

2025 Vinyl Chloride Contingency Trigger Assessment – South Park Landfill

Prepared for



**Seattle
Public
Utilities**

January 2026

ParametriX

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Prepared for

Seattle Public Utilities

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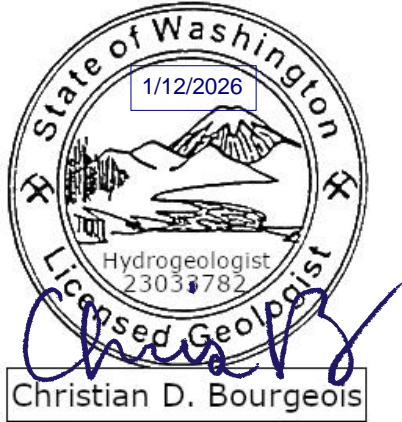
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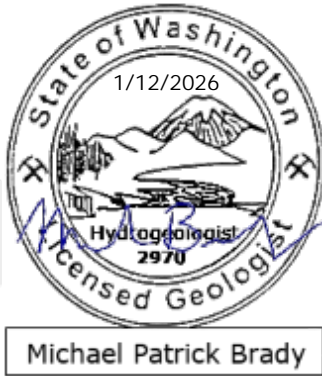
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Trigger Assessment – South Park Landfill.
Prepared for Seattle Public Utilities
by Parametrix, Seattle, Washington.
January 2026.

Certification

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional hydrogeologist licensed to practice as such, is affixed below.



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Acronyms and Abbreviations

1Q25	First quarter of 2025
2Q25	Second quarter of 2025
3Q25	Third quarter of 2025
4Q25	Fourth quarter of 2025
CAP	Cleanup Action Plan
CPOC	conditional point-of-compliance
CPSP	CenterPoint Properties South Park, LLC
CUL	cleanup level
PCE	tetrachloroethylene
SPU	Seattle Public Utilities
TCE	trichloroethylene
VC	vinyl chloride

1. Introduction

This assessment was prepared to evaluate and address vinyl chloride (VC) contingency trigger conditions under the South Park Landfill Cleanup Action Plan (CAP; Ecology 2023). The purpose of this report is to summarize identification of VC triggers and evaluate if statistically significant increasing trends are present in VC concentrations at select monitoring wells during the 2025 monitoring year, and to assess whether observed conditions warrant further action.

1.1 Background

The South Park Landfill is a closed landfill located in Seattle, Washington (see Figure 1). The landfill is regulated by the Washington State Department of Ecology (Ecology) under the Toxics Cleanup Program, with Seattle Public Utilities (SPU) and CenterPoint Properties South Park, LLC (CPSP) as the responsible parties. Parametrix serves as the Site Coordinator on behalf of SPU and CPSP. The CAP describes the cleanup action selected by Ecology for the “Settlement Area,” a portion of the landfill area comprising the two largest properties which overlie waste associated with the landfill, as well as certain adjacent City of Seattle and Washington State rights-of-way.

1.1.1 Groundwater Monitoring

At the Settlement Area, there are three groundwater zones of interest; all are part of the upper portion of the Duwamish Valley Alluvial Aquifer system.

- The Perched Zone is a thin discontinuous layer of groundwater (mostly infiltrating rainwater) that exists above the Silt Overbank Deposit. The thickness of the Perched Zone may vary seasonally but is often only a few inches of water sitting on the hummocky surface of the Silt Overbank Deposit.
- The A-Zone of the Duwamish Valley Alluvial Aquifer is immediately beneath the Silt Overbank Deposit and is the critical zone where leachate (and perched water) can enter the groundwater system and move off-site. The A-Zone extends from the base of the Silt Overbank Deposit for approximately 15 to 20 ft (generally to -15 ft elevation North American Vertical Datum of 1988 [NAVD 88]).
- The B-Zone of the Duwamish Valley Alluvial Aquifer is the next deeper zone extending from approximately -15 ft elevation NAVD 88 to either the top of the estuarine/marine deposits or approximately -35 ft elevation NAVD 88, whichever is shallower.

In accordance with the CAP, quarterly groundwater sampling and analysis of water quality in wells upgradient and downgradient of the Settlement Area is completed. The CAP established groundwater contingency triggers for VC based on concentration and trend conditions.

1.1.2 Cleanup Conditions

The solid waste deposited in the landfill extends into the top of the A-Zone with the depth of waste extending down approximately to sea level (Floyd|Snider et al 2021). The lower portion of solid waste in the landfill is saturated (i.e., occurring below the local water table). Interpreted cross-sections of the landfill and surrounding area are included in Figures 5.2 to 5.7 in Floyd|Snider et al (2021).

In addition to the Settlement Area, there are other nearby properties with known groundwater impacts that influence local conditions. The former Glitsa American, Inc. property, located immediately northeast of the landfill across State Route 99 (see Figure 1), has been identified as a separate MTCA cleanup site (Facility ID No. 63168342) with documented solvent- and petroleum-impacted soil and groundwater, including detections of chlorinated ethenes such as trichloroethylene (TCE) and VC

(Environmental Associates 2010). Because of this nearby, non-landfill source area, MW-30 and MW-31 are not designated as conditional point-of-compliance (CPOC) wells under the CAP.

1.1.3 Contingent Triggers and Actions Based upon Vinyl Chloride

Two groundwater conditions trigger contingent actions in the existing compliance monitoring well network:

- Condition 1. Condition 1 (the concentration trigger) is based on groundwater concentrations. In about half of the downgradient wells, the VC concentrations exceed the CUL of 0.29 µg/L, with concentrations in one well (MW-25) fairly consistently between 0.7 and 1.4 µg/L. If concentrations in any downgradient well exceed 1.45 µg/L (5 times the CUL) for two consecutive sampling events, this constitutes Condition 1, and a contingent response is triggered. This trigger is not applied to MW-30 and MW-31, whose concentrations are affected by a non-landfill source in addition to the landfill.
- Condition 2. Condition 2 (the trend trigger) is based on the trend of groundwater concentrations over time in the monitoring wells. Condition 2 is reported using trend plots supported with simple statistical tools in ProUCL. Condition 2 is designed to capture statistically meaningful increases in groundwater concentrations. The trend identification will use a well-established, non-parametric statistical method for trend analysis available in ProUCL called the Mann-Kendall method and will be applied to downgradient wells where the concentration of VC is greater than the CUL. The trend analysis will include MW-31 (which is screened in the Alluvial Aquifer), but not MW-30 (which is screened in the Silt Overbank Deposit). The trend test will be performed at a 95 percent confidence interval.

The CAP outlines specific requirements for responding to triggers at CPOC wells, such as MW-10, and a separate set of requirements for MW-31, which is not designated as a CPOC well. For CPOC wells, a written evaluation must consider the following:

- A. Is the cause of the trigger event (source of the contamination) known?
- B. Does it likely represent a transient condition or a new condition?
- C. Do the data indicate that the most likely source is the Settlement Area?
- D. Does a focused exposure assessment indicate an exposure threat to human health or the environment?
- E. If the source is likely within the Settlement Area, what actions are appropriate at this time? Actions may include, but are not limited to, one or more of the following:
 - i. Continued monitoring to confirm that it is a transitory effect. For example, construction that disturbs the Silt Overbank Deposit may cause a short-term increase that may be acceptable to Ecology as part of the construction project.
 - ii. Modified sampling to understand the cause or source.
 - iii. Changes in operations of landfill gas systems.
 - iv. Changes in some site-related activity, if practicable.
 - v. Additional investigation at the Site.
 - vi. Confirmation that natural attenuation conditions are stable and favorable and possible implementation of in situ modification (such as the addition of a reducing agent or microbial enhancement), if needed.
 - vii. Pump and/or treat if determined to be appropriate and effective.
 - viii. Other technologies that are appropriate to the situation.
- F. If additional remedial action beyond the above actions is considered, it will be evaluated in a manner consistent with a focused feasibility study under MTCA, leading to a proposed corrective action.

If an increasing trend is identified in MW-31, the CAP requires evaluation of monitoring wells MW-25, MW-32, and MW-33, which are located between the Settlement Area and MW-31, to assess if the observed trend could be attributed to the Settlement Area or another source. If the data from MW-25, MW-32, and MW-33 indicate that the Settlement Area is likely the cause of the increasing trend, the CAP requires evaluating additional actions.

Identification and evaluation of VC trigger conditions under the CAP are based on quarterly groundwater monitoring data collected from 2020 to present. Earlier groundwater monitoring data are documented in the RI/FS. Historical data indicate that VC concentrations previously observed at several of the wells discussed in this report, including MW-10 and MW-31, were substantially higher than concentrations measured during the monitoring period from 2020 to the present. This historical context is illustrated in the time-series plots provided in Appendix A and indicates that trigger conditions evaluated in this assessment occur within a comparatively lower concentration range than historically observed.

The following section summarizes VC trigger conditions identified during the 2025 monitoring year and the associated evaluation requirements under the CAP.

2. 2025 Vinyl Chloride Trigger Assessment

Groundwater monitoring data are validated following each quarterly sampling event and evaluated to determine whether VC contingency trigger conditions have been met under the CAP. For wells with VC concentrations exceeding the cleanup level (CUL), trend analyses are conducted using the Mann-Kendall method to evaluate whether statistically significant increasing trends are present. The following subsections summarize the VC CUL exceedances and results of trend analyses performed on wells that exceeded the CUL in the 2025 monitoring year.

2.1 Concentrations Exceeding the Cleanup Level

The following VC exceedances of the CUL occurred during 2025:

- MW-10 in 2Q25
- MW-25 in 1Q25, 3Q25, and 4Q25
- MW-30 in 3Q25 (non-CPOC well, not subject to VC trigger conditions)
- MW-32 in 1Q25 (duplicate only)
- MW-31 in 1Q25, 2Q25, 3Q25, and 4Q25

None of the 2025 concentrations exceeded the VC Condition 1 (concentration trigger). Data summary tables for the 2025 monitoring year are attached in Appendix B.

2.2 Trend Analyses

Mann-Kendall trend analyses were conducted to evaluate statistically significant trends in VC concentrations at wells where VC exceeded the CUL. Based on these analyses, statistically significant increases meeting the criteria for a Condition 2 (trend trigger) under the CAP were identified in the following wells:

- MW-10 in 2Q25
- MW-31 in 1Q25, 2Q25, 3Q25, and 4Q25

Results of VC statistical trend analyses for all wells with VC CUL exceedances, as well as nearby well MW-33, are provided in Appendix C. Trend analyses were performed on a quarterly basis; however, only the results through the fourth quarter of 2025 are presented because the trend direction and statistical significance were consistent across all evaluated quarters.

2.3 Results

Evaluation of 2025 groundwater monitoring data indicates that VC CUL exceedances occurred at multiple monitoring wells; however, no Condition 1 (concentration trigger) criteria were met during the 2025 monitoring year. Mann-Kendall trend analyses conducted for wells with VC concentrations exceeding the CUL identified statistically significant increasing trends meeting the criteria for a Condition 2 (trend trigger) at MW-10 in 2Q25 and MW-31 in all four quarters.

Consistent with the Cleanup Action Plan (CAP), further evaluation focused on MW-10, a conditional point-of-compliance (CPOC) well, and MW-31, which is not designated as a CPOC well but is subject to trend evaluation requirements. The following section presents an assessment of the cause, source, and implications of the statistically significant increasing trends identified at these wells, including evaluation of supporting well data and potential contributing influences.

3. Trigger Response Evaluation

3.1 Approach

An assessment was performed to evaluate the cause and source of the increasing trends of VC and to evaluate whether they represent transient or new conditions. Since VC is the degradation product of reductive dechlorination, this assessment compared VC, cis-1,2-dichloroethene (cis-1,2-DCE), and the combination of VC and cis-1,2-DCE (VC + cis-1,2-DCE) from wells MW-10 and MW-31 where statistically significant increases were confirmed in the quarterly analysis. Results from nearby monitoring wells MW-25, MW-32, and MW-33 were also included in the analysis. Although not specified in the CAP, results from well MW-30 were also considered due to the well's close proximity to MW-31. MW-30 is screened in the perched zone of the aquifer and is considered hydraulically isolated from the A- and B-zones of the aquifer. These comparisons were used to evaluate whether the observed VC trends are attributable to the Settlement Area, reflect natural attenuation of cis-1,2-DCE to VC, or are related to other contributing influences, such as off-site sources (e.g., former Glitsa Property).

Although standard guidance does not specifically recommend a combined VC + cis-1,2-DCE concentration metric, the natural attenuation of chlorinated ethenes is well-recognized to occur through depletion of both parent and degradation compounds (e.g., EPA 1998; ITRC 1999; Ecology 2014). Accordingly, this assessment incorporates the combined concentration of VC and cis-1,2-DCE as a practical metric for evaluating relative chlorinated-ethene mass trends and attenuation performance in groundwater wells at the Settlement Area. For evaluation of the combined concentrations of VC and cis-1,2-DCE, the results were converted to molar equivalency.

Tetrachloroethylene (PCE) and trichloroethylene (TCE) were not included in the CAP analyte list and were not evaluated as part of this assessment. The RI/FS documented that TCE was likely present historically at the landfill but was not detected at the landfill at the time of the RI/FS, with only sporadic low-level detections below CULs observed in select upgradient and off-site monitoring wells (Floyd | Snider 2016). Under reducing conditions typical of landfill environments, PCE and TCE are parent compounds that occur earlier in the reductive dechlorination sequence and biodegrade to cis-1,2-DCE and VC. Consistent with the CAP framework and the available site history, this assessment focuses on VC and cis-1,2-DCE.

3.1.1 Trend Analysis

Statistical evaluations of trends in VC, cis-1,2-DCE, and the combined molar equivalency in data through 4Q25 were conducted using ProUCL v5.2 (EPA 2015), following methods described in EPA’s *Unified Guidance for Statistical Analysis of Groundwater Monitoring Data* (EPA 2009). The Mann-Kendall test was applied at the 95% confidence level for each analyte (VC, cis-1,2-DCE, and VC + cis-1,2-DCE). Trends that did not meet the 95% confidence level were not considered in this evaluation; therefore, all trends discussed in this report should be considered statistically significant. Sen’s slope and percent change per year (Helsel et al. 2020; Sen 1968) were calculated for combined VC + cis-1,2-DCE to quantify the magnitude and direction of long-term concentration change. The analysis focused on trigger wells and supporting wells specified in the CAP, organized by aquifer zone as follows:

- **B-zone:** MW-10
- **A-zone:** MW-25, MW-31, MW-32, MW-33
- **Perched/Silt Overbank Deposit:** MW-30

Trend plots of VC, cis-1,2-DCE, and VC + cis-1,2-DCE generated using ProUCL are provided in Appendix C.

3.2 Results

The results of the Mann-Kendall and related statistical analyses are summarized in Table 1. The trend analyses include quarterly groundwater monitoring data collected from the second quarter of 2020 to the fourth quarter of 2025.

Table 1. Summary of Mann-Kendall and Sen’s Slope Results

Well	Aquifer	VC result(s) above CUL in 2025	Cis-1,2-DCE result(s) above CUL in 2025	4Q25 VC trend	4Q25 cis-1,2-DCE trend	4Q25 VC + cis-1,2-DCE meq/L trend	4Q25 VC + cis-1,2-DCE Percent Change per Year (%)	4Q25 VC + cis-1,2-DCE Sen's Slope (mol/L per year)
MW-10	B	2Q	--	increasing	decreasing	decreasing	-8.69	-9.60E-10
MW-31	A	1Q-4Q	--	increasing	increasing	increasing	17.55	1.90E-09
MW-25	A	1Q,3Q,4Q	--	decreasing	increasing	--	--	--
MW-32	A*	1Q†	--	--	decreasing	decreasing	-9.42	-1.07E-09
MW-33	A*	--	--	increasing	non-detect	increasing	7.10	2.30E-10
MW-30	perched	3Q	--	--	--	--	--	--

* = MW-32 and MW-33 are screened beneath refuse.

† = The 1Q25 VC result for well MW-32 was slightly below the CUL; however, the duplicate sample collected at MW-32 was above the CUL.

-- = No results detected above CULs or no statistically significant trend.

VC = Vinyl chloride

DCE = dichloroethene

3.2.1 Trend Trigger Wells

- **MW-10 (B-zone):** VC exhibits an increasing trend; however, concentrations have declined from the peak measured during 2Q25, which was the only CUL exceedance observed at this well in 2025. Cis-1,2-DCE exhibits a decreasing trend from 2020 to the present. When VC and cis-1,2-DCE are evaluated together, the combined molar concentration shows an overall decreasing trend.
- **MW-31 (A-zone):** VC exhibits an increasing trend, with concentrations consistently above the CUL. Cis-1,2-DCE also exhibits an increasing trend. When VC and cis-1,2-DCE are evaluated together, the combined concentration also shows an overall increasing trend.

3.2.2 Supporting Wells

- **MW-25 (A-zone):** VC exhibits a decreasing trend, while cis-1,2-DCE exhibits an increasing trend. When evaluated together, combined VC + cis-1,2-DCE concentrations show no trend, indicating relatively stable combined concentrations at this location.
- **MW-32 (A-zone beneath refuse):** VC shows no trend, while cis-1,2-DCE exhibits a decreasing trend. When evaluated together, combined VC + cis-1,2-DCE concentrations also show an overall decreasing trend.
- **MW-33 (A-zone beneath refuse):** VC exhibits an increasing trend, while cis-1,2-DCE was not detected during the monitoring period. When evaluated together, combined concentrations show an increasing trend; however, VC concentrations remained below the CUL throughout the monitoring period and cis-1,2-DCE was not detected at this location.
- **MW-30 (Perched zone):** No trends were identified and the data were relatively stable.

3.3 Summary

MW-10 and MW-31 met Condition 2 (trend trigger) criteria during one or more quarters of 2025. MW-10, the only B-zone well included in this assessment, exhibits an increasing trend in VC concurrent with decreasing trends in cis-1,2-DCE and the combined molar concentration of VC and cis-1,2-DCE. These results indicate that contamination at MW-10 is relatively stable to decreasing and is discussed further in Section 4.1. In contrast, MW-31, which is not designated as a CPOC well, exhibits increasing trends in VC, cis-1,2-DCE, and the combined molar concentration of VC and cis-1,2-DCE.

The remaining wells (MW-25, MW-32, MW-33, and MW-30) were evaluated to assess whether the VC trends observed at MW-31 could be attributable to the Settlement Area. Among these wells, only MW-33 exhibits an increasing trend in VC; however, VC concentrations at MW-33 remain below the CUL, and cis-1,2-DCE has not been detected at that location. Well MW-25 exhibits an increasing trend in cis-1,2-DCE and a decreasing trend in VC; however, when evaluated together, the combined molar concentration of VC and cis-1,2-DCE shows no overall trend, indicating relatively stable combined concentrations at this location. Results from these wells do not indicate new or changing groundwater conditions attributable to the Settlement Area. These data also provide context for evaluating whether the trends observed at MW-31 are associated with conditions at the Settlement Area, as discussed in Section 4.2.

4. Comparison to CAP Response Requirements

4.1 MW-10 (Aquifer Zone B)

VC concentrations at MW-10 exceeded the CUL during 2Q25 and exhibit an increasing trend over the monitoring period; however, concentrations have declined from the 2Q25 peak. Cis-1,2-DCE exhibits a decreasing trend over the same period, and when evaluated together, the combined molar concentration of VC and cis-1,2-DCE shows an overall decrease. Taken together, these results indicate that groundwater conditions at MW-10 are undergoing natural attenuation, consistent with reductive dechlorination processes in which cis-1,2-DCE is biodegraded to VC, resulting in a minor increase in VC concurrent with an overall reduction in total chlorinated-ethene mass.

To fulfill the CAP requirements for evaluation of a Condition 2 (trend trigger), the following responses address the questions specified for this well:

- a. **Cause of the trigger event (source):** The observed VC increase is interpreted as resulting from in-situ biodegradation of cis-1,2-DCE into VC within the B-zone of the aquifer by reductive dechlorination, rather than from new mass input originating from the Settlement Area.
- b. **Transient or new condition:** The trend is interpreted to represent a transient condition within an ongoing attenuation process, rather than a new or expanding groundwater impact.
- c. **Most likely source:** Available data indicate that VC at MW-10 is derived from natural degradation of cis-1,2-DCE already present in groundwater associated with the Settlement Area, and not from a new source.
- d. **Focused exposure assessment:** VC concentrations are currently below the CUL, and no exposure pathway exists for groundwater in this aquifer; therefore, no exposure threat to human health or the environment is indicated.
- e. **What actions are appropriate at this time:** Continued monitoring to confirm that it is a transitory effect.

These findings indicate that the conditions associated with the trend trigger at MW-10 reflect ongoing attenuation processes within the B-zone of the aquifer and do not represent a new release or substantive change in groundwater quality.

4.2 MW-31 (Aquifer Zone A)

VC, cis-1,2-DCE, and the combined molar concentration of VC and cis-1,2-DCE at MW-31 exhibit increasing trends. To evaluate whether these increases could be attributable to the Settlement Area, this assessment considered monitoring data from adjacent A-zone wells MW-25, MW-32, MW-33, as well as MW-30, which is screened in the perched aquifer. Among these wells, MW-25, MW-32, and MW-30 exhibit stable or decreasing trends in VC and combined VC + cis-1,2-DCE concentrations. MW-33 exhibits an increasing trend in VC; however, cis-1,2-DCE has not been detected at this location, and VC concentrations remain below the CUL.

Groundwater fate and transport modeling completed as part of the RI/FS evaluated whether concentrations observed at MW-31 could result from sources within the Settlement Area. BIOSCREEN-AT simulations, which used MW-25, MW-32, and MW-33 as potential upgradient sources, predicted steady-state VC concentrations at MW-31 of 0.25 µg/L or less, which is below the CUL of 0.29 µg/L. In contrast, the highest measured VC concentration at MW-31 in 2025 (0.987 µg/L) is substantially higher than those modeled values.

These results indicate that groundwater conditions at MW-31 differ from those observed in nearby Settlement-Area monitoring wells, and that modeled concentrations from Settlement-Area sources do not account for the VC concentrations measured at this location.

5. Conclusions and Recommended Actions

5.1 Conclusions

This assessment was completed in accordance with the South Park Landfill CAP (Ecology 2023) to evaluate VC contingency trigger conditions identified during the 2025 monitoring year. Condition 2 (trend trigger) events were identified for wells MW-10 and MW-31, and no Condition 1 (concentration trigger) events were identified during 2025. Based on the statistical analyses and supporting evaluation, both wells exhibit increasing trends in VC; however, the data indicates that the underlying causes and implications differ between the two locations. Results from MW-10 are consistent with ongoing natural attenuation processes within the B-zone aquifer. In contrast, increasing VC concentrations at MW-31 reflect influences that are not attributable to the Settlement Area.

5.2 Recommendations

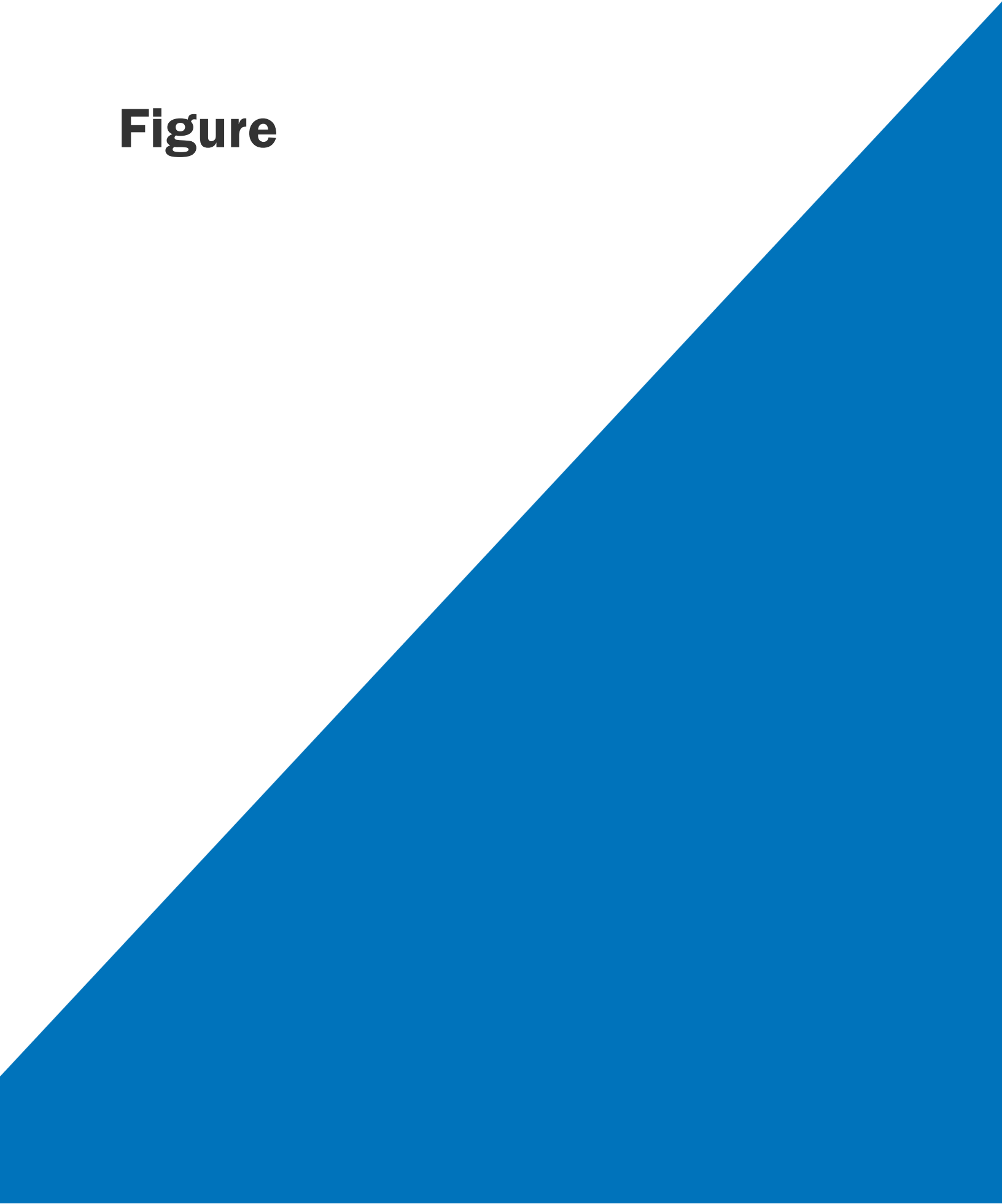
- **Trigger evaluation framework:** Continue to identify VC contingency trigger conditions on a quarterly basis in accordance with the CAP. Identified trigger conditions will be documented and evaluated through a comprehensive annual trigger assessment that summarizes quarterly trigger occurrences and associated evaluations for inclusion in the annual groundwater monitoring report.
- **New trigger conditions:** If a new VC trigger condition is identified at a CPOC monitoring well other than MW-10, a written evaluation will be completed in accordance with the CAP requirements and timelines to assess the cause, significance, and potential implications of the trigger.
- **MW-10:** Continue conducting groundwater monitoring at MW-10 in accordance with the CAP. Given the evidence of natural attenuation at this location, including decreasing trends in cis-1,2-DCE and combined VC + cis-1,2-DCE concentrations, evaluate VC trend trigger occurrences at MW-10 as part of the annual comprehensive assessment, rather than through separate quarter-specific evaluations.
- **MW-31:** Discontinue evaluating MW-31 for VC trigger conditions under the CAP. Available evidence indicates that VC concentrations and trends at this location are not attributable to the Settlement Area, and that continued application of quarterly trend trigger evaluations would be expected to repeatedly identify Condition 2 triggers without providing additional insight into Settlement Area-related groundwater conditions.

Implementation of these recommendations would maintain compliance with CAP trigger identification requirements while focusing detailed evaluations on conditions that are meaningful for assessing Settlement Area-related groundwater quality.

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Figure





Source: Floyd|Snider, Aspect, Herrera. 2018. South Park Landfill, Landfill Post-Closure Operations, Maintenance, and Monitoring Plan.

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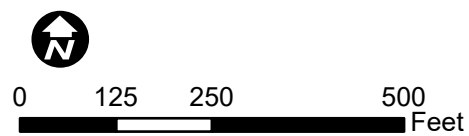
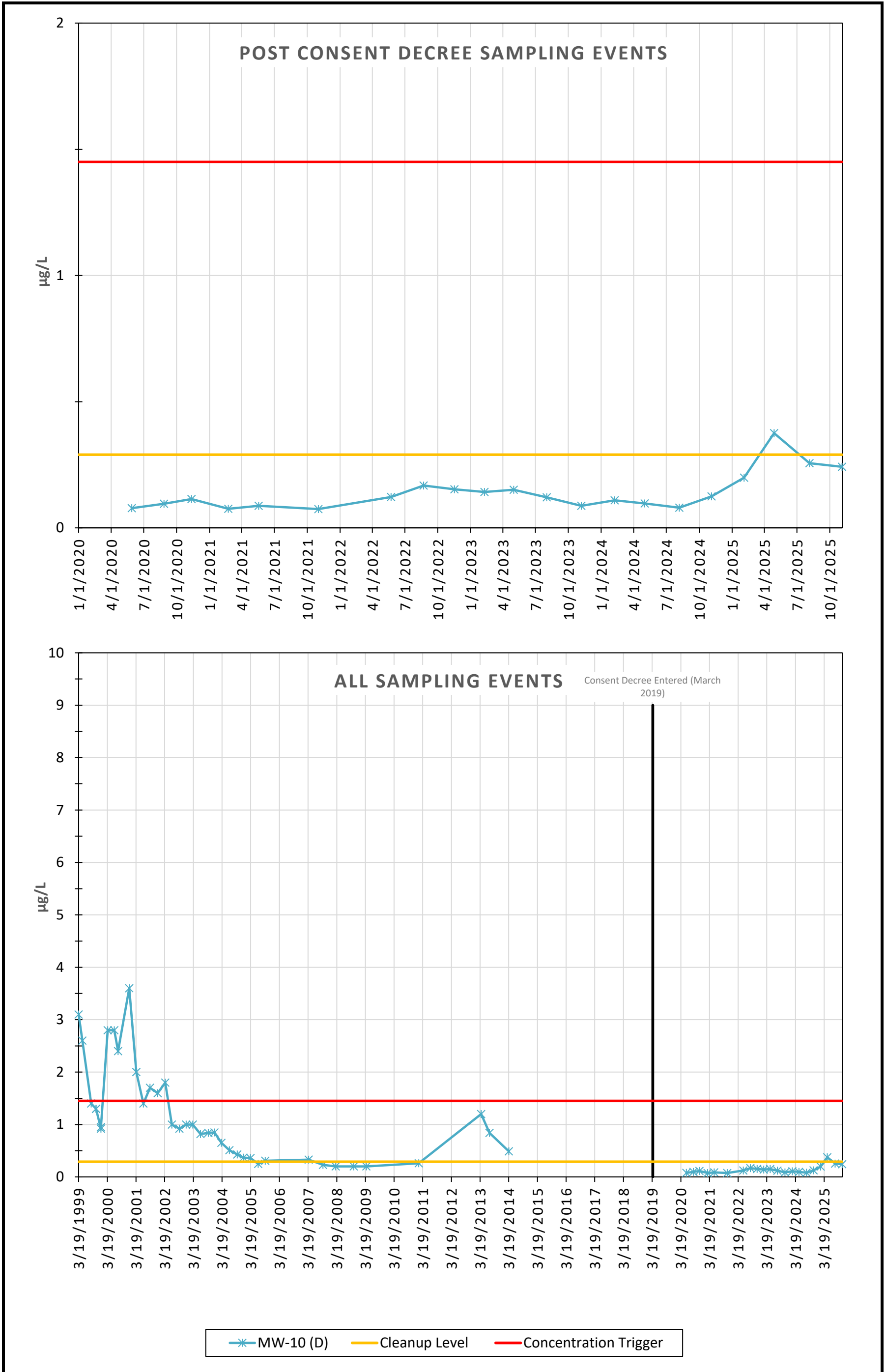


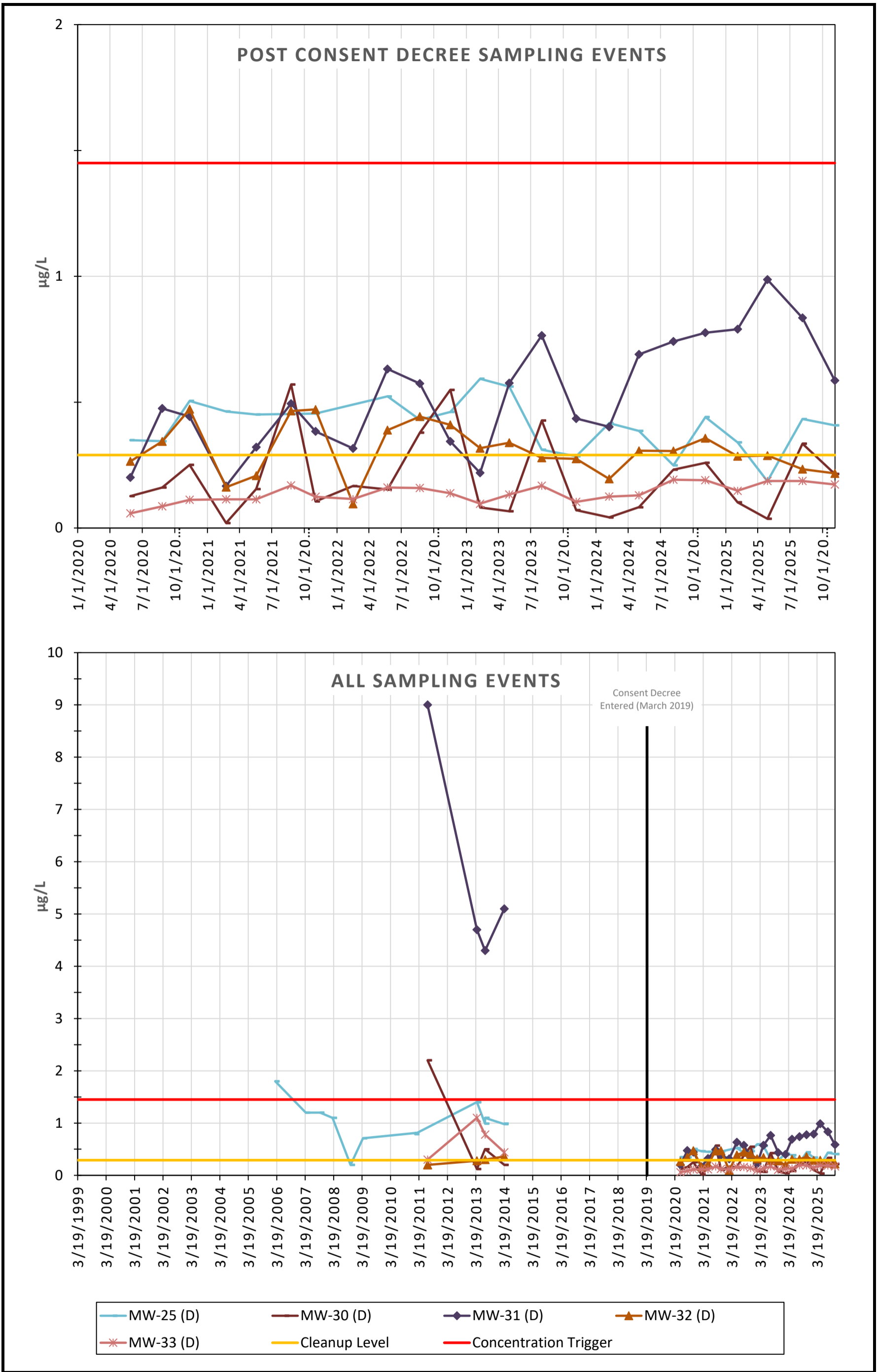
Figure 1
Groundwater Monitoring Well Network
 2025 Vinyl Chloride Trigger Assessment
 South Park Landfill

Seattle, WA

Appendix A

Historical Data Time-Series Plots





Appendix B

Quarterly Groundwater Analytical Summaries

Groundwater Quality Data Summary, First Quarter 2025, South Park Landfill

Parameter	Units	Cleanup Level	Upgradient Wells			Downgradient Wells											Trip Blanks			
			A-Zone			Perched Zone	A-Zone							B-Zone				MW-80	MW-81	
			MW-12	MW-14	MW-29	MW-30 ¹	MW-25	MW-26	MW-61 (MW-26 Dup)	MW-27	MW-31 ^{1,2}	MW-32 ³	MW-60 (MW-32 Dup)	MW-33 ³	MW-08	MW-10	MW-18 ³			MW-24
2/3/25	2/4/25	2/5/25	2/4/25	2/5/25	2/4/25	2/4/25	2/4/25	2/3/25	2/4/25	2/5/25	2/5/25	2/5/25	2/3/25	2/5/25	2/5/25	2/4/25	2/4/25	2/5/25		
Field Parameters																				
Temperature	C		10.9	13.4	10.7	11.3	12.9	12.1	--	11.3	13.5	12.8	--	13.7	11.4	13.0	12.3	11.9	--	--
Dissolved Oxygen	mg/L		0.50	0.20	0.21	1.22	0.22	0.35	--	0.29	0.24	0.25	--	0.24	0.23	0.22	0.31	0.21	--	--
Specific Conductivity	µS/cm		499	531	761	384.5	1209	212.1	--	449.1	513	870	--	1370	1265	1491	541	1044	--	--
pH	units		6.16	6.65	6.73	6.09	6.59	6.03	--	6.37	6.35	6.75	--	6.76	6.68	6.83	6.72	6.64	--	--
Redox	mv		146.1	-43.6	-75.3	54.8	-73.2	29.2	--	-62.7	-54.3	-104.7	--	-105.6	-98.5	-111.8	-64.9	-100.2	--	--
Turbidity	NTU		0.40	3.49	0.99	2.49	0.76	1.88	--	7.64	3.76	3.67	--	1.98	1.02	2.11	1.17	5.93	--	--
Metals																				
Iron, Total	mg/L	27 A-Zone	0.360 U	3.13	20.2	0.948	39.8	4.26	4.73	13.0	19.4	14.3 J	13.1	18.6	--	--	--	--	--	--
		31 B-Zone	--	--	--	--	--	--	--	--	--	--	--	--	14.4	34.4	12.9	26.6	--	--
Manganese, Total	mg/L	2.2	0.0292	0.840	0.626	0.0425	3.24	0.0605	0.0690	0.434	0.847	1.30	1.23	1.92	0.953	2.00	0.734	1.67	--	--
Volatile Organic Compounds																				
Vinyl Chloride	µg/L	0.29	0.0200 U	0.0200 U	0.0537	0.102	0.340	0.0819	0.0942	0.0827	0.790	0.285	0.305	0.148	0.0603	0.199	0.0200 U	0.0313	0.0200 U	0.0200 U
Cis-1,2-Dichloroethene	µg/L	16	0.20 U	0.20 U	0.20 U	0.24	0.20 U	0.32	0.28	0.21	0.33	0.40 J	0.43	0.20 U	0.20 U	0.58	0.20 U	0.20 U	0.20 U	0.20 U

Notes:

- ¹ MW 30 and MW-31 monitor the former Glitsa property and are not CPOC wells.
 - ² MW-31 is not a CPOC well, but is considered in vinyl chloride trigger condition 2 (the trend trigger).
 - ³ MW 18 is completed in refuse along the downgradient edge of the Landfill; MW 32 and MW 33 are completed beneath refuse along the downgradient edge.
- = Exceeds cleanup level for CPOC wells
 -- = Not analyzed
 U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.
 J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Abbreviations:

- µg/L Micrograms per liter
- mg/L Milligrams per liter
- µS/cm Microsiemens per centimeter
- NTU Nephelometric Turbidity unit
- CPOC Conditional point of compliance

Groundwater Quality Data Summary, Third Quarter 2025, South Park Landfill

Parameter	Units	Cleanup Level	Upgradient Wells			Downgradient Wells											Trip Blanks				
			A-Zone			Perched Zone	A-Zone						B-Zone				MW-80	MW-81	MW-82		
			MW-12	MW-14	MW-29	MW-30 ¹	MW-25	MW-26	MW-61 (MW-26 Dup)	MW-27	MW-31 ^{1,2}	MW-32 ³	MW-60 (MW-32 Dup)	MW-33 ³	MW-08	MW-10	MW-18 ³	MW-24	8/4/25	8/5/25	8/6/25
Field Parameters																					
Temperature	C		16.4	16.9	14.1	16.3	14.9	13.6	--	14.8	16.4	14.8	--	15.9	13.6	15.3	16.4	13.4	--	--	--
Dissolved Oxygen	mg/L		0.45	4.71	0.10	0.10	0.09	0.93	--	0.22	0.24	0.14	--	0.13	0.16	0.25	0.09	0.08	--	--	--
Specific Conductivity	µS/cm		511.0	610.0	823.0	510.0	1181.0	276.2	--	604.0	517.0	846.0	--	1309.0	1050.0	1450.0	609.0	1000.0	--	--	--
pH	units		6.32	6.78	6.84	6.41	6.66	6.23	--	6.65	6.48	6.85	--	6.85	6.79	6.82	6.85	6.69	--	--	--
Redox	mv		38.7	-37.7	-100.2	-2.3	-79.9	1.0	--	-72.2	-46.2	-109.0	--	-127.5	-97.1	-59.6	-73.4	-75.9	--	--	--
Turbidity	NTU		1.47	1.97	1.67	1.37	4.87	4.55	--	11.40	19.40	4.67	--	2.23	3.83	2.85	4.33	3.98	--	--	--
Metals																					
Iron, Total	mg/L	27 A-Zone 31 B-Zone	2.93	4.67	21.1	3.97	33.5	7.35	7.34	19.6	19.6	13.1	12.8	16.5	--	--	--	--	--	--	--
Manganese, Total	mg/L	2.2	0.190	1.03	0.634	0.121	2.81	0.0895	0.0916	0.528	0.831	1.19	1.16	1.66	0.836	2.17	0.714	1.44	--	--	--
Volatile Organic Compounds																					
Vinyl Chloride	µg/L	0.29	0.0200 U	0.0200 U	0.109	0.335	0.433	0.0200 U	0.0204	0.0808	0.835	0.234	0.234	0.187	0.0592	0.256	0.0406	0.0524	0.0200 U	0.0200 U	0.0200 U
Cis-1,2-Dichloroethene	µg/L	16	0.20 U	0.20 U	0.20 U	0.64	0.22	0.25	0.26	0.20 U	0.30	0.32	0.33	0.20 U	0.20 U	0.61	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U

Notes:

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- ² MW-31 is not a CPOC well, but is considered in vinyl chloride trigger condition 2 (the trend trigger).
- ³ MW 18 is completed in refuse along the downgradient edge of the Landfill; MW 32 and MW 33 are completed beneath refuse along the downgradient edge.
- █** = Exceeds cleanup level for CPOC wells
- = Not analyzed
- U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.

Abbreviations:

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- mg/L Milligrams per liter
- µS/cm Microsiemens per centimeter
- NTU Nephelometric Turbidity unit
- CPOC Conditional point of compliance

Groundwater Quality Data Summary, Fourth Quarter 2025, South Park Landfill

Parameter	Units	Cleanup Level	Upgradient Wells			Perched Zone	Downgradient Wells										Trip Blanks				
			A-Zone				A-Zone										B-Zone				
			MW-12	MW-14	MW-29	MW-30 ¹	MW-25	MW-26	MW-27	MW-31 ^{1,2}	MW-32 ³	MW-33 ³	MW-60 (MW-33 Dup)	MW-08	MW-61 (MW-08 Dup)	MW-10	MW-18 ³	MW-24	MW-80	MW-81	MW-82
11/4/25	11/4/25	11/5/25	11/4/25	11/5/25	11/5/25	11/4/25	11/4/25	11/3/25	11/3/25	11/3/25	11/4/25	11/5/25	11/3/25	11/5/25	11/3/25	11/3/25	11/4/25	11/5/25			
Field Parameters																					
Temperature	C		15.4	15.8	12.8	15.2	14.2	13.3	13.5	14.4	13.8	15.0	--	13.1	--	14.2	14.2	13.2	--	--	--
Dissolved Oxygen	mg/L		1.04	0.18	0.11	0.19	0.14	0.18	0.17	0.13	0.11	0.19	--	0.17	--	0.10	0.23	0.10	--	--	--
Specific Conductivity	µS/cm		441.3	599.0	699.0	482.7	1154.0	329.7	589.0	511.0	827.0	122.5	--	883.0	--	1513.0	583.0	1011.0	--	--	--
pH	units		6.19	6.76	6.73	6.40	6.67	6.11	6.44	6.43	6.67	6.69	--	6.71	--	6.85	6.63	6.55	--	--	--
Redox	mv		119.8	-48.8	-79.9	-26.4	-86.9	39.1	-44.7	-64.3	-93.1	-110.1	--	-72.9	--	-113.7	-74.9	-52.3	--	--	--
Turbidity	NTU		1.89	9.73	1.39	2.46	1.28	3.30	3.04	6.58	8.56	4.00	--	1.35	--	0.68	1.62	0.26	--	--	--
Metals																					
Iron, Total	mg/L	27 A-Zone	0.372	3.39	16.6	6.72	27.3	8.35	19.5	17.8	12.3	14.1	13.5	--	--	--	--	--	--	--	--
		31 B-Zone	--	--	--	--	--	--	--	--	--	--	--	--	13.0	12.7	28.9	13.5	21.8	--	--
Manganese, Total	mg/L	2.2	0.0305	0.873	0.509	0.135	2.56	0.120	0.543	0.757	1.09	1.50	1.45	0.711	0.699	2.03	0.657	1.32	--	--	--
Volatile Organic Compounds																					
Vinyl Chloride	µg/L	0.29	0.0200 U	0.0200 U	0.0382	0.215	0.408	0.0263	0.0473	0.586	0.217	0.173	0.180	0.0425	0.0394	0.242	0.0430	0.0402	0.0200 U	0.0200 U	0.0200 U
Cis-1,2-Dichloroethene	µg/L	16	0.20 U	0.20 U	0.20 U	0.27	0.38	0.20 U	0.20 U	0.26	0.42	0.20 U	0.20 U	0.20 U	0.20 U	0.88	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U

Notes:

- ¹ MW 30 and MW-31 monitor the former Glitsa property and are not CPOC wells.
- ² MW-31 is not a CPOC well, but is considered in vinyl chloride trigger condition 2 (the trend trigger).
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- CPOC Conditional point of compliance

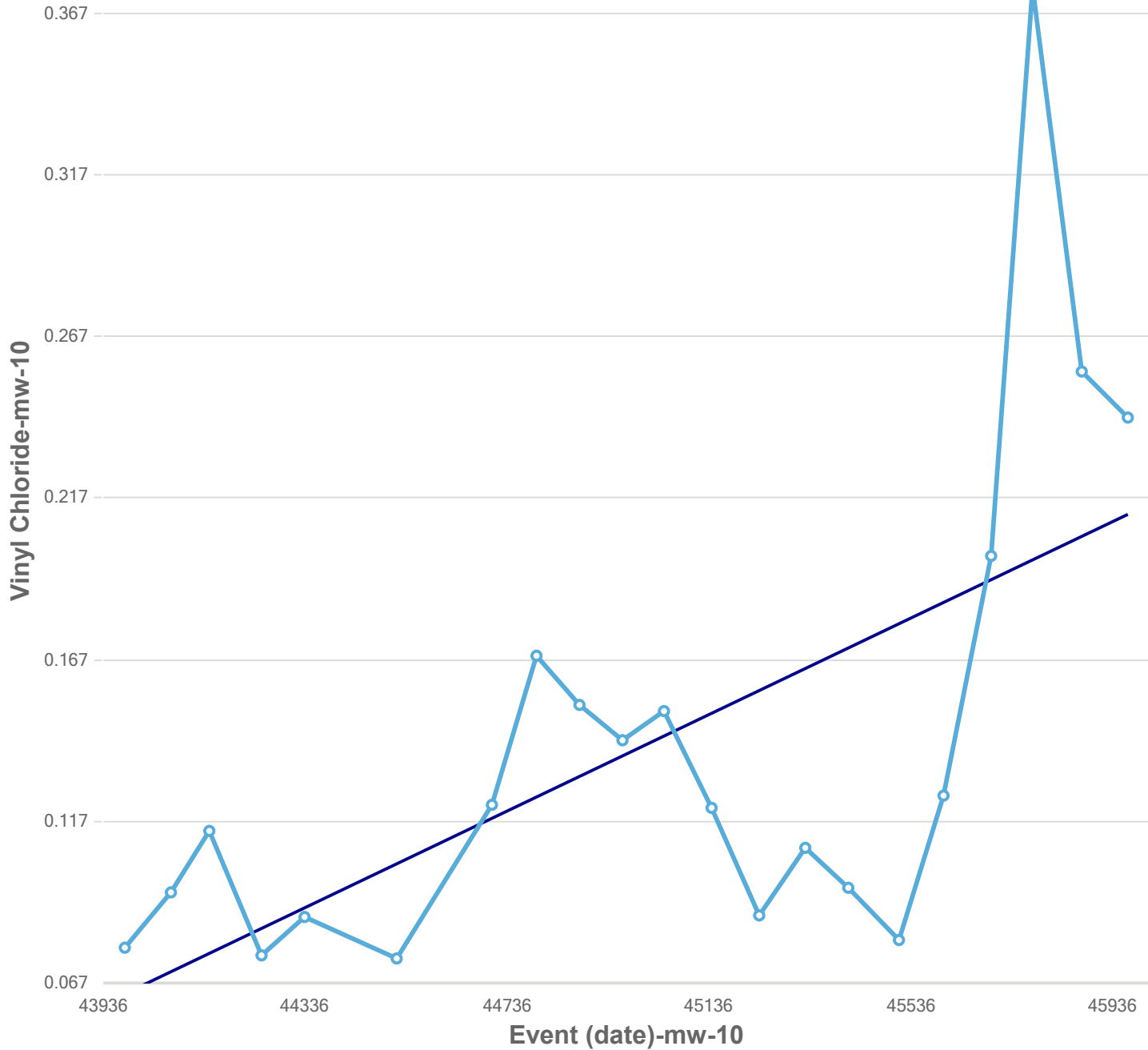
Appendix C

ProUCL Mann–Kendall Trend
Time-Series Plots

Vinyl Chloride



Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

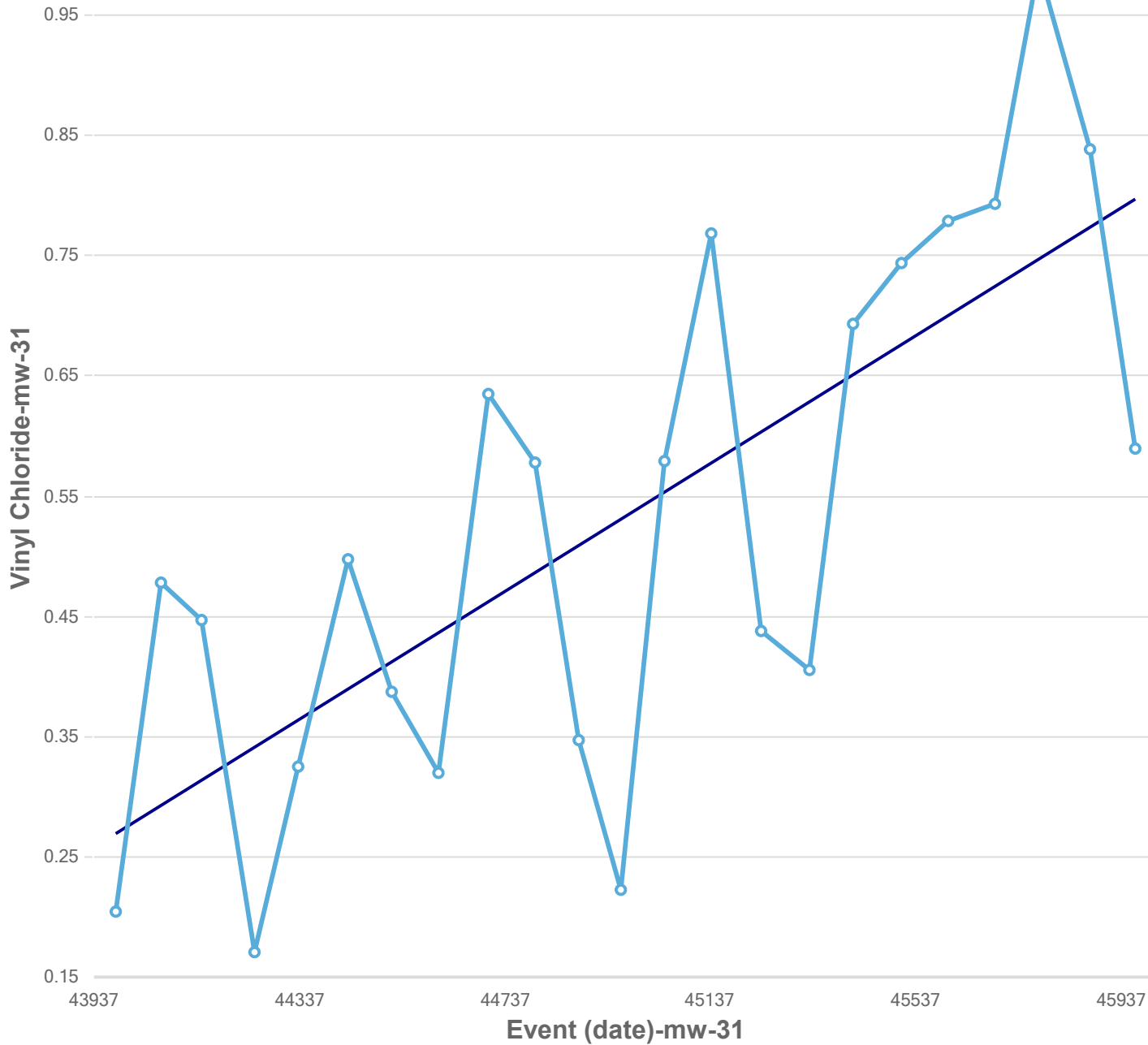
n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.1160
Standardized Value of S	2.5667
M-K Test Value (S)	86
Tabulated p-value	0.0050
Approximate p-value	0.0051

OLS Regression Line (Blue)

OLS Regression Slope	0.0001
OLS Regression Intercept	-3.2234

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

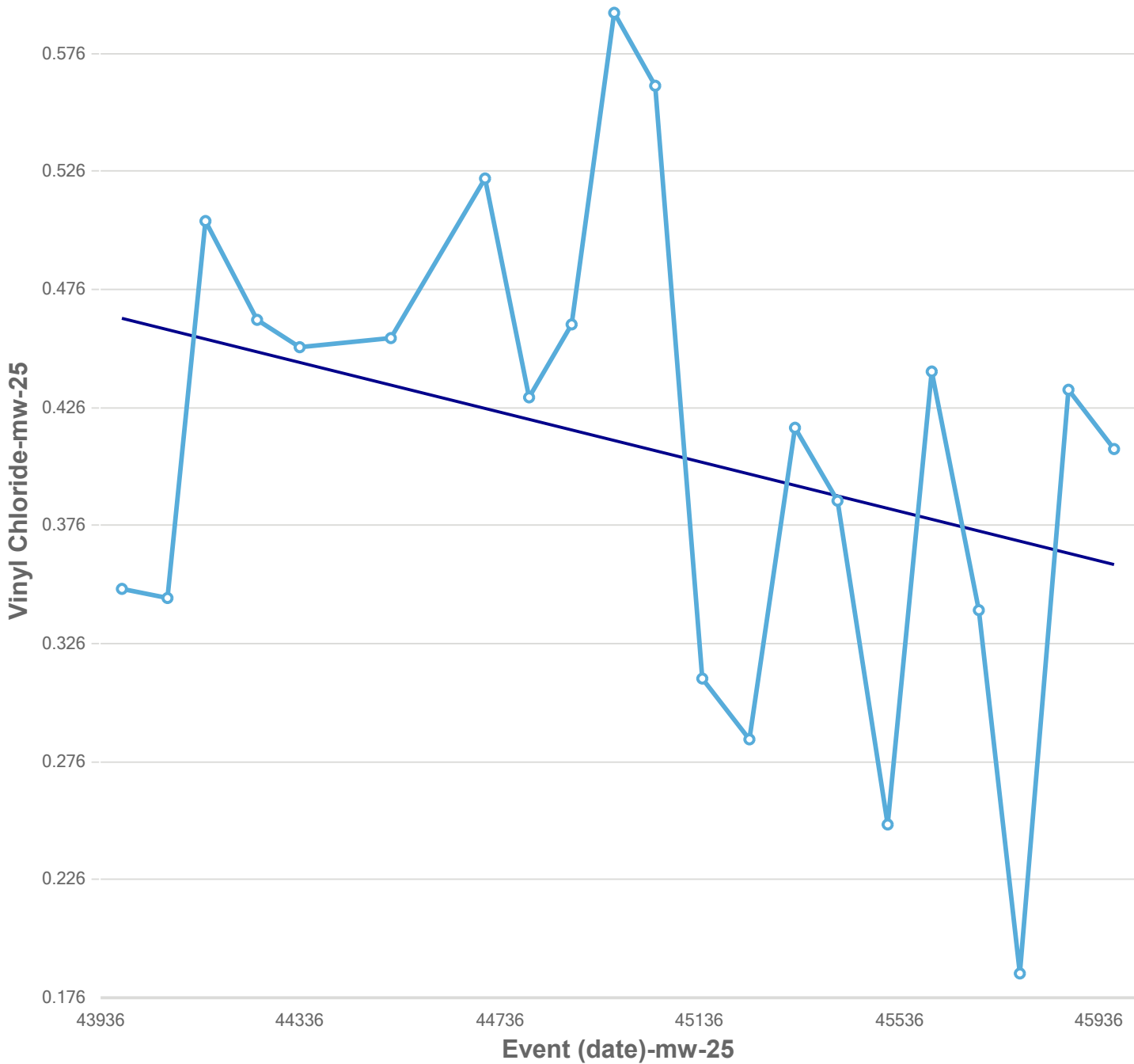
n	23
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	37.8638
Standardized Value of S	3.6446
M-K Test Value (S)	139
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0001

OLS Regression Line (Blue)

OLS Regression Slope	0.0003
OLS Regression Intercept	-11.4293

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

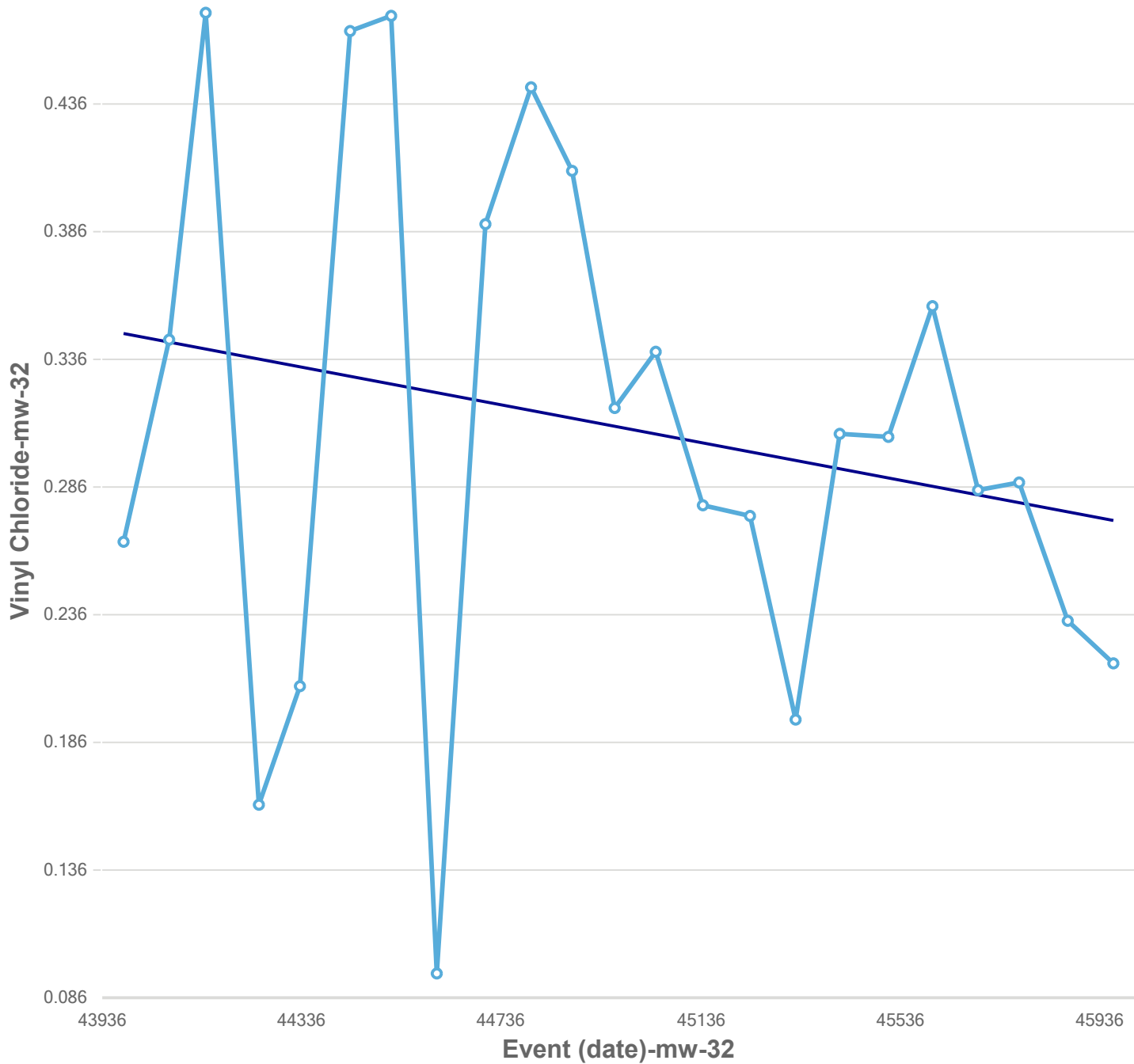
n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.1160
Standardized Value of S	-1.6608
M-K Test Value (S)	-56
Tabulated p-value	0.0490
Approximate p-value	0.0484

OLS Regression Line (Blue)

OLS Regression Slope	-0.0001
OLS Regression Intercept	2.7769

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test

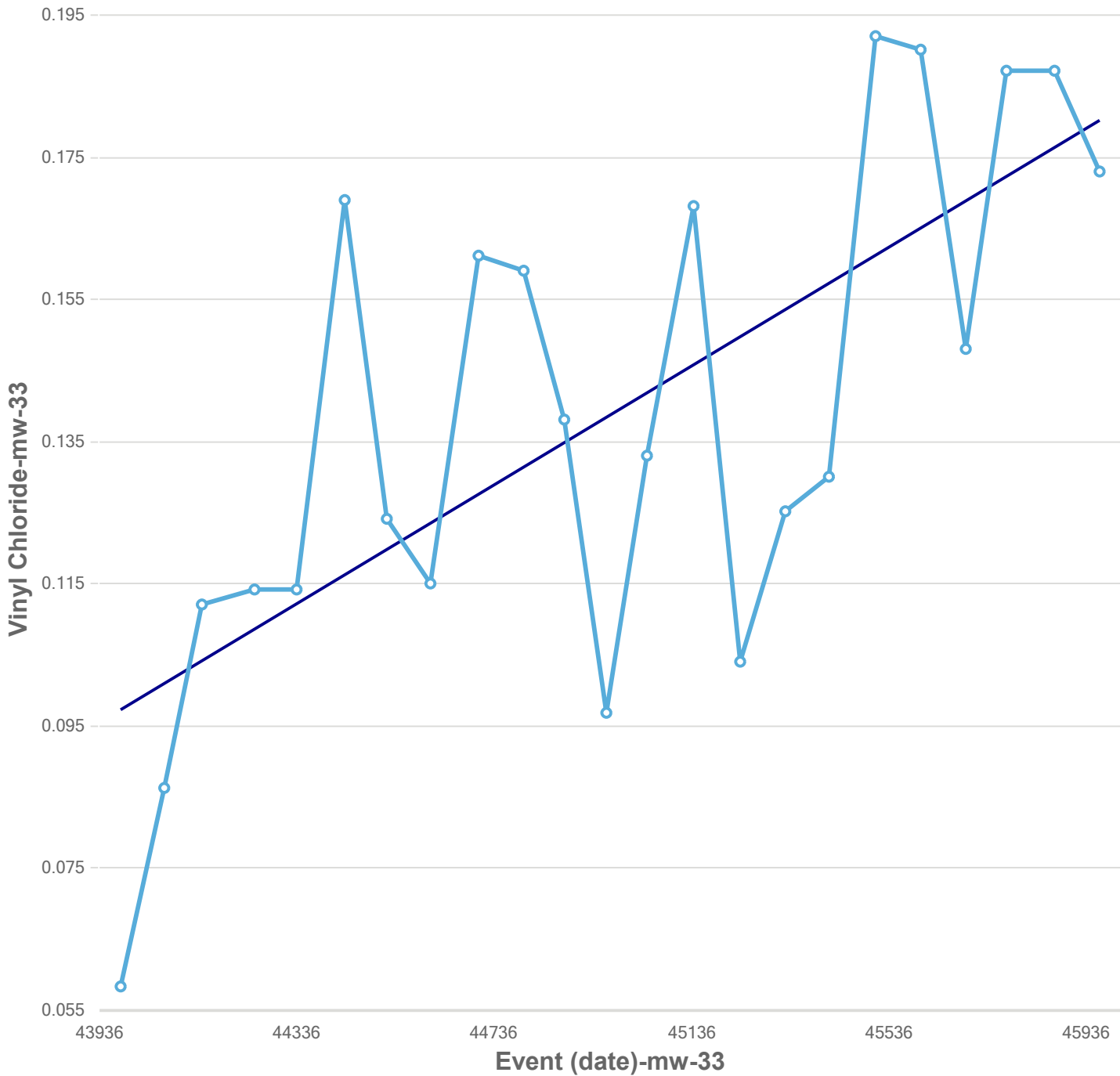


Mann-Kendall Trend Analysis	
n	23
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	37.8638
Standardized Value of S	-1.4790
M-K Test Value (S)	-57
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0696

OLS Regression Line (Blue)	
OLS Regression Slope	0.0000
OLS Regression Intercept	1.9725

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test

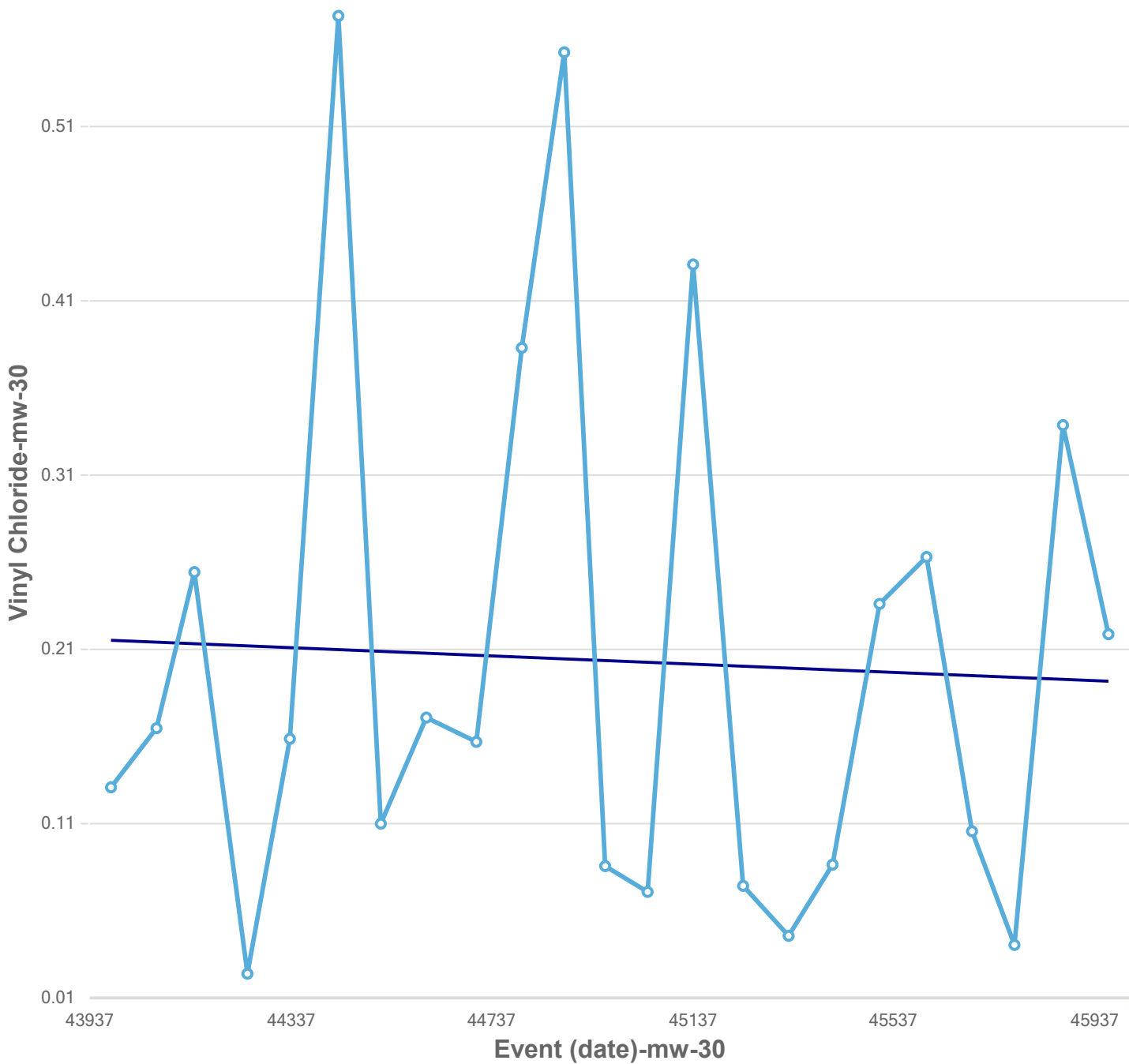


Mann-Kendall Trend Analysis	
n	23
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	37.8374
Standardized Value of S	3.3829
M-K Test Value (S)	129
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0004

OLS Regression Line (Blue)	
OLS Regression Slope	0.0000
OLS Regression Intercept	-1.7392

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test



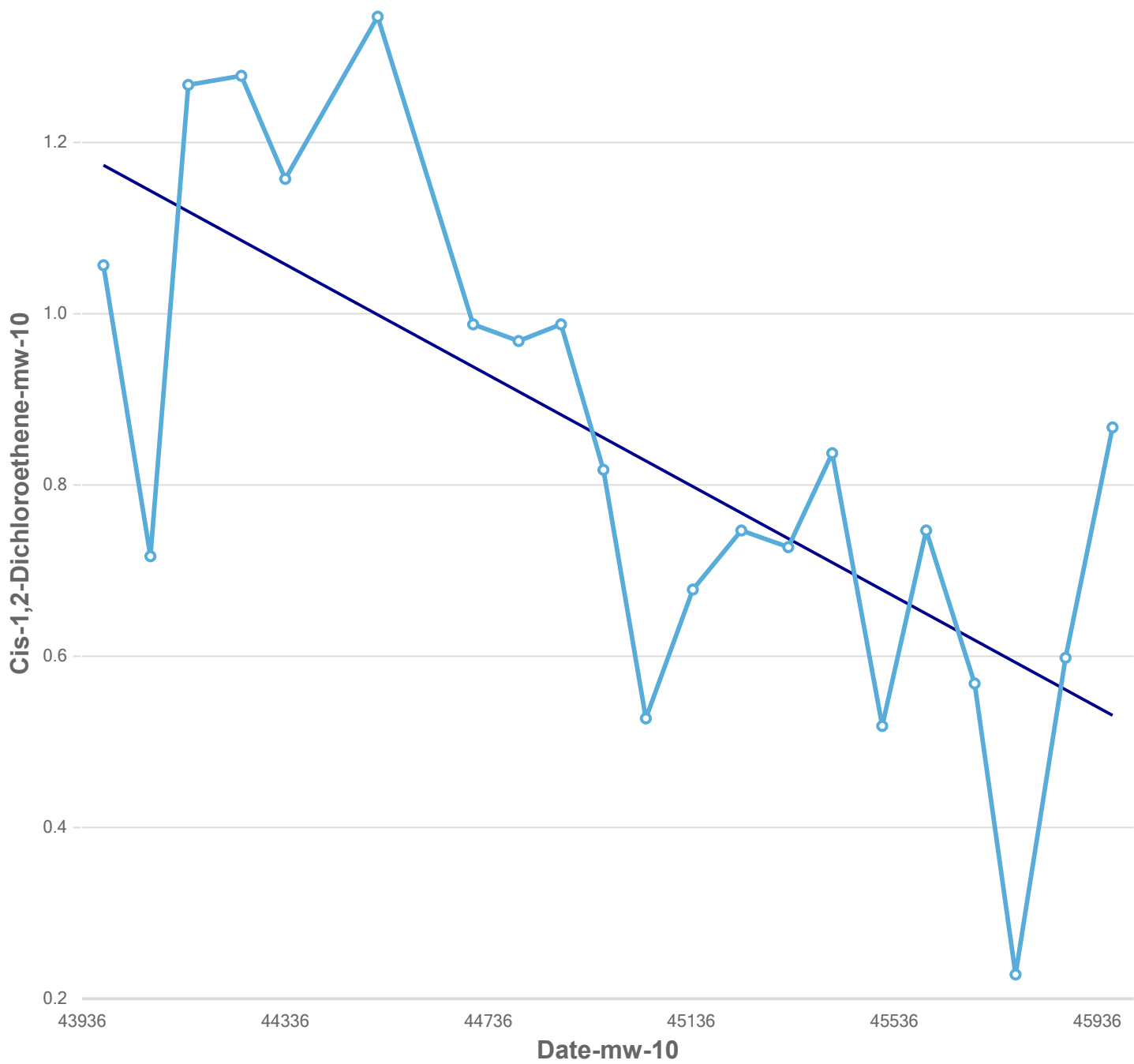
Mann-Kendall Trend Analysis	
n	23
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	37.8638
Standardized Value of S	-0.2641
M-K Test Value (S)	-11
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.3958

OLS Regression Line (Blue)	
OLS Regression Slope	0.0000
OLS Regression Intercept	0.7247

Insufficient statistical evidence of a significant trend at the specified level of significance.

Cis-1,2-Dichloroethene

Mann-Kendall Trend Test

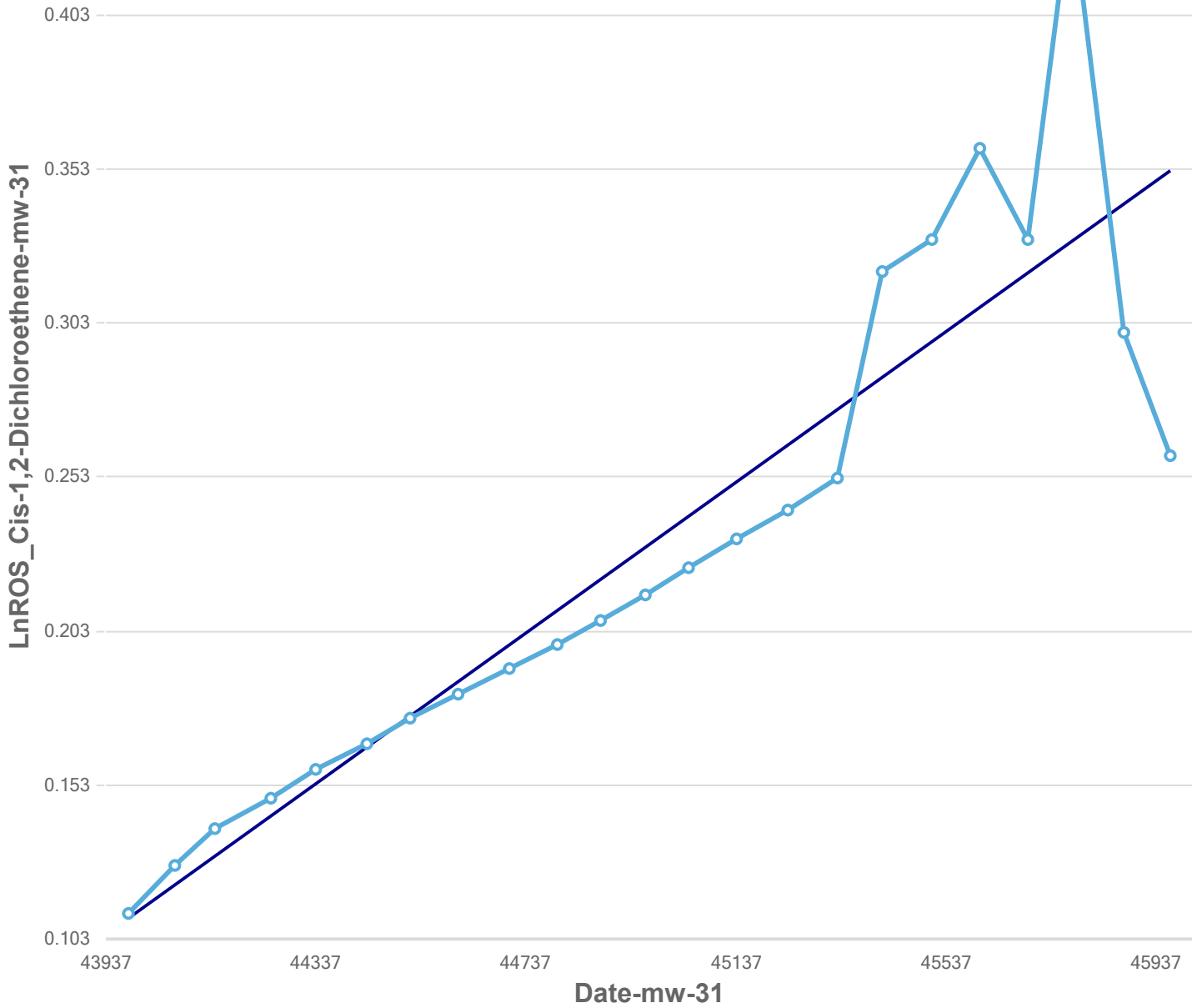


Mann-Kendall Trend Analysis	
n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.0857
Standardized Value of S	-3.0527
M-K Test Value (S)	-102
Tabulated p-value	0.0010
Approximate p-value	0.0011

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0003
OLS Regression Intercept	15.3899

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test

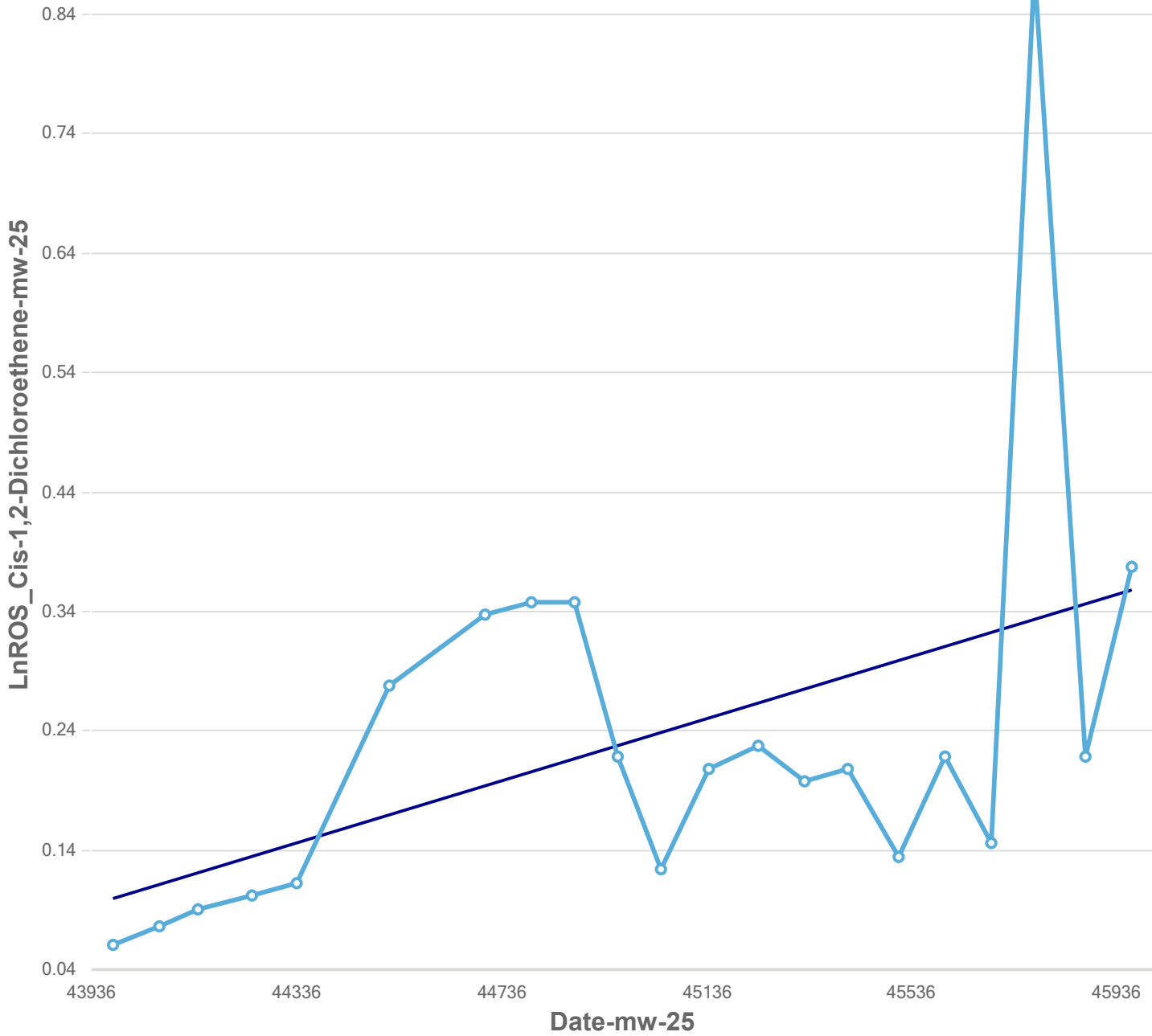


Mann-Kendall Trend Analysis	
n	23
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	37.8506
Standardized Value of S	5.9973
M-K Test Value (S)	228
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)	
OLS Regression Slope	0.0001
OLS Regression Intercept	-5.2643

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test

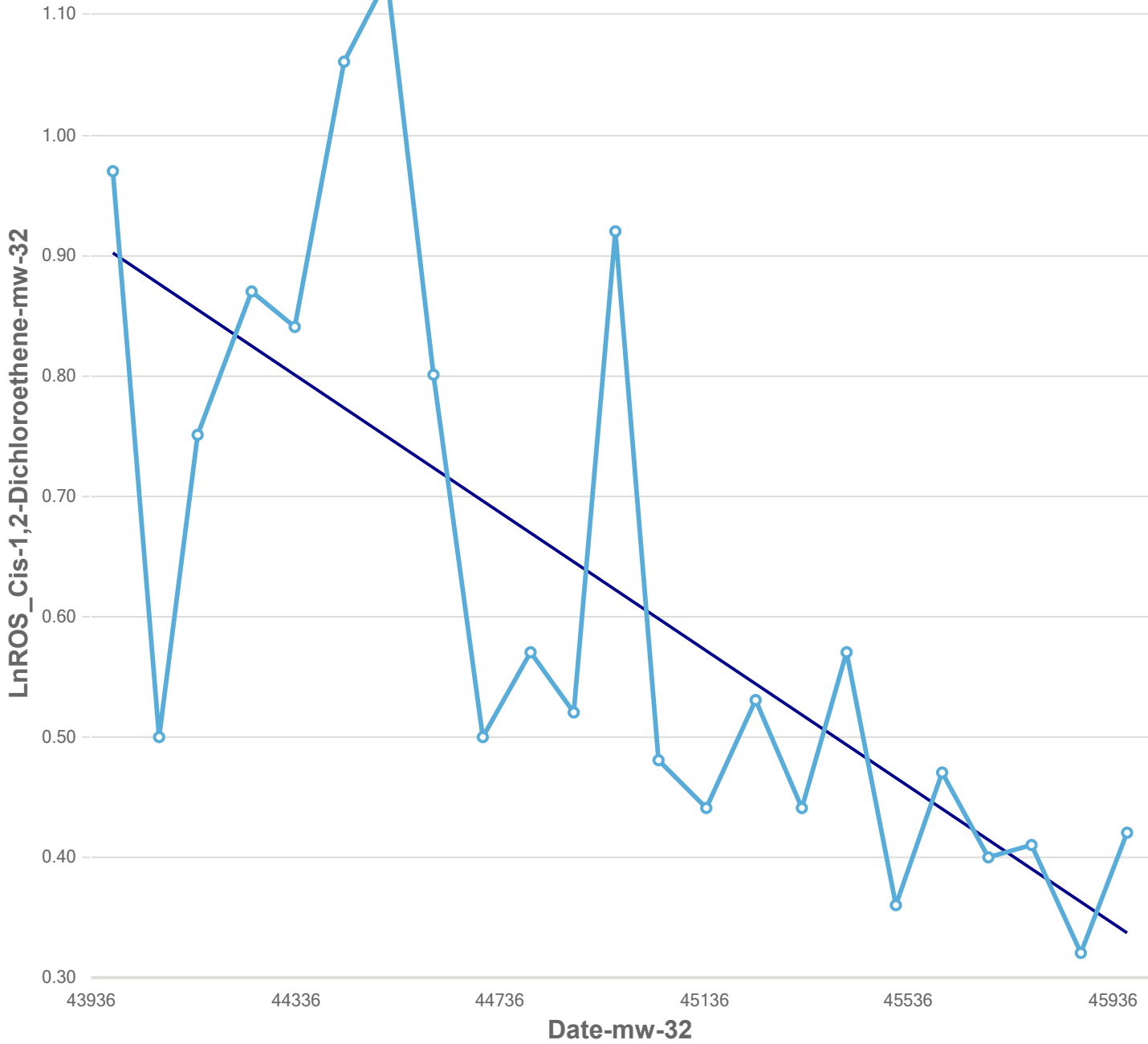


Mann-Kendall Trend Analysis	
n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.0303
Standardized Value of S	2.4220
M-K Test Value (S)	81
Tabulated p-value	0.0080
Approximate p-value	0.0077

OLS Regression Line (Blue)	
OLS Regression Slope	0.0001
OLS Regression Intercept	-5.6020

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test

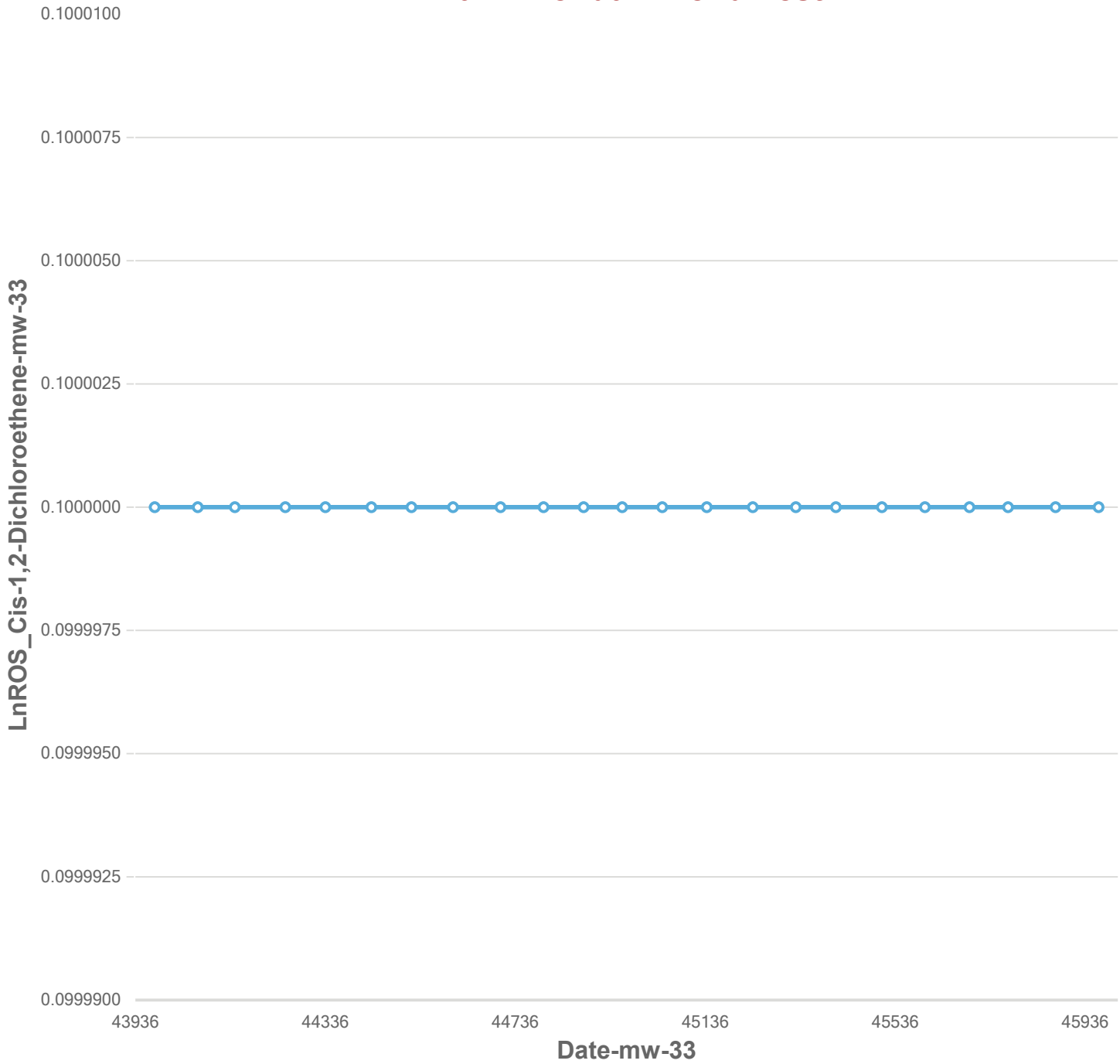


Mann-Kendall Trend Analysis	
n	23
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	37.8242
Standardized Value of S	-3.8335
M-K Test Value (S)	-146
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0001

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0003
OLS Regression Intercept	13.3930

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

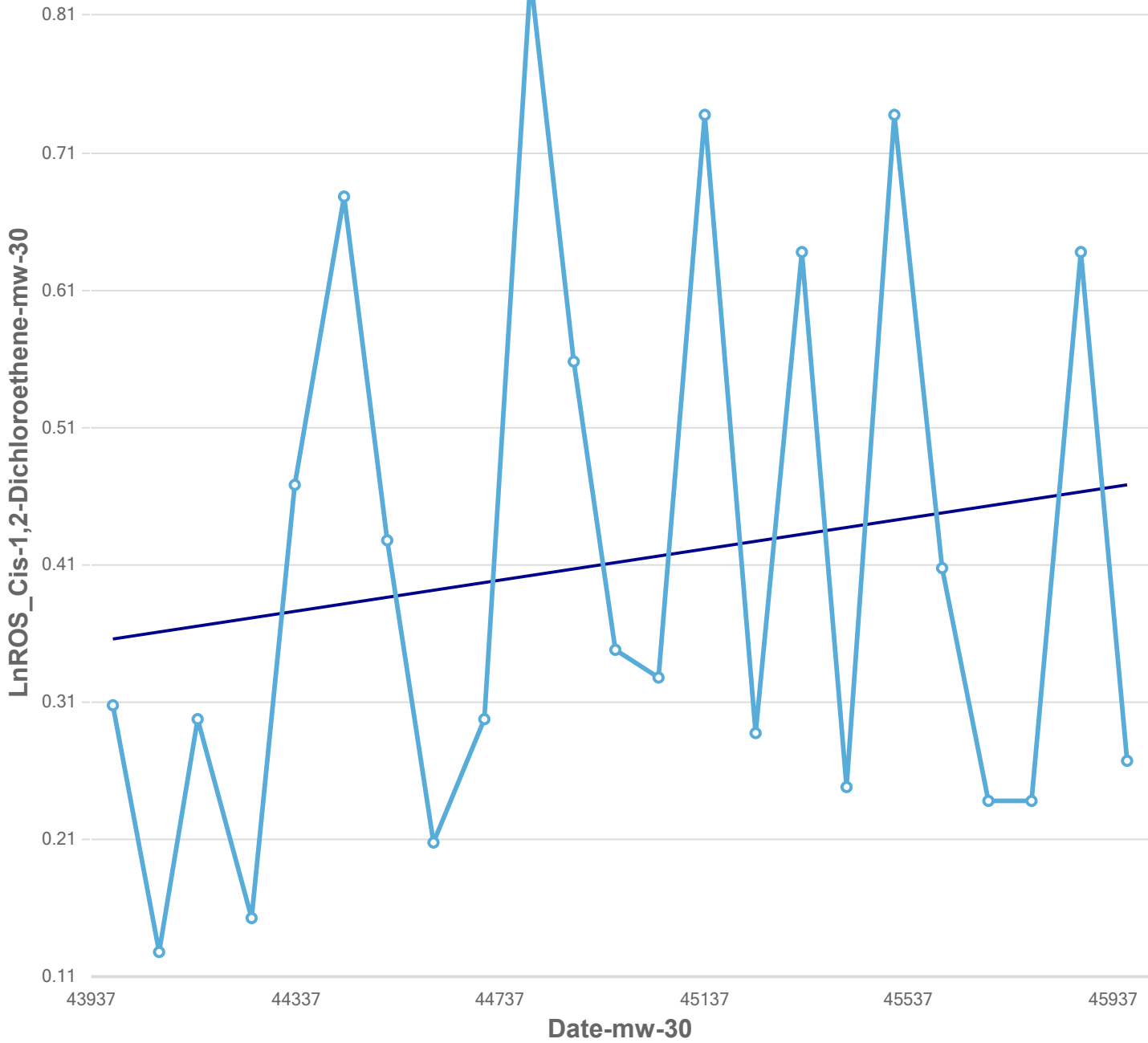
n	23
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	0.0000
Standardized Value of S	
M-K Test Value (S)	0
Appx. Critical Value (0.05)	
Approximate p-value	

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	0.1000

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

n	23
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	37.8109
Standardized Value of S	0.3703
M-K Test Value (S)	15
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.3556

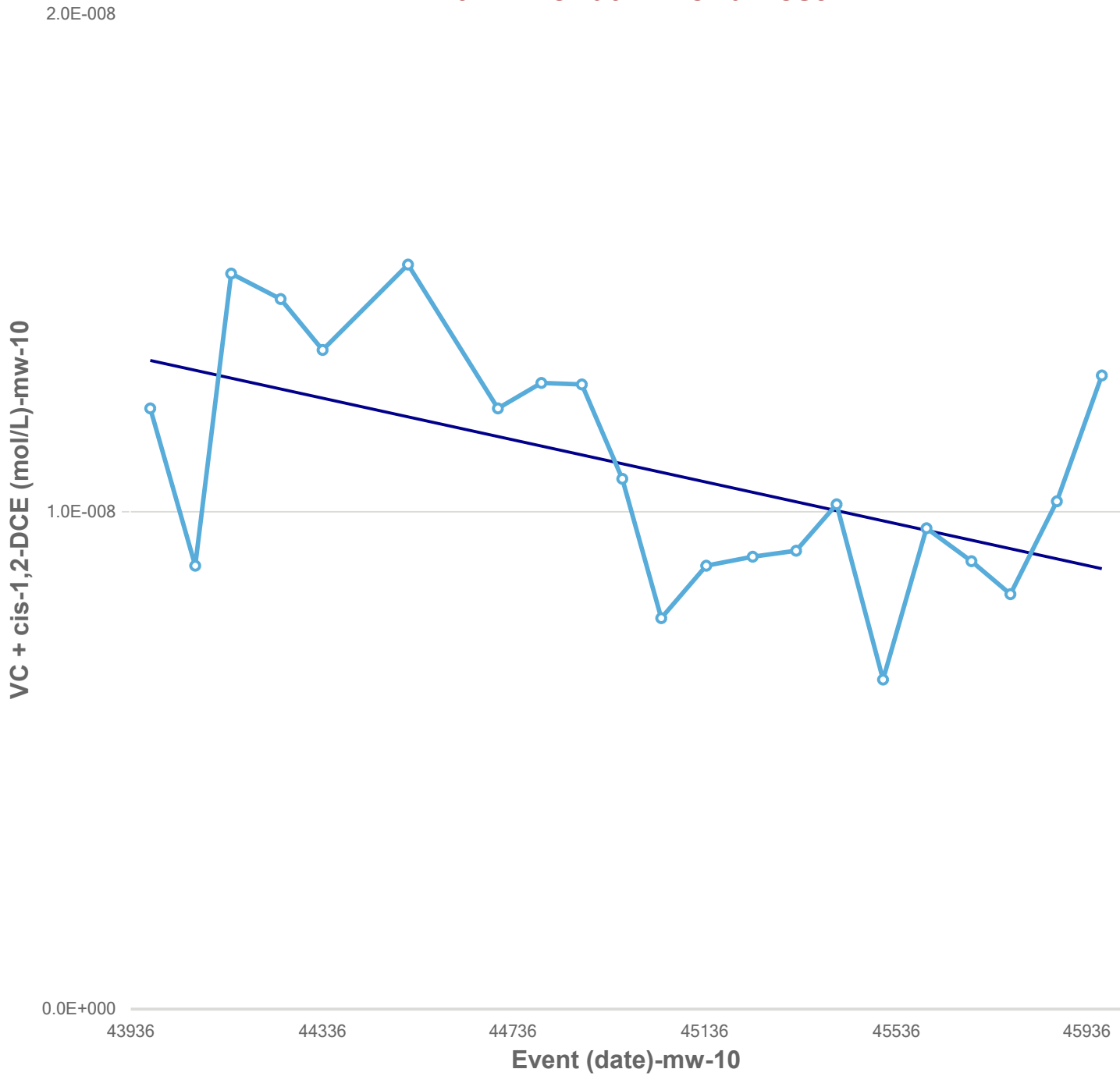
OLS Regression Line (Blue)

OLS Regression Slope	0.0001
OLS Regression Intercept	-2.1162

Insufficient statistical evidence of a significant trend at the specified level of significance.

Vinyl Chloride + Cis-1,2-Dichloroethene

Mann-Kendall Trend Test

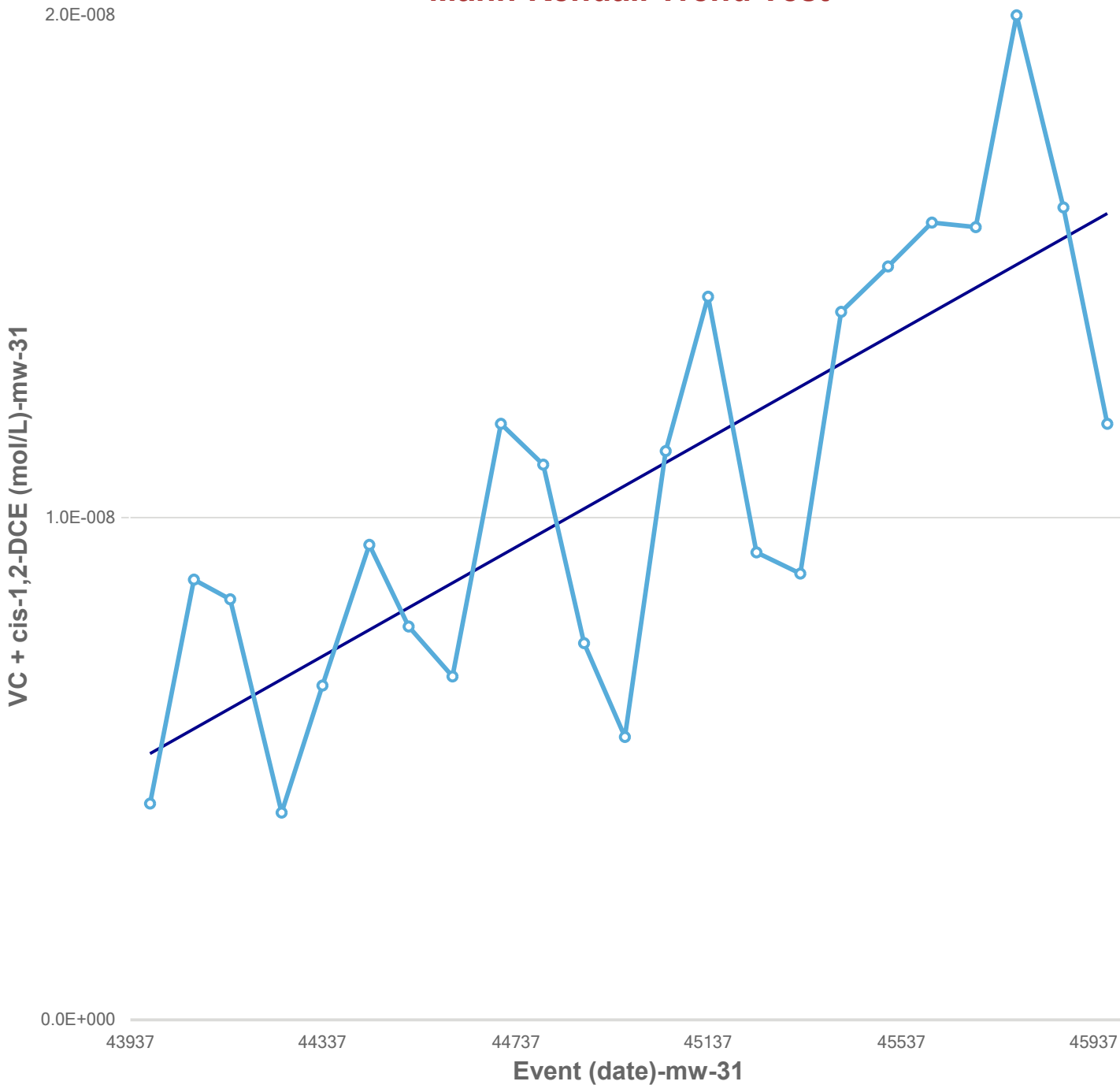


Mann-Kendall Trend Analysis	
n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.1160
Standardized Value of S	-2.0232
M-K Test Value (S)	-68
Tabulated p-value	0.0210
Approximate p-value	0.0215

OLS Regression Line (Blue)	
OLS Regression Slope	0.0000
OLS Regression Intercept	0.0000

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test

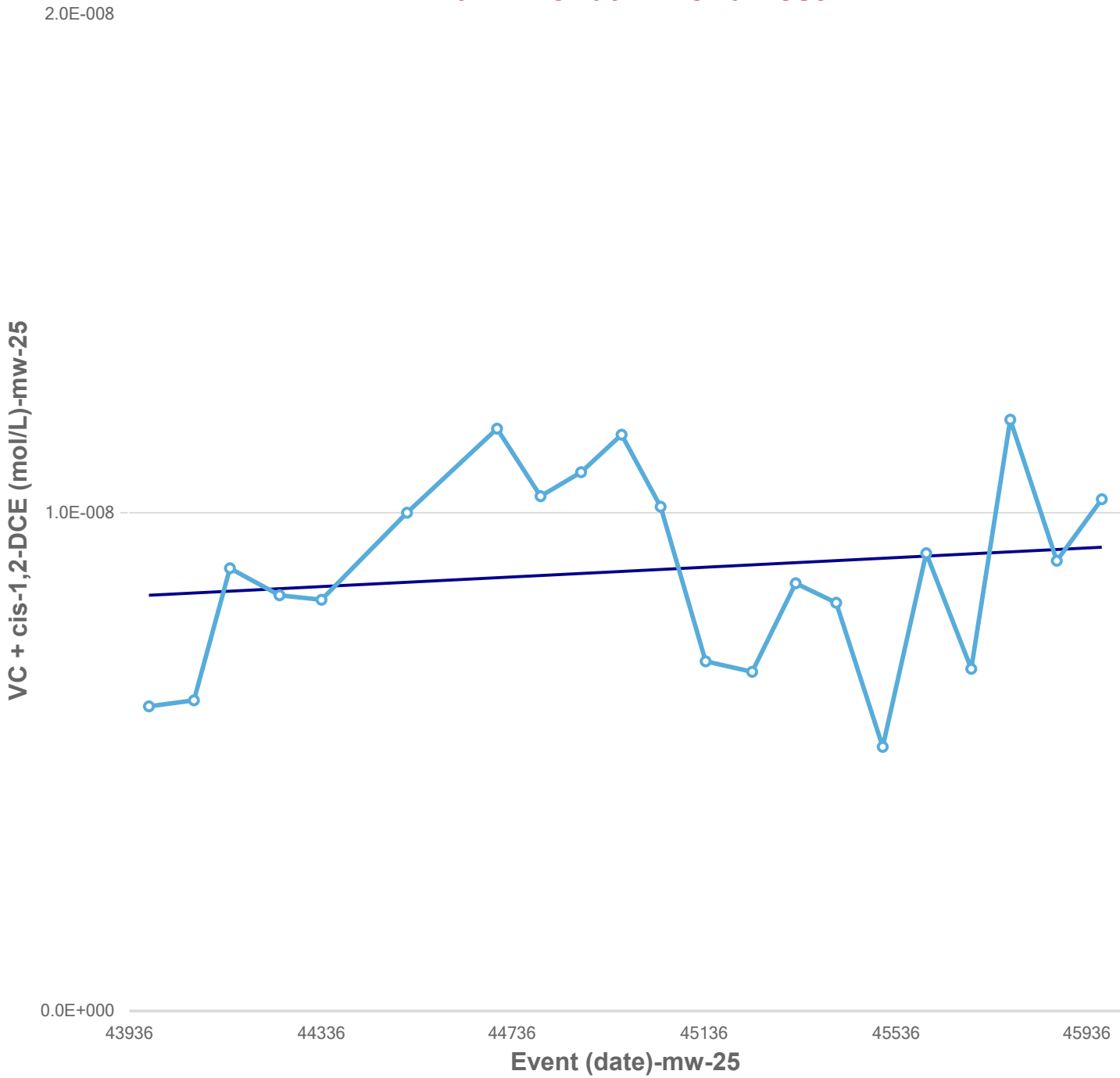


Mann-Kendall Trend Analysis	
n	23
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	37.8638
Standardized Value of S	3.9087
M-K Test Value (S)	149
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)	
OLS Regression Slope	0.0000
OLS Regression Intercept	0.0000

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test

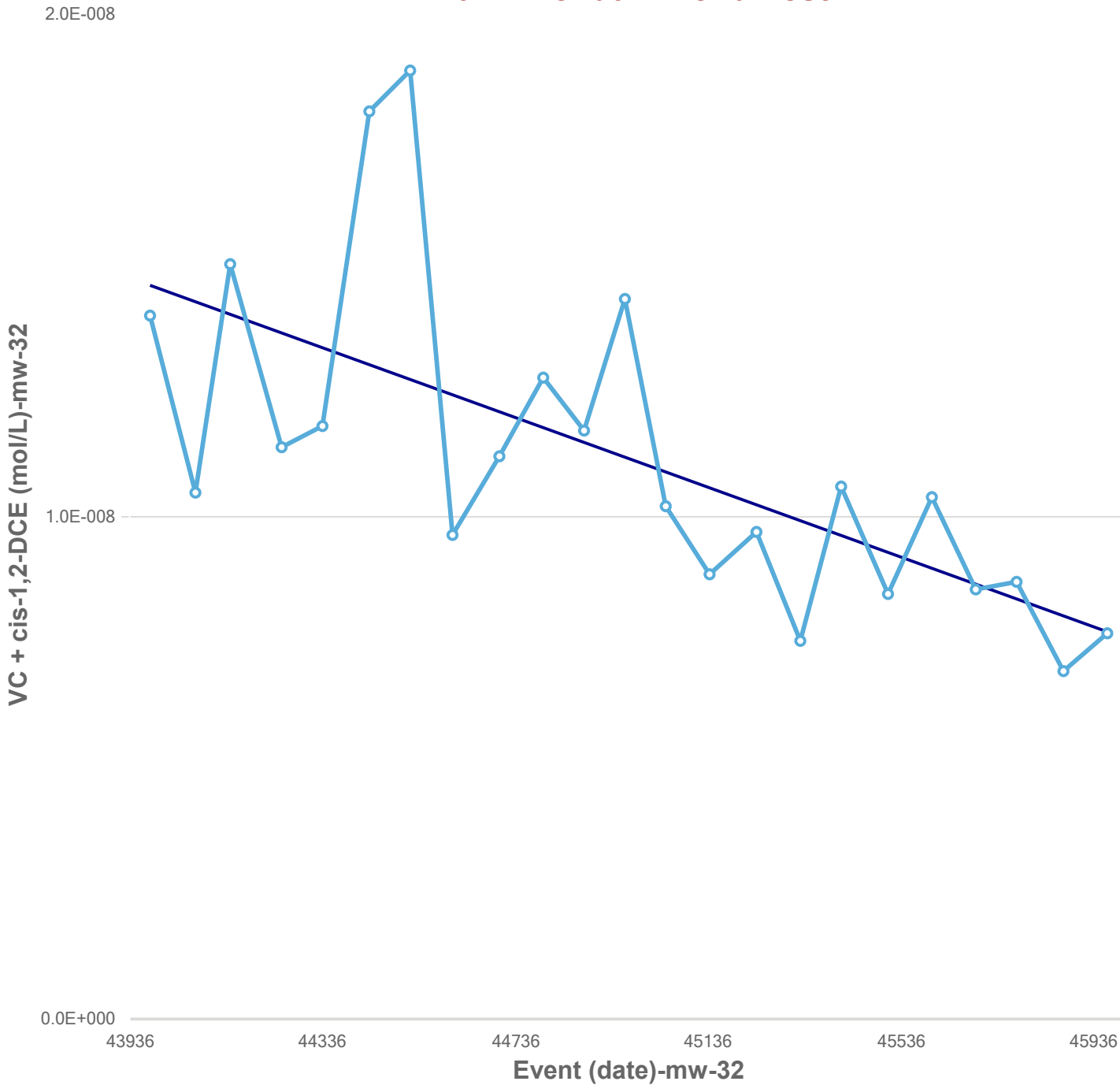


Mann-Kendall Trend Analysis	
n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.1160
Standardized Value of S	0.6945
M-K Test Value (S)	24
Tabulated p-value	0.2460
Approximate p-value	0.2437

OLS Regression Line (Blue)	
OLS Regression Slope	0.0000
OLS Regression Intercept	0.0000

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test

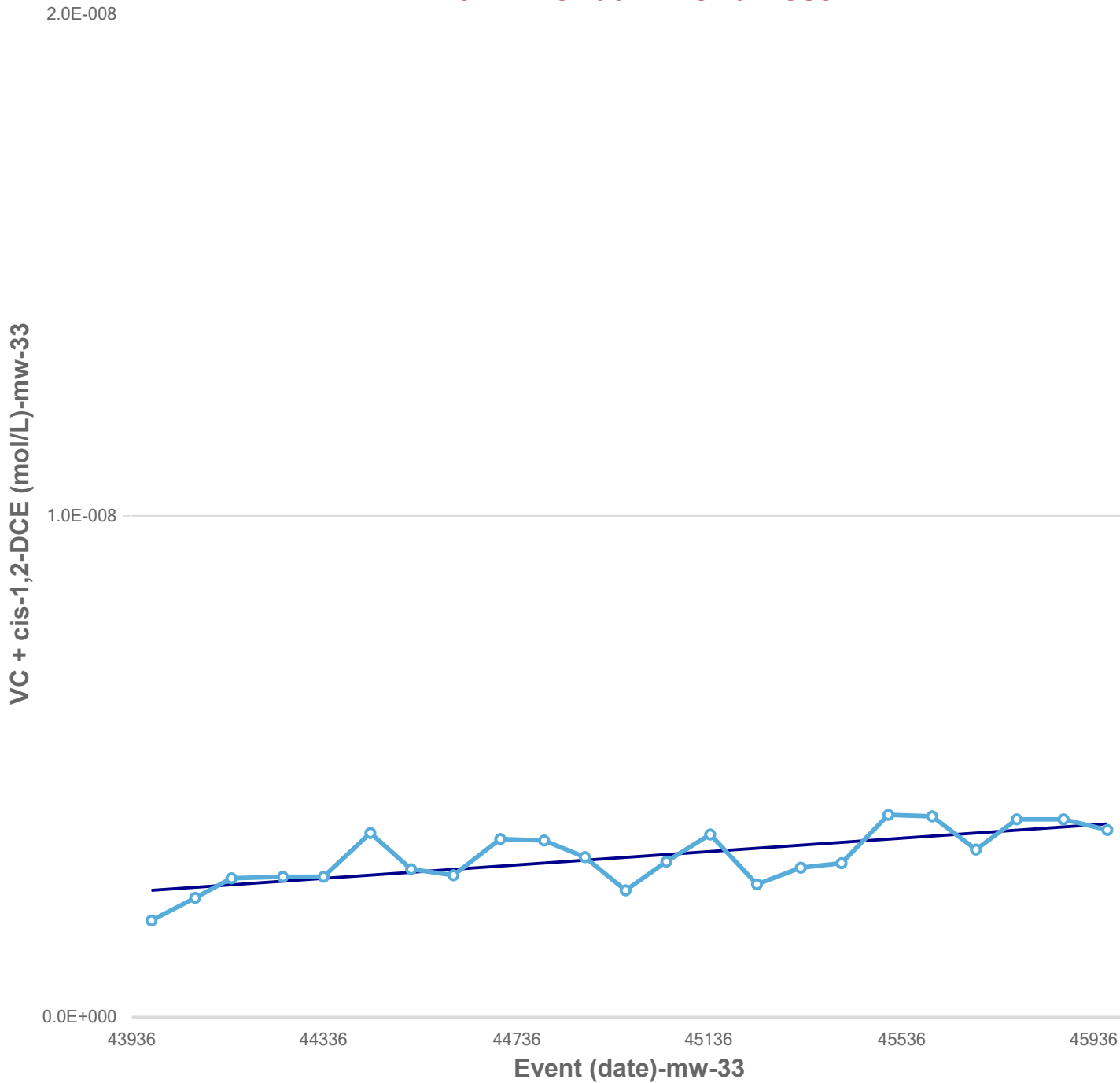


Mann-Kendall Trend Analysis	
n	23
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	37.8638
Standardized Value of S	-3.5918
M-K Test Value (S)	-137
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0002

OLS Regression Line (Blue)	
OLS Regression Slope	0.0000
OLS Regression Intercept	0.0000

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

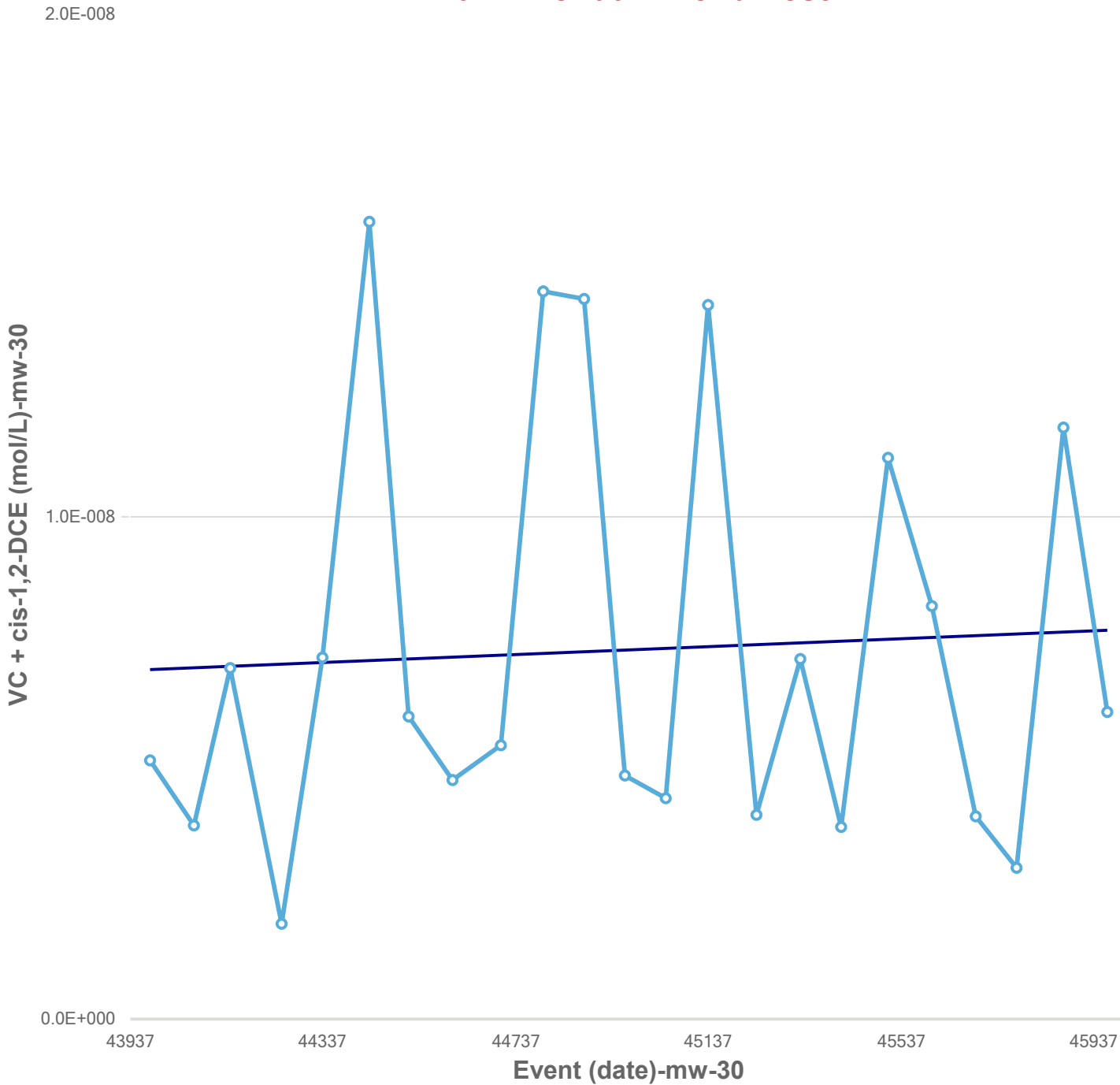
n	23
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	37.8374
Standardized Value of S	3.3829
M-K Test Value (S)	129
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0004

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	0.0000

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis	
n	23
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	37.8638
Standardized Value of S	-0.1585
M-K Test Value (S)	-7
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.4370

OLS Regression Line (Blue)	
OLS Regression Slope	0.0000
OLS Regression Intercept	0.0000

Insufficient statistical evidence of a significant trend at the specified level of significance.