December 20, 2023

Dr. Eun Ju Lee, P.E.
Project Manager
Industrial and Hazardous Waste Permits Section
Coal Combustion Residuals Program, MC-130
Waste Permits Division
Texas Commission on Environmental Quality
P. O. Box 13087
Austin, Texas 78711-3087

**RE: Monticello Steam Electric Station – CCR114, ISW 30081, EPA ID No. TXD054378948, Tracking No. 27262899; RN102285921/CN605736982 New CCR Registration – Technical NODs #3**

Dear Dr. Lee:
On behalf of Golden Eagle Development, LLC (Golden Eagle), Gemini Engineering (Gemini) is submitting responses to the deficiencies identified provided September 20, 2023, regarding the CCR Registration Application to the Texas Commission on Environmental Quality for the former Monticello Steam Electric Station (MOSES) facility.

## Deficiencies

**Deficiency #1:** *Revise the title of the referenced table to state, "Table VI.C.1 – Ground Water Detection Monitoring Parameters."*

**Response:** Table VI.C.1 was revised and is included in a revised Attachment #12.

**Deficiency #2:** *The potentiometric surface maps submitted with the facility's CCR application and the 2021 Texas Pollution Discharge Elimination System (TPDES) ground water monitoring report (GWMR) appear to be inconsistent with respect to the direction of ground water flow beneath the CCR units.*

1. *Provide a discussion regarding why these potentiometric surface maps are inconsistent with respect to the ground water direction in relation to the CCR units and revise maps in ground water report if necessary. Data from nearby TPDES ground water wells may be used to prepare a more detailed potentiometric surface map to substantiate your conclusion.*

*Revise application to include additional information to demonstrate that W-31, W 32, and W-33 are located upgradient from the CCR units and do not become downgradient due to seasonality.*

**Response:** Upon review of topographic maps and potentiometric data it appears that the BAP area is at a higher elevation and the shallow groundwater flows away from the BAP area and towards the east and west. Therefore, the monitoring wells: W-31, W-32, and W-33 are upgradient and at a high point in the area. An area specific groundwater study has not been completed; but recent potentiometric data supports the 2019 potentiometric surface map. Additionally, the CCR monitoring wells were not used in the TPDES potentiometric surface maps. The TPDES monitoring wells are deeper than the CCR monitoring wells; therefore, the CCR monitoring wells should provide a more accurate demonstration of the shallow groundwater in the BAPs area. A figure is included in the revised Attachment #15.

**Deficiency #3**: *Provide a discussion regarding whether the background concentrations for sulfate and total dissolved solids accurately represent the quality of background that has not been affected by leakage from any CCR unit.*

Based upon a review of the statistical analyses conducted in response to Deficiency's #5 through #7, there does not appear to be sufficient statistical evidence to state that the background monitoring wells have been affected by leakage from any CCR unit in the immediate vicinity of the ash ponds. Some natural variability has occurred during some events in the upgradient background monitoring wells. The CCR Groundwater Background Evaluation Report was updated and is included in a revised Attachment #15.

**Deficiency #4:** *Revise referenced tables to ensure: analytical results for boron are provided; all values that were not used in background ground water quality calculations are identified; and that the existing and updated background values with respect to each ground water monitoring well (MW) and each constituent in 40 CFR Part 257 Appendix III are included.*

**Response:** Table 1 (Appendix B) in the Updated CCR Groundwater Background Evaluation Report presents the analytical data used to perform the background calculations. The column titled "U-D-NE" identifies "U" – Upgradient (monitoring wells MW-31, MW-32, and MW-33), "D" – Downgradient (monitoring wells MW-29, MW-30, MW-34, and MW_35), and "NE" – Nature & Extent monitoring wells of which there are no current monitoring wells so designated. The table is organized with the upgradient monitoring wells presented first, followed by the downgradient monitoring wells in a simple numerical order (decreasing).

All parameters identified in 40 CFR Part 257 Appendix III are included in Table 1 (Appendix B) and were statistically analyzed. As Table 1 (Appendix B) is used for input into statistical software, no units of measure are identified in the table, however, all units are milligrams per Liter (mg/L) except for pH whose units are Standard Units.

**Deficiency #5:** *Revise to include a discussion regarding the type of probability distribution represented by the ground water sample data. The discussion should include how data was analyzed, whether sample data used to obtain initial/updated background concentrations is normally distributed, whether the distribution was mathematically transformed, whether any data was removed, and the probability distribution that best fits the data.*

**Response:** The data was analyzed following the procedures outlined in the *CCR Combustion Residual Rule Statistical Analysis Plan* (SAP) *for Ash Ponds at the Monticello Steam Electric Station*[1] prepared by Pastor, Behling & Wheeler, LLC, dated October 11, 2017.

The data was first analyzed on how to handle duplicate data, non-detect data, and anomalous detections as described in Section 2. Table 2 (Appendix B) summarizes basic information on the background data set. Parameters boron, calcium, chloride, pH, sulfate, and total dissolved solids (TDS) had 100% detection rates (i.e., no non-detect data). Only Fluoride had non-detection data identified in the upgradient monitoring well MW-31, and the downgradient monitoring wells MW-29, MW-34, and MW-35.

Per the 2017 SAP1, the upgradient monitoring well MW-31 data, and the data from the downgradient monitoring wells MW-29, and MW-34 were required to utilize robust regression order statistics (RROS) to estimate the summary statistics used in the background statistical analysis. Non-parametric statistical approaches were used to evaluate the downgradient monitoring well MW-35.

The next step was to test for statistical independence validity which is described in Section 3 of the SAP1. The four steps used to confirm validity were:

1. Spatial stationarity (Section 3.1) using side-by-side box plots and one-way analysis of variance (ANOVA) or Kruskal-Wallis (K-W) test to determine if spatial variability exists.
2. Temporal stationarity (Section 3.2) using time-series charts and Mann-Kendal or Thiel-Sen trend tests to determine if temporal stationarity exists.
3. Lack of autocorrelation (Section 3.3) using the von Neumann ratio test statistic only if the percent detection exceeds 50%.
4. Lack of statistical data outliers (Section 3.4) using the box plots from the spatial stationarity and Dixon's or Rosner's test.

The statistical analyses conducted to confirm statistical independence validity and analytical results are described under Deficiency #6 Response below. The CCR Groundwater Background Evaluation Report was updated and is included in a revised Attachment #15.

**Deficiency #6:** *Revise to include a statistical evaluation of background data for the following: spatial or temporal stationarity, trends and/or seasonal variation, homogeneity of variance, outliers, and normality. Please ensure that background values will be evaluated for the items referenced above with statistical methods appropriate for the background data distribution (i.e. parametric vs. nonparametric methods).*

**Response:** Based upon Section 2 of the SAP1, the data was processed to determine how many detections, non-detections, and any missing data existed for each monitoring well by parameter. No duplicate data was identified in the laboratory test analytical results; therefore, no duplicate data was removed. Several J-flagged values were identified only for Fluoride. These J-flagged values were considered as detected concentrations. Anomalous detections will be discussed as part of the spatial stationarity below.

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[1] Pastor, Behling & Wheeler, LLC, *CCR Combustion Residual Rule Statistical Analysis Plan* (SAP) *for Ash Ponds at the Monticello Steam Electric Station*, October 11, 2017.

Table 2 (Appendix B) in the Updated CCR Groundwater Background Evaluation Report indicates that apart from Fluoride, all other parameters had no non-detections; therefore, no data substitution (i.e., replacement for non-detects) was necessary. The four monitoring wells that had non-detections for Fluoride varied from 25% to 75% non-detections. Based upon the SAP1, monitoring wells MW-31, MW-29, and MW-34 required the use of RROS procedures while MW-35 required the use of non-parametric procedures.

To initiate the *Spatial Stationarity* evaluation, box plots were first plotted to determine whether any spatial stationarity exists. See Figure 3 (Appendix A) which was developed in response to Deficiency #7. See Table 3 (Appendix B) for comments on the spatial stationarity evaluation of the box plots. Due to the number of non-detects and J-values for Fluoride, no further statistical analysis could be conducted for spatial stationary for Fluoride. The box plots indicate that spatial stationarity exists between the upgradient and downgradient monitoring wells.

To evaluate all other parameters, an ANOVA analysis (non-parametric K-W test) was conducted using ProUCL5. See Table 4 (Appendix B) for the results of the analysis on all parameters except Fluoride. The analyses indicate that for all parameters, there exists a significant difference in the mean/median characteristics between the upgradient and downgradient monitoring wells during the background sampling events.

To initiate the *Temporal Stationarity* evaluation, time-series charts were prepared. Figure 4 (Appendix A) presents the time-series chart by parameter (alphabetical) and sub-divided by monitoring well (numerical). These time-series charts were generated in EXCEL. The time-series charts range from the initial background sample date (10/15/15) to the last 2022 sample date (12/17/22). See Table 2 (Appendix B) for comments on the visual evaluation of the time-series charts.

Mann-Kendall or Thiel-Sen trend analysis was then performed based on the distribution (normal, gamma-distributed, log-normal, or non-parametric) of the background data. The distribution (Goodness of Fit statistical method) of the background data was determined using the software program EnvStats[2] under the RStudio[3] graphic user interface. Table 2 (Appendix B) summarizes the goodness of fit analyses for each monitoring well and parameter. Figure 6 (Appendix A) presents the constituent trend analysis using the GSI Mann-Kendall Toolkit[4]. Table 6 (Appendix B) summarizes the findings of this analysis.

Based upon the analyses conducted, no clear increasing or decreasing trends were readily identified as a *Temporal Stationarity* for the background data sets.

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[2] Millard, Steven, *EnvStats – An R Package for Environmental Statistics*, 2013. Website: https://cran.r-project.org/web/packages/EnvStats/index.html

[3] Posit, *RStudio*, October 17, 2023, Website: https://posit.co/download/rstudio-desktop/

[4] GSI Environmental Inc., GSI Mann Kendall Toolkit, 2023. Website: https://www.gsienv.com/product/gsi-mann-kendall-toolkit/

To evaluate the *Lack of Auto Correlation*, EnvStats2 was used to determine whether any auto-correlation relationship was present in the background data using von Neumann's rank test. Table 7 (Appendix B) summarizes the analytical results from von Neumann's rank test using EnvStats2.

Based upon the comparison of the P-value to the alpha significance value (1-Confidence Level) of 0.05, no parameters exhibited any auto correlation indicating that sampling has been conducted with sufficient time between sampling events, that the sampling events do not sample from the same volume of ground water as the previous samples.

To evaluate the presence of a lack of *Statistical Outliers*, ProUCL[5] was used to analyze all the parameters except for Fluoride using both Rosner's and Dixon's tests, box plots as described under response to Deficiency #7, and Q-Q plots for selected parameters. The analysis of the data using Dixon's test was borderline as the sample size was 24 rather than the generally accepted value of 25 or more. Table 8 (Appendix B) presents the analysis for outliers. Although several data points were identified as outliers, based upon the data check to confirm if conditions could be identified that would have resulted in outliers being so designated, no conditions were identified. Therefore, all data points identified in Table 8 (Appendix B) are not considered outliers and these data points were left in all statistical analyses.

The background data was evaluated per the process described in SAP1**.**

**Deficiency #7:** *Revise to include legible box plot data. Revise box plots to ensure the following information is legible: the 0th, 25th, 50th, 75th, and 100th percentiles; sample mean and median; all applicable data points; and non-detects.*

**Response:** Box Plots were recreated to address the items identified in Deficiency #7 and are presented in Figure 3 (Appendix A) in the Updated CCR Groundwater Background Evaluation Report. The box plots were created using the U.S. Environmental Protection Agency's software program, ProUCL5. The box plots generated by ProUCL represent five-point summary graphs as follows:

- Q1 equals the 25$^{th}$ percentile, Q2 equals the 50$^{th}$ (median), and Q3 equals the 75$^{th}$ percentile.
- The interquartile range (IQR) equals Q3-Q1 (the height of the box in a box plot).
- The lower whisker starts at Q1, and the upper whisker starts at Q3.
- The lower whisker extends up to the lowest observation or (Q1 - 1.5 * IQR) whichever is higher.
- The upper whisker extends up to the highest observation or (Q3 + 1.5 * IQR) whichever is lower.
- The horizontal bars (also known as fences) are drawn at the end of the whiskers.
- Observations that lie outside the fences (above the upper bar and below the lower bar) represent potential outliers.

[5] U.S. Environmental Protection Agency, *Statistical Software ProUCL 5.2 for Environmental Applications for Data Sets with and without Nondetect Observations*, June 14, 2022. Website: https://www.epa.gov/land-research/proucl-software

Box plots generated by ProUCL do not include a notification that represents the sample mean. Any box plots that have non-detects also show a red line which represents the highest non-detect value for the group of monitoring wells by parameter.

**Deficiency #8**: *Revise to include a discussion regarding how initial/updated background values were calculated. The discussion should include: a step-by-step explanation of the assumptions used to update the background values, why they were updated, and how they were calculated; the computer program and statistical methods used for the analysis; which ground water MWs contributed to background calculations; and the background values for each applicable ground water MW.*

**Response**: Per the 2017 SAP1, after completion of the statistical analyses discussed in Response to Deficiency #s 4 through 7, the background data was determined to be acceptable for use in calculating prediction limits as required in the SAP1. Fluoride analytical results were modified in accordance with the SAP1 by substituting ½ of the Reporting limits for all non-detect analytical results.

Per the SAP1, prediction limits were calculated for use in determining whether any groundwater monitoring analytical results beyond the background sampling events would result in a Statistically Significant Increase (SSI). To calculate the prediction limits, EnvStats2 was used to calculate these limits. Variables used to calculate the prediction limits included the following:

- Distribution of the data
- Sample size
- Prediction interval method and type
- Calculated confidence level as shown on page 19-8 of the Unified Guidance[6] document

**Table 9 (Appendix B) presents the prediction limits calculated for each parameter. The below table presents a summary of the calculated prediction limits:**

| Parameter | Calculated Prediction Limits |
|---|---|
| Boron (mg/L) | 8.52 |
| Calcium (mg/L) | 311 |
| Chloride (mg/L) | 182 |
| Fluoride (mg/L) | 2.10 |
| pH (field) (s.u.) | 5.27-7.36 |
| Sulfate (S04) (mg/L) | 1,193 |
| Total Dissolved Solids (TDS) (mg/L) | 2,160 |

The SAP1 states that in determining the background value one is to utilize the higher of the Upper Prediction Limit and the reporting limit. Table 10 summarizes the reporting limit, the prediction limits and what is the selected background value for each parameter based upon the directives in

[6] U.S. Environmental Protection Agency, *Unified Guidance: Statistical Analysis of Groundwater Monitoring Data At RCRA Facilities*, March 2009 (commonly called the Unified Guidance document)

the SAP1. Table 11 presents additional information which assisted in the evaluation of the background values.

The SAP1 requires that for each round of sampling conducted after the background sampling events (commonly referred to as post-background sampling events) each result is to be compared to the background value to determine if an SSI has occurred.

**Deficiency #9:** *Revise to include a discussion explaining how background concentrations will be used to evaluate groundwater. This should include: whether an interwell or intrawell analysis will be used, the statistical methods used to determine whether a statistically significant increase (SSI) has occurred, and whether different statistical methods will be used for certain constituents or wells.*

**Response:** Per the 2017 SAP1, after every detection monitoring event, the constituent concentrations from each downgradient point of compliance monitoring well will be compared to the background values to ascertain if an SSI above background does or does not exist. Possible outcomes from comparing the detection monitoring constituent concentrations in each downgradient monitoring well to their respective background values are as follows:

- All detection monitoring constituent concentrations in a downgradient compliance monitoring well are less than or equal to their respective background values; or
- One or more detection monitoring constituent concentrations in a downgradient compliance monitoring well are above their respective background values.

Should any point of compliance monitoring well concentrations from the current sampling event exceed their respective background value, that monitoring well from which the exceedance occurred is to be resampled for that parameter only as described in the SAP1. If the resample indicates that the target detection monitoring constituent concentration(s) in the monitoring well or wells is less than or equal to their respective background value(s), then it can be concluded that an SSI over background for all detection monitoring constituents does not exist, since concentrations in one (1) sample of the two (2) independent samples do not exceed the appropriate background value(s).

Should any point of compliance monitoring well concentrations from the current sampling event exceed their respective background value, then an SSI over background for this target detection monitoring constituents can be concluded. If an SSI is indicated, the following is to occur within 90 days of the resampling event:

- Establish an assessment monitoring program as described in the SAP1; or
- Demonstrate that a source other than the CCR unit caused the SSI over the background value for a constituent, or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in ground water quality.

If a successful demonstration is completed within the 90-day period, the CCR unit may continue with the detection monitoring program.

The SAP does not require any specific statistical processes nor interwell or intrawell analysis.

**Deficiency #10:** *Revise report to add a narrative explaining how the constituents in each ground water MW were evaluated for an SSI for ground water sampled during 2022. Include the specific statistical methods used, whether any data was removed and justification for removal, copies of charts or graphs that were used, and any other information used to perform the evaluation.*

**Response:** Based on the responses to Deficiency's #5 through #9 presented previously, the parameters in each downgradient point of compliance monitoring well are compared to their respective background values as described in the 2017 SAP1. There are two (2) possible outcomes identified below:

- All detection monitoring constituent concentrations in a downgradient compliance monitoring well are less than or equal to their respective background values; or
- One or more detection monitoring constituent concentrations in a downgradient compliance monitoring well are above their respective background values.

A table is included in Attachment 15 that summarizes the point of compliance groundwater monitoring data from the two (2) sampling events in 2022 compared to new the background values. All downgradient monitoring wells were below the background values. The CCR Groundwater Background Evaluation Report was updated and is included in a revised Attachment #15.

Some natural variability has occurred during some events in the upgradient background monitoring wells.

**Deficiency #11:** *Revise to specify whether the following items have been removed or will be left in place, with respect to each CCR unit: 4-in thick concrete revetment, clay liner, underground pipes, other liner system components, and underlying soils beneath the liner system.*

**Response:** Per the demolition contractor, the ash ponds did not contain a revetment mat above the clay liner as noted in original design drawings. Some concrete structures and piping remain on the berms; however, the pipes are abandoned and the coal burning units have been demolished. There is no underground piping in the BAPs. A few inches of liner material were removed during ash removal, but the clay liner still is still present until the units are regulatorily closed.

**Deficiency #12:** *Revise to include a discussion explaining how the facility will determine whether any underlying soils beneath the CCR units have been affected by releases from the CCR unit and how the facility plans to remove or decontaminate these areas. See federal register preamble 80 FR 21412 for more information.*

*Provide a demonstration that the closure by removal of CCR units meet ground water protection standards including Appendices III & IV constituents prescribed by the cited rule.*

**Response:** The CCR regulations do not require soil sampling or proof that soil is impacted and there have been no known documented releases at the CCR units. Per the Federal Register Preamble: "*The first phase is detection monitoring where indicators would be monitored to determine whether groundwater was potentially being contaminated*".

Additionally, per the TCEQ Draft Technical Guidance #32: *"After the completion of background monitoring, the Owner/Operator must sample all monitoring wells on a semiannual basis for the constituents listed in Appendix III adopted by reference in 30 TAC §352.1421, unless another sampling schedule is approved by the TCEQ. The goal of detection monitoring is to identify changes in groundwater chemistry that may indicate a release from the CCR unit"*.

As documented in the 2022 Annual Groundwater Monitoring and Corrective Action Report (Gemini 2023), the groundwater laboratory results of the downgradient point of compliance monitoring wells at the waste boundary do not indicate a release from the CCR units. The bottom ash ponds are lined with three-foot clay liners that meet 40 CFR 257.71, therefore; it is not likely that a release has occurred from the liner system.

Closure by removal has been completed and certified; and upon a review of the BAP groundwater data for the last several years, Assessment Monitoring has not been implemented at the BAPs; therefore, groundwater protection standards have not been established pursuant to 40 CFR 257.95 and there is no recent Appendix 4 analytical data for comparison. Based on the above information the CCR Units should be considered closed by removal.

If you have any questions or require additional information, please call me at 512-566-6878 or at A.Kaiser@GeminiSTL.com.

Respectfully,

Adam J. Kaiser

Adam Kaiser, PE
Senior Project Engineer

cc: Golden Eagle Development

**Attachment #12 for VI.29A – Table VI.C.1 – GW Detection Monitoring Parameters**

**NODs #1 – December 20, 2023**

**Table VI.C-1. – Groundwater Detection Monitoring Parameters**

| Parameter | Sampling Frequency | Analytical Method | Practical Quantification Limit (units) | Concentration Limt[1] |
|---|---|---|---|---|
| Boron | Semi-Annual | EPA 6020 | <0.03 mg/L | 8.52 mg/L |
| Calcium | Semi-Annual | EPA 6020 | <1.0 mg/L | 311 mg/L |
| Chloride | Semi-Annual | EPA 9056A | <1.0 mg/L | 184 mg/L |
| Fluoride | Semi-Annual | EPA 9056A | <0.15 mg/L | 2.93 mg/L |
| Sulfate | Semi-Annual | EPA 9056A | <25.0 mg/L | 1,190 mg/L |
| Total Dissolved Solids | Semi-Annual | EPA 2540 | <10.0 mg/L | 2,150 mg/L |
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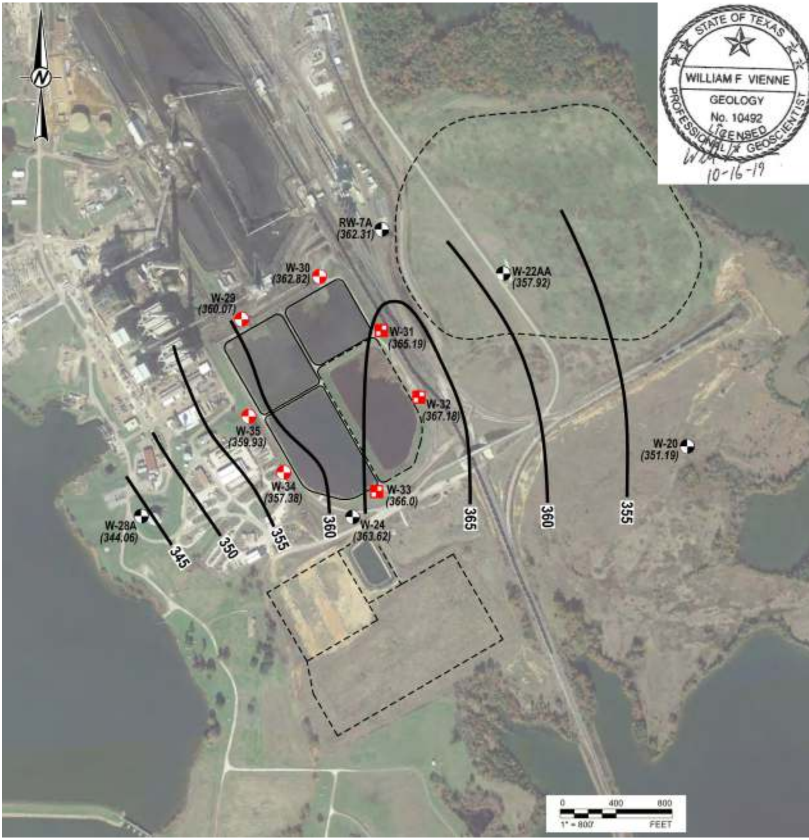
1 The concentration limit is the basis for determining whether a release has occurred from the CCR unit/area.

**Attachment #15 for VI.29.B – Groundwater Background Evaluation**

**NOD #2 through #10 – December 20, 2023**




**LEGEND**

- DOWNGRADIENT CCR MONITORING WELL
- UPGRADIENT CCR MONITORING WELL
- NON-CCR WELL IN SHALLOW/INTERMEDIATE ZONES
- *(357.26)* GROUNDWATER POTENTIOMETRIC SURFACE (FT AMSL)
- 360 GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR (C.I. = 5 FT)

**REFERENCE(S)**

BASE MAP TAKEN FROM GOOGLE EARTH, IMAGERY DATED 12/2/15.

CLIENT
LUMINANT

PROJECT
MONTICELLO STEAM ELECTRIC STATION
MT PLEASANT, TEXAS

TITLE
**ASH SETTLING PONDS & ASH WATER RETENTION POND POTENTIOMETRIC SURFACE MAP**
**MAY 2019**

CONSULTANT

GOLDER

| | |
|---|---|
| YYYY-MM-DD | 2019-09-23 |
| DESIGNED | AJD |
| PREPARED | AJD |
| REVIEWED | WFV |
| APPROVED | WFV |

PROJECT NO. 19122449 REV. 0 FIGURE 4

Last Edited By: adiamond Date: 2019-09-23 Time:10:16:33 AM | Printed By: adiamond Date: 2019-09-20 Time:4:31:05 PM | File Name: FIG 3 - POT Surface Map (May 2019).dwg
Path: \\texarkana\data\Projects - Round Rock\19122449 - Luminant\Monticello\APAR\

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
0 1 in

**TABLE D10-1**
**Statistical Analysis of Ground Water Data**
**Comparison of Background to 2023 Downgradient Wells**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

| Well ID | Date Sampled | Boron (mg/L) | Calcium (mg/L) | Chloride (mg/L) | Fluoride (mg/L) | pH (s.u.) | Sulfate (mg/L) | TDS (mg/L) |
|---|---|---|---|---|---|---|---|---|
| W-29 | 05/30/22 | NS | NS | NS | NS | NS | NS | NS |
| W-29 | 12/17/22 | 4.43 | 122 | 82 | 0.339 | 6.60 | 790 | 1,370 |
| W-30 | 05/30/22 | 4.04 | 112 | 43.8 | 0.70 | 5.61 | 682 | 1,090 |
| W-30 | 12/03/22 | 4.60 | 119 | 45.4 | 0.813 | 5.58 | 636 | 1,030 |
| W-34 | 05/30/22 | 5.61 | 220 | 108 | 0.29 | 6.30 | 918 | 1,800 |
| W-34 | 12/17/22 | 5.67 | 216 | 122 | 0.19 | 6.38 | 973 | 1,600 |
| W-35 | 05/30/22 | 5.26 | 232 | 115 | <0.15 | 5.42 | 946 | 1,670 |
| W-35 | 12/17/22 | 5.55 | 228 | 104 | <0.15 | 5.60 | 942 | 1,520 |
| | Background Values: | 8.52 | 311 | 182 | 2.10 | | 1,193 | 2,160 |
| | | | | | LPL: | 5.27 | | |
| | | | | | UPL: | 7.36 | | |

# Updated CCR Ground Water Background Evaluation Report

# Bottom Ash Ponds

Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

**Prepared For:**

Golden Eagle Development LLC

**Prepared By:**

Gemini Engineering LLC
2275 Cassens Drive, Suite 118
Fenton, Missouri 63026

December 19, 2023

## TABLE OF CONTENTS



**List of Tables (Appendix B)**

**List of Figures (Appendix A)**

## LIST OF COMMON ACRONYMS

| | |
|---|---|
| ANOVA | Analysis of Variance |
| BAPs | Bottom Ash Ponds |
| CCR | Coal Combustion Residuals |
| Gemini | Gemini Engineering LLC |
| GWMP | Ground Water Monitoring Plan |
| K-W | Kruskal–Wallis Test |
| mg/L | milligrams per liter |
| MOSES | Monticello Steam Electric Station |
| QA/QC | Quality Control/Quality Assurance |
| SAP | Sampling Analysis Plan |
| Q-Q Plots | Quantile-Quantile Plots |
| RROS | Robust Regression Order Statistics |
| S.U. | Standard Units |
| TCEQ | Texas Council of Environmental Quality |
| TDS | Total Dissolved Solids |
| USEPA | U.S. Environmental Protection Agency |

## 1.0 INTRODUCTION

On behalf of Golden Eagle Development, LLC (Golden Eagle), Gemini Engineering LLC (Gemini) has prepared this Updated Coal Combustion Residue (CCR) Ground Water Background Evaluation (30 TAC 352.281(b)) for the Bottom Ash Ponds (BAPs) at the Monticello Steam Electric Station (MOSES). This evaluation is an update to the background values previously provided, following the procedures detailed in the 2017 CCR Statistical Analysis Plan[1] (SAP) and 2017 Annual Groundwater Monitoring Report[2].

The MOSES CCR BAPs are currently in the Detection Monitoring Program. Luminant (the previous owner) collected the initial Detection Monitoring Program ground water samples from the BAPs CCR monitoring well network (see Figure 2 in Appendix A) in October 2015. Detection ground water samples have been collected from the CCR groundwater monitoring network on a semi-annual basis from 2015 through 2022, as required by the CCR Rule. All CCR ground water monitoring wells were sampled for Appendix III constituents during the detection monitoring sampling events. Closure by removal of the ash-settling ponds was completed in the Fall of 2022.

[1] Pastor, Behling & Wheeler, LLC, *CCR Combustion Residual Rule Statistical Analysis Plan* (SAP) *for Ash Ponds at the Monticello Steam Electric Station*, October 11, 2017. Website: https://www.ccrsites.com/monticello
[2] Pastor, Behling & Wheeler, LLC, *2017 Groundwater Monitoring Report for Ash Ponds at the Monticello Steam Electric Station*, January 31, 2018. Website: https://www.ccrsites.com/monticello

# 2.0 INITIAL DATA EVALUATION

## 2.1 Background Ground Water Analytical Data

Table 1 (Appendix B) presents the analytical data used to perform the background calculations. The laboratory analytical sheets are in Appendix A of the 2017 Annual Ground Water Monitoring Report[2].

The column in Table 1 (Appendix B) titled "U-D-NE" identifies "U" – Upgradient (monitoring wells MW-31, MW-32, and MW-33), "D" – Downgradient (monitoring wells MW-29, MW-30, MW-34, and MW-35), and "NE" – Nature & Extent monitoring wells of which there are no current wells so designated. The table is organized with the upgradient wells presented first, followed by the downgradient wells in a simple numerical order (decreasing).

Eight (8) background ground water samples were collected on the following dates:

1. October 15, 2015
2. December 7, 2015
3. February 22, 2016
4. April 4, 2016
5. June 6, 2016
6. August 8, 2016
7. October 29, 2016
8. December 29, 2016

All parameters identified in 40 CFR Part 257 Appendix III are included in Table 1 (Appendix B) and were statistically analyzed.

## 2.2 Initial Data Analysis

The data was analyzed following the procedures outlined in the SAP[1]. The data was first analyzed on how to handle duplicate data, non-detect data, and anomalous detections as described in Section 2 of the SAP[1]. The data was processed to determine how many detections, non-detections, and any missing data existed for each monitoring well by parameter. No duplicate data was identified in the laboratory test results; therefore, no duplicate data was removed. Several J-flagged values were identified only for Fluoride. These J-flagged values were considered as detected concentrations per the SAP[1]. Anomalous detections will be discussed as part of the spatial stationarity in Section 2.3. Table 2 (Appendix B) summarizes basic information on the background ground water data set. The parameters boron, calcium, chloride, pH, sulfate, and total dissolved solids (TDS) had 100% detection rates (i.e., no non-detect data). Only fluoride had any non-detection data identified in the upgradient monitoring well MW-31, and the downgradient wells MW-29, MW-34, and MW-35.

Per the SAP[1], the upgradient monitoring well MW-31, and the downgradient monitoring wells MW-29, and MW-34 were required to utilize robust regression order statistics (RROS) to estimate many of the summary statistics used in the background statistical analysis. Non-parametric statistical approaches were used to evaluate the downgradient monitoring well MW-35.

The next step for the initial data analysis was to test for statistical independence validity which is described in Section 3 of the SAP[1]. The four steps used to confirm validity were:

1. Spatial stationarity (Section 2.3) using side-by-side box plots and one-way analysis of variance (ANOVA) or Kruskal-Wallis (K-W) test to determine if spatial variability exists.
2. Temporal stationarity (Section 2.4) using time-series charts and Mann-Kendal or Thiel-Sen trend tests to determine if temporal stationarity exists.
3. Lack of autocorrelation (Section 2,5) using the von Neumann ratio test statistic only if the percent detection exceeds 50%.
4. Lack of statistical data outliers (Section 2.6) using the box plots from the spatial stationarity and Dixon's or Rosner's test.

## 2.3 Spatial Stationarity

To initiate the *Spatial Stationarity* evaluation, box plots were first generated to determine whether any spatial stationarity exists. Figure 3 (Appendix A) was developed to commence the spatial stationarity evaluation using box plots generated using ProUCL[3]. Due to the number of non-detects and J-values for fluoride, no further statistical analysis could be conducted for spatial stationary for fluoride.

The box plots generated by ProUCL[3] represent five-point summary graphs as follows:

- Q1 equals the 25th percentile, Q2 equals the 50th (median), and Q3 equals the 75th percentile.
- The interquartile range (IQR) equals Q3-Q1 (the height of the box in a box plot).
- The lower whisker starts at Q1, and the upper whisker starts at Q3.

[3] U.S. Environmental Protection Agency, *Statistical Software ProUCL 5.2 for Environmental Applications for Data Sets with and without Nondetect Observations*, June 14, 2022. Website: https://www.epa.gov/land-research/proucl-software

- The lower whisker extends up to the lowest observation or (Q1 - 1.5 * IQR) whichever is higher.
- The upper whisker extends up to the highest observation or (Q3 + 1.5 * IQR) whichever is lower.
- The horizontal bars (also known as fences) are drawn at the end of the whiskers.
- Observations that lie outside the fences (above the upper bar and below the lower bar) represent potential outliers.

The box plots indicate that spatial stationarity exists between the upgradient and downgradient wells (see Table 3 in Appendix B for a summary).

In addition to the box plots, Quantile-Quantile (Q-Q) plots were generated using ProUCL[3] to evaluate the validity of the box plot results. Figure 4 (Appendix A) presents the results of the Q-Q plots. The Q-Q plots generally reinforce the visual interpretation of the box plots (see Figure 3 in Appendix A and Table 3 in Appendix B).

To further evaluate *Spatial Stationarity*, a one-way ANOVA analysis (the non-parametric K-W test) was conducted using ProUCL[3]. See Table 4 (Appendix B) for the results of the analysis on all parameters except Fluoride. The analyses indicate that for all parameters, there exists a statistical difference in the mean/median characteristics between the upgradient and downgradient wells during the background sampling events.

## 2.4 Temporal Stationarity

To initiate the *Temporal Stationarity* evaluation, time-series charts were prepared. Figure 5 (Appendix A) presents the time-series chart by parameter (alphabetical) and subdivided by monitoring well (numerical). These time-series charts were generated in EXCEL[4]. The time-series charts range from the initial background sample date (10/15/15) to the last 2022 sample date (12/17/22). See the column titled "*Visual Trend from Time-Series Graphs*" in Table 2 (Appendix B) for comments on the visual evaluation of the time-series charts.

Mann-Kendall or Thiel-Sen trend analysis was then performed based on the distribution (normal, gamma-distributed, log-normal, or non-parametric) of the background data (see the columns titled "*Mann-Kendal Trend Analysis*" and "*Thiel-Sen Trend Analysis*" in Table 2, Appendix B). The Mann-Kendal charts are included as Figure 6, Appendix A. The distribution (Goodness of Fit statistical method) of the background data was determined

[4] Microsoft Corporation, *Microsoft Excel*, Retrieved from https://office.microsoft.com/excel.

using the software program EnvStats[5] under the RStudio[6] graphic user interface (see Table 5 in Appendix B). Table 6 (Appendix B) summarizes the goodness of fit analyses for each well and parameter.

Based upon the analyses conducted, no evidence of statistically increasing or decreasing trends was readily identified as a Temporal Stationarity for the background data sets.

### 2.5 Autocorrelation

To evaluate the *Lack of Auto Correlation*, EnvStats[5] was used to determine whether any auto-correlation relationship was present in the background data using Von Neumann's rank test. Table 7 (Appendix B) summarizes the results from von Neumann's rank test using EnvStats[5].

Based upon the comparison of the P-value to the alpha significance value (1-Confidence Level) of 0.05, no parameters exhibited any autocorrelation indicating that sampling has been conducted with sufficient time between sampling events, that the sampling events do not sample from the same volume of ground water as the previous samples.

### 2.6 Data Outliers

To evaluate the presence of a lack of *Statistical Outliers*, ProUCL[3] was used to analyze all the parameters except for Fluoride using both Rosner's and Dixon's tests, box plots (see Figure 3 in Appendix A) and Q-Q plots (see Figure 4 in Appendix A) for selected parameters. The analysis of the data using Dixon's test was borderline as the sample size was 24 rather than the generally accepted value of 25 or more. Table 8, Appendix B presents the analysis for outliers. Although several data points were identified as outliers, based upon the data check to confirm if conditions could be identified that would have resulted in outliers being so designated, no conditions were identified. Therefore, all data points identified in Table 8 are not considered outliers and these data points were left in all statistical analyses.

---

[5] Millard, Steven, EnvStats – *An R Package for Environmental Statistics*, 2013. Website: https://cran.r-project.org/web/packages/EnvStats/index.html

[6] Posit, RStudio, October 17, 2023. Website: https://posit.co/download/rstudio-desktop/

## 3.0 BACKGROUND VALUE EVALUATION

After completion of the statistical analyses discussed in Section 2 above and following the directives in the SAP[1], the background data was determined to be acceptable for use in calculating prediction limits. Fluoride results were modified following the SAP[1] by substituting ½ of the Reporting limits for all non-detect results.

### 3.1 Prediction Limits

Per the SAP[1], prediction limits were calculated for use in determining whether any ground water monitoring results beyond the background sampling events would result in a Statistically Significant Increase (SSI). To calculate the prediction limits, EnvStats[4] was used to calculate these limits. Variables used to calculate the prediction limits included the following:

- Distribution of the data
- Sample size
- Prediction interval method and type
- Calculated confidence level as shown on page 19-8 of the Unified Guidance document[7].

Table 9 (Appendix B) presents the prediction limits calculated for each parameter. The below table presents a summary of the calculated prediction limits.

| Parameter | Calculated Prediction Limits |
|---|---|
| Boron (mg/L) | 8.52 |
| Calcium (mg/L) | 311 |
| Chloride (mg/L) | 182 |
| Fluoride (mg/L) | 2.10 |
| pH (field) (s.u.) | 5.27-7.36 |
| Sulfate (S04) (mg/L) | 1,193 |
| Total Dissolved Solids (TDS) (mg/L) | 2,160 |

The SAP[1] states that in determining the background value one is to utilize the higher of the Upper Prediction Limit and the reporting limit except for the parameter pH which uses both

[7] U.S. Environmental Protection Agency, *Unified Guidance: Statistical Analysis of Groundwater Monitoring Data At RCRA Facilities*, March 2009 (commonly called the Unified Guidance document).

the Lower and Upper Prediction Limits. Table 10 (Appendix A) summarizes the reporting limit, the prediction limits and what is the selected background value for each parameter based upon the directives in the SAP[1]. Table 11 (Appendix A) presents additional information that assisted in the evaluation of the background values.

The SAP[1] requires that for each round of sampling conducted after the background sampling events (commonly referred to as post-background sampling events), each result is to be compared to the background value to determine if an SSI has occurred.

As detection monitoring continues, the SAP[1] recommends determining whether to update background data sets periodically with valid monitoring concentrations that are representative of ground water unimpacted by leakage from the CCR unit. The Unified Guidance document[7] recommends reviewing and potentially updating background values when enough new concentrations have been collected to perform statistical comparisons. Background values should be reviewed about every two- or three years during ground water monitoring.

Per the SAP[1], after every detection monitoring event, the constituent concentrations from each downgradient point of compliance monitoring well are compared to the background values (see Table 10 in Appendix B) to ascertain if an SSI above background does or does not exist. Possible outcomes from comparing the detection monitoring constituent concentrations in each downgradient monitoring well to their respective background values are as follows:

- All detection monitoring constituent concentrations in a downgradient compliance well are less than or equal to their respective background values; or
- One or more detection monitoring constituent concentrations in a downgradient compliance well are above their respective background values.

Should any point of compliance monitoring well concentrations from the current sampling event exceed their respective background value, that monitoring well from which the exceedance occurred is to be resampled for that parameter only as described in the SAP[1]. If the resample indicates that the target detection monitoring constituent concentration(s) in the monitoring well or wells is less than or equal to their respective background value(s), then it can be concluded that an SSI over background for all detection monitoring constituents does not exist, since concentrations in one (1) sample of the two (2) independent samples do not exceed the appropriate background value(s).

## 4.0 CERTIFICATION STATEMENT

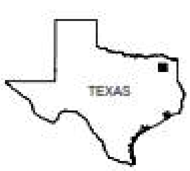
This ground water background re-evaluation report, and all attachments were prepared by Gemini Engineering LLC under my direction and supervision. This report meets the requirements of 30 TAC 352.281(b) and has been prepared in a manner consistent with recognized and generally accepted good engineering practices.

Adam J. Kaiser, PE
Senior Project Engineer
Gemini Engineering, LLC
Texas PE No 126387, Expires 3/31/2024
Texas Engineering Firm F-23183


12/20/2023

# APPENDIX A
# Figures and Tables


LEGEND




PHOTOGRAPH LOCATION

APPROXIMATE SCALE

0 1,000 2,000 4,000

Reference Imagine obtained from Pastor, Behling & Wheeler, LLC, *2017 Groundwater Monitoring Report for Ash Ponds at the Monticello Steam Electric Station* , January 31, 2018

Issue Date: 12/15/23

Gemini Engineering LLC
2275 Cassens Dr., St 118
Fenton, MO 63026

**Golden Eagle Development LLC**

| | | |
|---|---|---|
| DRWN: BJF | Date: | 12/15/23 |
| CHKD: KO | Date: | 12/15/23 |
| APPD: AK | Date: | 12/15/23 |
| SCALE: | 1" = ~2,000' | |

**Revised Background Ground Water Evaluation**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

**SITE LOCATION MAP**

Figure No: 1


LEGEND

CCR Monitoring Well Location

APPROXIMATE SCALE

0 1,000 2,000 4,000

Reference Imagine obtained from Pastor, Behling & Wheeler, LLC, *2017 Groundwater Monitoring Report for Ash Ponds at the Monticello Steam Electric Station* , January 31, 2018

Issue Date: 12/15/23

Gemini Engineering LLC
2275 Cassens Dr., St 118
Fenton, MO 63026

**Golden Eagle Development LLC**

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|---|---|---|
| DRWN: BJF | Date: | 12/15/23 |
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| APPD: AK | Date: | 12/15/23 |
| SCALE: | 1" = ~2,000' | |

GEMINI ENGINEERING

**Revised Background Ground Water Evaluation**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

**DETAILED SITE MAP**

Figure No: 2

**FIGURE 3**
**Statistical Analysis of Ground Water Data**
**Box Plots – All Parameters**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

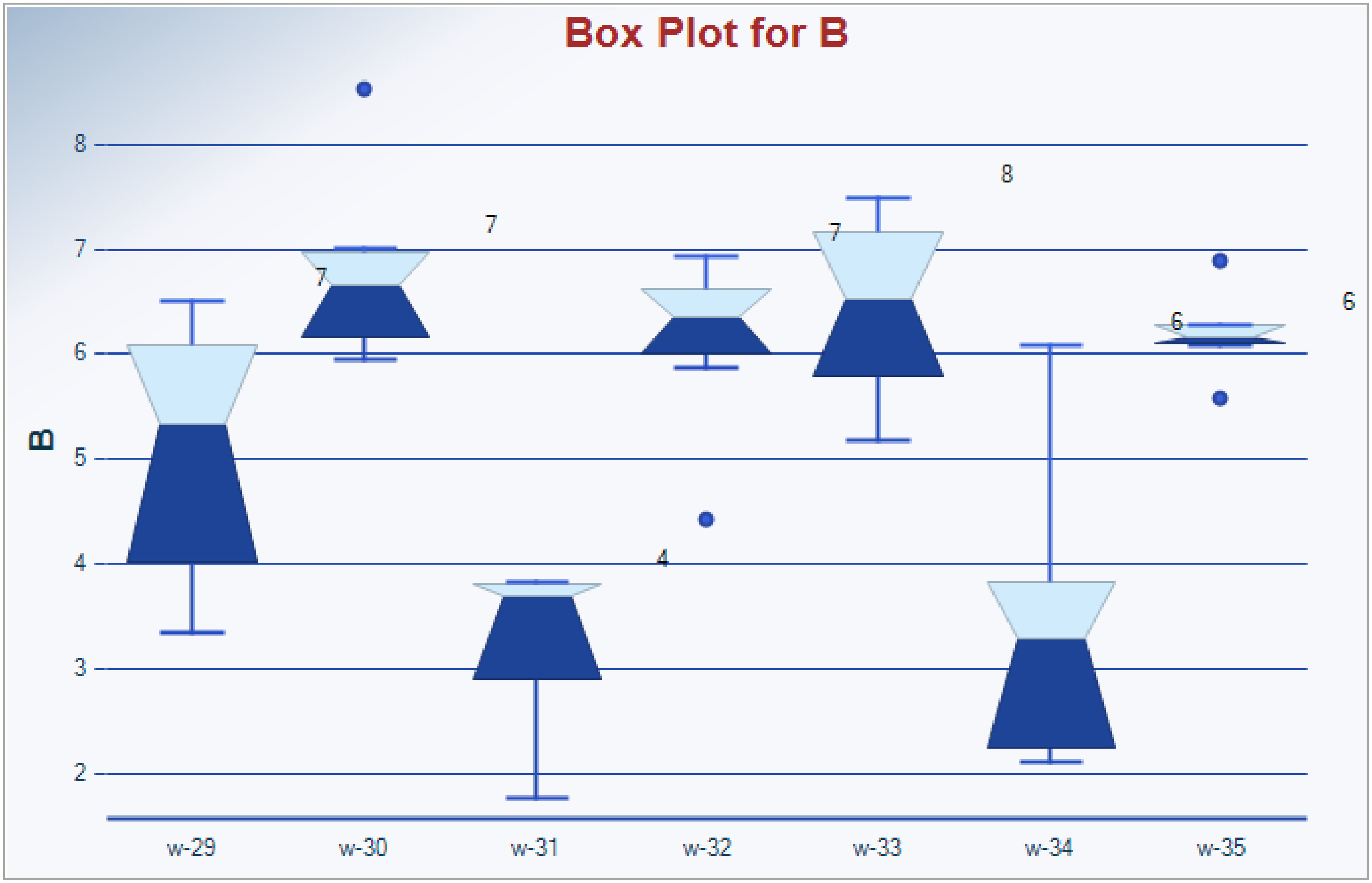

**FIGURE 3**
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**Former Monticello Steam Electric Station**
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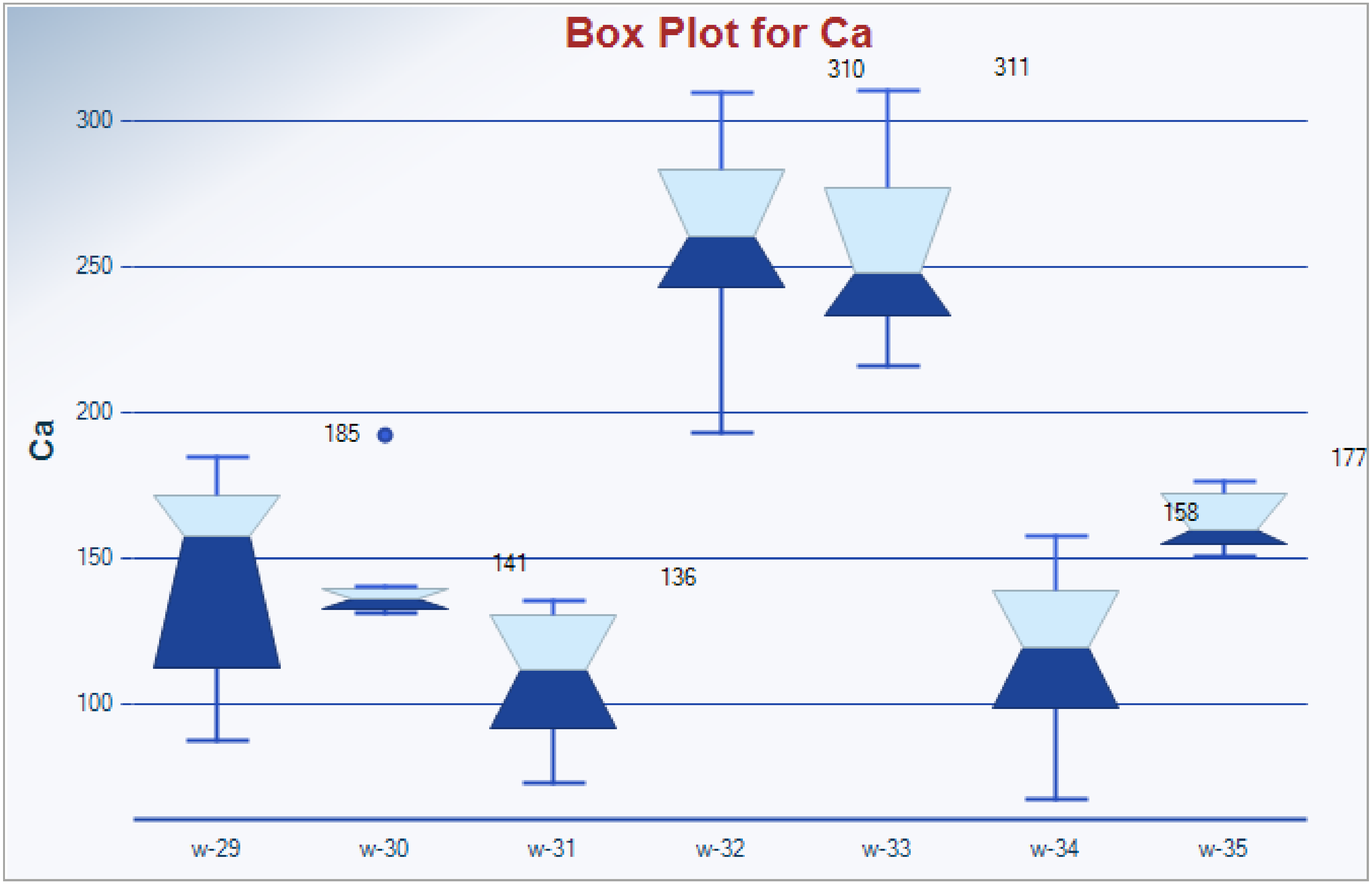

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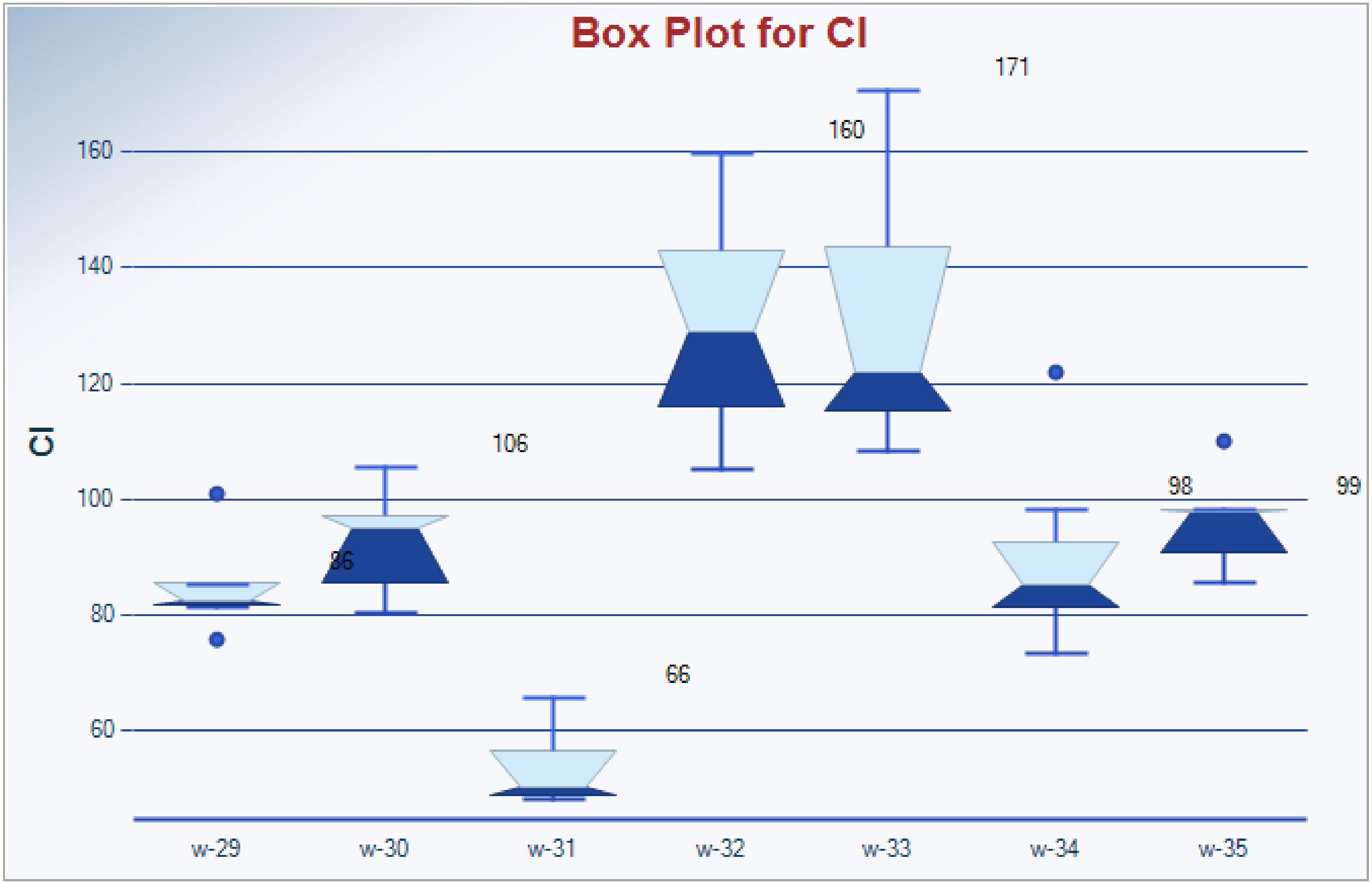

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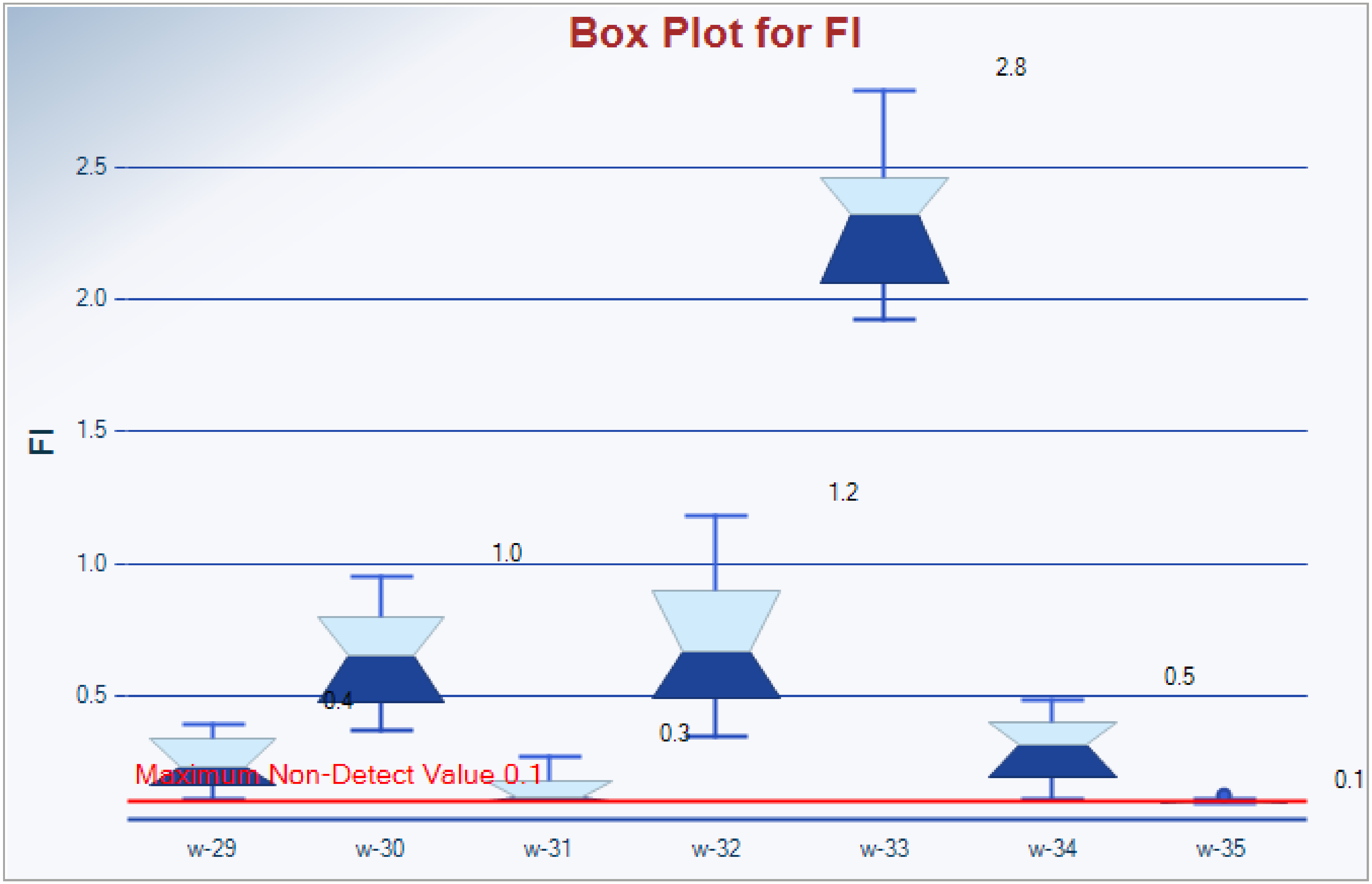

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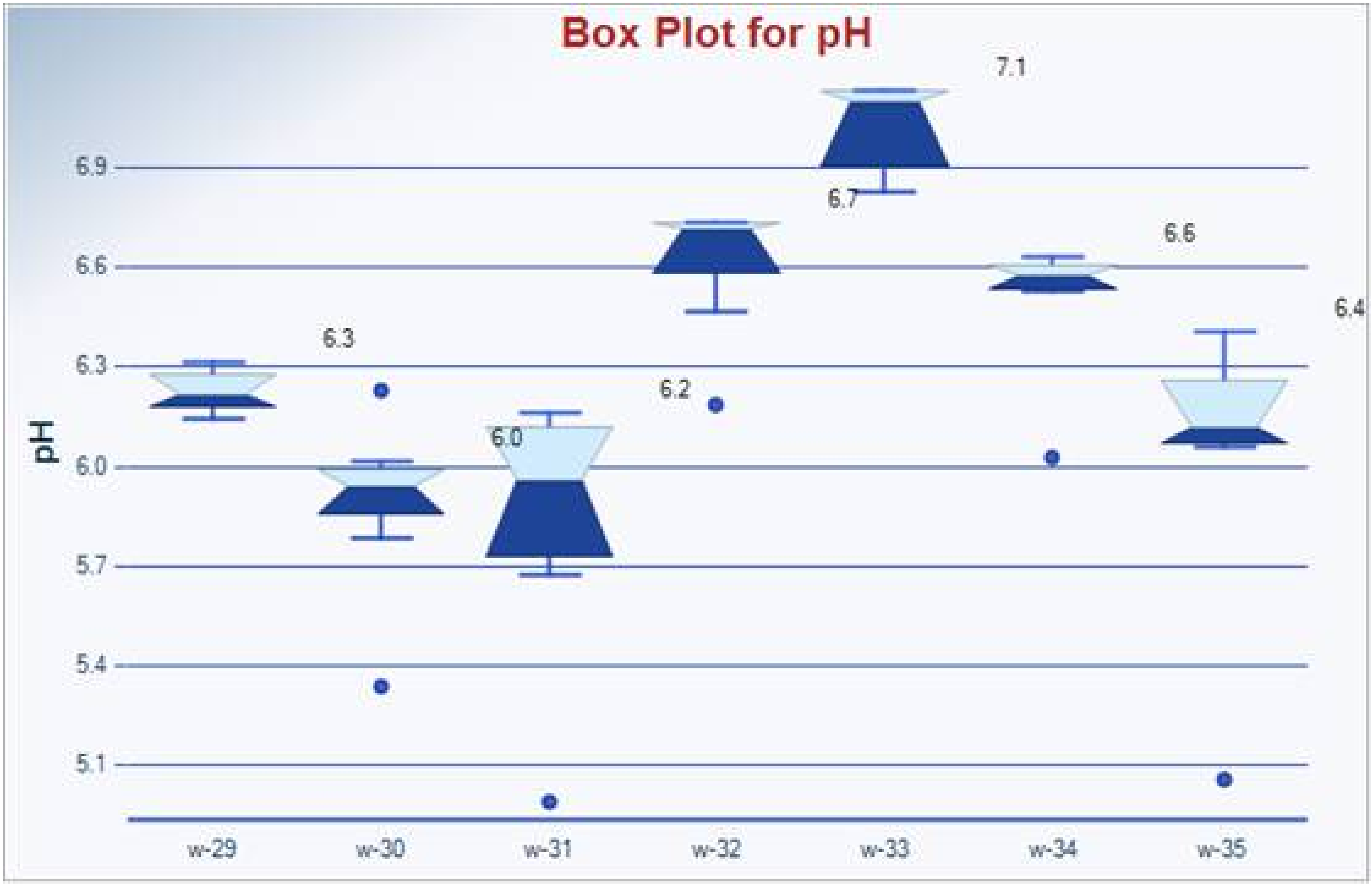

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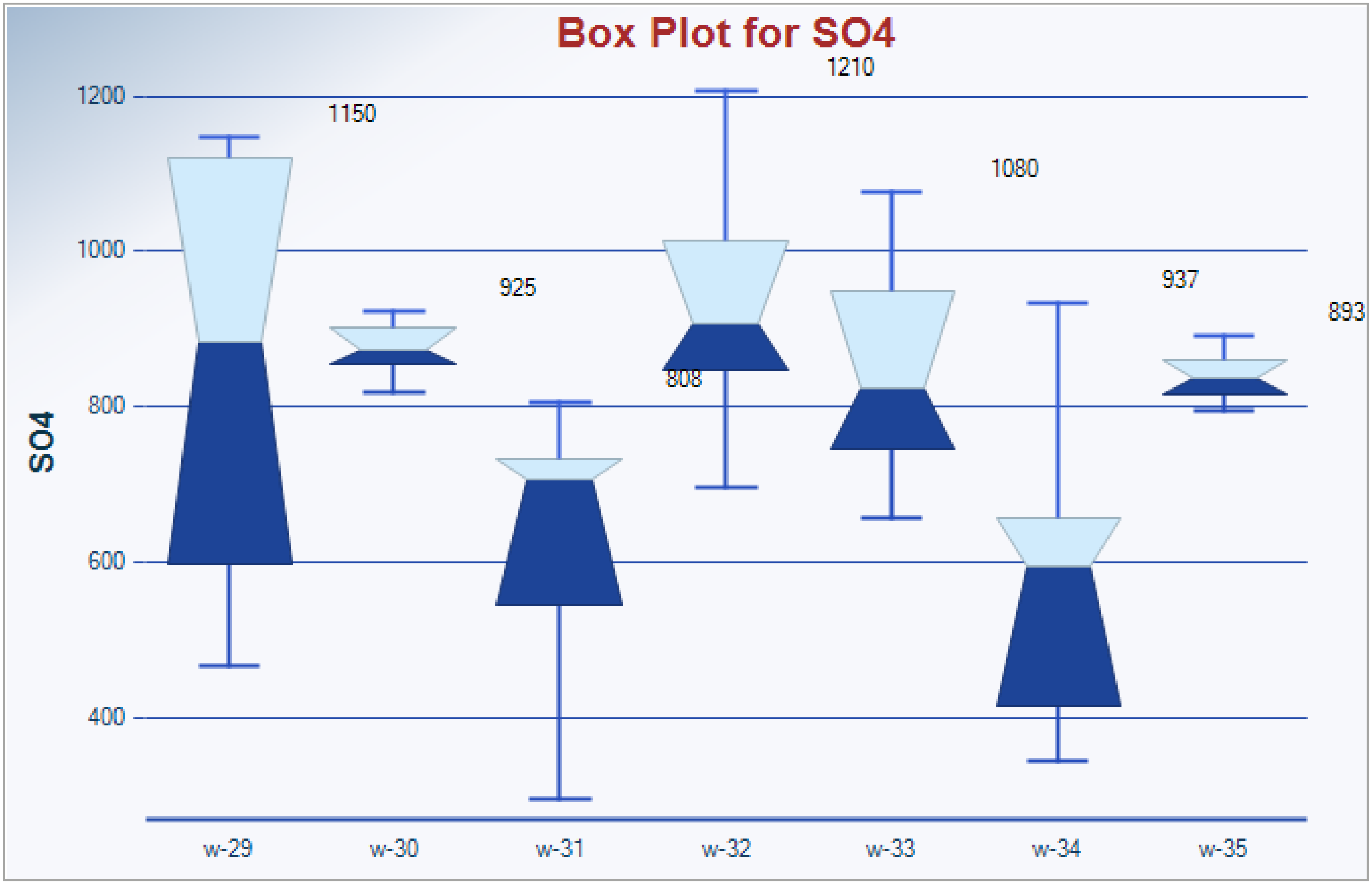

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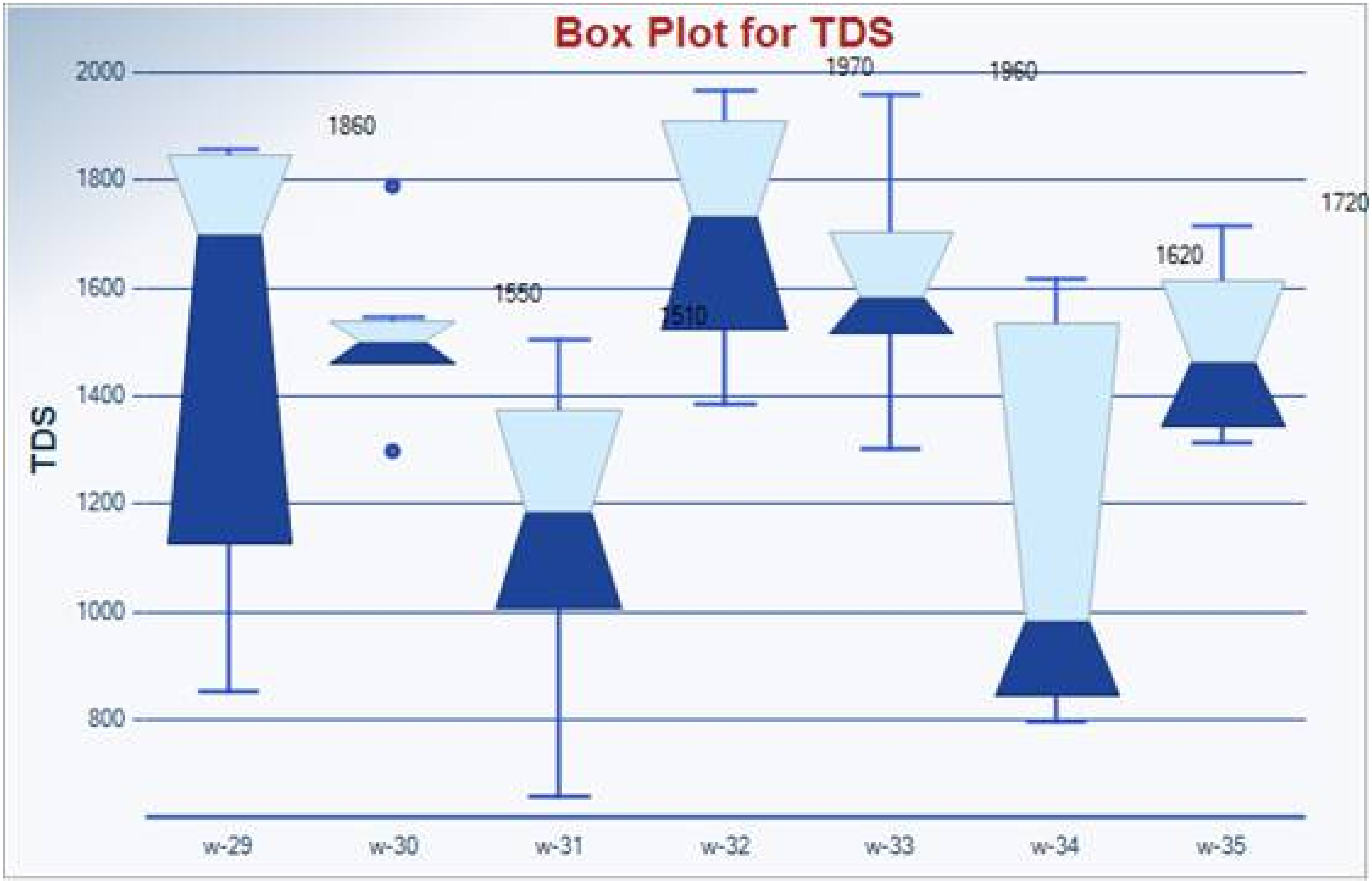
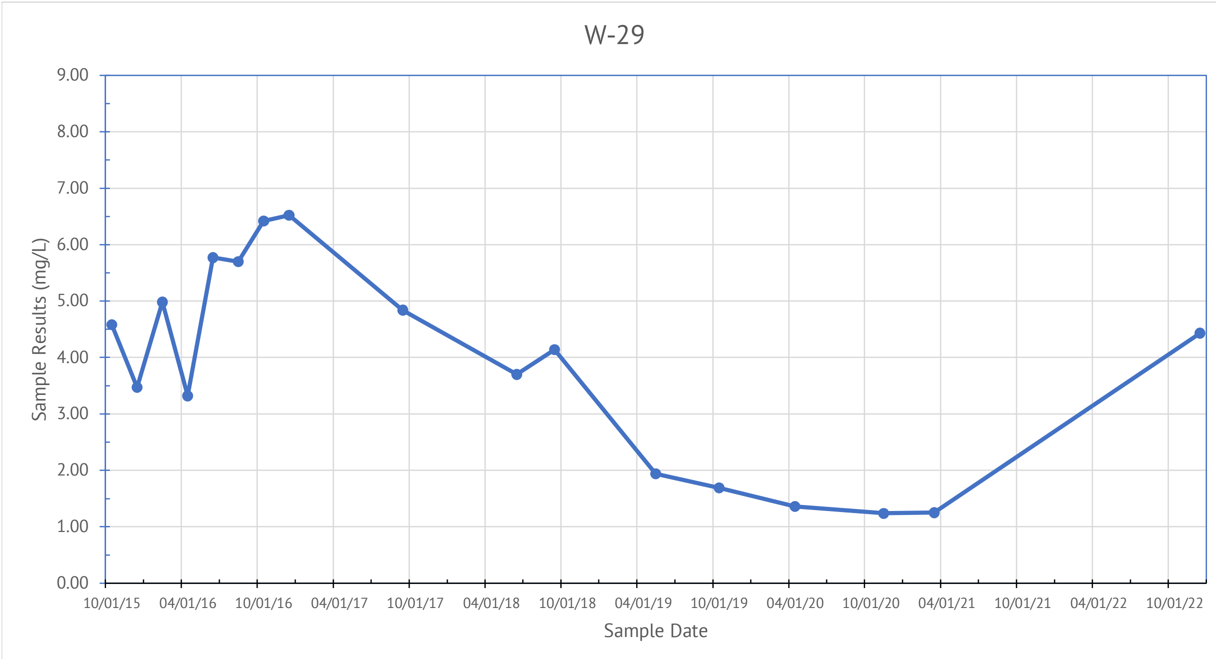


**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Boron**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



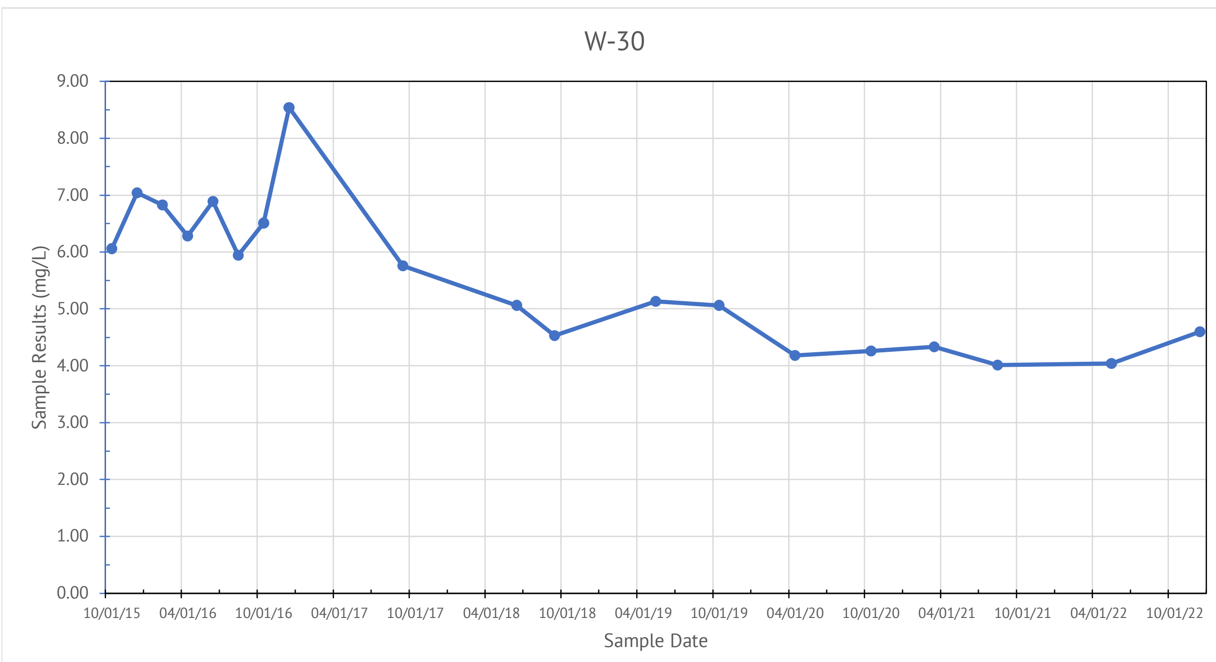
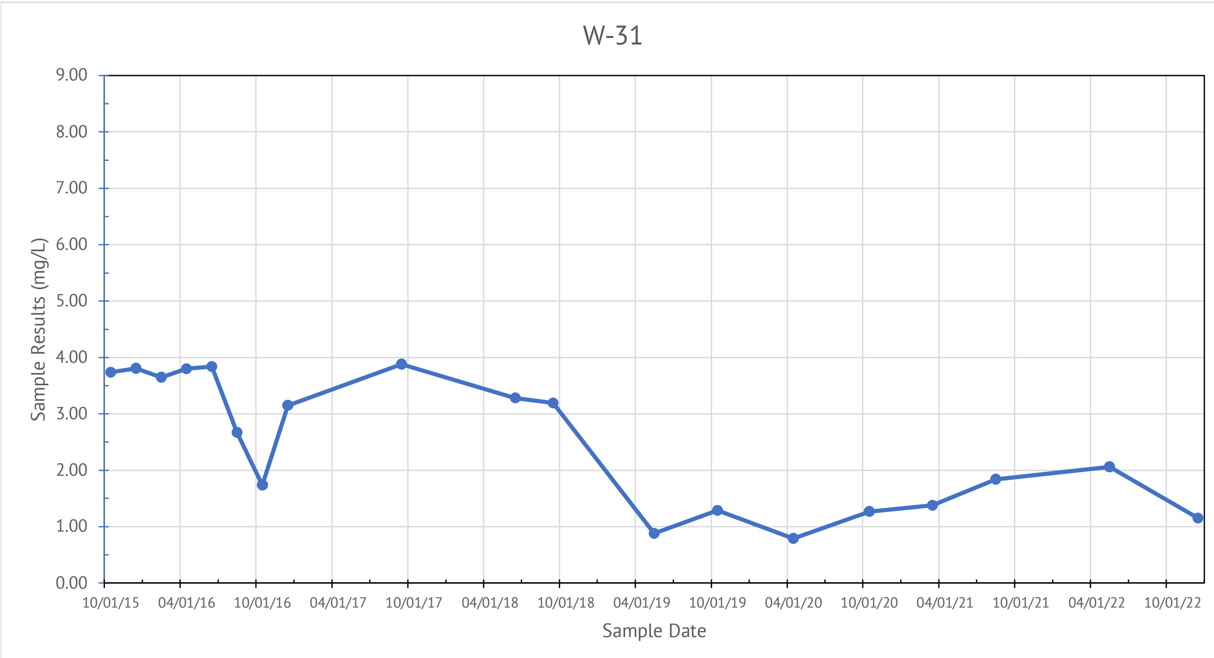



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Boron**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



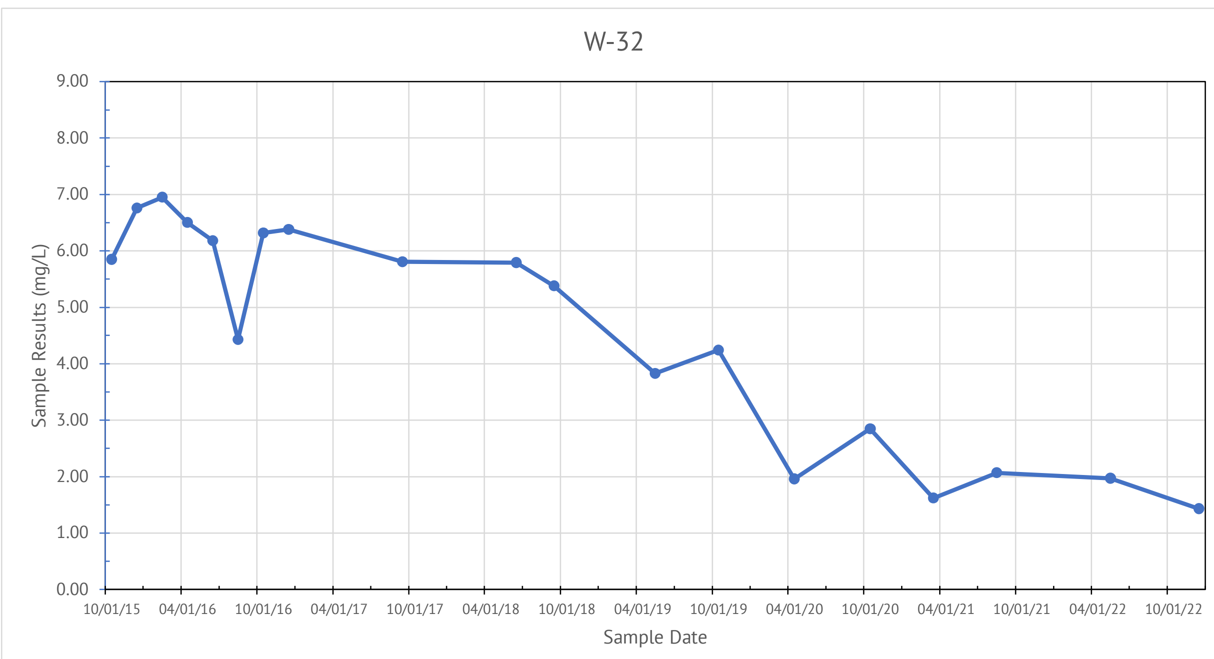



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Boron**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

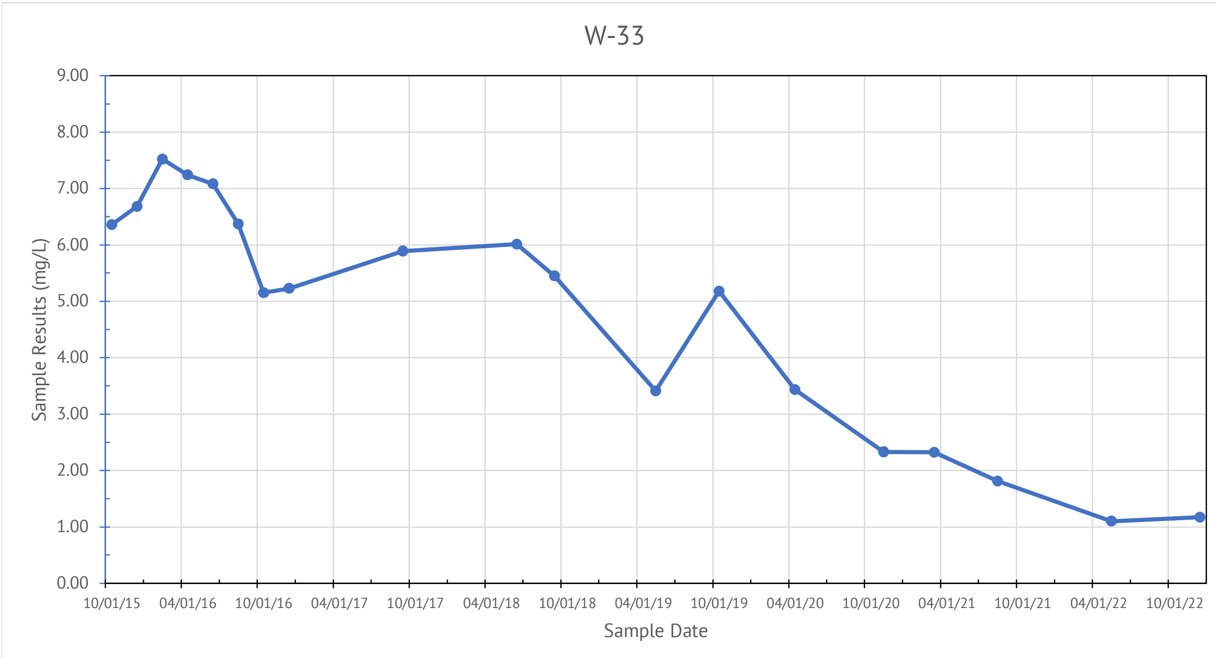



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Boron**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

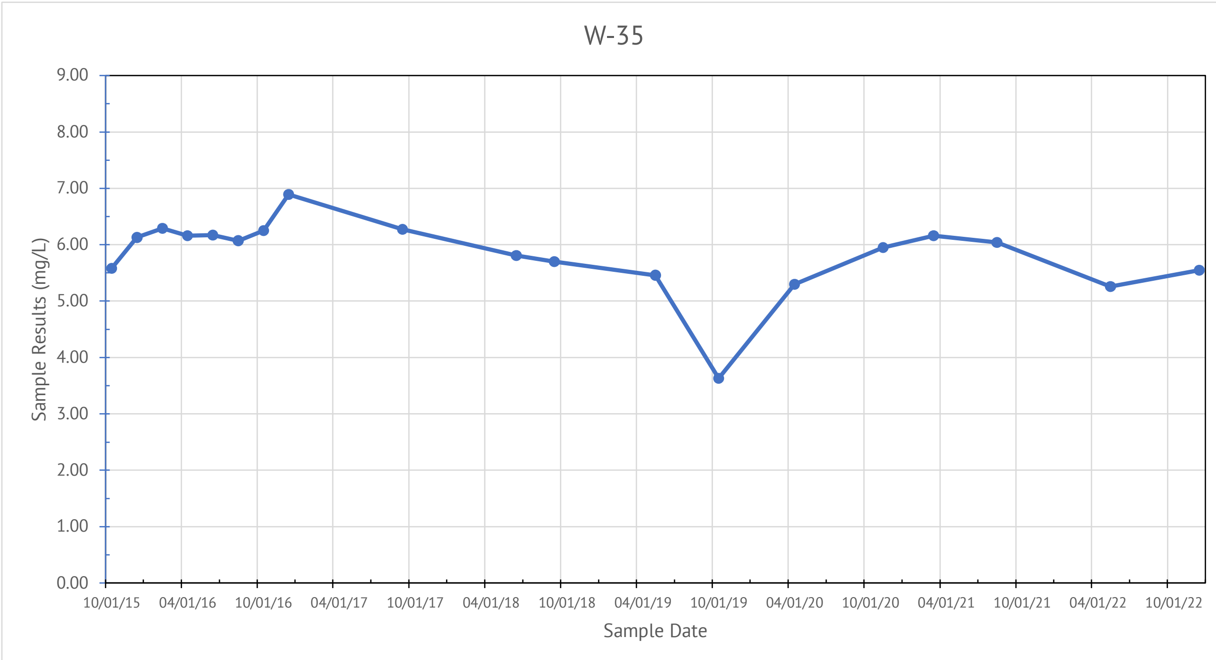
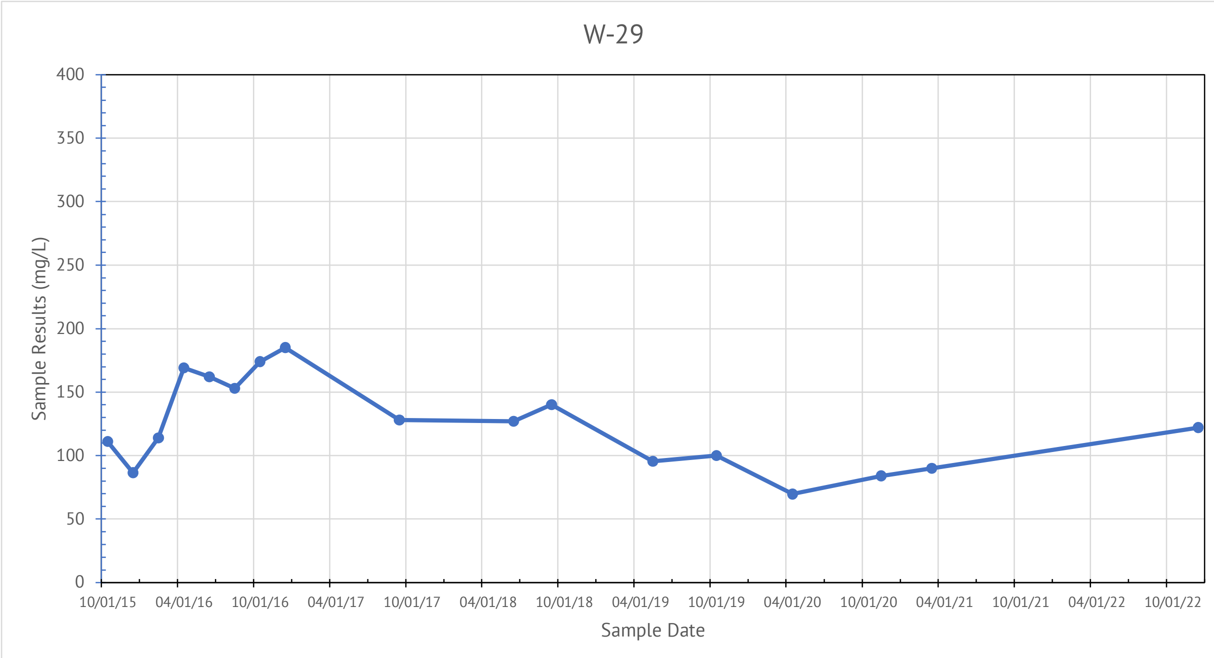


**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Calcium**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



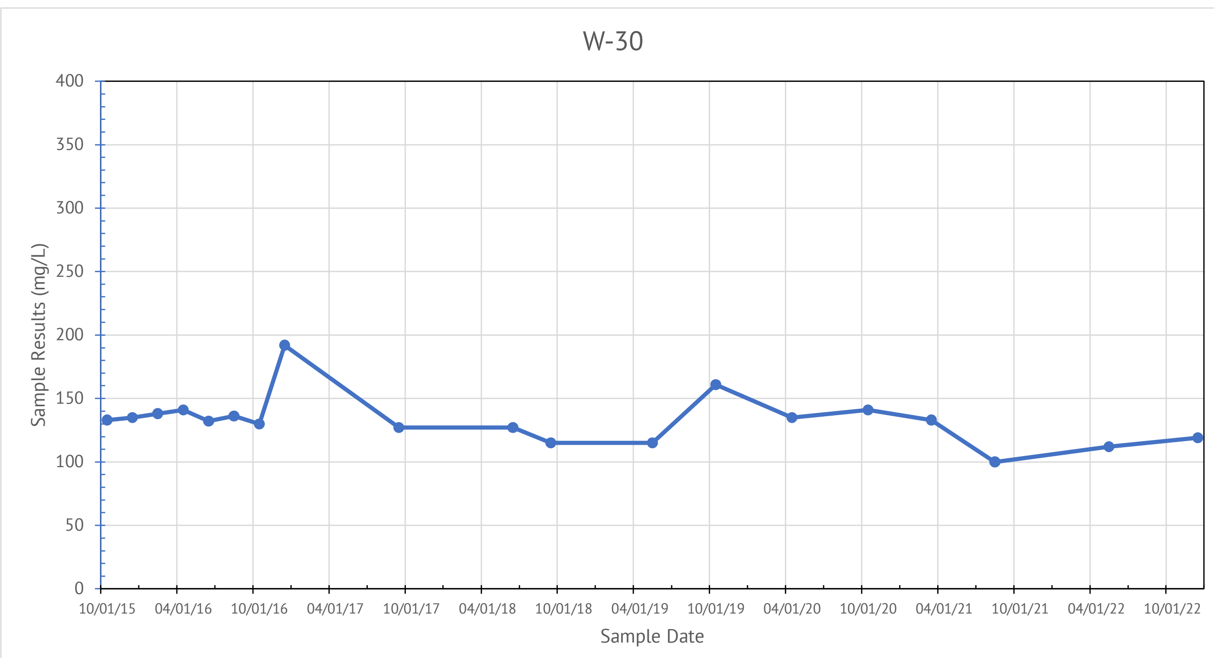
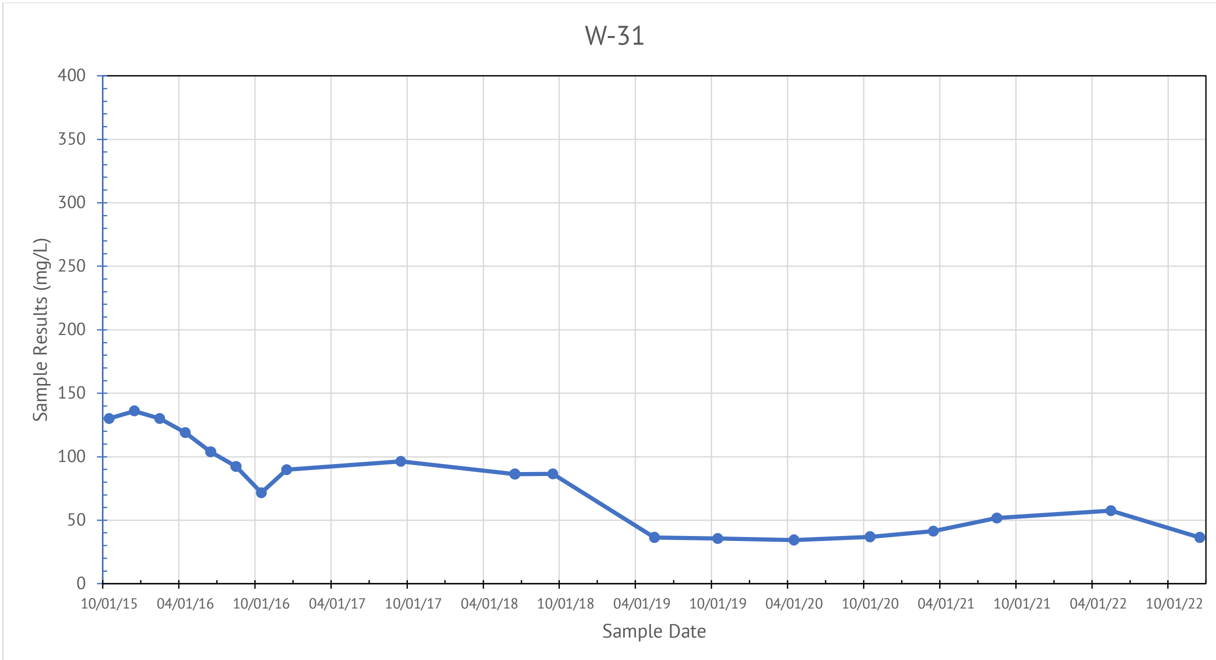



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Calcium**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



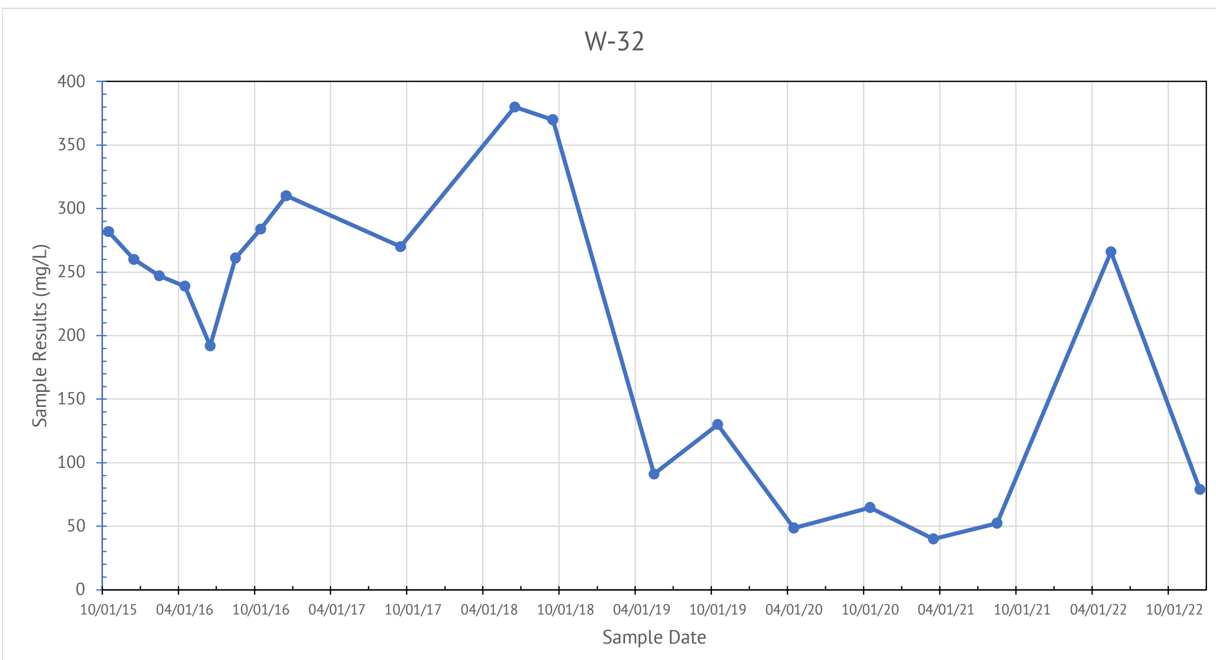
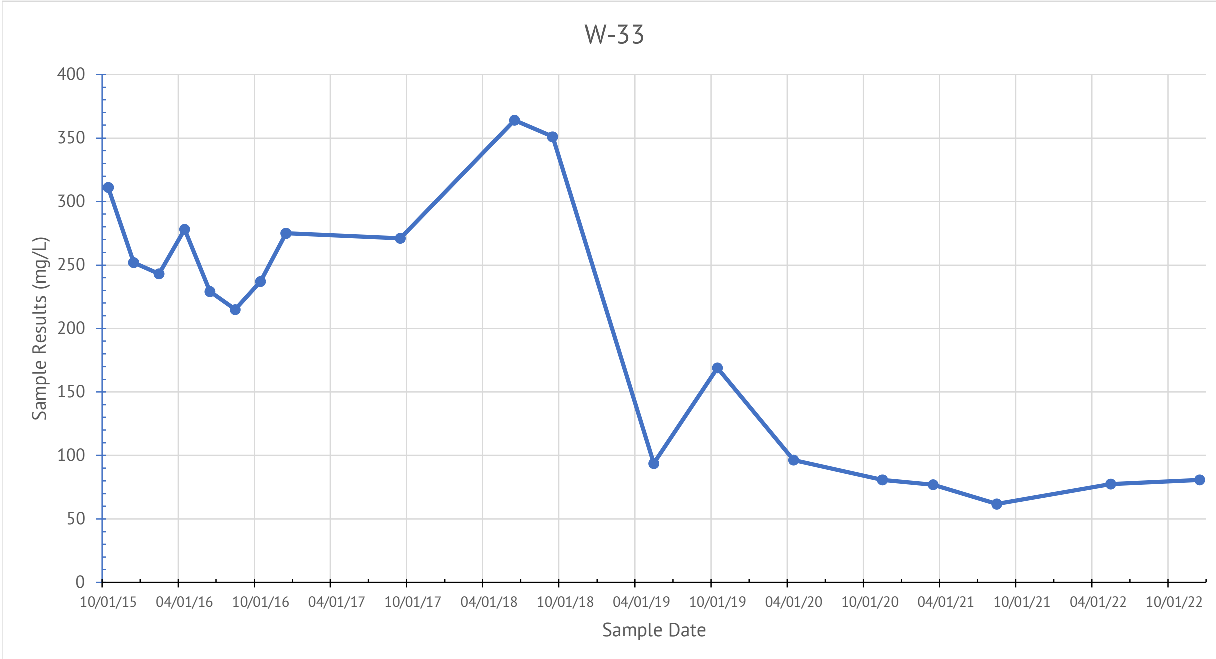



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Calcium**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



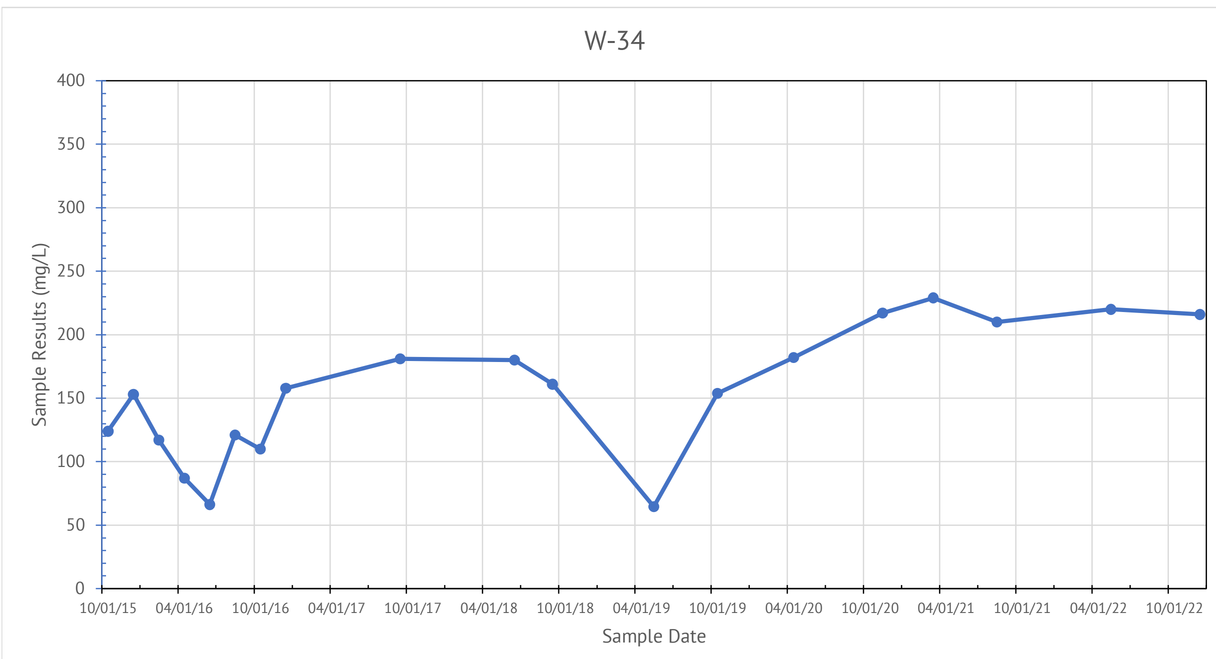



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Calcium**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

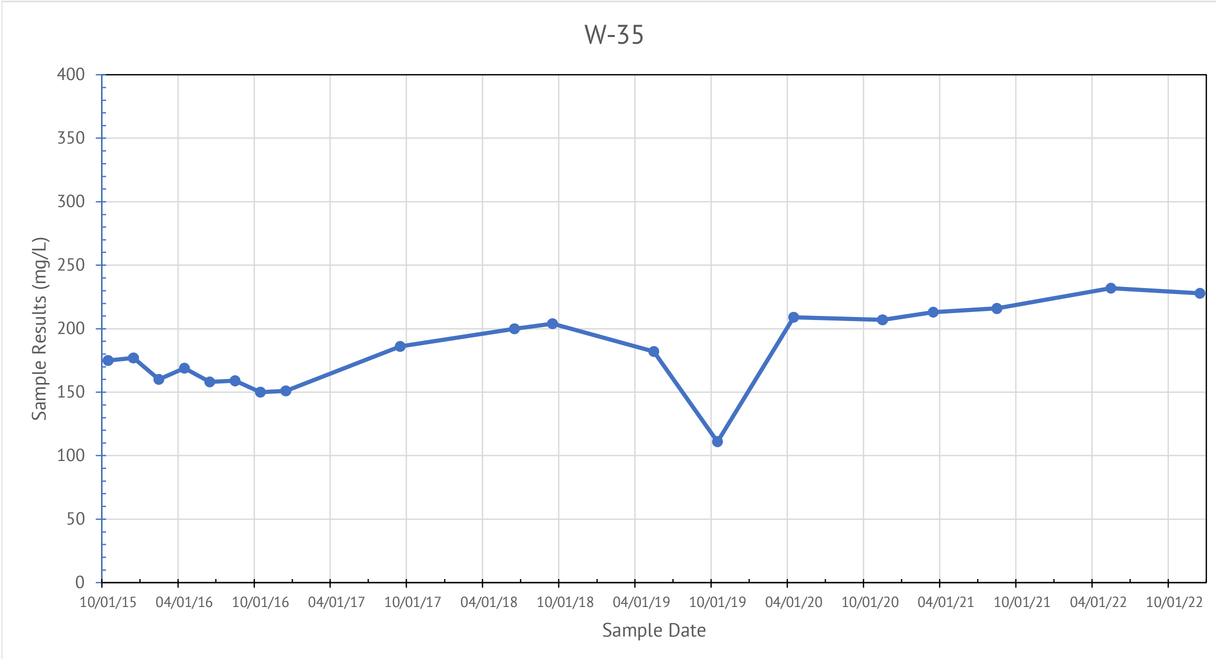
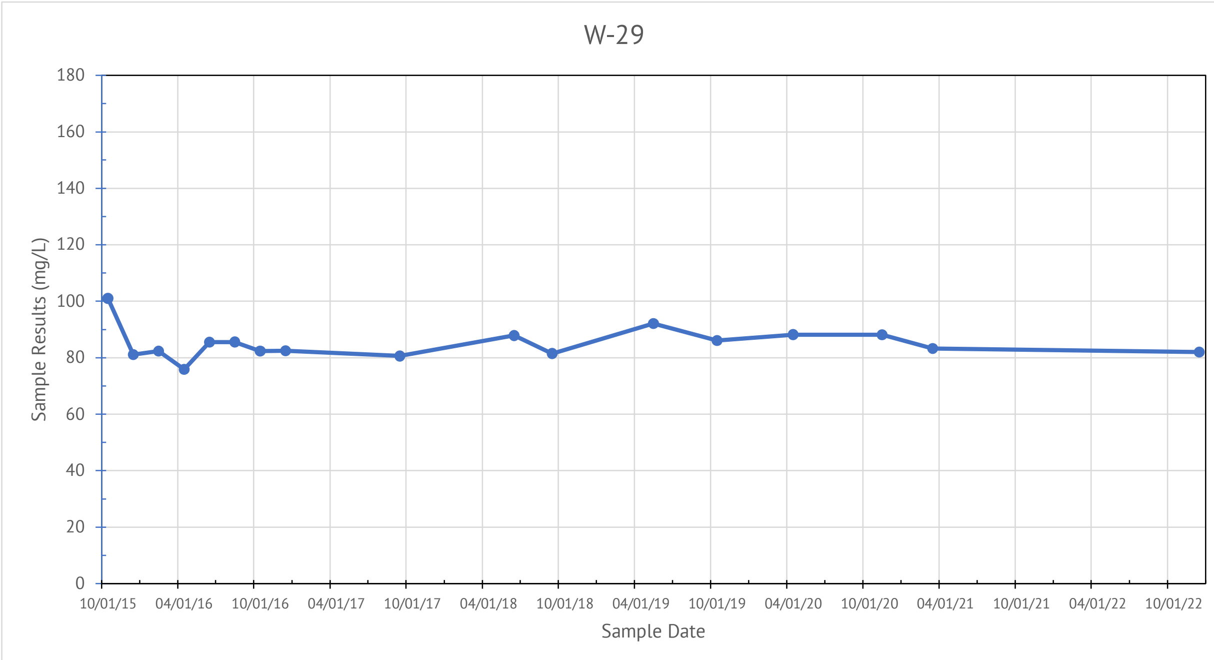


**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Chloride**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



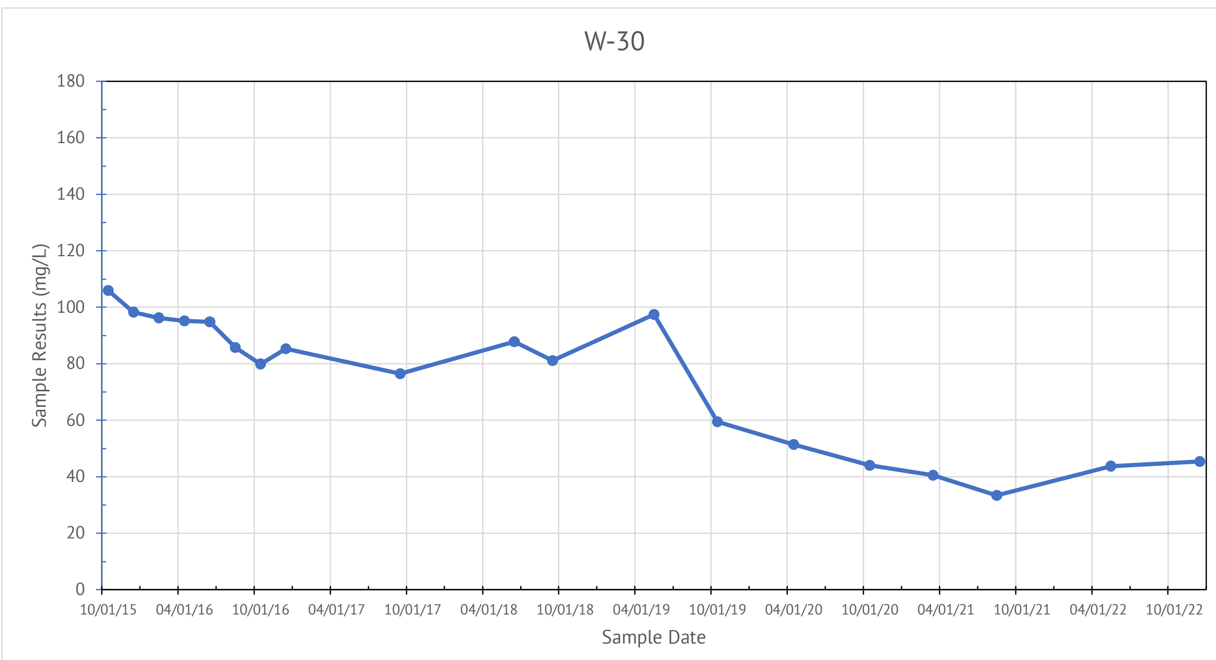
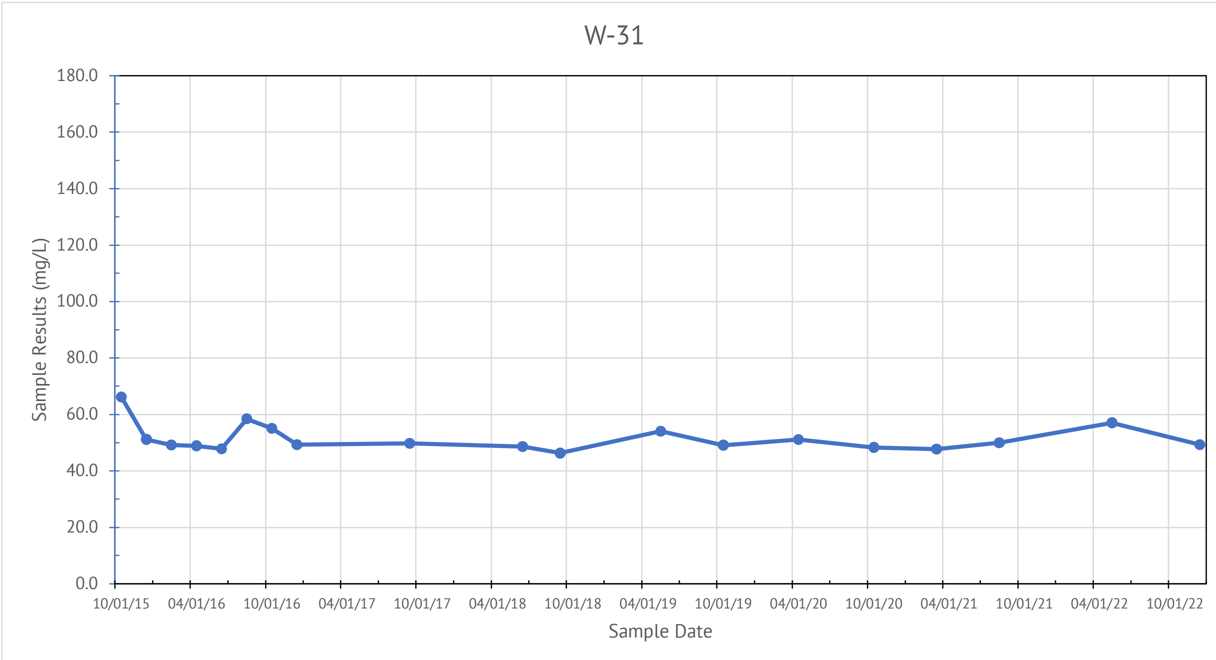



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Chloride**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



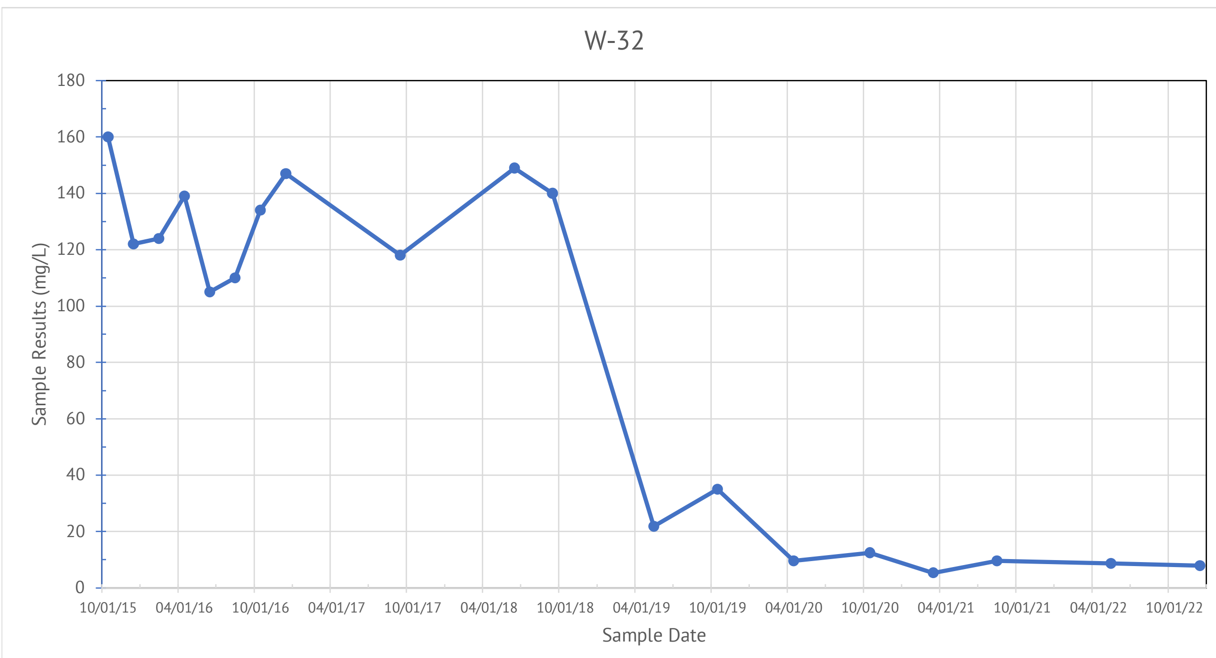



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Chloride**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

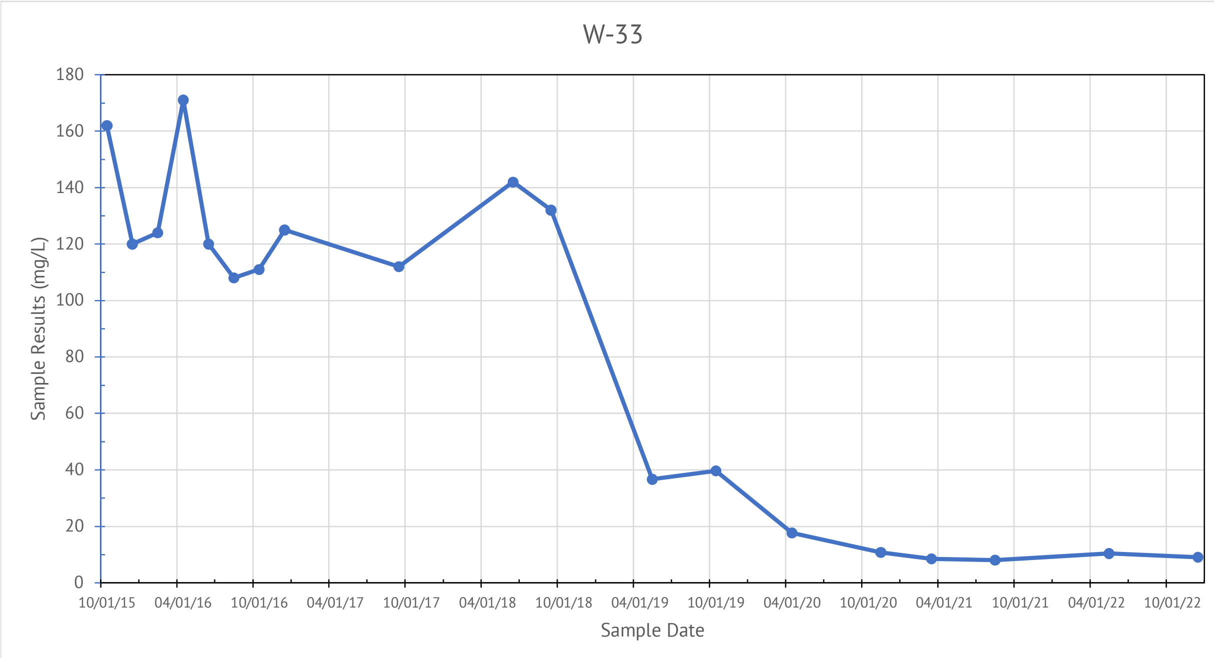



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Chloride**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

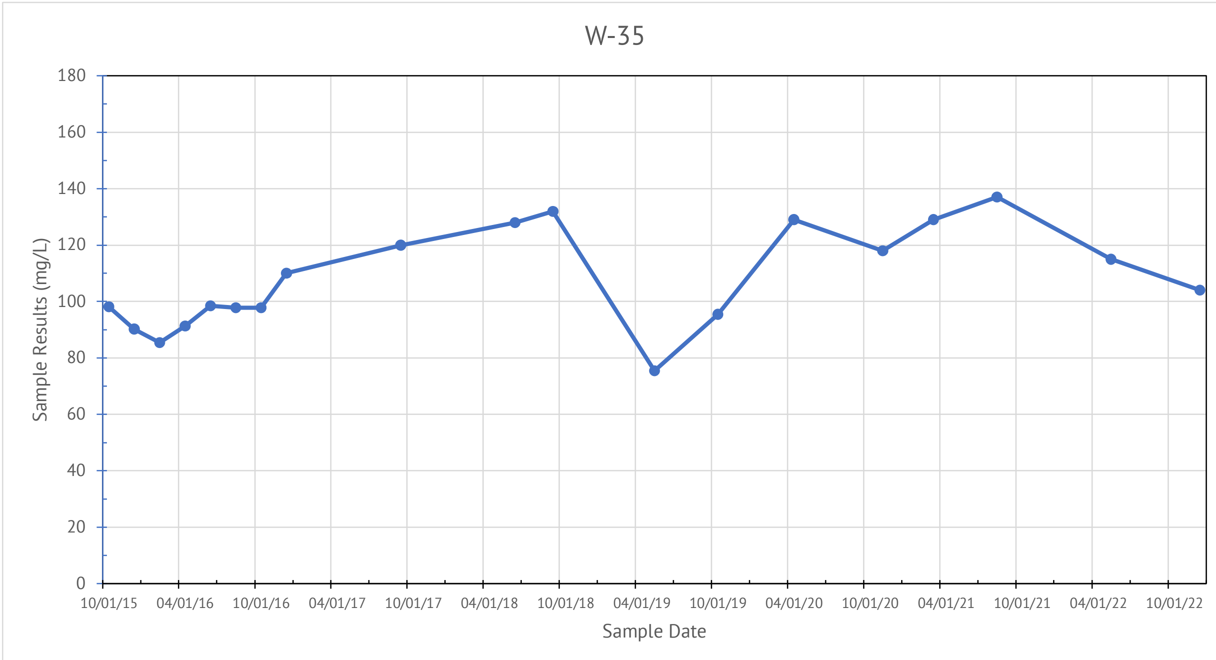
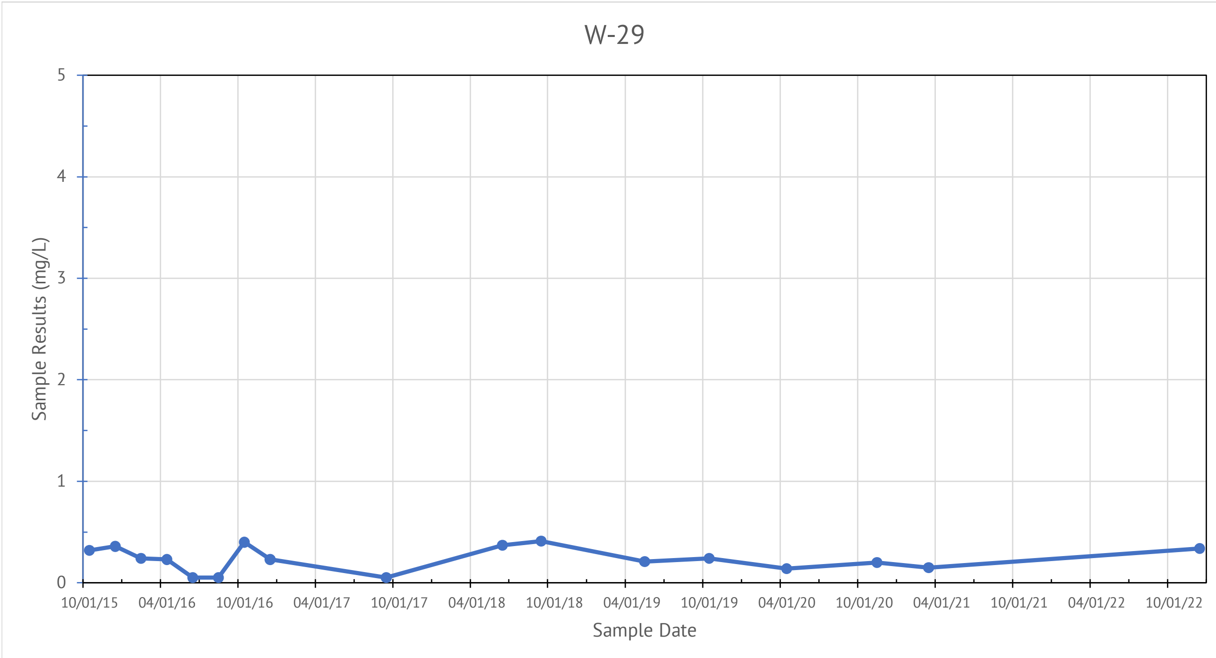


**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Fluoride**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



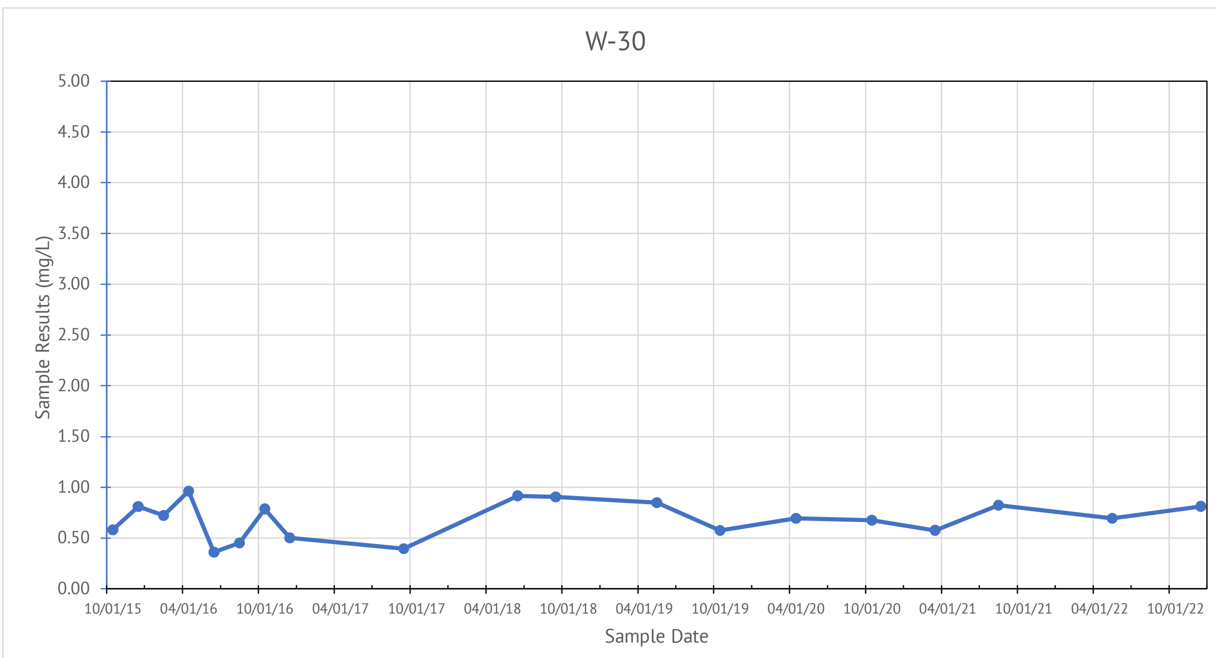
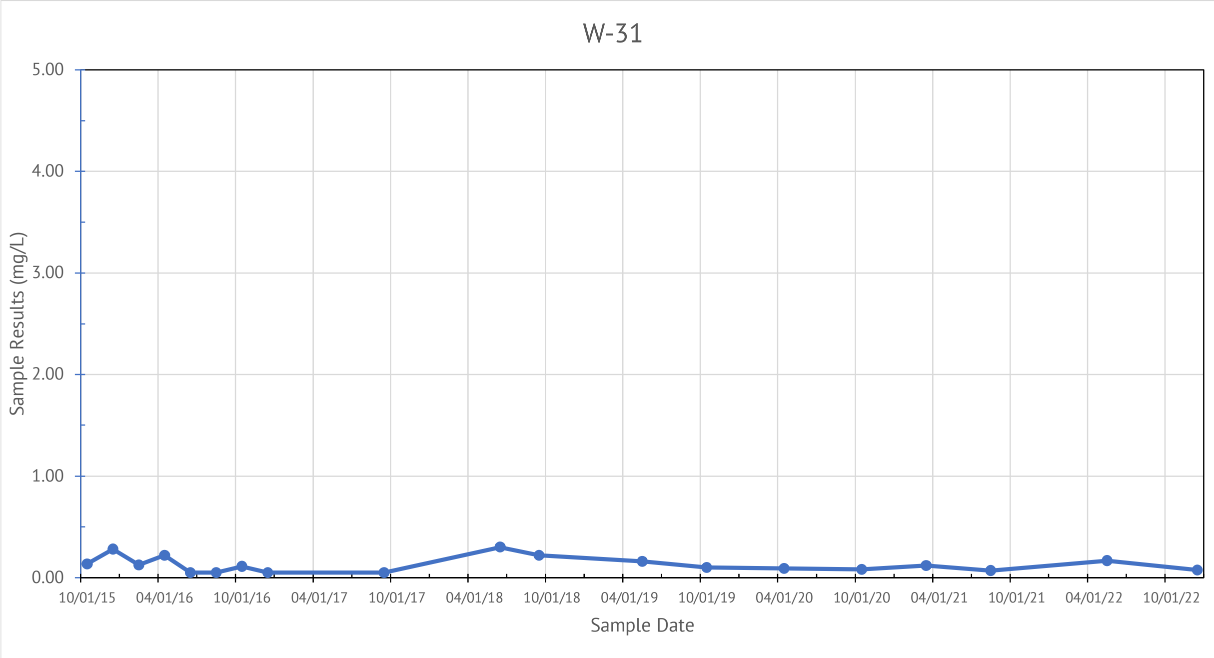



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Fluoride**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



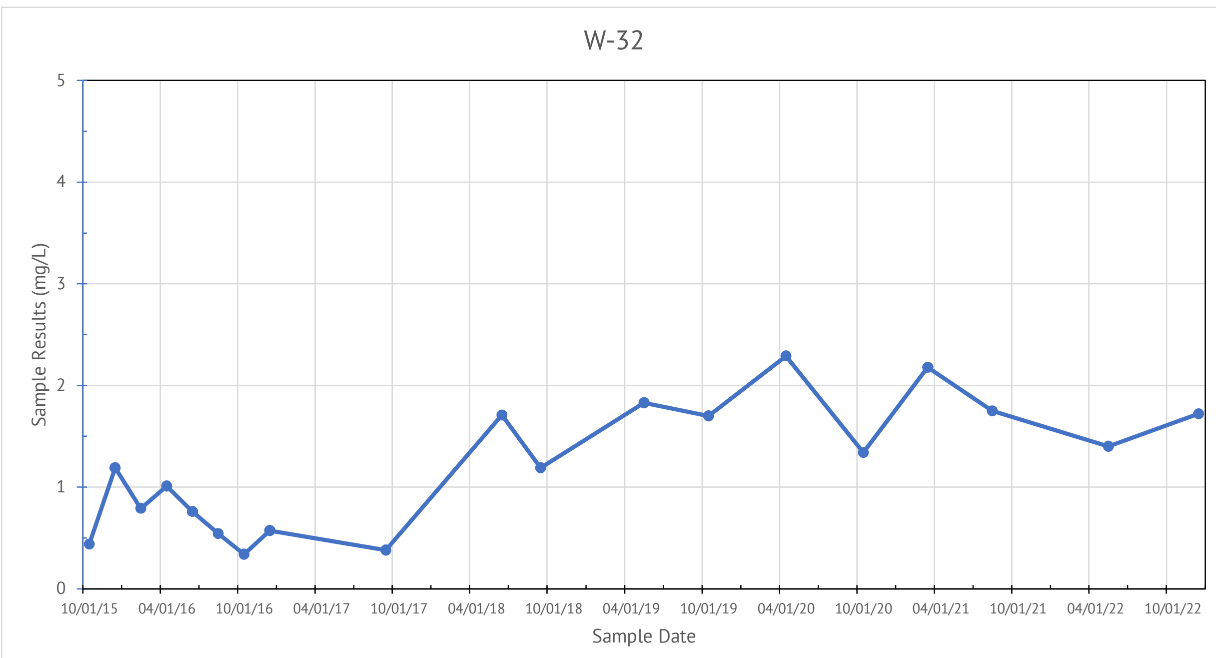
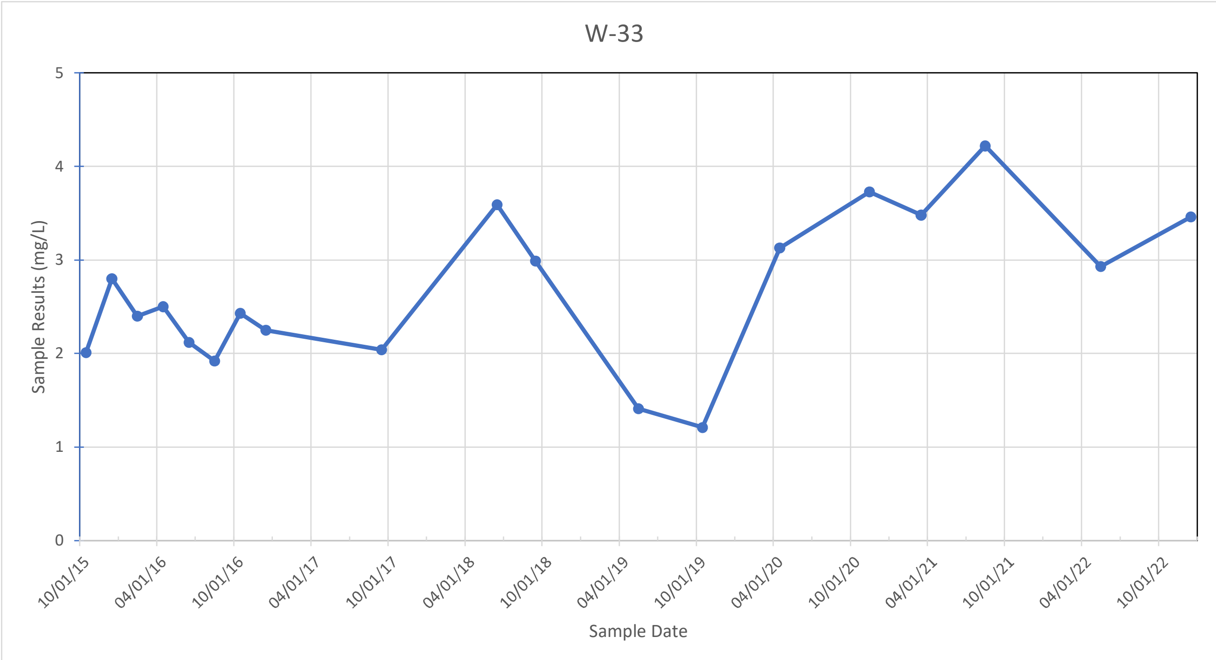



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Fluoride**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



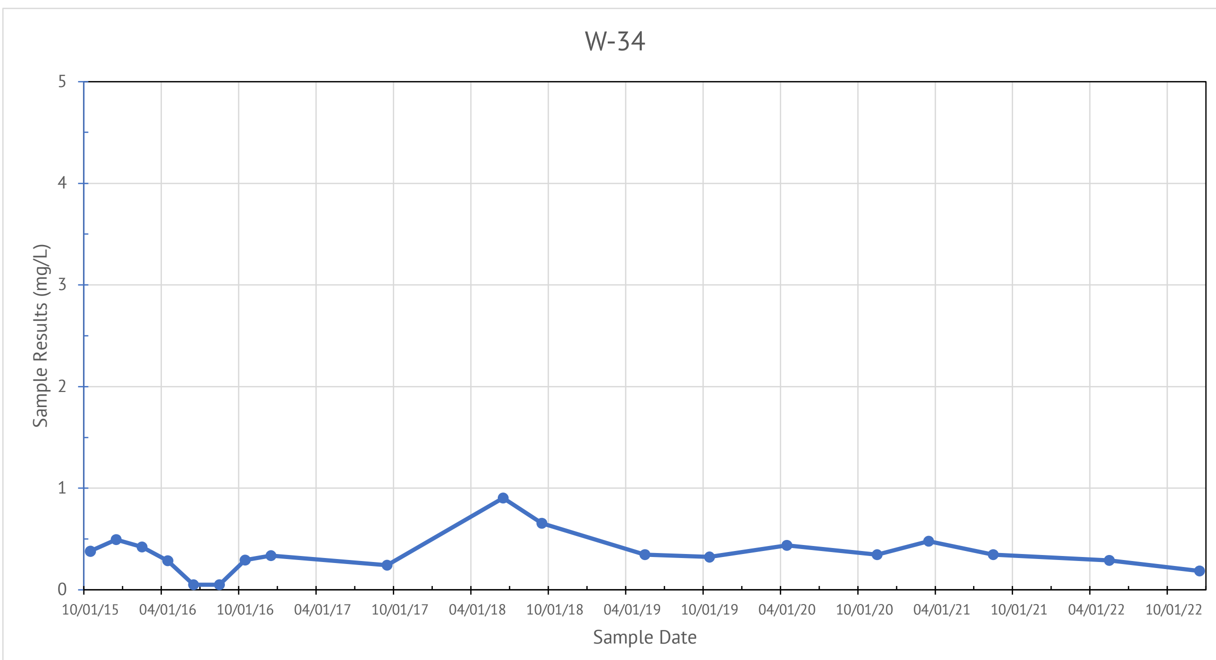



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Fluoride**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

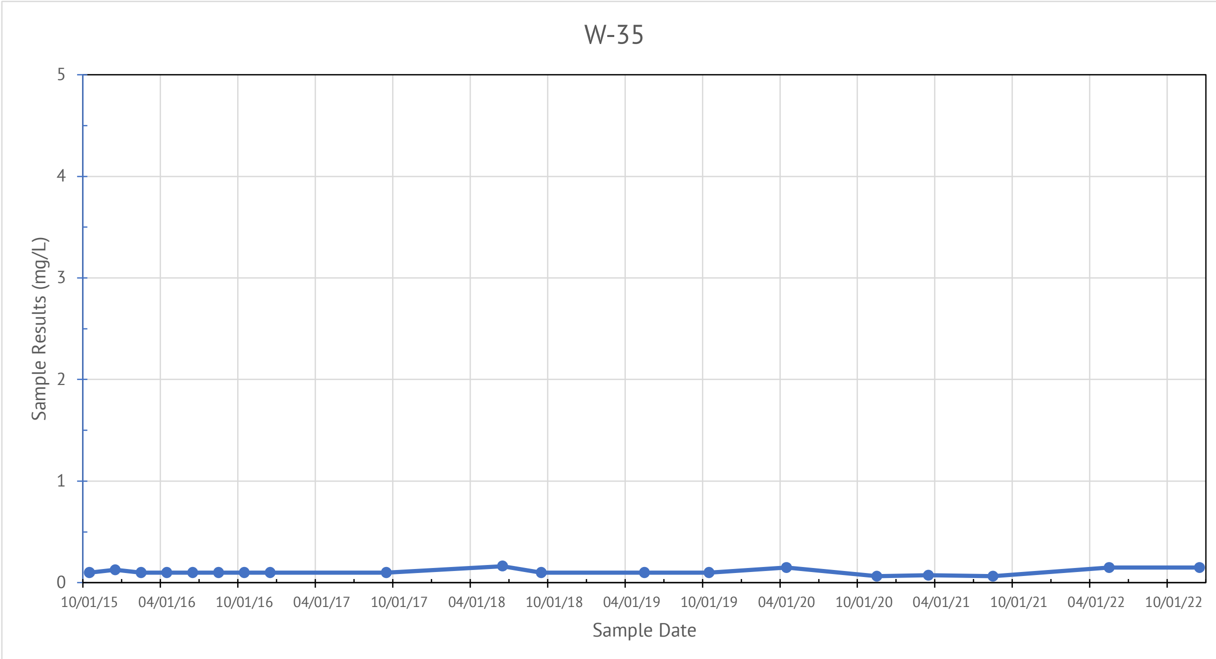
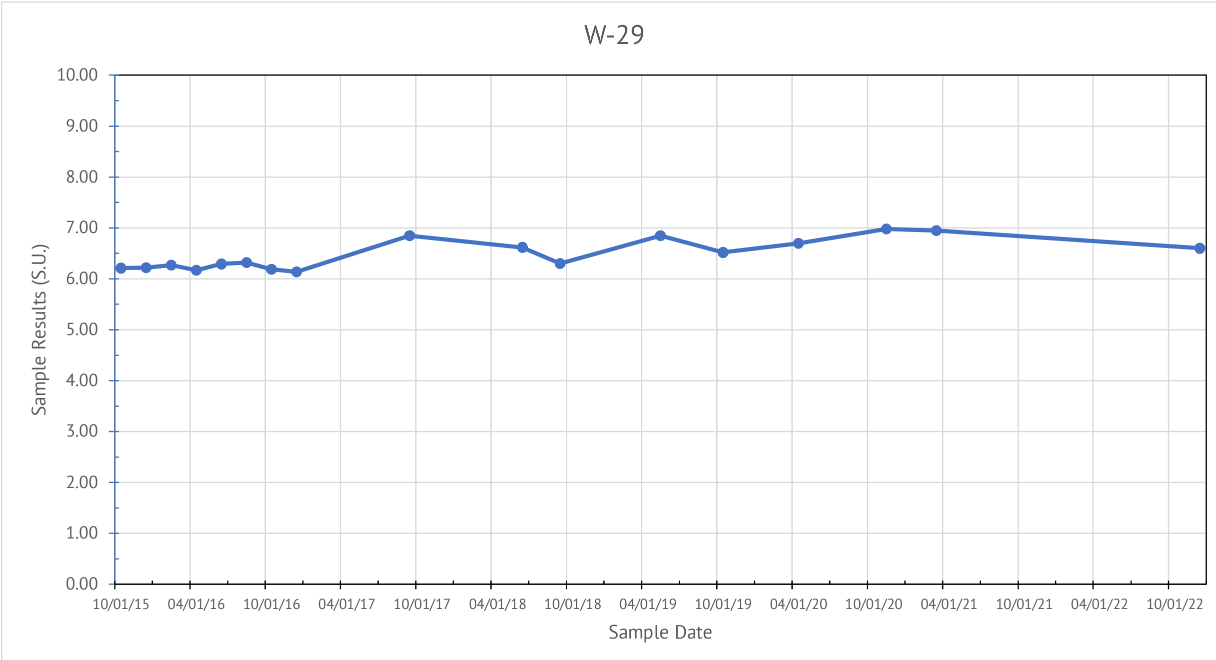


**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - pH**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



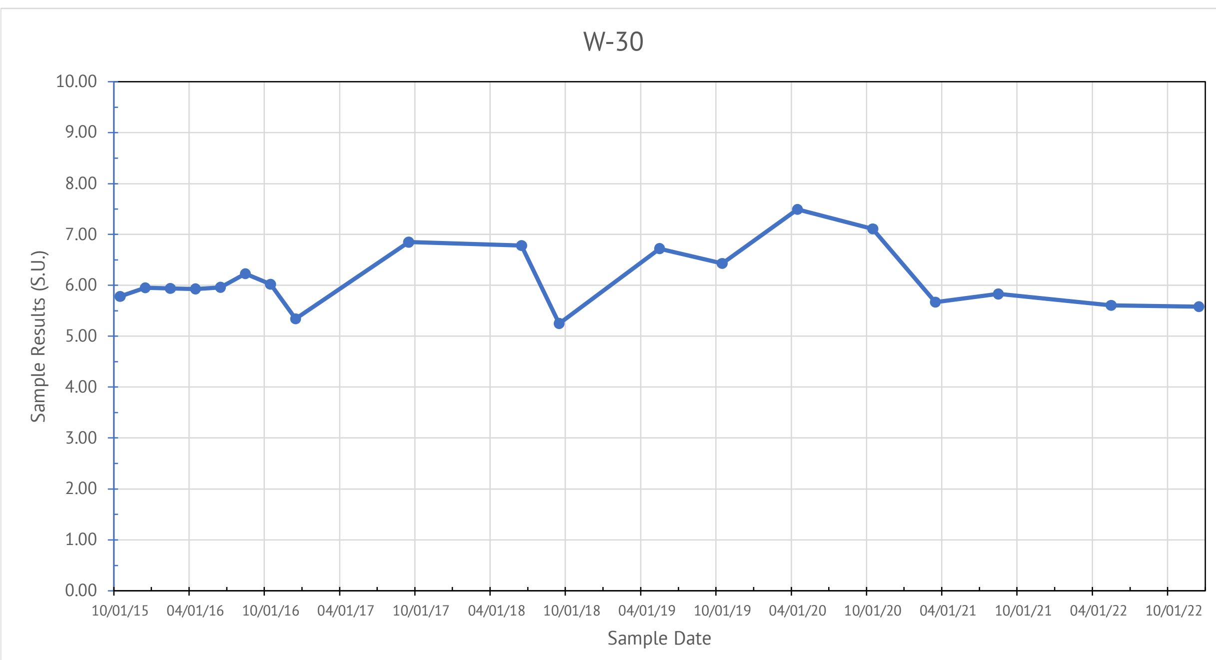
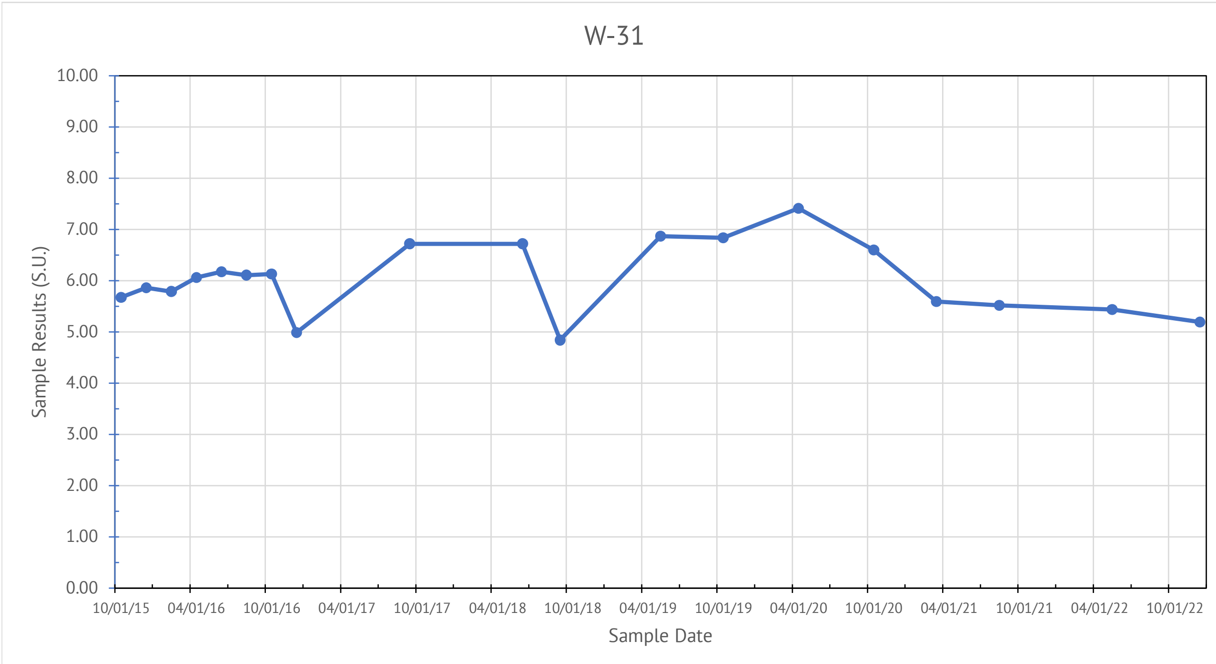



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - pH**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



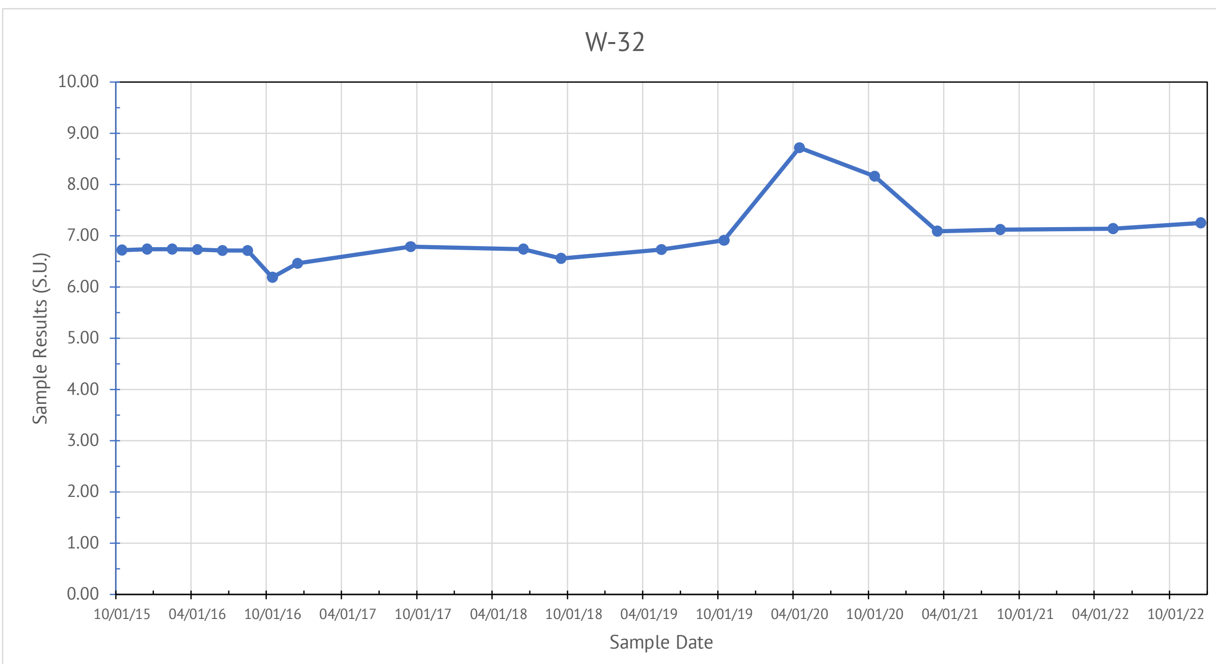
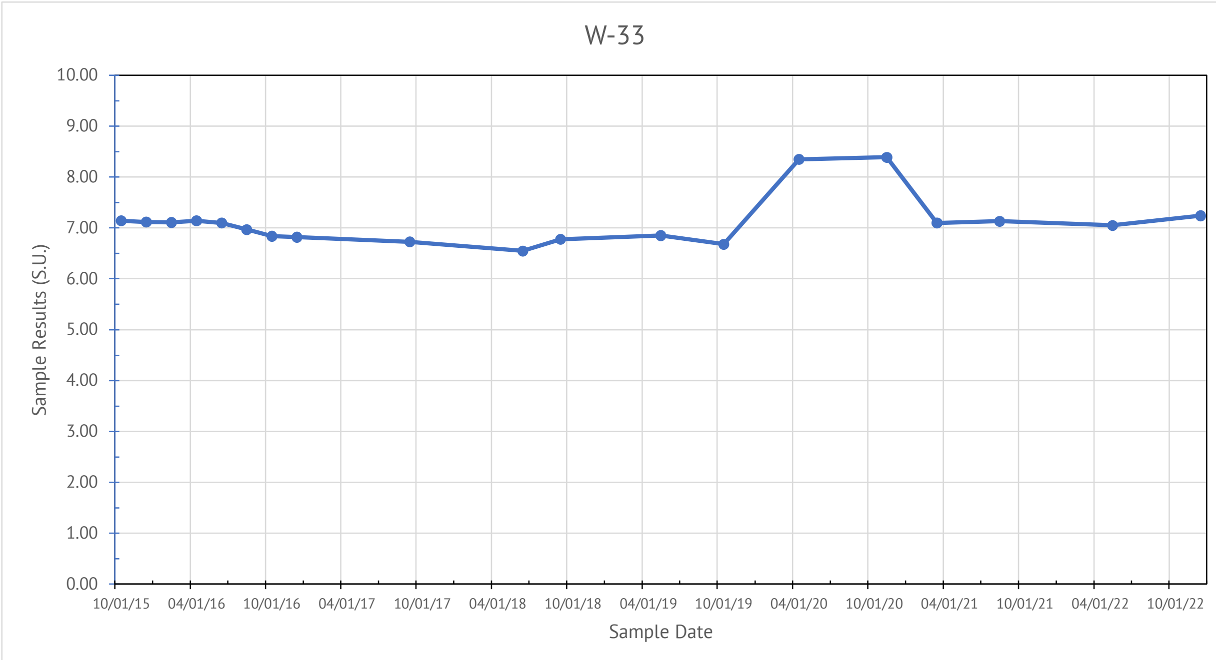



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - pH**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



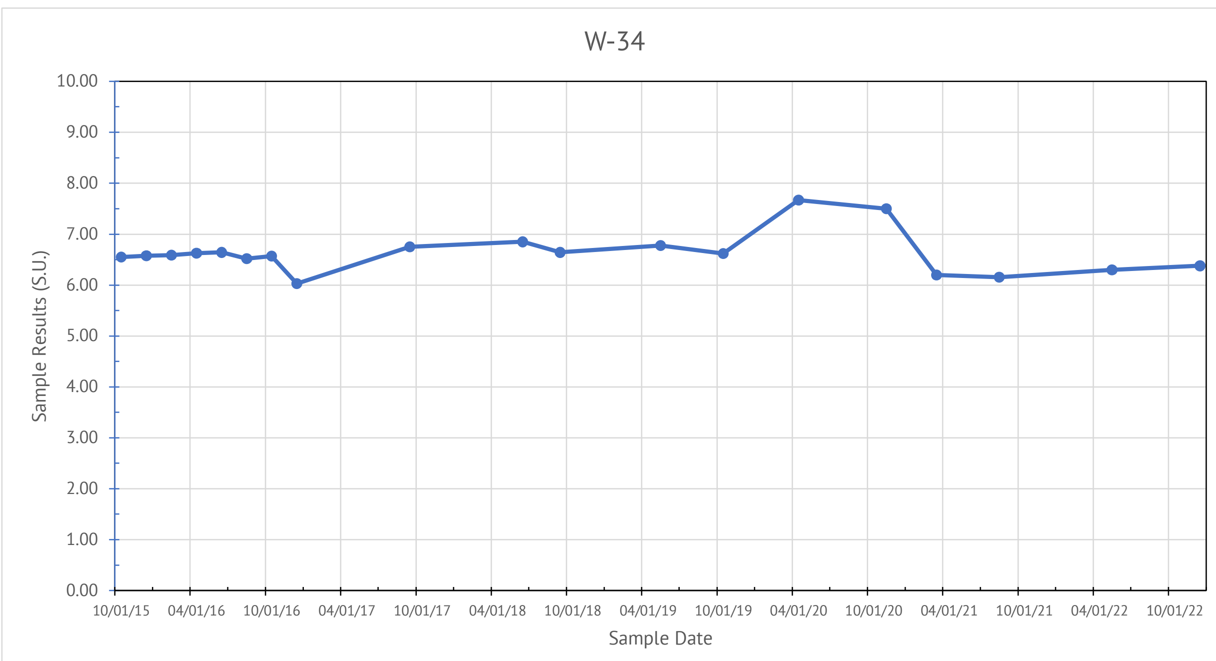



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - pH**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

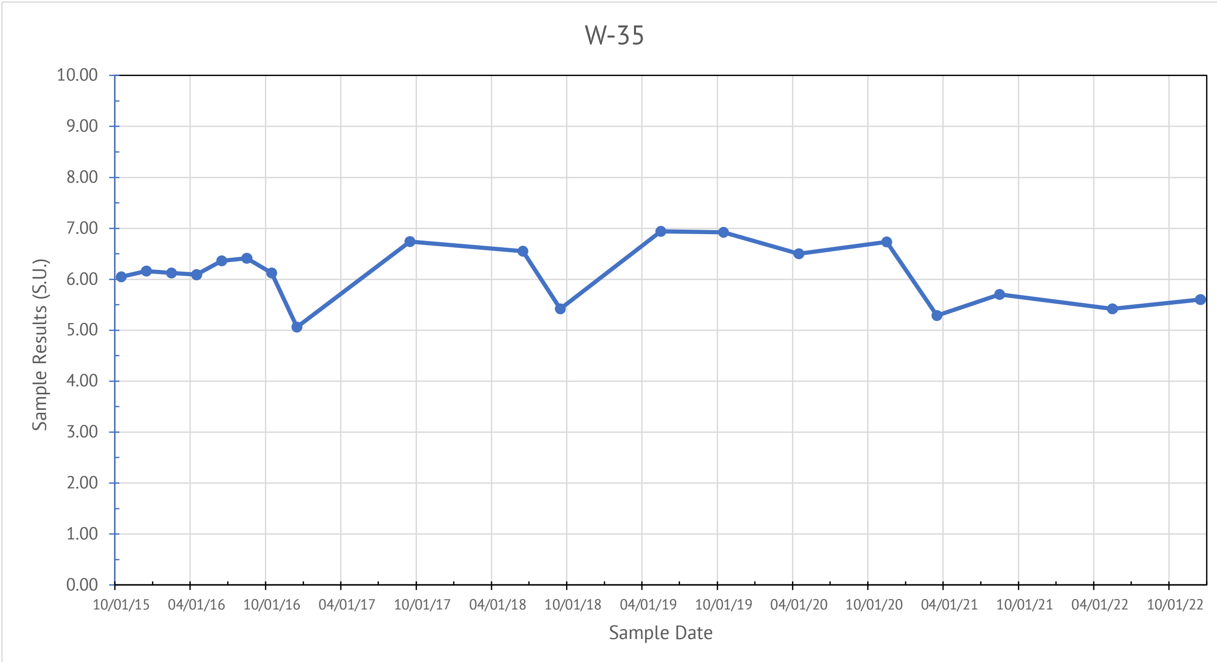
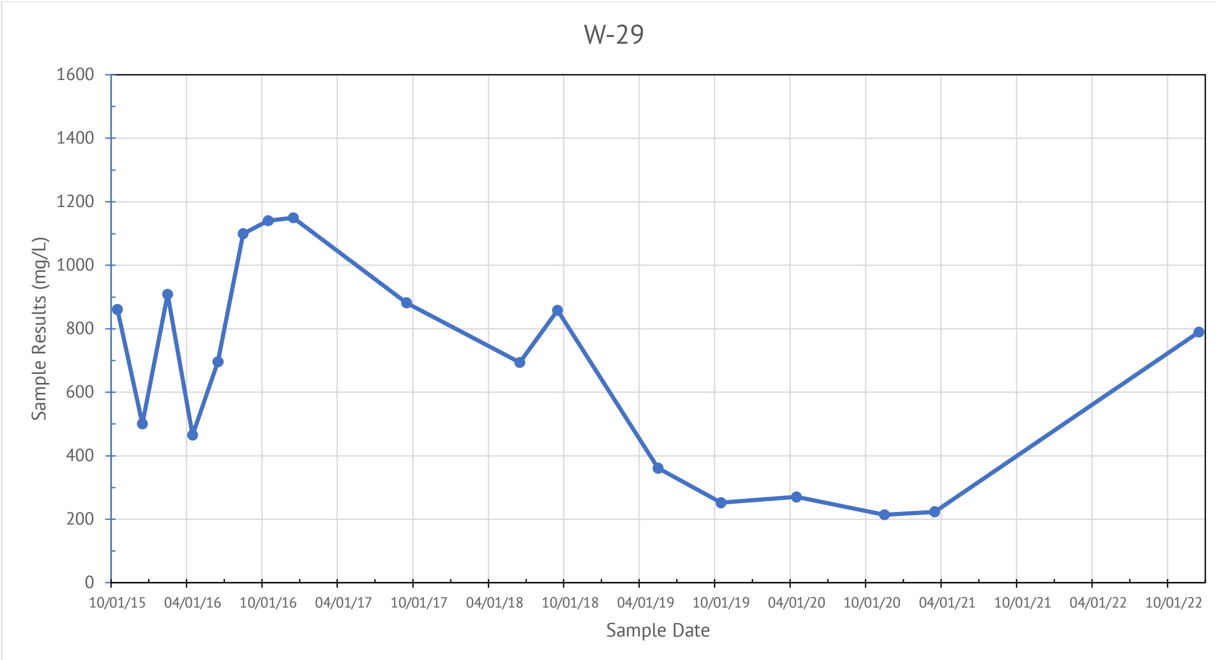


**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Sulfate**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



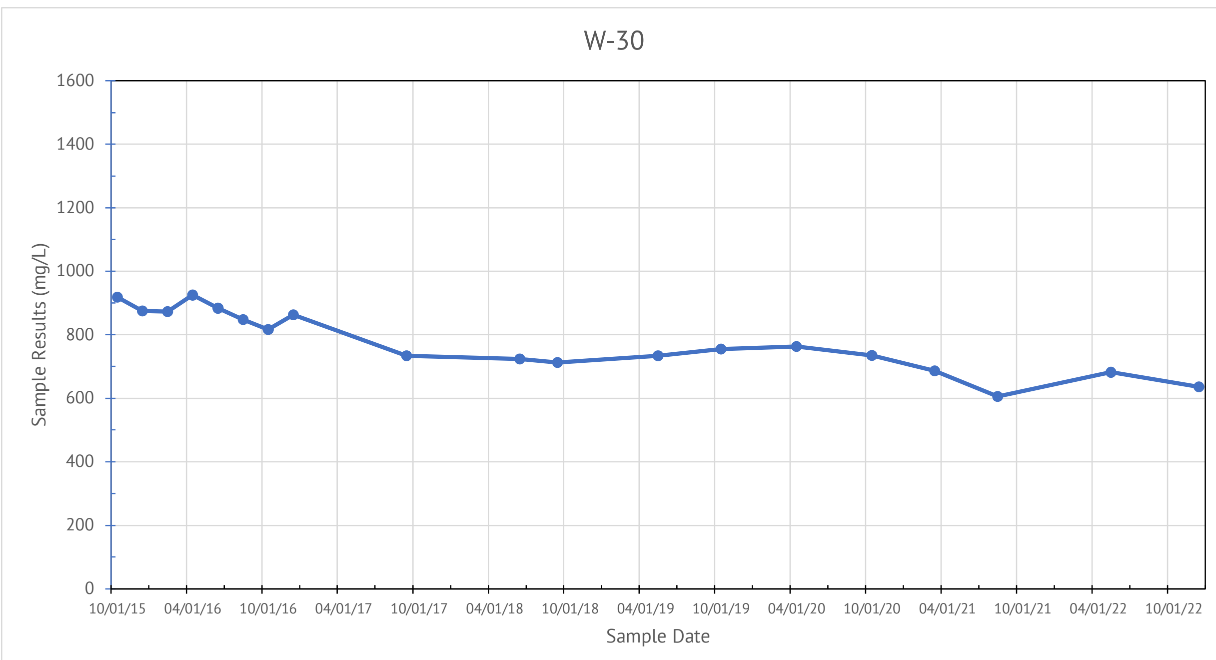
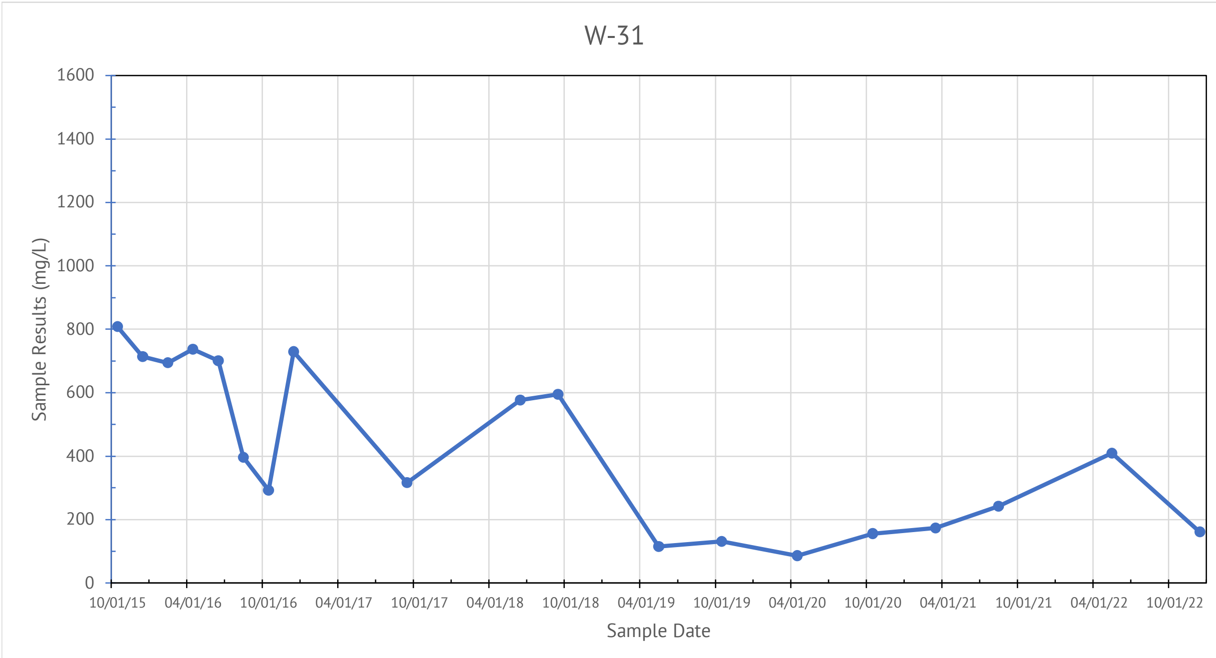



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Sulfate**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



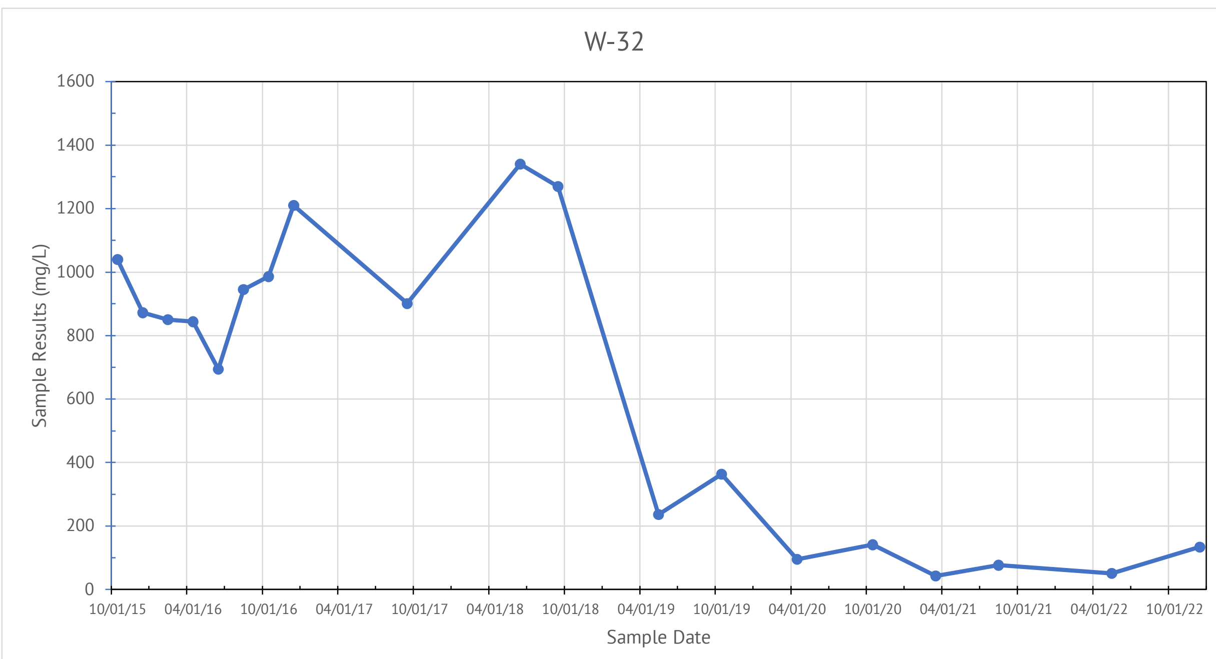



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Sulfate**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

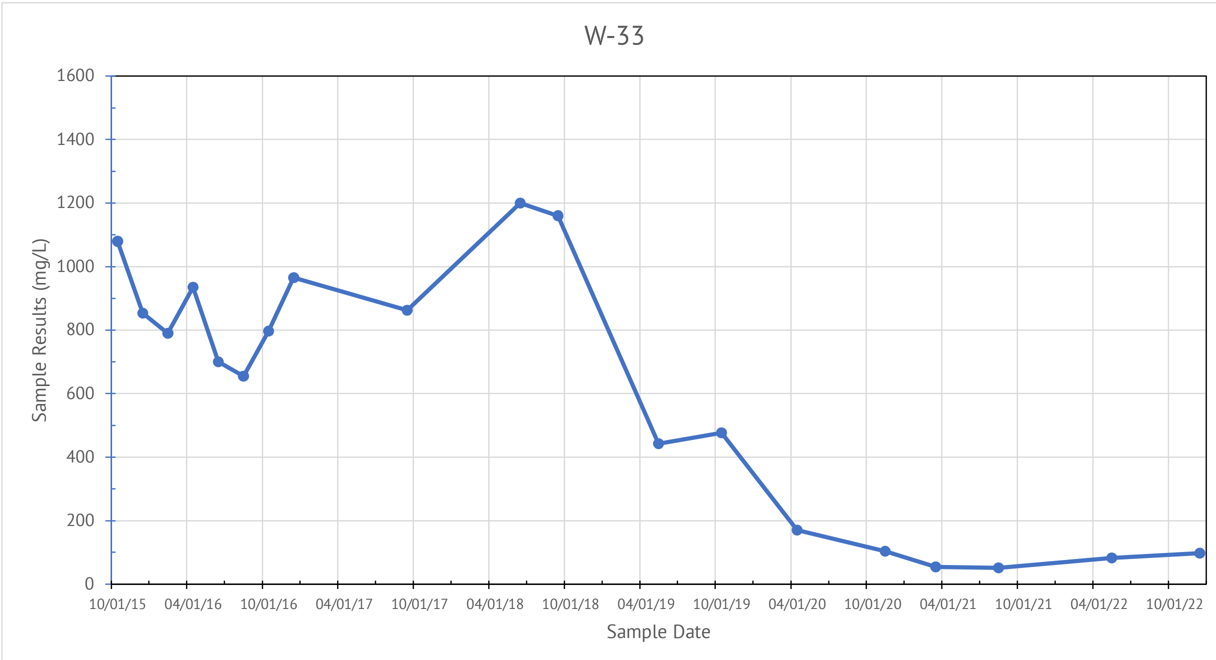



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - Sulfate**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

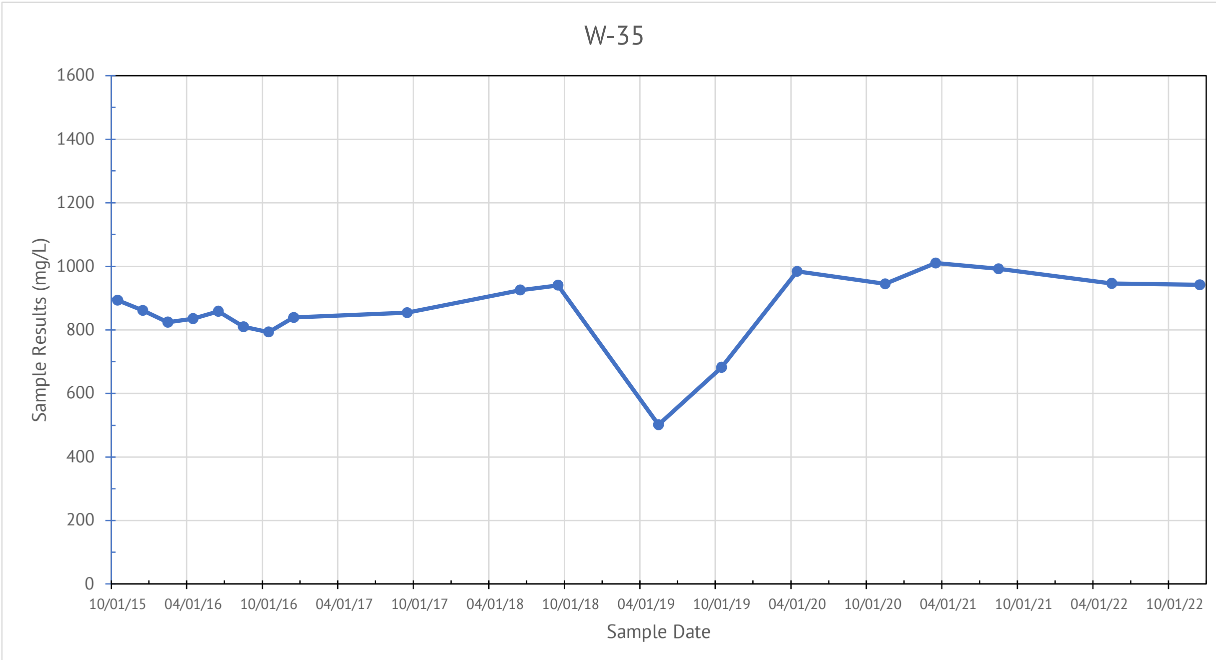
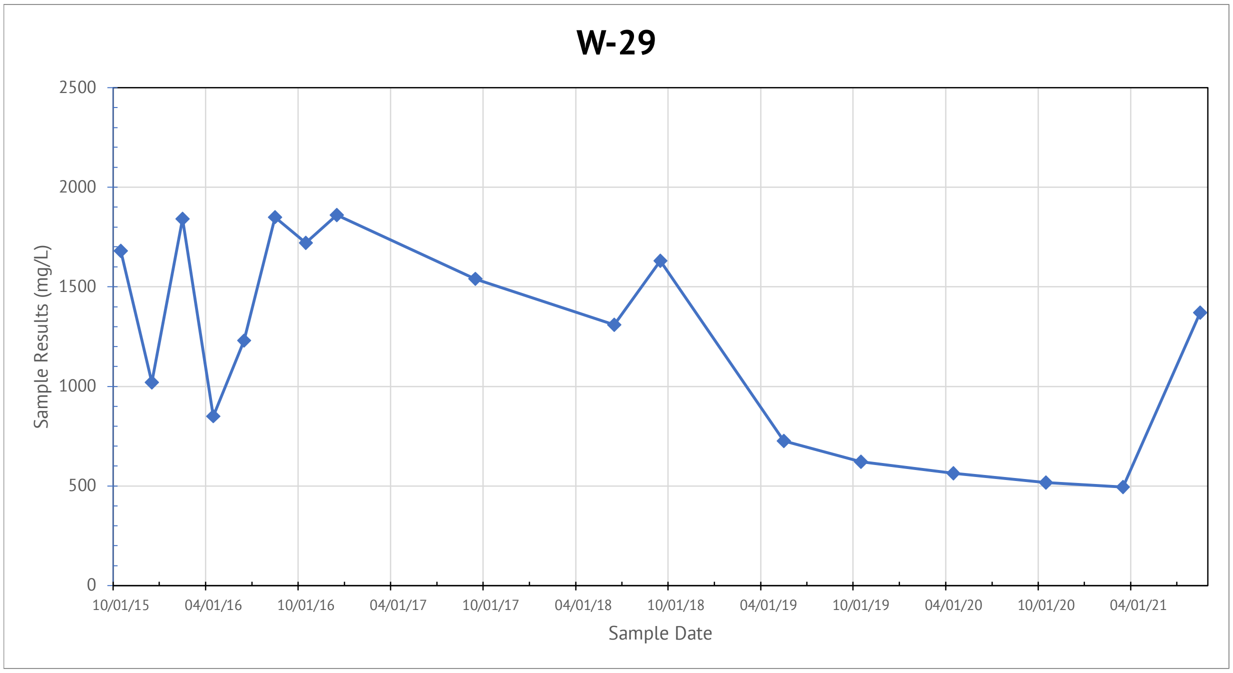


**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - TDS**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



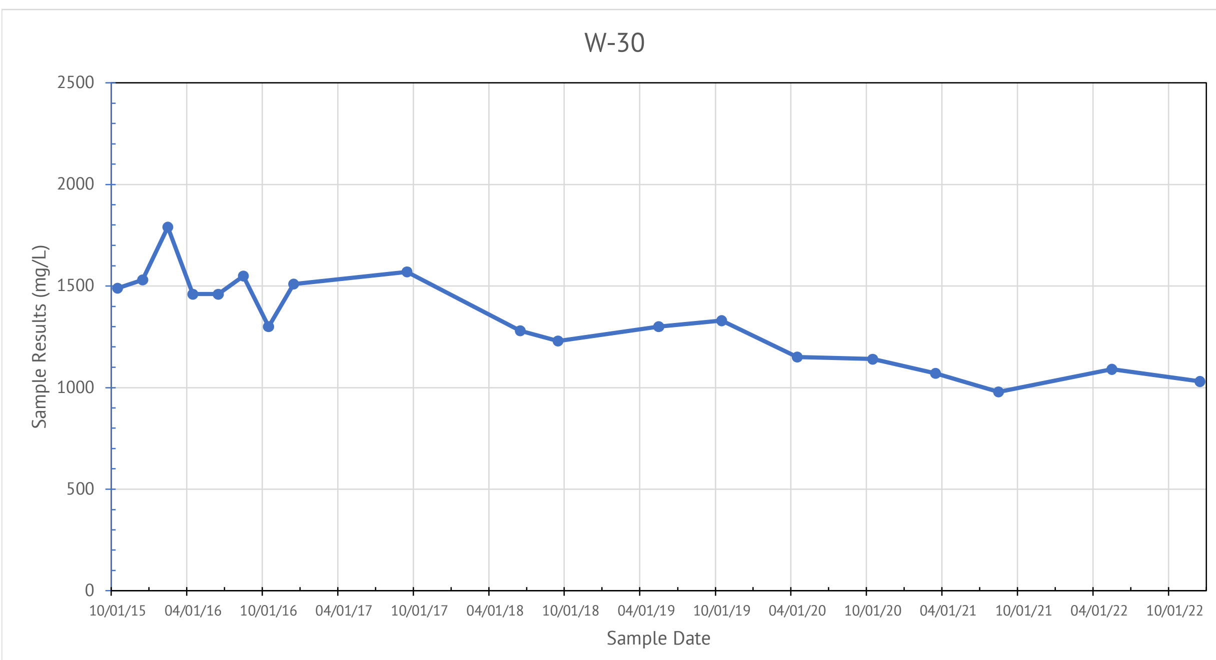
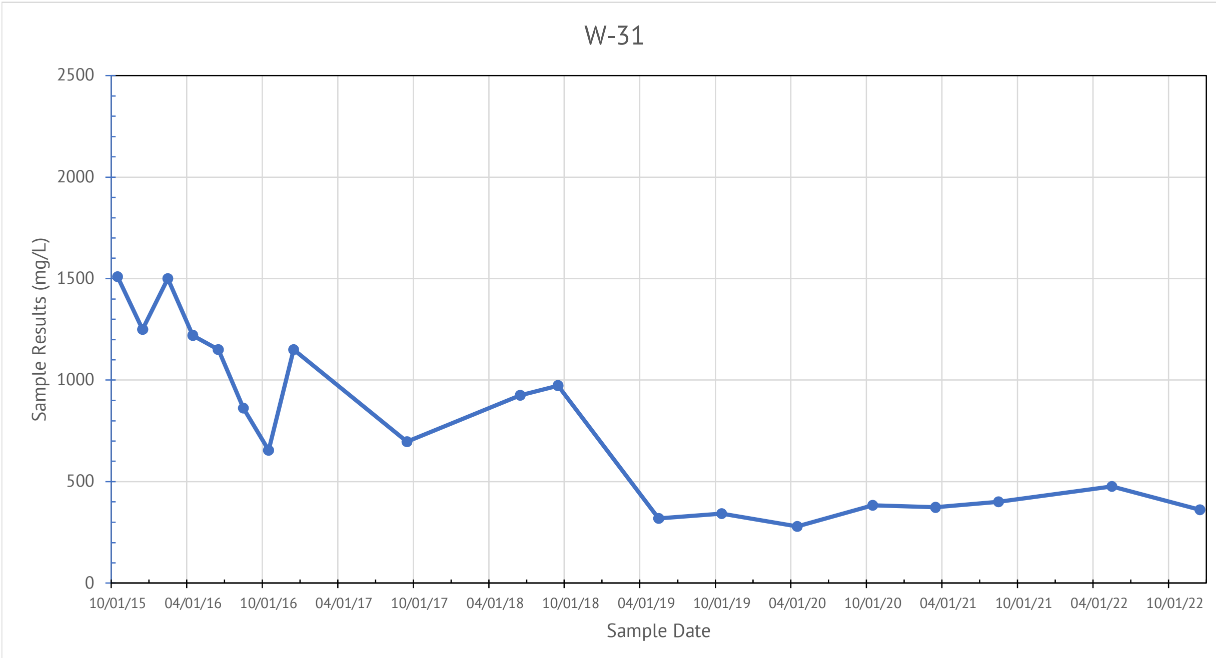



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - TDS**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



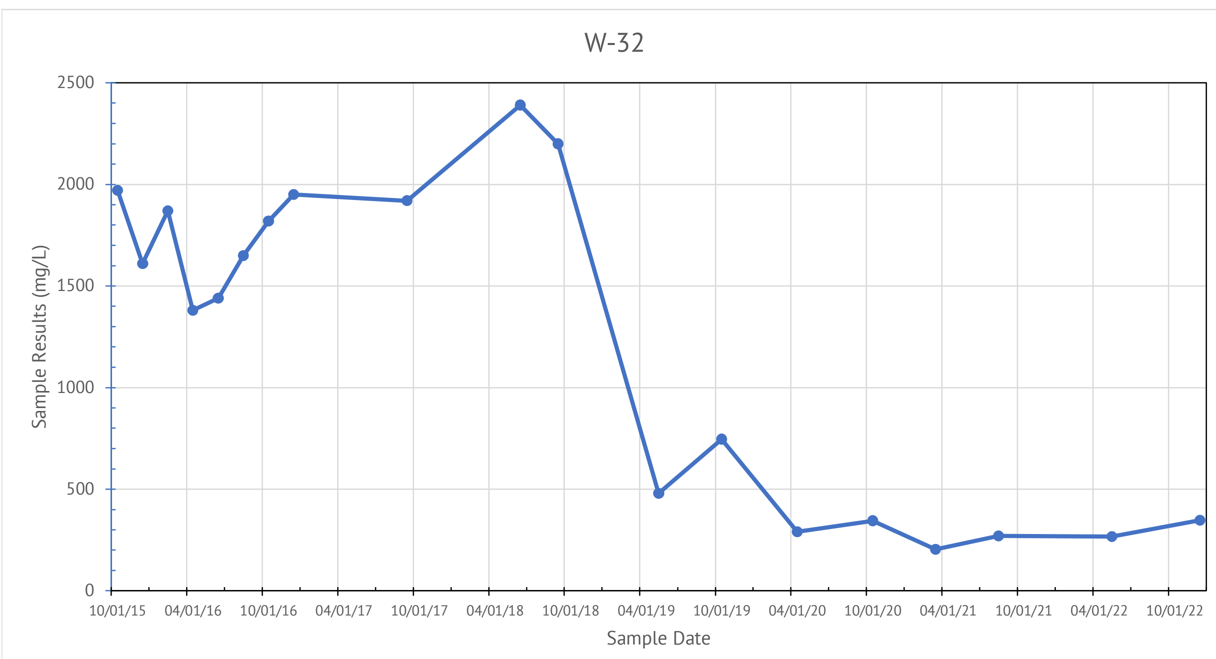
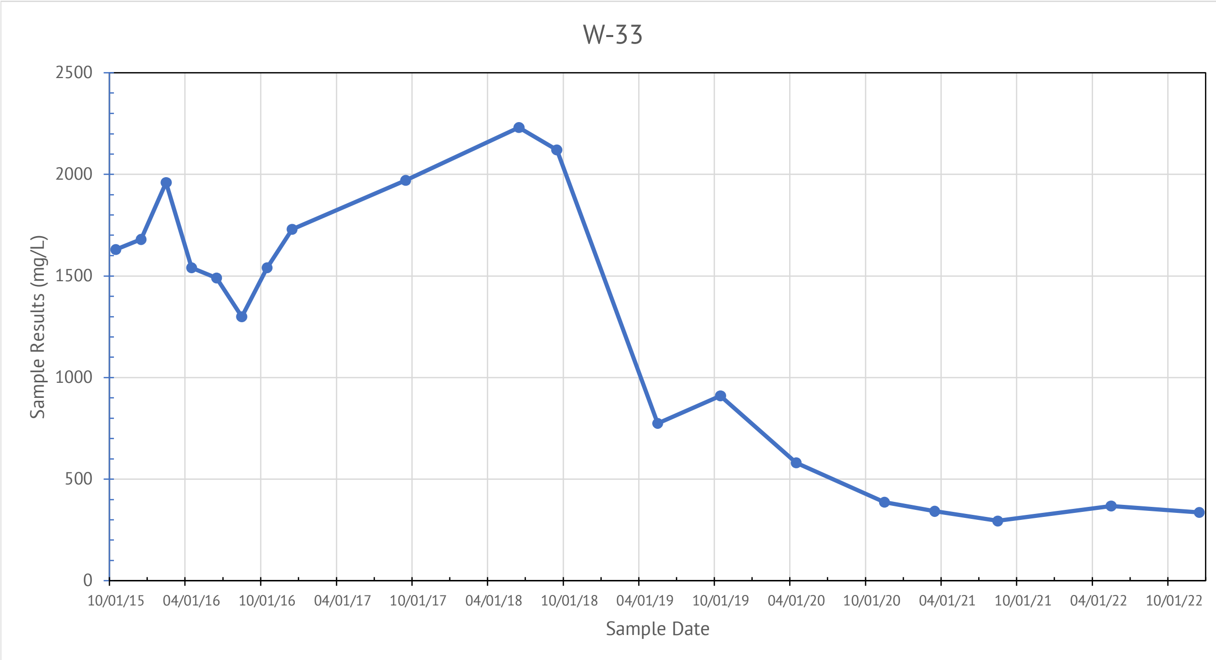



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - TDS**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



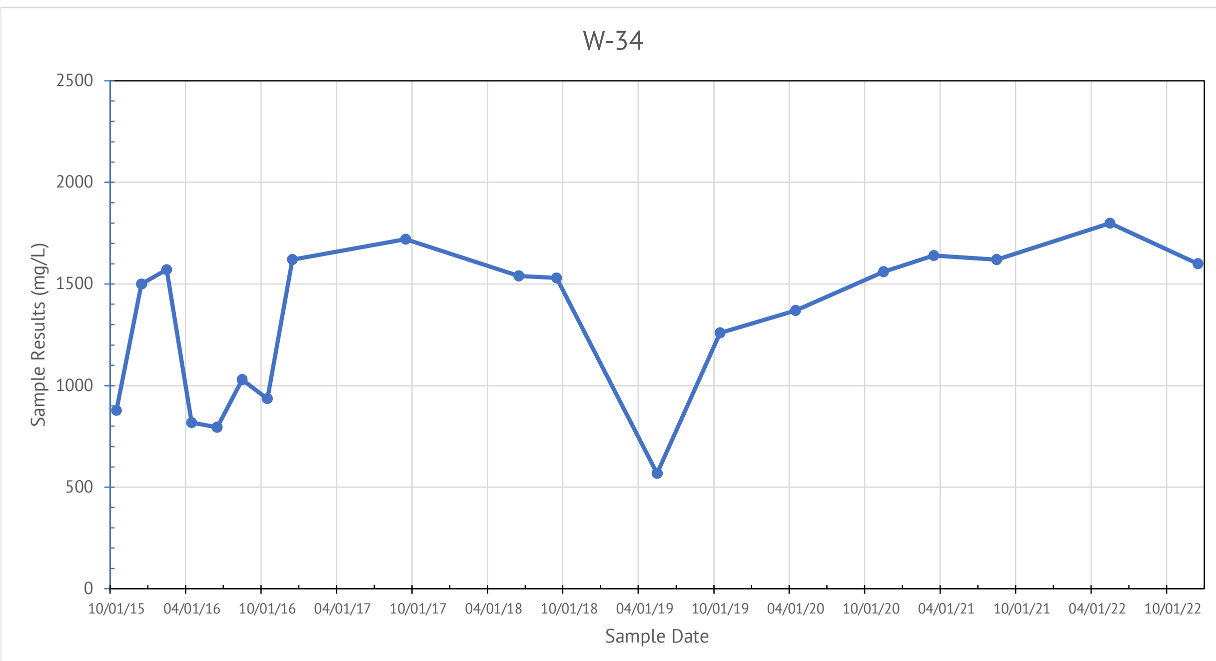



**FIGURE 4**
**Statistical Analysis of Ground Water Data**
**Time Series Chart - TDS**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

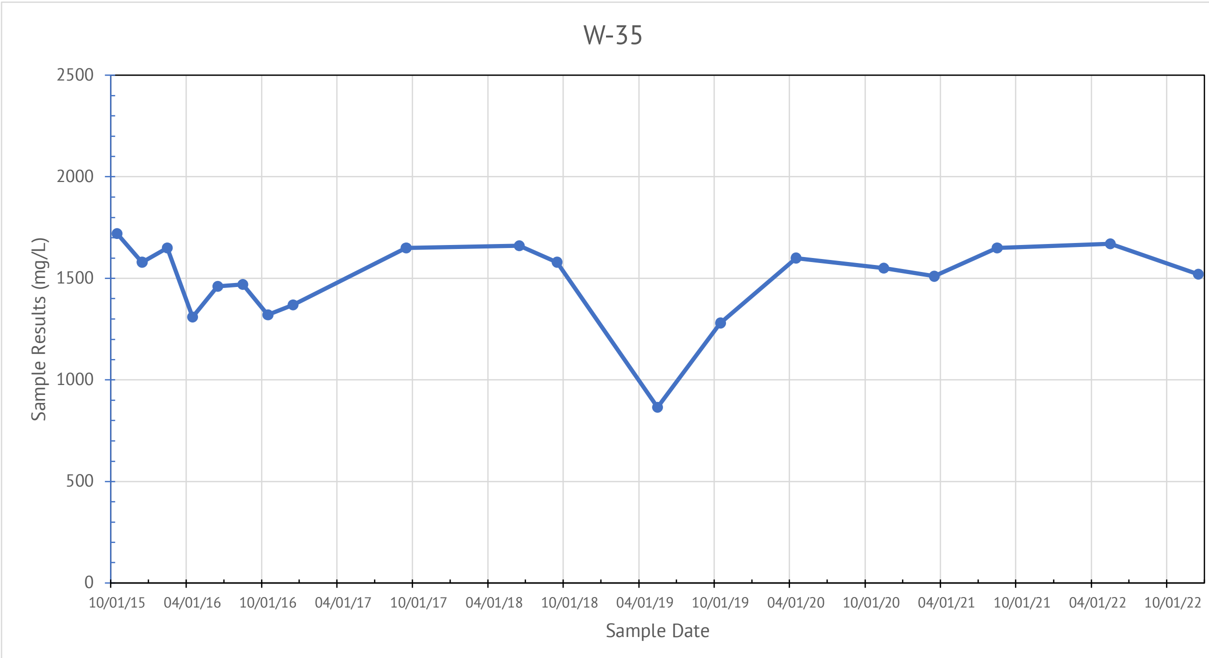
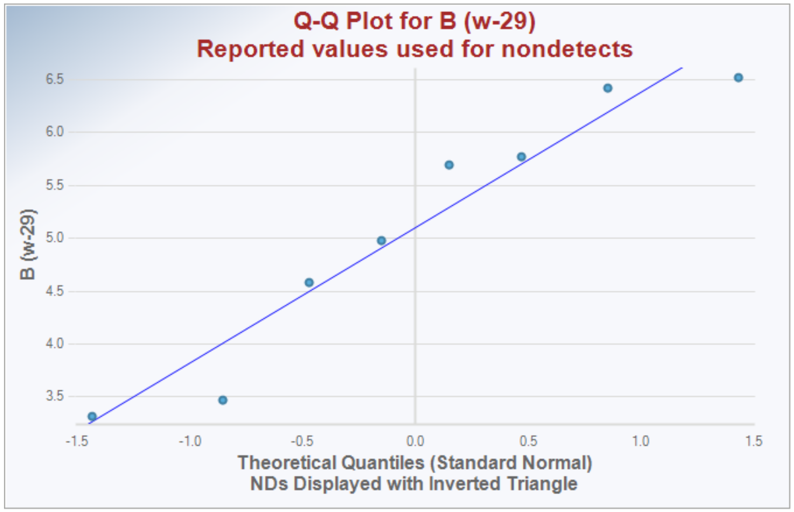
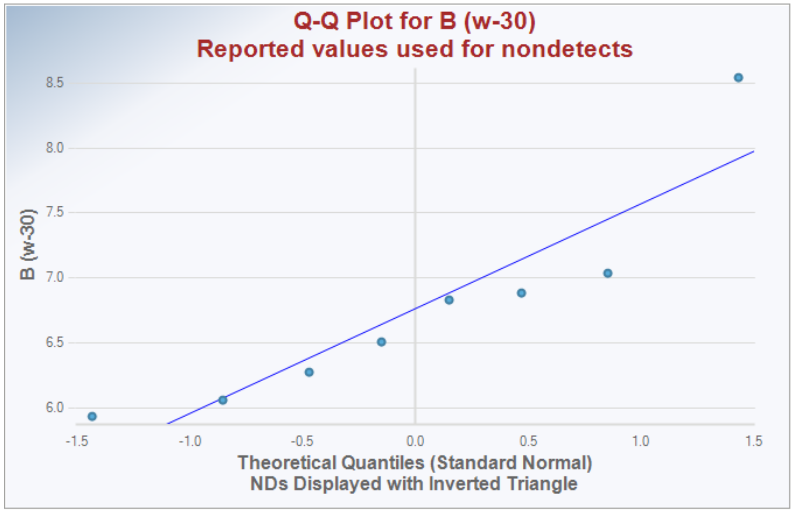
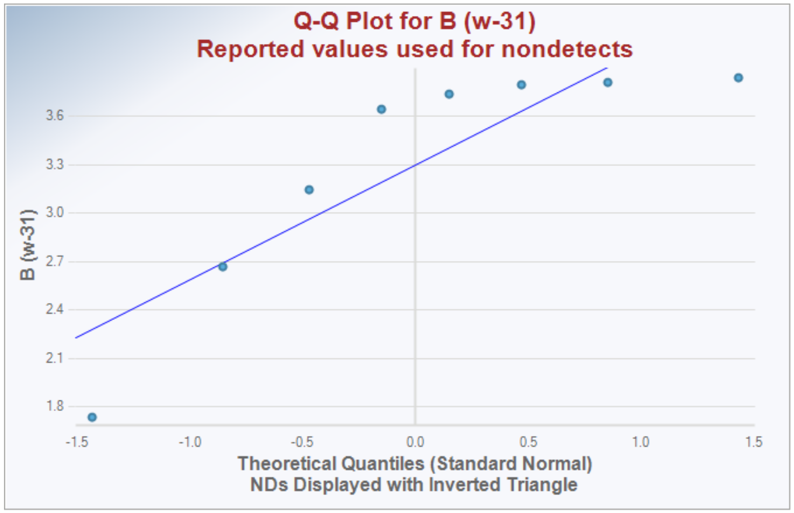
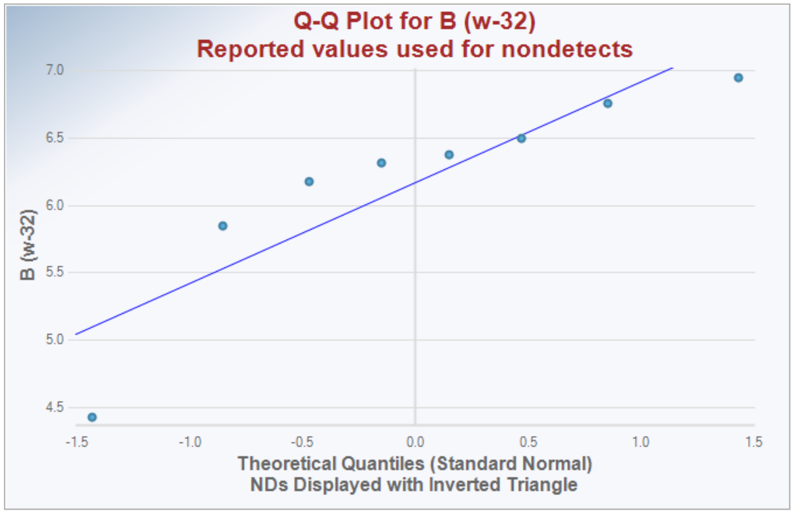


**FIGURE 5**
**Statistical Analysis of Ground Water Data**
**Q-Q Plots – All Parameters**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

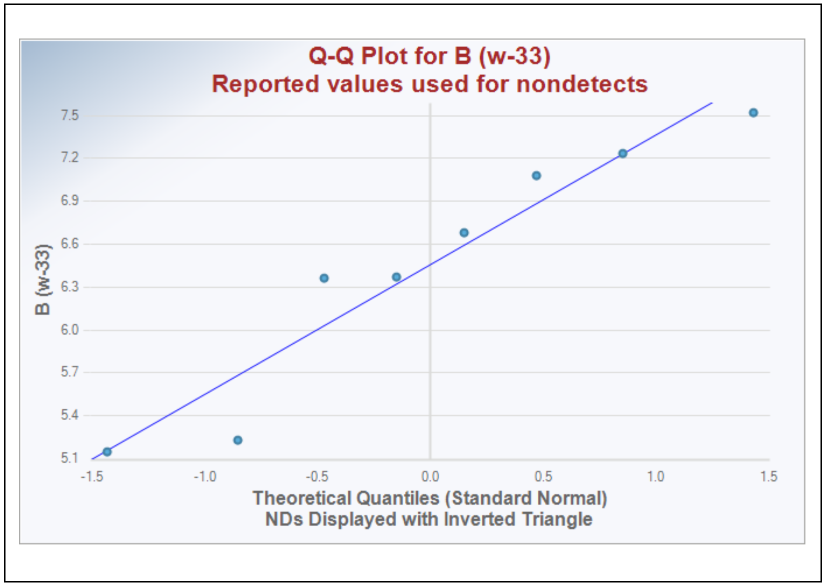


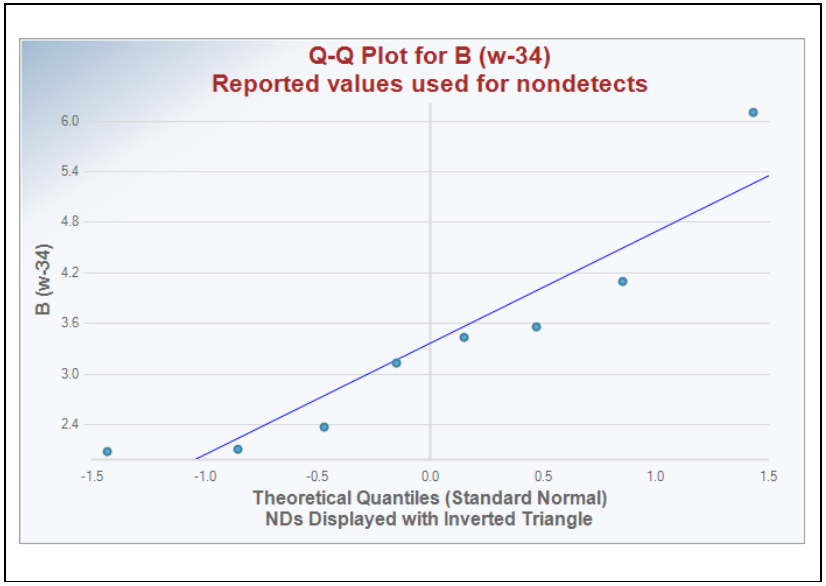



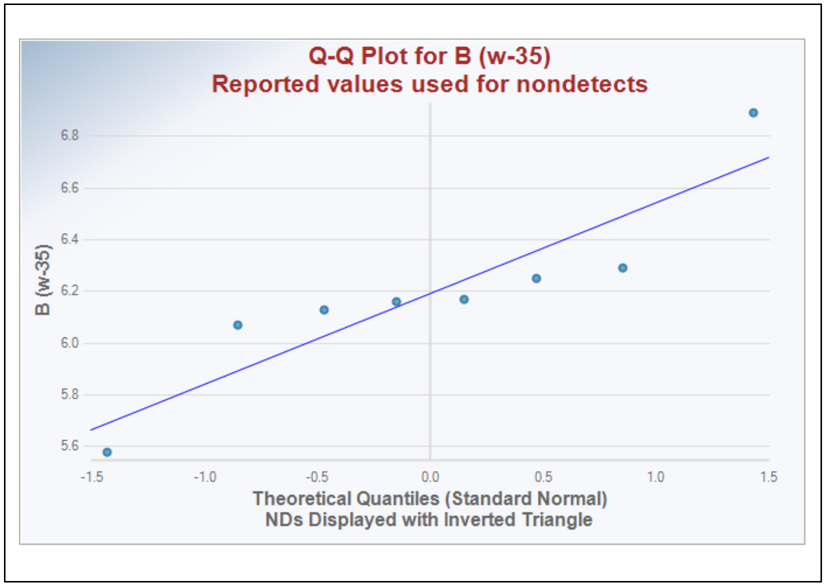



# FIGURE 5
## Statistical Analysis of Ground Water Data
## Q-Q Plots – All Parameters
## Monticello Steam Electric Station
## Mt. Pleasant, Titus County, Texas



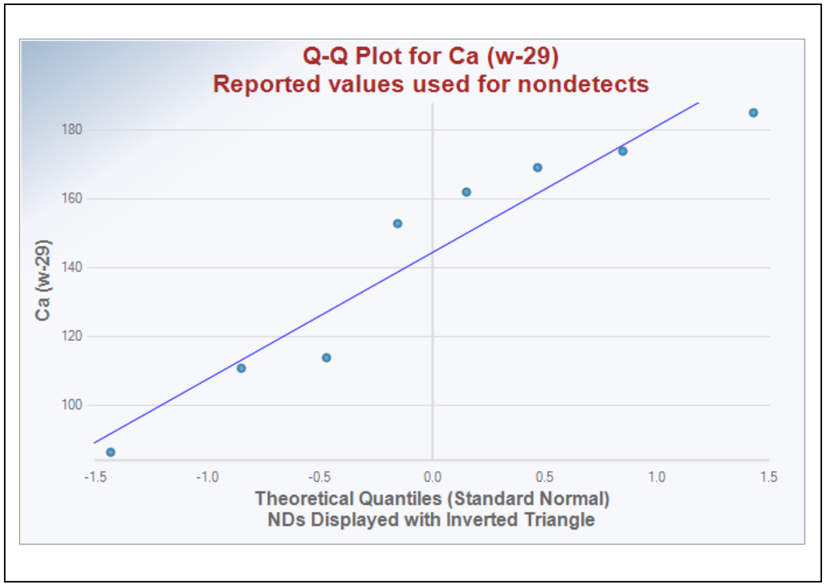
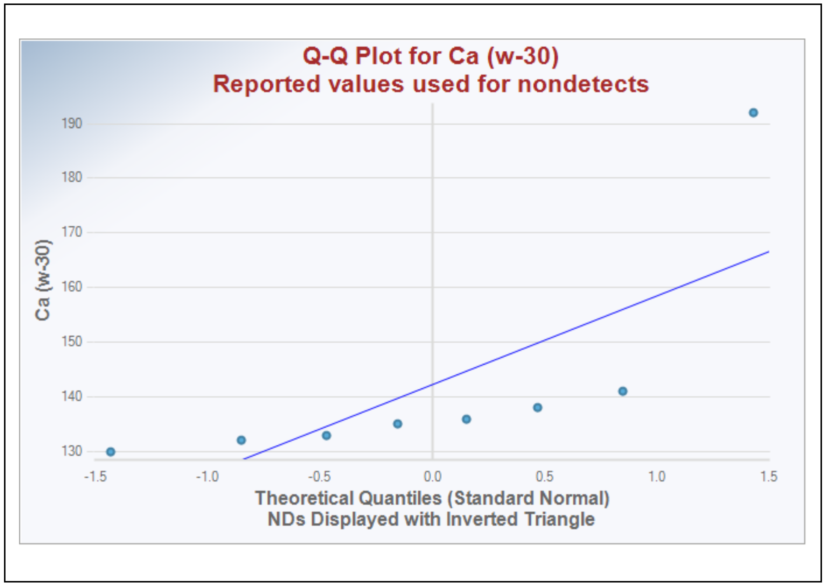
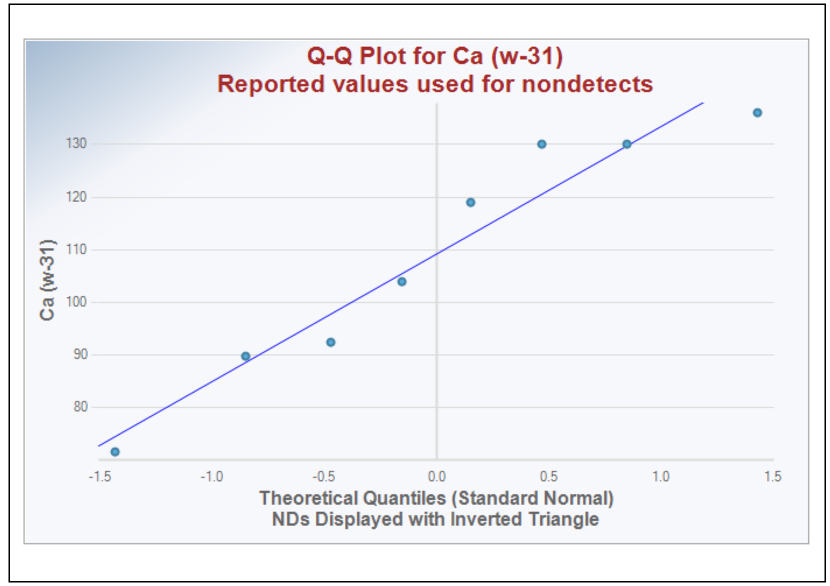
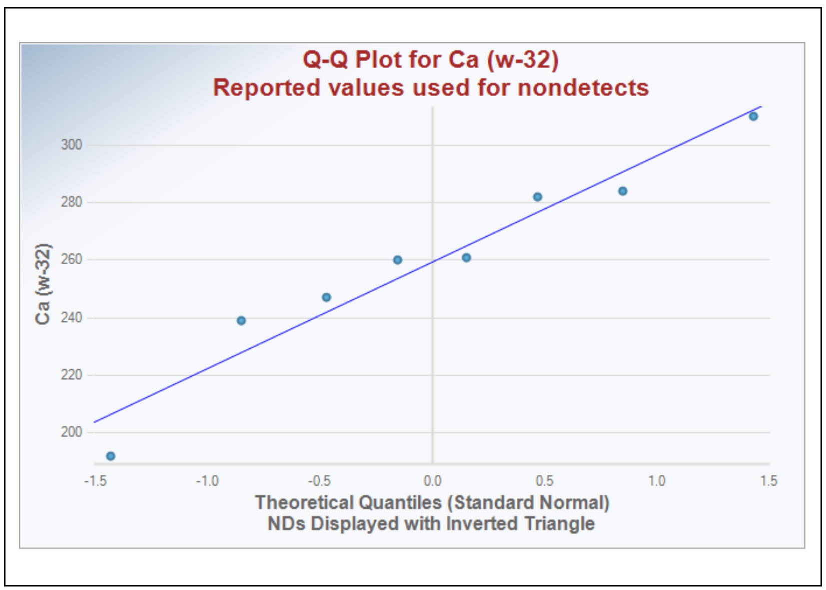



**FIGURE 5**
**Statistical Analysis of Ground Water Data**
**Q-Q Plots – All Parameters**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



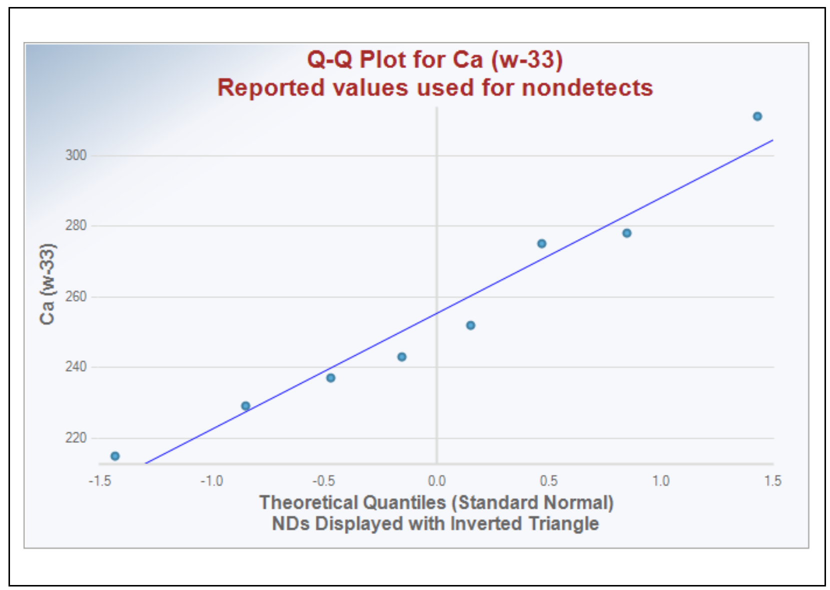
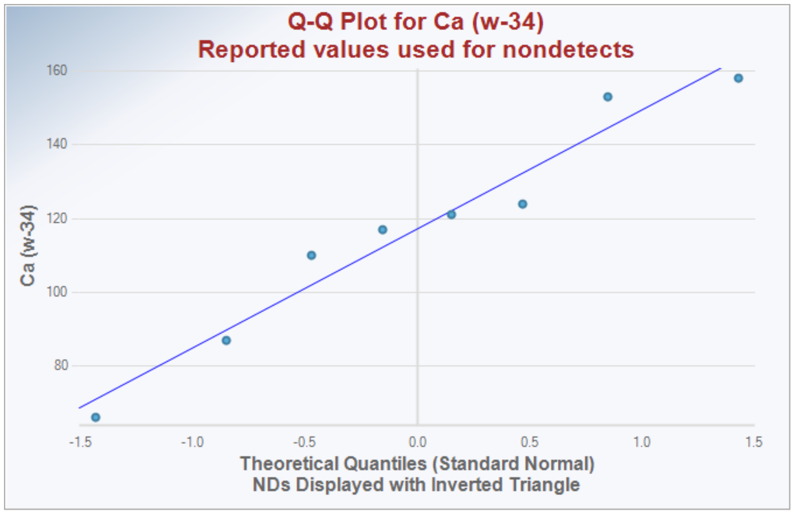
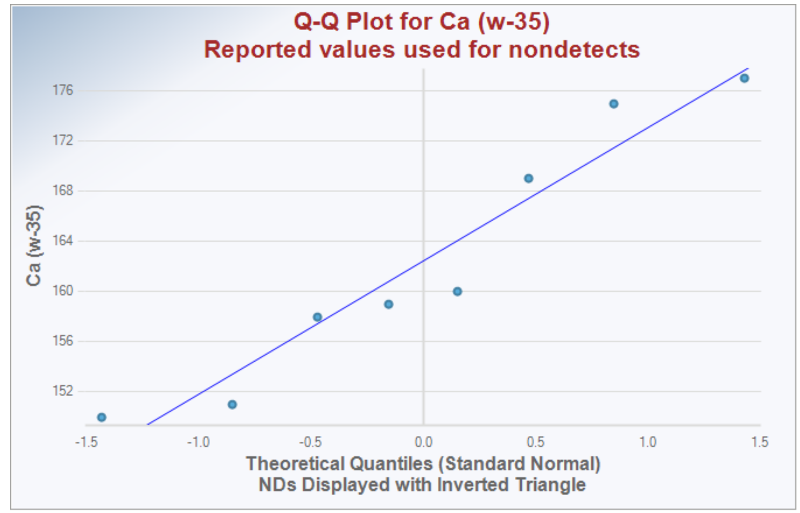
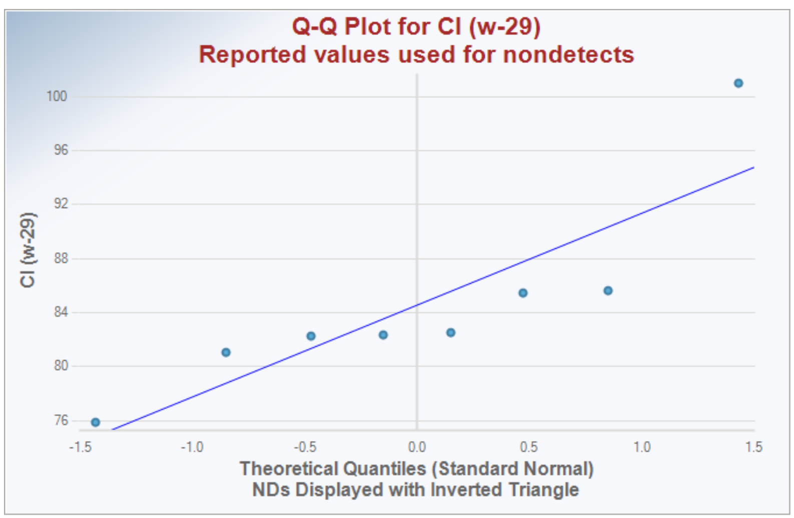



**FIGURE 5**
**Statistical Analysis of Ground Water Data**
**Q-Q Plots – All Parameters**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



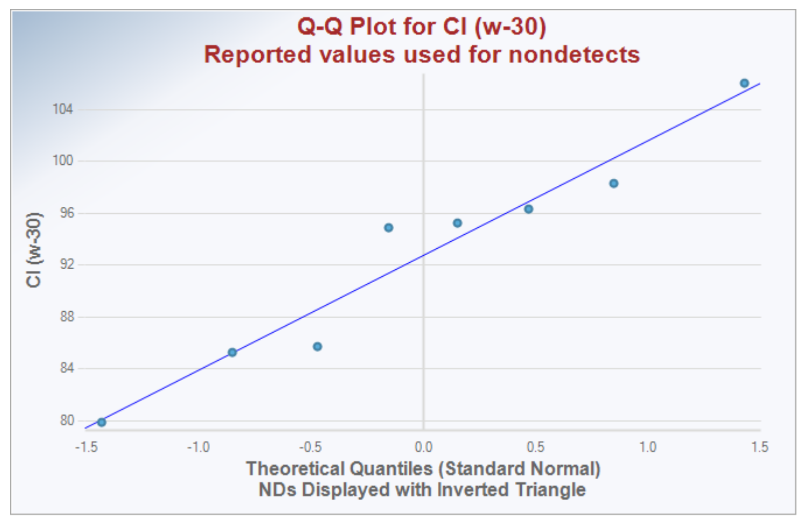
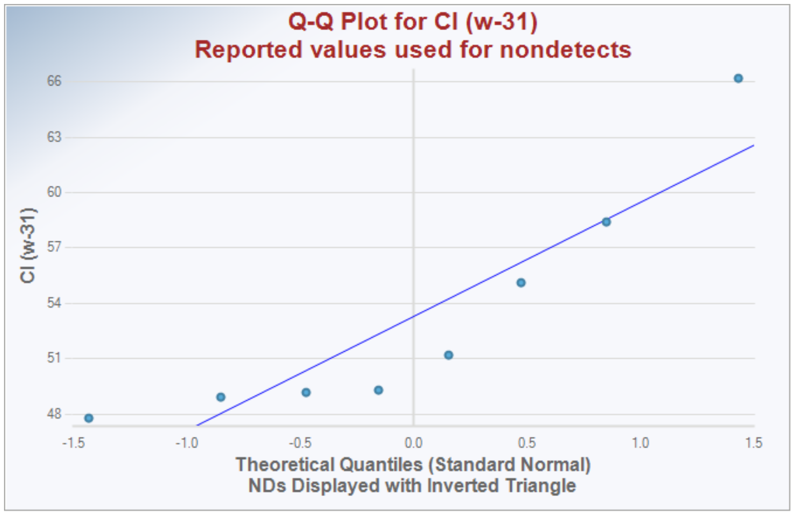
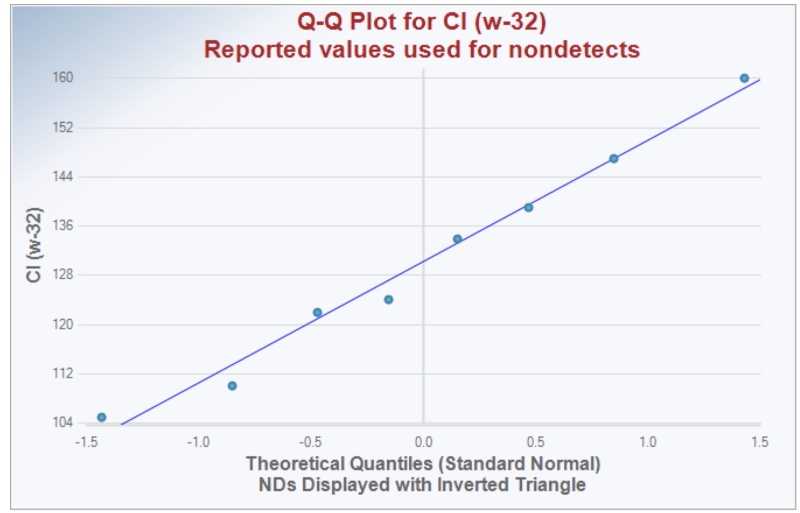
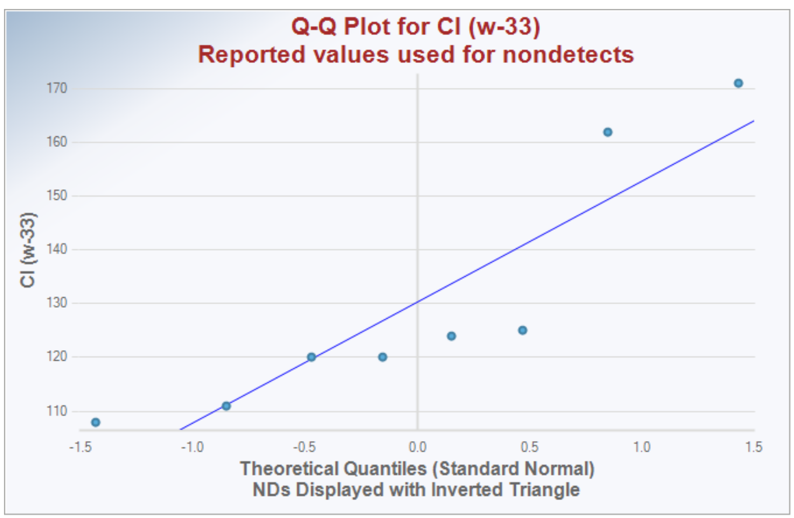



**FIGURE 5**
**Statistical Analysis of Ground Water Data**
**Q-Q Plots – All Parameters**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



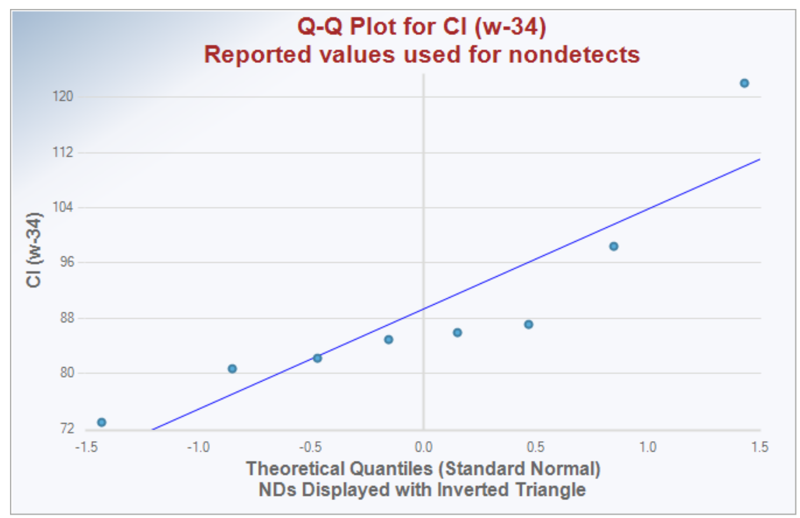
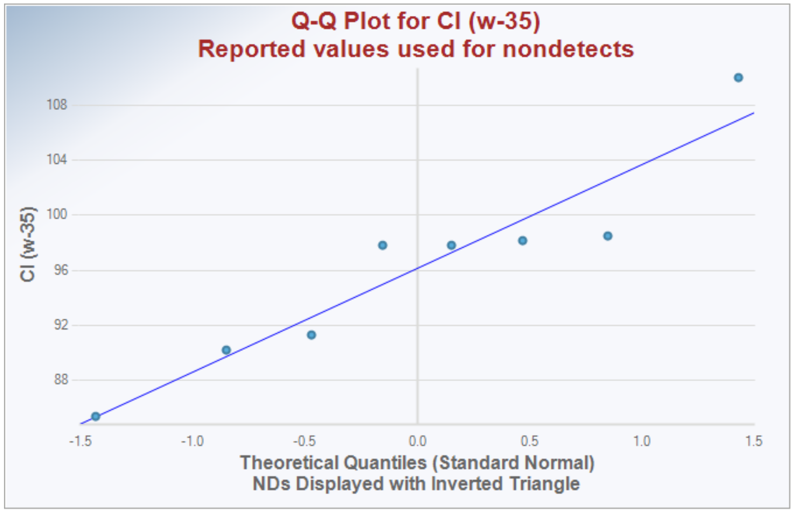
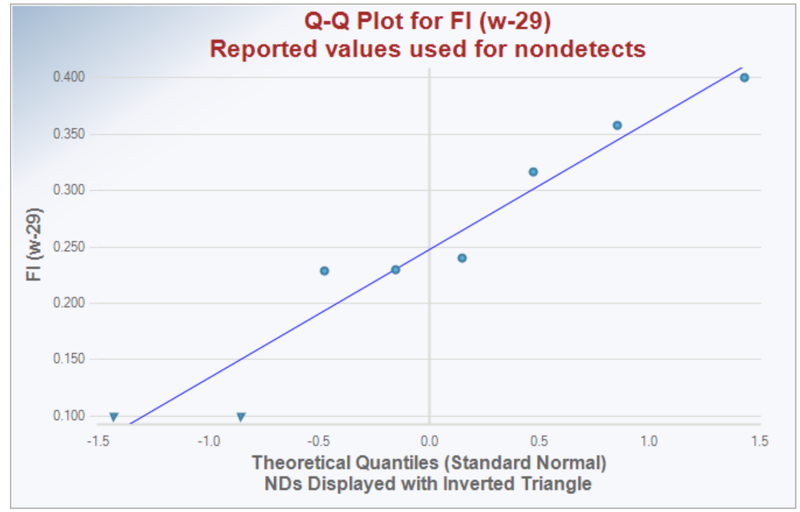
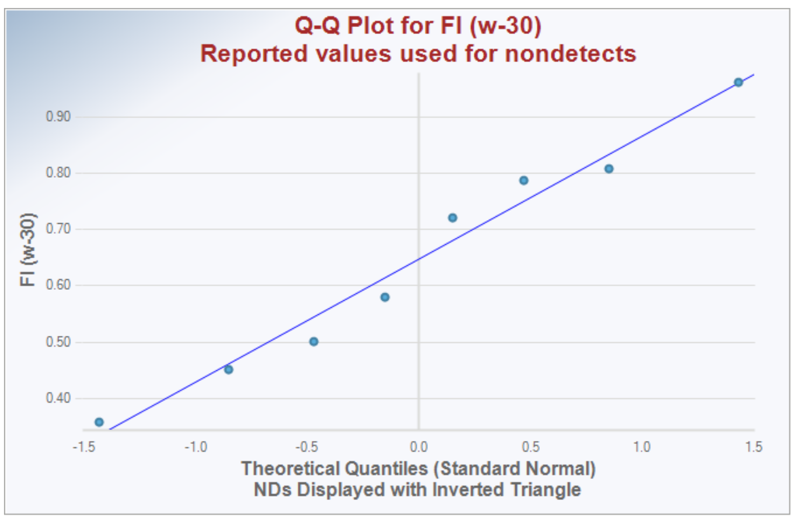



**FIGURE 5**
**Statistical Analysis of Ground Water Data**
**Q-Q Plots – All Parameters**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



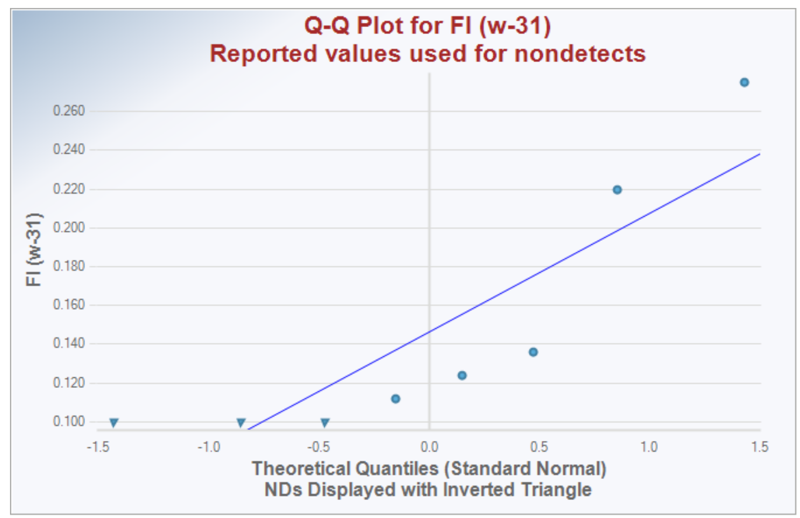
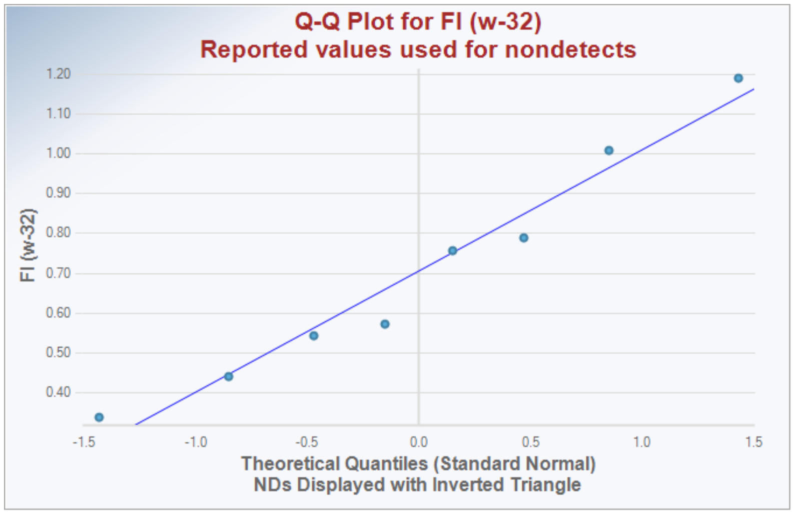
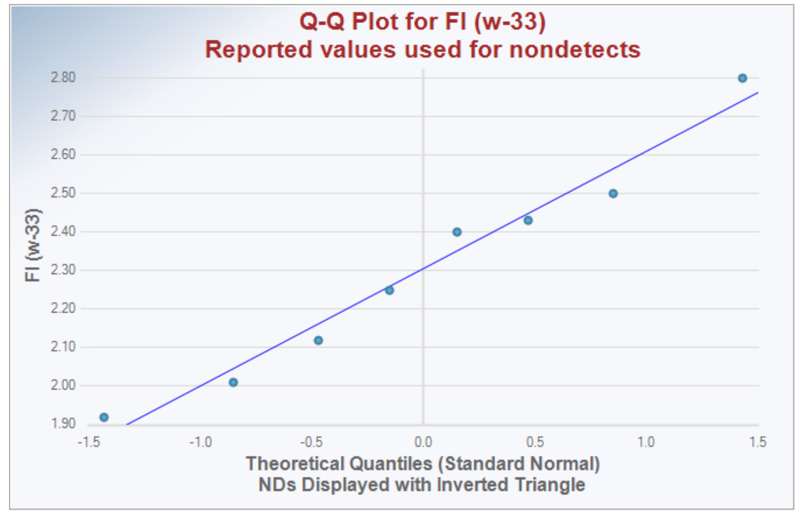
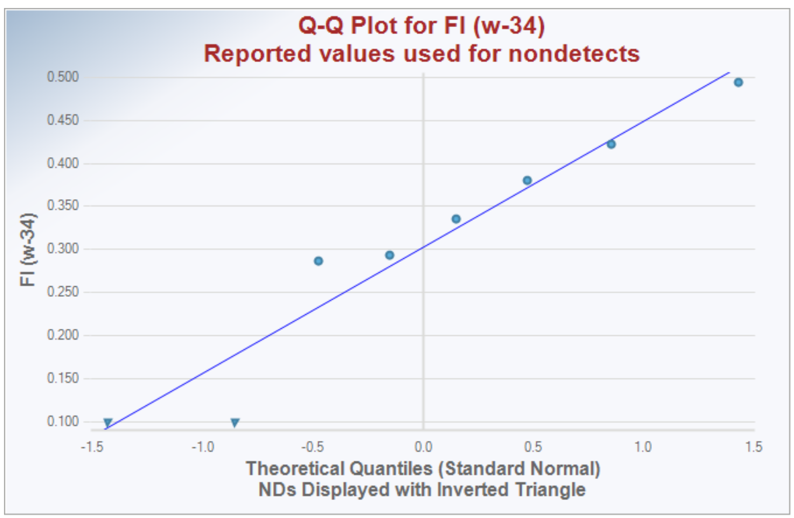



**FIGURE 5**
**Statistical Analysis of Ground Water Data**
**Q-Q Plots – All Parameters**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



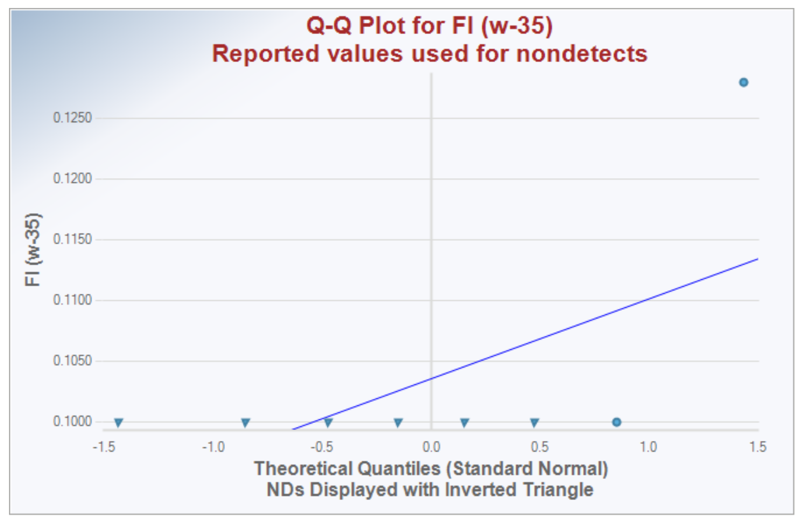
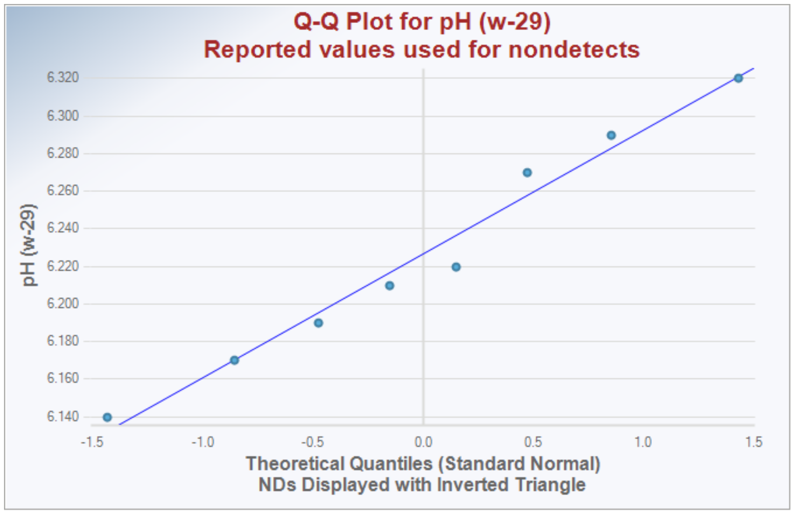
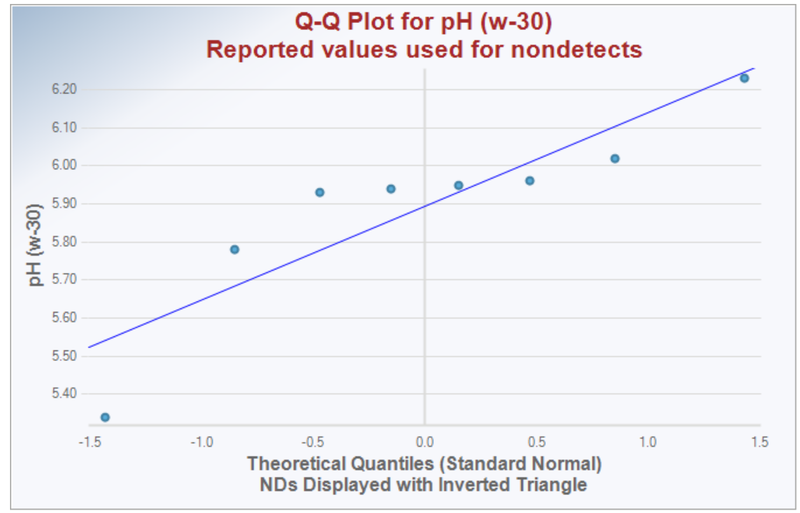
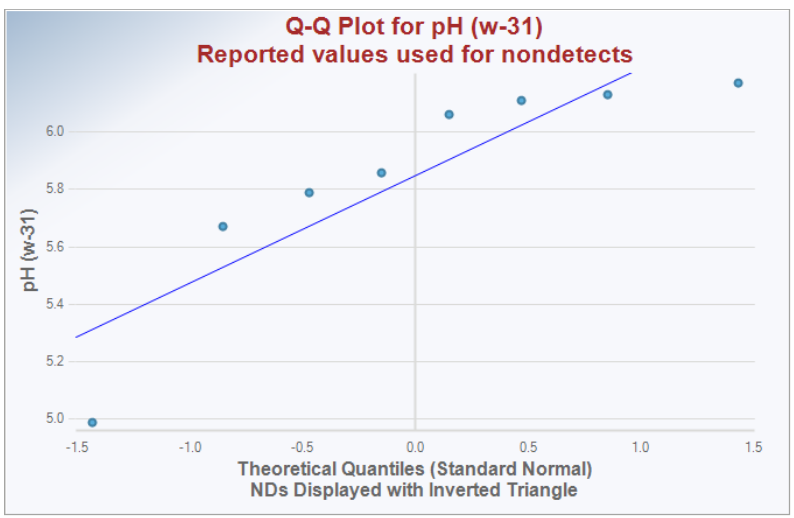



**FIGURE 5**
**Statistical Analysis of Ground Water Data**
**Q-Q Plots – All Parameters**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



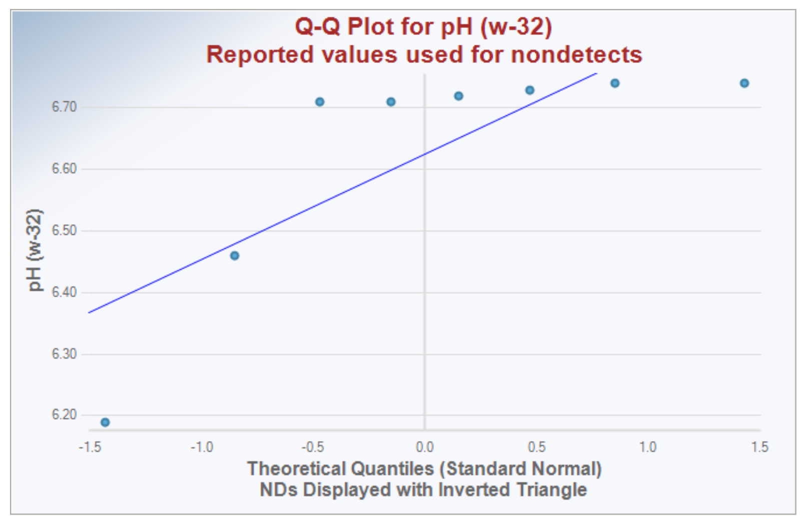
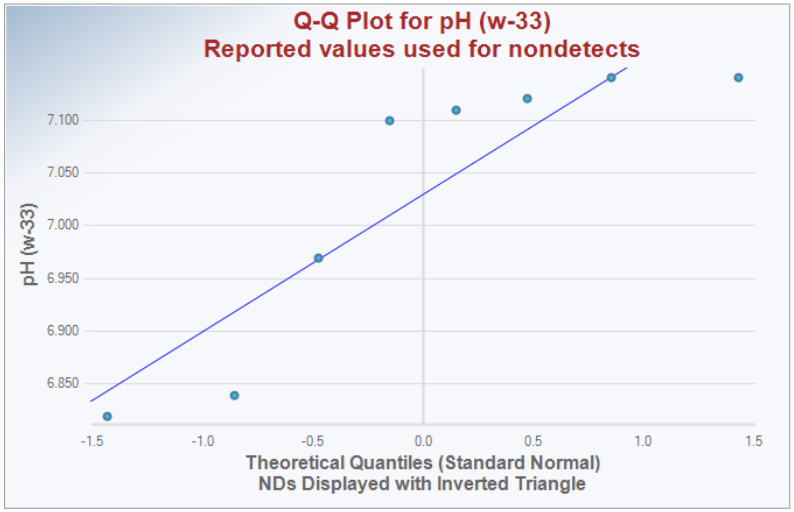
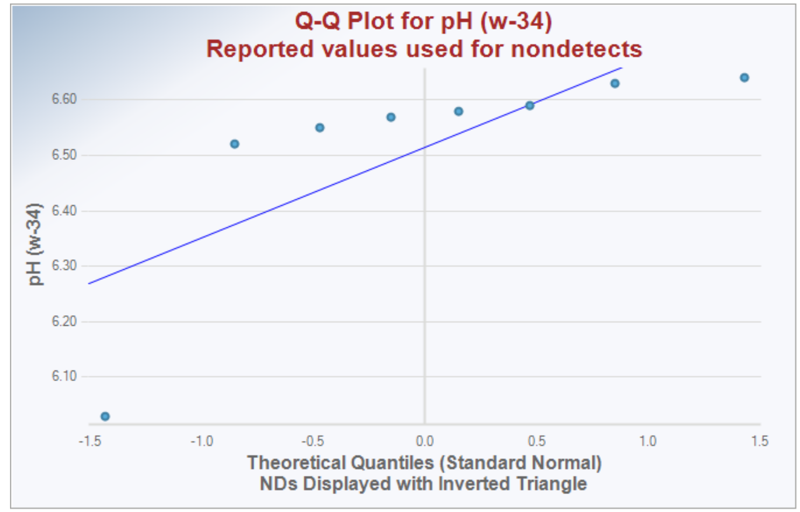
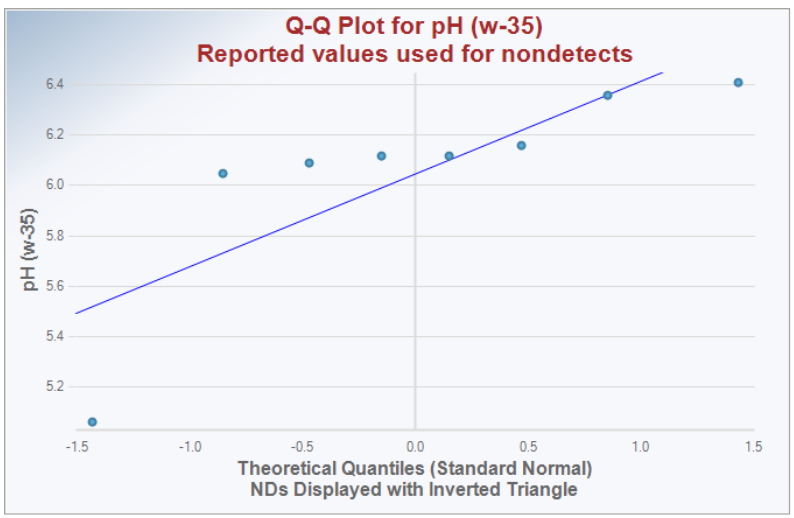



**FIGURE 5**
**Statistical Analysis of Ground Water Data**
**Q-Q Plots – All Parameters**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



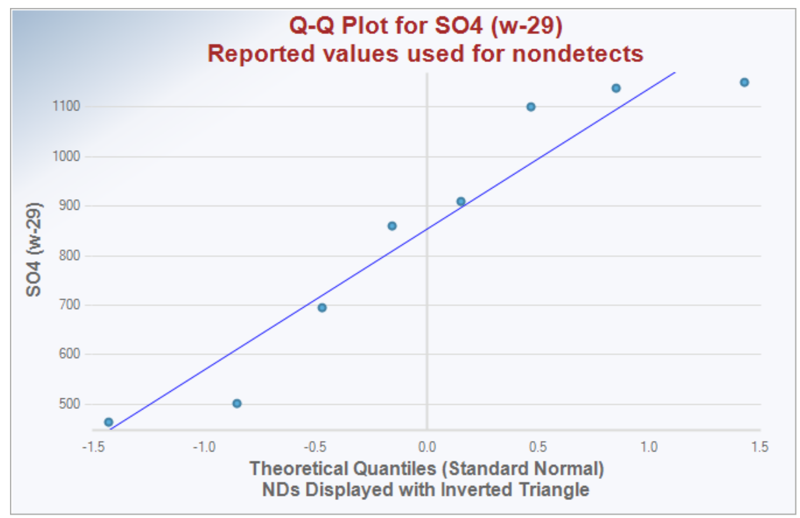
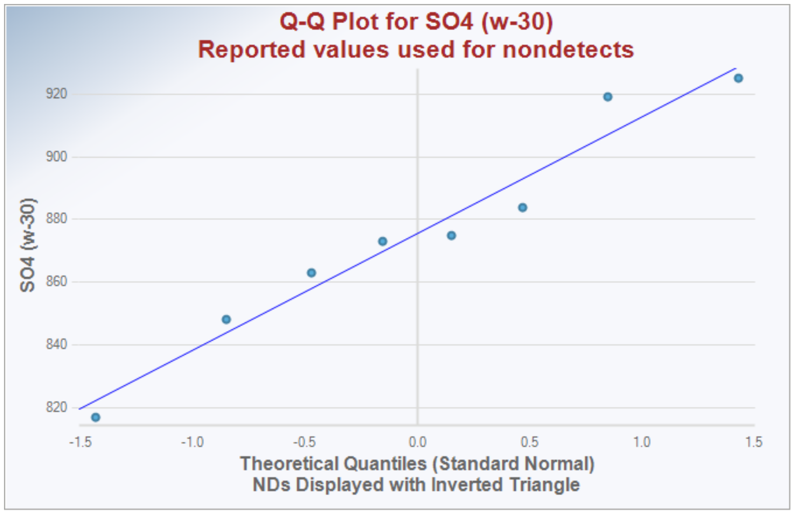
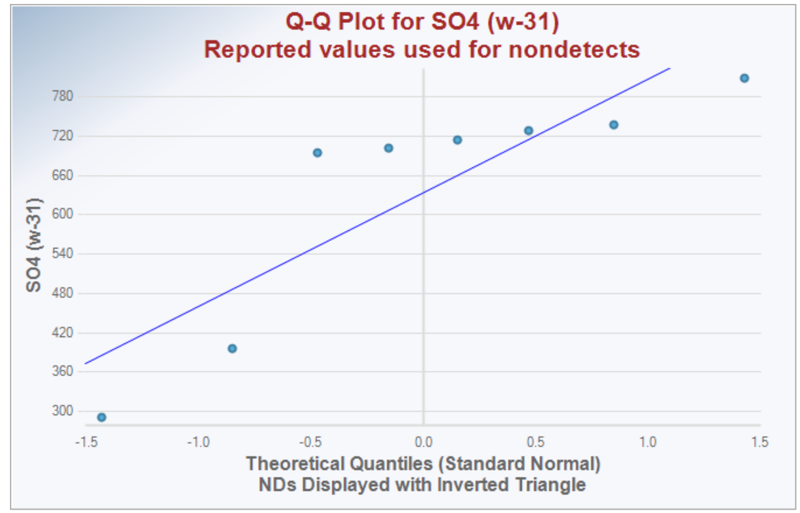
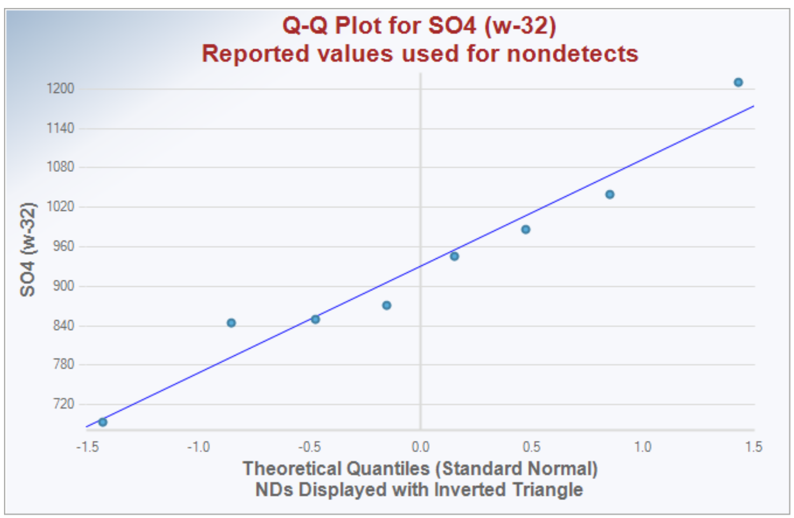



**FIGURE 5**
**Statistical Analysis of Ground Water Data**
**Q-Q Plots – All Parameters**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



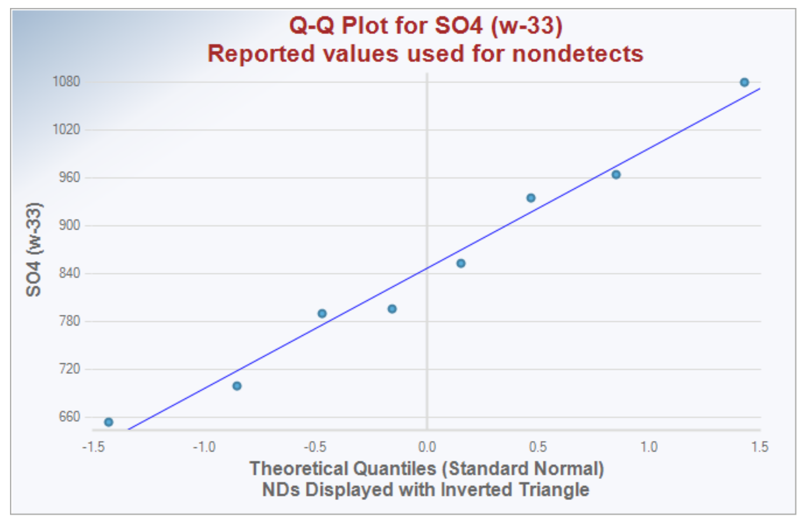
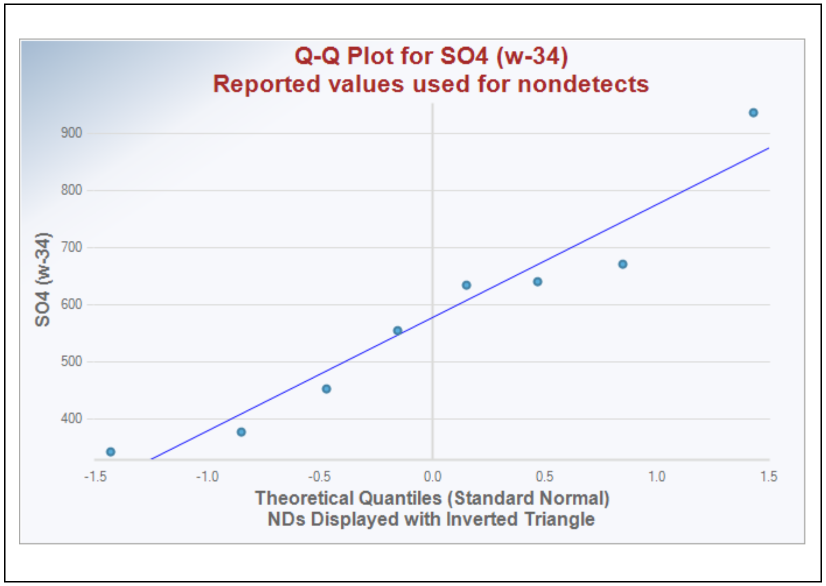
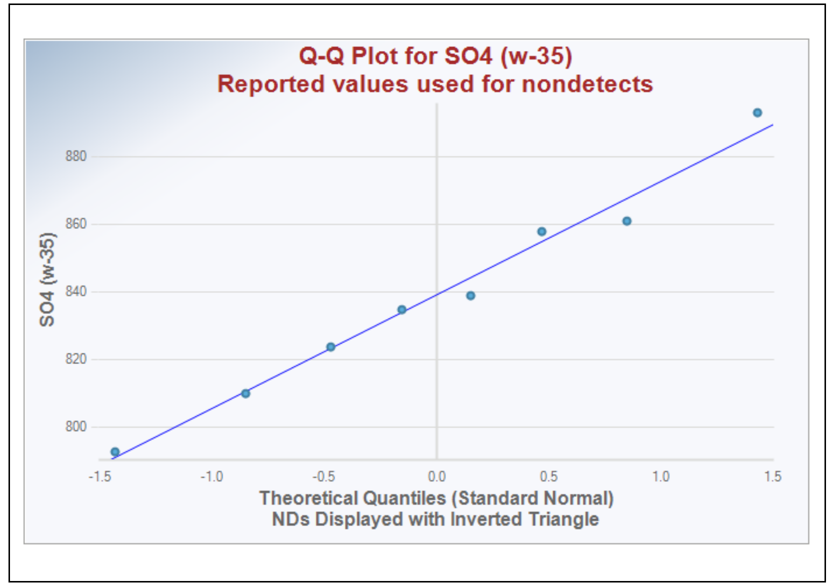
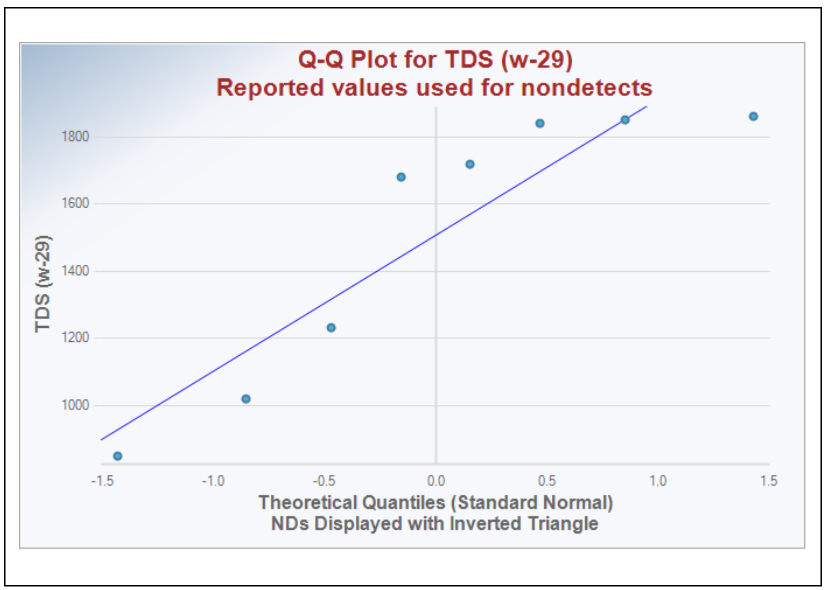



**FIGURE 5**
**Statistical Analysis of Ground Water Data**
**Q-Q Plots – All Parameters**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



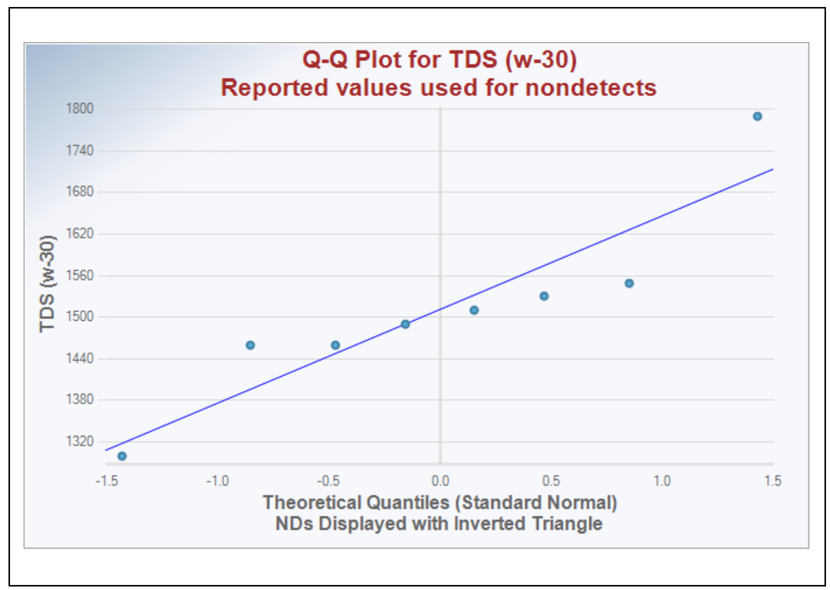
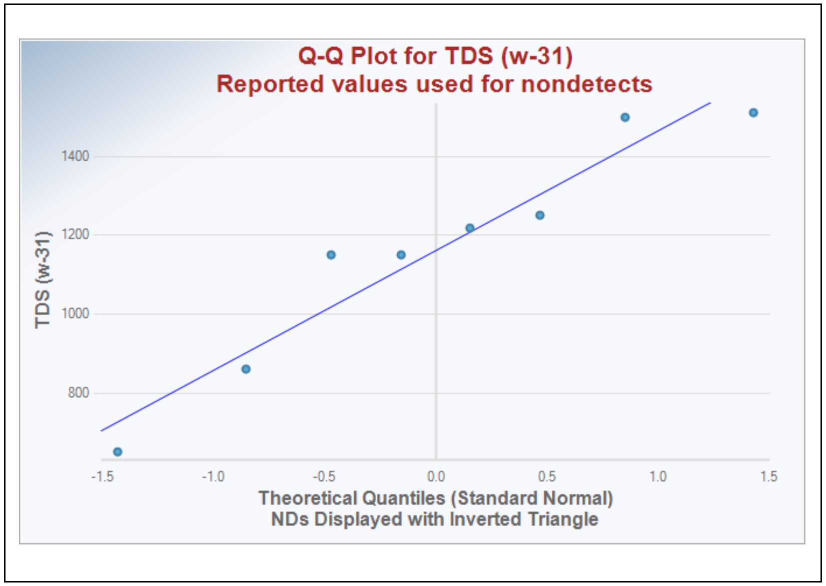
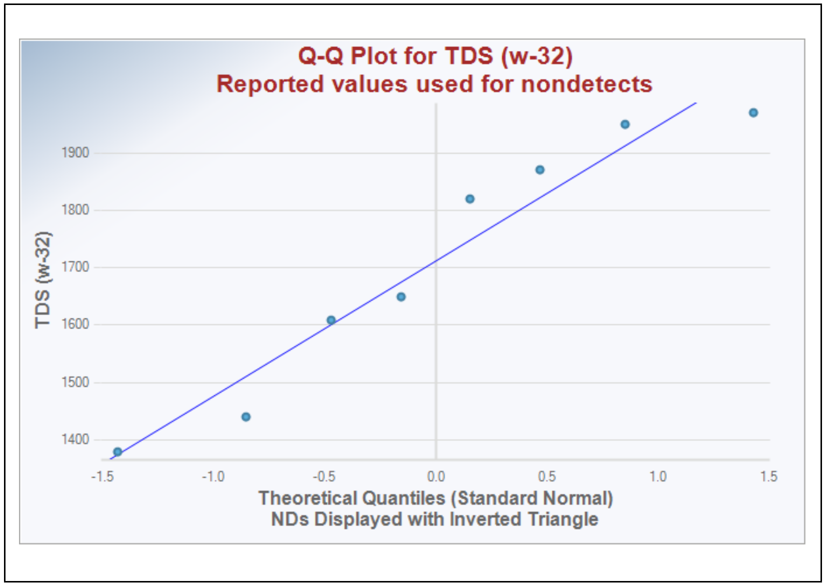
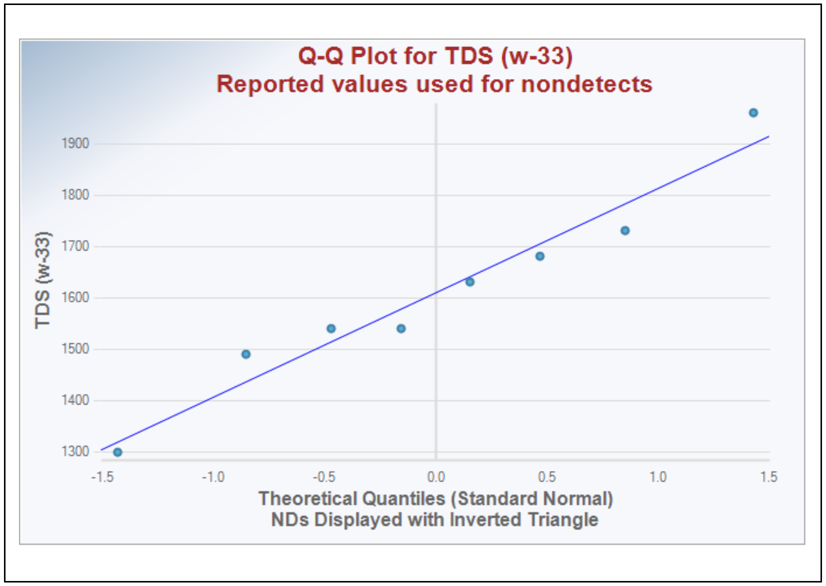



**FIGURE 5**
**Statistical Analysis of Ground Water Data**
**Q-Q Plots – All Parameters**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**



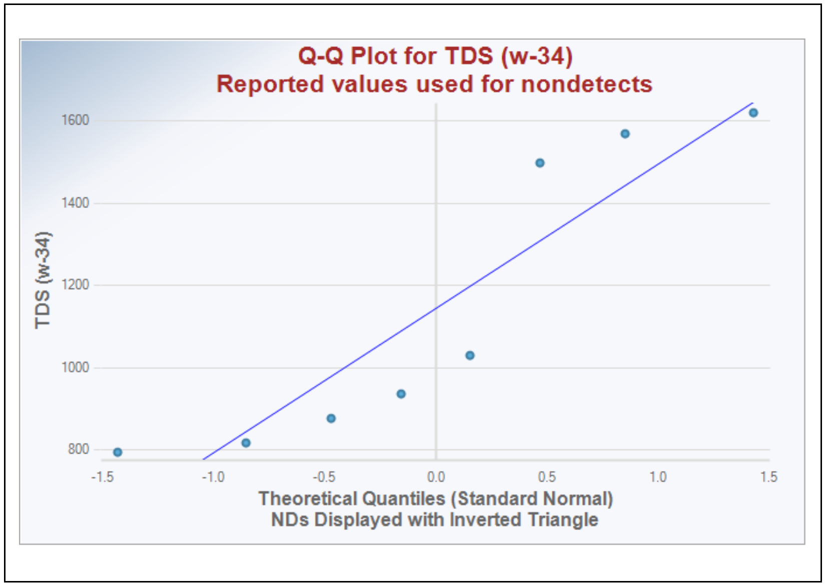



**FIGURE 5**
**Statistical Analysis of Ground Water Data**
**Q-Q Plots – All Parameters**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

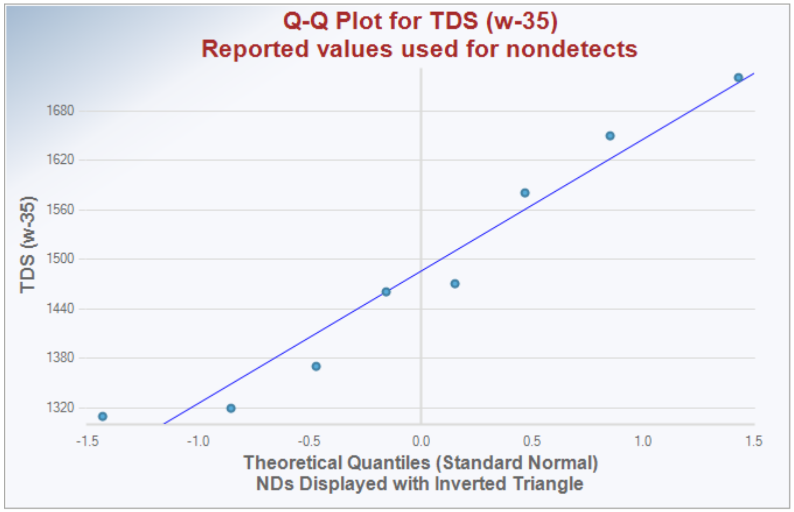



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FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

| | | | |
|---|---|---|---|
| Evaluation Date: | 8-Nov-22 | Job ID: | Bkgd-Ug |
| Facility Name: | MOSES | Constituent: | Boron |
| Conducted By: | BJF | Concentration Units: | mg/L |

| Sampling Event | Sampling Date | W-31 | W-32 | W-33 | | | | |
|---|---|---|---|---|---|---|---|---|
| | | BORON CONCENTRATION (mg/L) | | | | | | |
| 1 | 10/15/15 | 3.74 | 5.85 | 6.36 | | | | |
| 2 | 12/07/15 | 3.81 | 6.76 | 6.68 | | | | |
| 3 | 02/22/16 | 3.65 | 6.95 | 7.52 | | | | |
| 4 | 04/04/16 | 3.80 | 6.50 | 7.24 | | | | |
| 5 | 06/06/16 | 3.84 | 6.18 | 7.08 | | | | |
| 6 | 08/08/16 | 2.67 | 4.43 | 6.37 | | | | |
| 7 | 10/12/16 | 1.74 | 6.32 | 5.15 | | | | |
| 8 | 12/29/16 | 3.15 | 6.38 | 5.23 | | | | |
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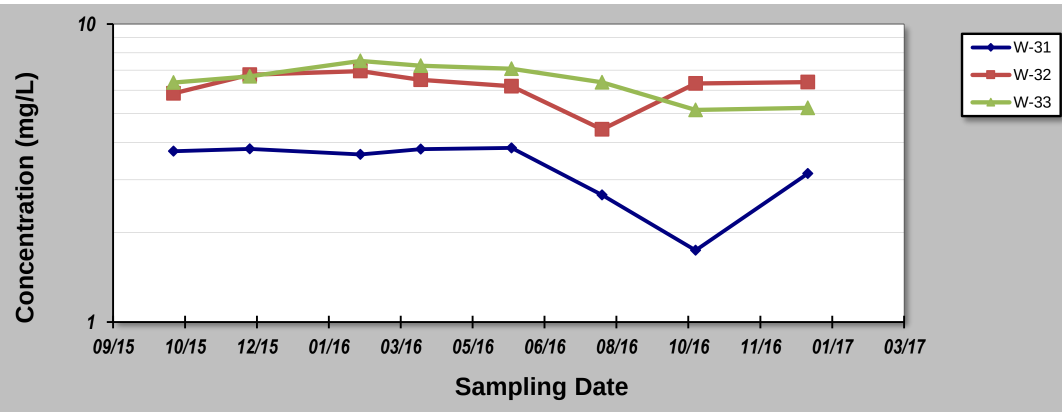
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.23 | 0.13 | 0.14 | | | | |
| Mann-Kendall Statistic (S): | | -10 | -4 | -10 | | | | |
| Confidence Factor: | | 86.2% | 64.0% | 86.2% | | | | |
| Concentration Trend: | | Stable | Stable | Stable | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 9-Nov-22 Job ID: Bkgd-Ug
Facility Name: MOSES Constituent: Calcium
Conducted By: KRO Concentration Units: mg/L

| Sampling Event | Sampling Date | W-31 | W-32 | W-33 | | | | |
|---|---|---|---|---|---|---|---|---|
| | | CALCIUM CONCENTRATION (mg/L) | | | | | | |
| 1 | 10/15/15 | 130.00 | 282.00 | 311.00 | | | | |
| 2 | 12/07/15 | 136.00 | 260.00 | 252.00 | | | | |
| 3 | 02/22/16 | 130.00 | 247.00 | 243.00 | | | | |
| 4 | 04/04/16 | 119.00 | 239.00 | 278.00 | | | | |
| 5 | 06/06/16 | 104.00 | 192.00 | 229.00 | | | | |
| 6 | 08/08/16 | 92.40 | 261.00 | 215.00 | | | | |
| 7 | 10/12/16 | 71.70 | 284.00 | 237.00 | | | | |
| 8 | 12/29/16 | 89.70 | 310.00 | 275.00 | | | | |
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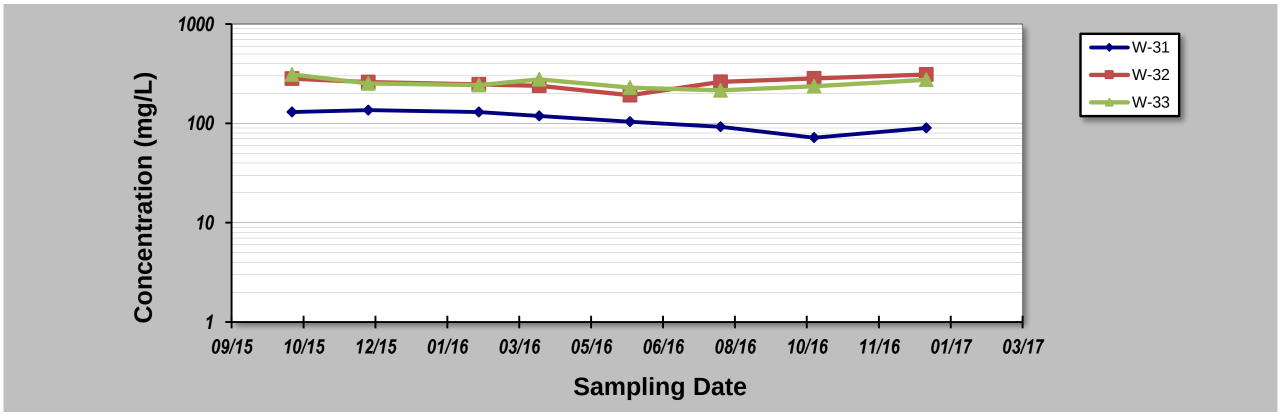
| Coefficient of Variation: | | 0.21 | 0.14 | 0.12 | | | | |
| Mann-Kendall Statistic (S): | | -23 | 6 | -10 | | | | |
| Confidence Factor: | | 99.9% | 72.6% | 86.2% | | | | |
| Concentration Trend: | | Decreasing | No Trend | Stable | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22
**Facility Name:** MOSES
**Conducted By:** KRO
**Job ID:** Bkgd-Ug
**Constituent:** Chloride
**Concentration Units:** mg/L

| Sampling Point ID: | | W-31 | W-32 | W-33 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Sampling Event** | **Sampling Date** | **CHLORIDE CONCENTRATION (mg/L)** | | | | | | |
| 1 | 10/15/15 | 66.20 | 160.00 | 162.00 | | | | |
| 2 | 12/07/15 | 51.20 | 122.00 | 120.00 | | | | |
| 3 | 02/22/16 | 49.20 | 124.00 | 124.00 | | | | |
| 4 | 04/04/16 | 48.90 | 139.00 | 171.00 | | | | |
| 5 | 06/06/16 | 47.80 | 105.00 | 120.00 | | | | |
| 6 | 08/08/16 | 58.40 | 110.00 | 108.00 | | | | |
| 7 | 10/12/16 | 55.10 | 134.00 | 111.00 | | | | |
| 8 | 12/29/16 | 49.30 | 147.00 | 125.00 | | | | |
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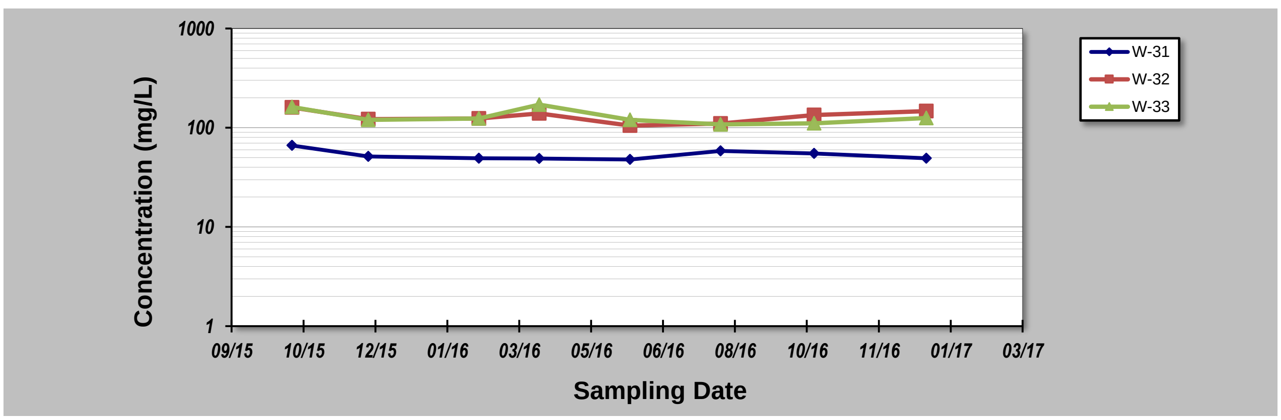
| 20 | | | | | | | | |
| **Coefficient of Variation:** | | 0.12 | 0.14 | 0.18 | | | | |
| **Mann-Kendall Statistic (S):** | | -6 | 0 | -7 | | | | |
| **Confidence Factor:** | | 72.6% | 45.2% | 76.4% | | | | |
| **Concentration Trend:** | | Stable | Stable | Stable | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22
**Facility Name:** MOSES
**Conducted By:** KRO
**Job ID:** Bkgd-Ug
**Constituent:** Fluoride
**Concentration Units:** mg/L

| Sampling Point ID: | | W-31 | W-32 | W-33 | | | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | FLUORIDE CONCENTRATION (mg/L) | | | | | | |
| 1 | 10/15/15 | 0.14 | 0.44 | 2.01 | | | | |
| 2 | 12/07/15 | 0.28 | 1.19 | 2.80 | | | | |
| 3 | 02/22/16 | 0.12 | 0.79 | 2.40 | | | | |
| 4 | 04/04/16 | 0.22 | 1.01 | 2.50 | | | | |
| 5 | 06/06/16 | 0.05 | 0.76 | 2.12 | | | | |
| 6 | 08/08/16 | 0.05 | 0.54 | 1.92 | | | | |
| 7 | 10/12/16 | 0.11 | 0.34 | 2.43 | | | | |
| 8 | 12/29/16 | 0.05 | 0.57 | 2.25 | | | | |
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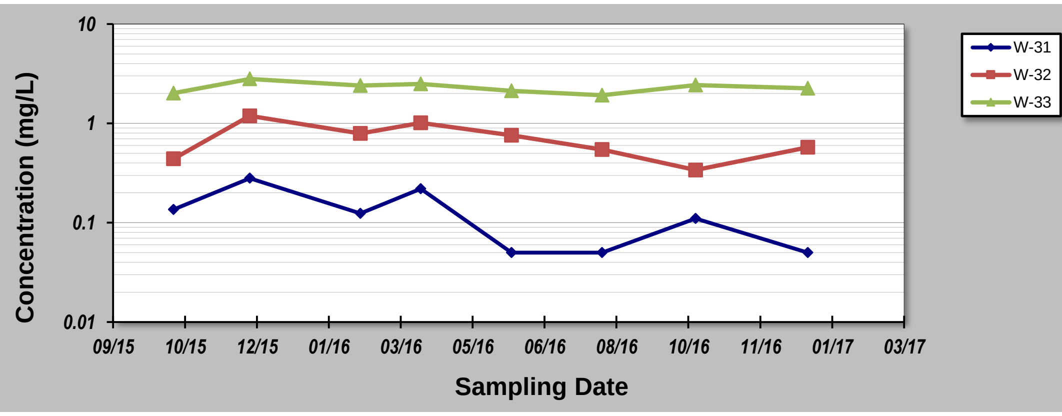
| Coefficient of Variation: | | 0.66 | 0.41 | 0.12 | | | | |
| Mann-Kendall Statistic (S): | | -15 | -10 | -4 | | | | |
| Confidence Factor: | | 95.8% | 86.2% | 64.0% | | | | |
| Concentration Trend: | | Decreasing | Stable | Stable | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22
**Facility Name:** MOSES
**Conducted By:** KRO
**Job ID:** Bkgd-Ug
**Constituent:** pH
**Concentration Units:** S.U.

| | Sampling Point ID: | W-31 | W-32 | W-33 | | | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | PH CONCENTRATION (S.U.) | | | | | | |
| 1 | 10/15/15 | 5.67 | 6.72 | 7.14 | | | | |
| 2 | 12/07/15 | 5.86 | 6.74 | 7.12 | | | | |
| 3 | 02/22/16 | 5.79 | 6.74 | 7.11 | | | | |
| 4 | 04/04/16 | 6.06 | 6.73 | 7.14 | | | | |
| 5 | 06/06/16 | 6.17 | 6.71 | 7.10 | | | | |
| 6 | 08/08/16 | 6.11 | 6.71 | 6.97 | | | | |
| 7 | 10/12/16 | 6.13 | 6.19 | 6.84 | | | | |
| 8 | 12/29/16 | 4.99 | 6.46 | 6.82 | | | | |
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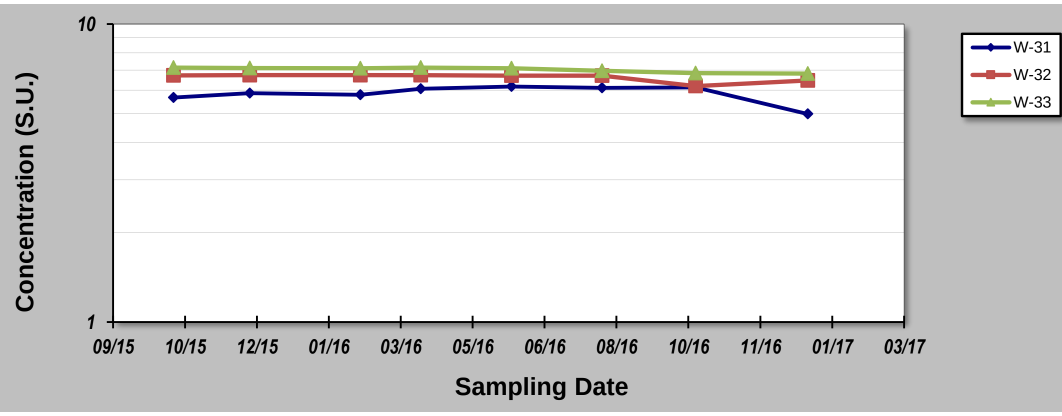
| | Coefficient of Variation: | 0.07 | 0.03 | 0.02 | | | | |
| | Mann-Kendall Statistic (S): | 8 | -18 | -23 | | | | |
| | Confidence Factor: | 80.1% | 98.4% | 99.9% | | | | |
| | Concentration Trend: | No Trend | Decreasing | Decreasing | | | | |




**Notes:**
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22
**Facility Name:** MOSES
**Conducted By:** KRO
**Job ID:** Bkgd-Ug
**Constituent:** Sulfate
**Concentration Units:** mg/L

| Sampling Point ID: | | W-31 | W-32 | W-33 | | | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | SULFATE CONCENTRATION (mg/L) | | | | | | |
| 1 | 10/15/15 | 808.00 | 1040.00 | 1080.00 | | | | |
| 2 | 12/07/15 | 714.00 | 872.00 | 853.00 | | | | |
| 3 | 02/22/16 | 694.00 | 850.00 | 790.00 | | | | |
| 4 | 04/04/16 | 737.00 | 844.00 | 935.00 | | | | |
| 5 | 06/06/16 | 701.00 | 694.00 | 700.00 | | | | |
| 6 | 08/08/16 | 396.00 | 945.00 | 655.00 | | | | |
| 7 | 10/12/16 | 292.00 | 986.00 | 797.00 | | | | |
| 8 | 12/29/16 | 729.00 | 1210.00 | 965.00 | | | | |
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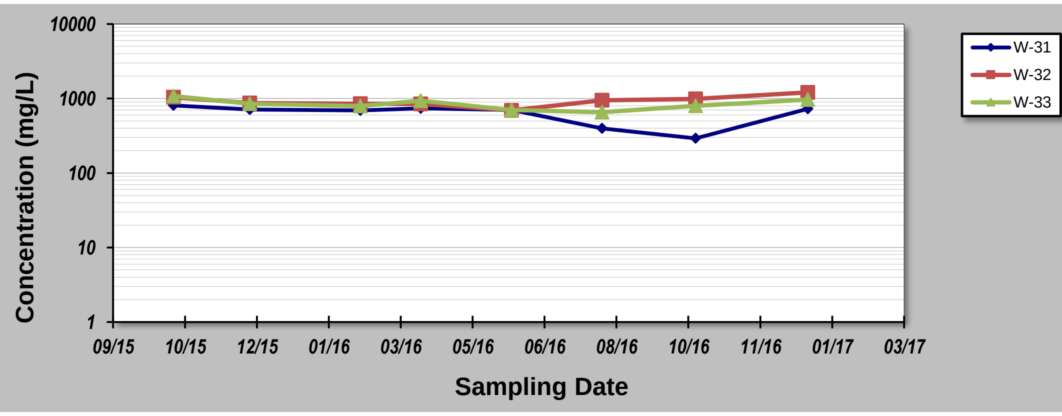
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.29 | 0.17 | 0.17 | | | | |
| Mann-Kendall Statistic (S): | | -12 | 4 | -6 | | | | |
| Confidence Factor: | | 91.1% | 64.0% | 72.6% | | | | |
| Concentration Trend: | | Prob. Decreasing | No Trend | Stable | | | | |




**Notes:**
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22
**Facility Name:** MOSES
**Conducted By:** KRO
**Job ID:** Bkgd-Ug
**Constituent:** TDS
**Concentration Units:** mg/L

| Sampling Event | Sampling Date | W-31 | W-32 | W-33 | | | | |
|---|---|---|---|---|---|---|---|---|
| | | TDS CONCENTRATION (mg/L) | | | | | | |
| 1 | 10/15/15 | 1510.00 | 1970.00 | 1630.00 | | | | |
| 2 | 12/07/15 | 1250.00 | 1610.00 | 1680.00 | | | | |
| 3 | 02/22/16 | 1500.00 | 1870.00 | 1960.00 | | | | |
| 4 | 04/04/16 | 1220.00 | 1380.00 | 1540.00 | | | | |
| 5 | 06/06/16 | 1150.00 | 1440.00 | 1490.00 | | | | |
| 6 | 08/08/16 | 862.00 | 1650.00 | 1300.00 | | | | |
| 7 | 10/12/16 | 654.00 | 1820.00 | 1540.00 | | | | |
| 8 | 12/29/16 | 1150.00 | 1950.00 | 1730.00 | | | | |
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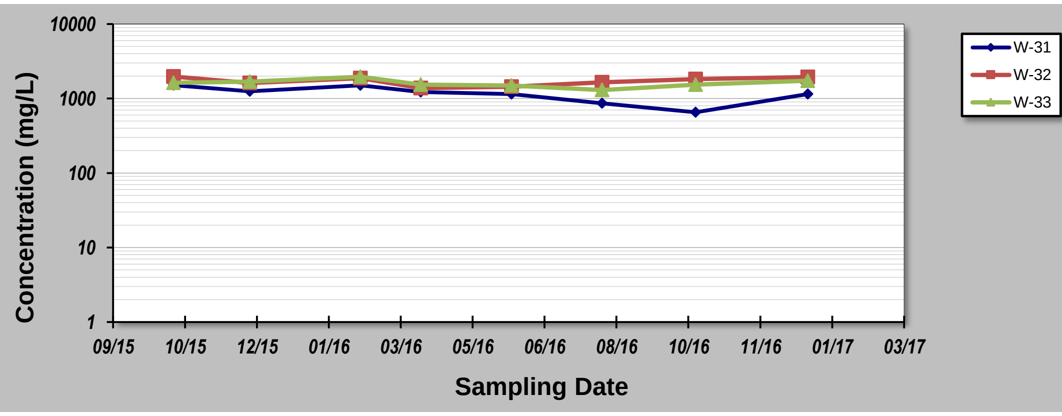
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.25 | 0.13 | 0.12 | | | | |
| Mann-Kendall Statistic (S): | | -21 | 2 | -5 | | | | |
| Confidence Factor: | | 99.6% | 54.8% | 68.3% | | | | |
| Concentration Trend: | | Decreasing | No Trend | Stable | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

| | | | |
|---|---|---|---|
| Evaluation Date: | 9-Nov-22 | Job ID: | Bkgd-Dg |
| Facility Name: | MOSES | Constituent: | Boron |
| Conducted By: | KO | Concentration Units: | mg/L |

| Sampling Event | Sampling Date | W-29 | W-30 | W-34 | W-35 | | | |
|---|---|---|---|---|---|---|---|---|
| | | BORON CONCENTRATION (mg/L) | | | | | | |
| 1 | 10/15/15 | 4.58 | 6.06 | 2.38 | 5.58 | | | |
| 2 | 12/07/15 | 3.47 | 7.04 | 4.10 | 6.13 | | | |
| 3 | 02/22/16 | 4.98 | 6.83 | 3.44 | 6.29 | | | |
| 4 | 04/04/16 | 3.32 | 6.28 | 2.09 | 6.16 | | | |
| 5 | 06/06/16 | 5.77 | 6.89 | 2.12 | 6.17 | | | |
| 6 | 08/08/16 | 5.70 | 5.94 | 3.56 | 6.07 | | | |
| 7 | 10/12/16 | 6.42 | 6.51 | 3.13 | 6.25 | | | |
| 8 | 12/29/16 | 6.52 | 8.54 | 6.10 | 6.89 | | | |
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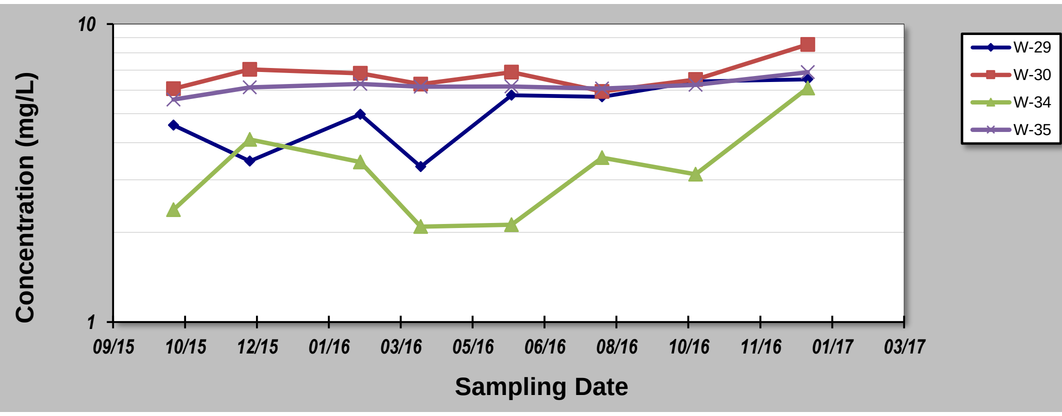
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.24 | 0.12 | 0.39 | 0.06 | | | |
| Mann-Kendall Statistic (S): | | 18 | 4 | 6 | 14 | | | |
| Confidence Factor: | | 98.4% | 64.0% | 72.6% | 94.6% | | | |
| Concentration Trend: | | Increasing | No Trend | No Trend | Prob. Increasing | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22 **Job ID:** Bkgd-Dg
**Facility Name:** MOSES **Constituent:** Calcium
**Conducted By:** KRO **Concentration Units:** mg/L

| Sampling Event | Sampling Date | W-29 | W-30 | W-34 | W-35 | | | |
|---|---|---|---|---|---|---|---|---|
| | | CALCIUM CONCENTRATION (mg/L) | | | | | | |
| 1 | 10/15/15 | 111.00 | 133.00 | 124.00 | 175.00 | | | |
| 2 | 12/07/15 | 86.60 | 135.00 | 153.00 | 177.00 | | | |
| 3 | 02/22/16 | 114.00 | 138.00 | 117.00 | 160.00 | | | |
| 4 | 04/04/16 | 169.00 | 141.00 | 86.90 | 169.00 | | | |
| 5 | 06/06/16 | 162.00 | 132.00 | 66.20 | 158.00 | | | |
| 6 | 08/08/16 | 153.00 | 136.00 | 121.00 | 159.00 | | | |
| 7 | 10/12/16 | 174.00 | 130.00 | 110.00 | 150.00 | | | |
| 8 | 12/29/16 | 185.00 | 192.00 | 158.00 | 151.00 | | | |
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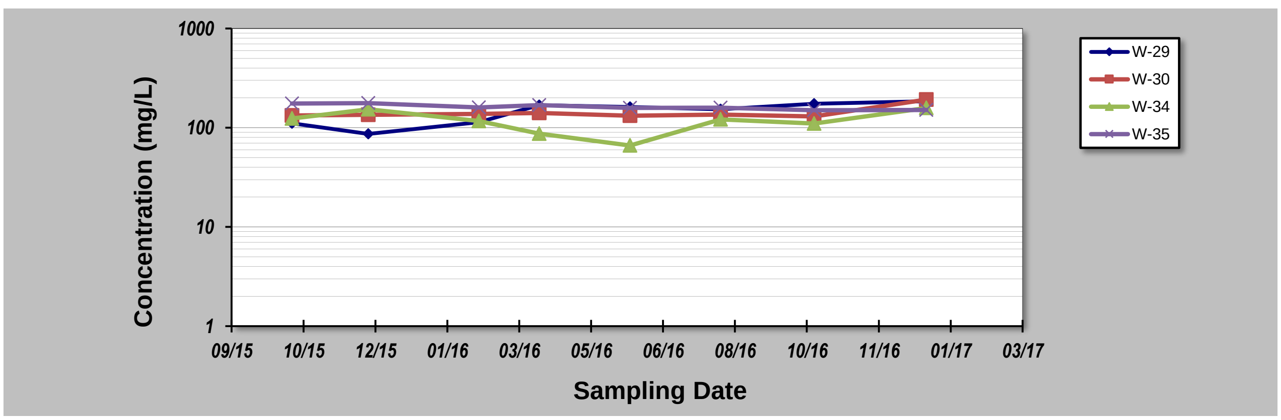
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.25 | 0.14 | 0.26 | 0.06 | | | |
| Mann-Kendall Statistic (S): | | 20 | 4 | -2 | -20 | | | |
| Confidence Factor: | | 99.3% | 64.0% | 54.8% | 99.3% | | | |
| Concentration Trend: | | Increasing | No Trend | Stable | Decreasing | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

| | | | |
|---|---|---|---|
| Evaluation Date: | 9-Nov-22 | Job ID: | Bkgd-Dg |
| Facility Name: | MOSES | Constituent: | Chloride |
| Conducted By: | KRO | Concentration Units: | mg/L |

| Sampling Event | Sampling Date | W-29 | W-30 | W-34 | W-35 | | | |
|---|---|---|---|---|---|---|---|---|
| | | CHLORIDE CONCENTRATION (mg/L) | | | | | | |
| 1 | 10/15/15 | 101.00 | 106.00 | 87.10 | 98.20 | | | |
| 2 | 12/07/15 | 81.10 | 98.30 | 82.20 | 90.20 | | | |
| 3 | 02/22/16 | 82.30 | 96.30 | 85.90 | 85.40 | | | |
| 4 | 04/04/16 | 75.90 | 95.20 | 80.70 | 91.30 | | | |
| 5 | 06/06/16 | 85.50 | 94.90 | 73.00 | 98.50 | | | |
| 6 | 08/08/16 | 85.60 | 85.70 | 98.40 | 97.80 | | | |
| 7 | 10/12/16 | 82.40 | 79.90 | 84.90 | 97.80 | | | |
| 8 | 12/29/16 | 82.50 | 85.30 | 122.00 | 110.00 | | | |
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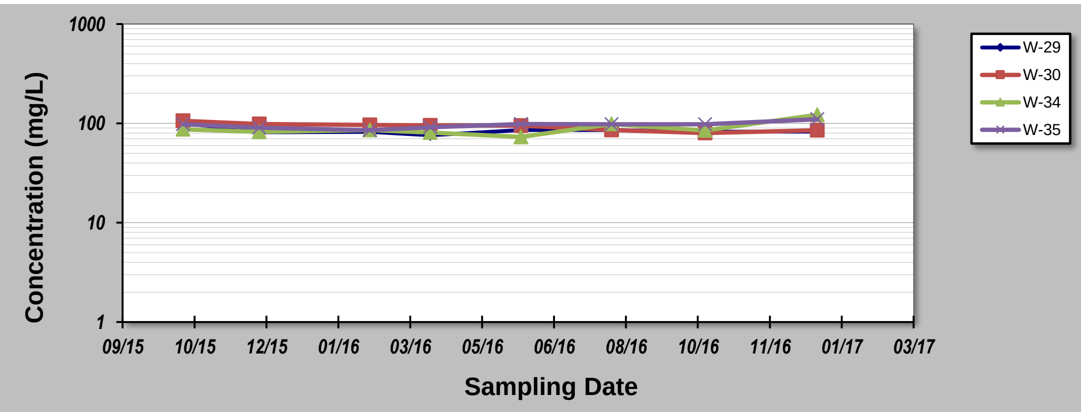
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.09 | 0.09 | 0.17 | 0.08 | | | |
| Mann-Kendall Statistic (S): | | 2 | -26 | 4 | 11 | | | |
| Confidence Factor: | | 54.8% | 100.0% | 64.0% | 88.7% | | | |
| Concentration Trend: | | No Trend | Decreasing | No Trend | No Trend | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

| | | | |
|---|---|---|---|
| Evaluation Date: | 9-Nov-22 | Job ID: | Bkgd-Dg |
| Facility Name: | MOSES | Constituent: | Fluoride |
| Conducted By: | KRO | Concentration Units: | mg/L |

| | Sampling Point ID: | W-29 | W-30 | W-34 | W-35 | | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | FLUORIDE CONCENTRATION (mg/L) | | | | | | |
| 1 | 10/15/15 | 0.32 | 0.58 | 0.38 | 0.10 | | | |
| 2 | 12/07/15 | 0.36 | 0.81 | 0.49 | 0.13 | | | |
| 3 | 02/22/16 | 0.24 | 0.72 | 0.42 | 0.10 | | | |
| 4 | 04/04/16 | 0.23 | 0.96 | 0.29 | 0.10 | | | |
| 5 | 06/06/16 | 0.05 | 0.36 | 0.05 | 0.10 | | | |
| 6 | 08/08/16 | 0.05 | 0.45 | 0.05 | 0.10 | | | |
| 7 | 10/12/16 | 0.40 | 0.79 | 0.29 | 0.10 | | | |
| 8 | 12/29/16 | 0.23 | 0.50 | 0.34 | 0.10 | | | |
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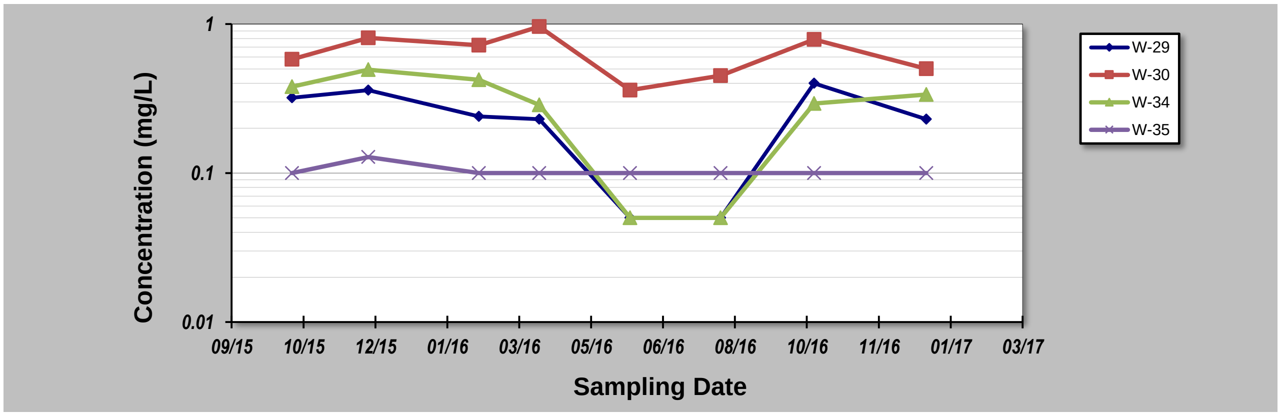
| Coefficient of Variation: | | 0.55 | 0.32 | 0.56 | 0.10 | | | |
| Mann-Kendall Statistic (S): | | -8 | -4 | -9 | -5 | | | |
| Confidence Factor: | | 80.1% | 64.0% | 83.2% | 68.3% | | | |
| Concentration Trend: | | Stable | Stable | Stable | Stable | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
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Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22
**Facility Name:** MOSES
**Conducted By:** KRO
**Job ID:** Bkgd-Dg
**Constituent:** pH
**Concentration Units:** S.U.

| | Sampling Point ID: | W-29 | W-30 | W-34 | W-35 | | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | PH CONCENTRATION (S.U.) | | | | | | |
| 1 | 10/15/15 | 6.21 | 5.78 | 6.55 | 6.05 | | | |
| 2 | 12/07/15 | 6.22 | 5.95 | 6.58 | 6.16 | | | |
| 3 | 02/22/16 | 6.27 | 5.94 | 6.59 | 6.12 | | | |
| 4 | 04/04/16 | 6.17 | 5.93 | 6.63 | 6.09 | | | |
| 5 | 06/06/16 | 6.29 | 5.96 | 6.64 | 6.36 | | | |
| 6 | 08/08/16 | 6.32 | 6.23 | 6.52 | 6.41 | | | |
| 7 | 10/12/16 | 6.19 | 6.02 | 6.57 | 6.12 | | | |
| 8 | 12/29/16 | 6.14 | 5.34 | 6.03 | 5.06 | | | |
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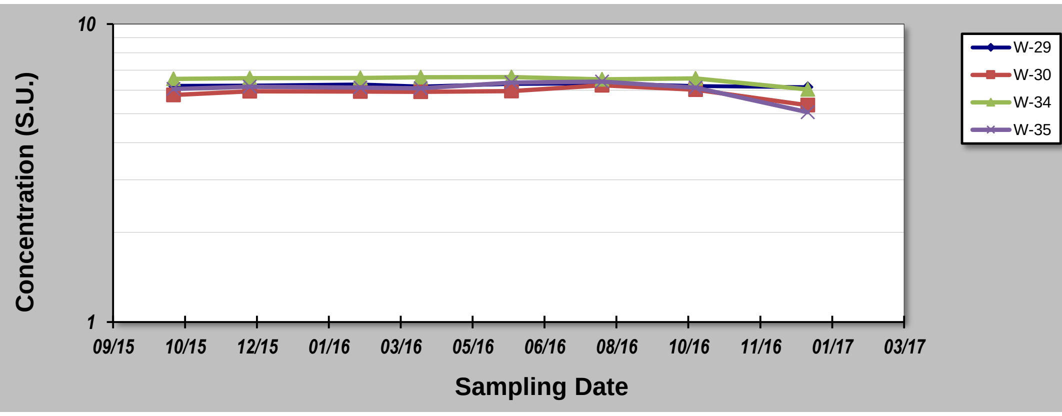
| | Coefficient of Variation: | 0.01 | 0.04 | 0.03 | 0.07 | | | |
| | Mann-Kendall Statistic (S): | -2 | 6 | -4 | 1 | | | |
| | Confidence Factor: | 54.8% | 72.6% | 64.0% | 50.0% | | | |
| | Concentration Trend: | Stable | No Trend | Stable | No Trend | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22
**Facility Name:** MOSES
**Conducted By:** KRO
**Job ID:** Bkgd-Dg
**Constituent:** Sulfate
**Concentration Units:** mg/L

| Sampling Event | Sampling Date | W-29 | W-30 | W-34 | W-35 | | | |
|---|---|---|---|---|---|---|---|---|
| | | SULFATE CONCENTRATION (mg/L) | | | | | | |
| 1 | 10/15/15 | 861.00 | 919.00 | 453.00 | 893.00 | | | |
| 2 | 12/07/15 | 501.00 | 875.00 | 671.00 | 861.00 | | | |
| 3 | 02/22/16 | 909.00 | 873.00 | 641.00 | 824.00 | | | |
| 4 | 04/04/16 | 465.00 | 925.00 | 378.00 | 835.00 | | | |
| 5 | 06/06/16 | 696.00 | 884.00 | 343.00 | 858.00 | | | |
| 6 | 08/08/16 | 1100.00 | 848.00 | 634.00 | 810.00 | | | |
| 7 | 10/12/16 | 1140.00 | 817.00 | 556.00 | 793.00 | | | |
| 8 | 12/29/16 | 1150.00 | 863.00 | 937.00 | 839.00 | | | |
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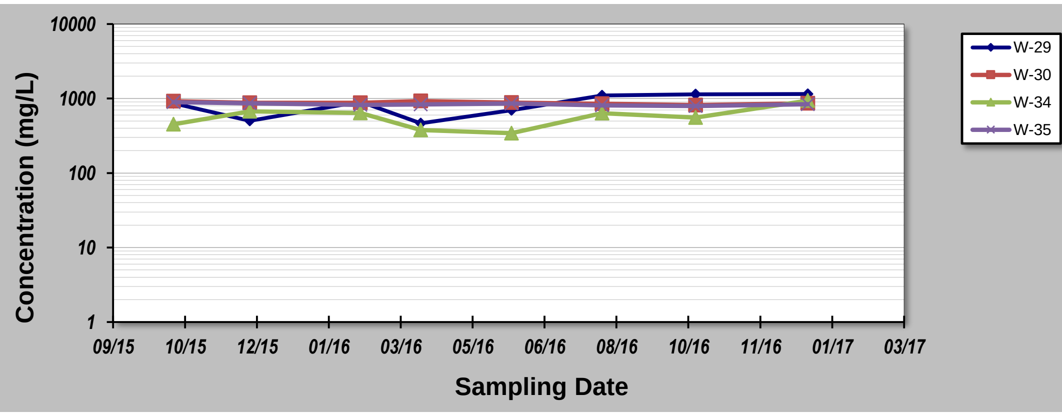
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.32 | 0.04 | 0.33 | 0.04 | | | |
| Mann-Kendall Statistic (S): | | 16 | -14 | 2 | -14 | | | |
| Confidence Factor: | | 96.9% | 94.6% | 54.8% | 94.6% | | | |
| Concentration Trend: | | Increasing | Prob. Decreasing | No Trend | Prob. Decreasing | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22
**Facility Name:** MOSES
**Conducted By:** KRO
**Job ID:** Bkgd-Dg
**Constituent:** TDS
**Concentration Units:** mg/L

| Sampling Point ID: | | W-29 | W-30 | W-34 | W-35 | | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | TDS CONCENTRATION (mg/L) | | | | | | |
| 1 | 10/15/15 | 1680.00 | 1490.00 | 878.00 | 1720.00 | | | |
| 2 | 12/07/15 | 1020.00 | 1530.00 | 1500.00 | 1580.00 | | | |
| 3 | 02/22/16 | 1840.00 | 1790.00 | 1570.00 | 1650.00 | | | |
| 4 | 04/04/16 | 850.00 | 1460.00 | 817.00 | 1310.00 | | | |
| 5 | 06/06/16 | 1230.00 | 1460.00 | 795.00 | 1460.00 | | | |
| 6 | 08/08/16 | 1850.00 | 1550.00 | 1030.00 | 1470.00 | | | |
| 7 | 10/12/16 | 1720.00 | 1300.00 | 935.00 | 1320.00 | | | |
| 8 | 12/29/16 | 1860.00 | 1510.00 | 1620.00 | 1370.00 | | | |
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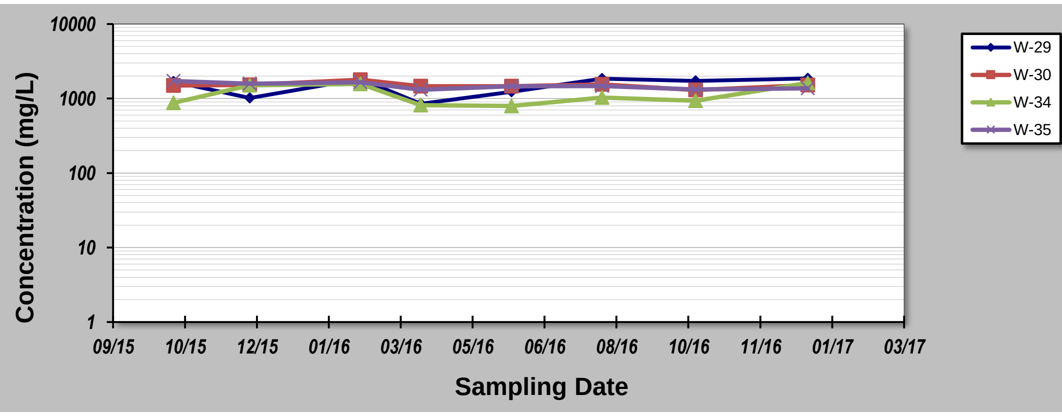
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.27 | 0.09 | 0.31 | 0.10 | | | |
| Mann-Kendall Statistic (S): | | 12 | -5 | 4 | -14 | | | |
| Confidence Factor: | | 91.1% | 68.3% | 64.0% | 94.6% | | | |
| Concentration Trend: | | Prob. Increasing | Stable | No Trend | Prob. Decreasing | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 8-Nov-22
**Facility Name:** MOSES
**Conducted By:** KO
**Job ID:** PBkgd-Ug
**Constituent:** Boron
**Concentration Units:** mg/L

| Sampling Event | Sampling Date | W-31 | W-32 | W-33 | | | | |
|---|---|---|---|---|---|---|---|---|
| | | BORON CONCENTRATION (mg/L) | | | | | | |
| 1 | 09/20/17 | 3.88 | 5.81 | 5.89 | | | | |
| 2 | 06/08/18 | 3.28 | 5.79 | 6.01 | | | | |
| 3 | 09/10/18 | 3.19 | 5.38 | 5.45 | | | | |
| 4 | 05/10/19 | 0.88 | 3.83 | 3.41 | | | | |
| 5 | 10/30/19 | 1.29 | 4.24 | 5.18 | | | | |
| 6 | 04/26/20 | 0.79 | 1.96 | 3.43 | | | | |
| 7 | 11/01/20 | 1.27 | 2.85 | 2.33 | | | | |
| 8 | 03/29/21 | 1.38 | 1.62 | 2.32 | | | | |
| 9 | 08/15/21 | 1.84 | 2.07 | 1.81 | | | | |
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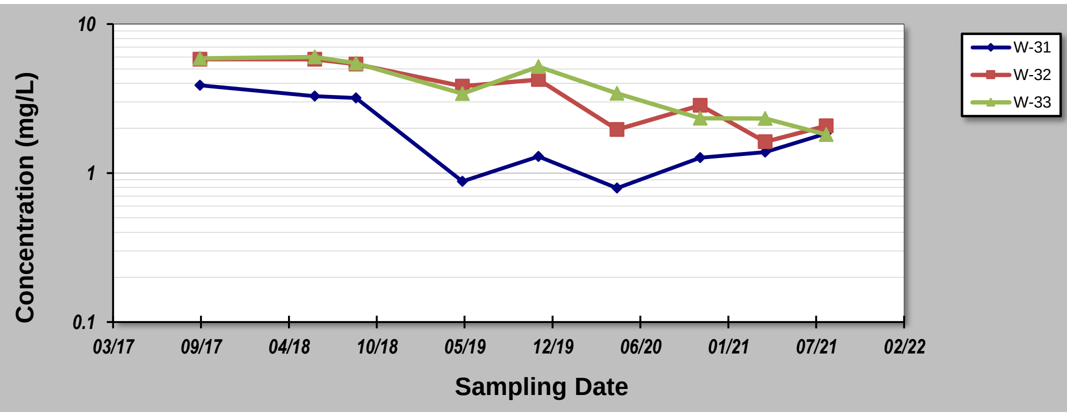
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.59 | 0.45 | 0.42 | | | | |
| Mann-Kendall Statistic (S): | | -12 | -28 | -30 | | | | |
| Confidence Factor: | | 87.0% | 99.9% | 100.0% | | | | |
| Concentration Trend: | | Stable | Decreasing | Decreasing | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22 | **Job ID:** PBkgd-Ug
**Facility Name:** MOSES | **Constituent:** Calcium
**Conducted By:** KRO | **Concentration Units:** mg/L

| Sampling Event | Sampling Date | W-31 | W-32 | W-33 | | | | |
|---|---|---|---|---|---|---|---|---|
| | | CALCIUM CONCENTRATION (mg/L) | | | | | | |
| 1 | 09/20/17 | 96.30 | 270.00 | 271.00 | | | | |
| 2 | 06/08/18 | 86.30 | 380.00 | 364.00 | | | | |
| 3 | 09/10/18 | 86.50 | 370.00 | 351.00 | | | | |
| 4 | 05/10/19 | 36.50 | 91.00 | 93.70 | | | | |
| 5 | 10/30/19 | 35.60 | 130.00 | 169.00 | | | | |
| 6 | 04/26/20 | 34.40 | 48.60 | 96.40 | | | | |
| 7 | 11/01/20 | 36.90 | 64.80 | 80.90 | | | | |
| 8 | 03/29/21 | 41.40 | 40.00 | 77.00 | | | | |
| 9 | 08/15/21 | 51.6 | 52.30 | 61.70 | | | | |
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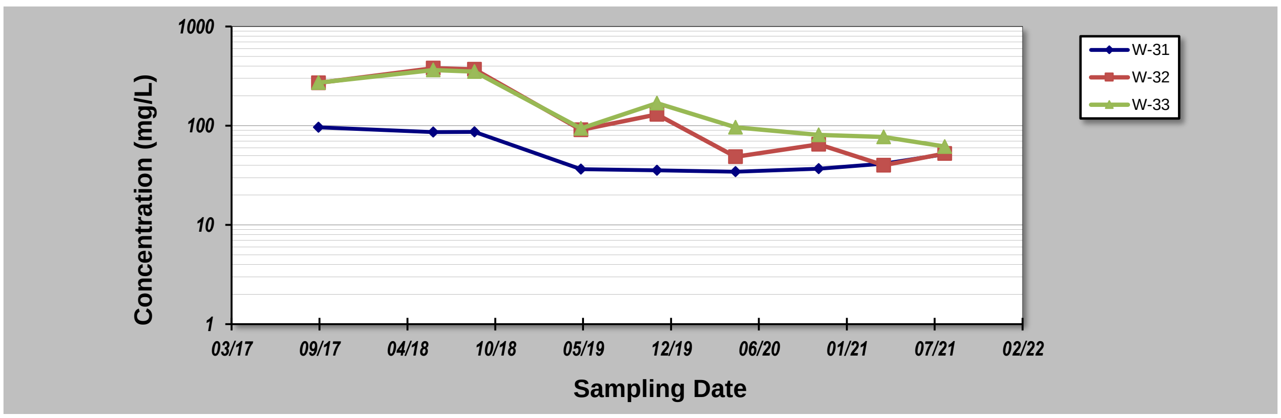
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.46 | 0.87 | 0.70 | | | | |
| Mann-Kendall Statistic (S): | | -10 | -24 | -28 | | | | |
| Confidence Factor: | | 82.1% | 99.4% | 99.9% | | | | |
| Concentration Trend: | | Stable | Decreasing | Decreasing | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 9-Nov-22
Facility Name: MOSES
Conducted By: KRO
Job ID: PBkgd-Ug
Constituent: Chloride
Concentration Units: mg/L

| Sampling Event | Sampling Date | W-31 | W-32 | W-33 | | | | |
|---|---|---|---|---|---|---|---|---|
| | | CHLORIDE CONCENTRATION (mg/L) | | | | | | |
| 1 | 09/20/17 | 49.80 | 118.00 | 112.00 | | | | |
| 2 | 06/08/18 | 48.60 | 149.00 | 142.00 | | | | |
| 3 | 09/10/18 | 46.30 | 140.00 | 132.00 | | | | |
| 4 | 05/10/19 | 54.00 | 21.90 | 36.70 | | | | |
| 5 | 10/30/19 | 49.10 | 35.00 | 39.70 | | | | |
| 6 | 04/26/20 | 51.10 | 9.65 | 17.70 | | | | |
| 7 | 11/01/20 | 48.30 | 12.50 | 10.80 | | | | |
| 8 | 03/29/21 | 47.70 | 5.32 | 8.55 | | | | |
| 9 | 08/15/21 | 49.9 | 9.64 | 8.05 | | | | |
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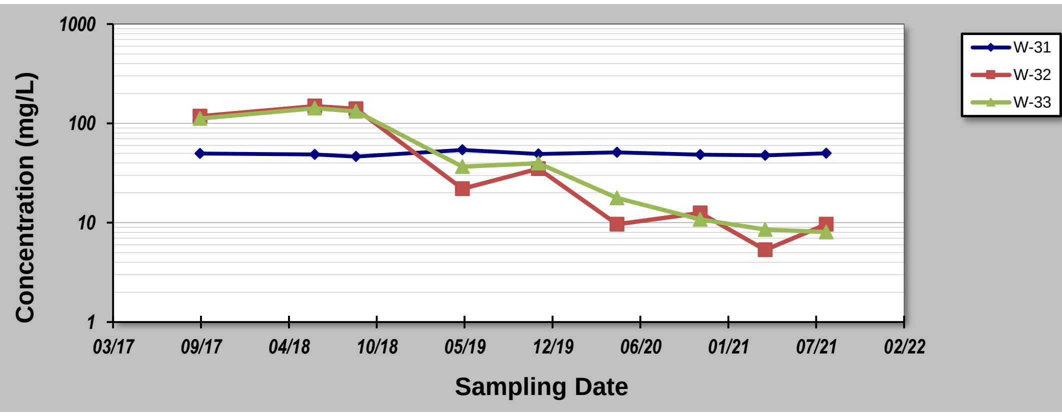
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.04 | 1.10 | 0.99 | | | | |
| Mann-Kendall Statistic (S): | | -2 | -26 | -30 | | | | |
| Confidence Factor: | | 54.0% | 99.7% | 100.0% | | | | |
| Concentration Trend: | | Stable | Decreasing | Decreasing | | | | |




**Notes:**
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

| | | | |
|---|---|---|---|
| Evaluation Date: | 9-Nov-22 | Job ID: | PBkgd-Ug |
| Facility Name: | MOSES | Constituent: | Fluoride |
| Conducted By: | KRO | Concentration Units: | mg/L |

| Sampling Event | Sampling Date | W-31 | W-32 | W-33 | | | | |
|---|---|---|---|---|---|---|---|---|
| | | FLUORIDE CONCENTRATION (mg/L) | | | | | | |
| 1 | 09/20/17 | 0.10 | 0.38 | 2.04 | | | | |
| 2 | 06/08/18 | 0.30 | 1.71 | 3.59 | | | | |
| 3 | 09/10/18 | 0.22 | 1.19 | 2.99 | | | | |
| 4 | 05/10/19 | 0.16 | 1.83 | 1.41 | | | | |
| 5 | 10/30/19 | 0.10 | 1.70 | 1.21 | | | | |
| 6 | 04/26/20 | 0.09 | 2.29 | 3.13 | | | | |
| 7 | 11/01/20 | 0.08 | 1.34 | 3.73 | | | | |
| 8 | 03/29/21 | 0.12 | 2.18 | 3.48 | | | | |
| 9 | 08/15/21 | 0.07 | 1.75 | 4.22 | | | | |
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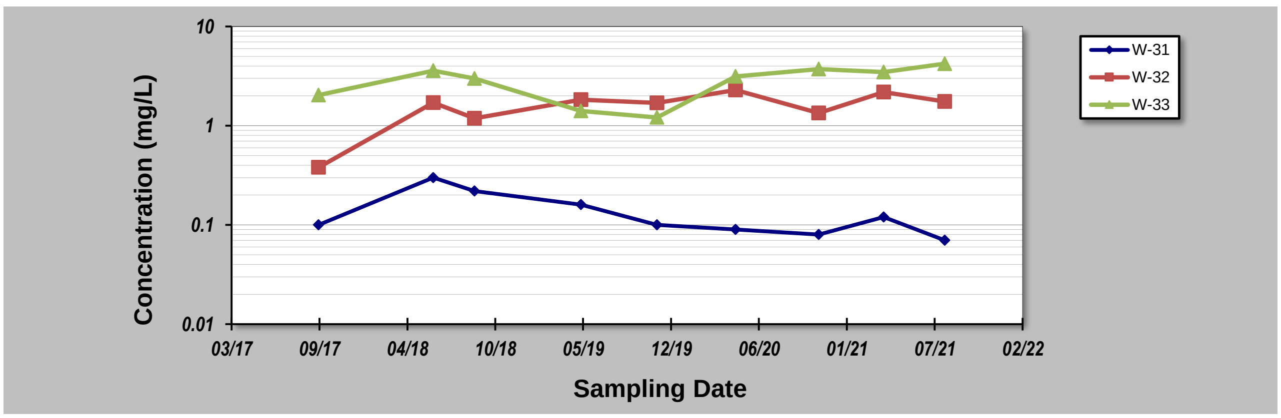
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.56 | 0.36 | 0.37 | | | | |
| Mann-Kendall Statistic (S): | | -21 | 14 | 14 | | | | |
| Confidence Factor: | | 98.3% | 91.0% | 91.0% | | | | |
| Concentration Trend: | | Decreasing | Prob. Increasing | Prob. Increasing | | | | |




**Notes:**
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22
**Facility Name:** MOSES
**Conducted By:** KRO
**Job ID:** PBkgd-Ug
**Constituent:** pH
**Concentration Units:** S.U.

| Sampling Point ID: | | W-31 | W-32 | W-33 | | | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | PH CONCENTRATION (S.U.) | | | | | | |
| 1 | 09/20/17 | 6.72 | 6.79 | 6.73 | | | | |
| 2 | 06/08/18 | 6.72 | 6.74 | 6.55 | | | | |
| 3 | 09/10/18 | 4.84 | 6.56 | 6.78 | | | | |
| 4 | 05/10/19 | 6.87 | 6.73 | 6.85 | | | | |
| 5 | 10/30/19 | 6.84 | 6.91 | 6.68 | | | | |
| 6 | 04/26/20 | 7.41 | 8.72 | 8.35 | | | | |
| 7 | 11/01/20 | 6.60 | 8.16 | 8.39 | | | | |
| 8 | 03/29/21 | 5.59 | 7.09 | 7.10 | | | | |
| 9 | 08/15/21 | 5.52 | 7.12 | 7.13 | | | | |
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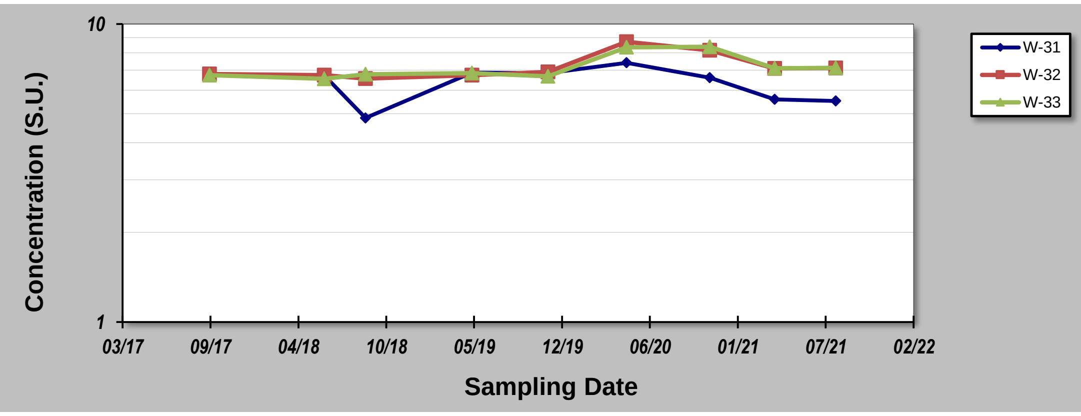
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.13 | 0.10 | 0.10 | | | | |
| Mann-Kendall Statistic (S): | | -7 | 16 | 20 | | | | |
| Confidence Factor: | | 72.8% | 94.0% | 97.8% | | | | |
| Concentration Trend: | | Stable | Prob. Increasing | Increasing | | | | |




**Notes:**
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
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Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22
**Facility Name:** MOSES
**Conducted By:** KRO
**Job ID:** PBkgd-Ug
**Constituent:** Sulfate
**Concentration Units:** mg/L

| | Sampling Point ID: | W-31 | W-32 | W-33 | | | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | SULFATE CONCENTRATION (mg/L) | | | | | | |
| 1 | 09/20/17 | 316.00 | 901.00 | 863.00 | | | | |
| 2 | 06/08/18 | 577.00 | 1340.00 | 1200.00 | | | | |
| 3 | 09/10/18 | 595.00 | 1270.00 | 1160.00 | | | | |
| 4 | 05/10/19 | 115.00 | 236.00 | 443.00 | | | | |
| 5 | 10/30/19 | 131.00 | 363.00 | 477.00 | | | | |
| 6 | 04/26/20 | 85.90 | 95.80 | 171.00 | | | | |
| 7 | 11/01/20 | 156.00 | 141.00 | 104.00 | | | | |
| 8 | 03/29/21 | 173.00 | 42.90 | 54.80 | | | | |
| 9 | 08/15/21 | 242 | 76.30 | 51.40 | | | | |
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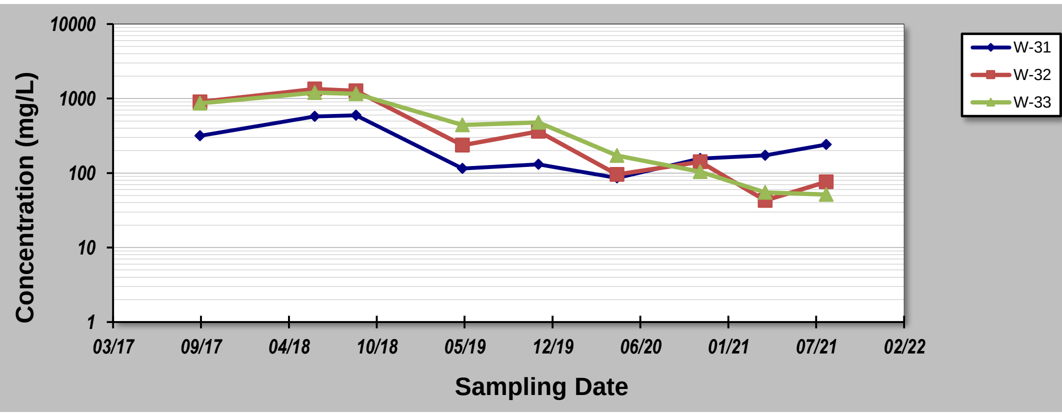
| 20 | | | | | | | | |
| | Coefficient of Variation: | 0.73 | 1.06 | 0.92 | | | | |
| | Mann-Kendall Statistic (S): | -4 | -26 | -30 | | | | |
| | Confidence Factor: | 61.9% | 99.7% | 100.0% | | | | |
| | Concentration Trend: | Stable | Decreasing | Decreasing | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22
**Facility Name:** MOSES
**Conducted By:** KRO
**Job ID:** PBkgd-Ug
**Constituent:** TDS
**Concentration Units:** mg/L

| Sampling Event | Sampling Date | W-31 | W-32 | W-33 | | | | |
|---|---|---|---|---|---|---|---|---|
| | | TDS CONCENTRATION (mg/L) | | | | | | |
| 1 | 09/20/17 | 696.00 | 1920.00 | 1970.00 | | | | |
| 2 | 06/08/18 | 925.00 | 2390.00 | 2230.00 | | | | |
| 3 | 09/10/18 | 973.00 | 2200.00 | 2120.00 | | | | |
| 4 | 05/10/19 | 319.00 | 479.00 | 775.00 | | | | |
| 5 | 10/30/19 | 343.00 | 746.00 | 911.00 | | | | |
| 6 | 04/26/20 | 279.00 | 290.00 | 580.00 | | | | |
| 7 | 11/01/20 | 384.00 | 344.00 | 387.00 | | | | |
| 8 | 03/29/21 | 373.00 | 204.00 | 342.00 | | | | |
| 9 | 08/15/21 | 400 | 270.00 | 295.00 | | | | |
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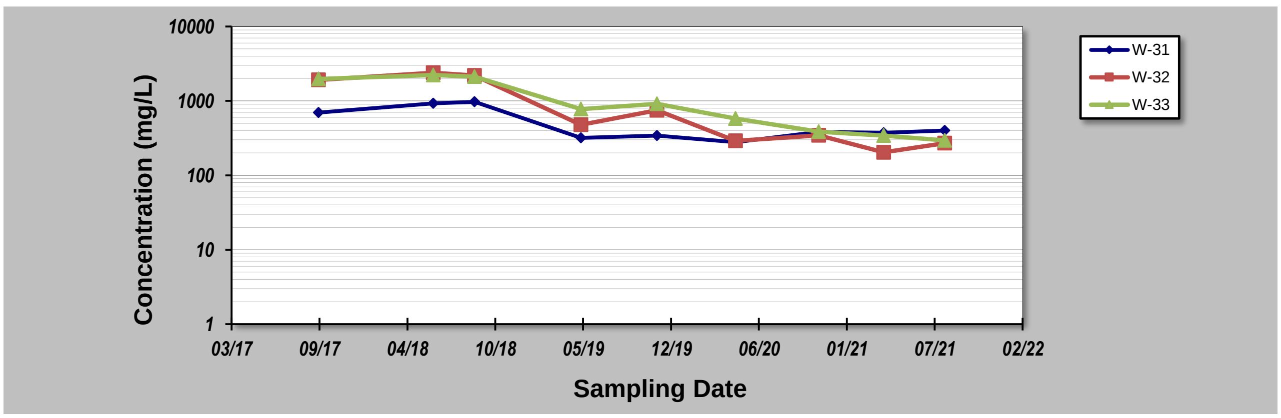
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.52 | 0.93 | 0.76 | | | | |
| Mann-Kendall Statistic (S): | | -6 | -26 | -30 | | | | |
| Confidence Factor: | | 69.4% | 99.7% | 100.0% | | | | |
| Concentration Trend: | | Stable | Decreasing | Decreasing | | | | |




**Notes:**
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

| | | | |
|---|---|---|---|
| Evaluation Date: | 8-Nov-22 | Job ID: | PBkgd-Dg |
| Facility Name: | MOSES | Constituent: | Boron |
| Conducted By: | KO | Concentration Units: | mg/L |

| Sampling Event | Sampling Date | W-29 | W-30 | W-34 | W-35 | | | |
|---|---|---|---|---|---|---|---|---|
| | | BORON CONCENTRATION (mg/L) | | | | | | |
| 1 | 09/20/17 | 4.84 | 5.76 | 5.36 | 6.27 | | | |
| 2 | 06/08/18 | 3.70 | 5.06 | 4.95 | 5.81 | | | |
| 3 | 09/10/18 | 4.14 | 4.53 | 4.53 | 5.70 | | | |
| 4 | 05/09/19 | 1.94 | 5.13 | 1.51 | 5.46 | | | |
| 5 | 10/30/19 | 1.69 | 5.06 | 4.11 | 3.63 | | | |
| 6 | 04/26/20 | 1.36 | 4.18 | 4.26 | 5.30 | | | |
| 7 | 11/01/20 | 1.24 | 4.26 | 5.47 | 5.95 | | | |
| 8 | 03/24/21 | 1.25 | 4.33 | 5.80 | 6.16 | | | |
| 9 | 08/15/21 | | 4.01 | 4.83 | 6.04 | | | |
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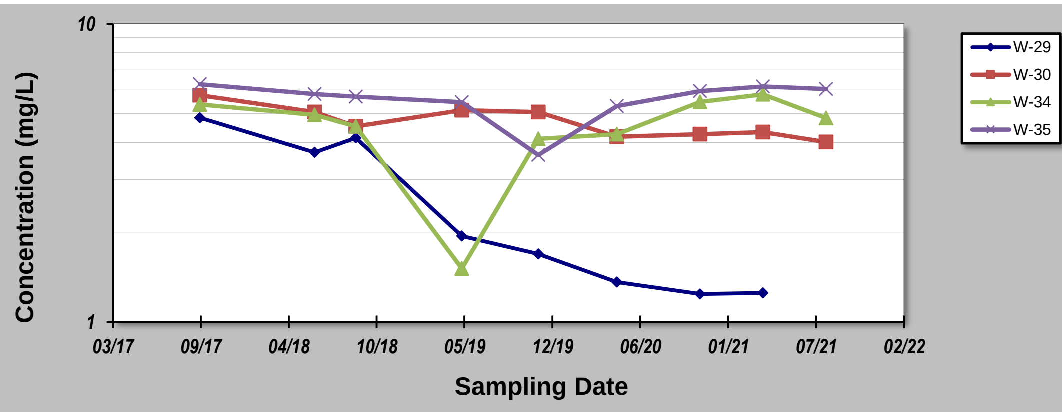
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.58 | 0.12 | 0.28 | 0.14 | | | |
| Mann-Kendall Statistic (S): | | -24 | -23 | 4 | 0 | | | |
| Confidence Factor: | | 99.9% | 99.1% | 61.9% | 46.0% | | | |
| Concentration Trend: | | Decreasing | Decreasing | No Trend | Stable | | | |




**Notes:**
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22 **Job ID:** PBkgd-Dg
**Facility Name:** MOSES **Constituent:** Calcium
**Conducted By:** KRO **Concentration Units:** mg/L

| Sampling Event | Sampling Date | W-29 | W-30 | W-34 | W-35 | | | |
|---|---|---|---|---|---|---|---|---|
| | | CALCIUM CONCENTRATION (mg/L) | | | | | | |
| 1 | 09/20/17 | 128.00 | 127.00 | 181.00 | 186.00 | | | |
| 2 | 06/08/18 | 127.00 | 127.00 | 180.00 | 200.00 | | | |
| 3 | 09/10/18 | 140.00 | 115.00 | 161.00 | 204.00 | | | |
| 4 | 05/09/19 | 95.40 | 115.00 | 64.70 | 182.00 | | | |
| 5 | 10/30/19 | 100.00 | 161.00 | 154.00 | 111.00 | | | |
| 6 | 04/26/20 | 69.70 | 135.00 | 182.00 | 209.00 | | | |
| 7 | 11/01/20 | 84.00 | 141.00 | 217.00 | 207.00 | | | |
| 8 | 03/24/21 | 89.90 | 133.00 | 229.00 | 213.00 | | | |
| 9 | 08/15/21 | | 100 | 210.00 | 216.00 | | | |
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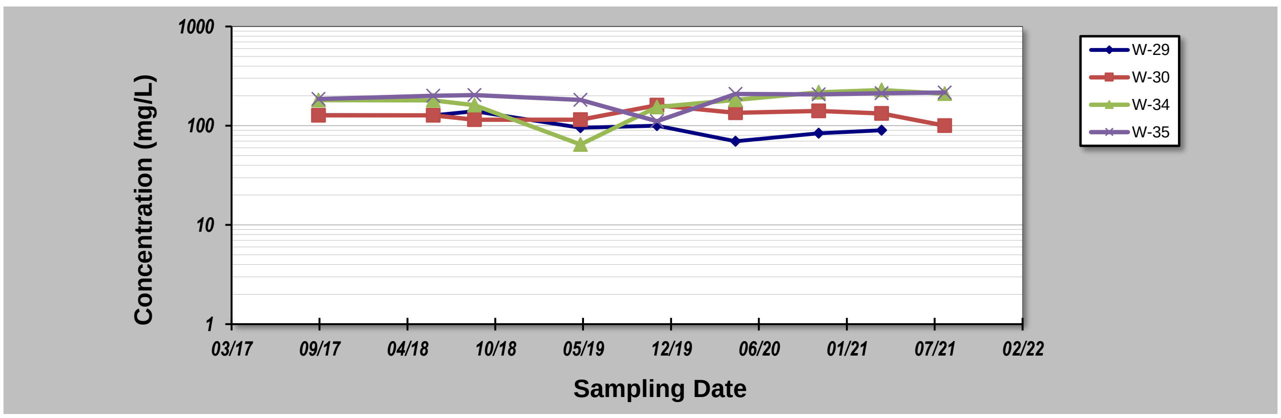
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.24 | 0.14 | 0.28 | 0.17 | | | |
| Mann-Kendall Statistic (S): | | -16 | 0 | 14 | 20 | | | |
| Confidence Factor: | | 96.9% | 46.0% | 91.0% | 97.8% | | | |
| Concentration Trend: | | Decreasing | Stable | Prob. Increasing | Increasing | | | |




**Notes:**
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22
**Facility Name:** MOSES
**Conducted By:** KRO
**Job ID:** PBkgd-Dg
**Constituent:** Chloride
**Concentration Units:** mg/L

| Sampling Event | Sampling Date | W-29 | W-30 | W-34 | W-35 | | | |
|---|---|---|---|---|---|---|---|---|
| | | CHLORIDE CONCENTRATION (mg/L) | | | | | | |
| 1 | 09/20/17 | 80.60 | 76.50 | 117.00 | 120.00 | | | |
| 2 | 06/08/18 | 87.90 | 87.80 | 116.00 | 128.00 | | | |
| 3 | 09/10/18 | 81.50 | 81.10 | 114.00 | 132.00 | | | |
| 4 | 05/09/19 | 92.10 | 97.50 | 45.10 | 75.50 | | | |
| 5 | 10/30/19 | 86.10 | 59.40 | 103.00 | 95.50 | | | |
| 6 | 04/26/20 | 88.20 | 51.40 | 108.00 | 129.00 | | | |
| 7 | 11/01/20 | 88.10 | 44.00 | 114.00 | 118.00 | | | |
| 8 | 03/24/21 | 83.30 | 40.50 | 132.00 | 129.00 | | | |
| 9 | 08/15/21 | | 33.4 | 125.00 | 137.00 | | | |
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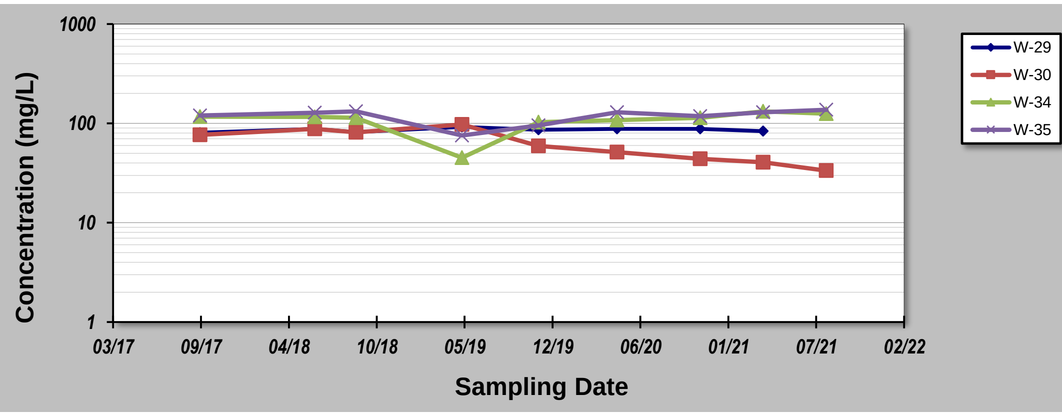
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.05 | 0.36 | 0.23 | 0.17 | | | |
| Mann-Kendall Statistic (S): | | 6 | -26 | 5 | 11 | | | |
| Confidence Factor: | | 72.6% | 99.7% | 65.7% | 84.6% | | | |
| Concentration Trend: | | No Trend | Decreasing | No Trend | No Trend | | | |




**Notes:**

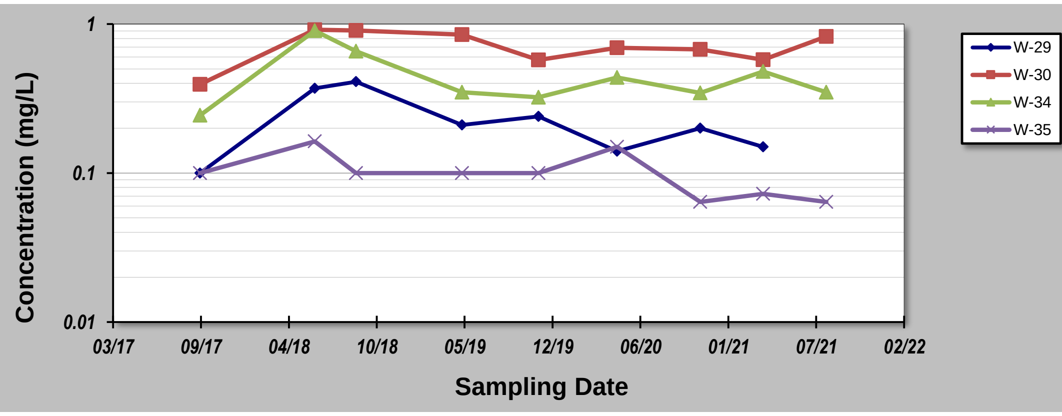
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

| | | | |
|---|---|---|---|
| Evaluation Date: | 9-Nov-22 | Job ID: | PBkgd-Dg |
| Facility Name: | MOSES | Constituent: | Fluoride |
| Conducted By: | KRO | Concentration Units: | mg/L |

| Sampling Event | Sampling Date | W-29 | W-30 | W-34 | W-35 | | | |
|---|---|---|---|---|---|---|---|---|
| | | FLUORIDE CONCENTRATION (mg/L) | | | | | | |
| 1 | 09/20/17 | 0.10 | 0.39 | 0.24 | 0.10 | | | |
| 2 | 06/08/18 | 0.37 | 0.92 | 0.90 | 0.16 | | | |
| 3 | 09/10/18 | 0.41 | 0.91 | 0.66 | 0.10 | | | |
| 4 | 05/09/19 | 0.21 | 0.85 | 0.35 | 0.10 | | | |
| 5 | 10/30/19 | 0.24 | 0.57 | 0.32 | 0.10 | | | |
| 6 | 04/26/20 | 0.14 | 0.69 | 0.44 | 0.15 | | | |
| 7 | 11/01/20 | 0.20 | 0.68 | 0.35 | 0.06 | | | |
| 8 | 03/24/21 | 0.15 | 0.58 | 0.48 | 0.07 | | | |
| 9 | 08/15/21 | | 0.824 | 0.35 | 0.06 | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.48 | 0.25 | 0.45 | 0.34 | | | |
| Mann-Kendall Statistic (S): | | -6 | -6 | -1 | -17 | | | |
| Confidence Factor: | | 72.6% | 69.4% | 50.0% | 95.1% | | | |
| Concentration Trend: | | Stable | Stable | Stable | Decreasing | | | |




**Notes:**

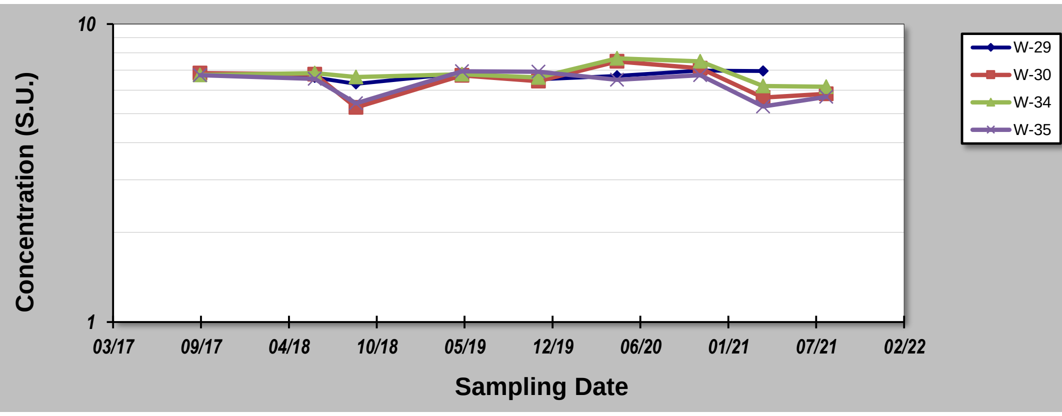
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
Statistical Analysis of Ground Water Data
Mann-Kendall Analyses - Background and Post-Background
Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

| | | | |
|---|---|---|---|
| Evaluation Date: | 9-Nov-22 | Job ID: | PBkgd-Dg |
| Facility Name: | MOSES | Constituent: | pH |
| Conducted By: | KRO | Concentration Units: | S.U. |

| | Sampling Point ID: | W-29 | W-30 | W-34 | W-35 | | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | PH CONCENTRATION (S.U.) | | | | | | |
| 1 | 09/20/17 | 6.85 | 6.85 | 6.75 | 6.74 | | | |
| 2 | 06/08/18 | 6.62 | 6.78 | 6.85 | 6.55 | | | |
| 3 | 09/10/18 | 6.30 | 5.25 | 6.64 | 5.42 | | | |
| 4 | 05/09/19 | 6.85 | 6.72 | 6.78 | 6.94 | | | |
| 5 | 10/30/19 | 6.52 | 6.43 | 6.62 | 6.92 | | | |
| 6 | 04/26/20 | 6.70 | 7.49 | 7.67 | 6.50 | | | |
| 7 | 11/01/20 | 6.98 | 7.11 | 7.50 | 6.73 | | | |
| 8 | 03/24/21 | 6.95 | 5.67 | 6.20 | 5.29 | | | |
| 9 | 08/15/21 | | 5.83 | 6.16 | 5.70 | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| | Coefficient of Variation: | 0.03 | 0.11 | 0.08 | 0.10 | | | |
| | Mann-Kendall Statistic (S): | 9 | -6 | -10 | -12 | | | |
| | Confidence Factor: | 83.2% | 69.4% | 82.1% | 87.0% | | | |
| | Concentration Trend: | No Trend | Stable | Stable | Stable | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

FIGURE 6
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Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

| | | | |
|---|---|---|---|
| Evaluation Date: | 9-Nov-22 | Job ID: | PBkgd-Dg |
| Facility Name: | MOSES | Constituent: | Sulfate |
| Conducted By: | KRO | Concentration Units: | mg/L |

| | Sampling Point ID: | W-29 | W-30 | W-34 | W-35 | | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | SULFATE CONCENTRATION (mg/L) | | | | | | |
| 1 | 09/20/17 | 882.00 | 734.00 | 873.00 | 854.00 | | | |
| 2 | 06/08/18 | 694.00 | 724.00 | 835.00 | 925.00 | | | |
| 3 | 09/10/18 | 858.00 | 713.00 | 819.00 | 940.00 | | | |
| 4 | 05/09/19 | 361.00 | 734.00 | 164.00 | 501.00 | | | |
| 5 | 10/30/19 | 252.00 | 755.00 | 677.00 | 682.00 | | | |
| 6 | 04/26/20 | 270.00 | 763.00 | 817.00 | 984.00 | | | |
| 7 | 11/01/20 | 214.00 | 735.00 | 930.00 | 945.00 | | | |
| 8 | 03/24/21 | 224.00 | 686.00 | 1130.00 | 1010.00 | | | |
| 9 | 08/15/21 | | 606.00 | 933.00 | 992.00 | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
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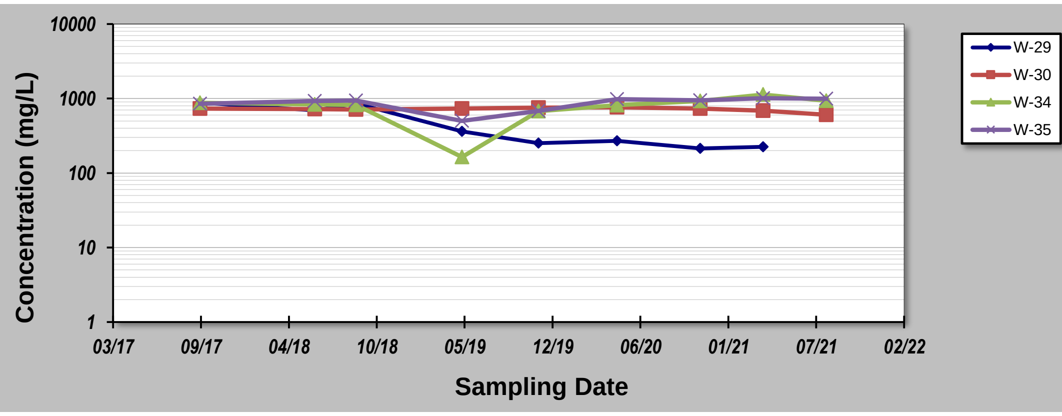
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| | Coefficient of Variation: | 0.62 | 0.07 | 0.33 | 0.20 | | | |
| | Mann-Kendall Statistic (S): | -22 | -5 | 10 | 20 | | | |
| | Confidence Factor: | 99.8% | 65.7% | 82.1% | 97.8% | | | |
| | Concentration Trend: | Decreasing | Stable | No Trend | Increasing | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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Former Monticello Steam Electric Station
Mt. Pleasant, Titus County, Texas

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

**Evaluation Date:** 9-Nov-22
**Facility Name:** MOSES
**Conducted By:** KRO
**Job ID:** PBkgd-Dg
**Constituent:** TDS
**Concentration Units:** mg/L

| Sampling Point ID: | | W-29 | W-30 | W-34 | W-35 | | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | TDS CONCENTRATION (mg/L) | | | | | | |
| 1 | 09/20/17 | 1540.00 | 1570.00 | 1720.00 | 1650.00 | | | |
| 2 | 06/08/18 | 1310.00 | 1280.00 | 1540.00 | 1660.00 | | | |
| 3 | 09/10/18 | 1630.00 | 1230.00 | 1530.00 | 1580.00 | | | |
| 4 | 05/09/19 | 727.00 | 1300.00 | 568.00 | 865.00 | | | |
| 5 | 10/30/19 | 621.00 | 1330.00 | 1260.00 | 1280.00 | | | |
| 6 | 04/26/20 | 563.00 | 1150.00 | 1370.00 | 1600.00 | | | |
| 7 | 11/01/20 | 517.00 | 1140.00 | 1560.00 | 1550.00 | | | |
| 8 | 03/24/21 | 495.00 | 1070.00 | 1640.00 | 1510.00 | | | |
| 9 | 08/15/21 | | 979 | 1620.00 | 1650.00 | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
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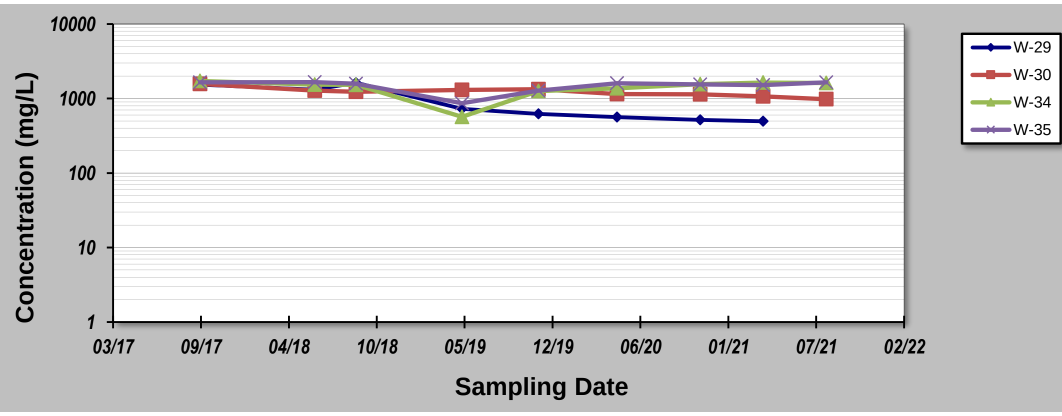
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.52 | 0.14 | 0.25 | 0.17 | | | |
| Mann-Kendall Statistic (S): | | -24 | -26 | 4 | -5 | | | |
| Confidence Factor: | | 99.9% | 99.7% | 61.9% | 65.7% | | | |
| Concentration Trend: | | Decreasing | Decreasing | No Trend | Stable | | | |




**Notes:**
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

# APPENDIX B
# Tables

**TABLE 1**

**Background Ground Water Analytical Data**

**Bottom Ash Pond**

**Mt. Pleasant, Titus County, Texas**

| Well ID | Sample Dates | U-D-NE | Boron (mg/L) | Calcium (mg/L) | Chloride (mg/L) | Fluoride (mg/L) | pH (S.U.) | Sulfate (mg/L) | TDS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| W-31 | 10/15/15 | U | 3.74 | 130 | 66.2 | 0.136 J | 5.67 | 808 | 1,510 |
| | 12/07/15 | U | 3.81 | 136 | 51.2 | 0.275 J | 5.86 | 714 | 1,250 |
| | 02/22/16 | U | 3.65 | 130 | 49.2 | 0.124 | 5.79 | 694 | 1,500 |
| | 04/04/16 | U | 3.80 | 119 | 48.9 | 0.22 J | 6.06 | 737 | 1,220 |
| | 06/06/16 | U | 3.84 | 104 | 47.8 | <0.1 | 6.17 | 701 | 1,150 |
| | 08/08/16 | U | 2.67 | 92.4 | 58.4 | <0.1 | 6.11 | 396 | 862 |
| | 10/12/16 | U | 1.74 | 71.7 | 55.1 | 0.112 | 6.13 | 292 | 654 |
| | 12/29/16 | U | 3.15 | 89.7 | 49.3 | <0.1 | 4.99 | 729 | 1,150 |
| W-32 | 10/15/15 | U | 5.85 | 282 | 160 | 0.44 | 6.72 | 1,040 | 1,970 |
| | 12/07/15 | U | 6.76 | 260 | 122 | 1.19 | 6.74 | 872 | 1,610 |
| | 02/22/16 | U | 6.95 | 247 | 124 | 0.79 | 6.74 | 850 | 1,870 |
| | 04/04/16 | U | 6.50 | 239 | 139 | 1.01 | 6.73 | 844 | 1,380 |
| | 06/06/16 | U | 6.18 | 192 | 105 | 0.758 | 6.71 | 694 | 1,440 |
| | 08/08/16 | U | 4.43 | 261 | 110 | 0.544 | 6.71 | 945 | 1,650 |
| | 10/12/16 | U | 6.32 | 284 | 134 | 0.339 | 6.19 | 986 | 1,820 |
| | 12/29/16 | U | 6.38 | 310 | 147 | 0.573 | 6.46 | 1,210 | 1,950 |
| W-33 | 10/15/15 | U | 6.36 | 311 | 162 | 2.01 | 7.14 | 1,080 | 1,630 |
| | 12/07/15 | U | 6.68 | 252 | 120 | 2.8 | 7.12 | 853 | 1,680 |
| | 02/22/16 | U | 7.52 | 243 | 124 | 2.4 | 7.11 | 790 | 1,960 |
| | 04/04/16 | U | 7.24 | 278 | 171 | 2.5 | 7.14 | 935 | 1,540 |
| | 06/06/16 | U | 7.08 | 229 | 120 | 2.12 | 7.10 | 700 | 1,490 |
| | 08/08/16 | U | 6.37 | 215 | 108 | 1.92 | 6.97 | 655 | 1,300 |
| | 10/12/16 | U | 5.15 | 237 | 111 | 2.43 | 6.84 | 797 | 1,540 |
| | 12/29/16 | U | 5.23 | 275 | 125 | 2.25 | 6.82 | 965 | 1,730 |
| W-29 | 10/15/15 | D | 4.58 | 111 | 101 | 0.317 J | 6.21 | 861 | 1,680 |
| | 12/07/15 | D | 3.47 | 86.6 | 81.1 | 0.358 J | 6.22 | 501 | 1,020 |
| | 02/22/16 | D | 4.98 | 114 | 82.3 | 0.24 | 6.27 | 909 | 1,840 |
| | 04/04/16 | D | 3.32 | 169 | 75.9 | 0.229 J | 6.17 | 465 | 850 |
| | 06/06/16 | D | 5.77 | 162 | 85.5 | <0.1 | 6.29 | 696 | 1,230 |
| | 08/08/16 | D | 5.70 | 153 | 85.6 | <0.1 | 6.32 | 1,100 | 1,850 |
| | 10/12/16 | D | 6.42 | 174 | 82.4 | 0.4 | 6.19 | 1,140 | 1,720 |
| | 12/29/16 | D | 6.52 | 185 | 82.5 | 0.23 J | 6.14 | 1,150 | 1,860 |
| W-30 | 10/15/15 | D | 6.06 | 133 | 106 | 0.58 | 5.78 | 919 | 1,490 |
| | 12/07/15 | D | 7.04 | 135 | 98.3 | 0.809 | 5.95 | 875 | 1,530 |
| | 02/22/16 | D | 6.83 | 138 | 96.3 | 0.721 | 5.94 | 873 | 1,790 |
| | 04/04/16 | D | 6.28 | 141 | 95.2 | 0.961 | 5.93 | 925 | 1,460 |
| | 06/06/16 | D | 6.89 | 132 | 94.9 | 0.359 J | 5.96 | 884 | 1,460 |
| | 08/08/16 | D | 5.94 | 136 | 85.7 | 0.451 | 6.23 | 848 | 1,550 |
| | 10/12/16 | D | 6.51 | 130 | 79.9 | 0.788 | 6.02 | 817 | 1,300 |
| | 12/29/16 | D | 8.54 | 192 | 85.3 | 0.501 | 5.34 | 863 | 1,510 |
| W-34 | 10/15/15 | D | 2.38 | 124 | 87.1 | 0.38 J | 6.55 | 453 | 878 |
| | 12/07/15 | D | 4.10 | 153 | 82.2 | 0.494 | 6.58 | 671 | 1,500 |
| | 02/22/16 | D | 3.44 | 117 | 85.9 | 0.422 | 6.59 | 641 | 1,570 |
| | 04/04/16 | D | 2.09 | 86.9 | 80.7 | 0.287 J | 6.63 | 378 | 817 |
| | 06/06/16 | D | 2.12 | 66.2 | 73 | <0.1 | 6.64 | 343 | 795 |
| | 08/08/16 | D | 3.56 | 121 | 98.4 | <0.1 | 6.52 | 634 | 1,030 |
| | 10/12/16 | D | 3.13 | 110 | 84.9 | 0.293 | 6.57 | 556 | 935 |
| | 12/29/16 | D | 6.10 | 158 | 122 | 0.336 J | 6.03 | 937 | 1,620 |
| W-35 | 10/15/15 | D | 5.58 | 175 | 98.2 | <0.1 | 6.05 | 893 | 1,720 |
| | 12/07/15 | D | 6.13 | 177 | 90.2 | 0.128 J | 6.16 | 861 | 1,580 |
| | 02/22/16 | D | 6.29 | 160 | 85.4 | <0.1 | 6.12 | 824 | 1,650 |
| | 04/04/16 | D | 6.16 | 169 | 91.3 | <0.1 | 6.09 | 835 | 1,310 |
| | 06/06/16 | D | 6.17 | 158 | 98.5 | <0.1 | 6.36 | 858 | 1,460 |
| | 08/08/16 | D | 6.07 | 159 | 97.8 | <0.1 | 6.41 | 810 | 1,470 |
| | 10/12/16 | D | 6.25 | 150 | 97.8 | 0.1 | 6.12 | 793 | 1,320 |
| | 12/29/16 | D | 6.89 | 151 | 110 | <0.1 | 5.06 | 839 | 1,370 |

**NOTES:**

1) Abbreviations: mg/L - milligrams per Liter; S.U. - Standard Units; TDS - Total Dissolved Solids
2) The symbol "<" means less than the value following the symbol.
3) The symbol "J" indicates the concentration is below the method quantitation limit; the result is considered an estimate.

# TABLE 2
## SUMMARY OF DETECTION MONITORING ANALYSES
## Former Monticello Steam Electric Station
## Mt. Pleasant, Titus County, Texas

| DETECTION MONITORING - APPENDIX III PARAMETERS | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Well ID | Total No. of Samples | Number of Detects | Number of Non-detects | Number of Missing Data | Number of Detects to Non-Detects to Missing | Percent Detects | Minimum Detected Values | Maximum Detected Values | Percentage of Non-Detects | Handling of Non-Reporting Data | Reporting Limits | Minimum Censored Value (for NDs) | Maximum Censored Value (for NDs) | Visual Trend from Time-Series Graphs | Any Outliers Identified? | Low Outliers | High Outliers | Any Outliers Removed? | Distribution Type | Mann-Kendal Trend Analysis | Thiel-Sen Trend Analysis | TEXAS GWPS | Total Number of Detection Exceedances Above GWPS |
| **Boron, Total (mg/L)** | | | | | | | | | | | | | | | | | | | | | | | |
| *W-31* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 1.7400 | 3.8400 | 0% | ½ Reporting Limit | | --- | --- | Decreasing | No | No | No | No | Non-Parametric | --- | ISE | | --- |
| *W-32* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 4.4300 | 6.9500 | 0% | ½ Reporting Limit | | --- | --- | Increasing | **Yes** | **Yes** | No | No | Normal | ISE | --- | | 7 |
| *W-33* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 5.1500 | 7.5200 | 0% | ½ Reporting Limit | | --- | --- | Decreasing | No | No | No | No | Normal | ISE | --- | | 8 |
| W-29 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 3.3200 | 6.5200 | 0% | ½ Reporting Limit | 0.03 | --- | --- | Increasing | No | No | No | No | Normal | SSE Increasing | --- | 4.9 | 5 |
| W-30 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 5.9400 | 8.5400 | 0% | ½ Reporting Limit | | --- | --- | Increasing | **Yes** | No | **Yes** | No | Normal | ISE | --- | | 8 |
| W-34 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 2.0900 | 6.1000 | 0% | ½ Reporting Limit | | --- | --- | Increasing | No | No | No | No | Normal | ISE | --- | | 1 |
| W-35 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 5.5800 | 6.8900 | 0% | ½ Reporting Limit | | --- | --- | Increasing | **Yes** | **Yes** | **Yes** | No | Normal | ISE | --- | | 8 |
| **Calcium, Total (mg/L)** | | | | | | | | | | | | | | | | | | | | | | | |
| *W-31* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 71.7 | 136.0 | 0% | ½ Reporting Limit | | --- | --- | Stable | No | No | No | No | Normal | SSE Decreasing | --- | | --- |
| *W-32* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 192.0 | 310.0 | 0% | ½ Reporting Limit | | --- | --- | Increasing | No | No | No | No | Normal | ISE | --- | | --- |
| *W-33* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 215.0 | 311.0 | 0% | ½ Reporting Limit | | --- | --- | Increasing | No | No | No | No | Normal | ISE | --- | | --- |
| W-29 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 86.6 | 185.0 | 0% | ½ Reporting Limit | 0.3 | --- | --- | Increasing | No | No | No | No | Normal | SSE Increasing | --- | --- | --- |
| W-30 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 130.0 | 192.0 | 0% | ½ Reporting Limit | | --- | --- | Increasing | **Yes** | No | **Yes** | No | Non-Parametric | --- | ISE | | --- |
| W-34 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 66.2 | 158.0 | 0% | ½ Reporting Limit | | --- | --- | Increasing | No | No | No | No | Normal | ISE | --- | | --- |
| W-35 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 150.0 | 177.0 | 0% | ½ Reporting Limit | | --- | --- | Decreasing | No | No | No | No | Normal | SSE Decreasing | --- | | --- |
| **Chloride, Total (mg/L)** | | | | | | | | | | | | | | | | | | | | | | | |
| *W-31* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 47.8 | 66.2 | 0% | ½ Reporting Limit | | --- | --- | Decreasing | No | No | No | No | Normal | ISE | --- | | --- |
| *W-32* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 105.0 | 160.0 | 0% | ½ Reporting Limit | | --- | --- | Increasing | No | No | No | No | Normal | ISE | --- | | --- |
| *W-33* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 108.0 | 171.0 | 0% | ½ Reporting Limit | | --- | --- | Increasing | No | No | No | No | Log-Normal | ISE | --- | | --- |
| W-29 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 75.9 | 101.0 | 0% | ½ Reporting Limit | 1 | --- | --- | Stable | **Yes** | **Yes** | **Yes** | No | Log-Normal | ISE | --- | 250 | --- |
| W-30 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 79.9 | 106.0 | 0% | ½ Reporting Limit | | --- | --- | Decreasing | No | No | No | No | Normal | SSE Decreasing | --- | | --- |
| W-34 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 73.0 | 122.0 | 0% | ½ Reporting Limit | | --- | --- | Increasing | **Yes** | No | **Yes** | No | Normal | ISE | --- | | --- |
| W-35 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 85.4 | 110.0 | 0% | ½ Reporting Limit | | --- | --- | Increasing | **Yes** | No | **Yes** | No | Normal | ISE | --- | | --- |
| **Fluoride, Total (mg/L)** | | | | | | | | | | | | | | | | | | | | | | | |
| *W-31* | 8 | 5 | 3 | 0 | 5 - 3 - 0 | 63% | 0.11 | 0.28 | 38% | RROS | | 0.10 | 0.10 | Stable | No | No | No | No | Normal | ISE | --- | | --- |
| *W-32* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 0.34 | 1.19 | 0% | ½ Reporting Limit | | --- | --- | Decreasing | No | No | No | No | Normal | ISE | --- | | --- |
| *W-33* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 1.92 | 2.80 | 0% | ½ Reporting Limit | | --- | --- | --- | No | No | No | No | Normal | ISE | --- | | --- |
| W-29 | 8 | 6 | 2 | 0 | 6 - 2 - 0 | 75% | 0.23 | 0.40 | 25% | RROS | 0.4 | 0.10 | 0.10 | Stable | No | No | No | No | Normal | ISE | --- | 2.0 | --- |
| W-30 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 0.36 | 0.96 | 0% | ½ Reporting Limit | | --- | --- | Stable | No | No | No | No | Normal | ISE | --- | | --- |
| W-34 | 8 | 6 | 2 | 0 | 6 - 2 - 0 | 75% | 0.29 | 0.49 | 25% | RROS | | 0.10 | 0.10 | --- | No | No | No | No | Normal | ISE | --- | | --- |
| W-35 | 8 | 2 | 6 | 0 | 2 - 6 - 0 | 25% | 0.10 | 0.13 | 75% | Non-parametric | | 0.10 | 0.10 | Stable | No | No | No | No | Non-Parametric | --- | ISE | | --- |
| **pH (S.U.)** | | | | | | | | | | | | | | | | | | | | | | | |
| *W-31* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 4.99 | 6.17 | 0% | ½ Reporting Limit | | --- | --- | --- | **Yes** | **Yes** | No | No | Normal | SSE Increasing | --- | | --- |
| *W-32* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 6.19 | 6.74 | 0% | ½ Reporting Limit | | --- | --- | --- | No | No | No | No | Non-Parametric | --- | SSE Decreasing | | --- |
| *W-33* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 6.82 | 7.14 | 0% | ½ Reporting Limit | | --- | --- | Decreasing | No | No | No | No | Non-Parametric | --- | SSE Decreasing | | --- |
| W-29 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 6.14 | 6.32 | 0% | ½ Reporting Limit | 0.1 | --- | --- | --- | No | No | No | No | Normal | ISE | --- | 6.5-8.5 | --- |
| W-30 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 5.34 | 6.23 | 0% | ½ Reporting Limit | | --- | --- | Decreasing | **Yes** | **Yes** | No | No | Normal | SSE Increasing | --- | | --- |
| W-34 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 6.03 | 6.64 | 0% | ½ Reporting Limit | | --- | --- | --- | **Yes** | **Yes** | No | No | Non-Parametric | --- | ISE | | --- |
| W-35 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 5.06 | 6.41 | 0% | ½ Reporting Limit | | --- | --- | Decreasing | **Yes** | **Yes** | No | No | Non-Parametric | --- | ISE | | --- |
| **Sulfate, Total (mg/L)** | | | | | | | | | | | | | | | | | | | | | | | |
| *W-31* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 292 | 808 | 0% | ½ Reporting Limit | | --- | --- | --- | No | No | No | No | Non-Parametric | --- | ISE | | 8 |
| *W-32* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 694 | 1210 | 0% | ½ Reporting Limit | | --- | --- | --- | No | No | No | No | Normal | ISE | --- | | 8 |
| *W-33* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 655 | 1080 | 0% | ½ Reporting Limit | | --- | --- | Stable | No | No | No | No | Normal | ISE | --- | | 8 |
| W-29 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 465 | 1150 | 0% | ½ Reporting Limit | 3 | --- | --- | Increasing | No | No | No | No | Normal | SSE Increasing | --- | 250 | 8 |
| W-30 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 817 | 925 | 0% | ½ Reporting Limit | | --- | --- | --- | No | No | No | No | Normal | ISE | --- | | 8 |
| W-34 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 343 | 937 | 0% | ½ Reporting Limit | | --- | --- | Increasing | No | No | No | No | Normal | ISE | --- | | 8 |
| W-35 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 793 | 893 | 0% | ½ Reporting Limit | | --- | --- | Decreasing | No | No | No | No | Normal | ISE | --- | | 8 |
| **TDS, Total (mg/L)** | | | | | | | | | | | | | | | | | | | | | | | |
| *W-31* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 654 | 1510 | 0% | ½ Reporting Limit | | --- | --- | Decreasing | No | No | No | No | Normal | SSE Decreasing | --- | | 8 |
| *W-32* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 1380 | 1970 | 0% | ½ Reporting Limit | | --- | --- | Increasing | No | No | No | No | Normal | ISE | --- | | 8 |
| *W-33* | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 1300 | 1960 | 0% | ½ Reporting Limit | | --- | --- | --- | No | No | No | No | Normal | ISE | --- | | 8 |
| W-29 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 850 | 1860 | 0% | ½ Reporting Limit | 10 | --- | --- | --- | No | No | No | No | Normal | ISE | --- | 500 | 8 |
| W-30 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 1300 | 1790 | 0% | ½ Reporting Limit | | --- | --- | --- | **Yes** | **Yes** | **Yes** | No | Normal | ISE | --- | | 8 |
| W-34 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 795 | 1620 | 0% | ½ Reporting Limit | | --- | --- | --- | No | No | No | No | Normal | ISE | --- | | 8 |
| W-35 | 8 | 8 | 0 | 0 | 8 - 0 - 0 | 100% | 1310 | 1720 | 0% | ½ Reporting Limit | | --- | --- | Decreasing | No | No | No | No | Normal | ISE | --- | | 8 |

**NOTES:**

1). Italized well IDs indicate that the well is considered a background well.
2). The trend and distribution determinations were based on the background data points for all wells.
3). Statistical analyses conducted were based on a sample set of the population considered as background.
4). The use of the symbol "---", throughout this table, indicates that no values were determined for this cell.
5). All data was analyzed for the presence of low and high outliers.
6). Current outliers were removed if statistically appropriate, otherwise the potential outlier was considered part of the data set.
7). The reporting limits used for these analyses were the laboratory reporting limit.
8). A simple comparison was made between the background results at the ground water protection standard (GWPS) as defined by the Texas Commission of Environmental Quality.

**TABLE 3**
**Statistical Analysis of Ground Water Data**
**Box Plots - Background**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

| Parameter | Well ID | Gradient | Comments |
|---|---|---|---|
| Boron | *MW-31* | Up | The background wells (upgradient) exhibit limited variability between well MW-31 and wells MW-32 and MW-33; however, all wells lie below a value of 7.5 mg/L. |
| | *MW-32* | | |
| | *MW-33* | | |
| | MW-29 | Down | The background wells (downgradient) exhibit less variability (all lie between +2 to 7 mg/L) than the upgradient background wells. All downgradient wells lie below the maximum of the upgradient wells for Boron. |
| | MW-30 | | |
| | MW-34 | | |
| | MW-35 | | |
| Calcium | *MW-31* | Up | The background wells (upgradient) exhibit variability between well MW-31 and wells MW-32 and MW-33; however, wells MW-32 and MW-33 exhibit the highest of all wells both upgradient and downgradient. |
| | *MW-32* | | |
| | *MW-33* | | |
| | MW-29 | Down | The background wells (downgradient) exhibit limited to no variability across all downgradient wells. |
| | MW-30 | | |
| | MW-34 | | |
| | MW-35 | | |
| Chloride | *MW-31* | Up | The background wells (upgradient) exhibit variability between well MW-31 and wells MW-32 and MW-33; however, wells MW-32 and MW-33 exhibit the highest of all wells both upgradient and downgradient. |
| | *MW-32* | | |
| | *MW-33* | | |
| | MW-29 | Down | The background wells (downgradient) exhibit limited to no variability across all downgradient wells. |
| | MW-30 | | |
| | MW-34 | | |
| | MW-35 | | |
| Fluoride | *MW-31* | Up | The background wells (upgradient) exhibit variability between all wells; however, many J-valued results result in the variability. |
| | *MW-32* | | |
| | *MW-33* | | |
| | MW-29 | Down | The background wells (downgradient) exhibit limited to no variability across all downgradient wells. |
| | MW-30 | | |
| | MW-34 | | |
| | MW-35 | | |
| pH | *MW-31* | Up | The background wells (upgradient) exhibit increasing variability from wells MW31 to MW-32 to MW-33; yet lie within a band between 5.7 and approximately 7.1. |
| | *MW-32* | | |
| | *MW-33* | | |
| | MW-29 | Down | The background wells (downgradient) exhibit little variability and lie within a band from 5.85 to 6.6. |
| | MW-30 | | |
| | MW-34 | | |
| | MW-35 | | |
| Sulfate | *MW-31* | Up | The background wells (upgradient) exhibit significant variability across all three (3) wells varying from approximately 250 to 1200+ mg/L. |
| | *MW-32* | | |
| | *MW-33* | | |
| | MW-29 | Down | The background wells (downgradient) exhibit less variability than the upgradient wells but still varied from approximately 400 to 1150 mg/L. |
| | MW-30 | | |
| | MW-34 | | |
| | MW-35 | | |
| TDS | *MW-31* | Up | The background wells (upgradient) exhibit variability across all three (3) wells varying from approximately 650 to approximately 2000 mg/L. |
| | *MW-32* | | |
| | *MW-33* | | |
| | MW-29 | Down | The background wells (downgradient) exhibit similar variability as the upgradient wells varying from 800 to 1960 mg/L. |
| | MW-30 | | |
| | MW-34 | | |
| | MW-35 | | |

**Notes:**

1) The order of the wells is based upon upgradient versus downgradient, and then in numerical order.
2) The well which are italized represent the upgradient wells.
3) Gradient represents whether the well is upgradient or downgradient.

**TABLE 4**
**Statistical Analysis of Ground Water Data**
**ANOVA Analysis - Non-parametric**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

**Nonparametric Oneway ANOVA (Kruskal-Wallis Test)**

| | |
|---|---|
| Date/Time of Computation | ProUCL 5.2 12/8/2023 1:03:42 PM |
| From File | D6-ANOVA.xls |
| Full Precision | OFF |

**Boron**

| Group | Obs | Median | Ave Rank | Z |
|---|---|---|---|---|
| d | 32 | 6.065 | 27.66 | -0.447 |
| u | 24 | 6.015 | 29.63 | 0.447 |
| Overall | 56 | 6.065 | 28.5 | |

| K-W (H-Stat) | DOF | P-Value | (Approx. Chisquare) |
|---|---|---|---|
| 0.2 | 1 | 0.655 | |
| 0.2 | 1 | 0.655 | (Adjusted for Ties) |

**Note: A p-value <= 0.05 (or some other selected level) suggests that there are significant differences in mean/median characteristics of the various groups at 0.05 or other selected level of significance**
**A p-value > 0.05 (or other selected level) suggests that mean/median characteristics of the various groups are comparable.**

**Calcium**

| Group | Obs | Median | Ave Rank | Z |
|---|---|---|---|---|
| d | 32 | 145.5 | 22.97 | -2.931 |
| u | 24 | 238 | 35.88 | 2.931 |
| Overall | 56 | 155.5 | 28.5 | |

| K-W (H-Stat) | DOF | P-Value | (Approx. Chisquare) |
|---|---|---|---|
| 8.588 | 1 | 0.00338 | |
| 8.591 | 1 | 0.00338 | (Adjusted for Ties) |

**Note: A p-value <= 0.05 (or some other selected level) suggests that there are significant differences in mean/median characteristics of the various groups at 0.05 or other selected level of significance**
**A p-value > 0.05 (or other selected level) suggests that mean/median characteristics of the various groups are comparable.**

**Chloride**

| Group | Obs | Median | Ave Rank | Z |
|---|---|---|---|---|
| d | 32 | 86.5 | 24.81 | -1.954 |
| u | 24 | 115.5 | 33.42 | 1.954 |
| Overall | 56 | 95.05 | 28.5 | |

| K-W (H-Stat) | DOF | P-Value | (Approx. Chisquare) |
|---|---|---|---|
| 3.817 | 1 | 0.0507 | |
| 3.818 | 1 | 0.0507 | (Adjusted for Ties) |

**Note: A p-value <= 0.05 (or some other selected level) suggests that there are significant differences in mean/median characteristics of the various groups at 0.05 or other selected level of significance**
**A p-value > 0.05 (or other selected level) suggests that mean/median characteristics of the various groups are comparable.**

**TABLE 4**
**Statistical Analysis of Ground Water Data**
**ANOVA Analysis - Non-parametric**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

**pH**

| Group | Obs | Median | Ave Rank | Z |
|---|---|---|---|---|
| d | 32 | 6.18 | 23.41 | -2.699 |
| u | 24 | 6.715 | 35.29 | 2.699 |
| Overall | 56 | 6.225 | 28.5 | |

| K-W (H-Stat) | DOF | P-Value | (Approx. Chisquare) |
|---|---|---|---|
| 7.283 | 1 | 0.00696 | |
| 7.285 | 1 | 0.00695 | (Adjusted for Ties) |

**Note: A p-value <= 0.05 (or some other selected level) suggests that there are significant differences in mean/median characteristics of the various groups at 0.05 or other selected level of significance**
**A p-value > 0.05 (or other selected level) suggests that mean/median characteristics of the various groups are comparable.**

**Sulfate**

| Group | Obs | Median | Ave Rank | Z |
|---|---|---|---|---|
| d | 32 | 843.5 | 28.44 | -0.0331 |
| u | 24 | 802.5 | 28.58 | 0.0331 |
| Overall | 56 | 837 | 28.5 | |

| K-W (H-Stat) | DOF | P-Value | (Approx. Chisquare) |
|---|---|---|---|
| 0.0011 | 1 | 0.974 | |
| 0.0011 | 1 | 0.974 | (Adjusted for Ties) |

**Note: A p-value <= 0.05 (or some other selected level) suggests that there are significant differences in mean/median characteristics of the various groups at 0.05 or other selected level of significance**
**A p-value > 0.05 (or other selected level) suggests that mean/median characteristics of the various groups are comparable.**

**TDS**

| Group | Obs | Median | Ave Rank | Z |
|---|---|---|---|---|
| d | 32 | 1480 | 26.78 | -0.911 |
| u | 24 | 1525 | 30.79 | 0.911 |
| Overall | 56 | 1500 | 28.5 | |

| K-W (H-Stat) | DOF | P-Value | (Approx. Chisquare) |
|---|---|---|---|
| 0.829 | 1 | 0.362 | |
| 0.83 | 1 | 0.362 | (Adjusted for Ties) |

**Note: A p-value <= 0.05 (or some other selected level) suggests that there are significant differences in mean/median characteristics of the various groups at 0.05 or other selected level of significance**
**A p-value > 0.05 (or other selected level) suggests that mean/median characteristics of the various groups are comparable.**

**TABLE 5**
**Statistical Analysis of Ground Water Data**
**Goodness of Fit Tests**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

**Results of Goodness-of-Fit Test**

Test Method: ---------------------------------Shapiro-Wilk GOF

Hypothesized Distribution: ------------------Normal

Estimated Parameter(s):---------------------mean = 5.334107
sd = 1.621487

Estimation Method: -------------------------mvue

Data: ------------------------------------------Boron

Number NA/NaN/Inf's Removed:------------2

Sample Size:---------------------------------56

Test Statistic:---------------------------------W = 0.9192611

Test Statistic Parameter: --------------------n = 56

P-value:---------------------------------------0.001117733

Alternative Hypothesis: ---------------------True cdf does not equal the Normal Distribution.

**Results of Goodness-of-Fit Test**

Test Method: ---------------------------------Shapiro-Wilk GOF

Hypothesized Distribution: -----------------Lognormal

Estimated Parameter(s): -------------------- meanlog = 1.6159899
---------------------------------------------- sdlog = 0.3686093

Estimation Method: -------------------------mvue

Data: ------------------------------------------Boron

Number NA/NaN/Inf's Removed:------------2

Sample Size:---------------------------------56

Test Statistic:--------------------------------- W = 0.860573

Test Statistic Parameter: --------------------n = 56

P-value:---------------------------------------1.169028e-05

Alternative Hypothesis: ---------------------True cdf does not equal the Lognormal Distribution.

**Results of Goodness-of-Fit Test**

Test Method: ----------------------------------Shapiro-Wilk GOF

Hypothesized Distribution: ------------------Normal

Estimated Parameter(s):----------------------mean = 169.9018
sd = 63.8619

Estimation Method: --------------------------mvue

Data: -------------------------------------------Calcium

Number NA/NaN/Inf's Removed:------------2

Sample Size:-----------------------------------56

Test Statistic:----------------------------------W = 0.9347253

Test Statistic Parameter: ---------------------n = 56

P-value:-----------------------------------------0.004653463

Alternative Hypothesis: ----------------------True cdf does not equal the Normal Distribution.

**Results of Goodness-of-Fit Test**

Test Method: ----------------------------------Shapiro-Wilk GOF

Hypothesized Distribution: ------------------Lognormal

Estimated Parameter(s):----------------------meanlog = 5.0661168
sdlog = 0.3780929

Estimation Method: --------------------------mvue

Data: -------------------------------------------Calcium

Number NA/NaN/Inf's Removed:------------2

Sample Size:-----------------------------------56

Test Statistic:----------------------------------= 0.9737109

Test Statistic Parameter: ---------------------n = 56

P-value:-----------------------------------------0.2584534

Alternative Hypothesis: ----------------------True cdf does not equal the Lognormal Distribution.

**TABLE 5**
**Statistical Analysis of Ground Water Data**
**Goodness of Fit Tests**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

**Results of Goodness-of-Fit Test**

Test Method: ----------------------------------Shapiro-Wilk GOF

Hypothesized Distribution: ------------------Normal

Estimated Parameter(s):----------------------mean = 96.59643
sd = 28.30395

Estimation Method: --------------------------mvue

Data: -------------------------------------------Chloride

Number NA/NaN/Inf's Removed:------------2

Sample Size:----------------------------------56

Test Statistic:----------------------------------W = 0.9586897

Test Statistic Parameter: ---------------------n = 56

P-value:----------------------------------------0.05278784

Alternative Hypothesis: ----------------------True cdf does not equal the Normal Distribution.

**Results of Goodness-of-Fit Test**

Test Method: ----------------------------------Shapiro-Wilk GOF

Hypothesized Distribution: ------------------Lognormal

Estimated Parameter(s):----------------------meanlog = 4.5269185
sdlog = 0.3038545

Estimation Method: --------------------------mvue

Data: -------------------------------------------Chloride

Number NA/NaN/Inf's Removed:------------2

Sample Size:----------------------------------56

Test Statistic:----------------------------------W = 0.9551078

Test Statistic Parameter: ---------------------n = 56

P-value:0.03617456

Alternative Hypothesis: ----------------------True cdf does not equal the Lognormal Distribution.

**Results of Goodness-of-Fit Test**

Test Method: ----------------------------------Shapiro-Wilk GOF

Hypothesized Distribution: ------------------Normal

Estimated Parameter(s):----------------------mean = 0.6361607
sd = 0.7423213

Estimation Method: --------------------------mvue

Data: -------------------------------------------Fluoride

Number NA/NaN/Inf's Removed:------------2

Sample Size:----------------------------------56

Test Statistic:----------------------------------W = 0.7151058

Test Statistic Parameter: ---------------------n = 56

P-value:----------------------------------------4.107741e-09

Alternative Hypothesis: ----------------------True cdf does not equal the Normal Distribution.

**Results of Goodness-of-Fit Test**

Test Method: ----------------------------------Shapiro-Wilk GOF

Hypothesized Distribution: ------------------Lognormal

Estimated Parameter(s):----------------------meanlog = -1.028269
sdlog = 1.072752

Estimation Method: --------------------------mvue

Data: -------------------------------------------Fluoride

Number NA/NaN/Inf's Removed:------------2

Sample Size:----------------------------------56

Test Statistic:----------------------------------W = 0.9064636

Test Statistic Parameter: ---------------------n = 56

P-value:----------------------------------------0.0003719209

Alternative Hypothesis: ----------------------True cdf does not equal the Lognormal Distribution.

**TABLE 5**
**Statistical Analysis of Ground Water Data**
**Goodness of Fit Tests**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

**Results of Goodness-of-Fit Test**

Test Method: ----------------------------------Shapiro-Wilk GOF

Hypothesized Distribution: ------------------Normal

Estimated Parameter(s):----------------------mean = 6.3117857
sd = 0.4757735

Estimation Method: --------------------------mvue

Data: -------------------------------------------pH

Number NA/NaN/Inf's Removed:------------2

Sample Size:----------------------------------56

Test Statistic:----------------------------------W = 0.9590466

Test Statistic Parameter: ---------------------n = 56

P-value:----------------------------------------0.05482421

Alternative Hypothesis: ----------------------True cdf does not equal the Normal Distribution.

Results of Goodness-of-Fit Test

Test Method: ----------------------------------Shapiro-Wilk GOF

Hypothesized Distribution: ------------------Lognormal

Estimated Parameter(s):----------------------meanlog = 1.83954243
sdlog = 0.07718869

Estimation Method: --------------------------mvue

Data: -------------------------------------------pH

Number NA/NaN/Inf's Removed:------------2

Sample Size:----------------------------------56

Test Statistic:----------------------------------W = 0.944486

Test Statistic Parameter: ---------------------n = 56

P-value:----------------------------------------0.01213442

Alternative Hypothesis: ----------------------True cdf does not equal the Lognormal Distribution.

**Results of Goodness-of-Fit Test**

Test Method: ----------------------------------Shapiro-Wilk GOF

Hypothesized Distribution: ------------------Normal

Estimated Parameter(s):----------------------mean = 793.5536
sd = 200.0573

Estimation Method: --------------------------mvue

Data: -------------------------------------------Sulfate

Number NA/NaN/Inf's Removed:------------2

Sample Size:----------------------------------56

Test Statistic:----------------------------------W = 0.956566

Test Statistic Parameter: ---------------------n = 56

P-value:-----------------------------------------0.04217151

Alternative Hypothesis: ----------------------True cdf does not equal the Normal Distribution.

**Results of Goodness-of-Fit Test**

Test Method: ----------------------------------Shapiro-Wilk GOF

Hypothesized Distribution: ------------------Lognormal

Estimated Parameter(s):----------------------meanlog = 6.6378688
----------------------------------------------------sdlog = 0.2991399

Estimation Method: --------------------------mvue

Data: -------------------------------------------Sulfate

Number NA/NaN/Inf's Removed:------------2

Sample Size:----------------------------------56

Test Statistic:----------------------------------W = 0.8734779

Test Statistic Parameter: ---------------------n = 56

P-value:-----------------------------------------2.892929e-05

Alternative Hypothesis: ----------------------True cdf does not equal the Lognormal Distribution.

**TABLE 5**
**Statistical Analysis of Ground Water Data**
**Goodness of Fit Tests**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

**Results of Goodness-of-Fit Test**

Test Method: ----------------------------------Shapiro-Wilk GOF

Hypothesized Distribution: ------------------Normal

Estimated Parameter(s):----------------------mean = 1446.8036
sd = 324.8191

Estimation Method: --------------------------mvue

Data: -------------------------------------------TDS

Number NA/NaN/Inf's Removed:------------2

Sample Size:-----------------------------------56

Test Statistic:----------------------------------W = 0.9525293

Test Statistic Parameter: ---------------------n = 56

P-value:----------------------------------------0.02763066

Alternative Hypothesis: ----------------------True cdf does not equal the Normal Distribution.

**Results of Goodness-of-Fit Test**

Test Method: ----------------------------------Shapiro-Wilk GOF

Hypothesized Distribution: ------------------Lognormal

Estimated Parameter(s):----------------------meanlog = 7.2478739
sdlog = 0.2556553

Estimation Method: --------------------------mvue

Data: -------------------------------------------TDS

Number NA/NaN/Inf's Removed:------------2

Sample Size:-----------------------------------56

Test Statistic:----------------------------------W = 0.8961628

Test Statistic Parameter: ---------------------n = 56

P-value:----------------------------------------0.0001608449

Alternative Hypothesis: ----------------------True cdf does not equal the Lognormal Distribution.

**TABLE 6**
**Statistsical Analysis of Ground Water Data**
**Trend Summary - Background and Post-Background**
**Former Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

| Background | | |
|---|---|---|
| **Parameter** | **Well ID** | **Constitutent Trend** |
| Boron | *MW-31* | Stable |
| | *MW-32* | Stable |
| | *MW-33* | Stable |
| | MW-29 | Increasing |
| | MW-30 | *No Trend* |
| | MW-34 | *No Trend* |
| | MW-35 | Probably Increasing |
| Calcium | *MW-31* | Decreasing |
| | *MW-32* | *No Trend* |
| | *MW-33* | Stable |
| | MW-29 | Increasing |
| | MW-30 | *No Trend* |
| | MW-34 | Stable |
| | MW-35 | Decreasing |
| Chloride | *MW-31* | Stable |
| | *MW-32* | Stable |
| | *MW-33* | Stable |
| | MW-29 | *No Trend* |
| | MW-30 | Decreasing |
| | MW-34 | *No Trend* |
| | MW-35 | *No Trend* |
| Fluoride | *MW-31* | Decreasing |
| | *MW-32* | Stable |
| | *MW-33* | Stable |
| | MW-29 | Stable |
| | MW-30 | Stable |
| | MW-34 | Stable |
| | MW-35 | Stable |
| pH | *MW-31* | *No Trend* |
| | *MW-32* | Decreasing |
| | *MW-33* | Decreasing |
| | MW-29 | Stable |
| | MW-30 | *No Trend* |
| | MW-34 | Stable |
| | MW-35 | *No Trend* |
| Sulfate | *MW-31* | Probably Decreasing |
| | *MW-32* | *No Trend* |
| | *MW-33* | Stable |
| | MW-29 | Increasing |
| | MW-30 | Probably Decreasing |
| | MW-34 | *No Trend* |
| | MW-35 | Probably Decreasing |
| TDS | *MW-31* | Decreasing |
| | *MW-32* | *No Trend* |
| | *MW-33* | Stable |
| | MW-29 | Probably Increasing |
| | MW-30 | Stable |
| | MW-34 | *No Trend* |
| | MW-35 | Probably Decreasing |

**Notes:**

1) The order of the wells is based upon upgradient
2) The well which are italized represent the
3) The constitutent trend is based upon the Coefficient of Variation (COV) and the Confidence Factor (CF). The methodology is based on"*MAROS: A Decision*

**TABLE 7**
**Statistical Analysis of Ground Water Data**
**Von Neumann's Test – Background**
**Monticello Steam electric Station**
**Mt. Pleasant, Titus County, Texas**

**Results of Hypothesis Test for Boron**

Null Hypothesis: ....................................rho = 0
Alternative Hypothesis:........................True rho is not equal to 0
Test Name:...............................................Rank von Neumann Test for
Lag-1 Autocorrelation
Beta Approximation)

Estimated Parameter(s): .....................rho = 0.6437864
Estimation Method:...............................Yule-Walker
Data:...........................................................Boron
Sample Size:.............................................56
Test Statistic:............................................RVN = 0.6617738

P-value:......................................................8.145779e-09

Confidence Interval for:.......................rho
Confidence Interval Method:.............Normal Approximation
Confidence Interval Type:...................two-sided
Confidence Level:..................................95%

Confidence Interval:..............................LCL = 0.4433705
UCL = 0.8442022

**TABLE 7**
**Statistical Analysis of Ground Water Data**
**Von Neumann's Test – Background**
**Monticello Steam electric Station**
**Mt. Pleasant, Titus County, Texas**

## Results of Hypothesis Test for Calcium

Null Hypothesis:......................................rho = 0
Alternative Hypothesis: ......................True rho is not equal to 0
Test Name: ...............................................Rank von Neumann Test for
Lag-1 Autocorrelation
(Beta Approximation)

Estimated Parameter(s): .....................rho = 0.7514778
Estimation Method: ..............................Yule-Walker
Data: ............................................................Calcium
Sample Size: ............................................56
Test Statistic:............................................RVN = 0.5800068

P-value: ......................................................3.686358e-10

Confidence Interval for:.......................rho
Confidence Interval Method: .............Normal Approximation
Confidence Interval Type:...................two-sided
Confidence Level:..................................95%

Confidence Interval:.............................. LCL = 0.5786797
UCL = 0.9242759

**TABLE 7**
**Statistical Analysis of Ground Water Data**
**Von Neumann's Test – Background**
**Monticello Steam electric Station**
**Mt. Pleasant, Titus County, Texas**

**Results of Hypothesis Test for Chloride**

Null Hypothesis:......................................rho = 0

Alternative Hypothesis:........................True rho is not equal to 0

Test Name: ..............................................Rank von Neumann Test for
Lag-1 Autocorrelation
(Beta Approximation)

Estimated Parameter(s):.......................rho = 0.6639911
Estimation Method:...............................Yule-Walker
Data:...........................................................Chloride
Sample Size: ............................................56
Test Statistic:...........................................RVN = 0.5280759

P-value:......................................................3.860789e-11

Confidence Interval for: ......................rho
Confidence Interval Method:.............Normal Approximation
Confidence Interval Type:...................two-sided
Confidence Level:..................................95%

Confidence Interval:..............................LCL = 0.4681495
UCL = 0.8598327

**TABLE 7**
**Statistical Analysis of Ground Water Data**
**Von Neumann's Test – Background**
**Monticello Steam electric Station**
**Mt. Pleasant, Titus County, Texas**

**<u>Results of Hypothesis Test for pH</u>**

Null Hypothesis:......................................rho = 0

Alternative Hypothesis:........................True rho is not equal to 0

Test Name:...............................................Rank von Neumann Test for
Lag-1 Autocorrelation
(Beta Approximation)

Estimated Parameter(s):.......................rho = 0.5390714
Estimation Method: ...............................Yule-Walker
Data: ...........................................................pH
Sample Size: ............................................56
Test Statistic:...........................................RVN = 0.5288107

P-value: ......................................................3.993328e-11

Confidence Interval for: .......................rho
Confidence Interval Method: .............Normal Approximation
Confidence Interval Type:...................two-sided
Confidence Level:..................................95%

Confidence Interval: ..............................LCL = 0.3184741
UCL = 0.7596688

**TABLE 7**
**Statistical Analysis of Ground Water Data**
**Von Neumann's Test – Background**
**Monticello Steam electric Station**
**Mt. Pleasant, Titus County, Texas**

**Results of Hypothesis Test for Sulfate**

Null Hypothesis:......................................rho = 0

Alternative Hypothesis:........................True rho is not equal to 0

Test Name:................................................Rank von Neumann Test for
Lag-1 Autocorrelation
(Beta Approximation)

Estimated Parameter(s):.......................rho = 0.5252193
Estimation Method: ...............................Yule-Walker
Data: ...........................................................Sulfate
Sample Size:.............................................56
Test Statistic:...........................................RVN = 1.016541

P-value: .....................................................8.274788e-05

Confidence Interval for:.......................rho
Confidence Interval Method: .............Normal Approximation
Confidence Interval Type:...................two-sided
Confidence Level:..................................95%

Confidence Interval:..............................LCL = 0.3023416
UCL = 0.7480971

**TABLE 7**
**Statistical Analysis of Ground Water Data**
**Von Neumann's Test – Background**
**Monticello Steam electric Station**
**Mt. Pleasant, Titus County, Texas**

**Results of Hypothesis Test for TDS**

Null Hypothesis:......................................rho = 0
Alternative Hypothesis: ......................True rho is not equal to 0
Test Name:................................................Rank von Neumann Test for
Lag-1 Autocorrelation
(Beta Approximation)

Estimated Parameter(s):.......................rho = 0.3566856
Estimation Method: ...............................Yule-Walker
Data: ............................................................TDS
Sample Size:.............................................56
Test Statistic:............................................RVN = 1.353298

P-value: ......................................................0.01291312

Confidence Interval for:.......................rho
Confidence Interval Method: .............Normal Approximation
Confidence Interval Type:...................two-sided
Confidence Level:..................................95%

Confidence Interval:..............................LCL = 0.1120017
UCL = 0.6013694

**TABLE 8**
**Statistical Analysis of Ground Water Data**
**Outlier Analysis - Background**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

## Outlier Tests for Selected Uncensored Variables

**User Selected Options**

| | |
|---|---|
| **Date/Time of Computation** | ProUCL 5.2 12/8/2023 1:39:44 PM |
| **From File** | D6-ANOVA.xls |
| **Full Precision** | OFF |

### Rosner's Outlier Test for Boron (d)

| | |
|---|---|
| **Mean** | **5.353** |
| **Standard Deviation** | **1.629** |
| **Number of data** | **32** |
| **Number of suspected outliers** | **2** |

| # | Mean | sd | Potential outlier | Obs. Number | Test value | Critical value (5%) | Critical value (1%) |
|---|---|---|---|---|---|---|---|
| 1 | 5.353 | 1.603 | 2.09 | 20 | 2.036 | 2.94 | 3.27 |
| 2 | 5.459 | 1.541 | 2.12 | 21 | 2.167 | 2.92 | 3.25 |

For 5% Significance Level, there is no Potential Outlier
For 1% Significance Level, there is no Potential Outlier

### Dixon's Outlier Test for Boron (u)

Number of Observations = 24
10% critical value: 0.367
5% critical value: 0.413
1% critical value: 0.497

**1. Observation Value 7.52 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.101

For 10% significance level, 7.52 is not an outlier.
For 5% significance level, 7.52 is not an outlier.
For 1% significance level, 7.52 is not an outlier.

**2. Observation Value 1.74 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.264

For 10% significance level, 1.74 is not an outlier.
For 5% significance level, 1.74 is not an outlier.
For 1% significance level, 1.74 is not an outlier.

### Rosner's Outlier Test for Calcium (d)

| | |
|---|---|
| **Mean** | **141.5** |
| **Standard Deviation** | **29.78** |
| **Number of data** | **32** |
| **Number of suspected outliers** | **2** |

| # | Mean | sd | Potential outlier | Obs. Number | Test value | Critical value (5%) | Critical value (1%) |
|---|---|---|---|---|---|---|---|
| 1 | 141.5 | 29.31 | 66.2 | 21 | 2.568 | 2.94 | 3.27 |
| 2 | 143.9 | 26.86 | 86.6 | 2 | 2.133 | 2.92 | 3.25 |

For 5% Significance Level, there is no Potential Outlier
For 1% Significance Level, there is no Potential Outlier

**TABLE 8**
**Statistical Analysis of Ground Water Data**
**Outlier Analysis - Background**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

### Dixon's Outlier Test for Calcium (u)

Number of Observations = 24
10% critical value: 0.367
5% critical value: 0.413
1% critical value: 0.497

**1. Observation Value 311 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.124

For 10% significance level, 311 is not an outlier.
For 5% significance level, 311 is not an outlier.
For 1% significance level, 311 is not an outlier.

**2. Observation Value 71.7 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.098

For 10% significance level, 71.7 is not an outlier.
For 5% significance level, 71.7 is not an outlier.
For 1% significance level, 71.7 is not an outlier.

### Rosner's Outlier Test for Chloride (d)

| | |
|---|---|
| **Mean** | **90.67** |
| **Standard Deviation** | **10.51** |
| **Number of data** | **32** |
| **Number of suspected outliers** | **2** |

| # | Mean | sd | Potential outlier | Obs. Number | Test value | Critical value (5%) | Critical value (1%) |
|---|---|---|---|---|---|---|---|
| 1 | 90.67 | 10.34 | 122 | 24 | 3.03 | 2.94 | 3.27 |
| 2 | 89.65 | 8.96 | 110 | 32 | 2.271 | 2.92 | 3.25 |

For 5% Significance Level, there is 1 Potential Outlier
Potential outliers is: 122
For 1% Significance Level, there is no Potential Outlier

### Dixon's Outlier Test for Chloride (u)

Number of Observations = 24
10% critical value: 0.367
5% critical value: 0.413
1% critical value: 0.497

**1. Observation Value 171 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.090

For 10% significance level, 171 is not an outlier.
For 5% significance level, 171 is not an outlier.
For 1% significance level, 171 is not an outlier.

**2. Observation Value 47.8 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.012

For 10% significance level, 47.8 is not an outlier.
For 5% significance level, 47.8 is not an outlier.
For 1% significance level, 47.8 is not an outlier.

# TABLE 8
## Statistical Analysis of Ground Water Data
## Outlier Analysis - Background
## Monticello Steam Electric Station
## Mt. Pleasant, Titus County, Texas

**Rosner's Outlier Test for pH (d)**

| | |
|---|---|
| **Mean** | **6.17** |
| **Standard Deviation** | **0.345** |
| **Number of data** | **32** |
| **Number of suspected outliers** | **2** |

| # | Mean | sd | Potential outlier | Obs. Number | Test value | Critical value (5%) | Critical value (1%) |
|---|---|---|---|---|---|---|---|
| 1 | 6.17 | 0.34 | 5.06 | 32 | 3.265 | 2.94 | 3.27 |
| 2 | 6.206 | 0.284 | 5.34 | 16 | 3.045 | 2.92 | 3.25 |

For 5% significance level, there are 2 Potential Outliers
Potential outliers are: 5.06, 5.34
For 1% Significance Level, there is no Potential Outlier

**Dixon's Outlier Test for pH (u)**

Number of Observations = 24
10% critical value: 0.367
5% critical value: 0.413
1% critical value: 0.497

**1. Observation Value 7.14 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.015

For 10% significance level, 7.14 is not an outlier.
For 5% significance level, 7.14 is not an outlier.
For 1% significance level, 7.14 is not an outlier.

**2. Observation Value 4.99 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.376

For 10% significance level, 4.99 is an outlier.
For 5% significance level, 4.99 is not an outlier.
For 1% significance level, 4.99 is not an outlier.

**Rosner's Outlier Test for Sulfate (d)**

| | |
|---|---|
| **Mean** | **786** |
| **Standard Deviation** | **203.1** |
| **Number of data** | **32** |
| **Number of suspected outliers** | **2** |

| # | Mean | sd | Potential outlier | Obs. Number | Test value | Critical value (5%) | Critical value (1%) |
|---|---|---|---|---|---|---|---|
| 1 | 786 | 199.9 | 343 | 21 | 2.216 | 2.94 | 3.27 |
| 2 | 800.3 | 189.4 | 378 | 20 | 2.23 | 2.92 | 3.25 |

For 5% Significance Level, there is no Potential Outlier
For 1% Significance Level, there is no Potential Outlier

**TABLE 8**
**Statistical Analysis of Ground Water Data**
**Outlier Analysis - Background**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

#### Dixon's Outlier Test for Sulfate (u)

Number of Observations = 24
10% critical value: 0.367
5% critical value: 0.413
1% critical value: 0.497

**1. Observation Value 1210 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.306

For 10% significance level, 1210 is not an outlier.
For 5% significance level, 1210 is not an outlier.
For 1% significance level, 1210 is not an outlier.

**2. Observation Value 292 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.485

For 10% significance level, 292 is an outlier.
For 5% significance level, 292 is an outlier.
For 1% significance level, 292 is not an outlier.

#### Rosner's Outlier Test for TDS (d)

| | |
|---|---|
| **Mean** | **1411** |
| **Standard Deviation** | **317.7** |
| **Number of data** | **32** |
| **Number of suspected outliers** | **2** |

| # | Mean | sd | Potential outlier | Obs. Number | Test value | Critical value (5%) | Critical value (1%) |
|---|---|---|---|---|---|---|---|
| 1 | 1411 | 312.7 | 795 | 21 | 1.971 | 2.94 | 3.27 |
| 2 | 1431 | 302 | 817 | 20 | 2.034 | 2.92 | 3.25 |

For 5% Significance Level, there is no Potential Outlier
For 1% Significance Level, there is no Potential Outlier

#### Dixon's Outlier Test for TDS (u)

Number of Observations = 24
10% critical value: 0.367
5% critical value: 0.413
1% critical value: 0.497

**1. Observation Value 1970 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.024

For 10% significance level, 1970 is not an outlier.
For 5% significance level, 1970 is not an outlier.
For 1% significance level, 1970 is not an outlier.

**2. Observation Value 654 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.383

For 10% significance level, 654 is an outlier.
For 5% significance level, 654 is not an outlier.
For 1% significance level, 654 is not an outlier.

**TABLE 9**
**Statistical Analysis of Ground Water Data**
**Prediction Limit Calculations**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

**Results of Distribution Parameter Estimation**

Assumed Distribution:......................Normal

Estimated Parameter(s): .................mean = 5.334107
sd = 1.621487

Estimation Method: ......................... mvue

Data:.......................................................Boron

Sample Size: .......................................56

Number NA/NaN/Inf's: .....................2

Prediction Interval Method: ...........exact

Prediction Interval Type:..................upper

Confidence Level:...............................99.897%

Minimum Number of Future Observations
Interval Should Contain:..................1

Total Number of
Future Observations:.........................2

Prediction Interval: ...........................LPL = -Inf
UPL = 8.518376

# TABLE 9
# Statistical Analysis of Ground Water Data
# Prediction Limit Calculations
# Monticello Steam Electric Station
# Mt. Pleasant, Titus County, Texas

**Results of Distribution Parameter Estimation**

Assumed Distribution:......................Lognormal

Estimated Parameter(s): .................meanlog = 5.0661168
sdlog = 0.3780929

Estimation Method: .........................mvue

Data:.......................................................Calcium

Sample Size:.......................................56

Number NA/NaN/Inf's: .....................2

Prediction Interval Method: ...........exact

Prediction Interval Type...................upper

Confidence Level:...............................99.79%

Minimum Number of Future Observations
Interval Should Contain:..................1

Total Number of
Future Observations:........................2

Prediction Interval:............................ LPL = 0.0000
UPL = 310.8145

**TABLE 9**
**Statistical Analysis of Ground Water Data**
**Prediction Limit Calculations**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

**Results of Distribution Parameter Estimation**

Assumed Distribution:......................Lognormal

Estimated Parameter(s):..................meanlog = 4.5269185
sdlog = 0.3038545

Estimation Method: .........................mvue

Data: .......................................................Chloride

Sample Size:.........................................56

Number NA/NaN/Inf's: ....................2

Prediction Interval Method: ............exact

Prediction Interval Type:..................upper

Confidence Level:...............................99.96%

Minimum Number of Future Observations
Interval Should Contain:..................1

Total Number of
Future Observations:.........................2

Prediction Interval: ............................LPL = 0.0000
UPL = 181.5453

# TABLE 9
# Statistical Analysis of Ground Water Data
# Prediction Limit Calculations
# Monticello Steam Electric Station
# Mt. Pleasant, Titus County, Texas

**Results of Distribution Parameter Estimation**

Assumed Distribution: ......................Normal

Estimated Parameter(s): ..................mean = 0.6245536
sd = 0.7511108

Estimation Method:............................mvue

Data: .......................................................Fluoride

Sample Size:.........................................56

Number NA/NaN/Inf's: ......................2

Prediction Interval Method: ............exact

Prediction Interval Type:...................upper

Confidence Level: ...............................99.9

Minimum Number of Future Observations
Interval Should Contain:...................1

Total Number of
Future Observations: ........................2

Prediction Interval: ............................LPL = -Inf
UPL = 2.10

# TABLE 9
# Statistical Analysis of Ground Water Data
# Prediction Limit Calculations
# Monticello Steam Electric Station
# Mt. Pleasant, Titus County, Texas

**Results of Distribution Parameter Estimation**

Assumed Distribution: ......................Normal

Estimated Parameter(s):....................mean = 6.3117857
sd = 0.4757735

Estimation Method:............................mvue

Data: .......................................................pH

Sample Size:.........................................56

Number NA/NaN/Inf's: ......................2

Prediction Interval Method: ............exact

Prediction Interval Type:...................two-sided

Confidence Level: ...............................99.96%

Minimum Number of Future Observations
Interval Should Contain:...................1

Total Number of
Future Observations: ........................2

Prediction Interval: ............................LPL = 5.267424
UPL = 7.356147

# TABLE 9
# Statistical Analysis of Ground Water Data
# Prediction Limit Calculations
# Monticello Steam Electric Station
# Mt. Pleasant, Titus County, Texas

**Results of Distribution Parameter Estimation**

Assumed Distribution:.......................Normal

Estimated Parameter(s):....................mean = 793.5536
sd = 200.0573

Estimation Method: ..........................mvue

Data:.......................................................Sulfate (SO4)

Sample Size:.........................................56

Number NA/NaN/Inf's: ......................2

Prediction Interval Method: ............exact

Prediction Interval Type:...................upper

Confidence Level:................................99.91%

Minimum Number of Future Observations
Interval Should Contain:...................1

Total Number of
Future Observations: .........................2

Prediction Interval:.............................LPL = -Inf
UPL = 1193.133

# TABLE 9
# Statistical Analysis of Ground Water Data
# Prediction Limit Calculations
# Monticello Steam Electric Station
# Mt. Pleasant, Titus County, Texas

**<u>Results of Distribution Parameter Estimation</u>**

Assumed Distribution:.......................Normal

Estimated Parameter(s):....................mean = 1446.8036
sd = 324.8191

Estimation Method: ..........................mvue

Data: ......................................................Total Dissolved Solids (TDS)

Sample Size:........................................56

Number NA/NaN/Inf's: .....................2

Prediction Interval Method: ...........exact

Prediction Interval Type: .................upper

Confidence Level: ...............................99.96%

Minimum Number of Future Observations
Interval Should Contain:...................1

Total Number of
Future Observations:.........................2

Prediction Interval: ............................LPL = -Inf
UPL = 2159.808

**TABLE 10**
**Statistical Analysis of Ground Water Data**
**Background Value Evaluation**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus, Texas**

| Parameter | Reporting Limits | Calculated Prediction Limits | Higher of Reporting Limit and Prediction Limit |
|---|---|---|---|
| Boron (mg/L) | 0.03 | 8.52 | 8.52 |
| Calcium (mg/L) | 0.3 | 311 | 311 |
| Chloride (mg/L) | 1 | 182 | 182 |
| Fluoride (mg/L) | 0.4 | 2.10 | 2.10 |
| pH (field) (s.u.) | -- | 5.27-7.36 | 5.27-7.36 |
| Sulfate (S04) (mg/L) | 3 | 1,193 | 1,193 |
| Total Dissolved Solids (TDS) (mg/L) | 10 | 2,160 | 2,160 |

**TABLE 11**
**Statistical Analysis of Ground Water Data**
**Background Value Selection**
**Monticello Steam Electric Station**
**Mt. Pleasant, Titus County, Texas**

| Site | Area | Constituent List | Constituent | No. of Detects | No. of Samples | Pecentage of Detects | Minimum Detection Value | Maximum Detection Value | Any Outliers Dropped? | LPL 1-of-2 | UPL 1-of-2 | Reporting Limit | Maximum of LPL/UPL 1-of-2 and Reporting Limit | Distribution | Calculated Confidence Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MOSES | Ash Water Ponds | Appendix III | Boron | 56 | 56 | 100.0% | 1.74 | 8.54 | FALSE | -- | 8.52 | 0.03 | 8.52 | Normal | 99.90% |
| MOSES | Ash Water Ponds | Appendix III | Calcium | 56 | 56 | 100.0% | 66.2 | 311 | FALSE | -- | 311 | 0.3 | 311 | Lognormal | 99.79% |
| MOSES | Ash Water Ponds | Appendix III | Chloride | 56 | 56 | 100.0% | 47.8 | 171 | FALSE | -- | 157 | 1 | 157 | Normal | 99.96% |
| MOSES | Ash Water Ponds | Appendix III | Fluoride (Appendix III) | 43 | 56 | 76.8% | 0.1 | 2.8 | FALSE | -- | 2.96 | 0.4 | 2.96 | Lognormal | 99.90% |
| MOSES | Ash Water Ponds | Appendix III | pH (field) | 56 | 56 | 100.0% | 4.99 | 7.14 | FALSE | 5.27 | 7.36 | -- | 5.27 - 7.36 | Normal | 99.96% |
| MOSES | Ash Water Ponds | Appendix III | Sulfate | 56 | 56 | 100.0% | 292 | 1,210 | FALSE | -- | 1,193 | 3 | 1,193 | Normal | 99.91% |
| MOSES | Ash Water Ponds | Appendix III | Total Dissolved Solids | 56 | 56 | 100.0% | 657 | 1,970 | FALSE | -- | 2,159 | 10 | 2,159 | Normal | 99.96% |