



**CORRESPONDENCE COVER SHEET  
WASTE PERMITS DIVISION  
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY**

Date: October 20, 2022  
 Facility Name: Twin Oaks Power Station CCR Landfill  
 Permit or Registration No.: CCR112

Nature of Correspondence:  
 Initial/New  
 Response/Revision\*

\*If Response/Revision, please provide previous TCEQ Tracking No.: 27247279  
 (Previous TCEQ Tracking No. can be found in the Subject line of the TCEQ's response letter to your original submittal.)

This cover sheet should accompany all correspondences submitted to the Waste Permits Division and should be affixed to the front of your submittal as a cover page. Please check the appropriate box for the type of correspondence being submitted. For questions regarding this form, please contact the Waste Permits Division at (512) 239-2335.

**Table 1 - Municipal Solid Waste**

APPLICATIONS	REPORTS and RESPONSES
<input type="checkbox"/> New Notification	<input type="checkbox"/> Closure Report
<input type="checkbox"/> New Permit (including Subchapter T)	<input type="checkbox"/> Groundwater Alternate SRC Demonstration
<input type="checkbox"/> New Registration (including Subchapter T)	<input type="checkbox"/> Groundwater Corrective Action
<input type="checkbox"/> Major Amendment	<input type="checkbox"/> Groundwater Monitoring Report
<input type="checkbox"/> Minor Amendment	<input type="checkbox"/> Groundwater Statistical Evaluation
<input type="checkbox"/> Limited Scope Major Amendment	<input type="checkbox"/> Landfill Gas Corrective Action
<input type="checkbox"/> Notice Modification	<input type="checkbox"/> Landfill Gas Monitoring
<input type="checkbox"/> Non-Notice Modification	<input type="checkbox"/> Liner Evaluation Report
<input type="checkbox"/> Transfer/Name Change Modification	<input type="checkbox"/> Soil Boring Plan
<input type="checkbox"/> Temporary Authorization	<input type="checkbox"/> Special Waste Request
<input type="checkbox"/> Voluntary Revocation	<input type="checkbox"/> Other:
<input type="checkbox"/> Subchapter T Workplan	
<input type="checkbox"/> Other:	

**Table 2 - Industrial & Hazardous Waste**

APPLICATIONS	REPORTS and RESPONSES
<input checked="" type="checkbox"/> New	<input type="checkbox"/> Annual/Biennial Site Activity Report
<input type="checkbox"/> Renewal	<input type="checkbox"/> CfPT Plan/Result
<input type="checkbox"/> Post-Closure Order	<input type="checkbox"/> Closure Certification/Report
<input type="checkbox"/> Major Amendment	<input type="checkbox"/> Construction Certification/Report
<input type="checkbox"/> Minor Amendment	<input type="checkbox"/> CPT Plan/Result
<input type="checkbox"/> Class 3 Modification	<input type="checkbox"/> Extension Request
<input type="checkbox"/> Class 2 Modification	<input type="checkbox"/> Groundwater Monitoring Report
<input type="checkbox"/> Class 1 ED Modification	<input type="checkbox"/> Interim Status Change
<input type="checkbox"/> Class 1 Modification	<input type="checkbox"/> Interim Status Closure Plan
<input type="checkbox"/> Endorsement	<input type="checkbox"/> Soil Core Monitoring Report
<input type="checkbox"/> Temporary Authorization	<input type="checkbox"/> Treatability Study
<input type="checkbox"/> Voluntary Revocation	<input type="checkbox"/> Trial Burn Plan/Result
<input type="checkbox"/> 335.6 Notification	<input type="checkbox"/> Unsaturated Zone Monitoring Report
<input type="checkbox"/> Other:	<input type="checkbox"/> Waste Minimization Report
	<input type="checkbox"/> Other:



Eddy Young  
Environmental Manager

P.O. Box 37  
13065 Plant Rd.  
Bremond, TX 76629  
Tel: (254)342-3664  
[Eddy.young@mesquitegen.com](mailto:Eddy.young@mesquitegen.com)

October 20, 2022

MC-130  
Mr. Chris Shaw, Project Manager  
Industrial and Hazardous Waste Permits Section  
Waste Permits Division  
Texas Commission on Environmental Quality  
P. O. Box 13087  
Austin, Texas 78711-3087

**RE: Response to TCEQ Technical NOD 2 Correspondence Dated September 22, 2022  
Twin Oaks Power Station Coal Combustion Residuals Landfill  
Major Oak Power, LLC  
Bremond (Robertson County), Texas  
CCR Registration No. CCR112  
TCEQ SWR No. 37677; EPA ID No. TXD987997988  
Tracking No. 27247279; RN100226570/CN604670034**

Dear Mr. Shaw:

The following information is provided on behalf of Twin Oaks Power Station Coal Combustion Residuals (CCR) Landfill (the facility), as a response to the above-referenced September 22, 2022 correspondence letter. For your convenience, comments from the TCEQ correspondence regarding the *Registration Application for Coal Combustion Residuals Waste Management*, dated January 12, 2022, are presented below (*in italics*) followed by the prepared response.

**TCEQ Deficiency ID #1:**

*Provide information describing how the existing landfill was constructed such as historical construction documents and drawings etc.*

**Response:**

Construction documentation for the existing Twin Oaks Power Station CCR landfill is not currently available. We are reviewing facility archives and will provide an update of our findings.

**TCEQ Deficiency ID #2:**

*Describe the design, installation, and operation of the liner. The description must demonstrate that the liner will prevent discharge to the land, groundwater, and surface water.*

**Response:**

In accordance with the standard of care at the time of construction for similar onsite industrial disposal facilities, the bottom liner of the existing landfill is constructed of compacted clay soil with a minimum thickness of three (3) feet and minimum hydraulic conductivity of  $1 \times 10^{-7}$  cm/s

**TCEQ Deficiency ID #3:**

- a. *Provide the appropriate P.G./P.E. seals for the 7 drawings related to the Run-on Run-off Report.*
- b. *Use the most current rainfall data from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 study for Texas 24 hour-25 year storm event rainfall amounts, and update calculations, HEC-RAS models, Hydraflow models/reports, or any other calculation/model relying on rainfall amount inputs.*

**Response:**

- a. The certified exhibits are included herein.
- b. Storm event data from NOAA Technical Paper No. 40 (provided in the Run-on and Run-off Control System Plan of registration application) was utilized to evaluate the 24-HR/25-YR design storm event for the CCR unit and satisfies the design requirements of §257.81(c), 30 TAC 352.4 and 352.231(c). No updated calculations are provided herein.

**TCEQ Deficiency ID #4:**

- a. *Complete Possible Error, Malfunction, or Deterioration column.*
- b. *Include more detailed line items for the basic inspection elements of the landfill inspection. Provide an inspection frequency for each item.*
- c. *Revise to indicate that weekly inspection items will be conducted at intervals not exceeding 7 days.*

**Response:**

- a. Table IV.D has been updated and included herein.
- b. Table IV.D has been updated and included herein.
- c. Table IV.D has been updated and included herein.

**TCEQ Deficiency ID #5:**

*Describe how the facility will comply with inspection requirements for CCR Landfills.*

**Response:**

In accordance with §257.84 and 30 TAC 352.841 the CCR landfill will be inspected weekly, not exceeding seven (7) days by a qualified person and annually by a qualified professional engineer. The annual inspection report will be placed in the facility's operating record, the TCEQ notified and available on the Twin Oaks CCR website in accordance with §257.105(g), §257.106(g) and §257.107(g), respectively.

**TCEQ Deficiency ID #6:**

*Provide the most recent inspection report.*

**Response:**

The inspection report completed in 2021 is included herein. Further, in accordance with §257.84 and 30 TAC 352.841 the annual inspection reports are available on the Twin Oaks CCR website.

**TCEQ Deficiency ID #7:**

*Provide the screen slot size in inches.*

**Response:**

Table VI.A has been revised to include screen slot size in inches and is included herein.

**TCEQ Deficiency ID #8:**

*Provide Firm Numbers with the qualified P.E. Seal certifying the Groundwater Monitoring System and the qualified P.E. Seal certifying the Groundwater Sampling and Analysis Plan.*

**Response:**

The Groundwater Monitoring System Certification and Statistical Methods Certification pages found in the Groundwater Sampling and Analysis Plan have been modified to include a qualified P.E. Seal. The replacement pages are included herein. All revisions will be posted to the facility's website (<https://twinoakscrr.com/>).

**TCEQ Deficiency ID #9:**

*Seal all of the groundwater contour maps and include the Firm Number.*

**Response:**

All groundwater contour maps have been signed and sealed by a licensed professional geoscientist in the State of Texas. The signed/sealed maps are attached herein.

**TCEQ Deficiency ID #10:**

- a. *Provide the hydraulic conductivities for wells MW-7 and MW-11.*
- b. *Provide the porosities and effective porosities for Units I, II, and III.*

**Response:**

- a. Hydraulic conductivities are not available for monitoring wells MW-7 and MW-17. Hydraulic conductivity testing results for the remaining monitoring wells (MW-11 through MW-16) are included in the January 2022 *Geology Summary Report* included in Attachment II of the registration submittal package.
- b. Porosity and effective porosity for Units I, II, and III are not available. Laboratory testing for porosity and effective porosity was not completed and not required at the time of installation. Note, Twin Oaks Power Station CCR Landfill is an existing facility.

**TCEQ Deficiency ID #11:**

- a. *Add and complete "Table VI.C.1. Groundwater Detection Monitoring Parameters". We have attached the table for your use as it was inadvertently omitted in the application form.*
- b. *Use mg/L for the concentration limits in the table, as those concentrations will be compared to MCLs in mg/L.*

**Response:**

Table VI.C.1 Groundwater Detection Monitoring Parameters has been completed and included herein.

**TCEQ Deficiency ID #12:**

*Provide a Background Evaluation Report.*

**Response:**

A January 2020 Background Groundwater Statistical Evaluation and Update report was included with the original January 2022 registration submittal package. The report was included in Attachment VI. However, since the time of the registration submittal a more recent evaluation has been completed. The report is included herein.

**TCEQ Deficiency ID #13:**

*Replace the title of "Table VI.D.2 – Groundwater Detection Monitoring Parameters" with "Table VI.D.2 – Groundwater Assessment Monitoring Parameters" However, you may remove this table since no CCR units are currently in assessment monitoring.*

**Response:**

Table VI.D.2 has been removed from the registration package.

**TCEQ Deficiency ID #14:**

*Provide data for upgradient wells, or historic data to show variability in sulfate concentrations in MW-14.*

**Response:**

Historical data for the Twin Oaks Power Station CCR Landfill was included in Attachment VI of the January 2022 registration submittal package. The Groundwater Data Summary table has been updated to reflect the most recent sampling event(s) and is included herein.

**TCEQ Deficiency ID #15:**

- a. *Provide drawings of the final cover to include a plan view, cross sections, and any tie-in or anchoring details.*
- b. *Provide additional narrative and drawing regarding the final cover and application of geosynthetics for prevention of erosion or sloughing.*

**Response:**

- a. The CCR Landfill Closure Plan has been prepared in accordance with §257.102 and 30 TAC 352.1221.
- b. Any additional plans will be prepared prior to initiating closure activities in accordance with §257.102 and 30 TAC 352.1221.

**TCEQ Deficiency ID #16:**

*Confirm whether or not the provided maximum estimated inventory of CCR material disposed in the landfill is the maximum estimated inventory of CCR ever on-site during the landfill's active life.*

**Response:**

The provided maximum estimated inventory of CCR disposed in the landfill is the maximum material currently expected onsite during the landfill's active life.

**TCEQ Deficiency ID #17:**

*Provide an email address for the facility post-closure care contact.*

**Response:**

The Post-Closure Plan has been updated and included herein.

**TCEQ Deficiency ID #18:**

*Replace all instances of "should" and "will".*

**Response:**

The Post-Closure Plan has been revised and included herein.

**TCEQ Deficiency ID #19:**

*Describe how the groundwater monitoring system will be inspected and maintained during the post-closure care.*

**Response:**

The groundwater monitoring system will be sampled, inspected and maintained throughout the post-closure care period in accordance with the Groundwater Sampling and Analysis Plan (GWSAP) and §257.104(b)(3).

**TCEQ Deficiency ID #20:**

*In the CCR landfill Post-Closure Plan, include a statement that certified demonstration showing the CCR landfill poses no threat to human health, the environment, or property shall be submitted to the TCEQ.*

**Response:**

The Post-Closure Plan has been revised in accordance with 30 TAC 352.1241(b) and included herein.

**TCEQ Deficiency ID #21:**

- a. *Correct the table label from "Table VII-1" to "Table VIII-1".*
- b. *Item 1.2 – Correct the Year Rate and Total for this line item. It appears that 129 acres was used for this calculation. Annual Site Inspection is based on acreage. Acreage for the CCR unit is 245.87 acres.*
- c. *Item 1.4 – Provide more details for the Groundwater Monitoring cost. The cost is given as a lumped yearly rate.*
- d. *Item 2.0 – Correct the Year Rate and Total for this item. Vegetation Management is based on acreage. It appears that 129 acres was used for unit that is 245.87 acres.*
- e. *Item 2.1 – Provide more details for the Erosion Control and Repair cost. The cost is given as a lumped yearly rate. Also, add footnote to table for this cost. This cost has the footnote 2 indicated, but there are no footnotes for this table.*
- f. *Item 2.2 – Provide more details for Monitoring Well P&A cost. This cost is given as a lumped yearly rate.*

- 
- g. *Correct the Annual Post Closure Cost, Subtotal, Contingency, and Total Post Closure Cost for this table.*

**Response:**

- a. Table VIII-1 has been corrected and included herein.
- b. The CCR unit boundary and area utilized for landfilling CCR material is approximately 129 acres. The property tract that the CCR unit occupies is 245.87 acres. No revisions or corrections to Item 1.2 are proposed or provided herein.
- c. Additional information has been provided in Footnote No. 1 of Table VIII-1 and included herein.
- d. The CCR unit boundary and area utilized for landfilling CCR material is approximately 129 acres. The property tract that the CCR unit occupies is 245.87 acres. No revisions or corrections to Item 2.0 are proposed or provided herein.
- e. Additional information has been provided in Footnote No. 2 of Table VIII-1 and included herein.
- f. Additional information has been provided in Footnote No. 3 of Table VIII-1 and included herein.
- g. Revised Table VIII-1 (per the above responses) is included herein.

Included with this submittal is a ~~strikeout/redline~~ copy of the revised pages indicating necessary changes, where applicable, and an unmarked copy of the revised pages suitable for insertion into the Registration Application for Coal Combustion Residuals Waste Management. We trust you will find this information sufficiently thorough and acceptable.

Should you have any questions, please feel free to contact me at (254) 342-3664 or via email at [Eddy.Young@mesquitegen.com](mailto:Eddy.Young@mesquitegen.com).

Sincerely,



Eddy Young  
Environmental Manager

**Attachments:**

Attachment A	Replacement Pages Showing Changes <del>Strikeout</del> / <u>Redline</u>
Attachment B	Unmarked Replacement Pages

**Distribution:**

(E-Copy)	MC-130 Mr. Chris Shaw, Project Manager Industrial and Hazardous Waste Permits Waste Permits Division Texas Commission on Environmental Quality P. O. Box 13087 Austin, Texas 78711-3087
(1 + E-Copy)	Mr. Eddy Young Environmental Manager Twin Oaks P.O. Box 37 Bremond, Texas 76629
(E-Copy)	Mr. John J. Tayntor, P.E. Auckland Consulting, LLC P.O. Box 8155 Jacksonville, Texas 75766
(E-Copy)	Hydrex Environmental



**Attachment A**  
**Replacement Pages Showing Changes**  
**~~Strikeout~~/Redline**

**Table VI.A. - Unit Groundwater Detection Monitoring Systems**

Waste Management Unit/Area Name <sup>1</sup>						
Well Number(s):	MW-7	MW-11	MW-12	MW-13	MW-14	MW-15
Hydrogeologic Unit Monitored	Unit II	Unit II	Unit II	Unit II	Unit II	Unit II
Type (e.g., point of compliance, background, observation, etc.)	Background	Background	Background	Point of Compliance	Point of Compliance	Point of Compliance
Up or Down Gradient	Up-gradient	Up-gradient	Up-gradient	Down-gradient	Down-gradient	Down-gradient
Casing Diameter and Material	2" PVC	2" PVC	2" PVC	2" PVC	2" PVC	2" PVC
Screen Diameter and Material	2" PVC	2" PVC	2" PVC	2" PVC	2" PVC	2" PVC
Screen Slot Size (in.)	<del>Sch. 40 0.010"</del>	<del>Sch. 40 0.010"</del>	<del>Sch. 40 0.010"</del>	<del>Sch. 40 0.010"</del>	<del>Sch. 40 0.010"</del>	<del>Sch. 40 0.010"</del>
Top of Casing Elevation (Ft, Mean Sea Level <i>[MSL]</i> )	411.60	406.93	387.27	398.32	394.68	410.47
Grade or Surface Elevation (Ft, MSL)	408.63	402.70	383.28	394.74	391.08	406.68
Well Depth (Ft, Below Grade Surface <i>[BGS]</i> )	29	35	40	30	33	45
Well Depth (Ft, Below Top of Casing <i>[BTOC]</i> )	31.97	39.23	43.99	33.58	36.60	48.79
Screen Interval From (Ft, BGS) To (Ft, BGS)	19 - 29	20-35	30-40	15-30	18-33	35-45
Screen Interval From (Ft, BTOC) To (Ft, BTOC)	21.97-31.97	24.23-39.23	33.99-43.99	18.58-33.58	21.60-36.60	38.79-48.79

Registration No.: CCR112  
 Registrant: Twin Oaks

Waste Management Unit/Area Name <sup>1</sup>						
Well Number(s):	MW-16	MW-17				
Hydrogeologic Unit Monitored	Unit II	Unit II				
Type (e.g., point of compliance, background, observation, etc.)	Background	Point of Compliance				
Up or Down Gradient	Up-gradient	Down-gradient				
Casing Diameter and Material	2" PVC	2" PVC				
Screen Diameter and Material	2" PVC	2" PVC				
Screen Slot Size (in.)	<del>Sch. 40 0.010"</del>	<del>Sch. 40 0.010"</del>				
Top of Casing Elevation (Ft, Mean Sea Level [MSL])	422.54	405.87				
Grade or Surface Elevation (Ft, MSL)	418.66	403.07				
Well Depth (Ft, Below Grade Surface [BGS])	45	36				
Well Depth (Ft, Below Top of Casing [BTOC])	48.88	38.80				
Screen Interval From (Ft, BGS) To (Ft, BGS)	35-45	26-36				
Screen Interval From (Ft, BTOC) To (Ft, BTOC)	38.88-48.88	28.80-38.80				

<sup>1</sup> From Tables in Section I.; MSL: Mean Sea Level; BGS: Below Grade Surface; BTOC: Below Top of Casing

COAL COMBUSTION RESIDUALS (CCR) LANDFILL  
TWIN OAKS POWER STATION  
ROBERTSON COUNTY, TEXAS

**GROUNDWATER SAMPLING AND ANALYSIS PLAN**

PREPARED FOR

MR. EDDY YOUNG  
TWIN OAKS POWER STATION  
13065 PLANT ROAD  
BREMONT, TEXAS 76629

**JANUARY 12, 2022**

**REVISED OCTOBER 20, 2022**

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Michelle K. Transier, P.G.  
Senior Geologist

HYDREX ENVIRONMENTAL  
1120 NW STALLINGS DRIVE  
NACOGDOCHES, TEXAS 75964-3428

## GROUNDWATER MONITORING SYSTEM CERTIFICATION

### COAL COMBUSTION RESIDUALS (CCR) LANDFILL TWIN OAKS POWER STATION ROBERTSON COUNTY, TEXAS

I certify I am a licensed professional ~~geoscientist~~ engineer in the State of Texas and a qualified professional engineer as defined in ~~30 TAC §352.3~~ 40 CFR §257.53. I certify that the groundwater monitoring system installed at the Twin Oaks Power Station's CCR landfill, as discussed in the Groundwater Sampling and Analysis Plan prepared by Hydrex Environmental and dated January 12, 2022, has been designed and constructed to meet the requirements of 30 TAC §352.911 and 40 CFR §257.91.

---

~~Michelle K. Transier, P.G.~~  
~~Geologist~~  
John J. Tayntor, P.E.  
Auckland Consulting, LLC

---

Date

## STATISTICAL METHODS CERTIFICATION

### COAL COMBUSTION RESIDUALS (CCR) LANDFILL TWIN OAKS POWER STATION ROBERTSON COUNTY, TEXAS

I certify I am a licensed professional geoscientist engineer in the State of Texas as defined in ~~30 TAC §352.3~~ 40 CFR §257.53. I certify that the statistical methods chosen to evaluate the groundwater monitoring data collected from the groundwater monitoring system installed at the Twin Oaks Power Station's CCR landfill, as discussed in detail in the Groundwater Sampling and Analysis Plan prepared by Hydrex Environmental and dated January 12, 2022, are appropriate and meet the requirements of 30 TAC §352.931 and 40 CFR §257.93.

Control charts are the preferred statistical evaluation method for data that demonstrate normal/transformed-normal distributions. Prediction limits are the preferred statistical evaluation method for heavy metals and radionuclides. The probability distribution and percentage of non-detects within any given data set will determine whether a non-parametric or parametric prediction interval is most appropriate. In cases where non-parametric prediction limits are not appropriate, a non-parametric rank sum test in conjunction with a contrast test will be used to evaluate the data. Trend analyses may be used as a supplement to prediction intervals and control charts. Retesting for the purpose of statistical analysis will be performed as necessary on an individual well/constituent basis and will generally follow a 1-of-m approach.

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Michelle K. Transier, P.G.  
Geologist  
John J. Tayntor, P.E.  
Auckland Consulting, LLC

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Date

**CCR Landfill Post-Closure Plan**  
**TCEQ Registration Application**

**Twin Oaks Power Generating Station**  
**13065 Plant Road**  
**Bremond (Robertson County), Texas 76629**

**January 12, 2022 October 14, 2022**

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## 1.0 Introduction

The following CCR Post-Closure Plan is intended to fulfill the requirements of 30 TAC §352.1241 and Coal Combustion Residual Rule 40 CFR §257.104 (Post-Closure Care Requirements) for the existing Twin Oaks Power (TOP) Utility Landfill located near Bremond, Texas. Section 40 CFR §257.104 requires that an owner or operator of a CCR landfill prepare a Post-Closure Plan describing post-closure care of the CCR unit.

The following constitutes the initial Post-Closure Plan for the CCR landfill as required under 30 TAC §352.1241 ~~and~~ 40 CFR §257.104.

## 2.0 Post Closure Activities

The purpose of this Post-Closure Plan is to describe the post-closure monitoring and maintenance activities at the CCR unit throughout the post-closure care period, in accordance with 30 TAC §352.1241/40 CFR §257.104.

### 2.1 Post-Closure Period

Part 40 CFR §257.104(c) requires a post closure care period to extend 30 years after completion of the final cover system.

Unless, as provided by 40 CFR §257.104(c)(2), if at the end of the post-closure care period the owner or operator of the CCR unit is operating under assessment monitoring in accordance with 40 CFR §257.95, the owner or operator of the CCR unit must continue to conduct post-closure care until the owner or operator returns to detection monitoring in accordance with 40 CFR §257.95.

### 2.2 Post-Closure Contact

The designated contact during the post-closure care period for the CCR landfill is the onsite Environmental Supervisor. The supervisor's contact information is:

Environmental Supervisor  
Twin Oaks Power  
13065 Plant Road  
Bremond, Texas 76629  
(254) 342-3664  
[eddy.young@mesquitegen.com](mailto:eddy.young@mesquitegen.com)

### 2.3 Inspection Plan

A qualified person will inspect the closed landfill semi-annually or at a frequency appropriate to maintain environmental and structural integrity of the final cover system.

Inspections ~~will~~ include the entire **CCR unit site** and look for evidence of settlement or subsidence, slope instability, animal burrows or damage, erosion of final surface cover, exposure of CCR material, vegetative growth, ponding of water on the final cover and any seepage from the side slopes. Groundwater monitoring wells ~~should~~will be inspected for

signs of damage and reported. Storm water features ~~should-will~~ be checked to see that they are free from sediment or debris that may prevent the system from operating properly.

If damage to the final cover system is identified during an inspection, an investigation to identify the potential cause of the damage ~~should-will~~ also be performed. Repairs ~~willshould~~ be made as soon as practical to minimize additional damage.

## **2.4 Maintenance Plan**

During the post-closure care period, the CCR landfill will receive routine maintenance to meet post-closure care requirements. In accordance with §257.104(b) and (d), the following sections include descriptions of the methods and procedures to be used to maintain the final cover system.

### **2.4.1 Erosion Damaged Areas**

Areas of the final cover system that have been eroded will be backfilled according to the cover system design detailed in the facility's Closure Plan. The depth of disturbance or damage will govern the repair process and soils placed and grading activities utilized. Repair areas will be seeded, mulched or protected by erosion control matting (or similar means) to deter the development of new erosion.

### **2.4.2 Areas of Settlement, Subsidence and Displacement**

Minor settlement, subsidence, or displacement will be corrected by grading to promote positive surface drainage. Suspected damage to the final cover systems will be inspected and repairs made as necessary.

Signs of surface sloughing, bulging at the toe, tension cracks at the top of the slope, or seepage from the side slopes are usually an indication of potential slope instability. Signs of instability shall be reported to a qualified professional engineer for further evaluation and recommendations for appropriate course of action. Any corrective action to any potential slope instability will be based on addressing the cause of the damage. Any repairs to the final cover system will be in accordance with the final Closure Plan and conducted as soon as practical after detection.

### **2.4.3 Run-On and Run-off Control Structures**

Surface water channels and downdrain entrances and exits ~~should-will~~ be inspected periodically or at least semi-annually during the post-closure care period. Drainage

Revised October 14, 2022

features ~~will should~~ also be inspected after a significant rainfall event (i.e. 2-year, 24-hour storm event, or greater). Storm water channels and ponds will be inspected for evidence of erosion, excessive vegetation, sedimentation and debris that would restrict the flow or prevent proper operation. Clogs will be removed from pipes or inlets to allow free flow of surface water and prevent damage to other parts of the drainage control system and facility.

#### 2.4.4 Mowing

Mowing operations will be appropriately scheduled during the growing season or occur at least once per year. Mowing is necessary to deter growth of woody vegetation, deter habitation by animals, and to allow inspection and access to the landfill's final cover features and related structures.

Undesirable vegetation such as trees and large shrubs ~~should-will~~ be removed and any damage to the final cover system repaired. Commercially available herbicide or mechanical control may be used to control invasive or undesirable vegetation.

### 2.5 Groundwater Monitoring Plan

Groundwater monitoring will be performed for the CCR landfill throughout the post-closure period. A Groundwater Sampling and Analysis Plan (GWSAP) has been prepared for the CCR landfill (in accordance with 40 CFR §257.90 through §257.98) and provides specific details for completion of groundwater monitoring activities at the landfill. The groundwater monitoring system will be ~~sampled and~~ maintained throughout the post-closure care period ~~in accordance with §257.104(b)(3)~~.

### 2.7 Post-Closure End Use

The closed CCR landfill will be used as open space and managed turf. The post-closure use will not interfere with inspection, maintenance and monitoring activities. Deed restriction will be placed on the property to ensure that there is no impact to the closed CCR landfill. Post-closure use of the property is not expected to disturb the integrity of the final cover or other components including monitoring systems of the closed landfill.

If any disturbance is proposed at the closed landfill, the owner or operator will demonstrate that the disturbance of the final cover, including any removal of CCR material for beneficial use, will not increase the potential threat to human health or the

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environment. This demonstration must be certified by a qualified professional engineer and provide notification to State agencies as required by §257.104(d)(1)(iii).

## 2.7 Completion of Post-Closure Care Period

In accordance with 40 CFR §257.104(c), the post-closure care period is to extend 30 years (unless otherwise required per 40 CFR §257.104(c)(2)) from the time of complete closure of the landfill. Within 60 days after the completion of the post-closure care period, the owner or operator of the CCR landfill will provide notification verifying that post-closure care has been completed. In accordance with 40 CFR §257.104(e), a qualified professional engineer must certify the notification that the post-closure care has been completed and the notification placed in the facility's operating record. Further, in accordance with 30 TAC 352.1241(b) the owner or operator shall submit to the TCEQ Executive Director a demonstration that the CCR unit poses no threat to human health, the environment, or property.

### 3.0 Post-Closure Plan Certification

By means of this certification, (i) this initial CCR Landfill Post-Closure Plan has been prepared, and reviewed in accordance with good engineering practice, (ii) it is my professional opinion that the Plan was prepared consistent with the minimum requirements of 30 TAC §352.1241-~~4~~ and 40 CFR §257.104, (iii) I or my agent has visited and examined the facility, (iv) this certification is not and shall not be interpreted or construed as a guarantee, warranty or legal opinion, and (v) this certification in no way relieves the owner or operator of the facility of his/her duty to fully implement this Plan.

By: \_\_\_\_\_

Dated: \_\_\_\_\_

**Post-Closure Care Cost Estimate  
 Twin Oaks Power – CCR Landfill**

**Table ~~VH-1VIII-1~~**

ITEM	UNIT RATE	PER YEAR	TOTAL
<b><u>1.0 Engineering and Geology</u></b>			
1.1 Post closure Plan	N/A		
1.2 Annual Site Inspections	\$ 30.00 /acre/year =	\$ 3,870.00 /year	\$ 116,100.00
1.3 Correctional Plans and Specifications		\$ 2,000.00 /year	\$ 60,000.00
1.4 Groundwater Monitoring <sup>1</sup>		\$ 39,300.00 /year	\$ 1,179,000.00
<b><u>2.0 Maintenance and Construction</u></b>			
2.0 Vegetation Management	\$ 28.00 /acre/year =	\$ 3,612.00 /year	\$ 108,360.00
2.1 Erosion Control and Repair <sup>2</sup>	\$ 500.00 /acre/year =	\$ 64,500.00 /year	\$ 1,935,000.00
2.2 Monitoring Well P&A <sup>3</sup>	\$ 1,000.00 /well =	\$ 8,000.00 LS	\$ 8,000.00
<b>SUBTOTAL</b>			\$ 3,406,460.00
<b>Contingency</b>	10 percent	\$ 11,354.87	\$ 340,646.00
<b>Annual Post Closure Cost</b>		<b>\$124,636.87 /year</b>	
<b>TOTAL POST CLOSURE COST</b>			<b>\$3,747,106.00</b>

**NOTES:**

1. Includes associated costs for Semi-Annual Groundwater Monitoring Sampling and Testing Activities per §257.104(b)(3)
2. Includes estimated costs for repair of localized rill erosion, reseeding, and use of erosion control materials.
3. Estimated cost of P&A (including plugging report) by a licensed State of Texas driller (per TDLR guidance).

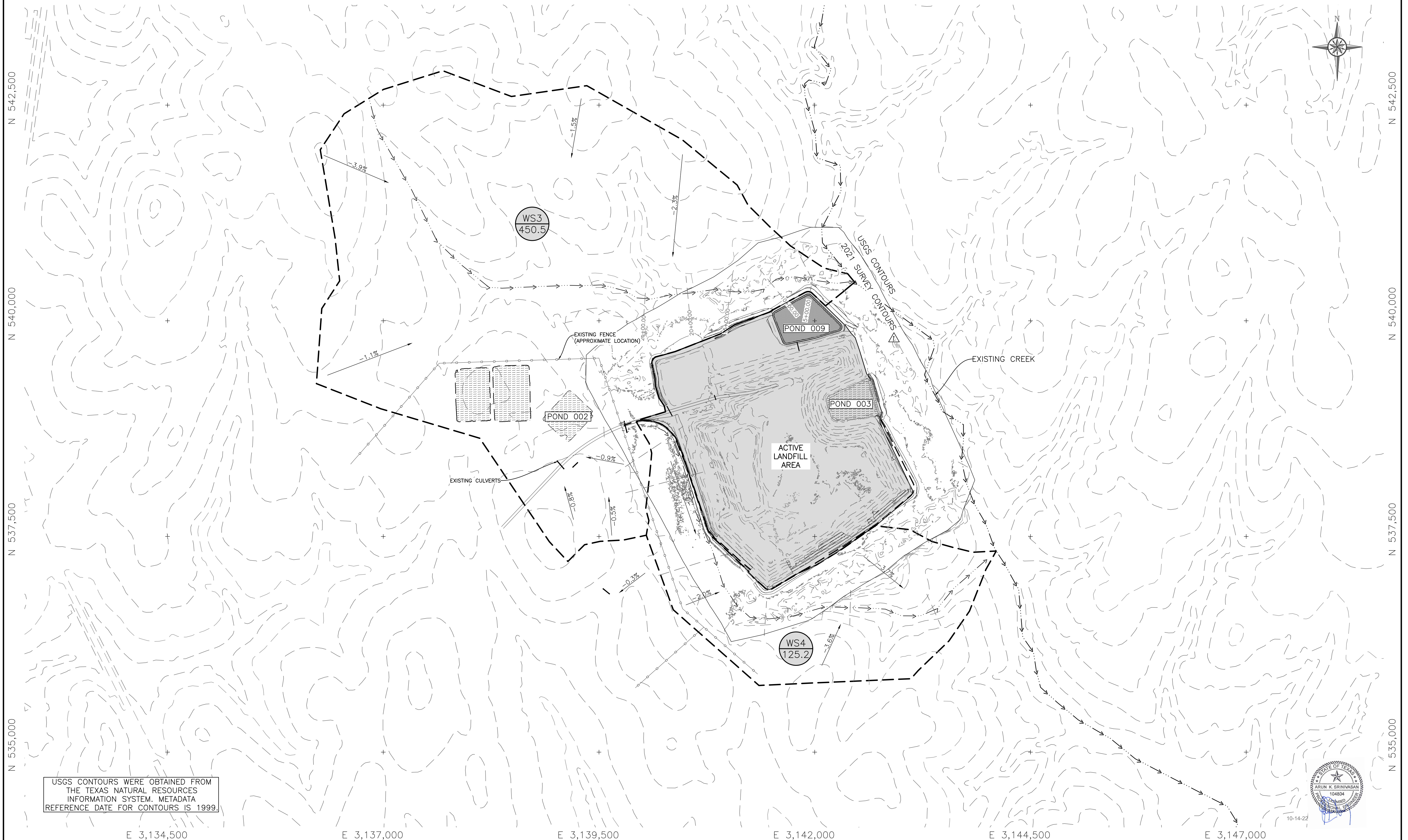
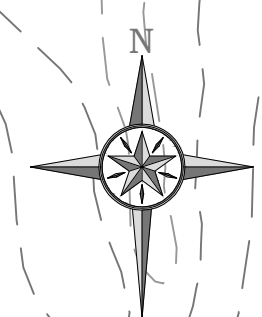
**Attachment B**  
**Unmarked Replacement Pages**



E 3,134,500      E 3,137,000      E 3,139,500      E 3,142,000      E 3,144,500      E 3,147,000

N 542,500  
N 540,000  
N 537,500  
N 535,000

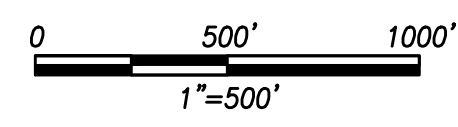
N 542,500  
N 540,000  
N 537,500  
N 535,000



USGS CONTOURS WERE OBTAINED FROM THE TEXAS NATURAL RESOURCES INFORMATION SYSTEM. METADATA REFERENCE DATE FOR CONTOURS IS 1999.



**AKRON CONSULTING, LLC.**  
431 N. CENTER ST.  
LONGVIEW, TX 75601  
TBPB Firm Reg. # 14014  
(O) 903-236-9744  
(F) 903-236-9745  
www.akron-consulting.com



NO.	REVISION	BY.	DATE
1	UPDATED EXISTING SURFACE W/ 2021 DATA.	AS	SEPT 21

WATERSHED BOUNDARY WATERSHED NUMBER & AREA (AC.)	HYDRAULIC LENGTH PERIMETER BERM PROPOSED CONTOUR EXISTING CONTOUR HEC-RAS STATION	ACTIVE LANDFILL AREA EXISTING POND PROPOSED POND
---	---	--

**TWIN OAKS POWER LANDFILL**  
BREMONT, TEXAS

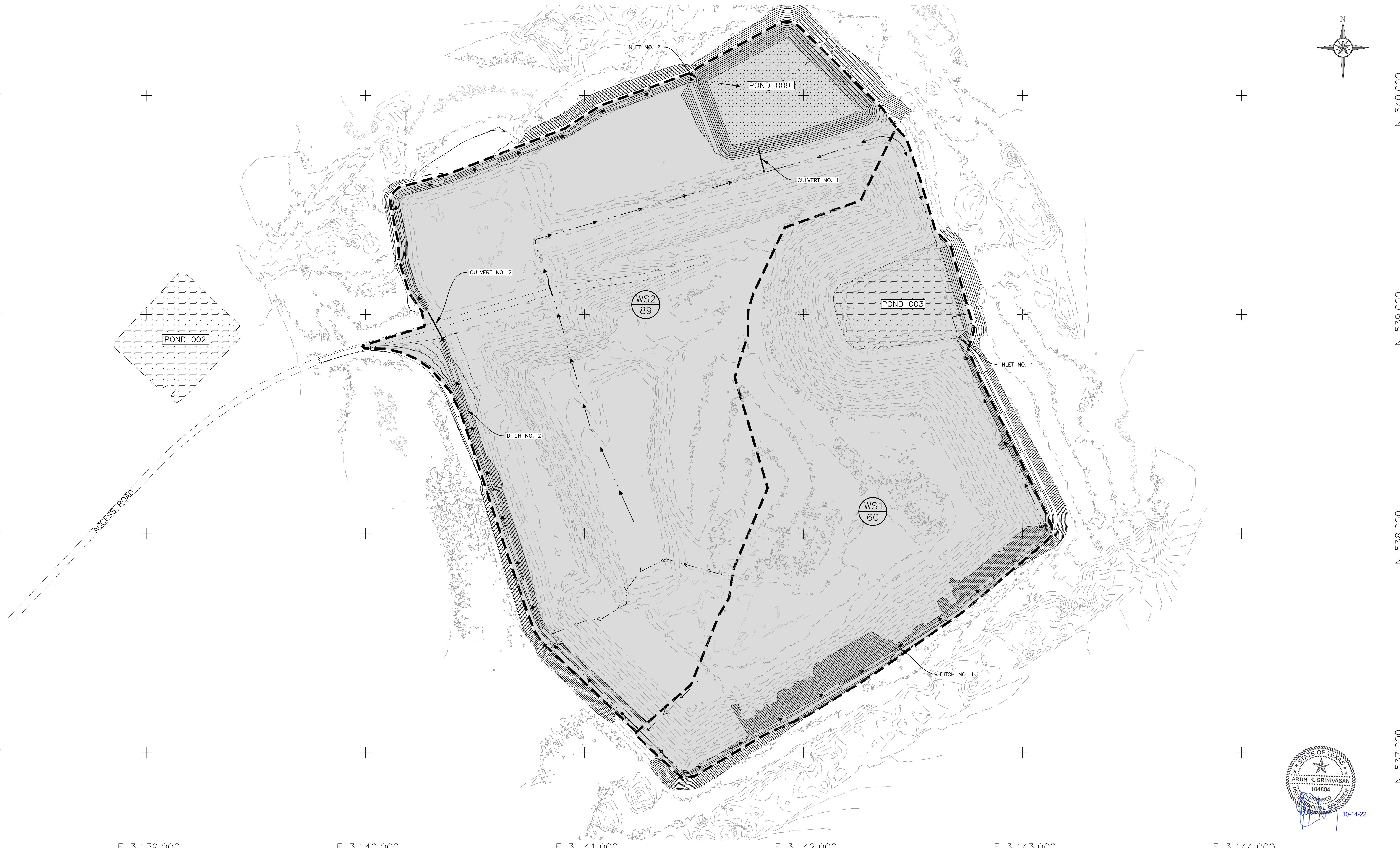
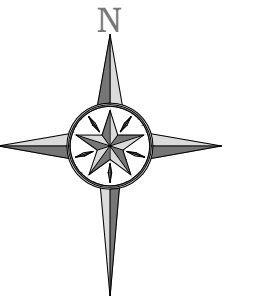
**WATERSHED MAP - RUN ON ANALYSIS**

<b>TWIN OAKS POWER</b>			
DR: BY BNS	APPROVAL BNS	DATE JULY 2016	DWG. NAME RUN ON ANALYSIS
			SHEET: X OF X

E 3,139,000      E 3,140,000      E 3,141,000      E 3,142,000      E 3,143,000      E 3,144,000

N 540,000  
N 539,000  
N 538,000  
N 537,000

N 540,000  
N 539,000  
N 538,000  
N 537,000



E 3,139,000      E 3,140,000      E 3,141,000      E 3,142,000      E 3,143,000      E 3,144,000

AKRON CONSULTING, LLC.  
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www.akron-consulting.com

NO.	REVISION	BY.	DATE
1	UPDATED EXISTING SURFACE W/ 2021 DATA.	AS	SEPT 21

WATERSHED BOUNDARY	HYDRAULIC LENGTH	DISTURBED WATERSHED AREA
WATERSHED NUMBER & AREA (AC.)	DIVERSION	EXISTING POND
	PROPOSED CONTOUR	PROPOSED POND
	EXISTING CONTOUR	

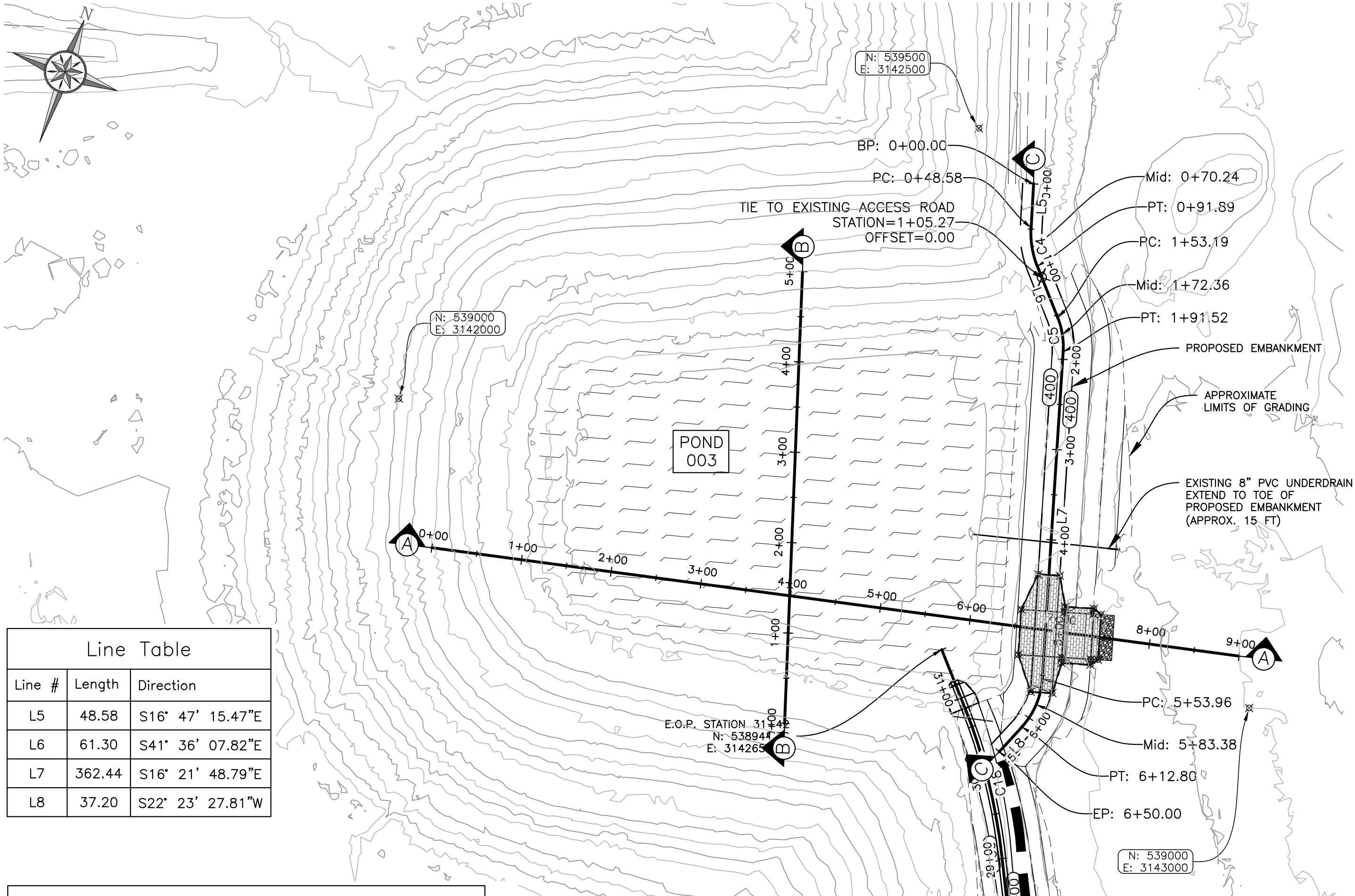
**TWIN OAKS POWER LANDFILL**  
BREMONT, TEXAS

WATERSHED MAP – RUN OFF ANALYSIS

**TWIN OAKS POWER**

DR. BY AKS	APPROVAL BNS	DATE SEPT 2015	DWG. NAME PROP. WS MAP	SHEET: 1 OF 6
---------------	-----------------	-------------------	---------------------------	------------------

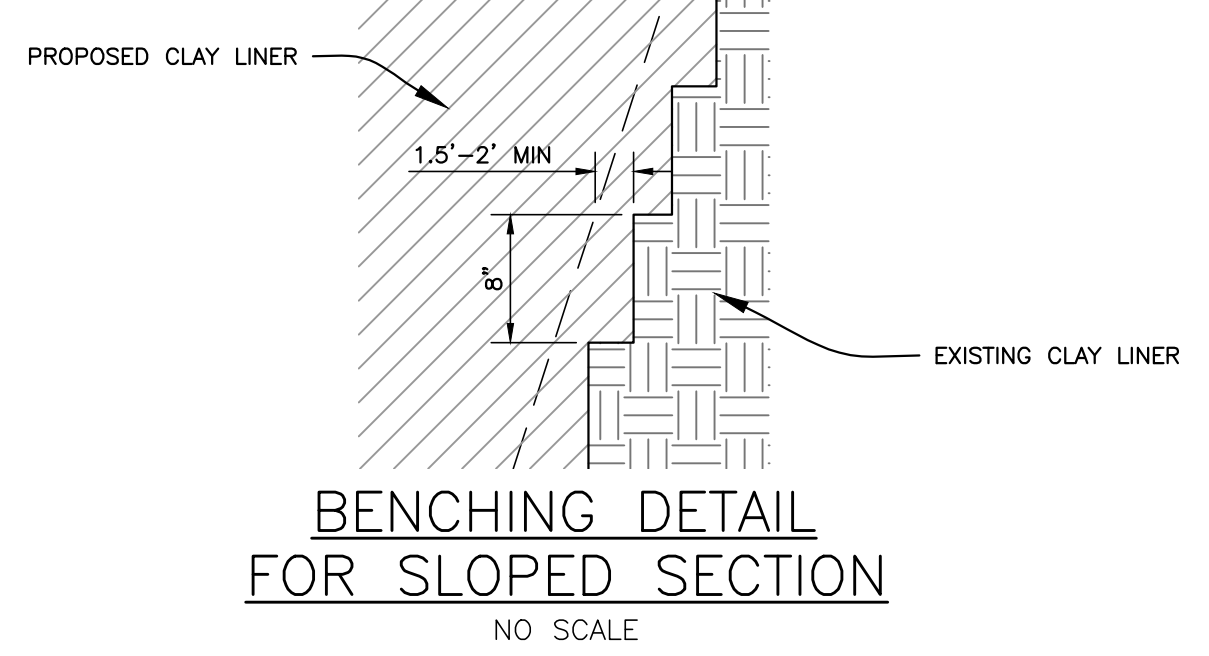




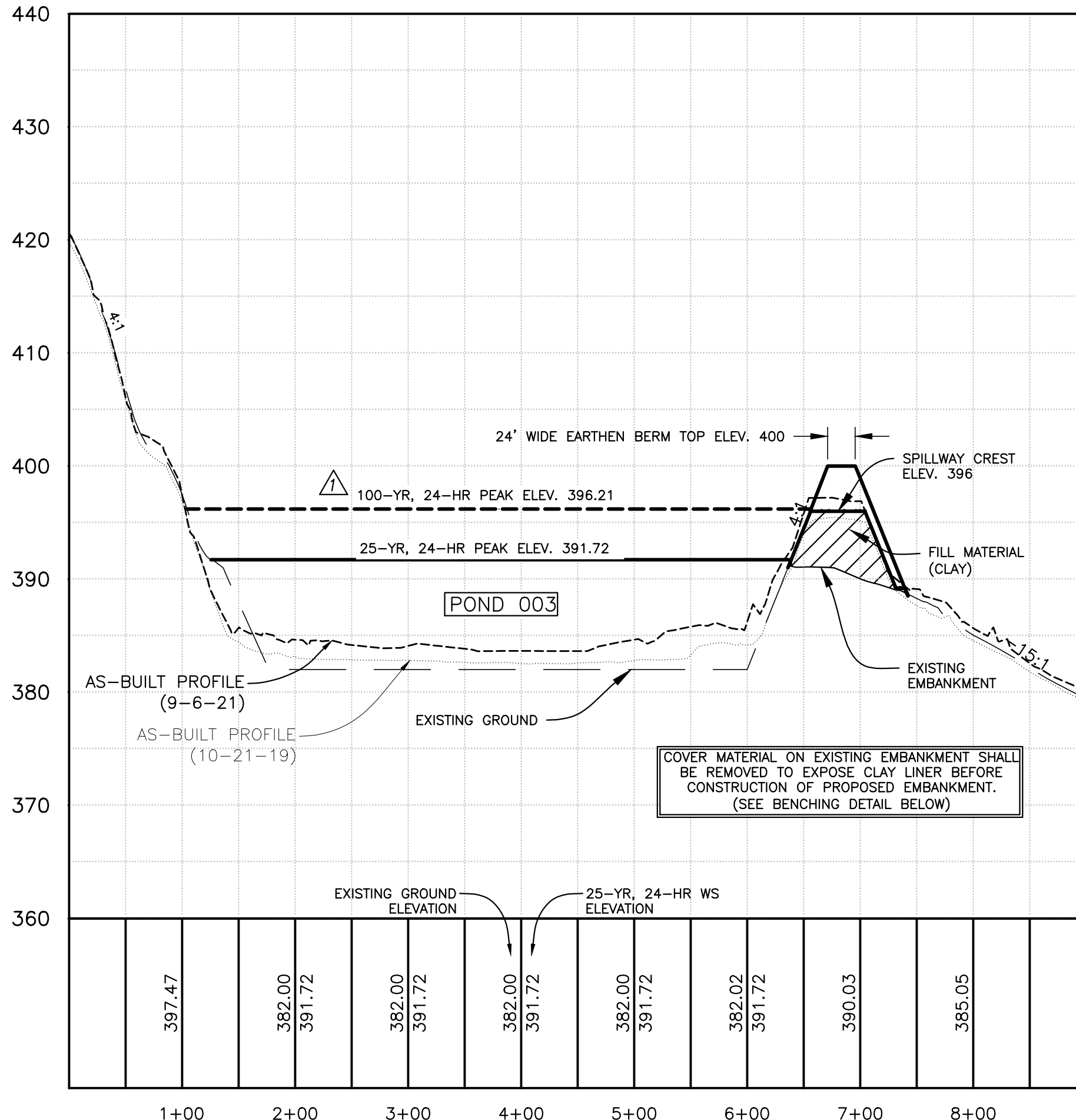
Line #	Length	Direction
L5	48.58	S16° 47' 15.47"E
L6	61.30	S41° 36' 07.82"E
L7	362.44	S16° 21' 48.79"E
L8	37.20	S22° 23' 27.81"W

Curve #	Length	Radius	Delta	Chord Direction	Chord Length
C4	43.31	100.00	24.81	S29° 11' 42"E	42.97
C5	38.32	87.00	25.24	S28° 58' 58"E	38.01

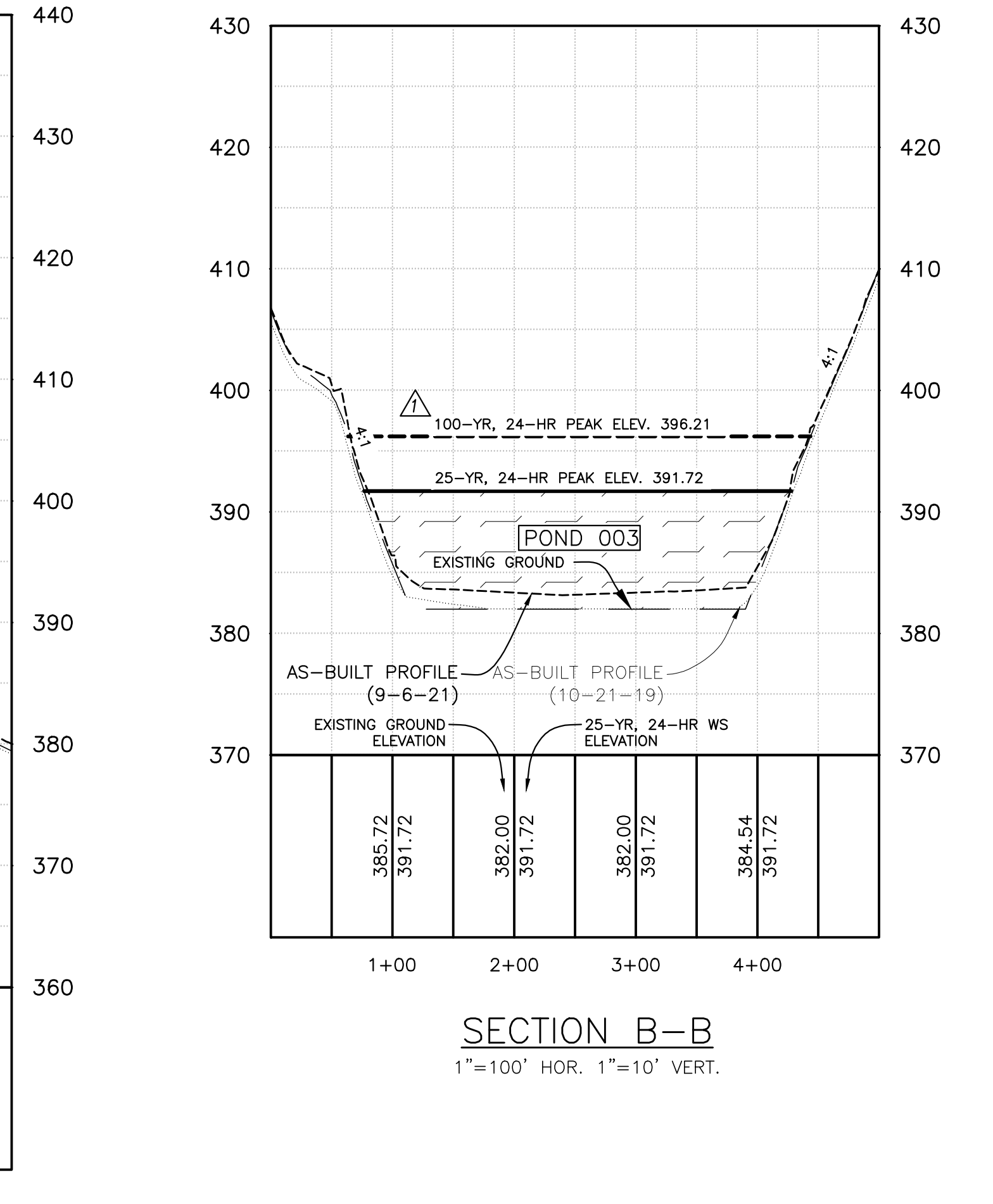
PLAN VIEW  
1"=100'



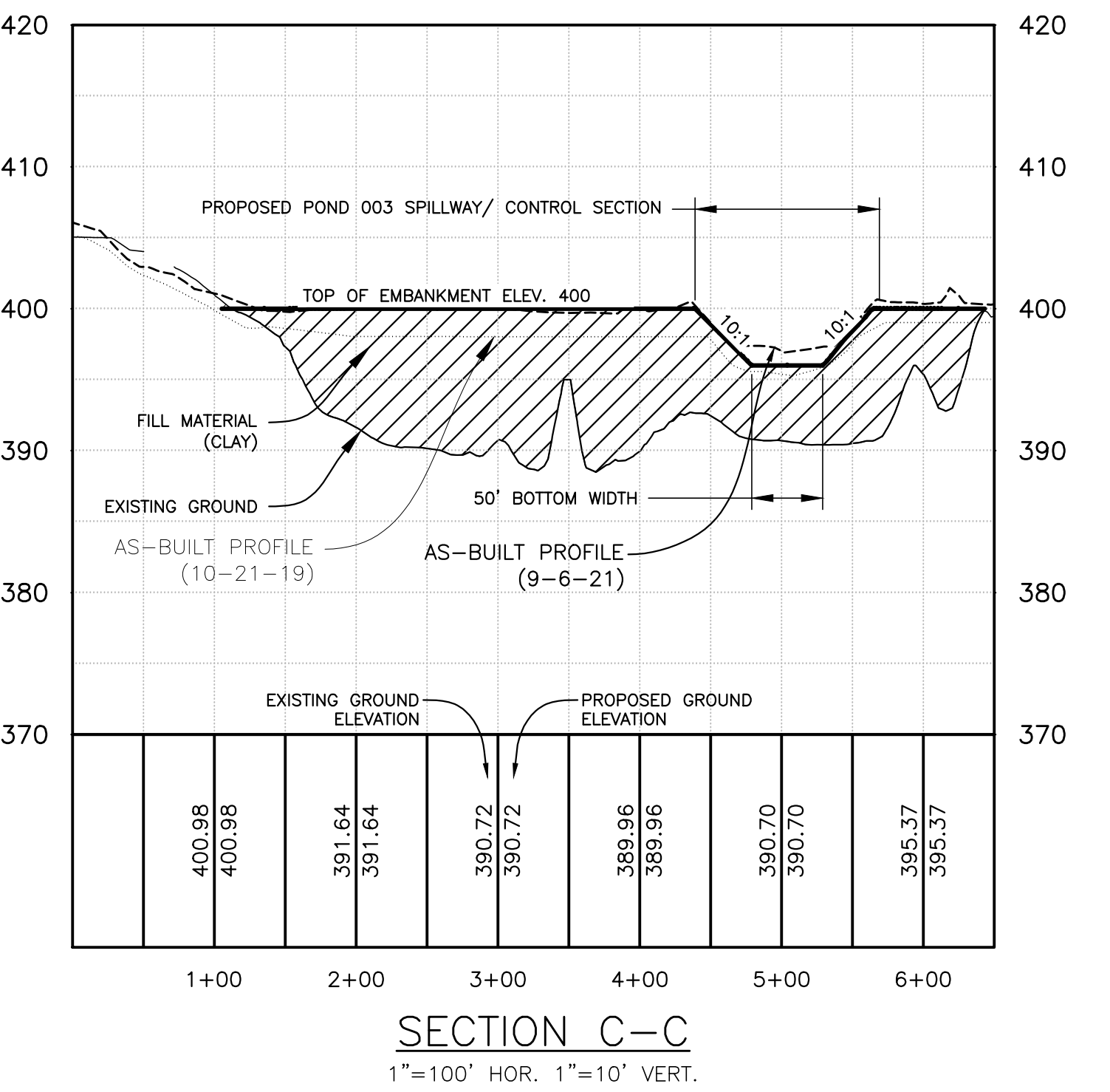
Point #	Northing	Easting	Elevation
1	538934.26	3142766.93	400.00
2	538968.14	3142740.32	396.00
3	539016.11	3142726.23	396.00
4	539059.00	3142730.30	400.00
5	539065.76	3142753.33	400.00
6	539035.39	3142770.59	398.00
7	539044.53	3142801.26	390.00
8	539040.90	3142810.66	388.00
9	538992.93	3142824.74	388.00
10	538984.92	3142818.76	390.00
11	538975.90	3142788.05	398.00
12	538941.02	3142789.96	400.00
13	538981.66	3142786.36	396.00
14	539029.63	3142772.28	396.00
15	539038.65	3142802.98	388.00
16	538990.67	3142817.07	388.00



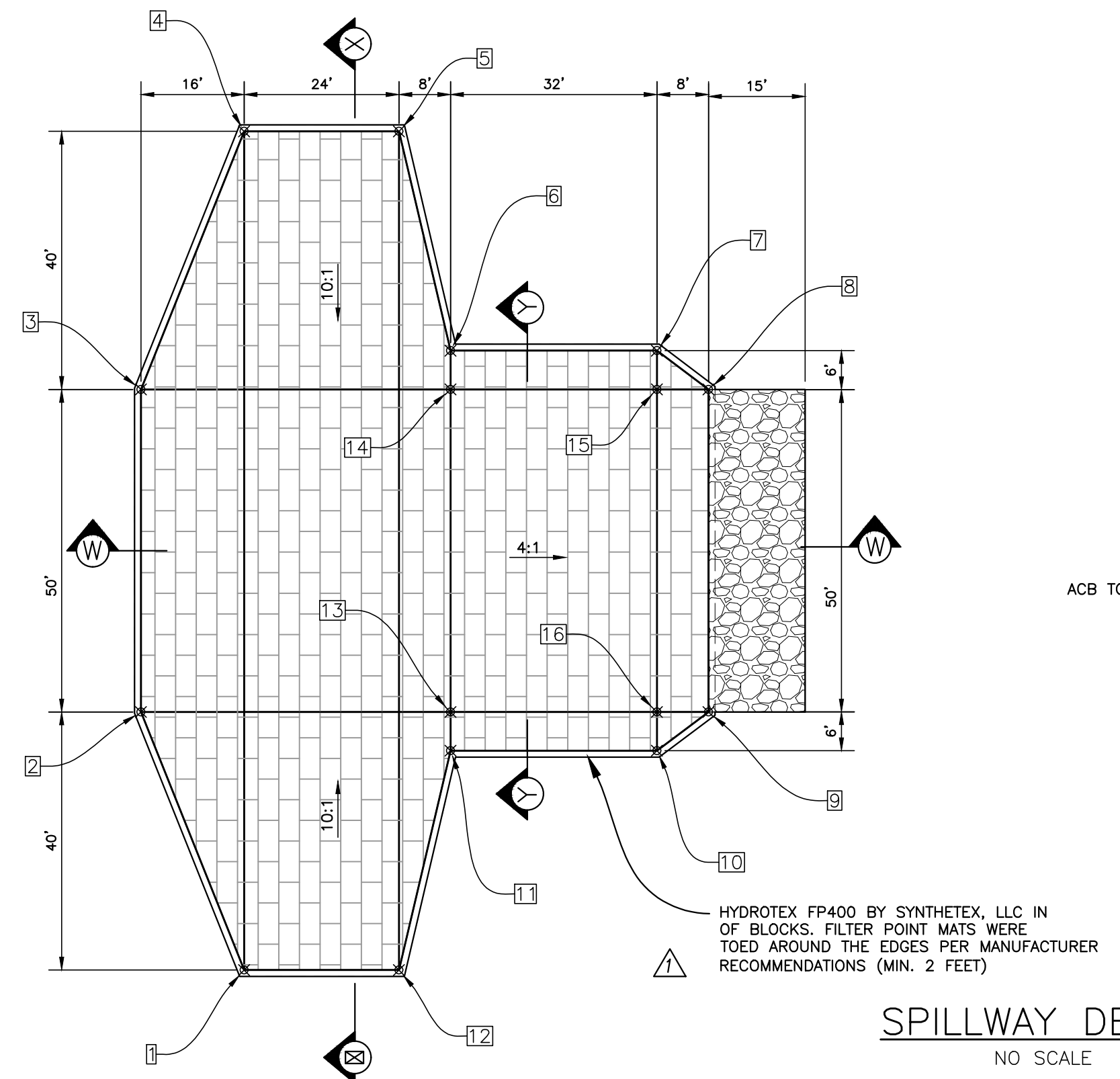
SECTION A-A  
1"=100' HOR. 1"=10' VERT.



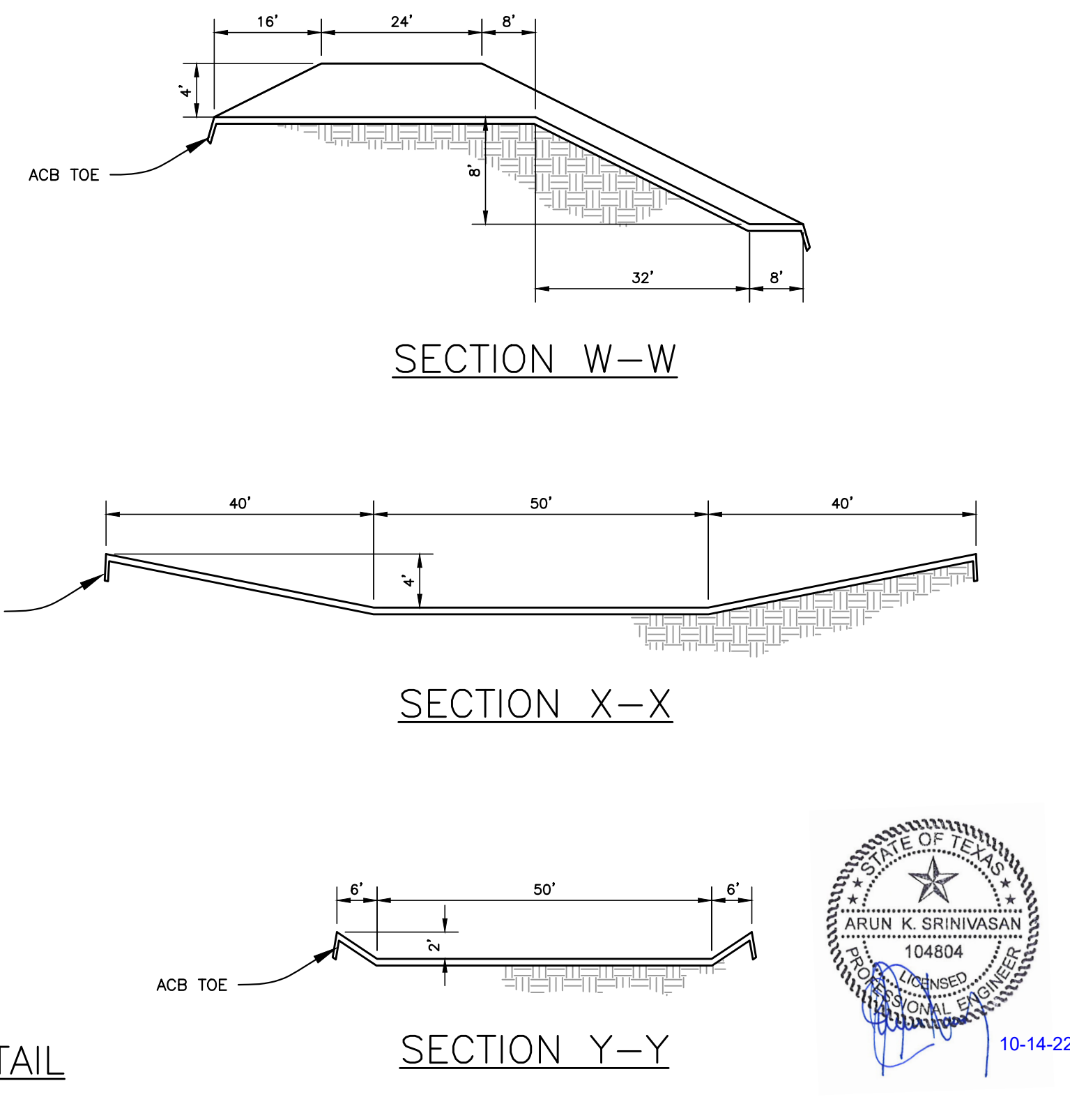
SECTION B-B  
1"=100' HOR. 1"=10' VERT.



SECTION C-C  
1"=100' HOR. 1"=10' VERT.



SPILLWAY DETAIL  
NO SCALE



SECTION W-W

SECTION X-X

SECTION Y-Y



10-14-22

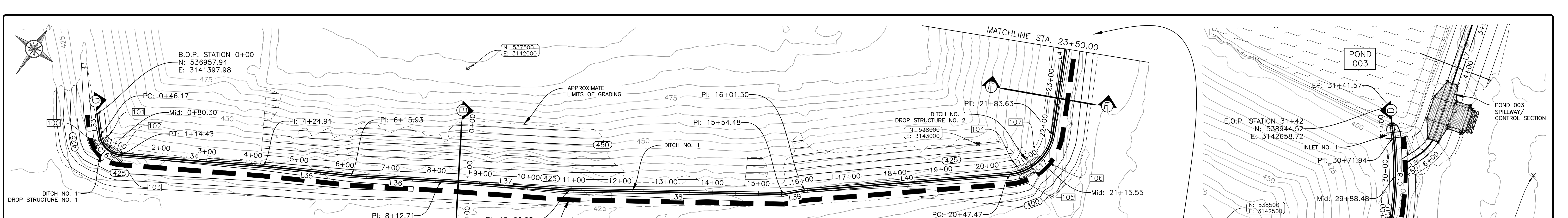


AS-BUILT

NO.	REVISION	BY.	DATE
1	25YR & 100YR PEAK ELEVATIONS UPDATED; UPDATED CALLOUT ON SPILLWAY DETAIL	CAM	11-07-19

---	PROPOSED CONTOUR	---	EXISTING POND
---	EXISTING CONTOUR	---	PROPOSED POND
---	PROPOSED DITCH	---	
---	PERIMETER BERM/ ACCESS ROAD	---	

TWIN OAKS POWER LANDFILL BREMONT, TEXAS			
POND 003			
TWIN OAKS POWER			
DR. BY: BNS	APPROVAL: ARS	DATE: SEPT. 2015	DWG. NAME: POND 003
			SHEET: 2 OF 6



**Point Table**

Point #	Northing	Easting	Elevation
100	536905.06	3141425.66	435.70
101	536930.38	3141445.23	435.70
102	536928.58	3141484.74	425.00
103	536900.84	3141500.12	425.00
104	538009.09	3143094.95	415.56
105	537988.80	3143119.70	415.78
106	538052.76	3143146.43	409.45
107	538056.12	3143114.61	409.34

**Line Table**

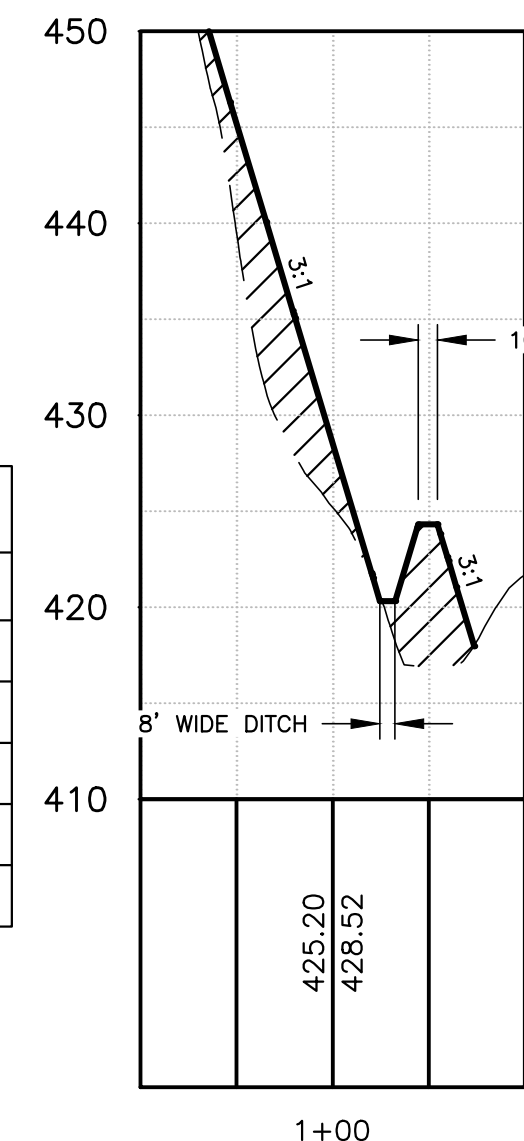
Line #	Length	Direction
L33	46.17	S42° 09' 21.22"E
L34	310.48	N59° 27' 59.70"E
L35	191.02	N61° 08' 15.03"E
L36	196.78	N58° 21' 42.22"E
L37	278.27	N59° 06' 28.02"E

**Line Table**

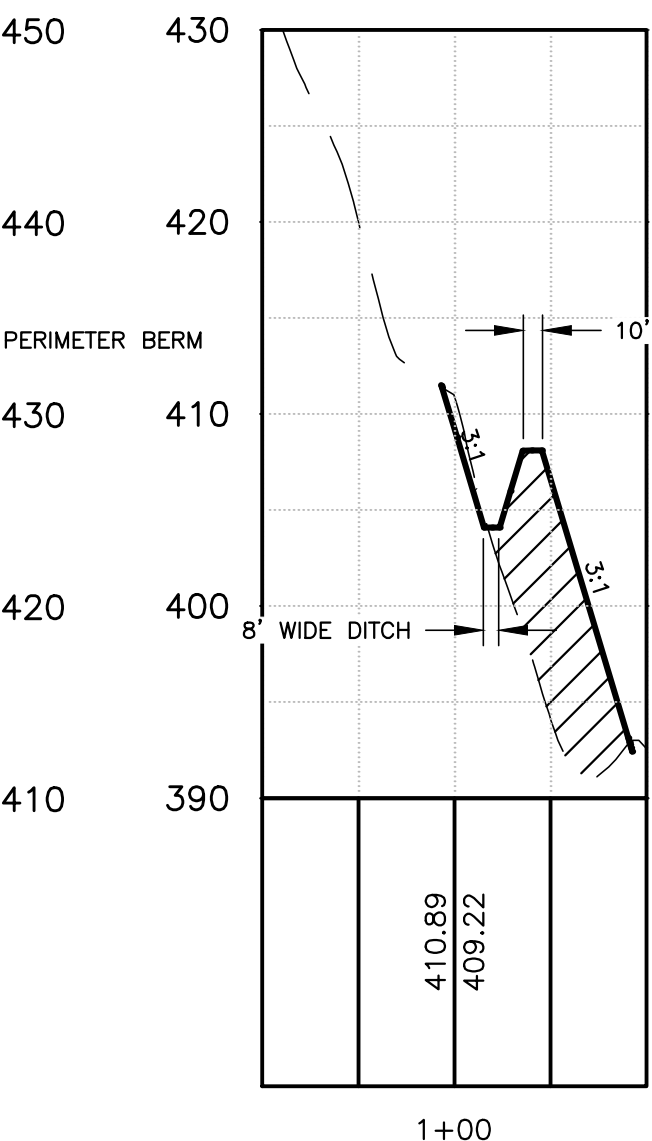
Line #	Length	Direction
L38	463.50	N56° 07' 39.64"E
L39	47.02	N45° 00' 43.43"E
L40	445.97	N50° 27' 40.23"E
L41	352.98	N26° 47' 57.97"W
L42	356.12	N26° 26' 30.80"W

**Curve Table**

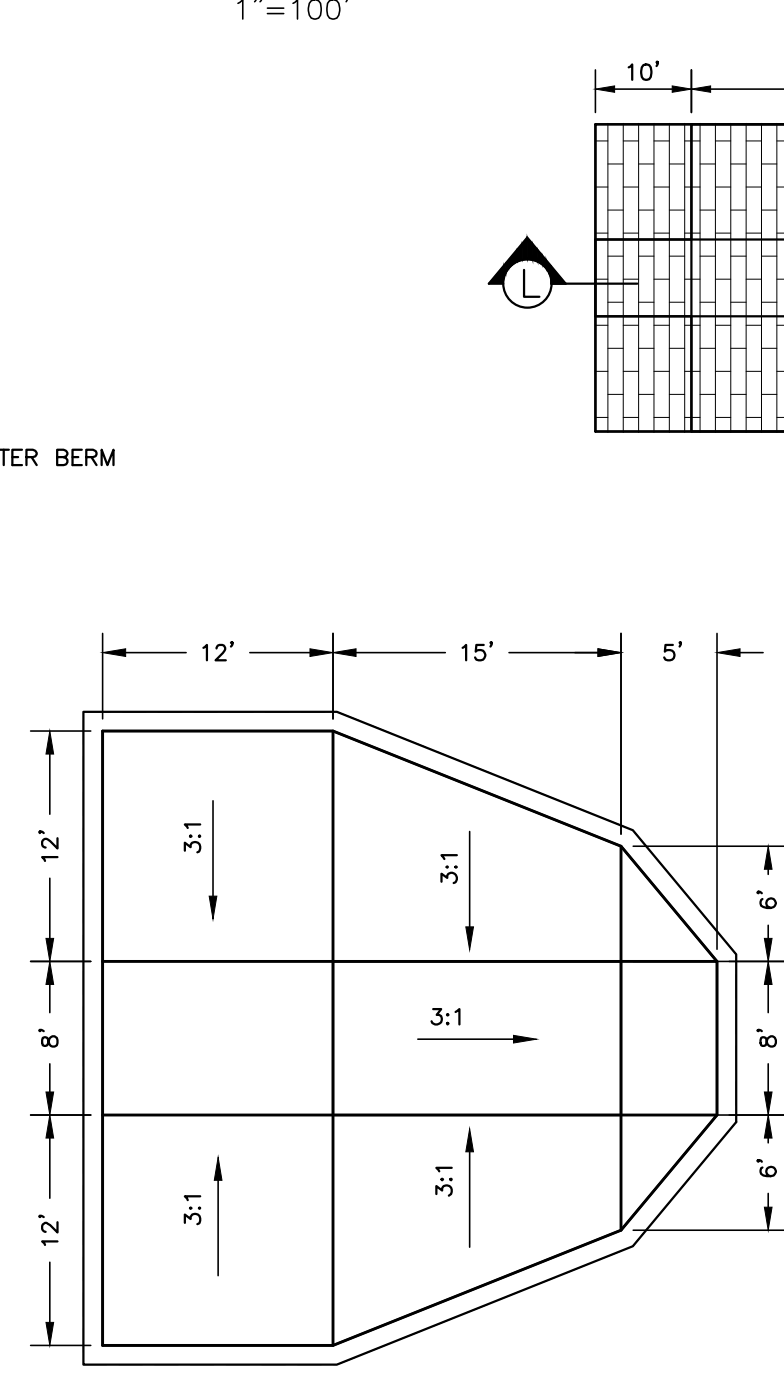
Curve #	Length	Radius	Delta	Chord Direction	Chord Length
C16	68.26	49.90	78.38	S81° 20' 41"E	63.06
C17	136.17	104.86	74.40	N12° 16' 22"E	126.80
C18	179.19	629.55	16.31	N33° 30' 55"W	178.59



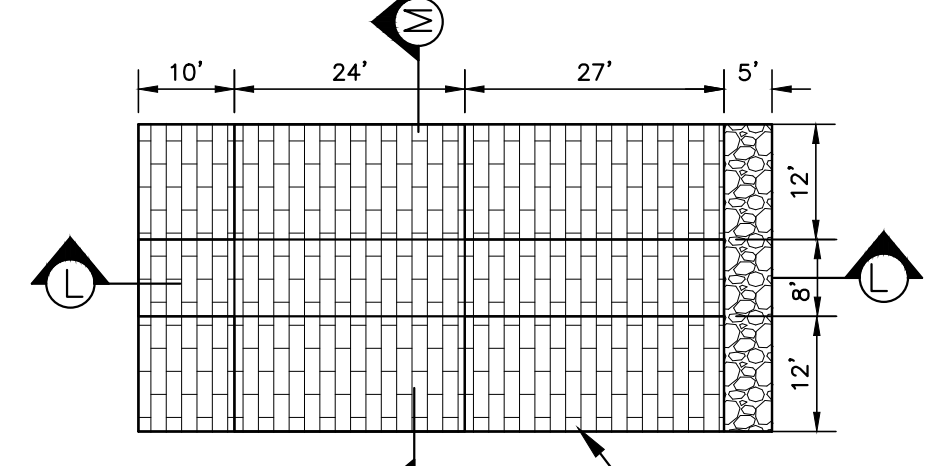
**SECTION E-E**  
1"=100' HOR. 1"=10' VERT.



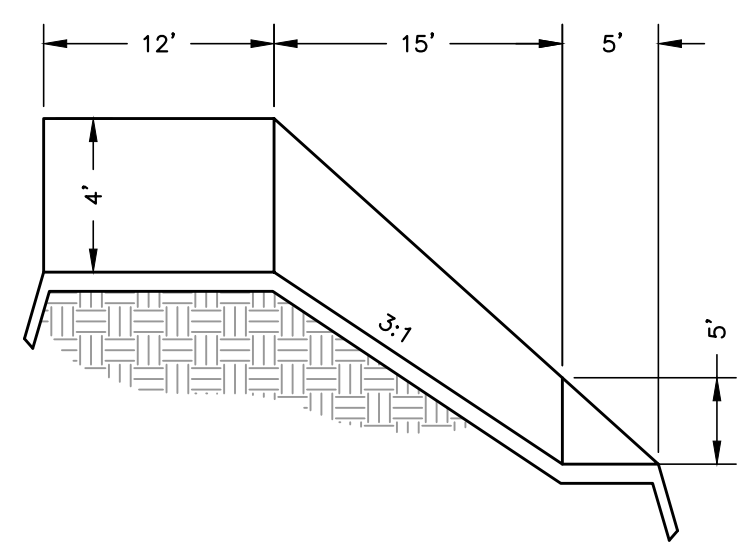
**SECTION F-F**  
1"=100' HOR. 1"=10' VERT.



**DITCH TYPICAL SECTION**  
NO SCALE



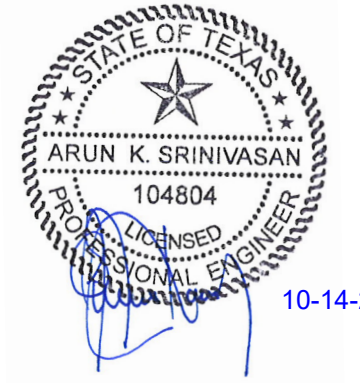
**DROP STRUCTURE DETAILS**  
NO SCALE



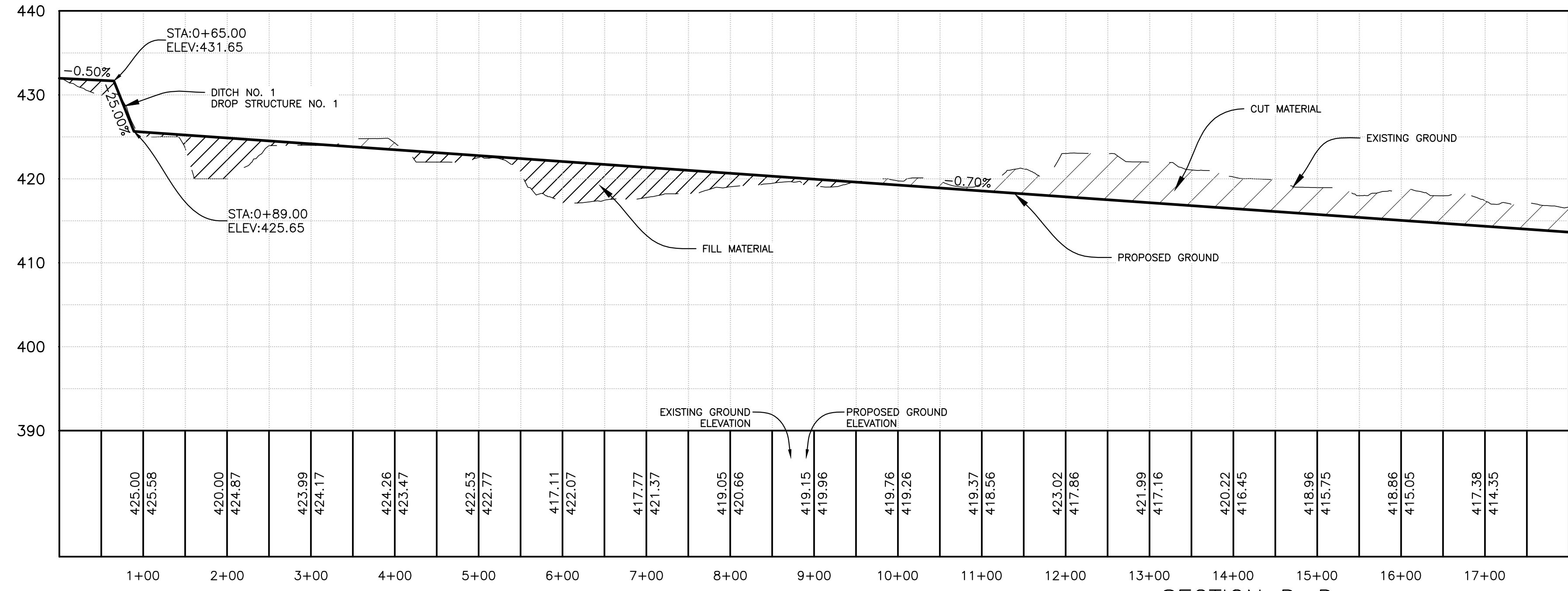
**INLET DETAILS**  
NO SCALE

**SECTION L-L**

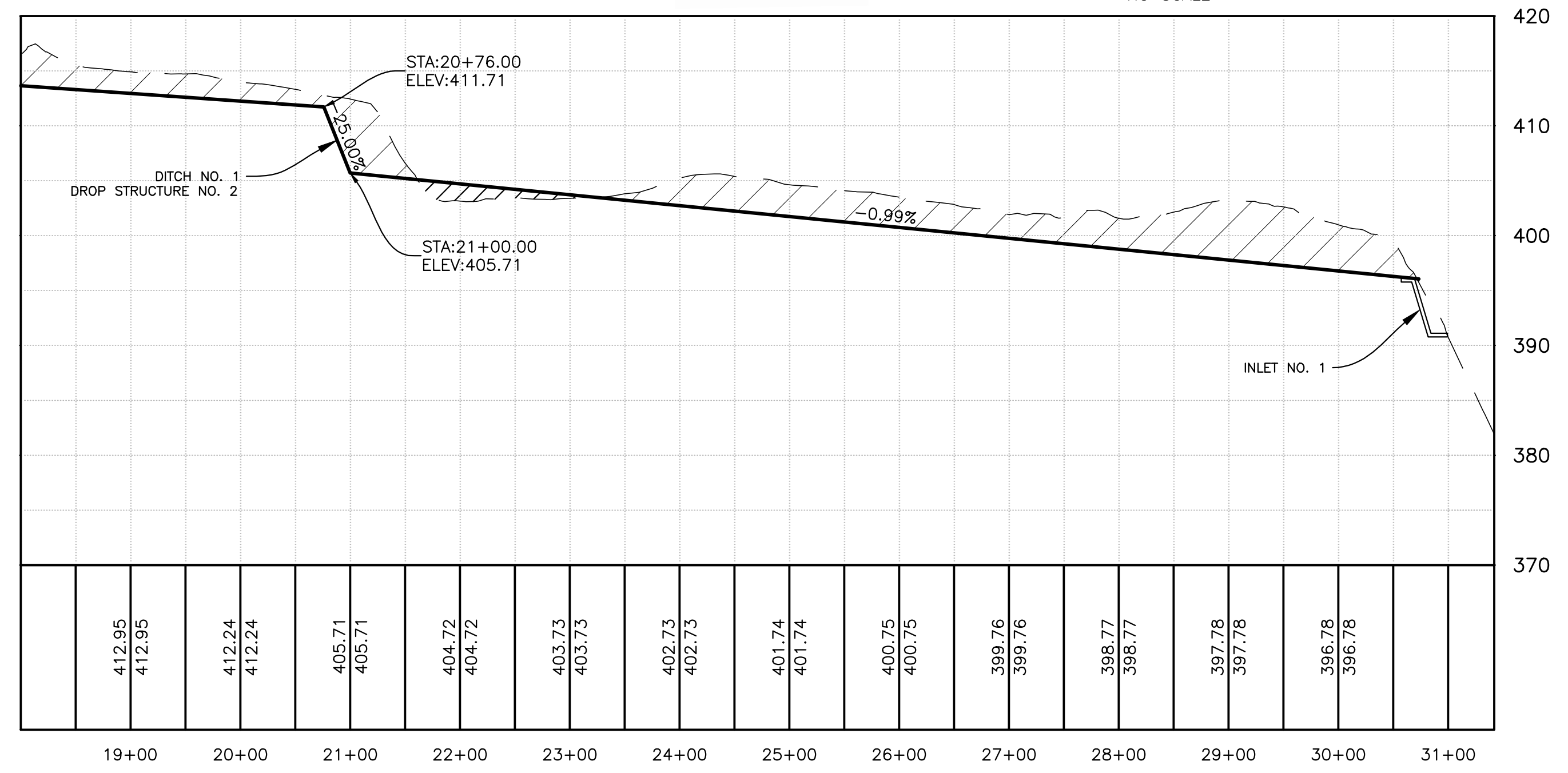
**SECTION M-M**



10-14-22

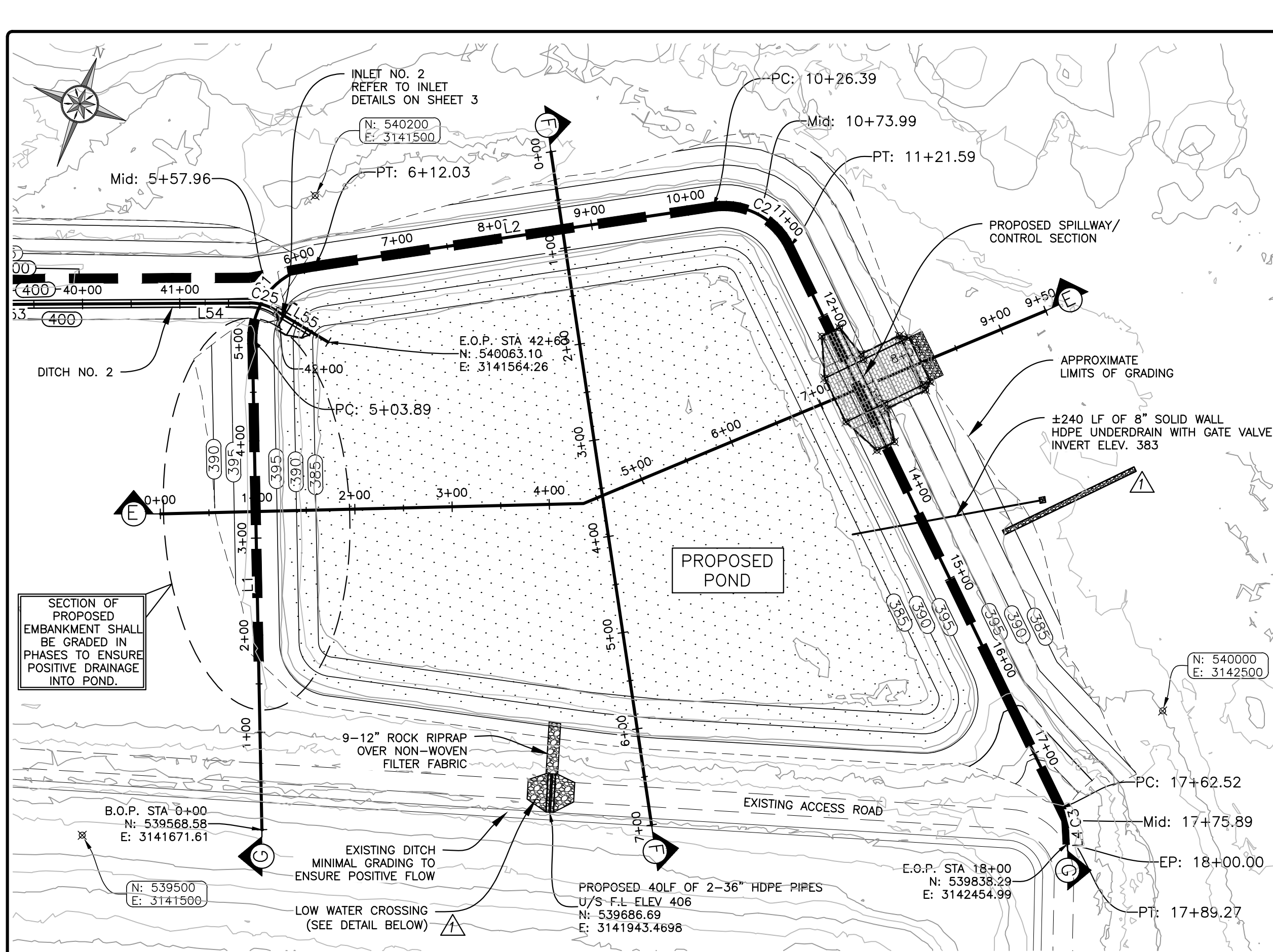


**SECTION D-D**  
1"=100' HOR. 1"=10' VERT.



NO.	REVISION	BY.	DATE

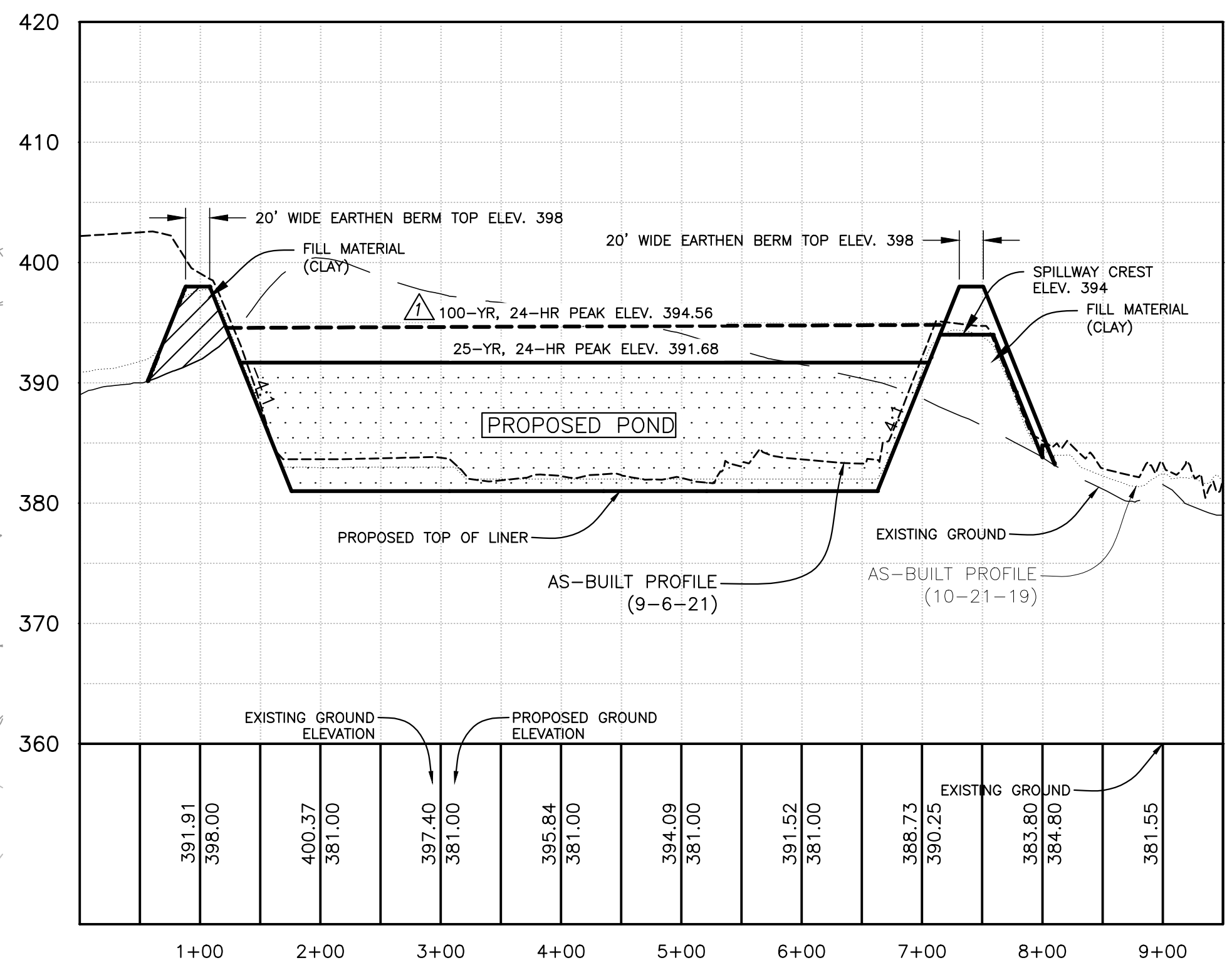
- PROPOSED CONTOUR
- - - EXISTING CONTOUR
- PROPOSED DITCH
- PERIMETER BERM/ ACCESS ROAD
- ▨ EXISTING POND
- ▨ PROPOSED POND



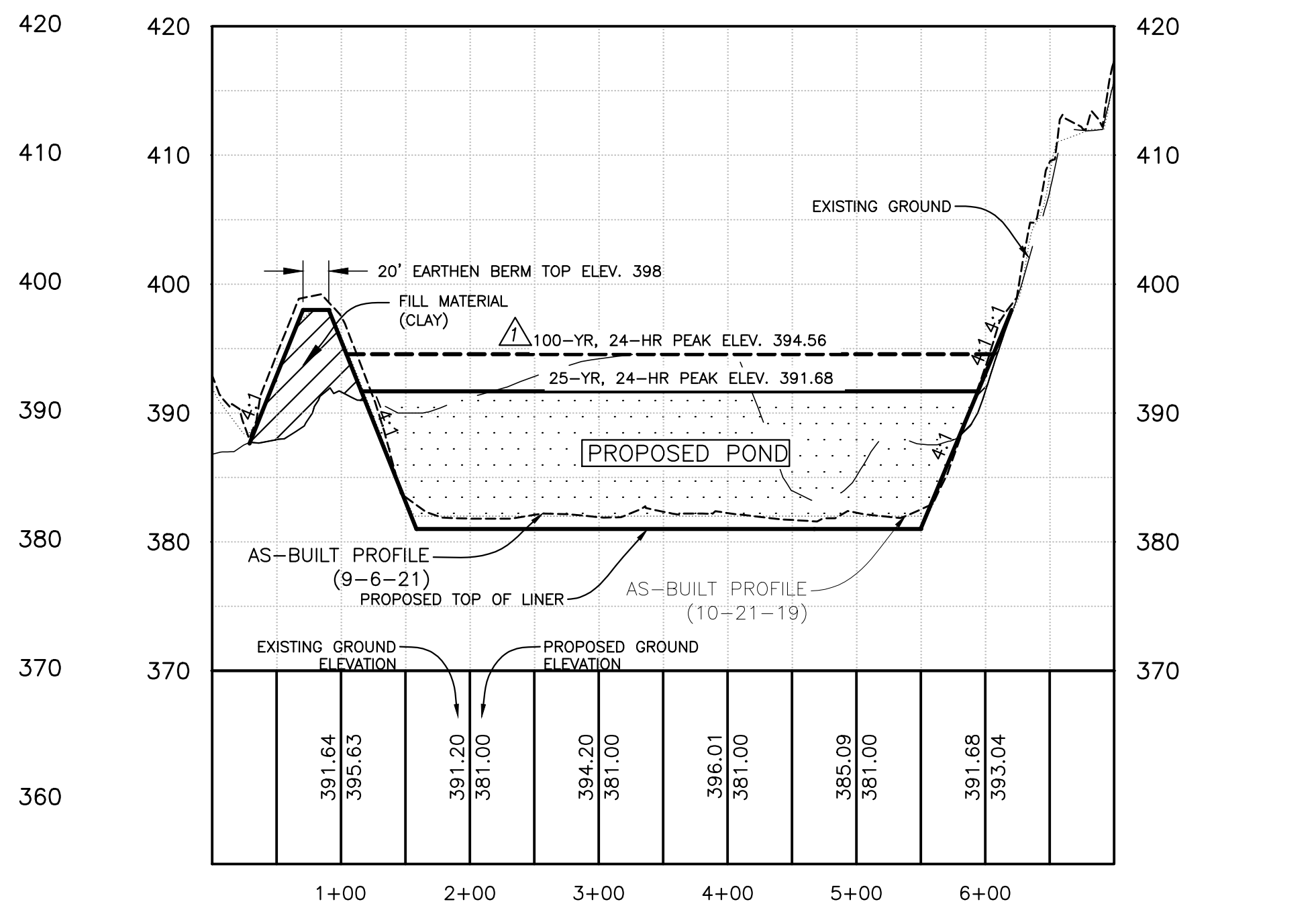
PLAN VIEW  
1"=100'

Curve Table					
Curve #	Length	Radius	Delta	Chord Direction	Chord Length
C1	108.14	75.00	82.61	N20° 11' 30"E	99.01
C2	95.20	75.00	72.73	S82° 08' 18"E	88.94
C3	26.75	67.20	22.80	S34° 22' 22"E	26.57

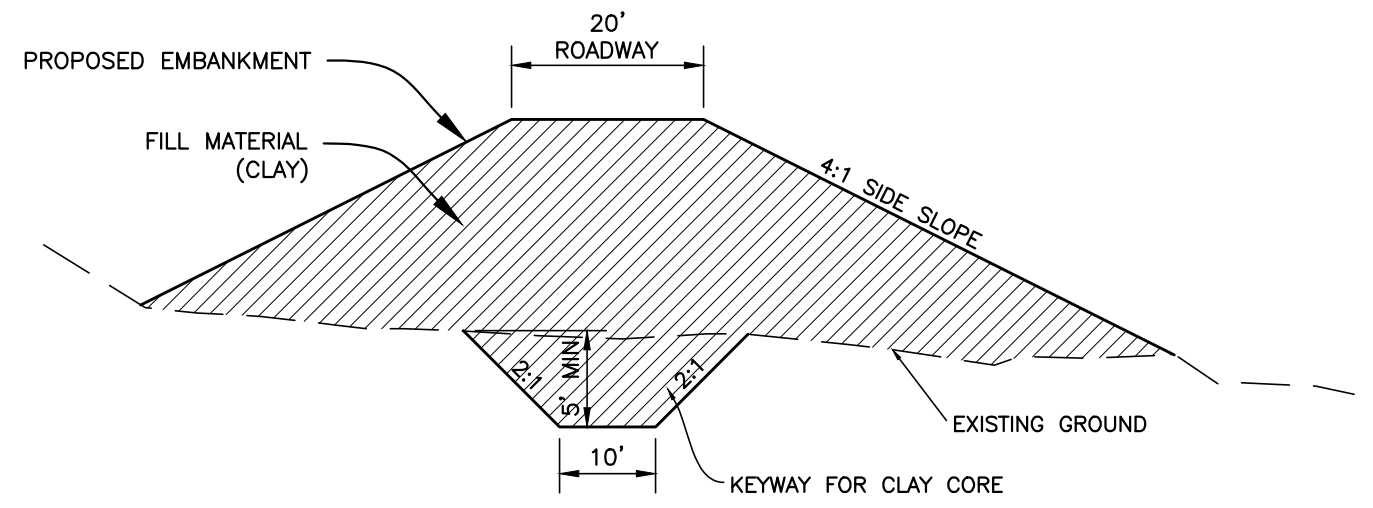
Line Table		
Line #	Length	Direction
L1	503.89	N21° 06' 52.39"W
L2	414.37	N61° 29' 51.73"E
L4	10.73	S22° 58' 14.63"E



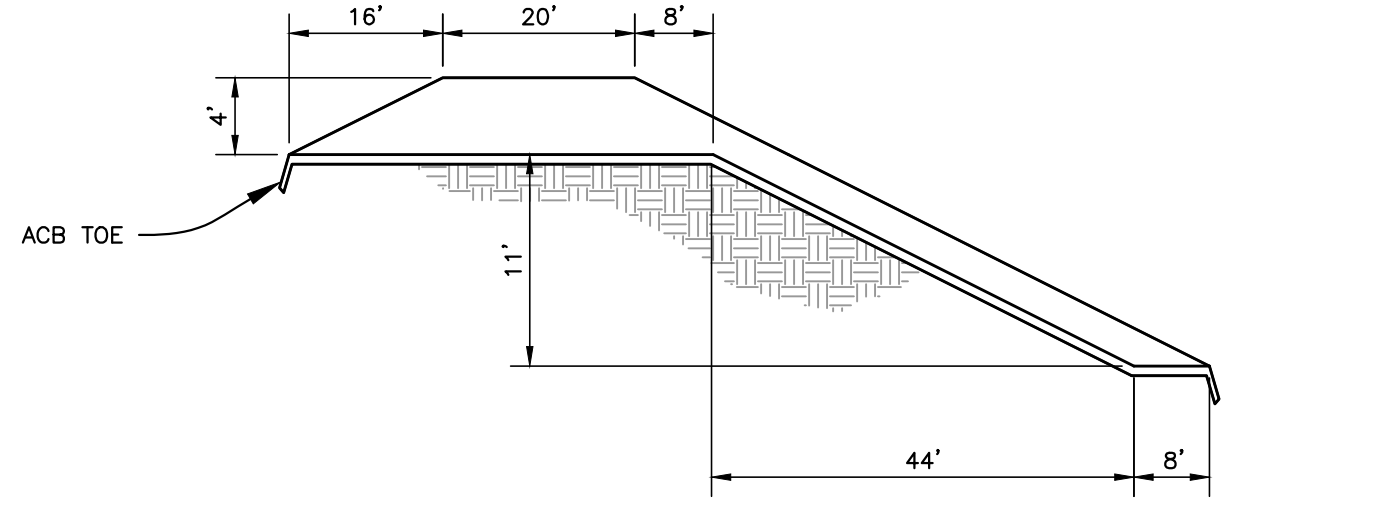
SECTION E-E  
1"=100' HOR. 1"=10' VERT.



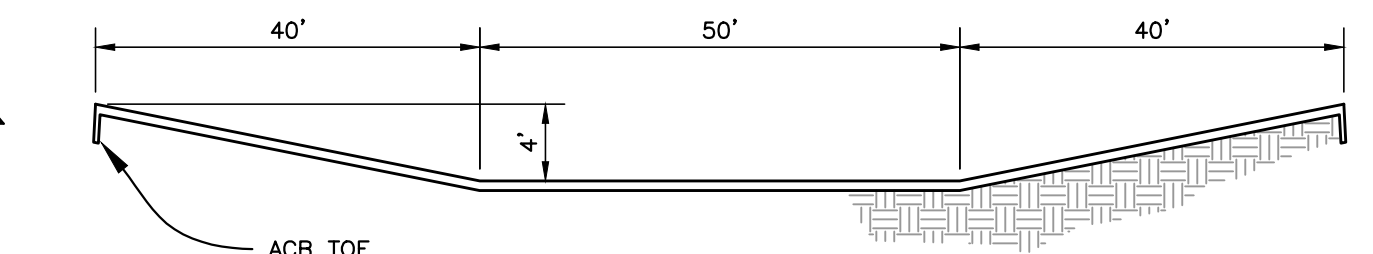
SECTION F-F  
1"=100' HOR. 1"=10' VERT.



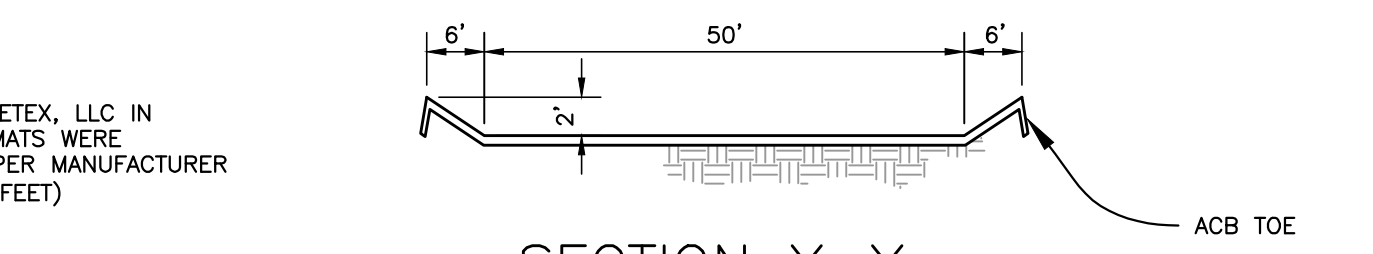
EMBankment KEYWAY DETAIL  
NO SCALE



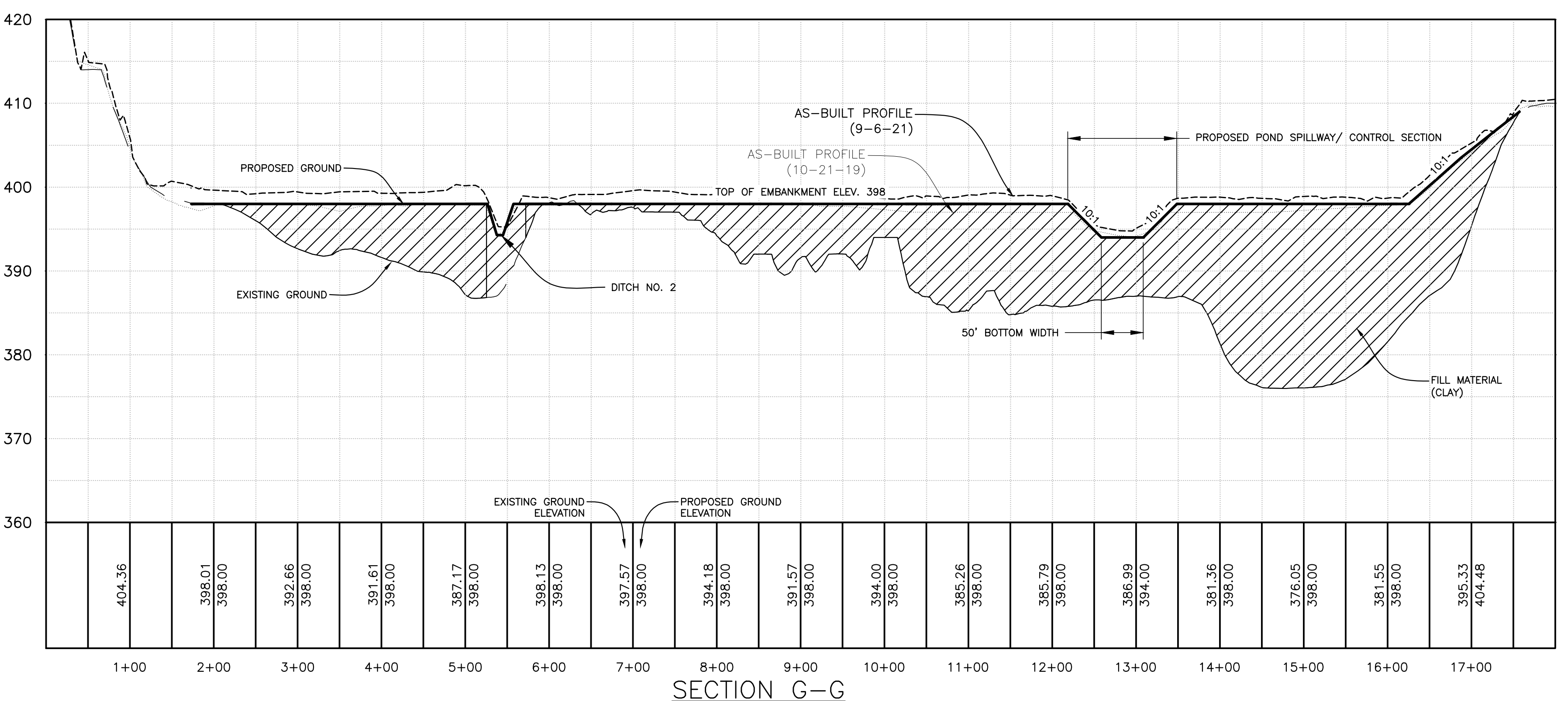
SECTION W-W  
NO SCALE



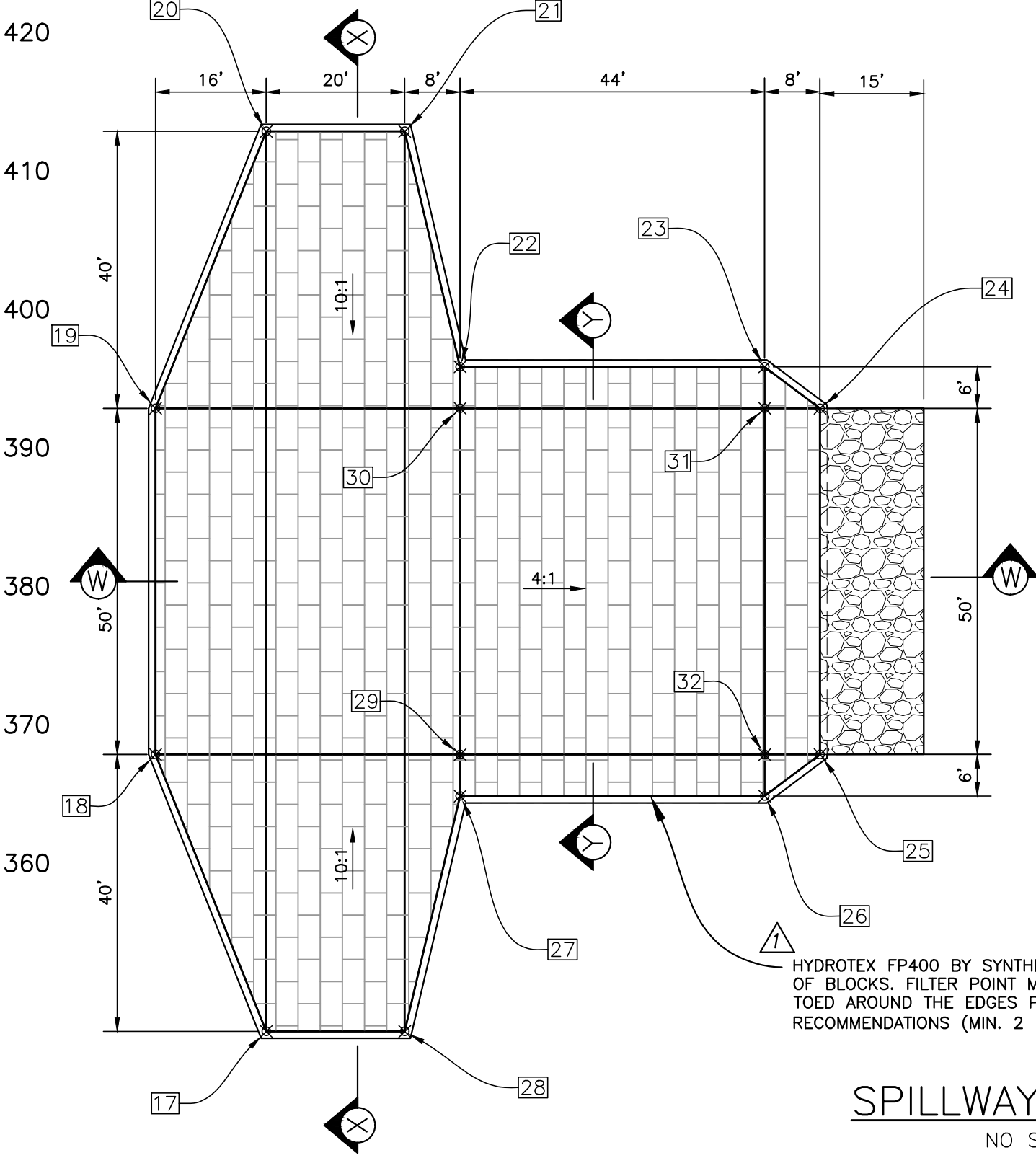
SECTION X-X  
NO SCALE



SECTION Y-Y  
NO SCALE



SECTION G-G  
1"=100' HOR. 1"=10' VERT.

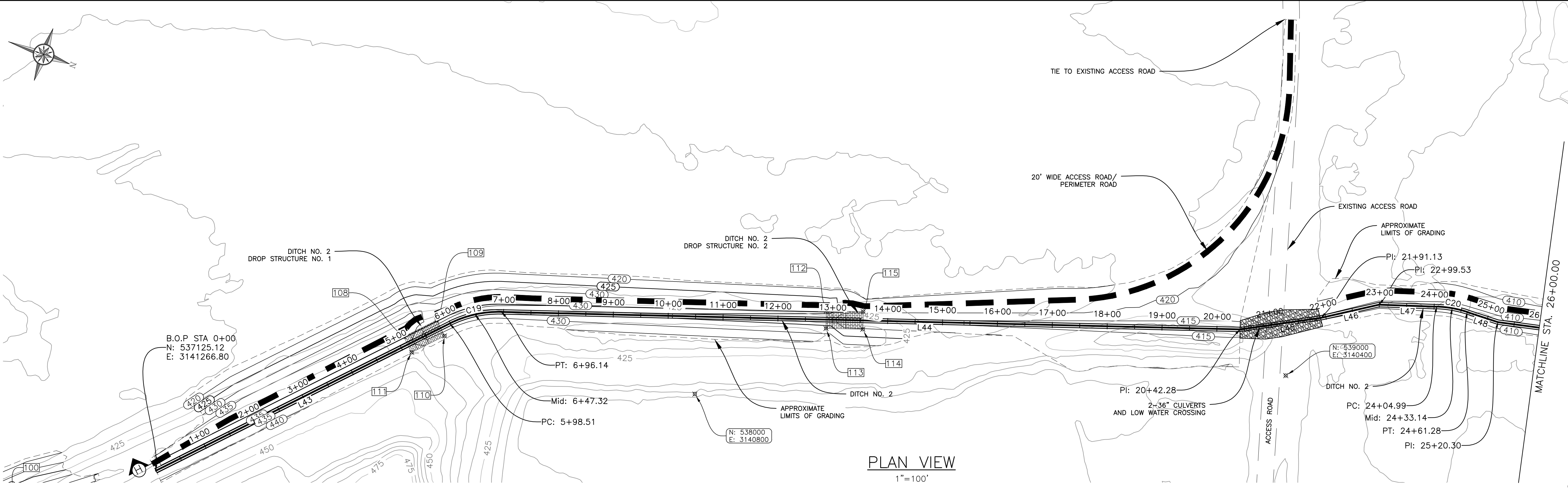


SPILLWAY DETAILS  
NO SCALE



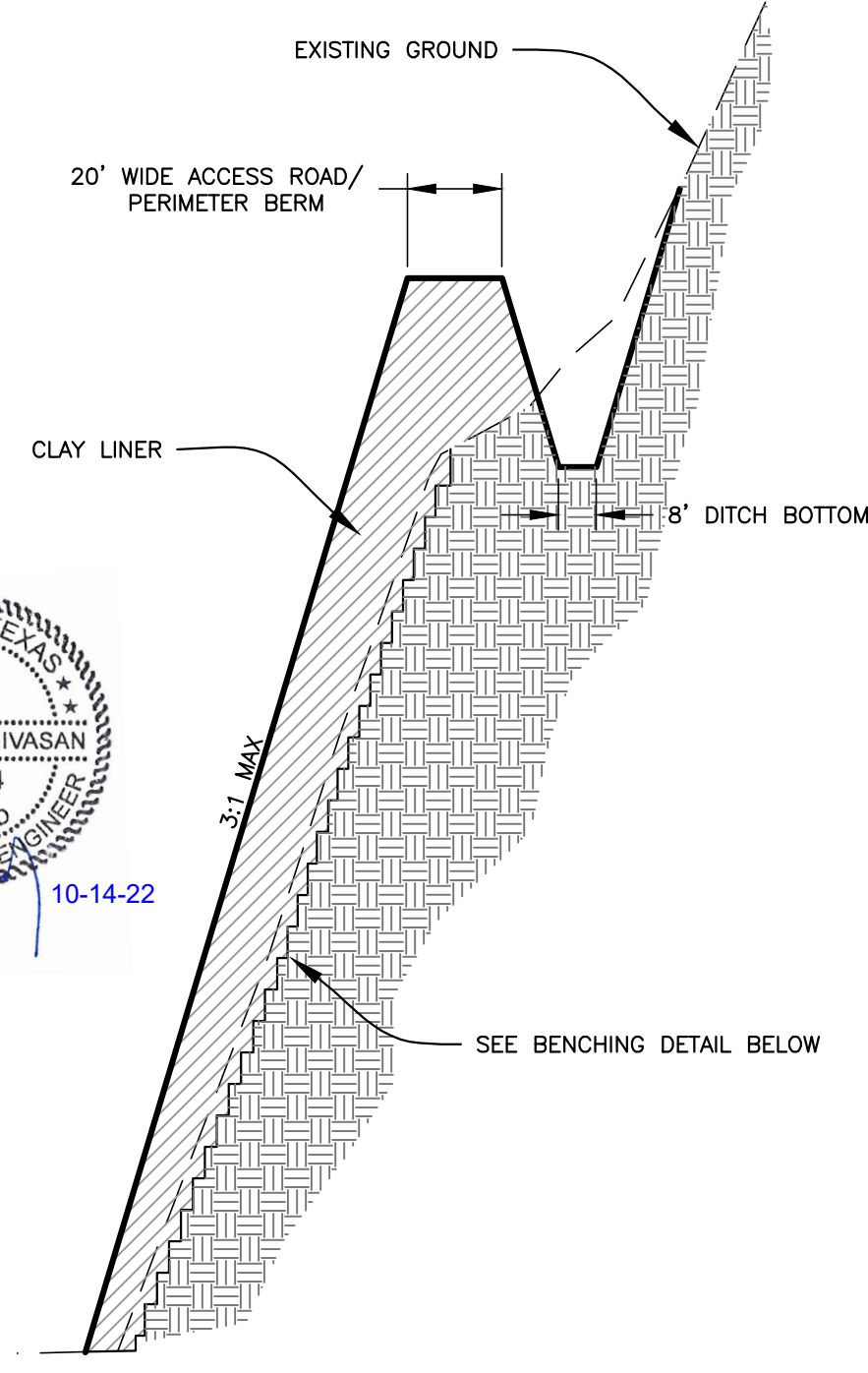
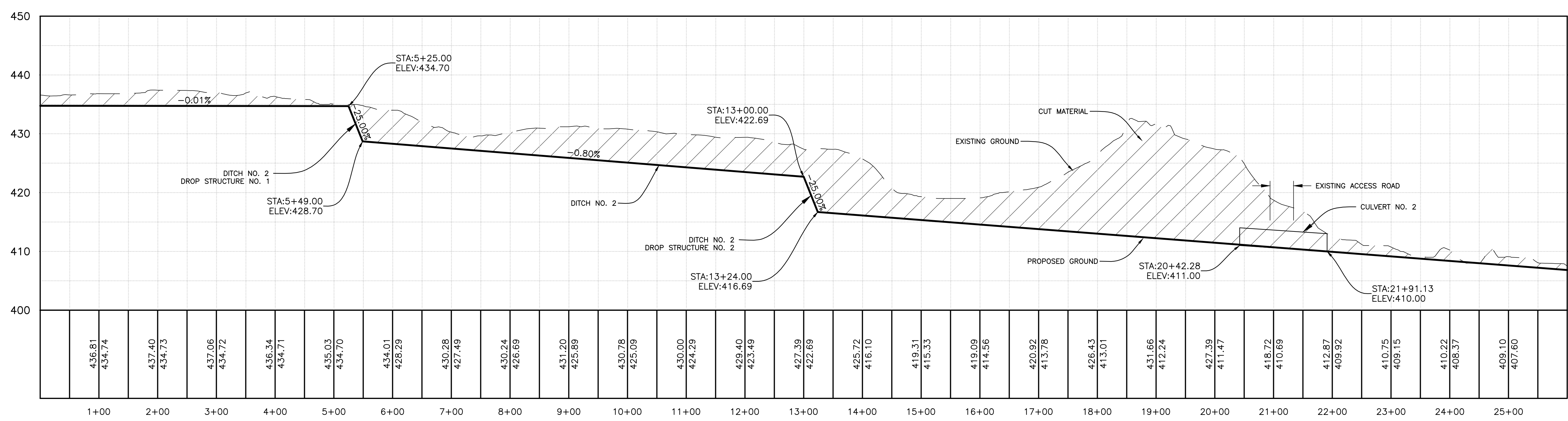
NO.	REVISION	BY	DATE
1	REMOVED FRENCH DRAIN DETAIL; ADDED RIP-RAP D/S OF UNDERDRAIN; LOW WATER CROSSING NOT-BUILT; 25YR & 100YR PEAK ELEVATIONS UPDATED; FRENCH DRAIN NOT INSTALLED; UPDATED CALLOUT ON SPILLWAY DETAIL	CAM	11-07-19

---	PROPOSED CONTOUR	▨	EXISTING POND
---	EXISTING CONTOUR	▨	PROPOSED POND
---	PROPOSED DITCH		
---	PERIMETER BERM/ ACCESS ROAD		

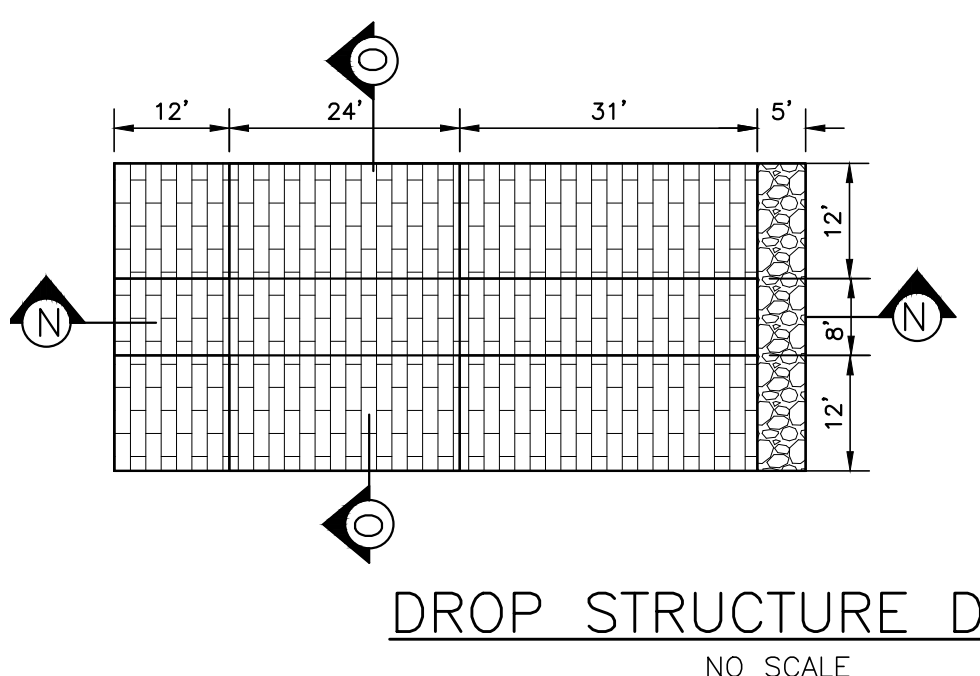


PLAN VIEW  
1"=100'

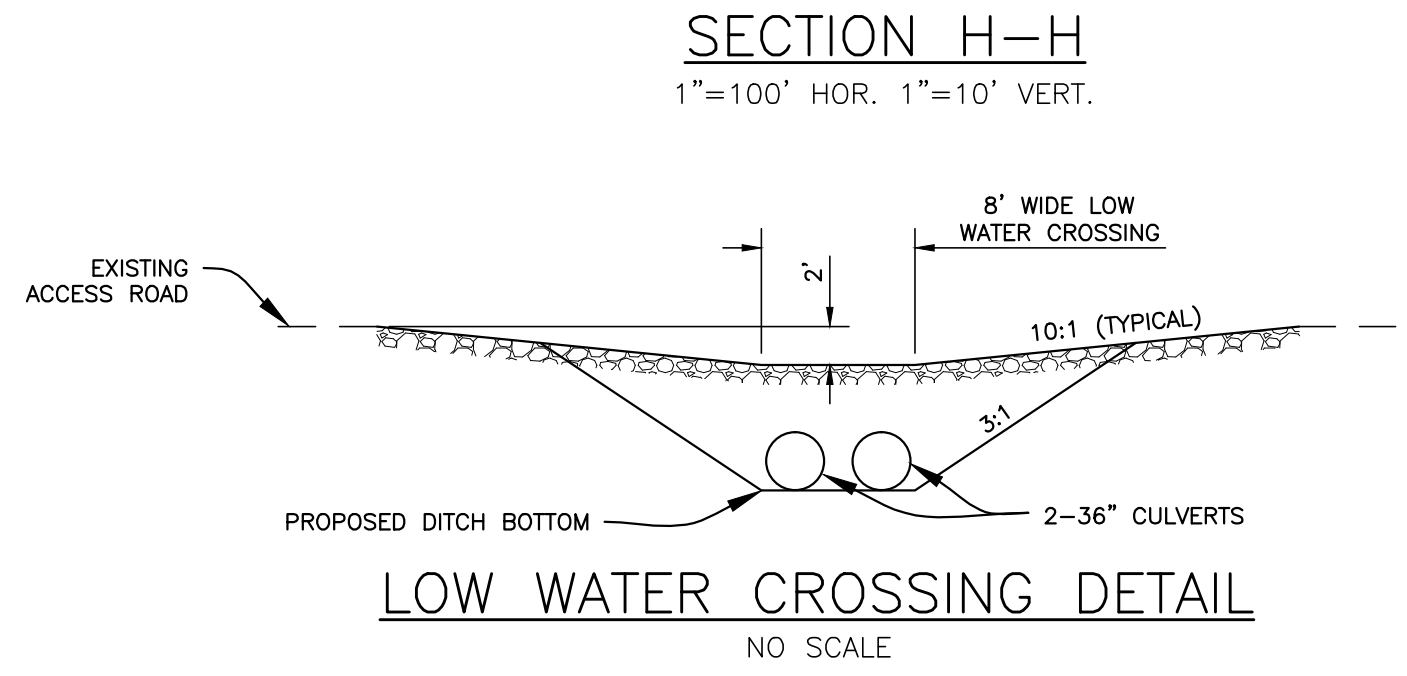
Point Table			
Point #	Northing	Easting	Elevation
17	540151.56	3142132.29	398.00
18	540168.00	3142092.46	394.00
19	540202.87	3142056.63	394.00
20	540242.24	3142039.13	398.00
21	540256.57	3142053.08	398.00
22	540238.59	3142083.02	396.00
23	540270.12	3142113.71	385.00
24	540271.67	3142123.59	383.00
25	540236.79	3142159.42	383.00
26	540226.87	3142158.14	385.00
27	540195.34	3142127.45	396.00
28	540165.90	3142146.24	398.00
29	540199.53	3142123.15	394.00
30	540234.40	3142087.32	394.00
31	540265.93	3142118.01	383.00
32	540231.06	3142153.84	383.00



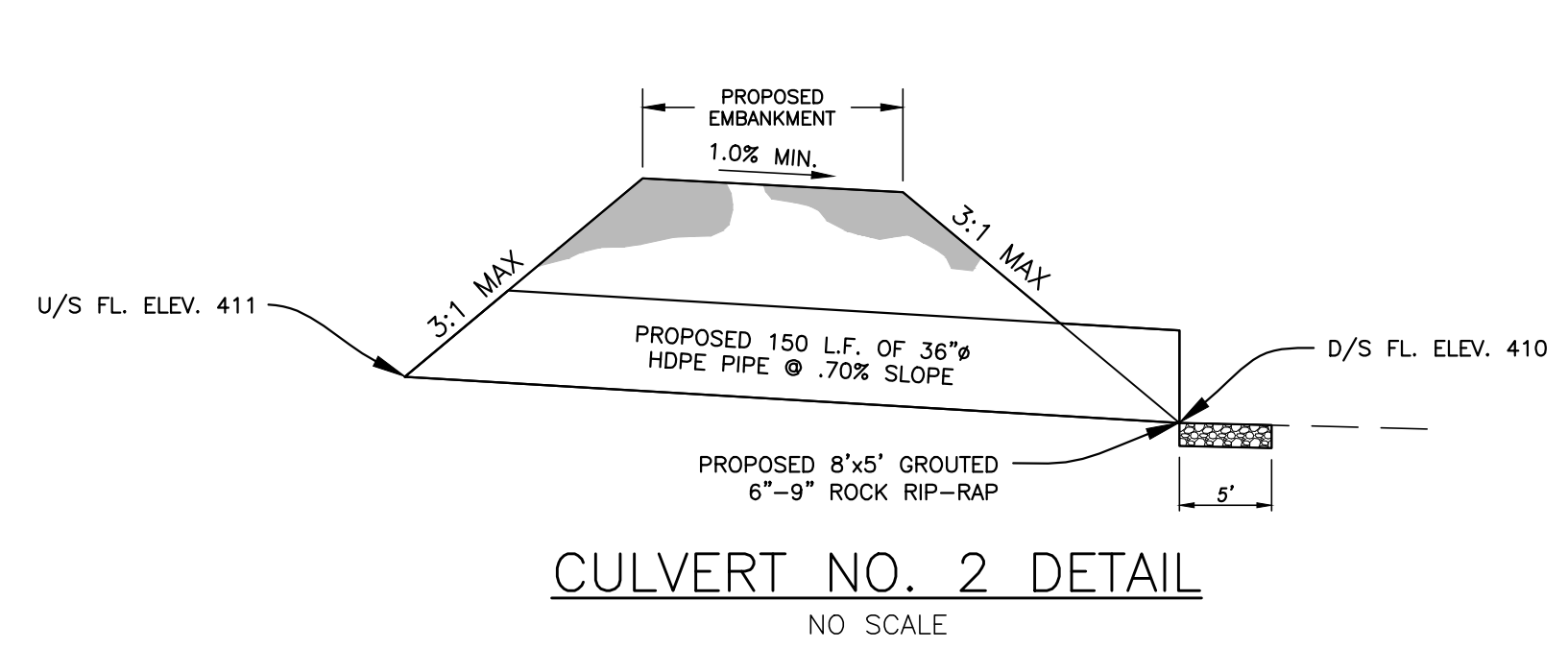
SLOPING DETAIL  
NO SCALE



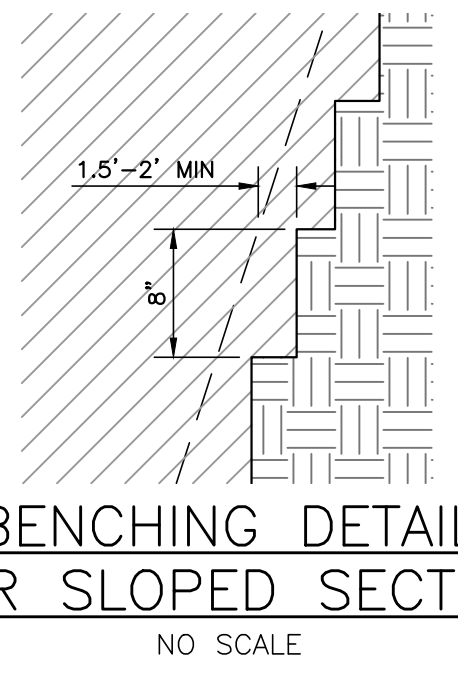
DROP STRUCTURE DETAILS  
NO SCALE



LOW WATER CROSSING DETAIL  
NO SCALE



CULVERT NO. 2 DETAIL  
NO SCALE



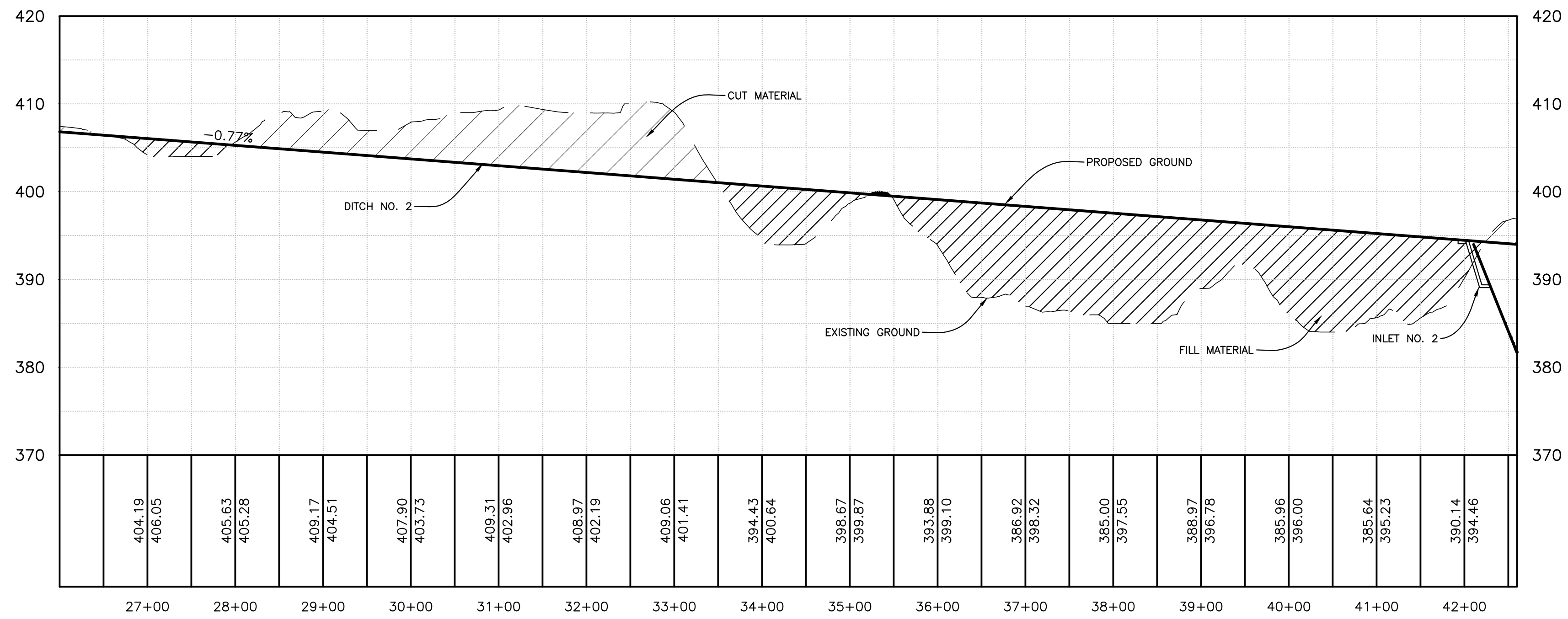
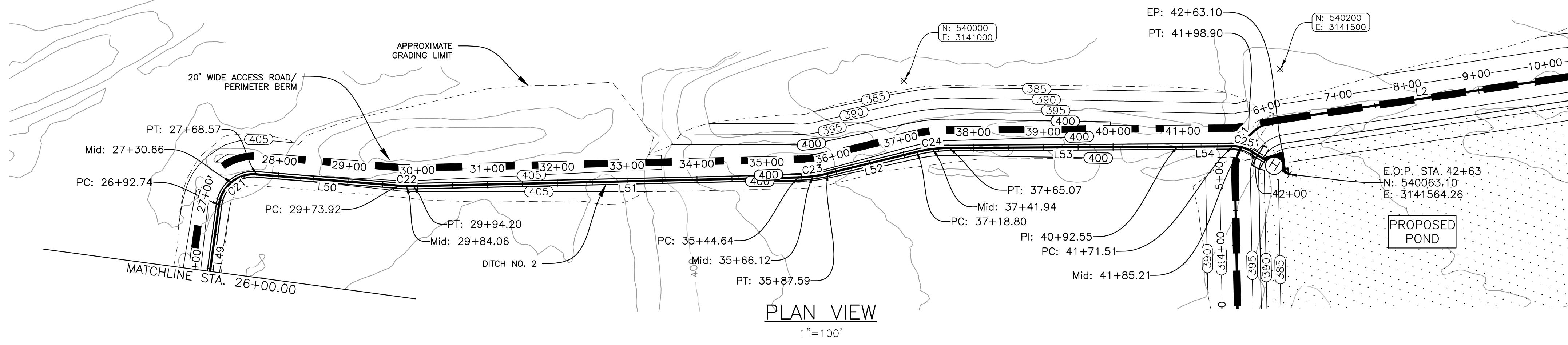
BENCHING DETAIL FOR SLOPED SECTION  
NO SCALE

Line Table		
Line #	Length	Direction
L43	598.51	N46° 36' 45.77"W
L44	1346.15	N18° 38' 38.76"W
L45	148.84	N28° 09' 12.17"W
L46	108.40	N32° 47' 56.66"W
L47	105.46	N17° 59' 55.38"W
L48	59.02	N1° 52' 16.04"W

Curve Table					
Curve #	Length	Radius	Delta	Chord Direction	Chord Length
C19	97.63	200.00	27.97	N32° 37' 42"W	96.66
C20	56.30	200.00	16.13	N9° 56' 06"W	56.11

NO.	REVISION	BY.	DATE

PROPOSED CONTOUR    EXISTING POND  
 EXISTING CONTOUR    PROPOSED POND  
 PROPOSED DITCH  
 PERIMETER BERM/ ACCESS ROAD



SECTION H-H (CONT.)  
1"=100' HOR. 1"=10' VERT.

Line Table		
Line #	Length	Direction
L49	172.44	N12° 22' 45.44"W
L50	205.35	N74° 30' 45.36"E
L51	550.44	N68° 42' 07.95"E
L52	131.21	N56° 23' 52.52"E
L53	327.47	N69° 39' 10.85"E
L54	78.97	N69° 39' 10.85"E
L55	64.20	S78° 57' 46.52"E

Point Table			
Point #	Northing	Easting	Elevation
17	540151.56	3142132.29	398.00
18	540168.00	3142092.46	394.00
19	540202.87	3142056.63	394.00
20	540242.24	3142039.13	398.00
21	540256.57	3142053.08	398.00
22	540238.59	3142083.02	396.00
23	540270.12	3142113.71	385.00
24	540271.67	3142123.59	383.00
25	540236.79	3142159.42	383.00
26	540226.87	3142158.14	385.00
27	540195.34	3142127.45	396.00
28	540165.90	3142146.24	398.00
29	540199.53	3142123.15	394.00
30	540234.40	3142087.32	394.00
31	540265.93	3142118.01	383.00
32	540231.06	3142153.84	383.00

Curve Table					
Curve #	Length	Radius	Delta	Chord Direction	Chord Length
C21	75.83	50.00	86.89	N31° 04' 00"E	68.77
C22	20.28	200.00	5.81	N71° 36' 27"E	20.27
C23	42.95	200.00	12.30	N62° 33' 00"E	42.87
C24	46.27	200.00	13.26	N63° 01' 32"E	46.17
C25	27.39	50.00	31.38	N85° 20' 42"E	27.05



10-14-22

NO.	REVISION	BY.	DATE

——— PROPOSED CONTOUR      [---] EXISTING POND  
 - - - - - EXISTING CONTOUR      [---] PROPOSED POND  
 - - - - - PROPOSED DITCH  
 [---] PERIMETER BERM/ ACCESS ROAD

Registration No.: CCR112  
 Registrant:

**Table IV.D. - Inspection Schedule of Landfills**

Facility Unit(s) and Basic Elements	Possible Error, Malfunction, or Deterioration	Frequency of Inspection
CCR Landfill	Evidence of crest surface cracking (or movement)	1/week (not to exceed 7 days) by qualified onsite personnel; Annually by qualified P.E.
CCR Landfill	Evidence of parallel surface cracking (along slope face)	1/week (not to exceed 7 days) by qualified onsite personnel; Annually by qualified P.E.
CCR Landfill	Occurrence of subsidence or seeps	1/week (not to exceed 7 days) by qualified onsite personnel; Annually by qualified P.E.
CCR Landfill	Evidence of slope failure (toe movement)	1/week (not to exceed 7 days) by qualified onsite personnel; Annually by qualified P.E.



**Coal Combustion Residual (CCR) Landfill  
2021 Annual Inspection**

**Twin Oaks Power Generating Station  
Robertson County, Texas**

**January 5, 2022**

# Table of Contents

- 1.0 INTRODUCTION ..... 1**
- 2.0 GENERAL LANDFILL INFORMATION ..... 2**
- 3.0 LANDFILL INSPECTION AND OBSERVATIONS..... 2**
  - 3.1 OPERATING RECORD REVIEW ..... 2**
  - 3.2 ASH LANDFILL INSPECTION ..... 2**
  - 3.3 FINAL DISCUSSION..... 3**
- 4.0 ANNUAL CCR LANDFILL INSPECTION ..... 4**

## **1.0 Introduction**

The following Annual Landfill Inspection is intended to fulfill the requirements of Coal Combustion Residual (CCR) Rule §257.84 - *Inspection Requirements for CCR Landfills* (40 CFR §257.84). This report contains the inspection findings, observations, and photographic descriptions of the onsite CCR landfill located at the Twin Oaks Generating Station near Bremond, Texas.

The onsite inspection of the ash landfill was completed by Mr. John J. Tayntor, P.E. on December 9, 2021, and conducted in general accordance with 40 CFR §257.84(b).

## **2.0 General Landfill Information**

The Twin Oaks Power (TOP) utility landfill disposes of Coal Combustion Residuals (CCR's) from combustion of the lignite fuel source from the adjacent power generating station. Near the time of the inspection (December 9, 2021) the CCR landfill contained an approximate volume of 11.9 million cubic yards of placed and compacted ash by-product material [40 CFR §257.84(b)(2)(ii)].

## **3.0 Landfill Inspection and Observations**

### **3.1 Operating Record Review**

In accordance with 40 CFR §257.84(b)(i) the weekly landfill inspection reports in the facility operating record were reviewed for any documented changes in the landfill geometry or overall condition. The weekly inspection documentation did not report any issue or change that would signify distress of the landfill. The review of the operating record was conducted prior to field inspection of the ash landfill. In addition, a meeting was held with the qualified person conducting the weekly inspections to identify any areas of concern, none were noted. A review of the initial annual landfill inspection report was conducted prior to the inspection.

### **3.2 Ash Landfill Inspection**

Ambient ground conditions at the time of the inspection were varied, ranging between soft and saturated to firm and dry. Based on information gathered by the National Weather Service (Bremond and Waco Area, Texas), the general area received approximately 38 inches of rainfall for 2021, which is about average for the region.

The inspection [40 CFR §257.84(b)] of the ash landfill consisted of walking along the landfill toe and crest. Slope lengths were traversed and inspected for any existing signs or potential signs of distress, or areas of concern, or areas of instability requiring corrective action or additional observation. The top of the landfill was traversed and inspected for any ponding of storm water, subsidence, cracking or similar areas of potential distress caused by differential movement or settlement in the ash fill. No visible signs of slope creep, longitudinal cracking or wedge failures were noted during the inspection. Inspection of the

toes did not reveal any evidence of bulging, displacement, or subsidence that may signal potential distress, indicate actual distress or actual structural slope failure. At the time of the inspection, no existing conditions were noted that could potentially disrupt the safe operation of the landfill. No areas of erosion were noted along the slope lengths; that would require additional monitoring or immediate corrective action or cause landfill or slope instability.

During the inspection, there was no observation of uncontrolled releases of ash or stormwater from perimeter drainage ditches. Photographs obtained during the inspection are contained in the Appendix of this inspection report.

### **3.3 Final Discussion**

Based on observations during the inspection on December 9, 2021, the ash landfill at the TOP Generating Station appears to be stable with no signs of distress, structural weakness and no current activities that may jeopardize the safety of the landfill. Per the review of the facility's operating record, weekly landfill inspections are being conducted as required and being completed by a qualified person.

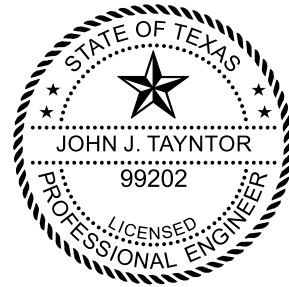
General maintenance activities at the landfill will be ongoing as weather and subgrade conditions allow.

#### 4.0 Annual CCR Landfill Inspection

By means of this certification, (i) I am familiar with the requirements of 40 CFR §257.84(b) – *Inspection Requirements for CCR Landfills*, (ii) visited and examined the facility, (iii) and the 2021 Annual CCR Landfill Inspection Report for the Twin Oaks Power onsite CCR Landfill has been prepared to the best of my knowledge in accordance with 40 CFR §257.84(b).

By:  \_\_\_\_\_

Dated: January 5, 2022



TBPE Firm Registration No. F-16721  
Expires 2/28/2022

## **Appendix**

### **Landfill Inspection Photographs**



Photo No. 1 – North portion of west perimeter drainage ditch, view south.



Photo No. 2 – North perimeter drainage ditch, view west.





Photo No. 3 – North perimeter drainage ditch, view east.



Photo No. 4 – Stormwater Pond No. 3, view southeast.



Photo No. 5 – Stormwater Pond 009, view northeast.



Photo No. 6 – Active disposal area, view northwest.



Photo No. 7 – South side slope crest, view east.



Photo No. 8 – South side slope crest, view west.



Photo No. 9 – East side slope crest, view north.



Photo No. 10 – East perimeter drainage ditch (south of Pond No. 3), view south.



Photo No. 11 – East perimeter drainage ditch (north of Pond No. 3), view north.



Photo No. 12 – West perimeter drainage ditch, view south.

**Table VI.A. - Unit Groundwater Detection Monitoring Systems**

Waste Management Unit/Area Name <sup>1</sup>						
Well Number(s):	MW-7	MW-11	MW-12	MW-13	MW-14	MW-15
Hydrogeologic Unit Monitored	Unit II	Unit II	Unit II	Unit II	Unit II	Unit II
Type (e.g., point of compliance, background, observation, etc.)	Background	Background	Background	Point of Compliance	Point of Compliance	Point of Compliance
Up or Down Gradient	Up-gradient	Up-gradient	Up-gradient	Down-gradient	Down-gradient	Down-gradient
Casing Diameter and Material	2" PVC	2" PVC	2" PVC	2" PVC	2" PVC	2" PVC
Screen Diameter and Material	2" PVC	2" PVC	2" PVC	2" PVC	2" PVC	2" PVC
Screen Slot Size (in.)	0.010"	0.010"	0.010"	0.010"	0.010"	0.010"
Top of Casing Elevation (Ft, Mean Sea Level <i>[MSL]</i> )	411.60	406.93	387.27	398.32	394.68	410.47
Grade or Surface Elevation (Ft, MSL)	408.63	402.70	383.28	394.74	391.08	406.68
Well Depth (Ft, Below Grade Surface <i>[BGS]</i> )	29	35	40	30	33	45
Well Depth (Ft, Below Top of Casing <i>[BTOC]</i> )	31.97	39.23	43.99	33.58	36.60	48.79
Screen Interval From (Ft, BGS) To (Ft, BGS)	19 - 29	20-35	30-40	15-30	18-33	35-45
Screen Interval From (Ft, BTOC) To (Ft, BTOC)	21.97-31.97	24.23-39.23	33.99-43.99	18.58-33.58	21.60-36.60	38.79-48.79

Registration No.: CCR112  
 Registrant: Twin Oaks

Waste Management Unit/Area Name <sup>1</sup>						
Well Number(s):	MW-16	MW-17				
Hydrogeologic Unit Monitored	Unit II	Unit II				
Type (e.g., point of compliance, background, observation, etc.)	Background	Point of Compliance				
Up or Down Gradient	Up-gradient	Down-gradient				
Casing Diameter and Material	2" PVC	2" PVC				
Screen Diameter and Material	2" PVC	2" PVC				
Screen Slot Size (in.)	0.010"	0.010"				
Top of Casing Elevation (Ft, Mean Sea Level <i>[MSL]</i> )	422.54	405.87				
Grade or Surface Elevation (Ft, MSL)	418.66	403.07				
Well Depth (Ft, Below Grade Surface <i>[BGS]</i> )	45	36				
Well Depth (Ft, Below Top of Casing <i>[BTOC]</i> )	48.88	38.80				
Screen Interval From (Ft, BGS) To (Ft, BGS)	35-45	26-36				
Screen Interval From (Ft, BTOC) To (Ft, BTOC)	38.88-48.88	28.80-38.80				

<sup>1</sup> From Tables in Section I.; *MSL*: Mean Sea Level; *BGS*: Below Grade Surface; *BTOC*: Below Top of Casing

COAL COMBUSTION RESIDUALS (CCR) LANDFILL  
TWIN OAKS POWER STATION  
ROBERTSON COUNTY, TEXAS

**GROUNDWATER SAMPLING AND ANALYSIS PLAN**

PREPARED FOR

MR. EDDY YOUNG  
TWIN OAKS POWER STATION  
13065 PLANT ROAD  
BREMONT, TEXAS 76629

**JANUARY 12, 2022**  
**REVISED OCTOBER 20, 2022**

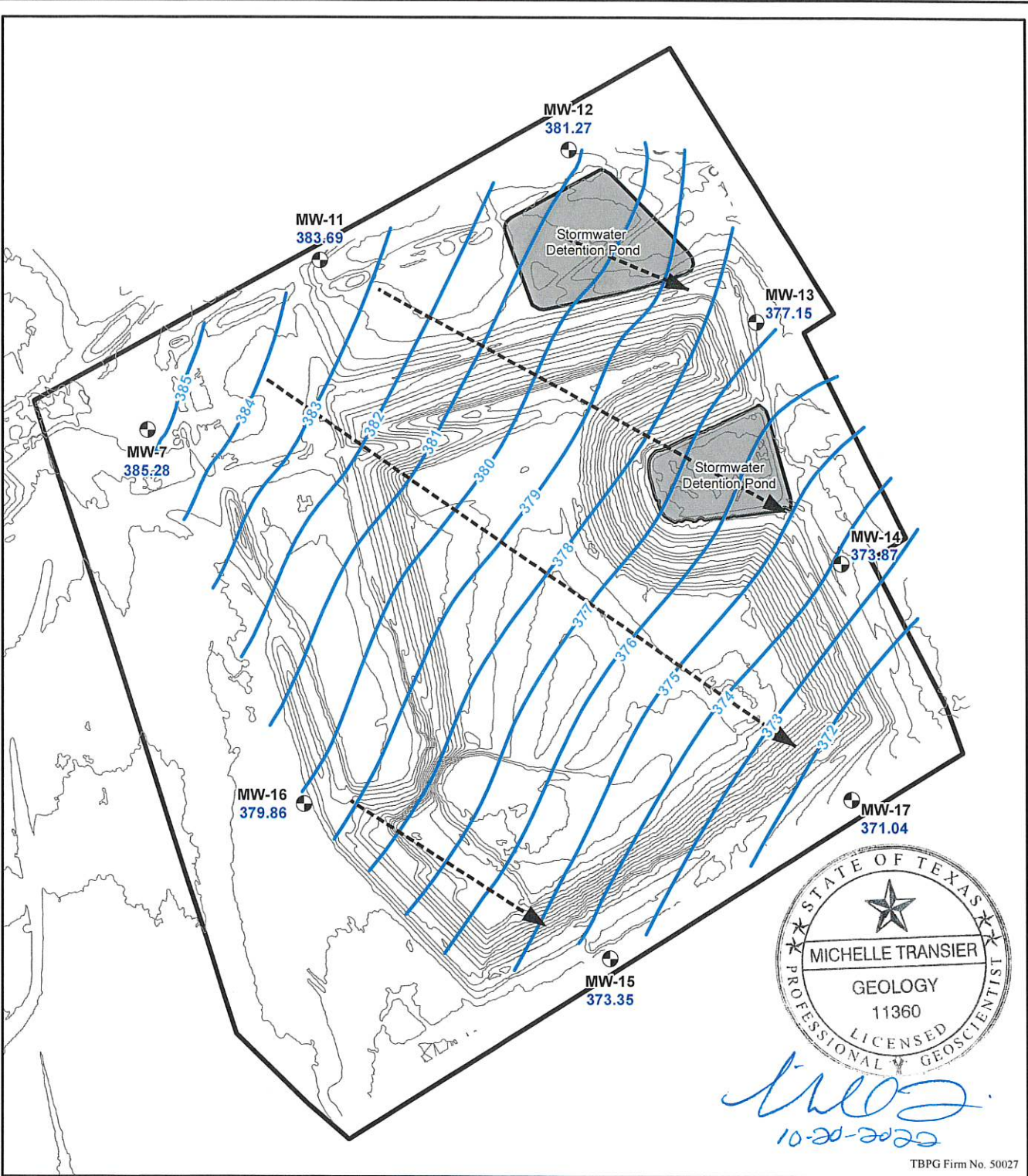


Michelle K. Transier, P.G.  
Senior Geologist



HYDREX ENVIRONMENTAL  
1120 NW STALLINGS DRIVE  
NACOGDOCHES, TEXAS 75964-3428



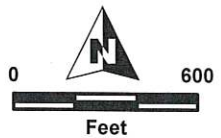


- Monitor Well
- Approx. Groundwater Flow Direction
- Groundwater Contour
- Pond
- 5-ft Ground Surface Contour
- Property Boundary
- Groundwater Elevation (Elevation Feet, MSL)



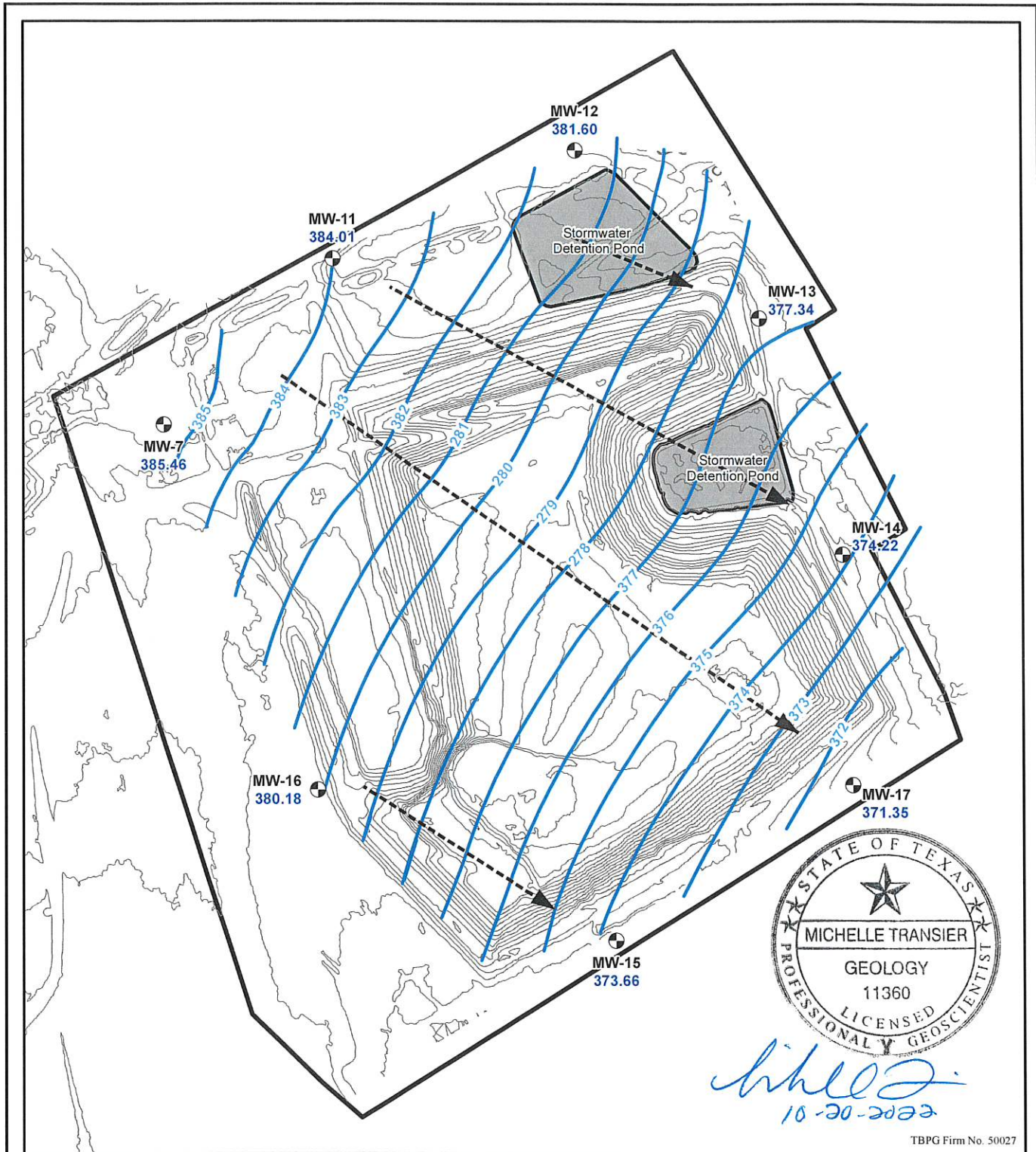
*Michelle Transier*  
10-20-2022

TBPG Firm No. 50027

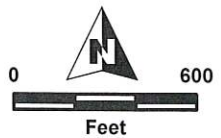


GROUNDWATER CONTOUR MAP  
← WATER LEVELS MEASURED (3/16/2016) →

CCR Landfill  
Twin Oaks Power Station  
13065 Plant Road  
Bremond (Robertson County), Texas 76629  
Map Revised: 10/20/2022 | Project Number: I-14-1007 | GIS Analyst: JLD



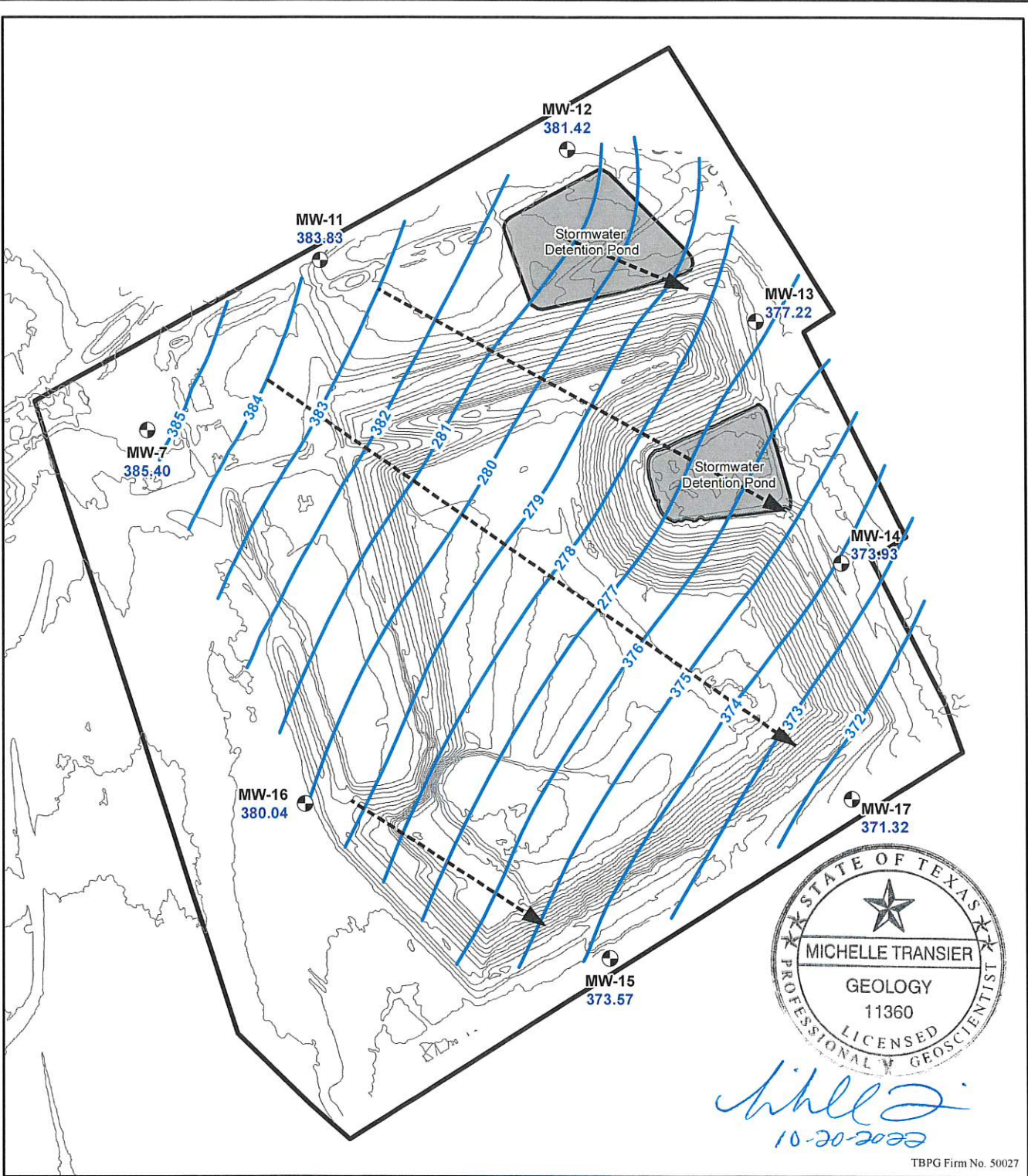
- Monitor Well
- Property Boundary
- 5-ft Ground Surface Contour
- Approx. Groundwater Flow Direction
- Pond
- Groundwater Contour
- Groundwater Elevation (Elevation Feet, MSL)



**GROUNDWATER CONTOUR MAP**  
 ← WATER LEVELS MEASURED (3/23/2016) →

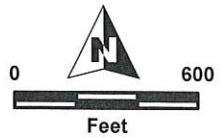
**CCR Landfill**  
**Twin Oaks Power Station**  
**13065 Plant Road**  
**Bremond (Robertson County), Texas 76629**

Map Revised: 10/20/2022    Project Number: I-14-1007    GIS Analyst: JLD



TBPG Firm No. 50027

- Monitor Well
- Approx. Groundwater Flow Direction
- Groundwater Contour
- Pond
- 5-ft Ground Surface Contour
- Property Boundary
- Groundwater Elevation (Elevation Feet, MSL)

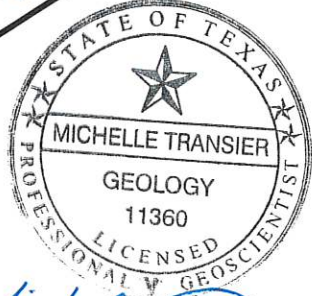
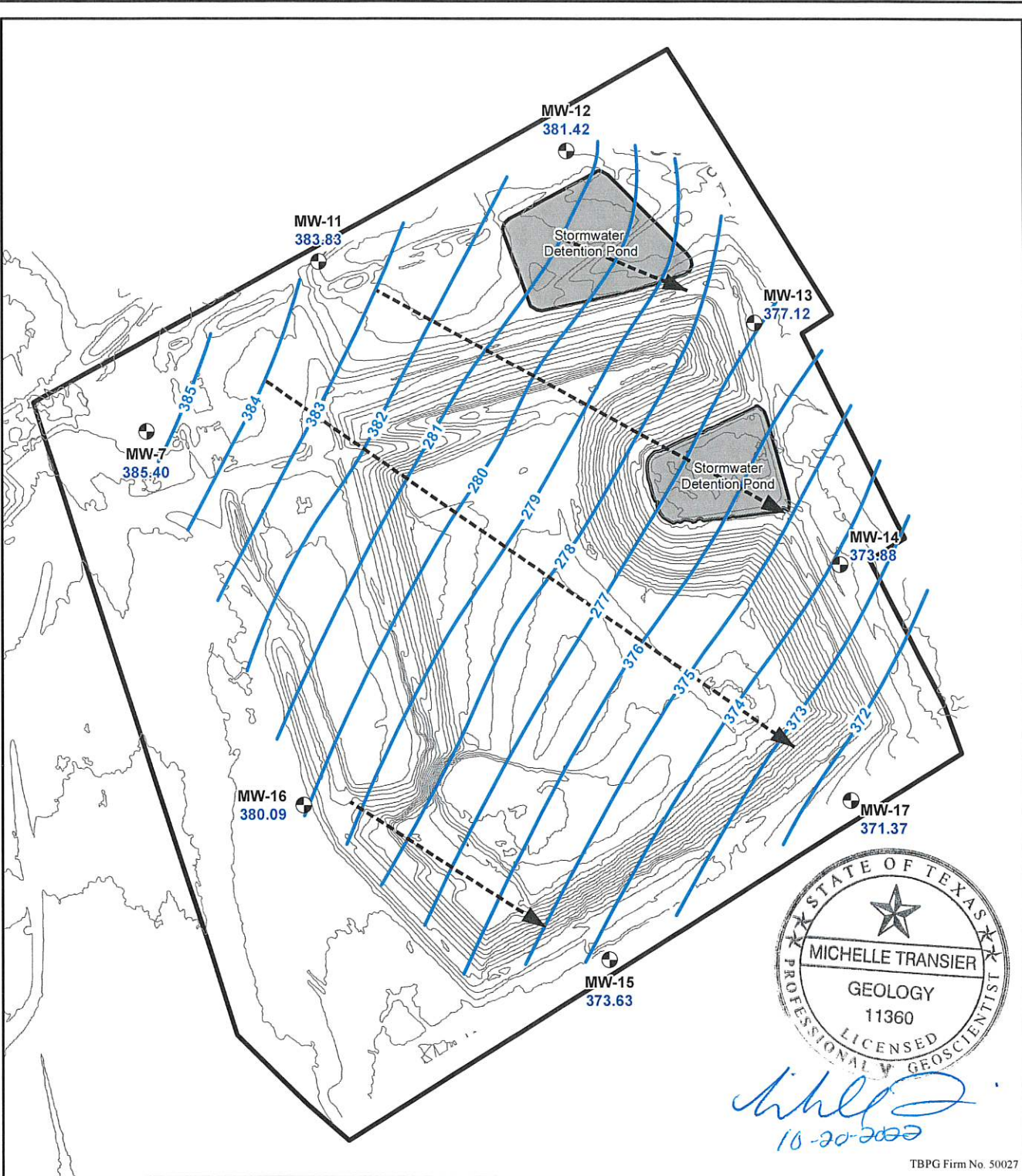


GROUNDWATER CONTOUR MAP

← WATER LEVELS MEASURED (3/29/2016) →

**CCR Landfill**  
**Twin Oaks Power Station**  
**13065 Plant Road**  
**Bremond (Robertson County), Texas 76629**

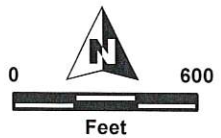
Map Revised: 10/20/2022    Project Number: I-14-1007    GIS Analyst: JLD



*Michelle Transier*  
10-20-2022

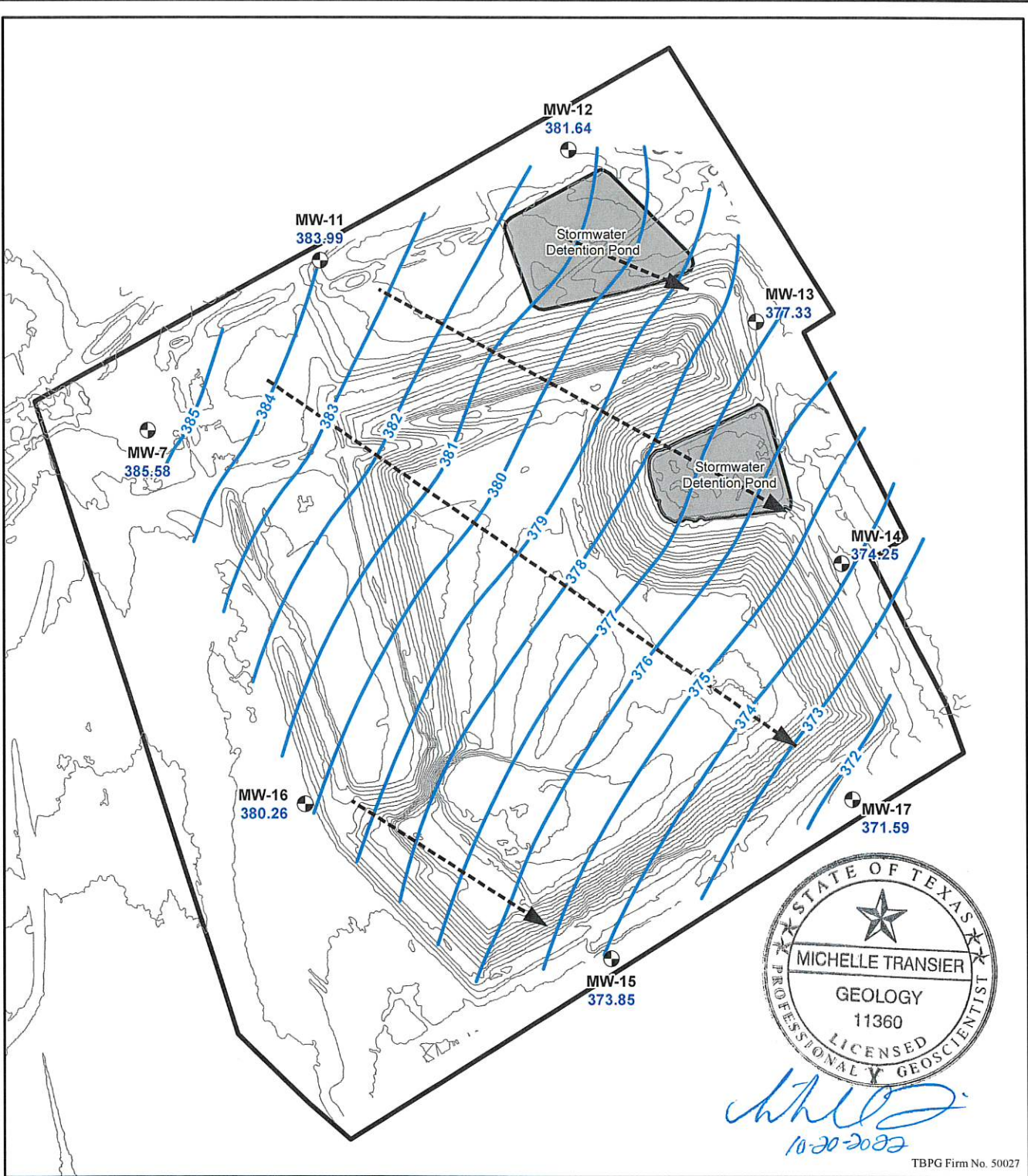
TBPG Firm No. 50027

- ⊕ Monitor Well
- > Approx. Groundwater Flow Direction
- 5-ft Ground Surface Contour
- ▭ Pond
- ▭ Property Boundary
- Groundwater Contour
- 385 Groundwater Elevation (Elevation Feet, MSL)

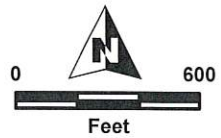


GROUNDWATER CONTOUR MAP  
← WATER LEVELS MEASURED (4/07/2016) →

CCR Landfill  
Twin Oaks Power Station  
13065 Plant Road  
Bremond (Robertson County), Texas 76629  
Map Revised: 10/20/2022 | Project Number: I-14-1007 | GIS Analyst: JLD



● Monitor Well  
 -> Approx. Groundwater Flow Direction  
 — Groundwater Contour  
 □ Pond  
 — 5-ft Ground Surface Contour  
 □ Property Boundary  
 — Groundwater Elevation  
 385 (Elevation Feet, MSL)

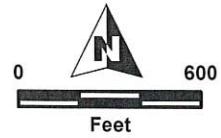
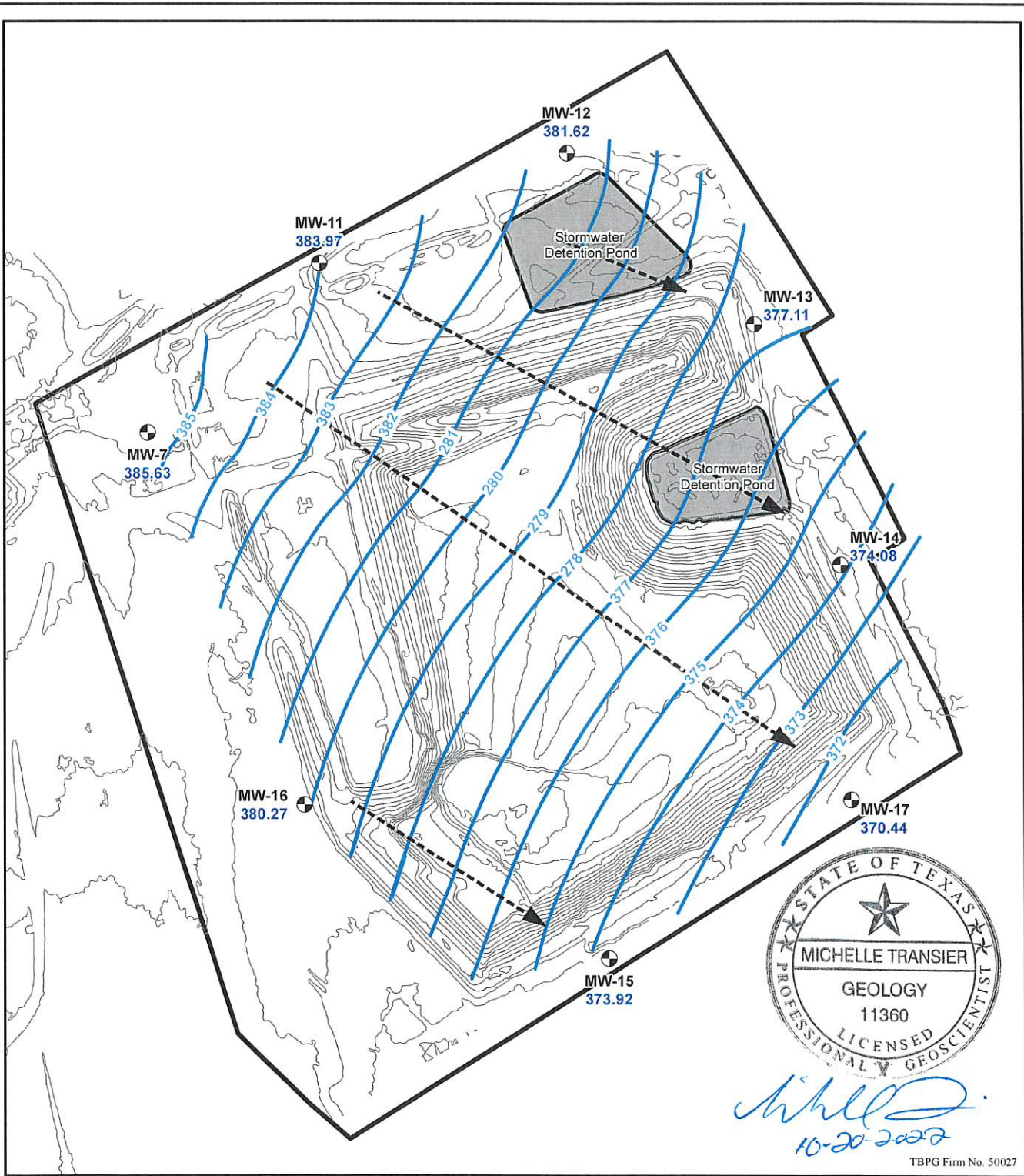


GROUNDWATER CONTOUR MAP

← WATER LEVELS MEASURED (4/26/2016) →

CCR Landfill  
 Twin Oaks Power Station  
 13065 Plant Road  
 Bremond (Robertson County), Texas 76629

Map Revised: 10/20/2022 | Project Number: I-14-1007 | GIS Analyst: JLD



● Monitor Well  
 -> Approx. Groundwater Flow Direction  
 — Groundwater Contour  
 □ Pond  
 — 5-ft Ground Surface Contour  
 □ Property Boundary  
 — Groundwater Elevation  
 385 (Elevation Feet, MSL)



GROUNDWATER CONTOUR MAP

← WATER LEVELS MEASURED (5/17/2016) →

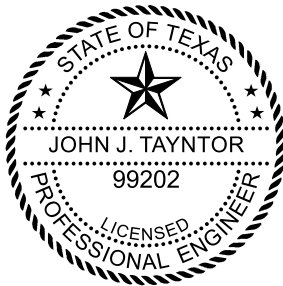
CCR Landfill  
 Twin Oaks Power Station  
 13065 Plant Road  
 Bremond (Robertson County), Texas 76629

Map Revised: 10/20/2022 | Project Number: I-14-1007 | GIS Analyst: JLD

# GROUNDWATER MONITORING SYSTEM CERTIFICATION

## COAL COMBUSTION RESIDUALS (CCR) LANDFILL TWIN OAKS POWER STATION ROBERTSON COUNTY, TEXAS

I certify I am a licensed professional engineer in the State of Texas and a *qualified professional engineer* as defined in 40 CFR §257.53. I certify that the groundwater monitoring system installed at the Twin Oaks Power Station's CCR landfill, as discussed in the Groundwater Sampling and Analysis Plan prepared by Hydrex Environmental and dated January 12, 2022, has been designed and constructed to meet the requirements of 30 TAC §352.911 and 40 CFR §257.91.



TBPE Firm Registration No. F16721

A handwritten signature in black ink, appearing to read "J. Tayntor", written over a horizontal line.

John J. Tayntor, P.E.  
Auckland Consulting, LLC

October 20, 2022

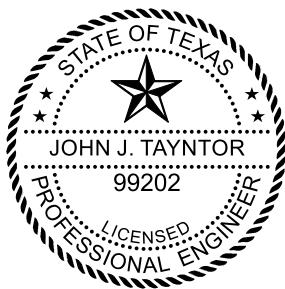
Date

## STATISTICAL METHODS CERTIFICATION

### COAL COMBUSTION RESIDUALS (CCR) LANDFILL TWIN OAKS POWER STATION ROBERTSON COUNTY, TEXAS

I certify I am a licensed professional engineer in the State of Texas as defined in 40 CFR §257.53. I certify that the statistical methods chosen to evaluate the groundwater monitoring data collected from the groundwater monitoring system installed at the Twin Oaks Power Station's CCR landfill, as discussed in detail in the Groundwater Sampling and Analysis Plan prepared by Hydrex Environmental and dated January 12, 2022, are appropriate and meet the requirements of 30 TAC §352.931 and 40 CFR §257.93.

Control charts are the preferred statistical evaluation method for data that demonstrate normal/transformed-normal distributions. Prediction limits are the preferred statistical evaluation method for heavy metals and radionuclides. The probability distribution and percentage of non-detects within any given data set will determine whether a non-parametric or parametric prediction interval is most appropriate. In cases where non-parametric prediction limits are not appropriate, a non-parametric rank sum test in conjunction with a contrast test will be used to evaluate the data. Trend analyses may be used as a supplement to prediction intervals and control charts. Retesting for the purpose of statistical analysis will be performed as necessary on an individual well/constituent basis and will generally follow a 1-of-m approach.



TBPE Firm Registration No. F16721

A handwritten signature in black ink, appearing to read "J. Tayntor", written over a horizontal line.

John J. Tayntor, P.E.  
Auckland Consulting, LLC

October 20, 2022

Date



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

Parameter	Sampling Frequency	Analytical Method	Practical Quantification Limit (units)	Concentration Limit <sup>1</sup>
Boron	Semi-Annual	Method 6020A	0.0100 (mg/L)	Statistical Limit <sup>2</sup>
Calcium	Semi-Annual	Method 6010B	0.200 (mg/L)	Statistical Limit <sup>2</sup>
Chloride	Semi-Annual	Method 300.0	0.500 (mg/L)	Statistical Limit <sup>2</sup>
Fluoride	Semi-Annual	Method 300.0	0.500 (mg/L)	Statistical Limit <sup>2</sup>
pH	Semi-Annual	Method SM 4500 H+ B		Statistical Limit <sup>2</sup>
Sulfate	Semi-Annual	Method 300.0	0.500 (mg/L)	Statistical Limit <sup>2</sup>
Total Dissolved Solids (TDS)	Semi-Annual	Method SM 2540C	5.00 (mg/L)	Statistical Limit <sup>2</sup>

1 The concentration limit is the basis for determining whether a release has occurred from the CCR unit/area.

2 Limits are well by well and are generated in accordance with Groundwater Sampling and Analysis Plan.

# **BACKGROUND GROUNDWATER STATISTICAL EVALUATION AND UPDATE**

**TWIN OAKS POWER STATION  
COAL COMBUSTION RESIDUALS (CCR) LANDFILL  
ROBERTSON COUNTY, TEXAS**

**January 28, 2022**

**Prepared By:**



**1120 NW Stallings Drive  
Nacogdoches, Texas 75964  
TBPG Firm No. 50027**

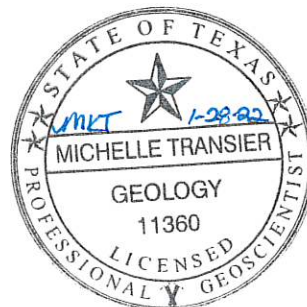
# BACKGROUND GROUNDWATER STATISTICAL EVALUATION AND UPDATE

## TWIN OAKS POWER STATION COAL COMBUSTION RESIDUALS (CCR) LANDFILL ROBERTSON COUNTY, TEXAS

January 28, 2022



Michelle K. Transier, P.G.  
Geologist



Prepared by:  
Hydrex Environmental  
Nacogdoches, Texas  
TBPG Firm No. 50027

## Contents

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<b>Trend Analysis .....</b>	<b>3</b>
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## Appendices

- Appendix A – Groundwater Contour Map**
- Appendix B – Baseline Data Set**
- Appendix C – Statistical Evaluation of Background Data**

## **Introduction**

The following information is submitted, on behalf of Twin Oaks Power Station Coal Combustion Residuals (CCR) Landfill, as an updated evaluation of the background groundwater data pool for the above-referenced facility. This correspondence includes statistical evaluation of Appendix III (detection monitoring constituents) monitoring data, performed in accordance with 30 TAC §352.941, 40 CFR §257.94, and using the statistical procedures presented in the approved Groundwater Sampling and Analysis Plan (GWSAP), for monitoring wells MW-13, MW-14, MW-15, and MW-17. This background evaluation includes data collected between June 2016 and June 2021. The findings of the background evaluation are presented below.

## **Statistical Methodologies**

Statistical evaluation of constituent concentration data for the facility shows high levels of spatial variability between upgradient groundwater monitoring wells (MW-7, MW-11, MW-12, and MW-16). Since the facility's upgradient monitoring wells are unaffected by landfilling of CCR waste due to their hydrologic position with respect to waste placement, the upgradient spatial variability observed is considered a reflection of the groundwater quality within the uppermost aquifer passing beneath the CCR facility. Based on the geologic environment that is present at the site, this natural spatial variability is expected to be evident in all monitoring wells installed for purposes of compliance with the performance standards detailed in 30 TAC §352.911 and 40 CFR 257.91(a), including the facility's downgradient monitoring wells.

In our professional opinion, interwell statistical evaluations alone would not adequately account for the natural spatial variability of the groundwater quality that has been observed within the uppermost aquifer and may lead to unacceptable rates of false positive results. Although all of the monitoring wells are screened in the same aquifer, the variable geochemistry at the site is such that data from upgradient wells may not be adequately representative of natural conditions in the downgradient wells. Background sampling data from downgradient wells provide an indication of background groundwater quality that is as representative or more representative than that provided by the upgradient wells, in accordance with 30 TAC §352.911 and 40 CFR 257.91(a)(ii). Therefore, intrawell statistical methodologies are the most appropriate methodologies for evaluating the facility's groundwater monitoring data as per the requirements of 30 TAC §352.931 and 40 CFR 257.93(h). Analysis of the downgradient background data indicates that constituent levels are representative of groundwater quality within the uppermost aquifer passing beneath the CCR facility, not affected by landfilling of CCR waste, and are thus appropriate for use as background data for statistical comparison in future sampling events. In our professional opinion, the statistical methodologies employed to meet the requirements of 30 TAC §352.931 and 40 CFR 257.93(h) are in accordance with the recommendations presented in Environmental Protection Agency (EPA) document titled, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance (Unified Guidance) and meet the performance standards detailed in 30 TAC §352.911 and 40 CFR 257.91(a).

## Outliers

Statistical evaluations applied to groundwater monitoring data assume the use of appropriate and representative background data. Data that reflect natural and non-impacted conditions are necessary for identification of true statistically significant increases. Determination of appropriate and representative background data necessitates evaluation of the data set for outliers. The outlier analysis identifies data points that do not seem to fit the distribution of the rest of the data set and determines if the identified difference is statistically significant. The purpose of identification of outliers within groundwater monitoring background data sets is to eliminate data that would result in a skewed statistical limit. Statistical evaluation of the background data for the referenced wells included an outlier analysis. In addition to statistical identification of outliers, the background data set was also reviewed for visually apparent outliers.

As some constituents are often sporadically detected in groundwater samples, the resultant non-parametric evaluations may employ high value background data points if high value outliers are not removed. Although removal of these high value outliers normally increases the statistical power, EPA guidance recommends that outliers generally not be removed unless an error or discrepancy is identified. Therefore, constituent concentrations that present statistical outliers with no apparent trends or source for the increased concentrations were closely scrutinized prior to removal from the data set. Concentrations determined to be visually apparent outliers were evaluated to determine if the concentrations represented natural conditions. Outlier values not determined to be representative of natural conditions were removed from the background data set. The following table presents all determined outliers and the results of the outlier analysis for the referenced wells. In addition, copies of the results of the statistical outlier analyses are included as attachments to this report (Appendix C).

### Results of Outlier Analysis

Well ID	Sample Date	Constituent	Value*	Retained in Data Set?	Reason for Removal/Retention
MW-13	6/14/2016	chloride	75.8	No	Statistically low value outlier
MW-14	10/10/2017	pH	5.9	Yes	Statistically low value outlier/within ranges of pH concentrations at site/representative of natural variation
	10/27/2020	boron	0.497	No	Visually high value outlier
	10/27/2020	calcium	112	No	Visually high value outlier
	6/23/2021		130	No	Visually high value outlier
	4/28/2021	chloride	381	No	Visually high value outlier
	6/23/2021	sulfate	545	No	Visually high value outlier
	4/28/2021	TDS	1520	No	Visually high value outlier
MW-15	6/23/2021	calcium	30	Yes	Statistically high value outlier/within ranges of calcium concentrations at site/representative of natural variation
	10/10/2017	pH	5.63	Yes	Statistically low value outlier/within ranges of pH concentrations at site/representative of natural variation
MW-17	7/26/2016	boron	0.362	Yes	Statistically high value outlier/within ranges of boron concentrations at site/representative of natural variation

\*Value: pH – SU, all others – mg/L

### Trend Analysis

In addition to outliers, background data sets should be evaluated for any statistical trends. A combination Mann-Kendall and Sen’s Slope Estimator analysis was employed to evaluate the referenced background data for significant trends. The Mann-Kendall test evaluates the data for trends, while the Sen’s Slope Estimator analysis indicates if a data trend is increasing or decreasing. Increasing statistical trends can indicate potential impact to a well. Increasing trends for chloride in MW-15 and for sulfate in MW-14 and MW-15 were indicated during evaluation of the proposed background data set. Further evaluation indicated the chloride and sulfate concentrations to be within concentrations in upgradient wells across the site. Therefore, chloride in MW-15 and for sulfate in MW-14 MW-15 are considered to be unaffected by landfilling of CCR waste. Copies of the results of the statistical trend analyses are included as attachments to this report (Appendix C).

### Recommendations for Background Database Update

The following table presents the proposed intrawell statistical limits for monitoring wells MW-13, MW-14, MW-15, and MW-17.

**Table Comparing Background Limits**

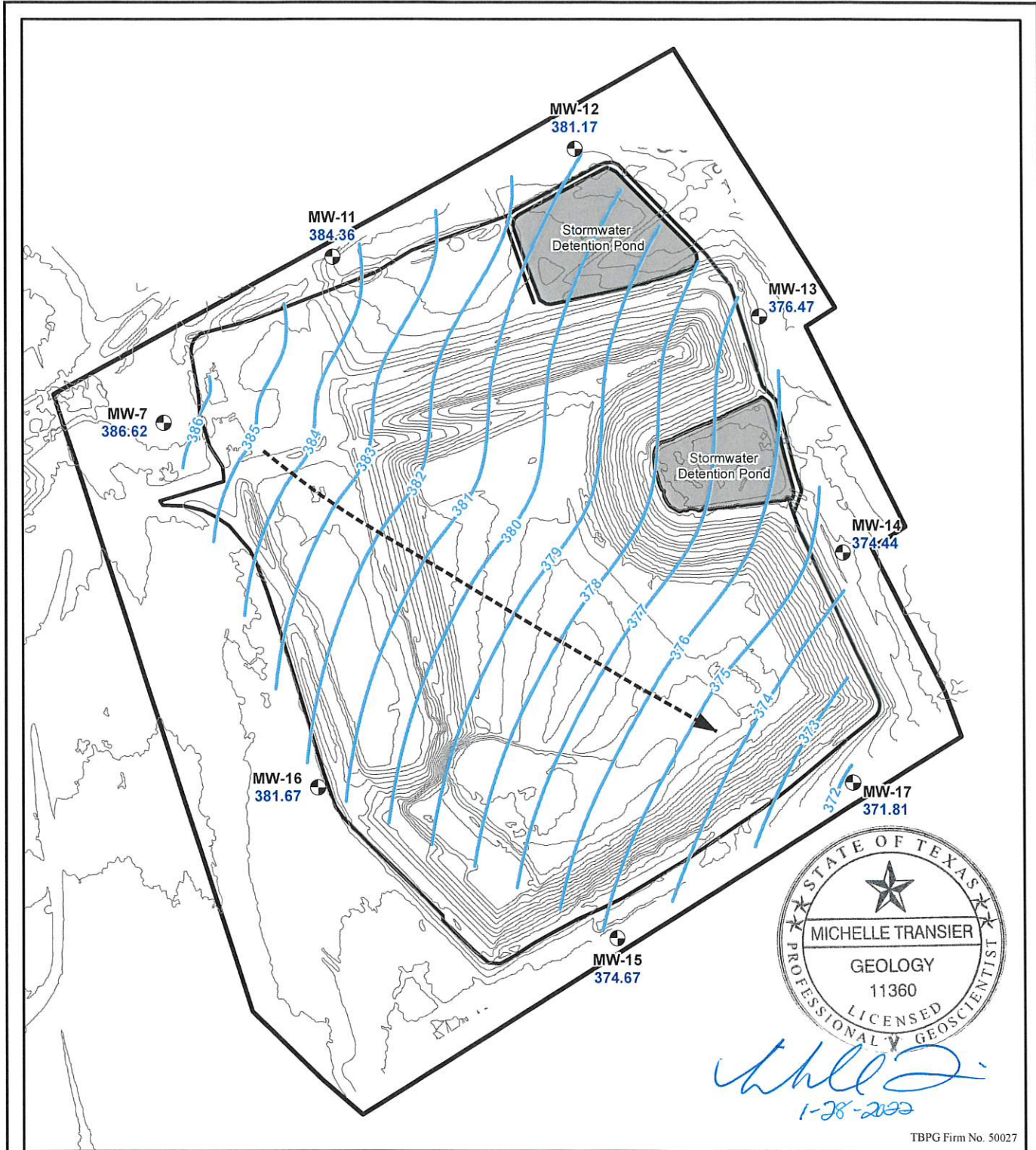
Constituent	MW-13		MW-14		MW-15		MW-17	
	Previous Limit	Updated Limit	Previous Limit	Updated Limit	Previous Limit	Updated Limit	Previous Limit	Updated Limit
<b>Detection Monitoring Constituents</b>								
Boron (mg/L)	0.1382	0.1206	0.5796	0.6019	0.06917	0.06659	0.362	0.362
Calcium (mg/L)	37.7	59.59	115.2	141.2	28.93	37.94	555.1	396.5
Chloride (mg/L)	119.4	120.1	436.5	440.9	175.8	197.6	1678	1728
Fluoride (mg/L)	0.584	0.584	0.682	0.682	0.5	0.5	0.5	0.5
pH (SU)	4.847-7.797	4.972-7.724	4.951-7.714	4.924-7.57	4.356-7.767	4.322-7.577	3.887-7.908	3.992-7.76
Sulfate (mg/L)	193.1	195.2	401.3	841.2	40.2	49.99	160.2	168
Total Dissolved Solids (mg/L)	660.3	631.9	1541	1940	476.9	482.6	3191	3264

Review of data collected demonstrates no indication of a release from the landfill. Evaluation of the constituent data shows somewhat high spatial variability with only moderate temporal variability across the site. Furthermore, the highest statistical background values for detection monitoring constituents are predominantly found in wells located upgradient of waste disposal activities. Therefore, the retained groundwater monitoring data collected through June 2021 are considered to be unaffected by landfilling of CCR waste and appropriate for use as background data for future statistical evaluations.

Based on the results of this evaluation, retained groundwater monitoring data collected during the period of June 2016 and June 2021 for monitoring wells MW-13, MW-14, MW-15, and MW-17 at Twin Oaks Power Station CCR Landfill is recommended for use as the background data set. The retained constituent data will be utilized in statistical evaluation of groundwater monitoring data in accordance with the facility’s approved GWSAP. A copy of the updated background data set documentation in table format is included in Appendix B of this report.

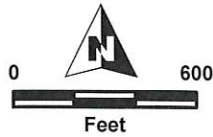
**Appendix A**  
**Groundwater Contour Map**





TBPG Firm No. 50027

Monitor Well	5-ft Ground Surface Contour
Approx. Groundwater Flow Direction	Property Boundary
Groundwater Contour	Groundwater Elevation (Elevation Feet, MSL)
Pond	



**GROUNDWATER CONTOUR MAP**

← WATER LEVELS MEASURED (10/18/2021) →

**CCR Landfill**  
**Twin Oaks Power Station**  
**13065 Plant Road**  
**Bremond (Robertson County), Texas 76629**

Map Revised: 12/28/2021	Project Number: I-14-1007	GIS Analyst: NCF
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**Appendix B**  
**Baseline Data Set**

**Twin Oaks Power Station – Coal Combustion Residuals (CCR) Landfill  
Updated Data Set (June 2016 - June 2021)**

Well ID	Date	Boron (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	pH (SU)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
MW-7 (Upgradient)	6/14/2016	0.313	179	186	<0.2	6.37	702	1460
	7/26/2016	0.566	208	257	0.459	6.37	880	1590
	9/27/2016	0.306	199	218	0.272	6.33	826	1550
	11/29/2016	0.288	217	208	<0.5	6.38	731	1550
	1/24/2017	0.264	199	206	<0.5	6.07	703	1530
	1/25/2017	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/28/2017	0.37	263	216	<0.5	6.27	730	1390
	6/22/2017	0.257	218	219	<0.5	6.81	671	1800
	8/15/2017	0.257	229	260	<0.5	6.49	782	708
	10/10/2017	0.259	186	258	<0.5	6.15	785	1650
	4/26/2018	0.257	232	300	<0.5	6.58	998	1660
	10/9/2018	0.303	326	312	<0.5	6.72	1070	1730
	4/4/2019	0.332	284	285	<0.5	6.36	908	1780
	10/21/2019	0.286	312	285	<0.5	6.5	1040	1950
	4/28/2020	0.322	268	274	<0.5	6.42	1550	1780
	10/27/2020	0.298	245	262	<0.5	6.06	930	1670
4/28/2021	0.295	258	259	<0.5	6.5	952	1800	
MW-11 (Upgradient)	6/14/2016	0.0975	93.9	143	<0.2	6.25	419	923
	7/26/2016	0.153	87.8	151	0.448	6.28	430	935
	9/27/2016	0.0947	90.2	138	0.256	6.28	437	888
	11/29/2016	0.0863	95.9	138	<0.5	6.26	418	952
	1/24/2017	0.0861	102	135	<0.5	6.17	416	913
	3/28/2017	0.149	88.8	138	<0.5	6.18	424	908
	6/22/2017	0.0952	74.2	124	<0.5	6.78	362	796
	8/15/2017	0.0675	55.6	109	<0.5	2.12	337	2890
	10/10/2017	0.0673	84.6	124	<0.5	6.39	363	890
	4/26/2018	0.0805	64.4	124	<0.5	6.55	365	785
	10/9/2018	0.102	109	153	<0.5	6.63	445	902
	4/4/2019	0.119	94.8	141	<0.5	6.3	406	862
	10/21/2019	0.11	127	155	<0.5	6.48	487	992
	4/28/2020	0.14	137	185	<0.5	6.42	606	1170
	10/27/2020	0.147	142	184	<0.5	6.07	621	1120
	4/28/2021	0.175	152	176	<0.5	6.5	612	1130

**Twin Oaks Power Station – Coal Combustion Residuals (CCR) Landfill  
Updated Data Set (June 2016 - June 2021)**

Well ID	Date	Boron (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	pH (SU)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
MW-12 (Upgradient)	6/14/2016	0.0366	19.1	87.1	<0.2	6.28	50	314
	7/26/2016	0.0635	21.2	85.9	0.484	6.37	48.1	307
	9/27/2016	0.0367	22	88.3	0.29	6.22	56.4	299
	11/29/2016	0.0359	22.3	84.9	<0.5	6.27	49.6	355
	1/24/2017	0.0321	22	83.2	<0.5	5.97	48.9	284
	3/28/2017	0.0615	23.2	87.6	<0.5	6.21	52.3	314
	6/22/2017	0.0378	18.6	84.3	<0.5	6.68	48.5	296
	8/15/2017	0.0334	20.2	84.2	<0.5	7.07	48.8	300
	10/10/2017	0.0285	21.9	83.4	<0.5	6.33	48.6	300
	4/26/2018	0.026	17.3	82.9	<0.5	6.62	50.3	279
	10/9/2018	0.0335	20.8	83.5	<0.5	6.71	50	267
	4/4/2019	0.0424	19.4	78.3	<0.5	6.56	42.6	256
	10/21/2019	0.0326	21.5	80.3	<0.5	6.48	46.1	313
	4/28/2020	0.0304	16.9	76.9	<0.5	6.47	43.4	275
	10/27/2020	0.028	18.3	76.5	<0.5	6.2	40.5	283
4/28/2021	0.0373	15.4	74.6	<0.5	6.5	38.1	221	
MW-13	6/14/2016	0.114	20.7	75.8**	0.285	6.32	26.7	348
	7/26/2016	0.0498	20.7	91.1	0.584	6.35	<0.2	414
	9/27/2016	0.0531	30.6	101	0.41	6.32	62.9	449
	11/29/2016	0.047	37.7	102	<0.5	6.16	108	495
	1/24/2017	0.0382	19.4	91.8	<0.5	5.91	37.7	322
	3/28/2017	0.0756	22.4	97.3	<0.5	6.21	36.2	336
	6/22/2017	0.0786	37.1	99.1	<0.5	6.66	93.5	448
	8/15/2017	0.0529	22.6	97.4	<0.5	6.61	44.4	371
	10/10/2017	0.0558	23.3	94.2	<0.5	5.71	38.4	368
	4/26/2018	0.04	17.9	98	<0.5	6.59	39.7	338
	10/9/2018	0.0394	20	98	<0.5	6.64	39.6	355
	4/4/2019	0.0529	23.7	92.4	<0.5	6.38	56.2	343
	10/22/2019	0.055	36.8	98.4	<0.5	6.63	84.8	423
	4/28/2020	0.075	31.1	103	<0.5	6.55	72.2	403
	10/27/2020	0.0604	28.8	104	<0.5	6.13	71.3	381
4/28/2021	0.0587	26.1	105	<0.5	6.4	78.9	398	

**Twin Oaks Power Station – Coal Combustion Residuals (CCR) Landfill  
Updated Data Set (June 2016 - June 2021)**

Well ID	Date	Boron (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	pH (SU)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
MW-14	6/14/2016	0.419	68.1	337	0.28	6.51	127	1040
	7/26/2016	0.0425	71.2	351	0.682	6.63	151	1130
	9/27/2016	0.0362	84.9	355	0.533	6.67	225	1180
	11/29/2016	0.0388	77.3	334	<0.5	6.59	177	1160
	1/24/2017	0.0338	69.1	337	<0.5	6.39	175	1170
	3/28/2017	0.0537	82.5	335	<0.5	6.55	209	1150
	6/22/2017	0.0355	75.4	345	<0.5	6.83	185	1070
	8/15/2017	0.157	70.8	307	<0.5	6.86	259	1180
	10/10/2017	0.305	88.2	322	<0.5	5.9	228	1290
	4/26/2018	0.236	68.3	358	<0.5	6.85	231	986
	10/9/2018	0.253	86.7	366	<0.5	6.88	225	1060
	4/4/2019	0.214	82.9	373	<0.5	6.67	242	1180
	10/22/2019	0.248	102	357	<0.5	6.74	306	1350
	4/28/2020	0.322	106	370	<0.5	6.8	467**	1680**
	7/9/2020	n/a	n/a	n/a	n/a	n/a	448^+	1490^
	10/27/2020	0.497	112**	364	<0.5	6.35	493**	1480
	11/23/2020	n/a	n/a	n/a	n/a	n/a	424^+	n/a
4/28/2021	0.391	117**	381**	0.51	6.7	493**	1520**	
6/23/2021	n/a	130^+**	n/a	n/a	n/a	545^+**	n/a	
MW-15	6/14/2016	0.0571	20.5	102	<0.2	6.49	28.2	337
	7/26/2016	0.0544	19.7	97.9	0.486	6.57	27.6	368
	9/27/2016	0.0512	19.7	96.5	0.298	6.59	28.6	356
	11/29/2016	0.0521	19.5	98.9	<0.5	6.51	24.3	407
	1/24/2017	0.0474	19.7	94.4	<0.5	6.23	26	370
	3/28/2017	0.0642	21.3	98.4	<0.5	6.54	29.1	362
	6/22/2017	0.0428	20	110	<0.5	6.86	27	393
	8/15/2017	0.0489	20.9	115	<0.5	6.34	26.3	401
	10/10/2017	0.0477	22.1	109	<0.5	5.63	24.9	373
	4/26/2018	0.0491	18.2	127	<0.5	6.85	29.2	345
	10/9/2018	0.0461	26.2*	138*	<0.5	6.71	33.1	365
	11/20/2018	n/a	17.2^	131^	n/a	n/a	n/a	n/a
	4/4/2019	0.05	26.8*	128	<0.5	6.6	30.5	355
	6/11/2019	n/a	23.9^+	n/a	n/a	n/a	n/a	n/a
	10/22/2019	0.0443	23.6	113	<0.5	6.71	34.7	380
	4/28/2020	0.0427	21.8	119	<0.5	6.61	38.1	338
	10/27/2020	0.0399	23.4	129	<0.5	6.32	34.3	381
4/28/2021	0.0475	29**	155	<0.5	6.7	34.5	404	
6/23/2021	n/a	30^+	n/a	n/a	n/a	n/a	n/a	

**Twin Oaks Power Station – Coal Combustion Residuals (CCR) Landfill  
Updated Data Set (June 2016 - June 2021)**

Well ID	Date	Boron (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	pH (SU)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
MW-16 (Upgradient)	6/14/2016	0.0566	57.2	230	<0.2	6.11	37.5	648
	7/26/2016	0.179	59.3	238	0.441	6.21	38	744
	9/27/2016	0.0475	59	244	0.252	6.16	41.2	670
	11/29/2016	0.0453	63.2	267	<0.5	6.19	36.9	832
	1/24/2017	0.0419	64.4	253	<0.5	5.97	44.5	676
	3/28/2017	0.0548	63	255	<0.5	6.11	57.2	671
	6/22/2017	0.0367	67	268	<0.5	6.48	63.1	675
	8/15/2017	0.0376	73.2	270	<0.5	6.51	68.1	670
	10/10/2017	0.0379	78	289	<0.5	5.05	71.9	781
	4/26/2018	0.0372	73.3	254	<0.5	6.4	142*	662
	6/26/2018	n/a	n/a	n/a	n/a	n/a	133^	n/a
	10/9/2018	0.03	58.1	233	<0.5	6.35	109	684
	4/4/2019	0.0314	62	267	<0.5	6.57	123	849
	10/21/2019	0.0354	69.2	257	<0.5	6.56	101	778
	4/28/2020	0.0257	87.1	371	<0.5	6.53	129	960
10/27/2020	0.0243	45.7	198	<0.5	6.33	87.5	598	
4/28/2021	0.0271	43.2	189	<0.5	6.9	82.8	677	
MW-17	6/14/2016	0.74	38	263	<0.2	5.84	28.2	714
	7/26/2016	0.362	80.1	432	0.441	5.79	<0.2	1010
	9/27/2016	0.0289	97.6	518	0.255	5.75	48	1220
	11/29/2016	0.0354	54.5	394	<0.5	5.63	51.6	1040
	1/24/2017	0.0267	91.6	494	<0.5	5.62	55.2	1110
	3/28/2017	0.037	61.6	417	<0.5	5.85	55.9	987
	6/22/2017	0.0285	118	544	<0.5	6.13	47.9	1250
	8/15/2017	0.0228	188	926	<0.5	6.06	52	1620
	10/10/2017	0.0198	226	957	<0.5	5.05	87.4	1980
	4/26/2018	0.0224	60.5	386	<0.5	6.3	78.5	905
	10/9/2018	0.0243	27.8	153	<0.5	6.67	38.4	379
	4/4/2019	0.028	69.6	350	<0.5	6.08	37.8	697
	10/22/2019	0.0195	137	806	<0.5	6.21	96.4	1810
	4/28/2020	0.0227	156	706	<0.5	5.83	55.2	1210
	10/27/2020	0.0237	162	640	<0.5	5.4	41.1	1340
4/28/2021	0.0314	156	798	<0.5	5.8	26.1	1500	

n/a - indicates constituent not sampled during the event

█ - indicates verification resampling results used as a replacement for original value

^ - verification resampling result

+ - indicates confirmed result with ASD

\* - data removed during previous update

\*\* - data removed during current update

## **Appendix C**

### **Statistical Evaluation of Background Data**

## **Control Charts and Prediction Limits**



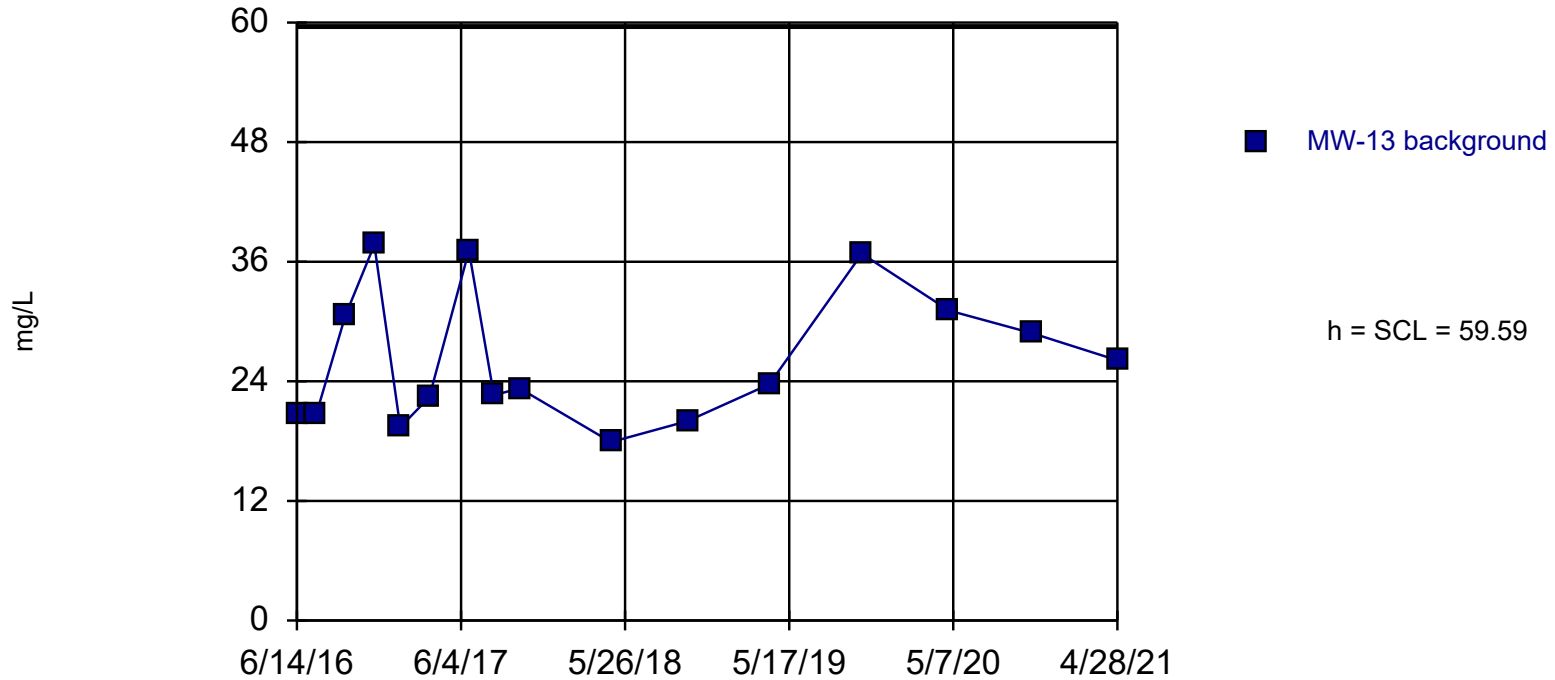
# Shewhart-Cusum Control Chart / Rank Sum

Twin Oaks Power Station CCR LF    Client: Major Oak Power    Data: Twin Oaks    Printed 12/28/2021, 10:10 AM

<u>Constituent</u>	<u>Well</u>	<u>Sig.</u>	<u>h</u>	<u>SCL</u>	<u>N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Method</u>
Calcium (mg/L)	MW-13	No	59.59	59.59	16	0	No	Param Intra
Chloride (mg/L)	MW-13	No	120.1	120.1	15	0	No	Param Intra
Fluoride (mg/L)	MW-13	No	PL=...	n/a	16	81.25	No	NP Intra PL (NDs)
pH (SU)	MW-13	No	7.7...	7.7...	16	0	No	Param Intra
Sulfate (mg/L)	MW-13	No	195.2	195.2	16	6.25	No	Param Intra
Total Dissolved Solids (mg/L)	MW-13	No	631.9	631.9	16	0	No	Param Intra
Calcium (mg/L)	MW-14	No	141.2	141.2	14	0	No	Param Intra
Chloride (mg/L)	MW-14	No	440.9	440.9	15	0	No	Param Intra
Fluoride (mg/L)	MW-14	No	PL=...	n/a	16	75	No	NP Intra PL (NDs)
pH (SU)	MW-14	No	7.5...	7.5...	16	0	x^4	Param Intra
Sulfate (mg/L)	MW-14	No	841.2	841.2	15	0	sqrt(x)	Param Intra
Total Dissolved Solids (mg/L)	MW-14	No	1940	1940	15	0	No	Param Intra
Calcium (mg/L)	MW-15	No	37.94	37.94	16	0	sqrt(x)	Param Intra
Chloride (mg/L)	MW-15	No	197.6	197.6	16	0	No	Param Intra
Fluoride (mg/L)	MW-15	No	PL=0.5	n/a	16	87.5	No	NP Intra PL (NDs)
pH (SU)	MW-15	No	7.5...	7.5...	16	0	x^4	Param Intra
Sulfate (mg/L)	MW-15	No	49.99	49.99	16	0	No	Param Intra
Total Dissolved Solids (mg/L)	MW-15	No	482.6	482.6	16	0	No	Param Intra
Calcium (mg/L)	MW-17	No	396.5	396.5	16	0	No	Param Intra
Chloride (mg/L)	MW-17	No	1728	1728	16	0	No	Param Intra
Fluoride (mg/L)	MW-17	No	PL=0.5	n/a	16	87.5	No	NP Intra PL (NDs)
pH (SU)	MW-17	No	7.7...	7.7...	16	0	No	Param Intra
Sulfate (mg/L)	MW-17	No	168	168	16	6.25	No	Param Intra
Total Dissolved Solids (mg/L)	MW-17	No	3264	3264	16	0	No	Param Intra

## Control Chart

MW-13



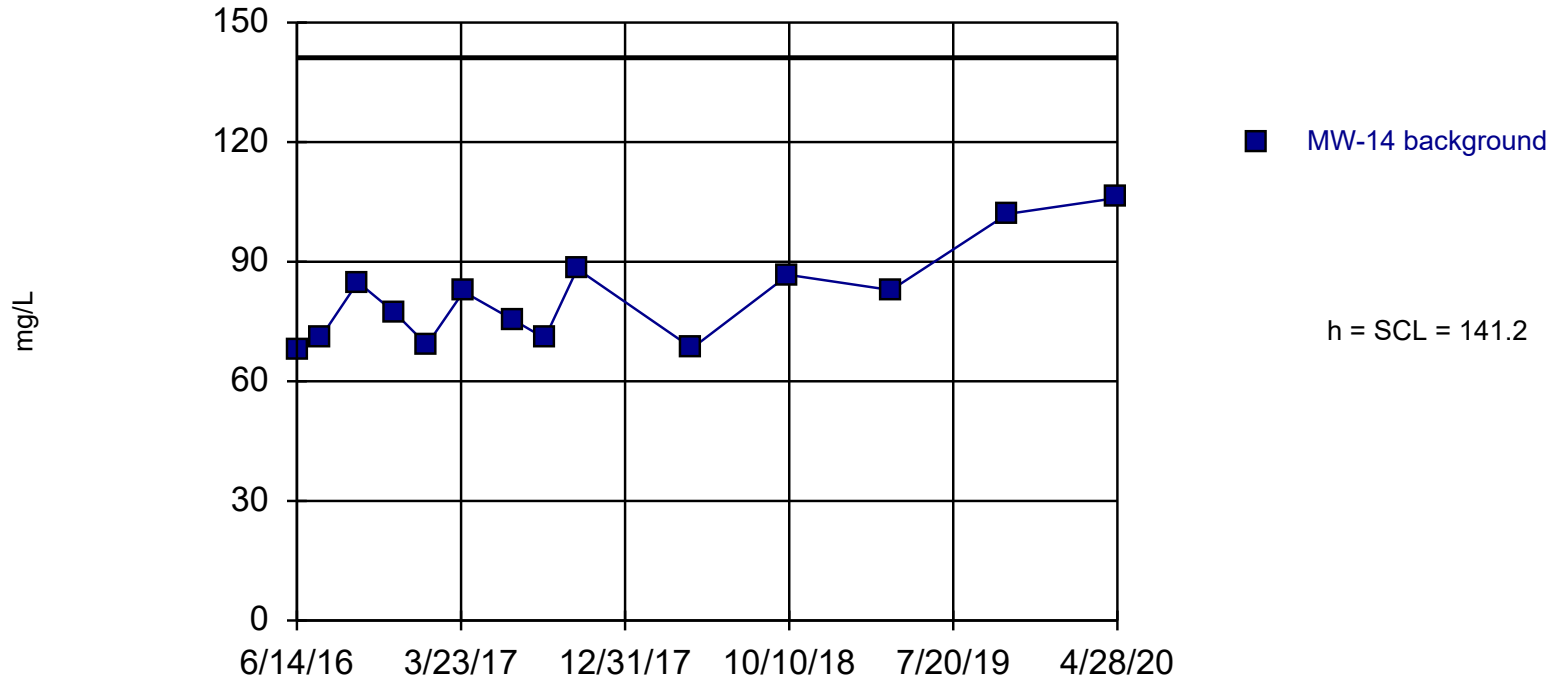
Background Data Summary: Mean=26.18, Std. Dev.=6.682, n=16. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8874, critical = 0.887. Report alpha = 0. Dates ending 4/28/2021 used for control stats. Standardized h=5, SCL=5.

Constituent: Calcium Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

### Control Chart

MW-14



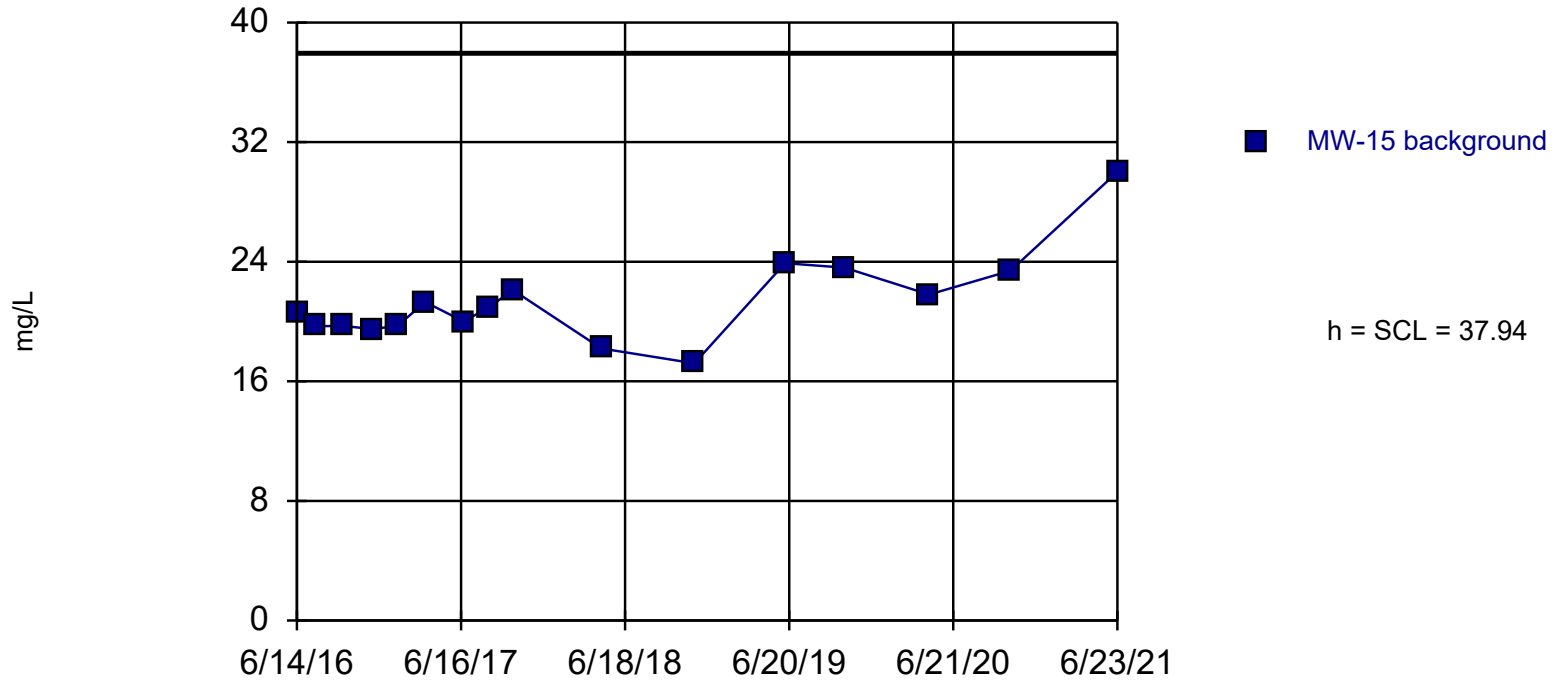
Background Data Summary: Mean=80.96, Std. Dev.=12.04, n=14. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8921, critical = 0.874. Report alpha = 0. Dates ending 4/28/2020 used for control stats. Standardized h=5, SCL=5.

Constituent: Calcium Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Control Chart

MW-15



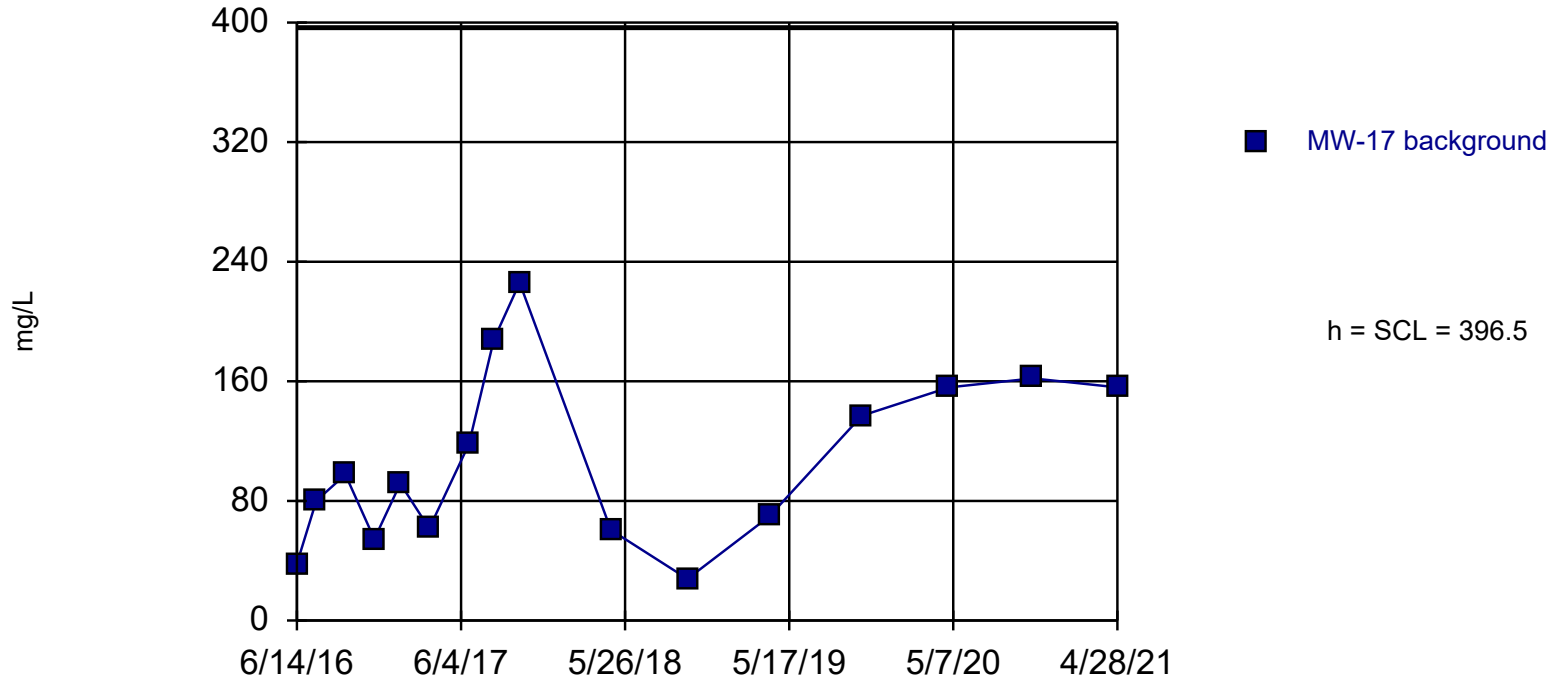
Background Data Summary (based on square root transformation): Mean=4.61, Std. Dev.=0.3099, n=16. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8969, critical = 0.887. Report alpha = 0. Dates ending 6/23/2021 used for control stats. Standardized h=5, SCL=5.

Constituent: Calcium Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Control Chart

MW-17



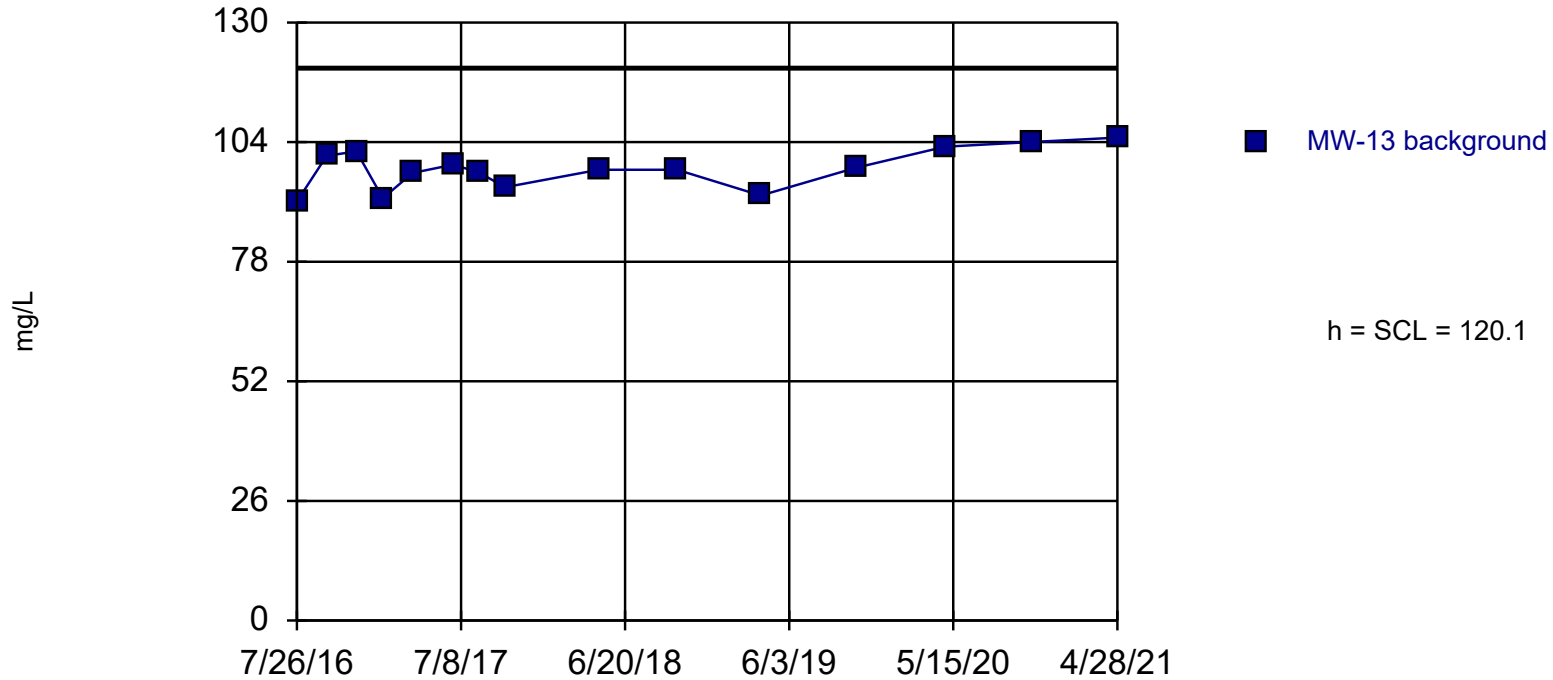
Background Data Summary: Mean=107.8, Std. Dev.=57.75, n=16. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9499, critical = 0.887. Report alpha = 0. Dates ending 4/28/2021 used for control stats. Standardized h=5, SCL=5.

Constituent: Calcium Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Control Chart

MW-13



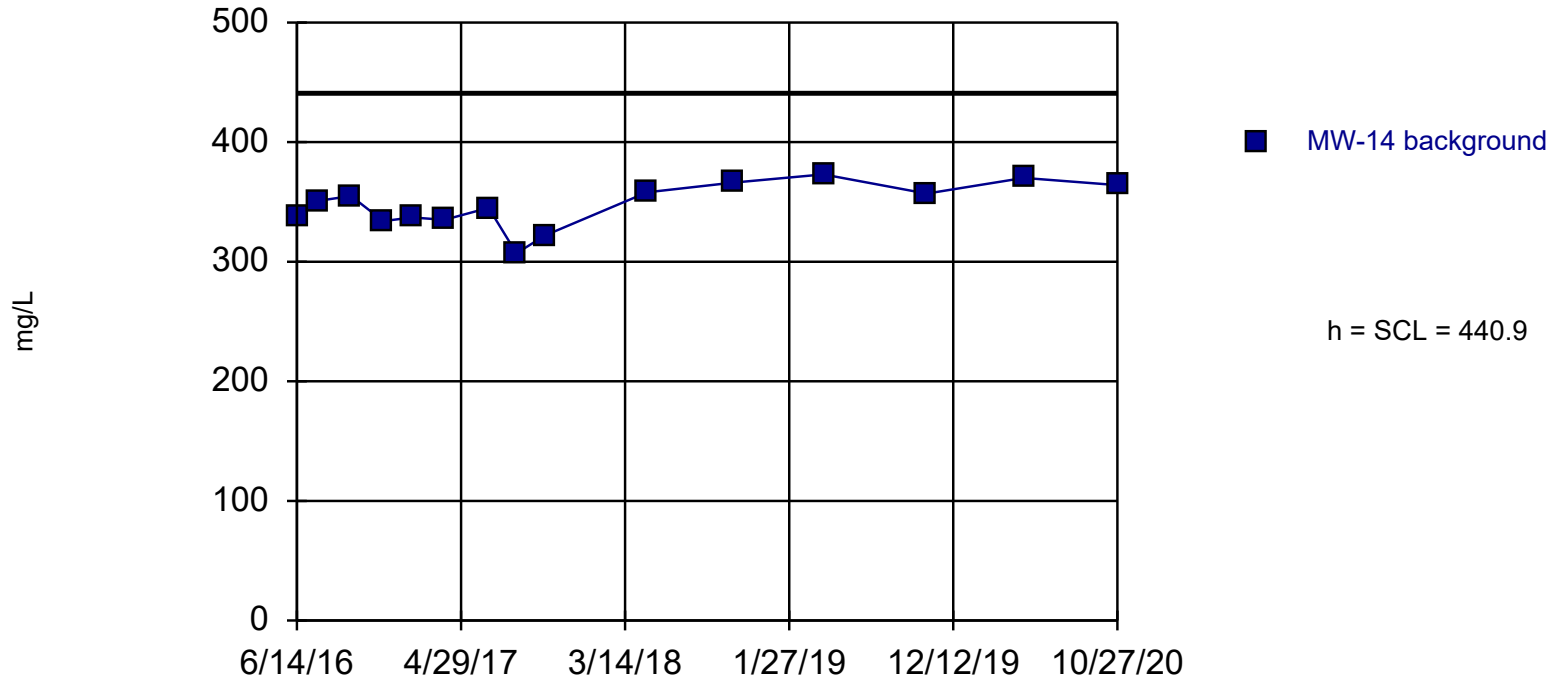
Background Data Summary: Mean=98.18, Std. Dev.=4.38, n=15. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9494, critical = 0.881. Report alpha = 0. Dates ending 4/28/2021 used for control stats. Standardized h=5, SCL=5.

Constituent: Chloride Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Control Chart

MW-14



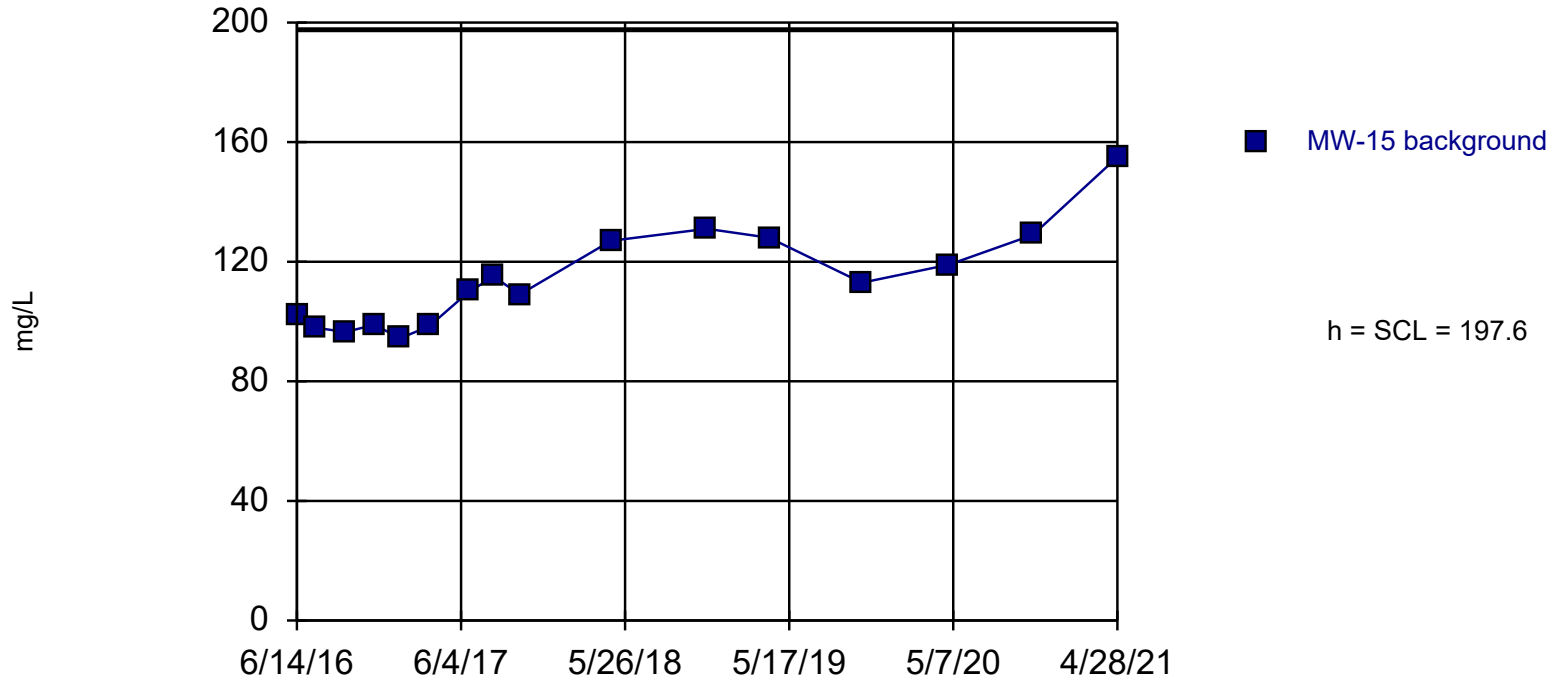
Background Data Summary: Mean=347.4, Std. Dev.=18.7, n=15. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9535, critical = 0.881. Report alpha = 0. Dates ending 10/27/2020 used for control stats. Standardized h=5, SCL=5.

Constituent: Chloride Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Control Chart

MW-15



Background Data Summary: Mean=114, Std. Dev.=16.72, n=16. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9096, critical = 0.887. Report alpha = 0. Dates ending 4/28/2021 used for control stats. Standardized h=5, SCL=5.

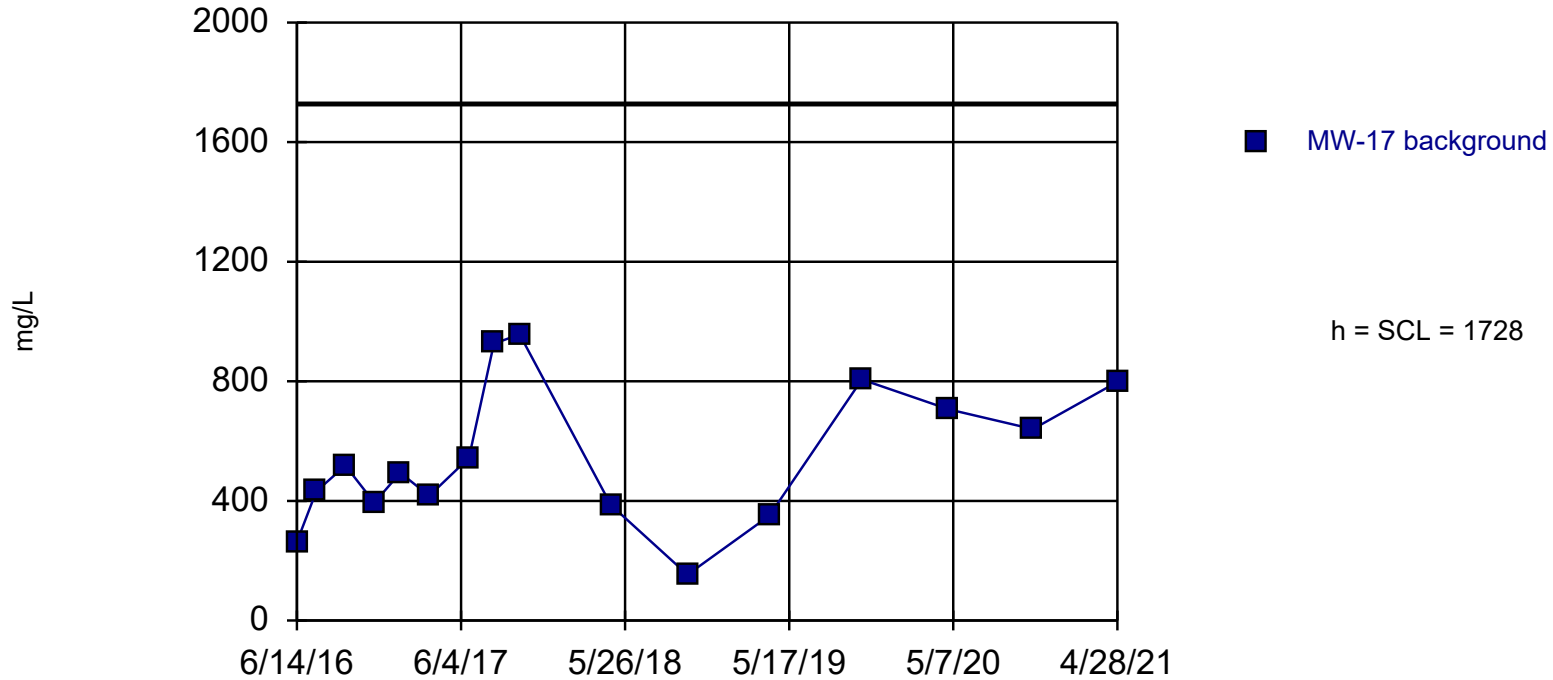
Constituent: Chloride Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks



## Control Chart

MW-17



Background Data Summary: Mean=549, Std. Dev.=235.7, n=16. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9592, critical = 0.887. Report alpha = 0. Dates ending 4/28/2021 used for control stats. Standardized h=5, SCL=5.

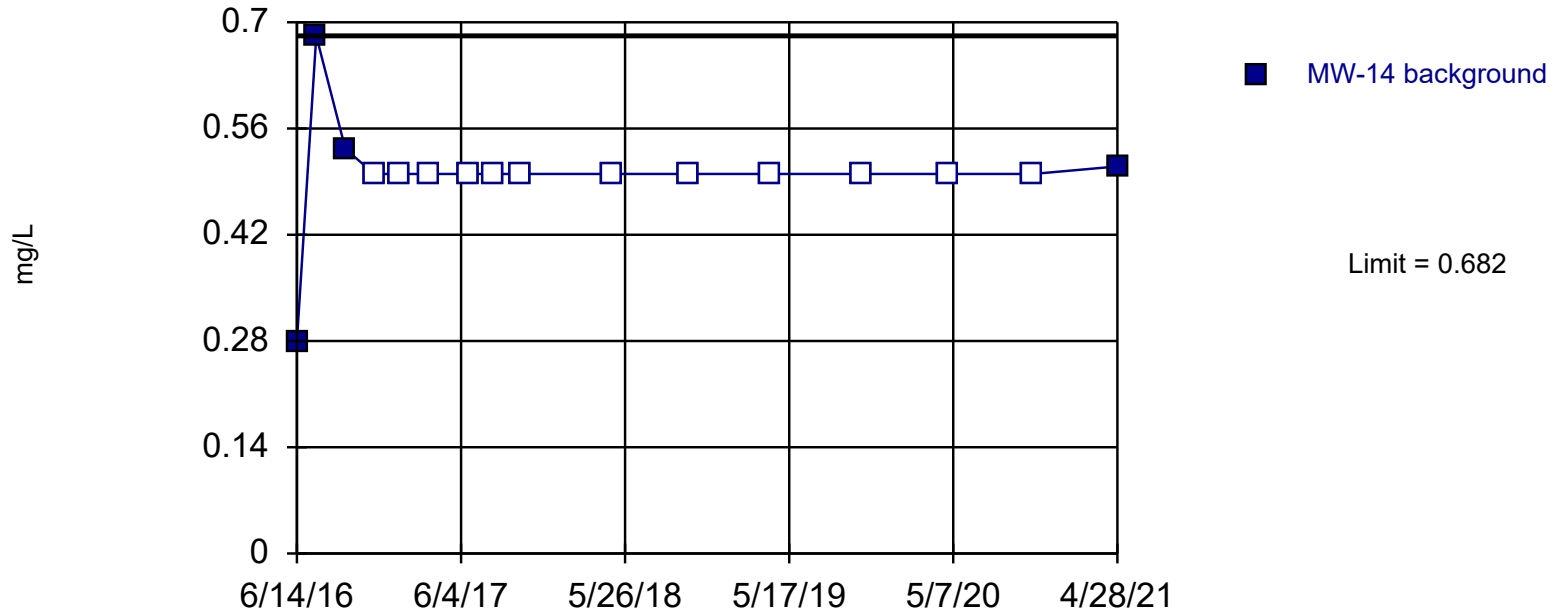
Constituent: Chloride Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks



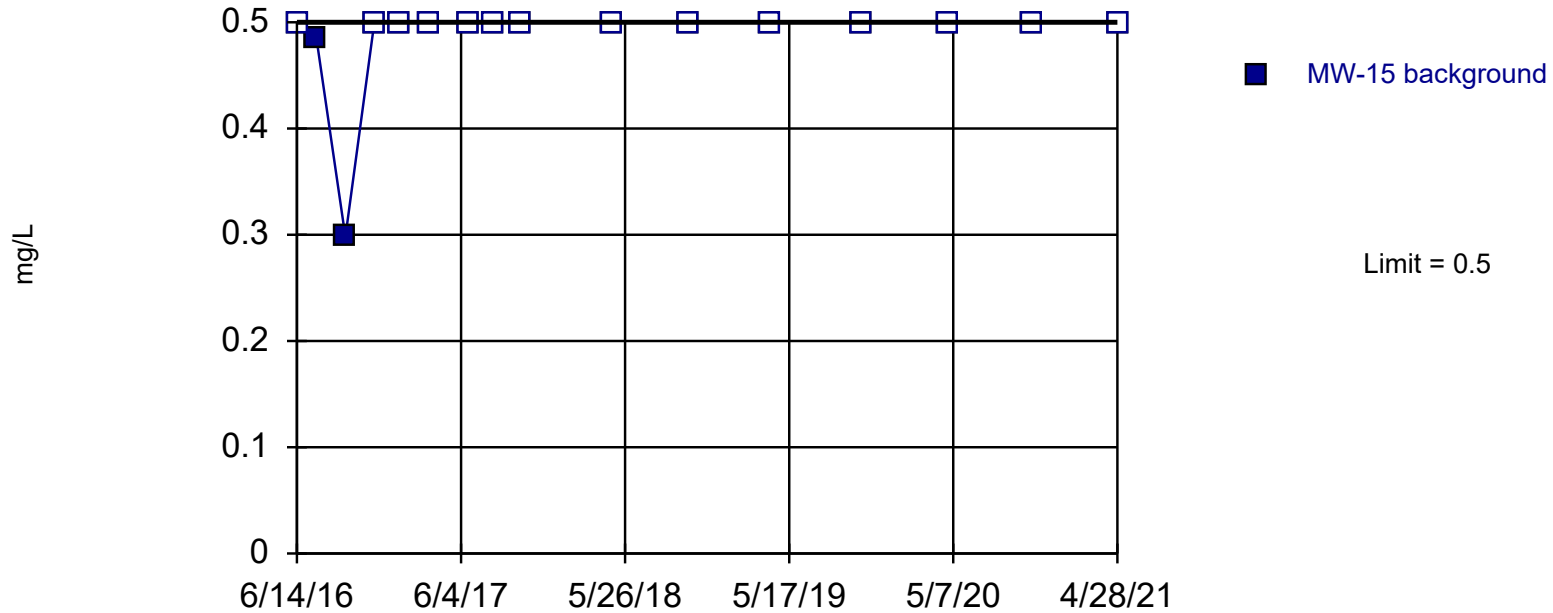
## Prediction Limit

### Intrawell Non-parametric, MW-14



## Prediction Limit

### Intrawell Non-parametric, MW-15



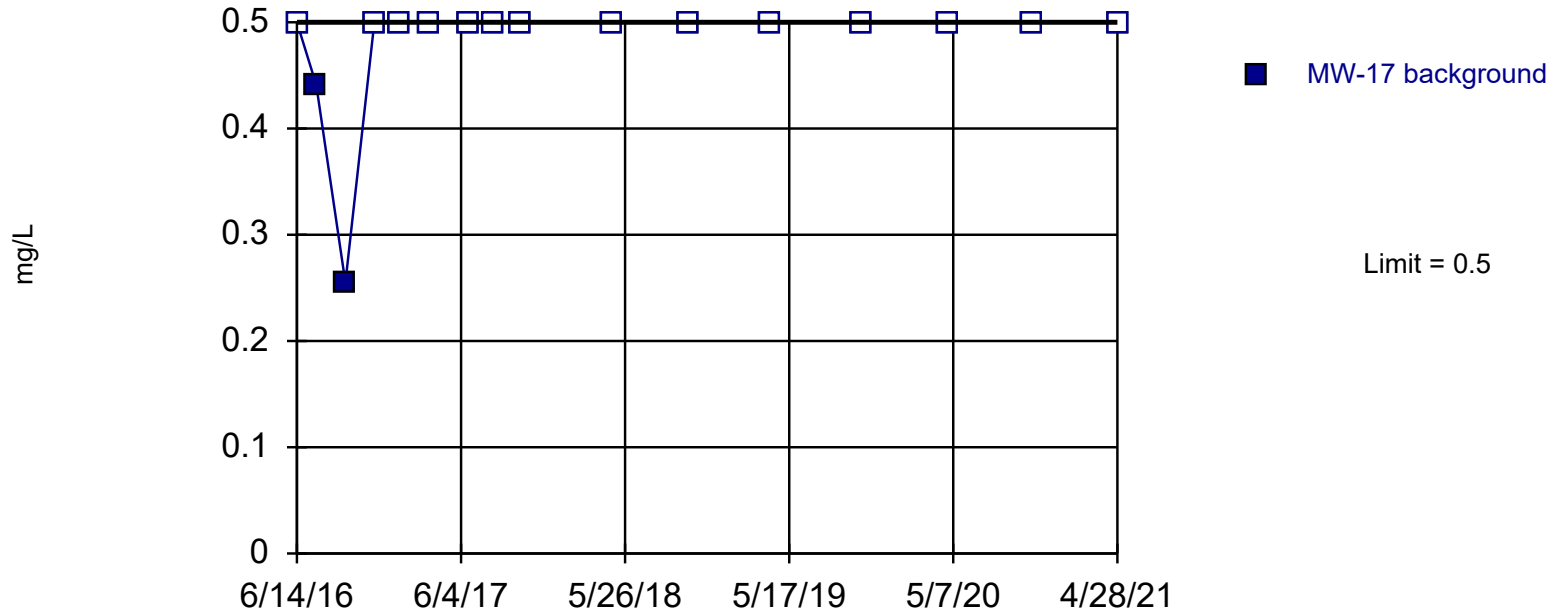
Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 16 background values. 87.5% NDs. Well-constituent pair annual alpha = 0.01287. Individual comparison alpha = 0.006456 (1 of 2). Assumes 1 future value. Seasonality was not detected with 95% confidence.

Constituent: Fluoride Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Prediction Limit

### Intrawell Non-parametric, MW-17



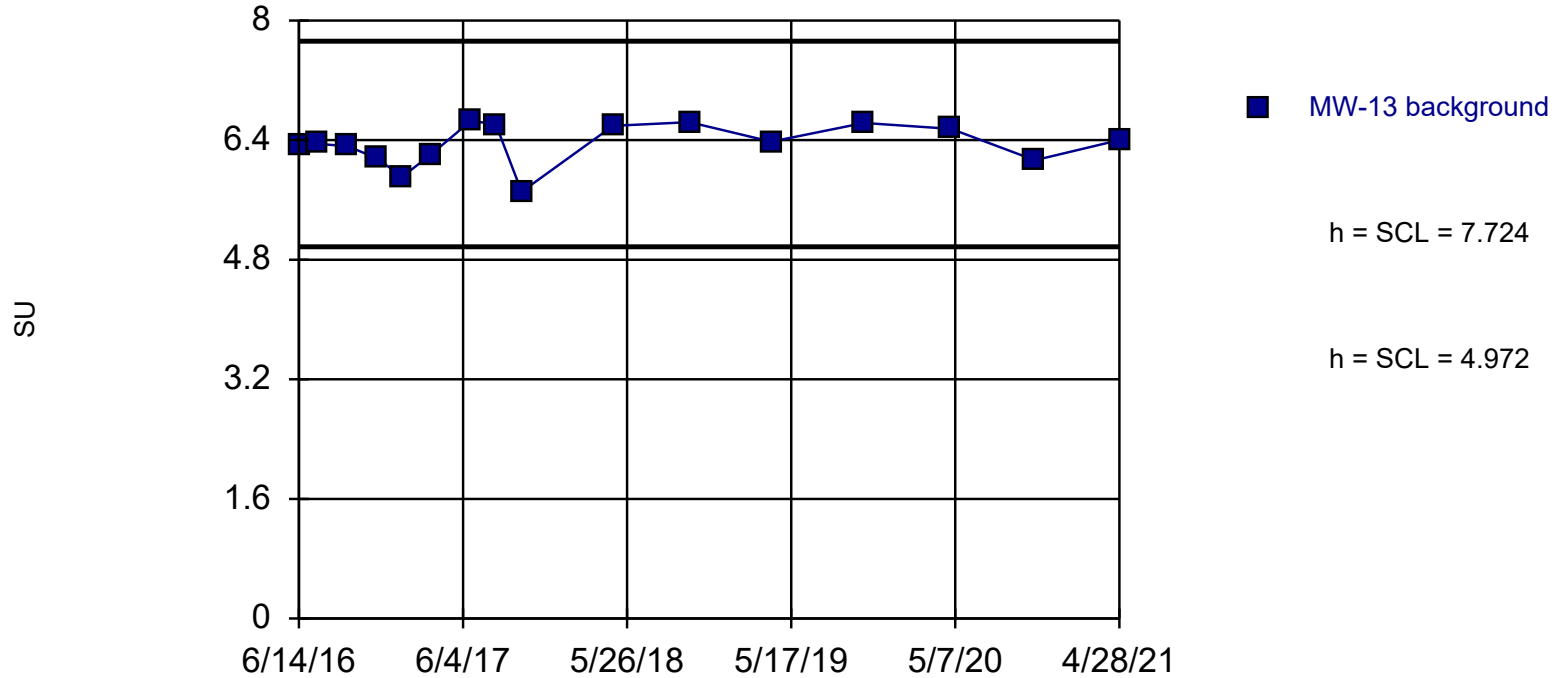
Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 16 background values. 87.5% NDs. Well-constituent pair annual alpha = 0.01287. Individual comparison alpha = 0.006456 (1 of 2). Assumes 1 future value. Seasonality was not detected with 95% confidence.

Constituent: Fluoride Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Control Chart

MW-13



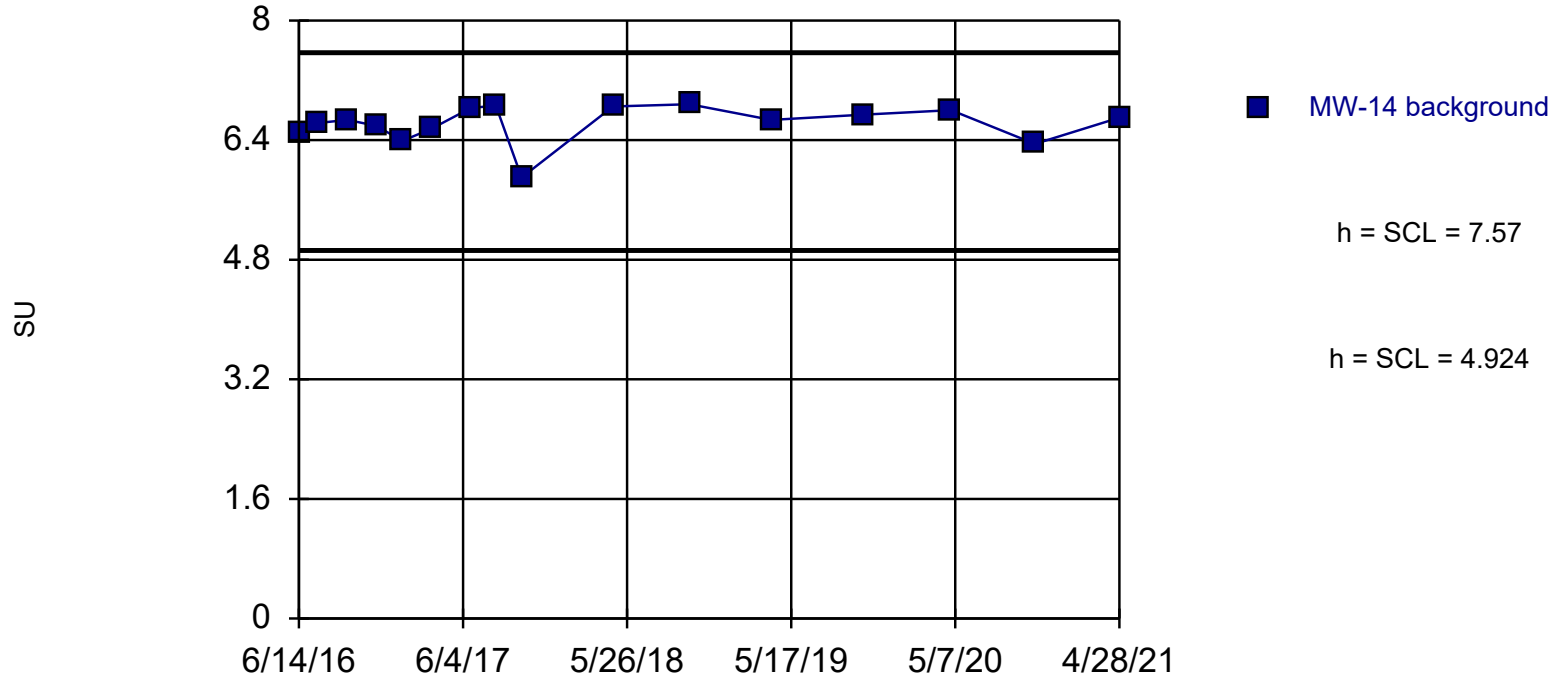
Background Data Summary: Mean=6.348, Std. Dev.=0.2752, n=16. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9107, critical = 0.887. Report alpha = 0. Dates ending 4/28/2021 used for control stats. Standardized h=5, SCL=5.

Constituent: pH Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Control Chart

MW-14



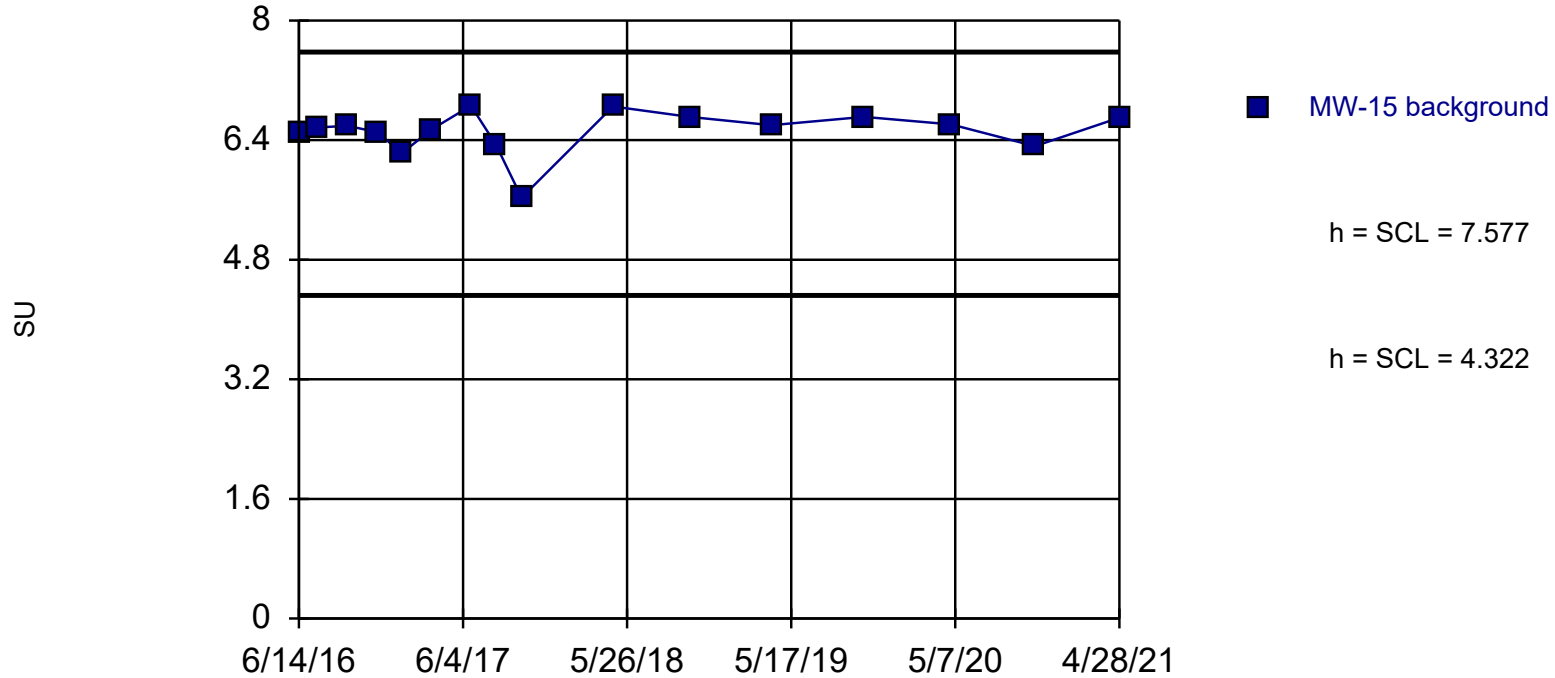
Background Data Summary (based on  $x^4$  transformation): Mean=1936, Std. Dev.=269.6, n=16. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8958, critical = 0.887. Report alpha = 0. Dates ending 4/28/2021 used for control stats. Standardized h=5, SCL=5.

Constituent: pH Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Control Chart

MW-15



Background Data Summary (based on  $x^4$  transformation): Mean=1823, Std. Dev.=294.8,  $n=16$ . Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @ $\alpha = 0.05$ , calculated = 0.8946, critical = 0.887. Report  $\alpha = 0$ . Dates ending 4/28/2021 used for control stats. Standardized  $h=5$ ,  $SCL=5$ .

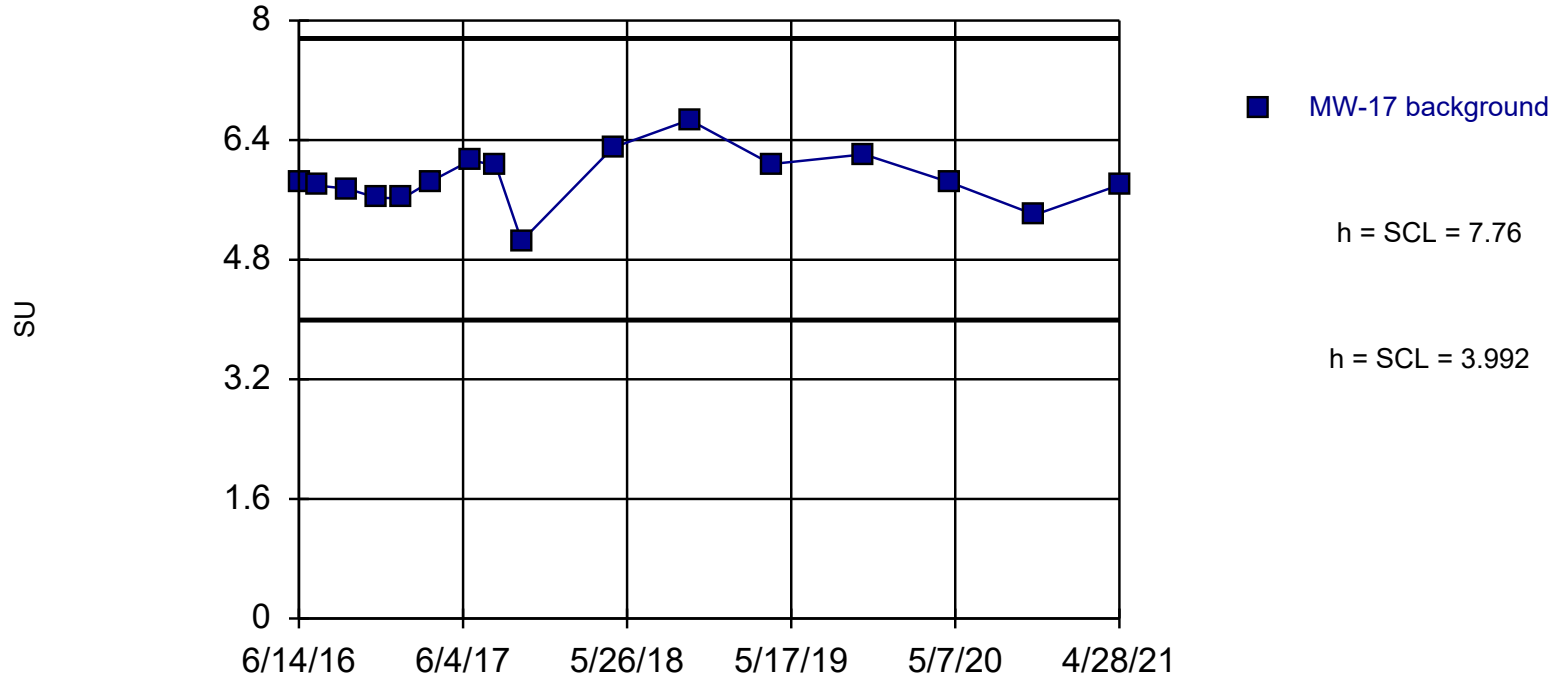
Constituent: pH Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks



## Control Chart

MW-17

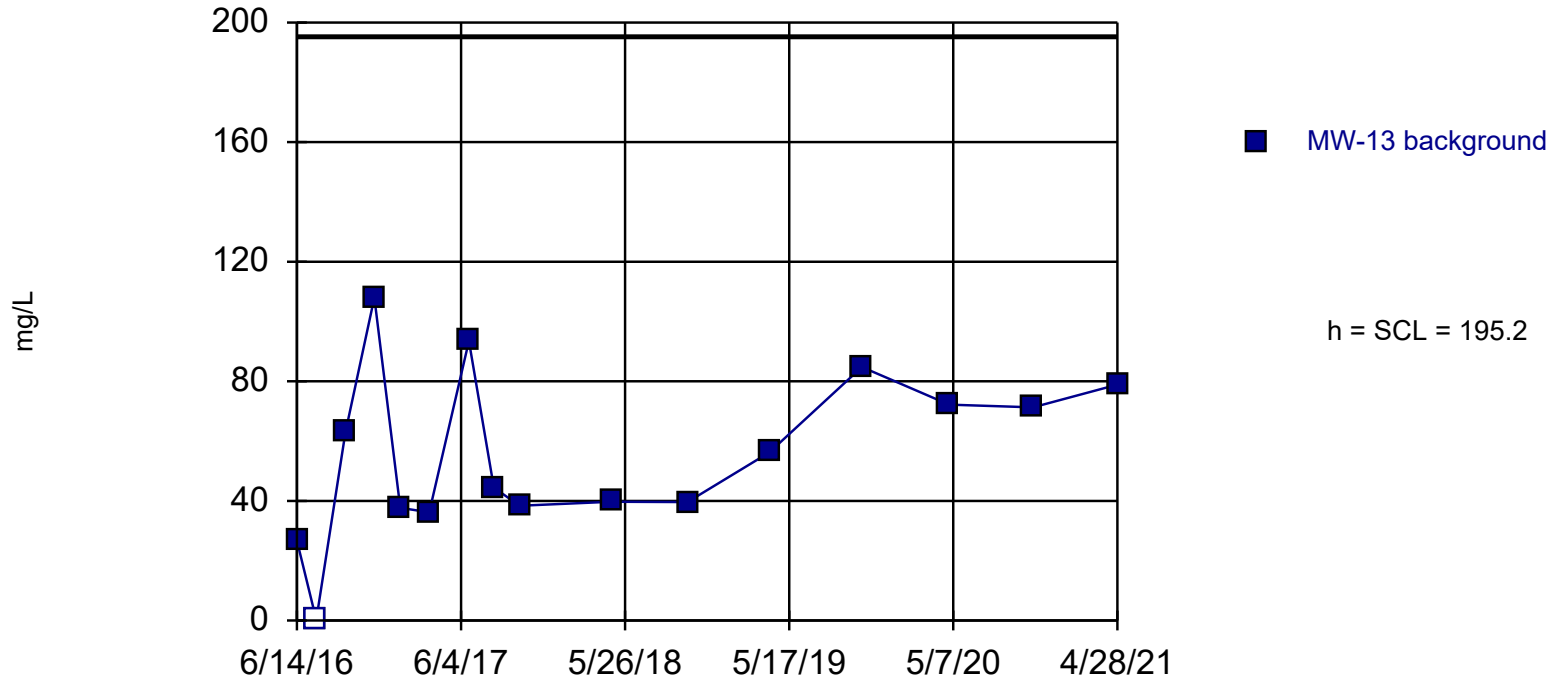


Background Data Summary: Mean=5.876, Std. Dev.=0.3768, n=16. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9721, critical = 0.887. Report alpha = 0. Dates ending 4/28/2021 used for control stats. Standardized h=5, SCL=5.

Constituent: pH Analysis Run 12/28/2021 10:09 AM View: BER Control Chart  
 Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Control Chart

MW-13



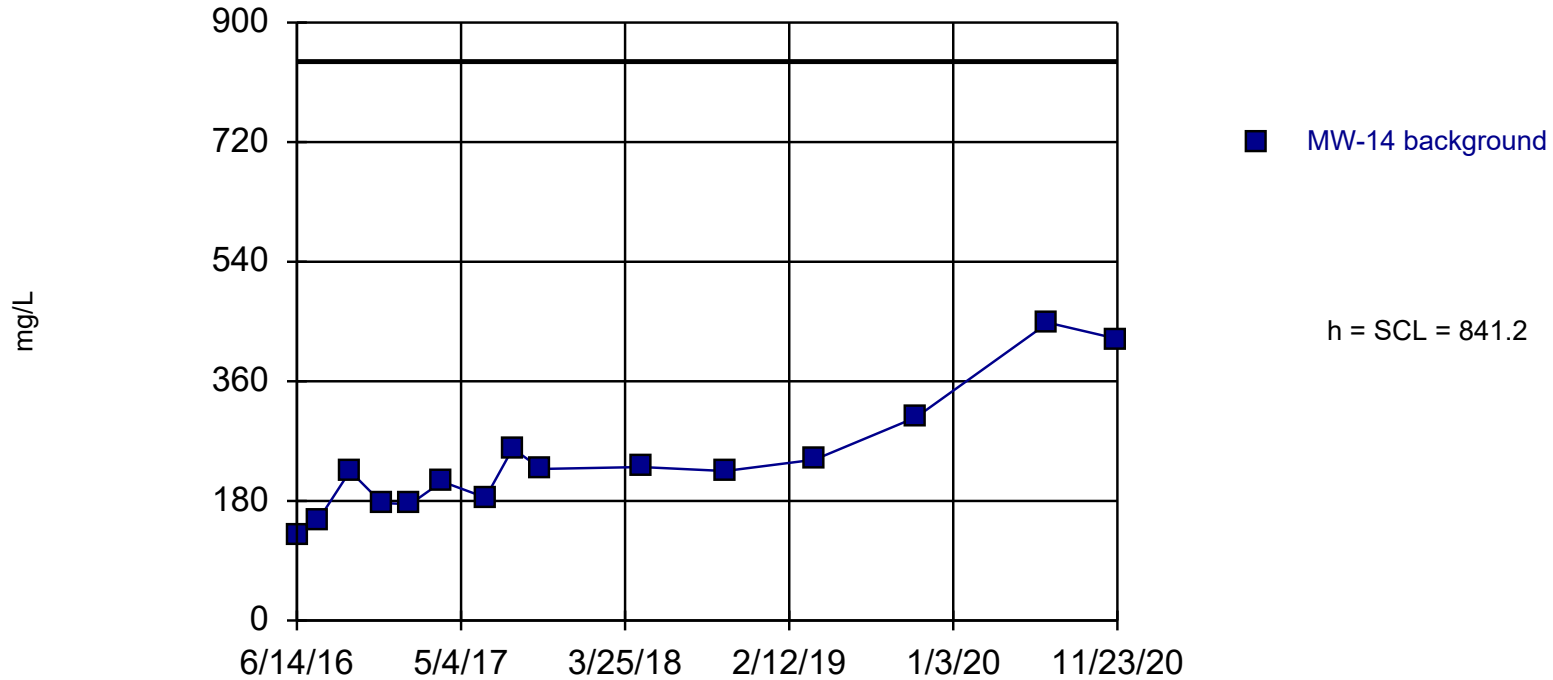
Background Data Summary: Mean=55.67, Std. Dev.=27.91, n=16, 6.25% NDs. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.969, critical = 0.887. Report alpha = 0. Dates ending 4/28/2021 used for control stats. Standardized h=5, SCL=5.

Constituent: Sulfate Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Control Chart

MW-14



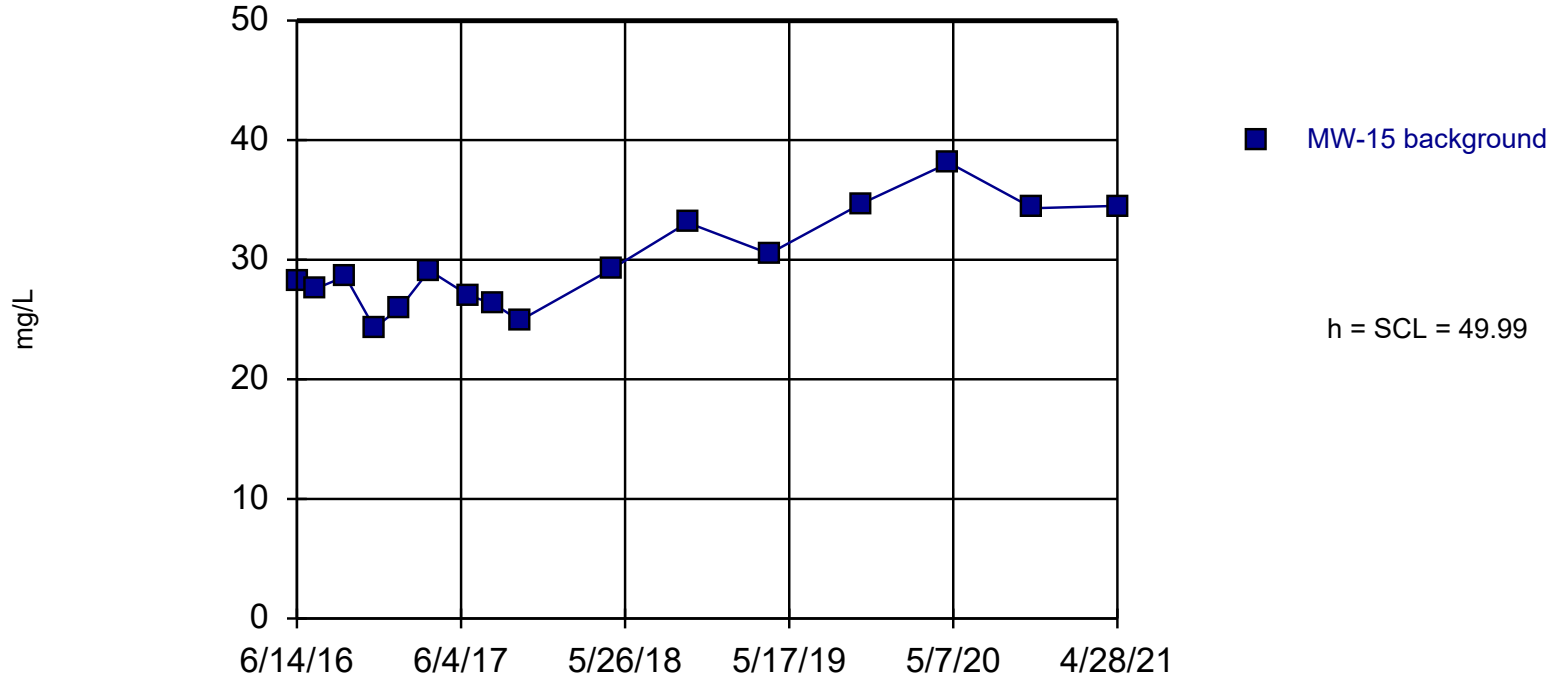
Background Data Summary (based on square root transformation): Mean=15.29, Std. Dev.=2.743, n=15. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9051, critical = 0.881. Report alpha = 0. Dates ending 11/23/2020 used for control stats. Standardized h=5, SCL=5.

Constituent: Sulfate Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Control Chart

MW-15



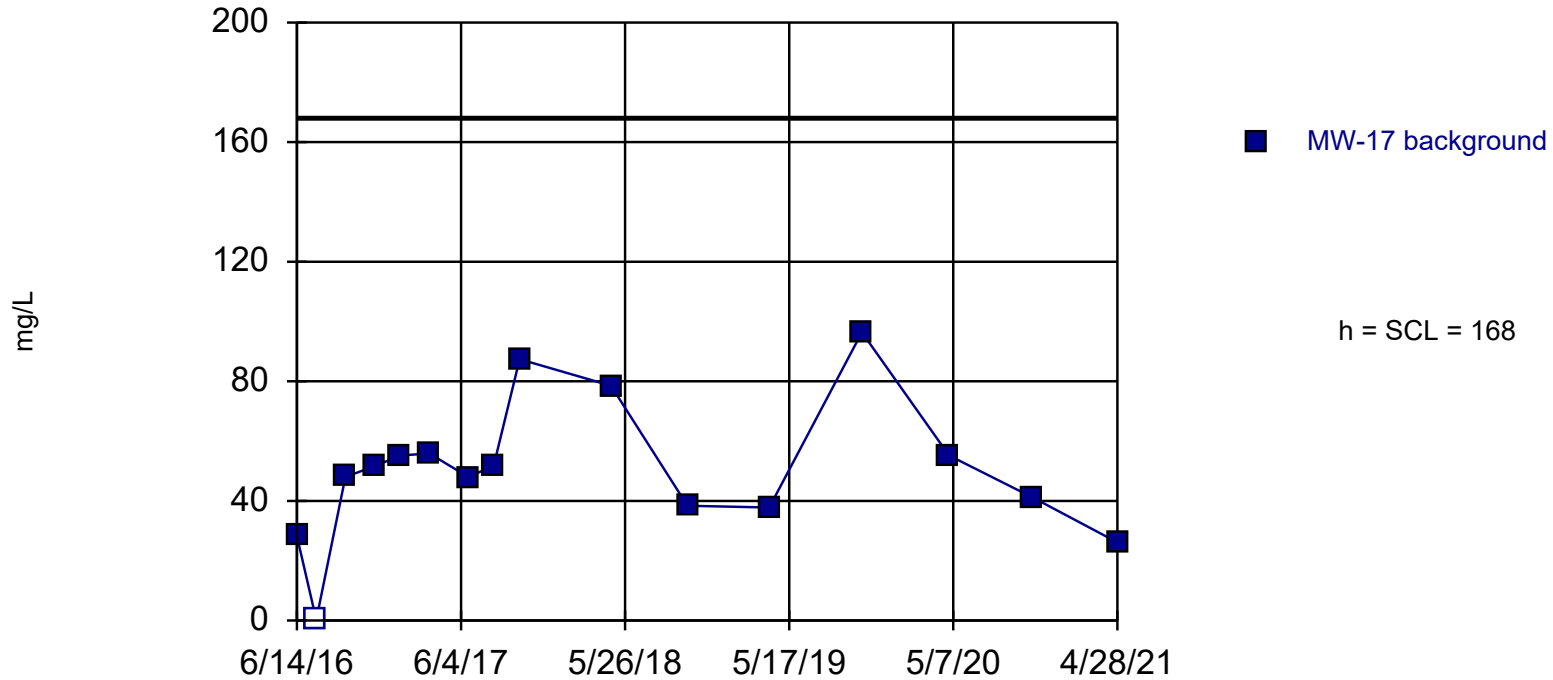
Background Data Summary: Mean=29.78, Std. Dev.=4.042, n=16. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9351, critical = 0.887. Report alpha = 0. Dates ending 4/28/2021 used for control stats. Standardized h=5, SCL=5.

Constituent: Sulfate Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Control Chart

MW-17



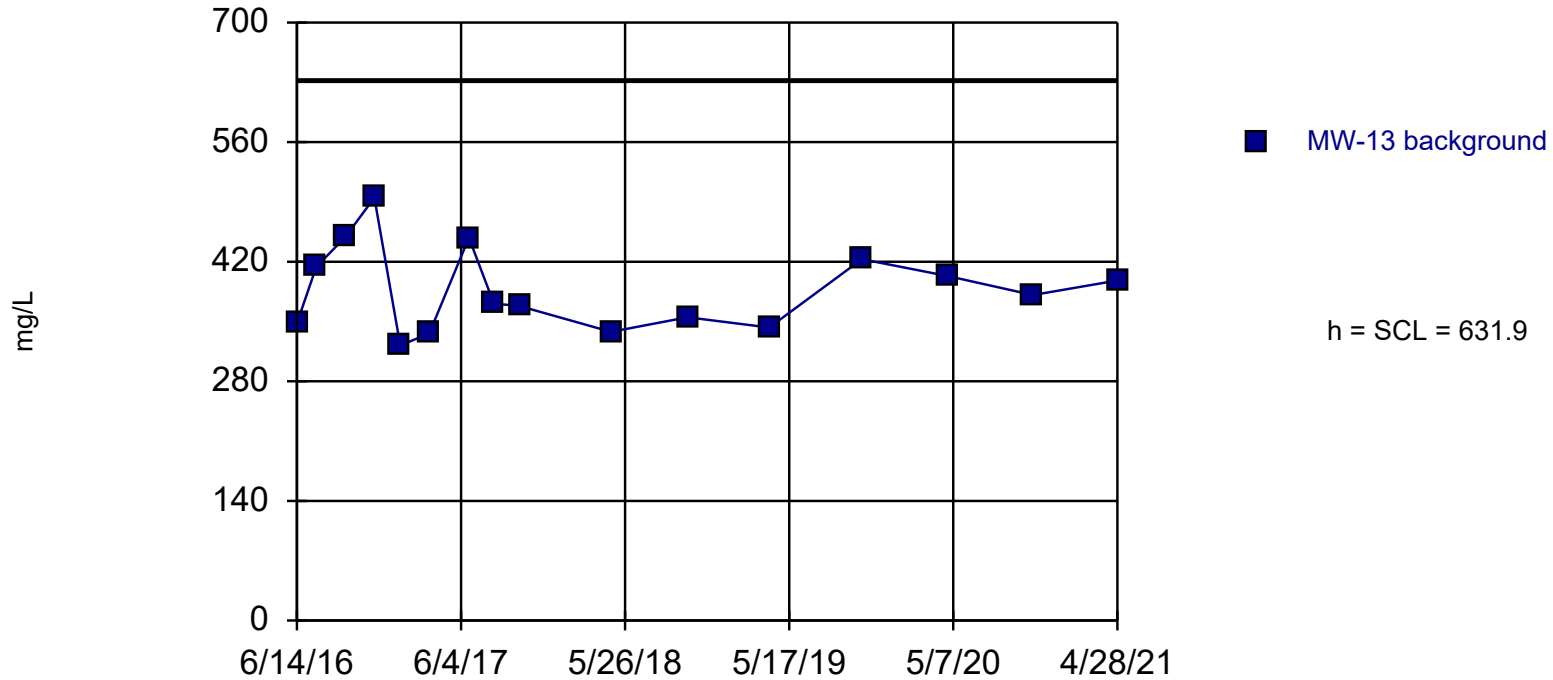
Background Data Summary: Mean=49.99, Std. Dev.=23.6, n=16, 6.25% NDs. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9512, critical = 0.887. Report alpha = 0. Dates ending 4/28/2021 used for control stats. Standardized h=5, SCL=5.

Constituent: Sulfate Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Control Chart

MW-13



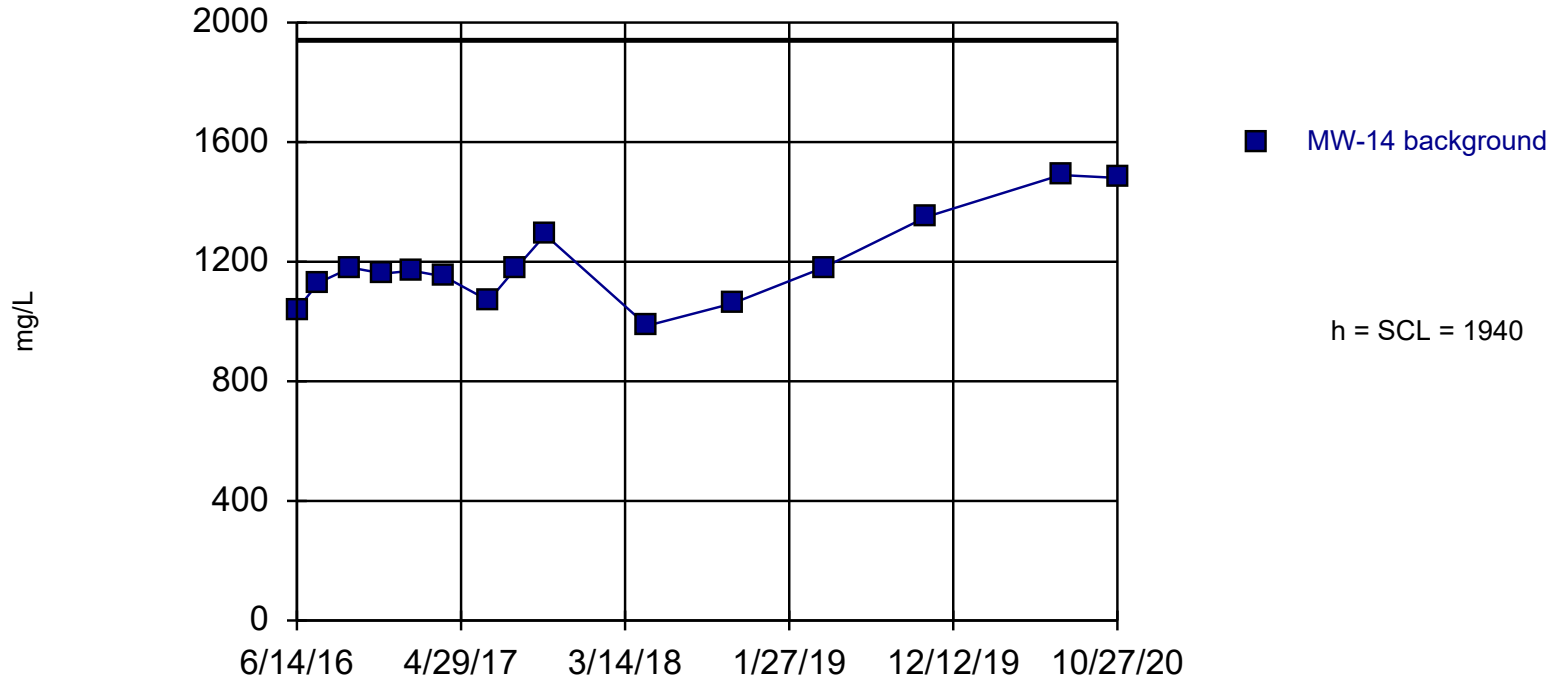
Background Data Summary: Mean=387, Std. Dev.=48.98, n=16. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9431, critical = 0.887. Report alpha = 0. Dates ending 4/28/2021 used for control stats. Standardized h=5, SCL=5.

Constituent: Total Dissolved Solids Analysis Run 12/28/2021 10:09 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Control Chart

MW-14



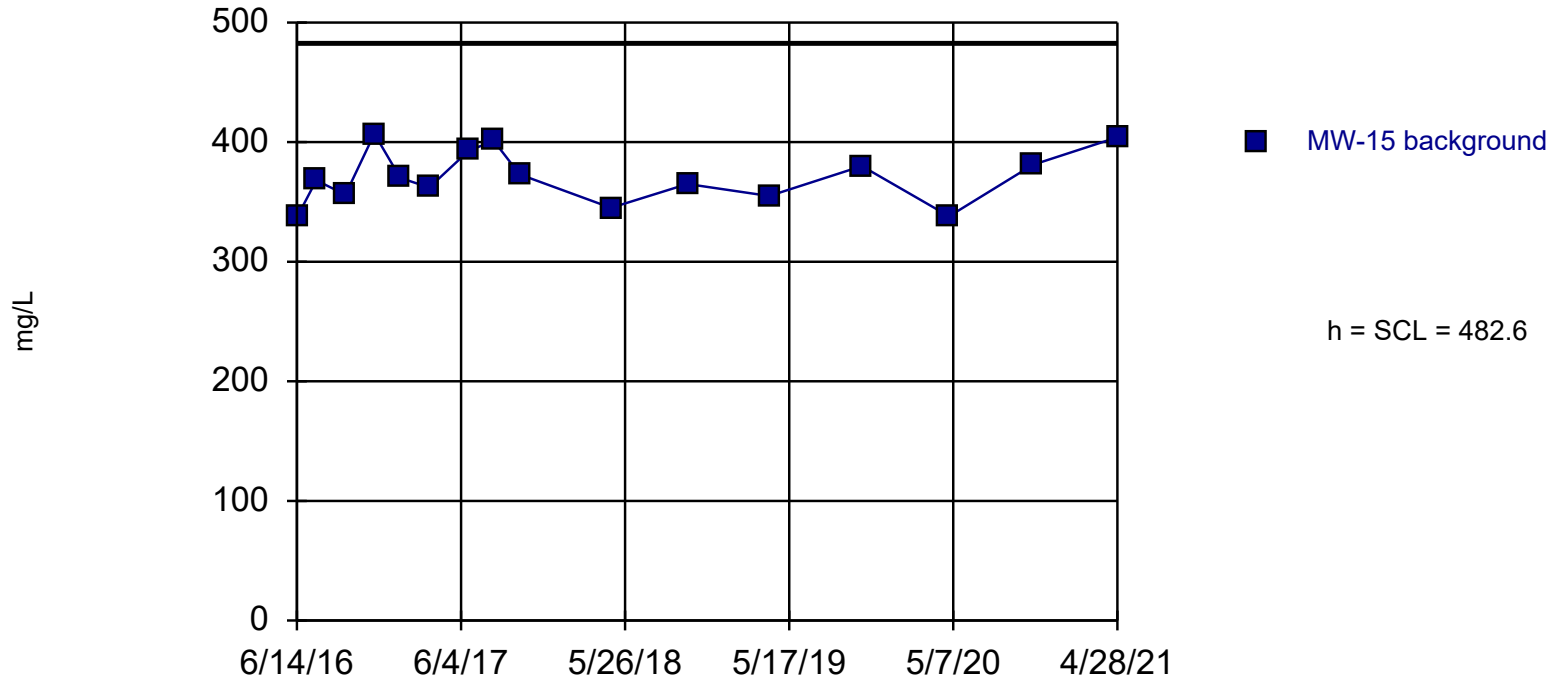
Background Data Summary: Mean=1194, Std. Dev.=149.2, n=15. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8979, critical = 0.881. Report alpha = 0. Dates ending 10/27/2020 used for control stats. Standardized h=5, SCL=5.

Constituent: Total Dissolved Solids Analysis Run 12/28/2021 10:10 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Control Chart

MW-15



Background Data Summary: Mean=370.9, Std. Dev.=22.34, n=16. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9549, critical = 0.887. Report alpha = 0. Dates ending 4/28/2021 used for control stats. Standardized h=5, SCL=5.

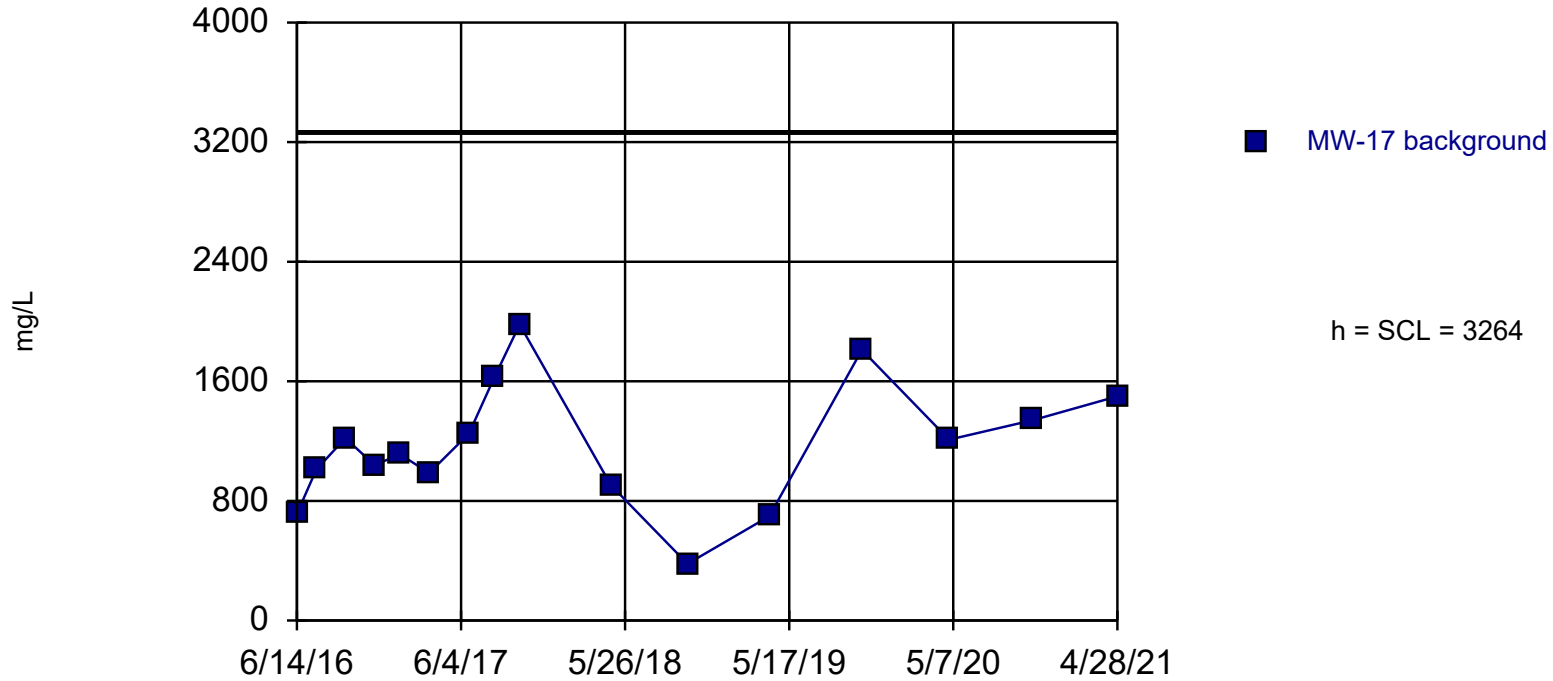
Constituent: Total Dissolved Solids Analysis Run 12/28/2021 10:10 AM View: BER Control Chart

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks



## Control Chart

MW-17



Background Data Summary: Mean=1173, Std. Dev.=418.2, n=16. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9847, critical = 0.887. Report alpha = 0. Dates ending 4/28/2021 used for control stats. Standardized h=5, SCL=5.

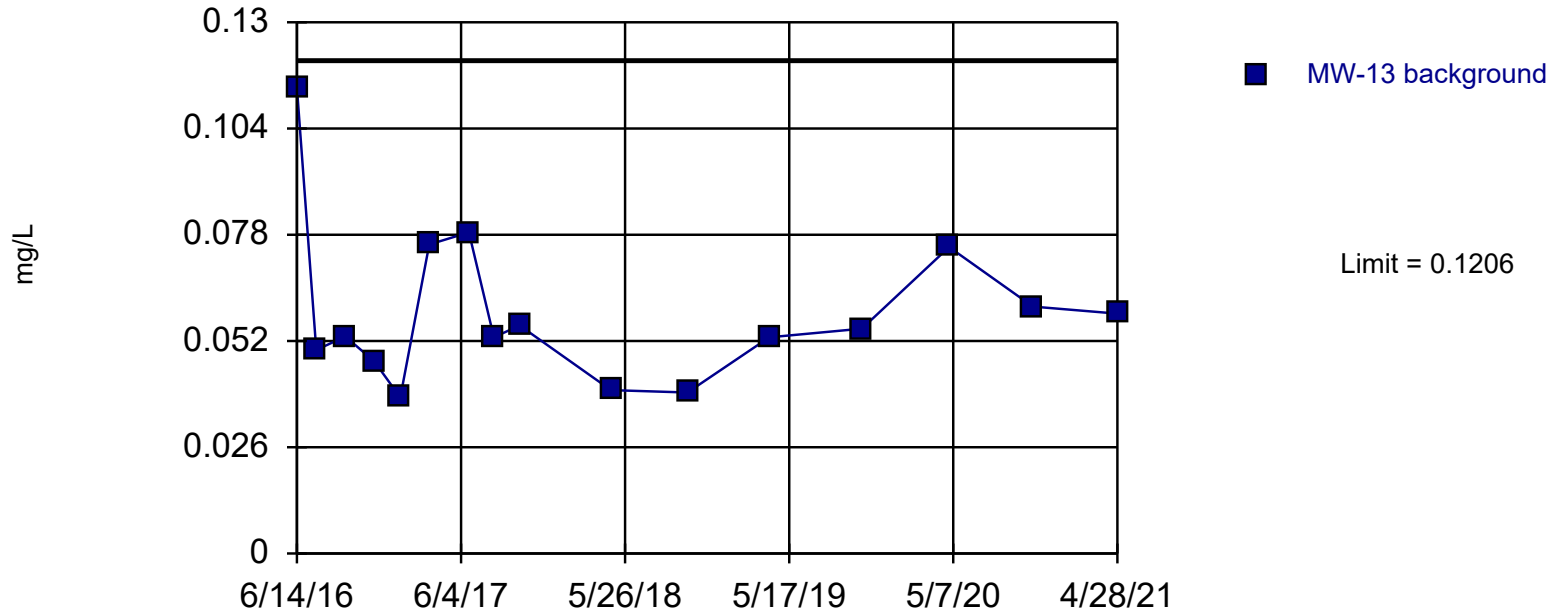
Constituent: Total Dissolved Solids    Analysis Run 12/28/2021 10:10 AM    View: BER Control Chart  
 Twin Oaks Power Station CCR LF    Client: Major Oak Power    Data: Twin Oaks

# Prediction Limit

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks Printed 12/28/2021, 10:02 AM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Date</u>	<u>Observ.</u>	<u>Sig.</u>	<u>Bq N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Boron (mg/L)	MW-13	0.1206	n/a	1 future	n/a	16	0	sqrt(x)	0.000...	Param Intra 1 of 2
Boron (mg/L)	MW-14	0.6019	n/a	1 future	n/a	15	0	No	0.000...	Param Intra 1 of 2
Boron (mg/L)	MW-15	0.06659	n/a	1 future	n/a	16	0	No	0.000...	Param Intra 1 of 2
Boron (mg/L)	MW-17	0.362	n/a	1 future	n/a	15	0	n/a	0.007533	NP Intra (normality) ...

## Prediction Limit Intrawell Parametric, MW-13

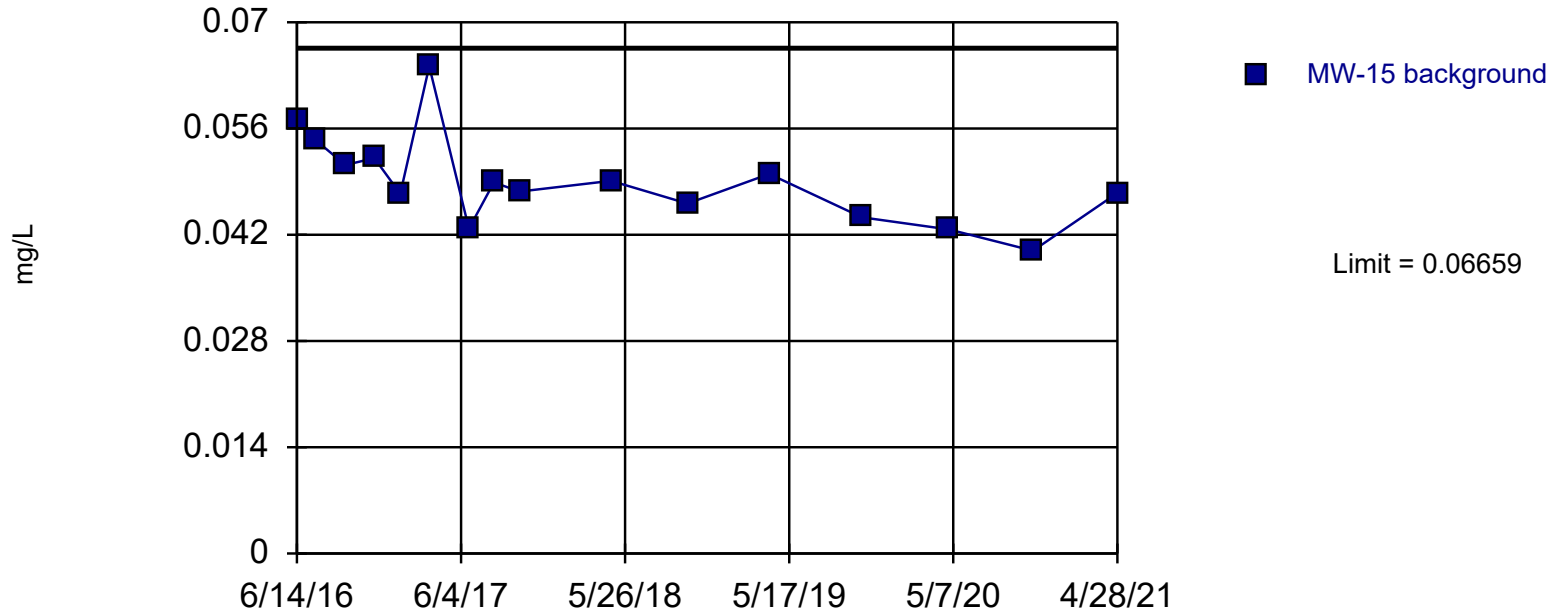


Background Data Summary (based on square root transformation): Mean=0.2406, Std. Dev.=0.03654, n=16. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8931, critical = 0.844. Kappa = 2.919 (c=15, w=21, 1 of 2, event alpha = 0.05132). Report alpha = 0.0001672. Assumes 1 future value.

Constituent: Boron Analysis Run 12/28/2021 10:01 AM View: BER Prediction Limit  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks



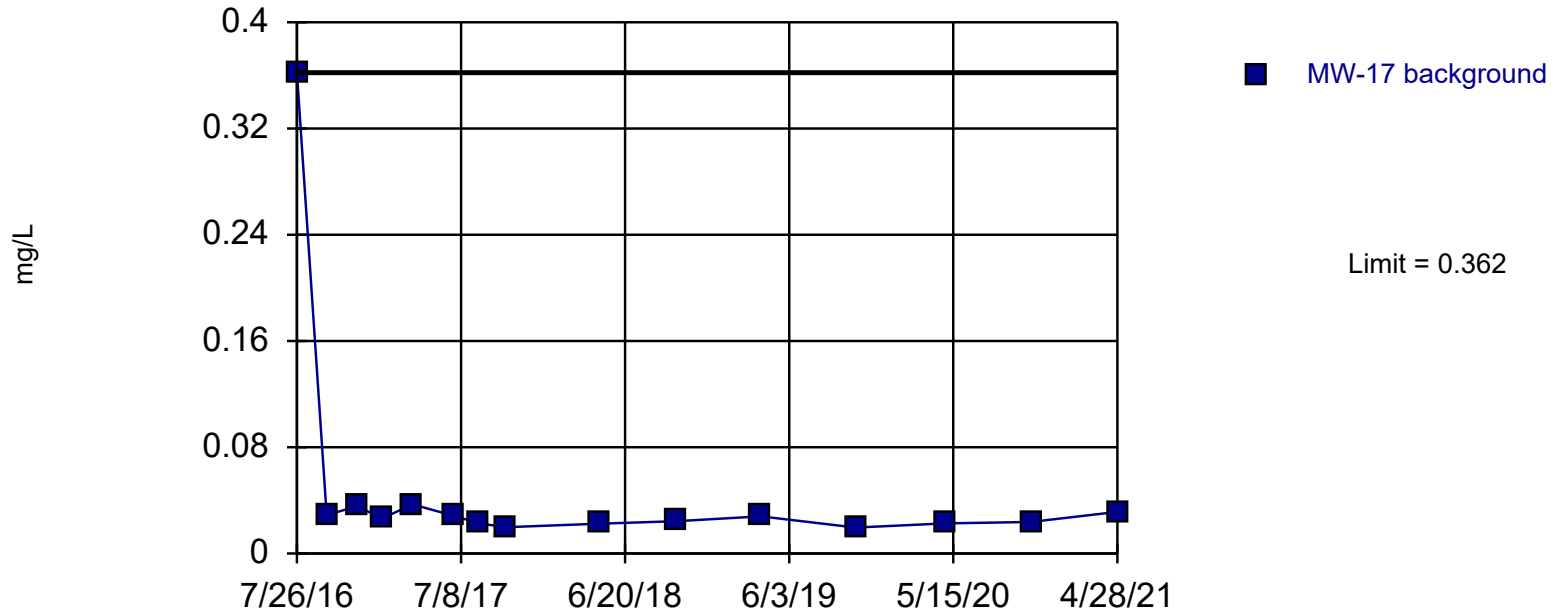
## Prediction Limit Intrawell Parametric, MW-15



Background Data Summary: Mean=0.04909, Std. Dev.=0.005995, n=16. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9456, critical = 0.844. Kappa = 2.919 (c=15, w=21, 1 of 2, event alpha = 0.05132). Report alpha = 0.0001672. Assumes 1 future value.

Constituent: Boron Analysis Run 12/28/2021 10:01 AM View: BER Prediction Limit  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Prediction Limit Intrawell Non-parametric, MW-17



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 15 background values. Well-constituent pair annual alpha = 0.01501. Individual comparison alpha = 0.007533 (1 of 2). Assumes 1 future value. Seasonality was not detected with 95% confidence.

Constituent: Boron Analysis Run 12/28/2021 10:01 AM View: BER Prediction Limit

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## **Outlier Analysis**

# Outlier Analysis

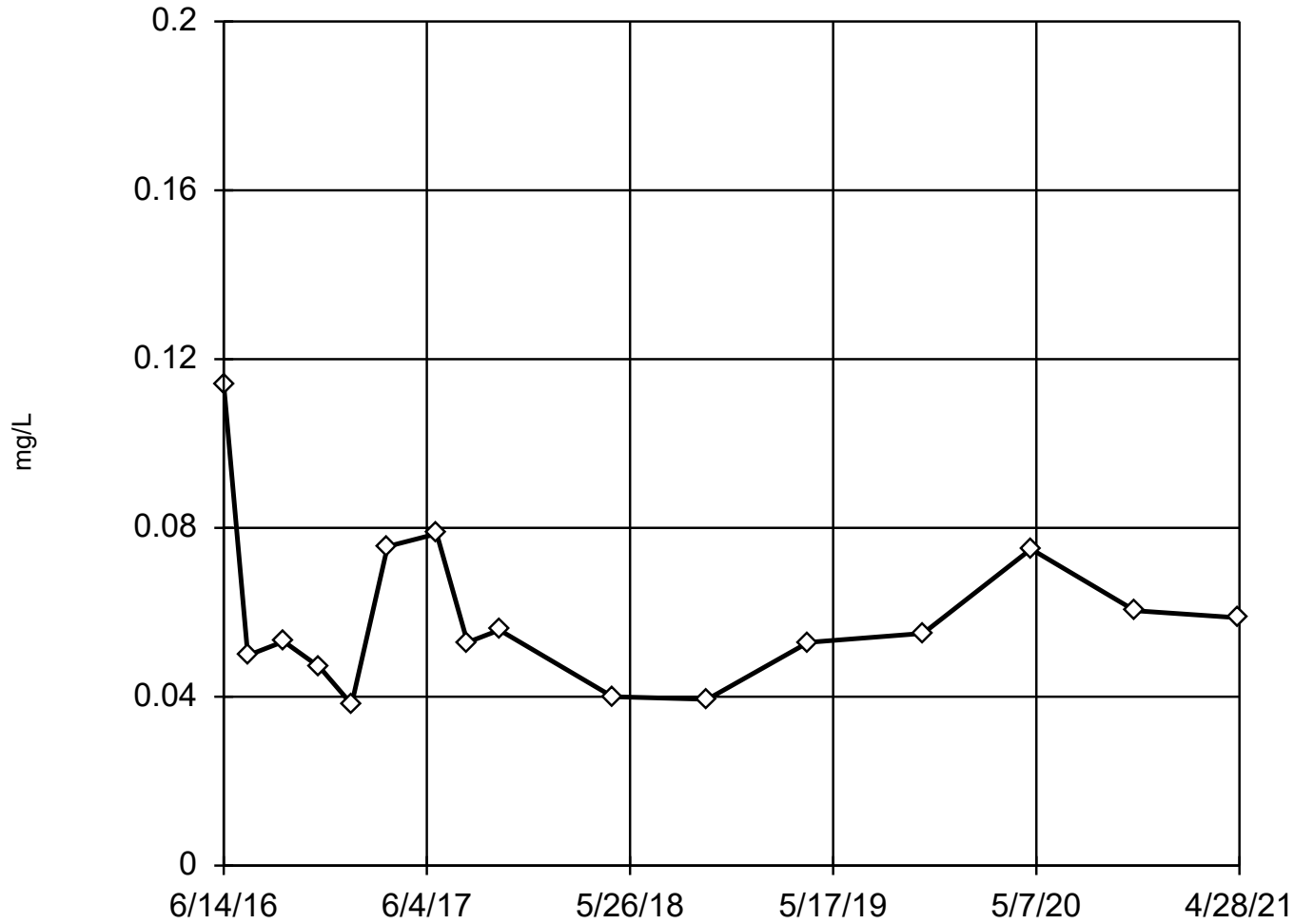
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks Printed 12/16/2021, 3:50 PM

<u>Constituent</u>	<u>Well</u>	<u>Outlier</u>	<u>Value(s)</u>	<u>Date(s)</u>	<u>Method</u>	<u>Alpha</u>	<u>N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Distribution</u>	<u>Normality Test</u>
Boron (mg/L)	MW-13	No	n/a	n/a	EPA 1989	0.05	16	0.05915	0.01912	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-13	No	n/a	n/a	EPA 1989	0.05	16	26.18	6.682	ln(x)	ShapiroWilk
<b>Chloride (mg/L)</b>	<b>MW-13</b>	<b>Yes</b>	<b>75.8</b>	<b>6/14/2016</b>	<b>Dixon's</b>	<b>0.05</b>	<b>16</b>	<b>96.78</b>	<b>7.015</b>	<b>normal</b>	<b>ShapiroWilk</b>
Fluoride (mg/L)	MW-13	n/a	n/a	n/a	NP (nrm)	NaN	16	0.4862	0.06236	unknown	ShapiroWilk
pH (SU)	MW-13	No	n/a	n/a	EPA 1989	0.05	16	6.348	0.2752	normal	ShapiroWilk
Sulfate (mg/L)	MW-13	No	n/a	n/a	Dixon's	0.05	16	55.67	27.91	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-13	No	n/a	n/a	EPA 1989	0.05	16	387	48.98	normal	ShapiroWilk
Boron (mg/L)	MW-14	No	n/a	n/a	NP (nrm)	NaN	16	0.2052	0.155	unknown	ShapiroWilk
Calcium (mg/L)	MW-14	No	n/a	n/a	EPA 1989	0.05	16	85.96	17.99	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-14	No	n/a	n/a	EPA 1989	0.05	16	349.5	19.92	normal	ShapiroWilk
Fluoride (mg/L)	MW-14	n/a	n/a	n/a	NP (nrm)	NaN	16	0.5003	0.07426	unknown	ShapiroWilk
<b>pH (SU)</b>	<b>MW-14</b>	<b>Yes</b>	<b>5.9</b>	<b>10/10/2017</b>	<b>Dixon's</b>	<b>0.05</b>	<b>16</b>	<b>6.62</b>	<b>0.2507</b>	<b>normal</b>	<b>ShapiroWilk</b>
Sulfate (mg/L)	MW-14	No	n/a	n/a	EPA 1989	0.05	16	259.8	116.1	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-14	No	n/a	n/a	EPA 1989	0.05	16	1215	165.5	ln(x)	ShapiroWilk
Boron (mg/L)	MW-15	No	n/a	n/a	EPA 1989	0.05	16	0.04909	0.005995	normal	ShapiroWilk
<b>Calcium (mg/L)</b>	<b>MW-15</b>	<b>Yes</b>	<b>30</b>	<b>6/23/2021</b>	<b>Dixon's</b>	<b>0.05</b>	<b>16</b>	<b>21.34</b>	<b>2.976</b>	<b>normal</b>	<b>ShapiroWilk</b>
Chloride (mg/L)	MW-15	No	n/a	n/a	EPA 1989	0.05	16	114	16.72	normal	ShapiroWilk
Fluoride (mg/L)	MW-15	n/a	n/a	n/a	NP (nrm)	NaN	16	0.4865	0.05039	unknown	ShapiroWilk
<b>pH (SU)</b>	<b>MW-15</b>	<b>Yes</b>	<b>5.63</b>	<b>10/10/2017</b>	<b>Dixon's</b>	<b>0.05</b>	<b>16</b>	<b>6.516</b>	<b>0.2945</b>	<b>normal</b>	<b>ShapiroWilk</b>
Sulfate (mg/L)	MW-15	No	n/a	n/a	EPA 1989	0.05	16	29.78	4.042	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-15	No	n/a	n/a	EPA 1989	0.05	16	370.9	22.34	normal	ShapiroWilk
<b>Boron (mg/L)</b>	<b>MW-17</b>	<b>Yes</b>	<b>0.362</b>	<b>7/26/2016</b>	<b>Dixon's</b>	<b>0.05</b>	<b>15</b>	<b>0.04887</b>	<b>0.08678</b>	<b>normal</b>	<b>ShapiroWilk</b>
Calcium (mg/L)	MW-17	No	n/a	n/a	EPA 1989	0.05	16	107.8	57.75	normal	ShapiroWilk
Chloride (mg/L)	MW-17	No	n/a	n/a	EPA 1989	0.05	16	549	235.7	normal	ShapiroWilk
Fluoride (mg/L)	MW-17	n/a	n/a	n/a	NP (nrm)	NaN	16	0.481	0.06204	unknown	ShapiroWilk
pH (SU)	MW-17	No	n/a	n/a	EPA 1989	0.05	16	5.876	0.3768	normal	ShapiroWilk
Sulfate (mg/L)	MW-17	No	n/a	n/a	Dixon's	0.05	16	49.99	23.6	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-17	No	n/a	n/a	Dixon's	0.05	16	1173	418.2	normal	ShapiroWilk



## EPA Screening (suspected outliers for Dixon's Test)

MW-13



n = 16

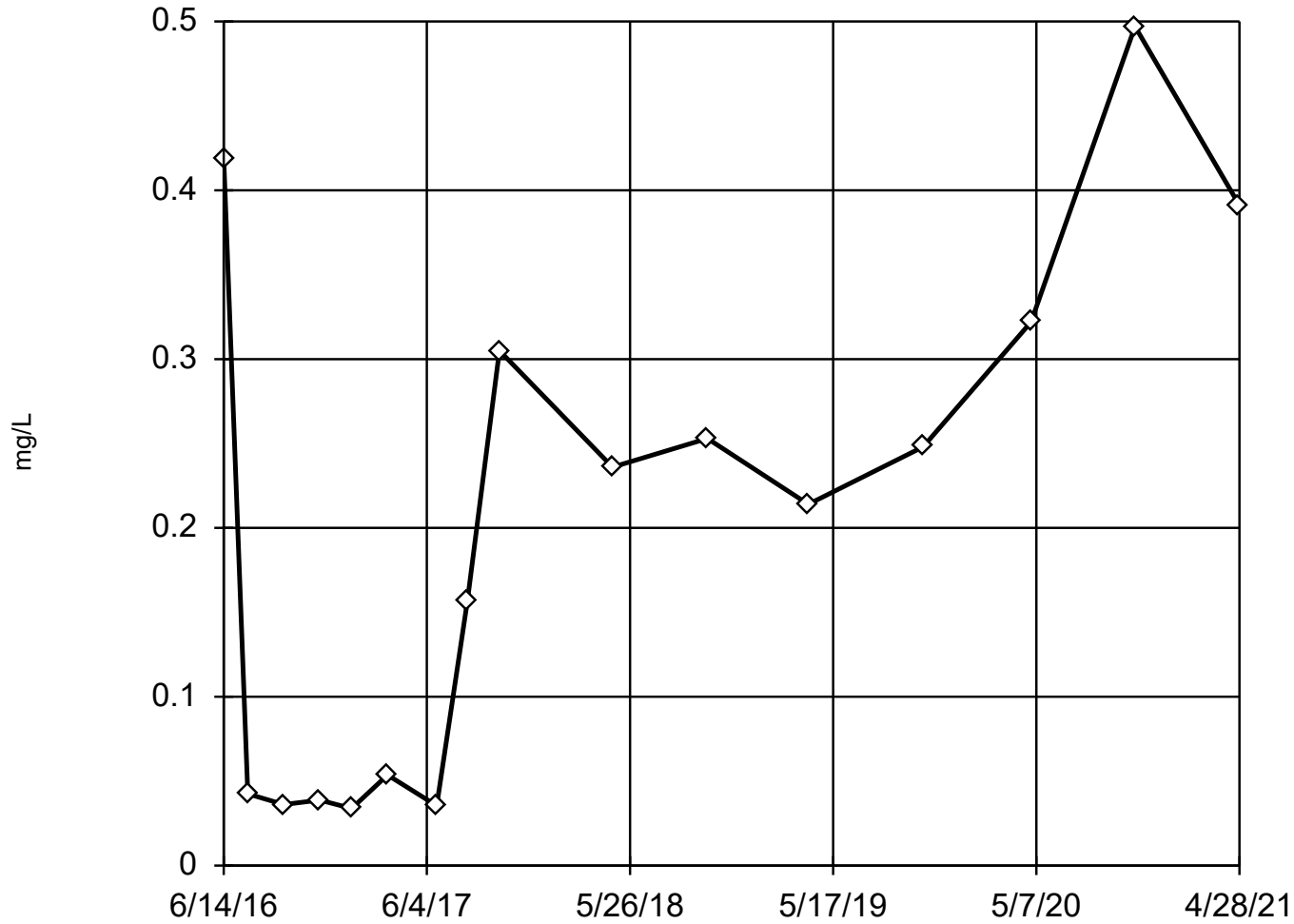
Dixon's will not be run.  
No suspect values identified  
or unable to establish  
suspect values.  
Mean 0.05915, std. dev.  
0.01912, critical Tn 2.443

Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9306  
Critical = 0.906 (after  
natural log transforma-  
tion)  
The distribution was found  
to be log-normal.

Constituent: Boron Analysis Run 12/16/2021 3:49 PM View: Outlier  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

# Tukey's Outlier Screening

MW-14



n = 16

No outliers found.  
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

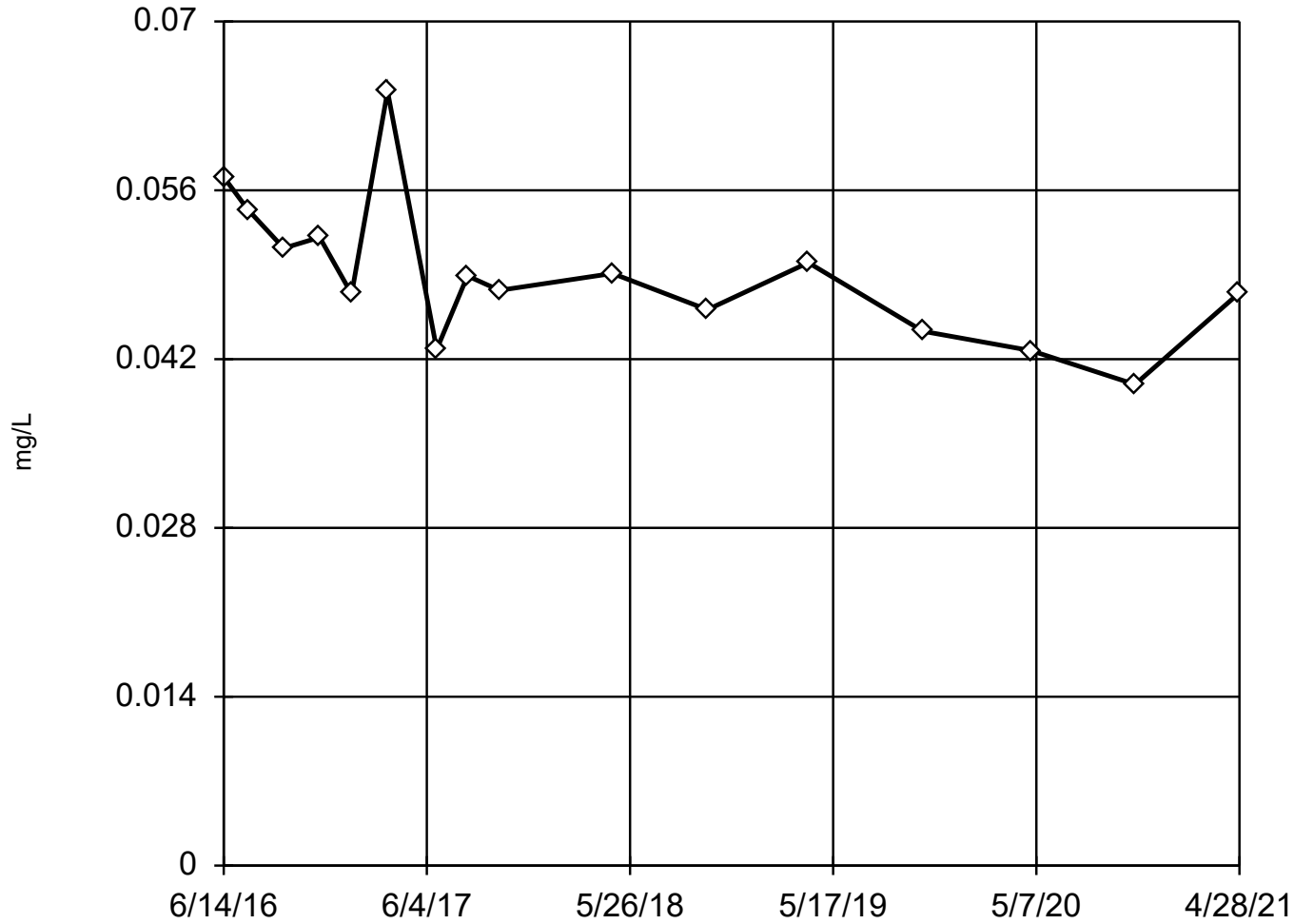
Ladder of Powers transformations did not improve normality; analysis run on raw data.

High cutoff = 1.132, low cutoff = -0.7779, based on IQR multiplier of 3.

Constituent: Boron Analysis Run 12/16/2021 3:49 PM View: Outlier  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

### EPA Screening (suspected outliers for Dixon's Test)

MW-15

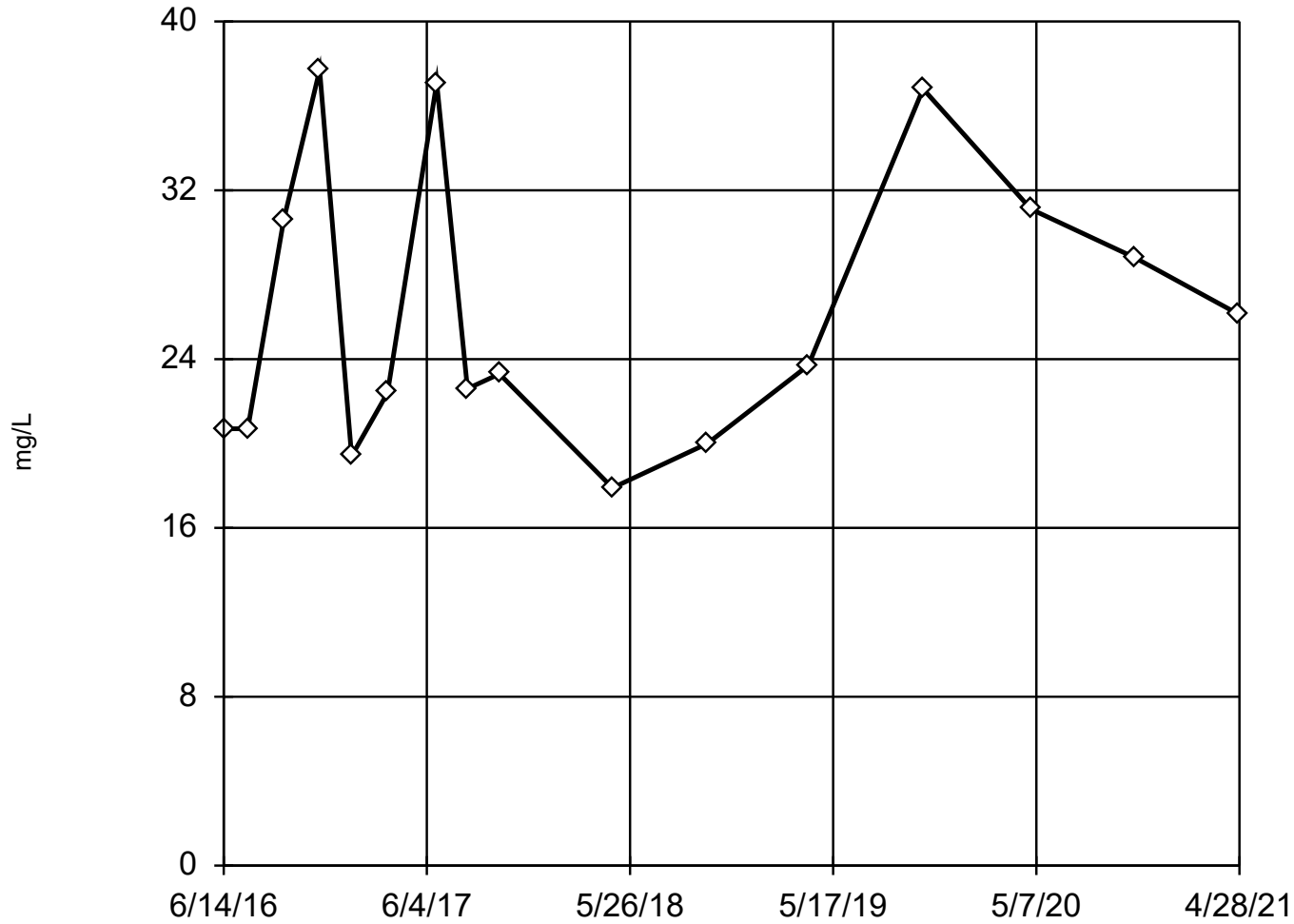


n = 16  
Dixon's will not be run.  
No suspect values identified or unable to establish suspect values.  
Mean 0.04909, std. dev. 0.005995, critical Tn 2.443  
Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9456  
Critical = 0.906  
The distribution was found to be normally distributed.



### EPA Screening (suspected outliers for Dixon's Test)

MW-13



n = 16

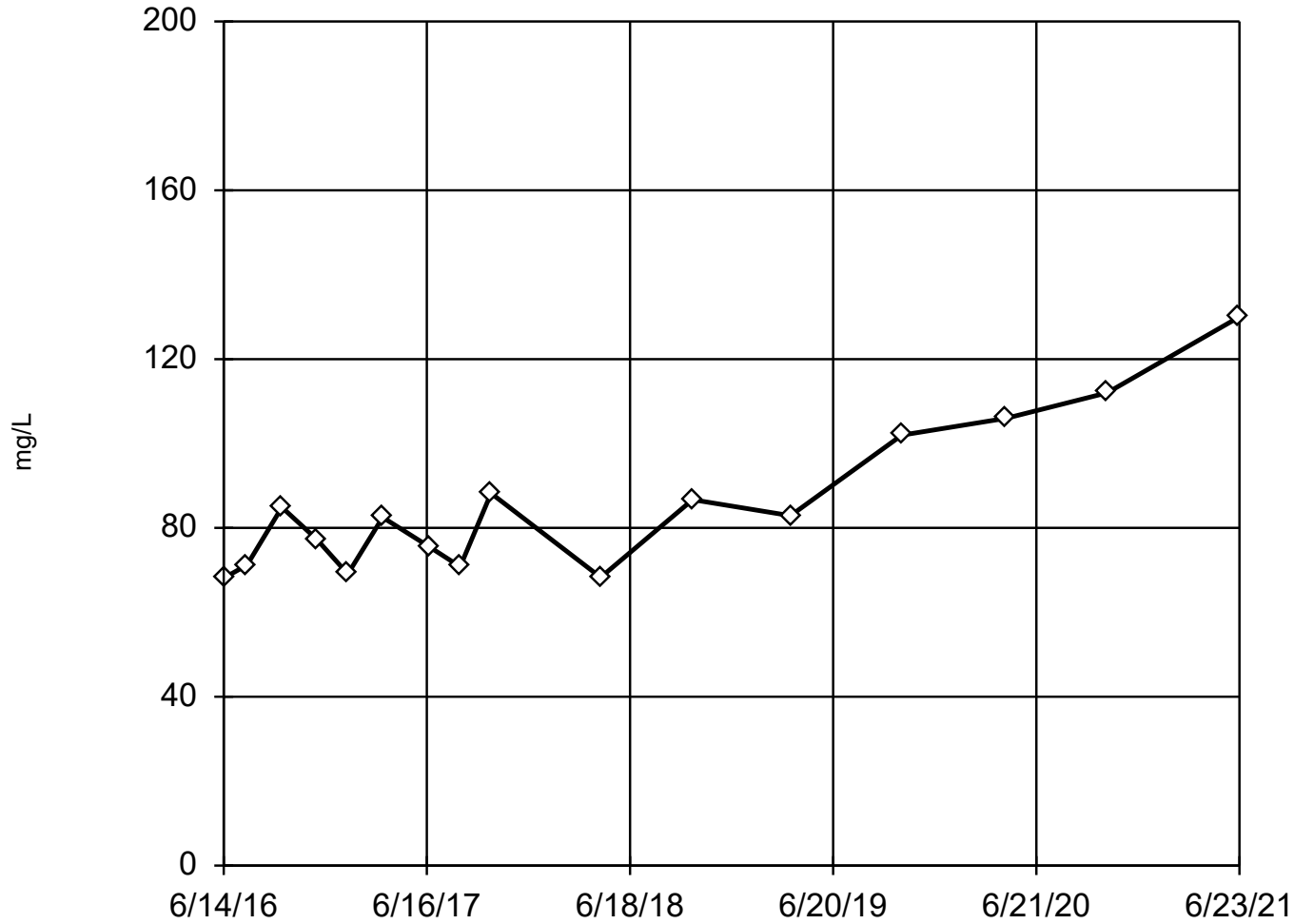
Dixon's will not be run.  
No suspect values identified  
or unable to establish  
suspect values.  
Mean 26.18, std. dev.  
6.682, critical Tn 2.443

Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9198  
Critical = 0.906 (after  
natural log transforma-  
tion)  
The distribution was found  
to be log-normal.

Constituent: Calcium Analysis Run 12/16/2021 3:49 PM View: Outlier  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## EPA Screening (suspected outliers for Dixon's Test)

MW-14



n = 16

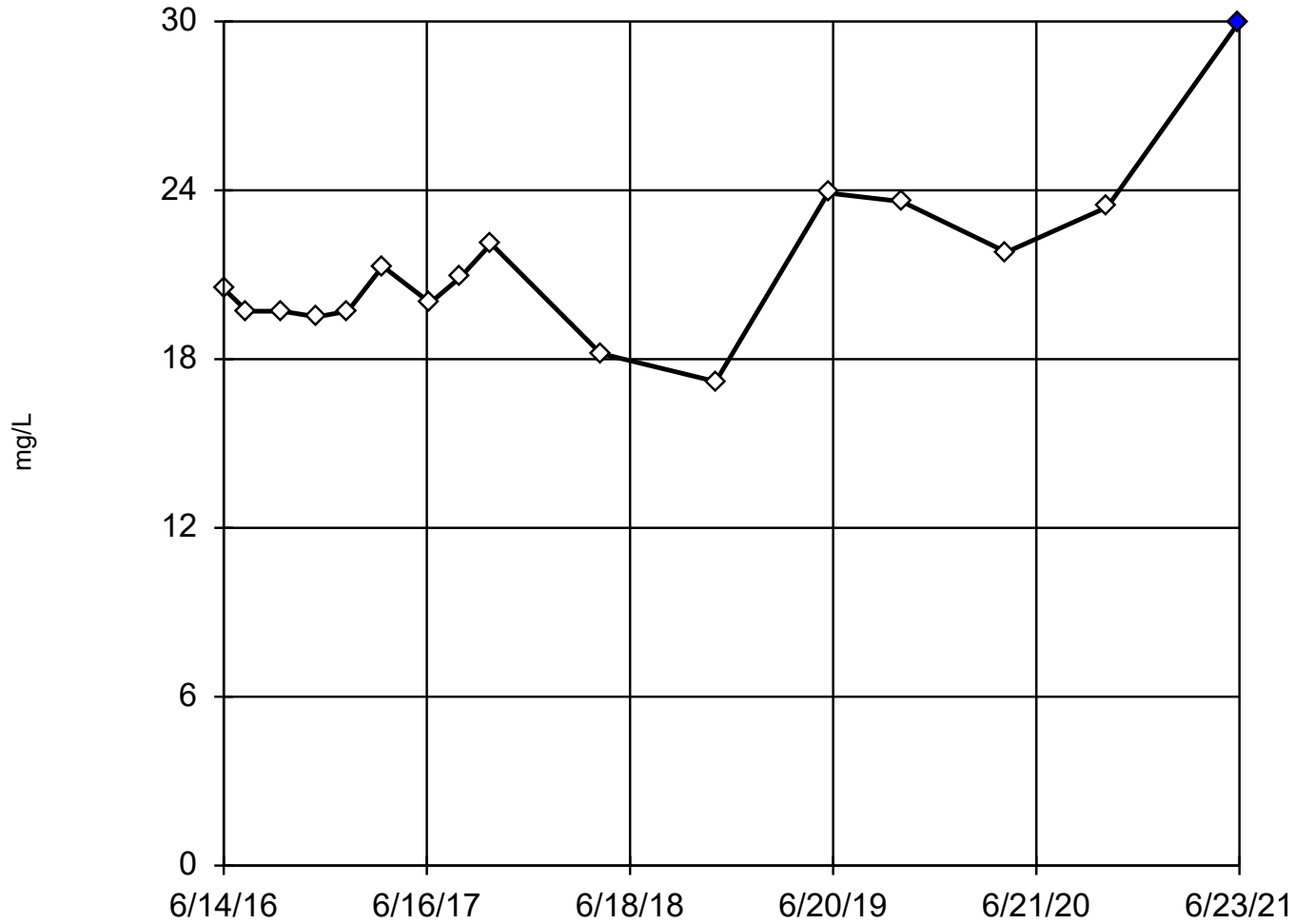
Dixon's will not be run.  
No suspect values identified  
or unable to establish  
suspect values.  
Mean 85.96, std. dev.  
17.99, critical Tn 2.443

Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9083  
Critical = 0.906 (after  
natural log transforma-  
tion)  
The distribution was found  
to be log-normal.

Constituent: Calcium Analysis Run 12/16/2021 3:49 PM View: Outlier  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Dixon's Outlier Test

MW-15



n = 16

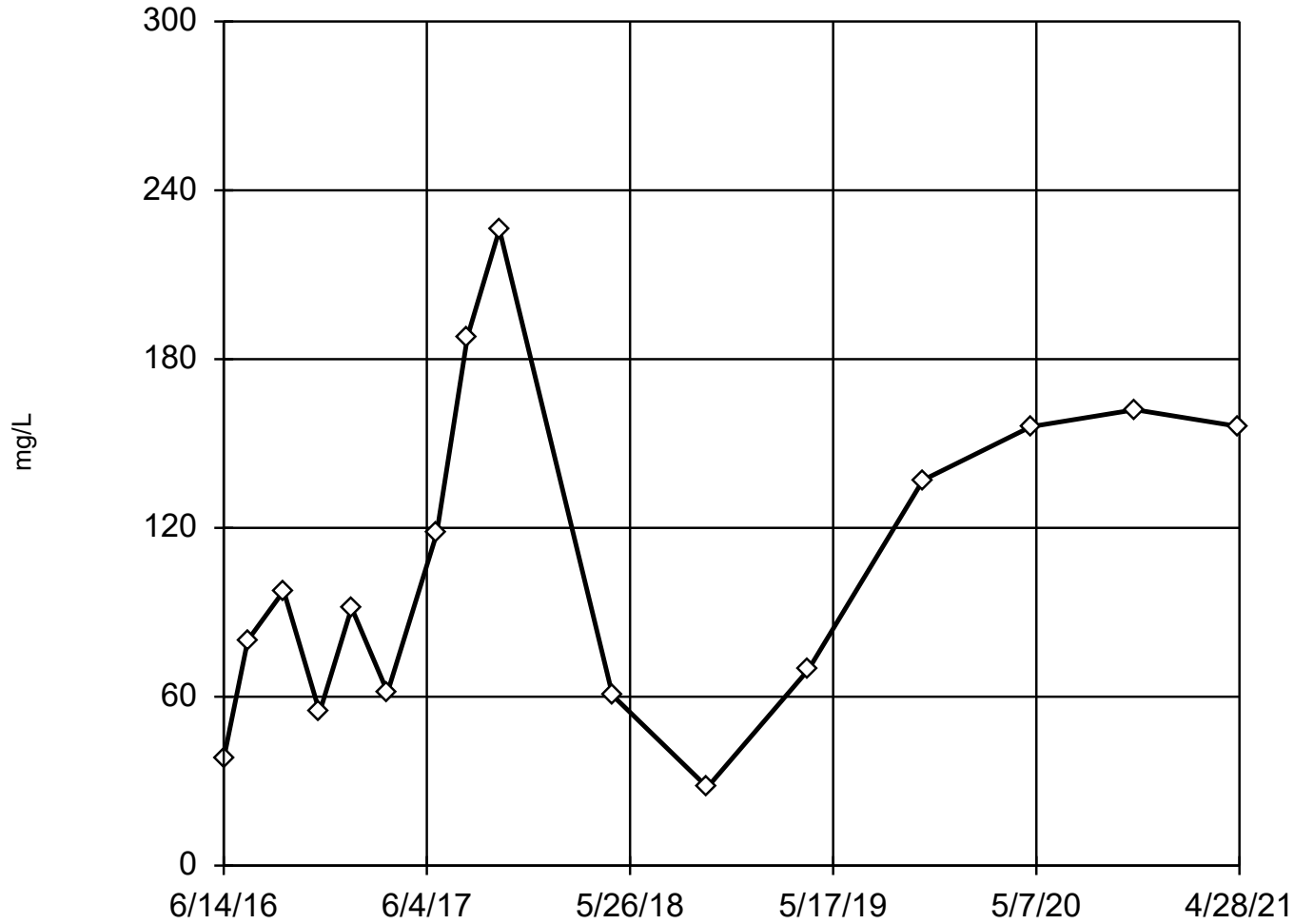
Statistical outlier is drawn as solid.  
Testing for 1 high outlier.  
Mean = 21.34.  
Std. Dev. = 2.976.  
30: c = 0.6095  
tab1 = 0.507.  
Alpha = 0.05.

Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.959  
Critical = 0.901  
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: Calcium Analysis Run 12/16/2021 3:49 PM View: Outlier  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## EPA Screening (suspected outliers for Dixon's Test)

MW-17



n = 16

Dixon's will not be run.  
No suspect values identified  
or unable to establish  
suspect values.  
Mean 107.8, std. dev.  
57.75, critical Tn 2.443

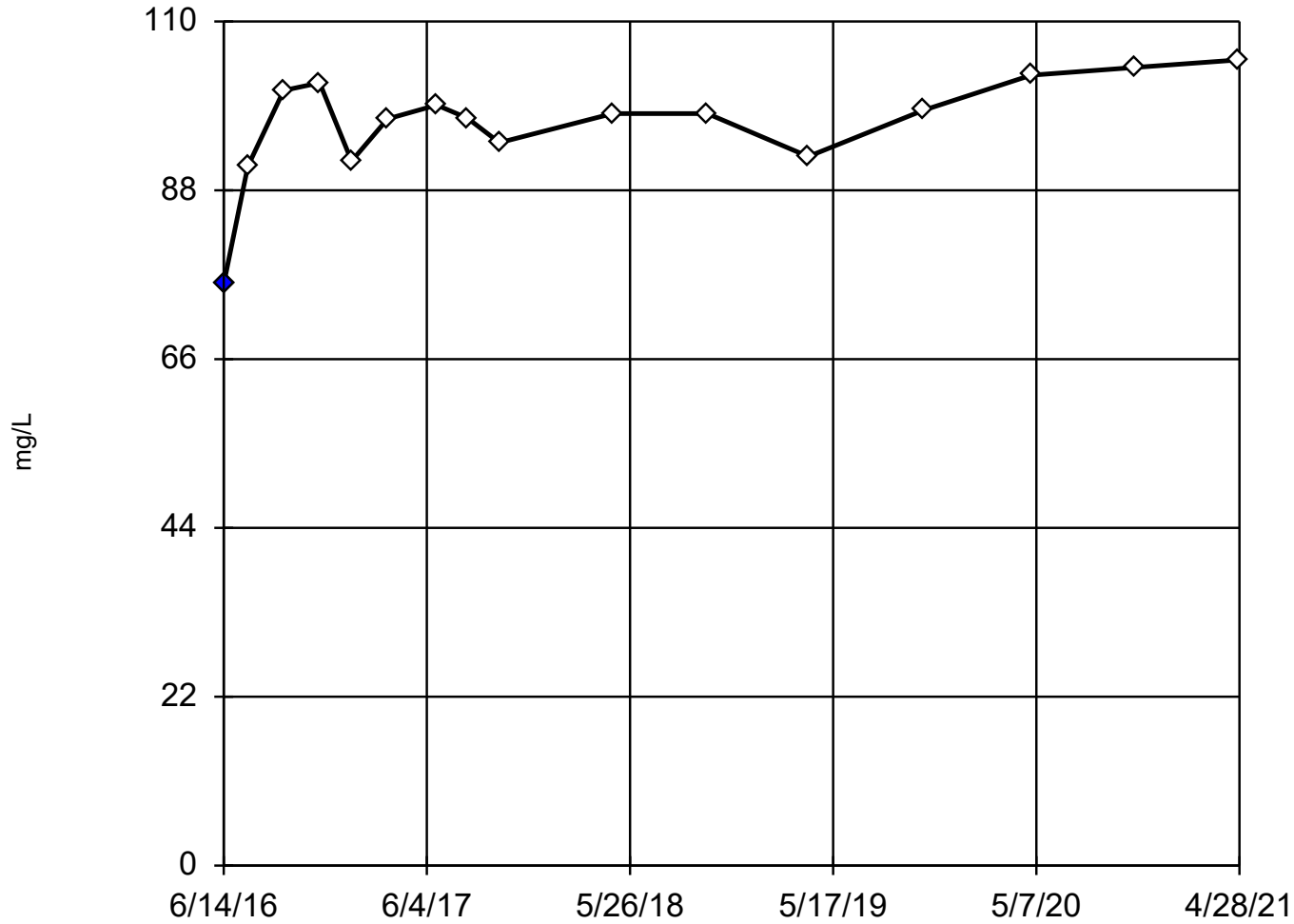
Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9499  
Critical = 0.906  
The distribution was found  
to be normally distrib-  
uted.

Constituent: Calcium Analysis Run 12/16/2021 3:49 PM View: Outlier  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks



### Dixon's Outlier Test

MW-13



n = 16

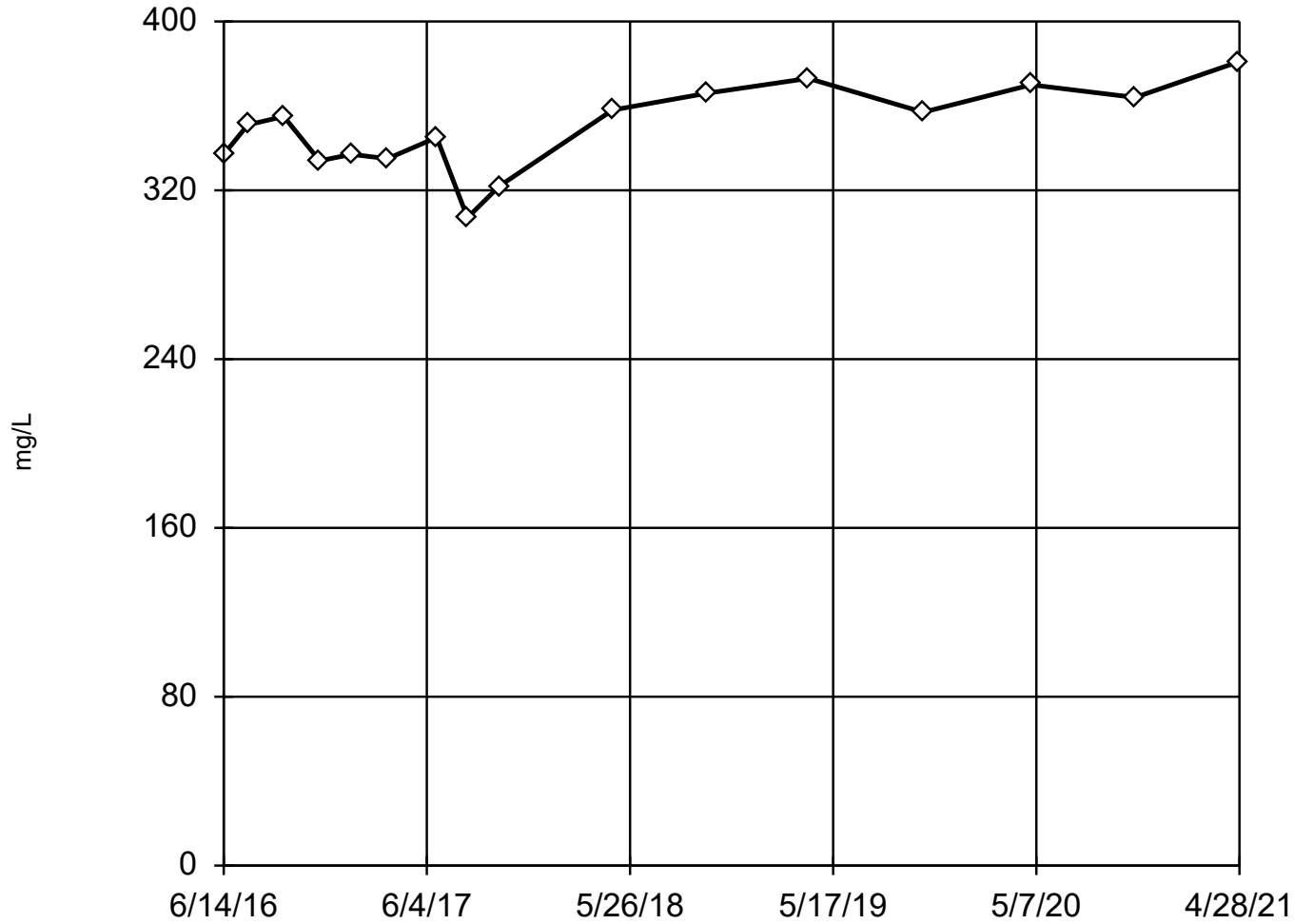
Statistical outlier is drawn as solid.  
Testing for 1 low outlier.  
Mean = 96.78.  
Std. Dev. = 7.015.  
75.8: c = 0.5882  
tab1 = 0.507.  
Alpha = 0.05.

Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9494  
Critical = 0.901  
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: Chloride Analysis Run 12/16/2021 3:49 PM View: Outlier  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

### EPA Screening (suspected outliers for Dixon's Test)

MW-14



n = 16

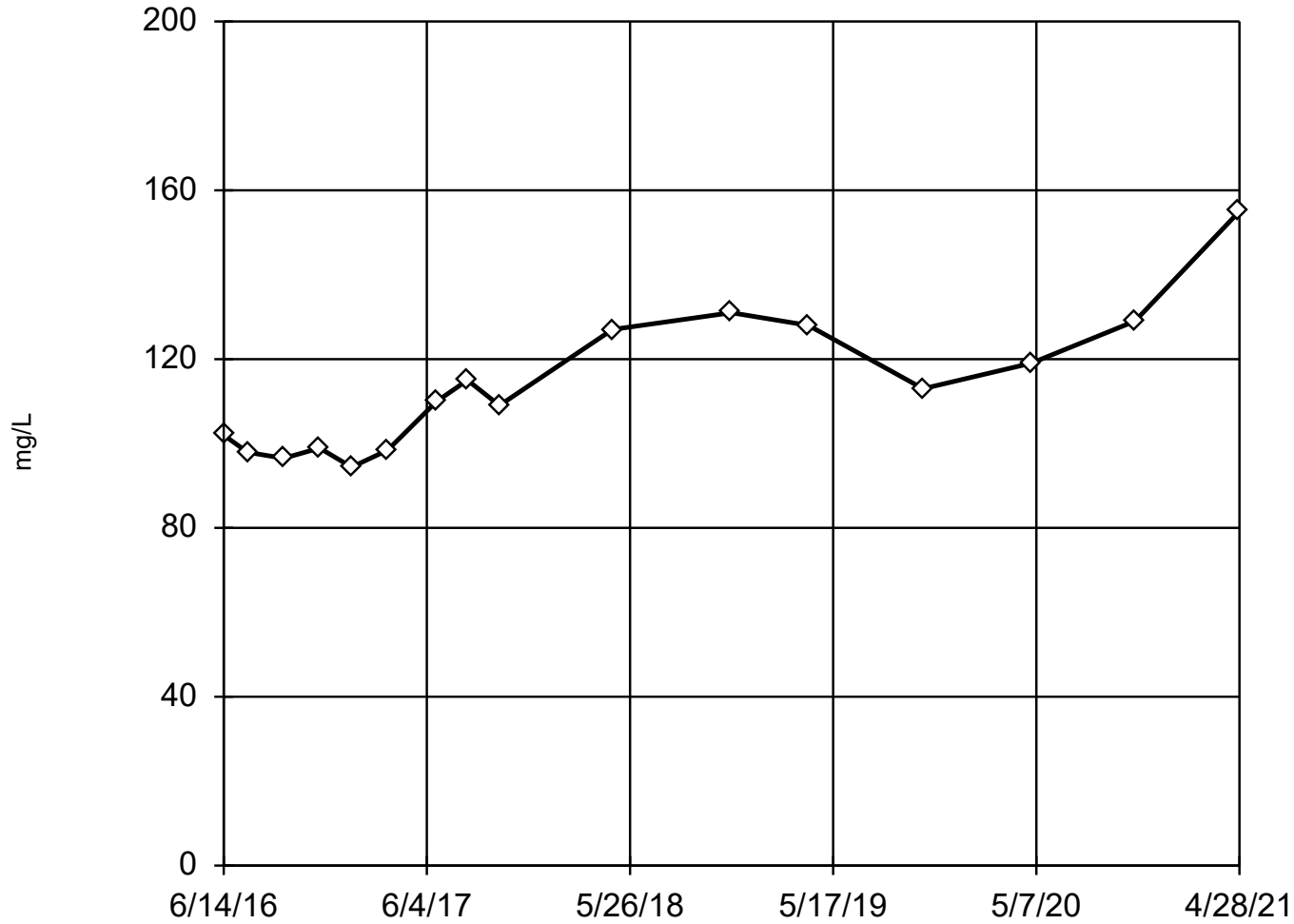
Dixon's will not be run.  
No suspect values identified  
or unable to establish  
suspect values.  
Mean 349.5, std. dev.  
19.92, critical Tn 2.443

Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9723  
Critical = 0.906  
The distribution was found  
to be normally distrib-  
uted.

Constituent: Chloride Analysis Run 12/16/2021 3:49 PM View: Outlier  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

### EPA Screening (suspected outliers for Dixon's Test)

MW-15



n = 16

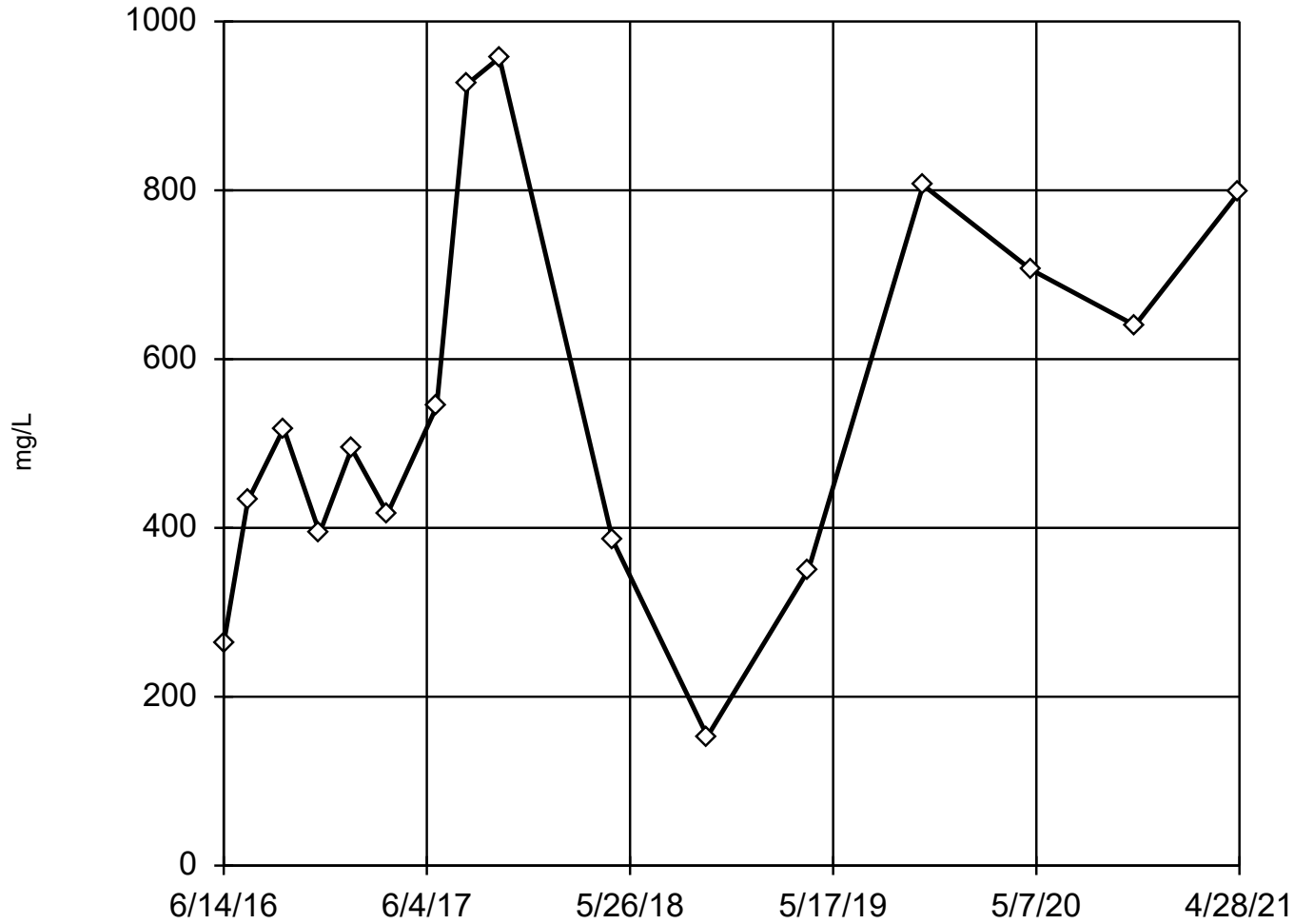
Dixon's will not be run.  
No suspect values identified or unable to establish suspect values.  
Mean 114, std. dev. 16.72, critical Tn 2.443

Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9096  
Critical = 0.906  
The distribution was found to be normally distributed.

Constituent: Chloride Analysis Run 12/16/2021 3:49 PM View: Outlier  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

### EPA Screening (suspected outliers for Dixon's Test)

MW-17



n = 16

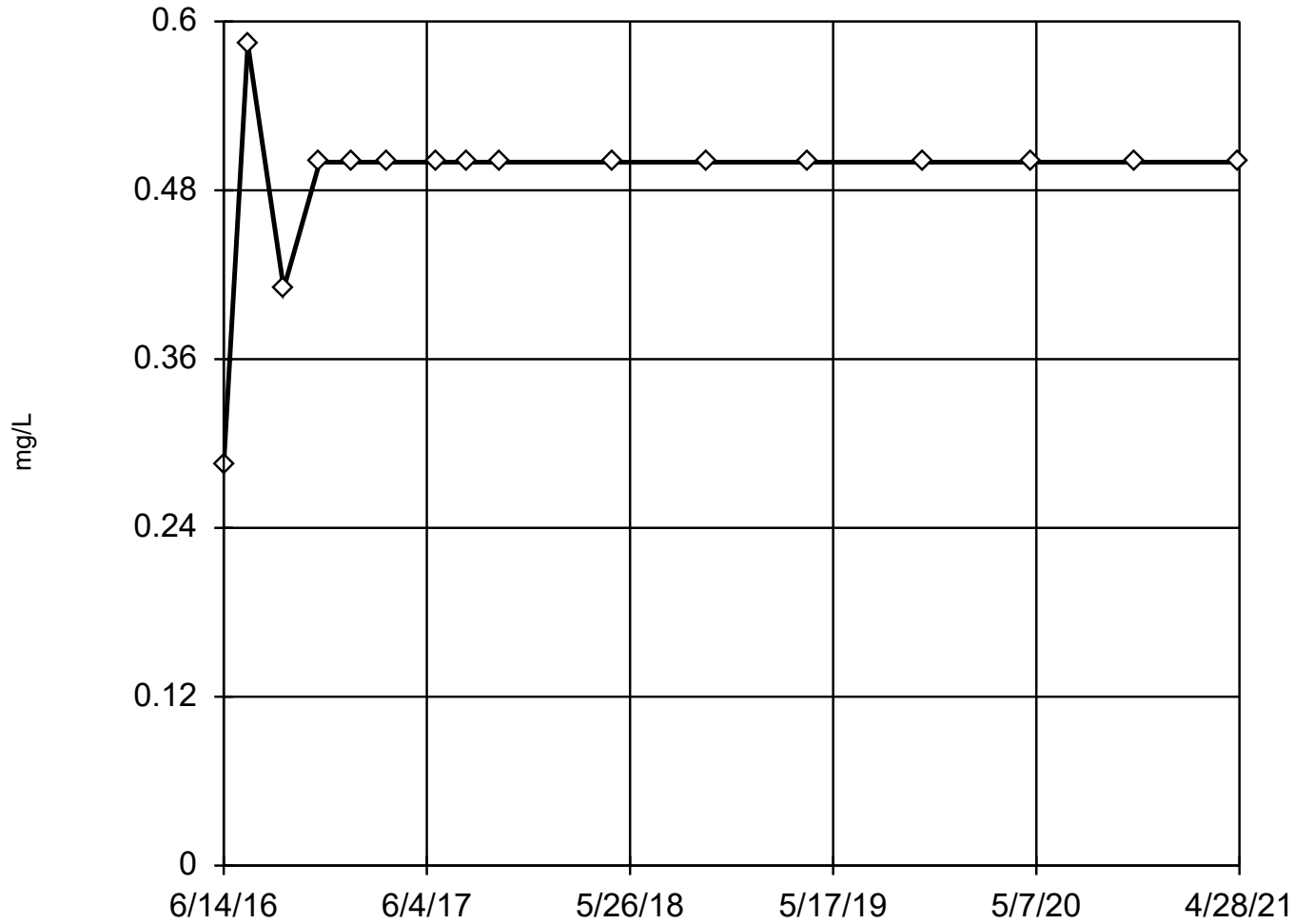
Dixon's will not be run.  
No suspect values identified or unable to establish suspect values.  
Mean 549, std. dev. 235.7, critical Tn 2.443

Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9592  
Critical = 0.906  
The distribution was found to be normally distributed.

Constituent: Chloride Analysis Run 12/16/2021 3:49 PM View: Outlier  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

# Tukey's Outlier Screening

MW-13



n = 16

No outliers found.  
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

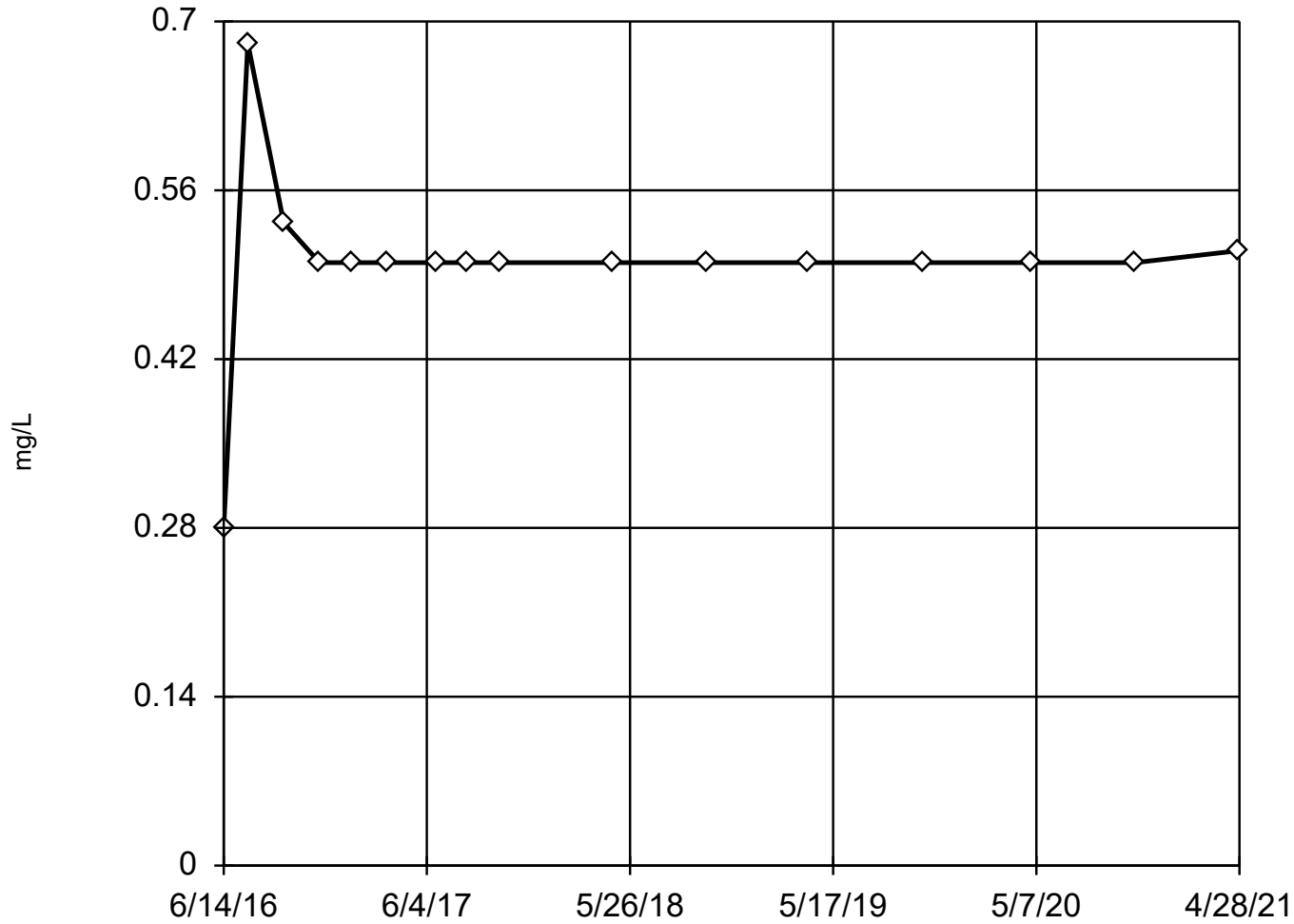
Data were  $x^4$  transformed to achieve best W statistic (graph shown in original units).

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

Constituent: Fluoride Analysis Run 12/16/2021 3:49 PM View: Outlier  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

# Tukey's Outlier Screening

MW-14



n = 16

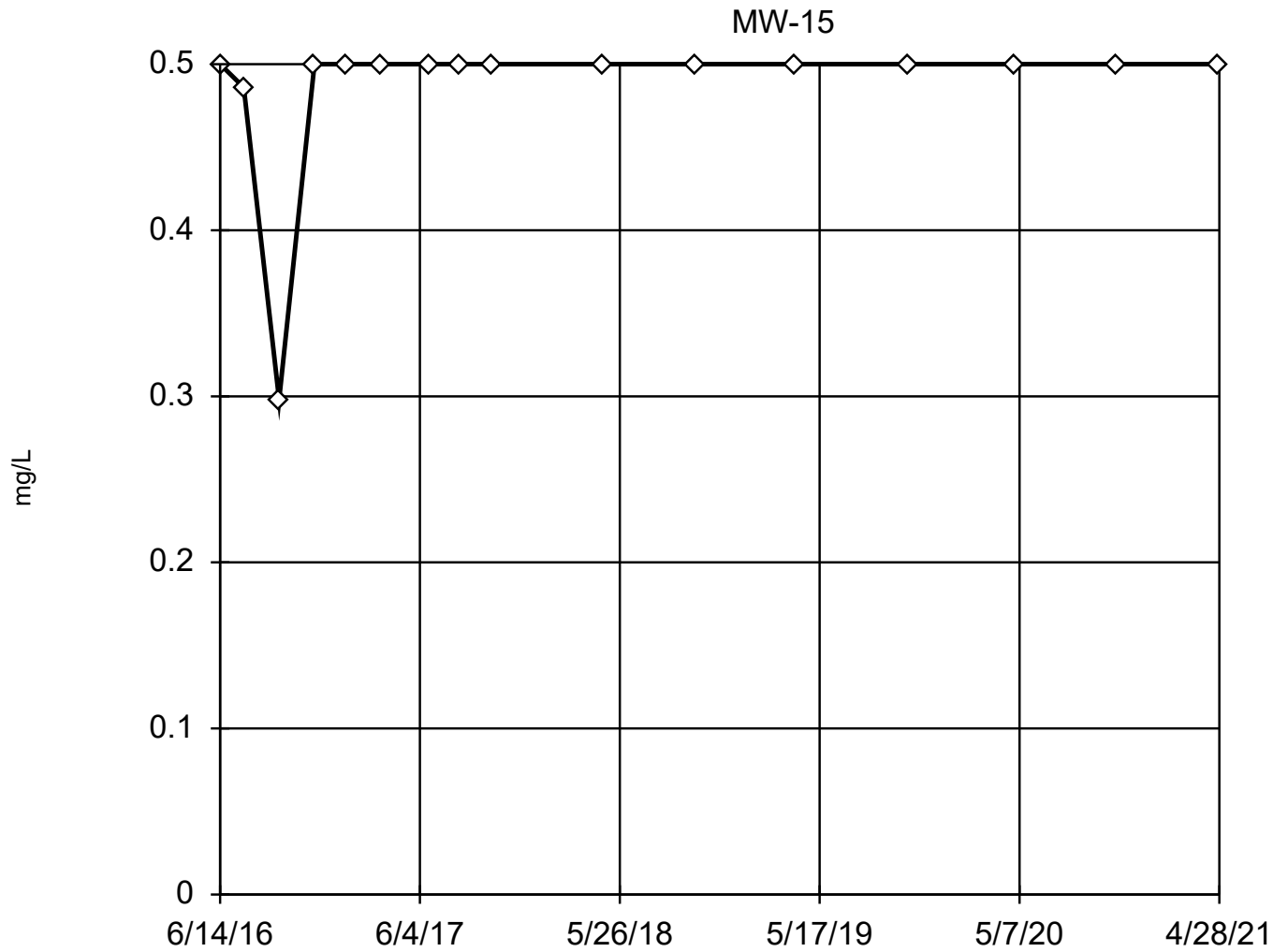
No outliers found.  
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

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

Constituent: Fluoride Analysis Run 12/16/2021 3:49 PM View: Outlier  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Tukey's Outlier Screening



n = 16

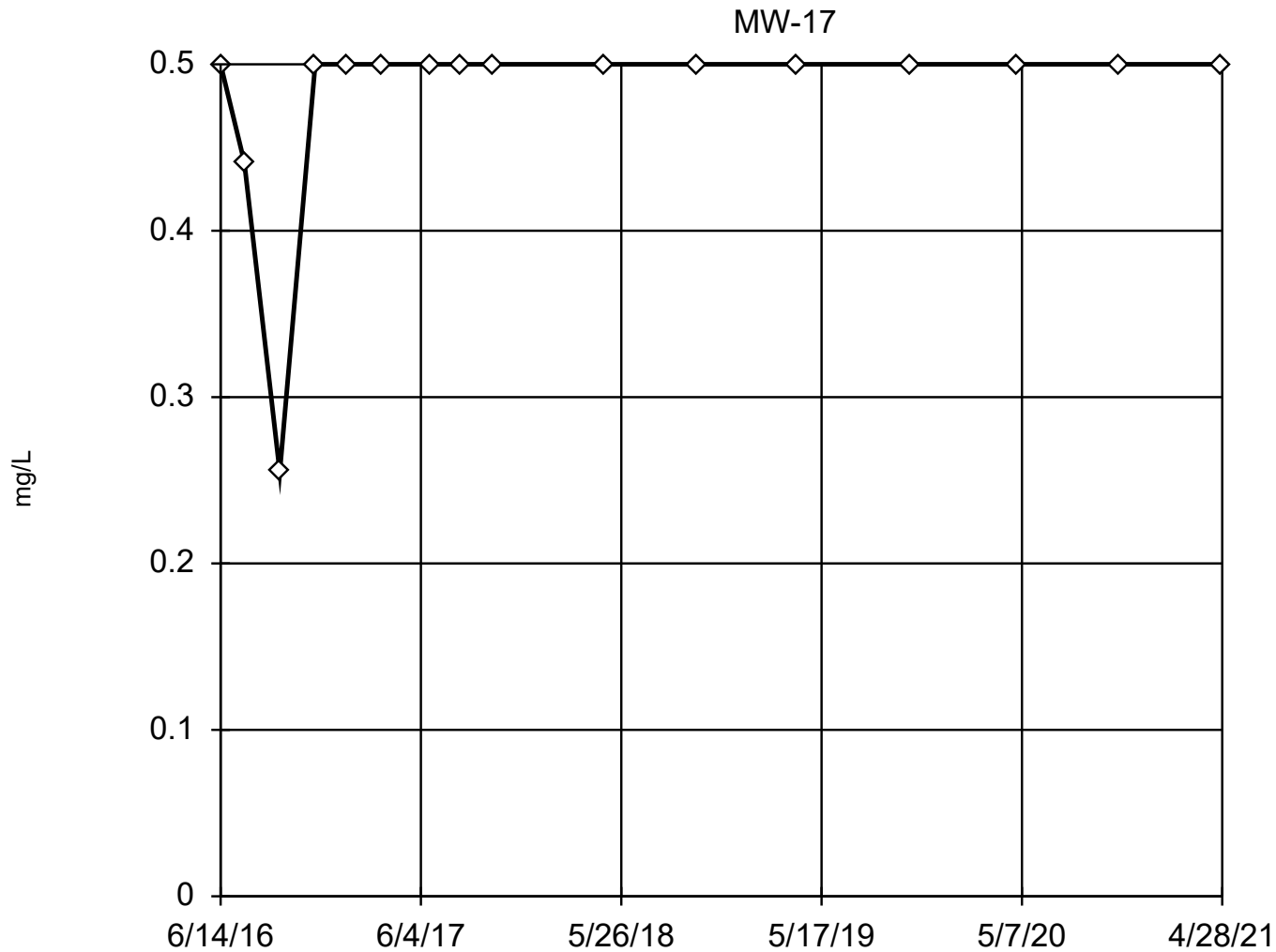
No outliers found.  
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

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

Constituent: Fluoride Analysis Run 12/16/2021 3:49 PM View: Outlier  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

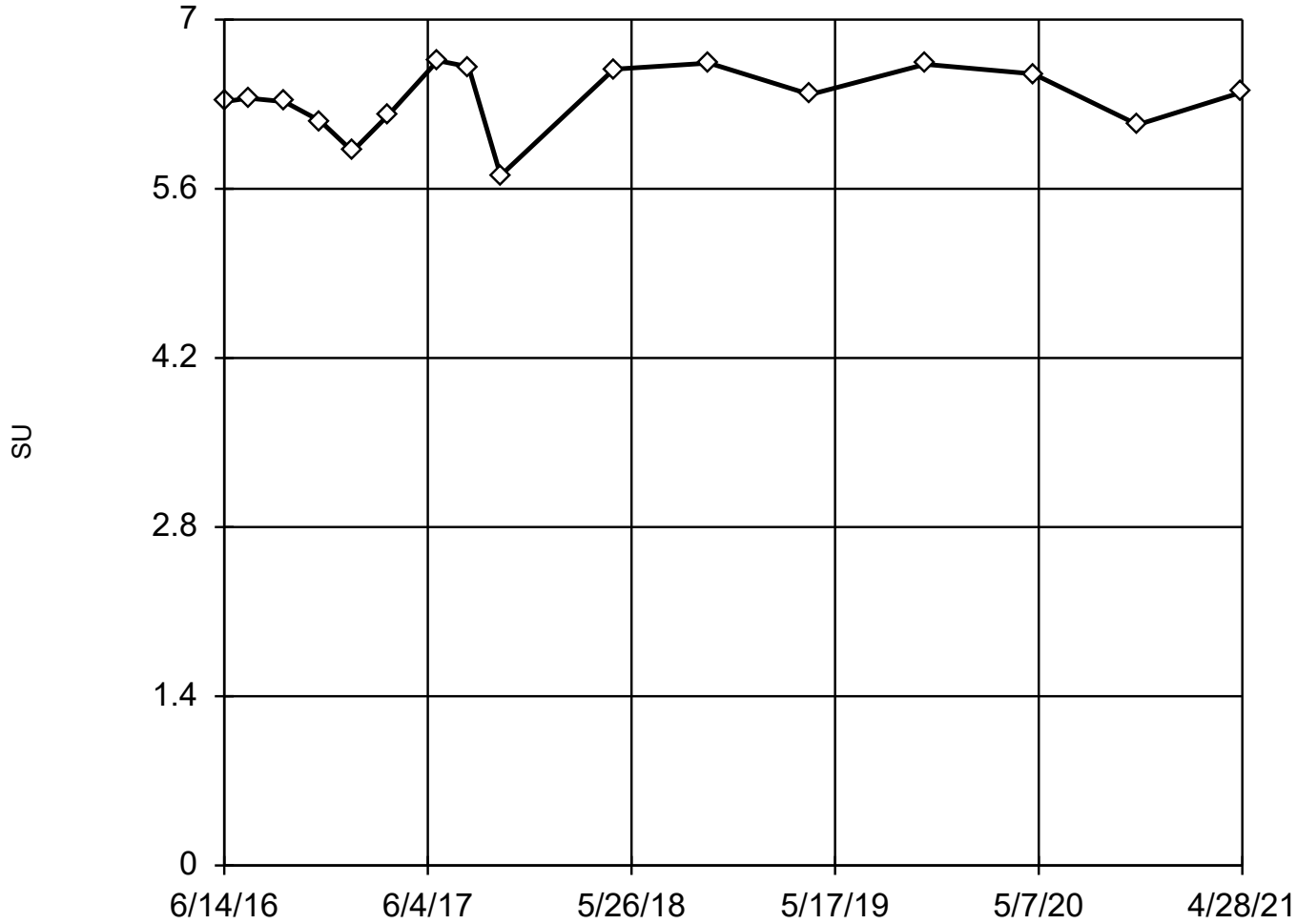
## Tukey's Outlier Screening





### EPA Screening (suspected outliers for Dixon's Test)

MW-13



n = 16

Dixon's will not be run.  
No suspect values identified  
or unable to establish  
suspect values.  
Mean 6.348, std. dev.  
0.2752, critical Tn 2.443

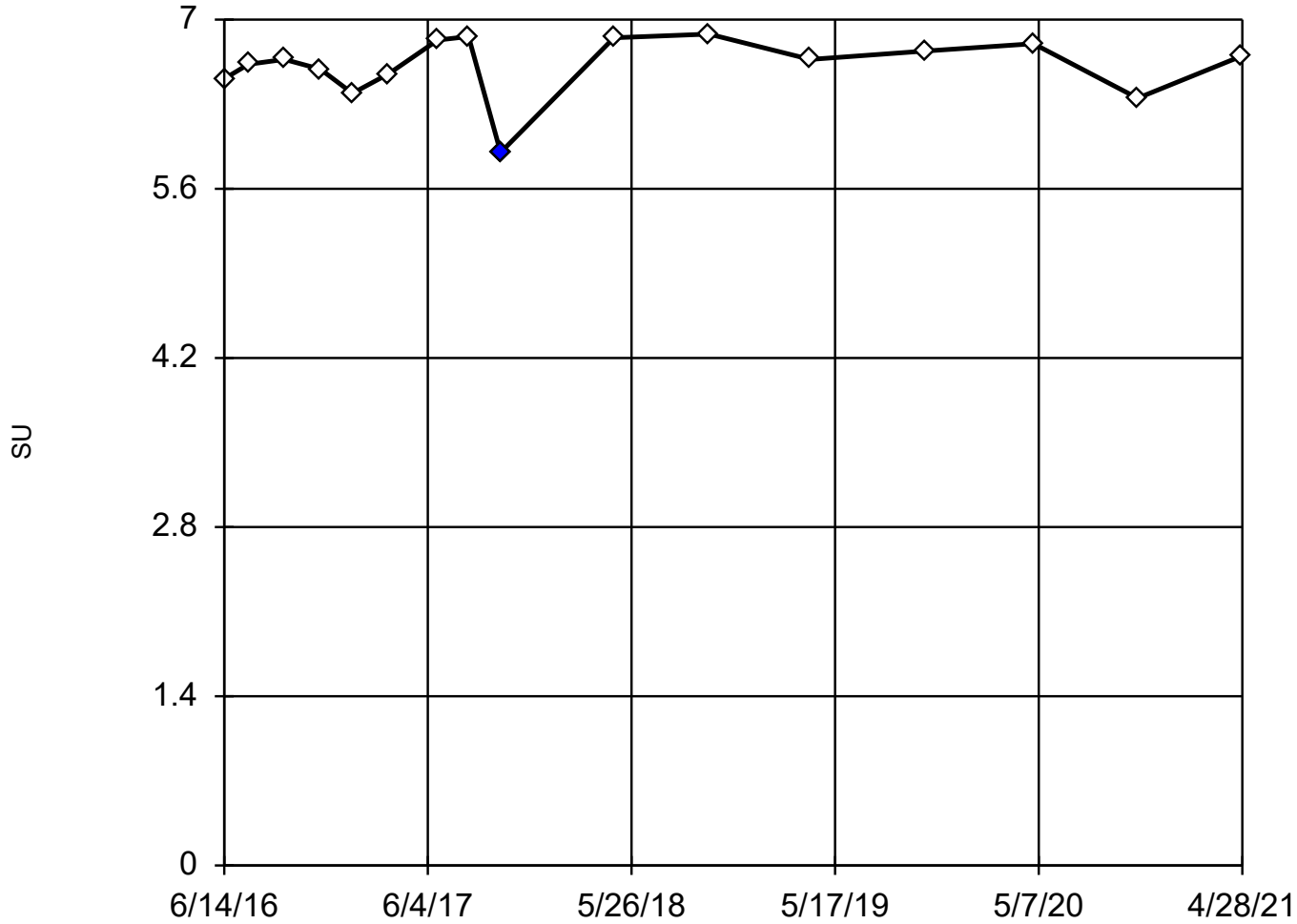
Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9107  
Critical = 0.906  
The distribution was found  
to be normally distrib-  
uted.

Constituent: pH Analysis Run 12/16/2021 3:49 PM View: Outlier

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Dixon's Outlier Test

MW-14



n = 16

Statistical outlier is drawn as solid.  
Testing for 1 low outlier.  
Mean = 6.62.  
Std. Dev. = 0.2507.  
5.9: c = 0.5158  
tab1 = 0.507.  
Alpha = 0.05.

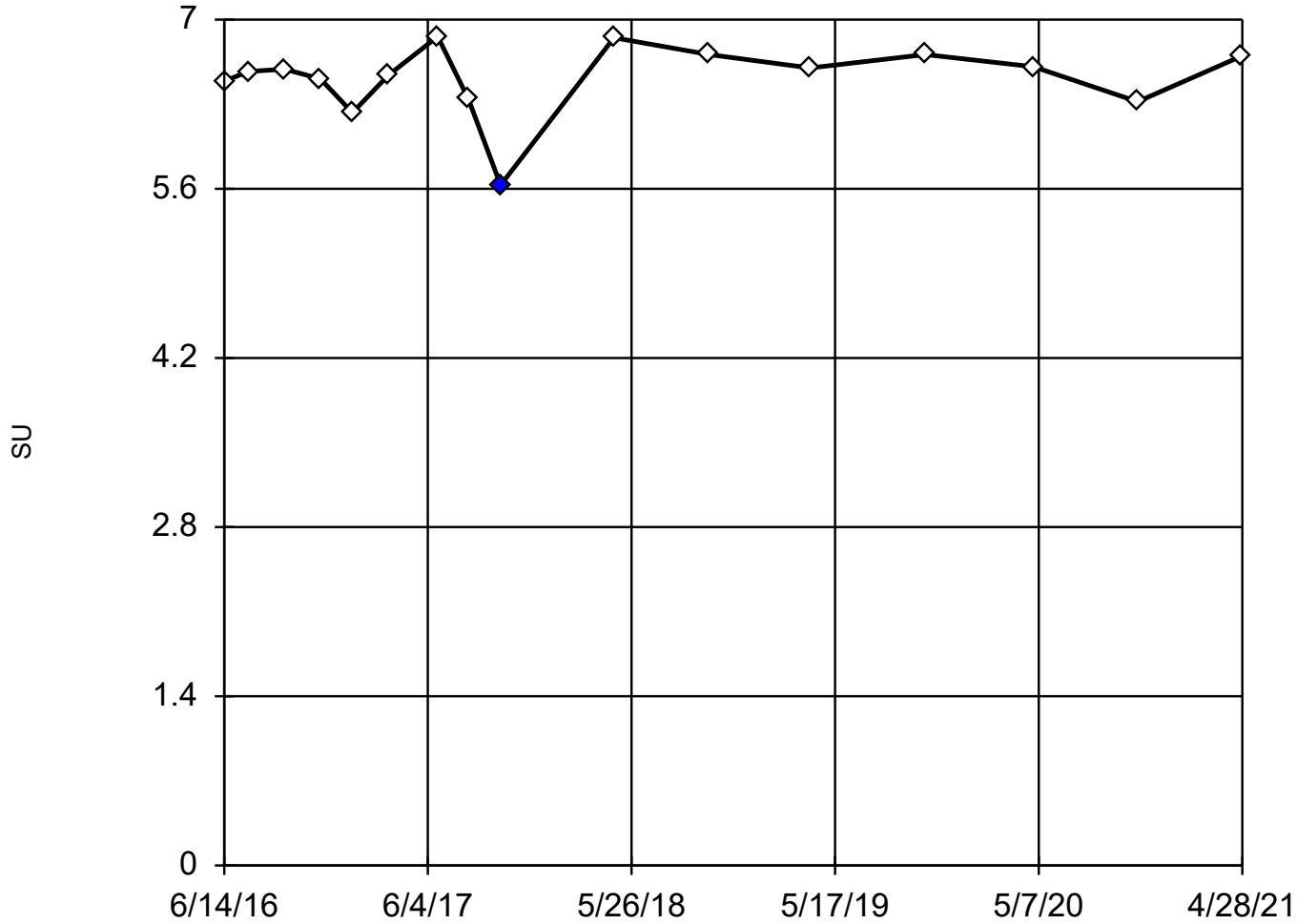
Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9398  
Critical = 0.901  
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: pH Analysis Run 12/16/2021 3:49 PM View: Outlier

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

### Dixon's Outlier Test

MW-15



n = 16

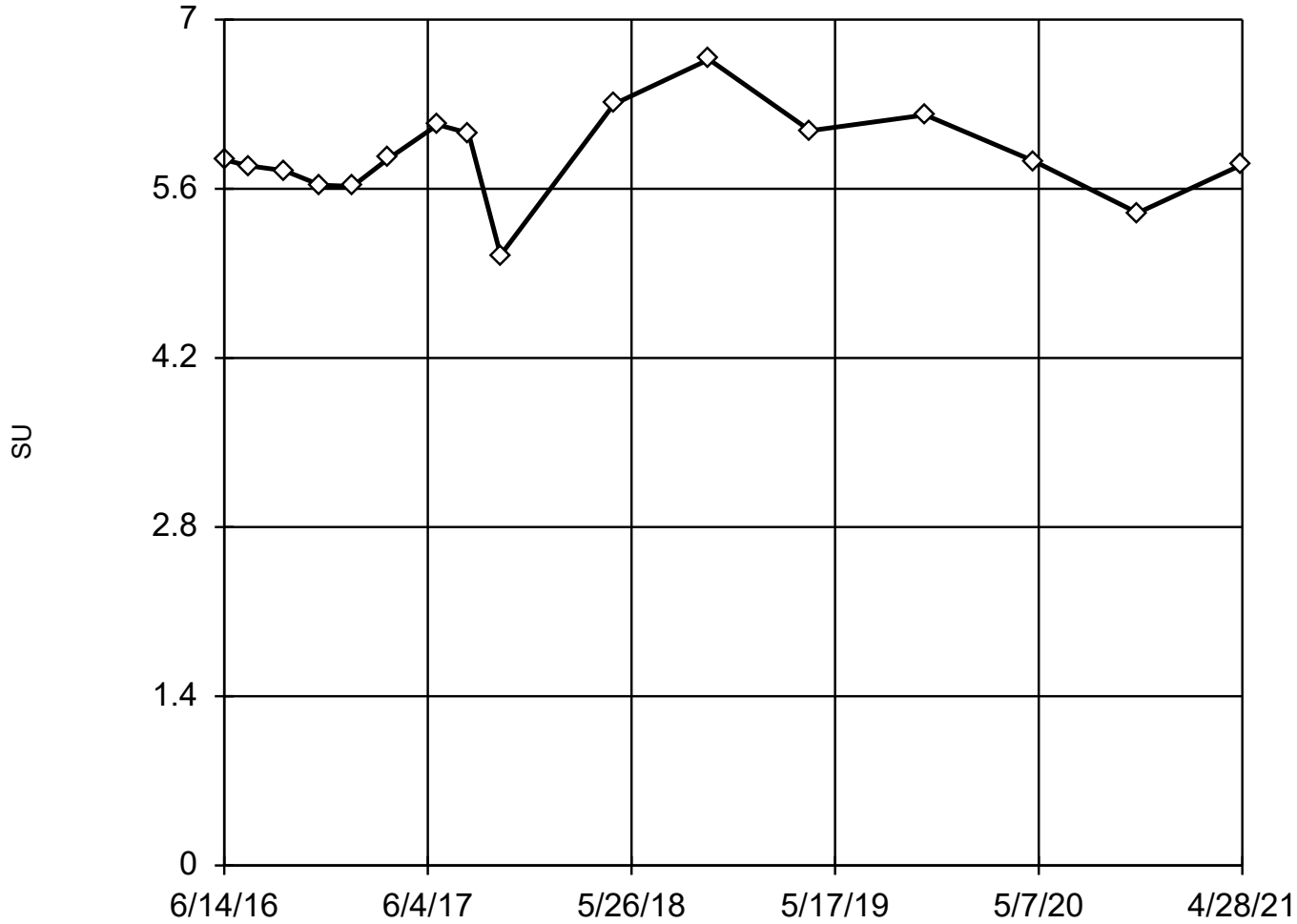
Statistical outlier is drawn as solid.  
Testing for 1 low outlier.  
Mean = 6.516.  
Std. Dev. = 0.2945.  
5.63: c = 0.6389  
tab1 = 0.507.  
Alpha = 0.05.

Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9594  
Critical = 0.901  
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: pH Analysis Run 12/16/2021 3:49 PM View: Outlier  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

### EPA Screening (suspected outliers for Dixon's Test)

MW-17



n = 16

Dixon's will not be run.  
No suspect values identified  
or unable to establish  
suspect values.  
Mean 5.876, std. dev.  
0.3768, critical Tn 2.443

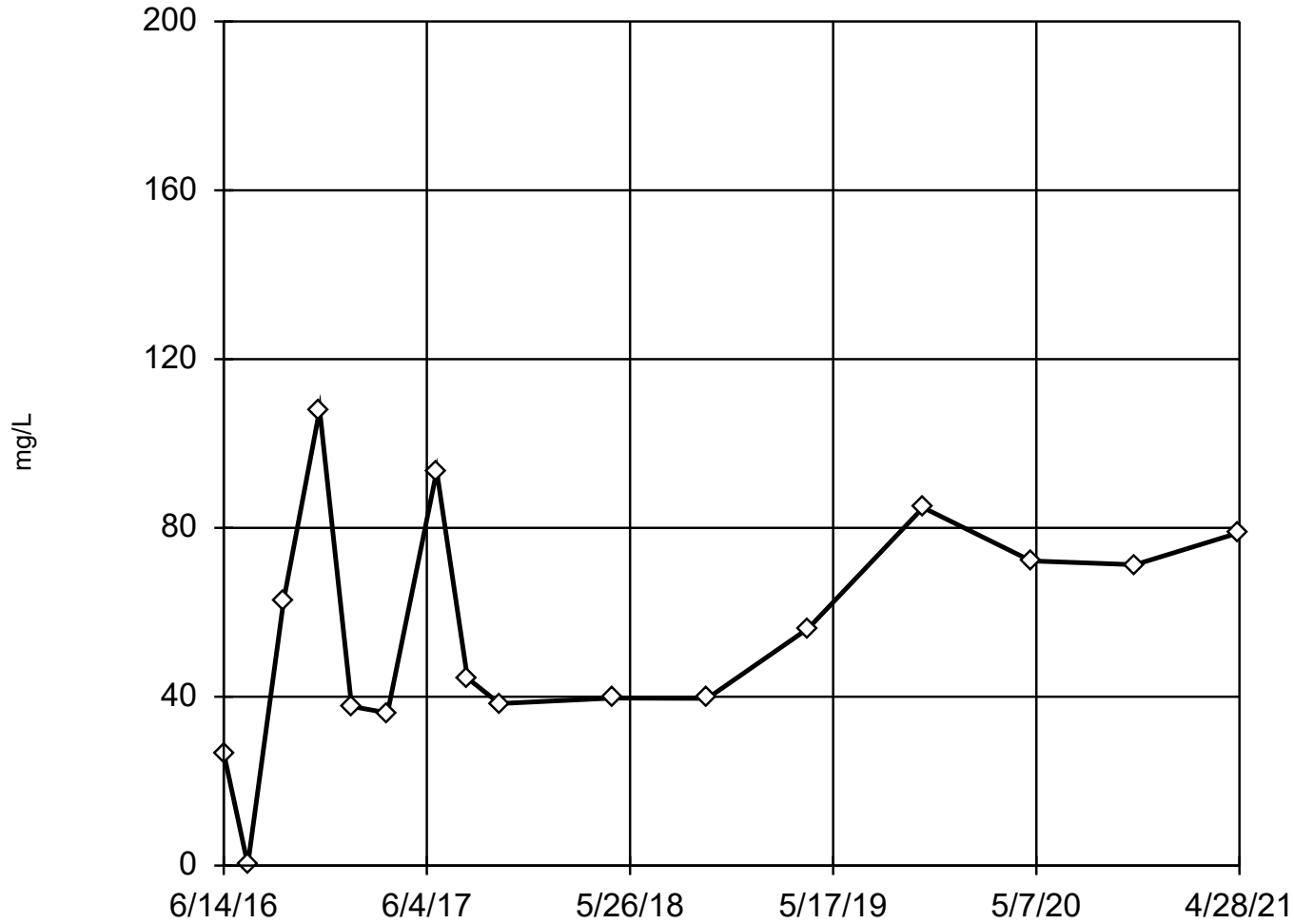
Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9721  
Critical = 0.906  
The distribution was found  
to be normally distrib-  
uted.

Constituent: pH Analysis Run 12/16/2021 3:49 PM View: Outlier

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

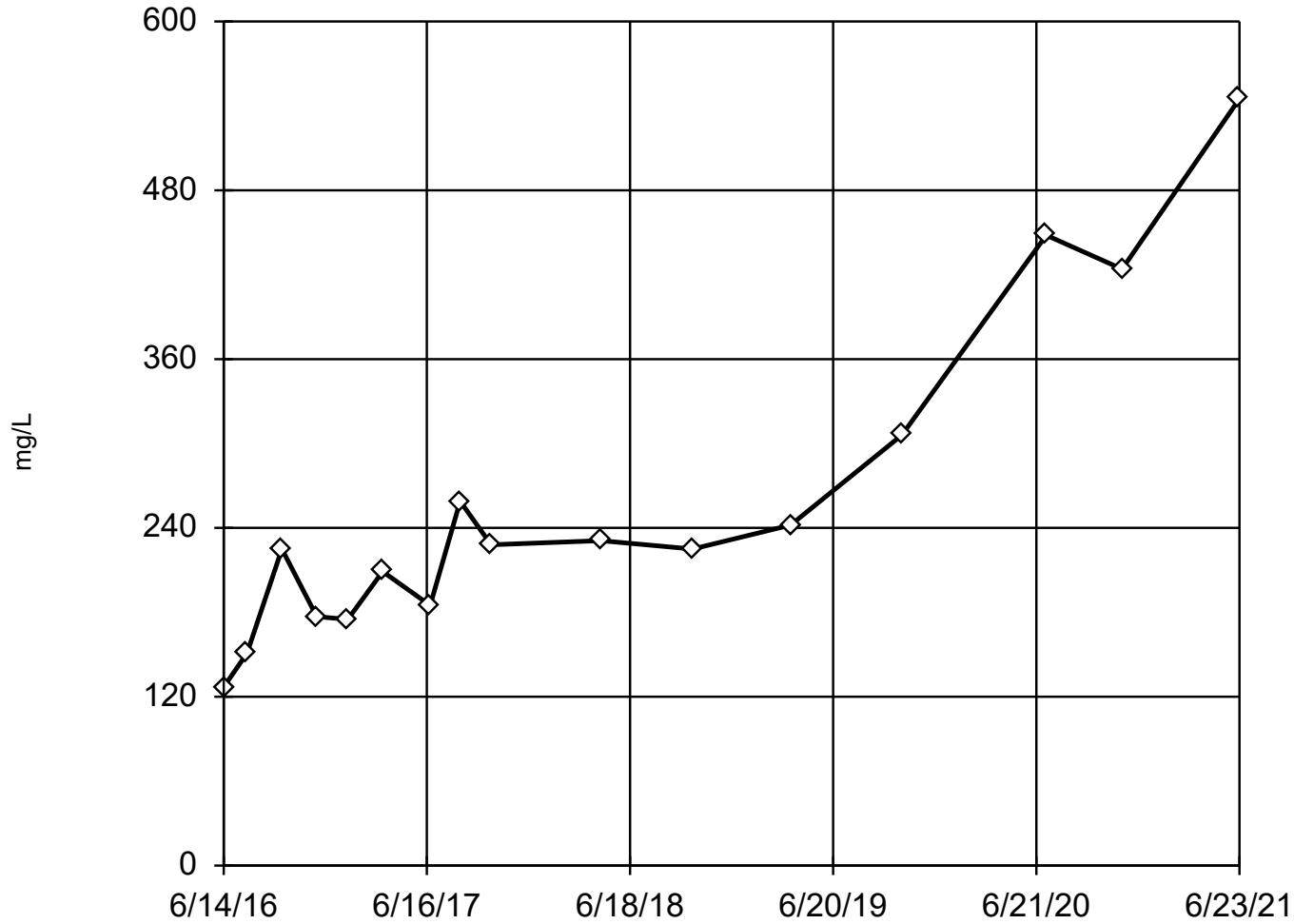
## Dixon's Outlier Test

MW-13



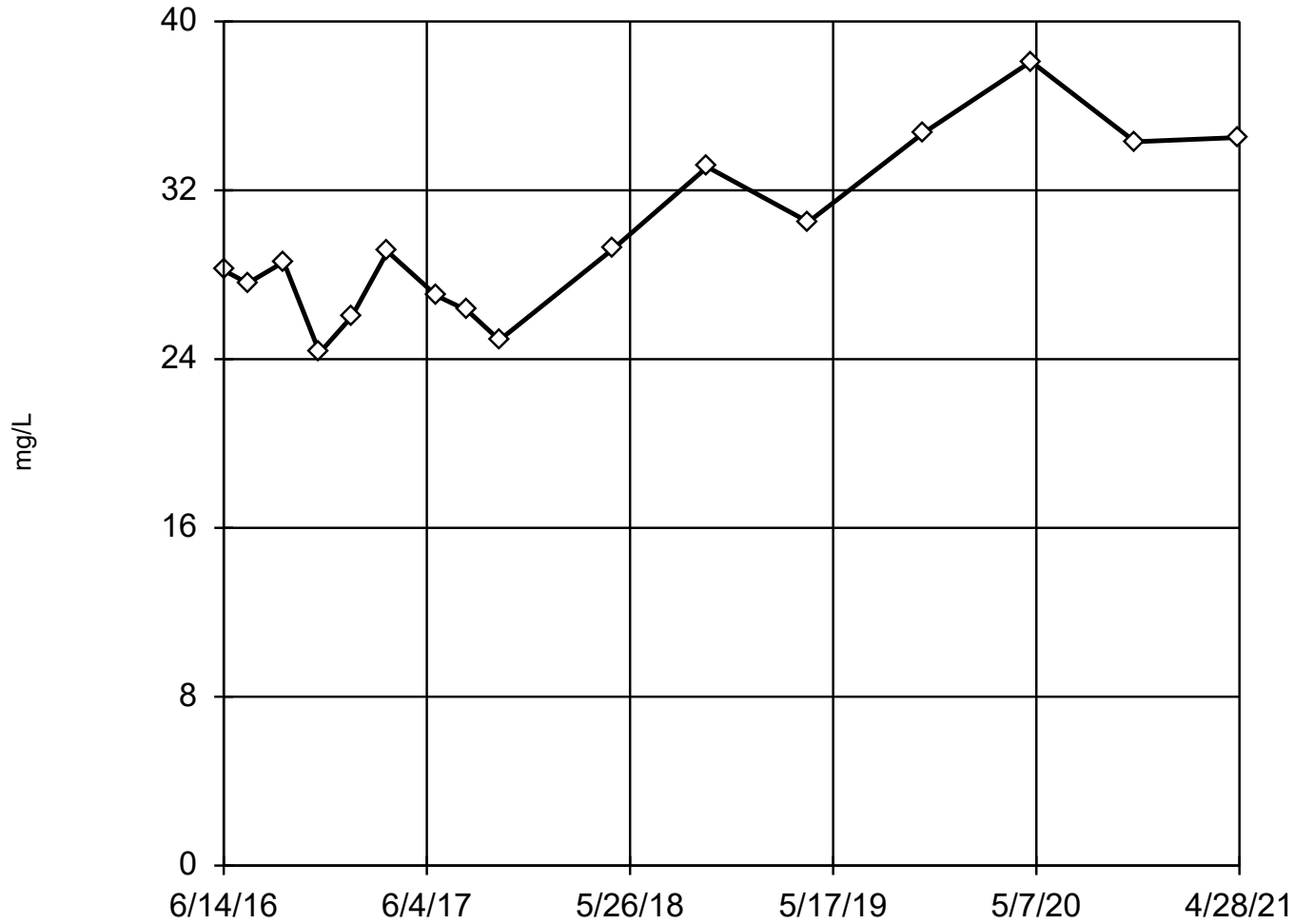
# EPA Screening (suspected outliers for Dixon's Test)

MW-14



### EPA Screening (suspected outliers for Dixon's Test)

MW-15



n = 16

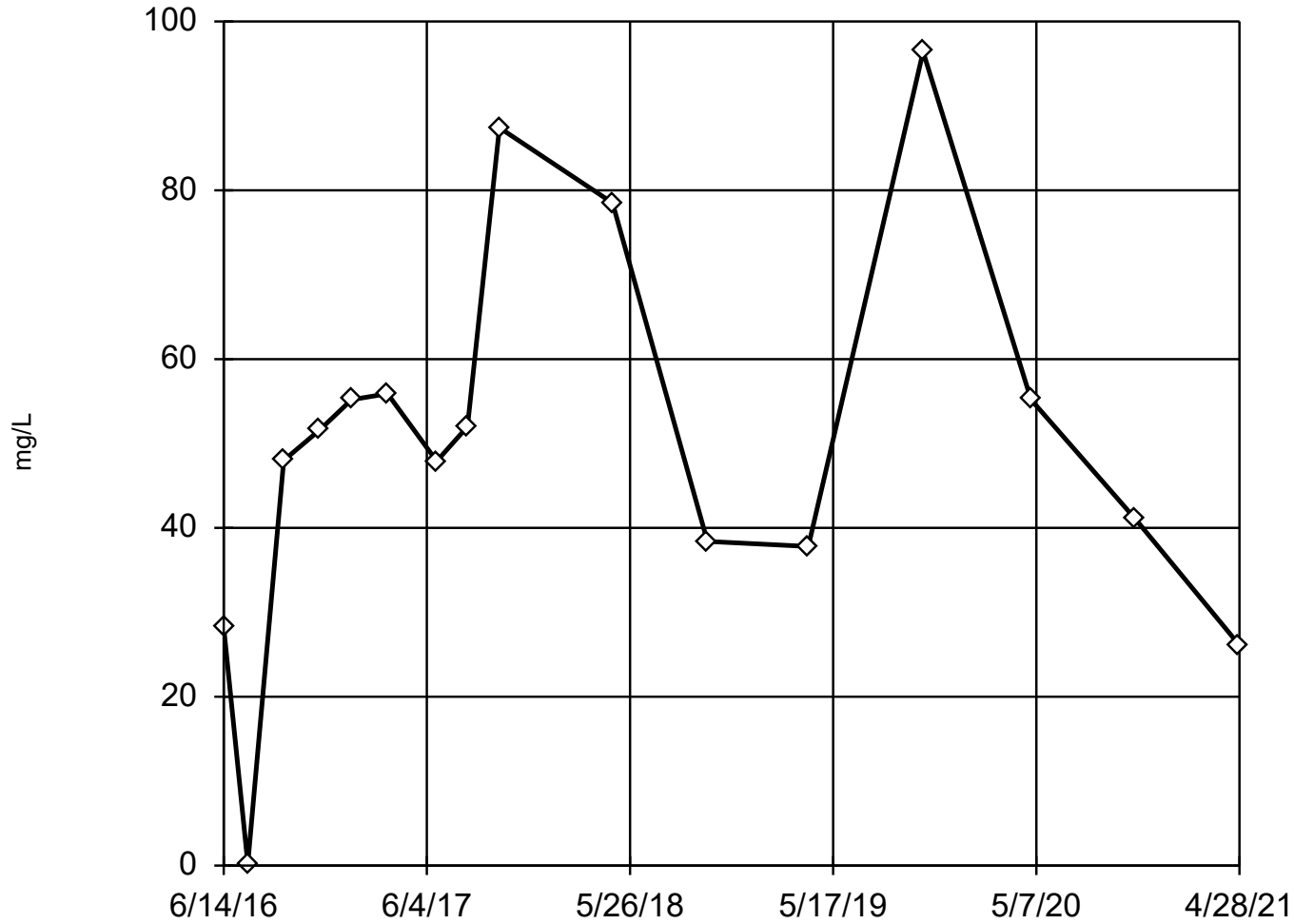
Dixon's will not be run.  
No suspect values identified  
or unable to establish  
suspect values.  
Mean 29.78, std. dev.  
4.042, critical Tn 2.443

Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9351  
Critical = 0.906  
The distribution was found  
to be normally distrib-  
uted.

Constituent: Sulfate    Analysis Run 12/16/2021 3:49 PM    View: Outlier  
Twin Oaks Power Station CCR LF    Client: Major Oak Power    Data: Twin Oaks

# Dixon's Outlier Test

MW-17



n = 16

No statistical outliers.  
Testing for 1 low outlier.  
Mean = 49.99.  
Std. Dev. = 23.6.  
<0.2: c = 0.3576  
tab1 = 0.507.  
Alpha = 0.05.

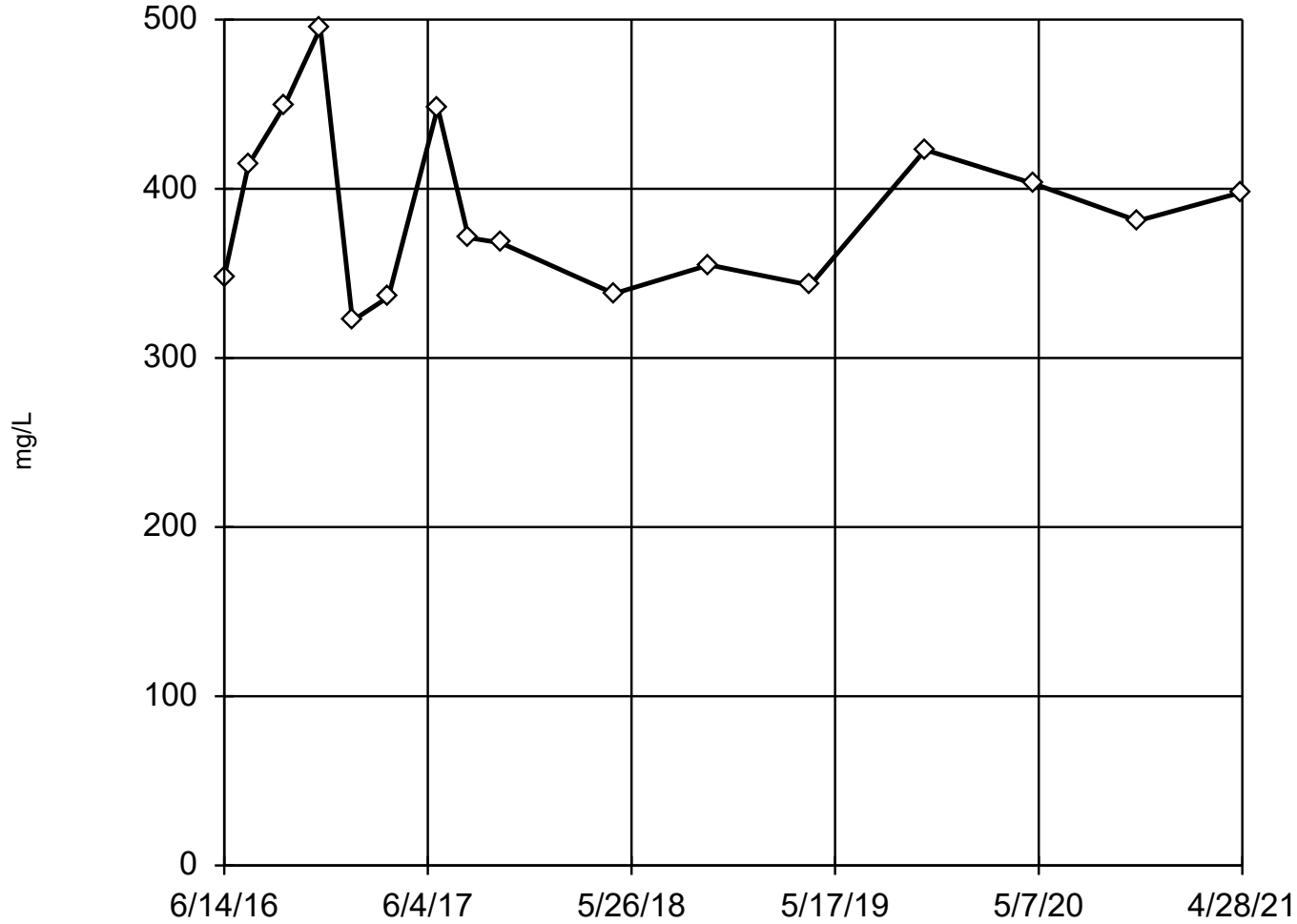
Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.906  
Critical = 0.901  
The distribution was found to be normally distributed.

Constituent: Sulfate Analysis Run 12/16/2021 3:49 PM View: Outlier  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks



### EPA Screening (suspected outliers for Dixon's Test)

MW-13



n = 16

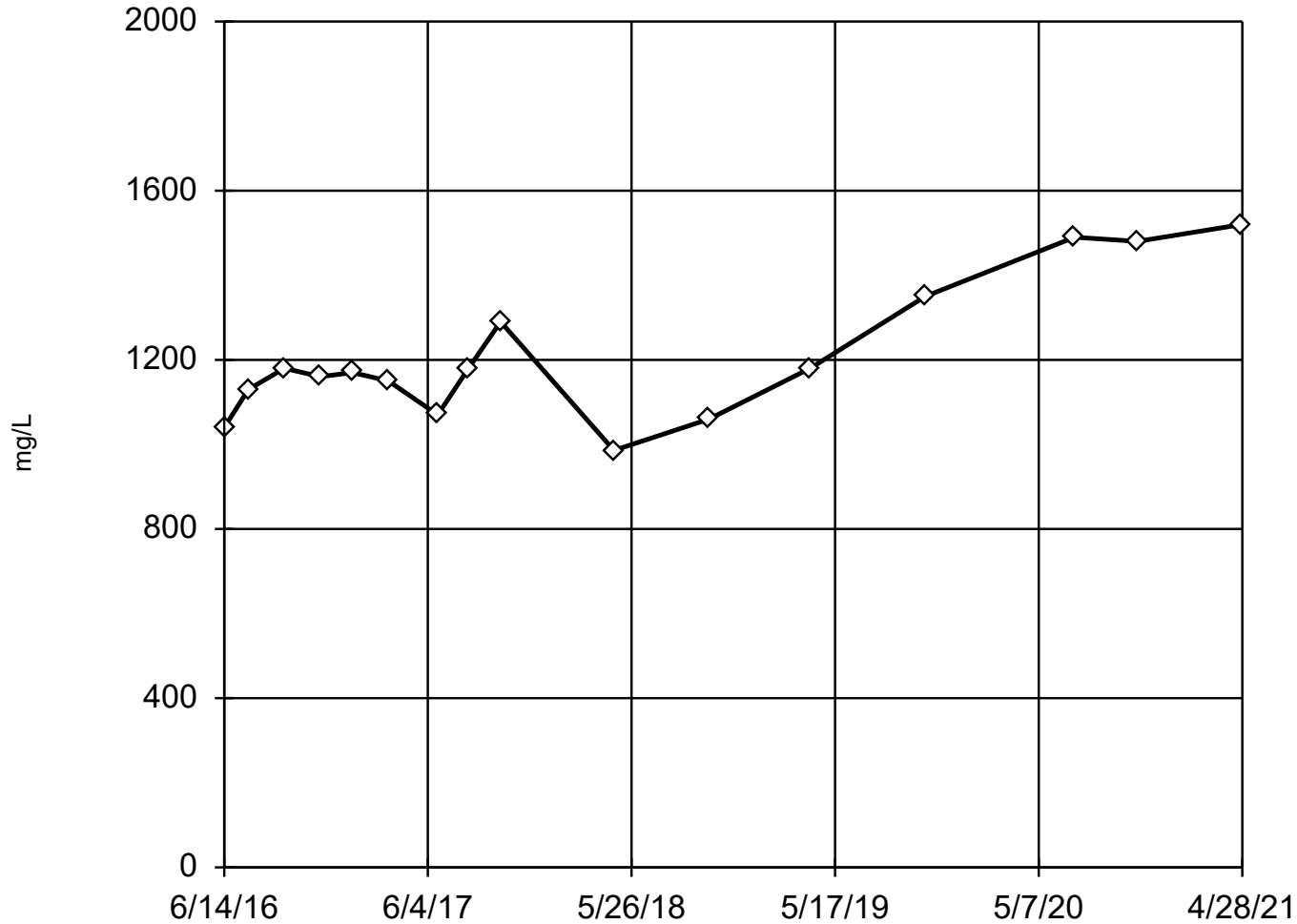
Dixon's will not be run.  
No suspect values identified or unable to establish suspect values.  
Mean 387, std. dev. 48.98, critical Tn 2.443

Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9431  
Critical = 0.906  
The distribution was found to be normally distributed.

Constituent: Total Dissolved Solids    Analysis Run 12/16/2021 3:49 PM    View: Outlier  
Twin Oaks Power Station CCR LF    Client: Major Oak Power    Data: Twin Oaks

## EPA Screening (suspected outliers for Dixon's Test)

MW-14



n = 16

Dixon's will not be run.  
No suspect values identified  
or unable to establish  
suspect values.  
Mean 1215, std. dev. 165.5,  
critical Tn 2.443

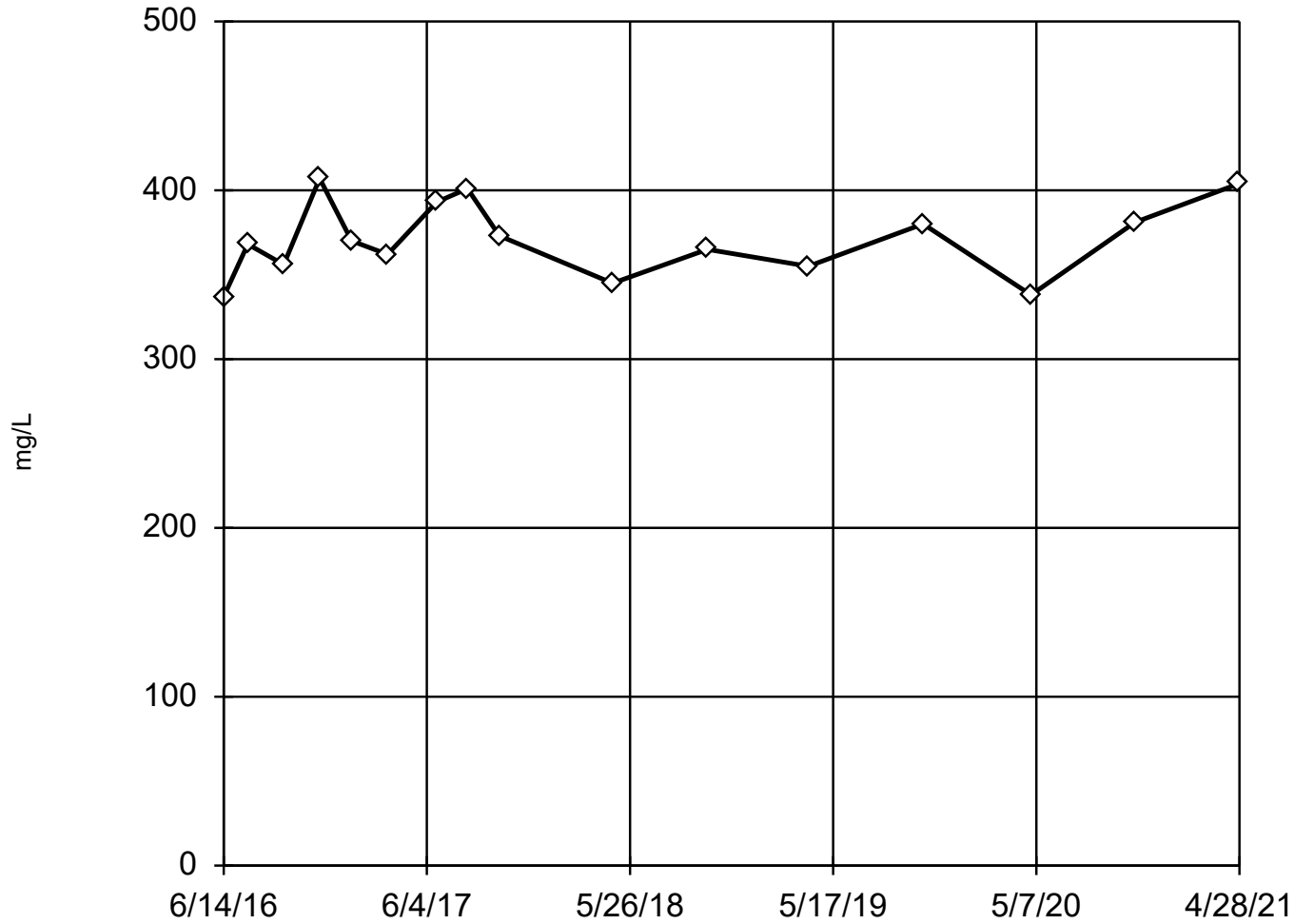
Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9164  
Critical = 0.906 (after  
natural log transforma-  
tion)  
The distribution was found  
to be log-normal.

Constituent: Total Dissolved Solids Analysis Run 12/16/2021 3:49 PM View: Outlier

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

### EPA Screening (suspected outliers for Dixon's Test)

MW-15

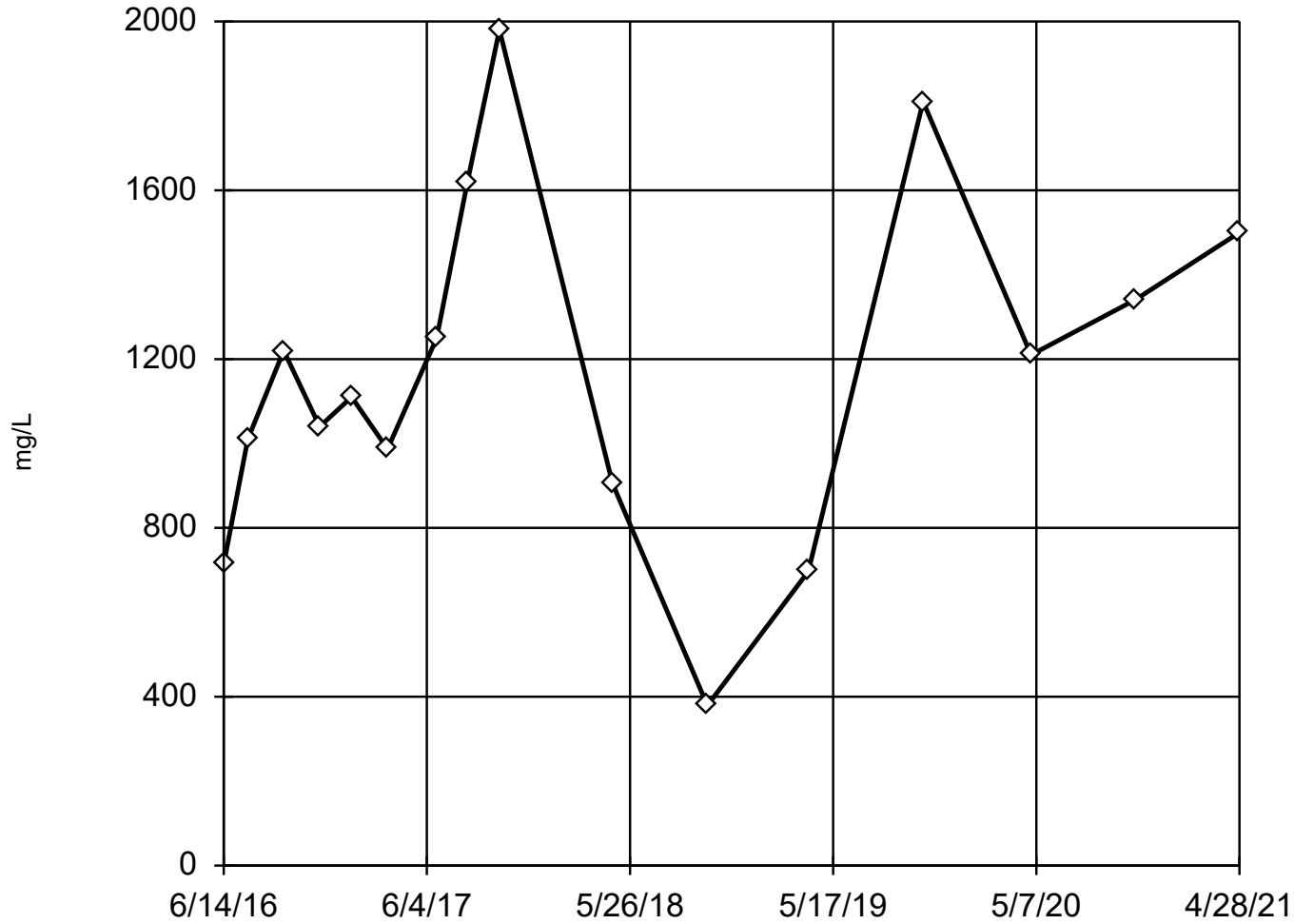


n = 16  
Dixon's will not be run.  
No suspect values identified or unable to establish suspect values.  
Mean 370.9, std. dev. 22.34, critical Tn 2.443  
  
Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9549  
Critical = 0.906  
The distribution was found to be normally distributed.

Constituent: Total Dissolved Solids    Analysis Run 12/16/2021 3:49 PM    View: Outlier  
Twin Oaks Power Station CCR LF    Client: Major Oak Power    Data: Twin Oaks

### Dixon's Outlier Test

MW-17



n = 16

No statistical outliers.  
Testing for 1 low outlier.  
Mean = 1173.  
Std. Dev. = 418.2.  
379: c = 0.2699  
tab1 = 0.507.  
Alpha = 0.05.

Normality test used:  
Shapiro Wilk@alpha = 0.1  
Calculated = 0.9562  
Critical = 0.901  
The distribution was found  
to be normally distrib-  
uted.

Constituent: Total Dissolved Solids Analysis Run 12/16/2021 3:49 PM View: Outlier

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## **Trend Test**

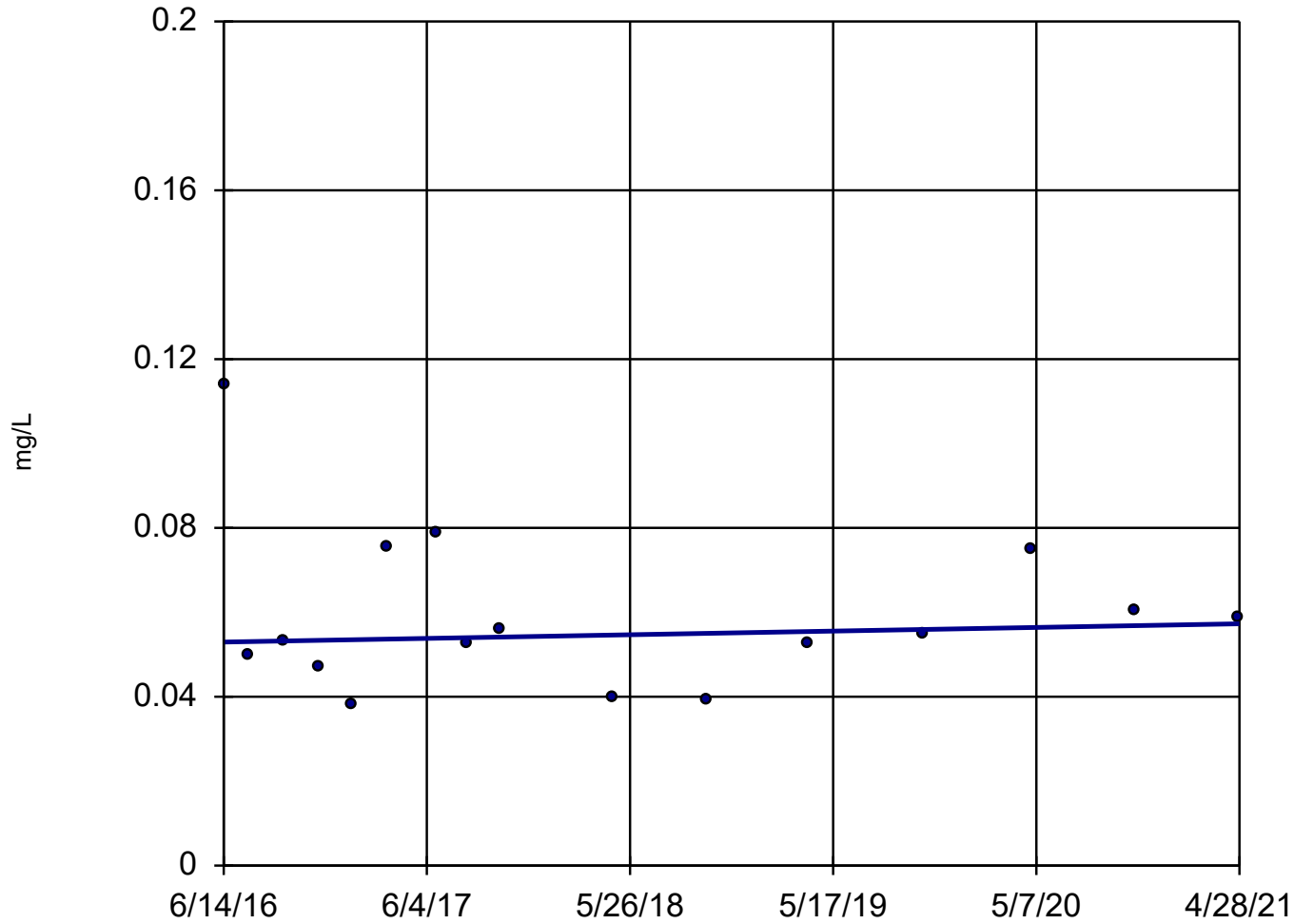
# Trend Test

Twin Oaks Power Station CCR LF    Client: Major Oak Power    Data: Twin Oaks    Printed 12/28/2021, 10:03 AM

<u>Constituent</u>	<u>Well</u>	<u>Slope</u>	<u>Calc.</u>	<u>Critical</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Normality</u>	<u>Xform</u>	<u>Alpha</u>	<u>Method</u>
Boron (mg/L)	MW-13	0.000...	7	53	No	16	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-13	1.089	21	53	No	16	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-13	1.532	42	48	No	15	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-13	0	14	53	No	16	81.25	n/a	n/a	0.02	NP
pH (SU)	MW-13	0.02261	15	53	No	16	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-13	9.653	44	53	No	16	6.25	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-13	0.2454	0	53	No	16	0	n/a	n/a	0.02	NP
Boron (mg/L)	MW-14	0.07062	45	48	No	15	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-14	7.143	41	44	No	14	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-14	7.149	40	48	No	15	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-14	0	0	53	No	16	75	n/a	n/a	0.02	NP
pH (SU)	MW-14	0.03518	21	53	No	16	0	n/a	n/a	0.02	NP
<b>Sulfate (mg/L)</b>	<b>MW-14</b>	<b>50.36</b>	<b>78</b>	<b>48</b>	<b>Yes</b>	<b>15</b>	<b>0</b>	<b>n/a</b>	<b>n/a</b>	<b>0.02</b>	<b>NP</b>
Total Dissolved Solids (mg/L)	MW-14	73.44	44	48	No	15	0	n/a	n/a	0.02	NP
<b>Boron (mg/L)</b>	<b>MW-15</b>	<b>-0.00...</b>	<b>-64</b>	<b>-53</b>	<b>Yes</b>	<b>16</b>	<b>0</b>	<b>n/a</b>	<b>n/a</b>	<b>0.02</b>	<b>NP</b>
Calcium (mg/L)	MW-15	0.9906	49	53	No	16	0	n/a	n/a	0.02	NP
<b>Chloride (mg/L)</b>	<b>MW-15</b>	<b>9.575</b>	<b>78</b>	<b>53</b>	<b>Yes</b>	<b>16</b>	<b>0</b>	<b>n/a</b>	<b>n/a</b>	<b>0.02</b>	<b>NP</b>
Fluoride (mg/L)	MW-15	0	23	53	No	16	87.5	n/a	n/a	0.02	NP
pH (SU)	MW-15	0.02831	19	53	No	16	0	n/a	n/a	0.02	NP
<b>Sulfate (mg/L)</b>	<b>MW-15</b>	<b>1.992</b>	<b>64</b>	<b>53</b>	<b>Yes</b>	<b>16</b>	<b>0</b>	<b>n/a</b>	<b>n/a</b>	<b>0.02</b>	<b>NP</b>
Total Dissolved Solids (mg/L)	MW-15	3.248	16	53	No	16	0	n/a	n/a	0.02	NP
Boron (mg/L)	MW-17	-0.00...	-39	-48	No	15	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-17	18.98	43	53	No	16	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-17	70.95	30	53	No	16	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-17	0	23	53	No	16	87.5	n/a	n/a	0.02	NP
pH (SU)	MW-17	0.02829	12	53	No	16	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-17	2.333	13	53	No	16	6.25	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-17	89.22	28	53	No	16	0	n/a	n/a	0.02	NP

# Sen's Slope Estimator

MW-13



n = 16

Slope = 0.0008886  
units per year.

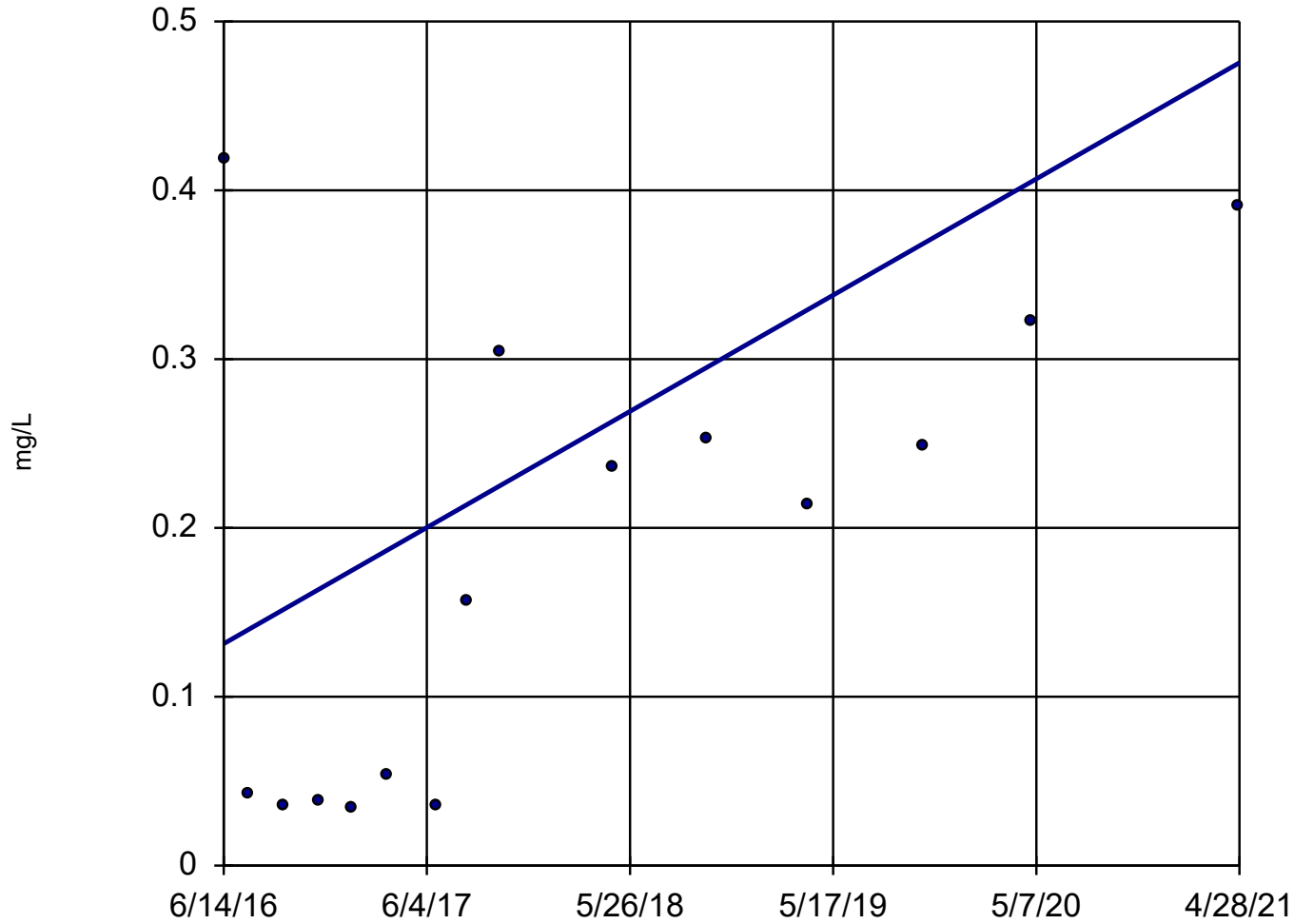
Mann-Kendall  
statistic = 7  
critical = 53

Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Boron Analysis Run 12/28/2021 10:02 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

# Sen's Slope Estimator

MW-14



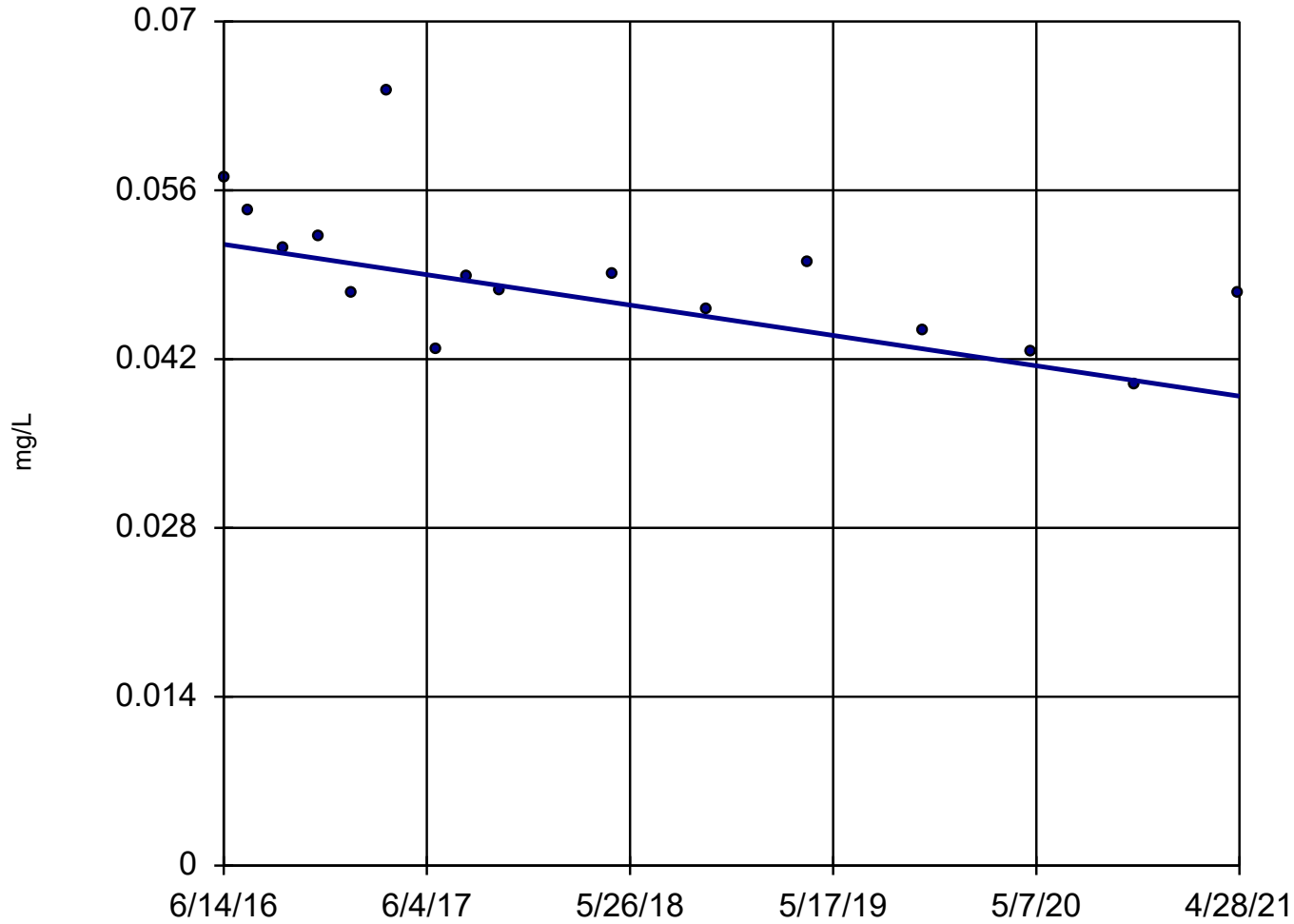
n = 15  
Slope = 0.07062  
units per year.  
Mann-Kendall  
statistic = 45  
critical = 48  
Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Boron Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks



### Sen's Slope Estimator

MW-15



n = 16

Slope = -0.002583  
units per year.

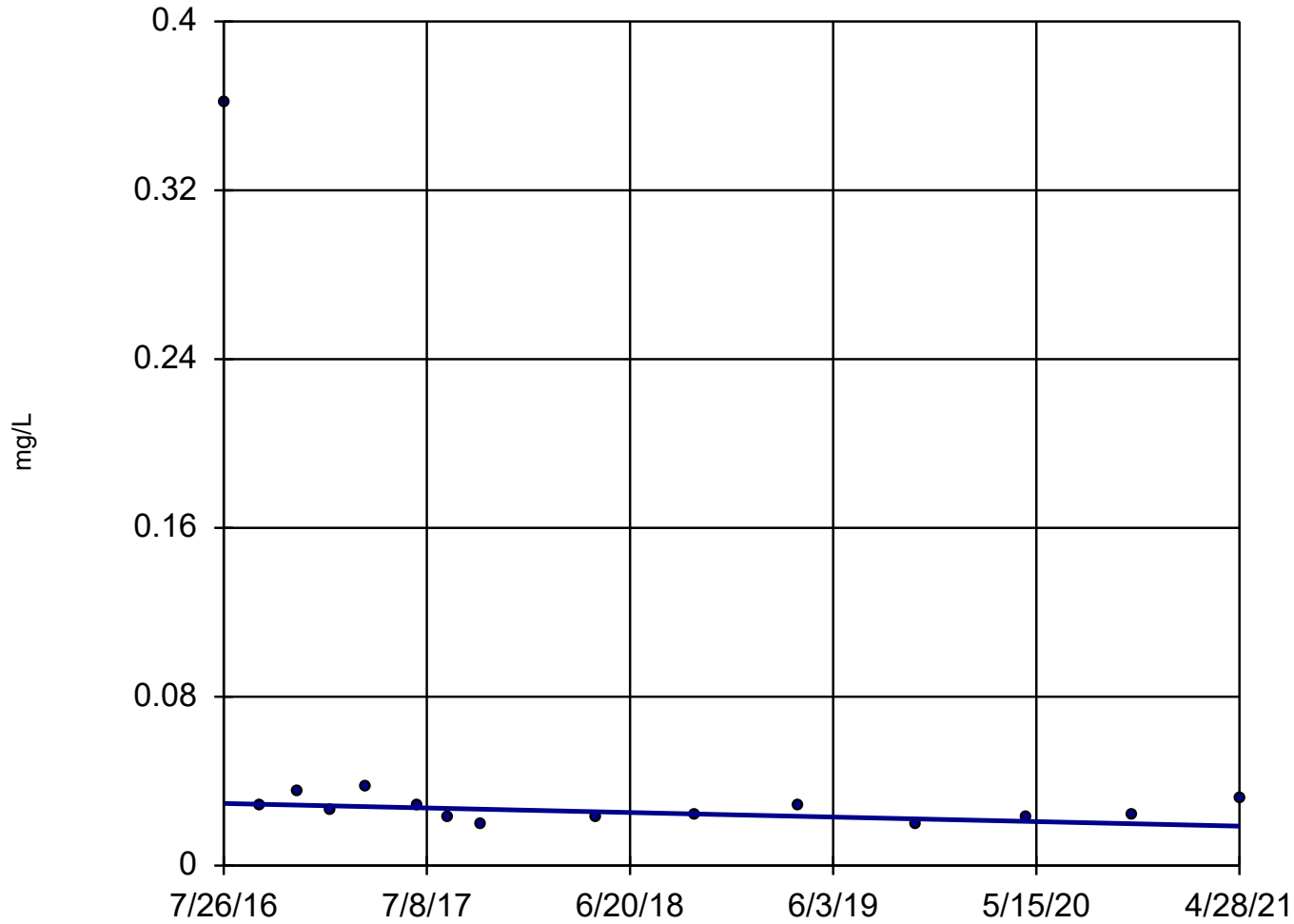
Mann-Kendall  
statistic = -64  
critical = -53

Decreasing trend  
significant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Boron Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

# Sen's Slope Estimator

MW-17



n = 15

Slope = -0.002263  
units per year.

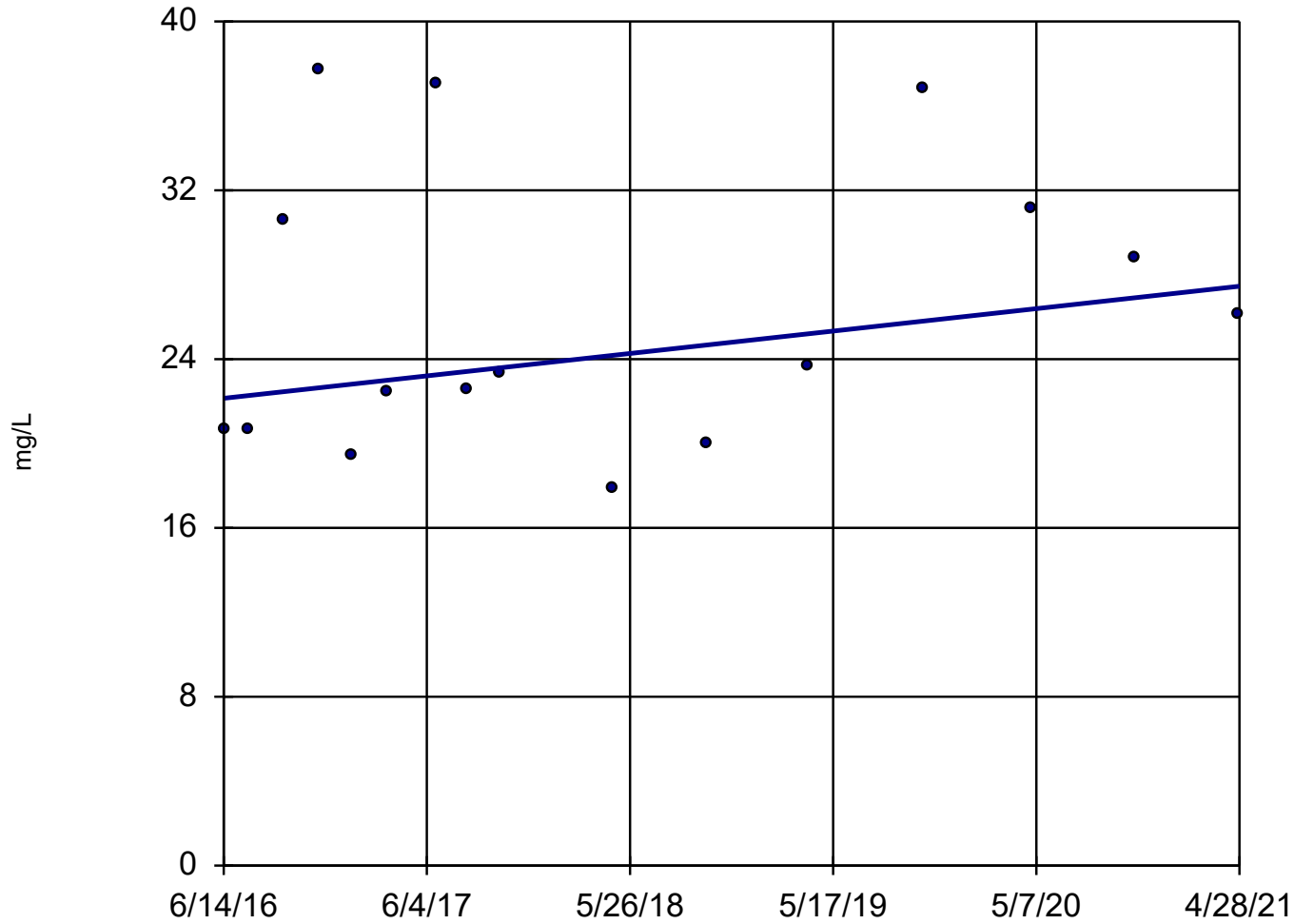
Mann-Kendall  
statistic = -39  
critical = -48

Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Boron Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Sen's Slope Estimator

MW-13



n = 16

Slope = 1.089  
units per year.

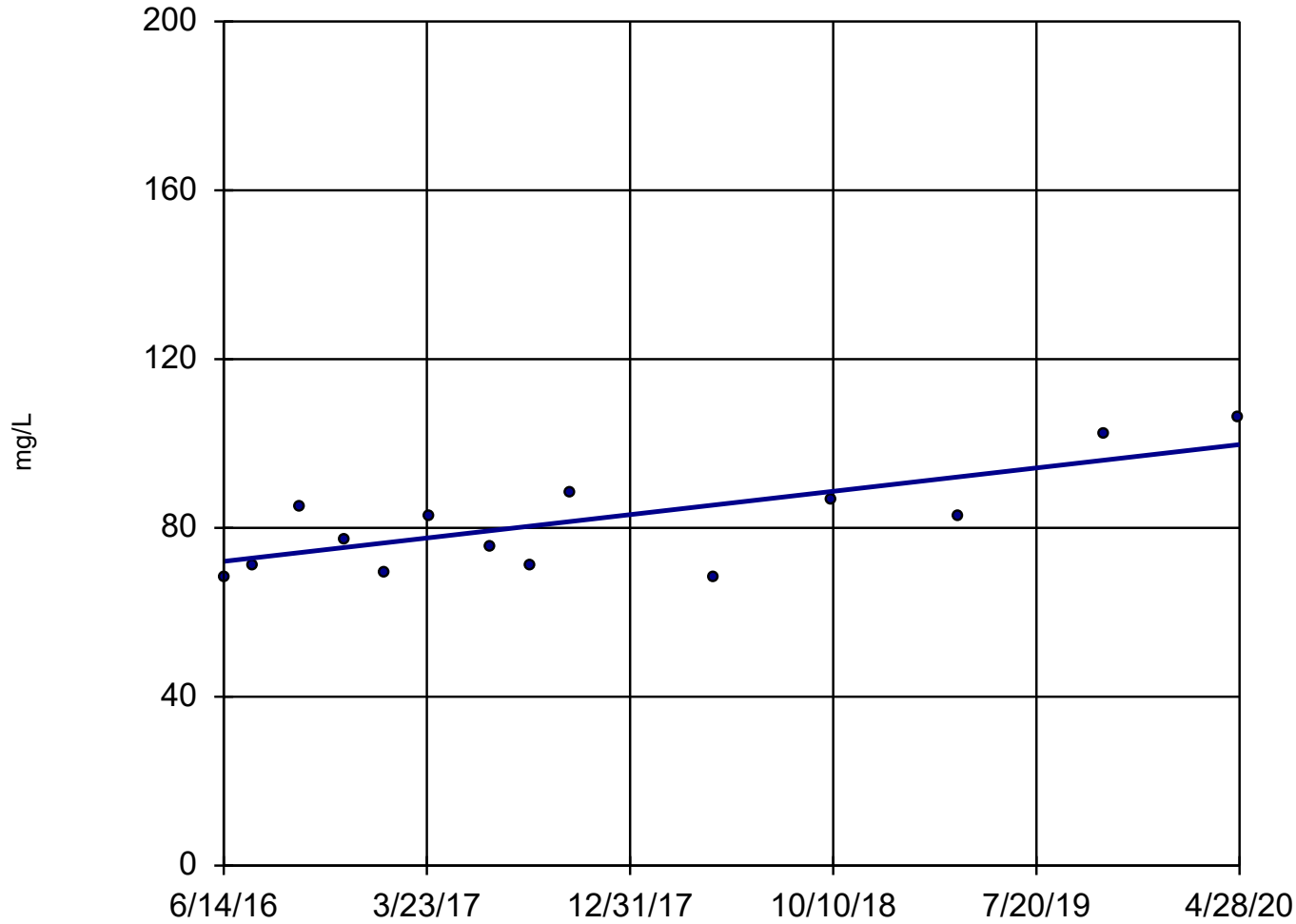
Mann-Kendall  
statistic = 21  
critical = 53

Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Calcium Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

# Sen's Slope Estimator

MW-14



n = 14

Slope = 7.143  
units per year.

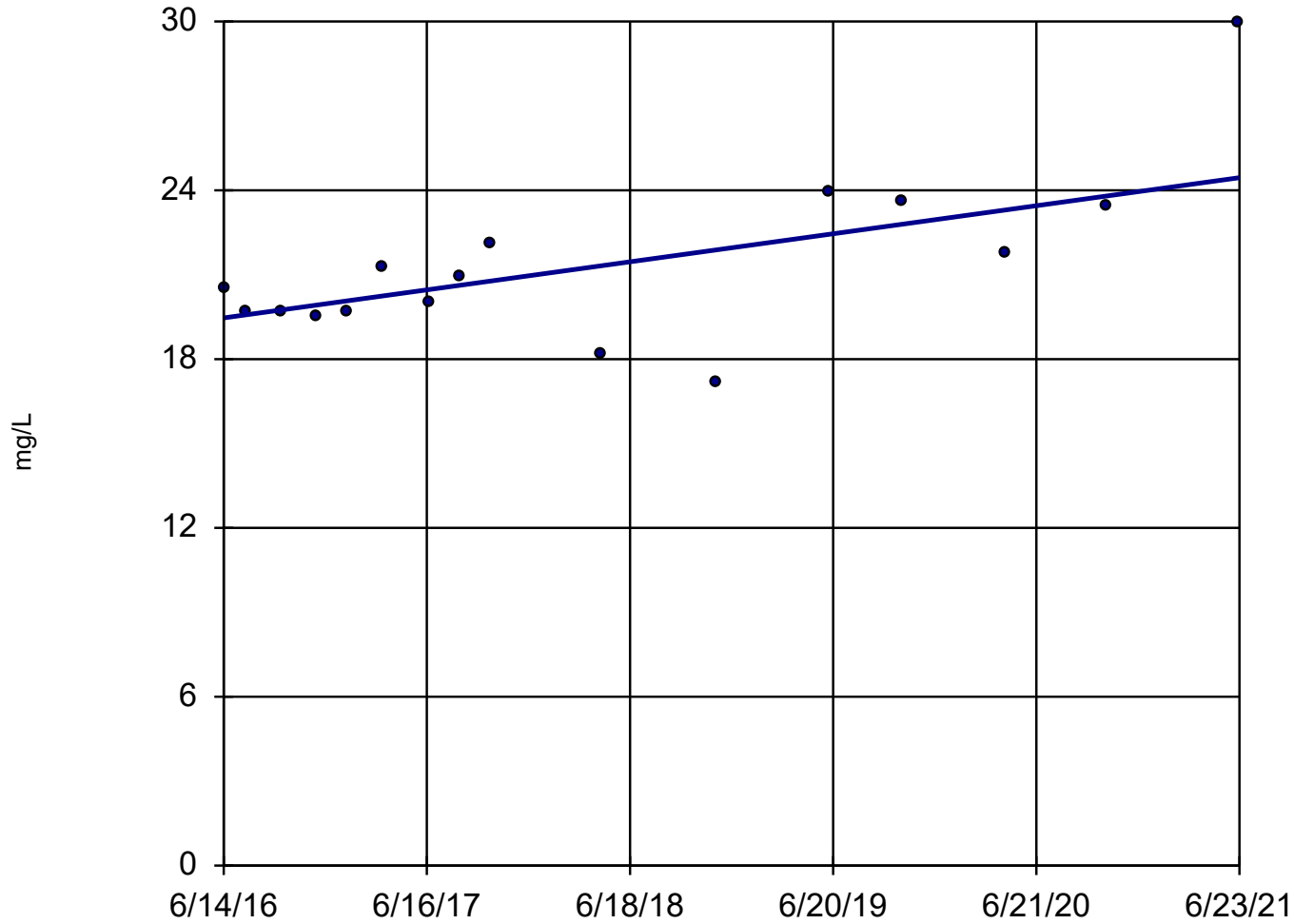
Mann-Kendall  
statistic = 41  
critical = 44

Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Calcium Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

# Sen's Slope Estimator

MW-15



n = 16

Slope = 0.9906  
units per year.

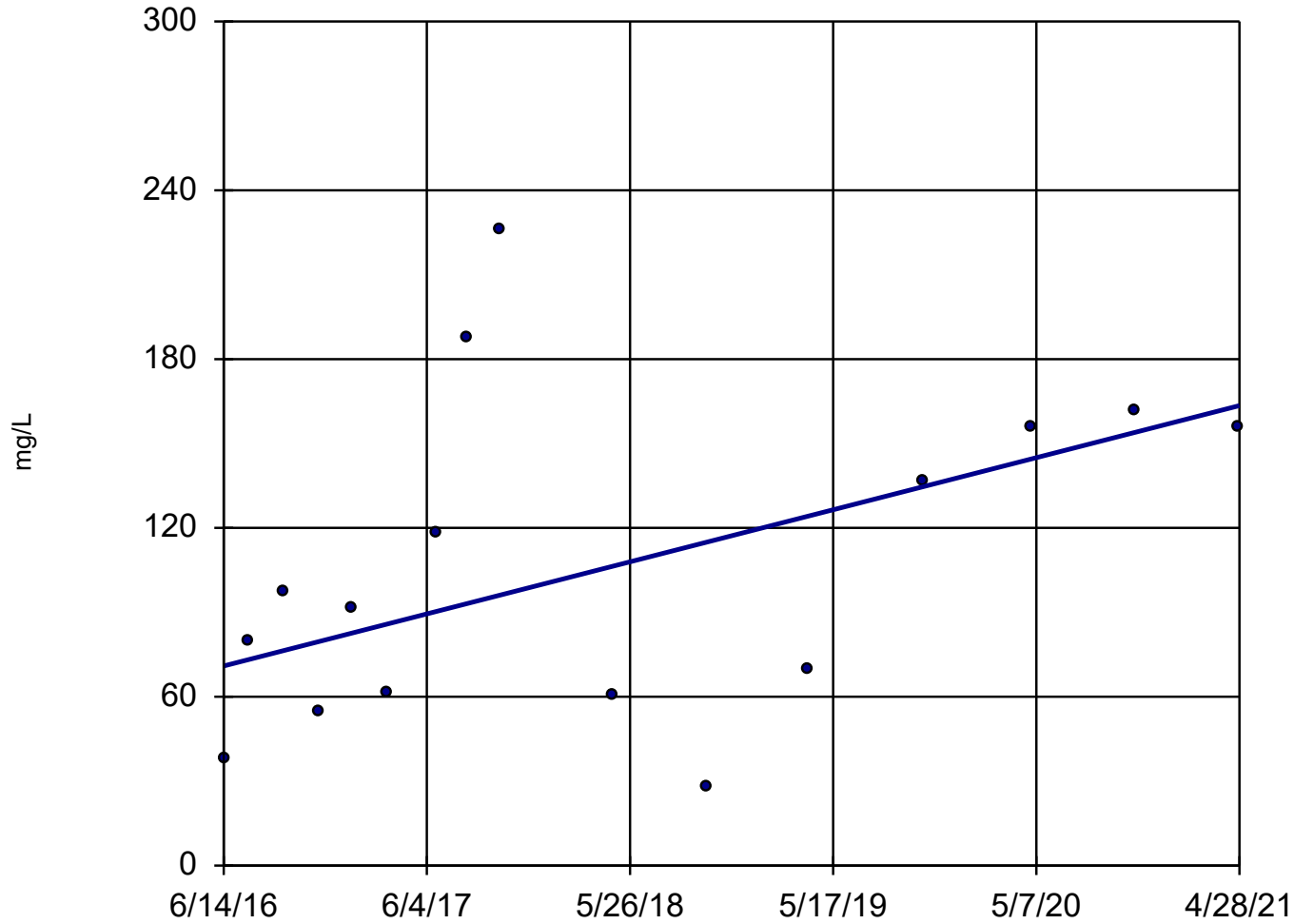
Mann-Kendall  
statistic = 49  
critical = 53

Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Calcium    Analysis Run 12/28/2021 10:03 AM    View: Trend Test  
Twin Oaks Power Station CCR LF    Client: Major Oak Power    Data: Twin Oaks

# Sen's Slope Estimator

MW-17

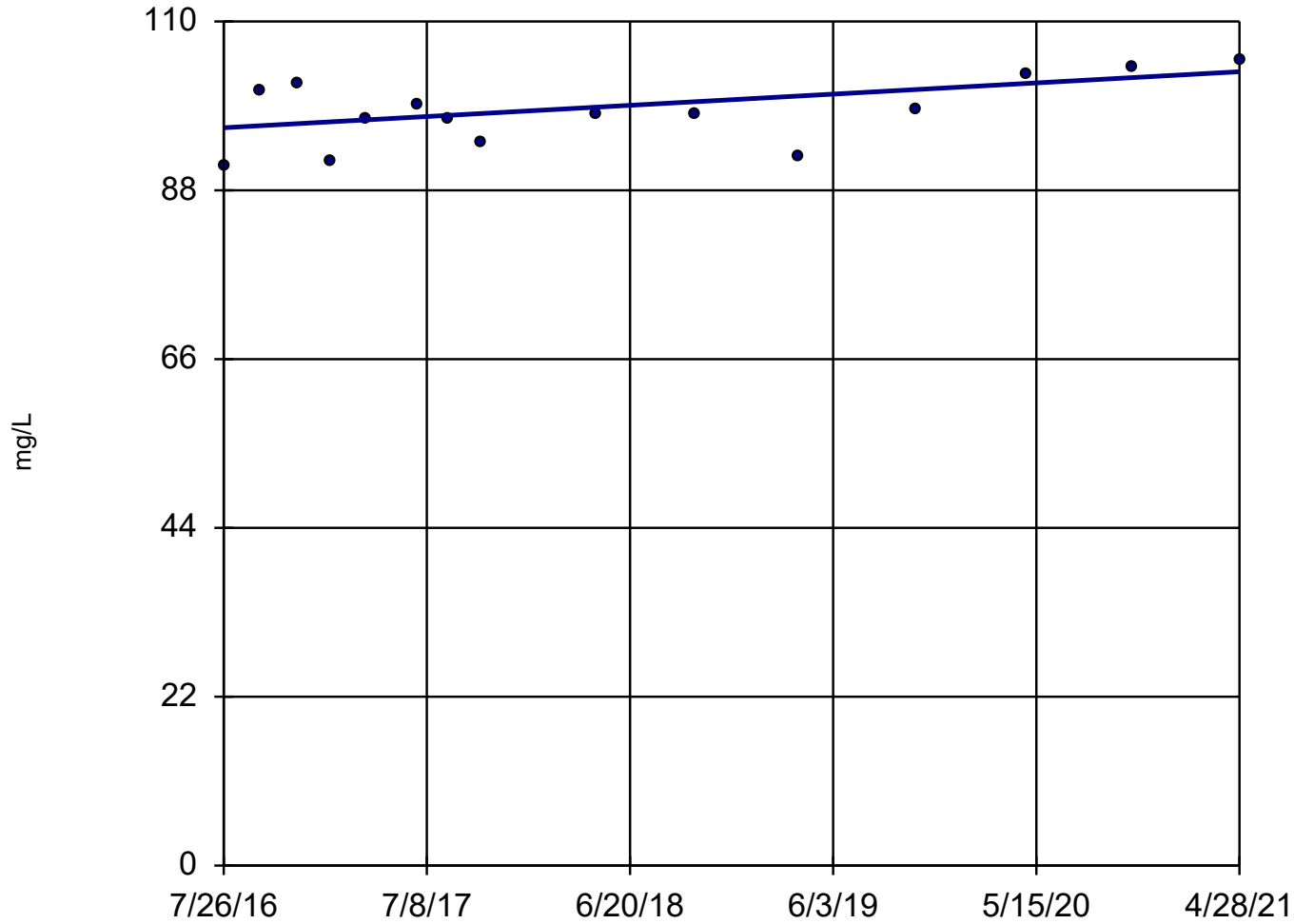


n = 16  
Slope = 18.98  
units per year.  
Mann-Kendall  
statistic = 43  
critical = 53  
Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Calcium Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

# Sen's Slope Estimator

MW-13



n = 15

Slope = 1.532  
units per year.

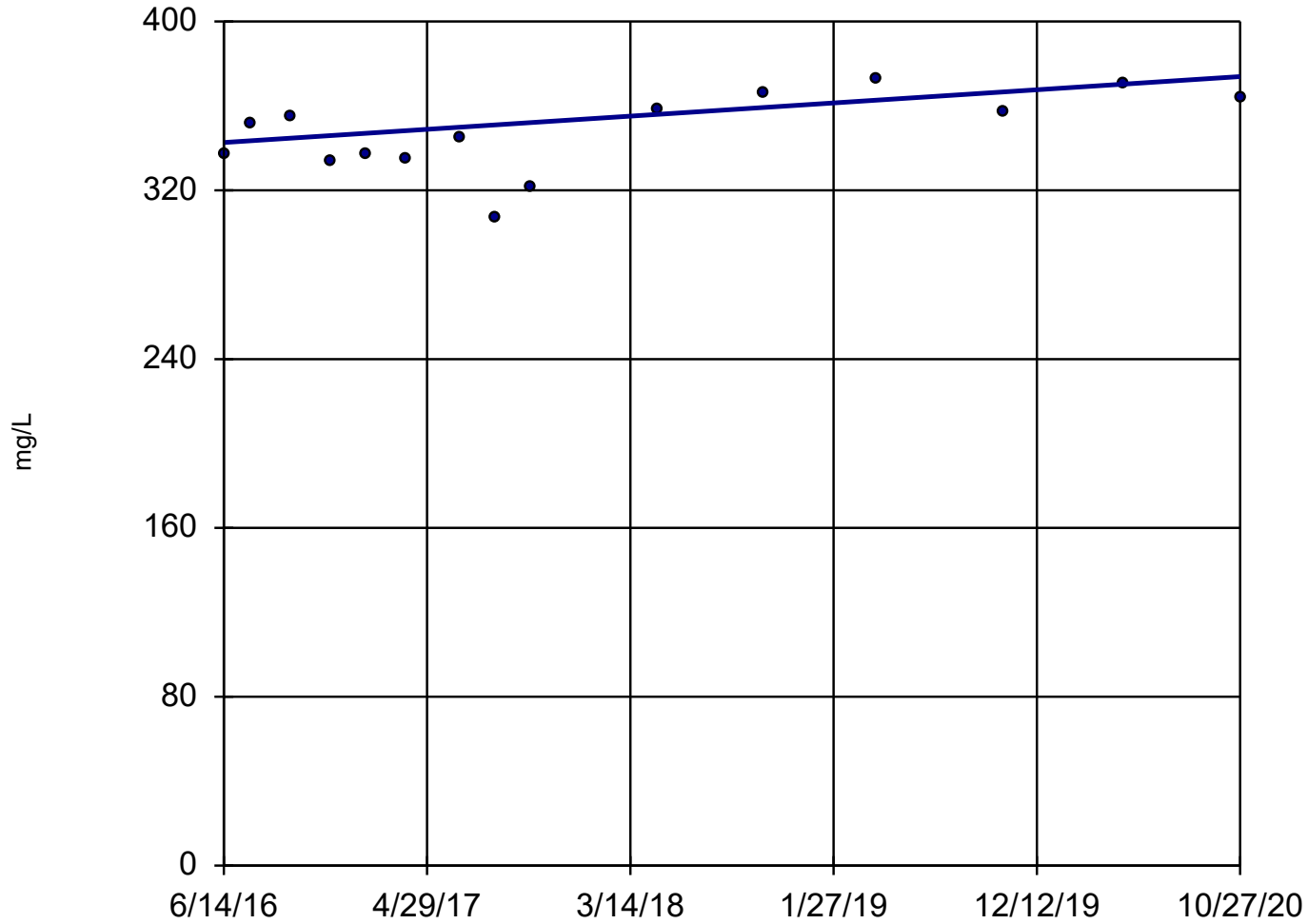
Mann-Kendall  
statistic = 42  
critical = 48

Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Chloride    Analysis Run 12/28/2021 10:03 AM    View: Trend Test  
Twin Oaks Power Station CCR LF    Client: Major Oak Power    Data: Twin Oaks

## Sen's Slope Estimator

MW-14



n = 15

Slope = 7.149  
units per year.

Mann-Kendall  
statistic = 40  
critical = 48

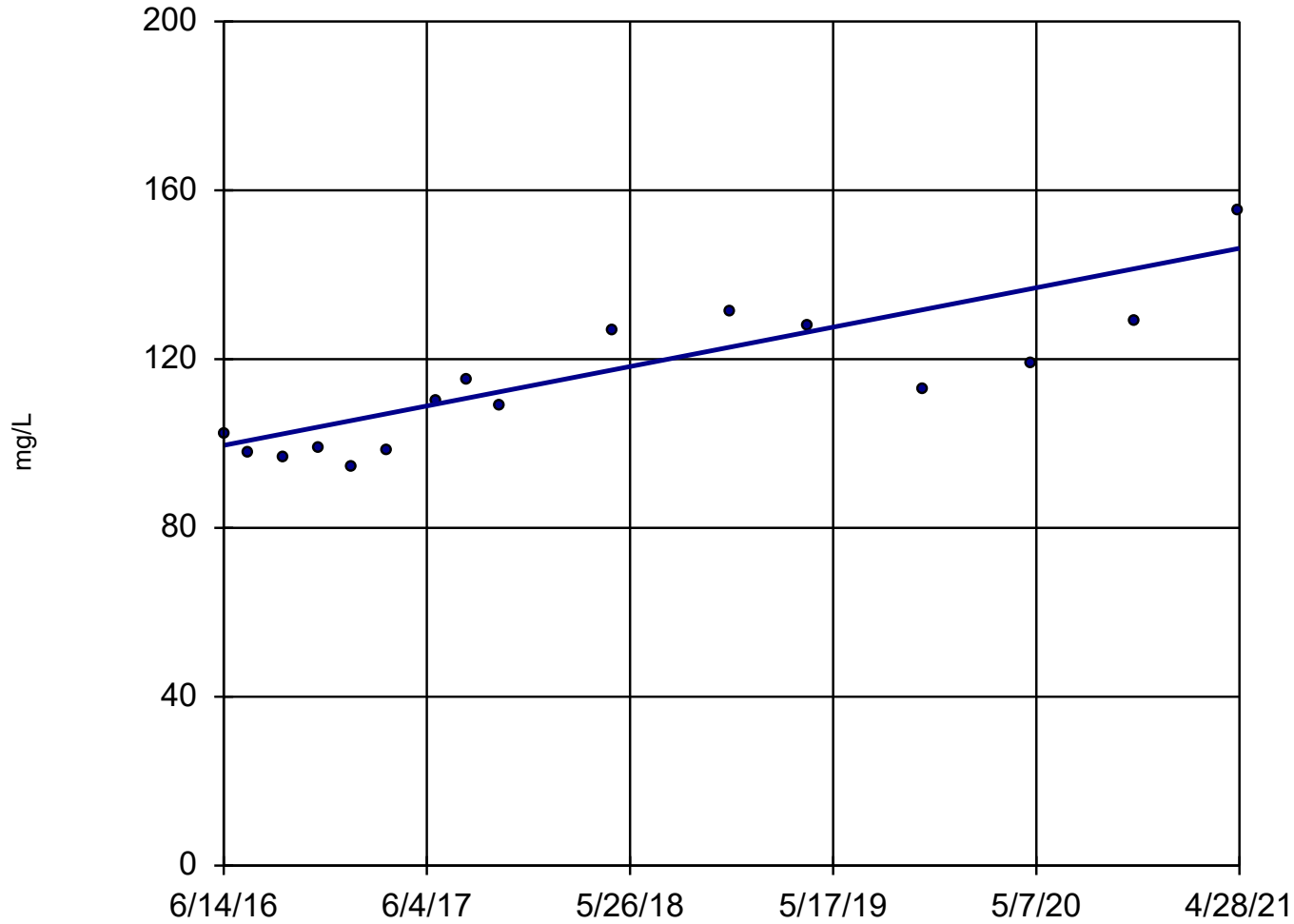
Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Chloride Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks



# Sen's Slope Estimator

MW-15



n = 16

Slope = 9.575  
units per year.

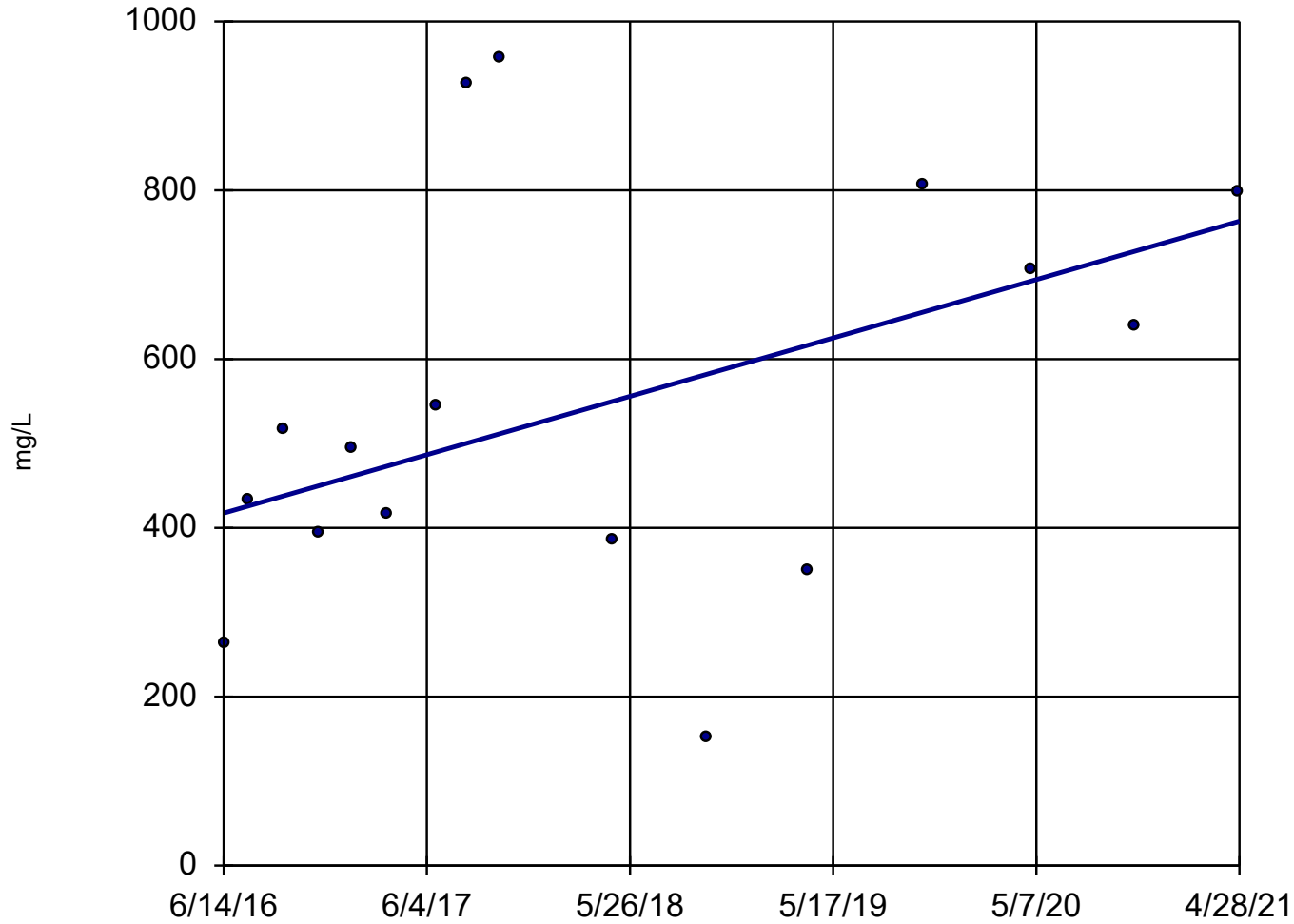
Mann-Kendall  
statistic = 78  
critical = 53

Increasing trend  
significant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Chloride Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

# Sen's Slope Estimator

MW-17



n = 16

Slope = 70.95  
units per year.

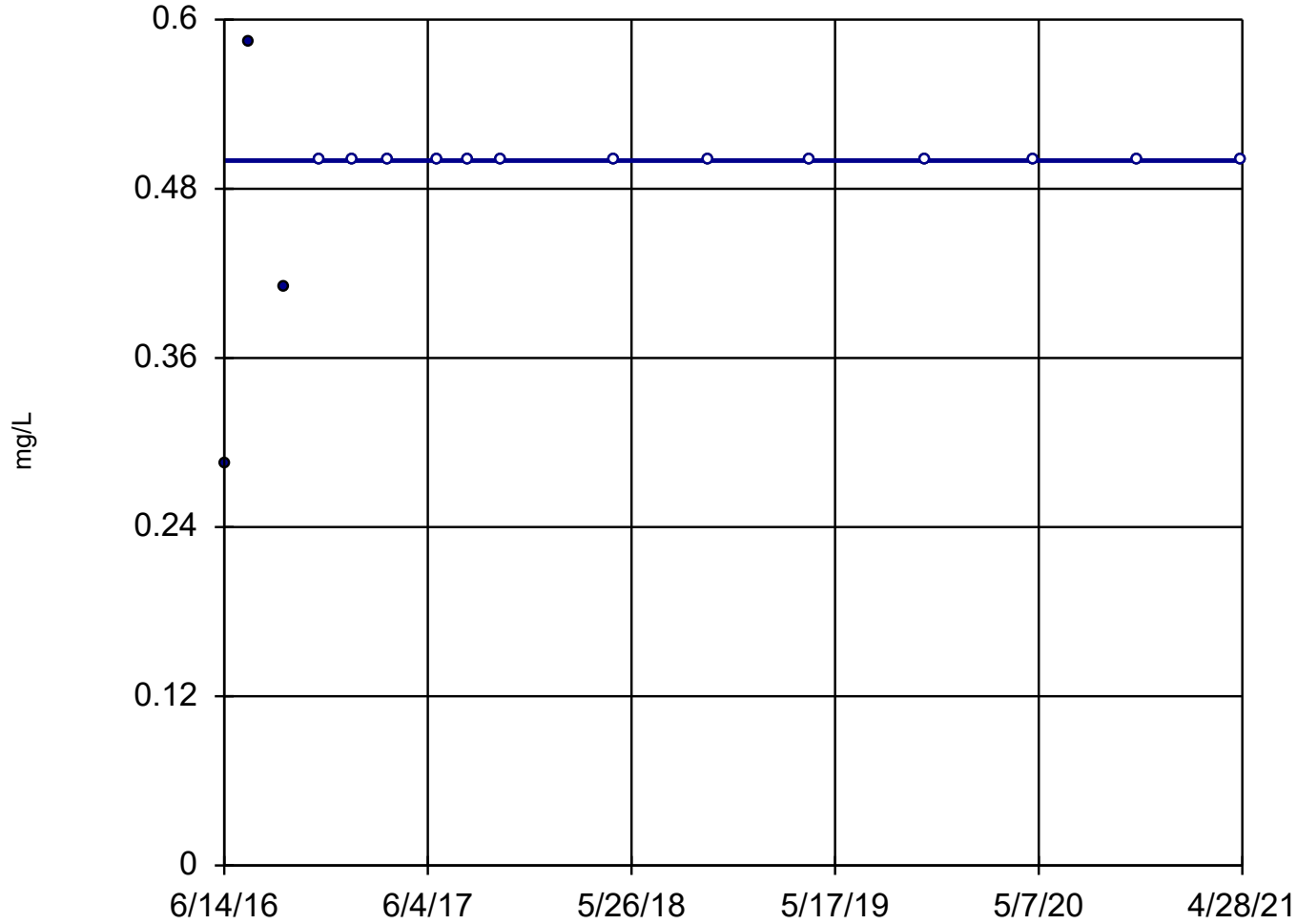
Mann-Kendall  
statistic = 30  
critical = 53

Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Chloride Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Sen's Slope Estimator

MW-13



n = 16

Slope = 0  
units per year.

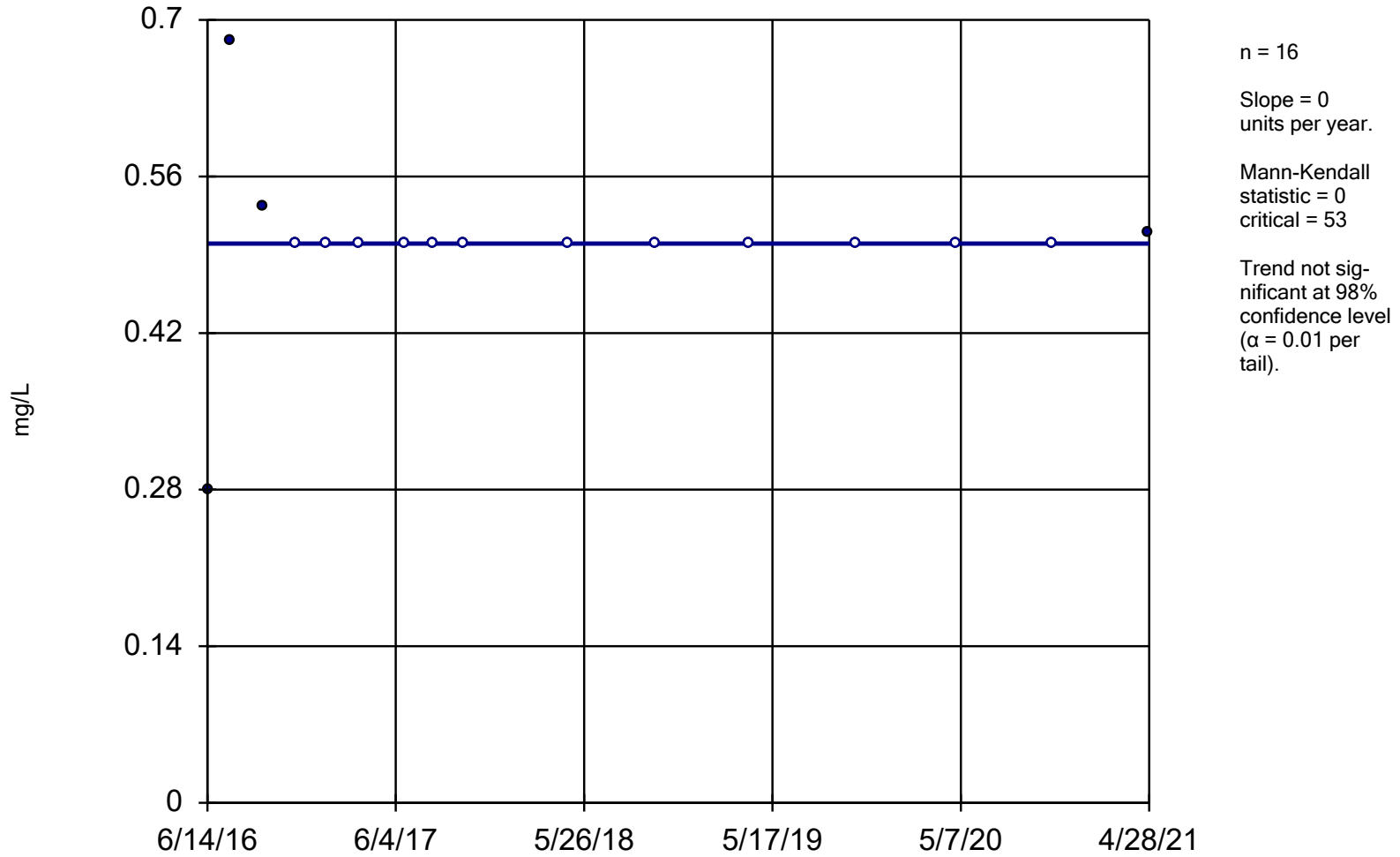
Mann-Kendall  
statistic = 14  
critical = 53

Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Fluoride Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

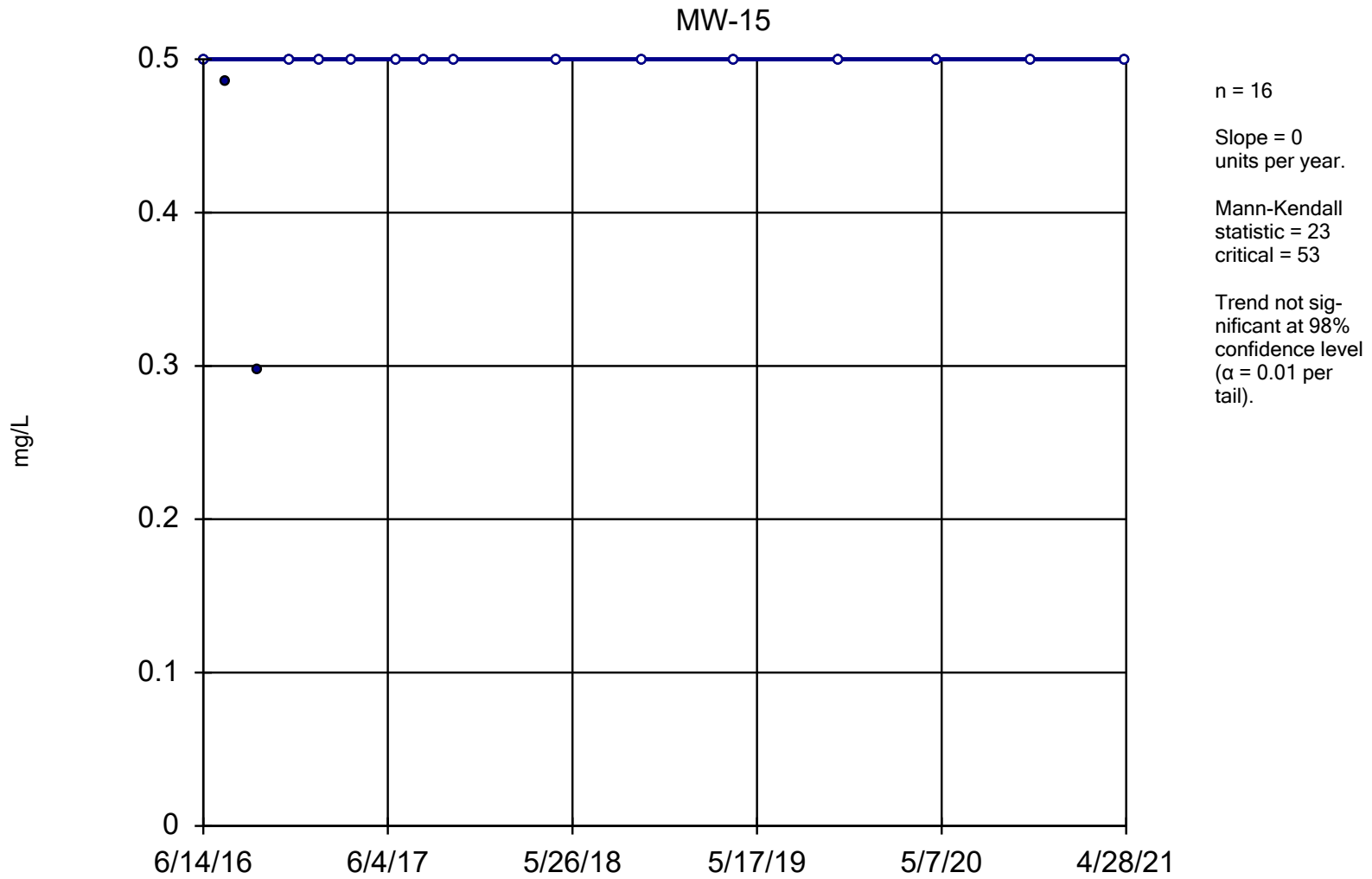
## Sen's Slope Estimator

MW-14



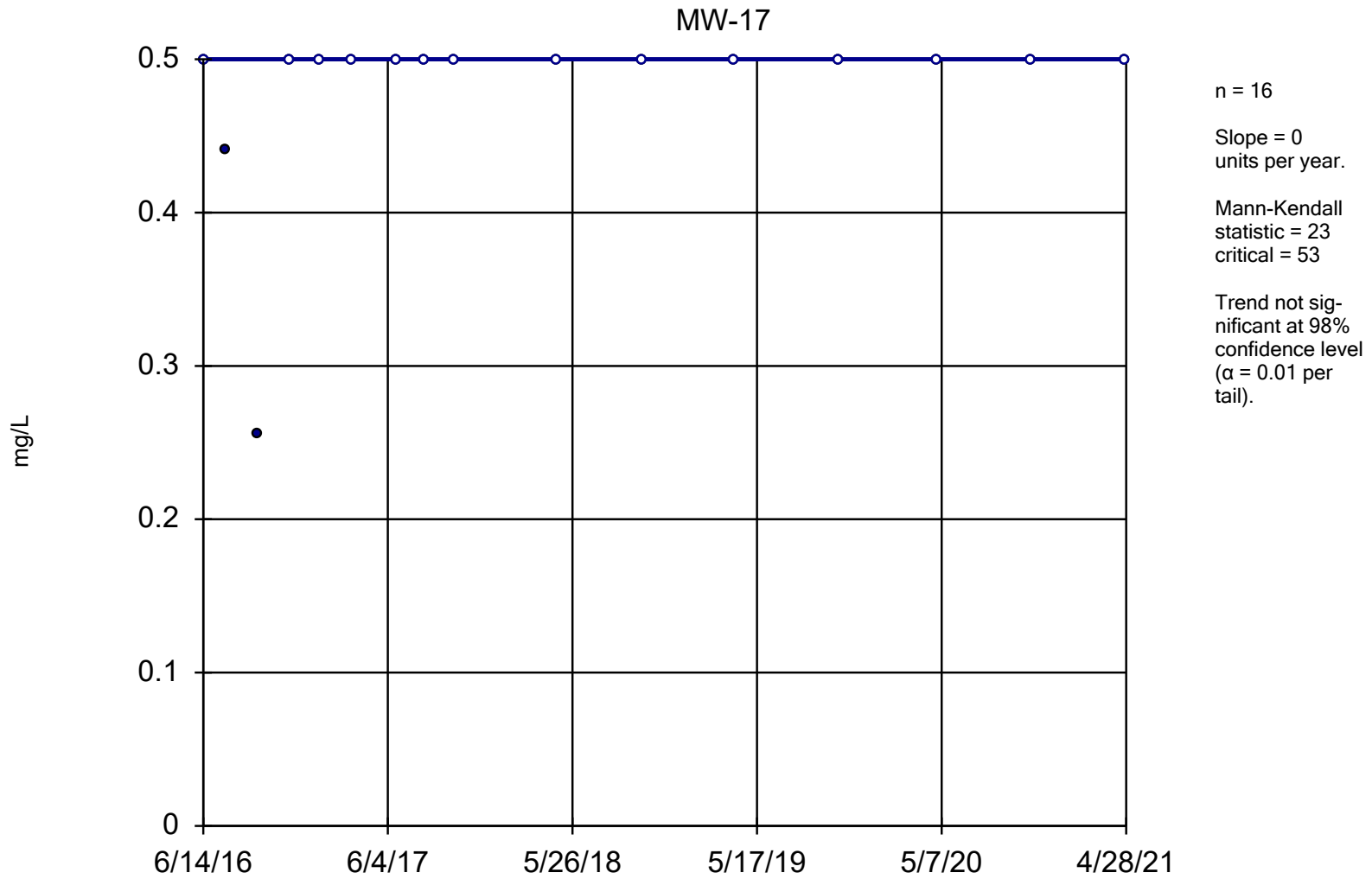
Constituent: Fluoride Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Sen's Slope Estimator



Constituent: Fluoride Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

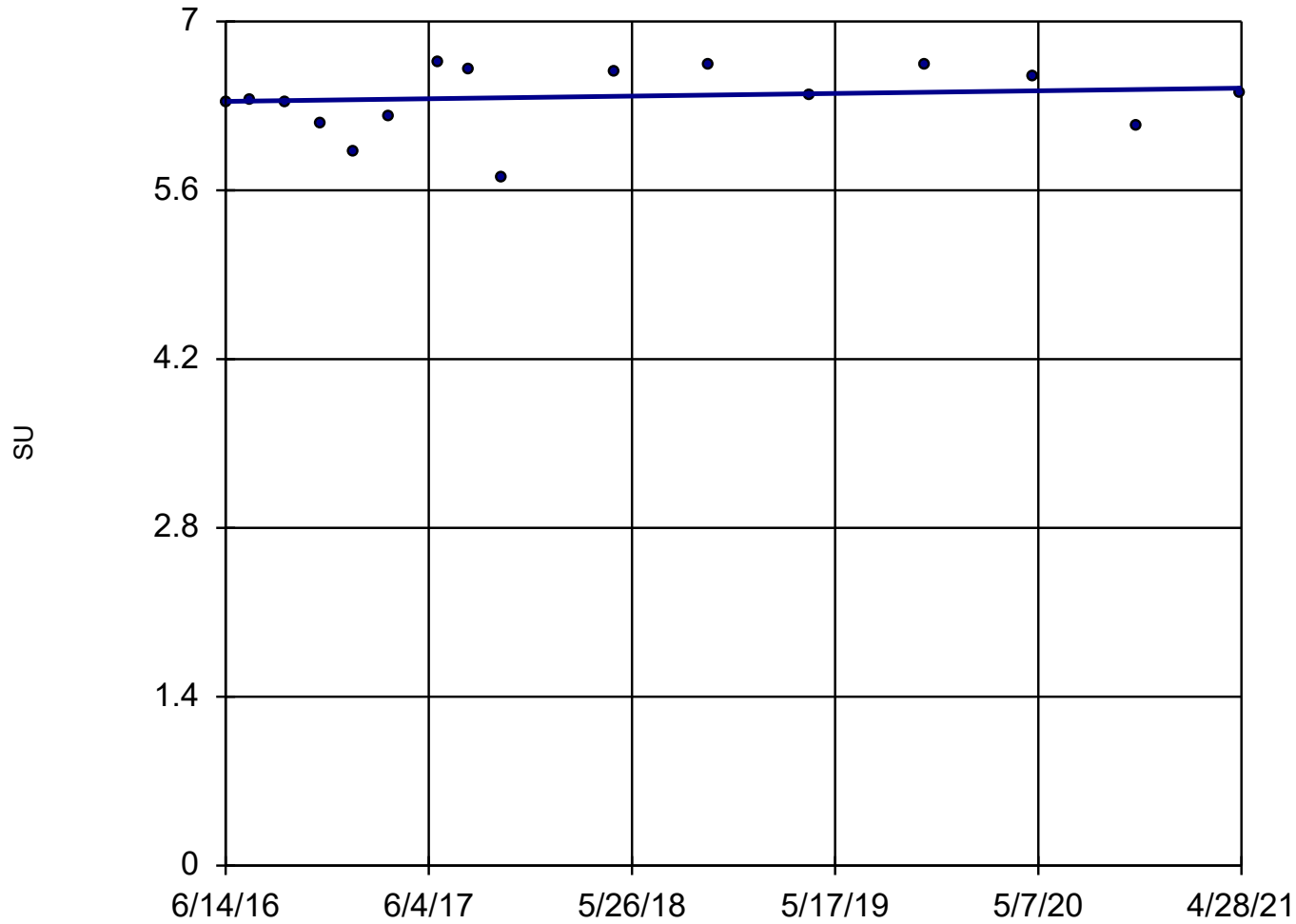
## Sen's Slope Estimator



Constituent: Fluoride Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

# Sen's Slope Estimator

MW-13



n = 16

Slope = 0.02261  
units per year.

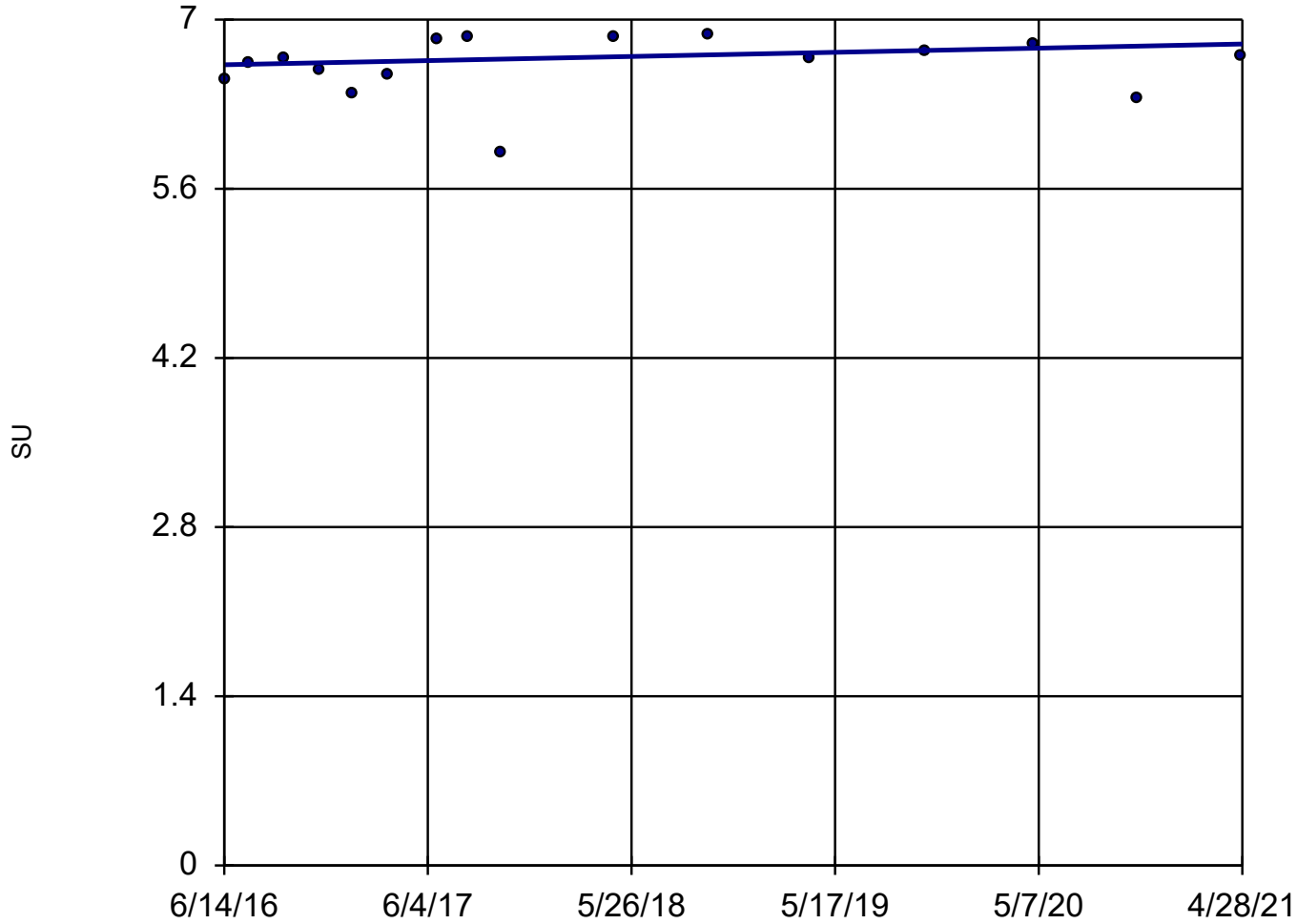
Mann-Kendall  
statistic = 15  
critical = 53

Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: pH Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

# Sen's Slope Estimator

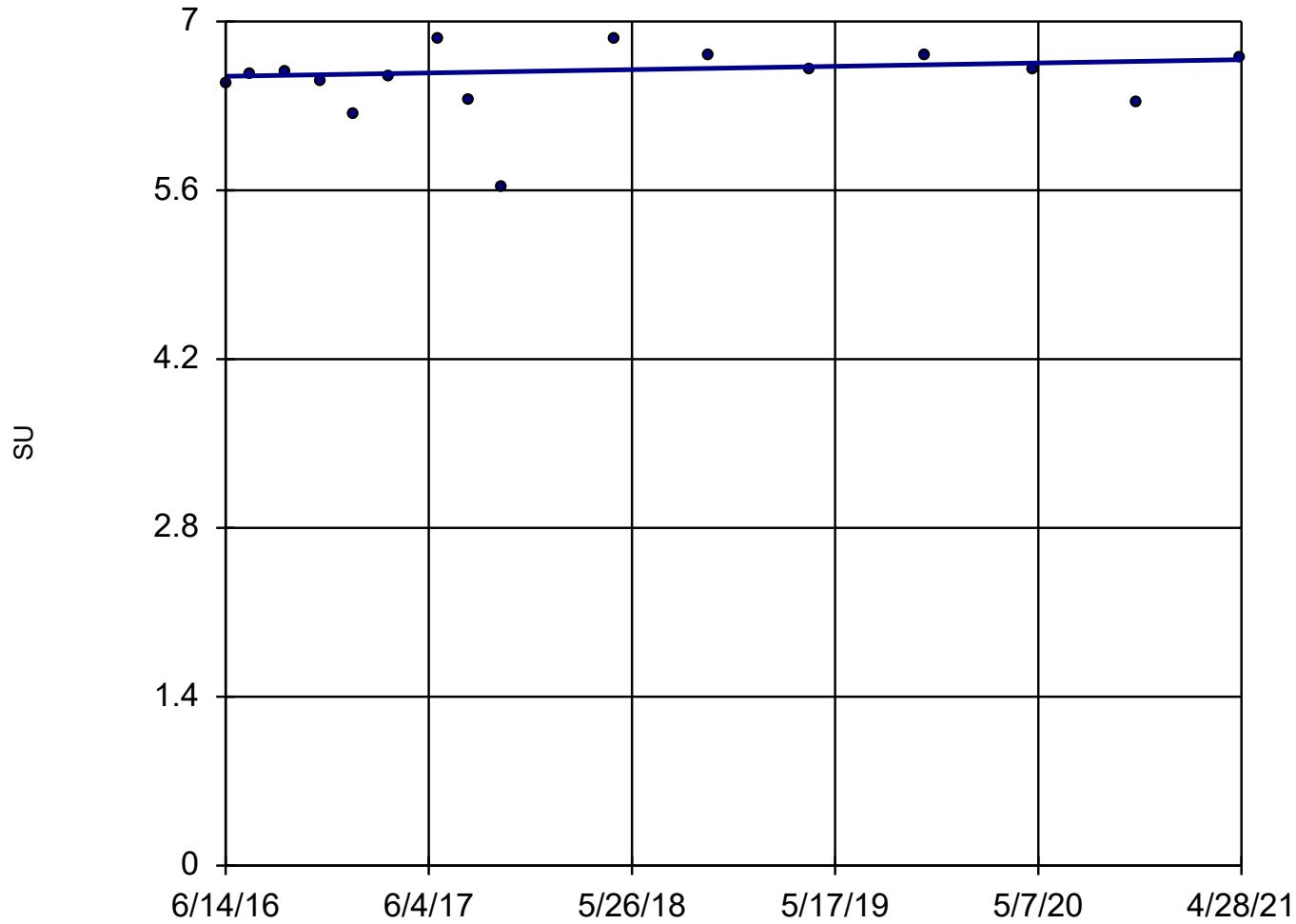
MW-14





# Sen's Slope Estimator

MW-15



n = 16

Slope = 0.02831  
units per year.

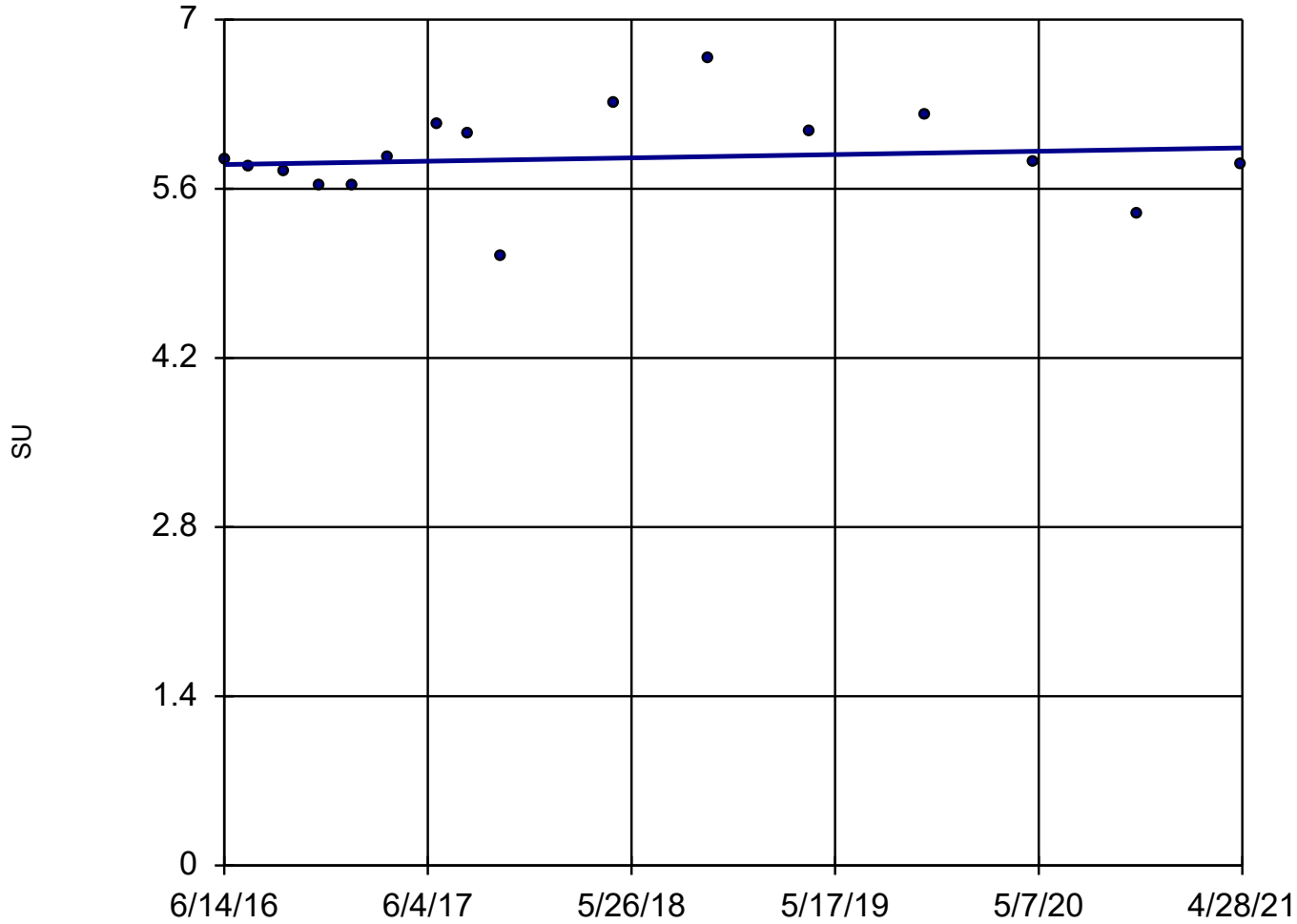
Mann-Kendall  
statistic = 19  
critical = 53

Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: pH Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

# Sen's Slope Estimator

MW-17

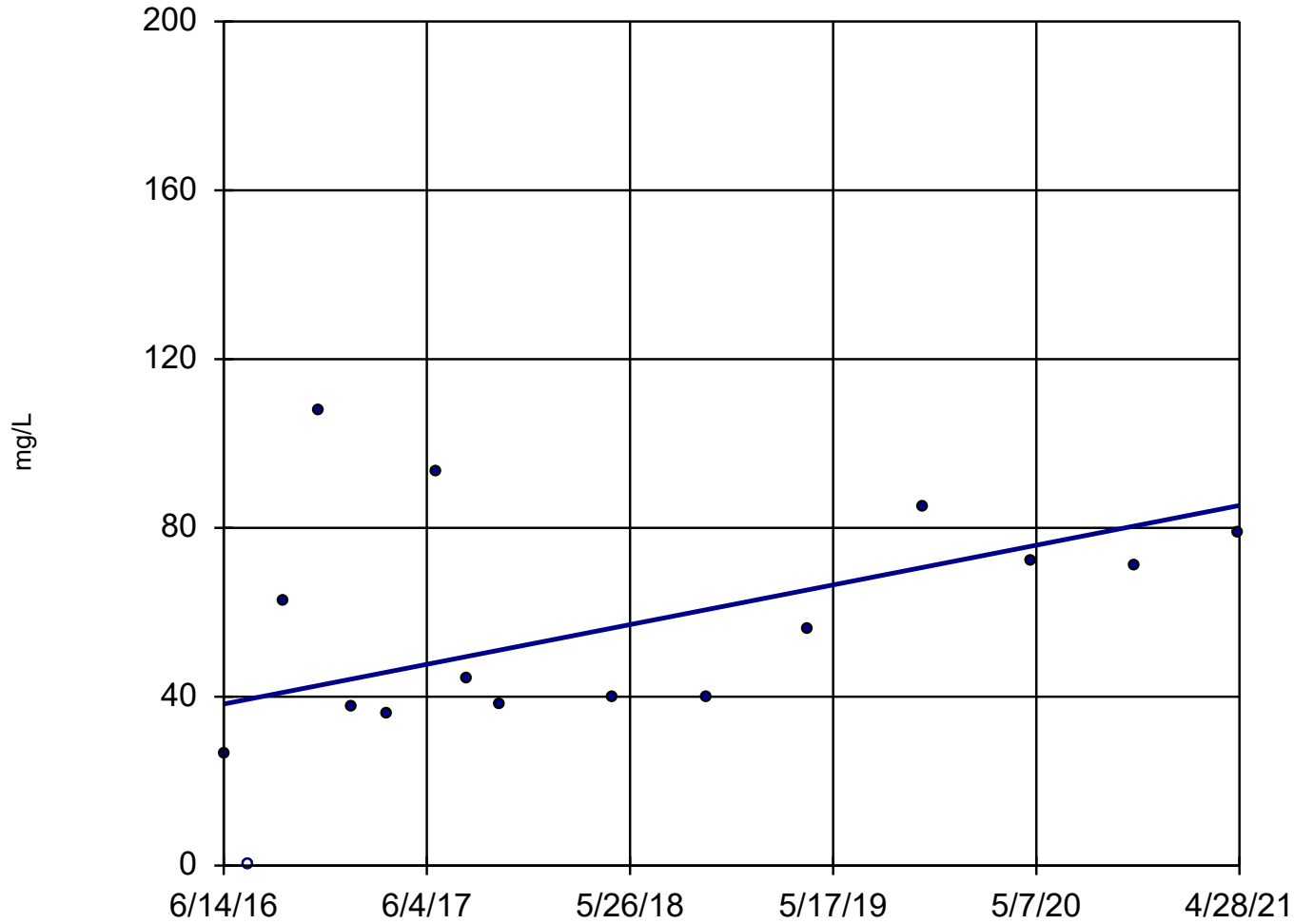


n = 16  
Slope = 0.02829  
units per year.  
Mann-Kendall  
statistic = 12  
critical = 53  
Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: pH Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Sen's Slope Estimator

MW-13



n = 16

Slope = 9.653  
units per year.

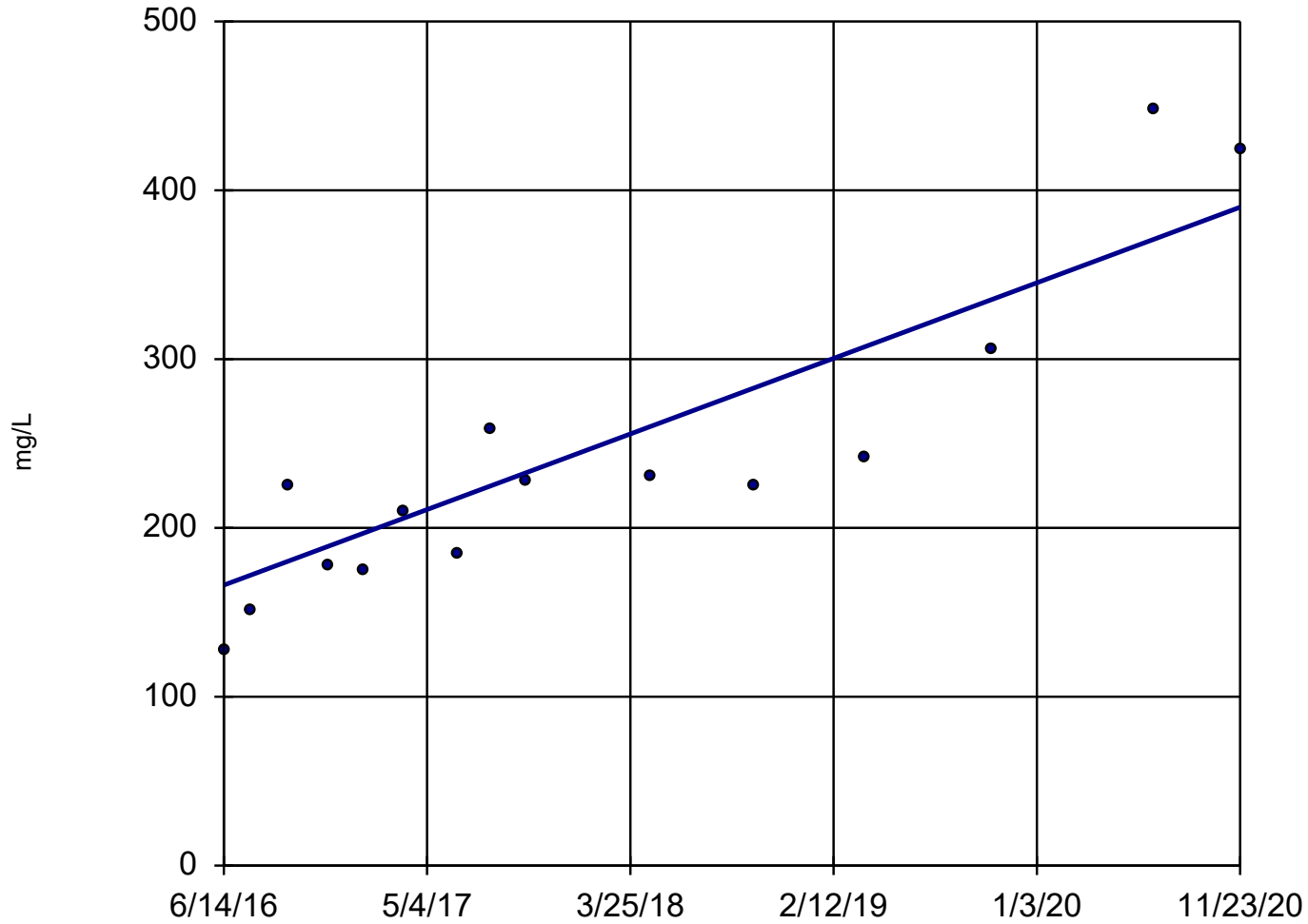
Mann-Kendall  
statistic = 44  
critical = 53

Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Sulfate Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Sen's Slope Estimator

MW-14



n = 15

Slope = 50.36  
units per year.

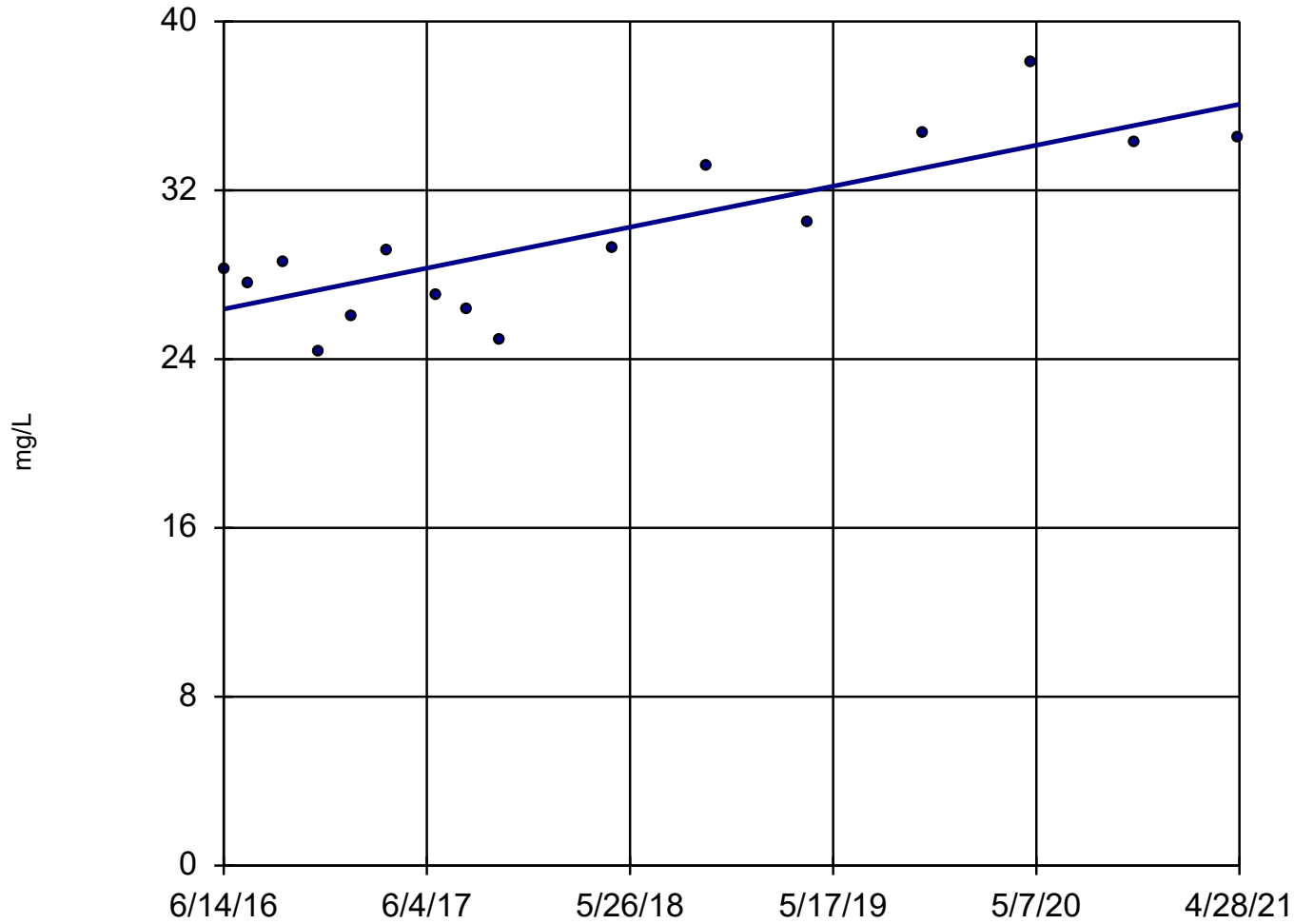
Mann-Kendall  
statistic = 78  
critical = 48

Increasing trend  
significant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Sulfate Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

# Sen's Slope Estimator

MW-15

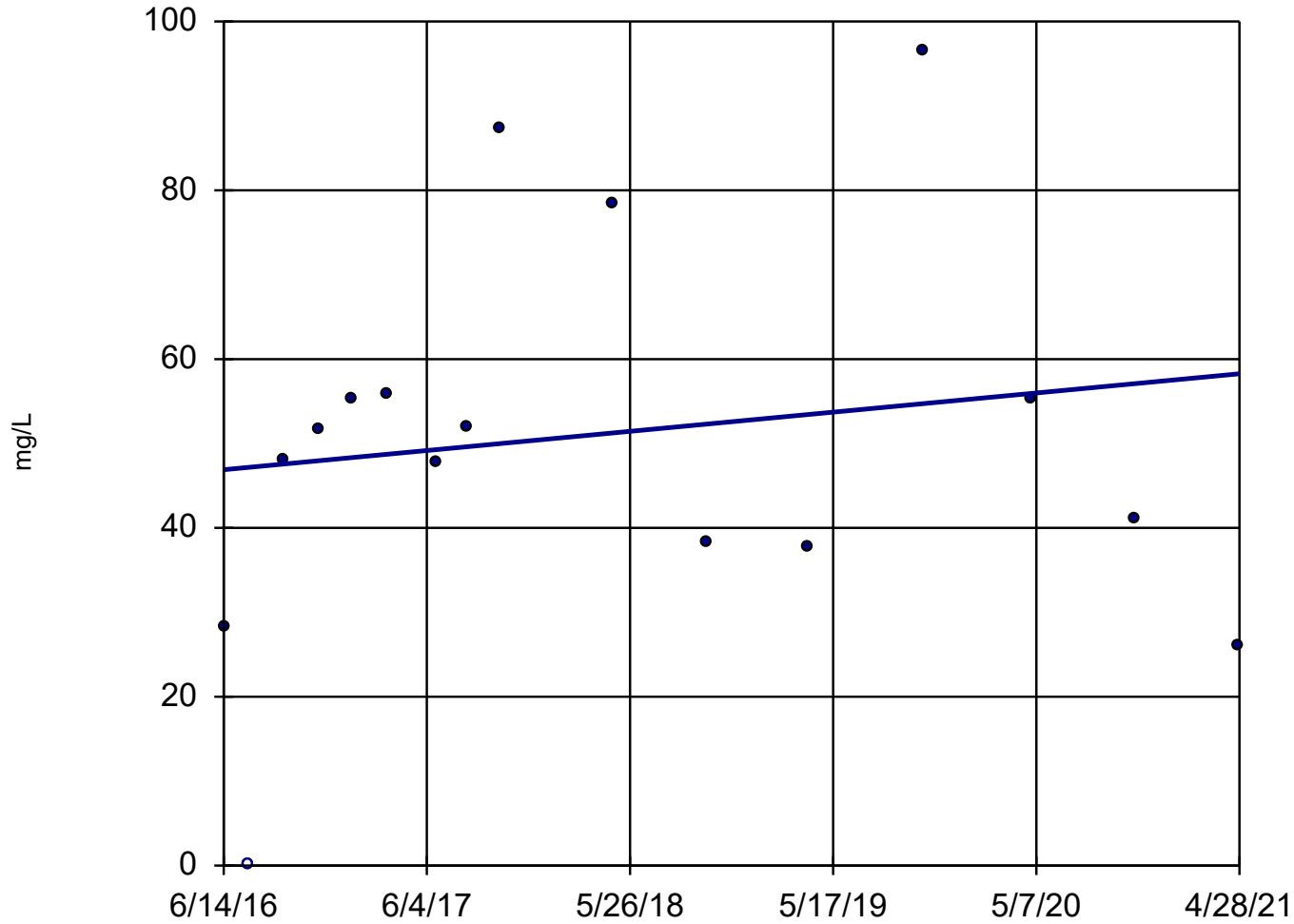


n = 16  
Slope = 1.992 units per year.  
Mann-Kendall statistic = 64  
critical = 53  
Increasing trend significant at 98% confidence level ( $\alpha = 0.01$  per tail).

Constituent: Sulfate Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Sen's Slope Estimator

MW-17



n = 16

Slope = 2.333  
units per year.

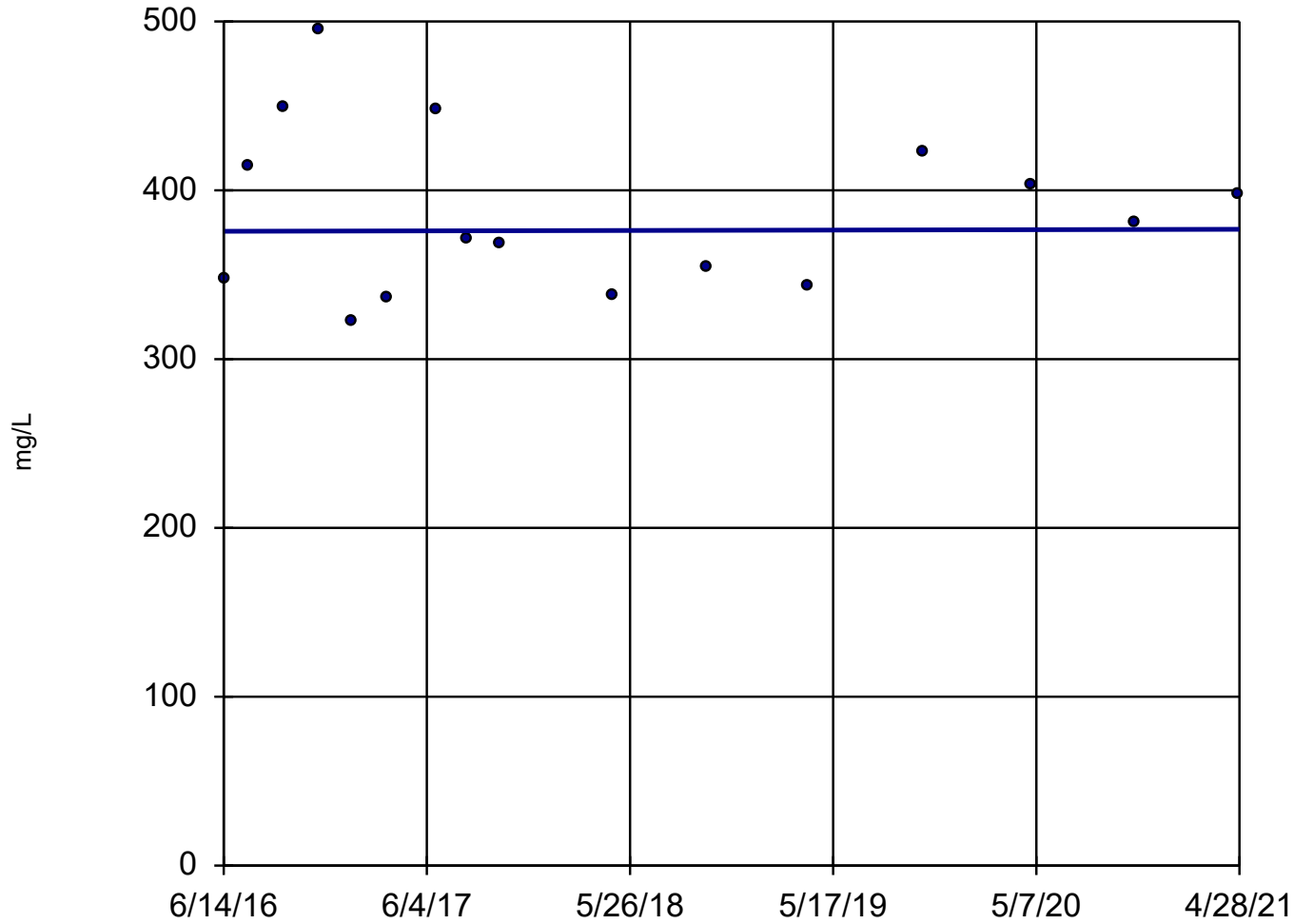
Mann-Kendall  
statistic = 13  
critical = 53

Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Sulfate Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Sen's Slope Estimator

MW-13



n = 16

Slope = 0.2454  
units per year.

Mann-Kendall  
statistic = 0  
critical = 53

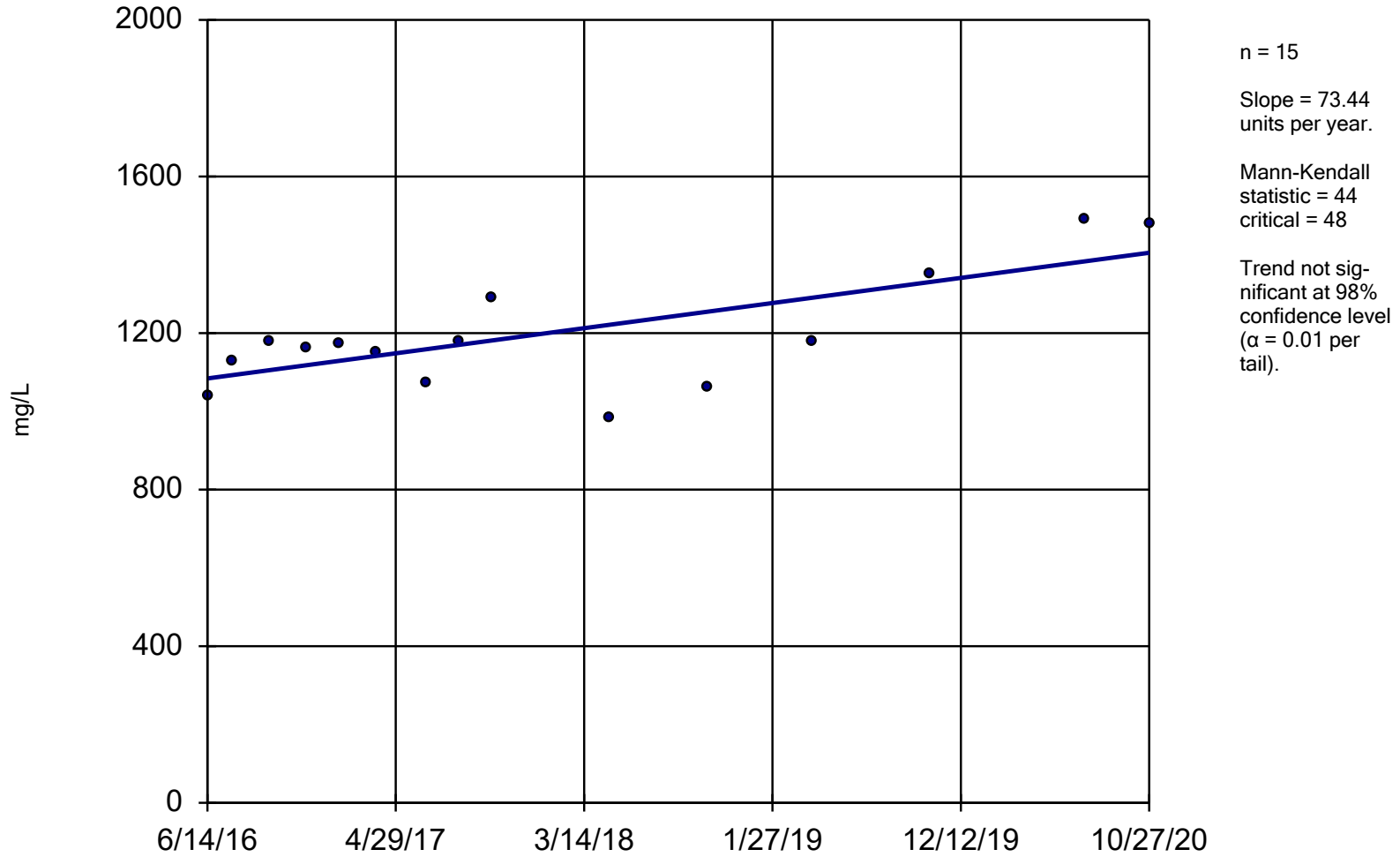
Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Total Dissolved Solids Analysis Run 12/28/2021 10:03 AM View: Trend Test

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

## Sen's Slope Estimator

MW-14



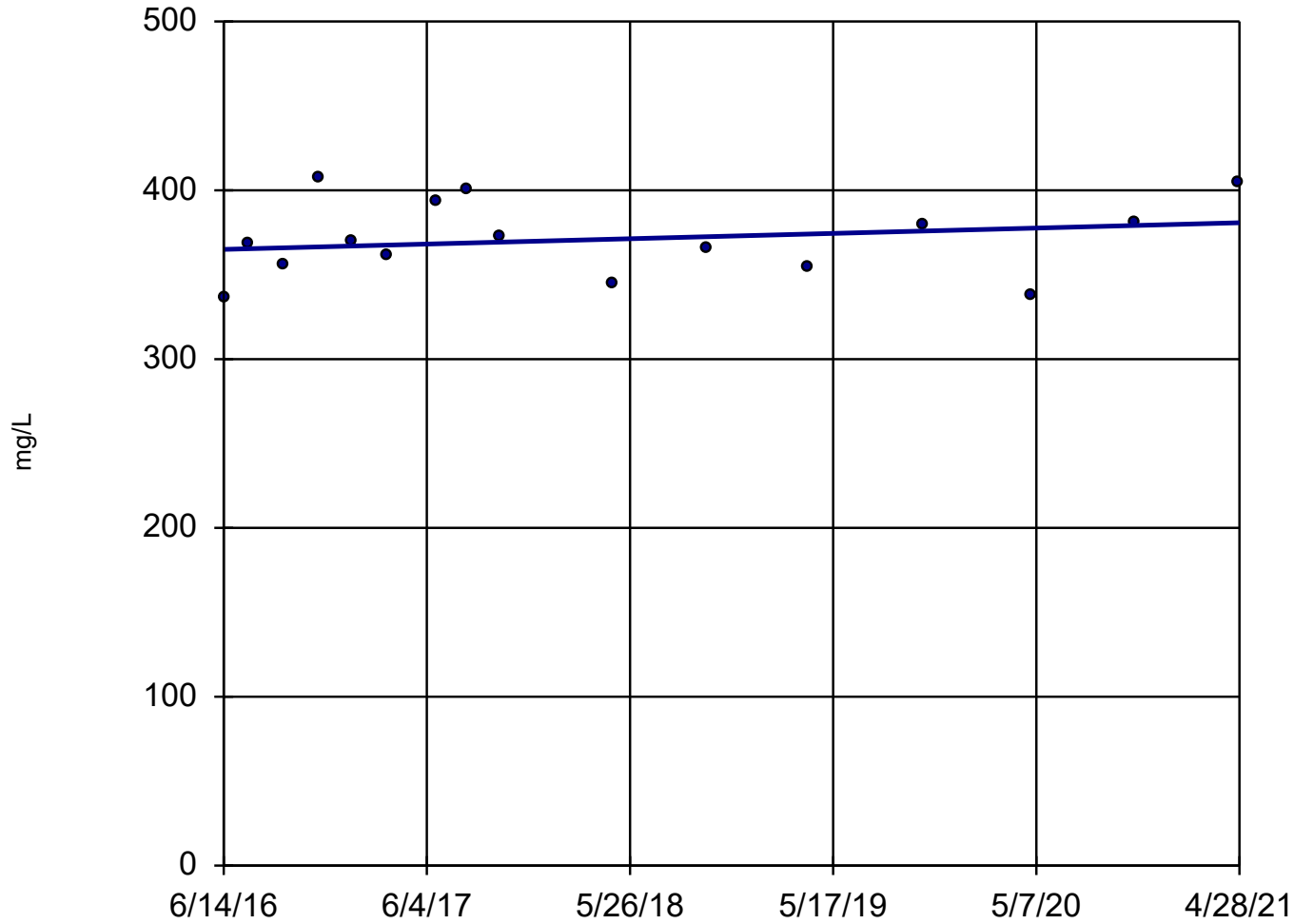
Constituent: Total Dissolved Solids Analysis Run 12/28/2021 10:03 AM View: Trend Test

Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks



# Sen's Slope Estimator

MW-15

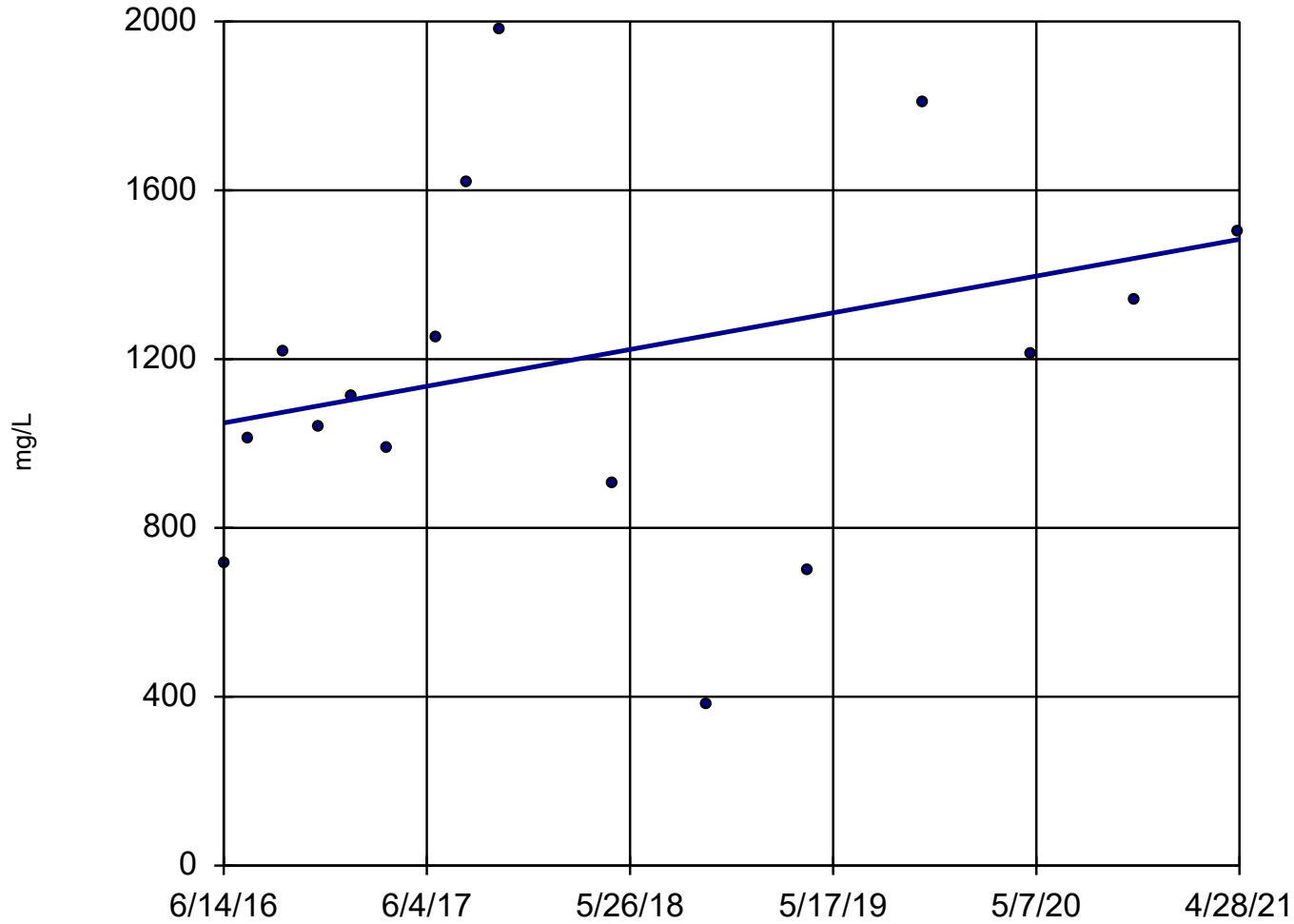


n = 16  
Slope = 3.248  
units per year.  
Mann-Kendall  
statistic = 16  
critical = 53  
Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Total Dissolved Solids Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks

# Sen's Slope Estimator

MW-17



n = 16  
Slope = 89.22  
units per year.  
Mann-Kendall  
statistic = 28  
critical = 53  
Trend not sig-  
nificant at 98%  
confidence level  
( $\alpha = 0.01$  per  
tail).

Constituent: Total Dissolved Solids Analysis Run 12/28/2021 10:03 AM View: Trend Test  
Twin Oaks Power Station CCR LF Client: Major Oak Power Data: Twin Oaks









**CCR Landfill Post-Closure Plan**  
**TCEQ Registration Application**

**Twin Oaks Power Generating Station**  
**13065 Plant Road**  
**Bremond (Robertson County), Texas 76629**

**October 14, 2022**

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## **1.0 Introduction**

The following CCR Post-Closure Plan is intended to fulfill the requirements of 30 TAC §352.1241 and Coal Combustion Residual Rule 40 CFR §257.104 (Post-Closure Care Requirements) for the existing Twin Oaks Power (TOP) Utility Landfill located near Bremond, Texas. Section 40 CFR §257.104 requires that an owner or operator of a CCR landfill prepare a Post-Closure Plan describing post-closure care of the CCR unit.

The following constitutes the initial Post-Closure Plan for the CCR landfill as required under 30 TAC §352.1241 and 40 CFR §257.104.

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## **2.0 Post Closure Activities**

The purpose of this Post-Closure Plan is to describe the post-closure monitoring and maintenance activities at the CCR unit throughout the post-closure care period, in accordance with 30 TAC §352.1241/40 CFR §257.104.

### **2.1 Post-Closure Period**

Part 40 CFR §257.104(c) requires a post closure care period to extend 30 years after completion of the final cover system.

Unless, as provided by 40 CFR §257.104(c)(2), if at the end of the post-closure care period the owner or operator of the CCR unit is operating under assessment monitoring in accordance with 40 CFR §257.95, the owner or operator of the CCR unit must continue to conduct post-closure care until the owner or operator returns to detection monitoring in accordance with 40 CFR §257.95.

### **2.2 Post-Closure Contact**

The designated contact during the post-closure care period for the CCR landfill is the onsite Environmental Supervisor. The supervisor's contact information is:

Environmental Supervisor  
Twin Oaks Power  
13065 Plant Road  
Bremond, Texas 76629  
(254) 746-5578  
eddy.young@mesquitegen.com

### **2.3 Inspection Plan**

A qualified person will inspect the closed landfill semi-annually or at a frequency appropriate to maintain environmental and structural integrity of the final cover system.

Inspections will include the entire CCR unit and look for evidence of settlement or subsidence, slope instability, animal burrows or damage, erosion of final surface cover, exposure of CCR material, vegetative growth, ponding of water on the final cover and any seepage from the side slopes. Groundwater monitoring wells will be inspected for signs of

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damage and reported. Storm water features will be checked to see that they are free from sediment or debris that may prevent the system from operating properly.

If damage to the final cover system is identified during an inspection, an investigation to identify the potential cause of the damage will also be performed. Repairs will be made as soon as practical to minimize additional damage.

## **2.4 Maintenance Plan**

During the post-closure care period, the CCR landfill will receive routine maintenance to meet post-closure care requirements. In accordance with §257.104(b) and (d), the following sections include descriptions of the methods and procedures to be used to maintain the final cover system.

### **2.4.1 Erosion Damaged Areas**

Areas of the final cover system that have been eroded will be backfilled according to the cover system design detailed in the facility's Closure Plan. The depth of disturbance or damage will govern the repair process and soils placed and grading activities utilized. Repair areas will be seeded, mulched or protected by erosion control matting (or similar means) to deter the development of new erosion.

### **2.4.2 Areas of Settlement, Subsidence and Displacement**

Minor settlement, subsidence, or displacement will be corrected by grading to promote positive surface drainage. Suspected damage to the final cover systems will be inspected and repairs made as necessary.

Signs of surface sloughing, bulging at the toe, tension cracks at the top of the slope, or seepage from the side slopes are usually an indication of potential slope instability. Signs of instability shall be reported to a qualified professional engineer for further evaluation and recommendations for appropriate course of action. Any corrective action to any potential slope instability will be based on addressing the cause of the damage. Any repairs to the final cover system will be in accordance with the final Closure Plan and conducted as soon as practical after detection.

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### **2.4.3 Run-On and Run-off Control Structures**

Surface water channels and down drain entrances and exits will be inspected periodically or at least semi-annually during the post-closure care period. Drainage features will also be inspected after a significant rainfall event (i.e. 2-year, 24-hour storm event, or greater). Storm water channels and ponds will be inspected for evidence of erosion, excessive vegetation, sedimentation and debris that would restrict the flow or prevent proper operation. Clogs will be removed from pipes or inlets to allow free flow of surface water and prevent damage to other parts of the drainage control system and facility.

### **2.4.4 Mowing**

Mowing operations will be appropriately scheduled during the growing season or occur at least once per year. Mowing is necessary to deter growth of woody vegetation, deter habitation by animals, and to allow inspection and access to the landfill's final cover features and related structures.

Undesirable vegetation such as trees and large shrubs will be removed and any damage to the final cover system repaired. Commercially available herbicide or mechanical control may be used to control invasive or undesirable vegetation.

## **2.5 Groundwater Monitoring Plan**

Groundwater monitoring will be performed for the CCR landfill throughout the post-closure period. A Groundwater Sampling and Analysis Plan (GWSAP) has been prepared for the CCR landfill (in accordance with 40 CFR §257.90 through §257.98) and provides specific details for completion of groundwater monitoring activities at the landfill. The groundwater monitoring system will be sampled and maintained throughout the post-closure care period in accordance with §257.104(b)(3).

## **2.7 Post-Closure End Use**

The closed CCR landfill will be used as open space and managed turf. The post-closure use will not interfere with inspection, maintenance and monitoring activities. Deed restriction will be placed on the property to ensure that there is no impact to the closed CCR landfill. Post-closure use of the property is not expected to disturb the integrity of the final cover or other components including monitoring systems of the closed landfill.

If any disturbance is proposed at the closed landfill, the owner or operator will demonstrate that the disturbance of the final cover, including any removal of CCR material for beneficial use, will not increase the potential threat to human health or the environment. This demonstration must be certified by a qualified professional engineer and provide notification to State agencies as required by §257.104(d)(1)(iii).

## **2.7 Completion of Post-Closure Care Period**

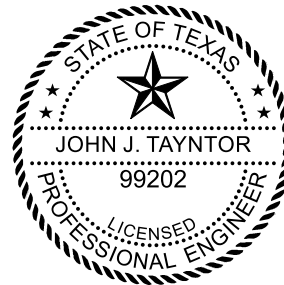
In accordance with 40 CFR §257.104(c), the post-closure care period is to extend 30 years (unless otherwise required per 40 CFR §257.104(c)(2)) from the time of complete closure of the landfill. Within 60 days after the completion of the post-closure care period, the owner or operator of the CCR landfill will provide notification verifying that post-closure care has been completed. In accordance with 40 CFR §257.104(e), a qualified professional engineer must certify the notification that the post-closure care has been completed and the notification placed in the facility's operating record. Further, in accordance with 30 TAC 352.1241(b) the owner or operator shall submit to the TCEQ Executive Director a demonstration that the CCR unit poses no threat to human health, the environment, or property.

### 3.0 Post-Closure Plan Certification

By means of this certification, (i) this initial CCR Landfill Post-Closure Plan has been prepared, and reviewed in accordance with good engineering practice, (ii) it is my professional opinion that the Plan was prepared consistent with the minimum requirements of 30 TAC §352.1241 and 40 CFR §257.104, (iii) I or my agent has visited and examined the facility, (iv) this certification is not and shall not be interpreted or construed as a guarantee, warranty or legal opinion, and (v) this certification in no way relieves the owner or operator of the facility of his/her duty to fully implement this Plan.

By:   
\_\_\_\_\_

Dated: October 20, 2022  
\_\_\_\_\_



TBPE Firm Registration No. F16721

**Post-Closure Care Cost Estimate  
 Twin Oaks Power – CCR Landfill**

**Table VIII-1**

ITEM	UNIT RATE	PER YEAR	TOTAL
<b><u>1.0 Engineering and Geology</u></b>			
1.1 Post closure Plan	N/A		
1.2 Annual Site Inspections	\$ 30.00 /acre/year =	\$ 3,870.00 /year	\$ 116,100.00
1.3 Correctional Plans and Specifications		\$ 2,000.00 /year	\$ 60,000.00
1.4 Groundwater Monitoring <sup>1</sup>		\$ 39,300.00 /year	\$ 1,179,000.00
<b><u>2.0 Maintenance and Construction</u></b>			
2.0 Vegetation Management	\$ 28.00 /acre/year =	\$ 3,612.00 /year	\$ 108,360.00
2.1 Erosion Control and Repair <sup>2</sup>	\$ 500.00 /acre/year =	\$ 64,500.00 /year	\$ 1,935,000.00
2.2 Monitoring Well P&A <sup>3</sup>	\$ 1,000.00 /well =	\$ 8,000.00 LS	\$ 8,000.00
<b>SUBTOTAL</b>			\$ 3,406,460.00
<b>Contingency</b>	10 percent	\$ 11,354.87	\$ 340,646.00
<b>Annual Post Closure Cost</b>		<b>\$124,636.87 /year</b>	
<b>TOTAL POST CLOSURE COST</b>			<b>\$ 3,747,106.00</b>

- NOTES:**
1. Includes associated costs for Semi-Annual Groundwater Monitoring Sampling and Testing Activities per §257.104(b)(3)
  2. Includes estimated costs for repair of localized rill erosion, reseeded, and use of erosion control materials.
  3. Estimated cost of P&A (including plugging report) by a licensed State of Texas driller (per TDLR guidance).