



# ANNUAL CCR GROUNDWATER MONITORING & CORRECTIVE ACTION REPORT

Cooper Landfill

January 31, 2023

Reporting Year - 2022



A Touchstone Energy Cooperative 

## Executive Summary

This annual report documents the status of the groundwater monitoring and corrective action program for Cooper Station’s Coal Combustion Residual (CCR) Landfill (herein “Cooper Landfill”, “Landfill”, or “the Unit”) pursuant to 40 Code of Federal Regulations (CFR) §257.90(e). Table 1-1 provides an overview of the status of the groundwater monitoring and corrective action program for the Unit during the reporting period.

**Table 1-1 Overview of the Status of the Groundwater Monitoring & Corrective Action Program for the Unit**

<b>Information Required by 40 CFR §257.90(e)(6)</b>	<b>Unit Information</b>
Identify whether the unit was operating at the start of the reporting period under the detection monitoring program or the assessment monitoring program.	Detection Monitoring
Identify whether the unit was operating at the end of the reporting period under the detection monitoring program or the assessment monitoring program.	Detection Monitoring
If applicable, list all appendix III (statistically significant increases (SSIs) pursuant to §257.94(e) and the associated monitoring location(s).	<u>S-13</u> ; Chloride and fluoride (detected February 2022)
If applicable, provide date when the assessment monitoring program was initiated.	Not Applicable. A successful Alternative Source Demonstration was completed; thus, assessment monitoring was not initiated.
If applicable, list all appendix IV statistically significant levels (SSLs) pursuant to §257.95(g) and the associated monitoring location(s).	Not Applicable
If applicable, provide the date when the assessment of corrective measures was initiated.	Not Applicable
If applicable, provide the date when the public meeting was held for the assessment of corrective measures.	Not Applicable
If applicable, provide the date when the assessment of corrective measures was completed.	Not Applicable
If applicable, provide the date when a remedy was selected pursuant to §257.97.	Not Applicable
If applicable, provide the date when remedial activities were initiated or identify if they are ongoing.	Not Applicable

## Table of Contents

1.0 Introduction.....	1
2.0 CCR Rule Compliance.....	1
3.0 Facility Information .....	2
4.0 Status of Groundwater Monitoring Program.....	2
5.0 Summary of Key Actions Completed.....	2
5.1 Groundwater Monitoring Activities.....	2
5.2 Statistical Analysis and Statistically Significant Increase(s) .....	3
5.3 Alternate Source Demonstration(s).....	4
6.0 Problems Encountered and Actions Taken .....	4
7.0 Key Activities Projected for 2023 .....	4
<b>APPENDIX A – Groundwater Monitoring Locations Map .....</b>	<b>6</b>
<b>APPENDIX B – Summary of Analytical Results .....</b>	<b>8</b>
<b>APPENDIX C – Laboratory Analytical Reports.....</b>	<b>9</b>
<b>APPENDIX D – Groundwater Flow Maps and Flow Direction Narrative .....</b>	<b>27</b>
<b>APPENDIX E1 – Statistical Analysis Package (September 2021).....</b>	<b>32</b>
<b>APPENDIX E2 – Statistical Analysis Package (February 2022) .....</b>	<b>321</b>
<b>APPENDIX F – Alternate Source Demonstration(s).....</b>	<b>678</b>

## 1.0 Introduction

On April 17, 2015, the EPA issued the final version of the federal Coal Combustion Residual (CCR) Rule to regulate the disposal of CCR materials generated at coal-fired units. The CCR Rule is administered as part of the Resource Conservation and Recovery Act (RCRA, 42 United States Code [U.S.C.] §6901 et seq.) using the Subtitle D approach.

East Kentucky Power Cooperative (EKPC) is subject to the CCR Rule and as such must prepare an annual groundwater monitoring and corrective action report for all CCR Units per 40 Code of Federal Regulations (CFR) §257.90(e). The annual report must document the status of the groundwater monitoring and corrective action program for the CCR Unit, summarize key actions completed, describe any problems encountered, discuss actions to resolve problems, and project key activities for the upcoming year.

This document has been prepared to meet those requirements for the CCR landfill at Cooper Power Station (Cooper) located near Somerset, Kentucky. This report covers the 2022 reporting period, January 1, 2022 through December 31, 2022.

## 2.0 CCR Rule Compliance

In accordance with 40 CFR §257.90(e), EKPC is required to, at minimum, provide the following information, to the extent available:

- A map, aerial image, or diagram showing the CCR unit and all background and downgradient monitoring wells/locations that are a part of the groundwater monitoring system, including identification numbers;
- Identify any monitoring wells/locations that were installed and/or decommissioned during the reporting period, along with a narrative description of why those actions were taken;
- Monitoring data obtained under §257.90 through §257.98, including a summary of the number of samples collected, the dates sampling occurred, and which program those samples were required by;
- A narrative description of any transition between monitoring programs (dates, circumstances, and identifying constituents detected at a SSI over background levels); and
- Other information required to be included in the annual report as specified in §257.90 through §257.98, such as:
  - Alternate monitoring frequency
  - Alternative Source Demonstrations
  - Assessment monitoring concentrations
  - Demonstrations of additional time to complete the assessment of corrective measures due to site-specific conditions; and
  - A section at the beginning of the annual report that provides an overview of the current status of groundwater monitoring and corrective action programs for the unit that contains all the information specified by §257.90(e)(6).

Other information being provided in this report includes, but is not limited to:

- Groundwater elevation data;
- Laboratory analytical reports and quantification limits; and

- Statistical analysis packages prepared for each compliance monitoring event during the reporting year.

### 3.0 Facility Information

The CCR Landfill at Cooper is located approximately six miles south of Somerset, Kentucky in Pulaski County. The site is located on KY-1247 near the interchange of US-27, and immediately adjacent to Lake Cumberland. The landfill is located on the United States Geological Survey's Somerset and Burnside, Kentucky topographic maps. Topography of the project area is rugged and local relief in the vicinity of the landfill ranges from the normal pool elevation of Lake Cumberland, which is 723 feet above mean sea level (AMSL), to 950 feet AMSL in Somerset, to 1,150 feet AMSL in the western edge of the county. Limestone and dolomite formations of Mississippian age generally underlie the site, with extremely high karst potential. **Appendix A**, prepared by Burns & McDonnell, shows the Cooper Station Landfill property, depicting the groundwater monitoring system present at Cooper's CCR landfill. Monitoring locations OPP and C-3 are background (or upgradient) monitoring locations, and locations S-13, J-2, J-3, S-5, J-5, and S-6 are downgradient monitoring locations.

### 4.0 Status of Groundwater Monitoring Program

The CCR Unit did not undergo any program transition in 2022 and EKPC is implementing a detection monitoring program at Cooper Landfill pursuant to 40 CFR §257.94. In order to comply with the requirements of detection monitoring, EKPC conducts semiannual groundwater sampling and utilizes an intra-well statistical approach for Appendix III constituents.

At the outset of implementation of the 2015 CCR Rule, EKPC interpreted the Rule's requirement for "semiannual" detection and assessment monitoring to mean two sampling events per year, with one in the first half of the year and one in the second half of the year (without necessarily being six months apart). To that end, detection monitoring occurred in February and August 2022. EKPC will continue to conduct semi-annual monitoring, as needed, approximately every six months and will conduct the annual Appendix IV constituents scan approximately every 12 months, if the unit initiates an assessment monitoring program.

### 5.0 Summary of Key Actions Completed

This Section provides a narrative of the key actions completed at the CCR Unit during the reporting period.

#### 5.1 Groundwater Monitoring Activities

The CCR Rule requires reporting of monitoring data obtained under 40 CFR §257.90 through §257.98 during the reporting year, including a summary of the number of samples collected, the dates sampling occurred, and which program those samples were required by (background, detection, or assessment). **Table 5-1** summarizes those sampling events that occurred during the reporting period. The summary of the analytical results that were received in 2022, which are February, April and August 2022 sampling events, are summarized in **Table B-1** in **Appendix B** while the laboratory analytical reports are located in **Appendix C**.

During the 2022 reporting year at Cooper Landfill, EKPC collected two semi-annual detection monitoring samples, pursuant to 40 CFR §257.94, from all wells in the Cooper Landfill monitoring system. The first semi-annual sample was collected on February 28, 2022 (at OPP, C-3, J-2, J-

3, J-5, S-5, S-6 and S-13). Due to an issue in the hold time for TDS for well J-2, a second sample was collected for analysis for TDS on April 14, 2022. The second semi-annual sample was collected on August 11, 2022 (at OPP, C-3, J-2, J-3, J-5, and S-13). Due to no-flow conditions during the semi-annual sampling event for S-5 and S-6 on August 11, 2022, EKPC continued to monitor precipitation conditions and made several other attempts to obtain a second sample at those locations (which tend to be influenced by precipitation) before the end of 2022. On December 15, 2022 a successful sample was obtained at both S-5 and S-6. The summary of the laboratory analytical results that were received in 2022 are provided in **Appendix B**, with the full laboratory reports located in **Appendix C**. The complete analytical results for the December 2022 event were not available on or before December 31, 2022. Therefore, the analytical results from the December 2022 sampling event are not included in this report and will be presented in the 2023 annual report. Groundwater flow maps and a flow direction narrative are provided in **Appendix D**.

**Table 5-1: Annual Sampling & Analysis Summary**

Collection Date	Number of Samples Collected	Location of Collected Samples	Monitoring Program
02/28/22	7	OPP, C-3, J-2, J-3, J-5, S-5, and S-13	Detection
02/28/22	1	S-6	Background
04/14/22	1	J-2	Detection
08/11/22	6	OPP, C-3, J-2, J-3, J-5, and S-13	Detection
12/15/22	2	S-5 and S-6	Detection

## 5.2 Statistical Analysis and Statistically Significant Increase(s)

Pursuant to 40 CFR §257.93(h)(2), within 90 days after completing sampling and analysis, the owner or operator must determine whether there has been a SSI over background for any Appendix III constituent at each monitoring location. Detection monitoring results, background limits, and SSI(s), if any, are summarized in **Table 1** of the statistical analysis packages in **Appendix E1** and **Appendix E2**.

In November, 2021 and within 90 days of receiving the laboratory analysis, Haley & Aldrich completed the statistical analysis of the September 2021 sampling event and communicated the results orally to EKPC. As stated in the 2021 annual report, no SSI's were found and the Landfill remained in detection monitoring. In April 2022 the full statistical package was finalized and is included in **Appendix E1**.

In May 2022 and within 90 days of receiving the laboratory analysis, Haley & Aldrich completed the statistical analysis of the detection monitoring sampling and analysis results from February 2022 (i.e., the first semi-annual 2022 detection monitoring event) and the April 2022 J-2 TDS resample. SSIs for chloride and fluoride in well S-13 were identified. EKPC pursued an ASD for these SSIs, which was successful, and the Landfill remained in detection monitoring. The full statistical package for the February 2022 event is provided in **Appendix E2**.

The results from the August 2022 sampling event were complete on October 18, 2022 and are located in **Appendix B**. The statistical analysis of the August 2022 sampling event was not completed on or before December 31, 2022, therefore it is not included in this report. In addition, the laboratory analysis of the December 2022 sampling event was not completed on or before

December 31, 2022, and is therefore are not included in this report. The results from the December 2022 sampling event and the statistical analysis package for both the August and December 2022 events will be reported in the 2023 annual report.

### 5.3 Alternate Source Demonstration(s)

Pursuant to 40 CFR §257.94(e)(2), if an SSI over background for any constituent is identified by the statistical analysis, an operator or owner may demonstrate that a source other than the CCR Unit caused the SSI(s), or the SSI(s) resulted from an error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Otherwise, the operator or owner must establish an assessment monitoring program meeting the requirements of 40 CFR §257.95.

Geosyntec, on behalf of EKPC, prepared an ASD for the chloride and fluoride SSIs measured in well S-13 during the February 2022 detection monitoring event. The ASD successfully demonstrated that the chloride and fluoride concentrations found above background were not due to a leachate release and therefore, the Unit may continue with the detection monitoring program. This ASD (dated August 2022) is provided in **Appendix F**.

## 6.0 Problems Encountered and Actions Taken

This section describes any problems encountered with the groundwater monitoring program during the reporting period and the actions taken in response.

In 2022, EKPC continued its efforts to collect the eight independent background samples from springs S-5 and S-6, as required by the CCR Rule. Due to S-5 and S-6 having a highly variable flow that is dependent upon precipitation events, having sufficient flow has been problematic. During the February 2022 sampling event, a sample was collected at S-6, providing S-6 with its eighth background event.

Thus, the December 15, 2022 sampling event for S-6 is a detection event in which it will be compared to its calculated background values. EKPC is continuing its efforts to collect samples from S-5 and S-6 and evaluate the feasibility for these locations to assist in meeting the requirements of the Rule, but those efforts will be dependent on availability of groundwater and characteristics of the aquifer. In the meantime, EKPC continues to rely on downgradient monitoring locations S-13, J-2, J-3, and J-5 to meet the requirements of the Rule.

## 7.0 Key Activities Projected for 2023

EKPC will continue semi-annual detection monitoring in 2023.

EKPC continues to evaluate the existing groundwater monitoring systems at its CCR units to identify opportunities for continuous improvement. This evaluation includes consideration of recent comments made by U.S. EPA concerning groundwater monitoring under the CCR Rule in the context of EPA's evaluation of demonstrations filed by various owners/operators pursuant to EPA's Part A (40 CFR 257.103(f)(1)) process, including the demonstration filed by EKPC for its Spurlock Impoundment. EKPC will provide updates on these efforts in the 2023 Groundwater Monitoring and Corrective Action annual reports for its CCR units.

## **APPENDIX A – Groundwater Monitoring Locations Map**



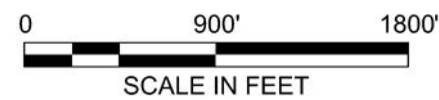


**NOTES:**

1. MAP DATA: GOOGLE

**LEGEND:**

● GROUNDWATER MONITORING POINT



date 9/8/2016

designed A. MYERS

**EAST KENTUCKY POWER  
COOPERATIVE**  
COOPER STATION LANDFILL  
GROUNDWATER MONITORING POINTS

project	-
contract	-
drawing	rev no.
<b>SK - CIVIL - 001</b>	<b>0</b>

## **APPENDIX B – Summary of Analytical Results**

**John S. Cooper Station Landfill**

**Annual Reporting Year 2022  
Table B-1: Summary of Analytical Results**

Appendix 3 Constituents

Well ID	Sample Date	Event Type	Boron (µg/L)	Calcium (µg/L)	Chloride (mg/L)	Fluoride (mg/L)	pH (S.U.)	Sulfate (mg/L)	TDS (mg/L)
CLF-GW-C03	2/28/2022	Detection	< 20	81100	20	0.32	7.96	14	270
CLF-GW-C03	8/11/2022	Detection	42.1	92700 D	14.7	0.42	7.87	23.1	328
CLF-GW-J02	2/28/2022	Detection	109	81100	19	0.17	8.19	36	120
CLF-GW-J02	4/14/2022	Detection	NA	NA	NA	NA	NA	NA	266
CLF-GW-J02	8/11/2022	Detection	167	96200 D	4.7	0.20	7.84	45.9	330
CLF-GW-J03	2/28/2022	Detection	116	82700	7.9	0.16	8.06	36	142
CLF-GW-J03	8/11/2022	Detection	158	99800 D	4.6	0.20	7.73	46.4	338
CLF-GW-J05	2/28/2022	Detection	89.8	80900	8.4	0.17	8.81	31	238
CLF-GW-J05	8/11/2022	Detection	105	98200 D	2.8	0.17	8.61	24.2	314
CLF-GW-OPP	2/28/2022	Detection	< 20	54500	1.6	0.11	7.76	12	210
CLF-GW-OPP	8/11/2022	Detection	26.8	77200 D	0.8	0.15	7.59	7.8	264
CLF-GW-S05	2/28/2022	Detection	21.2	72300	1.7	0.16	8.96	9.8	134
CLF-GW-S06	2/28/2022	Detection	< 20	74400	3.5	0.18	8.43	11	214
CLF-GW-S13	2/28/2022	Detection	155	74900	17	0.67	7.77	120	122
CLF-GW-S13	8/11/2022	Detection	373	207000 D	4.6	0.17	7.67	390 D	888

Result Notes :	J - Estimated Value NA - Not available	R - Unusable (Quality Control Failure) D - Result reported from dilution
Result Units :	mg/L - milligram per liter ft. MSL - feet above mean sea level	µg/L - microgram per liter pCi/L - picocurie per liter S.U. - Standard Units
Event Type Abbreviations :	A3 - Appendix III Constituents for Detection Monitoring ASD - Alternative Source Demonstration	
Event Type Constituents :	Background - A3 and A4 Assessment - A3 (All) and A4 (Detected in annual screen).	Detection - A3 Annual Screen - A4 ASD - Tested A3 and A4 parameters

# APPENDIX C – Laboratory Analytical Reports

**Certificate of Analysis**

 Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-C03 (Appendix III Constituents)  
 Gradient: Up

 Sample Collection Date: 2/28/2022  
 Sample Collection Time: 10:10 AM  
 Sample Collected By: MJ  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

Field Analyses	Result	Units	Analysis Method		Date Analyzed:	Time Analyzed:	Analyst:
pH	7.96	S.U.	SM 4500-H+, B-2011		2/28/2022	10:10 AM	MJ

ALS Environmental							Lab Identification #:	22031486-01
Sample Received Date:	3/17/2022	Sample Receipt Temperatures (°C):			> 6.0			
Sample Received Time:	9:30	Sample Received By:			LYS			
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Boron	< 20	µg/L	15	20	E200.8	3/22/2022	15:35	STP
Calcium	81100	µg/L	220	500	E200.8	3/22/2022	15:35	STP

ALS Environmental							Lab Identification #:	22030577-01
Sample Received Date:	3/7/2022	Sample Receipt Temperatures (°C):			< 6.0			
Sample Received Time:	16:00	Sample Received By:			JAS			
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Chloride	20	mg/L	5.0	16	E300.0	3/9/2022	18:01	QTN
Fluoride	0.32	mg/L	0.067	0.10	E300.0	3/10/2022	13:58	QTN
Sulfate	14	mg/L	0.19	1.0	E300.0	3/10/2022	13:58	QTN

Pace Analytical							Lab Identification #:	2032020-01
Sample Received Date:	3/2/2022	Sample Receipt Temperatures (°C):			0.4			
Sample Received Time:	12:11	Sample Received By:			KJ			
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Solids, Total Dissolved	270	mg/L		50	2540 C-2011	3/7/2022	11:34	HAG

## Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



 Jared Daugherty - Chemist  
 02:47 PM 04/21/2022



 Eric Hamilton - QA/QC Chemist  
 08:29 AM 04/26/2022

### Certificate of Analysis

 Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-J02 (Appendix III Constituents)  
 Gradient: Down

 Sample Collection Date: 2/28/2022  
 Sample Collection Time: 12:30 PM  
 Sample Collected By: BTB  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

Field Analyses	Result	Units	Analysis Method		Date Analyzed:	Time Analyzed:	Analyst:
pH	8.19	S.U.	SM 4500-H+, B-2011		2/28/2022	12:30 PM	BTB

ALS Environmental							Lab Identification #:	22031486-02
Sample Received Date:	3/17/2022	Sample Receipt Temperatures (°C):			> 6.0			
Sample Received Time:	9:30	Sample Received By:			LYS			
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Boron	109	µg/L	15	20	E200.8	3/22/2022	15:36	STP
Calcium	81100	µg/L	220	500	E200.8	3/22/2022	15:36	STP

ALS Environmental							Lab Identification #:	22030577-02
Sample Received Date:	3/7/2022	Sample Receipt Temperatures (°C):			< 6.0			
Sample Received Time:	16:00	Sample Received By:			JAS			
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Chloride	19	mg/L	5.0	16	E300.0	3/9/2022	18:12	QTN
Fluoride	0.17	mg/L	0.067	0.10	E300.0	3/10/2022	14:07	QTN
Sulfate	36	mg/L	3.0	16	E300.0	3/9/2022	18:12	QTN

Pace Analytical							Lab Identification #:	2032020-02
Sample Received Date:	3/2/2022	Sample Receipt Temperatures (°C):			0.4			
Sample Received Time:	12:11	Sample Received By:			KJ			
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Solids, Total Dissolved	120 -H	mg/L		25	2540 C-2011	3/7/2022	11:34	HAG

## Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification. Solids, Total Dissolved result qualified (H) with sample quality flag due to analysis past hold time. Sample recollected on 4/14/2022 and retested for total dissolved solids.

Electronically Approved By :



 Jared Daugherty - Chemist  
 02:47 PM 04/21/2022



 Eric Hamilton - QA/QC Chemist  
 08:29 AM 04/26/2022

**Certificate of Analysis**

 Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-J03 (Appendix III Constituents)  
 Gradient: Down

 Sample Collection Date: 2/28/2022  
 Sample Collection Time: 12:40 PM  
 Sample Collected By: BTB  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

Field Analyses	Result	Units	Analysis Method		Date Analyzed:	Time Analyzed:	Analyst:
pH	8.06	S.U.	SM 4500-H+, B-2011		2/28/2022	12:40 PM	BTB

ALS Environmental							Lab Identification #:	22031486-03
Sample Received Date:	3/17/2022	Sample Receipt Temperatures (°C):			> 6.0			
Sample Received Time:	9:30	Sample Received By:			LYS			
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Boron	116	µg/L	15	20	E200.8	3/22/2022	15:38	STP
Calcium	82700	µg/L	220	500	E200.8	3/22/2022	15:38	STP

ALS Environmental							Lab Identification #:	22030577-03
Sample Received Date:	3/7/2022	Sample Receipt Temperatures (°C):			< 6.0			
Sample Received Time:	16:00	Sample Received By:			JAS			
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Chloride	7.9	mg/L	0.31	1.0	E300.0	3/10/2022	14:18	QTN
Fluoride	0.16	mg/L	0.067	0.10	E300.0	3/10/2022	14:18	QTN
Sulfate	36	mg/L	3.0	16	E300.0	3/9/2022	18:23	QTN

Pace Analytical							Lab Identification #:	2032020-03
Sample Received Date:	3/2/2022	Sample Receipt Temperatures (°C):			0.4			
Sample Received Time:	12:11	Sample Received By:			KJ			
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Solids, Total Dissolved	142	mg/L		50	2540 C-2011	3/7/2022	11:34	HAG

## Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



 Jared Daugherty - Chemist  
 02:47 PM 04/21/2022



 Eric Hamilton - QA/QC Chemist  
 08:29 AM 04/26/2022

Report Date: Tuesday, April 26, 2022

### Certificate of Analysis

 Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-J05 (Appendix III Constituents)  
 Gradient: Down

 Sample Collection Date: 2/28/2022  
 Sample Collection Time: 1:10 PM  
 Sample Collected By: BTB  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

Field Analyses	Result	Units	Analysis Method		Date Analyzed:	Time Analyzed:	Analyst:
pH	8.81	S.U.	SM 4500-H+, B-2011		2/28/2022	1:10 PM	BTB

ALS Environmental							Lab Identification #:	22031486-04
Sample Received Date:		3/17/2022		Sample Receipt Temperatures (°C):		> 6.0		
Sample Received Time:		9:30		Sample Received By:		LYS		
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Boron	89.8	µg/L	15	20	E200.8	3/22/2022	15:39	STP
Calcium	80900	µg/L	220	500	E200.8	3/22/2022	15:39	STP

ALS Environmental							Lab Identification #:	22030577-04
Sample Received Date:		3/7/2022		Sample Receipt Temperatures (°C):		< 6.0		
Sample Received Time:		16:00		Sample Received By:		JAS		
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Chloride	8.4	mg/L	0.31	1.0	E300.0	3/10/2022	14:27	QTN
Fluoride	0.17	mg/L	0.017	0.10	E300.0	3/10/2022	14:27	QTN
Sulfate	31	mg/L	3.0	16	E300.0	3/9/2022	18:34	QTN

Pace Analytical							Lab Identification #:	2032020-04
Sample Received Date:		3/2/2022		Sample Receipt Temperatures (°C):		0.4		
Sample Received Time:		12:11		Sample Received By:		KJ		
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Solids, Total Dissolved	238	mg/L		50	2540 C-2011	3/7/2022	11:34	HAG

## Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



 Jared Daugherty - Chemist  
 02:47 PM 04/21/2022



 Eric Hamilton - QA/QC Chemist  
 08:29 AM 04/26/2022



### Certificate of Analysis

Station:	John Sherman Cooper Power Station	Sample Collection Date:	2/28/2022
Spring ID No:	CLF-GW-OPP (Appendix III Constituents)	Sample Collection Time:	10:40 AM
Gradient:	Up	Sample Collected By:	BTB
		Sample Matrix:	Ground Water
		Laboratory Certification ID:	KY# 08012

Field Analyses	Result	Units	Analysis Method		Date Analyzed:	Time Analyzed:	Analyst:
pH	7.76	S.U.	SM 4500-H+, B-2011		2/28/2022	10:40 AM	BTB

ALS Environmental							Lab Identification #:	22031486-05
Sample Received Date:	3/17/2022	Sample Receipt Temperatures (°C):			> 6.0			
Sample Received Time:	9:30	Sample Received By:			LYS			

Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Boron	< 20	µg/L	15	20	E200.8	3/23/2022	12:56	STP
Calcium	54500	µg/L	220	500	E200.8	3/22/2022	15:48	STP

ALS Environmental							Lab Identification #:	22030577-05
Sample Received Date:	3/7/2022	Sample Receipt Temperatures (°C):			< 6.0			
Sample Received Time:	16:00	Sample Received By:			JAS			

Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Chloride	1.6	mg/L	0.31	1.0	E300.0	3/10/2022	14:36	QTN
Fluoride	0.11	mg/L	0.067	0.10	E300.0	3/10/2022	14:36	QTN
Sulfate	12	mg/L	0.19	1.0	E300.0	3/10/2022	14:36	QTN

Pace Analytical							Lab Identification #:	2032020-05
Sample Received Date:	3/2/2022	Sample Receipt Temperatures (°C):			0.4			
Sample Received Time:	12:11	Sample Received By:			KJ			

Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Solids, Total Dissolved	210	mg/L		50	2540 C-2011	3/7/2022	11:34	HAG

## Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



Jared Daugherty - Chemist  
02:47 PM 04/21/2022



Eric Hamilton - QA/QC Chemist  
08:29 AM 04/26/2022

Report Date: Tuesday, April 26, 2022

### Certificate of Analysis

 Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-S05 (Appendix III Constituents)  
 Gradient: Down

 Sample Collection Date: 2/28/2022  
 Sample Collection Time: 12:52 PM  
 Sample Collected By: BTB  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

Field Analyses	Result	Units	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
pH	8.96	S.U.	SM 4500-H+, B-2011	2/28/2022	12:52 PM	BTB

ALS Environmental	Lab Identification #:
Sample Received Date: 3/17/2022	22031486-06
Sample Received Time: 9:30	
Sample Receipt Temperatures (°C): > 6.0	
Sample Received By: LYS	

Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Boron	21.2	µg/L	15	20	E200.8	3/23/2022	12:58	STP
Calcium	72300	µg/L	220	500	E200.8	3/22/2022	15:50	STP

22030577-06

ALS Environmental	Lab Identification #:
Sample Received Date: 3/7/2022	2032020-06
Sample Received Time: 16:00	
Sample Receipt Temperatures (°C): < 6.0	
Sample Received By: JAS	

Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Chloride	1.7	mg/L	0.31	1.0	E300.0	3/10/2022	14:47	QTN
Fluoride	0.16	mg/L	0.067	0.10	E300.0	3/10/2022	14:47	QTN
Sulfate	9.8	mg/L	0.19	1.0	E300.0	3/10/2022	14:47	QTN

Pace Analytical	Lab Identification #:
Sample Received Date: 3/2/2022	2032020-06
Sample Received Time: 12:11	
Sample Receipt Temperatures (°C): 0.4	
Sample Received By: KJ	

Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Solids, Total Dissolved	134	mg/L		50	2540 C-2011	3/7/2022	11:34	HAG

## Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



 Jared Daugherty - Chemist  
 02:47 PM 04/21/2022



 Eric Hamilton - QA/QC Chemist  
 08:29 AM 04/26/2022

**Certificate of Analysis**

 Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-S06 (Appendix III Constituents)  
 Gradient: Down

 Sample Collection Date: 2/28/2022  
 Sample Collection Time: 1:43 PM  
 Sample Collected By: BTB  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

Field Analyses	Result	Units	Analysis Method		Date Analyzed:	Time Analyzed:	Analyst:
pH	8.43	S.U.	SM 4500-H+, B-2011		2/28/2022	1:43 PM	BTB

ALS Environmental							Lab Identification #:	22031486-07
Sample Received Date:		3/17/2022		Sample Receipt Temperatures (°C):		> 6.0		
Sample Received Time:		9:30		Sample Received By:		LYS		
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Boron	< 20	µg/L	15	20	E200.8	3/23/2022	13:00	STP
Calcium	74400	µg/L	220	500	E200.8	3/22/2022	15:51	STP

ALS Environmental							Lab Identification #:	22030577-07
Sample Received Date:		3/7/2022		Sample Receipt Temperatures (°C):		< 6.0		
Sample Received Time:		16:00		Sample Received By:		JAS		
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Chloride	3.5	mg/L	0.31	1.0	E300.0	3/11/2022	13:37	QTN
Fluoride	0.18	mg/L	0.067	0.10	E300.0	3/11/2022	13:37	QTN
Sulfate	11	mg/L	0.19	1.0	E300.0	3/10/2022	16:59	QTN

Pace Analytical							Lab Identification #:	2032020-07
Sample Received Date:		3/2/2022		Sample Receipt Temperatures (°C):		0.4		
Sample Received Time:		12:11		Sample Received By:		KJ		
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Solids, Total Dissolved	214	mg/L		50	2540 C-2011	3/7/2022	11:34	HAG

## Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



 Jared Daugherty - Chemist  
 02:47 PM 04/21/2022



 Eric Hamilton - QA/QC Chemist  
 08:29 AM 04/26/2022

### Certificate of Analysis

 Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-S13 (Appendix III Constituents)  
 Gradient: Down

 Sample Collection Date: 2/28/2022  
 Sample Collection Time: 12:15 PM  
 Sample Collected By: BTB  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

Field Analyses	Result	Units	Analysis Method		Date Analyzed:	Time Analyzed:	Analyst:
pH	7.77	S.U.	SM 4500-H+, B-2011		2/28/2022	12:15 PM	BTB

ALS Environmental							Lab Identification #:	22031486-08
Sample Received Date:		3/17/2022		Sample Receipt Temperatures (°C):		> 6.0		
Sample Received Time:		9:30		Sample Received By:		LYS		
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Boron	155	µg/L	15	20	E200.8	3/23/2022	13:01	STP
Calcium	74900	µg/L	220	500	E200.8	3/22/2022	15:53	STP

ALS Environmental							Lab Identification #:	22030577-08
Sample Received Date:		3/7/2022		Sample Receipt Temperatures (°C):		< 6.0		
Sample Received Time:		16:00		Sample Received By:		JAS		
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Chloride	17	mg/L	5.0	16	E300.0	3/9/2022	21:00	QTN
Fluoride	0.67	mg/L	0.067	0.10	E300.0	3/11/2022	14:13	QTN
Sulfate	120	mg/L	3.0	16	E300.0	3/9/2022	21:00	QTN

Pace Analytical							Lab Identification #:	2032020-08
Sample Received Date:		3/2/2022		Sample Receipt Temperatures (°C):		0.4		
Sample Received Time:		12:11		Sample Received By:		KJ		
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Solids, Total Dissolved	122	mg/L		50	2540 C-2011	3/7/2022	11:34	HAG

## Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



 Jared Daugherty - Chemist  
 02:47 PM 04/21/2022



 Eric Hamilton - QA/QC Chemist  
 08:29 AM 04/26/2022

Report Date: Wednesday, April 27, 2022

**Certificate of Analysis**

Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-J02 (Appendix III Constituents)  
 Gradient: Down

Sample Collection Date: 4/14/2022  
 Sample Collection Time: 10:30 AM  
 Sample Collected By: MJ  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

**Pace Analytical**

Lab Identification #: 2043956-01

Sample Received Date: 4/18/2022      Sample Receipt Temperatures (°C): 4.7  
 Sample Received Time: 10:07      Sample Received By: KJ

Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Solids, Total Dissolved	266	mg/L		50	2540 C-2011	4/19/2022	11:24	HAG

Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



Jared Daugherty - Chemist  
 09:35 AM 04/26/2022



Eric Hamilton - QA/QC Chemist  
 03:34 PM 04/26/2022

**Certificate of Analysis**

 Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-C03 (Appendix III Constituents)  
 Gradient: Up

 Sample Collection Date: 8/11/2022  
 Sample Collection Time: 8:50 AM  
 Sample Collected By: MJ  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

Field Analyses	Result	Units	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
pH	7.87	S.U.	SM 4500-H+, B-2011	8/11/2022	8:50 AM	MJ

**EKPC - Central Laboratory Analyses**

Lab Identification #: 2200683

 Sample Received Date: 8/12/2022  
 Sample Received Time: 7:50 AM

 Sample Receipt Temperatures (°C): < 6  
 Sample Received By: JD

Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Boron	42.1	µg/L	29.5	25.0	EPA 200.8, Rev. 5.4 (1994)	9/8/2022	3:19 PM	JD
Calcium	92700	µg/L	4080	20000	EPA 200.8, Rev. 5.4 (1994)	9/7/2022	5:16 PM	JD
Chloride	14.7	mg/L	0.2	0.5	EPA 300.0 Rev 2.1 (1993)	8/16/2022	3:20 PM	JD
Fluoride	0.42	mg/L	0.05	0.10	EPA 300.0 Rev 2.1 (1993)	8/16/2022	3:20 PM	JD
Sulfate	23.1	mg/L	0.24	1.0	EPA 300.0 Rev 2.1 (1993)	8/16/2022	3:20 PM	JD
Solids, Total Dissolved	328	mg/L		50.0	SM 2540, C-2011	8/12/2022	11:46 AM	JD

## Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



 Jared Daugherty - Chemist  
 06:25 AM 10/17/2022



 Eric Hamilton - QA/QC Chemist  
 09:15 AM 10/18/2022

**Certificate of Analysis**

 Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-J02 (Appendix III Constituents)  
 Gradient: Down

 Sample Collection Date: 8/11/2022  
 Sample Collection Time: 11:20 AM  
 Sample Collected By: MJ  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

Field Analyses	Result	Units	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
pH	7.84	S.U.	SM 4500-H+, B-2011	8/11/2022	11:20 AM	MJ

**EKPC - Central Laboratory Analyses**

Lab Identification #: 2200684

 Sample Received Date: 8/12/2022  
 Sample Received Time: 7:50 AM

 Sample Receipt Temperatures (°C): < 6  
 Sample Received By: JD

Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Boron	167	µg/L	29.5	25.0	EPA 200.8, Rev. 5.4 (1994)	9/8/2022	3:23 PM	JD
Calcium	96200	µg/L	4080	20000	EPA 200.8, Rev. 5.4 (1994)	9/7/2022	5:20 PM	JD
Chloride	4.7	mg/L	0.2	0.5	EPA 300.0 Rev 2.1 (1993)	8/16/2022	3:39 PM	JD
Fluoride	0.20	mg/L	0.05	0.10	EPA 300.0 Rev 2.1 (1993)	8/16/2022	3:39 PM	JD
Sulfate	45.9	mg/L	0.24	1.0	EPA 300.0 Rev 2.1 (1993)	8/16/2022	3:39 PM	JD
Solids, Total Dissolved	330	mg/L		50.0	SM 2540, C-2011	8/12/2022	11:46 AM	JD

## Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



 Jared Daugherty - Chemist  
 06:25 AM 10/17/2022



 Eric Hamilton - QA/QC Chemist  
 09:15 AM 10/18/2022

### Certificate of Analysis

 Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-J03 (Appendix III Constituents)  
 Gradient: Down

 Sample Collection Date: 8/11/2022  
 Sample Collection Time: 11:30 AM  
 Sample Collected By: MJ  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

Field Analyses	Result	Units	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
pH	7.73	S.U.	SM 4500-H+, B-2011	8/11/2022	11:30 AM	MJ

**EKPC - Central Laboratory Analyses**

Lab Identification #: 2200685

Sample Received Date:	8/12/2022	Sample Receipt Temperatures (°C):	< 6					
Sample Received Time:	7:50 AM	Sample Received By:	JD					
Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Boron	158	µg/L	29.5	25.0	EPA 200.8, Rev. 5.4 (1994)	9/8/2022	3:27 PM	JD
Calcium	99800	µg/L	4080	20000	EPA 200.8, Rev. 5.4 (1994)	9/7/2022	5:24 PM	JD
Chloride	4.6	mg/L	0.2	0.5	EPA 300.0 Rev 2.1 (1993)	8/16/2022	3:58 PM	JD
Fluoride	0.20	mg/L	0.05	0.10	EPA 300.0 Rev 2.1 (1993)	8/16/2022	3:58 PM	JD
Sulfate	46.4	mg/L	0.24	1.0	EPA 300.0 Rev 2.1 (1993)	8/16/2022	3:58 PM	JD
Solids, Total Dissolved	338	mg/L		50.0	SM 2540, C-2011	8/12/2022	11:46 AM	JD

## Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



 Jared Daugherty - Chemist  
 06:25 AM 10/17/2022



 Eric Hamilton - QA/QC Chemist  
 09:15 AM 10/18/2022



**Certificate of Analysis**

 Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-J05 (Appendix III Constituents)  
 Gradient: Down

 Sample Collection Date: 8/11/2022  
 Sample Collection Time: 11:45 AM  
 Sample Collected By: MJ  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

Field Analyses	Result	Units	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
pH	8.61	S.U.	SM 4500-H+, B-2011	8/11/2022	11:45 AM	MJ

**EKPC - Central Laboratory Analyses**

Lab Identification #: 2200686

Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Sample Received Date:	8/12/2022				Sample Receipt Temperatures (°C):	< 6		
Sample Received Time:	7:50 AM				Sample Received By:	JD		
Boron	105	µg/L	29.5	25.0	EPA 200.8, Rev. 5.4 (1994)	9/8/2022	3:31 PM	JD
Calcium	98200	µg/L	4080	20000	EPA 200.8, Rev. 5.4 (1994)	9/7/2022	5:35 PM	JD
Chloride	2.8	mg/L	0.2	0.5	EPA 300.0 Rev 2.1 (1993)	8/16/2022	4:16 PM	JD
Fluoride	0.17	mg/L	0.05	0.10	EPA 300.0 Rev 2.1 (1993)	8/16/2022	4:16 PM	JD
Sulfate	24.2	mg/L	0.24	1.0	EPA 300.0 Rev 2.1 (1993)	8/16/2022	4:16 PM	JD
Solids, Total Dissolved	314	mg/L		50.0	SM 2540, C-2011	8/12/2022	11:46 AM	JD

## Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



 Jared Daugherty - Chemist  
 09:22 AM 09/29/2022



 Eric Hamilton - QA/QC Chemist  
 09:31 AM 09/29/2022

**Certificate of Analysis**

 Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-OPP (Appendix III Constituents)  
 Gradient: Up

 Sample Collection Date: 8/11/2022  
 Sample Collection Time: 9:15 AM  
 Sample Collected By: MJ  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

Field Analyses	Result	Units	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
pH	7.59	S.U.	SM 4500-H+, B-2011	8/11/2022	9:15 AM	MJ

**EKPC - Central Laboratory Analyses**

Lab Identification #: 2200687

 Sample Received Date: 8/12/2022  
 Sample Received Time: 7:50 AM

 Sample Receipt Temperatures (°C): < 6  
 Sample Received By: JD

Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Boron	26.8	µg/L	29.5	25.0	EPA 200.8, Rev. 5.4 (1994)	9/8/2022	3:35 PM	JD
Calcium	77200	µg/L	4080	20000	EPA 200.8, Rev. 5.4 (1994)	9/7/2022	5:39 PM	JD
Chloride	0.8	mg/L	0.2	0.5	EPA 300.0 Rev 2.1 (1993)	8/16/2022	4:35 PM	JD
Fluoride	0.15	mg/L	0.05	0.10	EPA 300.0 Rev 2.1 (1993)	8/16/2022	4:35 PM	JD
Sulfate	7.8	mg/L	0.24	1.0	EPA 300.0 Rev 2.1 (1993)	8/16/2022	4:35 PM	JD
Solids, Total Dissolved	264	mg/L		50.0	SM 2540, C-2011	8/12/2022	11:46 AM	JD

## Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



 Jared Daugherty - Chemist  
 09:22 AM 09/29/2022



 Eric Hamilton - QA/QC Chemist  
 09:31 AM 09/29/2022

Report Date: Tuesday, October 18, 2022

**Certificate of Analysis**

Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-S05 (Appendix III Constituents)  
 Gradient: Down

Sample Collection Date:  
 Sample Collection Time:  
 Sample Collected By:  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

Field Analyses	Result	Units	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Flow	No					

Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



Jared Daugherty - Chemist  
 12:14 PM 08/15/2022



Eric Hamilton - QA/QC Chemist  
 12:22 PM 08/15/2022

Report Date: Tuesday, October 18, 2022

**Certificate of Analysis**

Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-S06 (Appendix III Constituents)  
 Gradient: Down

Sample Collection Date:  
 Sample Collection Time:  
 Sample Collected By:  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

Field Analyses	Result	Units	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Flow	No					

Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



Jared Daugherty - Chemist  
 12:14 PM 08/15/2022



Eric Hamilton - QA/QC Chemist  
 12:22 PM 08/15/2022

**Certificate of Analysis**

 Station: John Sherman Cooper Power Station  
 Spring ID No: CLF-GW-S13 (Appendix III Constituents)  
 Gradient: Down

 Sample Collection Date: 8/11/2022  
 Sample Collection Time: 10:50 AM  
 Sample Collected By: MJ  
 Sample Matrix: Ground Water  
 Laboratory Certification ID: KY# 08012

Field Analyses	Result	Units	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
pH	7.67	S.U.	SM 4500-H+, B-2011	8/11/2022	10:50 AM	MJ

**EKPC - Central Laboratory Analyses**

Lab Identification #: 2200690

Parameter	Result	Units	MDL	Report Limit	Analysis Method	Date Analyzed:	Time Analyzed:	Analyst:
Sample Received Date:	8/12/2022				Sample Receipt Temperatures (°C):	< 6		
Sample Received Time:	7:50 AM				Sample Received By:	JD		
Boron	373	µg/L	29.5	25.0	EPA 200.8, Rev. 5.4 (1994)	9/8/2022	3:40 PM	JD
Calcium	207000	µg/L	10200	50000	EPA 200.8, Rev. 5.4 (1994)	9/8/2022	1:41 PM	JD
Chloride	4.6	mg/L	0.2	0.5	EPA 300.0 Rev 2.1 (1993)	8/16/2022	4:54 PM	JD
Fluoride	0.17	mg/L	0.05	0.10	EPA 300.0 Rev 2.1 (1993)	8/16/2022	4:54 PM	JD
Sulfate	390	mg/L	1.21	5.0	EPA 300.0 Rev 2.1 (1993)	8/17/2022	4:27 PM	JD
Solids, Total Dissolved	888	mg/L		50.0	SM 2540, C-2011	8/12/2022	11:46 AM	JD

## Comments / Notes:

Sample Results are compliant with East Kentucky Power Cooperatives Quality Assurance program. Quality Control sample results achieved laboratory specification.

Electronically Approved By :



 Jared Daugherty - Chemist  
 09:22 AM 09/29/2022



 Eric Hamilton - QA/QC Chemist  
 09:31 AM 09/29/2022

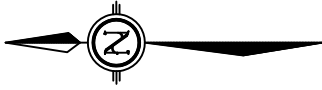
## **APPENDIX D – Groundwater Flow Maps and Flow Direction Narrative**

Excerpt from Tetra Tech's October 11, 2017 *Groundwater Monitoring System and Hydrogeological Investigation Report, Cooper Station Landfill, Burnside Kentucky.*

*"Section 4.4.2 Groundwater Flow Rate and Direction*

*Groundwater flow at this site is generally in a southerly direction from the CCR unit waste area toward the springs along Lake Cumberland. Due to the anisotropic and heterogeneous nature of the karst aquifer, a flow rate that would represent the overall site cannot be determined other than to establish that flow does occur, as evidenced from the previous and recent dye trace study results. Those studies identified that the springs do have intermittent and varying flow in response to precipitation (or lack thereof)(8)."*

(8): Minns Hutcheson, S.A., Sendlein, L.V.A, Dinger, J.S., Currens, J.C., and Sahba, A., 1997, *Hydrogeology and Ground-Water Monitoring of Coal-Ash Disposal Sites in a Karst Terrane near Burnside, South-Central Kentucky*, Kentucky Geological Survey Report of Investigations 11, Series XI.



Fluorescein trace (February 2, 2016)



NOT TO SCALE

200-115476-1510-F-dye.dwg

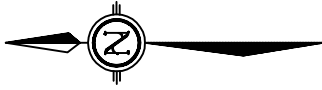


TETRA TECH, INC.

424 Lewis Hargett Circle Lexington, Kentucky 40503 (859) 223-8000

**FIGURE 5**  
Fluorescein Dye Trace Results  
East Kentucky Power Cooperative  
Cooper Landfill  
Pulaski County, Kentucky





Eosine trace (February 11, 2016)



NOT TO SCALE

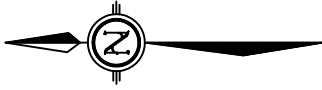
200-115476-1510-E-dye.dwg



TETRA TECH, INC.

424 Lewis Hargett Circle Lexington, Kentucky 40503 (859) 223-8000

**FIGURE 6**  
Eosine Dye Trace Results  
East Kentucky Power Cooperative  
Cooper Landfill  
Pulaski County, Kentucky



SRB trace (February 25, 2016)



NOT TO SCALE

200-115476-1510-SRB-dye.dwg



TETRA TECH, INC.

424 Lewis Hargett Circle Lexington, Kentucky 40503 (859) 223-8000

**FIGURE 7**  
 SRB Dye Trace Results  
 East Kentucky Power Cooperative  
 Cooper Landfill  
 Pulaski County, Kentucky

**APPENDIX E1 – Statistical Analysis Package (September 2021)**



HALEY & ALDRICH, INC.  
6500 Rockside Road  
Suite 200  
Cleveland, OH 44131  
216.739.0555

21 April 2022  
File No. 130592-015

East Kentucky Power Cooperative  
4775 Lexington Road  
Winchester, KY 40392

Subject: Summary of Appendix III Semi-Annual  
Groundwater Detection Monitoring Statistical Evaluation  
East Kentucky Power Cooperative  
J.S. Cooper Station Landfill  
Somerset, Kentucky

East Kentucky Power Cooperative, Inc. (EKPC) is implementing the 17 April 2015 U.S. Environmental Protection Agency (U.S. EPA) Federal Coal Combustion Residuals (CCR) Rule (40 CFR §257 and 261) for the J.S. Cooper Station Landfill, located in Pulaski County, Kentucky. The CCR Rule establishes requirements for the operation, maintenance and closure of landfills and surface impoundments of CCR materials.

On 10 November 2021, EKPC provided Haley & Aldrich, Inc. (Haley & Aldrich) with analytical data from groundwater samples collected on 23 September 2021 from four of the six monitoring locations from a groundwater monitoring system that meets the requirements of 40 CFR §257.91. On 30 December 2021, EKPC indicated that locations CLF-S05 and CLF-S06 were monitored for sufficient flow during the sampling interval; however, no flow was observed. Downgradient locations were defined in the *Groundwater Monitoring System and Hydrogeological Investigation Report, Cooper Station Landfill, Burnside, Kentucky* (Tetra Tech, 11 October 2017). This memorandum summarizes the results of statistical evaluations conducted to determine if Appendix III groundwater monitoring constituents have been detected in downgradient wells at levels that exhibit a statistically significant increase (SSI) above background levels consistent with the requirements in 40 CFR §257.94. The results presented herein were previously communicated orally to EKPC on 18 November 2021. Time-series graphs of data collected as part of the CCR Rule monitoring of J.S. Cooper Station Landfill are included in Attachment 1.

To identify SSIs, sample data from the most recent groundwater sampling event from the downgradient monitoring locations were compared to the Upper Prediction Limits (UPLs) calculated for each Appendix III constituent (boron, calcium, chloride, fluoride, pH, sulfate, and total dissolved solids) to represent background values within the given downgradient wells. Lower Prediction Limits (LPLs) were also

calculated for pH<sup>1</sup>. Based on these comparisons, the statistical results identify no Appendix III SSI above background concentrations. The results of the groundwater detection monitoring evaluation are provided below.

## Statistical Evaluation of Appendix III Constituents

The Rule, 40 CFR §257.93(f) (1-4), provides four (4) specific options to statistically evaluate whether water quality downgradient of the CCR Unit represents an SSI of Appendix III parameters compared to background water quality of the CCR Unit. Based on the *Selection of Statistical Procedures*, background was determined by calculating intra-well UPL for each Appendix III constituent as well as the LPL for pH for each downgradient monitoring location (see footnote 1). The UPL was used to evaluate potential SSIs at each downgradient well.

### UPL STATISTICAL ANALYSIS

Prediction limits are used to predict the UPL of possible future values for each Appendix III constituent as well as the lower prediction limit for pH, based on the downgradient monitoring well dataset and a specified number of future statistical comparisons. The prediction limit method is an accepted statistical method identified in the CCR Rule to evaluate the groundwater analytical data at CCR Units. The prediction limits are calculated with minimum 95% confidence level for four (4) future observations to maintain acceptable statistical power while maintaining site-wide false positive rate (SWFPR) of 10% per year or less. Depending on the assumed distribution of background, parametric or non-parametric procedures were used to develop the UPL for each Appendix III parameter at the four downgradient locations that had at least eight sampling events<sup>2</sup>. Parametric prediction limits utilize assumed distributions of the sample background data to develop the prediction limits, and non-parametric limits utilize order statistics or bootstrap methods to develop the prediction limits. The prediction limits were calculated after testing for outlier sample results that would warrant removal from the data set based on likely error in sampling or measurement. No sample data were deemed as outliers that warranted removal from the data set.

### BACKGROUND DISTRIBUTIONS AND UPLS

Prior to conducting the statistical analysis for the December 2020 compliance event, the groundwater analytical results for samples collected from 7 December 2016 through June 2020 were used to update

---

<sup>1</sup> We note that for pH, a Statistically Significant Difference (SSD) can be either an increase or a decrease. There is no SSD for pH.

<sup>2</sup> Six locations were identified in the *Groundwater Monitoring System and Hydrogeological Investigation Report* as downgradient locations. Two of these six locations (CLF-S05 and CLF-S06) are typically dry. EKPC was able to collect the eighth of eight minimum samples required under the rule at location CLF-S05 during the March 2021 sampling event. Based on previous determinations at Cooper Station Landfill and the available sample data from CLF-S05, the UPL is appropriate for evaluating the groundwater monitoring data from CLF-S05. A UPL has been calculated for this location for comparison starting in the next semiannual monitoring sampling event report. A seventh sample was collected from CLF-S06 during the March 2021 monitoring sampling event, and a UPL will be calculated when a minimum of eight sample results are available.

intra-well UPL and LPL (for pH) for each downgradient location (CLF-J2, CLF-J3, CLF-J5, and CLF-S13). Following four sampling events, the new sample results will be evaluated for incorporation into the background data set used for the calculation of the UPL. The variability and distribution of each downgradient well background dataset was evaluated to determine the method for UPL and LPL (for pH) calculation. The development of the UPL and LPL (for pH) for each of the Appendix III constituents is summarized in Table 1, and the supporting statistical software output is included in Attachment 2. The next time background will be reevaluated is prior to the statistical evaluation of the second semi-annual compliance event of 2022.

### RESULTS OF APPENDIX III DOWNGRADIENT STATISTICAL COMPARISONS

The sample concentrations for each of the Appendix III constituents from the last detection monitoring sampling event from each downgradient location were compared to their respective intra-well UPLs (Table 1). A sample concentration greater than the UPL (or less than LPL for pH) would be considered to represent an SSI over background. Based on these comparisons, no SSIs over background were identified for the September 2021 detection monitoring event.

We appreciate the opportunity to provide environmental consulting services on this project. Please do not hesitate to call if you have any questions or comments.

Sincerely,

**HALEY & ALDRICH, INC.**



Lloyd S. Ross  
Senior Scientist



Emily Guzik  
Project Manager

Enclosures:

Table 1. Summary of Background Sample Results and Comparison of Downgradient Sample Results

Attachment 1. Appendix III Time Series Graphs

Attachment 2. Statistical Output

## TABLE

**TABLE 1**  
**SUMMARY OF BACKGROUND SAMPLE RESULTS AND COMPARISON OF DOWNGRADE SAMPLE RESULTS**  
**JANUARY 2022**  
**EAST KENTUCKY POWER COOPERATIVE**  
**J. S. COOPER STATION LANDFILL**

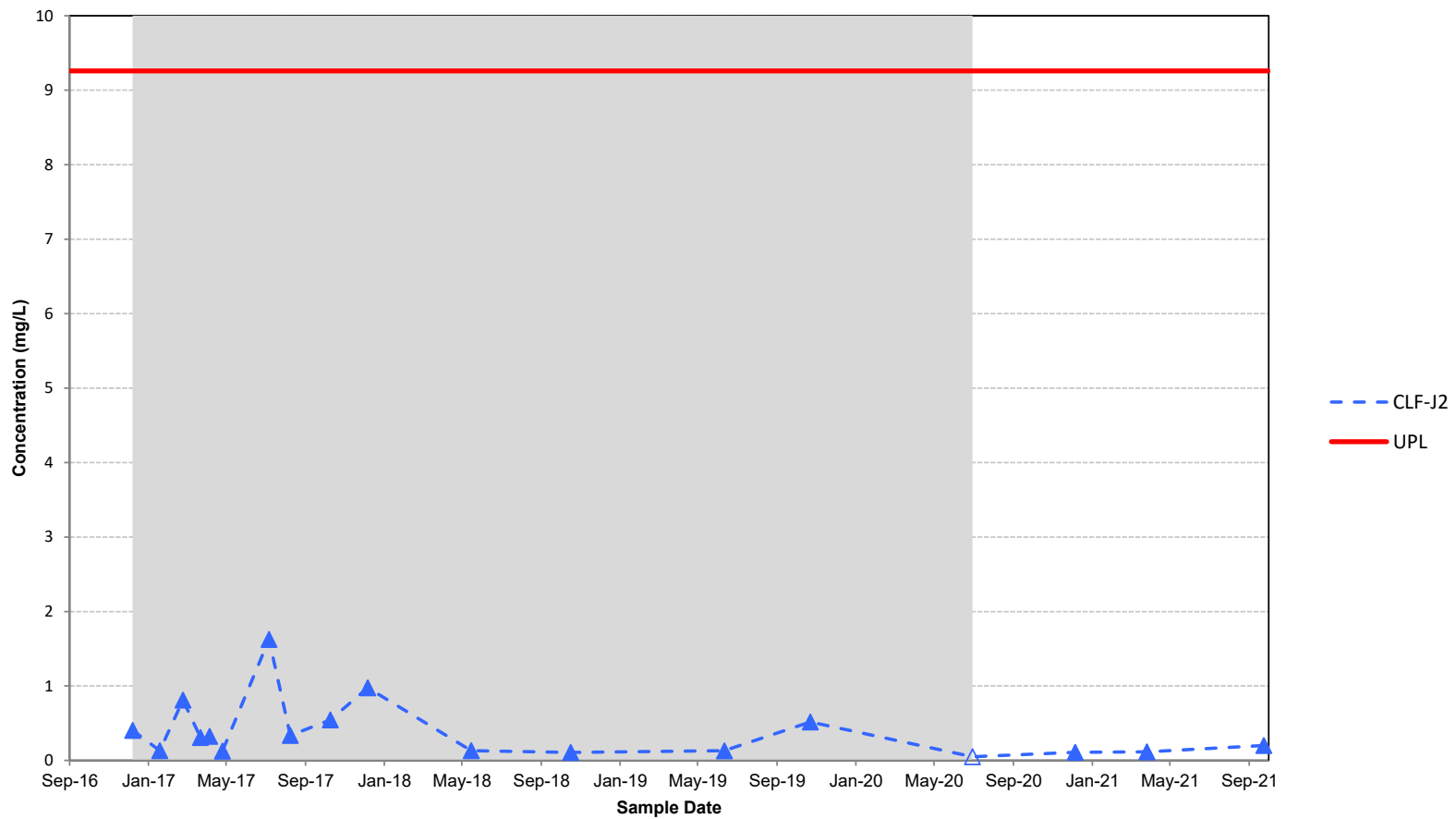
Location ID	Background Data Set Summary																	Intra-well Analysis		
	Frequency of Detection	Percent Non-Detects	Range of Non-Detect	Mean	50th Percentile (Median)	95th Percentile	Maximum Detect	Variance	Standard Deviation	Coefficient of Variance	Outlier Presence	Outlier Removed	Trend	Distribution*	Background Limit (Upper Prediction Limit)	Compliance Round (September 2021)	Statistically Significant Increase (SSI) Present?			
<b>Boron, Total (mg/L)</b>																				
CLF-J2	14	/	15	7%	0.05	0.05	0.435	0.325	1.17	1.626	1.69E-01	0.411	0.946	No	No	Stable	Log-transformed	9.26	0.201	No
CLF-J3	14	/	14	0%	N/A	N/A	0.549	0.5	1.254	1.741	1.87E-01	0.433	0.789	Yes	No	Stable	Normal	2.13	0.218	No
CLF-J5	15	/	15	0%	N/A	N/A	0.409	0.351	0.887	1.71	1.49E-01	0.387	0.946	No	No	Stable	Log-transformed	4.40	0.231	No
CLF-S05	6	/	8	25%	0.05	0.05	0.157	0.0799	0.4781	0.636	3.93E-02	0.1983	1.262	No	No	Stable	Log-transformed	4.93	N/A	No
CLF-S06	0	/	7	100%	N/A	0.05	0.05	0.05	0.05	N/A	5.78E-19	7.604E-10	1.521E-08	NT	NT	NT	NT	NT	N/A	No
CLF-S13	15	/	15	0%	N/A	N/A	0.614	0.484	0.958	1.041	5.67E-02	0.238	0.388	No	No	Stable	Normal	1.47	0.291	No
<b>Calcium, Total (mg/L)</b>																				
CLF-J2	15	/	15	0%	N/A	N/A	113.2	113	187.9	239.5	2.13E+03	46.1	0.407	Yes	No	Stable	Normal	279.05	86.2	No
CLF-J3	14	/	14	0%	N/A	N/A	123.2	118.5	192.8	239.8	1.54E+03	39.29	0.319	No	No	Stable	Log-transformed	316.51	86.7	No
CLF-J5	15	/	15	0%	N/A	N/A	124.5	111	215.8	297.3	2.83E+03	53.16	0.427	Yes	No	Stable	Non-parametric	297.33	88.5	No
CLF-S05	8	/	8	0%	N/A	N/A	93.4	92.9	117.5	120	3.81E+02	19.51	0.2089	No	No	Stable	Normal	182.44	N/A	N/A
CLF-S06	7	/	7	0%	N/A	N/A	81.1	79.2	90.24	90.5	6.34E+01	7.961	0.09822	NT	NT	NT	NT	NT	N/A	N/A
CLF-S13	15	/	15	0%	N/A	N/A	160.1	147	249	270	3.08E+03	55.48	0.347	No	No	Stable	Normal	359.64	110	No
<b>Chloride, Total (mg/L)</b>																				
CLF-J2	15	/	15	0%	N/A	N/A	14.13	9.941	49.54	50.8	2.23E+02	14.94	1.058	Yes	No	Stable	Log-transformed	277.65	7.9	No
CLF-J3	14	/	14	0%	N/A	N/A	16.3	12	49.81	51.3	2.21E+02	14.85	0.911	Yes	No	Stable	Log-transformed	178.69	8.1	No
CLF-J5	15	/	15	0%	N/A	N/A	17.91	10.56	68.82	76.1	4.83E+02	21.98	1.227	Yes	No	Stable	Log-transformed	294.49	5.1	No
CLF-S05	7	/	8	12%	1	1	5.3	4.789	12.14	14.1	1.96E+01	4.421	0.8342	No	No	Stable	Normal	25.48	N/A	N/A
CLF-S06	4	/	7	43%	1	1	1.59	1.764	2.076	2.1086	2.70E-01	0.52	0.3268	NT	NT	NT	NT	NT	N/A	N/A
CLF-S13	15	/	15	0%	N/A	N/A	4.898	3.7	9.017	9.237	5.42E+00	2.328	0.475	No	No	Decreasing	Normal	13.27	3.7	No
<b>Fluoride, Total (mg/L)</b>																				
CLF-J2	2	/	15	87%	0.5	0.5	0.155	0.5	0.5	0.171	2.36E-04	0.0154	0.0988	No	No	NA	Non-parametric	0.50	< 0.5	No
CLF-J3	1	/	14	93%	0.5	0.5	0.166	0.5	0.5	0.166	0.00E+00	0	N/A	No	No	NA	Non-parametric	0.50	< 0.5	No
CLF-J5	1	/	15	93%	0.5	0.5	0.167	0.5	0.5	0.167	0.00E+00	0	N/A	No	No	NA	Non-parametric	0.50	< 0.5	No
CLF-S05	2	/	8	75%	0.5	0.5	0.413	0.5	0.5	0.1658	2.59E-02	0.1608	0.3892	No	No	NT	Non-parametric	0.50	N/A	N/A
CLF-S06	2	/	7	71%	0.5	0.5	0.426	0.5	0.5	0.2731	1.62E-02	0.1274	0.299	NT	NT	NT	NT	NT	N/A	N/A
CLF-S13	1	/	15	93%	0.5	0.5	0.21	0.5	0.5	0.21	0.00E+00	0	N/A	No	No	NA	Non-parametric	0.50	< 0.5	No
<b>pH, Field, Total (pH units)</b>																				
CLF-J2	15	/	15	0%	N/A	N/A	7.888	7.89	8.269	8.29	1.06E-01	0.325	0.0412	No	No	Stable	Normal	6.63, 9.14	8.06	No
CLF-J3	14	/	14	0%	N/A	N/A	7.879	7.675	8.324	8.33	1.28E-01	0.358	0.0454	No	No	Stable	Non-parametric	7.45, 8.33	8.19	No
CLF-J5	15	/	15	0%	N/A	N/A	7.999	8.01	8.312	8.34	5.09E-02	0.226	0.0282	No	No	Stable	Normal	7.13, 8.87	8.41	No
CLF-S05	8	/	8	0%	N/A	N/A	8.08	8.11	8.372	8.4	7.22E-02	0.2686	0.03326	No	No	Stable	Normal	6.74, 9.42	N/A	N/A
CLF-S06	7	/	7	0%	N/A	N/A	7.59	7.99	8.651	8.81	2.36E+00	1.536	0.2024	NT	NT	NT	NT	NT	N/A	N/A
CLF-S13	15	/	15	0%	N/A	N/A	7.831	7.91	8.157	8.22	7.66E-02	0.277	0.0353	No	No	Stable	Normal	6.76, 8.9	7.94	No
<b>Sulfate, Total (mg/L)</b>																				
CLF-J2	15	/	15	0%	N/A	N/A	111.4	97.08	282.1	432	1.04E+04	102	0.916	Yes	No	Stable	Log-transformed	2173.83	82.6	No
CLF-J3	14	/	14	0%	N/A	N/A	124.1	100.4	292.2	430	9.73E+03	98.61	0.795	Yes	No	Stable	Log-transformed	987.57	83.4	No
CLF-J5	15	/	15	0%	N/A	N/A	110.1	67.8	354.1	555	1.86E+04	136.3	1.237	Yes	No	Stable	Log-transformed	1579.79	34.6	No
CLF-S05	8	/	8	0%	N/A	N/A	10.5	10.2	14.88	15.6	8.03E+00	2.833	0.269	No	No	Stable	Normal	146.81	N/A	N/A
CLF-S06	6	/	7	14%	N/A	N/A	34.9	37.04	67.03	69.4	6.01E+02	24.52	0.7021	NT	NT	NT	NT	NT	N/A	N/A
CLF-S13	15	/	15	0%	N/A	N/A	260.8	235	505.9	507.4	2.08E+04	144.3	0.553	No	No	Stable	Normal	779.92	126	No
<b>Total Dissolved Solids (TDS) (mg/L)</b>																				
CLF-J2	15	/	15	0%	N/A	N/A	383.1	359	762.2	982	4.38E+04	209.2	0.546	Yes	No	Stable	Log-transformed	1966.37	282	No
CLF-J3	14	/	14	0%	N/A	N/A	420.2	379.5	757.2	973	3.47E+04	186.2	0.443	No	No	Stable	Log-transformed	1443.96	280	No
CLF-J5	15	/	15	0%	N/A	N/A	418.7	350	914.9	1253	6.96E+04	263.8	0.63	Yes	No	Stable	Non-parametric	1253.00	238	No
CLF-S05	8	/	8	0%	N/A	N/A	251	257.5	351	386	5.81E+03	76.19	0.304	No	No	Stable	Normal	598.37	N/A	N/A
CLF-S06	6	/	7	0%	N/A	N/A	238	213	353	404	5.55E+03	74.5	0.313	NT	NT	NT	NT	NT	N/A	N/A
CLF-S13	15	/	15	0%	N/A	N/A	612.6	550	979	1014	5.14E+04	226.8	0.37	No	No	Stable	Normal	1428.38	368	No

**Notes and Abbreviations:**  
mg/L - Milligram per liter  
N/A - Not Applicable  
NT - Not Tested  
\* - Determined based on Shapiro-Wilks statistical test at 5% significance level and residual plot probability



**ATTACHMENT 1**

**Appendix III Time Series Graphs**



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

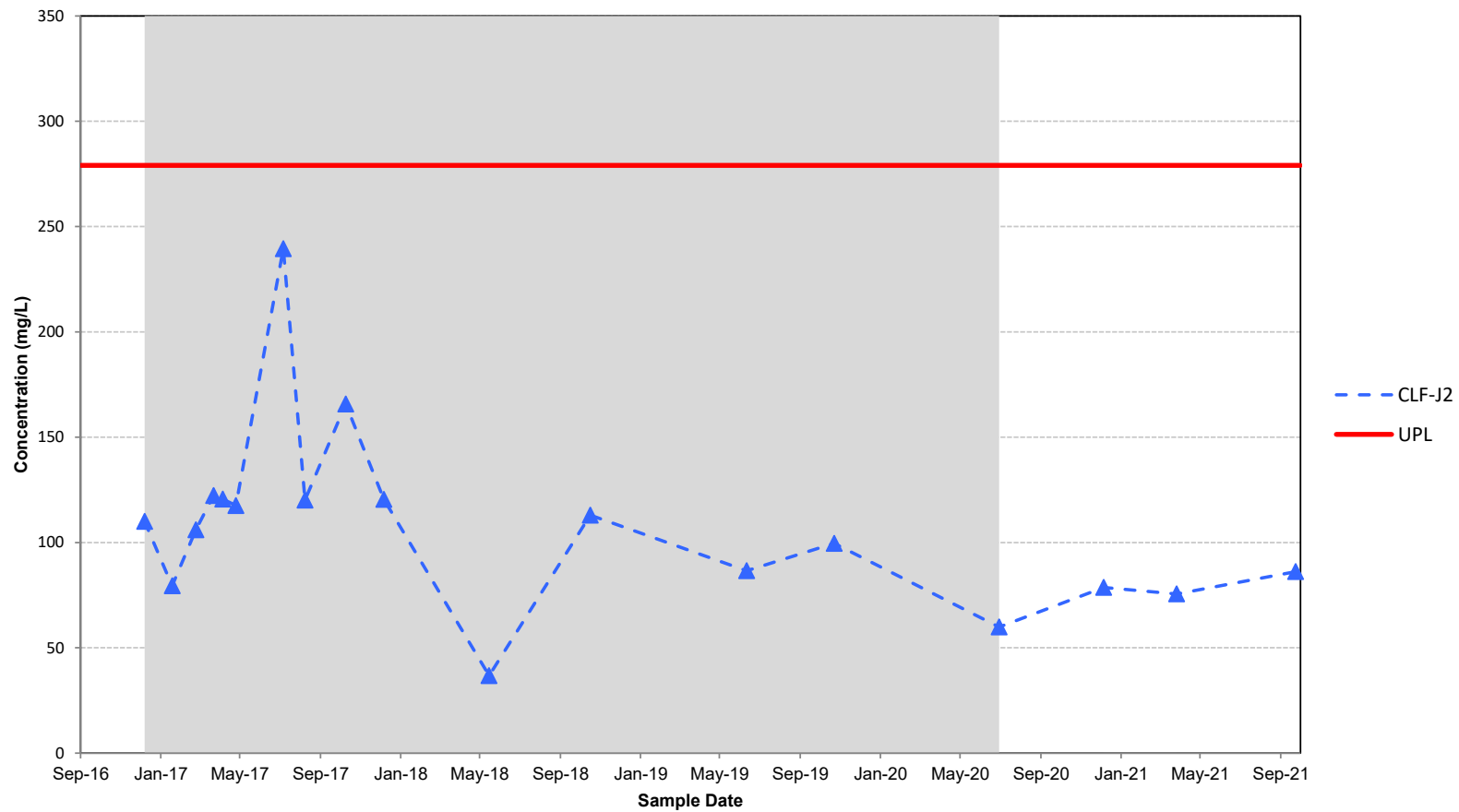


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**BORON  
CONCENTRATION VS. TIME**

January 2022

Figure F-1



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

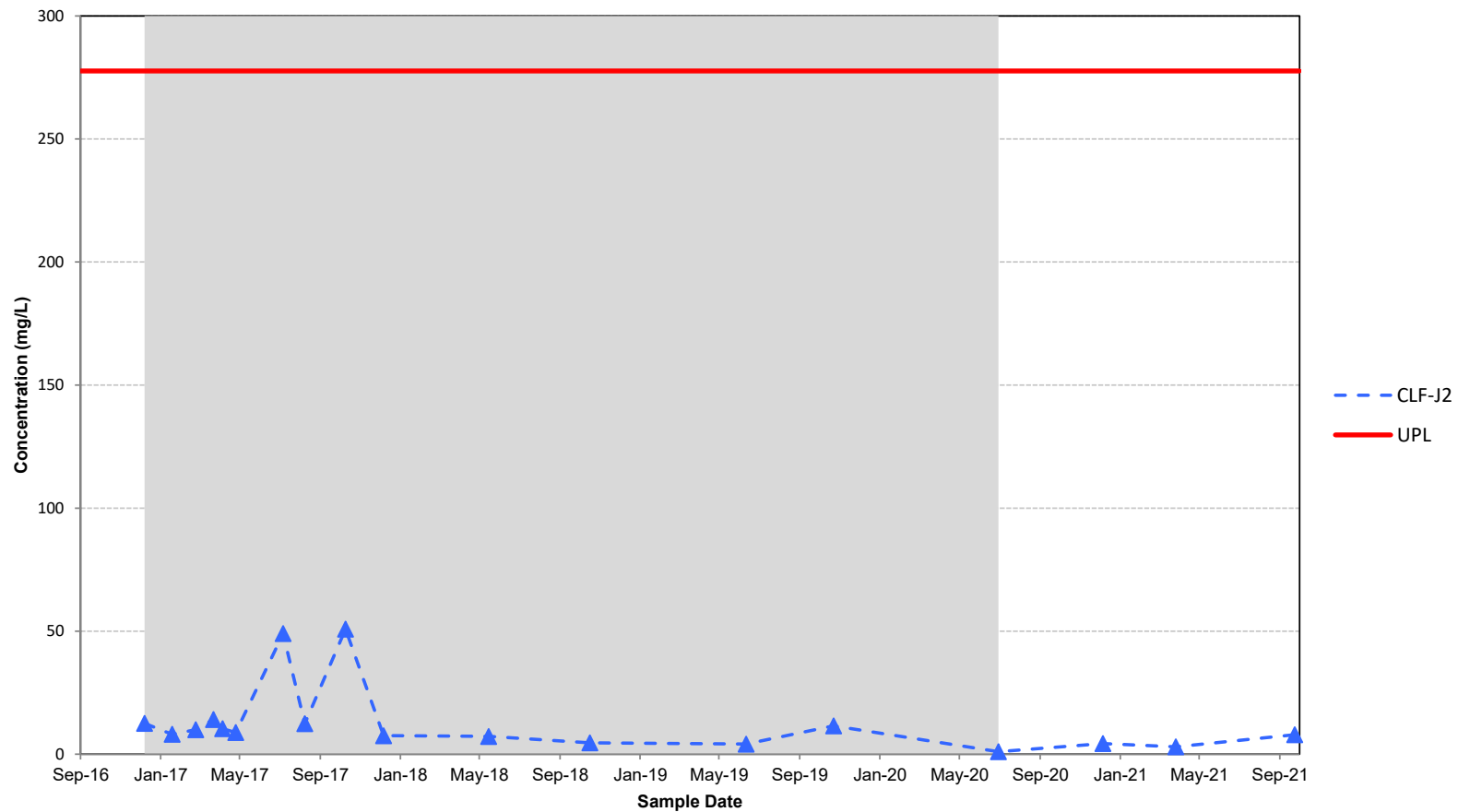


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CALCIUM  
CONCENTRATION VS. TIME**

January 2022

Figure F-2



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

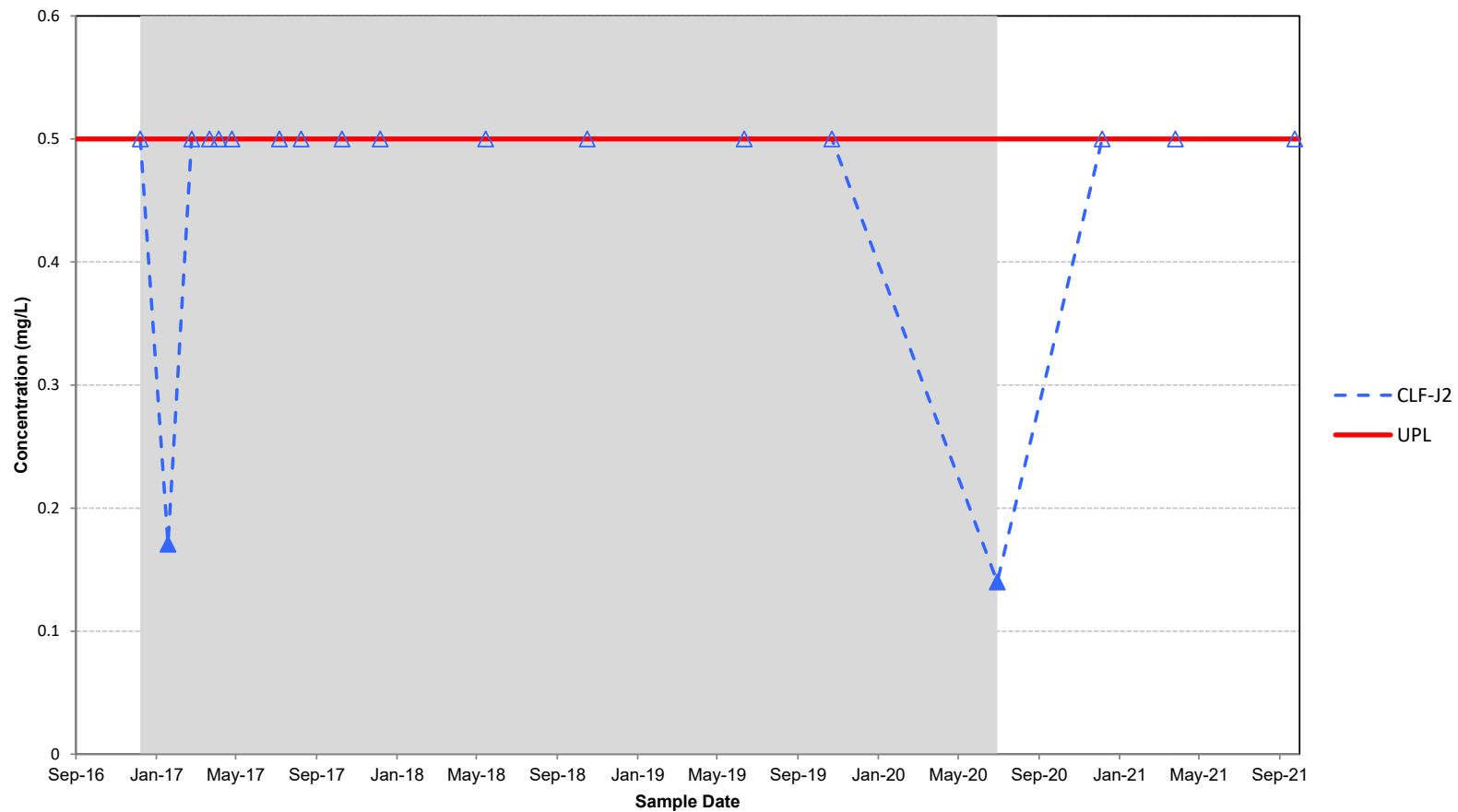


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CHLORIDE  
CONCENTRATION VS. TIME**

January 2022

Figure F-3



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

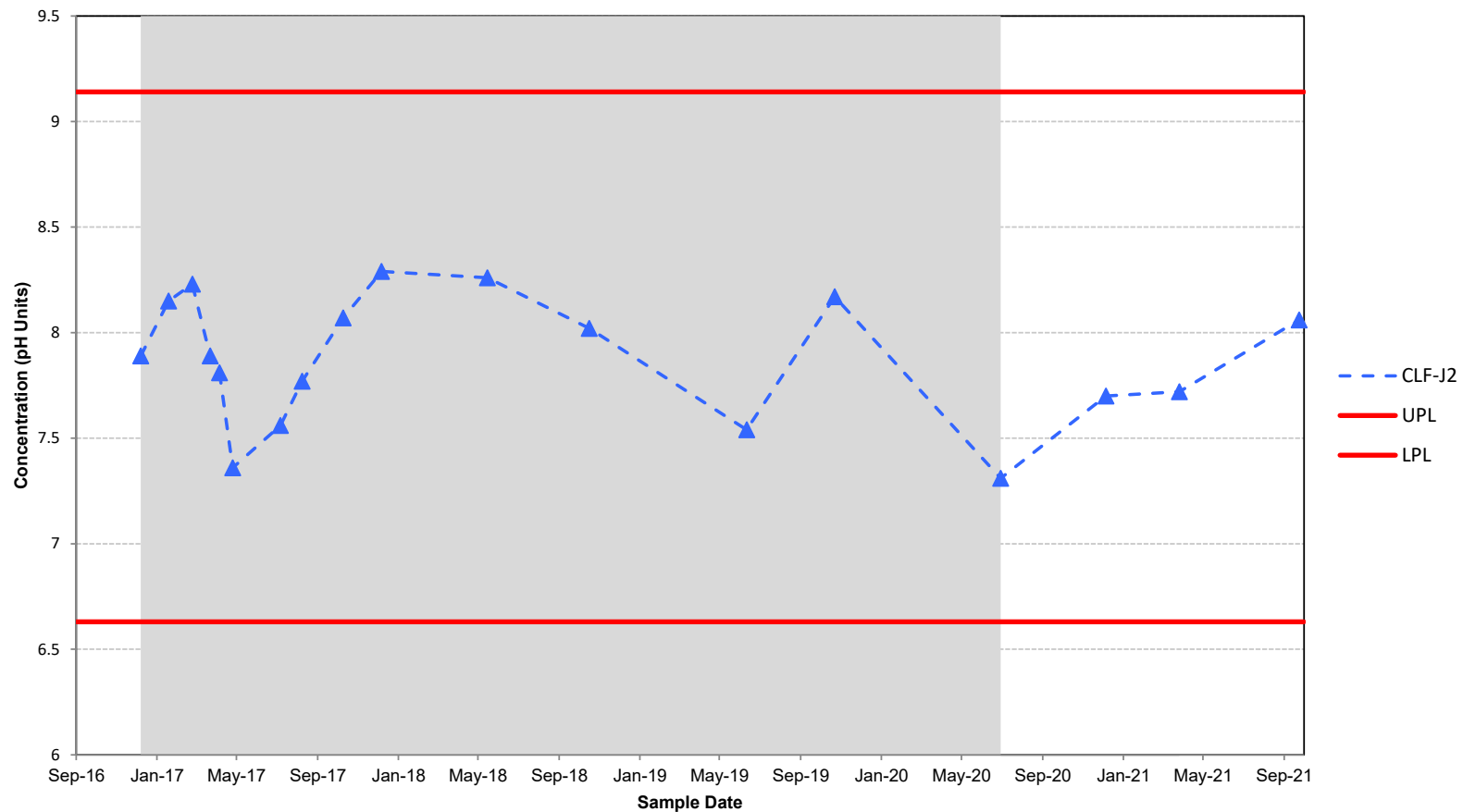


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**FLUORIDE  
CONCENTRATION VS. TIME**

January 2022

Figure F-4



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper and Lower Prediction Limit (UPL and LPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

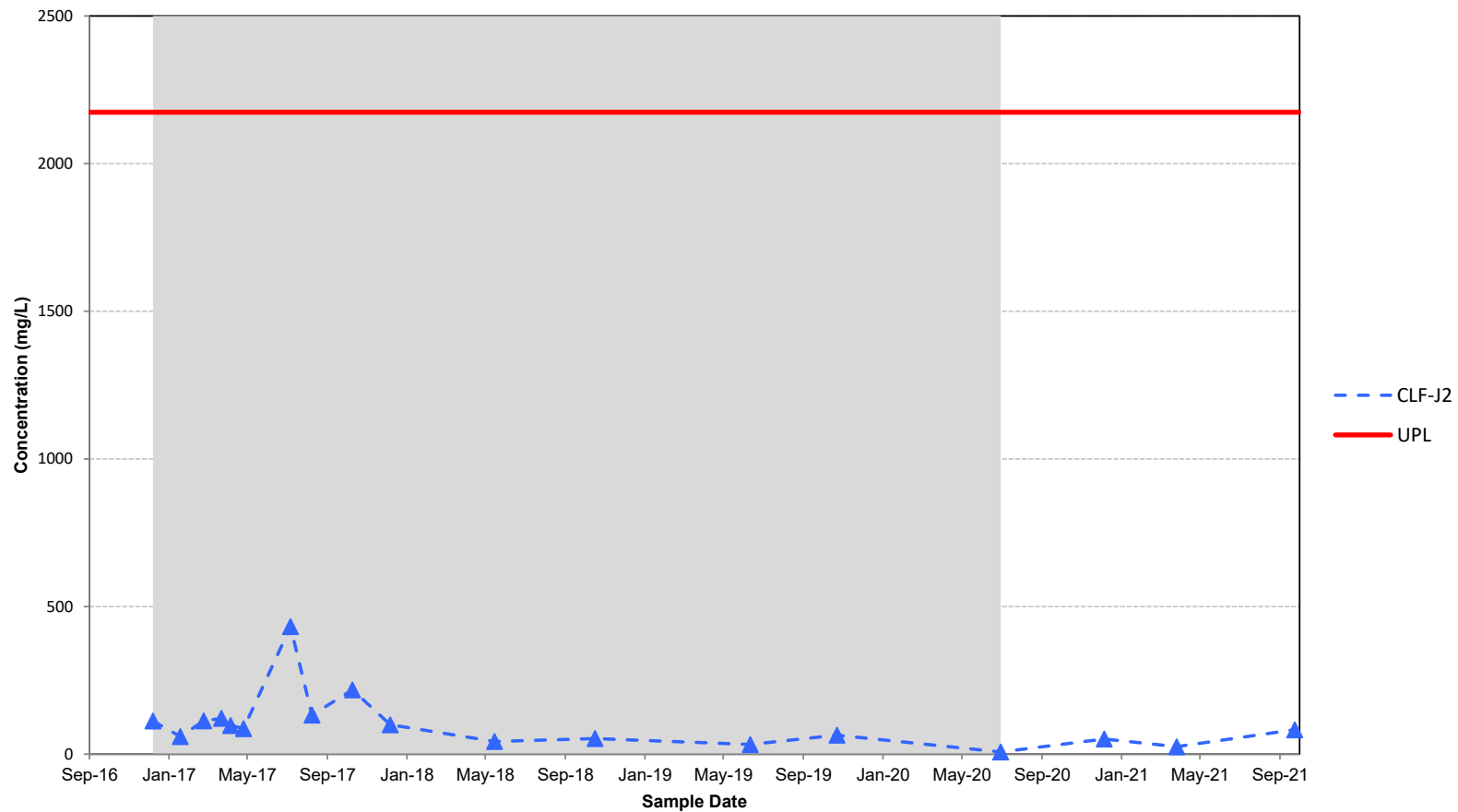


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**PH, FIELD  
CONCENTRATION VS. TIME**

January 2022

Figure F-5



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

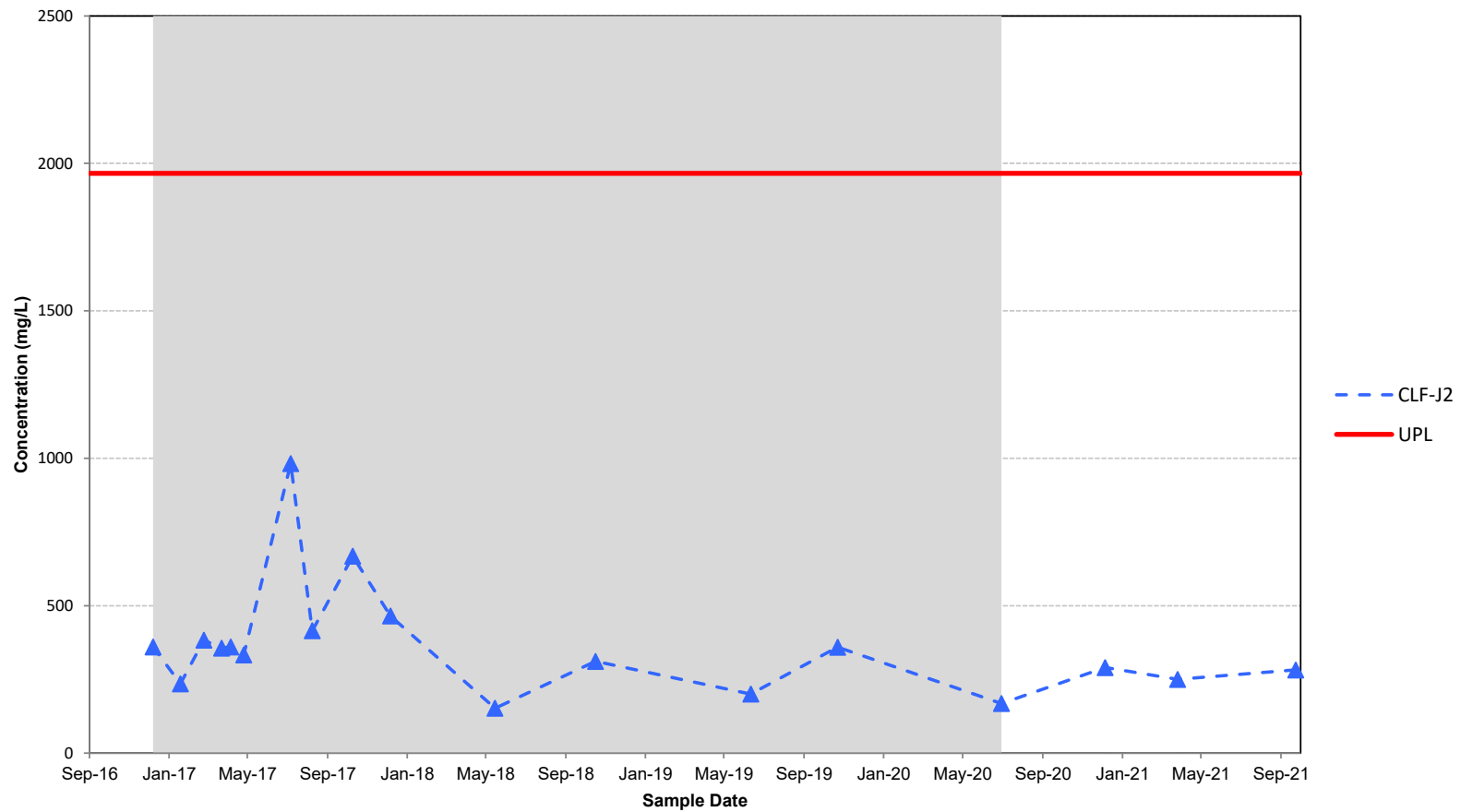
**HALEY  
ALDRICH**

J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**SULFATE  
CONCENTRATION VS. TIME**

January 2022

Figure F-6



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.



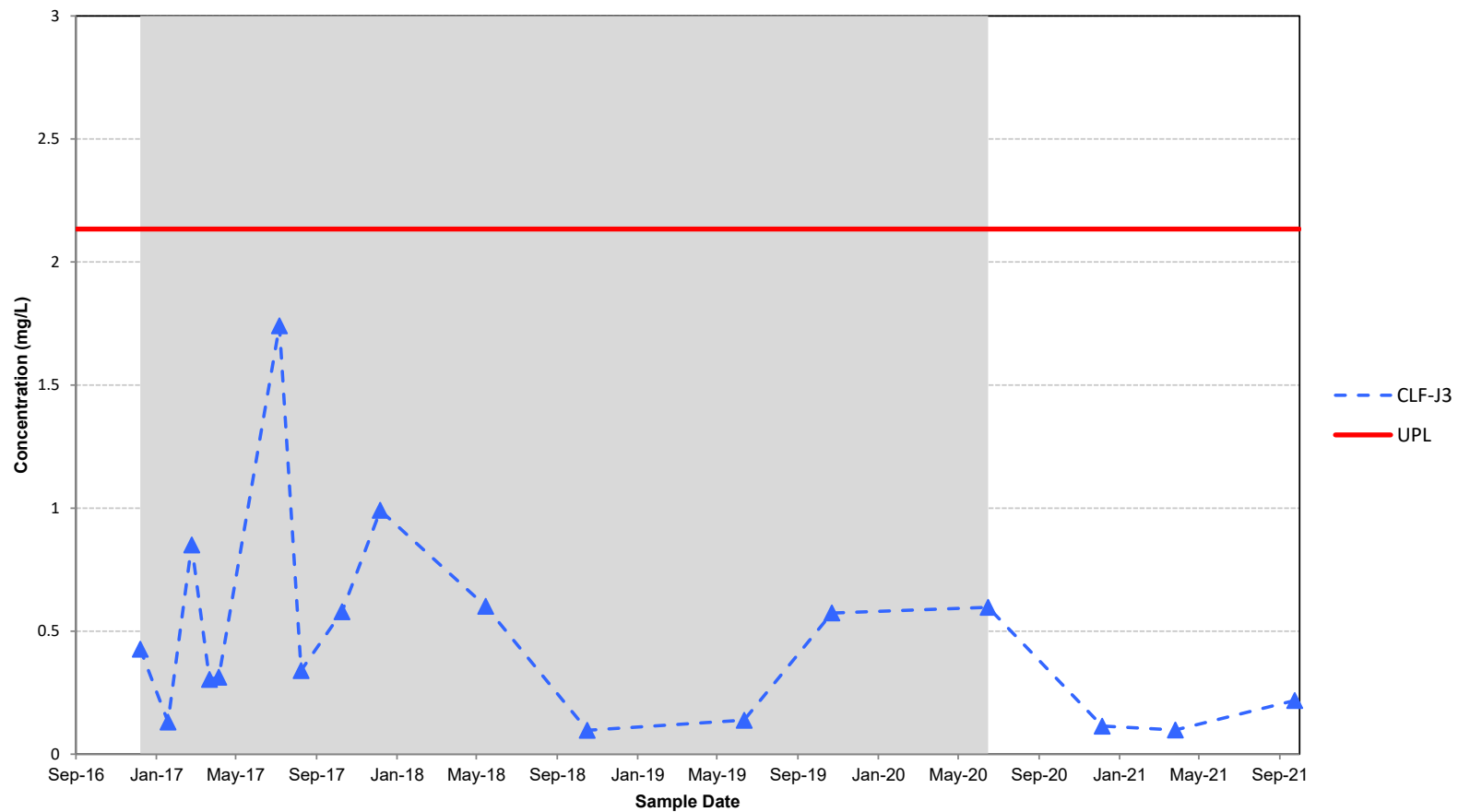
J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**TOTAL DISSOLVED SOLIDS (TDS)  
CONCENTRATION VS. TIME**

January 2022

Figure F-7





**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

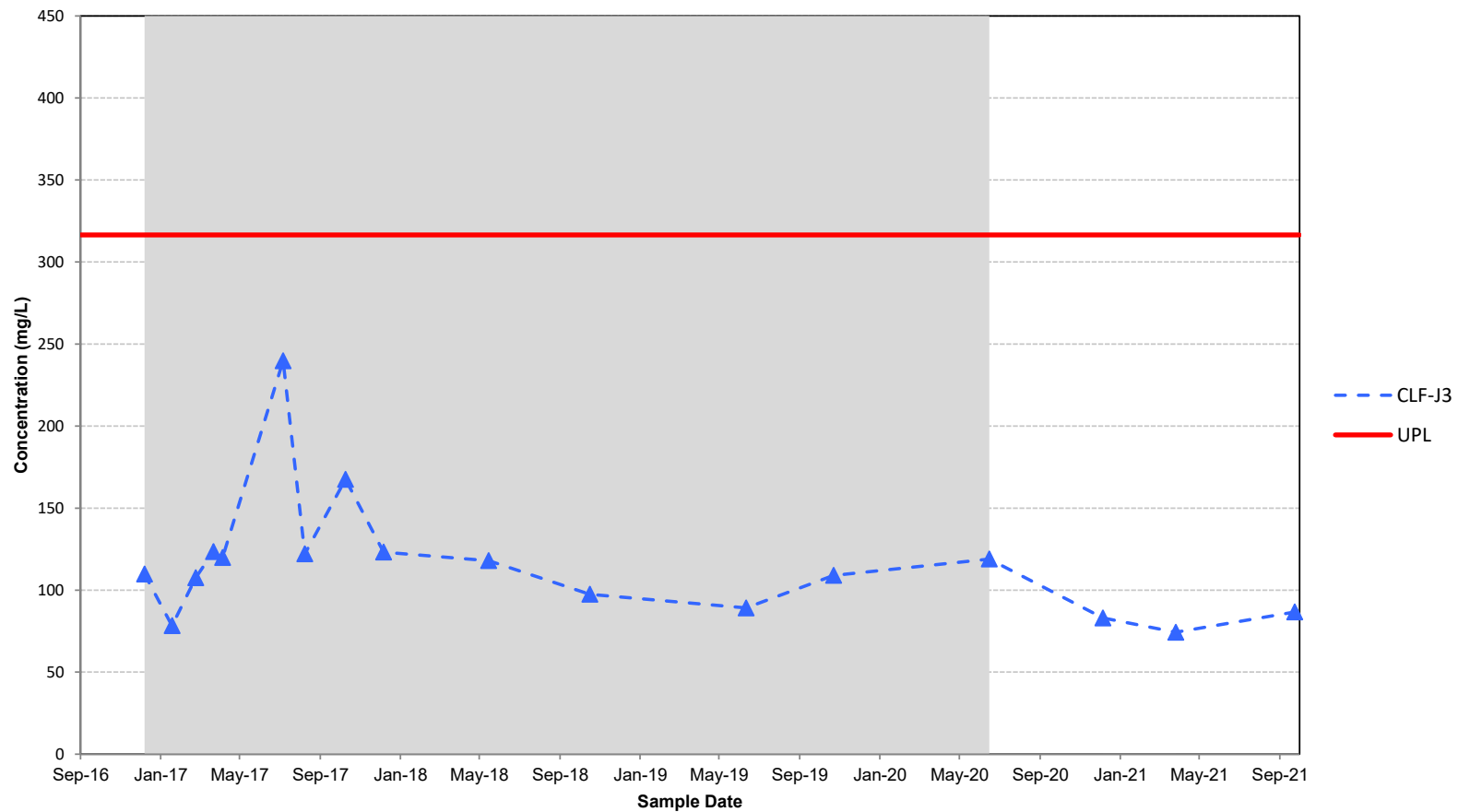


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**BORON  
CONCENTRATION VS. TIME**

January 2022

Figure F-8



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

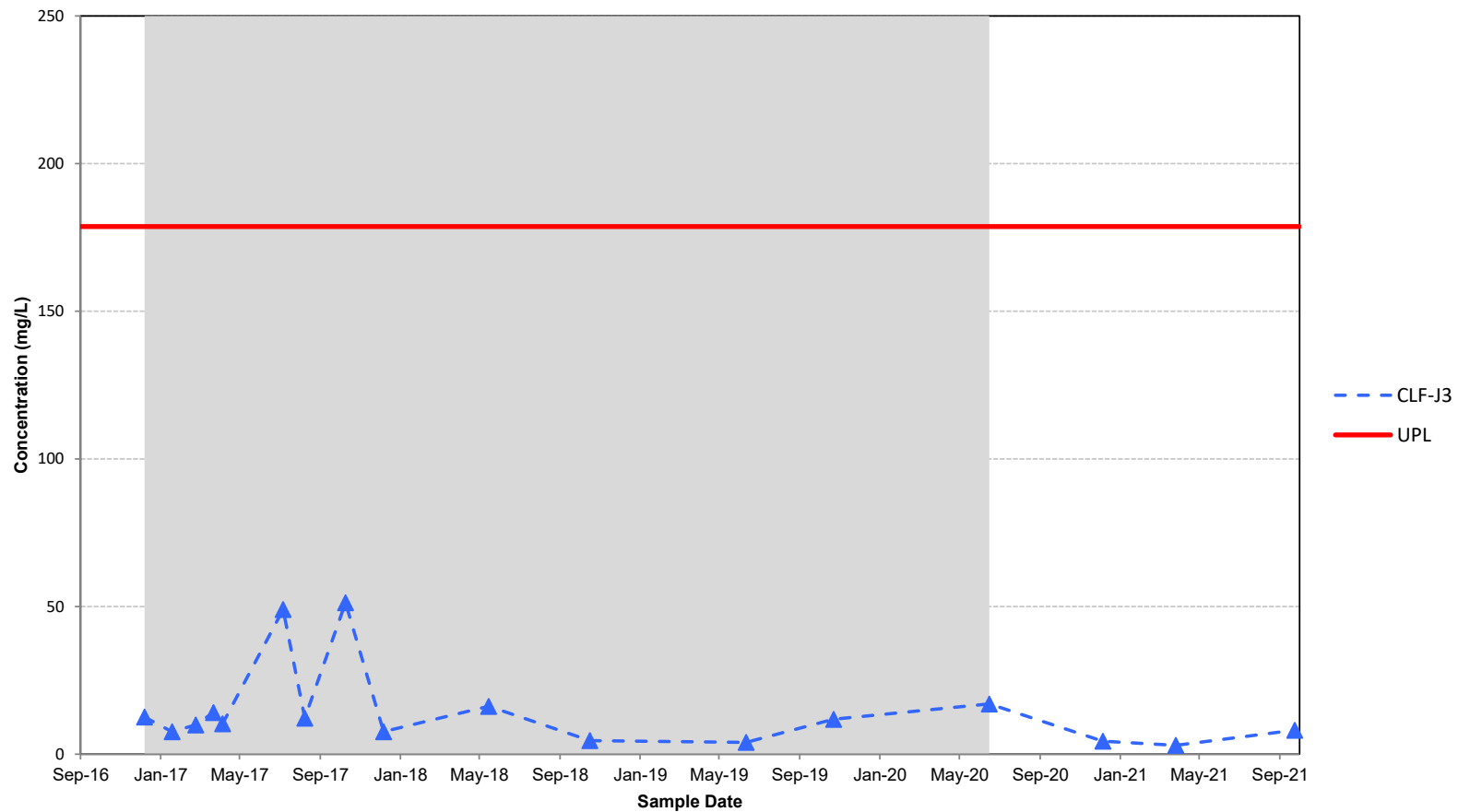


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CALCIUM  
CONCENTRATION VS. TIME**

January 2022

Figure F-9



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

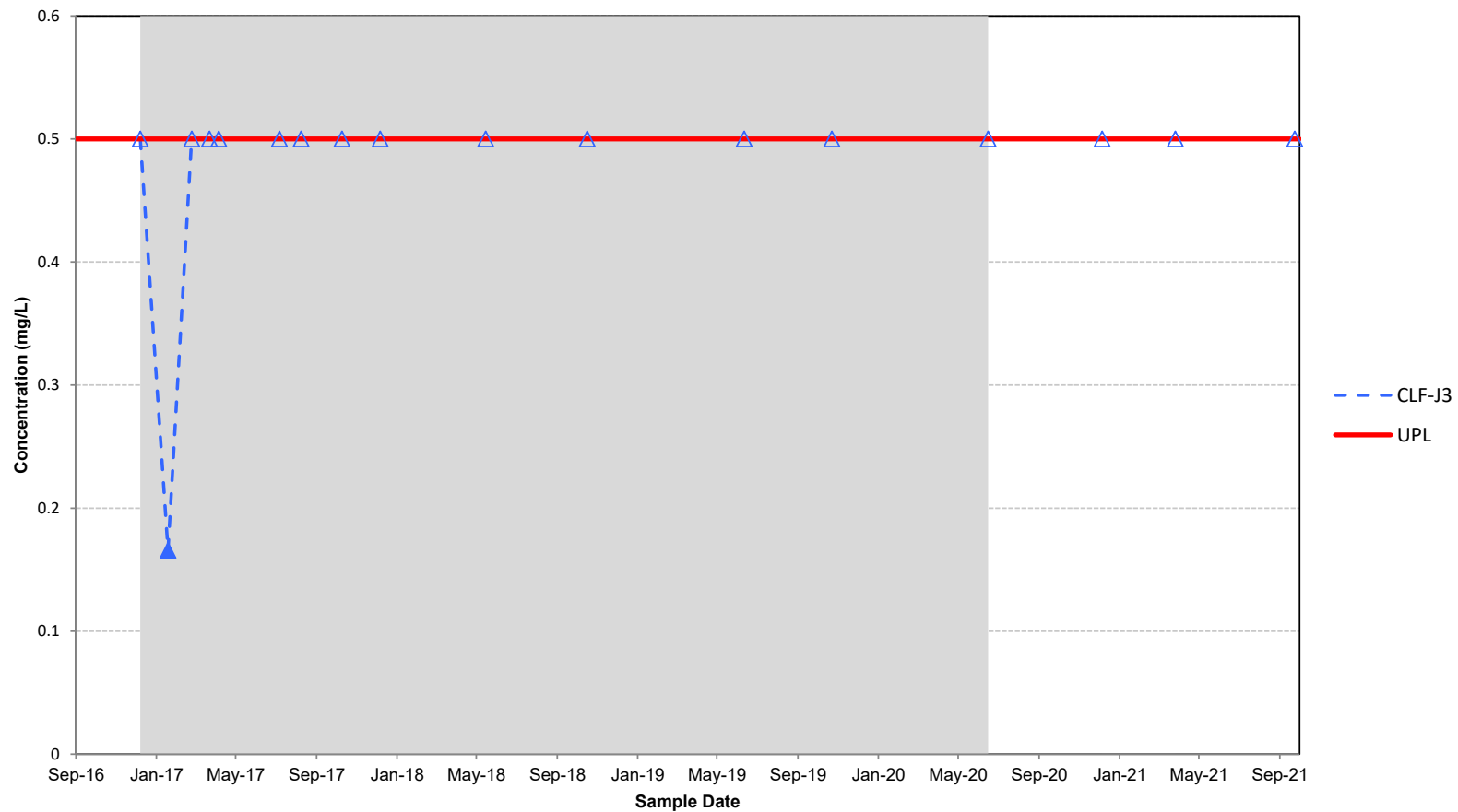


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CHLORIDE  
CONCENTRATION VS. TIME**

January 2022

Figure F-10



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

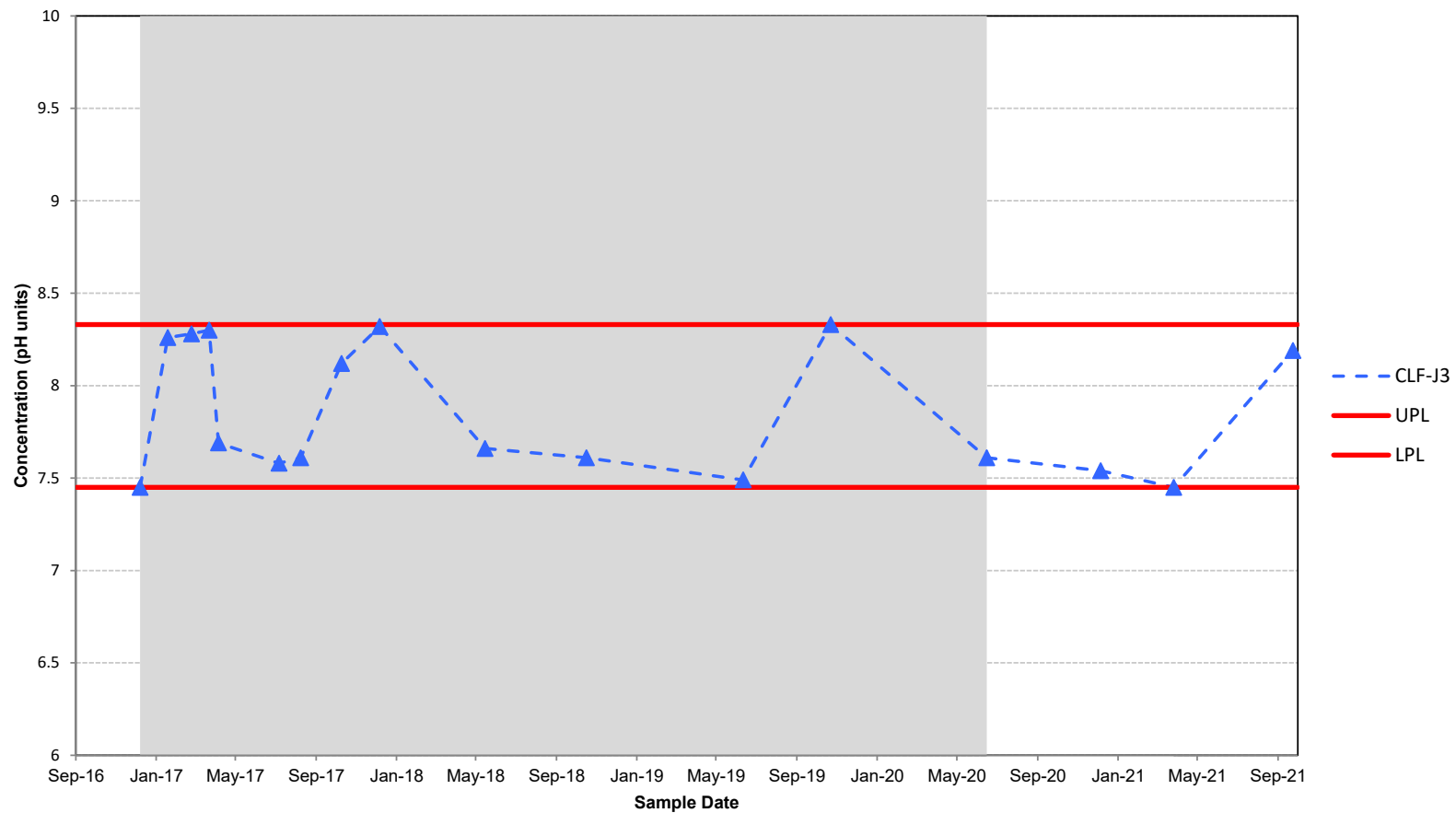


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**FLUORIDE  
CONCENTRATION VS. TIME**

January 2022

Figure F-11



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper and Lower Prediction Limit (UPL and LPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

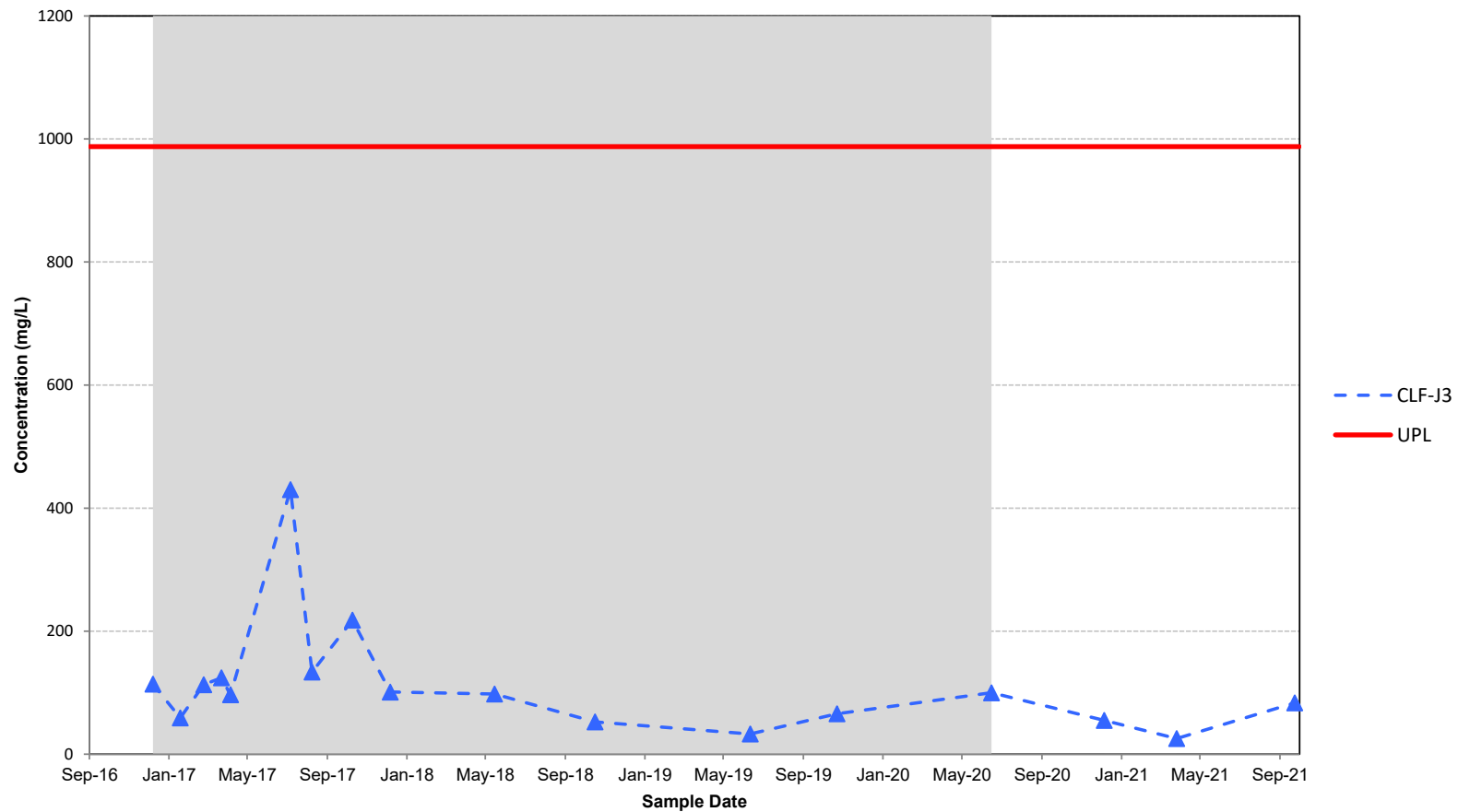


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**PH, FIELD  
CONCENTRATION VS. TIME**

January 2022

Figure F-12



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

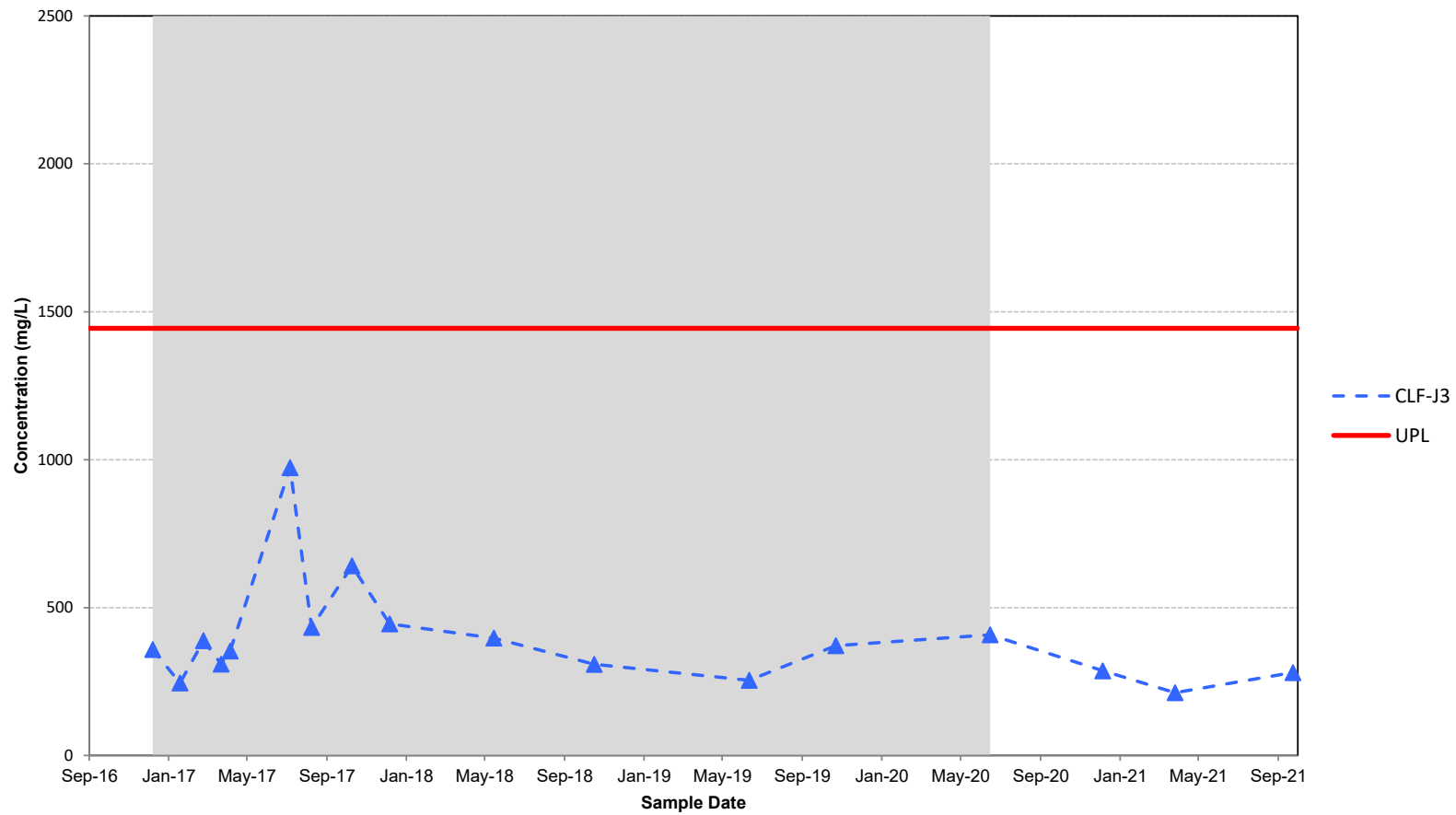


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**SULFATE  
CONCENTRATION VS. TIME**

January 2022

Figure F-13



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

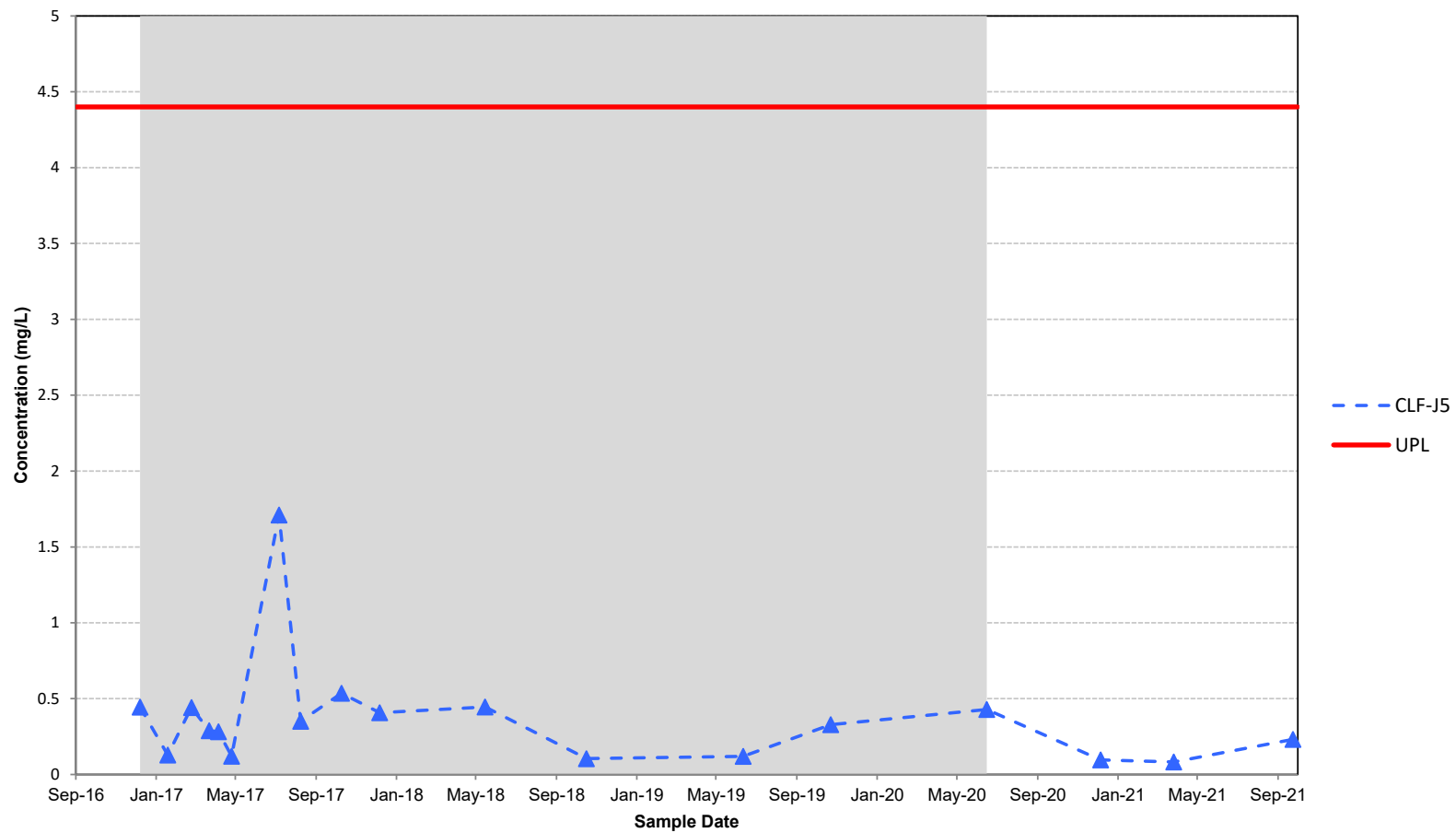


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**TOTAL DISSOLVED SOLIDS (TDS)  
CONCENTRATION VS. TIME**

January 2022

Figure F-14



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.



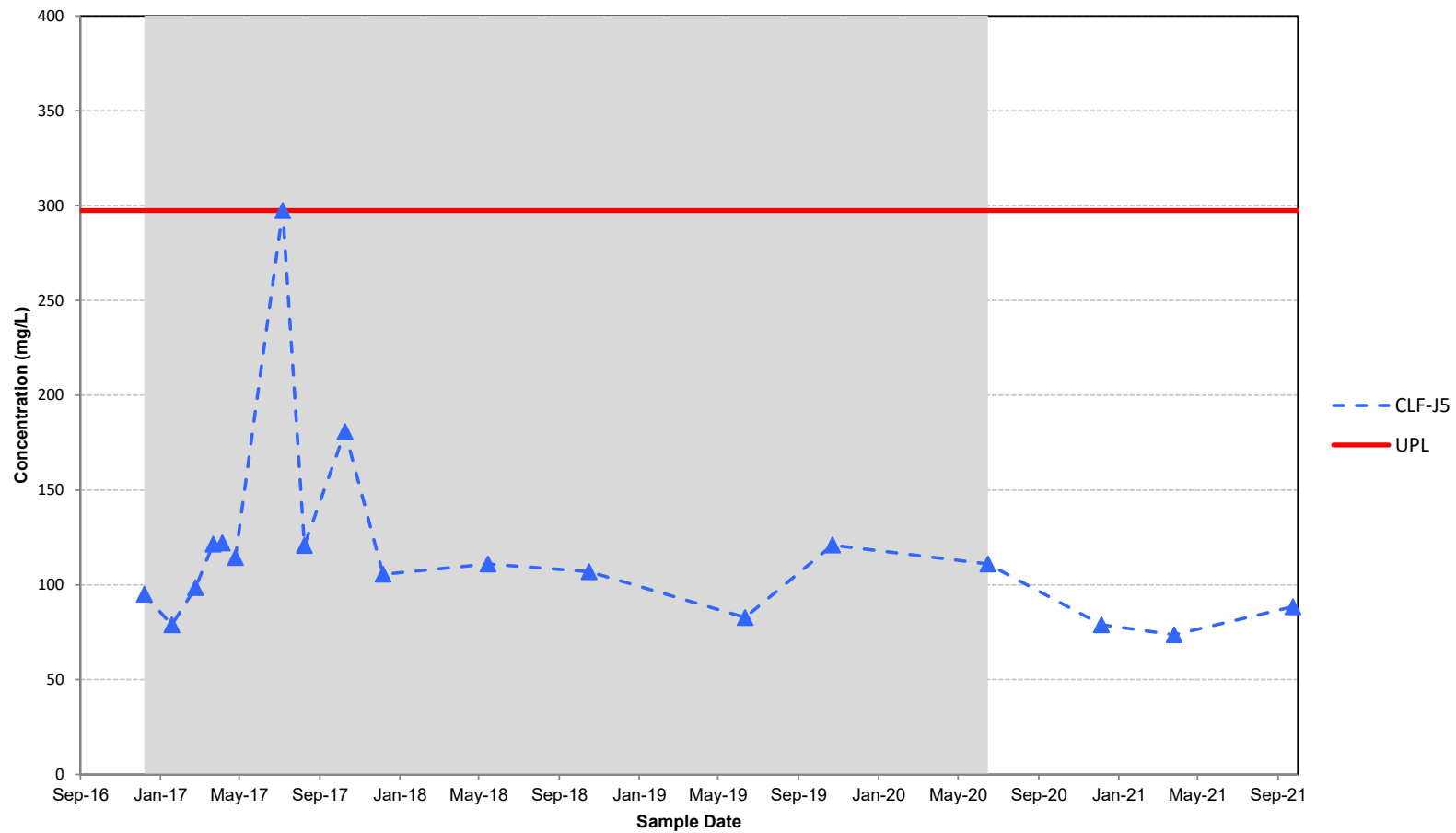
J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**BORON  
CONCENTRATION VS. TIME**

January 2022

Figure F-15





**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

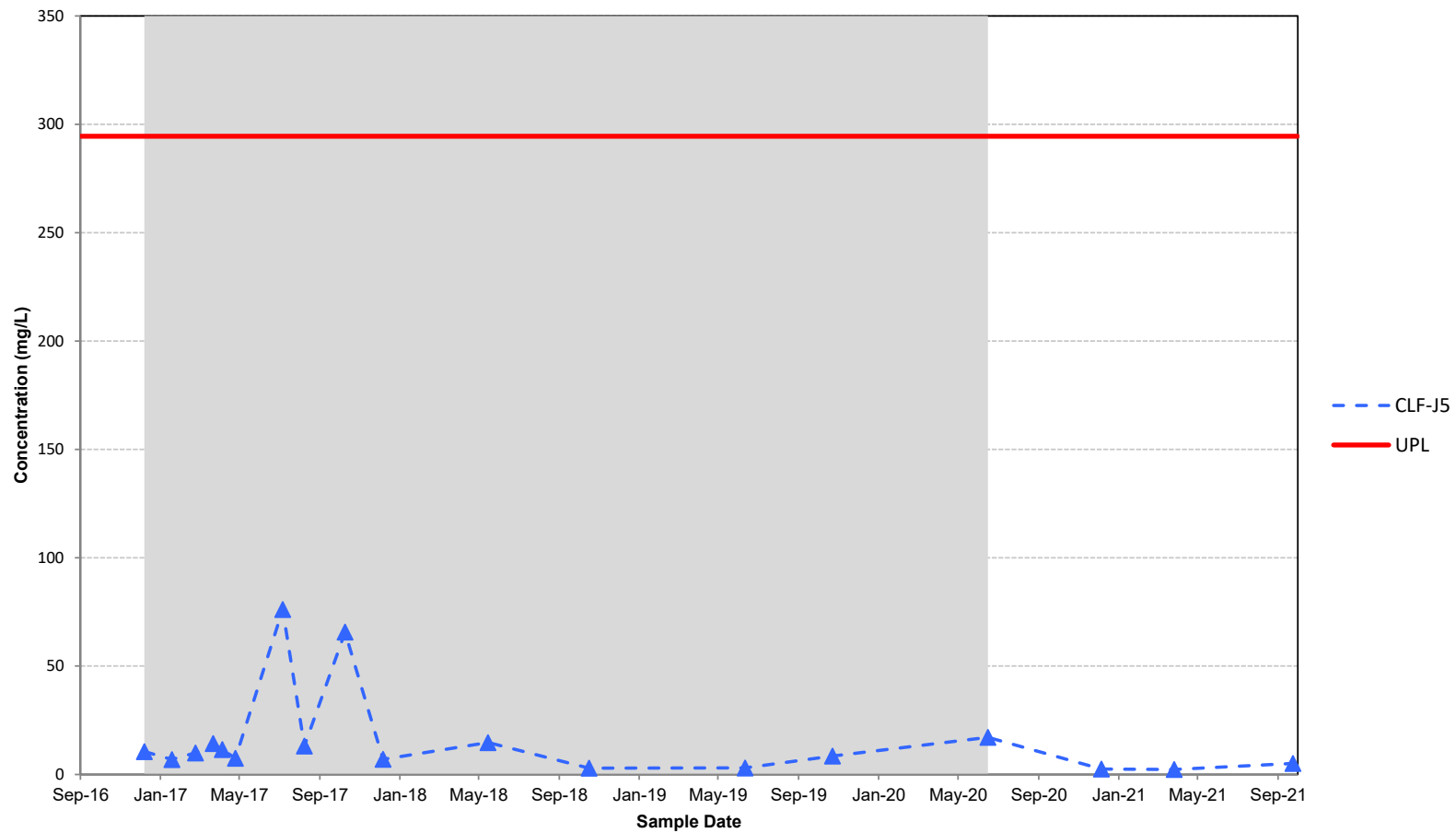


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CALCIUM  
CONCENTRATION VS. TIME**

January 2022

Figure F-16



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

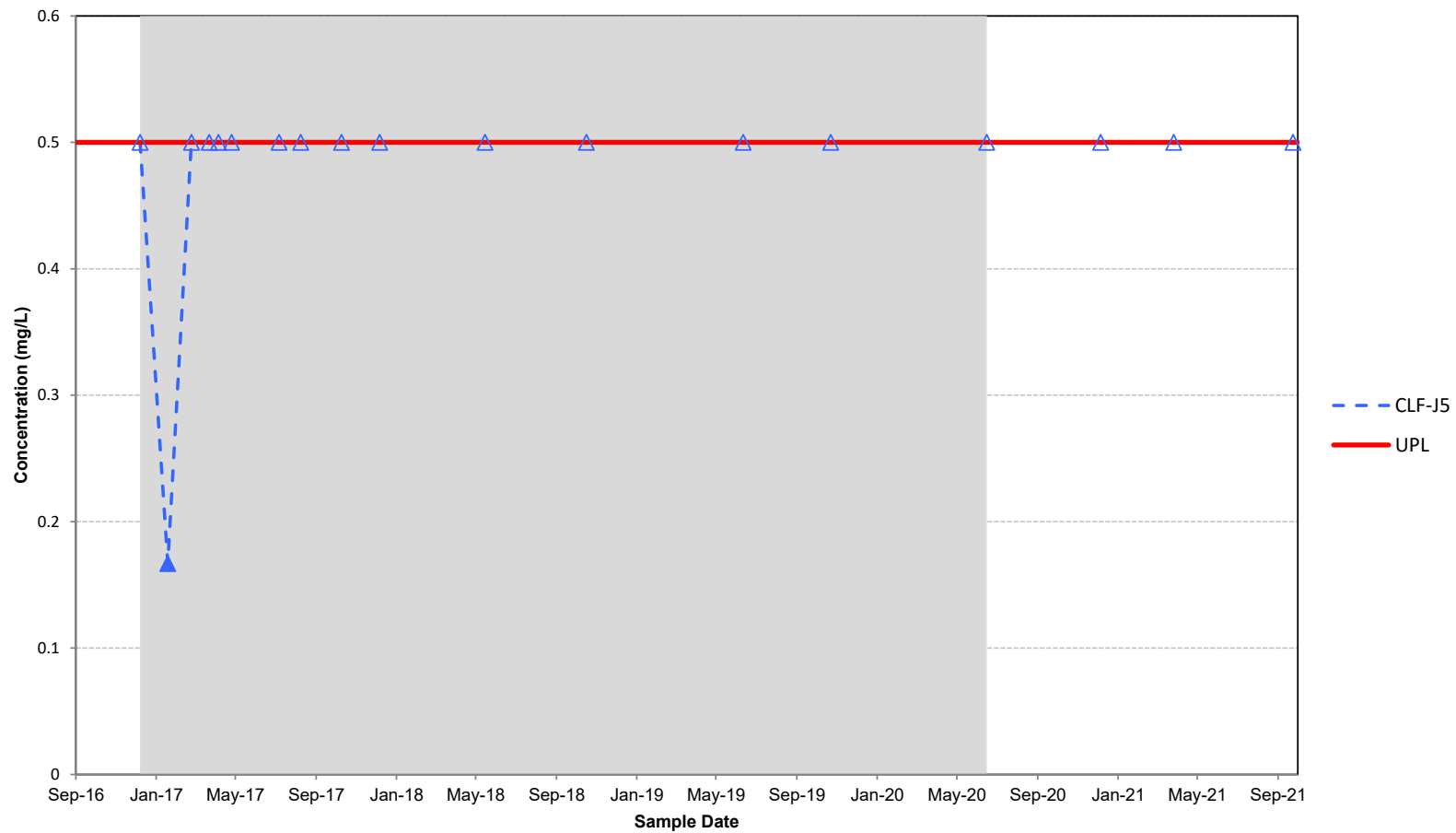


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CHLORIDE  
CONCENTRATION VS. TIME**

January 2022

Figure F-17



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

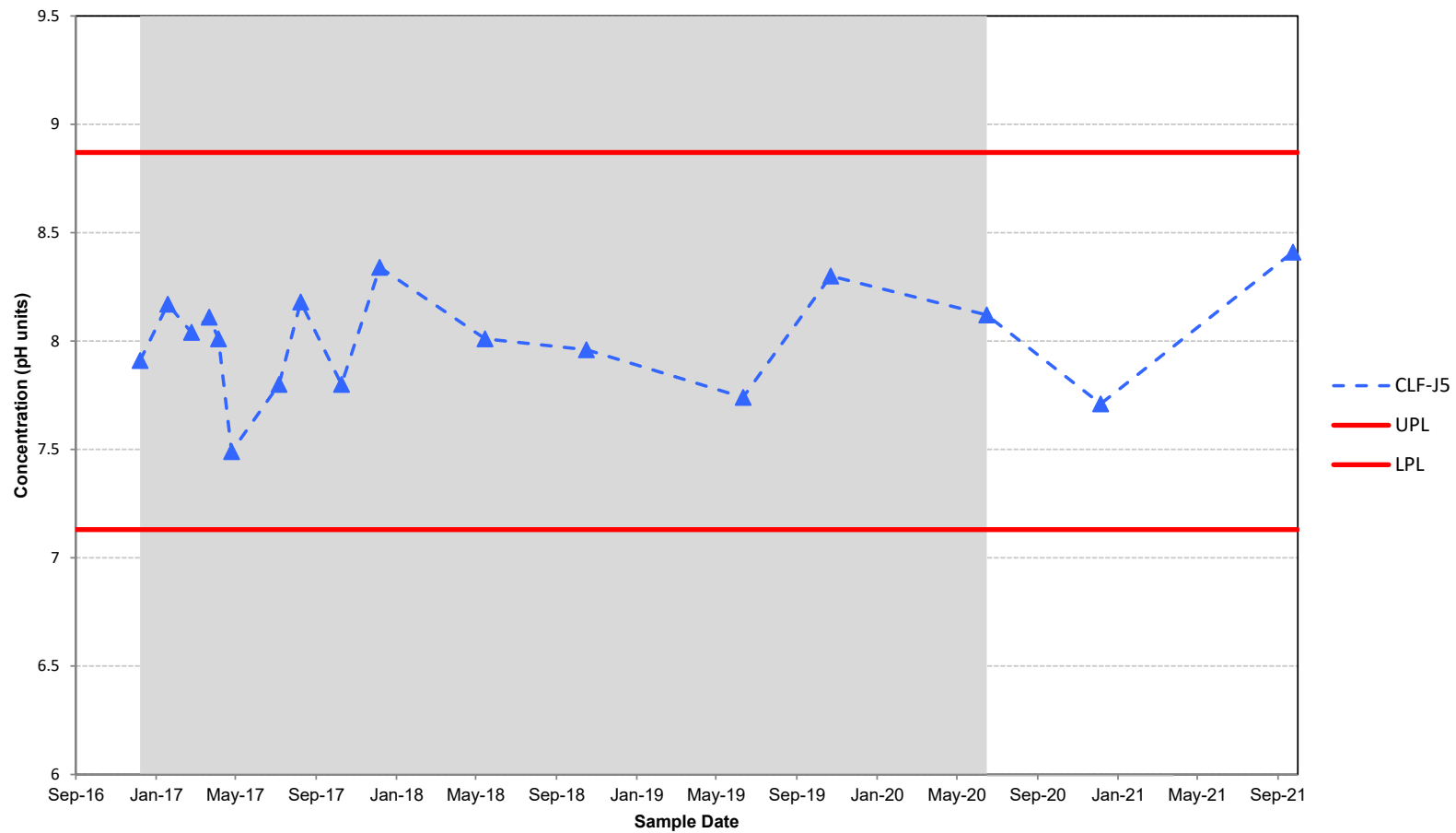


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**FLUORIDE  
CONCENTRATION VS. TIME**

January 2022

Figure F-18



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper and Lower Prediction Limit (UPL and LPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

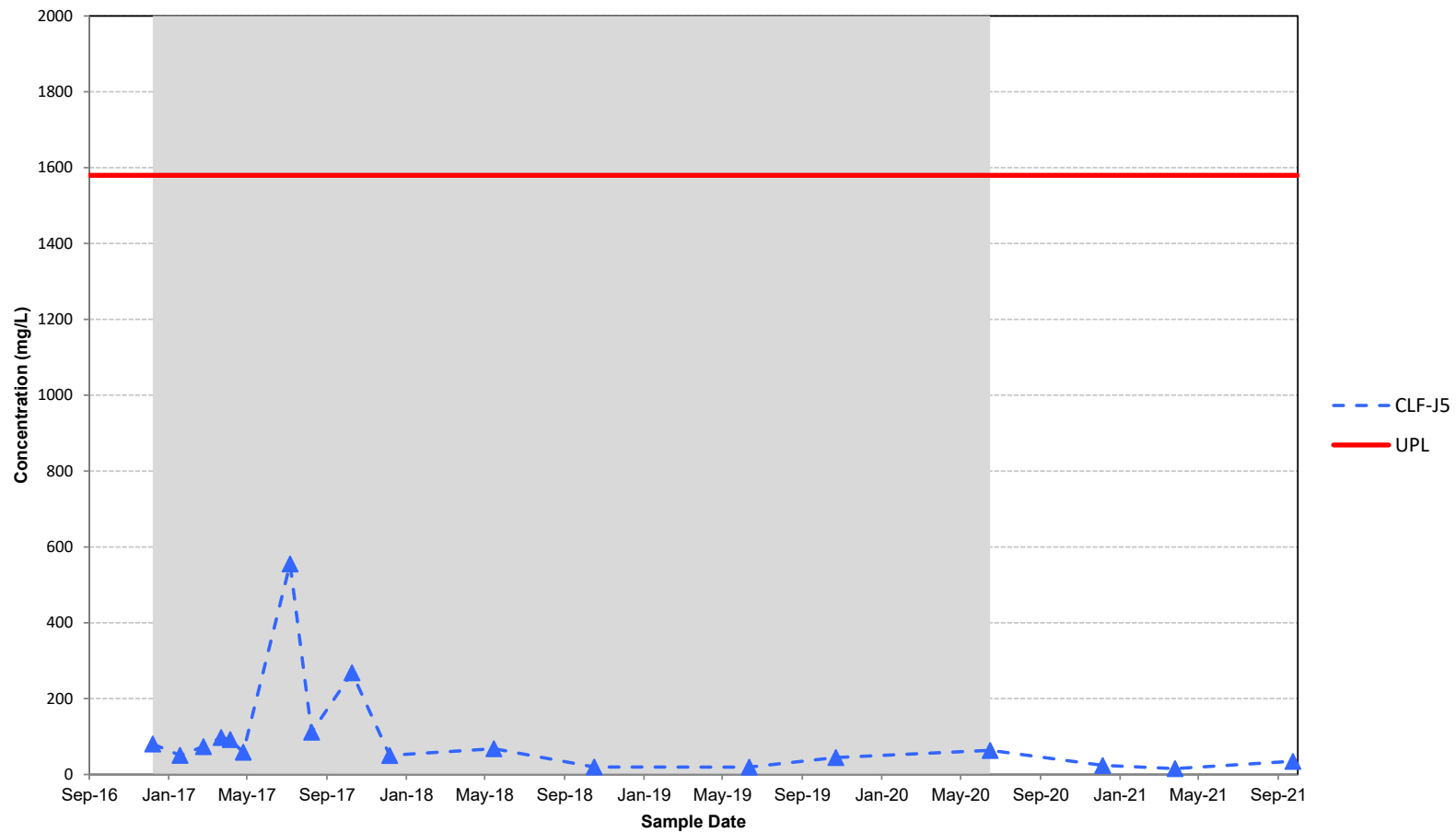


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**PH, FIELD  
CONCENTRATION VS. TIME**

January 2022

Figure F-19



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

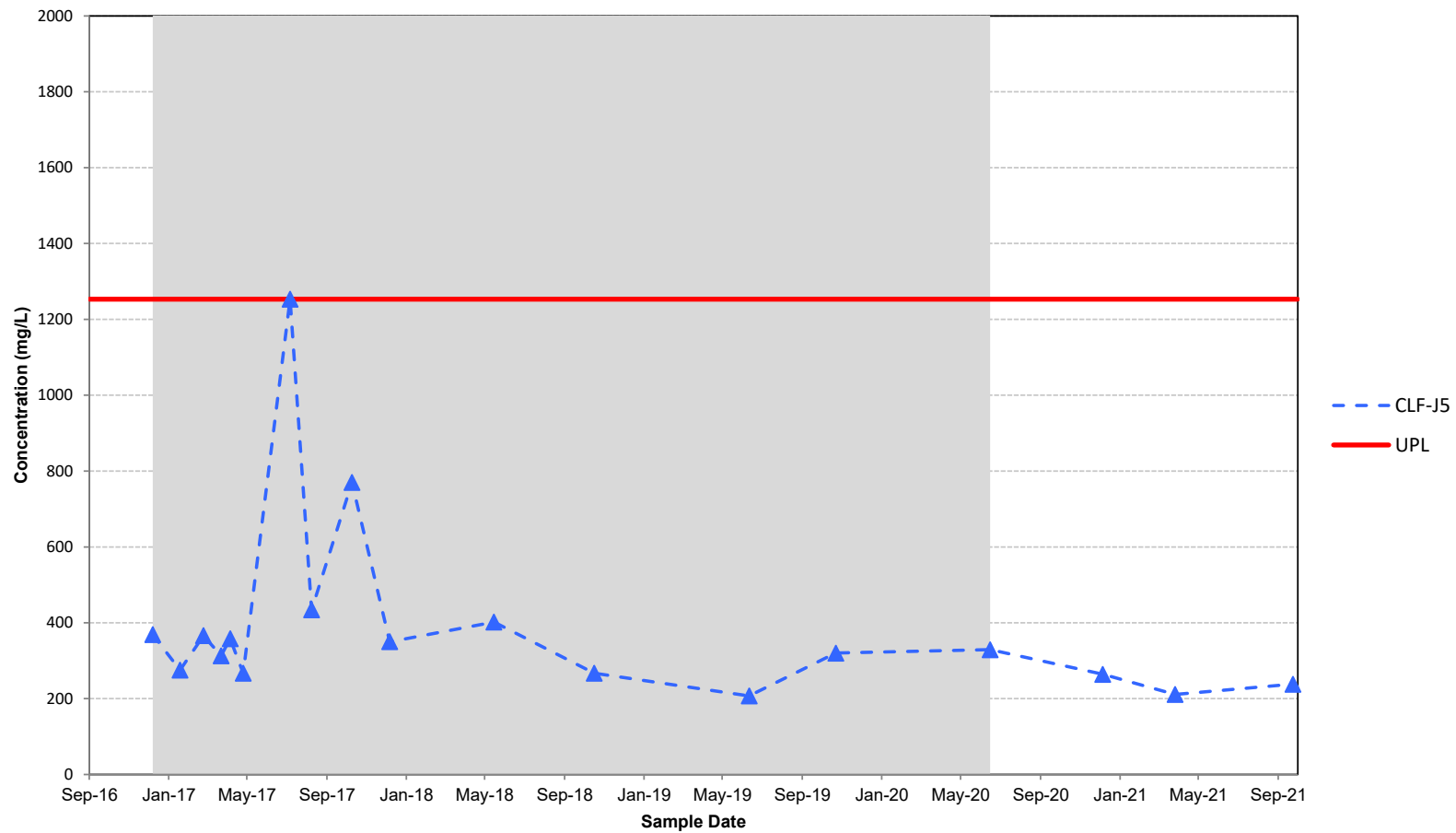


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**SULFATE  
CONCENTRATION VS. TIME**

January 2022

Figure F-20



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

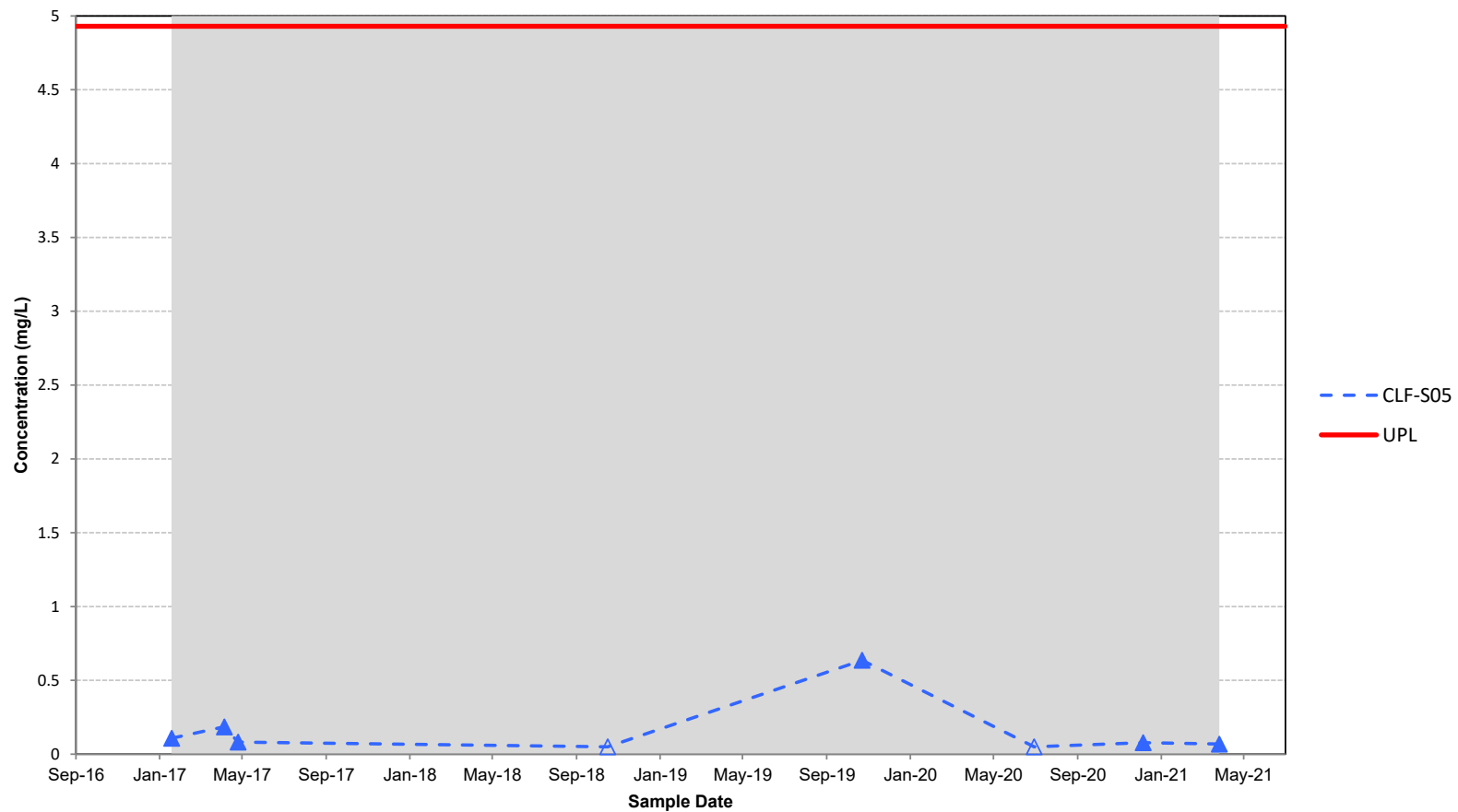


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**TOTAL DISSOLVED SOLIDS (TDS)  
CONCENTRATION VS. TIME**

January 2022

Figure F-21



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. A UPL has been calculated and will be used for comparison in the next semiannual monitoring sampling event.
3. Detection Monitoring was initiated on October 17, 2017.
4. Location CLF-S05 was monitored for sufficient flow during the 2nd half 2021 sampling interval; however no flow was observed.

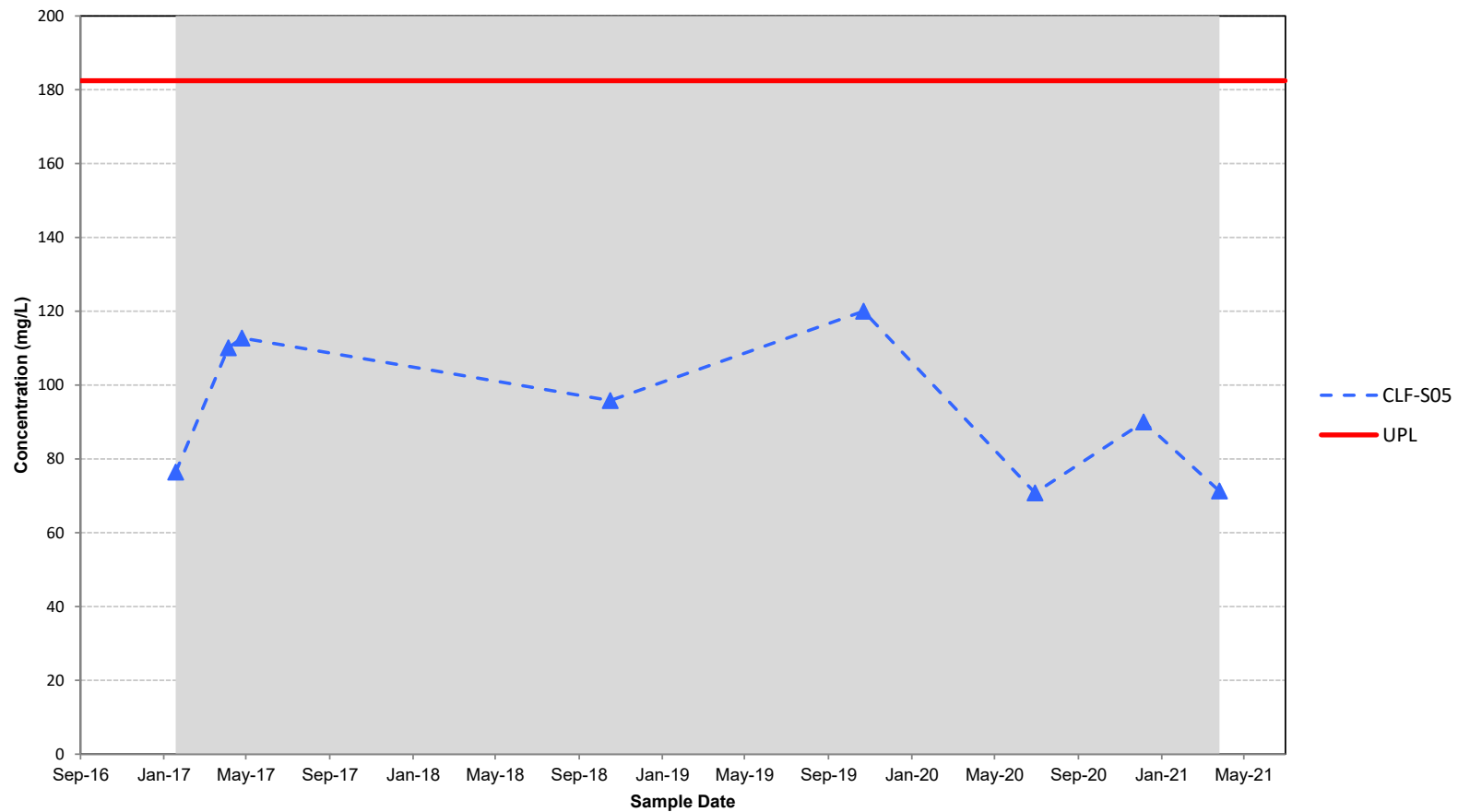
**HALEY  
ALDRICH**

J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**BORON  
CONCENTRATION VS. TIME**

January 2022

Figure F-22



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. A UPL has been calculated and will be used for comparison in the next semiannual monitoring sampling event.
3. Detection Monitoring was initiated on October 17, 2017.
4. Location CLF-S05 was monitored for sufficient flow during the 2nd half 2021 sampling interval; however no flow was observed.



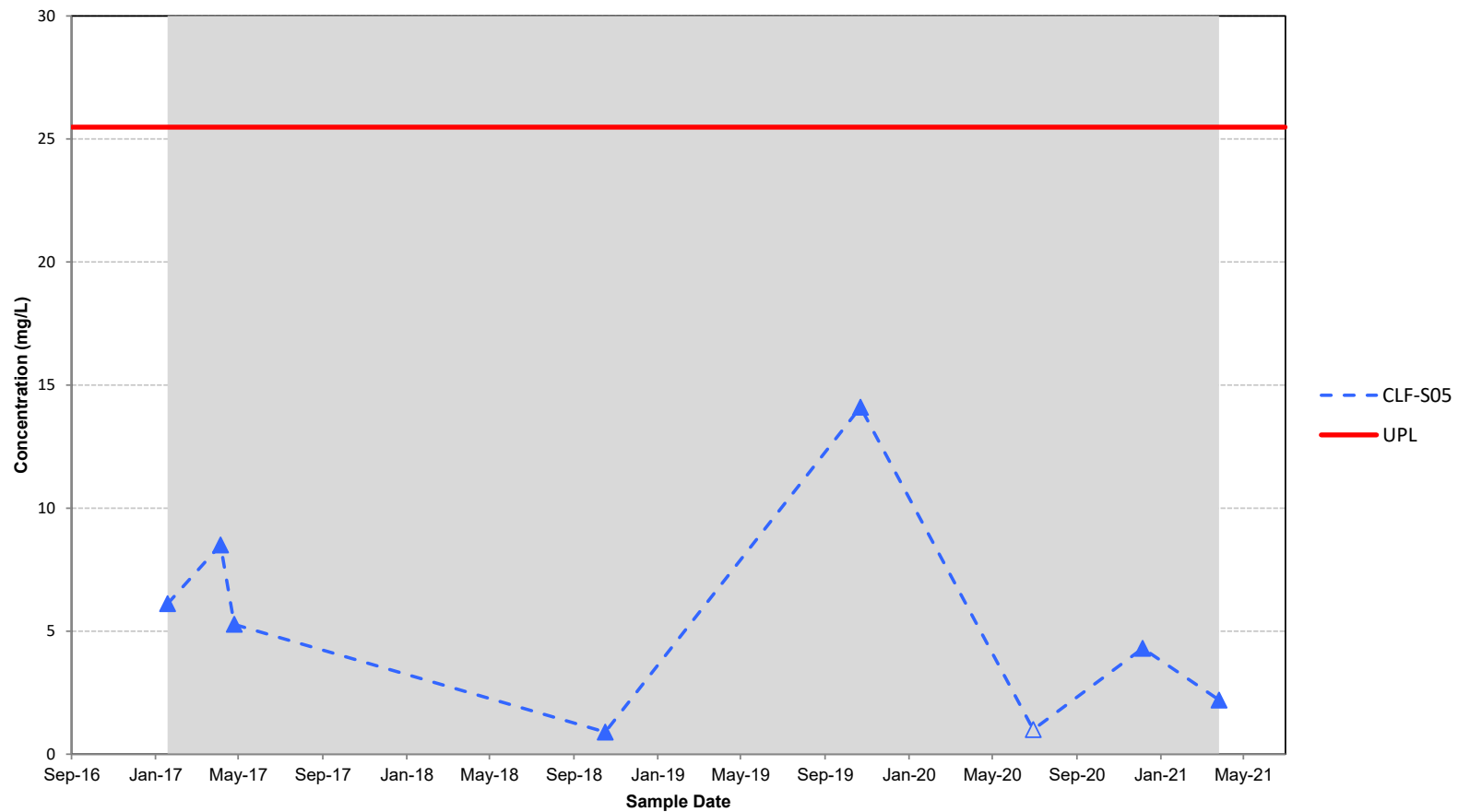
J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CALCIUM  
CONCENTRATION VS. TIME**

January 2022

Figure F-23





**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. A UPL has been calculated and will be used for comparison in the next semiannual monitoring sampling event.
3. Detection Monitoring was initiated on October 17, 2017.
4. Location CLF-S05 was monitored for sufficient flow during the 2nd half 2021 sampling interval; however no flow was observed.

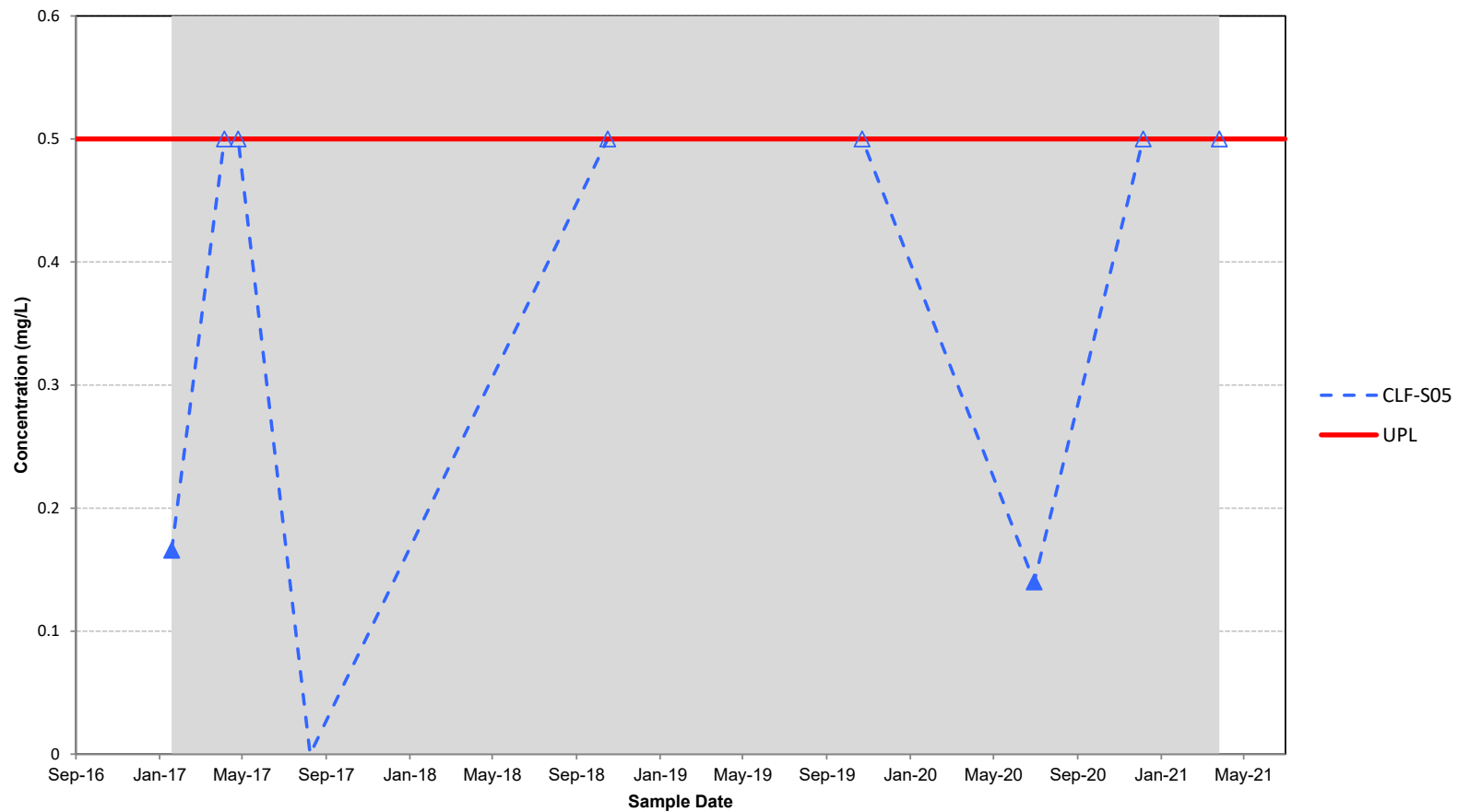


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CHLORIDE  
CONCENTRATION VS. TIME**

January 2022

Figure F-24



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. A UPL has been calculated and will be used for comparison in the next semiannual monitoring sampling event.
3. Detection Monitoring was initiated on October 17, 2017.
4. Location CLF-S05 was monitored for sufficient flow during the 2nd half 2021 sampling interval; however no flow was observed.

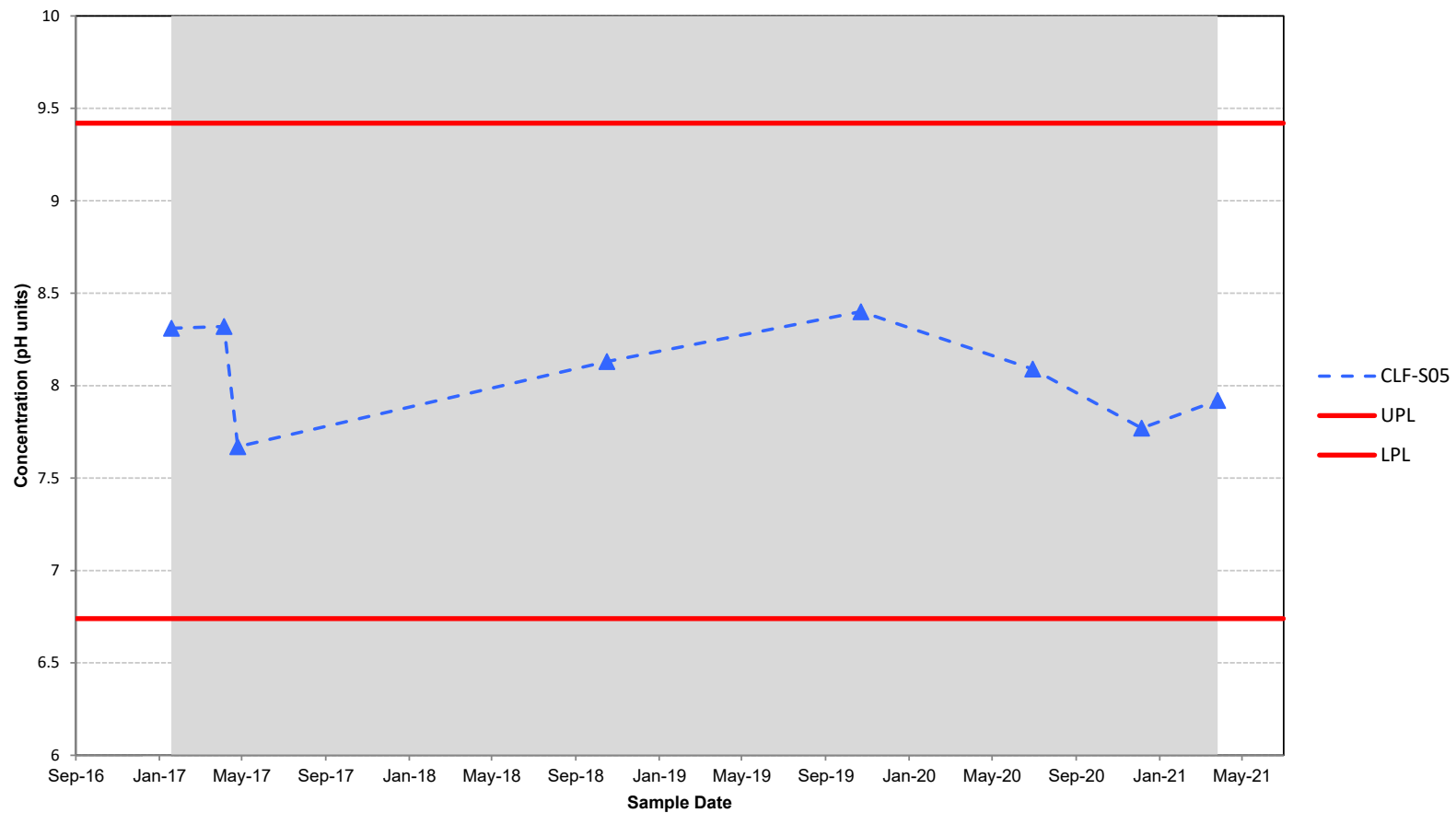


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**FLUORIDE  
CONCENTRATION VS. TIME**

January 2022

Figure F-25



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. A UPL has been calculated and will be used for comparison in the next semiannual monitoring sampling event.
3. Detection Monitoring was initiated on October 17, 2017.
4. Location CLF-S05 was monitored for sufficient flow during the 2nd half 2021 sampling interval; however no flow was observed.

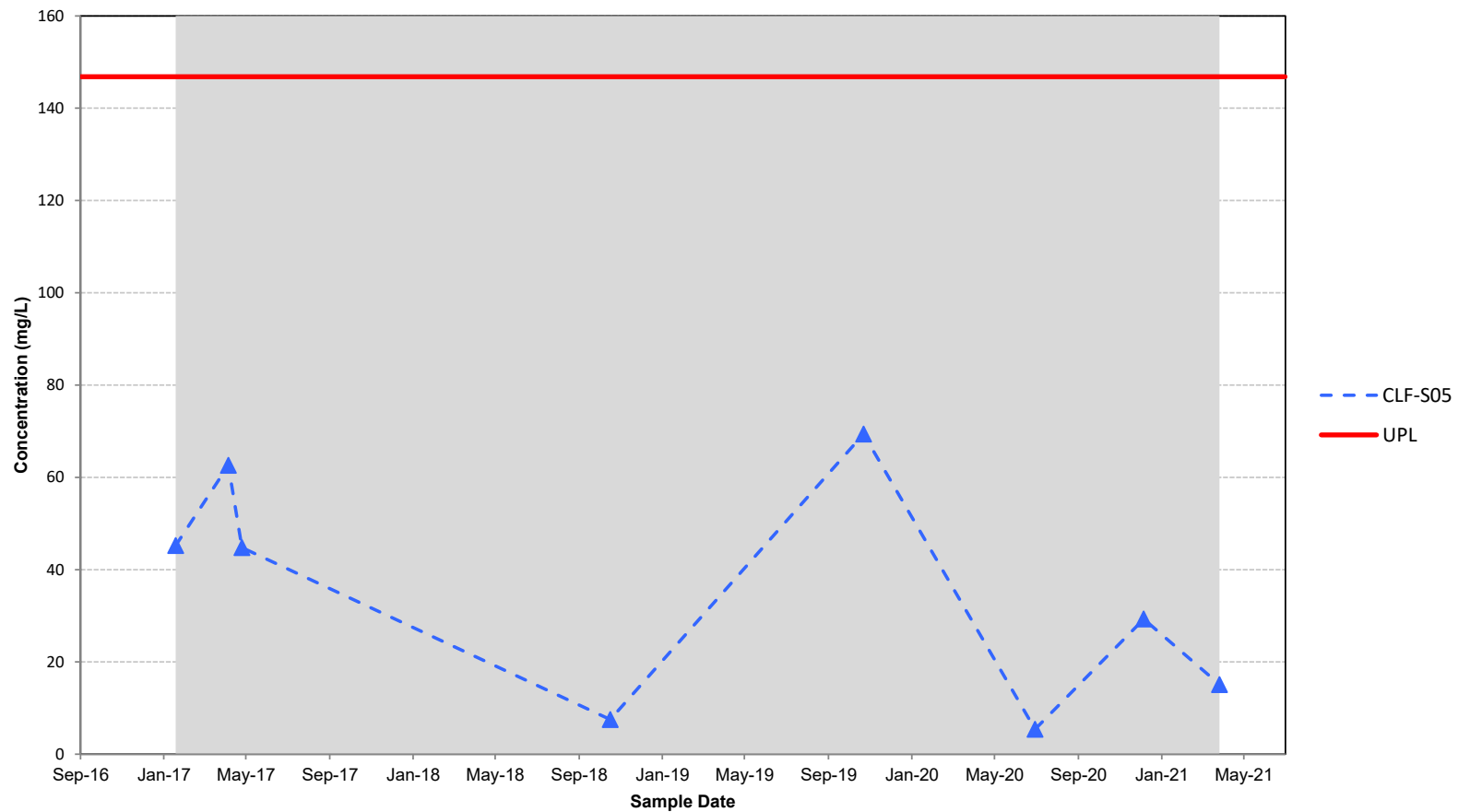


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**PH, FIELD  
CONCENTRATION VS. TIME**

January 2022

Figure F-26



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. A UPL has been calculated and will be used for comparison in the next semiannual monitoring sampling event.
3. Detection Monitoring was initiated on October 17, 2017.
4. Location CLF-S05 was monitored for sufficient flow during the 2nd half 2021 sampling interval; however no flow was observed.

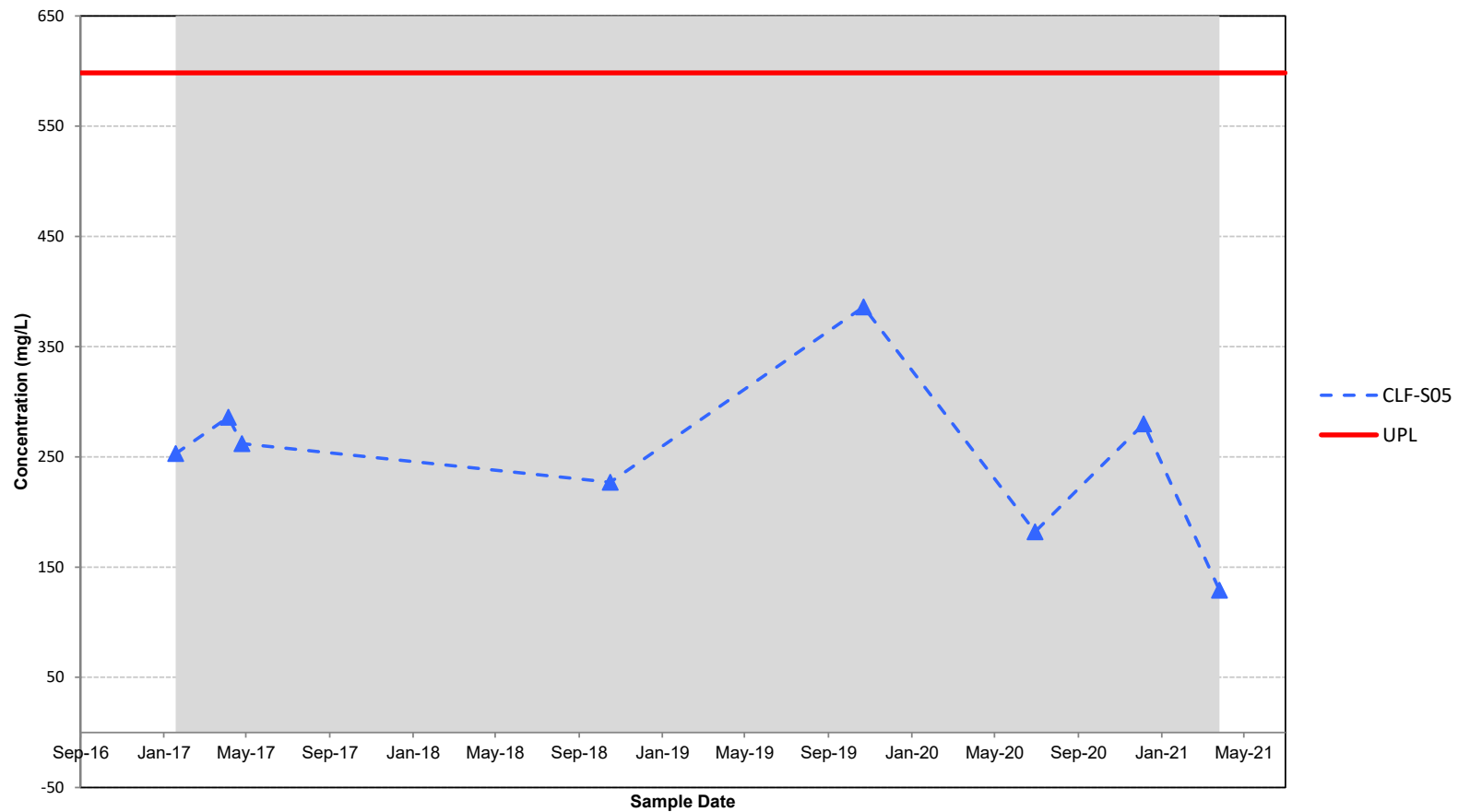


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**SULFATE  
CONCENTRATION VS. TIME**

January 2022

Figure F-27



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. A UPL has been calculated and will be used for comparison in the next semiannual monitoring sampling event.
3. Detection Monitoring was initiated on October 17, 2017.
4. Location CLF-S05 was monitored for sufficient flow during the 2nd half 2021 sampling interval; however no flow was observed.

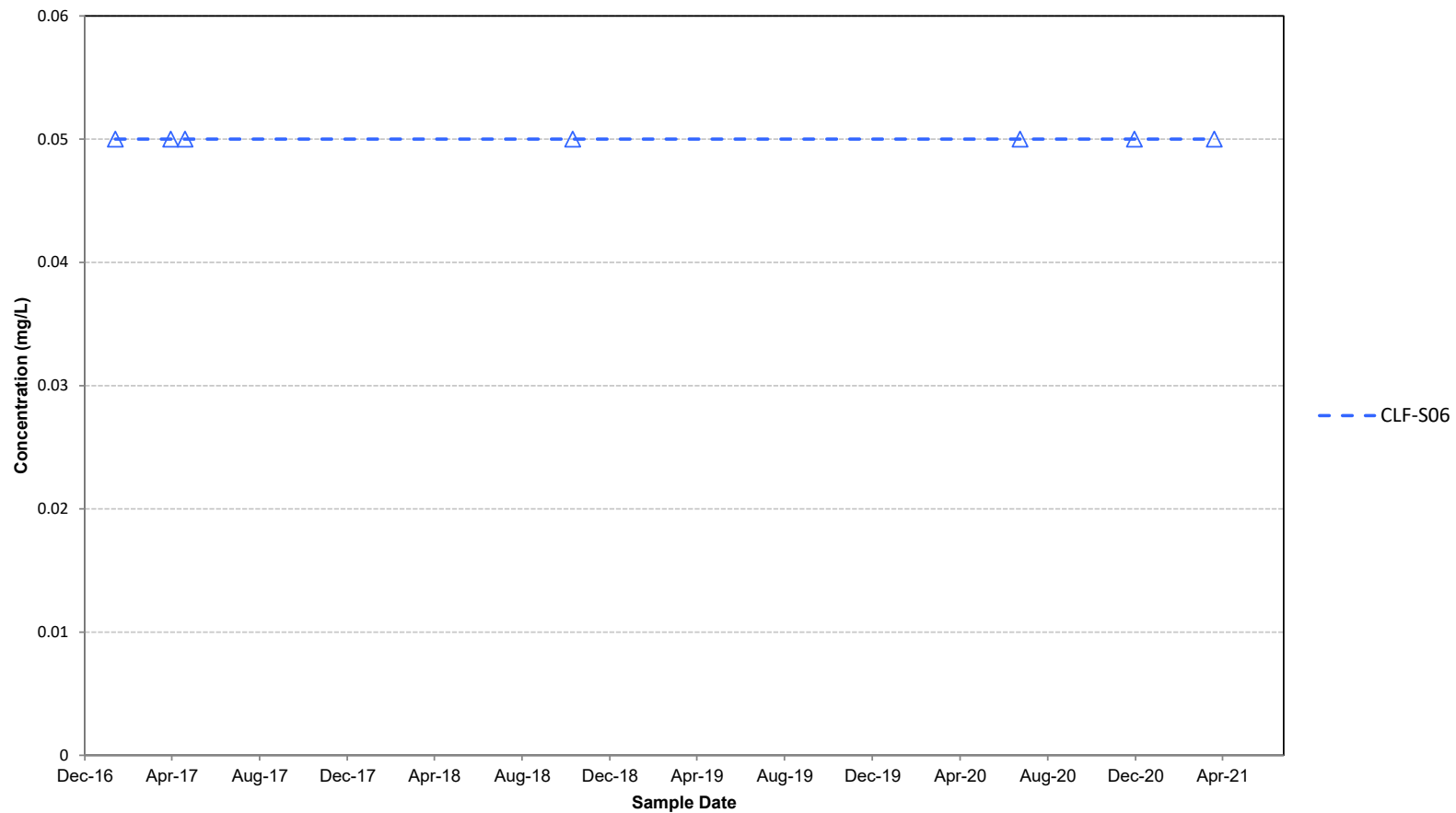
**HALEY  
ALDRICH**

J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**TOTAL DISSOLVED SOLIDS (TDS)  
CONCENTRATION VS. TIME**

January 2022

Figure F-28



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Upper Prediction Limit (UPL) was not calculated due to an insufficient number of sampling events as required under the CCR Rule.
3. Detection Monitoring was initiated on October 17, 2017.
4. Location CLF-S06 was monitored for sufficient flow during the 2nd half 2021 sampling interval; however no flow was observed.

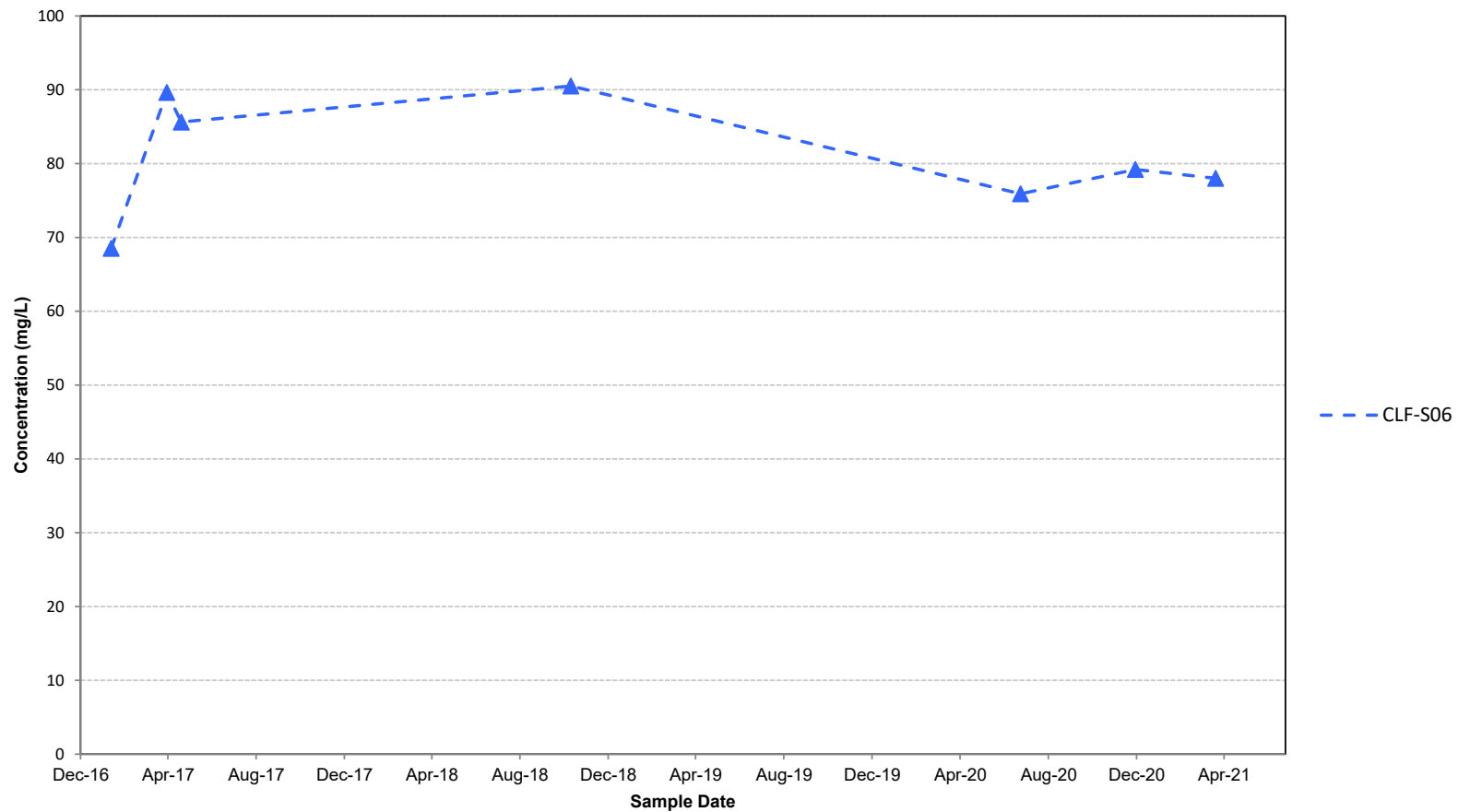


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**BORON  
CONCENTRATION VS. TIME**

January 2022

Figure F-29



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Upper Prediction Limit (UPL) was not calculated due to an insufficient number of sampling events as required under the CCR Rule.
3. Detection Monitoring was initiated on October 17, 2017.
4. Location CLF-S06 was monitored for sufficient flow during the 2nd half 2021 sampling interval; however no flow was observed.

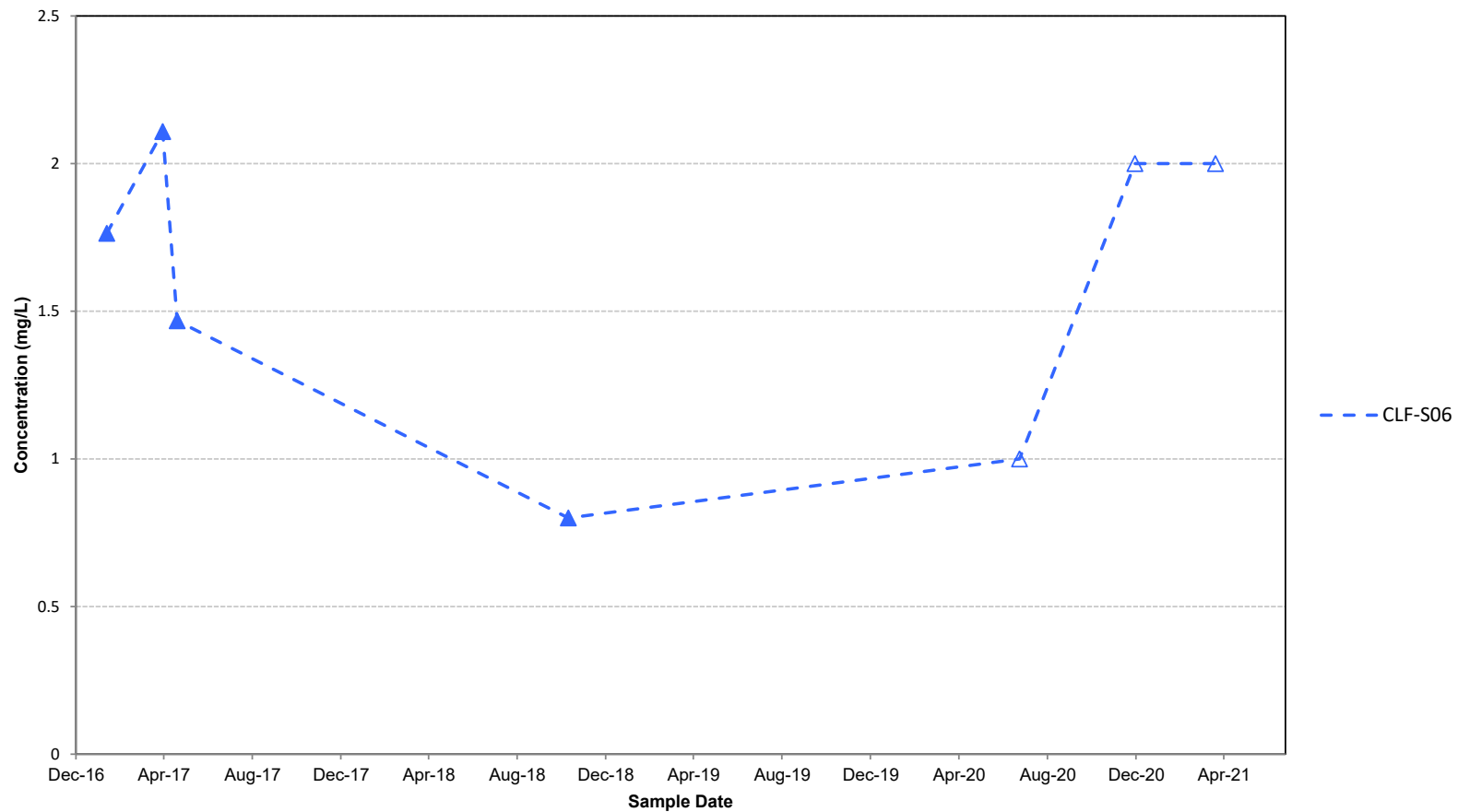


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CALCIUM  
CONCENTRATION VS. TIME**

January 2022

Figure F-30



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Upper Prediction Limit (UPL) was not calculated due to an insufficient number of sampling events as required under the CCR Rule.
3. Detection Monitoring was initiated on October 17, 2017.
4. Location CLF-S06 was monitored for sufficient flow during the 2nd half 2021 sampling interval; however no flow was observed.



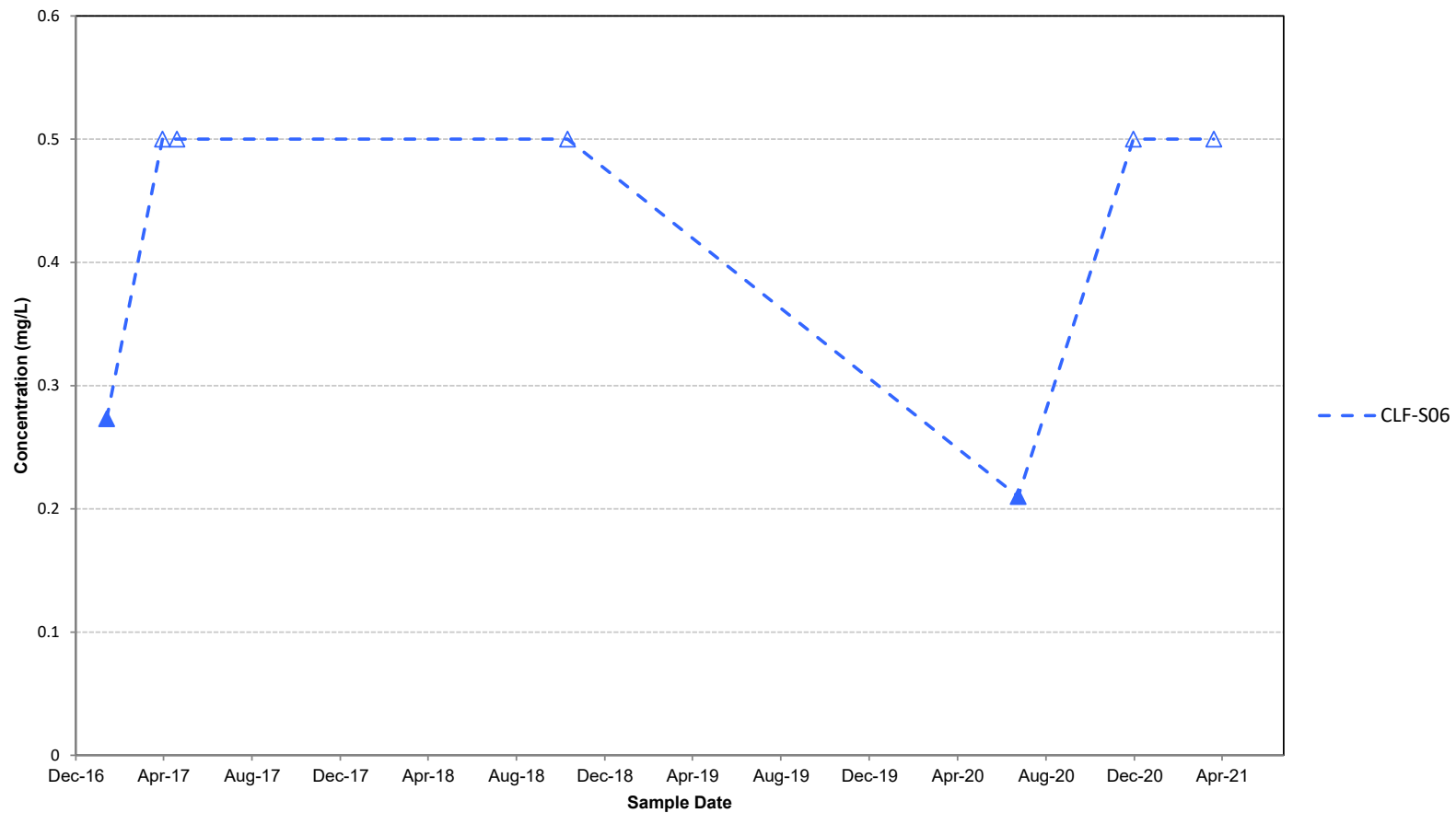
J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CHLORIDE  
CONCENTRATION VS. TIME**

January 2022

Figure F-31





**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Upper Prediction Limit (UPL) was not calculated due to an insufficient number of sampling events as required under the CCR Rule.
3. Detection Monitoring was initiated on October 17, 2017.
4. Location CLF-S06 was monitored for sufficient flow during the 2nd half 2021 sampling interval; however no flow was observed.

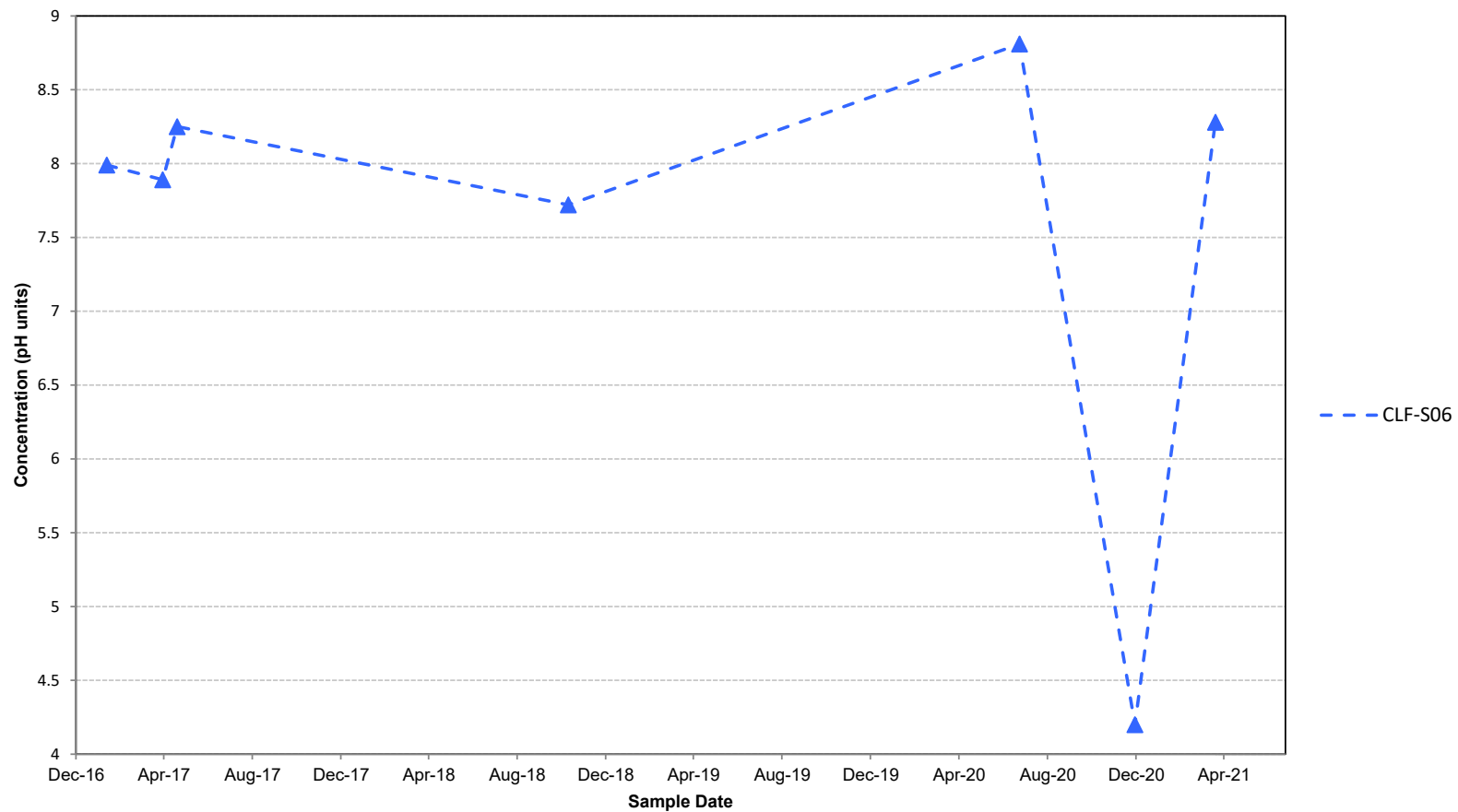


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**FLUORIDE  
CONCENTRATION VS. TIME**

January 2022

Figure F-32



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Upper Prediction Limit (UPL) was not calculated due to an insufficient number of sampling events as required under the CCR Rule.
3. Detection Monitoring was initiated on October 17, 2017.
4. Location CLF-S06 was monitored for sufficient flow during the 2nd half 2021 sampling interval; however no flow was observed.

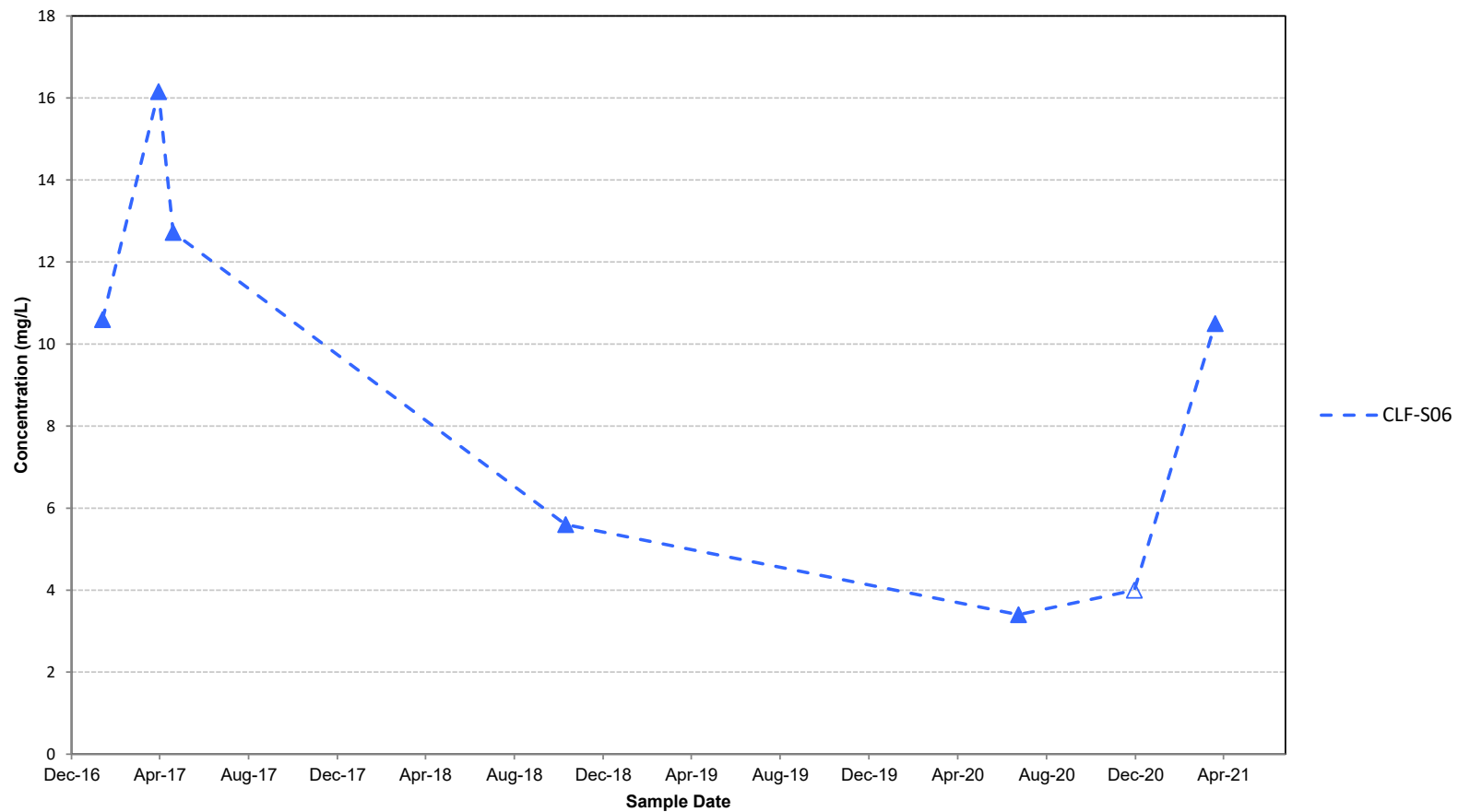


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**PH, FIELD  
CONCENTRATION VS. TIME**

January 2022

Figure F-33



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Upper Prediction Limit (UPL) was not calculated due to an insufficient number of sampling events as required under the CCR Rule.
3. Detection Monitoring was initiated on October 17, 2017.
4. Location CLF-S06 was monitored for sufficient flow during the 2nd half 2021 sampling interval; however no flow was observed.

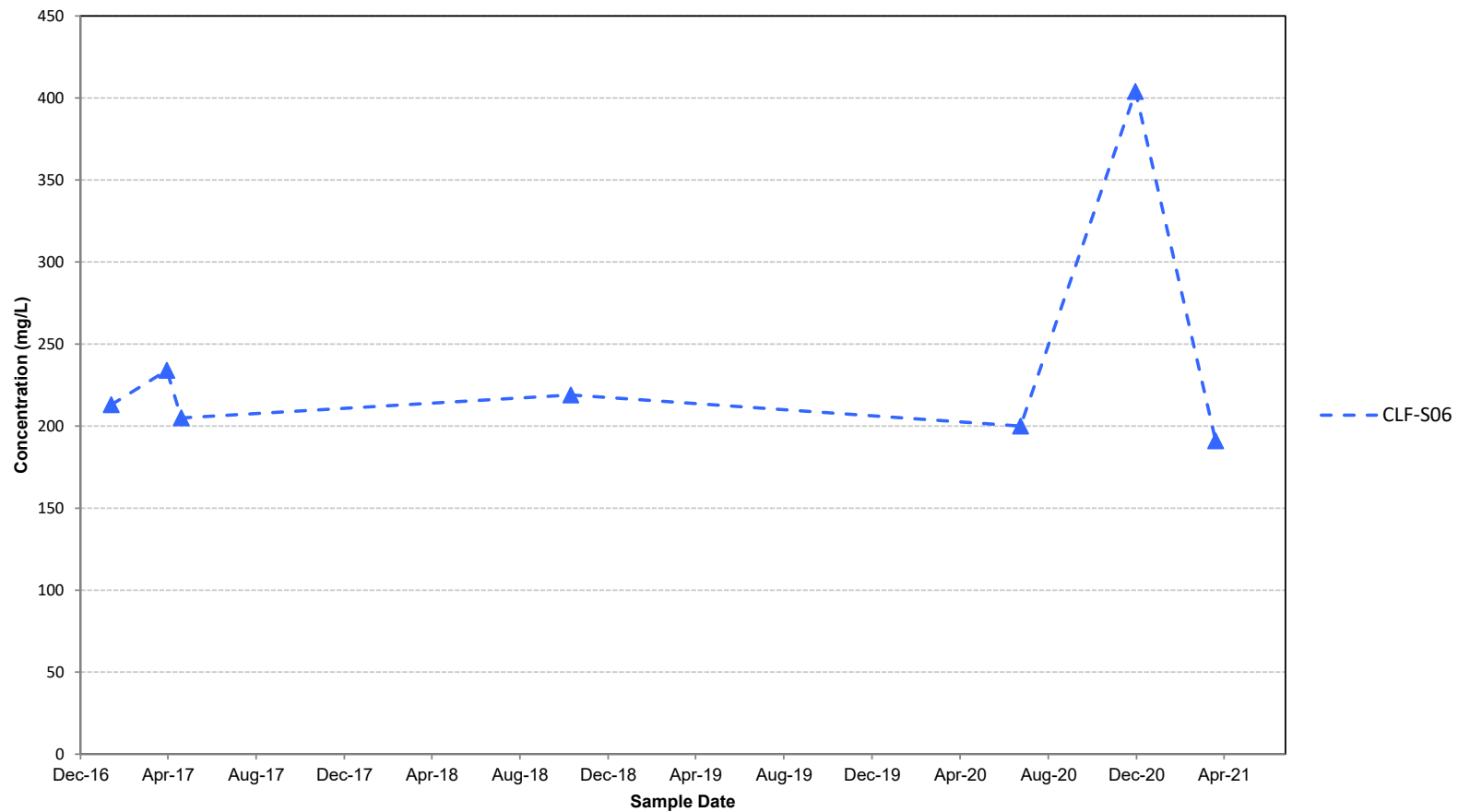


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**SULFATE  
CONCENTRATION VS. TIME**

January 2022

Figure F-34



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Upper Prediction Limit (UPL) was not calculated due to an insufficient number of sampling events as required under the CCR Rule.
3. Detection Monitoring was initiated on October 17, 2017.
4. Location CLF-S06 was monitored for sufficient flow during the 2nd half 2021 sampling interval; however no flow was observed.

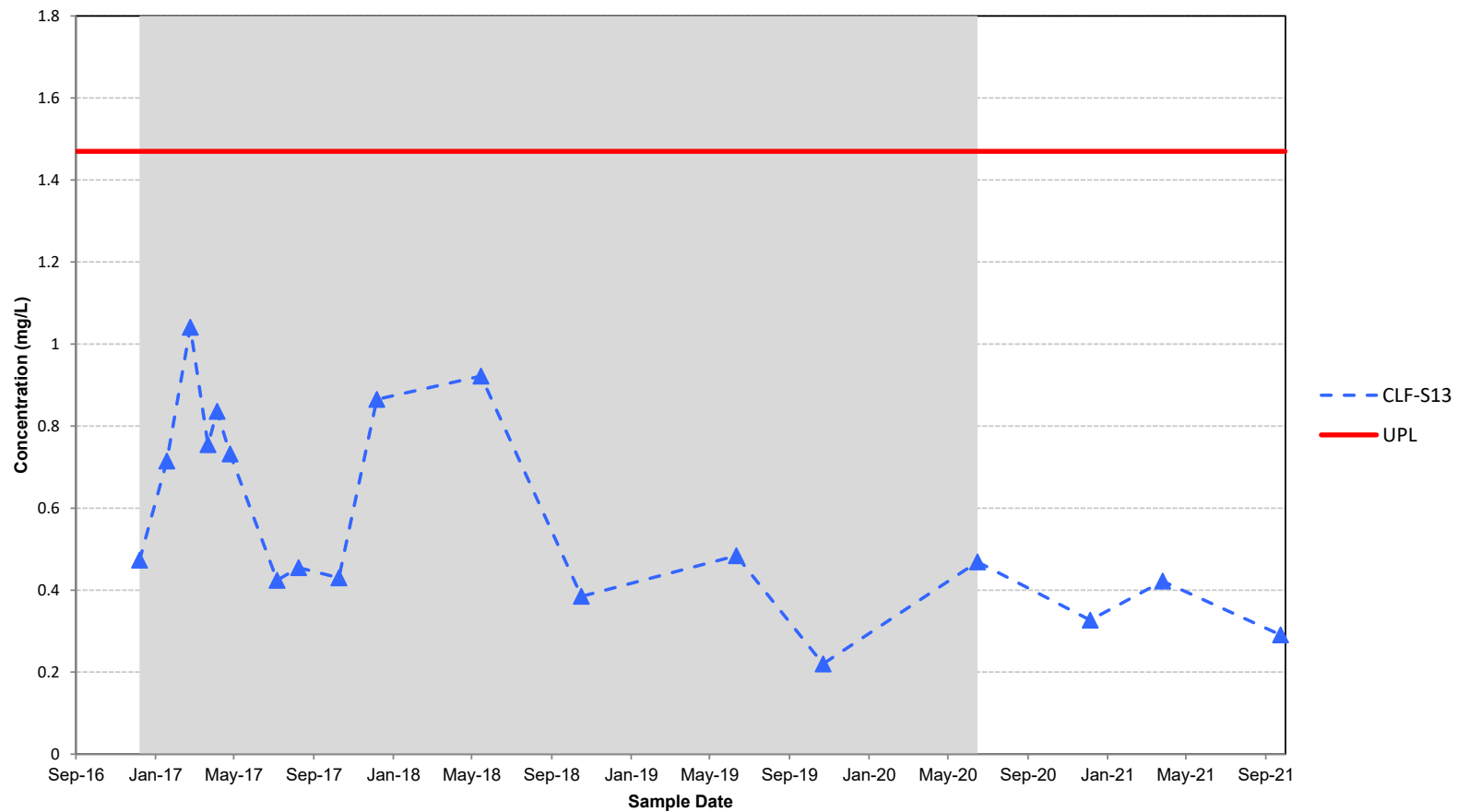


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**TOTAL DISSOLVED SOLIDS (TDS)  
CONCENTRATION VS. TIME**

January 2022

Figure F-35



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

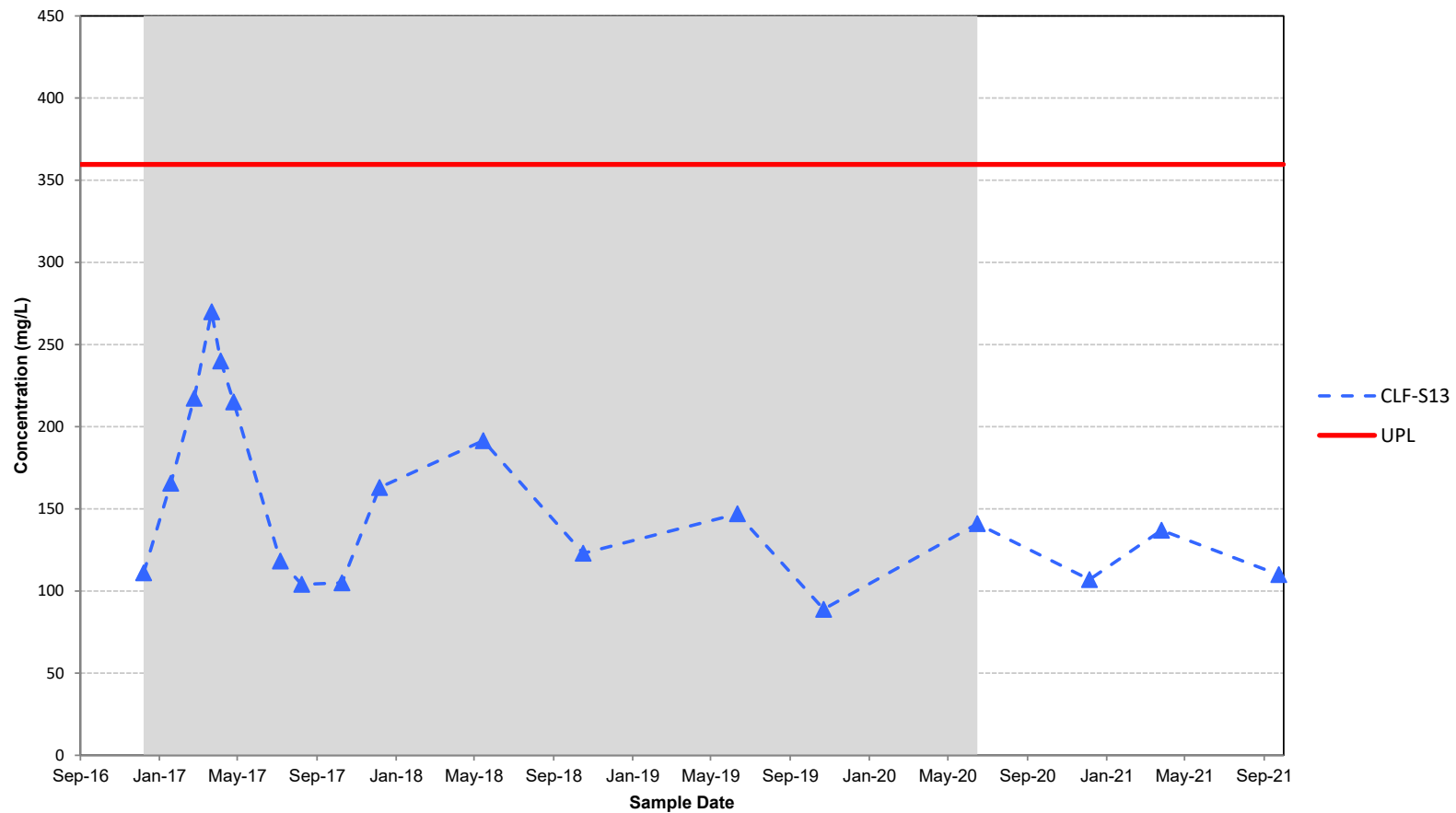


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**BORON  
CONCENTRATION VS. TIME**

January 2022

Figure F-36



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

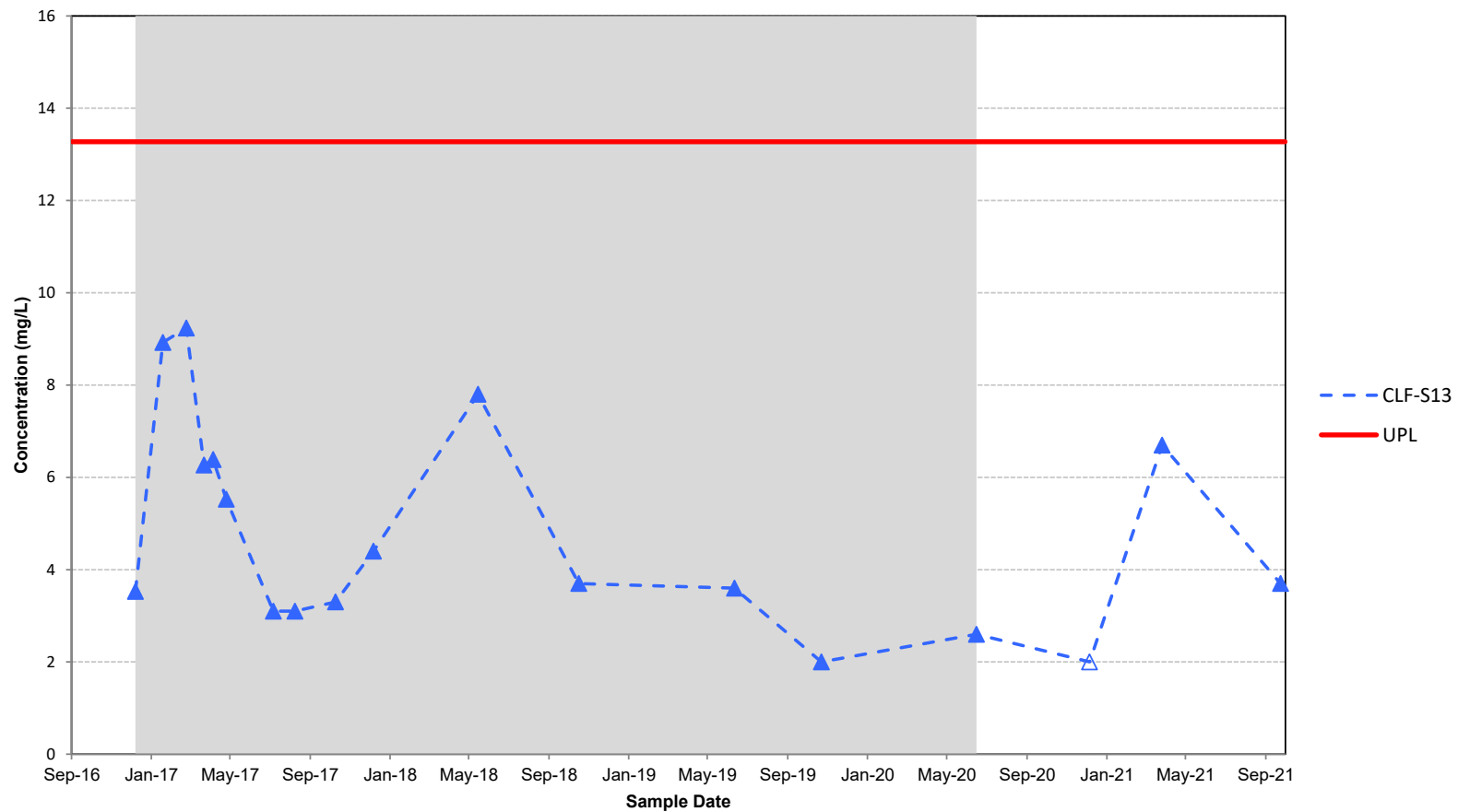


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CALCIUM  
CONCENTRATION VS. TIME**

January 2022

Figure F-37



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

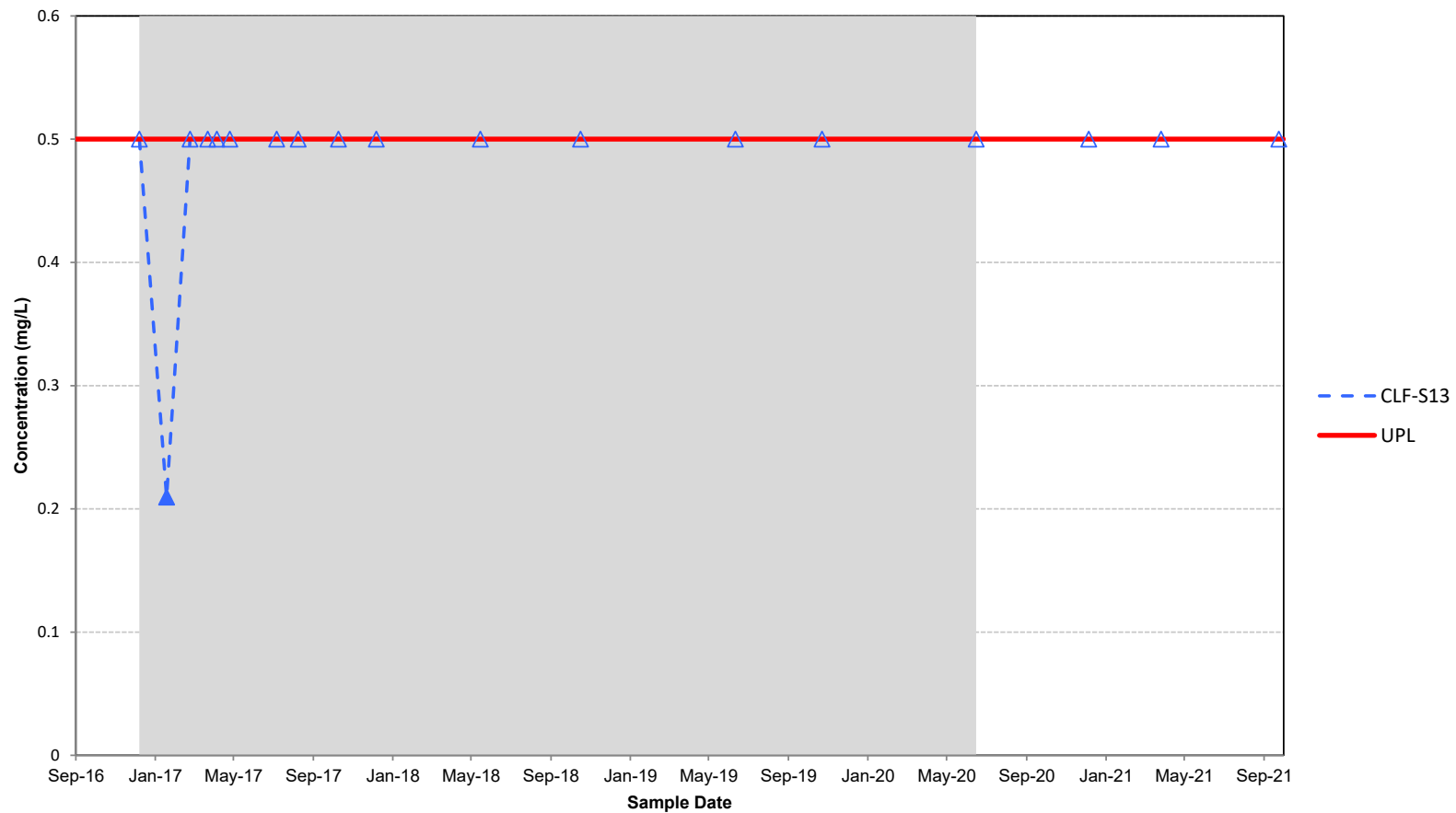


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CHLORIDE  
CONCENTRATION VS. TIME**

January 2022

Figure F-38



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.



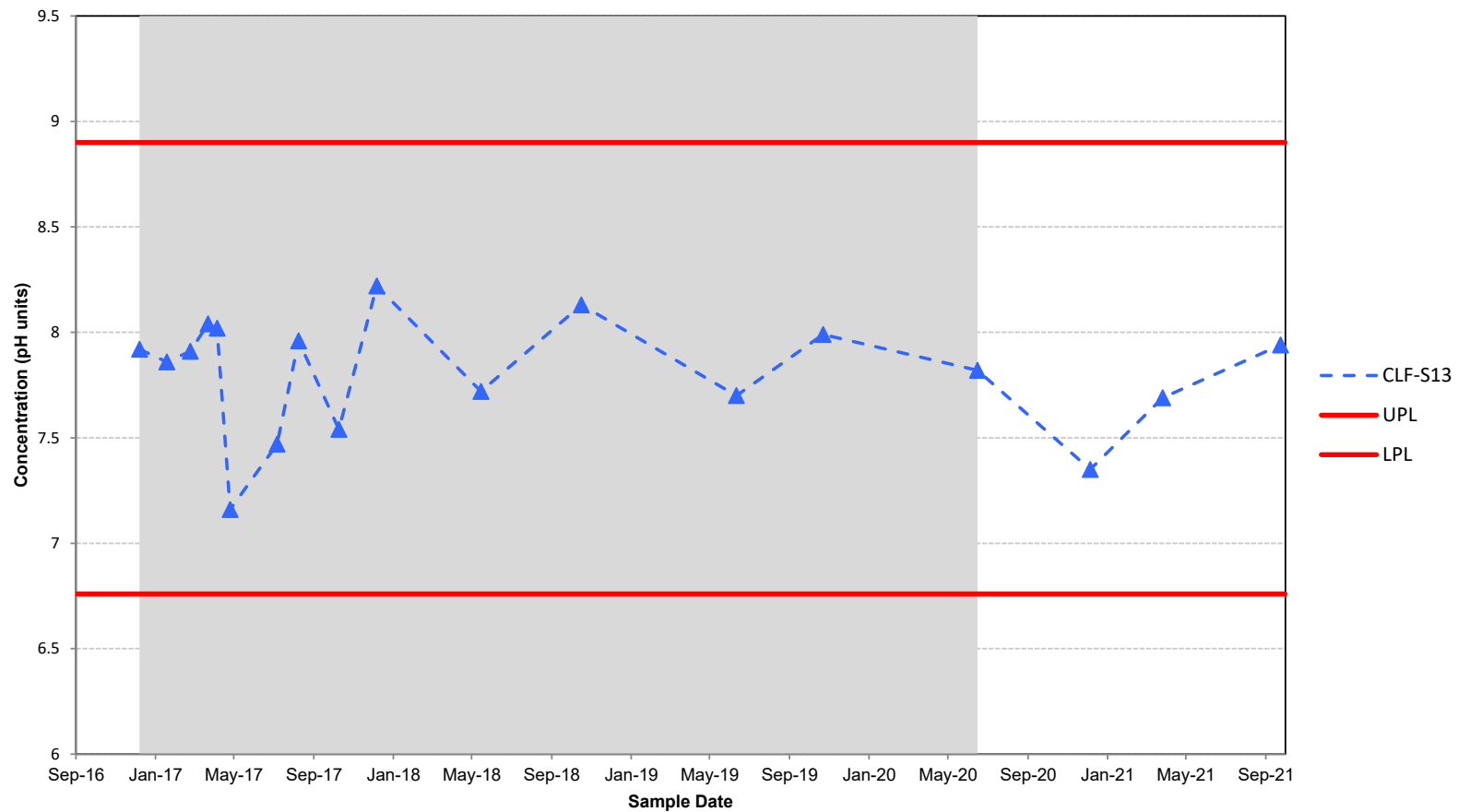
J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**FLUORIDE  
CONCENTRATION VS. TIME**

January 2022

Figure F-39





**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper and Lower Prediction Limit (UPL and LPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

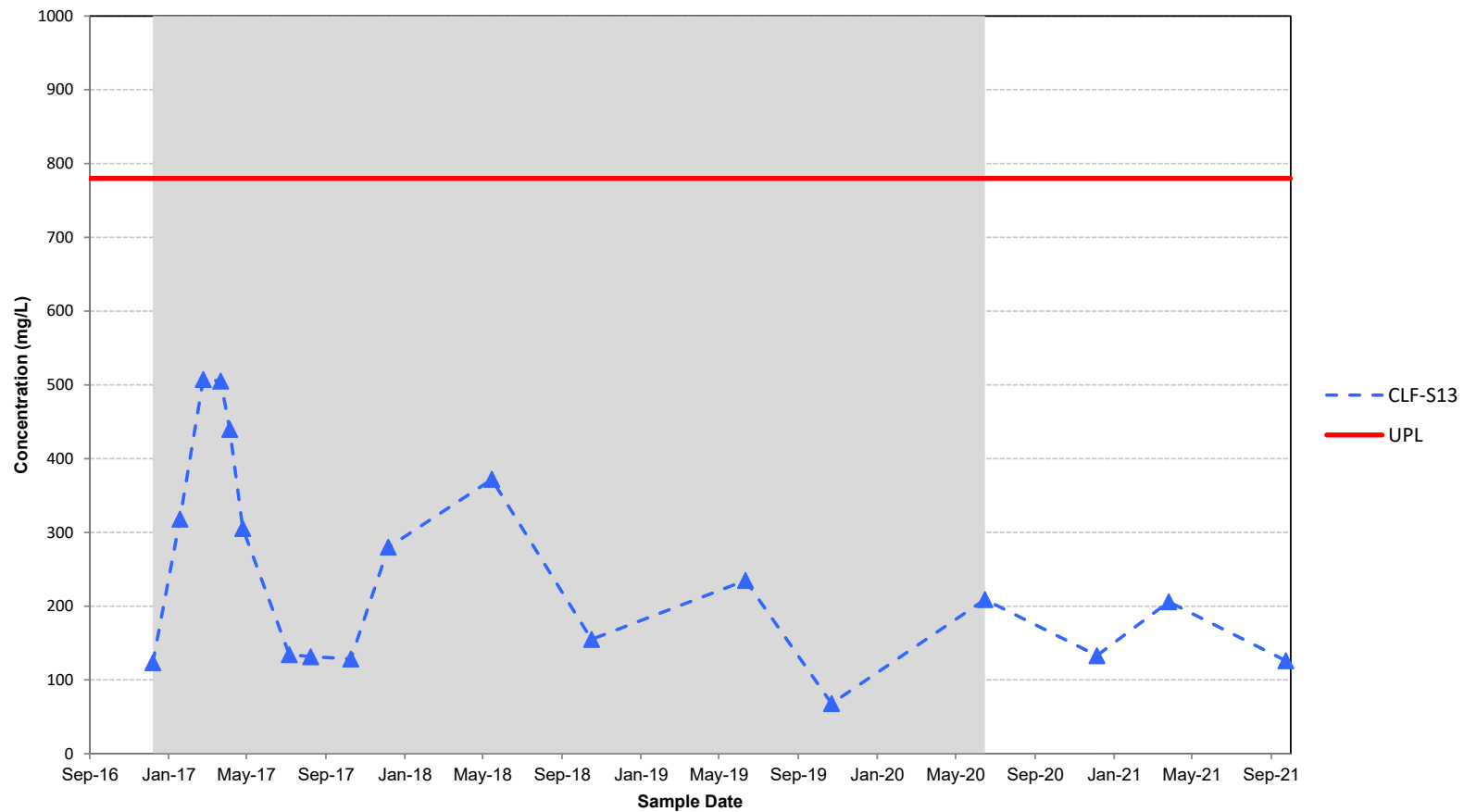


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**PH, FIELD  
CONCENTRATION VS. TIME**

January 2022

Figure F-40



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

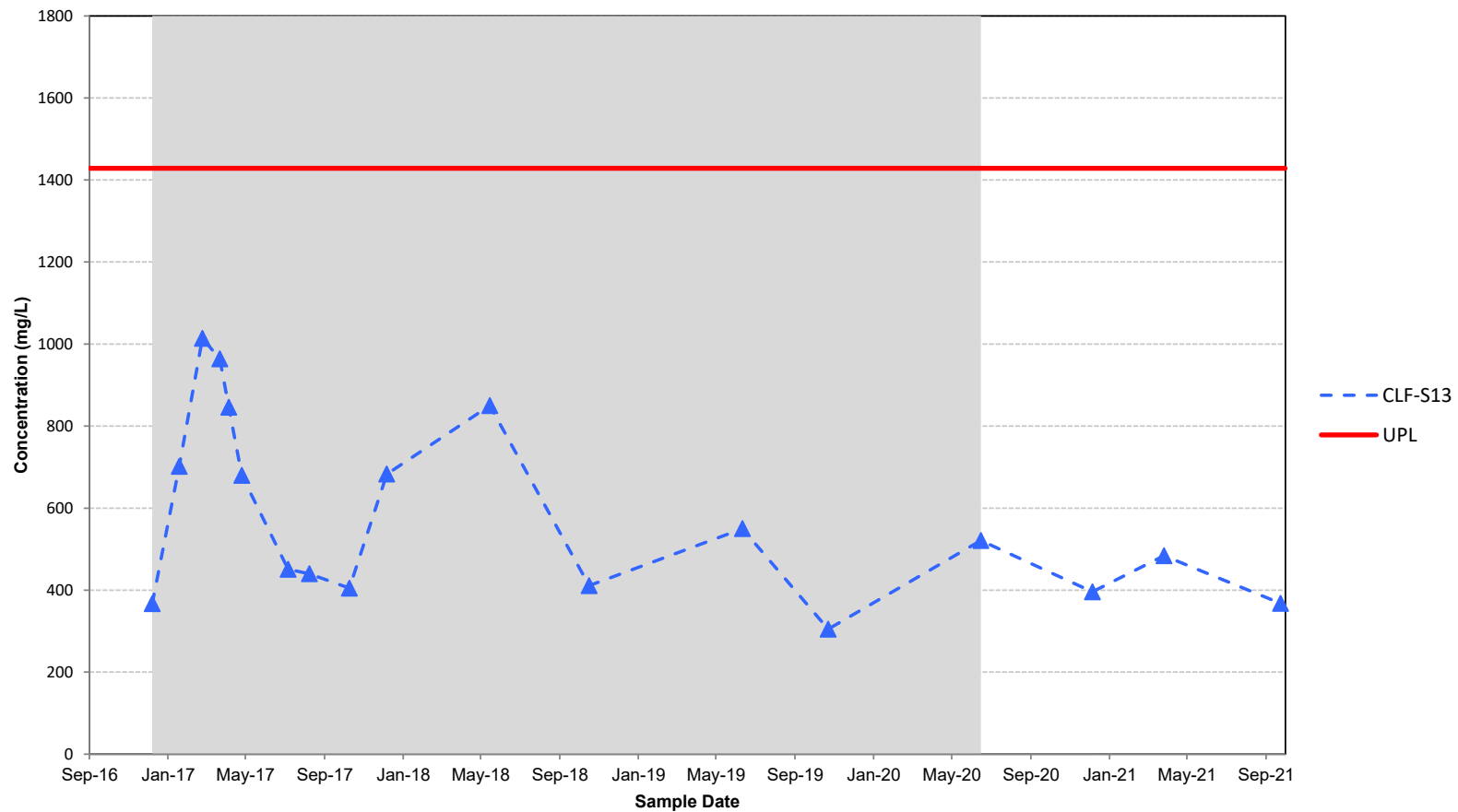


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**SULFATE  
CONCENTRATION VS. TIME**

January 2022

Figure F-41



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.



J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**TOTAL DISSOLVED SOLIDS (TDS)  
CONCENTRATION VS. TIME**

January 2022

Figure F-42

**ATTACHMENT 2**

**Statistical Outputs**

## Concentrations (ppb)

Parameter: Boron

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Total Measurements: 74

Total Non-Detect: 10

Percent Non-Detects: 13.5135%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

There are 6 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

CLF-J2	15	1 (6.66667%)	12/7/2016	6.0027	404.519
			1/18/2017	4.87304	130.718
			2/23/2017	6.69823	810.968
			3/22/2017	5.73439	309.323
			4/5/2017	5.78401	325.059
			4/25/2017	4.83896	126.338
			7/6/2017	7.39388	1626
			8/8/2017	5.81711	336
			10/9/2017	6.29895	544
			12/6/2017	6.88244	975
			5/15/2018	4.8752	131
			10/16/2018	4.68213	108
			6/11/2019	4.86753	130
			10/22/2019	6.24804	517
			6/29/2020	ND<3.91202	ND<50
			<b>12/5/2020</b>	<b>4.70048</b>	<b>110</b>
			<b>3/26/2021</b>	<b>4.74493</b>	<b>115</b>

CLF-J3	14	0 (0%)	12/7/2016	6.05655	426.902
			1/18/2017	4.87429	130.881
			2/23/2017	6.7457	850.398
			3/22/2017	5.71603	303.698
			4/5/2017	5.74504	312.635
			7/6/2017	7.46221	1741
			8/8/2017	5.82895	340
			10/9/2017	6.3613	579
			12/6/2017	6.89871	991
			5/15/2018	6.39859	601
			10/16/2018	4.57574	97.1
			6/11/2019	4.92725	138
			10/22/2019	6.35263	574
			6/15/2020	6.39192	597
			<b>12/5/2020</b>	<b>4.7362</b>	<b>114</b>
			<b>3/26/2021</b>	<b>4.58802</b>	<b>98.3</b>

CLF-J5	15	0 (0%)	12/7/2016	6.09509	443.676
			1/18/2017	4.85224	128.027
			2/23/2017	6.09015	441.487
			3/22/2017	5.66439	288.413
			4/5/2017	5.64114	281.784
			4/25/2017	4.7934	120.711

			7/6/2017	7.44425	1710
			8/8/2017	5.86079	351
			10/9/2017	6.28227	535
			12/6/2017	6.00881	407
			5/15/2018	6.09807	445
			10/16/2018	4.64439	104
			6/11/2019	4.77912	119
			10/22/2019	5.79301	328
			6/15/2020	6.05912	428
			<b>12/5/2020</b>	<b>4.56643</b>	<b>96.2</b>
			<b>3/26/2021</b>	<b>4.40672</b>	<b>82</b>
CLF-S05	8	2 (25%)	1/18/2017	4.6817	107.953
			4/5/2017	5.21984	184.904
			4/25/2017	4.40681	82.0072
			10/16/2018	ND<3.91202	ND<50
			10/22/2019	6.4552	636
			6/29/2020	ND<3.91202	ND<50
			12/5/2020	4.35414	77.8
			3/26/2021	4.22391	68.3
CLF-S06	7	7 (100%)	1/18/2017	ND<3.91202	ND<50
			4/5/2017	ND<3.91202	ND<50
			4/25/2017	ND<3.91202	ND<50
			10/16/2018	ND<3.91202	ND<50
			6/29/2020	ND<3.91202	ND<50
			12/5/2020	ND<3.91202	ND<50
			3/26/2021	ND<3.91202	ND<50
CLF-S13	15	0 (0%)	12/7/2016	6.15928	473.085
			1/18/2017	6.57217	714.92
			2/23/2017	6.94778	1040.84
			3/22/2017	6.62616	754.577
			4/5/2017	6.72872	836.075
			4/25/2017	6.59594	732.116
			7/6/2017	6.04973	424
			8/8/2017	6.1203	455
			10/9/2017	6.06379	430
			12/6/2017	6.76273	865
			5/15/2018	6.82655	922
			10/16/2018	5.95324	385
			6/11/2019	6.18208	484
			10/22/2019	5.39363	220
			6/15/2020	6.1506	469
			<b>12/5/2020</b>	<b>5.78996</b>	<b>327</b>
			<b>3/26/2021</b>	<b>6.04501</b>	<b>422</b>

There are 2 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
CLF-C03	17	15 (88.2353%)	12/7/2016	ND<3.91202	ND<50
			1/18/2017	ND<3.91202	ND<50
			2/23/2017	ND<3.68888	ND<40
			3/22/2017	2.44166	11.4921
			4/5/2017	ND<3.91202	ND<50
			4/25/2017	ND<3.91202	ND<50

7/6/2017	ND<3.91202	ND<50
8/8/2017	ND<3.91202	ND<50
10/9/2017	ND<3.91202	ND<50
12/6/2017	ND<3.91202	ND<50
5/15/2018	ND<3.91202	ND<50
10/16/2018	ND<3.91202	ND<50
6/11/2019	ND<3.91202	ND<50
10/22/2019	ND<3.91202	ND<50
6/15/2020	ND<3.91202	ND<50
12/5/2020	ND<3.91202	ND<50
3/26/2021	4.3745	79.4

---

CLF-OPP	17	16 (94.1176%)	12/7/2016	ND<3.91202	ND<50
			1/18/2017	ND<3.91202	ND<50
			2/23/2017	ND<3.68888	ND<40
			3/22/2017	2.66228	14.3289
			4/5/2017	ND<3.91202	ND<50
			4/25/2017	ND<3.91202	ND<50
			7/6/2017	ND<3.91202	ND<50
			8/8/2017	ND<3.91202	ND<50
			10/9/2017	ND<3.91202	ND<50
			12/6/2017	ND<3.91202	ND<50
			5/15/2018	ND<3.91202	ND<50
			10/16/2018	ND<3.91202	ND<50
			6/11/2019	ND<3.91202	ND<50
			10/22/2019	ND<3.91202	ND<50
			6/15/2020	ND<3.91202	ND<50
			12/5/2020	ND<3.91202	ND<50
			3/26/2021	ND<3.91202	ND<50

---

## Dixon's Test for Outliers

Parameter: Boron

Location: CLF-J2

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.272279	0.332688	0.525	None

Loc.	Date	Conc.	Outlier
CLF-J2	12/7/2016	6.0027	FALSE
	1/18/2017	4.87304	FALSE
	2/23/2017	6.69823	FALSE
	3/22/2017	5.73439	FALSE
	4/5/2017	5.78401	FALSE
	4/25/2017	4.83896	FALSE
	7/6/2017	7.39388	FALSE
	8/8/2017	5.81711	FALSE
	10/9/2017	6.29895	FALSE
	12/6/2017	6.88244	FALSE
	5/15/2018	4.8752	FALSE
	10/16/2018	4.68213	FALSE
	6/11/2019	4.86753	FALSE
	10/22/2019	6.24804	FALSE
	6/29/2020	ND<3.91202	FALSE



## Shapiro-Wilks Test of Normality

Parameter: Boron

Location: CLF-J2

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	3.91202	7.39388	3.48186	0.515	1.79316
2	4.68213	6.88244	2.20031	0.3306	0.727421
3	4.83896	6.69823	1.85927	0.2495	0.463887
4	4.86753	6.29895	1.43141	0.1878	0.26882
5	4.87304	6.24804	1.375	0.1353	0.186038
6	4.8752	6.0027	1.1275	0.088	0.0992201
7	5.73439	5.81711	0.0827251	0.0433	0.003582
8	5.78401	5.78401	0		
9	5.81711	5.73439	-0.0827251		
10	6.0027	4.8752	-1.1275		
11	6.24804	4.87304	-1.375		
12	6.29895	4.86753	-1.43141		
13	6.69823	4.83896	-1.85927		
14	6.88244	4.68213	-2.20031		
15	7.39388	3.91202	-3.48186		

---

Sum of b values = 3.54212

Sample Standard Deviation = 0.965278

W Statistic = 0.961821

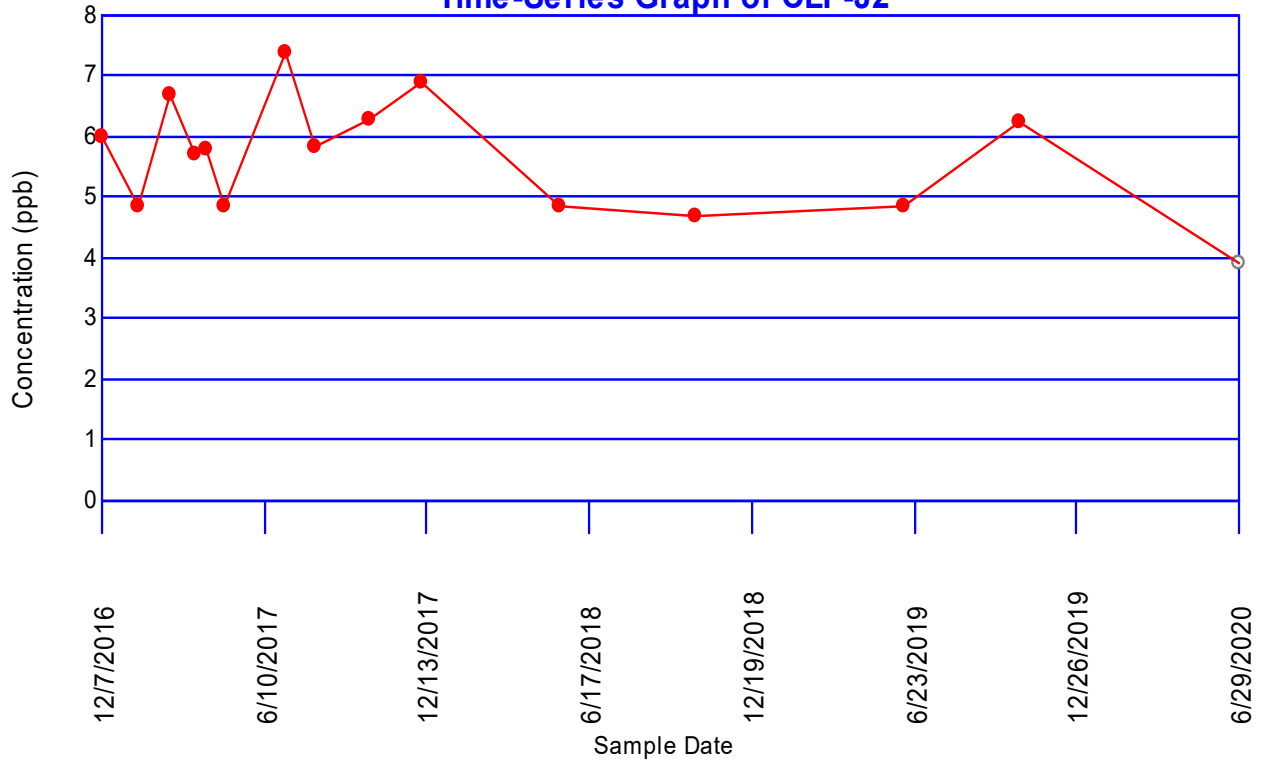
5% Critical value of 0.881 is less than 0.961821

Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.961821

Data is normally distributed at 99% level of significance

### Boron Time-Series Graph of CLF-J2



**Mann-Kendall Trend Analysis**  
**Parameter: Boron**  
**Location: CLF-J2**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
4.87304	6.0027	-1.12966	0	1
6.69823	6.0027	0.69553	1	1
5.73439	6.0027	-0.268313	1	2
5.78401	6.0027	-0.218692	1	3
4.83896	6.0027	-1.16374	1	4
7.39388	6.0027	1.39118	2	4
5.81711	6.0027	-0.185588	2	5
6.29895	6.0027	0.296251	3	5
6.88244	6.0027	0.879739	4	5
4.8752	6.0027	-1.1275	4	6
4.68213	6.0027	-1.32057	4	7
4.86753	6.0027	-1.13516	4	8
6.24804	6.0027	0.245344	5	8
ND<3.91202	6.0027	-2.09068	5	9
6.69823	4.87304	1.82519	6	9
5.73439	4.87304	0.861344	7	9
5.78401	4.87304	0.910964	8	9
4.83896	4.87304	-0.0340815	8	10
7.39388	4.87304	2.52084	9	10
5.81711	4.87304	0.944069	10	10
6.29895	4.87304	1.42591	11	10
6.88244	4.87304	2.0094	12	10
4.8752	4.87304	0.00215499	13	10
4.68213	4.87304	-0.190911	13	11
4.86753	4.87304	-0.00550788	13	12
6.24804	4.87304	1.375	14	12
ND<3.91202	4.87304	-0.961019	14	13
5.73439	6.69823	-0.963843	14	14
5.78401	6.69823	-0.914222	14	15
4.83896	6.69823	-1.85927	14	16
7.39388	6.69823	0.69565	15	16
5.81711	6.69823	-0.881117	15	17
6.29895	6.69823	-0.399279	15	18
6.88244	6.69823	0.184209	16	18
4.8752	6.69823	-1.82303	16	19
4.68213	6.69823	-2.0161	16	20
4.86753	6.69823	-1.83069	16	21
6.24804	6.69823	-0.450186	16	22
ND<3.91202	6.69823	-2.78621	16	23
5.78401	5.73439	0.0496207	17	23
4.83896	5.73439	-0.895425	17	24
7.39388	5.73439	1.65949	18	24
5.81711	5.73439	0.0827251	19	24
6.29895	5.73439	0.564563	20	24

6.88244	5.73439	1.14805	21	24
4.8752	5.73439	-0.859189	21	25
4.68213	5.73439	-1.05225	21	26
4.86753	5.73439	-0.866852	21	27
6.24804	5.73439	0.513657	22	27
ND<3.91202	5.73439	-1.82236	22	28
4.83896	5.78401	-0.945046	22	29
7.39388	5.78401	1.60987	23	29
5.81711	5.78401	0.0331045	24	29
6.29895	5.78401	0.514943	25	29
6.88244	5.78401	1.09843	26	29
4.8752	5.78401	-0.908809	26	30
4.68213	5.78401	-1.10188	26	31
4.86753	5.78401	-0.916472	26	32
6.24804	5.78401	0.464036	27	32
ND<3.91202	5.78401	-1.87198	27	33
7.39388	4.83896	2.55492	28	33
5.81711	4.83896	0.97815	29	33
6.29895	4.83896	1.45999	30	33
6.88244	4.83896	2.04348	31	33
4.8752	4.83896	0.0362365	32	33
4.68213	4.83896	-0.15683	32	34
4.86753	4.83896	0.0285736	33	34
6.24804	4.83896	1.40908	34	34
ND<3.91202	4.83896	-0.926938	34	35
5.81711	7.39388	-1.57677	34	36
6.29895	7.39388	-1.09493	34	37
6.88244	7.39388	-0.511441	34	38
4.8752	7.39388	-2.51868	34	39
4.68213	7.39388	-2.71175	34	40
4.86753	7.39388	-2.52634	34	41
6.24804	7.39388	-1.14584	34	42
ND<3.91202	7.39388	-3.48186	34	43
6.29895	5.81711	0.481838	35	43
6.88244	5.81711	1.06533	36	43
4.8752	5.81711	-0.941914	36	44
4.68213	5.81711	-1.13498	36	45
4.86753	5.81711	-0.949577	36	46
6.24804	5.81711	0.430932	37	46
ND<3.91202	5.81711	-1.90509	37	47
6.88244	6.29895	0.583488	38	47
4.8752	6.29895	-1.42375	38	48
4.68213	6.29895	-1.61682	38	49
4.86753	6.29895	-1.43141	38	50
6.24804	6.29895	-0.0509064	38	51
ND<3.91202	6.29895	-2.38693	38	52
4.8752	6.88244	-2.00724	38	53
4.68213	6.88244	-2.20031	38	54
4.86753	6.88244	-2.0149	38	55
6.24804	6.88244	-0.634395	38	56
ND<3.91202	6.88244	-2.97041	38	57

4.68213	4.8752	-0.193066	38	58
4.86753	4.8752	-0.00766287	38	59
6.24804	4.8752	1.37285	39	59
ND<3.91202	4.8752	-0.963174	39	60
4.86753	4.68213	0.185403	40	60
6.24804	4.68213	1.56591	41	60
ND<3.91202	4.68213	-0.770108	41	61
6.24804	4.86753	1.38051	42	61
ND<3.91202	4.86753	-0.955511	42	62
ND<3.91202	6.24804	-2.33602	42	63

S Statistic = 42 - 63 = -21

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/29/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -0.989743

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-0.989743**| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Boron

Location: CLF-J3

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 14 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.555585	0.0542946	0.546	1741
2	0.453426	0.0542946	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J3	12/7/2016	426.902	FALSE
	1/18/2017	130.881	FALSE
	2/23/2017	850.398	FALSE
	3/22/2017	303.698	FALSE
	4/5/2017	312.635	FALSE
	7/6/2017	<b>1741</b>	<b>TRUE</b>
	8/8/2017	340	FALSE
	10/9/2017	579	FALSE
	12/6/2017	991	FALSE
	5/15/2018	601	FALSE
	10/16/2018	97.1	FALSE
	6/11/2019	138	FALSE
	10/22/2019	574	FALSE
	6/15/2020	597	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Boron

Location: CLF-J3

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 14 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	97.1	1741	1643.9	0.5251	863.212
2	130.881	991	860.119	0.3318	285.387
3	138	850.398	712.398	0.246	175.25
4	303.698	601	297.302	0.1802	53.5738
5	312.635	597	284.365	0.124	35.2613
6	340	579	239	0.0727	17.3753
7	426.902	574	147.098	0.024	3.53035
8	574	426.902	-147.098		
9	579	340	-239		
10	597	312.635	-284.365		
11	601	303.698	-297.302		
12	850.398	138	-712.398		
13	991	130.881	-860.119		
14	1741	97.1	-1643.9		

---

Sum of b values = 1433.59

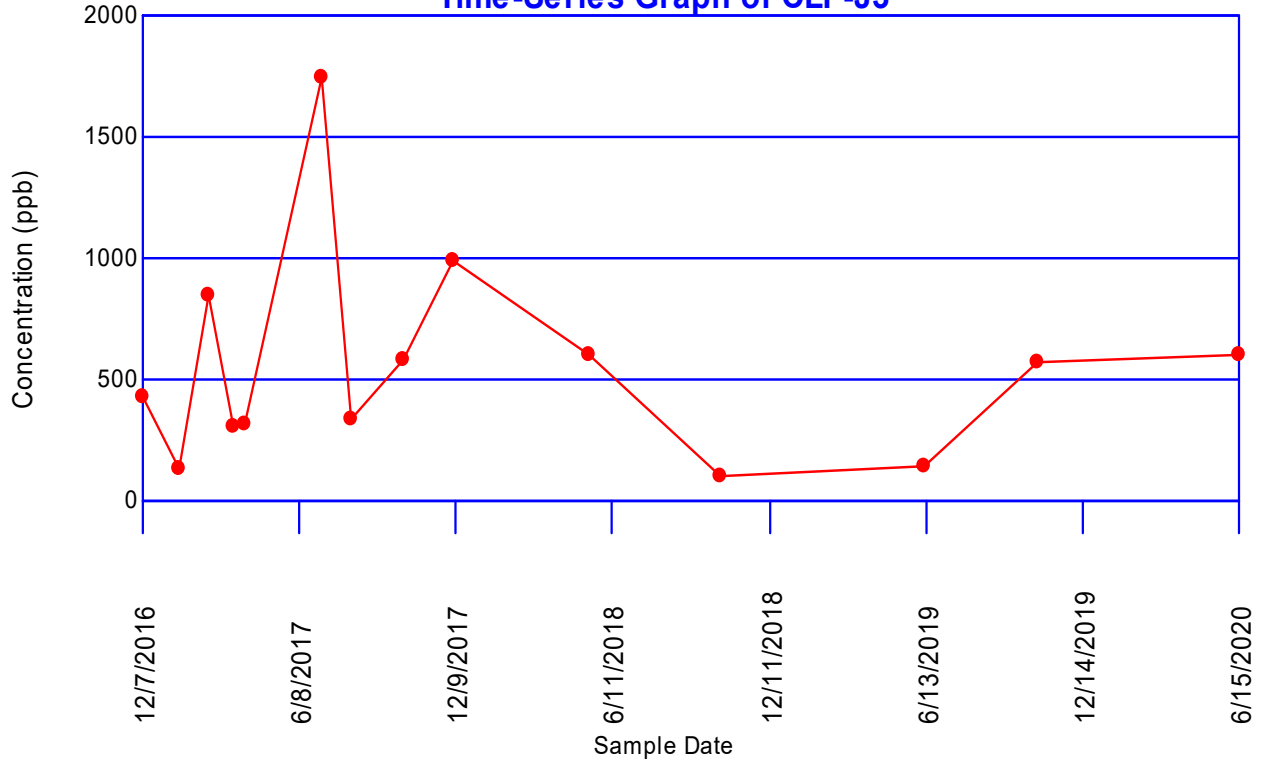
Sample Standard Deviation = 432.896

W Statistic = 0.843604

**5% Critical value of 0.874 exceeds 0.843604**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.825 is less than 0.843604  
Data is normally distributed at 99% level of significance

### Boron Time-Series Graph of CLF-J3





## Mann-Kendall Trend Analysis

Parameter: Boron

Location: CLF-J3

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
130.881	426.902	-296.021	0	1
850.398	426.902	423.496	1	1
303.698	426.902	-123.204	1	2
312.635	426.902	-114.267	1	3
1741	426.902	1314.1	2	3
340	426.902	-86.902	2	4
579	426.902	152.098	3	4
991	426.902	564.098	4	4
601	426.902	174.098	5	4
97.1	426.902	-329.802	5	5
138	426.902	-288.902	5	6
574	426.902	147.098	6	6
597	426.902	170.098	7	6
850.398	130.881	719.517	8	6
303.698	130.881	172.817	9	6
312.635	130.881	181.754	10	6
1741	130.881	1610.12	11	6
340	130.881	209.119	12	6
579	130.881	448.119	13	6
991	130.881	860.119	14	6
601	130.881	470.119	15	6
97.1	130.881	-33.781	15	7
138	130.881	7.119	16	7
574	130.881	443.119	17	7
597	130.881	466.119	18	7
303.698	850.398	-546.7	18	8
312.635	850.398	-537.763	18	9
1741	850.398	890.602	19	9
340	850.398	-510.398	19	10
579	850.398	-271.398	19	11
991	850.398	140.602	20	11
601	850.398	-249.398	20	12
97.1	850.398	-753.298	20	13
138	850.398	-712.398	20	14
574	850.398	-276.398	20	15
597	850.398	-253.398	20	16
312.635	303.698	8.937	21	16
1741	303.698	1437.3	22	16
340	303.698	36.302	23	16
579	303.698	275.302	24	16
991	303.698	687.302	25	16
601	303.698	297.302	26	16
97.1	303.698	-206.598	26	17
138	303.698	-165.698	26	18

574	303.698	270.302	27	18
597	303.698	293.302	28	18
1741	312.635	1428.37	29	18
340	312.635	27.365	30	18
579	312.635	266.365	31	18
991	312.635	678.365	32	18
601	312.635	288.365	33	18
97.1	312.635	-215.535	33	19
138	312.635	-174.635	33	20
574	312.635	261.365	34	20
597	312.635	284.365	35	20
340	1741	-1401	35	21
579	1741	-1162	35	22
991	1741	-750	35	23
601	1741	-1140	35	24
97.1	1741	-1643.9	35	25
138	1741	-1603	35	26
574	1741	-1167	35	27
597	1741	-1144	35	28
579	340	239	36	28
991	340	651	37	28
601	340	261	38	28
97.1	340	-242.9	38	29
138	340	-202	38	30
574	340	234	39	30
597	340	257	40	30
991	579	412	41	30
601	579	22	42	30
97.1	579	-481.9	42	31
138	579	-441	42	32
574	579	-5	42	33
597	579	18	43	33
601	991	-390	43	34
97.1	991	-893.9	43	35
138	991	-853	43	36
574	991	-417	43	37
597	991	-394	43	38
97.1	601	-503.9	43	39
138	601	-463	43	40
574	601	-27	43	41
597	601	-4	43	42
138	97.1	40.9	44	42
574	97.1	476.9	45	42
597	97.1	499.9	46	42
574	138	436	47	42
597	138	459	48	42
597	574	23	49	42

S Statistic = 49 - 42 = 7

---

Tied Group	Value	Members
<b>Time Period</b>		<b>Observations</b>
12/7/2016		1
1/18/2017		1
2/23/2017		1
3/22/2017		1
4/5/2017		1
7/6/2017		1
8/8/2017		1
10/9/2017		1
12/6/2017		1
5/15/2018		1
10/16/2018		1
6/11/2019		1
10/22/2019		1
6/15/2020		1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = 0.328469

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|0.328469| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Boron

Location: CLF-J5

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.507828	0.102504	0.525	None

Loc.	Date	Conc.	Outlier
CLF-J5	12/7/2016	6.09509	FALSE
	1/18/2017	4.85224	FALSE
	2/23/2017	6.09015	FALSE
	3/22/2017	5.66439	FALSE
	4/5/2017	5.64114	FALSE
	4/25/2017	4.7934	FALSE
	7/6/2017	7.44425	FALSE
	8/8/2017	5.86079	FALSE
	10/9/2017	6.28227	FALSE
	12/6/2017	6.00881	FALSE
	5/15/2018	6.09807	FALSE
	10/16/2018	4.64439	FALSE
	6/11/2019	4.77912	FALSE
	10/22/2019	5.79301	FALSE
	6/15/2020	6.05912	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Boron

Location: CLF-J5

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	4.64439	7.44425	2.79986	0.515	1.44193
2	4.77912	6.28227	1.50314	0.3306	0.496939
3	4.7934	6.09807	1.30468	0.2495	0.325516
4	4.85224	6.09509	1.24285	0.1878	0.233408
5	5.64114	6.09015	0.449008	0.1353	0.0607507
6	5.66439	6.05912	0.39473	0.088	0.0347362
7	5.79301	6.00881	0.2158	0.0433	0.00934412
8	5.86079	5.86079	0		0
9	6.00881	5.79301	-0.2158		
10	6.05912	5.66439	-0.39473		
11	6.09015	5.64114	-0.449008		
12	6.09509	4.85224	-1.24285		
13	6.09807	4.7934	-1.30468		
14	6.28227	4.77912	-1.50314		
15	7.44425	4.64439	-2.79986		

---

Sum of b values = 2.60262

Sample Standard Deviation = 0.736315

W Statistic = 0.892415

5% Critical value of 0.881 is less than 0.892415

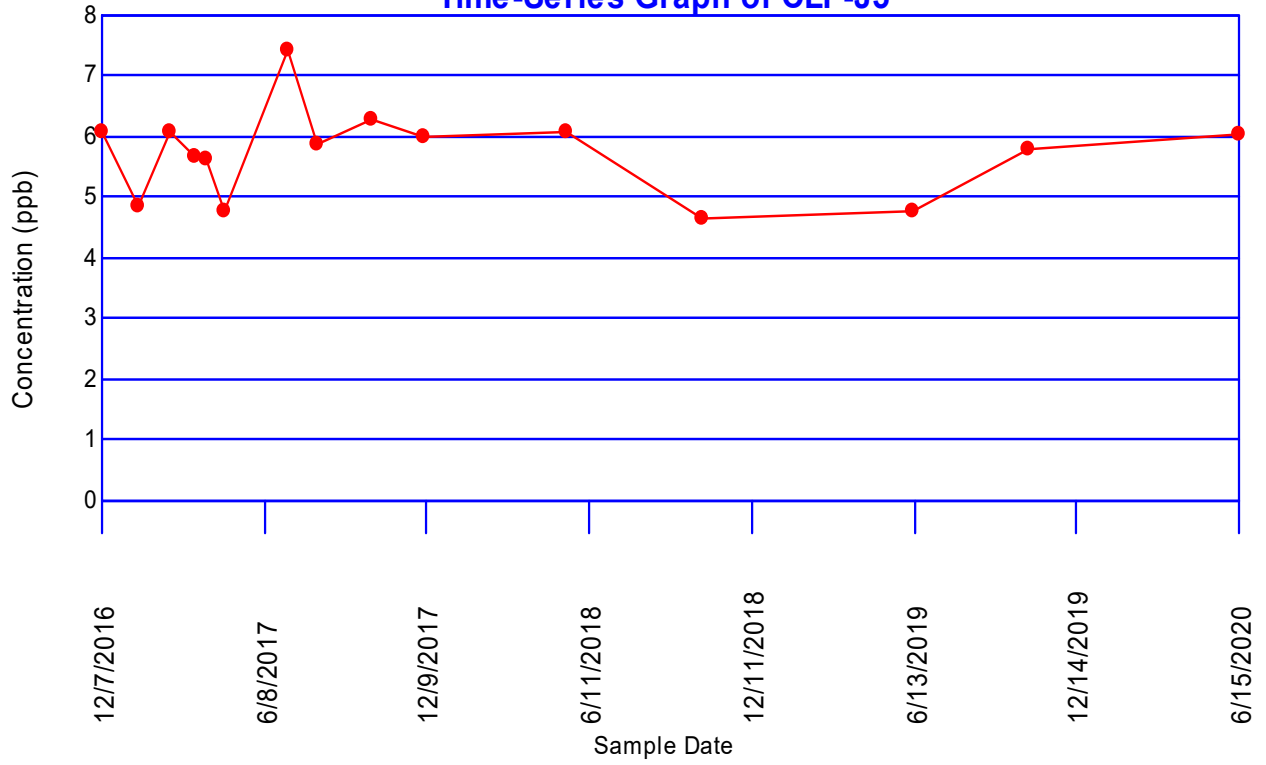
Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.892415

Data is normally distributed at 99% level of significance

# Boron

## Time-Series Graph of CLF-J5



**Mann-Kendall Trend Analysis**  
**Parameter: Boron**  
**Location: CLF-J5**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
4.85224	6.09509	-1.24285	0	1
6.09015	6.09509	-0.00494599	0	2
5.66439	6.09509	-0.430701	0	3
5.64114	6.09509	-0.453954	0	4
4.7934	6.09509	-1.3017	0	5
7.44425	6.09509	1.34915	1	5
5.86079	6.09509	-0.234308	1	6
6.28227	6.09509	0.187172	2	6
6.00881	6.09509	-0.0862814	2	7
6.09807	6.09509	0.00297972	3	7
4.64439	6.09509	-1.4507	3	8
4.77912	6.09509	-1.31597	3	9
5.79301	6.09509	-0.302081	3	10
6.05912	6.09509	-0.0359714	3	11
6.09015	4.85224	1.23791	4	11
5.66439	4.85224	0.812152	5	11
5.64114	4.85224	0.7889	6	11
4.7934	4.85224	-0.0588419	6	12
7.44425	4.85224	2.59201	7	12
5.86079	4.85224	1.00855	8	12
6.28227	4.85224	1.43003	9	12
6.00881	4.85224	1.15657	10	12
6.09807	4.85224	1.24583	11	12
4.64439	4.85224	-0.20785	11	13
4.77912	4.85224	-0.0731177	11	14
5.79301	4.85224	0.940772	12	14
6.05912	4.85224	1.20688	13	14
5.66439	6.09015	-0.425755	13	15
5.64114	6.09015	-0.449008	13	16
4.7934	6.09015	-1.29675	13	17
7.44425	6.09015	1.3541	14	17
5.86079	6.09015	-0.229362	14	18
6.28227	6.09015	0.192118	15	18
6.00881	6.09015	-0.0813354	15	19
6.09807	6.09015	0.00792571	16	19
4.64439	6.09015	-1.44576	16	20
4.77912	6.09015	-1.31103	16	21
5.79301	6.09015	-0.297135	16	22
6.05912	6.09015	-0.0310254	16	23
5.64114	5.66439	-0.0232527	16	24
4.7934	5.66439	-0.870994	16	25
7.44425	5.66439	1.77986	17	25
5.86079	5.66439	0.196393	18	25
6.28227	5.66439	0.617873	19	25

6.00881	5.66439	0.34442	20	25
6.09807	5.66439	0.433681	21	25
4.64439	5.66439	-1.02	21	26
4.77912	5.66439	-0.88527	21	27
5.79301	5.66439	0.12862	22	27
6.05912	5.66439	0.39473	23	27
4.7934	5.64114	-0.847742	23	28
7.44425	5.64114	1.80311	24	28
5.86079	5.64114	0.219645	25	28
6.28227	5.64114	0.641126	26	28
6.00881	5.64114	0.367672	27	28
6.09807	5.64114	0.456933	28	28
4.64439	5.64114	-0.99675	28	29
4.77912	5.64114	-0.862017	28	30
5.79301	5.64114	0.151873	29	30
6.05912	5.64114	0.417982	30	30
7.44425	4.7934	2.65085	31	30
5.86079	4.7934	1.06739	32	30
6.28227	4.7934	1.48887	33	30
6.00881	4.7934	1.21541	34	30
6.09807	4.7934	1.30468	35	30
4.64439	4.7934	-0.149008	35	31
4.77912	4.7934	-0.0142758	35	32
5.79301	4.7934	0.999614	36	32
6.05912	4.7934	1.26572	37	32
5.86079	7.44425	-1.58346	37	33
6.28227	7.44425	-1.16198	37	34
6.00881	7.44425	-1.43544	37	35
6.09807	7.44425	-1.34617	37	36
4.64439	7.44425	-2.79986	37	37
4.77912	7.44425	-2.66513	37	38
5.79301	7.44425	-1.65124	37	39
6.05912	7.44425	-1.38513	37	40
6.28227	5.86079	0.421481	38	40
6.00881	5.86079	0.148027	39	40
6.09807	5.86079	0.237288	40	40
4.64439	5.86079	-1.2164	40	41
4.77912	5.86079	-1.08166	40	42
5.79301	5.86079	-0.0677726	40	43
6.05912	5.86079	0.198337	41	43
6.00881	6.28227	-0.273454	41	44
6.09807	6.28227	-0.184192	41	45
4.64439	6.28227	-1.63788	41	46
4.77912	6.28227	-1.50314	41	47
5.79301	6.28227	-0.489253	41	48
6.05912	6.28227	-0.223144	41	49
6.09807	6.00881	0.0892611	42	49
4.64439	6.00881	-1.36442	42	50
4.77912	6.00881	-1.22969	42	51
5.79301	6.00881	-0.2158	42	52
6.05912	6.00881	0.05031	43	52



4.64439	6.09807	-1.45368	43	53
4.77912	6.09807	-1.31895	43	54
5.79301	6.09807	-0.305061	43	55
6.05912	6.09807	-0.0389511	43	56
4.77912	4.64439	0.134733	44	56
5.79301	4.64439	1.14862	45	56
6.05912	4.64439	1.41473	46	56
5.79301	4.77912	1.01389	47	56
6.05912	4.77912	1.28	48	56
6.05912	5.79301	0.26611	49	56

S Statistic = 49 - 56 = -7

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
-------------	--------------

12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -0.296923

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-0.296923**| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Boron

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.285066	0.316279	0.525	None

Loc.	Date	Conc.	Outlier
CLF-S13	12/7/2016	473.085	FALSE
	1/18/2017	714.92	FALSE
	2/23/2017	1040.84	FALSE
	3/22/2017	754.577	FALSE
	4/5/2017	836.075	FALSE
	4/25/2017	732.116	FALSE
	7/6/2017	424	FALSE
	8/8/2017	455	FALSE
	10/9/2017	430	FALSE
	12/6/2017	865	FALSE
	5/15/2018	922	FALSE
	10/16/2018	385	FALSE
	6/11/2019	484	FALSE
	10/22/2019	220	FALSE
	6/15/2020	469	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Boron

Location: CLF-S13

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	220	1040.84	820.84	0.515	422.733
2	385	922	537	0.3306	177.532
3	424	865	441	0.2495	110.03
4	430	836.075	406.075	0.1878	76.2609
5	455	754.577	299.577	0.1353	40.5328
6	469	732.116	263.116	0.088	23.1542
7	473.085	714.92	241.835	0.0433	10.4715
8	484	484	0		
9	714.92	473.085	-241.835		
10	732.116	469	-263.116		
11	754.577	455	-299.577		
12	836.075	430	-406.075		
13	865	424	-441		
14	922	385	-537		
15	1040.84	220	-820.84		

---

Sum of b values = 860.714

Sample Standard Deviation = 238.143

W Statistic = 0.933071

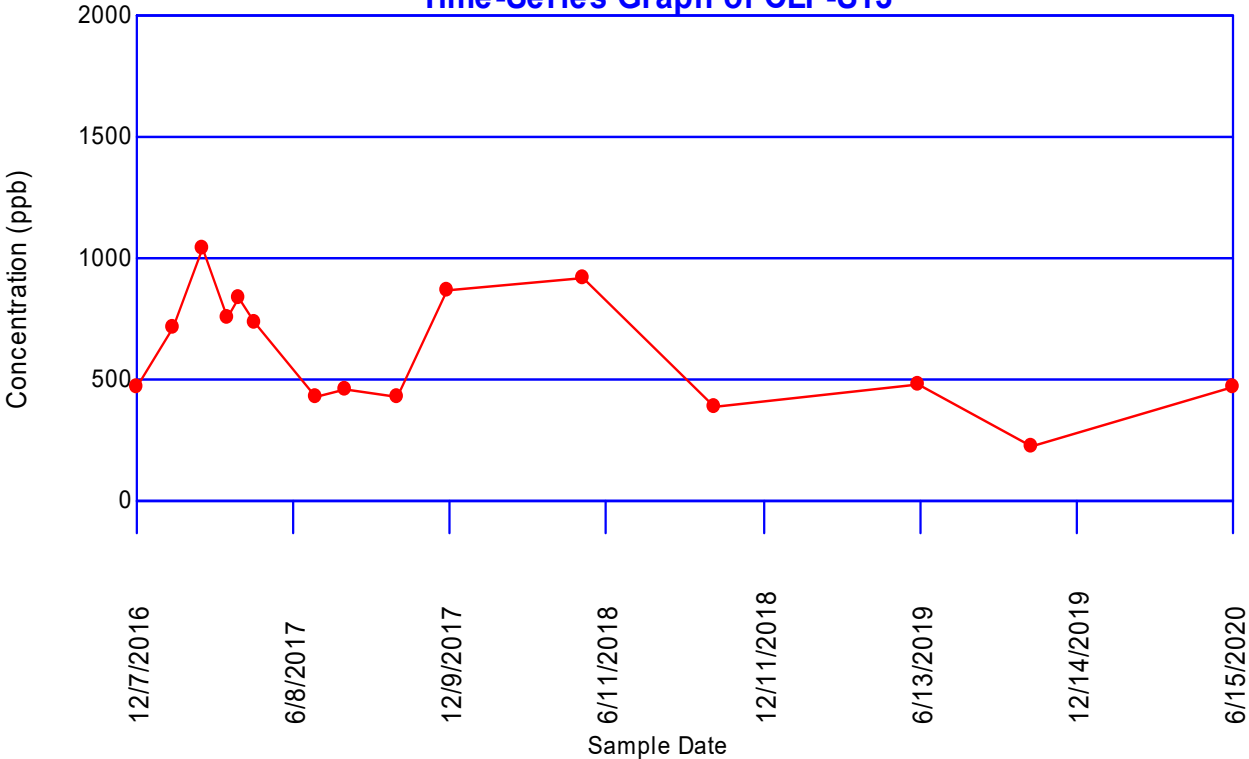
5% Critical value of 0.881 is less than 0.933071

Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.933071

Data is normally distributed at 99% level of significance

### Boron Time-Series Graph of CLF-S13



## Mann-Kendall Trend Analysis

Parameter: Boron

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
714.92	473.085	241.835	1	0
1040.84	473.085	567.755	2	0
754.577	473.085	281.492	3	0
836.075	473.085	362.99	4	0
732.116	473.085	259.031	5	0
424	473.085	-49.085	5	1
455	473.085	-18.085	5	2
430	473.085	-43.085	5	3
865	473.085	391.915	6	3
922	473.085	448.915	7	3
385	473.085	-88.085	7	4
484	473.085	10.915	8	4
220	473.085	-253.085	8	5
469	473.085	-4.085	8	6
1040.84	714.92	325.92	9	6
754.577	714.92	39.657	10	6
836.075	714.92	121.155	11	6
732.116	714.92	17.196	12	6
424	714.92	-290.92	12	7
455	714.92	-259.92	12	8
430	714.92	-284.92	12	9
865	714.92	150.08	13	9
922	714.92	207.08	14	9
385	714.92	-329.92	14	10
484	714.92	-230.92	14	11
220	714.92	-494.92	14	12
469	714.92	-245.92	14	13
754.577	1040.84	-286.263	14	14
836.075	1040.84	-204.765	14	15
732.116	1040.84	-308.724	14	16
424	1040.84	-616.84	14	17
455	1040.84	-585.84	14	18
430	1040.84	-610.84	14	19
865	1040.84	-175.84	14	20
922	1040.84	-118.84	14	21
385	1040.84	-655.84	14	22
484	1040.84	-556.84	14	23
220	1040.84	-820.84	14	24
469	1040.84	-571.84	14	25
836.075	754.577	81.498	15	25
732.116	754.577	-22.461	15	26
424	754.577	-330.577	15	27
455	754.577	-299.577	15	28
430	754.577	-324.577	15	29

865	754.577	110.423	16	29
922	754.577	167.423	17	29
385	754.577	-369.577	17	30
484	754.577	-270.577	17	31
220	754.577	-534.577	17	32
469	754.577	-285.577	17	33
732.116	836.075	-103.959	17	34
424	836.075	-412.075	17	35
455	836.075	-381.075	17	36
430	836.075	-406.075	17	37
865	836.075	28.925	18	37
922	836.075	85.925	19	37
385	836.075	-451.075	19	38
484	836.075	-352.075	19	39
220	836.075	-616.075	19	40
469	836.075	-367.075	19	41
424	732.116	-308.116	19	42
455	732.116	-277.116	19	43
430	732.116	-302.116	19	44
865	732.116	132.884	20	44
922	732.116	189.884	21	44
385	732.116	-347.116	21	45
484	732.116	-248.116	21	46
220	732.116	-512.116	21	47
469	732.116	-263.116	21	48
455	424	31	22	48
430	424	6	23	48
865	424	441	24	48
922	424	498	25	48
385	424	-39	25	49
484	424	60	26	49
220	424	-204	26	50
469	424	45	27	50
430	455	-25	27	51
865	455	410	28	51
922	455	467	29	51
385	455	-70	29	52
484	455	29	30	52
220	455	-235	30	53
469	455	14	31	53
865	430	435	32	53
922	430	492	33	53
385	430	-45	33	54
484	430	54	34	54
220	430	-210	34	55
469	430	39	35	55
922	865	57	36	55
385	865	-480	36	56
484	865	-381	36	57
220	865	-645	36	58
469	865	-396	36	59

385	922	-537	36	60
484	922	-438	36	61
220	922	-702	36	62
469	922	-453	36	63
484	385	99	37	63
220	385	-165	37	64
469	385	84	38	64
220	484	-264	38	65
469	484	-15	38	66
469	220	249	39	66

S Statistic = 39 - 66 = -27

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -1.28667

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-1.28667**| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Boron

Location: CLF-S05

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.485756	0	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S05	1/18/2017	4.6817	FALSE
	4/5/2017	5.21984	FALSE
	4/25/2017	4.40681	FALSE
	10/16/2018	ND<3.91202	FALSE
	10/22/2019	6.4552	FALSE
	6/29/2020	ND<3.91202	FALSE
	12/5/2020	4.35414	FALSE
	3/26/2021	4.22391	FALSE



## Shapiro-Wilks Test of Normality

Parameter: Boron

Location: CLF-S05

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	3.91202	6.4552	2.54318	0.6052	1.53913
2	3.91202	5.21984	1.30781	0.3164	0.413792
3	4.22391	4.6817	0.457786	0.1743	0.0797921
4	4.35414	4.40681	0.0526656	0.0561	0.00295454
5	4.40681	4.35414	-0.0526656		
6	4.6817	4.22391	-0.457786		
7	5.21984	3.91202	-1.30781		
8	6.4552	3.91202	-2.54318		

---

Sum of b values = 2.03567

Sample Standard Deviation = 0.845303

W Statistic = 0.828498

5% Critical value of 0.818 is less than 0.828498

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.828498

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Boron**  
**Location: CLF-S05**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

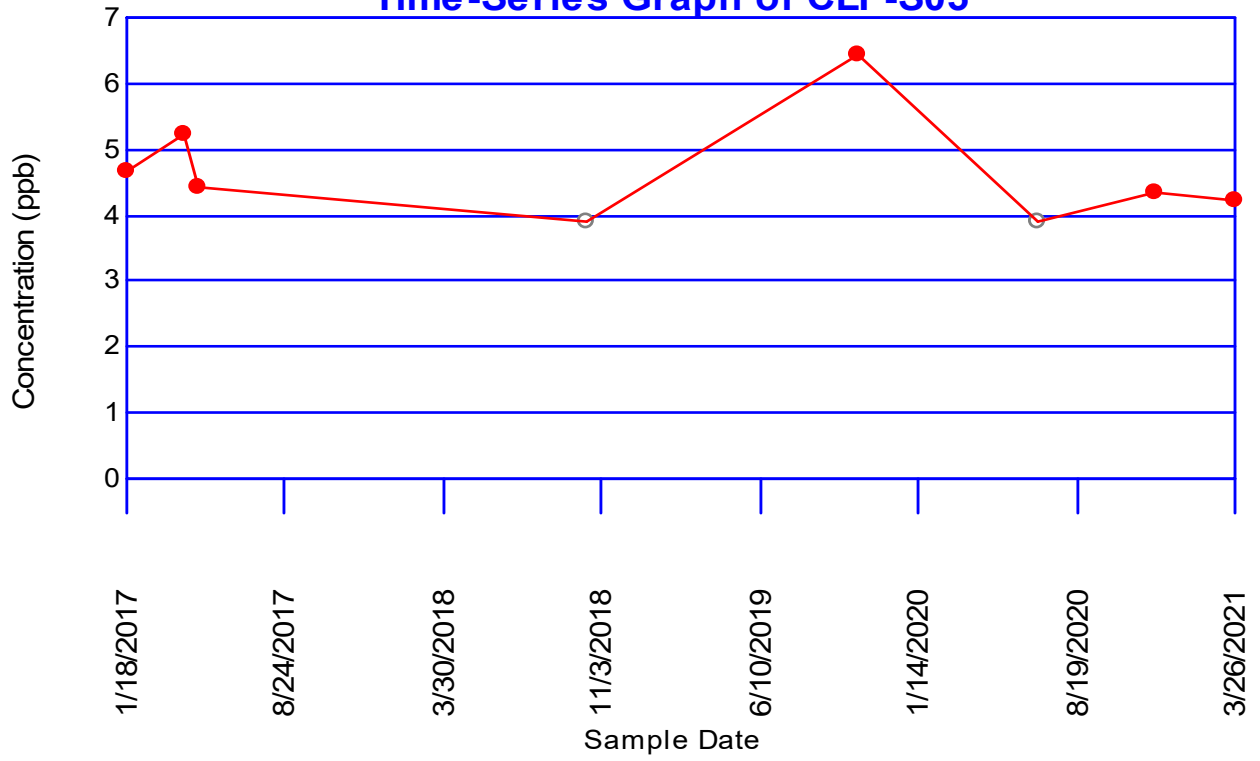
95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
5.21984	4.6817	0.538141	1	0
4.40681	4.6817	-0.274889	1	1
ND<3.91202	4.6817	-0.769673	1	2
6.4552	4.6817	1.7735	2	2
ND<3.91202	4.6817	-0.769673	2	3
4.35414	4.6817	-0.327555	2	4
4.22391	4.6817	-0.457786	2	5
4.40681	5.21984	-0.81303	2	6
ND<3.91202	5.21984	-1.30781	2	7
6.4552	5.21984	1.23536	3	7
ND<3.91202	5.21984	-1.30781	3	8
4.35414	5.21984	-0.865695	3	9
4.22391	5.21984	-0.995927	3	10
ND<3.91202	4.40681	-0.494784	3	11
6.4552	4.40681	2.04839	4	11
ND<3.91202	4.40681	-0.494784	4	12
4.35414	4.40681	-0.0526656	4	13
4.22391	4.40681	-0.182897	4	14
6.4552	ND<3.91202	2.54318	5	14
ND<3.91202	ND<3.91202	0	5	14
4.35414	ND<3.91202	0.442118	6	14
4.22391	ND<3.91202	0.311887	7	14
ND<3.91202	6.4552	-2.54318	7	15
4.35414	6.4552	-2.10106	7	16
4.22391	6.4552	-2.23129	7	17
4.35414	ND<3.91202	0.442118	8	17
4.22391	ND<3.91202	0.311887	9	17
4.22391	4.35414	-0.130232	9	18

S Statistic = 9 - 18 = -9  
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
Probability of obtaining  $S \geq |-9|$  is 0.337  
0.337  $\geq$  0.025 indicating no evidence of a trend

# Boron

## Time-Series Graph of CLF-S05



## Concentrations (ppb)

Parameter: Calcium

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Total Measurements: 74

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

---

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

---

There are 6 compliance locations

---

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

---

CLF-J2	15	0 (0%)	12/7/2016	11.6084	110017
			1/18/2017	11.283	79460.5
			2/23/2017	11.5718	106069
			3/22/2017	11.7146	122341
			4/5/2017	11.7006	120639
			4/25/2017	11.6748	117569
			7/6/2017	12.3864	239532
			8/8/2017	11.6965	120150
			10/9/2017	12.0184	165778
			12/6/2017	11.6995	120511
			5/15/2018	10.5133	36800
			10/16/2018	11.6351	113000
			6/11/2019	11.3691	86600
			10/22/2019	11.5089	99600
			6/29/2020	11.0004	59900
	<b>12/5/2020</b>	<b>11.2734</b>	<b>78700</b>		
	<b>3/26/2021</b>	<b>11.2332</b>	<b>75600</b>		

---

CLF-J3	14	0 (0%)	12/7/2016	11.6066	109825
			1/18/2017	11.2693	78378.3
			2/23/2017	11.5865	107630
			3/22/2017	11.724	123501
			4/5/2017	11.6948	119951
			7/6/2017	12.3875	239796
			8/8/2017	11.7128	122120
			10/9/2017	12.0289	167535
			12/6/2017	11.7215	123196
			5/15/2018	11.6784	118000
			10/16/2018	11.4876	97500
			6/11/2019	11.3986	89200
			10/22/2019	11.5991	109000
			6/15/2020	11.6869	119000
				<b>12/5/2020</b>	<b>11.3278</b>
	<b>3/26/2021</b>	<b>11.2159</b>	<b>74300</b>		

---

CLF-J5	15	0 (0%)	12/7/2016	11.4623	95061.3
			1/18/2017	11.2766	78950.2
			2/23/2017	11.4982	98538.8
			3/22/2017	11.7076	121487
			4/5/2017	11.713	122145
			4/25/2017	11.6477	114426

			7/6/2017	12.6026	297325
			8/8/2017	11.7021	120823
			10/9/2017	12.1052	180815
			12/6/2017	11.5677	105625
			5/15/2018	11.6173	111000
			10/16/2018	11.5806	107000
			6/11/2019	11.3242	82800
			10/22/2019	11.7035	121000
			6/15/2020	11.6173	111000
			<b>12/5/2020</b>	<b>11.2772</b>	<b>79000</b>
			<b>3/26/2021</b>	<b>11.2078</b>	<b>73700</b>
<hr/>					
CLF-S05	8	0 (0%)	1/18/2017	11.2442	76432
			4/5/2017	11.6092	110104
			4/25/2017	11.6327	112725
			10/16/2018	11.47	95800
			10/22/2019	11.6952	120000
			6/29/2020	11.1676	70800
			12/5/2020	11.4076	90000
			3/26/2021	11.1747	71300
<hr/>					
CLF-S06	7	0 (0%)	1/18/2017	11.1348	68511.1
			4/5/2017	11.4034	89628.6
			4/25/2017	11.3577	85619
			10/16/2018	11.4131	90500
			6/29/2020	11.2372	75900
			12/5/2020	11.2797	79200
			3/26/2021	11.2645	78000
<hr/>					
CLF-S13	15	0 (0%)	12/7/2016	11.6179	111064
			1/18/2017	12.0171	165561
			2/23/2017	12.2891	217307
			3/22/2017	12.5061	269982
			4/5/2017	12.3884	240010
			4/25/2017	12.2787	215059
			7/6/2017	11.681	118300
			8/8/2017	11.5528	104065
			10/9/2017	11.5616	104990
			12/6/2017	12.0016	163020
			5/15/2018	12.1626	191500
			10/16/2018	11.7199	123000
			6/11/2019	11.8982	147000
			10/22/2019	11.3953	88900
			6/15/2020	11.8565	141000
			<b>12/5/2020</b>	<b>11.5806</b>	<b>107000</b>
			<b>3/26/2021</b>	<b>11.8277</b>	<b>137000</b>

There are 2 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
CLF-C03	17	0 (0%)	12/7/2016	11.373	86943
			1/18/2017	11.2253	75002.6
			2/23/2017	11.3706	86737.5
			3/22/2017	11.4629	95118.7
			4/5/2017	11.423	91401.4
			4/25/2017	11.572	106082

			7/6/2017	11.2761	78911
			8/8/2017	11.2173	74410
			10/9/2017	11.2259	75048
			12/6/2017	11.392	88607
			5/15/2018	11.3469	84700
			10/16/2018	11.5899	108000
			6/11/2019	11.3667	86400
			10/22/2019	11.3516	85100
			6/15/2020	11.3421	84300
			12/5/2020	11.2797	79200
			3/26/2021	11.2593	77600
<hr/>					
CLF-OPP	17	0 (0%)	12/7/2016	11.054	63197.1
			1/18/2017	10.9105	54750.7
			2/23/2017	11.2227	74808.9
			3/22/2017	11.2662	78136.5
			4/5/2017	11.2716	78555.9
			4/25/2017	11.0536	63169.6
			7/6/2017	11.2656	78086
			8/8/2017	11.0438	62553
			10/9/2017	10.974	58339
			12/6/2017	11.3474	84749
			5/15/2018	11.3998	89300
			10/16/2018	11.3445	84500
			6/11/2019	10.9647	57800
			10/22/2019	11.1605	70300
			6/15/2020	11.1619	70400
			12/5/2020	11.0929	65700
			3/26/2021	11.0775	64700
<hr/>					

## Dixon's Test for Outliers

Parameter: Calcium

Location: CLF-J2

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.732117	0.498714	0.525	239532
2	0.522941	0.508838	0.546	None

Loc.	Date	Conc.	Outlier
CLF-J2	12/7/2016	110017	FALSE
	1/18/2017	79460.5	FALSE
	2/23/2017	106069	FALSE
	3/22/2017	122341	FALSE
	4/5/2017	120639	FALSE
	4/25/2017	117569	FALSE
	7/6/2017	<b>239532</b>	<b>TRUE</b>
	8/8/2017	120150	FALSE
	10/9/2017	165778	FALSE
	12/6/2017	120511	FALSE
	5/15/2018	36800	FALSE
	10/16/2018	113000	FALSE
	6/11/2019	86600	FALSE
	10/22/2019	99600	FALSE
	6/29/2020	59900	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Calcium

Location: CLF-J2

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	36800	239532	202732	0.515	104407
2	59900	165778	105878	0.3306	35003.3
3	79460.5	122341	42880.5	0.2495	10698.7
4	86600	120639	34039	0.1878	6392.52
5	99600	120511	20911	0.1353	2829.26
6	106069	120150	14081	0.088	1239.13
7	110017	117569	7552	0.0433	327.002
8	113000	113000	0		
9	117569	110017	-7552		
10	120150	106069	-14081		
11	120511	99600	-20911		
12	120639	86600	-34039		
13	122341	79460.5	-42880.5		
14	165778	59900	-105878		
15	239532	36800	-202732		

---

Sum of b values = 160897

Sample Standard Deviation = 46100.6

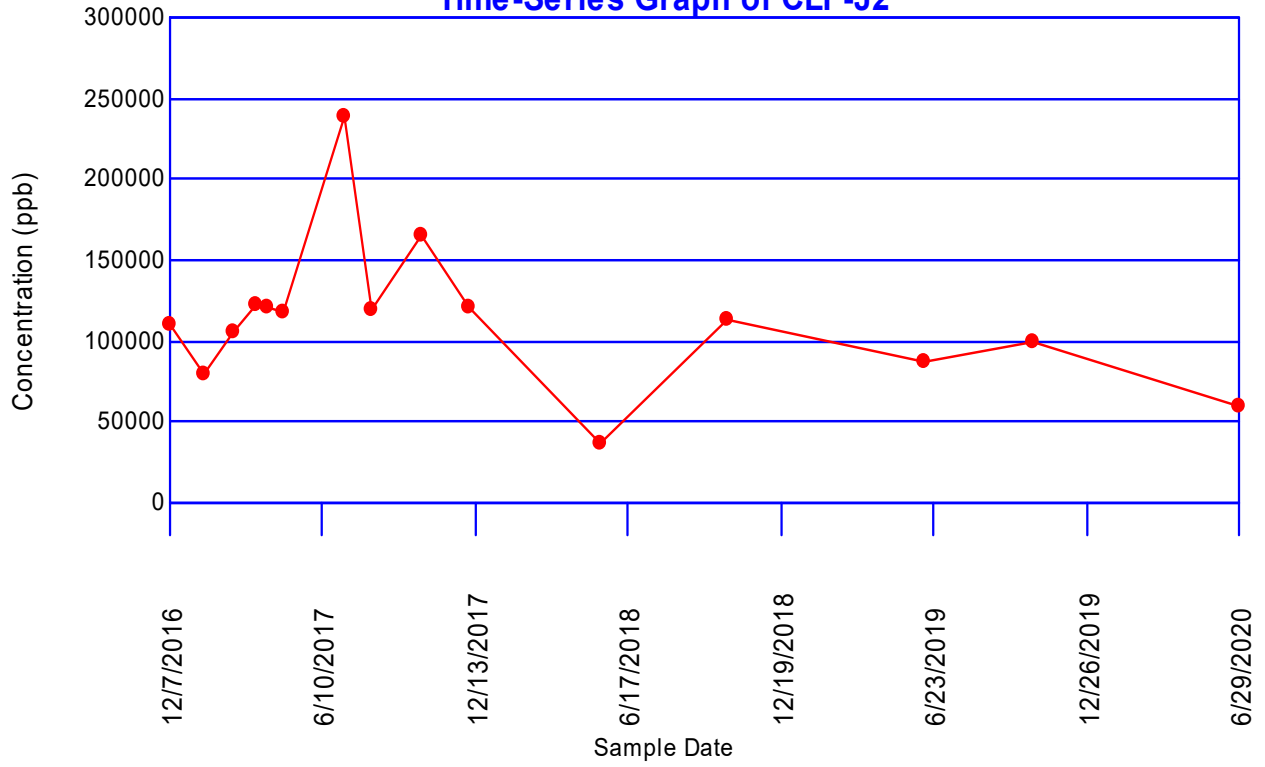
W Statistic = 0.87007

**5% Critical value of 0.881 exceeds 0.87007**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.835 is less than 0.87007  
Data is normally distributed at 99% level of significance



### Calcium Time-Series Graph of CLF-J2



**Mann-Kendall Trend Analysis**  
**Parameter: Calcium**  
**Location: CLF-J2**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

---

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
79460.5	110017	-30556.5	0	1
106069	110017	-3948	0	2
122341	110017	12324	1	2
120639	110017	10622	2	2
117569	110017	7552	3	2
239532	110017	129515	4	2
120150	110017	10133	5	2
165778	110017	55761	6	2
120511	110017	10494	7	2
36800	110017	-73217	7	3
113000	110017	2983	8	3
86600	110017	-23417	8	4
99600	110017	-10417	8	5
59900	110017	-50117	8	6
106069	79460.5	26608.5	9	6
122341	79460.5	42880.5	10	6
120639	79460.5	41178.5	11	6
117569	79460.5	38108.5	12	6
239532	79460.5	160072	13	6
120150	79460.5	40689.5	14	6
165778	79460.5	86317.5	15	6
120511	79460.5	41050.5	16	6
36800	79460.5	-42660.5	16	7
113000	79460.5	33539.5	17	7
86600	79460.5	7139.5	18	7
99600	79460.5	20139.5	19	7
59900	79460.5	-19560.5	19	8
122341	106069	16272	20	8
120639	106069	14570	21	8
117569	106069	11500	22	8
239532	106069	133463	23	8
120150	106069	14081	24	8
165778	106069	59709	25	8
120511	106069	14442	26	8
36800	106069	-69269	26	9
113000	106069	6931	27	9
86600	106069	-19469	27	10
99600	106069	-6469	27	11
59900	106069	-46169	27	12
120639	122341	-1702	27	13
117569	122341	-4772	27	14
239532	122341	117191	28	14
120150	122341	-2191	28	15
165778	122341	43437	29	15

120511	122341	-1830	29	16
36800	122341	-85541	29	17
113000	122341	-9341	29	18
86600	122341	-35741	29	19
99600	122341	-22741	29	20
59900	122341	-62441	29	21
117569	120639	-3070	29	22
239532	120639	118893	30	22
120150	120639	-489	30	23
165778	120639	45139	31	23
120511	120639	-128	31	24
36800	120639	-83839	31	25
113000	120639	-7639	31	26
86600	120639	-34039	31	27
99600	120639	-21039	31	28
59900	120639	-60739	31	29
239532	117569	121963	32	29
120150	117569	2581	33	29
165778	117569	48209	34	29
120511	117569	2942	35	29
36800	117569	-80769	35	30
113000	117569	-4569	35	31
86600	117569	-30969	35	32
99600	117569	-17969	35	33
59900	117569	-57669	35	34
120150	239532	-119382	35	35
165778	239532	-73754	35	36
120511	239532	-119021	35	37
36800	239532	-202732	35	38
113000	239532	-126532	35	39
86600	239532	-152932	35	40
99600	239532	-139932	35	41
59900	239532	-179632	35	42
165778	120150	45628	36	42
120511	120150	361	37	42
36800	120150	-83350	37	43
113000	120150	-7150	37	44
86600	120150	-33550	37	45
99600	120150	-20550	37	46
59900	120150	-60250	37	47
120511	165778	-45267	37	48
36800	165778	-128978	37	49
113000	165778	-52778	37	50
86600	165778	-79178	37	51
99600	165778	-66178	37	52
59900	165778	-105878	37	53
36800	120511	-83711	37	54
113000	120511	-7511	37	55
86600	120511	-33911	37	56
99600	120511	-20911	37	57
59900	120511	-60611	37	58

113000	36800	76200	38	58
86600	36800	49800	39	58
99600	36800	62800	40	58
59900	36800	23100	41	58
86600	113000	-26400	41	59
99600	113000	-13400	41	60
59900	113000	-53100	41	61
99600	86600	13000	42	61
59900	86600	-26700	42	62
59900	99600	-39700	42	63

S Statistic = 42 - 63 = -21

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/29/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -0.989743

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-0.989743**| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Calcium

Location: CLF-J3

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 14 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.737318	0.480106	0.546	12.3875
2	0.48772	0.480106	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J3	12/7/2016	11.6066	FALSE
	1/18/2017	11.2693	FALSE
	2/23/2017	11.5865	FALSE
	3/22/2017	11.724	FALSE
	4/5/2017	11.6948	FALSE
	7/6/2017	<b>12.3875</b>	<b>TRUE</b>
	8/8/2017	11.7128	FALSE
	10/9/2017	12.0289	FALSE
	12/6/2017	11.7215	FALSE
	5/15/2018	11.6784	FALSE
	10/16/2018	11.4876	FALSE
	6/11/2019	11.3986	FALSE
	10/22/2019	11.5991	FALSE
	6/15/2020	11.6869	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Calcium

Location: CLF-J3

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 14 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	11.2693	12.3875	1.11824	0.5251	0.587189
2	11.3986	12.0289	0.630311	0.3318	0.209137
3	11.4876	11.724	0.236397	0.246	0.0581536
4	11.5865	11.7215	0.135077	0.1802	0.0243409
5	11.5991	11.7128	0.113656	0.124	0.0140934
6	11.6066	11.6948	0.0881951	0.0727	0.00641179
7	11.6784	11.6869	0.00843887	0.024	0.000202533
8	11.6869	11.6784	-0.00843887		
9	11.6948	11.6066	-0.0881951		
10	11.7128	11.5991	-0.113656		
11	11.7215	11.5865	-0.135077		
12	11.724	11.4876	-0.236397		
13	12.0289	11.3986	-0.630311		
14	12.3875	11.2693	-1.11824		

---

Sum of b values = 0.899528

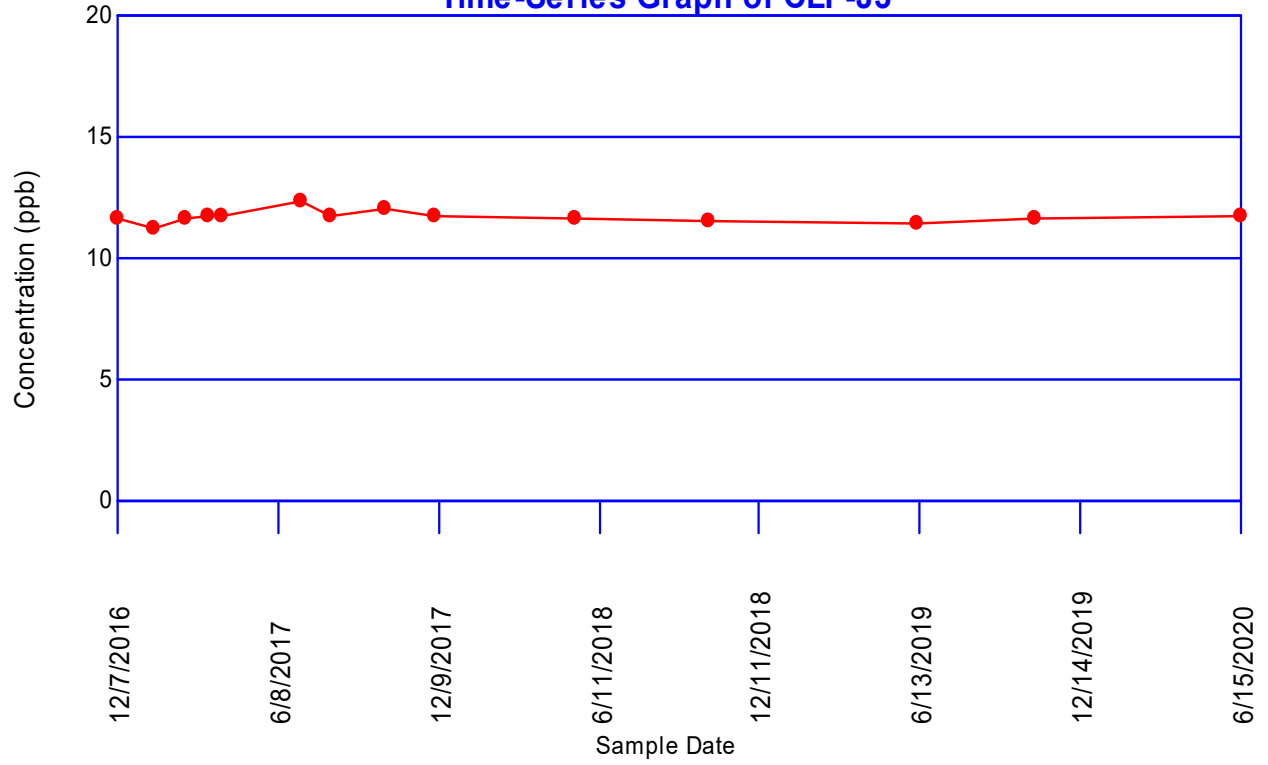
Sample Standard Deviation = 0.267845

W Statistic = 0.867596

**5% Critical value of 0.874 exceeds 0.867596**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.825 is less than 0.867596  
Data is normally distributed at 99% level of significance

### Calcium Time-Series Graph of CLF-J3



**Mann-Kendall Trend Analysis**  
**Parameter: Calcium**  
**Location: CLF-J3**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
11.2693	11.6066	-0.337341	0	1
11.5865	11.6066	-0.0201888	0	2
11.724	11.6066	0.117361	1	2
11.6948	11.6066	0.0881951	2	2
12.3875	11.6066	0.7809	3	2
11.7128	11.6066	0.106116	4	2
12.0289	11.6066	0.422304	5	2
11.7215	11.6066	0.114888	6	2
11.6784	11.6066	0.0717964	7	2
11.4876	11.6066	-0.119036	7	3
11.3986	11.6066	-0.208007	7	4
11.5991	11.6066	-0.00754031	7	5
11.6869	11.6066	0.0802353	8	5
11.5865	11.2693	0.317152	9	5
11.724	11.2693	0.454702	10	5
11.6948	11.2693	0.425536	11	5
12.3875	11.2693	1.11824	12	5
11.7128	11.2693	0.443457	13	5
12.0289	11.2693	0.759645	14	5
11.7215	11.2693	0.452229	15	5
11.6784	11.2693	0.409138	16	5
11.4876	11.2693	0.218305	17	5
11.3986	11.2693	0.129334	18	5
11.5991	11.2693	0.329801	19	5
11.6869	11.2693	0.417576	20	5
11.724	11.5865	0.13755	21	5
11.6948	11.5865	0.108384	22	5
12.3875	11.5865	0.801089	23	5
11.7128	11.5865	0.126305	24	5
12.0289	11.5865	0.442493	25	5
11.7215	11.5865	0.135077	26	5
11.6784	11.5865	0.0919852	27	5
11.4876	11.5865	-0.098847	27	6
11.3986	11.5865	-0.187818	27	7
11.5991	11.5865	0.0126485	28	7
11.6869	11.5865	0.100424	29	7
11.6948	11.724	-0.0291659	29	8
12.3875	11.724	0.663539	30	8
11.7128	11.724	-0.0112451	30	9
12.0289	11.724	0.304943	31	9
11.7215	11.724	-0.00247267	31	10
11.6784	11.724	-0.0455646	31	11
11.4876	11.724	-0.236397	31	12
11.3986	11.724	-0.325368	31	13



11.5991	11.724	-0.124901	31	14
11.6869	11.724	-0.0371258	31	15
12.3875	11.6948	0.692705	32	15
11.7128	11.6948	0.0179208	33	15
12.0289	11.6948	0.334109	34	15
11.7215	11.6948	0.0266933	35	15
11.6784	11.6948	-0.0163987	35	16
11.4876	11.6948	-0.207231	35	17
11.3986	11.6948	-0.296202	35	18
11.5991	11.6948	-0.0957354	35	19
11.6869	11.6948	-0.00795983	35	20
11.7128	12.3875	-0.674784	35	21
12.0289	12.3875	-0.358596	35	22
11.7215	12.3875	-0.666012	35	23
11.6784	12.3875	-0.709104	35	24
11.4876	12.3875	-0.899936	35	25
11.3986	12.3875	-0.988908	35	26
11.5991	12.3875	-0.788441	35	27
11.6869	12.3875	-0.700665	35	28
12.0289	11.7128	0.316188	36	28
11.7215	11.7128	0.00877242	37	28
11.6784	11.7128	-0.0343195	37	29
11.4876	11.7128	-0.225152	37	30
11.3986	11.7128	-0.314123	37	31
11.5991	11.7128	-0.113656	37	32
11.6869	11.7128	-0.0258807	37	33
11.7215	12.0289	-0.307416	37	34
11.6784	12.0289	-0.350508	37	35
11.4876	12.0289	-0.54134	37	36
11.3986	12.0289	-0.630311	37	37
11.5991	12.0289	-0.429844	37	38
11.6869	12.0289	-0.342069	37	39
11.6784	11.7215	-0.043092	37	40
11.4876	11.7215	-0.233924	37	41
11.3986	11.7215	-0.322896	37	42
11.5991	11.7215	-0.122429	37	43
11.6869	11.7215	-0.0346531	37	44
11.4876	11.6784	-0.190832	37	45
11.3986	11.6784	-0.279804	37	46
11.5991	11.6784	-0.0793367	37	47
11.6869	11.6784	0.00843887	38	47
11.3986	11.4876	-0.0889713	38	48
11.5991	11.4876	0.111496	39	48
11.6869	11.4876	0.199271	40	48
11.5991	11.3986	0.200467	41	48
11.6869	11.3986	0.288242	42	48
11.6869	11.5991	0.0877756	43	48

S Statistic = 43 - 48 = -5

---

Tied Group	Value	Members
<b>Time Period</b>		<b>Observations</b>
12/7/2016		1
1/18/2017		1
2/23/2017		1
3/22/2017		1
4/5/2017		1
7/6/2017		1
8/8/2017		1
10/9/2017		1
12/6/2017		1
5/15/2018		1
10/16/2018		1
6/11/2019		1
10/22/2019		1
6/15/2020		1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = -0.21898

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-0.21898**| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Calcium

Location: CLF-J5

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.866097	0.372987	0.525	297325
2	0.691842	0.378757	0.546	180815
3	0.0291015	0.378757	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J5	12/7/2016	95061.3	FALSE
	1/18/2017	78950.2	FALSE
	2/23/2017	98538.8	FALSE
	3/22/2017	121487	FALSE
	4/5/2017	122145	FALSE
	4/25/2017	114426	FALSE
	7/6/2017	<b>297325</b>	<b>TRUE</b>
	8/8/2017	120823	FALSE
	10/9/2017	<b>180815</b>	<b>TRUE</b>
	12/6/2017	105625	FALSE
	5/15/2018	111000	FALSE
	10/16/2018	107000	FALSE
	6/11/2019	82800	FALSE
	10/22/2019	121000	FALSE
	6/15/2020	111000	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Calcium

Location: CLF-J5

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	78950.2	297325	218375	0.515	112463
2	82800	180815	98015	0.3306	32403.8
3	95061.3	122145	27083.7	0.2495	6757.38
4	98538.8	121487	22948.2	0.1878	4309.67
5	105625	121000	15375	0.1353	2080.24
6	107000	120823	13823	0.088	1216.42
7	111000	114426	3426	0.0433	148.346
8	111000	111000	0		
9	114426	111000	-3426		
10	120823	107000	-13823		
11	121000	105625	-15375		
12	121487	98538.8	-22948.2		
13	122145	95061.3	-27083.7		
14	180815	82800	-98015		
15	297325	78950.2	-218375		

---

Sum of b values = 159379

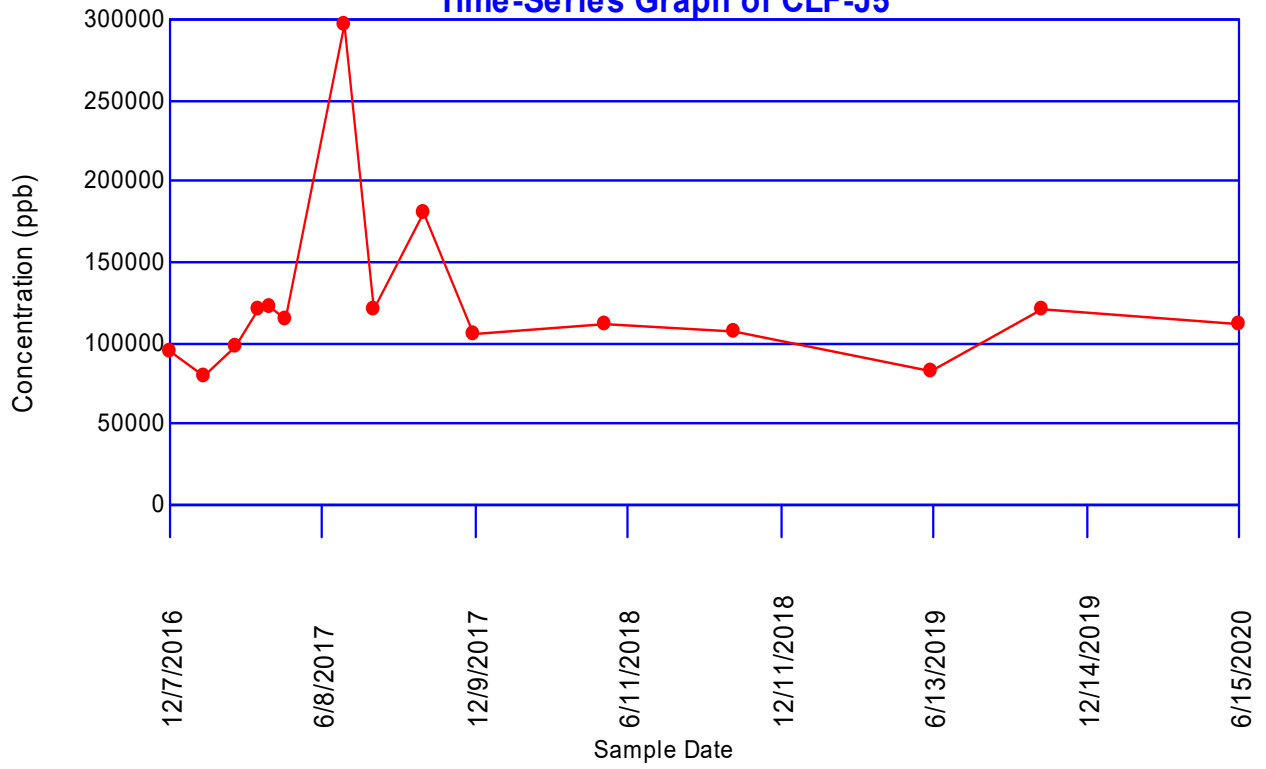
Sample Standard Deviation = 53159.5

W Statistic = 0.642054

**5% Critical value of 0.881 exceeds 0.642054**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.835 exceeds 0.642054**  
**Evidence of non-normality at 99% level of significance**

### Calcium Time-Series Graph of CLF-J5



# Mann-Kendall Trend Analysis

Parameter: Calcium

Location: CLF-J5

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
78950.2	95061.3	-16111.1	0	1
98538.8	95061.3	3477.5	1	1
121487	95061.3	26425.7	2	1
122145	95061.3	27083.7	3	1
114426	95061.3	19364.7	4	1
297325	95061.3	202264	5	1
120823	95061.3	25761.7	6	1
180815	95061.3	85753.7	7	1
105625	95061.3	10563.7	8	1
111000	95061.3	15938.7	9	1
107000	95061.3	11938.7	10	1
82800	95061.3	-12261.3	10	2
121000	95061.3	25938.7	11	2
111000	95061.3	15938.7	12	2
98538.8	78950.2	19588.6	13	2
121487	78950.2	42536.8	14	2
122145	78950.2	43194.8	15	2
114426	78950.2	35475.8	16	2
297325	78950.2	218375	17	2
120823	78950.2	41872.8	18	2
180815	78950.2	101865	19	2
105625	78950.2	26674.8	20	2
111000	78950.2	32049.8	21	2
107000	78950.2	28049.8	22	2
82800	78950.2	3849.8	23	2
121000	78950.2	42049.8	24	2
111000	78950.2	32049.8	25	2
121487	98538.8	22948.2	26	2
122145	98538.8	23606.2	27	2
114426	98538.8	15887.2	28	2
297325	98538.8	198786	29	2
120823	98538.8	22284.2	30	2
180815	98538.8	82276.2	31	2
105625	98538.8	7086.2	32	2
111000	98538.8	12461.2	33	2
107000	98538.8	8461.2	34	2
82800	98538.8	-15738.8	34	3
121000	98538.8	22461.2	35	3
111000	98538.8	12461.2	36	3
122145	121487	658	37	3
114426	121487	-7061	37	4
297325	121487	175838	38	4
120823	121487	-664	38	5
180815	121487	59328	39	5

105625	121487	-15862	39	6
111000	121487	-10487	39	7
107000	121487	-14487	39	8
82800	121487	-38687	39	9
121000	121487	-487	39	10
111000	121487	-10487	39	11
114426	122145	-7719	39	12
297325	122145	175180	40	12
120823	122145	-1322	40	13
180815	122145	58670	41	13
105625	122145	-16520	41	14
111000	122145	-11145	41	15
107000	122145	-15145	41	16
82800	122145	-39345	41	17
121000	122145	-1145	41	18
111000	122145	-11145	41	19
297325	114426	182899	42	19
120823	114426	6397	43	19
180815	114426	66389	44	19
105625	114426	-8801	44	20
111000	114426	-3426	44	21
107000	114426	-7426	44	22
82800	114426	-31626	44	23
121000	114426	6574	45	23
111000	114426	-3426	45	24
120823	297325	-176502	45	25
180815	297325	-116510	45	26
105625	297325	-191700	45	27
111000	297325	-186325	45	28
107000	297325	-190325	45	29
82800	297325	-214525	45	30
121000	297325	-176325	45	31
111000	297325	-186325	45	32
180815	120823	59992	46	32
105625	120823	-15198	46	33
111000	120823	-9823	46	34
107000	120823	-13823	46	35
82800	120823	-38023	46	36
121000	120823	177	47	36
111000	120823	-9823	47	37
105625	180815	-75190	47	38
111000	180815	-69815	47	39
107000	180815	-73815	47	40
82800	180815	-98015	47	41
121000	180815	-59815	47	42
111000	180815	-69815	47	43
111000	105625	5375	48	43
107000	105625	1375	49	43
82800	105625	-22825	49	44
121000	105625	15375	50	44
111000	105625	5375	51	44

107000	111000	-4000	51	45
82800	111000	-28200	51	46
121000	111000	10000	52	46
111000	111000	0	52	46
82800	107000	-24200	52	47
121000	107000	14000	53	47
111000	107000	4000	54	47
121000	82800	38200	55	47
111000	82800	28200	56	47
111000	121000	-10000	56	48

S Statistic = 56 - 48 = 8

---

Tied Group	Value	Members
1	111000	2

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 407.333

Z-Score = 0.346835

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|0.346835| <= 1.97737 indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Calcium

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.319258	0.125305	0.525	None

Loc.	Date	Conc.	Outlier
CLF-S13	12/7/2016	111064	FALSE
	1/18/2017	165561	FALSE
	2/23/2017	217307	FALSE
	3/22/2017	269982	FALSE
	4/5/2017	240010	FALSE
	4/25/2017	215059	FALSE
	7/6/2017	118300	FALSE
	8/8/2017	104065	FALSE
	10/9/2017	104990	FALSE
	12/6/2017	163020	FALSE
	5/15/2018	191500	FALSE
	10/16/2018	123000	FALSE
	6/11/2019	147000	FALSE
	10/22/2019	88900	FALSE
	6/15/2020	141000	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Calcium

Location: CLF-S13

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	88900	269982	181082	0.515	93257.2
2	104065	240010	135945	0.3306	44943.4
3	104990	217307	112317	0.2495	28023.1
4	111064	215059	103995	0.1878	19530.3
5	118300	191500	73200	0.1353	9903.96
6	123000	165561	42561	0.088	3745.37
7	141000	163020	22020	0.0433	953.466
8	147000	147000	0		
9	163020	141000	-22020		
10	165561	123000	-42561		
11	191500	118300	-73200		
12	215059	111064	-103995		
13	217307	104990	-112317		
14	240010	104065	-135945		
15	269982	88900	-181082		

---

Sum of b values = 200357

Sample Standard Deviation = 55477.2

W Statistic = 0.931645

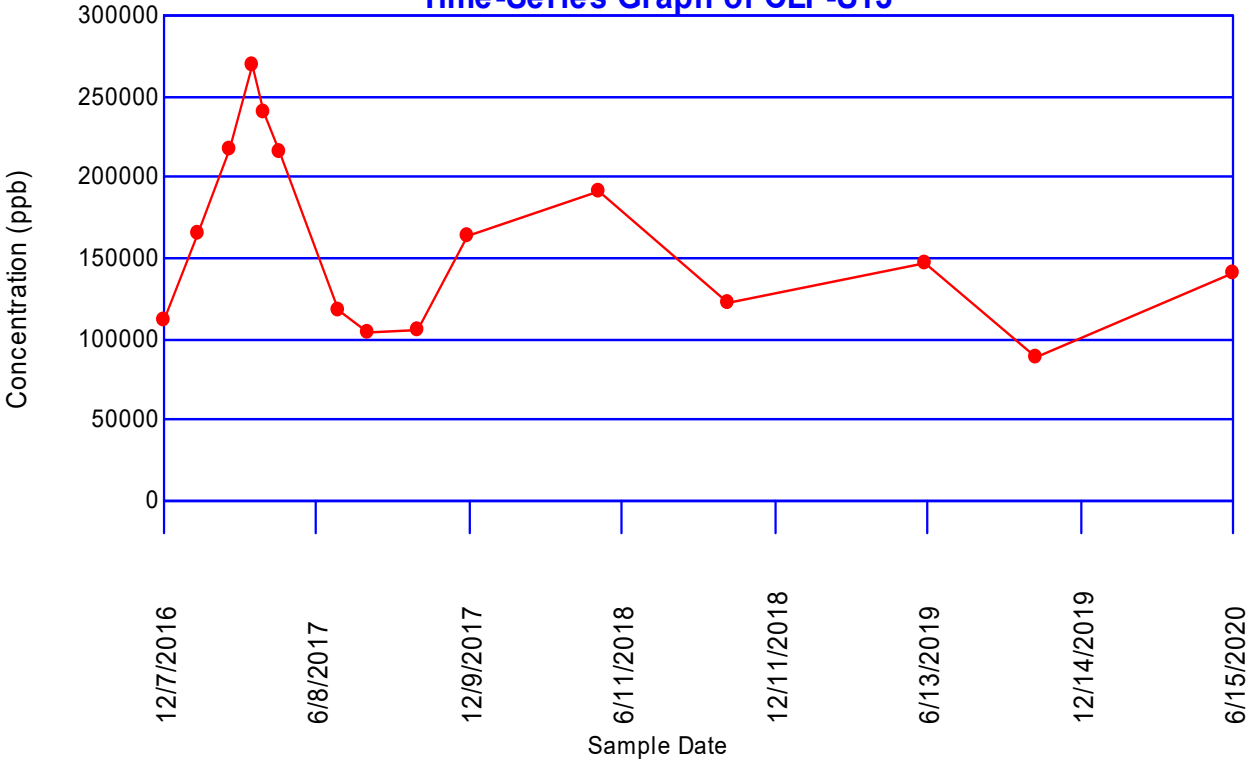
5% Critical value of 0.881 is less than 0.931645

Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.931645

Data is normally distributed at 99% level of significance

# Calcium Time-Series Graph of CLF-S13



**Mann-Kendall Trend Analysis**  
**Parameter: Calcium**  
**Location: CLF-S13**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
165561	111064	54497	1	0
217307	111064	106243	2	0
269982	111064	158918	3	0
240010	111064	128946	4	0
215059	111064	103995	5	0
118300	111064	7236	6	0
104065	111064	-6999	6	1
104990	111064	-6074	6	2
163020	111064	51956	7	2
191500	111064	80436	8	2
123000	111064	11936	9	2
147000	111064	35936	10	2
88900	111064	-22164	10	3
141000	111064	29936	11	3
217307	165561	51746	12	3
269982	165561	104421	13	3
240010	165561	74449	14	3
215059	165561	49498	15	3
118300	165561	-47261	15	4
104065	165561	-61496	15	5
104990	165561	-60571	15	6
163020	165561	-2541	15	7
191500	165561	25939	16	7
123000	165561	-42561	16	8
147000	165561	-18561	16	9
88900	165561	-76661	16	10
141000	165561	-24561	16	11
269982	217307	52675	17	11
240010	217307	22703	18	11
215059	217307	-2248	18	12
118300	217307	-99007	18	13
104065	217307	-113242	18	14
104990	217307	-112317	18	15
163020	217307	-54287	18	16
191500	217307	-25807	18	17
123000	217307	-94307	18	18
147000	217307	-70307	18	19
88900	217307	-128407	18	20
141000	217307	-76307	18	21
240010	269982	-29972	18	22
215059	269982	-54923	18	23
118300	269982	-151682	18	24
104065	269982	-165917	18	25
104990	269982	-164992	18	26

163020	269982	-106962	18	27
191500	269982	-78482	18	28
123000	269982	-146982	18	29
147000	269982	-122982	18	30
88900	269982	-181082	18	31
141000	269982	-128982	18	32
215059	240010	-24951	18	33
118300	240010	-121710	18	34
104065	240010	-135945	18	35
104990	240010	-135020	18	36
163020	240010	-76990	18	37
191500	240010	-48510	18	38
123000	240010	-117010	18	39
147000	240010	-93010	18	40
88900	240010	-151110	18	41
141000	240010	-99010	18	42
118300	215059	-96759	18	43
104065	215059	-110994	18	44
104990	215059	-110069	18	45
163020	215059	-52039	18	46
191500	215059	-23559	18	47
123000	215059	-92059	18	48
147000	215059	-68059	18	49
88900	215059	-126159	18	50
141000	215059	-74059	18	51
104065	118300	-14235	18	52
104990	118300	-13310	18	53
163020	118300	44720	19	53
191500	118300	73200	20	53
123000	118300	4700	21	53
147000	118300	28700	22	53
88900	118300	-29400	22	54
141000	118300	22700	23	54
104990	104065	925	24	54
163020	104065	58955	25	54
191500	104065	87435	26	54
123000	104065	18935	27	54
147000	104065	42935	28	54
88900	104065	-15165	28	55
141000	104065	36935	29	55
163020	104990	58030	30	55
191500	104990	86510	31	55
123000	104990	18010	32	55
147000	104990	42010	33	55
88900	104990	-16090	33	56
141000	104990	36010	34	56
191500	163020	28480	35	56
123000	163020	-40020	35	57
147000	163020	-16020	35	58
88900	163020	-74120	35	59
141000	163020	-22020	35	60

123000	191500	-68500	35	61
147000	191500	-44500	35	62
88900	191500	-102600	35	63
141000	191500	-50500	35	64
147000	123000	24000	36	64
88900	123000	-34100	36	65
141000	123000	18000	37	65
88900	147000	-58100	37	66
141000	147000	-6000	37	67
141000	88900	52100	38	67

S Statistic = 38 - 67 = -29

---

**Tied Group Value Members**

---

**Time Period Observations**

12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -1.38564

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**| -1.38564 | <= 1.97737 indicating no evidence of a trend**

## Dixon's Test for Outliers

Parameter: Calcium

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.149384	0.0119261	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S05	1/18/2017	76432	FALSE
	4/5/2017	110104	FALSE
	4/25/2017	112725	FALSE
	10/16/2018	95800	FALSE
	10/22/2019	120000	FALSE
	6/29/2020	70800	FALSE
	12/5/2020	90000	FALSE
	3/26/2021	71300	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Calcium

Location: CLF-S05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	70800	120000	49200	0.6052	29775.8
2	71300	112725	41425	0.3164	13106.9
3	76432	110104	33672	0.1743	5869.03
4	90000	95800	5800	0.0561	325.38
5	95800	90000	-5800		
6	110104	76432	-33672		
7	112725	71300	-41425		
8	120000	70800	-49200		

---

Sum of b values = 49077.1

Sample Standard Deviation = 19509.9

W Statistic = 0.903965

5% Critical value of 0.818 is less than 0.903965

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.903965

Data is normally distributed at 99% level of significance



## Mann-Kendall Trend Analysis

Parameter: Calcium

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

---

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
110104	76432	33672	1	0
112725	76432	36293	2	0
95800	76432	19368	3	0
120000	76432	43568	4	0
70800	76432	-5632	4	1
90000	76432	13568	5	1
71300	76432	-5132	5	2
112725	110104	2621	6	2
95800	110104	-14304	6	3
120000	110104	9896	7	3
70800	110104	-39304	7	4
90000	110104	-20104	7	5
71300	110104	-38804	7	6
95800	112725	-16925	7	7
120000	112725	7275	8	7
70800	112725	-41925	8	8
90000	112725	-22725	8	9
71300	112725	-41425	8	10
120000	95800	24200	9	10
70800	95800	-25000	9	11
90000	95800	-5800	9	12
71300	95800	-24500	9	13
70800	120000	-49200	9	14
90000	120000	-30000	9	15
71300	120000	-48700	9	16
90000	70800	19200	10	16
71300	70800	500	11	16
71300	90000	-18700	11	17

S Statistic = 11 - 17 = -6

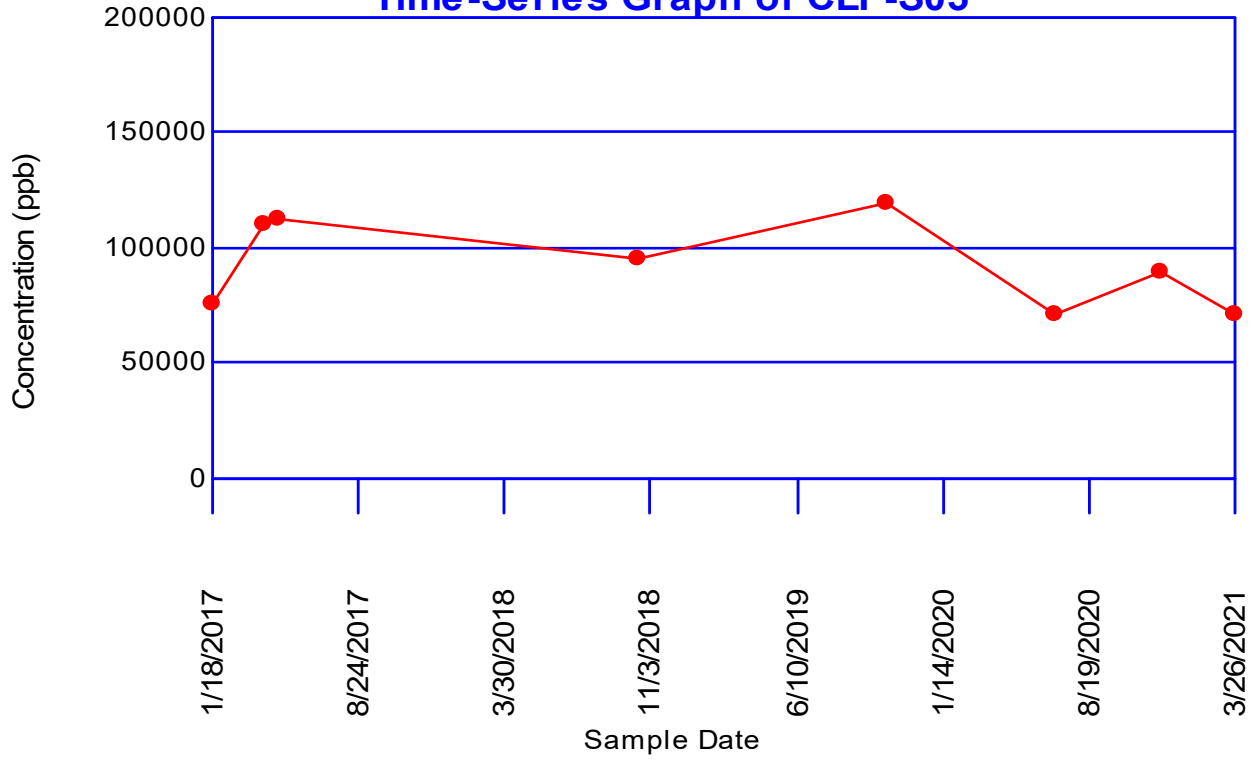
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)

Probability of obtaining S >= |-6| is 0.548

0.548 >= 0.025 indicating no evidence of a trend

# Calcium

## Time-Series Graph of CLF-S05



## Concentrations (ppb)

Parameter: Chloride

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Total Measurements: 74

Total Non-Detect: 4

Percent Non-Detects: 5.40541%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

There are 6 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

CLF-J2	15	0 (0%)	12/7/2016	9.43428	12510
			1/18/2017	8.99669	8076.3
			2/23/2017	9.2044	9940.8
			3/22/2017	9.55488	14113.4
			4/5/2017	9.24416	10344
			4/25/2017	9.08418	8814.7
			7/6/2017	10.7996	49000
			8/8/2017	9.42545	12400
			10/9/2017	10.8357	50800
			12/6/2017	8.92266	7500
			5/15/2018	8.88184	7200
			10/16/2018	8.43381	4600
			6/11/2019	8.31874	4100
			10/22/2019	9.3501	11500
			6/29/2020	6.90776	1000
	<b>12/5/2020</b>	<b>8.36637</b>	<b>4300</b>		
	<b>3/26/2021</b>	<b>8.00637</b>	<b>3000</b>		

CLF-J3	14	0 (0%)	12/7/2016	9.43994	12580.9
			1/18/2017	8.93253	7574.4
			2/23/2017	9.19974	9894.6
			3/22/2017	9.55392	14099.8
			4/5/2017	9.23982	10299.2
			7/6/2017	10.7996	49000
			8/8/2017	9.40919	12200
			10/9/2017	10.8454	51300
			12/6/2017	8.9359	7600
			5/15/2018	9.69277	16200
			10/16/2018	8.43381	4600
			6/11/2019	8.29405	4000
			10/22/2019	9.37585	11800
			6/15/2020	9.74097	17000
				<b>12/5/2020</b>	<b>8.38936</b>
	<b>3/26/2021</b>	<b>8.00637</b>	<b>3000</b>		

CLF-J5	15	0 (0%)	12/7/2016	9.26466	10558.2
			1/18/2017	8.83736	6886.8
			2/23/2017	9.20557	9952.4
			3/22/2017	9.56809	14301.1
			4/5/2017	9.34766	11471.9
			4/25/2017	8.91578	7448.6

			7/6/2017	11.2398	76100
			8/8/2017	9.48037	13100
			10/9/2017	11.0929	65700
			12/6/2017	8.85367	7000
			5/15/2018	9.5956	14700
			10/16/2018	7.97247	2900
			6/11/2019	8.00637	3000
			10/22/2019	9.04782	8500
			6/15/2020	9.74683	17100
			<b>12/5/2020</b>	<b>7.82405</b>	<b>2500</b>
			<b>3/26/2021</b>	<b>7.74066</b>	<b>2300</b>
<hr/>					
CLF-S05	8	1 (12.5%)	1/18/2017	8.71868	6116.1
			4/5/2017	9.04842	8505.1
			4/25/2017	8.57138	5278.4
			10/16/2018	6.80239	900
			10/22/2019	9.55393	14100
			6/29/2020	ND<6.90776	ND<1000
			12/5/2020	8.36637	4300
			3/26/2021	7.69621	2200
<hr/>					
CLF-S06	7	3 (42.8571%)	1/18/2017	7.47511	1763.6
			4/5/2017	7.65378	2108.6
			4/25/2017	7.29138	1467.6
			10/16/2018	6.68461	800
			6/29/2020	ND<6.90776	ND<1000
			12/5/2020	ND<7.6009	ND<2000
			3/26/2021	ND<7.6009	ND<2000
<hr/>					
CLF-S13	15	0 (0%)	12/7/2016	8.16905	3530
			1/18/2017	9.09639	8923
			2/23/2017	9.13093	9236.6
			3/22/2017	8.74297	6266.5
			4/5/2017	8.76205	6387.2
			4/25/2017	8.61733	5526.6
			7/6/2017	8.03916	3100
			8/8/2017	8.03916	3100
			10/9/2017	8.10168	3300
			12/6/2017	8.38936	4400
			5/15/2018	8.96188	7800
			10/16/2018	8.21609	3700
			6/11/2019	8.18869	3600
			10/22/2019	7.6009	2000
			6/15/2020	7.86327	2600
			<b>12/5/2020</b>	<b>ND&lt;7.6009</b>	<b>ND&lt;2000</b>
			<b>3/26/2021</b>	<b>8.80986</b>	<b>6700</b>

There are 2 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
CLF-C03	17	0 (0%)	12/7/2016	9.41148	12228
			1/18/2017	9.97168	21411.5
			2/23/2017	10.459	34857.4
			3/22/2017	9.09631	8922.3
			4/5/2017	9.15259	9438.9
			4/25/2017	8.70043	6005.5

			7/6/2017	9.11603	9100
			8/8/2017	9.40096	12100
			10/9/2017	9.14846	9400
			12/6/2017	8.68271	5900
			5/15/2018	9.65503	15600
			10/16/2018	7.93737	2800
			6/11/2019	8.63052	5600
			10/22/2019	8.537	5100
			6/15/2020	8.79482	6600
			12/5/2020	8.537	5100
			3/26/2021	10.0605	23400
<hr/>					
CLF-OPP	17	2 (11.7647%)	12/7/2016	7.83597	2530
			1/18/2017	8.04815	3128
			2/23/2017	8.28574	3966.9
			3/22/2017	7.47755	1767.9
			4/5/2017	7.31269	1499.2
			4/25/2017	7.2241	1372.1
			7/6/2017	7.09008	1200
			8/8/2017	7.54961	1900
			10/9/2017	7.24423	1400
			12/6/2017	7.24423	1400
			5/15/2018	7.37776	1600
			10/16/2018	6.55108	700
			6/11/2019	7.24423	1400
			10/22/2019	7.31322	1500
			6/15/2020	7.17012	1300
			12/5/2020	ND<7.6009	ND<2000
			3/26/2021	ND<7.6009	ND<2000
<hr/>					

## Dixon's Test for Outliers

Parameter: Chloride

Location: CLF-J2

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.533246	0.576496	0.525	10.8357
2	0.577104	0.604013	0.546	10.7996
3	0.104704	0.604013	0.521	6.90776
4	0.115451	0.504772	0.546	None

Loc.	Date	Conc.	Outlier
CLF-J2	12/7/2016	9.43428	FALSE
	1/18/2017	8.99669	FALSE
	2/23/2017	9.2044	FALSE
	3/22/2017	9.55488	FALSE
	4/5/2017	9.24416	FALSE
	4/25/2017	9.08418	FALSE
	7/6/2017	<b>10.7996</b>	<b>TRUE</b>
	8/8/2017	9.42545	FALSE
	10/9/2017	<b>10.8357</b>	<b>TRUE</b>
	12/6/2017	8.92266	FALSE
	5/15/2018	8.88184	FALSE
	10/16/2018	8.43381	FALSE
	6/11/2019	8.31874	FALSE
	10/22/2019	9.3501	FALSE
	6/29/2020	<b>6.90776</b>	<b>TRUE</b>

## Shapiro-Wilks Test of Normality

Parameter: Chloride

Location: CLF-J2

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	6.90776	10.8357	3.9279	0.515	2.02287
2	8.31874	10.7996	2.48083	0.3306	0.820163
3	8.43381	9.55488	1.12107	0.2495	0.279707
4	8.88184	9.43428	0.552447	0.1878	0.10375
5	8.92266	9.42545	0.502793	0.1353	0.068028
6	8.99669	9.3501	0.353413	0.088	0.0311004
7	9.08418	9.24416	0.159986	0.0433	0.00692739
8	9.2044	9.2044	0		
9	9.24416	9.08418	-0.159986		
10	9.3501	8.99669	-0.353413		
11	9.42545	8.92266	-0.502793		
12	9.43428	8.88184	-0.552447		
13	9.55488	8.43381	-1.12107		
14	10.7996	8.31874	-2.48083		
15	10.8357	6.90776	-3.9279		

---

Sum of b values = 3.33254

Sample Standard Deviation = 0.937955

W Statistic = 0.901694

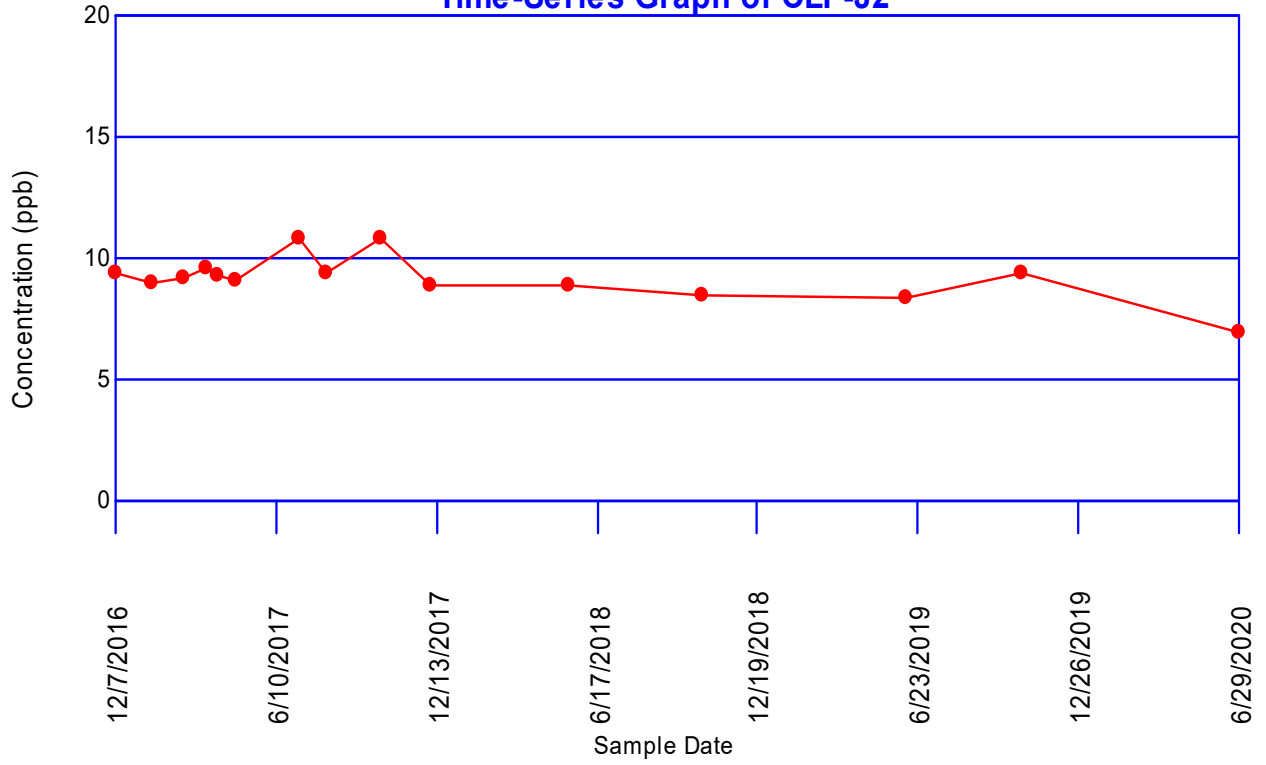
5% Critical value of 0.881 is less than 0.901694

Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.901694

Data is normally distributed at 99% level of significance

# Chloride Time-Series Graph of CLF-J2





**Mann-Kendall Trend Analysis**  
**Parameter: Chloride**  
**Location: CLF-J2**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8.99669	9.43428	-0.437594	0	1
9.2044	9.43428	-0.229881	0	2
9.55488	9.43428	0.120596	1	2
9.24416	9.43428	-0.190122	1	3
9.08418	9.43428	-0.350108	1	4
10.7996	9.43428	1.36529	2	4
9.42545	9.43428	-0.00883185	2	5
10.8357	9.43428	1.40137	3	5
8.92266	9.43428	-0.511625	3	6
8.88184	9.43428	-0.552447	3	7
8.43381	9.43428	-1.00047	3	8
8.31874	9.43428	-1.11554	3	9
9.3501	9.43428	-0.0841813	3	10
6.90776	9.43428	-2.52653	3	11
9.2044	8.99669	0.207714	4	11
9.55488	8.99669	0.558191	5	11
9.24416	8.99669	0.247473	6	11
9.08418	8.99669	0.0874869	7	11
10.7996	8.99669	1.80289	8	11
9.42545	8.99669	0.428763	9	11
10.8357	8.99669	1.83896	10	11
8.92266	8.99669	-0.0740308	10	12
8.88184	8.99669	-0.114853	10	13
8.43381	8.99669	-0.562878	10	14
8.31874	8.99669	-0.677947	10	15
9.3501	8.99669	0.353413	11	15
6.90776	8.99669	-2.08893	11	16
9.55488	9.2044	0.350477	12	16
9.24416	9.2044	0.0397591	13	16
9.08418	9.2044	-0.120227	13	17
10.7996	9.2044	1.59517	14	17
9.42545	9.2044	0.221049	15	17
10.8357	9.2044	1.63125	16	17
8.92266	9.2044	-0.281744	16	18
8.88184	9.2044	-0.322566	16	19
8.43381	9.2044	-0.770591	16	20
8.31874	9.2044	-0.885661	16	21
9.3501	9.2044	0.1457	17	21
6.90776	9.2044	-2.29665	17	22
9.24416	9.55488	-0.310718	17	23
9.08418	9.55488	-0.470704	17	24
10.7996	9.55488	1.2447	18	24
9.42545	9.55488	-0.129428	18	25
10.8357	9.55488	1.28077	19	25

8.92266	9.55488	-0.632222	19	26
8.88184	9.55488	-0.673044	19	27
8.43381	9.55488	-1.12107	19	28
8.31874	9.55488	-1.23614	19	29
9.3501	9.55488	-0.204778	19	30
6.90776	9.55488	-2.64712	19	31
9.08418	9.24416	-0.159986	19	32
10.7996	9.24416	1.55541	20	32
9.42545	9.24416	0.18129	21	32
10.8357	9.24416	1.59149	22	32
8.92266	9.24416	-0.321504	22	33
8.88184	9.24416	-0.362326	22	34
8.43381	9.24416	-0.81035	22	35
8.31874	9.24416	-0.92542	22	36
9.3501	9.24416	0.10594	23	36
6.90776	9.24416	-2.33641	23	37
10.7996	9.08418	1.7154	24	37
9.42545	9.08418	0.341276	25	37
10.8357	9.08418	1.75148	26	37
8.92266	9.08418	-0.161518	26	38
8.88184	9.08418	-0.20234	26	39
8.43381	9.08418	-0.650364	26	40
8.31874	9.08418	-0.765434	26	41
9.3501	9.08418	0.265926	27	41
6.90776	9.08418	-2.17642	27	42
9.42545	10.7996	-1.37412	27	43
10.8357	10.7996	0.0360761	28	43
8.92266	10.7996	-1.87692	28	44
8.88184	10.7996	-1.91774	28	45
8.43381	10.7996	-2.36576	28	46
8.31874	10.7996	-2.48083	28	47
9.3501	10.7996	-1.44947	28	48
6.90776	10.7996	-3.89182	28	49
10.8357	9.42545	1.4102	29	49
8.92266	9.42545	-0.502793	29	50
8.88184	9.42545	-0.543615	29	51
8.43381	9.42545	-0.99164	29	52
8.31874	9.42545	-1.10671	29	53
9.3501	9.42545	-0.0753494	29	54
6.90776	9.42545	-2.5177	29	55
8.92266	10.8357	-1.91299	29	56
8.88184	10.8357	-1.95382	29	57
8.43381	10.8357	-2.40184	29	58
8.31874	10.8357	-2.51691	29	59
9.3501	10.8357	-1.48555	29	60
6.90776	10.8357	-3.9279	29	61
8.88184	8.92266	-0.040822	29	62
8.43381	8.92266	-0.488847	29	63
8.31874	8.92266	-0.603916	29	64
9.3501	8.92266	0.427444	30	64
6.90776	8.92266	-2.0149	30	65

8.43381	8.88184	-0.448025	30	66
8.31874	8.88184	-0.563094	30	67
9.3501	8.88184	0.468266	31	67
6.90776	8.88184	-1.97408	31	68
8.31874	8.43381	-0.115069	31	69
9.3501	8.43381	0.916291	32	69
6.90776	8.43381	-1.52606	32	70
9.3501	8.31874	1.03136	33	70
6.90776	8.31874	-1.41099	33	71
6.90776	9.3501	-2.44235	33	72

S Statistic = 33 - 72 = -39

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
-------------	--------------

12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/29/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -1.88051

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**| -1.88051 | <= 1.97737 indicating no evidence of a trend**

## Dixon's Test for Outliers

Parameter: Chloride

Location: CLF-J3

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 14 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.577379	0.441269	0.546	10.8454
2	0.467844	0.441269	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J3	12/7/2016	9.43994	FALSE
	1/18/2017	8.93253	FALSE
	2/23/2017	9.19974	FALSE
	3/22/2017	9.55392	FALSE
	4/5/2017	9.23982	FALSE
	7/6/2017	10.7996	FALSE
	8/8/2017	9.40919	FALSE
	10/9/2017	<b>10.8454</b>	<b>TRUE</b>
	12/6/2017	8.9359	FALSE
	5/15/2018	9.69277	FALSE
	10/16/2018	8.43381	FALSE
	6/11/2019	8.29405	FALSE
	10/22/2019	9.37585	FALSE
	6/15/2020	9.74097	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Chloride

Location: CLF-J3

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 14 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	8.29405	10.8454	2.5514	0.5251	1.33974
2	8.43381	10.7996	2.36576	0.3318	0.78496
3	8.93253	9.74097	0.808439	0.246	0.198876
4	8.9359	9.69277	0.756863	0.1802	0.136387
5	9.19974	9.55392	0.354171	0.124	0.0439173
6	9.23982	9.43994	0.200114	0.0727	0.0145483
7	9.37585	9.40919	0.0333364	0.024	0.000800074
8	9.40919	9.37585	-0.0333364		
9	9.43994	9.23982	-0.200114		
10	9.55392	9.19974	-0.354171		
11	9.69277	8.9359	-0.756863		
12	9.74097	8.93253	-0.808439		
13	10.7996	8.43381	-2.36576		
14	10.8454	8.29405	-2.5514		

---

Sum of b values = 2.51923

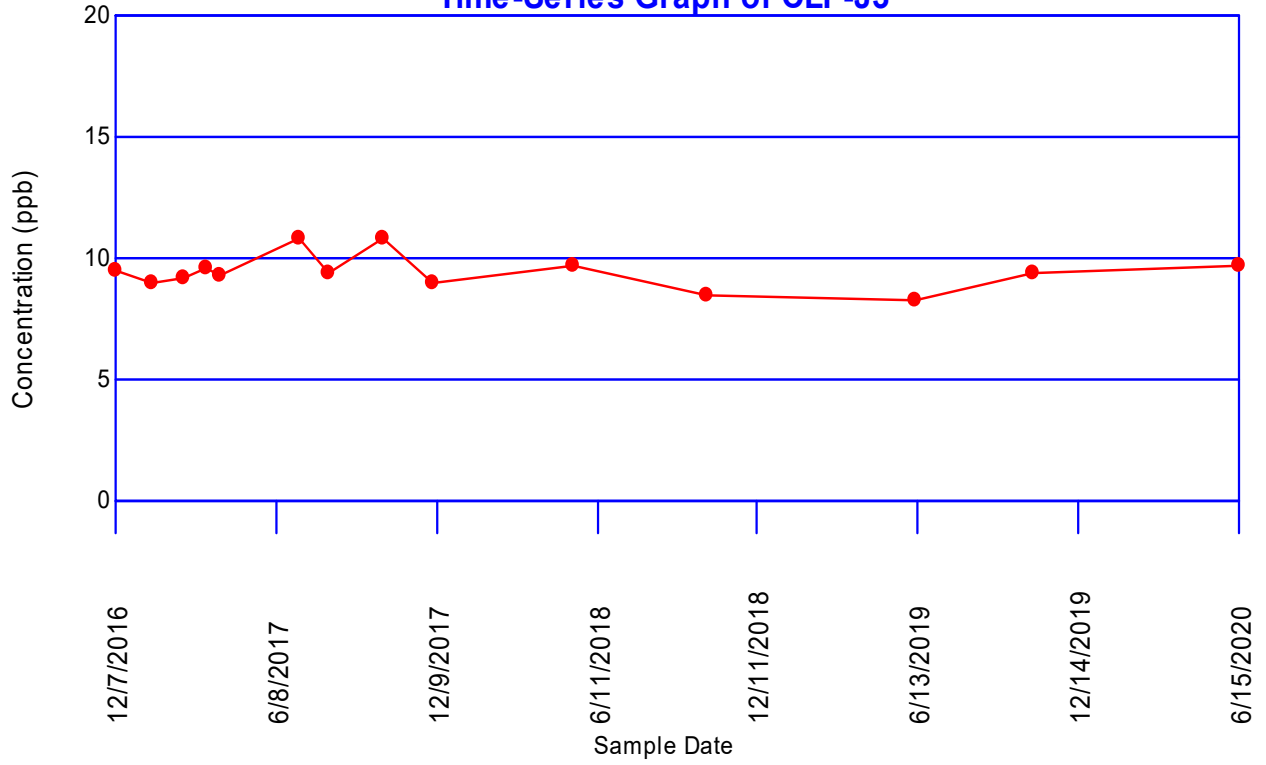
Sample Standard Deviation = 0.729922

W Statistic = 0.916302

5% Critical value of 0.874 is less than 0.916302  
Data is normally distributed at 95% level of significance

1% Critical value of 0.825 is less than 0.916302  
Data is normally distributed at 99% level of significance

# Chloride Time-Series Graph of CLF-J3



**Mann-Kendall Trend Analysis**  
**Parameter: Chloride**  
**Location: CLF-J3**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8.93253	9.43994	-0.507406	0	1
9.19974	9.43994	-0.240191	0	2
9.55392	9.43994	0.113981	1	2
9.23982	9.43994	-0.200114	1	3
10.7996	9.43994	1.35964	2	3
9.40919	9.43994	-0.0307438	2	4
10.8454	9.43994	1.40551	3	4
8.9359	9.43994	-0.504032	3	5
9.69277	9.43994	0.252831	4	5
8.43381	9.43994	-1.00612	4	6
8.29405	9.43994	-1.14589	4	7
9.37585	9.43994	-0.0640803	4	8
9.74097	9.43994	0.301034	5	8
9.19974	8.93253	0.267215	6	8
9.55392	8.93253	0.621386	7	8
9.23982	8.93253	0.307292	8	8
10.7996	8.93253	1.86705	9	8
9.40919	8.93253	0.476662	10	8
10.8454	8.93253	1.91292	11	8
8.9359	8.93253	0.00337411	12	8
9.69277	8.93253	0.760237	13	8
8.43381	8.93253	-0.498718	13	9
8.29405	8.93253	-0.63848	13	10
9.37585	8.93253	0.443325	14	10
9.74097	8.93253	0.808439	15	10
9.55392	9.19974	0.354171	16	10
9.23982	9.19974	0.0400771	17	10
10.7996	9.19974	1.59983	18	10
9.40919	9.19974	0.209447	19	10
10.8454	9.19974	1.6457	20	10
8.9359	9.19974	-0.263841	20	11
9.69277	9.19974	0.493022	21	11
8.43381	9.19974	-0.765933	21	12
8.29405	9.19974	-0.905695	21	13
9.37585	9.19974	0.17611	22	13
9.74097	9.19974	0.541224	23	13
9.23982	9.55392	-0.314094	23	14
10.7996	9.55392	1.24566	24	14
9.40919	9.55392	-0.144725	24	15
10.8454	9.55392	1.29153	25	15
8.9359	9.55392	-0.618012	25	16
9.69277	9.55392	0.138851	26	16
8.43381	9.55392	-1.1201	26	17
8.29405	9.55392	-1.25987	26	18

9.37585	9.55392	-0.178061	26	19
9.74097	9.55392	0.187053	27	19
10.7996	9.23982	1.55975	28	19
9.40919	9.23982	0.16937	29	19
10.8454	9.23982	1.60562	30	19
8.9359	9.23982	-0.303918	30	20
9.69277	9.23982	0.452945	31	20
8.43381	9.23982	-0.80601	31	21
8.29405	9.23982	-0.945772	31	22
9.37585	9.23982	0.136033	32	22
9.74097	9.23982	0.501147	33	22
9.40919	10.7996	-1.39038	33	23
10.8454	10.7996	0.0458705	34	23
8.9359	10.7996	-1.86367	34	24
9.69277	10.7996	-1.10681	34	25
8.43381	10.7996	-2.36576	34	26
8.29405	10.7996	-2.50553	34	27
9.37585	10.7996	-1.42372	34	28
9.74097	10.7996	-1.05861	34	29
10.8454	9.40919	1.43625	35	29
8.9359	9.40919	-0.473288	35	30
9.69277	9.40919	0.283575	36	30
8.43381	9.40919	-0.97538	36	31
8.29405	9.40919	-1.11514	36	32
9.37585	9.40919	-0.0333364	36	33
9.74097	9.40919	0.331777	37	33
8.9359	10.8454	-1.90954	37	34
9.69277	10.8454	-1.15268	37	35
8.43381	10.8454	-2.41163	37	36
8.29405	10.8454	-2.5514	37	37
9.37585	10.8454	-1.46959	37	38
9.74097	10.8454	-1.10448	37	39
9.69277	8.9359	0.756863	38	39
8.43381	8.9359	-0.502092	38	40
8.29405	8.9359	-0.641854	38	41
9.37585	8.9359	0.439951	39	41
9.74097	8.9359	0.805065	40	41
8.43381	9.69277	-1.25895	40	42
8.29405	9.69277	-1.39872	40	43
9.37585	9.69277	-0.316912	40	44
9.74097	9.69277	0.0482021	41	44
8.29405	8.43381	-0.139762	41	45
9.37585	8.43381	0.942043	42	45
9.74097	8.43381	1.30716	43	45
9.37585	8.29405	1.08181	44	45
9.74097	8.29405	1.44692	45	45
9.74097	9.37585	0.365114	46	45



S Statistic = 46 - 45 = 1

---

Tied Group	Value	Members
<b>Time Period</b>		<b>Observations</b>
12/7/2016		1
1/18/2017		1
2/23/2017		1
3/22/2017		1
4/5/2017		1
7/6/2017		1
8/8/2017		1
10/9/2017		1
12/6/2017		1
5/15/2018		1
10/16/2018		1
6/11/2019		1
10/22/2019		1
6/15/2020		1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = 0

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|0| \leq 1.97737$  indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Chloride

Location: CLF-J5

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.621439	0.487439	0.525	11.2398
2	0.663825	0.532855	0.546	11.0929
3	0.102698	0.532855	0.521	7.97247
4	0.196534	0.533148	0.546	None

Loc.	Date	Conc.	Outlier
CLF-J5	12/7/2016	9.26466	FALSE
	1/18/2017	8.83736	FALSE
	2/23/2017	9.20557	FALSE
	3/22/2017	9.56809	FALSE
	4/5/2017	9.34766	FALSE
	4/25/2017	8.91578	FALSE
	7/6/2017	<b>11.2398</b>	<b>TRUE</b>
	8/8/2017	9.48037	FALSE
	10/9/2017	<b>11.0929</b>	<b>TRUE</b>
	12/6/2017	8.85367	FALSE
	5/15/2018	9.5956	FALSE
	10/16/2018	<b>7.97247</b>	<b>TRUE</b>
	6/11/2019	8.00637	FALSE
	10/22/2019	9.04782	FALSE
	6/15/2020	9.74683	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Chloride

Location: CLF-J5

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	7.97247	11.2398	3.26734	0.515	1.68268
2	8.00637	11.0929	3.08649	0.3306	1.02039
3	8.83736	9.74683	0.909472	0.2495	0.226913
4	8.85367	9.5956	0.741937	0.1878	0.139336
5	8.91578	9.56809	0.65231	0.1353	0.0882576
6	9.04782	9.48037	0.432546	0.088	0.0380641
7	9.20557	9.34766	0.142087	0.0433	0.00615236
8	9.26466	9.26466	0		
9	9.34766	9.20557	-0.142087		
10	9.48037	9.04782	-0.432546		
11	9.56809	8.91578	-0.65231		
12	9.5956	8.85367	-0.741937		
13	9.74683	8.83736	-0.909472		
14	11.0929	8.00637	-3.08649		
15	11.2398	7.97247	-3.26734		

---

Sum of b values = 3.20179

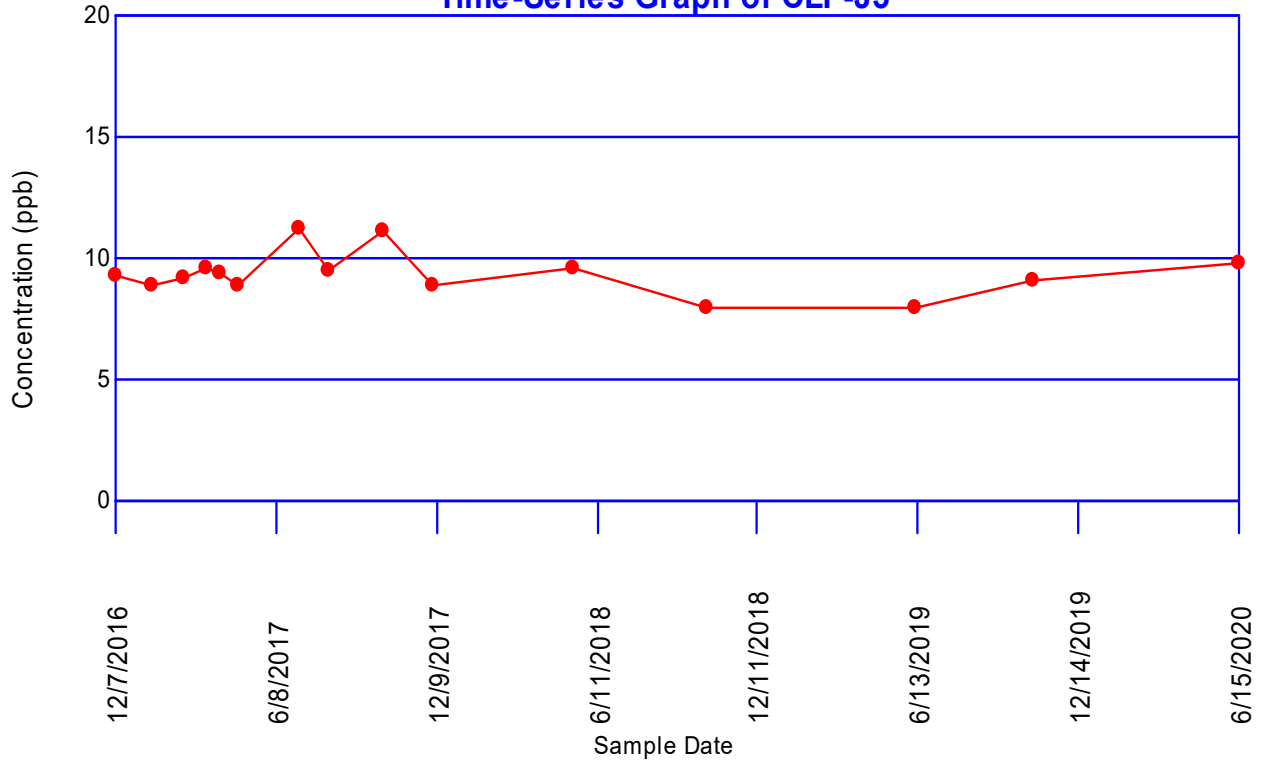
Sample Standard Deviation = 0.902812

W Statistic = 0.898388

5% Critical value of 0.881 is less than 0.898388  
Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.898388  
Data is normally distributed at 99% level of significance

# Chloride Time-Series Graph of CLF-J5



**Mann-Kendall Trend Analysis**  
**Parameter: Chloride**  
**Location: CLF-J5**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8.83736	9.26466	-0.427296	0	1
9.20557	9.26466	-0.0590891	0	2
9.56809	9.26466	0.303434	1	2
9.34766	9.26466	0.0829978	2	2
8.91578	9.26466	-0.348877	2	3
11.2398	9.26466	1.97515	3	3
9.48037	9.26466	0.215709	4	3
11.0929	9.26466	1.8282	5	3
8.85367	9.26466	-0.410993	5	4
9.5956	9.26466	0.330945	6	4
7.97247	9.26466	-1.29219	6	5
8.00637	9.26466	-1.25829	6	6
9.04782	9.26466	-0.216837	6	7
9.74683	9.26466	0.482176	7	7
9.20557	8.83736	0.368207	8	7
9.56809	8.83736	0.73073	9	7
9.34766	8.83736	0.510294	10	7
8.91578	8.83736	0.0784196	11	7
11.2398	8.83736	2.40244	12	7
9.48037	8.83736	0.643006	13	7
11.0929	8.83736	2.25549	14	7
8.85367	8.83736	0.0163036	15	7
9.5956	8.83736	0.758241	16	7
7.97247	8.83736	-0.864896	16	8
8.00637	8.83736	-0.830994	16	9
9.04782	8.83736	0.21046	17	9
9.74683	8.83736	0.909472	18	9
9.56809	9.20557	0.362523	19	9
9.34766	9.20557	0.142087	20	9
8.91578	9.20557	-0.289788	20	10
11.2398	9.20557	2.03423	21	10
9.48037	9.20557	0.274799	22	10
11.0929	9.20557	1.88729	23	10
8.85367	9.20557	-0.351904	23	11
9.5956	9.20557	0.390034	24	11
7.97247	9.20557	-1.2331	24	12
8.00637	9.20557	-1.1992	24	13
9.04782	9.20557	-0.157748	24	14
9.74683	9.20557	0.541265	25	14
9.34766	9.56809	-0.220436	25	15
8.91578	9.56809	-0.65231	25	16
11.2398	9.56809	1.67171	26	16
9.48037	9.56809	-0.0877242	26	17
11.0929	9.56809	1.52476	27	17

8.85367	9.56809	-0.714426	27	18
9.5956	9.56809	0.027511	28	18
7.97247	9.56809	-1.59563	28	19
8.00637	9.56809	-1.56172	28	20
9.04782	9.56809	-0.52027	28	21
9.74683	9.56809	0.178742	29	21
8.91578	9.34766	-0.431874	29	22
11.2398	9.34766	1.89215	30	22
9.48037	9.34766	0.132712	31	22
11.0929	9.34766	1.7452	32	22
8.85367	9.34766	-0.49399	32	23
9.5956	9.34766	0.247947	33	23
7.97247	9.34766	-1.37519	33	24
8.00637	9.34766	-1.34129	33	25
9.04782	9.34766	-0.299834	33	26
9.74683	9.34766	0.399178	34	26
11.2398	8.91578	2.32402	35	26
9.48037	8.91578	0.564586	36	26
11.0929	8.91578	2.17707	37	26
8.85367	8.91578	-0.0621159	37	27
9.5956	8.91578	0.679821	38	27
7.97247	8.91578	-0.943315	38	28
8.00637	8.91578	-0.909414	38	29
9.04782	8.91578	0.13204	39	29
9.74683	8.91578	0.831052	40	29
9.48037	11.2398	-1.75944	40	30
11.0929	11.2398	-0.146949	40	31
8.85367	11.2398	-2.38614	40	32
9.5956	11.2398	-1.6442	40	33
7.97247	11.2398	-3.26734	40	34
8.00637	11.2398	-3.23344	40	35
9.04782	11.2398	-2.19198	40	36
9.74683	11.2398	-1.49297	40	37
11.0929	9.48037	1.61249	41	37
8.85367	9.48037	-0.626702	41	38
9.5956	9.48037	0.115235	42	38
7.97247	9.48037	-1.5079	42	39
8.00637	9.48037	-1.474	42	40
9.04782	9.48037	-0.432546	42	41
9.74683	9.48037	0.266466	43	41
8.85367	11.0929	-2.23919	43	42
9.5956	11.0929	-1.49725	43	43
7.97247	11.0929	-3.12039	43	44
8.00637	11.0929	-3.08649	43	45
9.04782	11.0929	-2.04503	43	46
9.74683	11.0929	-1.34602	43	47
9.5956	8.85367	0.741937	44	47
7.97247	8.85367	-0.881199	44	48
8.00637	8.85367	-0.847298	44	49
9.04782	8.85367	0.194156	45	49
9.74683	8.85367	0.893168	46	49

7.97247	9.5956	-1.62314	46	50
8.00637	9.5956	-1.58924	46	51
9.04782	9.5956	-0.547781	46	52
9.74683	9.5956	0.151231	47	52
8.00637	7.97247	0.0339016	48	52
9.04782	7.97247	1.07536	49	52
9.74683	7.97247	1.77437	50	52
9.04782	8.00637	1.04145	51	52
9.74683	8.00637	1.74047	52	52
9.74683	9.04782	0.699012	53	52

S Statistic = 53 - 52 = 1

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = 0

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|0| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Chloride

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.234104	0.189655	0.525	None

Loc.	Date	Conc.	Outlier
CLF-S13	12/7/2016	3530	FALSE
	1/18/2017	8923	FALSE
	2/23/2017	9236.6	FALSE
	3/22/2017	6266.5	FALSE
	4/5/2017	6387.2	FALSE
	4/25/2017	5526.6	FALSE
	7/6/2017	3100	FALSE
	8/8/2017	3100	FALSE
	10/9/2017	3300	FALSE
	12/6/2017	4400	FALSE
	5/15/2018	7800	FALSE
	10/16/2018	3700	FALSE
	6/11/2019	3600	FALSE
	10/22/2019	2000	FALSE
	6/15/2020	2600	FALSE



## Shapiro-Wilks Test of Normality

Parameter: Chloride

Location: CLF-S13

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	2000	9236.6	7236.6	0.515	3726.85
2	2600	8923	6323	0.3306	2090.38
3	3100	7800	4700	0.2495	1172.65
4	3100	6387.2	3287.2	0.1878	617.336
5	3300	6266.5	2966.5	0.1353	401.367
6	3530	5526.6	1996.6	0.088	175.701
7	3600	4400	800	0.0433	34.64
8	3700	3700	0		
9	4400	3600	-800		
10	5526.6	3530	-1996.6		
11	6266.5	3300	-2966.5		
12	6387.2	3100	-3287.2		
13	7800	3100	-4700		
14	8923	2600	-6323		
15	9236.6	2000	-7236.6		

---

Sum of b values = 8218.93

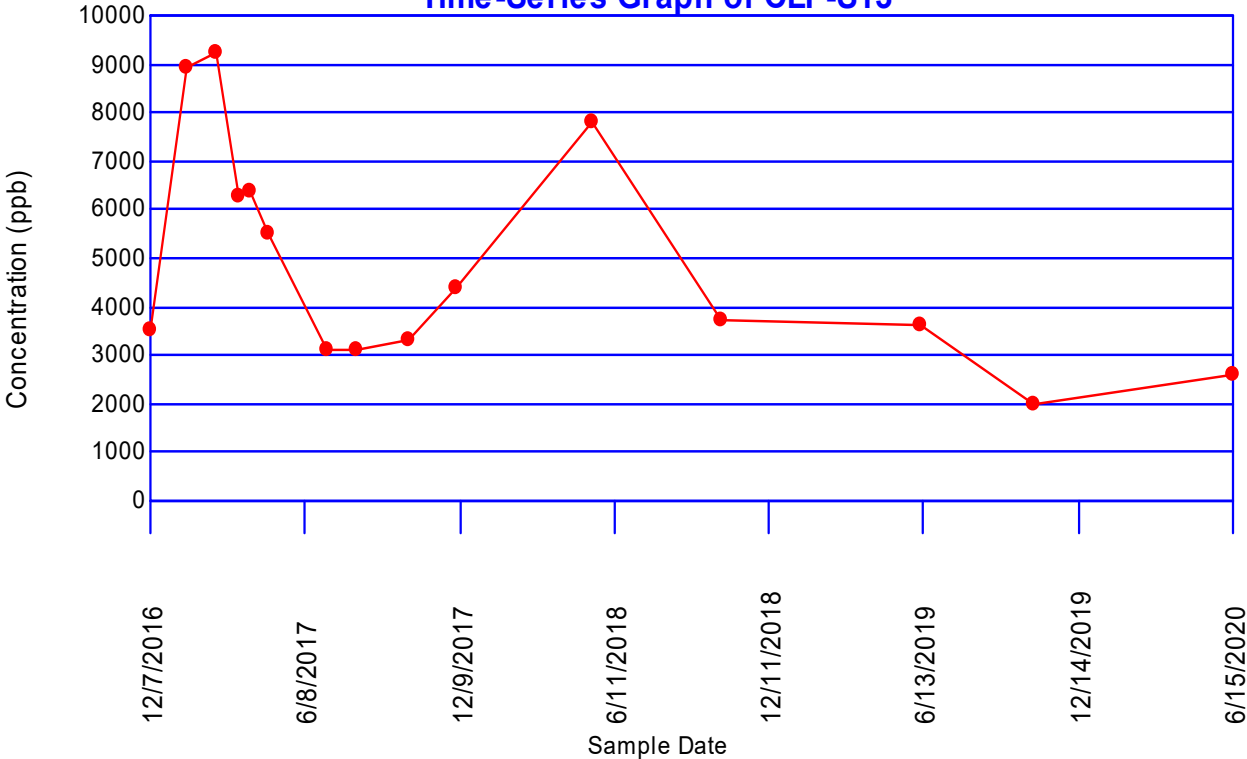
Sample Standard Deviation = 2327.92

W Statistic = 0.890358

5% Critical value of 0.881 is less than 0.890358  
Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.890358  
Data is normally distributed at 99% level of significance

### Chloride Time-Series Graph of CLF-S13



**Mann-Kendall Trend Analysis**  
**Parameter: Chloride**  
**Location: CLF-S13**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8923	3530	5393	1	0
9236.6	3530	5706.6	2	0
6266.5	3530	2736.5	3	0
6387.2	3530	2857.2	4	0
5526.6	3530	1996.6	5	0
3100	3530	-430	5	1
3100	3530	-430	5	2
3300	3530	-230	5	3
4400	3530	870	6	3
7800	3530	4270	7	3
3700	3530	170	8	3
3600	3530	70	9	3
2000	3530	-1530	9	4
2600	3530	-930	9	5
9236.6	8923	313.6	10	5
6266.5	8923	-2656.5	10	6
6387.2	8923	-2535.8	10	7
5526.6	8923	-3396.4	10	8
3100	8923	-5823	10	9
3100	8923	-5823	10	10
3300	8923	-5623	10	11
4400	8923	-4523	10	12
7800	8923	-1123	10	13
3700	8923	-5223	10	14
3600	8923	-5323	10	15
2000	8923	-6923	10	16
2600	8923	-6323	10	17
6266.5	9236.6	-2970.1	10	18
6387.2	9236.6	-2849.4	10	19
5526.6	9236.6	-3710	10	20
3100	9236.6	-6136.6	10	21
3100	9236.6	-6136.6	10	22
3300	9236.6	-5936.6	10	23
4400	9236.6	-4836.6	10	24
7800	9236.6	-1436.6	10	25
3700	9236.6	-5536.6	10	26
3600	9236.6	-5636.6	10	27
2000	9236.6	-7236.6	10	28
2600	9236.6	-6636.6	10	29
6387.2	6266.5	120.7	11	29
5526.6	6266.5	-739.9	11	30
3100	6266.5	-3166.5	11	31
3100	6266.5	-3166.5	11	32
3300	6266.5	-2966.5	11	33

4400	6266.5	-1866.5	11	34
7800	6266.5	1533.5	12	34
3700	6266.5	-2566.5	12	35
3600	6266.5	-2666.5	12	36
2000	6266.5	-4266.5	12	37
2600	6266.5	-3666.5	12	38
5526.6	6387.2	-860.6	12	39
3100	6387.2	-3287.2	12	40
3100	6387.2	-3287.2	12	41
3300	6387.2	-3087.2	12	42
4400	6387.2	-1987.2	12	43
7800	6387.2	1412.8	13	43
3700	6387.2	-2687.2	13	44
3600	6387.2	-2787.2	13	45
2000	6387.2	-4387.2	13	46
2600	6387.2	-3787.2	13	47
3100	5526.6	-2426.6	13	48
3100	5526.6	-2426.6	13	49
3300	5526.6	-2226.6	13	50
4400	5526.6	-1126.6	13	51
7800	5526.6	2273.4	14	51
3700	5526.6	-1826.6	14	52
3600	5526.6	-1926.6	14	53
2000	5526.6	-3526.6	14	54
2600	5526.6	-2926.6	14	55
3100	3100	0	14	55
3300	3100	200	15	55
4400	3100	1300	16	55
7800	3100	4700	17	55
3700	3100	600	18	55
3600	3100	500	19	55
2000	3100	-1100	19	56
2600	3100	-500	19	57
3300	3100	200	20	57
4400	3100	1300	21	57
7800	3100	4700	22	57
3700	3100	600	23	57
3600	3100	500	24	57
2000	3100	-1100	24	58
2600	3100	-500	24	59
4400	3300	1100	25	59
7800	3300	4500	26	59
3700	3300	400	27	59
3600	3300	300	28	59
2000	3300	-1300	28	60
2600	3300	-700	28	61
7800	4400	3400	29	61
3700	4400	-700	29	62
3600	4400	-800	29	63
2000	4400	-2400	29	64
2600	4400	-1800	29	65

3700	7800	-4100	29	66
3600	7800	-4200	29	67
2000	7800	-5800	29	68
2600	7800	-5200	29	69
3600	3700	-100	29	70
2000	3700	-1700	29	71
2600	3700	-1100	29	72
2000	3600	-1600	29	73
2600	3600	-1000	29	74
2600	2000	600	30	74

S Statistic = 30 - 74 = -44

---

Tied Group	Value	Members
1	3100	2

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 407.333

Z-Score = -2.13056

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**|-2.13056| > 1.97737 indicating a trend**

## Dixon's Test for Outliers

Parameter: Chloride

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.427092	0.0131491	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S05	1/18/2017	6116.1	FALSE
	4/5/2017	8505.1	FALSE
	4/25/2017	5278.4	FALSE
	10/16/2018	900	FALSE
	10/22/2019	14100	FALSE
	6/29/2020	ND<1000	FALSE
	12/5/2020	4300	FALSE
	3/26/2021	2200	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Chloride

Location: CLF-S05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	900	14100	13200	0.6052	7988.64
2	1000	8505.1	7505.1	0.3164	2374.61
3	2200	6116.1	3916.1	0.1743	682.576
4	4300	5278.4	978.4	0.0561	54.8882
5	5278.4	4300	-978.4		
6	6116.1	2200	-3916.1		
7	8505.1	1000	-7505.1		
8	14100	900	-13200		

---

Sum of b values = 11100.7

Sample Standard Deviation = 4421.36

W Statistic = 0.900517

5% Critical value of 0.818 is less than 0.900517

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.900517

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Chloride**  
**Location: CLF-S05**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

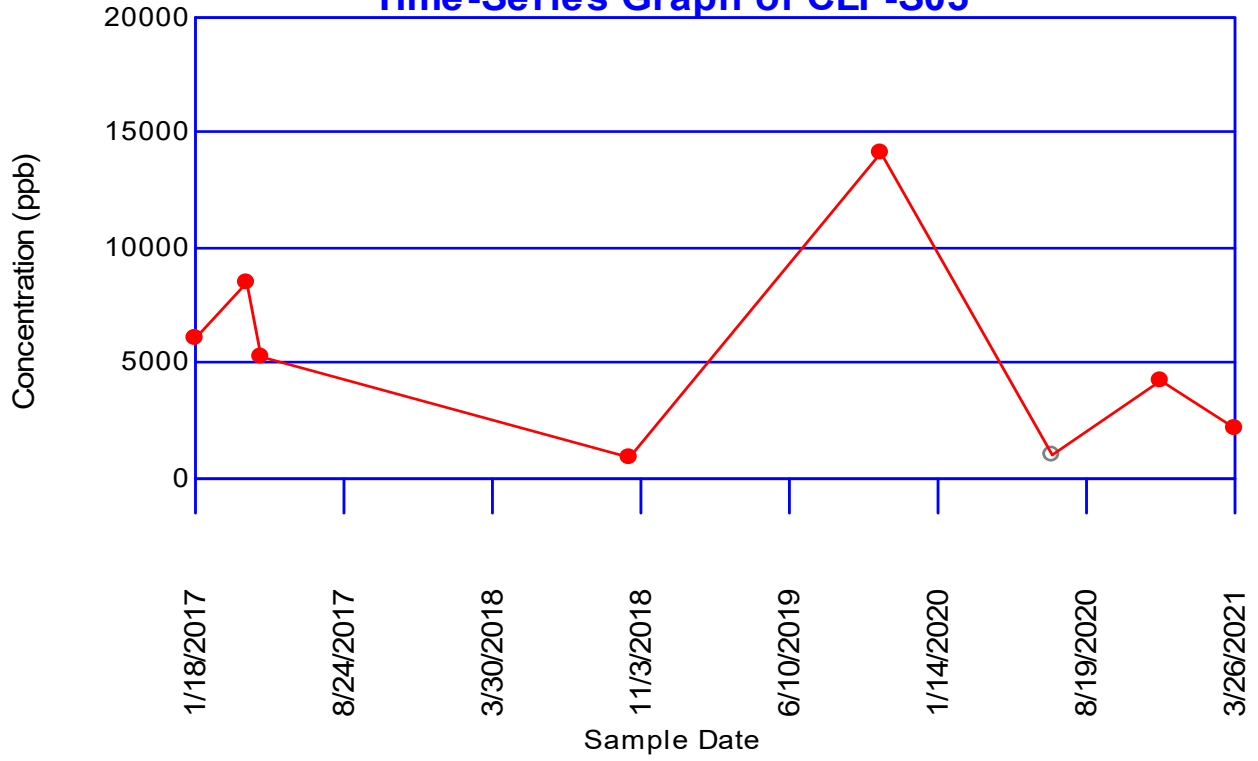
95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8505.1	6116.1	2389	1	0
5278.4	6116.1	-837.7	1	1
900	6116.1	-5216.1	1	2
14100	6116.1	7983.9	2	2
ND<1000	6116.1	-5116.1	2	3
4300	6116.1	-1816.1	2	4
2200	6116.1	-3916.1	2	5
5278.4	8505.1	-3226.7	2	6
900	8505.1	-7605.1	2	7
14100	8505.1	5594.9	3	7
ND<1000	8505.1	-7505.1	3	8
4300	8505.1	-4205.1	3	9
2200	8505.1	-6305.1	3	10
900	5278.4	-4378.4	3	11
14100	5278.4	8821.6	4	11
ND<1000	5278.4	-4278.4	4	12
4300	5278.4	-978.4	4	13
2200	5278.4	-3078.4	4	14
14100	900	13200	5	14
ND<1000	900	100	6	14
4300	900	3400	7	14
2200	900	1300	8	14
ND<1000	14100	-13100	8	15
4300	14100	-9800	8	16
2200	14100	-11900	8	17
4300	ND<1000	3300	9	17
2200	ND<1000	1200	10	17
2200	4300	-2100	10	18

S Statistic = 10 - 18 = -8  
 Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
 Probability of obtaining S >= |-8| is 0.398  
 0.398 >= 0.025 indicating no evidence of a trend



# Chloride Time-Series Graph of CLF-S05



## Concentrations (ppb)

Parameter: Fluoride

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Total Measurements: 74

Total Non-Detect: 65

Percent Non-Detects: 87.8378%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

There are 6 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

CLF-J2	15	13 (86.6667%)	12/7/2016	ND<6.21461	ND<500
			1/18/2017	5.13991	170.7
			2/23/2017	ND<6.21461	ND<500
			3/22/2017	ND<6.21461	ND<500
			4/5/2017	ND<6.21461	ND<500
			4/25/2017	ND<6.21461	ND<500
			7/6/2017	ND<6.21461	ND<500
			8/8/2017	ND<6.21461	ND<500
			10/9/2017	ND<6.21461	ND<500
			12/6/2017	ND<6.21461	ND<500
			5/15/2018	ND<6.21461	ND<500
			10/16/2018	ND<6.21461	ND<500
			6/11/2019	ND<6.21461	ND<500
			10/22/2019	ND<6.21461	ND<500
			6/29/2020	4.94164	140
			<b>12/5/2020</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>
			<b>3/26/2021</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>

CLF-J3	14	13 (92.8571%)	12/7/2016	ND<6.21461	ND<500
			1/18/2017	5.10958	165.6
			2/23/2017	ND<6.21461	ND<500
			3/22/2017	ND<6.21461	ND<500
			4/5/2017	ND<6.21461	ND<500
			7/6/2017	ND<6.21461	ND<500
			8/8/2017	ND<6.21461	ND<500
			10/9/2017	ND<6.21461	ND<500
			12/6/2017	ND<6.21461	ND<500
			5/15/2018	ND<6.21461	ND<500
			10/16/2018	ND<6.21461	ND<500
			6/11/2019	ND<6.21461	ND<500
			10/22/2019	ND<6.21461	ND<500
			6/15/2020	ND<6.21461	ND<500
			<b>12/5/2020</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>
			<b>3/26/2021</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>

CLF-J5	15	14 (93.3333%)	12/7/2016	ND<6.21461	ND<500
			1/18/2017	5.11739	166.9
			2/23/2017	ND<6.21461	ND<500
			3/22/2017	ND<6.21461	ND<500
			4/5/2017	ND<6.21461	ND<500
			4/25/2017	ND<6.21461	ND<500

			7/6/2017	ND<6.21461	ND<500
			8/8/2017	ND<6.21461	ND<500
			10/9/2017	ND<6.21461	ND<500
			12/6/2017	ND<6.21461	ND<500
			5/15/2018	ND<6.21461	ND<500
			10/16/2018	ND<6.21461	ND<500
			6/11/2019	ND<6.21461	ND<500
			10/22/2019	ND<6.21461	ND<500
			6/15/2020	ND<6.21461	ND<500
			<b>12/5/2020</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>
			<b>3/26/2021</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>
CLF-S05	8	6 (75%)	1/18/2017	5.11078	165.8
			4/5/2017	ND<6.21461	ND<500
			4/25/2017	ND<6.21461	ND<500
			10/16/2018	ND<6.21461	ND<500
			10/22/2019	ND<6.21461	ND<500
			6/29/2020	4.94164	140
			12/5/2020	ND<6.21461	ND<500
			3/26/2021	ND<6.21461	ND<500
CLF-S06	7	5 (71.4286%)	1/18/2017	5.60984	273.1
			4/5/2017	ND<6.21461	ND<500
			4/25/2017	ND<6.21461	ND<500
			10/16/2018	ND<6.21461	ND<500
			6/29/2020	5.34711	210
			12/5/2020	ND<6.21461	ND<500
			3/26/2021	ND<6.21461	ND<500
CLF-S13	15	14 (93.3333%)	12/7/2016	ND<6.21461	ND<500
			1/18/2017	5.3452	209.6
			2/23/2017	ND<6.21461	ND<500
			3/22/2017	ND<6.21461	ND<500
			4/5/2017	ND<6.21461	ND<500
			4/25/2017	ND<6.21461	ND<500
			7/6/2017	ND<6.21461	ND<500
			8/8/2017	ND<6.21461	ND<500
			10/9/2017	ND<6.21461	ND<500
			12/6/2017	ND<6.21461	ND<500
			5/15/2018	ND<6.21461	ND<500
			10/16/2018	ND<6.21461	ND<500
			6/11/2019	ND<6.21461	ND<500
			10/22/2019	ND<6.21461	ND<500
			6/15/2020	ND<6.21461	ND<500
			<b>12/5/2020</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>
			<b>3/26/2021</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>

There are 2 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
CLF-C03	17	13 (76.4706%)	12/7/2016	6.29231	540.4
			1/18/2017	5.50044	244.8
			2/23/2017	ND<6.21461	ND<500
			3/22/2017	ND<6.21461	ND<500
			4/5/2017	ND<6.21461	ND<500
			4/25/2017	ND<6.21461	ND<500

7/6/2017	ND<6.21461	ND<500
8/8/2017	6.39693	600
10/9/2017	6.21461	500
12/6/2017	ND<6.21461	ND<500
5/15/2018	ND<6.21461	ND<500
10/16/2018	ND<6.21461	ND<500
6/11/2019	ND<6.21461	ND<500
10/22/2019	ND<6.21461	ND<500
6/15/2020	ND<6.21461	ND<500
12/5/2020	ND<6.21461	ND<500
3/26/2021	ND<6.21461	ND<500

---

CLF-OPP	17	16 (94.1176%)	12/7/2016	ND<6.21461	ND<500
			1/18/2017	4.99383	147.5
			2/23/2017	ND<6.21461	ND<500
			3/22/2017	ND<6.21461	ND<500
			4/5/2017	ND<6.21461	ND<500
			4/25/2017	ND<6.21461	ND<500
			7/6/2017	ND<6.21461	ND<500
			8/8/2017	ND<6.21461	ND<500
			10/9/2017	ND<6.21461	ND<500
			12/6/2017	ND<6.21461	ND<500
			5/15/2018	ND<6.21461	ND<500
			10/16/2018	ND<6.21461	ND<500
			6/11/2019	ND<6.21461	ND<500
			10/22/2019	ND<6.21461	ND<500
			6/15/2020	ND<6.21461	ND<500
			12/5/2020	ND<6.21461	ND<500
			3/26/2021	ND<6.21461	ND<500

---

## Dixon's Test for Outliers

Parameter: Fluoride

Location: CLF-J2

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

**Iteration    Highest    Lowest    Critical    Outlier**

**A Divide-By-Zero error occurred in the calculations.**

**Additional Outliers May Exist.**

<b>Loc.</b>	<b>Date</b>	<b>Conc.</b>	<b>Outlier</b>
CLF-J2	12/7/2016	ND<500	FALSE
	1/18/2017	170.7	FALSE
	2/23/2017	ND<500	FALSE
	3/22/2017	ND<500	FALSE
	4/5/2017	ND<500	FALSE
	4/25/2017	ND<500	FALSE
	7/6/2017	ND<500	FALSE
	8/8/2017	ND<500	FALSE
	10/9/2017	ND<500	FALSE
	12/6/2017	ND<500	FALSE
	5/15/2018	ND<500	FALSE
	10/16/2018	ND<500	FALSE
	6/11/2019	ND<500	FALSE
	10/22/2019	ND<500	FALSE
	6/29/2020	140	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: CLF-J2

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	140	500	360	0.515	185.4
2	170.7	500	329.3	0.3306	108.867
3	500	500	0	0.2495	0
4	500	500	0	0.1878	0
5	500	500	0	0.1353	0
6	500	500	0	0.088	0
7	500	500	0	0.0433	0
8	500	500	0		0
9	500	500	0		0
10	500	500	0		0
11	500	500	0		0
12	500	500	0		0
13	500	500	0		0
14	500	170.7	-329.3		0
15	500	140	-360		0

---

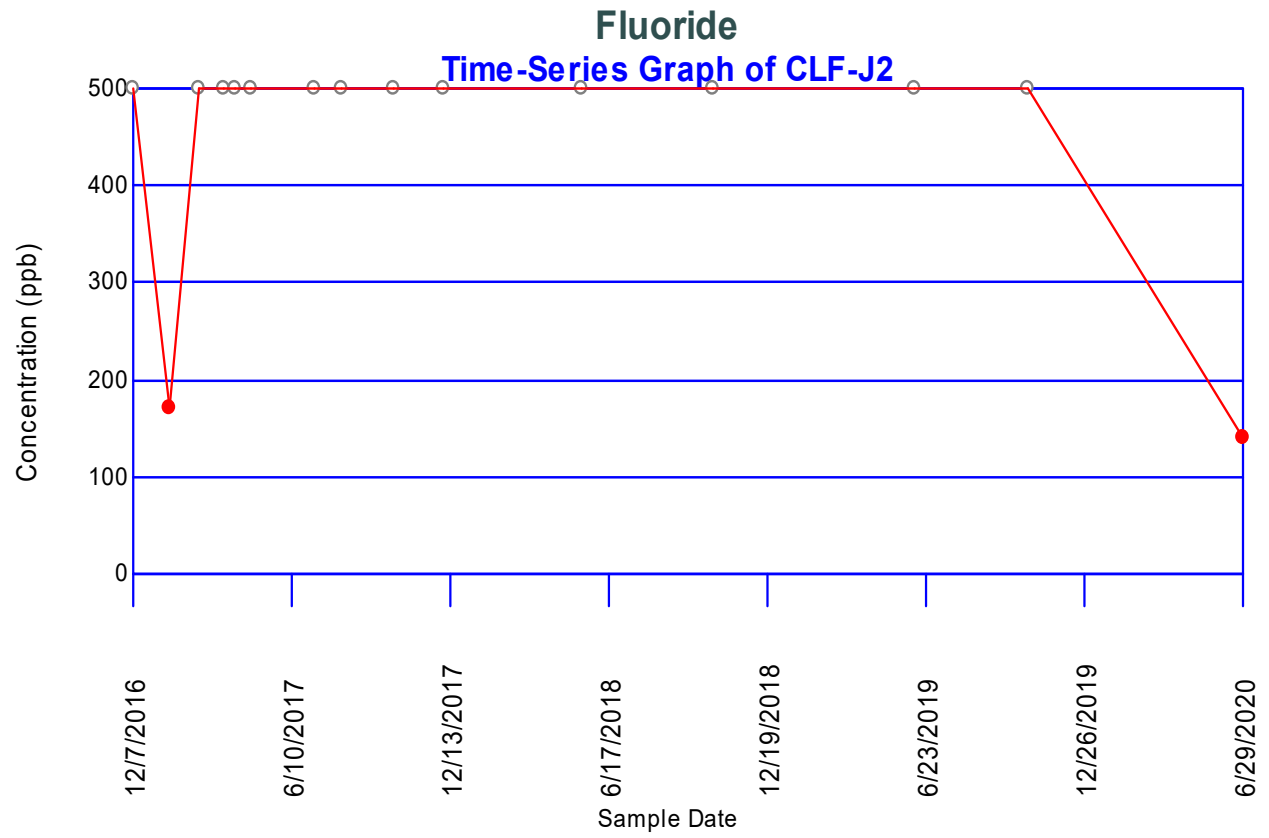
Sum of b values = 294.267

Sample Standard Deviation = 121.409

W Statistic = 0.419614

**5% Critical value of 0.881 exceeds 0.419614**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.835 exceeds 0.419614**  
**Evidence of non-normality at 99% level of significance**



## Dixon's Test for Outliers

Parameter: Fluoride

Location: CLF-J3

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 14 Measurements...

5% Level of Significance

**Iteration    Highest    Lowest    Critical    Outlier**

**A Divide-By-Zero error occurred in the calculations.**

**Additional Outliers May Exist.**

<b>Loc.</b>	<b>Date</b>	<b>Conc.</b>	<b>Outlier</b>
CLF-J3	12/7/2016	ND<500	FALSE
	1/18/2017	165.6	FALSE
	2/23/2017	ND<500	FALSE
	3/22/2017	ND<500	FALSE
	4/5/2017	ND<500	FALSE
	7/6/2017	ND<500	FALSE
	8/8/2017	ND<500	FALSE
	10/9/2017	ND<500	FALSE
	12/6/2017	ND<500	FALSE
	5/15/2018	ND<500	FALSE
	10/16/2018	ND<500	FALSE
	6/11/2019	ND<500	FALSE
	10/22/2019	ND<500	FALSE
	6/15/2020	ND<500	FALSE



## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: CLF-J3

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 14 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	165.6	500	334.4	0.5251	175.593
2	500	500	0	0.3318	0
3	500	500	0	0.246	0
4	500	500	0	0.1802	0
5	500	500	0	0.124	0
6	500	500	0	0.0727	0
7	500	500	0	0.024	0
8	500	500	0		0
9	500	500	0		0
10	500	500	0		0
11	500	500	0		0
12	500	500	0		0
13	500	500	0		0
14	500	165.6	-334.4		0

---

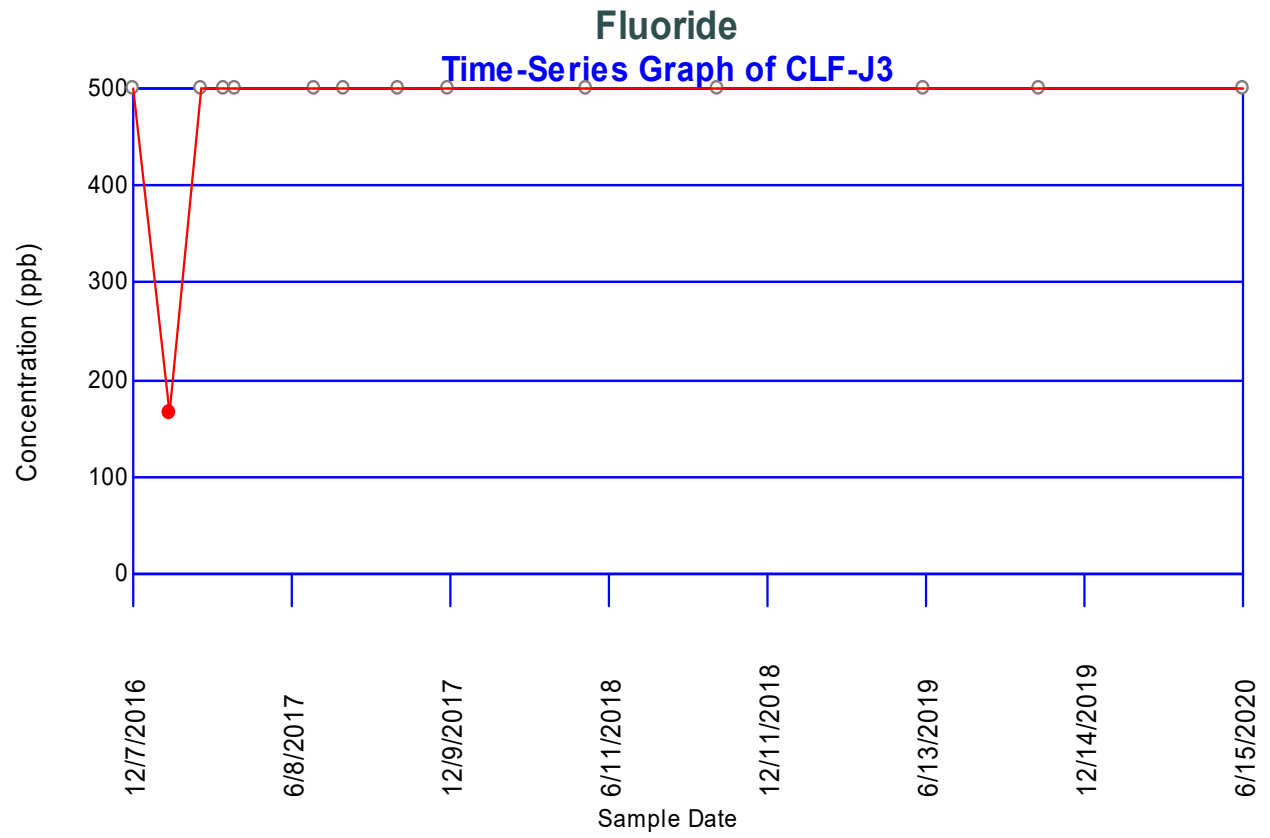
Sum of b values = 175.593

Sample Standard Deviation = 89.3722

W Statistic = 0.29694

**5% Critical value of 0.874 exceeds 0.29694**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.825 exceeds 0.29694**  
**Evidence of non-normality at 99% level of significance**



## Dixon's Test for Outliers

Parameter: Fluoride

Location: CLF-J5

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

**Iteration    Highest    Lowest    Critical    Outlier**

**A Divide-By-Zero error occurred in the calculations.**

**Additional Outliers May Exist.**

<b>Loc.</b>	<b>Date</b>	<b>Conc.</b>	<b>Outlier</b>
CLF-J5	12/7/2016	ND<500	FALSE
	1/18/2017	166.9	FALSE
	2/23/2017	ND<500	FALSE
	3/22/2017	ND<500	FALSE
	4/5/2017	ND<500	FALSE
	4/25/2017	ND<500	FALSE
	7/6/2017	ND<500	FALSE
	8/8/2017	ND<500	FALSE
	10/9/2017	ND<500	FALSE
	12/6/2017	ND<500	FALSE
	5/15/2018	ND<500	FALSE
	10/16/2018	ND<500	FALSE
	6/11/2019	ND<500	FALSE
	10/22/2019	ND<500	FALSE
	6/15/2020	ND<500	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: CLF-J5

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	166.9	500	333.1	0.515	171.547
2	500	500	0	0.3306	0
3	500	500	0	0.2495	0
4	500	500	0	0.1878	0
5	500	500	0	0.1353	0
6	500	500	0	0.088	0
7	500	500	0	0.0433	0
8	500	500	0		0
9	500	500	0		0
10	500	500	0		0
11	500	500	0		0
12	500	500	0		0
13	500	500	0		0
14	500	500	0		0
15	500	166.9	-333.1		0

---

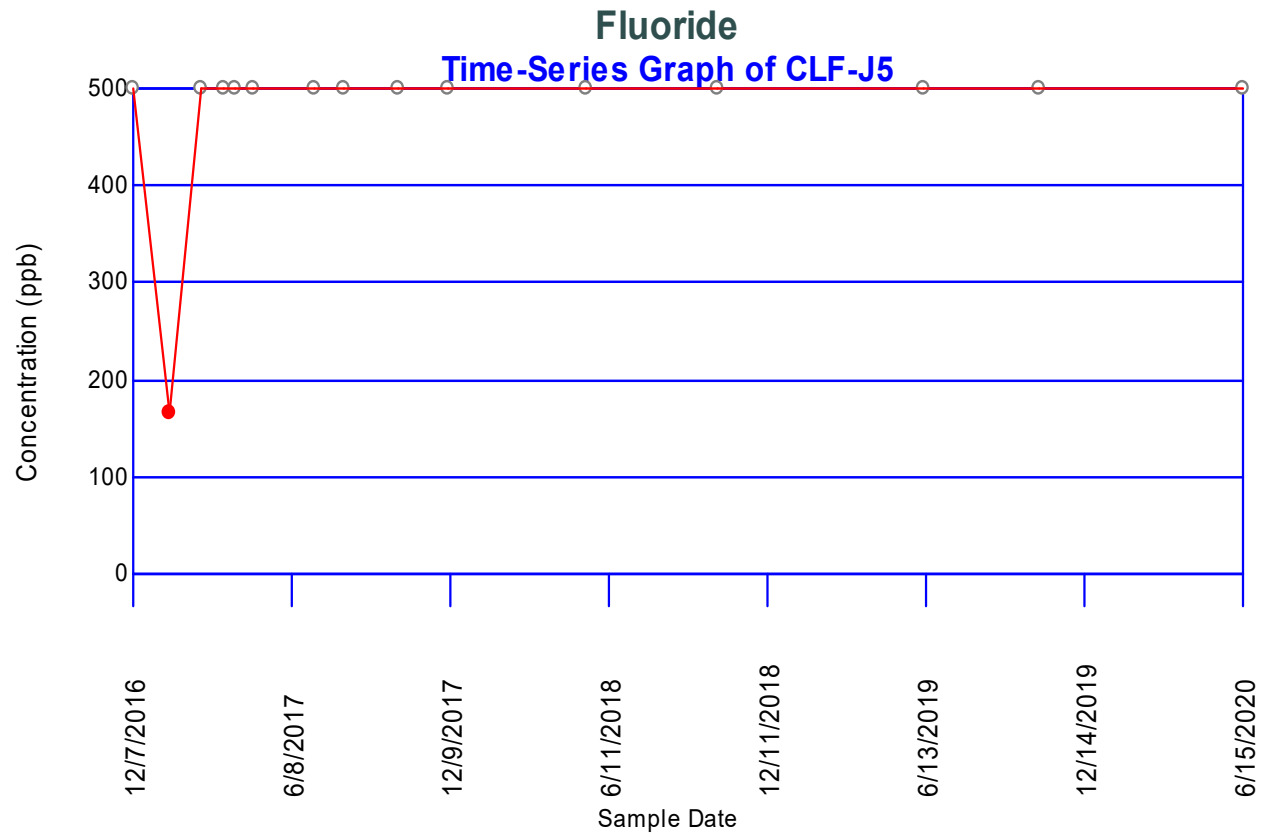
Sum of b values = 171.547

Sample Standard Deviation = 86.0061

W Statistic = 0.28417

**5% Critical value of 0.881 exceeds 0.28417**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.835 exceeds 0.28417**  
**Evidence of non-normality at 99% level of significance**



## Dixon's Test for Outliers

Parameter: Fluoride

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

**Iteration    Highest    Lowest    Critical    Outlier**

**A Divide-By-Zero error occurred in the calculations.**

**Additional Outliers May Exist.**

<b>Loc.</b>	<b>Date</b>	<b>Conc.</b>	<b>Outlier</b>
CLF-S13	12/7/2016	ND<500	FALSE
	1/18/2017	209.6	FALSE
	2/23/2017	ND<500	FALSE
	3/22/2017	ND<500	FALSE
	4/5/2017	ND<500	FALSE
	4/25/2017	ND<500	FALSE
	7/6/2017	ND<500	FALSE
	8/8/2017	ND<500	FALSE
	10/9/2017	ND<500	FALSE
	12/6/2017	ND<500	FALSE
	5/15/2018	ND<500	FALSE
	10/16/2018	ND<500	FALSE
	6/11/2019	ND<500	FALSE
	10/22/2019	ND<500	FALSE
	6/15/2020	ND<500	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: CLF-S13

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	209.6	500	290.4	0.515	149.556
2	500	500	0	0.3306	0
3	500	500	0	0.2495	0
4	500	500	0	0.1878	0
5	500	500	0	0.1353	0
6	500	500	0	0.088	0
7	500	500	0	0.0433	0
8	500	500	0		0
9	500	500	0		0
10	500	500	0		0
11	500	500	0		0
12	500	500	0		0
13	500	500	0		0
14	500	500	0		0
15	500	209.6	-290.4		0

---

Sum of b values = 149.556

Sample Standard Deviation = 74.981

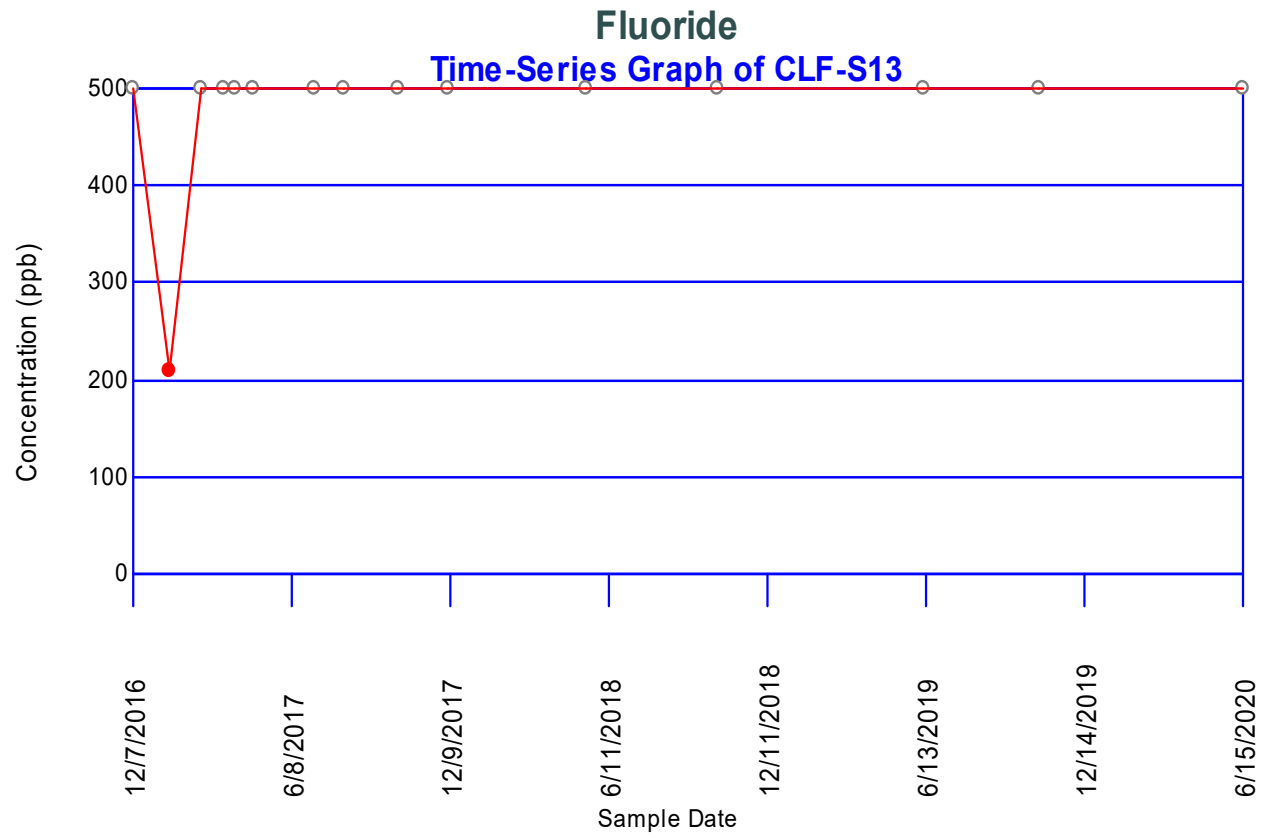
W Statistic = 0.28417

**5% Critical value of 0.881 exceeds 0.28417**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.835 exceeds 0.28417**

**Evidence of non-normality at 99% level of significance**





## Dixon's Test for Outliers

Parameter: Fluoride

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0	0.0716667	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S05	1/18/2017	165.8	FALSE
	4/5/2017	ND<500	FALSE
	4/25/2017	ND<500	FALSE
	10/16/2018	ND<500	FALSE
	10/22/2019	ND<500	FALSE
	6/29/2020	140	FALSE
	12/5/2020	ND<500	FALSE
	3/26/2021	ND<500	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: CLF-S05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	140	500	360	0.6052	217.872
2	165.8	500	334.2	0.3164	105.741
3	500	500	0	0.1743	0
4	500	500	0	0.0561	0
5	500	500	0		
6	500	500	0		
7	500	165.8	-334.2		
8	500	140	-360		

---

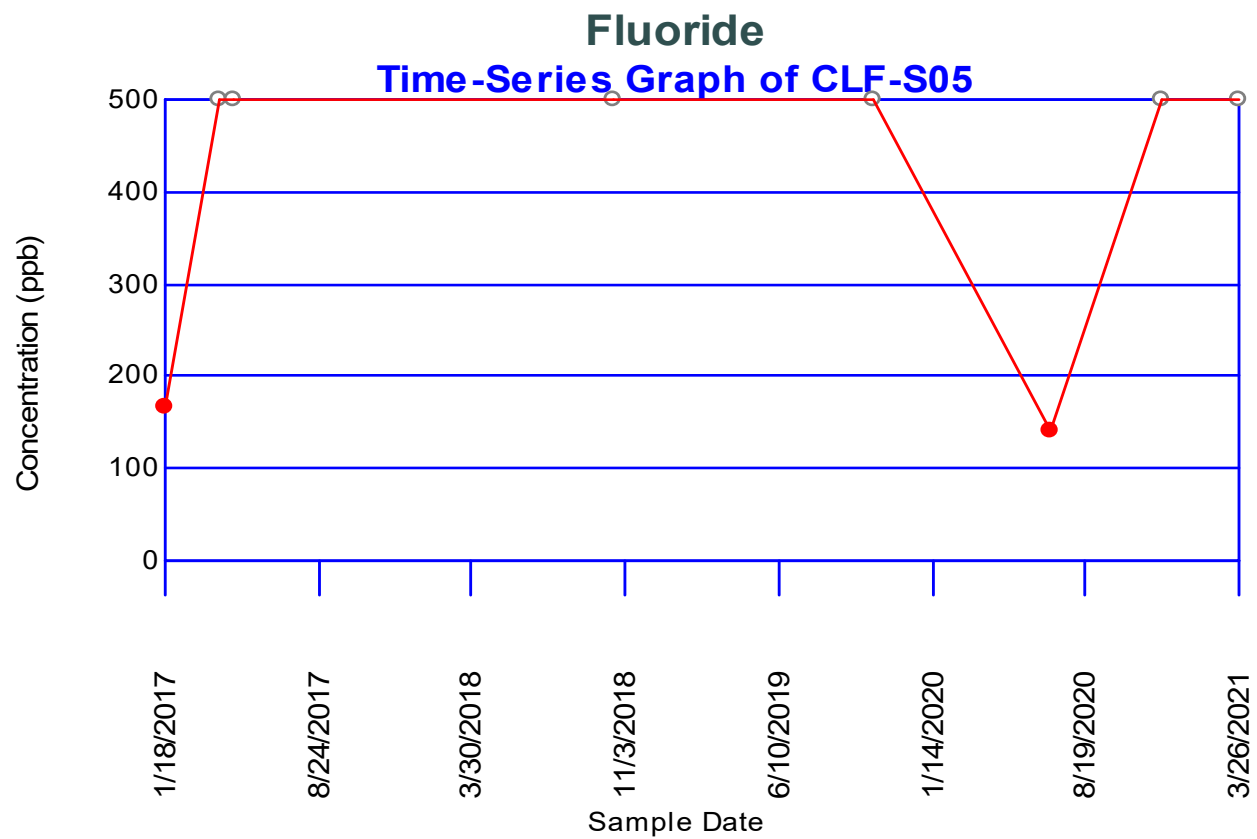
Sum of b values = 323.613

Sample Standard Deviation = 160.824

W Statistic = 0.578432

**5% Critical value of 0.818 exceeds 0.578432**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.749 exceeds 0.578432**  
**Evidence of non-normality at 99% level of significance**



### Concentrations (ppb)

Parameter: pH, Field

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 70

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

There are 6 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

CLF-J2	15	0 (0%)	12/7/2016	7.89	7.89
			1/18/2017	8.15	8.15
			2/23/2017	8.23	8.23
			3/22/2017	7.89	7.89
			4/5/2017	7.81	7.81
			4/25/2017	7.36	7.36
			7/6/2017	7.56	7.56
			8/8/2017	7.77	7.77
			10/9/2017	8.07	8.07
			12/6/2017	8.29	8.29
			5/15/2018	8.26	8.26
			10/16/2018	8.02	8.02
			6/11/2019	7.54	7.54
			10/22/2019	8.17	8.17
			6/29/2020	7.31	7.31
<b>12/5/2020</b>	<b>7.7</b>	<b>7.7</b>			

CLF-J3	14	0 (0%)	12/7/2016	7.45	7.45
			1/18/2017	8.26	8.26
			2/23/2017	8.28	8.28
			3/22/2017	8.3	8.3
			4/5/2017	7.69	7.69
			7/6/2017	7.58	7.58
			8/8/2017	7.61	7.61
			10/9/2017	8.12	8.12
			12/6/2017	8.32	8.32
			5/15/2018	7.66	7.66
			10/16/2018	7.61	7.61
			6/11/2019	7.49	7.49
			10/22/2019	8.33	8.33
			6/15/2020	7.61	7.61
			<b>12/5/2020</b>	<b>7.54</b>	<b>7.54</b>

CLF-J5	15	0 (0%)	12/7/2016	7.91	7.91
			1/18/2017	8.17	8.17
			2/23/2017	8.04	8.04
			3/22/2017	8.11	8.11
			4/5/2017	8.01	8.01
			4/25/2017	7.49	7.49
			7/6/2017	7.8	7.8
			8/8/2017	8.18	8.18

			10/9/2017	7.8	7.8
			12/6/2017	8.34	8.34
			5/15/2018	8.01	8.01
			10/16/2018	7.96	7.96
			6/11/2019	7.74	7.74
			10/22/2019	8.3	8.3
			6/15/2020	8.12	8.12
			<b>12/5/2020</b>	<b>7.71</b>	<b>7.71</b>
CLF-S05	6	0 (0%)	1/18/2017	8.31	8.31
			4/5/2017	8.32	8.32
			4/25/2017	7.67	7.67
			10/16/2018	8.13	8.13
			10/22/2019	8.4	8.4
			6/29/2020	8.09	8.09
			<b>12/5/2020</b>	<b>7.77</b>	<b>7.77</b>
CLF-S06	5	0 (0%)	1/18/2017	7.99	7.99
			4/5/2017	7.89	7.89
			4/25/2017	8.25	8.25
			10/16/2018	7.72	7.72
			6/29/2020	8.81	8.81
			<b>12/5/2020</b>	<b>4.2</b>	<b>4.2</b>
CLF-S13	15	0 (0%)	12/7/2016	7.92	7.92
			1/18/2017	7.86	7.86
			2/23/2017	7.91	7.91
			3/22/2017	8.04	8.04
			4/5/2017	8.02	8.02
			4/25/2017	7.16	7.16
			7/6/2017	7.47	7.47
			8/8/2017	7.96	7.96
			10/9/2017	7.54	7.54
			12/6/2017	8.22	8.22
			5/15/2018	7.72	7.72
			10/16/2018	8.13	8.13
			6/11/2019	7.7	7.7
			10/22/2019	7.99	7.99
			6/15/2020	7.82	7.82
			<b>12/5/2020</b>	<b>7.35</b>	<b>7.35</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

## Dixon's Test for Outliers

Parameter: pH, Field

Location: CLF-J2

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.08	0.25	0.525	None

Loc.	Date	Conc.	Outlier
CLF-J2	12/7/2016	7.89	FALSE
	1/18/2017	8.15	FALSE
	2/23/2017	8.23	FALSE
	3/22/2017	7.89	FALSE
	4/5/2017	7.81	FALSE
	4/25/2017	7.36	FALSE
	7/6/2017	7.56	FALSE
	8/8/2017	7.77	FALSE
	10/9/2017	8.07	FALSE
	12/6/2017	8.29	FALSE
	5/15/2018	8.26	FALSE
	10/16/2018	8.02	FALSE
	6/11/2019	7.54	FALSE
	10/22/2019	8.17	FALSE
	6/29/2020	7.31	FALSE

## Shapiro-Wilks Test of Normality

Parameter: pH, Field

Location: CLF-J2

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	7.31	8.29	0.98	0.515	0.5047
2	7.36	8.26	0.9	0.3306	0.29754
3	7.54	8.23	0.69	0.2495	0.172155
4	7.56	8.17	0.61	0.1878	0.114558
5	7.77	8.15	0.38	0.1353	0.051414
6	7.81	8.07	0.26	0.088	0.02288
7	7.89	8.02	0.13	0.0433	0.005629
8	7.89	7.89	0		
9	8.02	7.89	-0.13		
10	8.07	7.81	-0.26		
11	8.15	7.77	-0.38		
12	8.17	7.56	-0.61		
13	8.23	7.54	-0.69		
14	8.26	7.36	-0.9		
15	8.29	7.31	-0.98		

---

Sum of b values = 1.16888

Sample Standard Deviation = 0.324834

W Statistic = 0.924881

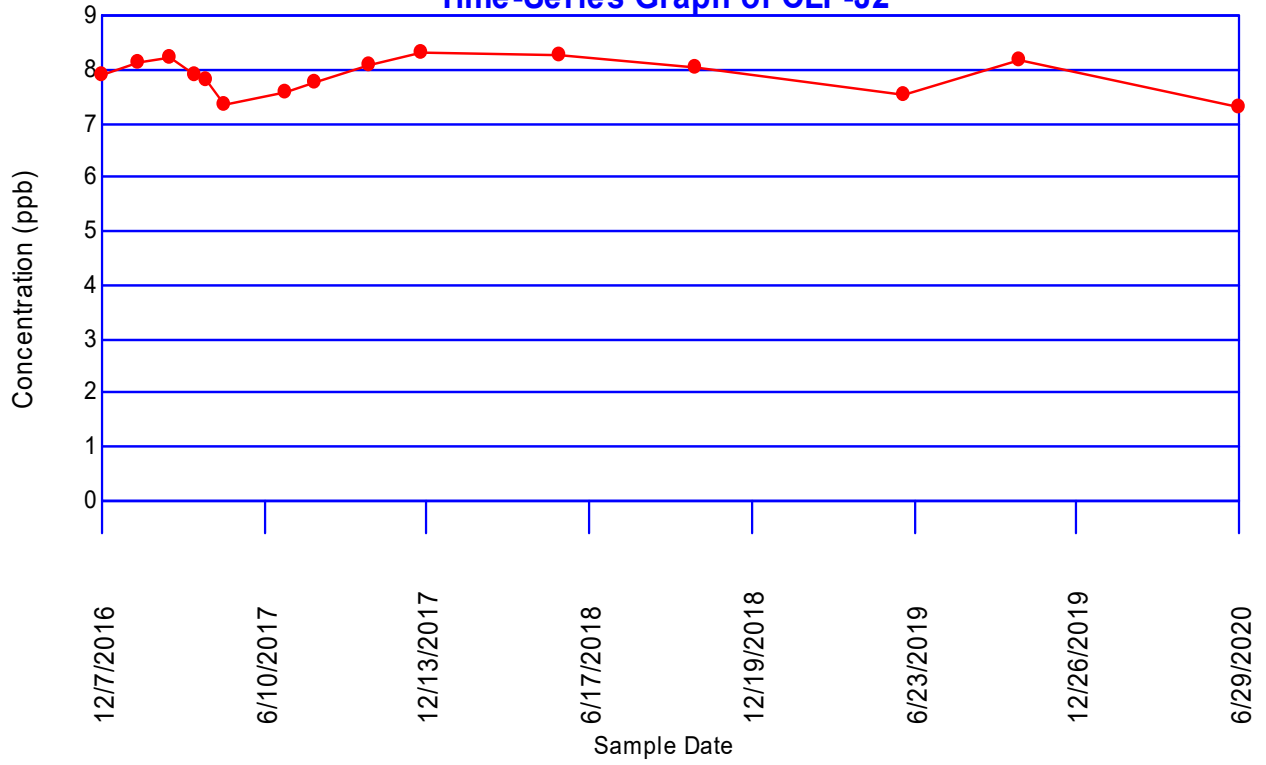
5% Critical value of 0.881 is less than 0.924881

Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.924881

Data is normally distributed at 99% level of significance

pH, Field  
Time-Series Graph of CLF-J2





**Mann-Kendall Trend Analysis**  
**Parameter: pH, Field**  
**Location: CLF-J2**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

---

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8.15	7.89	0.26	1	0
8.23	7.89	0.34	2	0
7.89	7.89	0	2	0
7.81	7.89	-0.08	2	1
7.36	7.89	-0.53	2	2
7.56	7.89	-0.33	2	3
7.77	7.89	-0.12	2	4
8.07	7.89	0.18	3	4
8.29	7.89	0.4	4	4
8.26	7.89	0.37	5	4
8.02	7.89	0.13	6	4
7.54	7.89	-0.35	6	5
8.17	7.89	0.28	7	5
7.31	7.89	-0.58	7	6
8.23	8.15	0.08	8	6
7.89	8.15	-0.26	8	7
7.81	8.15	-0.34	8	8
7.36	8.15	-0.79	8	9
7.56	8.15	-0.59	8	10
7.77	8.15	-0.38	8	11
8.07	8.15	-0.08	8	12
8.29	8.15	0.14	9	12
8.26	8.15	0.11	10	12
8.02	8.15	-0.13	10	13
7.54	8.15	-0.61	10	14
8.17	8.15	0.02	11	14
7.31	8.15	-0.84	11	15
7.89	8.23	-0.34	11	16
7.81	8.23	-0.42	11	17
7.36	8.23	-0.87	11	18
7.56	8.23	-0.67	11	19
7.77	8.23	-0.46	11	20
8.07	8.23	-0.16	11	21
8.29	8.23	0.06	12	21
8.26	8.23	0.03	13	21
8.02	8.23	-0.21	13	22
7.54	8.23	-0.69	13	23
8.17	8.23	-0.06	13	24
7.31	8.23	-0.92	13	25
7.81	7.89	-0.08	13	26
7.36	7.89	-0.53	13	27
7.56	7.89	-0.33	13	28
7.77	7.89	-0.12	13	29
8.07	7.89	0.18	14	29

8.29	7.89	0.4	15	29
8.26	7.89	0.37	16	29
8.02	7.89	0.13	17	29
7.54	7.89	-0.35	17	30
8.17	7.89	0.28	18	30
7.31	7.89	-0.58	18	31
7.36	7.81	-0.45	18	32
7.56	7.81	-0.25	18	33
7.77	7.81	-0.04	18	34
8.07	7.81	0.26	19	34
8.29	7.81	0.48	20	34
8.26	7.81	0.45	21	34
8.02	7.81	0.21	22	34
7.54	7.81	-0.27	22	35
8.17	7.81	0.36	23	35
7.31	7.81	-0.5	23	36
7.56	7.36	0.2	24	36
7.77	7.36	0.41	25	36
8.07	7.36	0.71	26	36
8.29	7.36	0.93	27	36
8.26	7.36	0.9	28	36
8.02	7.36	0.66	29	36
7.54	7.36	0.18	30	36
8.17	7.36	0.81	31	36
7.31	7.36	-0.05	31	37
7.77	7.56	0.21	32	37
8.07	7.56	0.51	33	37
8.29	7.56	0.73	34	37
8.26	7.56	0.7	35	37
8.02	7.56	0.46	36	37
7.54	7.56	-0.02	36	38
8.17	7.56	0.61	37	38
7.31	7.56	-0.25	37	39
8.07	7.77	0.3	38	39
8.29	7.77	0.52	39	39
8.26	7.77	0.49	40	39
8.02	7.77	0.25	41	39
7.54	7.77	-0.23	41	40
8.17	7.77	0.4	42	40
7.31	7.77	-0.46	42	41
8.29	8.07	0.22	43	41
8.26	8.07	0.19	44	41
8.02	8.07	-0.05	44	42
7.54	8.07	-0.53	44	43
8.17	8.07	0.1	45	43
7.31	8.07	-0.76	45	44
8.26	8.29	-0.03	45	45
8.02	8.29	-0.27	45	46
7.54	8.29	-0.75	45	47
8.17	8.29	-0.12	45	48
7.31	8.29	-0.98	45	49

8.02	8.26	-0.24	45	50
7.54	8.26	-0.72	45	51
8.17	8.26	-0.09	45	52
7.31	8.26	-0.95	45	53
7.54	8.02	-0.48	45	54
8.17	8.02	0.15	46	54
7.31	8.02	-0.71	46	55
8.17	7.54	0.63	47	55
7.31	7.54	-0.23	47	56
7.31	8.17	-0.86	47	57

S Statistic = 47 - 57 = -10

---

Tied Group	Value	Members
1	7.89	2

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/29/2020	1

There are 0 time periods with multiple data

---

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 407.333

Z-Score = -0.445931

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-0.445931**| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: pH, Field

Location: CLF-J3

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 14 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.04	0.152941	0.546	None

Loc.	Date	Conc.	Outlier
CLF-J3	12/7/2016	7.45	FALSE
	1/18/2017	8.26	FALSE
	2/23/2017	8.28	FALSE
	3/22/2017	8.3	FALSE
	4/5/2017	7.69	FALSE
	7/6/2017	7.58	FALSE
	8/8/2017	7.61	FALSE
	10/9/2017	8.12	FALSE
	12/6/2017	8.32	FALSE
	5/15/2018	7.66	FALSE
	10/16/2018	7.61	FALSE
	6/11/2019	7.49	FALSE
	10/22/2019	8.33	FALSE
	6/15/2020	7.61	FALSE

## Shapiro-Wilks Test of Normality

Parameter: pH, Field

Location: CLF-J3

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 14 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	7.45	8.33	0.88	0.5251	0.462088
2	7.49	8.32	0.83	0.3318	0.275394
3	7.58	8.3	0.72	0.246	0.17712
4	7.61	8.28	0.67	0.1802	0.120734
5	7.61	8.26	0.65	0.124	0.0806
6	7.61	8.12	0.51	0.0727	0.037077
7	7.66	7.69	0.03	0.024	0.00072
8	7.69	7.66	-0.03		
9	8.12	7.61	-0.51		
10	8.26	7.61	-0.65		
11	8.28	7.61	-0.67		
12	8.3	7.58	-0.72		
13	8.32	7.49	-0.83		
14	8.33	7.45	-0.88		

---

Sum of b values = 1.15373

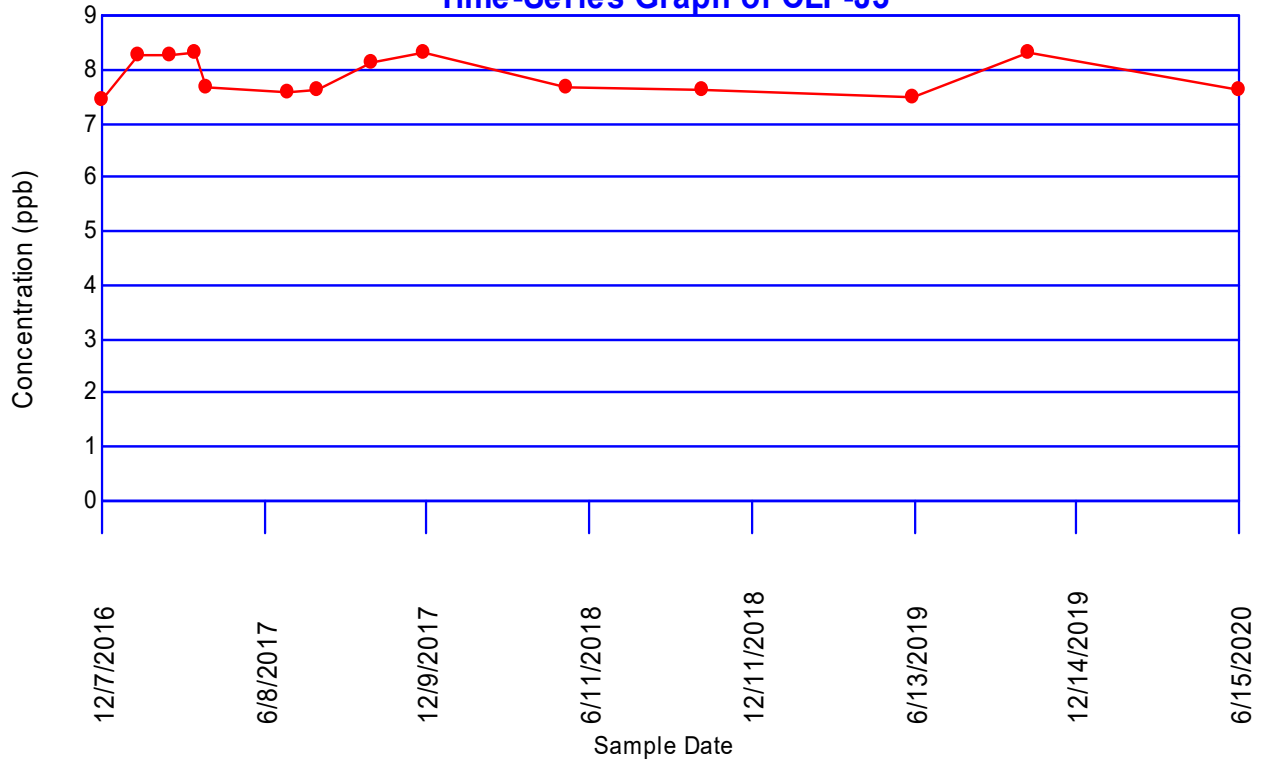
Sample Standard Deviation = 0.357845

W Statistic = 0.799607

**5% Critical value of 0.874 exceeds 0.799607**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.825 exceeds 0.799607**  
**Evidence of non-normality at 99% level of significance**

pH, Field  
Time-Series Graph of CLF-J3



**Mann-Kendall Trend Analysis**  
**Parameter: pH, Field**  
**Location: CLF-J3**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8.26	7.45	0.81	1	0
8.28	7.45	0.83	2	0
8.3	7.45	0.85	3	0
7.69	7.45	0.24	4	0
7.58	7.45	0.13	5	0
7.61	7.45	0.16	6	0
8.12	7.45	0.67	7	0
8.32	7.45	0.87	8	0
7.66	7.45	0.21	9	0
7.61	7.45	0.16	10	0
7.49	7.45	0.04	11	0
8.33	7.45	0.88	12	0
7.61	7.45	0.16	13	0
8.28	8.26	0.02	14	0
8.3	8.26	0.04	15	0
7.69	8.26	-0.57	15	1
7.58	8.26	-0.68	15	2
7.61	8.26	-0.65	15	3
8.12	8.26	-0.14	15	4
8.32	8.26	0.06	16	4
7.66	8.26	-0.6	16	5
7.61	8.26	-0.65	16	6
7.49	8.26	-0.77	16	7
8.33	8.26	0.07	17	7
7.61	8.26	-0.65	17	8
8.3	8.28	0.02	18	8
7.69	8.28	-0.59	18	9
7.58	8.28	-0.7	18	10
7.61	8.28	-0.67	18	11
8.12	8.28	-0.16	18	12
8.32	8.28	0.04	19	12
7.66	8.28	-0.62	19	13
7.61	8.28	-0.67	19	14
7.49	8.28	-0.79	19	15
8.33	8.28	0.05	20	15
7.61	8.28	-0.67	20	16
7.69	8.3	-0.61	20	17
7.58	8.3	-0.72	20	18
7.61	8.3	-0.69	20	19
8.12	8.3	-0.18	20	20
8.32	8.3	0.02	21	20
7.66	8.3	-0.64	21	21
7.61	8.3	-0.69	21	22
7.49	8.3	-0.81	21	23

8.33	8.3	0.03	22	23
7.61	8.3	-0.69	22	24
7.58	7.69	-0.11	22	25
7.61	7.69	-0.08	22	26
8.12	7.69	0.43	23	26
8.32	7.69	0.63	24	26
7.66	7.69	-0.03	24	27
7.61	7.69	-0.08	24	28
7.49	7.69	-0.2	24	29
8.33	7.69	0.64	25	29
7.61	7.69	-0.08	25	30
7.61	7.58	0.03	26	30
8.12	7.58	0.54	27	30
8.32	7.58	0.74	28	30
7.66	7.58	0.08	29	30
7.61	7.58	0.03	30	30
7.49	7.58	-0.09	30	31
8.33	7.58	0.75	31	31
7.61	7.58	0.03	32	31
8.12	7.61	0.51	33	31
8.32	7.61	0.71	34	31
7.66	7.61	0.05	35	31
7.61	7.61	0	35	31
7.49	7.61	-0.12	35	32
8.33	7.61	0.72	36	32
7.61	7.61	0	36	32
8.32	8.12	0.2	37	32
7.66	8.12	-0.46	37	33
7.61	8.12	-0.51	37	34
7.49	8.12	-0.63	37	35
8.33	8.12	0.21	38	35
7.61	8.12	-0.51	38	36
7.66	8.32	-0.66	38	37
7.61	8.32	-0.71	38	38
7.49	8.32	-0.83	38	39
8.33	8.32	0.01	39	39
7.61	8.32	-0.71	39	40
7.61	7.66	-0.05	39	41
7.49	7.66	-0.17	39	42
8.33	7.66	0.67	40	42
7.61	7.66	-0.05	40	43
7.49	7.61	-0.12	40	44
8.33	7.61	0.72	41	44
7.61	7.61	0	41	44
8.33	7.49	0.84	42	44
7.61	7.49	0.12	43	44
7.61	8.33	-0.72	43	45



S Statistic = 43 - 45 = -2

---

Tied Group	Value	Members
1	7.61	3

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 66

B = 0

C = 6

D = 0

E = 6

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 330

Z-Score = -0.0550482

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

$|-0.0550482| \leq 1.97737$  indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: pH, Field

Location: CLF-J5

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.296296	0.449275	0.525	None

Loc.	Date	Conc.	Outlier
CLF-J5	12/7/2016	7.91	FALSE
	1/18/2017	8.17	FALSE
	2/23/2017	8.04	FALSE
	3/22/2017	8.11	FALSE
	4/5/2017	8.01	FALSE
	4/25/2017	7.49	FALSE
	7/6/2017	7.8	FALSE
	8/8/2017	8.18	FALSE
	10/9/2017	7.8	FALSE
	12/6/2017	8.34	FALSE
	5/15/2018	8.01	FALSE
	10/16/2018	7.96	FALSE
	6/11/2019	7.74	FALSE
	10/22/2019	8.3	FALSE
	6/15/2020	8.12	FALSE

## Shapiro-Wilks Test of Normality

Parameter: pH, Field

Location: CLF-J5

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	7.49	8.34	0.85	0.515	0.43775
2	7.74	8.3	0.56	0.3306	0.185136
3	7.8	8.18	0.38	0.2495	0.09481
4	7.8	8.17	0.37	0.1878	0.069486
5	7.91	8.12	0.21	0.1353	0.028413
6	7.96	8.11	0.15	0.088	0.0132
7	8.01	8.04	0.03	0.0433	0.001299
8	8.01	8.01	0		
9	8.04	8.01	-0.03		
10	8.11	7.96	-0.15		
11	8.12	7.91	-0.21		
12	8.17	7.8	-0.37		
13	8.18	7.8	-0.38		
14	8.3	7.74	-0.56		
15	8.34	7.49	-0.85		

---

Sum of b values = 0.830094

Sample Standard Deviation = 0.225606

W Statistic = 0.966997

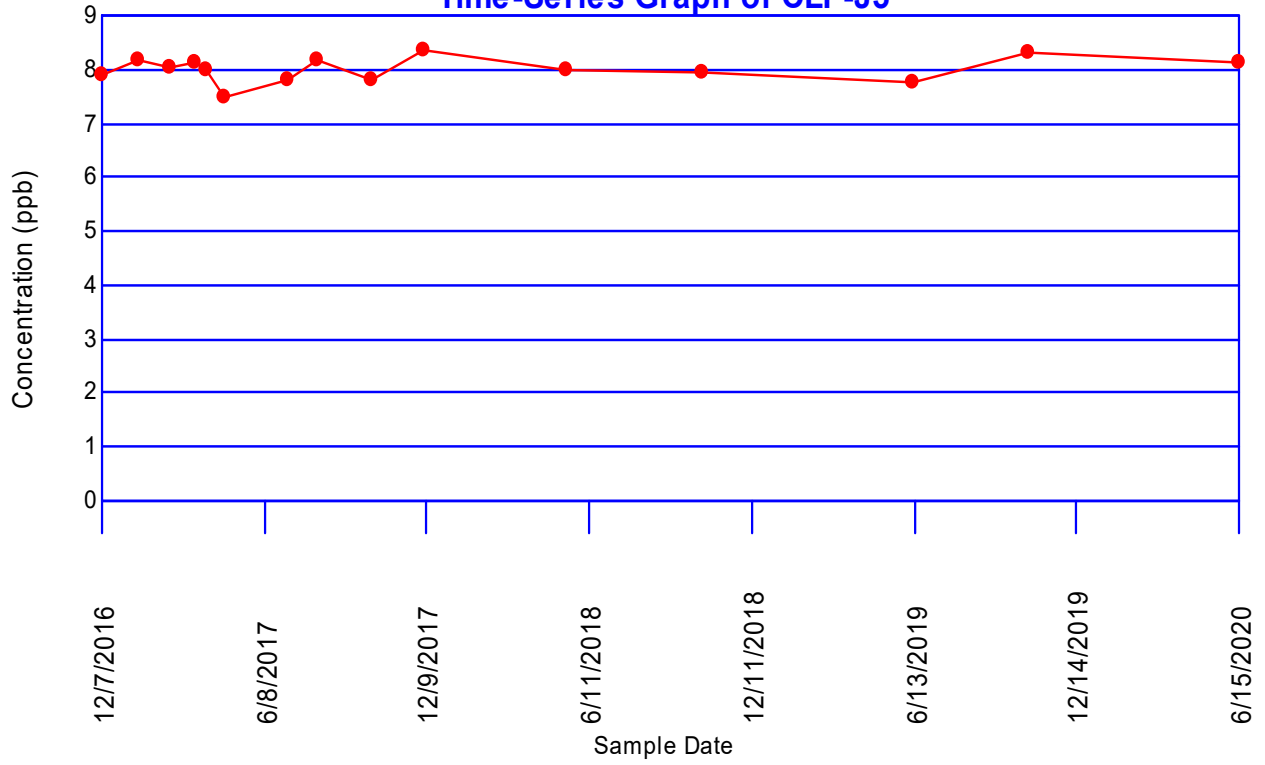
5% Critical value of 0.881 is less than 0.966997

Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.966997

Data is normally distributed at 99% level of significance

pH, Field  
Time-Series Graph of CLF-J5



**Mann-Kendall Trend Analysis**  
**Parameter: pH, Field**  
**Location: CLF-J5**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

---

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8.17	7.91	0.26	1	0
8.04	7.91	0.13	2	0
8.11	7.91	0.2	3	0
8.01	7.91	0.1	4	0
7.49	7.91	-0.42	4	1
7.8	7.91	-0.11	4	2
8.18	7.91	0.27	5	2
7.8	7.91	-0.11	5	3
8.34	7.91	0.43	6	3
8.01	7.91	0.1	7	3
7.96	7.91	0.05	8	3
7.74	7.91	-0.17	8	4
8.3	7.91	0.39	9	4
8.12	7.91	0.21	10	4
8.04	8.17	-0.13	10	5
8.11	8.17	-0.06	10	6
8.01	8.17	-0.16	10	7
7.49	8.17	-0.68	10	8
7.8	8.17	-0.37	10	9
8.18	8.17	0.01	11	9
7.8	8.17	-0.37	11	10
8.34	8.17	0.17	12	10
8.01	8.17	-0.16	12	11
7.96	8.17	-0.21	12	12
7.74	8.17	-0.43	12	13
8.3	8.17	0.13	13	13
8.12	8.17	-0.05	13	14
8.11	8.04	0.07	14	14
8.01	8.04	-0.03	14	15
7.49	8.04	-0.55	14	16
7.8	8.04	-0.24	14	17
8.18	8.04	0.14	15	17
7.8	8.04	-0.24	15	18
8.34	8.04	0.3	16	18
8.01	8.04	-0.03	16	19
7.96	8.04	-0.08	16	20
7.74	8.04	-0.3	16	21
8.3	8.04	0.26	17	21
8.12	8.04	0.08	18	21
8.01	8.11	-0.1	18	22
7.49	8.11	-0.62	18	23
7.8	8.11	-0.31	18	24
8.18	8.11	0.07	19	24
7.8	8.11	-0.31	19	25

8.34	8.11	0.23	20	25
8.01	8.11	-0.1	20	26
7.96	8.11	-0.15	20	27
7.74	8.11	-0.37	20	28
8.3	8.11	0.19	21	28
8.12	8.11	0.01	22	28
7.49	8.01	-0.52	22	29
7.8	8.01	-0.21	22	30
8.18	8.01	0.17	23	30
7.8	8.01	-0.21	23	31
8.34	8.01	0.33	24	31
8.01	8.01	0	24	31
7.96	8.01	-0.05	24	32
7.74	8.01	-0.27	24	33
8.3	8.01	0.29	25	33
8.12	8.01	0.11	26	33
7.8	7.49	0.31	27	33
8.18	7.49	0.69	28	33
7.8	7.49	0.31	29	33
8.34	7.49	0.85	30	33
8.01	7.49	0.52	31	33
7.96	7.49	0.47	32	33
7.74	7.49	0.25	33	33
8.3	7.49	0.81	34	33
8.12	7.49	0.63	35	33
8.18	7.8	0.38	36	33
7.8	7.8	0	36	33
8.34	7.8	0.54	37	33
8.01	7.8	0.21	38	33
7.96	7.8	0.16	39	33
7.74	7.8	-0.06	39	34
8.3	7.8	0.5	40	34
8.12	7.8	0.32	41	34
7.8	8.18	-0.38	41	35
8.34	8.18	0.16	42	35
8.01	8.18	-0.17	42	36
7.96	8.18	-0.22	42	37
7.74	8.18	-0.44	42	38
8.3	8.18	0.12	43	38
8.12	8.18	-0.06	43	39
8.34	7.8	0.54	44	39
8.01	7.8	0.21	45	39
7.96	7.8	0.16	46	39
7.74	7.8	-0.06	46	40
8.3	7.8	0.5	47	40
8.12	7.8	0.32	48	40
8.01	8.34	-0.33	48	41
7.96	8.34	-0.38	48	42
7.74	8.34	-0.6	48	43
8.3	8.34	-0.04	48	44
8.12	8.34	-0.22	48	45

7.96	8.01	-0.05	48	46
7.74	8.01	-0.27	48	47
8.3	8.01	0.29	49	47
8.12	8.01	0.11	50	47
7.74	7.96	-0.22	50	48
8.3	7.96	0.34	51	48
8.12	7.96	0.16	52	48
8.3	7.74	0.56	53	48
8.12	7.74	0.38	54	48
8.12	8.3	-0.18	54	49

S Statistic = 54 - 49 = 5

---

Tied Group	Value	Members
1	8.01	2
2	7.8	2

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 36

B = 0

C = 0

D = 0

E = 4

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 406.333

Z-Score = 0.198435

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

[0.198435] <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: pH, Field

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.264706	0.431818	0.525	None

Loc.	Date	Conc.	Outlier
CLF-S13	12/7/2016	7.92	FALSE
	1/18/2017	7.86	FALSE
	2/23/2017	7.91	FALSE
	3/22/2017	8.04	FALSE
	4/5/2017	8.02	FALSE
	4/25/2017	7.16	FALSE
	7/6/2017	7.47	FALSE
	8/8/2017	7.96	FALSE
	10/9/2017	7.54	FALSE
	12/6/2017	8.22	FALSE
	5/15/2018	7.72	FALSE
	10/16/2018	8.13	FALSE
	6/11/2019	7.7	FALSE
	10/22/2019	7.99	FALSE
	6/15/2020	7.82	FALSE



## Shapiro-Wilks Test of Normality

Parameter: pH, Field

Location: CLF-S13

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	7.16	8.22	1.06	0.515	0.5459
2	7.47	8.13	0.66	0.3306	0.218196
3	7.54	8.04	0.5	0.2495	0.12475
4	7.7	8.02	0.32	0.1878	0.060096
5	7.72	7.99	0.27	0.1353	0.036531
6	7.82	7.96	0.14	0.088	0.01232
7	7.86	7.92	0.06	0.0433	0.002598
8	7.91	7.91	0		
9	7.92	7.86	-0.06		
10	7.96	7.82	-0.14		
11	7.99	7.72	-0.27		
12	8.02	7.7	-0.32		
13	8.04	7.54	-0.5		
14	8.13	7.47	-0.66		
15	8.22	7.16	-1.06		

---

Sum of b values = 1.00039

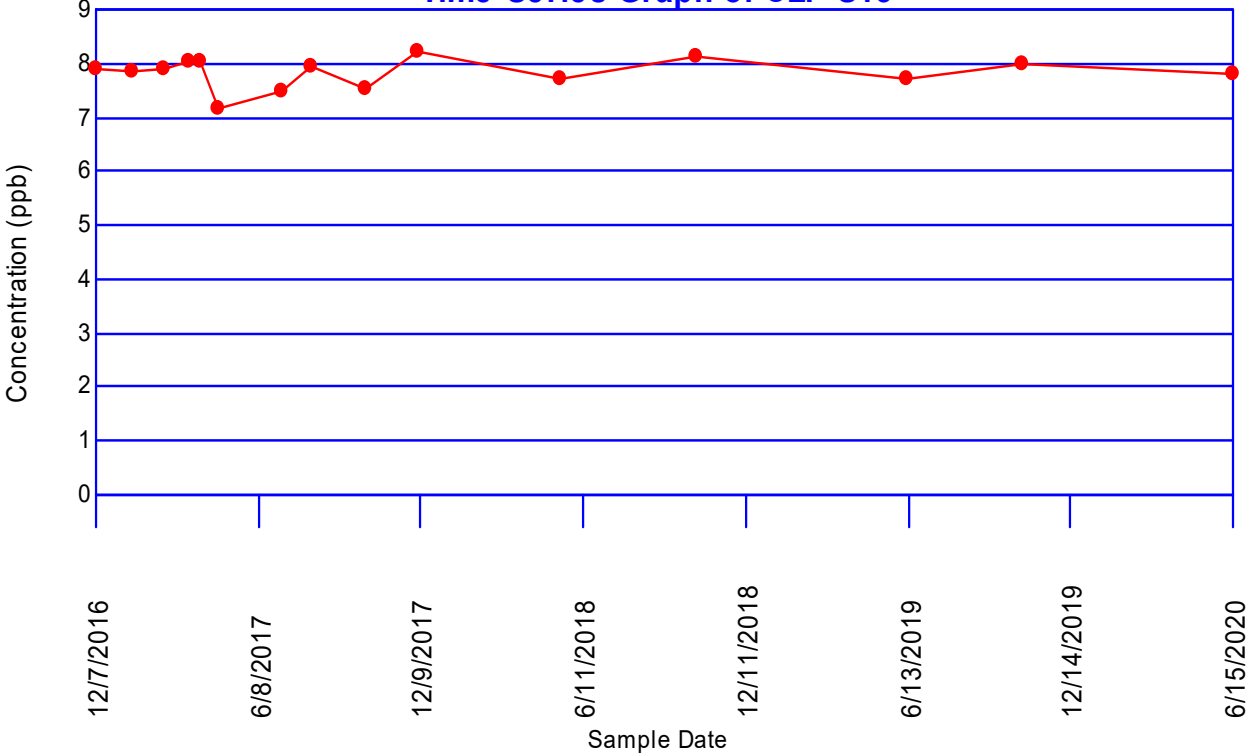
Sample Standard Deviation = 0.276702

W Statistic = 0.933658

5% Critical value of 0.881 is less than 0.933658  
Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.933658  
Data is normally distributed at 99% level of significance

pH, Field  
Time-Series Graph of CLF-S13



**Mann-Kendall Trend Analysis**  
**Parameter: pH, Field**  
**Location: CLF-S13**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

---

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
7.86	7.92	-0.06	0	1
7.91	7.92	-0.01	0	2
8.04	7.92	0.12	1	2
8.02	7.92	0.1	2	2
7.16	7.92	-0.76	2	3
7.47	7.92	-0.45	2	4
7.96	7.92	0.04	3	4
7.54	7.92	-0.38	3	5
8.22	7.92	0.3	4	5
7.72	7.92	-0.2	4	6
8.13	7.92	0.21	5	6
7.7	7.92	-0.22	5	7
7.99	7.92	0.07	6	7
7.82	7.92	-0.1	6	8
7.91	7.86	0.05	7	8
8.04	7.86	0.18	8	8
8.02	7.86	0.16	9	8
7.16	7.86	-0.7	9	9
7.47	7.86	-0.39	9	10
7.96	7.86	0.1	10	10
7.54	7.86	-0.32	10	11
8.22	7.86	0.36	11	11
7.72	7.86	-0.14	11	12
8.13	7.86	0.27	12	12
7.7	7.86	-0.16	12	13
7.99	7.86	0.13	13	13
7.82	7.86	-0.04	13	14
8.04	7.91	0.13	14	14
8.02	7.91	0.11	15	14
7.16	7.91	-0.75	15	15
7.47	7.91	-0.44	15	16
7.96	7.91	0.05	16	16
7.54	7.91	-0.37	16	17
8.22	7.91	0.31	17	17
7.72	7.91	-0.19	17	18
8.13	7.91	0.22	18	18
7.7	7.91	-0.21	18	19
7.99	7.91	0.08	19	19
7.82	7.91	-0.09	19	20
8.02	8.04	-0.02	19	21
7.16	8.04	-0.88	19	22
7.47	8.04	-0.57	19	23
7.96	8.04	-0.08	19	24
7.54	8.04	-0.5	19	25

8.22	8.04	0.18	20	25
7.72	8.04	-0.32	20	26
8.13	8.04	0.09	21	26
7.7	8.04	-0.34	21	27
7.99	8.04	-0.05	21	28
7.82	8.04	-0.22	21	29
7.16	8.02	-0.86	21	30
7.47	8.02	-0.55	21	31
7.96	8.02	-0.06	21	32
7.54	8.02	-0.48	21	33
8.22	8.02	0.2	22	33
7.72	8.02	-0.3	22	34
8.13	8.02	0.11	23	34
7.7	8.02	-0.32	23	35
7.99	8.02	-0.03	23	36
7.82	8.02	-0.2	23	37
7.47	7.16	0.31	24	37
7.96	7.16	0.8	25	37
7.54	7.16	0.38	26	37
8.22	7.16	1.06	27	37
7.72	7.16	0.56	28	37
8.13	7.16	0.97	29	37
7.7	7.16	0.54	30	37
7.99	7.16	0.83	31	37
7.82	7.16	0.66	32	37
7.96	7.47	0.49	33	37
7.54	7.47	0.07	34	37
8.22	7.47	0.75	35	37
7.72	7.47	0.25	36	37
8.13	7.47	0.66	37	37
7.7	7.47	0.23	38	37
7.99	7.47	0.52	39	37
7.82	7.47	0.35	40	37
7.54	7.96	-0.42	40	38
8.22	7.96	0.26	41	38
7.72	7.96	-0.24	41	39
8.13	7.96	0.17	42	39
7.7	7.96	-0.26	42	40
7.99	7.96	0.03	43	40
7.82	7.96	-0.14	43	41
8.22	7.54	0.68	44	41
7.72	7.54	0.18	45	41
8.13	7.54	0.59	46	41
7.7	7.54	0.16	47	41
7.99	7.54	0.45	48	41
7.82	7.54	0.28	49	41
7.72	8.22	-0.5	49	42
8.13	8.22	-0.09	49	43
7.7	8.22	-0.52	49	44
7.99	8.22	-0.23	49	45
7.82	8.22	-0.4	49	46

8.13	7.72	0.41	50	46
7.7	7.72	-0.02	50	47
7.99	7.72	0.27	51	47
7.82	7.72	0.1	52	47
7.7	8.13	-0.43	52	48
7.99	8.13	-0.14	52	49
7.82	8.13	-0.31	52	50
7.99	7.7	0.29	53	50
7.82	7.7	0.12	54	50
7.82	7.99	-0.17	54	51

S Statistic = 54 - 51 = 3

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = 0.0989743

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|0.0989743| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: pH, Field

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.126984	0.153846	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S05	1/18/2017	8.31	FALSE
	4/5/2017	8.32	FALSE
	4/25/2017	7.67	FALSE
	10/16/2018	8.13	FALSE
	10/22/2019	8.4	FALSE
	6/29/2020	8.09	FALSE
	12/5/2020	7.77	FALSE
	3/26/2021	7.92	FALSE

## Shapiro-Wilks Test of Normality

Parameter: pH, Field

Location: CLF-S05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	7.67	8.4	0.73	0.6052	0.441796
2	7.77	8.32	0.55	0.3164	0.17402
3	7.92	8.31	0.39	0.1743	0.067977
4	8.09	8.13	0.04	0.0561	0.002244
5	8.13	8.09	-0.04		
6	8.31	7.92	-0.39		
7	8.32	7.77	-0.55		
8	8.4	7.67	-0.73		

---

Sum of b values = 0.686037

Sample Standard Deviation = 0.268644

W Statistic = 0.931628

5% Critical value of 0.818 is less than 0.931628

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.931628

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: pH, Field**  
**Location: CLF-S05**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

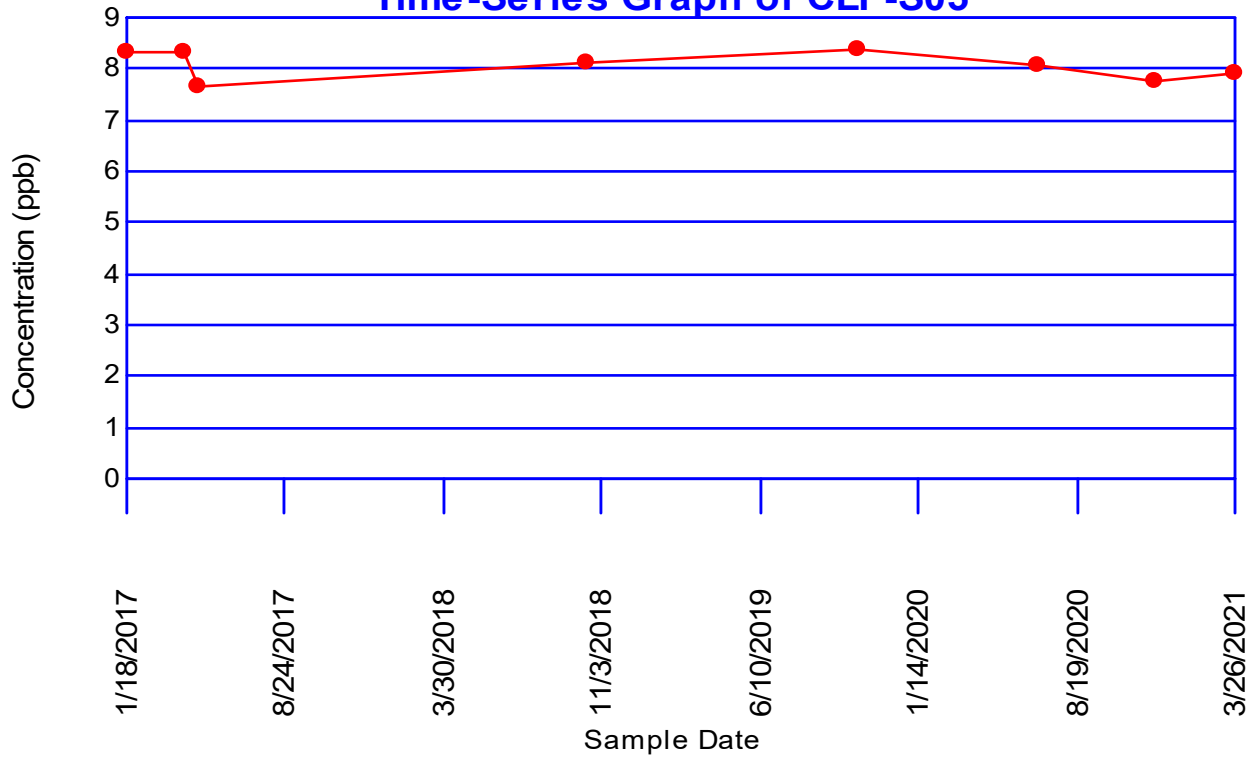
95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8.32	8.31	0.01	1	0
7.67	8.31	-0.64	1	1
8.13	8.31	-0.18	1	2
8.4	8.31	0.09	2	2
8.09	8.31	-0.22	2	3
7.77	8.31	-0.54	2	4
7.92	8.31	-0.39	2	5
7.67	8.32	-0.65	2	6
8.13	8.32	-0.19	2	7
8.4	8.32	0.08	3	7
8.09	8.32	-0.23	3	8
7.77	8.32	-0.55	3	9
7.92	8.32	-0.4	3	10
8.13	7.67	0.46	4	10
8.4	7.67	0.73	5	10
8.09	7.67	0.42	6	10
7.77	7.67	0.1	7	10
7.92	7.67	0.25	8	10
8.4	8.13	0.27	9	10
8.09	8.13	-0.04	9	11
7.77	8.13	-0.36	9	12
7.92	8.13	-0.21	9	13
8.09	8.4	-0.31	9	14
7.77	8.4	-0.63	9	15
7.92	8.4	-0.48	9	16
7.77	8.09	-0.32	9	17
7.92	8.09	-0.17	9	18
7.92	7.77	0.15	10	18

S Statistic = 10 - 18 = -8  
 Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
 Probability of obtaining S >= |-8| is 0.398  
 0.398 >= 0.025 indicating no evidence of a trend



### pH, Field Time-Series Graph of CLF-S05



### Concentrations (ppb)

Parameter: Sulfate

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Total Measurements: 74

Total Non-Detect: 1

Percent Non-Detects: 1.35135%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

There are 6 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

CLF-J2	15	0 (0%)	12/7/2016	11.6295	112360
			1/18/2017	10.9938	59503.6
			2/23/2017	11.632	112644
			3/22/2017	11.7068	121391
			4/5/2017	11.4833	97080.5
			4/25/2017	11.3676	86471.6
			7/6/2017	12.9762	432000
			8/8/2017	11.7928	132300
			10/9/2017	12.2913	217800
			12/6/2017	11.5079	99500
			5/15/2018	10.669	43000
			10/16/2018	10.8724	52700
			6/11/2019	10.3951	32700
			10/22/2019	11.0713	64300
			6/29/2020	8.89563	7300
	<b>12/5/2020</b>	<b>10.8454</b>	<b>51300</b>		
	<b>3/26/2021</b>	<b>10.1346</b>	<b>25200</b>		

CLF-J3	14	0 (0%)	12/7/2016	11.6428	113868
			1/18/2017	10.9837	58908.2
			2/23/2017	11.6351	112997
			3/22/2017	11.7292	124144
			4/5/2017	11.4776	96528.1
			7/6/2017	12.9715	430000
			8/8/2017	11.8019	133500
			10/9/2017	12.2923	218000
			12/6/2017	11.5229	101000
			5/15/2018	11.4907	97800
			10/16/2018	10.8667	52400
			6/11/2019	10.3982	32800
			10/22/2019	11.0929	65700
			6/15/2020	11.5109	99800
				<b>12/5/2020</b>	<b>10.9114</b>
	<b>3/26/2021</b>	<b>10.1464</b>	<b>25500</b>		

CLF-J5	15	0 (0%)	12/7/2016	11.2942	80351.1
			1/18/2017	10.8298	50501.3
			2/23/2017	11.2063	73590.6
			3/22/2017	11.4863	97376.7
			4/5/2017	11.4286	91913.1
			4/25/2017	10.9773	58530.4

			7/6/2017	13.2267	555000
			8/8/2017	11.6218	111500
			10/9/2017	12.4987	268000
			12/6/2017	10.8238	50200
			5/15/2018	11.1243	67800
			10/16/2018	9.88837	19700
			6/11/2019	9.87303	19400
			10/22/2019	10.7077	44700
			6/15/2020	11.0572	63400
			<b>12/5/2020</b>	<b>10.0774</b>	<b>23800</b>
			<b>3/26/2021</b>	<b>9.65503</b>	<b>15600</b>
<hr/>					
CLF-S05	8	0 (0%)	1/18/2017	10.7194	45223.8
			4/5/2017	11.0448	62615.6
			4/25/2017	10.7095	44781.4
			10/16/2018	8.92266	7500
			10/22/2019	11.1476	69400
			6/29/2020	8.59415	5400
			12/5/2020	10.2853	29300
			3/26/2021	9.62245	15100
<hr/>					
CLF-S06	7	1 (14.2857%)	1/18/2017	9.2681	10594.6
			4/5/2017	9.69	16155.3
			4/25/2017	9.45103	12721.2
			10/16/2018	8.63052	5600
			6/29/2020	8.13153	3400
			12/5/2020	ND<8.29405	ND<4000
			3/26/2021	9.25913	10500
<hr/>					
CLF-S13	15	0 (0%)	12/7/2016	11.7242	123520
			1/18/2017	12.67	318064
			2/23/2017	13.1371	507416
			3/22/2017	13.1328	505253
			4/5/2017	12.9941	439796
			4/25/2017	12.6295	305426
			7/6/2017	11.8078	134300
			8/8/2017	11.7868	131500
			10/9/2017	11.7629	128400
			12/6/2017	12.5425	280000
			5/15/2018	12.8266	372000
			10/16/2018	11.9512	155000
			6/11/2019	12.3673	235000
			10/22/2019	11.1273	68000
			6/15/2020	12.2501	209000
			<b>12/5/2020</b>	<b>11.7981</b>	<b>133000</b>
			<b>3/26/2021</b>	<b>12.2356</b>	<b>206000</b>

There are 2 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
CLF-C03	17	0 (0%)	12/7/2016	10.4563	34762.7
			1/18/2017	9.67689	15944.9
			2/23/2017	10.07	23623.8
			3/22/2017	9.78327	17734.6
			4/5/2017	9.76161	17354.5
			4/25/2017	9.70621	16419.2

			7/6/2017	9.78132	17700
			8/8/2017	10.2989	29700
			10/9/2017	10.1811	26400
			12/6/2017	9.75266	17200
			5/15/2018	9.86786	19300
			10/16/2018	9.29652	10900
			6/11/2019	9.54681	14000
			10/22/2019	9.88328	19600
			6/15/2020	9.72913	16800
			12/5/2020	9.79256	17900
			3/26/2021	9.2399	10300
<hr/>					
CLF-OPP	17	0 (0%)	12/7/2016	9.49024	13230
			1/18/2017	9.23016	10200.2
			2/23/2017	9.59523	14694.5
			3/22/2017	9.58607	14560.5
			4/5/2017	9.29409	10873.6
			4/25/2017	9.36244	11642.8
			7/6/2017	9.22029	10100
			8/8/2017	8.90924	7400
			10/9/2017	9.04782	8500
			12/6/2017	8.99962	8100
			5/15/2018	9.65503	15600
			10/16/2018	8.7483	6300
			6/11/2019	9.2399	10300
			10/22/2019	9.01189	8200
			6/15/2020	9.46498	12900
			12/5/2020	9.07108	8700
			3/26/2021	8.94898	7700
<hr/>					

## Dixon's Test for Outliers

Parameter: Sulfate

Location: CLF-J2

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.51289	0.612083	0.525	8.89563
2	0.562481	0.341448	0.546	12.9762
3	0.360311	0.341448	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J2	12/7/2016	11.6295	FALSE
	1/18/2017	10.9938	FALSE
	2/23/2017	11.632	FALSE
	3/22/2017	11.7068	FALSE
	4/5/2017	11.4833	FALSE
	4/25/2017	11.3676	FALSE
	7/6/2017	<b>12.9762</b>	<b>TRUE</b>
	8/8/2017	11.7928	FALSE
	10/9/2017	12.2913	FALSE
	12/6/2017	11.5079	FALSE
	5/15/2018	10.669	FALSE
	10/16/2018	10.8724	FALSE
	6/11/2019	10.3951	FALSE
	10/22/2019	11.0713	FALSE
	6/29/2020	<b>8.89563</b>	<b>TRUE</b>

## Shapiro-Wilks Test of Normality

Parameter: Sulfate

Location: CLF-J2

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	8.89563	12.9762	4.08055	0.515	2.10148
2	10.3951	12.2913	1.8962	0.3306	0.626884
3	10.669	11.7928	1.12387	0.2495	0.280406
4	10.8724	11.7068	0.834401	0.1878	0.156701
5	10.9938	11.632	0.638196	0.1353	0.0863479
6	11.0713	11.6295	0.558148	0.088	0.0491171
7	11.3676	11.5079	0.140342	0.0433	0.00607679
8	11.4833	11.4833	0		0
9	11.5079	11.3676	-0.140342		
10	11.6295	11.0713	-0.558148		
11	11.632	10.9938	-0.638196		
12	11.7068	10.8724	-0.834401		
13	11.7928	10.669	-1.12387		
14	12.2913	10.3951	-1.8962		
15	12.9762	8.89563	-4.08055		

---

Sum of b values = 3.30702

Sample Standard Deviation = 0.919031

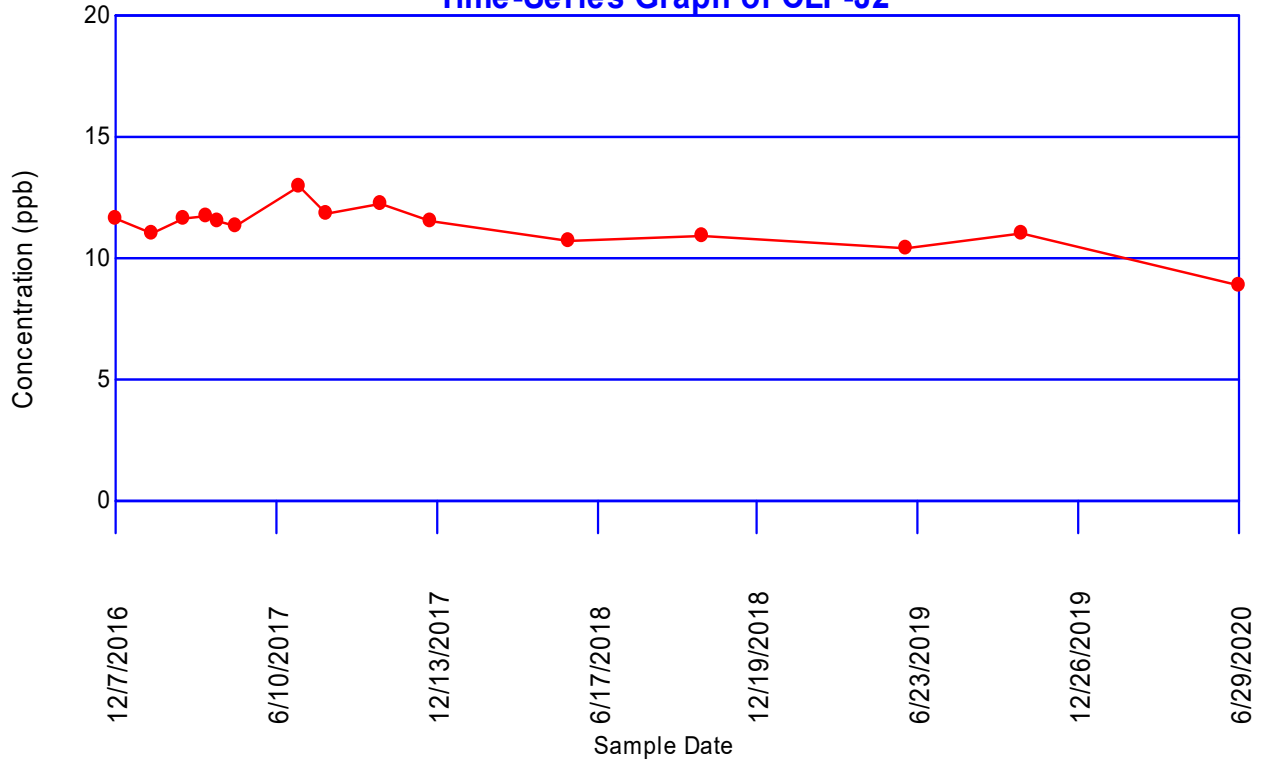
W Statistic = 0.924878

5% Critical value of 0.881 is less than 0.924878  
Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.924878  
Data is normally distributed at 99% level of significance

# Sulfate

## Time-Series Graph of CLF-J2



**Mann-Kendall Trend Analysis**  
**Parameter: Sulfate**  
**Location: CLF-J2**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
10.9938	11.6295	-0.635671	0	1
11.632	11.6295	0.0025244	1	1
11.7068	11.6295	0.0773087	2	1
11.4833	11.6295	-0.146167	2	2
11.3676	11.6295	-0.261892	2	3
12.9762	11.6295	1.34672	3	3
11.7928	11.6295	0.163364	4	3
12.2913	11.6295	0.661869	5	3
11.5079	11.6295	-0.12155	5	4
10.669	11.6295	-0.960508	5	5
10.8724	11.6295	-0.757093	5	6
10.3951	11.6295	-1.23433	5	7
11.0713	11.6295	-0.558148	5	8
8.89563	11.6295	-2.73383	5	9
11.632	10.9938	0.638196	6	9
11.7068	10.9938	0.71298	7	9
11.4833	10.9938	0.489504	8	9
11.3676	10.9938	0.373779	9	9
12.9762	10.9938	1.98239	10	9
11.7928	10.9938	0.799035	11	9
12.2913	10.9938	1.29754	12	9
11.5079	10.9938	0.514121	13	9
10.669	10.9938	-0.324837	13	10
10.8724	10.9938	-0.121421	13	11
10.3951	10.9938	-0.598662	13	12
11.0713	10.9938	0.0775228	14	12
8.89563	10.9938	-2.09816	14	13
11.7068	11.632	0.0747843	15	13
11.4833	11.632	-0.148692	15	14
11.3676	11.632	-0.264416	15	15
12.9762	11.632	1.34419	16	15
11.7928	11.632	0.16084	17	15
12.2913	11.632	0.659345	18	15
11.5079	11.632	-0.124075	18	16
10.669	11.632	-0.963032	18	17
10.8724	11.632	-0.759617	18	18
10.3951	11.632	-1.23686	18	19
11.0713	11.632	-0.560673	18	20
8.89563	11.632	-2.73636	18	21
11.4833	11.7068	-0.223476	18	22
11.3676	11.7068	-0.339201	18	23
12.9762	11.7068	1.26941	19	23
11.7928	11.7068	0.0860553	20	23
12.2913	11.7068	0.58456	21	23



11.5079	11.7068	-0.198859	21	24
10.669	11.7068	-1.03782	21	25
10.8724	11.7068	-0.834401	21	26
10.3951	11.7068	-1.31164	21	27
11.0713	11.7068	-0.635457	21	28
8.89563	11.7068	-2.81114	21	29
11.3676	11.4833	-0.115724	21	30
12.9762	11.4833	1.49289	22	30
11.7928	11.4833	0.309532	23	30
12.2913	11.4833	0.808037	24	30
11.5079	11.4833	0.0246171	25	30
10.669	11.4833	-0.81434	25	31
10.8724	11.4833	-0.610925	25	32
10.3951	11.4833	-1.08817	25	33
11.0713	11.4833	-0.411981	25	34
8.89563	11.4833	-2.58767	25	35
12.9762	11.3676	1.60861	26	35
11.7928	11.3676	0.425256	27	35
12.2913	11.3676	0.923761	28	35
11.5079	11.3676	0.140342	29	35
10.669	11.3676	-0.698616	29	36
10.8724	11.3676	-0.495201	29	37
10.3951	11.3676	-0.972441	29	38
11.0713	11.3676	-0.296256	29	39
8.89563	11.3676	-2.47194	29	40
11.7928	12.9762	-1.18335	29	41
12.2913	12.9762	-0.684848	29	42
11.5079	12.9762	-1.46827	29	43
10.669	12.9762	-2.30723	29	44
10.8724	12.9762	-2.10381	29	45
10.3951	12.9762	-2.58105	29	46
11.0713	12.9762	-1.90487	29	47
8.89563	12.9762	-4.08055	29	48
12.2913	11.7928	0.498505	30	48
11.5079	11.7928	-0.284914	30	49
10.669	11.7928	-1.12387	30	50
10.8724	11.7928	-0.920457	30	51
10.3951	11.7928	-1.3977	30	52
11.0713	11.7928	-0.721512	30	53
8.89563	11.7928	-2.8972	30	54
11.5079	12.2913	-0.78342	30	55
10.669	12.2913	-1.62238	30	56
10.8724	12.2913	-1.41896	30	57
10.3951	12.2913	-1.8962	30	58
11.0713	12.2913	-1.22002	30	59
8.89563	12.2913	-3.3957	30	60
10.669	11.5079	-0.838958	30	61
10.8724	11.5079	-0.635542	30	62
10.3951	11.5079	-1.11278	30	63
11.0713	11.5079	-0.436598	30	64
8.89563	11.5079	-2.61228	30	65

10.8724	10.669	0.203415	31	65
10.3951	10.669	-0.273825	31	66
11.0713	10.669	0.40236	32	66
8.89563	10.669	-1.77333	32	67
10.3951	10.8724	-0.47724	32	68
11.0713	10.8724	0.198944	33	68
8.89563	10.8724	-1.97674	33	69
11.0713	10.3951	0.676185	34	69
8.89563	10.3951	-1.4995	34	70
8.89563	11.0713	-2.17569	34	71

S Statistic = 34 - 71 = -37

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
-------------	--------------

12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/29/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -1.78154

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**| -1.78154 | <= 1.97737 indicating no evidence of a trend**

## Dixon's Test for Outliers

Parameter: Sulfate

Location: CLF-J3

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 14 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.58843	0.417157	0.546	12.9715
2	0.394962	0.417157	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J3	12/7/2016	11.6428	FALSE
	1/18/2017	10.9837	FALSE
	2/23/2017	11.6351	FALSE
	3/22/2017	11.7292	FALSE
	4/5/2017	11.4776	FALSE
	7/6/2017	<b>12.9715</b>	<b>TRUE</b>
	8/8/2017	11.8019	FALSE
	10/9/2017	12.2923	FALSE
	12/6/2017	11.5229	FALSE
	5/15/2018	11.4907	FALSE
	10/16/2018	10.8667	FALSE
	6/11/2019	10.3982	FALSE
	10/22/2019	11.0929	FALSE
	6/15/2020	11.5109	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Sulfate

Location: CLF-J3

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 14 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	10.3982	12.9715	2.57336	0.5251	1.35127
2	10.8667	12.2923	1.42559	0.3318	0.47301
3	10.9837	11.8019	0.818121	0.246	0.201258
4	11.0929	11.7292	0.636343	0.1802	0.114669
5	11.4776	11.6428	0.165206	0.124	0.0204855
6	11.4907	11.6351	0.144437	0.0727	0.0105005
7	11.5109	11.5229	0.0119523	0.024	0.000286856
8	11.5229	11.5109	-0.0119523		
9	11.6351	11.4907	-0.144437		
10	11.6428	11.4776	-0.165206		
11	11.7292	11.0929	-0.636343		
12	11.8019	10.9837	-0.818121		
13	12.2923	10.8667	-1.42559		
14	12.9715	10.3982	-2.57336		

---

Sum of b values = 2.17148

Sample Standard Deviation = 0.620896

W Statistic = 0.940871

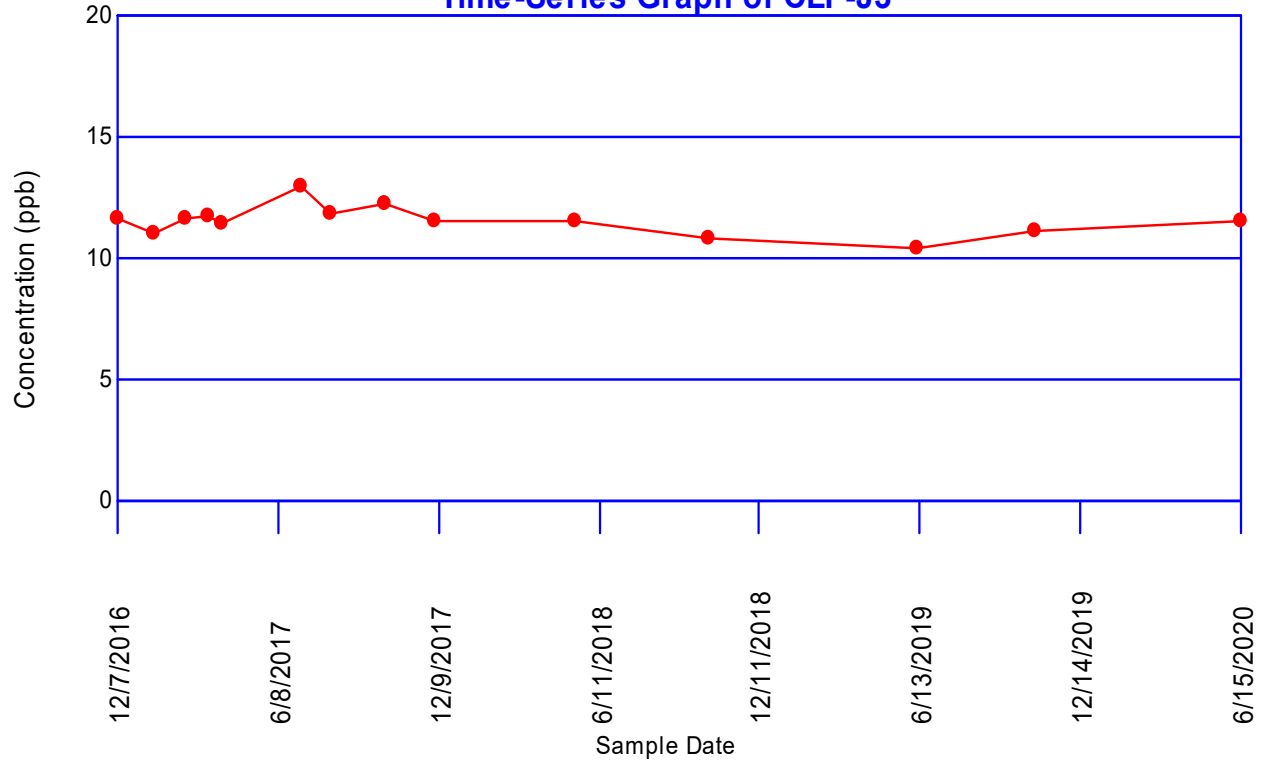
5% Critical value of 0.874 is less than 0.940871

Data is normally distributed at 95% level of significance

1% Critical value of 0.825 is less than 0.940871

Data is normally distributed at 99% level of significance

### Sulfate Time-Series Graph of CLF-J3



**Mann-Kendall Trend Analysis**  
**Parameter: Sulfate**  
**Location: CLF-J3**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
10.9837	11.6428	-0.65906	0	1
11.6351	11.6428	-0.00767861	0	2
11.7292	11.6428	0.0864023	1	2
11.4776	11.6428	-0.165206	1	3
12.9715	11.6428	1.32875	2	3
11.8019	11.6428	0.159062	3	3
12.2923	11.6428	0.649455	4	3
11.5229	11.6428	-0.119919	4	4
11.4907	11.6428	-0.152115	4	5
10.8667	11.6428	-0.776133	4	6
10.3982	11.6428	-1.24461	4	7
11.0929	11.6428	-0.549941	4	8
11.5109	11.6428	-0.131872	4	9
11.6351	10.9837	0.651381	5	9
11.7292	10.9837	0.745462	6	9
11.4776	10.9837	0.493854	7	9
12.9715	10.9837	1.9878	8	9
11.8019	10.9837	0.818121	9	9
12.2923	10.9837	1.30851	10	9
11.5229	10.9837	0.53914	11	9
11.4907	10.9837	0.506944	12	9
10.8667	10.9837	-0.117074	12	10
10.3982	10.9837	-0.585552	12	11
11.0929	10.9837	0.109119	13	11
11.5109	10.9837	0.527188	14	11
11.7292	11.6351	0.0940809	15	11
11.4776	11.6351	-0.157527	15	12
12.9715	11.6351	1.33642	16	12
11.8019	11.6351	0.16674	17	12
12.2923	11.6351	0.657134	18	12
11.5229	11.6351	-0.112241	18	13
11.4907	11.6351	-0.144437	18	14
10.8667	11.6351	-0.768455	18	15
10.3982	11.6351	-1.23693	18	16
11.0929	11.6351	-0.542262	18	17
11.5109	11.6351	-0.124193	18	18
11.4776	11.7292	-0.251608	18	19
12.9715	11.7292	1.24234	19	19
11.8019	11.7292	0.0726593	20	19
12.2923	11.7292	0.563053	21	19
11.5229	11.7292	-0.206322	21	20
11.4907	11.7292	-0.238518	21	21
10.8667	11.7292	-0.862536	21	22
10.3982	11.7292	-1.33101	21	23

11.0929	11.7292	-0.636343	21	24
11.5109	11.7292	-0.218274	21	25
12.9715	11.4776	1.49395	22	25
11.8019	11.4776	0.324267	23	25
12.2923	11.4776	0.814661	24	25
11.5229	11.4776	0.0452864	25	25
11.4907	11.4776	0.0130904	26	25
10.8667	11.4776	-0.610928	26	26
10.3982	11.4776	-1.07941	26	27
11.0929	11.4776	-0.384735	26	28
11.5109	11.4776	0.033334	27	28
11.8019	12.9715	-1.16968	27	29
12.2923	12.9715	-0.67929	27	30
11.5229	12.9715	-1.44866	27	31
11.4907	12.9715	-1.48086	27	32
10.8667	12.9715	-2.10488	27	33
10.3982	12.9715	-2.57336	27	34
11.0929	12.9715	-1.87869	27	35
11.5109	12.9715	-1.46062	27	36
12.2923	11.8019	0.490394	28	36
11.5229	11.8019	-0.278981	28	37
11.4907	11.8019	-0.311177	28	38
10.8667	11.8019	-0.935195	28	39
10.3982	11.8019	-1.40367	28	40
11.0929	11.8019	-0.709003	28	41
11.5109	11.8019	-0.290933	28	42
11.5229	12.2923	-0.769375	28	43
11.4907	12.2923	-0.80157	28	44
10.8667	12.2923	-1.42559	28	45
10.3982	12.2923	-1.89407	28	46
11.0929	12.2923	-1.1994	28	47
11.5109	12.2923	-0.781327	28	48
11.4907	11.5229	-0.0321959	28	49
10.8667	11.5229	-0.656214	28	50
10.3982	11.5229	-1.12469	28	51
11.0929	11.5229	-0.430022	28	52
11.5109	11.5229	-0.0119523	28	53
10.8667	11.4907	-0.624018	28	54
10.3982	11.4907	-1.0925	28	55
11.0929	11.4907	-0.397826	28	56
11.5109	11.4907	0.0202436	29	56
10.3982	10.8667	-0.468478	29	57
11.0929	10.8667	0.226192	30	57
11.5109	10.8667	0.644262	31	57
11.0929	10.3982	0.69467	32	57
11.5109	10.3982	1.11274	33	57
11.5109	11.0929	0.418069	34	57

S Statistic = 34 - 57 = -23

---

Tied Group	Value	Members
<b>Time Period</b>		<b>Observations</b>
12/7/2016		1
1/18/2017		1
2/23/2017		1
3/22/2017		1
4/5/2017		1
7/6/2017		1
8/8/2017		1
10/9/2017		1
12/6/2017		1
5/15/2018		1
10/16/2018		1
6/11/2019		1
10/22/2019		1
6/15/2020		1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = -1.20439

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-1.20439**| <= 1.97737 indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Sulfate

Location: CLF-J5

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.637137	0.477312	0.525	13.2267
2	0.565267	0.517383	0.546	12.4987
3	0.111446	0.517383	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J5	12/7/2016	11.2942	FALSE
	1/18/2017	10.8298	FALSE
	2/23/2017	11.2063	FALSE
	3/22/2017	11.4863	FALSE
	4/5/2017	11.4286	FALSE
	4/25/2017	10.9773	FALSE
	7/6/2017	<b>13.2267</b>	<b>TRUE</b>
	8/8/2017	11.6218	FALSE
	10/9/2017	<b>12.4987</b>	<b>TRUE</b>
	12/6/2017	10.8238	FALSE
	5/15/2018	11.1243	FALSE
	10/16/2018	9.88837	FALSE
	6/11/2019	9.87303	FALSE
	10/22/2019	10.7077	FALSE
6/15/2020	11.0572	FALSE	

## Shapiro-Wilks Test of Normality

Parameter: Sulfate

Location: CLF-J5

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	9.87303	13.2267	3.3537	0.515	1.72715
2	9.88837	12.4987	2.61037	0.3306	0.862988
3	10.7077	11.6218	0.914051	0.2495	0.228056
4	10.8238	11.4863	0.662572	0.1878	0.124431
5	10.8298	11.4286	0.598844	0.1353	0.0810237
6	10.9773	11.2942	0.31686	0.088	0.0278836
7	11.0572	11.2063	0.149053	0.0433	0.00645401
8	11.1243	11.1243	0		0
9	11.2063	11.0572	-0.149053		
10	11.2942	10.9773	-0.31686		
11	11.4286	10.8298	-0.598844		
12	11.4863	10.8238	-0.662572		
13	11.6218	10.7077	-0.914051		
14	12.4987	9.88837	-2.61037		
15	13.2267	9.87303	-3.3537		

---

Sum of b values = 3.05799

Sample Standard Deviation = 0.853277

W Statistic = 0.91741

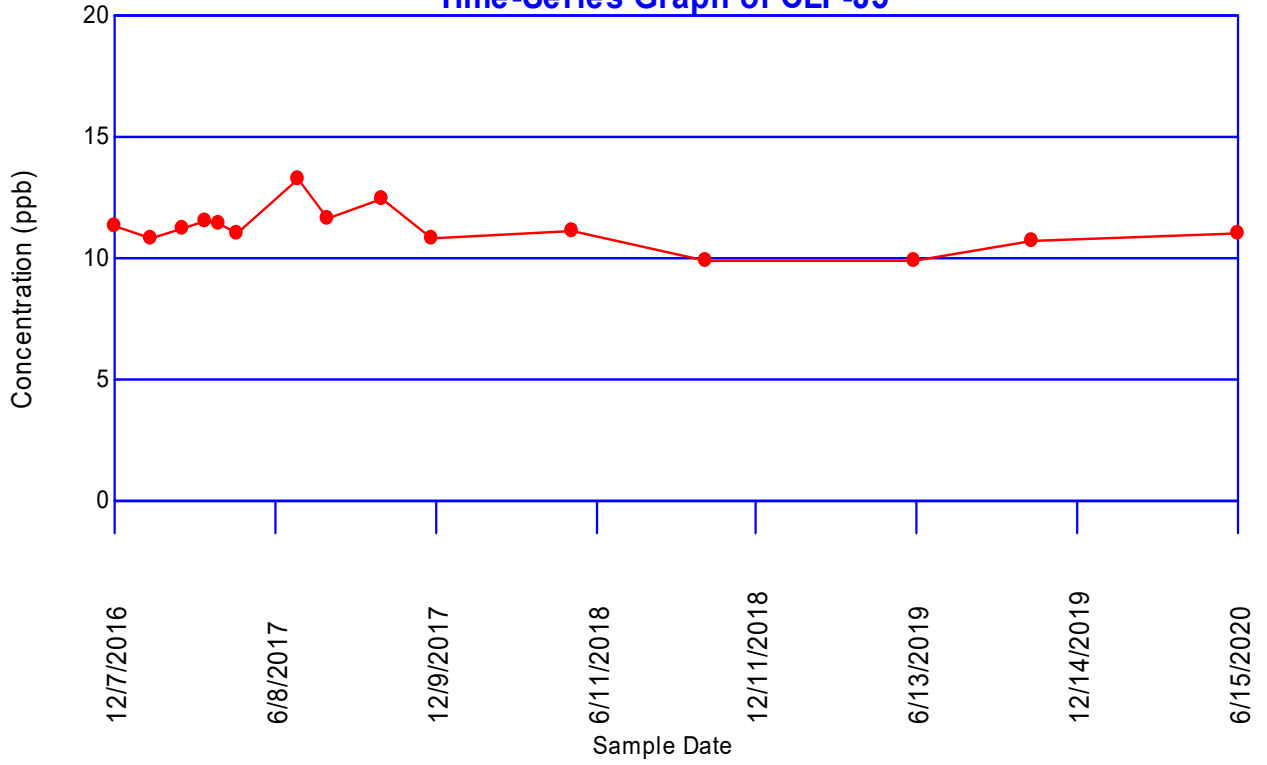
5% Critical value of 0.881 is less than 0.91741

Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.91741

Data is normally distributed at 99% level of significance

**Sulfate**  
**Time-Series Graph of CLF-J5**



**Mann-Kendall Trend Analysis**  
**Parameter: Sulfate**  
**Location: CLF-J5**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
10.8298	11.2942	-0.464407	0	1
11.2063	11.2942	-0.0878885	0	2
11.4863	11.2942	0.192181	1	2
11.4286	11.2942	0.134438	2	2
10.9773	11.2942	-0.31686	2	3
13.2267	11.2942	1.93256	3	3
11.6218	11.2942	0.327619	4	3
12.4987	11.2942	1.20458	5	3
10.8238	11.2942	-0.470391	5	4
11.1243	11.2942	-0.169844	5	5
9.88837	11.2942	-1.40579	5	6
9.87303	11.2942	-1.42113	5	7
10.7077	11.2942	-0.586432	5	8
11.0572	11.2942	-0.236942	5	9
11.2063	10.8298	0.376518	6	9
11.4863	10.8298	0.656588	7	9
11.4286	10.8298	0.598844	8	9
10.9773	10.8298	0.147547	9	9
13.2267	10.8298	2.39697	10	9
11.6218	10.8298	0.792026	11	9
12.4987	10.8298	1.66899	12	9
10.8238	10.8298	-0.00598405	12	10
11.1243	10.8298	0.294563	13	10
9.88837	10.8298	-0.94138	13	11
9.87303	10.8298	-0.956726	13	12
10.7077	10.8298	-0.122026	13	13
11.0572	10.8298	0.227465	14	13
11.4863	11.2063	0.28007	15	13
11.4286	11.2063	0.222326	16	13
10.9773	11.2063	-0.228971	16	14
13.2267	11.2063	2.02045	17	14
11.6218	11.2063	0.415507	18	14
12.4987	11.2063	1.29247	19	14
10.8238	11.2063	-0.382502	19	15
11.1243	11.2063	-0.0819551	19	16
9.88837	11.2063	-1.3179	19	17
9.87303	11.2063	-1.33324	19	18
10.7077	11.2063	-0.498544	19	19
11.0572	11.2063	-0.149053	19	20
11.4286	11.4863	-0.0577434	19	21
10.9773	11.4863	-0.509041	19	22
13.2267	11.4863	1.74038	20	22
11.6218	11.4863	0.135438	21	22
12.4987	11.4863	1.0124	22	22

10.8238	11.4863	-0.662572	22	23
11.1243	11.4863	-0.362025	22	24
9.88837	11.4863	-1.59797	22	25
9.87303	11.4863	-1.61331	22	26
10.7077	11.4863	-0.778613	22	27
11.0572	11.4863	-0.429123	22	28
10.9773	11.4286	-0.451297	22	29
13.2267	11.4286	1.79812	23	29
11.6218	11.4286	0.193181	24	29
12.4987	11.4286	1.07014	25	29
10.8238	11.4286	-0.604829	25	30
11.1243	11.4286	-0.304281	25	31
9.88837	11.4286	-1.54022	25	32
9.87303	11.4286	-1.55557	25	33
10.7077	11.4286	-0.72087	25	34
11.0572	11.4286	-0.37138	25	35
13.2267	10.9773	2.24942	26	35
11.6218	10.9773	0.644478	27	35
12.4987	10.9773	1.52144	28	35
10.8238	10.9773	-0.153531	28	36
11.1243	10.9773	0.147016	29	36
9.88837	10.9773	-1.08893	29	37
9.87303	10.9773	-1.10427	29	38
10.7077	10.9773	-0.269573	29	39
11.0572	10.9773	0.0799176	30	39
11.6218	13.2267	-1.60494	30	40
12.4987	13.2267	-0.727981	30	41
10.8238	13.2267	-2.40295	30	42
11.1243	13.2267	-2.10241	30	43
9.88837	13.2267	-3.33835	30	44
9.87303	13.2267	-3.3537	30	45
10.7077	13.2267	-2.51899	30	46
11.0572	13.2267	-2.1695	30	47
12.4987	11.6218	0.876962	31	47
10.8238	11.6218	-0.79801	31	48
11.1243	11.6218	-0.497462	31	49
9.88837	11.6218	-1.73341	31	50
9.87303	11.6218	-1.74875	31	51
10.7077	11.6218	-0.914051	31	52
11.0572	11.6218	-0.564561	31	53
10.8238	12.4987	-1.67497	31	54
11.1243	12.4987	-1.37442	31	55
9.88837	12.4987	-2.61037	31	56
9.87303	12.4987	-2.62571	31	57
10.7077	12.4987	-1.79101	31	58
11.0572	12.4987	-1.44152	31	59
11.1243	10.8238	0.300547	32	59
9.88837	10.8238	-0.935396	32	60
9.87303	10.8238	-0.950742	32	61
10.7077	10.8238	-0.116042	32	62
11.0572	10.8238	0.233449	33	62

9.88837	11.1243	-1.23594	33	63
9.87303	11.1243	-1.25129	33	64
10.7077	11.1243	-0.416589	33	65
11.0572	11.1243	-0.0670983	33	66
9.87303	9.88837	-0.0153456	33	67
10.7077	9.88837	0.819355	34	67
11.0572	9.88837	1.16885	35	67
10.7077	9.87303	0.8347	36	67
11.0572	9.87303	1.18419	37	67
11.0572	10.7077	0.34949	38	67

S Statistic = 38 - 67 = -29

---

**Tied Group Value Members**

---

**Time Period Observations**

12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -1.38564

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**| -1.38564 | <= 1.97737 indicating no evidence of a trend**

## Dixon's Test for Outliers

Parameter: Sulfate

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.178409	0.162455	0.525	None

Loc.	Date	Conc.	Outlier
CLF-S13	12/7/2016	123520	FALSE
	1/18/2017	318064	FALSE
	2/23/2017	507416	FALSE
	3/22/2017	505253	FALSE
	4/5/2017	439796	FALSE
	4/25/2017	305426	FALSE
	7/6/2017	134300	FALSE
	8/8/2017	131500	FALSE
	10/9/2017	128400	FALSE
	12/6/2017	280000	FALSE
	5/15/2018	372000	FALSE
	10/16/2018	155000	FALSE
	6/11/2019	235000	FALSE
	10/22/2019	68000	FALSE
	6/15/2020	209000	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Sulfate

Location: CLF-S13

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	68000	507416	439416	0.515	226299
2	123520	505253	381733	0.3306	126201
3	128400	439796	311396	0.2495	77693.3
4	131500	372000	240500	0.1878	45165.9
5	134300	318064	183764	0.1353	24863.3
6	155000	305426	150426	0.088	13237.5
7	209000	280000	71000	0.0433	3074.3
8	235000	235000	0		
9	280000	209000	-71000		
10	305426	155000	-150426		
11	318064	134300	-183764		
12	372000	131500	-240500		
13	439796	128400	-311396		
14	505253	123520	-381733		
15	507416	68000	-439416		

---

Sum of b values = 516534

Sample Standard Deviation = 144279

W Statistic = 0.915507

5% Critical value of 0.881 is less than 0.915507

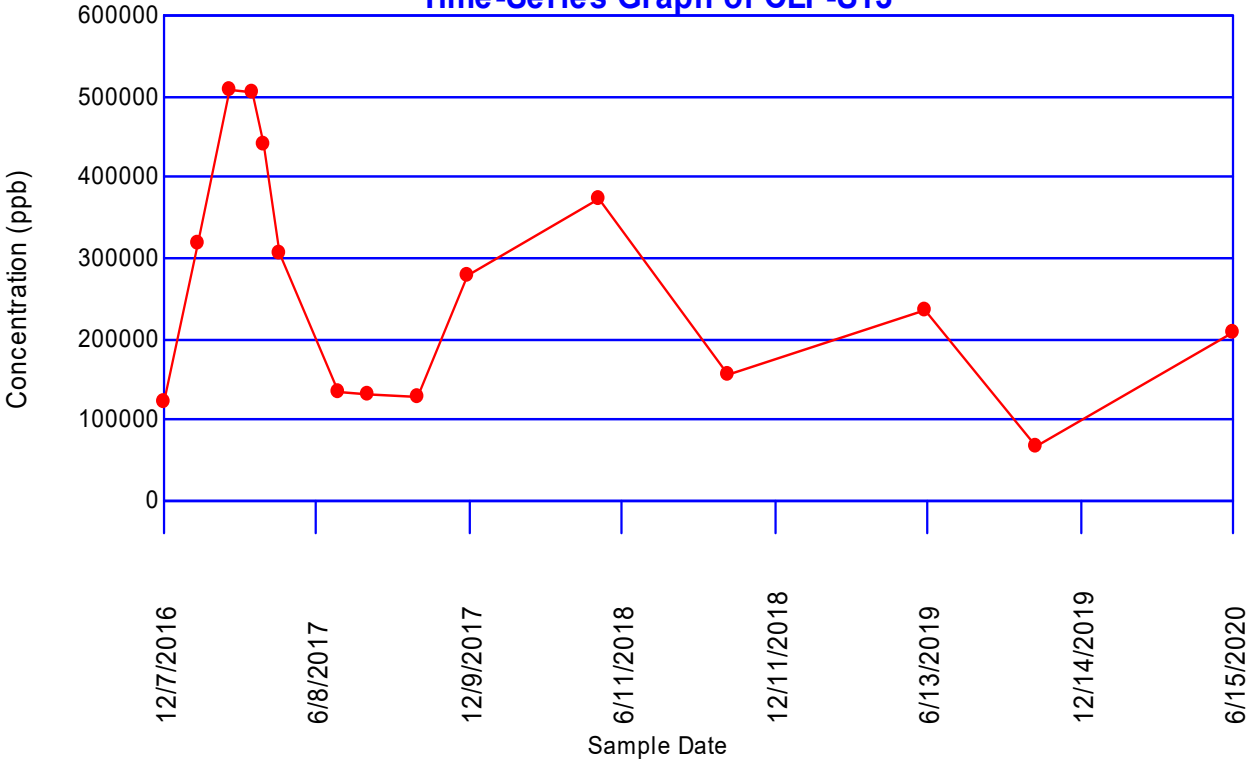
Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.915507

Data is normally distributed at 99% level of significance



### Sulfate Time-Series Graph of CLF-S13



## Mann-Kendall Trend Analysis

Parameter: Sulfate

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
318064	123520	194544	1	0
507416	123520	383896	2	0
505253	123520	381733	3	0
439796	123520	316276	4	0
305426	123520	181906	5	0
134300	123520	10780	6	0
131500	123520	7980	7	0
128400	123520	4880	8	0
280000	123520	156480	9	0
372000	123520	248480	10	0
155000	123520	31480	11	0
235000	123520	111480	12	0
68000	123520	-55520	12	1
209000	123520	85480	13	1
507416	318064	189352	14	1
505253	318064	187189	15	1
439796	318064	121732	16	1
305426	318064	-12638	16	2
134300	318064	-183764	16	3
131500	318064	-186564	16	4
128400	318064	-189664	16	5
280000	318064	-38064	16	6
372000	318064	53936	17	6
155000	318064	-163064	17	7
235000	318064	-83064	17	8
68000	318064	-250064	17	9
209000	318064	-109064	17	10
505253	507416	-2163	17	11
439796	507416	-67620	17	12
305426	507416	-201990	17	13
134300	507416	-373116	17	14
131500	507416	-375916	17	15
128400	507416	-379016	17	16
280000	507416	-227416	17	17
372000	507416	-135416	17	18
155000	507416	-352416	17	19
235000	507416	-272416	17	20
68000	507416	-439416	17	21
209000	507416	-298416	17	22
439796	505253	-65457	17	23
305426	505253	-199827	17	24
134300	505253	-370953	17	25
131500	505253	-373753	17	26
128400	505253	-376853	17	27

280000	505253	-225253	17	28
372000	505253	-133253	17	29
155000	505253	-350253	17	30
235000	505253	-270253	17	31
68000	505253	-437253	17	32
209000	505253	-296253	17	33
305426	439796	-134370	17	34
134300	439796	-305496	17	35
131500	439796	-308296	17	36
128400	439796	-311396	17	37
280000	439796	-159796	17	38
372000	439796	-67796	17	39
155000	439796	-284796	17	40
235000	439796	-204796	17	41
68000	439796	-371796	17	42
209000	439796	-230796	17	43
134300	305426	-171126	17	44
131500	305426	-173926	17	45
128400	305426	-177026	17	46
280000	305426	-25426	17	47
372000	305426	66574	18	47
155000	305426	-150426	18	48
235000	305426	-70426	18	49
68000	305426	-237426	18	50
209000	305426	-96426	18	51
131500	134300	-2800	18	52
128400	134300	-5900	18	53
280000	134300	145700	19	53
372000	134300	237700	20	53
155000	134300	20700	21	53
235000	134300	100700	22	53
68000	134300	-66300	22	54
209000	134300	74700	23	54
128400	131500	-3100	23	55
280000	131500	148500	24	55
372000	131500	240500	25	55
155000	131500	23500	26	55
235000	131500	103500	27	55
68000	131500	-63500	27	56
209000	131500	77500	28	56
280000	128400	151600	29	56
372000	128400	243600	30	56
155000	128400	26600	31	56
235000	128400	106600	32	56
68000	128400	-60400	32	57
209000	128400	80600	33	57
372000	280000	92000	34	57
155000	280000	-125000	34	58
235000	280000	-45000	34	59
68000	280000	-212000	34	60
209000	280000	-71000	34	61

155000	372000	-217000	34	62
235000	372000	-137000	34	63
68000	372000	-304000	34	64
209000	372000	-163000	34	65
235000	155000	80000	35	65
68000	155000	-87000	35	66
209000	155000	54000	36	66
68000	235000	-167000	36	67
209000	235000	-26000	36	68
209000	68000	141000	37	68

S Statistic = 37 - 68 = -31

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
-------------	--------------

12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -1.48461

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**| -1.48461 | <= 1.97737 indicating no evidence of a trend**

## Dixon's Test for Outliers

Parameter: Sulfate

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.109603	0.0367033	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S05	1/18/2017	45223.8	FALSE
	4/5/2017	62615.6	FALSE
	4/25/2017	44781.4	FALSE
	10/16/2018	7500	FALSE
	10/22/2019	69400	FALSE
	6/29/2020	5400	FALSE
	12/5/2020	29300	FALSE
	3/26/2021	15100	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Sulfate

Location: CLF-S05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	5400	69400	64000	0.6052	38732.8
2	7500	62615.6	55115.6	0.3164	17438.6
3	15100	45223.8	30123.8	0.1743	5250.58
4	29300	44781.4	15481.4	0.0561	868.507
5	44781.4	29300	-15481.4		
6	45223.8	15100	-30123.8		
7	62615.6	7500	-55115.6		
8	69400	5400	-64000		

---

Sum of b values = 62290.5

Sample Standard Deviation = 24515.4

W Statistic = 0.922289

5% Critical value of 0.818 is less than 0.922289

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.922289

Data is normally distributed at 99% level of significance

## Mann-Kendall Trend Analysis

Parameter: Sulfate

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

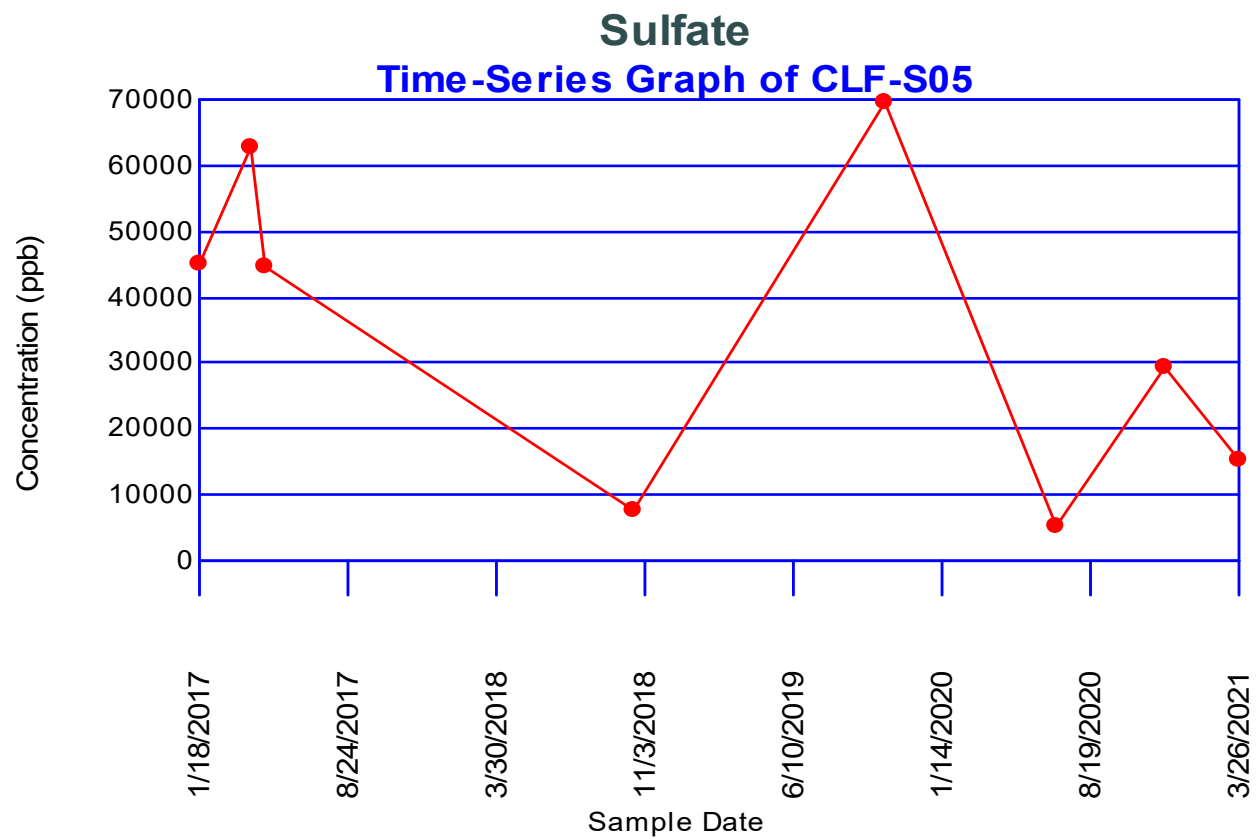
Xj	Xk	Xj - Xk	Positives	Negatives
62615.6	45223.8	17391.8	1	0
44781.4	45223.8	-442.4	1	1
7500	45223.8	-37723.8	1	2
69400	45223.8	24176.2	2	2
5400	45223.8	-39823.8	2	3
29300	45223.8	-15923.8	2	4
15100	45223.8	-30123.8	2	5
44781.4	62615.6	-17834.2	2	6
7500	62615.6	-55115.6	2	7
69400	62615.6	6784.4	3	7
5400	62615.6	-57215.6	3	8
29300	62615.6	-33315.6	3	9
15100	62615.6	-47515.6	3	10
7500	44781.4	-37281.4	3	11
69400	44781.4	24618.6	4	11
5400	44781.4	-39381.4	4	12
29300	44781.4	-15481.4	4	13
15100	44781.4	-29681.4	4	14
69400	7500	61900	5	14
5400	7500	-2100	5	15
29300	7500	21800	6	15
15100	7500	7600	7	15
5400	69400	-64000	7	16
29300	69400	-40100	7	17
15100	69400	-54300	7	18
29300	5400	23900	8	18
15100	5400	9700	9	18
15100	29300	-14200	9	19

S Statistic = 9 - 19 = -10

Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)

Probability of obtaining  $S \geq |-10|$  is 0.276

0.276  $\geq$  0.025 indicating no evidence of a trend





### Concentrations (ppb)

Parameter: Total Dissolved Solids (TDS)

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Total Measurements: 74

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

There are 6 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

CLF-J2	15	0 (0%)	12/7/2016	12.7939	360000
			1/18/2017	12.3673	235000
			2/23/2017	12.8558	383000
			3/22/2017	12.7827	356000
			4/5/2017	12.7939	360000
			4/25/2017	12.7159	333000
			7/6/2017	13.7973	982000
			8/8/2017	12.936	415000
			10/9/2017	13.412	668000
			12/6/2017	13.0498	465000
			5/15/2018	11.9316	152000
			10/16/2018	12.6475	311000
			6/11/2019	12.2061	200000
			10/22/2019	12.7911	359000
			6/29/2020	12.0317	168000
	<b>12/5/2020</b>	<b>12.5776</b>	<b>290000</b>		
	<b>3/26/2021</b>	<b>12.4292</b>	<b>250000</b>		

CLF-J3	14	0 (0%)	12/7/2016	12.7883	358000
			1/18/2017	12.409	245000
			2/23/2017	12.8688	388000
			3/22/2017	12.6411	309000
			4/5/2017	12.7742	353000
			7/6/2017	13.7881	973000
			8/8/2017	12.9785	433000
			10/9/2017	13.3708	641000
			12/6/2017	13.0058	445000
			5/15/2018	12.8917	397000
			10/16/2018	12.6379	308000
			6/11/2019	12.4451	254000
			10/22/2019	12.824	371000
			6/15/2020	12.919	408000
				<b>12/5/2020</b>	<b>12.5637</b>
	<b>3/26/2021</b>	<b>12.2643</b>	<b>212000</b>		

CLF-J5	15	0 (0%)	12/7/2016	12.8186	369000
			1/18/2017	12.5245	275000
			2/23/2017	12.8104	366000
			3/22/2017	12.654	313000
			4/5/2017	12.7883	358000
			4/25/2017	12.495	267000

			7/6/2017	14.0411	1.253e+006
			8/8/2017	12.9808	434000
			10/9/2017	13.5541	770000
			12/6/2017	12.7657	350000
			5/15/2018	12.9042	402000
			10/16/2018	12.495	267000
			6/11/2019	12.2405	207000
			10/22/2019	12.6761	320000
			6/15/2020	12.7038	329000
			<b>12/5/2020</b>	<b>12.4837</b>	<b>264000</b>
			<b>3/26/2021</b>	<b>12.2596</b>	<b>211000</b>
CLF-S05	8	0 (0%)	1/18/2017	12.4411	253000
			4/5/2017	12.5637	286000
			4/25/2017	12.4761	262000
			10/16/2018	12.3327	227000
			10/22/2019	12.8636	386000
			6/29/2020	12.1118	182000
			12/5/2020	12.5425	280000
			3/26/2021	11.7676	129000
CLF-S06	7	0 (0%)	1/18/2017	12.269	213000
			4/5/2017	12.3631	234000
			4/25/2017	12.2308	205000
			10/16/2018	12.2968	219000
			6/29/2020	12.2061	200000
			12/5/2020	12.9092	404000
			3/26/2021	12.16	191000
CLF-S13	15	0 (0%)	12/7/2016	12.8131	367000
			1/18/2017	13.4617	702000
			2/23/2017	13.8294	1.014e+006
			3/22/2017	13.7788	964000
			4/5/2017	13.6483	846000
			4/25/2017	13.4298	680000
			7/6/2017	13.0192	451000
			8/8/2017	12.9945	440000
			10/9/2017	12.9116	405000
			12/6/2017	13.4343	683000
			5/15/2018	13.653	850000
			10/16/2018	12.9263	411000
			6/11/2019	13.2177	550000
			10/22/2019	12.6281	305000
			6/15/2020	13.1635	521000
			<b>12/5/2020</b>	<b>12.8892</b>	<b>396000</b>
			<b>3/26/2021</b>	<b>13.0898</b>	<b>484000</b>

There are 2 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
CLF-C03	17	0 (0%)	12/7/2016	11.7118	122000
			1/18/2017	12.3239	225000
			2/23/2017	12.6761	320000
			3/22/2017	12.2308	205000
			4/5/2017	12.4292	250000
			4/25/2017	12.4837	264000

			7/6/2017	12.4913	266000
			8/8/2017	12.4451	254000
			10/9/2017	12.5099	271000
			12/6/2017	12.5981	296000
			5/15/2018	12.6281	305000
			10/16/2018	12.495	267000
			6/11/2019	12.4411	253000
			10/22/2019	12.4411	253000
			6/15/2020	12.3014	220000
			12/5/2020	12.6248	304000
			3/26/2021	12.3884	240000
<hr/>					
CLF-OPP	17	0 (0%)	12/7/2016	12.3014	220000
			1/18/2017	11.3266	83000
			2/23/2017	12.3371	228000
			3/22/2017	11.7906	132000
			4/5/2017	12.1118	182000
			4/25/2017	12.0137	165000
			7/6/2017	12.3758	237000
			8/8/2017	12.0076	164000
			10/9/2017	12.16	191000
			12/6/2017	12.4684	260000
			5/15/2018	12.5354	278000
			10/16/2018	12.2923	218000
			6/11/2019	11.7906	132000
			10/22/2019	12.3631	234000
			6/15/2020	12.2308	205000
			12/5/2020	12.3716	236000
			3/26/2021	11.783	131000
<hr/>					

## Dixon's Test for Outliers

Parameter: Total Dissolved Solids (TDS)

Location: CLF-J2

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.469783	0.245437	0.525	None

Loc.	Date	Conc.	Outlier
CLF-J2	12/7/2016	12.7939	FALSE
	1/18/2017	12.3673	FALSE
	2/23/2017	12.8558	FALSE
	3/22/2017	12.7827	FALSE
	4/5/2017	12.7939	FALSE
	4/25/2017	12.7159	FALSE
	7/6/2017	13.7973	FALSE
	8/8/2017	12.936	FALSE
	10/9/2017	13.412	FALSE
	12/6/2017	13.0498	FALSE
	5/15/2018	11.9316	FALSE
	10/16/2018	12.6475	FALSE
	6/11/2019	12.2061	FALSE
	10/22/2019	12.7911	FALSE
	6/29/2020	12.0317	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Total Dissolved Solids (TDS)

Location: CLF-J2

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	11.9316	13.7973	1.86571	0.515	0.960841
2	12.0317	13.412	1.38032	0.3306	0.456335
3	12.2061	13.0498	0.84372	0.2495	0.210508
4	12.3673	12.936	0.568693	0.1878	0.106801
5	12.6475	12.8558	0.208242	0.1353	0.0281752
6	12.7159	12.7939	0.0779615	0.088	0.00686062
7	12.7827	12.7939	0.0111733	0.0433	0.000483804
8	12.7911	12.7911	0		
9	12.7939	12.7827	-0.0111733		
10	12.7939	12.7159	-0.0779615		
11	12.8558	12.6475	-0.208242		
12	12.936	12.3673	-0.568693		
13	13.0498	12.2061	-0.84372		
14	13.412	12.0317	-1.38032		
15	13.7973	11.9316	-1.86571		

---

Sum of b values = 1.77

Sample Standard Deviation = 0.486669

W Statistic = 0.94483

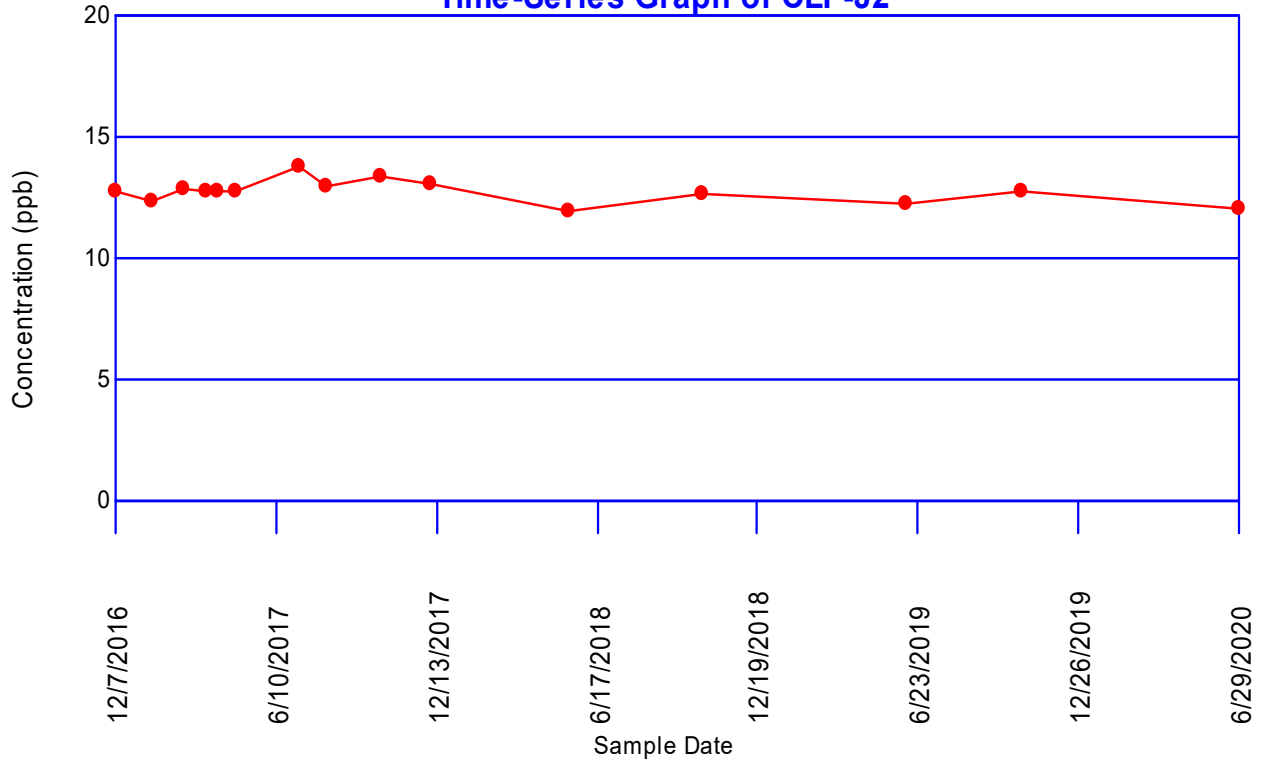
5% Critical value of 0.881 is less than 0.94483

Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.94483

Data is normally distributed at 99% level of significance

### Total Dissolved Solids (TDS) Time-Series Graph of CLF-J2



**Mann-Kendall Trend Analysis**  
**Parameter: Total Dissolved Solids (TDS)**  
**Location: CLF-J2**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
12.3673	12.7939	-0.426519	0	1
12.8558	12.7939	0.061931	1	1
12.7827	12.7939	-0.0111733	1	2
12.7939	12.7939	0	1	2
12.7159	12.7939	-0.0779615	1	3
13.7973	12.7939	1.00349	2	3
12.936	12.7939	0.142174	3	3
13.412	12.7939	0.618184	4	3
13.0498	12.7939	0.255933	5	3
11.9316	12.7939	-0.862224	5	4
12.6475	12.7939	-0.146311	5	5
12.2061	12.7939	-0.587787	5	6
12.7911	12.7939	-0.00278164	5	7
12.0317	12.7939	-0.76214	5	8
12.8558	12.3673	0.488449	6	8
12.7827	12.3673	0.415345	7	8
12.7939	12.3673	0.426519	8	8
12.7159	12.3673	0.348557	9	8
13.7973	12.3673	1.43001	10	8
12.936	12.3673	0.568693	11	8
13.412	12.3673	1.0447	12	8
13.0498	12.3673	0.682452	13	8
11.9316	12.3673	-0.435705	13	9
12.6475	12.3673	0.280207	14	9
12.2061	12.3673	-0.161268	14	10
12.7911	12.3673	0.423737	15	10
12.0317	12.3673	-0.335622	15	11
12.7827	12.8558	-0.0731043	15	12
12.7939	12.8558	-0.061931	15	13
12.7159	12.8558	-0.139892	15	14
13.7973	12.8558	0.941556	16	14
12.936	12.8558	0.0802435	17	14
13.412	12.8558	0.556253	18	14
13.0498	12.8558	0.194002	19	14
11.9316	12.8558	-0.924154	19	15
12.6475	12.8558	-0.208242	19	16
12.2061	12.8558	-0.649718	19	17
12.7911	12.8558	-0.0647126	19	18
12.0317	12.8558	-0.824071	19	19
12.7939	12.7827	0.0111733	20	19
12.7159	12.7827	-0.0667882	20	20
13.7973	12.7827	1.01466	21	20
12.936	12.7827	0.153348	22	20
13.412	12.7827	0.629357	23	20

13.0498	12.7827	0.267107	24	20
11.9316	12.7827	-0.85105	24	21
12.6475	12.7827	-0.135138	24	22
12.2061	12.7827	-0.576613	24	23
12.7911	12.7827	0.00839166	25	23
12.0317	12.7827	-0.750967	25	24
12.7159	12.7939	-0.0779615	25	25
13.7973	12.7939	1.00349	26	25
12.936	12.7939	0.142174	27	25
13.412	12.7939	0.618184	28	25
13.0498	12.7939	0.255933	29	25
11.9316	12.7939	-0.862224	29	26
12.6475	12.7939	-0.146311	29	27
12.2061	12.7939	-0.587787	29	28
12.7911	12.7939	-0.00278164	29	29
12.0317	12.7939	-0.76214	29	30
13.7973	12.7159	1.08145	30	30
12.936	12.7159	0.220136	31	30
13.412	12.7159	0.696146	32	30
13.0498	12.7159	0.333895	33	30
11.9316	12.7159	-0.784262	33	31
12.6475	12.7159	-0.0683496	33	32
12.2061	12.7159	-0.509825	33	33
12.7911	12.7159	0.0751799	34	33
12.0317	12.7159	-0.684179	34	34
12.936	13.7973	-0.861313	34	35
13.412	13.7973	-0.385303	34	36
13.0498	13.7973	-0.747554	34	37
11.9316	13.7973	-1.86571	34	38
12.6475	13.7973	-1.1498	34	39
12.2061	13.7973	-1.59127	34	40
12.7911	13.7973	-1.00627	34	41
12.0317	13.7973	-1.76563	34	42
13.412	12.936	0.47601	35	42
13.0498	12.936	0.113759	36	42
11.9316	12.936	-1.0044	36	43
12.6475	12.936	-0.288486	36	44
12.2061	12.936	-0.729961	36	45
12.7911	12.936	-0.144956	36	46
12.0317	12.936	-0.904315	36	47
13.0498	13.412	-0.362251	36	48
11.9316	13.412	-1.48041	36	49
12.6475	13.412	-0.764495	36	50
12.2061	13.412	-1.20597	36	51
12.7911	13.412	-0.620966	36	52
12.0317	13.412	-1.38032	36	53
11.9316	13.0498	-1.11816	36	54
12.6475	13.0498	-0.402244	36	55
12.2061	13.0498	-0.84372	36	56
12.7911	13.0498	-0.258715	36	57
12.0317	13.0498	-1.01807	36	58



12.6475	11.9316	0.715912	37	58
12.2061	11.9316	0.274437	38	58
12.7911	11.9316	0.859442	39	58
12.0317	11.9316	0.100083	40	58
12.2061	12.6475	-0.441476	40	59
12.7911	12.6475	0.143529	41	59
12.0317	12.6475	-0.615829	41	60
12.7911	12.2061	0.585005	42	60
12.0317	12.2061	-0.174353	42	61
12.0317	12.7911	-0.759358	42	62

S Statistic = 42 - 62 = -20

---

Tied Group	Value	Members
1	12.7939	2

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/29/2020	1

There are 0 time periods with multiple data

---

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 407.333

Z-Score = -0.94141

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**| -0.94141 | <= 1.97737 indicating no evidence of a trend**

## Dixon's Test for Outliers

Parameter: Total Dissolved Solids (TDS)

Location: CLF-J3

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 14 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.680101	0.383437	0.546	13.7881
2	0.423781	0.383437	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J3	12/7/2016	12.7883	FALSE
	1/18/2017	12.409	FALSE
	2/23/2017	12.8688	FALSE
	3/22/2017	12.6411	FALSE
	4/5/2017	12.7742	FALSE
	7/6/2017	<b>13.7881</b>	<b>TRUE</b>
	8/8/2017	12.9785	FALSE
	10/9/2017	13.3708	FALSE
	12/6/2017	13.0058	FALSE
	5/15/2018	12.8917	FALSE
	10/16/2018	12.6379	FALSE
	6/11/2019	12.4451	FALSE
	10/22/2019	12.824	FALSE
	6/15/2020	12.919	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Total Dissolved Solids (TDS)

Location: CLF-J3

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 14 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	12.409	13.7881	1.37913	0.5251	0.724179
2	12.4451	13.3708	0.925695	0.3318	0.307146
3	12.6379	13.0058	0.367974	0.246	0.0905217
4	12.6411	12.9785	0.337396	0.1802	0.0607988
5	12.7742	12.919	0.144799	0.124	0.0179551
6	12.7883	12.8917	0.103403	0.0727	0.00751742
7	12.824	12.8688	0.0448033	0.024	0.00107528
8	12.8688	12.824	-0.0448033		
9	12.8917	12.7883	-0.103403		
10	12.919	12.7742	-0.144799		
11	12.9785	12.6411	-0.337396		
12	13.0058	12.6379	-0.367974		
13	13.3708	12.4451	-0.925695		
14	13.7881	12.409	-1.37913		

---

Sum of b values = 1.20919

Sample Standard Deviation = 0.35543

W Statistic = 0.890307

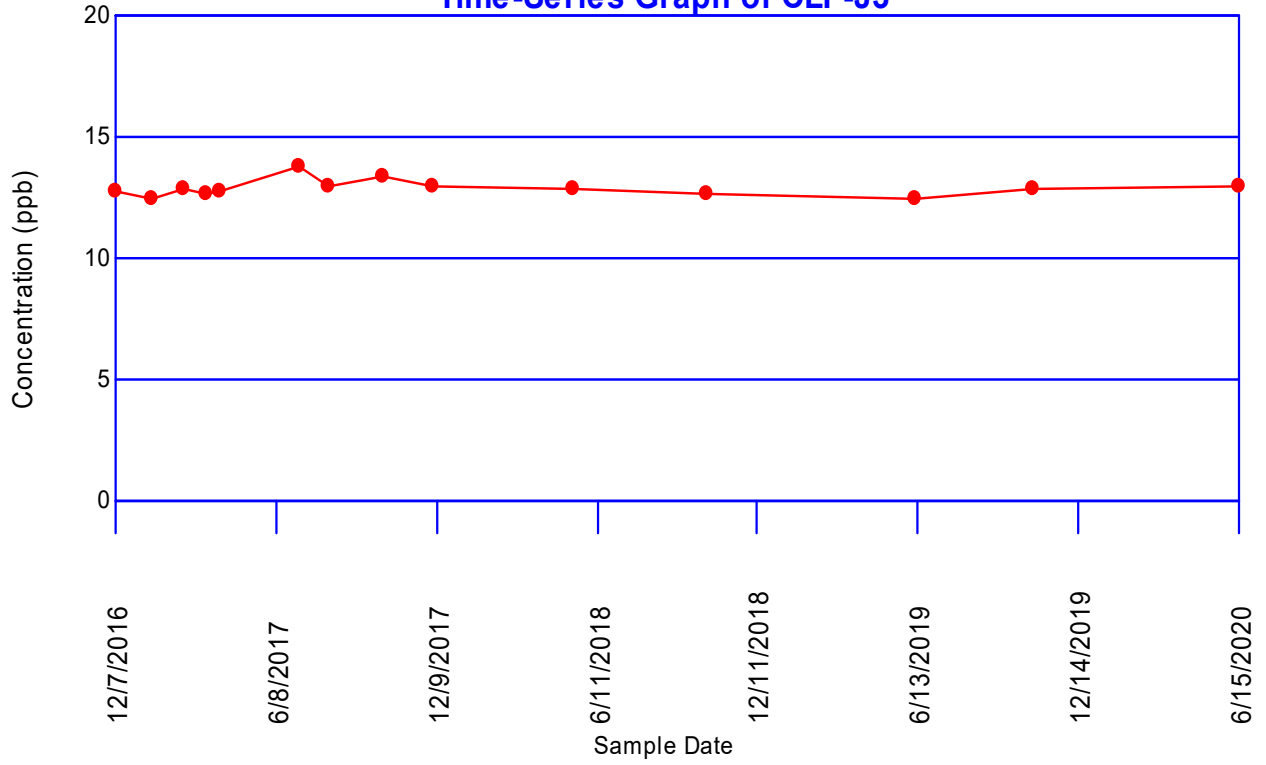
5% Critical value of 0.874 is less than 0.890307

Data is normally distributed at 95% level of significance

1% Critical value of 0.825 is less than 0.890307

Data is normally distributed at 99% level of significance

### Total Dissolved Solids (TDS) Time-Series Graph of CLF-J3



**Mann-Kendall Trend Analysis**  
**Parameter: Total Dissolved Solids (TDS)**  
**Location: CLF-J3**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
12.409	12.7883	-0.379275	0	1
12.8688	12.7883	0.0804724	1	1
12.6411	12.7883	-0.147192	1	2
12.7742	12.7883	-0.0140649	1	3
13.7881	12.7883	0.999851	2	3
12.9785	12.7883	0.190205	3	3
13.3708	12.7883	0.582496	4	3
13.0058	12.7883	0.217541	5	3
12.8917	12.7883	0.103403	6	3
12.6379	12.7883	-0.150433	6	4
12.4451	12.7883	-0.343199	6	5
12.824	12.7883	0.0356691	7	5
12.919	12.7883	0.130734	8	5
12.8688	12.409	0.459747	9	5
12.6411	12.409	0.232083	10	5
12.7742	12.409	0.36521	11	5
13.7881	12.409	1.37913	12	5
12.9785	12.409	0.56948	13	5
13.3708	12.409	0.961771	14	5
13.0058	12.409	0.596816	15	5
12.8917	12.409	0.482678	16	5
12.6379	12.409	0.228842	17	5
12.4451	12.409	0.0360761	18	5
12.824	12.409	0.414944	19	5
12.919	12.409	0.510009	20	5
12.6411	12.8688	-0.227664	20	6
12.7742	12.8688	-0.0945373	20	7
13.7881	12.8688	0.919379	21	7
12.9785	12.8688	0.109732	22	7
13.3708	12.8688	0.502024	23	7
13.0058	12.8688	0.137069	24	7
12.8917	12.8688	0.0229309	25	7
12.6379	12.8688	-0.230906	25	8
12.4451	12.8688	-0.423671	25	9
12.824	12.8688	-0.0448033	25	10
12.919	12.8688	0.0502618	26	10
12.7742	12.6411	0.133127	27	10
13.7881	12.6411	1.14704	28	10
12.9785	12.6411	0.337396	29	10
13.3708	12.6411	0.729688	30	10
13.0058	12.6411	0.364733	31	10
12.8917	12.6411	0.250595	32	10
12.6379	12.6411	-0.00324149	32	11
12.4451	12.6411	-0.196007	32	12

12.824	12.6411	0.182861	33	12
12.919	12.6411	0.277926	34	12
13.7881	12.7742	1.01392	35	12
12.9785	12.7742	0.20427	36	12
13.3708	12.7742	0.596561	37	12
13.0058	12.7742	0.231606	38	12
12.8917	12.7742	0.117468	39	12
12.6379	12.7742	-0.136368	39	13
12.4451	12.7742	-0.329134	39	14
12.824	12.7742	0.049734	40	14
12.919	12.7742	0.144799	41	14
12.9785	13.7881	-0.809646	41	15
13.3708	13.7881	-0.417355	41	16
13.0058	13.7881	-0.78231	41	17
12.8917	13.7881	-0.896448	41	18
12.6379	13.7881	-1.15028	41	19
12.4451	13.7881	-1.34305	41	20
12.824	13.7881	-0.964182	41	21
12.919	13.7881	-0.869117	41	22
13.3708	12.9785	0.392292	42	22
13.0058	12.9785	0.0273366	43	22
12.8917	12.9785	-0.0868014	43	23
12.6379	12.9785	-0.340638	43	24
12.4451	12.9785	-0.533403	43	25
12.824	12.9785	-0.154536	43	26
12.919	12.9785	-0.0594706	43	27
13.0058	13.3708	-0.364955	43	28
12.8917	13.3708	-0.479093	43	29
12.6379	13.3708	-0.73293	43	30
12.4451	13.3708	-0.925695	43	31
12.824	13.3708	-0.546827	43	32
12.919	13.3708	-0.451762	43	33
12.8917	13.0058	-0.114138	43	34
12.6379	13.0058	-0.367974	43	35
12.4451	13.0058	-0.56074	43	36
12.824	13.0058	-0.181872	43	37
12.919	13.0058	-0.0868071	43	38
12.6379	12.8917	-0.253836	43	39
12.4451	12.8917	-0.446602	43	40
12.824	12.8917	-0.0677342	43	41
12.919	12.8917	0.0273309	44	41
12.4451	12.6379	-0.192766	44	42
12.824	12.6379	0.186102	45	42
12.919	12.6379	0.281167	46	42
12.824	12.4451	0.378868	47	42
12.919	12.4451	0.473933	48	42
12.919	12.824	0.0950651	49	42

S Statistic = 49 - 42 = 7

---

Tied Group	Value	Members
<b>Time Period</b>		<b>Observations</b>
12/7/2016		1
1/18/2017		1
2/23/2017		1
3/22/2017		1
4/5/2017		1
7/6/2017		1
8/8/2017		1
10/9/2017		1
12/6/2017		1
5/15/2018		1
10/16/2018		1
6/11/2019		1
10/22/2019		1
6/15/2020		1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = 0.328469

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|0.328469| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Total Dissolved Solids (TDS)

Location: CLF-J5

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.830629	0.264317	0.525	1.253e+006
2	0.73161	0.307692	0.546	770000
3	0.389222	0.307692	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J5	12/7/2016	369000	FALSE
	1/18/2017	275000	FALSE
	2/23/2017	366000	FALSE
	3/22/2017	313000	FALSE
	4/5/2017	358000	FALSE
	4/25/2017	267000	FALSE
	7/6/2017	1.253e+006	TRUE
	8/8/2017	434000	FALSE
	10/9/2017	770000	TRUE
	12/6/2017	350000	FALSE
	5/15/2018	402000	FALSE
	10/16/2018	267000	FALSE
	6/11/2019	207000	FALSE
	10/22/2019	320000	FALSE
	6/15/2020	329000	FALSE



## Shapiro-Wilks Test of Normality

Parameter: Total Dissolved Solids (TDS)

Location: CLF-J5

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	207000	1.253e+006	1.046e+006	0.515	538690
2	267000	770000	503000	0.3306	166292
3	267000	434000	167000	0.2495	41666.5
4	275000	402000	127000	0.1878	23850.6
5	313000	369000	56000	0.1353	7576.8
6	320000	366000	46000	0.088	4048
7	329000	358000	29000	0.0433	1255.7
8	350000	350000	0		0
9	358000	329000	-29000		
10	366000	320000	-46000		
11	369000	313000	-56000		
12	402000	275000	-127000		
13	434000	267000	-167000		
14	770000	267000	-503000		
15	1.253e+006	207000	-1.046e+006		

---

Sum of b values = 783379

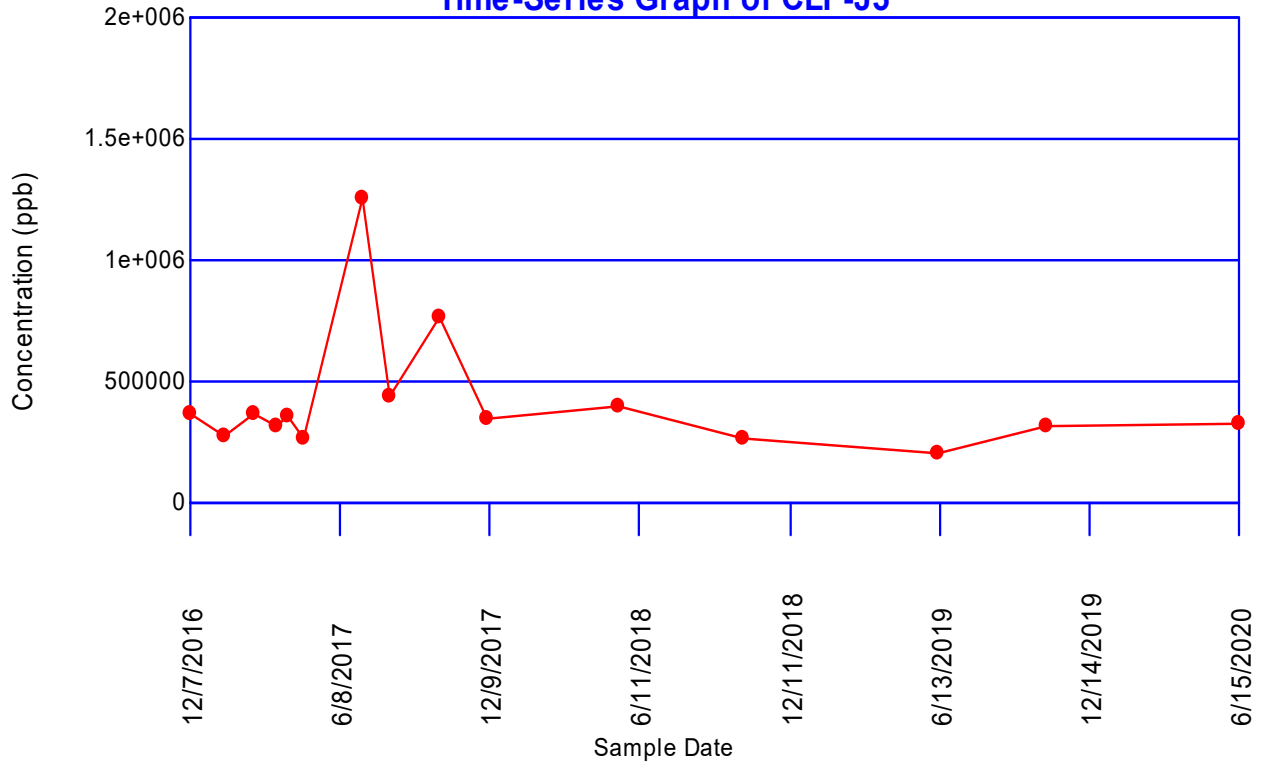
Sample Standard Deviation = 263776

W Statistic = 0.63001

**5% Critical value of 0.881 exceeds 0.63001**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.835 exceeds 0.63001**  
**Evidence of non-normality at 99% level of significance**

### Total Dissolved Solids (TDS) Time-Series Graph of CLF-J5



**Mann-Kendall Trend Analysis**  
**Parameter: Total Dissolved Solids (TDS)**  
**Location: CLF-J5**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
275000	369000	-94000	0	1
366000	369000	-3000	0	2
313000	369000	-56000	0	3
358000	369000	-11000	0	4
267000	369000	-102000	0	5
1.253e+006	369000	884000	1	5
434000	369000	65000	2	5
770000	369000	401000	3	5
350000	369000	-19000	3	6
402000	369000	33000	4	6
267000	369000	-102000	4	7
207000	369000	-162000	4	8
320000	369000	-49000	4	9
329000	369000	-40000	4	10
366000	275000	91000	5	10
313000	275000	38000	6	10
358000	275000	83000	7	10
267000	275000	-8000	7	11
1.253e+006	275000	978000	8	11
434000	275000	159000	9	11
770000	275000	495000	10	11
350000	275000	75000	11	11
402000	275000	127000	12	11
267000	275000	-8000	12	12
207000	275000	-68000	12	13
320000	275000	45000	13	13
329000	275000	54000	14	13
313000	366000	-53000	14	14
358000	366000	-8000	14	15
267000	366000	-99000	14	16
1.253e+006	366000	887000	15	16
434000	366000	68000	16	16
770000	366000	404000	17	16
350000	366000	-16000	17	17
402000	366000	36000	18	17
267000	366000	-99000	18	18
207000	366000	-159000	18	19
320000	366000	-46000	18	20
329000	366000	-37000	18	21
358000	313000	45000	19	21
267000	313000	-46000	19	22
1.253e+006	313000	940000	20	22
434000	313000	121000	21	22
770000	313000	457000	22	22

350000	313000	37000	23	22
402000	313000	89000	24	22
267000	313000	-46000	24	23
207000	313000	-106000	24	24
320000	313000	7000	25	24
329000	313000	16000	26	24
267000	358000	-91000	26	25
1.253e+006	358000	895000	27	25
434000	358000	76000	28	25
770000	358000	412000	29	25
350000	358000	-8000	29	26
402000	358000	44000	30	26
267000	358000	-91000	30	27
207000	358000	-151000	30	28
320000	358000	-38000	30	29
329000	358000	-29000	30	30
1.253e+006	267000	986000	31	30
434000	267000	167000	32	30
770000	267000	503000	33	30
350000	267000	83000	34	30
402000	267000	135000	35	30
267000	267000	0	35	30
207000	267000	-60000	35	31
320000	267000	53000	36	31
329000	267000	62000	37	31
434000	1.253e+006	-819000	37	32
770000	1.253e+006	-483000	37	33
350000	1.253e+006	-903000	37	34
402000	1.253e+006	-851000	37	35
267000	1.253e+006	-986000	37	36
207000	1.253e+006	-1.046e+006	37	37
320000	1.253e+006	-933000	37	38
329000	1.253e+006	-924000	37	39
770000	434000	336000	38	39
350000	434000	-84000	38	40
402000	434000	-32000	38	41
267000	434000	-167000	38	42
207000	434000	-227000	38	43
320000	434000	-114000	38	44
329000	434000	-105000	38	45
350000	770000	-420000	38	46
402000	770000	-368000	38	47
267000	770000	-503000	38	48
207000	770000	-563000	38	49
320000	770000	-450000	38	50
329000	770000	-441000	38	51
402000	350000	52000	39	51
267000	350000	-83000	39	52
207000	350000	-143000	39	53
320000	350000	-30000	39	54
329000	350000	-21000	39	55

267000	402000	-135000	39	56
207000	402000	-195000	39	57
320000	402000	-82000	39	58
329000	402000	-73000	39	59
207000	267000	-60000	39	60
320000	267000	53000	40	60
329000	267000	62000	41	60
320000	207000	113000	42	60
329000	207000	122000	43	60
329000	320000	9000	44	60

S Statistic = 44 - 60 = -16

---

Tied Group	Value	Members
1	267000	2

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 407.333

Z-Score = -0.743218

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-0.743218**| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Total Dissolved Solids (TDS)

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.269294	0.183486	0.525	None

Loc.	Date	Conc.	Outlier
CLF-S13	12/7/2016	367000	FALSE
	1/18/2017	702000	FALSE
	2/23/2017	1.014e+006	FALSE
	3/22/2017	964000	FALSE
	4/5/2017	846000	FALSE
	4/25/2017	680000	FALSE
	7/6/2017	451000	FALSE
	8/8/2017	440000	FALSE
	10/9/2017	405000	FALSE
	12/6/2017	683000	FALSE
	5/15/2018	850000	FALSE
	10/16/2018	411000	FALSE
	6/11/2019	550000	FALSE
	10/22/2019	305000	FALSE
	6/15/2020	521000	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Total Dissolved Solids (TDS)

Location: CLF-S13

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	305000	1.014e+006	709000	0.515	365135
2	367000	964000	597000	0.3306	197368
3	405000	850000	445000	0.2495	111028
4	411000	846000	435000	0.1878	81693
5	440000	702000	262000	0.1353	35448.6
6	451000	683000	232000	0.088	20416
7	521000	680000	159000	0.0433	6884.7
8	550000	550000	0		
9	680000	521000	-159000		
10	683000	451000	-232000		
11	702000	440000	-262000		
12	846000	411000	-435000		
13	850000	405000	-445000		
14	964000	367000	-597000		
15	1.014e+006	305000	-709000		

---

Sum of b values = 817973

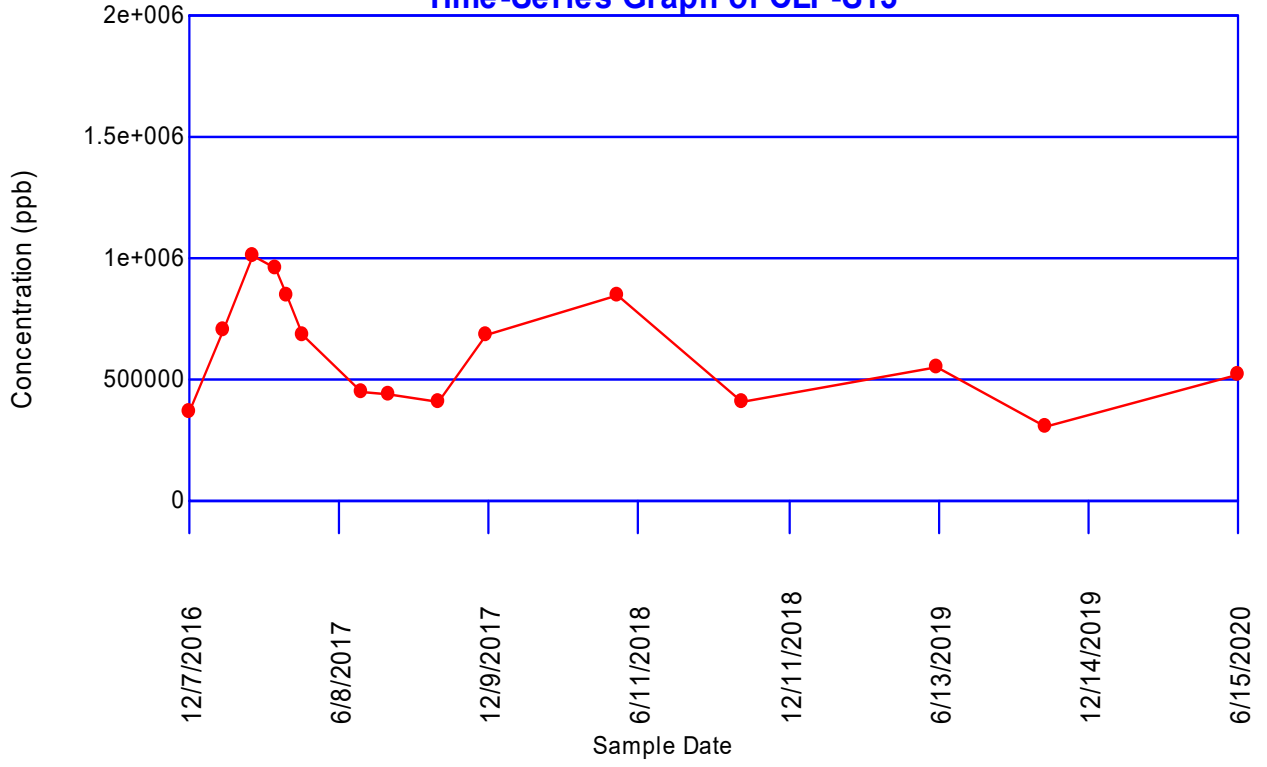
Sample Standard Deviation = 226751

W Statistic = 0.929508

5% Critical value of 0.881 is less than 0.929508  
Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.929508  
Data is normally distributed at 99% level of significance

### Total Dissolved Solids (TDS) Time-Series Graph of CLF-S13





**Mann-Kendall Trend Analysis**  
**Parameter: Total Dissolved Solids (TDS)**  
**Location: CLF-S13**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
702000	367000	335000	1	0
1.014e+006	367000	647000	2	0
964000	367000	597000	3	0
846000	367000	479000	4	0
680000	367000	313000	5	0
451000	367000	84000	6	0
440000	367000	73000	7	0
405000	367000	38000	8	0
683000	367000	316000	9	0
850000	367000	483000	10	0
411000	367000	44000	11	0
550000	367000	183000	12	0
305000	367000	-62000	12	1
521000	367000	154000	13	1
1.014e+006	702000	312000	14	1
964000	702000	262000	15	1
846000	702000	144000	16	1
680000	702000	-22000	16	2
451000	702000	-251000	16	3
440000	702000	-262000	16	4
405000	702000	-297000	16	5
683000	702000	-19000	16	6
850000	702000	148000	17	6
411000	702000	-291000	17	7
550000	702000	-152000	17	8
305000	702000	-397000	17	9
521000	702000	-181000	17	10
964000	1.014e+006	-50000	17	11
846000	1.014e+006	-168000	17	12
680000	1.014e+006	-334000	17	13
451000	1.014e+006	-563000	17	14
440000	1.014e+006	-574000	17	15
405000	1.014e+006	-609000	17	16
683000	1.014e+006	-331000	17	17
850000	1.014e+006	-164000	17	18
411000	1.014e+006	-603000	17	19
550000	1.014e+006	-464000	17	20
305000	1.014e+006	-709000	17	21
521000	1.014e+006	-493000	17	22
846000	964000	-118000	17	23
680000	964000	-284000	17	24
451000	964000	-513000	17	25
440000	964000	-524000	17	26
405000	964000	-559000	17	27

683000	964000	-281000	17	28
850000	964000	-114000	17	29
411000	964000	-553000	17	30
550000	964000	-414000	17	31
305000	964000	-659000	17	32
521000	964000	-443000	17	33
680000	846000	-166000	17	34
451000	846000	-395000	17	35
440000	846000	-406000	17	36
405000	846000	-441000	17	37
683000	846000	-163000	17	38
850000	846000	4000	18	38
411000	846000	-435000	18	39
550000	846000	-296000	18	40
305000	846000	-541000	18	41
521000	846000	-325000	18	42
451000	680000	-229000	18	43
440000	680000	-240000	18	44
405000	680000	-275000	18	45
683000	680000	3000	19	45
850000	680000	170000	20	45
411000	680000	-269000	20	46
550000	680000	-130000	20	47
305000	680000	-375000	20	48
521000	680000	-159000	20	49
440000	451000	-11000	20	50
405000	451000	-46000	20	51
683000	451000	232000	21	51
850000	451000	399000	22	51
411000	451000	-40000	22	52
550000	451000	99000	23	52
305000	451000	-146000	23	53
521000	451000	70000	24	53
405000	440000	-35000	24	54
683000	440000	243000	25	54
850000	440000	410000	26	54
411000	440000	-29000	26	55
550000	440000	110000	27	55
305000	440000	-135000	27	56
521000	440000	81000	28	56
683000	405000	278000	29	56
850000	405000	445000	30	56
411000	405000	6000	31	56
550000	405000	145000	32	56
305000	405000	-100000	32	57
521000	405000	116000	33	57
850000	683000	167000	34	57
411000	683000	-272000	34	58
550000	683000	-133000	34	59
305000	683000	-378000	34	60
521000	683000	-162000	34	61

411000	850000	-439000	34	62
550000	850000	-300000	34	63
305000	850000	-545000	34	64
521000	850000	-329000	34	65
550000	411000	139000	35	65
305000	411000	-106000	35	66
521000	411000	110000	36	66
305000	550000	-245000	36	67
521000	550000	-29000	36	68
521000	305000	216000	37	68

S Statistic = 37 - 68 = -31

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
-------------	--------------

12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -1.48461

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**| -1.48461 | <= 1.97737 indicating no evidence of a trend**

## Dixon's Test for Outliers

Parameter: Total Dissolved Solids (TDS)

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.490196	0.33758	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S05	1/18/2017	253000	FALSE
	4/5/2017	286000	FALSE
	4/25/2017	262000	FALSE
	10/16/2018	227000	FALSE
	10/22/2019	386000	FALSE
	6/29/2020	182000	FALSE
	12/5/2020	280000	FALSE
	3/26/2021	129000	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Total Dissolved Solids (TDS)

Location: CLF-S05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	129000	386000	257000	0.6052	155536
2	182000	286000	104000	0.3164	32905.6
3	227000	280000	53000	0.1743	9237.9
4	253000	262000	9000	0.0561	504.9
5	262000	253000	-9000		
6	280000	227000	-53000		
7	286000	182000	-104000		
8	386000	129000	-257000		

---

Sum of b values = 198185

Sample Standard Deviation = 76191.4

W Statistic = 0.966565

5% Critical value of 0.818 is less than 0.966565  
Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.966565  
Data is normally distributed at 99% level of significance

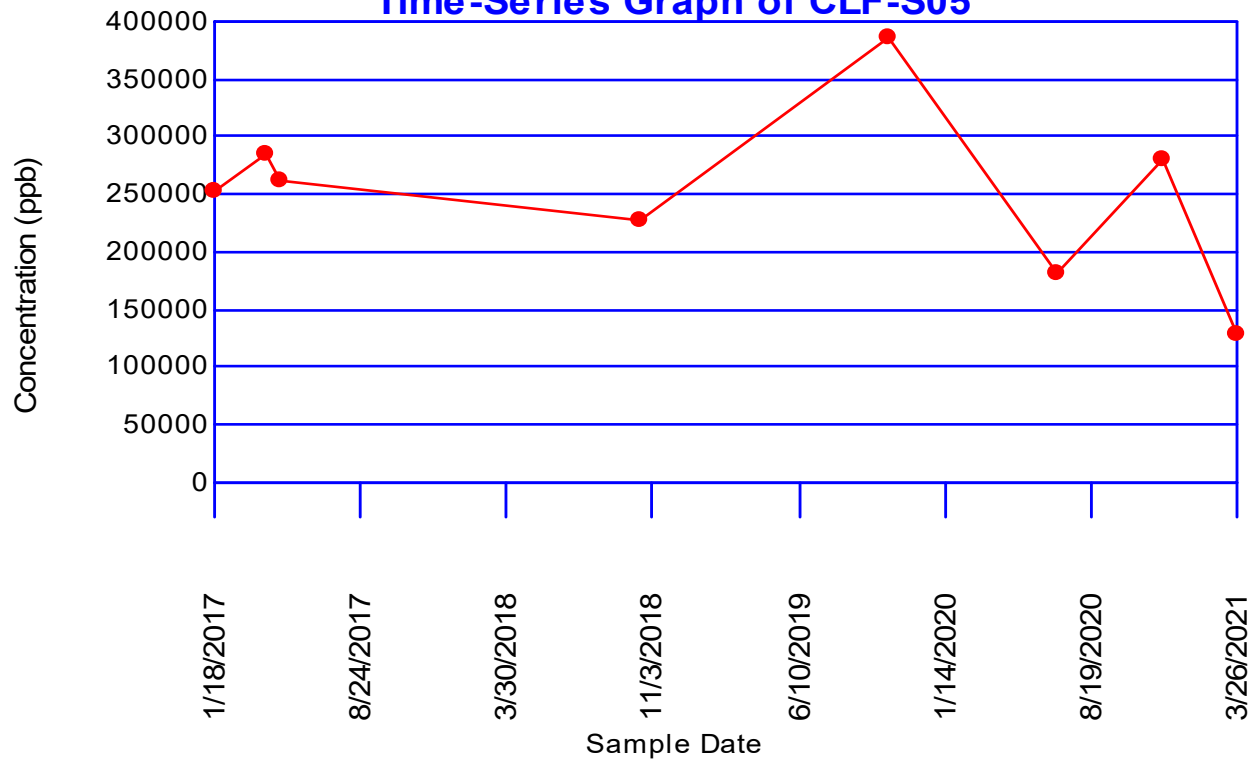
**Mann-Kendall Trend Analysis**  
**Parameter: Total Dissolved Solids (TDS)**  
**Location: CLF-S05**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
286000	253000	33000	1	0
262000	253000	9000	2	0
227000	253000	-26000	2	1
386000	253000	133000	3	1
182000	253000	-71000	3	2
280000	253000	27000	4	2
129000	253000	-124000	4	3
262000	286000	-24000	4	4
227000	286000	-59000	4	5
386000	286000	100000	5	5
182000	286000	-104000	5	6
280000	286000	-6000	5	7
129000	286000	-157000	5	8
227000	262000	-35000	5	9
386000	262000	124000	6	9
182000	262000	-80000	6	10
280000	262000	18000	7	10
129000	262000	-133000	7	11
386000	227000	159000	8	11
182000	227000	-45000	8	12
280000	227000	53000	9	12
129000	227000	-98000	9	13
182000	386000	-204000	9	14
280000	386000	-106000	9	15
129000	386000	-257000	9	16
280000	182000	98000	10	16
129000	182000	-53000	10	17
129000	280000	-151000	10	18

S Statistic = 10 - 18 = -8  
 Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
 Probability of obtaining S >= |-8| is 0.398  
 0.398 >= 0.025 indicating no evidence of a trend

### Total Dissolved Solids (TDS) Time-Series Graph of CLF-S05



## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J2

Parameter: Boron

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	6.0027
	1/18/2017	4.87304
	2/23/2017	6.69823
	3/22/2017	5.73439
	4/5/2017	5.78401
	4/25/2017	4.83896
	7/6/2017	7.39388
	8/8/2017	5.81711
	10/9/2017	6.29895
	12/6/2017	6.88244
	5/15/2018	4.8752
	10/16/2018	4.68213
	6/11/2019	4.86753
	10/22/2019	6.24804
	6/29/2020	ND<3.91202

From 15 baseline samples

Baseline mean = 5.66058

Baseline std Dev = 0.965278

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	4.70048	[0, 9.13336]	FALSE
6/29/2020	1	3.91202	[0, 9.13336]	FALSE
10/22/2019	1	6.24804	[0, 9.13336]	FALSE
6/11/2019	1	4.86753	[0, 9.13336]	FALSE



## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J3

Parameter: Boron

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	426.902
	1/18/2017	130.881
	2/23/2017	850.398
	3/22/2017	303.698
	4/5/2017	312.635
	7/6/2017	1741
	8/8/2017	340
	10/9/2017	579
	12/6/2017	991
	5/15/2018	601
	10/16/2018	97.1
	6/11/2019	138
	10/22/2019	574
	6/15/2020	597

From 14 baseline samples  
Baseline mean = 548.758  
Baseline std Dev = 432.896

For 4 recent sampling event(s)  
Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$   
t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$   
Degrees of Freedom = 14 (background observations) - 1  
 $t(0.9975, 13) = 3.53713$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	114	[0, 2133.71]	FALSE
6/15/2020	1	597	[0, 2133.71]	FALSE
10/22/2019	1	574	[0, 2133.71]	FALSE
6/11/2019	1	138	[0, 2133.71]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J5

Parameter: Boron

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	6.09509
	1/18/2017	4.85224
	2/23/2017	6.09015
	3/22/2017	5.66439
	4/5/2017	5.64114
	4/25/2017	4.7934
	7/6/2017	7.44425
	8/8/2017	5.86079
	10/9/2017	6.28227
	12/6/2017	6.00881
	5/15/2018	6.09807
	10/16/2018	4.64439
	6/11/2019	4.77912
	10/22/2019	5.79301
	6/15/2020	6.05912

From 15 baseline samples

Baseline mean = 5.74042

Baseline std Dev = 0.736315

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	4.56643	[0, 8.38946]	FALSE
6/15/2020	1	6.05912	[0, 8.38946]	FALSE
10/22/2019	1	5.79301	[0, 8.38946]	FALSE
6/11/2019	1	4.77912	[0, 8.38946]	FALSE

# Parametric Prediction Interval Analysis

## Intra-Well Comparison for CLF-S05

Parameter: Boron

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	4.6817
	4/5/2017	5.21984
	4/25/2017	4.40681
	10/16/2018	ND<3.91202
	10/22/2019	6.4552
	6/29/2020	ND<3.91202
	12/5/2020	4.35414
	3/26/2021	4.22391

From 8 baseline samples

Baseline mean = 4.6457

Baseline std Dev = 0.845303

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
3/26/2021	1	4.22391	[0, 8.50376]	FALSE
12/5/2020	1	4.35414	[0, 8.50376]	FALSE
6/29/2020	1	3.91202	[0, 8.50376]	FALSE
10/22/2019	1	6.4552	[0, 8.50376]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S13

Parameter: Boron

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	473.085
	1/18/2017	714.92
	2/23/2017	1040.84
	3/22/2017	754.577
	4/5/2017	836.075
	4/25/2017	732.116
	7/6/2017	424
	8/8/2017	455
	10/9/2017	430
	12/6/2017	865
	5/15/2018	922
	10/16/2018	385
	6/11/2019	484
	10/22/2019	220
	6/15/2020	469

From 15 baseline samples

Baseline mean = 613.708

Baseline std Dev = 238.143

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	327	[0, 1470.47]	FALSE
6/15/2020	1	469	[0, 1470.47]	FALSE
10/22/2019	1	220	[0, 1470.47]	FALSE
6/11/2019	1	484	[0, 1470.47]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J2

Parameter: Calcium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	110017
	1/18/2017	79460.5
	2/23/2017	106069
	3/22/2017	122341
	4/5/2017	120639
	4/25/2017	117569
	7/6/2017	239532
	8/8/2017	120150
	10/9/2017	165778
	12/6/2017	120511
	5/15/2018	36800
	10/16/2018	113000
	6/11/2019	86600
	10/22/2019	99600
	6/29/2020	59900

From 15 baseline samples  
 Baseline mean = 113198  
 Baseline std Dev = 46100.6

For 4 recent sampling event(s)  
 Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$   
 t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$   
 Degrees of Freedom = 15 (background observations) - 1  
 $t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	78700	[0, 279054]	FALSE
6/29/2020	1	59900	[0, 279054]	FALSE
10/22/2019	1	99600	[0, 279054]	FALSE
6/11/2019	1	86600	[0, 279054]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J3

Parameter: Calcium

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	11.6066
	1/18/2017	11.2693
	2/23/2017	11.5865
	3/22/2017	11.724
	4/5/2017	11.6948
	7/6/2017	12.3875
	8/8/2017	11.7128
	10/9/2017	12.0289
	12/6/2017	11.7215
	5/15/2018	11.6784
	10/16/2018	11.4876
	6/11/2019	11.3986
	10/22/2019	11.5991
	6/15/2020	11.6869

From 14 baseline samples

Baseline mean = 11.6845

Baseline std Dev = 0.267845

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 14 (background observations) - 1

$t(0.9975, 13) = 3.53713$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	11.3278	[0, 12.6651]	FALSE
6/15/2020	1	11.6869	[0, 12.6651]	FALSE
10/22/2019	1	11.5991	[0, 12.6651]	FALSE
6/11/2019	1	11.3986	[0, 12.6651]	FALSE

## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-J5

Parameter: Calcium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 0%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 15

Maximum Baseline Concentration = 297325

Confidence Level = 78.9%

False Positive Rate = 21.1%

---

Baseline Measurements	Date	Value
	12/7/2016	95061.3
	1/18/2017	78950.2
	2/23/2017	98538.8
	3/22/2017	121487
	4/5/2017	122145
	4/25/2017	114426
	7/6/2017	297325
	8/8/2017	120823
	10/9/2017	180815
	12/6/2017	105625
	5/15/2018	111000
	10/16/2018	107000
	6/11/2019	82800
	10/22/2019	121000
	6/15/2020	111000

---

Date	Count	Mean	Significant
12/5/2020	1	79000	FALSE
6/15/2020	1	111000	FALSE
10/22/2019	1	121000	FALSE
6/11/2019	1	82800	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S05

Parameter: Calcium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	76432
	4/5/2017	110104
	4/25/2017	112725
	10/16/2018	95800
	10/22/2019	120000
	6/29/2020	70800
	12/5/2020	90000
	3/26/2021	71300

From 8 baseline samples

Baseline mean = 93395.1

Baseline std Dev = 19509.9

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
3/26/2021	1	71300	[0, 182440]	FALSE
12/5/2020	1	90000	[0, 182440]	FALSE
6/29/2020	1	70800	[0, 182440]	FALSE
10/22/2019	1	120000	[0, 182440]	FALSE



## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S13

Parameter: Calcium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	111064
	1/18/2017	165561
	2/23/2017	217307
	3/22/2017	269982
	4/5/2017	240010
	4/25/2017	215059
	7/6/2017	118300
	8/8/2017	104065
	10/9/2017	104990
	12/6/2017	163020
	5/15/2018	191500
	10/16/2018	123000
	6/11/2019	147000
	10/22/2019	88900
	6/15/2020	141000

From 15 baseline samples

Baseline mean = 160051

Baseline std Dev = 55477.2

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	107000	[0, 359641]	FALSE
6/15/2020	1	141000	[0, 359641]	FALSE
10/22/2019	1	88900	[0, 359641]	FALSE
6/11/2019	1	147000	[0, 359641]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J2

Parameter: Chloride

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	9.43428
	1/18/2017	8.99669
	2/23/2017	9.2044
	3/22/2017	9.55488
	4/5/2017	9.24416
	4/25/2017	9.08418
	7/6/2017	10.7996
	8/8/2017	9.42545
	10/9/2017	10.8357
	12/6/2017	8.92266
	5/15/2018	8.88184
	10/16/2018	8.43381
	6/11/2019	8.31874
	10/22/2019	9.3501
	6/29/2020	6.90776

From 15 baseline samples  
 Baseline mean = 9.15961  
 Baseline std Dev = 0.937955

For 4 recent sampling event(s)  
 Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$   
 t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$   
 Degrees of Freedom = 15 (background observations) - 1  
 $t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	8.36637	[0, 12.5341]	FALSE
6/29/2020	1	6.90776	[0, 12.5341]	FALSE
10/22/2019	1	9.3501	[0, 12.5341]	FALSE
6/11/2019	1	8.31874	[0, 12.5341]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J3

Parameter: Chloride

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	9.43994
	1/18/2017	8.93253
	2/23/2017	9.19974
	3/22/2017	9.55392
	4/5/2017	9.23982
	7/6/2017	10.7996
	8/8/2017	9.40919
	10/9/2017	10.8454
	12/6/2017	8.9359
	5/15/2018	9.69277
	10/16/2018	8.43381
	6/11/2019	8.29405
	10/22/2019	9.37585
	6/15/2020	9.74097

From 14 baseline samples

Baseline mean = 9.42097

Baseline std Dev = 0.729922

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 14 (background observations) - 1

$t(0.9975, 13) = 3.53713$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	8.38936	[0, 12.0934]	FALSE
6/15/2020	1	9.74097	[0, 12.0934]	FALSE
10/22/2019	1	9.37585	[0, 12.0934]	FALSE
6/11/2019	1	8.29405	[0, 12.0934]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J5

Parameter: Chloride

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	9.26466
	1/18/2017	8.83736
	2/23/2017	9.20557
	3/22/2017	9.56809
	4/5/2017	9.34766
	4/25/2017	8.91578
	7/6/2017	11.2398
	8/8/2017	9.48037
	10/9/2017	11.0929
	12/6/2017	8.85367
	5/15/2018	9.5956
	10/16/2018	7.97247
	6/11/2019	8.00637
	10/22/2019	9.04782
	6/15/2020	9.74683

From 15 baseline samples

Baseline mean = 9.34499

Baseline std Dev = 0.902812

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	7.82405	[0, 12.593]	FALSE
6/15/2020	1	9.74683	[0, 12.593]	FALSE
10/22/2019	1	9.04782	[0, 12.593]	FALSE
6/11/2019	1	8.00637	[0, 12.593]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S05

Parameter: Chloride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	6116.1
	4/5/2017	8505.1
	4/25/2017	5278.4
	10/16/2018	900
	10/22/2019	14100
	6/29/2020	ND<1000
	12/5/2020	4300
	3/26/2021	2200

From 8 baseline samples

Baseline mean = 5299.95

Baseline std Dev = 4421.36

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
3/26/2021	1	2200	[0, 25479.6]	FALSE
12/5/2020	1	4300	[0, 25479.6]	FALSE
6/29/2020	1	1000	[0, 25479.6]	FALSE
10/22/2019	1	14100	[0, 25479.6]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S13

Parameter: Chloride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	3530
	1/18/2017	8923
	2/23/2017	9236.6
	3/22/2017	6266.5
	4/5/2017	6387.2
	4/25/2017	5526.6
	7/6/2017	3100
	8/8/2017	3100
	10/9/2017	3300
	12/6/2017	4400
	5/15/2018	7800
	10/16/2018	3700
	6/11/2019	3600
	10/22/2019	2000
	6/15/2020	2600

From 15 baseline samples  
Baseline mean = 4897.99  
Baseline std Dev = 2327.92

For 4 recent sampling event(s)  
Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$   
t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$   
Degrees of Freedom = 15 (background observations) - 1  
 $t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	2000	[0, 13273.2]	FALSE
6/15/2020	1	2600	[0, 13273.2]	FALSE
10/22/2019	1	2000	[0, 13273.2]	FALSE
6/11/2019	1	3600	[0, 13273.2]	FALSE

## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-J2

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 86.6667%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 15

Maximum Baseline Concentration = 500

Confidence Level = 78.9%

False Positive Rate = 21.1%

---

Baseline Measurements	Date	Value
	12/7/2016	ND<500
	1/18/2017	170.7
	2/23/2017	ND<500
	3/22/2017	ND<500
	4/5/2017	ND<500
	4/25/2017	ND<500
	7/6/2017	ND<500
	8/8/2017	ND<500
	10/9/2017	ND<500
	12/6/2017	ND<500
	5/15/2018	ND<500
	10/16/2018	ND<500
	6/11/2019	ND<500
	10/22/2019	ND<500
	6/29/2020	140

---

Date	Count	Mean	Significant
12/5/2020	1	500	FALSE
6/29/2020	1	140	FALSE
10/22/2019	1	500	FALSE
6/11/2019	1	500	FALSE

## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-J3

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 92.8571%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 14

Maximum Baseline Concentration = 500

Confidence Level = 77.8%

False Positive Rate = 22.2%

---

Baseline Measurements	Date	Value
	12/7/2016	ND<500
	1/18/2017	165.6
	2/23/2017	ND<500
	3/22/2017	ND<500
	4/5/2017	ND<500
	7/6/2017	ND<500
	8/8/2017	ND<500
	10/9/2017	ND<500
	12/6/2017	ND<500
	5/15/2018	ND<500
	10/16/2018	ND<500
	6/11/2019	ND<500
	10/22/2019	ND<500
	6/15/2020	ND<500

---

Date	Count	Mean	Significant
12/5/2020	1	500	FALSE
6/15/2020	1	500	FALSE
10/22/2019	1	500	FALSE
6/11/2019	1	500	FALSE



## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-J5

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 93.3333%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 15

Maximum Baseline Concentration = 500

Confidence Level = 78.9%

False Positive Rate = 21.1%

---

Baseline Measurements	Date	Value
	12/7/2016	ND<500
	1/18/2017	166.9
	2/23/2017	ND<500
	3/22/2017	ND<500
	4/5/2017	ND<500
	4/25/2017	ND<500
	7/6/2017	ND<500
	8/8/2017	ND<500
	10/9/2017	ND<500
	12/6/2017	ND<500
	5/15/2018	ND<500
	10/16/2018	ND<500
	6/11/2019	ND<500
	10/22/2019	ND<500
	6/15/2020	ND<500

---

Date	Count	Mean	Significant
12/5/2020	1	500	FALSE
6/15/2020	1	500	FALSE
10/22/2019	1	500	FALSE
6/11/2019	1	500	FALSE

## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-S05

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 75%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 8

Maximum Baseline Concentration = 500

Confidence Level = 66.7%

False Positive Rate = 33.3%

---

Baseline Measurements	Date	Value
	1/18/2017	165.8
	4/5/2017	ND<500
	4/25/2017	ND<500
	10/16/2018	ND<500
	10/22/2019	ND<500
	6/29/2020	140
	12/5/2020	ND<500
	3/26/2021	ND<500

---

Date	Count	Mean	Significant
3/26/2021	1	500	FALSE
12/5/2020	1	500	FALSE
6/29/2020	1	140	FALSE
10/22/2019	1	500	FALSE

## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-S13

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 93.3333%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 15

Maximum Baseline Concentration = 500

Confidence Level = 78.9%

False Positive Rate = 21.1%

---

Baseline Measurements	Date	Value
	12/7/2016	ND<500
	1/18/2017	209.6
	2/23/2017	ND<500
	3/22/2017	ND<500
	4/5/2017	ND<500
	4/25/2017	ND<500
	7/6/2017	ND<500
	8/8/2017	ND<500
	10/9/2017	ND<500
	12/6/2017	ND<500
	5/15/2018	ND<500
	10/16/2018	ND<500
	6/11/2019	ND<500
	10/22/2019	ND<500
	6/15/2020	ND<500

---

Date	Count	Mean	Significant
12/5/2020	1	500	FALSE
6/15/2020	1	500	FALSE
10/22/2019	1	500	FALSE
6/11/2019	1	500	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J2

Parameter: pH, Field

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% Two-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	7.89
	1/18/2017	8.15
	2/23/2017	8.23
	3/22/2017	7.89
	4/5/2017	7.81
	4/25/2017	7.36
	7/6/2017	7.56
	8/8/2017	7.77
	10/9/2017	8.07
	12/6/2017	8.29
	5/15/2018	8.26
	10/16/2018	8.02
	6/11/2019	7.54
	10/22/2019	8.17
	6/29/2020	7.31

From 15 baseline samples

Baseline mean = 7.888

Baseline std Dev = 0.324834

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.05/4)/2 = 99.875\%$

t is Percentile of Student's T-Test  $(0.99/4)/2 = 0.99875$

Degrees of Freedom = 15 (background observations) - 1

$t(0.99875, 15) = 3.73677$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	7.7	[6.63, 9.14]	FALSE
6/29/2020	1	7.31	[6.63, 9.14]	FALSE
10/22/2019	1	8.17	[6.63, 9.14]	FALSE
6/11/2019	1	7.54	[6.63, 9.14]	FALSE

## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-J3

Parameter: pH, Field

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 0%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 14

Maximum Baseline Concentration = 8.33

Confidence Level = 77.8%

False Positive Rate = 22.2%

---

Baseline Measurements	Date	Value
	12/7/2016	7.45
	1/18/2017	8.26
	2/23/2017	8.28
	3/22/2017	8.3
	4/5/2017	7.69
	7/6/2017	7.58
	8/8/2017	7.61
	10/9/2017	8.12
	12/6/2017	8.32
	5/15/2018	7.66
	10/16/2018	7.61
	6/11/2019	7.49
	10/22/2019	8.33
	6/15/2020	7.61

---

Date	Count	Mean	Significant
12/5/2020	1	7.54	FALSE
6/15/2020	1	7.61	FALSE
10/22/2019	1	8.33	FALSE
6/11/2019	1	7.49	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J5

Parameter: pH, Field

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% Two-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	7.91
	1/18/2017	8.17
	2/23/2017	8.04
	3/22/2017	8.11
	4/5/2017	8.01
	4/25/2017	7.49
	7/6/2017	7.8
	8/8/2017	8.18
	10/9/2017	7.8
	12/6/2017	8.34
	5/15/2018	8.01
	10/16/2018	7.96
	6/11/2019	7.74
	10/22/2019	8.3
	6/15/2020	8.12

From 15 baseline samples

Baseline mean = 7.99867

Baseline std Dev = 0.225606

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.05/4)/2 = 99.875\%$

t is Percentile of Student's T-Test  $(0.99/4/2) = 0.99875$

Degrees of Freedom = 15 (background observations) - 1

$t(0.99875, 15) = 3.73677$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	7.71	[7.13, 8.87]	FALSE
6/15/2020	1	8.12	[7.13, 8.87]	FALSE
10/22/2019	1	8.3	[7.13, 8.87]	FALSE
6/11/2019	1	7.74	[7.13, 8.87]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S05

Parameter: pH, Field

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% Two-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	8.31
	4/5/2017	8.32
	4/25/2017	7.67
	10/16/2018	8.13
	10/22/2019	8.4
	6/29/2020	8.09
	12/5/2020	7.77
	3/26/2021	7.92

From 8 baseline samples

Baseline mean = 8.07625

Baseline std Dev = 0.268644

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.05/4)/2 = 99.875\%$

t is Percentile of Student's T-Test  $(0.99/4/2) = 0.99875$

Degrees of Freedom = 8 (background observations) - 1

$t(0.99875, 8) = 4.70489$

---

Date	Samples	Mean	Interval	Significant
3/26/2021	1	7.92	[6.74, 9.42]	FALSE
12/5/2020	1	7.77	[6.74, 9.42]	FALSE
6/29/2020	1	8.09	[6.74, 9.42]	FALSE
10/22/2019	1	8.4	[6.74, 9.42]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S13

Parameter: pH, Field

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% Two-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	7.92
	1/18/2017	7.86
	2/23/2017	7.91
	3/22/2017	8.04
	4/5/2017	8.02
	4/25/2017	7.16
	7/6/2017	7.47
	8/8/2017	7.96
	10/9/2017	7.54
	12/6/2017	8.22
	5/15/2018	7.72
	10/16/2018	8.13
	6/11/2019	7.7
	10/22/2019	7.99
	6/15/2020	7.82

From 15 baseline samples

Baseline mean = 7.83067

Baseline std Dev = 0.276702

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.05/4)/2 = 99.875\%$

t is Percentile of Student's T-Test  $(0.99/4/2) = 0.99875$

Degrees of Freedom = 15 (background observations) - 1

$t(0.99875, 15) = 3.73677$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	7.35	[6.76, 8.9]	FALSE
6/15/2020	1	7.82	[6.76, 8.9]	FALSE
10/22/2019	1	7.99	[6.76, 8.9]	FALSE
6/11/2019	1	7.7	[6.76, 8.9]	FALSE



## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J2

Parameter: Sulfate

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	11.6295
	1/18/2017	10.9938
	2/23/2017	11.632
	3/22/2017	11.7068
	4/5/2017	11.4833
	4/25/2017	11.3676
	7/6/2017	12.9762
	8/8/2017	11.7928
	10/9/2017	12.2913
	12/6/2017	11.5079
	5/15/2018	10.669
	10/16/2018	10.8724
	6/11/2019	10.3951
	10/22/2019	11.0713
	6/29/2020	8.89563

From 15 baseline samples

Baseline mean = 11.2856

Baseline std Dev = 0.919031

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	10.8454	[0, 14.592]	FALSE
6/29/2020	1	8.89563	[0, 14.592]	FALSE
10/22/2019	1	11.0713	[0, 14.592]	FALSE
6/11/2019	1	10.3951	[0, 14.592]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J3

Parameter: Sulfate

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	11.6428
	1/18/2017	10.9837
	2/23/2017	11.6351
	3/22/2017	11.7292
	4/5/2017	11.4776
	7/6/2017	12.9715
	8/8/2017	11.8019
	10/9/2017	12.2923
	12/6/2017	11.5229
	5/15/2018	11.4907
	10/16/2018	10.8667
	6/11/2019	10.3982
	10/22/2019	11.0929
	6/15/2020	11.5109

From 14 baseline samples  
 Baseline mean = 11.5297  
 Baseline std Dev = 0.620896

For 4 recent sampling event(s)  
 Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$   
 t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$   
 Degrees of Freedom = 14 (background observations) - 1  
 $t(0.9975, 13) = 3.53713$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	10.9114	[0, 13.803]	FALSE
6/15/2020	1	11.5109	[0, 13.803]	FALSE
10/22/2019	1	11.0929	[0, 13.803]	FALSE
6/11/2019	1	10.3982	[0, 13.803]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J5

Parameter: Sulfate

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	11.2942
	1/18/2017	10.8298
	2/23/2017	11.2063
	3/22/2017	11.4863
	4/5/2017	11.4286
	4/25/2017	10.9773
	7/6/2017	13.2267
	8/8/2017	11.6218
	10/9/2017	12.4987
	12/6/2017	10.8238
	5/15/2018	11.1243
	10/16/2018	9.88837
	6/11/2019	9.87303
	10/22/2019	10.7077
	6/15/2020	11.0572

From 15 baseline samples

Baseline mean = 11.2029

Baseline std Dev = 0.853277

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	10.0774	[0, 14.2728]	FALSE
6/15/2020	1	11.0572	[0, 14.2728]	FALSE
10/22/2019	1	10.7077	[0, 14.2728]	FALSE
6/11/2019	1	9.87303	[0, 14.2728]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J5

Parameter: Sulfate

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	11.2942
	1/18/2017	10.8298
	2/23/2017	11.2063
	3/22/2017	11.4863
	4/5/2017	11.4286
	4/25/2017	10.9773
	7/6/2017	13.2267
	8/8/2017	11.6218
	10/9/2017	12.4987
	12/6/2017	10.8238
	5/15/2018	11.1243
	10/16/2018	9.88837
	6/11/2019	9.87303
	10/22/2019	10.7077
	6/15/2020	11.0572

From 15 baseline samples

Baseline mean = 11.2029

Baseline std Dev = 0.853277

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	10.0774	[0, 14.2728]	FALSE
6/15/2020	1	11.0572	[0, 14.2728]	FALSE
10/22/2019	1	10.7077	[0, 14.2728]	FALSE
6/11/2019	1	9.87303	[0, 14.2728]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S05

Parameter: Sulfate

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	45223.8
	4/5/2017	62615.6
	4/25/2017	44781.4
	10/16/2018	7500
	10/22/2019	69400
	6/29/2020	5400
	12/5/2020	29300
	3/26/2021	15100

From 8 baseline samples

Baseline mean = 34915.1

Baseline std Dev = 24515.4

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
3/26/2021	1	15100	[0, 146806]	FALSE
12/5/2020	1	29300	[0, 146806]	FALSE
6/29/2020	1	5400	[0, 146806]	FALSE
10/22/2019	1	69400	[0, 146806]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S13

Parameter: Sulfate

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	123520
	1/18/2017	318064
	2/23/2017	507416
	3/22/2017	505253
	4/5/2017	439796
	4/25/2017	305426
	7/6/2017	134300
	8/8/2017	131500
	10/9/2017	128400
	12/6/2017	280000
	5/15/2018	372000
	10/16/2018	155000
	6/11/2019	235000
	10/22/2019	68000
	6/15/2020	209000

From 15 baseline samples

Baseline mean = 260845

Baseline std Dev = 144279

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	133000	[0, 779919]	FALSE
6/15/2020	1	209000	[0, 779919]	FALSE
10/22/2019	1	68000	[0, 779919]	FALSE
6/11/2019	1	235000	[0, 779919]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J2

Parameter: Total Dissolved Solids (TDS)

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	12.7939
	1/18/2017	12.3673
	2/23/2017	12.8558
	3/22/2017	12.7827
	4/5/2017	12.7939
	4/25/2017	12.7159
	7/6/2017	13.7973
	8/8/2017	12.936
	10/9/2017	13.412
	12/6/2017	13.0498
	5/15/2018	11.9316
	10/16/2018	12.6475
	6/11/2019	12.2061
	10/22/2019	12.7911
	6/29/2020	12.0317

From 15 baseline samples

Baseline mean = 12.7408

Baseline std Dev = 0.486669

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	12.5776	[0, 14.4917]	FALSE
6/29/2020	1	12.0317	[0, 14.4917]	FALSE
10/22/2019	1	12.7911	[0, 14.4917]	FALSE
6/11/2019	1	12.2061	[0, 14.4917]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J3

Parameter: Total Dissolved Solids (TDS)

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	12.7883
	1/18/2017	12.409
	2/23/2017	12.8688
	3/22/2017	12.6411
	4/5/2017	12.7742
	7/6/2017	13.7881
	8/8/2017	12.9785
	10/9/2017	13.3708
	12/6/2017	13.0058
	5/15/2018	12.8917
	10/16/2018	12.6379
	6/11/2019	12.4451
	10/22/2019	12.824
	6/15/2020	12.919

From 14 baseline samples  
Baseline mean = 12.8816  
Baseline std Dev = 0.35543

For 4 recent sampling event(s)  
Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$   
t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$   
Degrees of Freedom = 14 (background observations) - 1  
 $t(0.9975, 13) = 3.53713$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	12.5637	[0, 14.1829]	FALSE
6/15/2020	1	12.919	[0, 14.1829]	FALSE
10/22/2019	1	12.824	[0, 14.1829]	FALSE
6/11/2019	1	12.4451	[0, 14.1829]	FALSE



**Non-Parametric Prediction Interval**  
**Intra-Well Comparison for CLF-J5**  
**Parameter: Total Dissolved Solids (TDS)**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

Total Percent Non-Detects = 0%  
 Future Samples (k) = 4  
 Recent Dates = 4  
 Baseline Measurements (n) = 15  
**Maximum Baseline Concentration = 1.253e+006**  
 Confidence Level = 78.9%  
 False Positive Rate = 21.1%

---

<b>Baseline Measurements</b>	<b>Date</b>	<b>Value</b>
	12/7/2016	369000
	1/18/2017	275000
	2/23/2017	366000
	3/22/2017	313000
	4/5/2017	358000
	4/25/2017	267000
	7/6/2017	1.253e+006
	8/8/2017	434000
	10/9/2017	770000
	12/6/2017	350000
	5/15/2018	402000
	10/16/2018	267000
	6/11/2019	207000
	10/22/2019	320000
	6/15/2020	329000

---

<b>Date</b>	<b>Count</b>	<b>Mean</b>	<b>Significant</b>
12/5/2020	1	264000	FALSE
6/15/2020	1	329000	FALSE
10/22/2019	1	320000	FALSE
6/11/2019	1	207000	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S05

#### Parameter: Total Dissolved Solids (TDS)

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	253000
	4/5/2017	286000
	4/25/2017	262000
	10/16/2018	227000
	10/22/2019	386000
	6/29/2020	182000
	12/5/2020	280000
	3/26/2021	129000

From 8 baseline samples

Baseline mean = 250625

Baseline std Dev = 76191.4

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
3/26/2021	1	129000	[0, 598371]	FALSE
12/5/2020	1	280000	[0, 598371]	FALSE
6/29/2020	1	182000	[0, 598371]	FALSE
10/22/2019	1	386000	[0, 598371]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S13

#### Parameter: Total Dissolved Solids (TDS)

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	367000
	1/18/2017	702000
	2/23/2017	1.014e+006
	3/22/2017	964000
	4/5/2017	846000
	4/25/2017	680000
	7/6/2017	451000
	8/8/2017	440000
	10/9/2017	405000
	12/6/2017	683000
	5/15/2018	850000
	10/16/2018	411000
	6/11/2019	550000
	10/22/2019	305000
	6/15/2020	521000

From 15 baseline samples

Baseline mean = 612600

Baseline std Dev = 226751

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	396000	[0, 1.42838e+00]	FALSE
6/15/2020	1	521000	[0, 1.42838e+00]	FALSE
10/22/2019	1	305000	[0, 1.42838e+00]	FALSE
6/11/2019	1	550000	[0, 1.42838e+00]	FALSE

**APPENDIX E2 – Statistical Analysis Package (February 2022)**



HALEY & ALDRICH, INC.  
6500 Rockside Road  
Suite 200  
Cleveland, OH 44131  
216.739.0555

14 June 2022  
File No. 130592-015

East Kentucky Power Cooperative  
4775 Lexington Road  
Winchester, KY 40392

Subject: Summary of Appendix III Semi-Annual  
Groundwater Detection Monitoring Statistical Evaluation  
East Kentucky Power Cooperative  
J.S. Cooper Station Landfill  
Somerset, Kentucky

East Kentucky Power Cooperative, Inc. (EKPC) is implementing the 17 April 2015 U.S. Environmental Protection Agency (U.S. EPA) Federal Coal Combustion Residuals (CCR) Rule (40 CFR §257 and 261) for the J.S. Cooper Station Landfill, located in Pulaski County, Kentucky. The CCR Rule establishes requirements for the operation, maintenance and closure of landfills and surface impoundments of CCR materials.

On 26 April 2022, EKPC provided Haley & Aldrich, Inc. (Haley & Aldrich) with analytical data from groundwater samples collected on 28 February 2022 from the six monitoring locations from a groundwater monitoring system that meets the requirements of 40 CFR §257.91. A resample was collected on 14 April 2022 for Total Dissolved Solids (TDS) from CLF-J2 only due to the initial sample being analyzed out of hold time. This additional analytical result was provided on 27 April 2022. Downgradient locations were defined in the *Groundwater Monitoring System and Hydrogeological Investigation Report, Cooper Station Landfill, Burnside, Kentucky* (Tetra Tech, 11 October 2017). This memorandum summarizes the results of statistical evaluations conducted to determine if Appendix III groundwater monitoring constituents have been detected in downgradient wells at levels that exhibit a statistically significant increase (SSI) above background levels consistent with the requirements in 40 CFR §257.94. The results presented herein were previously communicated orally to EKPC on 17 May 2022. Time-series graphs of data collected as part of the CCR Rule monitoring of J.S. Cooper Station Landfill are included in Attachment 1.

To identify SSIs, sample data from the most recent groundwater sampling event from the downgradient monitoring locations were compared to the Upper Prediction Limits (UPLs) calculated for each Appendix III constituent (boron, calcium, chloride, fluoride, pH, sulfate, and total dissolved solids) to represent background values within the given downgradient wells. Lower Prediction Limits (LPLs) were also calculated for pH<sup>1</sup>. Based on these comparisons, the statistical results identify SSIs above background

---

<sup>1</sup> We note that for pH, a Statistically Significant Difference (SSD) can be either an increase or a decrease. There is no SSD for pH.

concentrations for chloride and fluoride, both at CLF-S13. The results of the groundwater detection monitoring evaluation are provided below.

## Statistical Evaluation of Appendix III Constituents

The Rule, 40 CFR §257.93(f) (1-4), provides four (4) specific options to statistically evaluate whether water quality downgradient of the CCR Unit represents an SSI of Appendix III parameters compared to background water quality of the CCR Unit. Based on the *Selection of Statistical Procedures*, background was determined by calculating intra-well UPL for each Appendix III constituent as well as the LPL for pH for each downgradient monitoring location (see footnote 1). The UPL was used to evaluate potential SSIs at each downgradient well.

### UPL STATISTICAL ANALYSIS

Prediction limits are used to predict the UPL of possible future values for each Appendix III constituent as well as the lower prediction limit for pH, based on the downgradient monitoring well dataset and a specified number of future statistical comparisons. The prediction limit method is an accepted statistical method identified in the CCR Rule to evaluate the groundwater analytical data at CCR Units. The prediction limits are calculated with minimum 95% confidence level for four (4) future observations to maintain acceptable statistical power while maintaining site-wide false positive rate (SWFPR) of 10% per year or less. Depending on the assumed distribution of background, parametric or non-parametric procedures were used to develop the UPL for each Appendix III parameter at the six downgradient locations that had at least eight sampling events. Parametric prediction limits utilize assumed distributions of the sample background data to develop the prediction limits, and non-parametric limits utilize order statistics or bootstrap methods to develop the prediction limits. The prediction limits were calculated after testing for outlier sample results that would warrant removal from the data set based on likely error in sampling or measurement. No sample data were deemed as outliers that warranted removal from the data set.

### BACKGROUND DISTRIBUTIONS AND UPLS

Prior to conducting the statistical analysis for the December 2020 compliance event, the groundwater analytical results for samples collected from 7 December 2016 through June 2020 were used to update intra-well UPL and LPL (for pH) for four of the six downgradient locations CLF-J2, CLF-J3, CLF-J5, and CLF-S13 identified in the *Groundwater Monitoring System and Hydrogeological Investigation Report*. The other two locations (CLF-S05 and CLF-S06) are typically dry and insufficient samples were available to conduct UPL calculations at that time. Since the December 2020 compliance event, a minimum of eight samples have been obtained from CLF-S05 and CLF-S06 and the calculation of the UPLs were completed for those two remaining locations. The eighth of eight background samples for CLF-S06 and CLF-S05 were collected in March 2021 and February 2022, respectively. The groundwater analytical results for samples collected from 18 January 2017 through 26 March 2021 were used to calculate intra-well UPL and LPL (for pH) for CLF-S06. The groundwater analytical results for samples collected from 18 January 2017 through 28 February 2022 were used to calculate intra-well UPL and LPL (for pH) for CLF-S05 and will be used for comparison to the next sample obtained from that location. Following four sampling

events, the new sample results will be evaluated for incorporation into the background data set used for the calculation of the UPL. The variability and distribution of each downgradient well background dataset was evaluated to determine the method for UPL and LPL (for pH) calculation. The development of the UPL and LPL (for pH) for each of the Appendix III constituents is summarized in Table 1, and the supporting statistical software output is included in Attachment 2. The next time background will be reevaluated is prior to the statistical evaluation of the second semi-annual compliance event of 2022.

### RESULTS OF APPENDIX III DOWNGRADIENT STATISTICAL COMPARISONS

The sample concentrations for each of the Appendix III constituents from the last detection monitoring sampling event from each downgradient location were compared to their respective intra-well UPLs (Table 1). A sample concentration greater than the UPL (or less than LPL for pH) would be considered to represent an SSI over background. Based on these comparisons, two SSIs are detected in this event:

- Chloride at CLF-S13
- Fluoride at CLF-S13

We appreciate the opportunity to provide environmental consulting services on this project. Please do not hesitate to call if you have any questions or comments.

Sincerely,  
**HALEY & ALDRICH, INC.**



Lloyd S. Ross  
Senior Scientist



Emily Guzik  
Project Manager

Enclosures:

- Table 1. Summary of Background Sample Results and Comparison of Downgradient Sample Results
- Attachment 1. Appendix III Time Series Graphs
- Attachment 2. Statistical Output

## TABLE



TABLE 1

SUMMARY OF BACKGROUND SAMPLE RESULTS AND COMPARISON OF DOWNGRADIENT SAMPLE RESULTS

MAY 2022

EAST KENTUCKY POWER COOPERATIVE

J. S. COOPER STATION LANDFILL

Location ID	Background Data Set Summary																Intra-well Analysis		
	Frequency of Detection	Percent Non-Detects	Range of Non-Detect		Mean	50th Percentile (Median)	95th Percentile	Maximum Detect	Variance	Standard Deviation	Coefficient of Variance	Outlier Presence	Outlier Removed	Trend	Distribution*	Background Limit (Upper Prediction Limit)	Compliance Round (February 2022)	Statistically Significant Increase (SSI) Present?	
<b>Boron, Total (mg/L)</b>																			
CLF-J2	14 / 15	7%	0.05	0.05	0.435	0.325	1.17	1.626	1.69E-01	0.411	0.946	No	No	Stable	Log-transformed	9.26	0.109	No	
CLF-J3	14 / 14	0%	N/A	N/A	0.549	0.5	1.254	1.741	1.87E-01	0.433	0.789	Yes	No	Stable	Normal	2.13	0.116	No	
CLF-J5	15 / 15	0%	N/A	N/A	0.409	0.351	0.887	1.71	1.49E-01	0.387	0.946	No	No	Stable	Log-transformed	4.40	0.0898	No	
CLF-S05	6 / 8	25%	0.05	0.05	0.157	0.0799	0.4781	0.636	3.93E-02	0.1983	1.262	No	No	Stable	Log-transformed	4.93	0.0212	No	
CLF-S06	0 / 8	100%	0.02	0.05	N/A	0.05	0.05	N/A	N/A	N/A	N/A	No	No	NT	Non-parametric	0.05	N/A	N/A	
CLF-S13	15 / 15	0%	N/A	N/A	0.614	0.484	0.958	1.041	5.67E-02	0.238	0.388	No	No	Stable	Normal	1.47	0.155	No	
<b>Calcium, Total (mg/L)</b>																			
CLF-J2	15 / 15	0%	N/A	N/A	113.2	113	187.9	239.5	2.13E+03	46.1	0.407	Yes	No	Stable	Normal	279.05	81.1	No	
CLF-J3	14 / 14	0%	N/A	N/A	123.2	118.5	192.8	239.8	1.54E+03	39.29	0.319	No	No	Stable	Log-transformed	316.51	82.7	No	
CLF-J5	15 / 15	0%	N/A	N/A	124.5	111	215.8	297.3	2.83E+03	53.16	0.427	Yes	No	Stable	Non-parametric	297.33	80.9	No	
CLF-S05	8 / 8	0%	N/A	N/A	93.4	92.9	117.5	120	3.81E+02	19.51	0.2089	No	No	Stable	Normal	182.44	72.3	No	
CLF-S06	8 / 8	0%	N/A	N/A	80.2	78.6	90.2	90.5	5.98E+01	7.74	0.0964	No	No	Stable	Normal-Parametric	115.5	N/A	N/A	
CLF-S13	15 / 15	0%	N/A	N/A	160.1	147	249	270	3.08E+03	55.48	0.347	No	No	Stable	Normal	359.64	74.9	No	
<b>Chloride, Total (mg/L)</b>																			
CLF-J2	15 / 15	0%	N/A	N/A	14.13	9.941	49.54	50.8	2.23E+02	14.94	1.058	Yes	No	Stable	Log-transformed	277.65	19	No	
CLF-J3	14 / 14	0%	N/A	N/A	16.3	12	49.81	51.3	2.21E+02	14.85	0.911	Yes	No	Stable	Log-transformed	178.69	7.9	No	
CLF-J5	15 / 15	0%	N/A	N/A	17.91	10.56	68.82	76.1	4.83E+02	21.98	1.227	Yes	No	Stable	Log-transformed	294.49	8.4	No	
CLF-S05	7 / 8	12%	1	1	5.3	4.789	12.14	14.1	1.96E+01	4.421	0.8342	No	No	Stable	Normal	25.48	1.7	No	
CLF-S06	5 / 8	38%	1	2	1.83	1.88	3.01	3.5	6.87E-01	0.83	0.453	Yes	No	Stable	Normal-Parametric	5.61	N/A	N/A	
CLF-S13	15 / 15	0%	N/A	N/A	4.898	3.7	9.017	9.237	5.42E+00	2.328	0.475	No	No	Decreasing	Normal	13.27	17	Yes	
<b>Fluoride, Total (mg/L)</b>																			
CLF-J2	2 / 15	87%	0.5	0.5	0.155	0.5	0.5	0.171	2.36E-04	0.0154	0.0988	No	No	NT	Non-parametric	0.50	0.17	No	
CLF-J3	1 / 14	93%	0.5	0.5	0.166	0.5	0.5	0.166	0.00E+00	0	N/A	No	No	NT	Non-parametric	0.50	0.16	No	
CLF-J5	1 / 15	93%	0.5	0.5	0.167	0.5	0.5	0.167	0.00E+00	0	N/A	No	No	NT	Non-parametric	0.50	0.17	No	
CLF-S05	2 / 8	75%	0.5	0.5	0.413	0.5	0.5	0.1658	2.59E-02	0.1608	0.3892	No	No	NT	Non-parametric	0.50	0.16	No	
CLF-S06	3 / 8	63%	0.5	0.5	0.395	0.5	0.5	0.2731	2.15E-02	0.1466	0.371	No	No	NT	Non-parametric	0.5	N/A	N/A	
CLF-S13	1 / 15	93%	0.5	0.5	0.21	0.5	0.5	0.21	0.00E+00	0	N/A	No	No	NT	Non-parametric	0.50	0.67	Yes	
<b>pH, Field, Total (pH units)</b>																			
CLF-J2	15 / 15	0%	N/A	N/A	7.888	7.89	8.269	8.29	1.06E-01	0.325	0.0412	No	No	Stable	Normal	6.63, 9.14	8.19	No	
CLF-J3	14 / 14	0%	N/A	N/A	7.879	7.675	8.324	8.33	1.28E-01	0.358	0.0454	No	No	Stable	Non-parametric	7.45, 8.33	8.06	No	
CLF-J5	15 / 15	0%	N/A	N/A	7.999	8.01	8.312	8.34	5.09E-02	0.226	0.0282	No	No	Stable	Normal	7.13, 8.87	8.81	No	
CLF-S05	8 / 8	0%	N/A	N/A	8.08	8.11	8.372	8.4	7.22E-02	0.2686	0.03326	No	No	Stable	Normal	6.74, 9.42	8.96	No	
CLF-S06	8 / 8	0%	N/A	N/A	7.696	8.12	8.677	8.81	2.11E+00	1.453	0.189	Yes	No	Stable	Non-parametric	4.2, 8.81	N/A	N/A	
CLF-S13	15 / 15	0%	N/A	N/A	7.831	7.91	8.157	8.22	7.66E-02	0.277	0.0353	No	No	Stable	Normal	6.76, 8.9	7.77	No	
<b>Sulfate, Total (mg/L)</b>																			
CLF-J2	15 / 15	0%	N/A	N/A	111.4	97.08	282.1	432	1.04E+04	102	0.916	Yes	No	Stable	Log-transformed	2173.83	36	No	
CLF-J3	14 / 14	0%	N/A	N/A	124.1	100.4	292.2	430	9.73E+03	98.61	0.795	Yes	No	Stable	Log-transformed	987.57	36	No	
CLF-J5	15 / 15	0%	N/A	N/A	110.1	67.8	354.1	555	1.86E+04	136.3	1.237	Yes	No	Stable	Log-transformed	1579.79	31	No	
CLF-S05	8 / 8	0%	N/A	N/A	10.5	10.2	14.88	15.6	8.03E+00	2.833	0.269	No	No	Stable	Normal	146.81	9.8	No	
CLF-S06	7 / 8	13%	4	4	9.246	10.547	14.953	16.155	2.02E+01	4.492	0.7021	No	No	Stable	Normal-Parametric	29.75	N/A	N/A	
CLF-S13	15 / 15	0%	N/A	N/A	260.8	235	505.9	507.4	2.08E+04	144.3	0.553	No	No	Stable	Normal	779.92	120	No	
<b>Total Dissolved Solids (TDS) (mg/L)</b>																			
CLF-J2	15 / 15	0%	N/A	N/A	383.1	359	762.2	982	4.38E+04	209.2	0.546	Yes	No	Stable	Log-transformed	1966.37	266 <sup>†</sup>	No	
CLF-J3	14 / 14	0%	N/A	N/A	420.2	379.5	757.2	973	3.47E+04	186.2	0.443	No	No	Stable	Log-transformed	1443.96	142	No	
CLF-J5	15 / 15	0%	N/A	N/A	418.7	350	914.9	1253	6.96E+04	263.8	0.63	Yes	No	Stable	Non-parametric	1253.00	238	No	
CLF-S05	8 / 8	0%	N/A	N/A	251	257.5	351	386	5.81E+03	76.19	0.304	No	No	Stable	Normal	598.37	134	No	
CLF-S06	8 / 8	0%	N/A	N/A	235	213.5	344.5	404	4.83E+03	69.492	0.296	Yes	No	Stable	Non-parametric	404.00	N/A	N/A	
CLF-S13	15 / 15	0%	N/A	N/A	612.6	550	979	1014	5.14E+04	226.8	0.37	No	No	Stable	Normal	1428.38	122	No	

Notes and Abbreviations:

mg/L - Milligram per liter

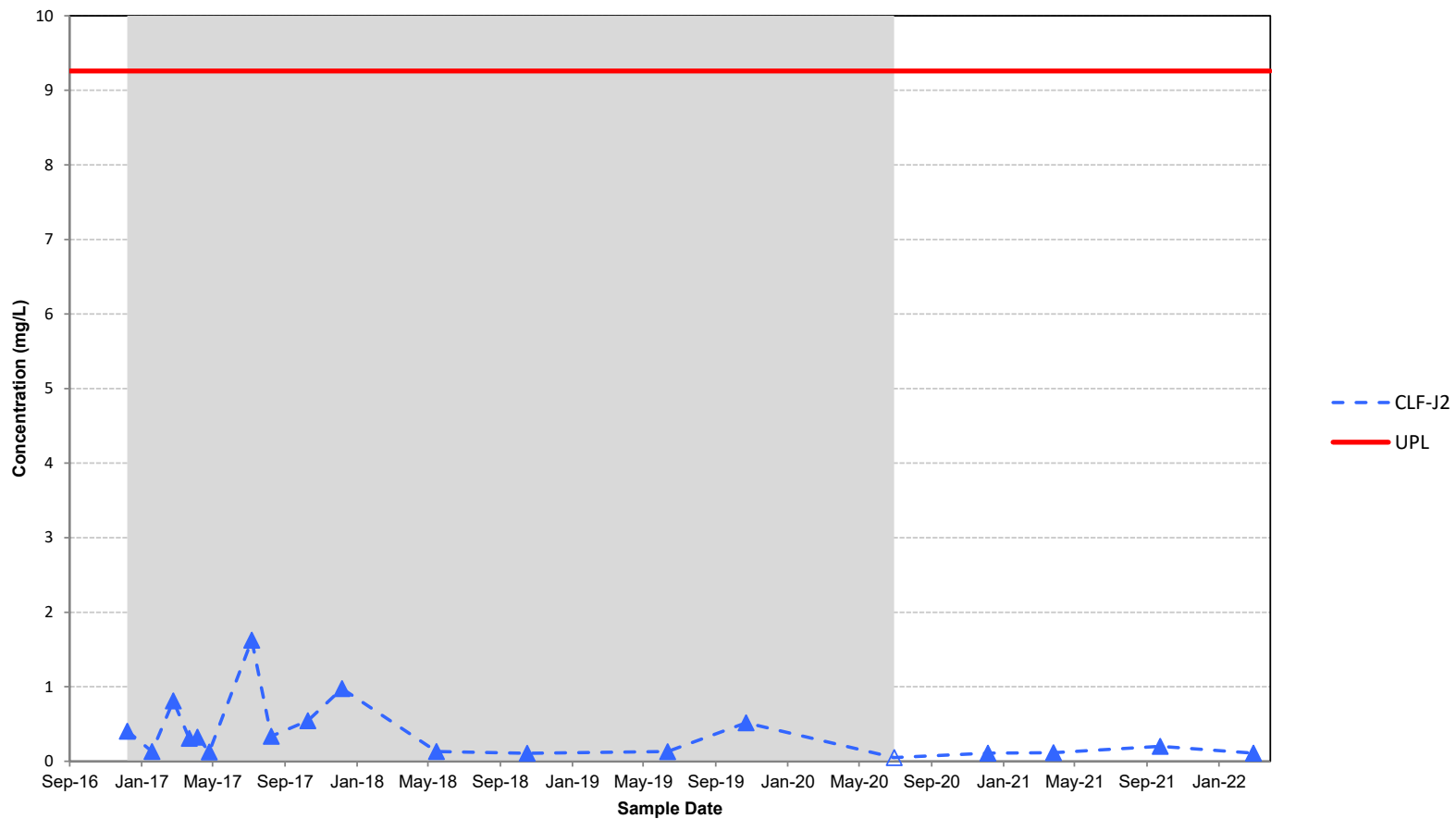
N/A - Not Applicable

NT - Not Tested

\* - Determined based on Shapiro-Wilks statistical test at 5% significance level and residual plot probability

**ATTACHMENT 1**

**Appendix III Time Series Graphs**



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

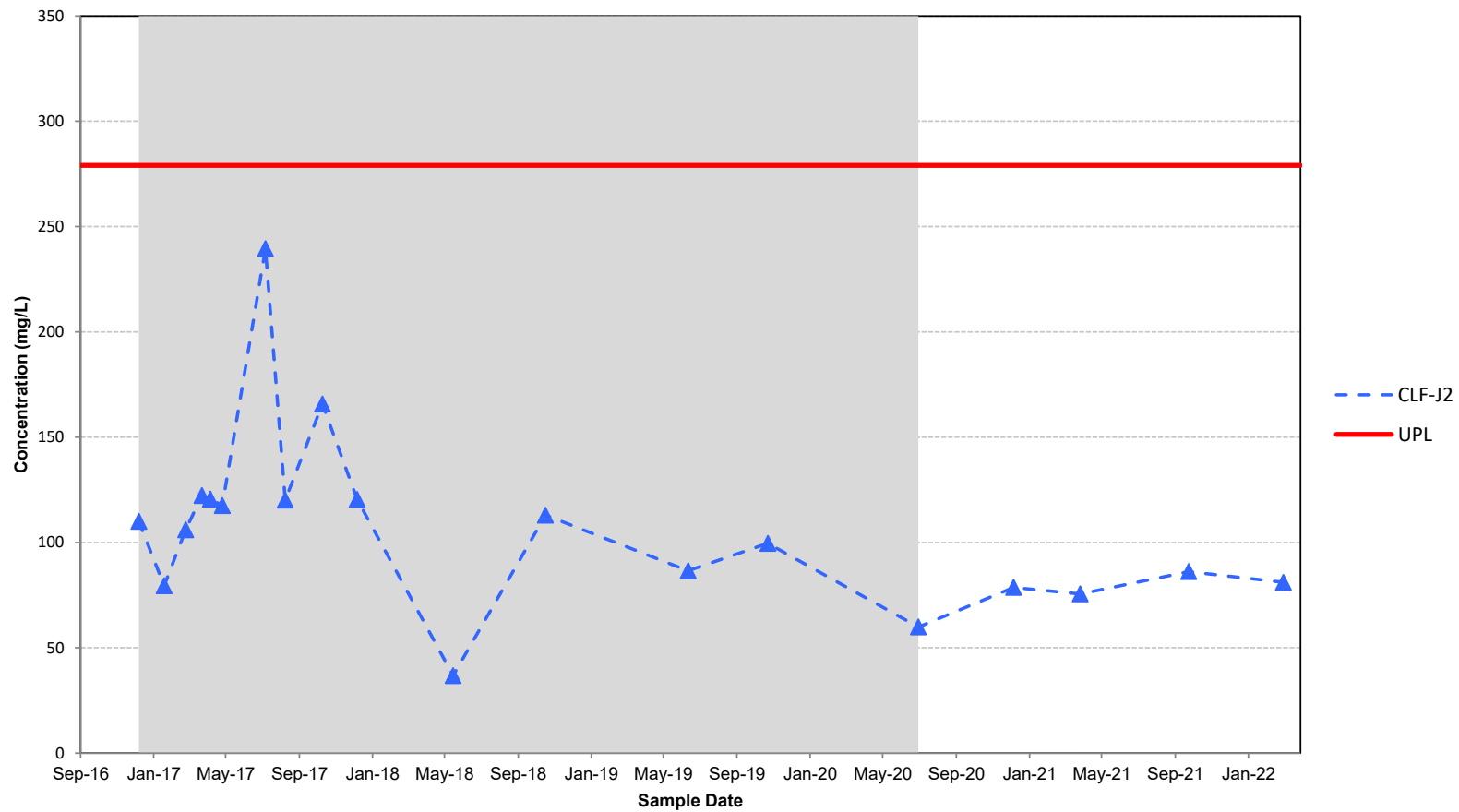
**HALEY  
ALDRICH**

J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**BORON  
CONCENTRATION VS. TIME**

May 2022

Figure F-1



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

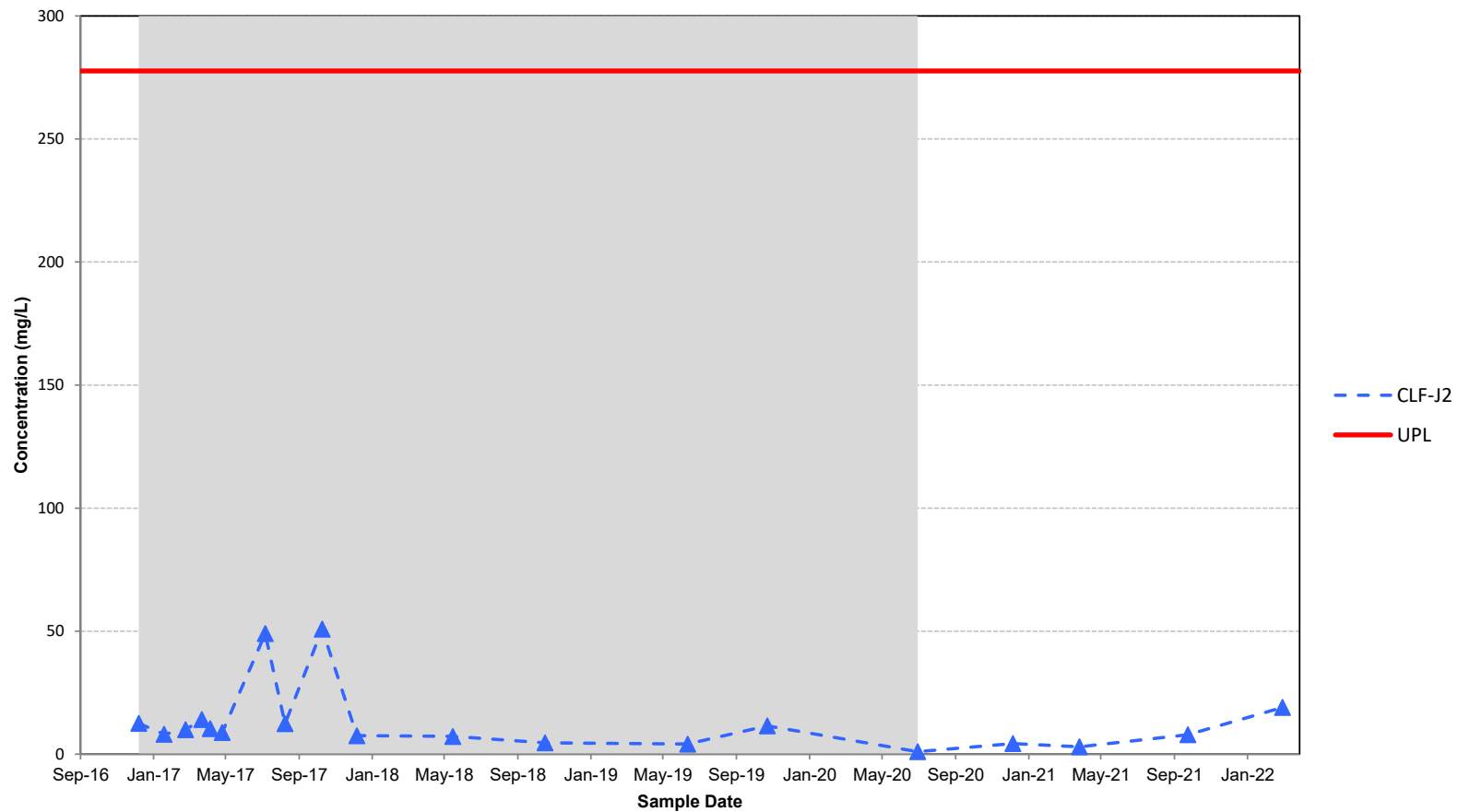


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CALCIUM  
CONCENTRATION VS. TIME**

May 2022

Figure F-2



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

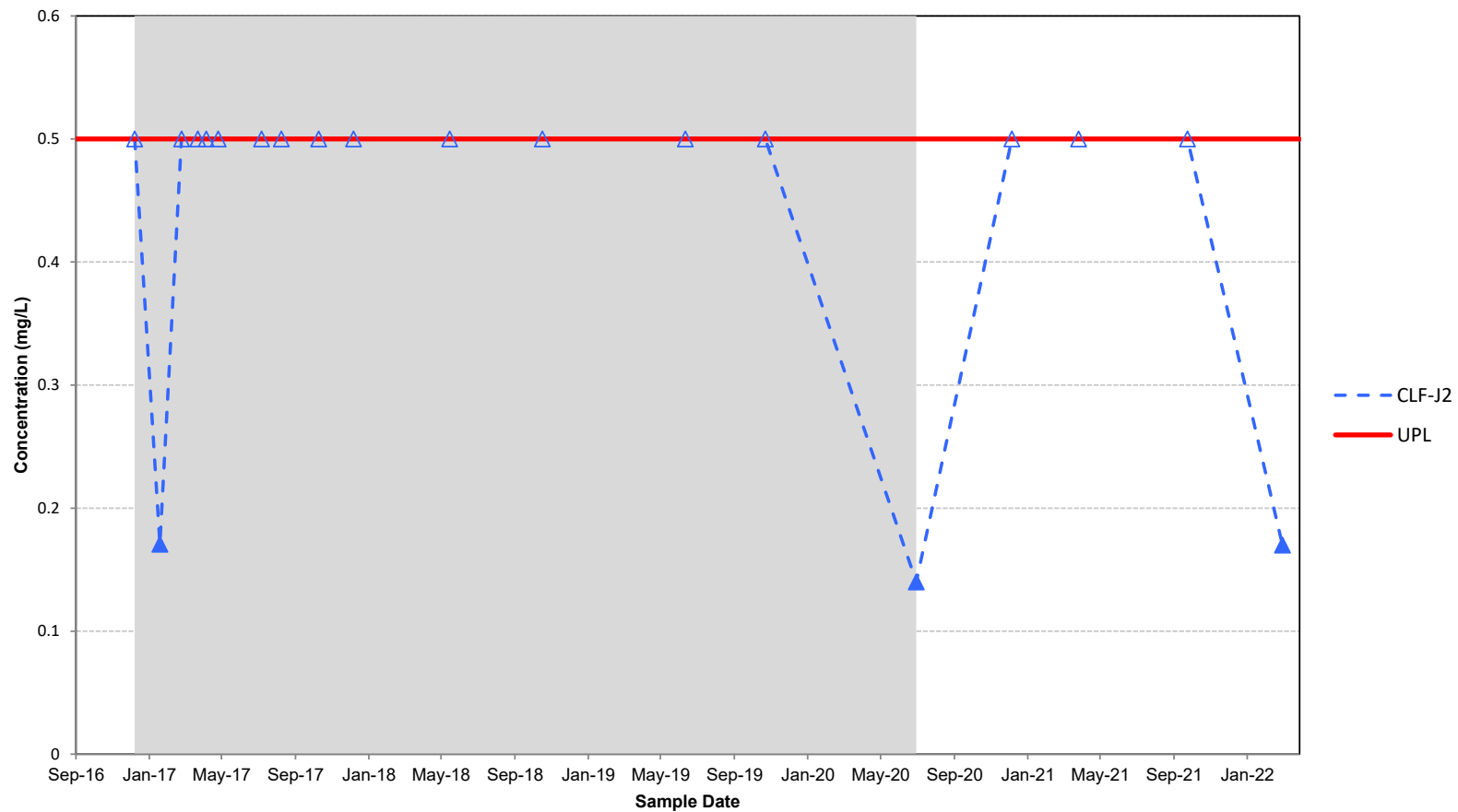


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CHLORIDE  
CONCENTRATION VS. TIME**

May 2022

Figure F-3



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

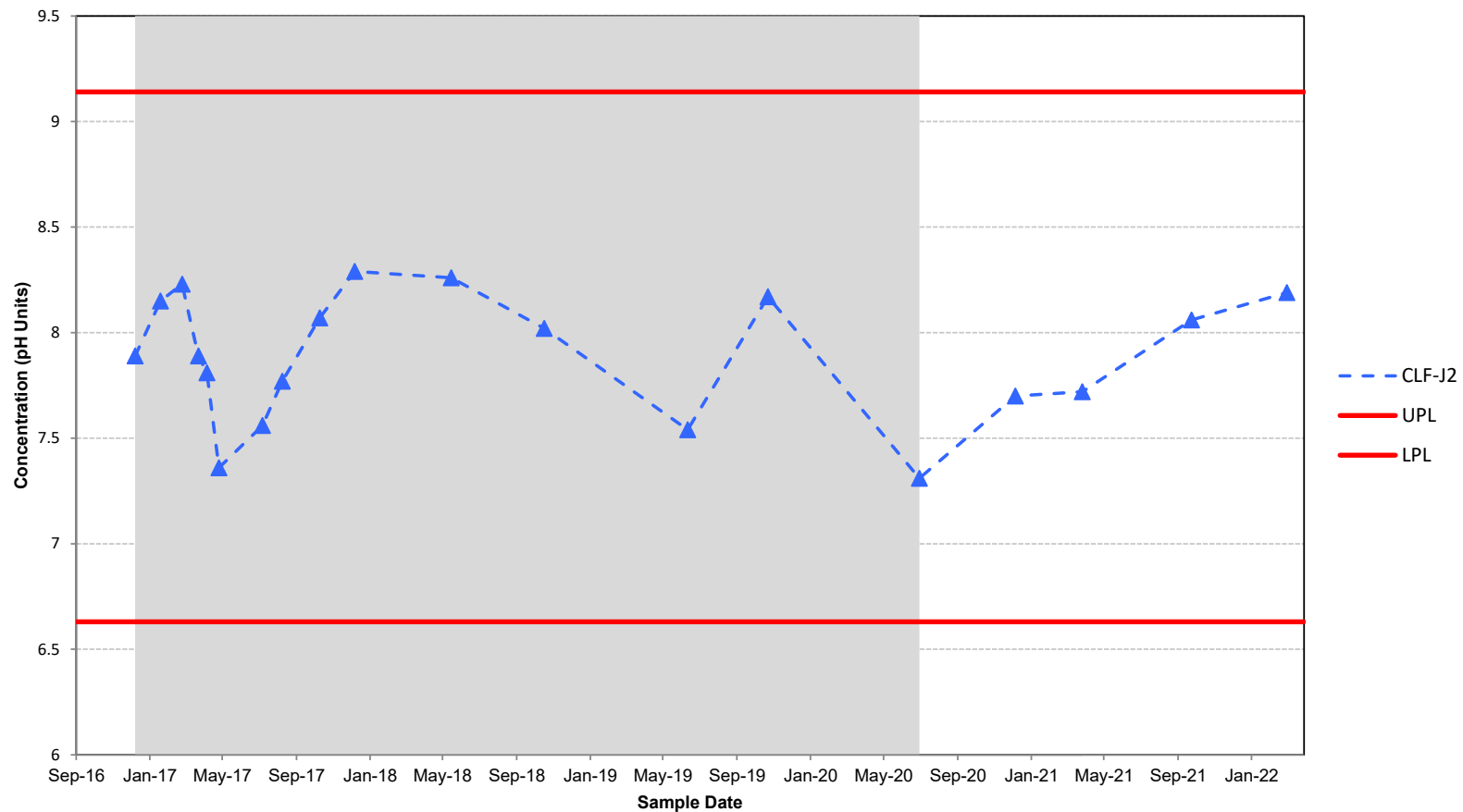


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**FLUORIDE  
CONCENTRATION VS. TIME**

May 2022

Figure F-4



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper and Lower Prediction Limit (UPL and LPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

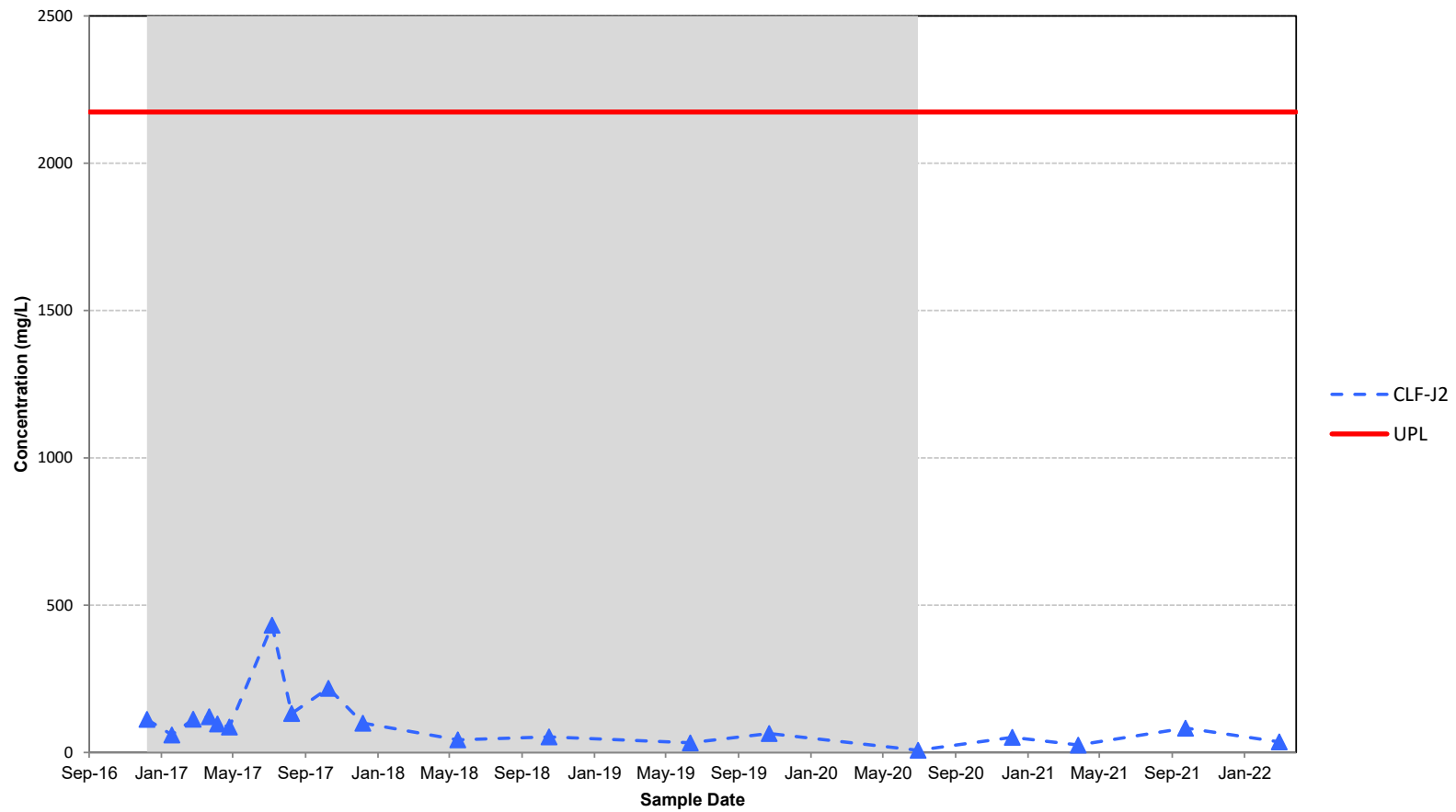


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**PH, FIELD  
CONCENTRATION VS. TIME**

May 2022

Figure F-5



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.



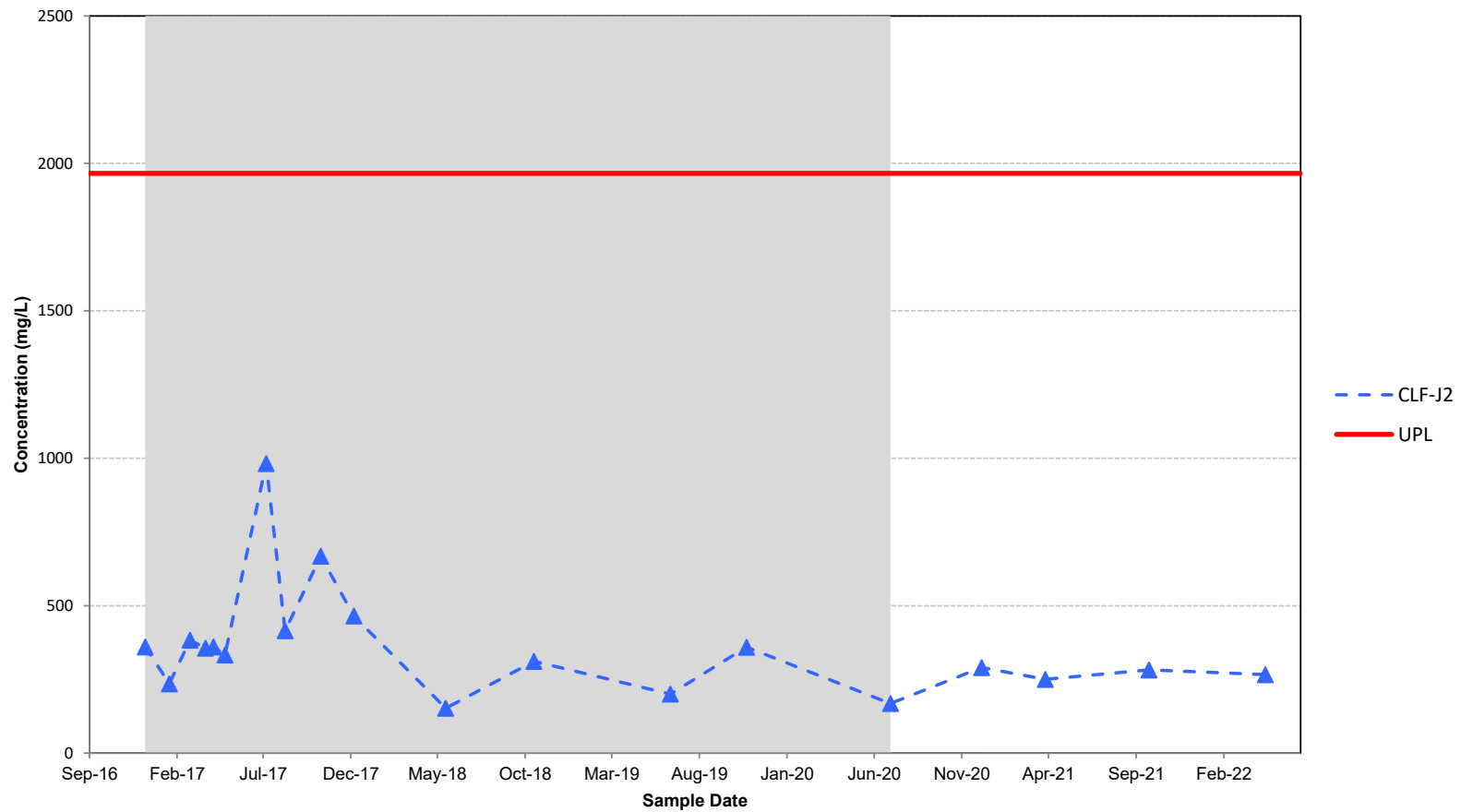
J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**SULFATE  
CONCENTRATION VS. TIME**

May 2022

Figure F-6





**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

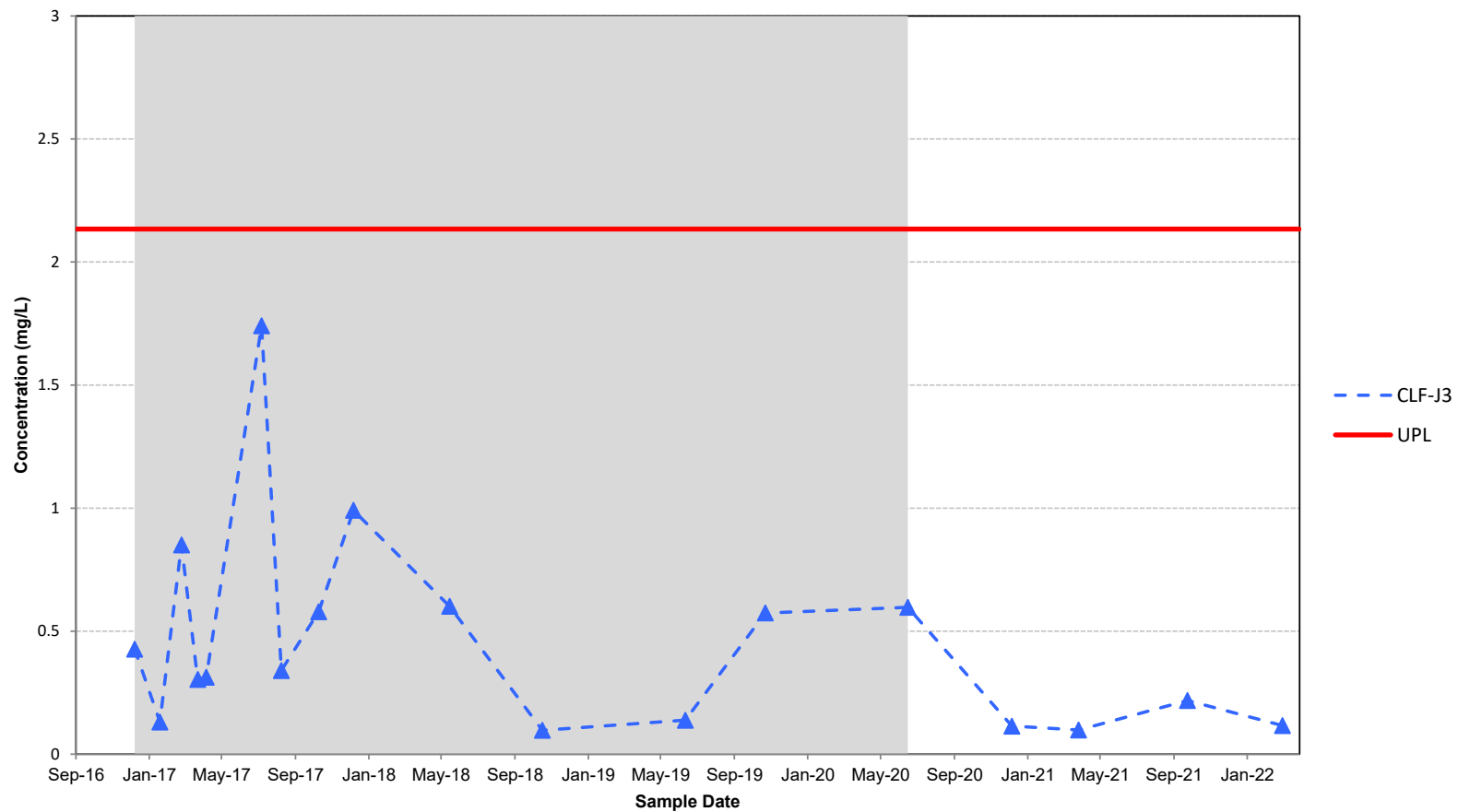


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**TOTAL DISSOLVED SOLIDS (TDS)  
CONCENTRATION VS. TIME**

May 2022

Figure F-7



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

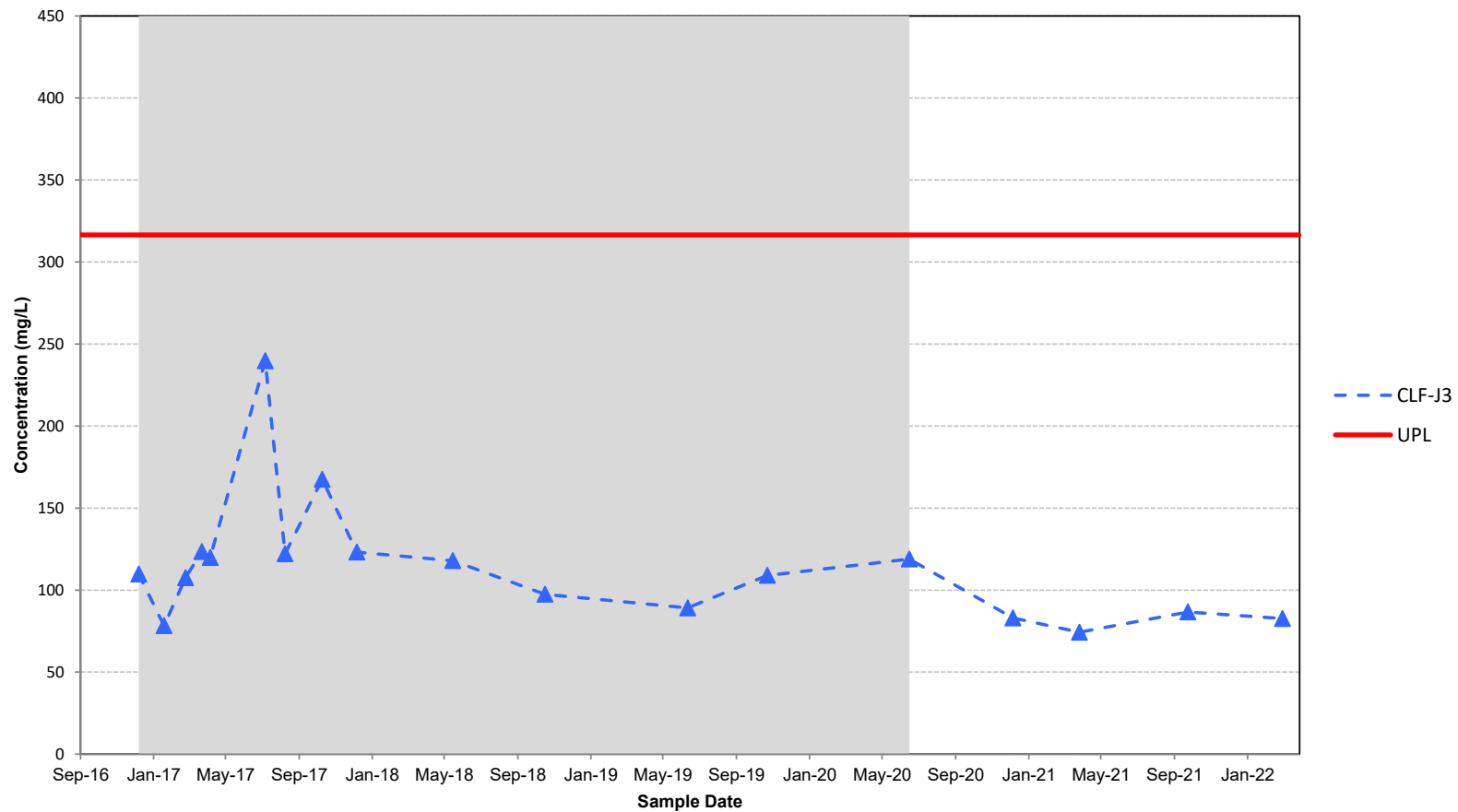


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**BORON  
CONCENTRATION VS. TIME**

May 2022

Figure F-8



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

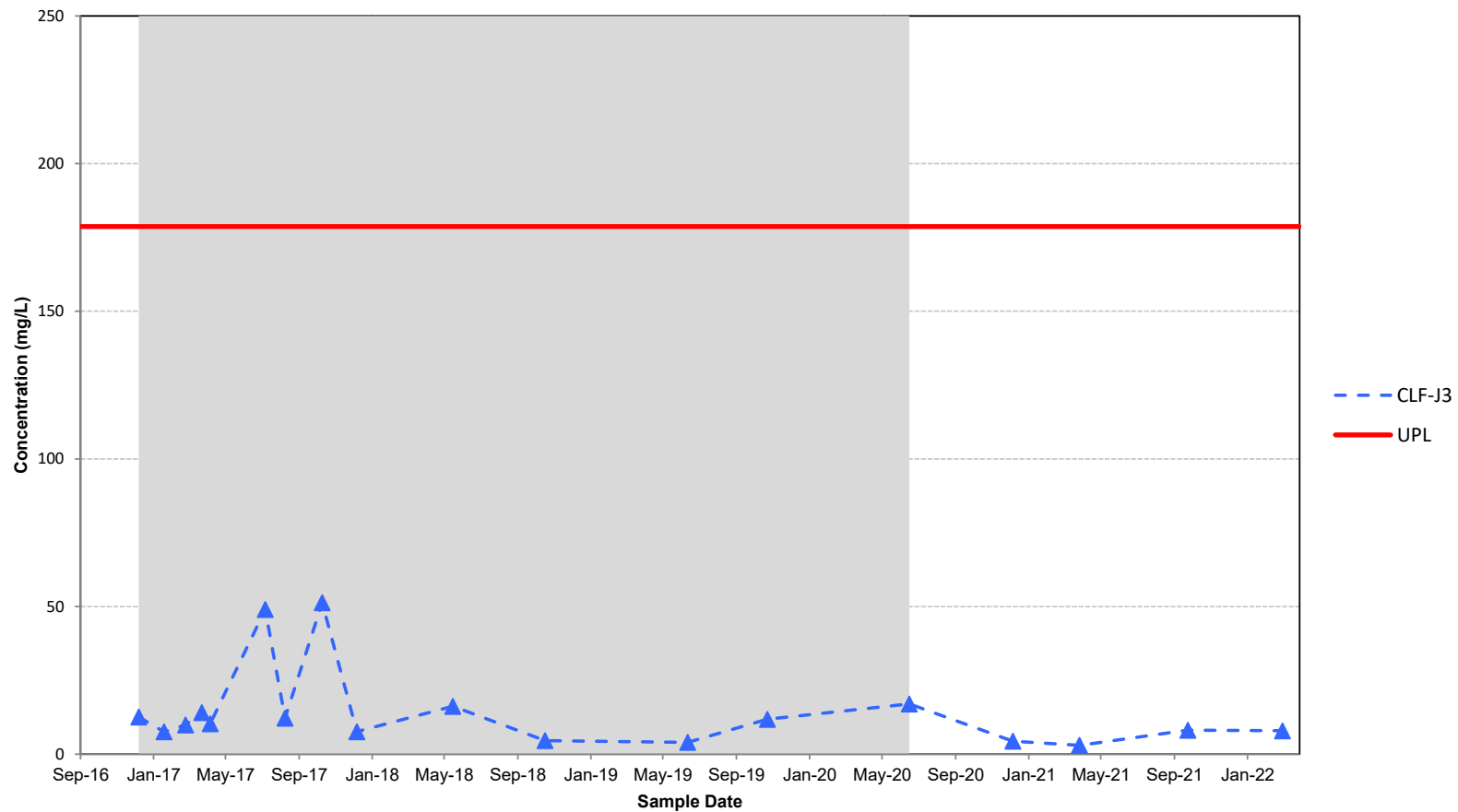


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CALCIUM  
CONCENTRATION VS. TIME**

May 2022

Figure F-9



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

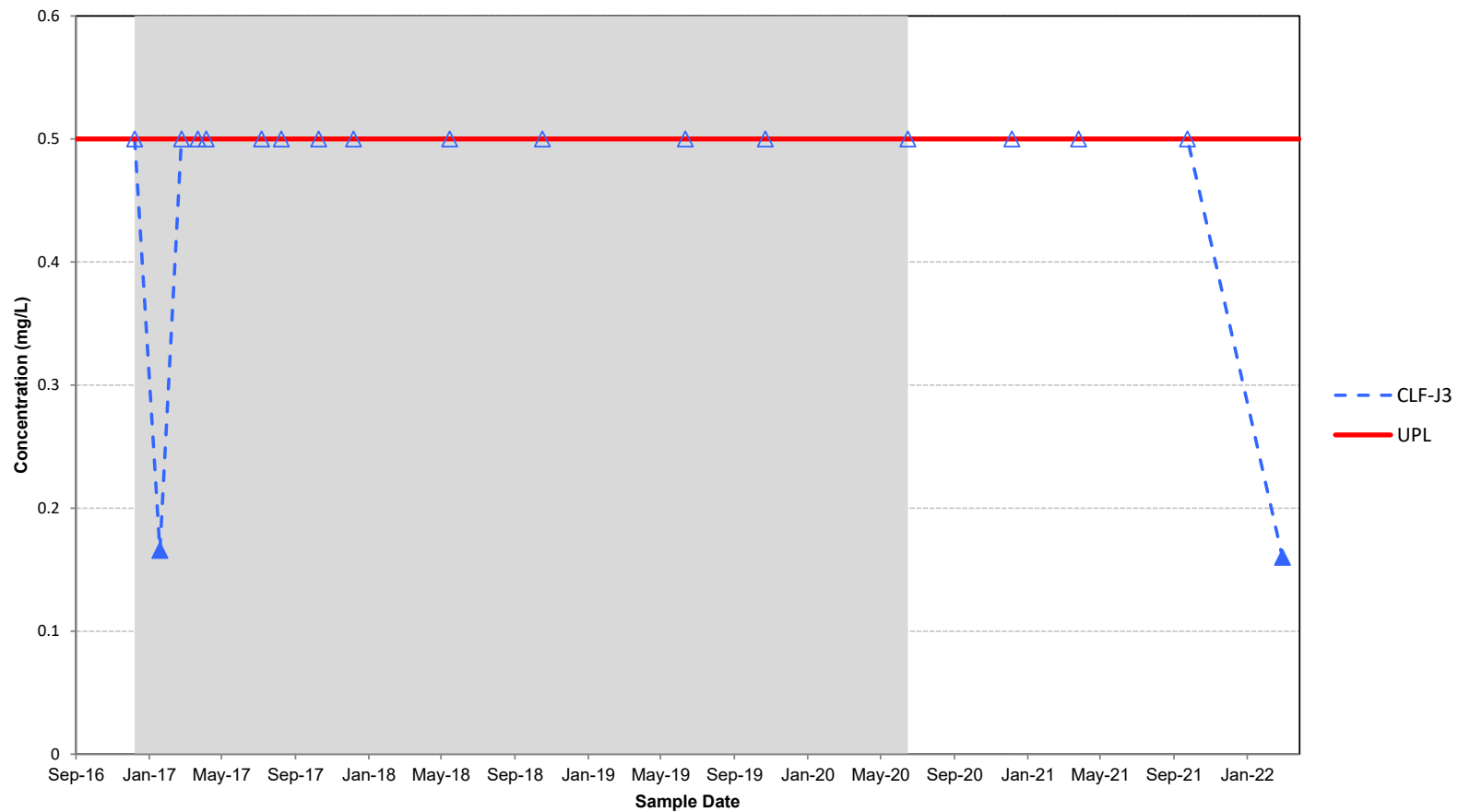


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CHLORIDE  
CONCENTRATION VS. TIME**

May 2022

Figure F-10



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

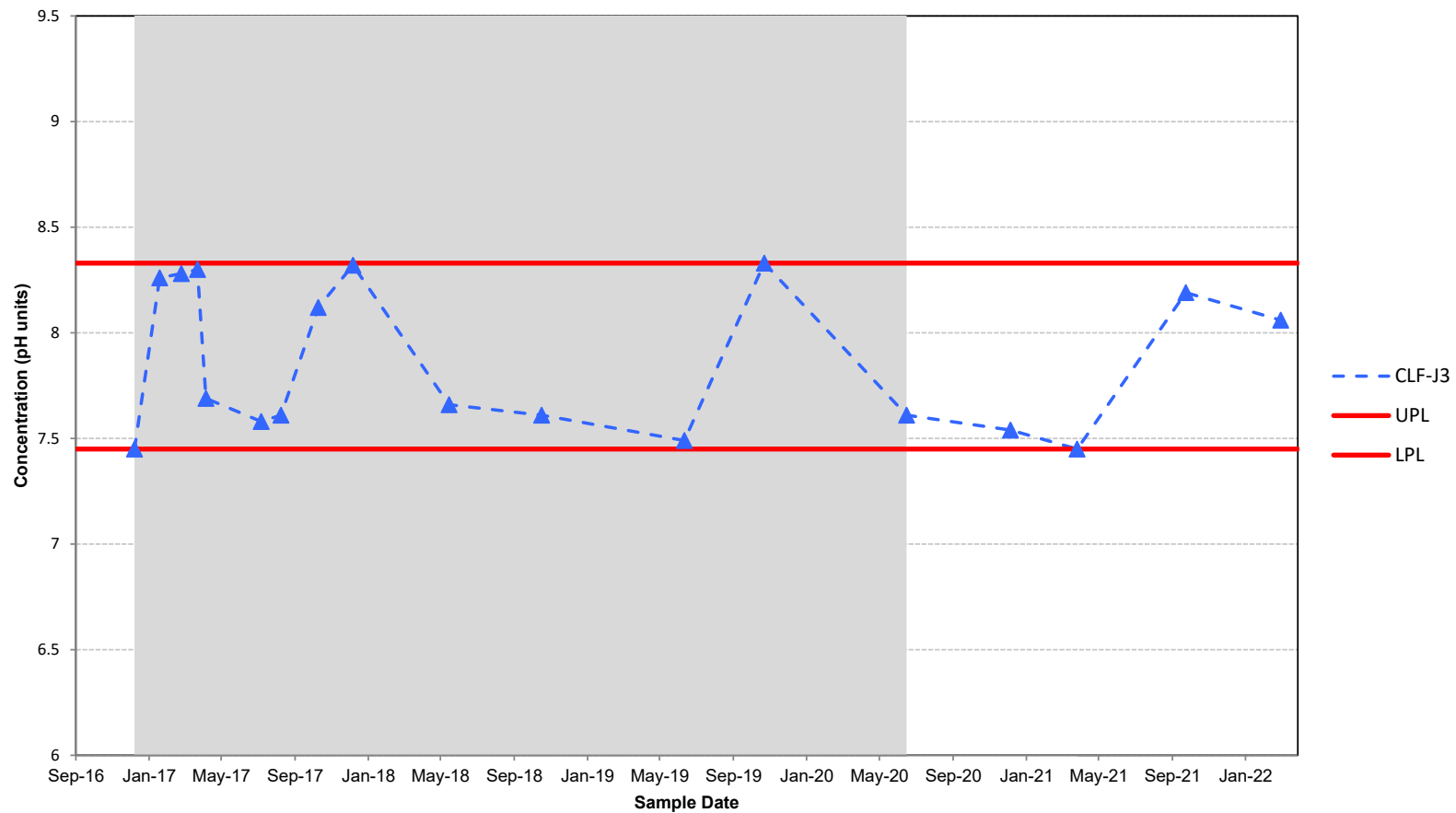


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**FLUORIDE  
CONCENTRATION VS. TIME**

May 2022

Figure F-11



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper and Lower Prediction Limit (UPL and LPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

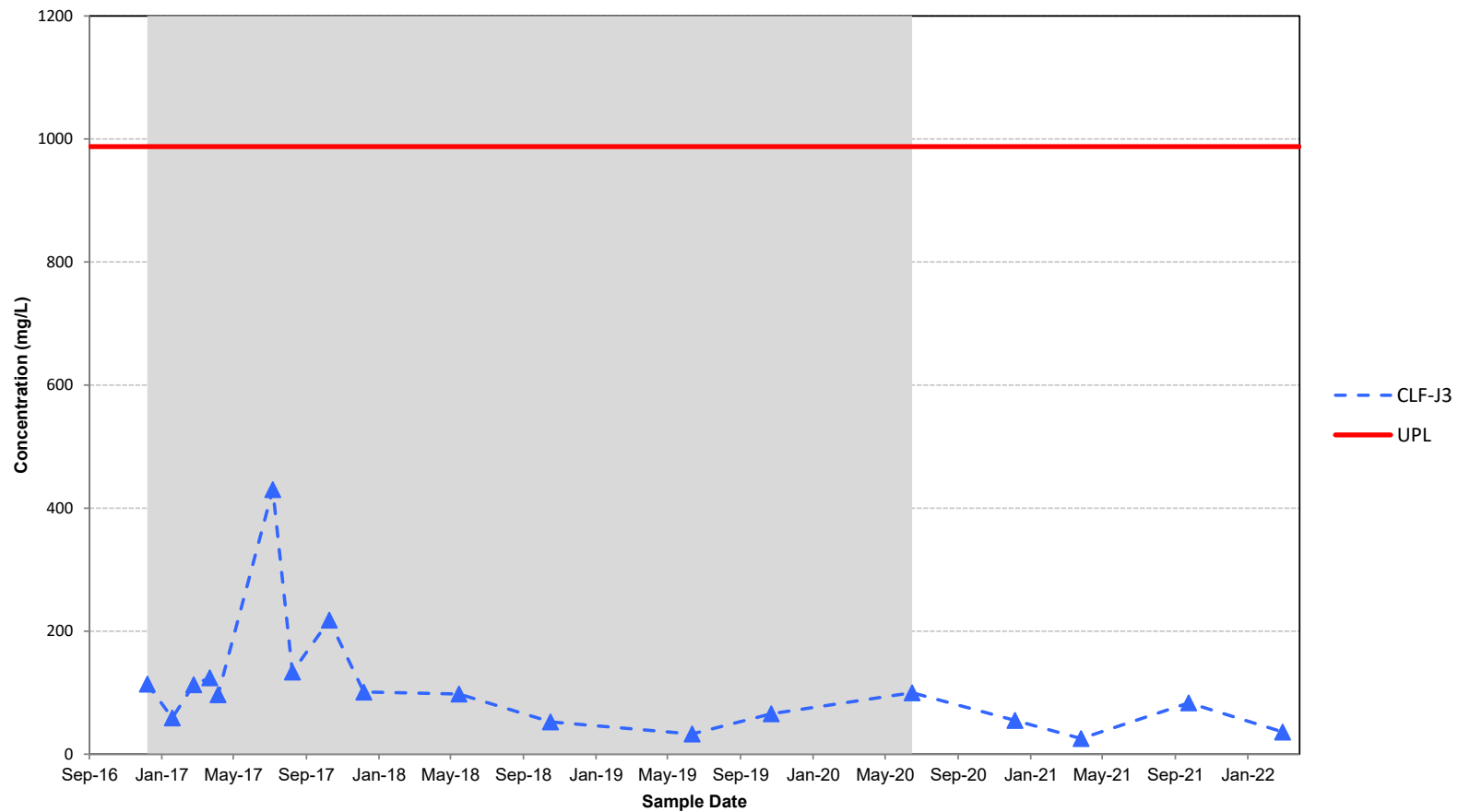


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**PH, FIELD  
CONCENTRATION VS. TIME**

May 2022

Figure F-12



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

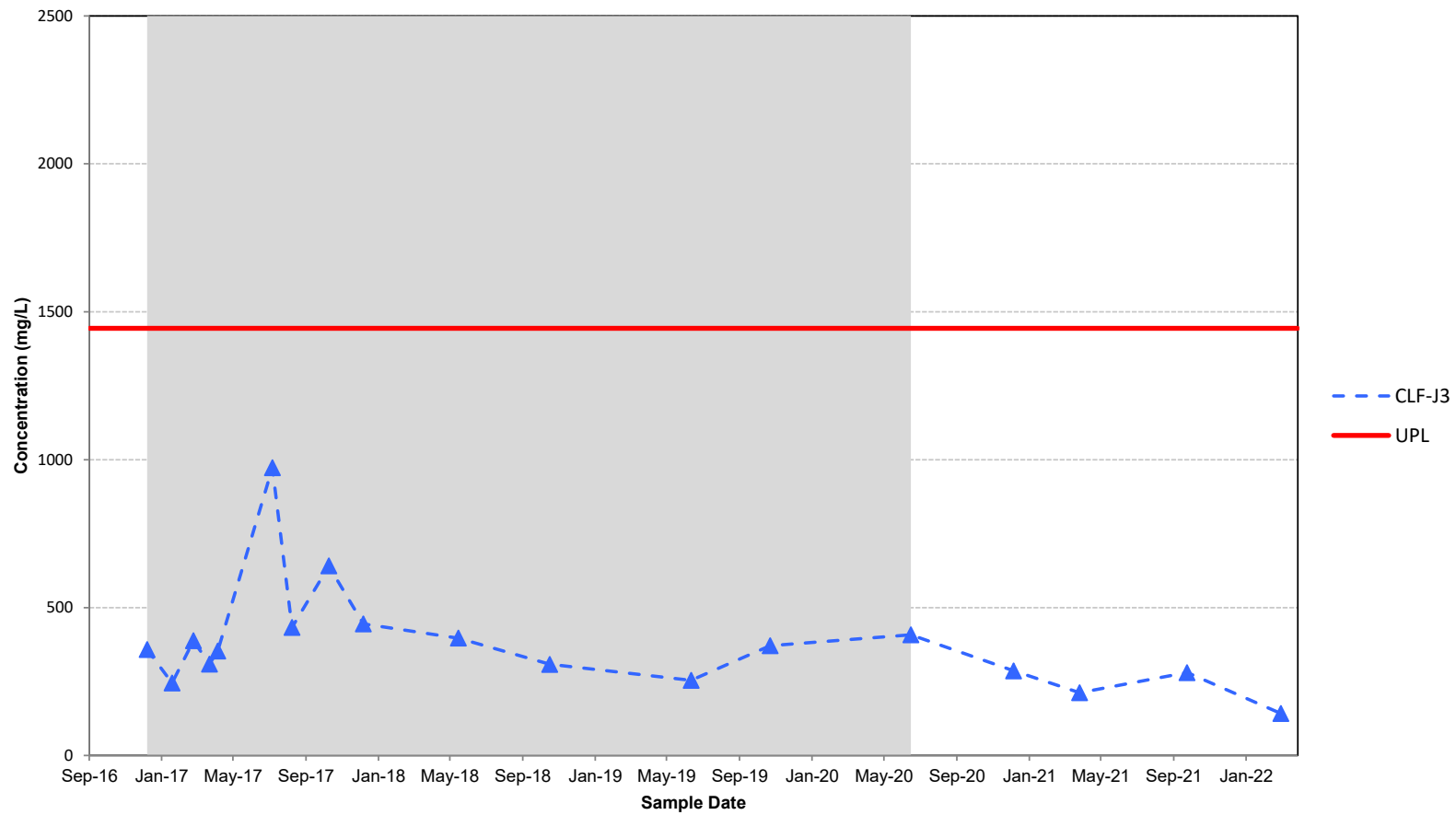


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**SULFATE  
CONCENTRATION VS. TIME**

May 2022

Figure F-13



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.



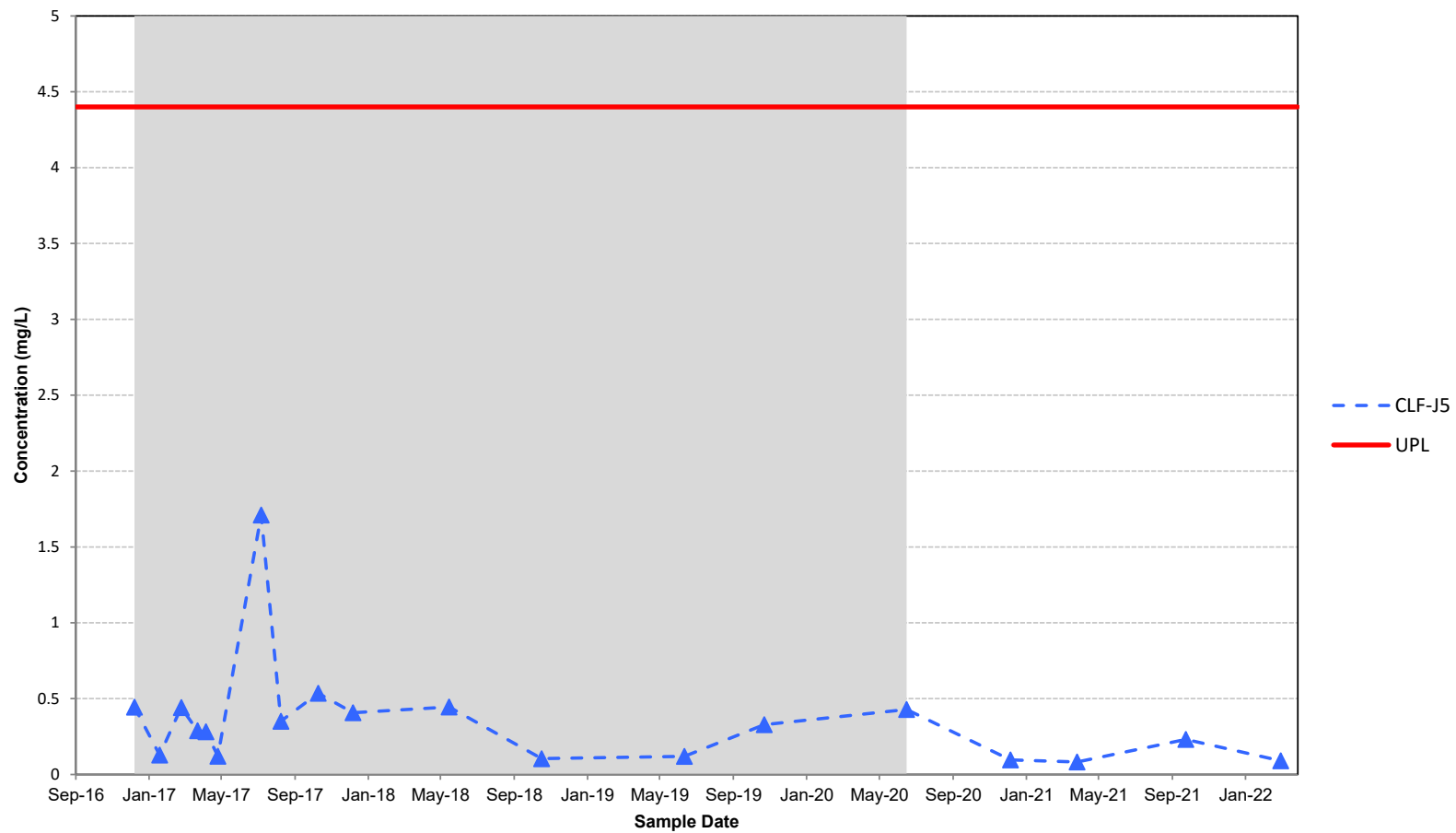
J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**TOTAL DISSOLVED SOLIDS (TDS)  
CONCENTRATION VS. TIME**

May 2022

Figure F-14





**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

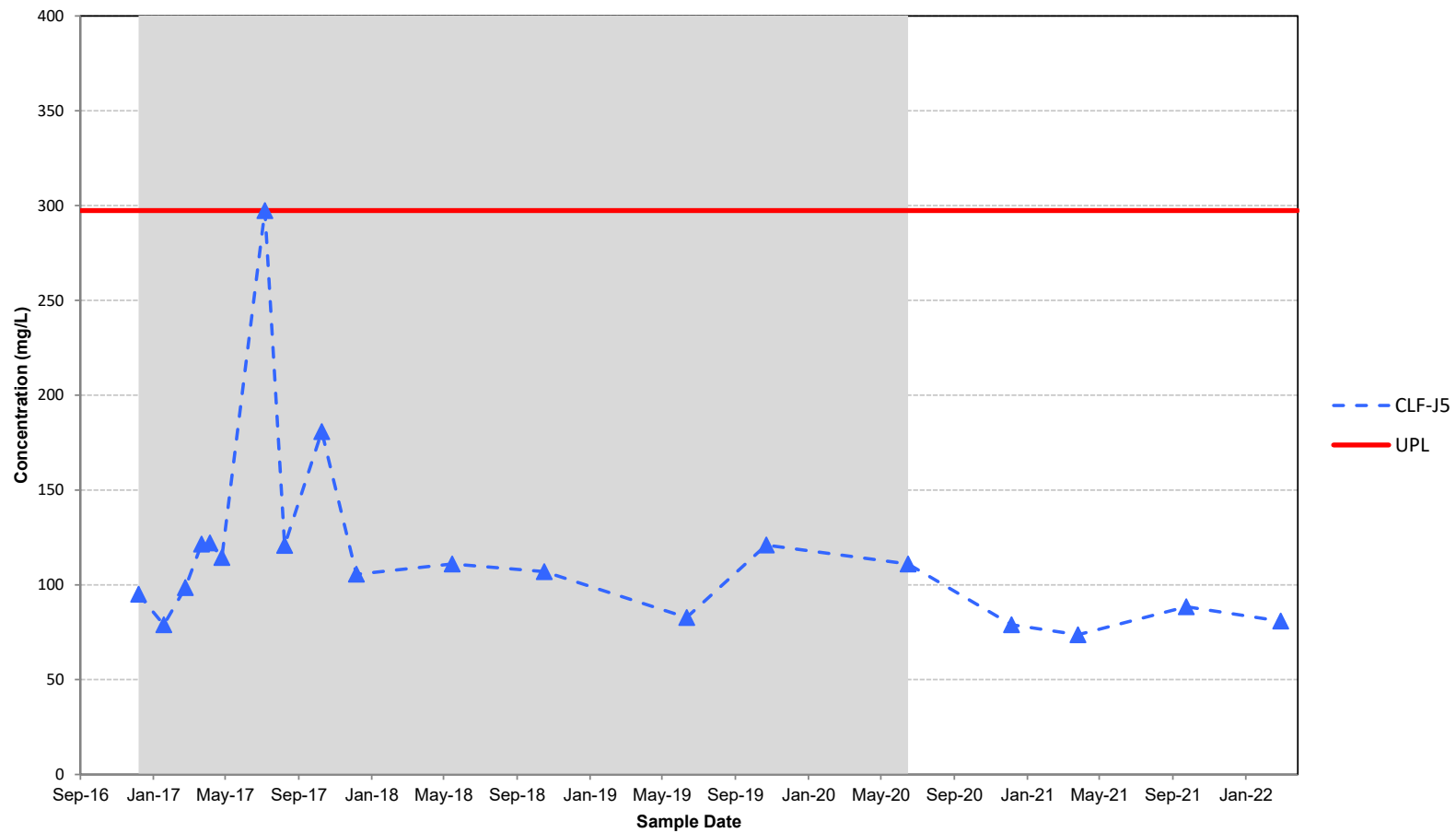


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**BORON  
CONCENTRATION VS. TIME**

May 2022

Figure F-15



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

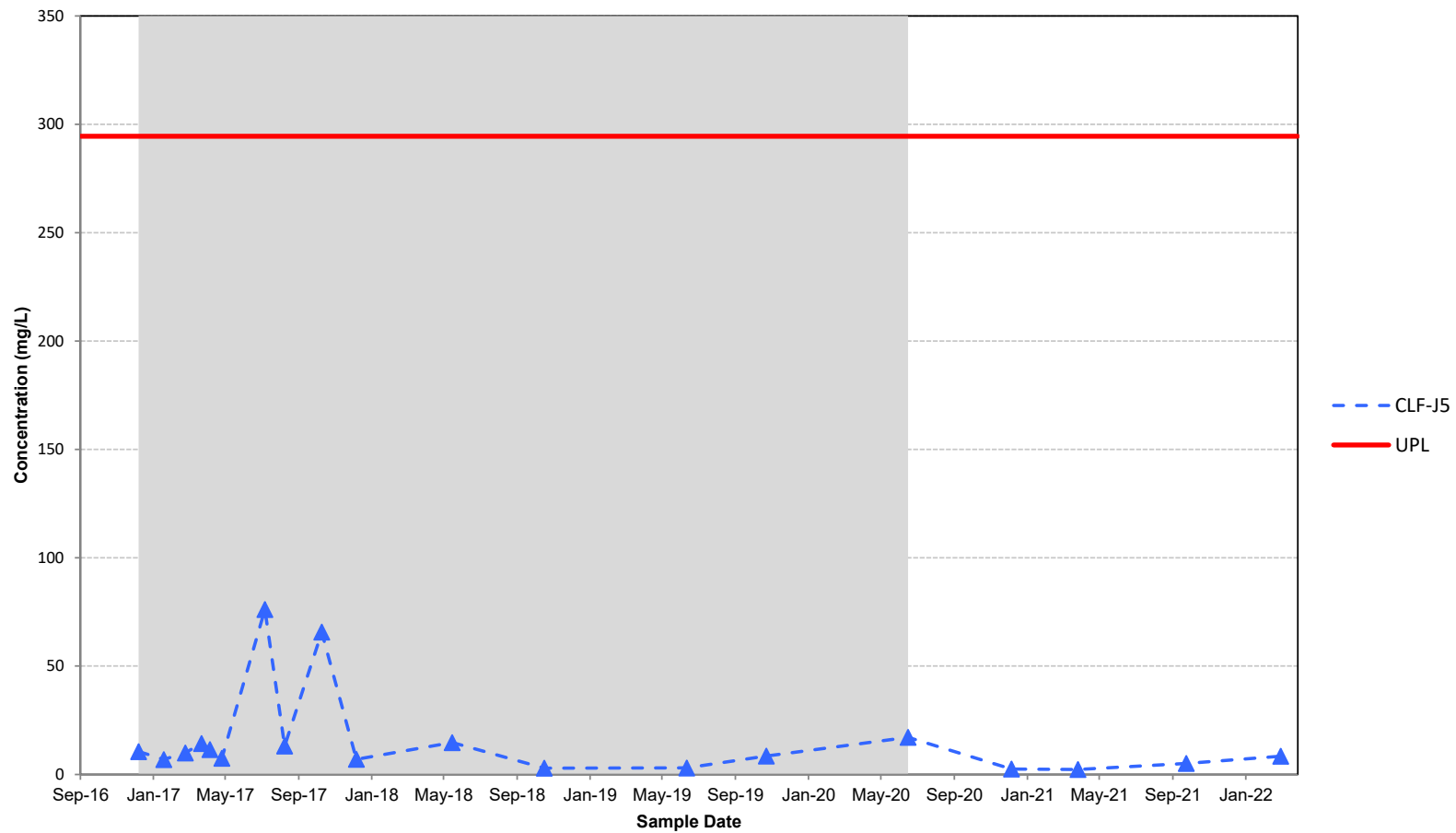


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CALCIUM  
CONCENTRATION VS. TIME**

May 2022

Figure F-16



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

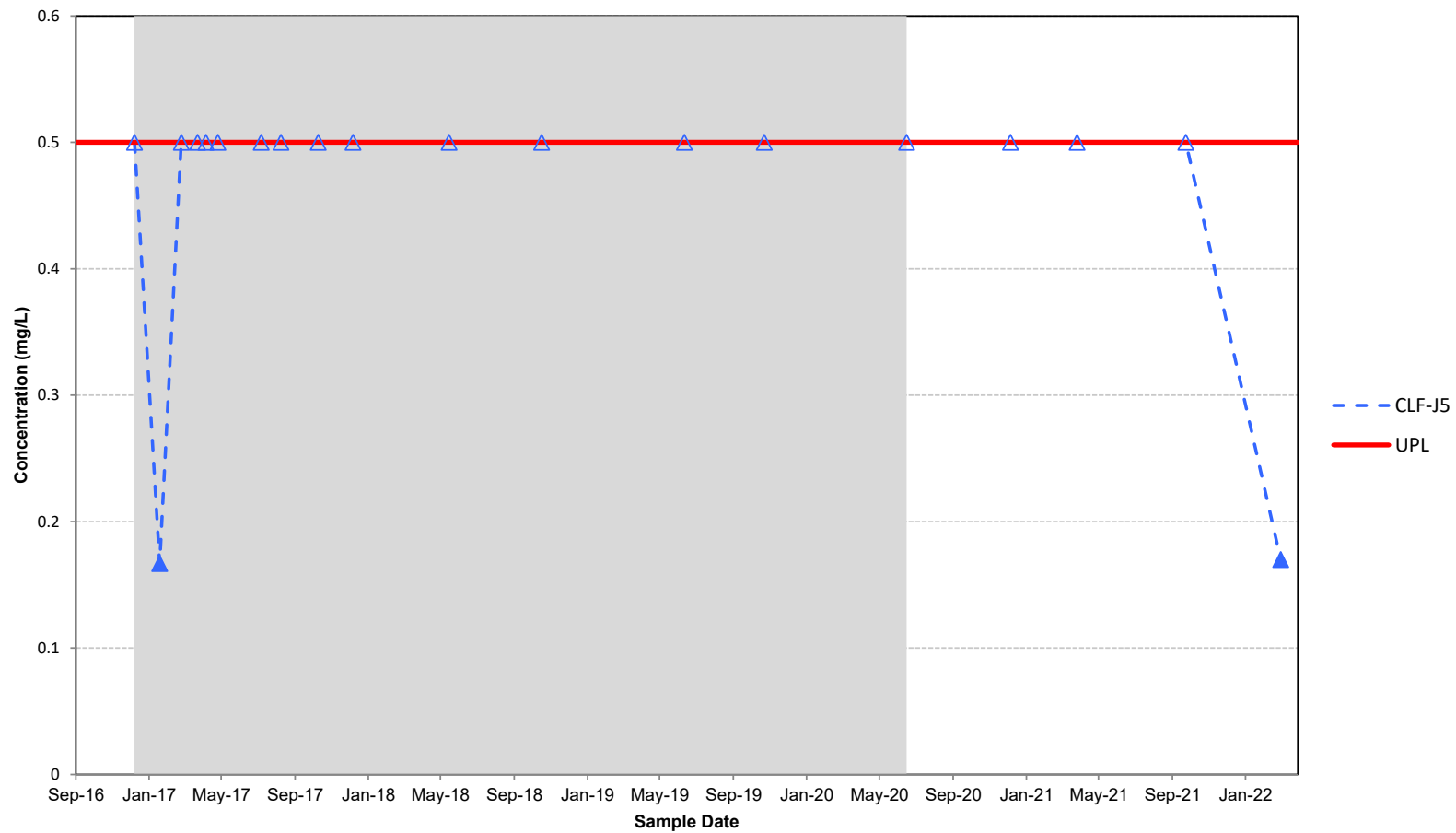
**HALEY  
ALDRICH**

J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CHLORIDE  
CONCENTRATION VS. TIME**

May 2022

Figure F-17



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

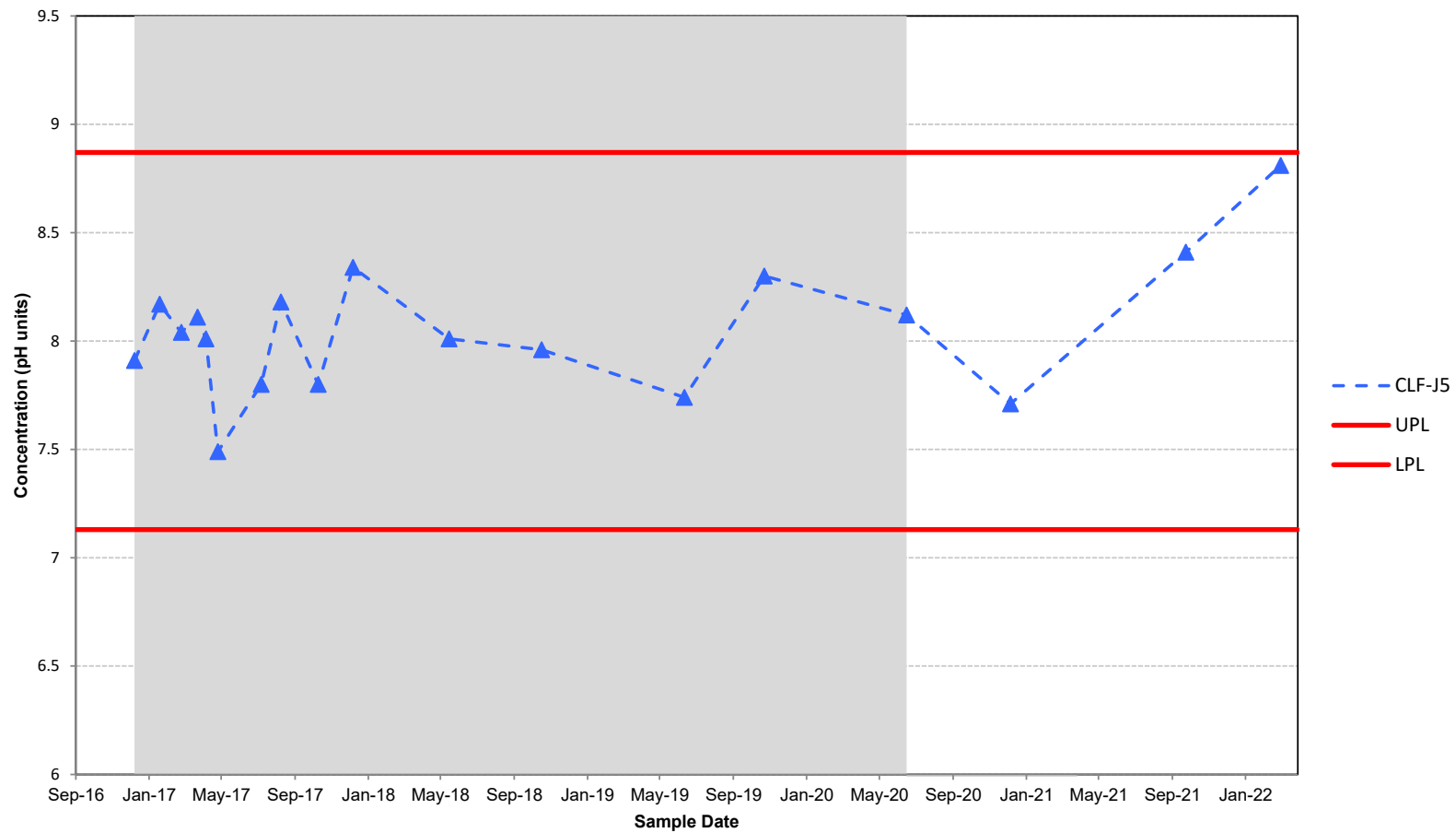


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**FLUORIDE  
CONCENTRATION VS. TIME**

May 2022

Figure F-18



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper and Lower Prediction Limit (UPL and LPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

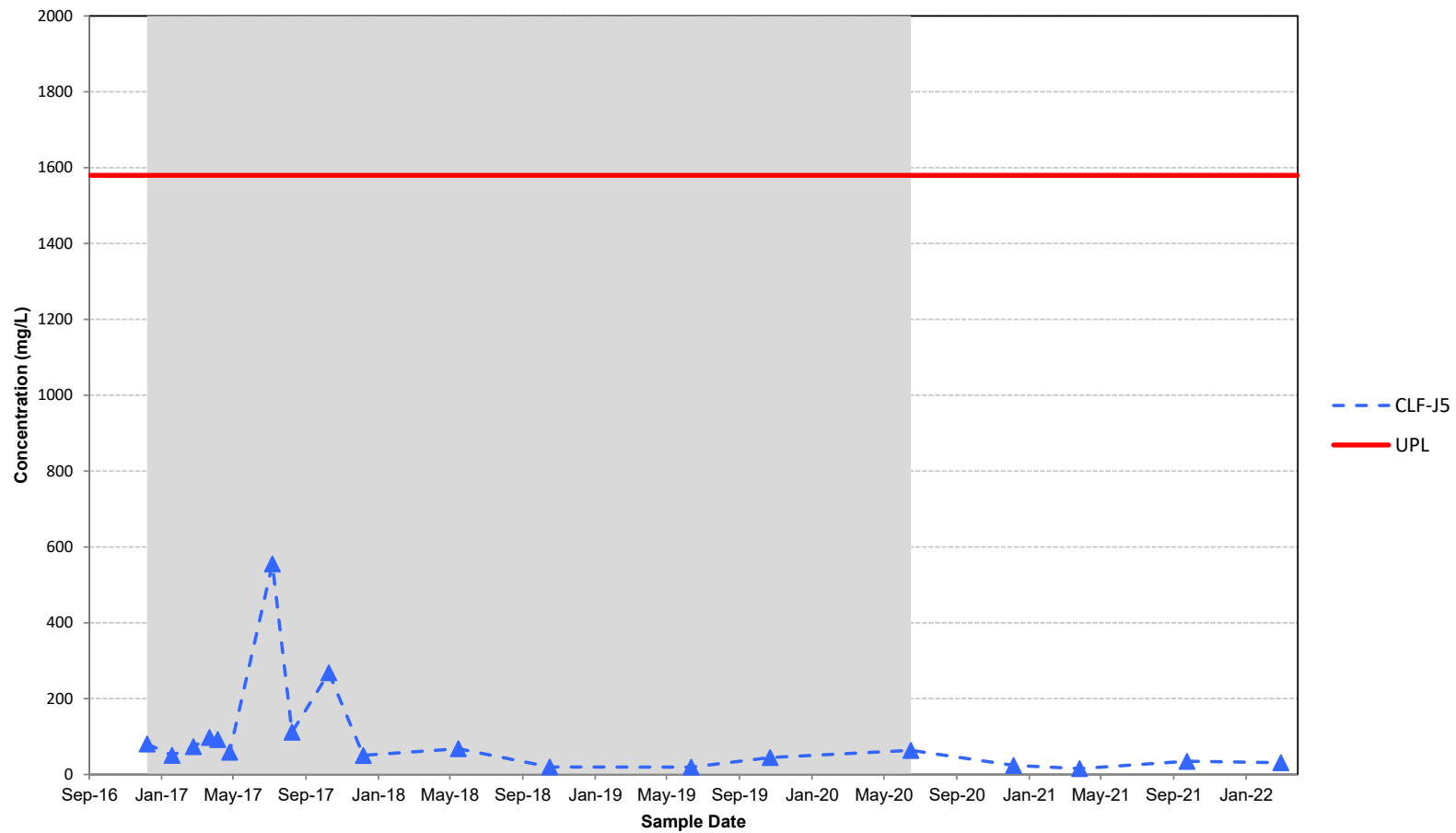


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**PH, FIELD  
CONCENTRATION VS. TIME**

May 2022

Figure F-19



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

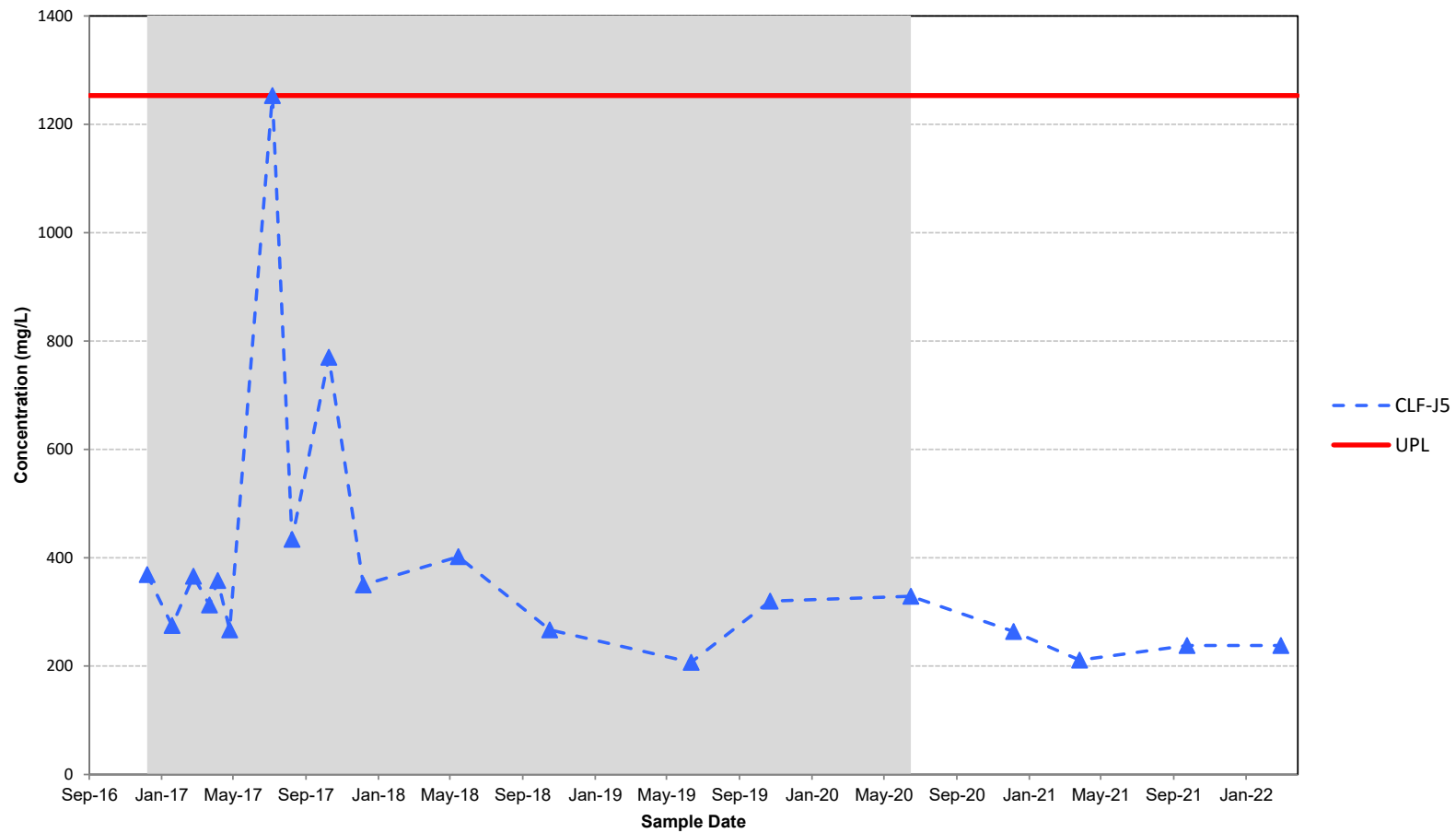
**HALEY  
ALDRICH**

J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**SULFATE  
CONCENTRATION VS. TIME**

May 2022

Figure F-20



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

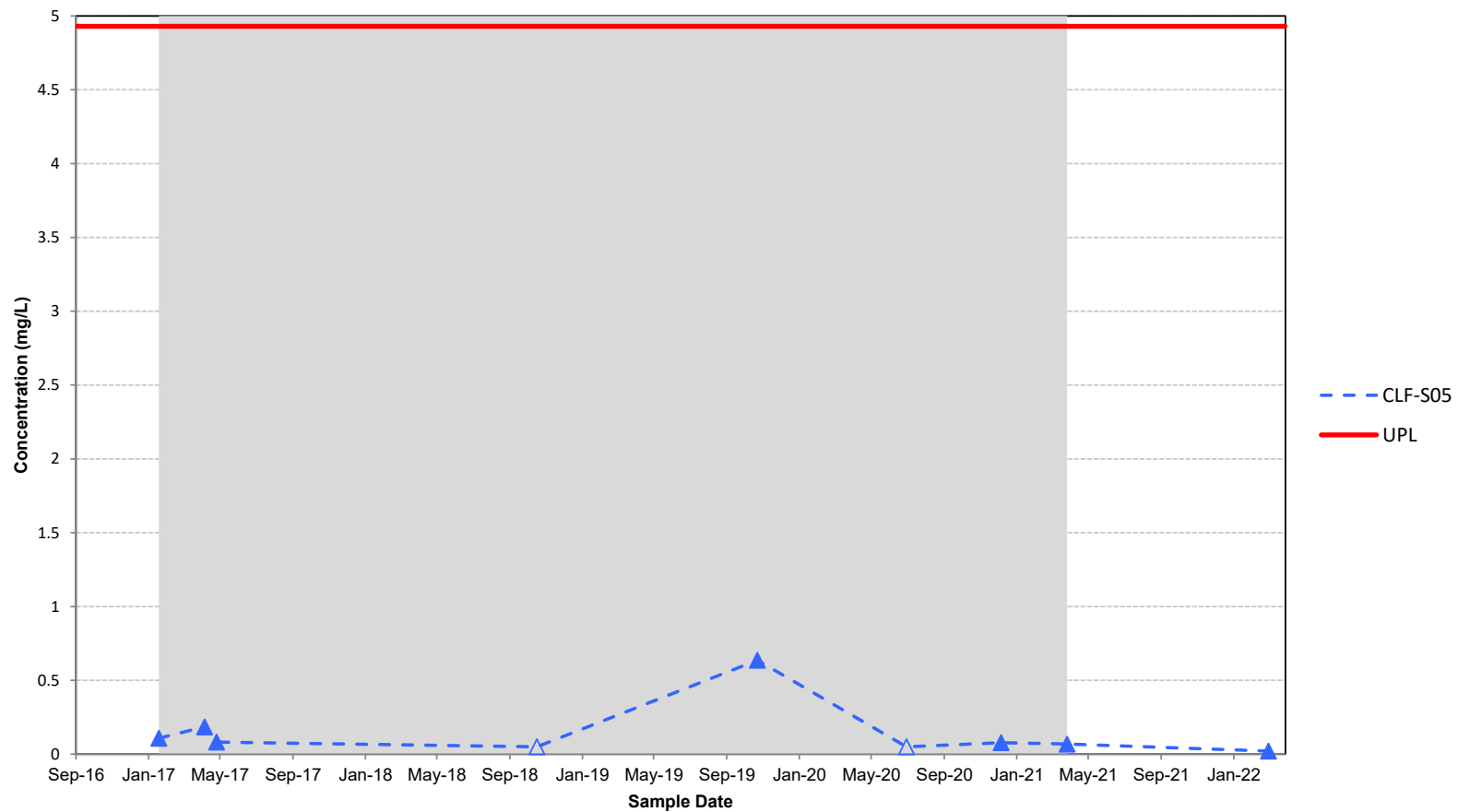


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**TOTAL DISSOLVED SOLIDS (TDS)  
CONCENTRATION VS. TIME**

May 2022

Figure F-21



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

**HALEY  
ALDRICH**

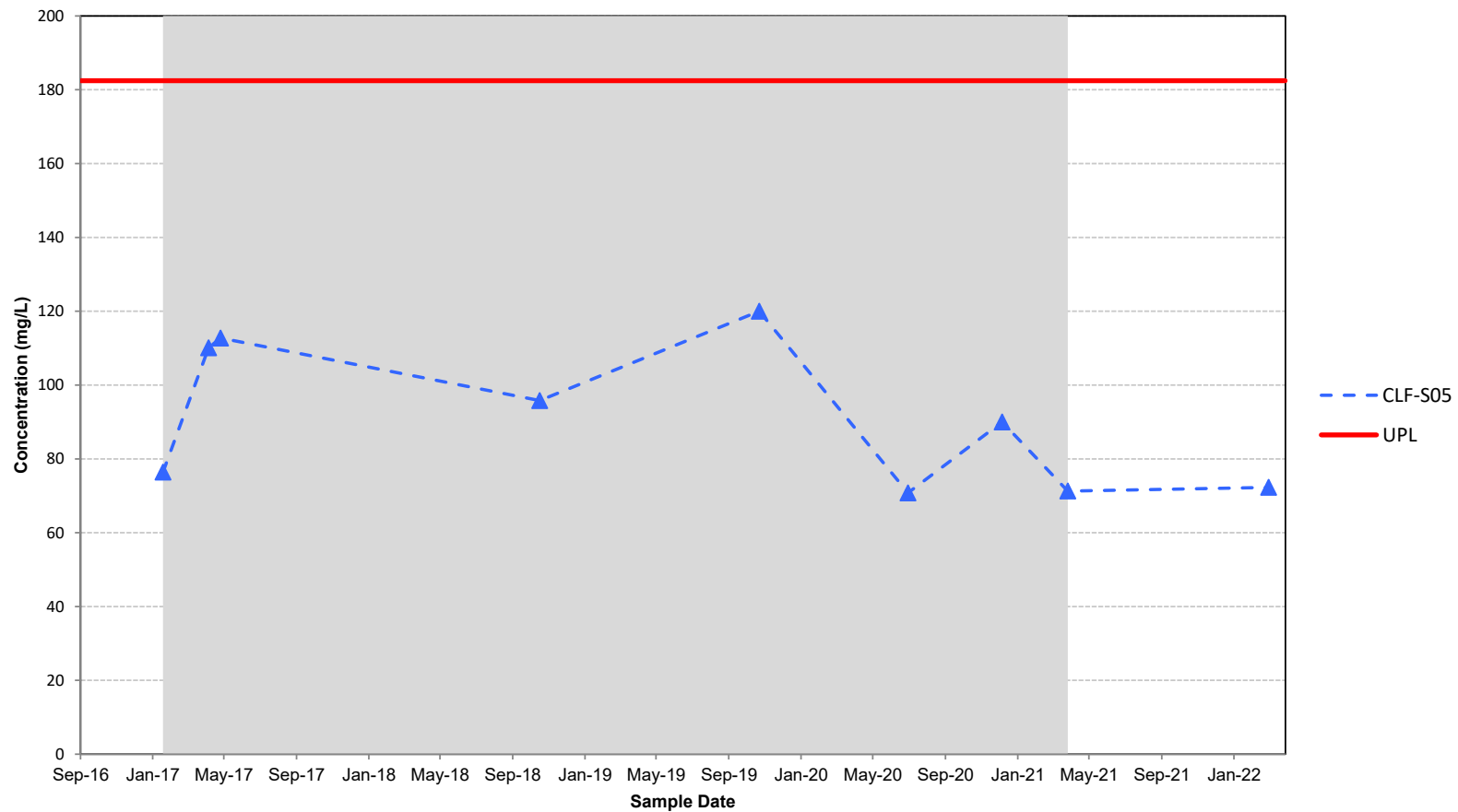
J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**BORON  
CONCENTRATION VS. TIME**

May 2022

Figure F-22





**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

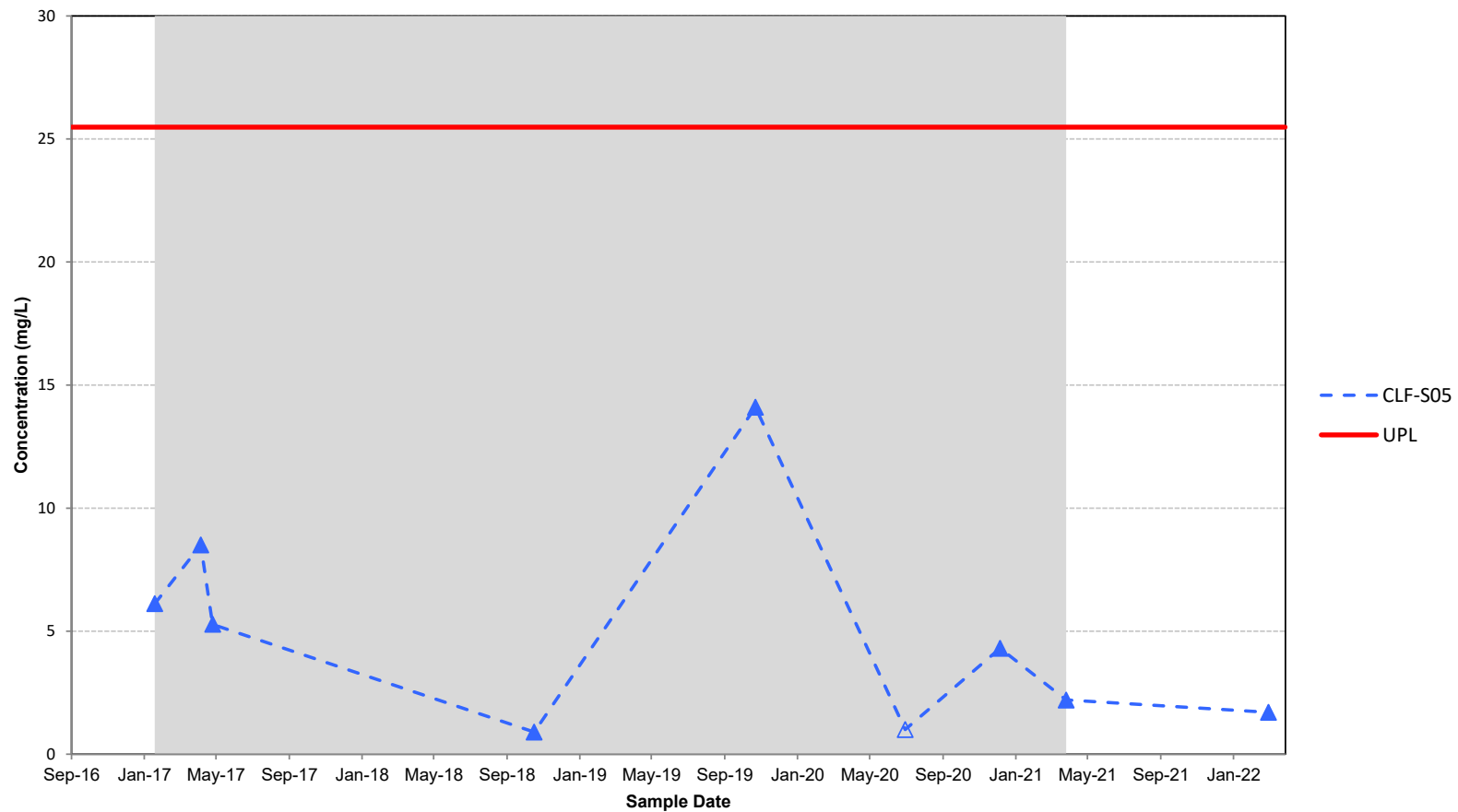


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CALCIUM  
CONCENTRATION VS. TIME**

May 2022

Figure F-23



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

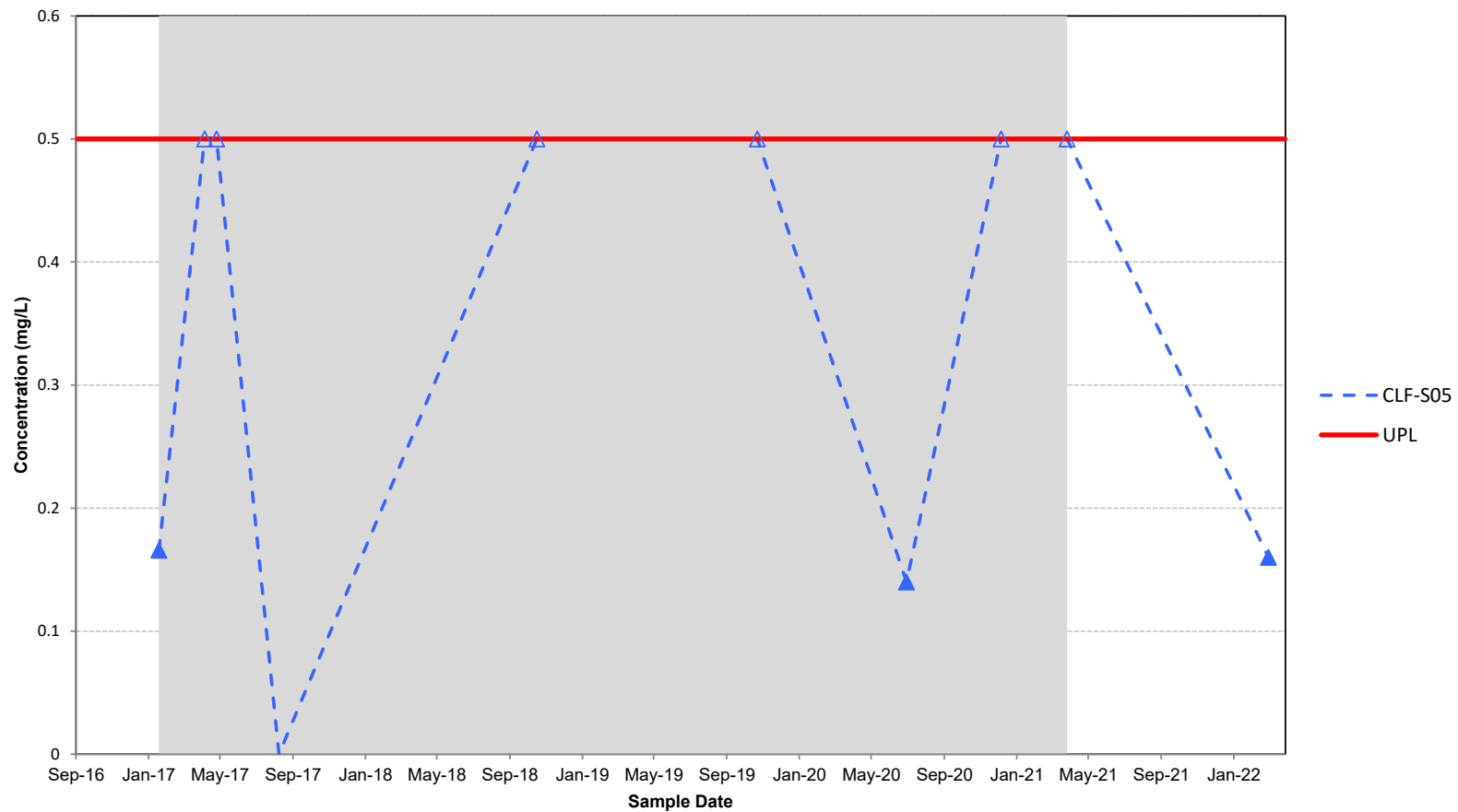


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CHLORIDE  
CONCENTRATION VS. TIME**

May 2022

Figure F-24



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

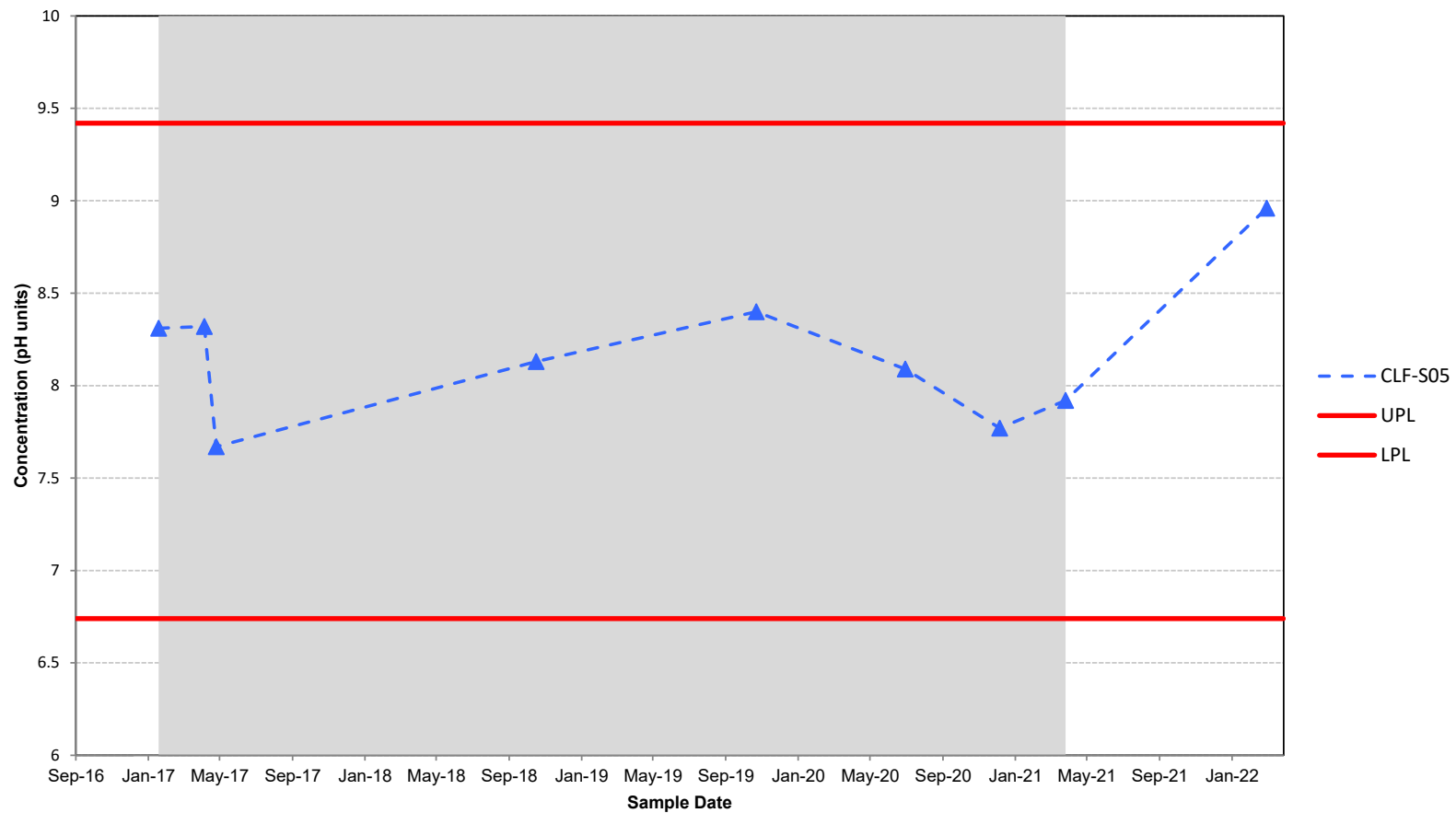


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**FLUORIDE  
CONCENTRATION VS. TIME**

May 2022

Figure F-25



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper and Lower Prediction Limit (UPL and LPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

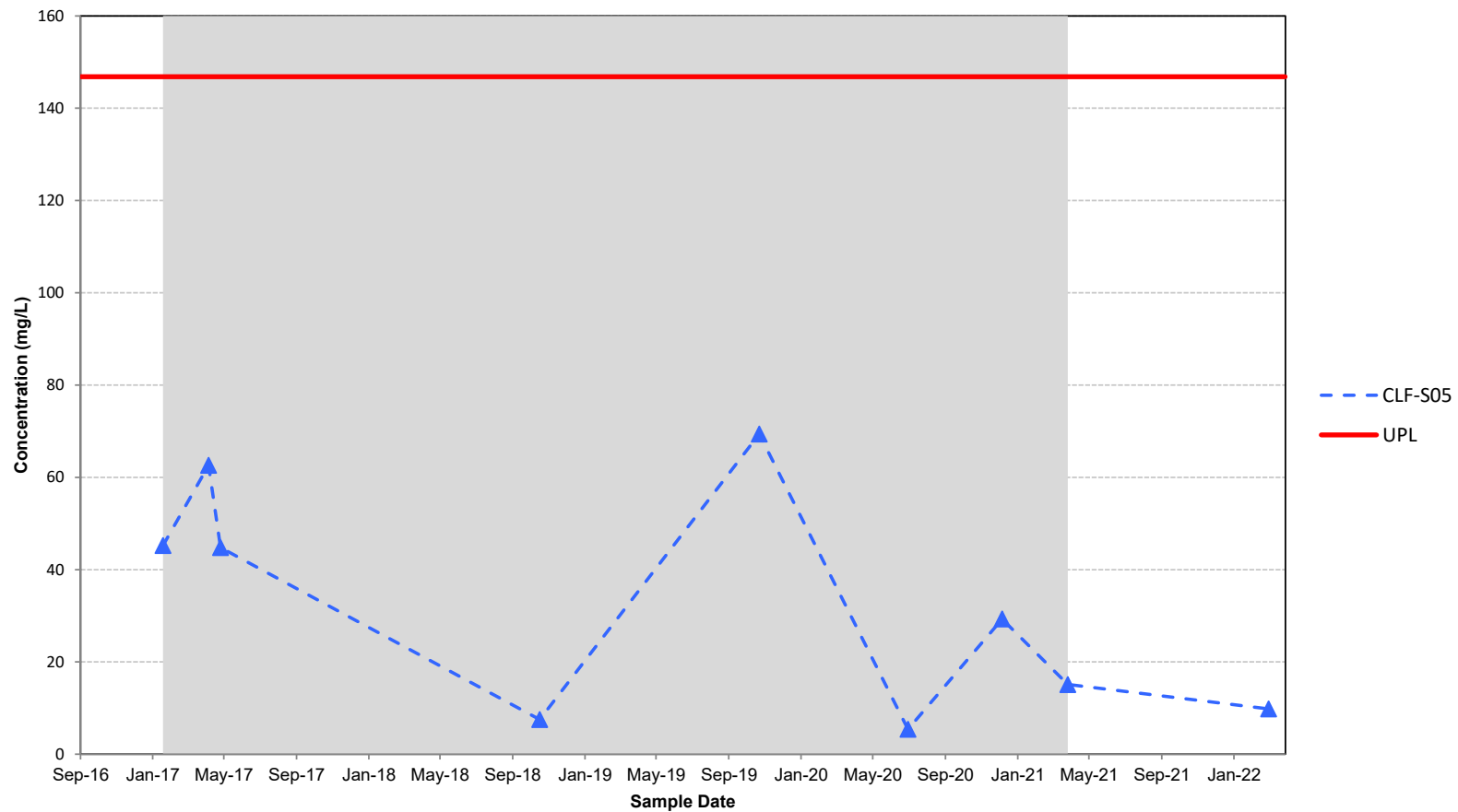


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**PH, FIELD  
CONCENTRATION VS. TIME**

May 2022

Figure F-26



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

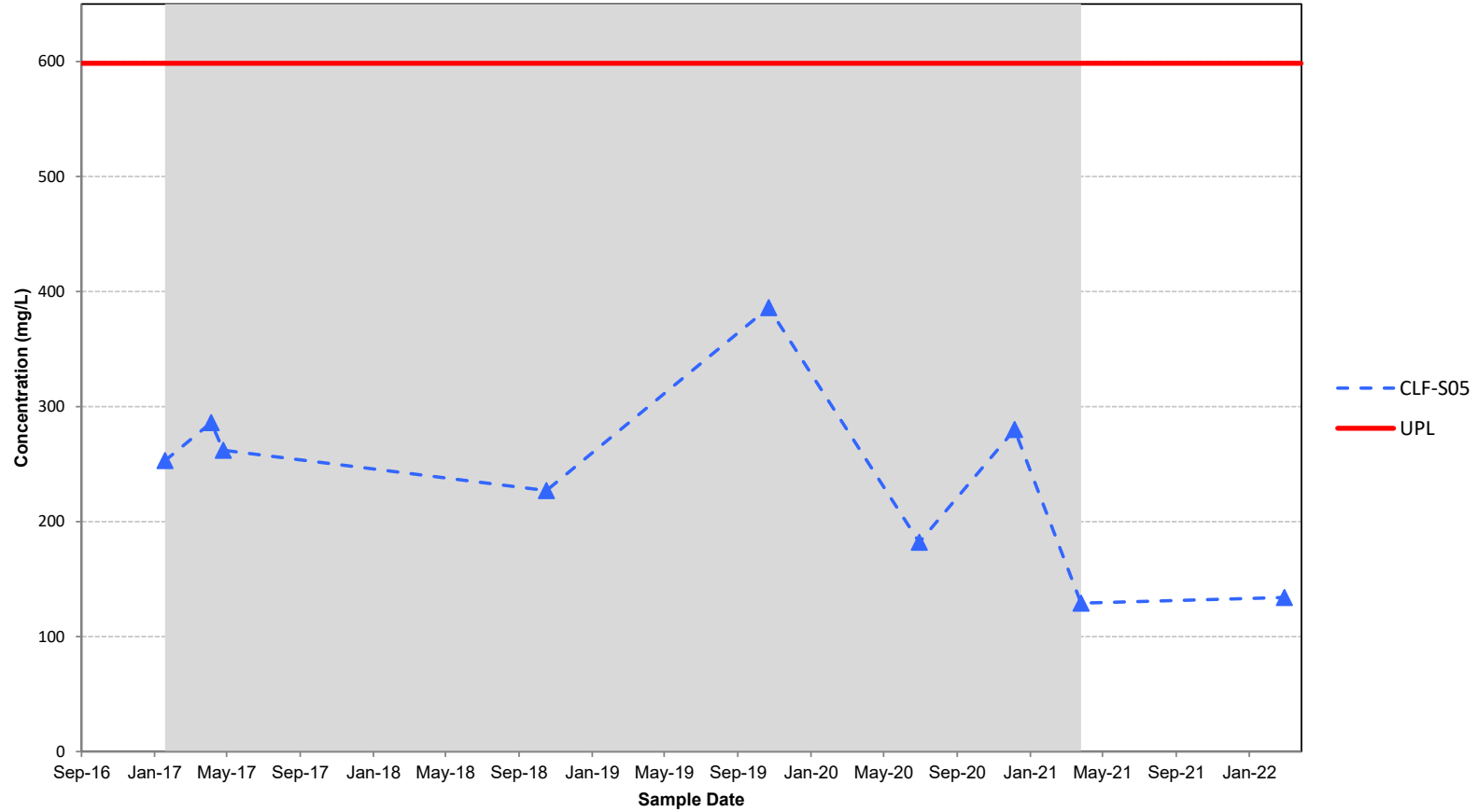
**HALEY  
ALDRICH**

J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**SULFATE  
CONCENTRATION VS. TIME**

May 2022

Figure F-27



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

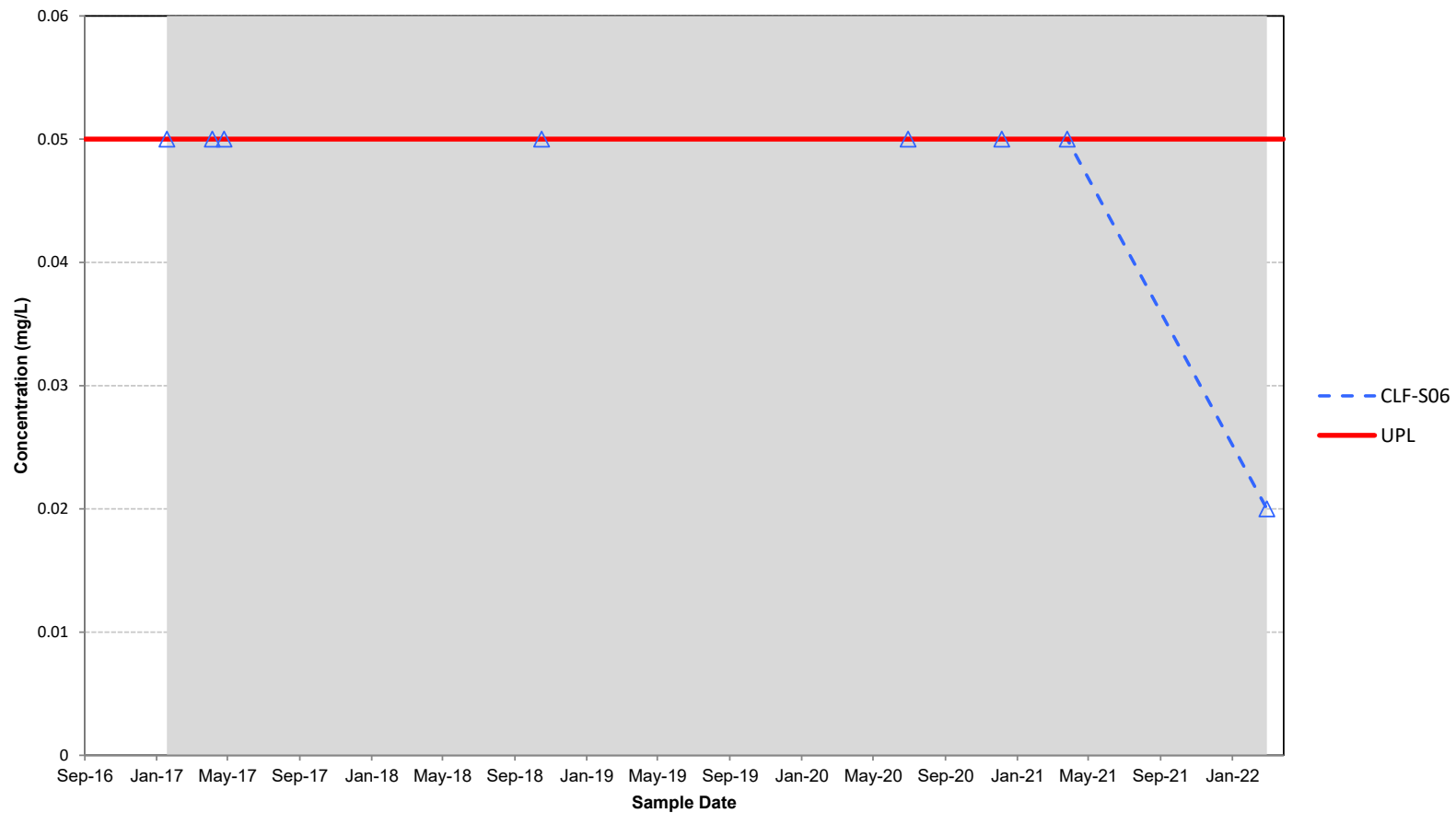


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**TOTAL DISSOLVED SOLIDS (TDS)  
CONCENTRATION VS. TIME**

May 2022

Figure F-28



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. An eighth sample was collected in February 2022. An Upper Prediction Limit (UPL) has been calculated, but will not be used for comparison until the next sampling event.
3. Detection Monitoring was initiated on October 17, 2017.

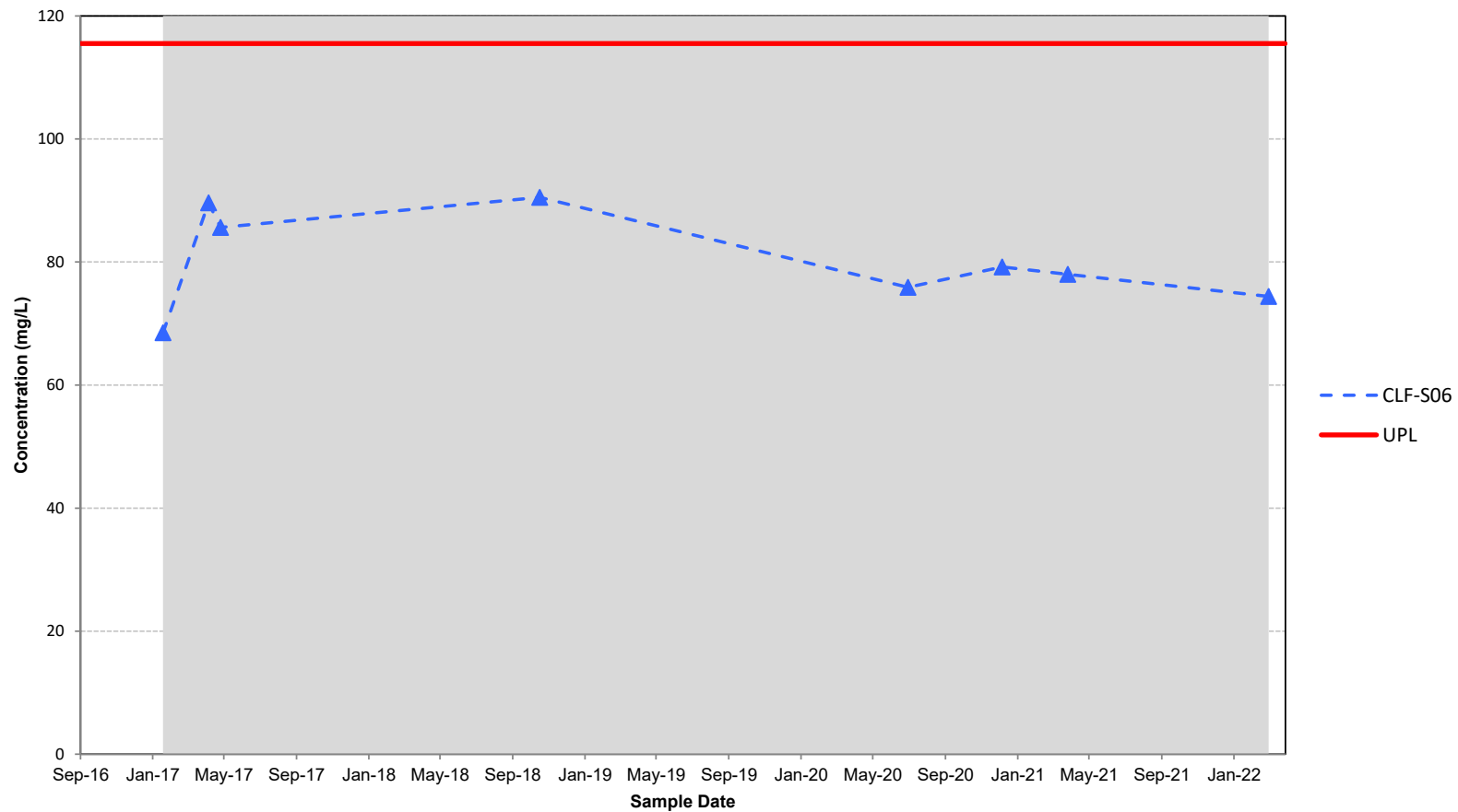


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**BORON  
CONCENTRATION VS. TIME**

May 2022

Figure F-29



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. An eighth sample was collected in February 2022. An Upper Prediction Limit (UPL) has been calculated, and the next sample obtained will be the first compliance sample for this well.
3. Detection Monitoring was initiated on October 17, 2017.
4. Shading denotes data used to calculate Statistical Background limits.



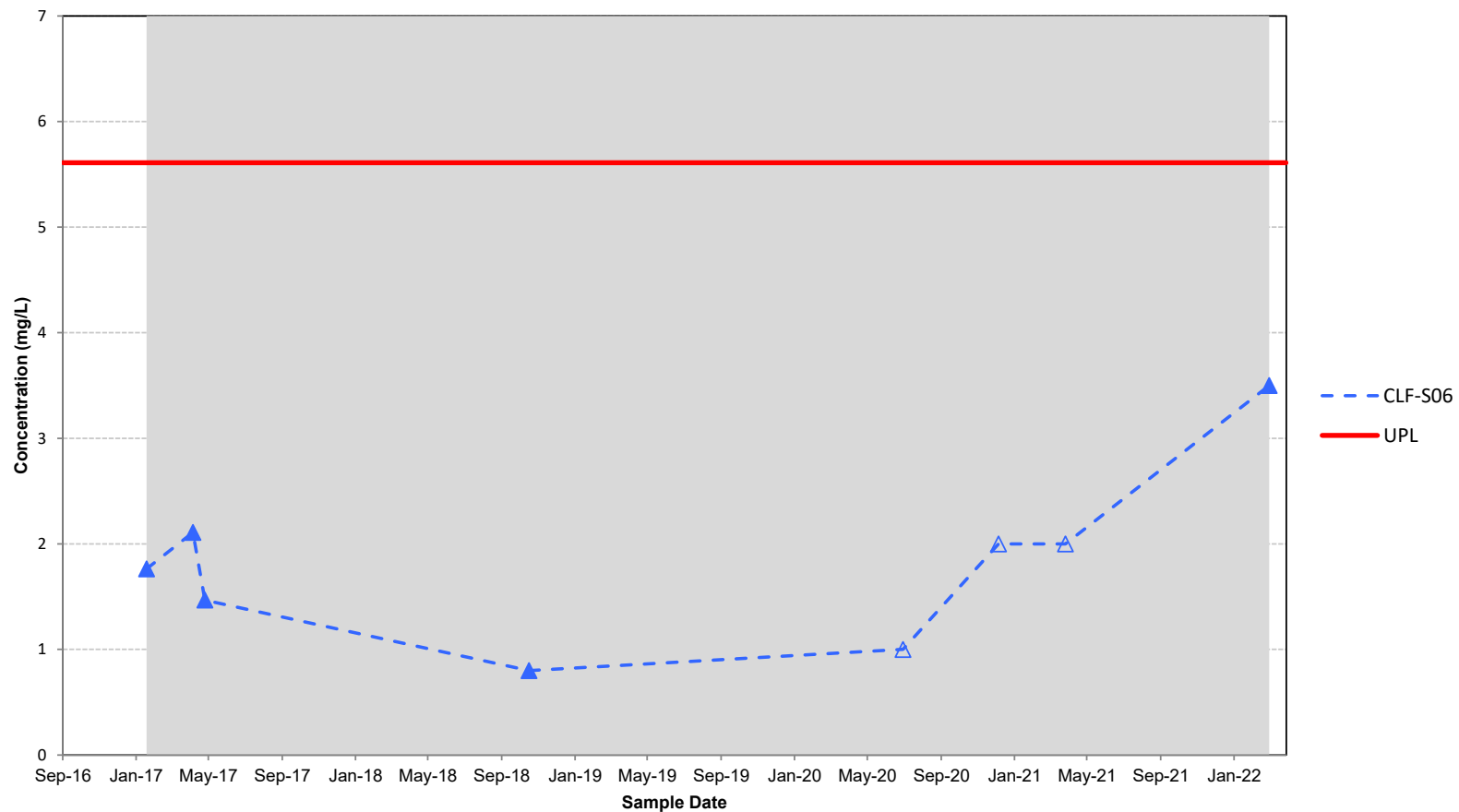
J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CALCIUM  
CONCENTRATION VS. TIME**

May 2022

Figure F-30





**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. An eighth sample was collected in February 2022. An Upper Prediction Limit (UPL) has been calculated, and the next sample obtained will be the first compliance sample for this well.
3. Detection Monitoring was initiated on October 17, 2017.
4. Shading denotes data used to calculate Statistical Background limits.

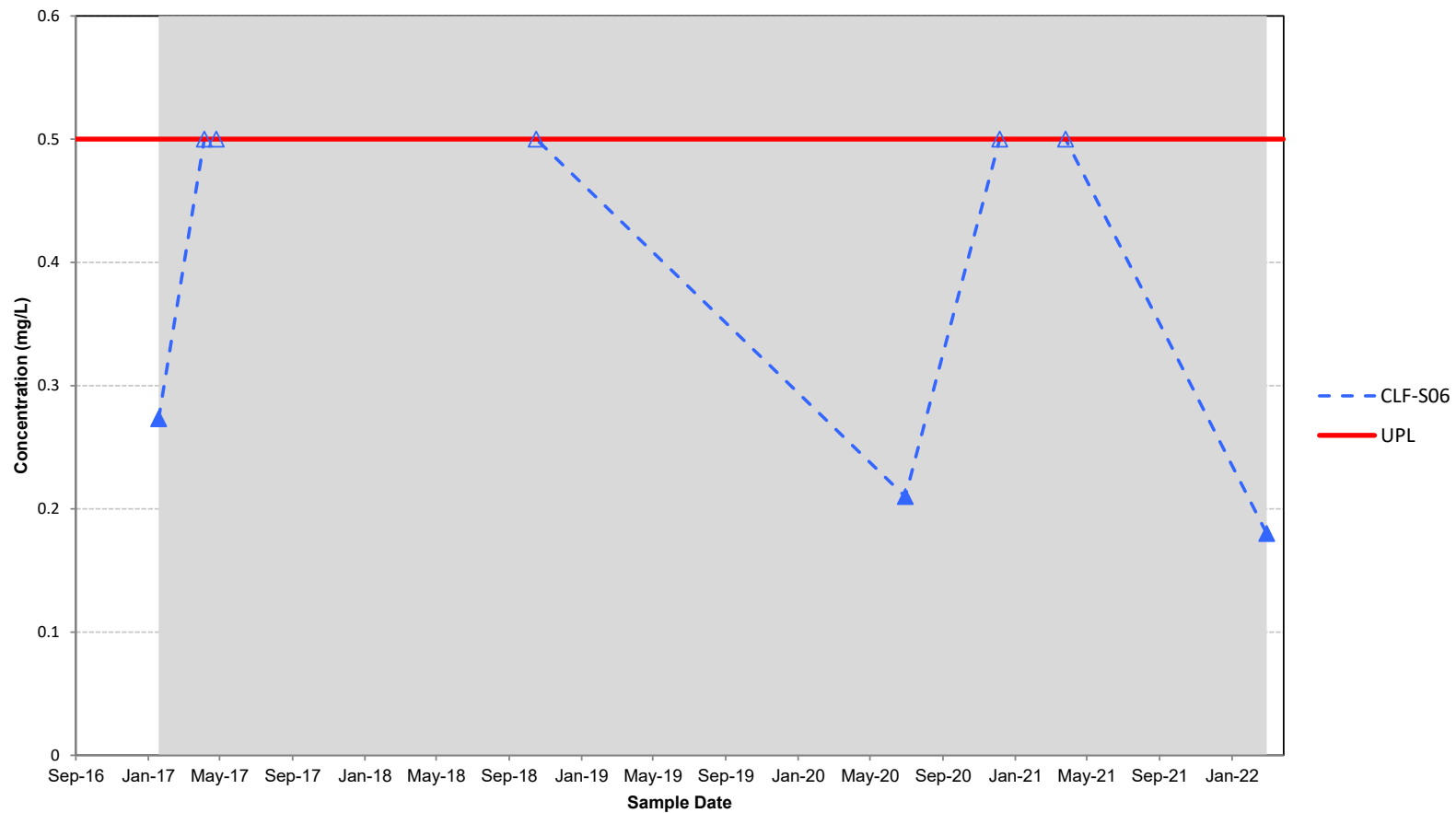


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CHLORIDE  
CONCENTRATION VS. TIME**

May 2022

Figure F-31



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. An eighth sample was collected in February 2022. An Upper Prediction Limit (UPL) has been calculated, and the next sample obtained will be the first compliance sample for this well.
3. Detection Monitoring was initiated on October 17, 2017.
4. Shading denotes data used to calculate Statistical Background limits.

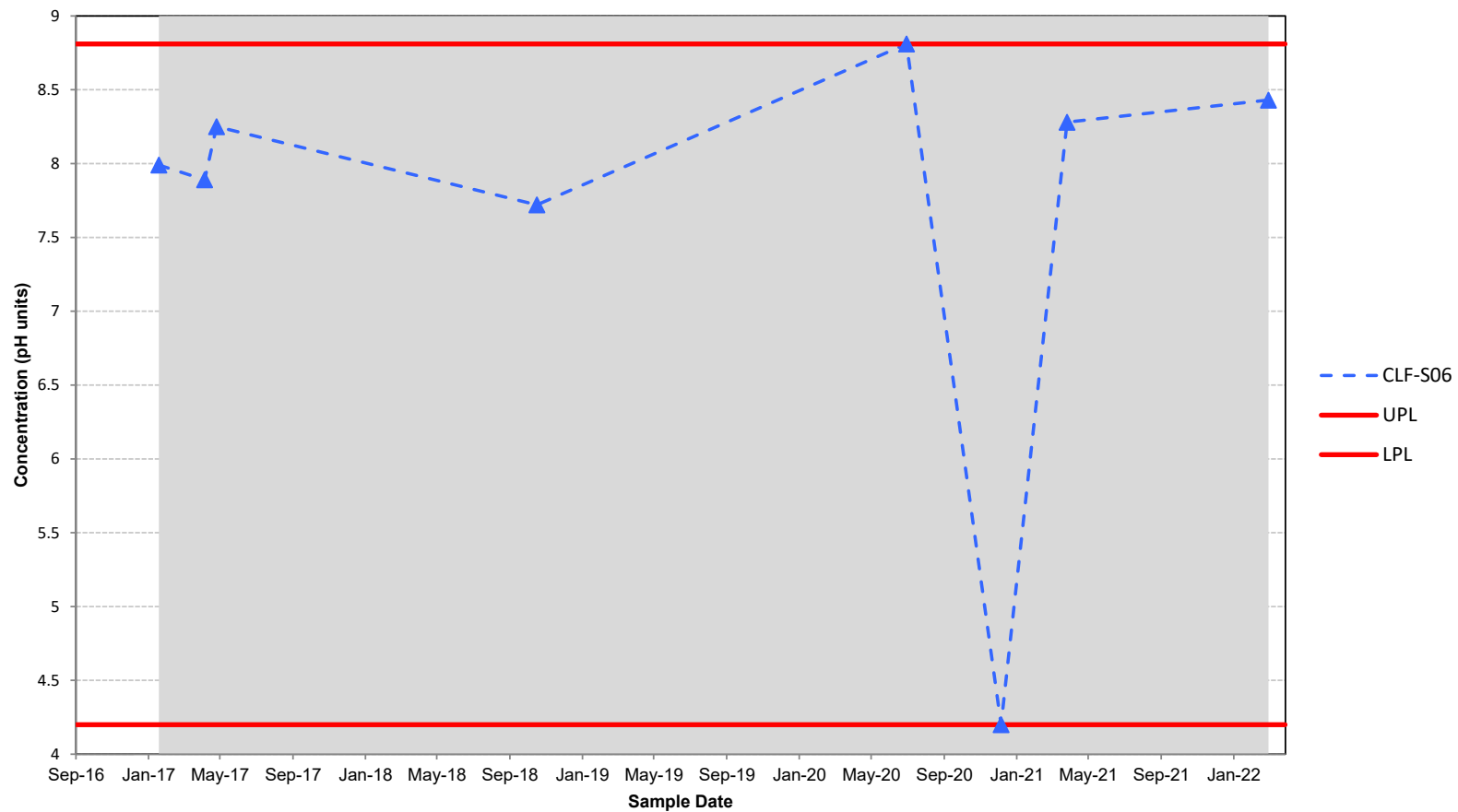


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**FLUORIDE  
CONCENTRATION VS. TIME**

May 2022

Figure F-32



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. An eighth sample was collected in February 2022. An Upper Prediction Limit (UPL) and Lower Prediction Limit (LPL) have been calculated, and the next sample obtained will be the first compliance sample for this well.
3. Detection Monitoring was initiated on October 17, 2017.
4. Shading denotes data used to calculate Statistical Background limits.

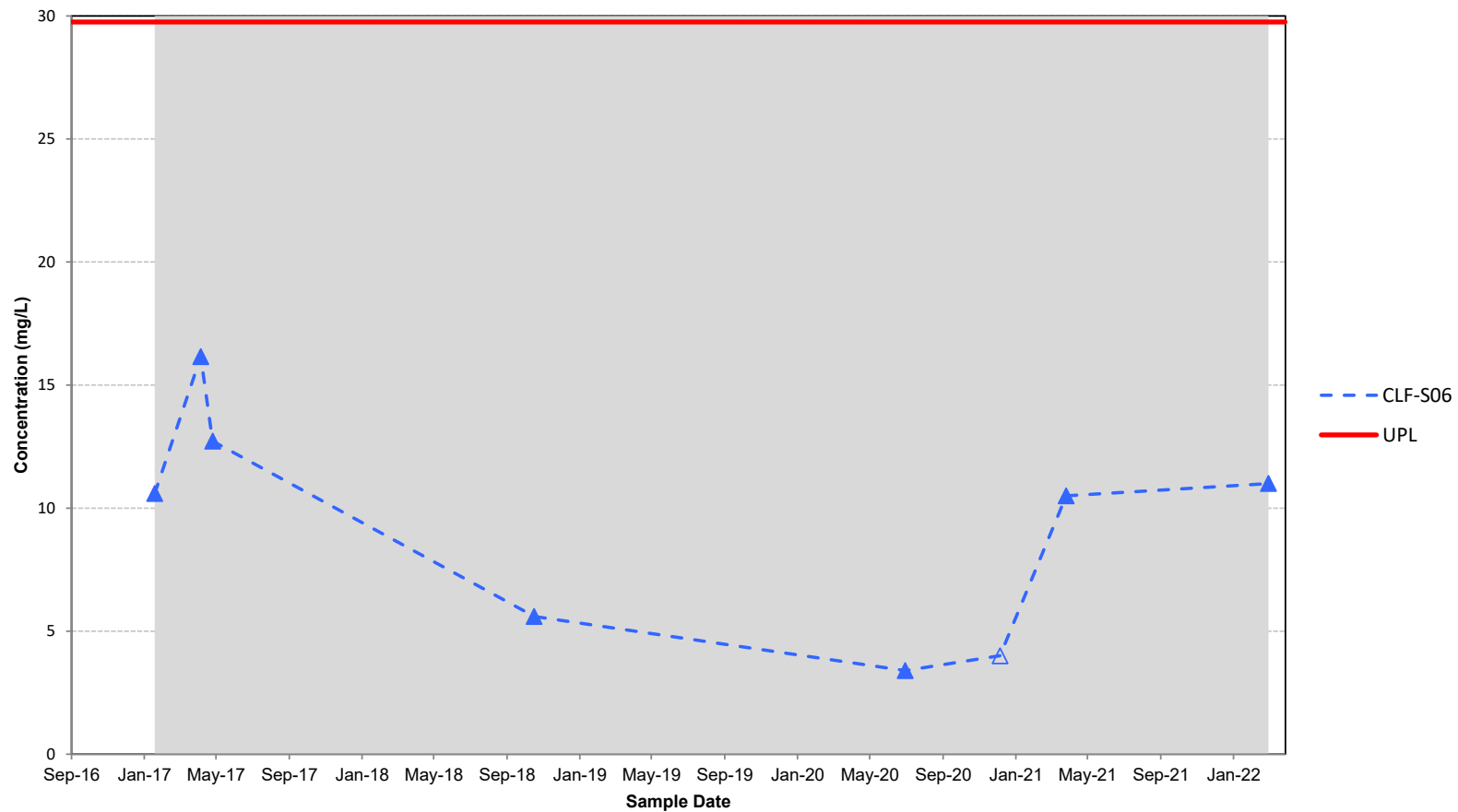
**HALEY  
ALDRICH**

J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**PH, FIELD  
CONCENTRATION VS. TIME**

May 2022

Figure F-33



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. An eighth sample was collected in February 2022. An Upper Prediction Limit (UPL) has been calculated, and the next sample obtained will be the first compliance sample for this well.
3. Detection Monitoring was initiated on October 17, 2017.
4. Shading denotes data used to calculate Statistical Background limits.

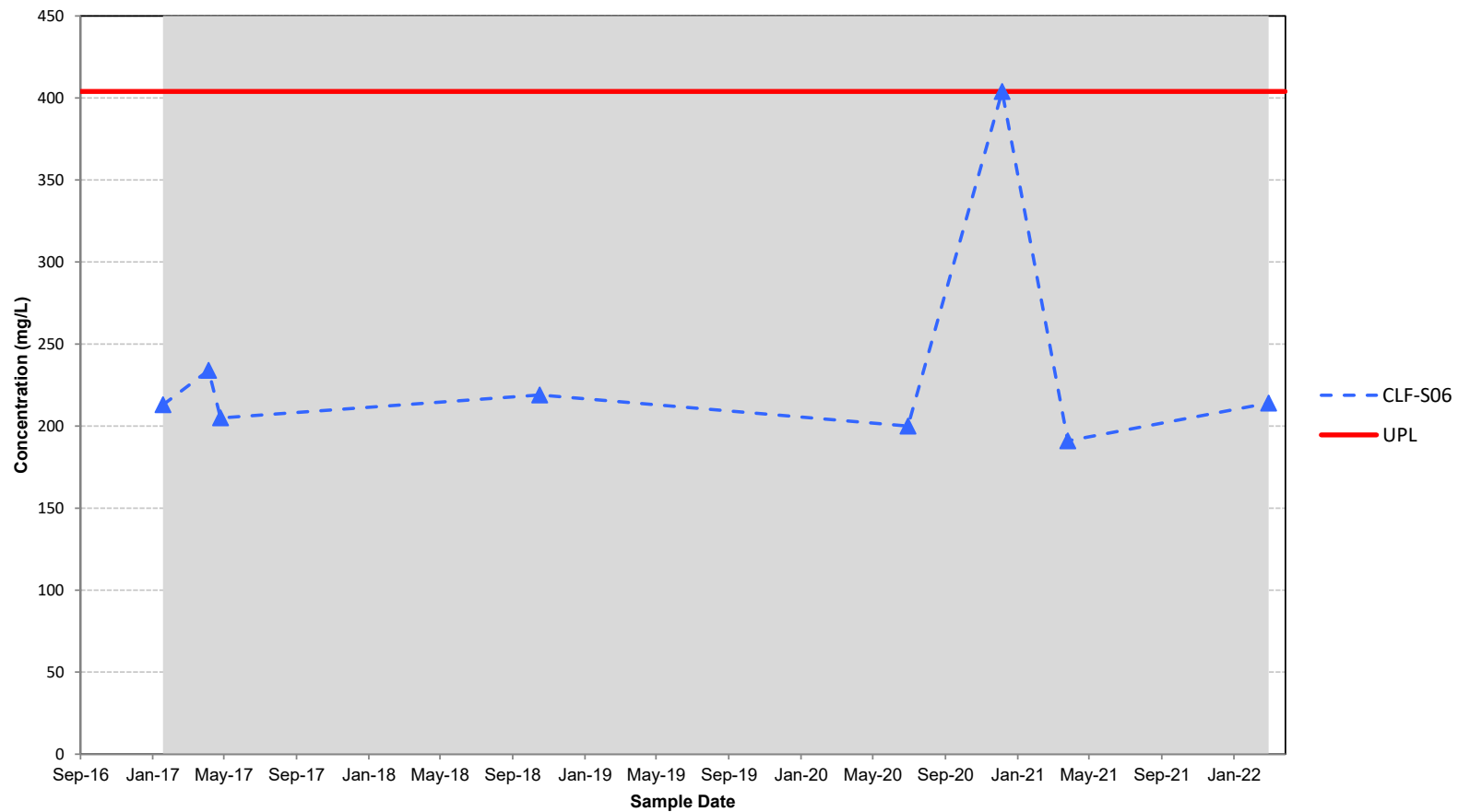


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**SULFATE  
CONCENTRATION VS. TIME**

May 2022

Figure F-34



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. An eighth sample was collected in February 2022. An Upper Prediction Limit (UPL) has been calculated, and the next sample obtained will be the first compliance sample for this well.
3. Detection Monitoring was initiated on October 17, 2017.
4. Shading denotes data used to calculate Statistical Background limits.

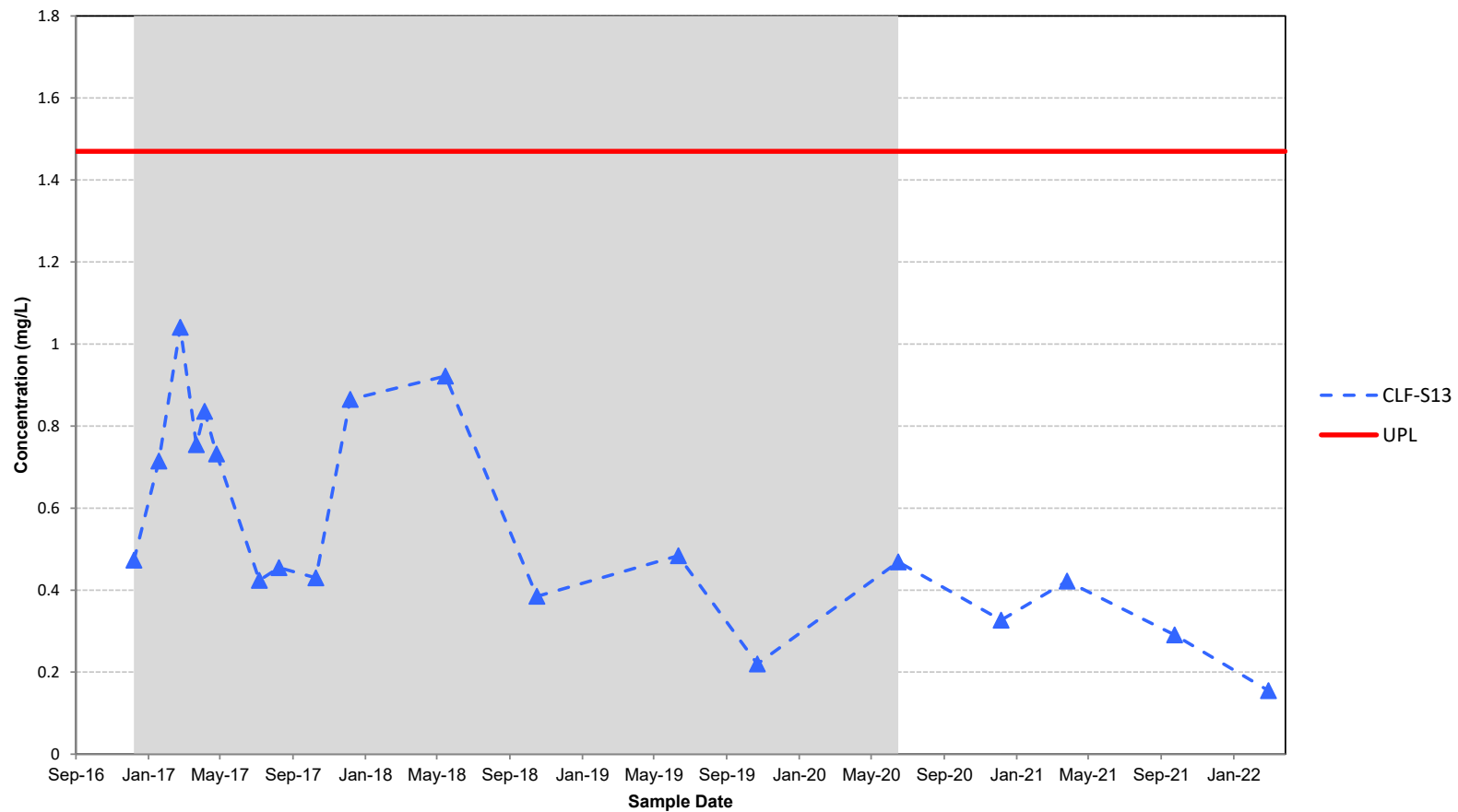
**HALEY  
ALDRICH**

J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**TOTAL DISSOLVED SOLIDS (TDS)  
CONCENTRATION VS. TIME**

May 2022

Figure F-35



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

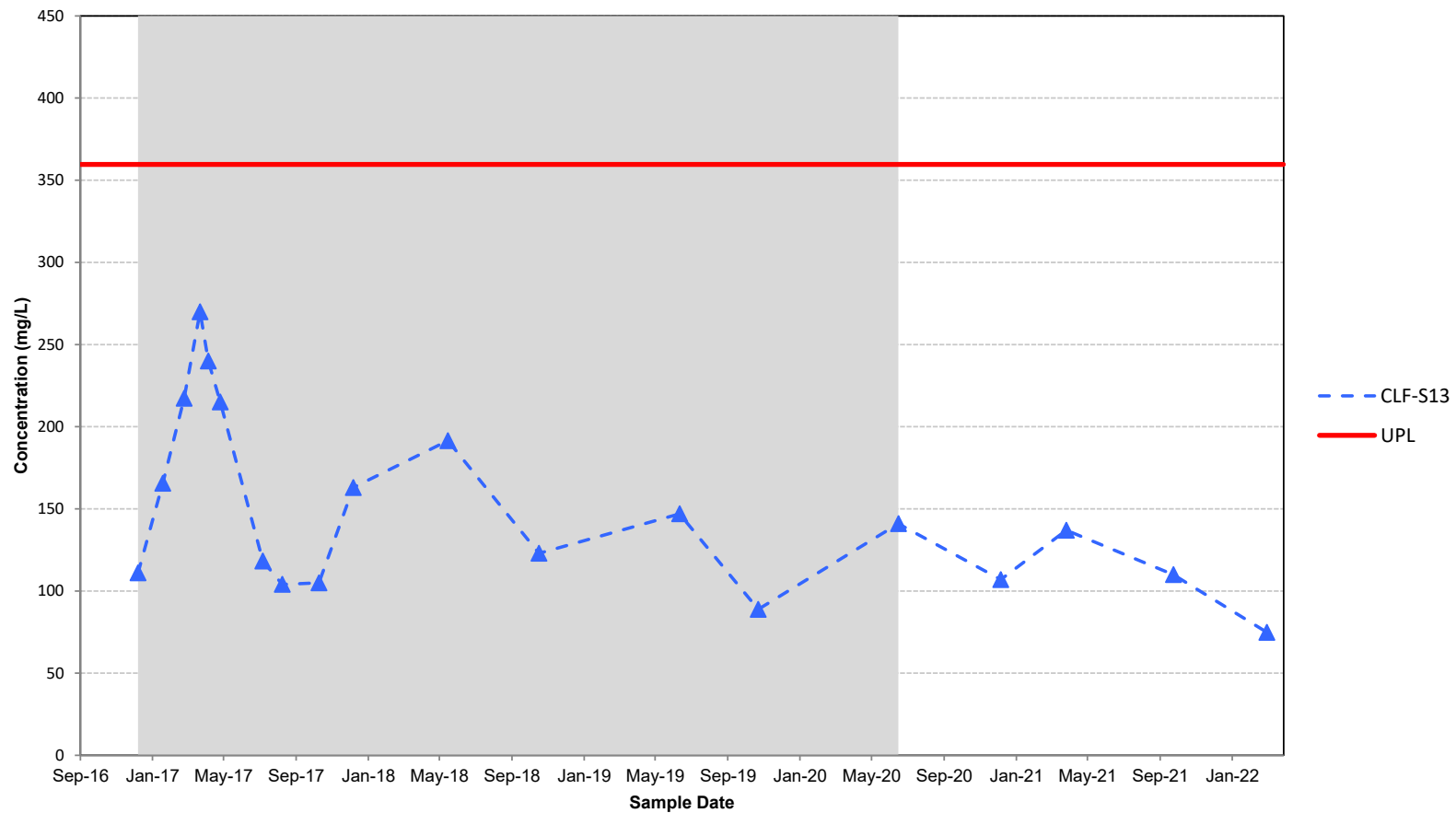


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**BORON  
CONCENTRATION VS. TIME**

May 2022

Figure F-36



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

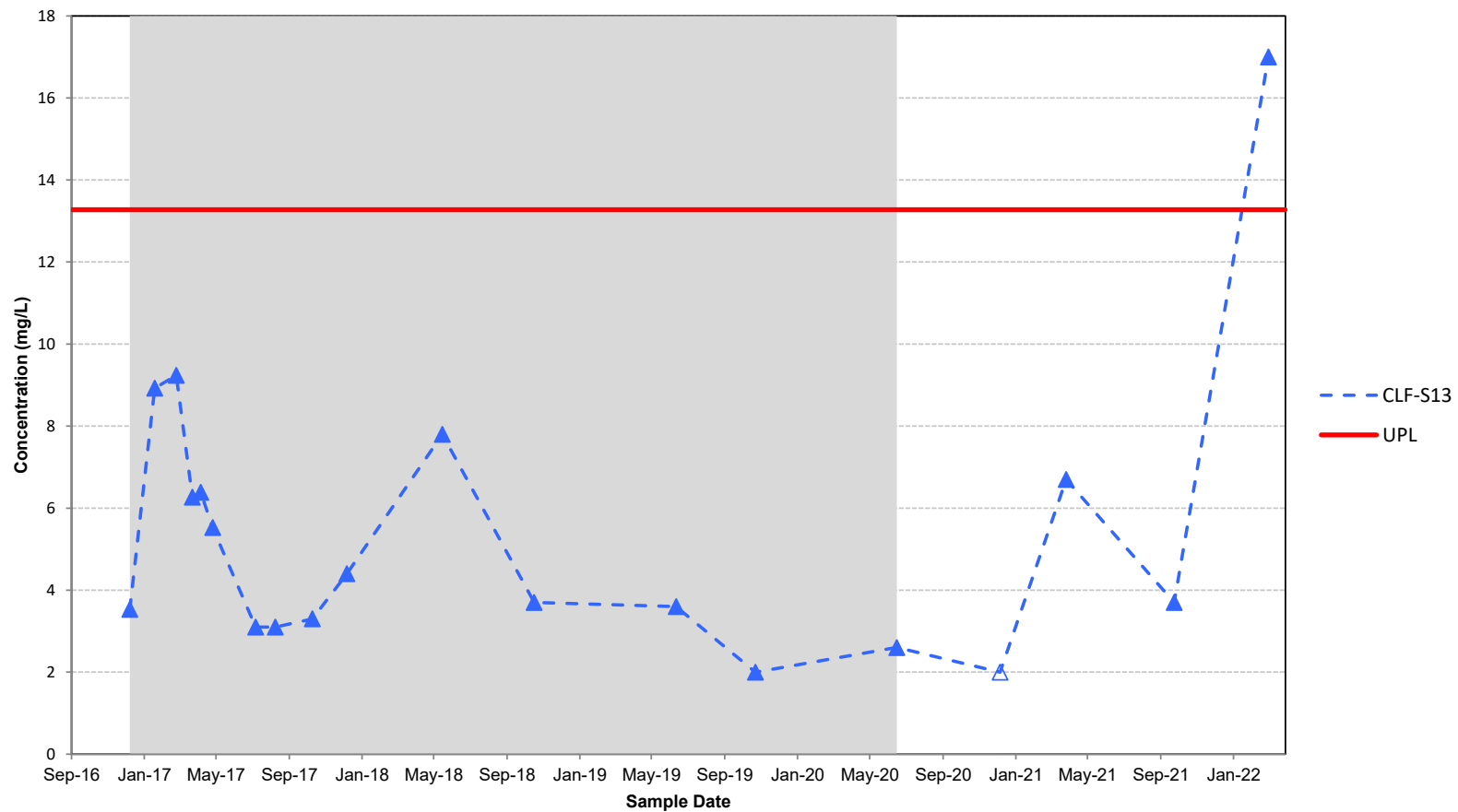


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CALCIUM  
CONCENTRATION VS. TIME**

May 2022

Figure F-37



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.



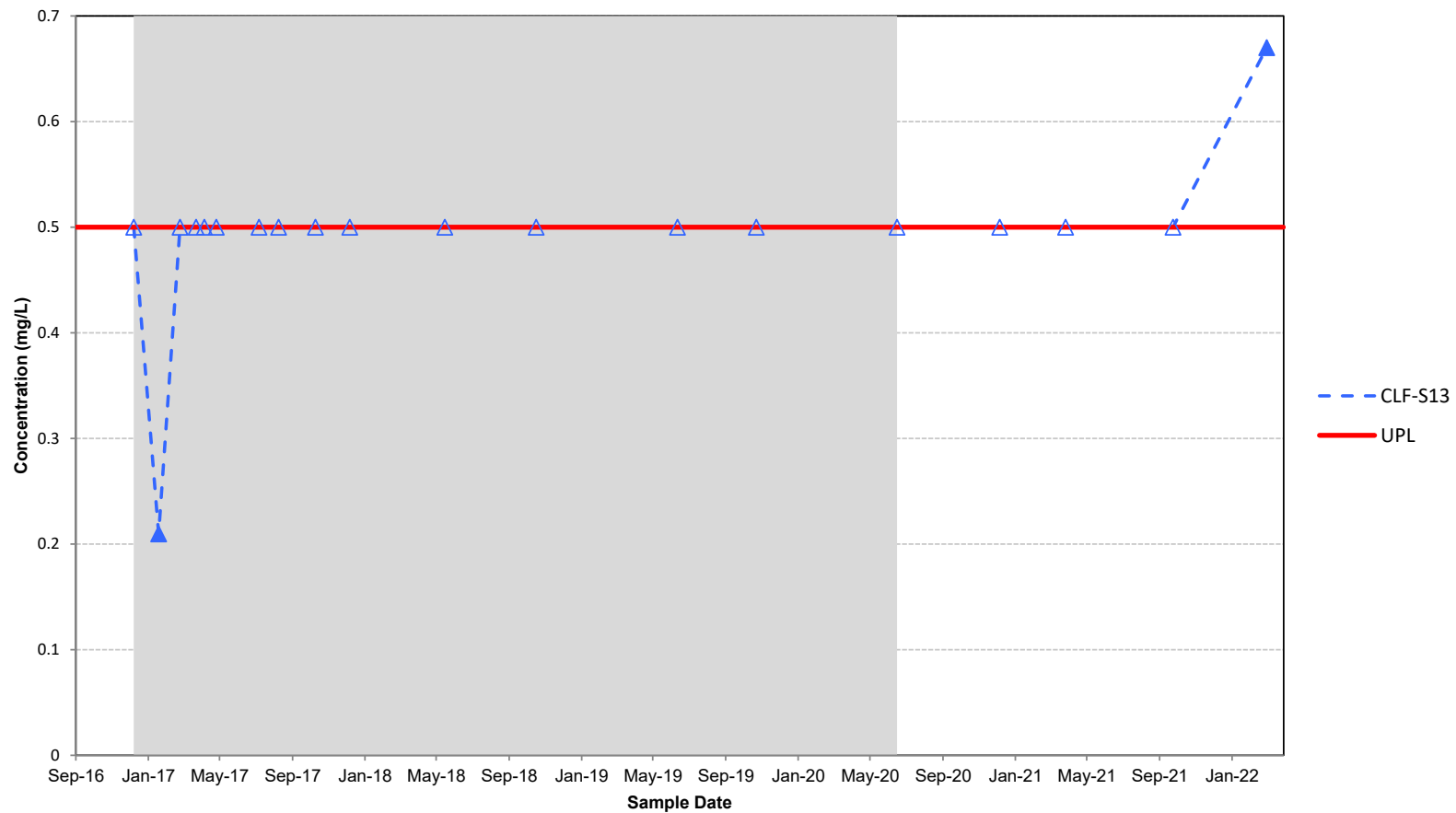
J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**CHLORIDE  
CONCENTRATION VS. TIME**

May 2022

Figure F-38





**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

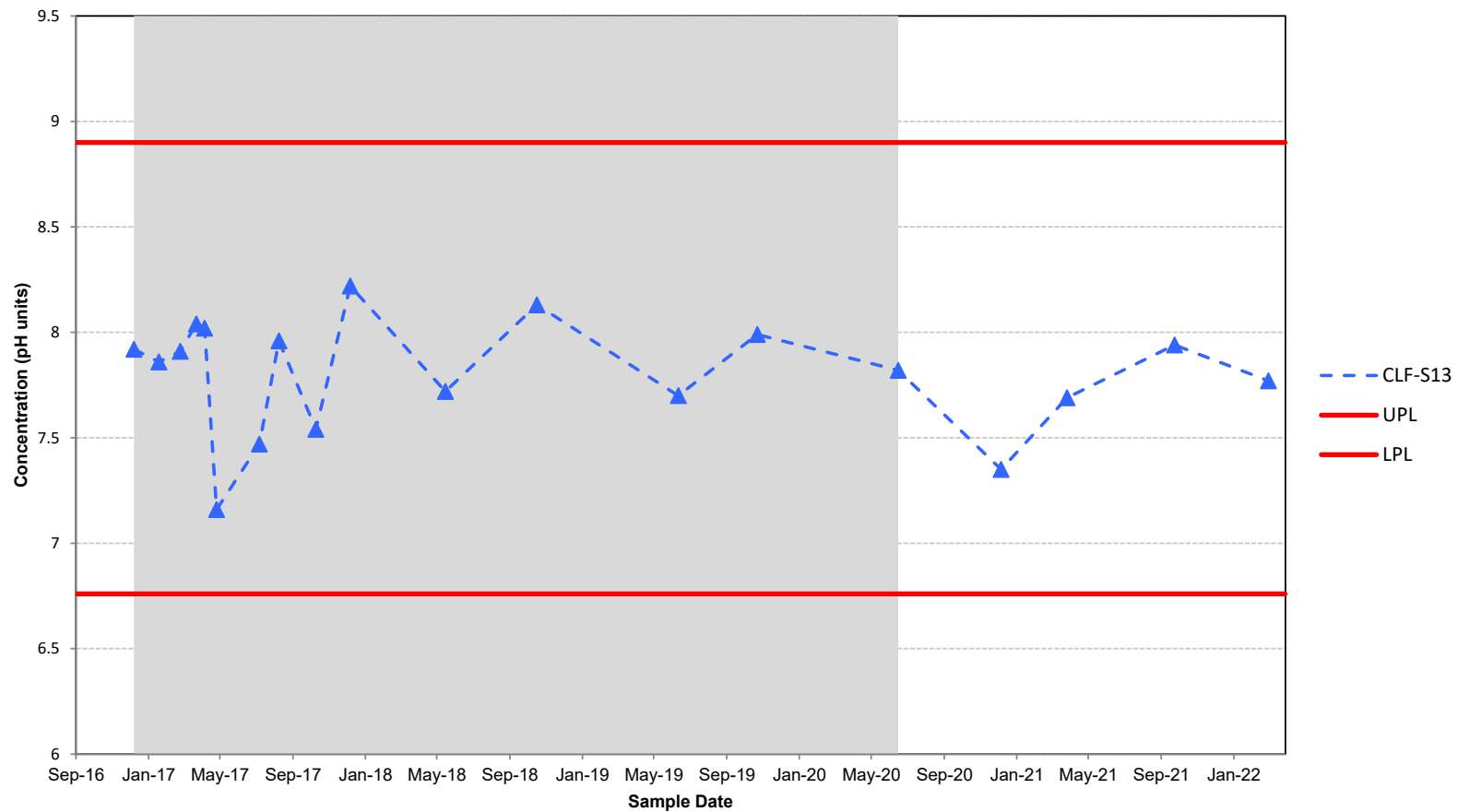


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**FLUORIDE  
CONCENTRATION VS. TIME**

May 2022

Figure F-39



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper and Lower Prediction Limit (UPL and LPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

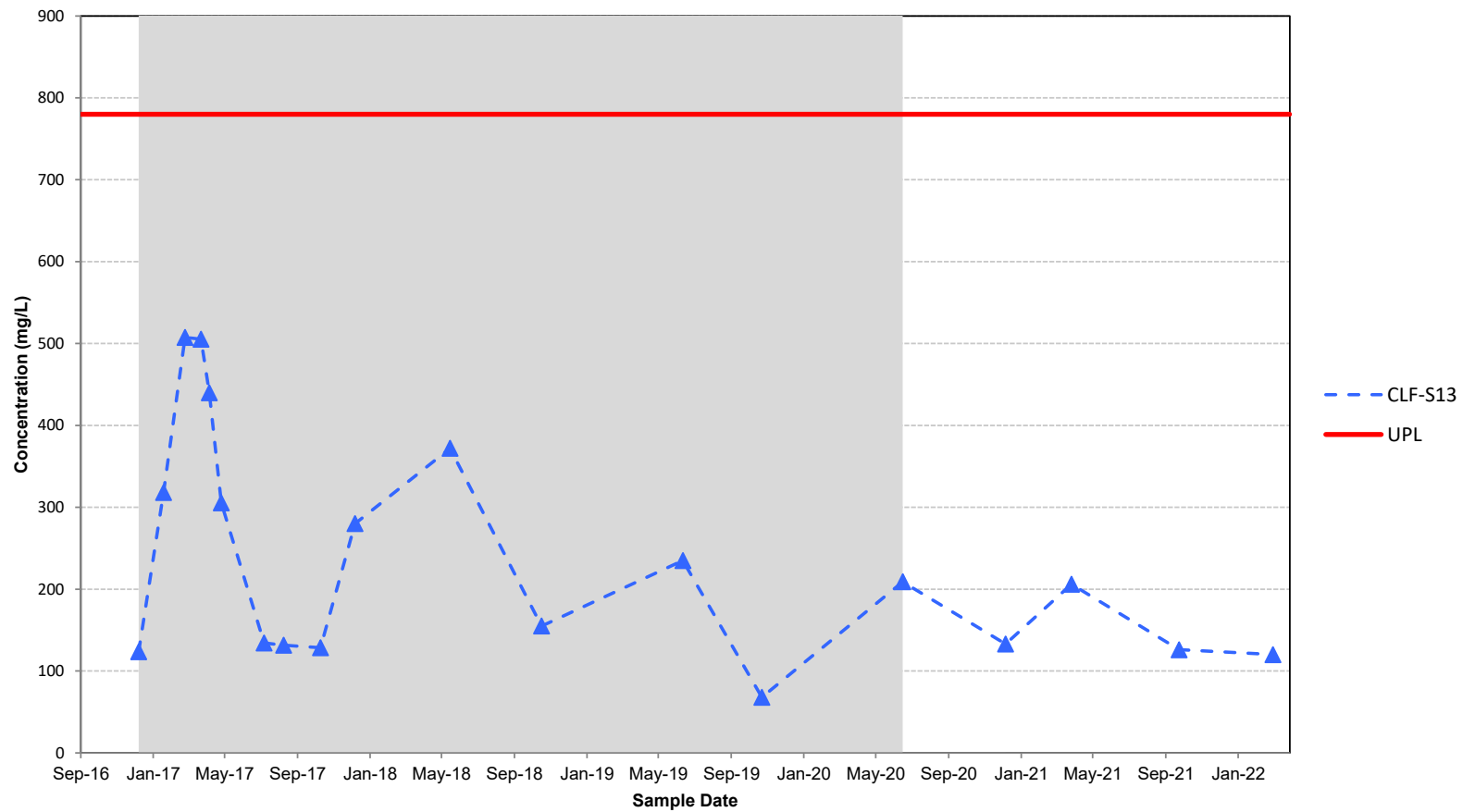


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**PH, FIELD  
CONCENTRATION VS. TIME**

May 2022

Figure F-40



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.

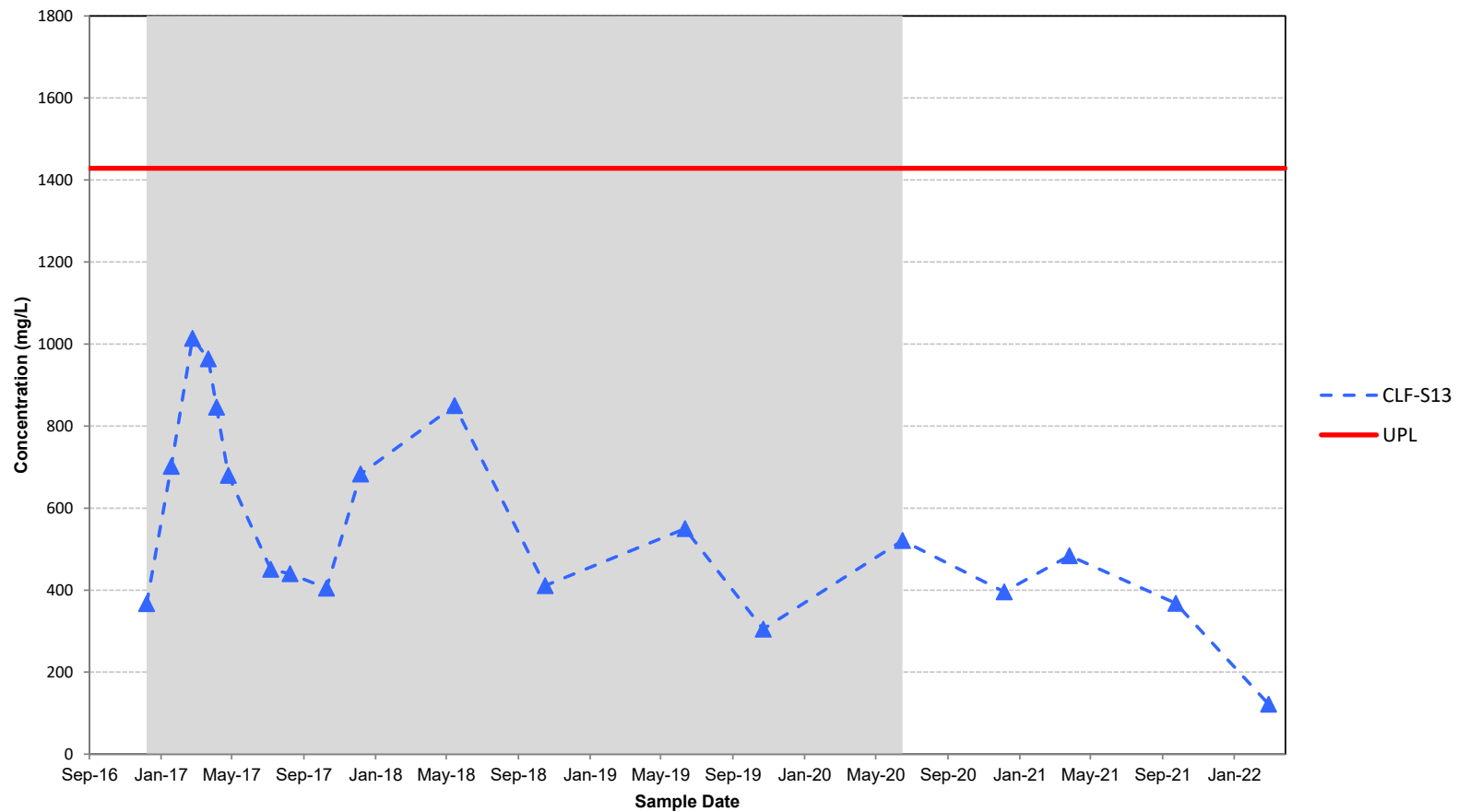


J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**SULFATE  
CONCENTRATION VS. TIME**

May 2022

Figure F-41



**NOTES:**

1. Solid symbol indicates a detected concentration. Open symbol indicates a non-detect, the laboratory reporting limit is graphed.
2. Screening Level shown is the Upper Prediction Limit (UPL).
3. Shading denotes data used to calculate Statistical Background limits.
4. Detection Monitoring was initiated on October 17, 2017.



J. S. COOPER STATION LANDFILL  
PULASKI, KENTUCKY

**TOTAL DISSOLVED SOLIDS (TDS)  
CONCENTRATION VS. TIME**

May 2022

Figure F-42

**ATTACHMENT 2**

**Statistical Outputs**

## Concentrations (ppb)

Parameter: Boron

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 8

Total Non-Detect: 8

Percent Non-Detects: 100%

Total Background Measurements: 0

There are 0 background locations

---

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

---

There is 1 compliance location

---

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

---

CLF-S06	8	8 (100%)	1/18/2017	ND<50	ND<50
			4/5/2017	ND<50	ND<50
			4/25/2017	ND<50	ND<50
			10/16/2018	ND<50	ND<50
			6/29/2020	ND<50	ND<50
			12/5/2020	ND<50	ND<50
			3/26/2021	ND<50	ND<50
			2/28/2022	ND<20	ND<20

---

## Dixon's Test for Outliers

Parameter: Boron

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...

5% Level of Significance

**Iteration      Highest      Lowest      Critical      Outlier**

**A Divide-By-Zero error occurred in the calculations.**

**Additional Outliers May Exist.**

<b>Loc.</b>	<b>Date</b>	<b>Conc.</b>	<b>Outlier</b>
CLF-S06	1/18/2017	ND<50	FALSE
	4/5/2017	ND<50	FALSE
	4/25/2017	ND<50	FALSE
	10/16/2018	ND<50	FALSE
	6/29/2020	ND<50	FALSE
	12/5/2020	ND<50	FALSE
	3/26/2021	ND<50	FALSE
	2/28/2022	ND<20	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Boron

Location: CLF-S06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	20	50	30	0.6052	18.156
2	50	50	0	0.3164	0
3	50	50	0	0.1743	0
4	50	50	0	0.0561	0
5	50	50	0		
6	50	50	0		
7	50	50	0		
8	50	20	-30		

---

Sum of b values = 18.156

Sample Standard Deviation = 10.6066

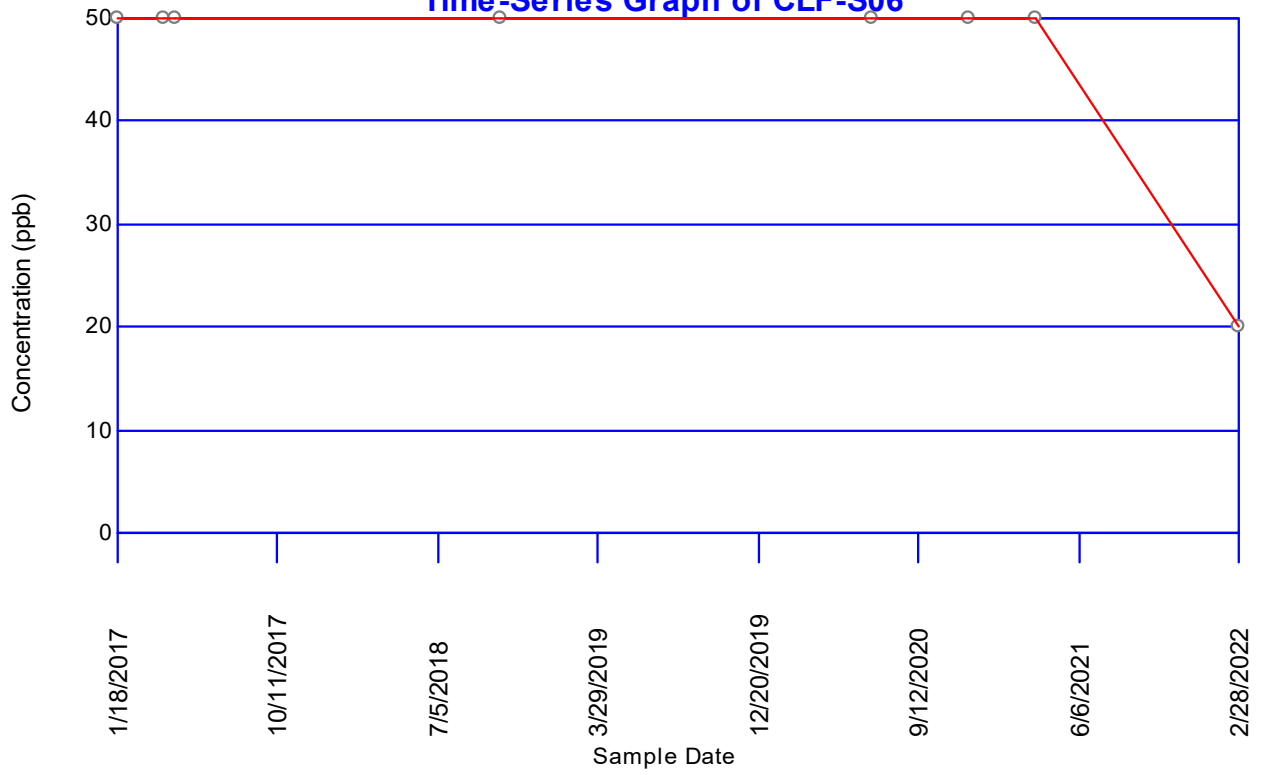
W Statistic = 0.418591

**5% Critical value of 0.818 exceeds 0.418591**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.749 exceeds 0.418591**  
**Evidence of non-normality at 99% level of significance**



### Boron Time-Series Graph of CLF-S06



## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-S06

Parameter: Boron

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 100%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 8

Maximum Baseline Concentration = 50

Confidence Level = 66.7%

False Positive Rate = 33.3%

---

Baseline Measurements	Date	Value
	1/18/2017	ND<50
	4/5/2017	ND<50
	4/25/2017	ND<50
	10/16/2018	ND<50
	6/29/2020	ND<50
	12/5/2020	ND<50
	3/26/2021	ND<50
	2/28/2022	ND<20

---

Date	Count	Mean	Significant
2/28/2022	1	20	FALSE
3/26/2021	1	50	FALSE
12/5/2020	1	50	FALSE
6/29/2020	1	50	FALSE

## Dixon's Test for Outliers

Parameter: Calcium

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.0541242	0.278864	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S06	1/18/2017	68511.1	FALSE
	4/5/2017	89628.6	FALSE
	4/25/2017	85619	FALSE
	10/16/2018	90500	FALSE
	6/29/2020	75900	FALSE
	12/5/2020	79200	FALSE
	3/26/2021	78000	FALSE
	2/28/2022	74400	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Calcium

Location: CLF-S06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	68511.1	90500	21988.9	0.6052	13307.7
2	74400	89628.6	15228.6	0.3164	4818.33
3	75900	85619	9719	0.1743	1694.02
4	78000	79200	1200	0.0561	67.32
5	79200	78000	-1200		
6	85619	75900	-9719		
7	89628.6	74400	-15228.6		
8	90500	68511.1	-21988.9		

---

Sum of b values = 19887.4

Sample Standard Deviation = 7736.29

W Statistic = 0.94404

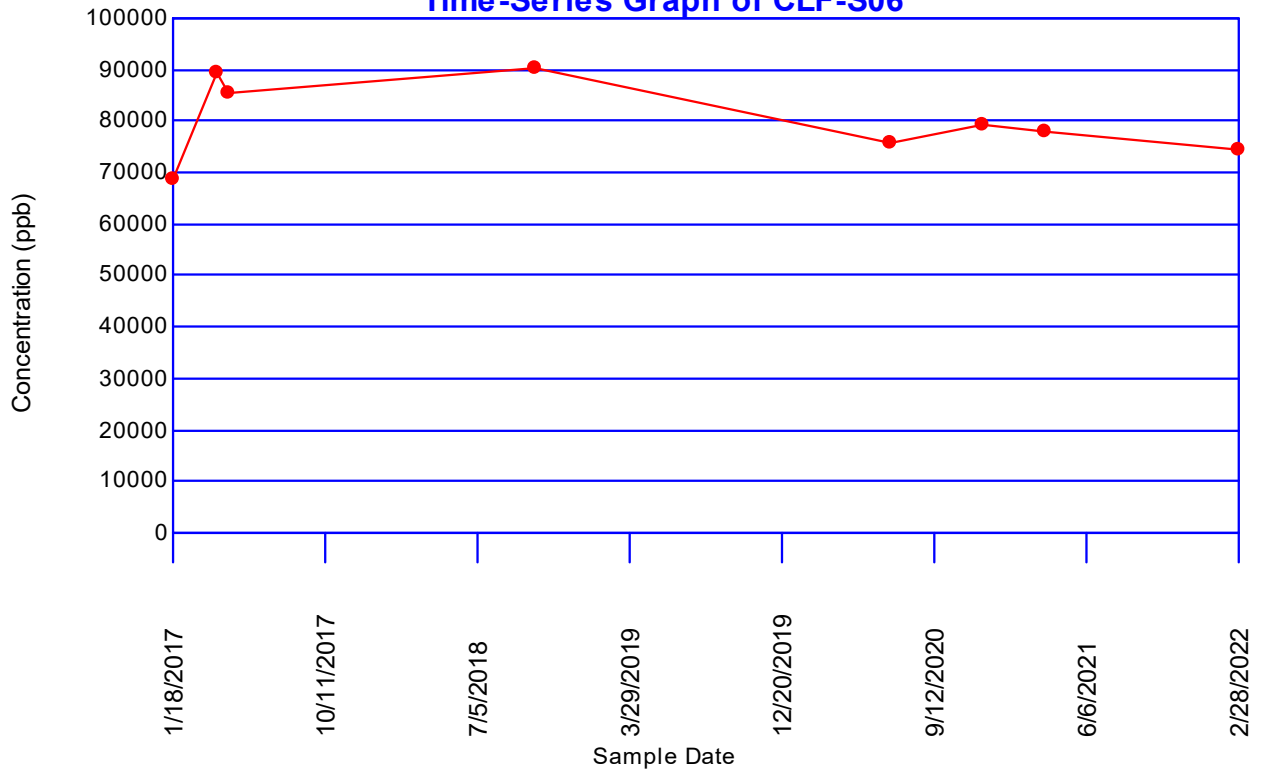
5% Critical value of 0.818 is less than 0.94404

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.94404

Data is normally distributed at 99% level of significance

### Calcium Time-Series Graph of CLF-S06



**Mann-Kendall Trend Analysis**  
**Parameter: Calcium**  
**Location: CLF-S06**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
89628.6	68511.1	21117.5	1	0
85619	68511.1	17107.9	2	0
90500	68511.1	21988.9	3	0
75900	68511.1	7388.9	4	0
79200	68511.1	10688.9	5	0
78000	68511.1	9488.9	6	0
74400	68511.1	5888.9	7	0
85619	89628.6	-4009.6	7	1
90500	89628.6	871.4	8	1
75900	89628.6	-13728.6	8	2
79200	89628.6	-10428.6	8	3
78000	89628.6	-11628.6	8	4
74400	89628.6	-15228.6	8	5
90500	85619	4881	9	5
75900	85619	-9719	9	6
79200	85619	-6419	9	7
78000	85619	-7619	9	8
74400	85619	-11219	9	9
75900	90500	-14600	9	10
79200	90500	-11300	9	11
78000	90500	-12500	9	12
74400	90500	-16100	9	13
79200	75900	3300	10	13
78000	75900	2100	11	13
74400	75900	-1500	11	14
78000	79200	-1200	11	15
74400	79200	-4800	11	16
74400	78000	-3600	11	17

S Statistic = 11 - 17 = -6  
 Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
 Probability of obtaining S >= |-6| is 0.548  
 0.548 >= 0.025 indicating no evidence of a trend

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S06

Parameter: Calcium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	68511.1
	4/5/2017	89628.6
	4/25/2017	85619
	10/16/2018	90500
	6/29/2020	75900
	12/5/2020	79200
	3/26/2021	78000
	2/28/2022	74400

From 8 baseline samples

Baseline mean = 80219.8

Baseline std Dev = 7736.29

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
2/28/2022	1	74400	[0, 115529]	FALSE
3/26/2021	1	78000	[0, 115529]	FALSE
12/5/2020	1	79200	[0, 115529]	FALSE
6/29/2020	1	75900	[0, 115529]	FALSE

## Dixon's Test for Outliers

Parameter: Chloride

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.55656	0.152835	0.554	3500
2	0.0829895	0.152835	0.507	None

Loc.	Date	Conc.	Outlier
CLF-S06	1/18/2017	1763.6	FALSE
	4/5/2017	2108.6	FALSE
	4/25/2017	1467.6	FALSE
	10/16/2018	800	FALSE
	6/29/2020	ND<1000	FALSE
	12/5/2020	ND<2000	FALSE
	3/26/2021	ND<2000	FALSE
	2/28/2022	<b>3500</b>	<b>TRUE</b>



## Shapiro-Wilks Test of Normality

Parameter: Chloride

Location: CLF-S06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	800	3500	2700	0.6052	1634.04
2	1000	2108.6	1108.6	0.3164	350.761
3	1467.6	2000	532.4	0.1743	92.7973
4	1763.6	2000	236.4	0.0561	13.262
5	2000	1763.6	-236.4		
6	2000	1467.6	-532.4		
7	2108.6	1000	-1108.6		
8	3500	800	-2700		

---

Sum of b values = 2090.86

Sample Standard Deviation = 828.929

W Statistic = 0.908903

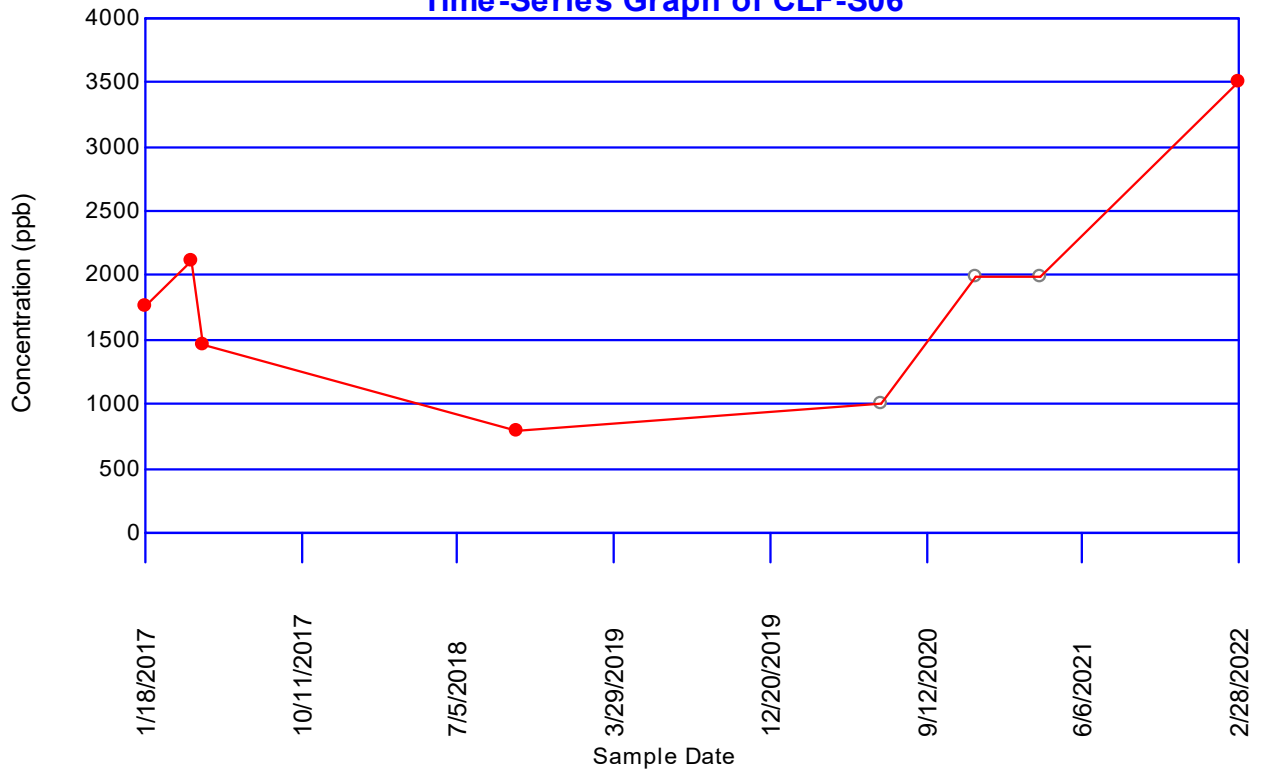
5% Critical value of 0.818 is less than 0.908903

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.908903

Data is normally distributed at 99% level of significance

# Chloride Time-Series Graph of CLF-S06



**Mann-Kendall Trend Analysis**  
**Parameter: Chloride**  
**Location: CLF-S06**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
2108.6	1763.6	345	1	0
1467.6	1763.6	-296	1	1
800	1763.6	-963.6	1	2
ND<1000	1763.6	-763.6	1	3
ND<2000	1763.6	236.4	2	3
ND<2000	1763.6	236.4	3	3
3500	1763.6	1736.4	4	3
1467.6	2108.6	-641	4	4
800	2108.6	-1308.6	4	5
ND<1000	2108.6	-1108.6	4	6
ND<2000	2108.6	-108.6	4	7
ND<2000	2108.6	-108.6	4	8
3500	2108.6	1391.4	5	8
800	1467.6	-667.6	5	9
ND<1000	1467.6	-467.6	5	10
ND<2000	1467.6	532.4	6	10
ND<2000	1467.6	532.4	7	10
3500	1467.6	2032.4	8	10
ND<1000	800	200	9	10
ND<2000	800	1200	10	10
ND<2000	800	1200	11	10
3500	800	2700	12	10
ND<2000	ND<1000	1000	13	10
ND<2000	ND<1000	1000	14	10
3500	ND<1000	2500	15	10
ND<2000	ND<2000	0	15	10
3500	ND<2000	1500	16	10
3500	ND<2000	1500	17	10

S Statistic = 17 - 10 = 7  
 Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
 Probability of obtaining S >= |7| is 0.473  
 0.473 >= 0.025 indicating no evidence of a trend

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S06

Parameter: Chloride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	1763.6
	4/5/2017	2108.6
	4/25/2017	1467.6
	10/16/2018	800
	6/29/2020	ND<1000
	12/5/2020	ND<2000
	3/26/2021	ND<2000
	2/28/2022	3500

From 8 baseline samples

Baseline mean = 1829.97

Baseline std Dev = 828.929

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
2/28/2022	1	3500	[0, 5613.3]	FALSE
3/26/2021	1	2000	[0, 5613.3]	FALSE
12/5/2020	1	2000	[0, 5613.3]	FALSE
6/29/2020	1	1000	[0, 5613.3]	FALSE

## Dixon's Test for Outliers

Parameter: Fluoride

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0	0.09375	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S06	1/18/2017	273.1	FALSE
	4/5/2017	ND<500	FALSE
	4/25/2017	ND<500	FALSE
	10/16/2018	ND<500	FALSE
	6/29/2020	210	FALSE
	12/5/2020	ND<500	FALSE
	3/26/2021	ND<500	FALSE
	2/28/2022	180	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: CLF-S06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	180	500	320	0.6052	193.664
2	210	500	290	0.3164	91.756
3	273.1	500	226.9	0.1743	39.5487
4	500	500	0	0.0561	0
5	500	500	0		
6	500	273.1	-226.9		
7	500	210	-290		
8	500	180	-320		

---

Sum of b values = 324.969

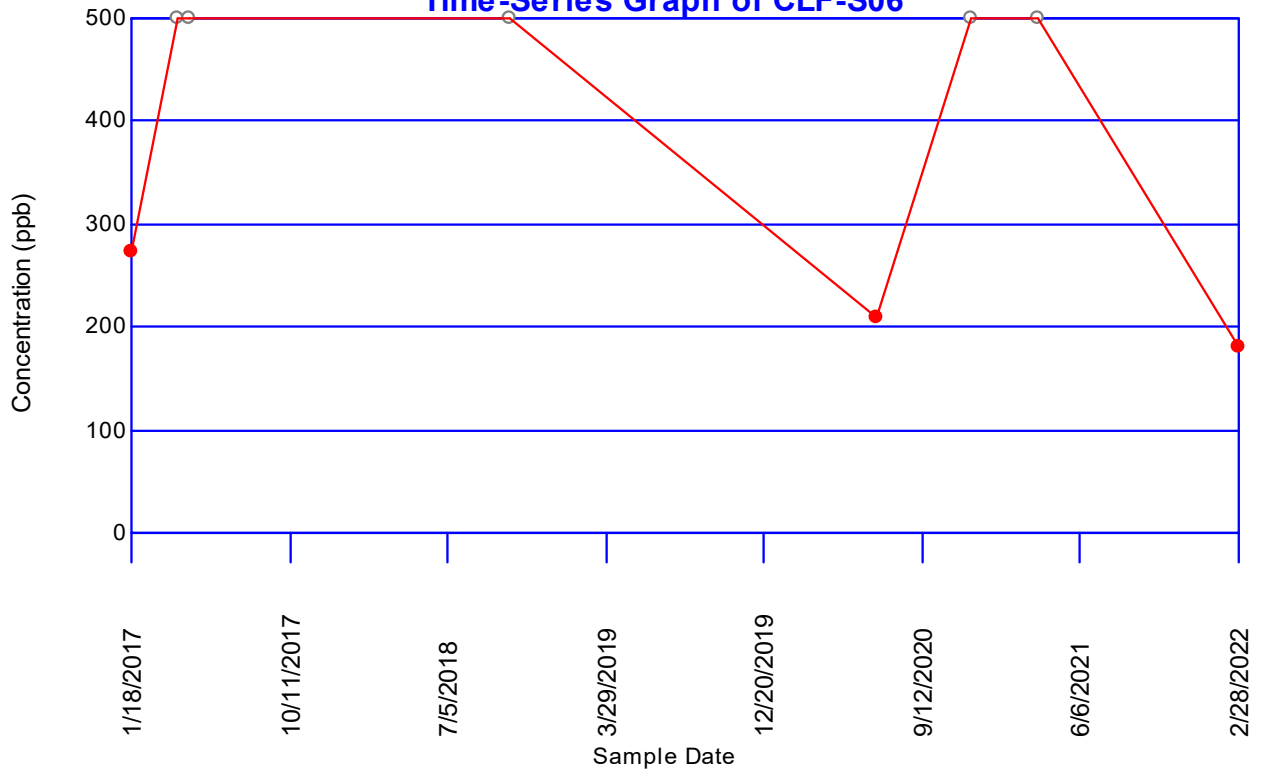
Sample Standard Deviation = 146.596

W Statistic = 0.702003

**5% Critical value of 0.818 exceeds 0.702003**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.749 exceeds 0.702003**  
**Evidence of non-normality at 99% level of significance**

# Fluoride Time-Series Graph of CLF-S06



## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-S06

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 62.5%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 8

Maximum Baseline Concentration = 500

Confidence Level = 66.7%

False Positive Rate = 33.3%

---

Baseline Measurements	Date	Value
	1/18/2017	273.1
	4/5/2017	ND<500
	4/25/2017	ND<500
	10/16/2018	ND<500
	6/29/2020	210
	12/5/2020	ND<500
	3/26/2021	ND<500
	2/28/2022	180

---

Date	Count	Mean	Significant
2/28/2022	1	180	FALSE
3/26/2021	1	500	FALSE
12/5/2020	1	500	FALSE
6/29/2020	1	210	FALSE



## Dixon's Test for Outliers

Parameter: Sulfate

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.282519	0.0643694	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S06	1/18/2017	10594.6	FALSE
	4/5/2017	16155.3	FALSE
	4/25/2017	12721.2	FALSE
	10/16/2018	5600	FALSE
	6/29/2020	3400	FALSE
	12/5/2020	ND<4000	FALSE
	3/26/2021	10500	FALSE
	2/28/2022	11000	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Sulfate

Location: CLF-S06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	3400	16155.3	12755.3	0.6052	7719.51
2	4000	12721.2	8721.2	0.3164	2759.39
3	5600	11000	5400	0.1743	941.22
4	10500	10594.6	94.6	0.0561	5.30706
5	10594.6	10500	-94.6		
6	11000	5600	-5400		
7	12721.2	4000	-8721.2		
8	16155.3	3400	-12755.3		

---

Sum of b values = 11425.4

Sample Standard Deviation = 4492.42

W Statistic = 0.92403

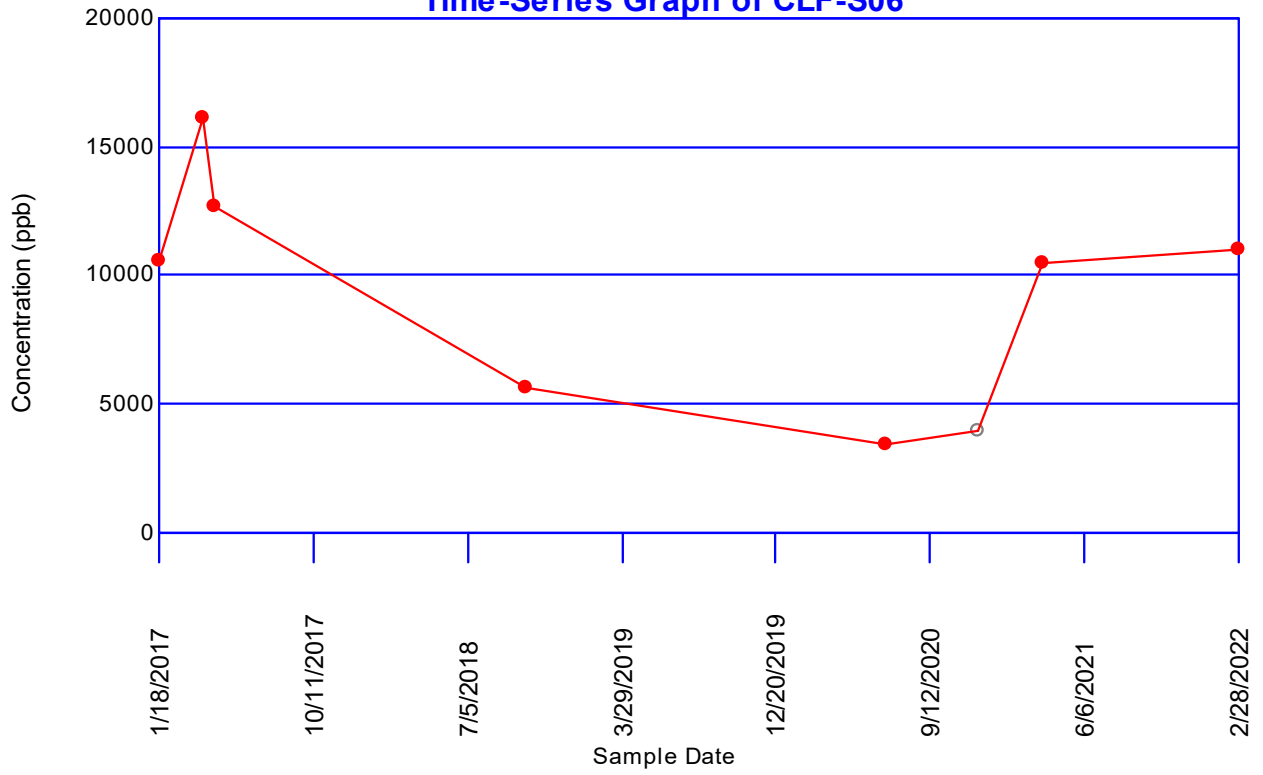
5% Critical value of 0.818 is less than 0.92403

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.92403

Data is normally distributed at 99% level of significance

### Sulfate Time-Series Graph of CLF-S06



## Mann-Kendall Trend Analysis

Parameter: Sulfate

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
16155.3	10594.6	5560.7	1	0
12721.2	10594.6	2126.6	2	0
5600	10594.6	-4994.6	2	1
3400	10594.6	-7194.6	2	2
ND<4000	10594.6	-6594.6	2	3
10500	10594.6	-94.6	2	4
11000	10594.6	405.4	3	4
12721.2	16155.3	-3434.1	3	5
5600	16155.3	-10555.3	3	6
3400	16155.3	-12755.3	3	7
ND<4000	16155.3	-12155.3	3	8
10500	16155.3	-5655.3	3	9
11000	16155.3	-5155.3	3	10
5600	12721.2	-7121.2	3	11
3400	12721.2	-9321.2	3	12
ND<4000	12721.2	-8721.2	3	13
10500	12721.2	-2221.2	3	14
11000	12721.2	-1721.2	3	15
3400	5600	-2200	3	16
ND<4000	5600	-1600	3	17
10500	5600	4900	4	17
11000	5600	5400	5	17
ND<4000	3400	600	6	17
10500	3400	7100	7	17
11000	3400	7600	8	17
10500	ND<4000	6500	9	17
11000	ND<4000	7000	10	17
11000	10500	500	11	17

S Statistic = 11 - 17 = -6

Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)

Probability of obtaining S >= |-6| is 0.548

0.548 >= 0.025 indicating no evidence of a trend

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S06

Parameter: Sulfate

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	10594.6
	4/5/2017	16155.3
	4/25/2017	12721.2
	10/16/2018	5600
	6/29/2020	3400
	12/5/2020	ND<4000
	3/26/2021	10500
	2/28/2022	11000

From 8 baseline samples

Baseline mean = 9246.39

Baseline std Dev = 4492.42

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
2/28/2022	1	11000	[0, 29750.3]	FALSE
3/26/2021	1	10500	[0, 29750.3]	FALSE
12/5/2020	1	4000	[0, 29750.3]	FALSE
6/29/2020	1	3400	[0, 29750.3]	FALSE

## Dixon's Test for Outliers

Parameter: pH, Field

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.348624	0.832151	0.554	4.2
2	0.348624	0.155963	0.507	None

Loc.	Date	Conc.	Outlier
CLF-S06	1/18/2017	7.99	FALSE
	4/5/2017	7.89	FALSE
	4/25/2017	8.25	FALSE
	10/16/2018	7.72	FALSE
	6/29/2020	8.81	FALSE
	12/5/2020	4.2	TRUE
	3/26/2021	8.28	FALSE
	2/28/2022	8.43	FALSE

## Shapiro-Wilks Test of Normality

Parameter: pH, Field

Location: CLF-S06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	4.2	8.81	4.61	0.6052	2.78997
2	7.72	8.43	0.71	0.3164	0.224644
3	7.89	8.28	0.39	0.1743	0.067977
4	7.99	8.25	0.26	0.0561	0.014586
5	8.25	7.99	-0.26		
6	8.28	7.89	-0.39		
7	8.43	7.72	-0.71		
8	8.81	4.2	-4.61		

---

Sum of b values = 3.09718

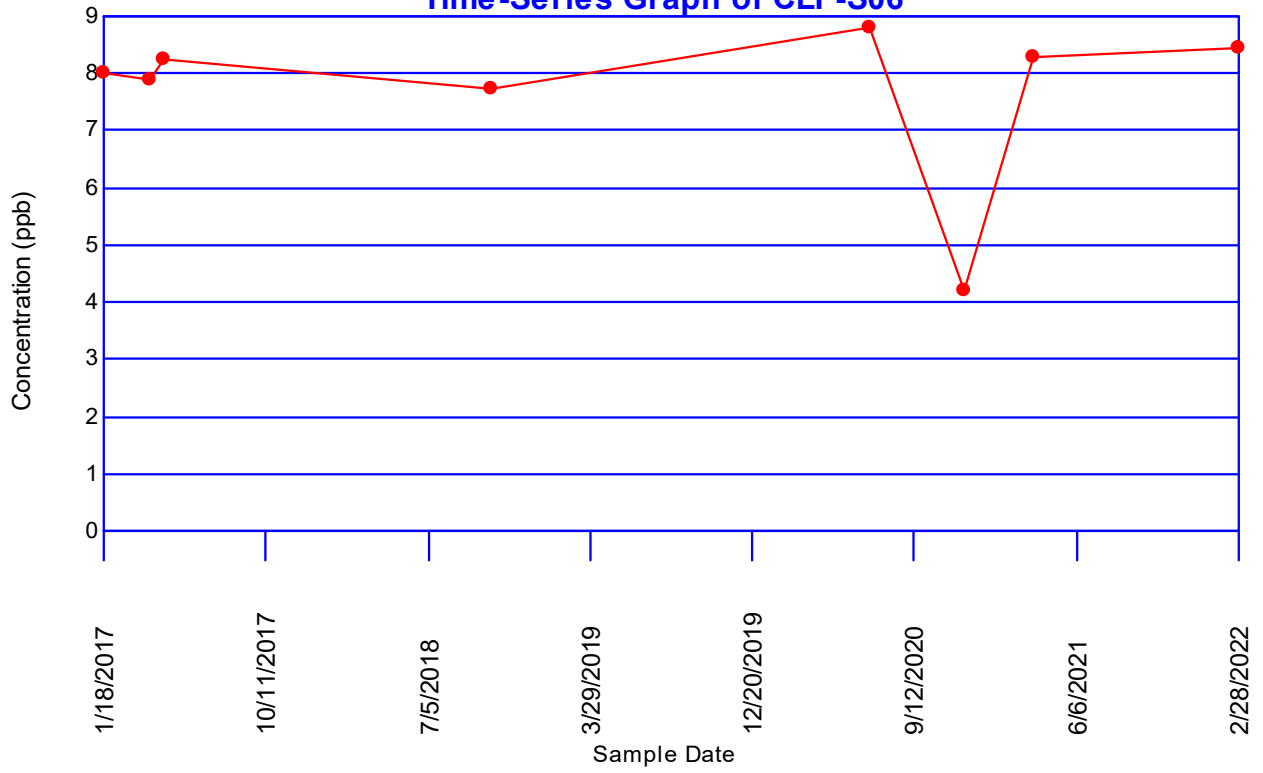
Sample Standard Deviation = 1.4528

W Statistic = 0.649267

**5% Critical value of 0.818 exceeds 0.649267**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.749 exceeds 0.649267**  
**Evidence of non-normality at 99% level of significance**

pH, Field  
Time-Series Graph of CLF-S06





**Mann-Kendall Trend Analysis**  
**Parameter: pH, Field**  
**Location: CLF-S06**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
7.89	7.99	-0.1	0	1
8.25	7.99	0.26	1	1
7.72	7.99	-0.27	1	2
8.81	7.99	0.82	2	2
4.2	7.99	-3.79	2	3
8.28	7.99	0.29	3	3
8.43	7.99	0.44	4	3
8.25	7.89	0.36	5	3
7.72	7.89	-0.17	5	4
8.81	7.89	0.92	6	4
4.2	7.89	-3.69	6	5
8.28	7.89	0.39	7	5
8.43	7.89	0.54	8	5
7.72	8.25	-0.53	8	6
8.81	8.25	0.56	9	6
4.2	8.25	-4.05	9	7
8.28	8.25	0.03	10	7
8.43	8.25	0.18	11	7
8.81	7.72	1.09	12	7
4.2	7.72	-3.52	12	8
8.28	7.72	0.56	13	8
8.43	7.72	0.71	14	8
4.2	8.81	-4.61	14	9
8.28	8.81	-0.53	14	10
8.43	8.81	-0.38	14	11
8.28	4.2	4.08	15	11
8.43	4.2	4.23	16	11
8.43	8.28	0.15	17	11

S Statistic = 17 - 11 = 6  
 Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
 Probability of obtaining S >= |6| is 0.548  
 0.548 >= 0.025 indicating no evidence of a trend

## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-S06

Parameter: pH, Field

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 0%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 8

Maximum Baseline Concentration = 8.81

Confidence Level = 66.7%

False Positive Rate = 33.3%

---

Baseline Measurements	Date	Value
	1/18/2017	7.99
	4/5/2017	7.89
	4/25/2017	8.25
	10/16/2018	7.72
	6/29/2020	8.81
	12/5/2020	4.2
	3/26/2021	8.28
	2/28/2022	8.43

---

Date	Count	Mean	Significant
2/28/2022	1	8.43	FALSE
3/26/2021	1	8.28	FALSE
12/5/2020	1	4.2	FALSE
6/29/2020	1	8.81	FALSE

## Dixon's Test for Outliers

Parameter: Total Dissolved Solids (TDS)

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.833333	0.209302	0.554	404000
2	0.348837	0.209302	0.507	None

Loc.	Date	Conc.	Outlier
CLF-S06	1/18/2017	213000	FALSE
	4/5/2017	234000	FALSE
	4/25/2017	205000	FALSE
	10/16/2018	219000	FALSE
	6/29/2020	200000	FALSE
	12/5/2020	<b>404000</b>	<b>TRUE</b>
	3/26/2021	191000	FALSE
	2/28/2022	214000	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Total Dissolved Solids (TDS)

Location: CLF-S06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	191000	404000	213000	0.6052	128908
2	200000	234000	34000	0.3164	10757.6
3	205000	219000	14000	0.1743	2440.2
4	213000	214000	1000	0.0561	56.1
5	214000	213000	-1000		
6	219000	205000	-14000		
7	234000	200000	-34000		
8	404000	191000	-213000		

---

Sum of b values = 142162

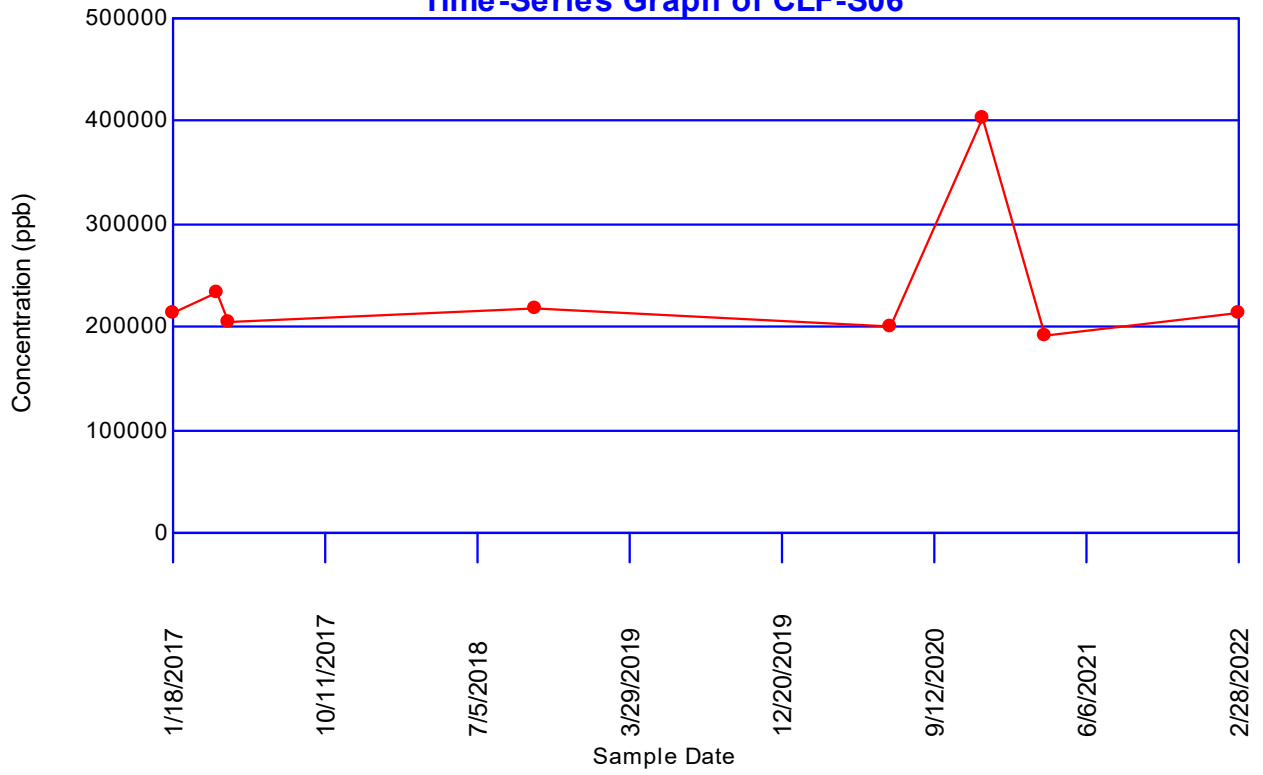
Sample Standard Deviation = 69492

W Statistic = 0.597855

**5% Critical value of 0.818 exceeds 0.597855**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.749 exceeds 0.597855**  
**Evidence of non-normality at 99% level of significance**

### Total Dissolved Solids (TDS) Time-Series Graph of CLF-S06



**Mann-Kendall Trend Analysis**  
**Parameter: Total Dissolved Solids (TDS)**  
**Location: CLF-S06**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
234000	213000	21000	1	0
205000	213000	-8000	1	1
219000	213000	6000	2	1
200000	213000	-13000	2	2
404000	213000	191000	3	2
191000	213000	-22000	3	3
214000	213000	1000	4	3
205000	234000	-29000	4	4
219000	234000	-15000	4	5
200000	234000	-34000	4	6
404000	234000	170000	5	6
191000	234000	-43000	5	7
214000	234000	-20000	5	8
219000	205000	14000	6	8
200000	205000	-5000	6	9
404000	205000	199000	7	9
191000	205000	-14000	7	10
214000	205000	9000	8	10
200000	219000	-19000	8	11
404000	219000	185000	9	11
191000	219000	-28000	9	12
214000	219000	-5000	9	13
404000	200000	204000	10	13
191000	200000	-9000	10	14
214000	200000	14000	11	14
191000	404000	-213000	11	15
214000	404000	-190000	11	16
214000	191000	23000	12	16

S Statistic = 12 - 16 = -4  
 Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
 Probability of obtaining S >= |-4| is 0.72  
 0.72 >= 0.025 indicating no evidence of a trend

**Non-Parametric Prediction Interval**  
**Intra-Well Comparison for CLF-S06**  
**Parameter: Total Dissolved Solids (TDS)**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

Total Percent Non-Detects = 0%  
 Future Samples (k) = 4  
 Recent Dates = 4  
 Baseline Measurements (n) = 8  
**Maximum Baseline Concentration = 404000**  
 Confidence Level = 66.7%  
 False Positive Rate = 33.3%

---

<b>Baseline Measurements</b>	<b>Date</b>	<b>Value</b>
	1/18/2017	213000
	4/5/2017	234000
	4/25/2017	205000
	10/16/2018	219000
	6/29/2020	200000
	12/5/2020	404000
	3/26/2021	191000
	2/28/2022	214000

---

<b>Date</b>	<b>Count</b>	<b>Mean</b>	<b>Significant</b>
2/28/2022	1	214000	FALSE
3/26/2021	1	191000	FALSE
12/5/2020	1	404000	FALSE
6/29/2020	1	200000	FALSE

## Concentrations (ppb)

Parameter: Boron

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Total Measurements: 74

Total Non-Detect: 10

Percent Non-Detects: 13.5135%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

There are 6 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

CLF-J2	15	1 (6.66667%)	12/7/2016	6.0027	404.519
			1/18/2017	4.87304	130.718
			2/23/2017	6.69823	810.968
			3/22/2017	5.73439	309.323
			4/5/2017	5.78401	325.059
			4/25/2017	4.83896	126.338
			7/6/2017	7.39388	1626
			8/8/2017	5.81711	336
			10/9/2017	6.29895	544
			12/6/2017	6.88244	975
			5/15/2018	4.8752	131
			10/16/2018	4.68213	108
			6/11/2019	4.86753	130
			10/22/2019	6.24804	517
			6/29/2020	ND<3.91202	ND<50
			<b>12/5/2020</b>	<b>4.70048</b>	<b>110</b>
			<b>3/26/2021</b>	<b>4.74493</b>	<b>115</b>

CLF-J3	14	0 (0%)	12/7/2016	6.05655	426.902
			1/18/2017	4.87429	130.881
			2/23/2017	6.7457	850.398
			3/22/2017	5.71603	303.698
			4/5/2017	5.74504	312.635
			7/6/2017	7.46221	1741
			8/8/2017	5.82895	340
			10/9/2017	6.3613	579
			12/6/2017	6.89871	991
			5/15/2018	6.39859	601
			10/16/2018	4.57574	97.1
			6/11/2019	4.92725	138
			10/22/2019	6.35263	574
			6/15/2020	6.39192	597
			<b>12/5/2020</b>	<b>4.7362</b>	<b>114</b>
			<b>3/26/2021</b>	<b>4.58802</b>	<b>98.3</b>

CLF-J5	15	0 (0%)	12/7/2016	6.09509	443.676
			1/18/2017	4.85224	128.027
			2/23/2017	6.09015	441.487
			3/22/2017	5.66439	288.413
			4/5/2017	5.64114	281.784
			4/25/2017	4.7934	120.711



			7/6/2017	7.44425	1710
			8/8/2017	5.86079	351
			10/9/2017	6.28227	535
			12/6/2017	6.00881	407
			5/15/2018	6.09807	445
			10/16/2018	4.64439	104
			6/11/2019	4.77912	119
			10/22/2019	5.79301	328
			6/15/2020	6.05912	428
			<b>12/5/2020</b>	<b>4.56643</b>	<b>96.2</b>
			<b>3/26/2021</b>	<b>4.40672</b>	<b>82</b>
CLF-S05	8	2 (25%)	1/18/2017	4.6817	107.953
			4/5/2017	5.21984	184.904
			4/25/2017	4.40681	82.0072
			10/16/2018	ND<3.91202	ND<50
			10/22/2019	6.4552	636
			6/29/2020	ND<3.91202	ND<50
			12/5/2020	4.35414	77.8
			3/26/2021	4.22391	68.3
CLF-S06	7	7 (100%)	1/18/2017	ND<3.91202	ND<50
			4/5/2017	ND<3.91202	ND<50
			4/25/2017	ND<3.91202	ND<50
			10/16/2018	ND<3.91202	ND<50
			6/29/2020	ND<3.91202	ND<50
			12/5/2020	ND<3.91202	ND<50
			3/26/2021	ND<3.91202	ND<50
CLF-S13	15	0 (0%)	12/7/2016	6.15928	473.085
			1/18/2017	6.57217	714.92
			2/23/2017	6.94778	1040.84
			3/22/2017	6.62616	754.577
			4/5/2017	6.72872	836.075
			4/25/2017	6.59594	732.116
			7/6/2017	6.04973	424
			8/8/2017	6.1203	455
			10/9/2017	6.06379	430
			12/6/2017	6.76273	865
			5/15/2018	6.82655	922
			10/16/2018	5.95324	385
			6/11/2019	6.18208	484
			10/22/2019	5.39363	220
			6/15/2020	6.1506	469
			<b>12/5/2020</b>	<b>5.78996</b>	<b>327</b>
			<b>3/26/2021</b>	<b>6.04501</b>	<b>422</b>

There are 2 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
CLF-C03	17	15 (88.2353%)	12/7/2016	ND<3.91202	ND<50
			1/18/2017	ND<3.91202	ND<50
			2/23/2017	ND<3.68888	ND<40
			3/22/2017	2.44166	11.4921
			4/5/2017	ND<3.91202	ND<50
			4/25/2017	ND<3.91202	ND<50

7/6/2017	ND<3.91202	ND<50
8/8/2017	ND<3.91202	ND<50
10/9/2017	ND<3.91202	ND<50
12/6/2017	ND<3.91202	ND<50
5/15/2018	ND<3.91202	ND<50
10/16/2018	ND<3.91202	ND<50
6/11/2019	ND<3.91202	ND<50
10/22/2019	ND<3.91202	ND<50
6/15/2020	ND<3.91202	ND<50
12/5/2020	ND<3.91202	ND<50
3/26/2021	4.3745	79.4

---

CLF-OPP	17	16 (94.1176%)	12/7/2016	ND<3.91202	ND<50
			1/18/2017	ND<3.91202	ND<50
			2/23/2017	ND<3.68888	ND<40
			3/22/2017	2.66228	14.3289
			4/5/2017	ND<3.91202	ND<50
			4/25/2017	ND<3.91202	ND<50
			7/6/2017	ND<3.91202	ND<50
			8/8/2017	ND<3.91202	ND<50
			10/9/2017	ND<3.91202	ND<50
			12/6/2017	ND<3.91202	ND<50
			5/15/2018	ND<3.91202	ND<50
			10/16/2018	ND<3.91202	ND<50
			6/11/2019	ND<3.91202	ND<50
			10/22/2019	ND<3.91202	ND<50
			6/15/2020	ND<3.91202	ND<50
			12/5/2020	ND<3.91202	ND<50
			3/26/2021	ND<3.91202	ND<50

---

## Dixon's Test for Outliers

Parameter: Boron

Location: CLF-J2

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.272279	0.332688	0.525	None

Loc.	Date	Conc.	Outlier
CLF-J2	12/7/2016	6.0027	FALSE
	1/18/2017	4.87304	FALSE
	2/23/2017	6.69823	FALSE
	3/22/2017	5.73439	FALSE
	4/5/2017	5.78401	FALSE
	4/25/2017	4.83896	FALSE
	7/6/2017	7.39388	FALSE
	8/8/2017	5.81711	FALSE
	10/9/2017	6.29895	FALSE
	12/6/2017	6.88244	FALSE
	5/15/2018	4.8752	FALSE
	10/16/2018	4.68213	FALSE
	6/11/2019	4.86753	FALSE
	10/22/2019	6.24804	FALSE
	6/29/2020	ND<3.91202	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Boron

Location: CLF-J2

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	3.91202	7.39388	3.48186	0.515	1.79316
2	4.68213	6.88244	2.20031	0.3306	0.727421
3	4.83896	6.69823	1.85927	0.2495	0.463887
4	4.86753	6.29895	1.43141	0.1878	0.26882
5	4.87304	6.24804	1.375	0.1353	0.186038
6	4.8752	6.0027	1.1275	0.088	0.0992201
7	5.73439	5.81711	0.0827251	0.0433	0.003582
8	5.78401	5.78401	0		
9	5.81711	5.73439	-0.0827251		
10	6.0027	4.8752	-1.1275		
11	6.24804	4.87304	-1.375		
12	6.29895	4.86753	-1.43141		
13	6.69823	4.83896	-1.85927		
14	6.88244	4.68213	-2.20031		
15	7.39388	3.91202	-3.48186		

---

Sum of b values = 3.54212

Sample Standard Deviation = 0.965278

W Statistic = 0.961821

5% Critical value of 0.881 is less than 0.961821

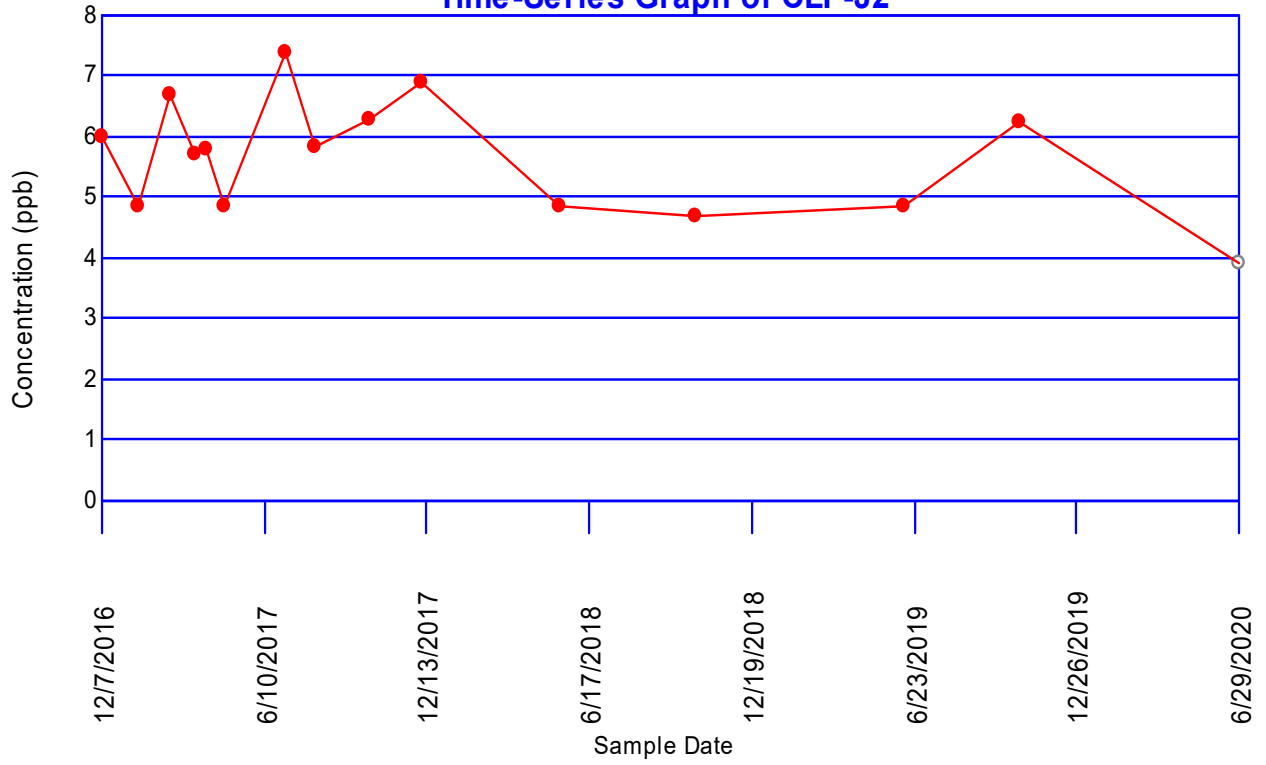
Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.961821

Data is normally distributed at 99% level of significance

# Boron

## Time-Series Graph of CLF-J2



**Mann-Kendall Trend Analysis**  
**Parameter: Boron**  
**Location: CLF-J2**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
4.87304	6.0027	-1.12966	0	1
6.69823	6.0027	0.69553	1	1
5.73439	6.0027	-0.268313	1	2
5.78401	6.0027	-0.218692	1	3
4.83896	6.0027	-1.16374	1	4
7.39388	6.0027	1.39118	2	4
5.81711	6.0027	-0.185588	2	5
6.29895	6.0027	0.296251	3	5
6.88244	6.0027	0.879739	4	5
4.8752	6.0027	-1.1275	4	6
4.68213	6.0027	-1.32057	4	7
4.86753	6.0027	-1.13516	4	8
6.24804	6.0027	0.245344	5	8
ND<3.91202	6.0027	-2.09068	5	9
6.69823	4.87304	1.82519	6	9
5.73439	4.87304	0.861344	7	9
5.78401	4.87304	0.910964	8	9
4.83896	4.87304	-0.0340815	8	10
7.39388	4.87304	2.52084	9	10
5.81711	4.87304	0.944069	10	10
6.29895	4.87304	1.42591	11	10
6.88244	4.87304	2.0094	12	10
4.8752	4.87304	0.00215499	13	10
4.68213	4.87304	-0.190911	13	11
4.86753	4.87304	-0.00550788	13	12
6.24804	4.87304	1.375	14	12
ND<3.91202	4.87304	-0.961019	14	13
5.73439	6.69823	-0.963843	14	14
5.78401	6.69823	-0.914222	14	15
4.83896	6.69823	-1.85927	14	16
7.39388	6.69823	0.69565	15	16
5.81711	6.69823	-0.881117	15	17
6.29895	6.69823	-0.399279	15	18
6.88244	6.69823	0.184209	16	18
4.8752	6.69823	-1.82303	16	19
4.68213	6.69823	-2.0161	16	20
4.86753	6.69823	-1.83069	16	21
6.24804	6.69823	-0.450186	16	22
ND<3.91202	6.69823	-2.78621	16	23
5.78401	5.73439	0.0496207	17	23
4.83896	5.73439	-0.895425	17	24
7.39388	5.73439	1.65949	18	24
5.81711	5.73439	0.0827251	19	24
6.29895	5.73439	0.564563	20	24

6.88244	5.73439	1.14805	21	24
4.8752	5.73439	-0.859189	21	25
4.68213	5.73439	-1.05225	21	26
4.86753	5.73439	-0.866852	21	27
6.24804	5.73439	0.513657	22	27
ND<3.91202	5.73439	-1.82236	22	28
4.83896	5.78401	-0.945046	22	29
7.39388	5.78401	1.60987	23	29
5.81711	5.78401	0.0331045	24	29
6.29895	5.78401	0.514943	25	29
6.88244	5.78401	1.09843	26	29
4.8752	5.78401	-0.908809	26	30
4.68213	5.78401	-1.10188	26	31
4.86753	5.78401	-0.916472	26	32
6.24804	5.78401	0.464036	27	32
ND<3.91202	5.78401	-1.87198	27	33
7.39388	4.83896	2.55492	28	33
5.81711	4.83896	0.97815	29	33
6.29895	4.83896	1.45999	30	33
6.88244	4.83896	2.04348	31	33
4.8752	4.83896	0.0362365	32	33
4.68213	4.83896	-0.15683	32	34
4.86753	4.83896	0.0285736	33	34
6.24804	4.83896	1.40908	34	34
ND<3.91202	4.83896	-0.926938	34	35
5.81711	7.39388	-1.57677	34	36
6.29895	7.39388	-1.09493	34	37
6.88244	7.39388	-0.511441	34	38
4.8752	7.39388	-2.51868	34	39
4.68213	7.39388	-2.71175	34	40
4.86753	7.39388	-2.52634	34	41
6.24804	7.39388	-1.14584	34	42
ND<3.91202	7.39388	-3.48186	34	43
6.29895	5.81711	0.481838	35	43
6.88244	5.81711	1.06533	36	43
4.8752	5.81711	-0.941914	36	44
4.68213	5.81711	-1.13498	36	45
4.86753	5.81711	-0.949577	36	46
6.24804	5.81711	0.430932	37	46
ND<3.91202	5.81711	-1.90509	37	47
6.88244	6.29895	0.583488	38	47
4.8752	6.29895	-1.42375	38	48
4.68213	6.29895	-1.61682	38	49
4.86753	6.29895	-1.43141	38	50
6.24804	6.29895	-0.0509064	38	51
ND<3.91202	6.29895	-2.38693	38	52
4.8752	6.88244	-2.00724	38	53
4.68213	6.88244	-2.20031	38	54
4.86753	6.88244	-2.0149	38	55
6.24804	6.88244	-0.634395	38	56
ND<3.91202	6.88244	-2.97041	38	57

4.68213	4.8752	-0.193066	38	58
4.86753	4.8752	-0.00766287	38	59
6.24804	4.8752	1.37285	39	59
ND<3.91202	4.8752	-0.963174	39	60
4.86753	4.68213	0.185403	40	60
6.24804	4.68213	1.56591	41	60
ND<3.91202	4.68213	-0.770108	41	61
6.24804	4.86753	1.38051	42	61
ND<3.91202	4.86753	-0.955511	42	62
ND<3.91202	6.24804	-2.33602	42	63

S Statistic = 42 - 63 = -21

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/29/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -0.989743

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-0.989743**| <= 1.97737 indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Boron

Location: CLF-J3

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 14 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.555585	0.0542946	0.546	1741
2	0.453426	0.0542946	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J3	12/7/2016	426.902	FALSE
	1/18/2017	130.881	FALSE
	2/23/2017	850.398	FALSE
	3/22/2017	303.698	FALSE
	4/5/2017	312.635	FALSE
	7/6/2017	<b>1741</b>	<b>TRUE</b>
	8/8/2017	340	FALSE
	10/9/2017	579	FALSE
	12/6/2017	991	FALSE
	5/15/2018	601	FALSE
	10/16/2018	97.1	FALSE
	6/11/2019	138	FALSE
	10/22/2019	574	FALSE
	6/15/2020	597	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Boron

Location: CLF-J3

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 14 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	97.1	1741	1643.9	0.5251	863.212
2	130.881	991	860.119	0.3318	285.387
3	138	850.398	712.398	0.246	175.25
4	303.698	601	297.302	0.1802	53.5738
5	312.635	597	284.365	0.124	35.2613
6	340	579	239	0.0727	17.3753
7	426.902	574	147.098	0.024	3.53035
8	574	426.902	-147.098		
9	579	340	-239		
10	597	312.635	-284.365		
11	601	303.698	-297.302		
12	850.398	138	-712.398		
13	991	130.881	-860.119		
14	1741	97.1	-1643.9		

---

Sum of b values = 1433.59

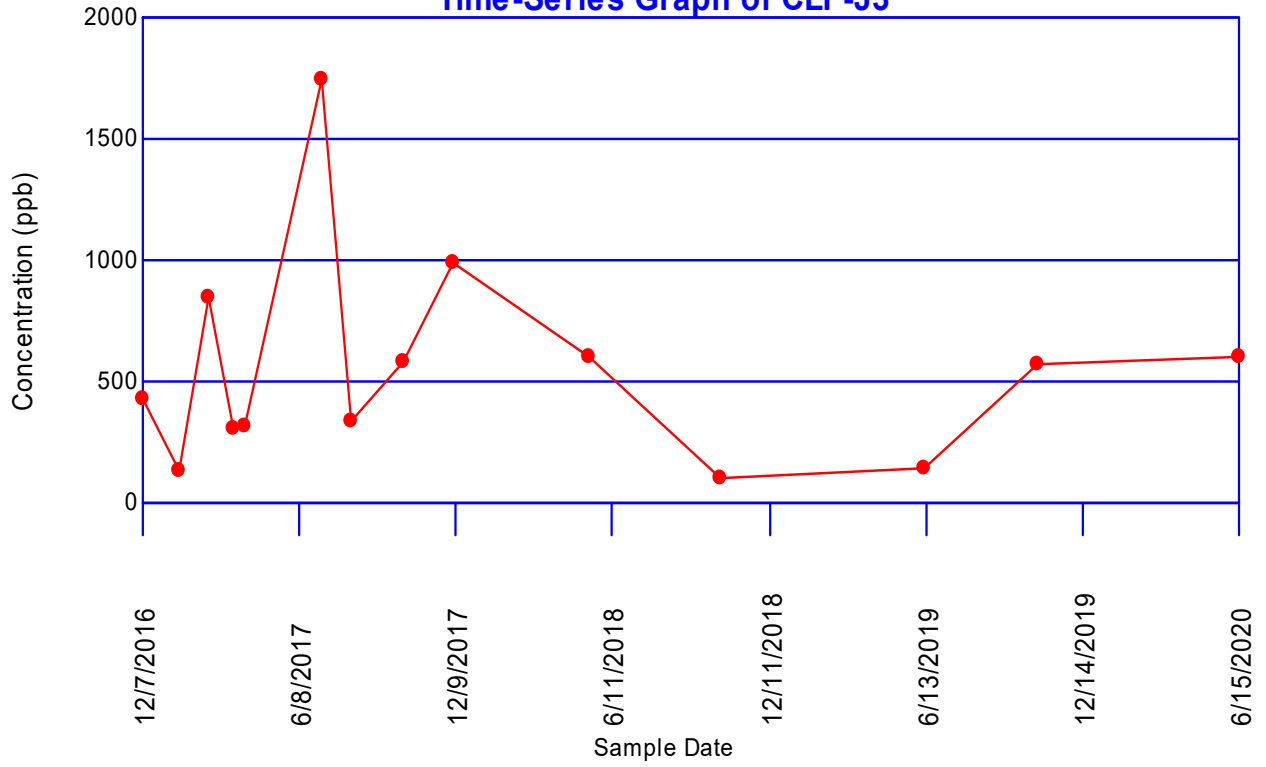
Sample Standard Deviation = 432.896

W Statistic = 0.843604

**5% Critical value of 0.874 exceeds 0.843604**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.825 is less than 0.843604  
Data is normally distributed at 99% level of significance

### Boron Time-Series Graph of CLF-J3



## Mann-Kendall Trend Analysis

Parameter: Boron

Location: CLF-J3

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
130.881	426.902	-296.021	0	1
850.398	426.902	423.496	1	1
303.698	426.902	-123.204	1	2
312.635	426.902	-114.267	1	3
1741	426.902	1314.1	2	3
340	426.902	-86.902	2	4
579	426.902	152.098	3	4
991	426.902	564.098	4	4
601	426.902	174.098	5	4
97.1	426.902	-329.802	5	5
138	426.902	-288.902	5	6
574	426.902	147.098	6	6
597	426.902	170.098	7	6
850.398	130.881	719.517	8	6
303.698	130.881	172.817	9	6
312.635	130.881	181.754	10	6
1741	130.881	1610.12	11	6
340	130.881	209.119	12	6
579	130.881	448.119	13	6
991	130.881	860.119	14	6
601	130.881	470.119	15	6
97.1	130.881	-33.781	15	7
138	130.881	7.119	16	7
574	130.881	443.119	17	7
597	130.881	466.119	18	7
303.698	850.398	-546.7	18	8
312.635	850.398	-537.763	18	9
1741	850.398	890.602	19	9
340	850.398	-510.398	19	10
579	850.398	-271.398	19	11
991	850.398	140.602	20	11
601	850.398	-249.398	20	12
97.1	850.398	-753.298	20	13
138	850.398	-712.398	20	14
574	850.398	-276.398	20	15
597	850.398	-253.398	20	16
312.635	303.698	8.937	21	16
1741	303.698	1437.3	22	16
340	303.698	36.302	23	16
579	303.698	275.302	24	16
991	303.698	687.302	25	16
601	303.698	297.302	26	16
97.1	303.698	-206.598	26	17
138	303.698	-165.698	26	18

574	303.698	270.302	27	18
597	303.698	293.302	28	18
1741	312.635	1428.37	29	18
340	312.635	27.365	30	18
579	312.635	266.365	31	18
991	312.635	678.365	32	18
601	312.635	288.365	33	18
97.1	312.635	-215.535	33	19
138	312.635	-174.635	33	20
574	312.635	261.365	34	20
597	312.635	284.365	35	20
340	1741	-1401	35	21
579	1741	-1162	35	22
991	1741	-750	35	23
601	1741	-1140	35	24
97.1	1741	-1643.9	35	25
138	1741	-1603	35	26
574	1741	-1167	35	27
597	1741	-1144	35	28
579	340	239	36	28
991	340	651	37	28
601	340	261	38	28
97.1	340	-242.9	38	29
138	340	-202	38	30
574	340	234	39	30
597	340	257	40	30
991	579	412	41	30
601	579	22	42	30
97.1	579	-481.9	42	31
138	579	-441	42	32
574	579	-5	42	33
597	579	18	43	33
601	991	-390	43	34
97.1	991	-893.9	43	35
138	991	-853	43	36
574	991	-417	43	37
597	991	-394	43	38
97.1	601	-503.9	43	39
138	601	-463	43	40
574	601	-27	43	41
597	601	-4	43	42
138	97.1	40.9	44	42
574	97.1	476.9	45	42
597	97.1	499.9	46	42
574	138	436	47	42
597	138	459	48	42
597	574	23	49	42

S Statistic = 49 - 42 = 7

---

Tied Group	Value	Members
<b>Time Period</b>		<b>Observations</b>
12/7/2016		1
1/18/2017		1
2/23/2017		1
3/22/2017		1
4/5/2017		1
7/6/2017		1
8/8/2017		1
10/9/2017		1
12/6/2017		1
5/15/2018		1
10/16/2018		1
6/11/2019		1
10/22/2019		1
6/15/2020		1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = 0.328469

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|0.328469| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Boron

Location: CLF-J5

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.507828	0.102504	0.525	None

Loc.	Date	Conc.	Outlier
CLF-J5	12/7/2016	6.09509	FALSE
	1/18/2017	4.85224	FALSE
	2/23/2017	6.09015	FALSE
	3/22/2017	5.66439	FALSE
	4/5/2017	5.64114	FALSE
	4/25/2017	4.7934	FALSE
	7/6/2017	7.44425	FALSE
	8/8/2017	5.86079	FALSE
	10/9/2017	6.28227	FALSE
	12/6/2017	6.00881	FALSE
	5/15/2018	6.09807	FALSE
	10/16/2018	4.64439	FALSE
	6/11/2019	4.77912	FALSE
	10/22/2019	5.79301	FALSE
	6/15/2020	6.05912	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Boron

Location: CLF-J5

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	4.64439	7.44425	2.79986	0.515	1.44193
2	4.77912	6.28227	1.50314	0.3306	0.496939
3	4.7934	6.09807	1.30468	0.2495	0.325516
4	4.85224	6.09509	1.24285	0.1878	0.233408
5	5.64114	6.09015	0.449008	0.1353	0.0607507
6	5.66439	6.05912	0.39473	0.088	0.0347362
7	5.79301	6.00881	0.2158	0.0433	0.00934412
8	5.86079	5.86079	0		0
9	6.00881	5.79301	-0.2158		
10	6.05912	5.66439	-0.39473		
11	6.09015	5.64114	-0.449008		
12	6.09509	4.85224	-1.24285		
13	6.09807	4.7934	-1.30468		
14	6.28227	4.77912	-1.50314		
15	7.44425	4.64439	-2.79986		

---

Sum of b values = 2.60262

Sample Standard Deviation = 0.736315

W Statistic = 0.892415

5% Critical value of 0.881 is less than 0.892415

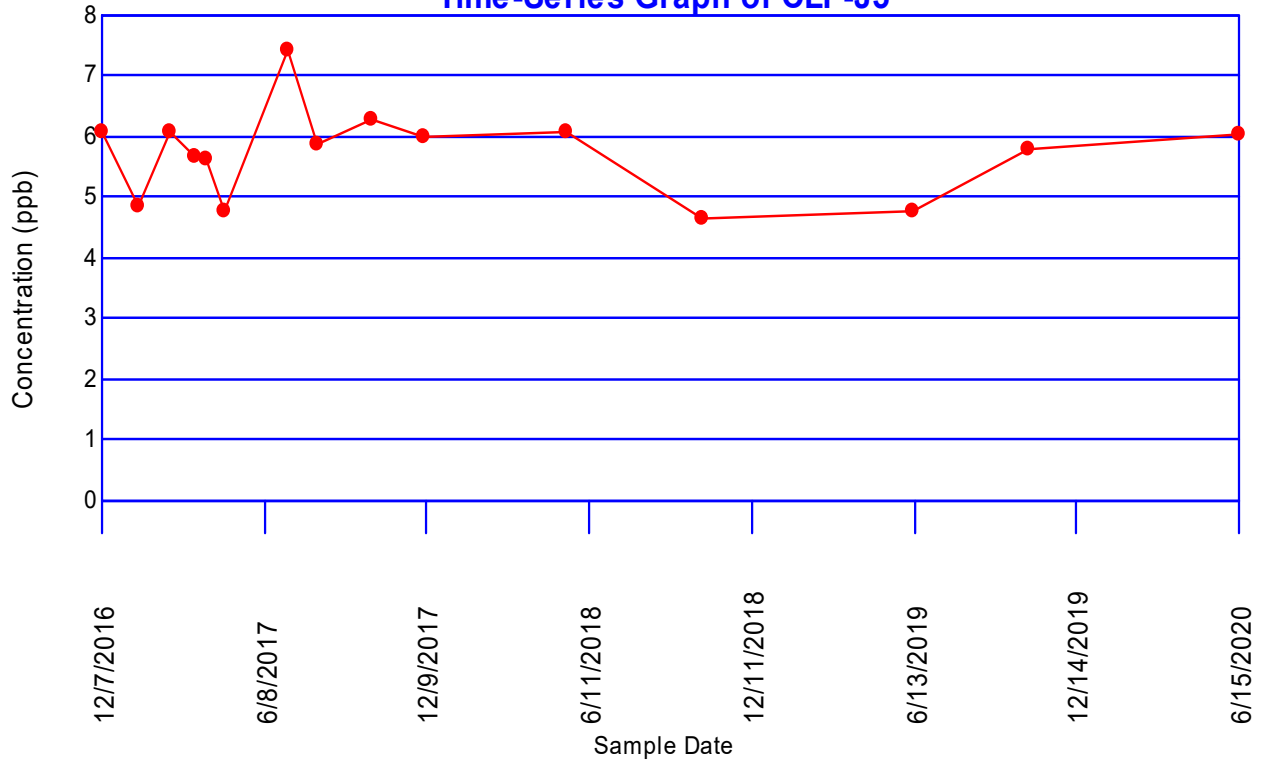
Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.892415

Data is normally distributed at 99% level of significance



### Boron Time-Series Graph of CLF-J5



**Mann-Kendall Trend Analysis**  
**Parameter: Boron**  
**Location: CLF-J5**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
4.85224	6.09509	-1.24285	0	1
6.09015	6.09509	-0.00494599	0	2
5.66439	6.09509	-0.430701	0	3
5.64114	6.09509	-0.453954	0	4
4.7934	6.09509	-1.3017	0	5
7.44425	6.09509	1.34915	1	5
5.86079	6.09509	-0.234308	1	6
6.28227	6.09509	0.187172	2	6
6.00881	6.09509	-0.0862814	2	7
6.09807	6.09509	0.00297972	3	7
4.64439	6.09509	-1.4507	3	8
4.77912	6.09509	-1.31597	3	9
5.79301	6.09509	-0.302081	3	10
6.05912	6.09509	-0.0359714	3	11
6.09015	4.85224	1.23791	4	11
5.66439	4.85224	0.812152	5	11
5.64114	4.85224	0.7889	6	11
4.7934	4.85224	-0.0588419	6	12
7.44425	4.85224	2.59201	7	12
5.86079	4.85224	1.00855	8	12
6.28227	4.85224	1.43003	9	12
6.00881	4.85224	1.15657	10	12
6.09807	4.85224	1.24583	11	12
4.64439	4.85224	-0.20785	11	13
4.77912	4.85224	-0.0731177	11	14
5.79301	4.85224	0.940772	12	14
6.05912	4.85224	1.20688	13	14
5.66439	6.09015	-0.425755	13	15
5.64114	6.09015	-0.449008	13	16
4.7934	6.09015	-1.29675	13	17
7.44425	6.09015	1.3541	14	17
5.86079	6.09015	-0.229362	14	18
6.28227	6.09015	0.192118	15	18
6.00881	6.09015	-0.0813354	15	19
6.09807	6.09015	0.00792571	16	19
4.64439	6.09015	-1.44576	16	20
4.77912	6.09015	-1.31103	16	21
5.79301	6.09015	-0.297135	16	22
6.05912	6.09015	-0.0310254	16	23
5.64114	5.66439	-0.0232527	16	24
4.7934	5.66439	-0.870994	16	25
7.44425	5.66439	1.77986	17	25
5.86079	5.66439	0.196393	18	25
6.28227	5.66439	0.617873	19	25

6.00881	5.66439	0.34442	20	25
6.09807	5.66439	0.433681	21	25
4.64439	5.66439	-1.02	21	26
4.77912	5.66439	-0.88527	21	27
5.79301	5.66439	0.12862	22	27
6.05912	5.66439	0.39473	23	27
4.7934	5.64114	-0.847742	23	28
7.44425	5.64114	1.80311	24	28
5.86079	5.64114	0.219645	25	28
6.28227	5.64114	0.641126	26	28
6.00881	5.64114	0.367672	27	28
6.09807	5.64114	0.456933	28	28
4.64439	5.64114	-0.99675	28	29
4.77912	5.64114	-0.862017	28	30
5.79301	5.64114	0.151873	29	30
6.05912	5.64114	0.417982	30	30
7.44425	4.7934	2.65085	31	30
5.86079	4.7934	1.06739	32	30
6.28227	4.7934	1.48887	33	30
6.00881	4.7934	1.21541	34	30
6.09807	4.7934	1.30468	35	30
4.64439	4.7934	-0.149008	35	31
4.77912	4.7934	-0.0142758	35	32
5.79301	4.7934	0.999614	36	32
6.05912	4.7934	1.26572	37	32
5.86079	7.44425	-1.58346	37	33
6.28227	7.44425	-1.16198	37	34
6.00881	7.44425	-1.43544	37	35
6.09807	7.44425	-1.34617	37	36
4.64439	7.44425	-2.79986	37	37
4.77912	7.44425	-2.66513	37	38
5.79301	7.44425	-1.65124	37	39
6.05912	7.44425	-1.38513	37	40
6.28227	5.86079	0.421481	38	40
6.00881	5.86079	0.148027	39	40
6.09807	5.86079	0.237288	40	40
4.64439	5.86079	-1.2164	40	41
4.77912	5.86079	-1.08166	40	42
5.79301	5.86079	-0.0677726	40	43
6.05912	5.86079	0.198337	41	43
6.00881	6.28227	-0.273454	41	44
6.09807	6.28227	-0.184192	41	45
4.64439	6.28227	-1.63788	41	46
4.77912	6.28227	-1.50314	41	47
5.79301	6.28227	-0.489253	41	48
6.05912	6.28227	-0.223144	41	49
6.09807	6.00881	0.0892611	42	49
4.64439	6.00881	-1.36442	42	50
4.77912	6.00881	-1.22969	42	51
5.79301	6.00881	-0.2158	42	52
6.05912	6.00881	0.05031	43	52

4.64439	6.09807	-1.45368	43	53
4.77912	6.09807	-1.31895	43	54
5.79301	6.09807	-0.305061	43	55
6.05912	6.09807	-0.0389511	43	56
4.77912	4.64439	0.134733	44	56
5.79301	4.64439	1.14862	45	56
6.05912	4.64439	1.41473	46	56
5.79301	4.77912	1.01389	47	56
6.05912	4.77912	1.28	48	56
6.05912	5.79301	0.26611	49	56

S Statistic = 49 - 56 = -7

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -0.296923

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-0.296923**| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Boron

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.285066	0.316279	0.525	None

Loc.	Date	Conc.	Outlier
CLF-S13	12/7/2016	473.085	FALSE
	1/18/2017	714.92	FALSE
	2/23/2017	1040.84	FALSE
	3/22/2017	754.577	FALSE
	4/5/2017	836.075	FALSE
	4/25/2017	732.116	FALSE
	7/6/2017	424	FALSE
	8/8/2017	455	FALSE
	10/9/2017	430	FALSE
	12/6/2017	865	FALSE
	5/15/2018	922	FALSE
	10/16/2018	385	FALSE
	6/11/2019	484	FALSE
	10/22/2019	220	FALSE
	6/15/2020	469	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Boron

Location: CLF-S13

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	220	1040.84	820.84	0.515	422.733
2	385	922	537	0.3306	177.532
3	424	865	441	0.2495	110.03
4	430	836.075	406.075	0.1878	76.2609
5	455	754.577	299.577	0.1353	40.5328
6	469	732.116	263.116	0.088	23.1542
7	473.085	714.92	241.835	0.0433	10.4715
8	484	484	0		
9	714.92	473.085	-241.835		
10	732.116	469	-263.116		
11	754.577	455	-299.577		
12	836.075	430	-406.075		
13	865	424	-441		
14	922	385	-537		
15	1040.84	220	-820.84		

---

Sum of b values = 860.714

Sample Standard Deviation = 238.143

W Statistic = 0.933071

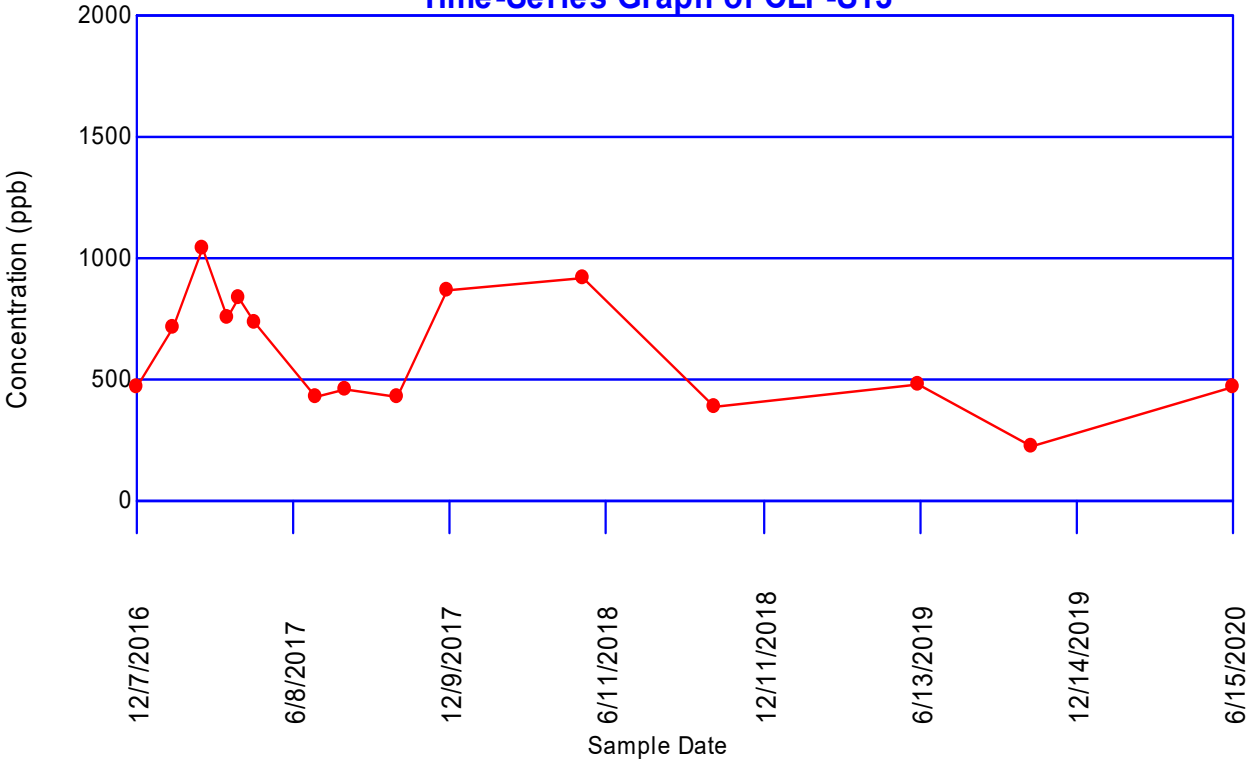
5% Critical value of 0.881 is less than 0.933071

Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.933071

Data is normally distributed at 99% level of significance

### Boron Time-Series Graph of CLF-S13



## Mann-Kendall Trend Analysis

Parameter: Boron

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
714.92	473.085	241.835	1	0
1040.84	473.085	567.755	2	0
754.577	473.085	281.492	3	0
836.075	473.085	362.99	4	0
732.116	473.085	259.031	5	0
424	473.085	-49.085	5	1
455	473.085	-18.085	5	2
430	473.085	-43.085	5	3
865	473.085	391.915	6	3
922	473.085	448.915	7	3
385	473.085	-88.085	7	4
484	473.085	10.915	8	4
220	473.085	-253.085	8	5
469	473.085	-4.085	8	6
1040.84	714.92	325.92	9	6
754.577	714.92	39.657	10	6
836.075	714.92	121.155	11	6
732.116	714.92	17.196	12	6
424	714.92	-290.92	12	7
455	714.92	-259.92	12	8
430	714.92	-284.92	12	9
865	714.92	150.08	13	9
922	714.92	207.08	14	9
385	714.92	-329.92	14	10
484	714.92	-230.92	14	11
220	714.92	-494.92	14	12
469	714.92	-245.92	14	13
754.577	1040.84	-286.263	14	14
836.075	1040.84	-204.765	14	15
732.116	1040.84	-308.724	14	16
424	1040.84	-616.84	14	17
455	1040.84	-585.84	14	18
430	1040.84	-610.84	14	19
865	1040.84	-175.84	14	20
922	1040.84	-118.84	14	21
385	1040.84	-655.84	14	22
484	1040.84	-556.84	14	23
220	1040.84	-820.84	14	24
469	1040.84	-571.84	14	25
836.075	754.577	81.498	15	25
732.116	754.577	-22.461	15	26
424	754.577	-330.577	15	27
455	754.577	-299.577	15	28
430	754.577	-324.577	15	29



865	754.577	110.423	16	29
922	754.577	167.423	17	29
385	754.577	-369.577	17	30
484	754.577	-270.577	17	31
220	754.577	-534.577	17	32
469	754.577	-285.577	17	33
732.116	836.075	-103.959	17	34
424	836.075	-412.075	17	35
455	836.075	-381.075	17	36
430	836.075	-406.075	17	37
865	836.075	28.925	18	37
922	836.075	85.925	19	37
385	836.075	-451.075	19	38
484	836.075	-352.075	19	39
220	836.075	-616.075	19	40
469	836.075	-367.075	19	41
424	732.116	-308.116	19	42
455	732.116	-277.116	19	43
430	732.116	-302.116	19	44
865	732.116	132.884	20	44
922	732.116	189.884	21	44
385	732.116	-347.116	21	45
484	732.116	-248.116	21	46
220	732.116	-512.116	21	47
469	732.116	-263.116	21	48
455	424	31	22	48
430	424	6	23	48
865	424	441	24	48
922	424	498	25	48
385	424	-39	25	49
484	424	60	26	49
220	424	-204	26	50
469	424	45	27	50
430	455	-25	27	51
865	455	410	28	51
922	455	467	29	51
385	455	-70	29	52
484	455	29	30	52
220	455	-235	30	53
469	455	14	31	53
865	430	435	32	53
922	430	492	33	53
385	430	-45	33	54
484	430	54	34	54
220	430	-210	34	55
469	430	39	35	55
922	865	57	36	55
385	865	-480	36	56
484	865	-381	36	57
220	865	-645	36	58
469	865	-396	36	59

385	922	-537	36	60
484	922	-438	36	61
220	922	-702	36	62
469	922	-453	36	63
484	385	99	37	63
220	385	-165	37	64
469	385	84	38	64
220	484	-264	38	65
469	484	-15	38	66
469	220	249	39	66

S Statistic = 39 - 66 = -27

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -1.28667

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-1.28667**| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Boron

Location: CLF-S05

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.485756	0	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S05	1/18/2017	4.6817	FALSE
	4/5/2017	5.21984	FALSE
	4/25/2017	4.40681	FALSE
	10/16/2018	ND<3.91202	FALSE
	10/22/2019	6.4552	FALSE
	6/29/2020	ND<3.91202	FALSE
	12/5/2020	4.35414	FALSE
	3/26/2021	4.22391	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Boron

Location: CLF-S05

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	3.91202	6.4552	2.54318	0.6052	1.53913
2	3.91202	5.21984	1.30781	0.3164	0.413792
3	4.22391	4.6817	0.457786	0.1743	0.0797921
4	4.35414	4.40681	0.0526656	0.0561	0.00295454
5	4.40681	4.35414	-0.0526656		
6	4.6817	4.22391	-0.457786		
7	5.21984	3.91202	-1.30781		
8	6.4552	3.91202	-2.54318		

---

Sum of b values = 2.03567

Sample Standard Deviation = 0.845303

W Statistic = 0.828498

5% Critical value of 0.818 is less than 0.828498

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.828498

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Boron**  
**Location: CLF-S05**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

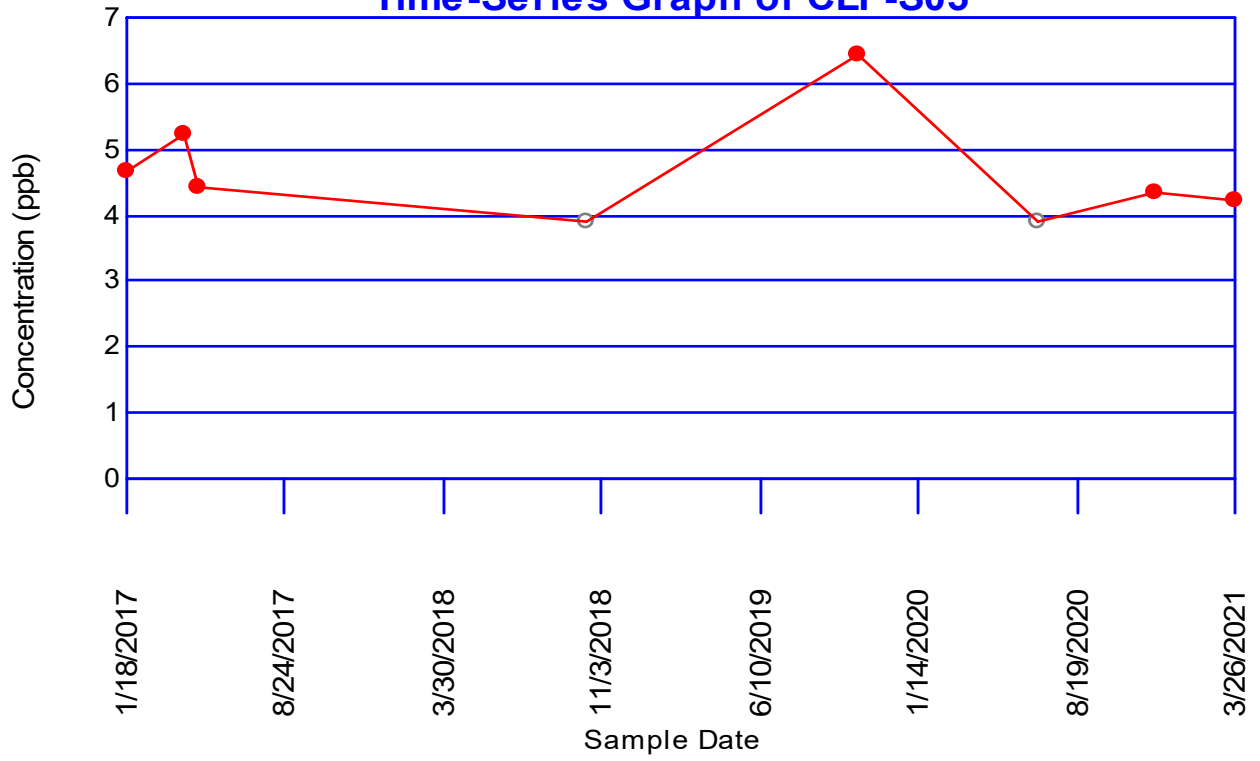
95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
5.21984	4.6817	0.538141	1	0
4.40681	4.6817	-0.274889	1	1
ND<3.91202	4.6817	-0.769673	1	2
6.4552	4.6817	1.7735	2	2
ND<3.91202	4.6817	-0.769673	2	3
4.35414	4.6817	-0.327555	2	4
4.22391	4.6817	-0.457786	2	5
4.40681	5.21984	-0.81303	2	6
ND<3.91202	5.21984	-1.30781	2	7
6.4552	5.21984	1.23536	3	7
ND<3.91202	5.21984	-1.30781	3	8
4.35414	5.21984	-0.865695	3	9
4.22391	5.21984	-0.995927	3	10
ND<3.91202	4.40681	-0.494784	3	11
6.4552	4.40681	2.04839	4	11
ND<3.91202	4.40681	-0.494784	4	12
4.35414	4.40681	-0.0526656	4	13
4.22391	4.40681	-0.182897	4	14
6.4552	ND<3.91202	2.54318	5	14
ND<3.91202	ND<3.91202	0	5	14
4.35414	ND<3.91202	0.442118	6	14
4.22391	ND<3.91202	0.311887	7	14
ND<3.91202	6.4552	-2.54318	7	15
4.35414	6.4552	-2.10106	7	16
4.22391	6.4552	-2.23129	7	17
4.35414	ND<3.91202	0.442118	8	17
4.22391	ND<3.91202	0.311887	9	17
4.22391	4.35414	-0.130232	9	18

S Statistic = 9 - 18 = -9  
 Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
 Probability of obtaining S >= |-9| is 0.337  
 0.337 >= 0.025 indicating no evidence of a trend

# Boron

## Time-Series Graph of CLF-S05



## Concentrations (ppb)

Parameter: Calcium

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Total Measurements: 74

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

---

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

---

There are 6 compliance locations

---

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

---

CLF-J2	15	0 (0%)	12/7/2016	11.6084	110017
			1/18/2017	11.283	79460.5
			2/23/2017	11.5718	106069
			3/22/2017	11.7146	122341
			4/5/2017	11.7006	120639
			4/25/2017	11.6748	117569
			7/6/2017	12.3864	239532
			8/8/2017	11.6965	120150
			10/9/2017	12.0184	165778
			12/6/2017	11.6995	120511
			5/15/2018	10.5133	36800
			10/16/2018	11.6351	113000
			6/11/2019	11.3691	86600
			10/22/2019	11.5089	99600
			6/29/2020	11.0004	59900
	<b>12/5/2020</b>	<b>11.2734</b>	<b>78700</b>		
	<b>3/26/2021</b>	<b>11.2332</b>	<b>75600</b>		

---

CLF-J3	14	0 (0%)	12/7/2016	11.6066	109825
			1/18/2017	11.2693	78378.3
			2/23/2017	11.5865	107630
			3/22/2017	11.724	123501
			4/5/2017	11.6948	119951
			7/6/2017	12.3875	239796
			8/8/2017	11.7128	122120
			10/9/2017	12.0289	167535
			12/6/2017	11.7215	123196
			5/15/2018	11.6784	118000
			10/16/2018	11.4876	97500
			6/11/2019	11.3986	89200
			10/22/2019	11.5991	109000
			6/15/2020	11.6869	119000
				<b>12/5/2020</b>	<b>11.3278</b>
	<b>3/26/2021</b>	<b>11.2159</b>	<b>74300</b>		

---

CLF-J5	15	0 (0%)	12/7/2016	11.4623	95061.3
			1/18/2017	11.2766	78950.2
			2/23/2017	11.4982	98538.8
			3/22/2017	11.7076	121487
			4/5/2017	11.713	122145
			4/25/2017	11.6477	114426

			7/6/2017	12.6026	297325
			8/8/2017	11.7021	120823
			10/9/2017	12.1052	180815
			12/6/2017	11.5677	105625
			5/15/2018	11.6173	111000
			10/16/2018	11.5806	107000
			6/11/2019	11.3242	82800
			10/22/2019	11.7035	121000
			6/15/2020	11.6173	111000
			<b>12/5/2020</b>	<b>11.2772</b>	<b>79000</b>
			<b>3/26/2021</b>	<b>11.2078</b>	<b>73700</b>
<hr/>					
CLF-S05	8	0 (0%)	1/18/2017	11.2442	76432
			4/5/2017	11.6092	110104
			4/25/2017	11.6327	112725
			10/16/2018	11.47	95800
			10/22/2019	11.6952	120000
			6/29/2020	11.1676	70800
			12/5/2020	11.4076	90000
			3/26/2021	11.1747	71300
<hr/>					
CLF-S06	7	0 (0%)	1/18/2017	11.1348	68511.1
			4/5/2017	11.4034	89628.6
			4/25/2017	11.3577	85619
			10/16/2018	11.4131	90500
			6/29/2020	11.2372	75900
			12/5/2020	11.2797	79200
			3/26/2021	11.2645	78000
<hr/>					
CLF-S13	15	0 (0%)	12/7/2016	11.6179	111064
			1/18/2017	12.0171	165561
			2/23/2017	12.2891	217307
			3/22/2017	12.5061	269982
			4/5/2017	12.3884	240010
			4/25/2017	12.2787	215059
			7/6/2017	11.681	118300
			8/8/2017	11.5528	104065
			10/9/2017	11.5616	104990
			12/6/2017	12.0016	163020
			5/15/2018	12.1626	191500
			10/16/2018	11.7199	123000
			6/11/2019	11.8982	147000
			10/22/2019	11.3953	88900
			6/15/2020	11.8565	141000
			<b>12/5/2020</b>	<b>11.5806</b>	<b>107000</b>
			<b>3/26/2021</b>	<b>11.8277</b>	<b>137000</b>

There are 2 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
CLF-C03	17	0 (0%)	12/7/2016	11.373	86943
			1/18/2017	11.2253	75002.6
			2/23/2017	11.3706	86737.5
			3/22/2017	11.4629	95118.7
			4/5/2017	11.423	91401.4
			4/25/2017	11.572	106082



			7/6/2017	11.2761	78911
			8/8/2017	11.2173	74410
			10/9/2017	11.2259	75048
			12/6/2017	11.392	88607
			5/15/2018	11.3469	84700
			10/16/2018	11.5899	108000
			6/11/2019	11.3667	86400
			10/22/2019	11.3516	85100
			6/15/2020	11.3421	84300
			12/5/2020	11.2797	79200
			3/26/2021	11.2593	77600
<hr/>					
CLF-OPP	17	0 (0%)	12/7/2016	11.054	63197.1
			1/18/2017	10.9105	54750.7
			2/23/2017	11.2227	74808.9
			3/22/2017	11.2662	78136.5
			4/5/2017	11.2716	78555.9
			4/25/2017	11.0536	63169.6
			7/6/2017	11.2656	78086
			8/8/2017	11.0438	62553
			10/9/2017	10.974	58339
			12/6/2017	11.3474	84749
			5/15/2018	11.3998	89300
			10/16/2018	11.3445	84500
			6/11/2019	10.9647	57800
			10/22/2019	11.1605	70300
			6/15/2020	11.1619	70400
			12/5/2020	11.0929	65700
			3/26/2021	11.0775	64700
<hr/>					

## Dixon's Test for Outliers

Parameter: Calcium

Location: CLF-J2

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.732117	0.498714	0.525	239532
2	0.522941	0.508838	0.546	None

Loc.	Date	Conc.	Outlier
CLF-J2	12/7/2016	110017	FALSE
	1/18/2017	79460.5	FALSE
	2/23/2017	106069	FALSE
	3/22/2017	122341	FALSE
	4/5/2017	120639	FALSE
	4/25/2017	117569	FALSE
	7/6/2017	<b>239532</b>	<b>TRUE</b>
	8/8/2017	120150	FALSE
	10/9/2017	165778	FALSE
	12/6/2017	120511	FALSE
	5/15/2018	36800	FALSE
	10/16/2018	113000	FALSE
	6/11/2019	86600	FALSE
	10/22/2019	99600	FALSE
	6/29/2020	59900	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Calcium

Location: CLF-J2

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	36800	239532	202732	0.515	104407
2	59900	165778	105878	0.3306	35003.3
3	79460.5	122341	42880.5	0.2495	10698.7
4	86600	120639	34039	0.1878	6392.52
5	99600	120511	20911	0.1353	2829.26
6	106069	120150	14081	0.088	1239.13
7	110017	117569	7552	0.0433	327.002
8	113000	113000	0		
9	117569	110017	-7552		
10	120150	106069	-14081		
11	120511	99600	-20911		
12	120639	86600	-34039		
13	122341	79460.5	-42880.5		
14	165778	59900	-105878		
15	239532	36800	-202732		

---

Sum of b values = 160897

Sample Standard Deviation = 46100.6

W Statistic = 0.87007

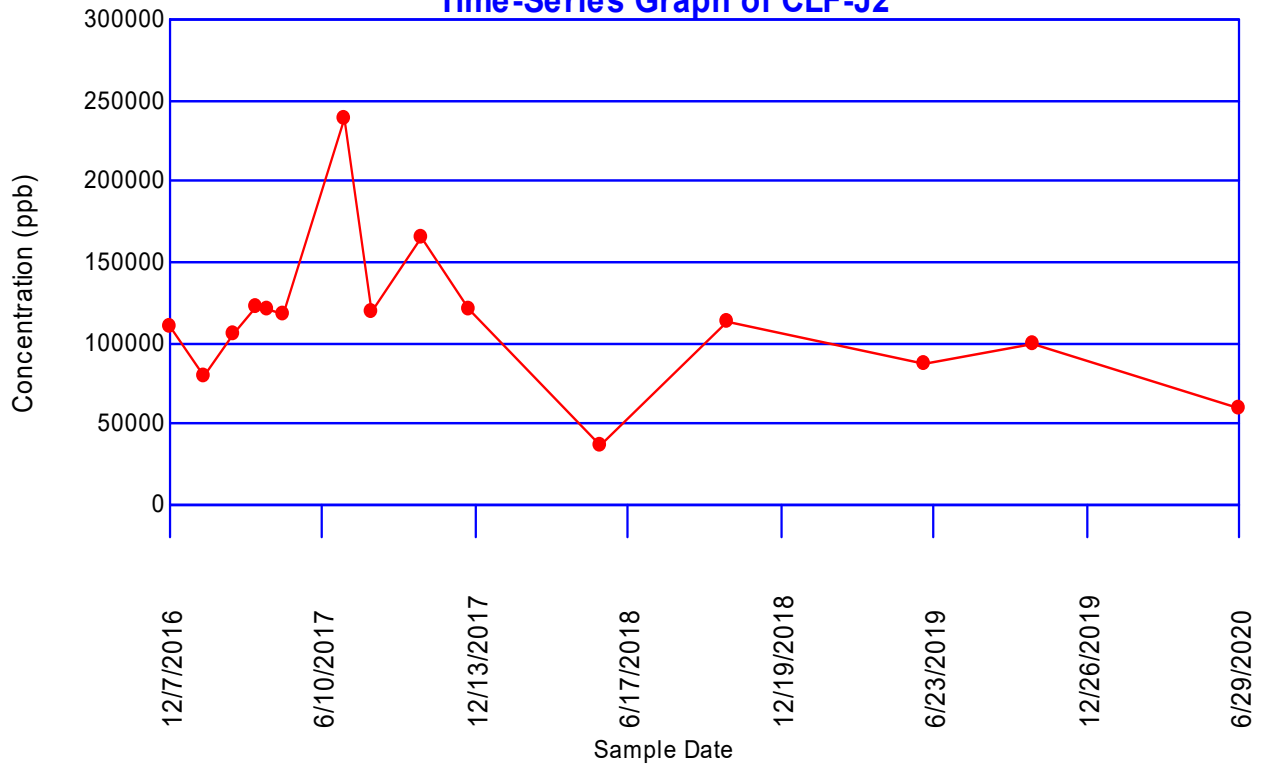
**5% Critical value of 0.881 exceeds 0.87007**

**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.835 is less than 0.87007

Data is normally distributed at 99% level of significance

### Calcium Time-Series Graph of CLF-J2



**Mann-Kendall Trend Analysis**  
**Parameter: Calcium**  
**Location: CLF-J2**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
79460.5	110017	-30556.5	0	1
106069	110017	-3948	0	2
122341	110017	12324	1	2
120639	110017	10622	2	2
117569	110017	7552	3	2
239532	110017	129515	4	2
120150	110017	10133	5	2
165778	110017	55761	6	2
120511	110017	10494	7	2
36800	110017	-73217	7	3
113000	110017	2983	8	3
86600	110017	-23417	8	4
99600	110017	-10417	8	5
59900	110017	-50117	8	6
106069	79460.5	26608.5	9	6
122341	79460.5	42880.5	10	6
120639	79460.5	41178.5	11	6
117569	79460.5	38108.5	12	6
239532	79460.5	160072	13	6
120150	79460.5	40689.5	14	6
165778	79460.5	86317.5	15	6
120511	79460.5	41050.5	16	6
36800	79460.5	-42660.5	16	7
113000	79460.5	33539.5	17	7
86600	79460.5	7139.5	18	7
99600	79460.5	20139.5	19	7
59900	79460.5	-19560.5	19	8
122341	106069	16272	20	8
120639	106069	14570	21	8
117569	106069	11500	22	8
239532	106069	133463	23	8
120150	106069	14081	24	8
165778	106069	59709	25	8
120511	106069	14442	26	8
36800	106069	-69269	26	9
113000	106069	6931	27	9
86600	106069	-19469	27	10
99600	106069	-6469	27	11
59900	106069	-46169	27	12
120639	122341	-1702	27	13
117569	122341	-4772	27	14
239532	122341	117191	28	14
120150	122341	-2191	28	15
165778	122341	43437	29	15

120511	122341	-1830	29	16
36800	122341	-85541	29	17
113000	122341	-9341	29	18
86600	122341	-35741	29	19
99600	122341	-22741	29	20
59900	122341	-62441	29	21
117569	120639	-3070	29	22
239532	120639	118893	30	22
120150	120639	-489	30	23
165778	120639	45139	31	23
120511	120639	-128	31	24
36800	120639	-83839	31	25
113000	120639	-7639	31	26
86600	120639	-34039	31	27
99600	120639	-21039	31	28
59900	120639	-60739	31	29
239532	117569	121963	32	29
120150	117569	2581	33	29
165778	117569	48209	34	29
120511	117569	2942	35	29
36800	117569	-80769	35	30
113000	117569	-4569	35	31
86600	117569	-30969	35	32
99600	117569	-17969	35	33
59900	117569	-57669	35	34
120150	239532	-119382	35	35
165778	239532	-73754	35	36
120511	239532	-119021	35	37
36800	239532	-202732	35	38
113000	239532	-126532	35	39
86600	239532	-152932	35	40
99600	239532	-139932	35	41
59900	239532	-179632	35	42
165778	120150	45628	36	42
120511	120150	361	37	42
36800	120150	-83350	37	43
113000	120150	-7150	37	44
86600	120150	-33550	37	45
99600	120150	-20550	37	46
59900	120150	-60250	37	47
120511	165778	-45267	37	48
36800	165778	-128978	37	49
113000	165778	-52778	37	50
86600	165778	-79178	37	51
99600	165778	-66178	37	52
59900	165778	-105878	37	53
36800	120511	-83711	37	54
113000	120511	-7511	37	55
86600	120511	-33911	37	56
99600	120511	-20911	37	57
59900	120511	-60611	37	58

113000	36800	76200	38	58
86600	36800	49800	39	58
99600	36800	62800	40	58
59900	36800	23100	41	58
86600	113000	-26400	41	59
99600	113000	-13400	41	60
59900	113000	-53100	41	61
99600	86600	13000	42	61
59900	86600	-26700	42	62
59900	99600	-39700	42	63

S Statistic = 42 - 63 = -21

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/29/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -0.989743

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-0.989743**| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Calcium

Location: CLF-J3

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 14 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.737318	0.480106	0.546	12.3875
2	0.48772	0.480106	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J3	12/7/2016	11.6066	FALSE
	1/18/2017	11.2693	FALSE
	2/23/2017	11.5865	FALSE
	3/22/2017	11.724	FALSE
	4/5/2017	11.6948	FALSE
	7/6/2017	<b>12.3875</b>	<b>TRUE</b>
	8/8/2017	11.7128	FALSE
	10/9/2017	12.0289	FALSE
	12/6/2017	11.7215	FALSE
	5/15/2018	11.6784	FALSE
	10/16/2018	11.4876	FALSE
	6/11/2019	11.3986	FALSE
	10/22/2019	11.5991	FALSE
	6/15/2020	11.6869	FALSE



## Shapiro-Wilks Test of Normality

Parameter: Calcium

Location: CLF-J3

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 14 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	11.2693	12.3875	1.11824	0.5251	0.587189
2	11.3986	12.0289	0.630311	0.3318	0.209137
3	11.4876	11.724	0.236397	0.246	0.0581536
4	11.5865	11.7215	0.135077	0.1802	0.0243409
5	11.5991	11.7128	0.113656	0.124	0.0140934
6	11.6066	11.6948	0.0881951	0.0727	0.00641179
7	11.6784	11.6869	0.00843887	0.024	0.000202533
8	11.6869	11.6784	-0.00843887		
9	11.6948	11.6066	-0.0881951		
10	11.7128	11.5991	-0.113656		
11	11.7215	11.5865	-0.135077		
12	11.724	11.4876	-0.236397		
13	12.0289	11.3986	-0.630311		
14	12.3875	11.2693	-1.11824		

---

Sum of b values = 0.899528

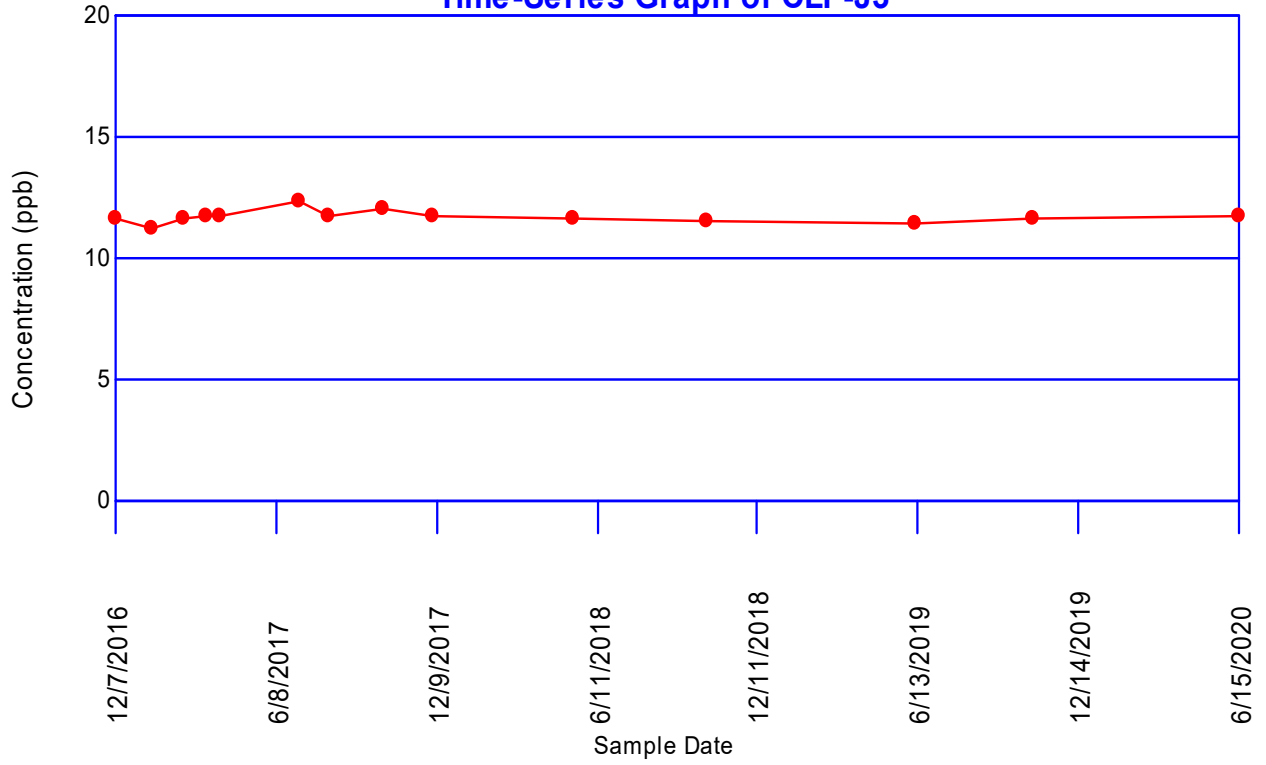
Sample Standard Deviation = 0.267845

W Statistic = 0.867596

**5% Critical value of 0.874 exceeds 0.867596**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.825 is less than 0.867596  
Data is normally distributed at 99% level of significance

### Calcium Time-Series Graph of CLF-J3



**Mann-Kendall Trend Analysis**  
**Parameter: Calcium**  
**Location: CLF-J3**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
11.2693	11.6066	-0.337341	0	1
11.5865	11.6066	-0.0201888	0	2
11.724	11.6066	0.117361	1	2
11.6948	11.6066	0.0881951	2	2
12.3875	11.6066	0.7809	3	2
11.7128	11.6066	0.106116	4	2
12.0289	11.6066	0.422304	5	2
11.7215	11.6066	0.114888	6	2
11.6784	11.6066	0.0717964	7	2
11.4876	11.6066	-0.119036	7	3
11.3986	11.6066	-0.208007	7	4
11.5991	11.6066	-0.00754031	7	5
11.6869	11.6066	0.0802353	8	5
11.5865	11.2693	0.317152	9	5
11.724	11.2693	0.454702	10	5
11.6948	11.2693	0.425536	11	5
12.3875	11.2693	1.11824	12	5
11.7128	11.2693	0.443457	13	5
12.0289	11.2693	0.759645	14	5
11.7215	11.2693	0.452229	15	5
11.6784	11.2693	0.409138	16	5
11.4876	11.2693	0.218305	17	5
11.3986	11.2693	0.129334	18	5
11.5991	11.2693	0.329801	19	5
11.6869	11.2693	0.417576	20	5
11.724	11.5865	0.13755	21	5
11.6948	11.5865	0.108384	22	5
12.3875	11.5865	0.801089	23	5
11.7128	11.5865	0.126305	24	5
12.0289	11.5865	0.442493	25	5
11.7215	11.5865	0.135077	26	5
11.6784	11.5865	0.0919852	27	5
11.4876	11.5865	-0.098847	27	6
11.3986	11.5865	-0.187818	27	7
11.5991	11.5865	0.0126485	28	7
11.6869	11.5865	0.100424	29	7
11.6948	11.724	-0.0291659	29	8
12.3875	11.724	0.663539	30	8
11.7128	11.724	-0.0112451	30	9
12.0289	11.724	0.304943	31	9
11.7215	11.724	-0.00247267	31	10
11.6784	11.724	-0.0455646	31	11
11.4876	11.724	-0.236397	31	12
11.3986	11.724	-0.325368	31	13

11.5991	11.724	-0.124901	31	14
11.6869	11.724	-0.0371258	31	15
12.3875	11.6948	0.692705	32	15
11.7128	11.6948	0.0179208	33	15
12.0289	11.6948	0.334109	34	15
11.7215	11.6948	0.0266933	35	15
11.6784	11.6948	-0.0163987	35	16
11.4876	11.6948	-0.207231	35	17
11.3986	11.6948	-0.296202	35	18
11.5991	11.6948	-0.0957354	35	19
11.6869	11.6948	-0.00795983	35	20
11.7128	12.3875	-0.674784	35	21
12.0289	12.3875	-0.358596	35	22
11.7215	12.3875	-0.666012	35	23
11.6784	12.3875	-0.709104	35	24
11.4876	12.3875	-0.899936	35	25
11.3986	12.3875	-0.988908	35	26
11.5991	12.3875	-0.788441	35	27
11.6869	12.3875	-0.700665	35	28
12.0289	11.7128	0.316188	36	28
11.7215	11.7128	0.00877242	37	28
11.6784	11.7128	-0.0343195	37	29
11.4876	11.7128	-0.225152	37	30
11.3986	11.7128	-0.314123	37	31
11.5991	11.7128	-0.113656	37	32
11.6869	11.7128	-0.0258807	37	33
11.7215	12.0289	-0.307416	37	34
11.6784	12.0289	-0.350508	37	35
11.4876	12.0289	-0.54134	37	36
11.3986	12.0289	-0.630311	37	37
11.5991	12.0289	-0.429844	37	38
11.6869	12.0289	-0.342069	37	39
11.6784	11.7215	-0.043092	37	40
11.4876	11.7215	-0.233924	37	41
11.3986	11.7215	-0.322896	37	42
11.5991	11.7215	-0.122429	37	43
11.6869	11.7215	-0.0346531	37	44
11.4876	11.6784	-0.190832	37	45
11.3986	11.6784	-0.279804	37	46
11.5991	11.6784	-0.0793367	37	47
11.6869	11.6784	0.00843887	38	47
11.3986	11.4876	-0.0889713	38	48
11.5991	11.4876	0.111496	39	48
11.6869	11.4876	0.199271	40	48
11.5991	11.3986	0.200467	41	48
11.6869	11.3986	0.288242	42	48
11.6869	11.5991	0.0877756	43	48

S Statistic = 43 - 48 = -5

---

Tied Group	Value	Members
<b>Time Period</b>		<b>Observations</b>
12/7/2016		1
1/18/2017		1
2/23/2017		1
3/22/2017		1
4/5/2017		1
7/6/2017		1
8/8/2017		1
10/9/2017		1
12/6/2017		1
5/15/2018		1
10/16/2018		1
6/11/2019		1
10/22/2019		1
6/15/2020		1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = -0.21898

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-0.21898**| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Calcium

Location: CLF-J5

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.866097	0.372987	0.525	297325
2	0.691842	0.378757	0.546	180815
3	0.0291015	0.378757	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J5	12/7/2016	95061.3	FALSE
	1/18/2017	78950.2	FALSE
	2/23/2017	98538.8	FALSE
	3/22/2017	121487	FALSE
	4/5/2017	122145	FALSE
	4/25/2017	114426	FALSE
	7/6/2017	<b>297325</b>	<b>TRUE</b>
	8/8/2017	120823	FALSE
	10/9/2017	<b>180815</b>	<b>TRUE</b>
	12/6/2017	105625	FALSE
	5/15/2018	111000	FALSE
	10/16/2018	107000	FALSE
	6/11/2019	82800	FALSE
	10/22/2019	121000	FALSE
	6/15/2020	111000	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Calcium

Location: CLF-J5

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	78950.2	297325	218375	0.515	112463
2	82800	180815	98015	0.3306	32403.8
3	95061.3	122145	27083.7	0.2495	6757.38
4	98538.8	121487	22948.2	0.1878	4309.67
5	105625	121000	15375	0.1353	2080.24
6	107000	120823	13823	0.088	1216.42
7	111000	114426	3426	0.0433	148.346
8	111000	111000	0		
9	114426	111000	-3426		
10	120823	107000	-13823		
11	121000	105625	-15375		
12	121487	98538.8	-22948.2		
13	122145	95061.3	-27083.7		
14	180815	82800	-98015		
15	297325	78950.2	-218375		

---

Sum of b values = 159379

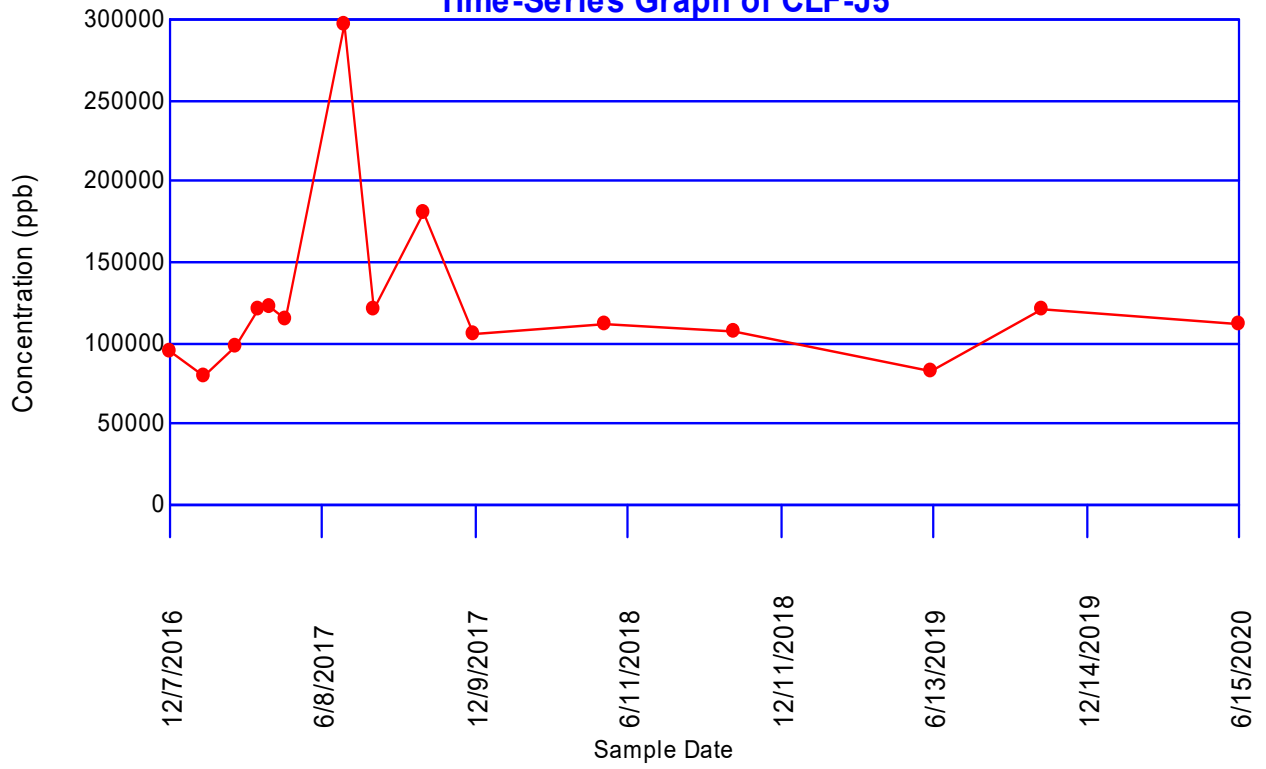
Sample Standard Deviation = 53159.5

W Statistic = 0.642054

**5% Critical value of 0.881 exceeds 0.642054**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.835 exceeds 0.642054**  
**Evidence of non-normality at 99% level of significance**

### Calcium Time-Series Graph of CLF-J5





## Mann-Kendall Trend Analysis

Parameter: Calcium

Location: CLF-J5

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
78950.2	95061.3	-16111.1	0	1
98538.8	95061.3	3477.5	1	1
121487	95061.3	26425.7	2	1
122145	95061.3	27083.7	3	1
114426	95061.3	19364.7	4	1
297325	95061.3	202264	5	1
120823	95061.3	25761.7	6	1
180815	95061.3	85753.7	7	1
105625	95061.3	10563.7	8	1
111000	95061.3	15938.7	9	1
107000	95061.3	11938.7	10	1
82800	95061.3	-12261.3	10	2
121000	95061.3	25938.7	11	2
111000	95061.3	15938.7	12	2
98538.8	78950.2	19588.6	13	2
121487	78950.2	42536.8	14	2
122145	78950.2	43194.8	15	2
114426	78950.2	35475.8	16	2
297325	78950.2	218375	17	2
120823	78950.2	41872.8	18	2
180815	78950.2	101865	19	2
105625	78950.2	26674.8	20	2
111000	78950.2	32049.8	21	2
107000	78950.2	28049.8	22	2
82800	78950.2	3849.8	23	2
121000	78950.2	42049.8	24	2
111000	78950.2	32049.8	25	2
121487	98538.8	22948.2	26	2
122145	98538.8	23606.2	27	2
114426	98538.8	15887.2	28	2
297325	98538.8	198786	29	2
120823	98538.8	22284.2	30	2
180815	98538.8	82276.2	31	2
105625	98538.8	7086.2	32	2
111000	98538.8	12461.2	33	2
107000	98538.8	8461.2	34	2
82800	98538.8	-15738.8	34	3
121000	98538.8	22461.2	35	3
111000	98538.8	12461.2	36	3
122145	121487	658	37	3
114426	121487	-7061	37	4
297325	121487	175838	38	4
120823	121487	-664	38	5
180815	121487	59328	39	5

105625	121487	-15862	39	6
111000	121487	-10487	39	7
107000	121487	-14487	39	8
82800	121487	-38687	39	9
121000	121487	-487	39	10
111000	121487	-10487	39	11
114426	122145	-7719	39	12
297325	122145	175180	40	12
120823	122145	-1322	40	13
180815	122145	58670	41	13
105625	122145	-16520	41	14
111000	122145	-11145	41	15
107000	122145	-15145	41	16
82800	122145	-39345	41	17
121000	122145	-1145	41	18
111000	122145	-11145	41	19
297325	114426	182899	42	19
120823	114426	6397	43	19
180815	114426	66389	44	19
105625	114426	-8801	44	20
111000	114426	-3426	44	21
107000	114426	-7426	44	22
82800	114426	-31626	44	23
121000	114426	6574	45	23
111000	114426	-3426	45	24
120823	297325	-176502	45	25
180815	297325	-116510	45	26
105625	297325	-191700	45	27
111000	297325	-186325	45	28
107000	297325	-190325	45	29
82800	297325	-214525	45	30
121000	297325	-176325	45	31
111000	297325	-186325	45	32
180815	120823	59992	46	32
105625	120823	-15198	46	33
111000	120823	-9823	46	34
107000	120823	-13823	46	35
82800	120823	-38023	46	36
121000	120823	177	47	36
111000	120823	-9823	47	37
105625	180815	-75190	47	38
111000	180815	-69815	47	39
107000	180815	-73815	47	40
82800	180815	-98015	47	41
121000	180815	-59815	47	42
111000	180815	-69815	47	43
111000	105625	5375	48	43
107000	105625	1375	49	43
82800	105625	-22825	49	44
121000	105625	15375	50	44
111000	105625	5375	51	44

107000	111000	-4000	51	45
82800	111000	-28200	51	46
121000	111000	10000	52	46
111000	111000	0	52	46
82800	107000	-24200	52	47
121000	107000	14000	53	47
111000	107000	4000	54	47
121000	82800	38200	55	47
111000	82800	28200	56	47
111000	121000	-10000	56	48

S Statistic = 56 - 48 = 8

---

Tied Group	Value	Members
1	111000	2

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 407.333

Z-Score = 0.346835

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

[0.346835] <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Calcium

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.319258	0.125305	0.525	None

Loc.	Date	Conc.	Outlier
CLF-S13	12/7/2016	111064	FALSE
	1/18/2017	165561	FALSE
	2/23/2017	217307	FALSE
	3/22/2017	269982	FALSE
	4/5/2017	240010	FALSE
	4/25/2017	215059	FALSE
	7/6/2017	118300	FALSE
	8/8/2017	104065	FALSE
	10/9/2017	104990	FALSE
	12/6/2017	163020	FALSE
	5/15/2018	191500	FALSE
	10/16/2018	123000	FALSE
	6/11/2019	147000	FALSE
	10/22/2019	88900	FALSE
	6/15/2020	141000	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Calcium

Location: CLF-S13

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	88900	269982	181082	0.515	93257.2
2	104065	240010	135945	0.3306	44943.4
3	104990	217307	112317	0.2495	28023.1
4	111064	215059	103995	0.1878	19530.3
5	118300	191500	73200	0.1353	9903.96
6	123000	165561	42561	0.088	3745.37
7	141000	163020	22020	0.0433	953.466
8	147000	147000	0		
9	163020	141000	-22020		
10	165561	123000	-42561		
11	191500	118300	-73200		
12	215059	111064	-103995		
13	217307	104990	-112317		
14	240010	104065	-135945		
15	269982	88900	-181082		

---

Sum of b values = 200357

Sample Standard Deviation = 55477.2

W Statistic = 0.931645

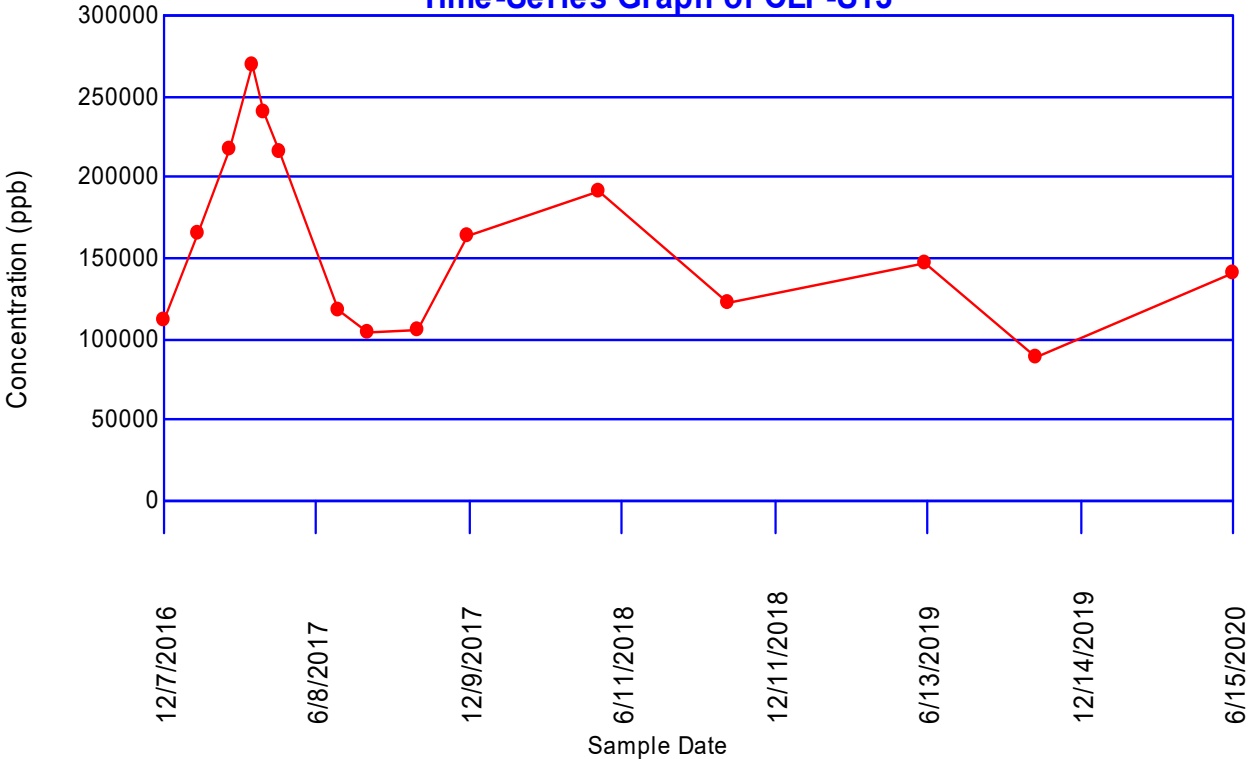
5% Critical value of 0.881 is less than 0.931645

Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.931645

Data is normally distributed at 99% level of significance

# Calcium Time-Series Graph of CLF-S13



**Mann-Kendall Trend Analysis**  
**Parameter: Calcium**  
**Location: CLF-S13**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
165561	111064	54497	1	0
217307	111064	106243	2	0
269982	111064	158918	3	0
240010	111064	128946	4	0
215059	111064	103995	5	0
118300	111064	7236	6	0
104065	111064	-6999	6	1
104990	111064	-6074	6	2
163020	111064	51956	7	2
191500	111064	80436	8	2
123000	111064	11936	9	2
147000	111064	35936	10	2
88900	111064	-22164	10	3
141000	111064	29936	11	3
217307	165561	51746	12	3
269982	165561	104421	13	3
240010	165561	74449	14	3
215059	165561	49498	15	3
118300	165561	-47261	15	4
104065	165561	-61496	15	5
104990	165561	-60571	15	6
163020	165561	-2541	15	7
191500	165561	25939	16	7
123000	165561	-42561	16	8
147000	165561	-18561	16	9
88900	165561	-76661	16	10
141000	165561	-24561	16	11
269982	217307	52675	17	11
240010	217307	22703	18	11
215059	217307	-2248	18	12
118300	217307	-99007	18	13
104065	217307	-113242	18	14
104990	217307	-112317	18	15
163020	217307	-54287	18	16
191500	217307	-25807	18	17
123000	217307	-94307	18	18
147000	217307	-70307	18	19
88900	217307	-128407	18	20
141000	217307	-76307	18	21
240010	269982	-29972	18	22
215059	269982	-54923	18	23
118300	269982	-151682	18	24
104065	269982	-165917	18	25
104990	269982	-164992	18	26

163020	269982	-106962	18	27
191500	269982	-78482	18	28
123000	269982	-146982	18	29
147000	269982	-122982	18	30
88900	269982	-181082	18	31
141000	269982	-128982	18	32
215059	240010	-24951	18	33
118300	240010	-121710	18	34
104065	240010	-135945	18	35
104990	240010	-135020	18	36
163020	240010	-76990	18	37
191500	240010	-48510	18	38
123000	240010	-117010	18	39
147000	240010	-93010	18	40
88900	240010	-151110	18	41
141000	240010	-99010	18	42
118300	215059	-96759	18	43
104065	215059	-110994	18	44
104990	215059	-110069	18	45
163020	215059	-52039	18	46
191500	215059	-23559	18	47
123000	215059	-92059	18	48
147000	215059	-68059	18	49
88900	215059	-126159	18	50
141000	215059	-74059	18	51
104065	118300	-14235	18	52
104990	118300	-13310	18	53
163020	118300	44720	19	53
191500	118300	73200	20	53
123000	118300	4700	21	53
147000	118300	28700	22	53
88900	118300	-29400	22	54
141000	118300	22700	23	54
104990	104065	925	24	54
163020	104065	58955	25	54
191500	104065	87435	26	54
123000	104065	18935	27	54
147000	104065	42935	28	54
88900	104065	-15165	28	55
141000	104065	36935	29	55
163020	104990	58030	30	55
191500	104990	86510	31	55
123000	104990	18010	32	55
147000	104990	42010	33	55
88900	104990	-16090	33	56
141000	104990	36010	34	56
191500	163020	28480	35	56
123000	163020	-40020	35	57
147000	163020	-16020	35	58
88900	163020	-74120	35	59
141000	163020	-22020	35	60



123000	191500	-68500	35	61
147000	191500	-44500	35	62
88900	191500	-102600	35	63
141000	191500	-50500	35	64
147000	123000	24000	36	64
88900	123000	-34100	36	65
141000	123000	18000	37	65
88900	147000	-58100	37	66
141000	147000	-6000	37	67
141000	88900	52100	38	67

S Statistic = 38 - 67 = -29

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
-------------	--------------

12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -1.38564

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**| -1.38564 | <= 1.97737 indicating no evidence of a trend**

## Dixon's Test for Outliers

Parameter: Calcium

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.149384	0.0119261	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S05	1/18/2017	76432	FALSE
	4/5/2017	110104	FALSE
	4/25/2017	112725	FALSE
	10/16/2018	95800	FALSE
	10/22/2019	120000	FALSE
	6/29/2020	70800	FALSE
	12/5/2020	90000	FALSE
	3/26/2021	71300	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Calcium

Location: CLF-S05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	70800	120000	49200	0.6052	29775.8
2	71300	112725	41425	0.3164	13106.9
3	76432	110104	33672	0.1743	5869.03
4	90000	95800	5800	0.0561	325.38
5	95800	90000	-5800		
6	110104	76432	-33672		
7	112725	71300	-41425		
8	120000	70800	-49200		

---

Sum of b values = 49077.1

Sample Standard Deviation = 19509.9

W Statistic = 0.903965

5% Critical value of 0.818 is less than 0.903965

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.903965

Data is normally distributed at 99% level of significance

## Mann-Kendall Trend Analysis

Parameter: Calcium

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

---

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
110104	76432	33672	1	0
112725	76432	36293	2	0
95800	76432	19368	3	0
120000	76432	43568	4	0
70800	76432	-5632	4	1
90000	76432	13568	5	1
71300	76432	-5132	5	2
112725	110104	2621	6	2
95800	110104	-14304	6	3
120000	110104	9896	7	3
70800	110104	-39304	7	4
90000	110104	-20104	7	5
71300	110104	-38804	7	6
95800	112725	-16925	7	7
120000	112725	7275	8	7
70800	112725	-41925	8	8
90000	112725	-22725	8	9
71300	112725	-41425	8	10
120000	95800	24200	9	10
70800	95800	-25000	9	11
90000	95800	-5800	9	12
71300	95800	-24500	9	13
70800	120000	-49200	9	14
90000	120000	-30000	9	15
71300	120000	-48700	9	16
90000	70800	19200	10	16
71300	70800	500	11	16
71300	90000	-18700	11	17

S Statistic = 11 - 17 = -6

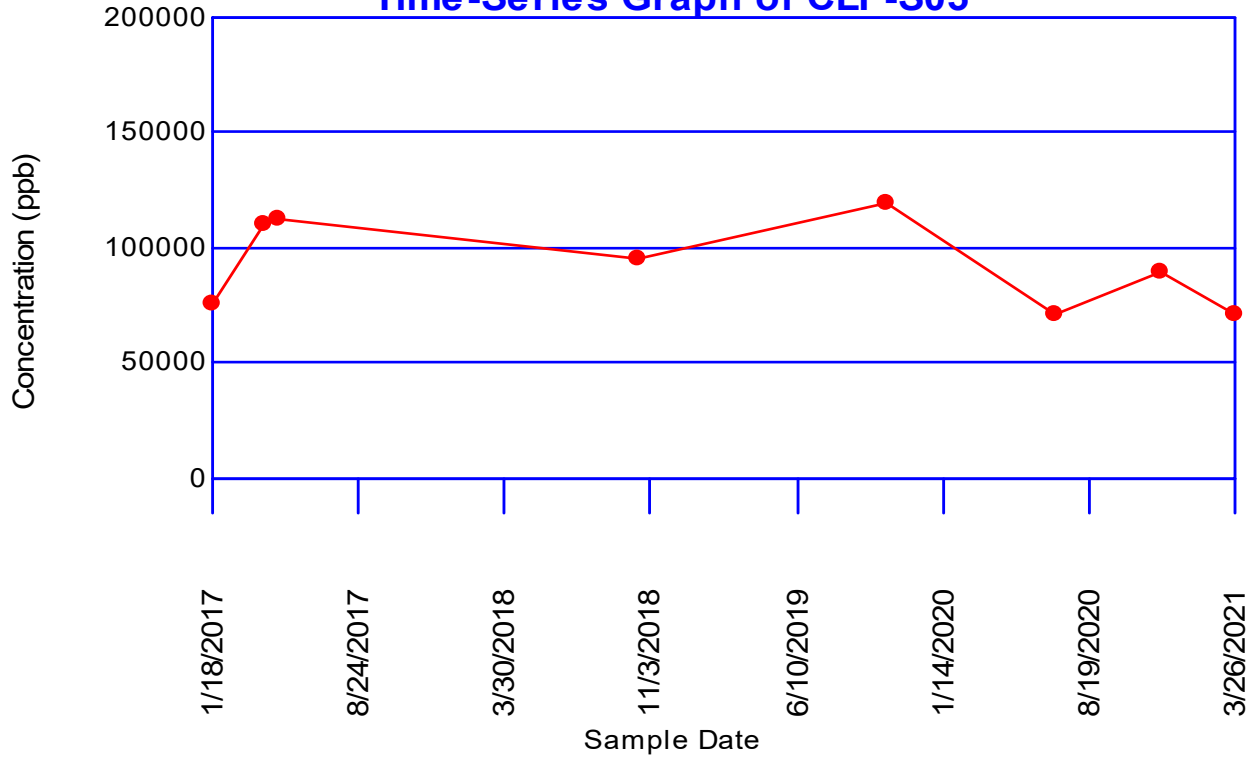
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)

Probability of obtaining  $S \geq |-6|$  is 0.548

0.548  $\geq$  0.025 indicating no evidence of a trend

# Calcium

## Time-Series Graph of CLF-S05



## Concentrations (ppb)

Parameter: Chloride

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Total Measurements: 74

Total Non-Detect: 4

Percent Non-Detects: 5.40541%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

There are 6 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

CLF-J2	15	0 (0%)	12/7/2016	9.43428	12510
			1/18/2017	8.99669	8076.3
			2/23/2017	9.2044	9940.8
			3/22/2017	9.55488	14113.4
			4/5/2017	9.24416	10344
			4/25/2017	9.08418	8814.7
			7/6/2017	10.7996	49000
			8/8/2017	9.42545	12400
			10/9/2017	10.8357	50800
			12/6/2017	8.92266	7500
			5/15/2018	8.88184	7200
			10/16/2018	8.43381	4600
			6/11/2019	8.31874	4100
			10/22/2019	9.3501	11500
			6/29/2020	6.90776	1000
<b>12/5/2020</b>	<b>8.36637</b>	<b>4300</b>			
<b>3/26/2021</b>	<b>8.00637</b>	<b>3000</b>			

CLF-J3	14	0 (0%)	12/7/2016	9.43994	12580.9
			1/18/2017	8.93253	7574.4
			2/23/2017	9.19974	9894.6
			3/22/2017	9.55392	14099.8
			4/5/2017	9.23982	10299.2
			7/6/2017	10.7996	49000
			8/8/2017	9.40919	12200
			10/9/2017	10.8454	51300
			12/6/2017	8.9359	7600
			5/15/2018	9.69277	16200
			10/16/2018	8.43381	4600
			6/11/2019	8.29405	4000
			10/22/2019	9.37585	11800
			6/15/2020	9.74097	17000
			<b>12/5/2020</b>	<b>8.38936</b>	<b>4400</b>
<b>3/26/2021</b>	<b>8.00637</b>	<b>3000</b>			

CLF-J5	15	0 (0%)	12/7/2016	9.26466	10558.2
			1/18/2017	8.83736	6886.8
			2/23/2017	9.20557	9952.4
			3/22/2017	9.56809	14301.1
			4/5/2017	9.34766	11471.9
			4/25/2017	8.91578	7448.6

			7/6/2017	11.2398	76100
			8/8/2017	9.48037	13100
			10/9/2017	11.0929	65700
			12/6/2017	8.85367	7000
			5/15/2018	9.5956	14700
			10/16/2018	7.97247	2900
			6/11/2019	8.00637	3000
			10/22/2019	9.04782	8500
			6/15/2020	9.74683	17100
			<b>12/5/2020</b>	<b>7.82405</b>	<b>2500</b>
			<b>3/26/2021</b>	<b>7.74066</b>	<b>2300</b>
<hr/>					
CLF-S05	8	1 (12.5%)	1/18/2017	8.71868	6116.1
			4/5/2017	9.04842	8505.1
			4/25/2017	8.57138	5278.4
			10/16/2018	6.80239	900
			10/22/2019	9.55393	14100
			6/29/2020	ND<6.90776	ND<1000
			12/5/2020	8.36637	4300
			3/26/2021	7.69621	2200
<hr/>					
CLF-S06	7	3 (42.8571%)	1/18/2017	7.47511	1763.6
			4/5/2017	7.65378	2108.6
			4/25/2017	7.29138	1467.6
			10/16/2018	6.68461	800
			6/29/2020	ND<6.90776	ND<1000
			12/5/2020	ND<7.6009	ND<2000
			3/26/2021	ND<7.6009	ND<2000
<hr/>					
CLF-S13	15	0 (0%)	12/7/2016	8.16905	3530
			1/18/2017	9.09639	8923
			2/23/2017	9.13093	9236.6
			3/22/2017	8.74297	6266.5
			4/5/2017	8.76205	6387.2
			4/25/2017	8.61733	5526.6
			7/6/2017	8.03916	3100
			8/8/2017	8.03916	3100
			10/9/2017	8.10168	3300
			12/6/2017	8.38936	4400
			5/15/2018	8.96188	7800
			10/16/2018	8.21609	3700
			6/11/2019	8.18869	3600
			10/22/2019	7.6009	2000
			6/15/2020	7.86327	2600
			<b>12/5/2020</b>	<b>ND&lt;7.6009</b>	<b>ND&lt;2000</b>
			<b>3/26/2021</b>	<b>8.80986</b>	<b>6700</b>

There are 2 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
CLF-C03	17	0 (0%)	12/7/2016	9.41148	12228
			1/18/2017	9.97168	21411.5
			2/23/2017	10.459	34857.4
			3/22/2017	9.09631	8922.3
			4/5/2017	9.15259	9438.9
			4/25/2017	8.70043	6005.5

			7/6/2017	9.11603	9100
			8/8/2017	9.40096	12100
			10/9/2017	9.14846	9400
			12/6/2017	8.68271	5900
			5/15/2018	9.65503	15600
			10/16/2018	7.93737	2800
			6/11/2019	8.63052	5600
			10/22/2019	8.537	5100
			6/15/2020	8.79482	6600
			12/5/2020	8.537	5100
			3/26/2021	10.0605	23400
<hr/>					
CLF-OPP	17	2 (11.7647%)	12/7/2016	7.83597	2530
			1/18/2017	8.04815	3128
			2/23/2017	8.28574	3966.9
			3/22/2017	7.47755	1767.9
			4/5/2017	7.31269	1499.2
			4/25/2017	7.2241	1372.1
			7/6/2017	7.09008	1200
			8/8/2017	7.54961	1900
			10/9/2017	7.24423	1400
			12/6/2017	7.24423	1400
			5/15/2018	7.37776	1600
			10/16/2018	6.55108	700
			6/11/2019	7.24423	1400
			10/22/2019	7.31322	1500
			6/15/2020	7.17012	1300
			12/5/2020	ND<7.6009	ND<2000
			3/26/2021	ND<7.6009	ND<2000
<hr/>					



## Dixon's Test for Outliers

Parameter: Chloride

Location: CLF-J2

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.533246	0.576496	0.525	10.8357
2	0.577104	0.604013	0.546	10.7996
3	0.104704	0.604013	0.521	6.90776
4	0.115451	0.504772	0.546	None

Loc.	Date	Conc.	Outlier
CLF-J2	12/7/2016	9.43428	FALSE
	1/18/2017	8.99669	FALSE
	2/23/2017	9.2044	FALSE
	3/22/2017	9.55488	FALSE
	4/5/2017	9.24416	FALSE
	4/25/2017	9.08418	FALSE
	7/6/2017	10.7996	TRUE
	8/8/2017	9.42545	FALSE
	10/9/2017	10.8357	TRUE
	12/6/2017	8.92266	FALSE
	5/15/2018	8.88184	FALSE
	10/16/2018	8.43381	FALSE
	6/11/2019	8.31874	FALSE
	10/22/2019	9.3501	FALSE
	6/29/2020	6.90776	TRUE

## Shapiro-Wilks Test of Normality

Parameter: Chloride

Location: CLF-J2

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	6.90776	10.8357	3.9279	0.515	2.02287
2	8.31874	10.7996	2.48083	0.3306	0.820163
3	8.43381	9.55488	1.12107	0.2495	0.279707
4	8.88184	9.43428	0.552447	0.1878	0.10375
5	8.92266	9.42545	0.502793	0.1353	0.068028
6	8.99669	9.3501	0.353413	0.088	0.0311004
7	9.08418	9.24416	0.159986	0.0433	0.00692739
8	9.2044	9.2044	0		
9	9.24416	9.08418	-0.159986		
10	9.3501	8.99669	-0.353413		
11	9.42545	8.92266	-0.502793		
12	9.43428	8.88184	-0.552447		
13	9.55488	8.43381	-1.12107		
14	10.7996	8.31874	-2.48083		
15	10.8357	6.90776	-3.9279		

---

Sum of b values = 3.33254

Sample Standard Deviation = 0.937955

W Statistic = 0.901694

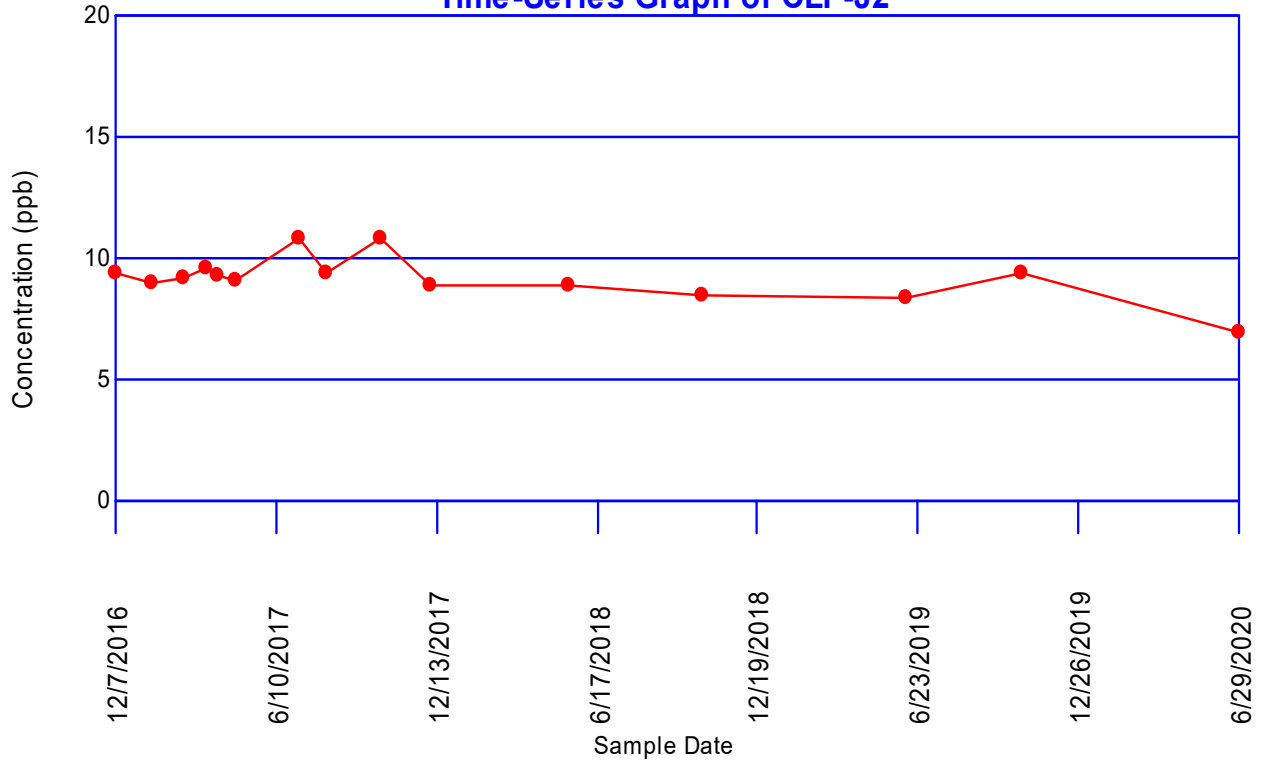
5% Critical value of 0.881 is less than 0.901694

Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.901694

Data is normally distributed at 99% level of significance

# Chloride Time-Series Graph of CLF-J2



**Mann-Kendall Trend Analysis**  
**Parameter: Chloride**  
**Location: CLF-J2**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8.99669	9.43428	-0.437594	0	1
9.2044	9.43428	-0.229881	0	2
9.55488	9.43428	0.120596	1	2
9.24416	9.43428	-0.190122	1	3
9.08418	9.43428	-0.350108	1	4
10.7996	9.43428	1.36529	2	4
9.42545	9.43428	-0.00883185	2	5
10.8357	9.43428	1.40137	3	5
8.92266	9.43428	-0.511625	3	6
8.88184	9.43428	-0.552447	3	7
8.43381	9.43428	-1.00047	3	8
8.31874	9.43428	-1.11554	3	9
9.3501	9.43428	-0.0841813	3	10
6.90776	9.43428	-2.52653	3	11
9.2044	8.99669	0.207714	4	11
9.55488	8.99669	0.558191	5	11
9.24416	8.99669	0.247473	6	11
9.08418	8.99669	0.0874869	7	11
10.7996	8.99669	1.80289	8	11
9.42545	8.99669	0.428763	9	11
10.8357	8.99669	1.83896	10	11
8.92266	8.99669	-0.0740308	10	12
8.88184	8.99669	-0.114853	10	13
8.43381	8.99669	-0.562878	10	14
8.31874	8.99669	-0.677947	10	15
9.3501	8.99669	0.353413	11	15
6.90776	8.99669	-2.08893	11	16
9.55488	9.2044	0.350477	12	16
9.24416	9.2044	0.0397591	13	16
9.08418	9.2044	-0.120227	13	17
10.7996	9.2044	1.59517	14	17
9.42545	9.2044	0.221049	15	17
10.8357	9.2044	1.63125	16	17
8.92266	9.2044	-0.281744	16	18
8.88184	9.2044	-0.322566	16	19
8.43381	9.2044	-0.770591	16	20
8.31874	9.2044	-0.885661	16	21
9.3501	9.2044	0.1457	17	21
6.90776	9.2044	-2.29665	17	22
9.24416	9.55488	-0.310718	17	23
9.08418	9.55488	-0.470704	17	24
10.7996	9.55488	1.2447	18	24
9.42545	9.55488	-0.129428	18	25
10.8357	9.55488	1.28077	19	25

8.92266	9.55488	-0.632222	19	26
8.88184	9.55488	-0.673044	19	27
8.43381	9.55488	-1.12107	19	28
8.31874	9.55488	-1.23614	19	29
9.3501	9.55488	-0.204778	19	30
6.90776	9.55488	-2.64712	19	31
9.08418	9.24416	-0.159986	19	32
10.7996	9.24416	1.55541	20	32
9.42545	9.24416	0.18129	21	32
10.8357	9.24416	1.59149	22	32
8.92266	9.24416	-0.321504	22	33
8.88184	9.24416	-0.362326	22	34
8.43381	9.24416	-0.81035	22	35
8.31874	9.24416	-0.92542	22	36
9.3501	9.24416	0.10594	23	36
6.90776	9.24416	-2.33641	23	37
10.7996	9.08418	1.7154	24	37
9.42545	9.08418	0.341276	25	37
10.8357	9.08418	1.75148	26	37
8.92266	9.08418	-0.161518	26	38
8.88184	9.08418	-0.20234	26	39
8.43381	9.08418	-0.650364	26	40
8.31874	9.08418	-0.765434	26	41
9.3501	9.08418	0.265926	27	41
6.90776	9.08418	-2.17642	27	42
9.42545	10.7996	-1.37412	27	43
10.8357	10.7996	0.0360761	28	43
8.92266	10.7996	-1.87692	28	44
8.88184	10.7996	-1.91774	28	45
8.43381	10.7996	-2.36576	28	46
8.31874	10.7996	-2.48083	28	47
9.3501	10.7996	-1.44947	28	48
6.90776	10.7996	-3.89182	28	49
10.8357	9.42545	1.4102	29	49
8.92266	9.42545	-0.502793	29	50
8.88184	9.42545	-0.543615	29	51
8.43381	9.42545	-0.99164	29	52
8.31874	9.42545	-1.10671	29	53
9.3501	9.42545	-0.0753494	29	54
6.90776	9.42545	-2.5177	29	55
8.92266	10.8357	-1.91299	29	56
8.88184	10.8357	-1.95382	29	57
8.43381	10.8357	-2.40184	29	58
8.31874	10.8357	-2.51691	29	59
9.3501	10.8357	-1.48555	29	60
6.90776	10.8357	-3.9279	29	61
8.88184	8.92266	-0.040822	29	62
8.43381	8.92266	-0.488847	29	63
8.31874	8.92266	-0.603916	29	64
9.3501	8.92266	0.427444	30	64
6.90776	8.92266	-2.0149	30	65

8.43381	8.88184	-0.448025	30	66
8.31874	8.88184	-0.563094	30	67
9.3501	8.88184	0.468266	31	67
6.90776	8.88184	-1.97408	31	68
8.31874	8.43381	-0.115069	31	69
9.3501	8.43381	0.916291	32	69
6.90776	8.43381	-1.52606	32	70
9.3501	8.31874	1.03136	33	70
6.90776	8.31874	-1.41099	33	71
6.90776	9.3501	-2.44235	33	72

S Statistic = 33 - 72 = -39

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
-------------	--------------

12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/29/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -1.88051

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**| -1.88051 | <= 1.97737 indicating no evidence of a trend**

## Dixon's Test for Outliers

Parameter: Chloride

Location: CLF-J3

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 14 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.577379	0.441269	0.546	10.8454
2	0.467844	0.441269	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J3	12/7/2016	9.43994	FALSE
	1/18/2017	8.93253	FALSE
	2/23/2017	9.19974	FALSE
	3/22/2017	9.55392	FALSE
	4/5/2017	9.23982	FALSE
	7/6/2017	10.7996	FALSE
	8/8/2017	9.40919	FALSE
	10/9/2017	<b>10.8454</b>	<b>TRUE</b>
	12/6/2017	8.9359	FALSE
	5/15/2018	9.69277	FALSE
	10/16/2018	8.43381	FALSE
	6/11/2019	8.29405	FALSE
	10/22/2019	9.37585	FALSE
	6/15/2020	9.74097	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Chloride

Location: CLF-J3

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 14 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	8.29405	10.8454	2.5514	0.5251	1.33974
2	8.43381	10.7996	2.36576	0.3318	0.78496
3	8.93253	9.74097	0.808439	0.246	0.198876
4	8.9359	9.69277	0.756863	0.1802	0.136387
5	9.19974	9.55392	0.354171	0.124	0.0439173
6	9.23982	9.43994	0.200114	0.0727	0.0145483
7	9.37585	9.40919	0.0333364	0.024	0.000800074
8	9.40919	9.37585	-0.0333364		
9	9.43994	9.23982	-0.200114		
10	9.55392	9.19974	-0.354171		
11	9.69277	8.9359	-0.756863		
12	9.74097	8.93253	-0.808439		
13	10.7996	8.43381	-2.36576		
14	10.8454	8.29405	-2.5514		

---

Sum of b values = 2.51923

Sample Standard Deviation = 0.729922

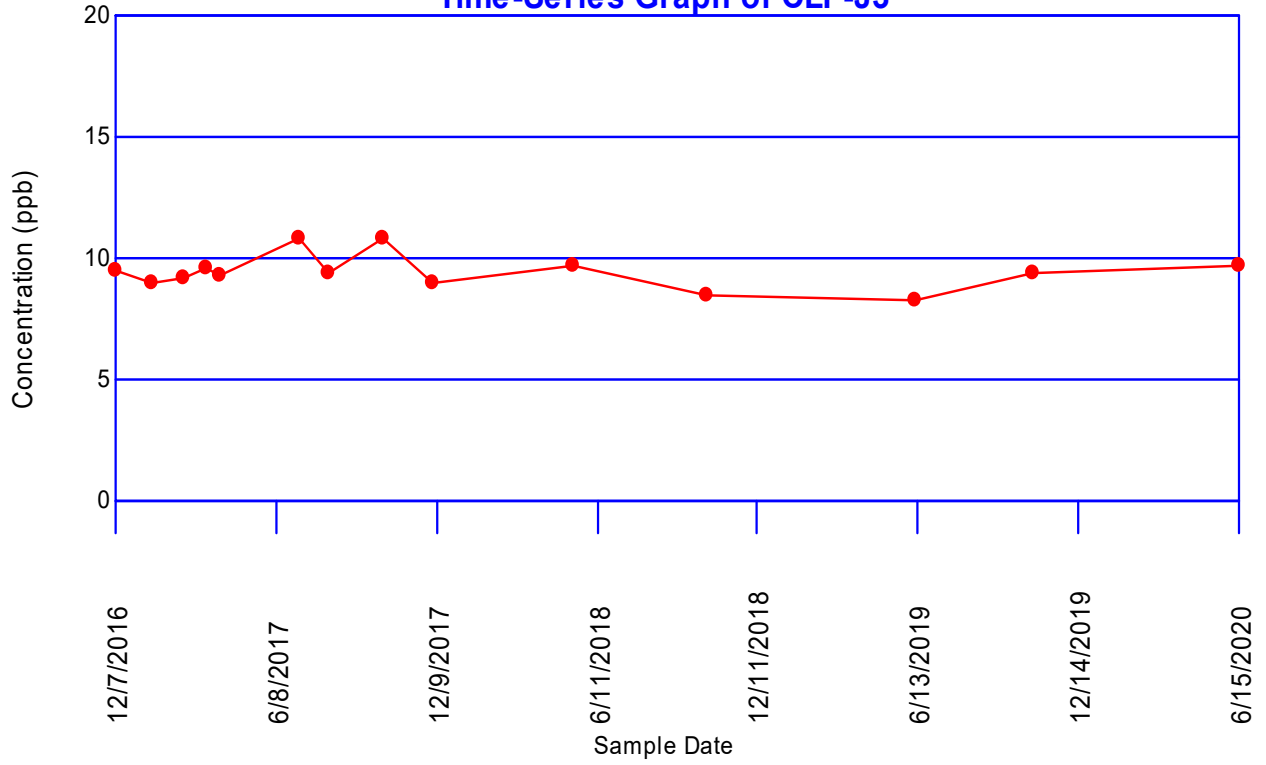
W Statistic = 0.916302

5% Critical value of 0.874 is less than 0.916302  
Data is normally distributed at 95% level of significance

1% Critical value of 0.825 is less than 0.916302  
Data is normally distributed at 99% level of significance



### Chloride Time-Series Graph of CLF-J3



**Mann-Kendall Trend Analysis**  
**Parameter: Chloride**  
**Location: CLF-J3**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8.93253	9.43994	-0.507406	0	1
9.19974	9.43994	-0.240191	0	2
9.55392	9.43994	0.113981	1	2
9.23982	9.43994	-0.200114	1	3
10.7996	9.43994	1.35964	2	3
9.40919	9.43994	-0.0307438	2	4
10.8454	9.43994	1.40551	3	4
8.9359	9.43994	-0.504032	3	5
9.69277	9.43994	0.252831	4	5
8.43381	9.43994	-1.00612	4	6
8.29405	9.43994	-1.14589	4	7
9.37585	9.43994	-0.0640803	4	8
9.74097	9.43994	0.301034	5	8
9.19974	8.93253	0.267215	6	8
9.55392	8.93253	0.621386	7	8
9.23982	8.93253	0.307292	8	8
10.7996	8.93253	1.86705	9	8
9.40919	8.93253	0.476662	10	8
10.8454	8.93253	1.91292	11	8
8.9359	8.93253	0.00337411	12	8
9.69277	8.93253	0.760237	13	8
8.43381	8.93253	-0.498718	13	9
8.29405	8.93253	-0.63848	13	10
9.37585	8.93253	0.443325	14	10
9.74097	8.93253	0.808439	15	10
9.55392	9.19974	0.354171	16	10
9.23982	9.19974	0.0400771	17	10
10.7996	9.19974	1.59983	18	10
9.40919	9.19974	0.209447	19	10
10.8454	9.19974	1.6457	20	10
8.9359	9.19974	-0.263841	20	11
9.69277	9.19974	0.493022	21	11
8.43381	9.19974	-0.765933	21	12
8.29405	9.19974	-0.905695	21	13
9.37585	9.19974	0.17611	22	13
9.74097	9.19974	0.541224	23	13
9.23982	9.55392	-0.314094	23	14
10.7996	9.55392	1.24566	24	14
9.40919	9.55392	-0.144725	24	15
10.8454	9.55392	1.29153	25	15
8.9359	9.55392	-0.618012	25	16
9.69277	9.55392	0.138851	26	16
8.43381	9.55392	-1.1201	26	17
8.29405	9.55392	-1.25987	26	18

9.37585	9.55392	-0.178061	26	19
9.74097	9.55392	0.187053	27	19
10.7996	9.23982	1.55975	28	19
9.40919	9.23982	0.16937	29	19
10.8454	9.23982	1.60562	30	19
8.9359	9.23982	-0.303918	30	20
9.69277	9.23982	0.452945	31	20
8.43381	9.23982	-0.80601	31	21
8.29405	9.23982	-0.945772	31	22
9.37585	9.23982	0.136033	32	22
9.74097	9.23982	0.501147	33	22
9.40919	10.7996	-1.39038	33	23
10.8454	10.7996	0.0458705	34	23
8.9359	10.7996	-1.86367	34	24
9.69277	10.7996	-1.10681	34	25
8.43381	10.7996	-2.36576	34	26
8.29405	10.7996	-2.50553	34	27
9.37585	10.7996	-1.42372	34	28
9.74097	10.7996	-1.05861	34	29
10.8454	9.40919	1.43625	35	29
8.9359	9.40919	-0.473288	35	30
9.69277	9.40919	0.283575	36	30
8.43381	9.40919	-0.97538	36	31
8.29405	9.40919	-1.11514	36	32
9.37585	9.40919	-0.0333364	36	33
9.74097	9.40919	0.331777	37	33
8.9359	10.8454	-1.90954	37	34
9.69277	10.8454	-1.15268	37	35
8.43381	10.8454	-2.41163	37	36
8.29405	10.8454	-2.5514	37	37
9.37585	10.8454	-1.46959	37	38
9.74097	10.8454	-1.10448	37	39
9.69277	8.9359	0.756863	38	39
8.43381	8.9359	-0.502092	38	40
8.29405	8.9359	-0.641854	38	41
9.37585	8.9359	0.439951	39	41
9.74097	8.9359	0.805065	40	41
8.43381	9.69277	-1.25895	40	42
8.29405	9.69277	-1.39872	40	43
9.37585	9.69277	-0.316912	40	44
9.74097	9.69277	0.0482021	41	44
8.29405	8.43381	-0.139762	41	45
9.37585	8.43381	0.942043	42	45
9.74097	8.43381	1.30716	43	45
9.37585	8.29405	1.08181	44	45
9.74097	8.29405	1.44692	45	45
9.74097	9.37585	0.365114	46	45

S Statistic = 46 - 45 = 1

---

Tied Group	Value	Members
<b>Time Period</b>		<b>Observations</b>
12/7/2016		1
1/18/2017		1
2/23/2017		1
3/22/2017		1
4/5/2017		1
7/6/2017		1
8/8/2017		1
10/9/2017		1
12/6/2017		1
5/15/2018		1
10/16/2018		1
6/11/2019		1
10/22/2019		1
6/15/2020		1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = 0

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|0| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Chloride

Location: CLF-J5

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.621439	0.487439	0.525	11.2398
2	0.663825	0.532855	0.546	11.0929
3	0.102698	0.532855	0.521	7.97247
4	0.196534	0.533148	0.546	None

Loc.	Date	Conc.	Outlier
CLF-J5	12/7/2016	9.26466	FALSE
	1/18/2017	8.83736	FALSE
	2/23/2017	9.20557	FALSE
	3/22/2017	9.56809	FALSE
	4/5/2017	9.34766	FALSE
	4/25/2017	8.91578	FALSE
	7/6/2017	<b>11.2398</b>	<b>TRUE</b>
	8/8/2017	9.48037	FALSE
	10/9/2017	<b>11.0929</b>	<b>TRUE</b>
	12/6/2017	8.85367	FALSE
	5/15/2018	9.5956	FALSE
	10/16/2018	<b>7.97247</b>	<b>TRUE</b>
	6/11/2019	8.00637	FALSE
	10/22/2019	9.04782	FALSE
	6/15/2020	9.74683	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Chloride

Location: CLF-J5

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	7.97247	11.2398	3.26734	0.515	1.68268
2	8.00637	11.0929	3.08649	0.3306	1.02039
3	8.83736	9.74683	0.909472	0.2495	0.226913
4	8.85367	9.5956	0.741937	0.1878	0.139336
5	8.91578	9.56809	0.65231	0.1353	0.0882576
6	9.04782	9.48037	0.432546	0.088	0.0380641
7	9.20557	9.34766	0.142087	0.0433	0.00615236
8	9.26466	9.26466	0		
9	9.34766	9.20557	-0.142087		
10	9.48037	9.04782	-0.432546		
11	9.56809	8.91578	-0.65231		
12	9.5956	8.85367	-0.741937		
13	9.74683	8.83736	-0.909472		
14	11.0929	8.00637	-3.08649		
15	11.2398	7.97247	-3.26734		

---

Sum of b values = 3.20179

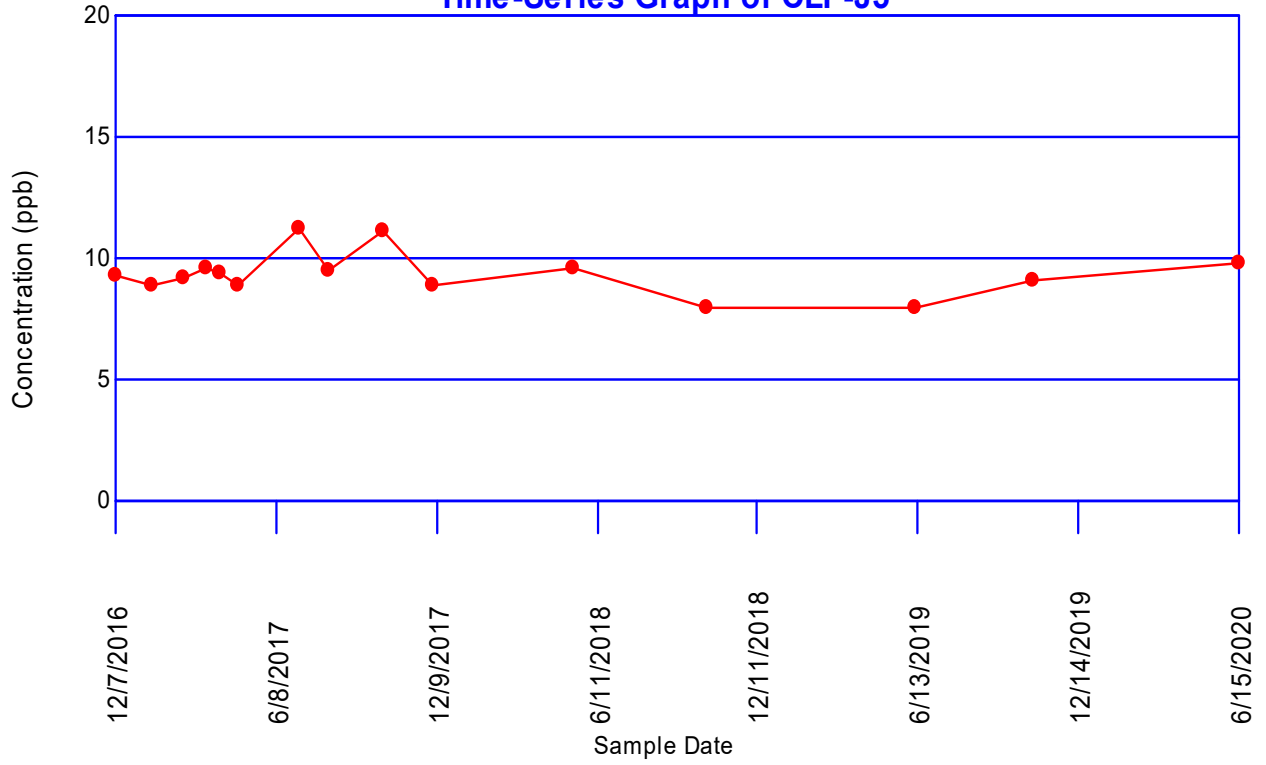
Sample Standard Deviation = 0.902812

W Statistic = 0.898388

5% Critical value of 0.881 is less than 0.898388  
Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.898388  
Data is normally distributed at 99% level of significance

### Chloride Time-Series Graph of CLF-J5



**Mann-Kendall Trend Analysis**  
**Parameter: Chloride**  
**Location: CLF-J5**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8.83736	9.26466	-0.427296	0	1
9.20557	9.26466	-0.0590891	0	2
9.56809	9.26466	0.303434	1	2
9.34766	9.26466	0.0829978	2	2
8.91578	9.26466	-0.348877	2	3
11.2398	9.26466	1.97515	3	3
9.48037	9.26466	0.215709	4	3
11.0929	9.26466	1.8282	5	3
8.85367	9.26466	-0.410993	5	4
9.5956	9.26466	0.330945	6	4
7.97247	9.26466	-1.29219	6	5
8.00637	9.26466	-1.25829	6	6
9.04782	9.26466	-0.216837	6	7
9.74683	9.26466	0.482176	7	7
9.20557	8.83736	0.368207	8	7
9.56809	8.83736	0.73073	9	7
9.34766	8.83736	0.510294	10	7
8.91578	8.83736	0.0784196	11	7
11.2398	8.83736	2.40244	12	7
9.48037	8.83736	0.643006	13	7
11.0929	8.83736	2.25549	14	7
8.85367	8.83736	0.0163036	15	7
9.5956	8.83736	0.758241	16	7
7.97247	8.83736	-0.864896	16	8
8.00637	8.83736	-0.830994	16	9
9.04782	8.83736	0.21046	17	9
9.74683	8.83736	0.909472	18	9
9.56809	9.20557	0.362523	19	9
9.34766	9.20557	0.142087	20	9
8.91578	9.20557	-0.289788	20	10
11.2398	9.20557	2.03423	21	10
9.48037	9.20557	0.274799	22	10
11.0929	9.20557	1.88729	23	10
8.85367	9.20557	-0.351904	23	11
9.5956	9.20557	0.390034	24	11
7.97247	9.20557	-1.2331	24	12
8.00637	9.20557	-1.1992	24	13
9.04782	9.20557	-0.157748	24	14
9.74683	9.20557	0.541265	25	14
9.34766	9.56809	-0.220436	25	15
8.91578	9.56809	-0.65231	25	16
11.2398	9.56809	1.67171	26	16
9.48037	9.56809	-0.0877242	26	17
11.0929	9.56809	1.52476	27	17



8.85367	9.56809	-0.714426	27	18
9.5956	9.56809	0.027511	28	18
7.97247	9.56809	-1.59563	28	19
8.00637	9.56809	-1.56172	28	20
9.04782	9.56809	-0.52027	28	21
9.74683	9.56809	0.178742	29	21
8.91578	9.34766	-0.431874	29	22
11.2398	9.34766	1.89215	30	22
9.48037	9.34766	0.132712	31	22
11.0929	9.34766	1.7452	32	22
8.85367	9.34766	-0.49399	32	23
9.5956	9.34766	0.247947	33	23
7.97247	9.34766	-1.37519	33	24
8.00637	9.34766	-1.34129	33	25
9.04782	9.34766	-0.299834	33	26
9.74683	9.34766	0.399178	34	26
11.2398	8.91578	2.32402	35	26
9.48037	8.91578	0.564586	36	26
11.0929	8.91578	2.17707	37	26
8.85367	8.91578	-0.0621159	37	27
9.5956	8.91578	0.679821	38	27
7.97247	8.91578	-0.943315	38	28
8.00637	8.91578	-0.909414	38	29
9.04782	8.91578	0.13204	39	29
9.74683	8.91578	0.831052	40	29
9.48037	11.2398	-1.75944	40	30
11.0929	11.2398	-0.146949	40	31
8.85367	11.2398	-2.38614	40	32
9.5956	11.2398	-1.6442	40	33
7.97247	11.2398	-3.26734	40	34
8.00637	11.2398	-3.23344	40	35
9.04782	11.2398	-2.19198	40	36
9.74683	11.2398	-1.49297	40	37
11.0929	9.48037	1.61249	41	37
8.85367	9.48037	-0.626702	41	38
9.5956	9.48037	0.115235	42	38
7.97247	9.48037	-1.5079	42	39
8.00637	9.48037	-1.474	42	40
9.04782	9.48037	-0.432546	42	41
9.74683	9.48037	0.266466	43	41
8.85367	11.0929	-2.23919	43	42
9.5956	11.0929	-1.49725	43	43
7.97247	11.0929	-3.12039	43	44
8.00637	11.0929	-3.08649	43	45
9.04782	11.0929	-2.04503	43	46
9.74683	11.0929	-1.34602	43	47
9.5956	8.85367	0.741937	44	47
7.97247	8.85367	-0.881199	44	48
8.00637	8.85367	-0.847298	44	49
9.04782	8.85367	0.194156	45	49
9.74683	8.85367	0.893168	46	49

7.97247	9.5956	-1.62314	46	50
8.00637	9.5956	-1.58924	46	51
9.04782	9.5956	-0.547781	46	52
9.74683	9.5956	0.151231	47	52
8.00637	7.97247	0.0339016	48	52
9.04782	7.97247	1.07536	49	52
9.74683	7.97247	1.77437	50	52
9.04782	8.00637	1.04145	51	52
9.74683	8.00637	1.74047	52	52
9.74683	9.04782	0.699012	53	52

S Statistic = 53 - 52 = 1

---

Tied Group	Value	Members
<b>Time Period</b>		<b>Observations</b>
12/7/2016		1
1/18/2017		1
2/23/2017		1
3/22/2017		1
4/5/2017		1
4/25/2017		1
7/6/2017		1
8/8/2017		1
10/9/2017		1
12/6/2017		1
5/15/2018		1
10/16/2018		1
6/11/2019		1
10/22/2019		1
6/15/2020		1
There are 0 time periods with multiple data		

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = 0

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|0| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Chloride

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.234104	0.189655	0.525	None

Loc.	Date	Conc.	Outlier
CLF-S13	12/7/2016	3530	FALSE
	1/18/2017	8923	FALSE
	2/23/2017	9236.6	FALSE
	3/22/2017	6266.5	FALSE
	4/5/2017	6387.2	FALSE
	4/25/2017	5526.6	FALSE
	7/6/2017	3100	FALSE
	8/8/2017	3100	FALSE
	10/9/2017	3300	FALSE
	12/6/2017	4400	FALSE
	5/15/2018	7800	FALSE
	10/16/2018	3700	FALSE
	6/11/2019	3600	FALSE
	10/22/2019	2000	FALSE
	6/15/2020	2600	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Chloride

Location: CLF-S13

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	2000	9236.6	7236.6	0.515	3726.85
2	2600	8923	6323	0.3306	2090.38
3	3100	7800	4700	0.2495	1172.65
4	3100	6387.2	3287.2	0.1878	617.336
5	3300	6266.5	2966.5	0.1353	401.367
6	3530	5526.6	1996.6	0.088	175.701
7	3600	4400	800	0.0433	34.64
8	3700	3700	0		
9	4400	3600	-800		
10	5526.6	3530	-1996.6		
11	6266.5	3300	-2966.5		
12	6387.2	3100	-3287.2		
13	7800	3100	-4700		
14	8923	2600	-6323		
15	9236.6	2000	-7236.6		

---

Sum of b values = 8218.93

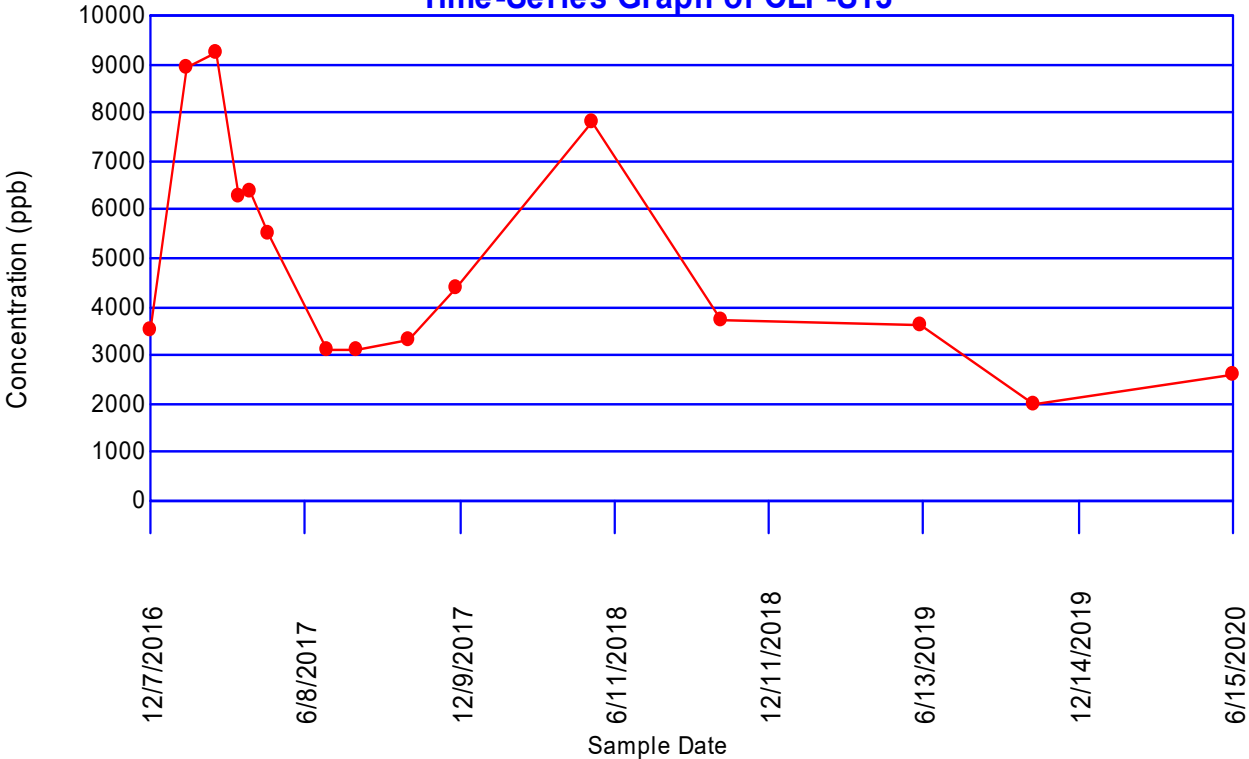
Sample Standard Deviation = 2327.92

W Statistic = 0.890358

5% Critical value of 0.881 is less than 0.890358  
Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.890358  
Data is normally distributed at 99% level of significance

### Chloride Time-Series Graph of CLF-S13



# Mann-Kendall Trend Analysis

Parameter: Chloride

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
8923	3530	5393	1	0
9236.6	3530	5706.6	2	0
6266.5	3530	2736.5	3	0
6387.2	3530	2857.2	4	0
5526.6	3530	1996.6	5	0
3100	3530	-430	5	1
3100	3530	-430	5	2
3300	3530	-230	5	3
4400	3530	870	6	3
7800	3530	4270	7	3
3700	3530	170	8	3
3600	3530	70	9	3
2000	3530	-1530	9	4
2600	3530	-930	9	5
9236.6	8923	313.6	10	5
6266.5	8923	-2656.5	10	6
6387.2	8923	-2535.8	10	7
5526.6	8923	-3396.4	10	8
3100	8923	-5823	10	9
3100	8923	-5823	10	10
3300	8923	-5623	10	11
4400	8923	-4523	10	12
7800	8923	-1123	10	13
3700	8923	-5223	10	14
3600	8923	-5323	10	15
2000	8923	-6923	10	16
2600	8923	-6323	10	17
6266.5	9236.6	-2970.1	10	18
6387.2	9236.6	-2849.4	10	19
5526.6	9236.6	-3710	10	20
3100	9236.6	-6136.6	10	21
3100	9236.6	-6136.6	10	22
3300	9236.6	-5936.6	10	23
4400	9236.6	-4836.6	10	24
7800	9236.6	-1436.6	10	25
3700	9236.6	-5536.6	10	26
3600	9236.6	-5636.6	10	27
2000	9236.6	-7236.6	10	28
2600	9236.6	-6636.6	10	29
6387.2	6266.5	120.7	11	29
5526.6	6266.5	-739.9	11	30
3100	6266.5	-3166.5	11	31
3100	6266.5	-3166.5	11	32
3300	6266.5	-2966.5	11	33

4400	6266.5	-1866.5	11	34
7800	6266.5	1533.5	12	34
3700	6266.5	-2566.5	12	35
3600	6266.5	-2666.5	12	36
2000	6266.5	-4266.5	12	37
2600	6266.5	-3666.5	12	38
5526.6	6387.2	-860.6	12	39
3100	6387.2	-3287.2	12	40
3100	6387.2	-3287.2	12	41
3300	6387.2	-3087.2	12	42
4400	6387.2	-1987.2	12	43
7800	6387.2	1412.8	13	43
3700	6387.2	-2687.2	13	44
3600	6387.2	-2787.2	13	45
2000	6387.2	-4387.2	13	46
2600	6387.2	-3787.2	13	47
3100	5526.6	-2426.6	13	48
3100	5526.6	-2426.6	13	49
3300	5526.6	-2226.6	13	50
4400	5526.6	-1126.6	13	51
7800	5526.6	2273.4	14	51
3700	5526.6	-1826.6	14	52
3600	5526.6	-1926.6	14	53
2000	5526.6	-3526.6	14	54
2600	5526.6	-2926.6	14	55
3100	3100	0	14	55
3300	3100	200	15	55
4400	3100	1300	16	55
7800	3100	4700	17	55
3700	3100	600	18	55
3600	3100	500	19	55
2000	3100	-1100	19	56
2600	3100	-500	19	57
3300	3100	200	20	57
4400	3100	1300	21	57
7800	3100	4700	22	57
3700	3100	600	23	57
3600	3100	500	24	57
2000	3100	-1100	24	58
2600	3100	-500	24	59
4400	3300	1100	25	59
7800	3300	4500	26	59
3700	3300	400	27	59
3600	3300	300	28	59
2000	3300	-1300	28	60
2600	3300	-700	28	61
7800	4400	3400	29	61
3700	4400	-700	29	62
3600	4400	-800	29	63
2000	4400	-2400	29	64
2600	4400	-1800	29	65

3700	7800	-4100	29	66
3600	7800	-4200	29	67
2000	7800	-5800	29	68
2600	7800	-5200	29	69
3600	3700	-100	29	70
2000	3700	-1700	29	71
2600	3700	-1100	29	72
2000	3600	-1600	29	73
2600	3600	-1000	29	74
2600	2000	600	30	74

S Statistic = 30 - 74 = -44

---

Tied Group	Value	Members
1	3100	2

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 407.333

Z-Score = -2.13056

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**|-2.13056| > 1.97737 indicating a trend**



## Dixon's Test for Outliers

Parameter: Chloride

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.427092	0.0131491	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S05	1/18/2017	6116.1	FALSE
	4/5/2017	8505.1	FALSE
	4/25/2017	5278.4	FALSE
	10/16/2018	900	FALSE
	10/22/2019	14100	FALSE
	6/29/2020	ND<1000	FALSE
	12/5/2020	4300	FALSE
	3/26/2021	2200	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Chloride

Location: CLF-S05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	900	14100	13200	0.6052	7988.64
2	1000	8505.1	7505.1	0.3164	2374.61
3	2200	6116.1	3916.1	0.1743	682.576
4	4300	5278.4	978.4	0.0561	54.8882
5	5278.4	4300	-978.4		
6	6116.1	2200	-3916.1		
7	8505.1	1000	-7505.1		
8	14100	900	-13200		

---

Sum of b values = 11100.7

Sample Standard Deviation = 4421.36

W Statistic = 0.900517

5% Critical value of 0.818 is less than 0.900517

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.900517

Data is normally distributed at 99% level of significance

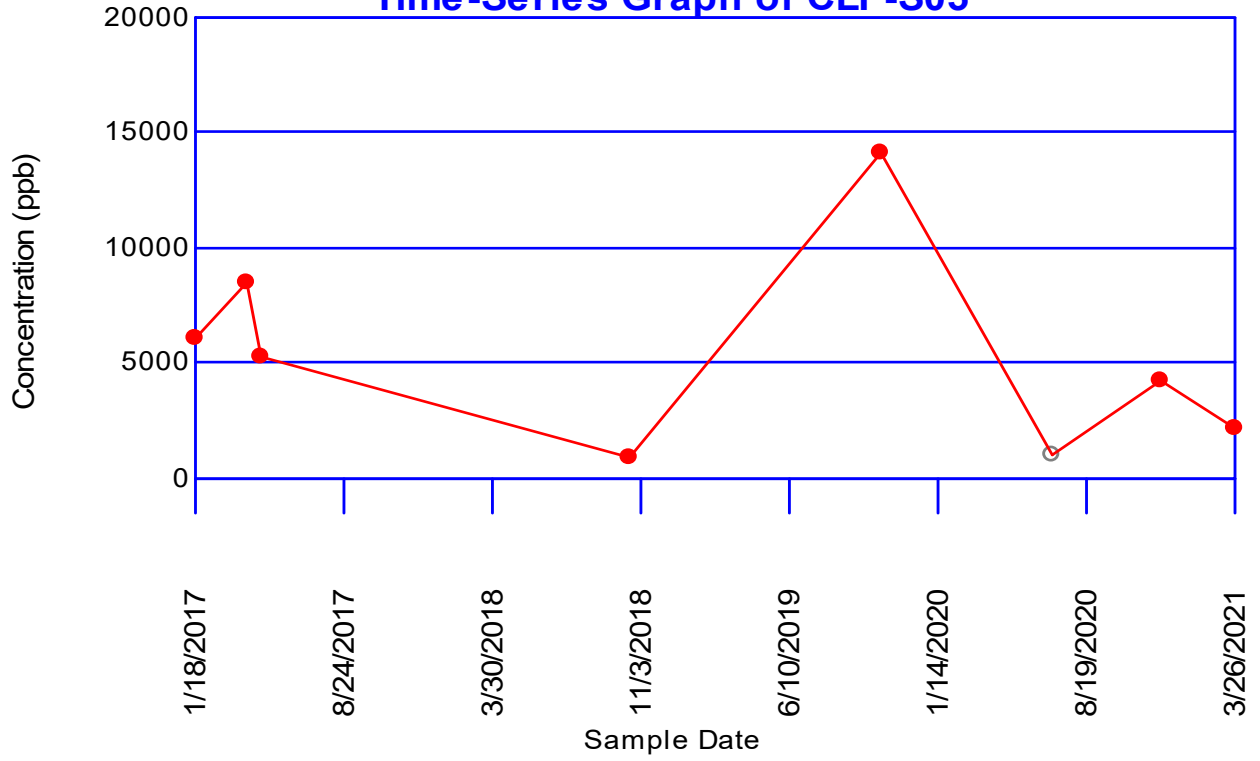
**Mann-Kendall Trend Analysis**  
**Parameter: Chloride**  
**Location: CLF-S05**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8505.1	6116.1	2389	1	0
5278.4	6116.1	-837.7	1	1
900	6116.1	-5216.1	1	2
14100	6116.1	7983.9	2	2
ND<1000	6116.1	-5116.1	2	3
4300	6116.1	-1816.1	2	4
2200	6116.1	-3916.1	2	5
5278.4	8505.1	-3226.7	2	6
900	8505.1	-7605.1	2	7
14100	8505.1	5594.9	3	7
ND<1000	8505.1	-7505.1	3	8
4300	8505.1	-4205.1	3	9
2200	8505.1	-6305.1	3	10
900	5278.4	-4378.4	3	11
14100	5278.4	8821.6	4	11
ND<1000	5278.4	-4278.4	4	12
4300	5278.4	-978.4	4	13
2200	5278.4	-3078.4	4	14
14100	900	13200	5	14
ND<1000	900	100	6	14
4300	900	3400	7	14
2200	900	1300	8	14
ND<1000	14100	-13100	8	15
4300	14100	-9800	8	16
2200	14100	-11900	8	17
4300	ND<1000	3300	9	17
2200	ND<1000	1200	10	17
2200	4300	-2100	10	18

S Statistic = 10 - 18 = -8  
 Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
 Probability of obtaining S >= |-8| is 0.398  
 0.398 >= 0.025 indicating no evidence of a trend

# Chloride Time-Series Graph of CLF-S05



## Concentrations (ppb)

Parameter: Fluoride

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Total Measurements: 74

Total Non-Detect: 65

Percent Non-Detects: 87.8378%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

There are 6 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

CLF-J2	15	13 (86.6667%)	12/7/2016	ND<6.21461	ND<500
			1/18/2017	5.13991	170.7
			2/23/2017	ND<6.21461	ND<500
			3/22/2017	ND<6.21461	ND<500
			4/5/2017	ND<6.21461	ND<500
			4/25/2017	ND<6.21461	ND<500
			7/6/2017	ND<6.21461	ND<500
			8/8/2017	ND<6.21461	ND<500
			10/9/2017	ND<6.21461	ND<500
			12/6/2017	ND<6.21461	ND<500
			5/15/2018	ND<6.21461	ND<500
			10/16/2018	ND<6.21461	ND<500
			6/11/2019	ND<6.21461	ND<500
			10/22/2019	ND<6.21461	ND<500
			6/29/2020	4.94164	140
			<b>12/5/2020</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>
			<b>3/26/2021</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>

CLF-J3	14	13 (92.8571%)	12/7/2016	ND<6.21461	ND<500
			1/18/2017	5.10958	165.6
			2/23/2017	ND<6.21461	ND<500
			3/22/2017	ND<6.21461	ND<500
			4/5/2017	ND<6.21461	ND<500
			7/6/2017	ND<6.21461	ND<500
			8/8/2017	ND<6.21461	ND<500
			10/9/2017	ND<6.21461	ND<500
			12/6/2017	ND<6.21461	ND<500
			5/15/2018	ND<6.21461	ND<500
			10/16/2018	ND<6.21461	ND<500
			6/11/2019	ND<6.21461	ND<500
			10/22/2019	ND<6.21461	ND<500
			6/15/2020	ND<6.21461	ND<500
			<b>12/5/2020</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>
			<b>3/26/2021</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>

CLF-J5	15	14 (93.3333%)	12/7/2016	ND<6.21461	ND<500
			1/18/2017	5.11739	166.9
			2/23/2017	ND<6.21461	ND<500
			3/22/2017	ND<6.21461	ND<500
			4/5/2017	ND<6.21461	ND<500
			4/25/2017	ND<6.21461	ND<500

			7/6/2017	ND<6.21461	ND<500
			8/8/2017	ND<6.21461	ND<500
			10/9/2017	ND<6.21461	ND<500
			12/6/2017	ND<6.21461	ND<500
			5/15/2018	ND<6.21461	ND<500
			10/16/2018	ND<6.21461	ND<500
			6/11/2019	ND<6.21461	ND<500
			10/22/2019	ND<6.21461	ND<500
			6/15/2020	ND<6.21461	ND<500
			<b>12/5/2020</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>
			<b>3/26/2021</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>
CLF-S05	8	6 (75%)	1/18/2017	5.11078	165.8
			4/5/2017	ND<6.21461	ND<500
			4/25/2017	ND<6.21461	ND<500
			10/16/2018	ND<6.21461	ND<500
			10/22/2019	ND<6.21461	ND<500
			6/29/2020	4.94164	140
			12/5/2020	ND<6.21461	ND<500
			3/26/2021	ND<6.21461	ND<500
CLF-S06	7	5 (71.4286%)	1/18/2017	5.60984	273.1
			4/5/2017	ND<6.21461	ND<500
			4/25/2017	ND<6.21461	ND<500
			10/16/2018	ND<6.21461	ND<500
			6/29/2020	5.34711	210
			12/5/2020	ND<6.21461	ND<500
			3/26/2021	ND<6.21461	ND<500
CLF-S13	15	14 (93.3333%)	12/7/2016	ND<6.21461	ND<500
			1/18/2017	5.3452	209.6
			2/23/2017	ND<6.21461	ND<500
			3/22/2017	ND<6.21461	ND<500
			4/5/2017	ND<6.21461	ND<500
			4/25/2017	ND<6.21461	ND<500
			7/6/2017	ND<6.21461	ND<500
			8/8/2017	ND<6.21461	ND<500
			10/9/2017	ND<6.21461	ND<500
			12/6/2017	ND<6.21461	ND<500
			5/15/2018	ND<6.21461	ND<500
			10/16/2018	ND<6.21461	ND<500
			6/11/2019	ND<6.21461	ND<500
			10/22/2019	ND<6.21461	ND<500
			6/15/2020	ND<6.21461	ND<500
			<b>12/5/2020</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>
			<b>3/26/2021</b>	<b>ND&lt;6.21461</b>	<b>ND&lt;500</b>

There are 2 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
CLF-C03	17	13 (76.4706%)	12/7/2016	6.29231	540.4
			1/18/2017	5.50044	244.8
			2/23/2017	ND<6.21461	ND<500
			3/22/2017	ND<6.21461	ND<500
			4/5/2017	ND<6.21461	ND<500
			4/25/2017	ND<6.21461	ND<500

7/6/2017	ND<6.21461	ND<500
8/8/2017	6.39693	600
10/9/2017	6.21461	500
12/6/2017	ND<6.21461	ND<500
5/15/2018	ND<6.21461	ND<500
10/16/2018	ND<6.21461	ND<500
6/11/2019	ND<6.21461	ND<500
10/22/2019	ND<6.21461	ND<500
6/15/2020	ND<6.21461	ND<500
12/5/2020	ND<6.21461	ND<500
3/26/2021	ND<6.21461	ND<500

---

CLF-OPP	17	16 (94.1176%)	12/7/2016	ND<6.21461	ND<500
			1/18/2017	4.99383	147.5
			2/23/2017	ND<6.21461	ND<500
			3/22/2017	ND<6.21461	ND<500
			4/5/2017	ND<6.21461	ND<500
			4/25/2017	ND<6.21461	ND<500
			7/6/2017	ND<6.21461	ND<500
			8/8/2017	ND<6.21461	ND<500
			10/9/2017	ND<6.21461	ND<500
			12/6/2017	ND<6.21461	ND<500
			5/15/2018	ND<6.21461	ND<500
			10/16/2018	ND<6.21461	ND<500
			6/11/2019	ND<6.21461	ND<500
			10/22/2019	ND<6.21461	ND<500
			6/15/2020	ND<6.21461	ND<500
			12/5/2020	ND<6.21461	ND<500
			3/26/2021	ND<6.21461	ND<500

---

## Dixon's Test for Outliers

Parameter: Fluoride

Location: CLF-J2

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

**Iteration    Highest    Lowest    Critical    Outlier**

**A Divide-By-Zero error occurred in the calculations.**

**Additional Outliers May Exist.**

<b>Loc.</b>	<b>Date</b>	<b>Conc.</b>	<b>Outlier</b>
CLF-J2	12/7/2016	ND<500	FALSE
	1/18/2017	170.7	FALSE
	2/23/2017	ND<500	FALSE
	3/22/2017	ND<500	FALSE
	4/5/2017	ND<500	FALSE
	4/25/2017	ND<500	FALSE
	7/6/2017	ND<500	FALSE
	8/8/2017	ND<500	FALSE
	10/9/2017	ND<500	FALSE
	12/6/2017	ND<500	FALSE
	5/15/2018	ND<500	FALSE
	10/16/2018	ND<500	FALSE
	6/11/2019	ND<500	FALSE
	10/22/2019	ND<500	FALSE
	6/29/2020	140	FALSE



## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: CLF-J2

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	140	500	360	0.515	185.4
2	170.7	500	329.3	0.3306	108.867
3	500	500	0	0.2495	0
4	500	500	0	0.1878	0
5	500	500	0	0.1353	0
6	500	500	0	0.088	0
7	500	500	0	0.0433	0
8	500	500	0		0
9	500	500	0		0
10	500	500	0		0
11	500	500	0		0
12	500	500	0		0
13	500	500	0		0
14	500	170.7	-329.3		0
15	500	140	-360		0

---

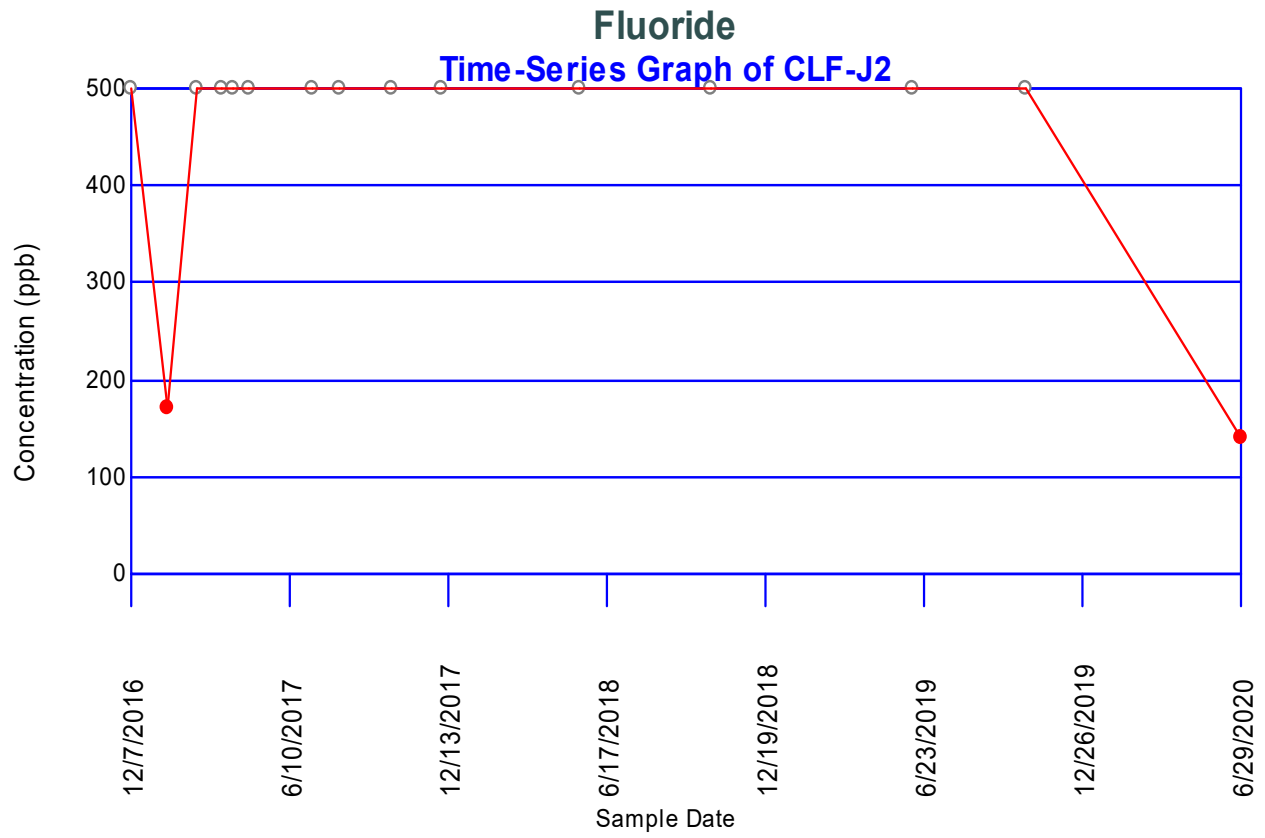
Sum of b values = 294.267

Sample Standard Deviation = 121.409

W Statistic = 0.419614

**5% Critical value of 0.881 exceeds 0.419614**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.835 exceeds 0.419614**  
**Evidence of non-normality at 99% level of significance**



## Dixon's Test for Outliers

Parameter: Fluoride

Location: CLF-J3

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 14 Measurements...

5% Level of Significance

**Iteration    Highest    Lowest    Critical    Outlier**

**A Divide-By-Zero error occurred in the calculations.**

**Additional Outliers May Exist.**

<b>Loc.</b>	<b>Date</b>	<b>Conc.</b>	<b>Outlier</b>
CLF-J3	12/7/2016	ND<500	FALSE
	1/18/2017	165.6	FALSE
	2/23/2017	ND<500	FALSE
	3/22/2017	ND<500	FALSE
	4/5/2017	ND<500	FALSE
	7/6/2017	ND<500	FALSE
	8/8/2017	ND<500	FALSE
	10/9/2017	ND<500	FALSE
	12/6/2017	ND<500	FALSE
	5/15/2018	ND<500	FALSE
	10/16/2018	ND<500	FALSE
	6/11/2019	ND<500	FALSE
	10/22/2019	ND<500	FALSE
	6/15/2020	ND<500	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: CLF-J3

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 14 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	165.6	500	334.4	0.5251	175.593
2	500	500	0	0.3318	0
3	500	500	0	0.246	0
4	500	500	0	0.1802	0
5	500	500	0	0.124	0
6	500	500	0	0.0727	0
7	500	500	0	0.024	0
8	500	500	0		0
9	500	500	0		0
10	500	500	0		0
11	500	500	0		0
12	500	500	0		0
13	500	500	0		0
14	500	165.6	-334.4		0

---

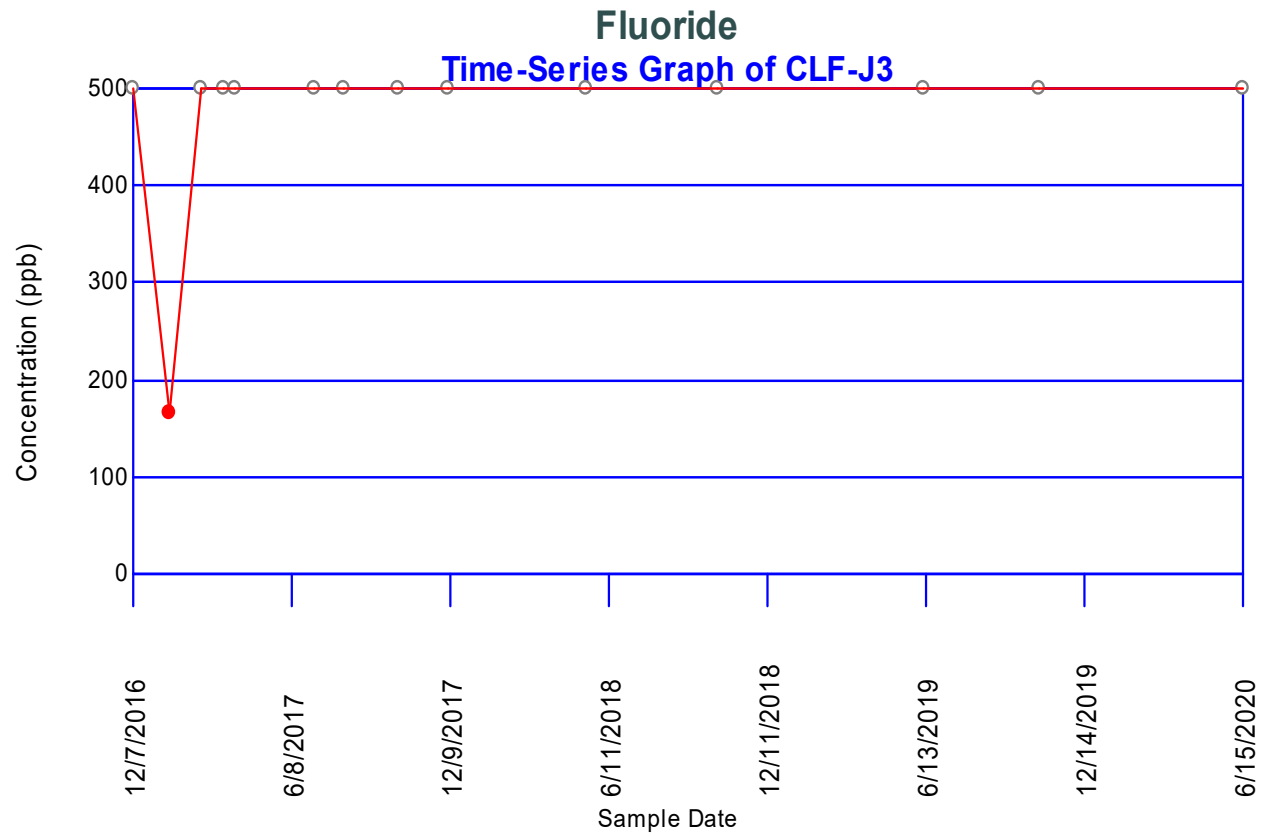
Sum of b values = 175.593

Sample Standard Deviation = 89.3722

W Statistic = 0.29694

**5% Critical value of 0.874 exceeds 0.29694**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.825 exceeds 0.29694**  
**Evidence of non-normality at 99% level of significance**



## Dixon's Test for Outliers

Parameter: Fluoride

Location: CLF-J5

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

**Iteration    Highest    Lowest    Critical    Outlier**

**A Divide-By-Zero error occurred in the calculations.**

**Additional Outliers May Exist.**

<b>Loc.</b>	<b>Date</b>	<b>Conc.</b>	<b>Outlier</b>
CLF-J5	12/7/2016	ND<500	FALSE
	1/18/2017	166.9	FALSE
	2/23/2017	ND<500	FALSE
	3/22/2017	ND<500	FALSE
	4/5/2017	ND<500	FALSE
	4/25/2017	ND<500	FALSE
	7/6/2017	ND<500	FALSE
	8/8/2017	ND<500	FALSE
	10/9/2017	ND<500	FALSE
	12/6/2017	ND<500	FALSE
	5/15/2018	ND<500	FALSE
	10/16/2018	ND<500	FALSE
	6/11/2019	ND<500	FALSE
	10/22/2019	ND<500	FALSE
	6/15/2020	ND<500	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: CLF-J5

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	166.9	500	333.1	0.515	171.547
2	500	500	0	0.3306	0
3	500	500	0	0.2495	0
4	500	500	0	0.1878	0
5	500	500	0	0.1353	0
6	500	500	0	0.088	0
7	500	500	0	0.0433	0
8	500	500	0		0
9	500	500	0		0
10	500	500	0		0
11	500	500	0		0
12	500	500	0		0
13	500	500	0		0
14	500	500	0		0
15	500	166.9	-333.1		0

---

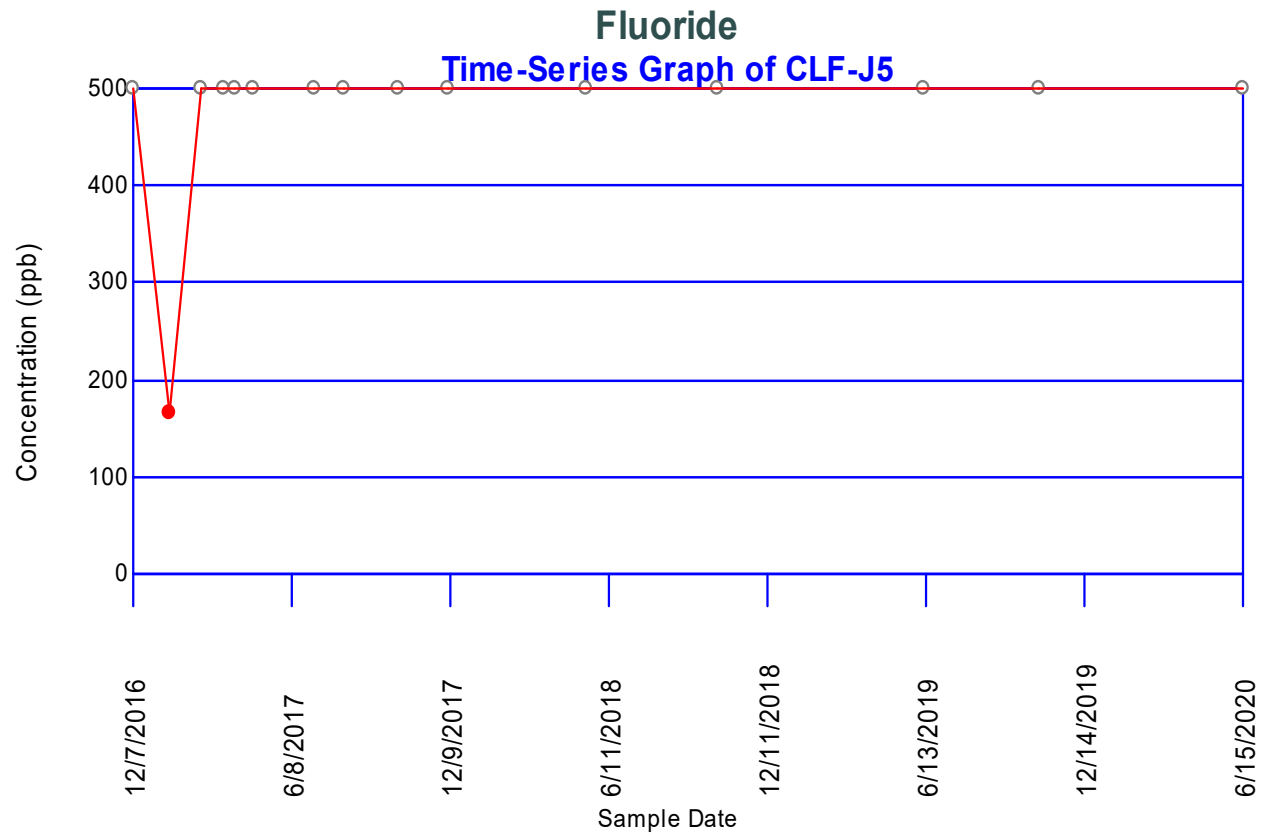
Sum of b values = 171.547

Sample Standard Deviation = 86.0061

W Statistic = 0.28417

**5% Critical value of 0.881 exceeds 0.28417**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.835 exceeds 0.28417**  
**Evidence of non-normality at 99% level of significance**





## Dixon's Test for Outliers

Parameter: Fluoride

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

**Iteration    Highest    Lowest    Critical    Outlier**

**A Divide-By-Zero error occurred in the calculations.**

**Additional Outliers May Exist.**

<b>Loc.</b>	<b>Date</b>	<b>Conc.</b>	<b>Outlier</b>
CLF-S13	12/7/2016	ND<500	FALSE
	1/18/2017	209.6	FALSE
	2/23/2017	ND<500	FALSE
	3/22/2017	ND<500	FALSE
	4/5/2017	ND<500	FALSE
	4/25/2017	ND<500	FALSE
	7/6/2017	ND<500	FALSE
	8/8/2017	ND<500	FALSE
	10/9/2017	ND<500	FALSE
	12/6/2017	ND<500	FALSE
	5/15/2018	ND<500	FALSE
	10/16/2018	ND<500	FALSE
	6/11/2019	ND<500	FALSE
	10/22/2019	ND<500	FALSE
	6/15/2020	ND<500	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: CLF-S13

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	209.6	500	290.4	0.515	149.556
2	500	500	0	0.3306	0
3	500	500	0	0.2495	0
4	500	500	0	0.1878	0
5	500	500	0	0.1353	0
6	500	500	0	0.088	0
7	500	500	0	0.0433	0
8	500	500	0		0
9	500	500	0		0
10	500	500	0		0
11	500	500	0		0
12	500	500	0		0
13	500	500	0		0
14	500	500	0		0
15	500	209.6	-290.4		0

---

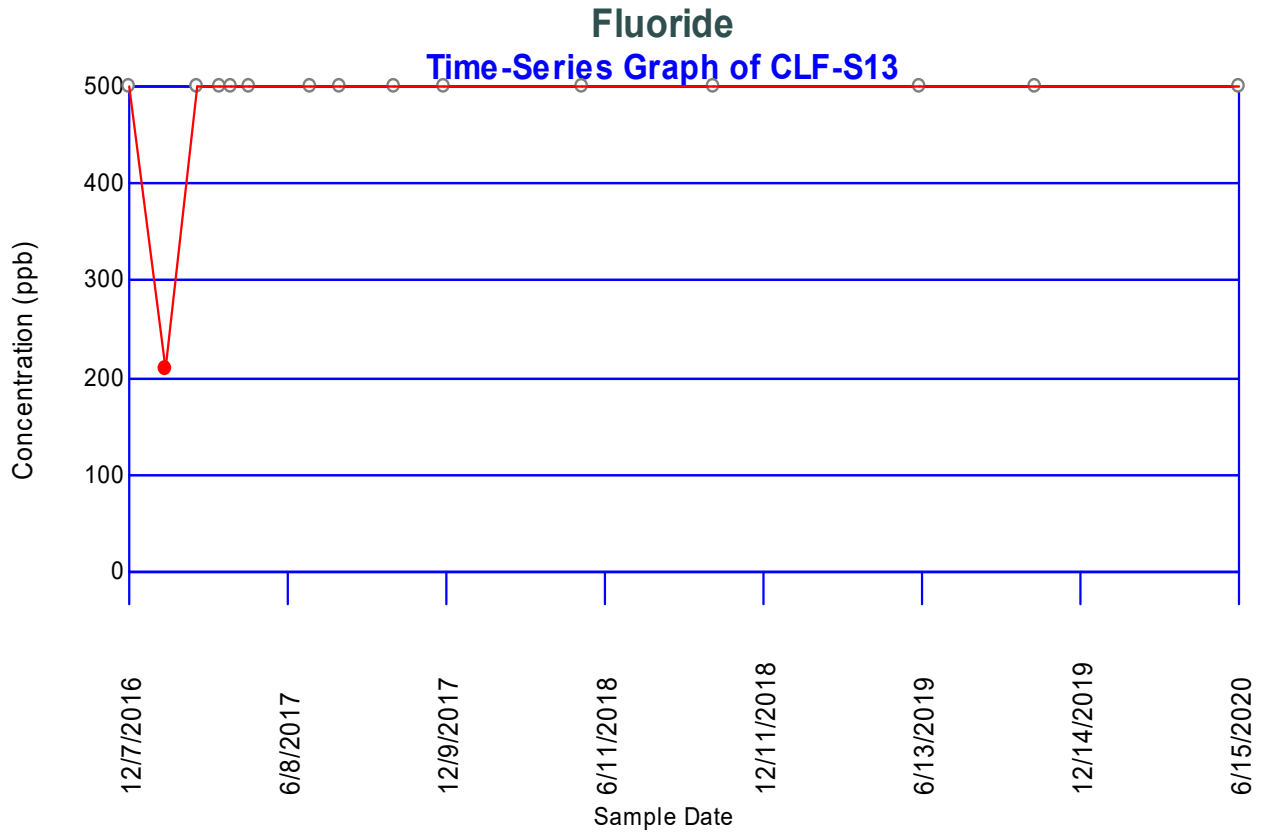
Sum of b values = 149.556

Sample Standard Deviation = 74.981

W Statistic = 0.28417

**5% Critical value of 0.881 exceeds 0.28417**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.835 exceeds 0.28417**  
**Evidence of non-normality at 99% level of significance**



## Dixon's Test for Outliers

Parameter: Fluoride

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0	0.0716667	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S05	1/18/2017	165.8	FALSE
	4/5/2017	ND<500	FALSE
	4/25/2017	ND<500	FALSE
	10/16/2018	ND<500	FALSE
	10/22/2019	ND<500	FALSE
	6/29/2020	140	FALSE
	12/5/2020	ND<500	FALSE
	3/26/2021	ND<500	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: CLF-S05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	140	500	360	0.6052	217.872
2	165.8	500	334.2	0.3164	105.741
3	500	500	0	0.1743	0
4	500	500	0	0.0561	0
5	500	500	0		
6	500	500	0		
7	500	165.8	-334.2		
8	500	140	-360		

---

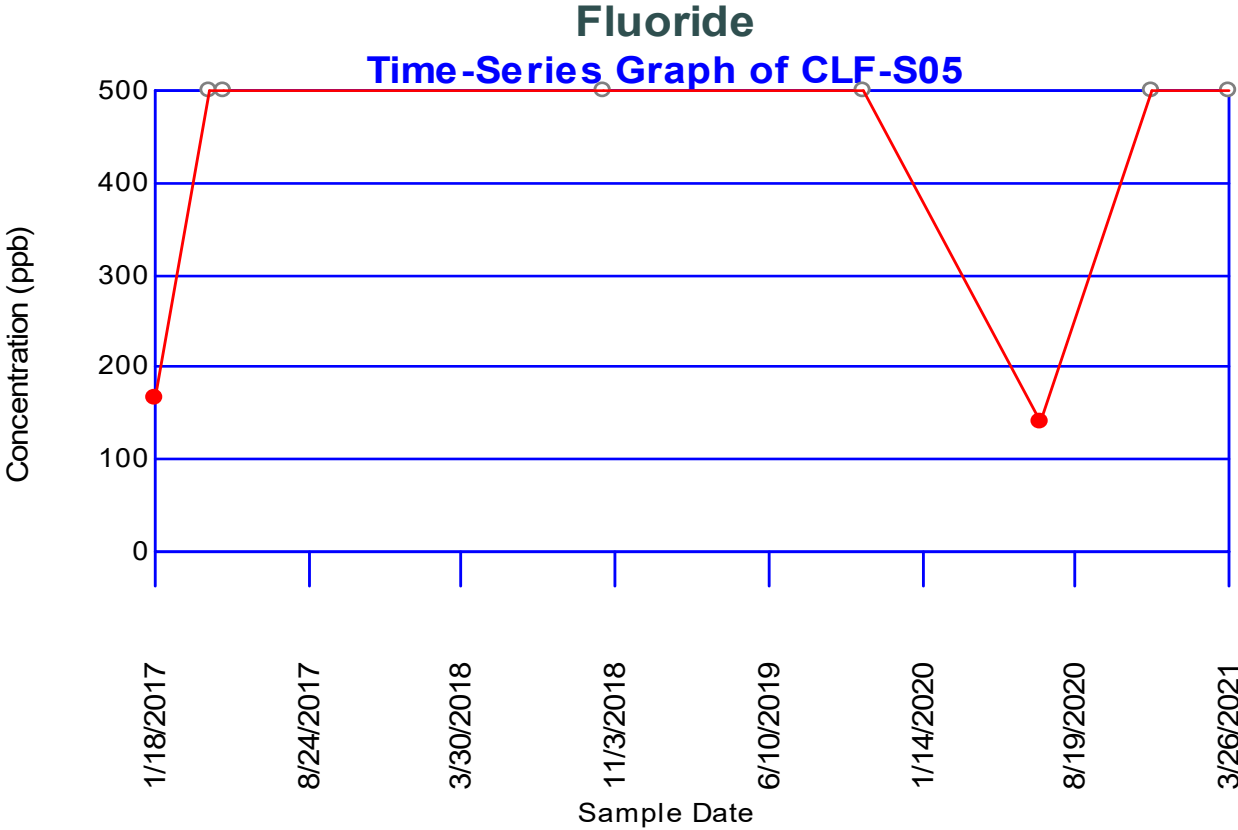
Sum of b values = 323.613

Sample Standard Deviation = 160.824

W Statistic = 0.578432

**5% Critical value of 0.818 exceeds 0.578432**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.749 exceeds 0.578432**  
**Evidence of non-normality at 99% level of significance**



**Concentrations (ppb)**

**Parameter: pH, Field**

**Original Data (Not Transformed)**

**Non-Detects Replaced with Detection Limit**

Total Measurements: 70

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

There are 6 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

CLF-J2	15	0 (0%)	12/7/2016	7.89	7.89
			1/18/2017	8.15	8.15
			2/23/2017	8.23	8.23
			3/22/2017	7.89	7.89
			4/5/2017	7.81	7.81
			4/25/2017	7.36	7.36
			7/6/2017	7.56	7.56
			8/8/2017	7.77	7.77
			10/9/2017	8.07	8.07
			12/6/2017	8.29	8.29
			5/15/2018	8.26	8.26
			10/16/2018	8.02	8.02
			6/11/2019	7.54	7.54
			10/22/2019	8.17	8.17
			6/29/2020	7.31	7.31
<b>12/5/2020</b>	<b>7.7</b>	<b>7.7</b>			

CLF-J3	14	0 (0%)	12/7/2016	7.45	7.45
			1/18/2017	8.26	8.26
			2/23/2017	8.28	8.28
			3/22/2017	8.3	8.3
			4/5/2017	7.69	7.69
			7/6/2017	7.58	7.58
			8/8/2017	7.61	7.61
			10/9/2017	8.12	8.12
			12/6/2017	8.32	8.32
			5/15/2018	7.66	7.66
			10/16/2018	7.61	7.61
			6/11/2019	7.49	7.49
			10/22/2019	8.33	8.33
			6/15/2020	7.61	7.61
			<b>12/5/2020</b>	<b>7.54</b>	<b>7.54</b>

CLF-J5	15	0 (0%)	12/7/2016	7.91	7.91
			1/18/2017	8.17	8.17
			2/23/2017	8.04	8.04
			3/22/2017	8.11	8.11
			4/5/2017	8.01	8.01
			4/25/2017	7.49	7.49
			7/6/2017	7.8	7.8
			8/8/2017	8.18	8.18

			10/9/2017	7.8	7.8
			12/6/2017	8.34	8.34
			5/15/2018	8.01	8.01
			10/16/2018	7.96	7.96
			6/11/2019	7.74	7.74
			10/22/2019	8.3	8.3
			6/15/2020	8.12	8.12
			<b>12/5/2020</b>	<b>7.71</b>	<b>7.71</b>
CLF-S05	6	0 (0%)	1/18/2017	8.31	8.31
			4/5/2017	8.32	8.32
			4/25/2017	7.67	7.67
			10/16/2018	8.13	8.13
			10/22/2019	8.4	8.4
			6/29/2020	8.09	8.09
			<b>12/5/2020</b>	<b>7.77</b>	<b>7.77</b>
CLF-S06	5	0 (0%)	1/18/2017	7.99	7.99
			4/5/2017	7.89	7.89
			4/25/2017	8.25	8.25
			10/16/2018	7.72	7.72
			6/29/2020	8.81	8.81
			<b>12/5/2020</b>	<b>4.2</b>	<b>4.2</b>
CLF-S13	15	0 (0%)	12/7/2016	7.92	7.92
			1/18/2017	7.86	7.86
			2/23/2017	7.91	7.91
			3/22/2017	8.04	8.04
			4/5/2017	8.02	8.02
			4/25/2017	7.16	7.16
			7/6/2017	7.47	7.47
			8/8/2017	7.96	7.96
			10/9/2017	7.54	7.54
			12/6/2017	8.22	8.22
			5/15/2018	7.72	7.72
			10/16/2018	8.13	8.13
			6/11/2019	7.7	7.7
			10/22/2019	7.99	7.99
			6/15/2020	7.82	7.82
			<b>12/5/2020</b>	<b>7.35</b>	<b>7.35</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------



## Dixon's Test for Outliers

Parameter: pH, Field

Location: CLF-J2

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.08	0.25	0.525	None

Loc.	Date	Conc.	Outlier
CLF-J2	12/7/2016	7.89	FALSE
	1/18/2017	8.15	FALSE
	2/23/2017	8.23	FALSE
	3/22/2017	7.89	FALSE
	4/5/2017	7.81	FALSE
	4/25/2017	7.36	FALSE
	7/6/2017	7.56	FALSE
	8/8/2017	7.77	FALSE
	10/9/2017	8.07	FALSE
	12/6/2017	8.29	FALSE
	5/15/2018	8.26	FALSE
	10/16/2018	8.02	FALSE
	6/11/2019	7.54	FALSE
	10/22/2019	8.17	FALSE
	6/29/2020	7.31	FALSE

## Shapiro-Wilks Test of Normality

Parameter: pH, Field

Location: CLF-J2

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	7.31	8.29	0.98	0.515	0.5047
2	7.36	8.26	0.9	0.3306	0.29754
3	7.54	8.23	0.69	0.2495	0.172155
4	7.56	8.17	0.61	0.1878	0.114558
5	7.77	8.15	0.38	0.1353	0.051414
6	7.81	8.07	0.26	0.088	0.02288
7	7.89	8.02	0.13	0.0433	0.005629
8	7.89	7.89	0		
9	8.02	7.89	-0.13		
10	8.07	7.81	-0.26		
11	8.15	7.77	-0.38		
12	8.17	7.56	-0.61		
13	8.23	7.54	-0.69		
14	8.26	7.36	-0.9		
15	8.29	7.31	-0.98		

---

Sum of b values = 1.16888

Sample Standard Deviation = 0.324834

W Statistic = 0.924881

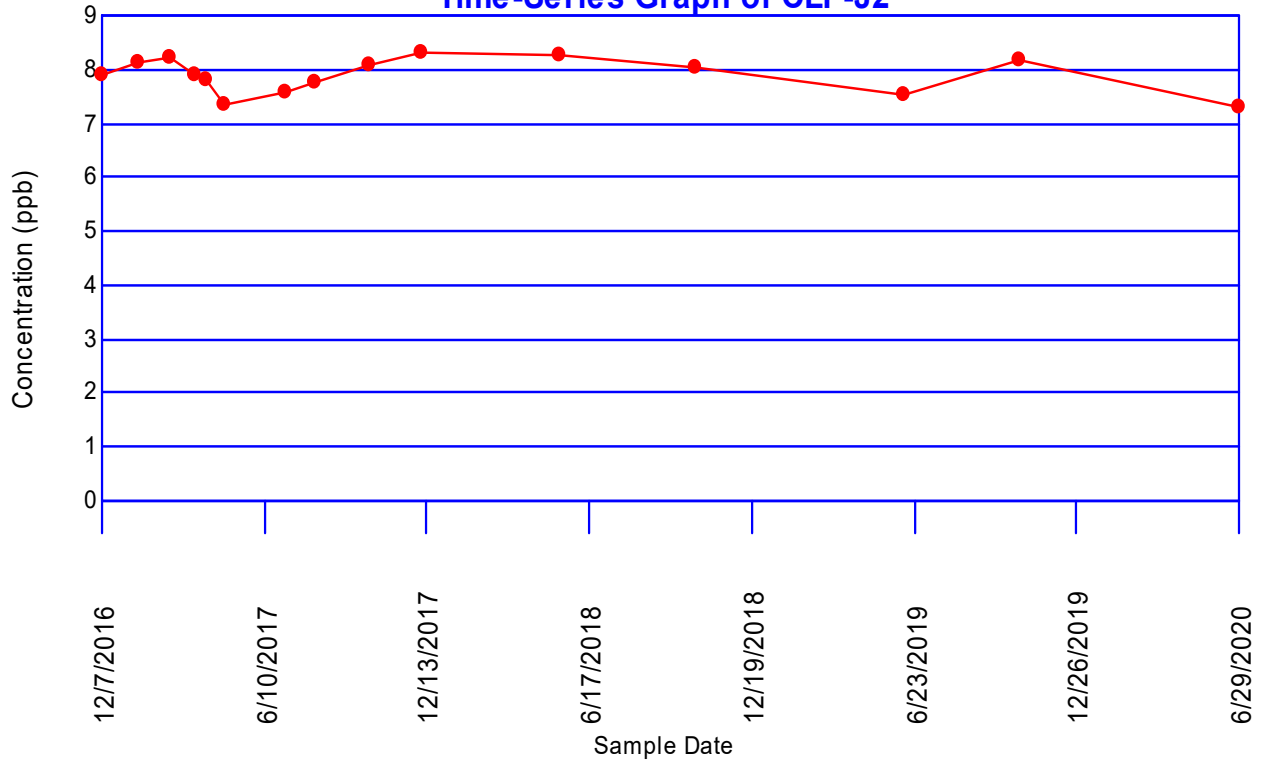
5% Critical value of 0.881 is less than 0.924881

Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.924881

Data is normally distributed at 99% level of significance

### pH, Field Time-Series Graph of CLF-J2



**Mann-Kendall Trend Analysis**  
**Parameter: pH, Field**  
**Location: CLF-J2**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

---

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8.15	7.89	0.26	1	0
8.23	7.89	0.34	2	0
7.89	7.89	0	2	0
7.81	7.89	-0.08	2	1
7.36	7.89	-0.53	2	2
7.56	7.89	-0.33	2	3
7.77	7.89	-0.12	2	4
8.07	7.89	0.18	3	4
8.29	7.89	0.4	4	4
8.26	7.89	0.37	5	4
8.02	7.89	0.13	6	4
7.54	7.89	-0.35	6	5
8.17	7.89	0.28	7	5
7.31	7.89	-0.58	7	6
8.23	8.15	0.08	8	6
7.89	8.15	-0.26	8	7
7.81	8.15	-0.34	8	8
7.36	8.15	-0.79	8	9
7.56	8.15	-0.59	8	10
7.77	8.15	-0.38	8	11
8.07	8.15	-0.08	8	12
8.29	8.15	0.14	9	12
8.26	8.15	0.11	10	12
8.02	8.15	-0.13	10	13
7.54	8.15	-0.61	10	14
8.17	8.15	0.02	11	14
7.31	8.15	-0.84	11	15
7.89	8.23	-0.34	11	16
7.81	8.23	-0.42	11	17
7.36	8.23	-0.87	11	18
7.56	8.23	-0.67	11	19
7.77	8.23	-0.46	11	20
8.07	8.23	-0.16	11	21
8.29	8.23	0.06	12	21
8.26	8.23	0.03	13	21
8.02	8.23	-0.21	13	22
7.54	8.23	-0.69	13	23
8.17	8.23	-0.06	13	24
7.31	8.23	-0.92	13	25
7.81	7.89	-0.08	13	26
7.36	7.89	-0.53	13	27
7.56	7.89	-0.33	13	28
7.77	7.89	-0.12	13	29
8.07	7.89	0.18	14	29

8.29	7.89	0.4	15	29
8.26	7.89	0.37	16	29
8.02	7.89	0.13	17	29
7.54	7.89	-0.35	17	30
8.17	7.89	0.28	18	30
7.31	7.89	-0.58	18	31
7.36	7.81	-0.45	18	32
7.56	7.81	-0.25	18	33
7.77	7.81	-0.04	18	34
8.07	7.81	0.26	19	34
8.29	7.81	0.48	20	34
8.26	7.81	0.45	21	34
8.02	7.81	0.21	22	34
7.54	7.81	-0.27	22	35
8.17	7.81	0.36	23	35
7.31	7.81	-0.5	23	36
7.56	7.36	0.2	24	36
7.77	7.36	0.41	25	36
8.07	7.36	0.71	26	36
8.29	7.36	0.93	27	36
8.26	7.36	0.9	28	36
8.02	7.36	0.66	29	36
7.54	7.36	0.18	30	36
8.17	7.36	0.81	31	36
7.31	7.36	-0.05	31	37
7.77	7.56	0.21	32	37
8.07	7.56	0.51	33	37
8.29	7.56	0.73	34	37
8.26	7.56	0.7	35	37
8.02	7.56	0.46	36	37
7.54	7.56	-0.02	36	38
8.17	7.56	0.61	37	38
7.31	7.56	-0.25	37	39
8.07	7.77	0.3	38	39
8.29	7.77	0.52	39	39
8.26	7.77	0.49	40	39
8.02	7.77	0.25	41	39
7.54	7.77	-0.23	41	40
8.17	7.77	0.4	42	40
7.31	7.77	-0.46	42	41
8.29	8.07	0.22	43	41
8.26	8.07	0.19	44	41
8.02	8.07	-0.05	44	42
7.54	8.07	-0.53	44	43
8.17	8.07	0.1	45	43
7.31	8.07	-0.76	45	44
8.26	8.29	-0.03	45	45
8.02	8.29	-0.27	45	46
7.54	8.29	-0.75	45	47
8.17	8.29	-0.12	45	48
7.31	8.29	-0.98	45	49

8.02	8.26	-0.24	45	50
7.54	8.26	-0.72	45	51
8.17	8.26	-0.09	45	52
7.31	8.26	-0.95	45	53
7.54	8.02	-0.48	45	54
8.17	8.02	0.15	46	54
7.31	8.02	-0.71	46	55
8.17	7.54	0.63	47	55
7.31	7.54	-0.23	47	56
7.31	8.17	-0.86	47	57

S Statistic = 47 - 57 = -10

---

Tied Group	Value	Members
1	7.89	2

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/29/2020	1

There are 0 time periods with multiple data

---

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 407.333

Z-Score = -0.445931

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-0.445931**| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: pH, Field

Location: CLF-J3

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 14 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.04	0.152941	0.546	None

Loc.	Date	Conc.	Outlier
CLF-J3	12/7/2016	7.45	FALSE
	1/18/2017	8.26	FALSE
	2/23/2017	8.28	FALSE
	3/22/2017	8.3	FALSE
	4/5/2017	7.69	FALSE
	7/6/2017	7.58	FALSE
	8/8/2017	7.61	FALSE
	10/9/2017	8.12	FALSE
	12/6/2017	8.32	FALSE
	5/15/2018	7.66	FALSE
	10/16/2018	7.61	FALSE
	6/11/2019	7.49	FALSE
	10/22/2019	8.33	FALSE
	6/15/2020	7.61	FALSE

## Shapiro-Wilks Test of Normality

Parameter: pH, Field

Location: CLF-J3

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 14 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	7.45	8.33	0.88	0.5251	0.462088
2	7.49	8.32	0.83	0.3318	0.275394
3	7.58	8.3	0.72	0.246	0.17712
4	7.61	8.28	0.67	0.1802	0.120734
5	7.61	8.26	0.65	0.124	0.0806
6	7.61	8.12	0.51	0.0727	0.037077
7	7.66	7.69	0.03	0.024	0.00072
8	7.69	7.66	-0.03		
9	8.12	7.61	-0.51		
10	8.26	7.61	-0.65		
11	8.28	7.61	-0.67		
12	8.3	7.58	-0.72		
13	8.32	7.49	-0.83		
14	8.33	7.45	-0.88		

---

Sum of b values = 1.15373

Sample Standard Deviation = 0.357845

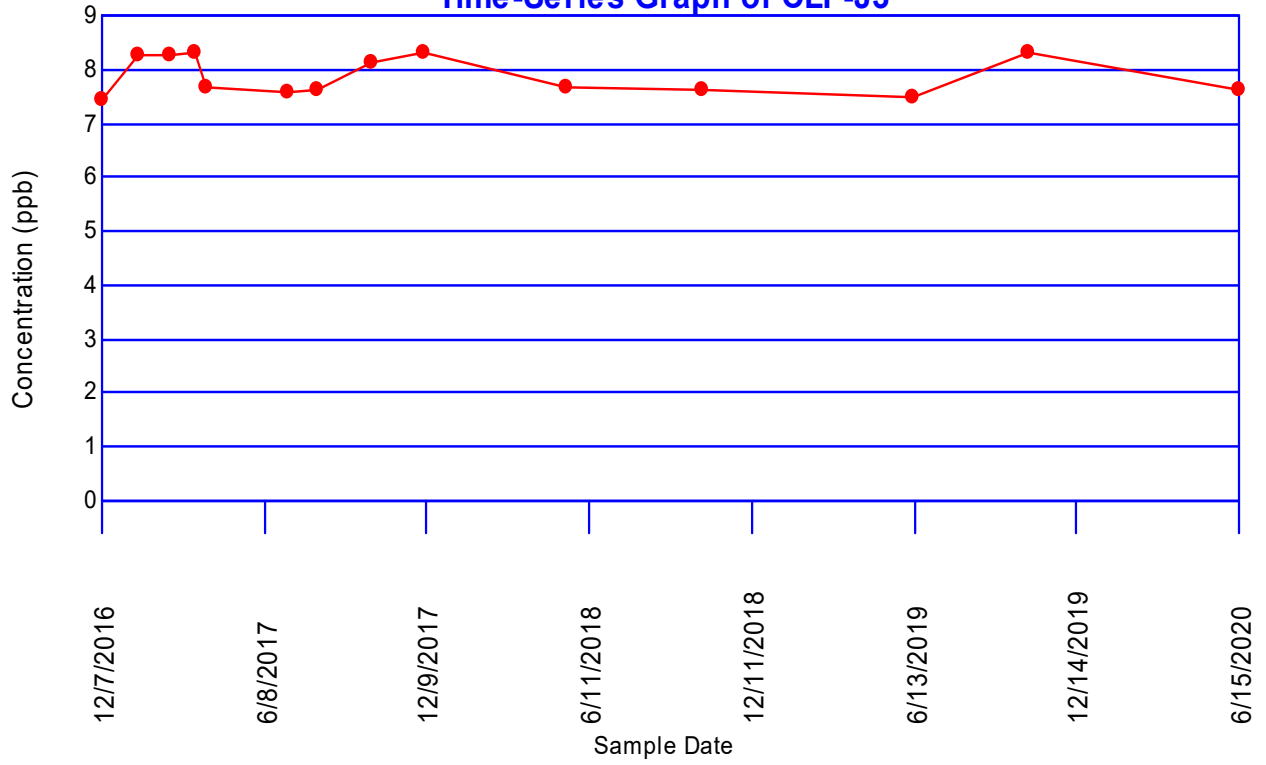
W Statistic = 0.799607

**5% Critical value of 0.874 exceeds 0.799607**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.825 exceeds 0.799607**  
**Evidence of non-normality at 99% level of significance**



pH, Field  
Time-Series Graph of CLF-J3



**Mann-Kendall Trend Analysis**  
**Parameter: pH, Field**  
**Location: CLF-J3**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8.26	7.45	0.81	1	0
8.28	7.45	0.83	2	0
8.3	7.45	0.85	3	0
7.69	7.45	0.24	4	0
7.58	7.45	0.13	5	0
7.61	7.45	0.16	6	0
8.12	7.45	0.67	7	0
8.32	7.45	0.87	8	0
7.66	7.45	0.21	9	0
7.61	7.45	0.16	10	0
7.49	7.45	0.04	11	0
8.33	7.45	0.88	12	0
7.61	7.45	0.16	13	0
8.28	8.26	0.02	14	0
8.3	8.26	0.04	15	0
7.69	8.26	-0.57	15	1
7.58	8.26	-0.68	15	2
7.61	8.26	-0.65	15	3
8.12	8.26	-0.14	15	4
8.32	8.26	0.06	16	4
7.66	8.26	-0.6	16	5
7.61	8.26	-0.65	16	6
7.49	8.26	-0.77	16	7
8.33	8.26	0.07	17	7
7.61	8.26	-0.65	17	8
8.3	8.28	0.02	18	8
7.69	8.28	-0.59	18	9
7.58	8.28	-0.7	18	10
7.61	8.28	-0.67	18	11
8.12	8.28	-0.16	18	12
8.32	8.28	0.04	19	12
7.66	8.28	-0.62	19	13
7.61	8.28	-0.67	19	14
7.49	8.28	-0.79	19	15
8.33	8.28	0.05	20	15
7.61	8.28	-0.67	20	16
7.69	8.3	-0.61	20	17
7.58	8.3	-0.72	20	18
7.61	8.3	-0.69	20	19
8.12	8.3	-0.18	20	20
8.32	8.3	0.02	21	20
7.66	8.3	-0.64	21	21
7.61	8.3	-0.69	21	22
7.49	8.3	-0.81	21	23

8.33	8.3	0.03	22	23
7.61	8.3	-0.69	22	24
7.58	7.69	-0.11	22	25
7.61	7.69	-0.08	22	26
8.12	7.69	0.43	23	26
8.32	7.69	0.63	24	26
7.66	7.69	-0.03	24	27
7.61	7.69	-0.08	24	28
7.49	7.69	-0.2	24	29
8.33	7.69	0.64	25	29
7.61	7.69	-0.08	25	30
7.61	7.58	0.03	26	30
8.12	7.58	0.54	27	30
8.32	7.58	0.74	28	30
7.66	7.58	0.08	29	30
7.61	7.58	0.03	30	30
7.49	7.58	-0.09	30	31
8.33	7.58	0.75	31	31
7.61	7.58	0.03	32	31
8.12	7.61	0.51	33	31
8.32	7.61	0.71	34	31
7.66	7.61	0.05	35	31
7.61	7.61	0	35	31
7.49	7.61	-0.12	35	32
8.33	7.61	0.72	36	32
7.61	7.61	0	36	32
8.32	8.12	0.2	37	32
7.66	8.12	-0.46	37	33
7.61	8.12	-0.51	37	34
7.49	8.12	-0.63	37	35
8.33	8.12	0.21	38	35
7.61	8.12	-0.51	38	36
7.66	8.32	-0.66	38	37
7.61	8.32	-0.71	38	38
7.49	8.32	-0.83	38	39
8.33	8.32	0.01	39	39
7.61	8.32	-0.71	39	40
7.61	7.66	-0.05	39	41
7.49	7.66	-0.17	39	42
8.33	7.66	0.67	40	42
7.61	7.66	-0.05	40	43
7.49	7.61	-0.12	40	44
8.33	7.61	0.72	41	44
7.61	7.61	0	41	44
8.33	7.49	0.84	42	44
7.61	7.49	0.12	43	44
7.61	8.33	-0.72	43	45

S Statistic = 43 - 45 = -2

---

Tied Group	Value	Members
1	7.61	3

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 66

B = 0

C = 6

D = 0

E = 6

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 330

Z-Score = -0.0550482

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

$|-0.0550482| \leq 1.97737$  indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: pH, Field

Location: CLF-J5

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.296296	0.449275	0.525	None

Loc.	Date	Conc.	Outlier
CLF-J5	12/7/2016	7.91	FALSE
	1/18/2017	8.17	FALSE
	2/23/2017	8.04	FALSE
	3/22/2017	8.11	FALSE
	4/5/2017	8.01	FALSE
	4/25/2017	7.49	FALSE
	7/6/2017	7.8	FALSE
	8/8/2017	8.18	FALSE
	10/9/2017	7.8	FALSE
	12/6/2017	8.34	FALSE
	5/15/2018	8.01	FALSE
	10/16/2018	7.96	FALSE
	6/11/2019	7.74	FALSE
	10/22/2019	8.3	FALSE
	6/15/2020	8.12	FALSE

## Shapiro-Wilks Test of Normality

Parameter: pH, Field

Location: CLF-J5

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	7.49	8.34	0.85	0.515	0.43775
2	7.74	8.3	0.56	0.3306	0.185136
3	7.8	8.18	0.38	0.2495	0.09481
4	7.8	8.17	0.37	0.1878	0.069486
5	7.91	8.12	0.21	0.1353	0.028413
6	7.96	8.11	0.15	0.088	0.0132
7	8.01	8.04	0.03	0.0433	0.001299
8	8.01	8.01	0		
9	8.04	8.01	-0.03		
10	8.11	7.96	-0.15		
11	8.12	7.91	-0.21		
12	8.17	7.8	-0.37		
13	8.18	7.8	-0.38		
14	8.3	7.74	-0.56		
15	8.34	7.49	-0.85		

---

Sum of b values = 0.830094

Sample Standard Deviation = 0.225606

W Statistic = 0.966997

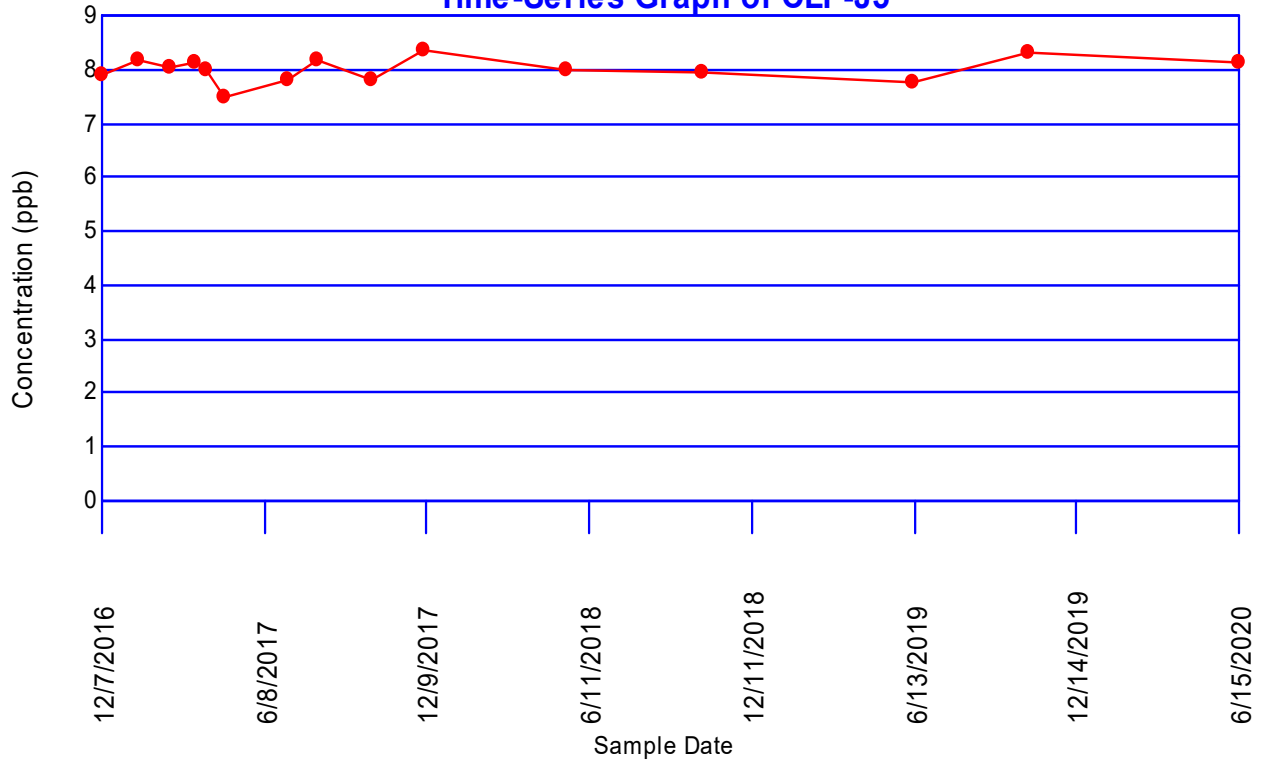
5% Critical value of 0.881 is less than 0.966997

Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.966997

Data is normally distributed at 99% level of significance

pH, Field  
Time-Series Graph of CLF-J5



**Mann-Kendall Trend Analysis**  
**Parameter: pH, Field**  
**Location: CLF-J5**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

---

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8.17	7.91	0.26	1	0
8.04	7.91	0.13	2	0
8.11	7.91	0.2	3	0
8.01	7.91	0.1	4	0
7.49	7.91	-0.42	4	1
7.8	7.91	-0.11	4	2
8.18	7.91	0.27	5	2
7.8	7.91	-0.11	5	3
8.34	7.91	0.43	6	3
8.01	7.91	0.1	7	3
7.96	7.91	0.05	8	3
7.74	7.91	-0.17	8	4
8.3	7.91	0.39	9	4
8.12	7.91	0.21	10	4
8.04	8.17	-0.13	10	5
8.11	8.17	-0.06	10	6
8.01	8.17	-0.16	10	7
7.49	8.17	-0.68	10	8
7.8	8.17	-0.37	10	9
8.18	8.17	0.01	11	9
7.8	8.17	-0.37	11	10
8.34	8.17	0.17	12	10
8.01	8.17	-0.16	12	11
7.96	8.17	-0.21	12	12
7.74	8.17	-0.43	12	13
8.3	8.17	0.13	13	13
8.12	8.17	-0.05	13	14
8.11	8.04	0.07	14	14
8.01	8.04	-0.03	14	15
7.49	8.04	-0.55	14	16
7.8	8.04	-0.24	14	17
8.18	8.04	0.14	15	17
7.8	8.04	-0.24	15	18
8.34	8.04	0.3	16	18
8.01	8.04	-0.03	16	19
7.96	8.04	-0.08	16	20
7.74	8.04	-0.3	16	21
8.3	8.04	0.26	17	21
8.12	8.04	0.08	18	21
8.01	8.11	-0.1	18	22
7.49	8.11	-0.62	18	23
7.8	8.11	-0.31	18	24
8.18	8.11	0.07	19	24
7.8	8.11	-0.31	19	25



8.34	8.11	0.23	20	25
8.01	8.11	-0.1	20	26
7.96	8.11	-0.15	20	27
7.74	8.11	-0.37	20	28
8.3	8.11	0.19	21	28
8.12	8.11	0.01	22	28
7.49	8.01	-0.52	22	29
7.8	8.01	-0.21	22	30
8.18	8.01	0.17	23	30
7.8	8.01	-0.21	23	31
8.34	8.01	0.33	24	31
8.01	8.01	0	24	31
7.96	8.01	-0.05	24	32
7.74	8.01	-0.27	24	33
8.3	8.01	0.29	25	33
8.12	8.01	0.11	26	33
7.8	7.49	0.31	27	33
8.18	7.49	0.69	28	33
7.8	7.49	0.31	29	33
8.34	7.49	0.85	30	33
8.01	7.49	0.52	31	33
7.96	7.49	0.47	32	33
7.74	7.49	0.25	33	33
8.3	7.49	0.81	34	33
8.12	7.49	0.63	35	33
8.18	7.8	0.38	36	33
7.8	7.8	0	36	33
8.34	7.8	0.54	37	33
8.01	7.8	0.21	38	33
7.96	7.8	0.16	39	33
7.74	7.8	-0.06	39	34
8.3	7.8	0.5	40	34
8.12	7.8	0.32	41	34
7.8	8.18	-0.38	41	35
8.34	8.18	0.16	42	35
8.01	8.18	-0.17	42	36
7.96	8.18	-0.22	42	37
7.74	8.18	-0.44	42	38
8.3	8.18	0.12	43	38
8.12	8.18	-0.06	43	39
8.34	7.8	0.54	44	39
8.01	7.8	0.21	45	39
7.96	7.8	0.16	46	39
7.74	7.8	-0.06	46	40
8.3	7.8	0.5	47	40
8.12	7.8	0.32	48	40
8.01	8.34	-0.33	48	41
7.96	8.34	-0.38	48	42
7.74	8.34	-0.6	48	43
8.3	8.34	-0.04	48	44
8.12	8.34	-0.22	48	45

7.96	8.01	-0.05	48	46
7.74	8.01	-0.27	48	47
8.3	8.01	0.29	49	47
8.12	8.01	0.11	50	47
7.74	7.96	-0.22	50	48
8.3	7.96	0.34	51	48
8.12	7.96	0.16	52	48
8.3	7.74	0.56	53	48
8.12	7.74	0.38	54	48
8.12	8.3	-0.18	54	49

S Statistic = 54 - 49 = 5

---

Tied Group	Value	Members
1	8.01	2
2	7.8	2

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 36

B = 0

C = 0

D = 0

E = 4

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 406.333

Z-Score = 0.198435

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

[0.198435] <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: pH, Field

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.264706	0.431818	0.525	None

Loc.	Date	Conc.	Outlier
CLF-S13	12/7/2016	7.92	FALSE
	1/18/2017	7.86	FALSE
	2/23/2017	7.91	FALSE
	3/22/2017	8.04	FALSE
	4/5/2017	8.02	FALSE
	4/25/2017	7.16	FALSE
	7/6/2017	7.47	FALSE
	8/8/2017	7.96	FALSE
	10/9/2017	7.54	FALSE
	12/6/2017	8.22	FALSE
	5/15/2018	7.72	FALSE
	10/16/2018	8.13	FALSE
	6/11/2019	7.7	FALSE
	10/22/2019	7.99	FALSE
	6/15/2020	7.82	FALSE

## Shapiro-Wilks Test of Normality

Parameter: pH, Field

Location: CLF-S13

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	7.16	8.22	1.06	0.515	0.5459
2	7.47	8.13	0.66	0.3306	0.218196
3	7.54	8.04	0.5	0.2495	0.12475
4	7.7	8.02	0.32	0.1878	0.060096
5	7.72	7.99	0.27	0.1353	0.036531
6	7.82	7.96	0.14	0.088	0.01232
7	7.86	7.92	0.06	0.0433	0.002598
8	7.91	7.91	0		
9	7.92	7.86	-0.06		
10	7.96	7.82	-0.14		
11	7.99	7.72	-0.27		
12	8.02	7.7	-0.32		
13	8.04	7.54	-0.5		
14	8.13	7.47	-0.66		
15	8.22	7.16	-1.06		

---

Sum of b values = 1.00039

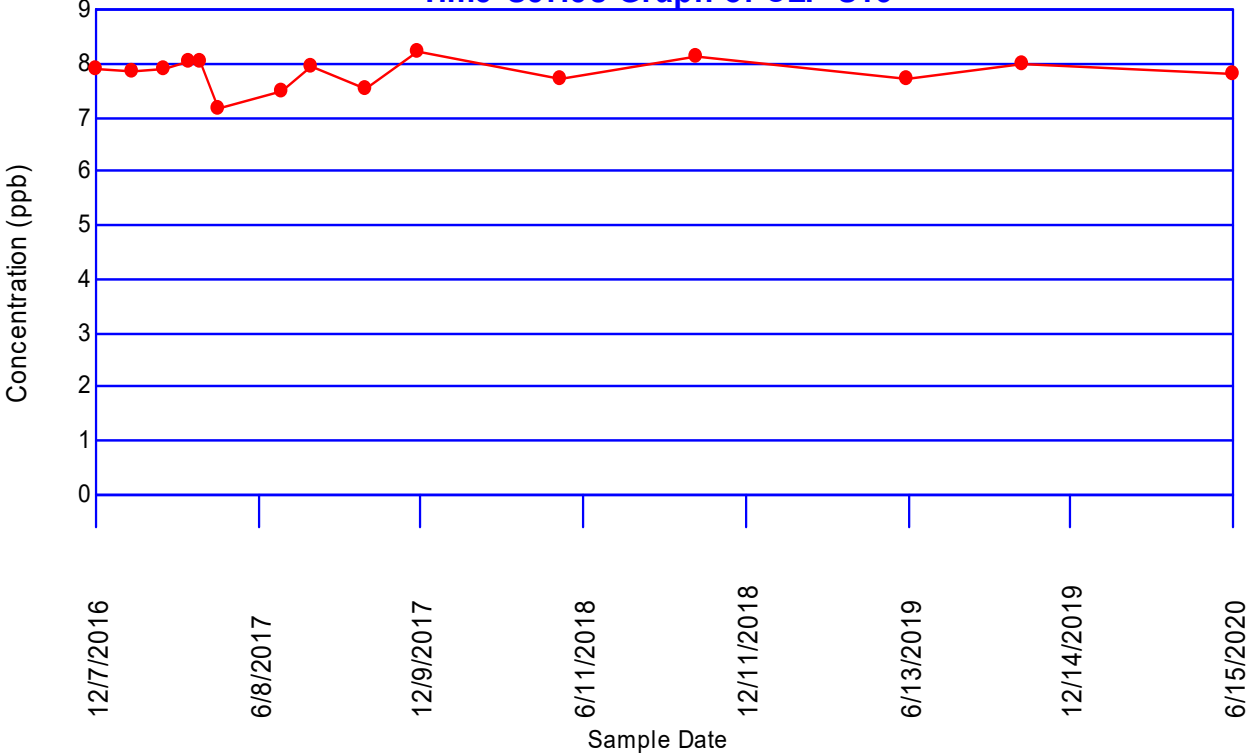
Sample Standard Deviation = 0.276702

W Statistic = 0.933658

5% Critical value of 0.881 is less than 0.933658  
Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.933658  
Data is normally distributed at 99% level of significance

pH, Field  
Time-Series Graph of CLF-S13



**Mann-Kendall Trend Analysis**  
**Parameter: pH, Field**  
**Location: CLF-S13**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

---

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
7.86	7.92	-0.06	0	1
7.91	7.92	-0.01	0	2
8.04	7.92	0.12	1	2
8.02	7.92	0.1	2	2
7.16	7.92	-0.76	2	3
7.47	7.92	-0.45	2	4
7.96	7.92	0.04	3	4
7.54	7.92	-0.38	3	5
8.22	7.92	0.3	4	5
7.72	7.92	-0.2	4	6
8.13	7.92	0.21	5	6
7.7	7.92	-0.22	5	7
7.99	7.92	0.07	6	7
7.82	7.92	-0.1	6	8
7.91	7.86	0.05	7	8
8.04	7.86	0.18	8	8
8.02	7.86	0.16	9	8
7.16	7.86	-0.7	9	9
7.47	7.86	-0.39	9	10
7.96	7.86	0.1	10	10
7.54	7.86	-0.32	10	11
8.22	7.86	0.36	11	11
7.72	7.86	-0.14	11	12
8.13	7.86	0.27	12	12
7.7	7.86	-0.16	12	13
7.99	7.86	0.13	13	13
7.82	7.86	-0.04	13	14
8.04	7.91	0.13	14	14
8.02	7.91	0.11	15	14
7.16	7.91	-0.75	15	15
7.47	7.91	-0.44	15	16
7.96	7.91	0.05	16	16
7.54	7.91	-0.37	16	17
8.22	7.91	0.31	17	17
7.72	7.91	-0.19	17	18
8.13	7.91	0.22	18	18
7.7	7.91	-0.21	18	19
7.99	7.91	0.08	19	19
7.82	7.91	-0.09	19	20
8.02	8.04	-0.02	19	21
7.16	8.04	-0.88	19	22
7.47	8.04	-0.57	19	23
7.96	8.04	-0.08	19	24
7.54	8.04	-0.5	19	25

8.22	8.04	0.18	20	25
7.72	8.04	-0.32	20	26
8.13	8.04	0.09	21	26
7.7	8.04	-0.34	21	27
7.99	8.04	-0.05	21	28
7.82	8.04	-0.22	21	29
7.16	8.02	-0.86	21	30
7.47	8.02	-0.55	21	31
7.96	8.02	-0.06	21	32
7.54	8.02	-0.48	21	33
8.22	8.02	0.2	22	33
7.72	8.02	-0.3	22	34
8.13	8.02	0.11	23	34
7.7	8.02	-0.32	23	35
7.99	8.02	-0.03	23	36
7.82	8.02	-0.2	23	37
7.47	7.16	0.31	24	37
7.96	7.16	0.8	25	37
7.54	7.16	0.38	26	37
8.22	7.16	1.06	27	37
7.72	7.16	0.56	28	37
8.13	7.16	0.97	29	37
7.7	7.16	0.54	30	37
7.99	7.16	0.83	31	37
7.82	7.16	0.66	32	37
7.96	7.47	0.49	33	37
7.54	7.47	0.07	34	37
8.22	7.47	0.75	35	37
7.72	7.47	0.25	36	37
8.13	7.47	0.66	37	37
7.7	7.47	0.23	38	37
7.99	7.47	0.52	39	37
7.82	7.47	0.35	40	37
7.54	7.96	-0.42	40	38
8.22	7.96	0.26	41	38
7.72	7.96	-0.24	41	39
8.13	7.96	0.17	42	39
7.7	7.96	-0.26	42	40
7.99	7.96	0.03	43	40
7.82	7.96	-0.14	43	41
8.22	7.54	0.68	44	41
7.72	7.54	0.18	45	41
8.13	7.54	0.59	46	41
7.7	7.54	0.16	47	41
7.99	7.54	0.45	48	41
7.82	7.54	0.28	49	41
7.72	8.22	-0.5	49	42
8.13	8.22	-0.09	49	43
7.7	8.22	-0.52	49	44
7.99	8.22	-0.23	49	45
7.82	8.22	-0.4	49	46

8.13	7.72	0.41	50	46
7.7	7.72	-0.02	50	47
7.99	7.72	0.27	51	47
7.82	7.72	0.1	52	47
7.7	8.13	-0.43	52	48
7.99	8.13	-0.14	52	49
7.82	8.13	-0.31	52	50
7.99	7.7	0.29	53	50
7.82	7.7	0.12	54	50
7.82	7.99	-0.17	54	51

S Statistic = 54 - 51 = 3

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = 0.0989743

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|0.0989743| <= 1.97737 indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: pH, Field

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.126984	0.153846	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S05	1/18/2017	8.31	FALSE
	4/5/2017	8.32	FALSE
	4/25/2017	7.67	FALSE
	10/16/2018	8.13	FALSE
	10/22/2019	8.4	FALSE
	6/29/2020	8.09	FALSE
	12/5/2020	7.77	FALSE
	3/26/2021	7.92	FALSE

## Shapiro-Wilks Test of Normality

Parameter: pH, Field

Location: CLF-S05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	7.67	8.4	0.73	0.6052	0.441796
2	7.77	8.32	0.55	0.3164	0.17402
3	7.92	8.31	0.39	0.1743	0.067977
4	8.09	8.13	0.04	0.0561	0.002244
5	8.13	8.09	-0.04		
6	8.31	7.92	-0.39		
7	8.32	7.77	-0.55		
8	8.4	7.67	-0.73		

---

Sum of b values = 0.686037

Sample Standard Deviation = 0.268644

W Statistic = 0.931628

5% Critical value of 0.818 is less than 0.931628

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.931628

Data is normally distributed at 99% level of significance

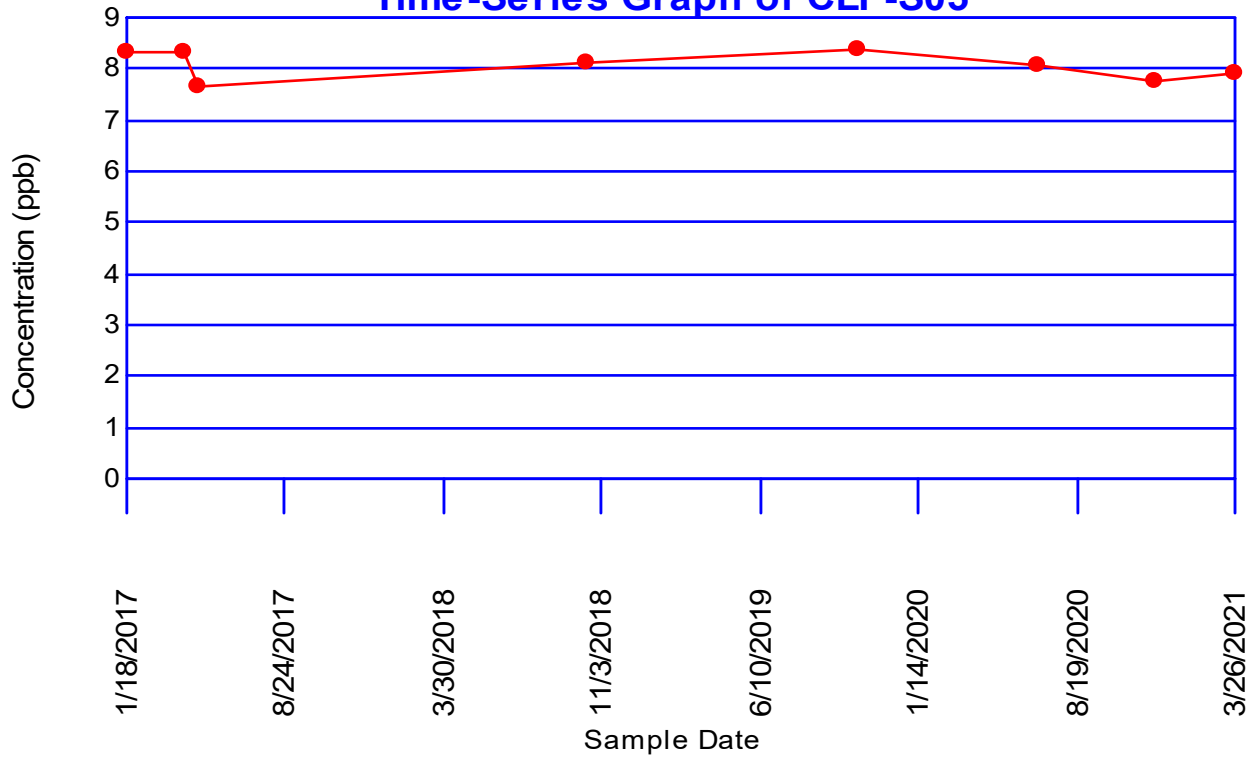
**Mann-Kendall Trend Analysis**  
**Parameter: pH, Field**  
**Location: CLF-S05**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
8.32	8.31	0.01	1	0
7.67	8.31	-0.64	1	1
8.13	8.31	-0.18	1	2
8.4	8.31	0.09	2	2
8.09	8.31	-0.22	2	3
7.77	8.31	-0.54	2	4
7.92	8.31	-0.39	2	5
7.67	8.32	-0.65	2	6
8.13	8.32	-0.19	2	7
8.4	8.32	0.08	3	7
8.09	8.32	-0.23	3	8
7.77	8.32	-0.55	3	9
7.92	8.32	-0.4	3	10
8.13	7.67	0.46	4	10
8.4	7.67	0.73	5	10
8.09	7.67	0.42	6	10
7.77	7.67	0.1	7	10
7.92	7.67	0.25	8	10
8.4	8.13	0.27	9	10
8.09	8.13	-0.04	9	11
7.77	8.13	-0.36	9	12
7.92	8.13	-0.21	9	13
8.09	8.4	-0.31	9	14
7.77	8.4	-0.63	9	15
7.92	8.4	-0.48	9	16
7.77	8.09	-0.32	9	17
7.92	8.09	-0.17	9	18
7.92	7.77	0.15	10	18

S Statistic = 10 - 18 = -8  
 Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
 Probability of obtaining S >= |-8| is 0.398  
 0.398 >= 0.025 indicating no evidence of a trend

### pH, Field Time-Series Graph of CLF-S05



### Concentrations (ppb)

Parameter: Sulfate

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Total Measurements: 74

Total Non-Detect: 1

Percent Non-Detects: 1.35135%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

There are 6 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

CLF-J2	15	0 (0%)	12/7/2016	11.6295	112360
			1/18/2017	10.9938	59503.6
			2/23/2017	11.632	112644
			3/22/2017	11.7068	121391
			4/5/2017	11.4833	97080.5
			4/25/2017	11.3676	86471.6
			7/6/2017	12.9762	432000
			8/8/2017	11.7928	132300
			10/9/2017	12.2913	217800
			12/6/2017	11.5079	99500
			5/15/2018	10.669	43000
			10/16/2018	10.8724	52700
			6/11/2019	10.3951	32700
			10/22/2019	11.0713	64300
			6/29/2020	8.89563	7300
	<b>12/5/2020</b>	<b>10.8454</b>	<b>51300</b>		
	<b>3/26/2021</b>	<b>10.1346</b>	<b>25200</b>		

CLF-J3	14	0 (0%)	12/7/2016	11.6428	113868
			1/18/2017	10.9837	58908.2
			2/23/2017	11.6351	112997
			3/22/2017	11.7292	124144
			4/5/2017	11.4776	96528.1
			7/6/2017	12.9715	430000
			8/8/2017	11.8019	133500
			10/9/2017	12.2923	218000
			12/6/2017	11.5229	101000
			5/15/2018	11.4907	97800
			10/16/2018	10.8667	52400
			6/11/2019	10.3982	32800
			10/22/2019	11.0929	65700
			6/15/2020	11.5109	99800
				<b>12/5/2020</b>	<b>10.9114</b>
	<b>3/26/2021</b>	<b>10.1464</b>	<b>25500</b>		

CLF-J5	15	0 (0%)	12/7/2016	11.2942	80351.1
			1/18/2017	10.8298	50501.3
			2/23/2017	11.2063	73590.6
			3/22/2017	11.4863	97376.7
			4/5/2017	11.4286	91913.1
			4/25/2017	10.9773	58530.4

			7/6/2017	13.2267	555000
			8/8/2017	11.6218	111500
			10/9/2017	12.4987	268000
			12/6/2017	10.8238	50200
			5/15/2018	11.1243	67800
			10/16/2018	9.88837	19700
			6/11/2019	9.87303	19400
			10/22/2019	10.7077	44700
			6/15/2020	11.0572	63400
			<b>12/5/2020</b>	<b>10.0774</b>	<b>23800</b>
			<b>3/26/2021</b>	<b>9.65503</b>	<b>15600</b>
<hr/>					
CLF-S05	8	0 (0%)	1/18/2017	10.7194	45223.8
			4/5/2017	11.0448	62615.6
			4/25/2017	10.7095	44781.4
			10/16/2018	8.92266	7500
			10/22/2019	11.1476	69400
			6/29/2020	8.59415	5400
			12/5/2020	10.2853	29300
			3/26/2021	9.62245	15100
<hr/>					
CLF-S06	7	1 (14.2857%)	1/18/2017	9.2681	10594.6
			4/5/2017	9.69	16155.3
			4/25/2017	9.45103	12721.2
			10/16/2018	8.63052	5600
			6/29/2020	8.13153	3400
			12/5/2020	ND<8.29405	ND<4000
			3/26/2021	9.25913	10500
<hr/>					
CLF-S13	15	0 (0%)	12/7/2016	11.7242	123520
			1/18/2017	12.67	318064
			2/23/2017	13.1371	507416
			3/22/2017	13.1328	505253
			4/5/2017	12.9941	439796
			4/25/2017	12.6295	305426
			7/6/2017	11.8078	134300
			8/8/2017	11.7868	131500
			10/9/2017	11.7629	128400
			12/6/2017	12.5425	280000
			5/15/2018	12.8266	372000
			10/16/2018	11.9512	155000
			6/11/2019	12.3673	235000
			10/22/2019	11.1273	68000
			6/15/2020	12.2501	209000
			<b>12/5/2020</b>	<b>11.7981</b>	<b>133000</b>
			<b>3/26/2021</b>	<b>12.2356</b>	<b>206000</b>

There are 2 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
CLF-C03	17	0 (0%)	12/7/2016	10.4563	34762.7
			1/18/2017	9.67689	15944.9
			2/23/2017	10.07	23623.8
			3/22/2017	9.78327	17734.6
			4/5/2017	9.76161	17354.5
			4/25/2017	9.70621	16419.2

			7/6/2017	9.78132	17700
			8/8/2017	10.2989	29700
			10/9/2017	10.1811	26400
			12/6/2017	9.75266	17200
			5/15/2018	9.86786	19300
			10/16/2018	9.29652	10900
			6/11/2019	9.54681	14000
			10/22/2019	9.88328	19600
			6/15/2020	9.72913	16800
			12/5/2020	9.79256	17900
			3/26/2021	9.2399	10300
<hr/>					
CLF-OPP	17	0 (0%)	12/7/2016	9.49024	13230
			1/18/2017	9.23016	10200.2
			2/23/2017	9.59523	14694.5
			3/22/2017	9.58607	14560.5
			4/5/2017	9.29409	10873.6
			4/25/2017	9.36244	11642.8
			7/6/2017	9.22029	10100
			8/8/2017	8.90924	7400
			10/9/2017	9.04782	8500
			12/6/2017	8.99962	8100
			5/15/2018	9.65503	15600
			10/16/2018	8.7483	6300
			6/11/2019	9.2399	10300
			10/22/2019	9.01189	8200
			6/15/2020	9.46498	12900
			12/5/2020	9.07108	8700
			3/26/2021	8.94898	7700
<hr/>					

## Dixon's Test for Outliers

Parameter: Sulfate

Location: CLF-J2

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.51289	0.612083	0.525	8.89563
2	0.562481	0.341448	0.546	12.9762
3	0.360311	0.341448	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J2	12/7/2016	11.6295	FALSE
	1/18/2017	10.9938	FALSE
	2/23/2017	11.632	FALSE
	3/22/2017	11.7068	FALSE
	4/5/2017	11.4833	FALSE
	4/25/2017	11.3676	FALSE
	7/6/2017	<b>12.9762</b>	<b>TRUE</b>
	8/8/2017	11.7928	FALSE
	10/9/2017	12.2913	FALSE
	12/6/2017	11.5079	FALSE
	5/15/2018	10.669	FALSE
	10/16/2018	10.8724	FALSE
	6/11/2019	10.3951	FALSE
	10/22/2019	11.0713	FALSE
	6/29/2020	<b>8.89563</b>	<b>TRUE</b>



## Shapiro-Wilks Test of Normality

Parameter: Sulfate

Location: CLF-J2

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	8.89563	12.9762	4.08055	0.515	2.10148
2	10.3951	12.2913	1.8962	0.3306	0.626884
3	10.669	11.7928	1.12387	0.2495	0.280406
4	10.8724	11.7068	0.834401	0.1878	0.156701
5	10.9938	11.632	0.638196	0.1353	0.0863479
6	11.0713	11.6295	0.558148	0.088	0.0491171
7	11.3676	11.5079	0.140342	0.0433	0.00607679
8	11.4833	11.4833	0		0
9	11.5079	11.3676	-0.140342		
10	11.6295	11.0713	-0.558148		
11	11.632	10.9938	-0.638196		
12	11.7068	10.8724	-0.834401		
13	11.7928	10.669	-1.12387		
14	12.2913	10.3951	-1.8962		
15	12.9762	8.89563	-4.08055		

---

Sum of b values = 3.30702

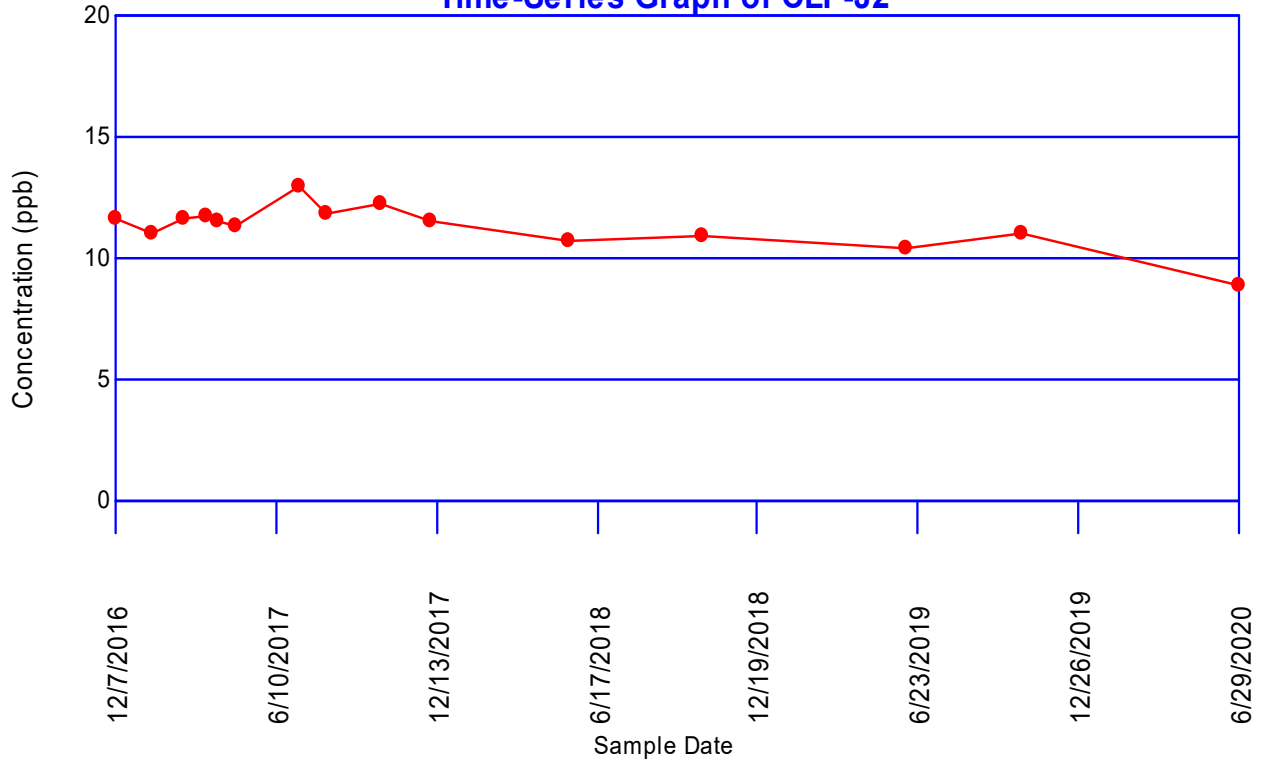
Sample Standard Deviation = 0.919031

W Statistic = 0.924878

5% Critical value of 0.881 is less than 0.924878  
Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.924878  
Data is normally distributed at 99% level of significance

### Sulfate Time-Series Graph of CLF-J2



**Mann-Kendall Trend Analysis**  
**Parameter: Sulfate**  
**Location: CLF-J2**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
10.9938	11.6295	-0.635671	0	1
11.632	11.6295	0.0025244	1	1
11.7068	11.6295	0.0773087	2	1
11.4833	11.6295	-0.146167	2	2
11.3676	11.6295	-0.261892	2	3
12.9762	11.6295	1.34672	3	3
11.7928	11.6295	0.163364	4	3
12.2913	11.6295	0.661869	5	3
11.5079	11.6295	-0.12155	5	4
10.669	11.6295	-0.960508	5	5
10.8724	11.6295	-0.757093	5	6
10.3951	11.6295	-1.23433	5	7
11.0713	11.6295	-0.558148	5	8
8.89563	11.6295	-2.73383	5	9
11.632	10.9938	0.638196	6	9
11.7068	10.9938	0.71298	7	9
11.4833	10.9938	0.489504	8	9
11.3676	10.9938	0.373779	9	9
12.9762	10.9938	1.98239	10	9
11.7928	10.9938	0.799035	11	9
12.2913	10.9938	1.29754	12	9
11.5079	10.9938	0.514121	13	9
10.669	10.9938	-0.324837	13	10
10.8724	10.9938	-0.121421	13	11
10.3951	10.9938	-0.598662	13	12
11.0713	10.9938	0.0775228	14	12
8.89563	10.9938	-2.09816	14	13
11.7068	11.632	0.0747843	15	13
11.4833	11.632	-0.148692	15	14
11.3676	11.632	-0.264416	15	15
12.9762	11.632	1.34419	16	15
11.7928	11.632	0.16084	17	15
12.2913	11.632	0.659345	18	15
11.5079	11.632	-0.124075	18	16
10.669	11.632	-0.963032	18	17
10.8724	11.632	-0.759617	18	18
10.3951	11.632	-1.23686	18	19
11.0713	11.632	-0.560673	18	20
8.89563	11.632	-2.73636	18	21
11.4833	11.7068	-0.223476	18	22
11.3676	11.7068	-0.339201	18	23
12.9762	11.7068	1.26941	19	23
11.7928	11.7068	0.0860553	20	23
12.2913	11.7068	0.58456	21	23

11.5079	11.7068	-0.198859	21	24
10.669	11.7068	-1.03782	21	25
10.8724	11.7068	-0.834401	21	26
10.3951	11.7068	-1.31164	21	27
11.0713	11.7068	-0.635457	21	28
8.89563	11.7068	-2.81114	21	29
11.3676	11.4833	-0.115724	21	30
12.9762	11.4833	1.49289	22	30
11.7928	11.4833	0.309532	23	30
12.2913	11.4833	0.808037	24	30
11.5079	11.4833	0.0246171	25	30
10.669	11.4833	-0.81434	25	31
10.8724	11.4833	-0.610925	25	32
10.3951	11.4833	-1.08817	25	33
11.0713	11.4833	-0.411981	25	34
8.89563	11.4833	-2.58767	25	35
12.9762	11.3676	1.60861	26	35
11.7928	11.3676	0.425256	27	35
12.2913	11.3676	0.923761	28	35
11.5079	11.3676	0.140342	29	35
10.669	11.3676	-0.698616	29	36
10.8724	11.3676	-0.495201	29	37
10.3951	11.3676	-0.972441	29	38
11.0713	11.3676	-0.296256	29	39
8.89563	11.3676	-2.47194	29	40
11.7928	12.9762	-1.18335	29	41
12.2913	12.9762	-0.684848	29	42
11.5079	12.9762	-1.46827	29	43
10.669	12.9762	-2.30723	29	44
10.8724	12.9762	-2.10381	29	45
10.3951	12.9762	-2.58105	29	46
11.0713	12.9762	-1.90487	29	47
8.89563	12.9762	-4.08055	29	48
12.2913	11.7928	0.498505	30	48
11.5079	11.7928	-0.284914	30	49
10.669	11.7928	-1.12387	30	50
10.8724	11.7928	-0.920457	30	51
10.3951	11.7928	-1.3977	30	52
11.0713	11.7928	-0.721512	30	53
8.89563	11.7928	-2.8972	30	54
11.5079	12.2913	-0.78342	30	55
10.669	12.2913	-1.62238	30	56
10.8724	12.2913	-1.41896	30	57
10.3951	12.2913	-1.8962	30	58
11.0713	12.2913	-1.22002	30	59
8.89563	12.2913	-3.3957	30	60
10.669	11.5079	-0.838958	30	61
10.8724	11.5079	-0.635542	30	62
10.3951	11.5079	-1.11278	30	63
11.0713	11.5079	-0.436598	30	64
8.89563	11.5079	-2.61228	30	65

10.8724	10.669	0.203415	31	65
10.3951	10.669	-0.273825	31	66
11.0713	10.669	0.40236	32	66
8.89563	10.669	-1.77333	32	67
10.3951	10.8724	-0.47724	32	68
11.0713	10.8724	0.198944	33	68
8.89563	10.8724	-1.97674	33	69
11.0713	10.3951	0.676185	34	69
8.89563	10.3951	-1.4995	34	70
8.89563	11.0713	-2.17569	34	71

S Statistic = 34 - 71 = -37

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
-------------	--------------

12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/29/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -1.78154

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**| -1.78154 | <= 1.97737 indicating no evidence of a trend**

## Dixon's Test for Outliers

Parameter: Sulfate

Location: CLF-J3

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 14 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.58843	0.417157	0.546	12.9715
2	0.394962	0.417157	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J3	12/7/2016	11.6428	FALSE
	1/18/2017	10.9837	FALSE
	2/23/2017	11.6351	FALSE
	3/22/2017	11.7292	FALSE
	4/5/2017	11.4776	FALSE
	7/6/2017	<b>12.9715</b>	<b>TRUE</b>
	8/8/2017	11.8019	FALSE
	10/9/2017	12.2923	FALSE
	12/6/2017	11.5229	FALSE
	5/15/2018	11.4907	FALSE
	10/16/2018	10.8667	FALSE
	6/11/2019	10.3982	FALSE
	10/22/2019	11.0929	FALSE
	6/15/2020	11.5109	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Sulfate

Location: CLF-J3

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 14 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	10.3982	12.9715	2.57336	0.5251	1.35127
2	10.8667	12.2923	1.42559	0.3318	0.47301
3	10.9837	11.8019	0.818121	0.246	0.201258
4	11.0929	11.7292	0.636343	0.1802	0.114669
5	11.4776	11.6428	0.165206	0.124	0.0204855
6	11.4907	11.6351	0.144437	0.0727	0.0105005
7	11.5109	11.5229	0.0119523	0.024	0.000286856
8	11.5229	11.5109	-0.0119523		
9	11.6351	11.4907	-0.144437		
10	11.6428	11.4776	-0.165206		
11	11.7292	11.0929	-0.636343		
12	11.8019	10.9837	-0.818121		
13	12.2923	10.8667	-1.42559		
14	12.9715	10.3982	-2.57336		

---

Sum of b values = 2.17148

Sample Standard Deviation = 0.620896

W Statistic = 0.940871

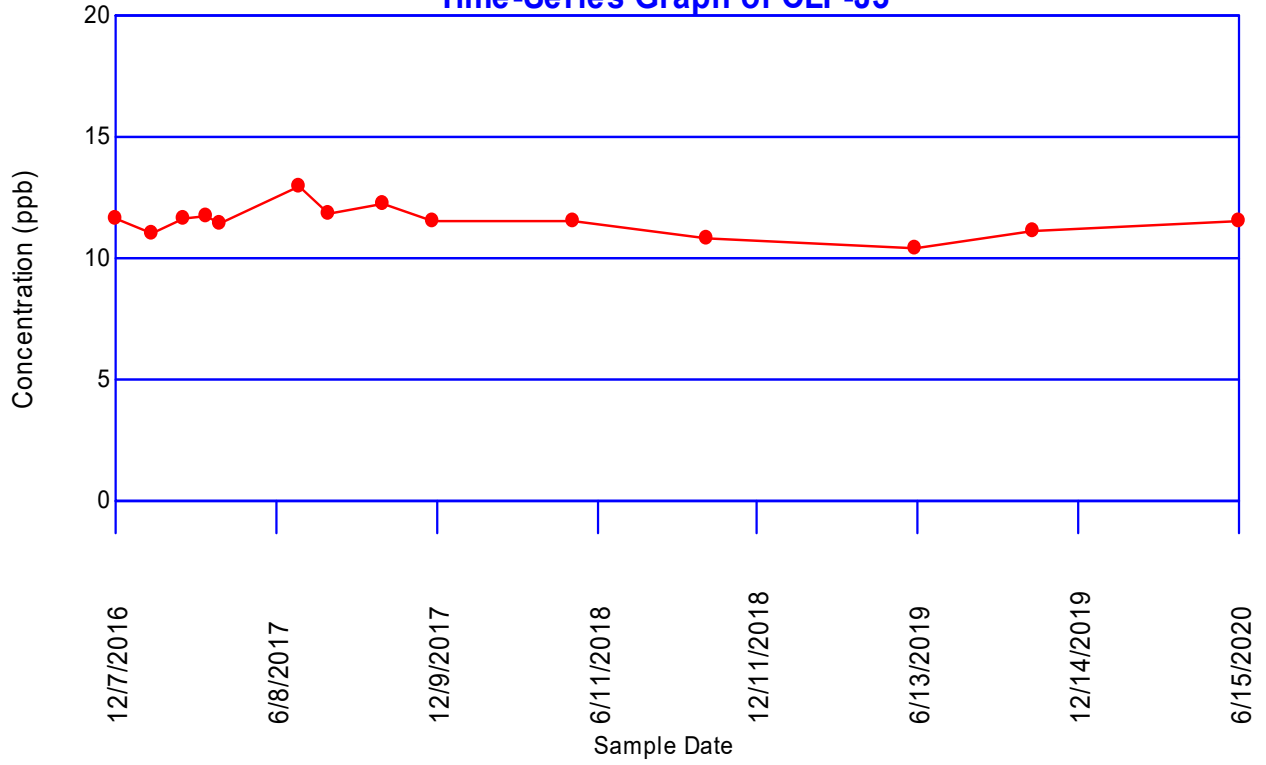
5% Critical value of 0.874 is less than 0.940871

Data is normally distributed at 95% level of significance

1% Critical value of 0.825 is less than 0.940871

Data is normally distributed at 99% level of significance

### Sulfate Time-Series Graph of CLF-J3





**Mann-Kendall Trend Analysis**  
**Parameter: Sulfate**  
**Location: CLF-J3**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
10.9837	11.6428	-0.65906	0	1
11.6351	11.6428	-0.00767861	0	2
11.7292	11.6428	0.0864023	1	2
11.4776	11.6428	-0.165206	1	3
12.9715	11.6428	1.32875	2	3
11.8019	11.6428	0.159062	3	3
12.2923	11.6428	0.649455	4	3
11.5229	11.6428	-0.119919	4	4
11.4907	11.6428	-0.152115	4	5
10.8667	11.6428	-0.776133	4	6
10.3982	11.6428	-1.24461	4	7
11.0929	11.6428	-0.549941	4	8
11.5109	11.6428	-0.131872	4	9
11.6351	10.9837	0.651381	5	9
11.7292	10.9837	0.745462	6	9
11.4776	10.9837	0.493854	7	9
12.9715	10.9837	1.9878	8	9
11.8019	10.9837	0.818121	9	9
12.2923	10.9837	1.30851	10	9
11.5229	10.9837	0.53914	11	9
11.4907	10.9837	0.506944	12	9
10.8667	10.9837	-0.117074	12	10
10.3982	10.9837	-0.585552	12	11
11.0929	10.9837	0.109119	13	11
11.5109	10.9837	0.527188	14	11
11.7292	11.6351	0.0940809	15	11
11.4776	11.6351	-0.157527	15	12
12.9715	11.6351	1.33642	16	12
11.8019	11.6351	0.16674	17	12
12.2923	11.6351	0.657134	18	12
11.5229	11.6351	-0.112241	18	13
11.4907	11.6351	-0.144437	18	14
10.8667	11.6351	-0.768455	18	15
10.3982	11.6351	-1.23693	18	16
11.0929	11.6351	-0.542262	18	17
11.5109	11.6351	-0.124193	18	18
11.4776	11.7292	-0.251608	18	19
12.9715	11.7292	1.24234	19	19
11.8019	11.7292	0.0726593	20	19
12.2923	11.7292	0.563053	21	19
11.5229	11.7292	-0.206322	21	20
11.4907	11.7292	-0.238518	21	21
10.8667	11.7292	-0.862536	21	22
10.3982	11.7292	-1.33101	21	23

11.0929	11.7292	-0.636343	21	24
11.5109	11.7292	-0.218274	21	25
12.9715	11.4776	1.49395	22	25
11.8019	11.4776	0.324267	23	25
12.2923	11.4776	0.814661	24	25
11.5229	11.4776	0.0452864	25	25
11.4907	11.4776	0.0130904	26	25
10.8667	11.4776	-0.610928	26	26
10.3982	11.4776	-1.07941	26	27
11.0929	11.4776	-0.384735	26	28
11.5109	11.4776	0.033334	27	28
11.8019	12.9715	-1.16968	27	29
12.2923	12.9715	-0.67929	27	30
11.5229	12.9715	-1.44866	27	31
11.4907	12.9715	-1.48086	27	32
10.8667	12.9715	-2.10488	27	33
10.3982	12.9715	-2.57336	27	34
11.0929	12.9715	-1.87869	27	35
11.5109	12.9715	-1.46062	27	36
12.2923	11.8019	0.490394	28	36
11.5229	11.8019	-0.278981	28	37
11.4907	11.8019	-0.311177	28	38
10.8667	11.8019	-0.935195	28	39
10.3982	11.8019	-1.40367	28	40
11.0929	11.8019	-0.709003	28	41
11.5109	11.8019	-0.290933	28	42
11.5229	12.2923	-0.769375	28	43
11.4907	12.2923	-0.80157	28	44
10.8667	12.2923	-1.42559	28	45
10.3982	12.2923	-1.89407	28	46
11.0929	12.2923	-1.1994	28	47
11.5109	12.2923	-0.781327	28	48
11.4907	11.5229	-0.0321959	28	49
10.8667	11.5229	-0.656214	28	50
10.3982	11.5229	-1.12469	28	51
11.0929	11.5229	-0.430022	28	52
11.5109	11.5229	-0.0119523	28	53
10.8667	11.4907	-0.624018	28	54
10.3982	11.4907	-1.0925	28	55
11.0929	11.4907	-0.397826	28	56
11.5109	11.4907	0.0202436	29	56
10.3982	10.8667	-0.468478	29	57
11.0929	10.8667	0.226192	30	57
11.5109	10.8667	0.644262	31	57
11.0929	10.3982	0.69467	32	57
11.5109	10.3982	1.11274	33	57
11.5109	11.0929	0.418069	34	57

S Statistic = 34 - 57 = -23

---

Tied Group	Value	Members
<b>Time Period</b>		<b>Observations</b>
12/7/2016		1
1/18/2017		1
2/23/2017		1
3/22/2017		1
4/5/2017		1
7/6/2017		1
8/8/2017		1
10/9/2017		1
12/6/2017		1
5/15/2018		1
10/16/2018		1
6/11/2019		1
10/22/2019		1
6/15/2020		1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = -1.20439

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-1.20439**| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Sulfate

Location: CLF-J5

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.637137	0.477312	0.525	13.2267
2	0.565267	0.517383	0.546	12.4987
3	0.111446	0.517383	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J5	12/7/2016	11.2942	FALSE
	1/18/2017	10.8298	FALSE
	2/23/2017	11.2063	FALSE
	3/22/2017	11.4863	FALSE
	4/5/2017	11.4286	FALSE
	4/25/2017	10.9773	FALSE
	7/6/2017	<b>13.2267</b>	<b>TRUE</b>
	8/8/2017	11.6218	FALSE
	10/9/2017	<b>12.4987</b>	<b>TRUE</b>
	12/6/2017	10.8238	FALSE
	5/15/2018	11.1243	FALSE
	10/16/2018	9.88837	FALSE
	6/11/2019	9.87303	FALSE
	10/22/2019	10.7077	FALSE
6/15/2020	11.0572	FALSE	

## Shapiro-Wilks Test of Normality

Parameter: Sulfate

Location: CLF-J5

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	9.87303	13.2267	3.3537	0.515	1.72715
2	9.88837	12.4987	2.61037	0.3306	0.862988
3	10.7077	11.6218	0.914051	0.2495	0.228056
4	10.8238	11.4863	0.662572	0.1878	0.124431
5	10.8298	11.4286	0.598844	0.1353	0.0810237
6	10.9773	11.2942	0.31686	0.088	0.0278836
7	11.0572	11.2063	0.149053	0.0433	0.00645401
8	11.1243	11.1243	0		0
9	11.2063	11.0572	-0.149053		
10	11.2942	10.9773	-0.31686		
11	11.4286	10.8298	-0.598844		
12	11.4863	10.8238	-0.662572		
13	11.6218	10.7077	-0.914051		
14	12.4987	9.88837	-2.61037		
15	13.2267	9.87303	-3.3537		

---

Sum of b values = 3.05799

Sample Standard Deviation = 0.853277

W Statistic = 0.91741

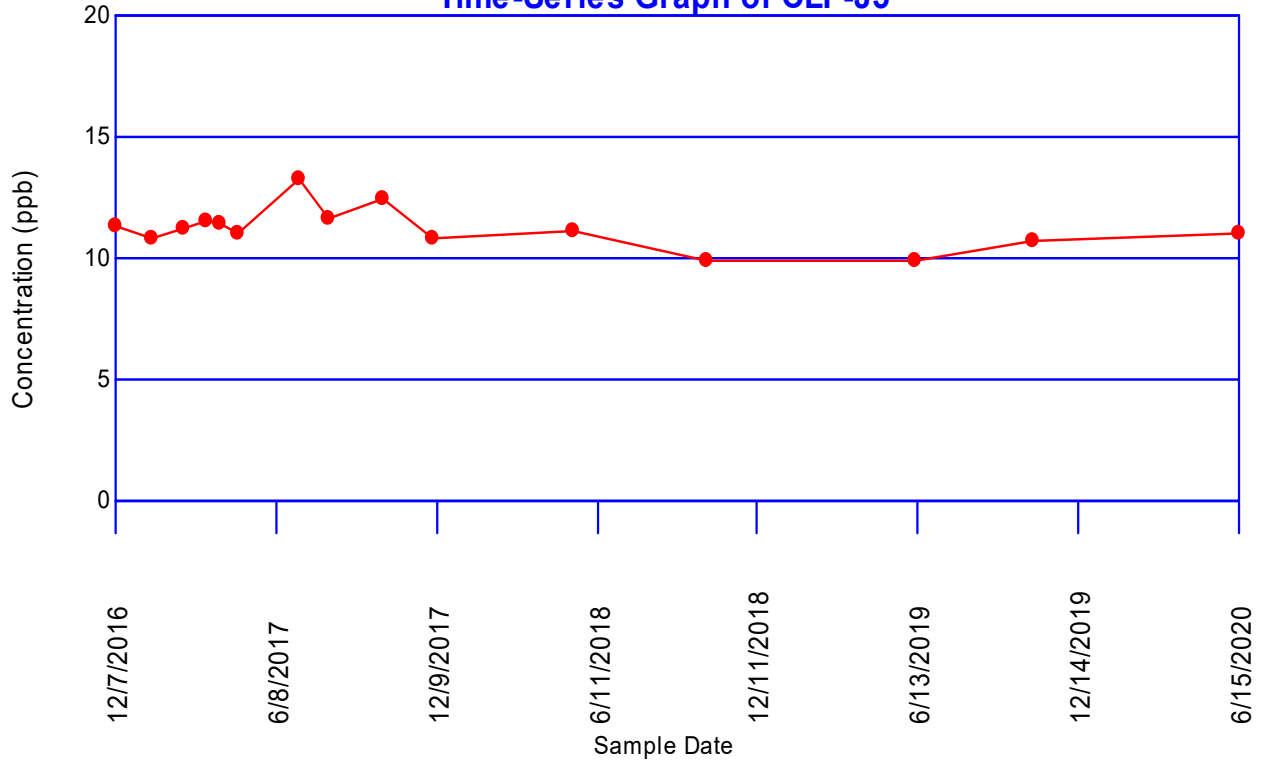
5% Critical value of 0.881 is less than 0.91741

Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.91741

Data is normally distributed at 99% level of significance

### Sulfate Time-Series Graph of CLF-J5



**Mann-Kendall Trend Analysis**  
**Parameter: Sulfate**  
**Location: CLF-J5**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
10.8298	11.2942	-0.464407	0	1
11.2063	11.2942	-0.0878885	0	2
11.4863	11.2942	0.192181	1	2
11.4286	11.2942	0.134438	2	2
10.9773	11.2942	-0.31686	2	3
13.2267	11.2942	1.93256	3	3
11.6218	11.2942	0.327619	4	3
12.4987	11.2942	1.20458	5	3
10.8238	11.2942	-0.470391	5	4
11.1243	11.2942	-0.169844	5	5
9.88837	11.2942	-1.40579	5	6
9.87303	11.2942	-1.42113	5	7
10.7077	11.2942	-0.586432	5	8
11.0572	11.2942	-0.236942	5	9
11.2063	10.8298	0.376518	6	9
11.4863	10.8298	0.656588	7	9
11.4286	10.8298	0.598844	8	9
10.9773	10.8298	0.147547	9	9
13.2267	10.8298	2.39697	10	9
11.6218	10.8298	0.792026	11	9
12.4987	10.8298	1.66899	12	9
10.8238	10.8298	-0.00598405	12	10
11.1243	10.8298	0.294563	13	10
9.88837	10.8298	-0.94138	13	11
9.87303	10.8298	-0.956726	13	12
10.7077	10.8298	-0.122026	13	13
11.0572	10.8298	0.227465	14	13
11.4863	11.2063	0.28007	15	13
11.4286	11.2063	0.222326	16	13
10.9773	11.2063	-0.228971	16	14
13.2267	11.2063	2.02045	17	14
11.6218	11.2063	0.415507	18	14
12.4987	11.2063	1.29247	19	14
10.8238	11.2063	-0.382502	19	15
11.1243	11.2063	-0.0819551	19	16
9.88837	11.2063	-1.3179	19	17
9.87303	11.2063	-1.33324	19	18
10.7077	11.2063	-0.498544	19	19
11.0572	11.2063	-0.149053	19	20
11.4286	11.4863	-0.0577434	19	21
10.9773	11.4863	-0.509041	19	22
13.2267	11.4863	1.74038	20	22
11.6218	11.4863	0.135438	21	22
12.4987	11.4863	1.0124	22	22

10.8238	11.4863	-0.662572	22	23
11.1243	11.4863	-0.362025	22	24
9.88837	11.4863	-1.59797	22	25
9.87303	11.4863	-1.61331	22	26
10.7077	11.4863	-0.778613	22	27
11.0572	11.4863	-0.429123	22	28
10.9773	11.4286	-0.451297	22	29
13.2267	11.4286	1.79812	23	29
11.6218	11.4286	0.193181	24	29
12.4987	11.4286	1.07014	25	29
10.8238	11.4286	-0.604829	25	30
11.1243	11.4286	-0.304281	25	31
9.88837	11.4286	-1.54022	25	32
9.87303	11.4286	-1.55557	25	33
10.7077	11.4286	-0.72087	25	34
11.0572	11.4286	-0.37138	25	35
13.2267	10.9773	2.24942	26	35
11.6218	10.9773	0.644478	27	35
12.4987	10.9773	1.52144	28	35
10.8238	10.9773	-0.153531	28	36
11.1243	10.9773	0.147016	29	36
9.88837	10.9773	-1.08893	29	37
9.87303	10.9773	-1.10427	29	38
10.7077	10.9773	-0.269573	29	39
11.0572	10.9773	0.0799176	30	39
11.6218	13.2267	-1.60494	30	40
12.4987	13.2267	-0.727981	30	41
10.8238	13.2267	-2.40295	30	42
11.1243	13.2267	-2.10241	30	43
9.88837	13.2267	-3.33835	30	44
9.87303	13.2267	-3.3537	30	45
10.7077	13.2267	-2.51899	30	46
11.0572	13.2267	-2.1695	30	47
12.4987	11.6218	0.876962	31	47
10.8238	11.6218	-0.79801	31	48
11.1243	11.6218	-0.497462	31	49
9.88837	11.6218	-1.73341	31	50
9.87303	11.6218	-1.74875	31	51
10.7077	11.6218	-0.914051	31	52
11.0572	11.6218	-0.564561	31	53
10.8238	12.4987	-1.67497	31	54
11.1243	12.4987	-1.37442	31	55
9.88837	12.4987	-2.61037	31	56
9.87303	12.4987	-2.62571	31	57
10.7077	12.4987	-1.79101	31	58
11.0572	12.4987	-1.44152	31	59
11.1243	10.8238	0.300547	32	59
9.88837	10.8238	-0.935396	32	60
9.87303	10.8238	-0.950742	32	61
10.7077	10.8238	-0.116042	32	62
11.0572	10.8238	0.233449	33	62



9.88837	11.1243	-1.23594	33	63
9.87303	11.1243	-1.25129	33	64
10.7077	11.1243	-0.416589	33	65
11.0572	11.1243	-0.0670983	33	66
9.87303	9.88837	-0.0153456	33	67
10.7077	9.88837	0.819355	34	67
11.0572	9.88837	1.16885	35	67
10.7077	9.87303	0.8347	36	67
11.0572	9.87303	1.18419	37	67
11.0572	10.7077	0.34949	38	67

S Statistic = 38 - 67 = -29

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
-------------	--------------

12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -1.38564

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**| -1.38564 | <= 1.97737 indicating no evidence of a trend**

## Dixon's Test for Outliers

Parameter: Sulfate

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.178409	0.162455	0.525	None

Loc.	Date	Conc.	Outlier
CLF-S13	12/7/2016	123520	FALSE
	1/18/2017	318064	FALSE
	2/23/2017	507416	FALSE
	3/22/2017	505253	FALSE
	4/5/2017	439796	FALSE
	4/25/2017	305426	FALSE
	7/6/2017	134300	FALSE
	8/8/2017	131500	FALSE
	10/9/2017	128400	FALSE
	12/6/2017	280000	FALSE
	5/15/2018	372000	FALSE
	10/16/2018	155000	FALSE
	6/11/2019	235000	FALSE
	10/22/2019	68000	FALSE
	6/15/2020	209000	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Sulfate

Location: CLF-S13

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	68000	507416	439416	0.515	226299
2	123520	505253	381733	0.3306	126201
3	128400	439796	311396	0.2495	77693.3
4	131500	372000	240500	0.1878	45165.9
5	134300	318064	183764	0.1353	24863.3
6	155000	305426	150426	0.088	13237.5
7	209000	280000	71000	0.0433	3074.3
8	235000	235000	0		
9	280000	209000	-71000		
10	305426	155000	-150426		
11	318064	134300	-183764		
12	372000	131500	-240500		
13	439796	128400	-311396		
14	505253	123520	-381733		
15	507416	68000	-439416		

---

Sum of b values = 516534

Sample Standard Deviation = 144279

W Statistic = 0.915507

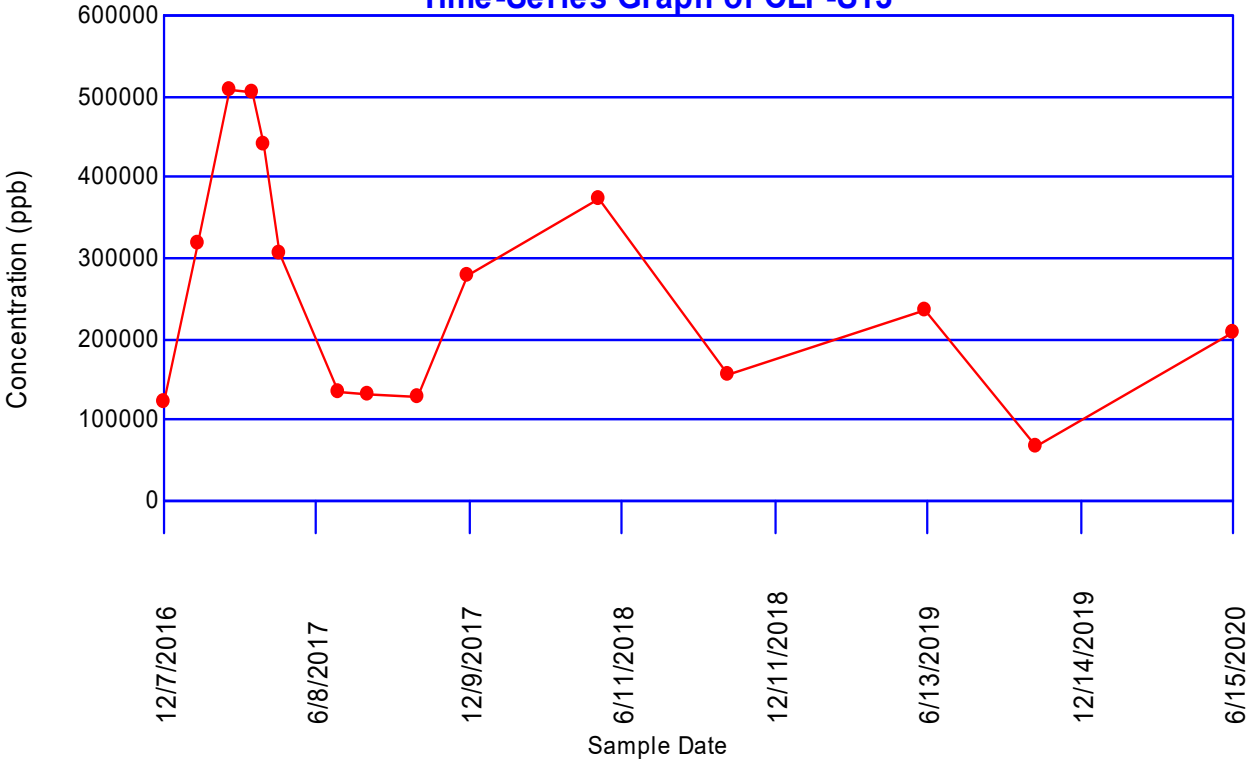
5% Critical value of 0.881 is less than 0.915507

Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.915507

Data is normally distributed at 99% level of significance

### Sulfate Time-Series Graph of CLF-S13



## Mann-Kendall Trend Analysis

Parameter: Sulfate

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

---

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
318064	123520	194544	1	0
507416	123520	383896	2	0
505253	123520	381733	3	0
439796	123520	316276	4	0
305426	123520	181906	5	0
134300	123520	10780	6	0
131500	123520	7980	7	0
128400	123520	4880	8	0
280000	123520	156480	9	0
372000	123520	248480	10	0
155000	123520	31480	11	0
235000	123520	111480	12	0
68000	123520	-55520	12	1
209000	123520	85480	13	1
507416	318064	189352	14	1
505253	318064	187189	15	1
439796	318064	121732	16	1
305426	318064	-12638	16	2
134300	318064	-183764	16	3
131500	318064	-186564	16	4
128400	318064	-189664	16	5
280000	318064	-38064	16	6
372000	318064	53936	17	6
155000	318064	-163064	17	7
235000	318064	-83064	17	8
68000	318064	-250064	17	9
209000	318064	-109064	17	10
505253	507416	-2163	17	11
439796	507416	-67620	17	12
305426	507416	-201990	17	13
134300	507416	-373116	17	14
131500	507416	-375916	17	15
128400	507416	-379016	17	16
280000	507416	-227416	17	17
372000	507416	-135416	17	18
155000	507416	-352416	17	19
235000	507416	-272416	17	20
68000	507416	-439416	17	21
209000	507416	-298416	17	22
439796	505253	-65457	17	23
305426	505253	-199827	17	24
134300	505253	-370953	17	25
131500	505253	-373753	17	26
128400	505253	-376853	17	27

280000	505253	-225253	17	28
372000	505253	-133253	17	29
155000	505253	-350253	17	30
235000	505253	-270253	17	31
68000	505253	-437253	17	32
209000	505253	-296253	17	33
305426	439796	-134370	17	34
134300	439796	-305496	17	35
131500	439796	-308296	17	36
128400	439796	-311396	17	37
280000	439796	-159796	17	38
372000	439796	-67796	17	39
155000	439796	-284796	17	40
235000	439796	-204796	17	41
68000	439796	-371796	17	42
209000	439796	-230796	17	43
134300	305426	-171126	17	44
131500	305426	-173926	17	45
128400	305426	-177026	17	46
280000	305426	-25426	17	47
372000	305426	66574	18	47
155000	305426	-150426	18	48
235000	305426	-70426	18	49
68000	305426	-237426	18	50
209000	305426	-96426	18	51
131500	134300	-2800	18	52
128400	134300	-5900	18	53
280000	134300	145700	19	53
372000	134300	237700	20	53
155000	134300	20700	21	53
235000	134300	100700	22	53
68000	134300	-66300	22	54
209000	134300	74700	23	54
128400	131500	-3100	23	55
280000	131500	148500	24	55
372000	131500	240500	25	55
155000	131500	23500	26	55
235000	131500	103500	27	55
68000	131500	-63500	27	56
209000	131500	77500	28	56
280000	128400	151600	29	56
372000	128400	243600	30	56
155000	128400	26600	31	56
235000	128400	106600	32	56
68000	128400	-60400	32	57
209000	128400	80600	33	57
372000	280000	92000	34	57
155000	280000	-125000	34	58
235000	280000	-45000	34	59
68000	280000	-212000	34	60
209000	280000	-71000	34	61

155000	372000	-217000	34	62
235000	372000	-137000	34	63
68000	372000	-304000	34	64
209000	372000	-163000	34	65
235000	155000	80000	35	65
68000	155000	-87000	35	66
209000	155000	54000	36	66
68000	235000	-167000	36	67
209000	235000	-26000	36	68
209000	68000	141000	37	68

S Statistic = 37 - 68 = -31

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
-------------	--------------

12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -1.48461

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**| -1.48461 | <= 1.97737 indicating no evidence of a trend**

## Dixon's Test for Outliers

Parameter: Sulfate

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.109603	0.0367033	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S05	1/18/2017	45223.8	FALSE
	4/5/2017	62615.6	FALSE
	4/25/2017	44781.4	FALSE
	10/16/2018	7500	FALSE
	10/22/2019	69400	FALSE
	6/29/2020	5400	FALSE
	12/5/2020	29300	FALSE
	3/26/2021	15100	FALSE



## Shapiro-Wilks Test of Normality

Parameter: Sulfate

Location: CLF-S05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	5400	69400	64000	0.6052	38732.8
2	7500	62615.6	55115.6	0.3164	17438.6
3	15100	45223.8	30123.8	0.1743	5250.58
4	29300	44781.4	15481.4	0.0561	868.507
5	44781.4	29300	-15481.4		
6	45223.8	15100	-30123.8		
7	62615.6	7500	-55115.6		
8	69400	5400	-64000		

---

Sum of b values = 62290.5

Sample Standard Deviation = 24515.4

W Statistic = 0.922289

5% Critical value of 0.818 is less than 0.922289

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.922289

Data is normally distributed at 99% level of significance

## Mann-Kendall Trend Analysis

Parameter: Sulfate

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

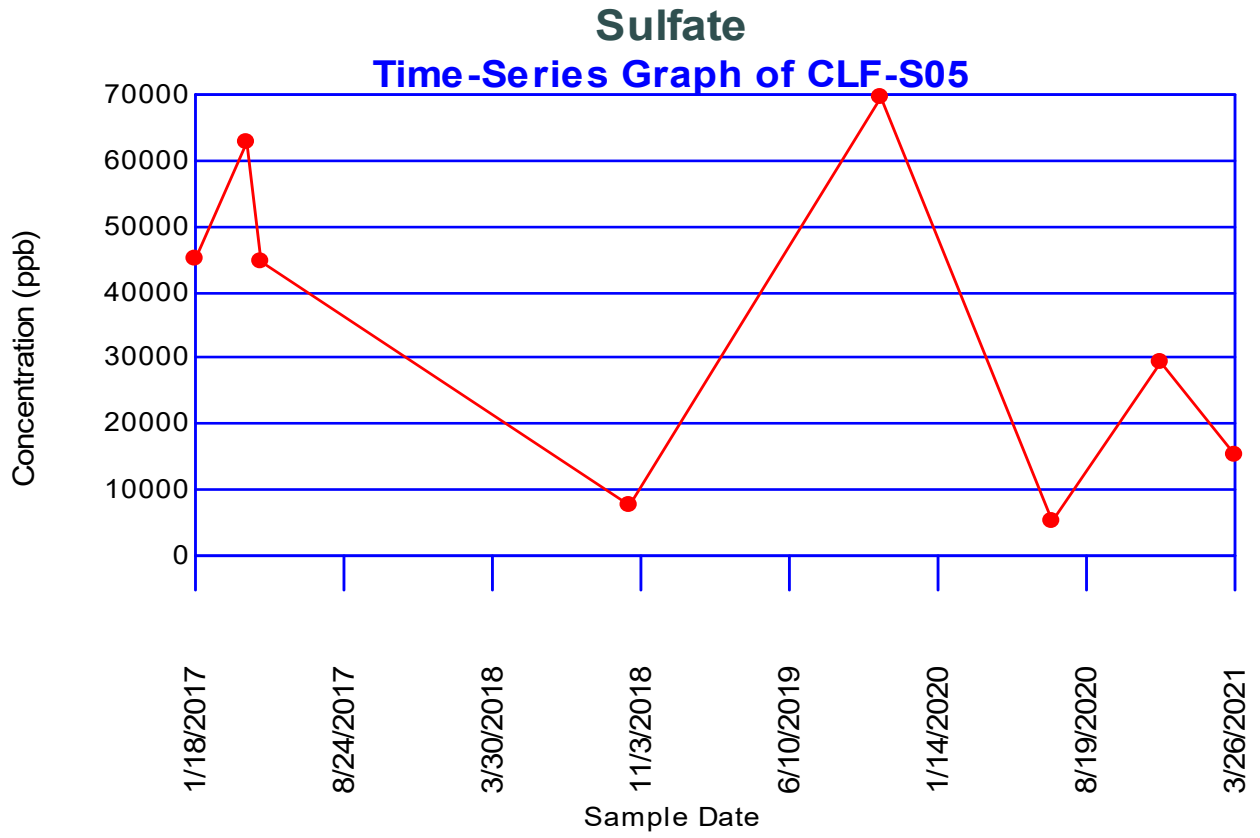
Xj	Xk	Xj - Xk	Positives	Negatives
62615.6	45223.8	17391.8	1	0
44781.4	45223.8	-442.4	1	1
7500	45223.8	-37723.8	1	2
69400	45223.8	24176.2	2	2
5400	45223.8	-39823.8	2	3
29300	45223.8	-15923.8	2	4
15100	45223.8	-30123.8	2	5
44781.4	62615.6	-17834.2	2	6
7500	62615.6	-55115.6	2	7
69400	62615.6	6784.4	3	7
5400	62615.6	-57215.6	3	8
29300	62615.6	-33315.6	3	9
15100	62615.6	-47515.6	3	10
7500	44781.4	-37281.4	3	11
69400	44781.4	24618.6	4	11
5400	44781.4	-39381.4	4	12
29300	44781.4	-15481.4	4	13
15100	44781.4	-29681.4	4	14
69400	7500	61900	5	14
5400	7500	-2100	5	15
29300	7500	21800	6	15
15100	7500	7600	7	15
5400	69400	-64000	7	16
29300	69400	-40100	7	17
15100	69400	-54300	7	18
29300	5400	23900	8	18
15100	5400	9700	9	18
15100	29300	-14200	9	19

S Statistic = 9 - 19 = -10

Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)

Probability of obtaining  $S \geq |-10|$  is 0.276

0.276  $\geq$  0.025 indicating no evidence of a trend



### Concentrations (ppb)

Parameter: Total Dissolved Solids (TDS)

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Total Measurements: 74

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

There are 6 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

CLF-J2	15	0 (0%)	12/7/2016	12.7939	360000
			1/18/2017	12.3673	235000
			2/23/2017	12.8558	383000
			3/22/2017	12.7827	356000
			4/5/2017	12.7939	360000
			4/25/2017	12.7159	333000
			7/6/2017	13.7973	982000
			8/8/2017	12.936	415000
			10/9/2017	13.412	668000
			12/6/2017	13.0498	465000
			5/15/2018	11.9316	152000
			10/16/2018	12.6475	311000
			6/11/2019	12.2061	200000
			10/22/2019	12.7911	359000
			6/29/2020	12.0317	168000
	<b>12/5/2020</b>	<b>12.5776</b>	<b>290000</b>		
	<b>3/26/2021</b>	<b>12.4292</b>	<b>250000</b>		

CLF-J3	14	0 (0%)	12/7/2016	12.7883	358000
			1/18/2017	12.409	245000
			2/23/2017	12.8688	388000
			3/22/2017	12.6411	309000
			4/5/2017	12.7742	353000
			7/6/2017	13.7881	973000
			8/8/2017	12.9785	433000
			10/9/2017	13.3708	641000
			12/6/2017	13.0058	445000
			5/15/2018	12.8917	397000
			10/16/2018	12.6379	308000
			6/11/2019	12.4451	254000
			10/22/2019	12.824	371000
			6/15/2020	12.919	408000
				<b>12/5/2020</b>	<b>12.5637</b>
	<b>3/26/2021</b>	<b>12.2643</b>	<b>212000</b>		

CLF-J5	15	0 (0%)	12/7/2016	12.8186	369000
			1/18/2017	12.5245	275000
			2/23/2017	12.8104	366000
			3/22/2017	12.654	313000
			4/5/2017	12.7883	358000
			4/25/2017	12.495	267000

			7/6/2017	14.0411	1.253e+006
			8/8/2017	12.9808	434000
			10/9/2017	13.5541	770000
			12/6/2017	12.7657	350000
			5/15/2018	12.9042	402000
			10/16/2018	12.495	267000
			6/11/2019	12.2405	207000
			10/22/2019	12.6761	320000
			6/15/2020	12.7038	329000
			<b>12/5/2020</b>	<b>12.4837</b>	<b>264000</b>
			<b>3/26/2021</b>	<b>12.2596</b>	<b>211000</b>
CLF-S05	8	0 (0%)	1/18/2017	12.4411	253000
			4/5/2017	12.5637	286000
			4/25/2017	12.4761	262000
			10/16/2018	12.3327	227000
			10/22/2019	12.8636	386000
			6/29/2020	12.1118	182000
			12/5/2020	12.5425	280000
			3/26/2021	11.7676	129000
CLF-S06	7	0 (0%)	1/18/2017	12.269	213000
			4/5/2017	12.3631	234000
			4/25/2017	12.2308	205000
			10/16/2018	12.2968	219000
			6/29/2020	12.2061	200000
			12/5/2020	12.9092	404000
			3/26/2021	12.16	191000
CLF-S13	15	0 (0%)	12/7/2016	12.8131	367000
			1/18/2017	13.4617	702000
			2/23/2017	13.8294	1.014e+006
			3/22/2017	13.7788	964000
			4/5/2017	13.6483	846000
			4/25/2017	13.4298	680000
			7/6/2017	13.0192	451000
			8/8/2017	12.9945	440000
			10/9/2017	12.9116	405000
			12/6/2017	13.4343	683000
			5/15/2018	13.653	850000
			10/16/2018	12.9263	411000
			6/11/2019	13.2177	550000
			10/22/2019	12.6281	305000
			6/15/2020	13.1635	521000
			<b>12/5/2020</b>	<b>12.8892</b>	<b>396000</b>
			<b>3/26/2021</b>	<b>13.0898</b>	<b>484000</b>

There are 2 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
CLF-C03	17	0 (0%)	12/7/2016	11.7118	122000
			1/18/2017	12.3239	225000
			2/23/2017	12.6761	320000
			3/22/2017	12.2308	205000
			4/5/2017	12.4292	250000
			4/25/2017	12.4837	264000

			7/6/2017	12.4913	266000
			8/8/2017	12.4451	254000
			10/9/2017	12.5099	271000
			12/6/2017	12.5981	296000
			5/15/2018	12.6281	305000
			10/16/2018	12.495	267000
			6/11/2019	12.4411	253000
			10/22/2019	12.4411	253000
			6/15/2020	12.3014	220000
			12/5/2020	12.6248	304000
			3/26/2021	12.3884	240000
<hr/>					
CLF-OPP	17	0 (0%)	12/7/2016	12.3014	220000
			1/18/2017	11.3266	83000
			2/23/2017	12.3371	228000
			3/22/2017	11.7906	132000
			4/5/2017	12.1118	182000
			4/25/2017	12.0137	165000
			7/6/2017	12.3758	237000
			8/8/2017	12.0076	164000
			10/9/2017	12.16	191000
			12/6/2017	12.4684	260000
			5/15/2018	12.5354	278000
			10/16/2018	12.2923	218000
			6/11/2019	11.7906	132000
			10/22/2019	12.3631	234000
			6/15/2020	12.2308	205000
			12/5/2020	12.3716	236000
			3/26/2021	11.783	131000
<hr/>					

## Dixon's Test for Outliers

Parameter: Total Dissolved Solids (TDS)

Location: CLF-J2

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.469783	0.245437	0.525	None

Loc.	Date	Conc.	Outlier
CLF-J2	12/7/2016	12.7939	FALSE
	1/18/2017	12.3673	FALSE
	2/23/2017	12.8558	FALSE
	3/22/2017	12.7827	FALSE
	4/5/2017	12.7939	FALSE
	4/25/2017	12.7159	FALSE
	7/6/2017	13.7973	FALSE
	8/8/2017	12.936	FALSE
	10/9/2017	13.412	FALSE
	12/6/2017	13.0498	FALSE
	5/15/2018	11.9316	FALSE
	10/16/2018	12.6475	FALSE
	6/11/2019	12.2061	FALSE
	10/22/2019	12.7911	FALSE
	6/29/2020	12.0317	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Total Dissolved Solids (TDS)

Location: CLF-J2

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	11.9316	13.7973	1.86571	0.515	0.960841
2	12.0317	13.412	1.38032	0.3306	0.456335
3	12.2061	13.0498	0.84372	0.2495	0.210508
4	12.3673	12.936	0.568693	0.1878	0.106801
5	12.6475	12.8558	0.208242	0.1353	0.0281752
6	12.7159	12.7939	0.0779615	0.088	0.00686062
7	12.7827	12.7939	0.0111733	0.0433	0.000483804
8	12.7911	12.7911	0		
9	12.7939	12.7827	-0.0111733		
10	12.7939	12.7159	-0.0779615		
11	12.8558	12.6475	-0.208242		
12	12.936	12.3673	-0.568693		
13	13.0498	12.2061	-0.84372		
14	13.412	12.0317	-1.38032		
15	13.7973	11.9316	-1.86571		

---

Sum of b values = 1.77

Sample Standard Deviation = 0.486669

W Statistic = 0.94483

5% Critical value of 0.881 is less than 0.94483

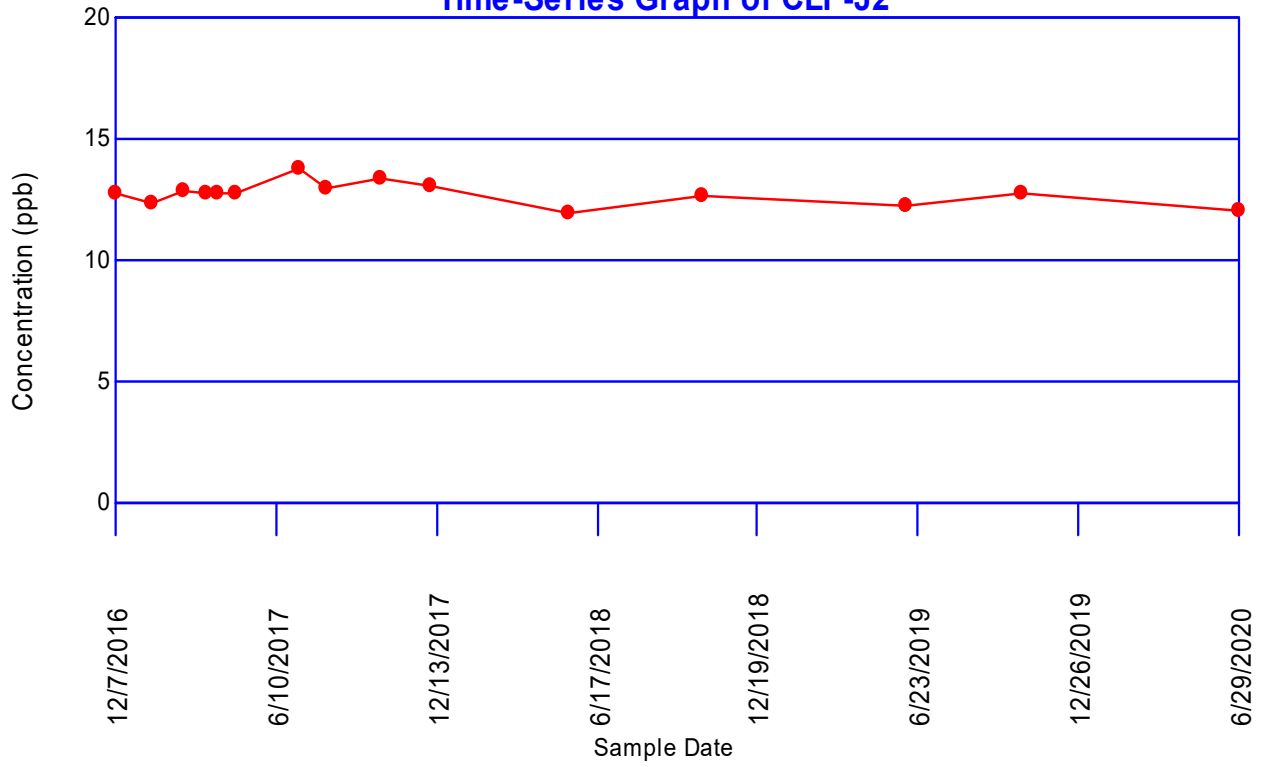
Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.94483

Data is normally distributed at 99% level of significance



### Total Dissolved Solids (TDS) Time-Series Graph of CLF-J2



**Mann-Kendall Trend Analysis**  
**Parameter: Total Dissolved Solids (TDS)**  
**Location: CLF-J2**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
12.3673	12.7939	-0.426519	0	1
12.8558	12.7939	0.061931	1	1
12.7827	12.7939	-0.0111733	1	2
12.7939	12.7939	0	1	2
12.7159	12.7939	-0.0779615	1	3
13.7973	12.7939	1.00349	2	3
12.936	12.7939	0.142174	3	3
13.412	12.7939	0.618184	4	3
13.0498	12.7939	0.255933	5	3
11.9316	12.7939	-0.862224	5	4
12.6475	12.7939	-0.146311	5	5
12.2061	12.7939	-0.587787	5	6
12.7911	12.7939	-0.00278164	5	7
12.0317	12.7939	-0.76214	5	8
12.8558	12.3673	0.488449	6	8
12.7827	12.3673	0.415345	7	8
12.7939	12.3673	0.426519	8	8
12.7159	12.3673	0.348557	9	8
13.7973	12.3673	1.43001	10	8
12.936	12.3673	0.568693	11	8
13.412	12.3673	1.0447	12	8
13.0498	12.3673	0.682452	13	8
11.9316	12.3673	-0.435705	13	9
12.6475	12.3673	0.280207	14	9
12.2061	12.3673	-0.161268	14	10
12.7911	12.3673	0.423737	15	10
12.0317	12.3673	-0.335622	15	11
12.7827	12.8558	-0.0731043	15	12
12.7939	12.8558	-0.061931	15	13
12.7159	12.8558	-0.139892	15	14
13.7973	12.8558	0.941556	16	14
12.936	12.8558	0.0802435	17	14
13.412	12.8558	0.556253	18	14
13.0498	12.8558	0.194002	19	14
11.9316	12.8558	-0.924154	19	15
12.6475	12.8558	-0.208242	19	16
12.2061	12.8558	-0.649718	19	17
12.7911	12.8558	-0.0647126	19	18
12.0317	12.8558	-0.824071	19	19
12.7939	12.7827	0.0111733	20	19
12.7159	12.7827	-0.0667882	20	20
13.7973	12.7827	1.01466	21	20
12.936	12.7827	0.153348	22	20
13.412	12.7827	0.629357	23	20

13.0498	12.7827	0.267107	24	20
11.9316	12.7827	-0.85105	24	21
12.6475	12.7827	-0.135138	24	22
12.2061	12.7827	-0.576613	24	23
12.7911	12.7827	0.00839166	25	23
12.0317	12.7827	-0.750967	25	24
12.7159	12.7939	-0.0779615	25	25
13.7973	12.7939	1.00349	26	25
12.936	12.7939	0.142174	27	25
13.412	12.7939	0.618184	28	25
13.0498	12.7939	0.255933	29	25
11.9316	12.7939	-0.862224	29	26
12.6475	12.7939	-0.146311	29	27
12.2061	12.7939	-0.587787	29	28
12.7911	12.7939	-0.00278164	29	29
12.0317	12.7939	-0.76214	29	30
13.7973	12.7159	1.08145	30	30
12.936	12.7159	0.220136	31	30
13.412	12.7159	0.696146	32	30
13.0498	12.7159	0.333895	33	30
11.9316	12.7159	-0.784262	33	31
12.6475	12.7159	-0.0683496	33	32
12.2061	12.7159	-0.509825	33	33
12.7911	12.7159	0.0751799	34	33
12.0317	12.7159	-0.684179	34	34
12.936	13.7973	-0.861313	34	35
13.412	13.7973	-0.385303	34	36
13.0498	13.7973	-0.747554	34	37
11.9316	13.7973	-1.86571	34	38
12.6475	13.7973	-1.1498	34	39
12.2061	13.7973	-1.59127	34	40
12.7911	13.7973	-1.00627	34	41
12.0317	13.7973	-1.76563	34	42
13.412	12.936	0.47601	35	42
13.0498	12.936	0.113759	36	42
11.9316	12.936	-1.0044	36	43
12.6475	12.936	-0.288486	36	44
12.2061	12.936	-0.729961	36	45
12.7911	12.936	-0.144956	36	46
12.0317	12.936	-0.904315	36	47
13.0498	13.412	-0.362251	36	48
11.9316	13.412	-1.48041	36	49
12.6475	13.412	-0.764495	36	50
12.2061	13.412	-1.20597	36	51
12.7911	13.412	-0.620966	36	52
12.0317	13.412	-1.38032	36	53
11.9316	13.0498	-1.11816	36	54
12.6475	13.0498	-0.402244	36	55
12.2061	13.0498	-0.84372	36	56
12.7911	13.0498	-0.258715	36	57
12.0317	13.0498	-1.01807	36	58

12.6475	11.9316	0.715912	37	58
12.2061	11.9316	0.274437	38	58
12.7911	11.9316	0.859442	39	58
12.0317	11.9316	0.100083	40	58
12.2061	12.6475	-0.441476	40	59
12.7911	12.6475	0.143529	41	59
12.0317	12.6475	-0.615829	41	60
12.7911	12.2061	0.585005	42	60
12.0317	12.2061	-0.174353	42	61
12.0317	12.7911	-0.759358	42	62

S Statistic = 42 - 62 = -20

---

Tied Group	Value	Members
1	12.7939	2

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/29/2020	1

There are 0 time periods with multiple data

---

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 407.333

Z-Score = -0.94141

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**| -0.94141 | <= 1.97737 indicating no evidence of a trend**

## Dixon's Test for Outliers

Parameter: Total Dissolved Solids (TDS)

Location: CLF-J3

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

For 14 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.680101	0.383437	0.546	13.7881
2	0.423781	0.383437	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J3	12/7/2016	12.7883	FALSE
	1/18/2017	12.409	FALSE
	2/23/2017	12.8688	FALSE
	3/22/2017	12.6411	FALSE
	4/5/2017	12.7742	FALSE
	7/6/2017	<b>13.7881</b>	<b>TRUE</b>
	8/8/2017	12.9785	FALSE
	10/9/2017	13.3708	FALSE
	12/6/2017	13.0058	FALSE
	5/15/2018	12.8917	FALSE
	10/16/2018	12.6379	FALSE
	6/11/2019	12.4451	FALSE
	10/22/2019	12.824	FALSE
	6/15/2020	12.919	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Total Dissolved Solids (TDS)

Location: CLF-J3

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

K = 7 for 14 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	12.409	13.7881	1.37913	0.5251	0.724179
2	12.4451	13.3708	0.925695	0.3318	0.307146
3	12.6379	13.0058	0.367974	0.246	0.0905217
4	12.6411	12.9785	0.337396	0.1802	0.0607988
5	12.7742	12.919	0.144799	0.124	0.0179551
6	12.7883	12.8917	0.103403	0.0727	0.00751742
7	12.824	12.8688	0.0448033	0.024	0.00107528
8	12.8688	12.824	-0.0448033		
9	12.8917	12.7883	-0.103403		
10	12.919	12.7742	-0.144799		
11	12.9785	12.6411	-0.337396		
12	13.0058	12.6379	-0.367974		
13	13.3708	12.4451	-0.925695		
14	13.7881	12.409	-1.37913		

---

Sum of b values = 1.20919

Sample Standard Deviation = 0.35543

W Statistic = 0.890307

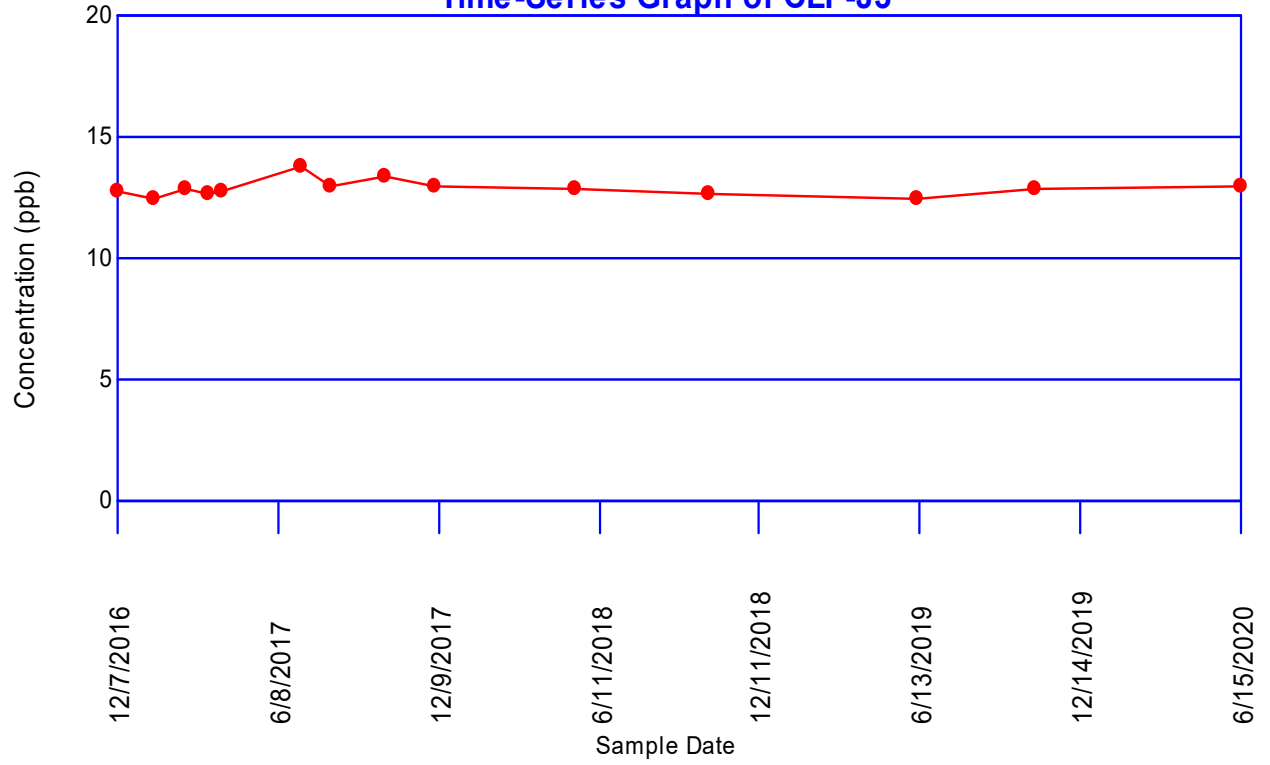
5% Critical value of 0.874 is less than 0.890307

Data is normally distributed at 95% level of significance

1% Critical value of 0.825 is less than 0.890307

Data is normally distributed at 99% level of significance

### Total Dissolved Solids (TDS) Time-Series Graph of CLF-J3



**Mann-Kendall Trend Analysis**  
**Parameter: Total Dissolved Solids (TDS)**  
**Location: CLF-J3**  
**Natural Logarithm Transformation**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
12.409	12.7883	-0.379275	0	1
12.8688	12.7883	0.0804724	1	1
12.6411	12.7883	-0.147192	1	2
12.7742	12.7883	-0.0140649	1	3
13.7881	12.7883	0.999851	2	3
12.9785	12.7883	0.190205	3	3
13.3708	12.7883	0.582496	4	3
13.0058	12.7883	0.217541	5	3
12.8917	12.7883	0.103403	6	3
12.6379	12.7883	-0.150433	6	4
12.4451	12.7883	-0.343199	6	5
12.824	12.7883	0.0356691	7	5
12.919	12.7883	0.130734	8	5
12.8688	12.409	0.459747	9	5
12.6411	12.409	0.232083	10	5
12.7742	12.409	0.36521	11	5
13.7881	12.409	1.37913	12	5
12.9785	12.409	0.56948	13	5
13.3708	12.409	0.961771	14	5
13.0058	12.409	0.596816	15	5
12.8917	12.409	0.482678	16	5
12.6379	12.409	0.228842	17	5
12.4451	12.409	0.0360761	18	5
12.824	12.409	0.414944	19	5
12.919	12.409	0.510009	20	5
12.6411	12.8688	-0.227664	20	6
12.7742	12.8688	-0.0945373	20	7
13.7881	12.8688	0.919379	21	7
12.9785	12.8688	0.109732	22	7
13.3708	12.8688	0.502024	23	7
13.0058	12.8688	0.137069	24	7
12.8917	12.8688	0.0229309	25	7
12.6379	12.8688	-0.230906	25	8
12.4451	12.8688	-0.423671	25	9
12.824	12.8688	-0.0448033	25	10
12.919	12.8688	0.0502618	26	10
12.7742	12.6411	0.133127	27	10
13.7881	12.6411	1.14704	28	10
12.9785	12.6411	0.337396	29	10
13.3708	12.6411	0.729688	30	10
13.0058	12.6411	0.364733	31	10
12.8917	12.6411	0.250595	32	10
12.6379	12.6411	-0.00324149	32	11
12.4451	12.6411	-0.196007	32	12



12.824	12.6411	0.182861	33	12
12.919	12.6411	0.277926	34	12
13.7881	12.7742	1.01392	35	12
12.9785	12.7742	0.20427	36	12
13.3708	12.7742	0.596561	37	12
13.0058	12.7742	0.231606	38	12
12.8917	12.7742	0.117468	39	12
12.6379	12.7742	-0.136368	39	13
12.4451	12.7742	-0.329134	39	14
12.824	12.7742	0.049734	40	14
12.919	12.7742	0.144799	41	14
12.9785	13.7881	-0.809646	41	15
13.3708	13.7881	-0.417355	41	16
13.0058	13.7881	-0.78231	41	17
12.8917	13.7881	-0.896448	41	18
12.6379	13.7881	-1.15028	41	19
12.4451	13.7881	-1.34305	41	20
12.824	13.7881	-0.964182	41	21
12.919	13.7881	-0.869117	41	22
13.3708	12.9785	0.392292	42	22
13.0058	12.9785	0.0273366	43	22
12.8917	12.9785	-0.0868014	43	23
12.6379	12.9785	-0.340638	43	24
12.4451	12.9785	-0.533403	43	25
12.824	12.9785	-0.154536	43	26
12.919	12.9785	-0.0594706	43	27
13.0058	13.3708	-0.364955	43	28
12.8917	13.3708	-0.479093	43	29
12.6379	13.3708	-0.73293	43	30
12.4451	13.3708	-0.925695	43	31
12.824	13.3708	-0.546827	43	32
12.919	13.3708	-0.451762	43	33
12.8917	13.0058	-0.114138	43	34
12.6379	13.0058	-0.367974	43	35
12.4451	13.0058	-0.56074	43	36
12.824	13.0058	-0.181872	43	37
12.919	13.0058	-0.0868071	43	38
12.6379	12.8917	-0.253836	43	39
12.4451	12.8917	-0.446602	43	40
12.824	12.8917	-0.0677342	43	41
12.919	12.8917	0.0273309	44	41
12.4451	12.6379	-0.192766	44	42
12.824	12.6379	0.186102	45	42
12.919	12.6379	0.281167	46	42
12.824	12.4451	0.378868	47	42
12.919	12.4451	0.473933	48	42
12.919	12.824	0.0950651	49	42

S Statistic = 49 - 42 = 7

---

Tied Group	Value	Members
<b>Time Period</b>		<b>Observations</b>
12/7/2016		1
1/18/2017		1
2/23/2017		1
3/22/2017		1
4/5/2017		1
7/6/2017		1
8/8/2017		1
10/9/2017		1
12/6/2017		1
5/15/2018		1
10/16/2018		1
6/11/2019		1
10/22/2019		1
6/15/2020		1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = 0.328469

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|0.328469| <= 1.97737 indicating no evidence of a trend

## Dixon's Test for Outliers

Parameter: Total Dissolved Solids (TDS)

Location: CLF-J5

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.830629	0.264317	0.525	1.253e+006
2	0.73161	0.307692	0.546	770000
3	0.389222	0.307692	0.521	None

Loc.	Date	Conc.	Outlier
CLF-J5	12/7/2016	369000	FALSE
	1/18/2017	275000	FALSE
	2/23/2017	366000	FALSE
	3/22/2017	313000	FALSE
	4/5/2017	358000	FALSE
	4/25/2017	267000	FALSE
	7/6/2017	1.253e+006	TRUE
	8/8/2017	434000	FALSE
	10/9/2017	770000	TRUE
	12/6/2017	350000	FALSE
	5/15/2018	402000	FALSE
	10/16/2018	267000	FALSE
	6/11/2019	207000	FALSE
	10/22/2019	320000	FALSE
	6/15/2020	329000	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Total Dissolved Solids (TDS)

Location: CLF-J5

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	207000	1.253e+006	1.046e+006	0.515	538690
2	267000	770000	503000	0.3306	166292
3	267000	434000	167000	0.2495	41666.5
4	275000	402000	127000	0.1878	23850.6
5	313000	369000	56000	0.1353	7576.8
6	320000	366000	46000	0.088	4048
7	329000	358000	29000	0.0433	1255.7
8	350000	350000	0		0
9	358000	329000	-29000		
10	366000	320000	-46000		
11	369000	313000	-56000		
12	402000	275000	-127000		
13	434000	267000	-167000		
14	770000	267000	-503000		
15	1.253e+006	207000	-1.046e+006		

---

Sum of b values = 783379

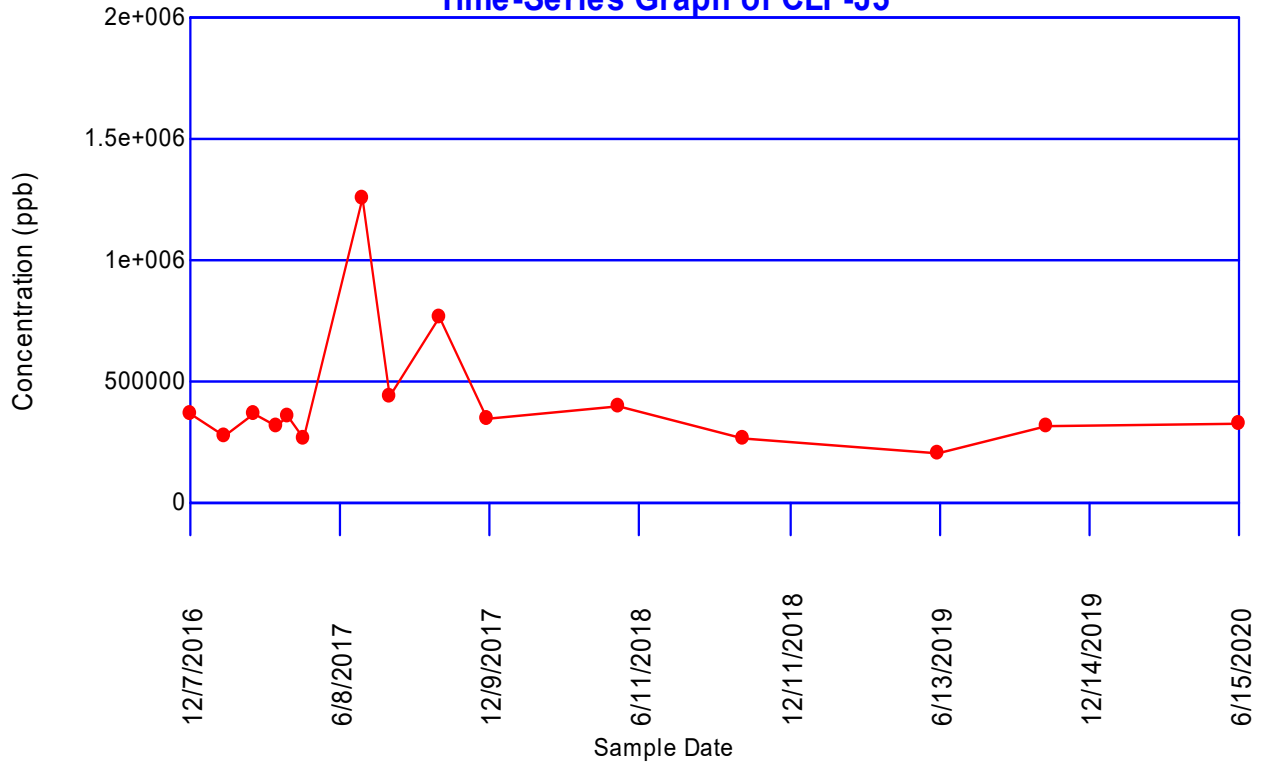
Sample Standard Deviation = 263776

W Statistic = 0.63001

**5% Critical value of 0.881 exceeds 0.63001**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.835 exceeds 0.63001**  
**Evidence of non-normality at 99% level of significance**

### Total Dissolved Solids (TDS) Time-Series Graph of CLF-J5



**Mann-Kendall Trend Analysis**  
**Parameter: Total Dissolved Solids (TDS)**  
**Location: CLF-J5**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
275000	369000	-94000	0	1
366000	369000	-3000	0	2
313000	369000	-56000	0	3
358000	369000	-11000	0	4
267000	369000	-102000	0	5
1.253e+006	369000	884000	1	5
434000	369000	65000	2	5
770000	369000	401000	3	5
350000	369000	-19000	3	6
402000	369000	33000	4	6
267000	369000	-102000	4	7
207000	369000	-162000	4	8
320000	369000	-49000	4	9
329000	369000	-40000	4	10
366000	275000	91000	5	10
313000	275000	38000	6	10
358000	275000	83000	7	10
267000	275000	-8000	7	11
1.253e+006	275000	978000	8	11
434000	275000	159000	9	11
770000	275000	495000	10	11
350000	275000	75000	11	11
402000	275000	127000	12	11
267000	275000	-8000	12	12
207000	275000	-68000	12	13
320000	275000	45000	13	13
329000	275000	54000	14	13
313000	366000	-53000	14	14
358000	366000	-8000	14	15
267000	366000	-99000	14	16
1.253e+006	366000	887000	15	16
434000	366000	68000	16	16
770000	366000	404000	17	16
350000	366000	-16000	17	17
402000	366000	36000	18	17
267000	366000	-99000	18	18
207000	366000	-159000	18	19
320000	366000	-46000	18	20
329000	366000	-37000	18	21
358000	313000	45000	19	21
267000	313000	-46000	19	22
1.253e+006	313000	940000	20	22
434000	313000	121000	21	22
770000	313000	457000	22	22

350000	313000	37000	23	22
402000	313000	89000	24	22
267000	313000	-46000	24	23
207000	313000	-106000	24	24
320000	313000	7000	25	24
329000	313000	16000	26	24
267000	358000	-91000	26	25
1.253e+006	358000	895000	27	25
434000	358000	76000	28	25
770000	358000	412000	29	25
350000	358000	-8000	29	26
402000	358000	44000	30	26
267000	358000	-91000	30	27
207000	358000	-151000	30	28
320000	358000	-38000	30	29
329000	358000	-29000	30	30
1.253e+006	267000	986000	31	30
434000	267000	167000	32	30
770000	267000	503000	33	30
350000	267000	83000	34	30
402000	267000	135000	35	30
267000	267000	0	35	30
207000	267000	-60000	35	31
320000	267000	53000	36	31
329000	267000	62000	37	31
434000	1.253e+006	-819000	37	32
770000	1.253e+006	-483000	37	33
350000	1.253e+006	-903000	37	34
402000	1.253e+006	-851000	37	35
267000	1.253e+006	-986000	37	36
207000	1.253e+006	-1.046e+006	37	37
320000	1.253e+006	-933000	37	38
329000	1.253e+006	-924000	37	39
770000	434000	336000	38	39
350000	434000	-84000	38	40
402000	434000	-32000	38	41
267000	434000	-167000	38	42
207000	434000	-227000	38	43
320000	434000	-114000	38	44
329000	434000	-105000	38	45
350000	770000	-420000	38	46
402000	770000	-368000	38	47
267000	770000	-503000	38	48
207000	770000	-563000	38	49
320000	770000	-450000	38	50
329000	770000	-441000	38	51
402000	350000	52000	39	51
267000	350000	-83000	39	52
207000	350000	-143000	39	53
320000	350000	-30000	39	54
329000	350000	-21000	39	55

267000	402000	-135000	39	56
207000	402000	-195000	39	57
320000	402000	-82000	39	58
329000	402000	-73000	39	59
207000	267000	-60000	39	60
320000	267000	53000	40	60
329000	267000	62000	41	60
320000	207000	113000	42	60
329000	207000	122000	43	60
329000	320000	9000	44	60

S Statistic = 44 - 60 = -16

---

Tied Group	Value	Members
1	267000	2

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 407.333

Z-Score = -0.743218

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|**-0.743218**| <= 1.97737 indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Total Dissolved Solids (TDS)

Location: CLF-S13

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 15 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.269294	0.183486	0.525	None

Loc.	Date	Conc.	Outlier
CLF-S13	12/7/2016	367000	FALSE
	1/18/2017	702000	FALSE
	2/23/2017	1.014e+006	FALSE
	3/22/2017	964000	FALSE
	4/5/2017	846000	FALSE
	4/25/2017	680000	FALSE
	7/6/2017	451000	FALSE
	8/8/2017	440000	FALSE
	10/9/2017	405000	FALSE
	12/6/2017	683000	FALSE
	5/15/2018	850000	FALSE
	10/16/2018	411000	FALSE
	6/11/2019	550000	FALSE
	10/22/2019	305000	FALSE
	6/15/2020	521000	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Total Dissolved Solids (TDS)

Location: CLF-S13

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 7 for 15 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	305000	1.014e+006	709000	0.515	365135
2	367000	964000	597000	0.3306	197368
3	405000	850000	445000	0.2495	111028
4	411000	846000	435000	0.1878	81693
5	440000	702000	262000	0.1353	35448.6
6	451000	683000	232000	0.088	20416
7	521000	680000	159000	0.0433	6884.7
8	550000	550000	0		
9	680000	521000	-159000		
10	683000	451000	-232000		
11	702000	440000	-262000		
12	846000	411000	-435000		
13	850000	405000	-445000		
14	964000	367000	-597000		
15	1.014e+006	305000	-709000		

---

Sum of b values = 817973

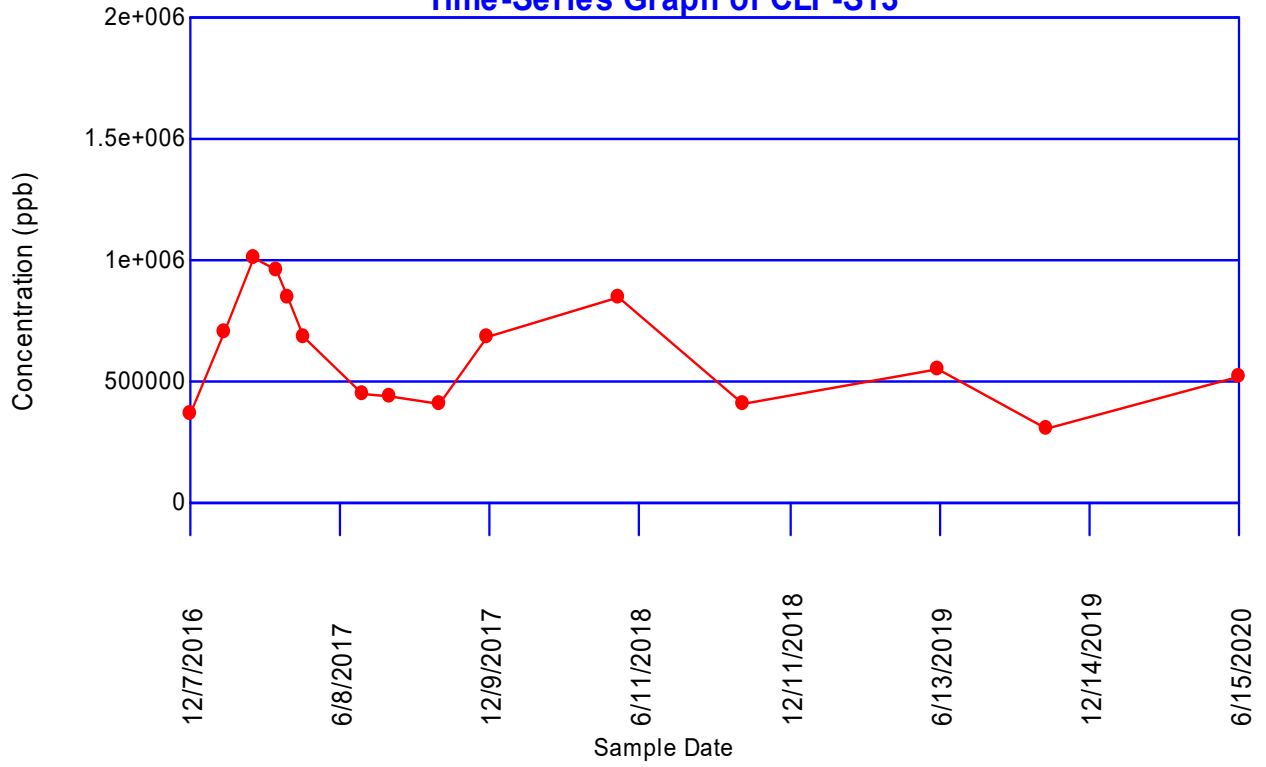
Sample Standard Deviation = 226751

W Statistic = 0.929508

5% Critical value of 0.881 is less than 0.929508  
Data is normally distributed at 95% level of significance

1% Critical value of 0.835 is less than 0.929508  
Data is normally distributed at 99% level of significance

### Total Dissolved Solids (TDS) Time-Series Graph of CLF-S13



**Mann-Kendall Trend Analysis**  
**Parameter: Total Dissolved Solids (TDS)**  
**Location: CLF-S13**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
702000	367000	335000	1	0
1.014e+006	367000	647000	2	0
964000	367000	597000	3	0
846000	367000	479000	4	0
680000	367000	313000	5	0
451000	367000	84000	6	0
440000	367000	73000	7	0
405000	367000	38000	8	0
683000	367000	316000	9	0
850000	367000	483000	10	0
411000	367000	44000	11	0
550000	367000	183000	12	0
305000	367000	-62000	12	1
521000	367000	154000	13	1
1.014e+006	702000	312000	14	1
964000	702000	262000	15	1
846000	702000	144000	16	1
680000	702000	-22000	16	2
451000	702000	-251000	16	3
440000	702000	-262000	16	4
405000	702000	-297000	16	5
683000	702000	-19000	16	6
850000	702000	148000	17	6
411000	702000	-291000	17	7
550000	702000	-152000	17	8
305000	702000	-397000	17	9
521000	702000	-181000	17	10
964000	1.014e+006	-50000	17	11
846000	1.014e+006	-168000	17	12
680000	1.014e+006	-334000	17	13
451000	1.014e+006	-563000	17	14
440000	1.014e+006	-574000	17	15
405000	1.014e+006	-609000	17	16
683000	1.014e+006	-331000	17	17
850000	1.014e+006	-164000	17	18
411000	1.014e+006	-603000	17	19
550000	1.014e+006	-464000	17	20
305000	1.014e+006	-709000	17	21
521000	1.014e+006	-493000	17	22
846000	964000	-118000	17	23
680000	964000	-284000	17	24
451000	964000	-513000	17	25
440000	964000	-524000	17	26
405000	964000	-559000	17	27

683000	964000	-281000	17	28
850000	964000	-114000	17	29
411000	964000	-553000	17	30
550000	964000	-414000	17	31
305000	964000	-659000	17	32
521000	964000	-443000	17	33
680000	846000	-166000	17	34
451000	846000	-395000	17	35
440000	846000	-406000	17	36
405000	846000	-441000	17	37
683000	846000	-163000	17	38
850000	846000	4000	18	38
411000	846000	-435000	18	39
550000	846000	-296000	18	40
305000	846000	-541000	18	41
521000	846000	-325000	18	42
451000	680000	-229000	18	43
440000	680000	-240000	18	44
405000	680000	-275000	18	45
683000	680000	3000	19	45
850000	680000	170000	20	45
411000	680000	-269000	20	46
550000	680000	-130000	20	47
305000	680000	-375000	20	48
521000	680000	-159000	20	49
440000	451000	-11000	20	50
405000	451000	-46000	20	51
683000	451000	232000	21	51
850000	451000	399000	22	51
411000	451000	-40000	22	52
550000	451000	99000	23	52
305000	451000	-146000	23	53
521000	451000	70000	24	53
405000	440000	-35000	24	54
683000	440000	243000	25	54
850000	440000	410000	26	54
411000	440000	-29000	26	55
550000	440000	110000	27	55
305000	440000	-135000	27	56
521000	440000	81000	28	56
683000	405000	278000	29	56
850000	405000	445000	30	56
411000	405000	6000	31	56
550000	405000	145000	32	56
305000	405000	-100000	32	57
521000	405000	116000	33	57
850000	683000	167000	34	57
411000	683000	-272000	34	58
550000	683000	-133000	34	59
305000	683000	-378000	34	60
521000	683000	-162000	34	61

411000	850000	-439000	34	62
550000	850000	-300000	34	63
305000	850000	-545000	34	64
521000	850000	-329000	34	65
550000	411000	139000	35	65
305000	411000	-106000	35	66
521000	411000	110000	36	66
305000	550000	-245000	36	67
521000	550000	-29000	36	68
521000	305000	216000	37	68

S Statistic = 37 - 68 = -31

---

Tied Group	Value	Members
------------	-------	---------

---

Time Period	Observations
12/7/2016	1
1/18/2017	1
2/23/2017	1
3/22/2017	1
4/5/2017	1
4/25/2017	1
7/6/2017	1
8/8/2017	1
10/9/2017	1
12/6/2017	1
5/15/2018	1
10/16/2018	1
6/11/2019	1
10/22/2019	1
6/15/2020	1

There are 0 time periods with multiple data

---

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 408.333

Z-Score = -1.48461

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**| -1.48461 | <= 1.97737 indicating no evidence of a trend**

## Dixon's Test for Outliers

Parameter: Total Dissolved Solids (TDS)

Location: CLF-S05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.490196	0.33758	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S05	1/18/2017	253000	FALSE
	4/5/2017	286000	FALSE
	4/25/2017	262000	FALSE
	10/16/2018	227000	FALSE
	10/22/2019	386000	FALSE
	6/29/2020	182000	FALSE
	12/5/2020	280000	FALSE
	3/26/2021	129000	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Total Dissolved Solids (TDS)

Location: CLF-S05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	129000	386000	257000	0.6052	155536
2	182000	286000	104000	0.3164	32905.6
3	227000	280000	53000	0.1743	9237.9
4	253000	262000	9000	0.0561	504.9
5	262000	253000	-9000		
6	280000	227000	-53000		
7	286000	182000	-104000		
8	386000	129000	-257000		

---

Sum of b values = 198185

Sample Standard Deviation = 76191.4

W Statistic = 0.966565

5% Critical value of 0.818 is less than 0.966565  
Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.966565  
Data is normally distributed at 99% level of significance



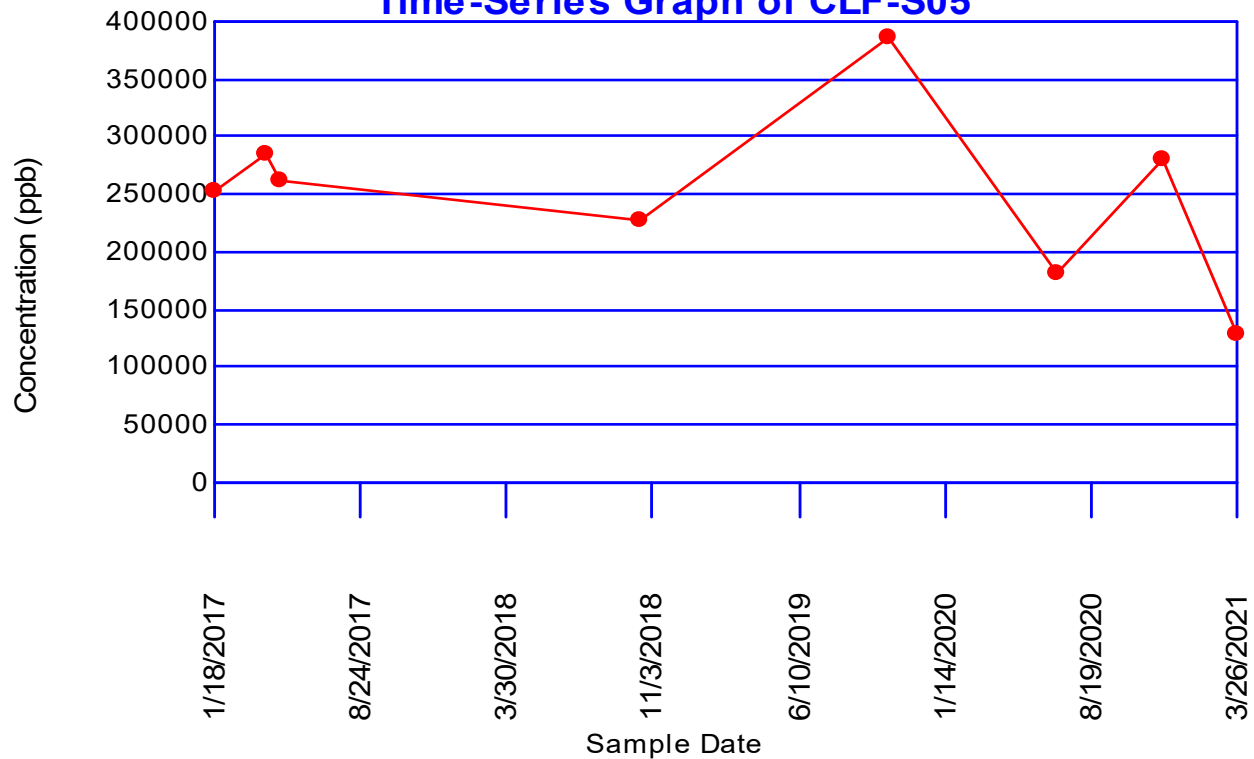
**Mann-Kendall Trend Analysis**  
**Parameter: Total Dissolved Solids (TDS)**  
**Location: CLF-S05**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
286000	253000	33000	1	0
262000	253000	9000	2	0
227000	253000	-26000	2	1
386000	253000	133000	3	1
182000	253000	-71000	3	2
280000	253000	27000	4	2
129000	253000	-124000	4	3
262000	286000	-24000	4	4
227000	286000	-59000	4	5
386000	286000	100000	5	5
182000	286000	-104000	5	6
280000	286000	-6000	5	7
129000	286000	-157000	5	8
227000	262000	-35000	5	9
386000	262000	124000	6	9
182000	262000	-80000	6	10
280000	262000	18000	7	10
129000	262000	-133000	7	11
386000	227000	159000	8	11
182000	227000	-45000	8	12
280000	227000	53000	9	12
129000	227000	-98000	9	13
182000	386000	-204000	9	14
280000	386000	-106000	9	15
129000	386000	-257000	9	16
280000	182000	98000	10	16
129000	182000	-53000	10	17
129000	280000	-151000	10	18

S Statistic = 10 - 18 = -8  
 Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
 Probability of obtaining S >= |-8| is 0.398  
 0.398 >= 0.025 indicating no evidence of a trend

### Total Dissolved Solids (TDS) Time-Series Graph of CLF-S05



## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J2

Parameter: Boron

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	6.0027
	1/18/2017	4.87304
	2/23/2017	6.69823
	3/22/2017	5.73439
	4/5/2017	5.78401
	4/25/2017	4.83896
	7/6/2017	7.39388
	8/8/2017	5.81711
	10/9/2017	6.29895
	12/6/2017	6.88244
	5/15/2018	4.8752
	10/16/2018	4.68213
	6/11/2019	4.86753
	10/22/2019	6.24804
	6/29/2020	ND<3.91202

From 15 baseline samples

Baseline mean = 5.66058

Baseline std Dev = 0.965278

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	4.70048	[0, 9.13336]	FALSE
6/29/2020	1	3.91202	[0, 9.13336]	FALSE
10/22/2019	1	6.24804	[0, 9.13336]	FALSE
6/11/2019	1	4.86753	[0, 9.13336]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J3

Parameter: Boron

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	426.902
	1/18/2017	130.881
	2/23/2017	850.398
	3/22/2017	303.698
	4/5/2017	312.635
	7/6/2017	1741
	8/8/2017	340
	10/9/2017	579
	12/6/2017	991
	5/15/2018	601
	10/16/2018	97.1
	6/11/2019	138
	10/22/2019	574
	6/15/2020	597

From 14 baseline samples  
Baseline mean = 548.758  
Baseline std Dev = 432.896

For 4 recent sampling event(s)  
Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$   
t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$   
Degrees of Freedom = 14 (background observations) - 1  
 $t(0.9975, 13) = 3.53713$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	114	[0, 2133.71]	FALSE
6/15/2020	1	597	[0, 2133.71]	FALSE
10/22/2019	1	574	[0, 2133.71]	FALSE
6/11/2019	1	138	[0, 2133.71]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J5

Parameter: Boron

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	6.09509
	1/18/2017	4.85224
	2/23/2017	6.09015
	3/22/2017	5.66439
	4/5/2017	5.64114
	4/25/2017	4.7934
	7/6/2017	7.44425
	8/8/2017	5.86079
	10/9/2017	6.28227
	12/6/2017	6.00881
	5/15/2018	6.09807
	10/16/2018	4.64439
	6/11/2019	4.77912
	10/22/2019	5.79301
	6/15/2020	6.05912

From 15 baseline samples

Baseline mean = 5.74042

Baseline std Dev = 0.736315

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	4.56643	[0, 8.38946]	FALSE
6/15/2020	1	6.05912	[0, 8.38946]	FALSE
10/22/2019	1	5.79301	[0, 8.38946]	FALSE
6/11/2019	1	4.77912	[0, 8.38946]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S05

Parameter: Boron

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	4.6817
	4/5/2017	5.21984
	4/25/2017	4.40681
	10/16/2018	ND<3.91202
	10/22/2019	6.4552
	6/29/2020	ND<3.91202
	12/5/2020	4.35414
	3/26/2021	4.22391

From 8 baseline samples

Baseline mean = 4.6457

Baseline std Dev = 0.845303

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
3/26/2021	1	4.22391	[0, 8.50376]	FALSE
12/5/2020	1	4.35414	[0, 8.50376]	FALSE
6/29/2020	1	3.91202	[0, 8.50376]	FALSE
10/22/2019	1	6.4552	[0, 8.50376]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S13

Parameter: Boron

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	473.085
	1/18/2017	714.92
	2/23/2017	1040.84
	3/22/2017	754.577
	4/5/2017	836.075
	4/25/2017	732.116
	7/6/2017	424
	8/8/2017	455
	10/9/2017	430
	12/6/2017	865
	5/15/2018	922
	10/16/2018	385
	6/11/2019	484
	10/22/2019	220
	6/15/2020	469

From 15 baseline samples  
Baseline mean = 613.708  
Baseline std Dev = 238.143

For 4 recent sampling event(s)  
Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$   
t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$   
Degrees of Freedom = 15 (background observations) - 1  
 $t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	327	[0, 1470.47]	FALSE
6/15/2020	1	469	[0, 1470.47]	FALSE
10/22/2019	1	220	[0, 1470.47]	FALSE
6/11/2019	1	484	[0, 1470.47]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J2

Parameter: Calcium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	110017
	1/18/2017	79460.5
	2/23/2017	106069
	3/22/2017	122341
	4/5/2017	120639
	4/25/2017	117569
	7/6/2017	239532
	8/8/2017	120150
	10/9/2017	165778
	12/6/2017	120511
	5/15/2018	36800
	10/16/2018	113000
	6/11/2019	86600
	10/22/2019	99600
	6/29/2020	59900

From 15 baseline samples

Baseline mean = 113198

Baseline std Dev = 46100.6

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	78700	[0, 279054]	FALSE
6/29/2020	1	59900	[0, 279054]	FALSE
10/22/2019	1	99600	[0, 279054]	FALSE
6/11/2019	1	86600	[0, 279054]	FALSE



## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J3

Parameter: Calcium

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	11.6066
	1/18/2017	11.2693
	2/23/2017	11.5865
	3/22/2017	11.724
	4/5/2017	11.6948
	7/6/2017	12.3875
	8/8/2017	11.7128
	10/9/2017	12.0289
	12/6/2017	11.7215
	5/15/2018	11.6784
	10/16/2018	11.4876
	6/11/2019	11.3986
	10/22/2019	11.5991
	6/15/2020	11.6869

From 14 baseline samples

Baseline mean = 11.6845

Baseline std Dev = 0.267845

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 14 (background observations) - 1

$t(0.9975, 13) = 3.53713$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	11.3278	[0, 12.6651]	FALSE
6/15/2020	1	11.6869	[0, 12.6651]	FALSE
10/22/2019	1	11.5991	[0, 12.6651]	FALSE
6/11/2019	1	11.3986	[0, 12.6651]	FALSE

## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-J5

Parameter: Calcium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 0%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 15

Maximum Baseline Concentration = 297325

Confidence Level = 78.9%

False Positive Rate = 21.1%

---

Baseline Measurements	Date	Value
	12/7/2016	95061.3
	1/18/2017	78950.2
	2/23/2017	98538.8
	3/22/2017	121487
	4/5/2017	122145
	4/25/2017	114426
	7/6/2017	297325
	8/8/2017	120823
	10/9/2017	180815
	12/6/2017	105625
	5/15/2018	111000
	10/16/2018	107000
	6/11/2019	82800
	10/22/2019	121000
	6/15/2020	111000

---

Date	Count	Mean	Significant
12/5/2020	1	79000	FALSE
6/15/2020	1	111000	FALSE
10/22/2019	1	121000	FALSE
6/11/2019	1	82800	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S05

Parameter: Calcium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	76432
	4/5/2017	110104
	4/25/2017	112725
	10/16/2018	95800
	10/22/2019	120000
	6/29/2020	70800
	12/5/2020	90000
	3/26/2021	71300

From 8 baseline samples

Baseline mean = 93395.1

Baseline std Dev = 19509.9

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
3/26/2021	1	71300	[0, 182440]	FALSE
12/5/2020	1	90000	[0, 182440]	FALSE
6/29/2020	1	70800	[0, 182440]	FALSE
10/22/2019	1	120000	[0, 182440]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S13

Parameter: Calcium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	111064
	1/18/2017	165561
	2/23/2017	217307
	3/22/2017	269982
	4/5/2017	240010
	4/25/2017	215059
	7/6/2017	118300
	8/8/2017	104065
	10/9/2017	104990
	12/6/2017	163020
	5/15/2018	191500
	10/16/2018	123000
	6/11/2019	147000
	10/22/2019	88900
	6/15/2020	141000

From 15 baseline samples

Baseline mean = 160051

Baseline std Dev = 55477.2

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	107000	[0, 359641]	FALSE
6/15/2020	1	141000	[0, 359641]	FALSE
10/22/2019	1	88900	[0, 359641]	FALSE
6/11/2019	1	147000	[0, 359641]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J2

Parameter: Chloride

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	9.43428
	1/18/2017	8.99669
	2/23/2017	9.2044
	3/22/2017	9.55488
	4/5/2017	9.24416
	4/25/2017	9.08418
	7/6/2017	10.7996
	8/8/2017	9.42545
	10/9/2017	10.8357
	12/6/2017	8.92266
	5/15/2018	8.88184
	10/16/2018	8.43381
	6/11/2019	8.31874
	10/22/2019	9.3501
	6/29/2020	6.90776

From 15 baseline samples  
 Baseline mean = 9.15961  
 Baseline std Dev = 0.937955

For 4 recent sampling event(s)  
 Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$   
 t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$   
 Degrees of Freedom = 15 (background observations) - 1  
 $t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	8.36637	[0, 12.5341]	FALSE
6/29/2020	1	6.90776	[0, 12.5341]	FALSE
10/22/2019	1	9.3501	[0, 12.5341]	FALSE
6/11/2019	1	8.31874	[0, 12.5341]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J3

Parameter: Chloride

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	9.43994
	1/18/2017	8.93253
	2/23/2017	9.19974
	3/22/2017	9.55392
	4/5/2017	9.23982
	7/6/2017	10.7996
	8/8/2017	9.40919
	10/9/2017	10.8454
	12/6/2017	8.9359
	5/15/2018	9.69277
	10/16/2018	8.43381
	6/11/2019	8.29405
	10/22/2019	9.37585
	6/15/2020	9.74097

From 14 baseline samples

Baseline mean = 9.42097

Baseline std Dev = 0.729922

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 14 (background observations) - 1

$t(0.9975, 13) = 3.53713$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	8.38936	[0, 12.0934]	FALSE
6/15/2020	1	9.74097	[0, 12.0934]	FALSE
10/22/2019	1	9.37585	[0, 12.0934]	FALSE
6/11/2019	1	8.29405	[0, 12.0934]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J5

Parameter: Chloride

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	9.26466
	1/18/2017	8.83736
	2/23/2017	9.20557
	3/22/2017	9.56809
	4/5/2017	9.34766
	4/25/2017	8.91578
	7/6/2017	11.2398
	8/8/2017	9.48037
	10/9/2017	11.0929
	12/6/2017	8.85367
	5/15/2018	9.5956
	10/16/2018	7.97247
	6/11/2019	8.00637
	10/22/2019	9.04782
	6/15/2020	9.74683

From 15 baseline samples  
 Baseline mean = 9.34499  
 Baseline std Dev = 0.902812

For 4 recent sampling event(s)  
 Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$   
 t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$   
 Degrees of Freedom = 15 (background observations) - 1  
 $t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	7.82405	[0, 12.593]	FALSE
6/15/2020	1	9.74683	[0, 12.593]	FALSE
10/22/2019	1	9.04782	[0, 12.593]	FALSE
6/11/2019	1	8.00637	[0, 12.593]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S05

Parameter: Chloride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	6116.1
	4/5/2017	8505.1
	4/25/2017	5278.4
	10/16/2018	900
	10/22/2019	14100
	6/29/2020	ND<1000
	12/5/2020	4300
	3/26/2021	2200

From 8 baseline samples

Baseline mean = 5299.95

Baseline std Dev = 4421.36

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
3/26/2021	1	2200	[0, 25479.6]	FALSE
12/5/2020	1	4300	[0, 25479.6]	FALSE
6/29/2020	1	1000	[0, 25479.6]	FALSE
10/22/2019	1	14100	[0, 25479.6]	FALSE



## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S13

Parameter: Chloride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	3530
	1/18/2017	8923
	2/23/2017	9236.6
	3/22/2017	6266.5
	4/5/2017	6387.2
	4/25/2017	5526.6
	7/6/2017	3100
	8/8/2017	3100
	10/9/2017	3300
	12/6/2017	4400
	5/15/2018	7800
	10/16/2018	3700
	6/11/2019	3600
	10/22/2019	2000
	6/15/2020	2600

From 15 baseline samples  
Baseline mean = 4897.99  
Baseline std Dev = 2327.92

For 4 recent sampling event(s)  
Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$   
t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$   
Degrees of Freedom = 15 (background observations) - 1  
 $t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	2000	[0, 13273.2]	FALSE
6/15/2020	1	2600	[0, 13273.2]	FALSE
10/22/2019	1	2000	[0, 13273.2]	FALSE
6/11/2019	1	3600	[0, 13273.2]	FALSE

## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-J2

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 86.6667%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 15

Maximum Baseline Concentration = 500

Confidence Level = 78.9%

False Positive Rate = 21.1%

---

Baseline Measurements	Date	Value
	12/7/2016	ND<500
	1/18/2017	170.7
	2/23/2017	ND<500
	3/22/2017	ND<500
	4/5/2017	ND<500
	4/25/2017	ND<500
	7/6/2017	ND<500
	8/8/2017	ND<500
	10/9/2017	ND<500
	12/6/2017	ND<500
	5/15/2018	ND<500
	10/16/2018	ND<500
	6/11/2019	ND<500
	10/22/2019	ND<500
	6/29/2020	140

---

Date	Count	Mean	Significant
12/5/2020	1	500	FALSE
6/29/2020	1	140	FALSE
10/22/2019	1	500	FALSE
6/11/2019	1	500	FALSE

## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-J3

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 92.8571%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 14

Maximum Baseline Concentration = 500

Confidence Level = 77.8%

False Positive Rate = 22.2%

---

Baseline Measurements	Date	Value
	12/7/2016	ND<500
	1/18/2017	165.6
	2/23/2017	ND<500
	3/22/2017	ND<500
	4/5/2017	ND<500
	7/6/2017	ND<500
	8/8/2017	ND<500
	10/9/2017	ND<500
	12/6/2017	ND<500
	5/15/2018	ND<500
	10/16/2018	ND<500
	6/11/2019	ND<500
	10/22/2019	ND<500
	6/15/2020	ND<500

---

Date	Count	Mean	Significant
12/5/2020	1	500	FALSE
6/15/2020	1	500	FALSE
10/22/2019	1	500	FALSE
6/11/2019	1	500	FALSE

## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-J5

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 93.3333%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 15

Maximum Baseline Concentration = 500

Confidence Level = 78.9%

False Positive Rate = 21.1%

---

Baseline Measurements	Date	Value
	12/7/2016	ND<500
	1/18/2017	166.9
	2/23/2017	ND<500
	3/22/2017	ND<500
	4/5/2017	ND<500
	4/25/2017	ND<500
	7/6/2017	ND<500
	8/8/2017	ND<500
	10/9/2017	ND<500
	12/6/2017	ND<500
	5/15/2018	ND<500
	10/16/2018	ND<500
	6/11/2019	ND<500
	10/22/2019	ND<500
	6/15/2020	ND<500

---

Date	Count	Mean	Significant
12/5/2020	1	500	FALSE
6/15/2020	1	500	FALSE
10/22/2019	1	500	FALSE
6/11/2019	1	500	FALSE

## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-S05

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 75%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 8

Maximum Baseline Concentration = 500

Confidence Level = 66.7%

False Positive Rate = 33.3%

---

Baseline Measurements	Date	Value
	1/18/2017	165.8
	4/5/2017	ND<500
	4/25/2017	ND<500
	10/16/2018	ND<500
	10/22/2019	ND<500
	6/29/2020	140
	12/5/2020	ND<500
	3/26/2021	ND<500

---

Date	Count	Mean	Significant
3/26/2021	1	500	FALSE
12/5/2020	1	500	FALSE
6/29/2020	1	140	FALSE
10/22/2019	1	500	FALSE

## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-S13

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 93.3333%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 15

Maximum Baseline Concentration = 500

Confidence Level = 78.9%

False Positive Rate = 21.1%

---

Baseline Measurements	Date	Value
	12/7/2016	ND<500
	1/18/2017	209.6
	2/23/2017	ND<500
	3/22/2017	ND<500
	4/5/2017	ND<500
	4/25/2017	ND<500
	7/6/2017	ND<500
	8/8/2017	ND<500
	10/9/2017	ND<500
	12/6/2017	ND<500
	5/15/2018	ND<500
	10/16/2018	ND<500
	6/11/2019	ND<500
	10/22/2019	ND<500
	6/15/2020	ND<500

---

Date	Count	Mean	Significant
12/5/2020	1	500	FALSE
6/15/2020	1	500	FALSE
10/22/2019	1	500	FALSE
6/11/2019	1	500	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J2

Parameter: pH, Field

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% Two-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	7.89
	1/18/2017	8.15
	2/23/2017	8.23
	3/22/2017	7.89
	4/5/2017	7.81
	4/25/2017	7.36
	7/6/2017	7.56
	8/8/2017	7.77
	10/9/2017	8.07
	12/6/2017	8.29
	5/15/2018	8.26
	10/16/2018	8.02
	6/11/2019	7.54
	10/22/2019	8.17
	6/29/2020	7.31

From 15 baseline samples

Baseline mean = 7.888

Baseline std Dev = 0.324834

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.05/4)/2 = 99.875\%$

t is Percentile of Student's T-Test  $(0.99/4/2) = 0.99875$

Degrees of Freedom = 15 (background observations) - 1

$t(0.99875, 15) = 3.73677$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	7.7	[6.63, 9.14]	FALSE
6/29/2020	1	7.31	[6.63, 9.14]	FALSE
10/22/2019	1	8.17	[6.63, 9.14]	FALSE
6/11/2019	1	7.54	[6.63, 9.14]	FALSE

## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-J3

Parameter: pH, Field

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 0%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 14

Maximum Baseline Concentration = 8.33

Confidence Level = 77.8%

False Positive Rate = 22.2%

---

Baseline Measurements	Date	Value
	12/7/2016	7.45
	1/18/2017	8.26
	2/23/2017	8.28
	3/22/2017	8.3
	4/5/2017	7.69
	7/6/2017	7.58
	8/8/2017	7.61
	10/9/2017	8.12
	12/6/2017	8.32
	5/15/2018	7.66
	10/16/2018	7.61
	6/11/2019	7.49
	10/22/2019	8.33
	6/15/2020	7.61

---

Date	Count	Mean	Significant
12/5/2020	1	7.54	FALSE
6/15/2020	1	7.61	FALSE
10/22/2019	1	8.33	FALSE
6/11/2019	1	7.49	FALSE



## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J5

Parameter: pH, Field

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% Two-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	7.91
	1/18/2017	8.17
	2/23/2017	8.04
	3/22/2017	8.11
	4/5/2017	8.01
	4/25/2017	7.49
	7/6/2017	7.8
	8/8/2017	8.18
	10/9/2017	7.8
	12/6/2017	8.34
	5/15/2018	8.01
	10/16/2018	7.96
	6/11/2019	7.74
	10/22/2019	8.3
	6/15/2020	8.12

From 15 baseline samples

Baseline mean = 7.99867

Baseline std Dev = 0.225606

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.05/4)/2 = 99.875\%$

t is Percentile of Student's T-Test  $(0.99/4/2) = 0.99875$

Degrees of Freedom = 15 (background observations) - 1

$t(0.99875, 15) = 3.73677$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	7.71	[7.13, 8.87]	FALSE
6/15/2020	1	8.12	[7.13, 8.87]	FALSE
10/22/2019	1	8.3	[7.13, 8.87]	FALSE
6/11/2019	1	7.74	[7.13, 8.87]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S05

Parameter: pH, Field

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% Two-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	8.31
	4/5/2017	8.32
	4/25/2017	7.67
	10/16/2018	8.13
	10/22/2019	8.4
	6/29/2020	8.09
	12/5/2020	7.77
	3/26/2021	7.92

From 8 baseline samples

Baseline mean = 8.07625

Baseline std Dev = 0.268644

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.05/4)/2 = 99.875\%$

t is Percentile of Student's T-Test  $(0.99/4/2) = 0.99875$

Degrees of Freedom = 8 (background observations) - 1

$t(0.99875, 8) = 4.70489$

---

Date	Samples	Mean	Interval	Significant
3/26/2021	1	7.92	[6.74, 9.42]	FALSE
12/5/2020	1	7.77	[6.74, 9.42]	FALSE
6/29/2020	1	8.09	[6.74, 9.42]	FALSE
10/22/2019	1	8.4	[6.74, 9.42]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S13

Parameter: pH, Field

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% Two-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	7.92
	1/18/2017	7.86
	2/23/2017	7.91
	3/22/2017	8.04
	4/5/2017	8.02
	4/25/2017	7.16
	7/6/2017	7.47
	8/8/2017	7.96
	10/9/2017	7.54
	12/6/2017	8.22
	5/15/2018	7.72
	10/16/2018	8.13
	6/11/2019	7.7
	10/22/2019	7.99
	6/15/2020	7.82

From 15 baseline samples

Baseline mean = 7.83067

Baseline std Dev = 0.276702

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.05/4)/2 = 99.875\%$

t is Percentile of Student's T-Test  $(0.99/4)/2 = 0.99875$

Degrees of Freedom = 15 (background observations) - 1

$t(0.99875, 15) = 3.73677$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	7.35	[6.76, 8.9]	FALSE
6/15/2020	1	7.82	[6.76, 8.9]	FALSE
10/22/2019	1	7.99	[6.76, 8.9]	FALSE
6/11/2019	1	7.7	[6.76, 8.9]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J2

Parameter: Sulfate

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	11.6295
	1/18/2017	10.9938
	2/23/2017	11.632
	3/22/2017	11.7068
	4/5/2017	11.4833
	4/25/2017	11.3676
	7/6/2017	12.9762
	8/8/2017	11.7928
	10/9/2017	12.2913
	12/6/2017	11.5079
	5/15/2018	10.669
	10/16/2018	10.8724
	6/11/2019	10.3951
	10/22/2019	11.0713
	6/29/2020	8.89563

From 15 baseline samples

Baseline mean = 11.2856

Baseline std Dev = 0.919031

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	10.8454	[0, 14.592]	FALSE
6/29/2020	1	8.89563	[0, 14.592]	FALSE
10/22/2019	1	11.0713	[0, 14.592]	FALSE
6/11/2019	1	10.3951	[0, 14.592]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J3

Parameter: Sulfate

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	11.6428
	1/18/2017	10.9837
	2/23/2017	11.6351
	3/22/2017	11.7292
	4/5/2017	11.4776
	7/6/2017	12.9715
	8/8/2017	11.8019
	10/9/2017	12.2923
	12/6/2017	11.5229
	5/15/2018	11.4907
	10/16/2018	10.8667
	6/11/2019	10.3982
	10/22/2019	11.0929
	6/15/2020	11.5109

From 14 baseline samples

Baseline mean = 11.5297

Baseline std Dev = 0.620896

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 14 (background observations) - 1

$t(0.9975, 13) = 3.53713$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	10.9114	[0, 13.803]	FALSE
6/15/2020	1	11.5109	[0, 13.803]	FALSE
10/22/2019	1	11.0929	[0, 13.803]	FALSE
6/11/2019	1	10.3982	[0, 13.803]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J5

Parameter: Sulfate

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	11.2942
	1/18/2017	10.8298
	2/23/2017	11.2063
	3/22/2017	11.4863
	4/5/2017	11.4286
	4/25/2017	10.9773
	7/6/2017	13.2267
	8/8/2017	11.6218
	10/9/2017	12.4987
	12/6/2017	10.8238
	5/15/2018	11.1243
	10/16/2018	9.88837
	6/11/2019	9.87303
	10/22/2019	10.7077
	6/15/2020	11.0572

From 15 baseline samples

Baseline mean = 11.2029

Baseline std Dev = 0.853277

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	10.0774	[0, 14.2728]	FALSE
6/15/2020	1	11.0572	[0, 14.2728]	FALSE
10/22/2019	1	10.7077	[0, 14.2728]	FALSE
6/11/2019	1	9.87303	[0, 14.2728]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J5

Parameter: Sulfate

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	11.2942
	1/18/2017	10.8298
	2/23/2017	11.2063
	3/22/2017	11.4863
	4/5/2017	11.4286
	4/25/2017	10.9773
	7/6/2017	13.2267
	8/8/2017	11.6218
	10/9/2017	12.4987
	12/6/2017	10.8238
	5/15/2018	11.1243
	10/16/2018	9.88837
	6/11/2019	9.87303
	10/22/2019	10.7077
	6/15/2020	11.0572

From 15 baseline samples

Baseline mean = 11.2029

Baseline std Dev = 0.853277

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test (0.9975) = 0.9975

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	10.0774	[0, 14.2728]	FALSE
6/15/2020	1	11.0572	[0, 14.2728]	FALSE
10/22/2019	1	10.7077	[0, 14.2728]	FALSE
6/11/2019	1	9.87303	[0, 14.2728]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S05

Parameter: Sulfate

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	45223.8
	4/5/2017	62615.6
	4/25/2017	44781.4
	10/16/2018	7500
	10/22/2019	69400
	6/29/2020	5400
	12/5/2020	29300
	3/26/2021	15100

From 8 baseline samples

Baseline mean = 34915.1

Baseline std Dev = 24515.4

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
3/26/2021	1	15100	[0, 146806]	FALSE
12/5/2020	1	29300	[0, 146806]	FALSE
6/29/2020	1	5400	[0, 146806]	FALSE
10/22/2019	1	69400	[0, 146806]	FALSE



## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S13

Parameter: Sulfate

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	123520
	1/18/2017	318064
	2/23/2017	507416
	3/22/2017	505253
	4/5/2017	439796
	4/25/2017	305426
	7/6/2017	134300
	8/8/2017	131500
	10/9/2017	128400
	12/6/2017	280000
	5/15/2018	372000
	10/16/2018	155000
	6/11/2019	235000
	10/22/2019	68000
	6/15/2020	209000

From 15 baseline samples

Baseline mean = 260845

Baseline std Dev = 144279

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	133000	[0, 779919]	FALSE
6/15/2020	1	209000	[0, 779919]	FALSE
10/22/2019	1	68000	[0, 779919]	FALSE
6/11/2019	1	235000	[0, 779919]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J2

Parameter: Total Dissolved Solids (TDS)

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	12.7939
	1/18/2017	12.3673
	2/23/2017	12.8558
	3/22/2017	12.7827
	4/5/2017	12.7939
	4/25/2017	12.7159
	7/6/2017	13.7973
	8/8/2017	12.936
	10/9/2017	13.412
	12/6/2017	13.0498
	5/15/2018	11.9316
	10/16/2018	12.6475
	6/11/2019	12.2061
	10/22/2019	12.7911
	6/29/2020	12.0317

From 15 baseline samples

Baseline mean = 12.7408

Baseline std Dev = 0.486669

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	12.5776	[0, 14.4917]	FALSE
6/29/2020	1	12.0317	[0, 14.4917]	FALSE
10/22/2019	1	12.7911	[0, 14.4917]	FALSE
6/11/2019	1	12.2061	[0, 14.4917]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-J3

Parameter: Total Dissolved Solids (TDS)

Natural Logarithm Transformation

Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	12.7883
	1/18/2017	12.409
	2/23/2017	12.8688
	3/22/2017	12.6411
	4/5/2017	12.7742
	7/6/2017	13.7881
	8/8/2017	12.9785
	10/9/2017	13.3708
	12/6/2017	13.0058
	5/15/2018	12.8917
	10/16/2018	12.6379
	6/11/2019	12.4451
	10/22/2019	12.824
	6/15/2020	12.919

From 14 baseline samples  
Baseline mean = 12.8816  
Baseline std Dev = 0.35543

For 4 recent sampling event(s)  
Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$   
t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$   
Degrees of Freedom = 14 (background observations) - 1  
 $t(0.9975, 13) = 3.53713$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	12.5637	[0, 14.1829]	FALSE
6/15/2020	1	12.919	[0, 14.1829]	FALSE
10/22/2019	1	12.824	[0, 14.1829]	FALSE
6/11/2019	1	12.4451	[0, 14.1829]	FALSE

**Non-Parametric Prediction Interval**  
**Intra-Well Comparison for CLF-J5**  
**Parameter: Total Dissolved Solids (TDS)**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

Total Percent Non-Detects = 0%  
 Future Samples (k) = 4  
 Recent Dates = 4  
 Baseline Measurements (n) = 15  
**Maximum Baseline Concentration = 1.253e+006**  
 Confidence Level = 78.9%  
 False Positive Rate = 21.1%

---

<b>Baseline Measurements</b>	<b>Date</b>	<b>Value</b>
	12/7/2016	369000
	1/18/2017	275000
	2/23/2017	366000
	3/22/2017	313000
	4/5/2017	358000
	4/25/2017	267000
	7/6/2017	1.253e+006
	8/8/2017	434000
	10/9/2017	770000
	12/6/2017	350000
	5/15/2018	402000
	10/16/2018	267000
	6/11/2019	207000
	10/22/2019	320000
	6/15/2020	329000

---

<b>Date</b>	<b>Count</b>	<b>Mean</b>	<b>Significant</b>
12/5/2020	1	264000	FALSE
6/15/2020	1	329000	FALSE
10/22/2019	1	320000	FALSE
6/11/2019	1	207000	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S05

#### Parameter: Total Dissolved Solids (TDS)

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	253000
	4/5/2017	286000
	4/25/2017	262000
	10/16/2018	227000
	10/22/2019	386000
	6/29/2020	182000
	12/5/2020	280000
	3/26/2021	129000

From 8 baseline samples

Baseline mean = 250625

Baseline std Dev = 76191.4

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
3/26/2021	1	129000	[0, 598371]	FALSE
12/5/2020	1	280000	[0, 598371]	FALSE
6/29/2020	1	182000	[0, 598371]	FALSE
10/22/2019	1	386000	[0, 598371]	FALSE

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S13

#### Parameter: Total Dissolved Solids (TDS)

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	12/7/2016	367000
	1/18/2017	702000
	2/23/2017	1.014e+006
	3/22/2017	964000
	4/5/2017	846000
	4/25/2017	680000
	7/6/2017	451000
	8/8/2017	440000
	10/9/2017	405000
	12/6/2017	683000
	5/15/2018	850000
	10/16/2018	411000
	6/11/2019	550000
	10/22/2019	305000
	6/15/2020	521000

From 15 baseline samples

Baseline mean = 612600

Baseline std Dev = 226751

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 15 (background observations) - 1

$t(0.9975, 14) = 3.48346$

---

Date	Samples	Mean	Interval	Significant
12/5/2020	1	396000	[0, 1.42838e+00]	FALSE
6/15/2020	1	521000	[0, 1.42838e+00]	FALSE
10/22/2019	1	305000	[0, 1.42838e+00]	FALSE
6/11/2019	1	550000	[0, 1.42838e+00]	FALSE

## Concentrations (ppb)

Parameter: Boron

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 8

Total Non-Detect: 8

Percent Non-Detects: 100%

Total Background Measurements: 0

There are 0 background locations

---

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

---

There is 1 compliance location

---

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

---

CLF-S06	8	8 (100%)	1/18/2017	ND<50	ND<50
			4/5/2017	ND<50	ND<50
			4/25/2017	ND<50	ND<50
			10/16/2018	ND<50	ND<50
			6/29/2020	ND<50	ND<50
			12/5/2020	ND<50	ND<50
			3/26/2021	ND<50	ND<50
			2/28/2022	ND<20	ND<20

---

## Dixon's Test for Outliers

Parameter: Boron

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...

5% Level of Significance

**Iteration      Highest      Lowest      Critical      Outlier**

**A Divide-By-Zero error occurred in the calculations.**

**Additional Outliers May Exist.**

<b>Loc.</b>	<b>Date</b>	<b>Conc.</b>	<b>Outlier</b>
CLF-S06	1/18/2017	ND<50	FALSE
	4/5/2017	ND<50	FALSE
	4/25/2017	ND<50	FALSE
	10/16/2018	ND<50	FALSE
	6/29/2020	ND<50	FALSE
	12/5/2020	ND<50	FALSE
	3/26/2021	ND<50	FALSE
	2/28/2022	ND<20	FALSE



## Shapiro-Wilks Test of Normality

Parameter: Boron

Location: CLF-S06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	20	50	30	0.6052	18.156
2	50	50	0	0.3164	0
3	50	50	0	0.1743	0
4	50	50	0	0.0561	0
5	50	50	0		
6	50	50	0		
7	50	50	0		
8	50	20	-30		

---

Sum of b values = 18.156

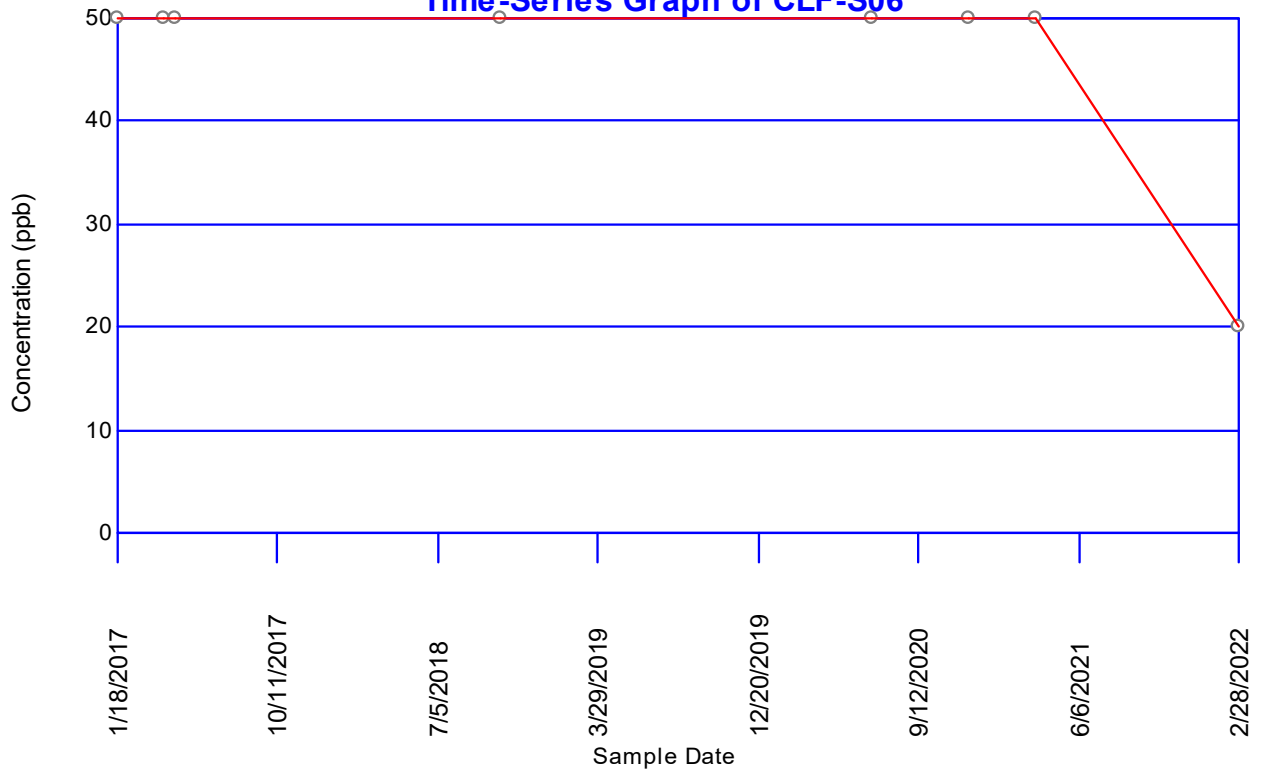
Sample Standard Deviation = 10.6066

W Statistic = 0.418591

**5% Critical value of 0.818 exceeds 0.418591**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.749 exceeds 0.418591**  
**Evidence of non-normality at 99% level of significance**

### Boron Time-Series Graph of CLF-S06



## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-S06

Parameter: Boron

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 100%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 8

Maximum Baseline Concentration = 50

Confidence Level = 66.7%

False Positive Rate = 33.3%

---

Baseline Measurements	Date	Value
	1/18/2017	ND<50
	4/5/2017	ND<50
	4/25/2017	ND<50
	10/16/2018	ND<50
	6/29/2020	ND<50
	12/5/2020	ND<50
	3/26/2021	ND<50
	2/28/2022	ND<20

---

Date	Count	Mean	Significant
2/28/2022	1	20	FALSE
3/26/2021	1	50	FALSE
12/5/2020	1	50	FALSE
6/29/2020	1	50	FALSE

## Dixon's Test for Outliers

Parameter: Calcium

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.0541242	0.278864	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S06	1/18/2017	68511.1	FALSE
	4/5/2017	89628.6	FALSE
	4/25/2017	85619	FALSE
	10/16/2018	90500	FALSE
	6/29/2020	75900	FALSE
	12/5/2020	79200	FALSE
	3/26/2021	78000	FALSE
	2/28/2022	74400	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Calcium

Location: CLF-S06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	68511.1	90500	21988.9	0.6052	13307.7
2	74400	89628.6	15228.6	0.3164	4818.33
3	75900	85619	9719	0.1743	1694.02
4	78000	79200	1200	0.0561	67.32
5	79200	78000	-1200		
6	85619	75900	-9719		
7	89628.6	74400	-15228.6		
8	90500	68511.1	-21988.9		

---

Sum of b values = 19887.4

Sample Standard Deviation = 7736.29

W Statistic = 0.94404

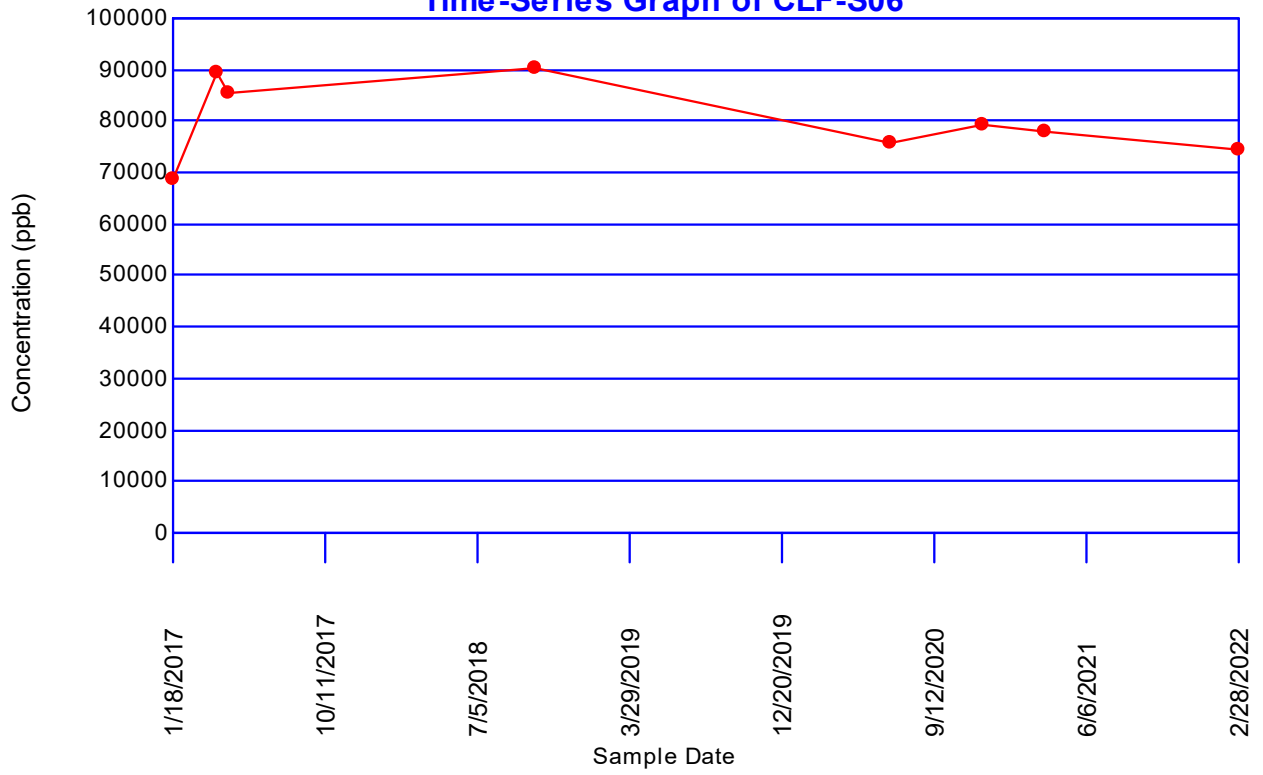
5% Critical value of 0.818 is less than 0.94404

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.94404

Data is normally distributed at 99% level of significance

### Calcium Time-Series Graph of CLF-S06



**Mann-Kendall Trend Analysis**  
**Parameter: Calcium**  
**Location: CLF-S06**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
89628.6	68511.1	21117.5	1	0
85619	68511.1	17107.9	2	0
90500	68511.1	21988.9	3	0
75900	68511.1	7388.9	4	0
79200	68511.1	10688.9	5	0
78000	68511.1	9488.9	6	0
74400	68511.1	5888.9	7	0
85619	89628.6	-4009.6	7	1
90500	89628.6	871.4	8	1
75900	89628.6	-13728.6	8	2
79200	89628.6	-10428.6	8	3
78000	89628.6	-11628.6	8	4
74400	89628.6	-15228.6	8	5
90500	85619	4881	9	5
75900	85619	-9719	9	6
79200	85619	-6419	9	7
78000	85619	-7619	9	8
74400	85619	-11219	9	9
75900	90500	-14600	9	10
79200	90500	-11300	9	11
78000	90500	-12500	9	12
74400	90500	-16100	9	13
79200	75900	3300	10	13
78000	75900	2100	11	13
74400	75900	-1500	11	14
78000	79200	-1200	11	15
74400	79200	-4800	11	16
74400	78000	-3600	11	17

S Statistic = 11 - 17 = -6  
 Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
 Probability of obtaining  $S \geq |-6|$  is 0.548  
 0.548  $\geq$  0.025 indicating no evidence of a trend

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S06

Parameter: Calcium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	68511.1
	4/5/2017	89628.6
	4/25/2017	85619
	10/16/2018	90500
	6/29/2020	75900
	12/5/2020	79200
	3/26/2021	78000
	2/28/2022	74400

From 8 baseline samples

Baseline mean = 80219.8

Baseline std Dev = 7736.29

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
2/28/2022	1	74400	[0, 115529]	FALSE
3/26/2021	1	78000	[0, 115529]	FALSE
12/5/2020	1	79200	[0, 115529]	FALSE
6/29/2020	1	75900	[0, 115529]	FALSE



## Dixon's Test for Outliers

Parameter: Chloride

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.55656	0.152835	0.554	3500
2	0.0829895	0.152835	0.507	None

Loc.	Date	Conc.	Outlier
CLF-S06	1/18/2017	1763.6	FALSE
	4/5/2017	2108.6	FALSE
	4/25/2017	1467.6	FALSE
	10/16/2018	800	FALSE
	6/29/2020	ND<1000	FALSE
	12/5/2020	ND<2000	FALSE
	3/26/2021	ND<2000	FALSE
	2/28/2022	<b>3500</b>	<b>TRUE</b>

## Shapiro-Wilks Test of Normality

Parameter: Chloride

Location: CLF-S06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	800	3500	2700	0.6052	1634.04
2	1000	2108.6	1108.6	0.3164	350.761
3	1467.6	2000	532.4	0.1743	92.7973
4	1763.6	2000	236.4	0.0561	13.262
5	2000	1763.6	-236.4		
6	2000	1467.6	-532.4		
7	2108.6	1000	-1108.6		
8	3500	800	-2700		

---

Sum of b values = 2090.86

Sample Standard Deviation = 828.929

W Statistic = 0.908903

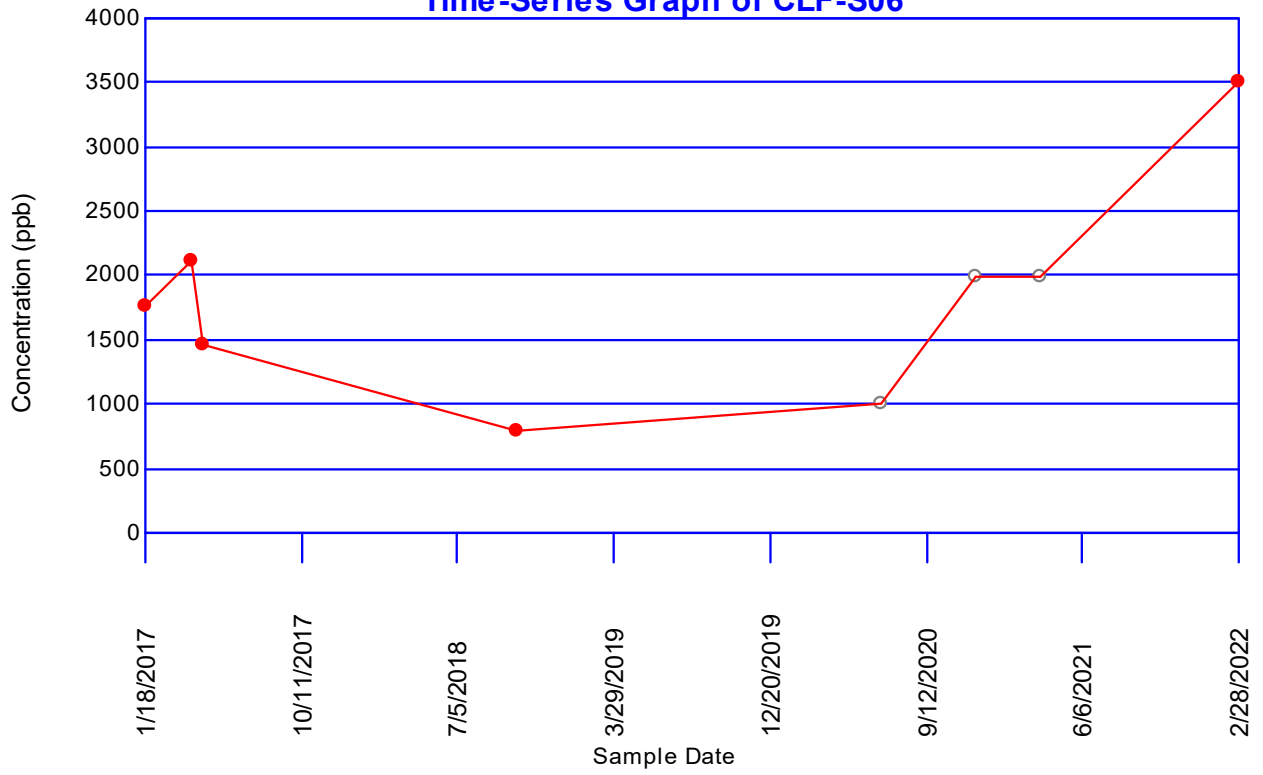
5% Critical value of 0.818 is less than 0.908903

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.908903

Data is normally distributed at 99% level of significance

# Chloride Time-Series Graph of CLF-S06



**Mann-Kendall Trend Analysis**  
**Parameter: Chloride**  
**Location: CLF-S06**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
2108.6	1763.6	345	1	0
1467.6	1763.6	-296	1	1
800	1763.6	-963.6	1	2
ND<1000	1763.6	-763.6	1	3
ND<2000	1763.6	236.4	2	3
ND<2000	1763.6	236.4	3	3
3500	1763.6	1736.4	4	3
1467.6	2108.6	-641	4	4
800	2108.6	-1308.6	4	5
ND<1000	2108.6	-1108.6	4	6
ND<2000	2108.6	-108.6	4	7
ND<2000	2108.6	-108.6	4	8
3500	2108.6	1391.4	5	8
800	1467.6	-667.6	5	9
ND<1000	1467.6	-467.6	5	10
ND<2000	1467.6	532.4	6	10
ND<2000	1467.6	532.4	7	10
3500	1467.6	2032.4	8	10
ND<1000	800	200	9	10
ND<2000	800	1200	10	10
ND<2000	800	1200	11	10
3500	800	2700	12	10
ND<2000	ND<1000	1000	13	10
ND<2000	ND<1000	1000	14	10
3500	ND<1000	2500	15	10
ND<2000	ND<2000	0	15	10
3500	ND<2000	1500	16	10
3500	ND<2000	1500	17	10

S Statistic = 17 - 10 = 7  
 Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
 Probability of obtaining S >= |7| is 0.473  
 0.473 >= 0.025 indicating no evidence of a trend

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S06

Parameter: Chloride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	1763.6
	4/5/2017	2108.6
	4/25/2017	1467.6
	10/16/2018	800
	6/29/2020	ND<1000
	12/5/2020	ND<2000
	3/26/2021	ND<2000
	2/28/2022	3500

From 8 baseline samples

Baseline mean = 1829.97

Baseline std Dev = 828.929

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
2/28/2022	1	3500	[0, 5613.3]	FALSE
3/26/2021	1	2000	[0, 5613.3]	FALSE
12/5/2020	1	2000	[0, 5613.3]	FALSE
6/29/2020	1	1000	[0, 5613.3]	FALSE

## Dixon's Test for Outliers

Parameter: Fluoride

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0	0.09375	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S06	1/18/2017	273.1	FALSE
	4/5/2017	ND<500	FALSE
	4/25/2017	ND<500	FALSE
	10/16/2018	ND<500	FALSE
	6/29/2020	210	FALSE
	12/5/2020	ND<500	FALSE
	3/26/2021	ND<500	FALSE
	2/28/2022	180	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: CLF-S06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	180	500	320	0.6052	193.664
2	210	500	290	0.3164	91.756
3	273.1	500	226.9	0.1743	39.5487
4	500	500	0	0.0561	0
5	500	500	0		
6	500	273.1	-226.9		
7	500	210	-290		
8	500	180	-320		

---

Sum of b values = 324.969

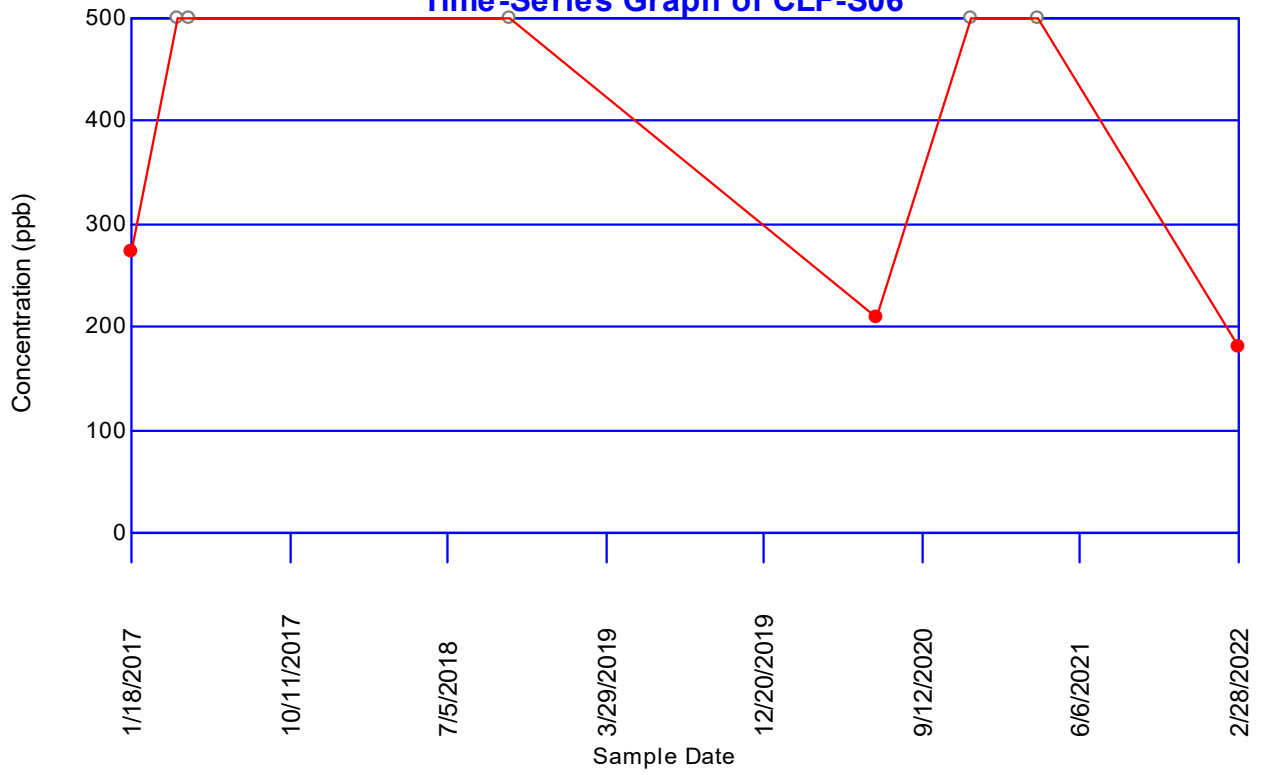
Sample Standard Deviation = 146.596

W Statistic = 0.702003

**5% Critical value of 0.818 exceeds 0.702003**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.749 exceeds 0.702003**  
**Evidence of non-normality at 99% level of significance**

# Fluoride Time-Series Graph of CLF-S06





## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-S06

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 62.5%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 8

Maximum Baseline Concentration = 500

Confidence Level = 66.7%

False Positive Rate = 33.3%

---

Baseline Measurements	Date	Value
	1/18/2017	273.1
	4/5/2017	ND<500
	4/25/2017	ND<500
	10/16/2018	ND<500
	6/29/2020	210
	12/5/2020	ND<500
	3/26/2021	ND<500
	2/28/2022	180

---

Date	Count	Mean	Significant
2/28/2022	1	180	FALSE
3/26/2021	1	500	FALSE
12/5/2020	1	500	FALSE
6/29/2020	1	210	FALSE

## Dixon's Test for Outliers

Parameter: Sulfate

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.282519	0.0643694	0.554	None

Loc.	Date	Conc.	Outlier
CLF-S06	1/18/2017	10594.6	FALSE
	4/5/2017	16155.3	FALSE
	4/25/2017	12721.2	FALSE
	10/16/2018	5600	FALSE
	6/29/2020	3400	FALSE
	12/5/2020	ND<4000	FALSE
	3/26/2021	10500	FALSE
	2/28/2022	11000	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Sulfate

Location: CLF-S06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	3400	16155.3	12755.3	0.6052	7719.51
2	4000	12721.2	8721.2	0.3164	2759.39
3	5600	11000	5400	0.1743	941.22
4	10500	10594.6	94.6	0.0561	5.30706
5	10594.6	10500	-94.6		
6	11000	5600	-5400		
7	12721.2	4000	-8721.2		
8	16155.3	3400	-12755.3		

---

Sum of b values = 11425.4

Sample Standard Deviation = 4492.42

W Statistic = 0.92403

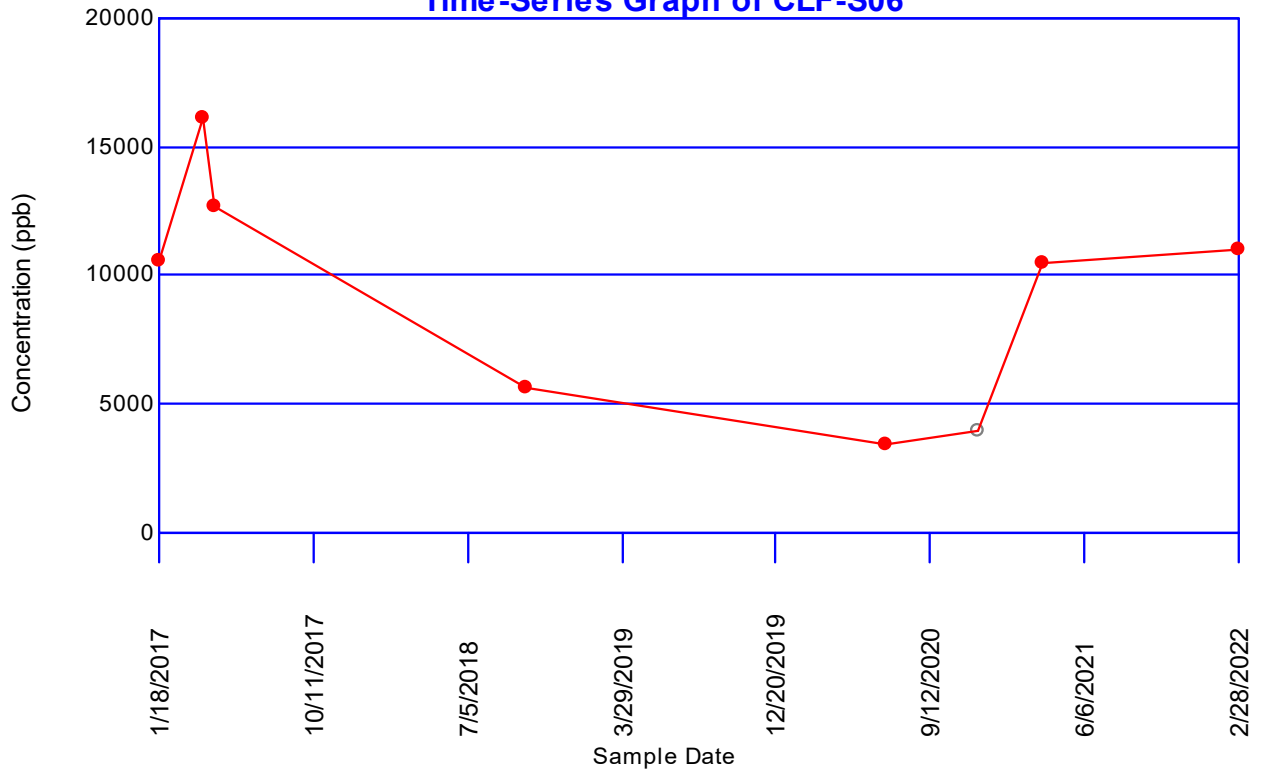
5% Critical value of 0.818 is less than 0.92403

Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.92403

Data is normally distributed at 99% level of significance

### Sulfate Time-Series Graph of CLF-S06



## Mann-Kendall Trend Analysis

Parameter: Sulfate

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
16155.3	10594.6	5560.7	1	0
12721.2	10594.6	2126.6	2	0
5600	10594.6	-4994.6	2	1
3400	10594.6	-7194.6	2	2
ND<4000	10594.6	-6594.6	2	3
10500	10594.6	-94.6	2	4
11000	10594.6	405.4	3	4
12721.2	16155.3	-3434.1	3	5
5600	16155.3	-10555.3	3	6
3400	16155.3	-12755.3	3	7
ND<4000	16155.3	-12155.3	3	8
10500	16155.3	-5655.3	3	9
11000	16155.3	-5155.3	3	10
5600	12721.2	-7121.2	3	11
3400	12721.2	-9321.2	3	12
ND<4000	12721.2	-8721.2	3	13
10500	12721.2	-2221.2	3	14
11000	12721.2	-1721.2	3	15
3400	5600	-2200	3	16
ND<4000	5600	-1600	3	17
10500	5600	4900	4	17
11000	5600	5400	5	17
ND<4000	3400	600	6	17
10500	3400	7100	7	17
11000	3400	7600	8	17
10500	ND<4000	6500	9	17
11000	ND<4000	7000	10	17
11000	10500	500	11	17

S Statistic = 11 - 17 = -6

Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)

Probability of obtaining S >= |-6| is 0.548

0.548 >= 0.025 indicating no evidence of a trend

## Parametric Prediction Interval Analysis

### Intra-Well Comparison for CLF-S06

Parameter: Sulfate

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

#### Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	1/18/2017	10594.6
	4/5/2017	16155.3
	4/25/2017	12721.2
	10/16/2018	5600
	6/29/2020	3400
	12/5/2020	ND<4000
	3/26/2021	10500
	2/28/2022	11000

From 8 baseline samples

Baseline mean = 9246.39

Baseline std Dev = 4492.42

For 4 recent sampling event(s)

Actual confidence level is  $1.0 - (0.01/4) = 99.75\%$

t is Percentile of Student's T-Test  $(0.99/4) = 0.9975$

Degrees of Freedom = 8 (background observations) - 1

$t(0.9975, 7) = 4.30309$

---

Date	Samples	Mean	Interval	Significant
2/28/2022	1	11000	[0, 29750.3]	FALSE
3/26/2021	1	10500	[0, 29750.3]	FALSE
12/5/2020	1	4000	[0, 29750.3]	FALSE
6/29/2020	1	3400	[0, 29750.3]	FALSE

## Dixon's Test for Outliers

Parameter: pH, Field

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...

5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.348624	0.832151	0.554	4.2
2	0.348624	0.155963	0.507	None

Loc.	Date	Conc.	Outlier
CLF-S06	1/18/2017	7.99	FALSE
	4/5/2017	7.89	FALSE
	4/25/2017	8.25	FALSE
	10/16/2018	7.72	FALSE
	6/29/2020	8.81	FALSE
	12/5/2020	4.2	TRUE
	3/26/2021	8.28	FALSE
	2/28/2022	8.43	FALSE

## Shapiro-Wilks Test of Normality

Parameter: pH, Field

Location: CLF-S06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	4.2	8.81	4.61	0.6052	2.78997
2	7.72	8.43	0.71	0.3164	0.224644
3	7.89	8.28	0.39	0.1743	0.067977
4	7.99	8.25	0.26	0.0561	0.014586
5	8.25	7.99	-0.26		
6	8.28	7.89	-0.39		
7	8.43	7.72	-0.71		
8	8.81	4.2	-4.61		

---

Sum of b values = 3.09718

Sample Standard Deviation = 1.4528

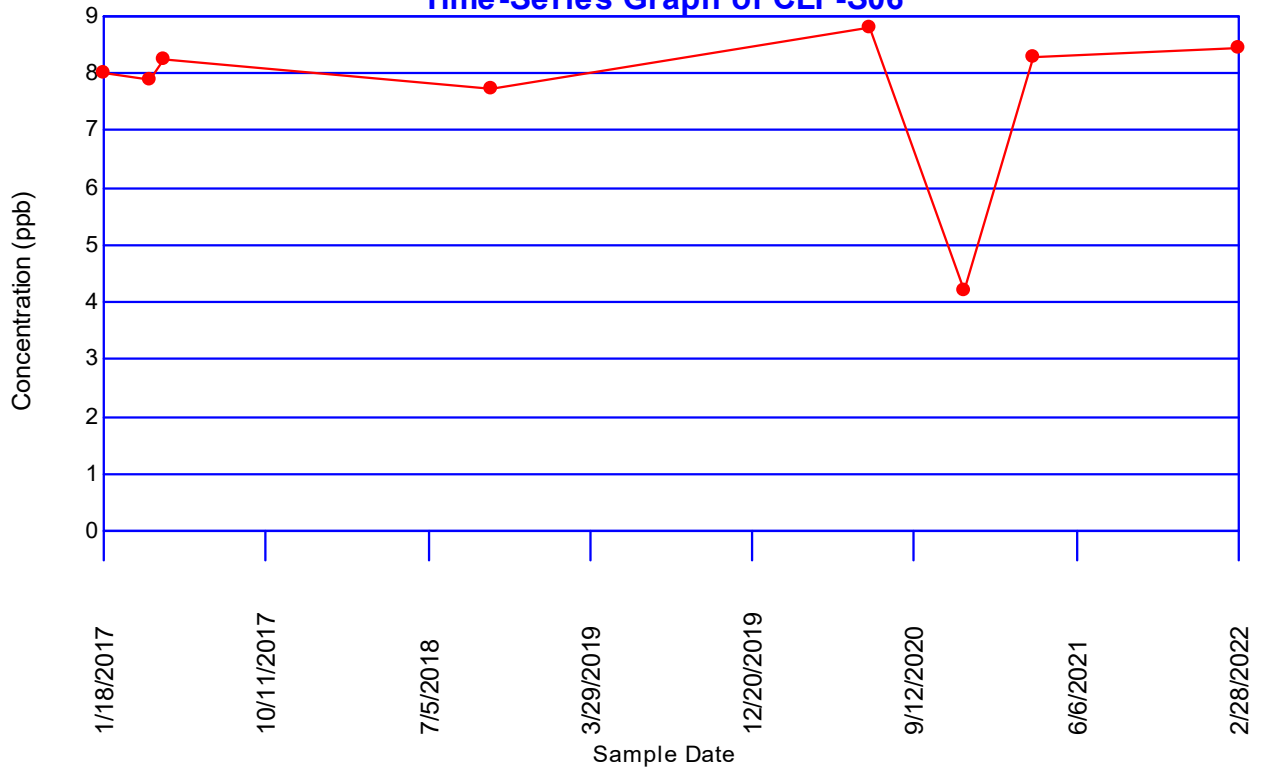
W Statistic = 0.649267

**5% Critical value of 0.818 exceeds 0.649267**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.749 exceeds 0.649267**  
**Evidence of non-normality at 99% level of significance**



pH, Field  
Time-Series Graph of CLF-S06



**Mann-Kendall Trend Analysis**  
**Parameter: pH, Field**  
**Location: CLF-S06**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
7.89	7.99	-0.1	0	1
8.25	7.99	0.26	1	1
7.72	7.99	-0.27	1	2
8.81	7.99	0.82	2	2
4.2	7.99	-3.79	2	3
8.28	7.99	0.29	3	3
8.43	7.99	0.44	4	3
8.25	7.89	0.36	5	3
7.72	7.89	-0.17	5	4
8.81	7.89	0.92	6	4
4.2	7.89	-3.69	6	5
8.28	7.89	0.39	7	5
8.43	7.89	0.54	8	5
7.72	8.25	-0.53	8	6
8.81	8.25	0.56	9	6
4.2	8.25	-4.05	9	7
8.28	8.25	0.03	10	7
8.43	8.25	0.18	11	7
8.81	7.72	1.09	12	7
4.2	7.72	-3.52	12	8
8.28	7.72	0.56	13	8
8.43	7.72	0.71	14	8
4.2	8.81	-4.61	14	9
8.28	8.81	-0.53	14	10
8.43	8.81	-0.38	14	11
8.28	4.2	4.08	15	11
8.43	4.2	4.23	16	11
8.43	8.28	0.15	17	11

S Statistic = 17 - 11 = 6  
 Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
 Probability of obtaining S >= |6| is 0.548  
 0.548 >= 0.025 indicating no evidence of a trend

## Non-Parametric Prediction Interval

### Intra-Well Comparison for CLF-S06

Parameter: pH, Field

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 0%

Future Samples (k) = 4

Recent Dates = 4

Baseline Measurements (n) = 8

Maximum Baseline Concentration = 8.81

Confidence Level = 66.7%

False Positive Rate = 33.3%

---

Baseline Measurements	Date	Value
	1/18/2017	7.99
	4/5/2017	7.89
	4/25/2017	8.25
	10/16/2018	7.72
	6/29/2020	8.81
	12/5/2020	4.2
	3/26/2021	8.28
	2/28/2022	8.43

---

Date	Count	Mean	Significant
2/28/2022	1	8.43	FALSE
3/26/2021	1	8.28	FALSE
12/5/2020	1	4.2	FALSE
6/29/2020	1	8.81	FALSE

## Dixon's Test for Outliers

Parameter: Total Dissolved Solids (TDS)

Location: CLF-S06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 8 Measurements...  
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.833333	0.209302	0.554	404000
2	0.348837	0.209302	0.507	None

Loc.	Date	Conc.	Outlier
CLF-S06	1/18/2017	213000	FALSE
	4/5/2017	234000	FALSE
	4/25/2017	205000	FALSE
	10/16/2018	219000	FALSE
	6/29/2020	200000	FALSE
	12/5/2020	<b>404000</b>	<b>TRUE</b>
	3/26/2021	191000	FALSE
	2/28/2022	214000	FALSE

## Shapiro-Wilks Test of Normality

Parameter: Total Dissolved Solids (TDS)

Location: CLF-S06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	191000	404000	213000	0.6052	128908
2	200000	234000	34000	0.3164	10757.6
3	205000	219000	14000	0.1743	2440.2
4	213000	214000	1000	0.0561	56.1
5	214000	213000	-1000		
6	219000	205000	-14000		
7	234000	200000	-34000		
8	404000	191000	-213000		

---

Sum of b values = 142162

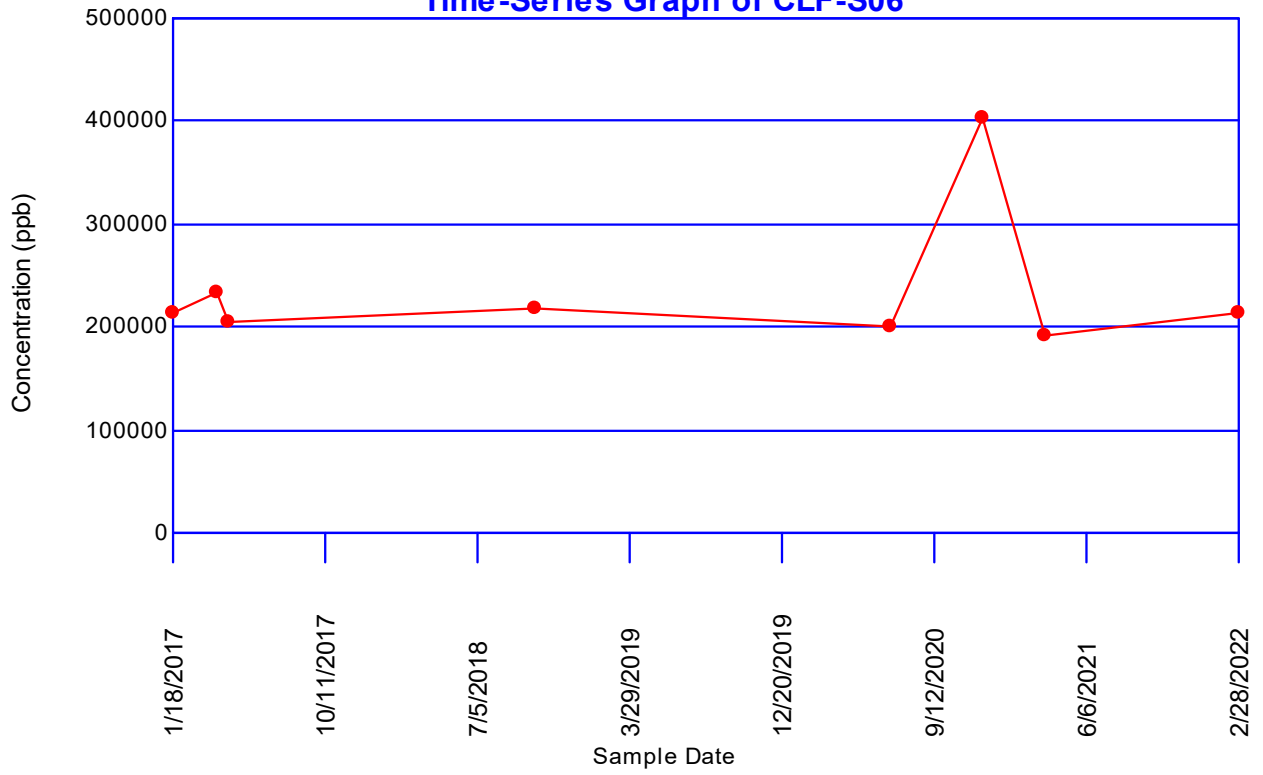
Sample Standard Deviation = 69492

W Statistic = 0.597855

**5% Critical value of 0.818 exceeds 0.597855**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.749 exceeds 0.597855**  
**Evidence of non-normality at 99% level of significance**

### Total Dissolved Solids (TDS) Time-Series Graph of CLF-S06



**Mann-Kendall Trend Analysis**  
**Parameter: Total Dissolved Solids (TDS)**  
**Location: CLF-S06**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

<b>Xj</b>	<b>Xk</b>	<b>Xj - Xk</b>	<b>Positives</b>	<b>Negatives</b>
234000	213000	21000	1	0
205000	213000	-8000	1	1
219000	213000	6000	2	1
200000	213000	-13000	2	2
404000	213000	191000	3	2
191000	213000	-22000	3	3
214000	213000	1000	4	3
205000	234000	-29000	4	4
219000	234000	-15000	4	5
200000	234000	-34000	4	6
404000	234000	170000	5	6
191000	234000	-43000	5	7
214000	234000	-20000	5	8
219000	205000	14000	6	8
200000	205000	-5000	6	9
404000	205000	199000	7	9
191000	205000	-14000	7	10
214000	205000	9000	8	10
200000	219000	-19000	8	11
404000	219000	185000	9	11
191000	219000	-28000	9	12
214000	219000	-5000	9	13
404000	200000	204000	10	13
191000	200000	-9000	10	14
214000	200000	14000	11	14
191000	404000	-213000	11	15
214000	404000	-190000	11	16
214000	191000	23000	12	16

S Statistic = 12 - 16 = -4  
 Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)  
 Probability of obtaining S >= |-4| is 0.72  
 0.72 >= 0.025 indicating no evidence of a trend

**Non-Parametric Prediction Interval**  
**Intra-Well Comparison for CLF-S06**  
**Parameter: Total Dissolved Solids (TDS)**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

Total Percent Non-Detects = 0%  
 Future Samples (k) = 4  
 Recent Dates = 4  
 Baseline Measurements (n) = 8  
**Maximum Baseline Concentration = 404000**  
 Confidence Level = 66.7%  
 False Positive Rate = 33.3%

---

<b>Baseline Measurements</b>	<b>Date</b>	<b>Value</b>
	1/18/2017	213000
	4/5/2017	234000
	4/25/2017	205000
	10/16/2018	219000
	6/29/2020	200000
	12/5/2020	404000
	3/26/2021	191000
	2/28/2022	214000

---

<b>Date</b>	<b>Count</b>	<b>Mean</b>	<b>Significant</b>
2/28/2022	1	214000	FALSE
3/26/2021	1	191000	FALSE
12/5/2020	1	404000	FALSE
6/29/2020	1	200000	FALSE



## **APPENDIX F – Alternate Source Demonstration(s)**



*Prepared for*

**East Kentucky Power Cooperative**  
P.O. Box 707  
Winchester, Kentucky 40392-0707

# **ALTERNATE SOURCE DEMONSTRATION**

## **COOPER STATION LANDFILL**

### **BURNSIDE, KENTUCKY**

*Prepared by*

**Geosyntec**   
consultants

**engineers | scientists | innovators**

1255 Roberts Boulevard, Suite 200  
Kennesaw, Georgia 30144

Project Number GR9033

August 2022



## ALTERNATE SOURCE DEMONSTRATION

Cooper Station Landfill  
Burnside, Kentucky

August 15, 2022

A handwritten signature in black ink that reads "Herwig Goldemund".

---

Herwig Goldemund, Ph.D.  
*Principal*

A handwritten signature in black ink that reads "Robert M. Glazier".

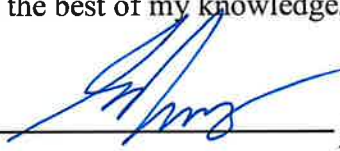
---

Robert Glazier  
*Project Director*

**Certification Statement**

**Alternate Source Demonstration  
Cooper Station Landfill  
Burnside, Kentucky  
August 15, 2022**

I, Scott Graves, a qualified professional engineer registered in the Commonwealth of Kentucky, certify that the above document was completed consistent with the requirements stipulated in 40 CFR 257.94(e)(2) and that the information contained herein is, to the best of my knowledge, accurate.



Seal and Signature



*8/15/2022*

Date

**TABLE OF CONTENTS**

1.	INTRODUCTION .....	1
1.1	Purpose .....	1
1.2	Site Description .....	2
1.3	Description of the CCR Unit .....	2
1.4	Hydrogeology and Groundwater Monitoring System .....	3
1.5	Detection Monitoring Program.....	5
1.6	Basis of the Statistically Significant Increase.....	6
2.	CONCEPTUAL SITE MODEL .....	7
2.1	Waste Description.....	7
2.2	Engineered Barrier Systems .....	7
2.3	Potential Release Mechanisms .....	7
2.4	Migration Pathways.....	7
3.	ALTERNATE SOURCE DEMONSTRATION.....	9
3.1	Evaluation of Error .....	9
3.1.1	Potential Sampling Error .....	9
3.1.2	Potential Laboratory Analysis Error.....	9
3.1.3	Potential Statistical Analysis Error.....	9
3.2	Natural Variation .....	9
3.3	Alternate Source .....	10
3.3.1	Geochemical Characterization of Leachate and Groundwater.....	10
3.3.2	Time Series.....	11
3.3.3	Major Ion Ratios.....	11
3.3.4	Piper and Stiff Diagrams .....	12
4.	CONCLUSIONS .....	14
5.	REFERENCES .....	16

## LIST OF TABLES

Table 1	Summary of Intra-Well Statistics of Detection Monitoring Program Data in Comparison to Leachate Data
Table 2	CCR Leachate and Groundwater Characteristics at the Cooper Landfill

## LIST OF FIGURES

Figure 1	Sampling Station Location Map
Figure 2	Geologic Cross-Section A-A'
Figure 3	Geologic Cross-Section B-B'
Figure 4	Dye Tracer Results
Figure 5	Time Series of Select Constituents
Figure 6	Piper Diagram
Figure 7	Stiff Diagrams

## LIST OF ACRONYMS

ASD	alternate source demonstration
B	boron
Ca	calcium
CCR	coal combustion residual
CFR	Code of Federal Regulations
Cl	chloride
EKPC	East Kentucky Power Cooperative
F	fluoride
FGD	flue gas desulfurization
HCO <sub>3</sub>	bicarbonate
K	potassium
KDWM	Kentucky Division of Waste Management
KGS	Kentucky Geological Survey
KPDES	Kentucky Pollutant Discharge Elimination System
Mg	magnesium
mg/L	milligram per liter
Na	sodium
P.E.	professional engineer
SSI	statistically significant increase
SO <sub>4</sub>	sulfate
TDS	total dissolved solids
UPL	upper prediction limit
U.S. EPA	United States Environmental Protection Agency
UTL	upper tolerance limit

## 1. INTRODUCTION

### 1.1 Purpose

The Federal Coal Combustion Residuals (CCR) Rule provides a process under 40 Code of Federal Regulations (CFR) Section 257.94(e)(2) for the owner/operator of a regulated CCR unit to demonstrate that a statistically significant increase (SSI) above background concentrations of Appendix III constituents during the detection monitoring program is not due to a release of CCR constituents from the CCR unit. An SSI for one or more Appendix III constituents might be a potential indication of a release of CCR constituents from the CCR unit to groundwater. However, the CCR unit may remain in the detection monitoring program if it can be demonstrated that an SSI is due to an error (i.e., sampling error, laboratory error, or statistical analysis error), due to natural variation in groundwater quality, or due to an alternate source (other than the regulated CCR unit). The Federal CCR Rule does not contain requirements nor reference agency guidance for a successful Alternate Source Demonstration (ASD) other than certification of its accuracy by a qualified Professional Engineer.

Geosyntec Consultants, Inc. (Geosyntec) previously prepared two successful ASDs for East Kentucky Power Cooperative's (EKPC's) CCR Landfill Unit at the John Sherman Cooper generating station in Burnside, Kentucky, referred to herein as the Site, the Landfill, and the CCR unit (Geosyntec, 2018a and b). Based on these previous ASDs that certified that the SSI(s) were not due to a release from the regulated unit, Haley & Aldrich certified new statistical methods on 9 March 2019 that shifted the statistical approach from inter-well to intra-well statistics (Haley & Aldrich, 2019).

On 28 February 2022, EKPC collected groundwater samples for the first semi-annual 2022 detection monitoring event. Groundwater sampling results were statistically analyzed by Haley & Aldrich, and SSIs for chloride (Cl) and fluoride (F) were identified in downgradient spring S-13 (Haley & Aldrich, 2022). EKPC was notified of the SSIs by teleconference on 17 May 2022 and commissioned Geosyntec to evaluate if the SSIs detected during the detection monitoring event were caused by a release from the regulated CCR unit. This report constitutes an ASD to evaluate whether the SSIs for Cl and F in spring S-13 are due to a release from the regulated unit.



## **1.2 Site Description**

The John Sherman Cooper generating station is located in Burnside, Pulaski County, Kentucky, approximately seven miles south of Somerset, and is operated by EKPC. The station is a 341 net megawatt (MW) coal-fired power plant that began operations in 1965 and added an additional coal-fired power generation unit in 1969. CCR generated at the Site is dry-handled and disposed of in the on-site CCR Landfill. Based upon review of historical topographic maps and aerial photos, land in the vicinity of the Site was historically undeveloped open space prior to Landfill development except for a few residences and Owens Cemetery. The area now occupied by the Landfill was forested and bisected by a stream that was a tributary to Lake Cumberland. The Site is situated on the northern side of Lake Cumberland (see **Figure 1**).

Geosyntec completed a visual site reconnaissance of the Landfill and surrounding vicinity in March 2018 and visited the Site again in October 2020. Geosyntec reviewed historical aerial photos and historical topographic maps, as well as the landfill permit application (Nesbitt Engineering, 2010) and the basis of the monitoring well certification under the CCR Rule (Tetra Tech, 2017), prior to the site visit. During these site visits, Geosyntec walked the Site, visited all upgradient and downgradient monitoring locations in the certified monitoring network, and observed operations at the Unit and the surrounding power station.

Features of the Site and their locations are presented on **Figure 1**. The power generating units, the coal pile, and a coal pile runoff pond, are located between the Landfill and the lake toward the west. The coal pile runoff pond was unlined until 1994. There is also a storm water runoff pond adjacent to the Landfill that was unlined until 2013. Previously, storm water runoff that accumulated in the unlined pond next to the Landfill either evaporated or seeped into the ground (EKPC, personal communication). The pond is now lined, and accumulated surface water discharge is routed through a Kentucky Pollutants Discharge Elimination System (KPDES) permitted and monitored discharge point. Surrounding areas in other directions are undeveloped.

## **1.3 Description of the CCR Unit**

The CCR unit that is the subject of this ASD is an existing lined Landfill that is permitted by the Kentucky Division of Waste Management (KDWM) and that continued to receive CCR for disposal after the October 19, 2015, effective date of the CCR Rule. This CCR

unit has a geomembrane liner overlain by a leachate collection system and is regulated by both the Commonwealth of Kentucky (special waste permit #SW10000015) and the Federal CCR Rule.

Prior to construction of the CCR unit, ash was originally managed in an unlined surface impoundment that is located beneath the CCR unit. The former impoundment was located within the stream valley that bisected the Site and was constructed with a dike across the downstream end of the impoundment. The impoundment was subsequently converted to dry ash management, and an unlined special waste landfill was constructed in 1994 on top of the former impoundment, after the impoundment had been dewatered and capped with two feet of clay (EKPC, personal communication). The current lined CCR Landfill was constructed on top of the unlined, but capped, landfill in 2012. Neither the former surface impoundment nor the unlined landfill are regulated by the CCR Rule because they both ceased receiving waste before October 19, 2015, and neither impounded liquids on or after October 19, 2015.

#### **1.4 Hydrogeology and Groundwater Monitoring System**

The Site is located along the eastern edge of the Mississippian Plateau Physiographic Province of Kentucky. The site topography is undulating and characterized by sinkhole development. The topography becomes very steep with cliff-forming limestone outcrops adjacent to Lake Cumberland. Topographic relief in the vicinity of the Landfill ranges from the normal pool elevation of Lake Cumberland, which is 723 feet above mean sea level (amsl), to 1,100 feet amsl at the northern extent of the landfill boundary. Drainage is primarily in the subsurface except for major rivers. Surface runoff from the Site flows to Lake Cumberland, and predominantly flows underground via solution-widened fractures and other karst features to emerge as seeps and springs along Lake Cumberland (University of Kentucky, 1991; Tetra Tech, 2017).

The Site is located in a heavily mature karst terrain of limestone and dolomite (Tetra Tech, 2017). Karst hydrogeology is characterized by the occurrence and movement of groundwater through solution channels/conduits and subsequent discharge at the surface as springs. Prior to adoption of the federal CCR Rule, EKPC monitored a series of downgradient springs under the KDWM special waste permit in lieu of groundwater monitoring wells because of the low probability of a well intercepting conduits through which groundwater moves in karst geology. Dye tracer studies were completed at the Site by the University of Kentucky Geology Department (1991), the Kentucky Geological

Survey, KGS (1997), and Tetra Tech (2017) to verify hydraulic connections between upgradient springs/sinkholes that are used as background sampling locations and downgradient compliance springs at the limestone escarpment along the northern banks of Lake Cumberland.

The University of Kentucky report characterized the overall groundwater flow regime as groundwater flow through the karst system from the Old Pond Pit towards Lake Cumberland. Downward migration of the groundwater is inhibited by an argillaceous limestone/dolomite unit in the Salem and Warsaw Formations that acts as an aquitard. Some of the downgradient springs (J2, J3, and J5) that were monitored under the KDWM permit, and now under the Federal CCR Rule, occur where the top of these argillaceous layers outcrops in the limestone escarpment along the northern side of Lake Cumberland (KGS, 1997). Tetra Tech conducted an additional hydrogeologic investigation, including tracer testing, to certify a monitoring location network under the Federal CCR Rule (Tetra Tech, 2017). The Tetra Tech investigation identified the carbonate sequences of the Saint Genevieve, Saint Louis, and Salem/Warsaw Formations as the upper aquifer and certified a spring monitoring approach in lieu of monitoring wells.

The current CCR groundwater monitoring system is comprised of two background sampling locations (OPP and C3) and six downgradient springs J2, J3, J5, S5, S6, and S13 (**Figure 1**). The discharge rate of the springs is highly variable, and some springs are dry for extended periods of time, especially during the summer. In addition, at times during wetter seasons or under flooding conditions, some locations along the Cumberland Lake may be unmonitorable because they are submerged due to high lake levels. Each sampling location is discussed in more detail below.

**OPP**: The background sampling location OPP is a sinkhole slightly uphill from the Landfill that has been adapted with a manhole cover and access/egress ladder that allows access to the flowing underground karst conduit system for sampling purposes.

**C3**: This background sampling location is a spring situated northwest of the CCR unit in an adjacent surface watershed uphill from the CCR unit. Water samples collected from C3 during the KGS and Tetra Tech studies indicated similar water quality as the downgradient J-series springs. Note that background sampling station C3 is sometimes indicated as C03 in certain reports and figures.

**J2, J3, and J5:** These springs are located on the escarpment along the northwestern bank of Lake Cumberland. The springs occur within the Salem and Warsaw Formations.

**S5 and S6:** These springs were identified during a site reconnaissance in 2015 and are located on the escarpment along the northwestern bank of Lake Cumberland. Springs S5 and S6 also occur within the Salem and Warsaw Formations.

**S13:** The spring is located southwest of the CCR unit and downgradient of the power plant, coal pile, and coal pile runoff pond. There are no monitoring points between the CCR unit and the power plant.

## **1.5 Detection Monitoring Program**

At least eight baseline monitoring program events (December 2016 through October 2017) were completed at most monitoring stations prior to October 17, 2017, for Appendix III constituents.<sup>1</sup> Statistical estimates of the upper end of the range of background concentrations were initially calculated by Haley & Aldrich (2018a and b) using the baseline monitoring data and inter-well statistical methods. The initial background concentrations were calculated using the Upper Tolerance Limit (UTL) method as described in the U.S. Environmental Protection Agency's (USEPA) 2009 Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Unified Guidance (Unified Guidance) and 40 CFR Section 257.93(f)(3).

Following the first two ASDs finding no release from the CCR unit and based on the sampling data obtained from the groundwater monitoring network, Haley & Aldrich reevaluated the statistical approach and determined that intra-well statistical testing is an appropriate and more sensitive method for detecting potential releases from the CCR unit. An intra-well approach was certified and has been used for statistical evaluation for groundwater detection monitoring at the Landfill pursuant to 40 CFR 257.94 (Haley & Aldrich, 2019). Haley & Aldrich established intra-well background by calculating the intra-well Upper Prediction Limit (UPL) for each Appendix III constituent (as well as the Lower Prediction Limit [LPL] for pH) separately for each downgradient monitoring location.

---

<sup>1</sup> Stations S5 and S6 do not flow continuously, and they were dry during several of the baseline events. Hence fewer than eight samples were collected at S5 and S6 by October 17, 2017. As of February 2022, a minimum of eight baseline samples have now been obtained from springs S5 and S6.

Prior to conducting the statistical analysis for the December 2020 compliance event, the groundwater analytical results for samples collected from December 2016 through June 2020 were used to update intra-well UPL and LPL (for pH) for four of the six downgradient locations (i.e., springs J2, J3, J5, and S13). The other two locations (i.e., springs S5 and S6) are typically dry and insufficient samples were available to conduct UPL calculations at that time. Since the December 2020 compliance event, the minimum of eight samples have been obtained from springs S5 and S6 and the calculation of the UPLs were completed for those two remaining locations. The eighth of eight background samples for S6 and S5 were collected in March 2021 and February 2022, respectively. The groundwater analytical results for samples collected from 18 January 2017 through 26 March 2021 were used to calculate intra-well UPL and LPL (for pH) for spring S6. The groundwater analytical results for samples collected from 18 January 2017 through 28 February 2022 were used to calculate intra-well UPL and LPL (for pH) for spring S5 and will be used for comparison to the next sample obtained from that location (Haley & Aldrich, 2022).

These current intra-well background UPLs (and LPL for pH) developed by Haley & Aldrich are provided in **Table 1** and are used to evaluate potential SSIs at each downgradient well during each semiannual groundwater monitoring event. In addition, leachate data are also included in **Table 1** for comparison purposes. The leachate data come from leachate sampling conducted for a previous ASD for this current ASD demonstration.

## **1.6 Basis of the Statistically Significant Increase**

The concentrations of each Appendix III constituent from the first 2022 semiannual detection monitoring sampling event were compared to their respective UPLs/LPL at each downgradient location. A sample concentration greater than the UPL is considered to represent an SSI. Two SSIs (i.e., for Cl and F) were detected at location S13 (**Table 1**). No other SSIs were identified at the Landfill.

## **2. CONCEPTUAL SITE MODEL**

### **2.1 Waste Description**

The Landfill is permitted to accept CCR materials, including fly ash and bottom ash, as well as dry flue gas desulfurization (FGD) solids, clarifier solids, and coal pile runoff pond solids, from the Cooper generating station. The disposal area covers 96.32 acres in a total permitted area of 315.25 acres.

### **2.2 Engineered Barrier Systems**

The CCR unit is a lined Landfill. The Landfill is equipped with run-on and run-off stormwater management systems, a low permeability composite liner system composed of 60 mil linear low-density polyethylene (LDPE) geomembrane liner installed on compacted low permeability soil that is overlain by a geocomposite leachate collection system, all meeting the requirements of 401 KAR Ch. 45 (Nesbitt Engineering, 2010) and the requirements of the federal CCR Rule. Leachate collected from the Landfill is routed via buried piping to a leachate storage tank and then pumped to a treatment system at the generating station.

### **2.3 Potential Release Mechanisms**

The potential release mechanism for CCR constituents from the Landfill to groundwater would be via infiltration of precipitation into the ash, dissolution of the soluble components of the CCR material into leachate, and (potential) migration of leachate to groundwater through defects and cracks and/or installation defects in the engineered barrier system. It should be noted that this release mechanism is deemed highly unlikely given the modern landfill design (USEPA, 2015, page 21370) and recent construction of the CCR unit, the construction quality assurance (CQA) program that was followed during construction, and the relatively steep grade on the leachate collection system that should promote lateral migration of leachate within the leachate collection layer as a preferential flow pathway within the containment system rather than downward flow through any potential small defects in the geomembrane liner.

### **2.4 Migration Pathways**

To illustrate potential groundwater migration pathways within, below, and around the Cooper Landfill, two cross sections were developed and presented in the July 2018 ASD

report (Geosyntec, 2018a). These geologic cross sections of the Site were recently updated and are provided as **Figure 2** and **Figure 3**.

The University of Kentucky (1991), the KGS (1997), and Tetra Tech (2017) interpreted the shallow groundwater flow direction to be to the south toward Lake Cumberland through a mature karst network that emerges through springs along the limestone bedrock escarpment at the northern edge of the lake. Dye tracer studies detected a connection between upgradient sinkhole OPP and many of the downgradient springs, as well as spring S13, located to the west near the coal pile. The dye tracer results are depicted on **Figure 4**. These results confirm that there is a hydraulic connection between the upgradient locations and the downgradient springs. However, the groundwater flow paths below the Landfill are unknown and it is unclear, for example, whether spring S-13 would receive groundwater that has passed below the footprint of the Landfill.

### 3. ALTERNATE SOURCE DEMONSTRATION

#### 3.1 Evaluation of Error

##### 3.1.1 Potential Sampling Error

Geosyntec was not present during groundwater sampling events. However, EKPC's field technicians are knowledgeable of the Site and have been briefed on the Site's *Sampling and Analysis Plan*, which details sampling protocols to be followed for each groundwater monitoring event. Taken together with the consistency of sampling results over the monitoring period of the compliance network, this suggests a low potential for sampling error.

##### 3.1.2 Potential Laboratory Analysis Error

EKPC conducts quality assurance/quality control (QA/QC) for data collected during groundwater monitoring activities as prescribed in the Cooper Landfill's *Sampling and Analysis Plan*. The QA/QC controls consist of data quality objectives, field and laboratory QA/QC requirements, and data validation (Stage I-III) components. Geosyntec did not conduct independent data validation of the laboratory results to evaluate whether laboratory analysis errors might have occurred during this event. However, previous (i.e., 2018) and recent charge balance calculations conducted for individual major cations and anions in the leachate and groundwater samples were/are indicative of good data quality.

##### 3.1.3 Potential Statistical Analysis Error

Geosyntec performed a high-level review of the *Summary of Appendix III Semi-Annual Groundwater Detection Monitoring Statistical Evaluation* report prepared by Haley and Aldrich (2022) and did not identify concerns in the approach presented. Therefore, the potential for statistical error is low.

#### 3.2 Natural Variation

Most of the Appendix III data for the samples from the two background sampling stations (OPP and C3) have been fairly consistent over time, and also between the two locations despite the fact that they are located in different surface water basins. However, Cl concentrations are generally higher at location C3 compared to location OPP, and they also vary between 2.8 mg/L and 34.9 mg/L. The time series for Cl at C3 is included on



**Figure 5** and shows that there is substantial natural variation in background groundwater quality that might be a potential source for SSIs.

### 3.3 Alternate Source

#### 3.3.1 **Geochemical Characterization of Leachate and Groundwater**

To update the geochemical characterization of leachate and groundwater at the Site, Geosyntec requested the collection of supplemental data from the leachate tank, the routine spring monitoring locations as well as piezometers PZ-1 through PZ-5. Due to dry conditions at the Site during the spring and early summer 2022, the upgradient and downgradient springs were not flowing and could not be sampled for this evaluation. Therefore, ASD samples were collected from the following locations:

- Leachate storage tank adjacent to the landfill; and
- Downgradient piezometers PZ-1, PZ-2, PZ-3, PZ-4, and PZ-5 (**Figure 1**).

Although Tetra Tech (2017) concluded that these piezometers were not located along the karst conduit pathway from the upgradient stations to the downgradient springs, Geosyntec considered it possible that they might still be within a more localized leachate migration pathway that feeds into the karst conduit(s), and therefore might provide useful data to compare with the leachate characteristics and/or the available data from upgradient and downgradient springs.

The supplemental samples were analyzed for field parameters (pH, conductivity, dissolved oxygen [DO], oxidation-reduction potential [ORP], and turbidity), Appendix III parameters (boron [B], calcium [Ca], Cl, F, pH, sulfate [SO<sub>4</sub>], and total dissolved solids [TDS]) and major ions that are not part of Appendix III, including magnesium (Mg), potassium (K), and bicarbonate (HCO<sub>3</sub>) measured as total and HCO<sub>3</sub> alkalinity.

The available data used for this characterization, including the results from the February 2022 compliance sampling event of the spring network, are summarized in **Table 2**.

A multiple lines of evidence approach was used in this evaluation, including time series for select Appendix III parameters, ion ratios, and visualization of major solute composition using Piper and Stiff diagrams.

### 3.3.2 Time Series

Several of the Appendix III constituents can be considered “indicator parameters” for a potential CCR leachate release since they are generally present at elevated concentrations in leachate compared to groundwater and do not readily attenuate in groundwater. They can therefore be viewed as “conservative leachate tracers.” These include B, SO<sub>4</sub>, Cl, and TDS. If a leachate release from a regulated CCR unit has occurred, it should result in an increase in several of these constituents. Note that B concentrations are low in site-specific leachate from the Landfill and therefore, B may not be a useful leachate indicator parameter at this Site.

To evaluate trends of select Appendix III constituents, **Figure 5** has been created to depict time series of these constituents over the monitoring history of downgradient spring S13, which has reported SSIs for Cl and F. Note that F was not included in this figure as it had been non-detect at a reporting limit of 0.5 mg/L until the September 2021 monitoring event, and it was only detected once at 0.67 mg/L during the February 2022 sampling event. As discussed above, the Cl concentrations in upgradient spring C3 was included on this figure to provide some context for upgradient conditions.

As can be seen on **Figure 5**, the Appendix III constituents B, Ca, SO<sub>4</sub>, and TDS show closely related concentration trends over time that appear to show some seasonality, but an overall stable to decreasing trend. Chloride concentrations generally followed that trend, except for the February 2022 sampling event, when the concentration suddenly increased to 17 mg/L. Note that 17 mg/L of Cl is still within the range of upgradient concentrations since Cl was detected at 20 mg/L in upgradient spring C3 during the same compliance monitoring event. Furthermore, since other constituents that have higher concentrations in leachate, including Ca, SO<sub>4</sub>, and TDS did not show a concurrent increase, it is unlikely that a leachate release from the regulated unit has caused the SSIs for Cl and F. Note that F concentrations in leachate were non-detect during the 2018 (<0.5 mg/L) and 2022 (<0.25 mg/L) sampling events, and therefore, a F detection of 0.67 mg/L at S13 cannot be explained by a release of leachate from the regulated unit.

### 3.3.3 Major Ion Ratios

Ion ratios of mobile CCR indicator parameters (i.e., B, SO<sub>4</sub>, and Cl) were calculated using the most recent leachate (June 2022), spring (February 2022) and piezometer (July 2022) sampling results. The ion ratios are summarized in **Table 2**. Comparing the molar ratios

of highly mobile and nonreactive solutes among monitoring points can also help to evaluate whether various waters are related. The ratios should remain relatively constant during dilution by infiltrating rainwater following a potential release and during aquifer dispersion but might change upon mixing with other waters.

As can be seen in **Table 2**, the calculated ion ratios (i.e., B/SO<sub>4</sub>, B/Cl, and SO<sub>4</sub>/Cl) are completely different between leachate and the various groundwater monitoring locations, including the downgradient monitoring springs. While these ion ratios vary somewhat between the upgradient springs and the downgradient springs and piezometer locations, they are generally consistent with each other but substantially different from the leachate. This is a strong line of evidence that the SSIs for Cl and F in spring S13 are not due to a release of Appendix III constituents from the regulated CCR unit.

### 3.3.4 Piper and Stiff Diagrams

Piper and Stiff diagrams are among the most common tools for assessing geochemical similarities and differences between aqueous samples. Laboratory data, which are normally reported in mg/L, are converted to milliequivalents per liter (meq/L) when plotted on a Piper or Stiff diagram.

Piper diagrams are trilinear diagrams that plot the relative contributions of major ions to the overall geochemical makeup of a liquid sample. The diagram has three components. The large diamond-shaped component displays the combined cation and anion composition of major solutes. The two smaller triangular components display the cation components and the anion components, separately and in greater detail. The sample data are plotted as a percentage of the total milliequivalents on the diagram with each component reaching 100 percent at its respective corner of the diagram. If the results from discrete samples plot relatively close to each other, their respective chemical compositions are similar, and they might have a similar (or the same) source of solutes.

Stiff diagrams plot the chemical compositions of each sample as polygons. Similar-shaped polygons for different samples indicate similar geochemical compositions, and they might have a similar (or the same) source of solutes. The relative size of each polygon is an indication of the ionic strength (or “concentration”) of the respective sample.

Since only leachate and piezometer samples could be collected for the analyses of major ions needed to construct these diagrams due to non-flowing conditions of these springs, this evaluation is limited to these collection locations. The resulting Piper diagram is presented as **Figure 6** and the Stiff diagrams are presented as **Figure 7**.

As can be seen on **Figure 6**, the leachate sample plots in a totally different area compared to the five downgradient piezometers. The leachate is dominated by Ca and Na (approximately 50/50) on the cationic side and Cl (80%) and SO<sub>4</sub> (20%) on the anionic side, while the piezometers are predominately Ca-HCO<sub>3</sub> waters, as would be expected in a karst environment, with varying (minor) contributions of other ions. The Piper diagram does not indicate that leachate from the regulated unit is mixing with groundwater collected from the five downgradient piezometers. Furthermore, the Stiff diagrams depicted on **Figure 7** show the similarities between the five piezometer samples and the dissimilarities between the piezometers and the leachate sample. Note the difference in scale between the leachate and piezometer samples.

#### 4. CONCLUSIONS

This ASD for the Cooper Landfill was prepared in accordance with 40 CFR 257.94(e)(2) and good engineering practices. The following lines of evidence demonstrate that the SSIs for Cl and F detected in downgradient spring S13 are not due to a leachate release from the regulated CCR unit.

1. The CCR unit is a lined landfill that was designed in 2010 and constructed in 2012 in accordance with generally accepted industry guidelines as well as Kentucky regulatory standards. Therefore, the likelihood of a release from the unit is low. The leachate collection system and the low permeability soil component underlying the membrane should limit the potential for leachate migrating through minor membrane defects.
2. The Cl concentration detected in spring S13 during this sampling event (17 mg/L) is within the range of concentrations detected in upgradient location C3, which had a detection of Cl of 20 mg/L during this sampling event. This suggests that this SSI was caused by natural variation within the aquifer.
3. Fluoride concentrations in leachate were non-detect during leachate characterization events in 2018 (<0.50 mg/L) and 2022 (<0.25 mg/L). Therefore, the detection of 0.67 mg/L of F in spring S13 cannot be explained by a release of leachate from the regulated unit.
4. Major ion ratios of conservative “leachate indicator parameters” (i.e., B/SO<sub>4</sub>, B/Cl, and SO<sub>4</sub>/Cl) show that these ratios are entirely different between leachate and upgradient and downgradient monitoring locations. While there is some variability between the various monitoring locations, these ion ratios are generally consistent with each other between upgradient and downgradient locations and totally inconsistent with the geochemical signature of leachate.
5. Piper and Stiff diagrams indicate that leachate from the CCR unit is distinctly different from downgradient piezometers that intercept groundwater flowing below the regulated CCR unit and the underlying CCR materials from historical CCR management operations.

These multiple lines of evidence demonstrate that the SSIs for Cl and F in the downgradient spring S13 are not due to a leachate release from the regulated CCR unit. The SSIs are likely due to natural variation. Based on these findings, Geosyntec has determined that the CCR unit may remain in the Detection Monitoring Program pursuant to 40 CFR 257.94(e)(2) and does not need to establish an Assessment Monitoring Program.

## 5. REFERENCES

- Geosyntec Consultants (2018a). Alternate Source Demonstration; Cooper Station Landfill, Burnside, Kentucky; July 2018.
- Geosyntec Consultants (2018b). Supplemental Alternate Source Demonstration; Cooper Station Landfill, Burnside, Kentucky; December 2018.
- Haley & Aldridge (2018a). CCR Detection Monitoring Statistical Approach Technical Memorandum, Spurlock Landfill, Spurlock Ash Pond, Smith Station Landfill and Cooper Station Landfill, April 16.
- Haley & Aldridge (2018b). Summary of Appendix III Semi-Annual Groundwater Detection Monitoring Statistical Evaluation, East Kentucky Power Cooperative, J.S. Cooper Landfill, Somerset, Kentucky, April.
- Haley & Aldrich (2019). East Kentucky Power Cooperative, Inc.; Cooper Station Landfill; Selection of Statistical Procedures; March 9, 2019.
- Haley & Aldrich (2022). Summary of Appendix III Semi-Annual Groundwater Detection Monitoring Statistical Evaluation, East Kentucky Power Cooperative, J.S. Cooper Station Landfill, Somerset, Kentucky. June 2022.
- Kentucky Department of Environmental Protection, 2017. Permit Approval, J.S. Cooper Landfill, Solid Waste Permit #SW10000015, January 9.
- Kentucky Geological Survey, 1997. Hydrogeology and Ground-Water Monitoring of Coal-Ash Disposal Sites in a Karst Terrain near Burnside, South-Central Kentucky, Report of Investigations 11, Series XI.
- Nesbitt Engineering, 2010. Special Waste Permit Modification, John Sherman Cooper Landfill Ash Disposal Facility, August 13.
- Tetra Tech, 2017. Groundwater Monitoring System and Hydrogeologic Investigation Report, Cooper Station Landfill, Burnside, Kentucky, October 11.

University of Kentucky, 1991. Hydrogeology and Ground Water Monitoring of the John Sherman Cooper Power Station, Burnside, Kentucky, Department of Geological Sciences.

U.S. EPA, 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Unified Guidance. March.

U.S. EPA, 2015. Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities (Final Rule). Fed. Reg. 80 FR 21301, pp. 21301-21501, 40 CFR Parts 257 and 261, April.



# TABLES

**Table 1 - Summary of Intra-Well Statistics of Detection Monitoring Program Data in Comparison to Leachate Data**  
Alternative Source Demonstration for Chloride and Fluoride under the Federal CCR Rule  
Cooper Station Landfill, Burnside, Kentucky

Constituent <sup>1</sup>	Spring J2		Spring J3		Spring J5		Spring S5		Spring S6		Spring S13		Leachate	
	1st Half 2022 Detection Monitoring Event <sup>2</sup>	Background Limit <sup>3</sup> (Upper Prediction Limit)	1st Half 2022 Detection Monitoring Event <sup>2</sup>	Background Limit <sup>3</sup> (Upper Prediction Limit)	1st Half 2022 Detection Monitoring Event <sup>2</sup>	Background Limit <sup>3</sup> (Upper Prediction Limit)	1st Half 2022 Detection Monitoring Event <sup>2</sup>	Background Limit <sup>3</sup> (Upper Prediction Limit)	1st Half 2022 Detection Monitoring Event <sup>2</sup>	Background Limit <sup>3</sup> (Upper Prediction Limit)	1st Half 2022 Detection Monitoring Event <sup>2</sup>	Background Limit <sup>3</sup> (Upper Prediction Limit)	March 2018	June 2022
Boron	0.109	9.26	0.116	2.13	0.0898	4.40	0.0212	4.93	<0.020 <sup>4</sup>	0.05	0.155	1.47	0.557	0.377
Calcium	81.1	279.05	82.7	316.51	80.9	297.33	72.3	182.44	74.4	115.5	74.9	359.64	1,210	1,250
Chloride	19	277.65	7.9	178.69	8.4	294	1.7	25.48	3.5	6	<b>17<sup>5</sup></b>	13.27	2,770	3,580
Fluoride	0.17	0.50	0.16	0.50	0.17	0.50	0.16	0.50	0.18	0.50	<b>0.67<sup>5</sup></b>	0.50	<0.5	<0.25
pH	8.19	6.63 / 9.14	8.06	7.45 / 8.33	8.81	7.13 / 8.87	8.96	6.74 / 9.42	8.43	4.20 / 8.81	7.77	6.76 / 8.90	7.44	6.32
Sulfate	36	2,173.83	36	987.57	31	1,579.79	9.8	146.81	11	29.75	120	779.92	1,000	1,240
Total Dissolved Solids	266	1,966.37	142	1,443.96	238	1,253	134	598.37	214	404	122	1,428.38	6,856	10,400

Notes:  
<sup>1</sup>All concentrations are in milligrams per liter (mg/L), except pH, which is expressed in standard units (s.u).  
<sup>2</sup>First half 2022 detection monitoring event conducted on 28 February 2022.  
<sup>3</sup>Intra-well UPL - 95% Upper Prediction Limit developed by Haley & Aldrich using data collected between December 2016 and June 2020 for springs J2, J3, J5, and S13, and January 2017 and February 2022 for springs S5 and S6, respectively.  
<sup>4</sup>Value is less than the reporting limit.  
<sup>5</sup>Bold number and yellow highlight indicate statistically significant increase above background for the February 2022 detection monitoring program samples.  
Sample results provided by East Kentucky Power Cooperative.

**Table 2. CCR Leachate and Groundwater Characteristics at the Cooper Landfill**

	Leachate <sup>1</sup>	Upgradient Locations <sup>2</sup>		Downgradient Locations <sup>3</sup>						Piezometers <sup>4</sup>				
		OPP	C3	J2	J3	J5	S5	S6	S13	PZ-1	PZ-2	PZ-3	PZ-4	PZ-5
<b>Field Parameters</b>														
pH (s.u.)	6.32	7.76	7.96	8.19	8.06	8.81	8.96	8.43	7.77	7.38	7.33	7.65	7.08	7.29
Conductivity (µS/cm)	13,270	340	430	403	412	404	312	299	442	532	665	667	684	725
DO (mg/L)	4.64	NS <sup>5</sup>	NS	NS	NS	NS	NS	NS	NS	4.15	<1.0	4.81	5.67	4.28
ORP (mV)	464.1	NS	NS	NS	NS	NS	NS	NS	NS	172.5	133.2	65.8	185.9	153.5
Turbidity (NTU)	24.6	NS	NS	NS	NS	NS	NS	NS	NS	85.4	16.1	159	95.1	>Range
<b>Appendix III</b>														
Boron (mg/L)	0.377	<0.020	<0.020	0.109	0.116	0.0898	0.0212	<0.020	0.155	0.062	0.133	0.191	0.0164	0.0884
Calcium (mg/L)	1,250	54.5	81.1	81.1	82.7	80.9	72.3	74.4	74.9	86.1	84.6	65.5	128	88.3
Chloride (mg/L)	3,580	1.6	20	19	7.9	8.4	1.7	3.5	17	5.7	47	34.4	2.3	31.7
Fluoride (mg/L)	<1.0 / <0.25	0.11	0.32	0.17	0.16	0.17	0.16	0.18	0.67	0.34	0.14	0.76	0.37	0.49
pH (s.u.)	6.32	7.76	7.96	8.19	8.06	8.81	8.96	8.43	7.77	7.38	7.33	7.65	7.08	7.29
Sulfate (mg/L)	1,240	12	14	36	36	31	9.8	11	120	30.7	6.3	44.6	33.5	55.7
TDS (mg/L)	10,400	210	270	266	142	238	134	214	122	378	420	452	460	482
<b>Major Ions</b>														
Magnesium (mg/L)	1.15	NS	NS	NS	NS	NS	NS	NS	NS	11.8	10.7	12.7	9.52	11.4
Potassium (mg/L)	1,600	NS	NS	NS	NS	NS	NS	NS	NS	1.64	1.13	1.97	1.18	2.08
Sodium (mg/L)	389	NS	NS	NS	NS	NS	NS	NS	NS	26.9	45.5	64.7	2.17	48.0
Bicarbonate Alkalinity (mg/L as CaCO <sub>3</sub> )	48	NS	NS	NS	NS	NS	NS	NS	NS	250	280	290	330	280
Total Alkalinity (mg/L as CaCO <sub>3</sub> )	48	NS	NS	NS	NS	NS	NS	NS	NS	250	280	290	330	280
<b>Ion Ratios (mol/mol)</b>														
B/SO <sub>4</sub> (x10 <sup>-3</sup> )	2.705	14.83	12.71	26.94	28.67	25.78	19.25	16.18	11.49	17.97	188	38.11	4.356	14.12
B/Cl (x10 <sup>-3</sup> )	0.3461	41.09	3.287	18.86	48.27	35.14	40.99	18.78	29.97	35.75	9.302	18.25	23.44	9.166
SO <sub>4</sub> /Cl	0.1280	2.771	0.2586	0.6999	1.683	1.363	2.130	1.161	2.608	1.990	0.0495	0.4789	5.381	0.6491

<sup>1</sup>Sampled on 6/29/2022; resampled for fluoride analysis on 8/3/2022

<sup>2</sup>Upgradient locations are no longer used for statistical analyses, but are still sampled and results are provided for context; they were sampled on 2/28/2022

<sup>3</sup>Downgradient locations sampled in 2/28/2022

<sup>4</sup>Piezometers are not used for compliance monitoring, but are installed immediately downgradient of the waste boundary; they were sampled on 7/7/2022





<sup>5</sup>NS = not sampled

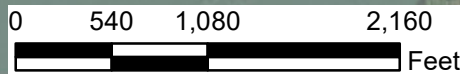
# FIGURES



N:\E\East\_Kentucky\_Power\Cooper\_Landfill\GIS\MXD\Figure 1\_Site\_Layout.mxd



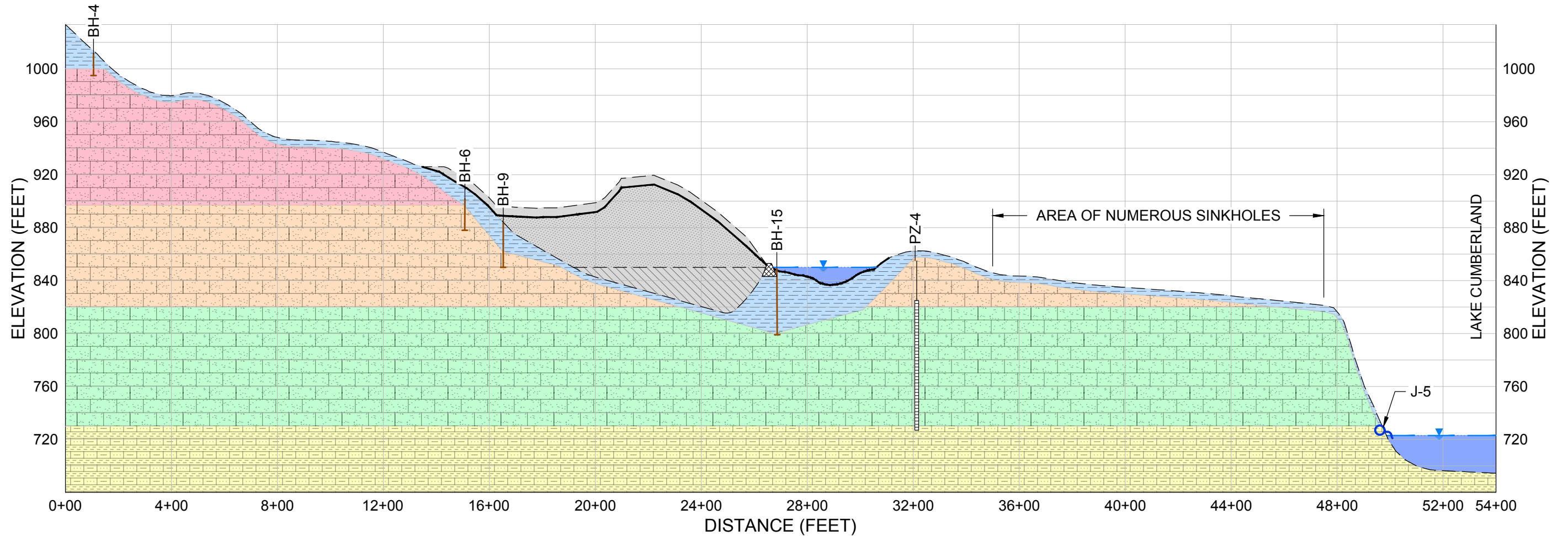
**Legend**

-  Piezometer
-  Upgradient Sinkhole/Spring
-  Downgradient Spring
-  Existing Permitted Boundary (Approximate Location)



<b>SAMPLING STATION LOCATION MAP</b>		
East Kentucky Power Cooperative Cooper Station Landfill		
PREPARED FOR 	PREPARED BY 	Figure 1
Project No. GR9033	Document No. GA220310	August 2022

L:\CADD\EAST KENTUCKY POWER\DRAWINGS\GR6562.04 - COOPER LANDFILL\GR6562.04-001



**LEGEND**

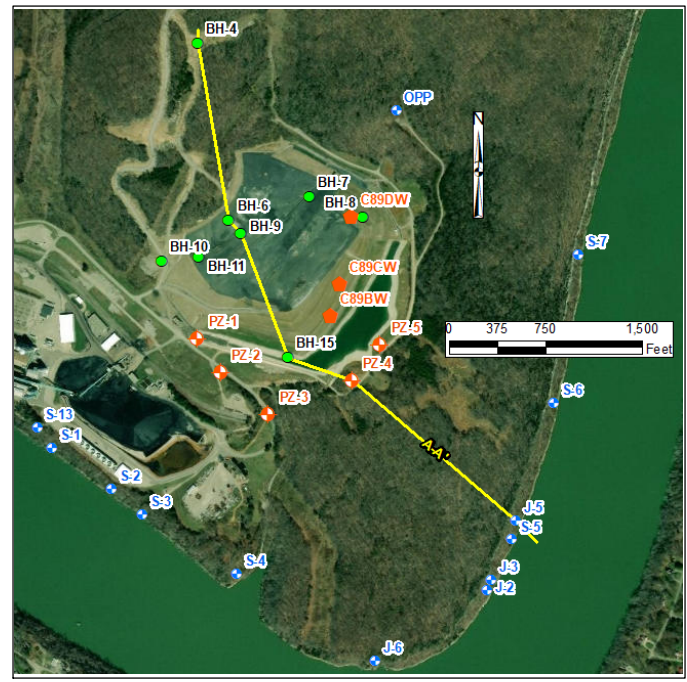
	PIEZOMETER		ASH		KIDDER LIMESTONE (WITH MINOR AMOUNTS OF SILTSTONE AND SHALE)
	SCREEN INTERVAL		ASH SUBGRADE		ST. GENEVIEVE LIMESTONE (PREDOMINANTLY LIMESTONE WITH MINOR AMOUNTS OF CHERT)
	SOIL BORING		CLOSED OUT SLURRY POND		ST. LOUIS LIMESTONE (CHERTY, ARGILLACEOUS, FOSSILIFEROUS LIMESTONE WITH INTERBEDS OF CLAYSTONE AND SILTSTONE)
	SPRING		FILL		SALEM & WARSAW FORMATIONS (SEQUENCE OF DOLOMITE, LIMESTONE, SHALE, SILTSTONE AND SANDSTONE)
	LIMITS OF CONSTRUCTED GEOSYNTHETIC LINER		CLAY		

**NOTE:**

1. TOP OF ASH LANDFILL ELEVATION WAS OBTAINED FROM GOOGLE EARTH IMAGERY DATED 11 APRIL 2016.

0 400' 800'  
HORIZONTAL SCALE IN FEET

0 80' 160'  
VERTICAL SCALE IN FEET  
VERTICAL EXAGGERATION = 5X

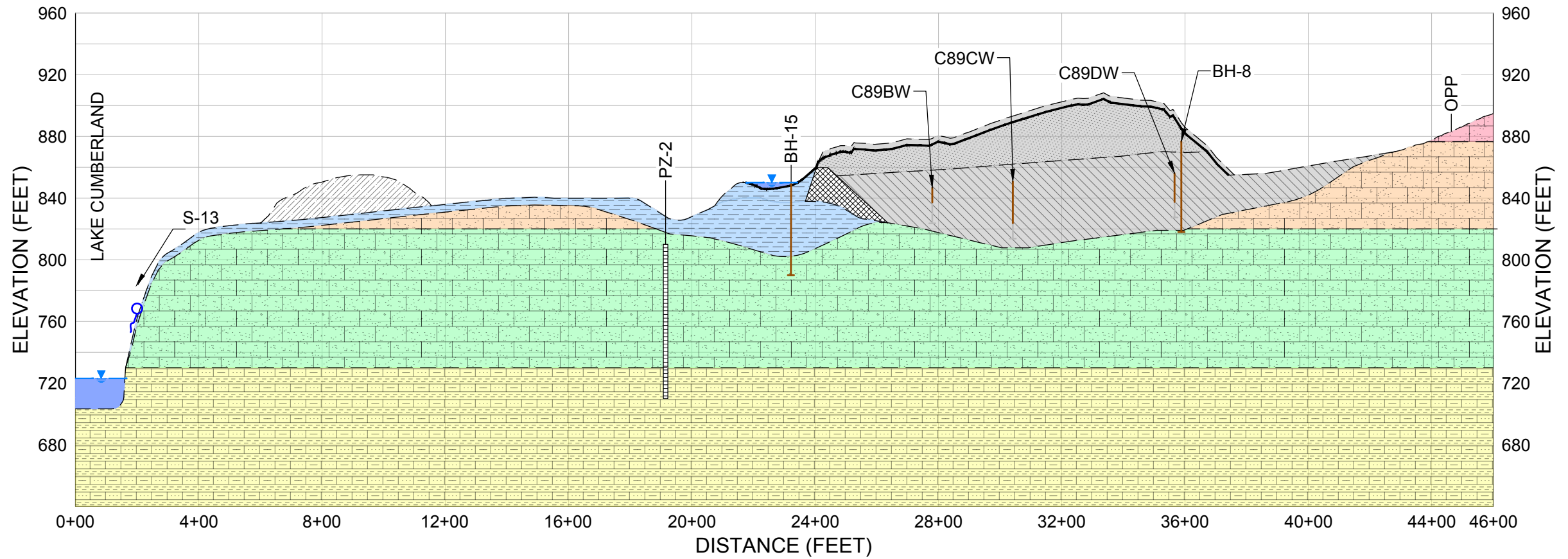


KEY MAP SECTION A-A'

Cross Section A - A'

PREPARED BY: <b>Geosyntec</b> consultants	PREPARED FOR:  EAST KENTUCKY POWER COOPERATIVE A Touchstone Energy Cooperative	FIGURE 2
KENNESAW, GA	PROJECT #: GR9033	

L:\CADD\EAST KENTUCKY POWER\DRAWINGS\GR6562.04 - COOPER LANDFILL\GR6562.04-001

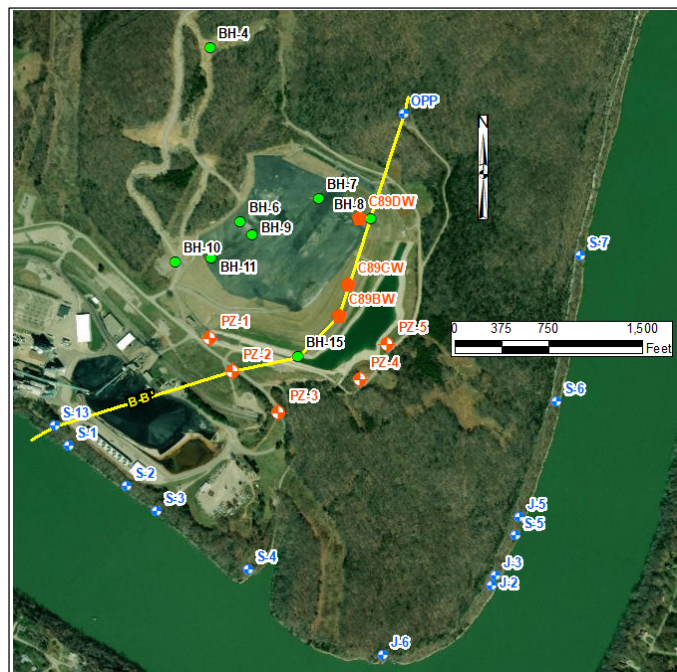
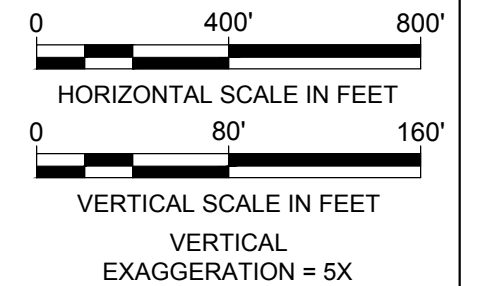


**LEGEND**

<p>PIEZOMETER</p> <p>SCREEN INTERVAL</p> <p>SOIL BORING</p> <p>SPRING</p> <p>LIMITS OF CONSTRUCTED GEOSYNTHETIC LINER</p>	<p>ASH</p> <p>ASH SUBGRADE</p> <p>CLOSED OUT SLURRY POND</p> <p>FILL</p> <p>CLAY</p>	<p><b>LITHOLOGIC DESCRIPTIONS</b></p> <p>KIDDER LIMESTONE (WITH MINOR AMOUNTS OF SILTSTONE AND SHALE)</p> <p>ST. GENEVIEVE LIMESTONE (PREDOMINANTLY LIMESTONE WITH MINOR AMOUNTS OF CHERT)</p> <p>ST. LOUIS LIMESTONE (CHERTY, ARGILLACEOUS, FOSSILIFEROUS LIMESTONE WITH INTERBEDS OF CLAYSTONE AND SILTSTONE)</p> <p>SALEM &amp; WARSAW FORMATIONS (SEQUENCE OF DOLOMITE, LIMESTONE, SHALE, SILTSTONE AND SANDSTONE)</p> <p>COAL</p>
---	--	--

**NOTE:**

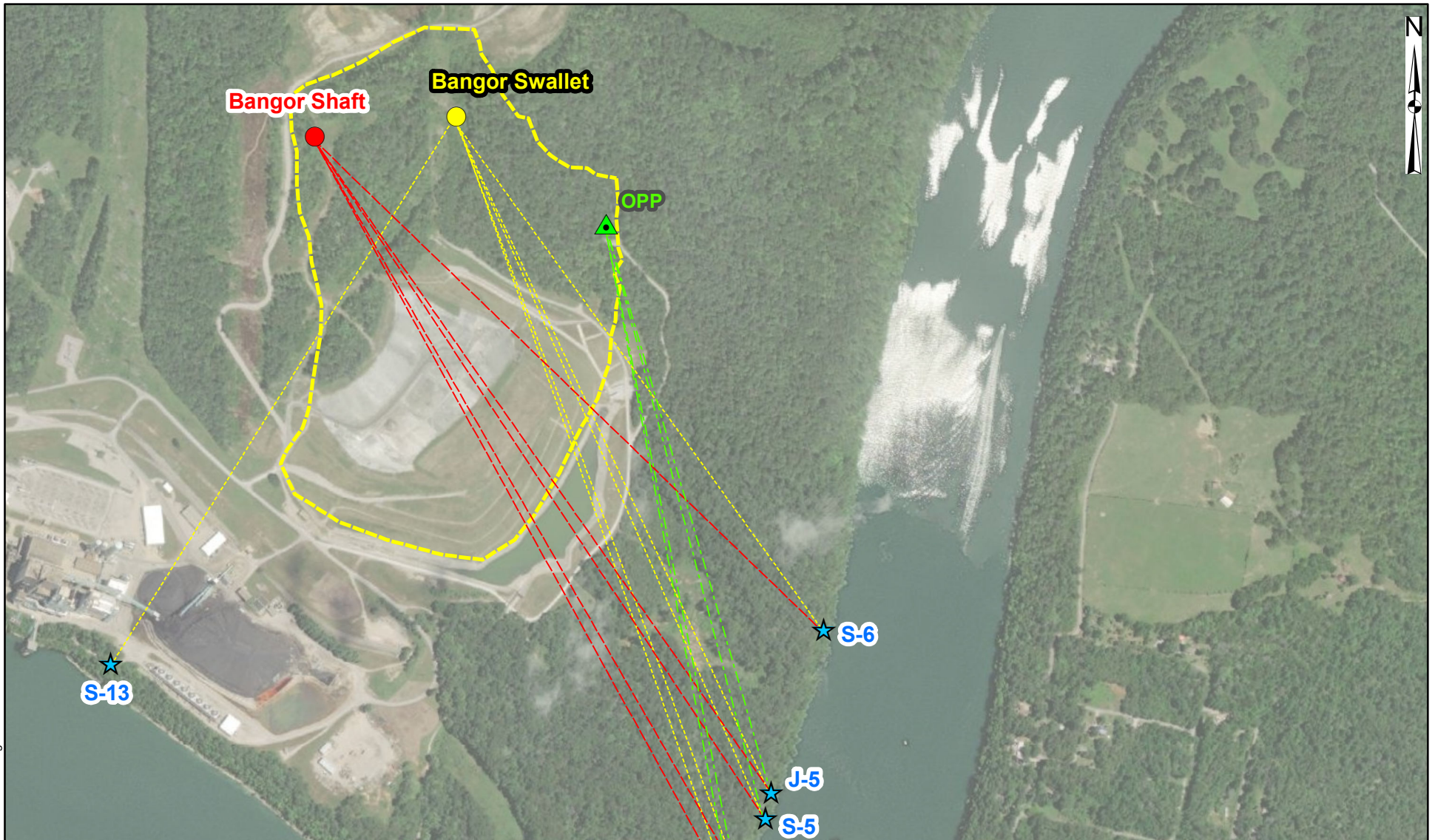
1. ELEVATION OF COAL PILE IS APPROXIMATE.
2. OPP = OLD POND PIT



KEY MAP SECTION B-B'

Cross Section B - B'

<p>PREPARED BY:</p> <p><b>Geosyntec</b> consultants</p>	<p>PREPARED FOR:</p> <p><b>EAST KENTUCKY POWER COOPERATIVE</b> A Touchstone Energy Cooperative</p>	<p>FIGURE</p> <p>3</p>
<p>KENNESAW, GA</p>	<p>PROJECT #: GR9033</p> <p>AUGUST 2022</p>	

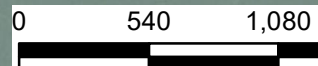


**Legend**

**Dye Tracer Type**

- Eosine
- Fluorescein
- Sulforhodamine-B
- Existing Boundary (Approximate Location)

OPP, Bangor Shaft, and Bangor Swallet were dye tracer injection stations. Adapoted from Tetra Tech (2017)



**DYE TRACER RESULTS**

East Kentucky Power Cooperative  
Cooper Station Landfill

PREPARED FOR



PREPARED BY



Figure  
4

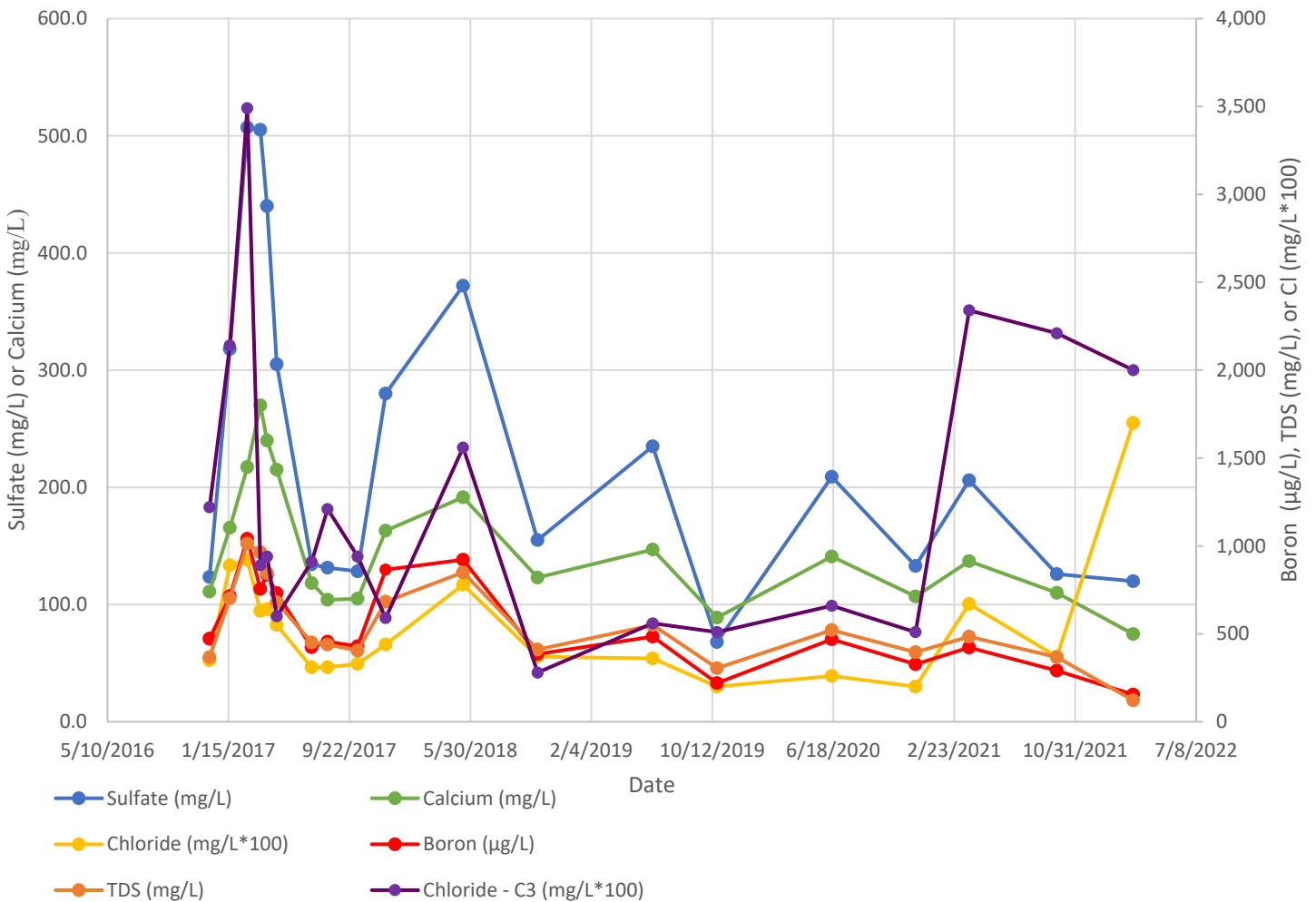
Project No. GR9033

Document No. GA220310

August 2022



### Select Appendix III Time Series at Spring S13 and Chloride at Spring C3



Notes: Concentration trends of select Appendix III constituents in spring S13 and Cl in upgradient spring C3 covering the monitoring history of these springs between December 2016 and February 2022.

Chloride concentrations were multiplied by a factor of 100 to fit the data into this scale. For example, a concentration of 1,700 mg/L on this graph corresponds to a measured concentration of 17 mg/L during the February 2022 sampling event.

#### Time Series of Select Constituents

Cooper Station Landfill  
Burnside, Kentucky

PREPARED FOR



PREPARED BY



PROJECT NO. GR9033

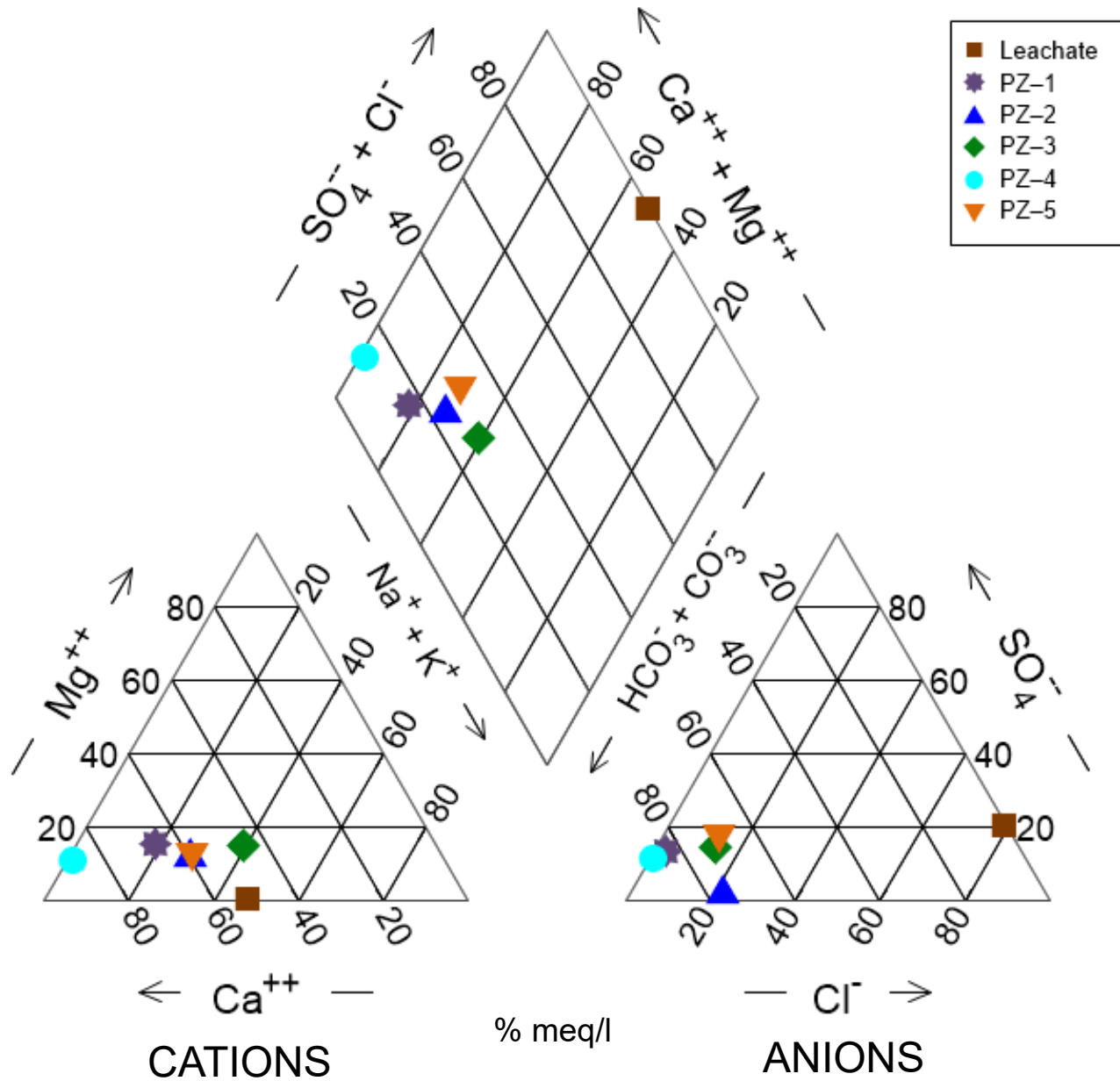
DOCUMENT NO. GA220310

**Figure**

**5**

# Piper Diagram

## Cooper Landfill



**Notes:**

1. The leachate sample was collected on 29 June 2022.
2. The piezometer samples were collected on 7 July 2022

**PIPER DIAGRAM – July 2022 SAMPLES**

Alternate Source Demonstration  
Cooper Station Landfill  
Burnside, Kentucky

PREPARED FOR



PREPARED BY

**Geosyntec**  
consultants  
KENNESAW, GA

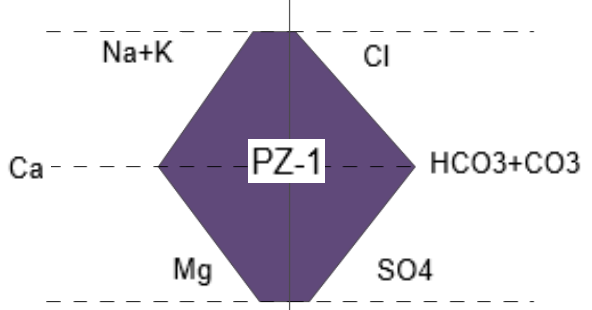
PROJECT NO. GR9033

DOCUMENT NO. GA220310

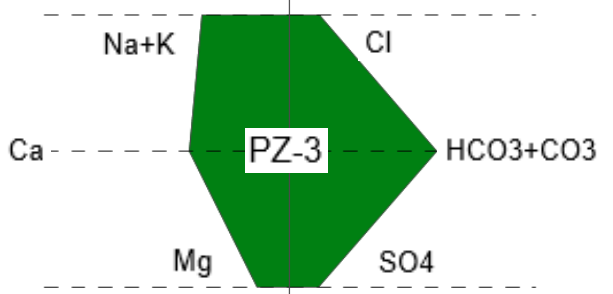
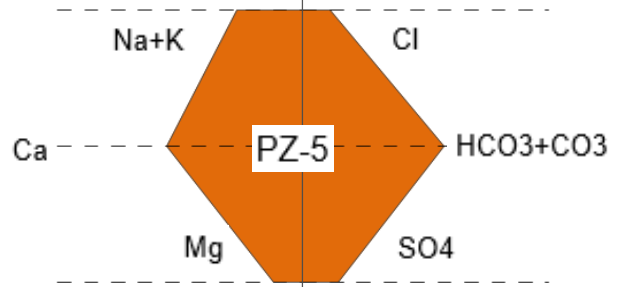
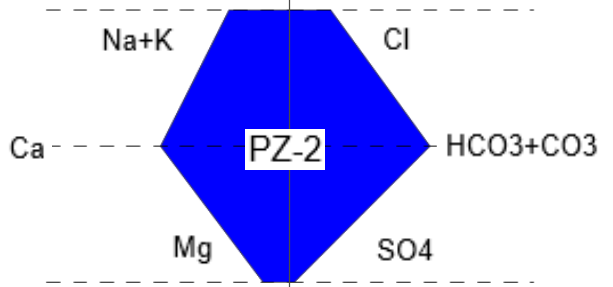
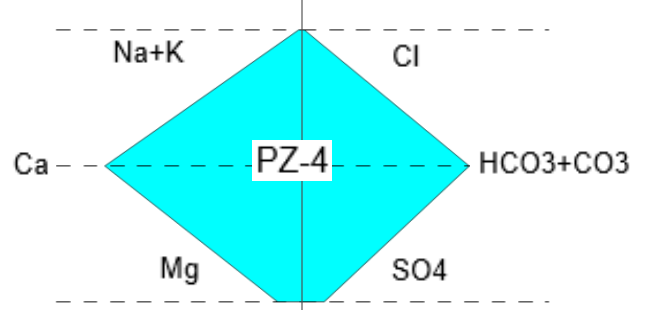
**Figure**

**6**

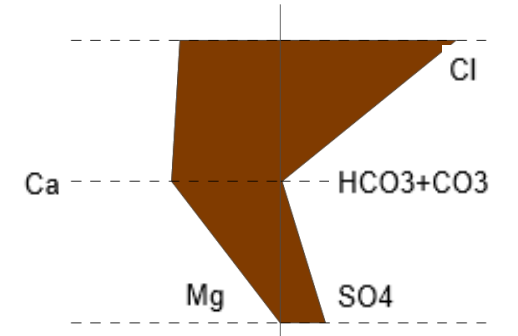
8 6 4 2 0 2 4 6 8  
Cations meq/l Anions



8 6 4 2 0 2 4 6 8  
Cations meq/l Anions



120 80 40 0 40 80 120  
Cations meq/l Anions



Leachate

Notes:  
1. The leachate sample was collected on 29 June 2022.  
2. The piezometer samples were collected on 7 July 2022.

**STIFF DIAGRAMS – JULY 2022 SAMPLES**

Alternate Source Demonstration  
Cooper Station Landfill  
Burnside, Kentucky

PREPARED FOR  
  
EAST KENTUCKY  
POWER COOPERATIVE  
A Touchstone Energy Cooperative

PREPARED BY  
  
Geosyntec  
consultants  
KENNESAW, GA

PROJECT NO. GR9033

DOCUMENT NO. GA220310

**Figure**  
**7**