Liberty Environmental

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July 23, 2024

Laurwal Holding Corp.
Attn: Gary Silversmith, Esq.
1701 Pennsylvania Avenue, N.W., 2nd Floor
Washington, DC 20006

Re: Groundwater Plume Stability Evaluation
Wallkill Wellfield Site
City of Middletown, Orange County, New York
Liberty Project No. 240331

Dear Mr. Silversmith:

Liberty Environmental (Liberty) is pleased to provide this report summarizing the results of the groundwater plume stability evaluation completed for the above-referenced property located in Middletown, Orange County, New York. A Site Diagram is provided in Figure 1. The stability evaluation presented below supports the plumes being stable and therefore, the installation of a groundwater pump-and-treat system is not necessary to gain hydraulic control of the plumes.

SITE BACKGROUND

The property was historically used by General Switch Corporation for the manufacturing of electrical components. During 1983, residential wells located along Highland Avenue were identified to be contaminated with chlorinated volatile organic compounds (CVOCs). A water main was later installed along Highland Avenue and the affected properties were connected to public water.

Soil and groundwater investigations were conducted at the site. The soil investigations identified two areas of soil impacts (northern and southern "hot spots") in the vicinity of the former General Switch building. These "hot spots" were subsequently excavated. Excavation of these areas was detailed in the September 1999 *Summary Report of Soil Remediation Activities* prepared by Ecosystems Strategies, Inc. (ESI). The locations of these former "hot spots" are depicted in Figure 1 for reference. A supplemental soil investigation was conducted during 2006-2007 and included the advancement of 18 soil borings through the slab of the former General Switch building. One boring (SB-8) indicated PCE above the site-specific action level. The supplemental soil investigation was detailed in the May 2007 *Summary Report of Subsurface Investigation* prepared by ESI. The location of SB-8 is depicted in Figure 1 for reference.

A total of 18 overburden monitoring wells and 10 bedrock monitoring wells have been installed to investigate groundwater at the site. The locations of these monitoring wells are depicted in Figure 1. MW-1 through MW-17 and MW-19 are considered overburden wells. MW-202 through MW-204, MW-206, MW-207, MW-209, MW-211, W-30 (former supply well for 320

Highland Avenue), MW-219, and MW-220 are considered bedrock wells. The overburden at the site is composed of sand, silt, and glacial till and the overburden aquifer is associated with flow along the overburden-bedrock interface. The bedrock underlying the site is an interbedded silty shale and silty-fine sandy siltstone and the bedrock aquifer is associated with flow within the fractures of this bedrock formation.

Gauging of the monitoring well network indicates groundwater flow in the overburden and bedrock aquifers is generally south-southeast from the former General Switch building. Dissolved tetrachloroethylene (PCE), trichloroethylene (TCE), 1,2-dichloroethylene (DCE), and vinyl chloride (VC), to a lesser extent, historically have been found in several of the 28 monitoring wells.

It should also be noted that six interior monitoring wells are currently installed through the slab of the former General Switch building. Only three rounds of samples have been collected from these interior wells to date and therefore, trend evaluations could not be performed on these wells due to the limited data set. Nevertheless, the data set from the 28 exterior wells is robust and sufficient to complete a thorough stability evaluation of the plumes.

PLUME STABILITY EVALUATION

Liberty used historical information from various reports prepared for the site and the available groundwater data from the exterior wells summarized in Table 1 to evaluate the stability of the CVOC plumes. Multiple lines of evidence were used to evaluate stability including:

- The historical information reviewed by Liberty indicates the following two key factors in support of plume stability:

  (1) A significant amount of time has passed since the release at the site occurred and while the exact date is unknown, the release was first discovered during 1983 (40+ years ago).

  (2) While the exact volume of the release is unknown, source areas were investigated and source removal (i.e. excavation of the northern and southern "hot spots") was completed at the site prior to 2000 (20+ years ago). The residual source that was later identified at the SB-8 soil sample location appears to be limited in extent and is currently capped beneath the former General Switch building.

- Graphical linear trendline evaluations of the concentration trends in individual wells.
- Statistical evaluations of the concentration trends in individual wells using the Mann-Kendall (MK) test.
- Statistical evaluation of the plume-wide mass and distribution over time of the CVOC plumes using GSI's Monitoring and Remediation Optimization System (MAROS).

The following three analyses provide additional discussion of the linear trendline, MK, and MAROS evaluations and results.

Graphical Linear Regression Evaluation – Analysis 1

A series of trend analysis graphs were prepared for select site monitoring wells for the data included in Table 1. Graphs were only prepared for wells and compounds with at least two exceedances of the New York State Ambient Water Quality Standards (AWQS). When a compound was not detected, the laboratory detection limit (when available) was used as the compound concentration in the evaluation. The graphs provide a visual presentation of the contaminant concentration over time for these monitoring wells. Linear trendlines, along with the equation of the trendline and associated R^2 values are also depicted on the graphs for reference. A summary of the results is included in Table 2 and 3. The graphs can be found in Attachment 1 of this document. Trends were evaluated as follows:

If the equation of the trendline is represented by $y=mx+b$ and m is the slope of the line, then where m is negative (-), the concentration trend is decreasing and where m is positive (+), the concentration trend is increasing.

The following provides a summary of the results:

PCE (Overburden Wells)

MW-2 – Decreasing
MW-3 – Decreasing
MW-4 – Decreasing
MW-5 – Decreasing
MW-6 – Increasing
MW-7 – Decreasing
MW-9 – Decreasing
MW-11 – Increasing
MW-12 – Decreasing
MW-13 – Decreasing
MW-14 – Increasing
MW-16 – Decreasing
MW-19 – Decreasing

PCE (Bedrock Wells)

MW-202 – Decreasing
MW-203 – Decreasing
MW-204 – Decreasing
MW-206 – Decreasing
MW-207 – Decreasing
MW-209 – Decreasing
MW-211 – Decreasing
W-30 – Decreasing
MW-219 – Decreasing
MW-220 – Decreasing

TCE (Overburden Wells)

MW-3 – Decreasing
MW-4 – Decreasing
MW-5 – Increasing
MW-6 – Decreasing
MW-9 – Increasing
MW-11 – Decreasing
MW-13 – Decreasing
MW-16 – Decreasing
MW-19 – Decreasing

TCE (Bedrock Wells)

MW-202 – Increasing
MW-203 – Decreasing
MW-204 – Decreasing
MW-206 – Increasing
MW-209 – Increasing
MW-211 – Decreasing
W-30 – Decreasing
MW-219 – Decreasing
MW-220 – Decreasing

DCE (Overburden Wells)

MW-3 – Decreasing
MW-4 – Decreasing

DCE (Bedrock Wells)

MW-202 – Increasing
MW-203 – Decreasing

MW-5 – Decreasing
MW-6 – Decreasing
MW-9 – Increasing
MW-11 – Increasing
MW-13 – Decreasing
MW-16 – Decreasing
MW-19 – Decreasing
MW-204 – Decreasing
MW-206 – Increasing
MW-209 – Decreasing
MW-211 – Decreasing
W-30 – Decreasing
MW-219 – Decreasing
MW-220 – Decreasing

VC (Bedrock Wells)

MW-209 – Increasing
W-30 – Decreasing

For the overburden aquifer, all of the increasing slopes (+*m*) with the exception of PCE in MW-14 are relatively small, indicating a weakly increasing or potentially stable trend. While the slope (*m*) for PCE in MW-14 is large, the 22,000 micrograms/liter (ug/l) detection during the 2000 sampling event appears anomalous as this detection is several orders of magnitude higher than any other PCE concentration reported for this well (see Table 1).

Likewise for the bedrock aquifer, all of the increasing slopes (+*m*) with the exception of TCE and DCE in MW-202 are relatively small, indicating a weakly increasing or potentially stable trend. While the slopes (*m*) for TCE and DCE in MW-202 are large, this well was not sampled post-2008, and therefore a full evaluation of the trends for this well is not possible without more recent data.

Overall, the results of the linear regression evaluation support that concentration trends are either stable or decreasing; however, it should be noted that this linear regression evaluation is viewed more as a preliminary screening tool. The MK trend and MAROS evaluations detailed below are more heavily weighted in determining plume stability.

Mann-Kendall Trend Evaluation – Analysis 2

To evaluate contaminant trends in groundwater at the site, MK statistical evaluations of the data were performed using the GSI Mann Kendall Toolkit. The MK analysis is a non-parametric evaluation that is applied to determine concentration trends over time. Possible outcomes to the GSI Toolkit analysis include no trend, stable, probably decreasing, decreasing, increasing and probably increasing. The no trend and stable outcomes both indicate that no increasing or decreasing trend can be determined with sufficient statistical confidence, but the stable result indicates less variability in concentrations from one sampling event to the next.

Liberty used this statistical toolkit to evaluate CVOC concentrations for the data included in Table 1. A summary of the results is included in Tables 2 and 3. Evaluations were only performed for wells and compounds with at least two exceedances of the AWQS. When a compound was not detected, the laboratory limit (when available) was used as the compound concentration in the evaluation. The results of the evaluation are discussed below and copies of the GSI MK Toolkit spreadsheets are provided in Attachment 2.

PCE (Overburden Wells)

MW-2 – Stable
MW-3 – Decreasing
MW-4 – Decreasing
MW-5 – Stable
MW-6 – No Trend (+S)
MW-7 – No Trend (+S)
MW-9 – Prob. Decreasing
MW-11 – Stable
MW-12 – Decreasing
MW-13 – Decreasing
MW-14 – No Trend (-S)
MW-16 – Decreasing
MW-19 – Prob. Decreasing

PCE (Bedrock Wells)

MW-202 – No Trend (-S)
MW-203 – Decreasing
MW-204 – Stable
MW-206 – Stable
MW-207 – Prob. Decreasing
MW-209 – No Trend (-S)
MW-211 – No Trend (-S)
W-30 – No Trend (-S)
MW-219 – Stable
MW-220 – No Trend (-S)

TCE (Overburden Wells)

MW-3 – Decreasing
MW-4 – Decreasing
MW-5 – No Trend (+S)
MW-6 – Stable
MW-9 – No Trend (+S)
MW-11 – No Trend (+S)
MW-13 – Stable
MW-16 – Decreasing
MW-19 – Stable

TCE (Bedrock Wells)

MW-202 – No Trend (+S)
MW-203 – Decreasing
MW-204 – Stable
MW-206 – No Trend (S=0)
MW-209 – No Trend (+S)
MW-211 – Stable
W-30 – No Trend (-S)
MW-219 – No Trend (-S)
MW-220 – Decreasing

DCE (Overburden Wells)

MW-3 – Prob. Decreasing
MW-4 – Decreasing
MW-5 – Stable
MW-6 – No Trend (-S)
MW-9 – No Trend (+S)
MW-11 – No Trend (+S)
MW-13 – No Trend (+S)
MW-16 – Decreasing
MW-19 – Stable

DCE (Bedrock Wells)

MW-202 – Increasing
MW-203 – Decreasing
MW-204 – Prob. Decreasing
MW-206 – No Trend (-S)
MW-209 – Stable
MW-211 – Decreasing
W-30 – No Trend (-S)
MW-219 – Prob. Decreasing
MW-220 – Prob. Decreasing

VC (Bedrock Wells)

MW-209 – No Trend (+S)
W-30 – No Trend (-S)

DCE in MW-202 is the only MK evaluation to indicate an increasing trend result; however, as stated above, this well was not sampled post-2008, and therefore a full evaluation of the trends for this well is not possible without more recent data.

Several compounds in multiple wells indicate a No Trend result with a positive MK Statistic (+S), which is indicative of a weakly increasing or potentially stable concentration trend. The greater the value of S, the greater the strength of the trend. Further review of the No Trend (+S) results indicates the MK Statistics are relatively small (i.e. <5), with the exception of PCE in MW-6 (+S=7), TCE in MW-9 (+S=6), and DCE in MW-13 (+S=6).

Overall, the results of the MK trend evaluations support that concentration trends are either stable or decreasing; however, due to the increasing and no trend (+S>5) results noted above, trends were further evaluated using MAROS software.

MAROS Plume Stability Evaluation – Analysis 3

To further evaluate the stability of the CVOC plumes in the overburden and bedrock aquifers, the MAROS software was utilized to perform spatial trend analyses of the plume. These analyses use the MK method to determine a statistical trend for the total dissolved contaminant mass in the plume, the location of the center of mass, and spread of the plume over time. These three evaluations are performed using the Zeroth Moment Analysis, First Moment Analysis, and Second Moment Analysis, respectively. The MAROS summary reports are provided in Attachment 3.

Due to the inconsistent frequency of which the wells were sampled or some wells not being installed until a later date, only select wells were utilized for the MAROS evaluation and only the groundwater data collected 2005-2023 were utilized. A summary of the wells and data used in the MAROS evaluation is also provided in Attachment 3. Further, due to the limited detections of VC during this period, VC was not included in the MAROS evaluation. Summary figures depicting the Zeroth Moment Analysis and First Moment Analysis for PCE, TCE, and DCE are included in Figures 2 through 7.

Zeroth Moment Analysis

The Zeroth Moment Analysis in MAROS' Spatial Moment Analysis estimates the total dissolved mass for each compound in each sampling event and then evaluates the data to determine a trend over time. The following provides a summary of the results:

Overburden Aquifer	Bedrock Aquifer
PCE – Stable	PCE – Stable
TCE – Stable	TCE – Stable
DCE – Stable	DCE – No Trend (-S)

All of the Zeroth Moment Analyses returned a stable trend result with the exception of DCE in the bedrock aquifer; however, the MK Statistic was negative (-S=-6), indicating a weakly decreasing or potentially stable concentration trend. The results of the Zeroth Moment Analyses indicate that the total dissolved mass of the plumes is stable over time.

First Moment Analysis

The First Moment Analysis determines a trend over time for the center of mass as it relates to the distance from the original source. A decreasing trend for the First Moment Analysis signifies that the center of mass is retreating toward the source (decreasing in distance from the source). An

increasing trend for the First Moment Analysis signifies that the center of mass is moving away from the source (increasing in distance from the source). For this evaluation, MW-17 was used as the source coordinates as this well is closest to the northern "hot spot" and SB-18. The following provides a summary of the results:

Overburden Aquifer	Bedrock Aquifer
PCE – Stable	PCE – Stable
TCE – Stable	TCE – Stable
DCE – Stable	DCE – No Trend (+S)

All of the First Moment Analyses returned a stable trend result with the exception of DCE in the bedrock aquifer. DCE in the bedrock aquifer indicates a No Trend result with a relatively small (i.e. <5) positive MK Statistic (+S), which is indicative of a weakly increasing or potentially stable concentration trend.

The locations of the center of mass for DCE in the bedrock aquifer are depicted in Figure 7 for reference. The depicted centers of mass appear to be more controlled by the detected concentrations in W-30, which is located side-gradient to groundwater flow, than actually depicting movement in the downgradient direction away from the source. W-30 reported a result of 130,000 ug/l for DCE during the 2005 sampling event. The 130,000 ug/l detection appears anomalous as this detection is several orders of magnitude higher than any other DCE concentration reported for any well (see Table 1). This anomaly would have shifted the center of mass for Sampling Event 1 towards W-30 and therefore further back closer to the source, skewing the results of the First Moment Analysis.

Second Moment Analysis

The Second Moment Analysis determines a trend over time for the spread of the plume in the longitudinal (X) and transverse (Y) directions from the center of mass. A decreasing trend for the Second Moment Analysis signifies that the plume footprint is shrinking in the specified direction (X or Y), while an increasing trend signifies that the plume footprint is expanding. The results of this analysis indicate the following:

Overburden Aquifer Longitudinal (X)	Bedrock Aquifer Longitudinal (X)
PCE – No Trend (+S)	PCE – Stable
TCE – Decreasing	TCE – Stable
DCE – No Trend (+S)	DCE – No Trend (+S)

Overburden Aquifer Transverse (Y)	Bedrock Aquifer Transverse (Y)
PCE – Stable	PCE – No Trend (+S)
TCE – Stable	TCE – Stable
DCE – Stable	DCE – Stable

All of the Second Moment Analyses returned either a stable trend or no trend with a relatively small (i.e. <5) positive MK Statistic (+S), which is indicative of a weakly increasing or potentially stable concentration trend.

CONCLUSIONS AND RECOMMENDATIONS

Based on the groundwater plume stability evaluation summarized above, the following conclusions and recommendations are presented.

- Based on multiple lines of evidence, the CVOC groundwater plumes at the subject site are stable or decreasing.
- Since the CVOC groundwater plumes are overall stable or decreasing and therefore, would not be expected to migrate beyond their current extent, the installation of a groundwater pump-and-treat system is not necessary to gain hydraulic control of the plumes.
- Alternative remedial approaches should be evaluated to address contaminated groundwater at the site.

We appreciate the opportunity to serve you on this project. If you have any questions concerning the information presented above or the site in general, please do not hesitate to contact our office. We may be reached at (800)305-6019.

Sincerely,
Liberty Environmental

James P. Cinelli, P.E., P.G.
President

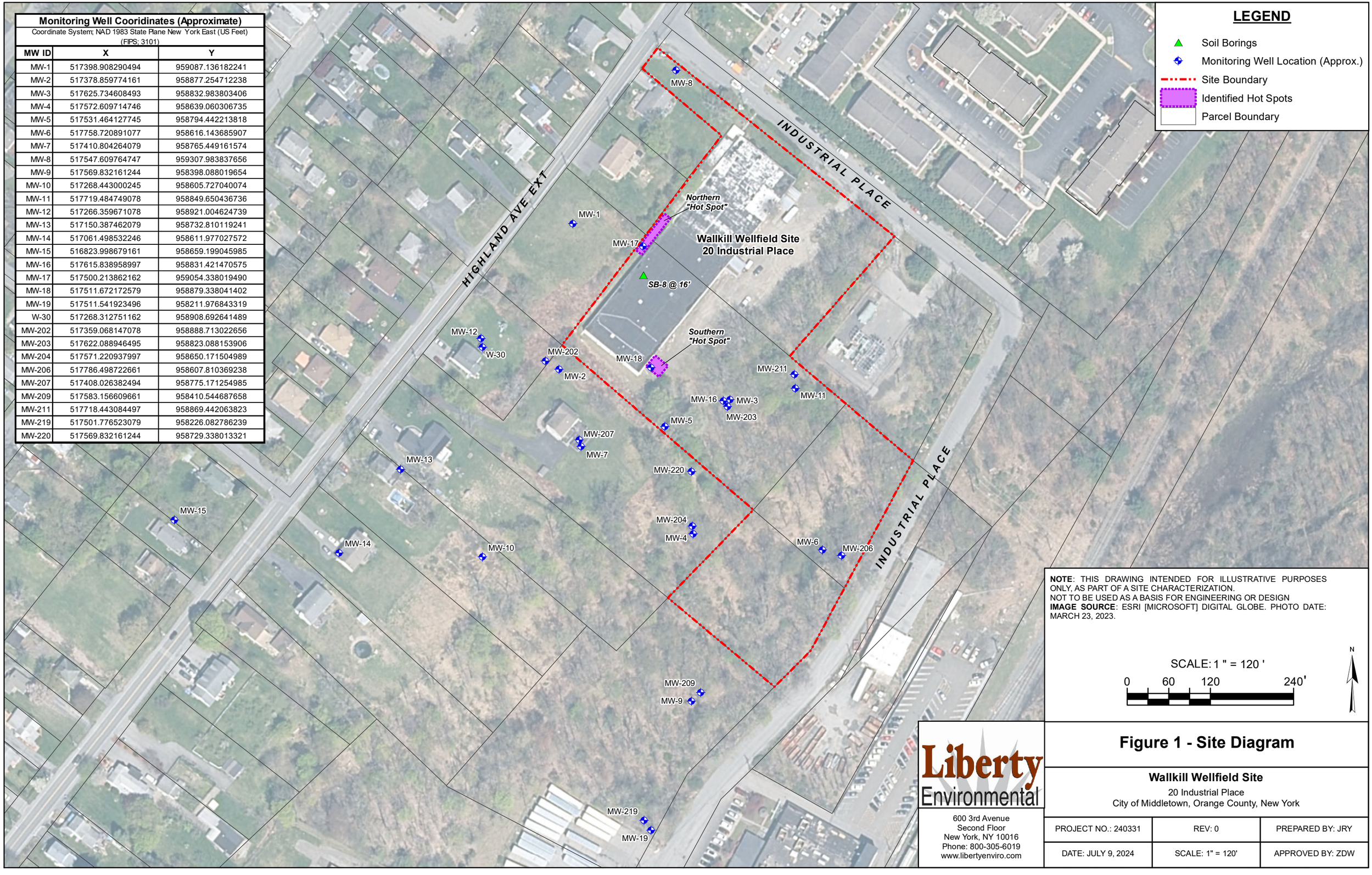
Zachary Weaver
Project Manager

Attachments:

Figure 1: Site Diagram
Figure 2: PCE MAROS Moment Analysis – Overburden Aquifer
Figure 3: TCE MAROS Moment Analysis – Overburden Aquifer
Figure 4: DCE MAROS Moment Analysis – Overburden Aquifer
Figure 5: PCE MAROS Moment Analysis – Bedrock Aquifer
Figure 6: TCE MAROS Moment Analysis – Bedrock Aquifer
Figure 7: DCE MAROS Moment Analysis – Bedrock Aquifer
Table 1: Historical Groundwater Data Summary – PCE & Daughter Compounds
Table 2: Summary Groundwater Trends – Overburden Wells (PCE & Daughter Compounds)
Table 3: Summary Groundwater Trends – Bedrock Wells (PCE & Daughter Compounds)
Attachment 1: Linear Regression Trend Graphs
Attachment 2: GSI Mann-Kendall Toolkit Spreadsheets
Attachment 3: MAROS Spatial Moment Analysis Summary

FIGURES

Monitoring Well Coordinates (Approximate)		
Coordinate System; NAD 1983 State Plane New York East (US Feet) (FIPS; 3101)		
MW ID	**X**	**Y**
MW-1	517398.908290494	959087.136182241
MW-2	517378.859774161	958877.254712238
MW-3	517625.734608493	958832.983803406
MW-4	517572.609714746	958639.060306735
MW-5	517531.464127745	958794.442213818
MW-6	517758.720891077	958616.143685907
MW-7	517410.804264079	958765.449161574
MW-8	517547.609764747	959307.983837656
MW-9	517569.832161244	958398.088019654
MW-10	517268.443000245	958605.727040074
MW-11	517719.484749078	958849.650436736
MW-12	517266.359671078	958921.004624739
MW-13	517150.387462079	958732.810119241
MW-14	517061.498532246	958611.977027572
MW-15	516823.998679161	958659.199045985
MW-16	517615.838958997	958831.421470575
MW-17	517500.213862162	959054.338019490
MW-18	517511.672172579	958879.338041402
MW-19	517511.541923496	958211.976843319
W-30	517268.312751162	958908.692641489
MW-202	517359.068147078	958888.713022656
MW-203	517622.088946495	958823.088153906
MW-204	517571.220937997	958650.171504989
MW-206	517786.498722661	958607.810369238
MW-207	517408.026382494	958775.171254985
MW-209	517583.156609661	958410.544687658
MW-211	517718.443084497	958869.442063823
MW-219	517501.776523079	958226.082786239
MW-220	517569.832161244	958729.338013321



NOTE: THIS DRAWING INTENDED FOR ILLUSTRATIVE PURPOSES ONLY, AS PART OF A SITE CHARACTERIZATION.
NOT TO BE USED AS A BASIS FOR ENGINEERING OR DESIGN
IMAGE SOURCE: ESRI [MICROSOFT] DIGITAL GLOBE. PHOTO DATE: MARCH 23, 2023.

SCALE: 1 " = 120 '

0 60 120 240'

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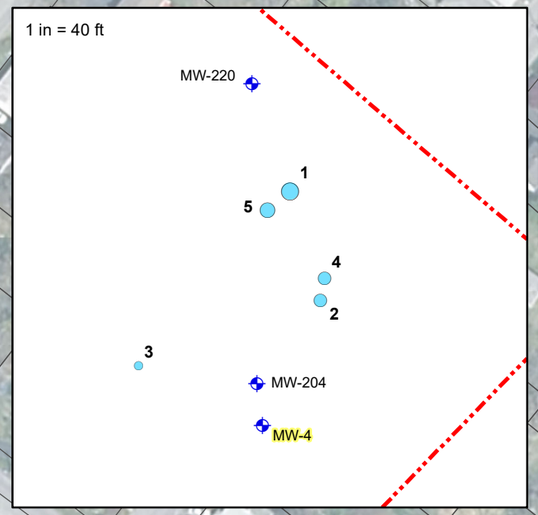
Figure 1 - Site Diagram

Wallkill Wellfield Site
20 Industrial Place
City of Middletown, Orange County, New York

Liberty Environmental
600 3rd Avenue
Second Floor
New York, NY 10016
Phone: 800-305-6019
www.libertyenviro.com

PROJECT NO.: 240331	REV: 0	PREPARED BY: JRY
DATE: JULY 9, 2024	SCALE: 1" = 120'	APPROVED BY: ZDW



Overburden PCE		
Sampling Event	Date	Est. Mass
1	4/29/2005	9.1
2	4/30/2008	3.8
3	3/23/2016	1.9
4	5/14/2019	3.4
5	4/18/2023	5.4

LEGEND

- MAROS CEnter of Mass - PCE
- Monitoring Well Location (Approx.)
- Site Boundary
- Parcel Boundary

HIGHLAND AVE EXT

INDUSTRIAL PLACE

INDUSTRIAL PLACE

MW-8

MW-1

MW-17

Northern "Hot Spot"

Wallkill Wellfield Site
20 Industrial Place

SB-8 @ 16'

Southern "Hot Spot"

MW-18

MW-12

W-30

MW-202

MW-2

MW-211

MW-11

MW-16

MW-3

MW-203

MW-5

MW-207

MW-7

MW-13

MW-220

1
5
4
2
3
MW-204

MW-4

MW-6

MW-206

MW-15

MW-14

MW-10

MW-209

MW-9

MW-219

MW-19

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SCALE: 1 " = 120 '

0 60 120 240'

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Figure 2 - PCE MAROS Moment Analysis - Overburden Aquifer

Wallkill Wellfield Site
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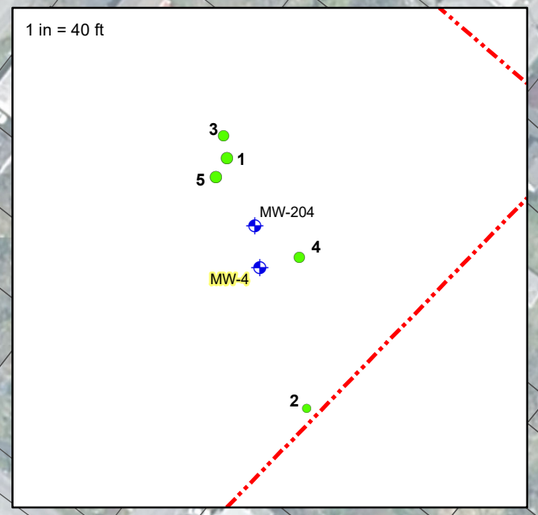
PROJECT NO.: 240331	REV: 0	PREPARED BY: JRY
DATE: JULY 12, 2024	SCALE: 1" = 120'	APPROVED BY: ZDW



Overburden TCE		
Sampling Event	Date	Est. Mass
1	4/29/2005	0.36
2	4/30/2008	0.2
3	3/23/2016	0.3
4	5/14/2019	0.29
5	4/18/2023	0.32

LEGEND

- MAROS CEnter of Mass - TCE
- Monitoring Well Location (Approx.)
- Site Boundary
- Parcel Boundary

HIGHLAND AVE EXT

INDUSTRIAL PLACE

INDUSTRIAL PLACE

Northern "Hot Spot"

Southern "Hot Spot"

Wallkill Wellfield Site
20 Industrial Place

SB-8 @ 16'

MW-8
MW-1
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MW-12
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MW-16
MW-3
MW-203
MW-5
MW-207
MW-7
MW-13
MW-220
MW-15
MW-14
MW-10
3
1
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MW-204
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SCALE: 1 " = 120 '

0 60 120 240'

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Figure 3 - TCE MAROS Moment Analysis - Overburden Aquifer

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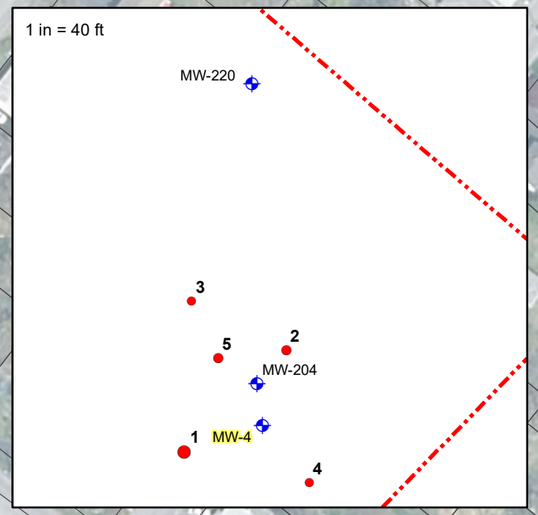

Overburden DCE		
Sampling Event	Date	Est. Mass
1	4/29/2005	0.85
2	4/30/2008	0.48
3	3/23/2016	0.42
4	5/14/2019	0.45
5	4/18/2023	0.49

LEGEND

- MAROS Center of Mass - DCE
- Monitoring Well Location (Approx.)
- Site Boundary
- Parcel Boundary

HIGHLAND AVE EXT

INDUSTRIAL PLACE

INDUSTRIAL PLACE

Wallkill Wellfield Site
20 Industrial Place

Northern "Hot Spot"

Southern "Hot Spot"

SB-8 @ 16'

MW-8
MW-1
MW-17
MW-12
W-30
MW-202
MW-2
MW-18
MW-211
MW-11
MW-16
MW-3
MW-203
MW-5
MW-207
MW-7
MW-13
MW-220
MW-15
MW-14
MW-10
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5
2
MW-204
1
4
MW-4
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MW-9
MW-219
MW-19

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SCALE: 1 " = 120 '

0 60 120 240'

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Figure 4 - DCE MAROS Moment Analysis - Overburden Aquifer

Wallkill Wellfield Site
20 Industrial Place
City of Middletown, Orange County, New York

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PROJECT NO.: 240331	REV: 0	PREPARED BY: JRY
DATE: JULY 12, 2024	SCALE: 1" = 120'	APPROVED BY: ZDW

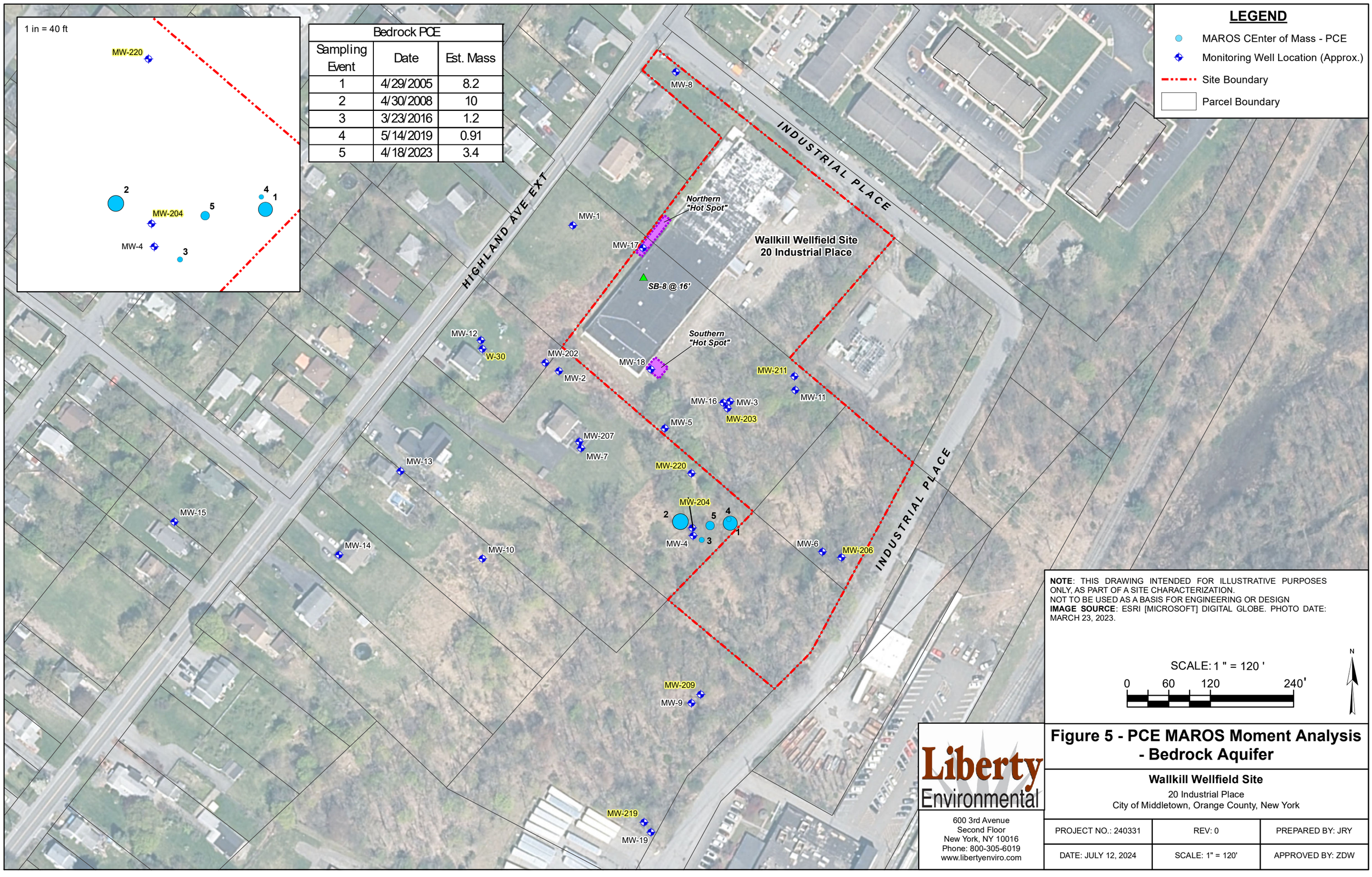
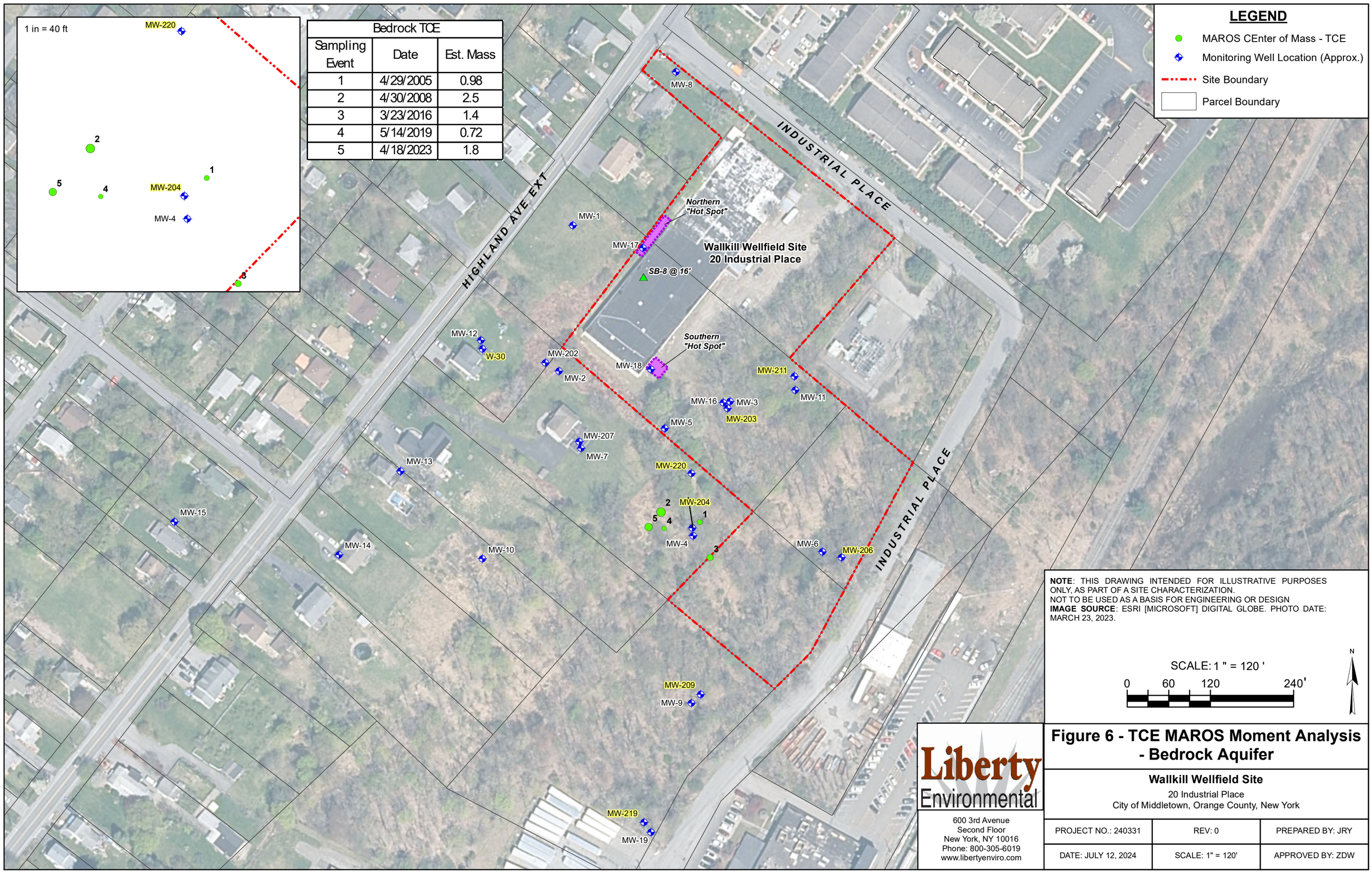


Figure 5 - PCE MAROS Moment Analysis - Bedrock Aquifer

Wallkill Wellfield Site
20 Industrial Place
City of Middletown, Orange County, New York

Liberty Environmental
600 3rd Avenue
Second Floor
New York, NY 10016
Phone: 800-305-6019
www.libertyenviro.com

PROJECT NO.: 240331	REV: 0	PREPARED BY: JRY
DATE: JULY 12, 2024	SCALE: 1" = 120'	APPROVED BY: ZDW



NOTE: THIS DRAWING INTENDED FOR ILLUSTRATIVE PURPOSES ONLY, AS PART OF A SITE CHARACTERIZATION.
NOT TO BE USED AS A BASIS FOR ENGINEERING OR DESIGN
IMAGE SOURCE: ESRI [MICROSOFT] DIGITAL GLOBE. PHOTO DATE: MARCH 23, 2023.

SCALE: 1 " = 120 '

0 60 120 240'

N

Figure 6 - TCE MAROS Moment Analysis - Bedrock Aquifer

Wallkill Wellfield Site
20 Industrial Place
City of Middletown, Orange County, New York

Liberty Environmental
600 3rd Avenue
Second Floor
New York, NY 10016
Phone: 800-305-6019
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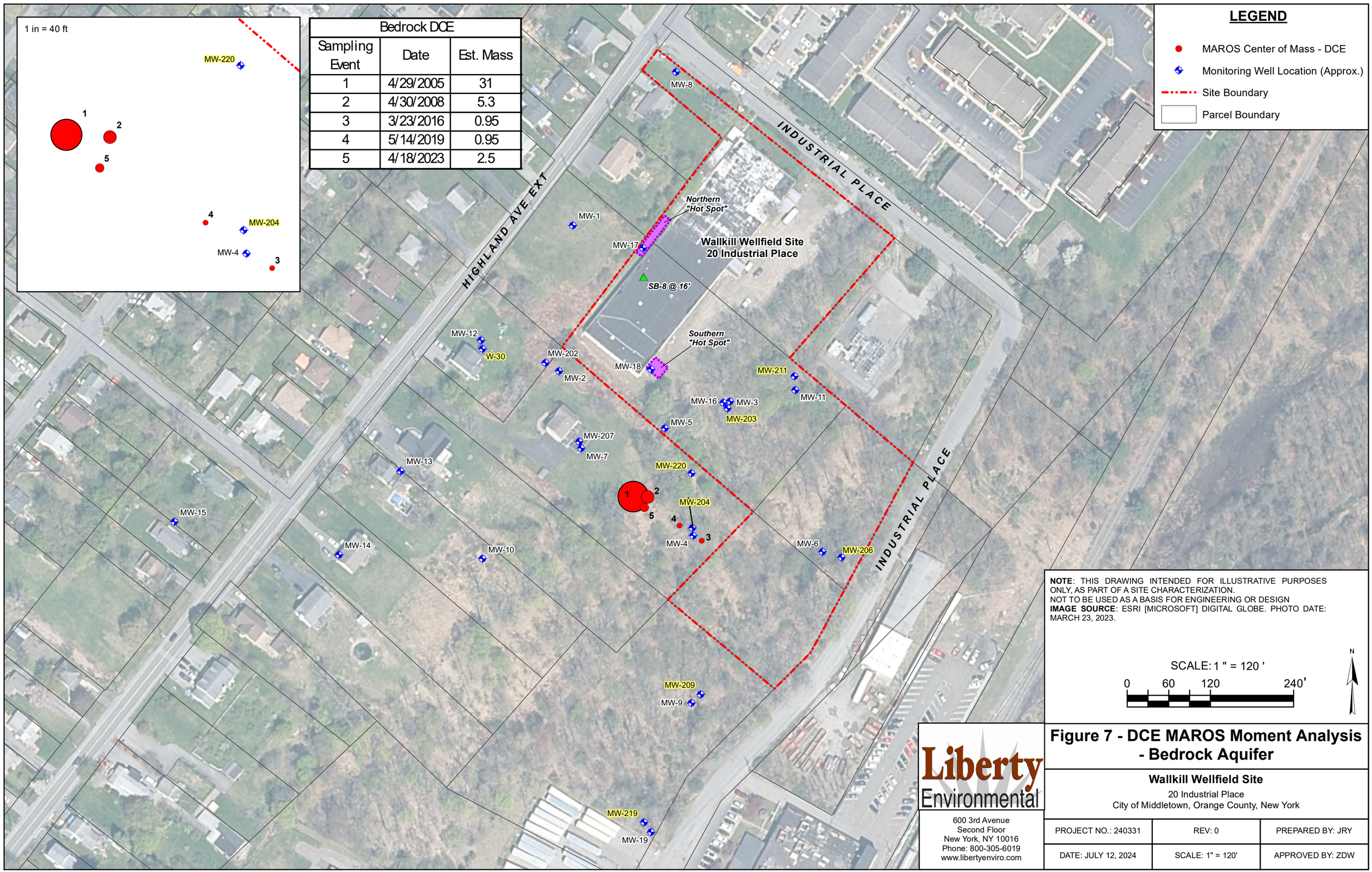
PROJECT NO.: 240331	REV: 0	PREPARED BY: JRY
DATE: JULY 12, 2024	SCALE: 1" = 120'	APPROVED BY: ZDW



Bedrock DCE		
Sampling Event	Date	Est. Mass
1	4/29/2005	31
2	4/30/2008	5.3
3	3/23/2016	0.95
4	5/14/2019	0.95
5	4/18/2023	2.5

NOTE: THIS DRAWING INTENDED FOR ILLUSTRATIVE PURPOSES ONLY, AS PART OF A SITE CHARACTERIZATION.
NOT TO BE USED AS A BASIS FOR ENGINEERING OR DESIGN
IMAGE SOURCE: ESRI [MICROSOFT] DIGITAL GLOBE. PHOTO DATE: MARCH 23, 2023.

Figure 7 - DCE MAROS Moment Analysis - Bedrock Aquifer

Wallkill Wellfield Site
20 Industrial Place
City of Middletown, Orange County, New York

Liberty Environmental
600 3rd Avenue
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New York, NY 10016
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PROJECT NO.: 240331	REV: 0	PREPARED BY: JRY
DATE: JULY 12, 2024	SCALE: 1" = 120'	APPROVED BY: ZDW

TABLES

TABLE 1

Historical Groundwater Data Summary - PCE & Daughter Compounds

Wallkill Wellfield Site, 20 Industrial Place, City of Middletown, Orange County, NY

Liberty Project No. 240331

Monitoring Well	Year	All concentrations in micrograms per liter (µg/L)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,2-DCE (Total)	VC
AWQS		5	5	5	5	5	2
MW-1	1992	**2.2**	**0.5**	NR	NR	<0.5	<0.5
	1992	**10**	<0.5	NR	NR	<0.5	<0.5
	2000	<1	<1	<1	<1	<1	<1
	2002	<1	<1	<1	<1	<1	<10
	2005	<1	<1	<1	<1	<1	<1
	2006	ND	N/A	N/A	N/A	N/A	N/A
	2008	ND	ND	NR	NR	ND	ND
	2023	<0.5	<0.5	<0.5	<0.75	<0.75	<0.2
MW-2	1992	**8 J**	**5 J**	NR	NR	<10	<10
	1992	**11**	**5**	NR	NR	<2.5	<2.5
	2000	<10	<10	<10	<10	<10	<10
	2001	<1	<1	<1	<1	<1	<1
	2002	<1	<1	<1	<1	<1	<10
	2005	<1	<1	<1	<1	<1	<1
	2008	ND	ND	NR	NR	ND	ND
MW-202	1992	**240**	**16**	NR	NR	<10	<10
	1992	**9,600**	**300**	NR	NR	<250	<250
	2000	**490**	**1,800**	**280**	**32**	**312**	<1
	2001	**730**	**2,500**	**440**	**29**	**469**	<10
	2002	**720**	**1,800**	**440**	**48**	**488**	<10
	2003	**450**	**1,000**	**230**	<25	**230**	<250
	2005	**670**	**1,600**	**460**	**57**	**517**	<10
	2008	**110**	**1,300**	NR	NR	**830**	ND
MW-3	1992	**8,700**	**1,000**	NR	NR	**880 J**	<1,000
	1992	**2,500**	**1,000**	NR	NR	**840**	<10
	2000	**7,300**	**820**	**12**	**14**	**26**	**2**
	2001	**2,900**	**550**	**420**	**2**	**422**	**1**
	2002	**4,300**	**160**	**310**	<50	**310**	<500
	2005	**2,700**	**190**	**240**	<50	**240**	<50
	2008	**430**	**270**	NR	NR	**353**	ND
	2016	**1,200**	**140**	**160**	**3.4**	**163.4**	<0.2
	2019	**462**	**90**	**144**	**1.73**	**145.73**	<0.2
	2023	**1,300**	**130**	**360**	**2**	**362**	<0.2
MW-203	1992	**13,000**	**1,200**	NR	NR	**1,000**	<1,000
	1992	**1,100**	<500	NR	NR	<500	<500
	2000	**6,000**	**500**	**450**	<10	**450**	<10
	2001	**3,100**	**580**	**510**	**3**	**513**	**1**
	2002	**2,100**	**120**	**280**	<100	**280**	<1,000
	2005	**4,200**	**270**	**370**	<50	**370**	<50
	2008	**1,500**	**130**	NR	NR	**270**	ND
	2016	**120**	**11**	**21**	<0.2	**21**	<0.2
	2019	**555**	**134**	**131**	**1.55**	**132.55**	**0.23 J**
	2023	**1,100**	**160**	**290**	**1.7**	**291.7**	<2
MW-4	1992	**20,000**	**210 J**	NR	NR	**420 J**	<1,000
	1992	**15,000**	**330**	NR	NR	**550**	<25
	2000	**15,000**	**320**	**560**	<50	**560**	<50
	2001	**10,000**	**120**	**150**	<1	**150**	<1
	2002	**1,600**	<1	**140**	<1	**140**	<10
	2005	**7,300**	**110**	**190**	<50	**190**	<50
	2008	**3,200**	**51**	NR	NR	**130**	ND
	2016	**5,100**	**110**	**140**	**2**	**142**	<0.2
	2019	**4,860**	**108**	**145**	**7.06**	**152.06**	<0.2
	2023	**3,800**	**60**	**86**	<15	**86**	<4
MW-204	1992	**204.4**	**20.0**	NR	NR	**11.6**	<0.5
	1992	**100**	**230**	NR	NR	**230**	<0.5
	2000	**2,400**	**160**	**200**	<10	**200**	<10
	2001	**1,600**	**150**	**180**	<1	**180**	**1**
	2002	**610**	**64**	**98**	<25	**98**	<250
	2005	**900**	**89**	**96**	<10	**96**	<10
	2008	**680**	**120**	NR	NR	**137**	ND
	2016	**430**	**61**	**52**	**3.2**	**55.2**	**1**
	2019	**176**	**54.1**	**33.3**	**1.04**	**34.34**	<0.2
	2023	**340**	**77**	**53**	**3**	**56**	**2.3**
MW-5	1992	**41,000**	**210 J**	NR	NR	**820 J**	<1,000
	2000	**13,000**	**220**	**350**	<10	**350**	<10
	2001	**28,000**	**300**	**1,100**	<1	**1,100**	<1
	2003	**9,800**	**160**	**350**	<50	**350**	<500
	2005	**26,000**	**230**	**820**	<200	**820**	<200
	2008	**17,000**	ND	NR	NR	**410**	ND
	2016	**26,000**	**280**	**660**	**12**	**672**	**1.4**
	2019	**5,960**	**113**	**174**	**4.39**	**178.39**	**0.28 J**
	2023	**16,000**	**280**	**410**	**4.1 J**	**414.1**	<2
MW-6	1992	**27**	**10**	NR	NR	**39**	<10
	1992	**34**	**9.4**	NR	NR	**8.9**	<2.5
	2000	**18**	N/A	N/A	N/A	N/A	N/A
	2001	**16**	**3**	<1	<1	<1	<1
	2003	**25**	**5**	NR	NR	<1	<10
	2005	**69**	**4**	**4**	<1	**4**	<1
	2008	**45**	**6**	NR	NR	**5**	ND
	2016	**5.7**	**1.5**	**0.59**	<0.2	**0.59**	<0.2
	2019	**52.6**	**8.64**	**10.2**	<0.2	**10.2**	<0.2
	2023	**39**	**5.6**	**3.7**	<0.75	**3.7**	<0.2
MW-206	2005	**150**	**4**	**12**	<1	**12**	<1
	2008	**130**	**15**	NR	NR	**11**	ND
	2016	**26**	**76**	**56**	**2.5**	**58.5**	**1.3**
	2019	**61.4**	**3.05**	**4.78**	<0.2	**4.78**	<0.2
	2023	**120**	**4.6**	**6.3**	<0.75	**6.3**	**0.23**
MW-7	1992	**10**	<10	NR	NR	<10	<10
	1992	**120**	<10	NR	NR	<10	<10
	2000	<1	<1	<1	<1	<1	<1
	2002	<1	<1	<1	<1	<1	<10
	2005	**4**	<1	**11**	<1	**11**	<1
	2008	ND	ND	NR	NR	ND	ND
	2016	**8.6**	**1**	**2.1**	<0.2	**2.1**	<0.2
	2019	**1.28**	**0.31**	**0.67**	<0.2	**0.67**	<0.2
	2023	**12**	**2.1**	**4.7**	<0.75	**4.7**	<0.2
MW-207	1992	**2,100**	<50	NR	NR	<50	<50
	1992	**390 J**	<500	NR	NR	<500	<500
	2000	**2**	**2**	<1	<1	<1	<1
	2002	**1**	<1	<1	<1	<1	<10
	2005	<1	<1	<1	<1	<1	<1
	2008	ND	ND	NR	NR	ND	ND
	2016	**0.34 J**	<0.2	<0.2	<0.2	<0.2	<0.2
	2019	**2.95**	**0.36 J**	**0.85**	<0.2	**0.85**	<0.2

TABLE 1
Historical Groundwater Data Summary - PCE & Daughter Compounds
Wallkill Wellfield Site, 20 Industrial Place, City of Middletown, Orange County, NY
Liberty Project No. 240331

Monitoring Well	Year	All concentrations in micrograms per liter (µg/L)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,2-DCE (Total)	VC
AWQS		5	5	5	5	5	2
MW-8	2000	<1	<1	<1	<1	<1	<1
	2002	<1	<1	<1	<1	<1	<10
	2005	<1	<1	<1	<1	<1	<1
	2008	ND	ND	NR	NR	ND	ND
MW-9	2000	**1,000**	**85**	**120**	<10	**120**	<10
	2001	**470**	**100**	**320**	**2**	**322**	<1
	2003	**770**	**73**	**85**	<10	**85**	<100
	2005	**500**	**76**	**400**	**4**	**404**	<1
	2008	**820**	**89**	NR	NR	**240**	ND
	2016	**320**	**140**	**330**	**2.8**	**332.8**	<0.2
	2019	**237**	**73.5**	**243**	**2.78**	**245.78**	<0.2
	2023	**470**	**110**	**230**	**1.7 J**	**231.7**	<0.5
MW-209	2005	**300**	**25**	**56**	<1	**56**	<1
	2008	**190**	**32**	NR	NR	**40**	ND
	2016	**11**	**110**	**24**	**0.22 J**	**24.22**	**2.4**
	2019	**2.85**	**15.2**	**86.4**	<1	**86.4**	<1
	2023	**47**	**46**	**26**	**0.27 J**	**26.27**	**2.5**
MW-10	1992	**57**	<0.5	NR	NR	<0.5	<0.5
	1992	**5 J**	<10	NR	NR	<10	<10
	2000	<1	<1	<1	<1	<1	<1
	2002	<1	<1	<1	<1	<1	<10
	2005	<1	<1	<1	<1	<1	<1
	2008	ND	ND	NR	NR	ND	ND
MW-11	1992	PR	PR	PR	PR	PR	PR
	2000	PR	PR	PR	PR	PR	PR
	2003	**740**	**56**	NR	NR	**40**	<100
	2005	**1,600**	**150**	**170**	<10	**170**	<10
	2008	DRY	DRY	DRY	DRY	DRY	DRY
	2016	DRY	DRY	DRY	DRY	DRY	DRY
	2019	**681**	**88.4**	**109**	**0.89**	**108.89**	<0.2
	2023	**1,400**	**100**	**210**	<7.5	**210**	<2
MW-211	2005	**73**	**170**	**98**	<1	**98**	<1
	2008	**23**	**61**	NR	NR	**77**	ND
	2016	**11**	**110**	**21**	<0.2	**21**	**2.3**
	2019	**2.78**	**5.37**	**38**	**0.3 J**	**38.3**	<0.2
	2023	**13**	**6.4**	**3.6**	<0.75	**3.6**	<0.2
MW-12	1992	**140**	<10	NR	NR	<10	<10
	1992	**280**	**3**	NR	NR	<0.5	<0.5
	2000	<1	**5**	<1	<1	<1	<1
	2002	**7**	**2**	<1	<1	<1	<1
	2005	**2**	**4**	<1	<1	<1	<1
	2008	ND	**8**	NR	NR	ND	ND
	2016	<0.2	**1.1**	<0.2	<0.2	<0.2	<0.2
	2019	<0.2	**1.86**	<0.2	<0.2	<0.2	<0.2
	2023	**0.7**	**2.1**	<0.5	<0.75	<0.75	<0.2
W-30	1992	**21**	**76**	**NR**	NR	**8 J**	<10
	2005	<1,000	<1,000	**130,000**	<1,000	**130,000**	<1,000
	2008	**62**	**100**	NR	NR	**790**	**10**
	2016	**1.4**	**1.4**	**2**	**1.4**	**3.4**	<0.2
	2019	**0.29 J**	**7.09**	**1.72**	**1.72**	**3.44**	<0.2
	2023	**3.9**	**82**	**360**	**8.8**	**368.8**	**2.4**
MW-13	1992	**130**	<2.5	NR	NR	<2.5	<2.5
	1992	**2,900**	<1,000	NR	NR	<1,000	<1,000
	2000	**180**	**960**	**22**	<1	**22**	<1
	2001	**140**	**610**	**24**	**1**	**25**	<1
	2002	**87**	**190**	**780**	<10	**780**	<100
	2005	**25**	**200**	**190**	**3**	**193**	<1
	2008	**4**	**59**	NR	NR	**193**	ND
MW-14	1992	**12**	<10	NR	NR	<10	<10
	1992	**140**	<10	NR	NR	<10	<10
	2000	**22,000**	**260**	**800**	<10	**800**	<10
	2001	**6**	**2**	<1	<1	<1	<1
	2002	<1	<1	<1	<1	<1	<10
	2005	<1	1	**2**	<	**2**	<1
MW-15	1992	**4 J**	<10	NR	NR	<10	<10
	1992	**18**	<10	NR	NR	<10	<10
MW-16	1992	**2,400**	**960**	NR	NR	**870**	**7 J**
	2000	**7,000**	**810**	**580**	<10	**580**	<10
	2001	**6,200**	**410**	**360**	<25	**360**	<25
	2002	**2,300**	**160**	**210**	<25	**210**	<250
	2005	**2,100**	**130**	**150**	<50	**150**	<50
	2008	**450**	**260**	NR	NR	**350**	ND
MW-17	1992	**1,200**	**130**	NR	NR	**21 J**	<50
	1992	**1,100**	**110**	NR	NR	**12**	<10
MW-19	2005	**1,300**	**93**	**110**	<10	**110**	<10
	2008	**520**	**42**	NR	NR	**52**	ND
	2016	**140**	**10**	**13**	<0.2	**13**	<0.2
	2019	**365**	**45.9**	**59.4**	**0.34 J**	**59.74**	<0.2
	2023	**140**	**13**	**22**	<0.75	**22**	<0.2
MW-219	2005	**160**	**260**	**49**	<1	**49**	<1
	2008	**220**	**22**	NR	NR	**22**	ND
	2016	**120**	**16**	**11**	<0.2	**11**	<0.2
	2019	**78.7**	**29.7**	**11.6**	<0.2	**11.6**	<0.2
	2023	**100**	**14**	**11**	<0.75	**11**	**0.14 J**
MW-220	2005	**380**	**22**	**64**	<2.0	**64**	<2.0
	2008	**340**	**18**	NR	NR	**38**	ND
	2016	**14**	**15**	**12**	<0.2	**12**	<0.2
	2019	**8.73**	**5.79**	**14**	<0.2	**14**	<0.2
	2023	**48**	**6.3**	**12**	<0.75	**12**	<0.2

Notes:
Results are reported in ug/L
AWQS = Ambient Water Quality Standard
N/A = Not Applicable or Not Available
NA = Not Analyzed
ND = Non-Detect
NR = Not Reported
PR = Poor Recovery
PCE = Tetrachloroethylene
TCE = Trichloroethylene
1,2-DCE = 1,2-Dichloroethylene
VC = Vinyl Chloride
"J" values indicate a concentration above the laboratory method detection limit but below the laboratory reporting limit. This is an estimated value.
Values preceeded by "<" are less than the laboratory method detection limit.
Values in bold were detected above the laboratory method detection limit
Values in bold and yellow shading exceed the applicable AWQS.

TABLE 2
Summary of Groundwater Trends - Overburden Wells (PCE & Daughter Compounds)

Wallkill Wellfield Site, 20 Industrial Place, City of Middletown, Orange County, NY
Liberty Project No. 240331

Well ID	Parameters Exceeding AWQS	# of Sampling Events with Data	Linear Regression		GSI MK Toolkit		
			Concentration Trend	R^2	Concentration Trend	Coefficient of Variation	MK Statistic
MW-2	PCE	7	Decreasing	0.594	Stable	0.91	-8
MW-3	PCE	10	Decreasing	0.475	Decreasing	0.89	-25
	TCE		Decreasing	0.7058	Decreasing	0.86	-36
	1,2-DCE		Decreasing	0.3772	Prob. Decreasing	0.75	-17
MW-4	PCE	10	Decreasing	0.5506	Decreasing	0.72	-28
	TCE		Decreasing	0.3473	Decreasing	0.78	-24
	1,2-DCE		Decreasing	0.5252	Decreasing	0.73	-23
MW-5	PCE	9	Decreasing	0.284	Stable	0.54	-13
	TCE		Increasing	0.0004	No Trend	0.29	3
	1,2-DCE		Decreasing	0.2254	Stable	0.53	-8
MW-6	PCE	10	Increasing	0.0352	No Trend	0.57	7
	TCE	9	Decreasing	0.149	Stable	0.5	-8
	1,2-DCE	9	Decreasing	0.2286	No Trend	1.48	-7
MW-7	PCE	9	Decreasing	0.2054	No Trend	2.06	1
MW-9	PCE	8	Decreasing	0.4376	Prob. Decreasing	0.46	-13
	TCE		Increasing	0.1674	No Trend	0.25	6
	1,2-DCE		Increasing	0.0369	No Trend	0.43	2
MW-11	PCE	4	Increasing	0.00005	Stable	0.42	0
	TCE		Decreasing	0.0008	No Trend	0.4	2
	1,2-DCE		Increasing	0.3202	No Trend	0.56	4
MW-12	PCE	9	Decreasing	0.4723	Decreasing	1.92	-17
MW-13	PCE	7	Decreasing	0.3759	Decreasing	2.15	-15
	TCE		Decreasing	0.1302	Stable	0.98	-7
	1,2-DCE		Decreasing	0.0706	No Trend	1.28	6
MW-14	PCE	6	Increasing	0.0136	No Trend	2.43	-8
MW-16	PCE	6	Decreasing	0.0945	Decreasing	0.76	-11
	TCE		Decreasing	0.6832	Decreasing	0.77	-11
	1,2-DCE		Decreasing	0.6887	Decreasing	0.63	-11
MW-19	PCE	5	Decreasing	0.686	Prob. Decreasing	0.97	-7
	TCE		Decreasing	0.5742	Stable	0.82	-4
	1,2-DCE		Decreasing	0.5207	Stable	0.74	-4

Notes:
AWQS = Ambient Water Quality Standard
MK = Mann Kendall
PCE = Tetrachloroethylene
TCE = Trichloroethylene
1,2-DCE = 1,2-Dichloroethylene
VC = Vinyl Chloride

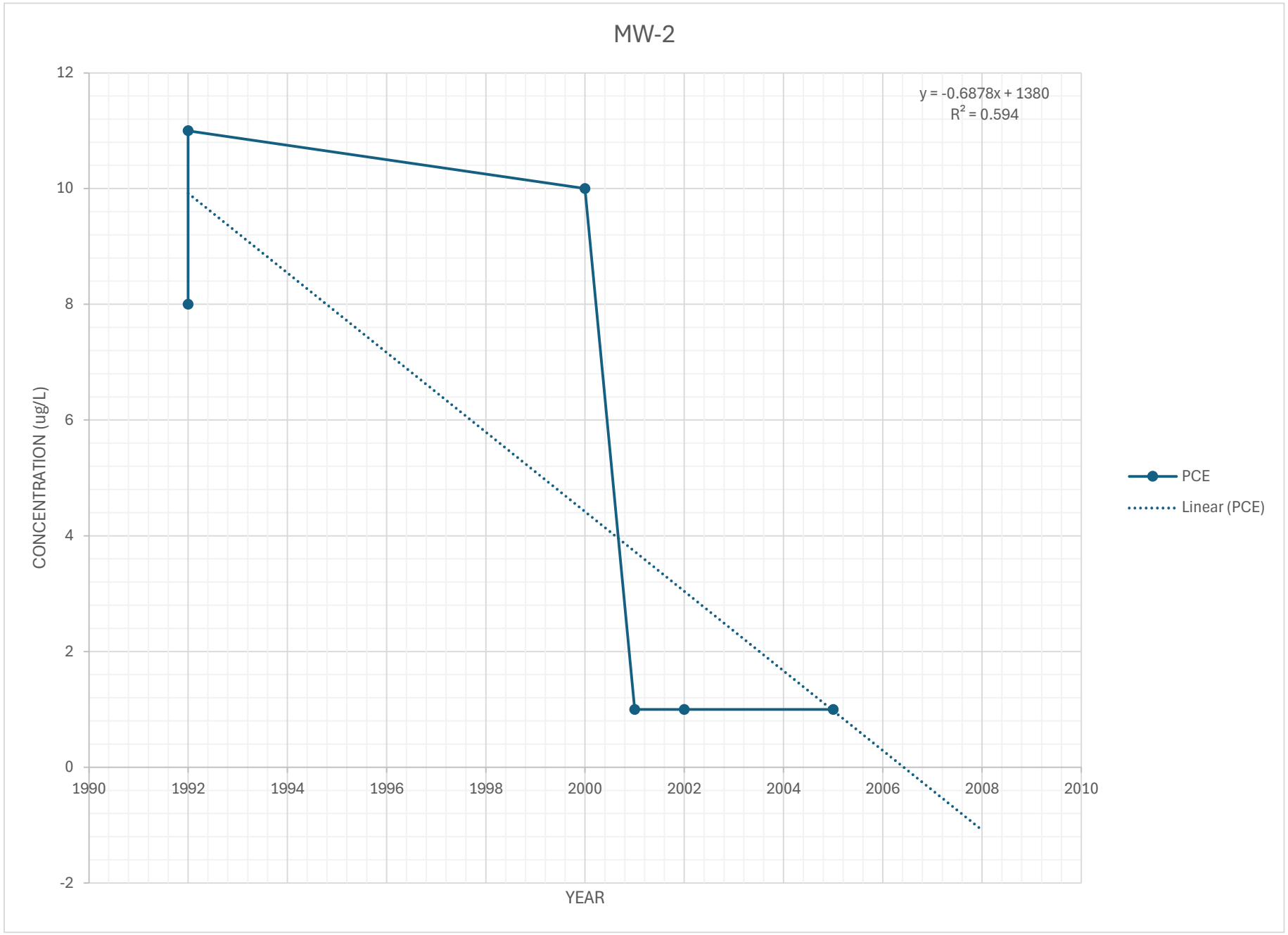
TABLE 3
Summary of Groundwater Trends - Bedrock Wells (PCE & Daughter Compounds)

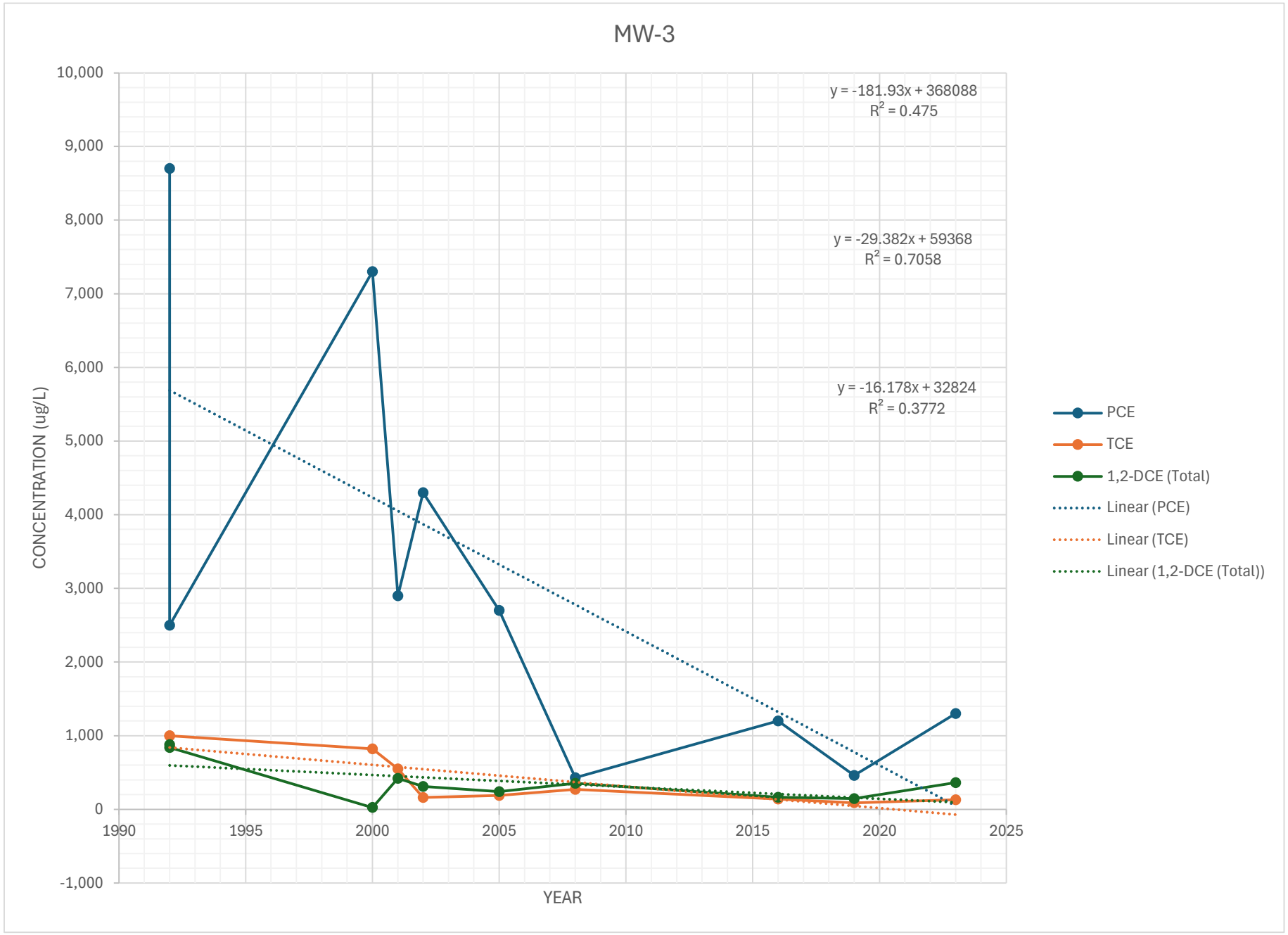
Wallkill Wellfield Site, 20 Industrial Place, City of Middletown, Orange County, NY
Liberty Project No. 240331

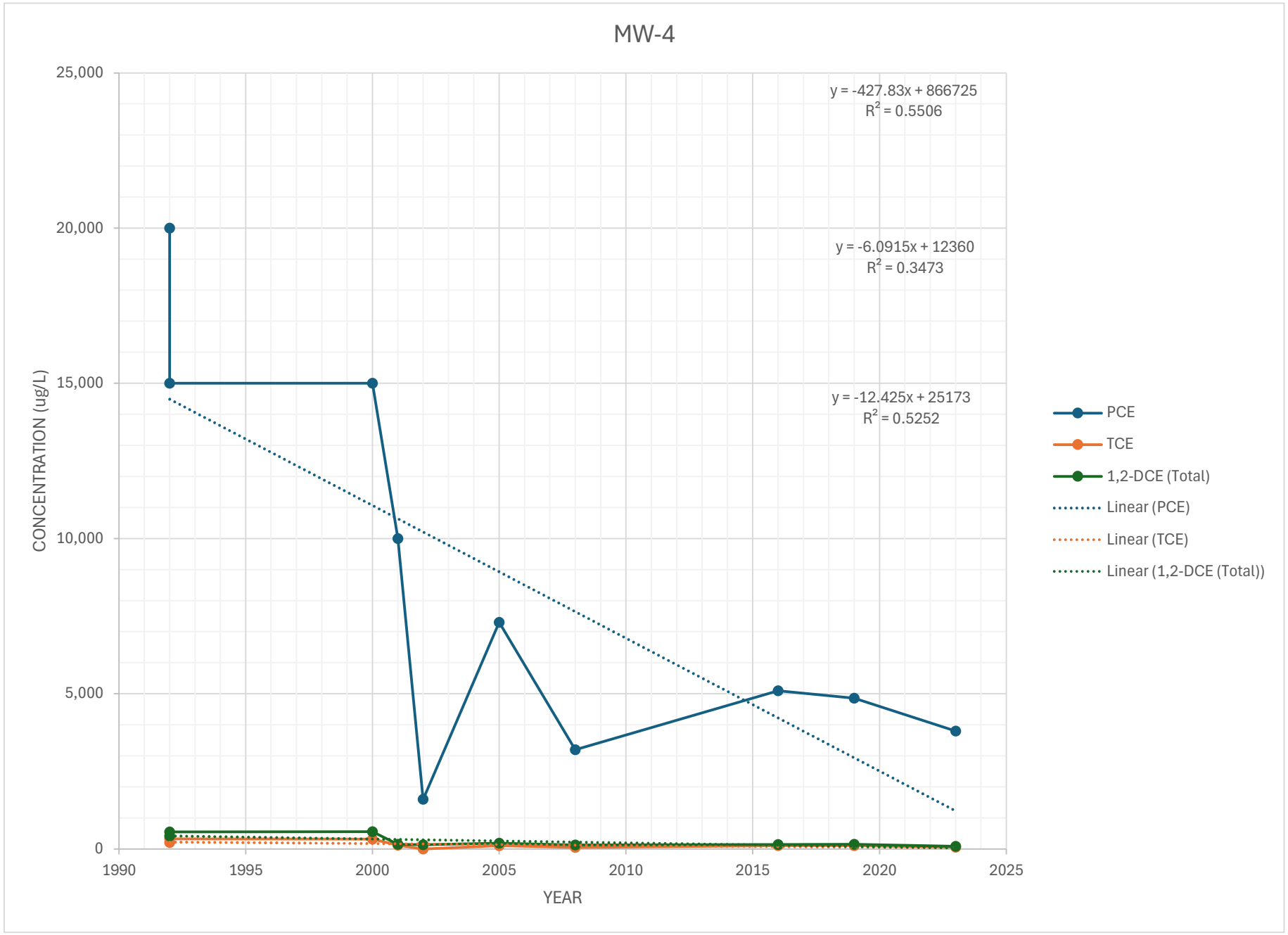
Well ID	Parameters Exceeding AWQS	# of Sampling Events with Data	Linear Regression		GSI MK Toolkit		
			Concentration Trend	R^2	Concentration Trend	Coefficient of Variation	MK Statistic
MW-202	PCE	8	Decreasing	0.3428	No Trend	1.99	-8
	TCE		Increasing	0.4064	No Trend	0.64	5
	1,2-DCE		Increasing	0.6801	Increasing	0.63	20
MW-203	PCE	10	Decreasing	0.365	Decreasing	1.18	-24
	TCE		Decreasing	0.5343	Decreasing	0.98	-22
	1,2-DCE		Decreasing	0.578	Decreasing	0.7	-29
MW-204	PCE	10	Decreasing	0.044	Stable	0.98	-9
	TCE		Decreasing	0.1699	Stable	0.61	-15
	1,2-DCE		Decreasing	0.2421	Prob. Decreasing	0.68	-19
MW-206	PCE	5	Decreasing	0.2554	Stable	0.53	-4
	TCE		Increasing	0.0043	No Trend	1.53	0
	1,2-DCE		Increasing	0.00006	No Trend	1.22	-4
MW-207	PCE	8	Decreasing	0.3411	Prob. Decreasing	2.19	-12
MW-209	PCE	5	Decreasing	0.7931	No Trend	1.18	-6
	TCE		Increasing	0.0475	No Trend	0.83	2
	1,2-DCE		Decreasing	0.0091	Stable	0.55	-2
	VC		Increasing	0.3345	No Trend	0.49	3
MW-211	PCE	5	Decreasing	0.6239	No Trend	1.14	-6
	TCE		Decreasing	0.6121	Stable	1	-6
	1,2-DCE		Decreasing	0.9108	Decreasing	0.82	-8
W-30	PCE	6	Decreasing	0.0697	No Trend	2.21	-7
	TCE		Decreasing	0.0764	No Trend	1.84	-3
	1,2-DCE		Decreasing	0.0567	No Trend	2.42	-3
	VC		Decreasing	0.0612	No Trend	2.38	-7
MW-219	PCE	5	Decreasing	0.6563	Stable	0.41	-6
	TCE		Decreasing	0.4776	No Trend	1.57	-6
	1,2-DCE		Decreasing	0.7072	Prob. Decreasing	0.78	-7
MW-220	PCE	5	Decreasing	0.8386	No Trend	1.17	-6
	TCE		Decreasing	0.8887	Decreasing	0.53	-8
	1,2-DCE		Decreasing	0.8317	Prob. Decreasing	0.82	-7

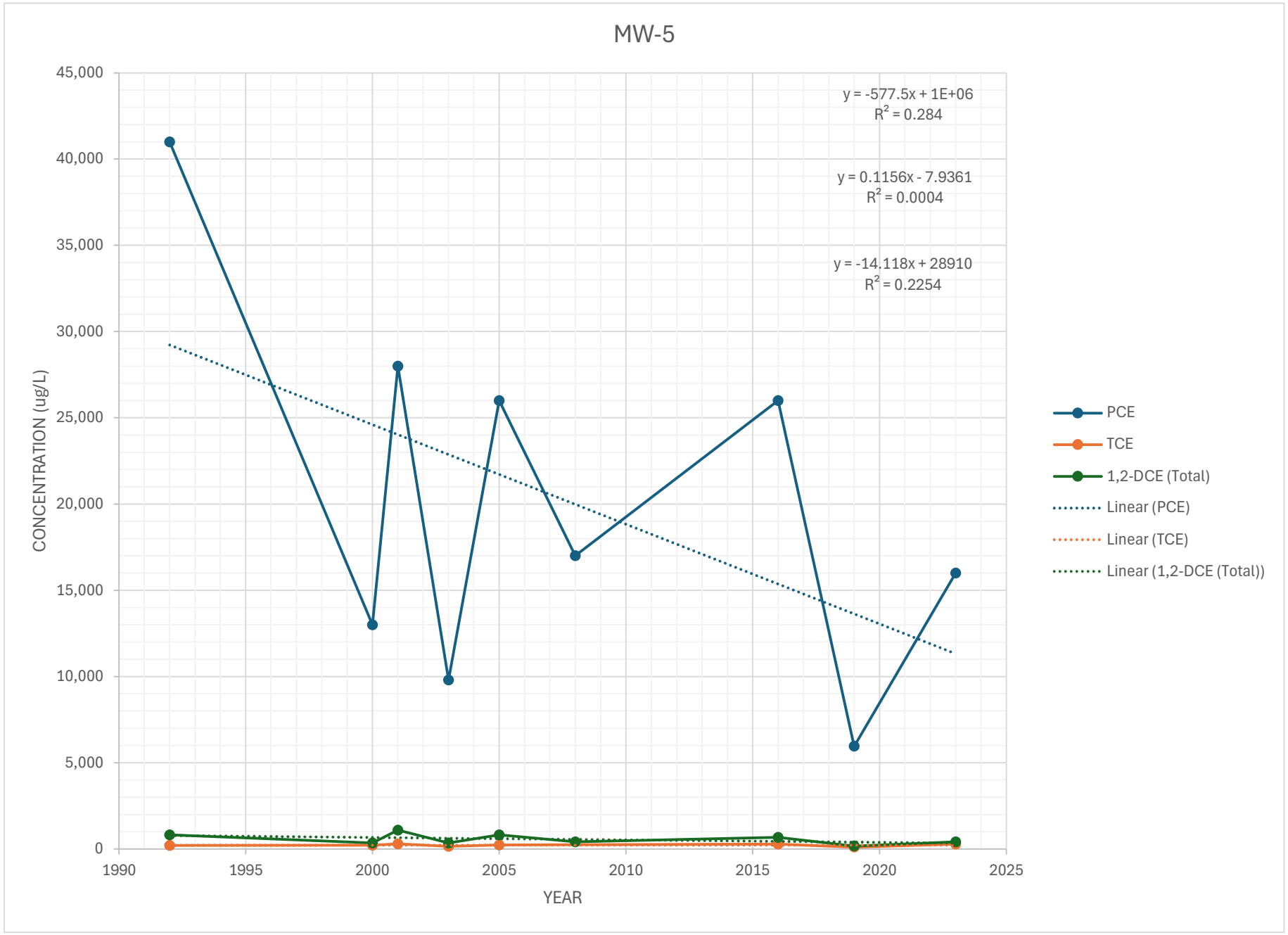
Notes:
AWQS = Ambient Water Quality Standard
MK = Mann Kendall
PCE = Tetrachloroethylene
TCE = Trichloroethylene
1,2-DCE = 1,2-Dichloroethylene
VC = Vinyl Chloride

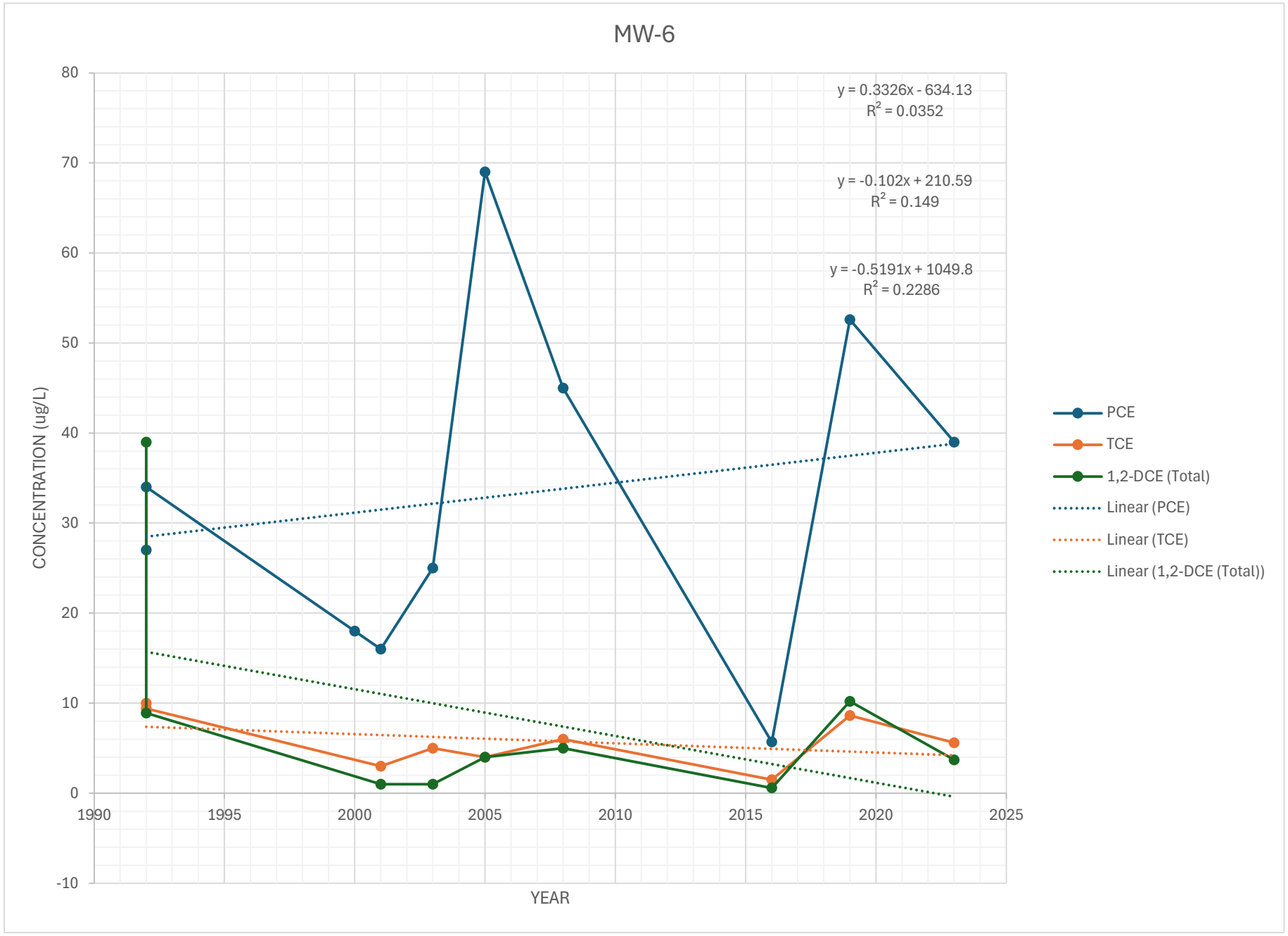
ATTACHMENT 1
LINEAR REGRESSION TREND GRAPHS

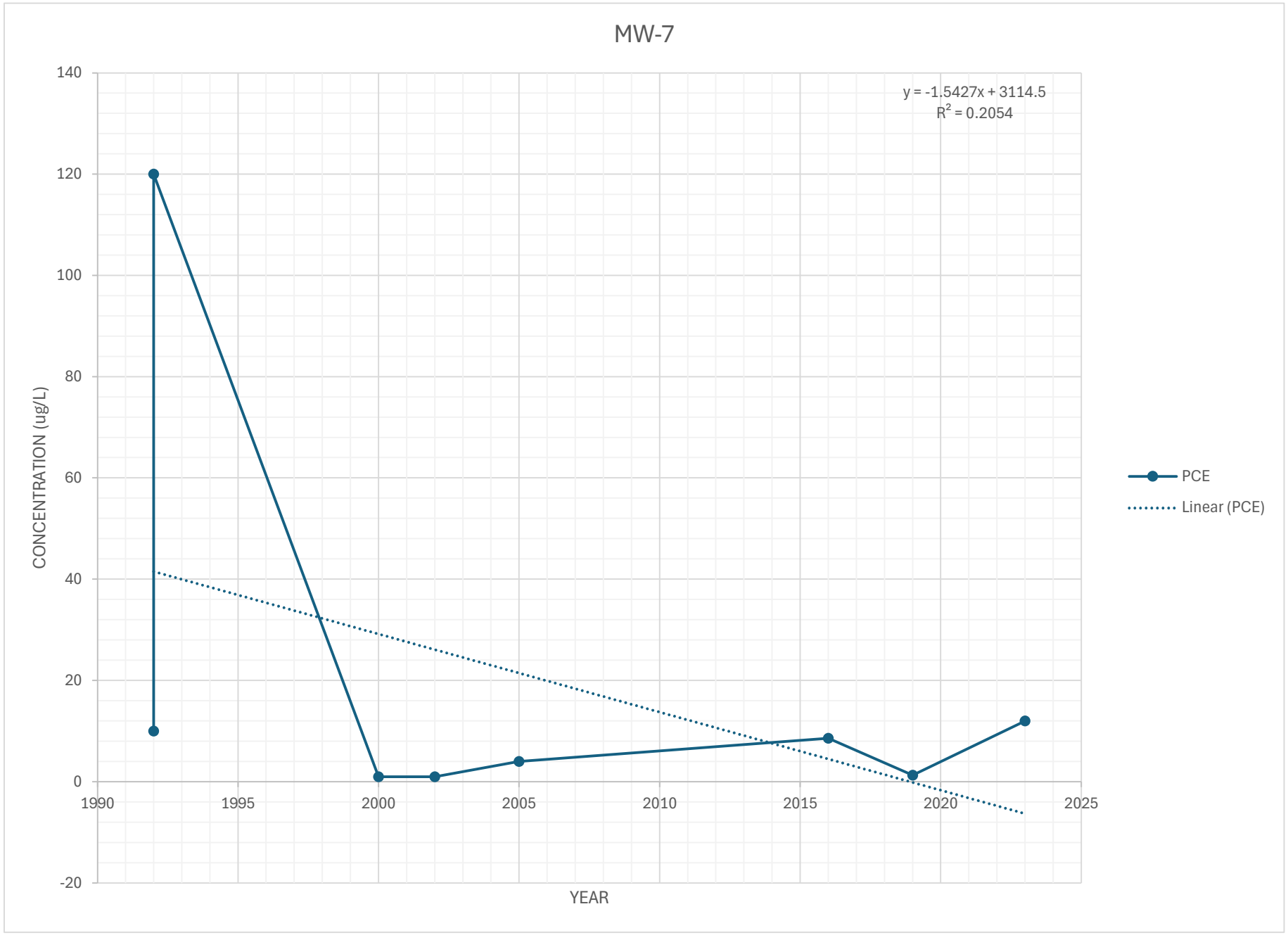

MW-2
y = -0.6878x + 1380
R² = 0.594
CONCENTRATION (ug/L)
YEAR
12
10
8
6
4
2
0
-2
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
PCE
Linear (PCE)

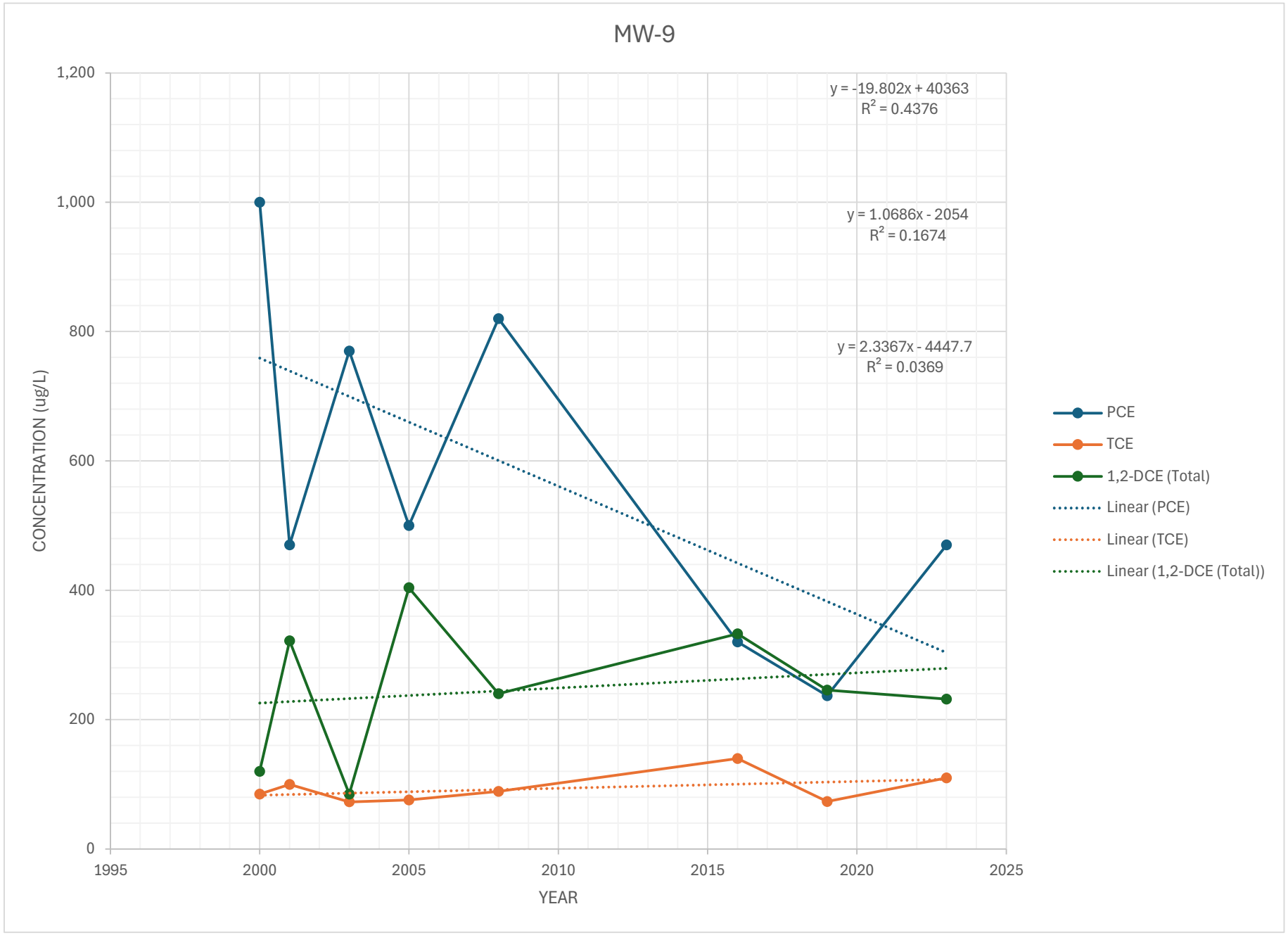

MW-3
y = -181.93x + 368088
R2 = 0.475
y = -29.382x + 59368
R2 = 0.7058
y = -16.178x + 32824
R2 = 0.3772
CONCENTRATION (ug/L)
YEAR
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
-1,000
1990
1995
2000
2005
2010
2015
2020
2025
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))

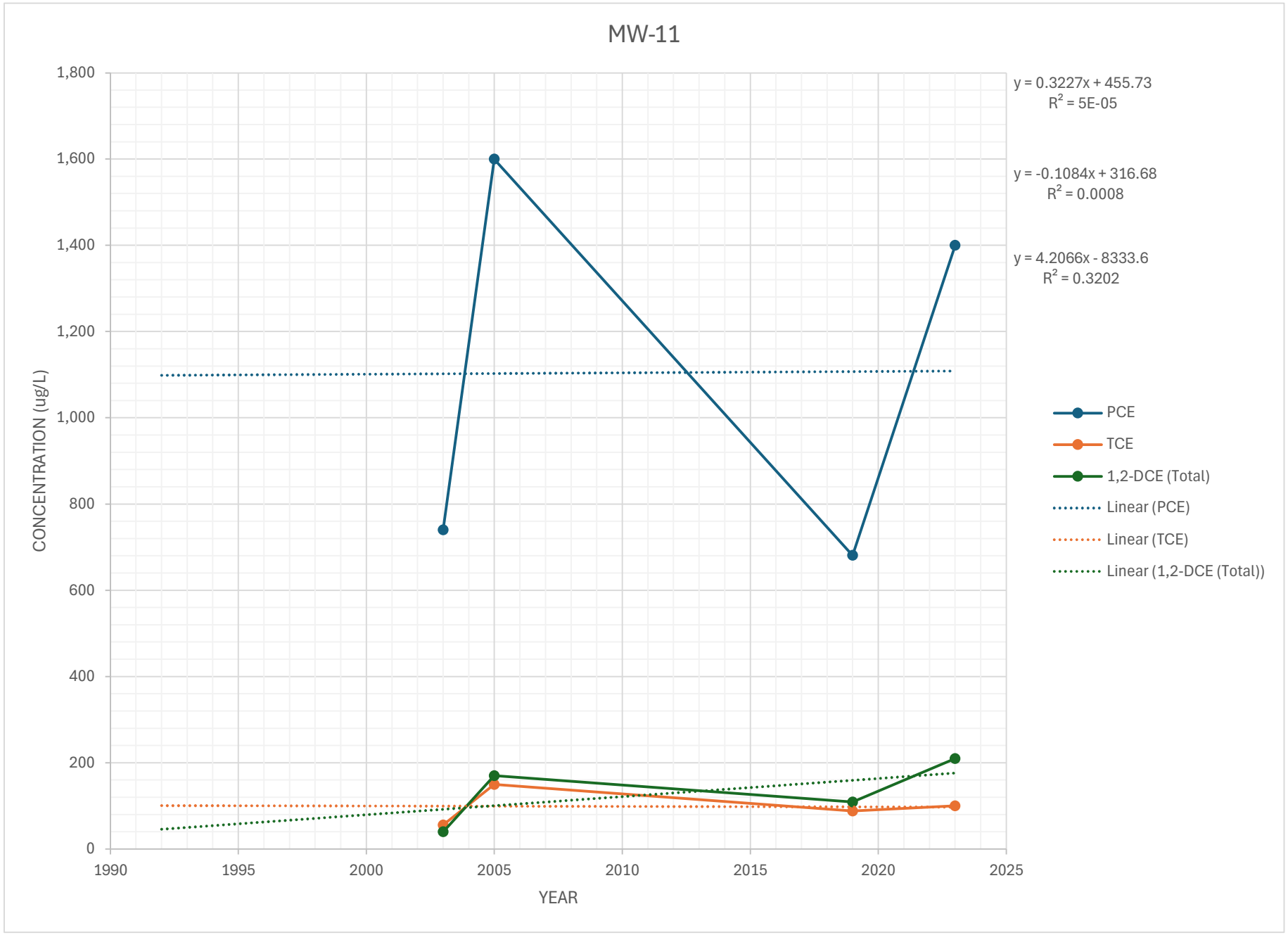

MW-4
25,000
20,000
15,000
10,000
5,000
0
CONCENTRATION (ug/L)
1990
1995
2000
2005
2010
2015
2020
2025
YEAR
y = -427.83x + 866725
R2 = 0.5506
y = -6.0915x + 12360
R2 = 0.3473
y = -12.425x + 25173
R2 = 0.5252
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))

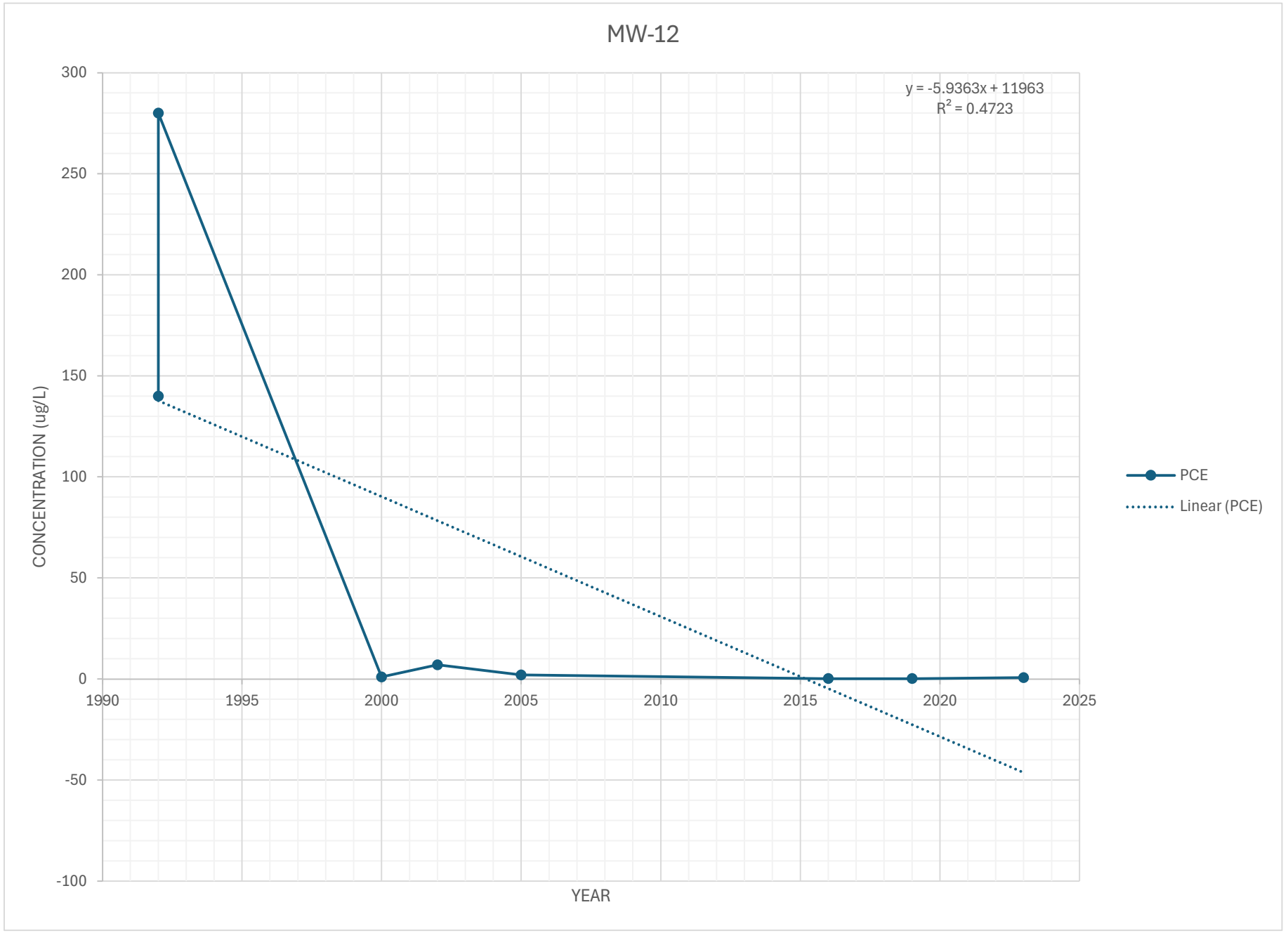

MW-5
y = -577.5x + 1E+06
R2 = 0.284
y = 0.1156x - 7.9361
R2 = 0.0004
y = -14.118x + 28910
R2 = 0.2254
CONCENTRATION (ug/L)
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1990
1995
2000
2005
2010
2015
2020
2025
YEAR
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))

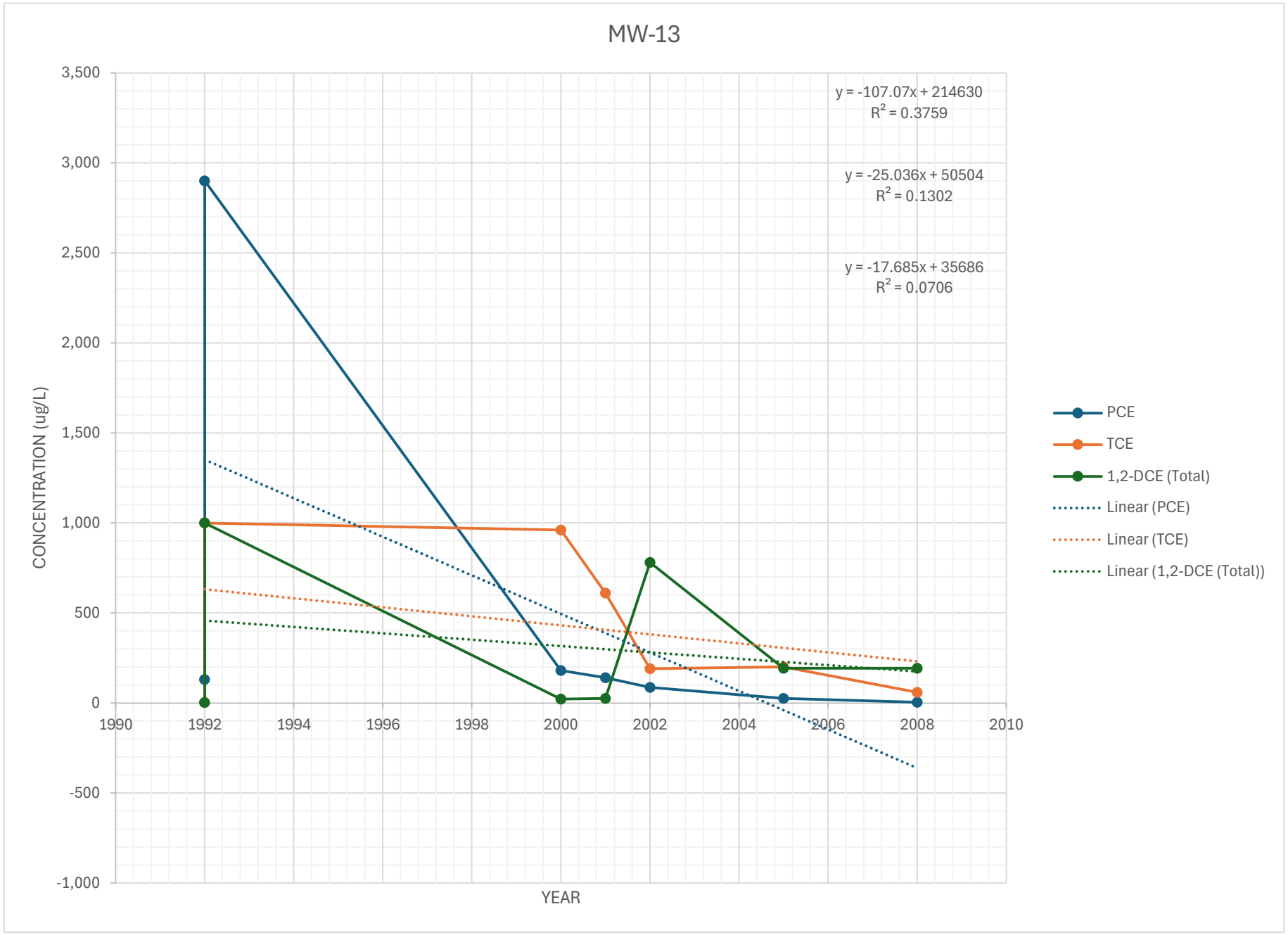

MW-6
y = 0.3326x - 634.13
R² = 0.0352
y = -0.102x + 210.59
R² = 0.149
y = -0.5191x + 1049.8
R² = 0.2286
CONCENTRATION (ug/L)
YEAR
80
70
60
50
40
30
20
10
0
-10
1990
1995
2000
2005
2010
2015
2020
2025
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))

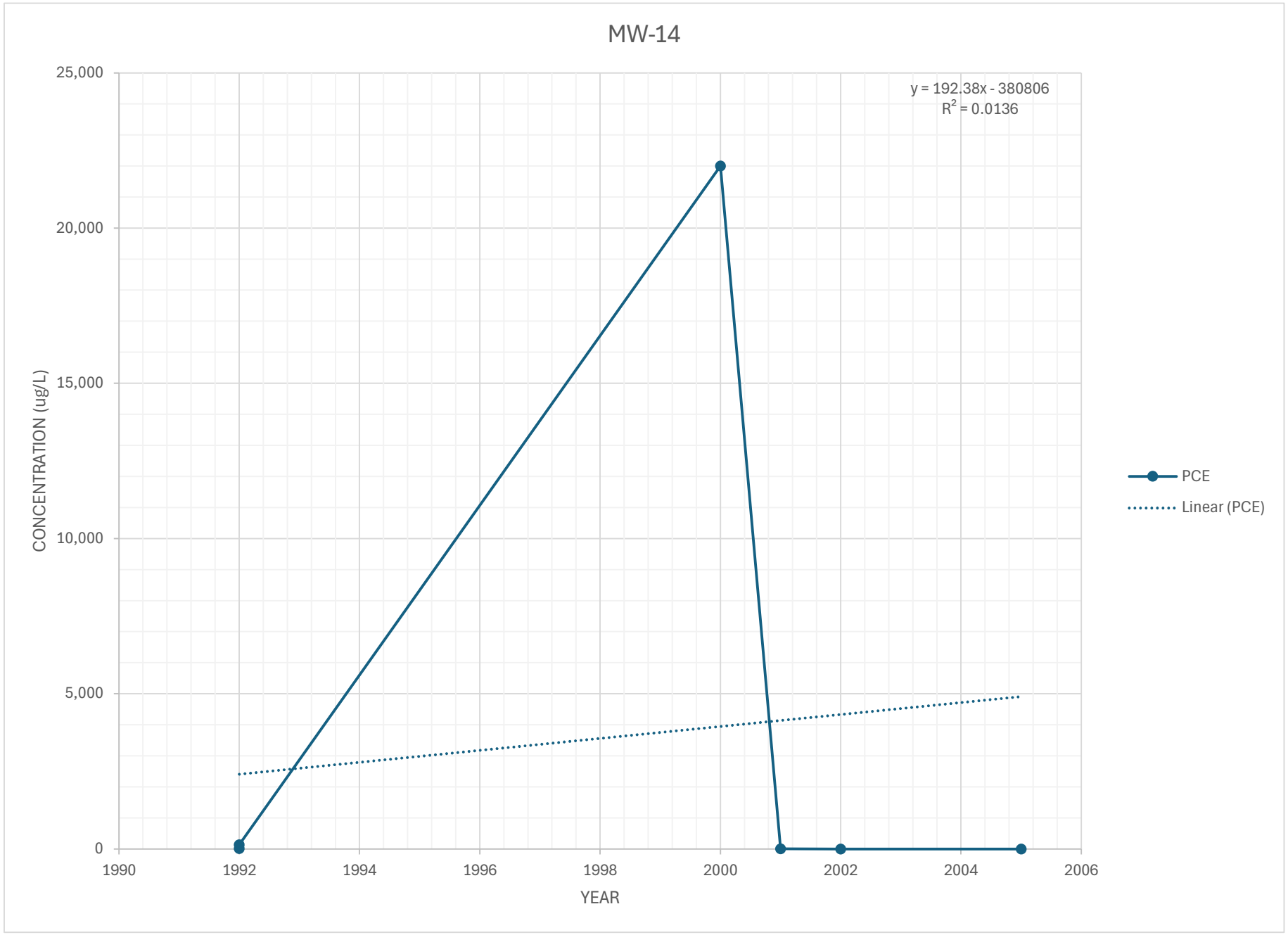

MW-7
y = -1.5427x + 3114.5
R2 = 0.2054
140
120
100
80
60
40
20
0
-20
1990
1995
2000
2005
2010
2015
2020
2025
CONCENTRATION (ug/L)
YEAR
PCE
Linear (PCE)

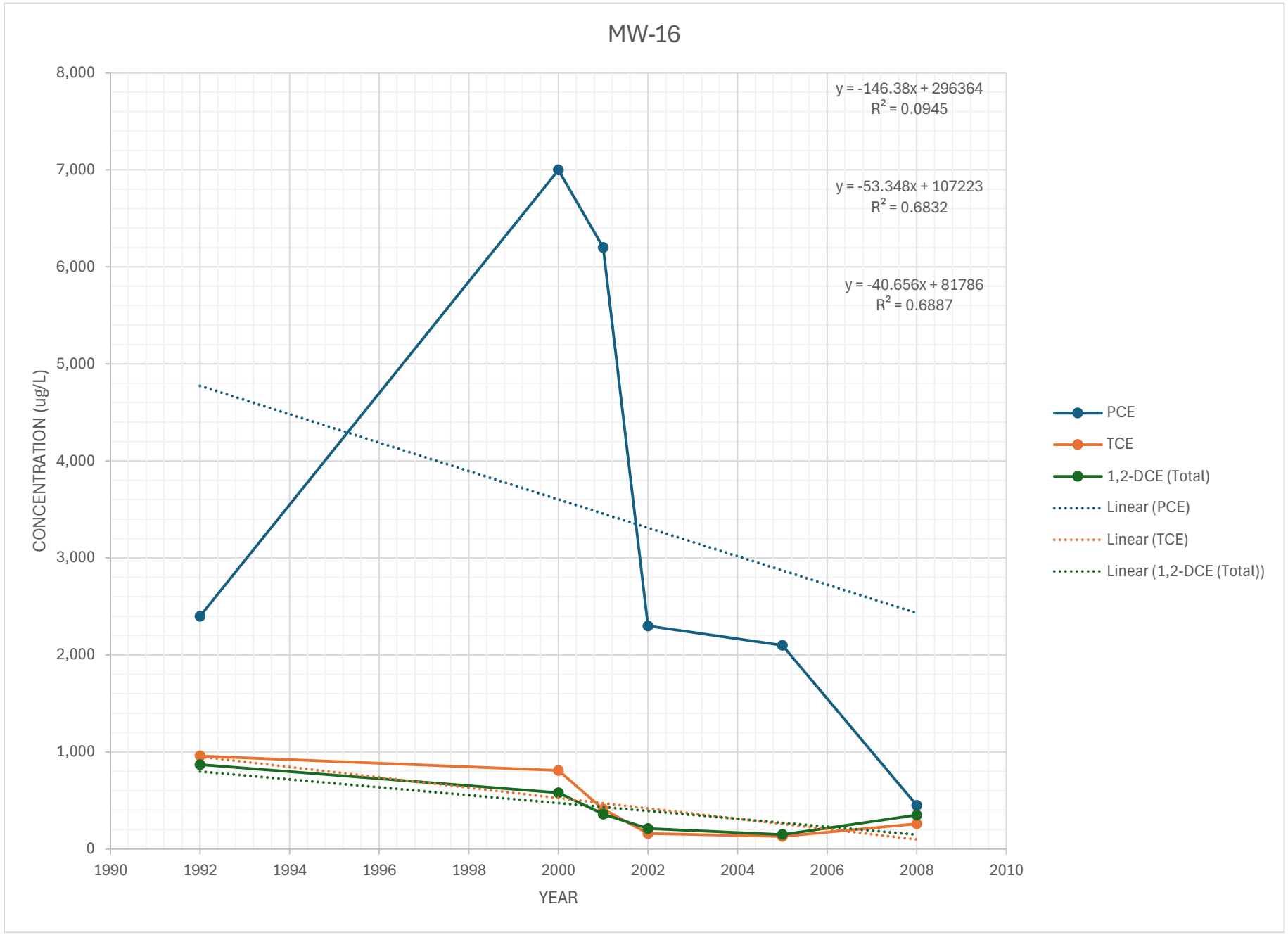

MW-9
y = -19.802x + 40363
R² = 0.4376
y = 1.0686x - 2054
R² = 0.1674
y = 2.3367x - 4447.7
R² = 0.0369
CONCENTRATION (ug/L)
YEAR
0
200
400
600
800
1,000
1,200
1995
2000
2005
2010
2015
2020
2025
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))

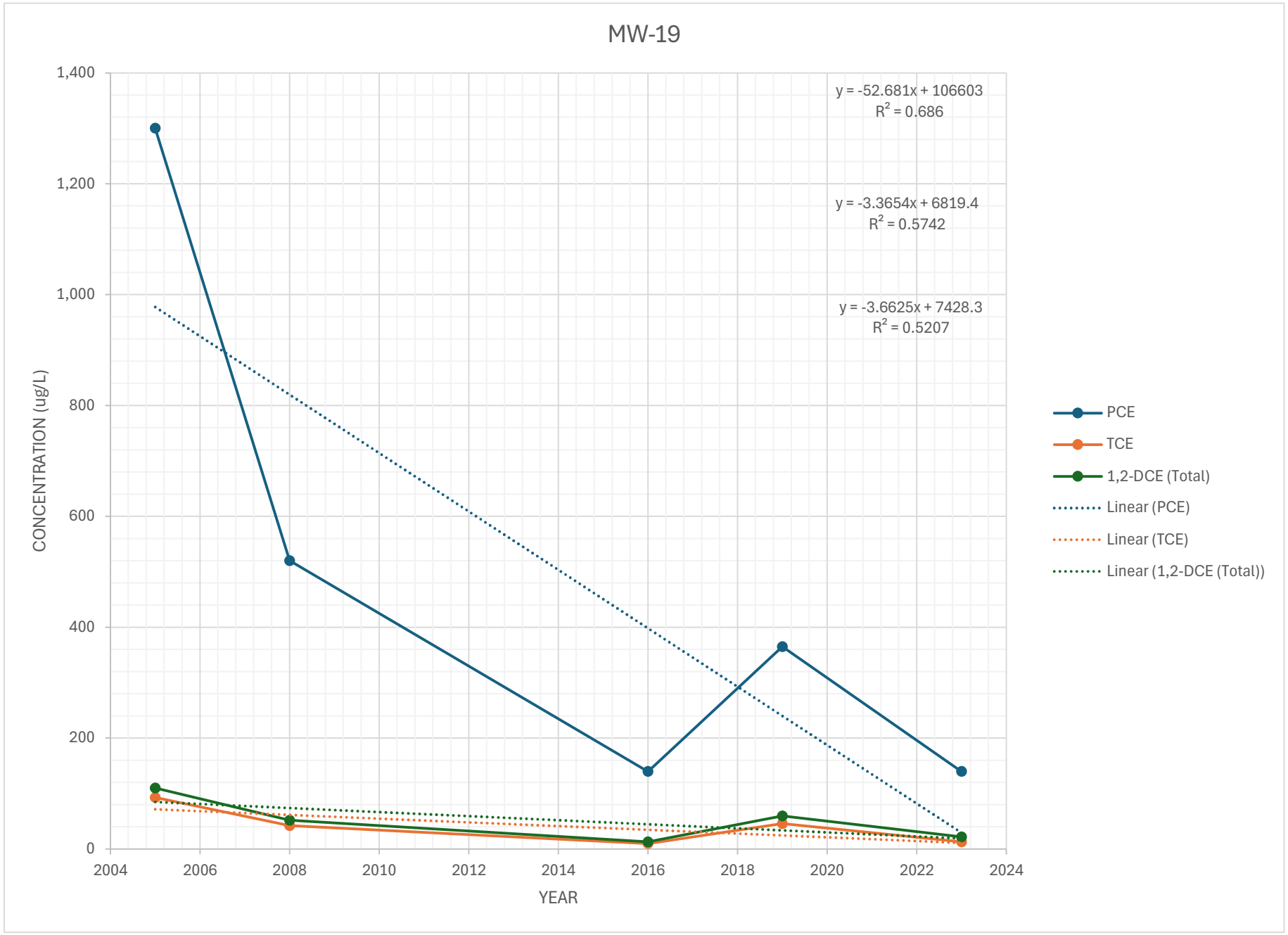

MW-11
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
CONCENTRATION (ug/L)
1990
1995
2000
2005
2010
2015
2020
2025
YEAR
y = 0.3227x + 455.73
R2 = 5E-05
y = -0.1084x + 316.68
R2 = 0.0008
y = 4.2066x - 8333.6
R2 = 0.3202
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))

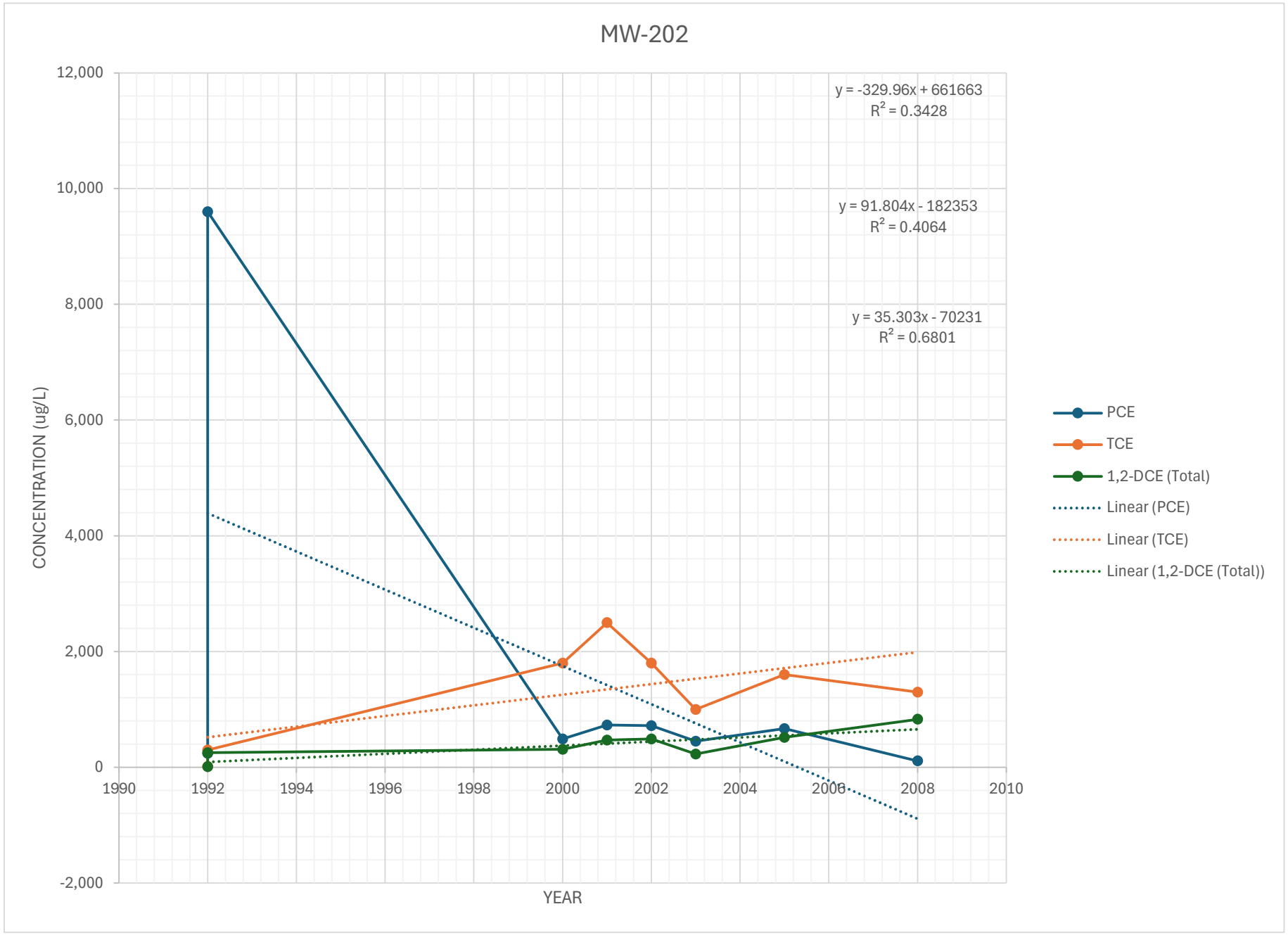

MW-12
y = -5.9363x + 11963
R2 = 0.4723
300
250
200
150
100
50
0
-50
-100
CONCENTRATION (ug/L)
1990
1995
2000
2005
2010
2015
2020
2025
YEAR
PCE
Linear (PCE)

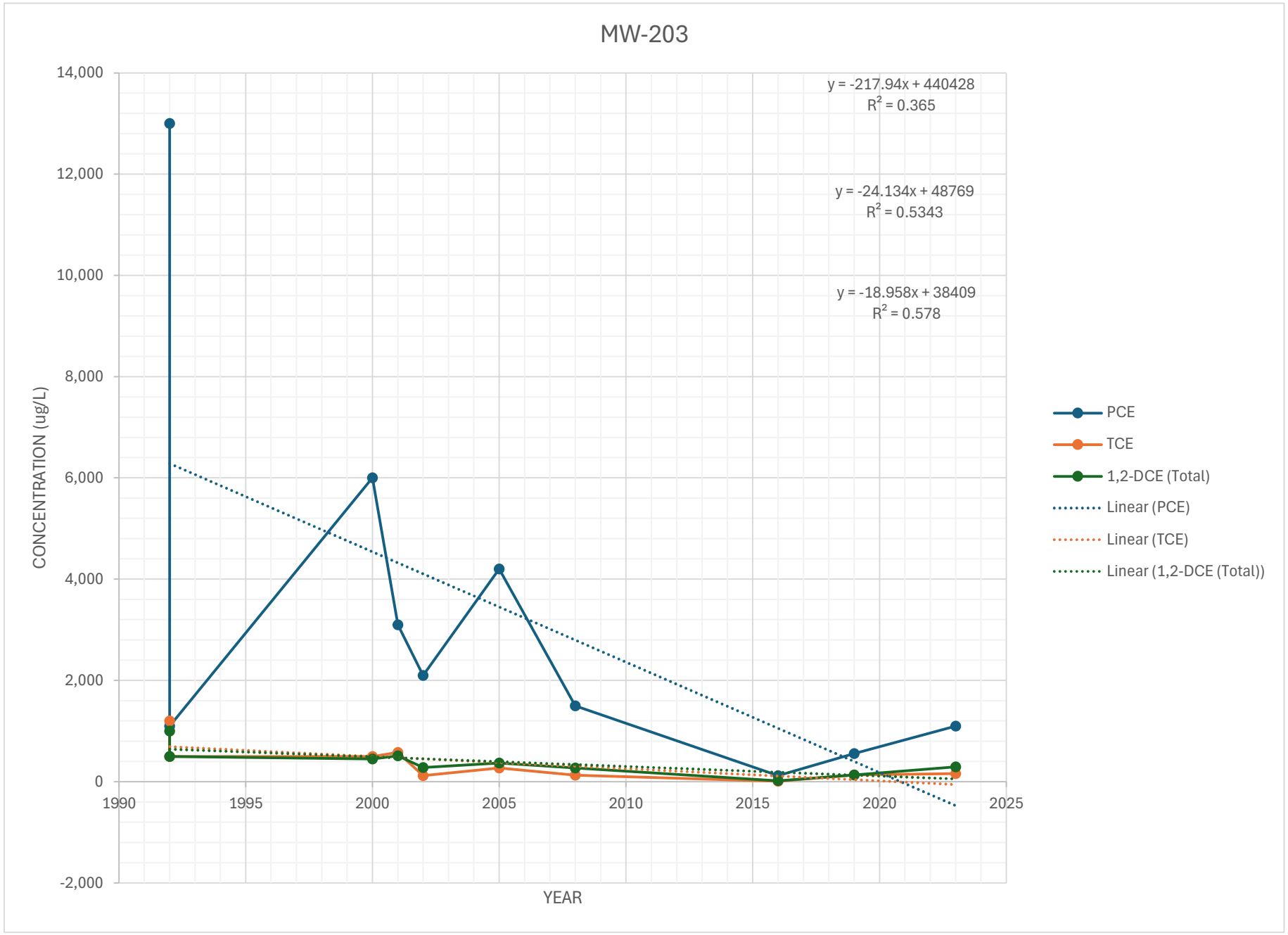

MW-13
y = -107.07x + 214630
R² = 0.3759
y = -25.036x + 50504
R² = 0.1302
y = -17.685x + 35686
R² = 0.0706
CONCENTRATION (ug/L)
YEAR
3,500
3,000
2,500
2,000
1,500
1,000
500
0
-500
-1,000
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))

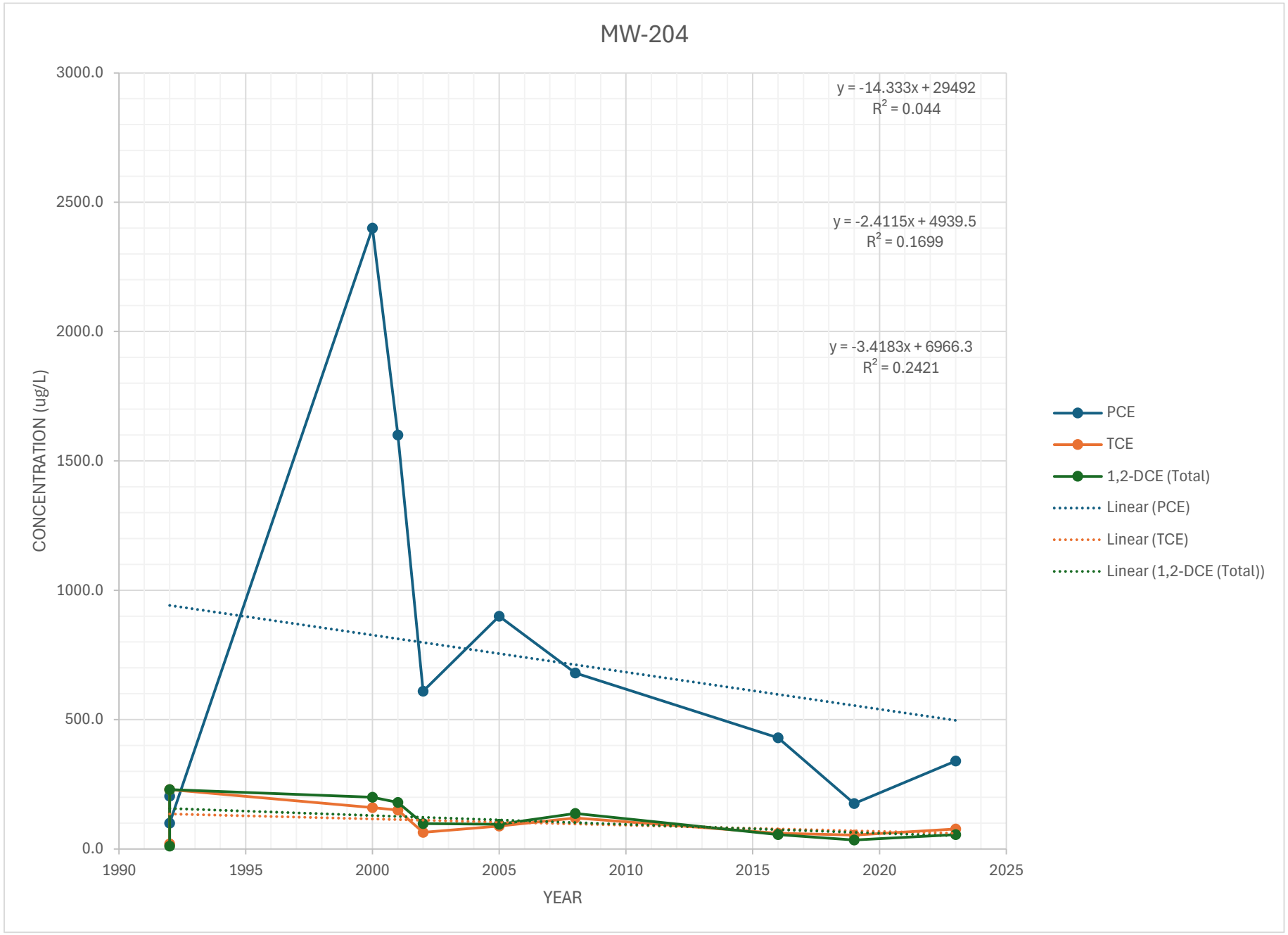

MW-14
y = 192.38x - 380806
R2 = 0.0136
25,000
20,000
15,000
10,000
5,000
0
CONCENTRATION (ug/L)
1990
1992
1994
1996
1998
2000
2002
2004
2006
YEAR
PCE
Linear (PCE)

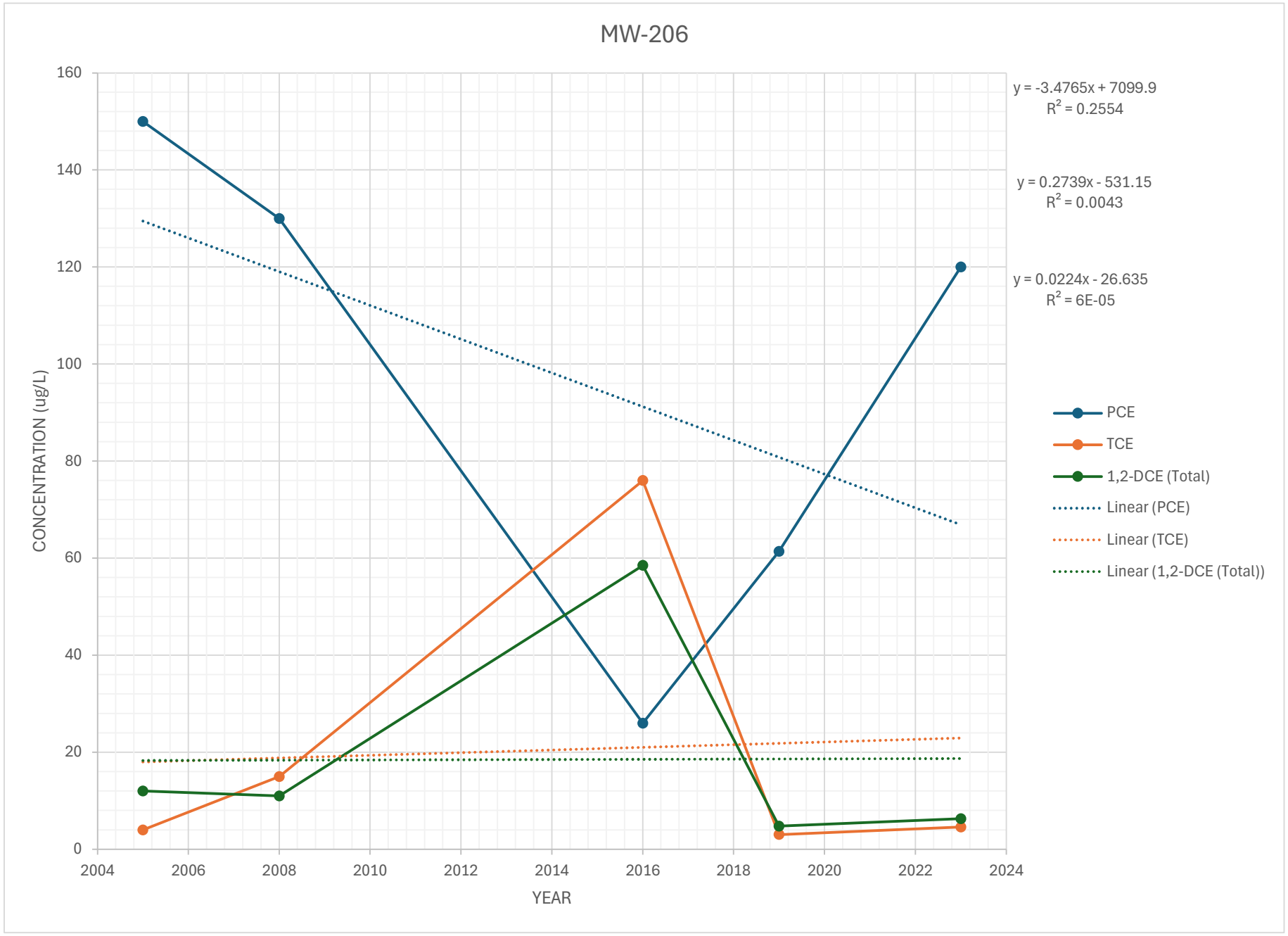

MW-16
y = -146.38x + 296364
R2 = 0.0945
y = -53.348x + 107223
R2 = 0.6832
y = -40.656x + 81786
R2 = 0.6887
CONCENTRATION (ug/L)
YEAR
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))

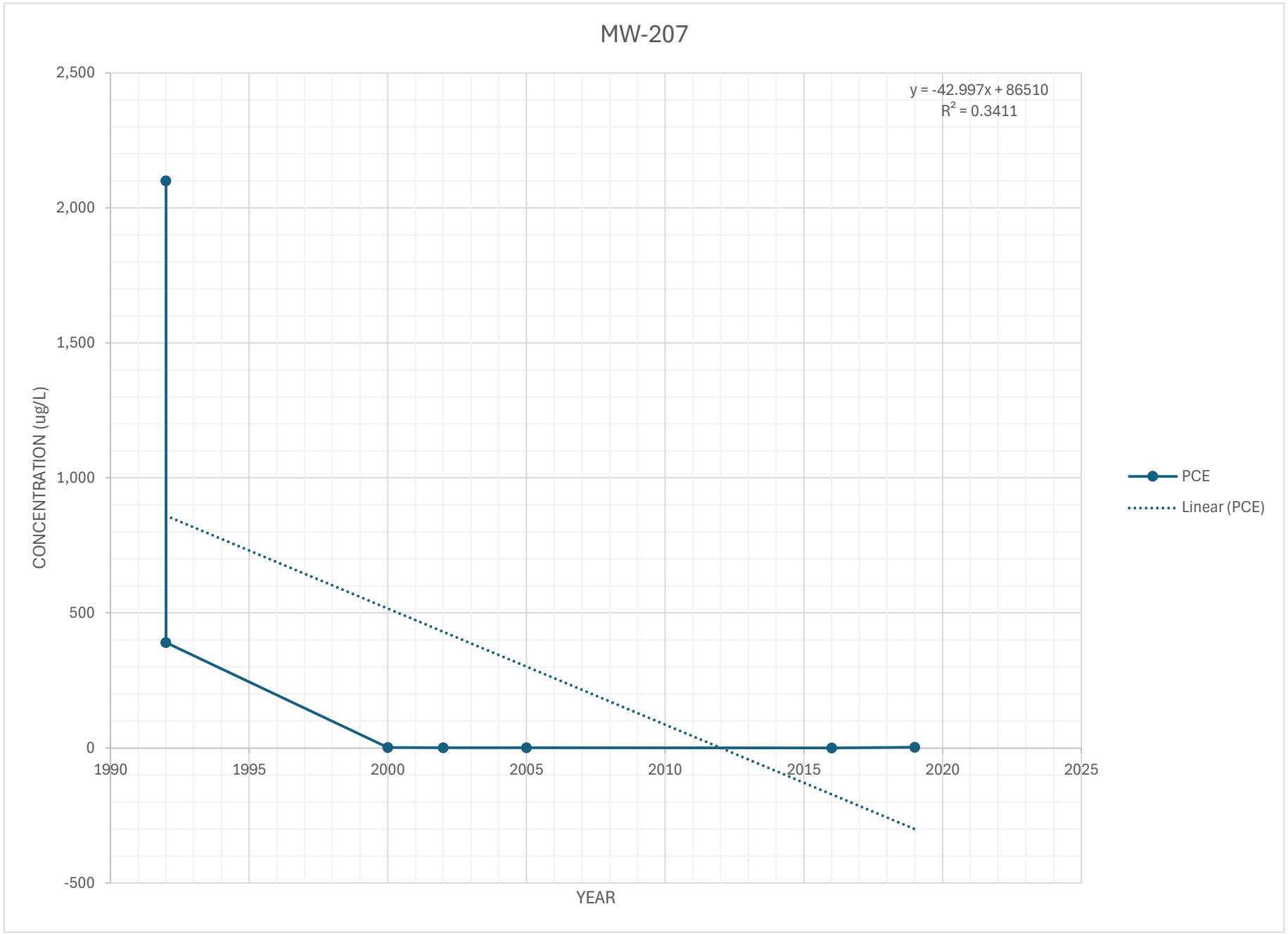

MW-19
y = -52.681x + 106603
R² = 0.686
y = -3.3654x + 6819.4
R² = 0.5742
y = -3.6625x + 7428.3
R² = 0.5207
CONCENTRATION (ug/L)
YEAR
0
200
400
600
800
1,000
1,200
1,400
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))

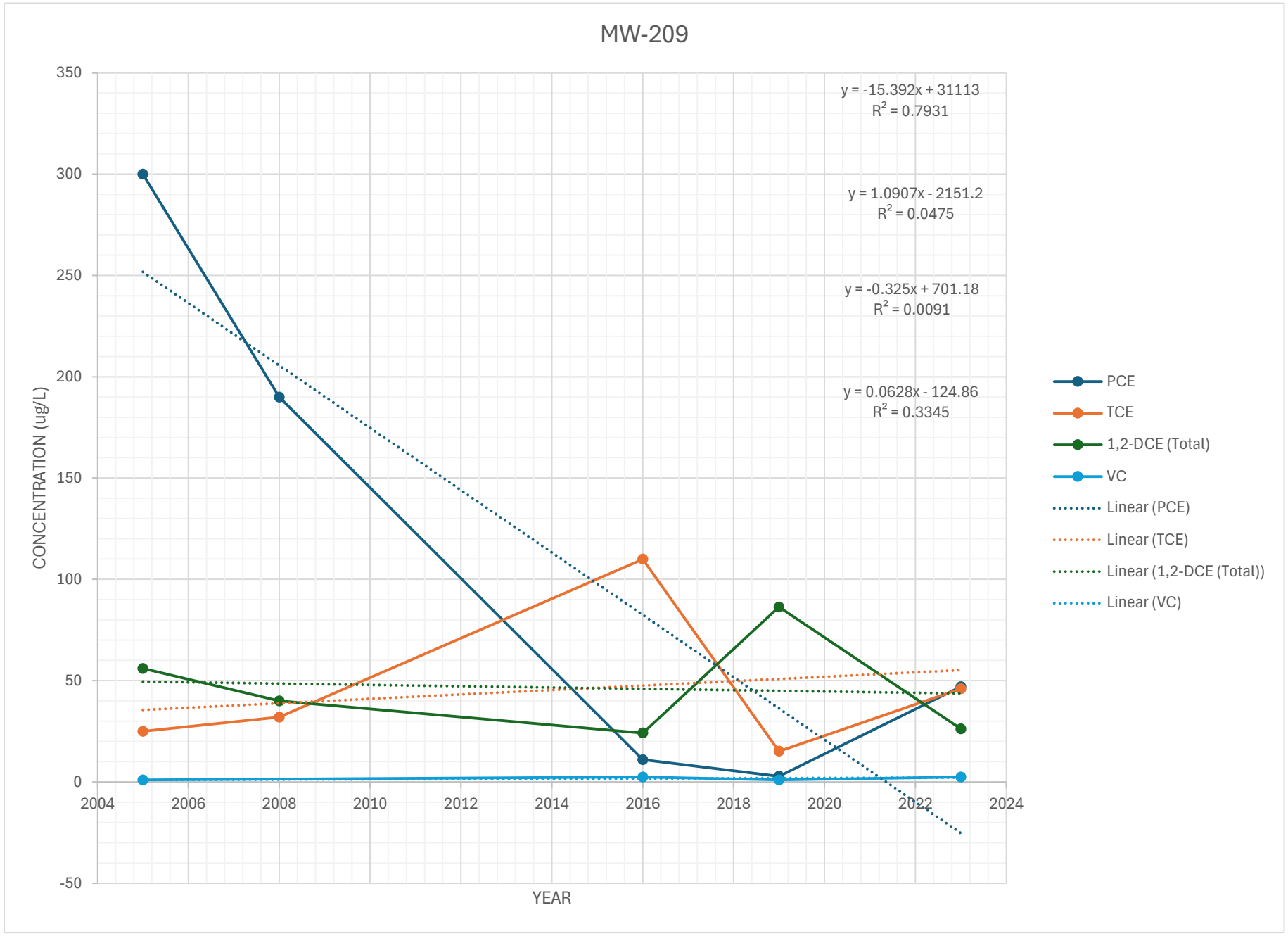

MW-202
y = -329.96x + 661663
R² = 0.3428
y = 91.804x - 182353
R² = 0.4064
y = 35.303x - 70231
R² = 0.6801
12,000
10,000
8,000
6,000
4,000
2,000
0
-2,000
CONCENTRATION (ug/L)
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
YEAR
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))


MW-203
y = -217.94x + 440428
R2 = 0.365
y = -24.134x + 48769
R2 = 0.5343
y = -18.958x + 38409
R2 = 0.578
CONCENTRATION (ug/L)
YEAR
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
-2,000
1990
1995
2000
2005
2010
2015
2020
2025
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))

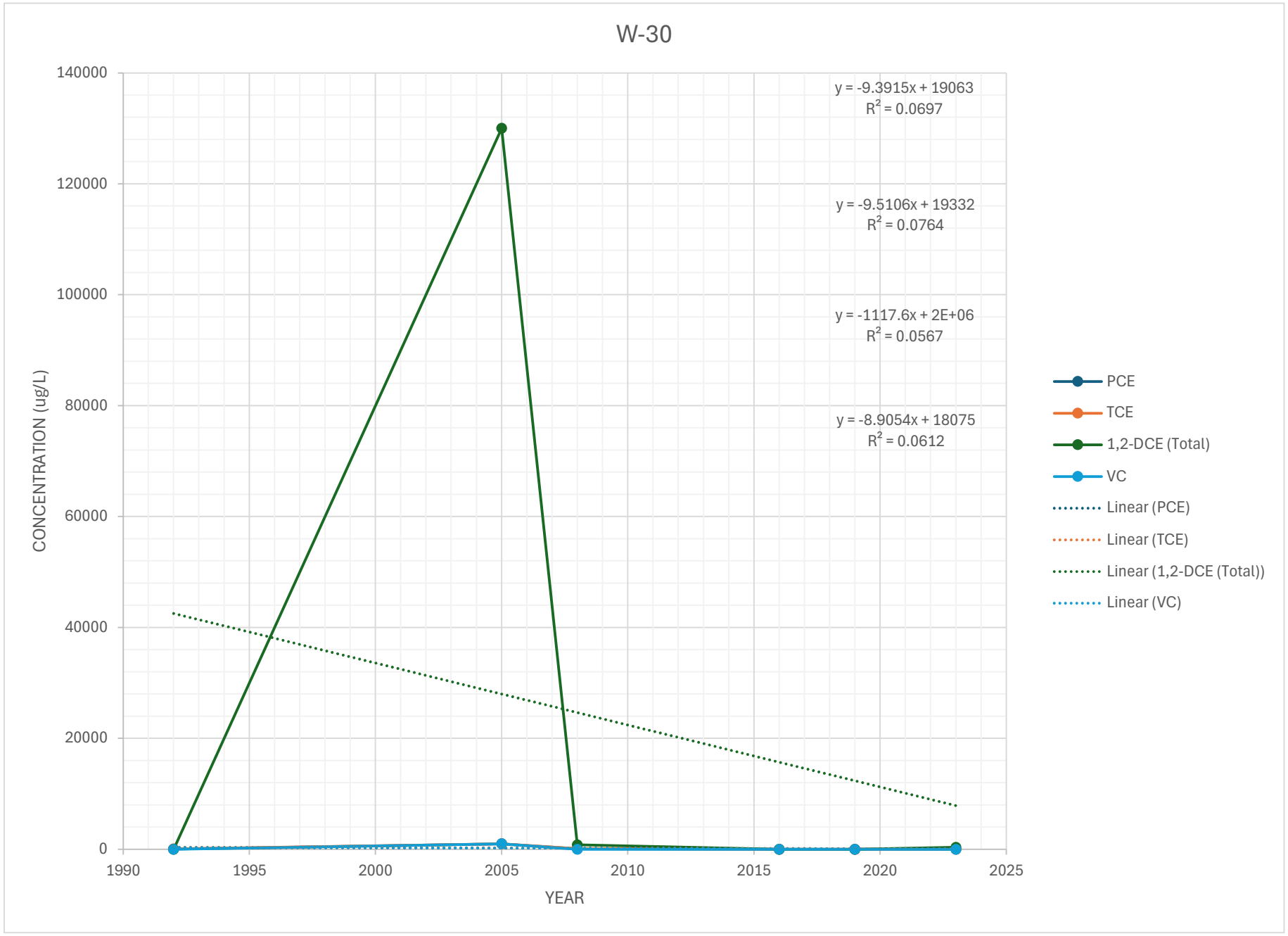

MW-204
y = -14.333x + 29492
R² = 0.044
y = -2.4115x + 4939.5
R² = 0.1699
y = -3.4183x + 6966.3
R² = 0.2421
CONCENTRATION (ug/L)
YEAR
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
1990
1995
2000
2005
2010
2015
2020
2025
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))

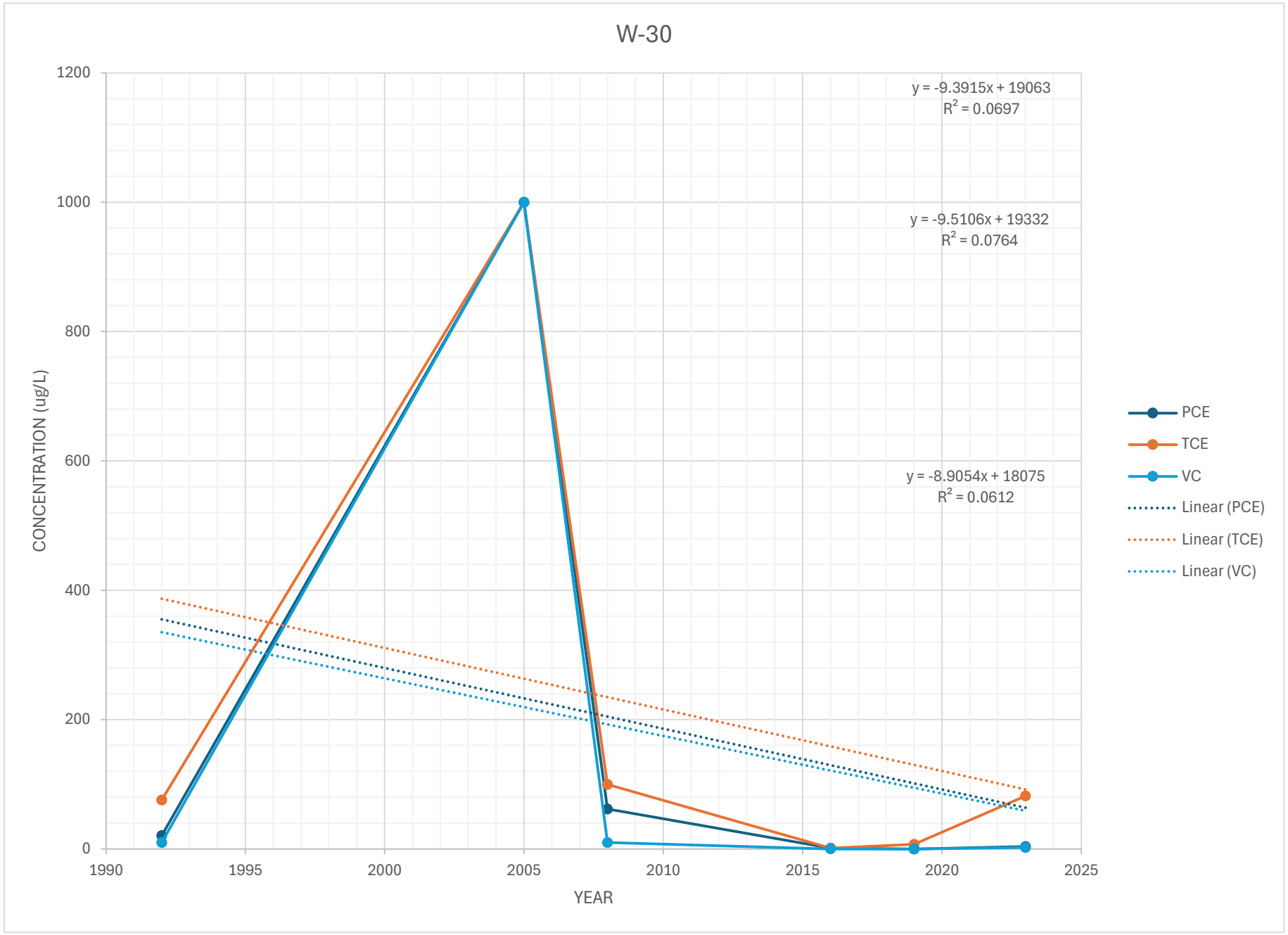

MW-206
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
YEAR
y = -3.4765x + 7099.9
R2 = 0.2554
y = 0.2739x - 531.15
R2 = 0.0043
y = 0.0224x - 26.635
R2 = 6E-05
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))


MW-207
y = -42.997x + 86510
R² = 0.3411
2,500
2,000
1,500
1,000
500
0
-500
CONCENTRATION (ug/L)
1990
1995
2000
2005
2010
2015
2020
2025
YEAR
PCE
Linear (PCE)


MW-209
y = -15.392x + 31113
R² = 0.7931
y = 1.0907x - 2151.2
R² = 0.0475
y = -0.325x + 701.18
R² = 0.0091
y = 0.0628x - 124.86
R² = 0.3345
CONCENTRATION (ug/L)
YEAR
350
300
250
200
150
100
50
0
-50
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
PCE
TCE
1,2-DCE (Total)
VC
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))
Linear (VC)


MW-211
y = -2.9394x + 5945.1
R² = 0.6239
y = -7.3285x + 14832
R² = 0.6121
y = -4.9633x + 10045
R² = 0.9108
CONCENTRATION (ug/L)
YEAR
180
160
140
120
100
80
60
40
20
0
-20
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))


W-30
140000
120000
100000
80000
60000
40000
20000
0
CONCENTRATION (ug/L)
1990
1995
2000
2005
2010
2015
2020
2025
YEAR
y = -9.3915x + 19063
R2 = 0.0697
y = -9.5106x + 19332
R2 = 0.0764
y = -1117.6x + 2E+06
R2 = 0.0567
y = -8.9054x + 18075
R2 = 0.0612
PCE
TCE
1,2-DCE (Total)
VC
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))
Linear (VC)


W-30
y = -9.3915x + 19063
R2 = 0.0697
y = -9.5106x + 19332
R2 = 0.0764
y = -8.9054x + 18075
R2 = 0.0612
CONCENTRATION (ug/L)
YEAR
0
200
400
600
800
1000
1200
1990
1995
2000
2005
2010
2015
2020
2025
PCE
TCE
VC
Linear (PCE)
Linear (TCE)
Linear (VC)


MW-219
y = -6.0063x + 12234
R² = 0.6563
y = -9.8494x + 19907
R² = 0.4776
y = -1.8295x + 3705.8
R² = 0.7072
CONCENTRATION (ug/L)
YEAR
300
250
200
150
100
50
0
-50
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))

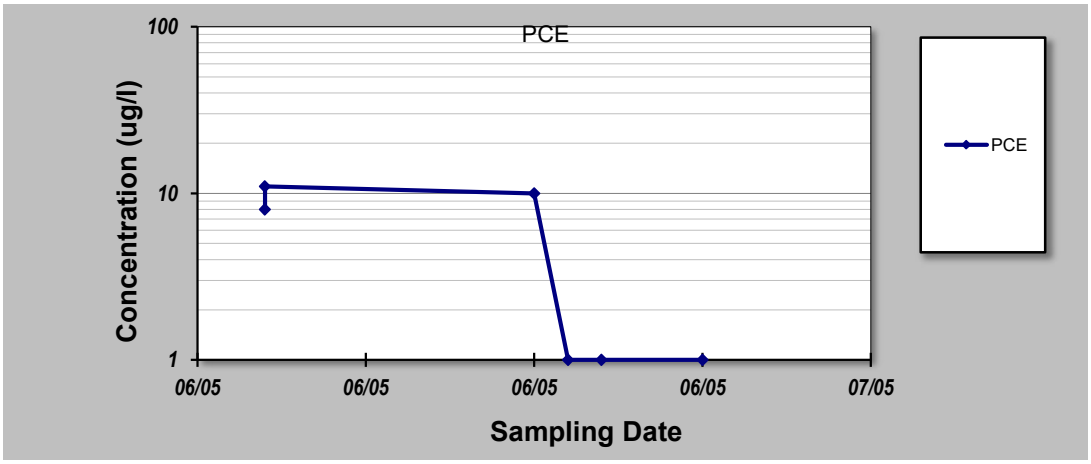

MW-220
y = -22.551x + 45580
R² = 0.8386
y = -0.8984x + 1823.1
R² = 0.8887
y = -2.7778x + 5623
R² = 0.8317
CONCENTRATION (ug/L)
YEAR
450
400
350
300
250
200
150
100
50
0
-50
-100
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
PCE
TCE
1,2-DCE (Total)
Linear (PCE)
Linear (TCE)
Linear (1,2-DCE (Total))

ATTACHMENT 2
GSI MANN-KENDALL TOOLKIT SPREADSHEETS

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-2
Conducted By:	ZDW	Concentration Units:	ug/l
Sampling Point ID:	PCE		

Sampling Event	Sampling Date	MW-2 CONCENTRATION (ug/l)
1	1992	8
2	1992	11
3	2000	10
4	2001	1
5	2002	1
6	2005	1
7	2008	ND
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
Coefficient of Variation:		0.91
Mann-Kendall Statistic (S):		-8
Confidence Factor:		89.8%
Concentration Trend:		Stable



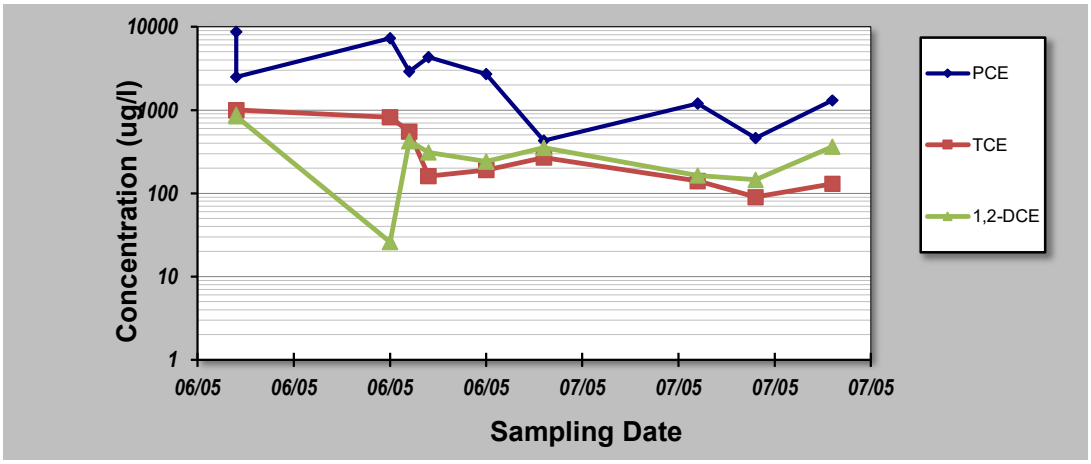
Notes:

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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-3
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-3 CONCENTRATION (ug/l)						
1	1992	8700	1000	880				
2	1992	2500	1000	840				
3	2000	7300	820	26				
4	2001	2900	550	422				
5	2002	4300	160	310				
6	2005	2700	190	240				
7	2008	430	270	353				
8	2016	1200	140	163.4				
9	2019	462	90	145.73				
10	2023	1300	130	362				
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.89	0.86	0.75				
Mann-Kendall Statistic (S):		-25	-36	-17				
Confidence Factor:		98.6%	>99.9%	92.2%				
Concentration Trend:		Decreasing	Decreasing	Prob. Decreasir				



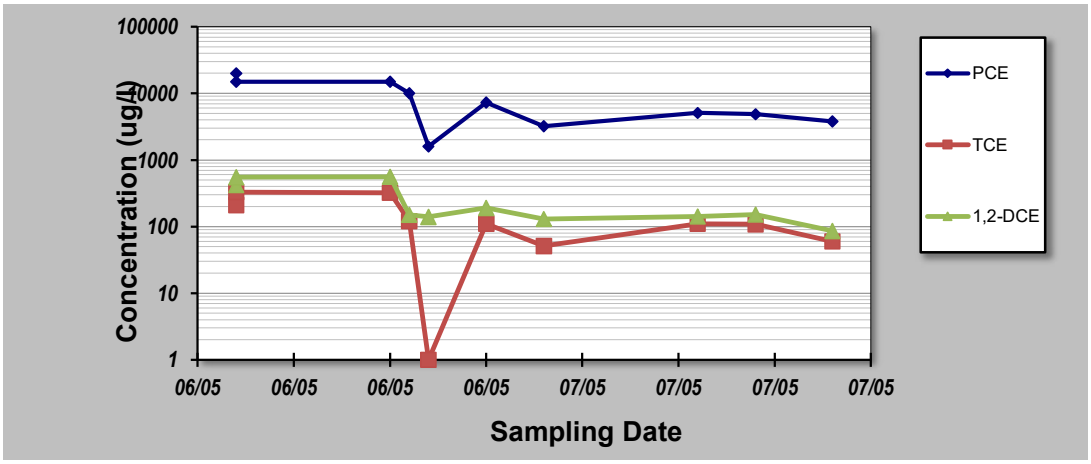
Notes:

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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-4
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-4 CONCENTRATION (ug/l)						
1	1992	20000	210	420				
2	1992	15000	330	550				
3	2000	15000	320	560				
4	2001	10000	120	150				
5	2002	1600	1	140				
6	2005	7300	110	190				
7	2008	3200	51	130				
8	2016	5100	110	142				
9	2019	4860	108	152.06				
10	2023	3800	60	86				
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.72	0.78	0.73				
Mann-Kendall Statistic (S):		-28	-24	-23				
Confidence Factor:		99.4%	98.2%	97.7%				
Concentration Trend:		Decreasing	Decreasing	Decreasing				



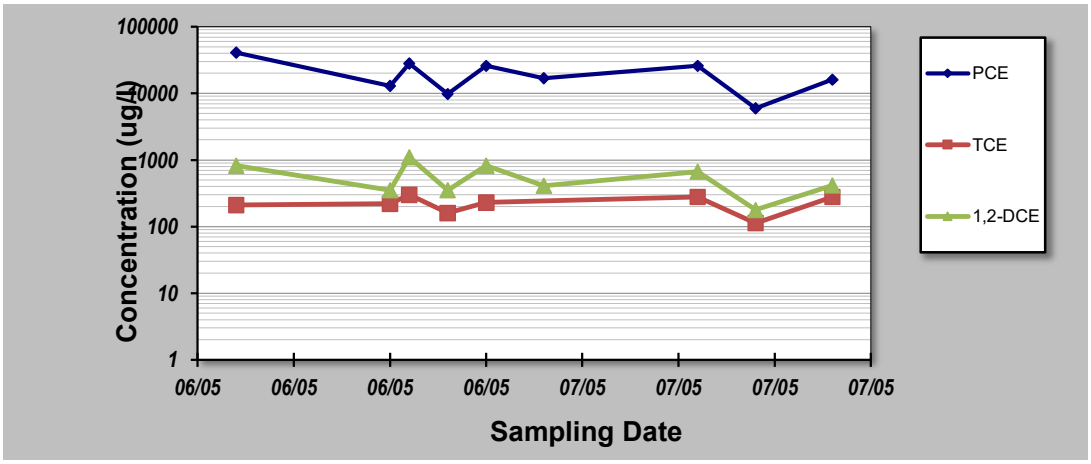
Notes:

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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-5
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-5 CONCENTRATION (ug/l)						
1	1992	41000	210	820				
2	2000	13000	220	350				
3	2001	28000	300	1100				
4	2003	9800	160	350				
5	2005	26000	230	820				
6	2008	17000	ND	410				
7	2016	26000	280	672				
8	2019	5960	113	178.39				
9	2023	16000	280	414.1				
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.54	0.29	0.53				
Mann-Kendall Statistic (S):		-13	3	-8				
Confidence Factor:		89.0%	59.4%	76.2%				
Concentration Trend:		Stable	No Trend	Stable				



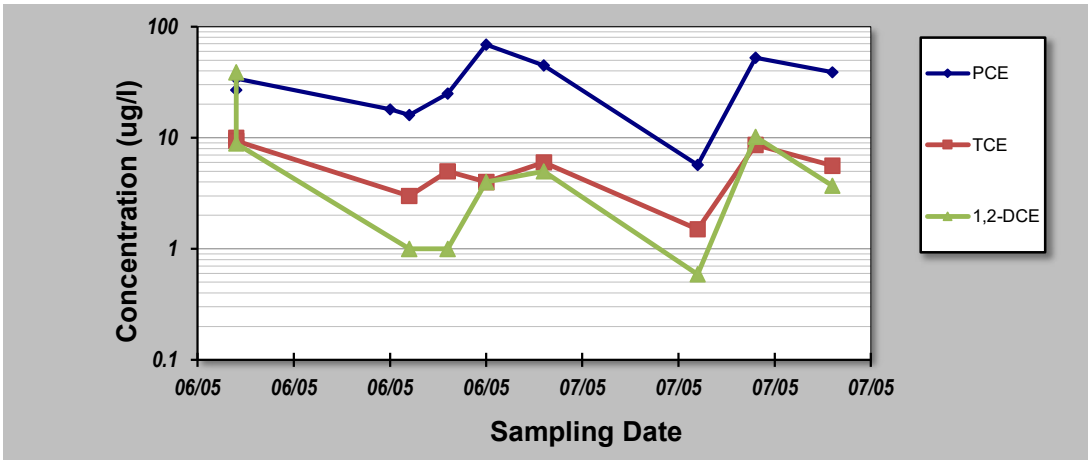
Notes:

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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-6
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-6 CONCENTRATION (ug/l)						
1	1992	27	10	39				
2	1992	34	9.4	8.9				
3	2000	18	N/A	N/A				
4	2001	16	3	1				
5	2003	25	5	1				
6	2005	69	4	4				
7	2008	45	6	5				
8	2016	5.7	1.5	0.59				
9	2019	52.6	8.64	10.2				
10	2023	39	5.6	3.7				
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.57	0.50	1.48				
Mann-Kendall Statistic (S):		7	-8	-7				
Confidence Factor:		70.0%	76.2%	72.8%				
Concentration Trend:		No Trend	Stable	No Trend				



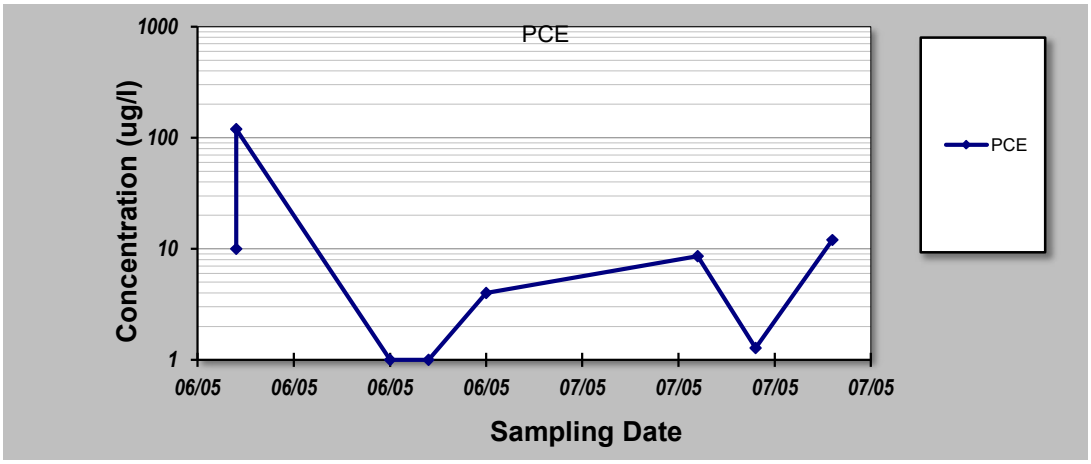
Notes:

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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-7
Conducted By:	ZDW	Concentration Units:	ug/l
Sampling Point ID:	PCE		

Sampling Event	Sampling Date	MW-7 CONCENTRATION (ug/l)
1	1992	10
2	1992	120
3	2000	1
4	2002	1
5	2005	4
6	2008	ND
7	2016	8.6
8	2019	1.28
9	2023	12
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
Coefficient of Variation:		2.06
Mann-Kendall Statistic (S):		1
Confidence Factor:		50.0%
Concentration Trend:		No Trend



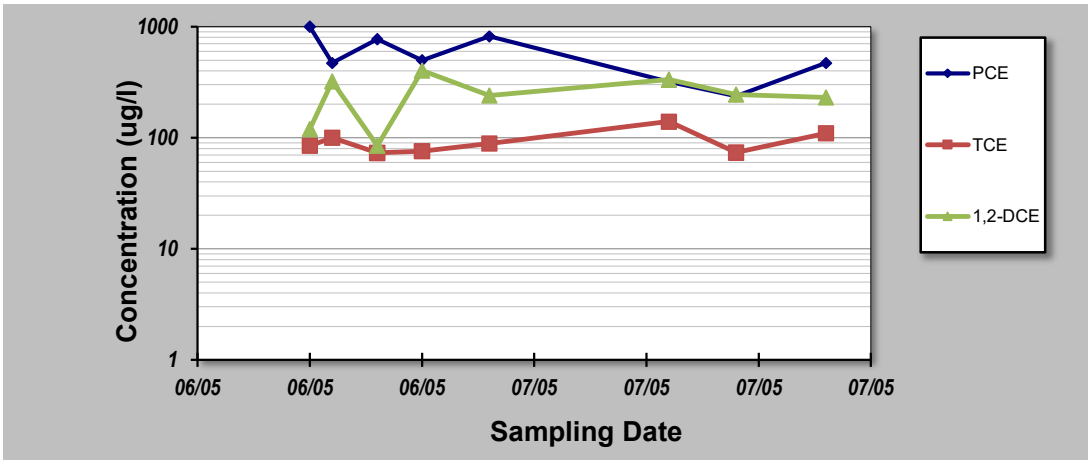
Notes:

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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-9
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-9 CONCENTRATION (ug/l)						
1	2000	1000	85	120				
2	2001	470	100	322				
3	2003	770	73	85				
4	2005	500	76	404				
5	2008	820	89	240				
6	2016	320	140	332.8				
7	2019	237	73.5	245.78				
8	2023	470	110	231.7				
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.46	0.25	0.43				
Mann-Kendall Statistic (S):		-13	6	2				
Confidence Factor:		92.9%	72.6%	54.8%				
Concentration Trend:		rob. Decreasir	No Trend	No Trend				



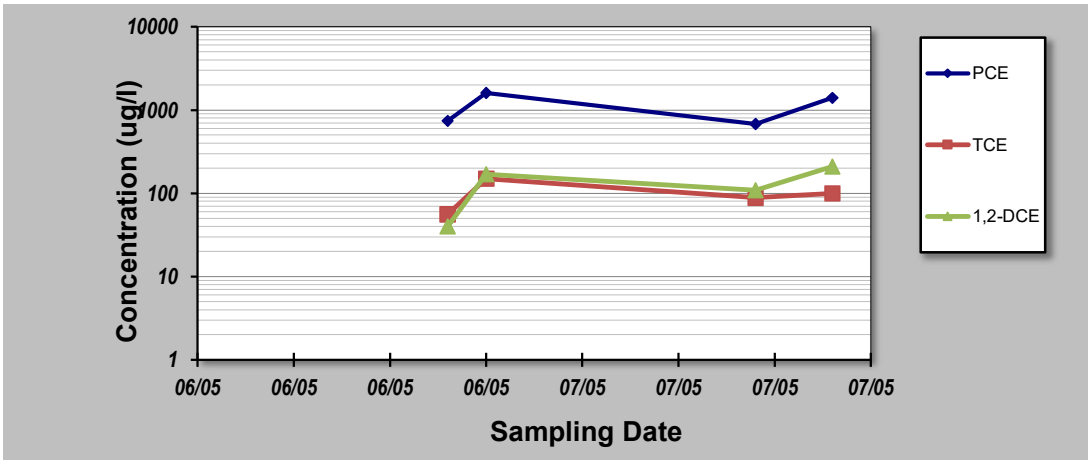
Notes:

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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-11
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-11 CONCENTRATION (ug/l)						
1	1992	PR	PR	PR				
2	2000	PR	PR	PR				
3	2003	740	56	40				
4	2005	1600	150	170				
5	2008	DRY	DRY	DRY				
6	2016	DRY	DRY	DRY				
7	2019	681	88.4	108.89				
8	2023	1400	100	210				
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.42	0.40	0.56				
Mann-Kendall Statistic (S):		0	2	4				
Confidence Factor:		37.5%	62.5%	83.3%				
Concentration Trend:		Stable	No Trend	No Trend				



Notes:

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2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Incr ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90%
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. N *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-12
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID: PCE

Sampling Event	Sampling Date	MW-12 CONCENTRATION (ug/l)
1	1992	140
2	1992	280
3	2000	1
4	2002	7
5	2005	2
6	2008	ND
7	2016	0.2
8	2019	0.2
9	2023	0.7
10		
11		
12		
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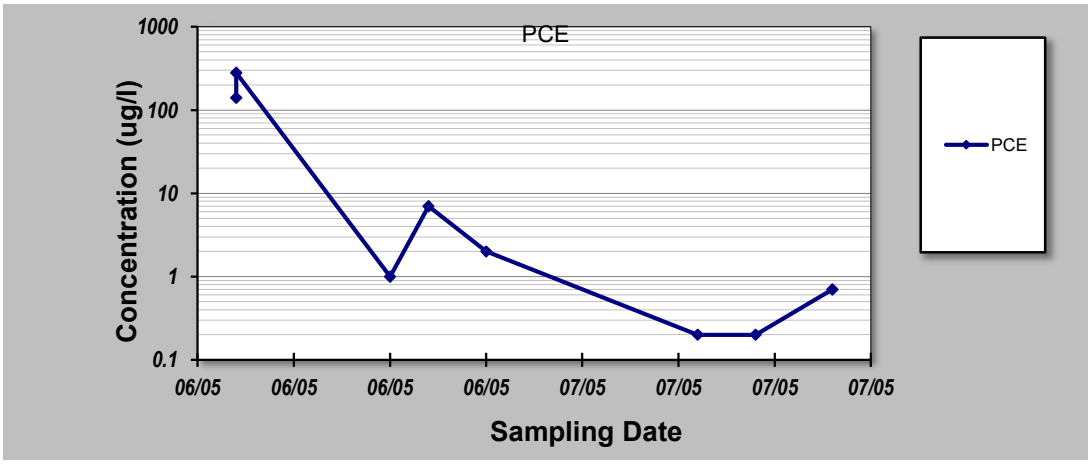
19		
20		
Coefficient of Variation:		1.92
Mann-Kendall Statistic (S):		-17
Confidence Factor:		97.7%
Concentration Trend:		Decreasing



Notes:

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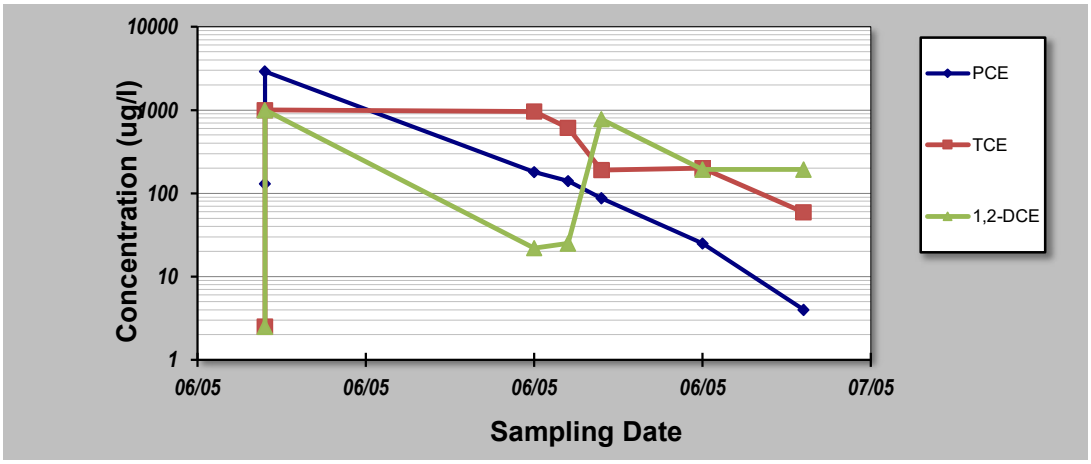
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Incr ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90%
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. N *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-13
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-13 CONCENTRATION (ug/l)						
1	1992	130	2.5	2.5				
2	1992	2900	1000	1000				
3	2000	180	960	22				
4	2001	140	610	25				
5	2002	87	190	780				
6	2005	25	200	193				
7	2008	4	59	193				
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		2.15	0.98	1.28				
Mann-Kendall Statistic (S):		-15	-7	6				
Confidence Factor:		98.5%	80.9%	76.4%				
Concentration Trend:		Decreasing	Stable	No Trend				



Notes:

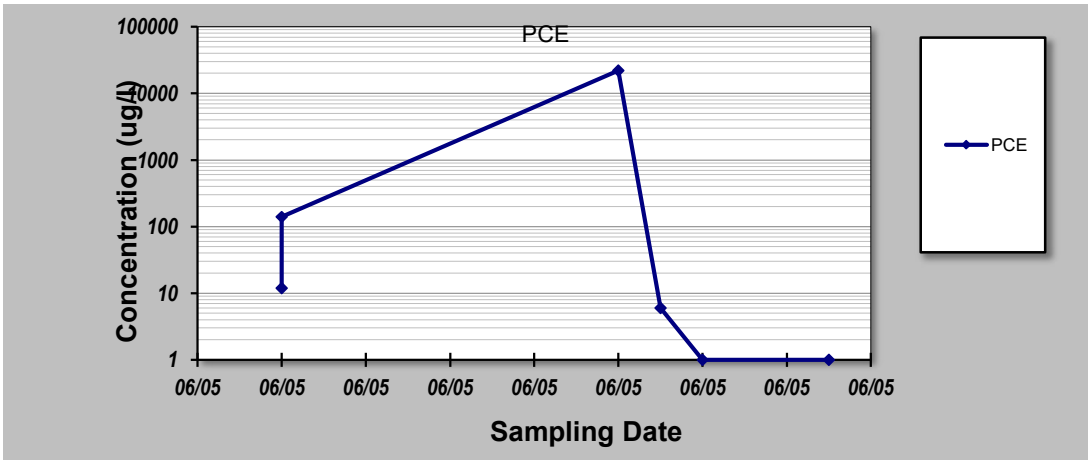
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Incr ≥ 90% = Probably Increasing or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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-14
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID: PCE

Sampling Event	Sampling Date	MW-14 CONCENTRATION (ug/l)
1	1992	12
2	1992	140
3	2000	22000
4	2001	6
5	2002	1
6	2005	1
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
Coefficient of Variation:		2.43
Mann-Kendall Statistic (S):		-8
Confidence Factor:		89.8%
Concentration Trend:		No Trend



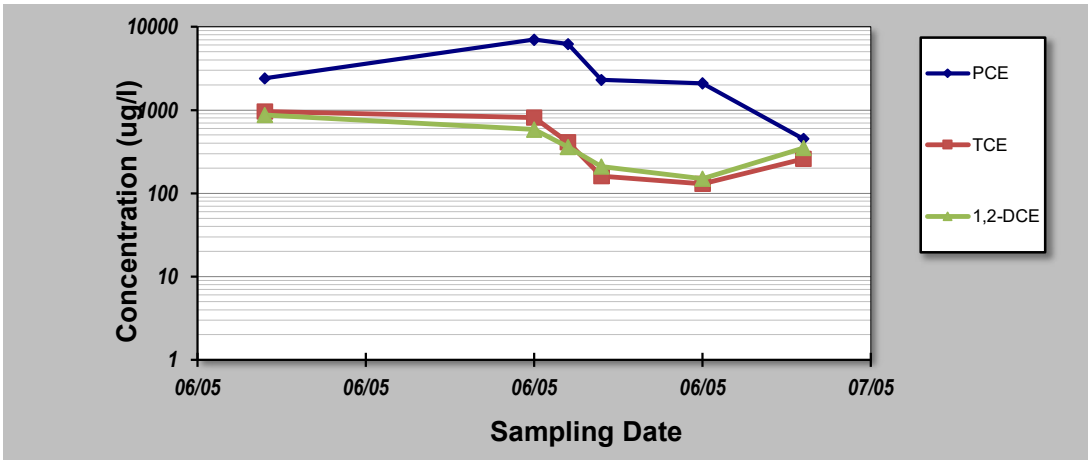
Notes:

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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-16
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-16 CONCENTRATION (ug/l)						
1	1992	2400	960	870				
2	2000	7000	810	580				
3	2001	6200	410	360				
4	2002	2300	160	210				
5	2005	2100	130	150				
6	2008	450	260	350				
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.76	0.77	0.63				
Mann-Kendall Statistic (S):		-11	-11	-11				
Confidence Factor:		97.2%	97.2%	97.2%				
Concentration Trend:		Decreasing	Decreasing	Decreasing				



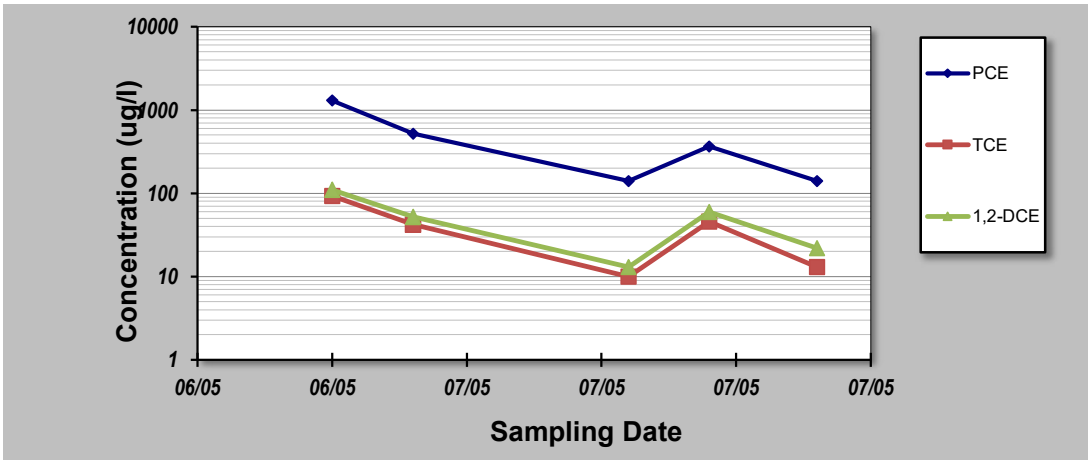
Notes:

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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-19
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-19 CONCENTRATION (ug/l)						
1	2005	1300	93	110				
2	2008	520	42	52				
3	2016	140	10	13				
4	2019	365	45.9	59.74				
5	2023	140	13	22				
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.97	0.82	0.74				
Mann-Kendall Statistic (S):		-7	-4	-4				
Confidence Factor:		92.1%	75.8%	75.8%				
Concentration Trend:		Prob. Decreasing	Stable	Stable				



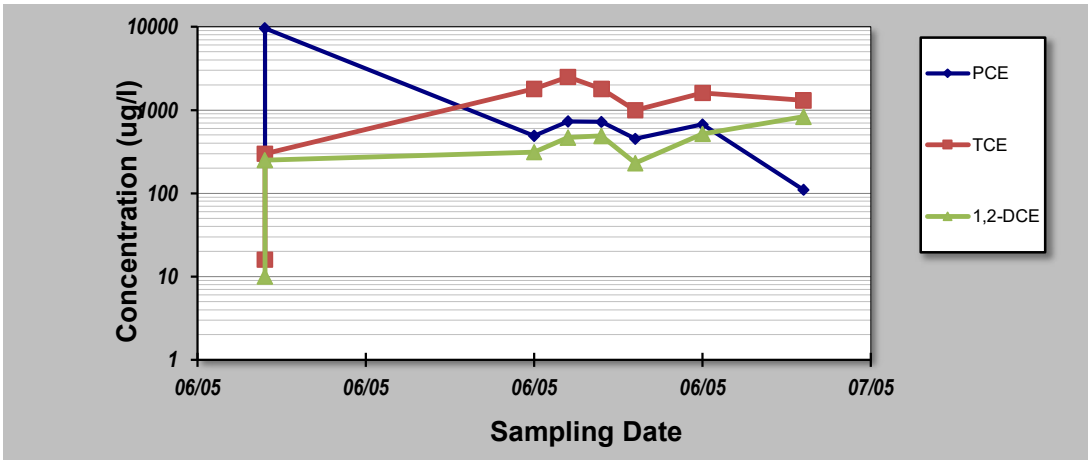
Notes:

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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-202
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-202 CONCENTRATION (ug/l)						
1	1992	240	16	10				
2	1992	9600	300	250				
3	2000	490	1800	312				
4	2001	730	2500	469				
5	2002	720	1800	488				
6	2003	450	1000	230				
7	2005	670	1600	517				
8	2008	110	1300	830				
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.99	0.64	0.63				
Mann-Kendall Statistic (S):		-8	5	20				
Confidence Factor:		80.1%	68.3%	99.3%				
Concentration Trend:		No Trend	No Trend	Increasing				



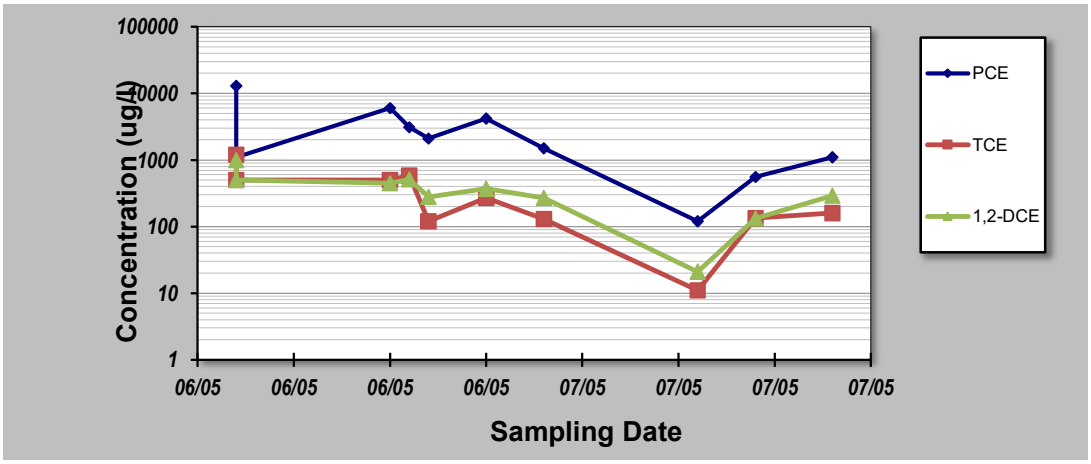
Notes:

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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-203
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-203 CONCENTRATION (ug/l)						
1	1992	13000	1200	1000				
2	1992	1100	500	500				
3	2000	6000	500	450				
4	2001	3100	580	513				
5	2002	2100	120	280				
6	2005	4200	270	370				
7	2008	1500	130	270				
8	2016	120	11	21				
9	2019	555	134	132.55				
10	2023	1100	160	291.7				
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.18	0.98	0.70				
Mann-Kendall Statistic (S):		-24	-22	-29				
Confidence Factor:		98.2%	97.1%	99.5%				
Concentration Trend:		Decreasing	Decreasing	Decreasing				



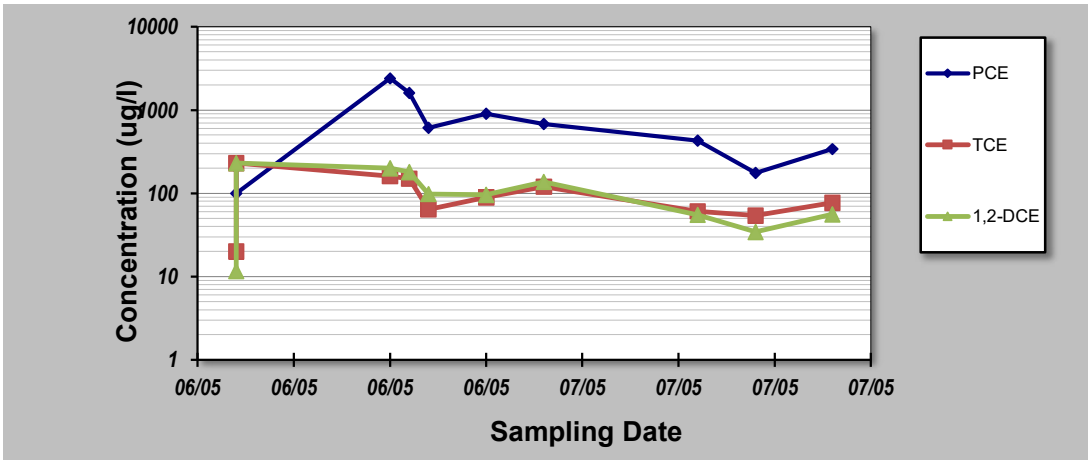
Notes:

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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-204
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-204 CONCENTRATION (ug/l)						
1	1992	204.4	20	11.6				
2	1992	100	230	230				
3	2000	2400	160	200				
4	2001	1600	150	180				
5	2002	610	64	98				
6	2005	900	89	96				
7	2008	680	120	137				
8	2016	430	61	55.2				
9	2019	176	54.1	34.34				
10	2023	340	77	56				
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.98	0.61	0.68				
Mann-Kendall Statistic (S):		-9	-15	-19				
Confidence Factor:		75.8%	89.2%	94.6%				
Concentration Trend:		Stable	Stable	rob. Decreasir				



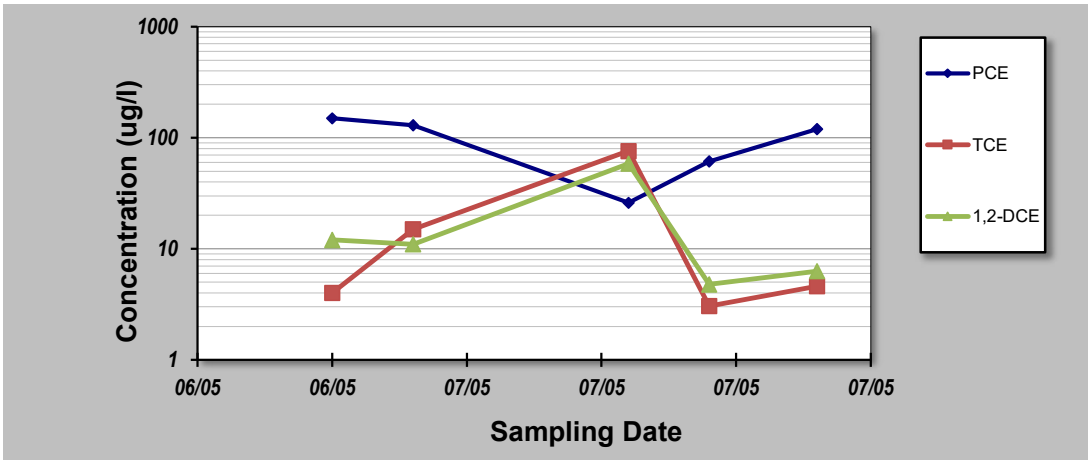
Notes:

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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-206
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-206 CONCENTRATION (ug/l)						
1	2005	150	4	12				
2	2008	130	15	11				
3	2016	26	76	58.5				
4	2019	61.4	3.05	4.78				
5	2023	120	4.6	6.3				
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.53	1.53	1.22				
Mann-Kendall Statistic (S):		-4	0	-4				
Confidence Factor:		75.8%	40.8%	75.8%				
Concentration Trend:		Stable	No Trend	No Trend				



Notes:

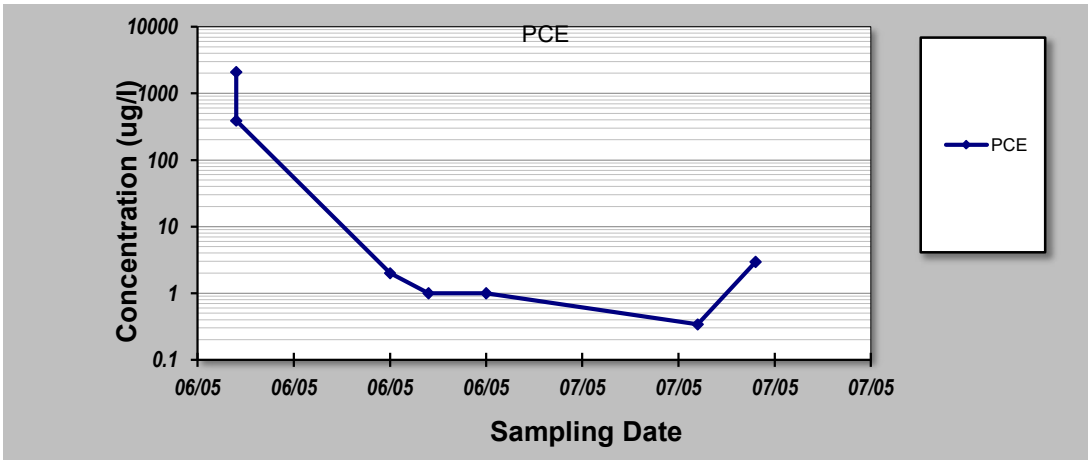
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Incr ≥ 90% = Probably Increasing or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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-207
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID: PCE

Sampling Event	Sampling Date	MW-207 CONCENTRATION (ug/l)
1	1992	2100
2	1992	390
3	2000	2
4	2002	1
5	2005	1
6	2008	ND
7	2016	0.34
8	2019	2.95
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
Coefficient of Variation:		2.19
Mann-Kendall Statistic (S):		-12
Confidence Factor:		94.9%
Concentration Trend:		rob. Decreasir



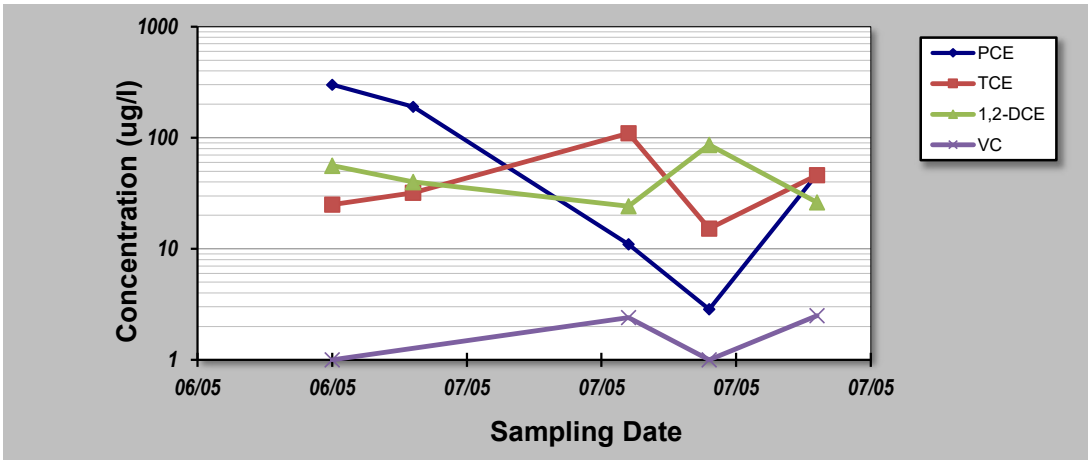
Notes:

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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-209
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE	VC			
Sampling Event	Sampling Date	MW-209 CONCENTRATION (ug/l)						
1	2005	300	25	56	1			
2	2008	190	32	40	ND			
3	2016	11	110	24.22	2.4			
4	2019	2.85	15.2	86.4	1			
5	2023	47	46	26.27	2.5			
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.18	0.83	0.55	0.49			
Mann-Kendall Statistic (S):		-6	2	-2	3			
Confidence Factor:		88.3%	59.2%	59.2%	72.9%			
Concentration Trend:		No Trend	No Trend	Stable	No Trend			



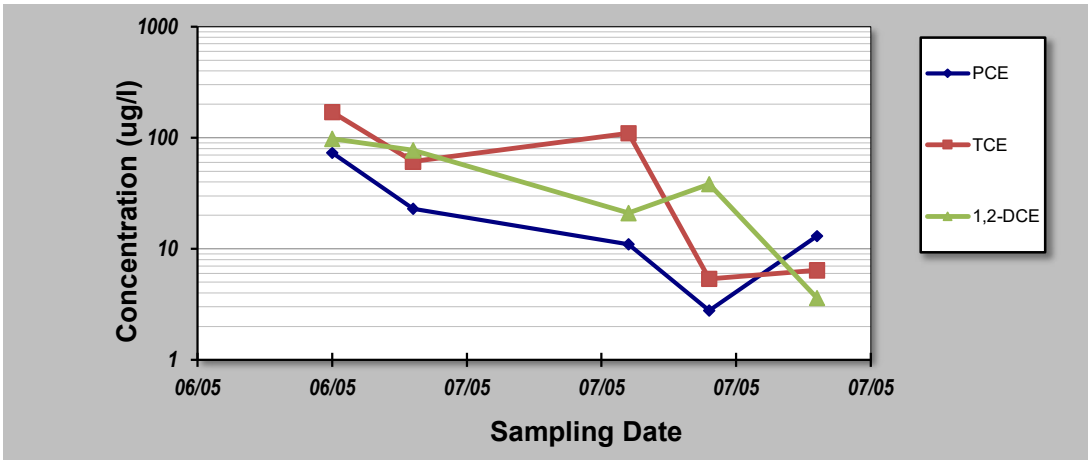
Notes:

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

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-211
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-211 CONCENTRATION (ug/l)						
1	2005	73	170	98				
2	2008	23	61	77				
3	2016	11	110	21				
4	2019	2.78	5.37	38.3				
5	2023	13	6.4	3.6				
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.14	1.00	0.82				
Mann-Kendall Statistic (S):		-6	-6	-8				
Confidence Factor:		88.3%	88.3%	95.8%				
Concentration Trend:		No Trend	Stable	Decreasing				



Notes:

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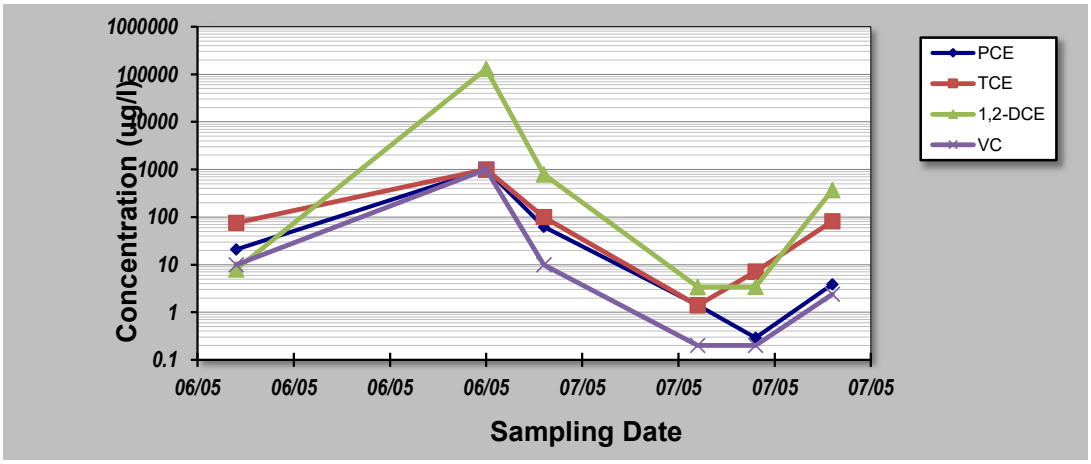
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Incr ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90%
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. N *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	W-30
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE	VC			
Sampling Event	Sampling Date	W-30 CONCENTRATION (ug/l)						
1	1992	21	76	8	10			
2	2005	1000	1000	130000	1000			
3	2008	62	100	790	10			
4	2016	1.4	1.4	3.4	0.2			
5	2019	0.29	7.09	3.44	0.2			
6	2023	3.9	82	368.8	2.4			
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		2.21	1.84	2.42	2.38			
Mann-Kendall Statistic (S):		-7	-3	-3	-7			
Confidence Factor:		86.4%	64.0%	64.0%	86.4%			
Concentration Trend:		No Trend	No Trend	No Trend	No Trend			



Notes:

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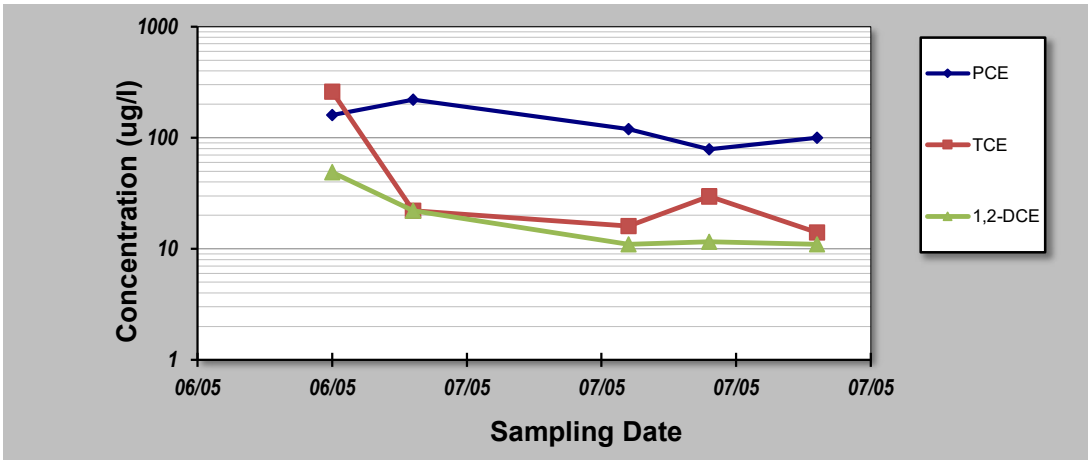
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Incr ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90%
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. N *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-219
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-219 CONCENTRATION (ug/l)						
1	2005	160	260	49				
2	2008	220	22	22				
3	2016	120	16	11				
4	2019	78.7	29.7	11.6				
5	2023	100	14	11				
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.41	1.57	0.78				
Mann-Kendall Statistic (S):		-6	-6	-7				
Confidence Factor:		88.3%	88.3%	92.1%				
Concentration Trend:		Stable	No Trend	rob. Decreasir				



Notes:

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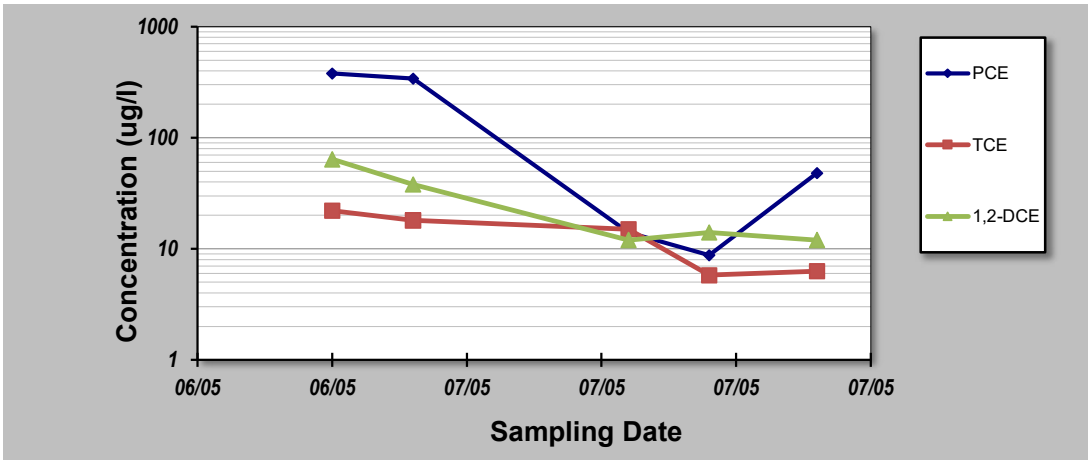
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Incr ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90%
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. N *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Jul-24	Job ID:	240331
Facility Name:	Wallkill Wellfield	Constituent:	MW-220
Conducted By:	ZDW	Concentration Units:	ug/l

Sampling Point ID:	PCE	TCE	1,2-DCE				
Sampling Event	Sampling Date	MW-220 CONCENTRATION (ug/l)						
1	2005	380	22	64				
2	2008	340	18	38				
3	2016	14	15	12				
4	2019	8.73	5.79	14				
5	2023	48	6.3	12				
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.17	0.53	0.82				
Mann-Kendall Statistic (S):		-6	-8	-7				
Confidence Factor:		88.3%	95.8%	92.1%				
Concentration Trend:		No Trend	Decreasing	Prob. Decreasing				



Notes:

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

ATTACHMENT 3
MAROS SPATIAL MOMENT ANALYSIS SUMMARY

Overburden Aquifer

Well ID	1992	1992	2000	2001	2002/2003	2005	2006	2008	2016	2019	2023
MW-1	X	X	X		X	X	X	X			X
MW-2	X	X	X	X	X	X		X			
MW-3	X	X	X	X	X	X		X	X	X	X
MW-4	X	X	X	X	X	X		X	X	X	X
MW-5	X		X	X	X	X		X	X	X	X
MW-6	X	X	X	X	X	X		X	X	X	X
MW-7	X	X	X		X	X		X	X	X	X
MW-8			X		X	X		X			
MW-9			X	X	X	X		X	X	X	X
MW-10	X	X	X		X	X		X			
MW-11					X	X				X	X
MW-12	X	X	X		X	X		X	X	X	X
MW-13	X	X	X	X	X	X		X			
MW-14	X	X	X	X	X	X					
MW-15	X	X									
MW-16	X		X	X	X	X		X			
MW-17	X	X									
MW-19						X		X	X	X	X

X = groundwater data available

= MAROS analysis performed

MAROS Spatial Moment Analysis Summary

Project: Wallkill **User Name:** ZDW

Location: Middletown **State:** New York

	0th Moment	1st Moment (Center of Mass)			2nd Moment (Spread)		
Effective Date	**Estimated Mass (Kg)**	**Xc (ft)**	**Yc (ft)**	**Source Distance**	**Sigma XX (sq ft)**	**Sigma YY (sq ft)**	**Number of Wells**
TETRACHLOROETHYLENE(PCE)							
4/29/2005	9.1E+00	517,580	958,701	362	2,783	9,796	8
4/30/2008	3.8E+00	517,588	958,672	392	2,562	12,845	8
3/23/2016	1.9E+00	517,540	958,655	401	3,337	11,068	8
5/14/2019	3.4E+00	517,589	958,678	387	2,806	10,916	8
4/18/2023	5.4E+00	517,574	958,696	366	2,998	9,294	8
TOTAL 1,2-DICHLOROETHENE							
4/29/2005	8.5E-01	517,552	958,632	425	4,140	16,142	8
4/30/2008	4.8E-01	517,579	958,659	403	3,841	15,298	8
3/23/2016	4.2E-01	517,554	958,672	386	3,611	13,791	8
5/14/2019	4.5E-01	517,585	958,624	439	4,025	15,238	8
4/18/2023	4.9E-01	517,561	958,657	402	4,299	15,070	8
TRICHLOROETHYLENE (TCE)							
4/29/2005	3.6E-01	517,564	958,668	391	5,230	16,990	8
4/30/2008	2.0E-01	517,585	958,602	461	6,108	13,678	8
3/23/2016	3.0E-01	517,563	958,674	385	4,307	14,002	8
5/14/2019	2.9E-01	517,583	958,642	421	4,691	15,933	8
4/18/2023	3.2E-01	517,561	958,663	396	5,182	15,806	8

MAROS Spatial Moment Analysis Summary

Project: Wallkill **User Name:** ZDW

Location: Middletown **State:** New York

Spatial Moment Analysis Summary:

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
0th Moment	TETRACHLOROETHYLENE(PC	0.58	-2	59.2%	S
0th Moment	TOTAL 1,2-DICHLOROETHEN	0.32	-2	59.2%	S
0th Moment	TRICHLOROETHYLENE (TCE)	0.20	0	40.8%	S
First Moment	TETRACHLOROETHYLENE(PC	0.04	0	40.8%	S
First Moment	TOTAL 1,2-DICHLOROETHEN	0.05	-2	59.2%	S
First Moment	TRICHLOROETHYLENE (TCE)	0.08	0	40.8%	S
Second Moment X	TETRACHLOROETHYLENE(PC	0.10	4	75.8%	NT
Second Moment X	TOTAL 1,2-DICHLOROETHEN	0.07	2	59.2%	NT
Second Moment X	TRICHLOROETHYLENE (TCE)	0.13	-2	59.2%	S
Second Moment Y	TETRACHLOROETHYLENE(PC	0.13	-4	75.8%	S
Second Moment Y	TOTAL 1,2-DICHLOROETHEN	0.06	-6	88.3%	S
Second Moment Y	TRICHLOROETHYLENE (TCE)	0.09	0	40.8%	S

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.25 **Saturated Thickness:** Uniform: 10 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events); (ND) Non Detect.

Note: The Sigma XX and Sigma YY components are estimated using the given field coordinate system and then rotated to align with the estimated groundwater flow direction. Moments are not calculated for sample events with less than 6 wells.

Bedrock Aquifer

Well ID	1992	1992	2000	2001	2002/2003	2005	2008	2016	2019	2023
MW-202	X	X	X	X	X	X	X			
MW-203	X	X	X	X	X	X	X	X	X	X
MW-204	X	X	X	X	X	X	X	X	X	X
MW-206						X	X	X	X	X
MW-207	X	X	X		X	X	X	X	X	
MW-209						X	X	X	X	X
MW-211						X	X	X	X	X
W-30	X					X	X	X	X	X
MW-219						X	X	X	X	X
MW-220						X	X	X	X	X

X = groundwater data available

=MAROS analysis performed

MAROS Spatial Moment Analysis Summary

Project: Wallkill **User Name:** ZDW

Location: Middletown **State:** New York

	0th Moment	1st Moment (Center of Mass)			2nd Moment (Spread)		
Effective Date	**Estimated Mass (Kg)**	**Xc (ft)**	**Yc (ft)**	**Source Distance**	**Sigma XX (sq ft)**	**Sigma YY (sq ft)**	**Number of Wells**
TETRACHLOROETHYLENE(PCE)							
4/29/2005	8.2E+00	517,626	958,657	417	5,614	12,391	8
4/30/2008	1.0E+01	517,554	958,660	398	8,533	14,528	8
3/23/2016	1.2E+00	517,585	958,633	430	8,444	13,491	8
5/14/2019	9.1E-01	517,624	958,663	411	6,180	13,103	8
4/18/2023	3.4E+00	517,597	958,654	412	8,062	14,005	8
TOTAL 1,2-DICHLOROETHENE							
4/29/2005	3.1E+01	517,486	958,696	359	1,741	18,080	8
4/30/2008	5.3E+00	517,507	958,695	359	4,826	16,119	8
3/23/2016	9.5E-01	517,585	958,632	431	8,554	13,513	8
5/14/2019	9.5E-01	517,553	958,654	403	9,062	16,109	8
4/18/2023	2.5E+00	517,502	958,680	374	4,575	15,729	8
TRICHLOROETHYLENE (TCE)							
4/29/2005	9.8E-01	517,582	958,659	403	9,935	18,332	8
4/30/2008	2.5E+00	517,526	958,673	382	7,241	15,847	8
3/23/2016	1.4E+00	517,597	958,608	457	7,873	12,792	8
5/14/2019	7.2E-01	517,531	958,650	405	7,897	16,170	8
4/18/2023	1.8E+00	517,508	958,652	402	5,666	14,637	8

MAROS Spatial Moment Analysis Summary

Project: Wallkill **User Name:** ZDW

Location: Middletown **State:** New York

Spatial Moment Analysis Summary:

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
0th Moment	TETRACHLOROETHYLENE(PC	0.89	-4	75.8%	S
0th Moment	TOTAL 1,2-DICHLOROETHEN	1.59	-6	88.3%	NT
0th Moment	TRICHLOROETHYLENE (TCE)	0.47	0	40.8%	S
First Moment	TETRACHLOROETHYLENE(PC	0.03	0	40.8%	S
First Moment	TOTAL 1,2-DICHLOROETHEN	0.08	4	75.8%	NT
First Moment	TRICHLOROETHYLENE (TCE)	0.07	0	40.8%	S
Second Moment X	TETRACHLOROETHYLENE(PC	0.19	0	40.8%	S
Second Moment X	TOTAL 1,2-DICHLOROETHEN	0.53	4	75.8%	NT
Second Moment X	TRICHLOROETHYLENE (TCE)	0.20	-4	75.8%	S
Second Moment Y	TETRACHLOROETHYLENE(PC	0.06	2	59.2%	NT
Second Moment Y	TOTAL 1,2-DICHLOROETHEN	0.10	-6	88.3%	S
Second Moment Y	TRICHLOROETHYLENE (TCE)	0.13	-4	75.8%	S

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.10 **Saturated Thickness:** Uniform: 86 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events); (ND) Non Detect.

Note: The Sigma XX and Sigma YY components are estimated using the given field coordinate system and then rotated to align with the estimated groundwater flow direction. Moments are not calculated for sample events with less than 6 wells.