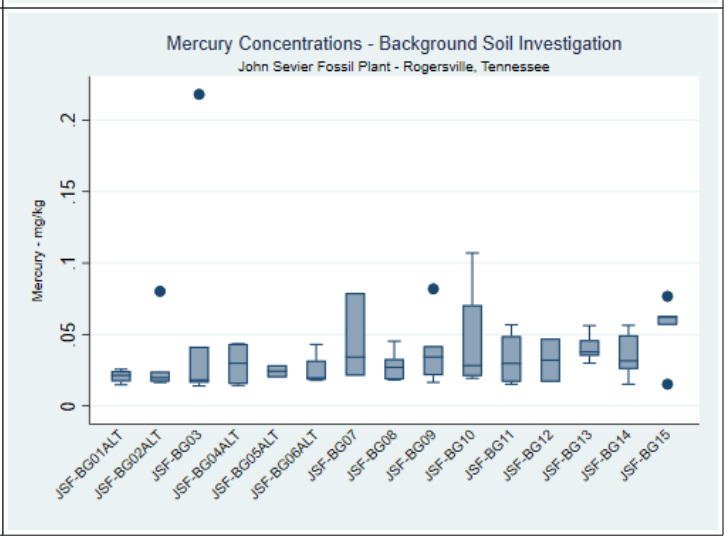

Lithium Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Cumberland, Tennessee
Lithium - mg/kg
0
20
40
60
Surficial
0.5'-10' bgs
>10' bgs

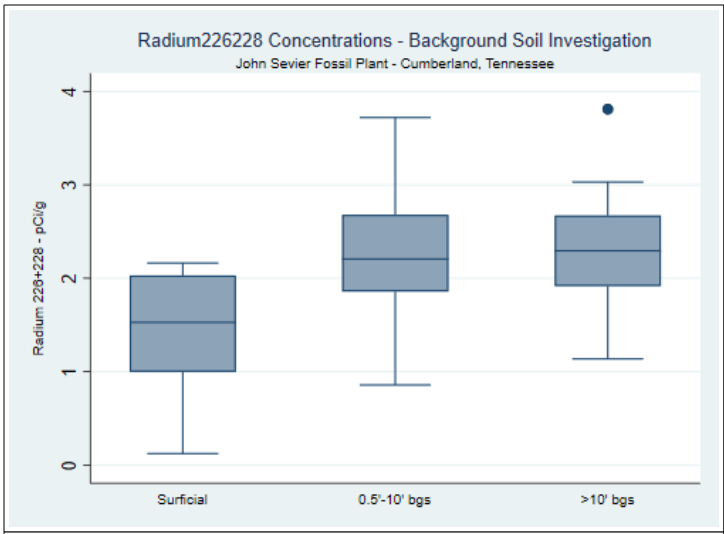

Lithium Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Lithium - mg/kg
0
20
40
60
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

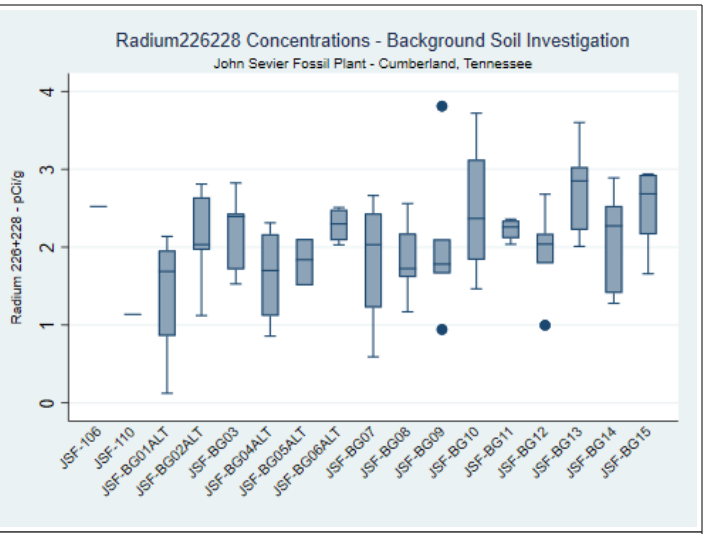

Molybdenum Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Cumberland, Tennessee
Molybdenum - mg/kg
.2
.4
.6
.8
1
1.2
Surficial
0.5'-10' bgs
>10' bgs

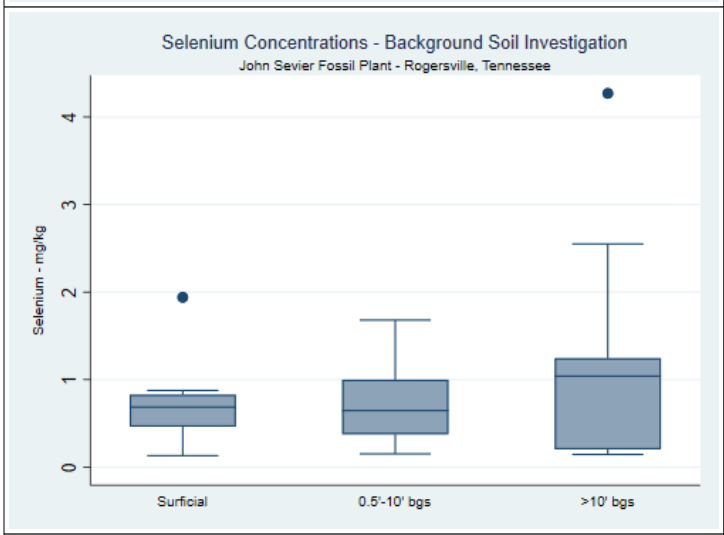

Molybdenum Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Molybdenum - mg/kg
.2
.4
.6
.8
1
1.2
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

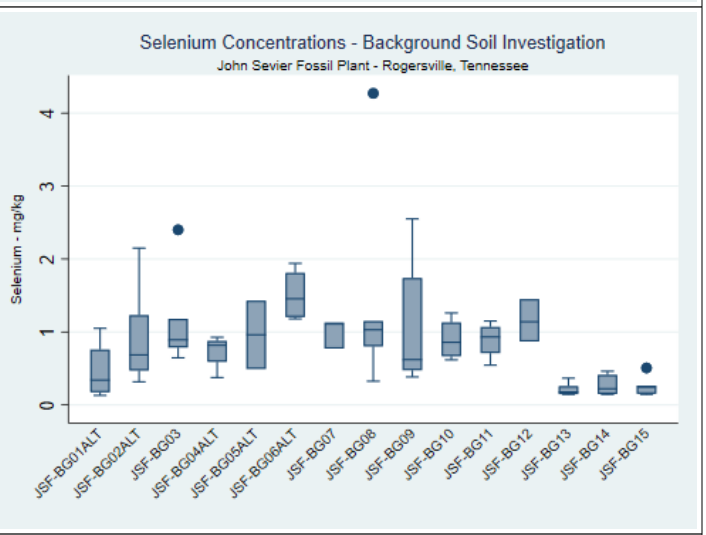

Mercury Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Cumberland, Tennessee
Mercury - mg/kg
0
.05
.1
.15
.2
Surficial
0.5'-10' bgs
>10' bgs

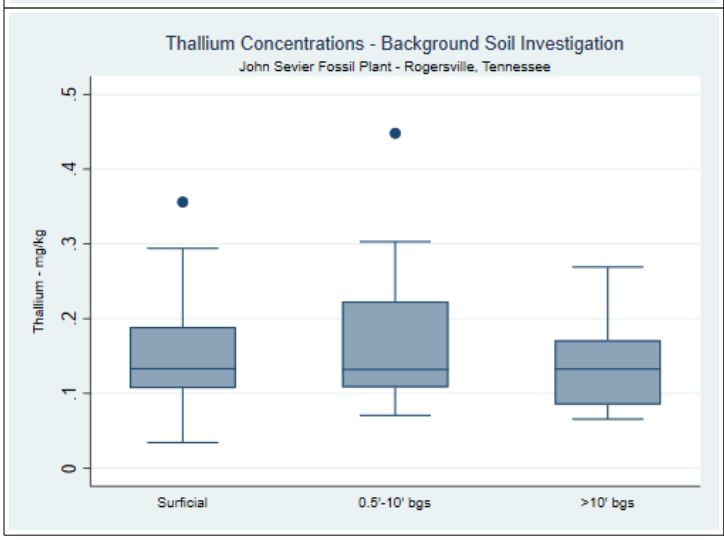

Mercury Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Mercury - mg/kg
0
.05
.1
.15
.2
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

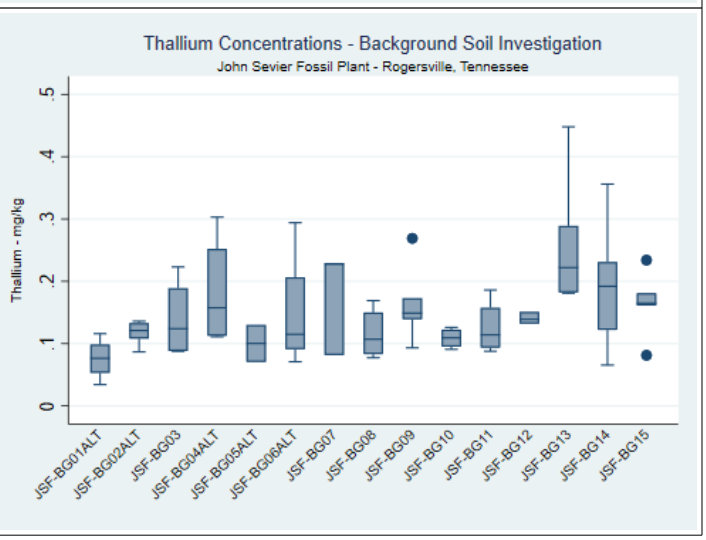

Radium226228 Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Cumberland, Tennessee
Radium 226+228 - pCi/g
0
1
2
3
4
Surficial
0.5'-10' bgs
>10' bgs


Radium226228 Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Cumberland, Tennessee
Radium 226+228 - pCi/g
0
1
2
3
4
JSF-106
JSF-110
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

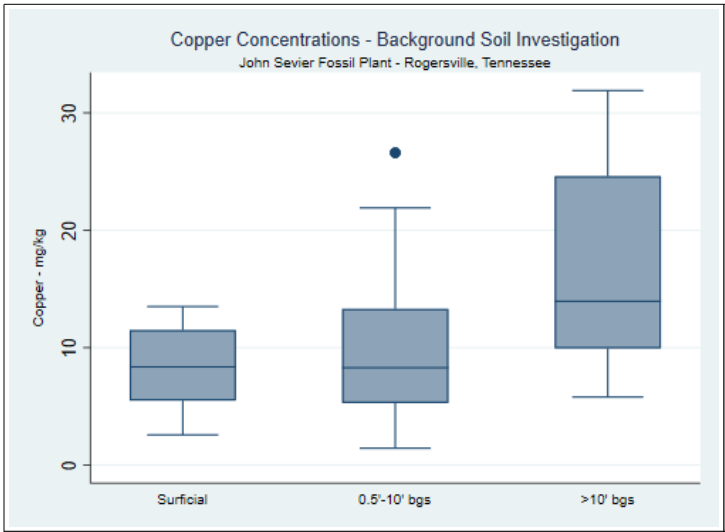

Selenium Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Selenium - mg/kg
0
1
2
3
4
Surficial
0.5'-10' bgs
>10' bgs

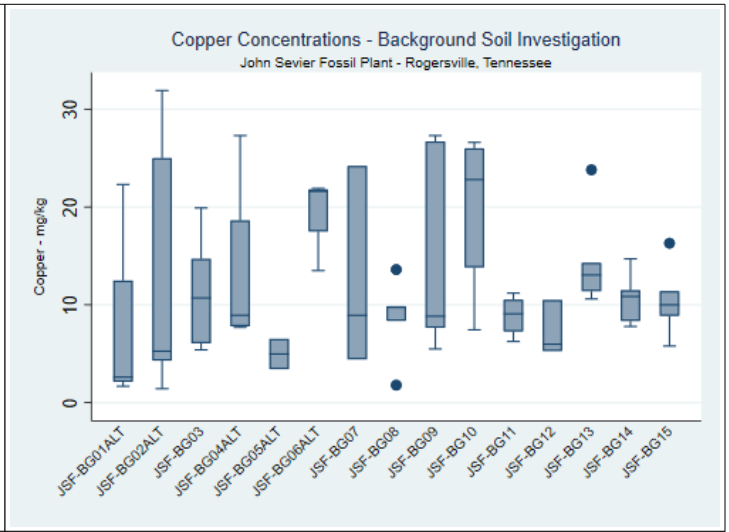

Selenium Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Selenium - mg/kg
0
1
2
3
4
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

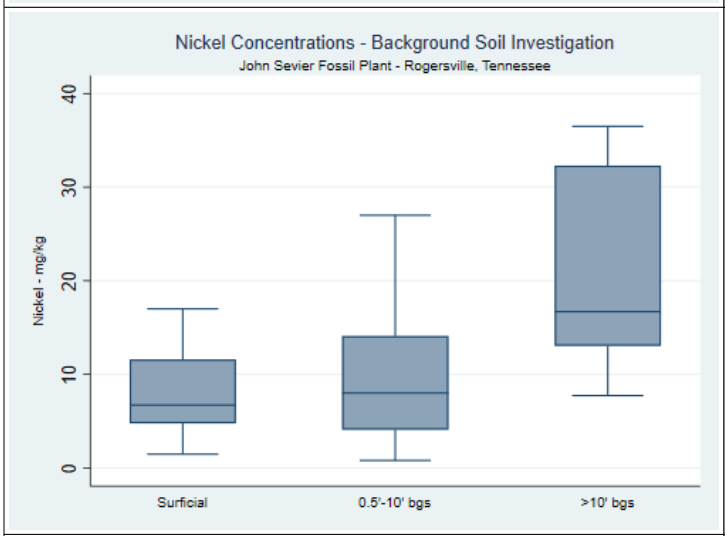

Thallium Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Thallium - mg/kg
0
.1
.2
.3
.4
.5
Surficial
0.5'-10' bgs
>10' bgs

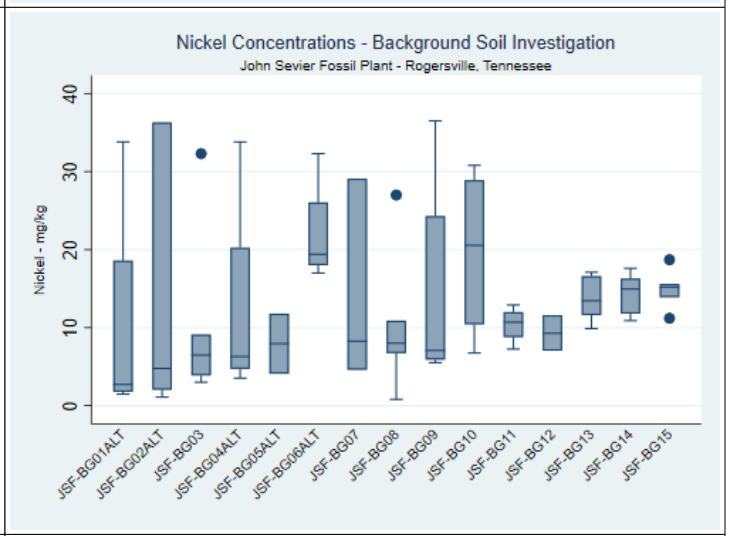

Thallium Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Thallium - mg/kg
0
.1
.2
.3
.4
.5
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

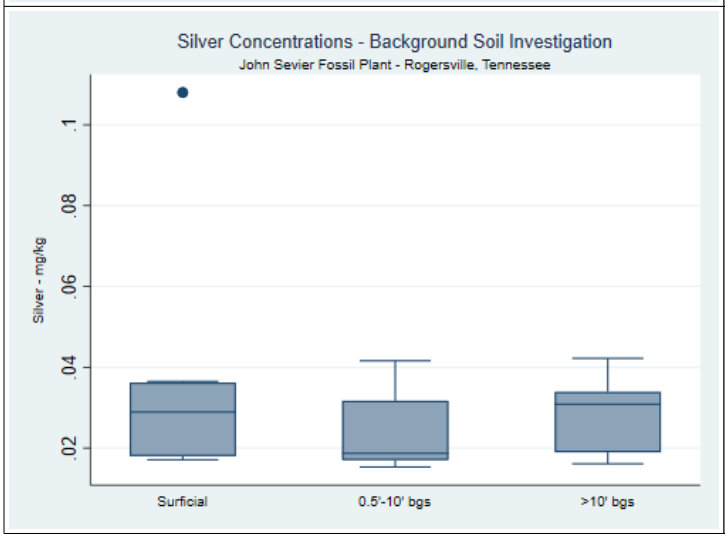
Box Plots - TDEC Appendix I Parameters
TDEC Appendix I Parameters
Background Soil Investigation
John Sevier Fossil Plant, Rogersville Tennessee

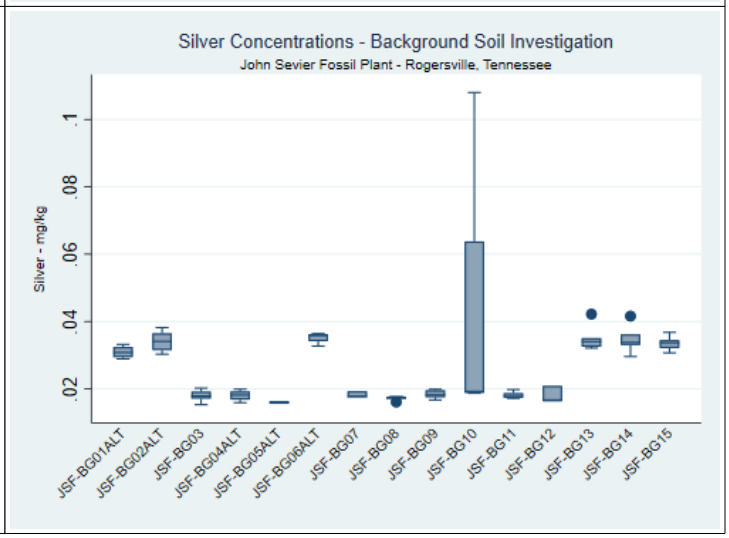


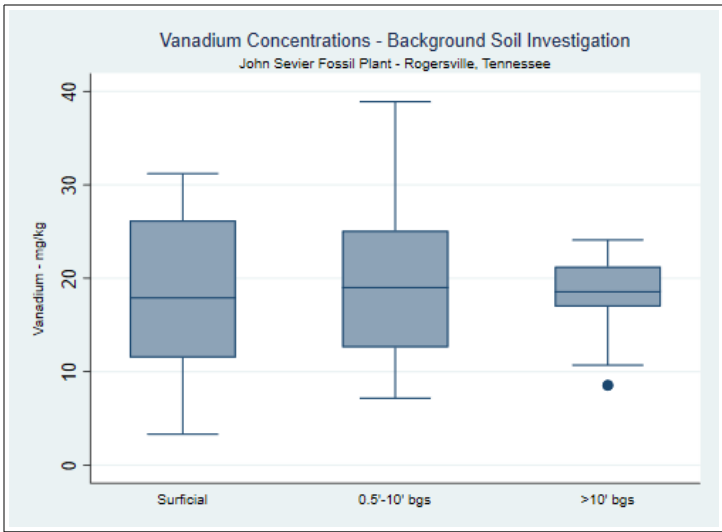


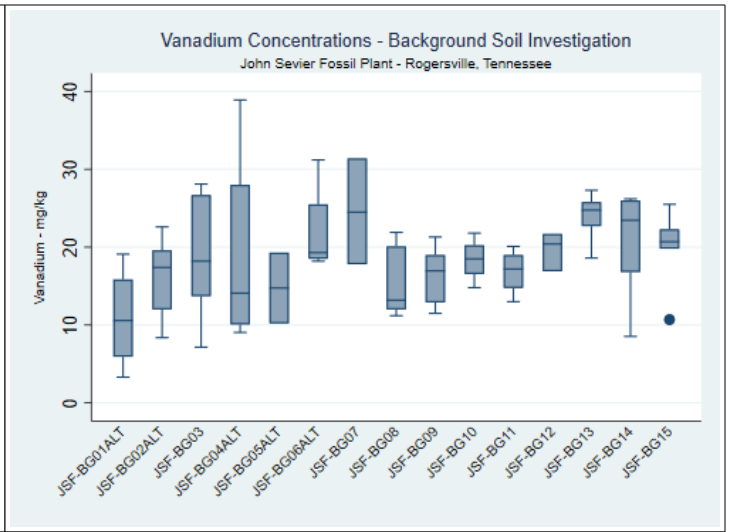


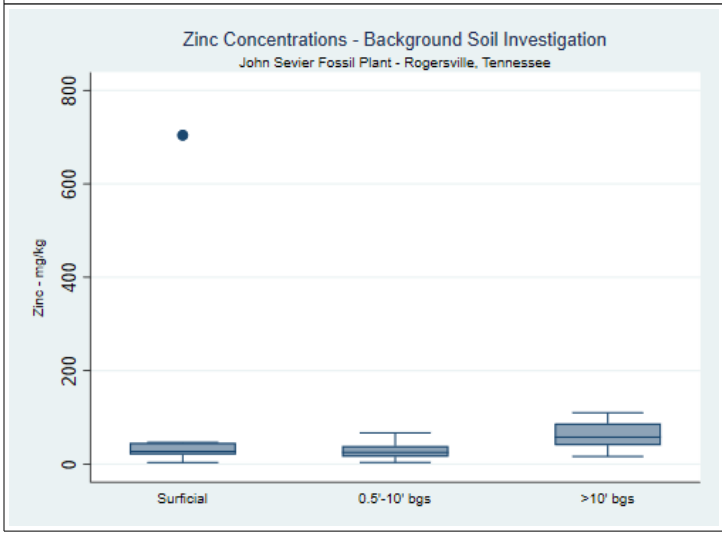


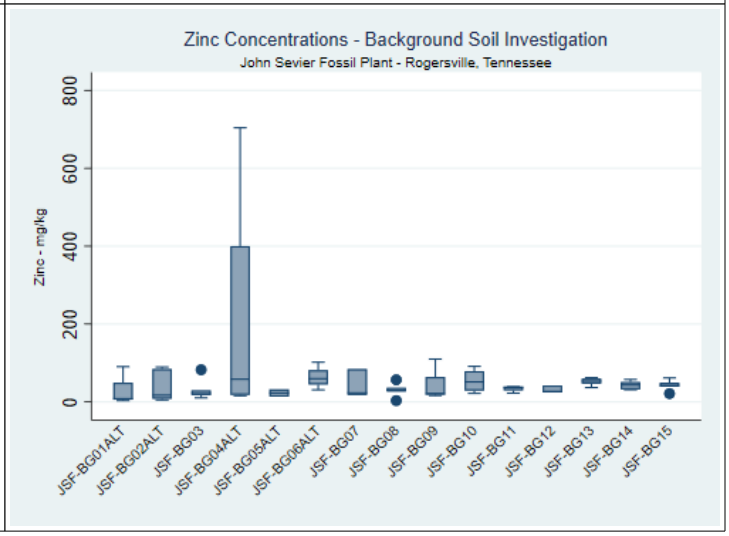





Vanadium Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Vanadium - mg/kg
0
10
20
30
40
Surficial
0.5'-10' bgs
>10' bgs


Vanadium Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Vanadium - mg/kg
0
10
20
30
40
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15


Zinc Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Zinc - mg/kg
0
200
400
600
800
Surficial
0.5'-10' bgs
>10' bgs


Zinc Concentrations - Background Soil Investigation
John Sevier Fossil Plant - Rogersville, Tennessee
Zinc - mg/kg
0
200
400
600
800
JSF-BG01ALT
JSF-BG02ALT
JSF-BG03
JSF-BG04ALT
JSF-BG05ALT
JSF-BG06ALT
JSF-BG07
JSF-BG08
JSF-BG09
JSF-BG10
JSF-BG11
JSF-BG12
JSF-BG13
JSF-BG14
JSF-BG15

APPENDIX E.2

STATISTICAL ANALYSIS OF CCR MATERIAL CHARACTERISTICS DATA

Appendix E.2 - Statistical Analysis of CCR Material Characteristics Data

TDEC Commissioner's Order:
Environmental Assessment Report
John Sevier Fossil Plant
Rogersville, Tennessee

July 3, 2023

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

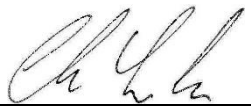
Stantec Consulting Services Inc.
Lexington, Kentucky

Revision Log

Revision	Description	Date
0	Submittal to TDEC	January 10, 2023
1	Addresses April 4, 2023 TDEC Review Comments and Issued for TDEC	July 3, 2023

Sign-off Sheet

This document entitled Appendix E.2 - Statistical Analysis of CCR Material Characteristics Data was prepared by Stantec Consulting Services Inc. (“Stantec”) for the account of Tennessee Valley Authority (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not consider any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by 

Chris La Londe, Senior Risk Assessor

Reviewed by 

Melissa Whitfield Aslund, PhD, Environmental Scientist

Approved by 

Rebekah Brooks, PG, Principal Hydrogeologist

Table of Contents

LIST OF TABLES

LIST OF ATTACHMENTS

Abbreviations

CASRN	Chemical Abstracts Service Registry Number
CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04
CCR Rule	Title 40, Code of Federal Regulations, Part 257
EAR	Environmental Assessment Report
IQR	Interquartile Range
JSF Plant	John Sevier Fossil Plant
NA	Not Available
%	Percent
SAR	Sampling and Analysis Report
SPLP	Synthetic Precipitate Leaching Procedure
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TVA	Tennessee Valley Authority

July 3, 2023

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) prepared this appendix on behalf of the Tennessee Valley Authority (TVA) to document the statistical analyses performed on data collected to characterize coal combustion residual (CCR) materials in support of evaluations conducted for the Environmental Assessment Report (EAR) at the John Sevier Fossil Plant (JSF Plant) located in Rogersville, Tennessee. The CCR material characterization samples were collected between March 2019 and February 2020 within the CCR management units[1] at the JSF Plant. Further details regarding the CCR material sampling and laboratory data results are presented in the JSF Plant *CCR Material Characteristics Sampling and Analysis Report* (SAR) (Appendix G.5).

For the Environmental Investigation, CCR material and pore water samples were collected for characterization related to the leachability of constituents listed in Appendices III and IV of 40 CFR 257 and five additional inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04 (CCR Parameters) from material within four JSF Plant CCR management units: the Dry Fly Ash Stack, Bottom Ash Pond, Ash Disposal Area J, and Highway 70 Borrow Area. The Synthetic Precipitate Leaching Procedure (SPLP) was used to characterize leachability of CCR Parameters in CCR material. Temporary well/boring locations and the number of samples collected in each JSF Plant CCR management unit are presented in Table E.2-1. Table E.2-2 presents the list of CCR parameters evaluated in this statistical evaluation.

Table E.2-1 – CCR Material Characteristics Sample Locations - JSF Plant

JSF Plant CCR Management Unit	Temporary Well/Boring Location	Number of Samples	
		CCR Material/SPLP	Pore Water
Dry Fly Ash Stack	JSF-TW01; JSF-TW02; JSF-TW03; JSF-TW-04; JSF-TW05; JSF-TW05b; MH-1G	53	1
Bottom Ash Pond	JSF-TW06; JSF-TW07; JSF-TW08	18	2
Ash Disposal Area J	JSF-TW09; JSF-TW10; JSF-TW11	22	3
Highway 70 Borrow Area	JSF-TW12	4	1

[1]The term “CCR management unit” is used in this document generally and is not intended to be a designation under federal or state regulations.

Table E.2-2 – CCR Parameters Evaluated in Statistical Analysis

CCR Parameter	CASRN
CCR Rule Appendix III Parameters	
Boron	7440-42-8
Calcium	7440-70-2
Chloride	16887-00-6
Fluoride[1] (also Appendix IV)	16984-48-8
pH	Not Available (NA)
Sulfate	14808-79-8
Total Dissolved Solids	NA
CCR Rule Appendix IV Parameters	
Antimony	7440-36-0
Arsenic	7440-38-2
Barium	7440-39-3
Beryllium	7440-41-7
Cadmium	7440-43-9
Chromium	7440-47-3
Cobalt	7440-48-4
Lead	7439-92-1
Lithium	7439-93-2
Mercury	7439-97-6
Molybdenum	7439-98-7
Radium-226+228	13982-63-3/ 15262-20-1
Selenium	7782-49-2
Thallium	7440-28-0
Additional TDEC Appendix I Parameters	
Copper	7440-50-8
Nickel	7440-02-0
Silver	7440-22-4
Vanadium	7440-62-2
Zinc	7440-66-6
Other	
Iron	7439-89-6
Manganese	7439-96-5
Total Organic Carbon	NA

Notes: CASRN: Chemical Abstracts Service Registry Number; CCR Rule - Title 40, Code of Federal Regulations, Part 257; TDEC - Tennessee Department of Environment and Conservation

[1]Fluoride is both a CCR Rule Appendix III and CCR Rule Appendix IV CCR parameter. In this table, and in the results figures and tables for this report, fluoride has been grouped with the Appendix III CCR parameters only to avoid duplication.

The following sections present the methods and results used to evaluate the CCR material and pore water data, including: 1) general exploratory data analysis (summary statistics, data plots and outlier screening), 2) a regression analysis to evaluate correlation between SPLP results to CCR Parameter concentrations in CCR material, and 3) a comparison of SPLP results to pore water concentrations.

2.0 METHODS

The statistical evaluation was conducted in three parts: 1) exploratory data analysis, 2) regression analysis, and 3) comparison of SPLP results to CCR Parameter concentrations in pore water.

2.1 EXPLORATORY DATA ANALYSIS

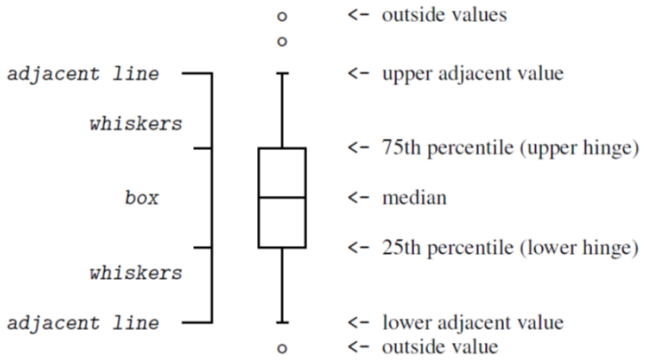
Exploratory data analysis is the initial step of statistical analysis. It utilizes simple summary statistics (e.g. mean, median, standard deviation and percentiles) and graphical representations to identify characteristics of an analytical dataset, such as the center of the data (mean, median), variation, distribution, patterns, presence of outliers, and randomness.

2.1.1 Summary Statistics

Summary statistics were calculated for CCR material, SPLP, and pore water for each CCR Parameter grouped by JSF Plant CCR management unit. Summary statistics include information such as the total numbers of available samples, the frequencies of detection, ranges of reporting limits, minimum and maximum detected concentrations, mean concentrations, standard deviations, median concentrations, and the 95th percentile concentrations. Summary statistics tables are presented in Attachment E.2-A.

2.1.2 Exploratory Data Plots

Box plots were constructed of CCR Parameter concentrations in CCR material to support a visual review of the data. Box plots were used to identify the center of the data, distribution, variability, and to visually identify potential outliers. The diagram below graphically depicts the basics of the construction of the box plots (StataCorp LLC 2017).



The box portion of the plot is the interquartile range (IQR), which represents the middle 50 percent (%) of data, with the bottom of the box being the 25th percentile and the top of the box being the 75th percentile. The line inside the box is the median concentration. The top of the upper “whisker” represents the first observed concentration above the 75th percentile, whereas the bottom of the lower “whisker” represents the first observed concentration below the 25th percentile (upper adjacent value and lower adjacent value, respectively). Values that lie outside of the adjacent values represent outside (potential outliers) concentrations (i.e. concentrations at the upper and lower ends of the distribution of the data). The method detection limit was used as the reported value in order to construct the box plot when analytical results were reported as non-detects.

Side-by-side box plots were constructed for the CCR materials data and aggregated by temporary well/boring location and JSF Plant CCR management unit. These box plots were useful in identifying

differences in CCR Parameter concentrations between each JSF Plant CCR management unit and are especially useful for visually identifying potential outliers.

2.1.3 Outlier Screening

Outliers are data points that are abnormally high or low as compared to other measurements and may represent anomalous data or data errors. Outliers may also represent natural variation of CCR Parameter concentrations in environmental systems. Screening for outliers is a critical step because outliers can bias statistical estimates, statistical testing results, and inferences.

Outlier values were initially screened visually using side-by-side box plots. If suspected visual outliers were identified, then Tukey's procedure was used to identify extreme outliers (Tukey 1977). This method relies on the 25th and 75th percentiles of the data (IQR), which is defined as the 75th percentile value minus the 25th percentile value. Values were identified as potential outliers as follows:

- **Lower extreme outliers** are less than the 25th percentile minus 3 x IQR
- **Upper extreme outliers** are greater than the 75th percentile plus 3 x IQR.

Finally, when the potential outlier(s) were identified visually and by Tukey's procedure, then statistical testing for outliers (Dixon or Rosner's Test) was conducted to determine if the data points were statistically significant outliers.

Following confirmation of the outliers as statistically significant, a desktop evaluation was conducted to verify that the data points were not errors (e.g., laboratory or transcriptional error). Field forms, data validation reports, and other variables in the dataset that could influence analytical results were also evaluated. If a verifiable error was discovered, the outlier was removed and, if possible, replaced with a corrected value.

In the absence of a verifiable error, additional lines of evidence were reviewed to determine final outlier disposition (e.g., frequency of detection, spatial and temporal variability). If an outlier was identified as suitable for removal from further statistical analysis, a clear and defensible rationale based on multiple lines of evidence was provided. In addition, values that were identified as outliers and removed from further evaluation in the present statistical analysis were retained in the historical database and will be reevaluated for inclusion or exclusion in future statistical analyses of this dataset. The results of the outlier screening for the JSF Plant CCR material dataset are provided in Section 3.1.

2.2 REGRESSION ANALYSIS

The linear relationship between the concentrations of CCR Parameters in SPLP results and concentrations in CCR material was evaluated using regression analysis. Scatter plots were constructed to compare SPLP and CCR material results for the CCR Parameters. Using linear regression, the Pearson's correlation coefficient was estimated, and a regression line was fit to the data and added to the scatter plots. As part of the analysis, the SPLP results for the CCR Parameters were compared to the range of pore water concentrations from the Ash Disposal Area J, Bottom Ash Pond, and Dry Fly Ash Stack. Regression analysis and a comparison to pore water was not conducted for data collected in the

Highway 70 Borrow Area due to the small size of the dataset. Analyses were conducted on data where CCR parameters were detected in greater than 50% of the samples in both the SPLP and CCR material datasets. Scatter plots, regression results, and range of pore water concentrations are presented in Attachment E.2-C.

3.0 RESULTS AND DISCUSSION

3.1 SUMMARY STATISTICS, EXPLORATORY DATA PLOTS, AND OUTLIER SCREENING

Summary statistics tables are presented in Attachment E.2-A, and box plots are presented in Attachment E.2-B.

There were no outliers identified as suitable for removal from further statistical analysis in the CCR material or SPLP datasets. The pore water dataset was not screened for outliers due to the small size of the dataset.

3.2 REGRESSION ANALYSIS

The purpose of the regression analysis was to evaluate whether the total concentrations of metals in CCR material could be used as a reliable predictor of leachable concentrations as represented by SPLP concentrations. Scatter plots, regression results, and range of pore water concentrations are presented in Attachment E.2-C. The correlation coefficient is a numerical measure that measures the strength of association between two variables (in this case, between total concentration and SPLP results for CCR material), with values ranging from zero and one. A high correlation coefficient (closer to one) demonstrates a strong relationship between the two variables, whereas a low correlation coefficient (closer to zero) demonstrates a weak relationship. The slope of the regression line indicates the direction of correlation. A positive slope indicates that SPLP concentrations increased as CCR Parameter concentrations in CCR material increased. Conversely, a negative slope indicates that as CCR Parameter concentrations increased, the SPLP concentrations decreased.

The statistical relationships between SPLP concentrations and CCR material concentrations were inconsistent and highly variable. One would expect SPLP concentrations to increase with increasing CCR parameter concentrations in CCR material (e.g. regression line with a positive slope). However, this relationship was inconsistent between different CCR parameters and between JSF Plant CCR management units. In some cases, even when there was a statistically significant correlation (e.g., zinc), the wide range of variability around the regression line limits the predictive value of the relationship. The results indicate that the total concentrations of metals in CCR material is not a reliable predictor of the magnitude of the potentially leached concentrations measured using SPLP.

In addition, the CCR parameter concentrations in SPLP generally underestimated CCR parameter concentrations measured in pore water.

The results indicate that direct measurement of pore water concentrations is the most accurate way of characterizing potential leachability from CCR materials.

4.0 REFERENCES

StataCorp. (2017). Stata Graphics Reference Manual Stata: Release 15. Statistical Software. College Station, TX: StataCorp LLC.

Tukey, J.W. (1977). Exploratory Data Analysis. Reading, Massachusetts: Addison-Wesley, 1977.

ATTACHMENT E.2–A
SUMMARY STATISTICS

Summary Statistics - CCR Material Characteristics Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	CCR Management Unit	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
CCR Rule Appendix III Parameters										
Boron	Ash Disposal Area J	22/22	--	0%	2.53	93.8	42.2	24.2	41.2	85.1
	Bottom Ash Pond	18/18	--	0%	2.38	65.2	19.1	15.9	17.3	41.2
	Dry Fly Ash Stack	52/53	(1.52 - 1.52)	1.89%	2.73	116	33.4	25.2	26.9	86.7
	Highway 70 Borrow Area	4/4	--	0%	29.0	42.6	36.7	5.69	37.6	42.0
Calcium	Ash Disposal Area J	22/22	--	0%	145	6,060	4,220	1,730	4,440	5,850
	Bottom Ash Pond	18/18	--	0%	862	14,400	4,100	3,820	3,070	13,700
	Dry Fly Ash Stack	53/53	--	0%	1,710	29,700	5,420	3,910	4,620	9,860
	Highway 70 Borrow Area	4/4	--	0%	3,470	5,090	4,300	663	4,330	4,980
Chloride	Ash Disposal Area J	4/22	(4.74 - 5.36)	81.8%	5.40	17.6	5.64	2.82	5.13	9.65
	Bottom Ash Pond	12/18	(4.41 - 5.54)	33.3%	5.12	11.7	6.74	2.23	6.30	10.8
	Dry Fly Ash Stack	24/53	(4.21 - 5.53)	54.7%	4.72	31.9	5.78	4.04	4.93	9.69
	Highway 70 Borrow Area	0/4	(4.49 - 4.81)	100%	--	--	--	--	4.77	4.80
Fluoride	Ash Disposal Area J	19/22	(0.877 - 0.934)	13.6%	2.57	14.4	4.85	2.89	4.89	8.56
	Bottom Ash Pond	14/18	(0.747 - 0.971)	22.2%	0.891	9.79	3.42	2.85	2.86	9.73
	Dry Fly Ash Stack	49/53	(0.752 - 0.840)	7.55%	0.891	12.2	5.42	3.33	5.18	11.7
	Highway 70 Borrow Area	4/4	--	0%	2.68	2.92	2.79	0.126	2.78	2.91
pH (field)	Ash Disposal Area J	11/11	--	0%	4.69	8.74	7.34	1.10	7.61	8.55
	Bottom Ash Pond	--	--	--	--	--	--	--	--	--
	Dry Fly Ash Stack	22/22	--	0%	6.82	11.1	8.08	0.961	7.91	10.4
	Highway 70 Borrow Area	4/4	--	0%	7.10	7.87	7.34	0.356	7.20	7.77
pH (lab)	Ash Disposal Area J	22/22	--	0%	5.40	8.60	7.85	0.975	8.20	8.50
	Bottom Ash Pond	18/18	--	0%	3.60	8.30	6.82	1.53	7.60	8.22
	Dry Fly Ash Stack	52/52	--	0%	6.60	10.0	8.07	0.622	7.90	9.55
	Highway 70 Borrow Area	4/4	--	0%	6.80	7.80	7.28	0.499	7.25	7.77
Sulfate	Ash Disposal Area J	22/22	--	0%	11.7	341	49.1	67.3	32.7	81.2
	Bottom Ash Pond	18/18	--	0%	43.1	7990	1310	2130	358	5880
	Dry Fly Ash Stack	53/53	--	0%	43.7	8780	1350	1680	822	4050
	Highway 70 Borrow Area	4/4	--	0%	15.2	105	62.7	39.3	65.3	102

Summary Statistics - CCR Material Characteristics Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	CCR Management Unit	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
CCR Rule Appendix IV Parameters										
Antimony	Ash Disposal Area J	22/22	--	0%	0.370	3.92	1.94	0.909	2.07	2.97
	Bottom Ash Pond	18/18	--	0%	0.137	2.51	1.21	0.753	1.08	2.20
	Dry Fly Ash Stack	53/53	--	0%	0.112	2.89	1.13	0.621	1.18	2.10
	Highway 70 Borrow Area	4/4	--	0%	1.13	1.40	1.28	0.115	1.30	1.39
Arsenic	Ash Disposal Area J	22/22	--	0%	19.2	234	147	70.5	150	227
	Bottom Ash Pond	18/18	--	0%	15.5	196	93.8	54.5	88.1	192
	Dry Fly Ash Stack	53/53	--	0%	4.88	259	72.5	59.7	47.1	201
	Highway 70 Borrow Area	4/4	--	0%	73.8	86.2	82.6	5.89	85.2	86.1
Barium	Ash Disposal Area J	22/22	--	0%	13.5	631	393	184	406	630
	Bottom Ash Pond	18/18	--	0%	64.1	578	309	164	276	559
	Dry Fly Ash Stack	53/53	--	0%	59.2	495	270	89.7	265	427
	Highway 70 Borrow Area	4/4	--	0%	300	379	348	36.4	356	378
Beryllium	Ash Disposal Area J	22/22	--	0%	0.550	6.22	3.58	1.49	3.94	5.34
	Bottom Ash Pond	18/18	--	0%	0.207	4.98	2.52	1.57	2.27	4.74
	Dry Fly Ash Stack	53/53	--	0%	0.645	5.05	2.24	1.00	2.15	3.95
	Highway 70 Borrow Area	4/4	--	0%	2.20	2.79	2.54	0.252	2.58	2.77
Cadmium	Ash Disposal Area J	22/22	--	0%	0.0317	1.47	0.705	0.397	0.613	1.46
	Bottom Ash Pond	16/18	(0.0191 - 0.0196)	11.1%	0.0827	1.08	0.322	0.244	0.309	0.650
	Dry Fly Ash Stack	53/53	--	0%	0.0364	1.52	0.342	0.274	0.277	0.756
	Highway 70 Borrow Area	4/4	--	0%	0.529	0.707	0.623	0.0794	0.629	0.701
Chromium	Ash Disposal Area J	22/22	--	0%	21.5	41.1	31.1	5.85	32.4	38.4
	Bottom Ash Pond	18/18	--	0%	7.26	31.3	18.2	7.33	17.7	28.8
	Dry Fly Ash Stack	53/53	--	0%	9.00	46.3	19.5	6.66	18.4	28.5
	Highway 70 Borrow Area	4/4	--	0%	20.0	25.1	22.6	2.08	22.6	24.7
Cobalt	Ash Disposal Area J	22/22	--	0%	7.51	21.5	13.8	3.77	14.2	19.6
	Bottom Ash Pond	18/18	--	0%	1.66	19.5	10.4	5.22	11.2	18.9
	Dry Fly Ash Stack	53/53	--	0%	4.66	18.0	9.60	3.02	9.99	13.3
	Highway 70 Borrow Area	4/4	--	0%	8.19	9.90	9.27	0.785	9.50	9.89
Fluoride	Ash Disposal Area J	19/22	(0.877 - 0.934)	13.6%	2.57	14.4	4.85	2.89	4.89	8.56
	Bottom Ash Pond	14/18	(0.747 - 0.971)	22.2%	0.891	9.79	3.42	2.85	2.86	9.73
	Dry Fly Ash Stack	49/53	(0.752 - 0.840)	7.55%	0.891	12.2	5.42	3.33	5.18	11.7
	Highway 70 Borrow Area	4/4	--	0%	2.68	2.92	2.79	0.126	2.78	2.91
Lead	Ash Disposal Area J	22/22	--	0%	18.0	48.9	32.5	9.09	33.1	46.5
	Bottom Ash Pond	18/18	--	0%	1.51	35.9	16.1	9.48	15.6	30.9
	Dry Fly Ash Stack	53/53	--	0%	4.30	50.9	16.3	8.36	14.8	28.6
	Highway 70 Borrow Area	4/4	--	0%	17.0	21.3	19.8	2.04	20.4	21.3

Summary Statistics - CCR Material Characteristics Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	CCR Management Unit	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Lithium	Ash Disposal Area J	22/22	--	0%	7.70	59.1	34.5	13.1	35.1	53.7
	Bottom Ash Pond	18/18	--	0%	2.54	43.0	17.7	10.3	19.6	29.2
	Dry Fly Ash Stack	53/53	--	0%	9.95	47.8	22.2	8.96	19.6	43.9
	Highway 70 Borrow Area	4/4	--	0%	24.4	30.5	28.0	2.66	28.6	30.3
Mercury	Ash Disposal Area J	22/22	--	0%	0.0569	0.298	0.132	0.0649	0.107	0.263
	Bottom Ash Pond	16/18	(0.0160 - 0.0587)	11.1%	0.0237	0.406	0.0998	0.0851	0.102	0.177
	Dry Fly Ash Stack	53/53	--	0%	0.0213	0.285	0.102	0.0619	0.103	0.208
	Highway 70 Borrow Area	4/4	--	0%	0.0543	0.0825	0.0700	0.0131	0.0716	0.082
Molybdenum	Ash Disposal Area J	22/22	--	0%	2.26	10.6	4.64	2.00	4.23	8.17
	Bottom Ash Pond	18/18	--	0%	1.47	6.16	3.40	1.48	3.25	5.45
	Dry Fly Ash Stack	53/53	--	0%	0.554	13.5	4.02	2.83	3.15	10.2
	Highway 70 Borrow Area	4/4	--	0%	3.41	4.44	3.84	0.444	3.76	4.36
Radium-226+228	Ash Disposal Area J	22/22	--	0%	3.17	11.2	8.22	2.26	9.09	10.8
	Bottom Ash Pond	18/18	--	0%	4.34	9.49	7.18	1.44	7.25	9.23
	Dry Fly Ash Stack	53/53	--	0%	2.52	10.5	6.63	1.54	6.70	8.60
	Highway 70 Borrow Area	4/4	--	0%	9.68	11.6	10.8	0.861	10.9	11.6
Selenium	Ash Disposal Area J	22/22	--	0%	0.442	11.1	5.64	3.02	6.37	9.68
	Bottom Ash Pond	18/18	--	0%	1.22	8.41	4.98	2.32	5.03	7.90
	Dry Fly Ash Stack	53/53	--	0%	1.96	16.5	6.72	3.49	5.74	13.4
	Highway 70 Borrow Area	4/4	--	0%	2.01	5.96	3.42	1.78	2.86	5.56
Thallium	Ash Disposal Area J	22/22	--	0%	0.289	4.73	2.81	1.38	2.95	4.38
	Bottom Ash Pond	18/18	--	0%	0.198	5.16	1.76	1.31	1.51	4.00
	Dry Fly Ash Stack	53/53	--	0%	0.174	5.33	1.28	1.04	0.887	2.97
	Highway 70 Borrow Area	4/4	--	0%	1.40	1.74	1.60	0.143	1.62	1.73
TDEC Appendix I Parameters										
Copper	Ash Disposal Area J	22/22	--	0%	25.6	91.2	61.0	20.2	64.3	87.5
	Bottom Ash Pond	18/18	--	0%	6.91	87.1	42.2	22.5	44.9	73.3
	Dry Fly Ash Stack	53/53	--	0%	7.72	71.7	35.8	13.6	34.9	59.5
	Highway 70 Borrow Area	4/4	--	0%	41.1	54.9	47.6	5.76	47.1	53.9
Nickel	Ash Disposal Area J	22/22	--	0%	12.1	40.1	29.0	7.83	30.8	39.4
	Bottom Ash Pond	18/18	--	0%	4.86	35.4	20.5	9.07	21.5	32.6
	Dry Fly Ash Stack	53/53	--	0%	9.42	48.7	20.8	8.00	20.7	33.1
	Highway 70 Borrow Area	4/4	--	0%	21.0	25.8	23.7	2.01	24.0	25.6
Silver	Ash Disposal Area J	17/22	(0.0350 - 0.0385)	22.7%	0.0773	0.234	0.123	0.0626	0.136	0.230
	Bottom Ash Pond	12/18	(0.0304 - 0.0340)	33.3%	0.0354	0.171	0.0655	0.0391	0.0507	0.131
	Dry Fly Ash Stack	44/53	(0.0303 - 0.0379)	17.0%	0.0326	0.767	0.0930	0.130	0.0555	0.241
	Highway 70 Borrow Area	4/4	--	0%	0.0676	0.0965	0.0806	0.0119	0.0792	0.094

Summary Statistics - CCR Material Characteristics Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	CCR Management Unit	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Vanadium	Ash Disposal Area J	22/22	--	0%	41.3	118	81.7	21.6	85.6	110
	Bottom Ash Pond	18/18	--	0%	8.31	83.2	42.3	23.6	40.3	74.7
	Dry Fly Ash Stack	53/53	--	0%	19.0	105	47.8	18.4	47.6	72.9
	Highway 70 Borrow Area	4/4	--	0%	56.4	67.8	63.3	5.11	64.4	67.6
Zinc	Ash Disposal Area J	22/22	--	0%	28.8	87.6	60.1	15.5	57.9	85.3
	Bottom Ash Pond	18/18	--	0%	5.20	71.9	37.0	20.4	38.7	67.8
	Dry Fly Ash Stack	53/53	--	0%	11.4	115	34.3	18.8	30.8	62.2
	Highway 70 Borrow Area	4/4	--	0%	33.4	55.9	49.5	10.8	54.3	55.7
Additional Parameters										
Iron	Ash Disposal Area J	22/22	--	0%	14,600	41,000	20,600	6,060	19,200	32,000
	Bottom Ash Pond	18/18	--	0%	9,430	30,700	18,000	5,620	17,300	30,000
	Dry Fly Ash Stack	53/53	--	0%	8,540	33,200	19,100	6,280	20,200	28,500
	Highway 70 Borrow Area	4/4	--	0%	16,600	21,500	19,000	2,150	19,000	21,300
Manganese	Ash Disposal Area J	22/22	--	0%	65.6	455	116	89.6	84.8	262
	Bottom Ash Pond	18/18	--	0%	30.3	361	97.2	80.3	75.8	236
	Dry Fly Ash Stack	53/53	--	0%	37.9	384	113	65.4	90.4	238
	Highway 70 Borrow Area	4/4	--	0%	59.6	89.0	72.8	12.4	71.4	86.8
TOC	Ash Disposal Area J	22/22	--	0%	1,870	53,300	22,300	14,100	21,000	45,500
	Bottom Ash Pond	18/18	--	0%	15,000	104,000	37,200	21,900	27,500	66,000
	Dry Fly Ash Stack	53/53	--	0%	1,200	124,000	33,600	24,100	24,000	72,900
	Highway 70 Borrow Area	4/4	--	0%	24,400	35,000	30,100	4,700	30,400	34,600

Notes:

CCR Rule - Title 40, Code of Federal Regulations, Part 257

TDEC - Tennessee Department of Environment and Conservation

TOC - Total Organic Carbon

"--" : Not Applicable

% - percent

Except for pH & Radium 226 + 228, all units in milligrams per kilogram (mg/kg)

Units for pH are Standard Units (S.U.)

Units for Radium 226+228 are picocuries per gram (pCi/g)

Non-detects are reported at the laboratory detection limit

For Parameters with non-detects reported at the method detection limit, the mean and standard deviation were calculated using Kaplan-Meier methods (KM)

Summary Statistics - CCR Material Characteristics - Synthetic Precipitate Leaching Procedure (SPLP) John Sevier Fossil Plant - Rogersville, Tennessee										
Parameter	CCR Management Unit	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
CCR Rule Appendix III Parameters										
Boron	Ash Disposal Area J	11/22	(38.5 - 177)	50.0%	86.4	785	225	228	162	585
	Bottom Ash Pond	18/18	--	0%	50.0	369	120	80.7	90.7	246
	Dry Fly Ash Stack	53/53	--	0%	66.3	1880	457	379	335	1280
	Highway 70 Borrow Area	4/4	--	0%	47.5	211	108	74.7	86.9	197
Calcium	Ash Disposal Area J	22/22	--	0%	289	20,100	8,810	5,130	8,580	16,300
	Bottom Ash Pond	18/18	--	0%	4,030	74,300	20,000	18,100	15,400	58,300
	Dry Fly Ash Stack	53/53	--	0%	5,360	205,000	34,500	34,900	25,800	73,500
	Highway 70 Borrow Area	4/4	--	0%	2,270	11,200	6,560	3,870	6,390	10,700
CCR Rule Appendix IV Parameters										
Antimony	Ash Disposal Area J	20/22	(0.378 - 0.378)	9.09%	1.27	26.6	5.49	5.57	3.52	12.3
	Bottom Ash Pond	15/18	(0.378 - 0.378)	16.7%	0.383	15.8	4.27	4.07	3.46	10.5
	Dry Fly Ash Stack	50/53	(0.378 - 0.378)	5.66%	0.533	19.3	4.84	4.67	3.21	16.5
	Highway 70 Borrow Area	4/4	--	0%	1.10	1.53	1.39	0.198	1.47	1.53
Arsenic	Ash Disposal Area J	21/22	(0.323 - 0.323)	4.55%	4.44	697	290	176	274	575
	Bottom Ash Pond	18/18	--	0%	0.760	398	97.3	126	22.0	339
	Dry Fly Ash Stack	53/53	--	0%	1.27	286	66.0	61.7	53.8	181
	Highway 70 Borrow Area	4/4	--	0%	18.5	73.4	50.6	23.2	55.3	71.2
Barium	Ash Disposal Area J	20/22	(1.49 - 1.49)	9.09%	2.97	582	71.8	120	37.9	141
	Bottom Ash Pond	18/18	--	0%	10.2	437	117	123	65.5	369
	Dry Fly Ash Stack	53/53	--	0%	6.36	272	92.7	68.3	82.2	199
	Highway 70 Borrow Area	4/4	--	0%	6.98	79.2	38.3	34	33.5	75.3
Beryllium	Ash Disposal Area J	6/22	(0.155 - 0.155)	72.7%	0.232	5.02	0.540	1.05	0.155	1.46
	Bottom Ash Pond	3/18	(0.155 - 0.155)	83.3%	0.808	5.66	0.658	1.39	0.155	3.44
	Dry Fly Ash Stack	4/53	(0.155 - 0.155)	92.5%	0.233	0.322	0.164	0.0329	0.155	0.249
	Highway 70 Borrow Area	0/4	(0.155 - 0.155)	100%	--	--	--	--	0.155	0.155
Cadmium	Ash Disposal Area J	4/22	(0.125 - 0.125)	81.8%	0.552	0.969	0.236	0.245	0.125	0.787
	Bottom Ash Pond	4/18	(0.125 - 0.125)	77.8%	0.249	4.86	0.652	1.25	0.125	2.90
	Dry Fly Ash Stack	3/53	(0.125 - 0.125)	94.3%	0.135	0.296	0.129	0.0237	0.125	0.129
	Highway 70 Borrow Area	0/4	(0.125 - 0.125)	100%	--	--	--	--	0.125	0.125
Chromium	Ash Disposal Area J	21/22	(1.53 - 1.53)	4.55%	1.58	40.0	7.97	10.5	2.73	28.3
	Bottom Ash Pond	18/18	--	0%	1.73	6.17	3.27	1.43	2.73	5.79
	Dry Fly Ash Stack	52/53	(1.53 - 1.53)	1.89%	1.70	13.3	3.87	2.06	3.38	7.67
	Highway 70 Borrow Area	4/4	--	0%	1.80	3.98	2.74	1.04	2.59	3.87
Cobalt	Ash Disposal Area J	14/22	(0.0750 - 0.0750)	36.4%	0.0880	15.5	1.78	3.68	0.118	7.51
	Bottom Ash Pond	15/18	(0.0750 - 0.0750)	16.7%	0.0750	63.5	6.99	16.0	0.172	35.4
	Dry Fly Ash Stack	40/53	(0.0750 - 0.0750)	24.5%	0.0780	1.76	0.251	0.296	0.113	0.821
	Highway 70 Borrow Area	2/4	(0.0750 - 0.0750)	50.0%	0.152	0.916	0.305	0.354	0.114	0.801

Summary Statistics - CCR Material Characteristics - Synthetic Precipitate Leaching Procedure (SPLP)
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	CCR Management Unit	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Lead	Ash Disposal Area J	10/22	(0.128 - 0.128)	54.6%	0.229	43.6	3.77	9.60	0.128	15.0
	Bottom Ash Pond	9/18	(0.128 - 0.128)	50.0%	0.17	1.34	0.366	0.378	0.149	1.08
	Dry Fly Ash Stack	27/53	(0.128 - 0.128)	49.1%	0.131	4.63	0.444	0.710	0.131	1.49
	Highway 70 Borrow Area	2/4	(0.128 - 0.128)	50.0%	0.206	0.312	0.194	0.0755	0.167	0.296
Lithium	Ash Disposal Area J	14/22	(3.14 - 3.14)	36.4%	3.44	93.0	12.4	20.5	4.33	48.5
	Bottom Ash Pond	12/18	(3.14 - 3.14)	33.3%	3.69	37.0	8.97	9.71	4.21	28.6
	Dry Fly Ash Stack	43/53	(3.14 - 15.7)	18.9%	3.49	145	20.7	25.2	12.0	56.9
	Highway 70 Borrow Area	4/4	--	0%	4.57	6.07	5.38	0.730	5.44	6.05
Mercury	Ash Disposal Area J	0/22	(0.101 - 0.101)	100%	--	--	--	--	0.101	0.101
	Bottom Ash Pond	0/18	(0.101 - 0.101)	100%	--	--	--	--	0.101	0.101
	Dry Fly Ash Stack	3/53	(0.101 - 0.101)	94.3%	0.101	0.167	0.103	0.0116	0.101	0.101
	Highway 70 Borrow Area	0/4	(0.101 - 0.101)	100%	--	--	--	--	0.101	0.101
Molybdenum	Ash Disposal Area J	20/22	(0.610 - 0.610)	9.09%	4.11	226	28.2	46.7	16.4	78.2
	Bottom Ash Pond	13/18	(0.610 - 3.06)	27.8%	1.44	186	36.0	45.0	28.5	109
	Dry Fly Ash Stack	49/53	(0.956 - 11.1)	7.55%	10.3	637	69.0	93.9	38.0	181
	Highway 70 Borrow Area	1/4	(8.25 - 10.3)	75.0%	10.8	10.8	8.89	1.10	9.94	10.7
Radium-226+228	Ash Disposal Area J	2/22	(0.00322 - 0.569)	90.9%	0.278	0.409	0.0399	0.107	0.192	0.500
	Bottom Ash Pond	11/18	(0.0431 - 0.241)	38.9%	0.211	0.627	0.296	0.2210	0.321	0.621
	Dry Fly Ash Stack	17/53	(0.30 - 0.593)	67.9%	0.126	0.732	0.122	0.187	0.176	0.691
	Highway 70 Borrow Area	1/4	(0.0291 - 0.341)	75.0%	0.594	0.594	0.17	0.245	0.186	0.586
Selenium	Ash Disposal Area J	19/22	(2.62 - 2.62)	13.6%	3.50	34.7	14.9	9.31	15.3	31.3
	Bottom Ash Pond	10/18	(2.62 - 2.62)	44.4%	2.99	43.7	11.9	12.2	4.27	36.5
	Dry Fly Ash Stack	46/53	(2.62 - 2.62)	13.2%	2.79	144	24.9	31.0	12.6	82.8
	Highway 70 Borrow Area	2/4	(2.62 - 2.62)	50.0%	6.10	18.7	7.51	6.62	4.36	16.8
Thallium	Ash Disposal Area J	7/22	(0.128 - 0.128)	68.2%	0.165	21.5	1.24	4.43	0.128	1.10
	Bottom Ash Pond	5/18	(0.128 - 0.128)	72.2%	0.129	1.96	0.307	0.493	0.128	1.48
	Dry Fly Ash Stack	20/53	(0.128 - 0.128)	62.3%	0.134	1.79	0.237	0.295	0.128	0.651
	Highway 70 Borrow Area	0/4	(0.128 - 0.128)	100.0%	--	--	--	--	0.128	0.128
TDEC Appendix I Parameters										
Copper	Ash Disposal Area J	16/22	(0.627 - 0.627)	27.3%	0.700	66.6	8.26	15.5	0.991	31.5
	Bottom Ash Pond	14/18	(0.627 - 0.627)	22.2%	0.668	1390	91.3	318	1.71	374
	Dry Fly Ash Stack	28/53	(0.627 - 2.77)	47.2%	0.646	28.5	3.11	4.73	1.35	10.7
	Highway 70 Borrow Area	2/4	(0.627 - 0.627)	50.0%	1.45	7.42	2.53	2.84	1.04	6.53
Nickel	Ash Disposal Area J	7/22	(0.312 - 1.07)	68.2%	0.410	31.1	4.28	7.99	0.369	19.8
	Bottom Ash Pond	13/18	(0.312 - 0.312)	27.8%	0.379	91.9	12.8	25.4	0.713	64.6
	Dry Fly Ash Stack	33/53	(0.312 - 0.312)	37.7%	0.332	4.09	0.831	0.773	0.491	2.11
	Highway 70 Borrow Area	2/4	(0.312 - 0.312)	50.0%	0.749	1.32	0.673	0.414	0.531	1.23
Silver	Ash Disposal Area J	6/22	(0.121 - 0.121)	72.7%	0.130	0.959	0.186	0.186	0.121	0.460
	Bottom Ash Pond	0/18	(0.121 - 0.121)	100%	--	--	--	--	0.121	0.121
	Dry Fly Ash Stack	8/53	(0.121 - 0.121)	84.9%	0.146	0.97	0.156	0.136	0.121	0.233
	Highway 70 Borrow Area	0/4	(0.121 - 0.121)	100%	--	--	--	--	0.121	0.121
Vanadium	Ash Disposal Area J	22/22	--	0%	1.07	249	93.3	62.0	78.5	181
	Bottom Ash Pond	18/18	--	0%	1.20	169	37.9	47.7	17.9	112
	Dry Fly Ash Stack	53/53	--	0%	1.87	168	51.0	45.0	36.7	148
	Highway 70 Borrow Area	4/4	--	0%	15.5	37.8	26.0	9.22	25.4	36.2

Summary Statistics - CCR Material Characteristics - Synthetic Precipitate Leaching Procedure (SPLP)
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	CCR Management Unit	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Zinc	Ash Disposal Area J	10/22	(3.22 - 3.22)	54.6%	3.42	88	13.4	21.0	3.22	53.2
	Bottom Ash Pond	9/18	(3.22 - 3.22)	50.0%	3.58	250	32.8	59.3	3.40	117
	Dry Fly Ash Stack	23/53	(3.22 - 3.22)	56.6%	3.28	35.1	5.23	4.78	3.22	11.1
	Highway 70 Borrow Area	1/4	(3.22 - 3.22)	75.0%	5.84	5.84	3.88	1.13	3.22	5.45
Additional Parameters										
Iron	Ash Disposal Area J	18/22	(14.1 - 14.1)	18.2%	17.2	12,800	1,530	3,650	61.3	12,300
	Bottom Ash Pond	12/18	(14.1 - 95.1)	33.3%	15.5	4,970	520	1,120	64.2	1,600
	Dry Fly Ash Stack	38/53	(14.1 - 14.1)	28.3%	14.4	5,870	446	971	83.7	2,070
	Highway 70 Borrow Area	2/4	(14.1 - 14.1)	50.0%	177	212	104	91.0	95.6	207
Manganese	Ash Disposal Area J	16/22	(1.35 - 1.35)	27.3%	1.74	85.6	11.7	21.1	2.64	54.9
	Bottom Ash Pond	15/18	(1.35 - 1.35)	16.7%	2.03	802	92.4	196	6.67	432
	Dry Fly Ash Stack	41/53	(1.35 - 1.35)	22.6%	1.36	38.6	8.06	9.44	4.32	29.9
	Highway 70 Borrow Area	2/4	(1.35 - 1.35)	50.0%	1.72	72.3	19.2	30.7	1.54	61.7

Notes:
CCR Rule - Title 40, Code of Federal Regulations, Part 257
TDEC - Tennessee Department of Environment and Conservation
% - percent
"--" - Not Applicable

Except for pH & Radium 226 + 228, all units in micrograms per liter (µg/L)
Units for pH are Standard Units (S.U.)
Units for Radium 226+228 are picocuries per liter (pCi/L)
Non-detects are reported at the laboratory detection limit
For Parameters with non-detects reported at the method detection limit, the mean and standard deviation were calculated using Kaplan-Meier methods (KM).

Summary Statistics - CCR Material Characteristics - Pore Water - Total Metals John Sevier Fossil Plant - Rogersville, Tennessee										
Parameter	CCR Management Unit	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
CCR Rule Appendix III Parameters										
Boron	Ash Disposal Area J	3/3	--	0%	3,390	4,880	4,370	852	4,850	4,880
	Bottom Ash Pond	2/2	--	0%	1,250	8,330	4,790	5,010	4,790	7,980
	Dry Fly Ash Stack	1/1	--	0%	7,330	7,330	--	--	7,330	7,330
	Highway 70 Borrow Area	1/1	--	0%	2,950	2,950	--	--	2,950	2,950
Calcium	Ash Disposal Area J	3/3	--	0%	72,500	199,000	121,000	68,500	90,400	188,000
	Bottom Ash Pond	2/2	--	0%	191,000	427,000	309,000	167,000	309,000	415,000
	Dry Fly Ash Stack	1/1	--	0%	541,000	541,000	--	--	541,000	541,000
	Highway 70 Borrow Area	1/1	--	0%	219,000	219,000	--	--	219,000	219,000
Chloride	Ash Disposal Area J	3/3	--	0%	8,070	27,600	19,000	9,980	21,400	27,000
	Bottom Ash Pond	2/2	--	0%	3,370	18,900	11,100	11,000	11,100	18,100
	Dry Fly Ash Stack	1/1	--	0%	39,500	39,500	--	--	39,500	39,500
	Highway 70 Borrow Area	1/1	--	0%	620	620	--	--	620	620
Fluoride	Ash Disposal Area J	3/3	--	0%	785	2,420	1,480	847	1,220	2,300
	Bottom Ash Pond	2/2	--	0%	199	4,370	2,290	2,950	2,290	4,160
	Dry Fly Ash Stack	1/1	--	0%	215	215	--	--	215	215
	Highway 70 Borrow Area	1/1	--	0%	99.3	99.3	--	--	99.3	99.3
pH (field)	Ash Disposal Area J	3/3	--	0%	7.94	8.06	8.02	0.0666	8.05	8.06
	Bottom Ash Pond	2/2	--	0%	4.83	7.44	6.14	1.85	6.14	7.31
	Dry Fly Ash Stack	1/1	--	0%	8.01	8.01	--	--	8.01	8.01
	Highway 70 Borrow Area	1/1	--	0%	6.82	6.82	--	--	6.82	6.82
Sulfate	Ash Disposal Area J	3/3	--	0%	87,800	294,000	161,000	115,000	102,000	275,000
	Bottom Ash Pond	2/2	--	0%	318,000	3,180,000	1,750,000	2,020,000	1,750,000	3,040,000
	Dry Fly Ash Stack	1/1	--	0%	2,140,000	2,140,000	--	--	2,140,000	2,140,000
	Highway 70 Borrow Area	1/1	--	0%	233,000	233,000	--	--	233,000	233,000
CCR Rule Appendix IV Parameters										
Antimony	Ash Disposal Area J	3/3	--	0%	0.391	4.71	1.93	2.41	0.692	4.310
	Bottom Ash Pond	2/2	--	0%	0.383	2.28	1.33	1.34	1.33	2.19
	Dry Fly Ash Stack	1/1	--	0%	26.3	26.3	--	--	26.3	26.3
	Highway 70 Borrow Area	1/1	--	0%	6.25	6.25	--	--	6.25	6.25
Arsenic	Ash Disposal Area J	3/3	--	0%	599	1800	1090	630	872	1710
	Bottom Ash Pond	2/2	--	0%	330	1700	1020	969	1020	1630
	Dry Fly Ash Stack	1/1	--	0%	446	446	--	--	446	446
	Highway 70 Borrow Area	1/1	--	0%	25.9	25.9	--	--	25.9	25.9
Barium	Ash Disposal Area J	3/3	--	0%	202	369	295	85.2	315	364
	Bottom Ash Pond	2/2	--	0%	31.6	314	173	200	173	300
	Dry Fly Ash Stack	1/1	--	0%	171	171	--	--	171	171
	Highway 70 Borrow Area	1/1	--	0%	196	196	--	--	196	196

Summary Statistics - CCR Material Characteristics - Pore Water - Total Metals
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	CCR Management Unit	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Beryllium	Ash Disposal Area J	2/3	(0.182 - 0.182)	33.3%	0.285	0.312	0.260	0.0560	0.285	0.309
	Bottom Ash Pond	2/2	--	0%	0.225	3.02	1.62	1.98	1.62	2.88
	Dry Fly Ash Stack	1/1	--	0%	1.09	1.09	--	--	1.09	1.09
	Highway 70 Borrow Area	0/1	(0.182 - 0.182)	100%	--	--	--	--	0.182	0.182
Cadmium	Ash Disposal Area J	0/3	(0.217 - 0.217)	100%	--	--	--	--	0.217	0.217
	Bottom Ash Pond	2/2	--	0%	0.260	1.19	0.725	0.658	0.725	1.14
	Dry Fly Ash Stack	1/1	--	0%	2.58	2.58	--	--	2.58	2.58
	Highway 70 Borrow Area	1/1	--	0%	0.512	0.512	--	--	0.512	0.512
Chromium	Ash Disposal Area J	1/3	(1.53 - 7.65)	66.7%	2.83	2.83	2.18	0.650	2.83	7.17
	Bottom Ash Pond	1/2	(1.53 - 1.53)	50.0%	2.38	2.38	1.96	0.425	1.96	2.34
	Dry Fly Ash Stack	1/1	--	0%	51.9	51.9	--	--	51.9	51.9
	Highway 70 Borrow Area	0/1	(7.65 - 7.65)	100%	--	--	--	--	7.65	7.65
Cobalt	Ash Disposal Area J	3/3	--	0%	0.454	0.822	0.623	0.186	0.593	0.8
	Bottom Ash Pond	2/2	--	0%	1.03	248	125	175	125	236
	Dry Fly Ash Stack	1/1	--	0%	4.30	4.30	--	--	4.30	4.30
	Highway 70 Borrow Area	1/1	--	0%	1.92	1.92	--	--	1.92	1.92
Fluoride	Ash Disposal Area J	3/3	--	0%	785	2,420	1,480	847	1,220	2,300
	Bottom Ash Pond	2/2	--	0%	199	4,370	2,290	2,950	2,290	4,160
	Dry Fly Ash Stack	1/1	--	0%	215	215	--	--	215	215
	Highway 70 Borrow Area	1/1	--	0%	99.3	99.3	--	--	99.3	99.3
Lead	Ash Disposal Area J	2/3	(0.826 - 0.826)	33.3%	1.44	1.79	1.35	0.398	1.44	1.76
	Bottom Ash Pond	2/2	--	0%	0.760	1.35	1.06	0.417	1.06	1.32
	Dry Fly Ash Stack	1/1	--	0%	6.82	6.82	--	--	6.82	6.82
	Highway 70 Borrow Area	0/1	(0.666 - 0.666)	100%	--	--	--	--	0.666	0.666
Lithium	Ash Disposal Area J	2/3	(14.5 - 14.5)	33.3%	97.4	341	151	139	97.4	317
	Bottom Ash Pond	2/2	--	0%	46.5	543	295	351	295	518
	Dry Fly Ash Stack	1/1	--	0%	9780	9780	--	--	9780	9780
	Highway 70 Borrow Area	1/1	--	0%	321	321	--	--	321	321
Mercury	Ash Disposal Area J	0/3	(0.101 - 0.101)	100%	--	--	--	--	0.101	0.101
	Bottom Ash Pond	0/2	(0.101 - 0.101)	100%	--	--	--	--	0.101	0.101
	Dry Fly Ash Stack	0/1	(0.101 - 0.101)	100%	--	--	--	--	0.101	0.101
	Highway 70 Borrow Area	0/1	(0.101 - 0.101)	100%	--	--	--	--	0.101	0.101
Molybdenum	Ash Disposal Area J	3/3	--	0%	207	738	535	287	661	730
	Bottom Ash Pond	2/2	--	0%	4.58	4,050	2,030	2,860	2,030	3,850
	Dry Fly Ash Stack	1/1	--	0%	23,600	23,600	--	--	23,600	23,600
	Highway 70 Borrow Area	1/1	--	0%	181	181	--	--	181	181
Radium-226+228	Ash Disposal Area J	3/3	--	0%	0.415	1.25	0.753	0.439	0.595	1.19
	Bottom Ash Pond	2/2	--	0%	0.520	0.940	0.730	0.297	0.730	0.919
	Dry Fly Ash Stack	0/1	(0.676 - 0.676)	100%	--	--	--	--	0.353	0.353
	Highway 70 Borrow Area	1/1	--	0%	0.544	0.544	--	--	0.544	0.544

Summary Statistics - CCR Material Characteristics - Pore Water - Total Metals
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	CCR Management Unit	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Selenium	Ash Disposal Area J	0/3	(1.51 - 1.51)	100%	--	--	--	--	1.51	1.51
	Bottom Ash Pond	2/2	--	0%	1.63	5.30	3.47	2.60	3.47	5.12
	Dry Fly Ash Stack	1/1	--	0%	474	474	--	--	474	474
	Highway 70 Borrow Area	1/1	--	0%	31.1	31.1	--	--	31.1	31.1
Thallium	Ash Disposal Area J	0/3	(0.162 - 0.802)	100%	--	--	--	--	0.248	0.747
	Bottom Ash Pond	1/2	(0.148 - 0.148)	50.0%	3.51	3.51	1.83	1.68	1.83	3.34
	Dry Fly Ash Stack	0/1	(0.734 - 0.734)	100%	--	--	--	--	0.734	0.734
	Highway 70 Borrow Area	1/1	--	0%	2.92	2.92	--	--	2.92	2.92
TDEC Appendix I Parameters										
Copper	Ash Disposal Area J	3/3	--	0%	1.33	3.16	2.21	0.917	2.14	3.06
	Bottom Ash Pond	2/2	--	0%	1.46	27.4	14.4	18.3	14.4	26.1
	Dry Fly Ash Stack	1/1	--	0%	14.1	14.1	--	--	14.1	14.1
	Highway 70 Borrow Area	1/1	--	0%	1.45	1.45	--	--	1.45	1.45
Nickel	Ash Disposal Area J	3/3	--	0%	0.816	2.44	1.67	0.815	1.74	2.37
	Bottom Ash Pond	2/2	--	0%	5.92	304	155	211	155	289
	Dry Fly Ash Stack	1/1	--	0%	6.78	6.78	--	--	6.78	6.78
	Highway 70 Borrow Area	1/1	--	0%	8.32	8.32	--	--	8.32	8.32
Silver	Ash Disposal Area J	0/3	(0.177 - 0.177)	100%	--	--	--	--	0.177	0.177
	Bottom Ash Pond	0/2	(0.177 - 0.177)	100%	--	--	--	--	0.177	0.177
	Dry Fly Ash Stack	0/1	(0.177 - 0.177)	100%	--	--	--	--	0.177	0.177
	Highway 70 Borrow Area	0/1	(0.177 - 0.177)	100%	--	--	--	--	0.177	0.177
Vanadium	Ash Disposal Area J	3/3	--	0%	7.29	15.9	12.2	4.43	13.4	15.7
	Bottom Ash Pond	2/2	--	0%	2.65	9.33	5.99	4.72	5.99	9.00
	Dry Fly Ash Stack	1/1	--	0%	744	744	--	--	744	744
	Highway 70 Borrow Area	1/1	--	0%	57.6	57.6	--	--	57.6	57.6
Zinc	Ash Disposal Area J	2/3	(3.22 - 3.22)	33.3%	3.92	7.74	4.96	1.99	3.92	7.36
	Bottom Ash Pond	2/2	--	0%	3.48	91.4	47.4	62.2	47.4	87.0
	Dry Fly Ash Stack	1/1	--	0%	15.9	15.9	--	--	15.9	15.9
	Highway 70 Borrow Area	1/1	--	0%	5.29	5.29	--	--	5.29	5.29

Summary Statistics - CCR Material Characteristics - Pore Water - Total Metals
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	CCR Management Unit	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Additional Water Quality Parameters										
Iron	Ash Disposal Area J	3/3	--	0%	492	1390	948	449	961	1350
	Bottom Ash Pond	2/2	--	0%	1,070	1,960,000	981,000	1,390,000	981,000	1,860,000
	Dry Fly Ash Stack	1/1	--	0%	3,190	3,190	--	--	3,190	3,190
	Highway 70 Borrow Area	1/1	--	0%	707	707	--	--	707	707
Manganese	Ash Disposal Area J	3/3	--	0%	111	382	253	136	267	371
	Bottom Ash Pond	2/2	--	0%	502	9530	5020	6380	5020	9080
	Dry Fly Ash Stack	1/1	--	0%	31.0	31.0	--	--	31.0	31.0
	Highway 70 Borrow Area	1/1	--	0%	590	590	--	--	590	590
TDS	Ash Disposal Area J	3/3	--	0%	566,000	1,080,000	788,000	264,000	718,000	1,040,000
	Bottom Ash Pond	2/2	--	0%	849,000	5,090,000	2,970,000	3,000,000	2,970,000	4,880,000
	Dry Fly Ash Stack	1/1	--	0%	3,850,000	3,850,000	--	--	3,850,000	3,850,000
	Highway 70 Borrow Area	1/1	--	0%	1,060,000	1,060,000	--	--	1,060,000	1,060,000
TOC	Ash Disposal Area J	3/3	--	0%	3,610	5,750	4,720	1,070	4,810	5,660
	Bottom Ash Pond	2/2	--	0%	991	3,570	2,280	1,820	2,280	3,440
	Dry Fly Ash Stack	1/1	--	0%	1,350	1,350	--	--	1,350	1,350
	Highway 70 Borrow Area	1/1	--	0%	1,120	1,120	--	--	1,120	1,120

Notes:
CCR Rule - Title 40, Code of Federal Regulations, Part 257
TDEC - Tennessee Department of Environment and Conservation
TDS - Total Dissolved Solids
TOC -Total Organic Carbon
% - percent
"--": Not Applicable

Except for pH, all units in micrograms per liter (µg/L)
Units for pH are Standard Units (S.U.)
Units for Radium 226+228 are picocuries per liter (pCi/L)
Non-detects are reported at the laboratory detection limit
For Parameters with non-detects reported at the method detection limit, the mean and standard deviation were calculated using Kaplan-Meier methods (KM).

Summary Statistics - CCR Material Characteristics - Pore Water - Dissolved Metals
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	CCR Management Unit	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects							
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	25th Percentile	50th Percentile	75th Percentile	95th Percentile	Number of Statistical Outliers	Number of Outliers Removed
CCR Rule Appendix III Parameters														
Boron	Ash Disposal Area J	3/3	--	0%	3,460	5,000	4,470	878	4,210	4,960	4,980	5,000	0	0
	Bottom Ash Pond	2/2	--	0%	1,110	7,690	4,400	4,650	2,760	4,400	6,050	7,360		
	Dry Fly Ash Stack	1/1	--	0%	7,240	7,240	--	--	7,240	7,240	7,240	7,240		
	Highway 70 Borrow Area	1/1	--	0%	2,860	2,860	--	--	2,860	2,860	2,860	2,860		
Calcium	Ash Disposal Area J	3/3	--	0%	78,400	196,000	122,000	64,800	84,300	90,100	143,000	185,000	0	0
	Bottom Ash Pond	2/2	--	0%	135,000	388,000	262,000	179,000	198,000	262,000	325,000	375,000		
	Dry Fly Ash Stack	1/1	--	0%	492,000	492,000	--	--	492,000	492,000	492,000	492,000		
	Highway 70 Borrow Area	1/1	--	0%	226,000	226,000	--	--	226,000	226,000	226,000	226,000		
CCR Rule Appendix IV Parameters														
Antimony	Ash Disposal Area J	2/3	(0.378 - 0.378)	33.3%	0.432	4.87	1.89	2.11	0.405	0.432	2.65	4.43	0	0
	Bottom Ash Pond	1/2	(0.378 - 0.378)	50.0%	1.94	1.94	1.16	0.781	0.769	1.16	1.55	1.86		
	Dry Fly Ash Stack	1/1	--	0%	2.31	2.31	--	--	2.31	2.31	2.31	2.31		
	Highway 70 Borrow Area	1/1	--	0%	6.10	6.10	--	--	6.10	6.10	6.10	6.10		
Arsenic	Ash Disposal Area J	3/3	--	0%	584	1780	1090	619	745	906	1340	1690	0	0
	Bottom Ash Pond	2/2	--	0%	331	1700	1020	968	673	1020	1360	1630		
	Dry Fly Ash Stack	1/1	--	0%	67.0	67.0	--	--	67.0	67.0	67.0	67.0		
	Highway 70 Borrow Area	1/1	--	0%	22.2	22.2	--	--	22.2	22.2	22.2	22.2		
Barium	Ash Disposal Area J	3/3	--	0%	179	362	283	94.2	244	309	336	357	0	0
	Bottom Ash Pond	2/2	--	0%	31.8	395	213	257	123	213	304	377		
	Dry Fly Ash Stack	1/1	--	0%	31.7	31.7	--	--	31.7	31.7	31.7	31.7		
	Highway 70 Borrow Area	1/1	--	0%	194	194	--	--	194	194	194	194		
Beryllium	Ash Disposal Area J	1/3	(0.182 - 0.182)	66.7%	0.267	0.267	0.210	0.0401	0.182	0.182	0.225	0.259	0	0
	Bottom Ash Pond	1/2	(0.182 - 0.182)	50.0%	2.60	2.60	1.39	1.21	0.787	1.39	2.00	2.48		
	Dry Fly Ash Stack	0/1	(0.182 - 0.182)	100%	--	--	--	--	0.182	0.182	0.182	0.182		
	Highway 70 Borrow Area	0/1	(0.182 - 0.182)	100%	--	--	--	--	0.182	0.182	0.182	0.182		
Cadmium	Ash Disposal Area J	0/3	(0.217 - 0.217)	100%	--	--	--	--	0.217	0.217	0.217	0.217	0	0
	Bottom Ash Pond	2/2	--	0%	0.342	1.33	0.836	0.699	0.589	0.836	1.08	1.28		
	Dry Fly Ash Stack	1/1	--	0%	2.57	2.57	--	--	2.57	2.57	2.57	2.57		
	Highway 70 Borrow Area	1/1	--	0%	0.449	0.449	--	--	0.449	0.449	0.449	0.449		
Chromium	Ash Disposal Area J	0/3	(1.53 - 7.65)	100%	--	--	--	--	1.53	1.53	4.59	7.04	0	0
	Bottom Ash Pond	1/2	(1.53 - 1.53)	50.0%	2.07	2.07	1.80	0.270	1.67	1.80	1.94	2.04		
	Dry Fly Ash Stack	1/1	--	0%	33.9	33.9	--	--	33.9	33.9	33.9	33.9		
	Highway 70 Borrow Area	0/1	(7.65 - 7.65)	100%	--	--	--	--	7.65	7.65	7.65	7.65		
Cobalt	Ash Disposal Area J	2/3	(0.134 - 0.134)	33.3%	0.273	0.373	0.260	0.0980	0.204	0.273	0.323	0.363	0	0
	Bottom Ash Pond	2/2	--	0%	0.559	245	123	173	61.7	123	184	233		
	Dry Fly Ash Stack	1/1	--	0%	0.249	0.249	--	--	0.249	0.249	0.249	0.249		
	Highway 70 Borrow Area	1/1	--	0%	1.83	1.83	--	--	1.83	1.83	1.83	1.83		
Lead	Ash Disposal Area J	0/3	(0.238 - 0.498)	100%	--	--	--	--	0.287	0.335	0.417	0.482	0	0
	Bottom Ash Pond	0/2	(0.163 - 1.24)	100%	--	--	--	--	0.432	0.702	0.971	1.19		
	Dry Fly Ash Stack	0/1	(0.128 - 0.128)	100%	--	--	--	--	0.128	0.128	0.128	0.128		
	Highway 70 Borrow Area	0/1	(0.331 - 0.331)	100%	--	--	--	--	0.331	0.331	0.331	0.331		

Summary Statistics - CCR Material Characteristics - Pore Water - Dissolved Metals
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	CCR Management Unit	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects							
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	25th Percentile	50th Percentile	75th Percentile	95th Percentile	Number of Statistical Outliers	Number of Outliers Removed
Lithium	Ash Disposal Area J	2/3	(12.8 - 12.8)	33.3%	95.4	354	154	145	54.1	95.4	225	328	0	0
	Bottom Ash Pond	2/2	--	0%	44.2	527	286	341	165	286	406	503		
	Dry Fly Ash Stack	1/1	--	0%	7120	7120	--	--	7120	7120	7120	7120		
	Highway 70 Borrow Area	1/1	--	0%	328	328	--	--	328	328	328	328		
Mercury	Ash Disposal Area J	0/3	(0.101 - 0.101)	100%	--	--	--	--	0.101	0.101	0.101	0.101	0	0
	Bottom Ash Pond	0/2	(0.101 - 0.101)	100%	--	--	--	--	0.101	0.101	0.101	0.101		
	Dry Fly Ash Stack	0/1	(0.101 - 0.101)	100%	--	--	--	--	0.101	0.101	0.101	0.101		
	Highway 70 Borrow Area	0/1	(0.101 - 0.101)	100%	--	--	--	--	0.101	0.101	0.101	0.101		
Molybdenum	Ash Disposal Area J	3/3	--	0%	217	733	522	271	417	616	675	721	0	0
	Bottom Ash Pond	2/2	--	0%	4.11	3,970	1,990	2,800	996	1,990	2,980	3,770		
	Dry Fly Ash Stack	1/1	--	0%	22,800	22,800	--	--	22,800	22,800	22,800	22,800		
	Highway 70 Borrow Area	1/1	--	0%	183.0	183	--	--	183	183	183	183		
Selenium	Ash Disposal Area J	0/3	(1.51 - 1.51)	100%	--	--	--	--	1.51	1.51	1.51	1.51	0	0
	Bottom Ash Pond	2/2	--	0%	1.57	4.20	2.89	1.86	2.23	2.89	3.54	4.07		
	Dry Fly Ash Stack	1/1	--	0%	439	439	--	--	439	439	439	439		
	Highway 70 Borrow Area	1/1	--	0%	28.0	28.0	--	--	28.0	28.0	28.0	28.0		
Thallium	Ash Disposal Area J	0/3	(0.148 - 0.448)	100%	--	--	--	--	0.234	0.319	0.384	0.435	0	0
	Bottom Ash Pond	1/2	(0.148 - 0.148)	50.0%	3.18	3.18	1.66	1.52	0.906	1.66	2.42	3.03		
	Dry Fly Ash Stack	0/1	(0.491 - 0.491)	100%	--	--	--	--	0.491	0.491	0.491	0.491		
	Highway 70 Borrow Area	1/1	--	0%	2.72	2.72	--	--	2.72	2.72	2.72	2.72		
TDEC Appendix I Parameters														
Copper	Ash Disposal Area J	0/3	(0.627 - 0.843)	100%	--	--	--	--	0.627	0.627	0.735	0.821	0	0
	Bottom Ash Pond	1/2	(0.627 - 0.627)	50.0%	24.8	24.8	12.7	12.1	6.67	12.7	18.8	23.60		
	Dry Fly Ash Stack	0/1	(0.691 - 0.691)	100%	--	--	--	--	0.691	0.691	0.691	0.691		
	Highway 70 Borrow Area	1/1	--	0%	0.808	0.808	--	--	0.808	0.808	0.808	0.808		
Nickel	Ash Disposal Area J	2/3	(0.336 - 0.336)	33.3%	0.485	1.72	0.847	0.62	0.411	0.485	1.10	1.60	0	0
	Bottom Ash Pond	2/2	--	0%	4.93	298	152	207	78.2	152	225	283		
	Dry Fly Ash Stack	0/1	(0.336 - 0.336)	100%	--	--	--	--	0.336	0.336	0.336	0.336		
	Highway 70 Borrow Area	1/1	--	0%	8.060	8.060	--	--	8.060	8.06	8.06	8.06		
Silver	Ash Disposal Area J	0/3	(0.177 - 0.177)	100%	--	--	--	--	0.177	0.177	0.177	0.177	0	0
	Bottom Ash Pond	0/2	(0.177 - 0.177)	100%	--	--	--	--	0.177	0.177	0.177	0.177		
	Dry Fly Ash Stack	0/1	(0.177 - 0.177)	100%	--	--	--	--	0.177	0.177	0.177	0.177		
	Highway 70 Borrow Area	0/1	(0.177 - 0.177)	100%	--	--	--	--	0.177	0.177	0.177	0.177		
Vanadium	Ash Disposal Area J	3/3	--	0%	4.96	14.0	8.92	4.62	6.39	7.81	10.90	13.4	0	0
	Bottom Ash Pond	2/2	--	0%	1.40	7.48	4.44	4.30	2.92	4.44	5.96	7.18		
	Dry Fly Ash Stack	1/1	--	0%	519	519	--	--	519	519	519	519		
	Highway 70 Borrow Area	1/1	--	0%	54.8	54.8	--	--	54.8	54.8	54.8	54.8		
Zinc	Ash Disposal Area J	0/3	(3.22 - 3.22)	100%	--	--	--	--	3.22	3.22	3.22	3.22	0	0
	Bottom Ash Pond	1/2	(3.22 - 3.22)	50.0%	96.8	96.8	50.0	46.8	26.6	50.0	73.4	92.1		
	Dry Fly Ash Stack	0/1	(3.22 - 3.22)	100%	--	--	--	--	3.22	3.22	3.22	3.22		
	Highway 70 Borrow Area	1/1	--	0%	5.38	5.38	--	--	5.38	5.38	5.38	5.38		

Summary Statistics - CCR Material Characteristics - Pore Water - Dissolved Metals
John Sevier Fossil Plant - Rogersville, Tennessee

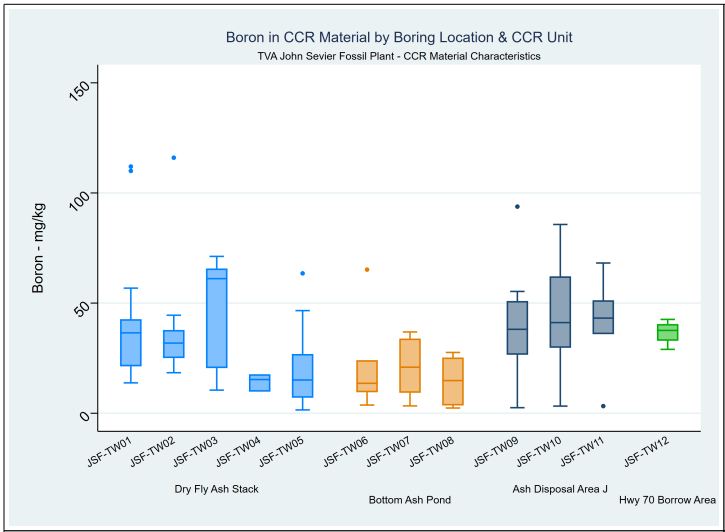
Parameter	CCR Management Unit	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects							
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	25th Percentile	50th Percentile	75th Percentile	95th Percentile	Number of Statistical Outliers	Number of Outliers Removed
Additional Water Quality Parameters														
Iron	Ash Disposal Area J	3/3	--	0%	232	885	465	364	256	279	582	824	0	0
	Bottom Ash Pond	2/2	--	0%	821	1,860,000	930,000	1,310,000	466,000	930,000	1,400,000	1,770,000		
	Dry Fly Ash Stack	0/1	(19.5 - 19.5)	100%	--	--	--	--	19.5	19.5	19.5	19.5		
	Highway 70 Borrow Area	1/1	--	0%	547	547	--	--	547	547	547	547		
Manganese	Ash Disposal Area J	3/3	--	0%	105	383	247	139	180	254	319	370	0	0
	Bottom Ash Pond	2/2	--	0%	464	10,600	5,530	7,170	3,000	5,530	8,070	10,100		
	Dry Fly Ash Stack	0/1	(1.4 - 1.4)	100%	--	--	--	--	1.40	1.40	1.40	1.40		
	Highway 70 Borrow Area	1/1	--	0%	610	610	--	--	610	610	610	610		

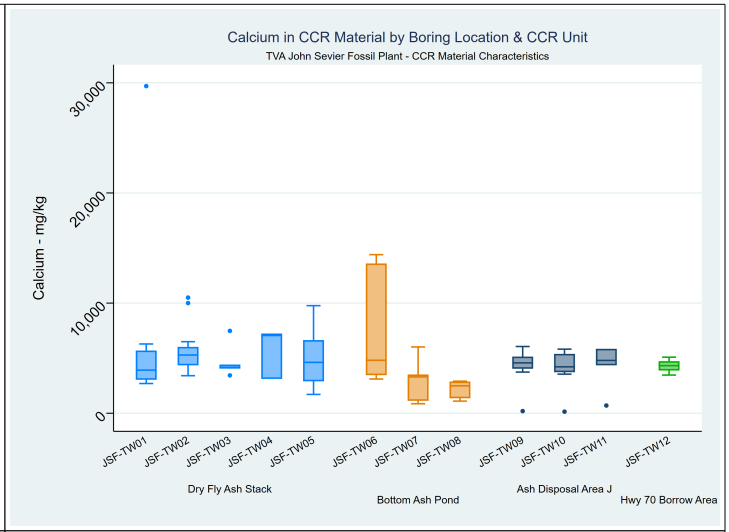
Notes:
CCR Rule - Title 40, Code of Federal Regulations, Part 257
TDEC - Tennessee Department of Environment and Conservation
% - percent
"--": Not Applicable

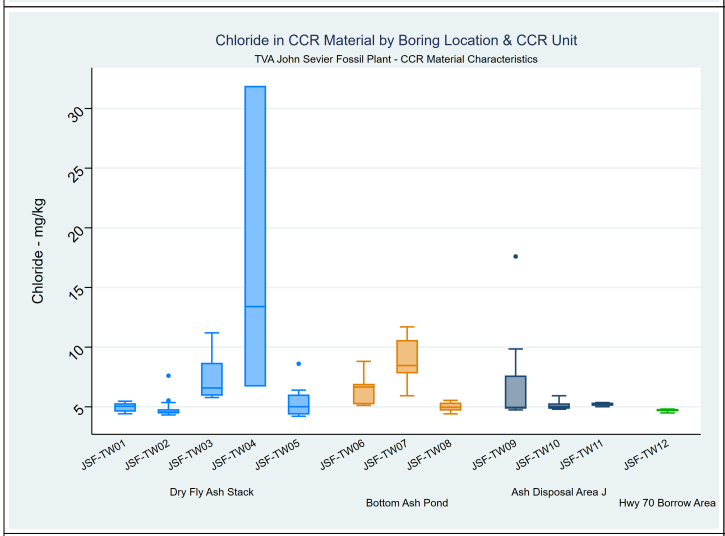
All units in micrograms per liter (µg/L)
Non-detects are reported at the laboratory detection limit
For Parameters with non-detects reported at the method detection limit, the mean and standard deviation were calculated using Kaplan-Meier methods (KM).

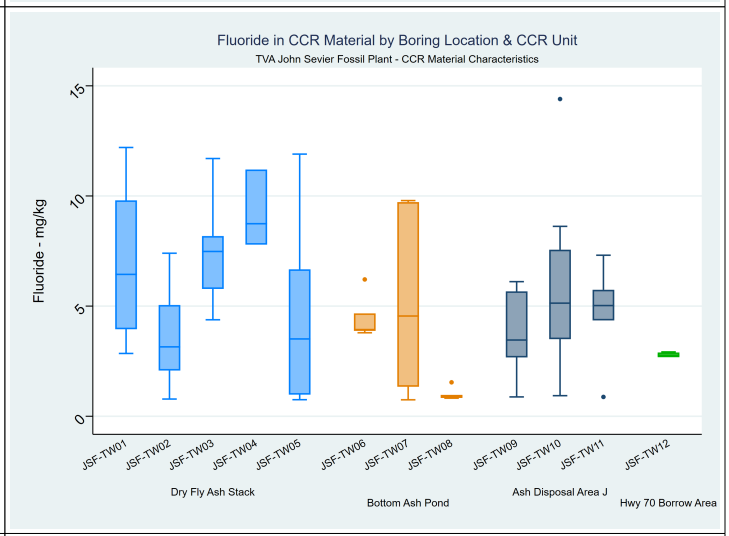
ATTACHMENT E.2-B
BOX PLOTS

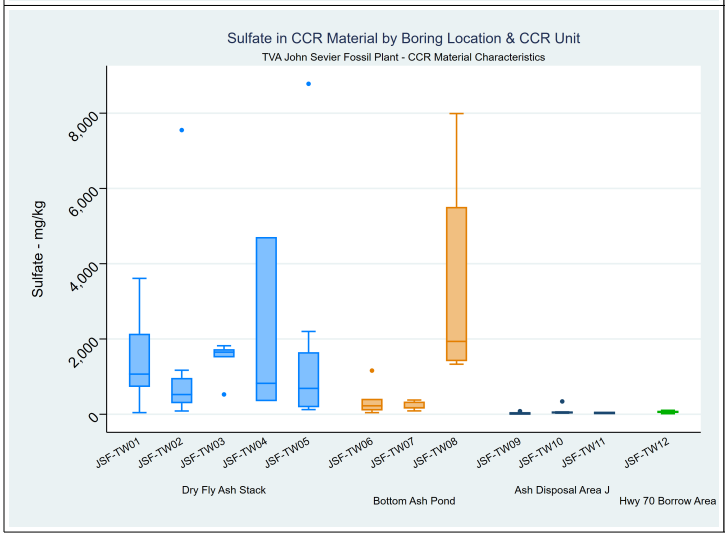
Box Plots
CCR Rule Appendix III Parameters
CCR Material Characteristics Investigation
John Sevier Fossil Plant, Rogersville Tennessee

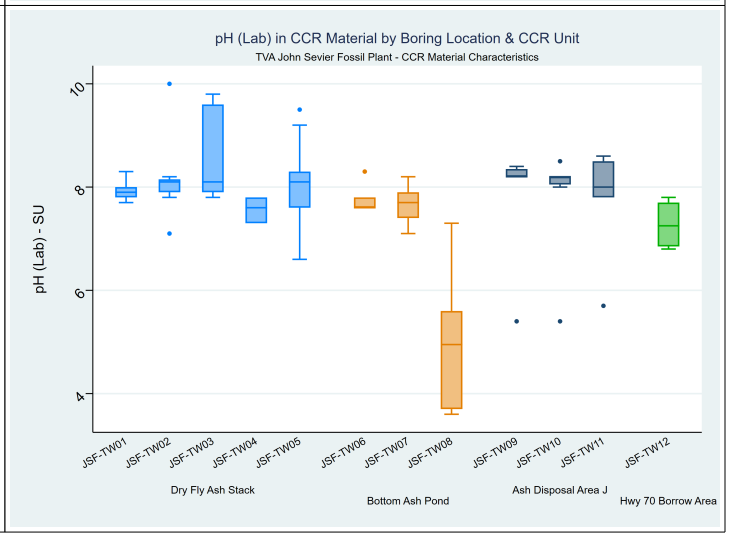




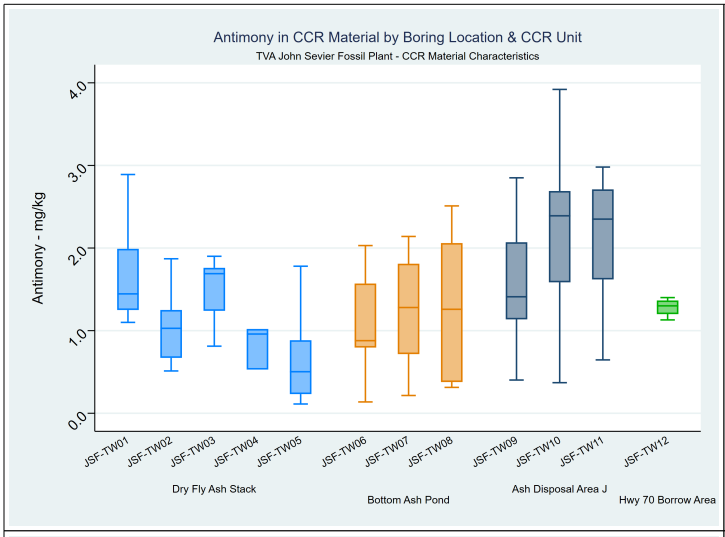


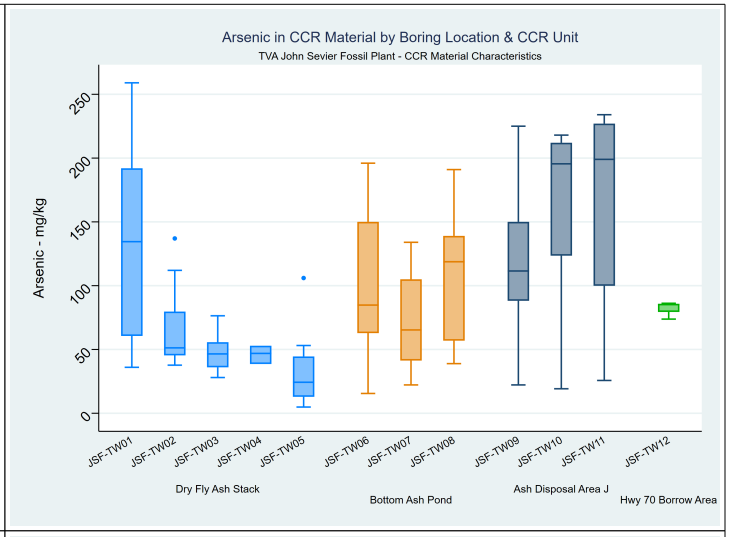


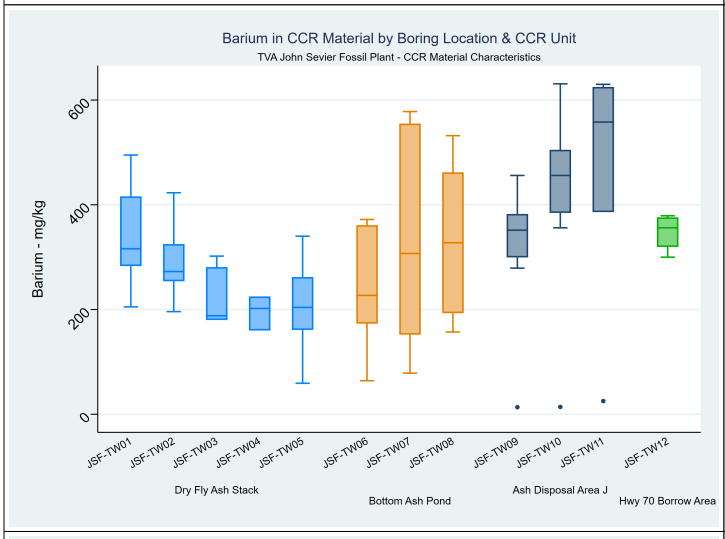


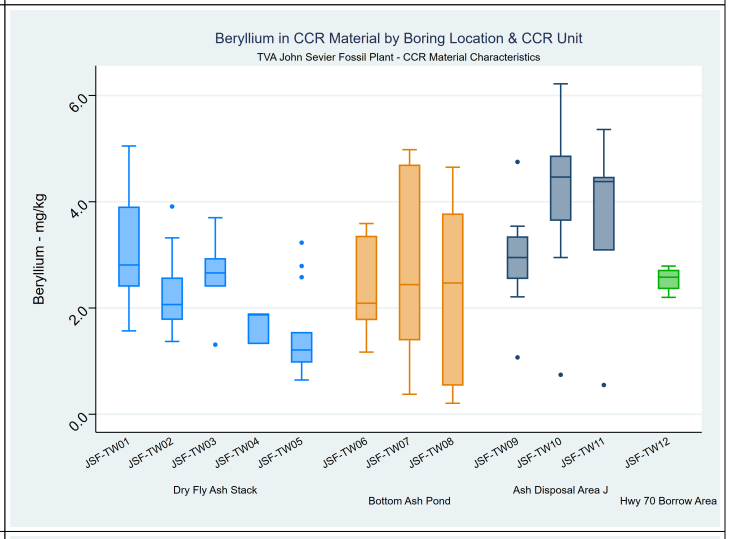


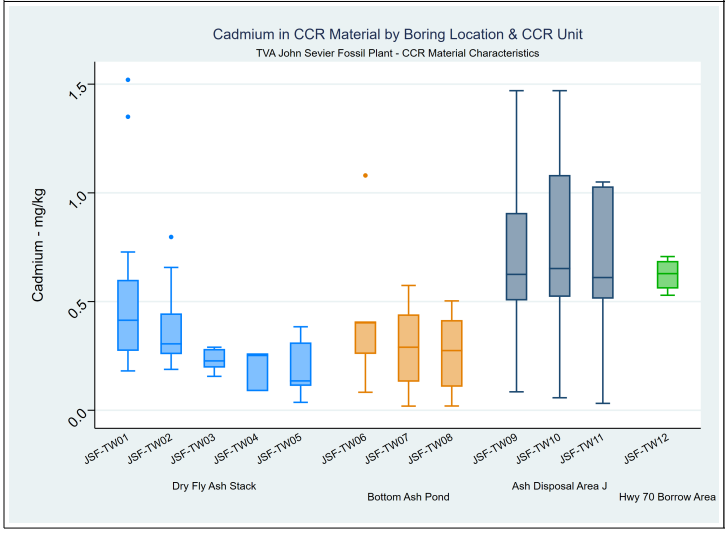
Box Plots
CCR Rule Appendix IV Parameters
CCR Material Characteristics Investigation
John Sevier Fossil Plant, Rogersville Tennessee

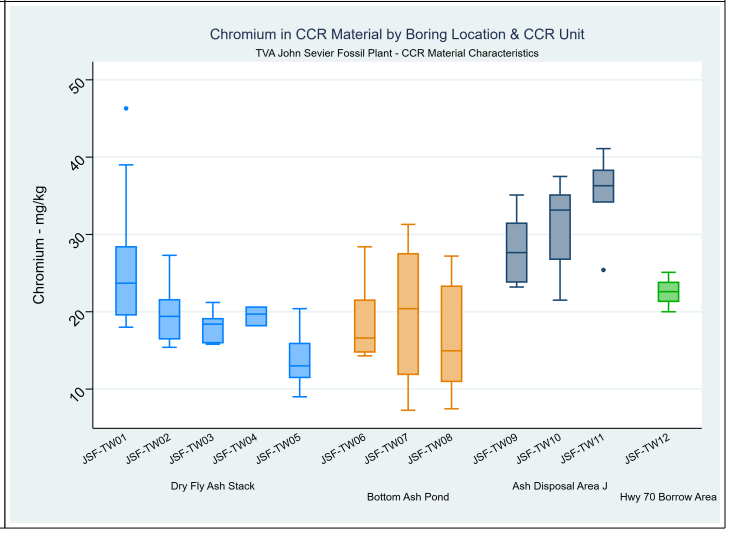


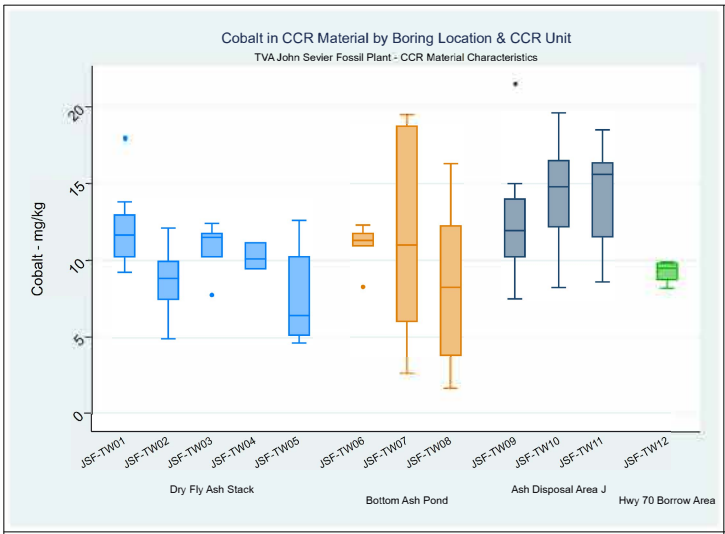


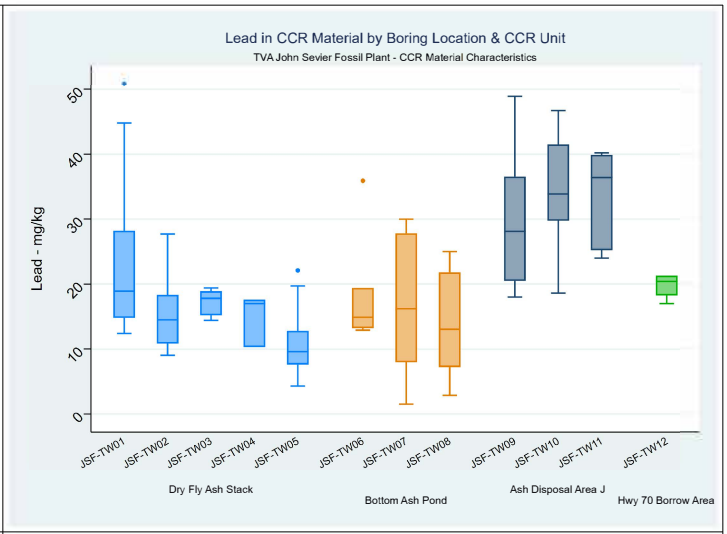


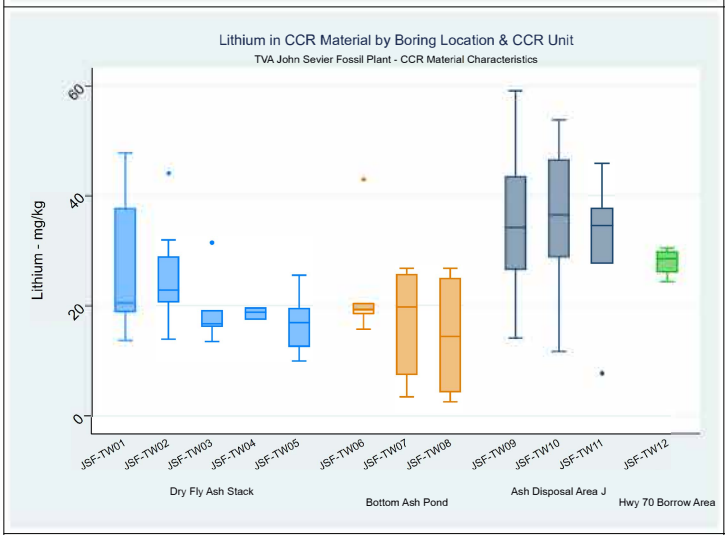


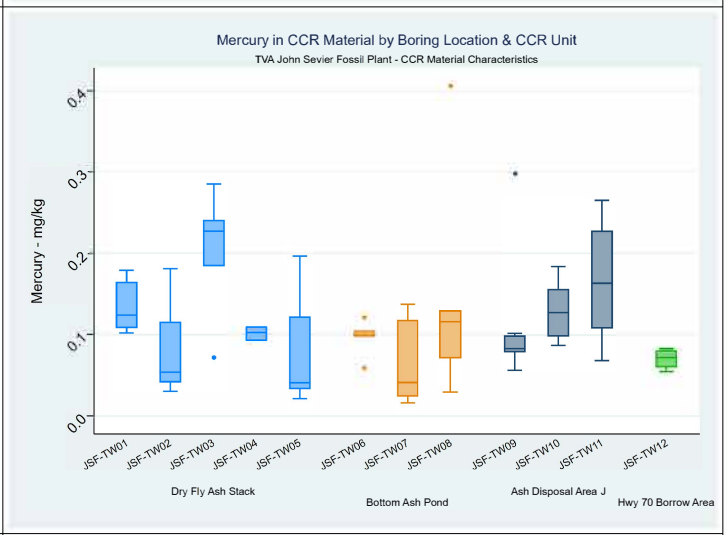


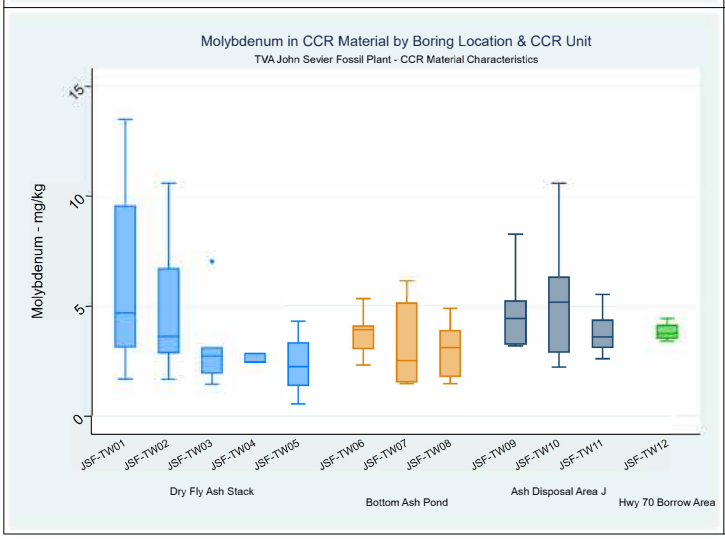


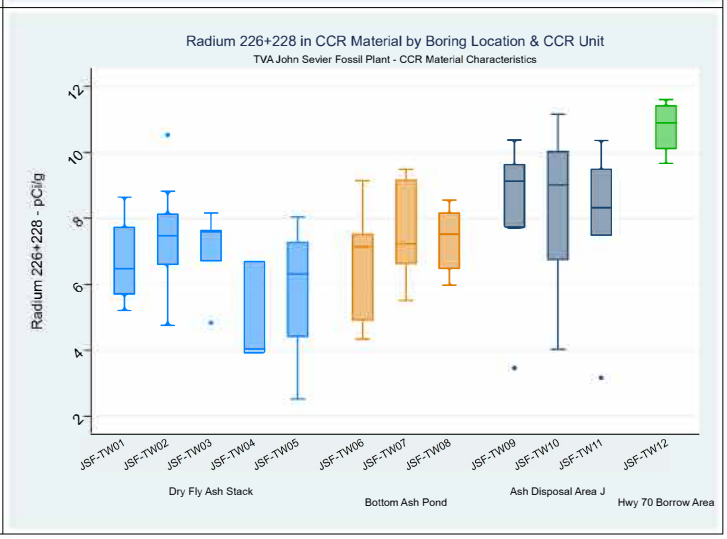

Cobalt in CCR Material by Boring Location & CCR Unit
TVA John Sevier Fossil Plant - CCR Material Characteristics
Cobalt - mg/kg
0
5
10
15
20
JSF-TW01
JSF-TW02
JSF-TW03
JSF-TW04
JSF-TW05
JSF-TW06
JSF-TW07
JSF-TW08
JSF-TW09
JSF-TW10
JSF-TW11
JSF-TW12
Dry Fly Ash Stack
Bottom Ash Pond
Ash Disposal Area J
Hwy 70 Borrow Area

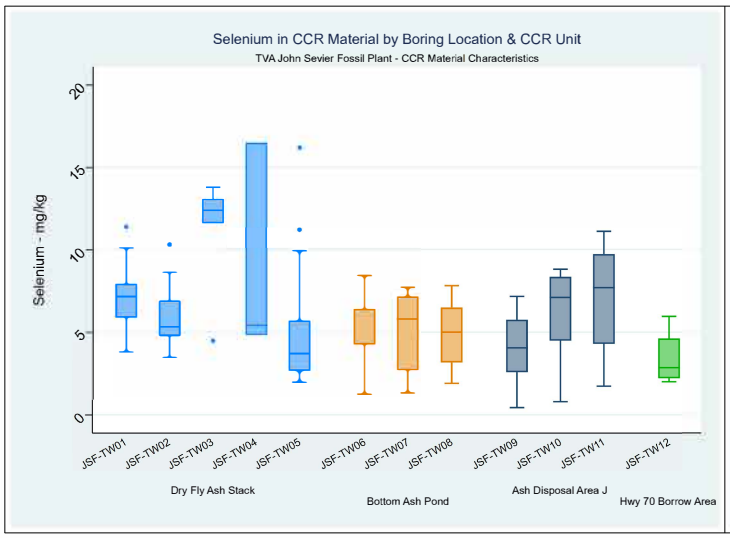

Lead in CCR Material by Boring Location & CCR Unit
TVA John Sevier Fossil Plant - CCR Material Characteristics
Lead - mg/kg
0
10
20
30
40
50
JSF-TW01
JSF-TW02
JSF-TW03
JSF-TW04
JSF-TW05
JSF-TW06
JSF-TW07
JSF-TW08
JSF-TW09
JSF-TW10
JSF-TW11
JSF-TW12
Dry Fly Ash Stack
Bottom Ash Pond
Ash Disposal Area J
Hwy 70 Borrow Area

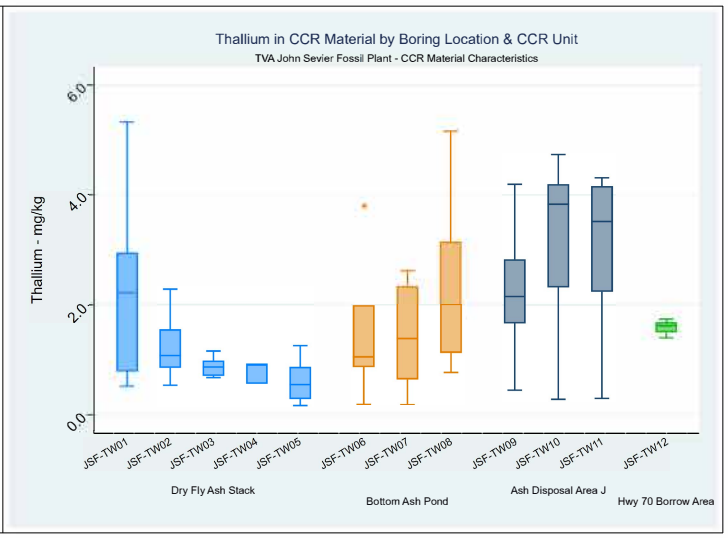

Lithium in CCR Material by Boring Location & CCR Unit
TVA John Sevier Fossil Plant - CCR Material Characteristics
Lithium - mg/kg
0
20
40
60
JSF-TW01
JSF-TW02
JSF-TW03
JSF-TW04
JSF-TW05
JSF-TW06
JSF-TW07
JSF-TW08
JSF-TW09
JSF-TW10
JSF-TW11
JSF-TW12
Dry Fly Ash Stack
Bottom Ash Pond
Ash Disposal Area J
Hwy 70 Borrow Area


Mercury in CCR Material by Boring Location & CCR Unit
TVA John Sevier Fossil Plant - CCR Material Characteristics
Mercury - mg/kg
0.0
0.1
0.2
0.3
0.4
JSF-TW01
JSF-TW02
JSF-TW03
JSF-TW04
JSF-TW05
JSF-TW06
JSF-TW07
JSF-TW08
JSF-TW09
JSF-TW10
JSF-TW11
JSF-TW12
Dry Fly Ash Stack
Bottom Ash Pond
Ash Disposal Area J
Hwy 70 Borrow Area

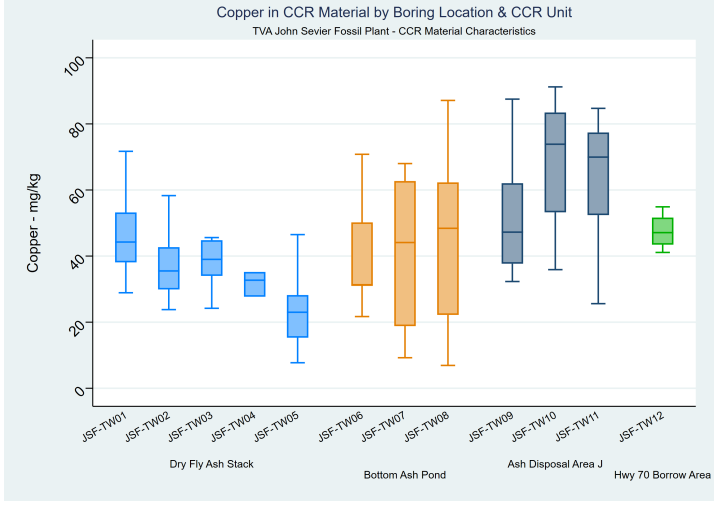

Molybdenum in CCR Material by Boring Location & CCR Unit
TVA John Sevier Fossil Plant - CCR Material Characteristics
Molybdenum - mg/kg
0
5
10
15
JSF-TW01
JSF-TW02
JSF-TW03
JSF-TW04
JSF-TW05
JSF-TW06
JSF-TW07
JSF-TW08
JSF-TW09
JSF-TW10
JSF-TW11
JSF-TW12
Dry Fly Ash Stack
Bottom Ash Pond
Ash Disposal Area J
Hwy 70 Borrow Area

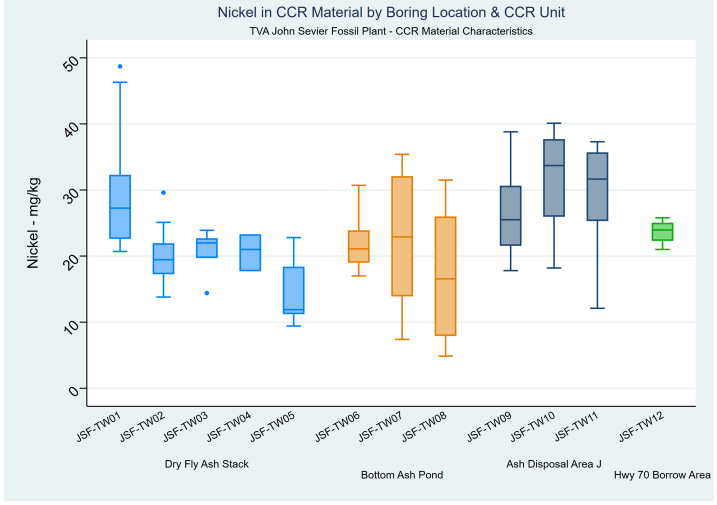

Radium 226+228 in CCR Material by Boring Location & CCR Unit
TVA John Sevier Fossil Plant - CCR Material Characteristics
Radium 226+228 - pCi/g
2
4
6
8
10
12
JSF-TW01
JSF-TW02
JSF-TW03
JSF-TW04
JSF-TW05
JSF-TW06
JSF-TW07
JSF-TW08
JSF-TW09
JSF-TW10
JSF-TW11
JSF-TW12
Dry Fly Ash Stack
Bottom Ash Pond
Ash Disposal Area J
Hwy 70 Borrow Area

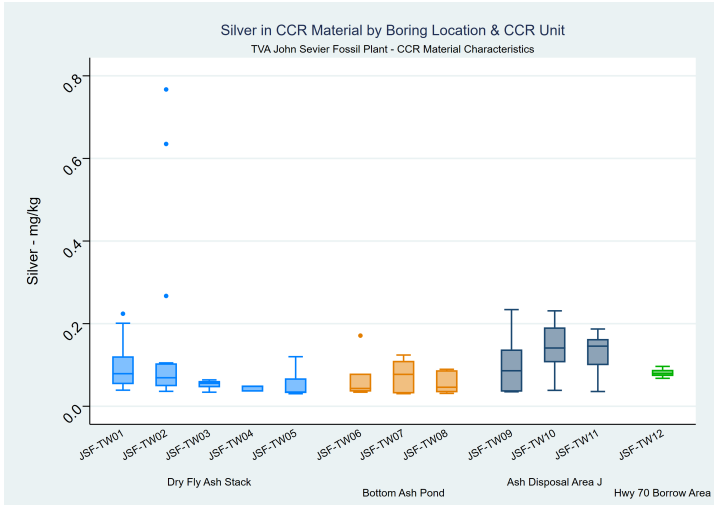

Selenium in CCR Material by Boring Location & CCR Unit
TVA John Sevier Fossil Plant - CCR Material Characteristics
Selenium - mg/kg
0
5
10
15
20
JSF-TW01
JSF-TW02
JSF-TW03
JSF-TW04
JSF-TW05
JSF-TW06
JSF-TW07
JSF-TW08
JSF-TW09
JSF-TW10
JSF-TW11
JSF-TW12
Dry Fly Ash Stack
Bottom Ash Pond
Ash Disposal Area J
Hwy 70 Borrow Area

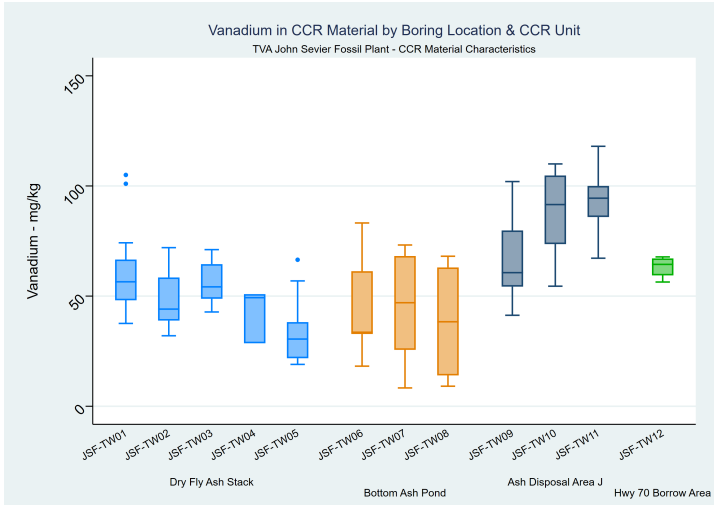

Thallium in CCR Material by Boring Location & CCR Unit
TVA John Sevier Fossil Plant - CCR Material Characteristics
Thallium - mg/kg
0.0
2.0
4.0
6.0
JSF-TW01
JSF-TW02
JSF-TW03
JSF-TW04
JSF-TW05
JSF-TW06
JSF-TW07
JSF-TW08
JSF-TW09
JSF-TW10
JSF-TW11
JSF-TW12
Dry Fly Ash Stack
Bottom Ash Pond
Ash Disposal Area J
Hwy 70 Borrow Area

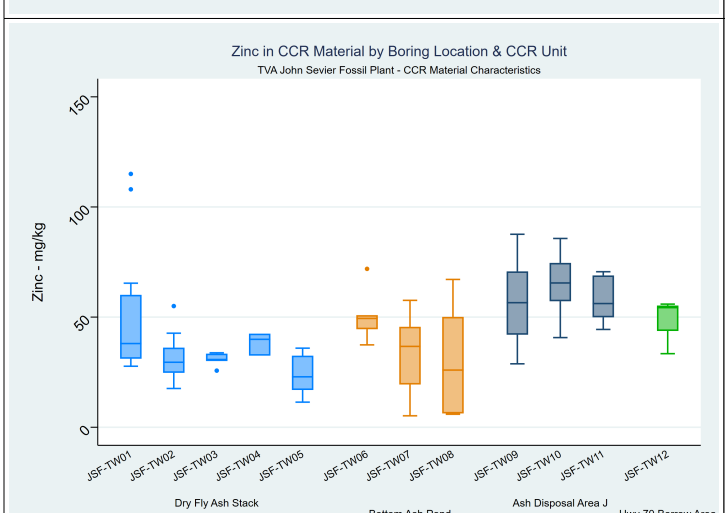
Box Plots
TDEC Appendix I Parameters
CCR Material Characteristics Investigation
John Sevier Fossil Plant, Rogersville Tennessee











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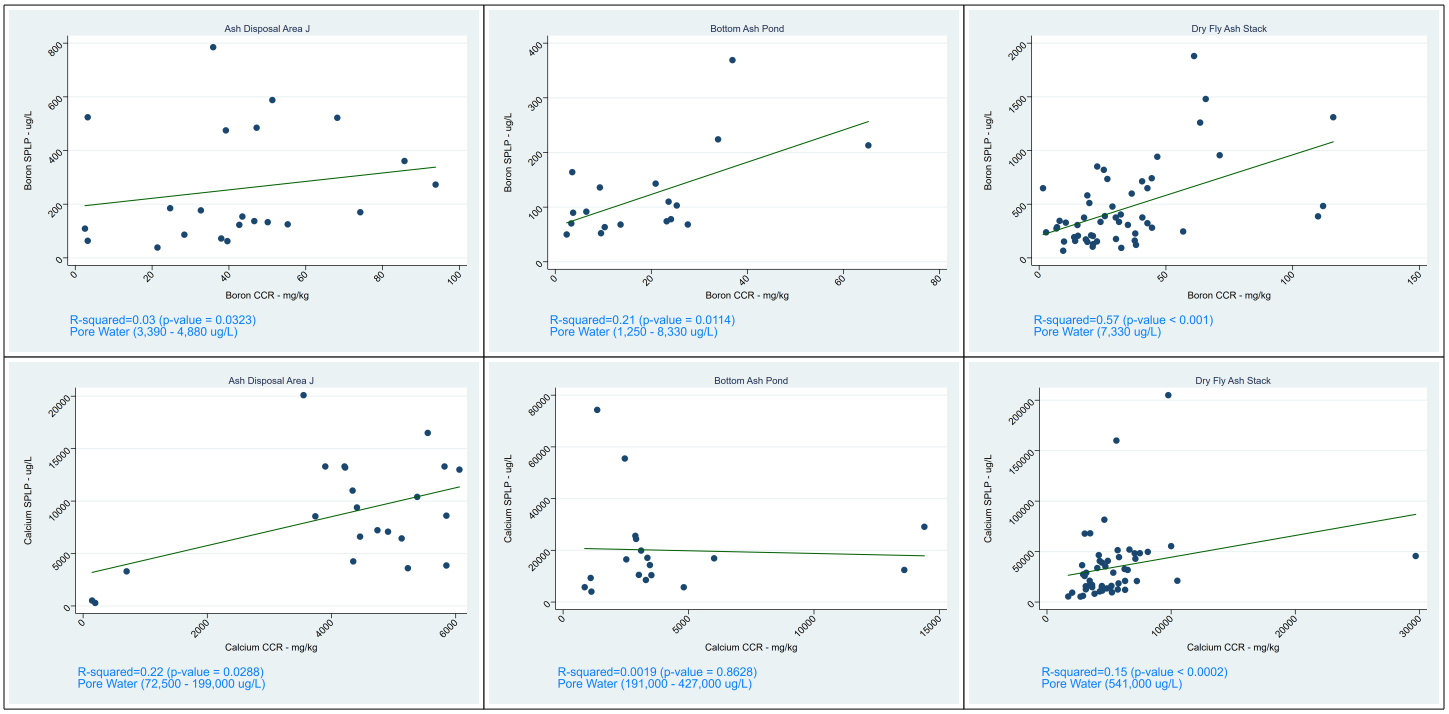
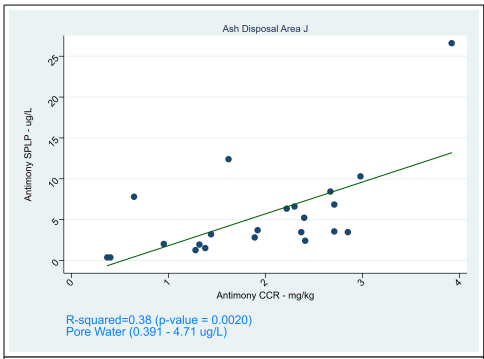
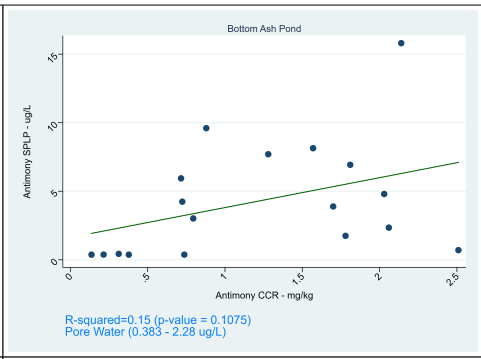
ATTACHMENT E.2-C
SCATTER PLOTS AND REGRESSION

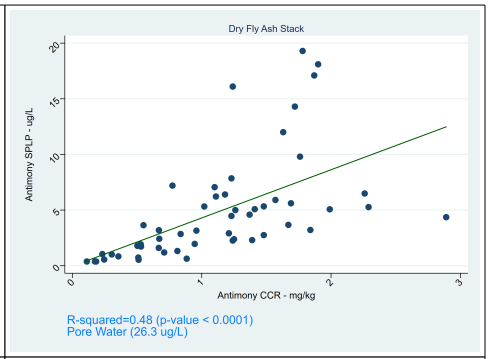
Scatter Plots (SPLP and CCR Material)
CCR Rule Appendix III Parameters
John Sevier Fossil Plant, Rogersville Tennessee

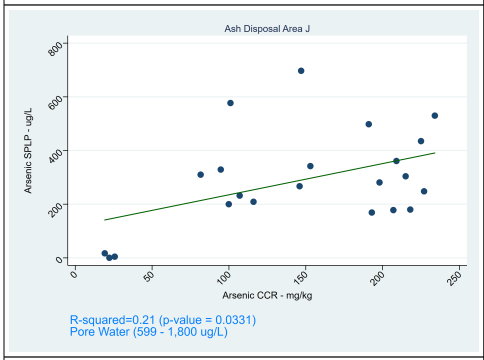


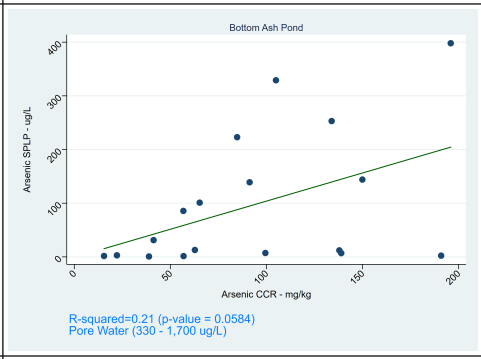
Scatter Plots (SPLP and CCR Material)
CCR Rule Appendix IV Parameters
John Sevier Fossil Plant, Rogersville Tennessee

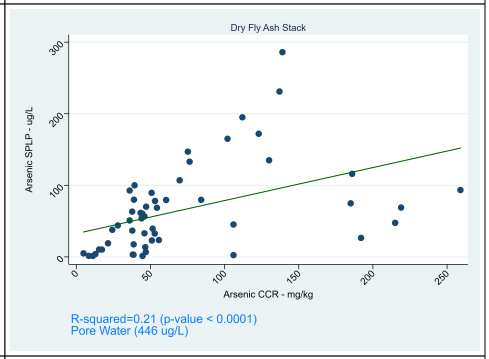


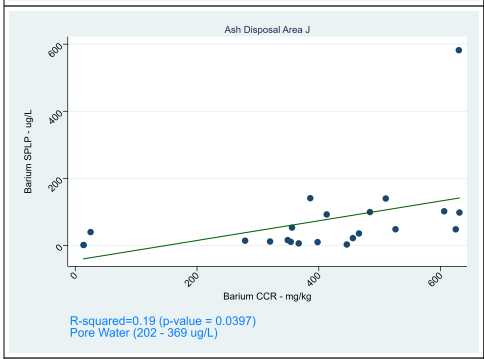


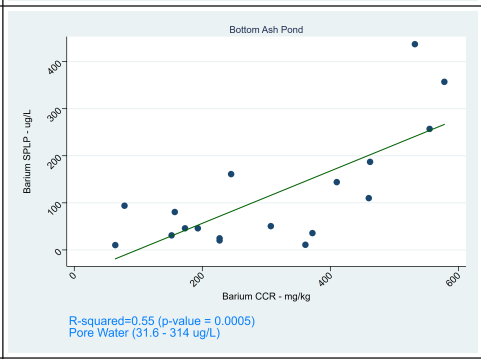


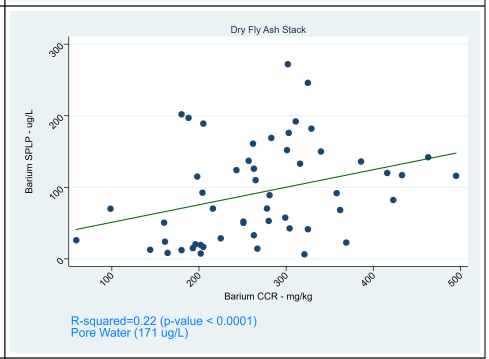




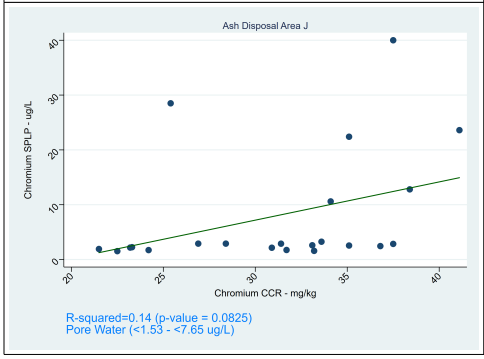


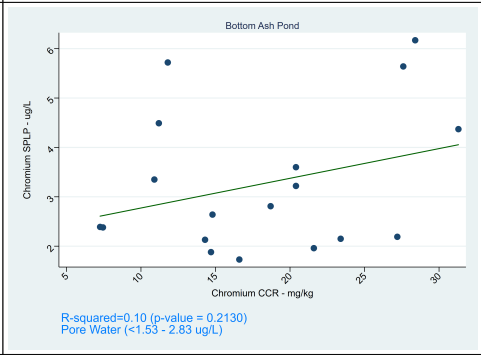


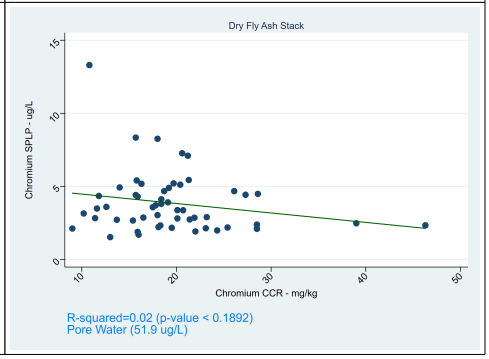


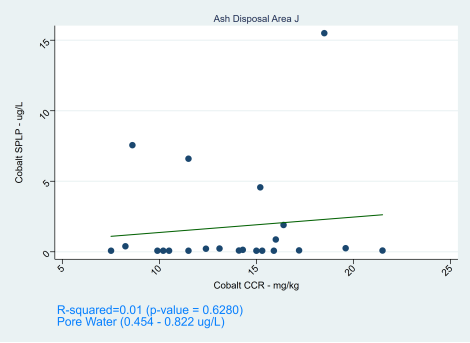
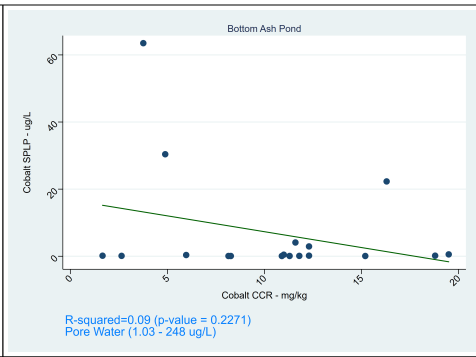
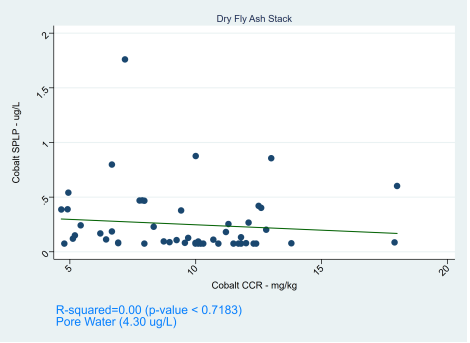
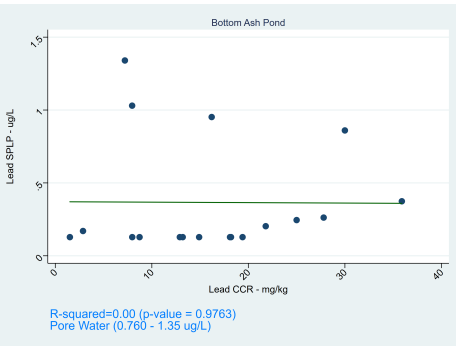
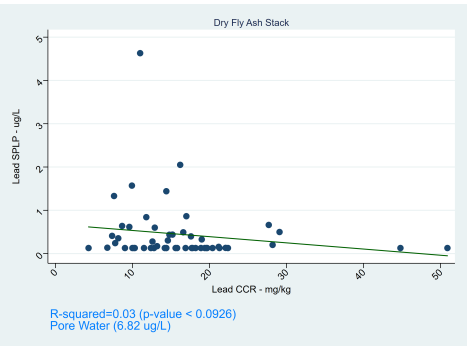
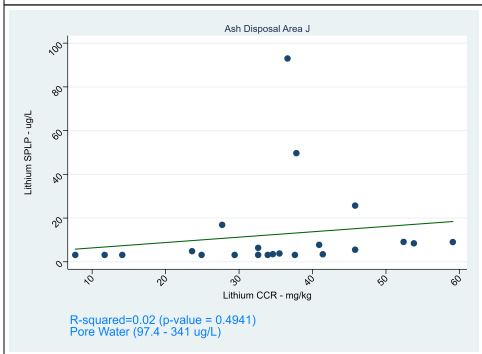
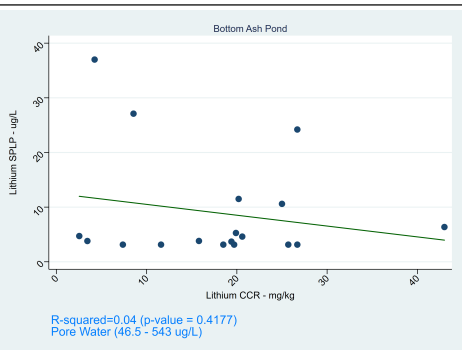
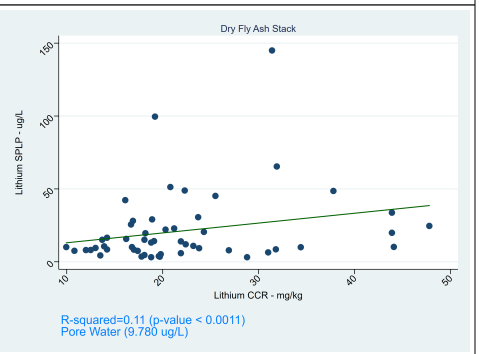
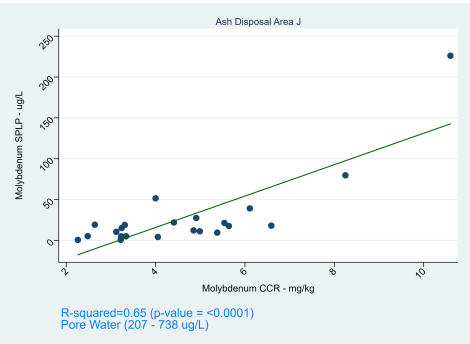
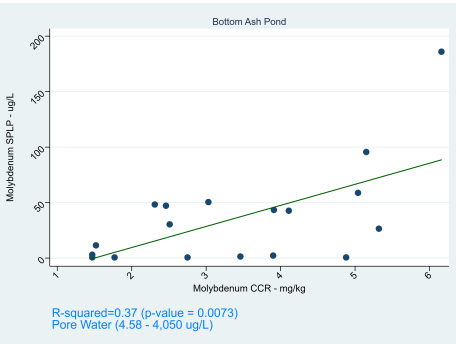
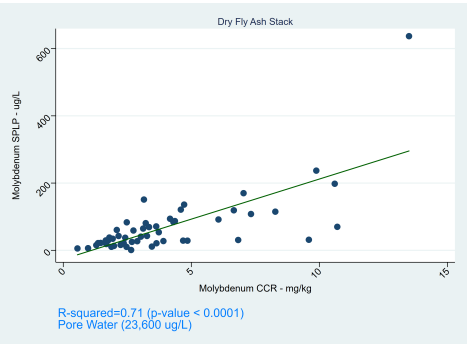


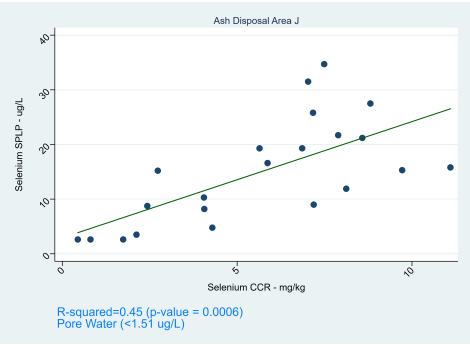
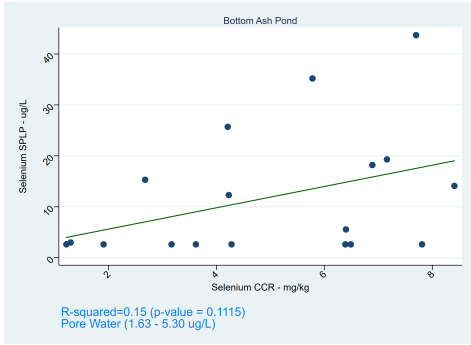
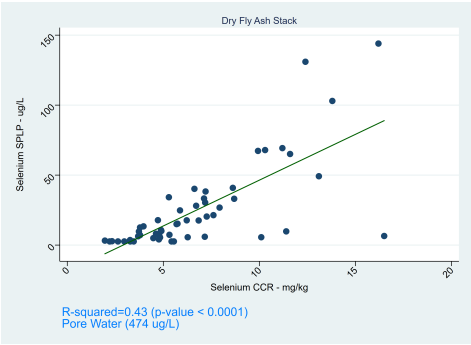
Beryllium/Ash Disposal Area J, Insufficient Data, > 50% non-Detects in SPLP or CCR Material Data Sets	Beryllium/Bottom Ash Pond, Insufficient Data, > 50% non-Detects in SPLP or CCR Material Data Sets	Beryllium/Dry Fly Ash Stack, Insufficient Data, > 50% non-Detects in SPLP or CCR Material Data Sets
Cadmium/Ash Disposal Area J, Insufficient Data, > 50% non-Detects in SPLP or CCR Material Data Sets	Cadmium/Bottom Ash Pond, Insufficient Data, > 50% non-Detects in SPLP or CCR Material Data Sets	Cadmium/Dry Fly Ash Stack, Insufficient Data, > 50% non-Detects in SPLP or CCR Material Data Sets







		
Lead/Ash Disposal Area J, Insufficient Data, > 50% non-Detects in SPLP or CCR Material Data Sets		
		
Mercury/Ash Disposal Area J, Insufficient Data, > 50% non-Detects in SPLP or CCR Material Data Sets	Mercury/Bottom Ash Pond, Insufficient Data, > 50% non-Detects in SPLP or CCR Material Data Sets	Mercury/Dry Fly Ash Stack, Insufficient Data, > 50% non-Detects in SPLP or CCR Material Data Sets
		
Radium 226+228/Ash Disposal Area J, Insufficient Data, > 50% non-Detects in SPLP or CCR Material Data Sets	Radium 226+228/Bottom Ash Pond, Insufficient Data, > 50% non-Detects in SPLP or CCR Material Data Sets	Radium 226+228/Dry Fly Ash Stack, Insufficient Data, > 50% non-Detects in SPLP or CCR Material Data Sets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Scatter Plots (SPLP and CCR Material)
TDEC Appendix I Parameters
John Sevier Fossil Plant, Rogersville Tennessee

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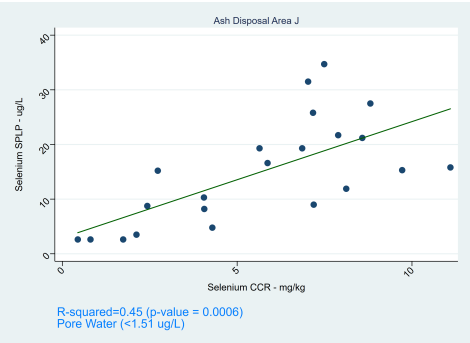
<td> 
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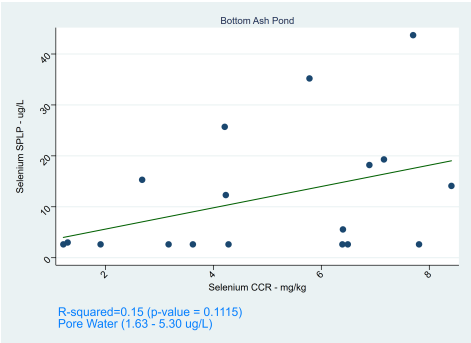
<td> 
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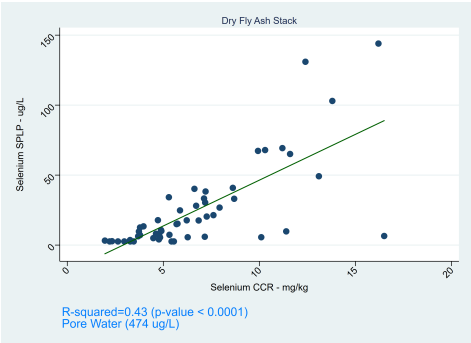
<td> 
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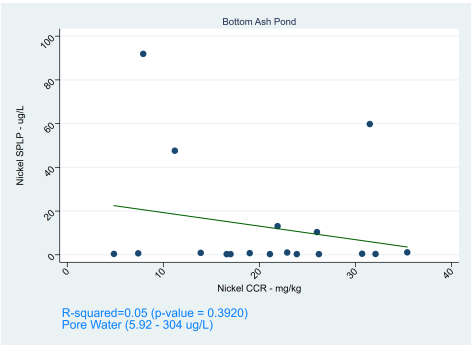
<td> 
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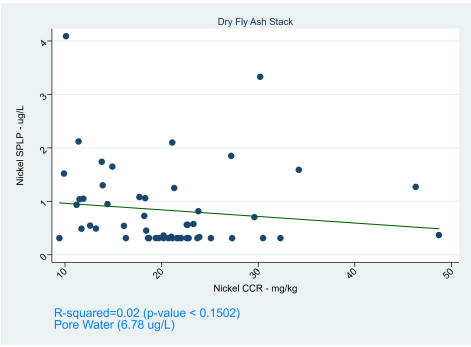
<td> 
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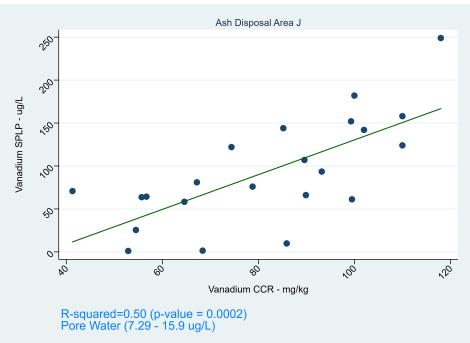
<td> 
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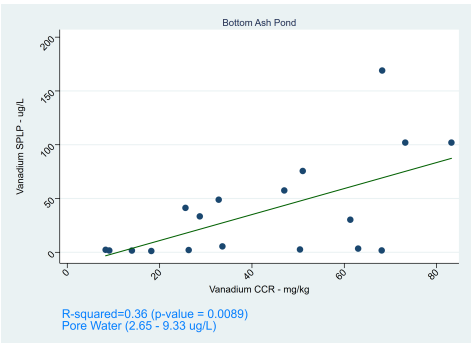
<td> 
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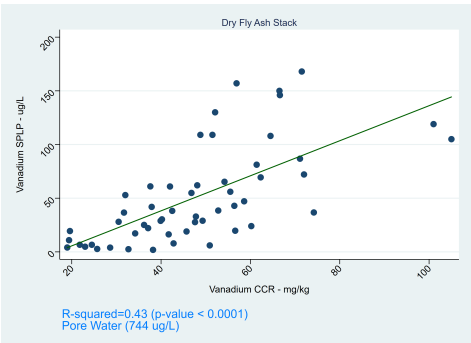
<td> 
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APPENDIX E.3

STATISTICAL ANALYSIS OF GROUNDWATER ANALYTICAL RESULTS

Appendix E.3 - Statistical Analysis of Groundwater Analytical Results

TDEC Commissioner's Order:
Environmental Assessment Report
John Sevier Fossil Plant
Rogersville, Tennessee

July 3, 2023

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

REVISION LOG

Revision	Description	Date
0	Submittal to TDEC	January 10, 2023
1	Addresses April 4, 2023 TDEC Review Comments and Issued for TDEC	July 3, 2023

Sign-off Sheet

This document entitled Appendix E.3 - Statistical Analysis of Groundwater Analytical Results was prepared by Stantec Consulting Services Inc. (“Stantec”) for the account of Tennessee Valley Authority (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not consider any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by 

Melissa Whitfield Aslund, PhD, Environmental Scientist

Reviewed by 

Chris LaLonde, Risk Assessor

Approved by 

Rebekah Brooks, PG, Senior Principal Hydrogeologist

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Abbreviations

CASRN	Chemical Abstracts Service Registry Number
CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of Title 40, Code of Federal Regulations, Part 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04
CCR Rule	Title 40, Code of Federal Regulations, Part 257
CFR	Code of Federal Regulations
EAR	Environmental Assessment Report
EI	Environmental Investigation
GSLs	Groundwater Screening Levels
JSF Plant	John Sevier Fossil Plant
NA	Not Available
%	Percent
RCRA	Resource Conservation and Recovery Act
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDS	Total Dissolved Solids
TVA	Tennessee Valley Authority
Unified Guidance	Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance
USEPA	United States Environmental Protection Agency

July 3, 2023

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) prepared this appendix on behalf of the Tennessee Valley Authority (TVA) to summarize the statistical analyses performed on groundwater quality data to support evaluations conducted for the Environmental Assessment Report (EAR) at the John Sevier Fossil Plant (JSF Plant) located in Rogersville, Tennessee. These statistical analyses include an evaluation of groundwater quality data collected at the JSF Plant for the Tennessee Department of Environment and Conservation (TDEC) Order Environmental Investigation (EI), in compliance with the Title 40, Code of Federal Regulations (Title 40 CFR) Part 257 (Coal Combustion Residuals [CCR] Rule) monitoring program, and the TDEC permitted landfill groundwater monitoring program. The statistical analysis in this appendix focused on the parameters listed in Appendices III and IV of Title 40 CFR 257 and five additional inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04 (CCR Parameters) (see Table E.3-1). The wells included in this statistical analysis are listed in Table E.3-2.

The dataset compiled for statistical analysis includes available analytical data for groundwater samples collected from the wells listed in Table E.3-2 between May 2016 and August 2022, although the specific start date and frequency of sampling may vary between wells based on date of well installation and the applicable monitoring program. This time period was selected because it coincides with modifications that were made to the monitoring program at the JSF Plant in 2016. The complete groundwater quality results for the dataset compiled for statistical analysis are reported in Appendix H.1.

Table E.3-1 – CCR Parameters Evaluated in Statistical Analysis

Parameter	CASRN
CCR Rule Appendix III Parameters	
Boron	7440-42-8
Calcium	7440-70-2
Chloride	16887-00-6
Fluoride[1] (also Appendix IV)	16984-48-8
pH	NA
Sulfate	14808-79-8
TDS	NA
CCR Rule Appendix IV Parameters	
Antimony	7440-36-0
Arsenic	7440-38-2
Barium	7440-39-3
Beryllium	7440-41-7
Cadmium	7440-43-9
Chromium	7440-47-3
Cobalt	7440-48-4
Lead	7439-92-1
Lithium	7439-93-2
Mercury	7439-97-6
Molybdenum	7439-98-7
Radium-226+228	13982-63-3/ 15262-20-1
Selenium	7782-49-2
Thallium	7440-28-0
Additional TDEC Appendix I Parameters	
Copper	7440-50-8
Nickel	7440-02-0
Silver	7440-22-4
Vanadium	7440-62-2
Zinc	7440-66-6

Notes: CASRN - Chemical Abstracts Service Registry Number; CCR – Coal Combustion Residuals; NA - Not available; TDS - Total dissolved solids

[1]Fluoride is both a CCR Rule Appendix III and CCR Rule Appendix IV constituent. In this table and in the results figures and tables for this report, fluoride has been grouped with the Appendix III constituents only to avoid duplication.

Table E.3-2 – Groundwater Monitoring Wells and Parameters Included in Statistical Analysis

Well Location	Well	Program			Parameters Included in Statistical Analysis		
		EI Wells	TDEC Permitted Landfill Wells	CCR Rule Wells	CCR Rule Appendix III	CCR Rule Appendix IV	TDEC Appendix I
Background	JSF-101*	-	X	-	X	X	X
	JSF-102*	-	X	-	X	X	X
	JSF-104**	-	-	X	X	X	X
	JSF-106	X	-	-	X	X	X
	JSF-110	X	-	-	X	X	X
	JSF-200	-	-	X	X	X	X
	JSF-205	-	-	X	X	X	X
	JSF-206	X	-	-	X	X	X
	JSF-210	X	-	-	X	X	X
	W-1	-	X	-	X	X	X
Ash Disposal Area J	JSF-107	X	-	-	X	X	X
	JSF-108	X	-	-	X	X	X
	JSF-109	X	-	-	X	X	X
Highway 70 Borrow Area	JSF-207	X	-	-	X	X	X
	JSF-208	X	-	-	X	X	X
	JSF-209	X	-	-	X	X	X
Bottom Ash Pond	10-36**	-	X	X	X	X	X
	JSF-103**	-	X	X	X	X	X
	JSF-105**	-	X	X	X	X	X
	JSF-201	-	-	X	X	X	X
	JSF-202	-	-	X	X	X	X
	JSF-203	-	-	X	X	X	X
	JSF-204	-	-	X	X	X	X
	W-32***	-	X	X	X	X	X
Dry Fly Ash Stack Landfill	W-28	-	X	-	X	X	X
	W-29	-	X	-	X	X	X
	W-30	-	X	-	X	X	X
	W-31	-	X	-	X	X	X

Notes:
* Wells JSF-101 and JSF-102 were added to the Dry Fly Ash Landfill permitted compliance network as background monitoring wells in February 2022.
** Not currently part of the permitted compliance network for the Dry Fly Ash Landfill. Wells are included in groundwater sampling events for the Dry Fly Ash Stack for comparison purposes.
*** Well W-32 is in the permitted compliance network for the Dry Fly Ash Landfill and the certified CCR groundwater monitoring network for the Bottom Ash Pond.
For each well, the program to which the well belongs as well as the parameters evaluated in this statistical analysis are identified with an 'X' and highlighted gray. Programs or parameters that are not applicable to that well are indicated with a dash (-).

2.0 METHODS

2.1 EXPLORATORY DATA ANALYSIS

The initial step of statistical analysis was the exploratory data analysis. The process of the exploratory data analysis utilizes simple summary statistics (e.g., mean, median, standard deviation, and percentiles) and graphical representations to identify important characteristics of an analytical dataset, such as the center of the data (i.e., mean, median), variation, distribution, patterns, presence of outliers, and randomness.

Summary statistics were calculated for each well-constituent pair. These summary statistics include information such as total number of available samples, frequency of detection, and maximum detected concentrations for each well-constituent pair. Exploratory data plots for each well-constituent pair (i.e., box plots and time series plots) were also constructed to support a visual review of the data and identify potential outliers.

Outliers are data points that are abnormally high or low as compared to other measurements and may represent anomalous data or data errors. Outliers may also represent natural variation of concentrations in environmental systems. Therefore, where potential outliers were visually identified in box plots or time-series plots, secondary statistical screening was completed using Tukey's procedure to identify extreme outliers (Tukey 1977) followed by statistical testing for outliers (Dixon or Rosner's test, α=0.05). Following confirmation of the outliers as statistically significant, a desktop evaluation was conducted to verify that the data points were not errors (e.g., laboratory or transcriptional error). Field forms, data validation reports, and other variables in the dataset that could influence analytical results were also evaluated. If a verifiable error was discovered, then the outlier was removed and, if possible, replaced with a corrected value.

In the absence of a verifiable error, additional lines of evidence were reviewed to determine final outlier disposition (e.g., frequency of detection, spatial and temporal variability). If an outlier was identified as suitable for removal from further statistical analysis, a clear and defensible rationale based on multiple lines of evidence was provided. In addition, values that were identified as outliers and removed from further evaluation in the present statistical analysis were retained in the database and will be reevaluated for inclusion or exclusion in future statistical analyses of this dataset.

2.2 COMPARISON OF GROUNDWATER QUALITY DATA TO GROUNDWATER SCREENING LEVELS

The United States Environmental Protection Agency (USEPA) document "*Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance"* (USEPA 2009; hereafter referred to as the Unified Guidance) describes statistical methods for comparing groundwater concentrations to fixed standards such as the TDEC-approved groundwater screening levels (GSLs) identified in Appendix A.2. In the Unified Guidance, a confidence interval approach is recommended for comparing groundwater monitoring data to a fixed numerical limit. If the underlying population is stable (i.e., no trend is present),

then the Unified Guidance indicates that comparison to a fixed standard can be made based on a confidence interval around the mean. However, the Unified Guidance indicates that "*where the data exhibit a trend over time the interval will incorporate not only the natural variability in the underlying population, but also additional variation induced by the trend itself. The net result is a confidence interval that can be much wider than expected for a given confidence level and sample size (n)".* Therefore, in the presence of a statistically significant trend, the Unified Guidance recommends constructing a confidence band around a trend line, where the comparison is made to the fixed standard based on the confidence band as of the most recent evaluated sampling event, rather than a static confidence interval around the mean.

For the groundwater data reviewed herein, these approaches were applied to identify well-constituent pairs where the available data indicate a statistically significant concentration above or equal to the GSL for constituents other than pH, or statistically significant values outside the GSL range for pH. For this dataset, the null hypothesis was that the groundwater concentrations were less than the GSL for constituents other than pH and that levels were within the GSL range for pH. In accordance with the methods described in the Unified Guidance, constituent concentrations were determined to represent a statistically significant concentration above or equal to a GSL for constituents other than pH, only when there were sufficient data to support statistical confidence band or interval evaluation and the applicable lower confidence band or interval was greater than or equal to the GSL as of the most recent sampling event included in the statistical analysis. For pH, which has both an upper and lower GSL, a statistical difference was identified if there were sufficient data to support statistical analysis, and either the applicable lower confidence band or interval was greater than or equal to the upper GSL or the applicable upper confidence band or interval was less than or equal to the lower GSL as of the most recent sampling event included in the statistical analysis. Whether comparison should be made using a confidence band or confidence interval was determined for each well-constituent pair based on the results of a linear regression trend analysis for each well-constituent pair. If no significant linear trend was detected ($p \geq 0.05$ for the regression slope), comparison to the GSLs was completed based on a static confidence interval around the mean. If a statistically significant linear trend was present ($p < 0.05$ for the regression slope), comparison to the GSLs was completed based on a confidence band around the linear regression trend line at the most recent evaluated sampling event. In both cases, the confidence band or intervals were constructed with 98 percent (%) confidence, which correspond to a lower confidence limit with 99% confidence.

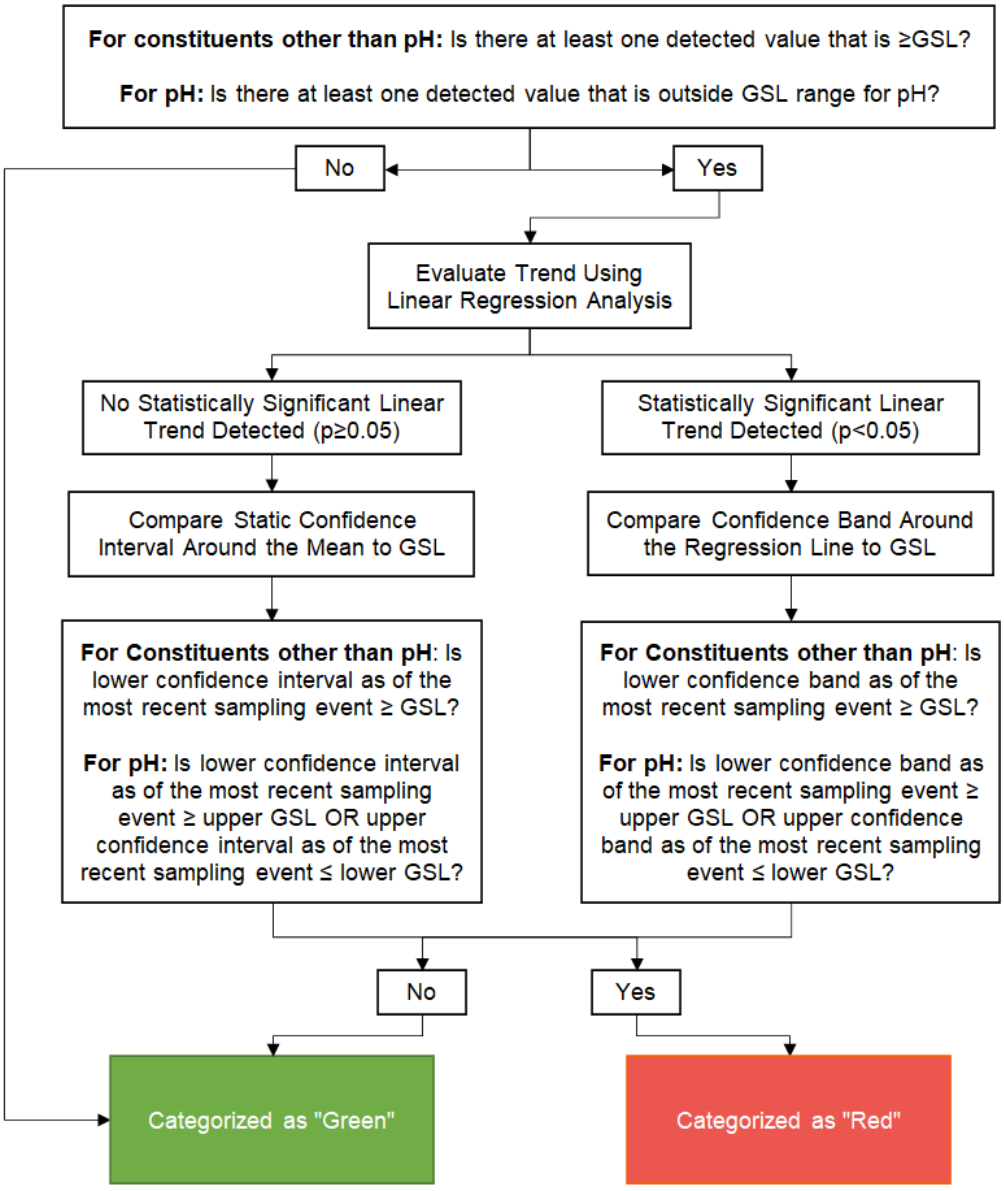
Additional details regarding the methods used to compare groundwater quality data to groundwater screening levels are provided below. As described below, the approach adopted for this comparison was dependent on the number of samples available and the proportion of detected concentrations for each well-constituent pair.

2.2.1 Linear Regression Trend Analysis and Confidence Interval/Confidence Band Evaluation

For well-constituent pairs with five or more samples and at least four detected values, groundwater quality data were compared to GSLs using a linear regression trend analysis and confidence interval/ confidence band evaluation summarized in **Figure E.3-1** (below) and described in more detail in this section.

First, data were screened to identify if there were reported individual values greater than or equal to the GSL for constituents other than pH or outside the GSL range for pH. In the absence of such a value, well-constituent pairs were classified as 'Green'. If such a value was observed, then linear regression analysis was completed to identify well-constituent pairs with a statistically significant linear trend ($p<0.05$) over the analyzed time period. As noted above, if no statistically significant linear trend was detected ($p\geq0.05$), a static confidence interval around the mean was used for comparison to the GSLs. If a statistically significant linear trend was present ($p<0.05$), a confidence band around the linear regression trend line at the most recent evaluated sampling event was used for comparison to the GSLs. In both cases, 98% confidence intervals were constructed, which correspond to a lower confidence limit with 99% confidence. Non-detect values were conservatively represented at the reported detection limit.

The resulting confidence intervals and confidence bands were then compared to the GSL for the analyzed well-constituent pairs as of the most recent sampling event included in the statistical analysis. For constituents other than pH, well-constituent pairs were classified as 'Red', indicating a statistically significant concentration above or equal to the GSL at a 99% confidence level only if the applicable lower confidence band or interval was greater than or equal to the GSL as of the most recent sampling event included in the statistical analysis (see examples in Figure E.3-2 below). For pH, well-constituent pairs were classified as 'Red', indicating a statistically significant difference from the GSL range at a 99% confidence level, if the applicable lower confidence band or interval was greater than or equal to the upper GSL or if the applicable upper confidence interval was less than or equal to the lower GSL as of the most recent sampling event included in the statistical analysis (see examples in Figure E.3-3 below). The remaining well-constituent pairs with five or more samples and at least four detected values that were not classified as 'Red' using the linear regression trend analysis and confidence interval/confidence band evaluation described above were classified as 'Green'. The 'Green' category indicates that as of the most recent sampling event included in the analysis, constituent levels were not statistically significantly greater than or equal to the GSL (for constituents other than pH) and not statistically greater than or equal to the upper GSL or less than or equal to the lower GSL for pH at a 99% confidence level.



Note: GSL = TDEC-approved Groundwater Screening Level (see Appendix A.2)

Figure E.3-1 – Flow chart summarizing linear regression trend analysis and confidence interval/ confidence band evaluation

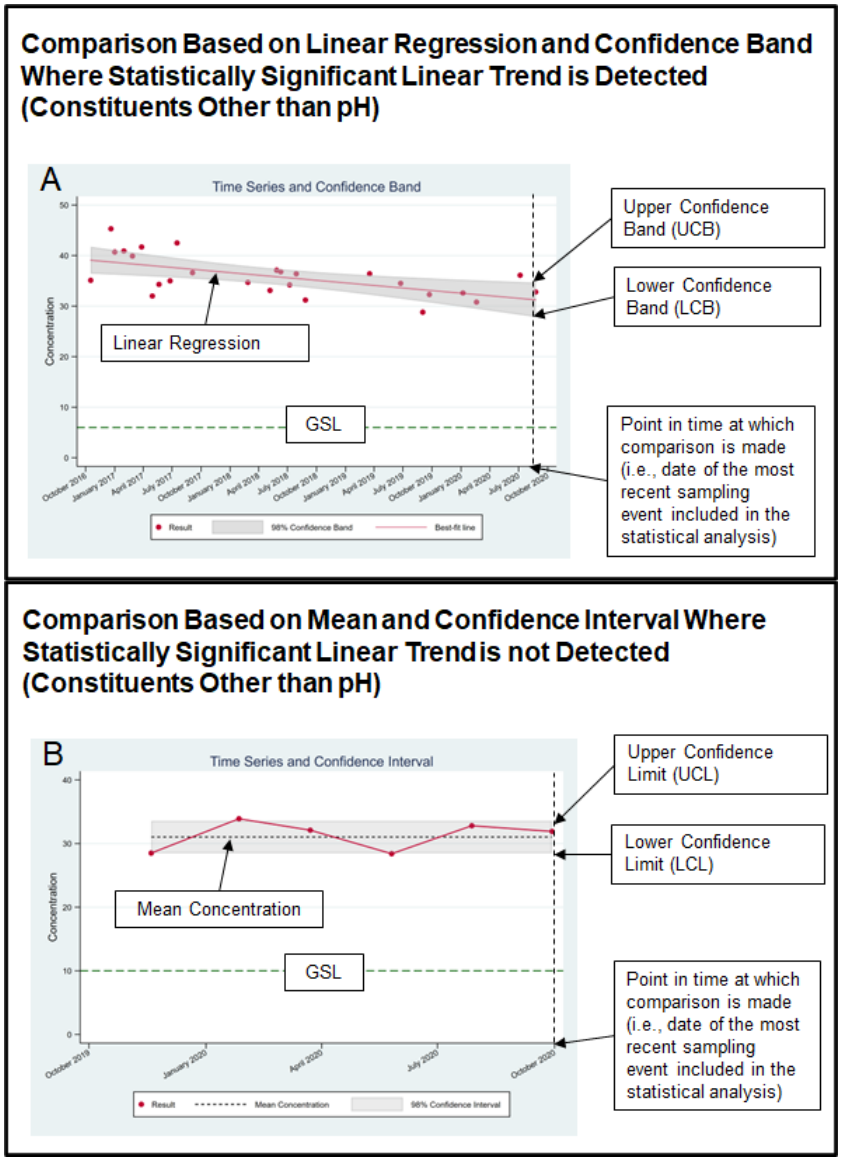


Figure E.3-2 – Examples of well-constituent pairs classified as 'Red' for constituents other than pH (A) in the presence of a statistically significant linear trend ($p<0.05$) and (B) in the absence of a statistically significant linear trend ($p\geq0.05$)

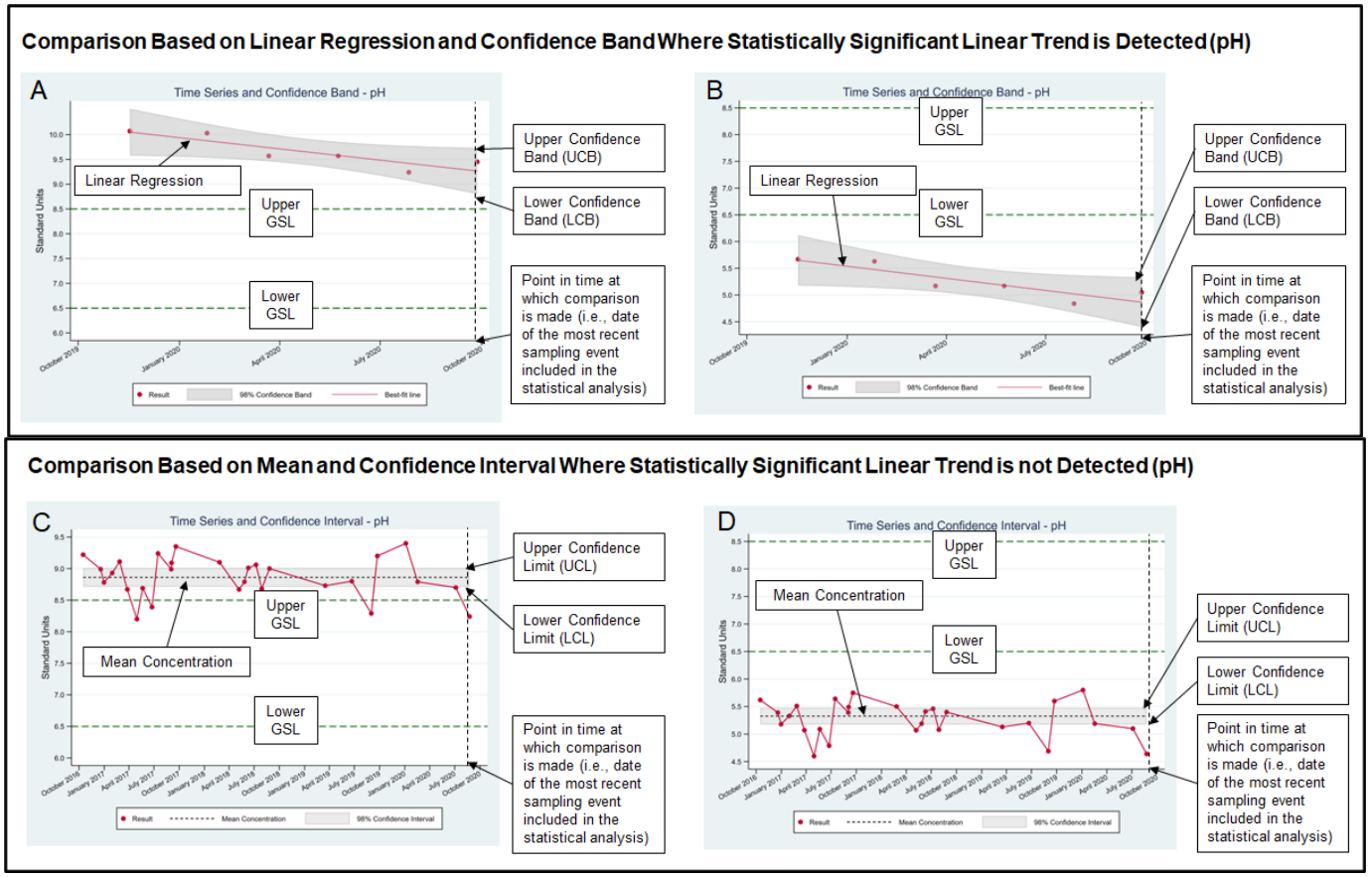


Figure E.3-3 - Examples of well-constituent pairs classified as 'Red' for pH, (A, B) in the presence of a statistically significant linear trend ($p<0.05$) and (C, D) in the absence of a statistically significant linear trend ($p\geq0.05$)

2.2.2 Evaluation for Well-Constituent Pairs Using Point-by-Point Method

Well-constituent pairs with less than five samples in the dataset or less than four detected results were not well suited to a linear regression trend analysis and confidence band or interval evaluation. Therefore, an alternate evaluation was completed for these well-constituent pairs based on a point-by-point comparison of the reported concentration for each sample to the applicable GSL. In this approach, well-constituent pairs were classified as 'Green*,' if there were no detected values that were greater than or equal to the GSL for constituents other than pH, or there were no detected values outside the GSL range for pH. However, if there was a limited dataset (i.e., less than five samples in the dataset or less than four detected results), and at least one value was greater than or equal to the GSL for constituents other than pH or there were detected values outside the GSL range for pH, this triggered further data review and an alternate evaluation of that well-constituent pair. For these well-constituent pairs, the available data were reviewed and alternate statistical approaches were considered (e.g., completing a statistical evaluation resulting in a 'Red' or 'Green' classification as described in Section 2.2.1 using the limited dataset). If such an alternate evaluation was required, then this was clearly identified and additional rationale provided in the applicable sub-sections of Section 3.0 .

3.0 RESULTS AND DISCUSSION

3.1 EXPLORATORY DATA ANALYSIS

Summary statistics for each evaluated well-constituent pair are provided in Attachment E.3-A**,** with results grouped by well and sorted by constituent type. Exploratory data analysis plots for each well-constituent pair (i.e., box plots and time-series plots) are provided in Attachments E.3-B and E.3-C. These plots were reviewed to identify potential outliers and provide a qualitative evaluation of data distribution. The plots also provide a preliminary comparison of the results from individual sampling events to the applicable GSLs. There were no outliers removed from further statistical analysis based on this evaluation.

3.2 COMPARISON OF GROUNDWATER QUALITY DATA TO APPROVED GROUNDWATER SCREENING LEVELS

A summary of the results comparing groundwater quality data to GSLs is provided in Table E.3-3. The confidence bands or confidence intervals generated to support this comparison are provided in Attachment E.3-D, and the statistical results of these regression analyses are reported in Attachment E.3-E. Further discussion is provided below.

There were 35 well-constituent pairs for which no significant trend was detected. Comparison to the GSLs for these well-constituent pairs was completed based on a static confidence interval around the mean as shown in Attachment E.3-D. However, there were 20 well-constituent pairs where a statistically significant decreasing trend was detected, and five well-constituent pairs where a statistically significant increasing trend was detected, as indicated in Attachment E.3-E. Comparison to the GSLs for these well-constituent pairs was completed based on a confidence band around the linear regression line as shown in Attachment E.3-D.

APPENDIX E.3 - STATISTICAL ANALYSIS OF GROUNDWATER ANALYTICAL RESULTS

July 3, 2023

Table E.3-3 – Summary of Statistically Significant Concentrations/Values

Parameter	Background										Ash Disposal Area J			Highway 70 Borrow Area			Bottom Ash Pond								Dry Fly Ash Stack Landfill			
	JSF-101*	JSF-102*	JSF-104**	JSF-106	JSF-110	JSF-200	JSF-205	JSF-206	JSF-210	W-1	JSF-107	JSF-108	JSF-109	JSF-207	JSF-208	JSF-209	10-36**	JSF-103**	JSF-105**	JSF-201	JSF-202	JSF-203	JSF-204	W-32***	W-28	W-29	W-30	W-31
CCR Rule Appendix III Parameters																												
Boron	Green	Green	Green*	Green	Green*	Green	Green	Green*	Green	Green*	Green	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Chloride	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Fluoride[1] (also Appendix IV)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
pH (field)	Green	Green	Red	Green	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Red	Green	Green	Green	Green	Green	Red	Green	Red	Green
Sulfate	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Green	Red	Green
Total Dissolved Solids	Red	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Green	Green	Green	Green	Red	Green	Green	Green	Green	Green	Green	Green	Red	Green	Red	Red
CCR Rule Appendix IV Parameters																												
Antimony	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Arsenic	Green*	Green*	Green*	Green	Green*	Green*	Green	Green	Green	Green	Green*	Green	Green	Green	Green	Green*	Green	Green*	Green*	Green*	Green	Green	Green	Green*	Green*	Green*	Green*	Green*
Barium	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Beryllium	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Cadmium	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green
Chromium	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*
Cobalt	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green*	Green	Green	Green	Green	Green*	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green*	Green	Green
Lead	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*
Lithium	Green	Green	Green	Green*	Green*	Green	Green	Green	Green	Green	Green*	Green*	Green	Green	Green	Green	Green	Green	Green*	Green	Green	Green	Green	Green	Green	Green*	Green*	Red
Mercury	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Molybdenum	Green*	Green*	Green*	Green	Green*	Green*	Green	Green*	Green*	Green*	Red	Green	Green	Green	Green	Green*	Green*	Green*	Green*	Green*	Green	Green	Green*	Green*	Green*	Green	Green*	Red
Radium-226+228	Green	Green	Green	Green*	Green*	Green	Green	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Selenium	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Thallium	Green*	Green*	Green	Green	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*
Additional TDEC Appendix I Parameters																												
Copper	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Nickel	Green	Green	Green	Green	Green	Green*	Green	Green	Green*	Green*	Green*	Green	Green	Green*	Green*	Green*	Green	Green	Green	Green*	Green*	Green	Green	Green	Green	Green	Green	Green
Silver	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Vanadium	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Zinc	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*

Notes:

Green - No statistically significant concentration greater than or equal to the GSL for constituents other than pH and no statistically significant difference outside the GSL range for pH.

Green* - Limited dataset (sample size <5 or <4 detected values), but none of the available results are greater than or equal to the GSL or outside the GSL range for pH.

Red - Statistically significant concentration greater than or equal to the GSL for constituents other than pH or a statistically significant difference outside the GSL range for pH.

Bold colors are used to represent CCR Rule Appendix IV Parameter and TDEC Appendix I Parameter results; subdued colors represent CCR Rule Appendix III Parameter results.

[1]Fluoride is both a CCR Rule Appendix III and CCR Rule Appendix IV constituent. In this table, fluoride has been grouped only with the Appendix III constituents to avoid duplication of results.

* Wells JSF-101 and JSF-102 were added to Dry Fly Ash Landfill permitted compliance network as background monitoring wells in February 2022.

** Not currently part of the permitted compliance network for the Dry Fly Ash Landfill. Wells are included in groundwater sampling events for the Dry Fly Ash Stack for comparison purposes.

*** Well W-32 is in the permitted compliance network for the Dry Fly Ash Landfill and the certified CCR groundwater monitoring network for the Bottom Ash Pond.

In total, 14 well-constituent pairs were identified with CCR Parameters at statistically significant concentrations greater than or equal to the GSL for constituents other than pH. There were also six wells where a statistically significant difference from the GSL range for pH were observed. The well-constituent pairs with statistically significant concentrations greater than or equal to the GSL or outside the GSL range for pH (i.e., categorized as 'Red' in Table E.3-3) are summarized in Table E.3-4.

Table E.3-4 – Summary of Statistically Significant Concentrations Greater than Groundwater Screening Levels

Parameter		CCR Rule Appendix III Parameters			CCR Rule Appendix IV Parameters		
		Boron	pH (Field)	Sulfate	Total Dissolved Solids	Lithium	Molybdenum
Background	JSF-101	-	-	-	X	-	-
	JSF-102	-	-	-	X	-	-
	JSF-104	-	X	-	-	-	-
	JSF-110	-	X	-	-	-	-
Ash Disposal Area J	JSF-107	-	-	-	-	-	X
	JSF-108	X	-	X	X	-	-
Bottom Ash Pond	10-36	-	-	-	X	-	-
	JSF-103	-	X	-	-	-	-
	JSF-105	-	X	-	-	-	-
Dry Fly Ash Stack Landfill	W-28	-	X	X	X	-	-
	W-30	-	X	X	X	-	-
	W-31	-	-	-	X	X	X

Notes
Well-constituent pairs with CCR Parameters at statistically significant concentrations greater than or equal to the GSL for constituents other than pH or outside the GSL range for pH are identified with an 'X' and highlighted gray.
Dash (-) indicates the absence of a statistically significant concentration greater than or equal to the GSL or outside the GSL range for pH for that well-constituent pair.

4.0 REFERENCES

Tukey, J.W. (1977). *Exploratory Data Analysis*. Reading, Massachusetts: Addison-Wesley. 1977.

United States Environmental Protection Agency. (2009). *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance*. EPA 530/R-09-007, 884 pp.

ATTACHMENT E.3-A
SUMMARY STATISTICS

Summary Statistics - Groundwater Investigation									
John Sevier Fossil Plant - Rogersville, Tennessee									
Parameter	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
				Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Well: JSF-101									
CCR Rule Appendix III Parameters									
Boron	14/26	(16 - 200)	46.2%	26.5	64.4	36.07	12.85	40.65	200
Calcium	28/28	--	0.0%	154,000	258,000	218,286	28,230	220,000	252,650
Chloride	26/26	--	0.0%	7,940	16,200	10,003	2,050	9,795	14,500
Fluoride[1] (also Appendix IV)	19/26	(77.6 - 100)	26.9%	58.9	117	87.67	13.4	94.15	106.5
pH	30/30	--	0.0%	6.42	7.03	6.71	0.172	6.71	7.006
Sulfate	26/26	--	0.0%	319,000	810,000	447,923	96,216	438,000	570,250
TDS	28/28	--	0.0%	547,000	1,120,000	927,714	124,131	963,000	1,066,500
CCR Rule Appendix IV Parameters									
Antimony	0/26	(0.378 - 2)	100.0%	N/A	N/A	N/A	N/A	0.538	2
Arsenic	2/26	(0.282 - 2)	92.3%	0.363	0.364	0.294	0.0285	0.364	1
Barium	20/26	(41 - 200000)	23.1%	21.2	65.5	35.41	8.663	36.35	200
Beryllium	1/26	(0.057 - 2)	96.2%	0.38	0.38	0.074	0.0721	0.182	1
Cadmium	0/26	(0.125 - 1)	100.0%	N/A	N/A	N/A	N/A	0.161	1
Chromium	0/26	(0.98 - 2.88)	100.0%	N/A	N/A	N/A	N/A	1.53	2.463
Cobalt	17/26	(0.134 - 2)	34.6%	0.201	0.62	0.358	0.154	0.462	0.618
Lead	1/26	(0.094 - 2)	96.2%	0.136	0.136	0.0968	0.0105	0.128	1
Lithium	25/28	(1.65 - 11.3)	10.7%	4	13.3	8.593	2.834	9.175	13.27
Mercury	0/26	(0.101 - 0.2)	100.0%	N/A	N/A	N/A	N/A	0.116	0.2
Molybdenum	1/28	(0.005 - 5)	96.4%	1.05	1.05	0.0665	0.246	0.61	5
Radium-226+228	14/28	(0.0686 - 1.029)	50.0%	0.134	0.932	0.363	0.223	0.442	0.879
Selenium	0/26	(0.739 - 5)	100.0%	N/A	N/A	N/A	N/A	2.62	5
Thallium	1/26	(0.063 - 2)	96.2%	0.247	0.247	0.0727	0.0411	0.148	1
TDEC Appendix I Parameters									
Copper	1/26	(0.627 - 2)	96.2%	0.814	0.814	0.644	0.0538	1.18	2
Nickel	11/26	(0.312 - 2)	57.7%	0.457	0.822	0.525	0.163	0.679	1.47
Silver	0/17	(0.053 - 2)	100.0%	N/A	N/A	N/A	N/A	0.177	1.2
Vanadium	0/17	(0.776 - 4)	100.0%	N/A	N/A	N/A	N/A	1	3.632
Zinc	1/17	(2.88 - 25)	94.1%	3.6	3.6	2.983	0.252	5	17
Well: JSF-102									
CCR Rule Appendix III Parameters									
Boron	14/26	(30.3 - 200000)	46.2%	27.8	77.9	37.07	11.85	38.05	200
Calcium	28/28	--	0.0%	139,000	180,000	158,429	9,834	158,500	172,300
Chloride	26/26	--	0.0%	2,420	4,800	3,959	699	4,240	4,658
Fluoride[1] (also Appendix IV)	24/26	(100 - 152)	7.7%	93.9	184	144	23.82	152.5	178
pH	29/29	--	0.0%	6.47	7.19	6.787	0.192	6.81	7.122
Sulfate	26/26	--	0.0%	134,000	179,000	153,962	12,938	154,000	176,500
TDS	28/28	--	0.0%	502,000	694,000	621,821	35,792	623,000	670,550
CCR Rule Appendix IV Parameters									
Antimony	0/26	(0.378 - 2)	100.0%	N/A	N/A	N/A	N/A	0.474	2
Arsenic	2/26	(0.282 - 2)	92.3%	0.419	0.788	0.317	0.114	0.429	1
Barium	21/26	(200 - 200000)	19.2%	87.9	131	115.3	10.27	120	200
Beryllium	1/26	(0.057 - 2)	96.2%	0.488	0.488	0.0797	0.0962	0.182	1
Cadmium	1/26	(0.125 - 1)	96.2%	0.243	0.243	0.131	0.0257	0.197	1
Chromium	0/26	(0.631 - 3.05)	100.0%	N/A	N/A	N/A	N/A	1.53	2.675
Cobalt	17/26	(0.19 - 2)	34.6%	0.131	0.606	0.244	0.108	0.269	0.58
Lead	3/26	(0.094 - 2)	88.5%	0.131	0.216	0.111	0.0389	0.165	1
Lithium	26/28	(8.26 - 10.8)	7.1%	4.41	10.4	7.632	1.503	7.775	10.18
Mercury	0/26	(0.101 - 0.2)	100.0%	N/A	N/A	N/A	N/A	0.116	0.2
Molybdenum	3/28	(0.474 - 5)	89.3%	0.879	4.01	0.705	0.773	0.745	5
Radium-226+228	11/28	(0.016 - 0.891)	60.7%	0.118	1.43	0.267	0.3	0.364	0.869
Selenium	0/26	(0.739 - 5)	100.0%	N/A	N/A	N/A	N/A	2.62	5
Thallium	2/26	(0.063 - 2)	92.3%	0.504	0.589	0.111	0.146	0.148	1
TDEC Appendix I Parameters									
Copper	2/26	(0.627 - 2)	92.3%	0.664	0.792	0.645	0.0476	1.175	2
Nickel	13/26	(0.312 - 2.95)	50.0%	0.36	0.658	0.493	0.0885	0.579	1.868
Silver	0/17	(0.053 - 2)	100.0%	N/A	N/A	N/A	N/A	0.177	1.2
Vanadium	0/17	(0.776 - 4)	100.0%	N/A	N/A	N/A	N/A	1	3.168
Zinc	1/17	(2.88 - 25)	94.1%	9.51	9.51	3.433	1.832	5	17

Summary Statistics - Groundwater Investigation John Sevier Fossil Plant - Rogersville, Tennessee									
Parameter	**Frequency of Detection**	**Range of Reporting Limits**	**% Non Detect**	**Statistics using Detected Data Only**		**Statistics using Detects & Non-Detects**			
				Minimum Detect	**Maximum Detect**	**Mean**	**Standard Deviation**	**50th Percentile**	**95th Percentile**
Well: JSF-104									
CCR Rule Appendix III Parameters									
Boron	1/32	(16 - 200)	96.9%	750	750	38.94	127.7	30.3	200
Calcium	34/34	--	0.0%	13,000	127,000	22,385	19,474	17,050	36,390
Chloride	32/32	--	0.0%	3,780	10,800	7,668	1,233	7,760	9,053
Fluoride[1] (also Appendix IV)	11/32	(24 - 100)	65.6%	24.5	244	35.18	38.53	27.75	100
pH	37/37	--	0.0%	4.88	6.5	5.526	0.341	5.42	6.144
Sulfate	32/32	--	0.0%	3,660	93,000	10,230	15,278	7,330	13,290
TDS	34/34	--	0.0%	42,000	558,000	99,676	83,865	81,000	133,500
CCR Rule Appendix IV Parameters									
Antimony	1/32	(0.378 - 2)	96.9%	1.77	1.77	0.432	0.268	0.57	2
Arsenic	3/32	(0.282 - 2)	90.6%	0.333	0.808	0.317	0.108	0.46	1
Barium	27/32	(200 - 200)	15.6%	36.5	56.7	45.96	5.018	47	200
Beryllium	4/32	(0.057 - 2)	87.5%	0.297	0.968	0.152	0.234	0.286	1
Cadmium	3/32	(0.125 - 1)	90.6%	0.205	0.441	0.145	0.0641	0.197	1
Chromium	7/32	(0.98 - 5.38)	78.1%	1.06	1.78	1.238	0.275	1.725	3.699
Cobalt	5/32	(0.075 - 2)	84.4%	0.098	0.519	0.116	0.105	0.19	0.509
Lead	4/32	(0.128 - 2)	87.5%	0.114	0.519	0.14	0.0818	0.315	1
Lithium	28/34	(5 - 10.6)	17.6%	4.05	10.2	7.033	1.491	6.955	9.648
Mercury	0/32	(0.101 - 0.2)	100.0%	N/A	N/A	N/A	N/A	0.13	0.2
Molybdenum	1/34	(0.474 - 5)	97.1%	1.61	1.61	0.518	0.218	0.845	5
Radium-226+228	4/35	(0 - 1.011)	88.6%	0.571	1.512	0.117	0.35	0.219	1.097
Selenium	1/32	(0.739 - 5)	96.9%	1.51	1.51	0.784	0.181	1.51	5
Thallium	5/32	(0.063 - 2)	84.4%	0.264	1.15	0.172	0.256	0.2	1.068
TDEC Appendix I Parameters									
Copper	1/32	(0.627 - 2)	96.9%	5.8	5.8	0.789	0.9	1.5	2
Nickel	19/32	(1 - 3.22)	40.6%	0.959	3.13	1.448	0.478	1.47	2.751
Silver	1/23	(0.053 - 2)	95.7%	0.093	0.093	0.0574	0.0126	0.177	1
Vanadium	1/23	(0.776 - 4)	95.7%	3.2	3.2	0.886	0.505	0.991	3.123
Zinc	2/23	(2.88 - 25)	91.3%	4.05	4.74	3.259	0.678	5	15
Well: JSF-106									
CCR Rule Appendix III Parameters									
Boron	8/10	(183 - 308)	20.0%	87.6	308	136	64.2	136.5	308
Calcium	10/10	--	0.0%	60,100	123,000	82,110	22,256	75,700	119,400
Chloride	10/10	--	0.0%	2,780	10,500	5,297	3,279	3,325	10,145
Fluoride[1] (also Appendix IV)	9/10	(73.2 - 73.2)	10.0%	79.1	132	103.7	20.13	110	132
pH	10/10	--	0.0%	3.92	6.62	6.215	0.829	6.51	6.616
Sulfate	10/10	--	0.0%	63,900	149,000	99,280	25,971	106,500	134,150
TDS	10/10	--	0.0%	271,000	464,000	342,100	72,554	325,500	462,650
CCR Rule Appendix IV Parameters									
Antimony	3/10	(0.378 - 0.57)	70.0%	0.599	1.06	0.5	0.215	0.57	0.894
Arsenic	5/10	(0.492 - 1.29)	50.0%	0.38	2.03	0.652	0.49	0.75	1.697
Barium	10/10	--	0.0%	35.9	76.4	51.3	15.22	45.95	75.95
Beryllium	1/10	(0.182 - 0.305)	90.0%	0.607	0.607	0.225	0.128	0.228	0.471
Cadmium	0/10	(0.125 - 0.217)	100.0%	N/A	N/A	N/A	N/A	0.197	0.217
Chromium	0/10	(0.98 - 2.99)	100.0%	N/A	N/A	N/A	N/A	1.53	2.621
Cobalt	6/10	(0.134 - 0.261)	40.0%	0.156	2.06	0.398	0.566	0.195	1.381
Lead	0/10	(0.128 - 0.45)	100.0%	N/A	N/A	N/A	N/A	0.173	0.45
Lithium	1/10	(1.65 - 3.39)	90.0%	0.937	0.937	0.937	0	2.52	3.39
Mercury	0/10	(0.101 - 0.139)	100.0%	N/A	N/A	N/A	N/A	0.13	0.135
Molybdenum	7/10	(0.61 - 1.49)	30.0%	1.23	7.88	2.1	2.028	1.68	5.535
Radium-226+228	1/10	(0.0374 - 1.174)	90.0%	0.903	0.903	0.134	0.272	0.437	1.052
Selenium	0/10	(0.739 - 1.51)	100.0%	N/A	N/A	N/A	N/A	1.2	1.51
Thallium	4/10	(0.148 - 0.472)	60.0%	0.275	1.26	0.326	0.33	0.238	0.92
TDEC Appendix I Parameters									
Copper	3/10	(0.627 - 2.48)	70.0%	1.16	2.04	1.198	0.448	1.7	2.282
Nickel	5/10	(1.27 - 1.47)	50.0%	0.428	3.14	1.22	0.8	1.47	2.69
Silver	0/10	(0.053 - 0.223)	100.0%	N/A	N/A	N/A	N/A	0.177	0.202
Vanadium	0/10	(0.776 - 1.66)	100.0%	N/A	N/A	N/A	N/A	0.906	1.489
Zinc	0/10	(3.22 - 15)	100.0%	N/A	N/A	N/A	N/A	6.725	15

Summary Statistics - Groundwater Investigation									
John Sevier Fossil Plant - Rogersville, Tennessee									
Parameter	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
				Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Well: JSF-110									
CCR Rule Appendix III Parameters									
Boron	1/6	(16 - 38.6)	83.3%	136	136	36	44.72	27.3	111.7
Calcium	6/6	--	0.0%	5,880	53,000	17,863	17,751	11,250	44,350
Chloride	6/6	--	0.0%	2,320	8,530	4,750	2,705	3,630	8,338
Fluoride[1] (also Appendix IV)	6/6	--	0.0%	30.5	69.2	44.22	14.1	40.85	64.23
pH	6/6	--	0.0%	4.44	6.69	5.405	0.754	5.31	6.428
Sulfate	6/6	--	0.0%	4,800	73,700	25,800	27,271	11,050	66,175
TDS	6/6	--	0.0%	35,000	279,000	107,333	91,303	76,500	241,750
CCR Rule Appendix IV Parameters									
Antimony	2/6	(0.378 - 0.57)	66.7%	0.647	1.12	0.547	0.275	0.57	1.002
Arsenic	1/6	(0.413 - 2.13)	83.3%	0.411	0.411	0.411	0	0.75	1.785
Barium	6/6	--	0.0%	45.1	85.2	60.78	15.48	54.85	82.45
Beryllium	3/6	(0.182 - 0.305)	50.0%	0.34	0.975	0.369	0.281	0.323	0.82
Cadmium	1/6	(0.125 - 0.197)	83.3%	0.253	0.253	0.146	0.0477	0.197	0.239
Chromium	0/6	(0.98 - 3.84)	100.0%	N/A	N/A	N/A	N/A	0.98	3.46
Cobalt	6/6	--	0.0%	0.9	2.73	1.57	0.638	1.55	2.45
Lead	1/6	(0.128 - 0.45)	83.3%	0.537	0.537	0.196	0.152	0.45	0.515
Lithium	1/6	(1.65 - 4.47)	83.3%	2.55	2.55	1.875	0.39	2.1	4.2
Mercury	0/6	(0.101 - 0.13)	100.0%	N/A	N/A	N/A	N/A	0.13	0.13
Molybdenum	1/6	(0.61 - 1.08)	83.3%	7.96	7.96	1.835	2.739	1.08	6.24
Radium-226+228	1/6	(0 - 1.03)	83.3%	1.62	1.62	0.27	0.604	0.547	1.473
Selenium	1/6	(0.89 - 1.51)	83.3%	1.32	1.32	0.998	0.186	1.105	1.51
Thallium	2/6	(0.148 - 1.12)	66.7%	0.254	0.93	0.326	0.305	0.227	1.073
TDEC Appendix I Parameters									
Copper	1/6	(1.2 - 1.7)	83.3%	1.15	1.15	1.15	0	1.7	1.7
Nickel	4/6	(1.47 - 1.54)	33.3%	1.96	20.2	4.878	6.857	1.985	15.69
Silver	0/6	(0.053 - 0.177)	100.0%	N/A	N/A	N/A	N/A	0.053	0.177
Vanadium	0/6	(0.82 - 2.56)	100.0%	N/A	N/A	N/A	N/A	0.82	2.288
Zinc	0/6	(11.1 - 15)	100.0%	N/A	N/A	N/A	N/A	15	15
Well: JSF-200									
CCR Rule Appendix III Parameters									
Boron	10/23	(16 - 109)	56.5%	16.1	77.1	22.09	13.37	30.3	73.53
Calcium	23/23	--	0.0%	85,100	103,000	97,591	5,008	98,600	103,000
Chloride	23/23	--	0.0%	7,240	11,600	8,945	1,152	8,660	10,750
Fluoride[1] (also Appendix IV)	18/23	(26.3 - 79.7)	21.7%	27.8	49.4	38.1	7.133	39.5	66.23
pH	24/24	--	0.0%	6.6	7.84	7.012	0.249	6.995	7.314
Sulfate	23/23	--	0.0%	10,700	19,500	16,030	2,648	16,800	19,070
TDS	23/23	--	0.0%	258,000	346,000	305,043	20,786	308,000	333,700
CCR Rule Appendix IV Parameters									
Antimony	0/23	(0.378 - 1.12)	100.0%	N/A	N/A	N/A	N/A	0.506	1.065
Arsenic	1/23	(0.313 - 0.75)	95.7%	0.355	0.355	0.316	0.0112	0.333	0.75
Barium	23/23	--	0.0%	163	240	196.6	21.15	195	230.7
Beryllium	0/23	(0.057 - 0.62)	100.0%	N/A	N/A	N/A	N/A	0.182	0.62
Cadmium	0/23	(0.125 - 0.217)	100.0%	N/A	N/A	N/A	N/A	0.125	0.215
Chromium	1/23	(0.631 - 3.14)	95.7%	1.13	1.13	0.702	0.175	1.53	2.47
Cobalt	9/23	(0.075 - 0.261)	60.9%	0.14	0.255	0.134	0.0462	0.172	0.254
Lead	0/23	(0.094 - 0.45)	100.0%	N/A	N/A	N/A	N/A	0.128	0.45
Lithium	19/23	(10 - 17.2)	17.4%	10.5	14.4	12.61	1.276	12.9	15.86
Mercury	0/23	(0.101 - 0.13)	100.0%	N/A	N/A	N/A	N/A	0.101	0.13
Molybdenum	0/23	(0.474 - 1.08)	100.0%	N/A	N/A	N/A	N/A	0.61	1.08
Radium-226+228	11/24	(0.104 - 1.397)	54.2%	0.157	0.931	0.363	0.233	0.497	1.144
Selenium	0/23	(0.739 - 2.62)	100.0%	N/A	N/A	N/A	N/A	0.89	2.62
Thallium	2/23	(0.063 - 0.472)	91.3%	0.212	0.255	0.0792	0.0505	0.148	0.342
TDEC Appendix I Parameters									
Copper	0/23	(0.627 - 1.7)	100.0%	N/A	N/A	N/A	N/A	1.14	1.7
Nickel	0/23	(0.312 - 1.47)	100.0%	N/A	N/A	N/A	N/A	0.336	1.47
Silver	0/14	(0.053 - 0.223)	100.0%	N/A	N/A	N/A	N/A	0.053	0.193
Vanadium	0/14	(0.776 - 1.81)	100.0%	N/A	N/A	N/A	N/A	0.82	1.485
Zinc	1/14	(2.88 - 15)	92.9%	4.04	4.04	3.112	0.464	15	15

Summary Statistics - Groundwater Investigation John Sevier Fossil Plant - Rogersville, Tennessee									
Parameter	**Frequency of Detection**	**Range of Reporting Limits**	**% Non Detect**	**Statistics using Detected Data Only**		**Statistics using Detects & Non-Detects**			
				Minimum Detect	**Maximum Detect**	**Mean**	**Standard Deviation**	**50th Percentile**	**95th Percentile**
Well: JSF-205									
CCR Rule Appendix III Parameters									
Boron	4/23	(16 - 60.1)	82.6%	16	53.3	19.27	9.797	30.3	52.65
Calcium	23/23	--	0.0%	59,800	79,000	71,339	4,995	72,500	77,560
Chloride	23/23	--	0.0%	5,730	8,310	6,915	674.7	7,050	7,617
Fluoride[1] (also Appendix IV)	19/23	(59.1 - 125)	17.4%	36.3	105	73.79	18	76.7	119.4
pH	23/23	--	0.0%	6.83	7.59	7.325	0.21	7.35	7.579
Sulfate	23/23	--	0.0%	14,700	29,800	22,183	5,675	21,500	29,790
TDS	23/23	--	0.0%	138,000	317,000	228,826	38,433	238,000	255,000
CCR Rule Appendix IV Parameters									
Antimony	5/23	(0.378 - 1.12)	78.3%	0.573	0.923	0.458	0.155	0.57	1.1
Arsenic	13/23	(0.75 - 1.56)	43.5%	0.699	1.95	0.947	0.313	0.872	1.543
Barium	23/23	--	0.0%	56	105	76.65	12.55	76.2	93.36
Beryllium	0/23	(0.057 - 0.62)	100.0%	N/A	N/A	N/A	N/A	0.182	0.62
Cadmium	0/23	(0.125 - 0.217)	100.0%	N/A	N/A	N/A	N/A	0.125	0.215
Chromium	1/23	(0.98 - 3.35)	95.7%	1.63	1.63	1.021	0.157	1.53	2.47
Cobalt	13/23	(0.19 - 0.261)	43.5%	0.225	0.692	0.303	0.14	0.265	0.548
Lead	0/23	(0.094 - 0.45)	100.0%	N/A	N/A	N/A	N/A	0.128	0.45
Lithium	19/23	(3.44 - 6.72)	17.4%	2.94	9.68	5.257	1.708	5.08	7.925
Mercury	0/23	(0.101 - 0.13)	100.0%	N/A	N/A	N/A	N/A	0.101	0.13
Molybdenum	16/23	(0.61 - 0.929)	30.4%	0.587	8.1	2.866	2.665	1.07	6.944
Radium-226+228	4/23	(0.0263 - 0.878)	82.6%	0.365	0.913	0.134	0.238	0.309	0.87
Selenium	0/23	(0.739 - 2.62)	100.0%	N/A	N/A	N/A	N/A	0.89	2.62
Thallium	0/23	(0.063 - 0.472)	100.0%	N/A	N/A	N/A	N/A	0.148	0.2
TDEC Appendix I Parameters									
Copper	1/23	(0.627 - 1.7)	95.7%	0.933	0.933	0.658	0.0918	1.14	1.7
Nickel	6/23	(0.312 - 1.47)	73.9%	0.343	1.2	0.485	0.272	0.765	1.47
Silver	0/14	(0.053 - 0.223)	100.0%	N/A	N/A	N/A	N/A	0.053	0.193
Vanadium	0/14	(0.776 - 1.84)	100.0%	N/A	N/A	N/A	N/A	0.82	1.762
Zinc	3/14	(2.88 - 15)	78.6%	4.12	15.4	4.318	3.153	15	15.14
Well: JSF-206									
CCR Rule Appendix III Parameters									
Boron	3/10	(16 - 38.6)	70.0%	16.3	18.4	16.9	1.004	28.5	38.6
Calcium	10/10	--	0.0%	84,900	120,000	100,970	10,166	99,200	116,400
Chloride	10/10	--	0.0%	9,170	30,000	15,547	6,646	12,300	27,210
Fluoride[1] (also Appendix IV)	7/10	(56.6 - 135)	30.0%	39	71.1	48.04	9.383	48.65	119.3
pH	10/10	--	0.0%	6.58	7.1	6.847	0.156	6.84	7.06
Sulfate	10/10	--	0.0%	28,800	67,400	46,410	11,311	45,600	64,970
TDS	10/10	--	0.0%	284,000	364,000	326,800	26,968	324,000	363,550
CCR Rule Appendix IV Parameters									
Antimony	0/10	(0.378 - 0.57)	100.0%	N/A	N/A	N/A	N/A	0.474	0.57
Arsenic	4/10	(0.313 - 0.914)	60.0%	0.558	1.95	0.673	0.455	0.75	1.484
Barium	10/10	--	0.0%	156	245	179.7	26.29	171	223.9
Beryllium	3/10	(0.182 - 0.305)	70.0%	0.265	1.43	0.348	0.368	0.305	0.977
Cadmium	0/10	(0.125 - 0.217)	100.0%	N/A	N/A	N/A	N/A	0.197	0.217
Chromium	0/10	(0.98 - 2.69)	100.0%	N/A	N/A	N/A	N/A	1.53	2.591
Cobalt	10/10	--	0.0%	0.205	1.79	0.626	0.508	0.433	1.52
Lead	0/10	(0.128 - 0.45)	100.0%	N/A	N/A	N/A	N/A	0.289	0.45
Lithium	9/10	(10 - 10)	10.0%	7.64	10.6	9.243	1.002	9.305	10.6
Mercury	0/10	(0.101 - 0.13)	100.0%	N/A	N/A	N/A	N/A	0.13	0.13
Molybdenum	0/10	(0.61 - 1.08)	100.0%	N/A	N/A	N/A	N/A	0.845	1.08
Radium-226+228	2/10	(0.107 - 1.363)	80.0%	0.544	1.263	0.313	0.374	0.649	1.318
Selenium	0/10	(0.89 - 1.51)	100.0%	N/A	N/A	N/A	N/A	1.2	1.51
Thallium	0/10	(0.148 - 0.2)	100.0%	N/A	N/A	N/A	N/A	0.174	0.2
TDEC Appendix I Parameters									
Copper	1/10	(0.627 - 1.7)	90.0%	0.966	0.966	0.712	0.147	1.63	1.7
Nickel	4/10	(1.25 - 1.47)	60.0%	1.1	2.86	1.487	0.688	1.47	2.856
Silver	0/10	(0.053 - 0.177)	100.0%	N/A	N/A	N/A	N/A	0.115	0.177
Vanadium	0/10	(0.82 - 1.34)	100.0%	N/A	N/A	N/A	N/A	0.906	1.255
Zinc	1/10	(3.24 - 15.5)	90.0%	4.78	4.78	3.625	0.667	11.01	15.28

Summary Statistics - Groundwater Investigation John Sevier Fossil Plant - Rogersville, Tennessee									
Parameter	**Frequency of Detection**	**Range of Reporting Limits**	**% Non Detect**	**Statistics using Detected Data Only**		**Statistics using Detects & Non-Detects**			
				Minimum Detect	**Maximum Detect**	**Mean**	**Standard Deviation**	**50th Percentile**	**95th Percentile**
Well: JSF-210									
CCR Rule Appendix III Parameters									
Boron	5/10	(16 - 62.3)	50.0%	17.9	90.9	25.45	21.85	29.2	78.03
Calcium	10/10	--	0.0%	112,000	137,000	120,500	6,932	120,000	131,150
Chloride	10/10	--	0.0%	14,800	40,900	24,650	9,803	20,800	38,965
Fluoride[1] (also Appendix IV)	8/10	(59.4 - 59.9)	20.0%	47.7	68.7	56.15	7.125	58.5	67.98
pH	10/10	--	0.0%	6.84	7.2	7.055	0.126	7.085	7.191
Sulfate	10/10	--	0.0%	56,700	87,900	69,680	12,443	66,500	87,900
TDS	10/10	--	0.0%	327,000	499,000	409,600	46,092	411,500	475,600
CCR Rule Appendix IV Parameters									
Antimony	0/10	(0.378 - 0.57)	100.0%	N/A	N/A	N/A	N/A	0.474	0.57
Arsenic	5/10	(0.75 - 0.939)	50.0%	0.614	1.17	0.803	0.233	0.837	1.166
Barium	10/10	--	0.0%	125	170	145.8	14.64	147.5	165.5
Beryllium	0/10	(0.182 - 0.62)	100.0%	N/A	N/A	N/A	N/A	0.244	0.478
Cadmium	0/10	(0.125 - 0.217)	100.0%	N/A	N/A	N/A	N/A	0.197	0.217
Chromium	0/10	(0.98 - 2.76)	100.0%	N/A	N/A	N/A	N/A	1.53	2.63
Cobalt	9/10	(0.19 - 0.19)	10.0%	0.48	0.996	0.635	0.224	0.624	0.995
Lead	0/10	(0.128 - 0.45)	100.0%	N/A	N/A	N/A	N/A	0.289	0.45
Lithium	9/10	(8.71 - 8.71)	10.0%	8.22	12.3	10.35	1.322	10.45	12.08
Mercury	0/10	(0.101 - 0.13)	100.0%	N/A	N/A	N/A	N/A	0.13	0.13
Molybdenum	2/10	(0.61 - 1.15)	80.0%	0.622	0.963	0.683	0.14	1.022	1.119
Radium-226+228	0/10	(0.0336 - 1.06)	100.0%	N/A	N/A	N/A	N/A	0.509	1.041
Selenium	0/10	(0.89 - 1.51)	100.0%	N/A	N/A	N/A	N/A	1.2	1.51
Thallium	2/10	(0.148 - 0.2)	80.0%	0.165	0.3	0.166	0.045	0.183	0.255
TDEC Appendix I Parameters									
Copper	1/10	(0.627 - 1.7)	90.0%	0.643	0.643	0.631	0.00693	1.66	1.7
Nickel	1/10	(0.336 - 1.47)	90.0%	0.381	0.381	0.347	0.0195	0.993	1.47
Silver	0/10	(0.053 - 0.177)	100.0%	N/A	N/A	N/A	N/A	0.115	0.177
Vanadium	0/10	(0.82 - 1.14)	100.0%	N/A	N/A	N/A	N/A	0.906	1.073
Zinc	1/10	(3.22 - 15)	90.0%	3.44	3.44	3.293	0.104	9.905	15
Well: W-1									
CCR Rule Appendix III Parameters									
Boron	3/13	(16 - 200)	76.9%	16.5	75.3	27.18	20.07	50	200
Calcium	14/14	--	0.0%	59,000	94,100	84,036	8,681	84,450	93,645
Chloride	13/13	--	0.0%	6,570	11,300	9,665	1,208	9,780	11,000
Fluoride[1] (also Appendix IV)	7/13	(100 - 100)	46.2%	62.4	90	70.57	9.694	90	100
pH	16/16	--	0.0%	6.78	8.73	7.161	0.45	7.055	7.733
Sulfate	13/13	--	0.0%	21,800	29,600	26,323	2,392	25,500	29,540
TDS	15/15	--	0.0%	265,000	305,000	289,133	12,512	287,000	305,000
CCR Rule Appendix IV Parameters									
Antimony	0/13	(0.378 - 2)	100.0%	N/A	N/A	N/A	N/A	0.57	2
Arsenic	9/13	(0.75 - 2)	30.8%	0.812	4.76	1.48	1.054	1.1	3.182
Barium	12/13	(200 - 200)	7.7%	204	348	233.6	37.02	229	291
Beryllium	2/13	(0.155 - 2)	84.6%	0.389	0.903	0.302	0.26	0.903	1.4
Cadmium	0/13	(0.125 - 1)	100.0%	N/A	N/A	N/A	N/A	0.217	1
Chromium	0/13	(0.98 - 2.47)	100.0%	N/A	N/A	N/A	N/A	2	2.188
Cobalt	4/13	(0.134 - 2)	69.2%	0.163	0.413	0.228	0.0989	0.413	1.1
Lead	5/13	(0.45 - 2)	61.5%	0.145	0.384	0.273	0.0906	0.45	1.4
Lithium	14/15	(14 - 14)	6.7%	8.88	10.9	10.24	0.638	10.4	11.83
Mercury	0/13	(0.101 - 0.2)	100.0%	N/A	N/A	N/A	N/A	0.13	0.2
Molybdenum	0/15	(0.005 - 5)	100.0%	N/A	N/A	N/A	N/A	1.08	5
Radium-226+228	9/15	(0.275 - 0.858)	40.0%	0.205	1.756	0.649	0.484	0.674	1.522
Selenium	0/13	(0.739 - 5)	100.0%	N/A	N/A	N/A	N/A	2	5
Thallium	2/13	(0.128 - 2)	84.6%	0.435	0.914	0.293	0.278	0.914	1.4
TDEC Appendix I Parameters									
Copper	3/13	(1.32 - 2)	76.9%	0.665	0.738	0.7	0.0298	1.7	2
Nickel	0/13	(0.336 - 2.45)	100.0%	N/A	N/A	N/A	N/A	1	2.18
Silver	0/13	(0.053 - 2)	100.0%	N/A	N/A	N/A	N/A	0.223	1.4
Vanadium	1/13	(0.82 - 4)	92.3%	0.999	0.999	0.85	0.0667	1	2.35
Zinc	2/13	(3.22 - 25)	84.6%	3.61	9.08	3.923	1.728	5	19

Summary Statistics - Groundwater Investigation									
John Sevier Fossil Plant - Rogersville, Tennessee									
Parameter	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
				Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Well: JSF-107									
CCR Rule Appendix III Parameters									
Boron	7/7	--	0.0%	3,960	5,320	4,553	482	4,430	5,254
Calcium	7/7	--	0.0%	74,100	85,600	79,043	4,175	79,400	84,700
Chloride	7/7	--	0.0%	2,610	3,690	3,287	370	3,240	3,654
Fluoride[1] (also Appendix IV)	7/7	--	0.0%	640	1,180	892.6	203.3	829	1,147
pH	7/7	--	0.0%	4.05	6.46	6.017	0.871	6.32	6.445
Sulfate	7/7	--	0.0%	108,000	140,000	130,286	11,056	130,000	139,700
TDS	7/7	--	0.0%	258,000	352,000	315,143	32,539	328,000	346,900
CCR Rule Appendix IV Parameters									
Antimony	2/7	(0.378 - 0.57)	71.4%	0.508	0.693	0.46	0.111	0.57	0.656
Arsenic	1/7	(0.313 - 0.75)	85.7%	0.38	0.38	0.335	0.0316	0.75	0.75
Barium	7/7	--	0.0%	21.8	28.5	26.16	2.756	27.5	28.35
Beryllium	0/7	(0.182 - 0.305)	100.0%	N/A	N/A	N/A	N/A	0.305	0.305
Cadmium	5/7	(0.197 - 0.217)	28.6%	0.206	0.426	0.268	0.0803	0.227	0.4
Chromium	1/7	(0.98 - 1.53)	85.7%	8.02	8.02	1.986	2.463	1.53	6.073
Cobalt	1/7	(0.134 - 0.261)	85.7%	0.427	0.427	0.176	0.103	0.19	0.377
Lead	0/7	(0.128 - 0.45)	100.0%	N/A	N/A	N/A	N/A	0.45	0.45
Lithium	1/7	(1.65 - 3.39)	85.7%	0.929	0.929	0.929	0	1.65	3.39
Mercury	0/7	(0.101 - 0.13)	100.0%	N/A	N/A	N/A	N/A	0.13	0.13
Molybdenum	7/7	--	0.0%	849	1380	1109	190.8	1160	1341
Radium-226+228	2/7	(0.142 - 0.508)	71.4%	0.883	1.26	0.408	0.432	0.398	1.147
Selenium	0/7	(0.739 - 1.51)	100.0%	N/A	N/A	N/A	N/A	0.89	1.51
Thallium	0/7	(0.148 - 0.472)	100.0%	N/A	N/A	N/A	N/A	0.2	0.39
TDEC Appendix I Parameters									
Copper	0/7	(0.627 - 1.7)	100.0%	N/A	N/A	N/A	N/A	1.7	1.7
Nickel	1/7	(0.517 - 1.6)	85.7%	0.485	0.485	0.485	0	1.47	1.561
Silver	0/7	(0.053 - 0.223)	100.0%	N/A	N/A	N/A	N/A	0.053	0.209
Vanadium	0/7	(0.776 - 0.991)	100.0%	N/A	N/A	N/A	N/A	0.82	0.991
Zinc	2/7	(3.22 - 15)	71.4%	4.76	21	6.42	5.995	15	19.2
Well: JSF-108									
CCR Rule Appendix III Parameters									
Boron	10/10	--	0.0%	4,830	6,540	5,721	450.5	5,755	6,333
Calcium	10/10	--	0.0%	167,000	222,000	180,600	17,309	173,000	208,950
Chloride	10/10	--	0.0%	9,100	39,600	14,950	9,150	11,500	30,780
Fluoride[1] (also Appendix IV)	10/10	--	0.0%	153	408	221.2	69.95	209.5	327.5
pH	10/10	--	0.0%	4.11	8.14	6.694	1.001	6.85	7.636
Sulfate	10/10	--	0.0%	242,000	317,000	275,900	23,867	277,500	307,550
TDS	10/10	--	0.0%	738,000	888,000	782,100	49,498	757,500	866,850
CCR Rule Appendix IV Parameters									
Antimony	3/10	(0.378 - 0.57)	70.0%	0.866	1.49	0.598	0.368	0.57	1.26
Arsenic	6/10	(0.323 - 1.23)	40.0%	0.337	1.06	0.509	0.249	0.594	1.154
Barium	10/10	--	0.0%	40.7	58.8	48.89	6.383	47.9	58.58
Beryllium	0/10	(0.182 - 0.305)	100.0%	N/A	N/A	N/A	N/A	0.228	0.305
Cadmium	0/10	(0.125 - 0.217)	100.0%	N/A	N/A	N/A	N/A	0.197	0.217
Chromium	0/10	(0.98 - 1.85)	100.0%	N/A	N/A	N/A	N/A	1.53	1.706
Cobalt	10/10	--	0.0%	0.332	8.47	3.748	2.721	3.305	8.448
Lead	0/10	(0.128 - 0.45)	100.0%	N/A	N/A	N/A	N/A	0.148	0.45
Lithium	1/10	(1.65 - 3.39)	90.0%	0.916	0.916	0.916	0	2.52	3.39
Mercury	0/10	(0.101 - 0.13)	100.0%	N/A	N/A	N/A	N/A	0.13	0.13
Molybdenum	10/10	--	0.0%	16.5	64.4	46.55	13.3	47.5	63.59
Radium-226+228	1/10	(0.21 - 0.707)	90.0%	1.472	1.472	0.336	0.379	0.447	1.128
Selenium	0/10	(0.739 - 1.51)	100.0%	N/A	N/A	N/A	N/A	1.2	1.51
Thallium	1/10	(0.148 - 0.472)	90.0%	0.172	0.172	0.153	0.0096	0.186	0.35
TDEC Appendix I Parameters									
Copper	0/10	(0.627 - 1.7)	100.0%	N/A	N/A	N/A	N/A	1.16	1.7
Nickel	8/10	(1.76 - 1.94)	20.0%	1.13	1.96	1.552	0.269	1.64	1.951
Silver	0/10	(0.053 - 0.223)	100.0%	N/A	N/A	N/A	N/A	0.177	0.202
Vanadium	0/10	(0.776 - 0.991)	100.0%	N/A	N/A	N/A	N/A	0.906	0.991
Zinc	0/10	(3.05 - 15)	100.0%	N/A	N/A	N/A	N/A	3.645	15

Summary Statistics - Groundwater Investigation									
John Sevier Fossil Plant - Rogersville, Tennessee									
Parameter	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
				Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Well: JSF-109									
CCR Rule Appendix III Parameters									
Boron	8/10	(158 - 191)	20.0%	109	150	125.5	12.8	128	176.2
Calcium	10/10	--	0.0%	96,700	246,000	163,770	55,172	164,000	234,300
Chloride	10/10	--	0.0%	54,500	559,000	317,310	181,571	404,000	523,900
Fluoride[1] (also Appendix IV)	9/10	(379 - 379)	10.0%	173	322	246.3	52.39	259.5	353.4
pH	10/10	--	0.0%	5.13	7.14	6.562	0.564	6.665	7.1
Sulfate	10/10	--	0.0%	161,000	751,000	395,000	187,495	379,000	700,150
TDS	10/10	--	0.0%	884,000	2,600,000	1,737,400	545,402	1,735,000	2,532,500
CCR Rule Appendix IV Parameters									
Antimony	3/10	(0.378 - 0.57)	70.0%	0.935	5.48	1.028	1.511	0.57	3.563
Arsenic	10/10	--	0.0%	3.98	19.9	10.05	4.954	9.245	17.92
Barium	10/10	--	0.0%	14.9	56.3	37.71	12.96	40.8	52.52
Beryllium	0/10	(0.182 - 0.305)	100.0%	N/A	N/A	N/A	N/A	0.228	0.305
Cadmium	0/10	(0.125 - 0.217)	100.0%	N/A	N/A	N/A	N/A	0.197	0.217
Chromium	1/10	(0.98 - 2.45)	90.0%	19.2	19.2	2.802	5.466	1.53	11.66
Cobalt	10/10	--	0.0%	0.369	17.3	7.337	4.695	6.06	14.51
Lead	2/10	(0.128 - 0.45)	80.0%	0.134	0.223	0.145	0.035	0.179	0.45
Lithium	6/10	(1.65 - 3.39)	40.0%	2.64	6.17	3.216	1.372	3.39	5.347
Mercury	0/10	(0.101 - 0.13)	100.0%	N/A	N/A	N/A	N/A	0.13	0.13
Molybdenum	10/10	--	0.0%	4.45	10.6	6.837	2.135	6.485	10.14
Radium-226+228	2/10	(0.285 - 1.197)	80.0%	0.761	1.24	0.434	0.307	0.43	1.221
Selenium	0/10	(0.739 - 1.51)	100.0%	N/A	N/A	N/A	N/A	1.2	1.51
Thallium	1/10	(0.148 - 0.472)	90.0%	0.23	0.23	0.157	0.0258	0.174	0.363
TDEC Appendix I Parameters									
Copper	2/10	(0.627 - 1.76)	80.0%	0.909	3.26	0.975	0.772	1.7	2.585
Nickel	9/10	(1.68 - 1.68)	10.0%	1.58	14	3.756	3.53	2.375	9.869
Silver	0/10	(0.053 - 0.223)	100.0%	N/A	N/A	N/A	N/A	0.177	0.202
Vanadium	7/10	(0.82 - 1.3)	30.0%	1.02	4.32	1.566	1.038	1.14	3.371
Zinc	1/10	(3.22 - 15)	90.0%	4.34	4.34	3.5	0.485	6.005	15
Well: JSF-207									
CCR Rule Appendix III Parameters									
Boron	9/10	(294 - 294)	10.0%	161	388	281.8	82.93	314	378.1
Calcium	10/10	--	0.0%	91,000	116,000	98,500	7,359	97,000	110,150
Chloride	10/10	--	0.0%	6,950	11,400	9,170	1,357	9,205	11,085
Fluoride[1] (also Appendix IV)	10/10	--	0.0%	54.5	79.6	66.17	7.588	66.7	76.72
pH	10/10	--	0.0%	3.97	7.48	6.988	1.067	7.33	7.48
Sulfate	10/10	--	0.0%	58,200	88,400	76,150	9,940	75,450	87,950
TDS	10/10	--	0.0%	262,000	412,000	347,200	45,340	343,500	409,750
CCR Rule Appendix IV Parameters									
Antimony	1/10	(0.378 - 0.57)	90.0%	0.421	0.421	0.387	0.0172	0.496	0.57
Arsenic	4/10	(0.75 - 1.06)	60.0%	0.396	0.926	0.614	0.178	0.75	1.033
Barium	10/10	--	0.0%	138	260	205.3	40.99	213	255.5
Beryllium	1/10	(0.182 - 0.62)	90.0%	0.374	0.374	0.206	0.0635	0.305	0.519
Cadmium	2/10	(0.125 - 0.217)	80.0%	0.131	0.157	0.138	0.0139	0.197	0.217
Chromium	0/10	(0.98 - 2.47)	100.0%	N/A	N/A	N/A	N/A	1.53	2.461
Cobalt	5/10	(0.134 - 0.19)	50.0%	0.147	0.375	0.185	0.071	0.19	0.305
Lead	3/10	(0.128 - 0.45)	70.0%	0.128	0.167	0.14	0.0159	0.309	0.45
Lithium	8/10	(11.2 - 22.6)	20.0%	5.84	11.1	9.138	1.765	10.25	17.47
Mercury	0/10	(0.101 - 0.13)	100.0%	N/A	N/A	N/A	N/A	0.13	0.13
Molybdenum	10/10	--	0.0%	0.829	3.44	2.237	0.748	2.36	3.184
Radium-226+228	1/10	(0.186 - 1.456)	90.0%	1.18	1.18	0.296	0.312	0.718	1.332
Selenium	0/10	(0.89 - 1.51)	100.0%	N/A	N/A	N/A	N/A	1.2	1.51
Thallium	3/10	(0.148 - 0.246)	70.0%	0.23	0.265	0.18	0.0485	0.2	0.263
TDEC Appendix I Parameters									
Copper	1/10	(0.627 - 1.7)	90.0%	1.03	1.03	0.708	0.161	1.365	1.7
Nickel	2/10	(0.336 - 1.47)	80.0%	0.498	0.75	0.462	0.159	1.11	1.47
Silver	0/10	(0.053 - 0.177)	100.0%	N/A	N/A	N/A	N/A	0.115	0.177
Vanadium	0/10	(0.82 - 2.52)	100.0%	N/A	N/A	N/A	N/A	0.906	1.832
Zinc	1/10	(3.22 - 15)	90.0%	3.97	3.97	3.408	0.325	9.625	15

Summary Statistics - Groundwater Investigation									
John Sevier Fossil Plant - Rogersville, Tennessee									
Parameter	**Frequency of Detection**	**Range of Reporting Limits**	**% Non Detect**	**Statistics using Detected Data Only**		**Statistics using Detects & Non-Detects**			
				Minimum Detect	**Maximum Detect**	**Mean**	**Standard Deviation**	**50th Percentile**	**95th Percentile**
Well: JSF-208									
CCR Rule Appendix III Parameters									
Boron	10/10	--	0.0%	1,410	1,920	1,634	138.2	1,640	1,826
Calcium	10/10	--	0.0%	158,000	186,000	169,000	10,296	165,500	183,300
Chloride	10/10	--	0.0%	13,500	26,800	20,830	5,001	22,250	26,620
Fluoride[1] (also Appendix IV)	9/10	(132 - 132)	10.0%	66.1	155	116.2	30.16	133.5	149.2
pH	10/10	--	0.0%	4.11	7.27	6.813	0.955	7.11	7.234
Sulfate	10/10	--	0.0%	262,000	297,000	277,900	12,013	278,000	295,650
TDS	10/10	--	0.0%	556,000	978,000	750,300	104,824	747,000	894,750
CCR Rule Appendix IV Parameters									
Antimony	5/10	(0.378 - 0.57)	50.0%	0.554	1.53	0.776	0.449	0.57	1.445
Arsenic	9/10	(1.7 - 1.7)	10.0%	0.685	7.62	2.911	2.27	2.54	6.779
Barium	10/10	--	0.0%	34.7	68.6	53.72	11.36	56.8	66.35
Beryllium	0/10	(0.182 - 0.305)	100.0%	N/A	N/A	N/A	N/A	0.228	0.305
Cadmium	1/10	(0.125 - 0.217)	90.0%	0.658	0.658	0.178	0.16	0.197	0.46
Chromium	0/10	(0.98 - 2.65)	100.0%	N/A	N/A	N/A	N/A	1.53	2.146
Cobalt	6/10	(0.19 - 0.261)	40.0%	0.16	0.49	0.257	0.115	0.226	0.441
Lead	1/10	(0.128 - 0.45)	90.0%	0.191	0.191	0.139	0.0235	0.16	0.45
Lithium	8/10	(17.9 - 23.6)	20.0%	5.65	9.7	7.24	1.379	7.94	21.04
Mercury	0/10	(0.101 - 0.13)	100.0%	N/A	N/A	N/A	N/A	0.13	0.13
Molybdenum	10/10	--	0.0%	3.63	7.48	5.633	1.377	5.985	7.359
Radium-226+228	1/10	(0.133 - 1.112)	90.0%	1.414	1.414	0.261	0.384	0.593	1.278
Selenium	0/10	(0.739 - 1.51)	100.0%	N/A	N/A	N/A	N/A	1.2	1.51
Thallium	0/10	(0.148 - 0.571)	100.0%	N/A	N/A	N/A	N/A	0.174	0.526
TDEC Appendix I Parameters									
Copper	1/10	(0.627 - 1.7)	90.0%	0.687	0.687	0.642	0.026	1.24	1.7
Nickel	3/10	(0.336 - 1.48)	70.0%	0.707	0.79	0.587	0.207	1.13	1.476
Silver	0/10	(0.053 - 0.223)	100.0%	N/A	N/A	N/A	N/A	0.177	0.202
Vanadium	1/10	(0.776 - 2.06)	90.0%	1.15	1.15	0.818	0.118	0.906	1.651
Zinc	1/10	(3.22 - 15)	90.0%	5.11	5.11	3.598	0.756	7.755	15
Well: JSF-209									
CCR Rule Appendix III Parameters									
Boron	7/10	(38.6 - 117)	30.0%	25.7	63.2	38.48	11.67	40.45	102.9
Calcium	10/10	--	0.0%	60,000	85,200	67,820	7,810	65,750	81,150
Chloride	10/10	--	0.0%	3,190	4,520	3,916	419	3,875	4,421
Fluoride[1] (also Appendix IV)	10/10	--	0.0%	26.5	73.7	57.84	14.05	62.55	71.09
pH	10/10	--	0.0%	6.94	7.36	7.198	0.154	7.245	7.356
Sulfate	10/10	--	0.0%	20,300	64,400	39,390	13,678	37,650	60,395
TDS	10/10	--	0.0%	201,000	595,000	299,500	119,201	251,500	496,900
CCR Rule Appendix IV Parameters									
Antimony	0/10	(0.378 - 0.57)	100.0%	N/A	N/A	N/A	N/A	0.474	0.57
Arsenic	3/10	(0.313 - 0.983)	70.0%	0.371	0.583	0.42	0.101	0.75	0.878
Barium	10/10	--	0.0%	25.8	35	30.11	2.963	30.5	34.19
Beryllium	1/10	(0.182 - 0.62)	90.0%	0.325	0.325	0.198	0.0449	0.305	0.487
Cadmium	0/10	(0.125 - 0.217)	100.0%	N/A	N/A	N/A	N/A	0.197	0.217
Chromium	1/10	(0.98 - 2.47)	90.0%	12.3	12.3	2.112	3.396	1.53	7.876
Cobalt	3/10	(0.134 - 0.474)	70.0%	0.1	0.159	0.128	0.0279	0.19	0.346
Lead	1/10	(0.128 - 0.45)	90.0%	0.218	0.218	0.146	0.036	0.334	0.45
Lithium	8/10	(5.74 - 16.5)	20.0%	3.06	4.6	3.609	0.497	3.745	11.66
Mercury	0/10	(0.101 - 0.13)	100.0%	N/A	N/A	N/A	N/A	0.13	0.13
Molybdenum	1/10	(0.61 - 5.04)	90.0%	1.24	1.24	0.68	0.198	1.08	3.33
Radium-226+228	0/10	(0 - 0.802)	100.0%	N/A	N/A	N/A	N/A	0.407	0.783
Selenium	0/10	(0.89 - 1.51)	100.0%	N/A	N/A	N/A	N/A	1.2	1.51
Thallium	1/10	(0.148 - 0.813)	90.0%	0.607	0.607	0.199	0.144	0.2	0.72
TDEC Appendix I Parameters									
Copper	1/10	(0.627 - 1.7)	90.0%	0.727	0.727	0.647	0.04	1.214	1.7
Nickel	1/10	(0.336 - 1.47)	90.0%	0.712	0.712	0.411	0.15	1.091	1.47
Silver	0/10	(0.053 - 0.177)	100.0%	N/A	N/A	N/A	N/A	0.115	0.177
Vanadium	0/10	(0.82 - 1.42)	100.0%	N/A	N/A	N/A	N/A	0.906	1.254
Zinc	0/10	(3.22 - 15)	100.0%	N/A	N/A	N/A	N/A	9.66	15

Summary Statistics - Groundwater Investigation John Sevier Fossil Plant - Rogersville, Tennessee									
Parameter	**Frequency of Detection**	**Range of Reporting Limits**	**% Non Detect**	**Statistics using Detected Data Only**		**Statistics using Detects & Non-Detects**			
				Minimum Detect	**Maximum Detect**	**Mean**	**Standard Deviation**	**50th Percentile**	**95th Percentile**
Well: 10-36									
CCR Rule Appendix III Parameters									
Boron	25/32	(88.6 - 227)	21.9%	48.8	214	115	46.49	137	206.3
Calcium	33/33	--	0.0%	95,100	170,000	135,367	16,332	137,000	163,000
Chloride	32/32	--	0.0%	4,850	10,500	8,777	1,426	9,310	10,345
Fluoride[1] (also Appendix IV)	26/32	(100 - 186)	18.8%	96	177	126.3	24.01	127.5	172.1
pH	36/36	--	0.0%	6.21	7.34	6.844	0.263	6.885	7.223
Sulfate	32/32	--	0.0%	93,400	283,000	154,950	44,447	137,500	237,600
TDS	34/34	--	0.0%	459,000	1,730,000	624,500	208,155	595,000	739,650
CCR Rule Appendix IV Parameters									
Antimony	0/32	(0.378 - 2)	100.0%	N/A	N/A	N/A	N/A	0.57	2
Arsenic	6/32	(0.282 - 2)	81.3%	0.372	0.557	0.34	0.0841	0.623	1
Barium	27/32	(200 - 200)	15.6%	31.7	62.7	43.16	5.769	44.75	200
Beryllium	0/32	(0.057 - 2)	100.0%	N/A	N/A	N/A	N/A	0.228	1
Cadmium	0/32	(0.125 - 1)	100.0%	N/A	N/A	N/A	N/A	0.197	1
Chromium	1/32	(0.631 - 3.12)	96.9%	1.54	1.54	0.676	0.198	1.53	2.47
Cobalt	21/32	(0.075 - 2)	34.4%	0.075	1.52	0.353	0.356	0.261	1.366
Lead	3/32	(0.094 - 2)	90.6%	0.214	0.6	0.133	0.108	0.375	1
Lithium	31/34	(13.5 - 20.9)	8.8%	7.84	28.7	18.66	6.282	18.3	27.62
Mercury	0/32	(0.101 - 0.2)	100.0%	N/A	N/A	N/A	N/A	0.13	0.2
Molybdenum	0/34	(0.474 - 5)	100.0%	N/A	N/A	N/A	N/A	0.845	5
Radium-226+228	14/35	(0.0475 - 0.915)	60.0%	0.22	1.49	0.328	0.31	0.418	0.962
Selenium	0/32	(0.739 - 5)	100.0%	N/A	N/A	N/A	N/A	1.51	5
Thallium	2/32	(0.063 - 2)	93.8%	0.168	0.29	0.0784	0.0499	0.184	1
TDEC Appendix I Parameters									
Copper	1/32	(0.627 - 2)	96.9%	0.839	0.839	0.645	0.0586	1.3	2
Nickel	15/32	(0.312 - 2)	53.1%	0.367	2.1	0.625	0.346	0.782	1.709
Silver	0/23	(0.053 - 2)	100.0%	N/A	N/A	N/A	N/A	0.177	1
Vanadium	2/23	(0.82 - 4)	91.3%	0.86	1.01	0.834	0.0442	0.991	2.158
Zinc	4/23	(2.88 - 25)	82.6%	3.37	17.6	3.829	3.058	5	17.34
Well: JSF-103									
CCR Rule Appendix III Parameters									
Boron	21/32	(30.3 - 200)	34.4%	17.5	638	119.1	168.9	58.8	583.3
Calcium	33/33	--	0.0%	8,510	655,000	83,982	137,812	17,700	312,800
Chloride	32/32	--	0.0%	2,740	11,100	4,466	2,052	3,770	9,494
Fluoride[1] (also Appendix IV)	11/32	(24 - 500)	65.6%	27.1	78.5	34.09	14.43	42.4	100
pH	35/35	--	0.0%	4.68	6.8	5.483	0.576	5.31	6.327
Sulfate	32/32	--	0.0%	20,400	1,360,000	226,125	362,004	52,600	1,230,000
TDS	34/34	--	0.0%	53,000	2,340,000	410,647	599,257	108,500	2,113,500
CCR Rule Appendix IV Parameters									
Antimony	0/32	(0.378 - 2)	100.0%	N/A	N/A	N/A	N/A	0.57	2
Arsenic	1/32	(0.282 - 2)	96.9%	0.335	0.335	0.285	0.0128	0.513	1
Barium	27/32	(200 - 200)	15.6%	20.6	133	51.76	32.71	38.75	200
Beryllium	10/32	(0.155 - 2)	68.8%	0.141	0.262	0.185	0.0444	0.268	1
Cadmium	3/32	(0.125 - 1)	90.6%	0.129	0.29	0.136	0.0368	0.197	1
Chromium	15/32	(1.53 - 5.48)	53.1%	2.1	3.47	2.188	0.631	2.47	4.484
Cobalt	20/32	(0.134 - 2)	37.5%	0.078	1.15	0.23	0.187	0.23	0.793
Lead	1/32	(0.094 - 2)	96.9%	0.172	0.172	0.0986	0.0184	0.17	1
Lithium	9/34	(1.65 - 6.09)	73.5%	1.68	9.24	2.526	1.621	3.265	5.96
Mercury	0/32	(0.101 - 0.2)	100.0%	N/A	N/A	N/A	N/A	0.13	0.2
Molybdenum	0/34	(0.474 - 5)	100.0%	N/A	N/A	N/A	N/A	0.845	5
Radium-226+228	4/34	(0 - 0.898)	88.2%	0.433	2.036	0.117	0.374	0.33	0.802
Selenium	0/32	(0.739 - 5)	100.0%	N/A	N/A	N/A	N/A	1.51	5
Thallium	3/32	(0.063 - 2)	90.6%	0.253	0.747	0.107	0.142	0.2	1
TDEC Appendix I Parameters									
Copper	0/32	(0.627 - 2)	100.0%	N/A	N/A	N/A	N/A	1.3	2
Nickel	32/32	--	0.0%	3.94	12.3	7.949	1.857	7.92	11.07
Silver	0/23	(0.053 - 2)	100.0%	N/A	N/A	N/A	N/A	0.177	1
Vanadium	0/23	(0.776 - 4)	100.0%	N/A	N/A	N/A	N/A	0.991	2.262
Zinc	11/23	(5 - 25)	52.2%	6.89	12.9	8.546	2.149	10.6	15

Summary Statistics - Groundwater Investigation									
John Sevier Fossil Plant - Rogersville, Tennessee									
Parameter	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
				Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Well: JSF-105									
CCR Rule Appendix III Parameters									
Boron	11/32	(30.3 - 200)	65.6%	18.6	114	35.59	24.05	40.5	200
Calcium	33/33	--	0.0%	37,700	234,000	79,467	37,009	65,000	118,400
Chloride	32/32	--	0.0%	798	4,720	1,952	1,028	1,475	4,048
Fluoride[1] (also Appendix IV)	18/32	(26.3 - 126)	43.8%	27.8	287	52.7	50.92	47.6	133.7
pH	36/36	--	0.0%	5.14	7.31	6.25	0.536	6.415	6.95
Sulfate	32/32	--	0.0%	52,800	406,000	101,253	59,333	96,200	133,550
TDS	34/34	--	0.0%	176,000	753,000	273,765	108,578	233,000	436,500
CCR Rule Appendix IV Parameters									
Antimony	0/32	(0.378 - 2)	100.0%	N/A	N/A	N/A	N/A	0.57	2
Arsenic	1/32	(0.313 - 2)	96.9%	0.588	0.588	0.329	0.0647	0.51	1
Barium	27/32	(200 - 200)	15.6%	45.4	165	69.03	22	67.1	200
Beryllium	1/32	(0.057 - 2)	96.9%	0.592	0.592	0.0803	0.109	0.228	1
Cadmium	0/32	(0.125 - 1)	100.0%	N/A	N/A	N/A	N/A	0.197	1
Chromium	2/32	(0.975 - 2.98)	93.8%	1.59	2.5	1.057	0.298	1.53	2.484
Cobalt	16/32	(0.075 - 2)	50.0%	0.082	0.375	0.16	0.0694	0.19	0.5
Lead	1/32	(0.094 - 2)	96.9%	0.195	0.195	0.0999	0.0238	0.181	1
Lithium	2/34	(0.831 - 5.05)	94.1%	2.02	2.36	1.133	0.571	3.14	5
Mercury	1/32	(0.101 - 0.2)	96.9%	0.106	0.106	0.101	0.00133	0.13	0.2
Molybdenum	1/34	(0.474 - 5)	97.1%	1.36	1.36	0.509	0.174	0.845	5
Radium-226+228	13/35	(0.0255 - 0.684)	62.9%	0.128	2.52	0.385	0.587	0.393	1.588
Selenium	0/32	(0.739 - 5)	100.0%	N/A	N/A	N/A	N/A	1.51	5
Thallium	2/32	(0.063 - 2)	93.8%	0.295	0.348	0.0837	0.0705	0.174	1
TDEC Appendix I Parameters									
Copper	5/32	(0.627 - 2)	84.4%	0.634	4.25	0.849	0.72	1.5	2.207
Nickel	21/32	(0.336 - 2)	34.4%	0.341	2.5	1.252	0.718	1.47	2.268
Silver	0/23	(0.053 - 2)	100.0%	N/A	N/A	N/A	N/A	0.177	1
Vanadium	0/23	(0.776 - 4)	100.0%	N/A	N/A	N/A	N/A	0.991	2.783
Zinc	3/23	(2.88 - 25)	87.0%	3.25	4.09	3.149	0.398	5	15
Well: JSF-201									
CCR Rule Appendix III Parameters									
Boron	9/23	(16 - 60.1)	60.9%	16.3	74.1	23.4	12.28	30.3	58.37
Calcium	23/23	--	0.0%	64,100	92,700	84,626	6,154	84,500	92,350
Chloride	23/23	--	0.0%	3,020	5,590	3,906	684	3,710	5,102
Fluoride[1] (also Appendix IV)	20/23	(33.3 - 54.3)	13.0%	30.1	77	44.91	9.997	43.8	58.86
pH	24/24	--	0.0%	7.03	7.96	7.338	0.193	7.305	7.717
Sulfate	23/23	--	0.0%	46,300	61,700	51,291	3,901	51,200	56,420
TDS	23/23	--	0.0%	236,000	668,000	290,087	85,031	270,000	324,400
CCR Rule Appendix IV Parameters									
Antimony	1/23	(0.378 - 1.12)	95.7%	1.18	1.18	0.413	0.164	0.57	1.12
Arsenic	1/23	(0.282 - 0.75)	95.7%	0.354	0.354	0.288	0.0192	0.323	0.75
Barium	23/23	--	0.0%	79.3	126	109.4	10.93	111	124.6
Beryllium	0/23	(0.057 - 0.62)	100.0%	N/A	N/A	N/A	N/A	0.182	0.62
Cadmium	0/23	(0.125 - 0.217)	100.0%	N/A	N/A	N/A	N/A	0.125	0.215
Chromium	0/23	(0.98 - 3.38)	100.0%	N/A	N/A	N/A	N/A	1.53	2.47
Cobalt	9/23	(0.075 - 0.261)	60.9%	0.077	0.156	0.0975	0.0277	0.154	0.19
Lead	1/23	(0.094 - 0.45)	95.7%	0.165	0.165	0.0995	0.0189	0.128	0.45
Lithium	14/23	(2.75 - 6.13)	39.1%	2.1	4.6	2.992	0.809	3.14	5.302
Mercury	0/23	(0.101 - 0.13)	100.0%	N/A	N/A	N/A	N/A	0.101	0.13
Molybdenum	1/23	(0.474 - 1.08)	95.7%	1.24	1.24	0.507	0.156	0.61	1.08
Radium-226+228	8/24	(0.00197 - 1.454)	66.7%	0.145	1.301	0.23	0.297	0.345	1.238
Selenium	0/23	(0.739 - 2.62)	100.0%	N/A	N/A	N/A	N/A	0.89	2.62
Thallium	0/23	(0.063 - 0.472)	100.0%	N/A	N/A	N/A	N/A	0.148	0.2
TDEC Appendix I Parameters									
Copper	1/23	(0.627 - 2.11)	95.7%	2.45	2.45	0.706	0.372	1.3	2.069
Nickel	0/23	(0.312 - 1.47)	100.0%	N/A	N/A	N/A	N/A	0.336	1.47
Silver	0/14	(0.053 - 0.223)	100.0%	N/A	N/A	N/A	N/A	0.053	0.193
Vanadium	0/14	(0.776 - 1.78)	100.0%	N/A	N/A	N/A	N/A	0.82	1.572
Zinc	1/14	(2.88 - 15)	92.9%	4.81	4.81	3.266	0.772	15	15

Summary Statistics - Groundwater Investigation									
John Sevier Fossil Plant - Rogersville, Tennessee									
Parameter	**Frequency of Detection**	**Range of Reporting Limits**	**% Non Detect**	**Statistics using Detected Data Only**		**Statistics using Detects & Non-Detects**			
				Minimum Detect	**Maximum Detect**	**Mean**	**Standard Deviation**	**50th Percentile**	**95th Percentile**
Well: JSF-202									
CCR Rule Appendix III Parameters									
Boron	23/23	--	0.0%	115	185	151.7	19.14	153	179.8
Calcium	23/23	--	0.0%	115,000	246,000	174,304	41,669	176,000	241,400
Chloride	23/23	--	0.0%	5,490	10,900	8,528	1,668	8,490	10,790
Fluoride[1] (also Appendix IV)	21/23	(100 - 172)	8.7%	77.3	209	118.4	26.51	119	168.6
pH	24/24	--	0.0%	6.09	7.9	7.081	0.295	7.095	7.27
Sulfate	23/23	--	0.0%	195,000	645,000	396,696	144,594	419,000	610,000
TDS	23/23	--	0.0%	533,000	1,180,000	825,826	208,804	864,000	1,098,000
CCR Rule Appendix IV Parameters									
Antimony	0/23	(0.378 - 1.12)	100.0%	N/A	N/A	N/A	N/A	0.506	1.065
Arsenic	7/23	(0.282 - 0.891)	69.6%	0.336	0.799	0.38	0.126	0.504	0.794
Barium	23/23	--	0.0%	36.7	70.2	53.63	10.71	54.8	67.64
Beryllium	2/23	(0.057 - 0.62)	91.3%	0.183	0.573	0.092	0.115	0.182	0.62
Cadmium	0/23	(0.125 - 0.217)	100.0%	N/A	N/A	N/A	N/A	0.125	0.215
Chromium	2/23	(0.767 - 2.77)	91.3%	1.88	1.92	0.893	0.356	1.53	2.47
Cobalt	10/23	(0.075 - 0.261)	56.5%	0.107	0.298	0.139	0.0525	0.185	0.254
Lead	1/23	(0.094 - 0.45)	95.7%	0.223	0.223	0.103	0.0332	0.128	0.45
Lithium	23/23	--	0.0%	26.9	44	36.07	4.613	36.7	42.48
Mercury	0/23	(0.101 - 0.13)	100.0%	N/A	N/A	N/A	N/A	0.101	0.13
Molybdenum	4/23	(0.61 - 1.08)	82.6%	0.5	1.73	0.598	0.259	0.61	1.08
Radium-226+228	10/24	(0.141 - 0.993)	58.3%	0.212	0.696	0.324	0.165	0.475	0.792
Selenium	0/23	(0.739 - 2.62)	100.0%	N/A	N/A	N/A	N/A	0.89	2.62
Thallium	1/23	(0.063 - 0.472)	95.7%	0.481	0.481	0.0812	0.0852	0.148	0.445
TDEC Appendix I Parameters									
Copper	0/23	(0.627 - 1.7)	100.0%	N/A	N/A	N/A	N/A	1.14	1.7
Nickel	2/23	(0.312 - 2.55)	91.3%	0.444	0.562	0.342	0.0732	0.517	1.47
Silver	0/14	(0.053 - 0.223)	100.0%	N/A	N/A	N/A	N/A	0.053	0.193
Vanadium	0/14	(0.776 - 1.84)	100.0%	N/A	N/A	N/A	N/A	0.82	1.821
Zinc	2/14	(2.88 - 15)	85.7%	3.31	3.9	3.17	0.401	15	15
Well: JSF-203									
CCR Rule Appendix III Parameters									
Boron	23/23	--	0.0%	1,160	1,820	1,482	176.8	1,480	1,736
Calcium	23/23	--	0.0%	83,700	101,000	95,543	4,413	96,200	101,000
Chloride	23/23	--	0.0%	9,590	15,700	13,313	1,882	13,900	15,670
Fluoride[1] (also Appendix IV)	20/23	(35.4 - 85.3)	13.0%	39.9	90.4	64.02	12.2	66	84.86
pH	23/23	--	0.0%	6.74	7.93	7.195	0.246	7.21	7.487
Sulfate	23/23	--	0.0%	64,100	86,600	70,726	5,357	68,600	77,830
TDS	23/23	--	0.0%	306,000	394,000	357,043	20,132	356,000	387,700
CCR Rule Appendix IV Parameters									
Antimony	1/23	(0.378 - 1.12)	95.7%	1	1	0.408	0.132	0.506	1.108
Arsenic	6/23	(0.282 - 0.75)	73.9%	0.338	0.452	0.325	0.0541	0.399	0.75
Barium	23/23	--	0.0%	75.2	104	84	7.344	81.6	94.8
Beryllium	1/23	(0.057 - 0.62)	95.7%	0.347	0.347	0.0715	0.0632	0.182	0.62
Cadmium	0/23	(0.125 - 0.217)	100.0%	N/A	N/A	N/A	N/A	0.125	0.215
Chromium	1/23	(0.98 - 2.8)	95.7%	1.6	1.6	1.021	0.155	1.53	2.47
Cobalt	8/23	(0.075 - 0.261)	65.2%	0.091	0.17	0.109	0.0339	0.164	0.19
Lead	3/23	(0.094 - 0.45)	87.0%	0.133	0.548	0.126	0.0961	0.167	0.45
Lithium	19/23	(9.88 - 13)	17.4%	9.06	12.3	10.68	1.084	11.1	12.84
Mercury	0/23	(0.101 - 0.13)	100.0%	N/A	N/A	N/A	N/A	0.101	0.13
Molybdenum	23/23	--	0.0%	15.2	58	39.12	11.91	42.6	53.19
Radium-226+228	10/23	(0.0667 - 1.77)	56.5%	0.271	1.795	0.413	0.404	0.461	1.733
Selenium	0/23	(0.739 - 2.62)	100.0%	N/A	N/A	N/A	N/A	0.89	2.62
Thallium	2/23	(0.063 - 0.472)	91.3%	0.507	1.07	0.126	0.221	0.148	0.504
TDEC Appendix I Parameters									
Copper	1/23	(0.627 - 1.7)	95.7%	0.669	0.669	0.631	0.0126	1.14	1.7
Nickel	13/23	(0.312 - 1.47)	43.5%	0.523	0.96	0.666	0.158	0.824	1.47
Silver	0/14	(0.053 - 0.223)	100.0%	N/A	N/A	N/A	N/A	0.053	0.193
Vanadium	0/14	(0.776 - 1.75)	100.0%	N/A	N/A	N/A	N/A	0.82	1.633
Zinc	1/14	(2.88 - 15)	92.9%	3.99	3.99	3.102	0.444	15	15

Summary Statistics - Groundwater Investigation									
John Sevier Fossil Plant - Rogersville, Tennessee									
Parameter	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
				Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Well: JSF-204									
CCR Rule Appendix III Parameters									
Boron	22/23	(108 - 108)	4.3%	68	191	93.87	22.94	90.5	108
Calcium	23/23	--	0.0%	72,300	96,800	88,317	6,404	89,000	95,930
Chloride	23/23	--	0.0%	6,520	13,200	8,937	1,749	9,070	11,680
Fluoride[1] (also Appendix IV)	20/23	(44.3 - 59.2)	13.0%	26.4	62.4	42.17	7.383	42.9	58.5
pH	24/24	--	0.0%	6.87	7.7	7.105	0.164	7.115	7.237
Sulfate	23/23	--	0.0%	38,200	54,500	46,657	3,822	47,600	50,860
TDS	23/23	--	0.0%	229,000	340,000	310,000	28,384	321,000	336,800
CCR Rule Appendix IV Parameters									
Antimony	0/23	(0.378 - 1.12)	100.0%	N/A	N/A	N/A	N/A	0.506	1.065
Arsenic	21/23	(0.323 - 1.38)	8.7%	0.376	3.55	1.114	0.862	0.922	3.056
Barium	23/23	--	0.0%	43.7	85.4	55.62	8.37	54.2	63.81
Beryllium	1/23	(0.057 - 0.62)	95.7%	0.464	0.464	0.0774	0.0887	0.182	0.62
Cadmium	0/23	(0.125 - 0.217)	100.0%	N/A	N/A	N/A	N/A	0.125	0.215
Chromium	0/23	(0.98 - 3.3)	100.0%	N/A	N/A	N/A	N/A	1.53	2.47
Cobalt	23/23	--	0.0%	0.174	0.795	0.392	0.149	0.36	0.647
Lead	0/23	(0.094 - 0.45)	100.0%	N/A	N/A	N/A	N/A	0.128	0.45
Lithium	19/23	(3.54 - 8.1)	17.4%	3.4	7.85	5.524	1.268	5.96	7.835
Mercury	0/23	(0.101 - 0.13)	100.0%	N/A	N/A	N/A	N/A	0.101	0.13
Molybdenum	0/23	(0.474 - 1.08)	100.0%	N/A	N/A	N/A	N/A	0.61	1.08
Radium-226+228	4/24	(0.0326 - 1.035)	83.3%	0.0926	0.483	0.122	0.139	0.354	0.775
Selenium	0/23	(0.739 - 2.62)	100.0%	N/A	N/A	N/A	N/A	0.89	2.62
Thallium	5/23	(0.063 - 0.472)	78.3%	0.184	0.444	0.13	0.127	0.148	0.44
TDEC Appendix I Parameters									
Copper	0/23	(0.627 - 1.7)	100.0%	N/A	N/A	N/A	N/A	1.14	1.7
Nickel	11/23	(0.312 - 1.47)	52.2%	0.351	0.544	0.415	0.0682	0.508	1.47
Silver	0/14	(0.053 - 0.223)	100.0%	N/A	N/A	N/A	N/A	0.053	0.193
Vanadium	0/14	(0.776 - 1.99)	100.0%	N/A	N/A	N/A	N/A	0.82	1.594
Zinc	1/14	(2.88 - 15)	92.9%	3.65	3.65	3.034	0.308	15	15
Well: W-32									
CCR Rule Appendix III Parameters									
Boron	24/32	(60.1 - 200)	25.0%	38.1	112	57.32	15.33	56.8	200
Calcium	33/33	--	0.0%	97,700	142,000	123,618	12,303	123,000	139,200
Chloride	32/32	--	0.0%	7,330	14,600	10,959	1,698	10,900	13,705
Fluoride[1] (also Appendix IV)	20/32	(26.3 - 100)	37.5%	32.6	93.1	43	12.49	44.1	100
pH	35/35	--	0.0%	6.03	7	6.624	0.261	6.61	6.948
Sulfate	32/32	--	0.0%	46,200	65,700	56,541	5,355	56,350	64,715
TDS	34/34	--	0.0%	180,000	436,000	377,176	41,834	380,000	422,100
CCR Rule Appendix IV Parameters									
Antimony	0/32	(0.378 - 2)	100.0%	N/A	N/A	N/A	N/A	0.57	2
Arsenic	0/32	(0.282 - 2)	100.0%	N/A	N/A	N/A	N/A	0.564	1
Barium	27/32	(200 - 200)	15.6%	49.4	84.3	61.49	7.376	61.55	200
Beryllium	2/32	(0.057 - 2)	93.8%	0.231	0.339	0.0804	0.0696	0.29	1
Cadmium	2/32	(0.125 - 1)	93.8%	0.145	0.173	0.13	0.0134	0.197	1
Chromium	4/32	(0.98 - 3.98)	87.5%	1.56	2.14	1.136	0.34	1.565	3.093
Cobalt	12/32	(0.075 - 2)	62.5%	0.104	0.305	0.126	0.053	0.19	0.5
Lead	6/32	(0.128 - 2)	81.3%	0.11	0.333	0.137	0.0604	0.296	1
Lithium	16/34	(1.65 - 8.97)	52.9%	2.17	5.49	3.083	0.923	3.45	5.701
Mercury	0/32	(0.101 - 0.2)	100.0%	N/A	N/A	N/A	N/A	0.13	0.2
Molybdenum	1/34	(0.474 - 5)	97.1%	5.45	5.45	0.62	0.841	0.845	5
Radium-226+228	8/34	(0.0447 - 0.883)	76.5%	0.293	0.872	0.206	0.273	0.331	0.833
Selenium	0/32	(0.739 - 5)	100.0%	N/A	N/A	N/A	N/A	1.51	5
Thallium	1/32	(0.063 - 2)	96.9%	0.306	0.306	0.0727	0.0476	0.2	1
TDEC Appendix I Parameters									
Copper	0/32	(0.627 - 2)	100.0%	N/A	N/A	N/A	N/A	1.475	2
Nickel	14/32	(0.312 - 2.89)	56.3%	0.334	1.45	0.533	0.263	0.911	1.709
Silver	0/23	(0.053 - 2)	100.0%	N/A	N/A	N/A	N/A	0.177	1
Vanadium	1/23	(0.776 - 4)	95.7%	1.07	1.07	0.791	0.0656	0.991	2.42
Zinc	4/23	(2.88 - 25)	82.6%	5.16	46.4	5.974	9.439	5.38	24.63

Summary Statistics - Groundwater Investigation									
John Sevier Fossil Plant - Rogersville, Tennessee									
Parameter	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
				Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Well: W-28									
CCR Rule Appendix III Parameters									
Boron	13/13	--	0.0%	2,040	3,230	2,615	309.8	2,590	3,092
Calcium	14/14	--	0.0%	196,000	302,000	257,000	36,574	267,000	297,450
Chloride	13/13	--	0.0%	6,100	12,900	9,428	1,728	9,630	12,000
Fluoride[1] (also Appendix IV)	7/13	(100 - 250)	46.2%	47	102	68.65	15.37	100	179.8
pH	16/16	--	0.0%	5.64	6.7	6.143	0.277	6.15	6.535
Sulfate	13/13	--	0.0%	450,000	689,000	551,769	77,139	543,000	686,000
TDS	15/15	--	0.0%	882,000	1,380,000	1,148,933	148,004	1,150,000	1,324,000
CCR Rule Appendix IV Parameters									
Antimony	3/13	(0.378 - 2)	76.9%	0.604	0.911	0.555	0.222	0.911	2
Arsenic	2/13	(0.282 - 2)	84.6%	0.318	0.781	0.364	0.171	0.781	1.4
Barium	8/13	(200 - 200)	38.5%	13.1	16.9	15.76	1.118	16.6	200
Beryllium	1/13	(0.155 - 2)	92.3%	0.21	0.21	0.169	0.0238	0.62	1.4
Cadmium	0/13	(0.125 - 1)	100.0%	N/A	N/A	N/A	N/A	0.217	1
Chromium	0/13	(0.98 - 2.47)	100.0%	N/A	N/A	N/A	N/A	2	2.188
Cobalt	13/13	--	0.0%	2.4	7.54	4.357	1.622	3.92	7.396
Lead	0/13	(0.128 - 2)	100.0%	N/A	N/A	N/A	N/A	0.45	1.4
Lithium	8/15	(0.005 - 9.88)	46.7%	2.52	8.12	4.045	3.047	5	8.648
Mercury	0/13	(0.101 - 0.2)	100.0%	N/A	N/A	N/A	N/A	0.13	0.2
Molybdenum	0/15	(0.005 - 5)	100.0%	N/A	N/A	N/A	N/A	1.08	5
Radium-226+228	4/15	(0 - 0.772)	73.3%	0.314	1.052	0.231	0.342	0.479	0.986
Selenium	0/13	(0.739 - 5)	100.0%	N/A	N/A	N/A	N/A	2	5
Thallium	1/13	(0.128 - 2)	92.3%	0.285	0.285	0.154	0.0585	0.472	1.4
TDEC Appendix I Parameters									
Copper	0/13	(0.627 - 2)	100.0%	N/A	N/A	N/A	N/A	1.7	2
Nickel	10/13	(1.47 - 3.66)	23.1%	1.14	4.56	2.109	0.984	1.77	4.02
Silver	0/13	(0.053 - 2)	100.0%	N/A	N/A	N/A	N/A	0.223	1.4
Vanadium	0/13	(0.776 - 4)	100.0%	N/A	N/A	N/A	N/A	0.991	2.2
Zinc	2/13	(3.22 - 25)	84.6%	5.25	6.39	3.74	1.071	5	19
Well: W-29									
CCR Rule Appendix III Parameters									
Boron	12/13	(200 - 200)	7.7%	399	1,370	792.9	289.4	847	1,154
Calcium	14/14	--	0.0%	13,800	182,000	145,914	39,819	153,000	179,400
Chloride	13/13	--	0.0%	1,070	8,490	3,218	1,802	2,560	5,868
Fluoride[1] (also Appendix IV)	11/13	(100 - 197)	15.4%	155	256	191.8	40.08	197	248.2
pH	14/14	--	0.0%	6.06	6.86	6.339	0.202	6.335	6.626
Sulfate	13/13	--	0.0%	5,580	186,000	100,145	43,399	99,800	154,800
TDS	15/15	--	0.0%	91,000	652,000	566,467	138,882	605,000	647,800
CCR Rule Appendix IV Parameters									
Antimony	0/13	(0.378 - 2)	100.0%	N/A	N/A	N/A	N/A	0.57	2
Arsenic	1/13	(0.313 - 2)	92.3%	2.86	2.86	0.509	0.679	1	2.344
Barium	7/13	(43.3 - 200)	46.2%	40	67.2	53.71	11.74	67.1	200
Beryllium	1/13	(0.155 - 2)	92.3%	0.194	0.194	0.165	0.0169	0.62	1.4
Cadmium	0/13	(0.125 - 1)	100.0%	N/A	N/A	N/A	N/A	0.217	1
Chromium	0/13	(0.98 - 2.47)	100.0%	N/A	N/A	N/A	N/A	2	2.188
Cobalt	3/13	(0.134 - 2)	76.9%	0.209	1.17	0.269	0.296	0.318	1.502
Lead	0/13	(0.128 - 2)	100.0%	N/A	N/A	N/A	N/A	0.45	1.4
Lithium	2/15	(0.831 - 5)	86.7%	4.1	5.97	1.609	1.606	5	5.291
Mercury	0/13	(0.101 - 0.2)	100.0%	N/A	N/A	N/A	N/A	0.13	0.2
Molybdenum	4/15	(0.61 - 5)	73.3%	0.622	2	0.982	0.455	5	5
Radium-226+228	4/15	(0.00749 - 0.873)	73.3%	0.273	0.522	0.14	0.192	0.283	0.655
Selenium	2/13	(0.89 - 5)	84.6%	2.33	4.77	1.585	1.304	2.62	5
Thallium	0/13	(0.128 - 2)	100.0%	N/A	N/A	N/A	N/A	0.472	1.4
TDEC Appendix I Parameters									
Copper	1/13	(0.627 - 2)	92.3%	0.74	0.74	0.655	0.0489	1.7	2
Nickel	4/13	(0.336 - 2.2)	69.2%	0.341	1.49	0.566	0.403	1	2.08
Silver	0/13	(0.053 - 2)	100.0%	N/A	N/A	N/A	N/A	0.223	1.4
Vanadium	1/13	(0.82 - 4)	92.3%	0.951	0.951	0.864	0.0618	1	2.404
Zinc	0/13	(2.88 - 25)	100.0%	N/A	N/A	N/A	N/A	5	19

Summary Statistics - Groundwater Investigation John Sevier Fossil Plant - Rogersville, Tennessee									
Parameter	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
				Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Well: W-30									
CCR Rule Appendix III Parameters									
Boron	13/13	--	0.0%	2,390	4,630	3,358	652.7	3,320	4,282
Calcium	14/14	--	0.0%	260,000	425,000	346,286	43,209	345,000	404,200
Chloride	13/13	--	0.0%	8,710	13,800	11,247	1,366	11,500	13,020
Fluoride[1] (also Appendix IV)	13/13	--	0.0%	243	362	304.9	34.8	300	348.8
pH	14/14	--	0.0%	5.97	6.5	6.244	0.129	6.26	6.416
Sulfate	13/13	--	0.0%	720,000	1,150,000	874,077	127,107	848,000	1,120,000
TDS	15/15	--	0.0%	1,440,000	1,990,000	1,668,000	175,141	1,620,000	1,927,000
CCR Rule Appendix IV Parameters									
Antimony	0/13	(0.378 - 2)	100.0%	N/A	N/A	N/A	N/A	0.57	2
Arsenic	2/13	(0.282 - 2)	84.6%	0.346	0.432	0.325	0.0591	0.75	1.4
Barium	8/13	(200 - 200)	38.5%	18.7	23.8	20.9	1.852	23.7	200
Beryllium	1/13	(0.155 - 2)	92.3%	0.525	0.525	0.217	0.138	0.62	1.4
Cadmium	3/13	(0.197 - 1)	76.9%	0.173	0.221	0.189	0.0165	0.221	1
Chromium	0/13	(0.98 - 2.47)	100.0%	N/A	N/A	N/A	N/A	2	2.188
Cobalt	13/13	--	0.0%	1.34	3.18	2.542	0.502	2.62	3.09
Lead	1/13	(0.128 - 2)	92.3%	0.242	0.242	0.151	0.0456	0.45	1.4
Lithium	2/15	(1.65 - 5)	86.7%	1.25	4.97	1.781	1.302	5	5
Mercury	0/13	(0.101 - 0.2)	100.0%	N/A	N/A	N/A	N/A	0.13	0.2
Molybdenum	0/15	(0.61 - 5)	100.0%	N/A	N/A	N/A	N/A	5	5
Radium-226+228	5/15	(0.0665 - 1.087)	66.7%	0.434	0.986	0.32	0.345	0.415	1.024
Selenium	0/13	(0.739 - 5)	100.0%	N/A	N/A	N/A	N/A	2	5
Thallium	1/13	(0.128 - 2)	92.3%	0.371	0.371	0.169	0.0906	0.472	1.4
TDEC Appendix I Parameters									
Copper	2/13	(0.627 - 2)	84.6%	0.772	0.904	0.733	0.115	1.7	2
Nickel	11/13	(2 - 2.4)	15.4%	1.44	2.7	1.925	0.306	1.98	2.52
Silver	0/13	(0.053 - 2)	100.0%	N/A	N/A	N/A	N/A	0.223	1.4
Vanadium	1/13	(0.776 - 4)	92.3%	1.32	1.32	0.825	0.156	1	3.058
Zinc	0/13	(2.88 - 25)	100.0%	N/A	N/A	N/A	N/A	5	19
Well: W-31									
CCR Rule Appendix III Parameters									
Boron	13/13	--	0.0%	4,590	15,800	9,200	3,347	7,860	15,140
Calcium	14/14	--	0.0%	151,000	416,000	254,857	65,935	250,000	360,100
Chloride	13/13	--	0.0%	5,550	10,400	9,189	1,502	9,850	10,400
Fluoride[1] (also Appendix IV)	13/13	--	0.0%	339	551	446.2	61.63	434	538.4
pH	15/15	--	0.0%	6.26	6.8	6.569	0.155	6.58	6.786
Sulfate	13/13	--	0.0%	338,000	1,870,000	773,385	363,152	684,000	1,360,000
TDS	15/15	--	0.0%	711,000	2,050,000	1,340,200	333,846	1,350,000	1,791,000
CCR Rule Appendix IV Parameters									
Antimony	0/13	(0.378 - 2)	100.0%	N/A	N/A	N/A	N/A	0.57	2
Arsenic	2/13	(0.282 - 2)	84.6%	0.355	0.438	0.339	0.0643	0.75	1.4
Barium	8/13	(200 - 200)	38.5%	33.6	61.9	43.36	7.914	46.7	200
Beryllium	0/13	(0.155 - 2)	100.0%	N/A	N/A	N/A	N/A	0.62	1.4
Cadmium	5/13	(0.217 - 1)	61.5%	0.232	0.854	0.48	0.243	0.854	1
Chromium	1/13	(0.98 - 2.79)	92.3%	4.74	4.74	1.269	1.002	2	3.57
Cobalt	5/13	(0.134 - 2)	61.5%	0.18	0.617	0.226	0.126	0.261	1.17
Lead	1/13	(0.128 - 2)	92.3%	0.198	0.198	0.142	0.028	0.45	1.4
Lithium	15/15	--	0.0%	505	1710	985.3	391.6	823	1654
Mercury	0/13	(0.101 - 0.2)	100.0%	N/A	N/A	N/A	N/A	0.13	0.2
Molybdenum	15/15	--	0.0%	1780	4130	2768	729.7	2650	4004
Radium-226+228	9/15	(0.302 - 0.847)	40.0%	0.167	1.732	0.559	0.475	0.683	1.408
Selenium	0/13	(0.739 - 5)	100.0%	N/A	N/A	N/A	N/A	2	5
Thallium	0/13	(0.128 - 2)	100.0%	N/A	N/A	N/A	N/A	0.472	1.4
TDEC Appendix I Parameters									
Copper	2/13	(0.627 - 2.17)	84.6%	0.703	8.57	1.261	2.11	2	4.73
Nickel	7/13	(0.948 - 2)	46.2%	0.749	4.99	1.559	1.436	1.2	4.846
Silver	0/13	(0.053 - 2)	100.0%	N/A	N/A	N/A	N/A	0.223	1.4
Vanadium	1/13	(0.776 - 4.24)	92.3%	1.22	1.22	0.82	0.133	1	4.096
Zinc	1/13	(2.88 - 25)	92.3%	0.216	0.216	0.216	0	5	19

Notes

CCR Rule - Title 40, Code of Federal Regulations, Part 257

TDEC - Tennessee Department of Environment and Conservation

"--" - Not Applicable

Except for Radium-226 + 228, and pH, all units micrograms per liter (µg/L).

Units for Radium 226+228 are picocuries per liter (pCi/L).

Units for pH are standard units (SU).

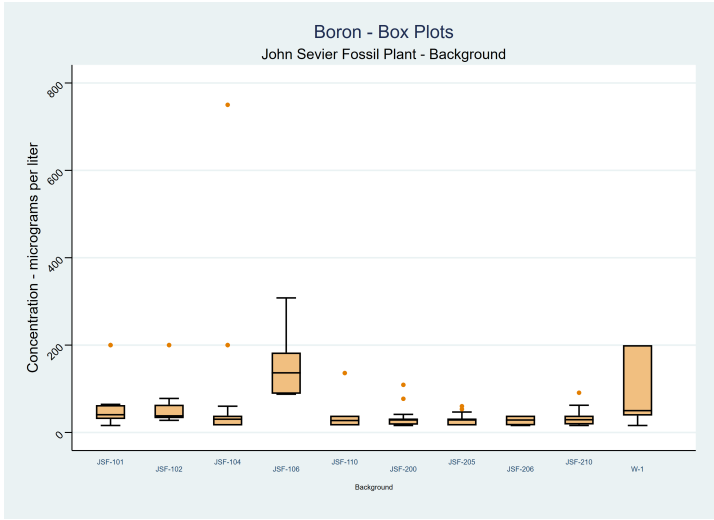
Mean and Standard Deviation are Kaplan Meier (KM) Mean and Standard Deviation for data with reported non-detect values.

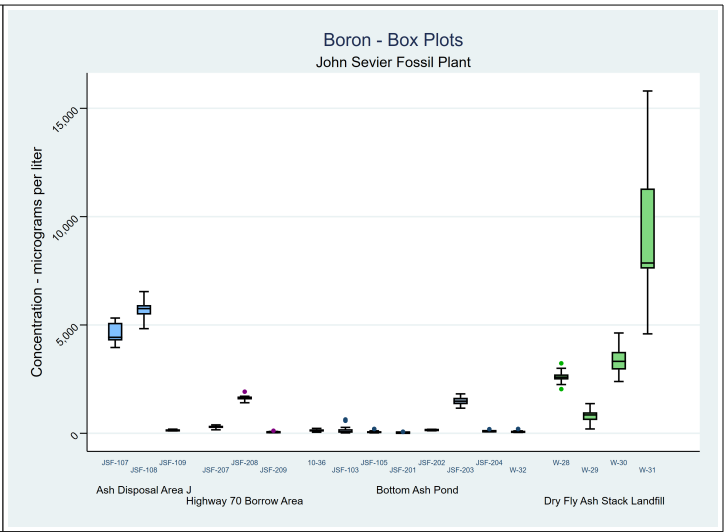
All non-detects reported at the laboratory reporting limit

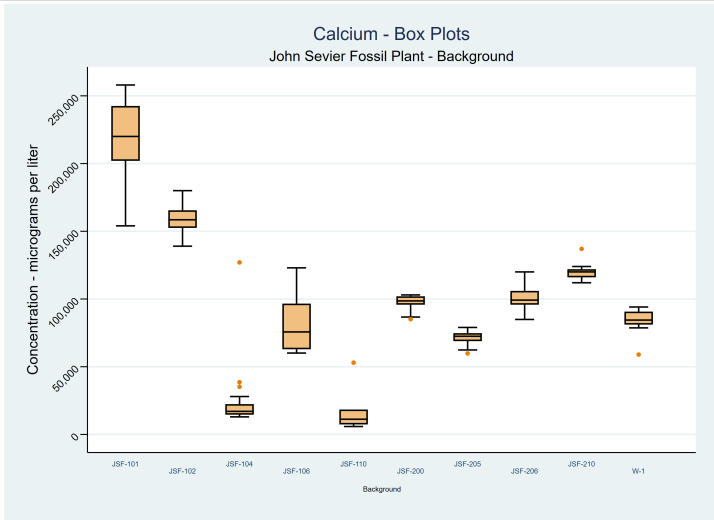
[1]Fluoride is both a CCR Rule Appendix III and CCR Rule Appendix IV constituent. In this table, fluoride has been grouped with the Appendix III constituents only to avoid duplication of results.

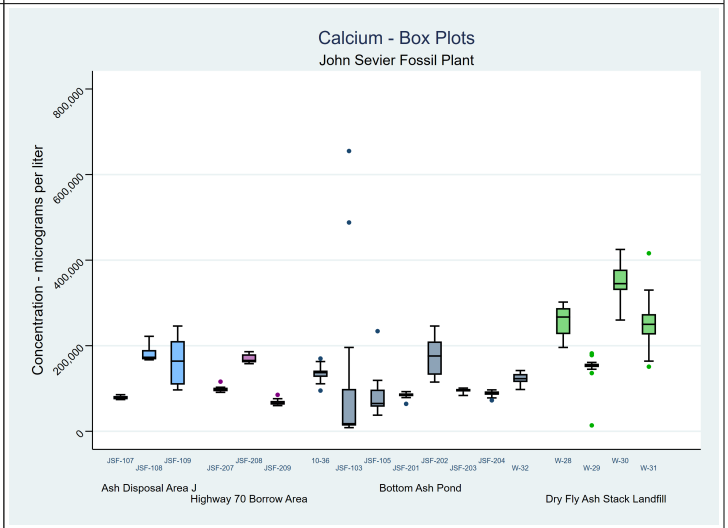
ATTACHMENT E.3-B
BOX PLOTS

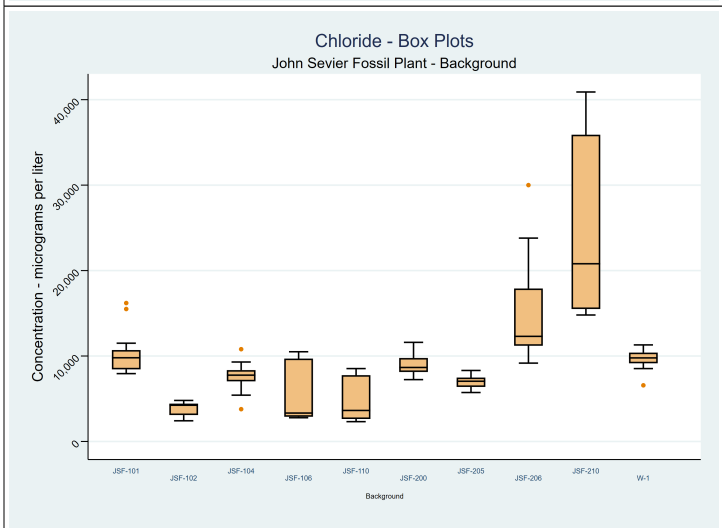
Box Plots
CCR Rule Appendix III Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

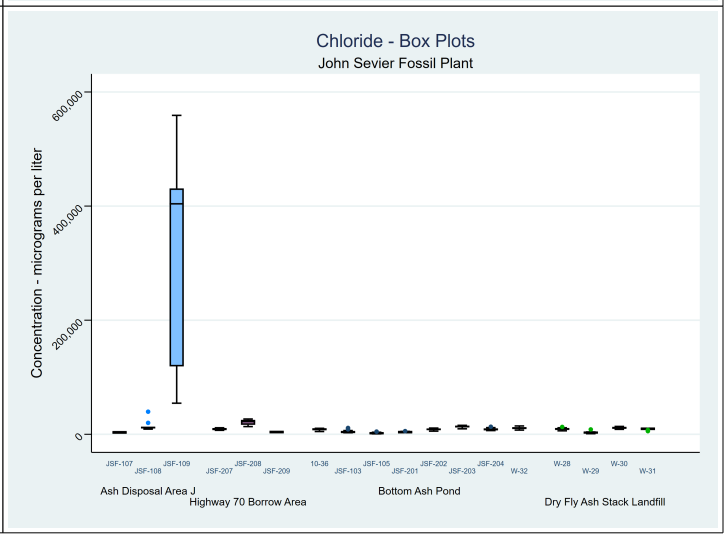


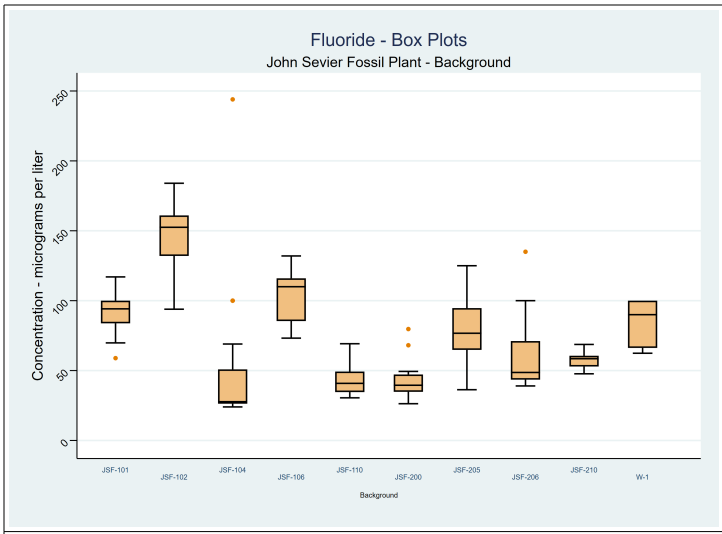


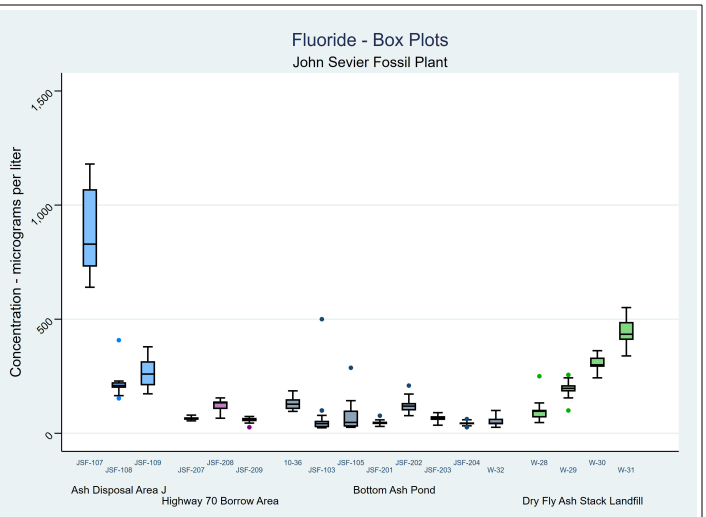


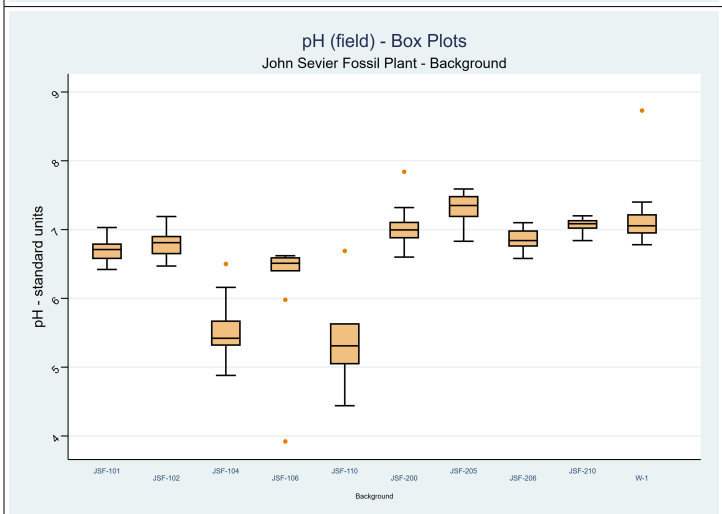


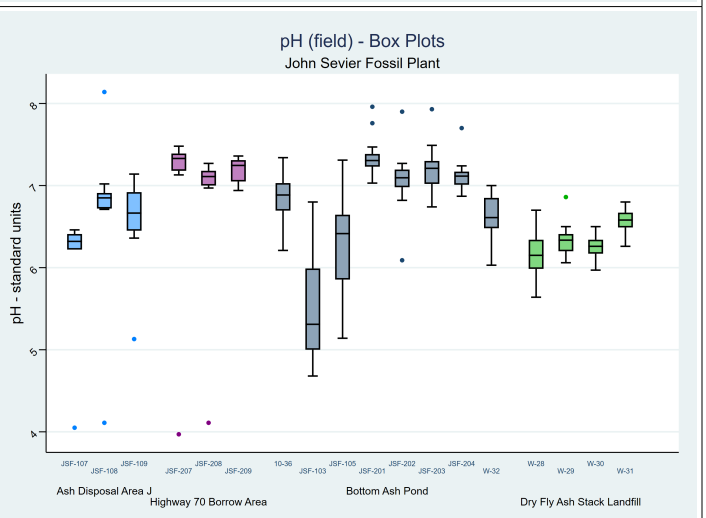


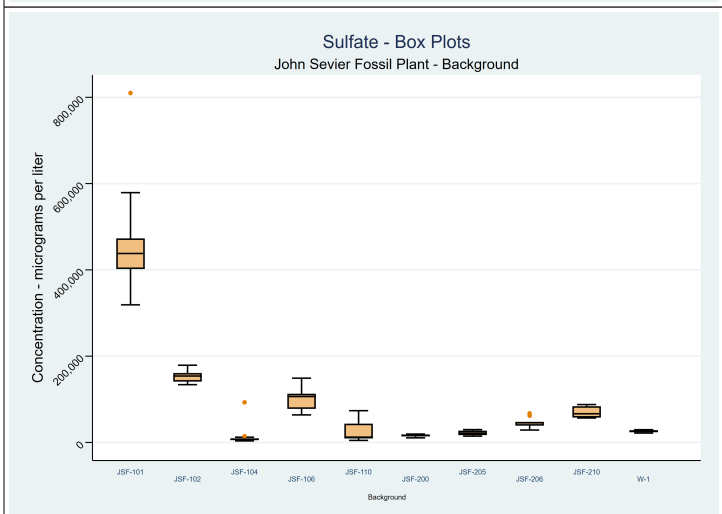


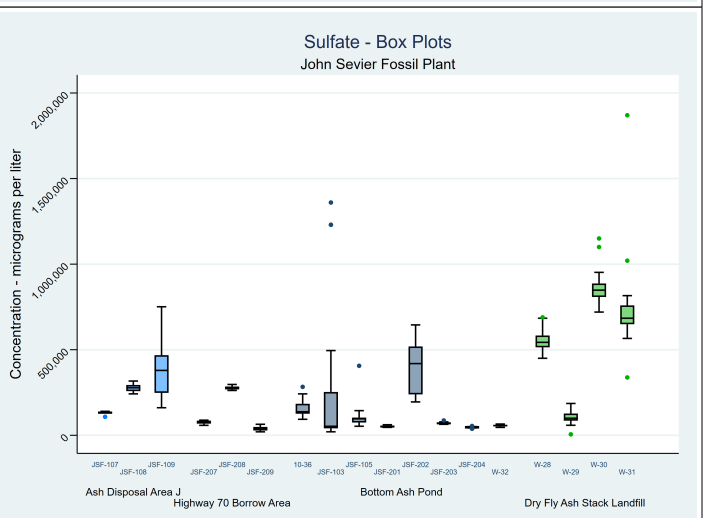

Fluoride - Box Plots
John Sevier Fossil Plant - Background
Concentration - micrograms per liter
0
50
100
150
200
250
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background

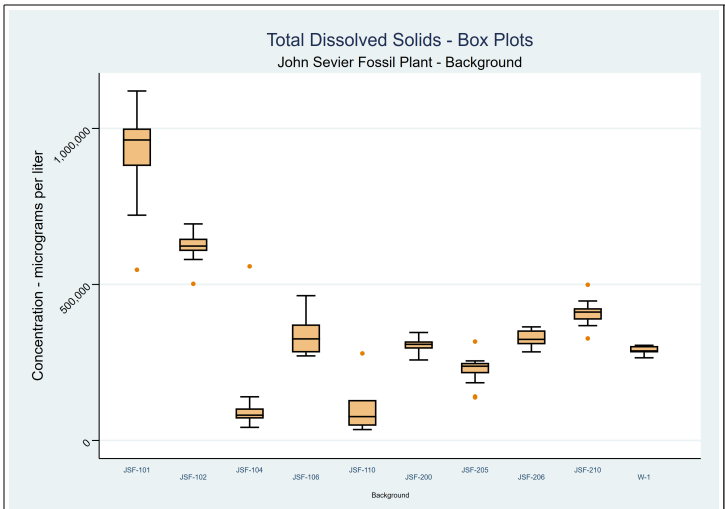

Fluoride - Box Plots
John Sevier Fossil Plant
Concentration - micrograms per liter
0
500
1,000
1,500
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

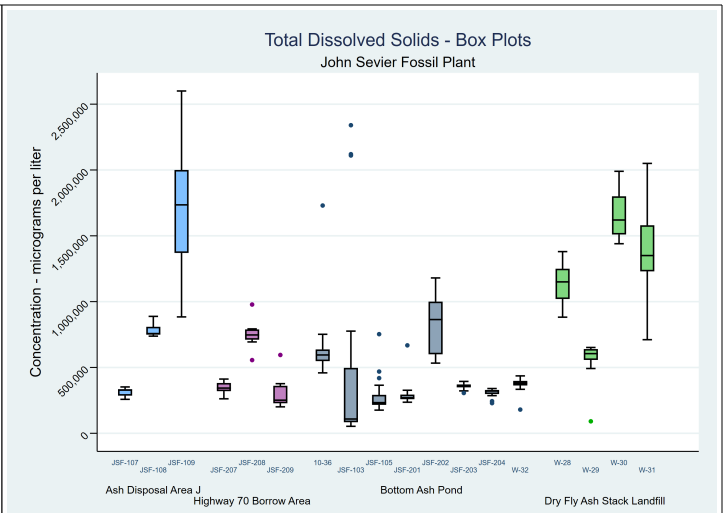

pH (field) - Box Plots
John Sevier Fossil Plant - Background
pH - standard units
4
5
6
7
8
9
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background


pH (field) - Box Plots
John Sevier Fossil Plant
pH - standard units
4
5
6
7
8
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

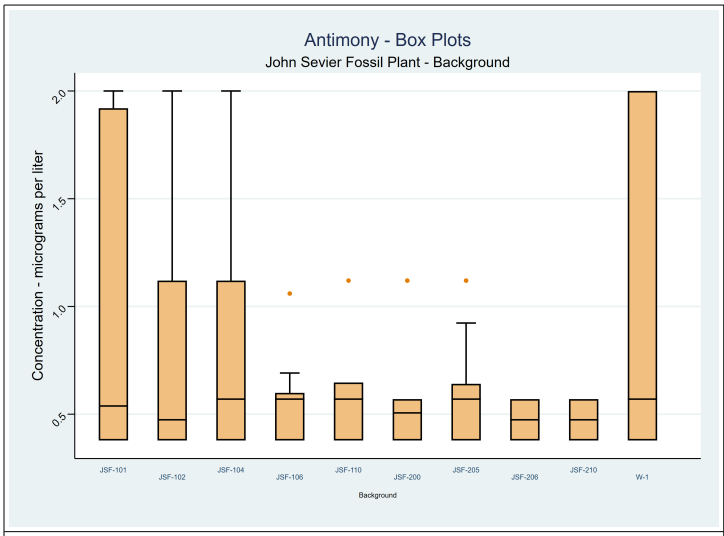

Sulfate - Box Plots
John Sevier Fossil Plant - Background
Concentration - micrograms per liter
0
200,000
400,000
600,000
800,000
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background

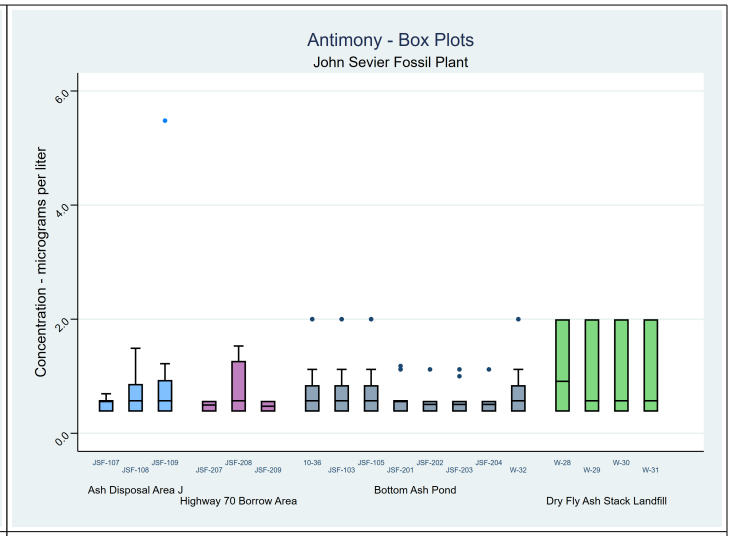

Sulfate - Box Plots
John Sevier Fossil Plant
Concentration - micrograms per liter
0
500,000
1,000,000
1,500,000
2,000,000
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

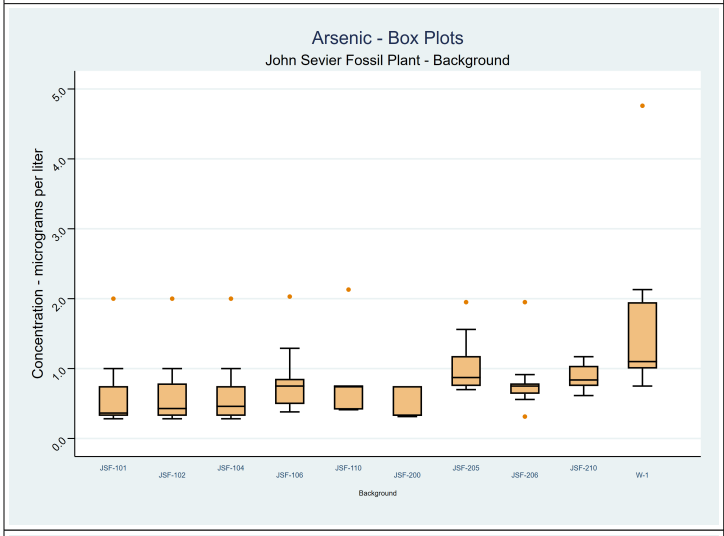

Total Dissolved Solids - Box Plots
John Sevier Fossil Plant - Background
Concentration - micrograms per liter
1,000,000
500,000
0
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background

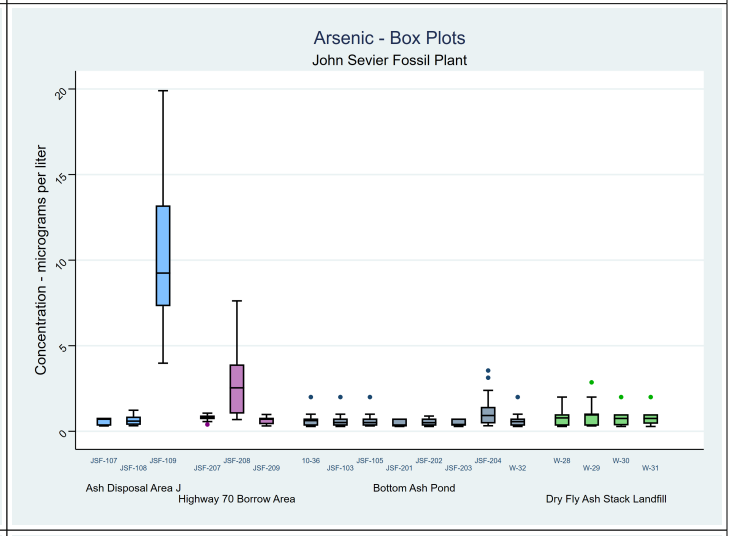

Total Dissolved Solids - Box Plots
John Sevier Fossil Plant
Concentration - micrograms per liter
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

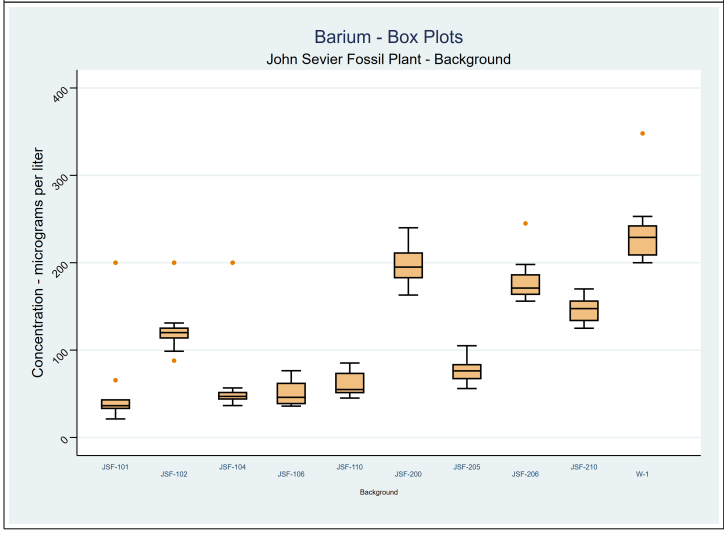
Box Plots
CCR Rule Appendix IV Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

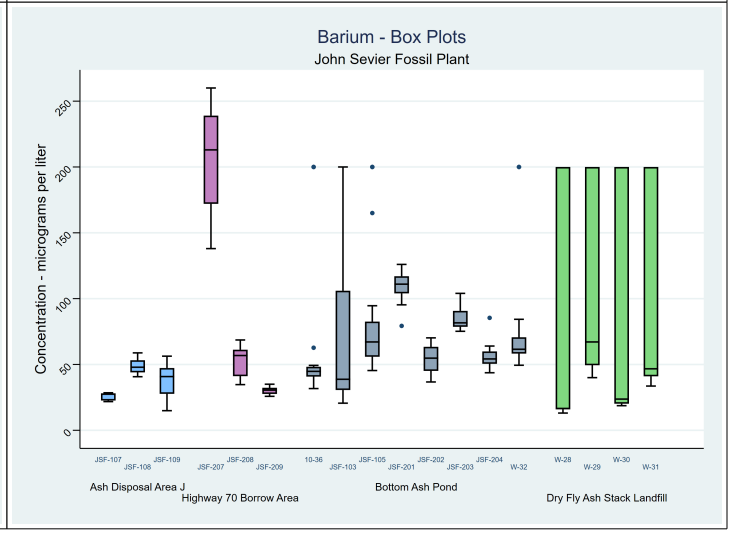


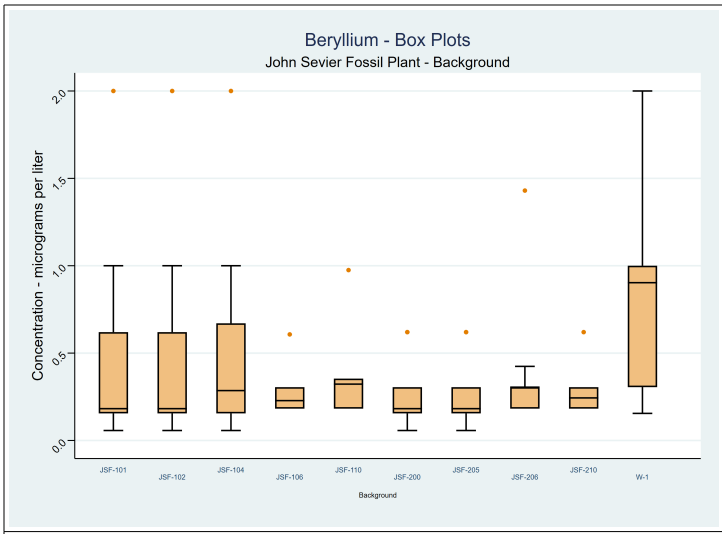


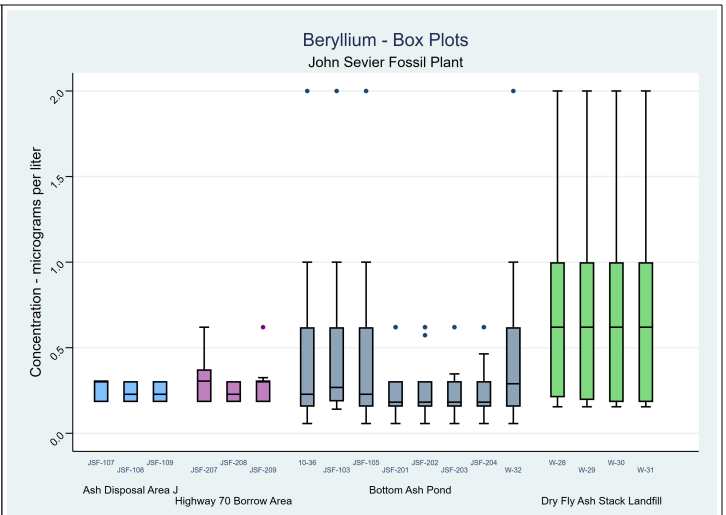


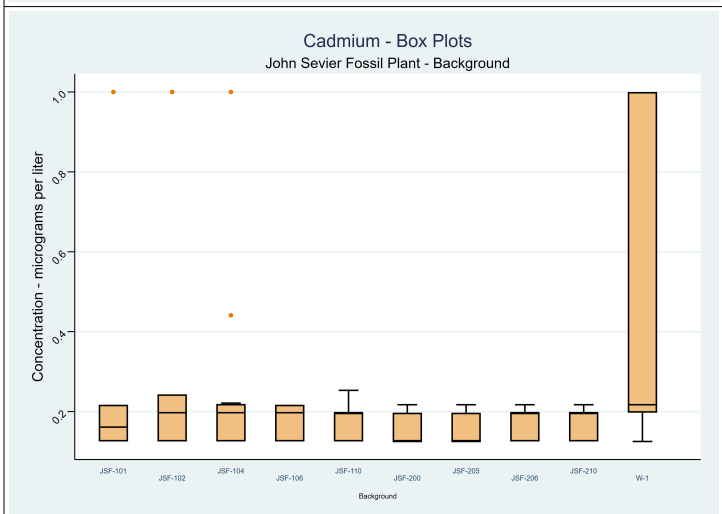


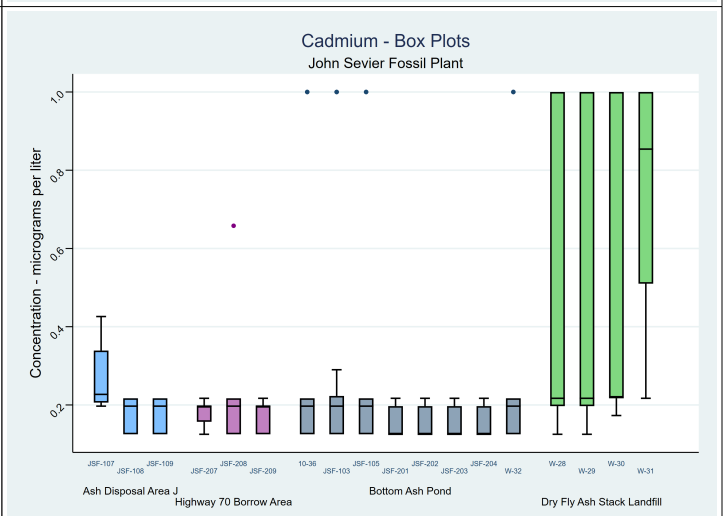


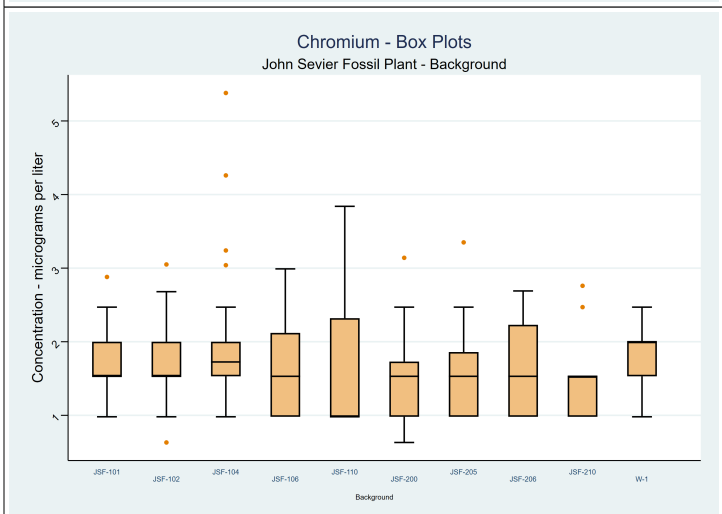


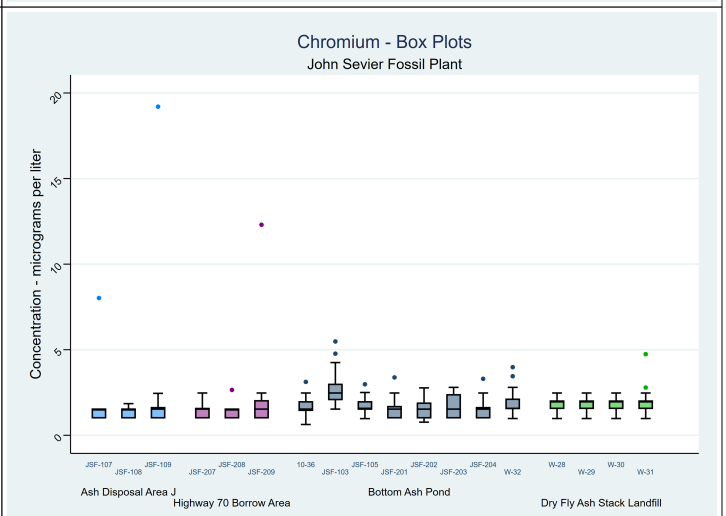

Beryllium - Box Plots
John Sevier Fossil Plant - Background
Concentration - micrograms per liter
0.0
0.5
1.0
1.5
2.0
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background

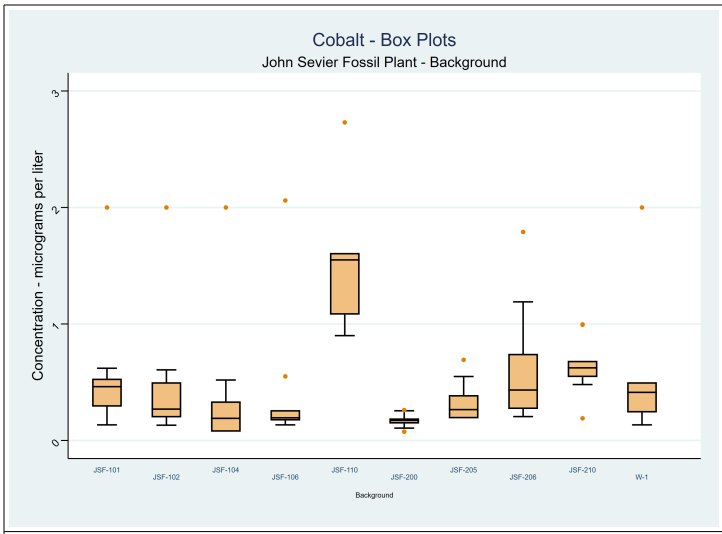

Beryllium - Box Plots
John Sevier Fossil Plant
Concentration - micrograms per liter
0.0
0.5
1.0
1.5
2.0
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

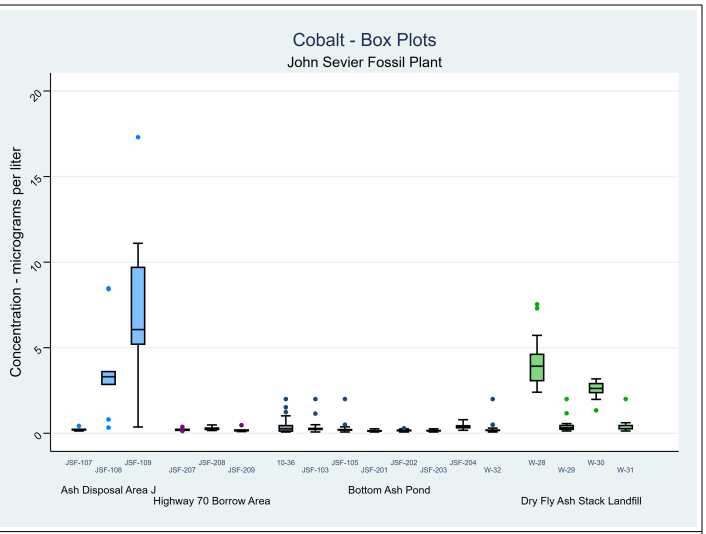

Cadmium - Box Plots
John Sevier Fossil Plant - Background
Concentration - micrograms per liter
0.2
0.4
0.6
0.8
1.0
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background

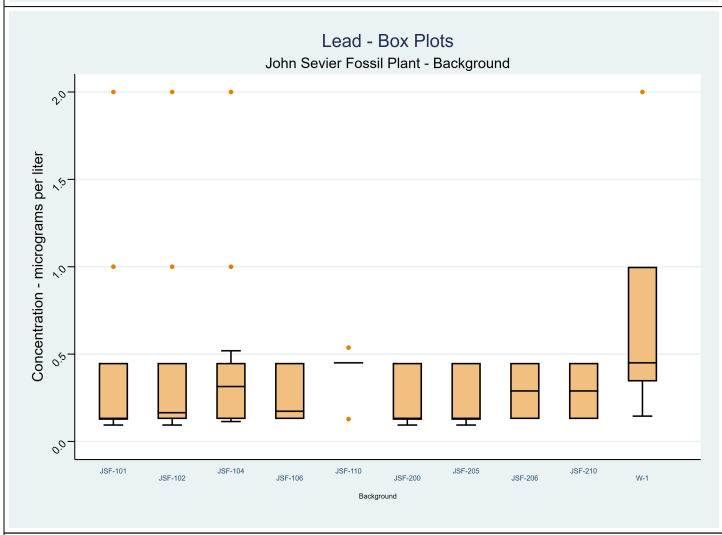

Cadmium - Box Plots
John Sevier Fossil Plant
Concentration - micrograms per liter
0.2
0.4
0.6
0.8
1.0
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

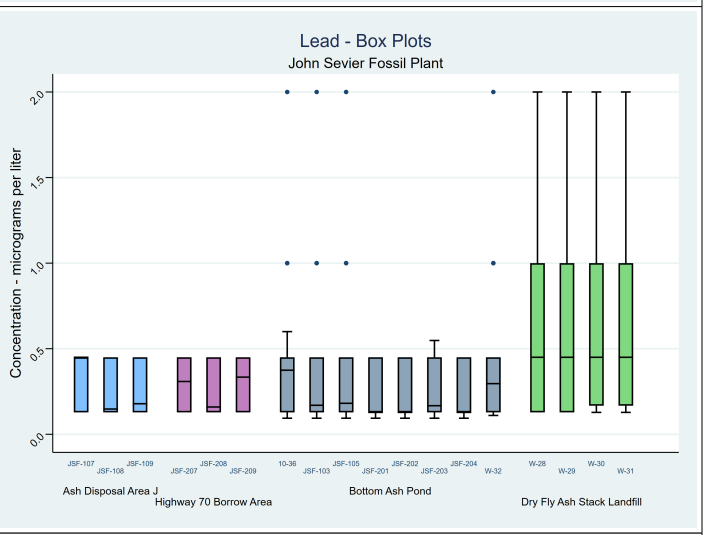

Chromium - Box Plots
John Sevier Fossil Plant - Background
Concentration - micrograms per liter
1
2
3
4
5
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background

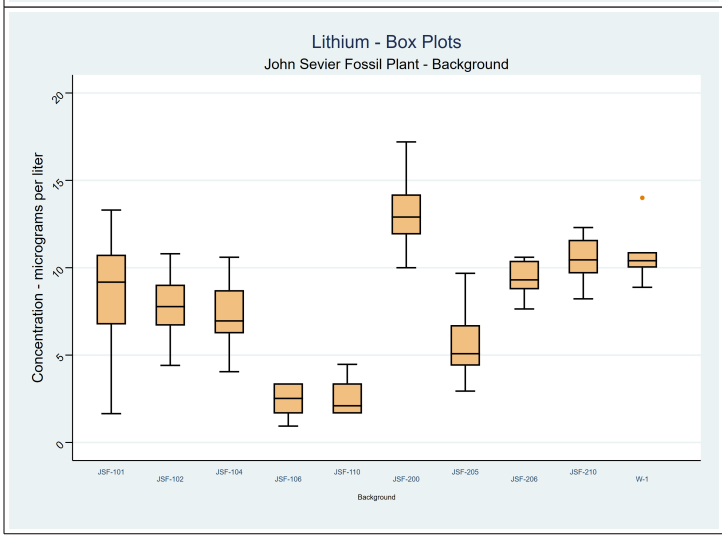

Chromium - Box Plots
John Sevier Fossil Plant
Concentration - micrograms per liter
0
5
10
15
20
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

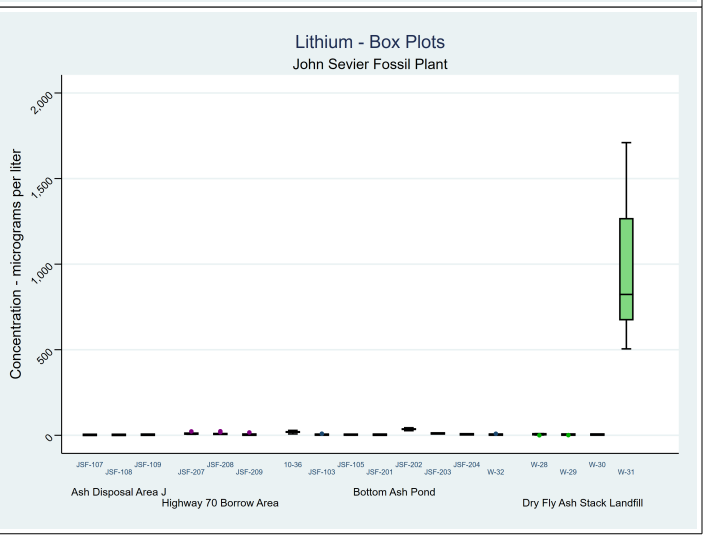

Cobalt - Box Plots
John Sevier Fossil Plant - Background
Concentration - micrograms per liter
0
1
2
3
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background

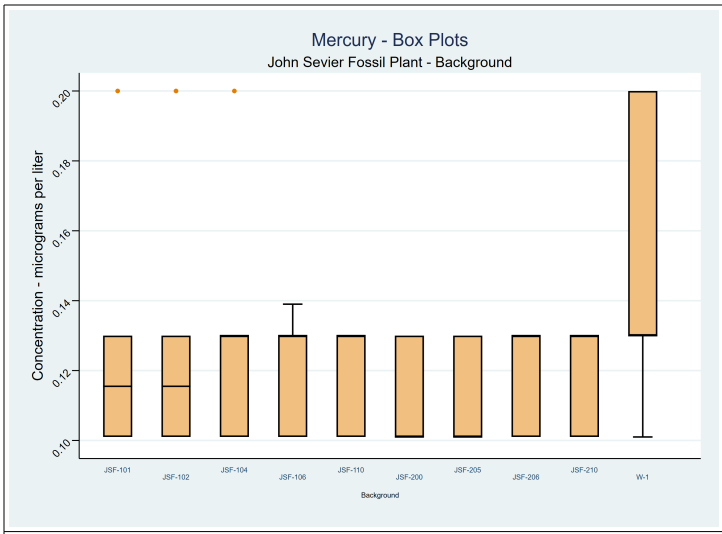

Cobalt - Box Plots
John Sevier Fossil Plant
Concentration - micrograms per liter
0
5
10
15
20
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

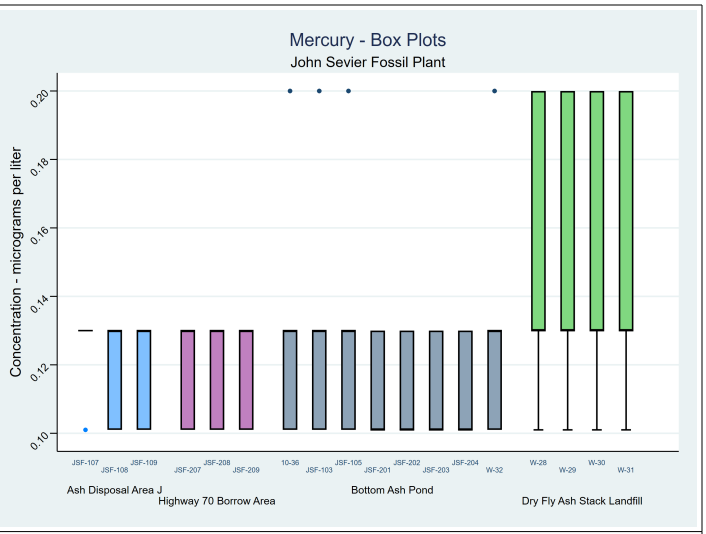

Lead - Box Plots
John Sevier Fossil Plant - Background
Concentration - micrograms per liter
0.0
0.5
1.0
1.5
2.0
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background

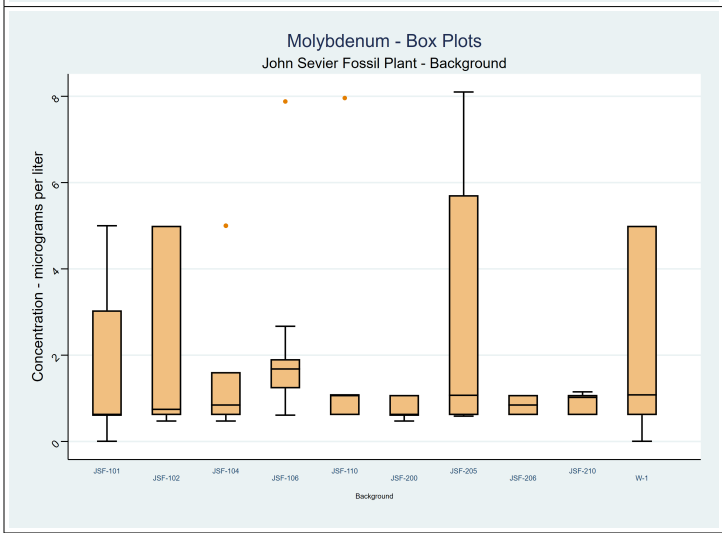

Lead - Box Plots
John Sevier Fossil Plant
Concentration - micrograms per liter
0.0
0.5
1.0
1.5
2.0
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

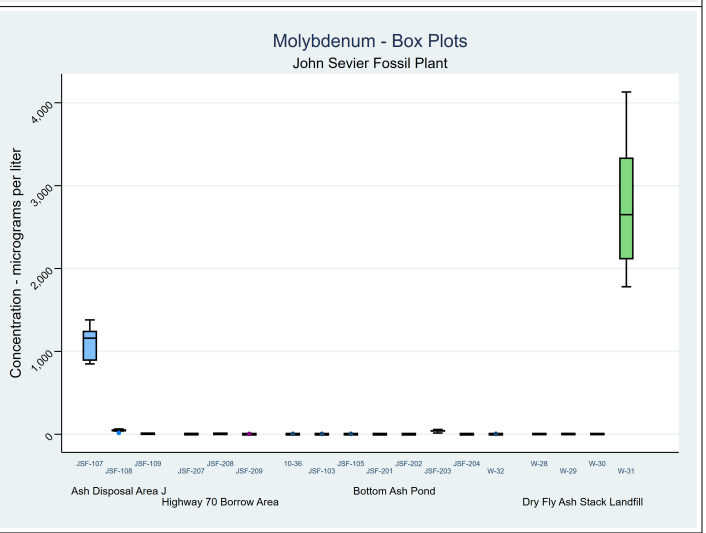

Lithium - Box Plots
John Sevier Fossil Plant - Background
Concentration - micrograms per liter
0
5
10
15
20
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background

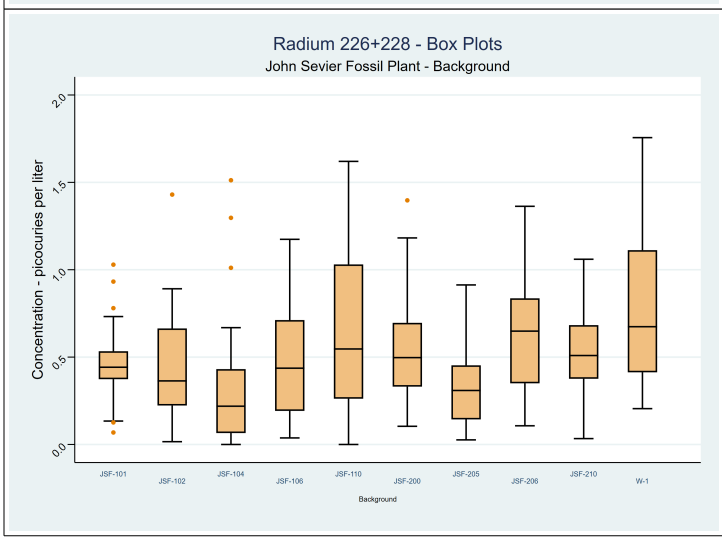

Lithium - Box Plots
John Sevier Fossil Plant
Concentration - micrograms per liter
0
500
1,000
1,500
2,000
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

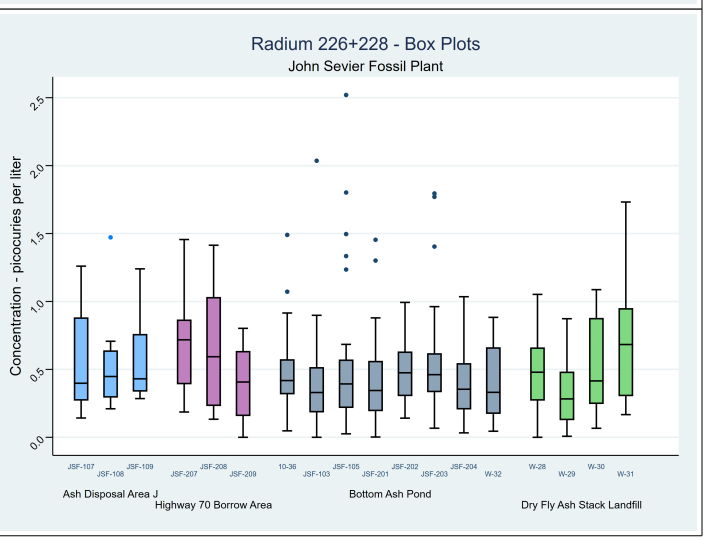

Mercury - Box Plots
John Sevier Fossil Plant - Background
Concentration - micrograms per liter
0.10
0.12
0.14
0.16
0.18
0.20
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background

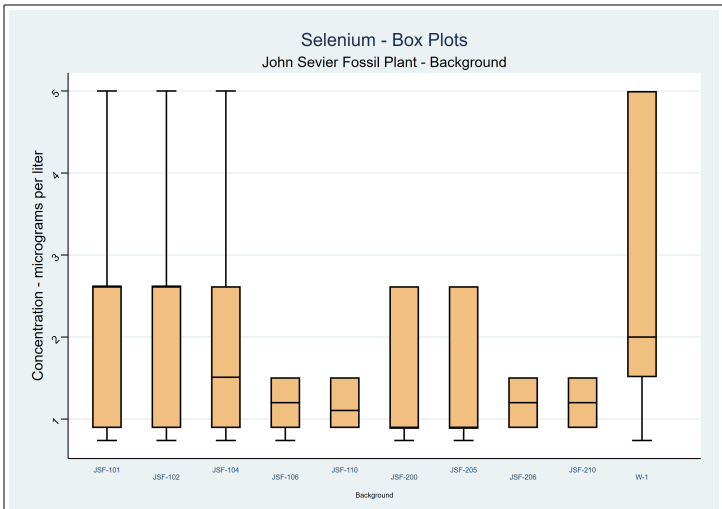

Mercury - Box Plots
John Sevier Fossil Plant
Concentration - micrograms per liter
0.10
0.12
0.14
0.16
0.18
0.20
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

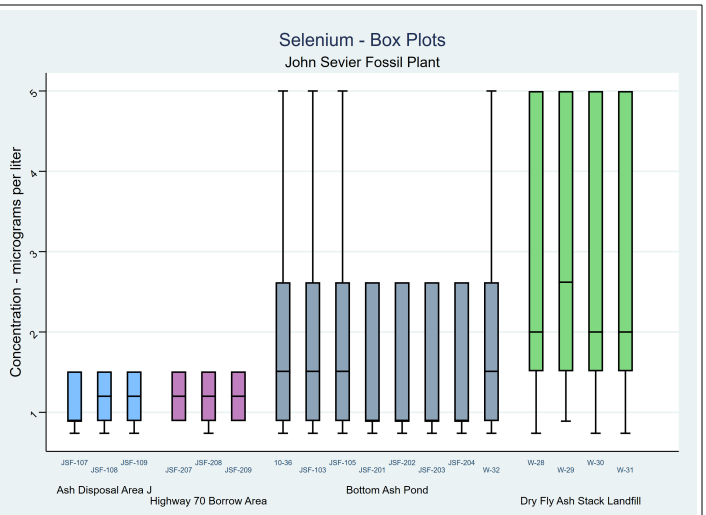

Molybdenum - Box Plots
John Sevier Fossil Plant - Background
Concentration - micrograms per liter
0
2
4
6
8
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background

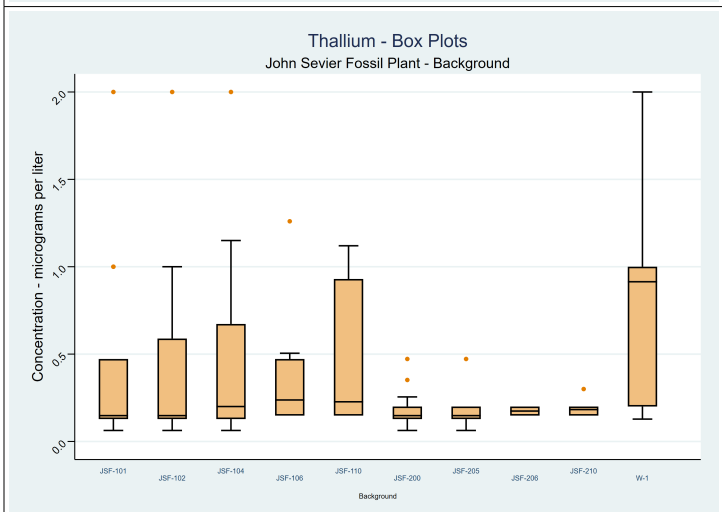

Molybdenum - Box Plots
John Sevier Fossil Plant
Concentration - micrograms per liter
0
1,000
2,000
3,000
4,000
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

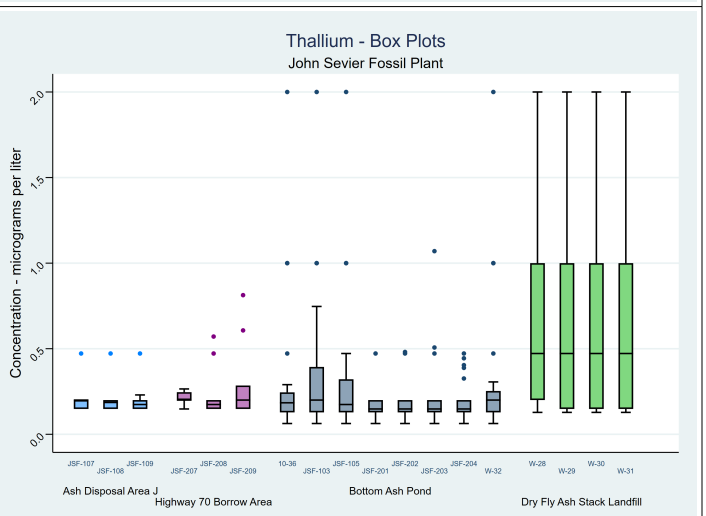

Radium 226+228 - Box Plots
John Sevier Fossil Plant - Background
Concentration - picocuries per liter
0.0
0.5
1.0
1.5
2.0
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background


Radium 226+228 - Box Plots
John Sevier Fossil Plant
Concentration - picocuries per liter
0.0
0.5
1.0
1.5
2.0
2.5
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

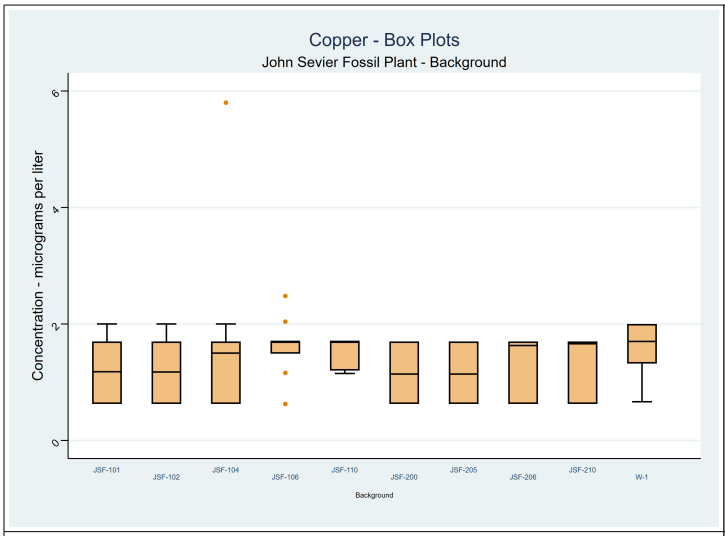

Selenium - Box Plots
John Sevier Fossil Plant - Background
Concentration - micrograms per liter
1
2
3
4
5
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background

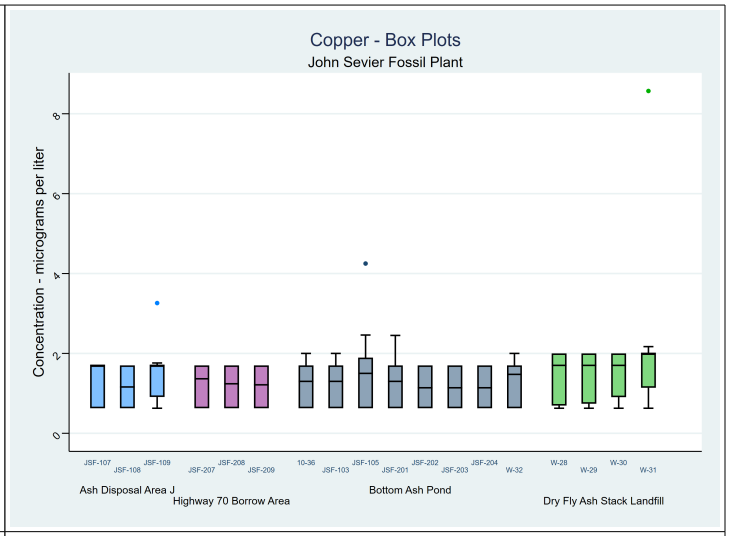

Selenium - Box Plots
John Sevier Fossil Plant
Concentration - micrograms per liter
1
2
3
4
5
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

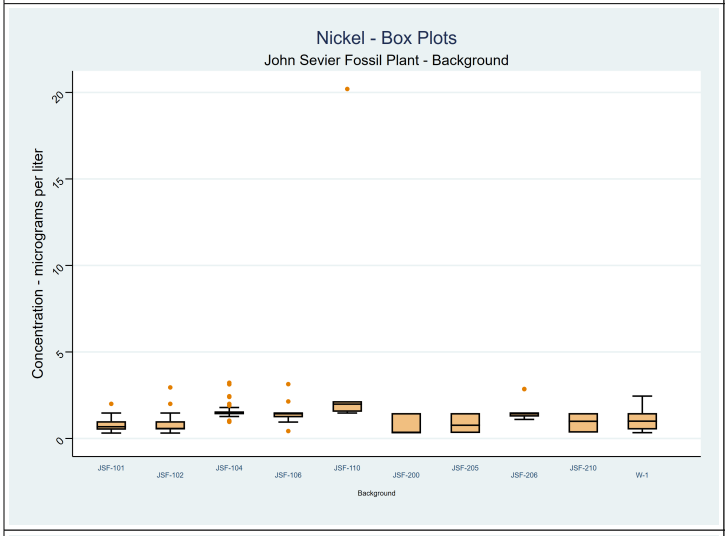

Thallium - Box Plots
John Sevier Fossil Plant - Background
Concentration - micrograms per liter
0.0
0.5
1.0
1.5
2.0
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background

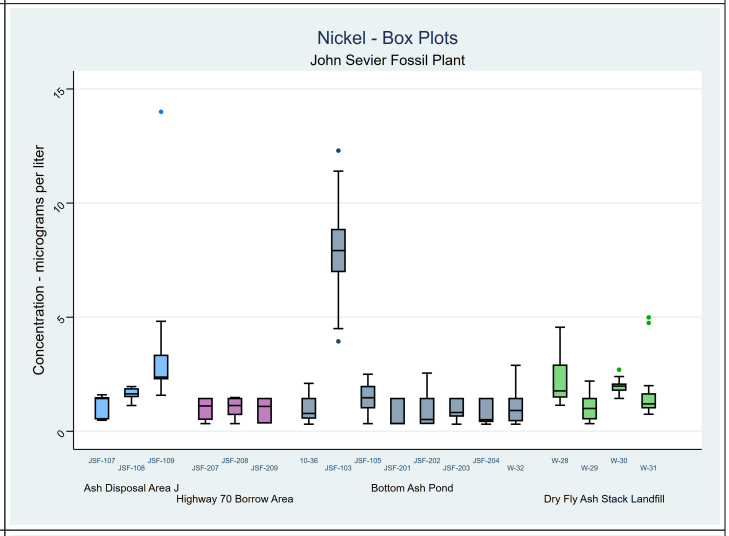

Thallium - Box Plots
John Sevier Fossil Plant
Concentration - micrograms per liter
0.0
0.5
1.0
1.5
2.0
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

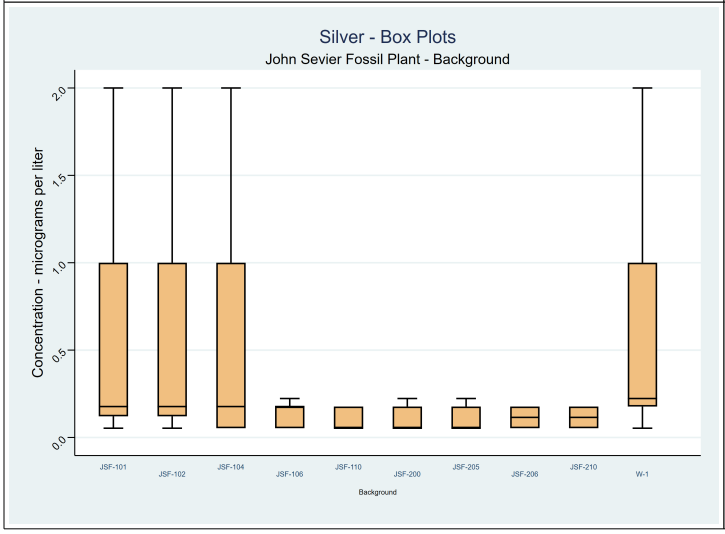
Box Plots
TDEC Appendix I Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

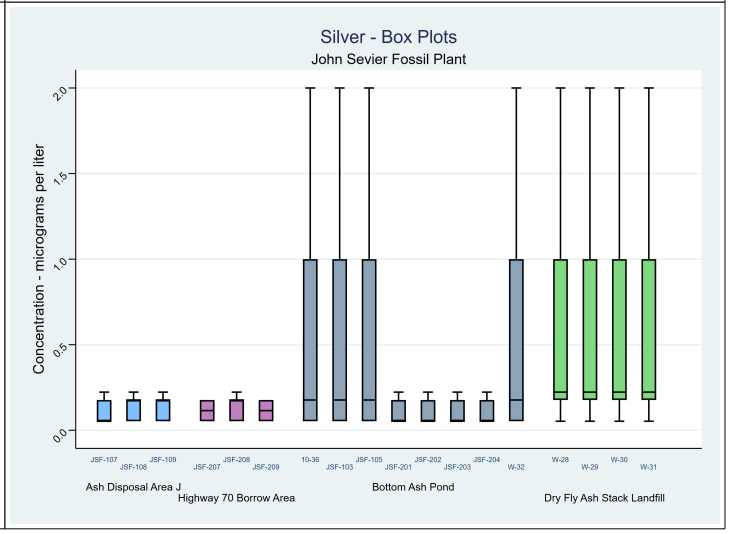


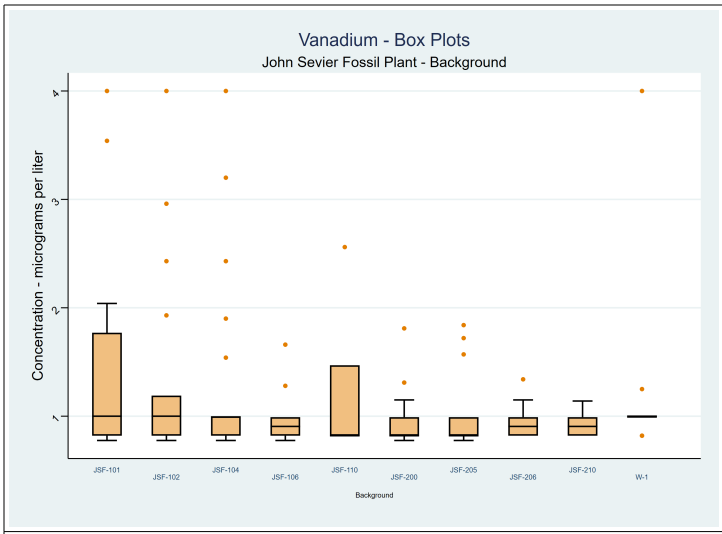


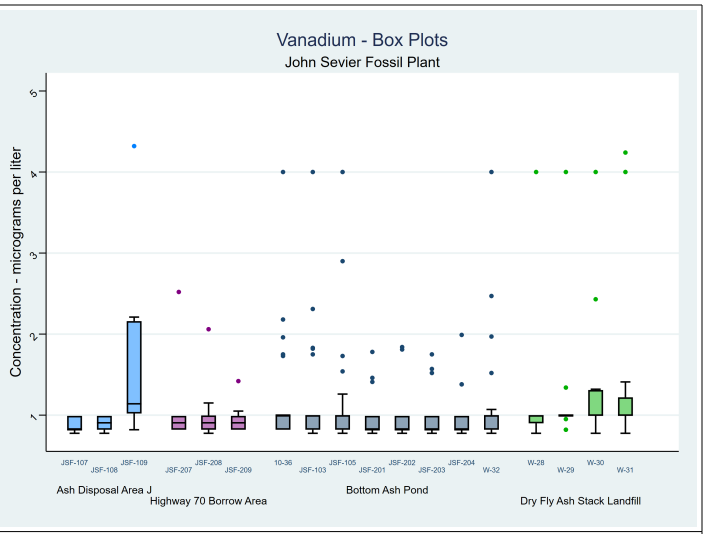


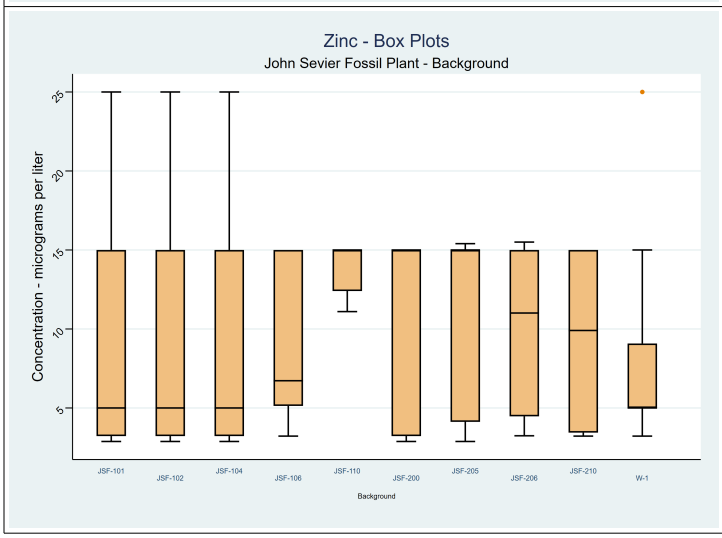


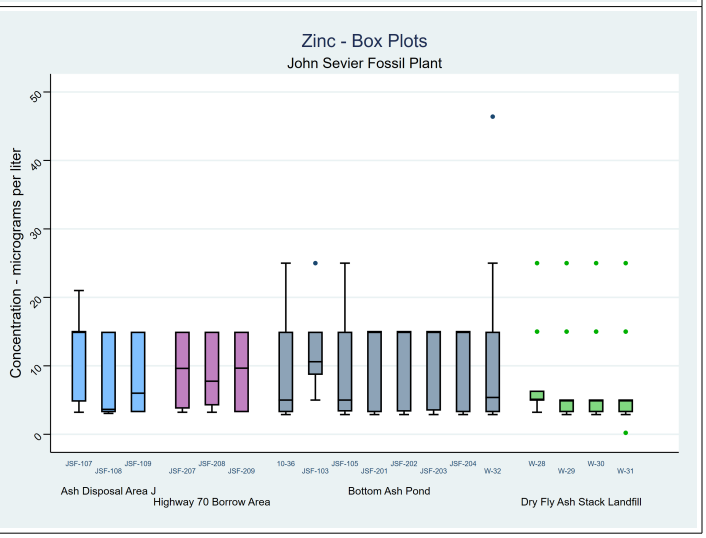





Vanadium - Box Plots
John Sevier Fossil Plant - Background
Concentration - micrograms per liter
1
2
3
4
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background

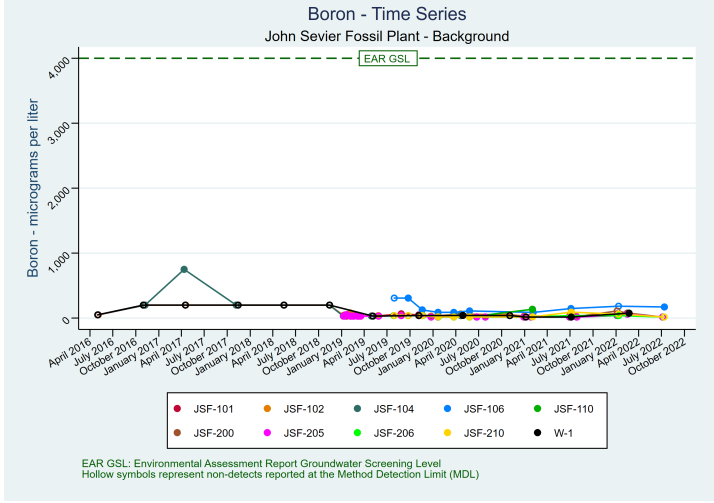

Vanadium - Box Plots
John Sevier Fossil Plant
Concentration - micrograms per liter
1
2
3
4
5
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

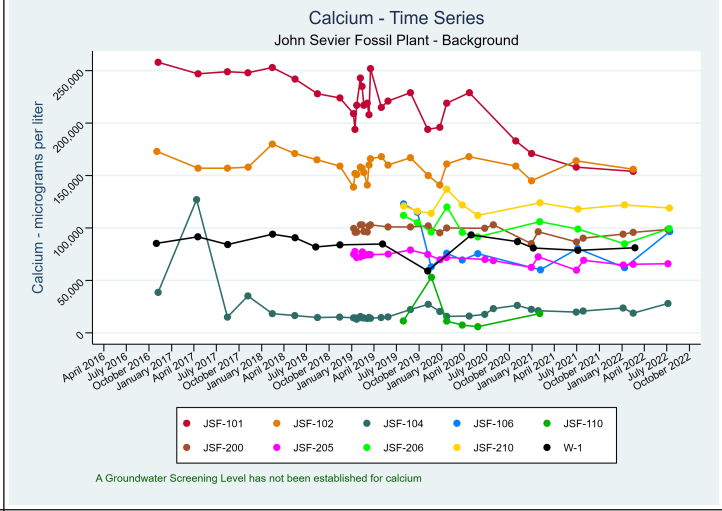

Zinc - Box Plots
John Sevier Fossil Plant - Background
Concentration - micrograms per liter
5
10
15
20
25
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
Background

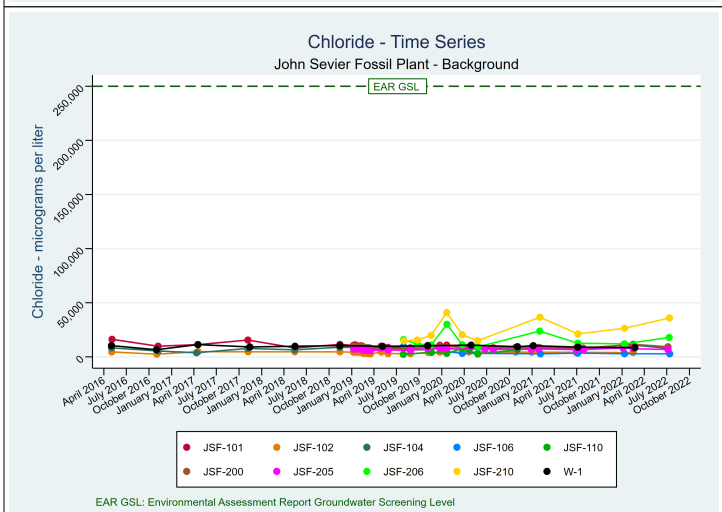

Zinc - Box Plots
John Sevier Fossil Plant
Concentration - micrograms per liter
0
10
20
30
40
50
JSF-107
JSF-108
JSF-109
JSF-207
JSF-208
JSF-209
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
W-28
W-29
W-30
W-31
Ash Disposal Area J
Highway 70 Borrow Area
Bottom Ash Pond
Dry Fly Ash Stack Landfill

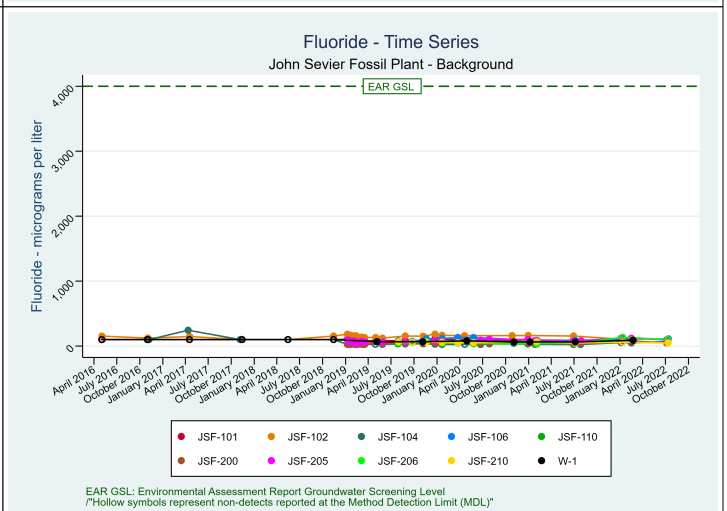
ATTACHMENT E.3-C
TIME SERIES PLOTS

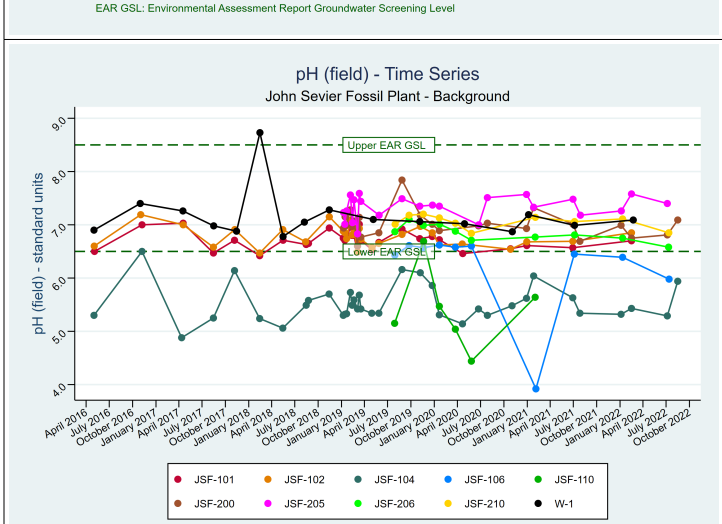
Time Series Plots
Background Wells
CCR Rule Appendix III Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

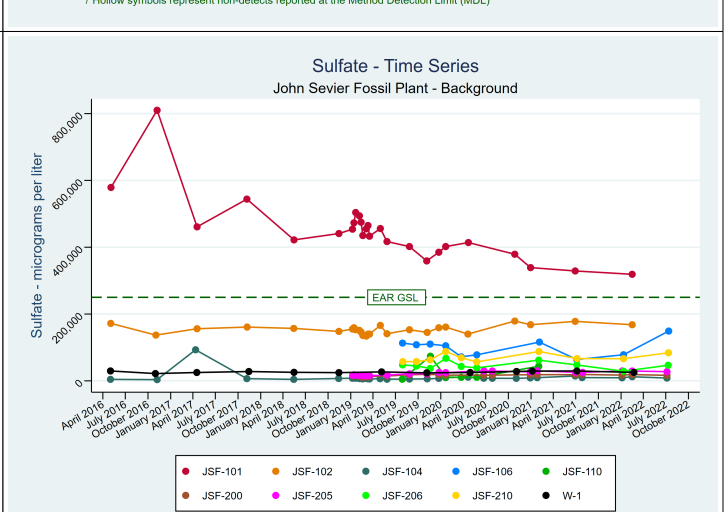


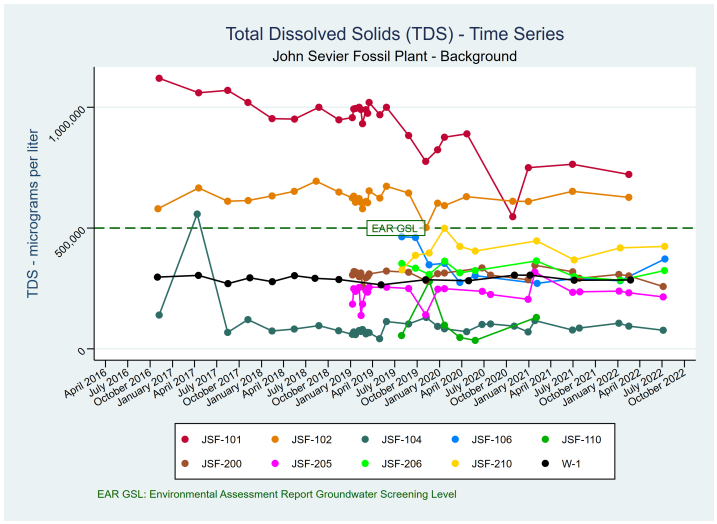












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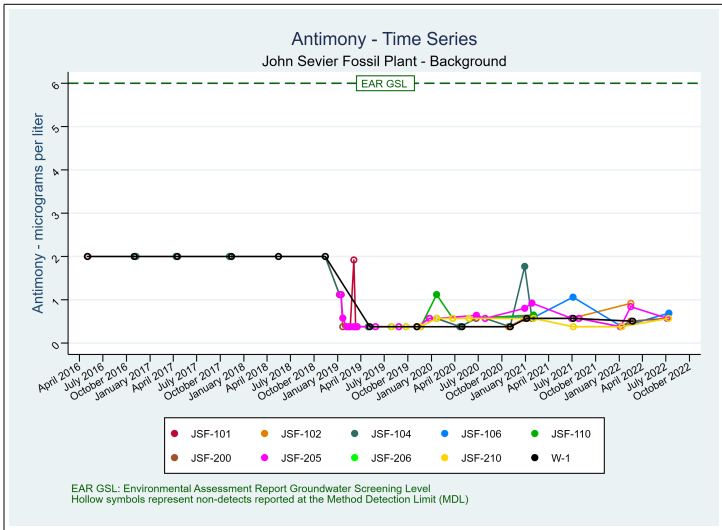
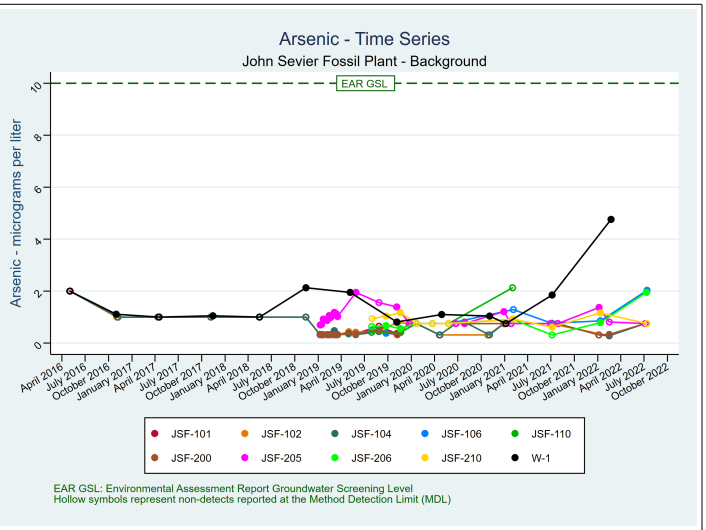
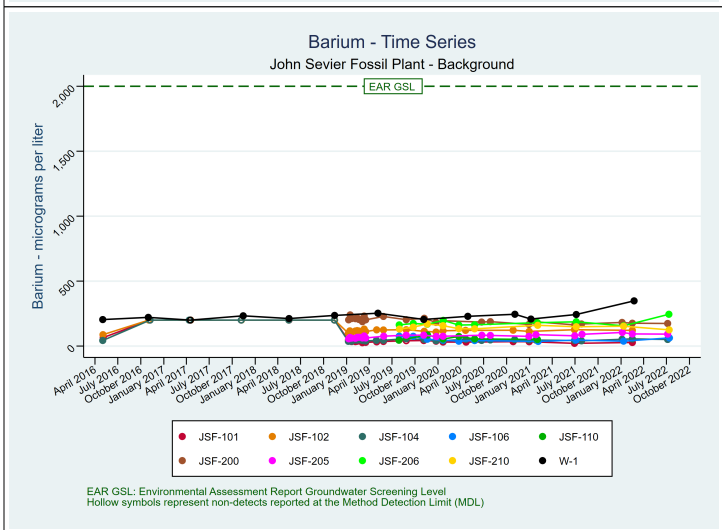
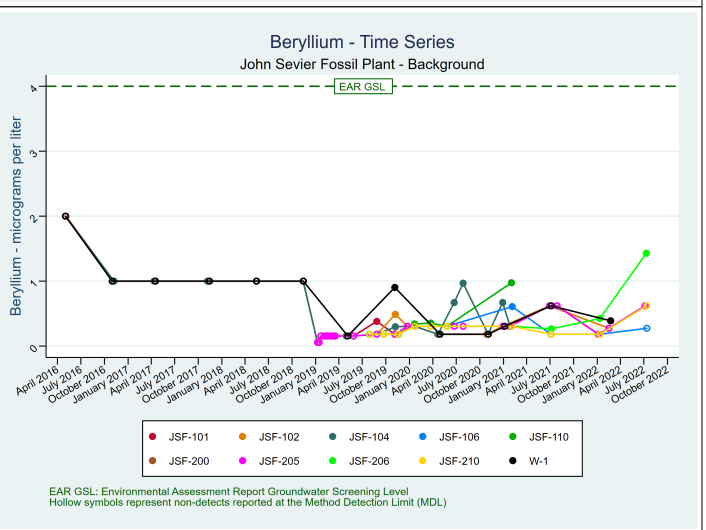
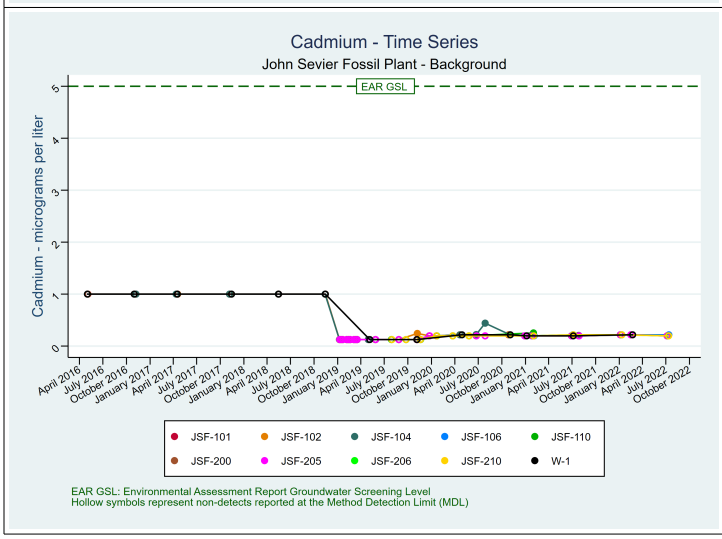
Time Series Plots
Background Wells
CCR Rule Appendix IV Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

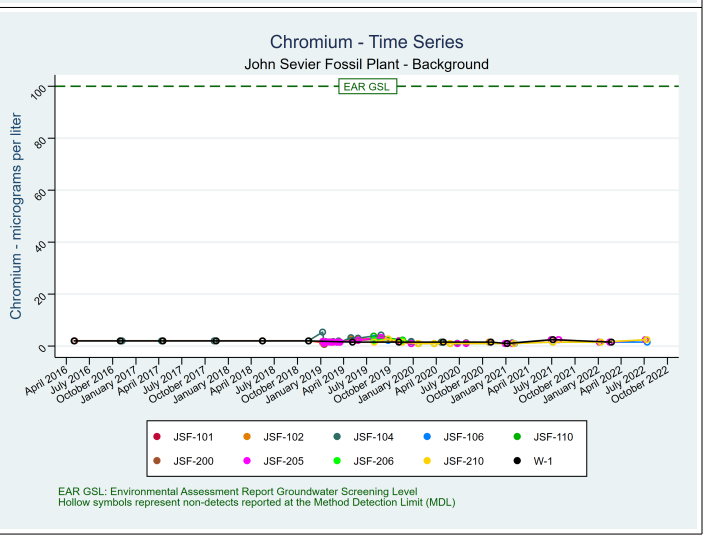






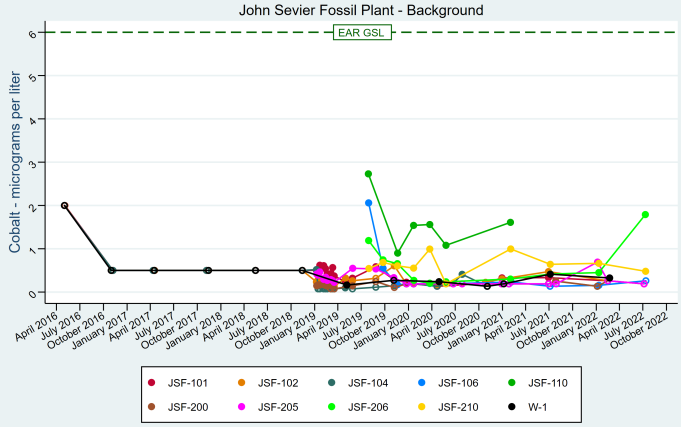






Cobalt - Time Series

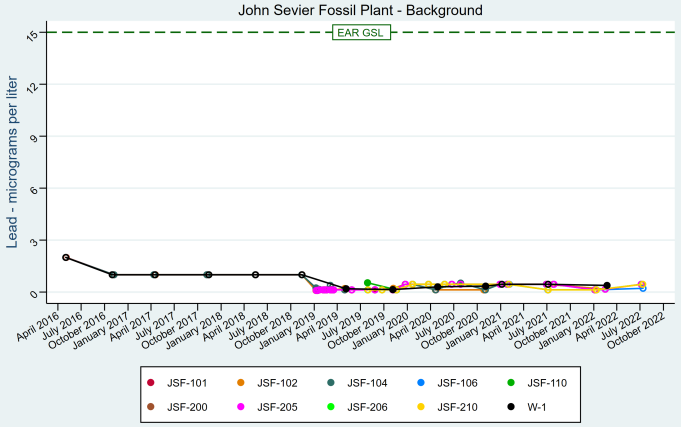
John Sevier Fossil Plant - Background



EAR GSL: Environmental Assessment Report Groundwater Screening Level
/"Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)"

Lead - Time Series

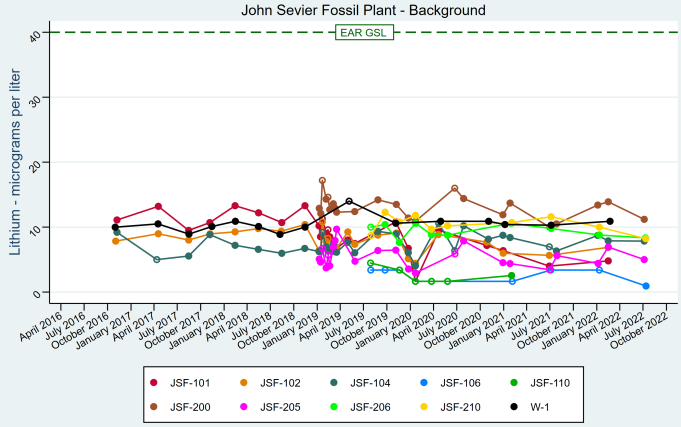
John Sevier Fossil Plant - Background



EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

Lithium - Time Series

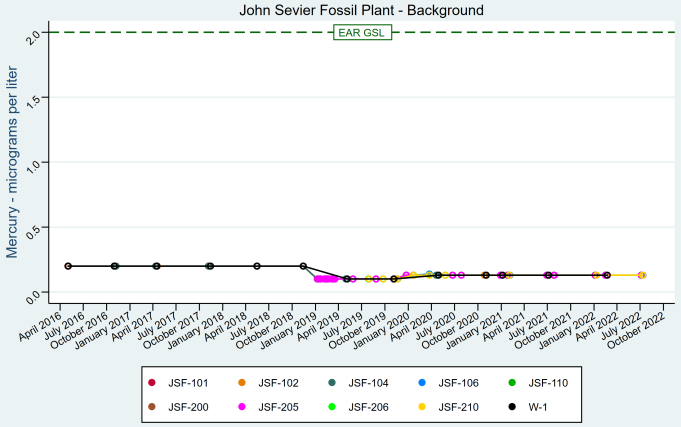
John Sevier Fossil Plant - Background



EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

Mercury - Time Series

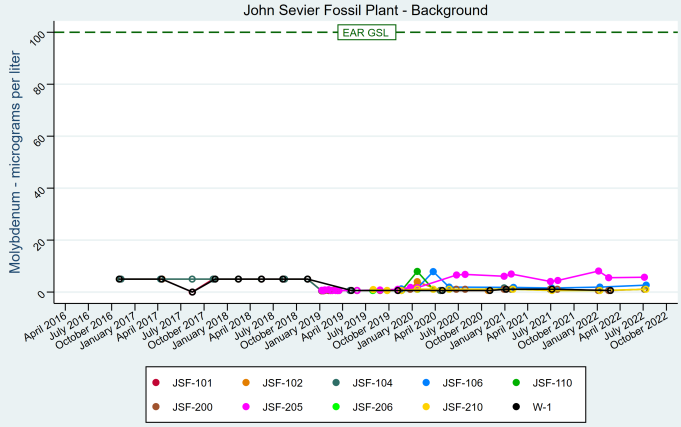
John Sevier Fossil Plant - Background



EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

Molybdenum - Time Series

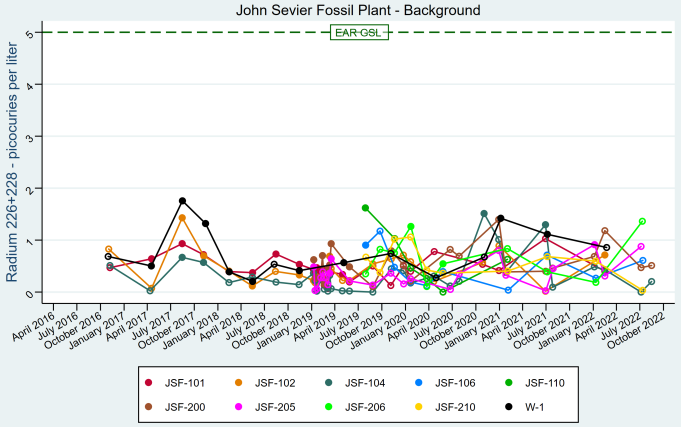
John Sevier Fossil Plant - Background



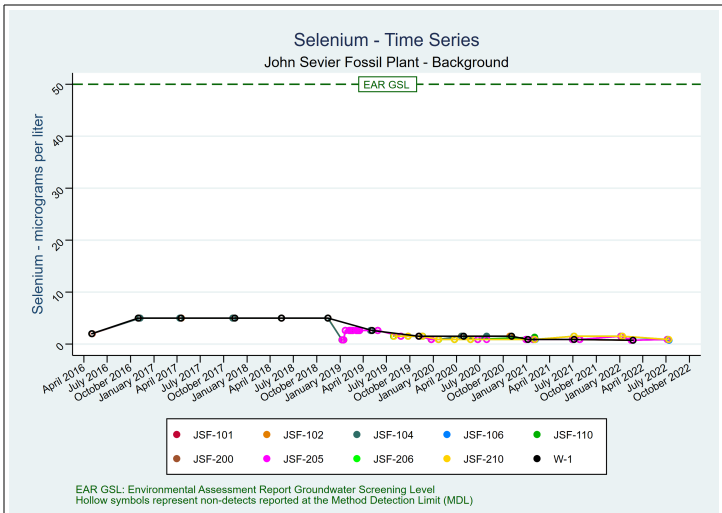
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

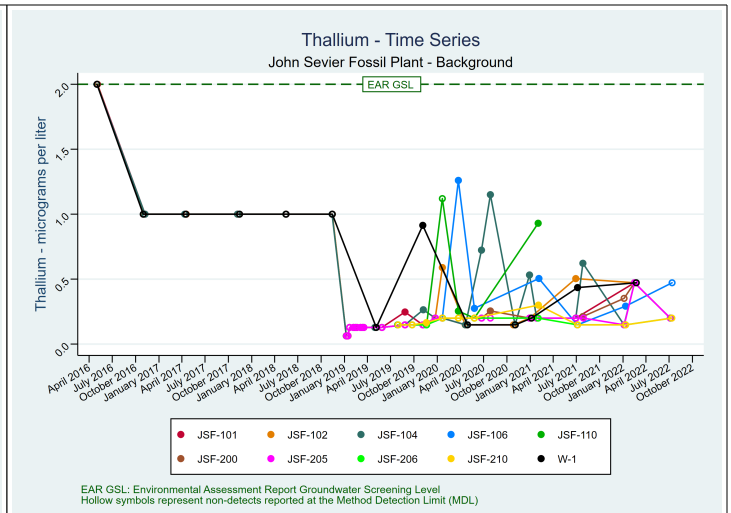
Radium 226+228 - Time Series

John Sevier Fossil Plant - Background

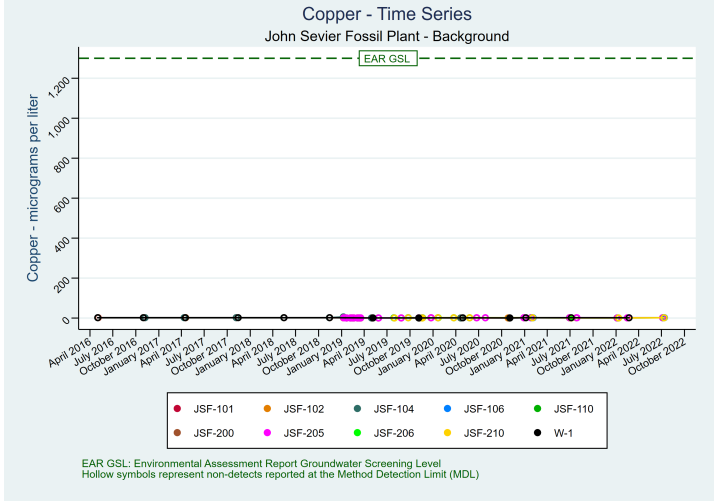


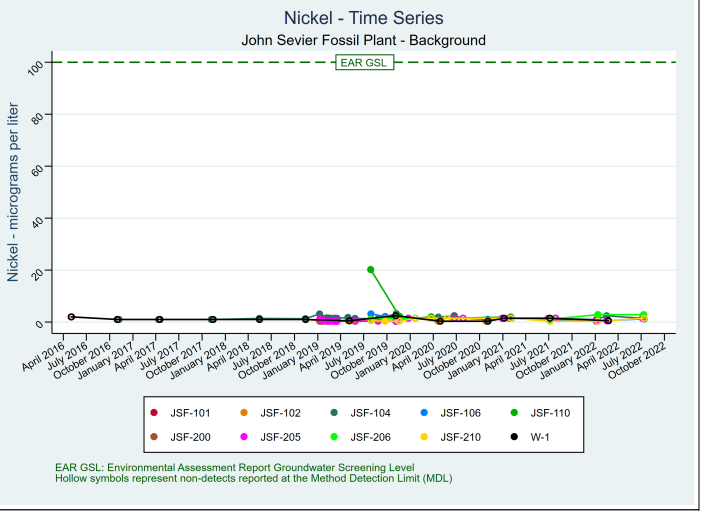
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

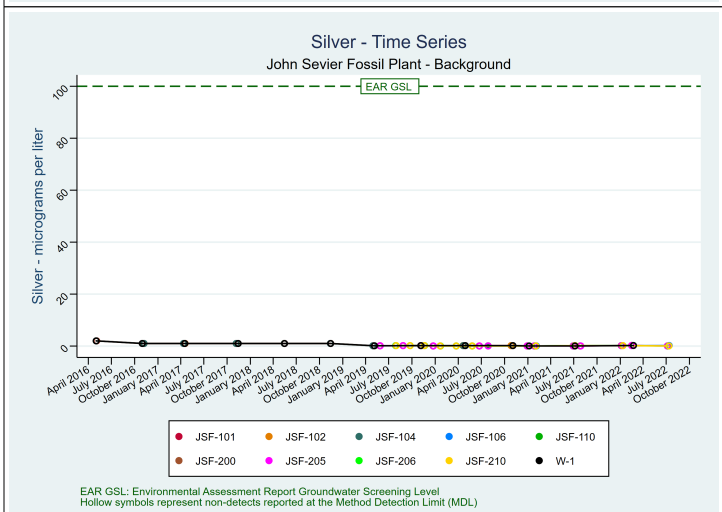

Selenium - Time Series
John Sevier Fossil Plant - Background
EAR GSL
Selenium - micrograms per liter
0
10
20
30
40
50
April 2016
July 2016
October 2016
January 2017
April 2017
July 2017
October 2017
January 2018
April 2018
July 2018
October 2018
January 2019
April 2019
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

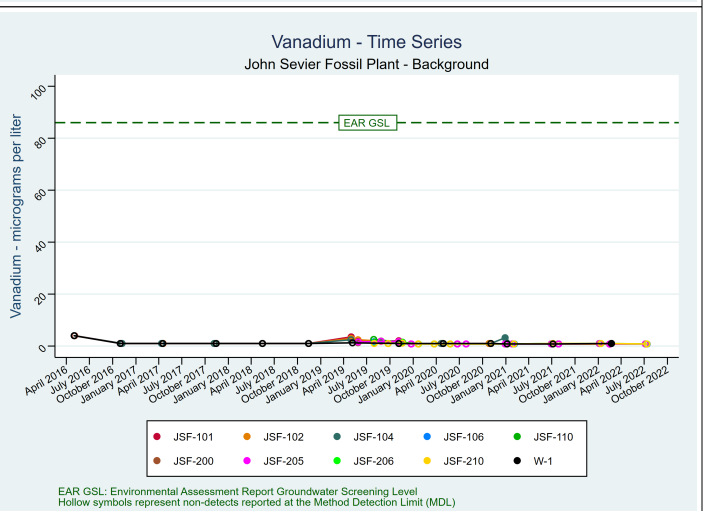

Thallium - Time Series
John Sevier Fossil Plant - Background
EAR GSL
Thallium - micrograms per liter
0.0
0.5
1.0
1.5
2.0
April 2016
July 2016
October 2016
January 2017
April 2017
July 2017
October 2017
January 2018
April 2018
July 2018
October 2018
January 2019
April 2019
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
JSF-101
JSF-102
JSF-104
JSF-106
JSF-110
JSF-200
JSF-205
JSF-206
JSF-210
W-1
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

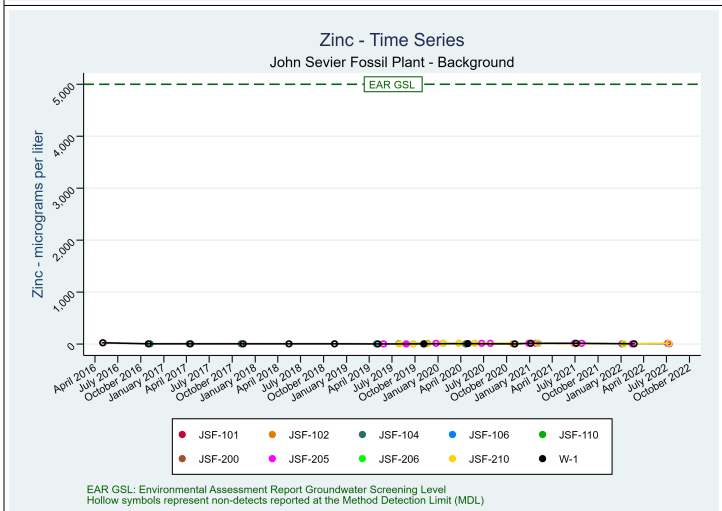
Time Series Plots
Background Wells
TDEC Appendix I Parameters
John Sevier Fossil Plant - Rogersville, Tennessee











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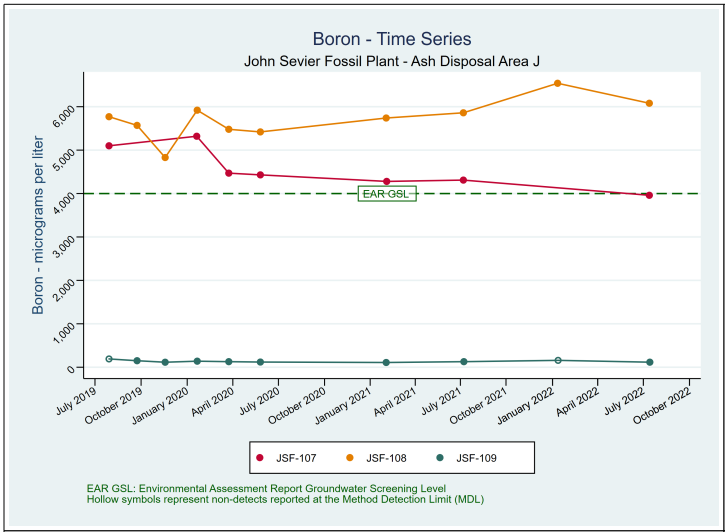
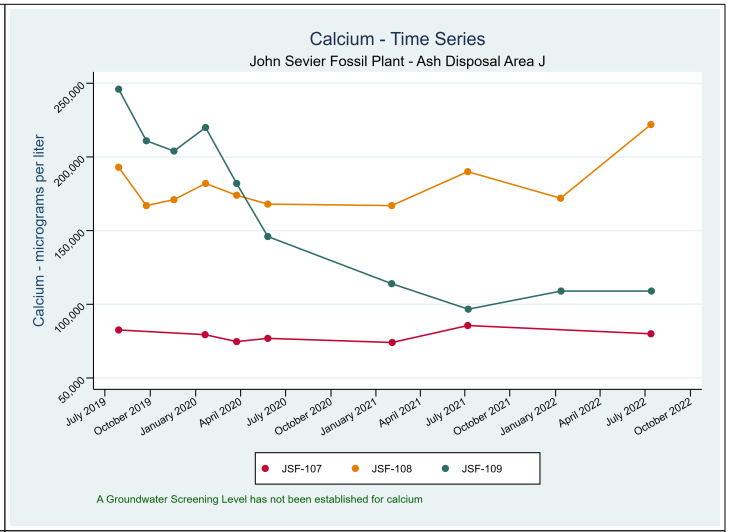
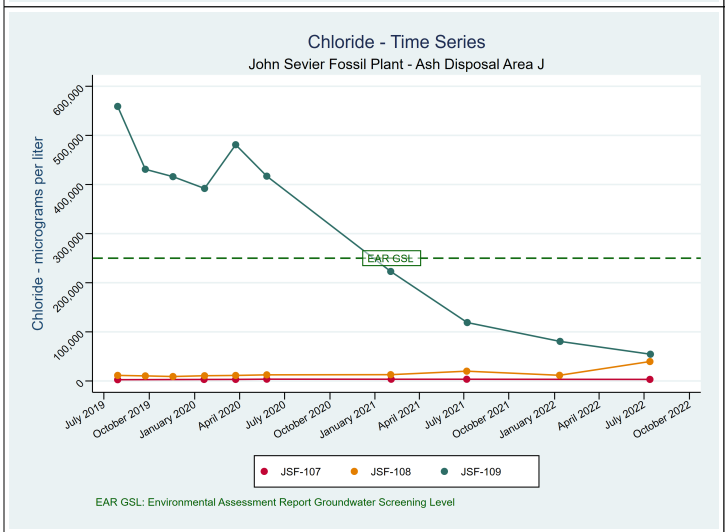
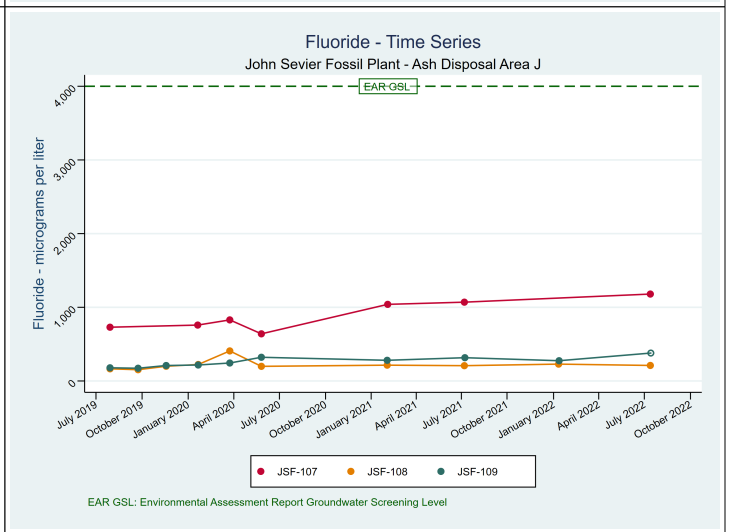
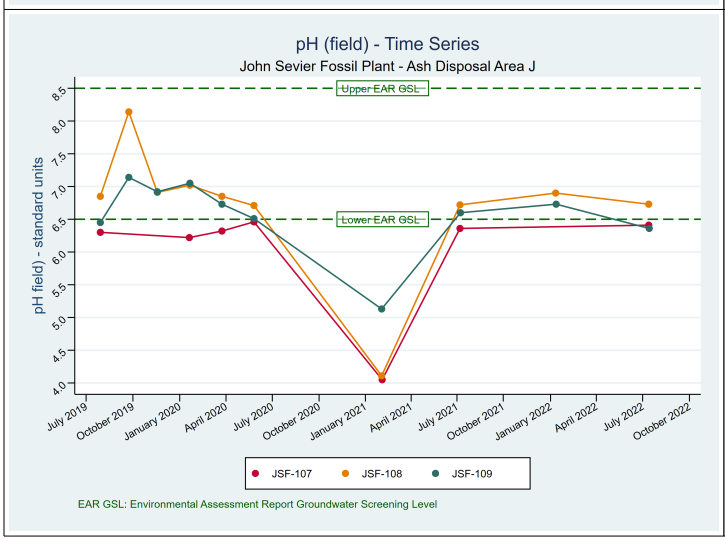
Time Series Plots
Ash Disposal Area J
CCR Rule Appendix III Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

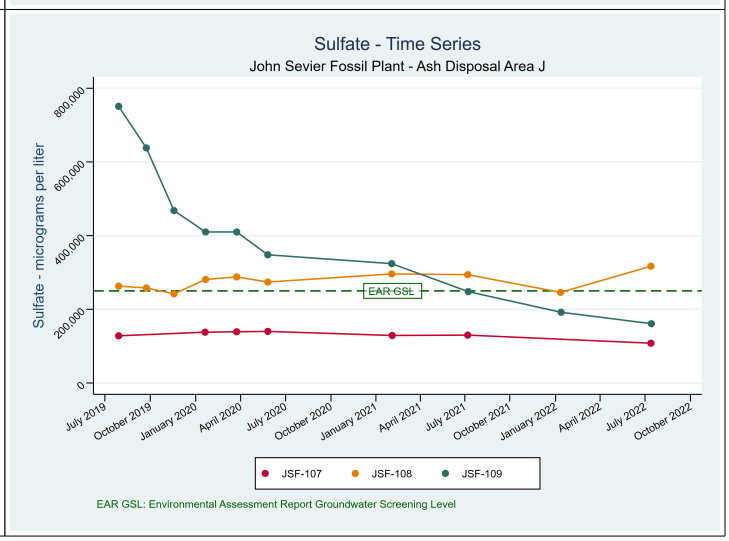


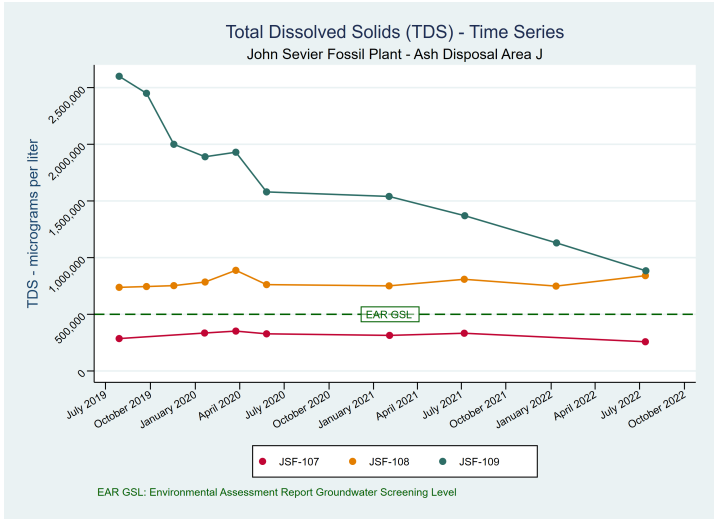












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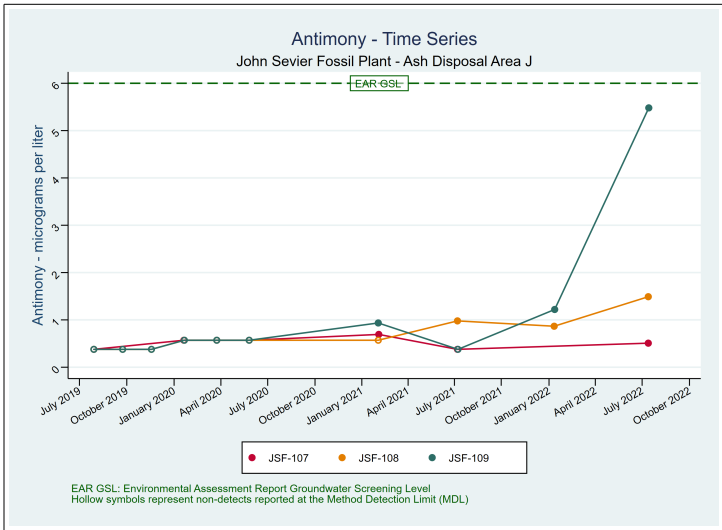
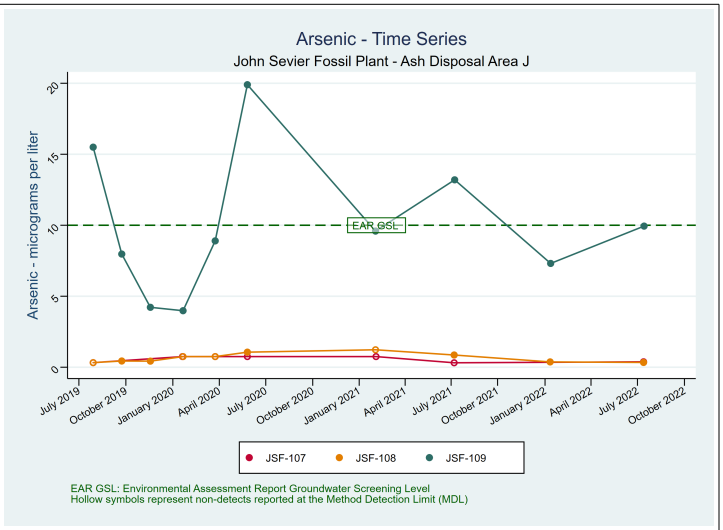
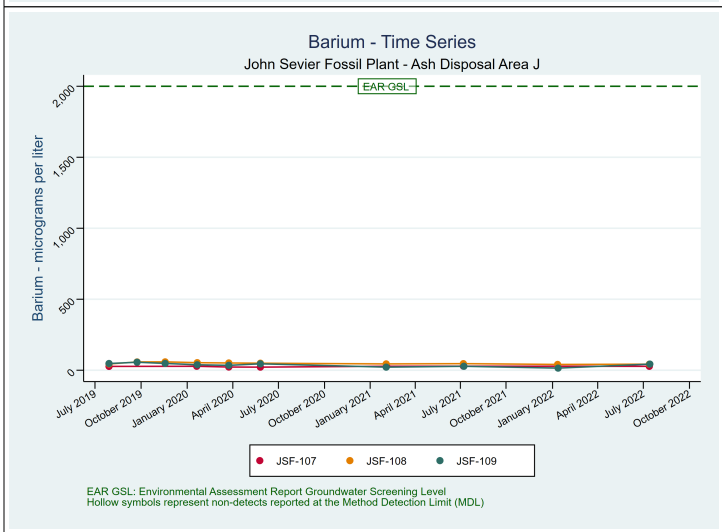
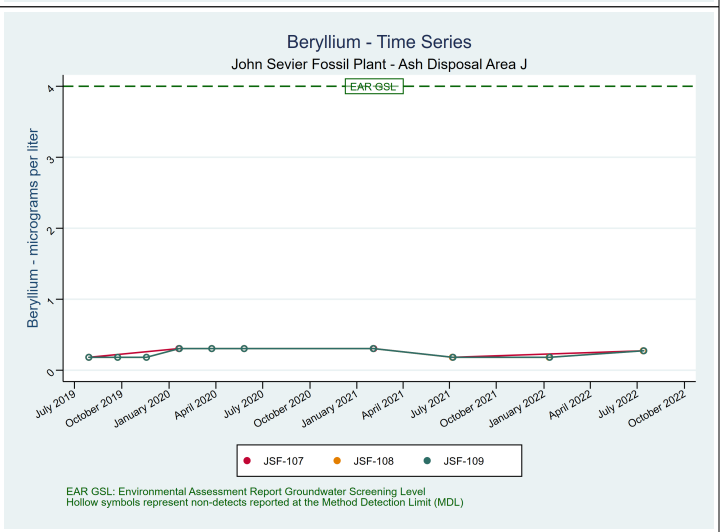
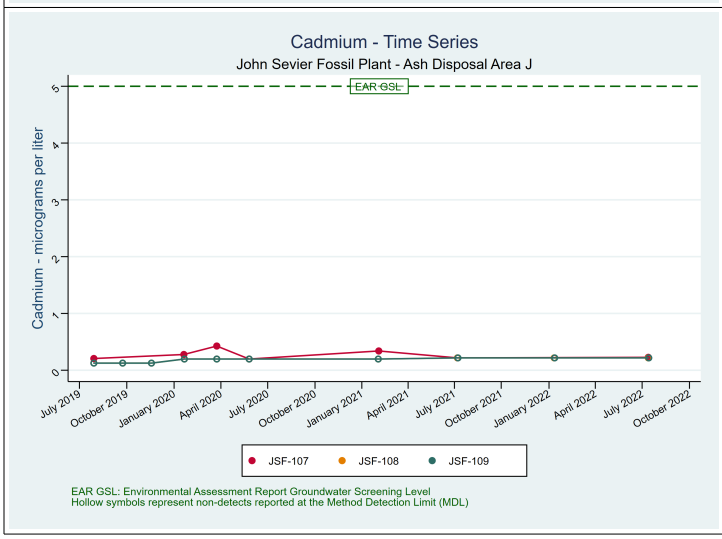
Time Series Plots
Ash Disposal Area J
CCR Rule Appendix IV Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

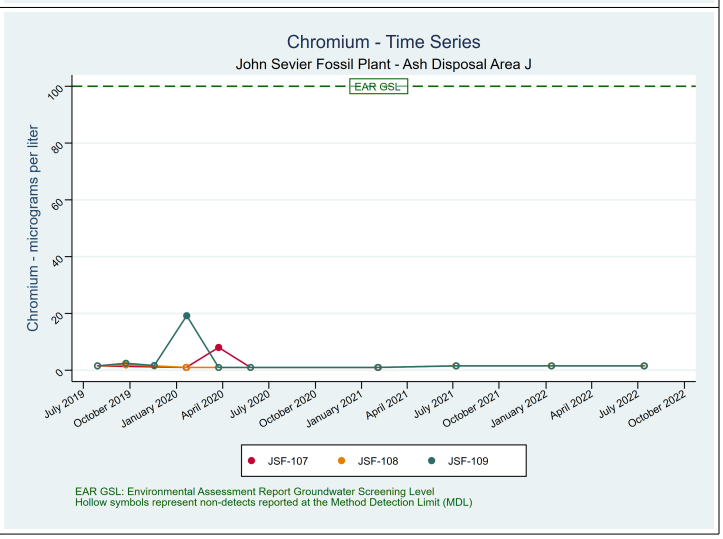


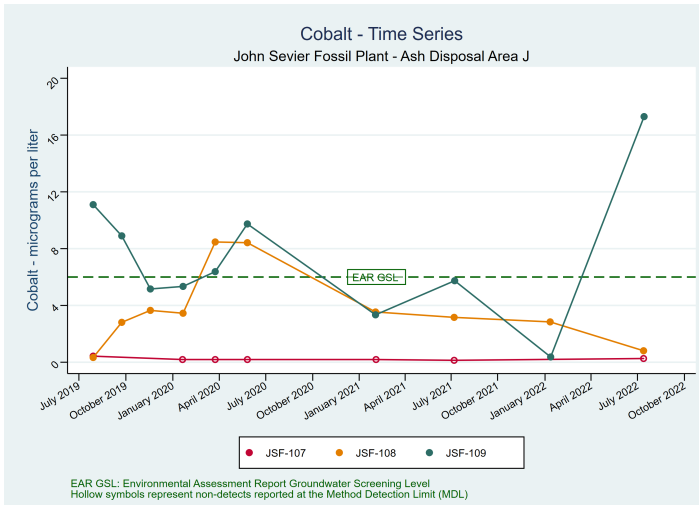




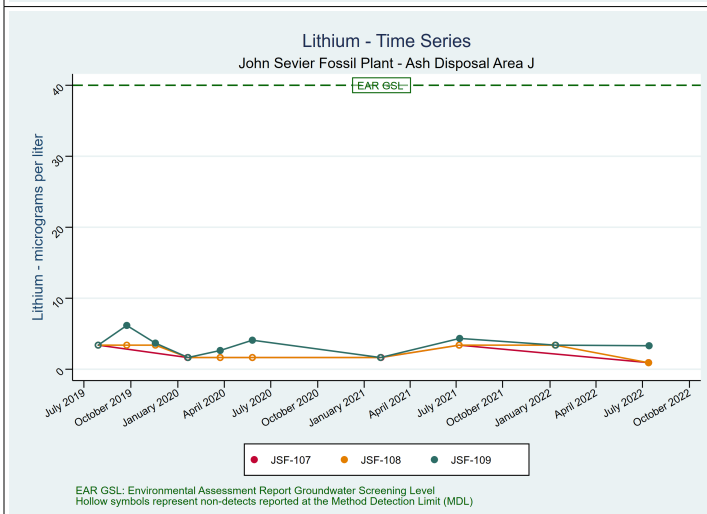


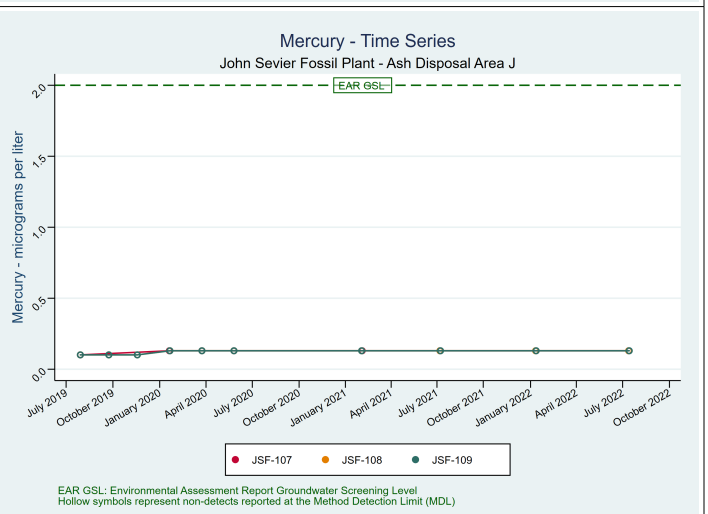


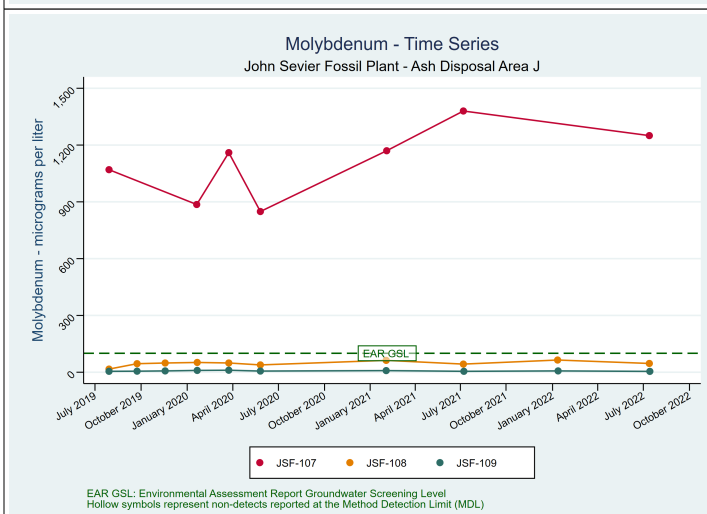


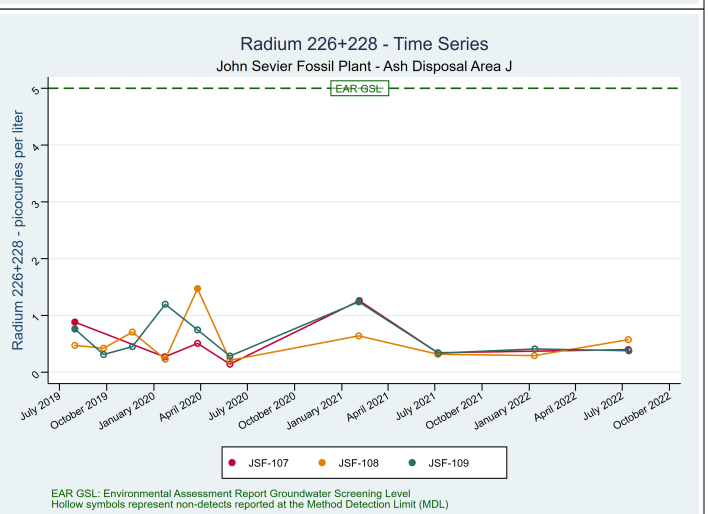

Cobalt - Time Series
John Sevier Fossil Plant - Ash Disposal Area J
Cobalt - micrograms per liter
EAR GSL
JSF-107
JSF-108
JSF-109
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

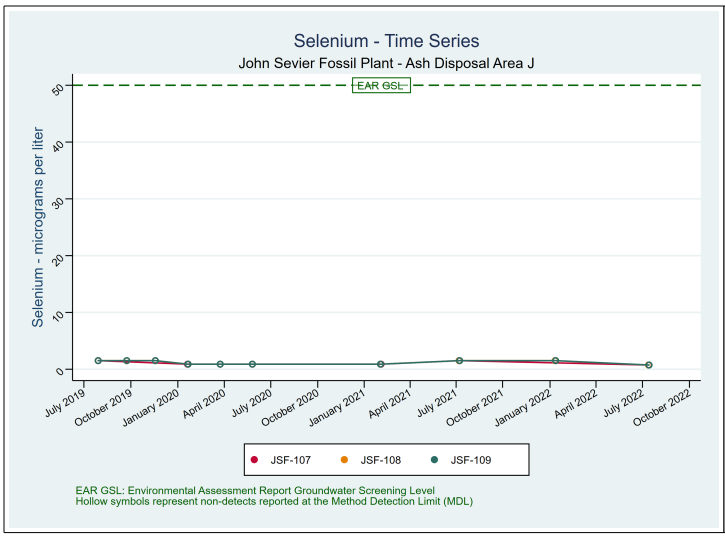

Lead - Time Series
John Sevier Fossil Plant - Ash Disposal Area J
Lead - micrograms per liter
EAR GSL
JSF-107
JSF-108
JSF-109
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

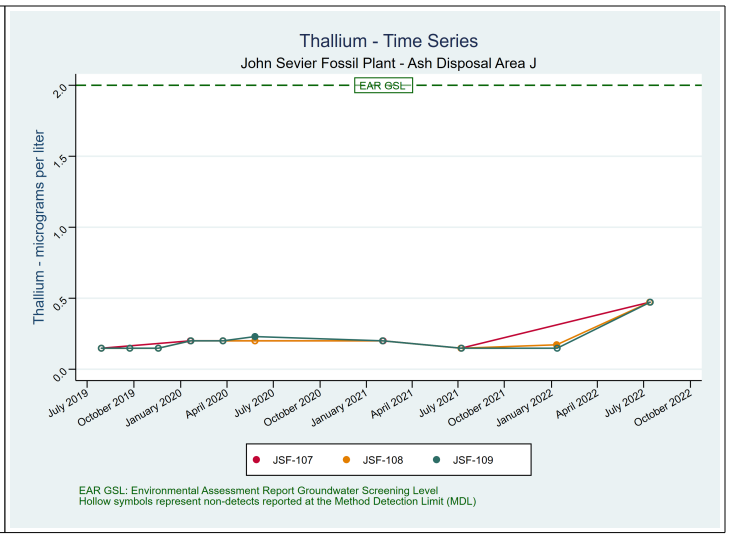

Lithium - Time Series
John Sevier Fossil Plant - Ash Disposal Area J
Lithium - micrograms per liter
EAR GSL
JSF-107
JSF-108
JSF-109
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)


Mercury - Time Series
John Sevier Fossil Plant - Ash Disposal Area J
Mercury - micrograms per liter
EAR GSL
JSF-107
JSF-108
JSF-109
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

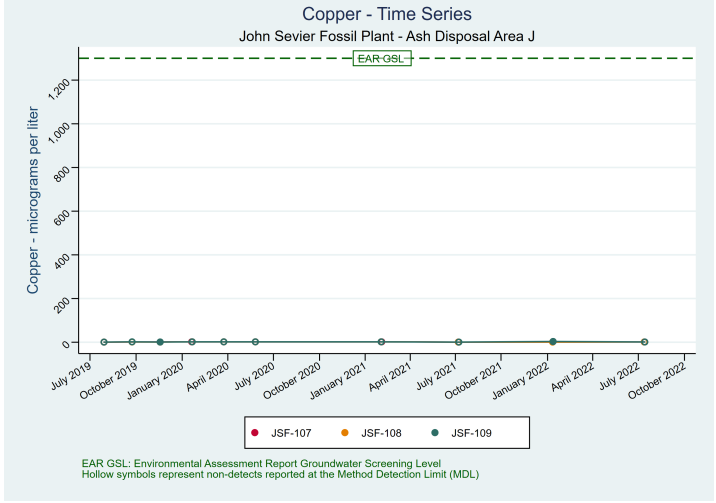

Molybdenum - Time Series
John Sevier Fossil Plant - Ash Disposal Area J
Molybdenum - micrograms per liter
EAR GSL
JSF-107
JSF-108
JSF-109
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

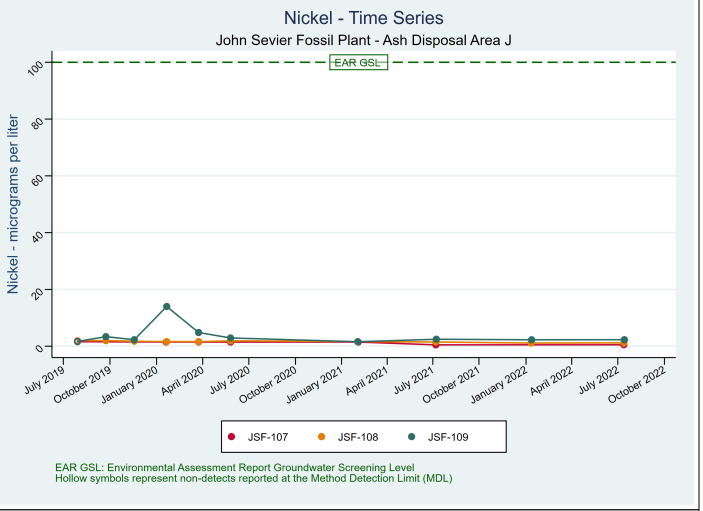

Radium 226+228 - Time Series
John Sevier Fossil Plant - Ash Disposal Area J
Radium 226+228 - picocuries per liter
EAR GSL
JSF-107
JSF-108
JSF-109
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

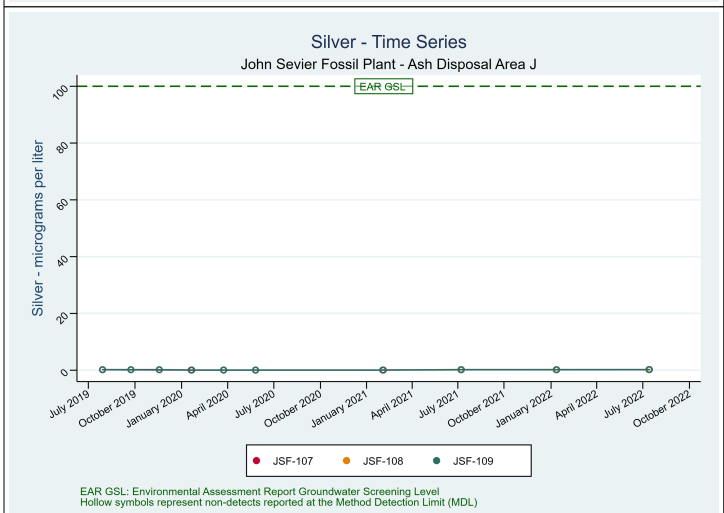

Selenium - Time Series
John Sevier Fossil Plant - Ash Disposal Area J
EAR GSL
Selenium - micrograms per liter
0
10
20
30
40
50
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
JSF-107
JSF-108
JSF-109
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

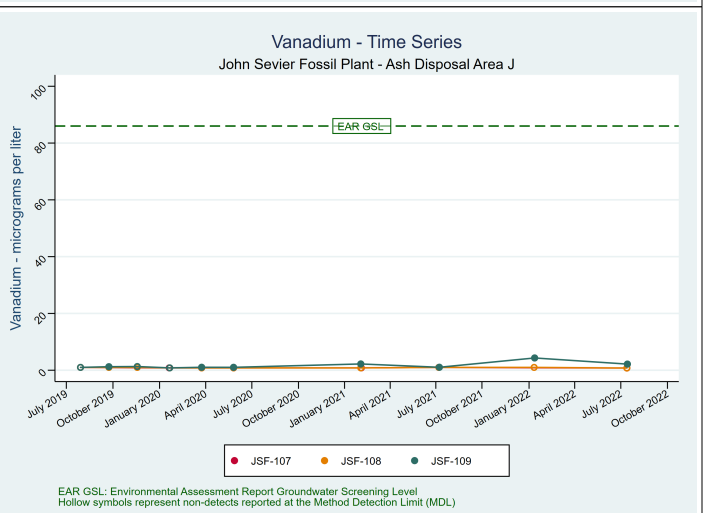

Thallium - Time Series
John Sevier Fossil Plant - Ash Disposal Area J
EAR GSL
Thallium - micrograms per liter
0.0
0.5
1.0
1.5
2.0
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
JSF-107
JSF-108
JSF-109
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

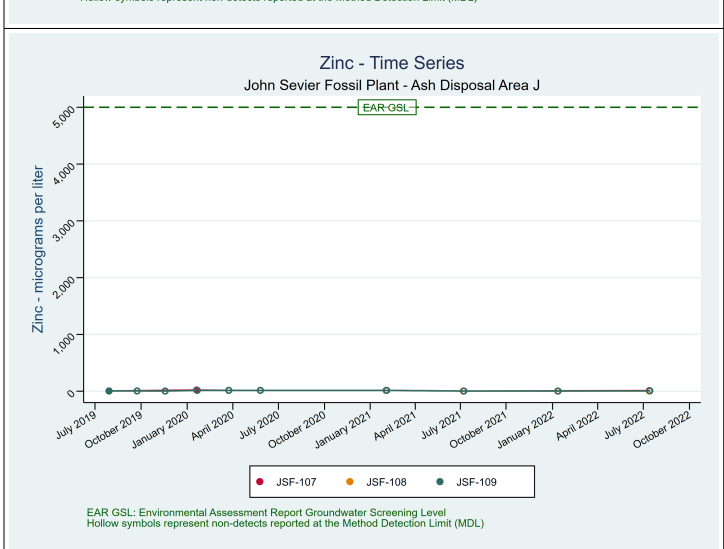
Time Series Plots
Ash Disposal Area J
TDEC Appendix I Parameters
John Sevier Fossil Plant - Rogersville, Tennessee











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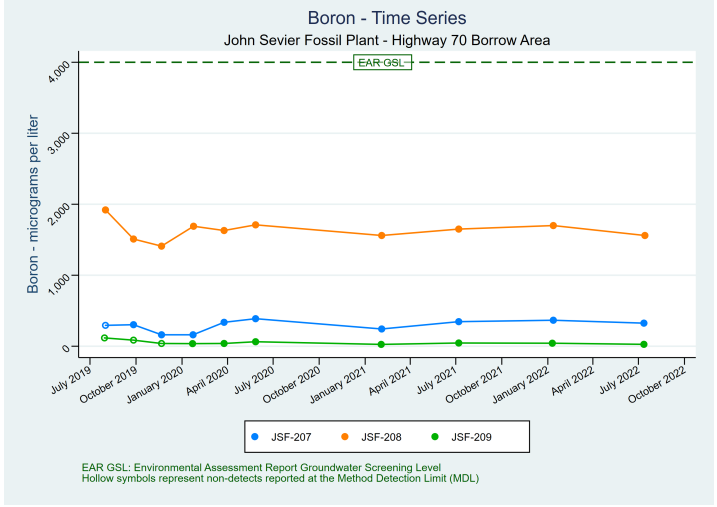
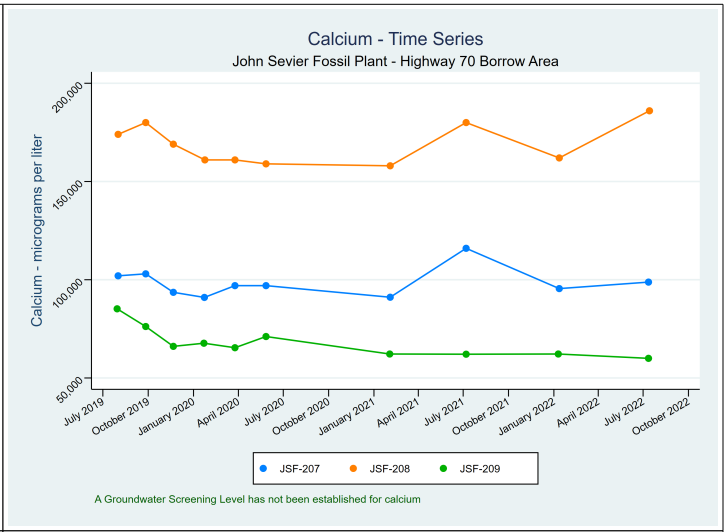
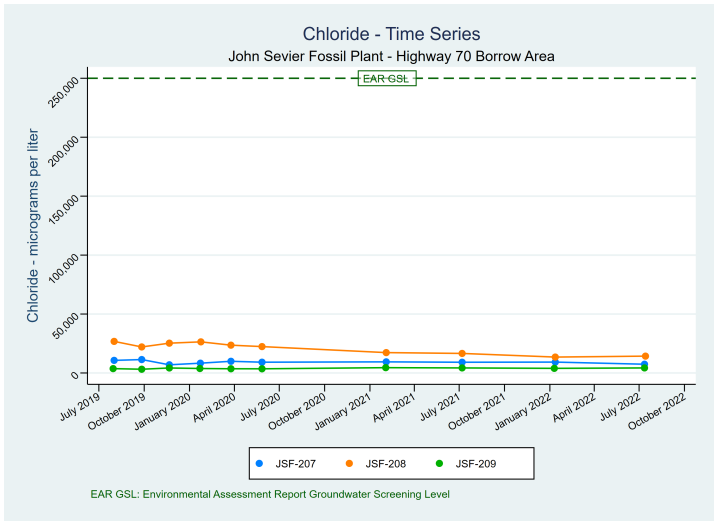
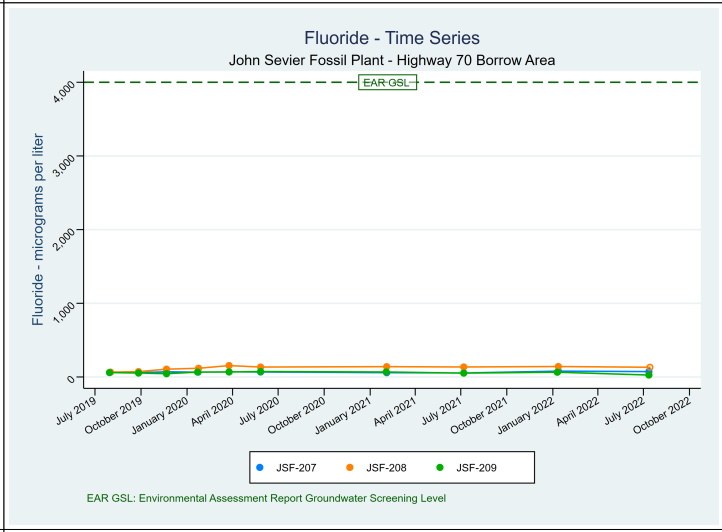
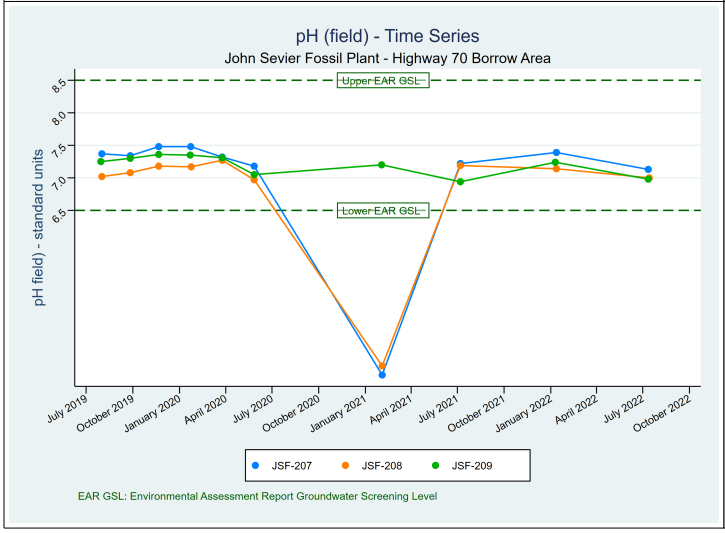
Time Series Plots
Highway 70 Borrow Area
CCR Rule Appendix III Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

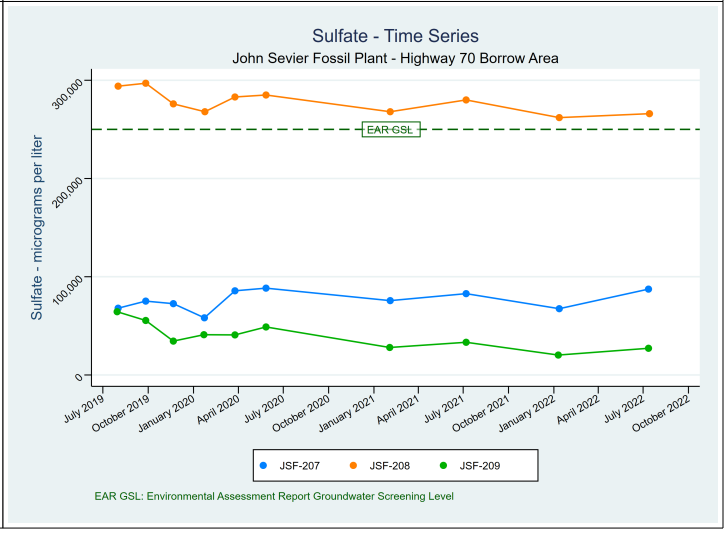


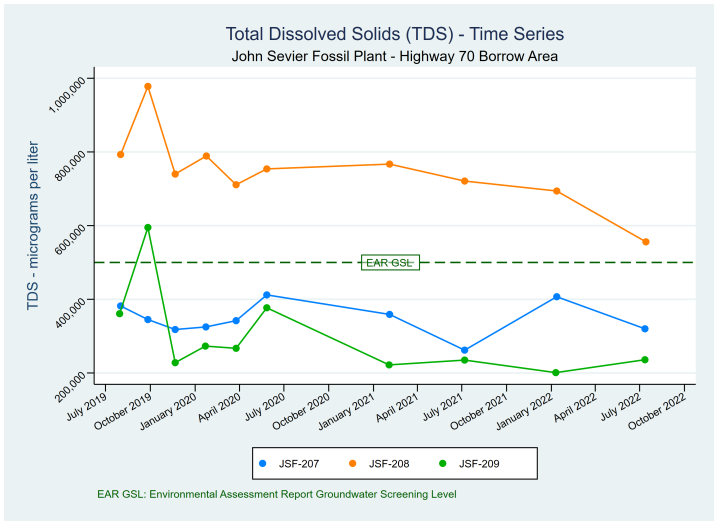












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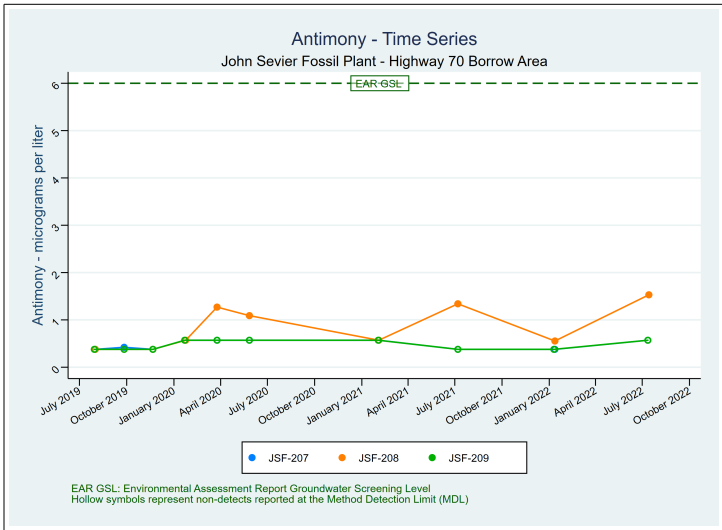
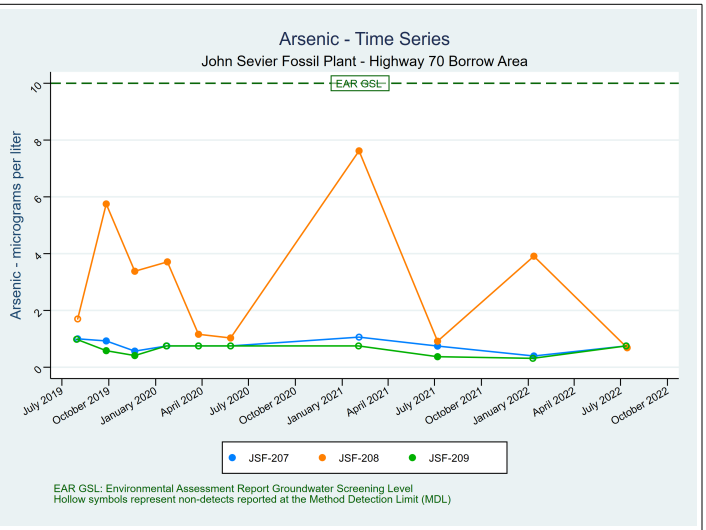
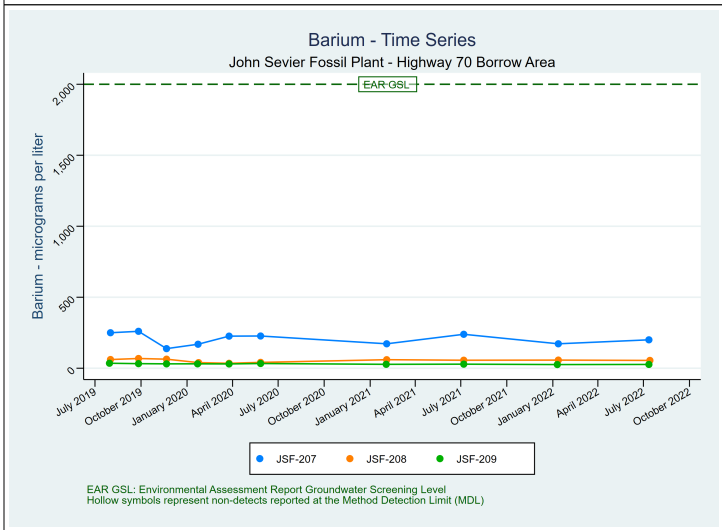
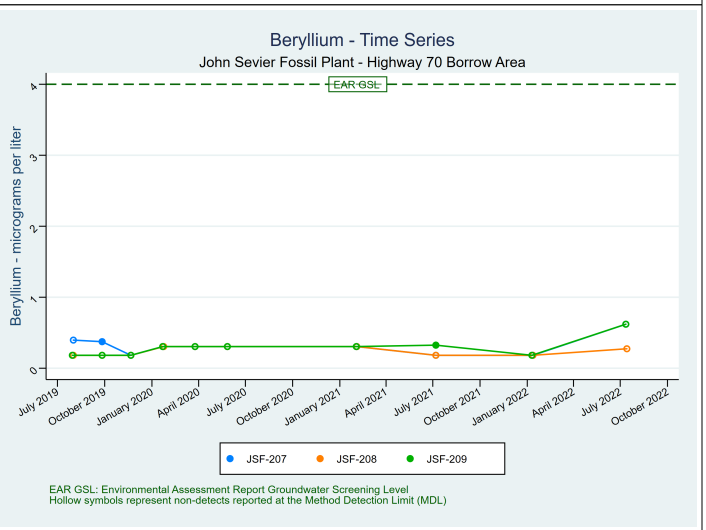
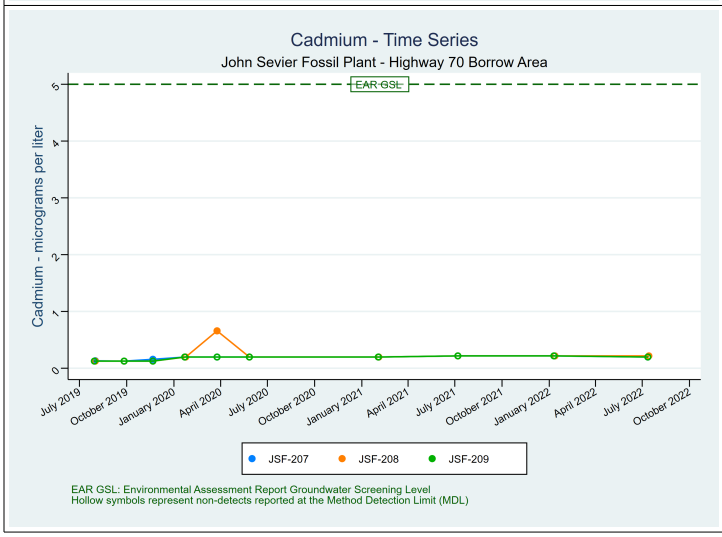
Time Series Plots
Highway 70 Borrow Area
CCR Rule Appendix IV Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

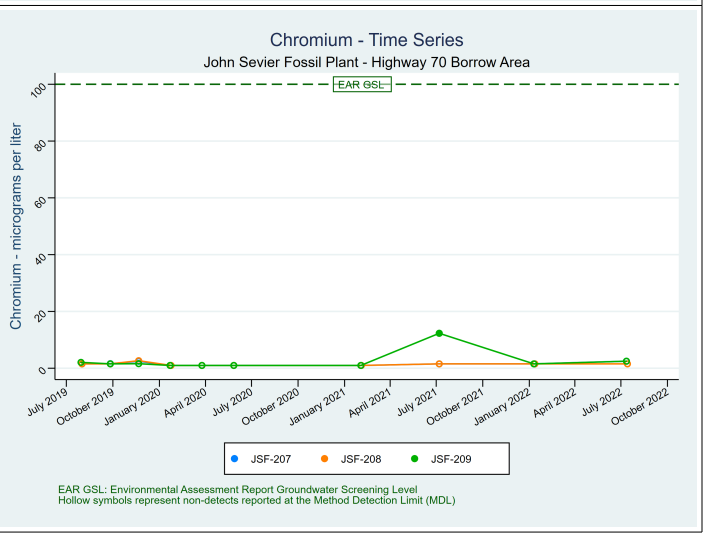


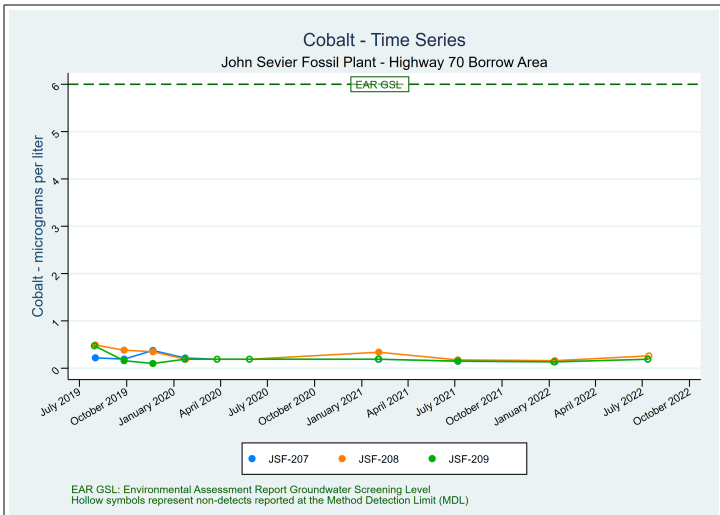


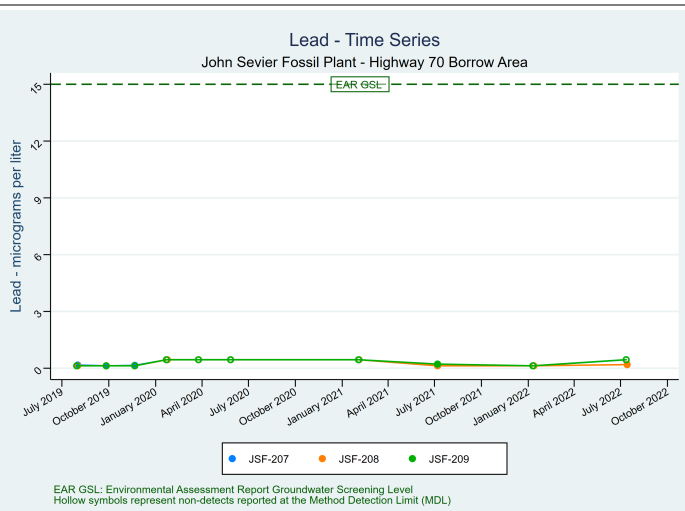


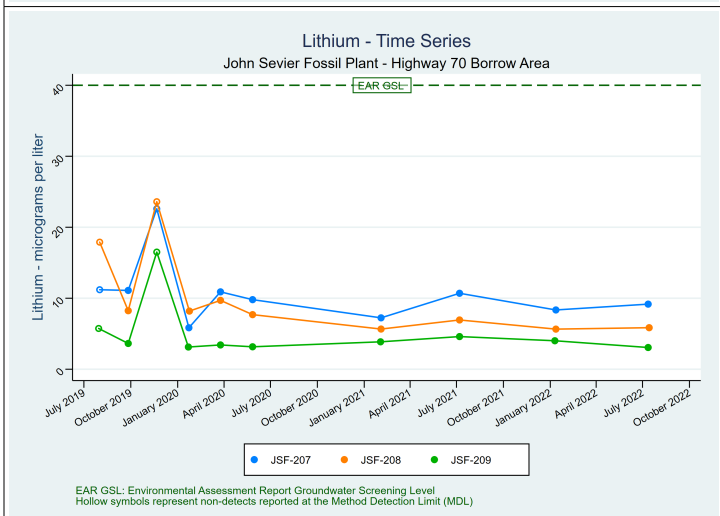


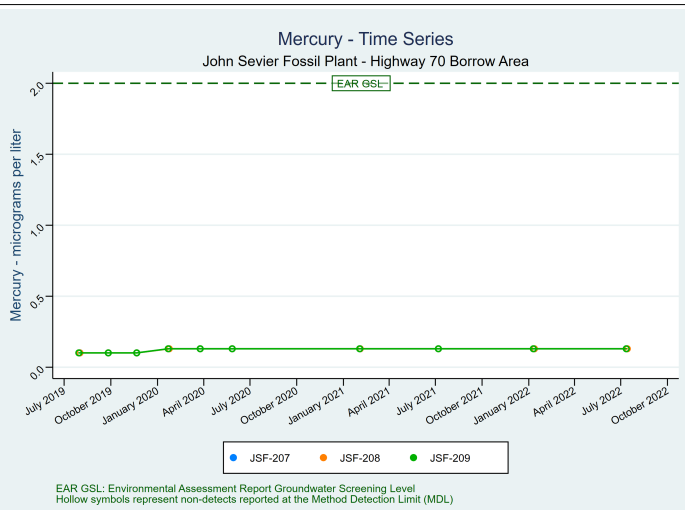


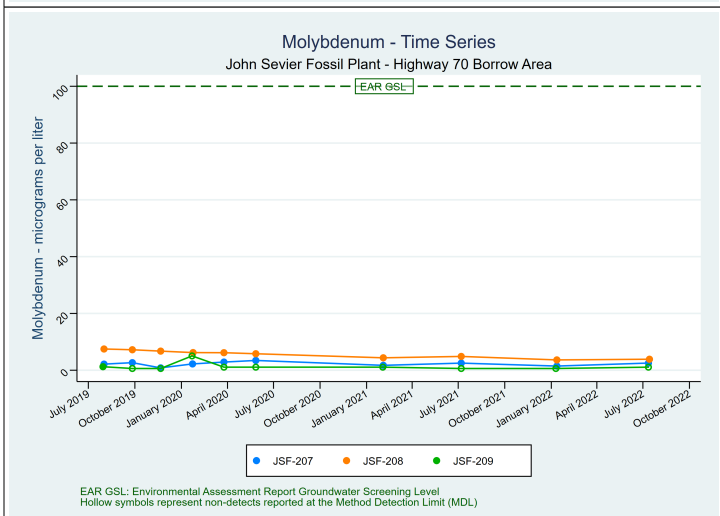


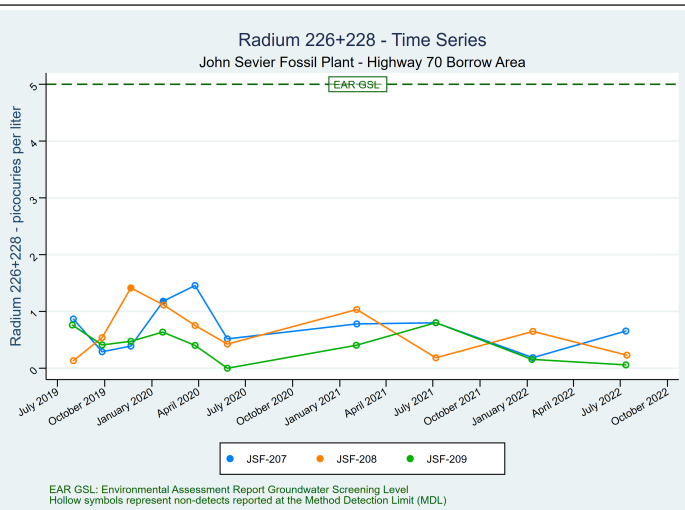

Cobalt - Time Series
John Sevier Fossil Plant - Highway 70 Borrow Area
EAR GSL
Cobalt - micrograms per liter
0
1
2
3
4
5
6
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
JSF-207
JSF-208
JSF-209
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

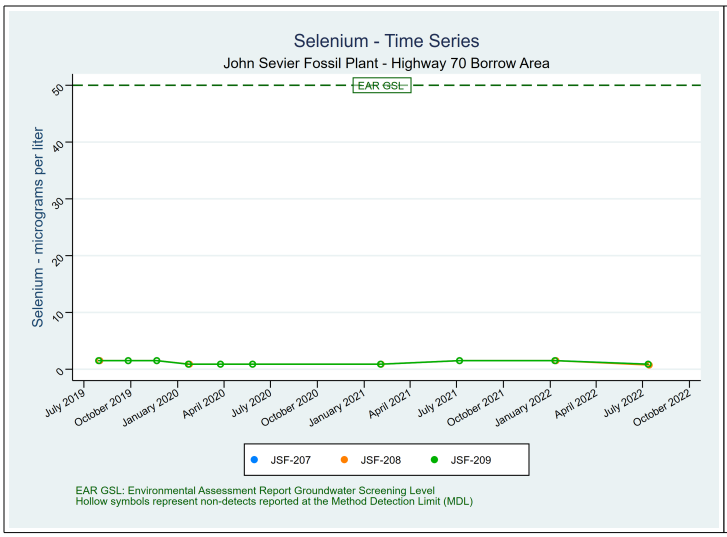

Lead - Time Series
John Sevier Fossil Plant - Highway 70 Borrow Area
EAR GSL
Lead - micrograms per liter
0
3
6
9
12
15
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
JSF-207
JSF-208
JSF-209
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

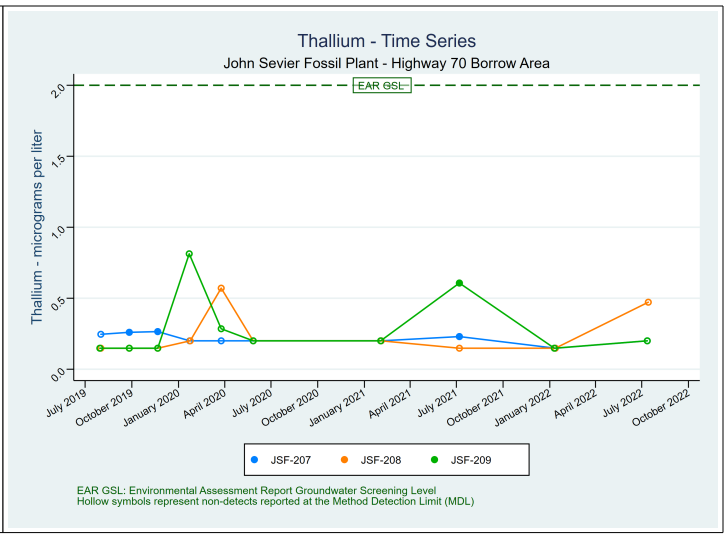

Lithium - Time Series
John Sevier Fossil Plant - Highway 70 Borrow Area
EAR GSL
Lithium - micrograms per liter
0
10
20
30
40
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
JSF-207
JSF-208
JSF-209
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)


Mercury - Time Series
John Sevier Fossil Plant - Highway 70 Borrow Area
EAR GSL
Mercury - micrograms per liter
0.0
0.5
1.0
1.5
2.0
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
JSF-207
JSF-208
JSF-209
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

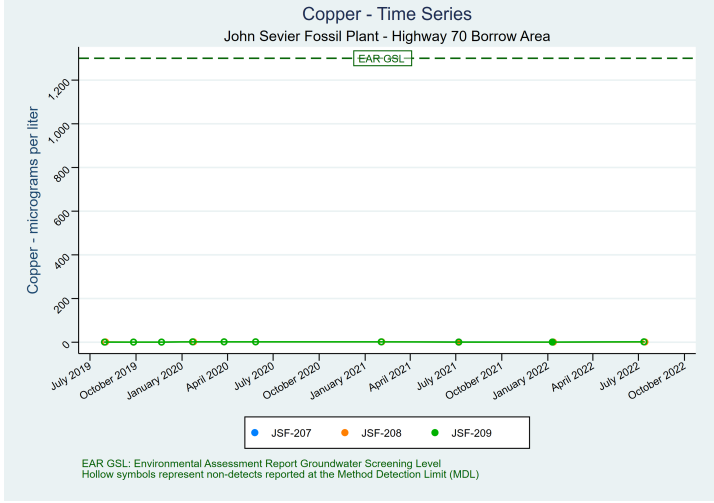

Molybdenum - Time Series
John Sevier Fossil Plant - Highway 70 Borrow Area
EAR GSL
Molybdenum - micrograms per liter
0
20
40
60
80
100
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
JSF-207
JSF-208
JSF-209
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

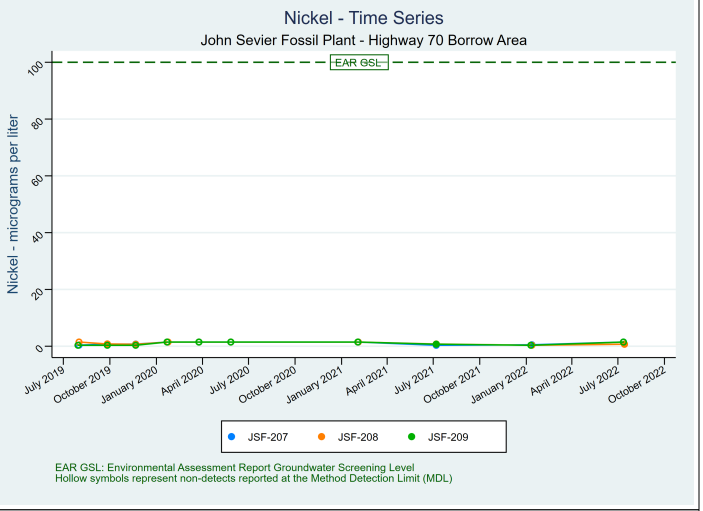

Radium 226+228 - Time Series
John Sevier Fossil Plant - Highway 70 Borrow Area
EAR GSL
Radium 226+228 - picocuries per liter
0
1
2
3
4
5
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
JSF-207
JSF-208
JSF-209
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

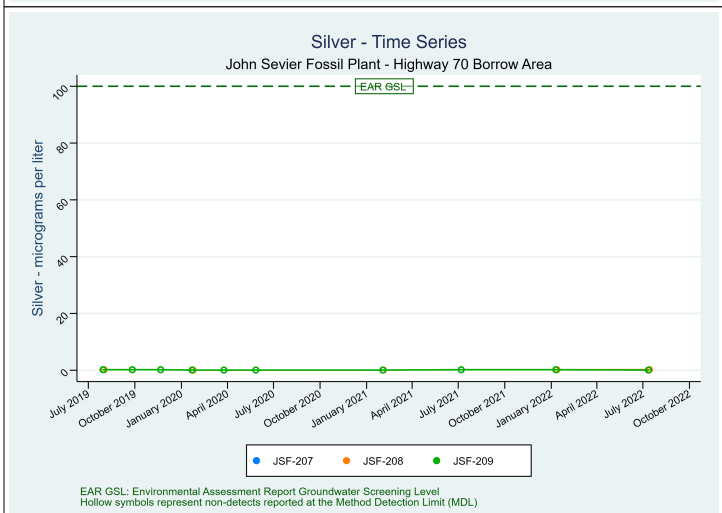

Selenium - Time Series
John Sevier Fossil Plant - Highway 70 Borrow Area
EAR GSL
Selenium - micrograms per liter
0
10
20
30
40
50
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
JSF-207
JSF-208
JSF-209
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

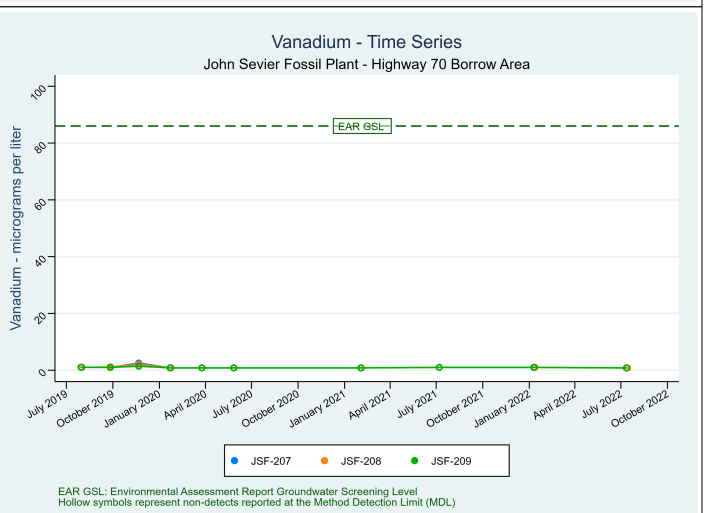

Thallium - Time Series
John Sevier Fossil Plant - Highway 70 Borrow Area
EAR GSL
Thallium - micrograms per liter
0.0
0.5
1.0
1.5
2.0
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
JSF-207
JSF-208
JSF-209
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

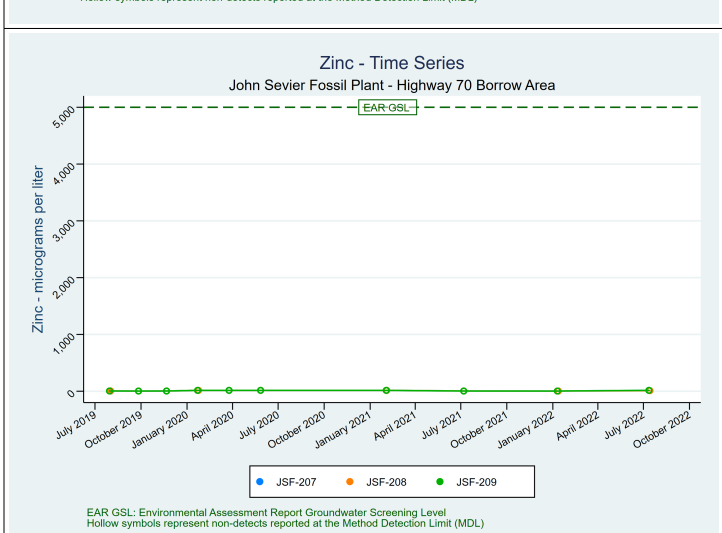
Time Series Plots
Highway 70 Borrow Area
TDEC Appendix I Parameters
John Sevier Fossil Plant - Rogersville, Tennessee











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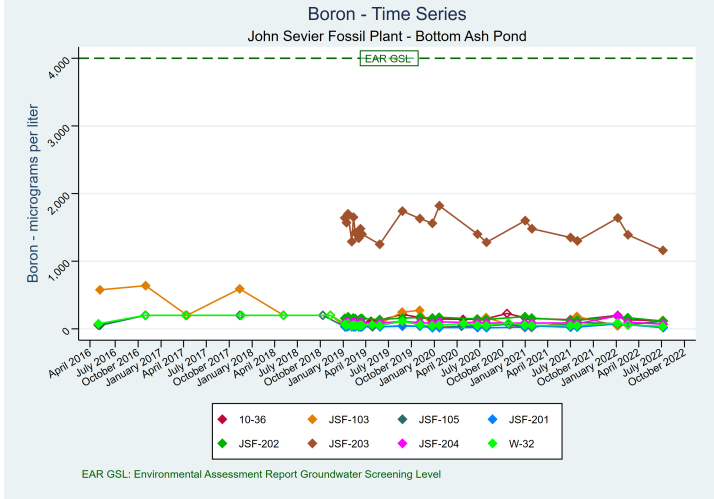
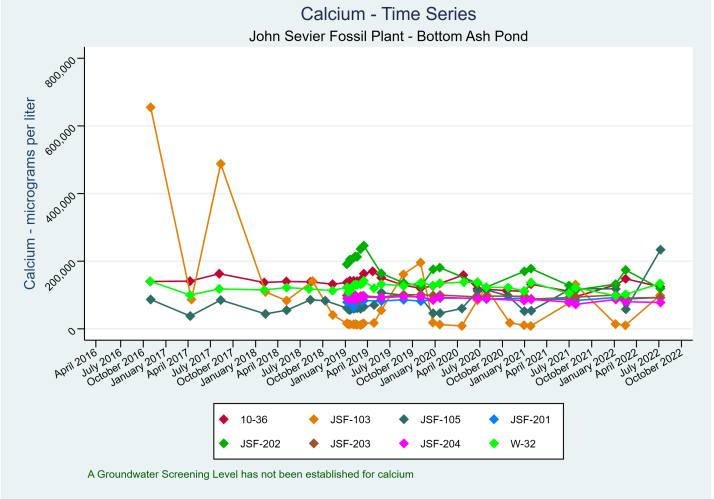
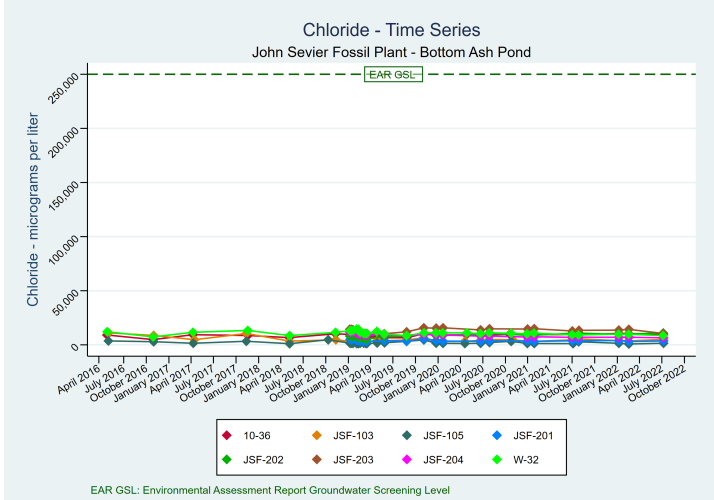
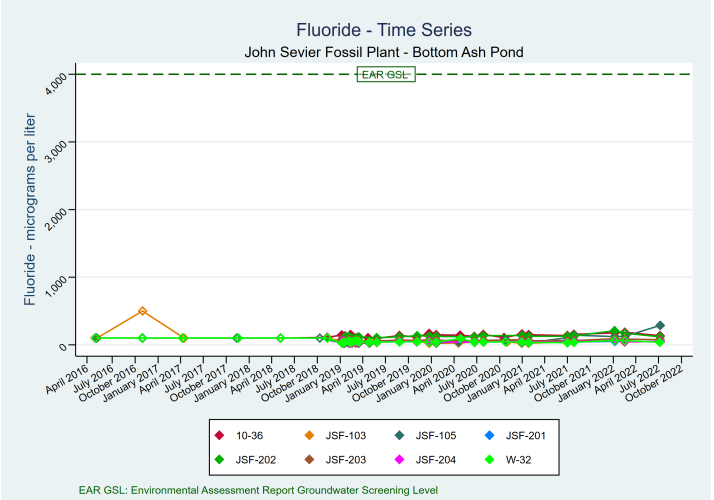
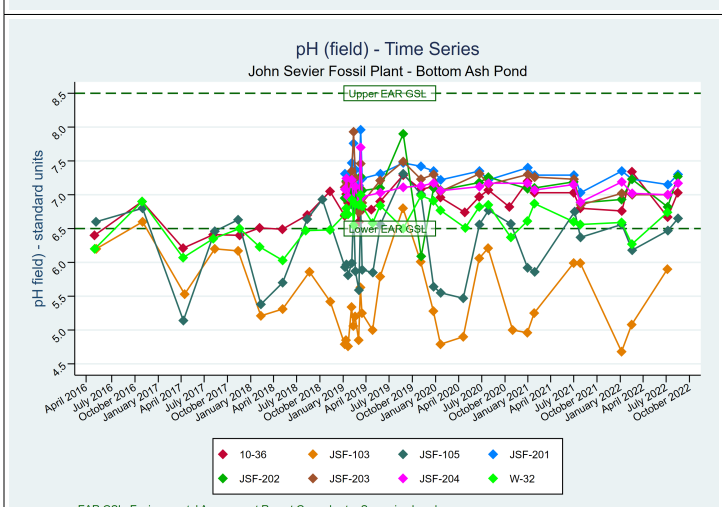
Time Series Plots
Bottom Ash Pond
CCR Rule Appendix III Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

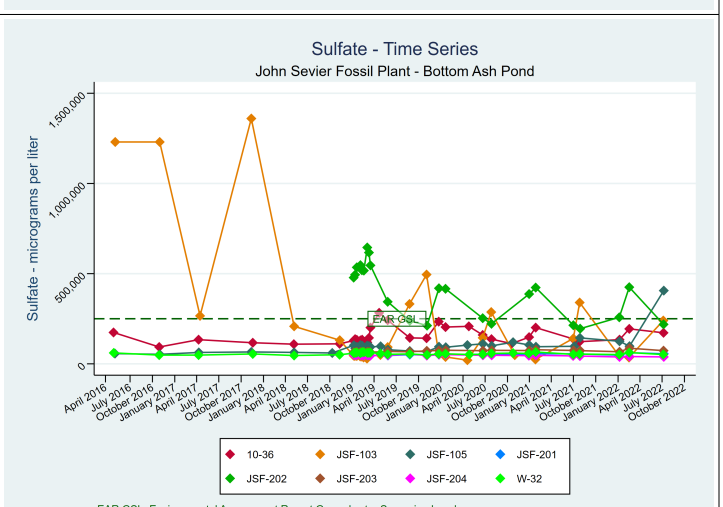


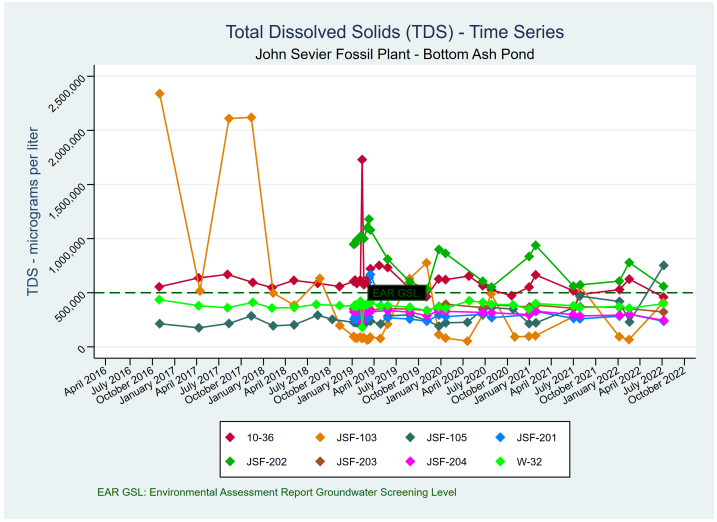












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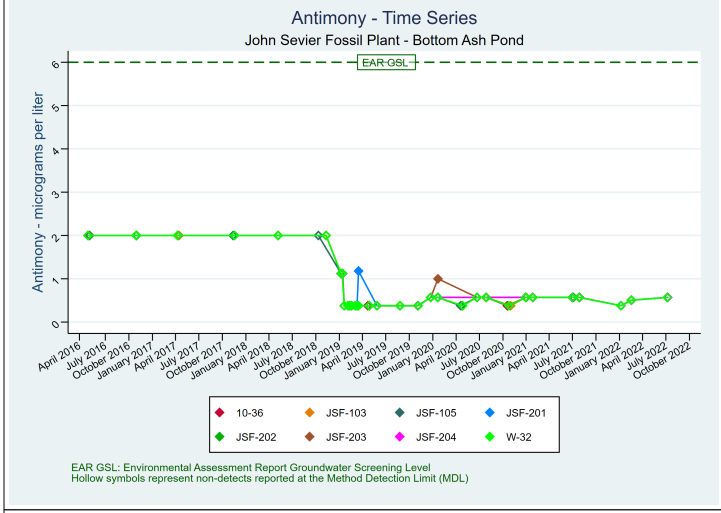
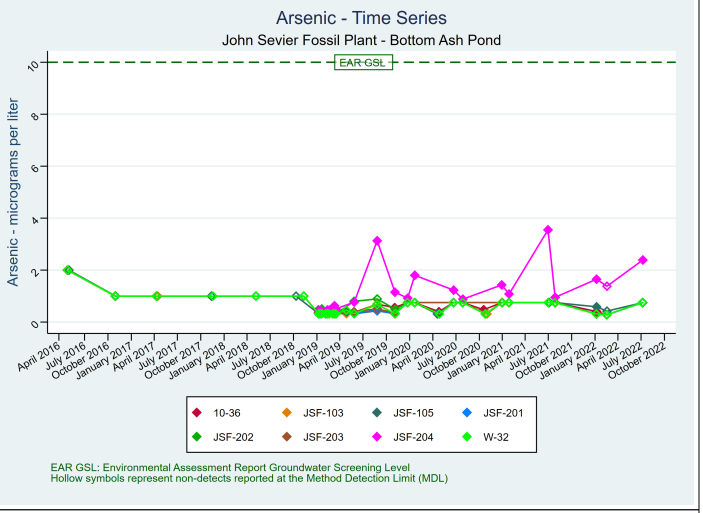
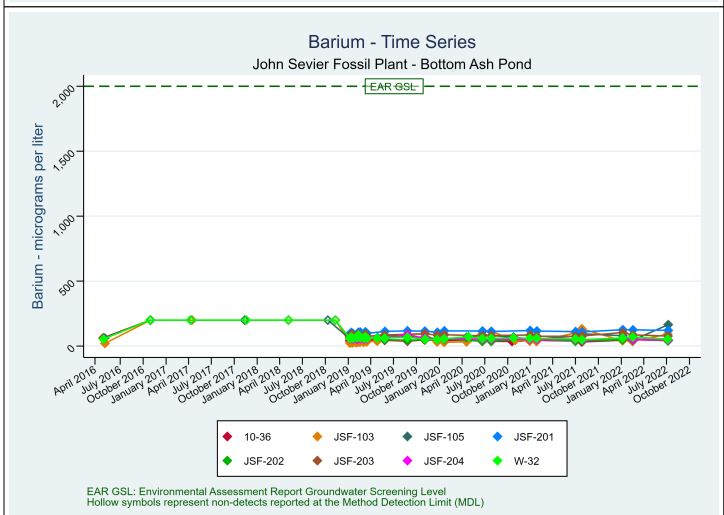
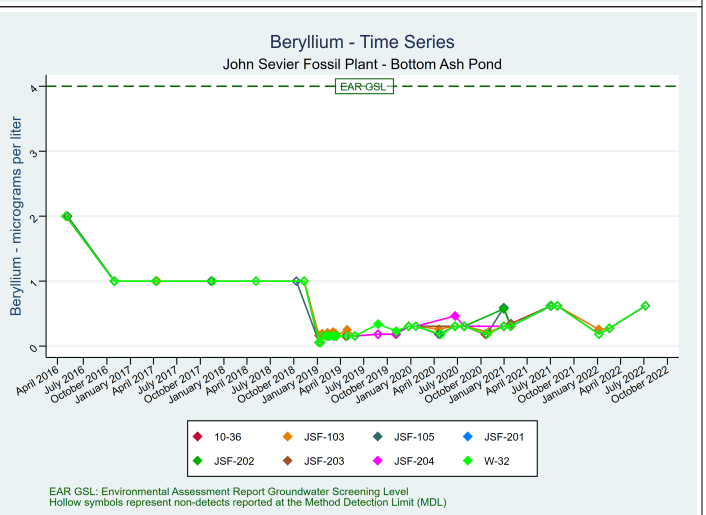
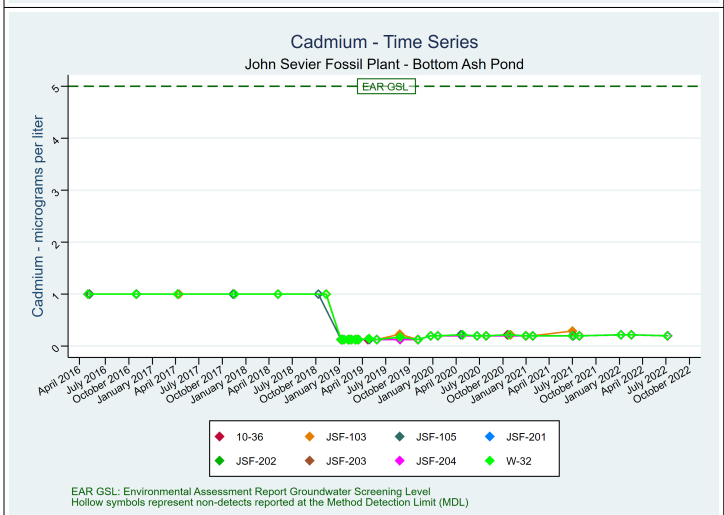
Time Series Plots
Bottom Ash Pond
CCR Rule Appendix IV Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

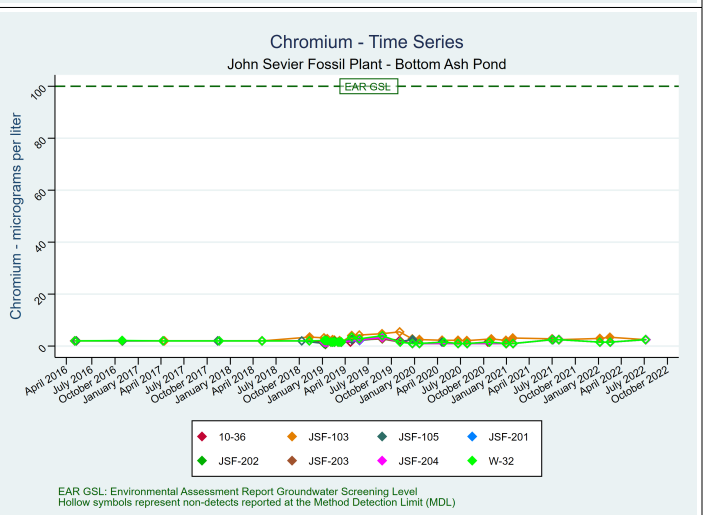






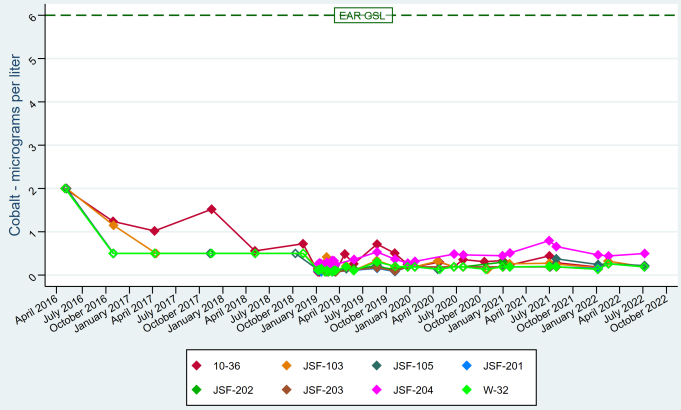






Cobalt - Time Series

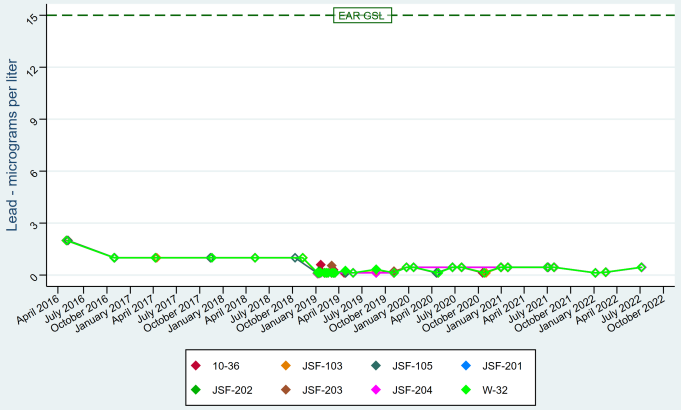
John Sevier Fossil Plant - Bottom Ash Pond



EAR GSL: Environmental Assessment Report Groundwater Screening Level
/"Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)"

Lead - Time Series

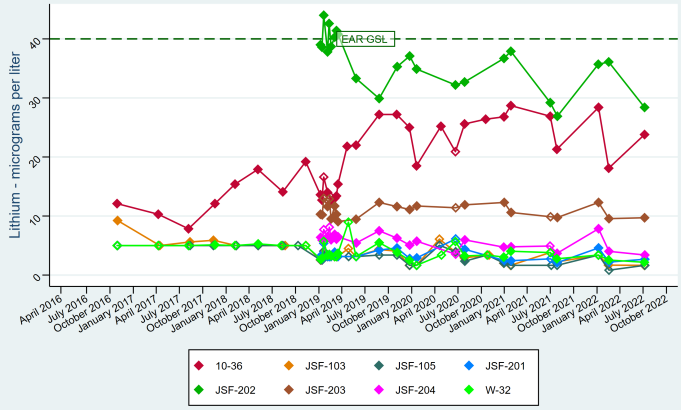
John Sevier Fossil Plant - Bottom Ash Pond



EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

Lithium - Time Series

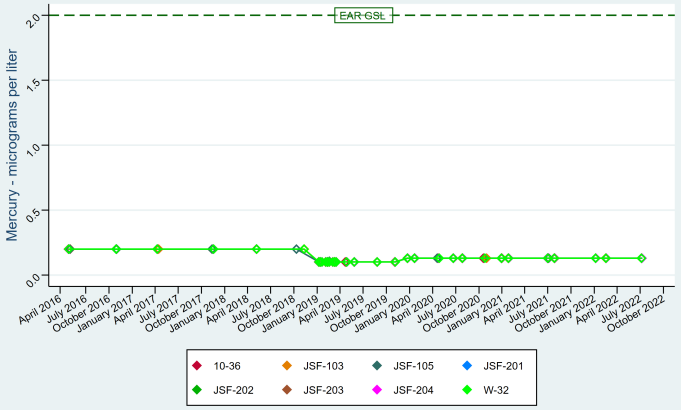
John Sevier Fossil Plant - Bottom Ash Pond



EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

Mercury - Time Series

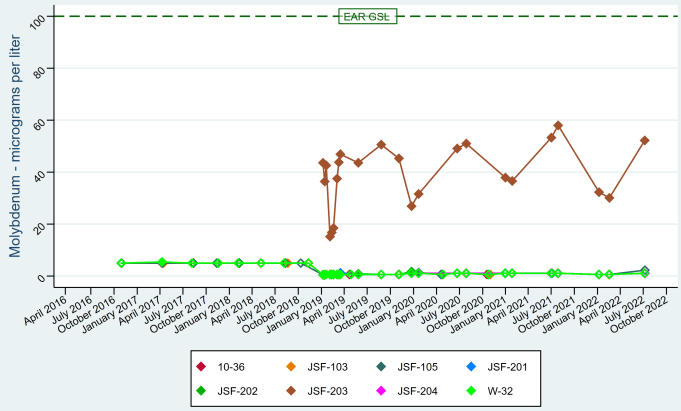
John Sevier Fossil Plant - Bottom Ash Pond



EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

Molybdenum - Time Series

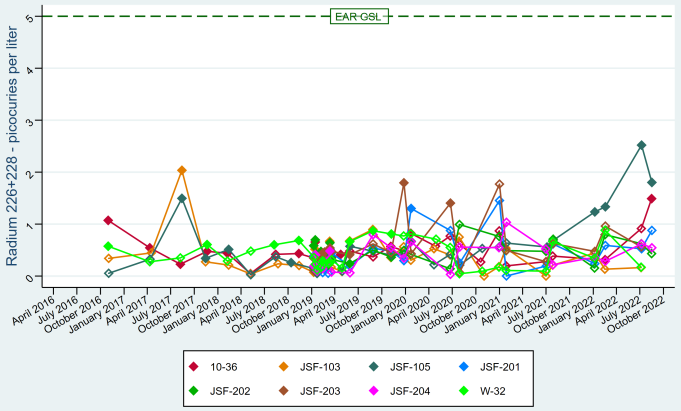
John Sevier Fossil Plant - Bottom Ash Pond



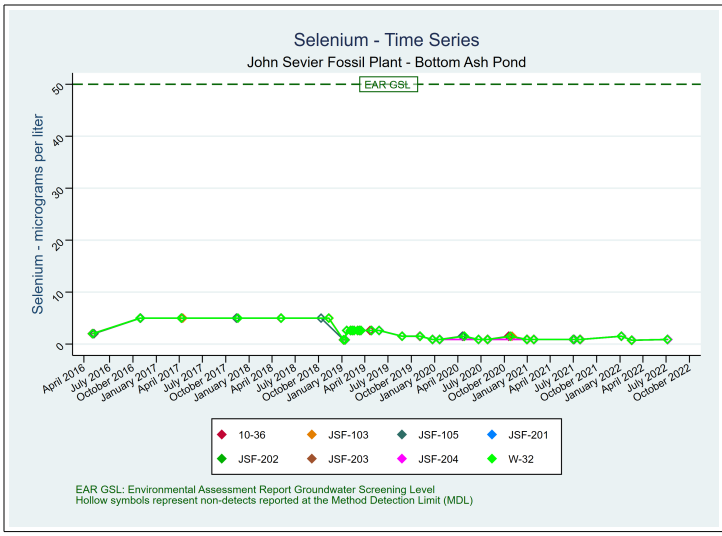
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

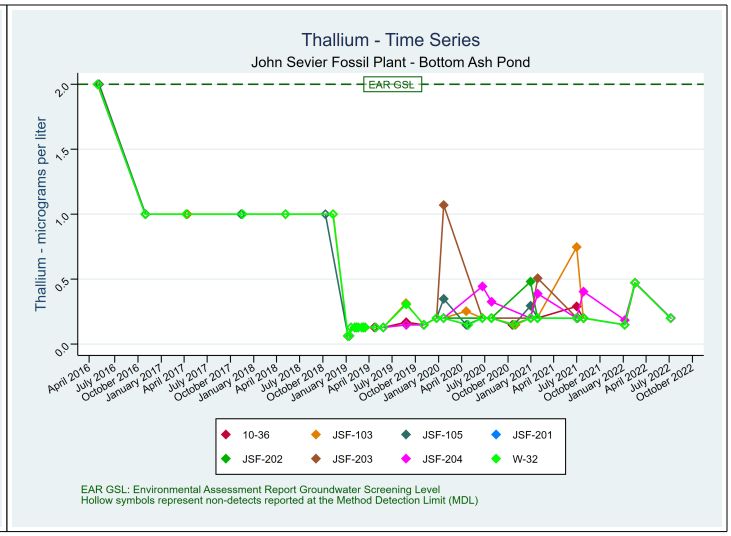
Radium 226+228 - Time Series

John Sevier Fossil Plant - Bottom Ash Pond

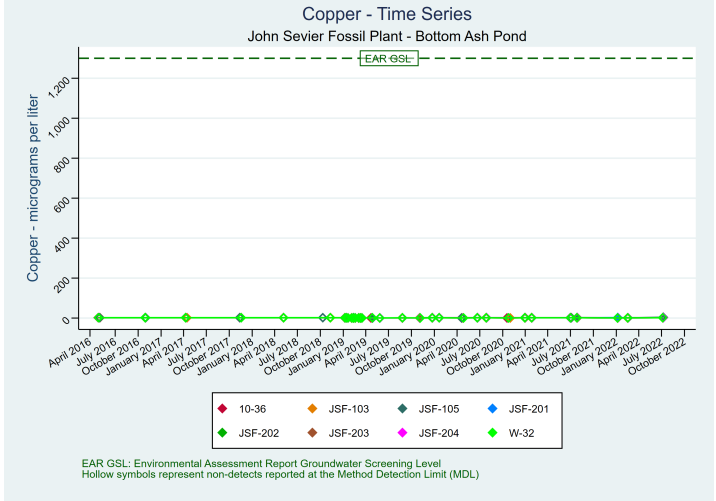


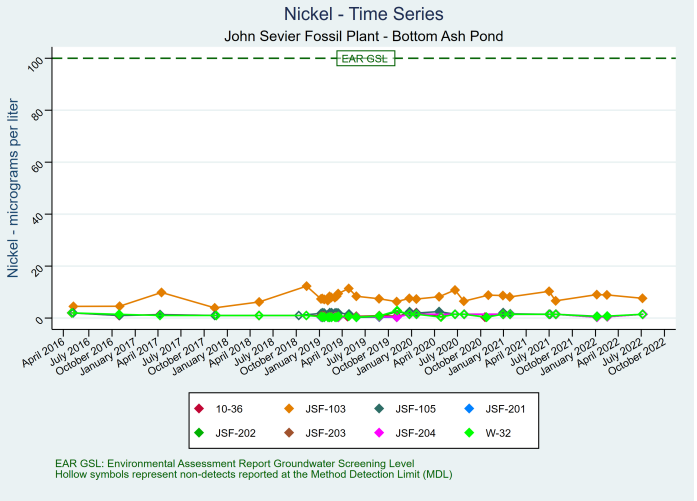
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

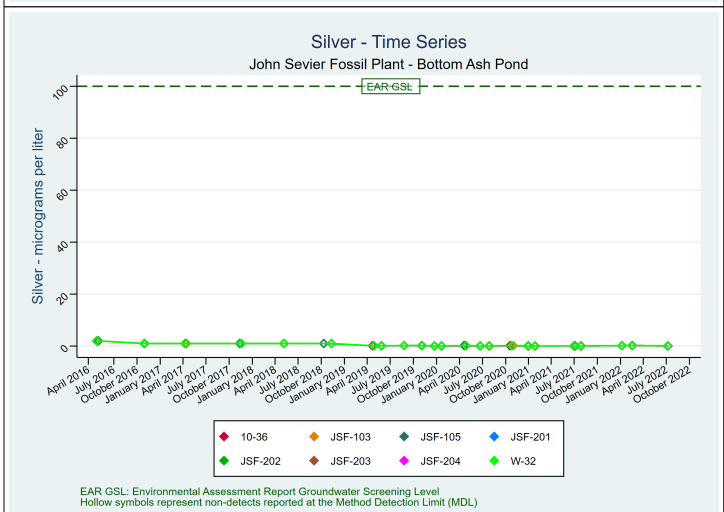

Selenium - Time Series
John Sevier Fossil Plant - Bottom Ash Pond
EAR GSL
Selenium - micrograms per liter
0
10
20
30
40
50
April 2016
July 2016
October 2016
January 2017
April 2017
July 2017
October 2017
January 2018
April 2018
July 2018
October 2018
January 2019
April 2019
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

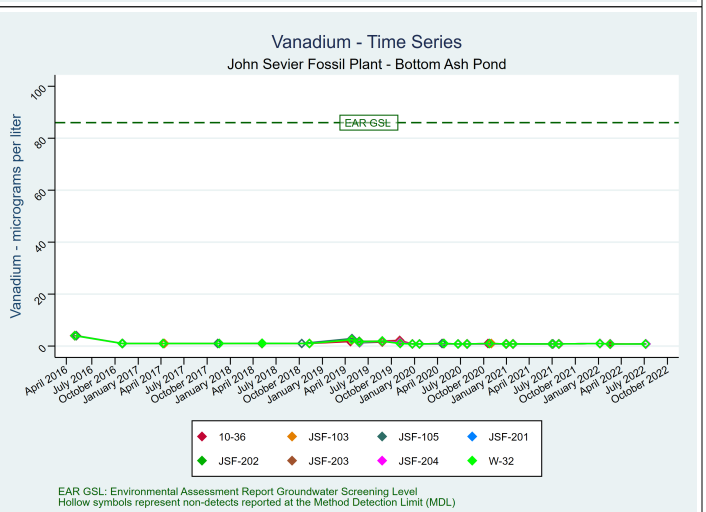

Thallium - Time Series
John Sevier Fossil Plant - Bottom Ash Pond
EAR GSL
Thallium - micrograms per liter
0.0
0.5
1.0
1.5
2.0
April 2016
July 2016
October 2016
January 2017
April 2017
July 2017
October 2017
January 2018
April 2018
July 2018
October 2018
January 2019
April 2019
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
10-36
JSF-103
JSF-105
JSF-201
JSF-202
JSF-203
JSF-204
W-32
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

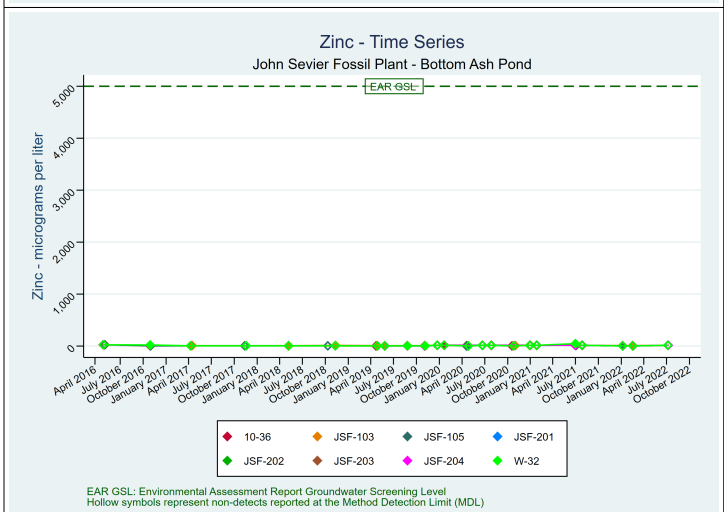
Time Series Plots
Bottom Ash Pond
TDEC Appendix I Parameters
John Sevier Fossil Plant - Rogersville, Tennessee











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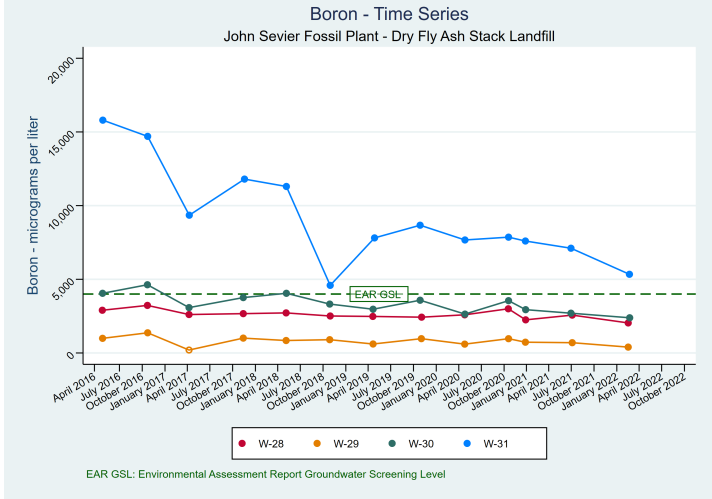
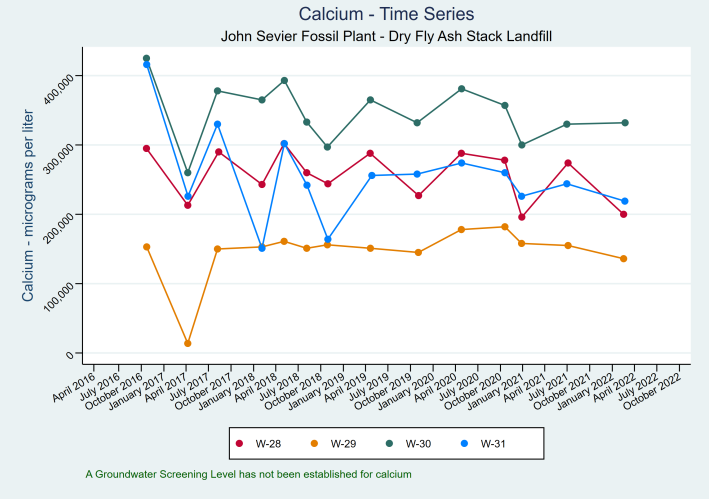
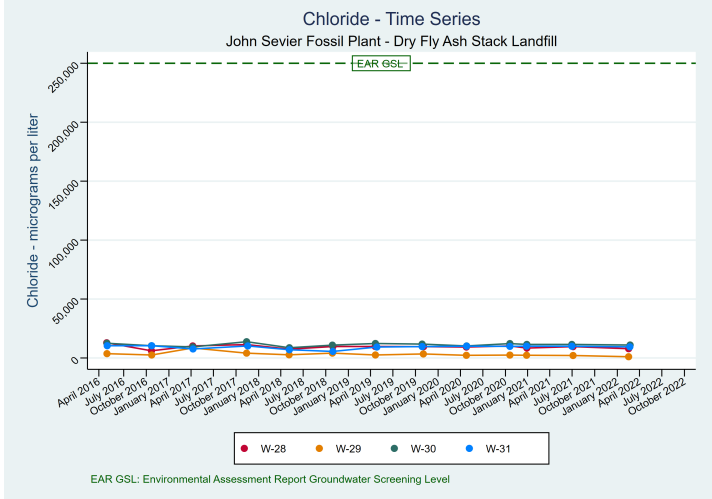
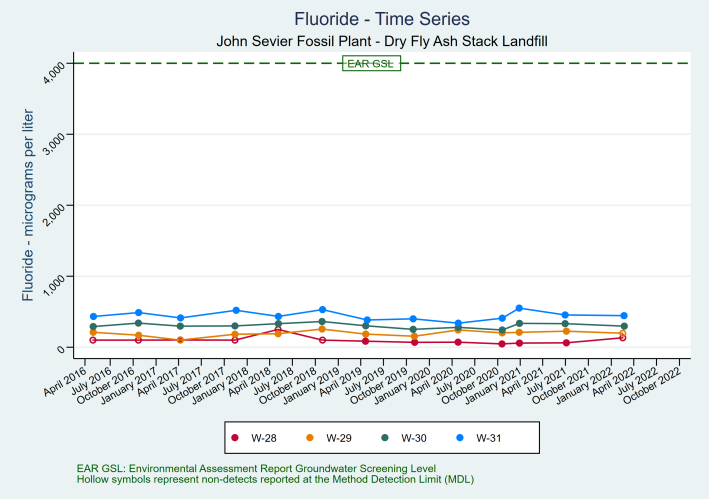
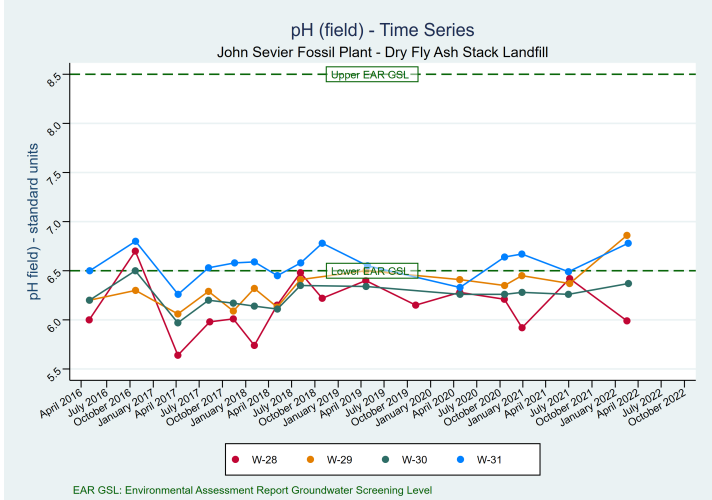
Time Series Plots
Dry Fly Ash Stack Landfill
CCR Rule Appendix III Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

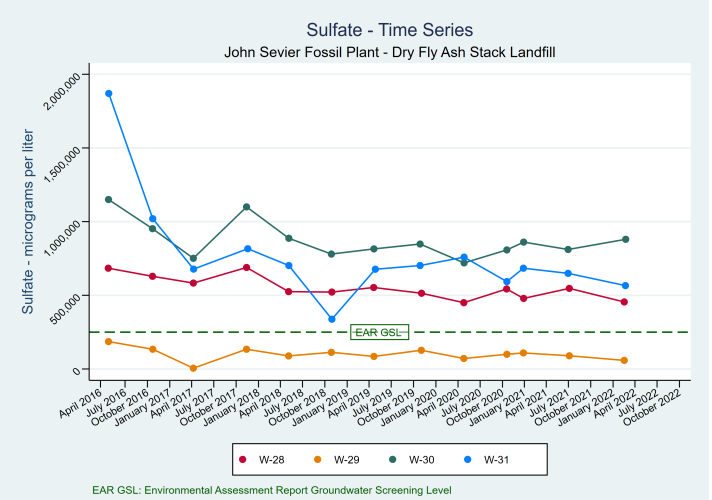


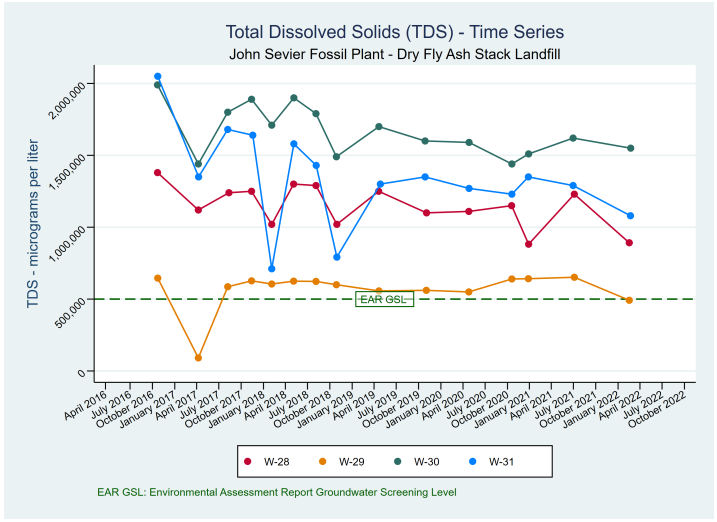












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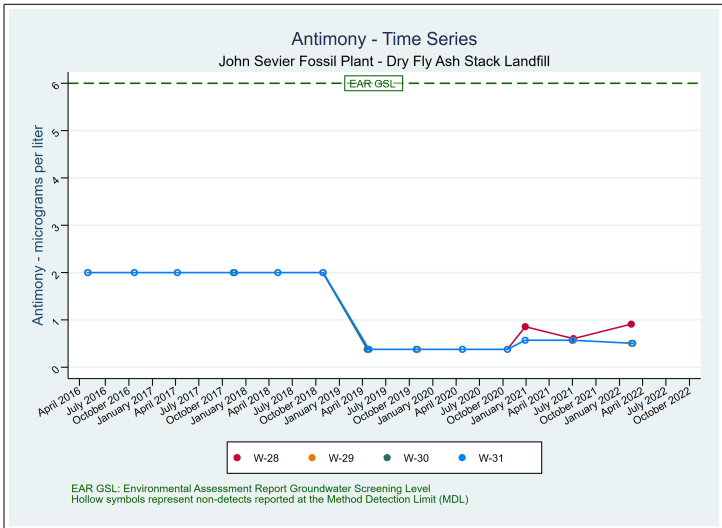
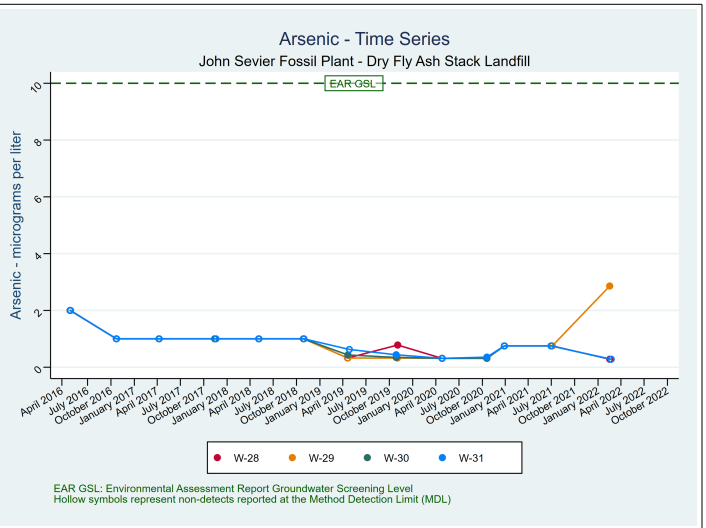
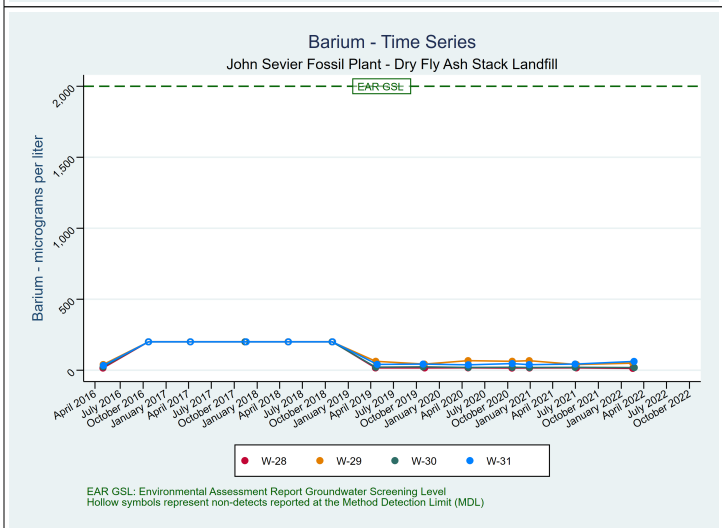
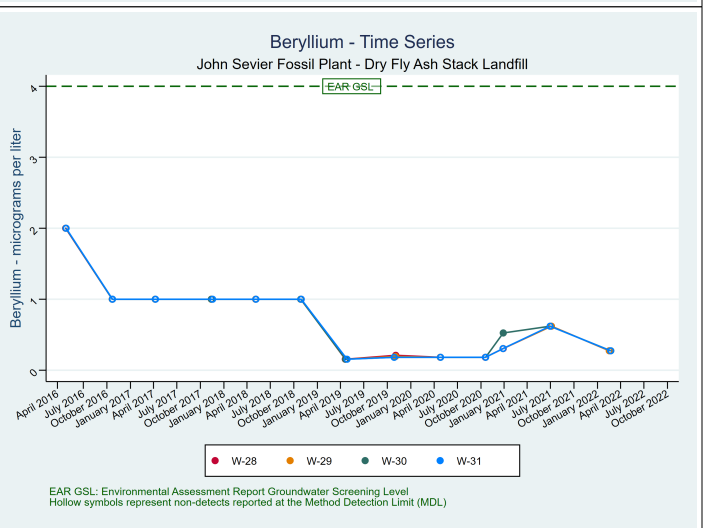
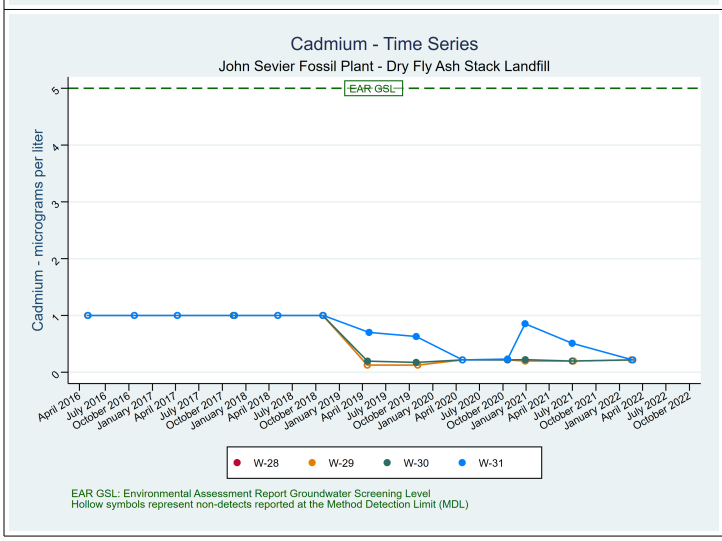
Time Series Plots
Dry Fly Ash Stack Landfill
CCR Rule Appendix IV Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

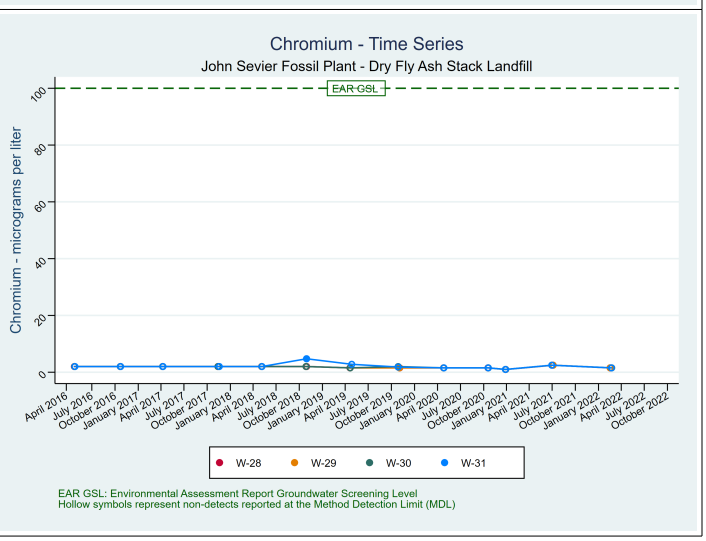






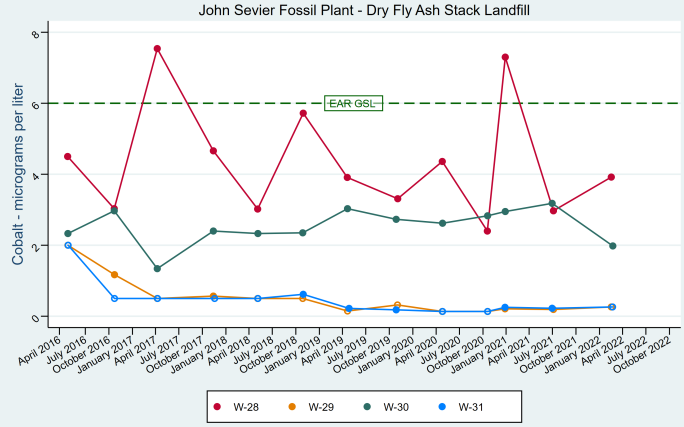






Cobalt - Time Series

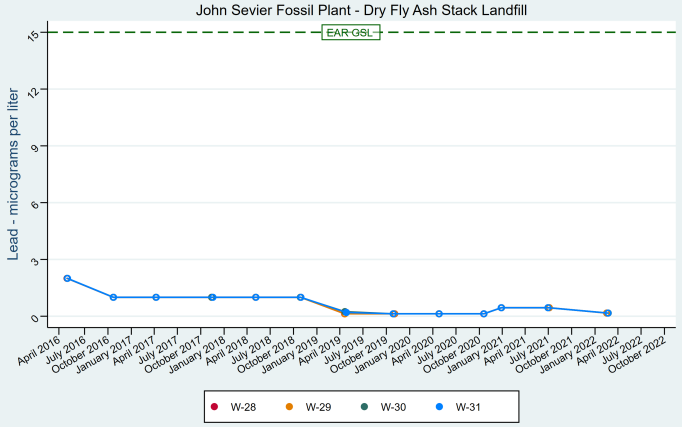
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill



EAR GSL: Environmental Assessment Report Groundwater Screening Level
/"Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)"

Lead - Time Series

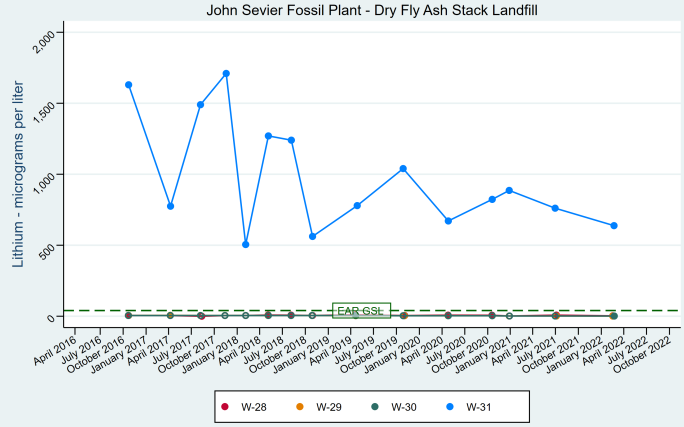
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill



EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

Lithium - Time Series

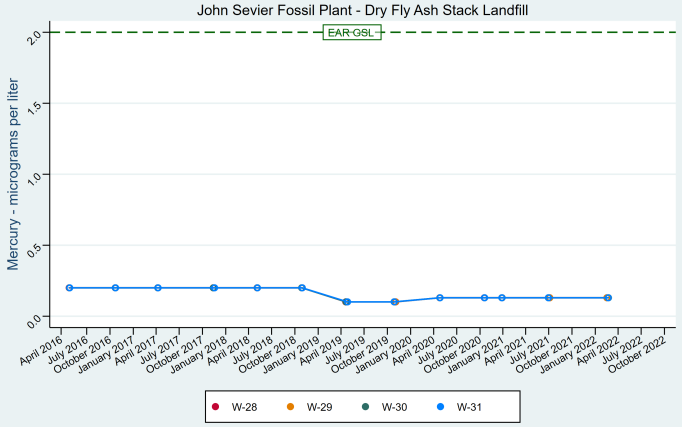
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill



EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

Mercury - Time Series

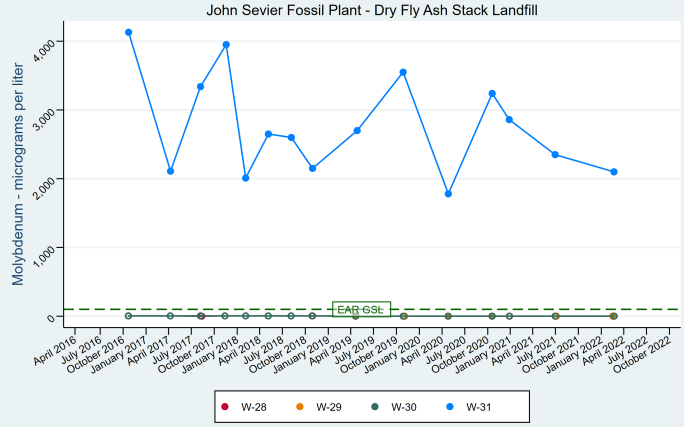
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill



EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

Molybdenum - Time Series

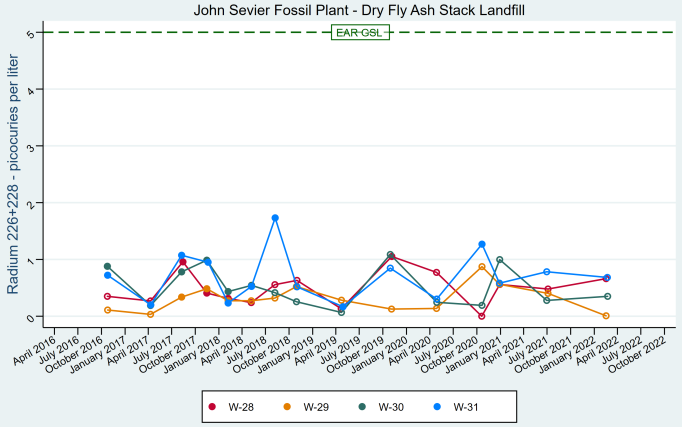
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill



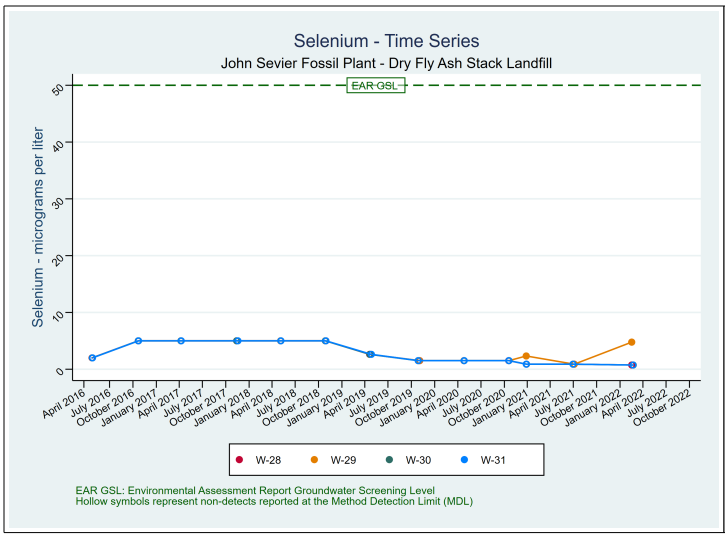
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

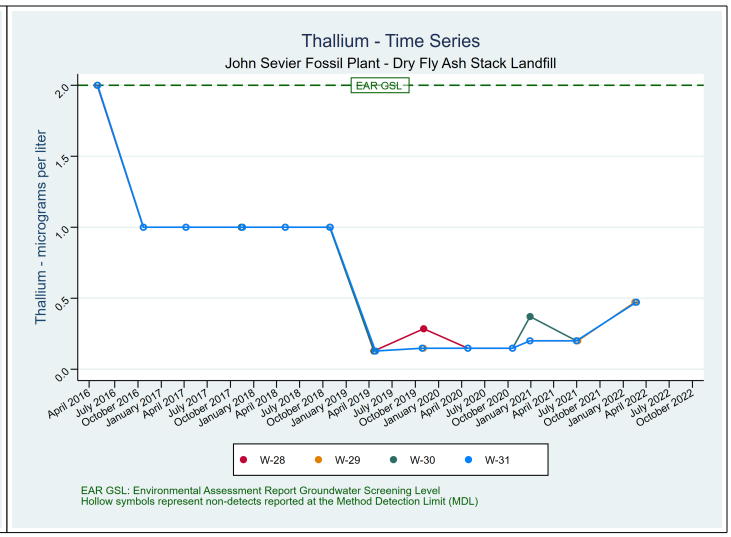
Radium 226+228 - Time Series

John Sevier Fossil Plant - Dry Fly Ash Stack Landfill

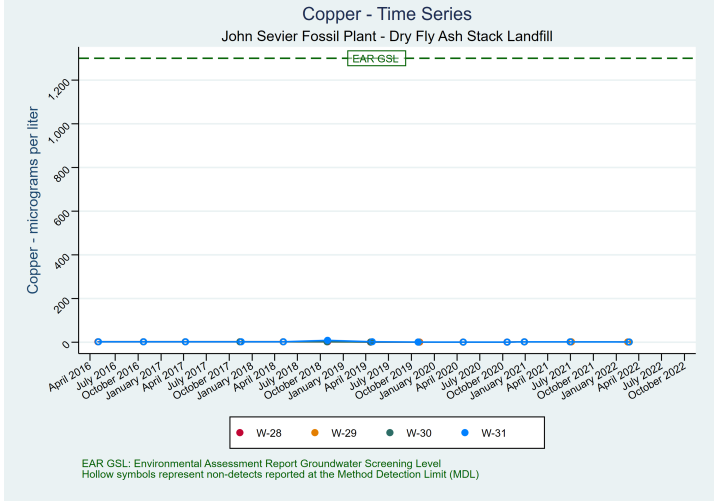


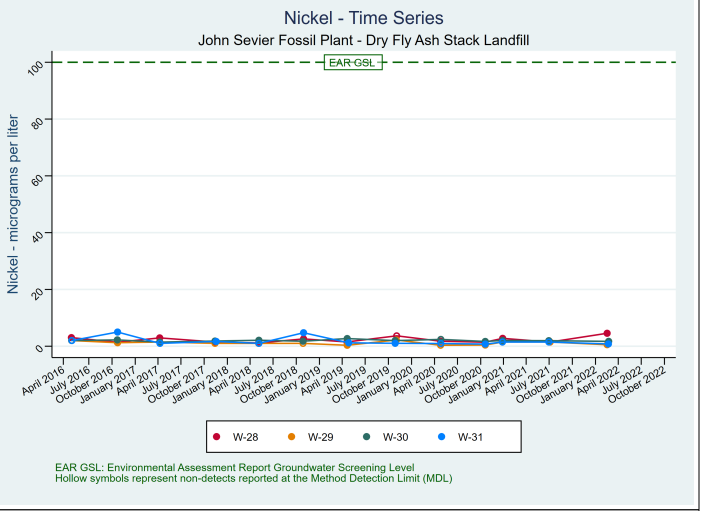
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

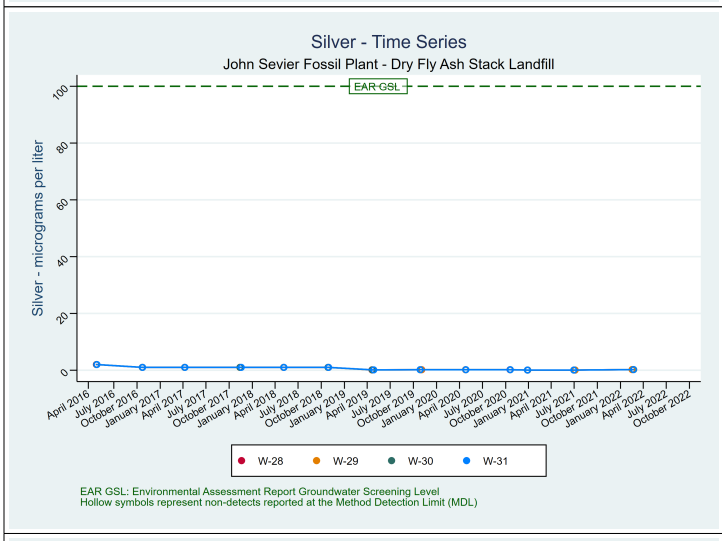

Selenium - Time Series
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill
Selenium - micrograms per liter
EAR GSL
0
10
20
30
40
50
April 2016
July 2016
October 2016
January 2017
April 2017
July 2017
October 2017
January 2018
April 2018
July 2018
October 2018
January 2019
April 2019
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
W-28
W-29
W-30
W-31
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

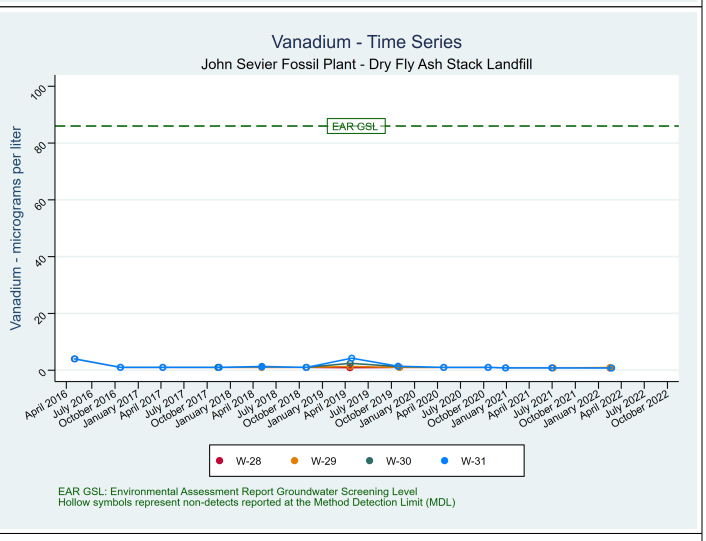

Thallium - Time Series
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill
Thallium - micrograms per liter
EAR GSL
0.0
0.5
1.0
1.5
2.0
April 2016
July 2016
October 2016
January 2017
April 2017
July 2017
October 2017
January 2018
April 2018
July 2018
October 2018
January 2019
April 2019
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
W-28
W-29
W-30
W-31
EAR GSL: Environmental Assessment Report Groundwater Screening Level
Hollow symbols represent non-detects reported at the Method Detection Limit (MDL)

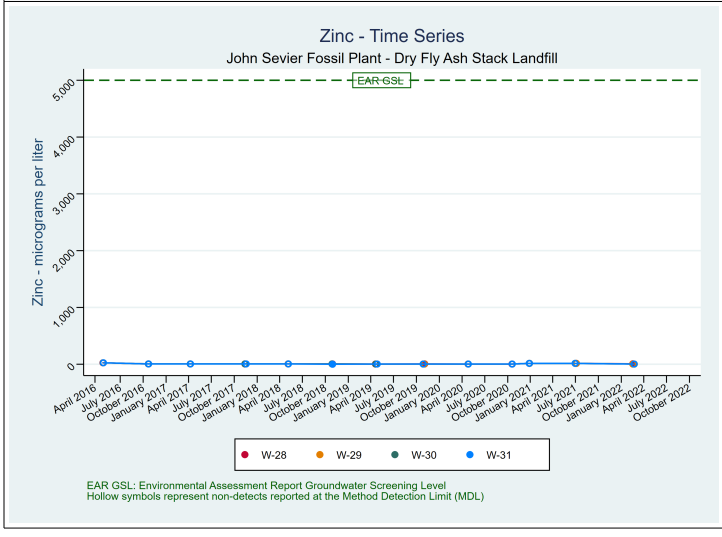
Time Series Plots
Dry Fly Ash Stack Landfill
TDEC Appendix I Parameters
John Sevier Fossil Plant - Rogersville, Tennessee











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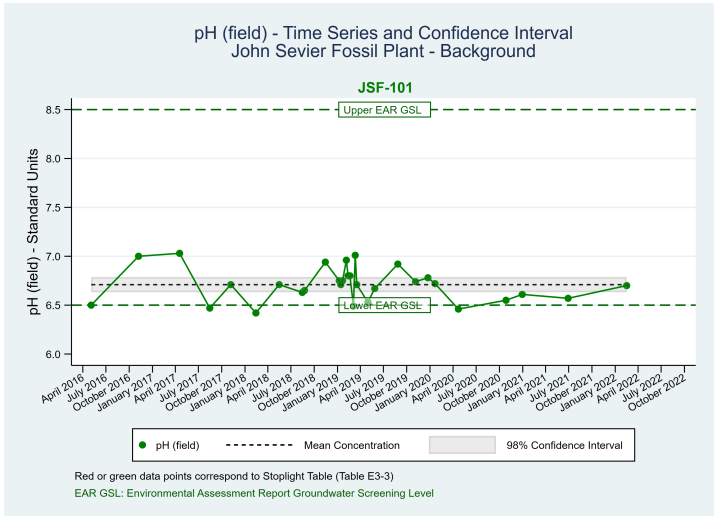
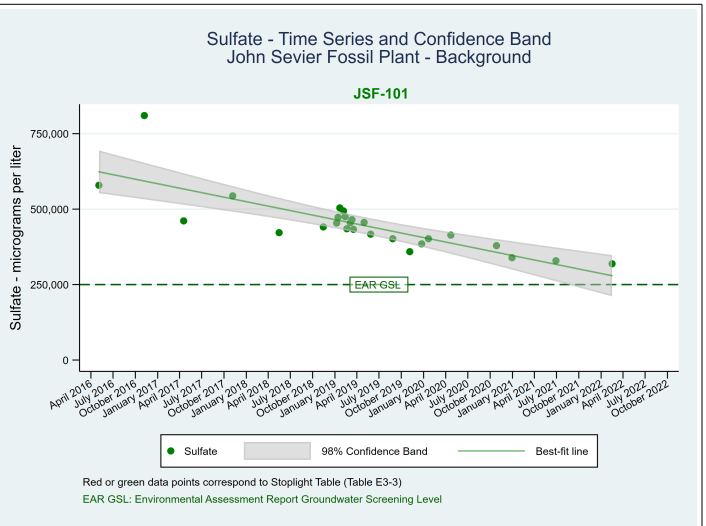
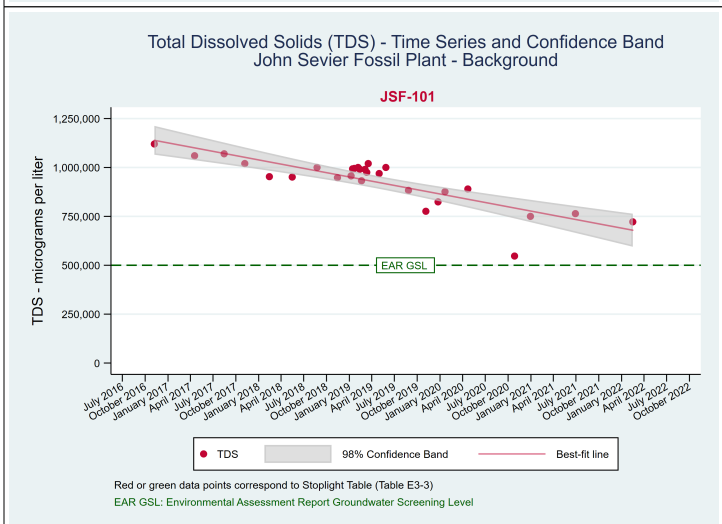
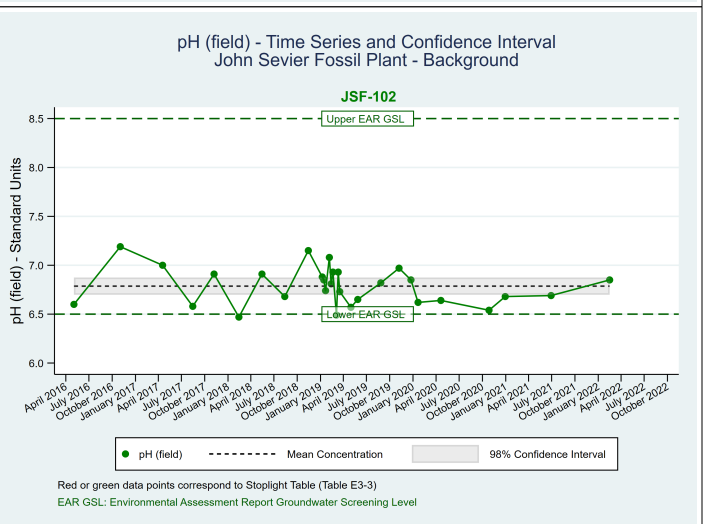
ATTACHMENT E.3-D
LINEAR REGRESSION PLOTS

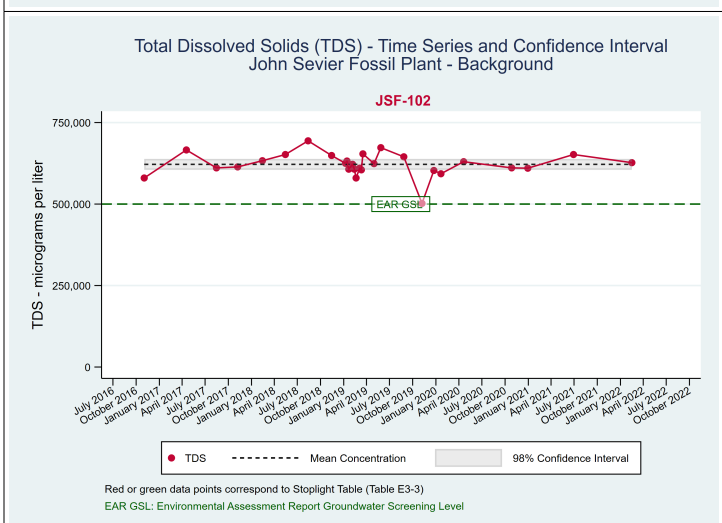
Regression Plots
Background Wells
CCR Rule Appendix III Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

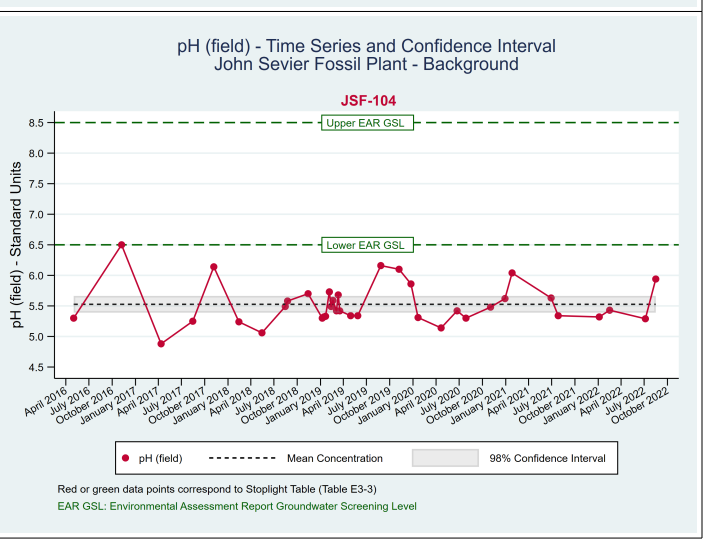


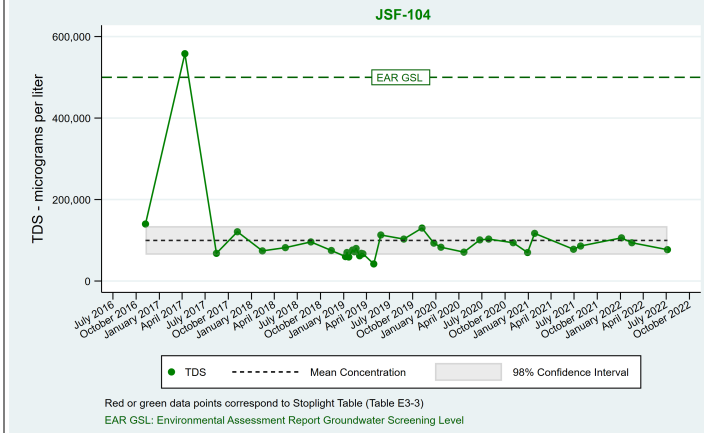


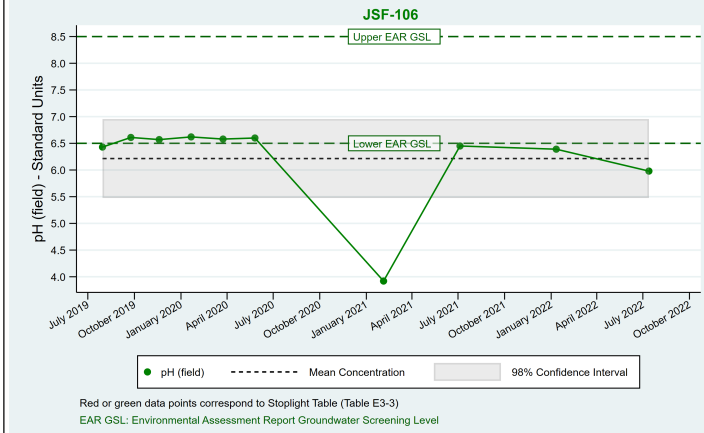


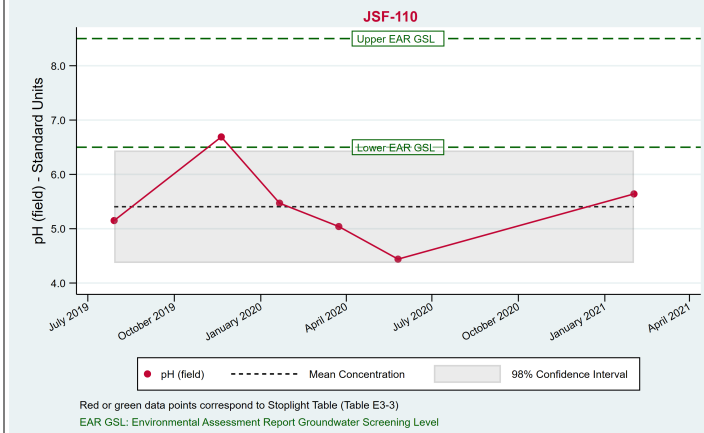


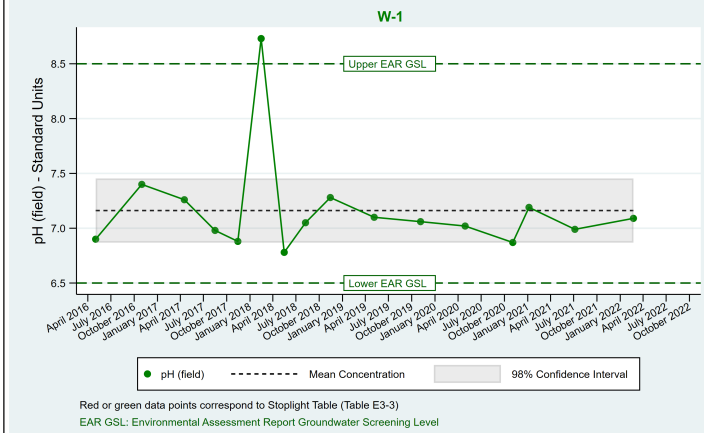




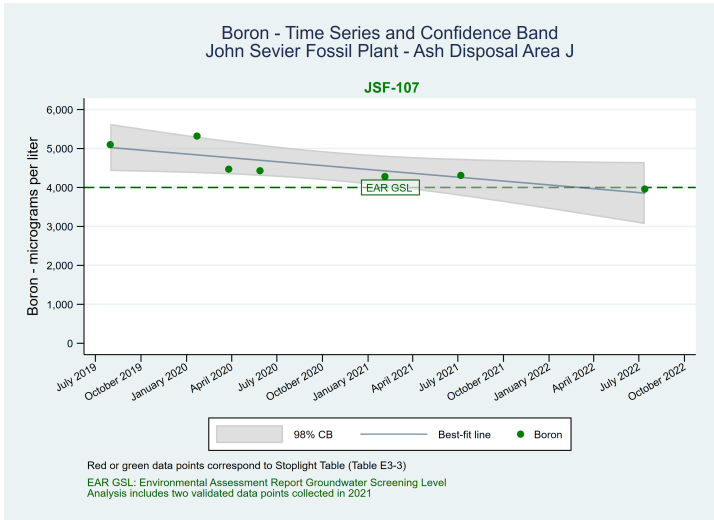

Total Dissolved Solids (TDS) - Time Series and Confidence Interval
John Sevier Fossil Plant - Background
JSF-104
TDS - micrograms per liter
600,000
400,000
200,000
0
EAR GSL
July 2016
October 2016
January 2017
April 2017
July 2017
October 2017
January 2018
April 2018
July 2018
October 2018
January 2019
April 2019
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
TDS
Mean Concentration
98% Confidence Interval
Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

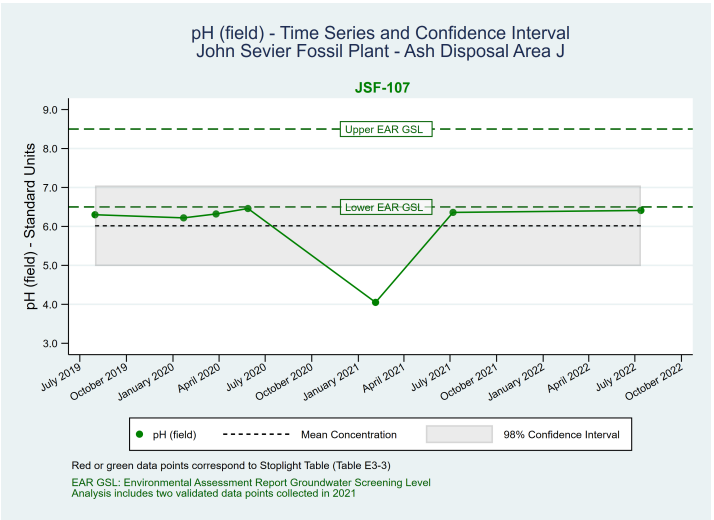

pH (field) - Time Series and Confidence Interval
John Sevier Fossil Plant - Background
JSF-106
pH (field) - Standard Units
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
Upper EAR GSL
Lower EAR GSL
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
pH (field)
Mean Concentration
98% Confidence Interval
Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

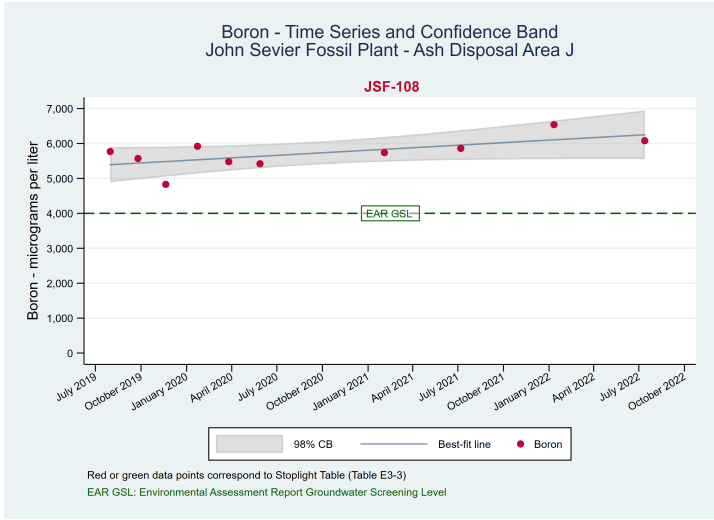

pH (field) - Time Series and Confidence Interval
John Sevier Fossil Plant - Background
JSF-110
pH (field) - Standard Units
8.0
7.0
6.0
5.0
4.0
Upper EAR GSL
Lower EAR GSL
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
pH (field)
Mean Concentration
98% Confidence Interval
Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

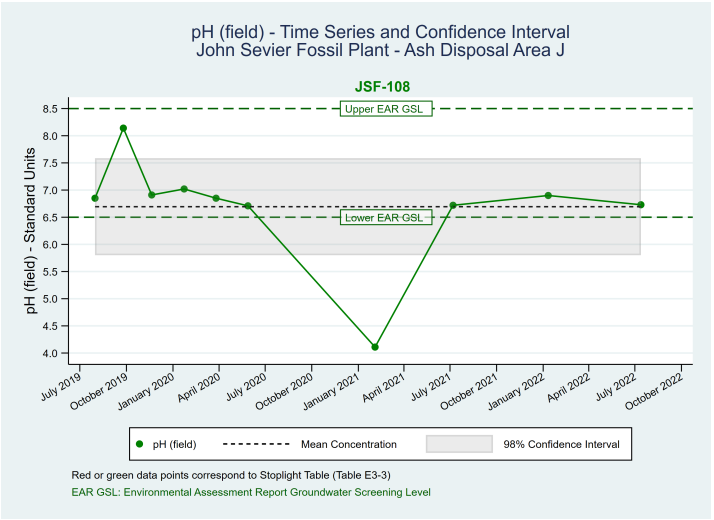

pH (field) - Time Series and Confidence Interval
John Sevier Fossil Plant - Background
W-1
pH (field) - Standard Units
8.5
8.0
7.5
7.0
6.5
Upper EAR GSL
Lower EAR GSL
April 2016
July 2016
October 2016
January 2017
April 2017
July 2017
October 2017
January 2018
April 2018
July 2018
October 2018
January 2019
April 2019
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
pH (field)
Mean Concentration
98% Confidence Interval
Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

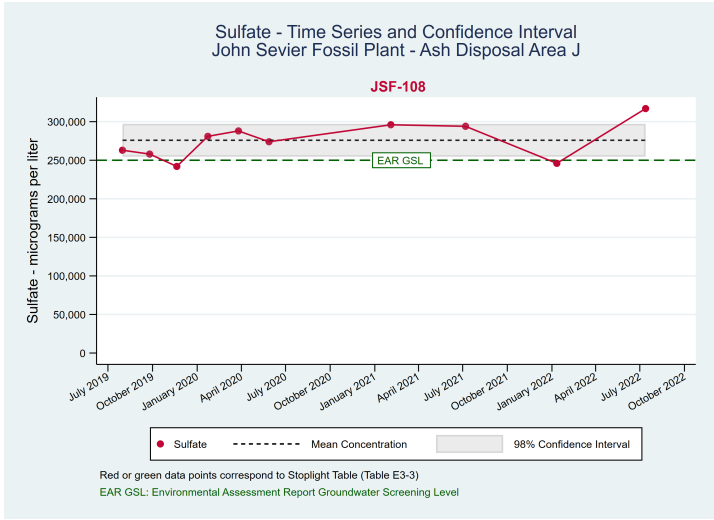
Regression Plots
Ash Disposal Area J
CCR Rule Appendix III Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

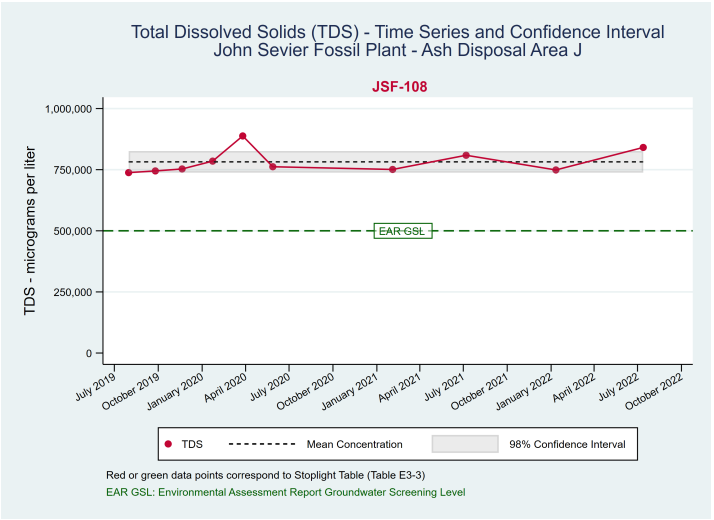










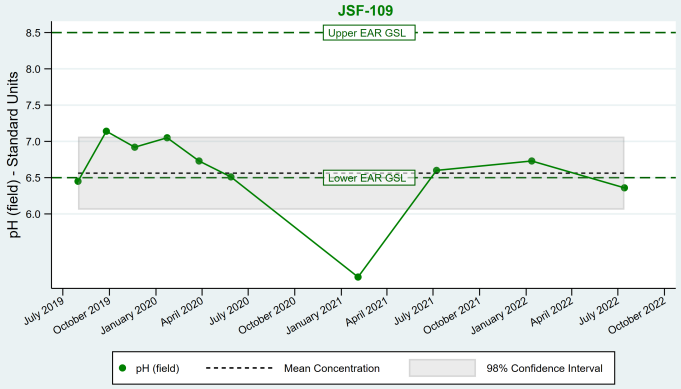


Chloride - Time Series and Confidence Band
John Sevier Fossil Plant - Ash Disposal Area J

Red or green data points correspond to Stoplight Table (Table E3-3)

EAR GSL: Environmental Assessment Report Groundwater Screening Level

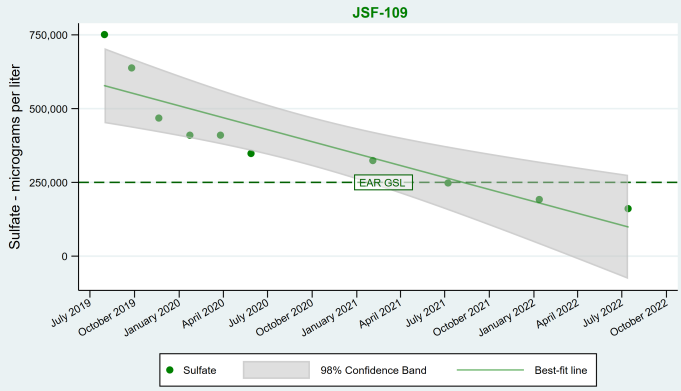
pH (field) - Time Series and Confidence Interval
John Sevier Fossil Plant - Ash Disposal Area J



Red or green data points correspond to Stoplight Table (Table E3-3)

EAR GSL: Environmental Assessment Report Groundwater Screening Level

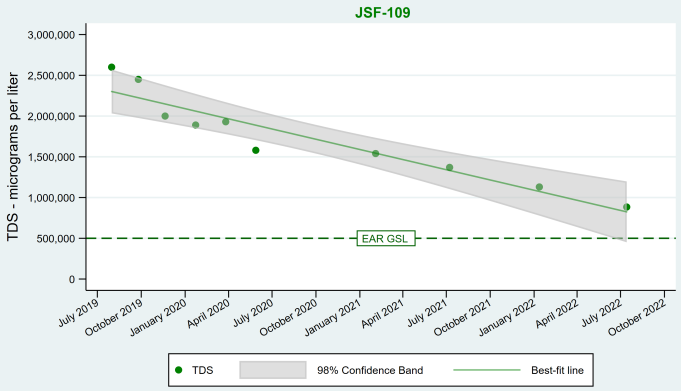
Sulfate - Time Series and Confidence Band
John Sevier Fossil Plant - Ash Disposal Area J



Red or green data points correspond to Stoplight Table (Table E3-3)

EAR GSL: Environmental Assessment Report Groundwater Screening Level

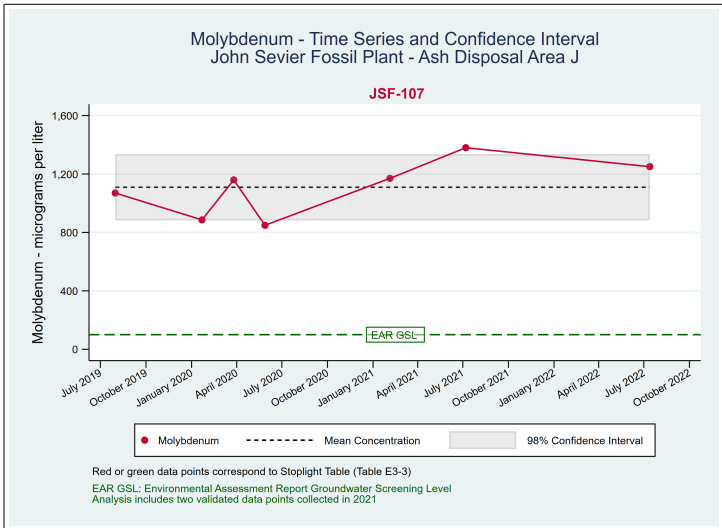
Total Dissolved Solids (TDS) - Time Series and Confidence Band
John Sevier Fossil Plant - Ash Disposal Area J

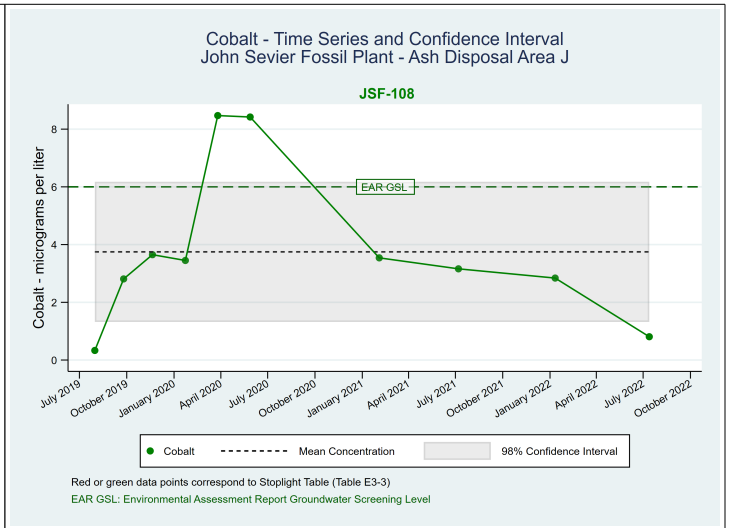


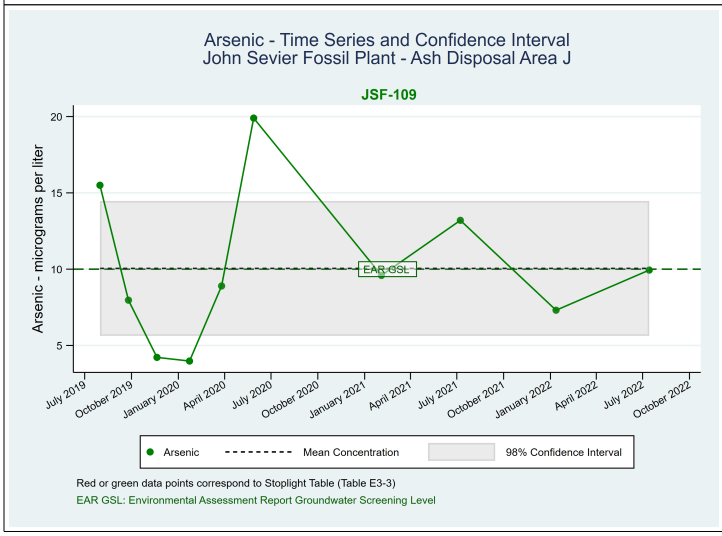
Red or green data points correspond to Stoplight Table (Table E3-3)

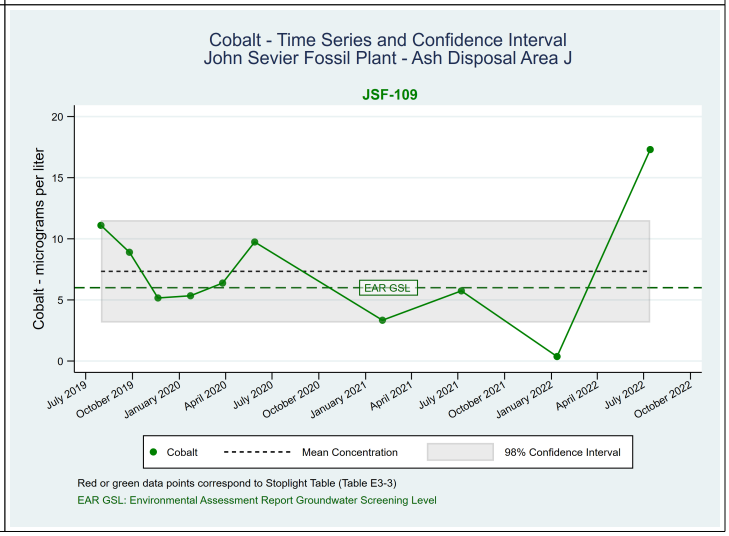
EAR GSL: Environmental Assessment Report Groundwater Screening Level

Regression Plots
Ash Disposal Area J
CCR Rule Appendix IV Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

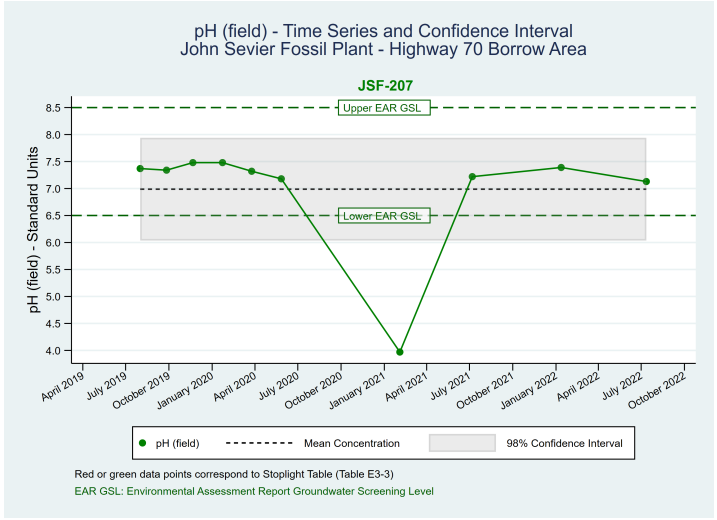


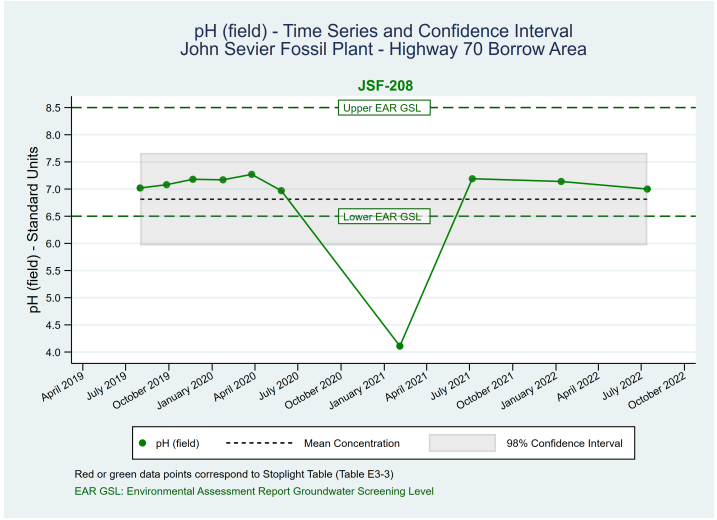


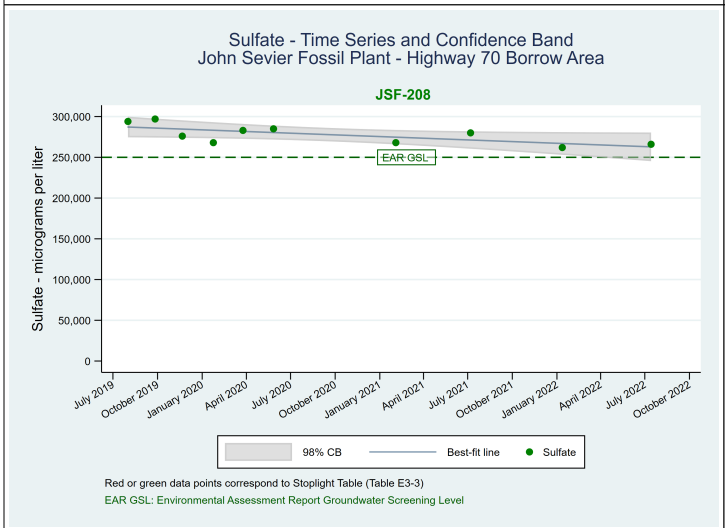


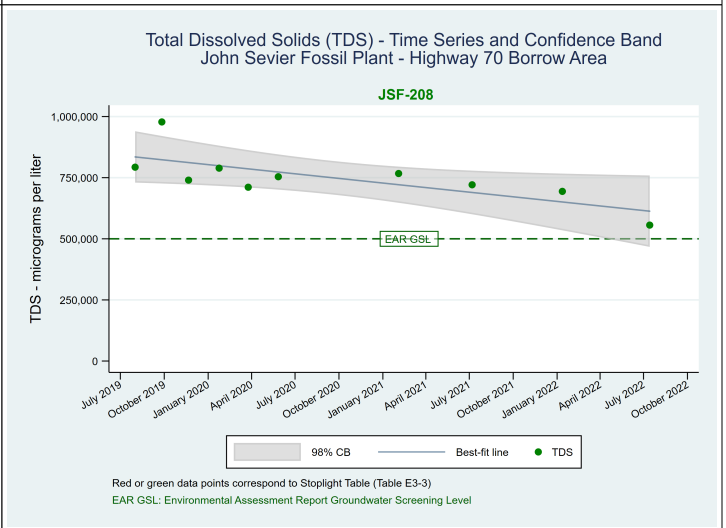


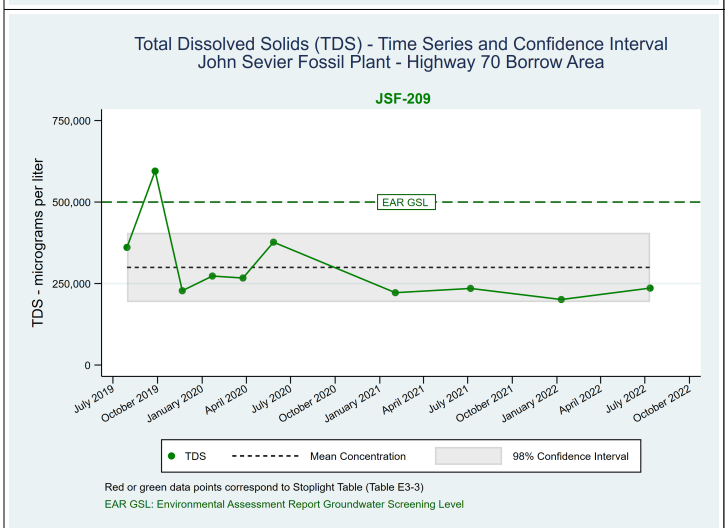
Regression Plots
Highway 70 Borrow Area
CCR Rule Appendix III Parameters
John Sevier Fossil Plant - Rogersville, Tennessee











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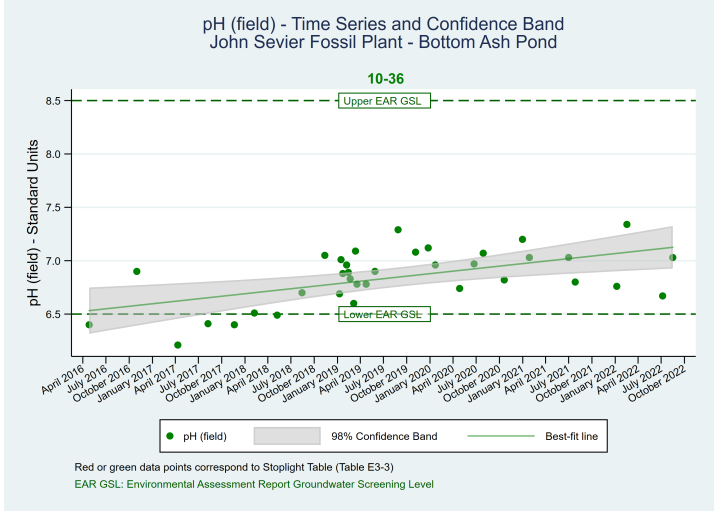
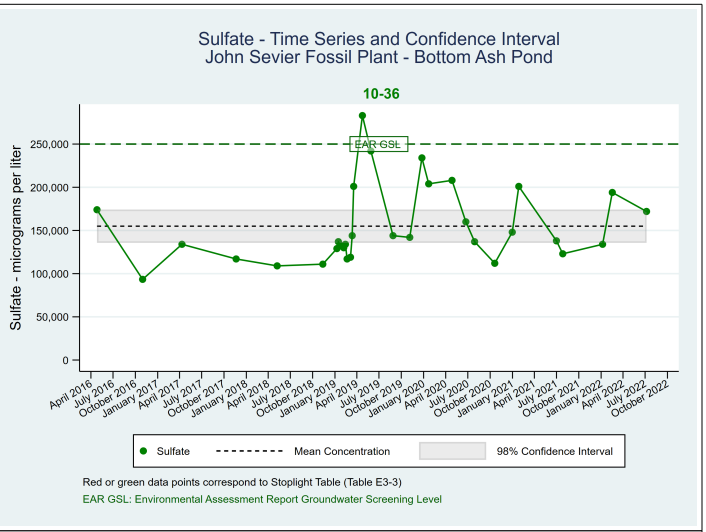
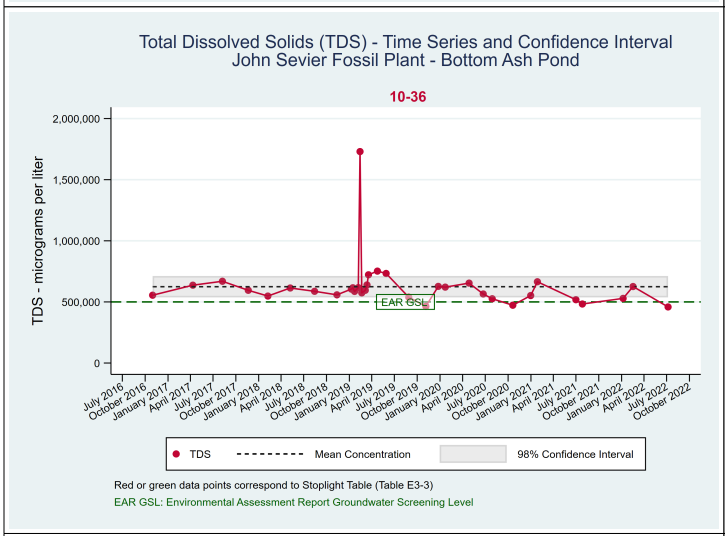
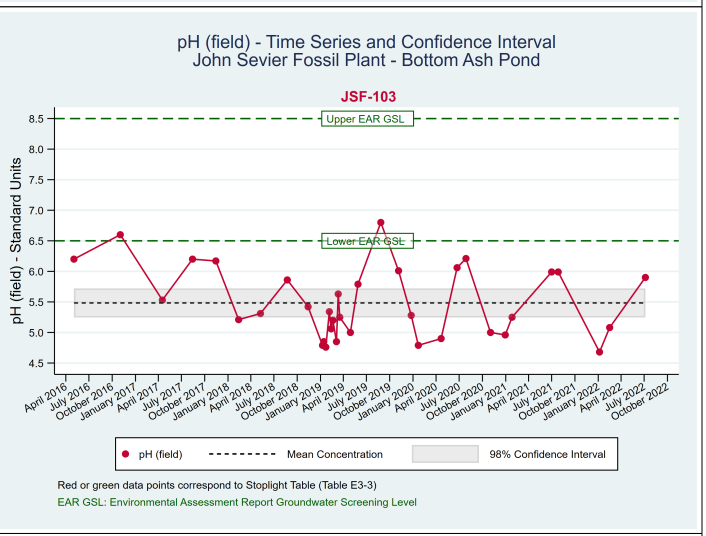
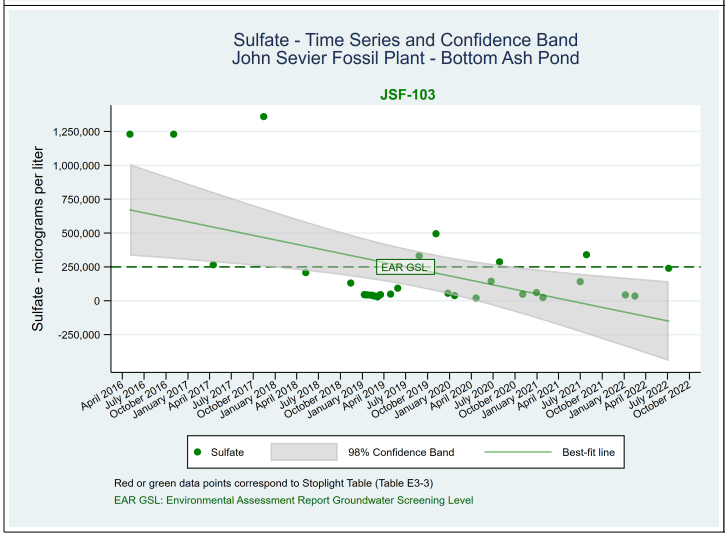
Regression Plots
Bottom Ash Pond
CCR Rule Appendix III Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

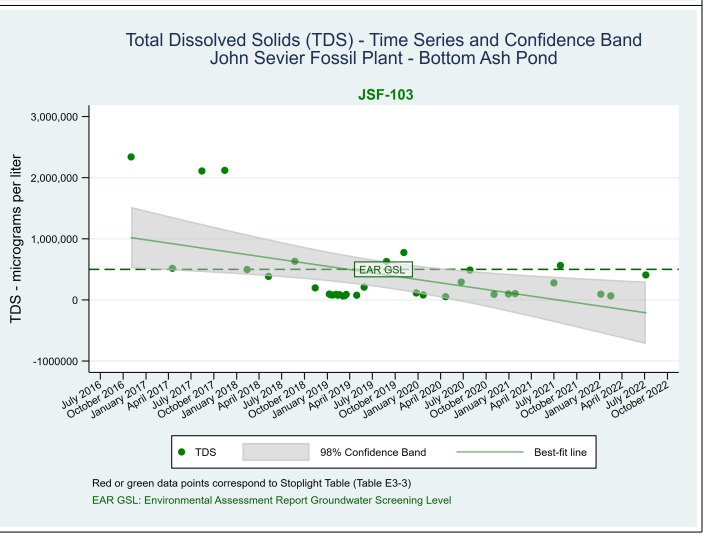




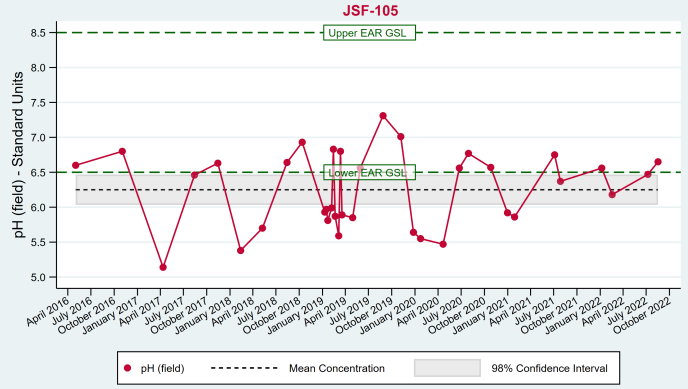






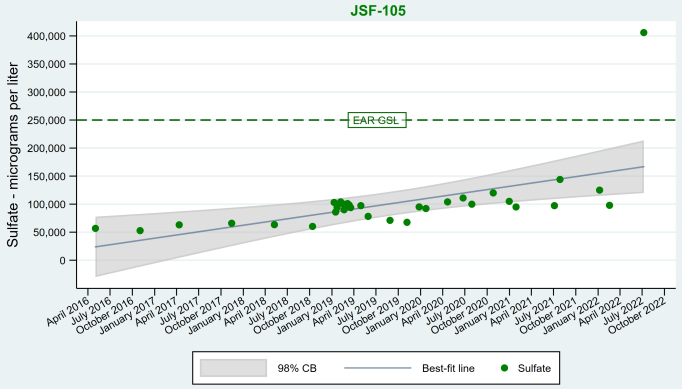


pH (field) - Time Series and Confidence Interval
John Sevier Fossil Plant - Bottom Ash Pond



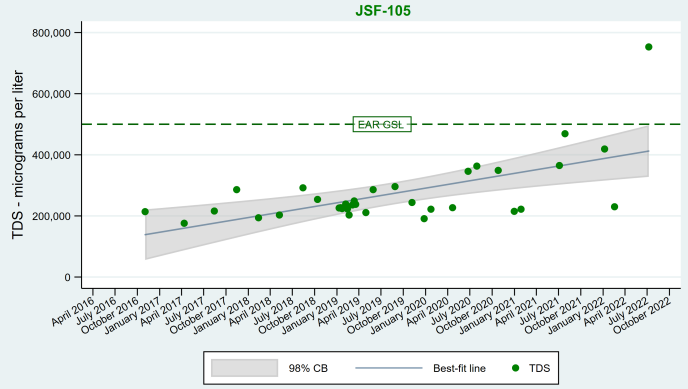
Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

Sulfate - Time Series and Confidence Band
John Sevier Fossil Plant - Bottom Ash Pond



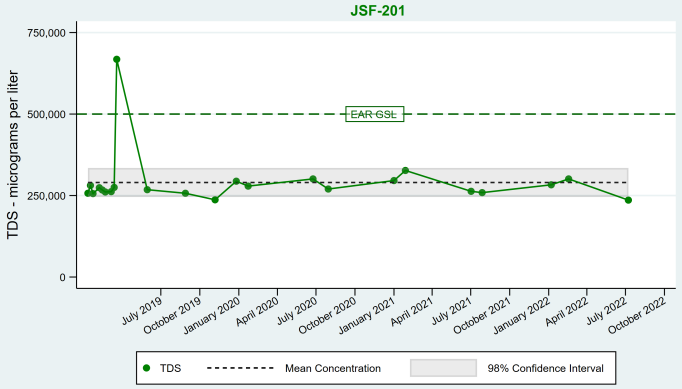
Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

Total Dissolved Solids (TDS) - Time Series and Confidence Band
John Sevier Fossil Plant - Bottom Ash Pond



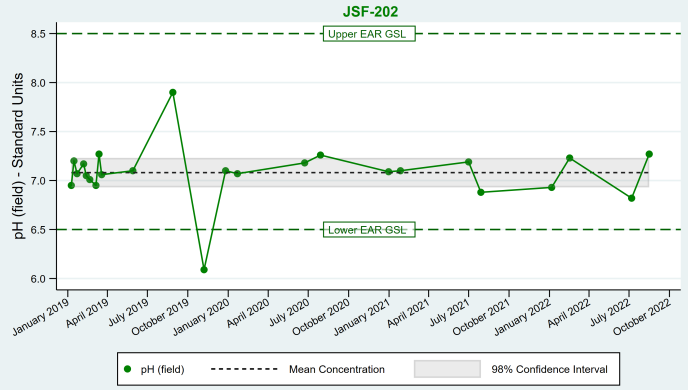
Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

Total Dissolved Solids (TDS) - Time Series and Confidence Interval
John Sevier Fossil Plant - Bottom Ash Pond



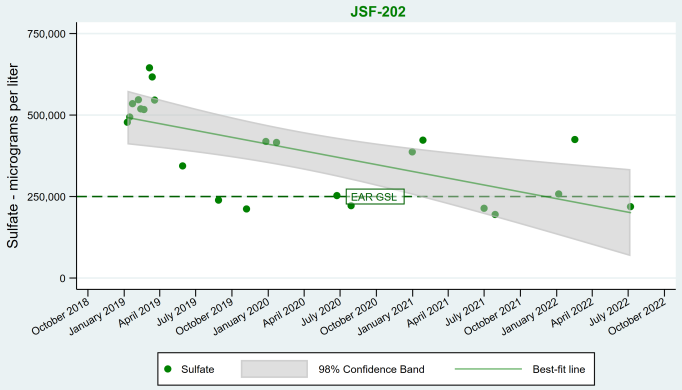
Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

pH (field) - Time Series and Confidence Interval
John Sevier Fossil Plant - Bottom Ash Pond

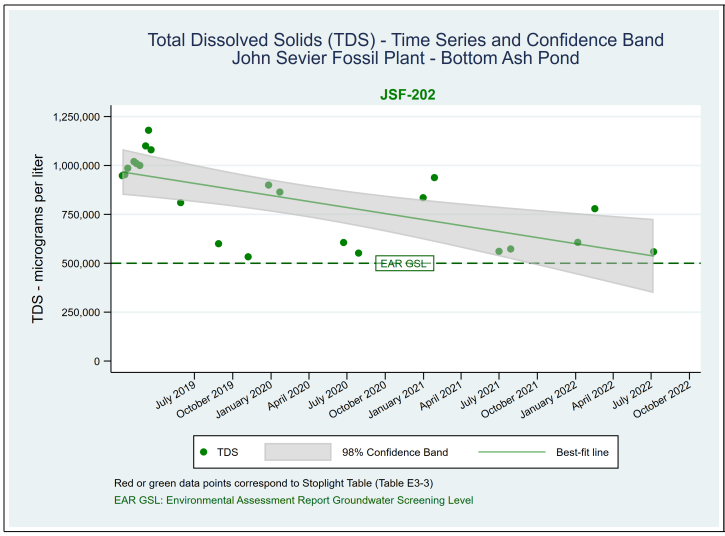


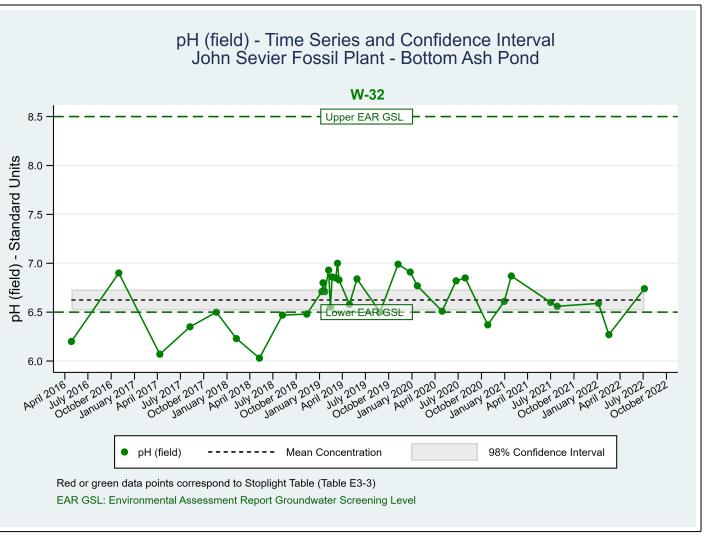
Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

Sulfate - Time Series and Confidence Band
John Sevier Fossil Plant - Bottom Ash Pond

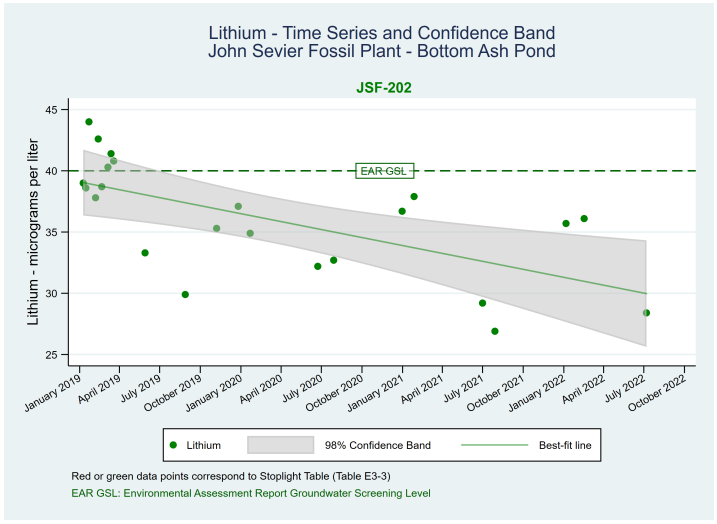


Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level


Total Dissolved Solids (TDS) - Time Series and Confidence Band
John Sevier Fossil Plant - Bottom Ash Pond
JSF-202
TDS - micrograms per liter
1,250,000
1,000,000
750,000
500,000
250,000
0
EAR GSL
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
TDS
98% Confidence Band
Best-fit line
Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level


pH (field) - Time Series and Confidence Interval
John Sevier Fossil Plant - Bottom Ash Pond
W-32
pH (field) - Standard Units
8.5
8.0
7.5
7.0
6.5
6.0
Upper EAR GSL
Lower EAR GSL
April 2016
July 2016
October 2016
January 2017
April 2017
July 2017
October 2017
January 2018
April 2018
July 2018
October 2018
January 2019
April 2019
July 2019
October 2019
January 2020
April 2020
July 2020
October 2020
January 2021
April 2021
July 2021
October 2021
January 2022
April 2022
July 2022
October 2022
pH (field)
Mean Concentration
98% Confidence Interval
Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

Regression Plots
Bottom Ash Pond
CCR Rule Appendix IV Parameters
John Sevier Fossil Plant - Rogersville, Tennessee



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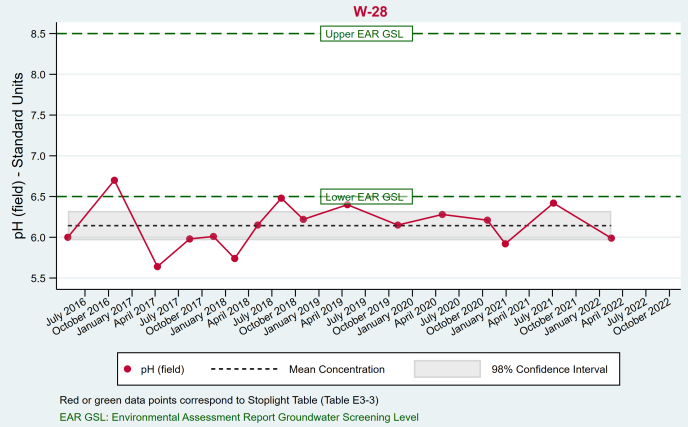
Regression Plots
Dry Fly Ash Stack Landfill
CCR Rule Appendix III Parameters
John Sevier Fossil Plant - Rogersville, Tennessee

pH (field) - Time Series and Confidence Interval
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill

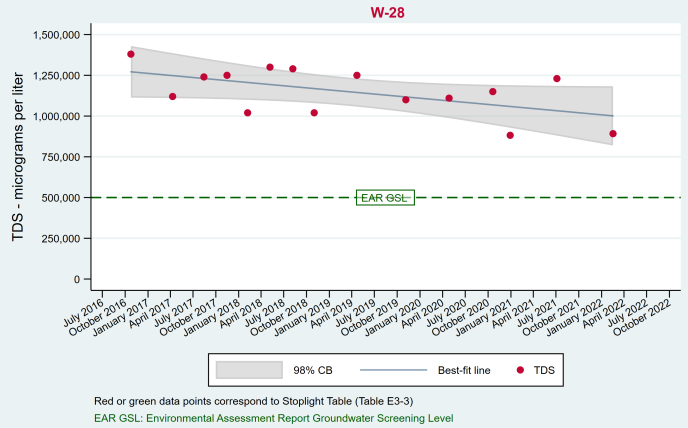


Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

Sulfate - Time Series and Confidence Band
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill

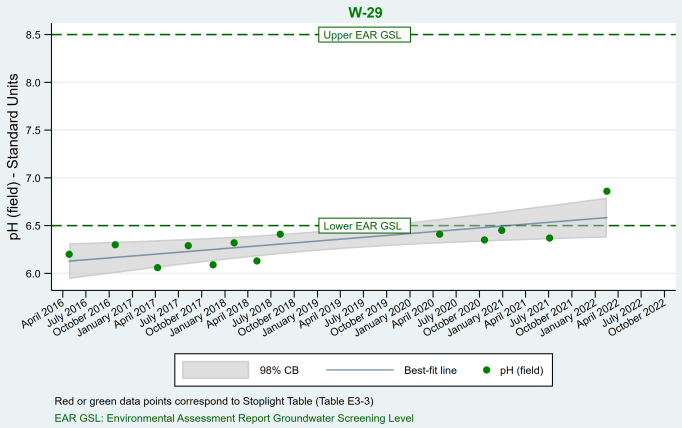
Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

Total Dissolved Solids (TDS) - Time Series and Confidence Band
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill



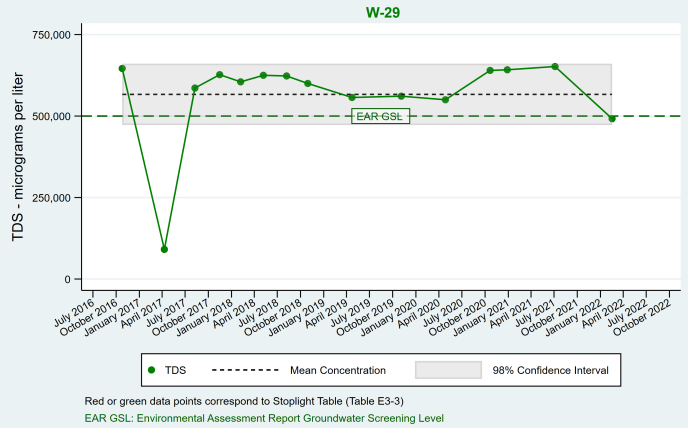
Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

pH (field) - Time Series and Confidence Band
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill



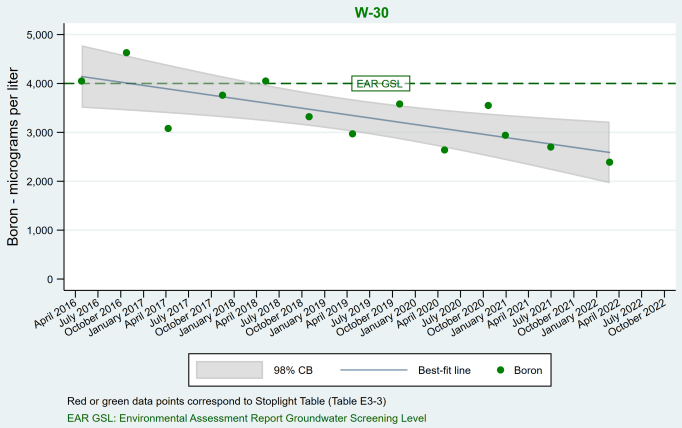
Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

Total Dissolved Solids (TDS) - Time Series and Confidence Interval
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill



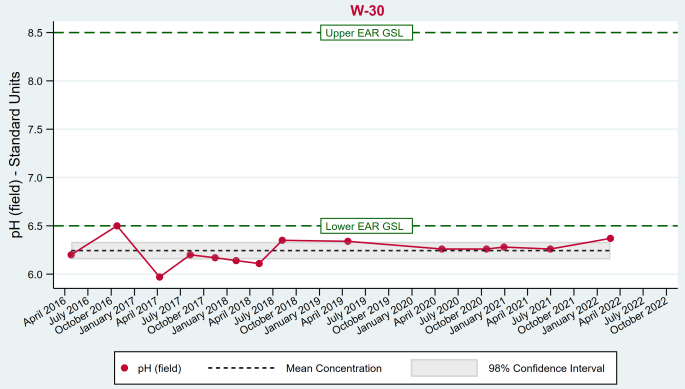
Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

Boron - Time Series and Confidence Band
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill



Red or green data points correspond to Stoplight Table (Table E3-3)
EAR GSL: Environmental Assessment Report Groundwater Screening Level

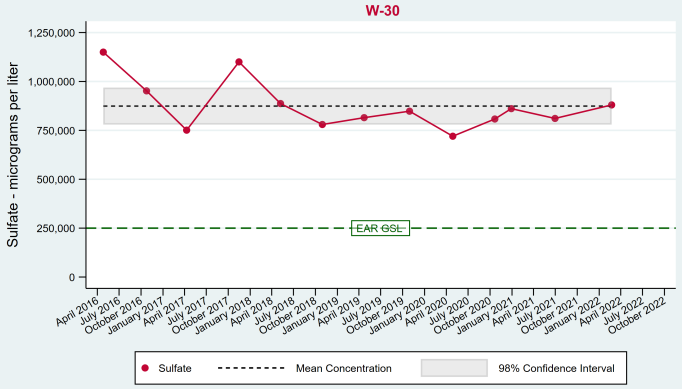
pH (field) - Time Series and Confidence Interval
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill



Red or green data points correspond to Stoplight Table (Table E3-3)

EAR GSL: Environmental Assessment Report Groundwater Screening Level

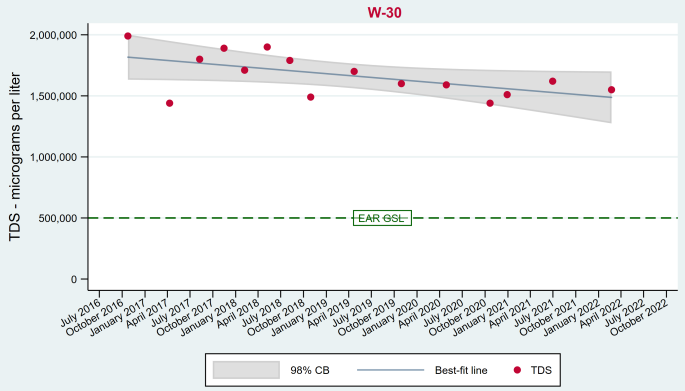
Sulfate - Time Series and Confidence Interval
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill



Red or green data points correspond to Stoplight Table (Table E3-3)

EAR GSL: Environmental Assessment Report Groundwater Screening Level

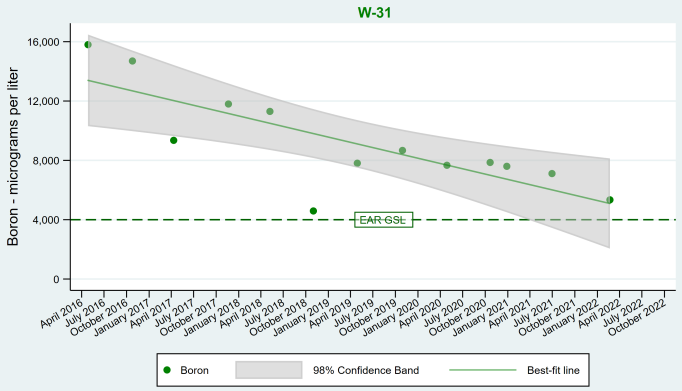
Total Dissolved Solids (TDS) - Time Series and Confidence Band
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill



Red or green data points correspond to Stoplight Table (Table E3-3)

EAR GSL: Environmental Assessment Report Groundwater Screening Level

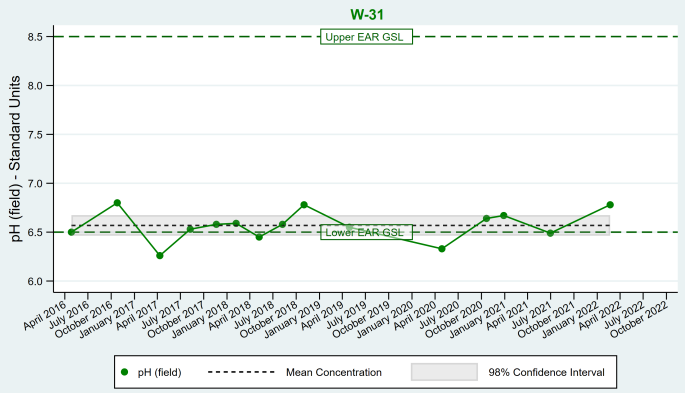
Boron - Time Series and Confidence Band
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill



Red or green data points correspond to Stoplight Table (Table E3-3)

EAR GSL: Environmental Assessment Report Groundwater Screening Level

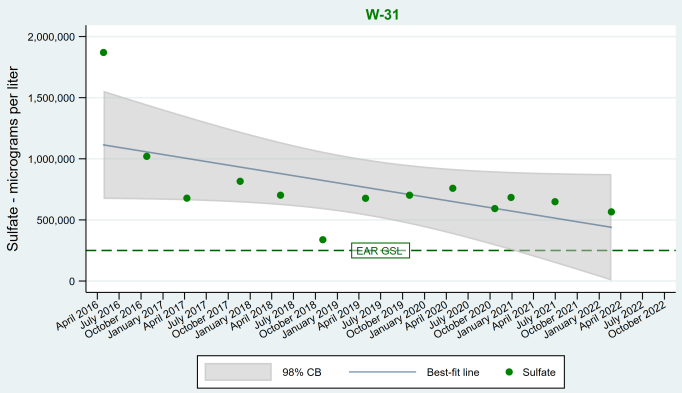
pH (field) - Time Series and Confidence Interval
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill



Red or green data points correspond to Stoplight Table (Table E3-3)

EAR GSL: Environmental Assessment Report Groundwater Screening Level

Sulfate - Time Series and Confidence Band
John Sevier Fossil Plant - Dry Fly Ash Stack Landfill



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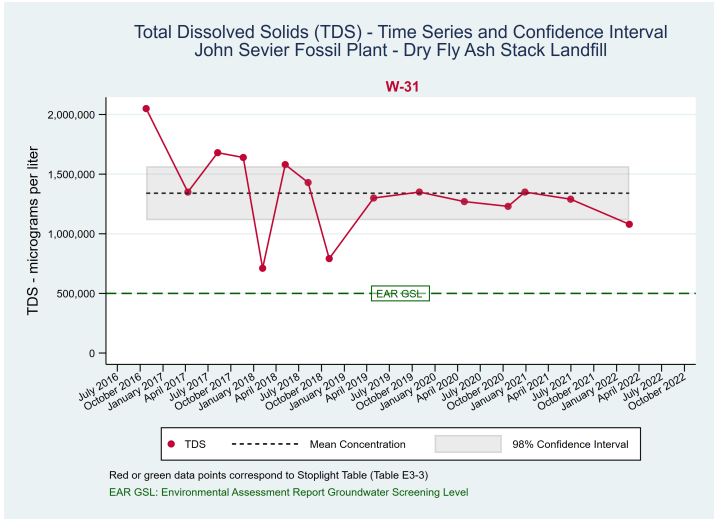
EAR GSL: Environmental Assessment Report Groundwater Screening Level



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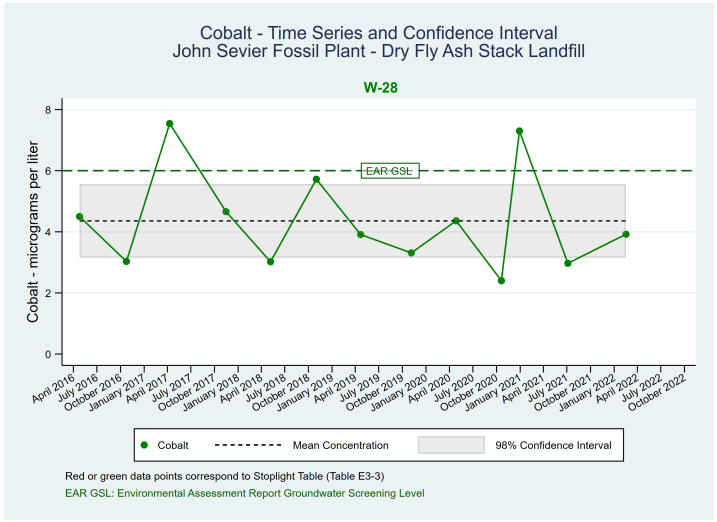
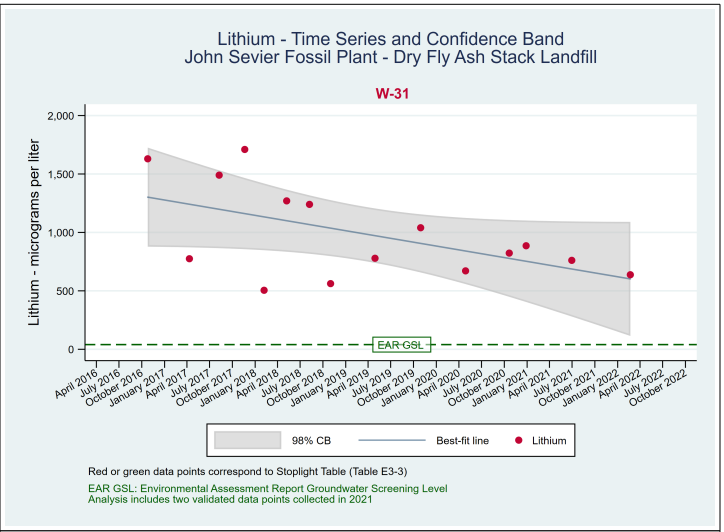
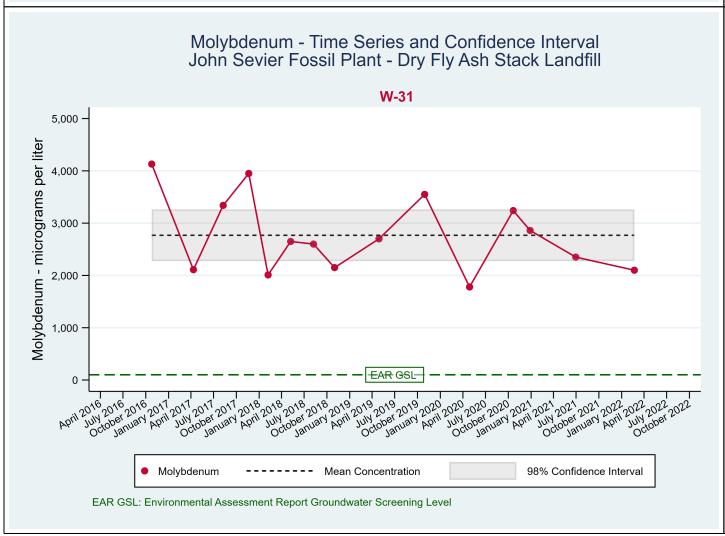
Regression Plots
Dry Fly Ash Stack Landfill
CCR Rule Appendix IV Parameters
John Sevier Fossil Plant - Rogersville, Tennessee







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ATTACHMENT E.3-E
LINEAR REGRESSION RESULTS

Attachment E.3-E - Linear Regression Results
Groundwater Investigation - John Sevier Fossil Plant - Rogersville, Tennessee

Well	Constituent Type	Constituent	p-value	Trend summary[1]
JSF-101	CCR Rule Appendix III Parameters	pH	0.425	No trend detected
		Sulfate	<0.0001	Decreasing
		Total Dissolved Solids	<0.0001	Decreasing
JSF-102	CCR Rule Appendix III Parameters	pH	0.317	No trend detected
		Total Dissolved Solids	0.717	No trend detected
JSF-104	CCR Rule Appendix III Parameters	pH	0.915	No trend detected
		Total Dissolved Solids	0.104	No trend detected
JSF-106	CCR Rule Appendix III Parameters	pH	0.383	No trend detected
JSF-110	CCR Rule Appendix III Parameters	pH	0.81	No trend detected
W-1	CCR Rule Appendix III Parameters	pH	0.537	No trend detected
JSF-107	CCR Rule Appendix III Parameters	Boron	0.0208	Decreasing
		pH	0.84	No trend detected
	CCR Rule Appendix IV Parameters	Molybdenum	0.12	No trend detected
JSF-108	CCR Rule Appendix III Parameters	Boron	0.0372	Increasing
		pH	0.415	No trend detected
		Sulfate	0.146	No trend detected
		Total Dissolved Solids	0.4	No trend detected
	CCR Rule Appendix IV Parameters	Cobalt	0.528	No trend detected
JSF-109	CCR Rule Appendix III Parameters	Chloride	<0.0001	Decreasing
		pH	0.336	No trend detected
		Sulfate	0.0006	Decreasing
		Total Dissolved Solids	<0.0001	Decreasing
	CCR Rule Appendix IV Parameters	Arsenic	0.966	No trend detected
		Cobalt	0.842	No trend detected
JSF-207	CCR Rule Appendix III Parameters	pH	0.595	No trend detected
JSF-208	CCR Rule Appendix III Parameters	pH	0.696	No trend detected
		Sulfate	0.023	Decreasing
		Total Dissolved Solids	0.015	Decreasing
JSF-209	CCR Rule Appendix III Parameters	Total Dissolved Solids	0.0925	No trend detected
10-36	CCR Rule Appendix III Parameters	pH	0.0005	Increasing
		Sulfate	0.257	No trend detected
		Total Dissolved Solids	0.285	No trend detected
JSF-103	CCR Rule Appendix III Parameters	pH	0.178	No trend detected
		Sulfate	0.0014	Decreasing
		Total Dissolved Solids	0.0025	Decreasing
JSF-105	CCR Rule Appendix III Parameters	pH	0.469	No trend detected
		Sulfate	0.0006	Increasing
		Total Dissolved Solids	0.0001	Increasing
JSF-201	CCR Rule Appendix III Parameters	Total Dissolved Solids	0.562	No trend detected
JSF-202	CCR Rule Appendix III Parameters	pH	0.885	No trend detected
		Sulfate	0.0005	Decreasing
		Total Dissolved Solids	0.0004	Decreasing
	CCR Rule Appendix IV Parameters	Lithium	0.0008	Decreasing
W-32	CCR Rule Appendix III Parameters	pH	0.149	No trend detected
W-28	CCR Rule Appendix III Parameters	pH	0.692	No trend detected
		Sulfate	0.0015	Decreasing
		Total Dissolved Solids	0.0292	Decreasing
	CCR Rule Appendix IV Parameters	Cobalt	0.577	No trend detected

Attachment E.3-E - Linear Regression Results
Groundwater Investigation - John Sevier Fossil Plant - Rogersville, Tennessee

Well	Constituent Type	Constituent	p-value	Trend summary[1]
W-29	CCR Rule Appendix III Parameters	pH	0.0036	Increasing
		Total Dissolved Solids	0.44	No trend detected
W-30	CCR Rule Appendix III Parameters	Boron	0.0025	Decreasing
		pH	0.316	No trend detected
		Sulfate	0.0698	No trend detected
		Total Dissolved Solids	0.0241	Decreasing
W-31	CCR Rule Appendix III Parameters	Boron	0.0012	Decreasing
		pH	0.493	No trend detected
		Sulfate	0.0324	Decreasing
		Total Dissolved Solids	0.13	No trend detected
	CCR Rule Appendix IV Parameters	Lithium	0.0342	Decreasing
		Molybdenum	0.204	No trend detected

Notes
CCR Rule - Title 40, Code of Federal Regulations, Part 257
p-value - probability value
[1.] Trend evaluated using linear regression. Slope considered significant when $p<0.05$.

APPENDIX E.4

STATISTICAL ANALYSIS OF SURFACE STREAM DATA

Appendix E.4 - Statistical Analysis of Surface Stream Data

TDEC Commissioner's Order:
Environmental Assessment Report
John Sevier Fossil Plant
Rogersville, Tennessee

July 3, 2023

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

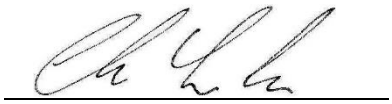
Stantec Consulting Services Inc.
Lexington, Kentucky

REVISION LOG

Revision	Description	Date
0	Submittal to TDEC	January 10, 2023
1	Addresses April 4, 2023 TDEC Review Comments and Issued for TDEC	July 3, 2023

Sign-off Sheet

This document entitled Appendix E.4 - Statistical Analysis of Surface Stream Data was prepared by Stantec Consulting Services Inc. (“Stantec”) for the account of Tennessee Valley Authority (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not consider any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by 

Chris La Londe, Senior Risk Assessor

Reviewed by 

Melissa Whitfield Aslund, PhD, Environmental Scientist

Approved by 

Rebekah Brooks, PG Principal Hydrogeologist

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LIST OF TABLES

LIST OF ATTACHMENTS

Abbreviations

CASRN	Chemical Abstracts Service Registry Number
CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04
CCR Rule	Title 40, Code of Federal Regulations, Part 257
EAR	Environmental Assessment Report
EI	Environmental Investigation
ESV	Ecological Screening Value
IQR	Interquartile Range
JSF Plant	John Sevier Fossil Plant
MDL	Method Detection Limit
NA	Not Available
%	Percent
SSL_{HH}	Site-specific Human Health Screening Levels
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TVA	Tennessee Valley Authority

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) prepared this appendix on behalf of the Tennessee Valley Authority (TVA) to summarize the statistical analyses performed on surface stream data to support evaluations conducted for the Environmental Assessment Report (EAR) at the John Sevier Fossil Plant (JSF Plant) located in Rogersville, Tennessee. The surface stream samples were collected between February and July 2019 in two water bodies in proximity to the JSF Plant. Further details regarding the surface stream sampling and a summary of the analytical data results are presented in the *Technical Evaluation of Surface Streams Data (*Appendix J.1) and the *JSF Plant Surface Stream Sampling and Analysis Report* (Appendix J.2).

For the Environmental Investigation (EI), surface stream samples were collected from locations along sample transects or individual locations from two water bodies proximate to the JSF Plant coal combustion residual (CCR) management units[1]: Holston River and Polly Branch. Sample transects/location names, locations relative to the JSF Plant CCR management units, and number of samples collected from each water body are presented in Table E.4-1. The constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04 (CCR Parameters) included in the statistical analysis are presented in Table E.4-2.

Table E.4-1 – Surface Stream Sample Transect/Locations, JSF Plant

Water Body	Transect/Location Name	Location Relative to CCR Management Units	Number of Samples
Holston River	JSF-HR01	Upstream	6
	JSF-HR02, JSF-HR03, JSF-HR04, JSF-HR05, JSF-HR06	Adjacent	50
	JSF-HR07, JSF-HR08, JSF-HR09	Downstream	34
Polly Branch	JSF-PB01, JSF-PB02, JSF-PB03, JSF-PB04	Upstream	19
	JSF-PB05, JSF-PB06, JSF-PB07, JSF-PB08, JSF-PB09	Adjacent	11

[1] The term “CCR management unit” is used in this document generally and is not intended to be a designation under federal or state regulations.

Table E.4-2 – CCR Parameters Evaluated in Statistical Analysis

CCR Parameter	CASRN
CCR Rule Appendix III Parameters	
Boron	7440-42-8
Calcium	7440-70-2
Chloride	16887-00-6
Fluoride[1] (also Appendix IV)	16984-48-8
pH	Not Available (NA)
Sulfate	14808-79-8
Total Dissolved Solids	NA
CCR Rule Appendix IV Parameters	
Antimony	7440-36-0
Arsenic	7440-38-2
Barium	7440-39-3
Beryllium	7440-41-7
Cadmium	7440-43-9
Chromium	7440-47-3
Cobalt	7440-48-4
Lead	7439-92-1
Lithium	7439-93-2
Mercury	7439-97-6
Molybdenum	7439-98-7
Radium-226+228	13982-63-3/ 15262-20-1
Selenium	7782-49-2
Thallium	7440-28-0
TDEC Appendix I Parameters	
Copper	7440-50-8
Nickel	7440-02-0
Silver	7440-22-4
Vanadium	7440-62-2
Zinc	7440-66-6
Other	
Hardness	NA
Iron	7439-89-6
Magnesium	7439-95-4
Manganese	7439-96-5
Total Suspended Solids	NA

Notes: CASRN: Chemical Abstracts Service Registry Number, CCR Rule - Title 40, Code of Federal Regulations, Part 257
NA – Not available, TDEC - Tennessee Department of Environment and Conservation
[1]Fluoride is both a CCR Rule Appendix III and CCR Rule Appendix IV CCR Parameter. In this table, and in the results figures and tables for this report, fluoride has been grouped with the Appendix III CCR Parameters only to avoid duplication.

The following sections present the methods and results from the general exploratory data analysis using summary statistics, data plots, and outlier screening, and a comparison of surface stream results to Site-specific Ecological Screening Values (ESVs) and Human Health Screening Levels (SSL_{HH}) that were developed for the EAR. The site specific ESVs and SSL_{HH} for surface stream data are provided in Table 1-2 and Appendix A.2.

Additional statistical analyses (principal component analysis [PCA] and hypothesis testing) were performed if the following conditions were satisfied: 1) CCR parameter concentrations were above ESVs or SSL_{HH} and 2) data were collected from transects/locations adjacent and from transects/locations either upstream or downstream to the JSF Plant CCR management units. Since CCR Parameter concentrations were not above ESVs or SSL_{HH} in the surface stream datasets, no additional statistical analyses were conducted.

2.0 METHODS

The statistical evaluation for the surface stream data collected at the JSF Plant for the EI was conducted in three parts: 1) exploratory data analysis, 2) comparison of results to site-specific ESVs and to generic $SSL_{HH,}$ and 3) additional statistical analysis, when warranted.

2.1 EXPLORATORY DATA ANALYSIS

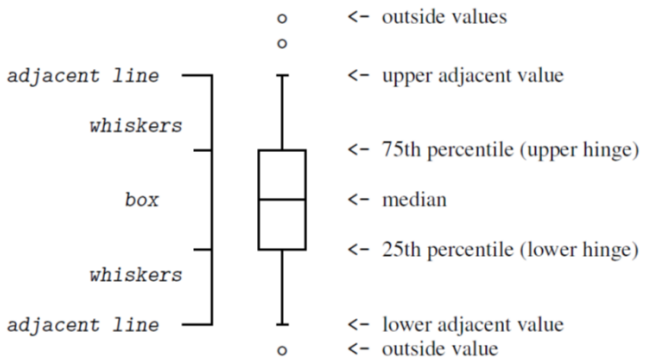
Exploratory data analysis is the initial step of statistical analysis. It utilizes simple summary statistics (e.g. mean, median, standard deviation, and percentiles) and graphical representations to identify characteristics of an analytical dataset, such as the center of the data (mean, median), variation, distribution, spatial or temporal patterns, presence of outliers, and randomness.

2.1.1 Summary Statistics

Summary statistics were calculated for each CCR Parameter grouped by water body and aggregated by the transect's position relative to the JSF Plant CCR management units (upstream, adjacent, and downstream). Summary statistics were also calculated for the following additional water quality parameters: hardness, iron, magnesium, manganese, and total suspended solids. Summary statistics include information such as the total numbers of available samples, the frequencies of detection, ranges of reporting limits, minimum and maximum detected concentrations, mean concentrations, standard deviations, median concentrations and the 95th percentile concentrations. Where applicable, summary statistics were calculated for the results for both total and dissolved metal results. Summary statistics tables are presented in Attachment E.4-A.

2.1.2 Exploratory Data Plots

Exploratory data plots (box plots and transect plots) were constructed using the surface stream results for total metals to support a visual review of the data. Box plots are used to identify the center of the data, distribution, and variability, and to visually identify potential outliers. The diagram below graphically depicts the basics of the construction of the box plots (StataCorp LLC 2017).



The box portion of the plot is the interquartile range (IQR), which represents the middle 50 percent (%) of data, with the bottom of the box being the 25th percentile and the top of the box being the 75th percentile.

The line inside the box is the median concentration. The top of the upper "whisker" represents the first observed concentration above the 75th percentile, whereas the bottom of the lower "whisker" represents the first observed concentration below the 25th percentile (upper adjacent value and lower adjacent value, respectively). Values that lie outside of the adjacent values represent outside (or outlier) concentrations (i.e. concentrations at the upper and lower ends of the distribution of the data). The method detection limit (MDL) was used as the reported value in order to construct the box plot when analytical results were reported as non-detects.

Side-by-side box plots were constructed for the surface stream CCR Parameter data and aggregated by transect and water body. These box plots were useful in identifying differences in CCR Parameter concentrations between transects and water bodies and were especially useful for visually identifying potential outliers.

Box plots were also prepared that compared results by transect in an individual water body. Transects ordered by relative location to the JSF Plant CCR management units (upstream, adjacent, downstream) were useful in assessing upstream to downstream patterns within a given water body, as well as data distribution and variability. Box plots for CCR Rule Appendix III, CCR Rule Appendix IV, and TDEC Appendix I CCR Parameters are presented in Attachment E.4-B.

Transect plots were constructed for each water body that showed individual sample results aggregated by transect, position relative to the JSF Plant CCR management units (upstream, adjacent, or downstream), and relative position in the water body (right bank, center channel, or left bank).

- Holston River: Left Bank = Fossil Plant Bank; Right Bank = Opposite Bank

The symbols used in the transect plots indicate whether the reported result is a detected concentration (solid symbol) or a non-detect reported at the MDL (hollow symbol).

Multiple transect plots were constructed for each CCR Parameter. Individual plots were constructed with a reference line for the SSL_{HH} using analytical results collected in the Holston River, because the Holston River is a potable water source, as described in Appendix J.1. Polly Branch is not a potable water source. Transect plots with a reference line for the site-specific ESVs were constructed using analytical results collected in the Holston River and Polly Branch. In many cases, sample results were much lower than either SSL_{HH} or ESVs, so including the reference lines induced a scaling effect which obscured patterns in the data. A third plot was produced for each CCR Parameter without a reference line in order to better identify patterns.

Transect plots provide more detailed information than side-by-side box plots and allow a more rigorous evaluation of the data. These plots are particularly useful in identifying potential patterns in the dataset (trends), frequency of detection, outliers, spatial differences relative to the JSF Plant CCR management units (upstream, adjacent, and downstream), and differences relative to the position in the water body (right bank, center channel, left bank). The transect plots are presented in Attachment E.4-C.

2.1.3 Outlier Screening

Outliers are data points that are abnormally high or low as compared to other measurements and may represent anomalous data or data errors. Outliers may also represent natural variations of CCR

Parameter concentrations in environmental systems. Screening for outliers is a critical step because outliers can bias statistical estimates, statistical testing results, and inferences.

Outlier values were initially screened visually using the side-by-side box plots. If suspected visual outliers were identified, then Tukey's procedure was used to identify extreme outliers (Tukey 1977). This method relies on the 25th and 75th percentiles of the data (IQR), which is defined as the 75th percentile value minus the 25th percentile value. Values were identified as potential outliers as follows:

- **Lower extreme outliers** are less than the 25th percentile minus 3 x IQR
- **Upper extreme outliers** are greater than the 75th percentile plus 3 x IQR.

Finally, when the potential outliers were identified visually and by Tukey's procedure, then statistical testing for outliers (Rosner's Test) was conducted to determine if those data points were statistically significant outliers.

Following confirmation of the outliers as statistically significant, a desktop evaluation was conducted to verify that the data points were not errors (e.g., laboratory or transcriptional error). Field forms, data validation reports, and other variables in the dataset that could influence analytical results were also evaluated at this point. If a verifiable error was discovered, the outlier was removed and, if possible, replaced with a corrected value.

In the absence of a verifiable error, additional lines of evidence were reviewed to determine final outlier disposition (e.g., frequency of detection, spatial and temporal variability). If an outlier was identified as suitable for removal from further statistical analysis, a clear and defensible rationale based on multiple lines of evidence was provided. In addition, values that were identified as outliers and removed from further evaluation in the present statistical analysis were retained in the database and will be reevaluated for inclusion or exclusion in future statistical analyses of this dataset. The results of the outlier screening for the JSF Plant surface stream dataset are provided in Section 3.1.

2.2 COMPARISON OF SURFACE STREAM RESULTS TO ESVS AND SSL_{HH}

The analytical results for total metals in the surface stream dataset were compared to both water body specific ESVs and generic SSL_{HH}, as provided in Table 1-2 and Appendix A.2. Screening against SSL_{HH} values was only done for surface stream data from the Holston River because it is the only surface water body used as a potable water source. No CCR parameter concentrations in either the Holston River or Polly Branch were above their respective ESV or SSL_{HH}, therefore no additional statistical analyses were conducted (PCA and hypothesis testing). Results were summarized graphically using transect plots and in tabular format in Tables in Appendix J.1. Comparisons were done independently for each water body since ESVs for some parameters are hardness dependent (cadmium, chromium, lead, copper, nickel, silver, and zinc) and therefore, vary by water body.

3.0 RESULTS AND DISCUSSION

3.1 SUMMARY STATISTICS, EXPLORATORY DATA PLOTS, AND OUTLIER SCREENING

Summary statistics tables are presented in Attachment E.4-A, box plots are presented in Attachment E.4-B, and transect plots are presented in Attachment E.4-C. The summary statistics and exploratory data plots were aggregated by water body and transect location relative to the JSF Plant CCR management units (upstream, adjacent, downstream) and sample position in the water body (left bank, center channel, and right bank).

There were no statistically significant outliers in the JSF surface stream dataset.

3.2 COMPARISON OF SURFACE STREAM RESULTS TO ESVS AND SSL_{HH}

There were no sample results above chronic ESVs, acute ESVs, or SSL_{HH} from surface stream sampling in the Holston River or Polly Branch; therefore, no additional statistical analyses are warranted.

4.0 REFERENCES

StataCorp. (2017) Stata Graphics Reference Manual Stata: Release 15. Statistical Software. College Station, TX: StataCorp LLC.

Tukey, J.W. (1977). Exploratory Data Analysis. Reading, Massachusetts: Addison-Wesley, 1977.

ATTACHMENT E.4-A - SUMMARY STATISTICS BY WATER BODY

Summary Statistics - Holston River
Surface Stream Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	Location Relative to CCR Management Units	Fraction	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
						Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
CCR Rule Appendix III Parameters											
Boron	Upstream	D	0/6	(30.3 - 38.6)	100.0%	--	--	--	--	34.5	38.6
		T	0/6	(30.3 - 38.6)	100.0%	--	--	--	--	34.5	38.6
	Adjacent	D	1/50	(30.3 - 38.6)	98.0%	42.2	42.2	30.5	1.67	38.6	38.6
		T	2/50	(30.3 - 38.6)	96.0%	39.8	45.5	30.8	2.49	38.6	38.6
	Downstream	D	4/34	(30.3 - 47.5)	88.2%	41.6	52.8	32.3	5.48	38.6	47.6
		T	2/34	(30.3 - 200)	94.1%	40.5	47.4	31.1	3.37	38.6	42.9
Calcium	Upstream	D	6/6	--	0.0%	26,500	32,800	29,800	3,070	29,900	32,800
		T	6/6	--	0.0%	27,100	32,500	29,900	2,480	30,100	32,400
	Adjacent	D	50/50	--	0.0%	24,000	34,000	30,900	2,630	32,200	33,100
		T	50/50	--	0.0%	25,700	34,300	31,100	2,340	32,200	33,100
	Downstream	D	34/34	--	0.0%	27,100	33,800	31,600	1,630	32,300	33,000
		T	34/34	--	0.0%	26,300	35,200	32,400	2,480	33,200	35,100
Chloride	Upstream	N	6/6	--	0.0%	10,700	15,400	13,200	2,260	13,200	15,400
	Adjacent	N	50/50	--	0.0%	10,900	15,400	13,700	1,530	14,600	15,000
	Downstream	N	34/34	--	0.0%	12,400	14,700	13,900	728	14,400	14,600
Sulfate	Upstream	N	6/6	--	0.0%	11,900	29,500	20,500	9,320	20,400	29,400
	Adjacent	N	50/50	--	0.0%	11,600	28,600	22,200	6,350	25,300	28,100
	Downstream	N	34/34	--	0.0%	13,600	27,400	22,800	4,850	24,900	27,200
TDS	Upstream	N	6/6	--	0.0%	118,000	224,000	160,000	39,800	153,000	214,000
	Adjacent	N	50/50	--	0.0%	117,000	231,000	164,000	28,200	164,000	210,000
	Downstream	N	34/34	--	0.0%	125,000	195,000	168,000	18,500	173,000	192,000
CCR Rule Appendix IV Parameters											
Antimony	Upstream	D	3/6	(0.378 - 0.378)	50.0%	0.379	0.415	0.387	0.0136	0.379	0.409
		T	1/6	(0.378 - 0.378)	83.3%	0.646	0.646	0.423	0.0999	0.378	0.579
	Adjacent	D	9/50	(0.378 - 0.378)	82.0%	0.393	0.523	0.392	0.0343	0.378	0.483
		T	9/50	(0.378 - 0.378)	82.0%	0.4	0.622	0.393	0.0435	0.378	0.476
	Downstream	D	13/34	(0.378 - 0.378)	61.8%	0.378	0.74	0.42	0.0913	0.378	0.671
		T	7/34	(0.378 - 0.378)	79.4%	0.379	0.556	0.396	0.0474	0.378	0.518
Arsenic	Upstream	D	6/6	--	0.0%	0.442	0.96	0.707	0.268	0.713	0.957
		T	6/6	--	0.0%	0.406	0.951	0.735	0.239	0.789	0.95
	Adjacent	D	44/50	(0.323 - 0.323)	12.0%	0.352	1.02	0.721	0.211	0.786	0.995
		T	49/50	(0.323 - 0.323)	2.0%	0.324	1.14	0.814	0.234	0.886	1.1
	Downstream	D	34/34	--	0.0%	0.397	1.17	0.817	0.221	0.865	1.12
		T	34/34	--	0.0%	0.44	1.11	0.838	0.178	0.906	1.03
Barium	Upstream	D	6/6	--	0.0%	24.3	39.3	31.6	7.86	31.3	39.2
		T	6/6	--	0.0%	23.8	40.3	32	8.42	32	40.2
	Adjacent	D	50/50	--	0.0%	22.4	43.1	34.1	5.92	36.3	40
		T	50/50	--	0.0%	23.9	42.4	36.4	6	39.2	41.9
	Downstream	D	34/34	--	0.0%	23	40.8	35.8	5.72	38.8	40.3
		T	34/34	--	0.0%	24.4	88	39.8	10.3	40.7	43.6
Beryllium	Upstream	D	0/6	(0.155 - 0.182)	100.0%	--	--	--	--	0.169	0.182
		T	0/6	(0.155 - 0.182)	100.0%	--	--	--	--	0.169	0.182
	Adjacent	D	2/50	(0.155 - 0.182)	96.0%	0.194	0.277	0.158	0.0178	0.182	0.182
		T	1/50	(0.155 - 0.182)	98.0%	0.25	0.25	0.157	0.0133	0.182	0.182
	Downstream	D	4/34	(0.155 - 0.182)	88.2%	0.191	0.313	0.166	0.0343	0.182	0.241
		T	2/34	(0.155 - 0.182)	94.1%	0.188	0.28	0.16	0.0217	0.182	0.184
Cadmium	Upstream	D	0/6	(0.125 - 0.125)	100.0%	--	--	--	--	0.125	0.125
		T	0/6	(0.125 - 0.125)	100.0%	--	--	--	--	0.125	0.125
	Adjacent	D	0/50	(0.125 - 0.125)	100.0%	--	--	--	--	0.125	0.125
		T	0/50	(0.125 - 0.125)	100.0%	--	--	--	--	0.125	0.125
	Downstream	D	0/34	(0.125 - 0.649)	100.0%	--	--	--	--	0.125	0.21
		T	0/34	(0.125 - 0.125)	100.0%	--	--	--	--	0.125	0.125
Chromium	Upstream	D	0/6	(1.53 - 1.53)	100.0%	--	--	--	--	1.53	1.53
		T	0/6	(1.53 - 1.53)	100.0%	--	--	--	--	1.53	1.53
	Adjacent	D	6/50	(1.53 - 1.53)	88.0%	1.6	2.43	1.57	0.138	1.53	1.72
		T	21/50	(1.53 - 1.53)	58.0%	1.53	2.16	1.61	0.142	1.53	1.89
	Downstream	D	5/34	(1.53 - 1.53)	85.3%	1.61	1.91	1.56	0.0767	1.53	1.69
		T	19/34	(1.53 - 1.53)	44.1%	1.53	2.17	1.67	0.195	1.56	2.08

Summary Statistics - Holston River
Surface Stream Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	Location Relative to CCR Management Units	Fraction	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
						Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Cobalt	Upstream	D	6/6	--	0.0%	0.252	1.11	0.678	0.452	0.675	1.11
		T	6/6	--	0.0%	0.435	1.45	0.916	0.513	0.9	1.43
	Adjacent	D	50/50	--	0.0%	0.238	1.33	0.924	0.43	1.17	1.3
		T	50/50	--	0.0%	0.388	1.89	1.33	0.531	1.6	1.83
	Downstream	D	34/34	--	0.0%	0.399	1.29	0.899	0.247	1.06	1.13
		T	34/34	--	0.0%	0.607	1.59	1.25	0.308	1.39	1.56
Fluoride	Upstream	N	6/6	--	0.0%	76.2	91	84.8	6.91	87.2	91
	Adjacent	N	50/50	--	0.0%	65.6	96.8	86	8.35	89.6	93.9
	Downstream	N	34/34	--	0.0%	65.3	93.2	85.8	5.26	86.5	91
Lead	Upstream	D	0/6	(0.128 - 0.128)	100.0%	--	--	--	--	0.128	0.128
		T	6/6	--	0.0%	0.16	0.403	0.281	0.101	0.283	0.391
	Adjacent	D	4/50	(0.128 - 0.128)	92.0%	0.184	0.316	0.137	0.0338	0.128	0.187
		T	44/50	(0.285 - 0.41)	12.0%	0.218	0.765	0.428	0.115	0.419	0.583
	Downstream	D	9/34	(0.128 - 0.235)	73.5%	0.128	0.332	0.142	0.0448	0.128	0.257
		T	34/34	--	0.0%	0.243	0.607	0.387	0.0803	0.38	0.522
Lithium	Upstream	D	1/6	(3.14 - 3.39)	83.3%	3.77	3.77	3.25	0.235	3.27	3.68
		T	3/6	(3.14 - 3.14)	50.0%	3.66	5.11	3.68	0.703	3.4	4.81
	Adjacent	D	14/50	(3.14 - 5.72)	72.0%	3.4	4.7	3.33	0.383	3.39	4.49
		T	25/50	(3.14 - 6)	50.0%	3.43	6.64	3.84	0.966	3.62	6.19
	Downstream	D	11/34	(3.14 - 3.39)	67.7%	3.31	4.09	3.32	0.273	3.39	3.83
		T	14/34	(3.14 - 3.39)	58.8%	3.61	5.11	3.58	0.604	3.39	4.7
Mercury	Upstream	D	0/6	(0.101 - 0.101)	100.0%	--	--	--	--	0.101	0.101
		T	0/6	(0.101 - 0.101)	100.0%	--	--	--	--	0.101	0.101
	Adjacent	D	0/50	(0.101 - 0.101)	100.0%	--	--	--	--	0.101	0.101
		T	0/50	(0.101 - 0.101)	100.0%	--	--	--	--	0.101	0.101
	Downstream	D	0/34	(0.101 - 0.101)	100.0%	--	--	--	--	0.101	0.101
		T	0/34	(0.101 - 0.101)	100.0%	--	--	--	--	0.101	0.101
Molybdenum	Upstream	D	3/6	(0.65 - 1.17)	50.0%	0.805	0.857	0.757	0.0888	0.814	1.09
		T	3/6	(0.61 - 2.15)	50.0%	0.708	0.786	0.719	0.0691	0.778	1.82
	Adjacent	D	34/50	(0.61 - 0.765)	32.0%	0.621	0.838	0.682	0.0731	0.67	0.826
	Adjacent	T	31/50	(0.61 - 1.14)	38.0%	0.615	0.842	0.675	0.0721	0.659	0.837
	Downstream	D	25/34	(0.61 - 2.48)	26.5%	0.67	0.9	0.727	0.0847	0.738	0.873
	Downstream	T	24/34	(0.61 - 0.61)	29.4%	0.61	0.897	0.688	0.0709	0.705	0.804
Radium-226+228	Upstream	N	0/6	(0.0 - 0.449)	100.0%	--	--	--	--	0.0981	0.413
	Adjacent	N	2/50	(0.0 - 0.526)	96.0%	0.270	0.397	0.0168	0.0736	0.199	0.442
	Downstream	N	1/34	(0.0 -0.329)	97.1%	2.5	0.397	0.0735	0.178	0.0839	0.305
Selenium	Upstream	D	0/6	(1.51 - 2.62)	100.0%	--	--	--	--	2.07	2.62
		T	0/6	(1.51 - 2.62)	100.0%	--	--	--	--	2.07	2.62
	Adjacent	D	0/50	(1.51 - 2.62)	100.0%	--	--	--	--	1.51	2.62
		T	0/50	(1.51 - 2.62)	100.0%	--	--	--	--	1.51	2.62
	Downstream	D	0/34	(1.51 - 2.62)	100.0%	--	--	--	--	1.51	2.62
		T	0/34	(1.51 - 2.62)	100.0%	--	--	--	--	1.51	2.62
Thallium	Upstream	D	0/6	(0.128 - 0.148)	100.0%	--	--	--	--	0.138	0.148
		T	0/6	(0.128 - 0.148)	100.0%	--	--	--	--	0.138	0.148
	Adjacent	D	0/50	(0.128 - 0.148)	100.0%	--	--	--	--	0.148	0.148
		T	1/50	(0.128 - 0.148)	98.0%	0.155	0.155	0.129	0.00378	0.148	0.148
	Downstream	D	5/34	(0.128 - 0.148)	85.3%	0.152	0.25	0.138	0.0284	0.148	0.211
		T	2/34	(0.128 - 0.148)	94.1%	0.165	0.238	0.132	0.0194	0.148	0.154
TDEC Appendix I Parameters											
Copper	Upstream	D	5/6	(0.627 - 0.627)	16.7%	0.731	2.01	1.39	0.58	1.51	1.99
		T	6/6	--	0.0%	0.697	2.99	1.76	1.12	1.72	2.92
	Adjacent	D	38/50	(0.627 - 0.627)	24.0%	0.648	3.09	1.51	0.616	1.72	2.2
		T	31/50	(2.74 - 3.85)	38.0%	0.784	6.79	1.97	1.09	2.8	3.48
	Downstream	D	29/34	(0.627 - 0.627)	14.7%	0.664	2.39	1.59	0.554	1.83	2.18
		T	34/34	--	0.0%	0.797	2.85	2.2	0.688	2.52	2.8
Nickel	Upstream	D	3/6	(0.312 - 0.359)	50.0%	0.541	0.611	0.446	0.135	0.45	0.605
		T	5/6	(0.312 - 0.312)	16.7%	0.329	0.841	0.568	0.214	0.573	0.826
	Adjacent	D	35/50	(0.312 - 0.312)	30.0%	0.433	2.77	0.81	0.646	0.592	2.32
		T	49/50	(0.312 - 0.312)	2.0%	0.323	1.24	0.751	0.232	0.822	1.03
	Downstream	D	25/34	(0.312 - 0.376)	26.5%	0.467	0.733	0.5	0.125	0.535	0.661
		T	33/34	(0.312 - 0.312)	2.9%	0.385	0.917	0.718	0.174	0.78	0.908

Summary Statistics - Holston River
Surface Stream Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	Location Relative to CCR Management Units	Fraction	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
						Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Silver	Upstream	D	0/6	(0.121 - 0.177)	100.0%	--	--	--	--	0.149	0.177
		T	0/6	(0.121 - 0.177)	100.0%	--	--	--	--	0.149	0.177
	Adjacent	D	0/50	(0.121 - 0.177)	100.0%	--	--	--	--	0.177	0.177
		T	0/50	(0.121 - 0.177)	100.0%	--	--	--	--	0.177	0.177
	Downstream	D	0/34	(0.121 - 0.177)	100.0%	--	--	--	--	0.177	0.177
		T	0/34	(0.121 - 0.177)	100.0%	--	--	--	--	0.177	0.177
Vanadium	Upstream	D	3/6	(1.24 - 1.42)	50.0%	1.23	1.34	1.26	0.0422	1.28	1.4
		T	3/6	(1.41 - 1.79)	50.0%	1.19	1.38	1.29	0.0785	1.4	1.77
	Adjacent	D	33/50	(0.899 - 2.13)	34.0%	1.09	1.89	1.23	0.22	1.3	2
		T	35/50	(1.04 - 2.32)	30.0%	1.19	1.98	1.54	0.257	1.63	2.26
	Downstream	D	23/34	(0.991 - 1.73)	32.4%	1.03	1.52	1.21	0.154	1.26	1.66
		T	25/34	(1.19 - 2.22)	26.5%	1.25	1.76	1.51	0.148	1.58	1.85
Zinc	Upstream	D	0/6	(3.22 - 5.22)	100.0%	--	--	--	--	3.81	5.17
		T	0/6	(3.22 - 5.72)	100.0%	--	--	--	--	4.25	5.65
	Adjacent	D	0/50	(3.22 - 9.15)	100.0%	--	--	--	--	3.86	5.18
		T	2/50	(3.22 - 27.6)	96.0%	3.3	3.62	3.25	0.1	6.29	8.36
	Downstream	D	0/34	(3.22 - 11.8)	100.0%	--	--	--	--	4.15	7.97
		T	4/34	(3.22 - 8.82)	88.2%	3.24	4.49	3.42	0.38	5.52	7.82
Other Analyzed Constituents											
Hardness	Upstream	N	6/6	--	0.0%	94,700	121,000	108,000	12,600	109,000	121,000
	Adjacent	N	50/50	--	0.0%	90,900	128,000	114,000	11,100	120,000	124,000
	Downstream	N	34/34	--	0.0%	93,500	130,000	119,000	10,400	123,000	130,000
Iron	Upstream	D	5/6	(14.1 - 14.1)	16.7%	18.4	51.5	28.7	12.3	27.7	46.8
		T	6/6	--	0.0%	145	289	205	63	178	287
	Adjacent	D	47/50	(14.1 - 14.1)	6.0%	14.8	227	33	35.6	25.1	62.9
		T	50/50	--	0.0%	184	591	323	76.9	321	434
	Downstream	D	29/34	(15 - 19.9)	14.7%	18.6	169	37	34.2	29.7	101
		T	34/34	--	0.0%	154	586	296	86.3	289	463
Magnesium	Upstream	D	6/6	--	0.0%	6,600	9,960	8,360	1,680	8,410	9,940
		T	6/6	--	0.0%	6,560	9,690	8,200	1,550	8,320	9,670
	Adjacent	D	50/50	--	0.0%	5,980	10,200	8,800	1,370	9,510	9,980
		T	50/50	--	0.0%	6,320	10,300	8,810	1,290	9,510	9,870
	Downstream	D	34/34	--	0.0%	6,780	10,100	9,190	943	9,700	9,900
		T	34/34	--	0.0%	6,750	10,300	9,270	1,050	9,610	10,200
Manganese	Upstream	D	6/6	--	0.0%	10.3	22.1	15.7	4.92	15.8	21.4
		T	6/6	--	0.0%	20.6	62.1	39.6	19.3	37.5	60.8
	Adjacent	D	50/50	--	0.0%	5.12	27	13.7	5.67	13.2	24.2
		T	50/50	--	0.0%	20.6	78.4	52.4	17.9	60.5	70.6
	Downstream	D	34/34	--	0.0%	3.68	35.1	9.63	5.63	8.58	15.8
		T	34/34	--	0.0%	22.1	80.6	51	16.2	54.9	75.1
TSS	Upstream	N	6/6	--	0.0%	5,400	8,800	7,530	1,300	8,000	8,700
	Adjacent	N	50/50	--	0.0%	5,000	15,100	9,960	2,030	9,900	13,000
	Downstream	N	34/34	--	0.0%	5,600	17,700	8,840	2,560	8,200	14,000

Notes:

CCR Rule - Title 40, Code of Federal Regulations, Part 257

TDEC - Tennessee Department of Environment and Conservation

% - percent

"--" - Not Applicable

Statistical data sets were aggregated by location of transect relative to the CCR management units (upstream, adjacent downstream) and sample fraction (total, dissolved, or normal)

Except for Radium 226 + 228, all units micrograms per liter (µg/L)

Units for Radium 226+228 are picocuries per liter (pCi/L)

Fractions reported include dissolved (D), total (T), and normal (N)

All non-detects reported at the laboratory reporting limit

For Parameters with non-detects reported at the method detection limit, the mean and standard deviation were calculated using Kaplan-Meier methods (KM).

Summary Statistics -Polly Branch
Surface Stream Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	Location Relative to CCR Management Units	Fraction	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics Using Detected Data Only		Statistics Using all Detects & Non-Detects			
						Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
CCR Rule Appendix III Parameters											
Boron	Upstream	D	0/11	(30.3 - 38.6)	100.0%	--	--	--	--	38.6	38.6
		T	1/11	(30.3 - 38.6)	90.9%	39.7	39.7	31.2	2.7	38.6	39.2
	Adjacent	D	9/19	(30.3 - 38.6)	52.6%	33.4	126	43.3	23.7	38.6	90.7
		T	9/19	(30.3 - 38.6)	52.6%	34.1	132	44.2	24.3	38.6	84.5
Calcium	Upstream	D	11/11	--	0.0%	40,000	59,500	45,400	5,230	44,800	53,700
		T	11/11	--	0.0%	38,600	60,800	45,000	6,110	44,700	54,600
	Adjacent	D	19/19	--	0.0%	35,300	59,000	45,600	6,100	45,000	57,800
		T	19/19	--	0.0%	35,800	58,400	45,500	5,820	45,400	58,000
Chloride	Upstream	N	11/11	--	0.0%	979	1,710	1,210	205	1,140	1,590
	Adjacent	N	19/19	--	0.0%	1,010	5,240	1,940	1,110	1,560	4,170
Sulfate	Upstream	N	11/11	--	0.0%	2,560	19,800	8,810	5,420	5,530	16,500
	Adjacent	N	19/19	--	0.0%	4,660	34,900	14,900	8,960	12,500	30,900
TDS	Upstream	N	11/11	--	0.0%	139,000	188,000	151,000	13,900	147,000	175,000
	Adjacent	N	19/19	--	0.0%	115,000	216,000	158,000	24,600	154,000	204,000
CCR Rule Appendix IV Parameters											
Antimony	Upstream	D	1/11	(0.378 - 0.378)	90.9%	0.455	0.455	0.385	0.0221	0.378	0.417
		T	1/11	(0.378 - 0.378)	90.9%	0.535	0.535	0.392	0.0451	0.378	0.457
	Adjacent	D	1/19	(0.378 - 0.378)	94.7%	0.424	0.424	0.38	0.0103	0.378	0.383
		T	1/19	(0.378 - 0.378)	94.7%	0.533	0.533	0.386	0.0346	0.378	0.394
Arsenic	Upstream	D	7/11	(0.323 - 0.323)	36.4%	0.694	1.07	0.678	0.281	0.831	1.01
		T	11/11	--	0.0%	0.326	1.55	0.763	0.391	0.805	1.33
	Adjacent	D	17/19	(0.323 - 0.323)	10.5%	0.435	3.28	1.11	0.943	0.739	3.22
		T	19/19	--	0.0%	0.428	3.75	1.24	1.08	0.823	3.47
Barium	Upstream	D	11/11	--	0.0%	20.8	31.8	25.4	3.67	25	31.5
		T	11/11	--	0.0%	22.2	35.9	26.5	4.21	25.9	34.1
	Adjacent	D	15/19	(15.3 - 17.1)	21.1%	18.7	36.2	22.7	5.88	22.3	35
		T	19/19	--	0.0%	17	53.2	25.9	9.08	23.3	43.1
Beryllium	Upstream	D	0/11	(0.155 - 0.182)	100.0%	--	--	--	--	0.182	0.182
		T	0/11	(0.155 - 0.182)	100.0%	--	--	--	--	0.182	0.182
	Adjacent	D	0/19	(0.155 - 0.182)	100.0%	--	--	--	--	0.182	0.182
		T	0/19	(0.155 - 0.182)	100.0%	--	--	--	--	0.182	0.182
Cadmium	Upstream	D	0/11	(0.125 - 0.125)	100.0%	--	--	--	--	0.125	0.125
		T	0/11	(0.125 - 0.125)	100.0%	--	--	--	--	0.125	0.125
	Adjacent	D	0/19	(0.125 - 0.125)	100.0%	--	--	--	--	0.125	0.125
		T	0/19	(0.125 - 0.125)	100.0%	--	--	--	--	0.125	0.125
Chromium	Upstream	D	0/11	(1.53 - 1.84)	100.0%	--	--	--	--	1.53	1.72
		T	0/11	(1.53 - 2.16)	100.0%	--	--	--	--	1.53	1.87
	Adjacent	D	1/19	(1.53 - 2.48)	94.7%	2.08	2.08	1.56	0.129	1.53	2.45
		T	1/19	(1.53 - 1.53)	94.7%	1.55	1.55	1.53	0.00447	1.53	1.53
Cobalt	Upstream	D	10/11	(0.075 - 0.075)	9.1%	0.086	0.2	0.111	0.0342	0.096	0.171
		T	11/11	--	0.0%	0.091	0.193	0.156	0.033	0.16	0.192
	Adjacent	D	14/19	(0.075 - 0.185)	26.3%	0.078	0.195	0.106	0.0313	0.105	0.186
		T	15/19	(0.075 - 0.35)	21.1%	0.099	0.326	0.147	0.0589	0.136	0.328
Fluoride	Upstream	N	11/11	--	0.0%	32	64.9	53.8	10.5	58.6	63.9
	Adjacent	N	19/19	--	0.0%	45.6	90	66.7	12.3	64.8	86.3
Lead	Upstream	D	0/11	(0.128 - 0.128)	100.0%	--	--	--	--	0.128	0.128
		T	4/11	(0.128 - 0.128)	63.6%	0.18	0.226	0.155	0.0377	0.128	0.218
	Adjacent	D	1/19	(0.128 - 0.128)	94.7%	0.163	0.163	0.13	0.00782	0.128	0.132
		T	8/19	(0.128 - 0.128)	57.9%	0.131	0.441	0.161	0.0711	0.128	0.233
Lithium	Upstream	D	0/11	(3.14 - 3.39)	100.0%	--	--	--	--	3.39	3.39
		T	0/11	(3.14 - 3.39)	100.0%	--	--	--	--	3.39	3.39
	Adjacent	D	1/19	(3.14 - 3.39)	94.7%	3.49	3.49	3.16	0.0782	3.39	3.4
		T	2/19	(3.14 - 3.39)	89.5%	3.32	3.59	3.18	0.111	3.39	3.41
Mercury	Upstream	D	0/11	(0.101 - 0.101)	100.0%	--	--	--	--	0.101	0.101
		T	0/11	(0.101 - 0.101)	100.0%	--	--	--	--	0.101	0.101
	Adjacent	D	0/19	(0.101 - 0.101)	100.0%	--	--	--	--	0.101	0.101
		T	0/19	(0.101 - 0.101)	100.0%	--	--	--	--	0.101	0.101
Molybdenum	Upstream	D	0/11	(0.61 - 0.687)	100.0%	--	--	--	--	0.61	0.649
		T	0/11	(0.61 - 1.55)	100.0%	--	--	--	--	0.61	1.08
	Adjacent	D	3/19	(0.61 - 5.4)	84.2%	0.637	2.99	0.813	0.596	0.61	3.29
		T	3/19	(0.61 - 5.28)	84.2%	0.68	1.89	0.756	0.388	0.61	3.18

Summary Statistics -Polly Branch
Surface Stream Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

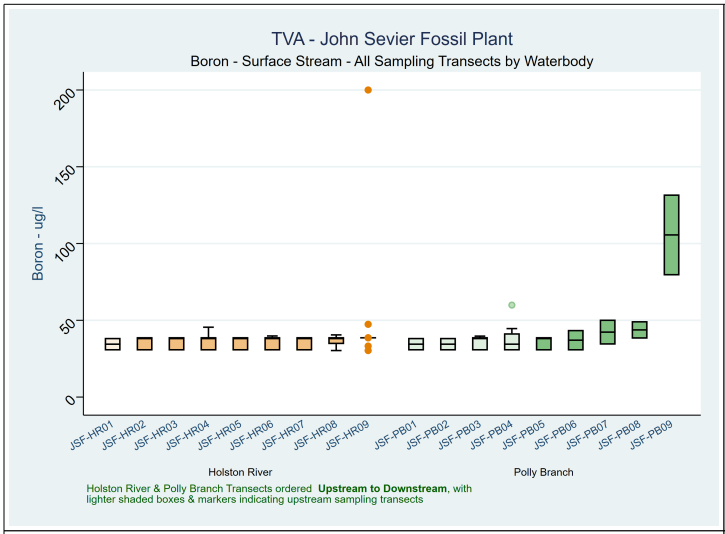
Parameter	Location Relative to CCR Management Units	Fraction	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics Using Detected Data Only		Statistics Using all Detects & Non-Detects			
						Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Radium-226+228	Upstream	N	0/11	(0.00875 - 0.280)	100.0%	--	--	--	--	0.143	0.254
	Adjacent	N	1/19	(0.0 - 0.401)	94.7%	0.158	0.158	0.0176	0.0497	0.211	0.387
Selenium	Upstream	D	0/11	(1.51 - 2.62)	100.0%	--	--	--	--	1.51	2.62
		T	0/11	(1.51 - 2.62)	100.0%	--	--	--	--	1.51	2.62
	Adjacent	D	0/19	(1.51 - 2.62)	100.0%	--	--	--	--	1.51	2.62
		T	0/19	(1.51 - 2.62)	100.0%	--	--	--	--	1.51	2.62
Thallium	Upstream	D	0/11	(0.128 - 0.148)	100.0%	--	--	--	--	0.148	0.148
		T	1/11	(0.128 - 0.148)	90.9%	0.131	0.131	0.129	0.0012	0.148	0.148
	Adjacent	D	0/19	(0.128 - 0.148)	100.0%	--	--	--	--	0.148	0.148
		T	1/19	(0.128 - 0.148)	94.7%	0.238	0.238	0.134	0.0246	0.148	0.157
TDEC Appendix I Parameters											
Copper	Upstream	D	0/11	(0.627 - 0.627)	100.0%	--	--	--	--	0.627	0.627
		T	0/11	(0.627 - 0.627)	100.0%	--	--	--	--	0.627	0.627
	Adjacent	D	4/19	(0.627 - 0.627)	79.0%	0.635	0.83	0.649	0.059	0.627	0.812
		T	7/19	(0.627 - 0.627)	63.2%	0.649	1.61	0.748	0.253	0.627	1.25
Nickel	Upstream	D	0/11	(0.312 - 0.336)	100.0%	--	--	--	--	0.336	0.336
		T	4/11	(0.312 - 0.336)	63.6%	0.346	0.377	0.329	0.0236	0.336	0.368
	Adjacent	D	5/19	(0.312 - 0.429)	73.7%	0.475	0.555	0.367	0.0933	0.336	0.548
		T	9/19	(0.312 - 0.336)	52.6%	0.376	3.05	0.57	0.607	0.336	0.99
Silver	Upstream	D	0/11	(0.121 - 0.177)	100.0%	--	--	--	--	0.177	0.177
		T	0/11	(0.121 - 0.177)	100.0%	--	--	--	--	0.177	0.177
	Adjacent	D	0/19	(0.121 - 0.177)	100.0%	--	--	--	--	0.177	0.177
		T	0/19	(0.121 - 0.177)	100.0%	--	--	--	--	0.177	0.177
Vanadium	Upstream	D	0/11	(0.899 - 1.58)	100.0%	--	--	--	--	0.991	1.29
		T	0/11	(0.899 - 1.46)	100.0%	--	--	--	--	0.991	1.41
	Adjacent	D	0/19	(0.899 - 1.45)	100.0%	--	--	--	--	0.991	1.36
		T	0/19	(0.899 - 1.71)	100.0%	--	--	--	--	0.991	1.7
Zinc	Upstream	D	0/11	(3.22 - 4.42)	100.0%	--	--	--	--	3.22	4.34
		T	0/11	(3.22 - 4.57)	100.0%	--	--	--	--	3.22	4.48
	Adjacent	D	0/19	(3.22 - 5.07)	100.0%	--	--	--	--	3.22	4.88
		T	1/19	(3.22 - 5.3)	94.7%	13.1	13.1	3.74	2.21	3.22	6.08
Other Analyzed Constituents											
Hardness	Upstream	N	11/11	--	0.0%	109,000	170,000	128,000	17,000	129,000	154,000
	Adjacent	N	19/19	--	0.0%	101,000	175,000	133,000	19,500	131,000	172,000
Iron	Upstream	D	11/11	--	0.0%	41.4	2,090	353	582	181	1,240
		T	11/11	--	0.0%	282	2,110	789	623	689	2,000
	Adjacent	D	16/19	(19.5 - 19.5)	15.8%	21.4	154	70.3	42.2	69.5	128
		T	19/19	--	0.0%	52.3	760	304	193	261	603
Magnesium	Upstream	D	11/11	--	0.0%	3,040	4,320	3,810	506	4,120	4,260
		T	11/11	--	0.0%	2,970	4,340	3,810	581	4,070	4,330
	Adjacent	D	19/19	--	0.0%	2,770	7,460	4,680	1,300	4,440	6,980
		T	19/19	--	0.0%	2,740	7,180	4,640	1,310	4,340	7,060
Manganese	Upstream	D	11/11	--	0.0%	79.8	497	172	143	109	453
		T	11/11	--	0.0%	89.8	567	199	168	131	532
	Adjacent	D	19/19	--	0.0%	3.28	1,070	147	245	71	459
		T	19/19	--	0.0%	32.9	1,230	204	275	129	599
TSS	Upstream	N	11/11	--	0.0%	2,000	8,630	3,790	1,760	3,200	6,670
	Adjacent	N	19/19	--	0.0%	900	36,400	5,430	7,840	3,400	12,200

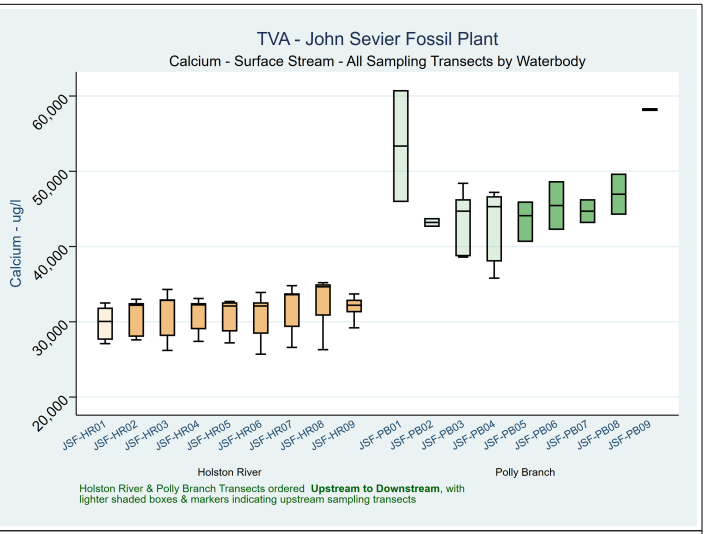
Notes:
CCR Rule - Title 40, Code of Federal Regulations, Part 257
TDEC - Tennessee Department of Environment and Conservation
% - percent
"--" or N/A - Not Applicable

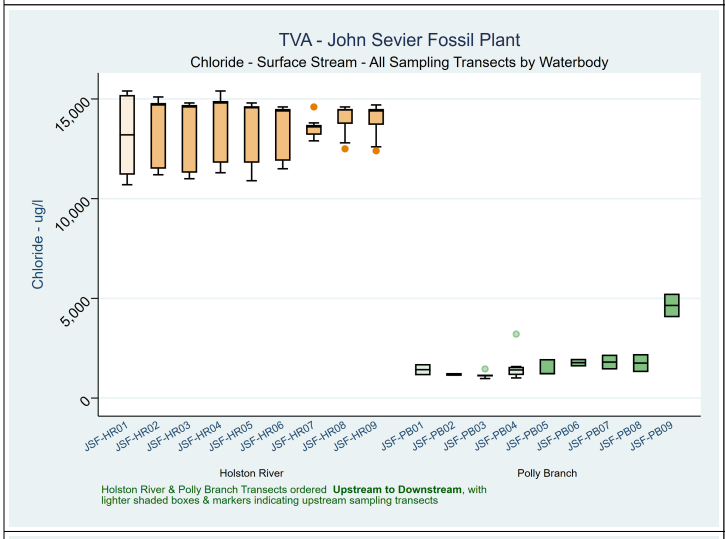
Statistical data sets were aggregated by location of transect relative to the CCR management units (upstream, adjacent downstream) and sample fraction (total, dissolved, or normal)
Except for Radium 226 + 228, all units milligrams per litre (µg/L)
Units for Radium 226+228 are picocuries per litre (pCi/L)
Fractions reported include dissolved (D), total (T), and normal (N)
All non-detects reported at the laboratory reporting limit

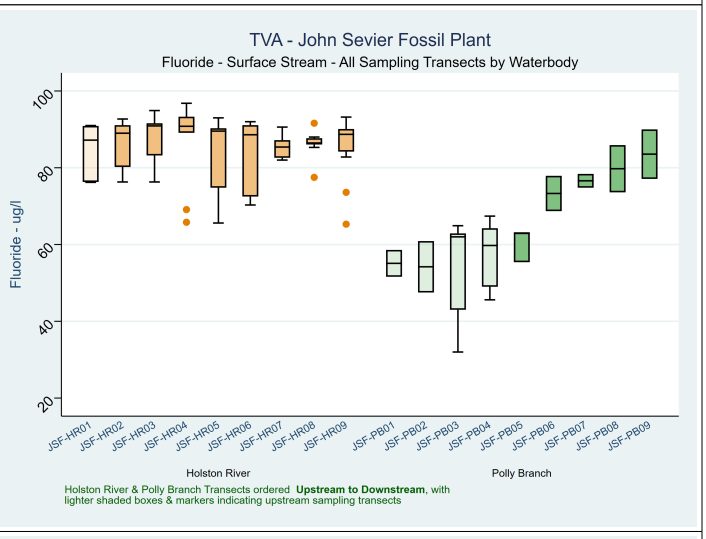
ATTACHMENT E.4-B - BOX PLOTS

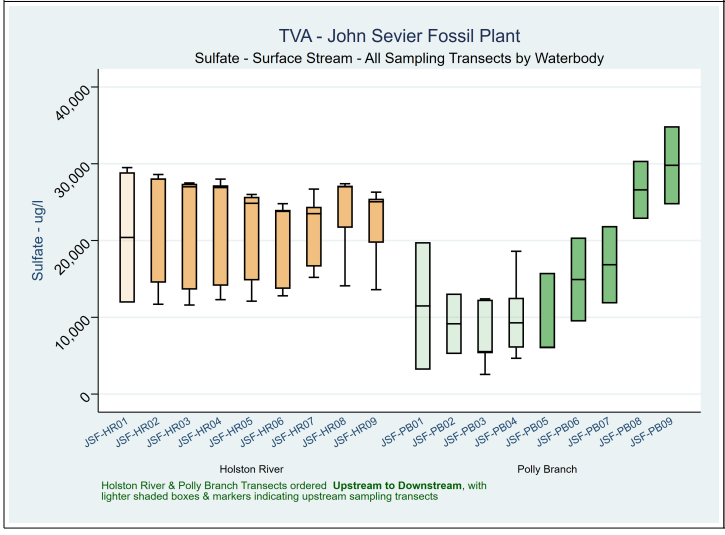
Box Plots
All Transects - CCR Rule Appendix III Parameters
Surface Stream Investigation
John Sevier Fossil Plant, Rogersville Tennessee

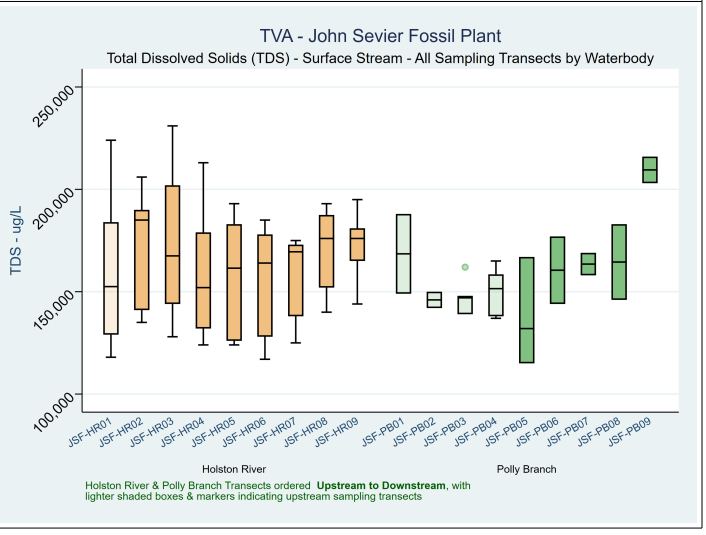




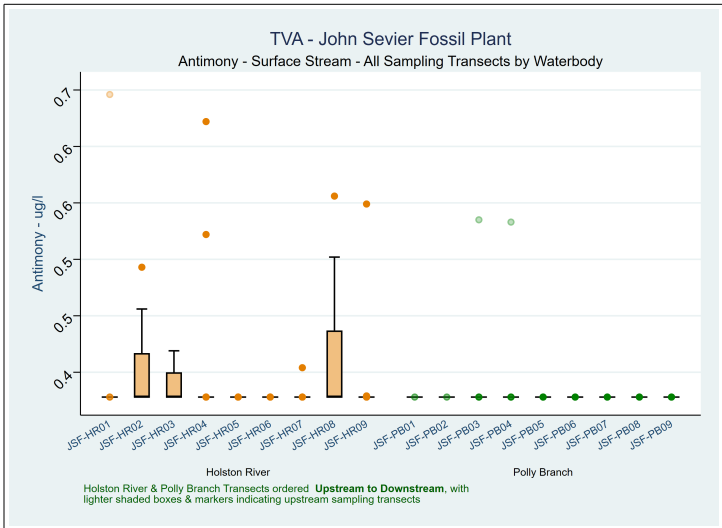


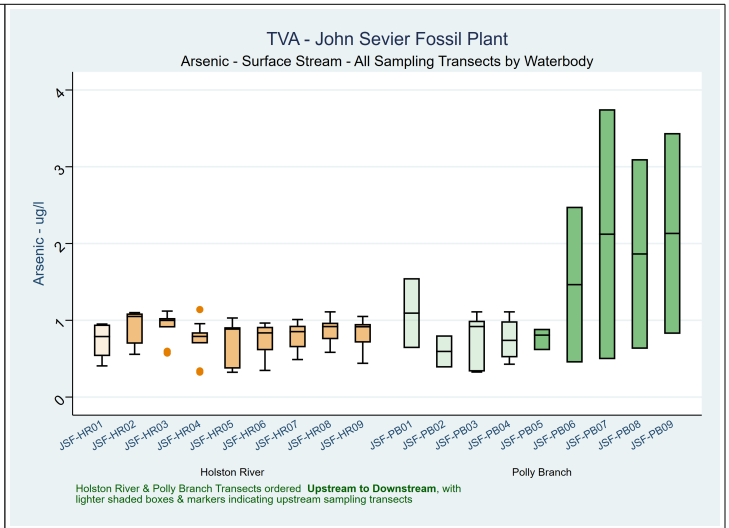


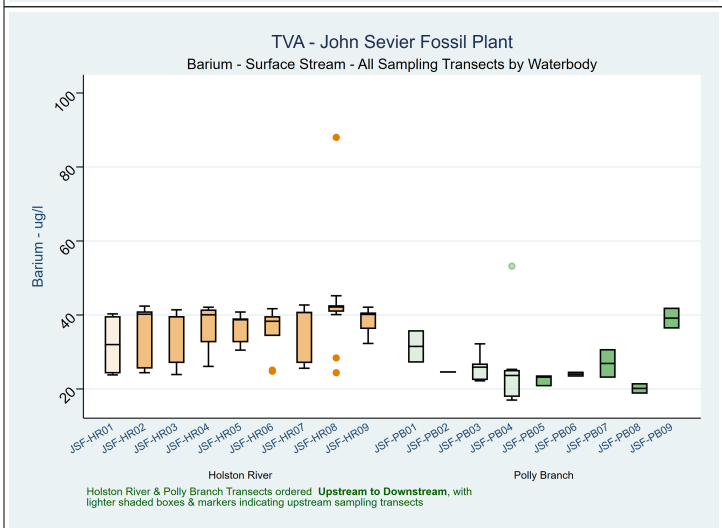


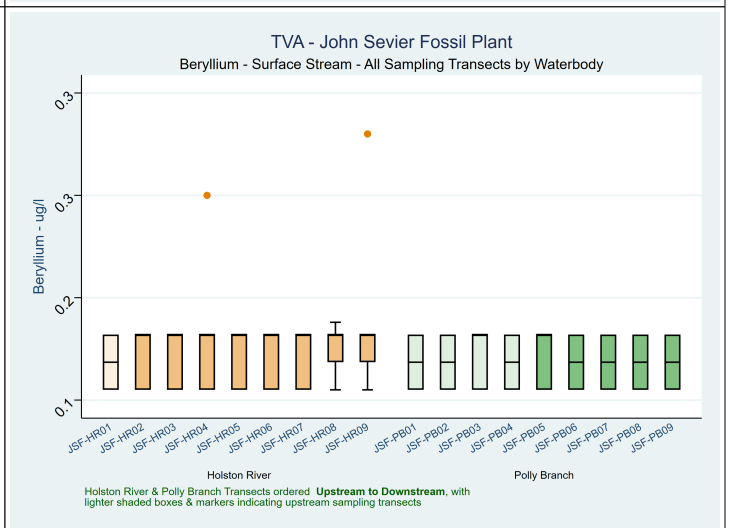


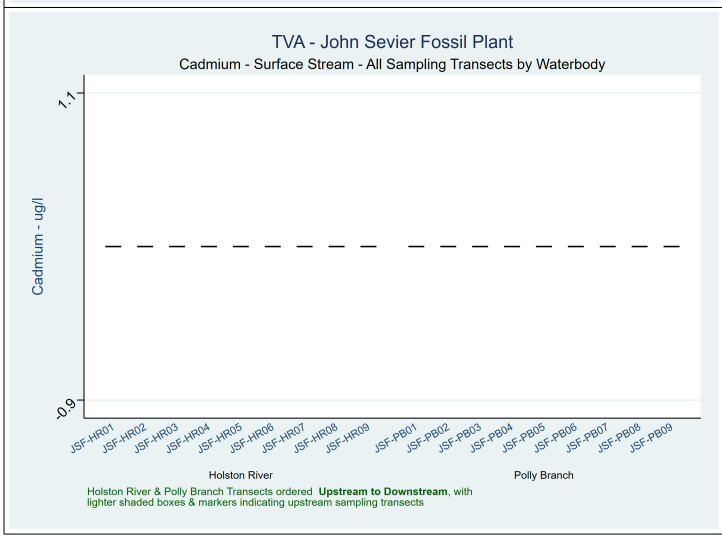
Box Plots
All Transects - CCR Rule Appendix IV Parameters
Surface Stream Investigation
John Sevier Fossil Plant, Rogersville Tennessee

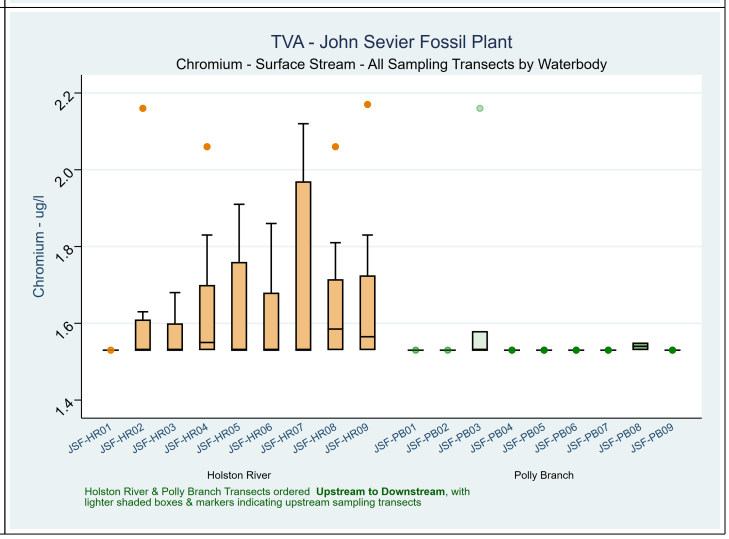


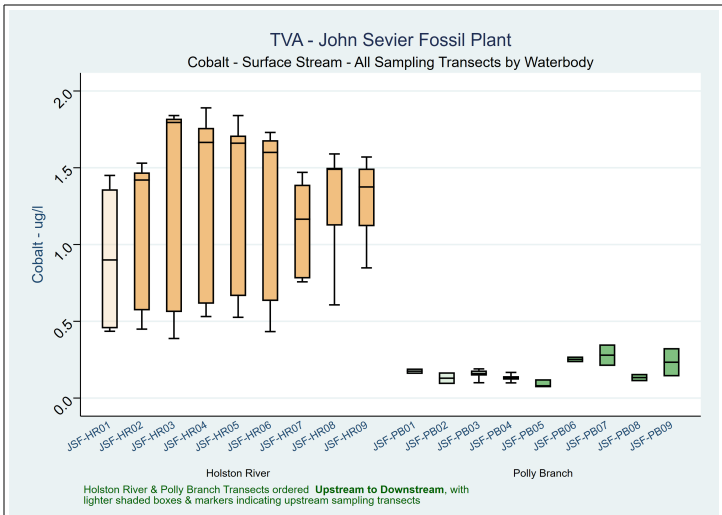


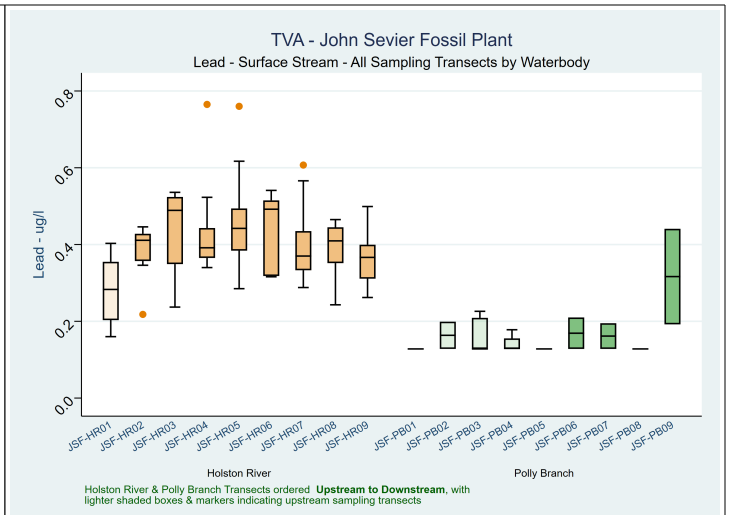


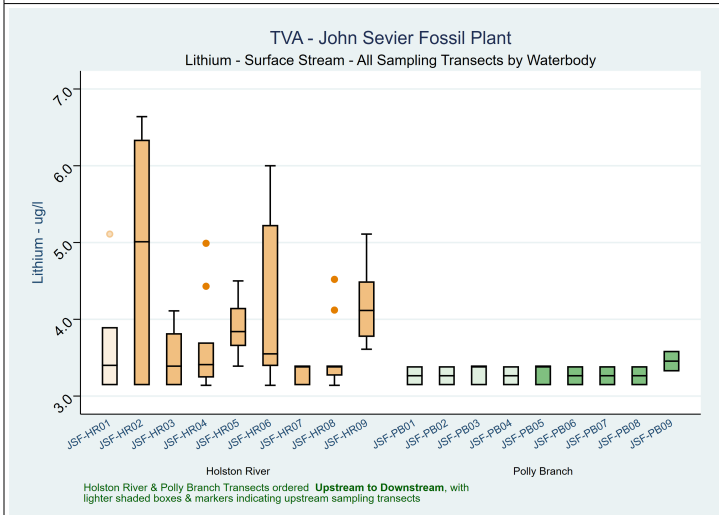


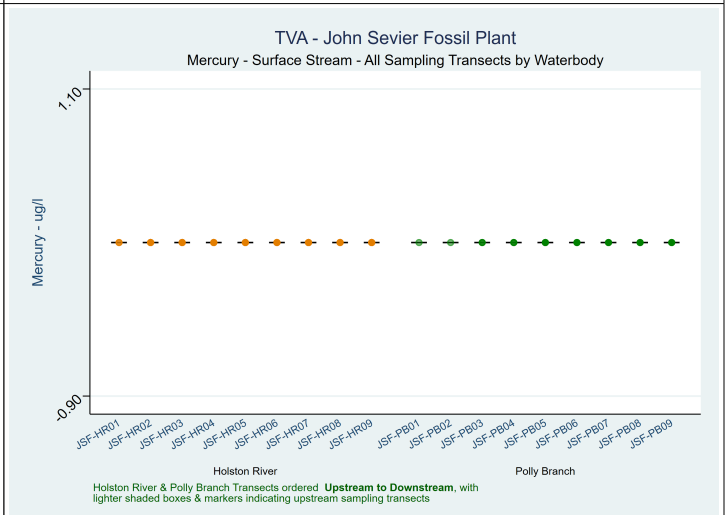


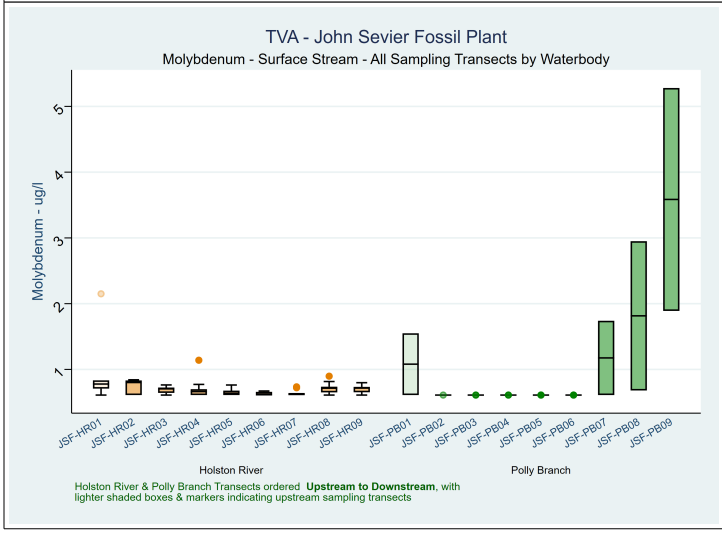


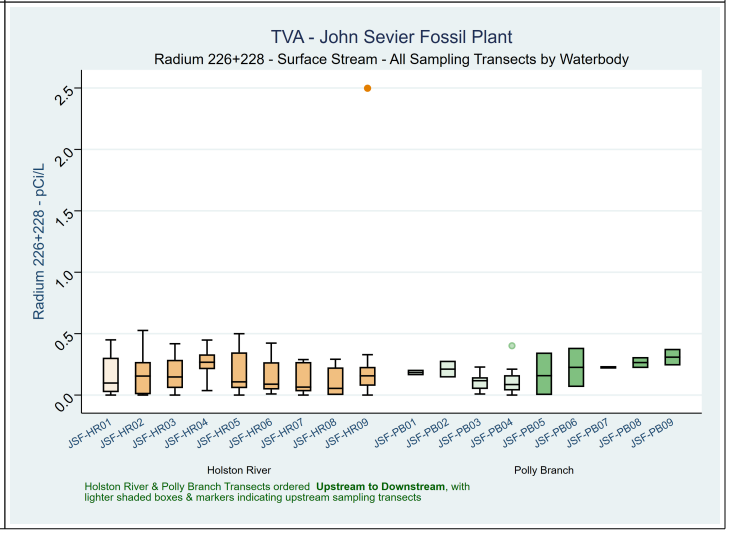

TVA - John Sevier Fossil Plant
Cobalt - Surface Stream - All Sampling Transects by Waterbody
Cobalt - ug/l
0.0
0.5
1.0
1.5
2.0
JSF-HR01 JSF-HR02 JSF-HR03 JSF-HR04 JSF-HR05 JSF-HR06 JSF-HR07 JSF-HR08 JSF-HR09 JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects

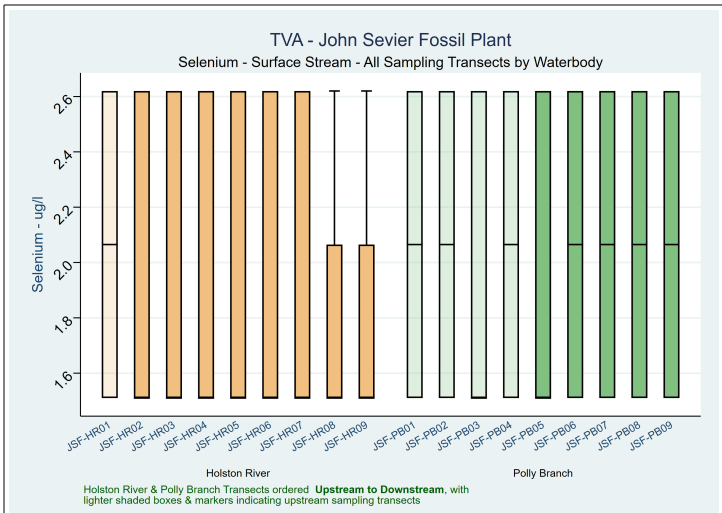

TVA - John Sevier Fossil Plant
Lead - Surface Stream - All Sampling Transects by Waterbody
Lead - ug/l
0.0
0.2
0.4
0.6
0.8
JSF-HR01 JSF-HR02 JSF-HR03 JSF-HR04 JSF-HR05 JSF-HR06 JSF-HR07 JSF-HR08 JSF-HR09 JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects

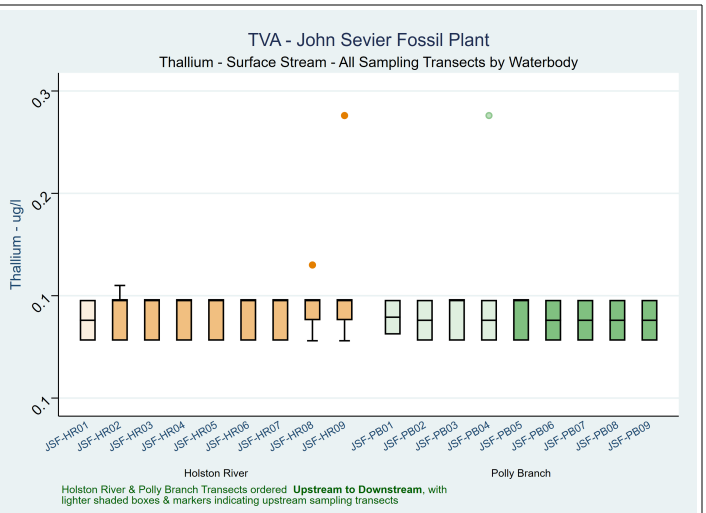

TVA - John Sevier Fossil Plant
Lithium - Surface Stream - All Sampling Transects by Waterbody
Lithium - ug/l
3.0
4.0
5.0
6.0
7.0
JSF-HR01 JSF-HR02 JSF-HR03 JSF-HR04 JSF-HR05 JSF-HR06 JSF-HR07 JSF-HR08 JSF-HR09 JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects


TVA - John Sevier Fossil Plant
Mercury - Surface Stream - All Sampling Transects by Waterbody
Mercury - ug/l
-0.90
1.10
JSF-HR01 JSF-HR02 JSF-HR03 JSF-HR04 JSF-HR05 JSF-HR06 JSF-HR07 JSF-HR08 JSF-HR09 JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects

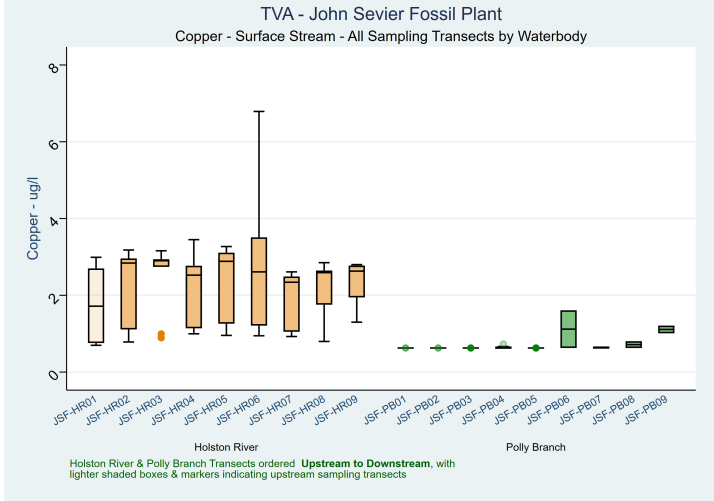

TVA - John Sevier Fossil Plant
Molybdenum - Surface Stream - All Sampling Transects by Waterbody
Molybdenum - ug/l
1
2
3
4
5
JSF-HR01 JSF-HR02 JSF-HR03 JSF-HR04 JSF-HR05 JSF-HR06 JSF-HR07 JSF-HR08 JSF-HR09 JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects

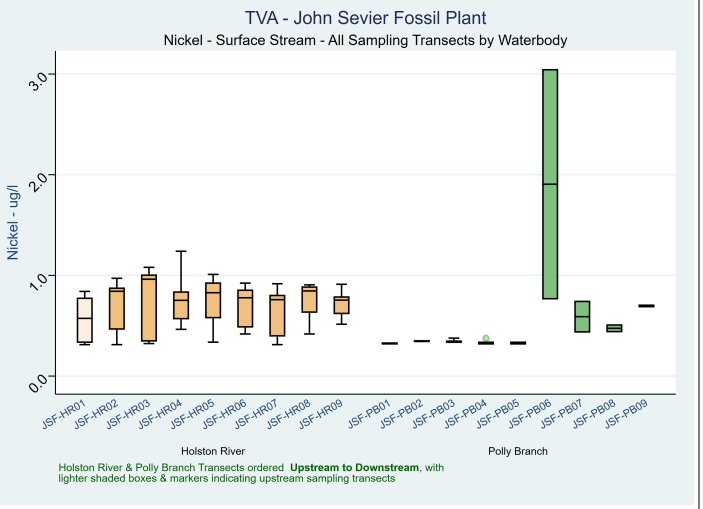

TVA - John Sevier Fossil Plant
Radium 226+228 - Surface Stream - All Sampling Transects by Waterbody
Radium 226+228 - pCi/L
0.0
0.5
1.0
1.5
2.0
2.5
JSF-HR01 JSF-HR02 JSF-HR03 JSF-HR04 JSF-HR05 JSF-HR06 JSF-HR07 JSF-HR08 JSF-HR09 JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects

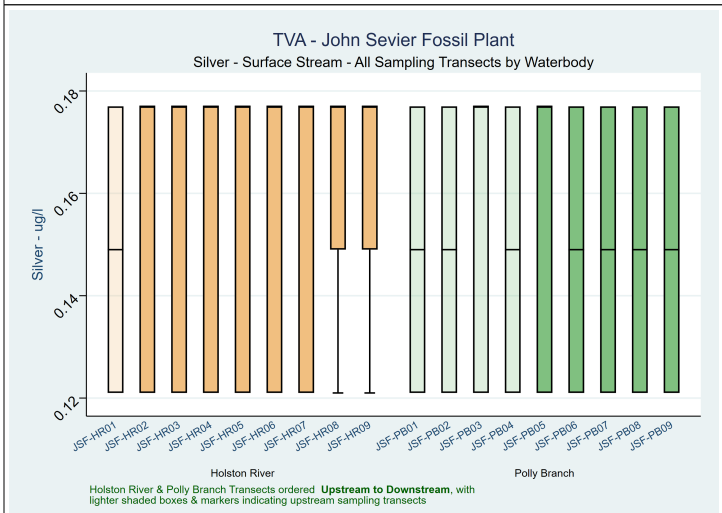

TVA - John Sevier Fossil Plant
Selenium - Surface Stream - All Sampling Transects by Waterbody
Selenium - ug/l
2.6
2.4
2.2
2.0
1.8
1.6
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
JSF-PB01
JSF-PB02
JSF-PB03
JSF-PB04
JSF-PB05
JSF-PB06
JSF-PB07
JSF-PB08
JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects

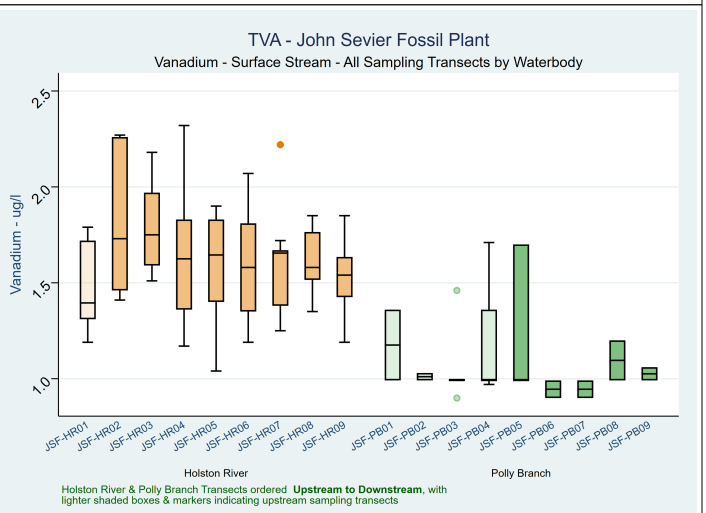

TVA - John Sevier Fossil Plant
Thallium - Surface Stream - All Sampling Transects by Waterbody
Thallium - ug/l
0.3
0.2
0.1
0.1
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
JSF-PB01
JSF-PB02
JSF-PB03
JSF-PB04
JSF-PB05
JSF-PB06
JSF-PB07
JSF-PB08
JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects

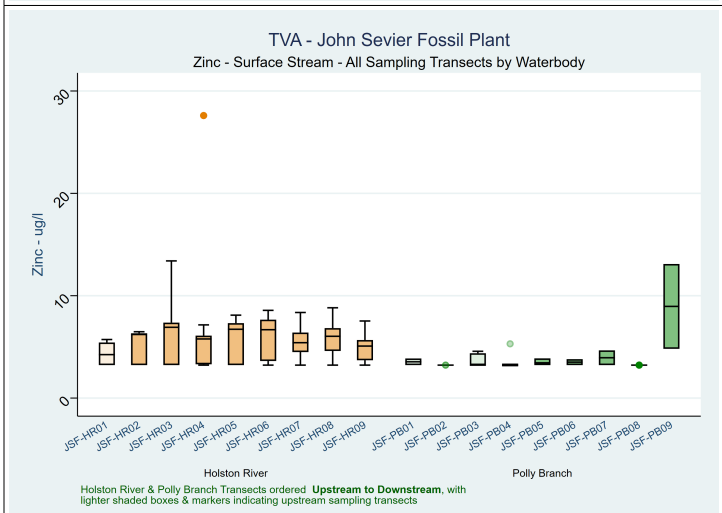
Box Plots
All Transects - TDEC Appendix I Parameters
Surface Stream Investigation
John Sevier Fossil Plant, Rogersville Tennessee











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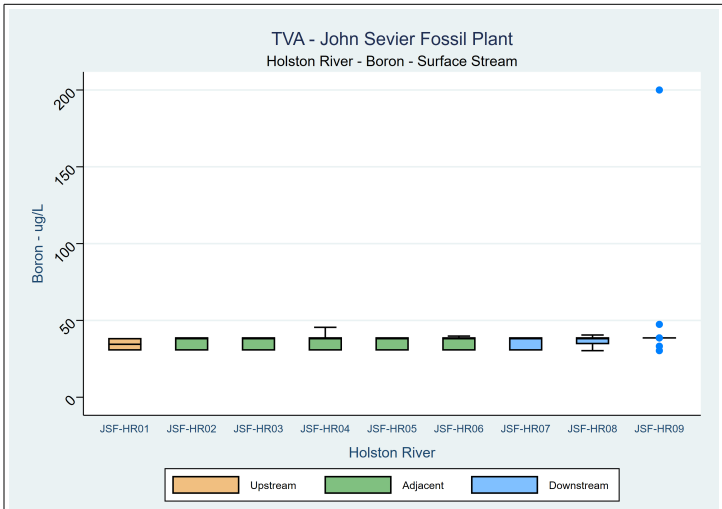
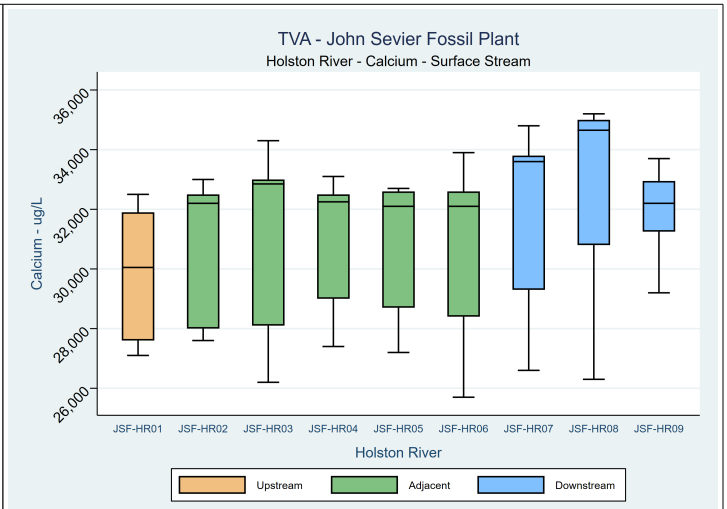
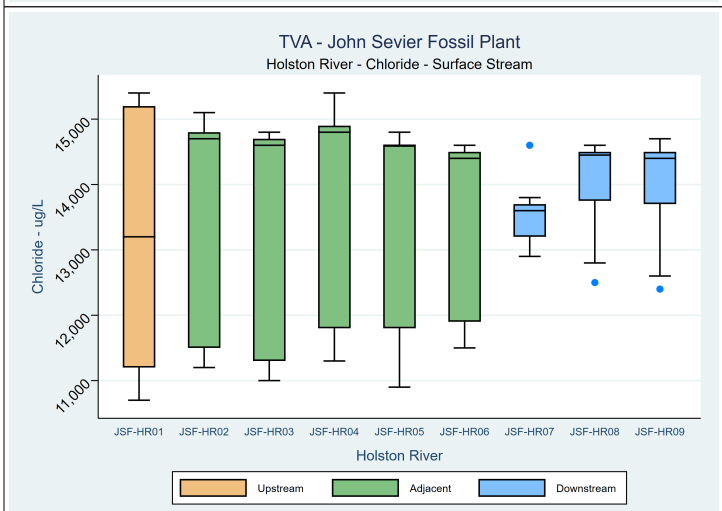
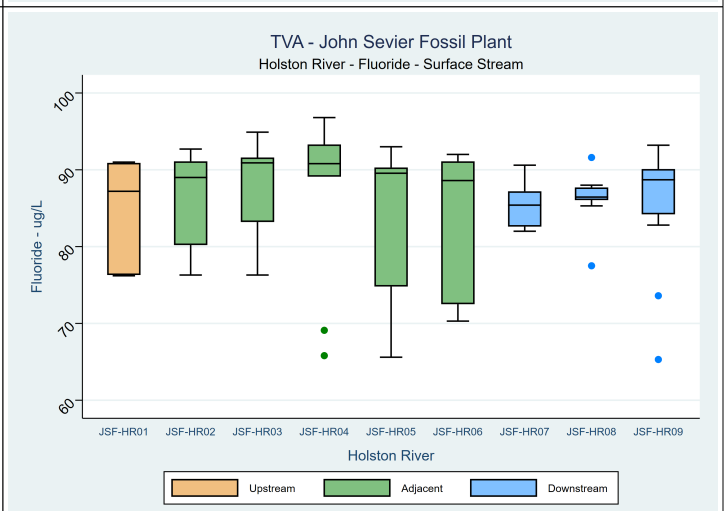
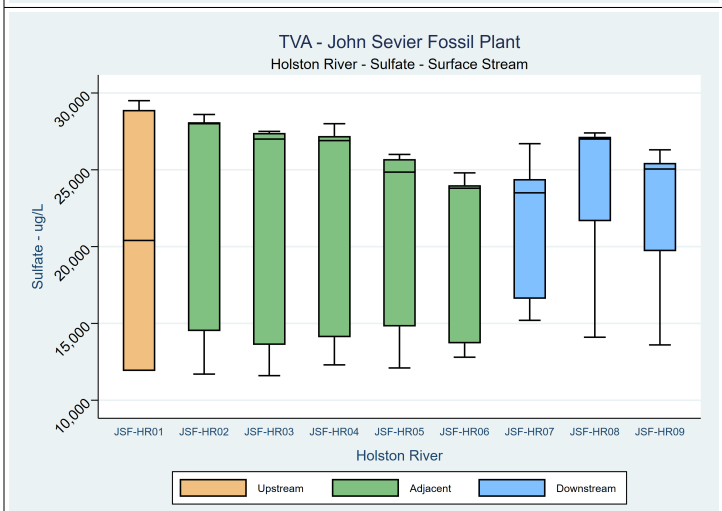
Box Plots
Holston River - CCR Rule Appendix III Parameters
Surface Stream Investigation
John Sevier Fossil Plant, Rogersville Tennessee

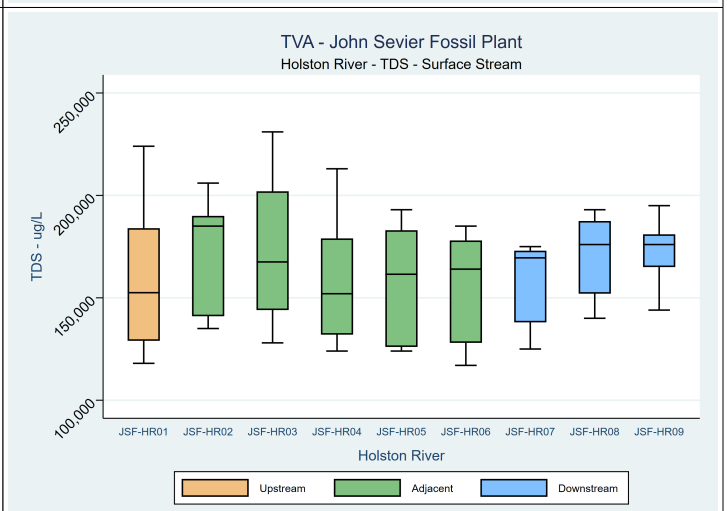




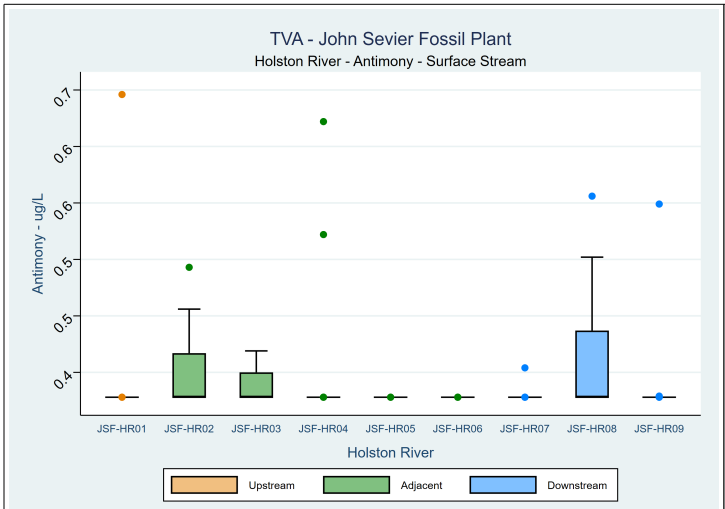


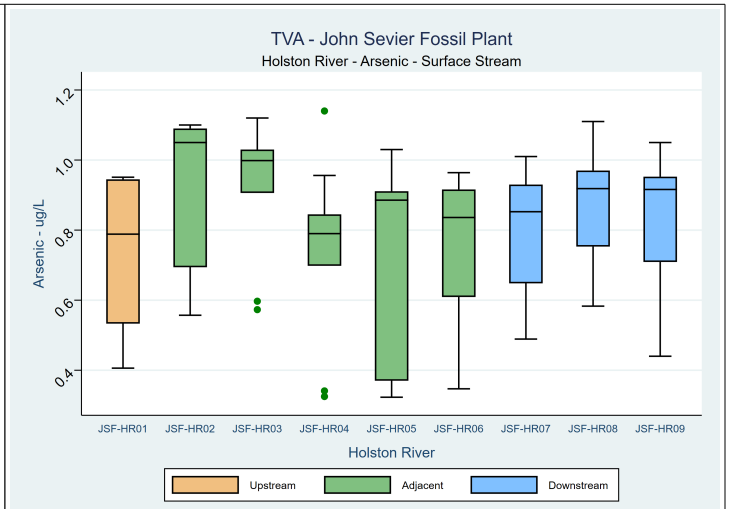


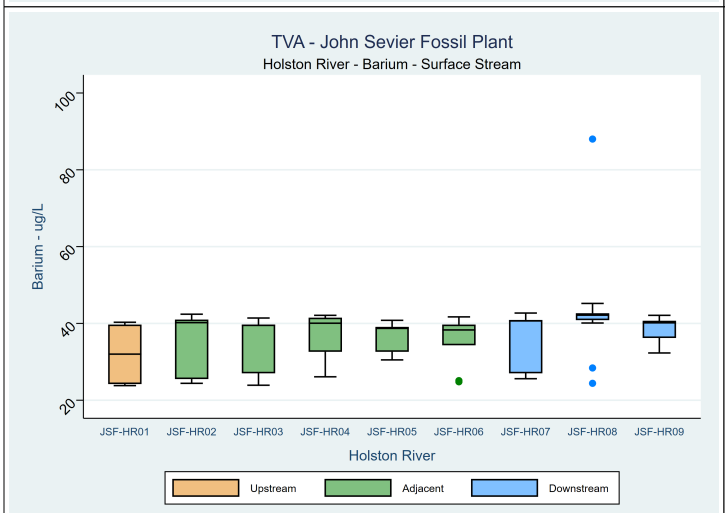


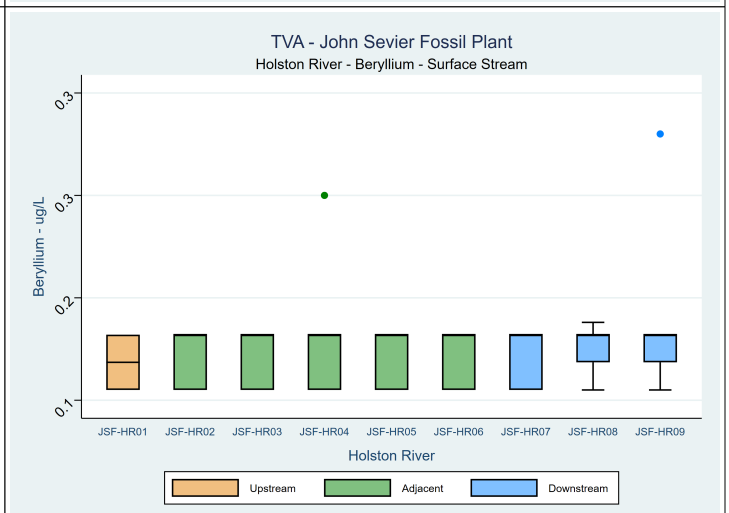


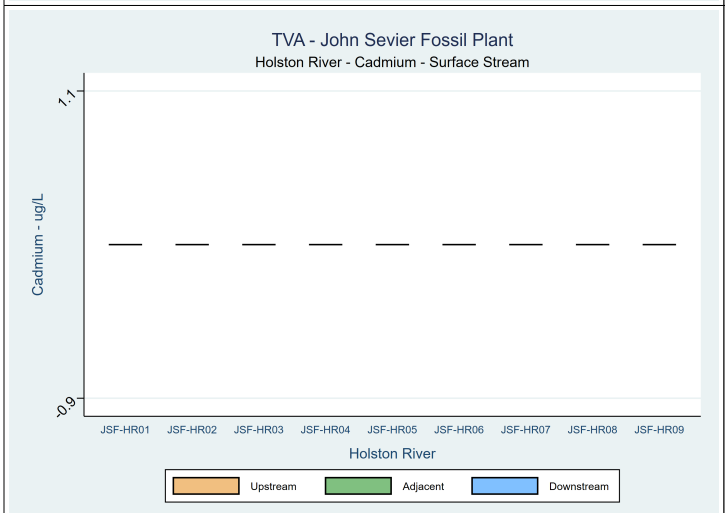
Box Plots
Holston River - CCR Rule Appendix IV Parameters
Surface Stream Investigation
John Sevier Fossil Plant, Rogersville Tennessee

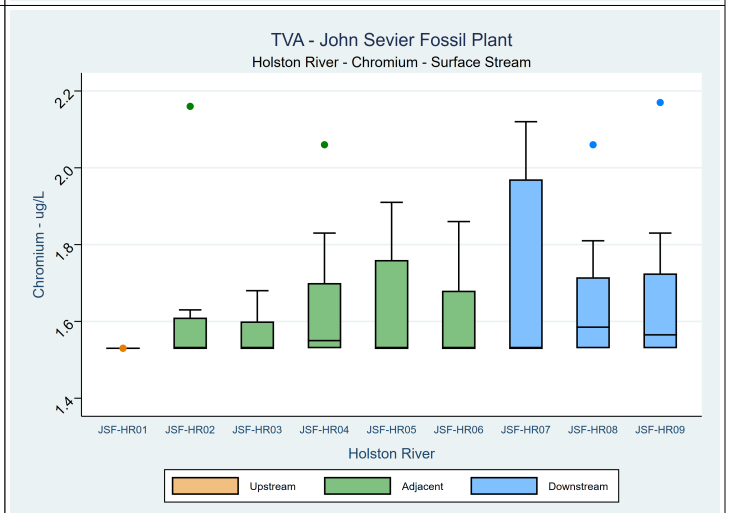


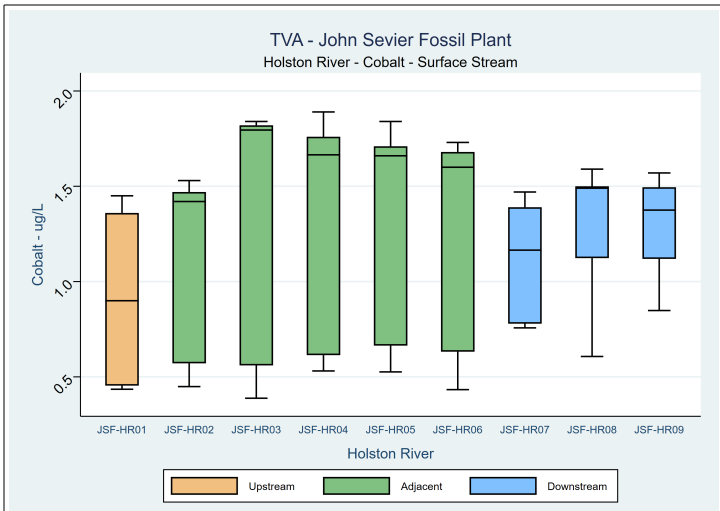


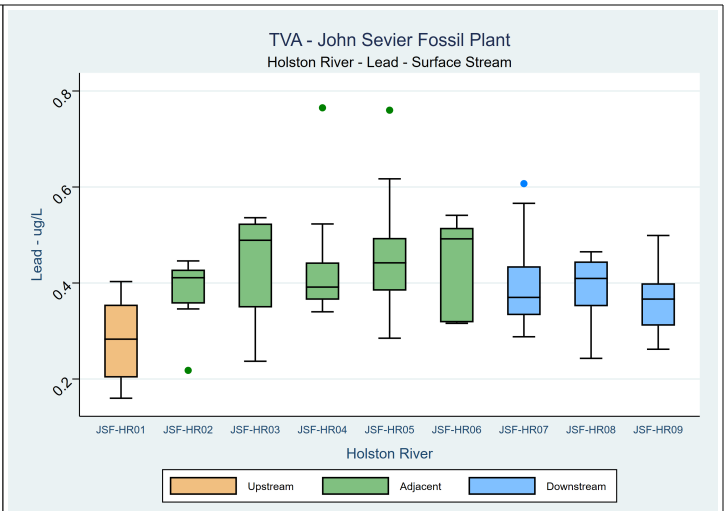


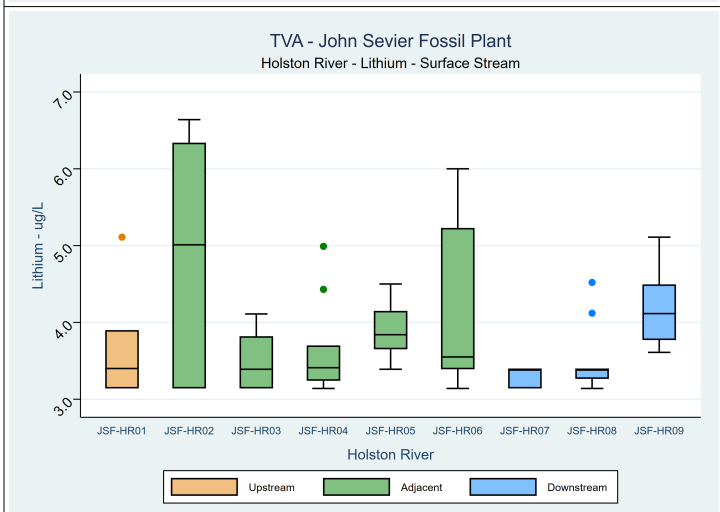


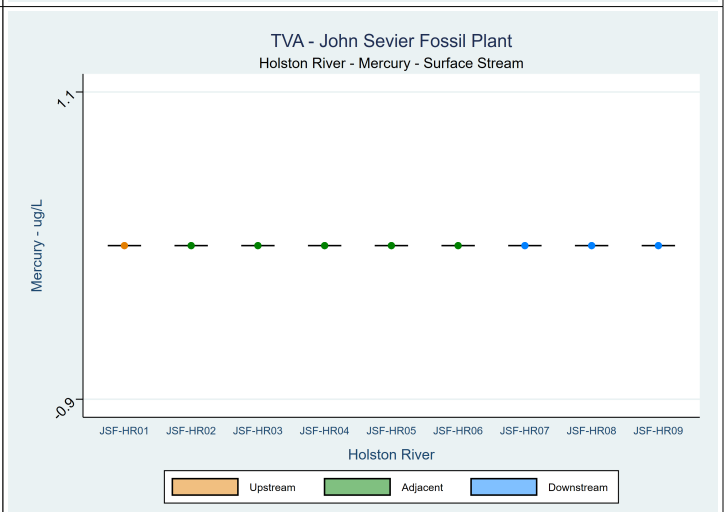


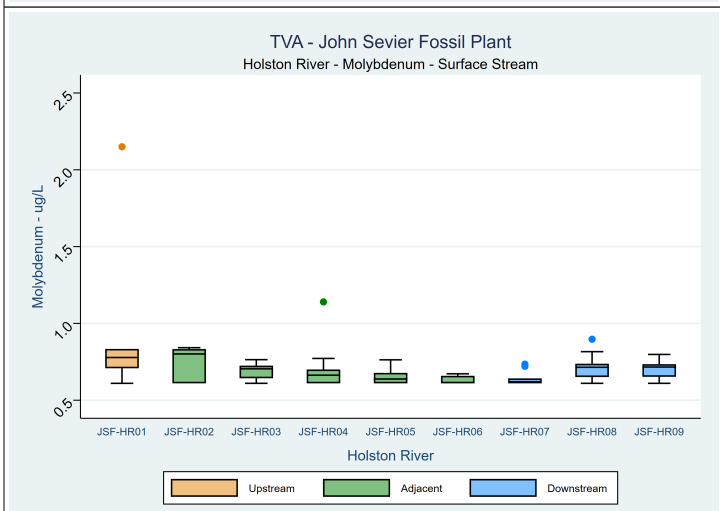


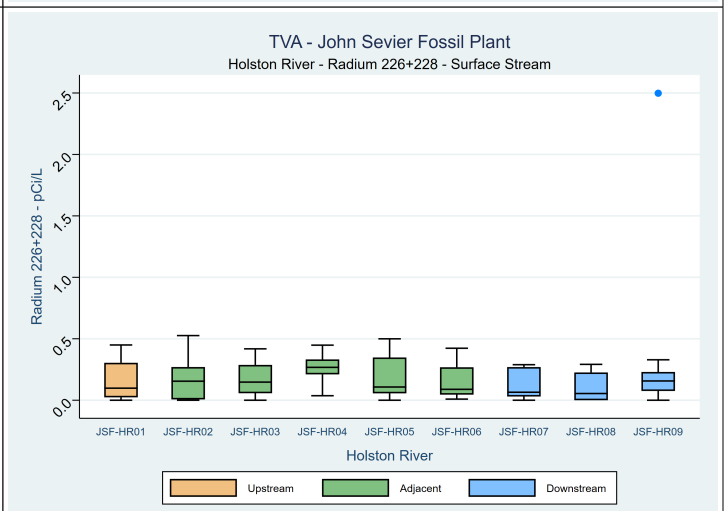

TVA - John Sevier Fossil Plant
Holston River - Cobalt - Surface Stream
Cobalt - ug/L
2.0
1.5
1.0
0.5
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Upstream
Adjacent
Downstream

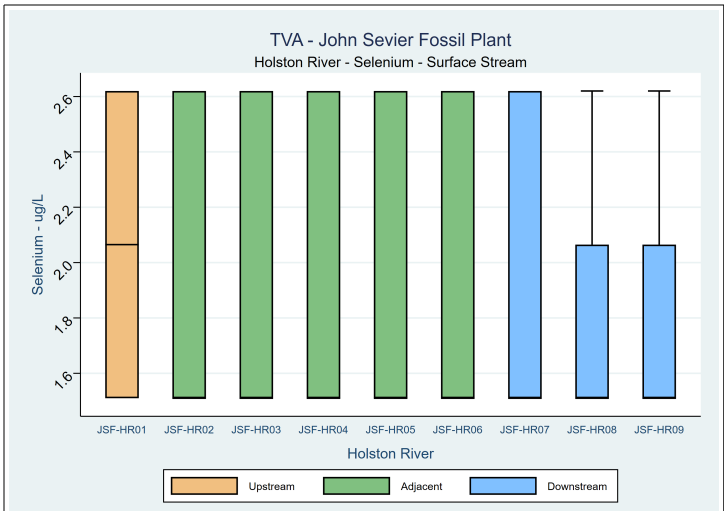

TVA - John Sevier Fossil Plant
Holston River - Lead - Surface Stream
Lead - ug/L
0.8
0.6
0.4
0.2
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Upstream
Adjacent
Downstream

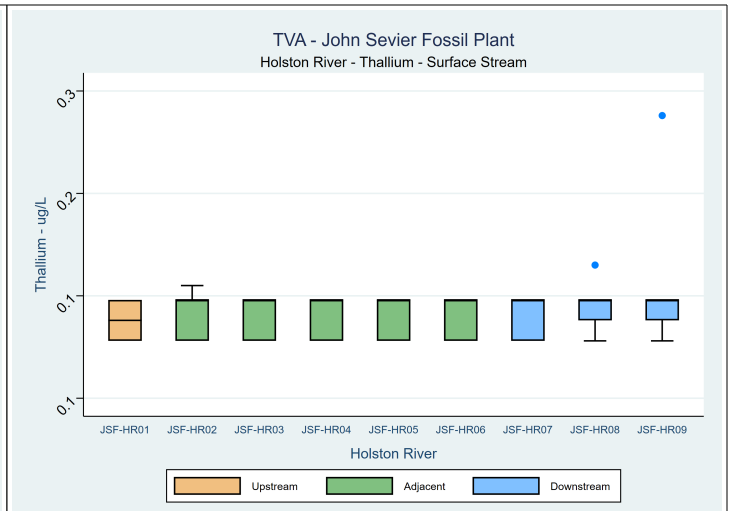

TVA - John Sevier Fossil Plant
Holston River - Lithium - Surface Stream
Lithium - ug/L
7.0
6.0
5.0
4.0
3.0
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Upstream
Adjacent
Downstream


TVA - John Sevier Fossil Plant
Holston River - Mercury - Surface Stream
Mercury - ug/L
1.1
-0.9
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Upstream
Adjacent
Downstream

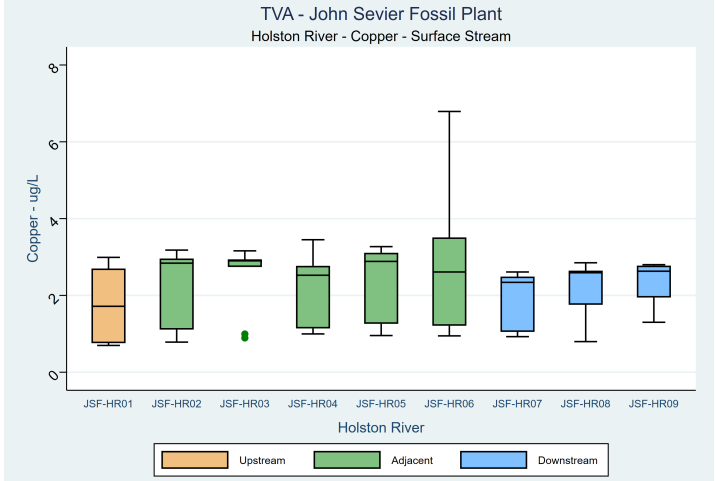

TVA - John Sevier Fossil Plant
Holston River - Molybdenum - Surface Stream
Molybdenum - ug/L
2.5
2.0
1.5
1.0
0.5
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Upstream
Adjacent
Downstream

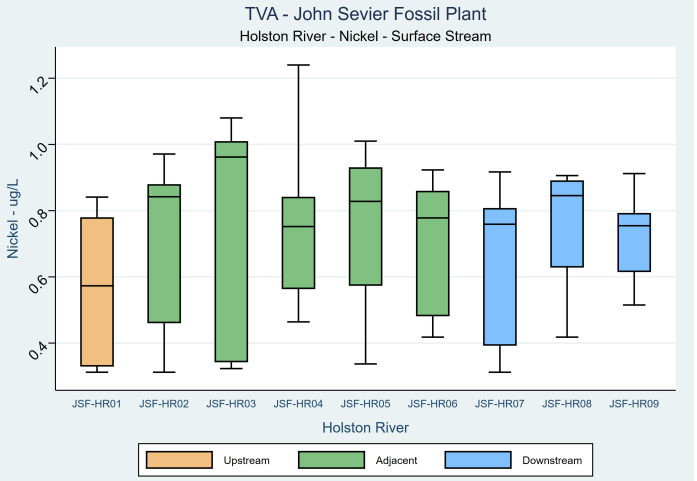

TVA - John Sevier Fossil Plant
Holston River - Radium 226+228 - Surface Stream
Radium 226+228 - pCi/L
2.5
2.0
1.5
1.0
0.5
0.0
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Upstream
Adjacent
Downstream

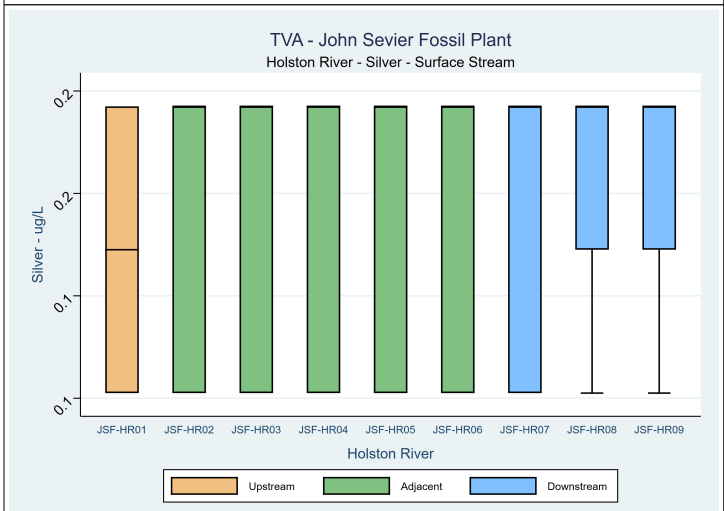

TVA - John Sevier Fossil Plant
Holston River - Selenium - Surface Stream
Selenium - ug/L
2.6
2.4
2.2
2.0
1.8
1.6
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Upstream
Adjacent
Downstream

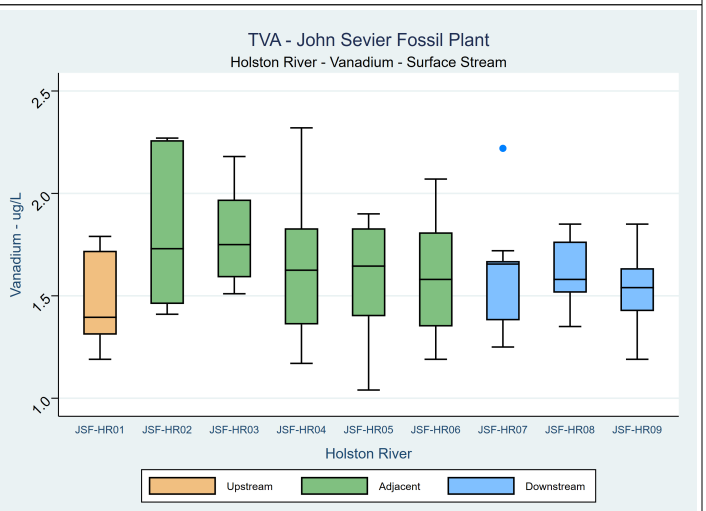

TVA - John Sevier Fossil Plant
Holston River - Thallium - Surface Stream
Thallium - ug/L
0.3
0.2
0.1
0.1
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Upstream
Adjacent
Downstream

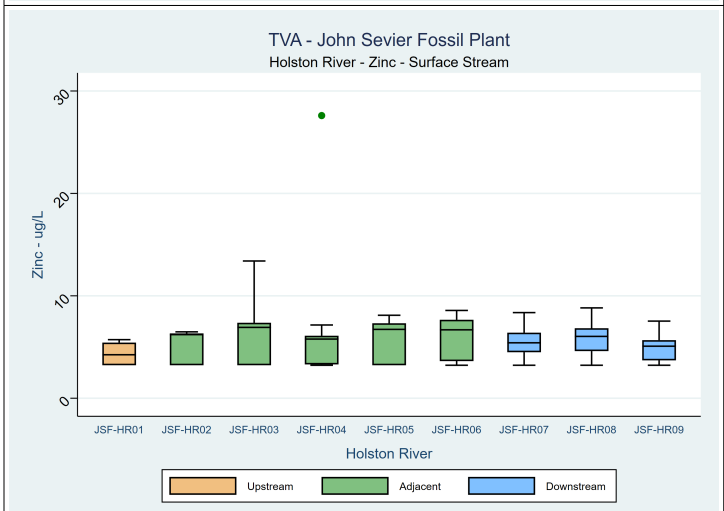
Box Plots
Holston River - TDEC Appendix I Parameters
Surface Stream Investigation
John Sevier Fossil Plant, Rogersville Tennessee











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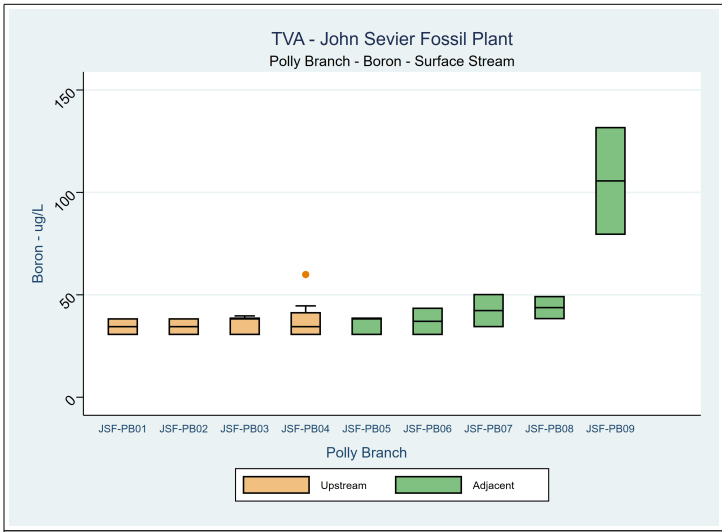
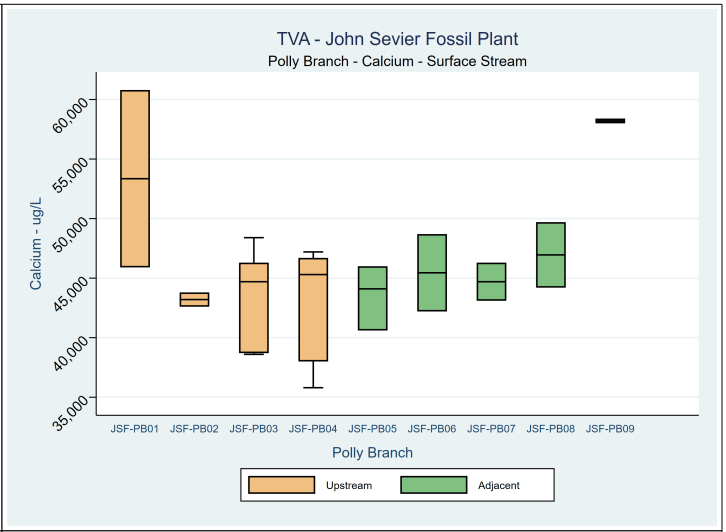
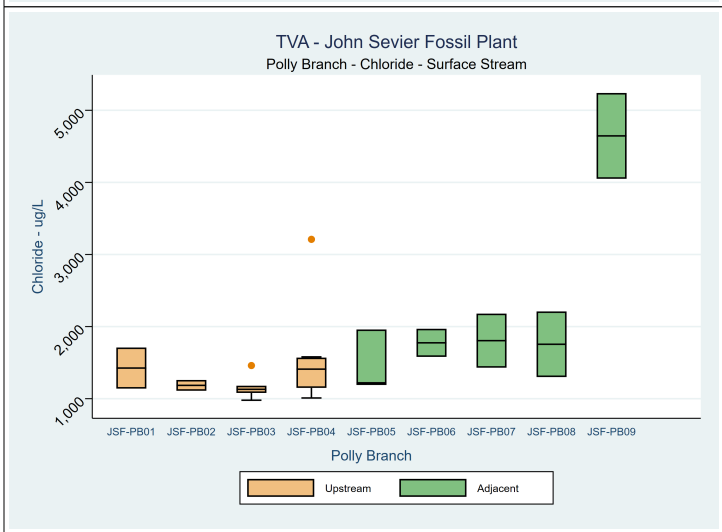
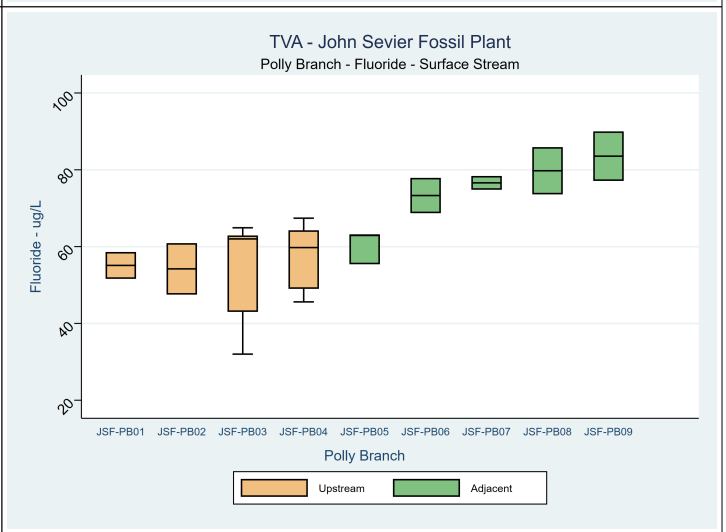
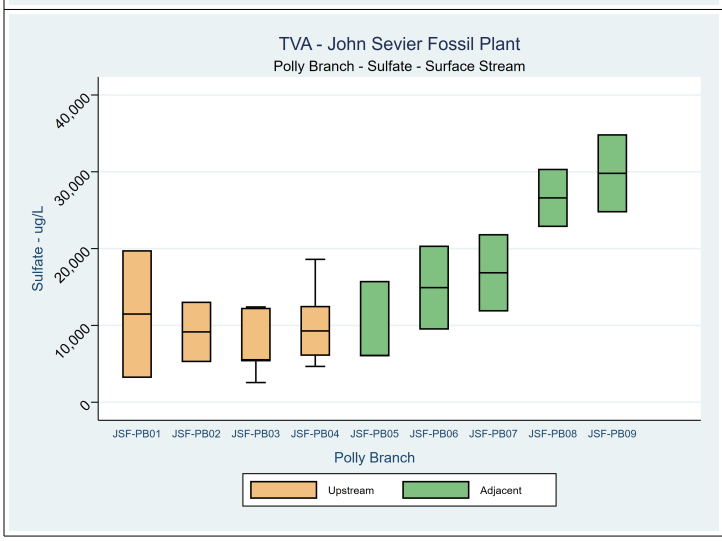
Box Plots
Polly Branch - CCR Rule Appendix III Parameters
Surface Stream Investigation
John Sevier Fossil Plant, Rogersville Tennessee



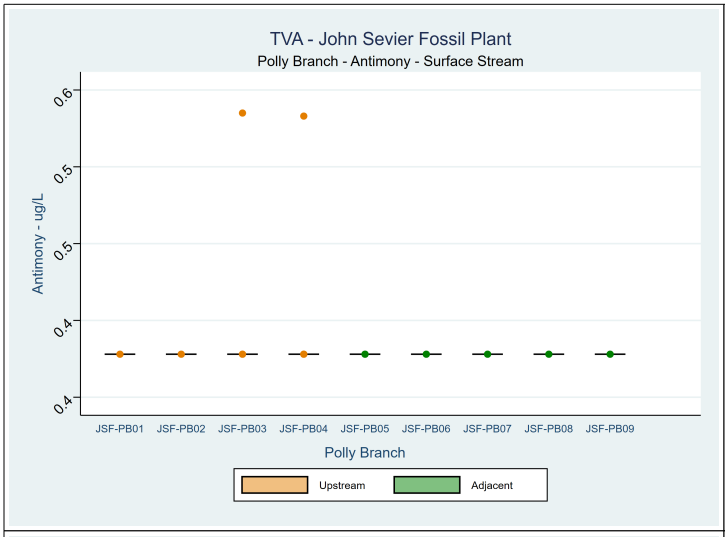


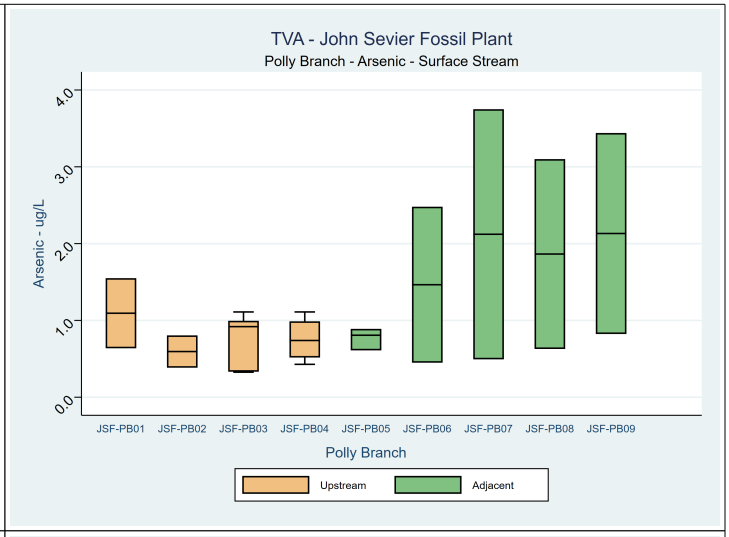


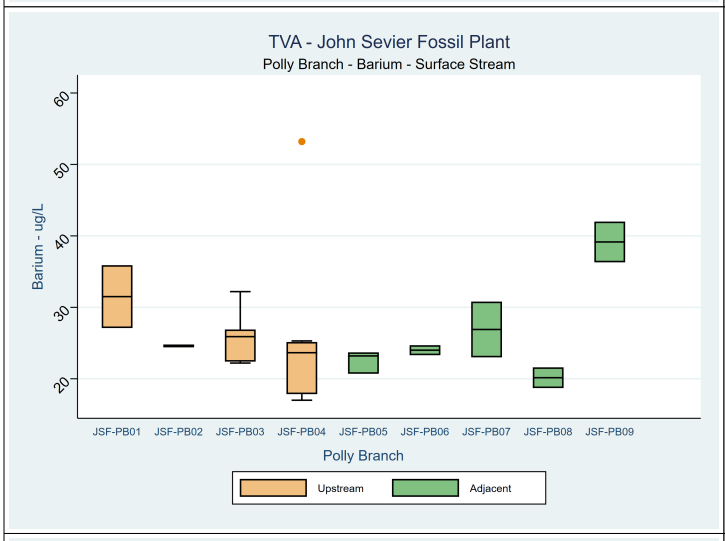


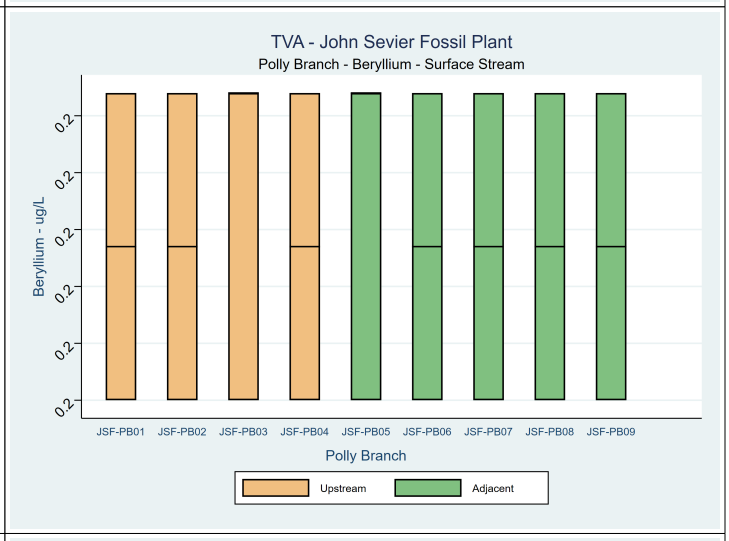


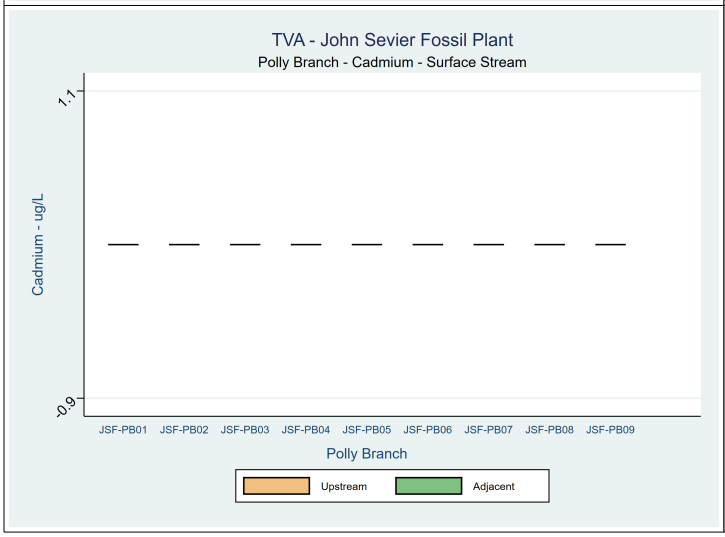
Box Plots
Polly Branch - CCR Rule Appendix IV Parameters
Surface Stream Investigation
John Sevier Fossil Plant, Rogersville Tennessee

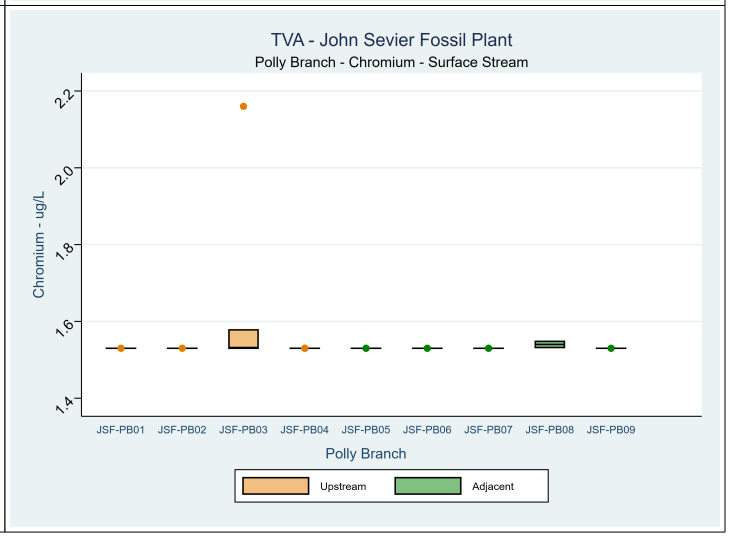


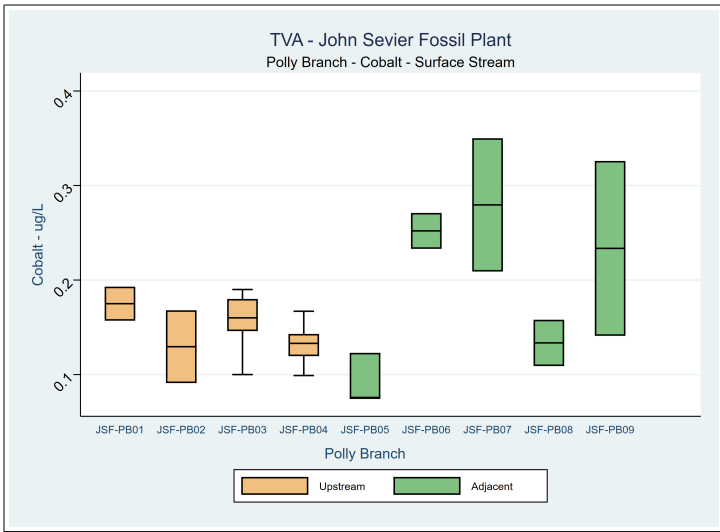


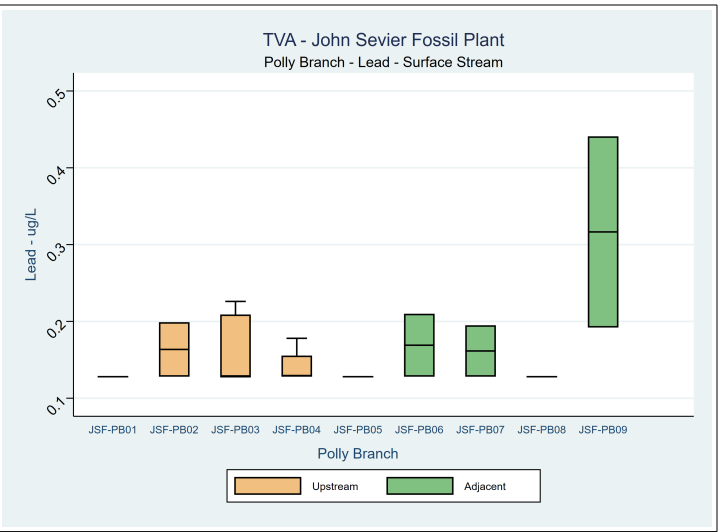


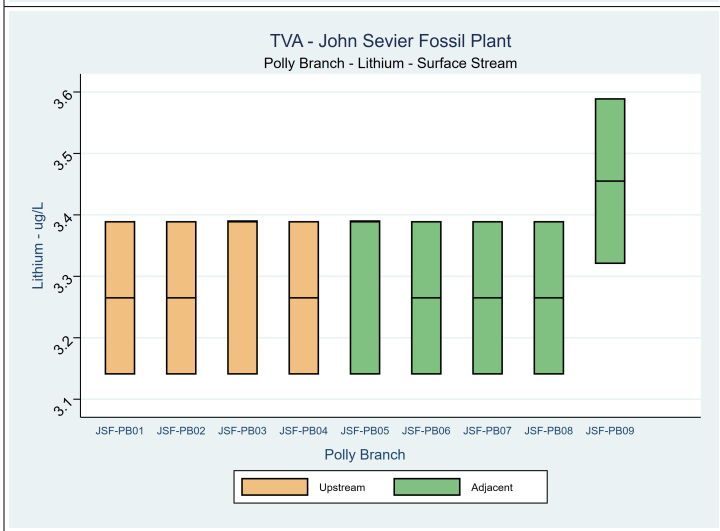




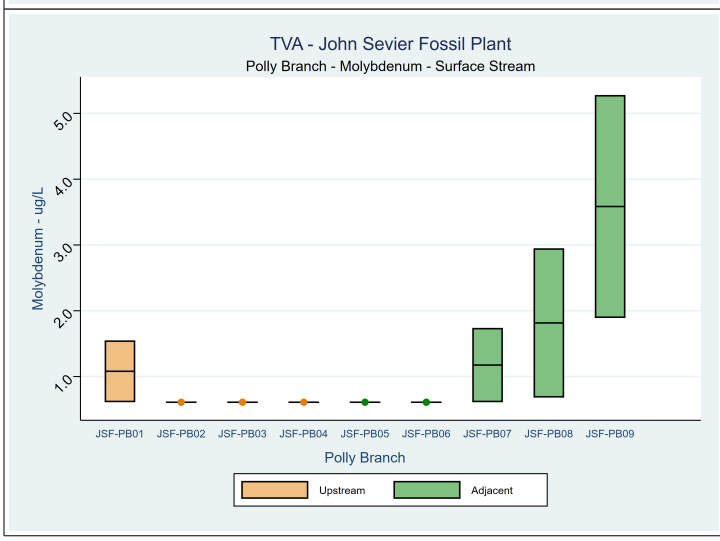


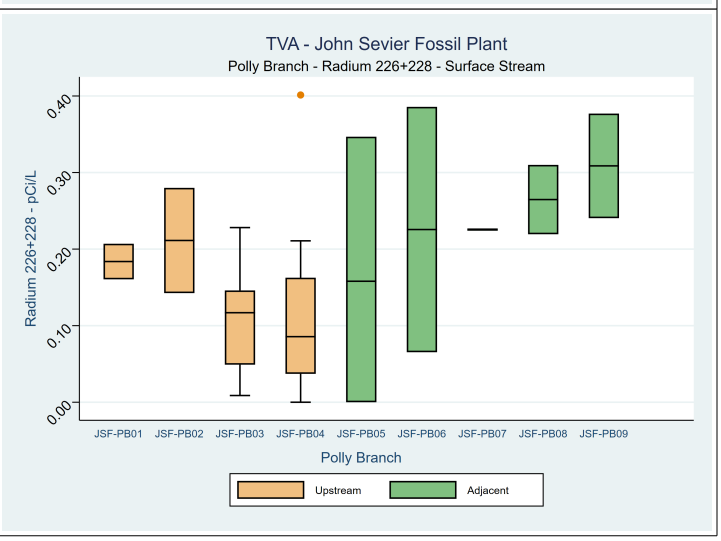

TVA - John Sevier Fossil Plant
Polly Branch - Cobalt - Surface Stream
Cobalt - ug/L
0.1
0.2
0.3
0.4
JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Polly Branch
Upstream
Adjacent

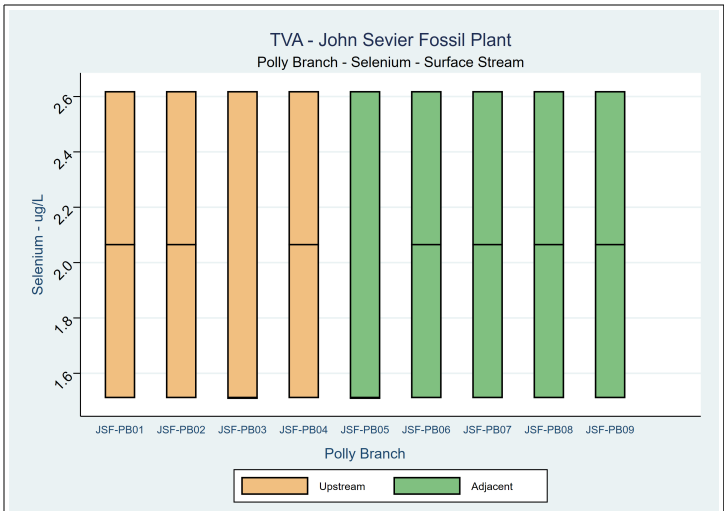

TVA - John Sevier Fossil Plant
Polly Branch - Lead - Surface Stream
Lead - ug/L
0.1
0.2
0.3
0.4
0.5
JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Polly Branch
Upstream
Adjacent

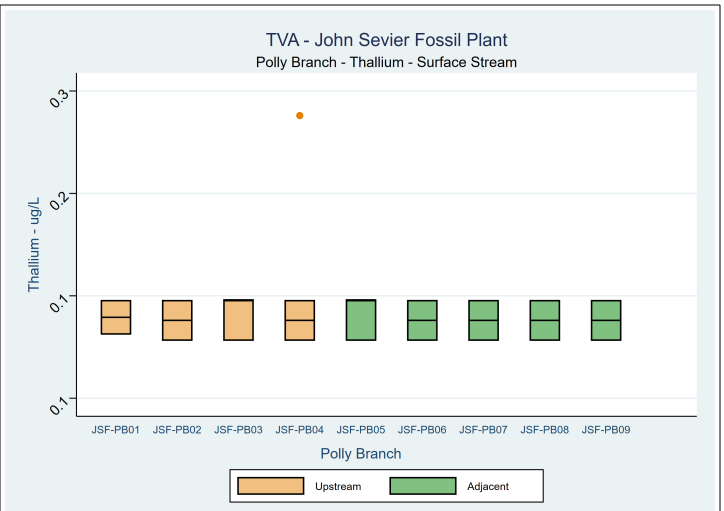

TVA - John Sevier Fossil Plant
Polly Branch - Lithium - Surface Stream
Lithium - ug/L
3.1
3.2
3.3
3.4
3.5
3.6
JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Polly Branch
Upstream
Adjacent


TVA - John Sevier Fossil Plant
Polly Branch - Mercury - Surface Stream
Mercury - ug/L
-0.9
1.1
JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Polly Branch
Upstream
Adjacent

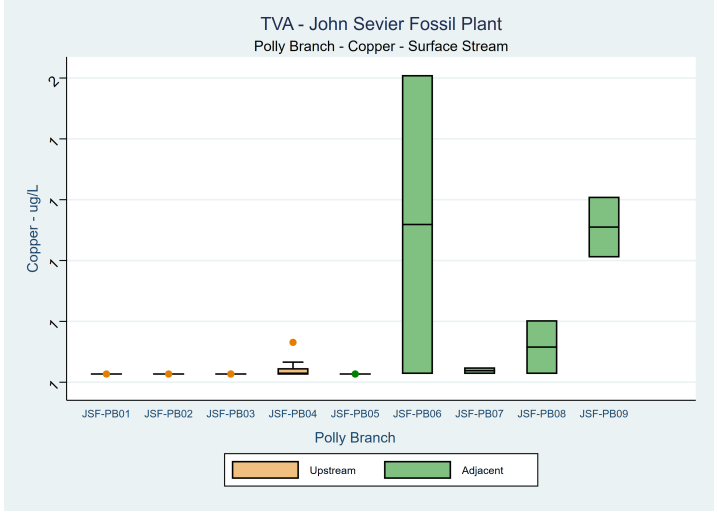

TVA - John Sevier Fossil Plant
Polly Branch - Molybdenum - Surface Stream
Molybdenum - ug/L
1.0
2.0
3.0
4.0
5.0
JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Polly Branch
Upstream
Adjacent

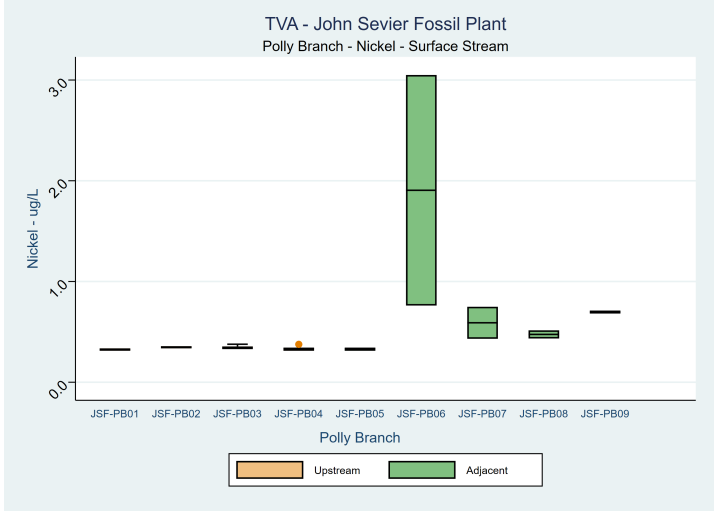

TVA - John Sevier Fossil Plant
Polly Branch - Radium 226+228 - Surface Stream
Radium 226+228 - pCi/L
0.00
0.10
0.20
0.30
0.40
JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Polly Branch
Upstream
Adjacent

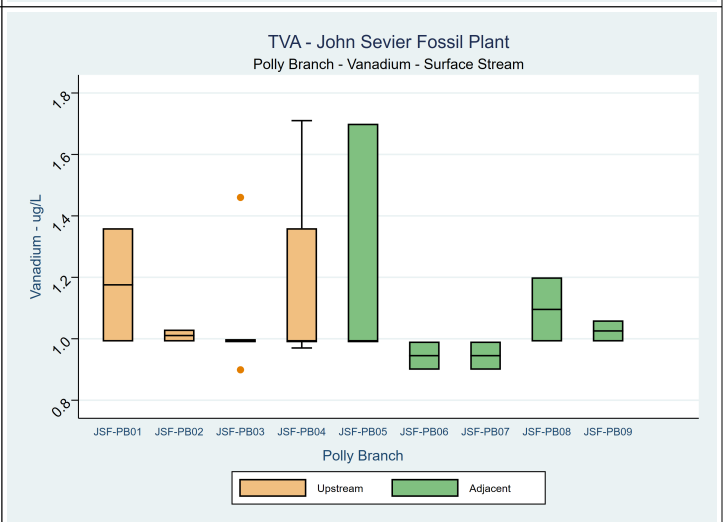

TVA - John Sevier Fossil Plant
Polly Branch - Selenium - Surface Stream
Selenium - ug/L
2.6
2.4
2.2
2.0
1.8
1.6
JSF-PB01
JSF-PB02
JSF-PB03
JSF-PB04
JSF-PB05
JSF-PB06
JSF-PB07
JSF-PB08
JSF-PB09
Polly Branch
Upstream
Adjacent

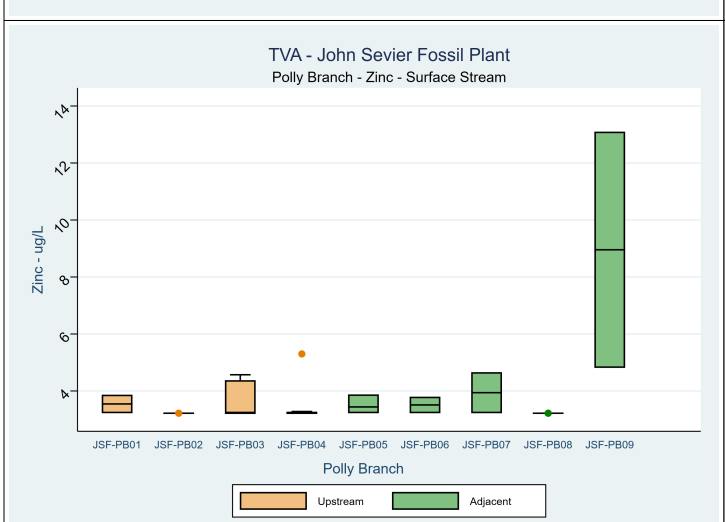

TVA - John Sevier Fossil Plant
Polly Branch - Thallium - Surface Stream
Thallium - ug/L
0.3
0.2
0.1
0.1
JSF-PB01
JSF-PB02
JSF-PB03
JSF-PB04
JSF-PB05
JSF-PB06
JSF-PB07
JSF-PB08
JSF-PB09
Polly Branch
Upstream
Adjacent

Box Plots
Polly Branch - TDEC Appendix I Parameters
Surface Stream Investigation
John Sevier Fossil Plant, Rogersville Tennessee









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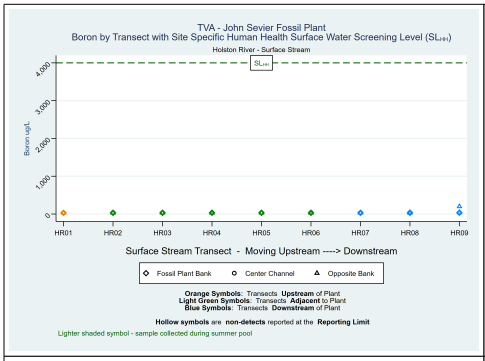
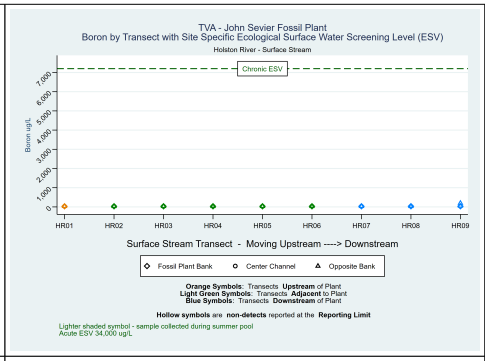
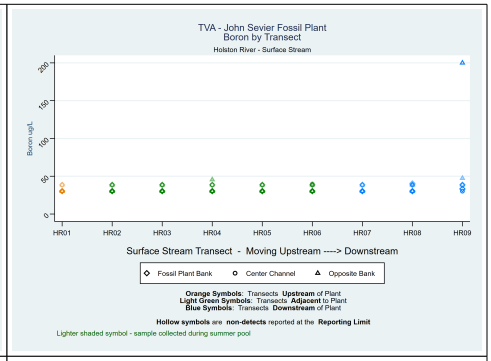
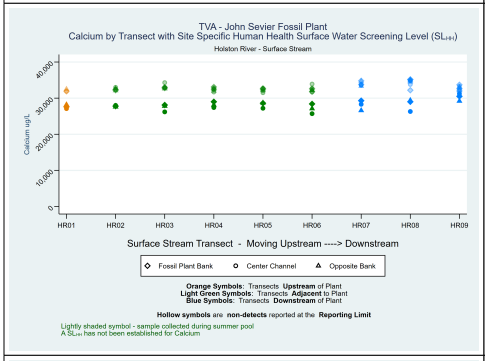
ATTACHMENT E.4-C - TRANSECT PLOTS

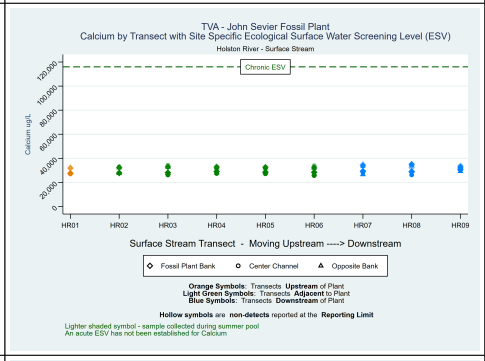
Transect Plots
Holston River - CCR Rule Appendix III Parameters
Surface Stream Investigation
John Sevier Fossil Plant, Rogersville Tennessee

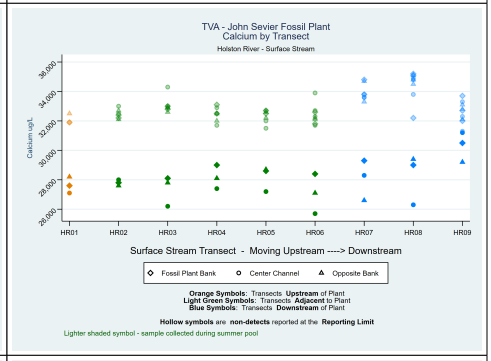


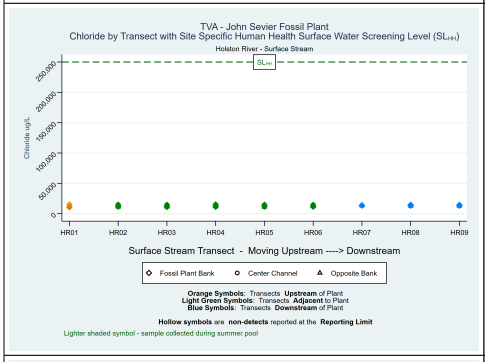


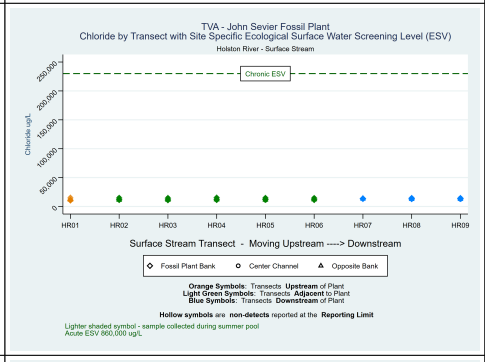


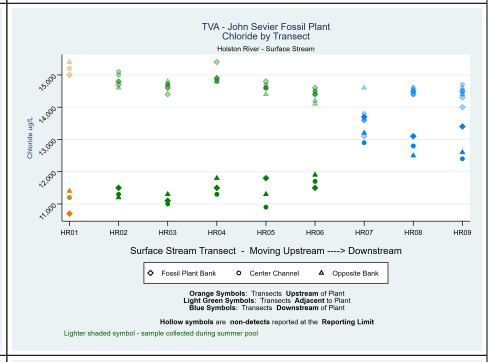


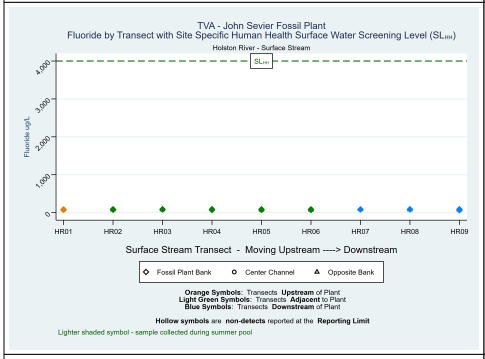


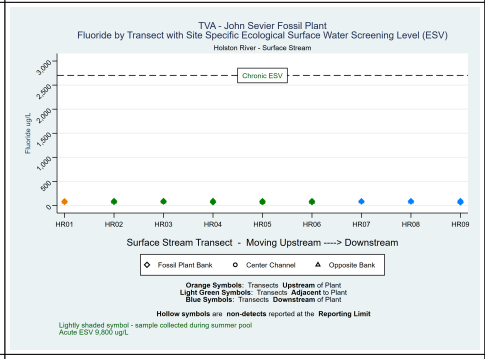


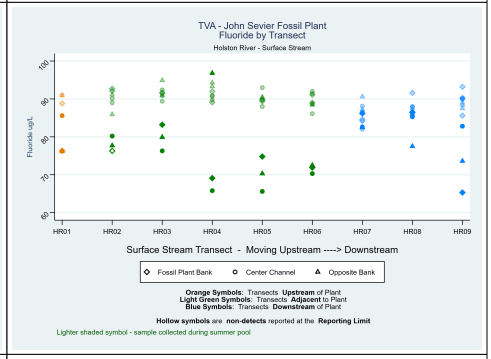


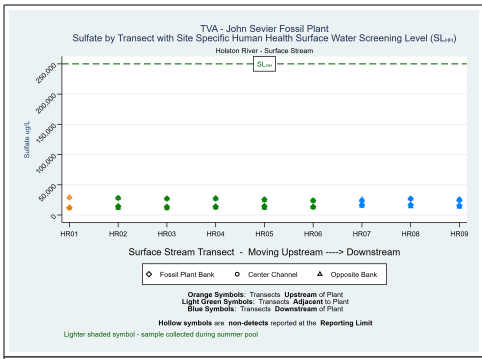


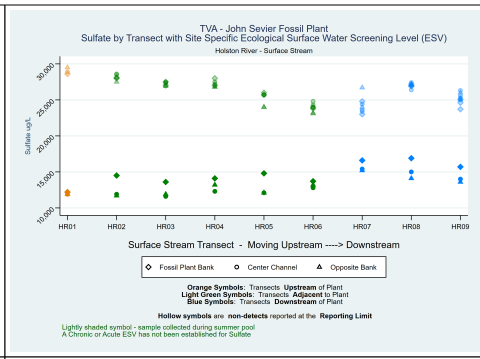


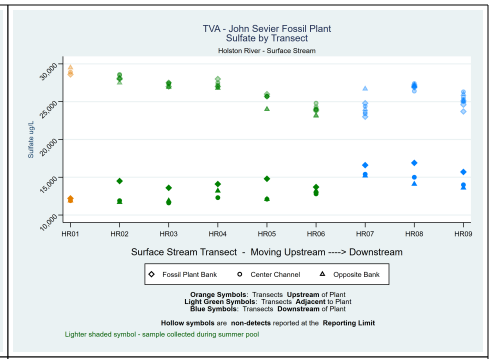


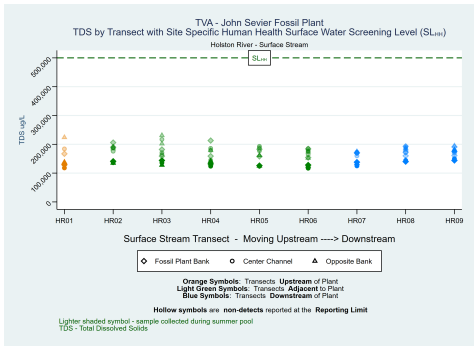


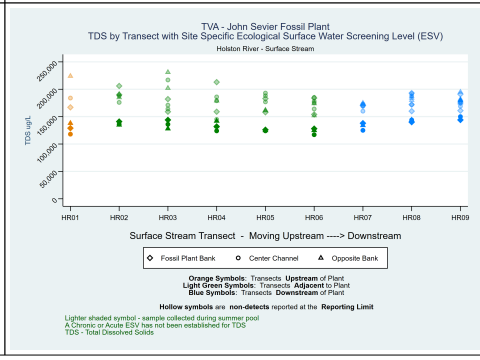


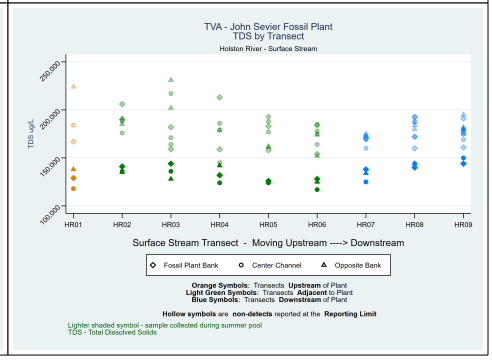

TVA - John Sevier Fossil Plant
Sulfate by Transect with Site Specific Human Health Surface Water Screening Level (SL$_{HH}$)
Holston River - Surface Stream
SL$_{HH}$
Sulfate ug/L
250,000
200,000
150,000
100,000
50,000
0
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool


TVA - John Sevier Fossil Plant
Sulfate by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Holston River - Surface Stream
Sulfate ug/L
30,000
25,000
20,000
15,000
10,000
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lightly shaded symbol - sample collected during summer pool
A Chronic or Acute ESV has not been established for Sulfate

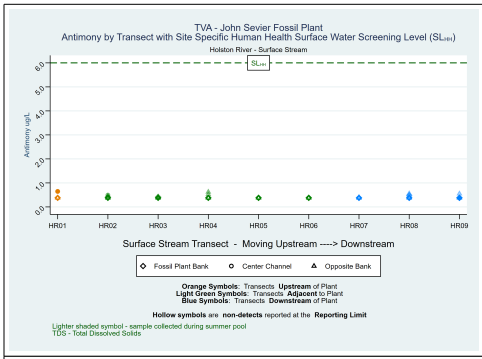

TVA - John Sevier Fossil Plant
Sulfate by Transect
Holston River - Surface Stream
Sulfate ug/L
30,000
25,000
20,000
15,000
10,000
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

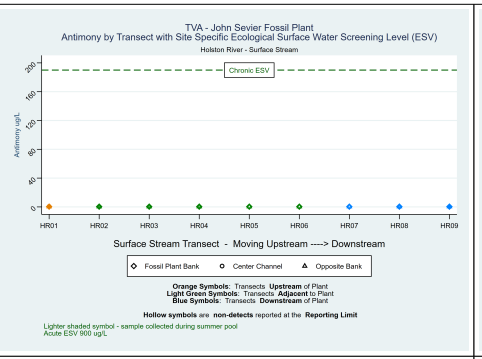

TVA - John Sevier Fossil Plant
TDS by Transect with Site Specific Human Health Surface Water Screening Level (SL$_{HH}$)
Holston River - Surface Stream
SL$_{HH}$
TDS ug/L
500,000
400,000
300,000
200,000
100,000
0
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
TDS - Total Dissolved Solids

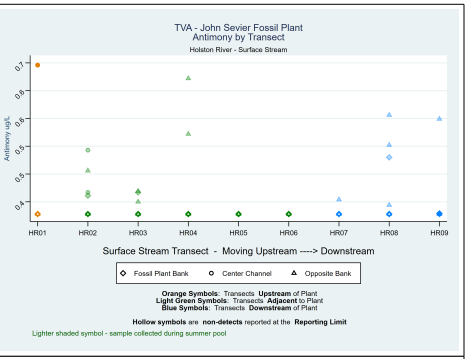

TVA - John Sevier Fossil Plant
TDS by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Holston River - Surface Stream
TDS ug/L
250,000
200,000
150,000
100,000
50,000
0
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
A Chronic or Acute ESV has not been established for TDS
TDS - Total Dissolved Solids

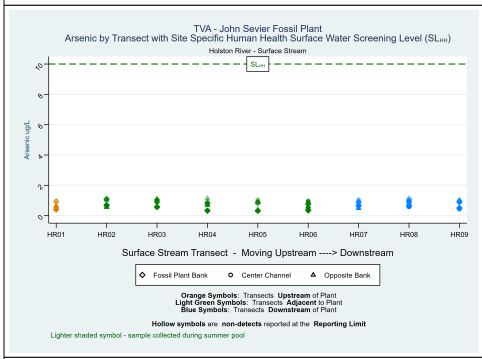

TVA - John Sevier Fossil Plant
TDS by Transect
Holston River - Surface Stream
TDS ug/L
250,000
200,000
150,000
100,000
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
TDS - Total Dissolved Solids

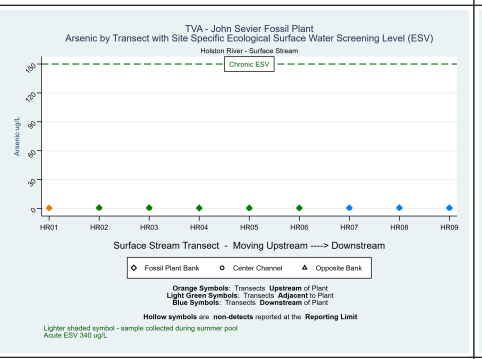
Transect Plots
Holston River - CCR Rule Appendix IV Parameters
Surface Stream Investigation
John Sevier Fossil Plant, Rogersville Tennessee

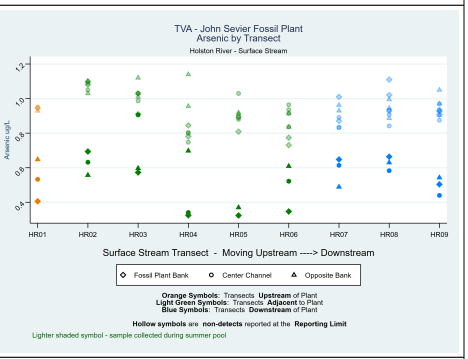


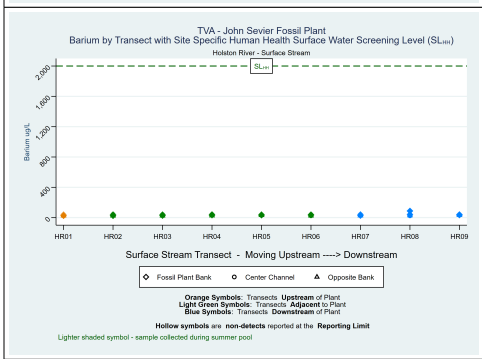


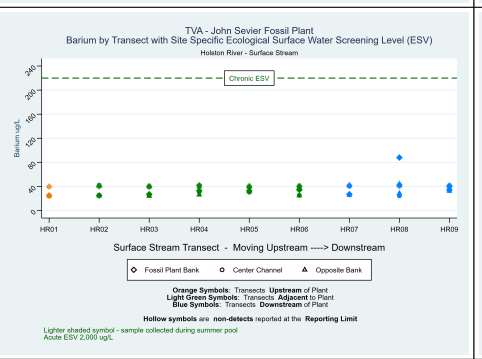


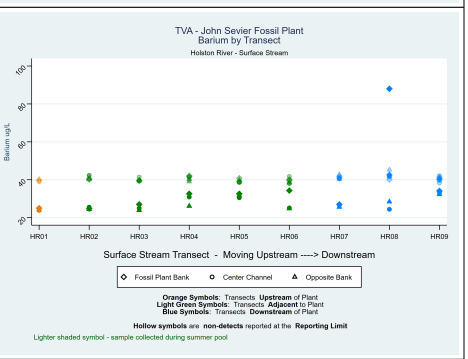


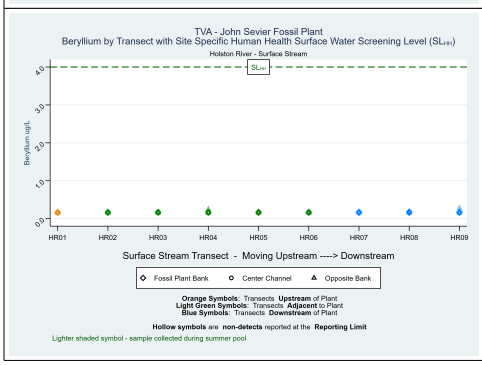


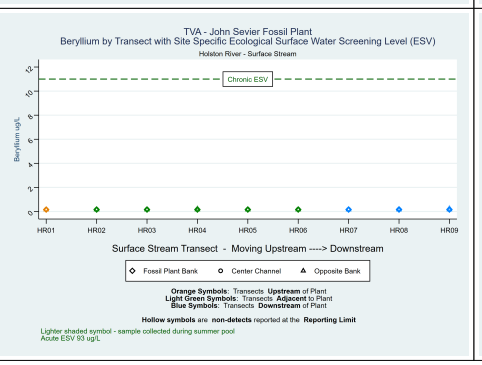


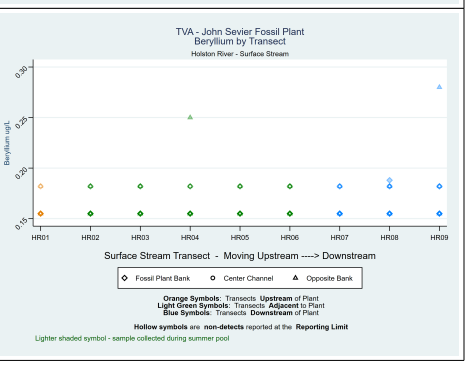




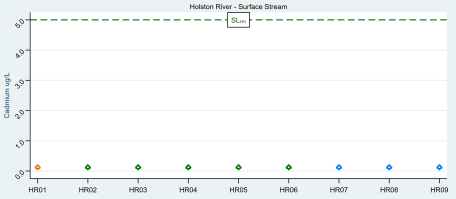








TVA - John Sevier Fossil Plant
Cadmium by Transect with Site Specific Human Health Surface Water Screening Level (SL_{HH})

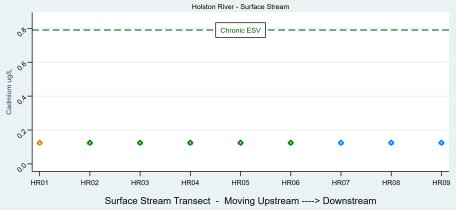


Orange Symbols: Transects **Upstream** of Plant
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Lighter shaded symbol - sample collected during summer pool

TVA - John Sevier Fossil Plant
Cadmium by Transect with Site Specific Ecological Surface Water Screening Level (ESV)

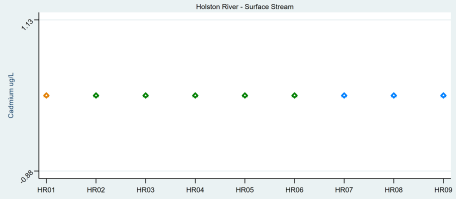


Orange Symbols: Transects **Upstream** of Plant
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Lighter shaded symbol - sample collected during summer pool
Acute ESV 1.91 ug/L

TVA - John Sevier Fossil Plant
Cadmium by Transect

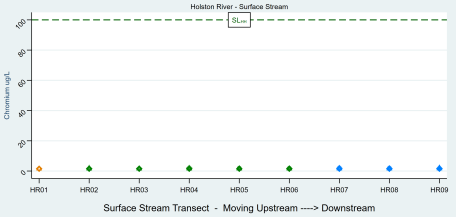


Orange Symbols: Transects **Upstream** of Plant
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Lighter shaded symbol - sample collected during summer pool

TVA - John Sevier Fossil Plant
Chromium by Transect with Site Specific Human Health Surface Water Screening Level (SL_{HH})

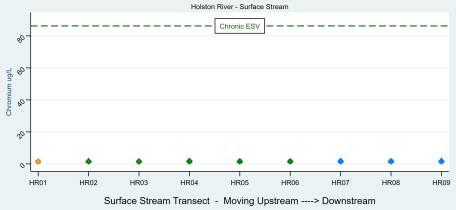


Orange Symbols: Transects **Upstream** of Plant
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Lighter shaded symbol - sample collected during summer pool

TVA - John Sevier Fossil Plant
Chromium by Transect with Site Specific Ecological Surface Water Screening Level (ESV)

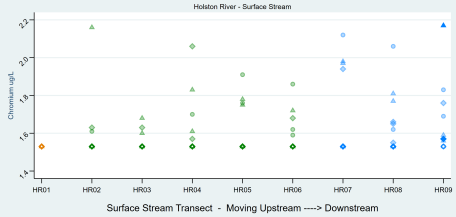


Orange Symbols: Transects **Upstream** of Plant
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Lighter shaded symbol - sample collected during summer pool
Acute ESV 1,803 ug/L

TVA - John Sevier Fossil Plant
Chromium by Transect

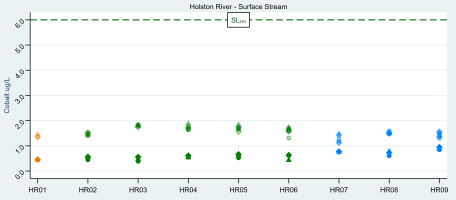


Orange Symbols: Transects **Upstream** of Plant
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Lighter shaded symbol - sample collected during summer pool

TVA - John Sevier Fossil Plant
Cobalt by Transect with Site Specific Human Health Surface Water Screening Level (SL_{HH})

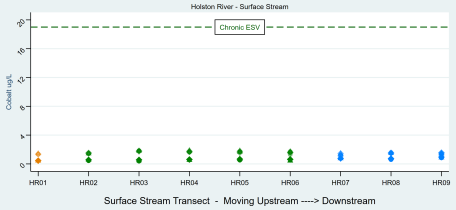


Orange Symbols: Transects **Upstream** of Plant
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Lighter shaded symbol - sample collected during summer pool

TVA - John Sevier Fossil Plant
Cobalt by Transect with Site Specific Ecological Surface Water Screening Level (ESV)

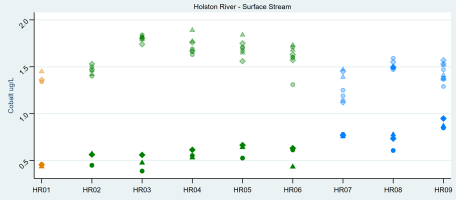


Orange Symbols: Transects **Upstream** of Plant
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Lighter shaded symbol - sample collected during summer pool
Acute ESV 120 ug/L

TVA - John Sevier Fossil Plant
Cobalt by Transect

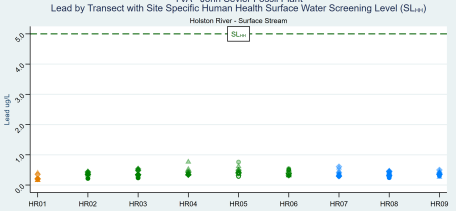


Orange Symbols: Transects **Upstream** of Plant
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Lighter shaded symbol - sample collected during summer pool

TVA - John Sevier Fossil Plant
Lead by Transect with Site Specific Human Health Surface Water Screening Level (SL_{HH})

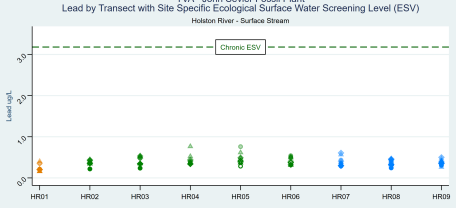


Orange Symbols: Transects **Upstream** of Plant
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Lighter shaded symbol - sample collected during summer pool

TVA - John Sevier Fossil Plant
Lead by Transect with Site Specific Ecological Surface Water Screening Level (ESV)



Orange Symbols: Transects **Upstream** of Plant
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Lighter shaded symbol - sample collected during summer pool
Acute ESV 81.6 ug/L

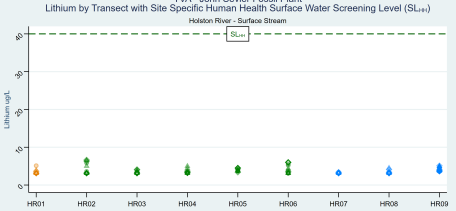
TVA - John Sevier Fossil Plant
Lead by Transect

Orange Symbols: Transects **Upstream** of Plant
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Lighter shaded symbol - sample collected during summer pool

TVA - John Sevier Fossil Plant
Lithium by Transect with Site Specific Human Health Surface Water Screening Level (SL_{HH})

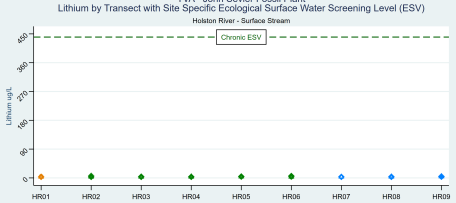


Orange Symbols: Transects **Upstream** of Plant
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Lighter shaded symbol - sample collected during summer pool

TVA - John Sevier Fossil Plant
Lithium by Transect with Site Specific Ecological Surface Water Screening Level (ESV)

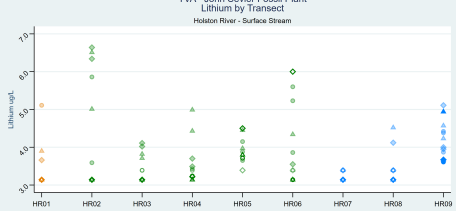


Orange Symbols: Transects **Upstream** of Plant
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Lighter shaded symbol - sample collected during summer pool
Acute ESV 910 ug/L

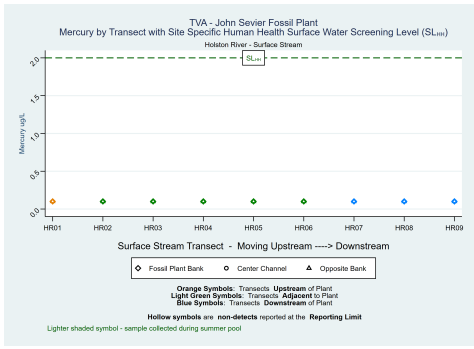
TVA - John Sevier Fossil Plant
Lithium by Transect

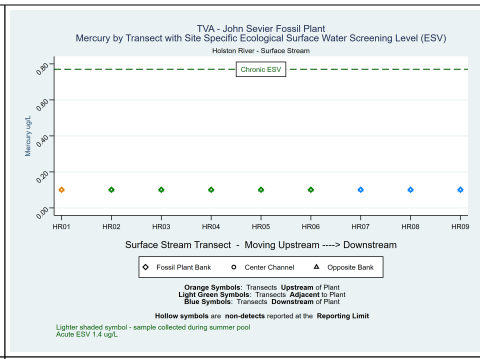


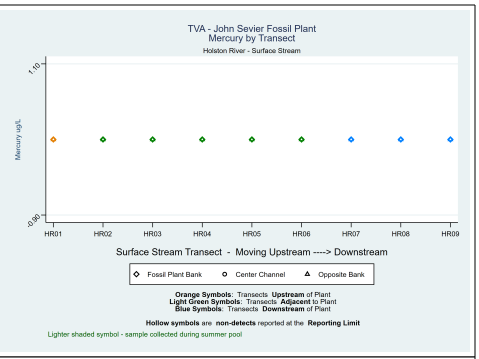
Orange Symbols: Transects **Upstream** of Plant
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

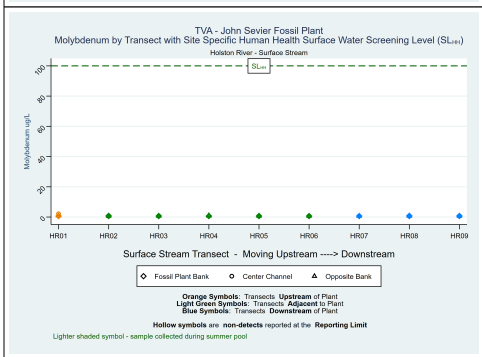
Hollow symbols are **non-detects** reported at the **Reporting Limit**

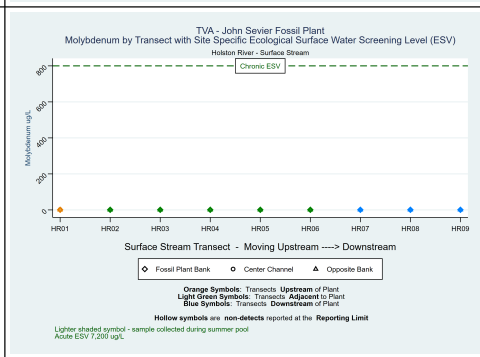
Lighter shaded symbol - sample collected during summer pool

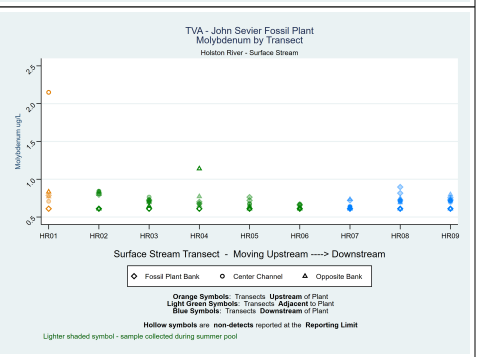

TVA - John Sevier Fossil Plant
Mercury by Transect with Site Specific Human Health Surface Water Screening Level (SLHH)
Holston River - Surface Stream
SLHH
Mercury ug/L
HR01 HR02 HR03 HR04 HR05 HR06 HR07 HR08 HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

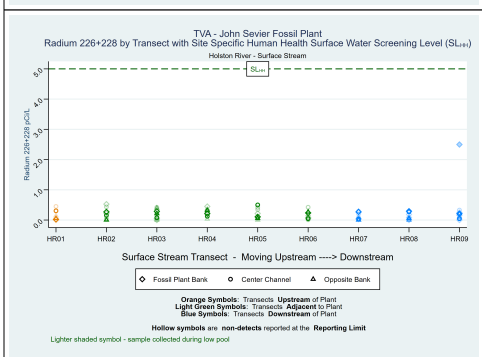

TVA - John Sevier Fossil Plant
Mercury by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Holston River - Surface Stream
Chronic ESV
Mercury ug/L
HR01 HR02 HR03 HR04 HR05 HR06 HR07 HR08 HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 1.4 ug/L

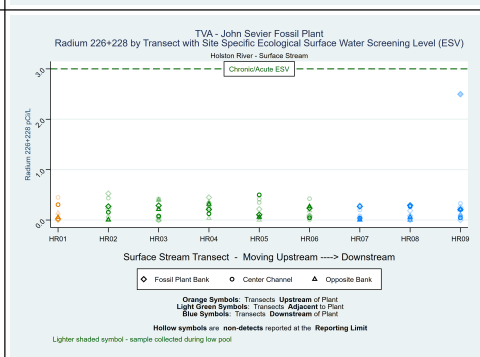

TVA - John Sevier Fossil Plant
Mercury by Transect
Holston River - Surface Stream
Mercury ug/L
HR01 HR02 HR03 HR04 HR05 HR06 HR07 HR08 HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

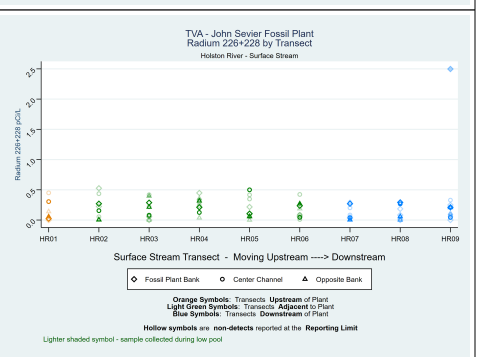

TVA - John Sevier Fossil Plant
Molybdenum by Transect with Site Specific Human Health Surface Water Screening Level (SLHH)
Holston River - Surface Stream
SLHH
Molybdenum ug/L
HR01 HR02 HR03 HR04 HR05 HR06 HR07 HR08 HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

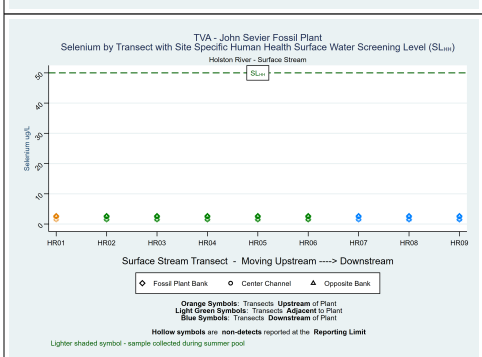

TVA - John Sevier Fossil Plant
Molybdenum by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Holston River - Surface Stream
Chronic ESV
Molybdenum ug/L
HR01 HR02 HR03 HR04 HR05 HR06 HR07 HR08 HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 7,200 ug/L

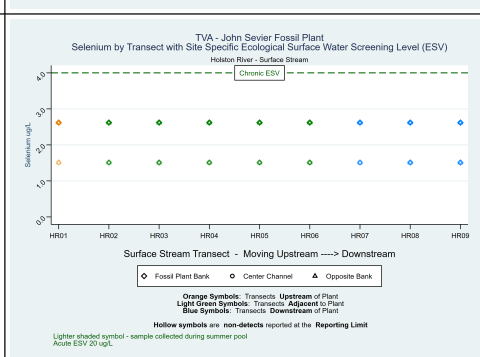

TVA - John Sevier Fossil Plant
Molybdenum by Transect
Holston River - Surface Stream
Molybdenum ug/L
HR01 HR02 HR03 HR04 HR05 HR06 HR07 HR08 HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

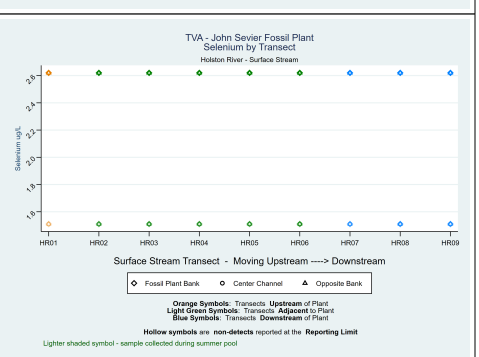

TVA - John Sevier Fossil Plant
Radium 226+228 by Transect with Site Specific Human Health Surface Water Screening Level (SLHH)
Holston River - Surface Stream
SLHH
Radium 226+228 pCi/L
HR01 HR02 HR03 HR04 HR05 HR06 HR07 HR08 HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during low pool

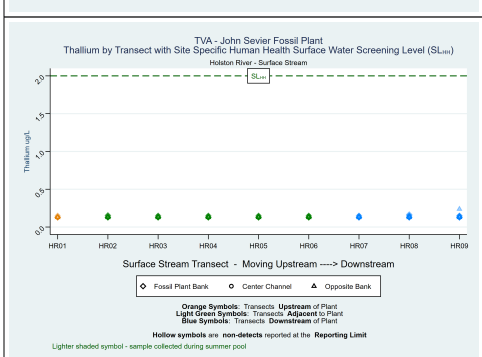

TVA - John Sevier Fossil Plant
Radium 226+228 by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Holston River - Surface Stream
Chronic/Acute ESV
Radium 226+228 pCi/L
HR01 HR02 HR03 HR04 HR05 HR06 HR07 HR08 HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during low pool

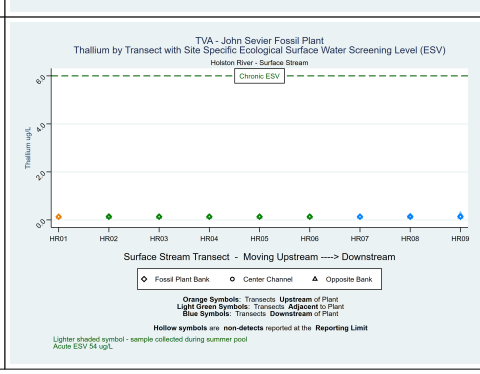

TVA - John Sevier Fossil Plant
Radium 226+228 by Transect
Holston River - Surface Stream
Radium 226+228 pCi/L
HR01 HR02 HR03 HR04 HR05 HR06 HR07 HR08 HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during low pool

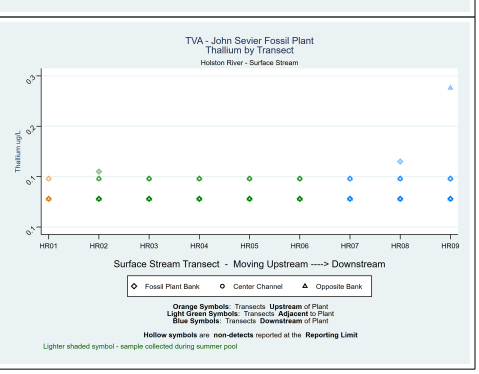

TVA - John Sevier Fossil Plant
Selenium by Transect with Site Specific Human Health Surface Water Screening Level (SLHH)
Holston River - Surface Stream
SLHH
Selenium ug/L
HR01 HR02 HR03 HR04 HR05 HR06 HR07 HR08 HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool


TVA - John Sevier Fossil Plant
Selenium by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Holston River - Surface Stream
Chronic ESV
Selenium ug/L
HR01 HR02 HR03 HR04 HR05 HR06 HR07 HR08 HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 20 ug/L

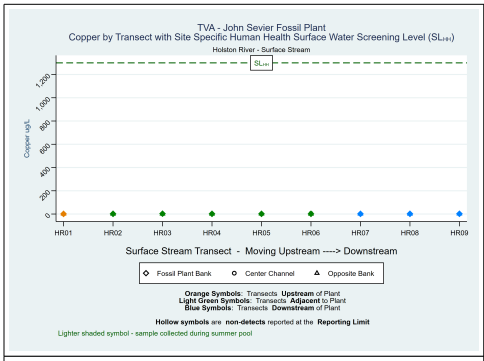

TVA - John Sevier Fossil Plant
Selenium by Transect
Holston River - Surface Stream
Selenium ug/L
HR01 HR02 HR03 HR04 HR05 HR06 HR07 HR08 HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

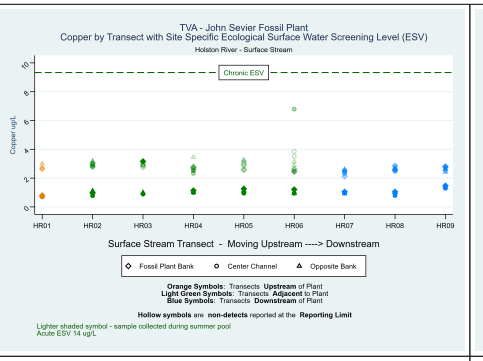

TVA - John Sevier Fossil Plant
Thallium by Transect with Site Specific Human Health Surface Water Screening Level (SLHH)
Holston River - Surface Stream
SLHH
Thallium ug/L
HR01 HR02 HR03 HR04 HR05 HR06 HR07 HR08 HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

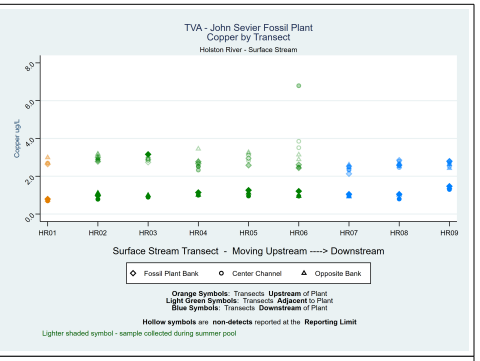

TVA - John Sevier Fossil Plant
Thallium by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Holston River - Surface Stream
Chronic ESV
Thallium ug/L
HR01 HR02 HR03 HR04 HR05 HR06 HR07 HR08 HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 54 ug/L

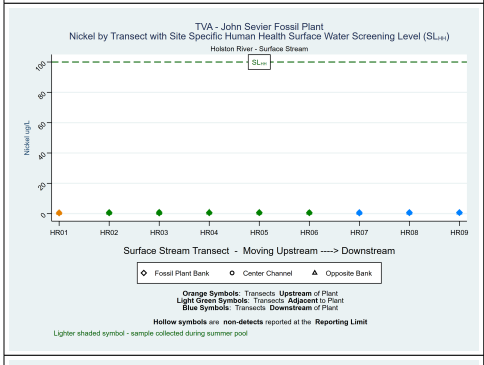

TVA - John Sevier Fossil Plant
Thallium by Transect
Holston River - Surface Stream
Thallium ug/L
HR01 HR02 HR03 HR04 HR05 HR06 HR07 HR08 HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

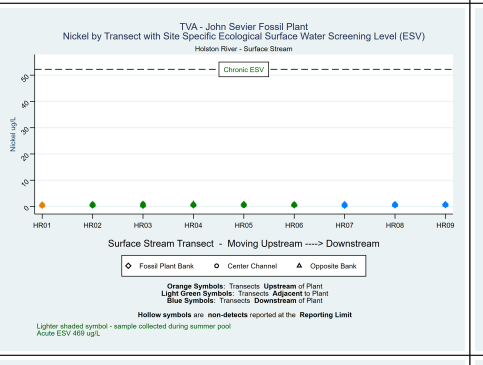
Transect Plots
Holston River - TDEC Appendix I Parameters
Surface Stream Investigation
John Sevier Fossil Plant, Rogersville Tennessee

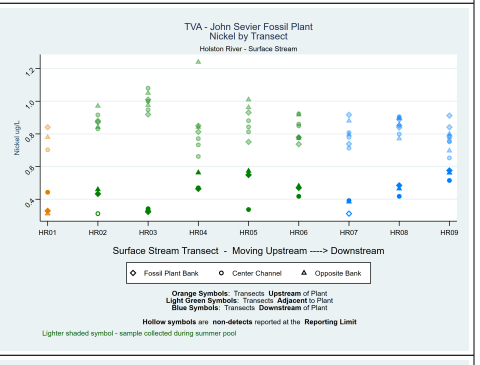


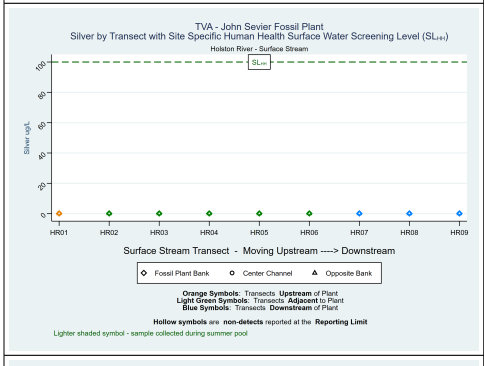


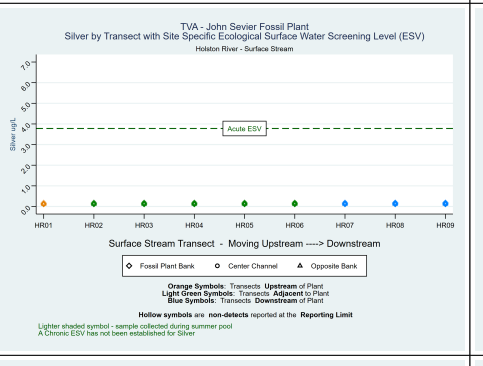


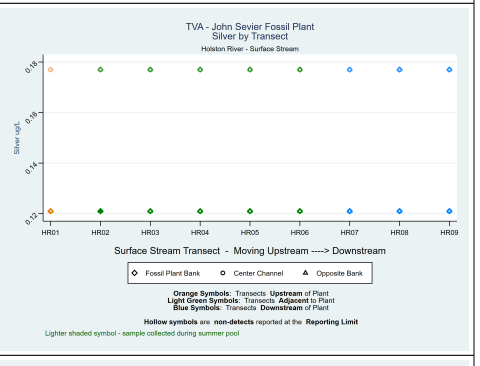


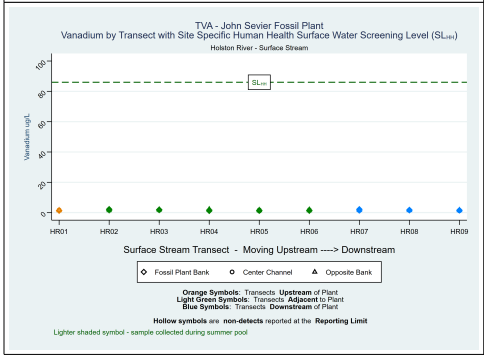


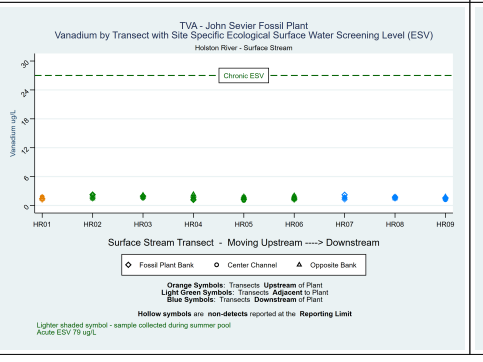


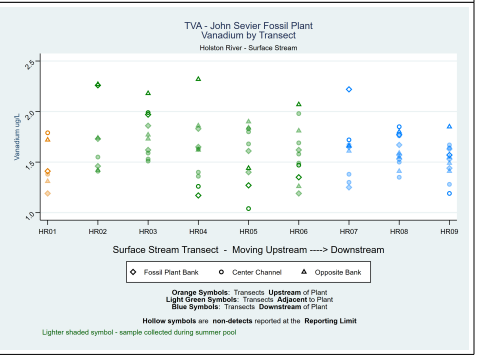


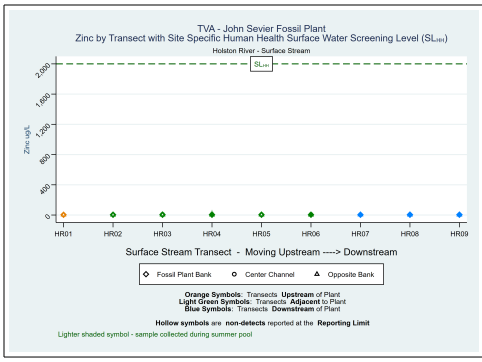


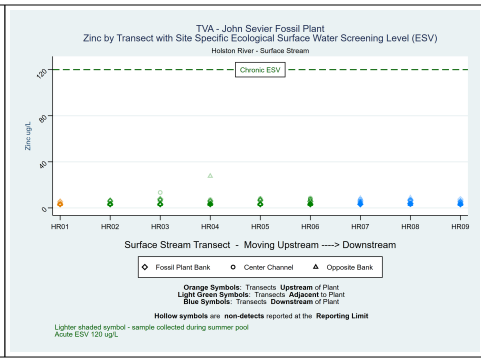


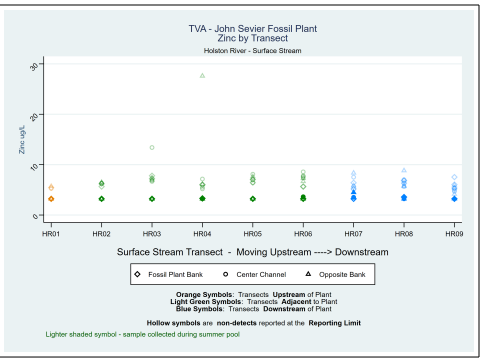




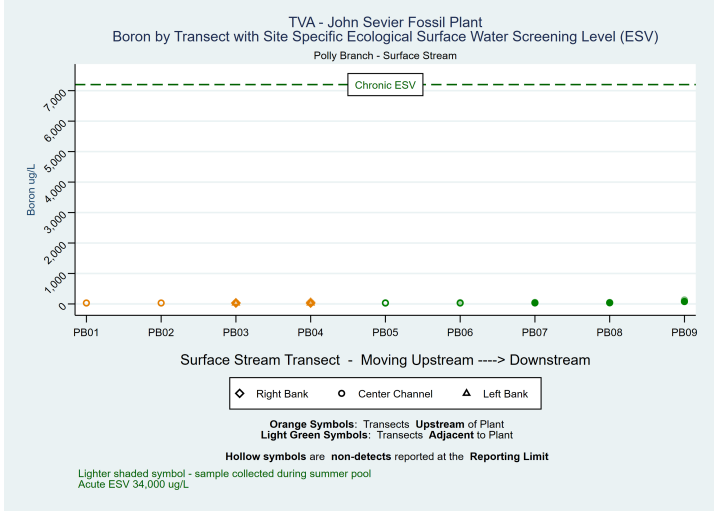


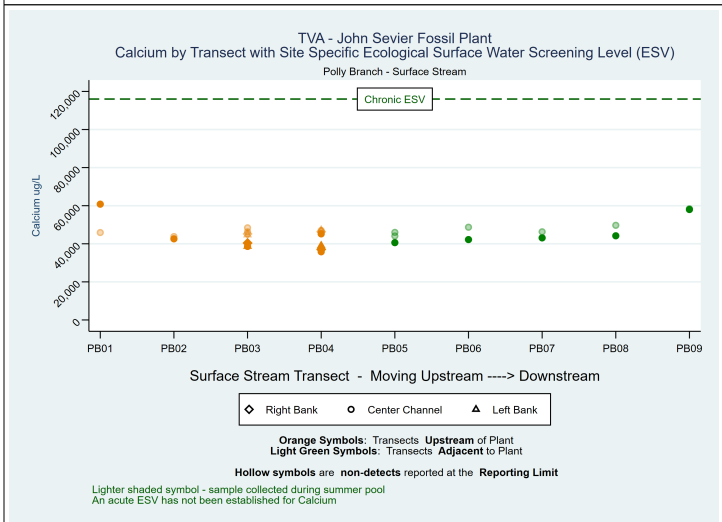

TVA - John Sevier Fossil Plant
Zinc by Transect with Site Specific Human Health Surface Water Screening Level (SLHH)
Holston River - Surface Stream
SLHH
Zinc ug/L
2,000
1,600
1,200
800
400
0
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

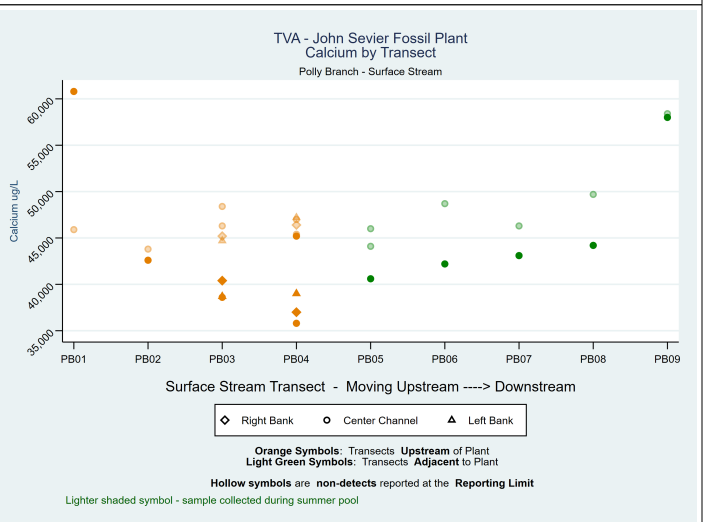

TVA - John Sevier Fossil Plant
Zinc by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Holston River - Surface Stream
Chronic ESV
Zinc ug/L
120
80
40
0
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 120 ug/L

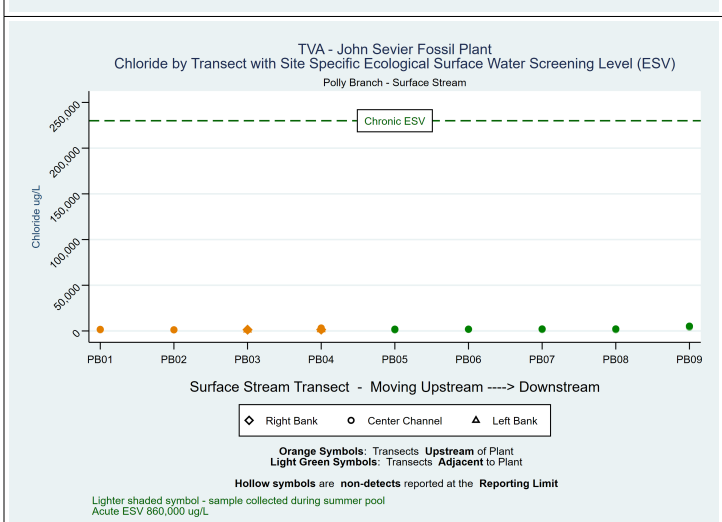

TVA - John Sevier Fossil Plant
Zinc by Transect
Holston River - Surface Stream
Zinc ug/L
30
20
10
0
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Surface Stream Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

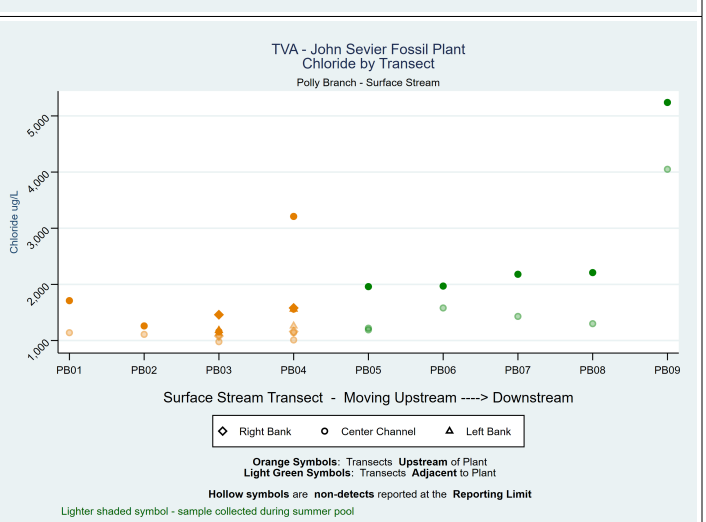
Transect Plots
Polly Branch - CCR Rule Appendix III Parameters
Surface Stream Investigation
John Sevier Fossil Plant, Rogersville Tennessee

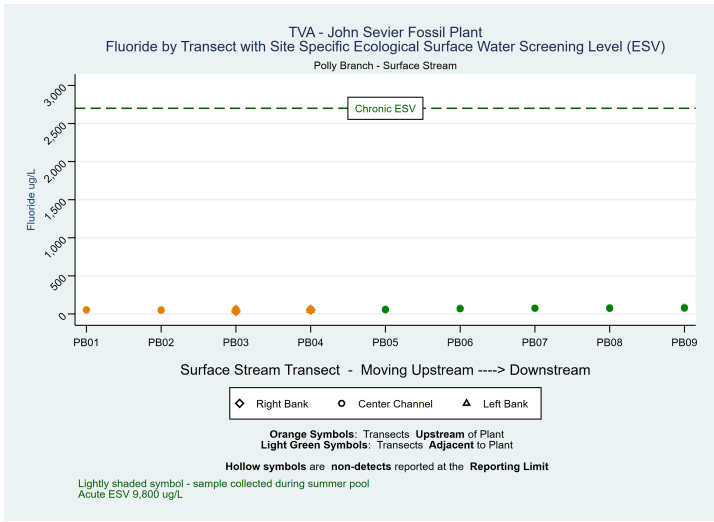


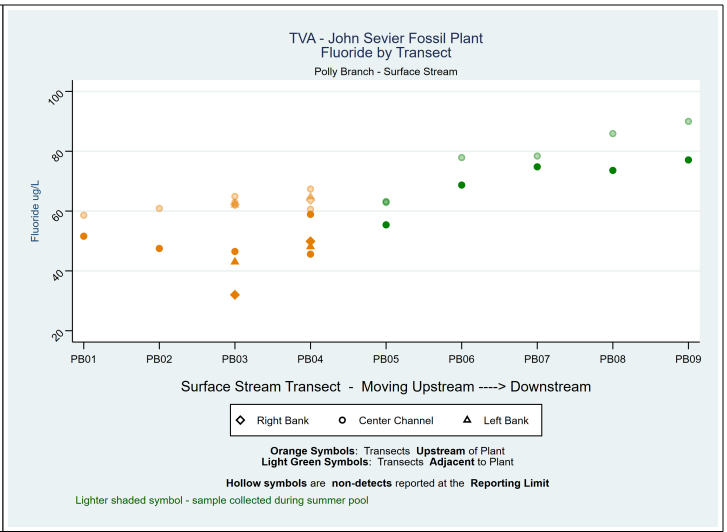






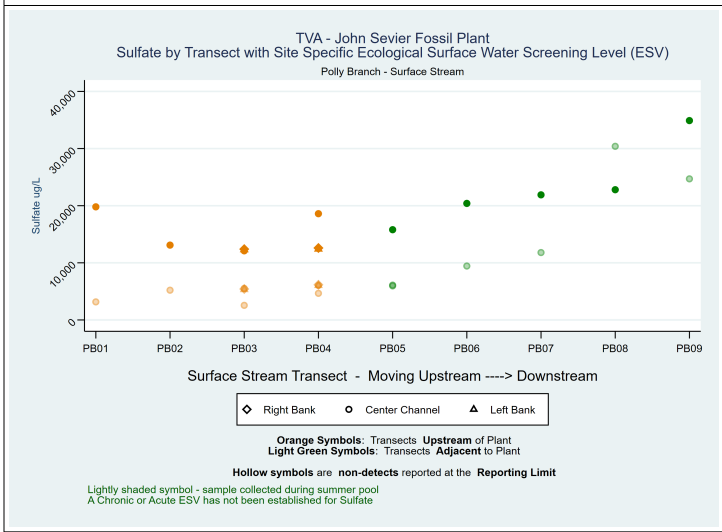


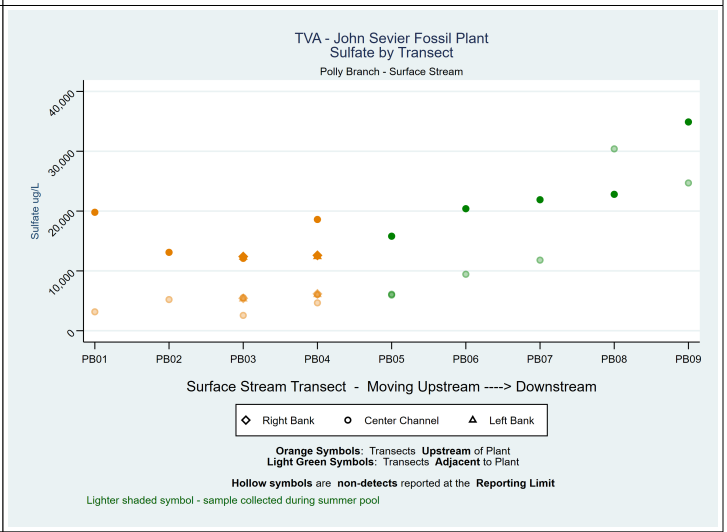


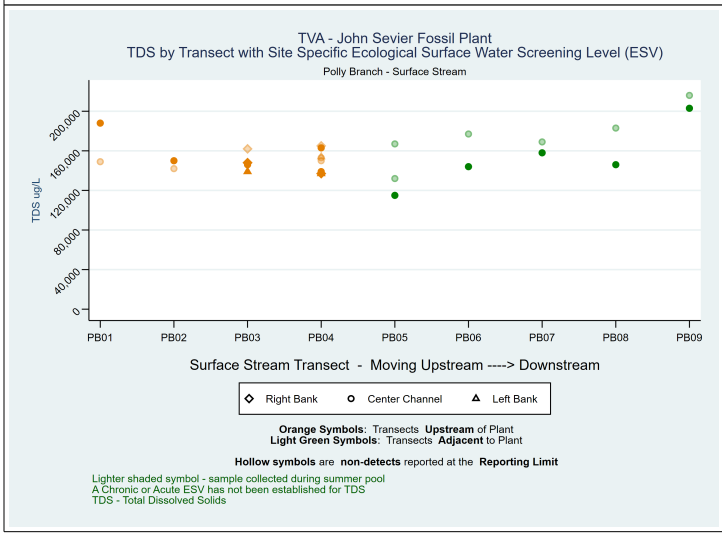


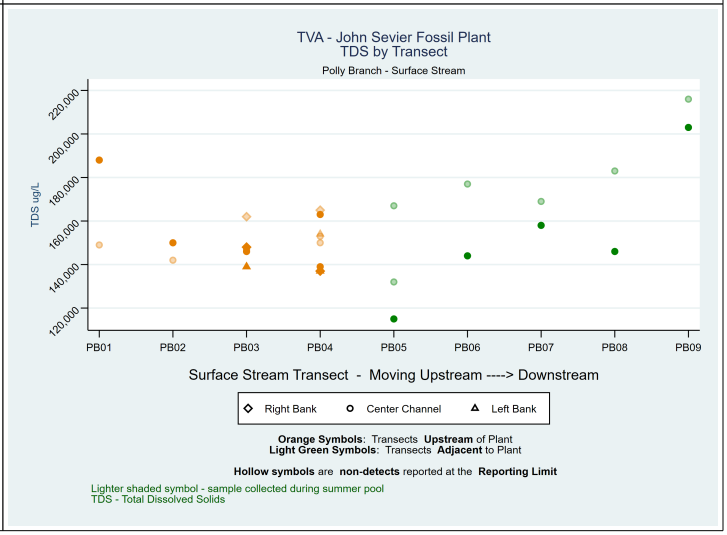
Place-holder for pH Field

Place-holder for pH Field

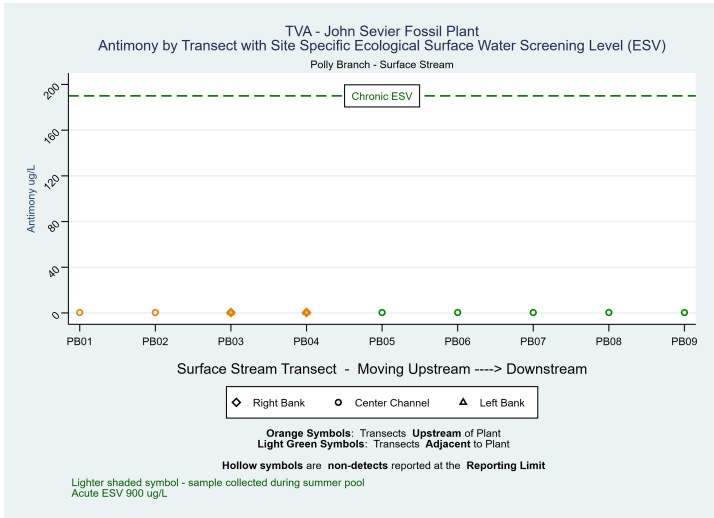


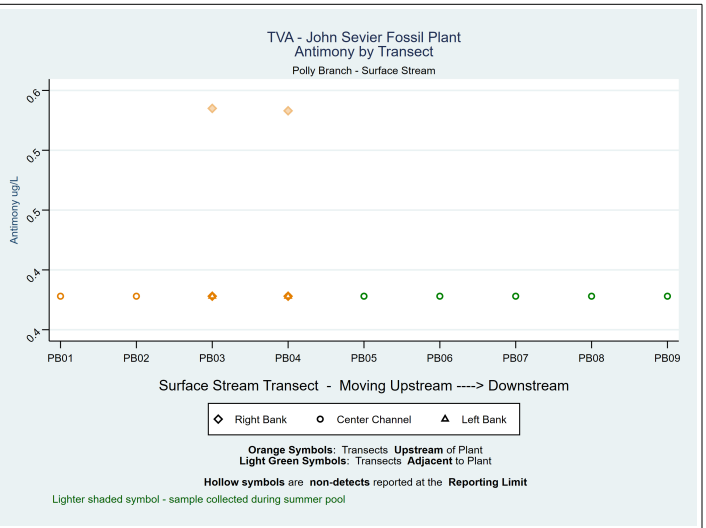


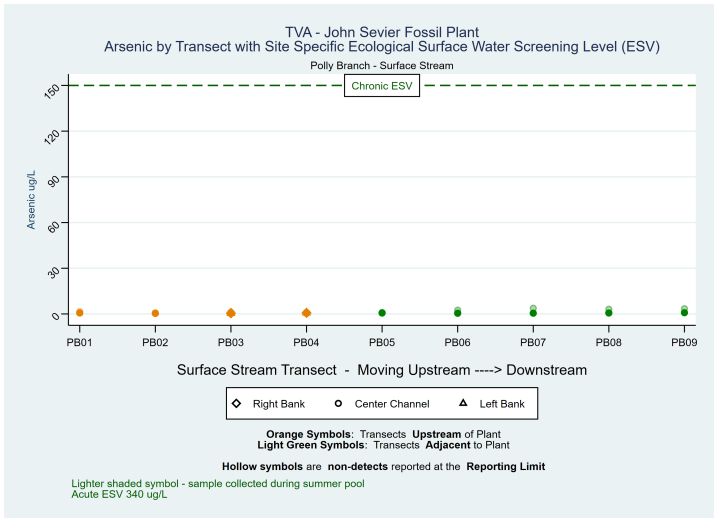


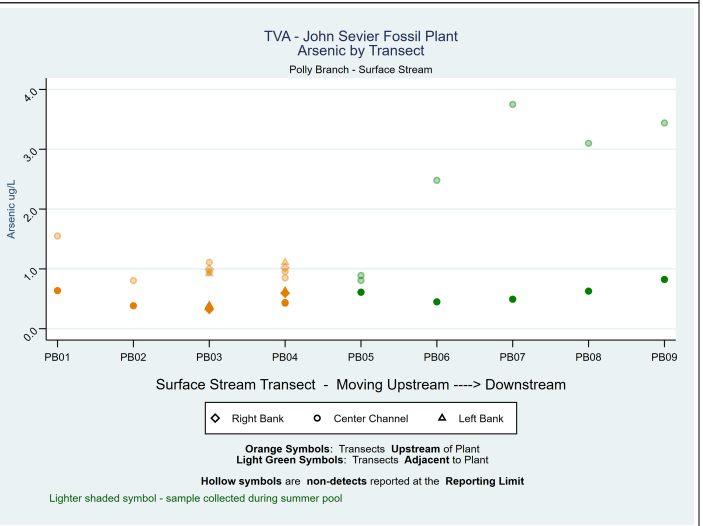


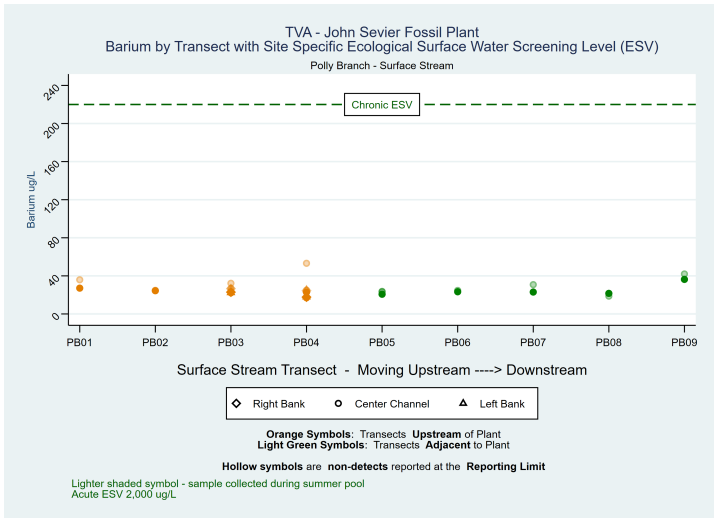
Transect Plots
Polly Branch - CCR Rule Appendix IV Parameters
Surface Stream Investigation
John Sevier Fossil Plant, Rogersville Tennessee

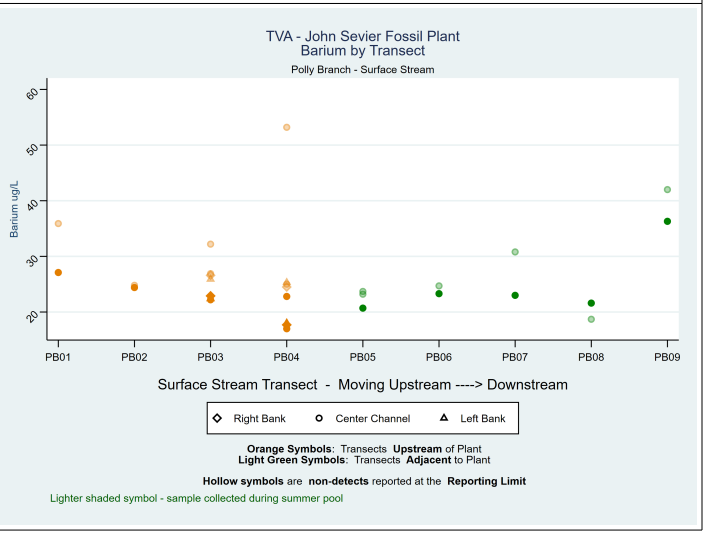


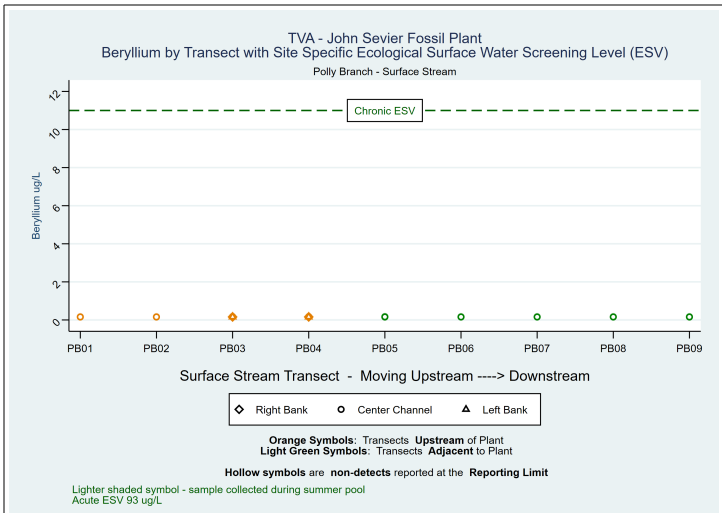


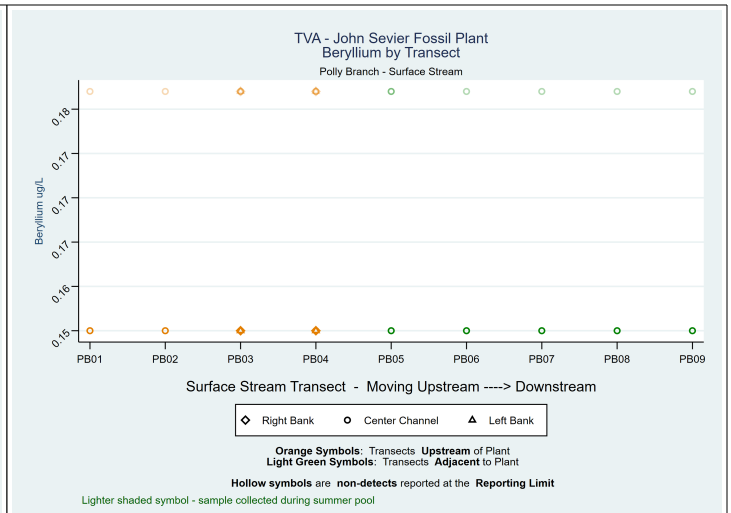


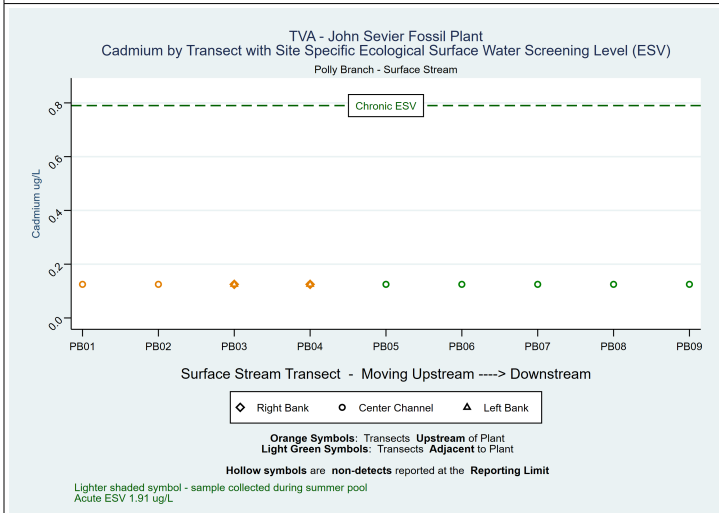


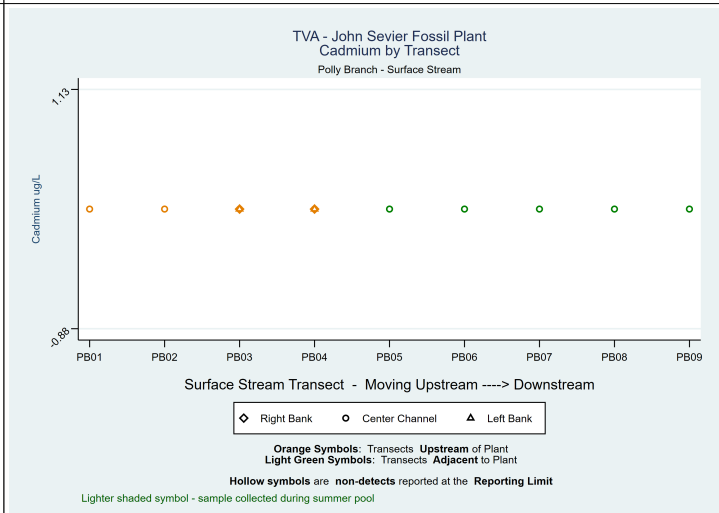


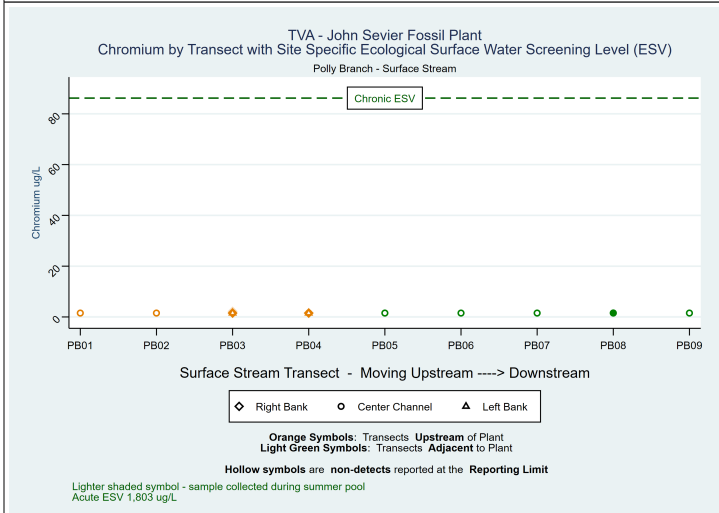


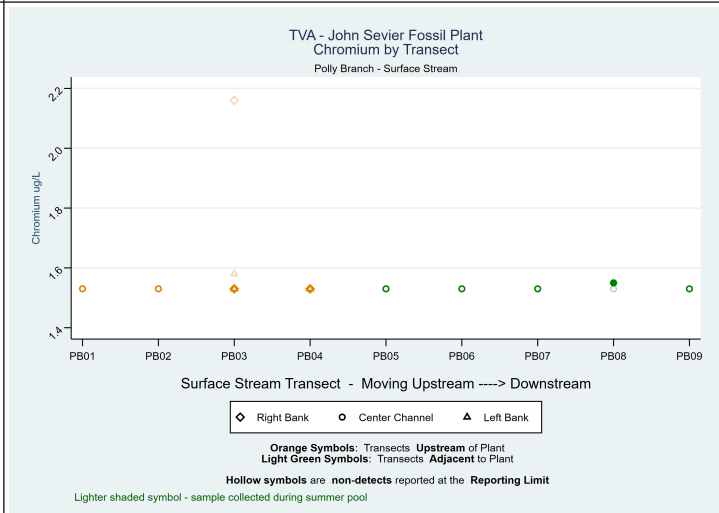

TVA - John Sevier Fossil Plant
Beryllium by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Polly Branch - Surface Stream
Chronic ESV
Beryllium ug/L
0
2
4
6
8
10
12
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 93 ug/L

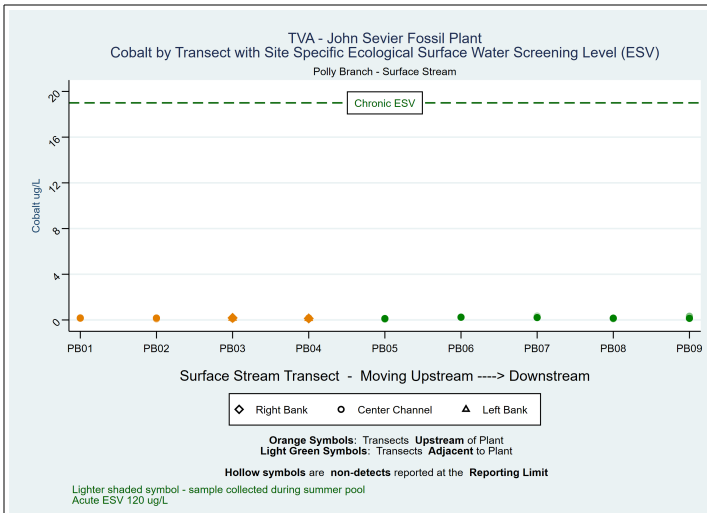

TVA - John Sevier Fossil Plant
Beryllium by Transect
Polly Branch - Surface Stream
Beryllium ug/L
0.15
0.16
0.17
0.17
0.17
0.18
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

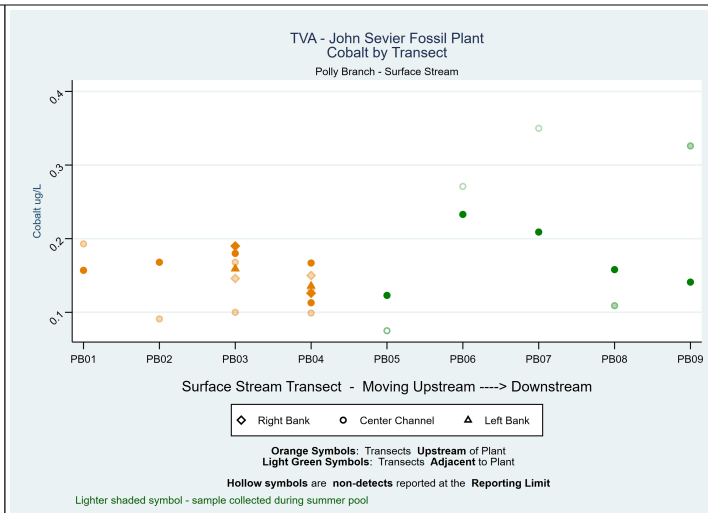

TVA - John Sevier Fossil Plant
Cadmium by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Polly Branch - Surface Stream
Chronic ESV
Cadmium ug/L
0.0
0.2
0.4
0.6
0.8
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 1.91 ug/L

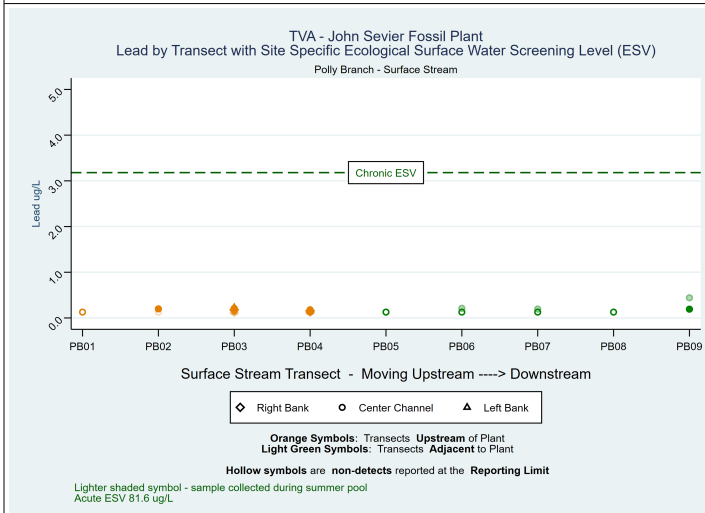

TVA - John Sevier Fossil Plant
Cadmium by Transect
Polly Branch - Surface Stream
Cadmium ug/L
-0.88
1.13
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

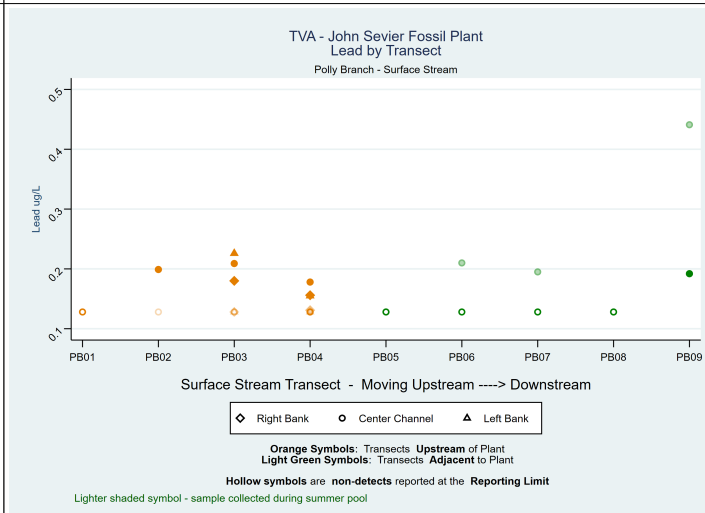

TVA - John Sevier Fossil Plant
Chromium by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Polly Branch - Surface Stream
Chronic ESV
Chromium ug/L
0
20
40
60
80
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 1,803 ug/L

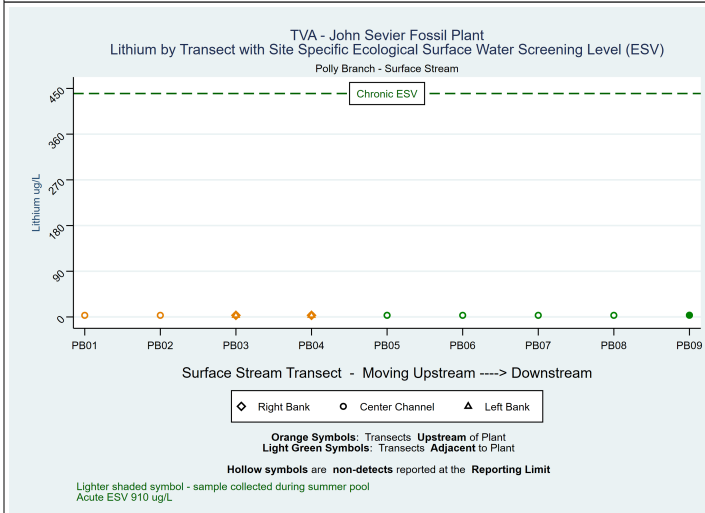

TVA - John Sevier Fossil Plant
Chromium by Transect
Polly Branch - Surface Stream
Chromium ug/L
1.4
1.6
1.8
2.0
2.2
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

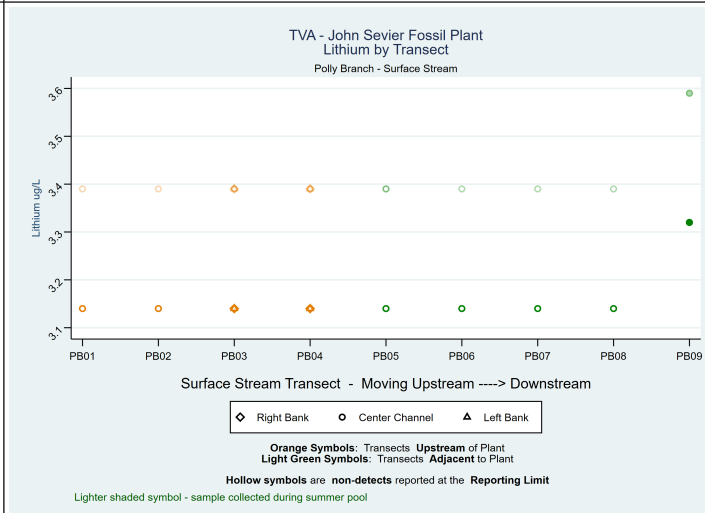

TVA - John Sevier Fossil Plant
Cobalt by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Polly Branch - Surface Stream
Chronic ESV
Cobalt ug/L
0
4
8
12
16
20
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 120 ug/L

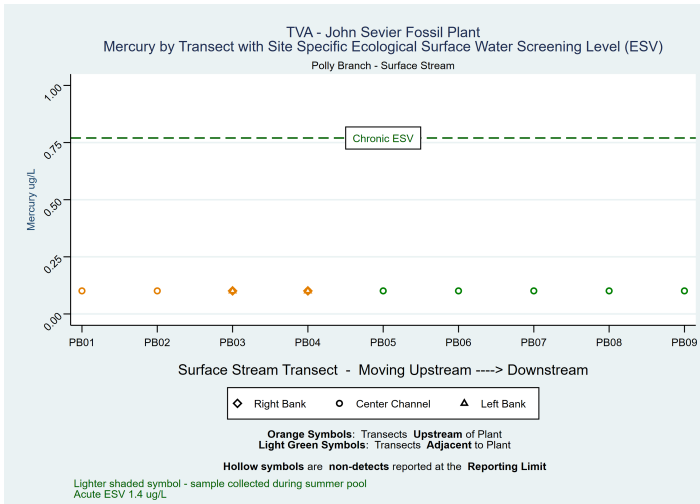

TVA - John Sevier Fossil Plant
Cobalt by Transect
Polly Branch - Surface Stream
Cobalt ug/L
0.1
0.2
0.3
0.4
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

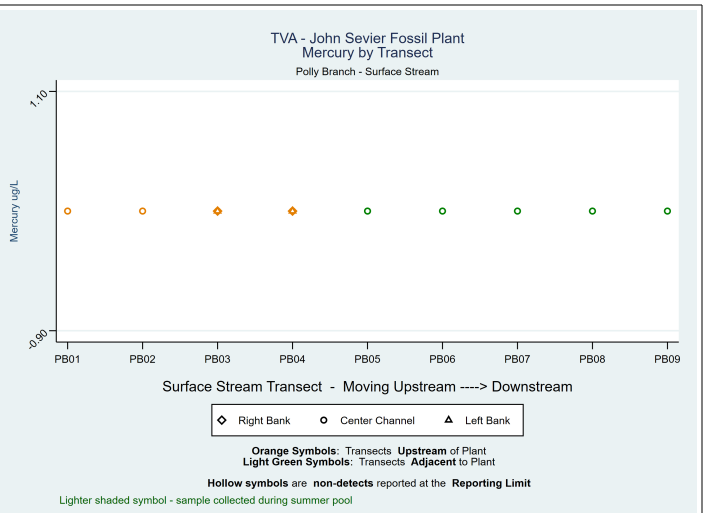

TVA - John Sevier Fossil Plant
Lead by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Polly Branch - Surface Stream
Chronic ESV
Lead ug/L
0.0
1.0
2.0
3.0
4.0
5.0
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 81.6 ug/L

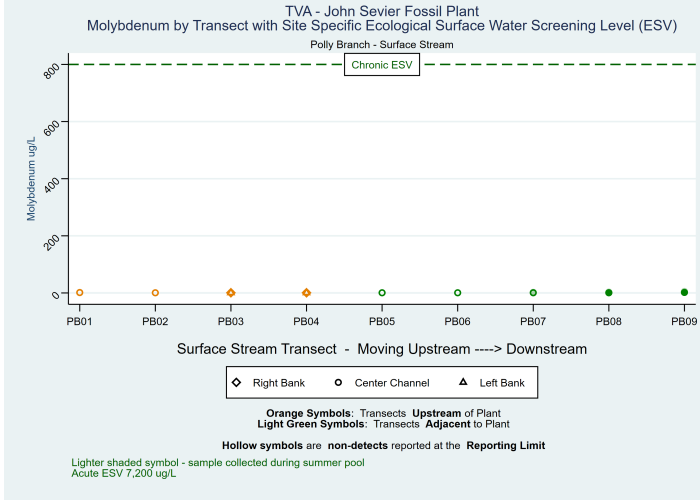

TVA - John Sevier Fossil Plant
Lead by Transect
Polly Branch - Surface Stream
Lead ug/L
0.1
0.2
0.3
0.4
0.5
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

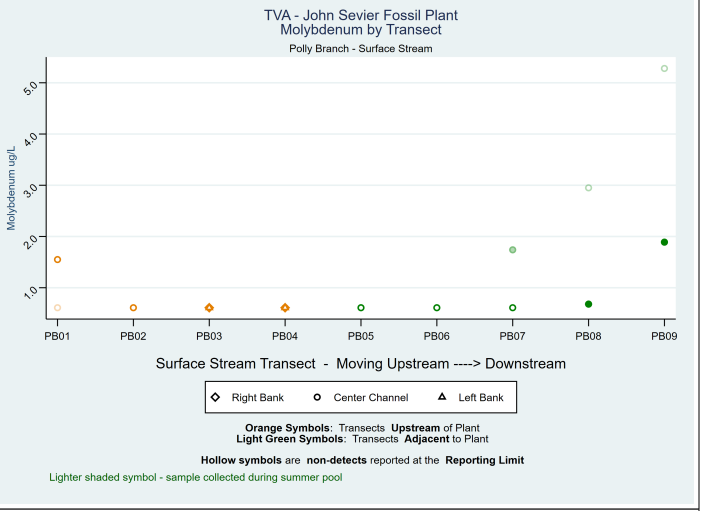

TVA - John Sevier Fossil Plant
Lithium by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Polly Branch - Surface Stream
Chronic ESV
Lithium ug/L
0
90
180
270
360
450
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 910 ug/L

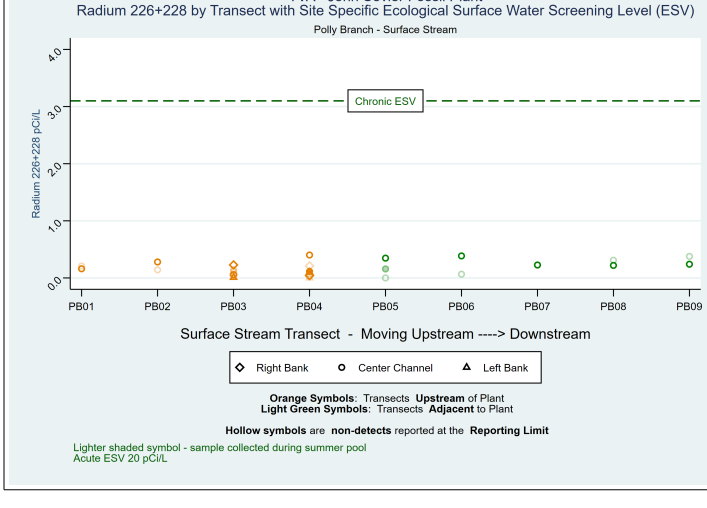

TVA - John Sevier Fossil Plant
Lithium by Transect
Polly Branch - Surface Stream
Lithium ug/L
3.1
3.2
3.3
3.4
3.5
3.6
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

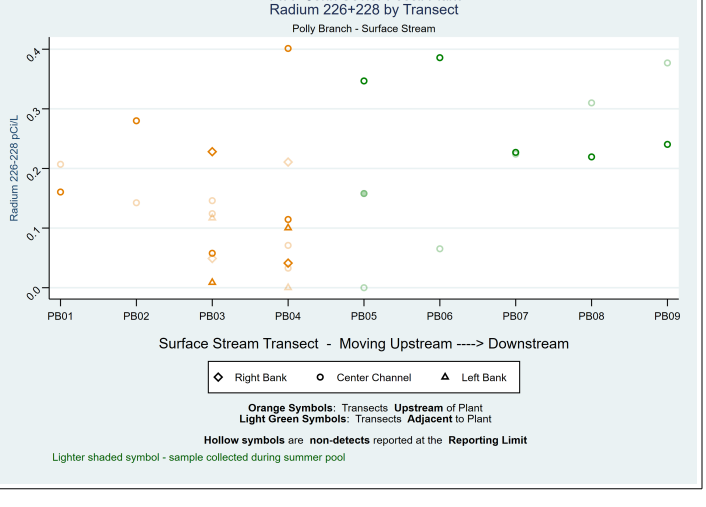

TVA - John Sevier Fossil Plant
Mercury by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Polly Branch - Surface Stream
Chronic ESV
Mercury ug/L
1.00
0.75
0.50
0.25
0.00
PB01 PB02 PB03 PB04 PB05 PB06 PB07 PB08 PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 1.4 ug/L

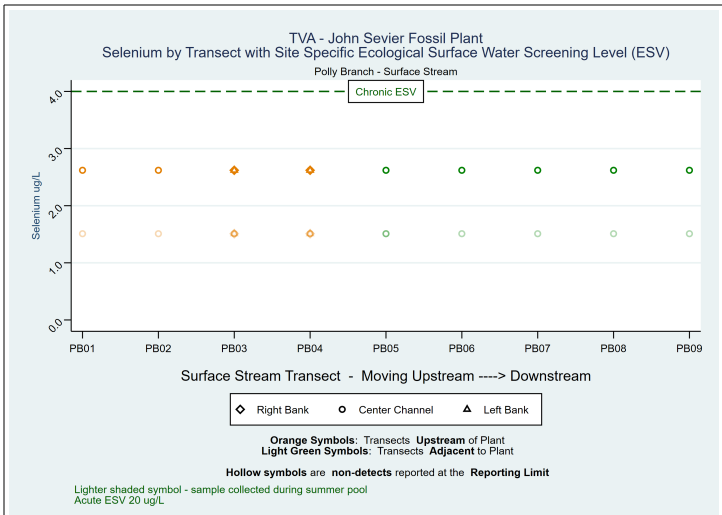

TVA - John Sevier Fossil Plant
Mercury by Transect
Polly Branch - Surface Stream
Mercury ug/L
1.10
-0.90
PB01 PB02 PB03 PB04 PB05 PB06 PB07 PB08 PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

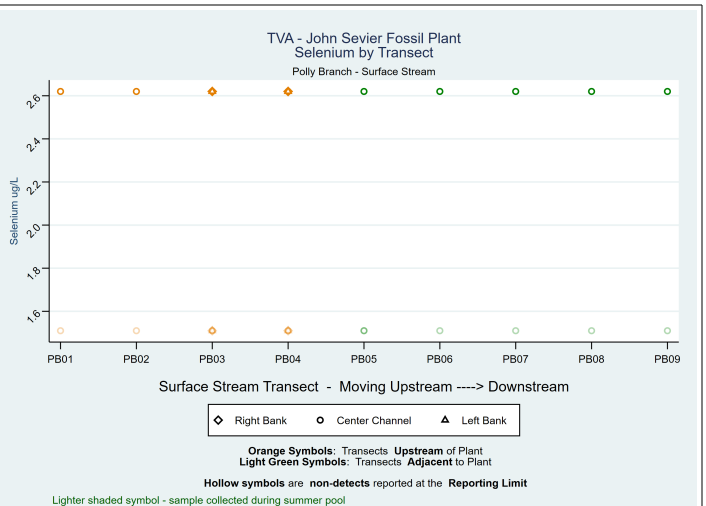

TVA - John Sevier Fossil Plant
Molybdenum by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Polly Branch - Surface Stream
Chronic ESV
Molybdenum ug/L
800
600
400
200
0
PB01 PB02 PB03 PB04 PB05 PB06 PB07 PB08 PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 7,200 ug/L

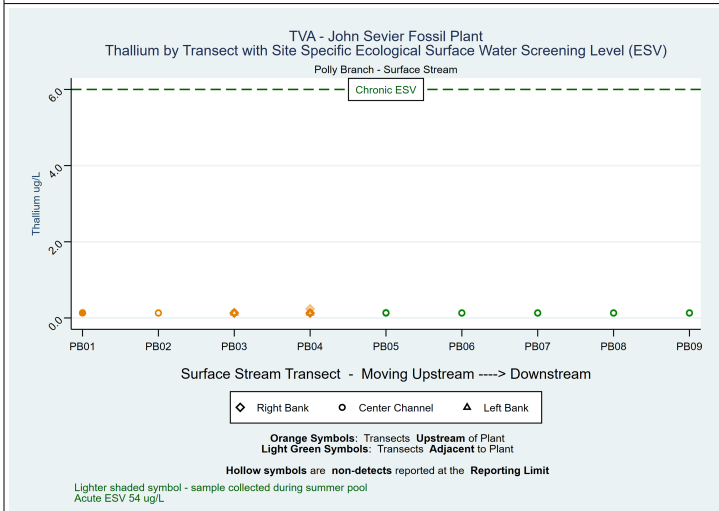

TVA - John Sevier Fossil Plant
Molybdenum by Transect
Polly Branch - Surface Stream
Molybdenum ug/L
5.0
4.0
3.0
2.0
1.0
PB01 PB02 PB03 PB04 PB05 PB06 PB07 PB08 PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

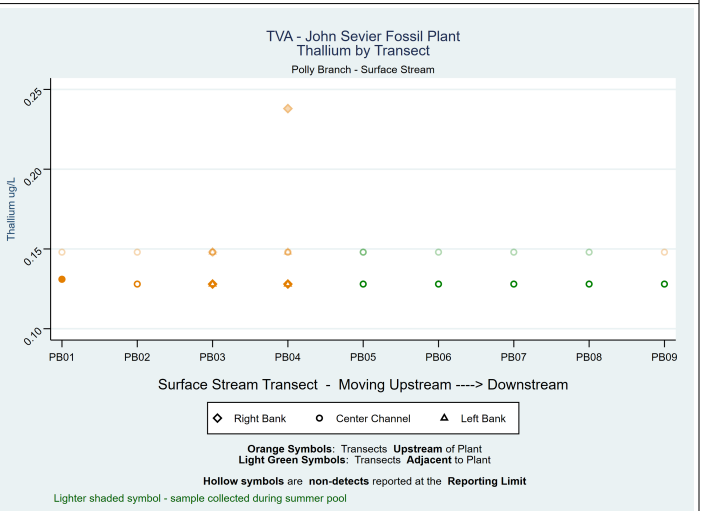

TVA - John Sevier Fossil Plant
Radium 226+228 by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Polly Branch - Surface Stream
Chronic ESV
Radium 226+228 pCi/L
4.0
3.0
2.0
1.0
0.0
PB01 PB02 PB03 PB04 PB05 PB06 PB07 PB08 PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 20 pCi/L


TVA - John Sevier Fossil Plant
Radium 226+228 by Transect
Polly Branch - Surface Stream
Radium 226-228 pCi/L
0.4
0.3
0.2
0.1
0.0
PB01 PB02 PB03 PB04 PB05 PB06 PB07 PB08 PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

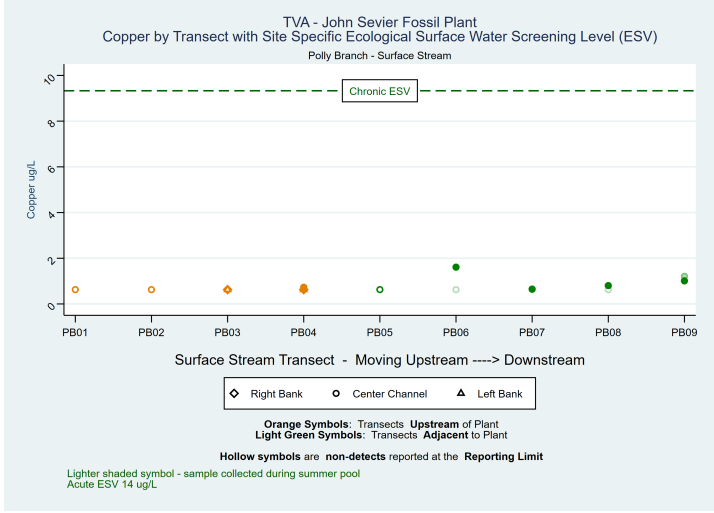

TVA - John Sevier Fossil Plant
Selenium by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Polly Branch - Surface Stream
Chronic ESV
Selenium ug/L
4.0
3.0
2.0
1.0
0.0
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 20 ug/L

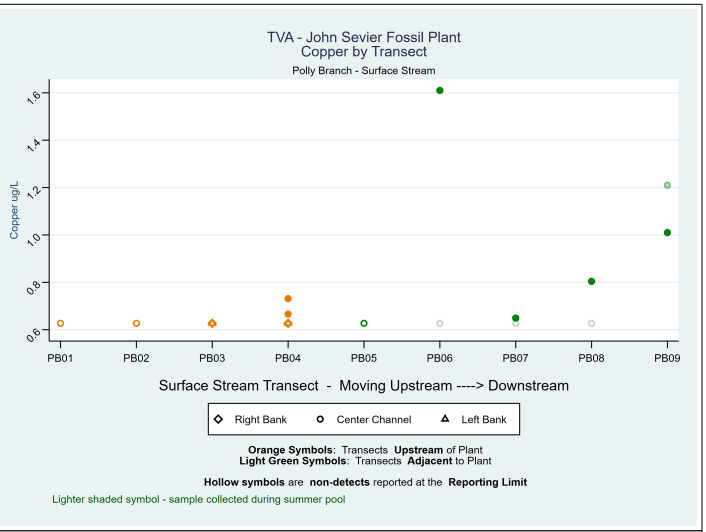

TVA - John Sevier Fossil Plant
Selenium by Transect
Polly Branch - Surface Stream
Selenium ug/L
2.6
2.4
2.2
2.0
1.8
1.6
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

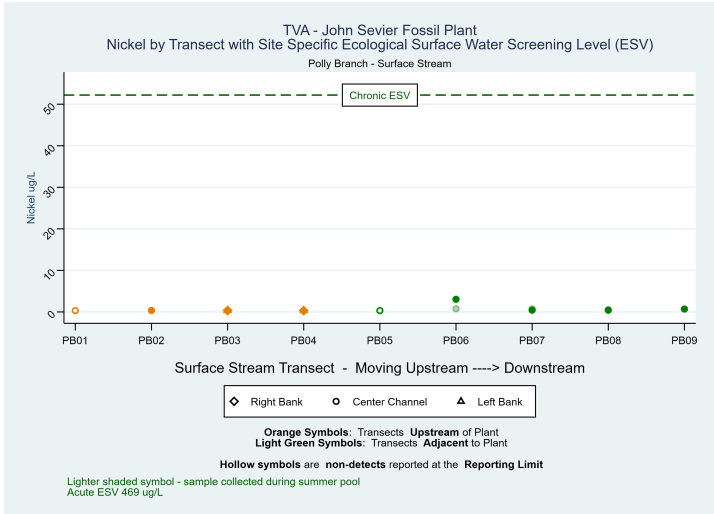

TVA - John Sevier Fossil Plant
Thallium by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Polly Branch - Surface Stream
Chronic ESV
Thallium ug/L
6.0
4.0
2.0
0.0
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 54 ug/L

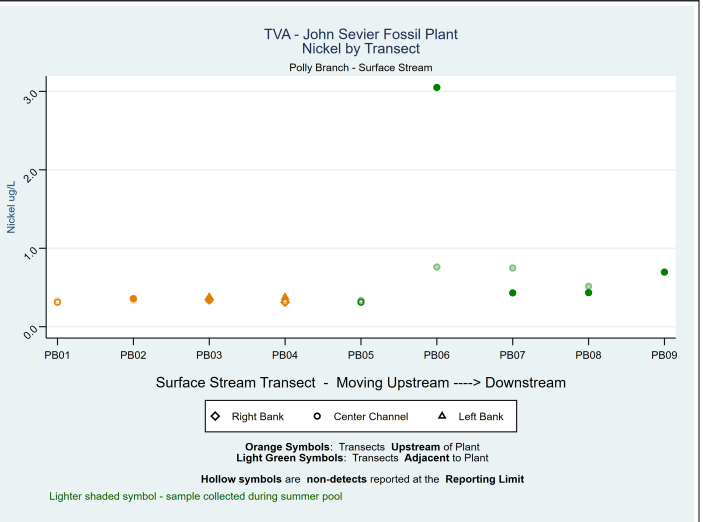

TVA - John Sevier Fossil Plant
Thallium by Transect
Polly Branch - Surface Stream
Thallium ug/L
0.25
0.20
0.15
0.10
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

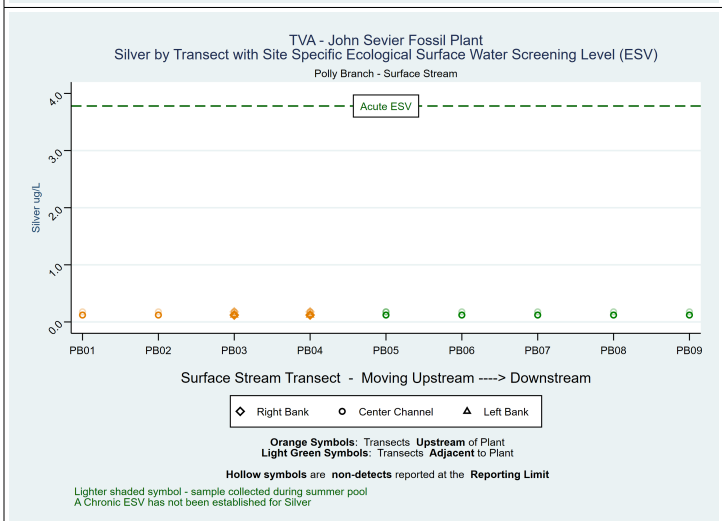
Transect Plots
Polly Branch - TDEC Appendix I Parameters
Surface Stream Investigation
John Sevier Fossil Plant, Rogersville Tennessee

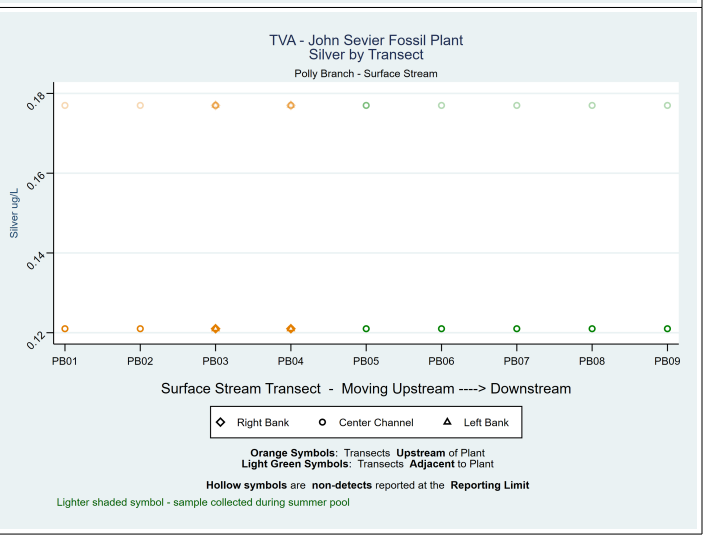


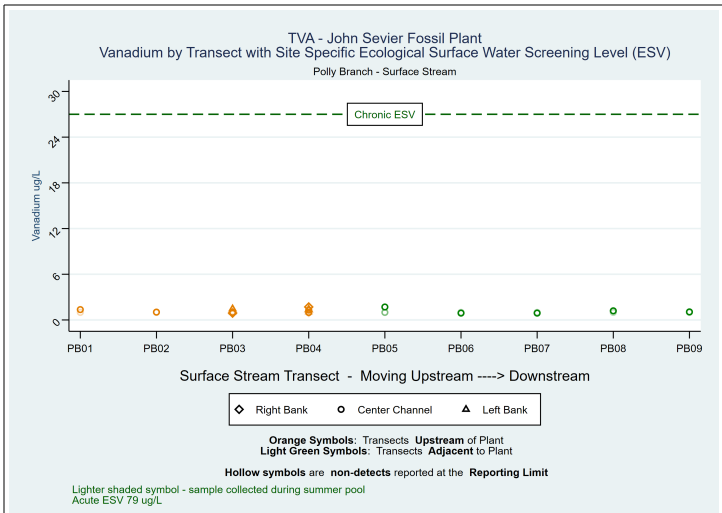


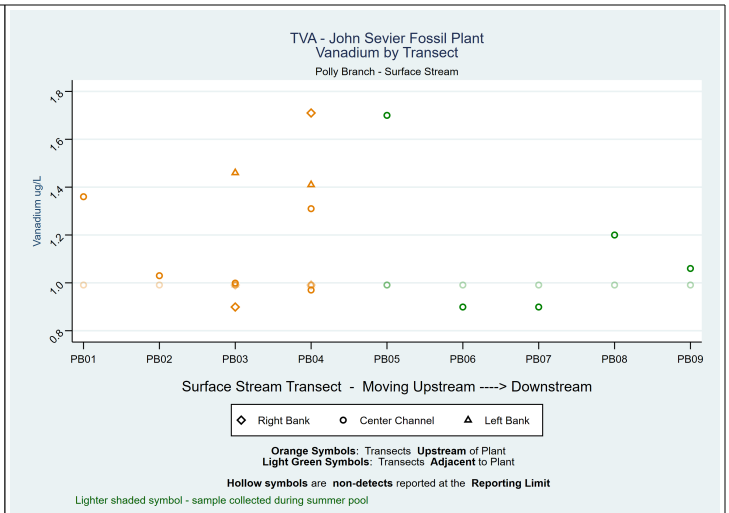


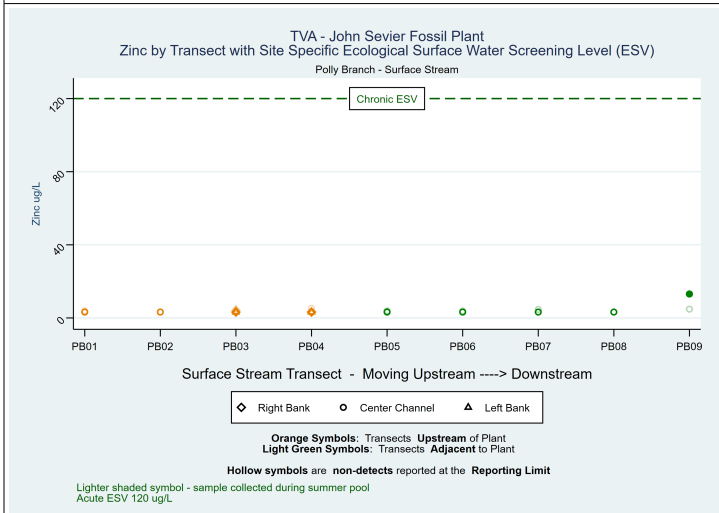


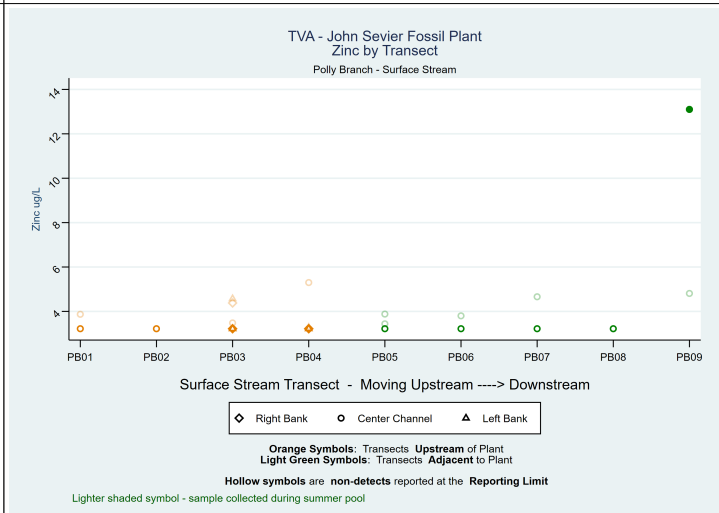





TVA - John Sevier Fossil Plant
Vanadium by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Polly Branch - Surface Stream
Chronic ESV
Vanadium ug/L
0
6
12
18
24
30
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 79 ug/L


TVA - John Sevier Fossil Plant
Vanadium by Transect
Polly Branch - Surface Stream
Vanadium ug/L
0.8
1.0
1.2
1.4
1.6
1.8
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool


TVA - John Sevier Fossil Plant
Zinc by Transect with Site Specific Ecological Surface Water Screening Level (ESV)
Polly Branch - Surface Stream
Chronic ESV
Zinc ug/L
0
40
80
120
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool
Acute ESV 120 ug/L


TVA - John Sevier Fossil Plant
Zinc by Transect
Polly Branch - Surface Stream
Zinc ug/L
4
6
8
10
12
14
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Surface Stream Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Lighter shaded symbol - sample collected during summer pool

APPENDIX E.5

STATISTICAL ANALYSIS OF SEDIMENT DATA

Appendix E.5 - Statistical Analysis of Sediment Data

TDEC Commissioner's Order:
Environmental Assessment Report
John Sevier Fossil Plant
Rogersville, Tennessee

July 3, 2023

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

Revision Log

Revision	Description	Date
0	Submittal to TDEC	January 10, 2023
1	Addresses April 4, 2023 TDEC Review Comments and Issued for TDEC	July 3, 2023

Sign-off Sheet

This document entitled Statistical Analysis of Sediment Data was prepared by Stantec Consulting Services Inc. (“Stantec”) for the account of Tennessee Valley Authority (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not consider any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by 

Chris La Londe, Senior Risk Assessor

Reviewed by 

Melissa Whitfield Aslund, PhD, Environmental Scientist

Approved by 

Rebekah Brooks, PG,Senior Principal Hydrogeologist

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LIST OF TABLES

LIST OF ATTACHMENTS

Abbreviations

CCR	Coal Combustion Residuals
EAR	Environmental Assessment Report
CCR Parameters	The Constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04
EI	Environmental Investigation
ESV	Ecological Screening Level
IQR	Interquartile Range
JSF Plant	John Sevier Fossil Plant
MDL	Method Detection Limit
mg/kg	milligrams per kilogram
%	Percent
PCA	Principal Component Analysis
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TVA	Tennessee Valley Authority

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) prepared this appendix on behalf of the Tennessee Valley Authority (TVA) to summarize the statistical analyses performed on sediment data to support evaluations conducted for the Environmental Assessment Report (EAR) at the John Sevier Fossil Plant (JSF Plant) located in Rogersville, Tennessee. The sediment samples were collected between December 2018 and April 2019 in two water bodies in proximity to the JSF Plant. Further details regarding the sediment sampling, and laboratory data results are presented in the *Technical Evaluation of Sediment and Benthic Macroinvertebrate Data (*Appendix J.3) and the JSF Plant *Benthic Investigation Sampling and Analysis Report* (Appendix J.4)**.**

For the Environmental Investigation (EI), sediment samples were collected from locations along sample transects or individual locations from the Holston River and Polly Branch proximal to the JSF Plant coal combustion residual (CCR) management units[1]. Sample transects/location names and locations relative to the JSF Plant CCR management units and number of samples collected from each water body are presented in Table E.5-1. The constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04 (CCR Parameters) included in the statistical analysis are presented in Table E.5-2.

TABLE E.5-1 – SEDIMENT SAMPLE TRANSECT/LOCATIONS

Water body	Transect/Location Name	Location Relative to JSF Plant CCR Management Units	Number of Samples
Holston River	HR01, HR02, HR03, HR04, HR05, HR06	Adjacent	12
	HR07, HR08, HR09	Downstream	6
Polly Branch	PB01, PB02, PB03, PB04	Upstream	8
	PB05, PB06, PB07, PB08, PB09	Adjacent	5

Eight additional samples were collected for analysis of percent (%) Ash at transects PB02 (1), PB03 (3), PB04 (3), and PB05 (1)

[1] The term “CCR management unit” is used in this document generally and is not intended to be a designation under federal or state regulations.

TABLE E.5-2 – CCR PARAMETERS EVALUATED IN STATISTICAL ANALYSIS

CCR Parameter	CASRN
CCR Rule Appendix III Parameters	
Boron	7440-42-8
Calcium	7440-70-2
Chloride	16887-00-6
Fluoride[1] (also Appendix IV)	16984-48-8
pH	NA
Sulfate	14808-79-8
CCR Rule Appendix IV Parameters	
Antimony	7440-36-0
Arsenic	7440-38-2
Barium	7440-39-3
Beryllium	7440-41-7
Cadmium	7440-43-9
Chromium	7440-47-3
Cobalt	7440-48-4
Lead	7439-92-1
Lithium	7439-93-2
Mercury	7439-97-6
Molybdenum	7439-98-7
Radium-226+228	13982-63-3/ 15262-20-1
Selenium	7782-49-2
Thallium	7440-28-0
TDEC Appendix I Parameters	
Copper	7440-50-8
Nickel	7440-02-0
Silver	7440-22-4
Vanadium	7440-62-2
Zinc	7440-66-6
Other	
% Ash	NA
Strontium	7440-24-6

Notes: CASRN - Chemical Abstracts Service Registry Number, CCR Rule - Title 40, Code of Federal Regulations, Part 257
NA – Not available
TDEC - Tennessee Department of Environment and Conservation
[1]Fluoride is both a CCR Rule Appendix III and CCR Rule Appendix IV CCR parameter. In this table, and in the results figures and tables for this report, fluoride has been grouped with the Appendix III CCR parameters only to avoid duplication.

The following sections present the methods and results from the general exploratory data analysis using summary statistics, data plots, and outlier screening, and a comparison of sediment results to Ecological Screening Values (ESVs) that were developed for the EAR. The ESVs for sediment data are provided in Table 1-3 and Appendix A.2.

Additional statistical analyses (principal component analysis [PCA] and hypothesis testing) were performed if the following conditions were met: 1) CCR Parameter concentrations were above ESVs, and 2) data were collected from transects/locations adjacent, and from transects/locations either upstream or downstream to the JSF Plant CCR management units.

2.0 METHODS

The statistical evaluation for the EI sediment data collected at the JSF Plant was conducted in three parts: 1) exploratory data analysis, 2) comparison of results to EAR screening levels, and 3) additional statistical analysis, when warranted.

2.1 EXPLORATORY DATA ANALYSIS

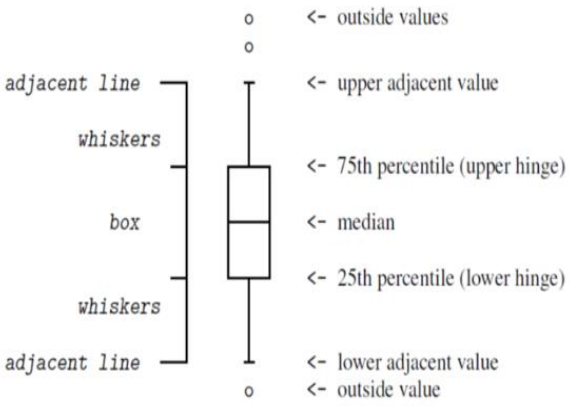
Exploratory data analysis is the initial step of statistical analysis. It utilizes simple summary statistics (e.g. mean, median, standard deviation, and percentiles) and graphical representations to identify important characteristics of an analytical dataset, such as the center of the data (mean, median), variation, distribution, spatial or temporal patterns, presence of outliers, and randomness.

2.1.1 Summary Statistics

Summary statistics were calculated for each CCR Parameter grouped by water body and aggregated by the transect position relative to the JSF Plant CCR management units (upstream, adjacent, and downstream). Summary statistics were also calculated for % ash and strontium. Summary statistics include information such as the total numbers of available samples, the frequencies of detection, ranges of reporting limits, minimum and maximum detected concentrations, mean concentrations, standard deviations, median concentrations, and the 95th percentile concentrations. Summary statistics tables are presented in Attachment E.5-A.

2.1.2 Exploratory Data Plots

Exploratory data plots (box plots and transect plots) were constructed using the sediment results to support a visual review of the data. Box plots are used to identify the center of the data, distribution, variability, and to visually identify potential outliers. The diagram below graphically depicts the basics of the construction of the box plots (StataCorp LLC 2017).



The box portion of the plot is the interquartile range (IQR), which represents the middle 50% of data, with the bottom of the box being the 25th percentile and the top of the box being the 75th percentile. The line inside the box is the median concentration. The top of the upper "whisker" represents the first observed concentration above the 75th percentile, whereas the bottom of the lower "whisker" represents the first observed concentration below the 25th percentile (upper adjacent value and lower adjacent value, respectively). Values that lie outside of the adjacent values represent outside (potential outlier) concentrations (i.e. concentrations at the upper and lower ends of the distribution of the data). The method detection limit (MDL) was used as the reported value in order to construct the box plot when analytical results were reported as non-detects.

Side-by-side box plots were constructed for the sediment data aggregated by transect and water body. These box plots were useful in identifying differences in CCR Parameter concentrations among transects and water bodies and were especially useful for visually identifying potential outliers.

Box plots were also prepared that compared results by transect in an individual water body. Transects ordered by relative location to the JSF Plant CCR management units (upstream, adjacent, downstream) were useful in assessing upstream to downstream patterns within a given water body, as well as data distribution and variability. Box plots are presented for CCR Rule Appendix III, CCR Rule Appendix IV, and TDEC Appendix I CCR Parameters in Attachment E.5-B.

Transect plots were constructed for each water body and show individual sample results aggregated by transect position relative to the JSF Plant CCR management units (upstream, adjacent, or downstream) and relative position in the water body (left bank, center channel, or right bank).

- Holston River: Left Bank = Fossil Plant Bank; Right Bank = Opposite Bank

The symbols used in the transect plots indicate whether the reported result is a detected concentration (solid symbol) or a non-detect reported at the MDL (hollow symbol).

Two transect plots were constructed for each CCR Parameter. One was a plot that included a reference line for the ESV for that parameter. In many cases, the sample results were much lower than the ESVs, so including the reference line induced a scaling effect that obscured patterns in the data. A second plot was produced for each CCR Parameter without a reference line in order to better identify patterns.

Transect plots provide more detailed information than side-by-side box plots and allow a more rigorous evaluation of the data. These plots were particularly useful in identifying potential patterns in the dataset (trends), frequency of detection, outliers, spatial differences relative to the JSF Plant CCR management units (upstream, adjacent, and downstream), and differences relative to the position in the water body (left bank, center channel, right bank). The transect plots are presented in Attachment E.5-C.

2.1.3 Outlier Screening

Outliers are data points that are abnormally high or low as compared to other measurements and may represent anomalous data or data errors. Outliers may also represent natural variations of CCR Parameter concentrations in environmental systems. Screening for outliers is a critical step because outliers can bias statistical estimates, statistical testing results, and inferences.

Outlier values were initially screened visually using the side-by-side box plots. If suspected visual outliers were identified, then Tukey's procedure was used to identify extreme outliers (Tukey 1977). This method relies on the IQR, which is defined as the 75th percentile value minus the 25th percentile value. Values were identified as potential outliers as follows:

- **Lower extreme outliers** are less than the 25th percentile minus 3 x IQR
- **Upper extreme outliers** are greater than the 75th percentile plus 3 x IQR.

Finally, when the potential outliers were identified visually and by Tukey's procedure, then statistical testing for outliers (Rosner's Test) was conducted to determine if those data points were statistically significant outliers.

Following confirmation of the outliers as statistically significant, a desktop evaluation was conducted to verify that the data points were not errors, (e.g., laboratory or transcriptional errors). Field forms, data validation reports, and other variables in the dataset that could influence analytical results also were evaluated at this point. If a verifiable error was discovered, the outlier was removed and, if possible, replaced with a corrected value.

In the absence of a verifiable error, additional lines of evidence were reviewed to determine final outlier disposition (e.g., frequency of detection, spatial and temporal variability). If an outlier was identified as suitable for removal from further statistical analysis, a clear and defensible rationale based on multiple lines of evidence was provided. In addition, values that were identified as outliers and removed from further evaluation in the present statistical analysis were retained in the database and will be reevaluated for inclusion or exclusion in future statistical analyses of this dataset. The results of the outlier screening for the JSF Plant sediment dataset are provided in Section 3.1.

2.2 COMPARISON OF SEDIMENT RESULTS TO ESVs

The analytical results for the sediment dataset were compared to ESVs, as provided in Table 1-3 and Appendix A.2. Comparisons were done graphically using transect plots for sample results from the Holston River and Polly Branch (Attachment E.5-C). Analytical results were also compared to ESVs in tabular format for these water bodies and are presented in Tables in Appendix J.3.

Additional statistical analyses were performed if the following conditions were met: 1) CCR Parameter concentrations were above ESVs and 2) data were collected from transects/locations adjacent, and from transects/locations either upstream or downstream to the JSF Plant CCR management units.

This additional statistical evaluation included:

- Formal hypothesis testing to identify differences between upstream, adjacent, and downstream results, and
- PCA to identify the variables and individual samples that explain the greatest proportion of variability (provide the greatest amount of information) in the datasets.

3.0 RESULTS AND DISCUSSION

3.1 SUMMARY STATISTICS, EXPLORATORY DATA PLOTS, AND OUTLIER SCREENING

Summary statistics tables are presented in Attachment E.5-A, box plots are presented in Attachment E.5-B, and transect plots are presented in Attachment E.5-C. The PCA plots from the analyses of sediment data in the Holston River and Polly Branch are presented in Attachment E.5-D. The summary statistics and exploratory data plots were aggregated by water body and transect location relative to the JSF Plant CCR management units (upstream, adjacent, and downstream) and sample position in the water body (left bank, center channel, and right bank).

Using the methods outlined in Section 2.1.3, there were no statistical outliers identified in the sediment data collected at the JSF Plant.

3.2 COMPARISON OF SEDIMENT RESULTS TO ESVs

A summary of sediment result comparisons to ESVs for each water body included in the statistical evaluations is provided below.

Holston River

- Copper – one sample (JSF-SED-HR09-CORLB-0.0/0.5-20190403 [35.9 milligrams per kilogram (mg/kg)]) had a concentration above the chronic ESV (31.6 mg/kg)
- Mercury - five samples had concentrations above the chronic ESV (0.18 mg/kg), with mercury concentrations ranging from 0.19 mg/kg to 0.55 mg/kg in these samples
- Zinc – one sample (JSF-SED-HR09-CORLB-0.0/0.5-20190403 [121 mg/kg]) had a concentration equal to the chronic ESV (121 mg/kg)
- No sediment sample results collected from Holston River were above the acute ESVs.

Polly Branch

- Arsenic – two samples (JSF-SED-PB06-CORCC-0.0/0.5-20181219 [12.9 mg/kg] and JSF-SED-PB07-CORCC-0.0/0.5-20181219 [20.7 mg/kg]) had concentrations above the chronic ESV (9.8 mg/kg)
- Beryllium – two samples (JSF-SED-PB06-CORCC-0.0/0.5-20181219 [1.47 mg/kg] and JSF-SED-PB07-CORCC-0.0/0.5-20181219 [1.59 mg/kg]) had concentrations above the chronic ESV (1.2 mg/kg)
- Nickel – one sample (JSF-SED-PB07-CORCC-0.0/0.5-20181219 [24.5 mg/kg]) had a concentration above the chronic ESV (22.7 mg/kg)

- No sediment sample results collected from Polly Branch were above the acute ESVs.

Additional statistical evaluation of CCR Parameters identified above ESVs are described in the following section. Additional evaluation of CCR Parameters above ESVs will also be provided in the context of the Corrective Action/Risk Assessment Plan.

3.3 ADDITIONAL STATISTICAL ANALYSES

3.3.1 Formal Hypothesis Testing

A summary of the results of hypothesis testing applied to identify differences between upstream, adjacent, and downstream results for each water body evaluated in the statistical analyses is provided below. Differences were considered statistically significant if the p-value of the test was below 0.05.

Holston River

- One sample result of copper and five sample results for mercury were above chronic ESVs in the Holston River. One sample result of zinc was equal to the chronic ESV. Sediment data from the Holston River were collected from adjacent and downstream transects, so adjacent concentrations of copper, mercury, and zinc were compared to downstream concentrations using a parametric two-sided two-sample t-test. Prior to statistical testing, the statistical assumptions of the two-sample t-test (normality and equality of variances) were evaluated visually using Normal Q-Q plots and statistically with Goodness of Fit testing (normality) and Bartlett's Test for Equal Variance. Both the upstream and adjacent datasets were found to be normally distributed with unequal variance. The Welch-Satterthwaite adjustment to the degrees of freedom of the test was used to account for unequal variance between the two datasets. The results of the two-sample t-tests for copper, mercury, and zinc in Holston River sediment (adjacent vs. downstream) are summarized below:
    - The mean copper concentration adjacent to the JSF CCR management units (13.0 mg/kg) was statistically significantly less than the mean downstream concentration (23.4 mg/kg) (p-value<0.05)
    - The mean mercury concentration adjacent to the JSF CCR management units (0.109 mg/kg) was statistically significantly less than the mean downstream concentration (0.286 mg/kg) (p-value<0.05)
    - The mean zinc concentration adjacent to the JSF CCR management units (49.4 mg/kg) was not statistically significantly less than the mean downstream concentration (70.0 mg/kg) (p-value>0.05).

Polly Branch

- Two sample results of arsenic, two sample results of beryllium, and one sample result of nickel were above chronic ESVs in Polly Branch. Sediment data from Polly Branch were collected from adjacent and upstream transects, so adjacent concentrations of arsenic, beryllium, and nickel

were compared to upstream concentrations using a parametric two-sided two-sample t-test. Prior to statistical testing, the statistical assumptions of the two-sample t-test (normality and equality of variances) was evaluated visually using Normal Q-Q plots and statistically with Goodness of Fit testing (normality) and Bartlett's Test for Equal Variance. Both the upstream and adjacent datasets were found to be normally distributed with unequal variance. The Welch-Satterthwaite adjustment to the degrees of freedom of the test was used to account for unequal variance between the two datasets. The results of the two-sample t-tests for arsenic, beryllium, and nickel in Polly Branch sediment (adjacent vs. upstream) are summarized below:

- The mean arsenic concentration adjacent to the JSF CCR management units (10.0 mg/kg) was not statistically significantly different than the mean upstream concentration (3.77 mg/kg) (p-value=0.108)
- The mean beryllium concentration adjacent to the JSF CCR management units (1.07 mg/kg) was not statistically significantly different than the mean upstream concentration (0.784 mg/kg) (p-value=0.251)
- The mean nickel concentration adjacent to the JSF CCR management units (15.1 mg/kg) was not statistically significantly different than the mean upstream concentration (10.7 mg/kg) (p-value=0.265).

3.3.2 Principal Component Analysis

PCA is an exploratory statistical method used to summarize and condense the information in large multivariate datasets to a small subset of components/dimensions without losing important information. PCA was used to identify the key CCR Parameters accounting for most of the variation in the datasets and to identify individual samples that explain the greatest proportion of variability (information) in the sediment dataset collected from the Holston River and Polly Branch.

As part of the PCA, three types of plots were produced. The scree plot shows the percentage of variation in the dataset explained by variables associated with the principal component. The key variables are presented in a bar chart for the first two components/dimensions. The key individual samples are presented on a bi-plot. In that plot, samples that explain more variation are more distant from the intersection of the dimension 1 and dimension 2 axes. 95% confidence ellipses were constructed around the centroid of the data collected either upstream, adjacent, or downstream. Ellipses that overlap provide statistical evidence that there are no differences in mean CCR Parameter concentrations when comparing upstream, adjacent, or downstream concentrations; whereas ellipses that do not overlap provide statistical evidence that mean concentrations are different. Attachment E.5-D presents these plots for sediment data collected from the Holston River and Polly Branch; the findings are described below.

<u>Holston River</u>

- The first two components/dimensions explain 66.4% of the variability in the Holston River sediment dataset (i.e. 66.4% of the information in the dataset is retained in the first two components). The PCA identified copper, mercury, and zinc as key CCR Parameters in the first

principal component/dimension. Copper, mercury, and zinc were the only CCR Parameters equal to or above their respective ESVs in the Holston River.

- The key individual samples were identified as JSF-SED-HR09-CORLB-0.0/0.5-20190403 (bi-plot #17) and JSF-SED-HR08-CORRB-0.0/0.5-20190403 (bi-plot #16). JSF-HR08 and JSF-HR09 are the most downstream sample transects and the transects where concentrations of copper, mercury, and zinc were observed equal to or above ESVs in the Holston River.
- The 95% confidence ellipses comparing adjacent to downstream CCR Parameter concentrations overlap across both dimensions, which provides statistical evidence that mean CCR Parameter concentrations adjacent to the JSF CCR Management Units are not different from downstream concentrations.

Polly Branch

- The first two components/dimensions explain 73.5% of the variability in the Polly Branch sediment dataset (i.e. 73.5% of the information in the dataset is retained in the first two components). The PCA identified nickel, beryllium, and arsenic as key CCR Parameters in the first principal component/dimension. Nickel, beryllium, and arsenic were the only CCR Parameters with concentrations above their respective ESVs.
- The key individual samples were identified as SF-SED-PB07-CORCC-0.0/0.5-20181219 (bi-plot #11) and JSF-SED-PB06-CORCC-0.0/0.5-20181219 (bi-plot #10). These sample locations correspond to the two locations where nickel, beryllium, and arsenic were above chronic ESVs in Polly Branch.
- The 95% confidence ellipses comparing upstream to downstream CCR Parameter concentrations overlap across the first principal component (dimension 1), which provides statistical evidence that mean CCR Parameter concentrations observed adjacent to the JSF CCR Management Units are not different from upstream concentrations.
- The 95% confidence ellipses do not overlap across the second component (dimension 2), which provides statistical evidence that mean CCR Parameter concentrations for nickel, beryllium, and arsenic observed adjacent to the JSF CCR Management Units are different than upstream concentrations. CCR Parameter concentrations for nickel, beryllium, and arsenic in adjacent samples are lower than upstream samples.

4.0 REFERENCES

StataCorp. (2017) Stata Graphics Reference Manual Stata: Release 15. Statistical Software. College Station, TX: StataCorp LLC.

Tukey, J.W., (1977). Exploratory Data Analysis. Reading, Massachusetts: Addison-Wesley, 1977

ATTACHMENT E.5-A SUMMARY STATISTICS

Summary Statistics - Holston River
Sediment Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	Location Relative to CCR Management Units	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Percent Ash										
Ash	Adjacent	12/12	--	0.0%	1	8	4.75	2.179	4.5	8
	Downstream	6/6	--	0.0%	2	7	4.667	1.862	5	6.75
CCR Rule Appendix III Parameters										
Boron	Adjacent	12/12	--	0.0%	1.28	3.19	2.118	0.596	2.115	3.009
	Downstream	6/6	--	0.0%	1.69	2.87	2.368	0.455	2.395	2.845
Calcium	Adjacent	12/12	--	0.0%	1,610	10,900	4,465	2,785	3,810	9,140
	Downstream	6/6	--	0.0%	2,520	7,350	4,610	2,069	4,020	7,253
Chloride	Adjacent	10/12	(5.28 - 6.05)	16.7%	5.37	8.86	6.567	1.147	6.33	8.25
	Downstream	3/6	(5.37 - 5.81)	50.0%	6.52	10.4	6.937	1.926	6.165	9.948
pH(Lab)	Adjacent	12/12	--	0.0%	7.2	7.9	7.658	0.198	7.7	7.845
	Downstream	6/6	--	0.0%	7.5	7.7	7.567	0.0816	7.55	7.675
Sulfate	Adjacent	12/12	--	0.0%	13.5	57.4	28.62	13.54	29.95	49.26
	Downstream	6/6	--	0.0%	12	50.5	24.7	13.79	21.95	44.6
CCR Rule Appendix IV Parameters										
Antimony	Adjacent	12/12	--	0.0%	0.08	0.229	0.112	0.0418	0.101	0.188
	Downstream	6/6	--	0.0%	0.126	0.232	0.169	0.04	0.17	0.222
Arsenic	Adjacent	12/12	--	0.0%	1.83	3.12	2.538	0.441	2.59	3.12
	Downstream	6/6	--	0.0%	2.63	5.05	3.578	0.983	3.325	4.905
Barium	Adjacent	12/12	--	0.0%	35.3	81.3	51.23	14.29	47.2	76.13
	Downstream	6/6	--	0.0%	44.6	92.2	58.8	17.2	54.6	83.78
Beryllium	Adjacent	12/12	--	0.0%	0.317	0.685	0.457	0.126	0.417	0.67
	Downstream	6/6	--	0.0%	0.423	0.681	0.514	0.0909	0.502	0.643
Cadmium	Adjacent	12/12	--	0.0%	0.0732	0.202	0.131	0.0386	0.122	0.193
	Downstream	6/6	--	0.0%	0.107	0.281	0.17	0.0657	0.157	0.26
Chromium	Adjacent	12/12	--	0.0%	7.92	19.4	11.09	2.925	10.65	15.55
	Downstream	6/6	--	0.0%	10	17.3	12.85	2.722	12.55	16.45
Cobalt	Adjacent	12/12	--	0.0%	7.52	20.2	13.19	3.987	13.35	19.71
	Downstream	6/6	--	0.0%	9.08	18.9	13.44	3.973	13.35	18.25
Fluoride	Adjacent	2/12	(0.9 - 1.11)	83.3%	1.09	1.29	0.952	0.117	1.04	1.191
	Downstream	2/6	(1.02 - 1.24)	66.7%	0.995	1.22	1.04	0.09	1.11	1.235
Lead	Adjacent	12/12	--	0.0%	6.33	16.5	10.54	2.596	10.15	14.96
	Downstream	6/6	--	0.0%	9.37	17.3	12.55	3.091	12.15	16.5
Lithium	Adjacent	12/12	--	0.0%	5.56	10.7	7.69	1.732	7.54	10.7
	Downstream	6/6	--	0.0%	6.64	12.3	8.853	1.888	8.655	11.46

Summary Statistics - Holston River
Sediment Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	Location Relative to CCR Management Units	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Mercury	Adjacent	12/12	--	0.0%	0.0296	0.191	0.109	0.0576	0.125	0.184
	Downstream	6/6	--	0.0%	0.14	0.55	0.286	0.15	0.256	0.499
Molybdenum	Adjacent	12/12	--	0.0%	0.251	0.583	0.391	0.0909	0.381	0.519
	Downstream	6/6	--	0.0%	0.342	0.555	0.428	0.0877	0.402	0.544
Radium-226+228	Adjacent	12/12	--	0.0%	1.284	2.5	1.698	0.353	1.738	2.21
	Downstream	6/6	--	0.0%	1.33	1.826	1.618	0.192	1.674	1.81
Selenium	Adjacent	12/12	--	0.0%	0.322	0.776	0.484	0.129	0.47	0.725
	Downstream	6/6	--	0.0%	0.513	0.718	0.628	0.0907	0.641	0.716
Thallium	Adjacent	12/12	--	0.0%	0.0553	0.112	0.0858	0.0149	0.0862	0.105
	Downstream	6/6	--	0.0%	0.0759	0.147	0.105	0.0305	0.102	0.142
TDEC Appendix I Parameters										
Copper	Adjacent	12/12	--	0.0%	7.37	18	13.01	3.13	12.85	17.4
	Downstream	6/6	--	0.0%	12.5	35.9	23.42	7.86	24.4	33.23
Nickel	Adjacent	12/12	--	0.0%	5.3	10.6	7.823	1.465	8.195	9.819
	Downstream	6/6	--	0.0%	7.07	12.2	9.157	1.98	8.855	11.75
Silver	Adjacent	3/12	(0.0194 - 0.0232)	75.0%	0.0236	0.226	0.0383	0.0568	0.0222	0.121
	Downstream	5/6	(0.0202 - 0.0202)	16.7%	0.0215	0.088	0.0375	0.0233	0.0292	0.0752
Vanadium	Adjacent	12/12	--	0.0%	7.25	14.2	9.49	2.307	9.055	13.54
	Downstream	6/6	--	0.0%	8.55	14.2	11.21	1.825	11.25	13.53
Zinc	Adjacent	12/12	--	0.0%	31.1	70.6	49.38	12.34	49.3	69.39
	Downstream	6/6	--	0.0%	42.7	121	69.97	29.45	65.85	110.8
Other Constituents										
Strontium	Adjacent	12/12	--	0.0%	6.76	20.5	12.14	4.254	10.95	20.34
	Downstream	6/6	--	0.0%	7.72	19.2	14.34	4.661	15.75	18.93

Notes:

CCR Rule - Title 40, Code of Federal Regulations, Part 257

TDEC - Tennessee Department of Environment and Conservation

% - percent

"--" - Not Applicable

Statistical datasets were aggregated by location of transect relative to the CCR management units (upstream, adjacent, downstream)

Except for Ash, pH & Radium 226 + 228, all units are milligrams per kilogram (mg/kg)

Units for Ash are percent (%)

Units for pH are Standard Units (S.U.)

Units for Radium 226+228 are picocuries per gram (pCi/g)

All non-detects reported at the laboratory reporting limit

For Parameters with non-detects reported at the method detection limit, the mean and standard deviation were calculated using Kaplan-Meier methods (KM).

Summary Statistics - Polly Branch
Sediment Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	Location Relative to CCR Management Units	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Percent Ash										
Ash	Upstream	5/10	(1 - 1)	50.0%	1	2	1.3	0.46	1	2
	Adjacent	6/13	(1 - 1)	53.9%	1	7	2.2	1.9	1	5.8
CCR Rule Appendix III Parameters										
Boron	Upstream	5/5	--	0.0%	1.3	2.88	2.33	0.635	2.64	2.84
	Adjacent	8/8	--	0.0%	1.5	8.96	4.4	2.53	4.08	8.03
Calcium	Upstream	5/5	--	0.0%	11,900	20,500	14,700	3,420	13,300	19,400
	Adjacent	8/8	--	0.0%	1,900	31,000	12,300	11,500	8,280	30,400
Chloride	Upstream	2/5	(9.21 - 12.1)	60.0%	12.3	18.5	11.7	3.61	12.1	17.3
	Adjacent	3/8	(5.86 - 12.5)	62.5%	9.4	15.8	8.9	3.38	10.8	14.7
pH(Lab)	Upstream	5/5	--	0.0%	6.8	6.9	6.88	0.0447	6.9	6.9
	Adjacent	8/8	--	0.0%	6.4	7.3	7.09	0.304	7.2	7.3
Sulfate	Upstream	5/5	--	0.0%	289	1910	719	675	408	1650
	Adjacent	8/8	--	0.0%	79.3	1380	457	421	374	1130
CCR Rule Appendix IV Parameters										
Antimony	Upstream	4/5	(0.0602 - 0.0602)	20.0%	0.0944	0.137	0.106	0.0268	0.111	0.135
	Adjacent	8/8	--	0.0%	0.101	0.469	0.223	0.123	0.194	0.407
Arsenic	Upstream	5/5	--	0.0%	2.25	4.29	3.44	0.775	3.37	4.22
	Adjacent	8/8	--	0.0%	2.96	20.7	7.89	5.97	5.49	18
Barium	Upstream	5/5	--	0.0%	41.8	99.6	73.7	20.8	74.3	95.7
	Adjacent	8/8	--	0.0%	26.7	107	67.3	29.3	66.2	104
Beryllium	Upstream	5/5	--	0.0%	0.484	0.959	0.822	0.195	0.866	0.958
	Adjacent	8/8	--	0.0%	0.379	1.59	0.937	0.425	0.878	1.55
Cadmium	Upstream	5/5	--	0.0%	0.0641	0.163	0.113	0.0371	0.115	0.156
	Adjacent	8/8	--	0.0%	0.0352	0.347	0.152	0.098	0.144	0.3
Chromium	Upstream	5/5	--	0.0%	7.28	15.8	12.7	3.24	13.5	15.5
	Adjacent	8/8	--	0.0%	7.87	20	14.1	4.12	14.6	19.3
Cobalt	Upstream	5/5	--	0.0%	5.92	11	8.79	1.85	9.15	10.7
	Adjacent	8/8	--	0.0%	4.64	17.6	9.65	4.57	8.49	16.2
Fluoride	Upstream	1/5	(1.32 - 2.11)	80.0%	2.94	2.94	1.64	0.648	1.86	2.77
	Adjacent	3/8	(1.03 - 2.19)	62.5%	1.16	2.16	1.4	0.459	1.9	2.18
Lead	Upstream	5/5	--	0.0%	10.4	19.5	16.8	3.66	17.9	19.4
	Adjacent	8/8	--	0.0%	8.25	24.1	16.5	5.76	18.2	23
Lithium	Upstream	5/5	--	0.0%	10.6	25	20.2	5.54	21.9	24.4
	Adjacent	8/8	--	0.0%	6.59	34.4	20.3	9.58	20.4	32.2

Summary Statistics - Polly Branch
Sediment Investigation
John Sevier Fossil Plant - Rogersville, Tennessee

Parameter	Location Relative to CCR Management Units	Frequency of Detection	Range of Reporting Limits	% Non Detect	Statistics using Detected Data Only		Statistics using Detects & Non-Detects			
					Minimum Detect	Maximum Detect	Mean	Standard Deviation	50th Percentile	95th Percentile
Mercury	Upstream	5/5	--	0.0%	0.0189	0.0441	0.0333	0.0105	0.0337	0.0437
	Adjacent	7/8	(0.0179 - 0.0179)	12.5%	0.0389	0.107	0.0583	0.024	0.0587	0.0932
Molybdenum	Upstream	5/5	--	0.0%	0.149	0.338	0.27	0.0713	0.287	0.33
	Adjacent	8/8	--	0.0%	0.354	14.3	2.98	4.91	0.719	11.3
Radium-226+228	Upstream	5/5	--	0.0%	2.47	3.17	2.84	0.301	2.94	3.15
	Adjacent	8/8	--	0.0%	1.76	3.64	2.69	0.667	2.56	3.63
Selenium	Upstream	5/5	--	0.0%	0.177	0.477	0.382	0.127	0.449	0.475
	Adjacent	8/8	--	0.0%	0.26	1.06	0.567	0.259	0.525	0.967
Thallium	Upstream	5/5	--	0.0%	0.0693	0.131	0.108	0.0241	0.114	0.129
	Adjacent	8/8	--	0.0%	0.0646	0.409	0.207	0.114	0.174	0.388
TDEC Appendix I Parameters										
Copper	Upstream	5/5	--	0.0%	5.51	13.4	10.5	3.05	11.6	13.1
	Adjacent	8/8	--	0.0%	6	22.5	13.8	6	14.2	21.2
Nickel	Upstream	5/5	--	0.0%	6.53	14	11.4	2.87	12.3	13.7
	Adjacent	8/8	--	0.0%	4.77	24.5	13	6.83	11.8	23.1
Silver	Upstream	0/5	(0.0136 - 0.0226)	100.0%	--	--	--	--	0.017	0.0222
	Adjacent	4/8	(0.0166 - 0.0224)	50.0%	0.0136	0.0386	0.0202	0.00961	0.0204	0.0371
Vanadium	Upstream	5/5	--	0.0%	6.7	14.4	11.8	3.07	12.1	14.3
	Adjacent	8/8	--	0.0%	8.01	20.7	15.3	4.52	16.4	20.5
Zinc	Upstream	5/5	--	0.0%	24.8	54.7	44.4	11.8	49.7	53.8
	Adjacent	8/8	--	0.0%	19.5	86.2	50.1	23.6	51	79.5
Other Constituents										
Strontium	Upstream	5/5	--	0.0%	29.5	53.1	39.5	9.04	35.8	51.1
	Adjacent	8/8	--	0.0%	5.51	58	25.8	18.5	20.2	54.4

Notes:

CCR Rule - Title 40, Code of Federal Regulations, Part 257

TDEC - Tennessee Department of Environment and Conservation

% - percent

"--" - Not Applicable

Statistical datasets were aggregated by location of transect relative to the CCR management units (upstream, adjacent, downstream)

Except for Ash, pH & Radium 226 + 228, all units are milligrams per kilogram (mg/kg)

Units for Ash are percent (%)

Units for pH are Standard Units (S.U.)

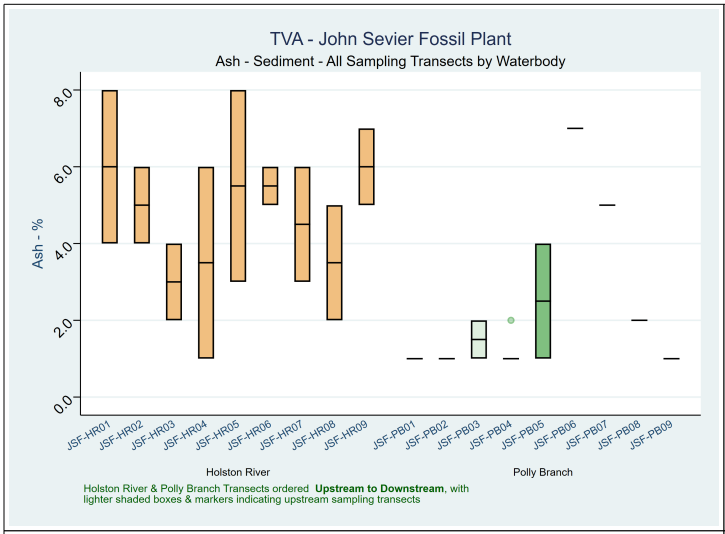
Units for Radium 226+228 are picocuries per gram (pCi/g)

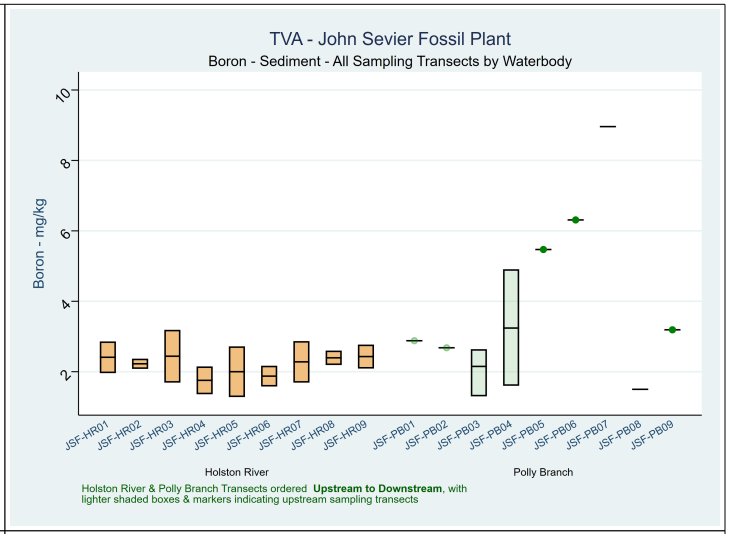
All non-detects reported at the laboratory reporting limit

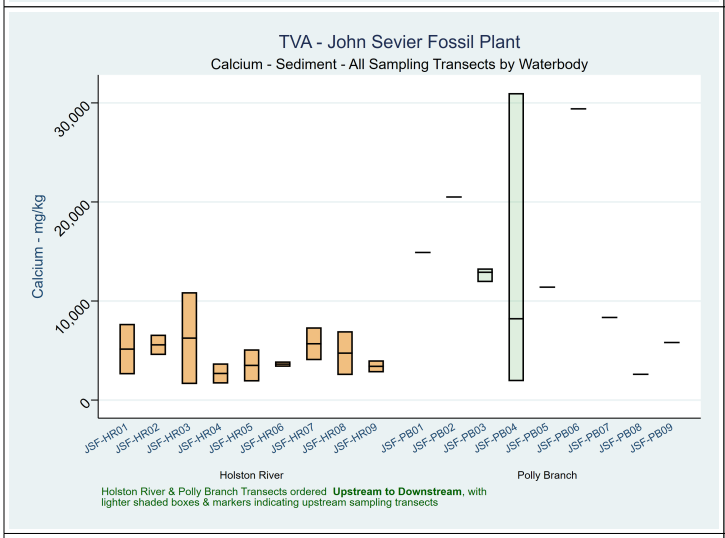
For Parameters with non-detects reported at the method detection limit, the mean and standard deviation were calculated using Kaplan-Meier methods (KM).

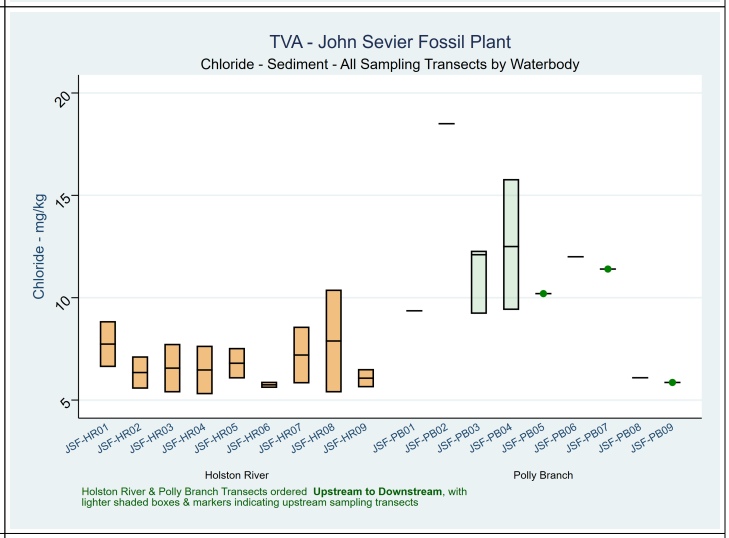
ATTACHMENT E.5-B BOX PLOTS

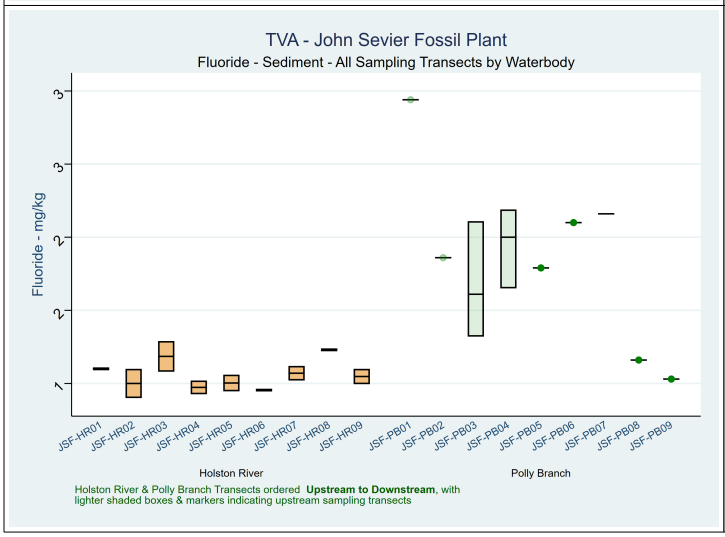
Box Plots
All Transects - CCR Rule Appendix III Parameters
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee

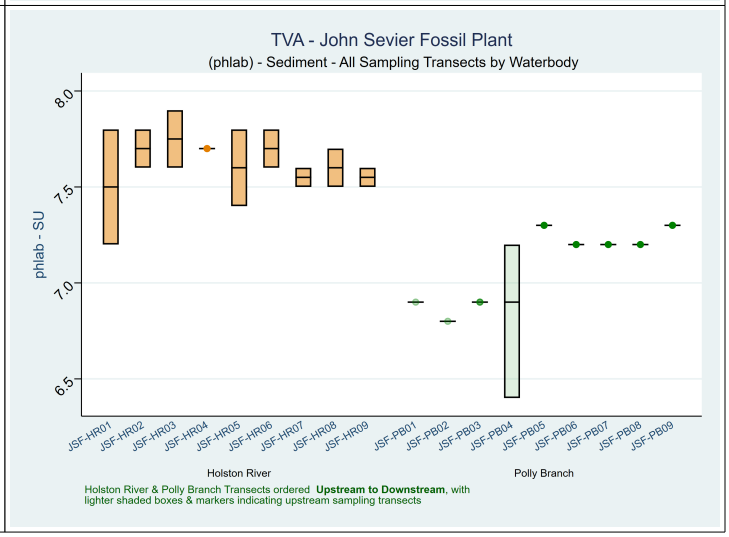


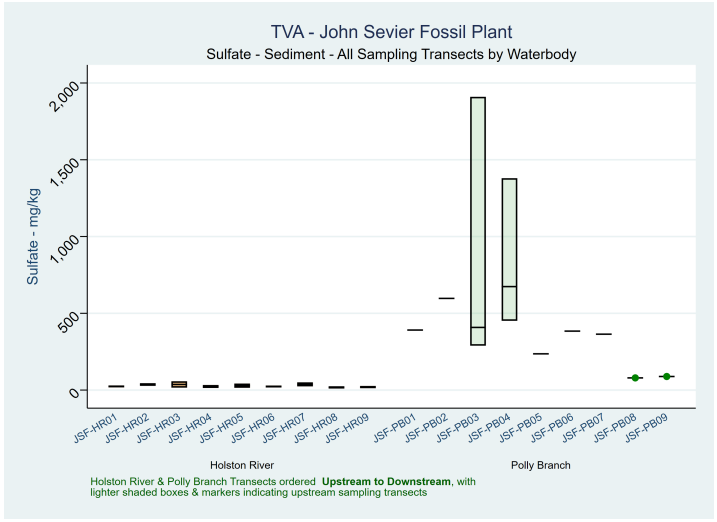












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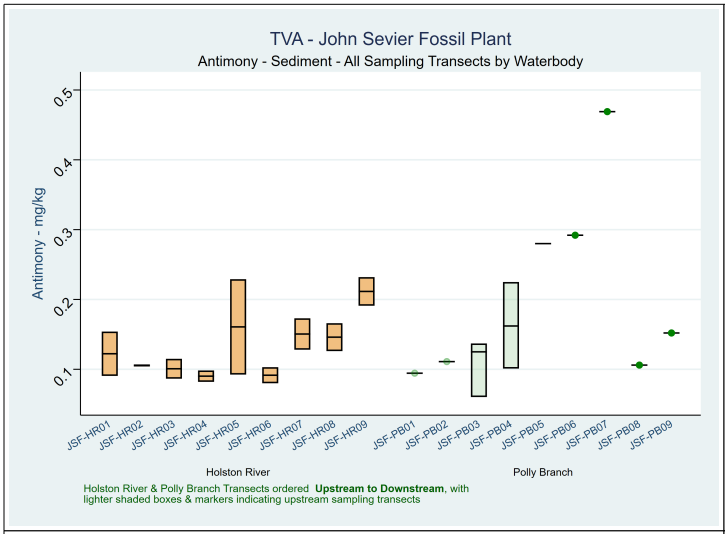
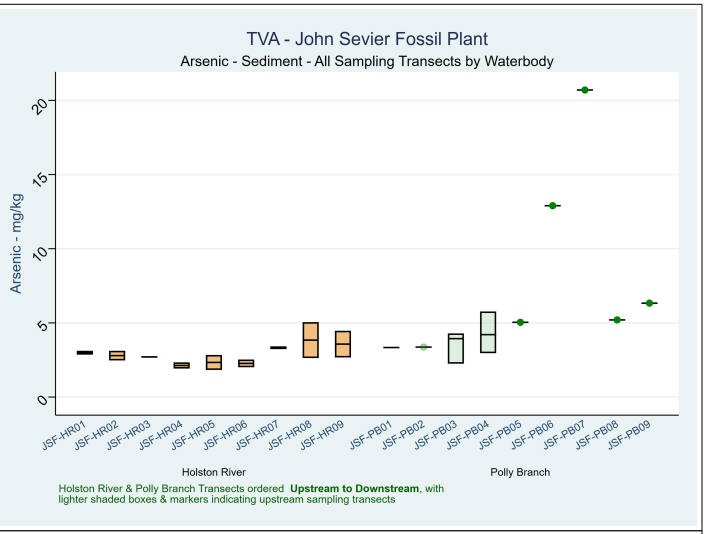
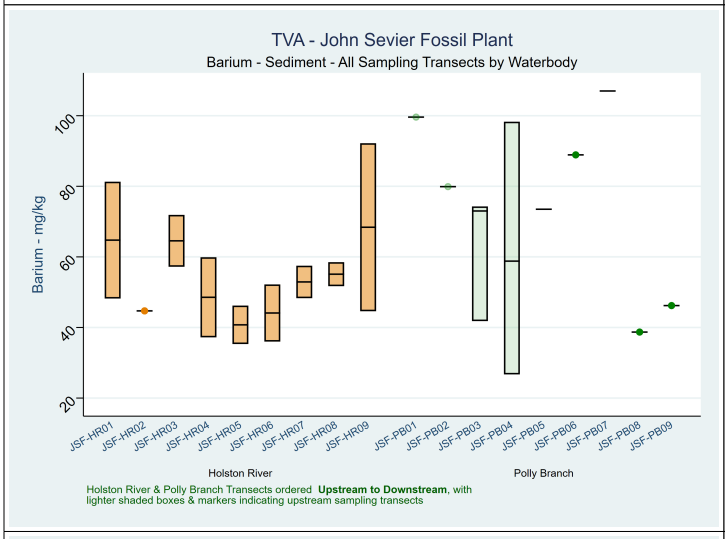
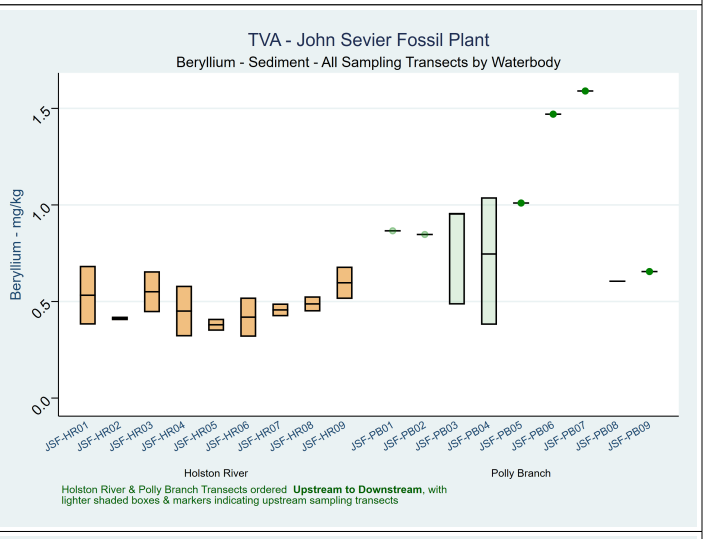
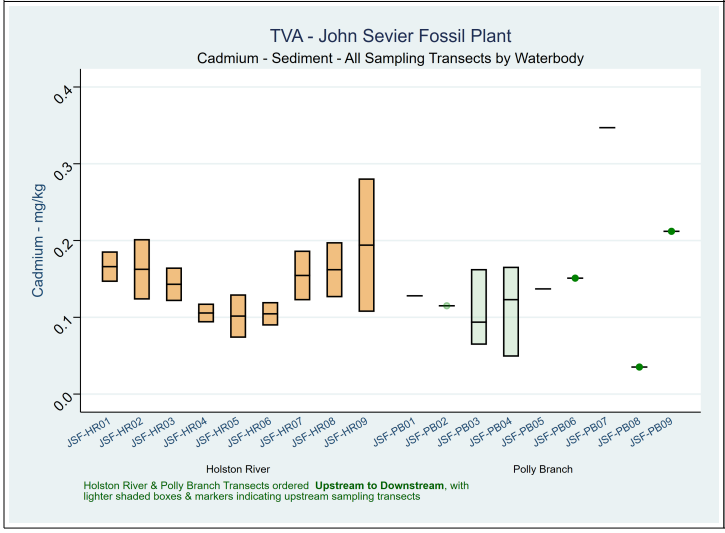
Box Plots
All Transects - CCR Rule Appendix IV Parameters
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee

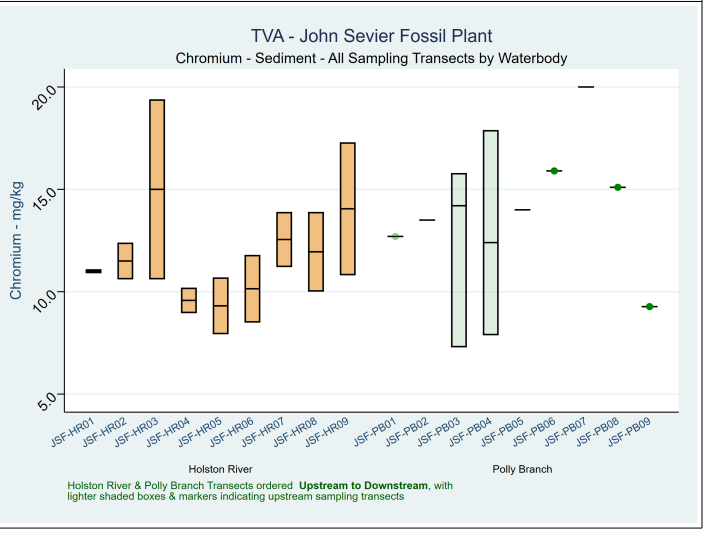


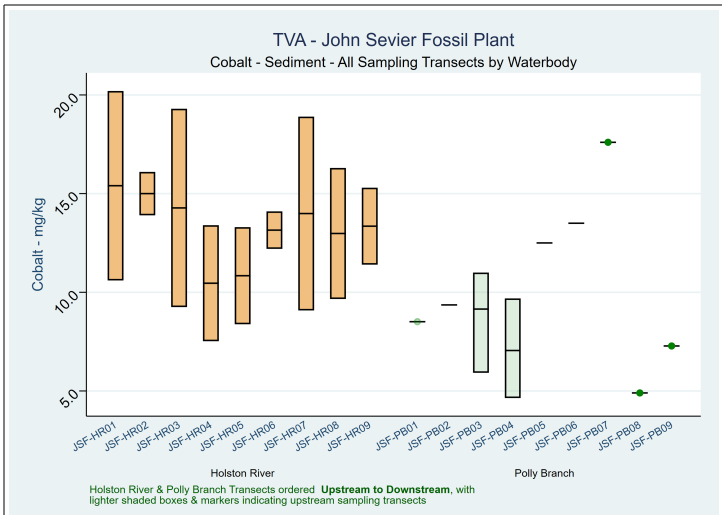


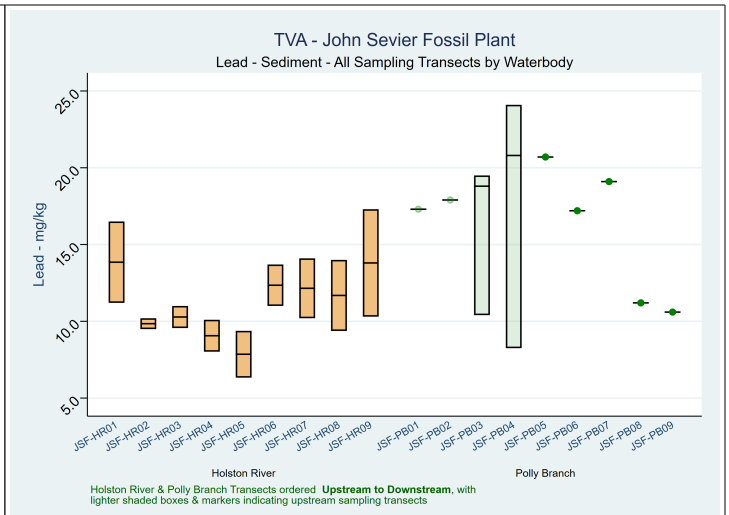


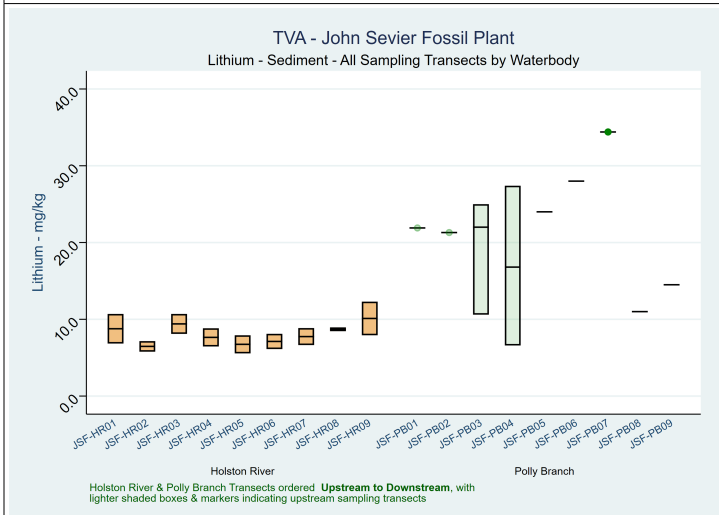


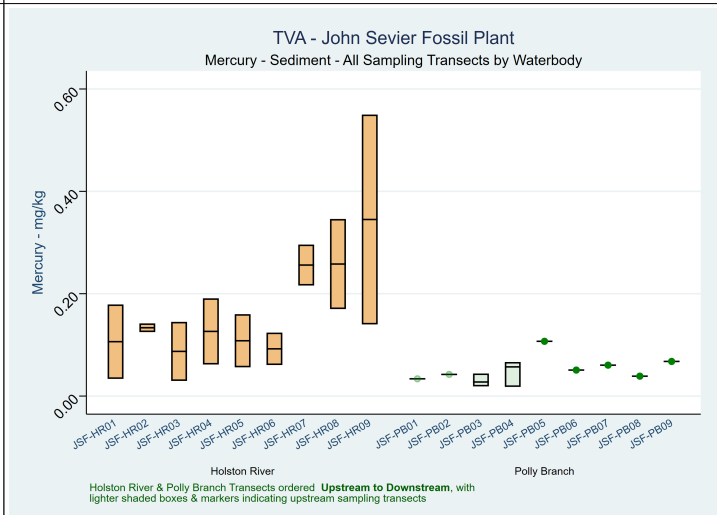


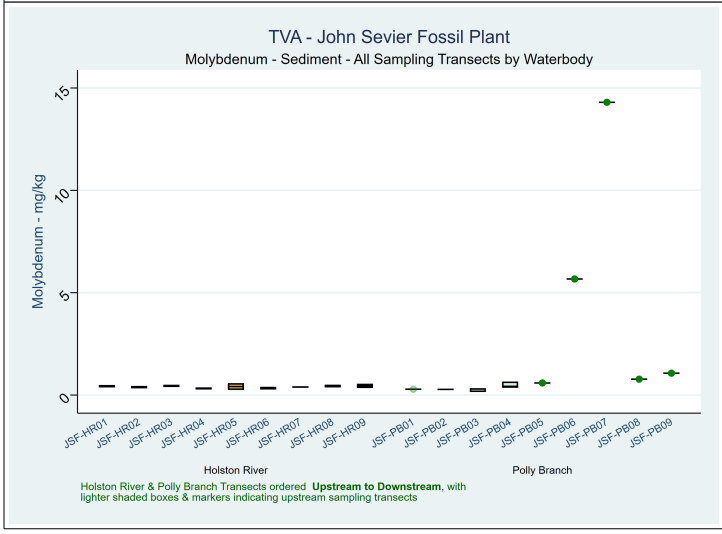


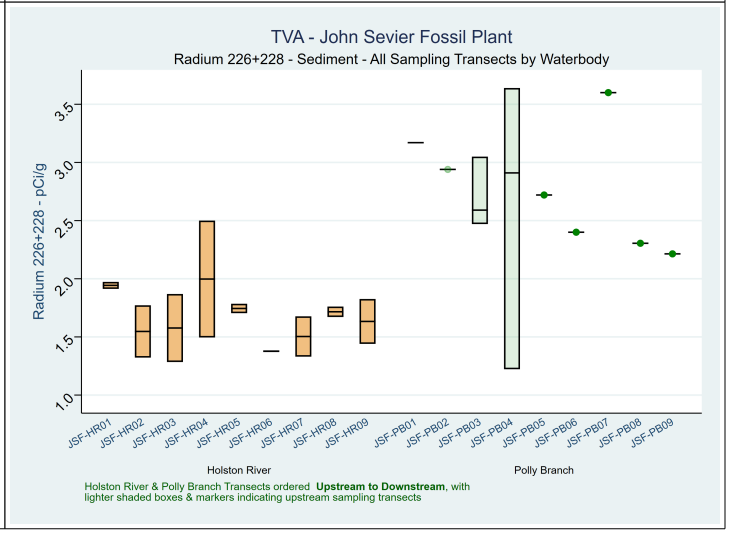

TVA - John Sevier Fossil Plant
Cobalt - Sediment - All Sampling Transects by Waterbody
Cobalt - mg/kg
20.0
15.0
10.0
5.0
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
JSF-PB01
JSF-PB02
JSF-PB03
JSF-PB04
JSF-PB05
JSF-PB06
JSF-PB07
JSF-PB08
JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects

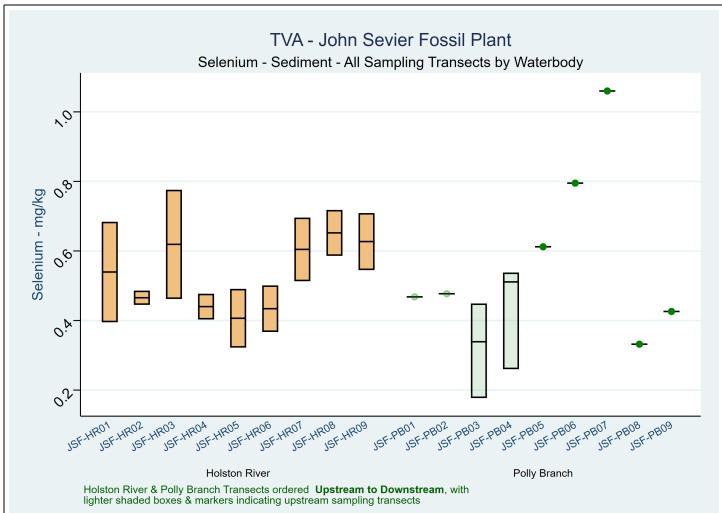

TVA - John Sevier Fossil Plant
Lead - Sediment - All Sampling Transects by Waterbody
Lead - mg/kg
25.0
20.0
15.0
10.0
5.0
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
JSF-PB01
JSF-PB02
JSF-PB03
JSF-PB04
JSF-PB05
JSF-PB06
JSF-PB07
JSF-PB08
JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects

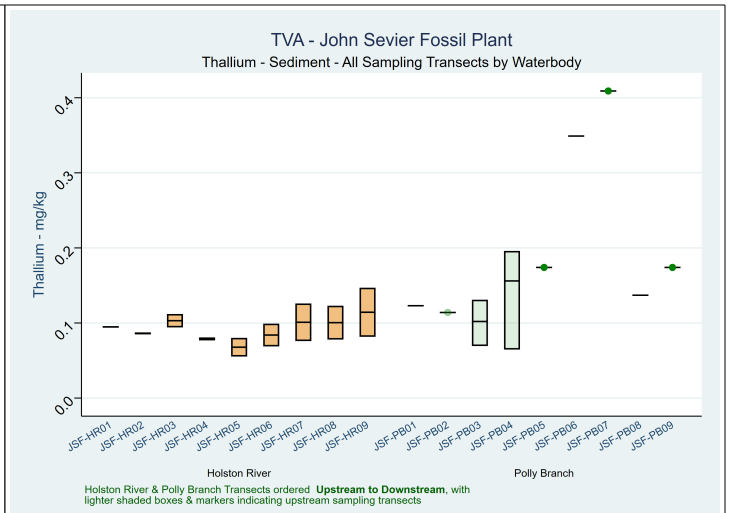

TVA - John Sevier Fossil Plant
Lithium - Sediment - All Sampling Transects by Waterbody
Lithium - mg/kg
40.0
30.0
20.0
10.0
0.0
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
JSF-PB01
JSF-PB02
JSF-PB03
JSF-PB04
JSF-PB05
JSF-PB06
JSF-PB07
JSF-PB08
JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects


TVA - John Sevier Fossil Plant
Mercury - Sediment - All Sampling Transects by Waterbody
Mercury - mg/kg
0.60
0.40
0.20
0.00
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
JSF-PB01
JSF-PB02
JSF-PB03
JSF-PB04
JSF-PB05
JSF-PB06
JSF-PB07
JSF-PB08
JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects

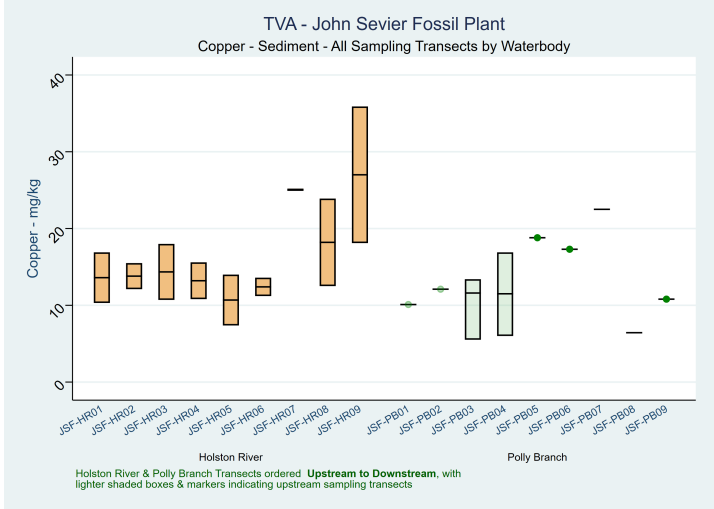

TVA - John Sevier Fossil Plant
Molybdenum - Sediment - All Sampling Transects by Waterbody
Molybdenum - mg/kg
15
10
5
0
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
JSF-PB01
JSF-PB02
JSF-PB03
JSF-PB04
JSF-PB05
JSF-PB06
JSF-PB07
JSF-PB08
JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects

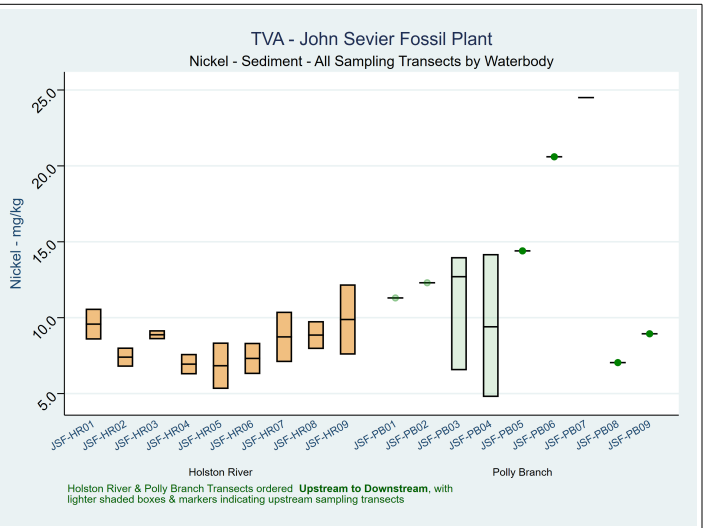

TVA - John Sevier Fossil Plant
Radium 226+228 - Sediment - All Sampling Transects by Waterbody
Radium 226+228 - pCi/g
3.5
3.0
2.5
2.0
1.5
1.0
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
JSF-PB01
JSF-PB02
JSF-PB03
JSF-PB04
JSF-PB05
JSF-PB06
JSF-PB07
JSF-PB08
JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects

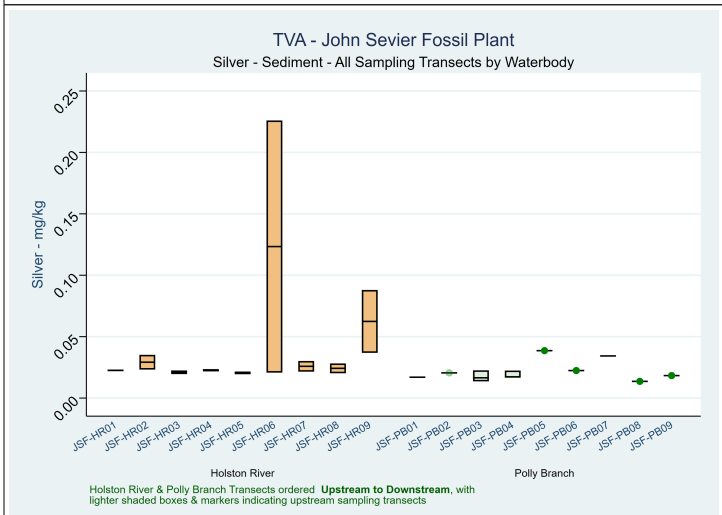

TVA - John Sevier Fossil Plant
Selenium - Sediment - All Sampling Transects by Waterbody
Selenium - mg/kg
0.2
0.4
0.6
0.8
1.0
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
JSF-PB01
JSF-PB02
JSF-PB03
JSF-PB04
JSF-PB05
JSF-PB06
JSF-PB07
JSF-PB08
JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects

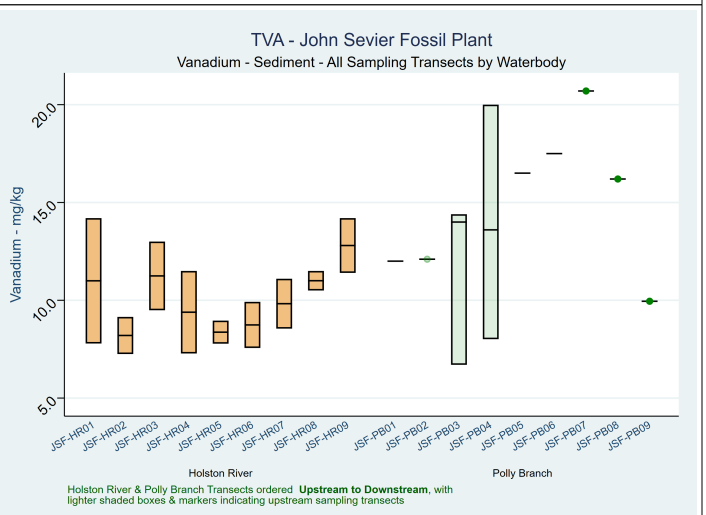

TVA - John Sevier Fossil Plant
Thallium - Sediment - All Sampling Transects by Waterbody
Thallium - mg/kg
0.0
0.1
0.2
0.3
0.4
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
JSF-PB01
JSF-PB02
JSF-PB03
JSF-PB04
JSF-PB05
JSF-PB06
JSF-PB07
JSF-PB08
JSF-PB09
Holston River
Polly Branch
Holston River & Polly Branch Transects ordered Upstream to Downstream, with lighter shaded boxes & markers indicating upstream sampling transects

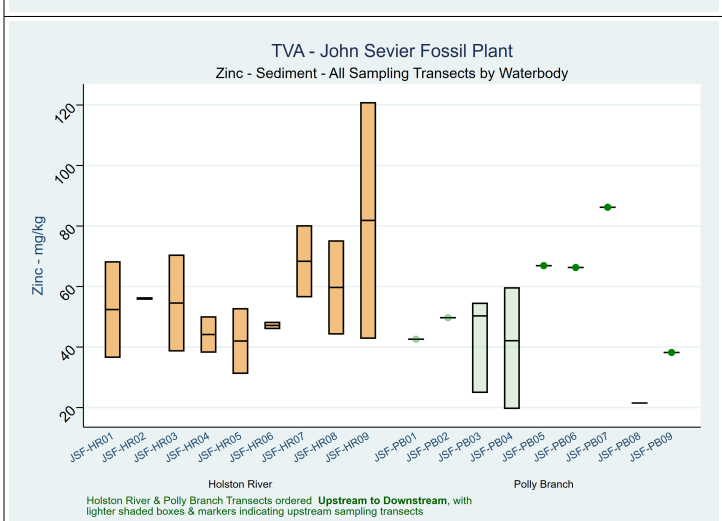
Box Plots
All Transects - TDEC Appendix I Parameters
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee











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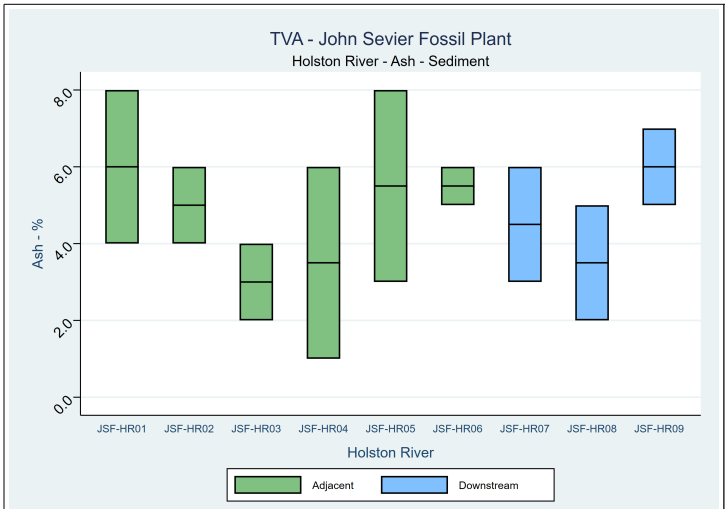
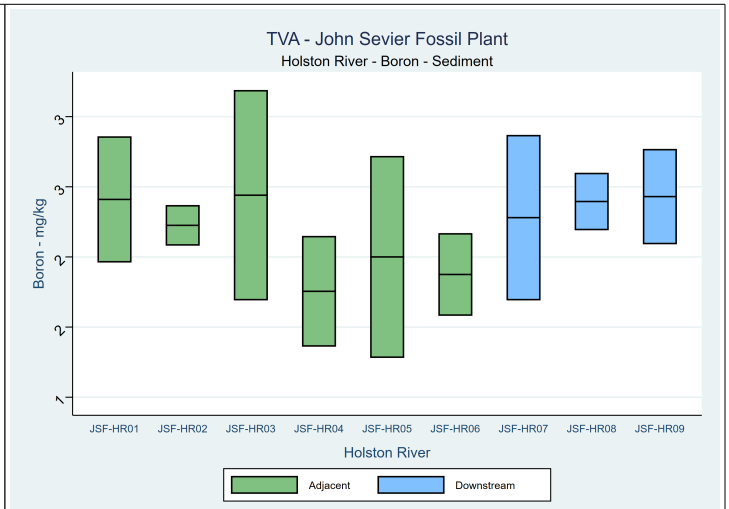
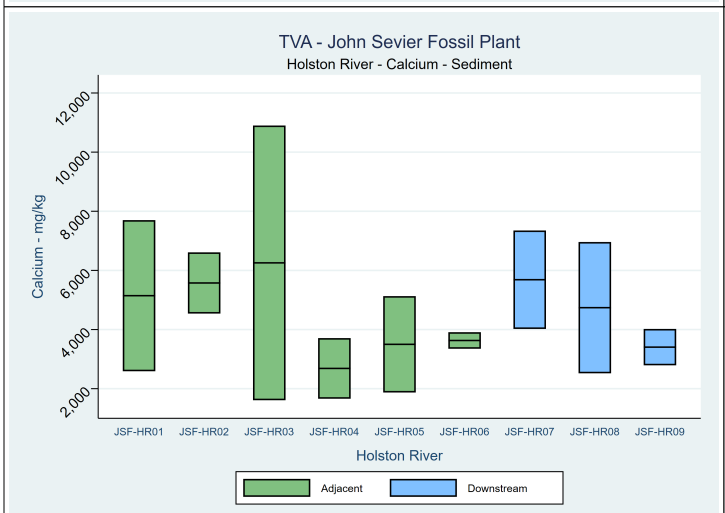
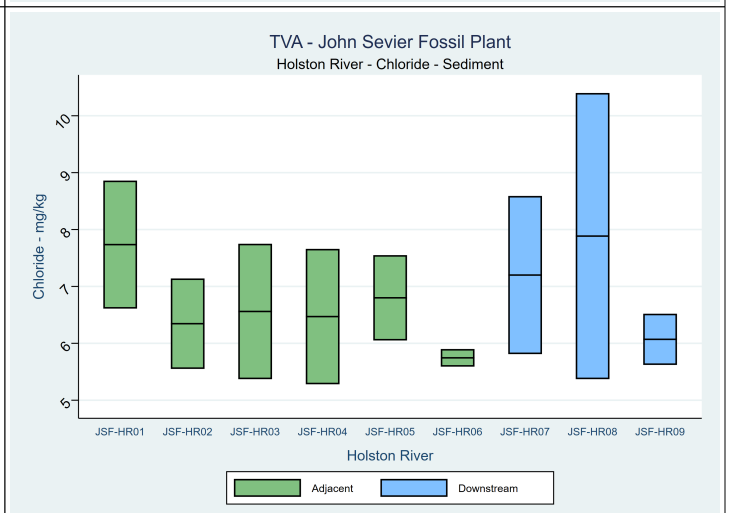
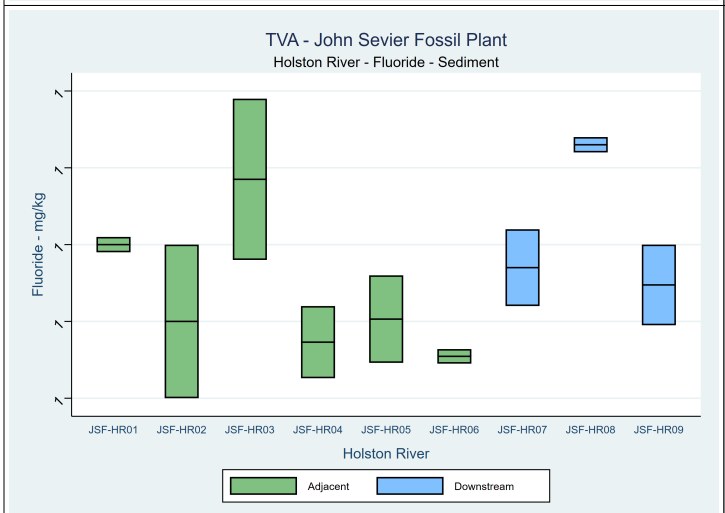
Box Plots
Holston River - CCR Rule Appendix III Parameters
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee

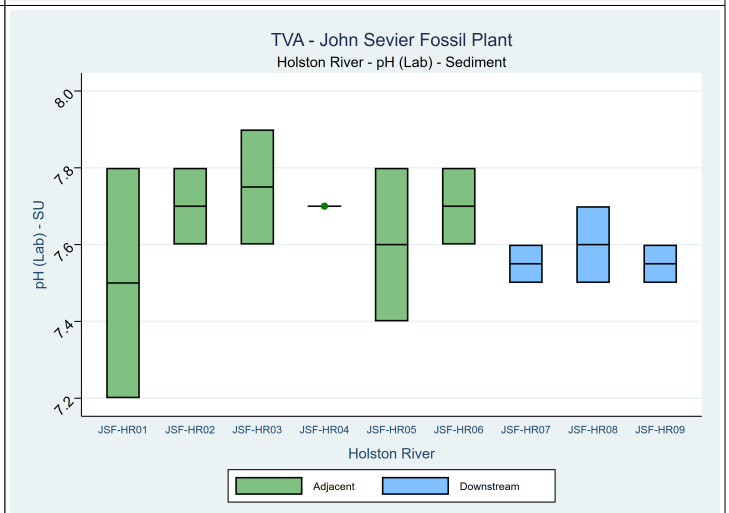


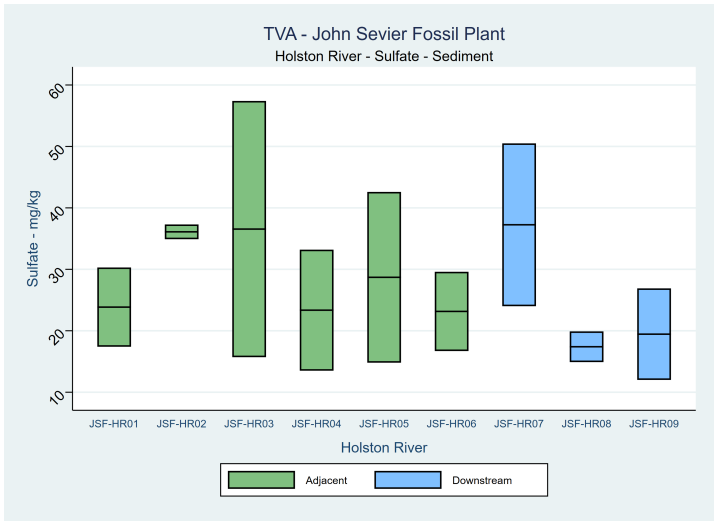












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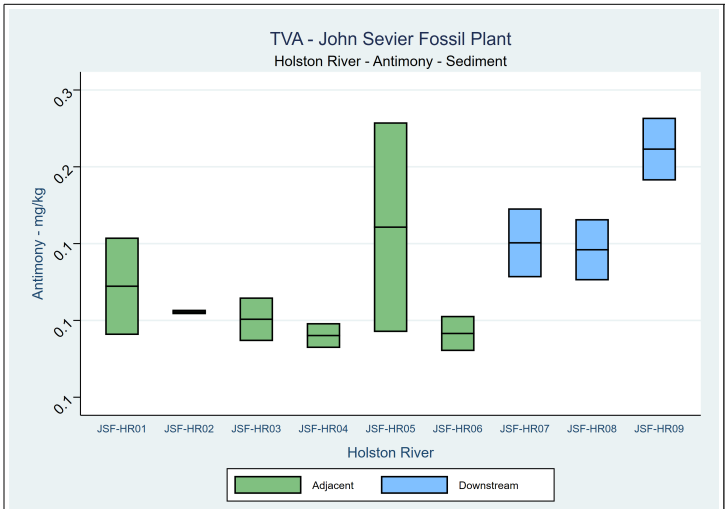
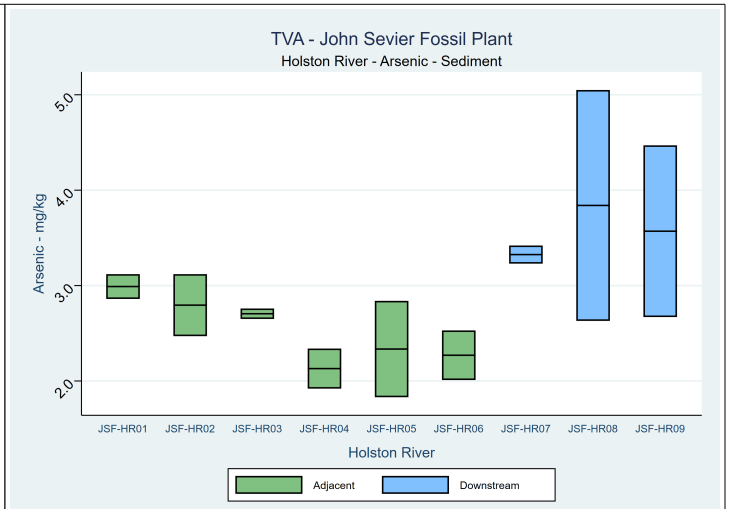
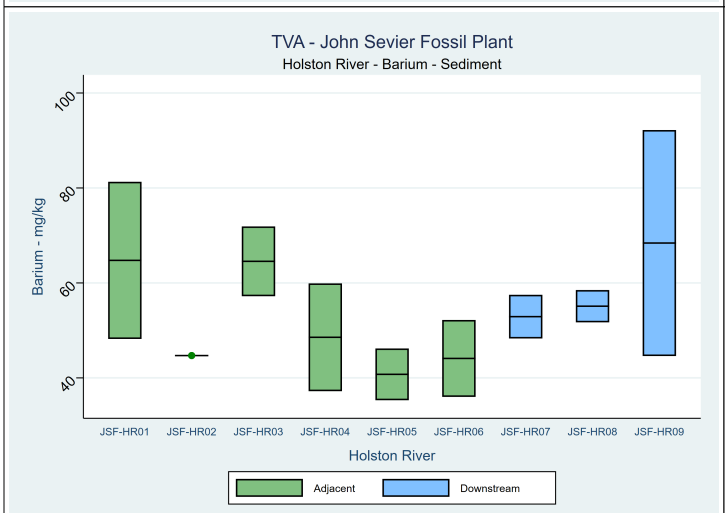
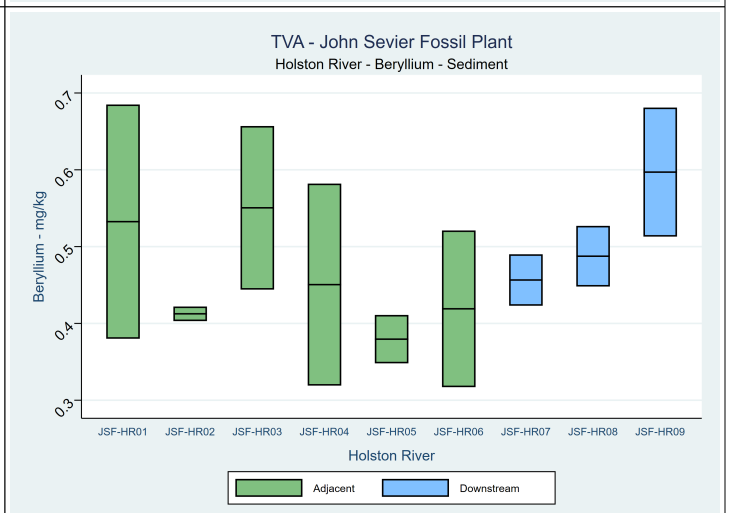
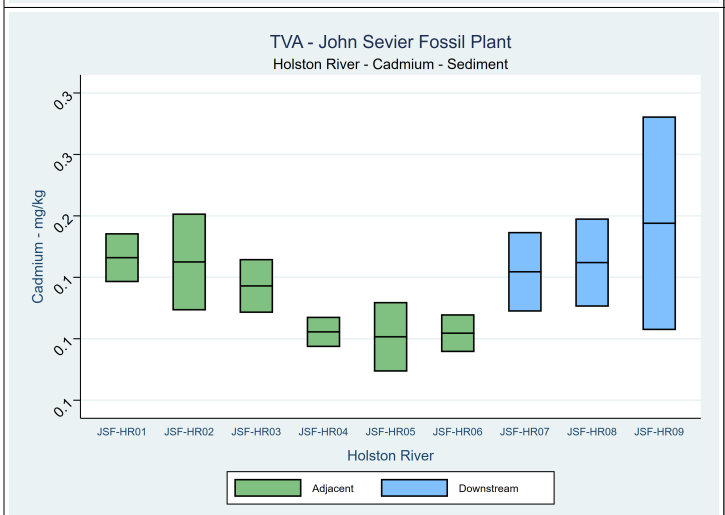
Box Plots
Holston River - CCR Rule Appendix IV Parameters
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee

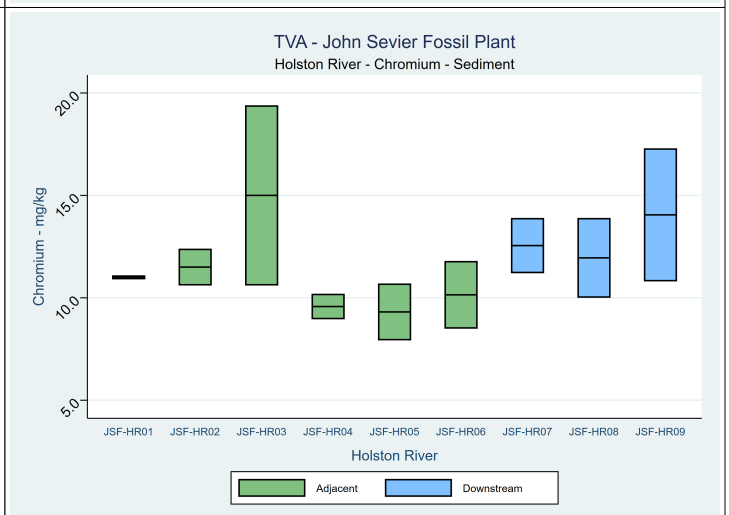


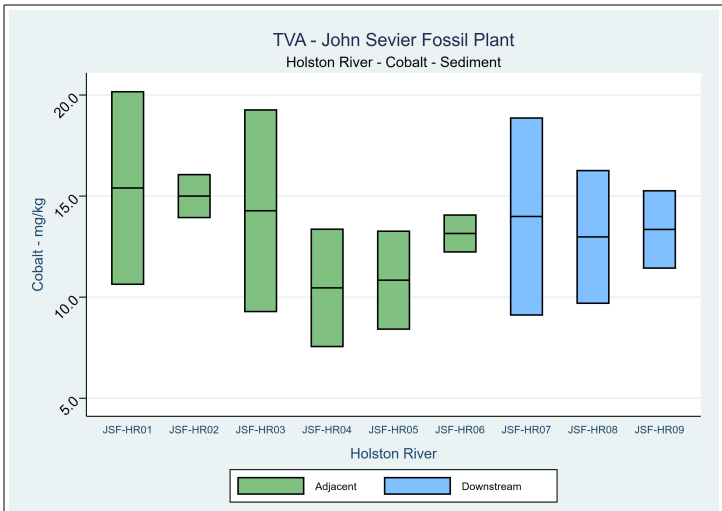


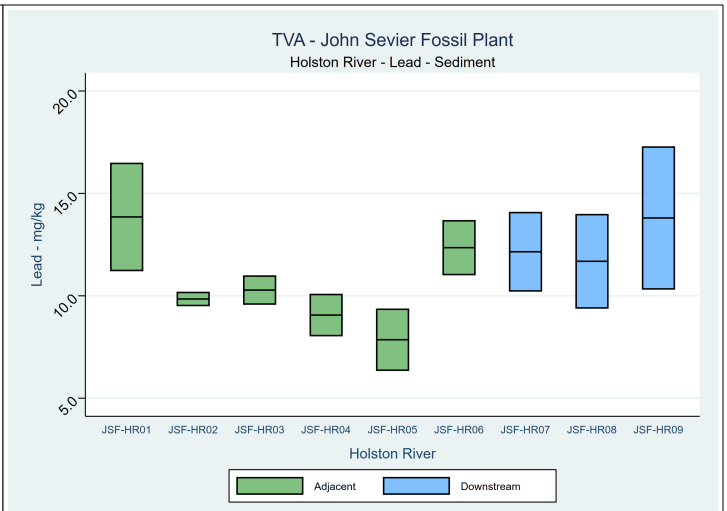


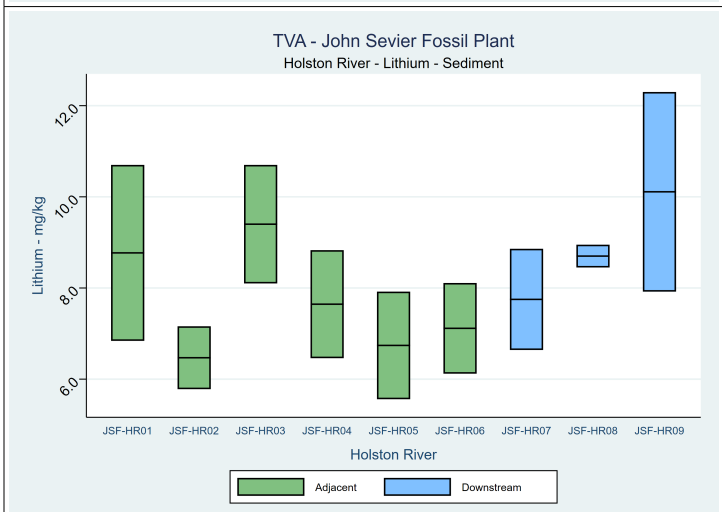


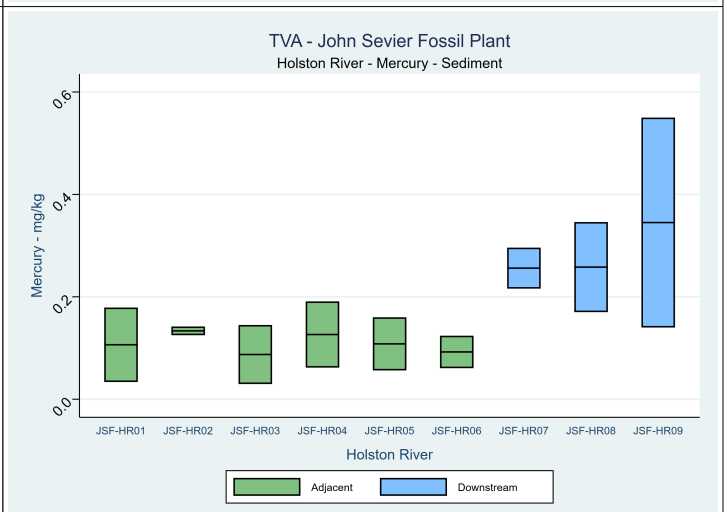


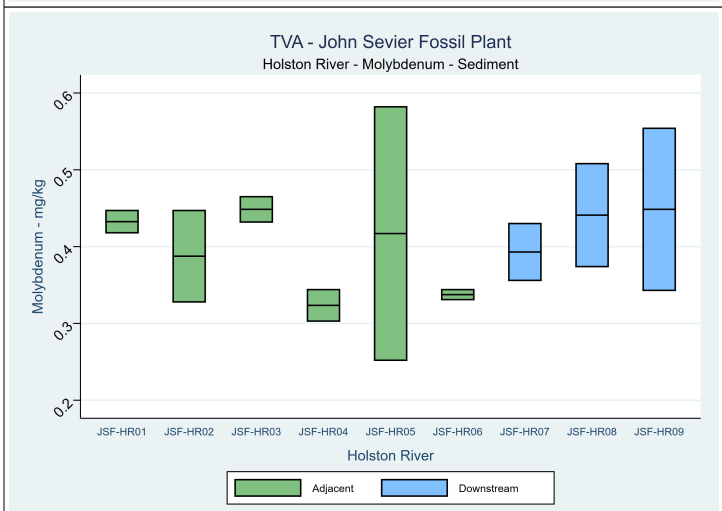


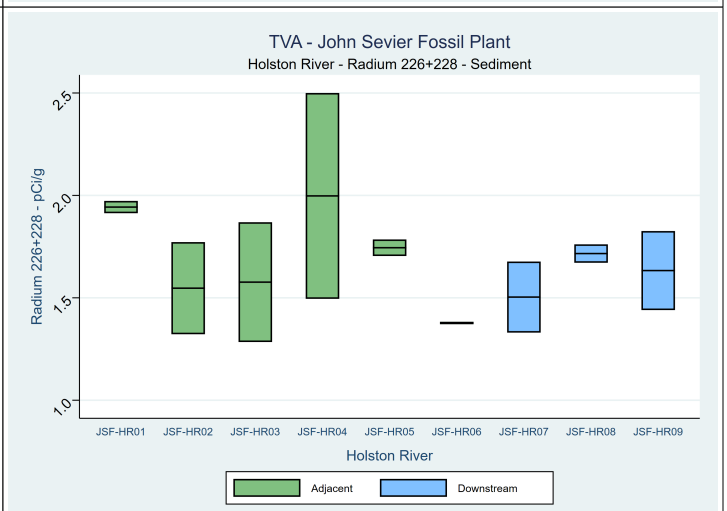

TVA - John Sevier Fossil Plant
Holston River - Cobalt - Sediment
Cobalt - mg/kg
20.0
15.0
10.0
5.0
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Adjacent
Downstream

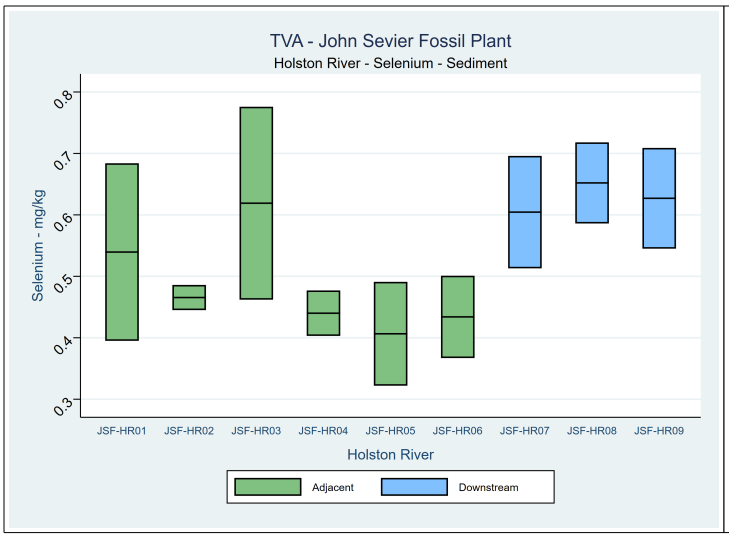

TVA - John Sevier Fossil Plant
Holston River - Lead - Sediment
Lead - mg/kg
20.0
15.0
10.0
5.0
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Adjacent
Downstream

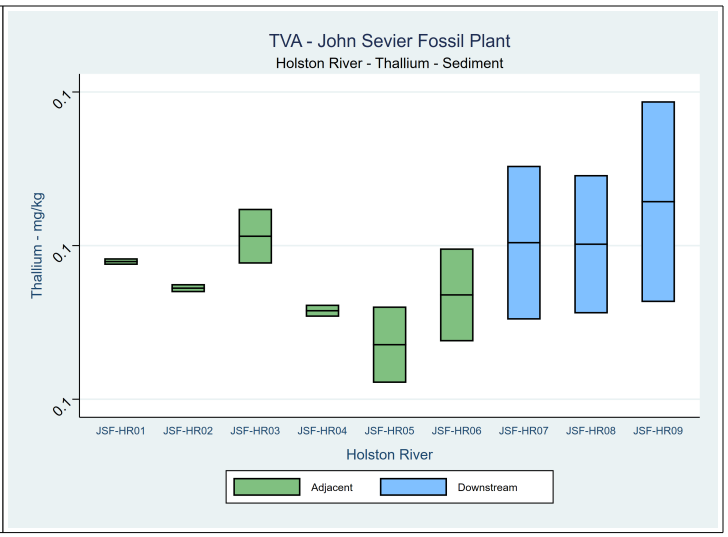

TVA - John Sevier Fossil Plant
Holston River - Lithium - Sediment
Lithium - mg/kg
12.0
10.0
8.0
6.0
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Adjacent
Downstream


TVA - John Sevier Fossil Plant
Holston River - Mercury - Sediment
Mercury - mg/kg
0.6
0.4
0.2
0.0
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Adjacent
Downstream

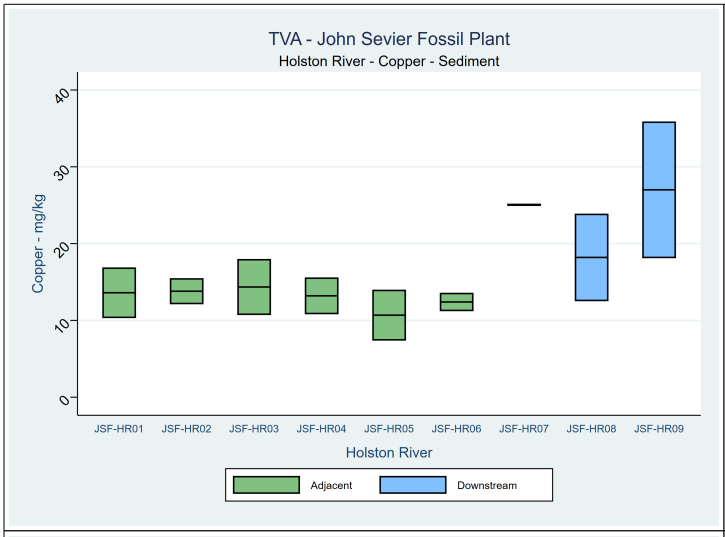

TVA - John Sevier Fossil Plant
Holston River - Molybdenum - Sediment
Molybdenum - mg/kg
0.6
0.5
0.4
0.3
0.2
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Adjacent
Downstream

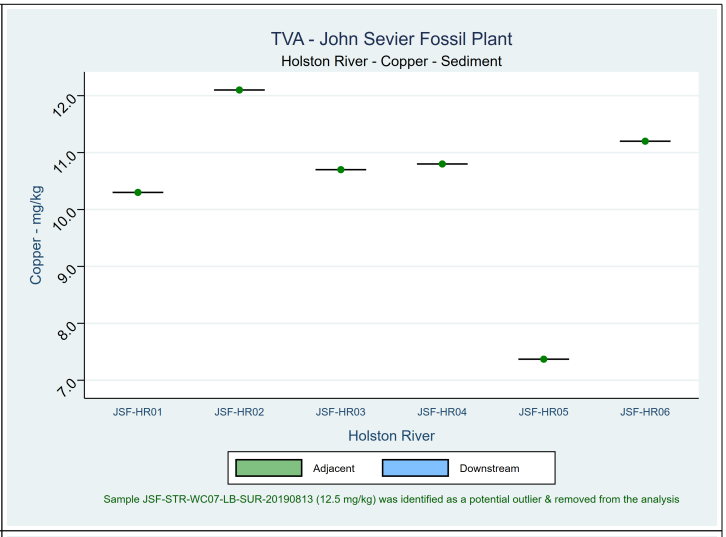

TVA - John Sevier Fossil Plant
Holston River - Radium 226+228 - Sediment
Radium 226+228 - pCi/g
2.5
2.0
1.5
1.0
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Adjacent
Downstream

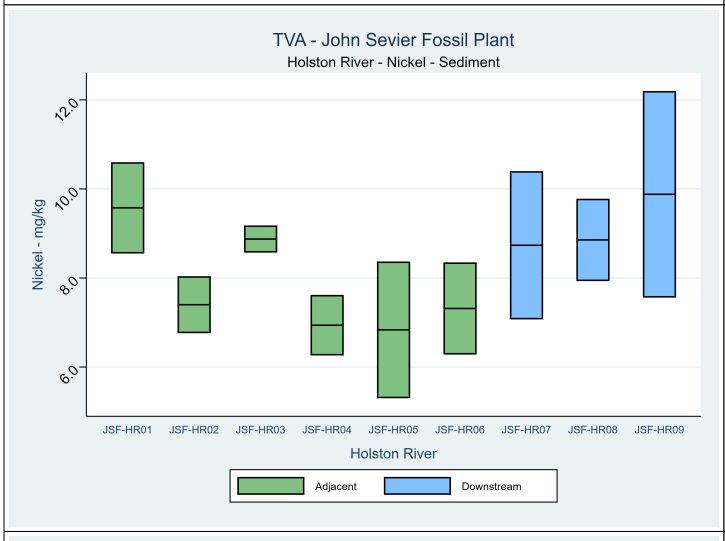

TVA - John Sevier Fossil Plant
Holston River - Selenium - Sediment
Selenium - mg/kg
0.8
0.7
0.6
0.5
0.4
0.3
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Adjacent
Downstream

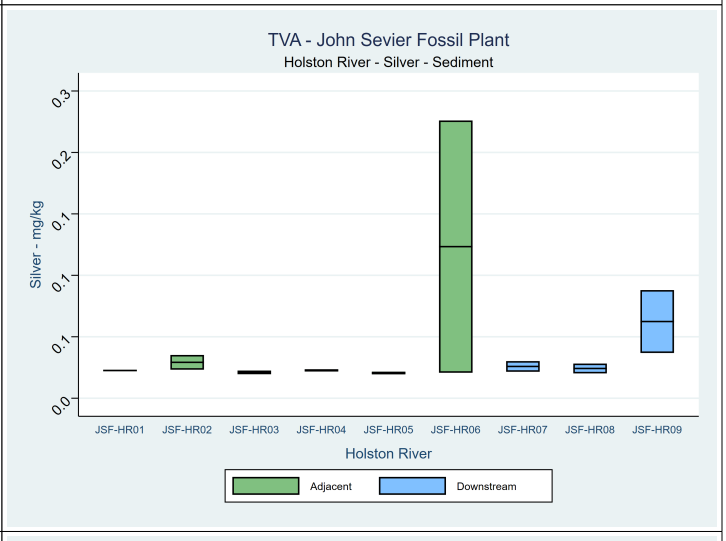

TVA - John Sevier Fossil Plant
Holston River - Thallium - Sediment
Thallium - mg/kg
0.1
0.1
0.1
JSF-HR01
JSF-HR02
JSF-HR03
JSF-HR04
JSF-HR05
JSF-HR06
JSF-HR07
JSF-HR08
JSF-HR09
Holston River
Adjacent
Downstream

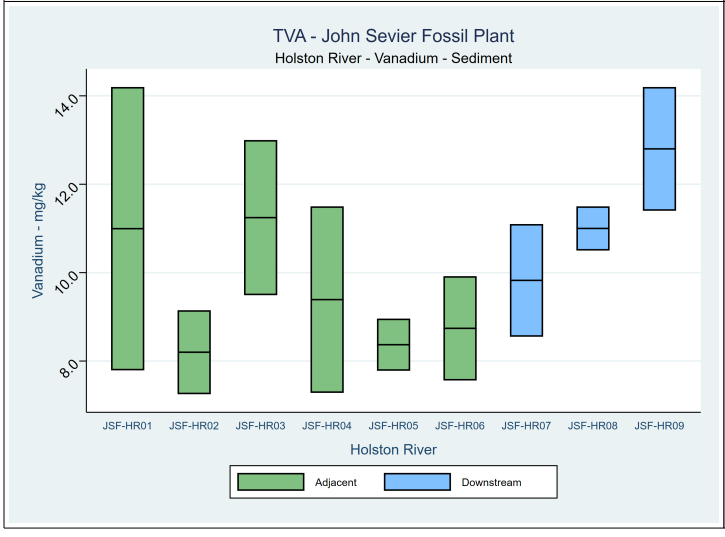
Box Plots
Holston River - TDEC Appendix I Parameters
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee

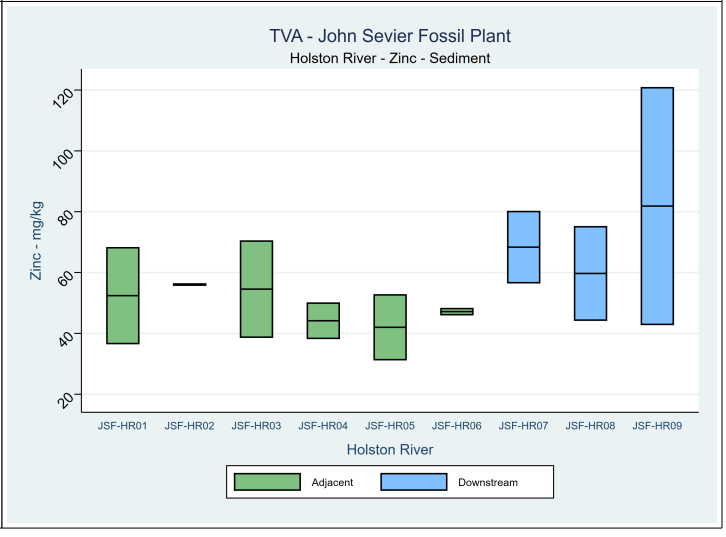




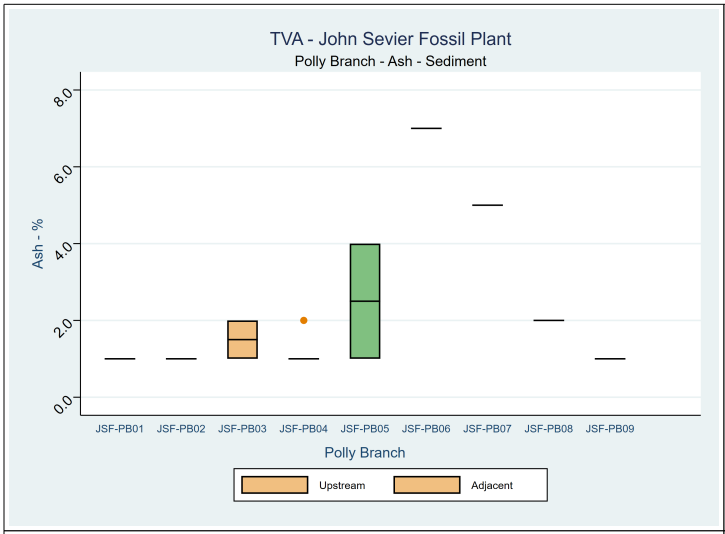


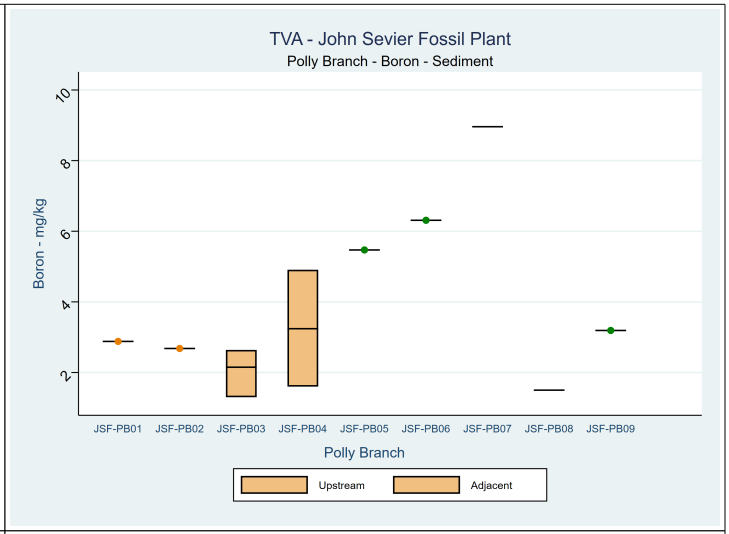


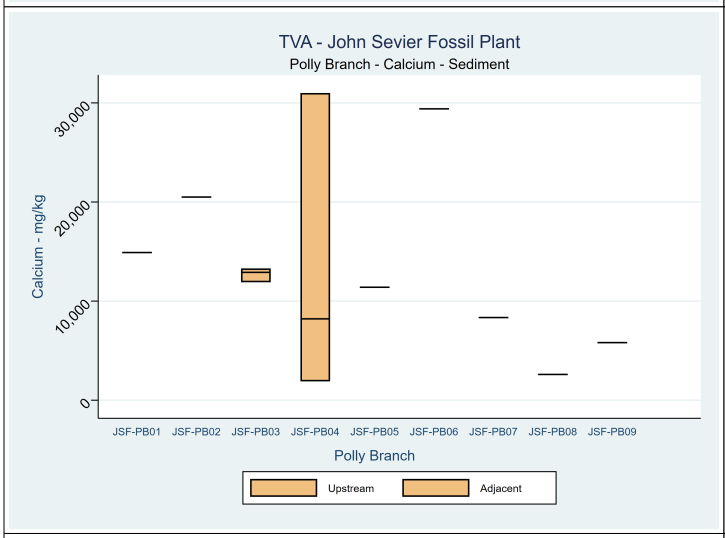


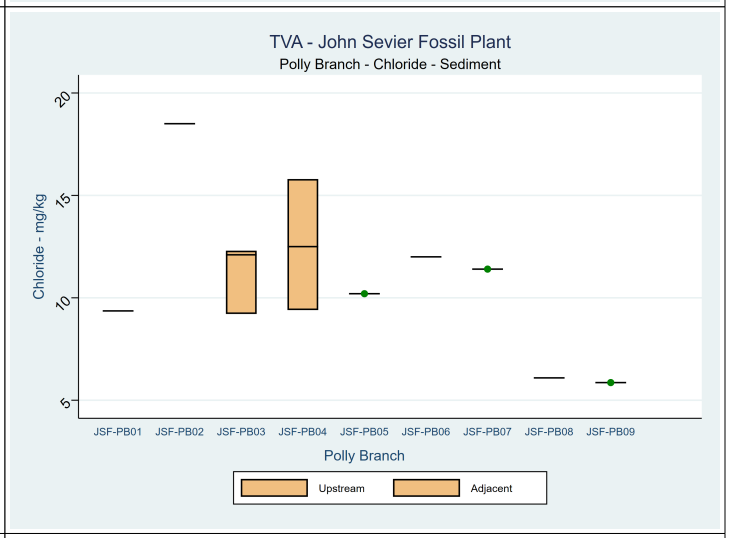


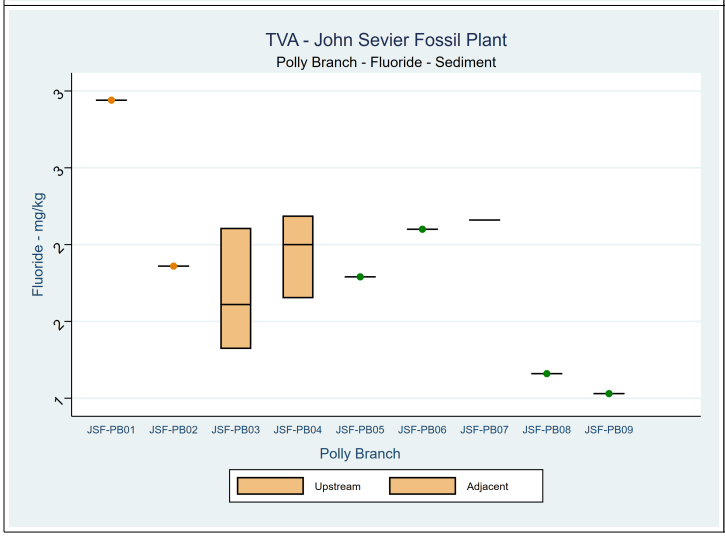
Box Plots
Polly Branch - CCR Rule Appendix III Parameters
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee

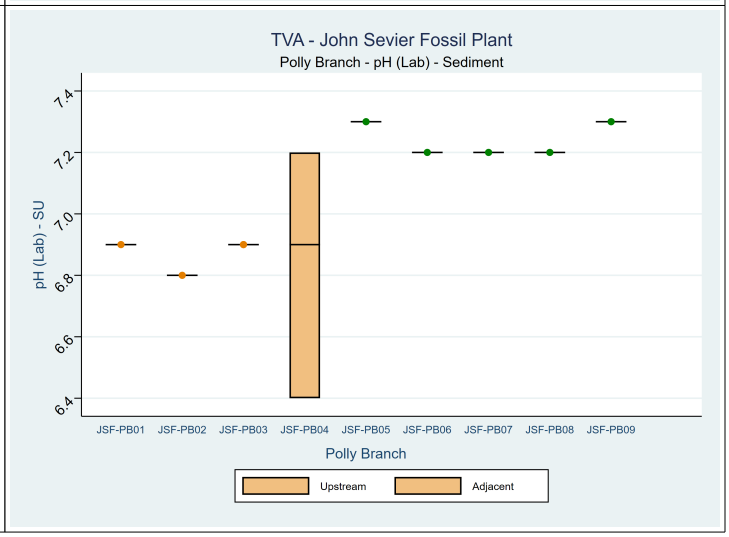


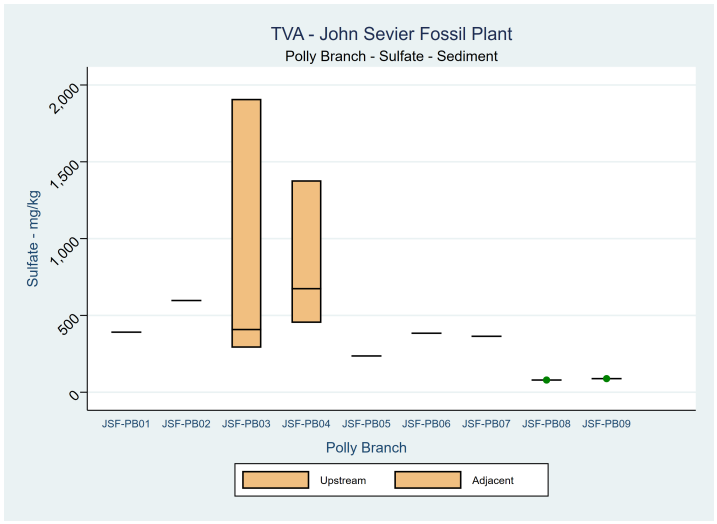












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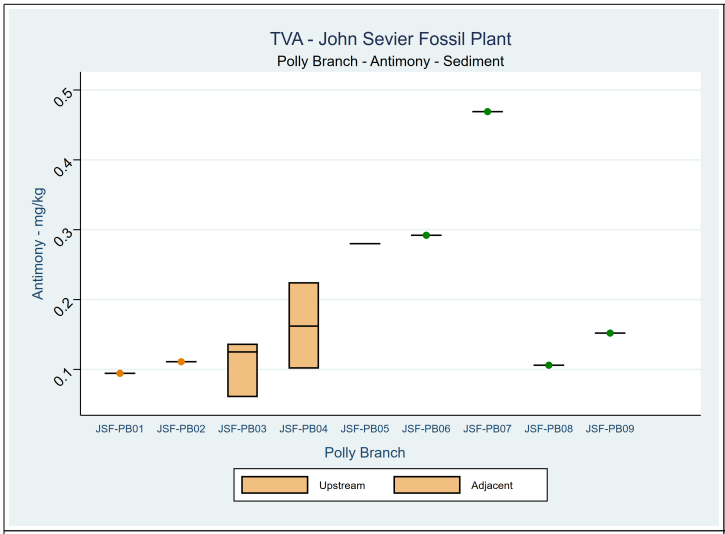
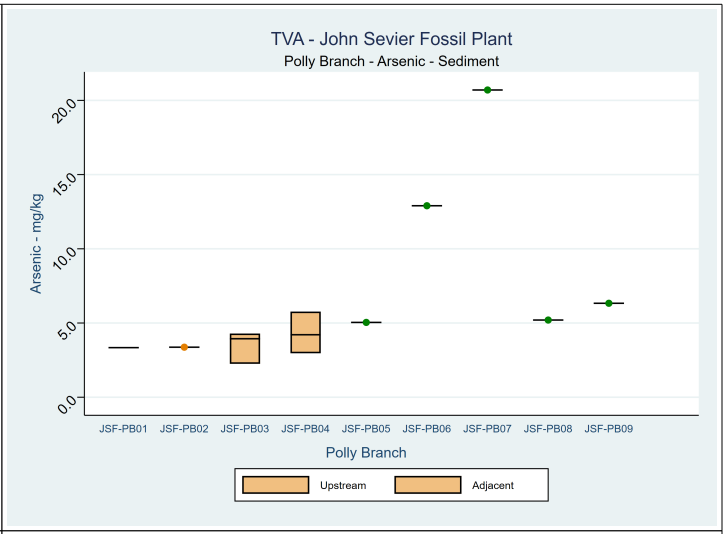
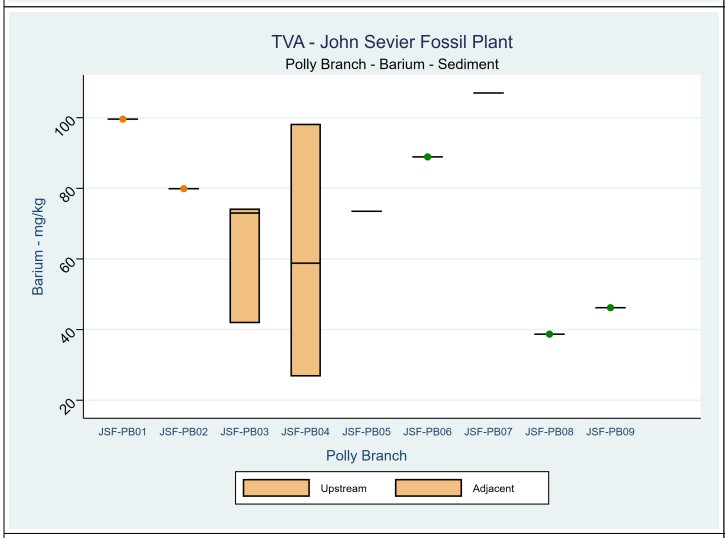
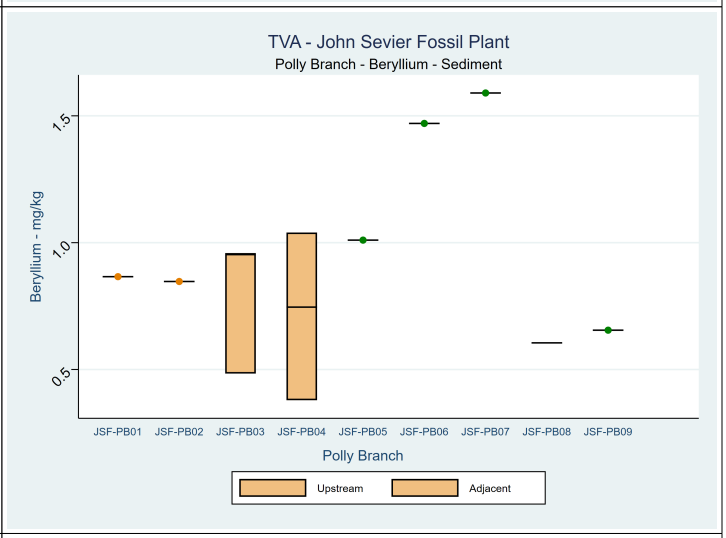
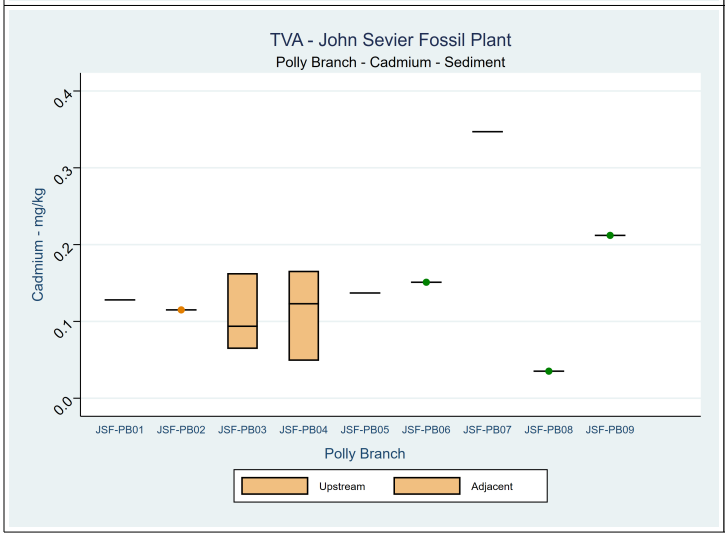
Box Plots
Polly Branch - CCR Rule Appendix IV Parameters
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee

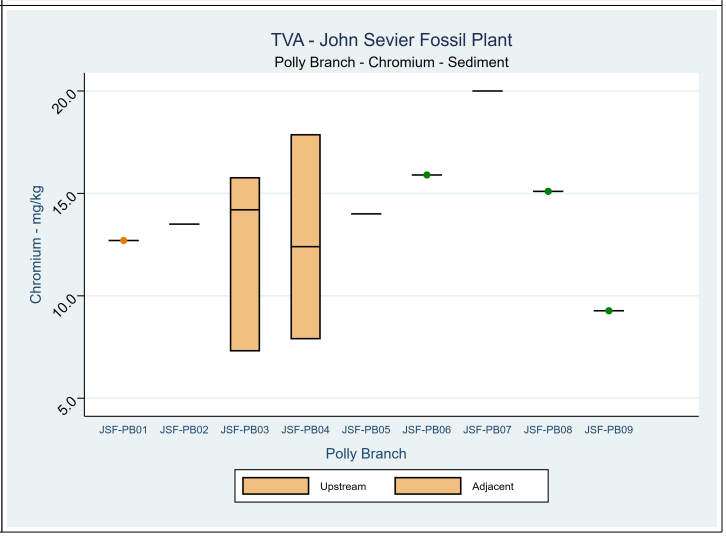


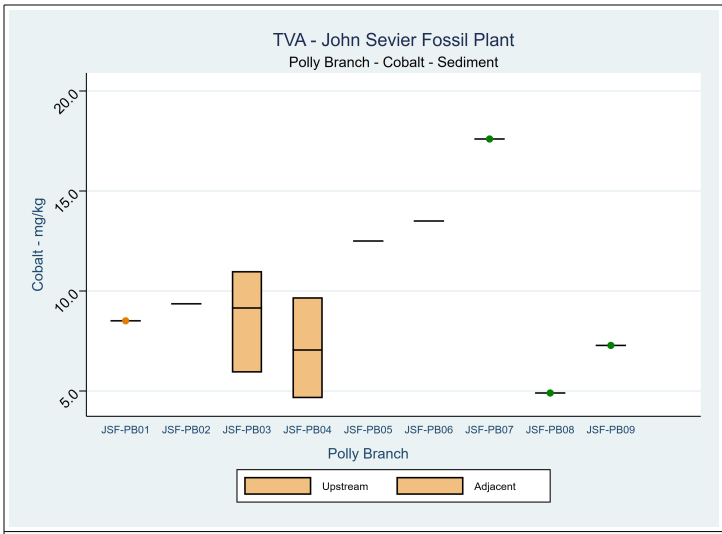


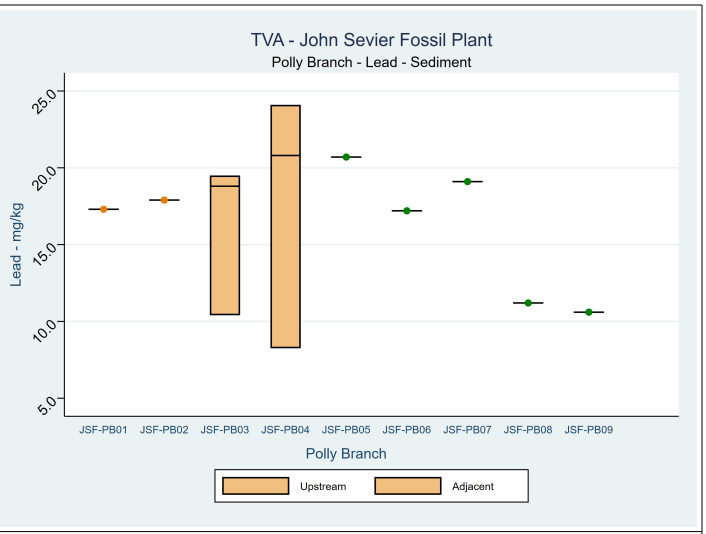


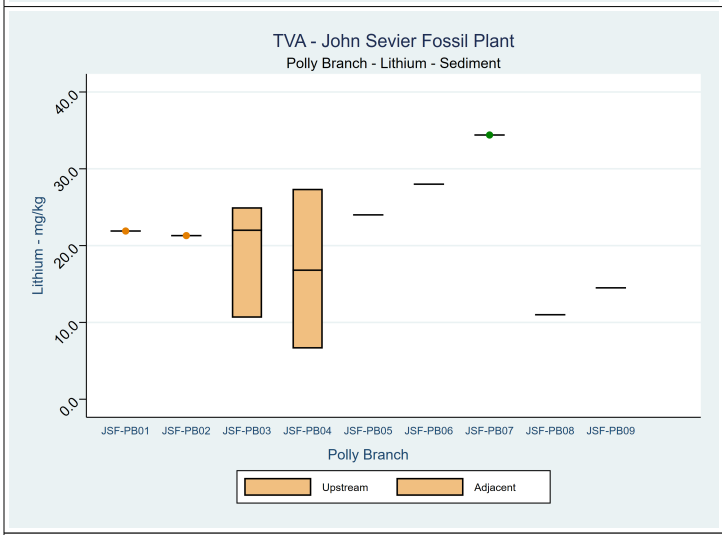


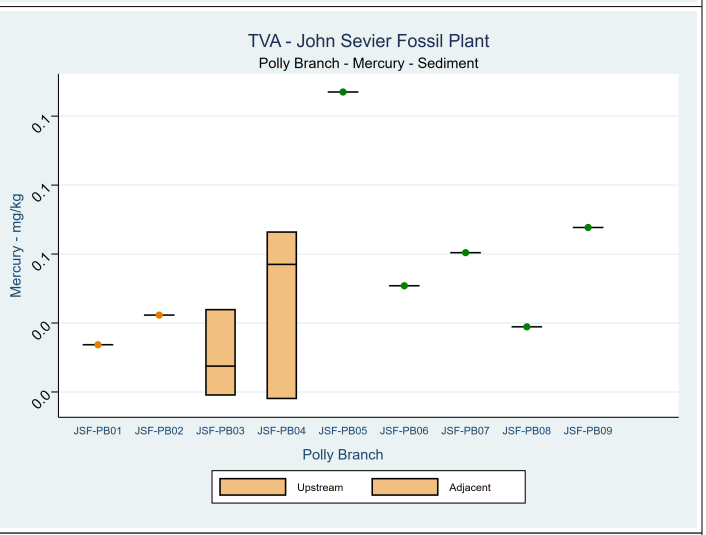


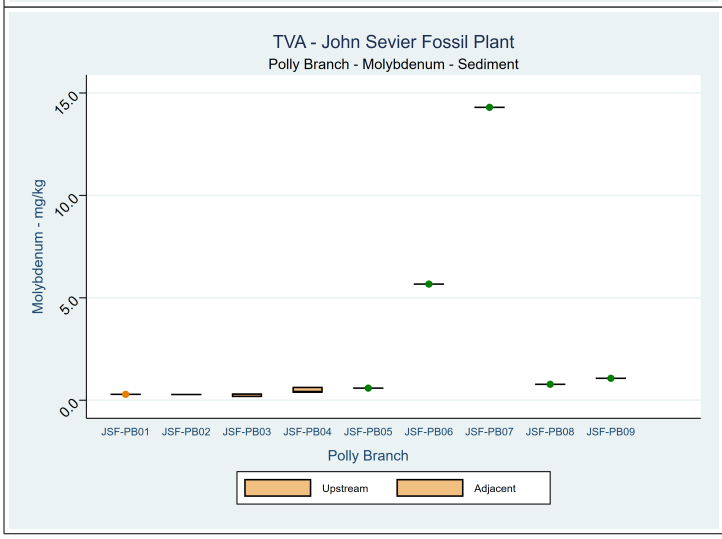


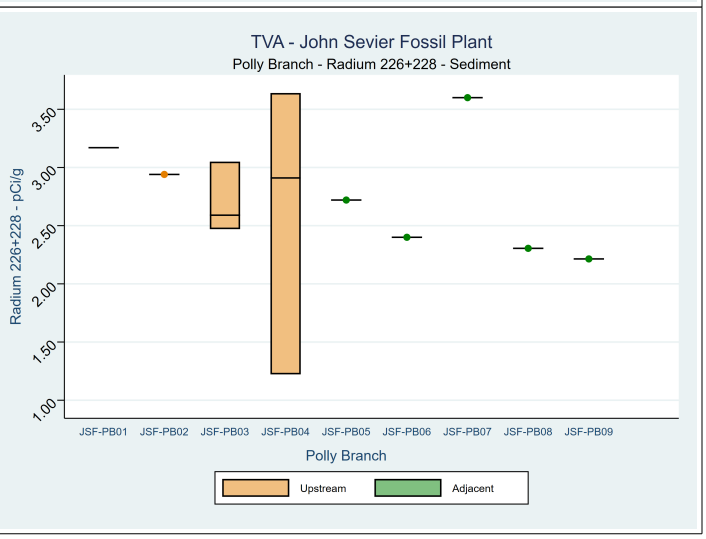

TVA - John Sevier Fossil Plant
Polly Branch - Cobalt - Sediment
Cobalt - mg/kg
20.0
15.0
10.0
5.0
JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Polly Branch
Upstream
Adjacent

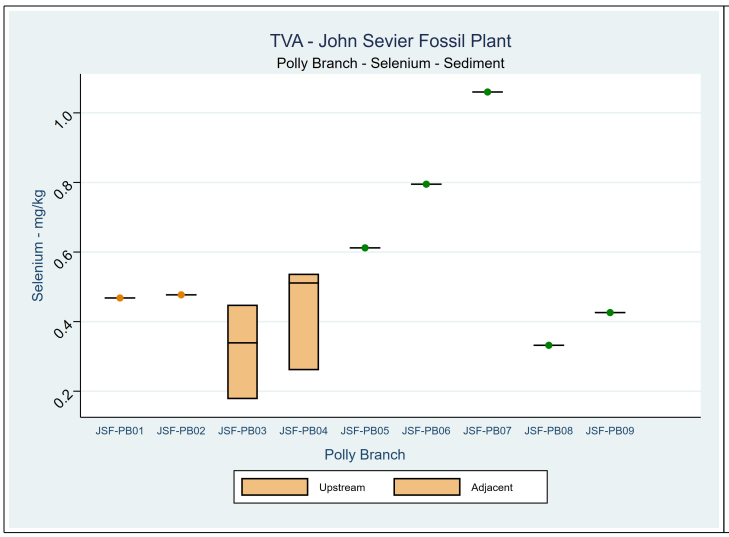

TVA - John Sevier Fossil Plant
Polly Branch - Lead - Sediment
Lead - mg/kg
25.0
20.0
15.0
10.0
5.0
JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Polly Branch
Upstream
Adjacent

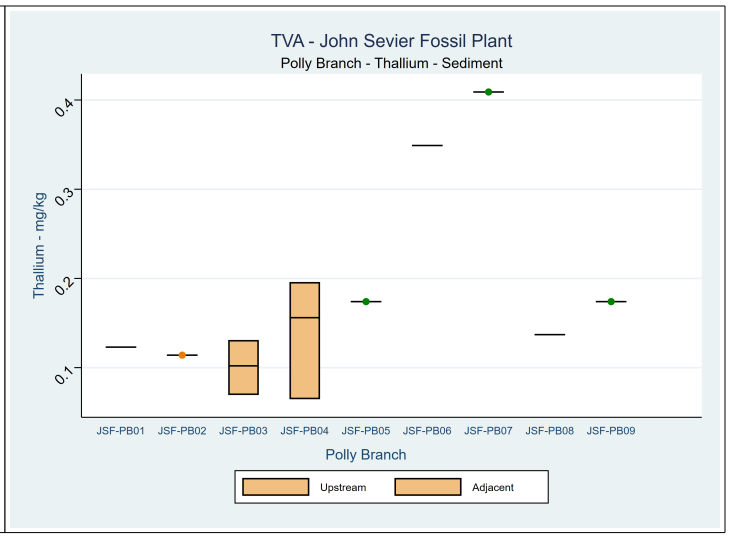

TVA - John Sevier Fossil Plant
Polly Branch - Lithium - Sediment
Lithium - mg/kg
40.0
30.0
20.0
10.0
0.0
JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Polly Branch
Upstream
Adjacent


TVA - John Sevier Fossil Plant
Polly Branch - Mercury - Sediment
Mercury - mg/kg
0.1
0.1
0.1
0.0
0.0
JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Polly Branch
Upstream
Adjacent

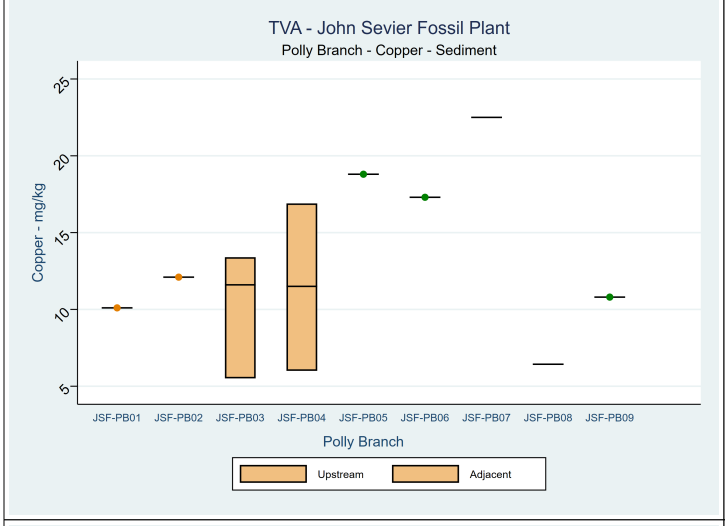

TVA - John Sevier Fossil Plant
Polly Branch - Molybdenum - Sediment
Molybdenum - mg/kg
15.0
10.0
5.0
0.0
JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Polly Branch
Upstream
Adjacent

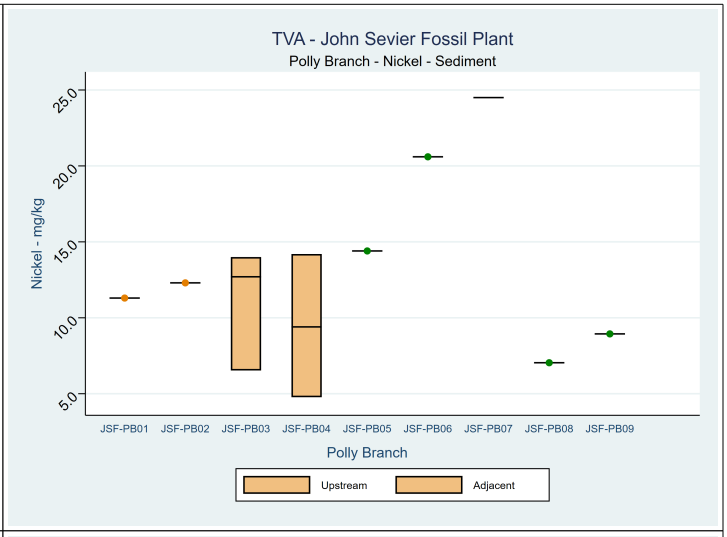

TVA - John Sevier Fossil Plant
Polly Branch - Radium 226+228 - Sediment
Radium 226+228 - pCi/g
3.50
3.00
2.50
2.00
1.50
1.00
JSF-PB01 JSF-PB02 JSF-PB03 JSF-PB04 JSF-PB05 JSF-PB06 JSF-PB07 JSF-PB08 JSF-PB09
Polly Branch
Upstream
Adjacent

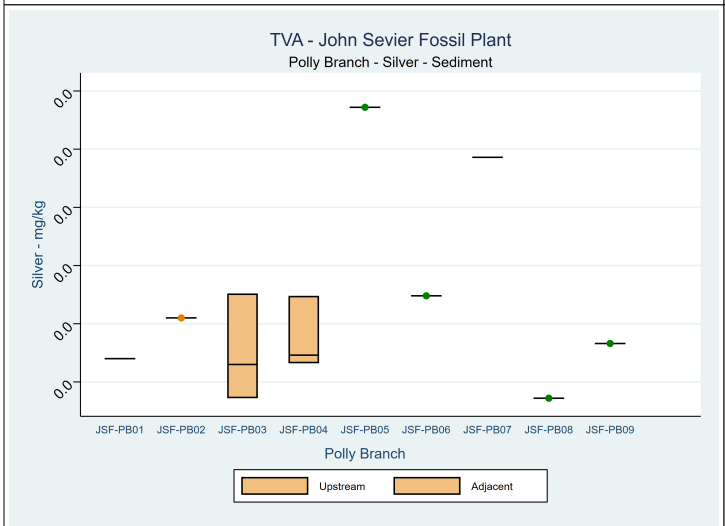

TVA - John Sevier Fossil Plant
Polly Branch - Selenium - Sediment
Selenium - mg/kg
0.2
0.4
0.6
0.8
1.0
JSF-PB01
JSF-PB02
JSF-PB03
JSF-PB04
JSF-PB05
JSF-PB06
JSF-PB07
JSF-PB08
JSF-PB09
Polly Branch
Upstream
Adjacent

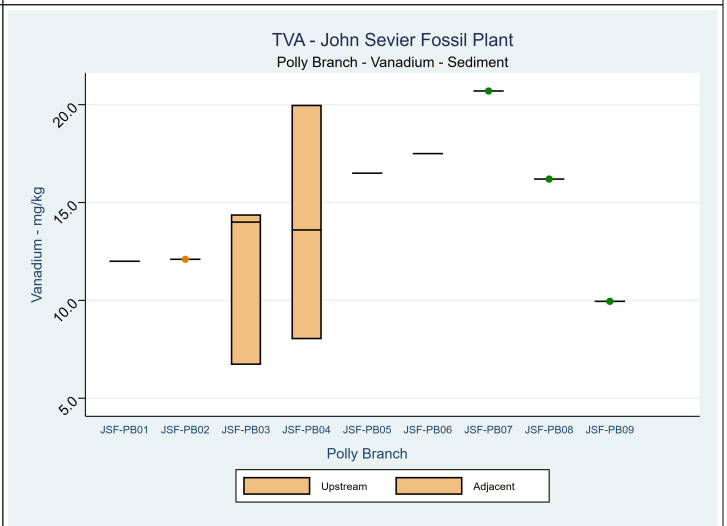

TVA - John Sevier Fossil Plant
Polly Branch - Thallium - Sediment
Thallium - mg/kg
0.1
0.2
0.3
0.4
JSF-PB01
JSF-PB02
JSF-PB03
JSF-PB04
JSF-PB05
JSF-PB06
JSF-PB07
JSF-PB08
JSF-PB09
Polly Branch
Upstream
Adjacent

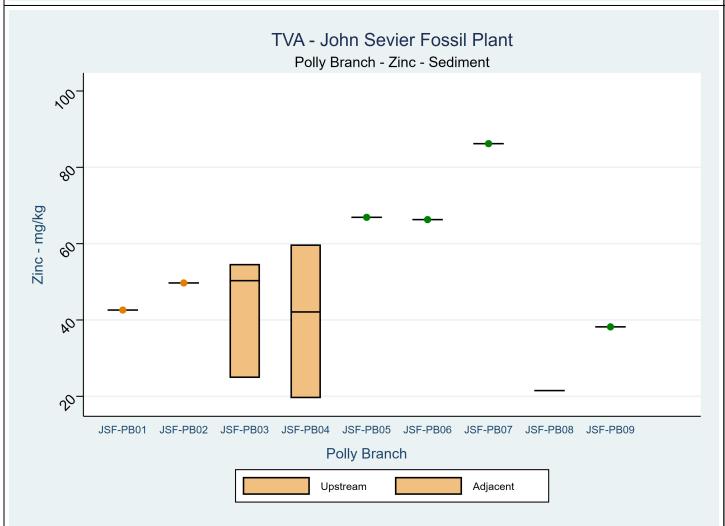
Box Plots
Polly Branch - TDEC Appendix I Parameters
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee











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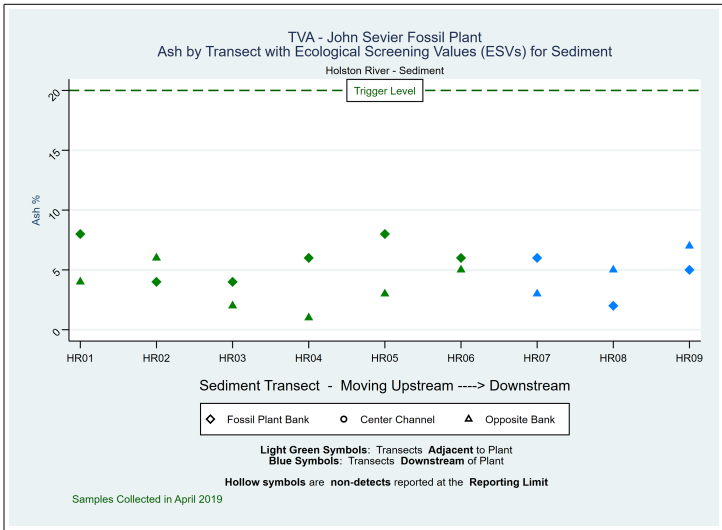
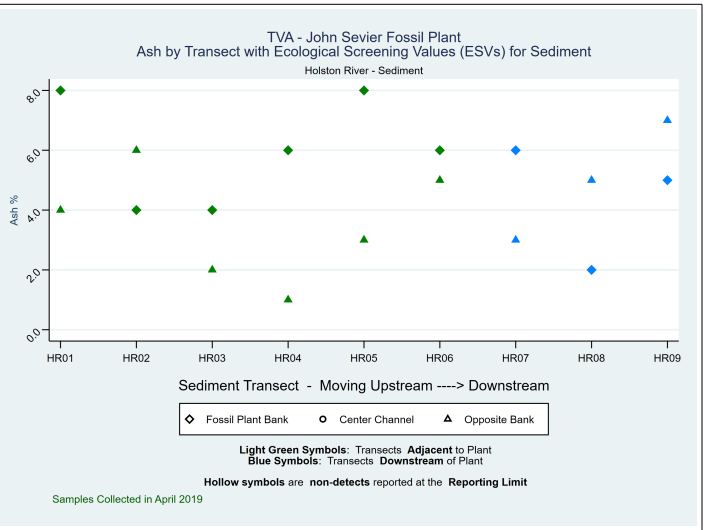
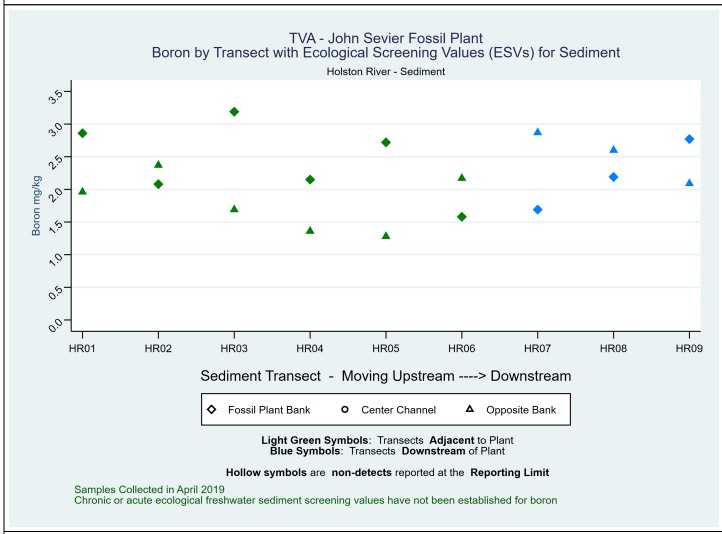
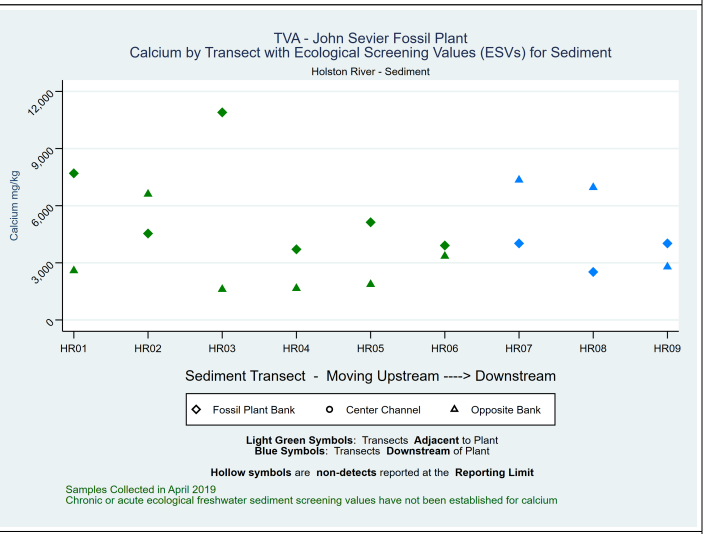
ATTACHMENT E.5-C TRANSECT PLOTS

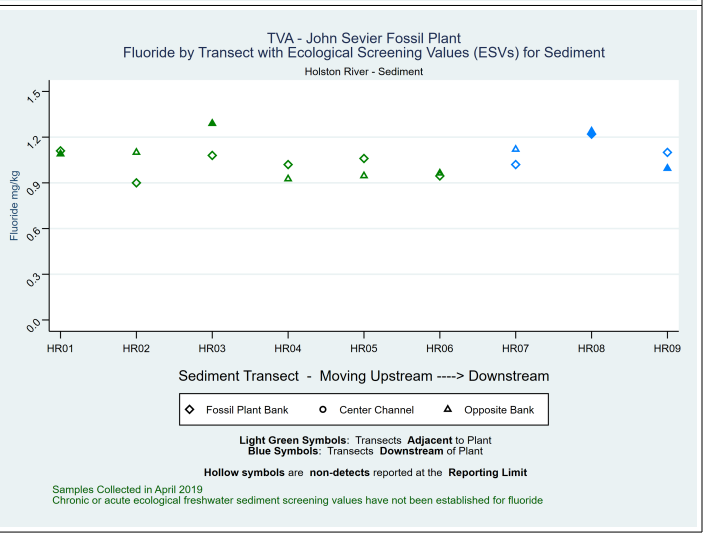
Transect Plots
Holston River - CCR Rule Appendix III Parameters
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee

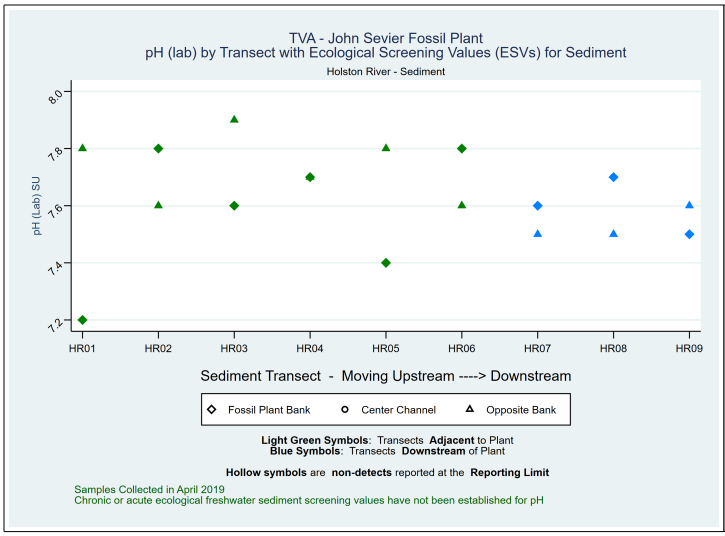


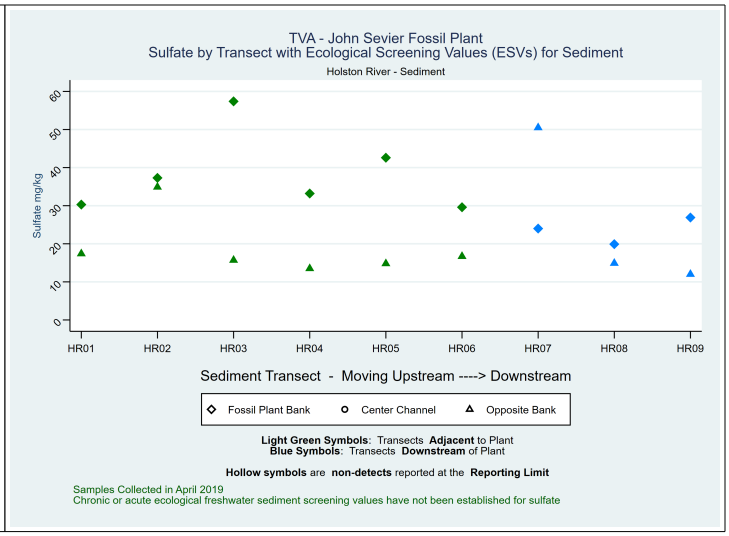




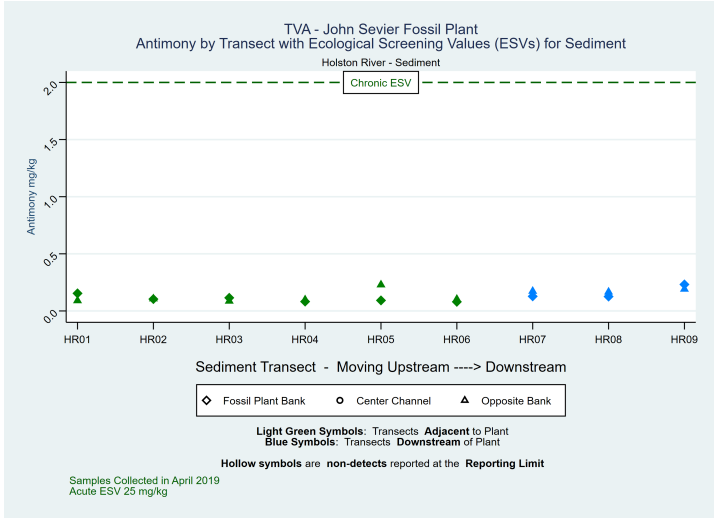


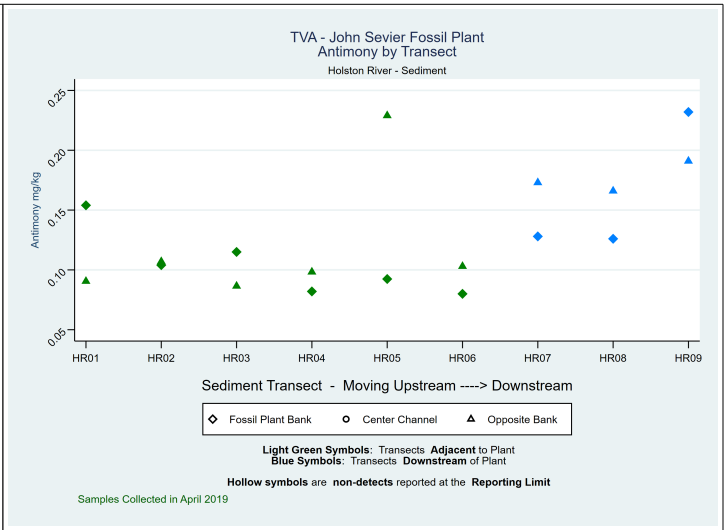


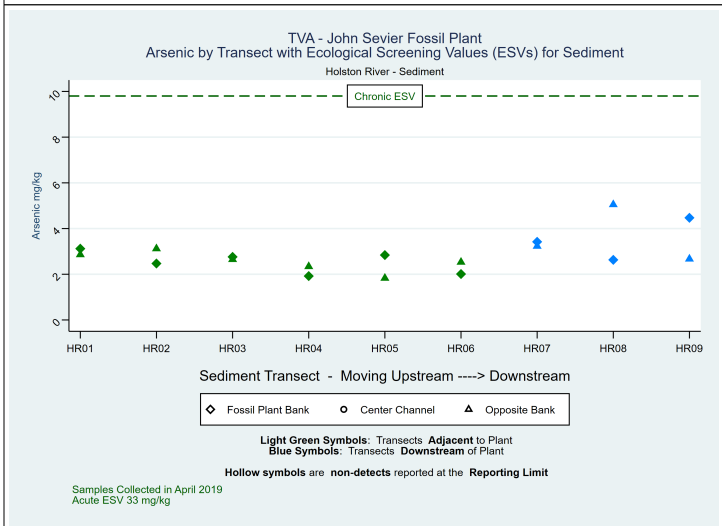

TVA - John Sevier Fossil Plant
pH (lab) by Transect with Ecological Screening Values (ESVs) for Sediment
Holston River - Sediment
pH (Lab) SU
8.0
7.8
7.6
7.4
7.2
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019
Chronic or acute ecological freshwater sediment screening values have not been established for pH

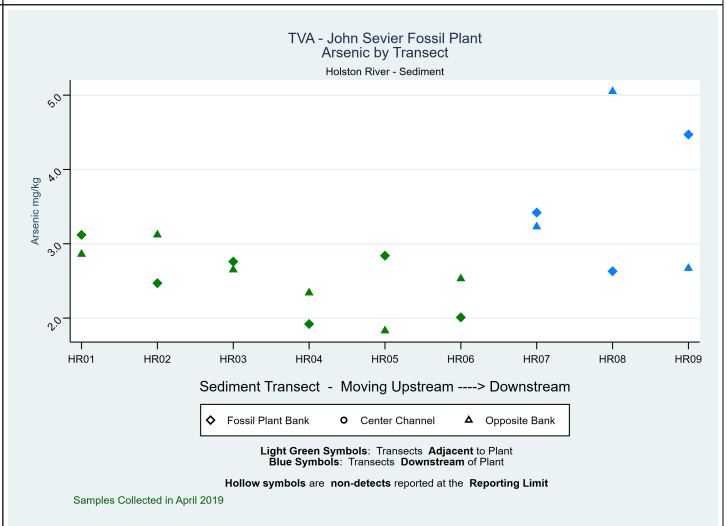

TVA - John Sevier Fossil Plant
Sulfate by Transect with Ecological Screening Values (ESVs) for Sediment
Holston River - Sediment
Sulfate mg/kg
60
50
40
30
20
10
0
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019
Chronic or acute ecological freshwater sediment screening values have not been established for sulfate

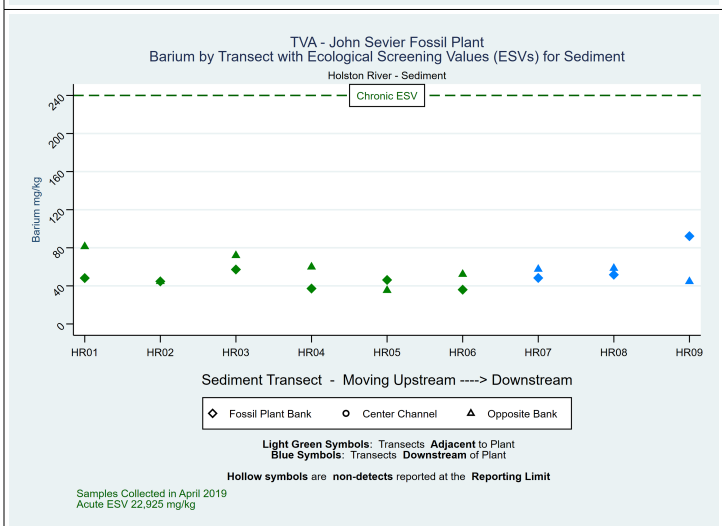
Transect Plots
Holston River - CCR Rule Appendix IV Parameters
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee

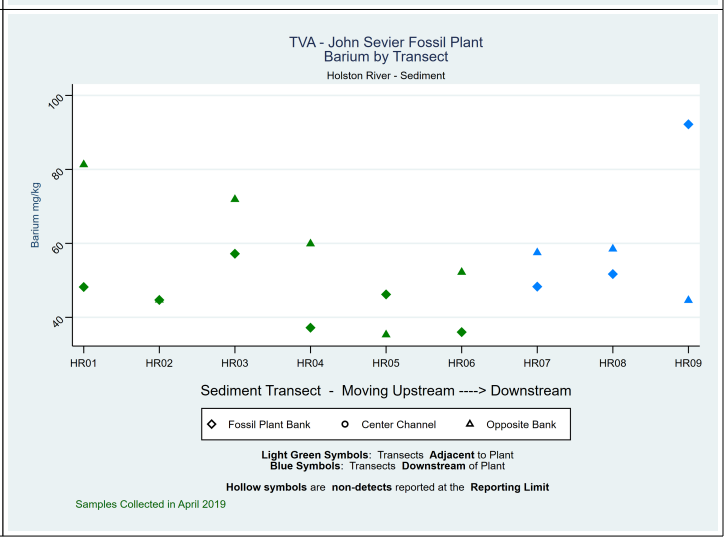


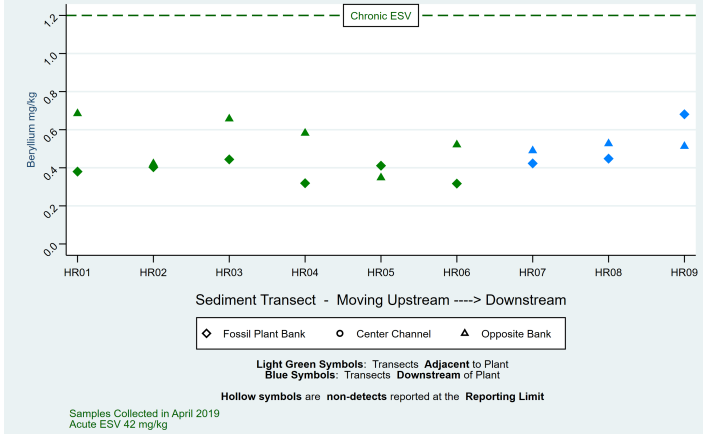


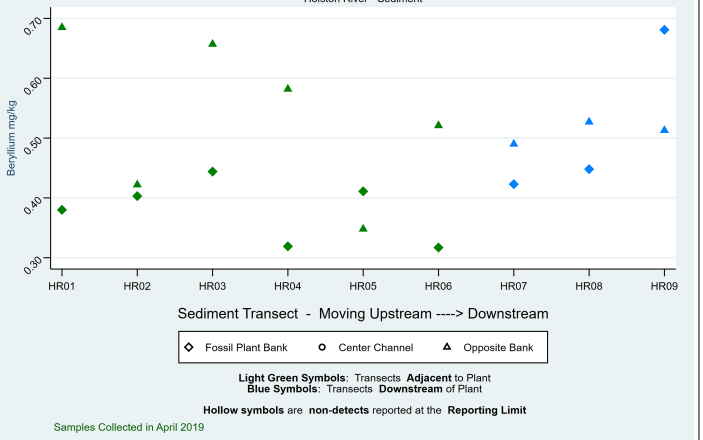


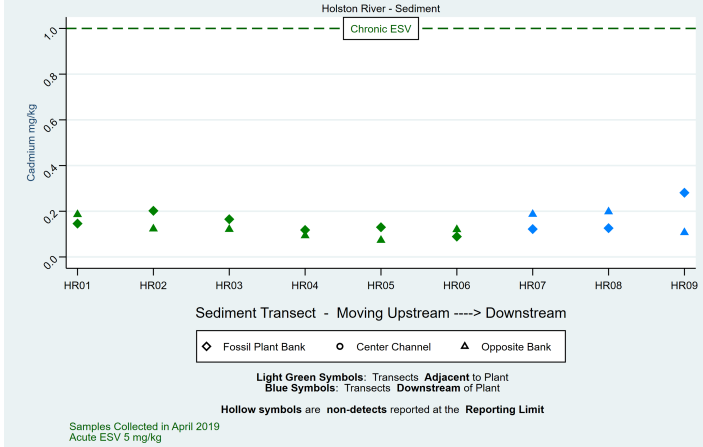


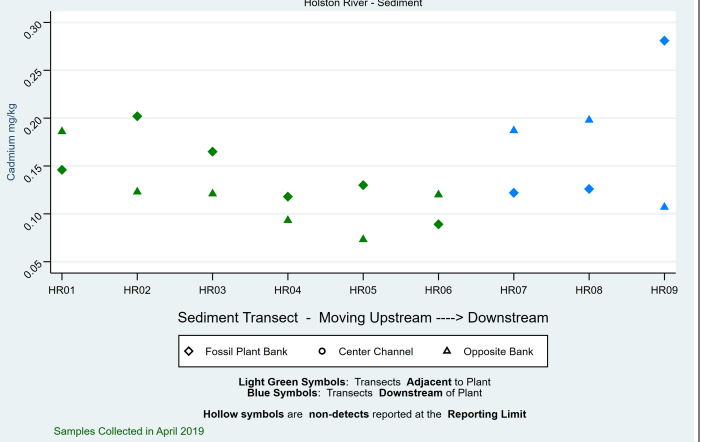


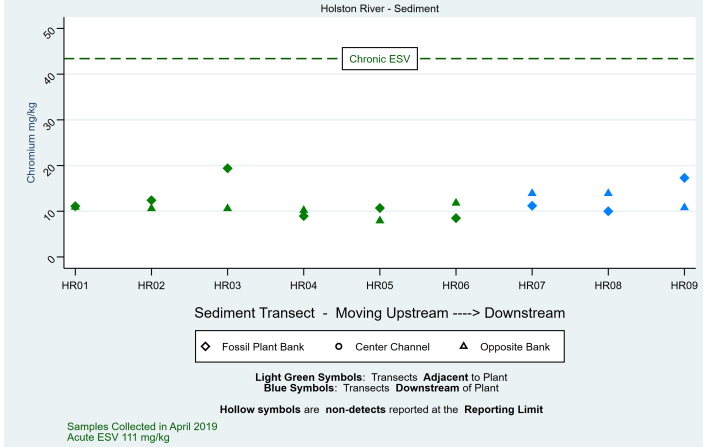


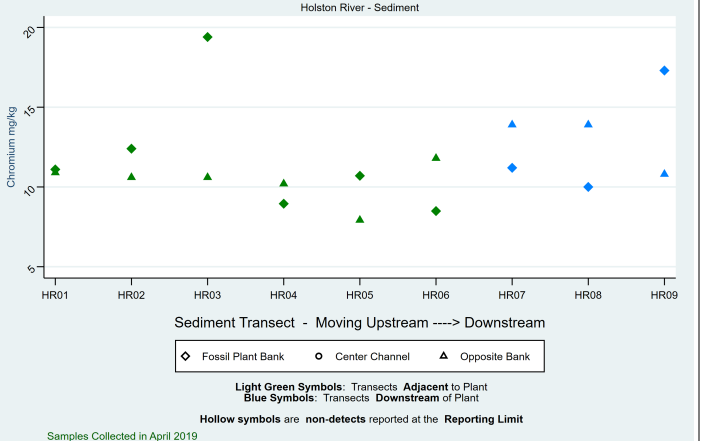

TVA - John Sevier Fossil Plant
Beryllium by Transect with Ecological Screening Values (ESVs) for Sediment
Holston River - Sediment
Chronic ESV
Beryllium mg/kg
0.0
0.2
0.4
0.6
0.8
1.0
1.2
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019
Acute ESV 42 mg/kg

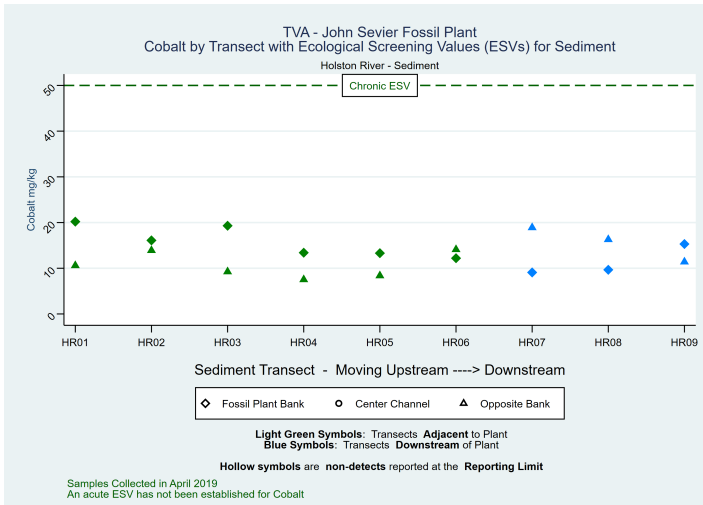

TVA - John Sevier Fossil Plant
Beryllium by Transect
Holston River - Sediment
Beryllium mg/kg
0.30
0.40
0.50
0.60
0.70
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019

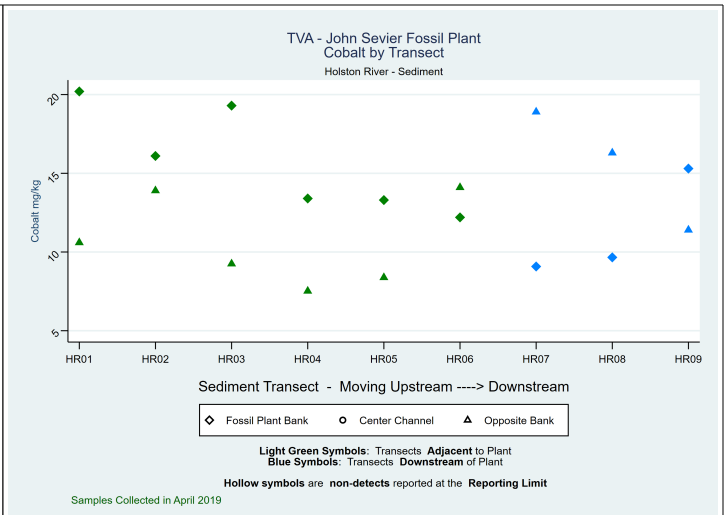

TVA - John Sevier Fossil Plant
Cadmium by Transect with Ecological Screening Values (ESVs) for Sediment
Holston River - Sediment
Chronic ESV
Cadmium mg/kg
0.0
0.2
0.4
0.6
0.8
1.0
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019
Acute ESV 5 mg/kg

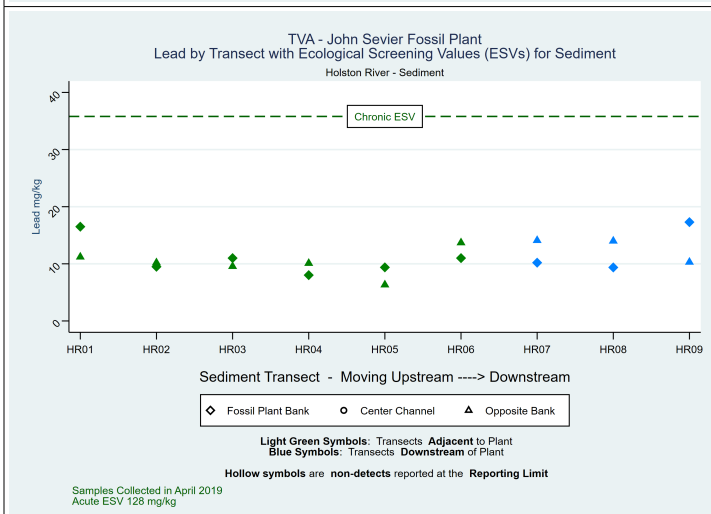

TVA - John Sevier Fossil Plant
Cadmium by Transect
Holston River - Sediment
Cadmium mg/kg
0.05
0.10
0.15
0.20
0.25
0.30
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019

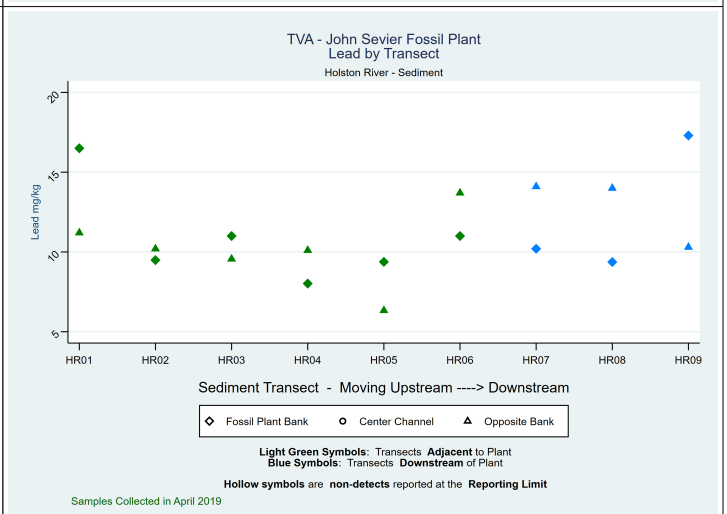

TVA - John Sevier Fossil Plant
Chromium by Transect with Ecological Screening Values (ESVs) for Sediment
Holston River - Sediment
Chronic ESV
Chromium mg/kg
0
10
20
30
40
50
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019
Acute ESV 111 mg/kg


TVA - John Sevier Fossil Plant
Chromium by Transect
Holston River - Sediment
Chromium mg/kg
5
10
15
20
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019

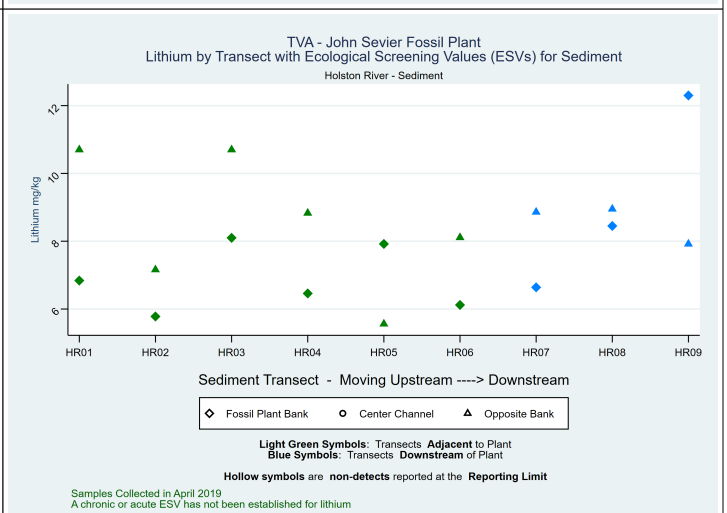




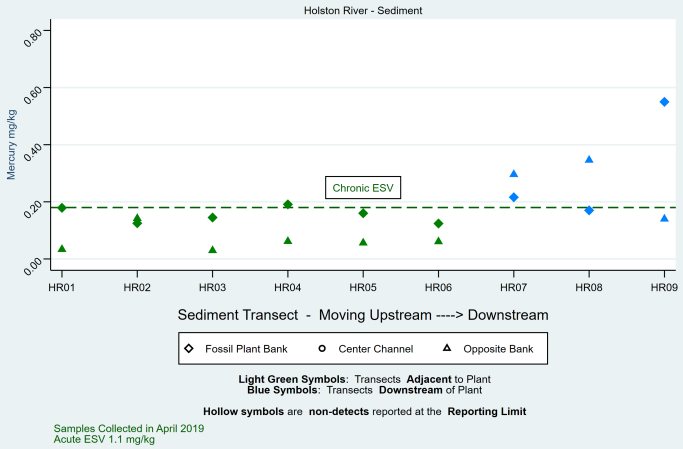




Chronic/Acute ESV not established for lithium



TVA - John Sevier Fossil Plant
Mercury by Transect with Ecological Screening Values (ESVs) for Sediment



Sediment Transect - Moving Upstream ----> Downstream

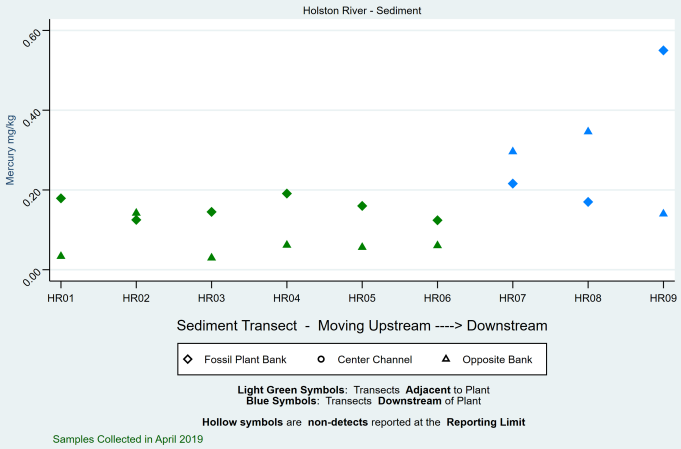
◇ Fossil Plant Bank ○ Center Channel △ Opposite Bank

Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Samples Collected in April 2019
Acute ESV 1.1 mg/kg

TVA - John Sevier Fossil Plant
Mercury by Transect



Sediment Transect - Moving Upstream ----> Downstream

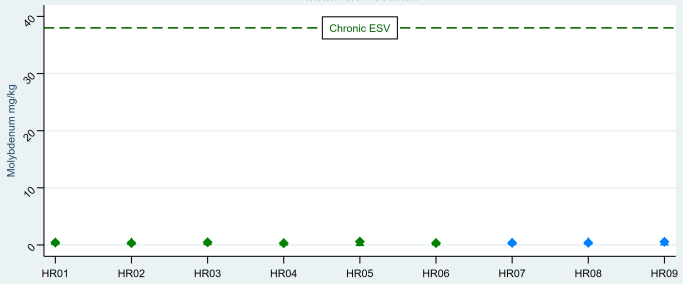
◇ Fossil Plant Bank ○ Center Channel △ Opposite Bank

Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Samples Collected in April 2019

TVA - John Sevier Fossil Plant
Molybdenum by Transect with Ecological Screening Values (ESVs) for Sediment



Sediment Transect - Moving Upstream ----> Downstream

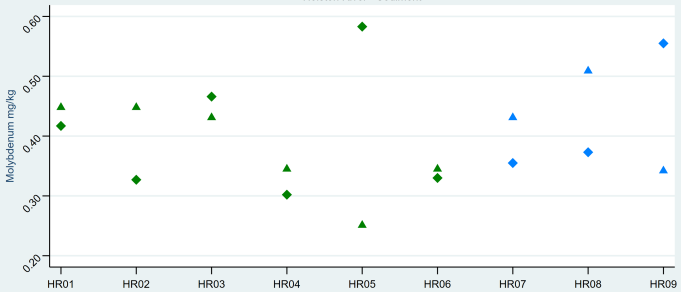
◇ Fossil Plant Bank ○ Center Channel △ Opposite Bank

Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Samples Collected in April 2019
Acute ESV 69,760 mg/kg

TVA - John Sevier Fossil Plant
Molybdenum by Transect



Sediment Transect - Moving Upstream ----> Downstream

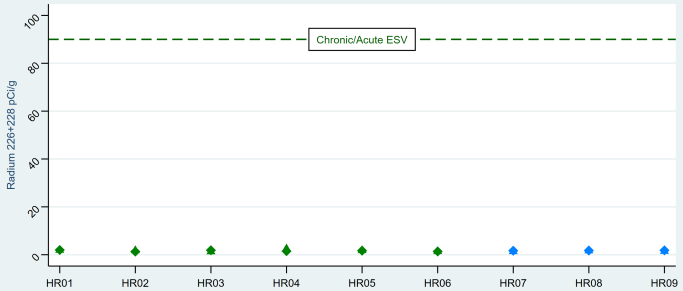
◇ Fossil Plant Bank ○ Center Channel △ Opposite Bank

Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Samples Collected in April 2019

TVA - John Sevier Fossil Plant
Radium 226+228 by Transect with Ecological Screening Values (ESVs) for Sediment



Sediment Transect - Moving Upstream ----> Downstream

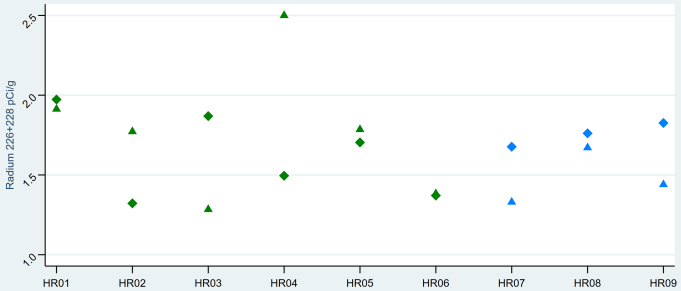
◇ Fossil Plant Bank ○ Center Channel △ Opposite Bank

Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

Hollow symbols are **non-detects** reported at the **Reporting Limit**

Samples collected in April 2019

TVA - John Sevier Fossil Plant
Radium 226+228 by Transect



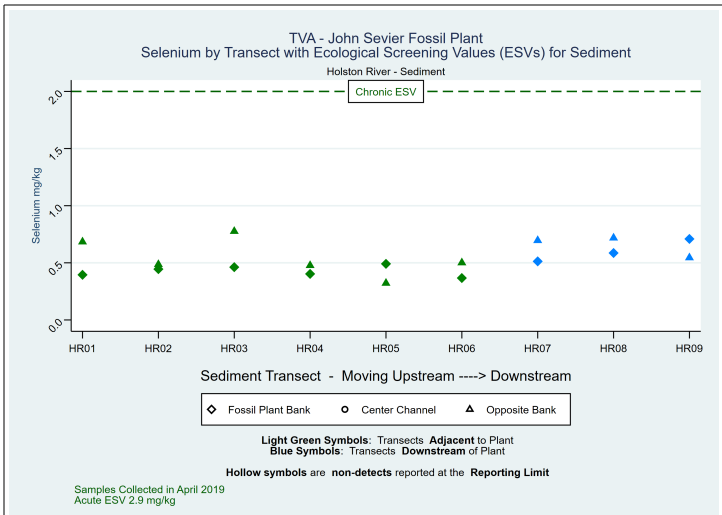
Sediment Transect - Moving Upstream ----> Downstream

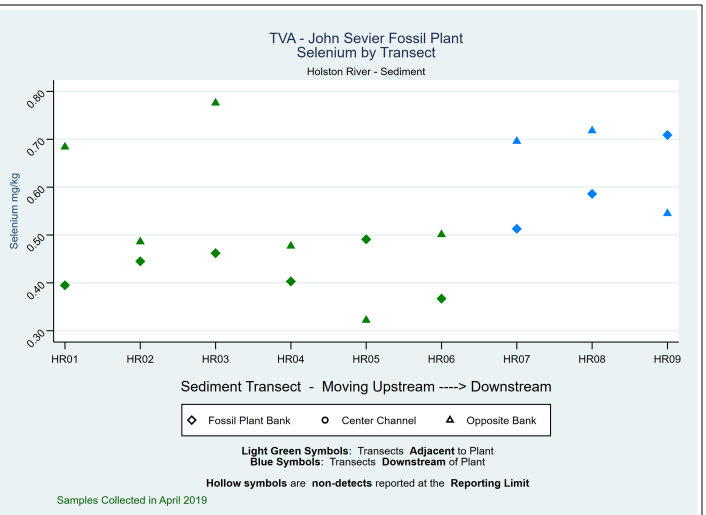
◇ Fossil Plant Bank ○ Center Channel △ Opposite Bank

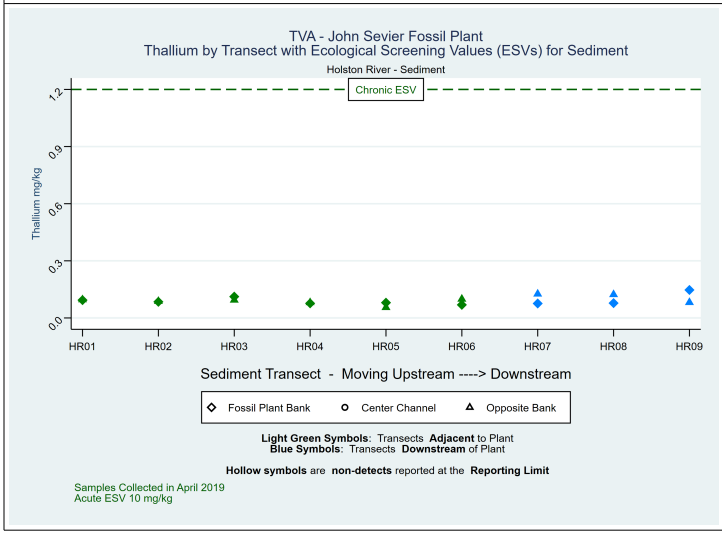
Light Green Symbols: Transects **Adjacent** to Plant
Blue Symbols: Transects **Downstream** of Plant

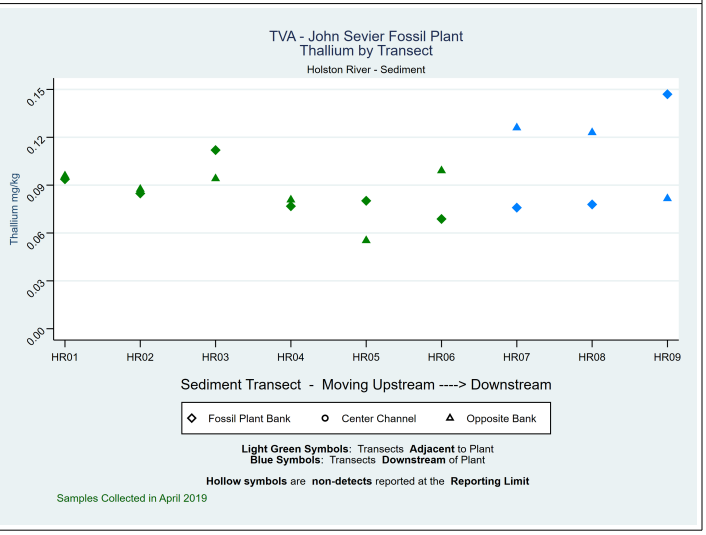
Hollow symbols are **non-detects** reported at the **Reporting Limit**

Lighter shaded symbol - sample collected during low pool

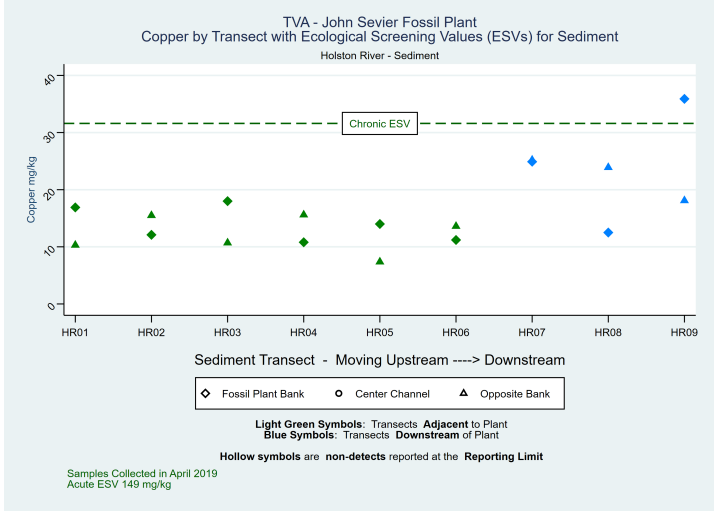

TVA - John Sevier Fossil Plant
Selenium by Transect with Ecological Screening Values (ESVs) for Sediment
Holston River - Sediment
Chronic ESV
Selenium mg/kg
2.0
1.5
1.0
0.5
0.0
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019
Acute ESV 2.9 mg/kg

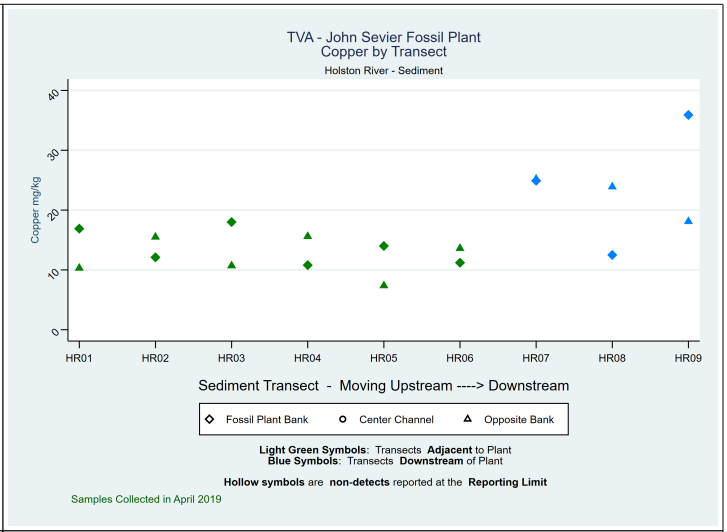

TVA - John Sevier Fossil Plant
Selenium by Transect
Holston River - Sediment
Selenium mg/kg
0.80
0.70
0.60
0.50
0.40
0.30
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019

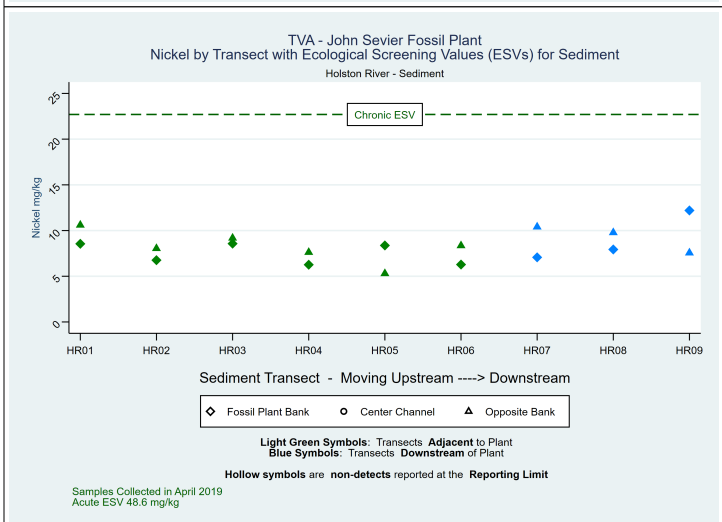

TVA - John Sevier Fossil Plant
Thallium by Transect with Ecological Screening Values (ESVs) for Sediment
Holston River - Sediment
Chronic ESV
Thallium mg/kg
1.2
0.9
0.6
0.3
0.0
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019
Acute ESV 10 mg/kg

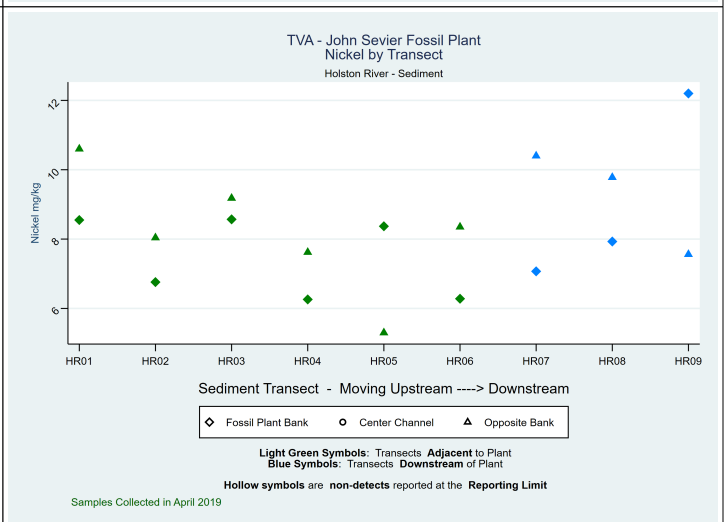

TVA - John Sevier Fossil Plant
Thallium by Transect
Holston River - Sediment
Thallium mg/kg
0.15
0.12
0.09
0.06
0.03
0.00
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019

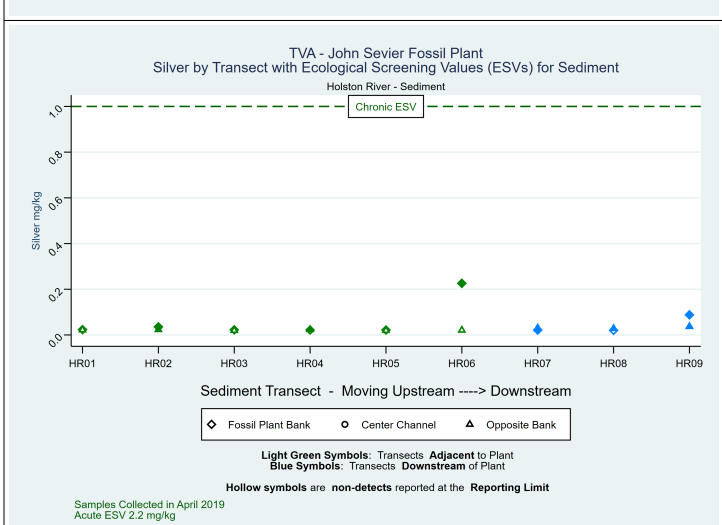
Transect Plots
Holston River - TDEC Appendix I Parameters
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee

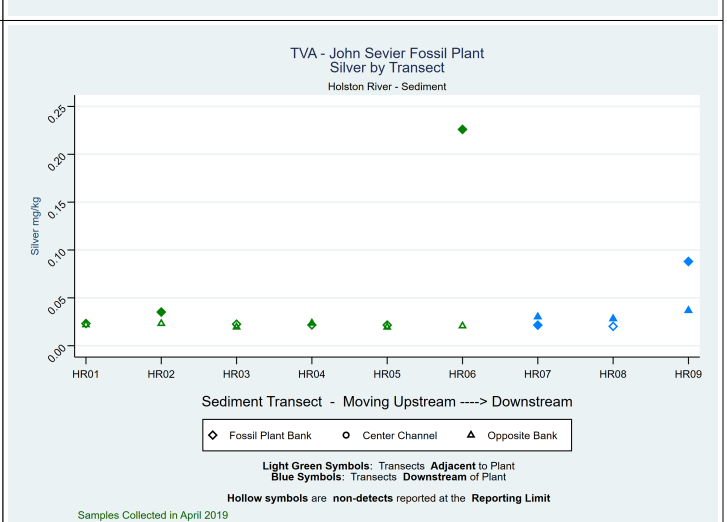


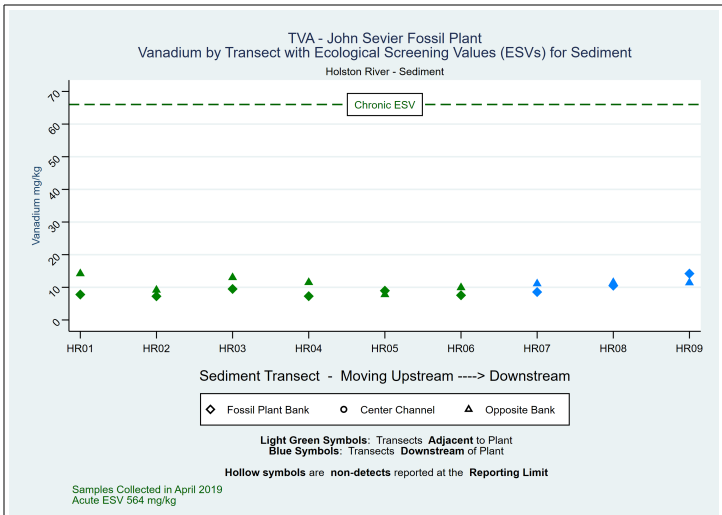


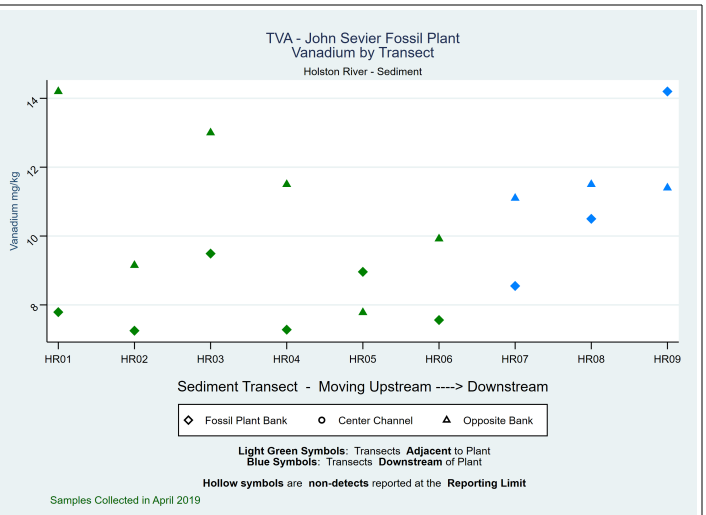


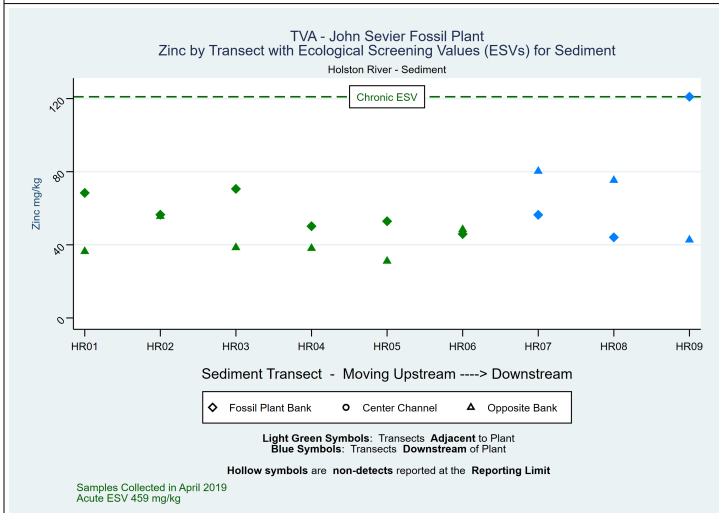


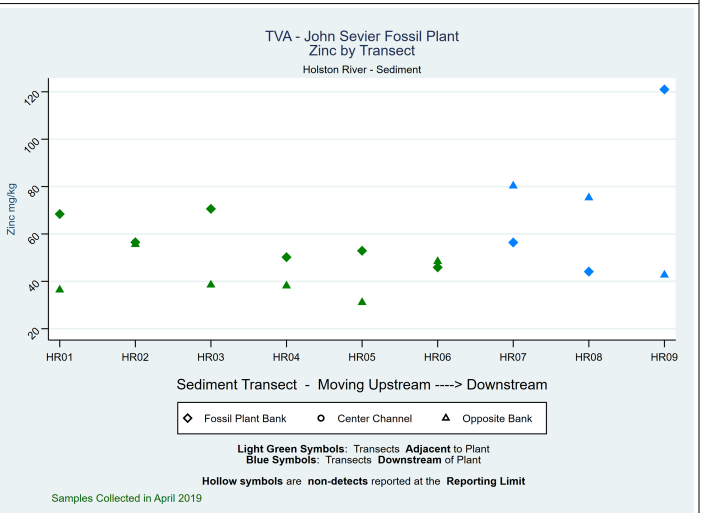




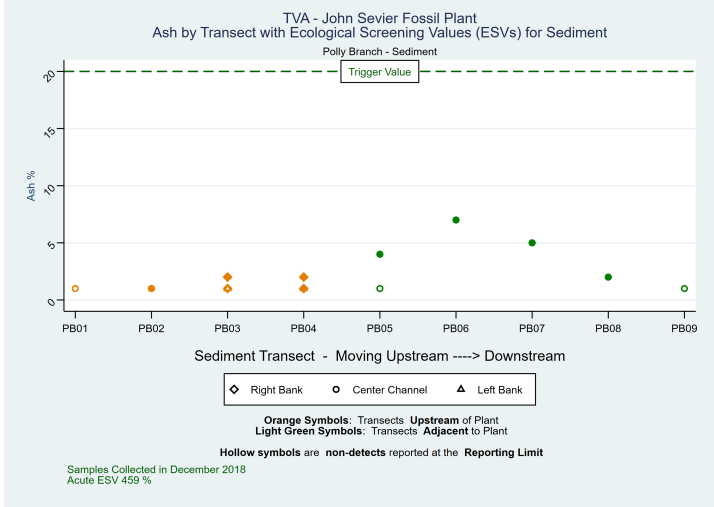

TVA - John Sevier Fossil Plant
Vanadium by Transect with Ecological Screening Values (ESVs) for Sediment
Holston River - Sediment
Chronic ESV
Vanadium mg/kg
0
10
20
30
40
50
60
70
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019
Acute ESV 564 mg/kg

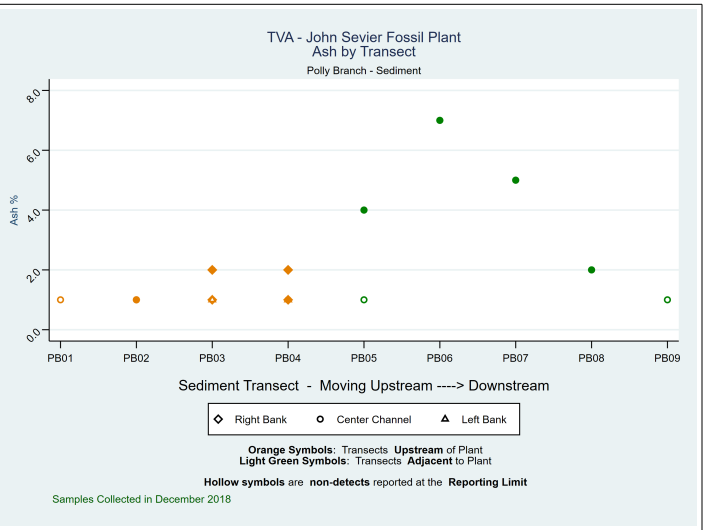

TVA - John Sevier Fossil Plant
Vanadium by Transect
Holston River - Sediment
Vanadium mg/kg
8
10
12
14
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019

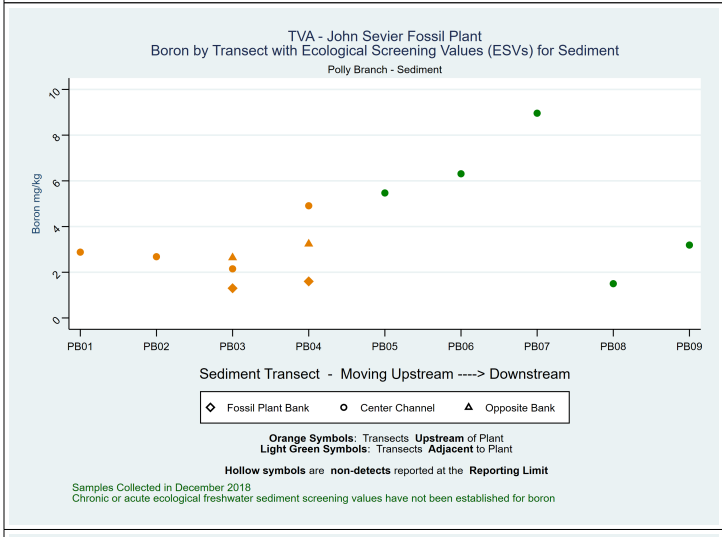

TVA - John Sevier Fossil Plant
Zinc by Transect with Ecological Screening Values (ESVs) for Sediment
Holston River - Sediment
Chronic ESV
Zinc mg/kg
0
40
80
120
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019
Acute ESV 459 mg/kg

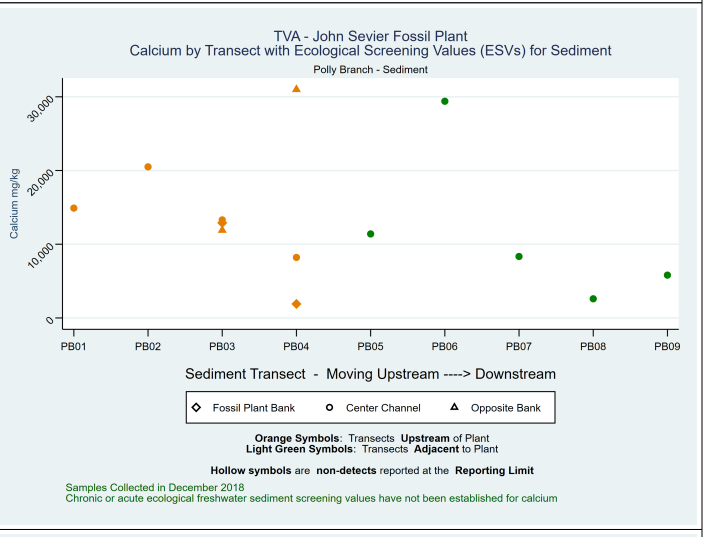

TVA - John Sevier Fossil Plant
Zinc by Transect
Holston River - Sediment
Zinc mg/kg
20
40
60
80
100
120
HR01
HR02
HR03
HR04
HR05
HR06
HR07
HR08
HR09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Light Green Symbols: Transects Adjacent to Plant
Blue Symbols: Transects Downstream of Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in April 2019

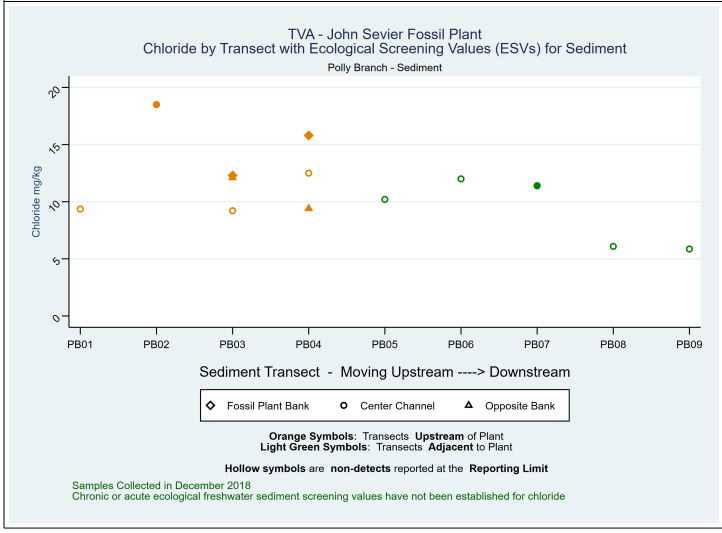
Transect Plots
Polly Branch - CCR Rule Appendix III Parameters
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee

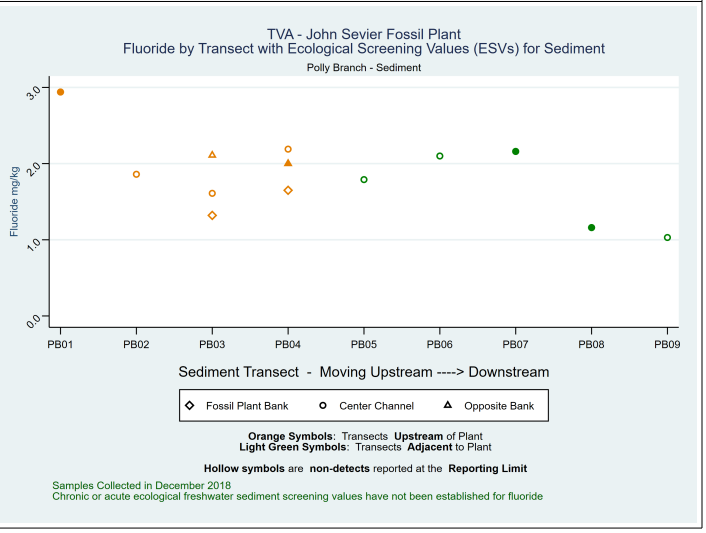


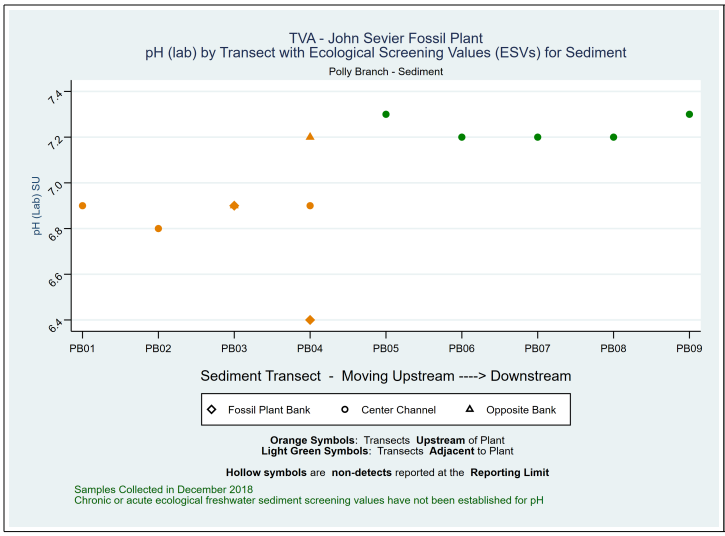


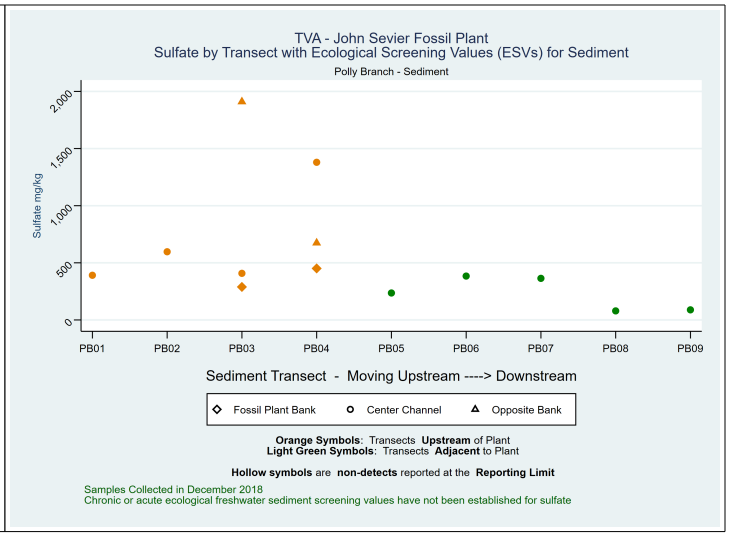




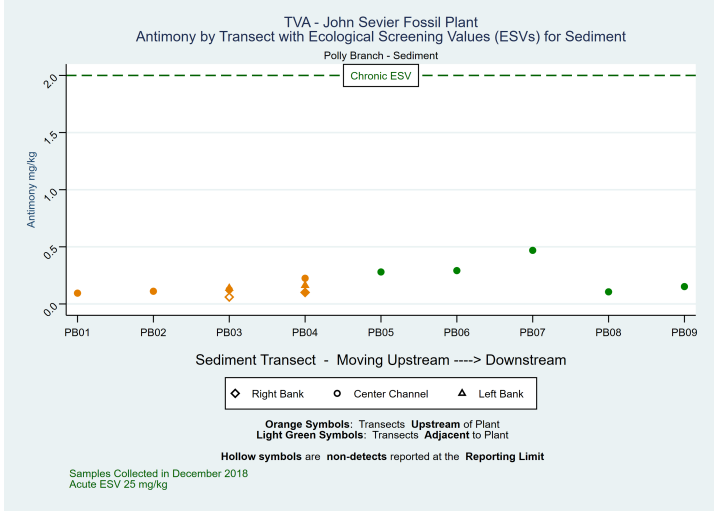


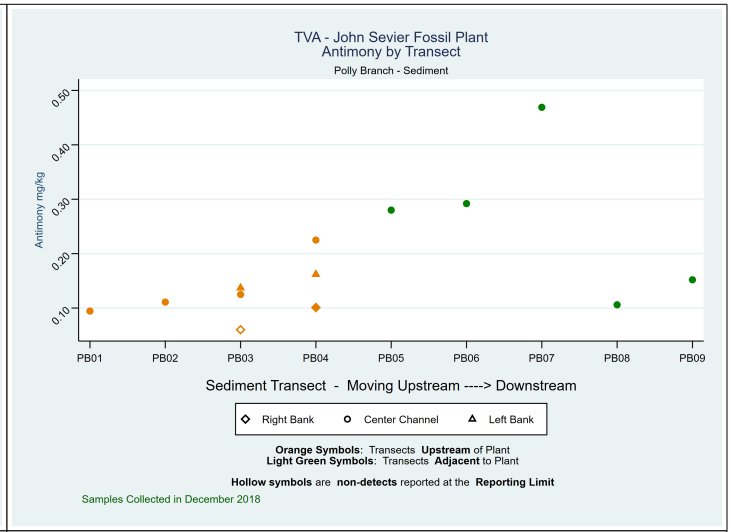


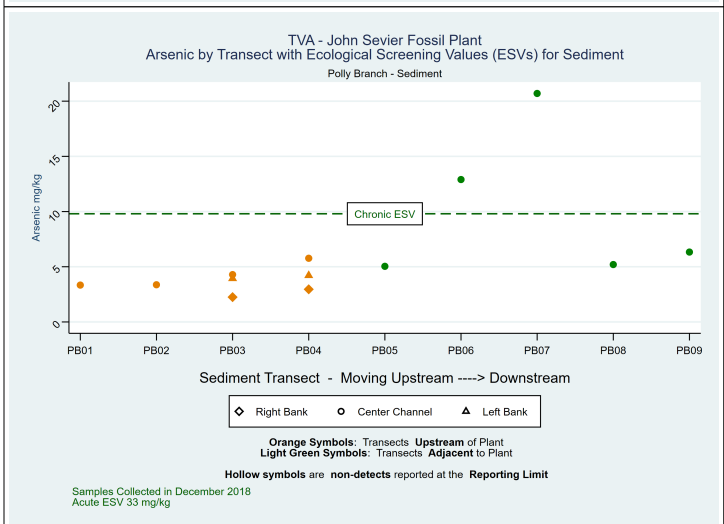

TVA - John Sevier Fossil Plant
pH (lab) by Transect with Ecological Screening Values (ESVs) for Sediment
Polly Branch - Sediment
pH (Lab) SU
7.4
7.2
7.0
6.8
6.6
6.4
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018
Chronic or acute ecological freshwater sediment screening values have not been established for pH

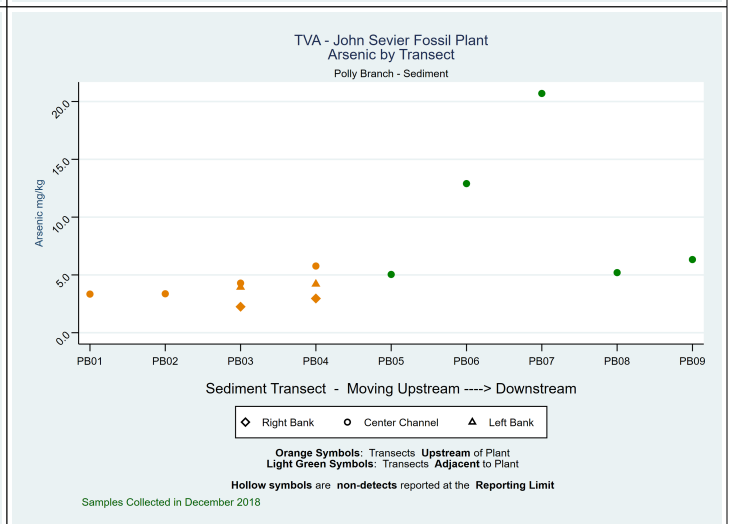

TVA - John Sevier Fossil Plant
Sulfate by Transect with Ecological Screening Values (ESVs) for Sediment
Polly Branch - Sediment
Sulfate mg/kg
2,000
1,500
1,000
500
0
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Fossil Plant Bank
Center Channel
Opposite Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018
Chronic or acute ecological freshwater sediment screening values have not been established for sulfate

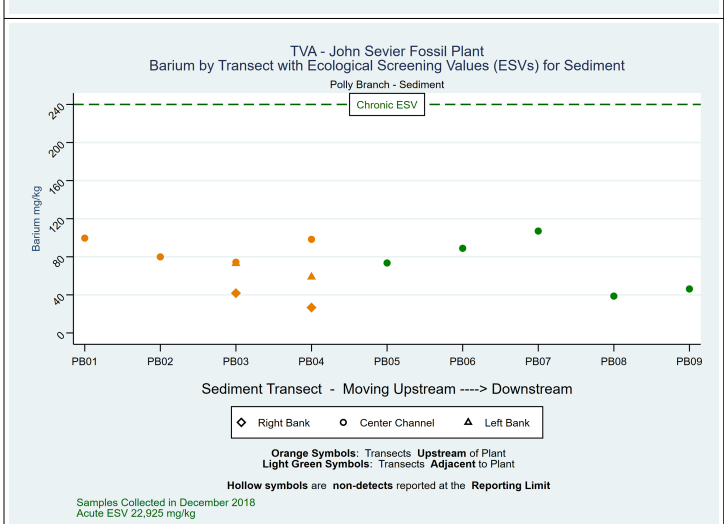
Transect Plots
Polly Branch - CCR Rule Appendix IV Parameters
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee

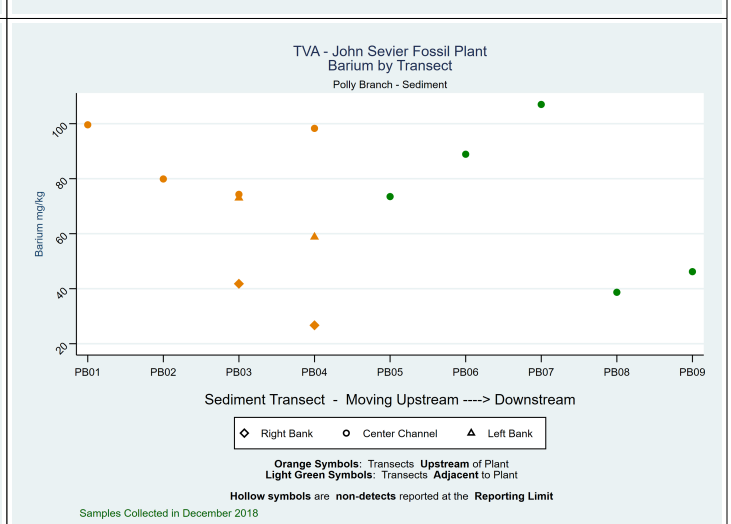




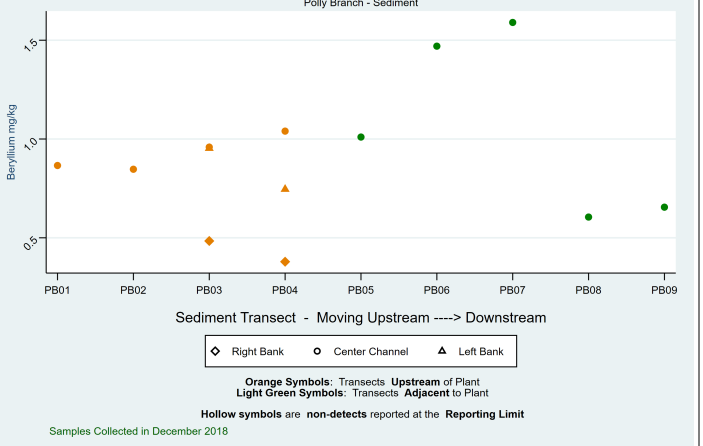


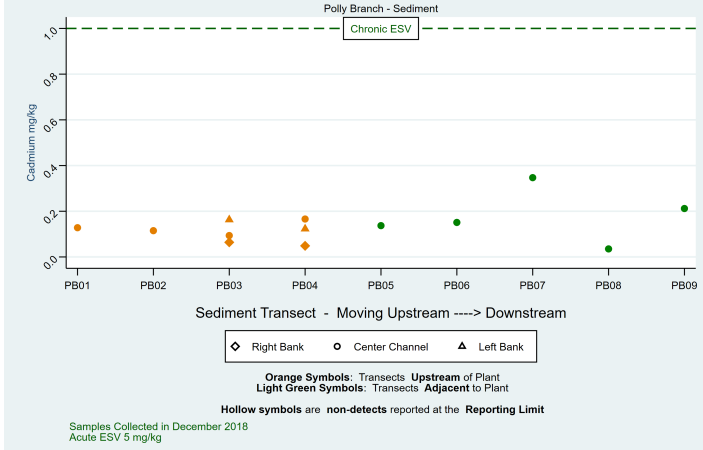


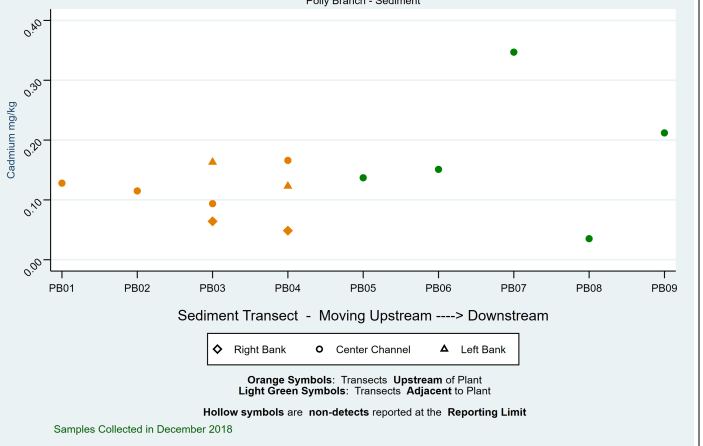




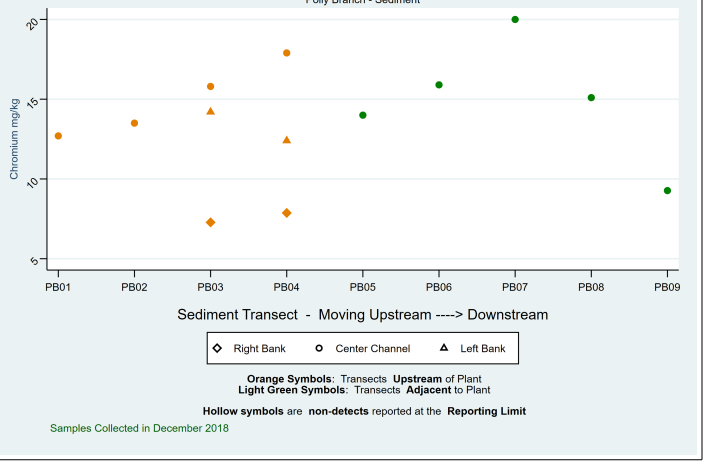

TVA - John Sevier Fossil Plant
Beryllium by Transect with Ecological Screening Values (ESVs) for Sediment
Polly Branch - Sediment
Chronic ESV
Beryllium mg/kg
0.0
0.4
0.8
1.2
1.6
2.0
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018
Acute ESV 42 mg/kg

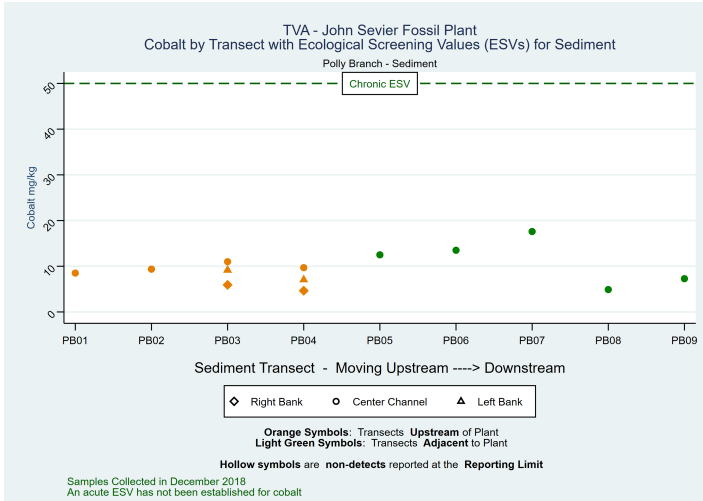

TVA - John Sevier Fossil Plant
Beryllium by Transect
Polly Branch - Sediment
Beryllium mg/kg
0.5
1.0
1.5
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018

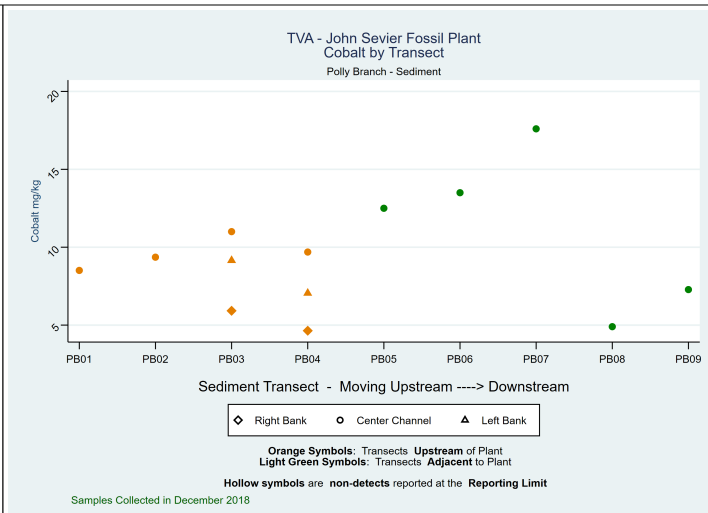

TVA - John Sevier Fossil Plant
Cadmium by Transect with Ecological Screening Values (ESVs) for Sediment
Polly Branch - Sediment
Chronic ESV
Cadmium mg/kg
0.0
0.2
0.4
0.6
0.8
1.0
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018
Acute ESV 5 mg/kg

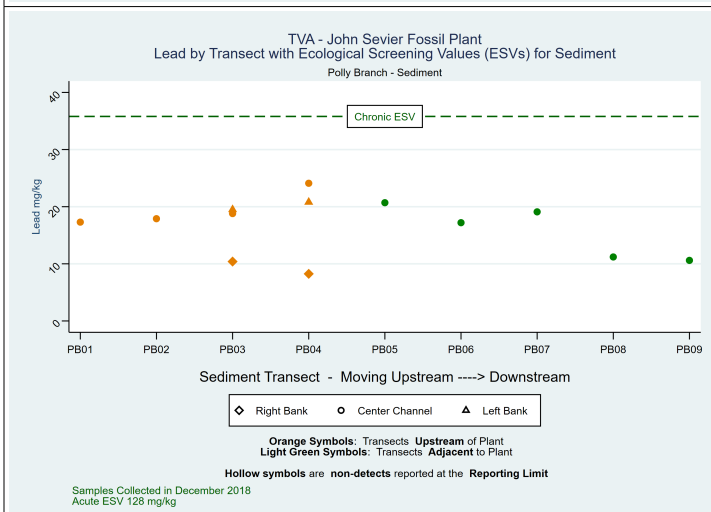

TVA - John Sevier Fossil Plant
Cadmium by Transect
Polly Branch - Sediment
Cadmium mg/kg
0.00
0.10
0.20
0.30
0.40
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018

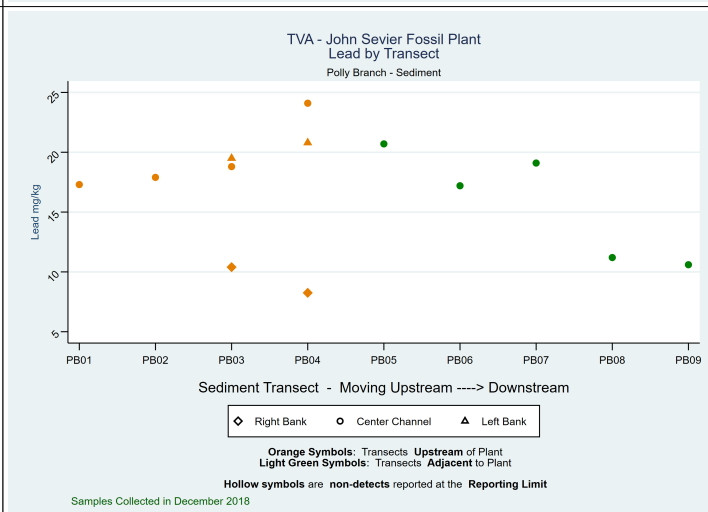

TVA - John Sevier Fossil Plant
Chromium by Transect with Ecological Screening Values (ESVs) for Sediment
Polly Branch - Sediment
Chronic ESV
Chromium mg/kg
0
10
20
30
40
50
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018
Acute ESV 111 mg/kg


TVA - John Sevier Fossil Plant
Chromium by Transect
Polly Branch - Sediment
Chromium mg/kg
5
10
15
20
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018

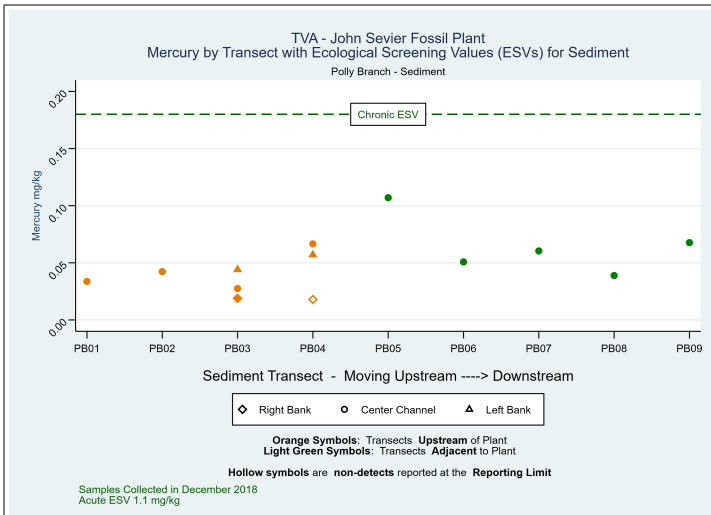


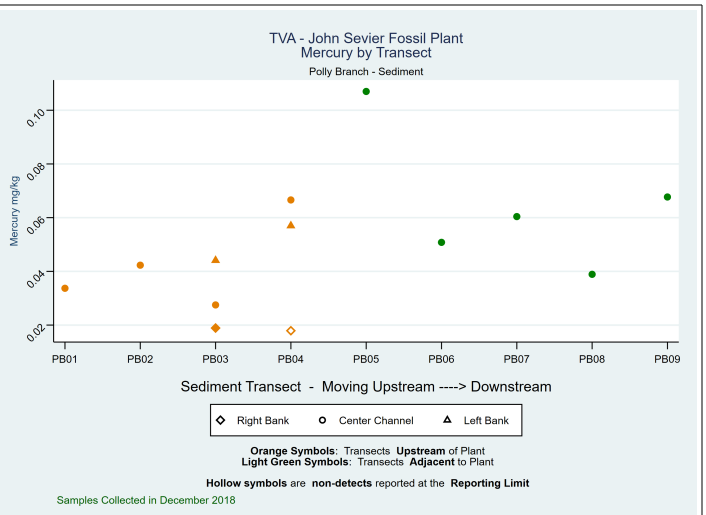


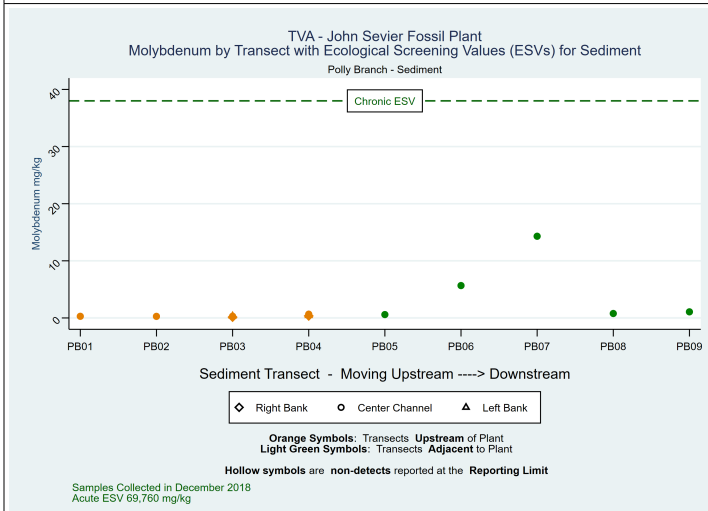


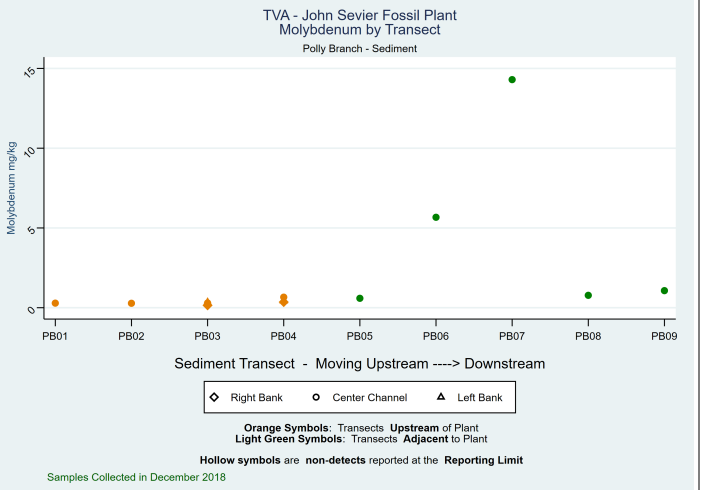


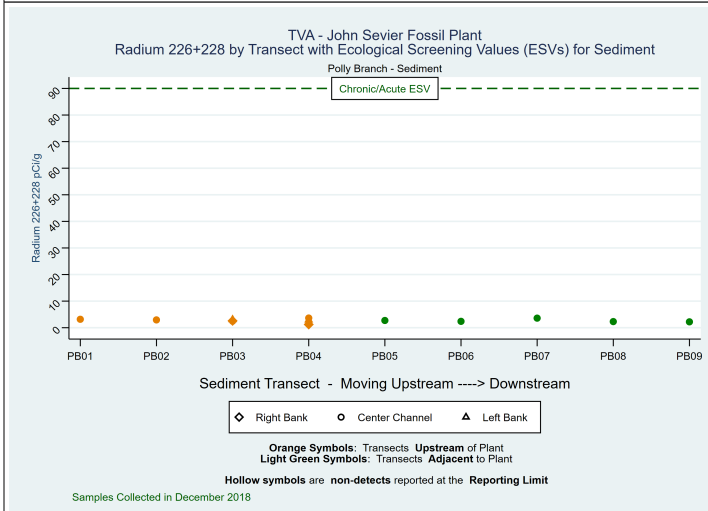
Chronic/Acute ESV has not been established for lithium

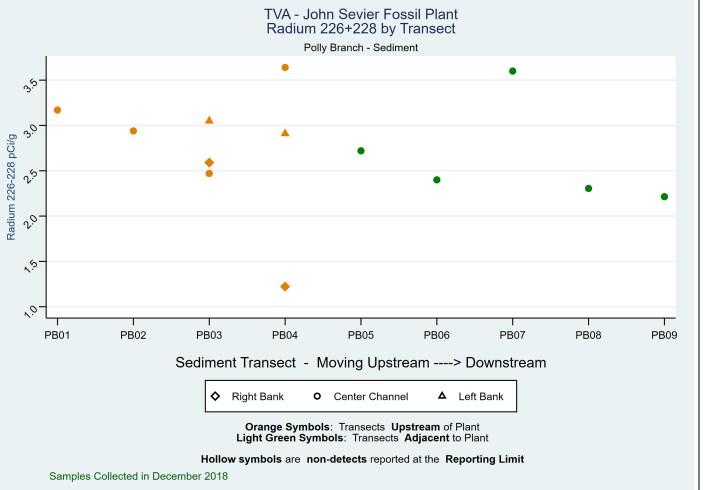

TVA - John Sevier Fossil Plant
Mercury by Transect with Ecological Screening Values (ESVs) for Sediment
Polly Branch - Sediment
Chronic ESV
Mercury mg/kg
0.00
0.05
0.10
0.15
0.20
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018
Acute ESV 1.1 mg/kg

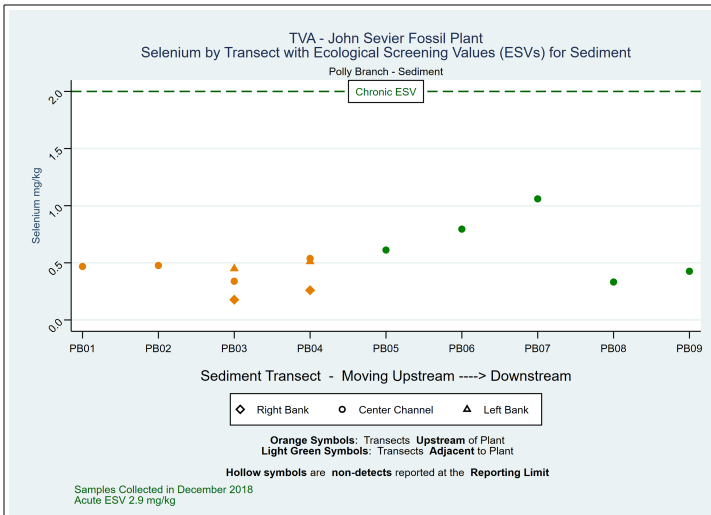

TVA - John Sevier Fossil Plant
Mercury by Transect
Polly Branch - Sediment
Mercury mg/kg
0.02
0.04
0.06
0.08
0.10
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018

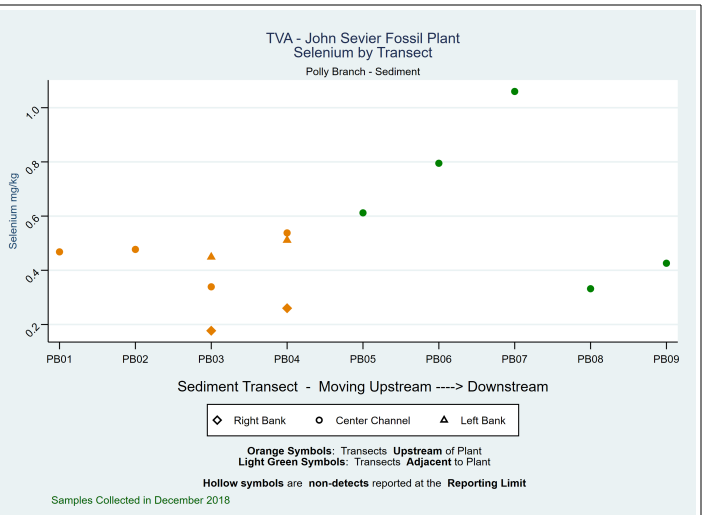

TVA - John Sevier Fossil Plant
Molybdenum by Transect with Ecological Screening Values (ESVs) for Sediment
Polly Branch - Sediment
Chronic ESV
Molybdenum mg/kg
0
10
20
30
40
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018
Acute ESV 69,760 mg/kg

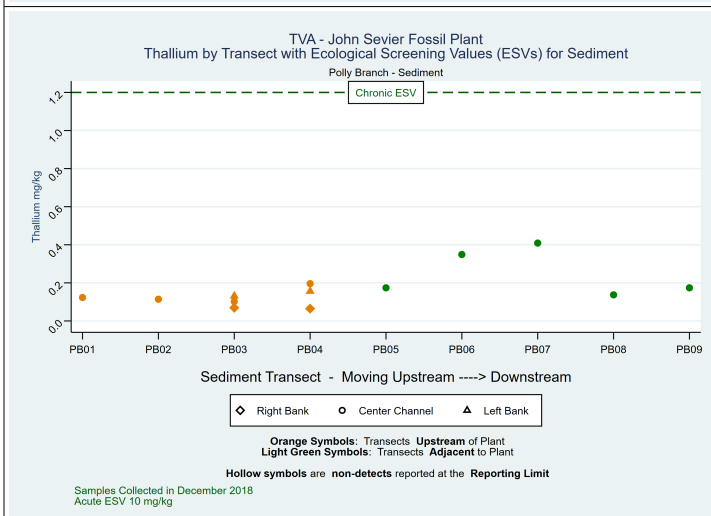

TVA - John Sevier Fossil Plant
Molybdenum by Transect
Polly Branch - Sediment
Molybdenum mg/kg
0
5
10
15
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018

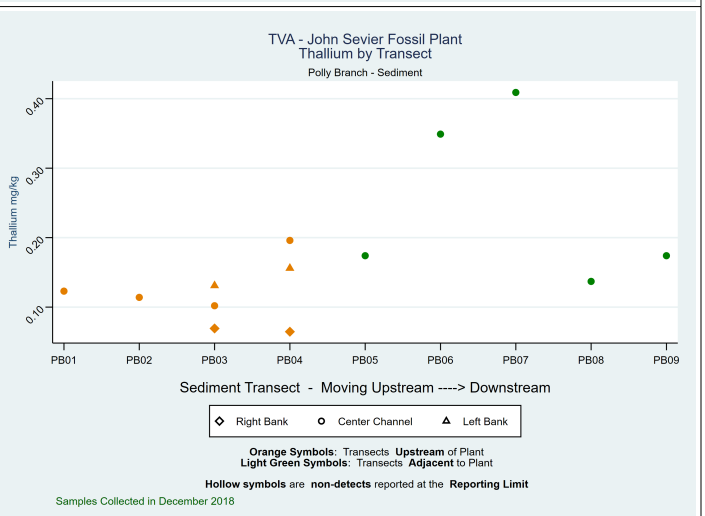

TVA - John Sevier Fossil Plant
Radium 226+228 by Transect with Ecological Screening Values (ESVs) for Sediment
Polly Branch - Sediment
Chronic/Acute ESV
Radium 226+228 pCi/g
0
10
20
30
40
50
60
70
80
90
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018


TVA - John Sevier Fossil Plant
Radium 226+228 by Transect
Polly Branch - Sediment
Radium 226-228 pCi/g
1.0
1.5
2.0
2.5
3.0
3.5
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018

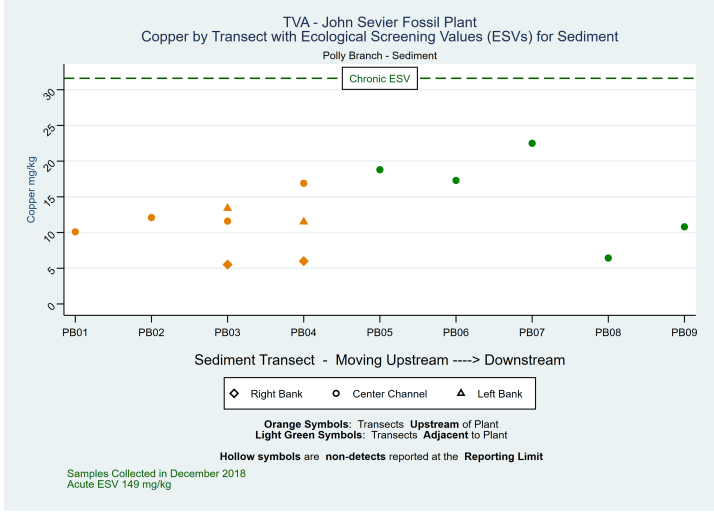

TVA - John Sevier Fossil Plant
Selenium by Transect with Ecological Screening Values (ESVs) for Sediment
Polly Branch - Sediment
Chronic ESV
Selenium mg/kg
0.0
0.5
1.0
1.5
2.0
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018
Acute ESV 2.9 mg/kg

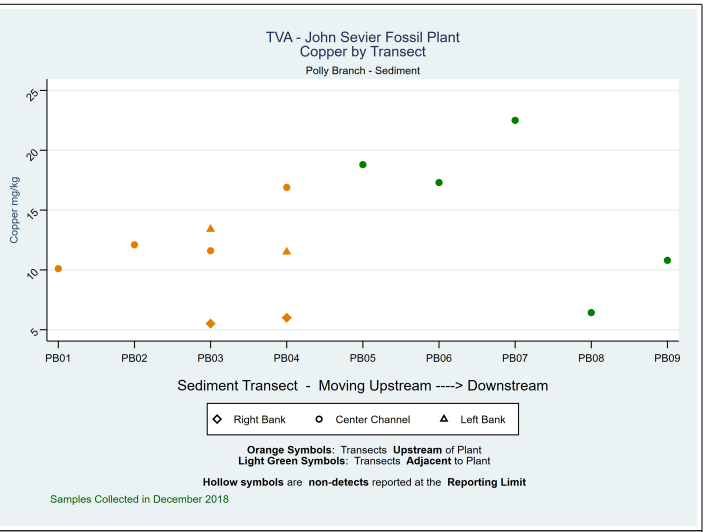

TVA - John Sevier Fossil Plant
Selenium by Transect
Polly Branch - Sediment
Selenium mg/kg
0.2
0.4
0.6
0.8
1.0
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018

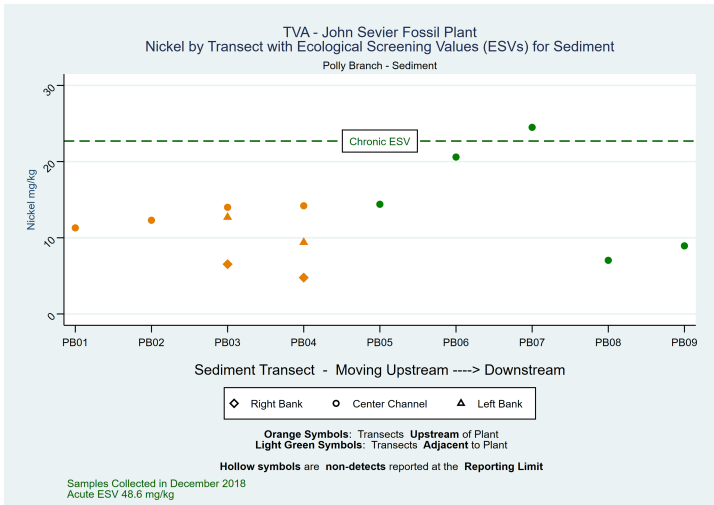

TVA - John Sevier Fossil Plant
Thallium by Transect with Ecological Screening Values (ESVs) for Sediment
Polly Branch - Sediment
Chronic ESV
Thallium mg/kg
0.0
0.2
0.4
0.6
0.8
1.0
1.2
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018
Acute ESV 10 mg/kg

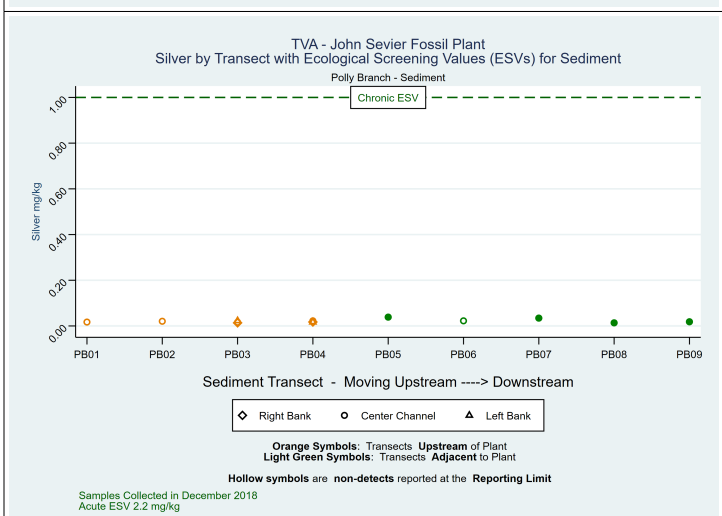

TVA - John Sevier Fossil Plant
Thallium by Transect
Polly Branch - Sediment
Thallium mg/kg
0.10
0.20
0.30
0.40
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018

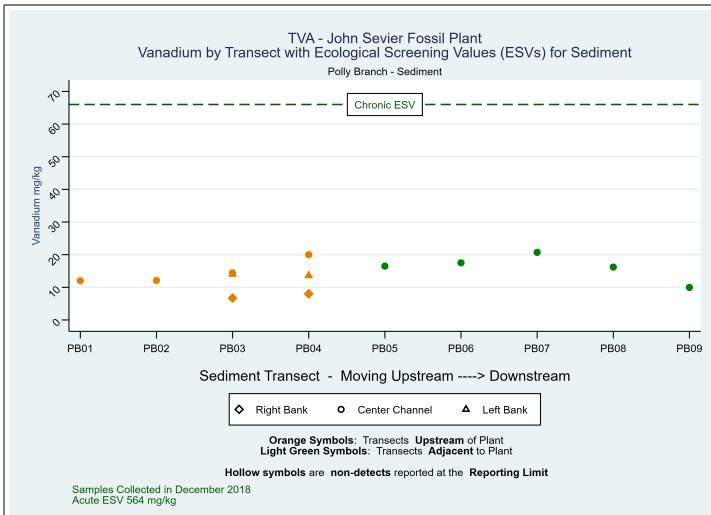
Transect Plots
Polly Branch - TDEC Appendix I Parameters
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee

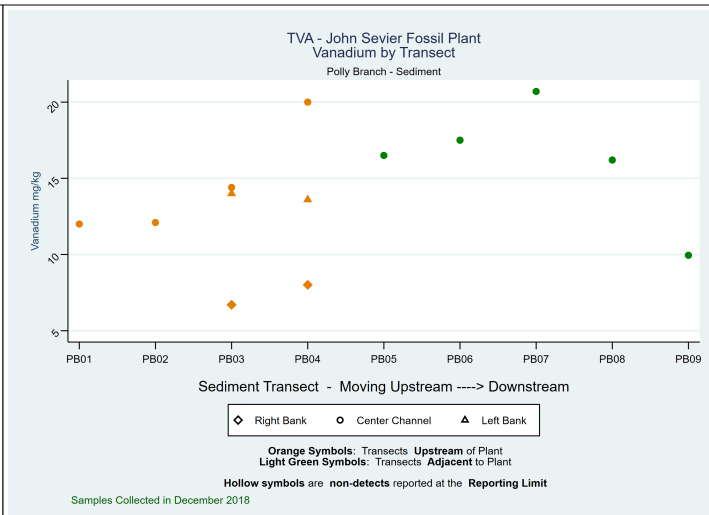


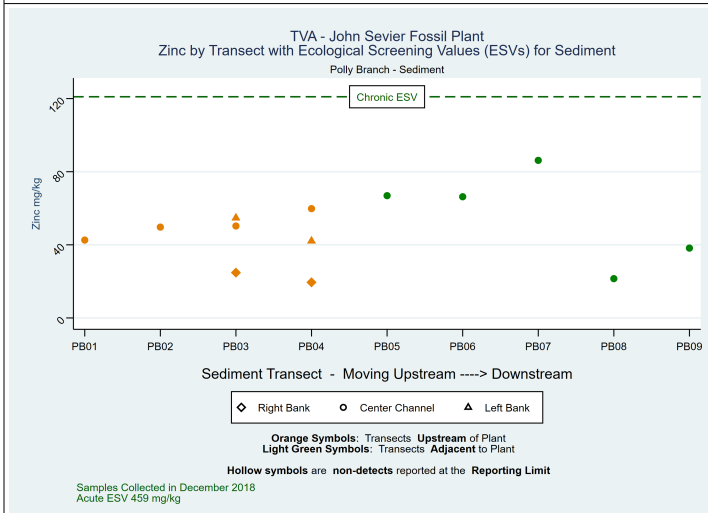


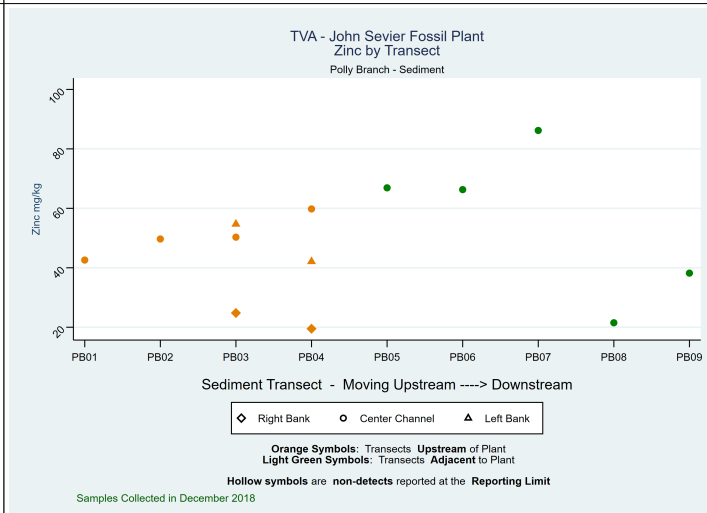





TVA - John Sevier Fossil Plant
Vanadium by Transect with Ecological Screening Values (ESVs) for Sediment
Polly Branch - Sediment
Chronic ESV
Vanadium mg/kg
0
10
20
30
40
50
60
70
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018
Acute ESV 564 mg/kg

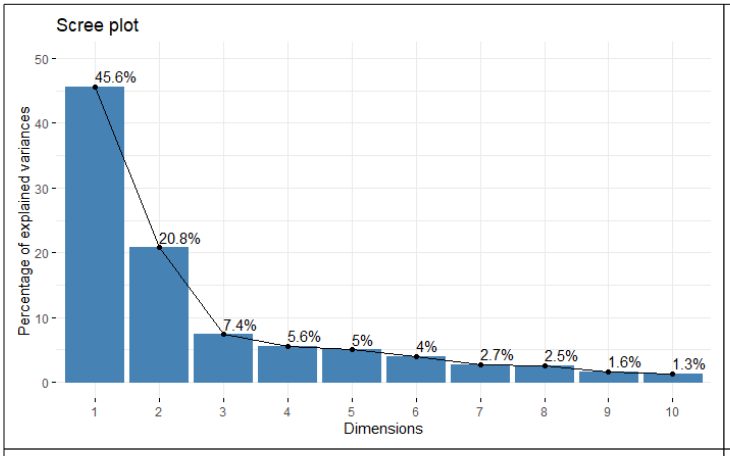

TVA - John Sevier Fossil Plant
Vanadium by Transect
Polly Branch - Sediment
Vanadium mg/kg
5
10
15
20
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018

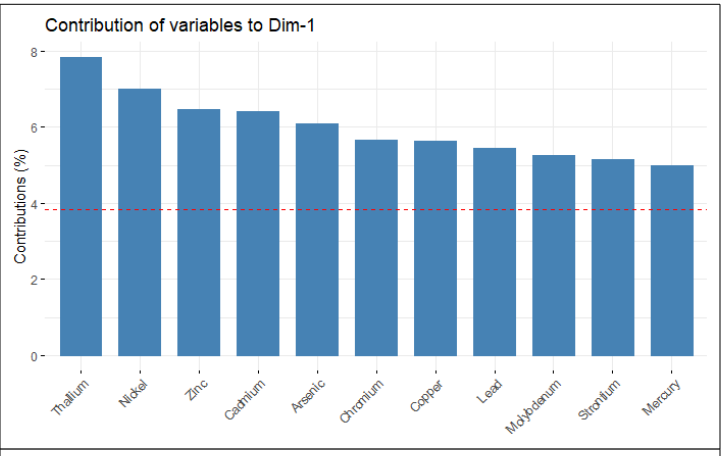

TVA - John Sevier Fossil Plant
Zinc by Transect with Ecological Screening Values (ESVs) for Sediment
Polly Branch - Sediment
Chronic ESV
Zinc mg/kg
0
40
80
120
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018
Acute ESV 459 mg/kg

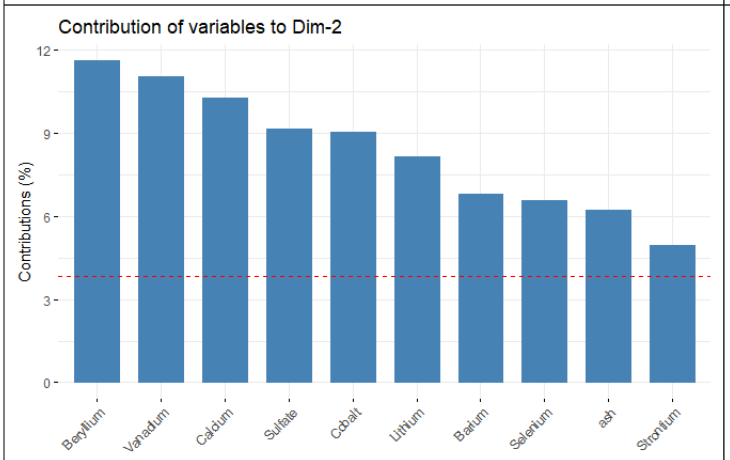

TVA - John Sevier Fossil Plant
Zinc by Transect
Polly Branch - Sediment
Zinc mg/kg
20
40
60
80
100
PB01
PB02
PB03
PB04
PB05
PB06
PB07
PB08
PB09
Sediment Transect - Moving Upstream ----> Downstream
Right Bank
Center Channel
Left Bank
Orange Symbols: Transects Upstream of Plant
Light Green Symbols: Transects Adjacent to Plant
Hollow symbols are non-detects reported at the Reporting Limit
Samples Collected in December 2018

ATTACHMENT E.5-D PRINCIPAL COMPONENT ANALYSIS

Principal Component Analysis
Holston River
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee







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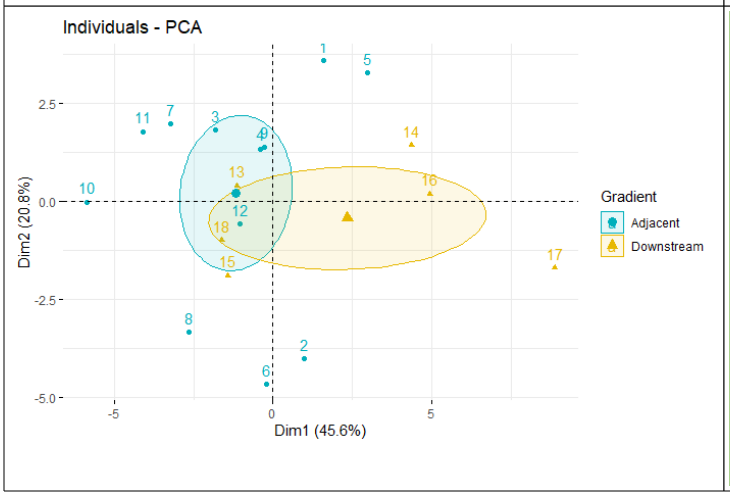
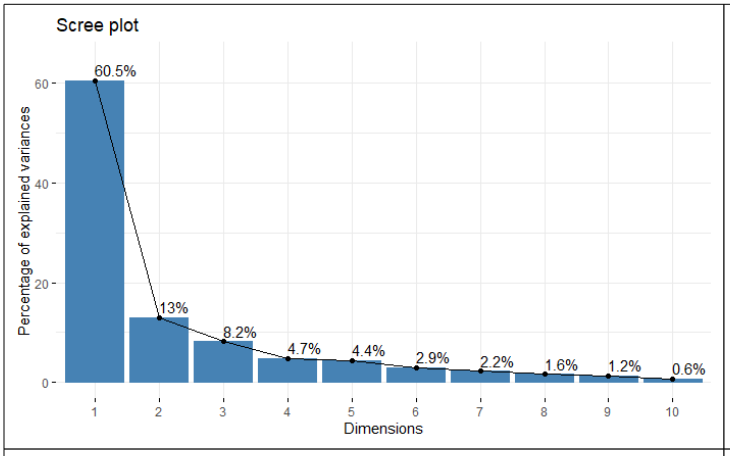
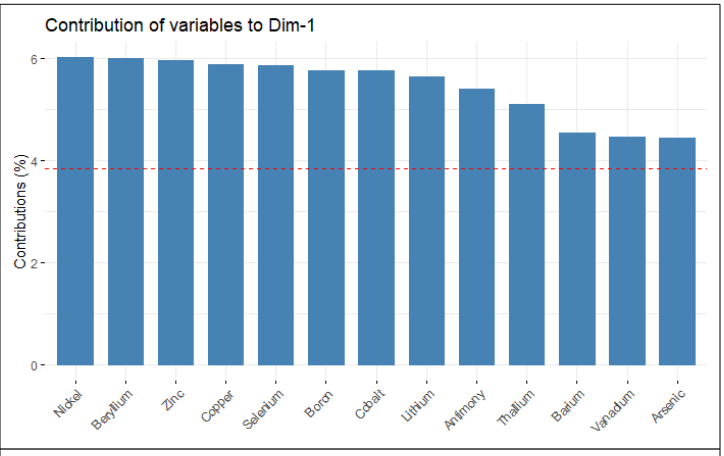
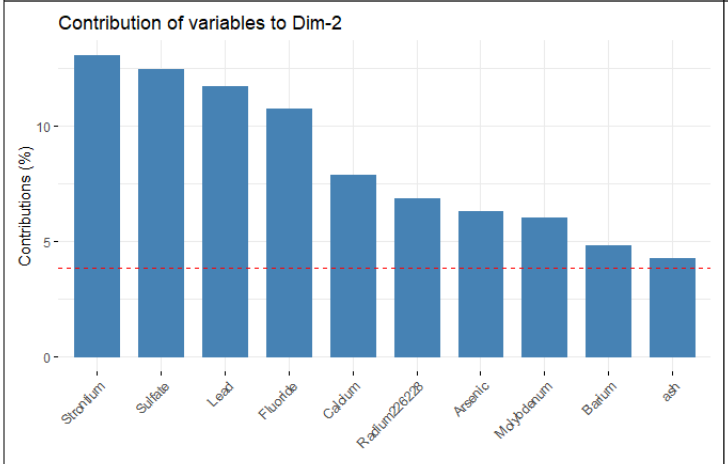


facility	sample_number	sample_name	loc_name
JSF	1	JSF-SED-HR01-CORLB-0.0/0.5-20190403	JSF-HR01
JSF	2	JSF-SED-HR01-CORRB-0.0/0.5-20190403	JSF-HR01
JSF	3	JSF-SED-HR02-CORLB-0.0/0.5-20190403	JSF-HR02
JSF	4	JSF-SED-HR02-CORRB-0.0/0.5-20190403	JSF-HR02
JSF	5	JSF-SED-HR03-CORLB-0.0/0.5-20190403	JSF-HR03
JSF	6	JSF-SED-HR03-CORRB-0.0/0.5-20190403	JSF-HR03
JSF	7	JSF-SED-HR04-CORLB-0.0/0.5-20190403	JSF-HR04
JSF	8	JSF-SED-HR04-CORRB-0.0/0.5-20190403	JSF-HR04
JSF	9	JSF-SED-HR05-CORLB-0.0/0.5-20190403	JSF-HR05
JSF	10	JSF-SED-HR05-CORRB-0.0/0.5-20190403	JSF-HR05
JSF	11	JSF-SED-HR06-CORLB-0.0/0.5-20190403	JSF-HR06
JSF	12	JSF-SED-HR06-CORRB-0.0/0.5-20190403	JSF-HR06
JSF	13	JSF-SED-HR07-CORLB-0.0/0.5-20190403	JSF-HR07
JSF	14	JSF-SED-HR07-CORRB-0.0/0.5-20190403	JSF-HR07
JSF	15	JSF-SED-HR08-CORLB-0.0/0.5-20190403	JSF-HR08
JSF	16	JSF-SED-HR08-CORRB-0.0/0.5-20190403	JSF-HR08
JSF	17	JSF-SED-HR09-CORLB-0.0/0.5-20190403	JSF-HR09
JSF	18	JSF-SED-HR09-CORRB-0.0/0.5-20190403	JSF-HR09

Principal Component Analysis
Polly Branch
Sediment Investigation
John Sevier Fossil Plant, Rogersville Tennessee







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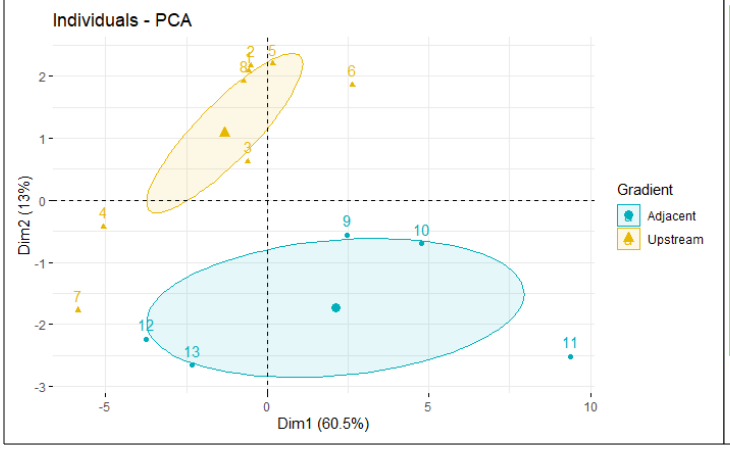


facility	sample number	sample_name	loc_name
JSF	1	JSF-SED-PB01-CORCC-0.0/0.5-20181218	JSF-PB01
JSF	2	JSF-SED-PB02-CORCC-0.0/0.5-20181218	JSF-PB02
JSF	3	JSF-SED-PB03-CORCC-0.0/0.5-20181218	JSF-PB03
JSF	4	JSF-SED-PB03-CORLB-0.0/0.5-20181218	JSF-PB03
JSF	5	JSF-SED-PB03-CORRB-0.0/0.5-20181218	JSF-PB03
JSF	6	JSF-SED-PB04-CORCC-0.0/0.5-20181218	JSF-PB04
JSF	7	JSF-SED-PB04-CORLB-0.0/0.5-20181218	JSF-PB04
JSF	8	JSF-SED-PB04-CORRB-0.0/0.5-20181218	JSF-PB04
JSF	9	JSF-SED-PB05-CORCC-0.0/0.5-20181219	JSF-PB05
JSF	10	JSF-SED-PB06-CORCC-0.0/0.5-20181219	JSF-PB06
JSF	11	JSF-SED-PB07-CORCC-0.0/0.5-20181219	JSF-PB07
JSF	12	JSF-SED-PB08-CORCC-0.0/0.5-20181219	JSF-PB08
JSF	13	JSF-SED-PB09-CORCC-0.0/0.5-20181219	JSF-PB09

APPENDIX E.6

DATA EVALUATION OF MAYFLY TISSUE SAMPLE DATA

Appendix E.6 - Data Evaluation of Mayfly Tissue Sample Data

TDEC Commissioner's Order:
Environmental Assessment Report
John Sevier Fossil Plant
Rogersville, Tennessee

July 3, 2023

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

Revision Log

Revision	Description	Date
0	Submittal to TDEC	January 10, 2023
1	Addresses April 4, 2023 TDEC Review Comments and Issued for TDEC	July 3, 2023

Sign-off Sheet

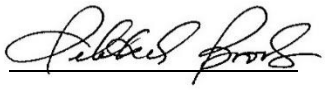
This document entitled Appendix E.6 - Data Evaluation of Mayfly Tissue Sample Data was prepared by Stantec Consulting Services Inc. (“Stantec”) for the account of Tennessee Valley Authority (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not consider any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by 

Melissa Whitfield Aslund, PhD, Environmental Scientist

Reviewed by 

Chris La Londe, Risk Assessor

Approved by 

Rebekah Brooks, PG, Senior Principal Hydrogeologist

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LIST OF TABLES

Abbreviations

CBR	Critical Body Residue
CCR	Coal Combustion Residuals
CCR Rule	Title 40, Code of Federal Regulations, Part 257
EAR	Environmental Assessment Report
HRA1	Holston River Adjacent 1
HRA2	Holston River Adjacent 2
HRD	Holston River Downstream
HRU	Holston River Upstream
JSF Plant	John Sevier Fossil Plant
LOAEL	Lowest Observed Adverse Effect Level
mg/kg	Milligrams per Kilogram
NA	Not Available
NOAEL	No Observed Adverse Effect Level
TDEC	Tennessee Department of Environment and Conservation
TVA	Tennessee Valley Authority
USEPA	United States Environmental Protection Agency
WW	Wet Weight

July 3, 2023

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) prepared this appendix on behalf of the Tennessee Valley Authority (TVA) to summarize the data evaluation performed on mayfly tissue data to support the Environmental Assessment Report (EAR) at the John Sevier Fossil Plant (JSF Plant) located in Rogersville, Tennessee. Mayfly tissue samples were collected as part of the Tennessee Department of Environment and Conservation (TDEC) Order Environmental Investigation in September 2019 in the Holston River in proximity to the JSF Plant. Further details regarding the mayfly tissue sampling program and results are available in Appendix J.3 and the *JSF Plant Benthic Sampling and Analysis Report* (Appendix J.4).

The sampling locations, and sample types included in this data evaluation are summarized in Table E.6-1.

Table E.6-1 – Summary of Samples Collected and Included in Data Analysis

Water Body	Sample Location	Location Relative to JSF CCR Units	Mayfly Nymphs (Non-Depurated)	Mayfly Nymphs (Depurated)
Holston River	HRU	Upstream	✓	✓
	HRA1	Adjacent	✓	✓
	HRA2	Adjacent	✓	✓
	HRD	Downstream	✓	✓

Notes: CCR - Coal Combustion Residuals; HRU – Holston River Upstream, HRA1 – Holston River Adjacent 1, HRA2 – Holston River Adjacent 2, HRD – Holston River River Downstream

This data evaluation focused on constituents from one of the following two categories:

- Constituents for which potential risks to aquatic life have been identified based on observations of concentrations greater than applicable EAR ecological screening values (Tables 1-2 and 1-3 and Appendix A.2) in surface stream or sediment (excluding statistical outliers). Detailed comparisons of constituent concentrations in surface stream and sediment to the applicable ecological screening values are provided in Appendices E.4 and Appendix E.5, respectively.
- Constituents with potential to bioaccumulate as identified by United States Environmental Protection Agency (USEPA 2018).

The constituents identified for review in mayfly tissue based on these criteria are summarized in Table E.6-2.

Table E.6-2 – Constituents Identified for Review in Mayfly Tissue

Water Body	Constituent	Rationale for Review in Fish Tissue
Holston River	Copper	Concentration greater than chronic ecological screening value observed in sediment
	Mercury	Concentration greater than chronic ecological screening value observed in sediment and bioaccumlative per USEPA (2018)
	Selenium	Bioaccumlative per USEPA (2018)
	Zinc	Concentration greater than chronic ecological screening value observed in sediment

For the constituents identified in Table E.6-2, the following sections present the methods and results from the data evaluation and comparison of mayfly tissue data to established screening levels for mayfly tissue critical body residues (CBRs), where available, (see Table 1-4 and Appendix A.2 for list of CBRs identified as EAR screening levels for mayfly tissue concentrations).

2.0 METHODS

2.1 COMPARISON OF CONSTITUENT CONCENTRATIONS IN MAYFLY TISSUES TO MAYFLY TISSUE CRITICAL BODY RESIDUES

For the constituents identified in Tables E.6-2 as requiring further review, measured constituent concentrations (or reported detection limits, for samples where the constituent was not detected) for each analyzed mayfly tissue type were compared directly to the applicable CBRs presented in Table 1-4 and Appendix A.2.

3.0 RESULTS

3.1 HOLSTON RIVER

For Holston River, mayfly tissue sample concentrations were compared to CBRs for copper, mercury, selenium, and zinc. The reported mayfly tissue concentrations for these constituents at the four Holston River sampling reaches are summarized and compared to their applicable CBRs, as shown in Table E.6-3 below.

Table E.6-3 – Mayfly Tissue Concentrations for Beryllium, Mercury, and Selenium for Samples Collected in Holston River

Constituent Type	Constituent	Sample Location	Gradient	Sample Concentration (mg/kg ww)	
				Non-Depurated Mayfly Nymphs	Depurated Mayfly Nymphs
CCR Rule Appendix IV	**Mercury**	HRU	Upstream	0.039	<0.0074
		HRA1	Adjacent	0.032	0.025
		HRA2	Adjacent	0.052	0.018
		HRD	Downstream	0.055	0.018
	Selenium	HRU	Upstream	0.51	0.43
		HRA1	Adjacent	0.46	0.39
		HRA2	Adjacent	0.6	0.4
		HRD	Downstream	0.49	0.42
TDEC Appendix I	**Copper**	HRU	Upstream	4.8	2.2
		HRA1	Adjacent	2.7	1.9
		HRA2	Adjacent	3.5	1.7
		HRD	Downstream	4.4	1.9
	Zinc	HRU	Upstream	39.5	34.9
		HRA1	Adjacent	32	31.5
		HRA2	Adjacent	35.9	29.9
		HRD	Downstream	34.4	29.6

Notes: CCR Rule - Title 40, Code of Federal Regulations, Part 257; LOAEL - Lowest Observed Adverse Effect Level; mg/kg - milligrams per kilogram; ww - wet weight; NA – Not Available; NOAEL - No Observed Adverse Effects Levels

Legend
Concentration < CBR NOAEL
Concentration ≥ CBR NOAEL
Concentration ≥ CBR LOAEL

4.0 DISCUSSION

For the reviewed constituents, where mayfly tissue concentrations were higher than CBR NOAELs, there was generally minimal variability in constituent concentrations between the upstream, adjacent, and downstream sampling reaches. Further evaluation of the ecological implications of these tissue concentrations will be completed in the context of the Corrective Action/Risk Assessment Plan.

5.0 REFERENCES

United States Environmental Protection Agency (USEPA). (2018). *Region 4 Ecological Risk Assessment Supplemental Guidance, March 2018 Update, Screening Values.*

APPENDIX E.7

DATA EVALUATION OF FISH TISSUE SAMPLE DATA

Appendix E.7 - Data Evaluation of Fish Tissue Sample Data

TDEC Commissioner's Order:
Environmental Assessment Report
John Sevier Fossil Plant
Rogersville, Tennessee

July 3, 2023

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

Revision Log

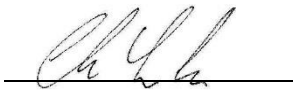
Revision	Description	Date
0	Submittal to TDEC	January 10, 2023
1	Addresses April 4, 2023 TDEC Review Comments and Issued for TDEC	July 3, 2023

Sign-off Sheet

This document entitled Appendix E.7 - Data Evaluation of Fish Tissue Sample Data was prepared by Stantec Consulting Services Inc. (“Stantec”) for the account of Tennessee Valley Authority (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not consider any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by 

Melissa Whitfield Aslund, PhD, Environmental Scientist

Reviewed by 

Chris La Londe, Risk Assessor

Approved by 

Rebekah Brooks, PG, Principal Hydrogeologist

Table of Contents

LIST OF TABLES

Abbreviations

BG	Bluegill
CBR	Critical Body Residue
CC	Channel Catfish
CCR	Coal Combustion Residuals
CCR Rule	Title 40, Code of Federal Regulations, Part 257
EAR	Environmental Assessment Report
ESVs	Ecological Screening Values
HRA1	Holston River Adjacent 1
HRA2	Holston River Adjacent 2
HRD	Holston River Downstream
HRU	Holston River Upstream
JSF Plant	John Sevier Fossil Plant
LB	Largemouth Bass
LOAEL	Lowest Observed Adverse Effect Level
mg/kg	Milligrams per Kilogram
NOAEL	No Observed Adverse Effect Level
RS	Redear Sunfish
SB	Smallmouth Bass
SH	Shad
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TVA	Tennessee Valley Authority
USEPA	United States Environmental Protection Agency
WW	Wet Weight

July 3, 2023

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) prepared this appendix on behalf of the Tennessee Valley Authority (TVA) to summarize the data evaluation performed on fish tissue data collected to support the Environmental Assessment Report (EAR) at the John Sevier Fossil Plant (JSF Plant) located in Rogersville, Tennessee. Fish tissue samples were collected as part of the Tennessee Department of Environment and Conservation (TDEC) Order Environmental Investigation between April and June 2019 in the Holston River in proximity to the JSF Plant. Further details regarding the fish tissue sampling program and results are available in Appendix J.5 and the *Fish Tissue Sampling and Analysis Report* (Appendix J.6).

The sampling locations, fish species, and tissue types included in this evaluation are summarized in Table E.7-1.

Table E.7-1 – Summary of Samples Collected and Included in Data Evaluation

Water Body	Sample Location	Locations Relative to JSF CCR Units	Bluegill (BG)			Channel Catfish (CC)			Largemouth Bass (LB)			Smallmouth Bass (SB)			Redear Sunfish (RS)			Shad (SH)
			Muscle	Liver	Ovary	Muscle	Liver	Ovary	Muscle	Liver	Ovary	Muscle	Liver	Ovary	Muscle	Liver	Ovary	Whole Fish
Holston River	HRU	Upstream	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	HRA1	Adjacent	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓
	HRA2	Adjacent	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	HRD	Downstream	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓

Notes: CCR - Coal Combustion Residuals, HRU – Holston River Upstream, HRA1 – Holston River Adjacent 1, HRA2 – Holston River Adjacent 2, HRD – Holston River Downstream

This data evaluation focused on constituents from one of the following two categories:

- Constituents for which potential risks to aquatic life have been identified based on observations of concentrations greater than applicable EAR ecological screening values (ESVs, see Tables 1-2 and 1-3 and Appendix A.2) in surface stream or sediment (excluding statistical outliers). Detailed comparisons of constituent concentrations in surface stream and sediment to the applicable ESVs are provided in Appendices E.4 and E.5, respectively.
- Constituents with potential to bioaccumulate in fish tissues as identified by the United States Environmental Protection Agency (USEPA 2018).

The constituents identified for review in fish tissue based on these criteria are summarized in Table E.7-2.

Table E.7-2 - Constituents Identified for Review in Fish Tissue

Water Body	Constituent	Rationale for Review in Fish Tissue
Holston River	Copper	Concentration greater than chronic ecological screening value observed in sediment
	Mercury	Concentration greater than chronic ecological screening value observed in sediment and bioaccumlative per USEPA (2018)
	Selenium	Bioaccumlative per USEPA (2018)
	Zinc	Concentration greater than chronic ecological screening value observed in sediment

For the constituents identified in Table E.7-2, the following sections present the methods and results from the data evaluation and comparison of fish tissue data to established screening levels for fish tissue critical body residue (CBR) No Observed Adverse Effect Levels (NOAELs) and Lowest Observed Adverse Effect Levels (LOAELs), where available, (see Table 1-5 and Appendix A.2 for list of CBRs identified as EAR screening levels for fish tissue concentrations).

2.0 METHODS

2.1 COMPARISON OF CONSTITUENT CONCENTRATIONS IN FISH TISSUES TO FISH TISSUE CRITICAL BODY RESIDUES

For the constituents identified in Table E.7-2 as requiring further review, measured constituent concentrations (or reported detection limits, for samples where the constituent was not detected) for each analyzed fish species and tissue type were compared directly to the applicable CBRs presented in Table 1-5 and Appendix A.2.

3.0 RESULTS

3.1 HOLSTON RIVER

For the Holston River, fish tissue sample concentrations were compared to CBR NOAELs and LOAELs for copper, mercury, selenium and zinc. The reported fish tissue concentrations for these constituents at the four Holston River sampling reaches are summarized and compared to their applicable CBRs in Table E.7-3 below. Additional information on the fish tissue results comparison to CBRs in the Holston River is included in Appendix J.5.

July 3, 2023

Table E.7-3 – Fish Tissue Concentrations for Copper, Mercury, Selenium, and Zinc in Holston River

Constituent Type	Constituent	Sample Location	Gradient	Sample Concentration (mg/kg ww)*															
				Muscle					Liver					Ovary					Whole Body
				BG	CC	LB	SB	RS	BG	CC	LB	SB	RS	BG	CC	LB	SB	RS	SH
CCR Rule Appendix IV	**Mercury**	HRU	Upstream	0.18	0.23	0.79	-	0.21	0.2	0.26	0.46	-	0.16	<0.0095	-	0.082	-	0.016	<0.034
		HRA1	Adjacent	0.043	0.25	-	0.59	0.072	0.091	0.37	-	0.29	0.15	<0.011	0.021	-	0.025	0.027	<0.039
		HRA2	Adjacent	0.21	0.19	0.54	-	0.19	0.089	0.43	0.22	-	<0.076	<0.016	-	0.024	-	0.01	<0.034
		HRD	Downstream	0.19	0.07	0.7	-	0.24	0.1	0.74	0.6	-	0.12	<0.013	-	0.095	-	0.017	<0.038
	Selenium*	HRU	Upstream	1.8	0.77	1.3	-	2.1	1.6	1.5	0.94	-	1.7	3.1	-	2.3	-	2.5	1.3
		HRA1	Adjacent	1.2	0.67	-	1.27	2.0	1	1.1	-	0.93	2.1	2.6	2.1	-	1.6	2.9	1.7
		HRA2	Adjacent	2.1	0.79	0.96	-	2.0	2.8	1.4	0.87	-	1.8	6.2	-	2.1	-	3.7	1.8
		HRD	Downstream	1.6	0.83	1.2	-	3.2	1.8	1.4	1.1	-	1.9	3.9	-	2.1	-	5.1	1.7
TDEC Appendix I	**Copper**	HRU	Upstream	<0.27	<0.28	0.28	-	<0.26	1.3	2.2	7.5	-	1.2	1.4	-	1.8	-	0.91	1.5
		HRA1	Adjacent	0.38	<0.28	-	0.35	<0.27	1.4	1.6	-	1.4	2.2	1.1	1	-	1.3	0.78	<1.4
		HRA2	Adjacent	<0.27	<0.27	<0.27	-	<0.27	1.4	2.4	8	-	1.1	1.1	-	1.6	-	0.77	<1.4
		HRD	Downstream	<0.27	0.72	0.41	-	0.73	1.5	2.9	11.7	-	1	1	-	1.3	-	0.73	<1.3
	Zinc	HRU	Upstream	5.8	5.1	4.1	-	5.6	22	26	23	-	20	32	-	33	-	34	17
		HRA1	Adjacent	5.6	5.4	-	3.3	6.1	23	21	-	19	21	26	46	-	31	26	20
		HRA2	Adjacent	6.1	6.1	4.5	-	6.8	21	24	25	-	19	31	-	34	-	30	15
		HRD	Downstream	5.7	6.3	3.9	-	8.3	22	27	28	-	17	33	-	27	-	33	20

Notes: mg/kg – milligram per kilogram, ww – wet weight, CCR Rule - Title 40, Code of Federal Regulations, Part 257; BG – Bluegill; CBR - Critical Body Residue; CC - Channel Catfish; HRU – Holston River Upstream; HRA1 – Holston River Adjacent 1; HRA2 – Holston River Adjacent 2; HRD – Holston River Downstream; LB - Largemouth Bass; RS - Redear Sunfish; SH – Shad

Tissue-constituent pairs for which no sample was collected and analyzed are identified with a dash ('-').

*Selenium concentrations reported as mg/kg ww for liver tissue and mg/kg dry weight for whole body, muscle, and ovary to permit direct comparison to the selenium CBRs for these tissues.

Legend
No applicable CBR
Concentration < CBR NOAEL
Concentration ≥ CBR NOAEL
Concentration ≥ CBR LOAEL

4.0 DISCUSSION

For the reviewed constituents, where fish tissue concentrations were higher than CBR NOAELs, there was generally minimal variability in constituent concentrations between the upstream, adjacent, and downstream sampling reaches in the Holston River in proximity to the JSF Plant. Further interpretation of the ecological implications of these tissue concentrations will be completed in the context of the Corrective Action/Risk Assessment Plan.

5.0 REFERENCES

United States Environmental Protection Agency (USEPA). (2018). *Region 4 Ecological Risk Assessment Supplemental Guidance, March 2018 Update, Screening Values.*