

INTERIM ACTION WORK PLAN ADDENDUM #3

American Linen Supply Co. - Dexter Avenue
Site Appendices A-F

Prepared for: BMR-Dexter LLC

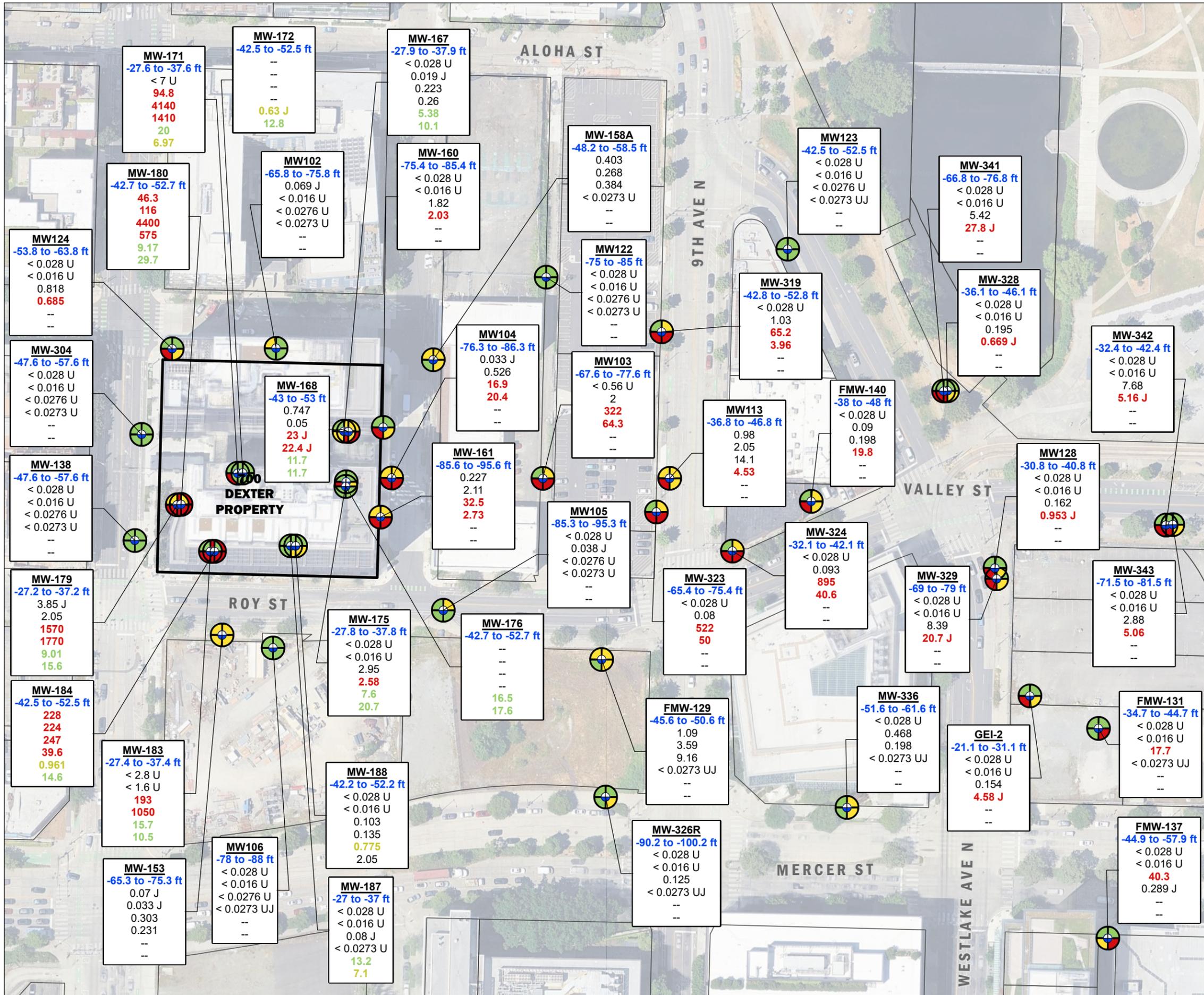
Project No. AS240461 • August 13, 2025 FINAL



e a r t h + w a t e r

APPENDIX A.1

Q4 2023 Site-wide Groundwater Analytical Maps



Explorations

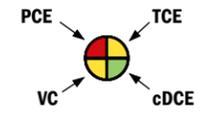
Deep Zone Monitoring Well

Site Features

700 Dexter Property
King County Tax Parcel

Groundwater Analytical Results

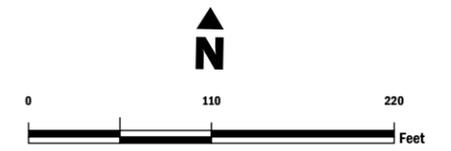
Detected and exceeds the PCUL
Detected and below the PCUL
Not Detected



Well ID / Analyte	Preliminary Cleanup Level	Units
elevation of well screen interval	N/A	feet NAVD
tetrachloroethene (PCE)	5	µg/L
trichloroethene (TCE)	4	µg/L
cis-1,2-dichloroethene (cDCE)	16	µg/L
vinyl chloride (VC)	0.29	µg/L
sum of ethene and ethane (ETH)	N/A	µmol/L
total organic carbon (TOC)	N/A	mg/L

8.71 --- detected concentration exceeds preliminary cleanup level
2.38 --- detected concentration
< 0.1 --- detection limit for non detect result
--- no sample or sample not analyzed
19.4 --- concentration indicates favorable ERD conditions
8.38 --- concentration indicates marginally favorable ERD conditions

Notes:
- mg/L = milligrams per liter
- µg/L = micrograms per liter
- µmol/L = micromoles per liter
- J = value estimated
- U = analyte not detected
- ERD = enhanced reductive dechlorination
- Results are shown for wells that were sampled



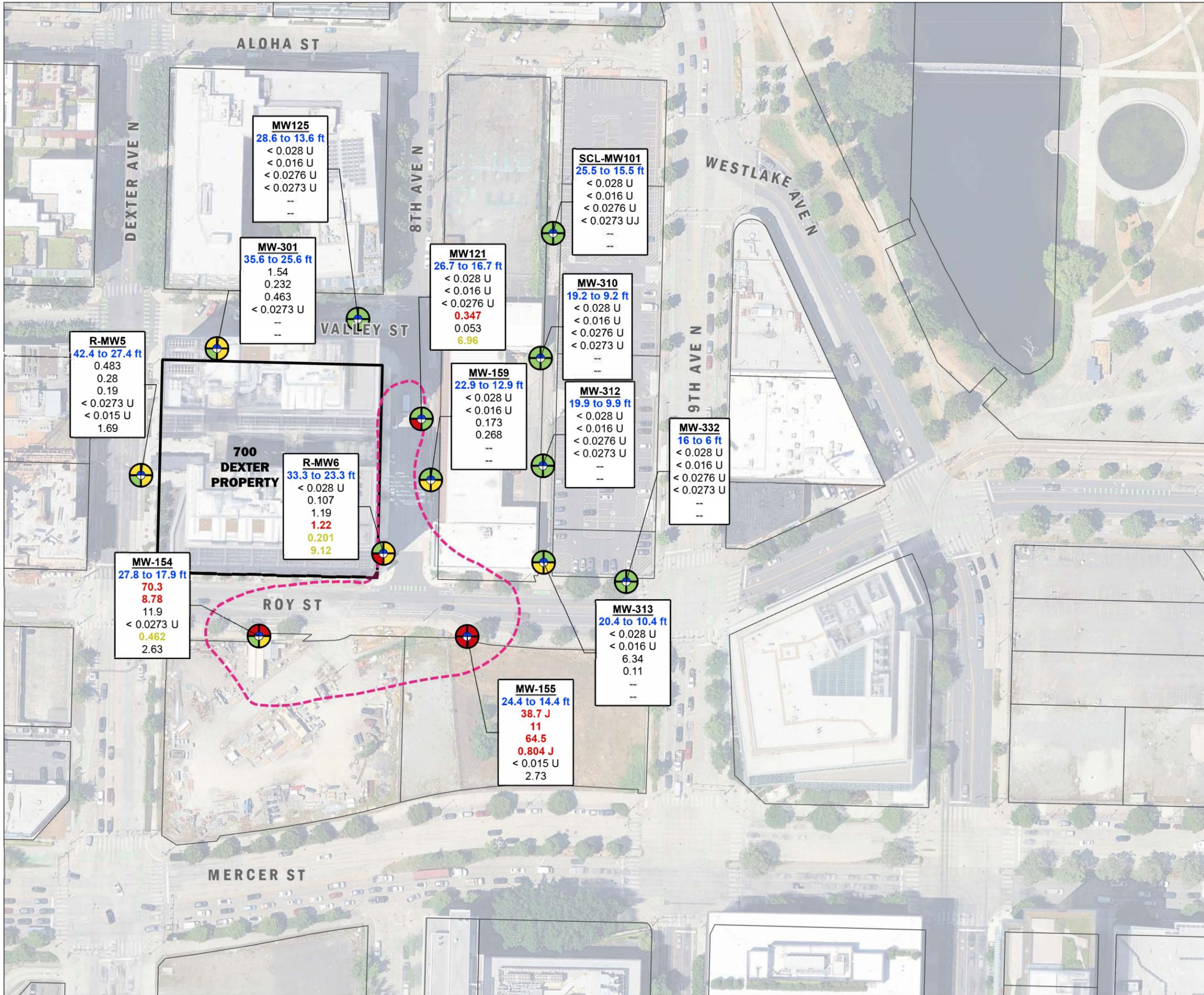
**Deep Zone - 4Q23
Groundwater Analytical Summary**
Interim Action Work Plan Addendum #3
American Linen Supply Co Dexter Ave Site
Seattle, Washington

Data source credits: None | Basemap Service Layer Credits: © OpenStreetMap (and) contributors, CC-BY-SA

05 Plan: Groundwater Analytical Summary (Interim Action Work Plan Addendum #3) American Linen Supply Co Dexter Ave Site - Deep Zone - 4Q23 Groundwater Analytical Summary | User: hudson@aspect.com | Print Date: 6/20/2025

APPENDIX A.2

Q4 2024 Site-wide Groundwater Analytical Maps



Explorations

Shallow Zone Monitoring Well

Areas of Concern

Extent of Shallow Zone Plume

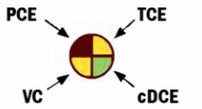
Site Features

700 Dexter Property

King County Tax Parcel

Groundwater Analytical Results

- Detected and exceeds the PCUL
- Detected and below the PCUL
- Not Detected



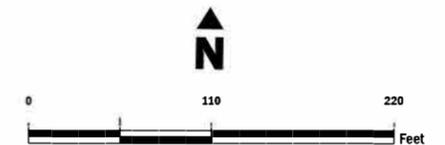
MW-176 -42.7 to -52.7 ft	Well ID / Analyte	Preliminary Cleanup	
		Level	Units
elevation of well screen interval	tetrachloroethene (PCE)	N/A	feet NAVD
< 0.1 U	trichloroethene (TCE)	5	µg/L
< 0.04 U	cis-1,2-dichloroethene (cDCE)	4	µg/L
0.734	vinyl chloride (VC)	16	µg/L
8.71	sum of ethene and ethane (ETH)	0.29	µmol/L
19.4	total organic carbon (TOC)	N/A	mg/L
23.1			

Format Definitions

- 8.71 --- detected concentration exceeds preliminary cleanup level
- 2.38 --- detected concentration
- < 0.1 --- detection limit for non detect result
- --- no sample or sample not analyzed
- 19.4 --- concentration indicates favorable ERD conditions
- 8.38 --- concentration indicates marginally favorable ERD conditions

Notes:

- mg/L = milligrams per liter
- µg/L = micrograms per liter
- µmol/L = micromoles per liter
- J = value estimated
- U = analyte not detected
- ERD = enhanced reductive dechlorination
- Results are shown for wells that were sampled



**Shallow Zone - 4Q24
Groundwater Analytical Summary**

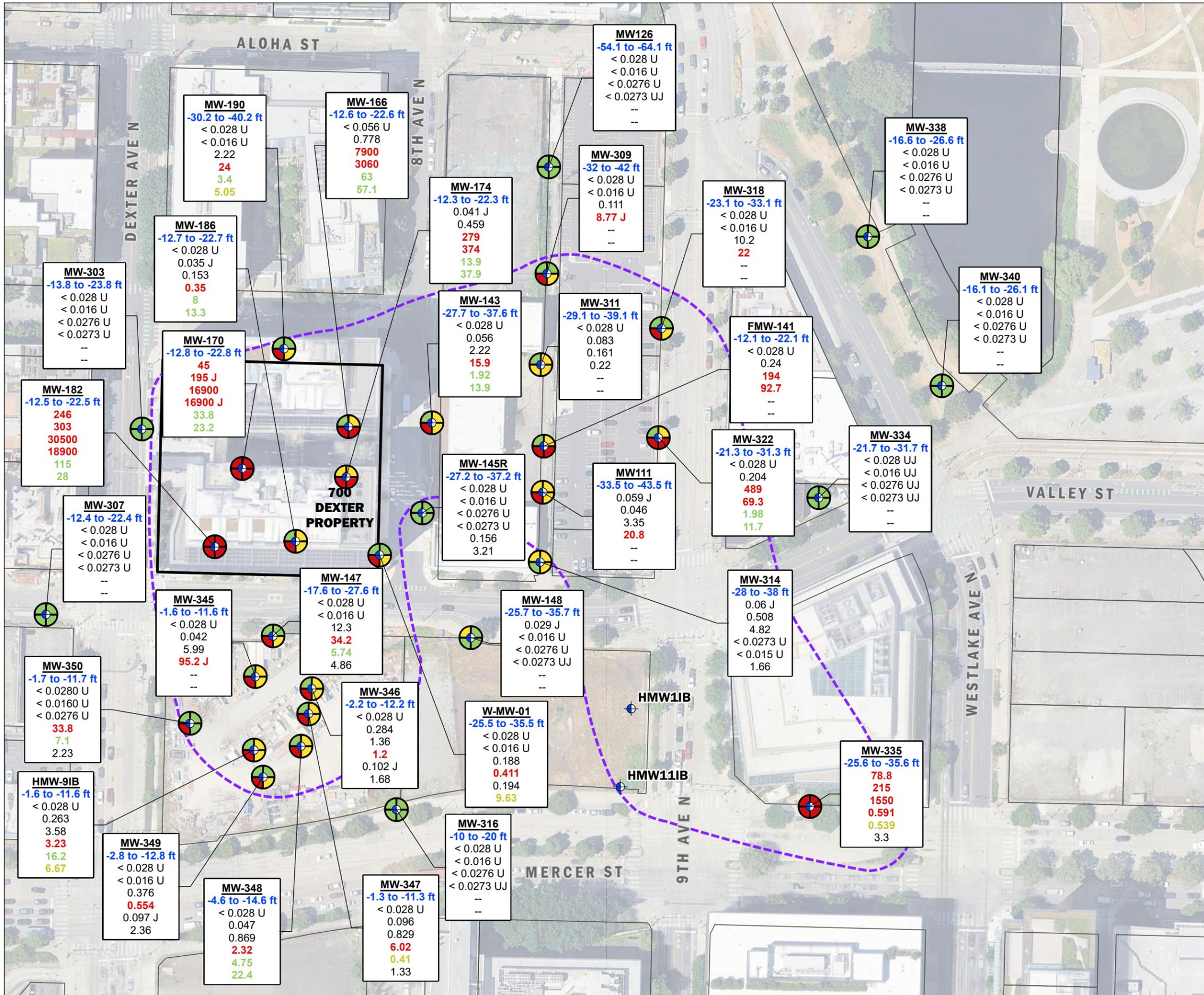
Interim Action Work Plan Addendum #3
American Linen Supply Co Dexter Ave Site
Seattle, Washington



JUN-2025
PROJECT NO.
AS240461

BY:
ALC / HRC / HMD
REVISED BY:
--- / ---

FIGURE NO.
A.2.1



Explorations

Intermediate B Zone Monitoring Well

Areas of Concern

Extent of Intermediate B Zone Plume

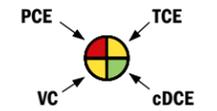
Site Features

700 Dexter Property

King County Tax Parcel

Groundwater Analytical Results

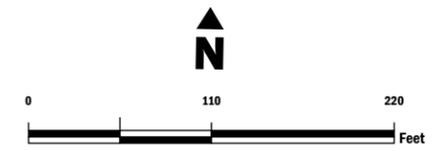
- Detected and exceeds the PCUL
- Detected and below the PCUL
- Not Detected



MW-176	Well ID / Analyte	Preliminary Cleanup	
		Level	Units
-42.7 to -52.7 ft	elevation of well screen interval	N/A	feet NAVD
< 0.1 U	tetrachloroethene (PCE)	5	µg/L
< 0.04 U	trichloroethene (TCE)	4	µg/L
0.734	cis-1,2-dichloroethene (cDCE)	16	µg/L
8.71	vinyl chloride (VC)	0.29	µg/L
19.4	sum of ethene and ethane (ETH)	N/A	µmol/L
23.1	total organic carbon (TOC)	N/A	mg/L

- 8.71 --- detected concentration exceeds preliminary cleanup level
- 2.38 --- detected concentration
- < 0.1 --- detection limit for non detect result
- no sample or sample not analyzed
- 19.4 --- concentration indicates favorable ERD conditions
- 8.38 --- concentration indicates marginally favorable ERD conditions

Notes:
 - mg/L = milligrams per liter
 - µg/L = micrograms per liter
 - µmol/L = micromoles per liter
 - J = value estimated
 - U = analyte not detected
 - ERD = enhanced reductive dechlorination
 - Results are shown for wells that were sampled



**Intermediate B Zone - 4Q24
Groundwater Analytical Summary**

Interim Action Work Plan Addendum #3
 American Linen Supply Co Dexter Ave Site
 Seattle, Washington

Aspect CONSULTING	JUN-2025	BY: ALC / HRC / HMD	FIGURE NO. A.2.3
	PROJECT NO. AS240461	REVISED BY: --- / ---	

Data source credits: None | Basemap Service Layer Credits: © OpenStreetMap (and) contributors, CC-BY-SA

03 Part 01 Updates (Dexter Ave) AS240461 (Interim Action Work Plan Addendum #3) Interim Action Work Plan Addendum #3 - 4Q24 Groundwater Analytical Summary | User: hshudson | 11 Print Date: 6/20/2025

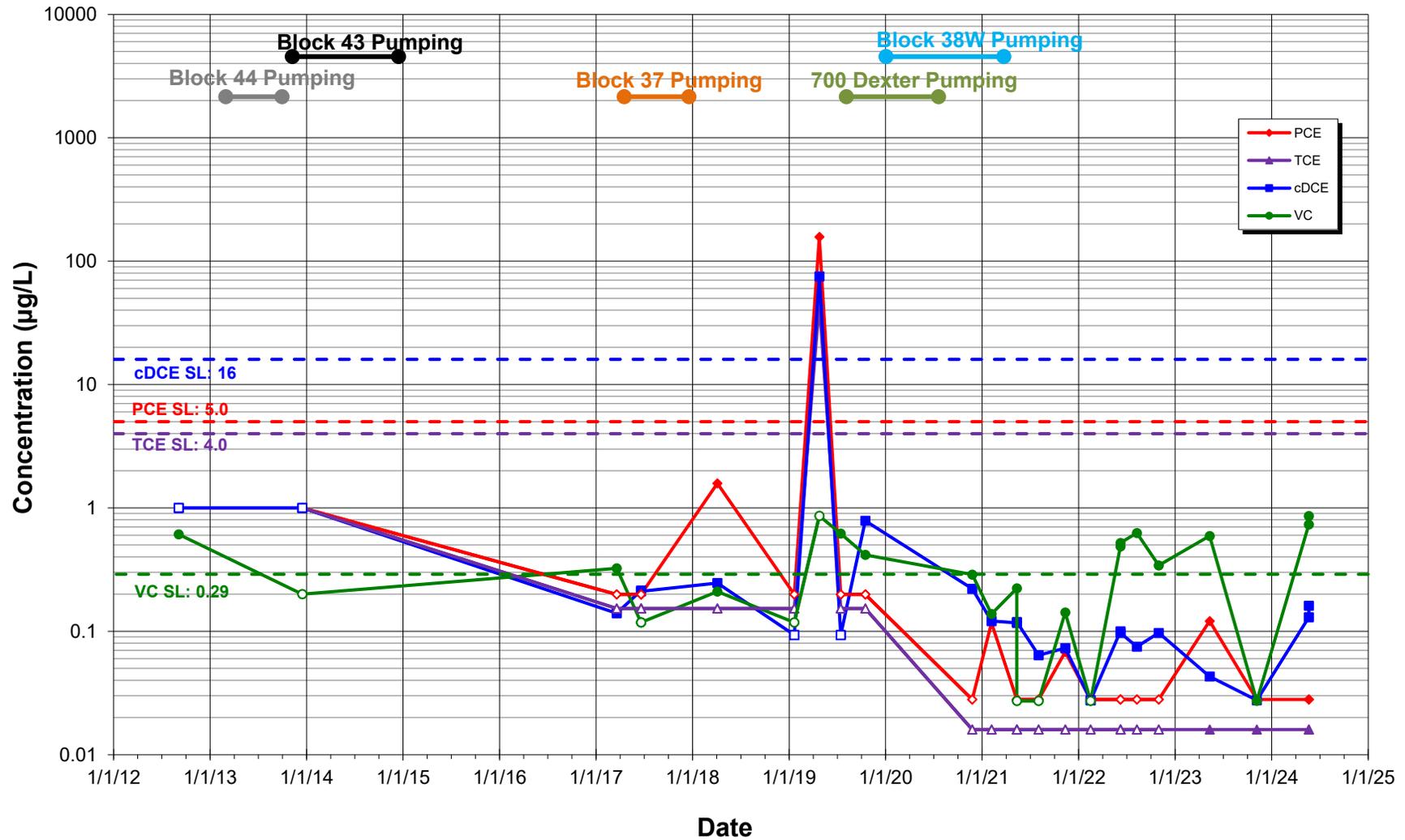
APPENDIX B

CVOC Trend Plots

CVOC Trend Plots

Shallow Zone

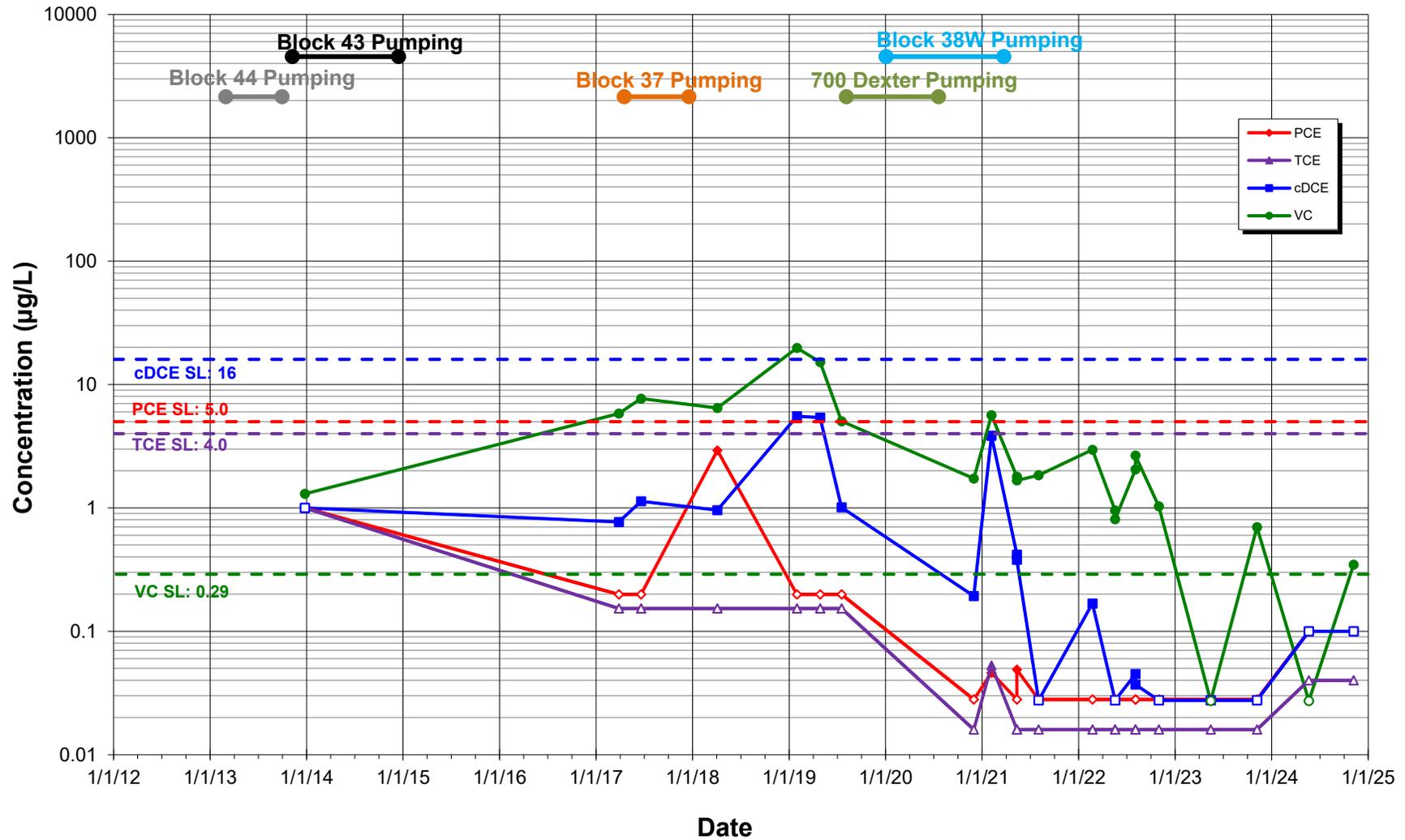
Concentration vs Time
MW-9 (34.1 to 19.1 feet NAVD), 8th Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points.
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

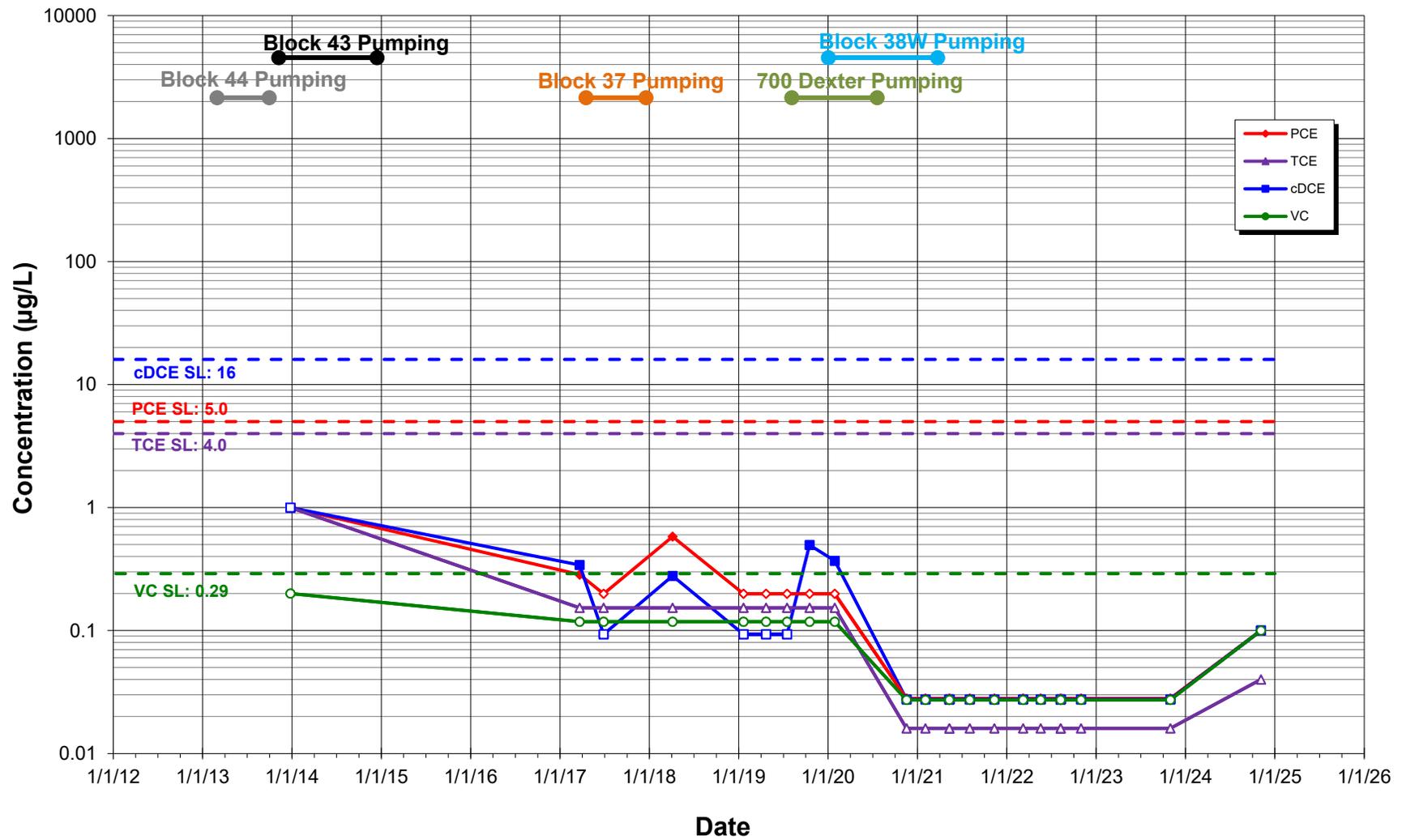
Concentration vs Time
MW121 (26.7 to 16.7 feet NAVD), 8th Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

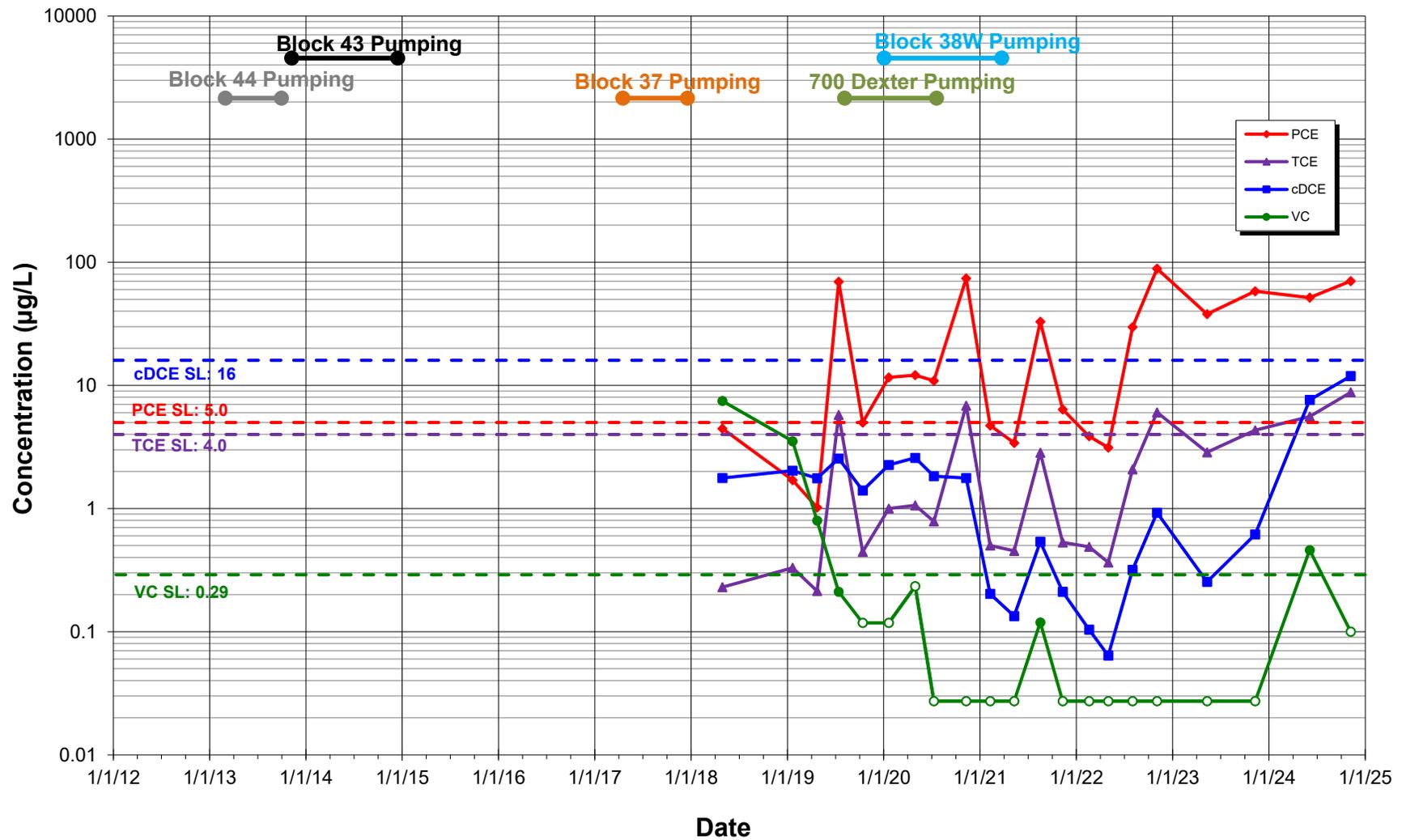
Concentration vs Time
MW125 (28.6 to 13.6 feet NAVD), Valley St ROW, N side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

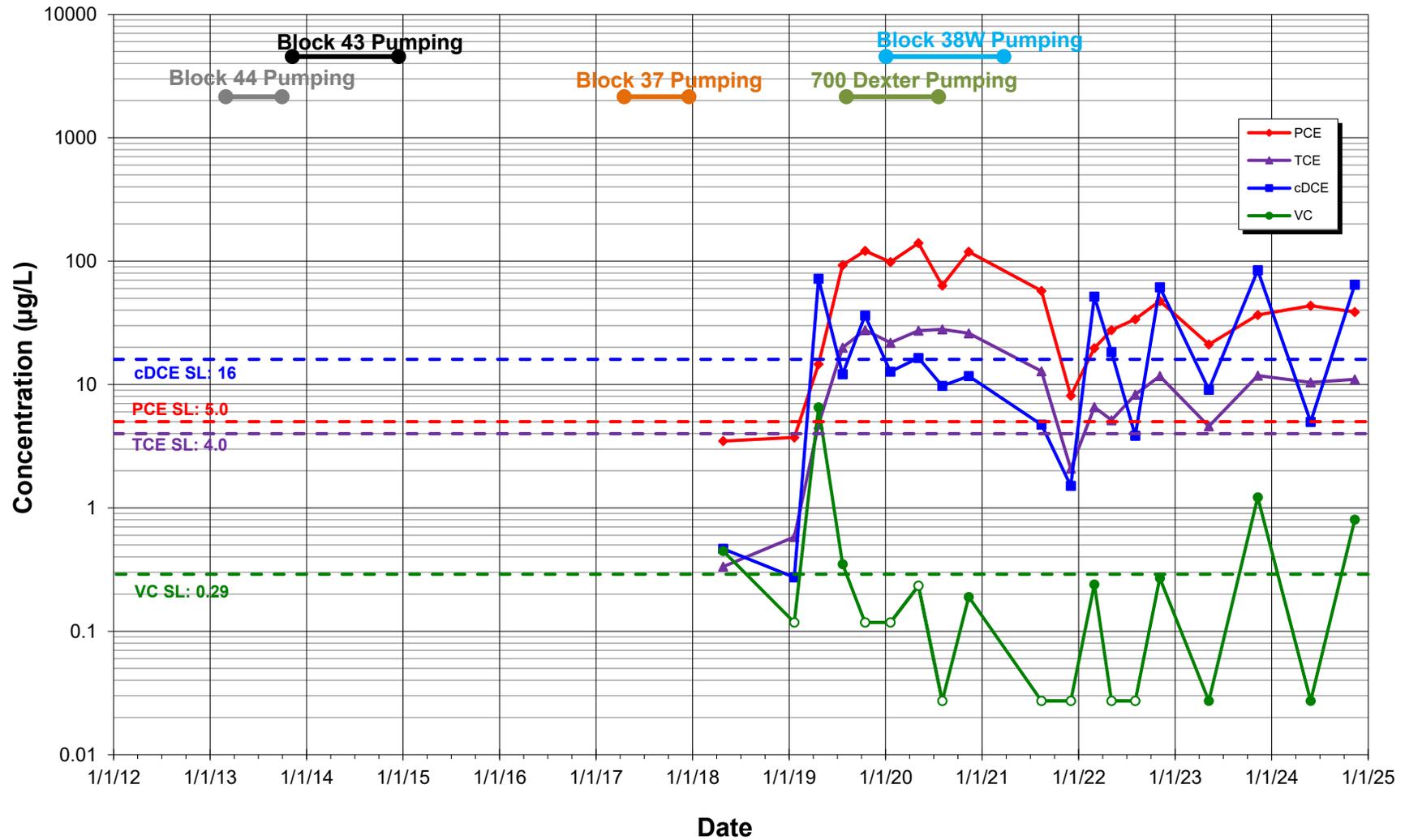
Concentration vs Time
MW-154 (27.8 to 17.9 feet NAVD), Roy St ROW, S side
American Linen Supply Co–Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points.
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

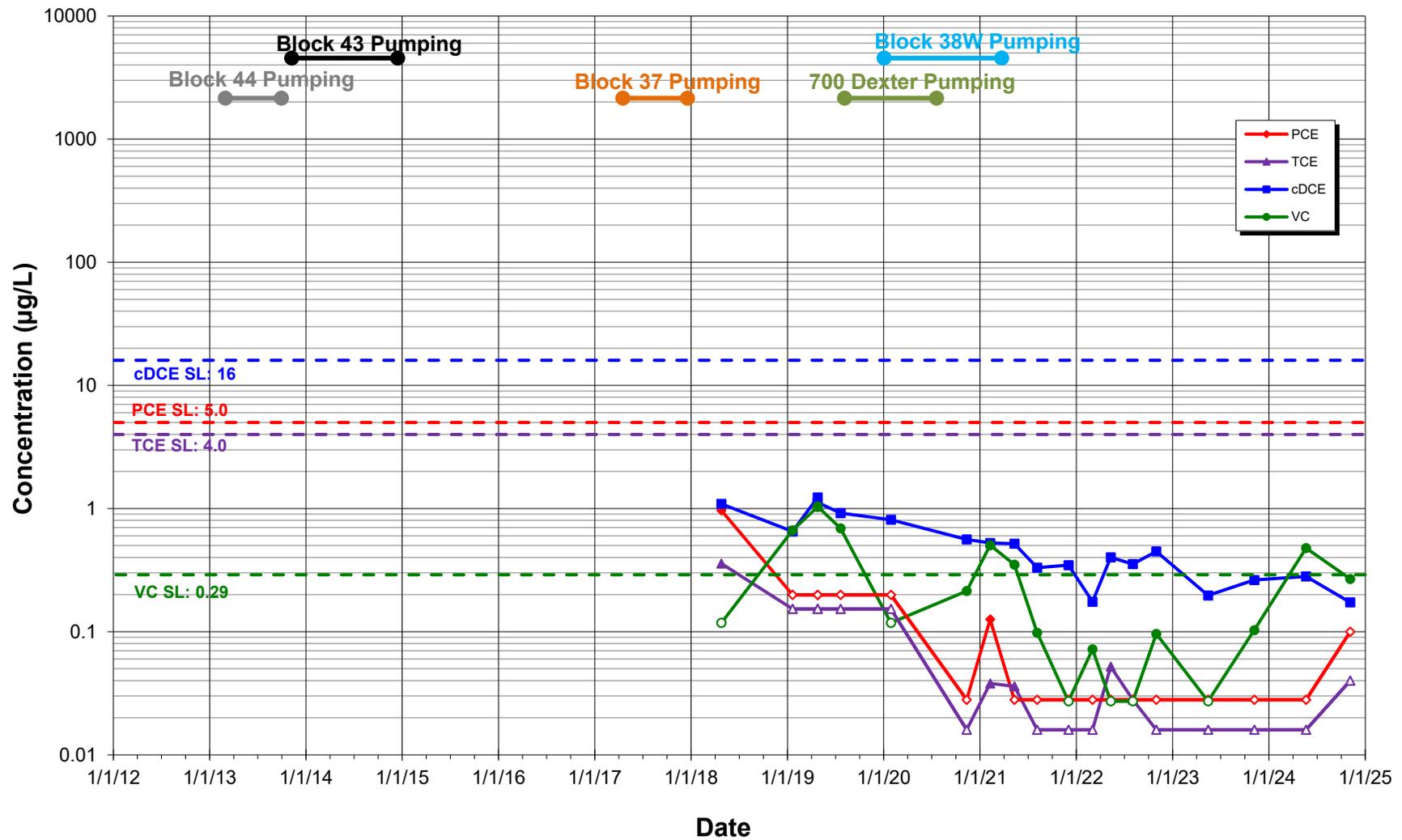
Concentration vs Time
MW-155 (24.4 to 14.4 feet NAVD), Roy St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points.
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

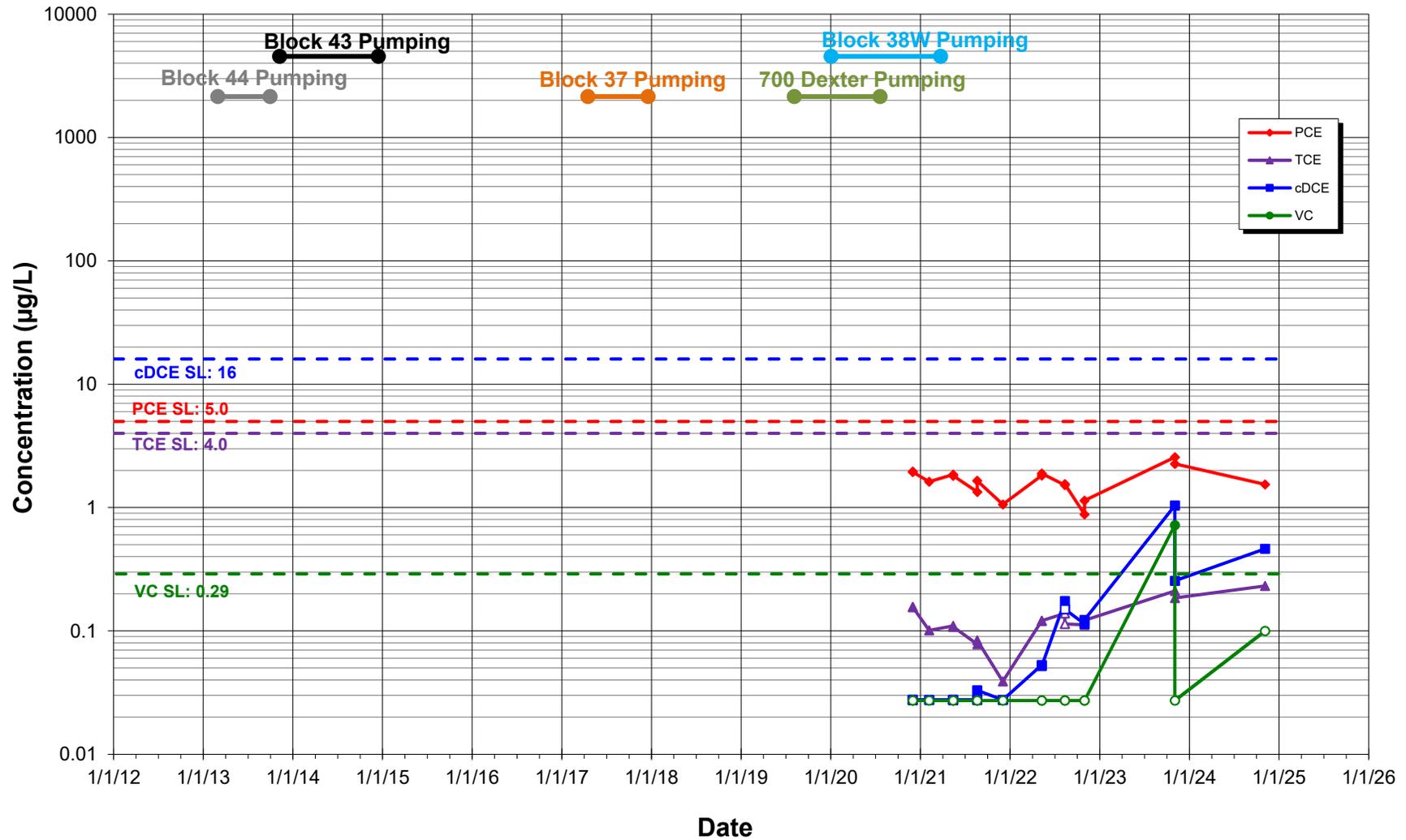
Concentration vs Time
MW-159 (22.9 to 12.9 feet NAVD), 8th Ave N, E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points.
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

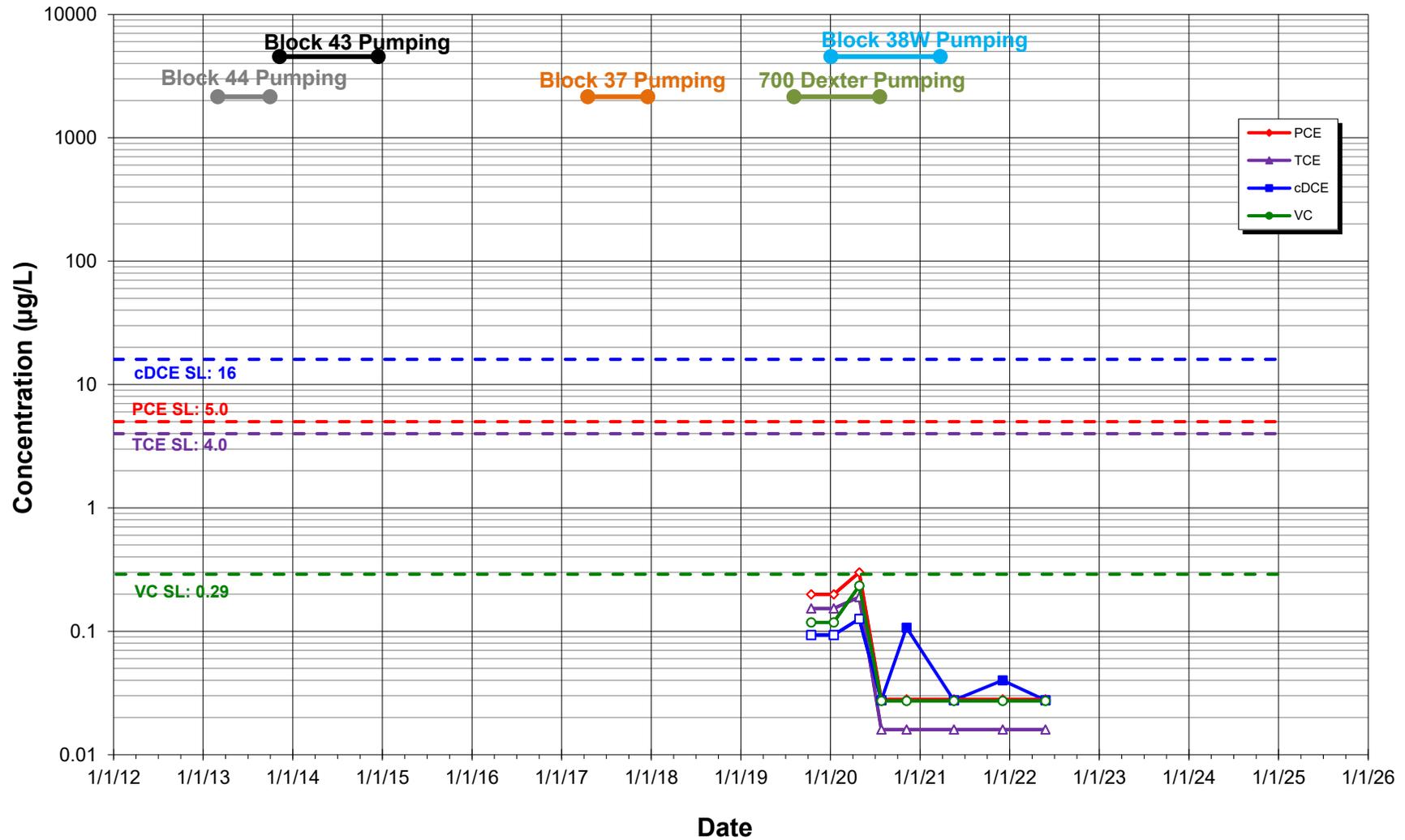
Concentration vs Time
MW-301 (35.6 to 25.6 feet NAVD), Valley St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

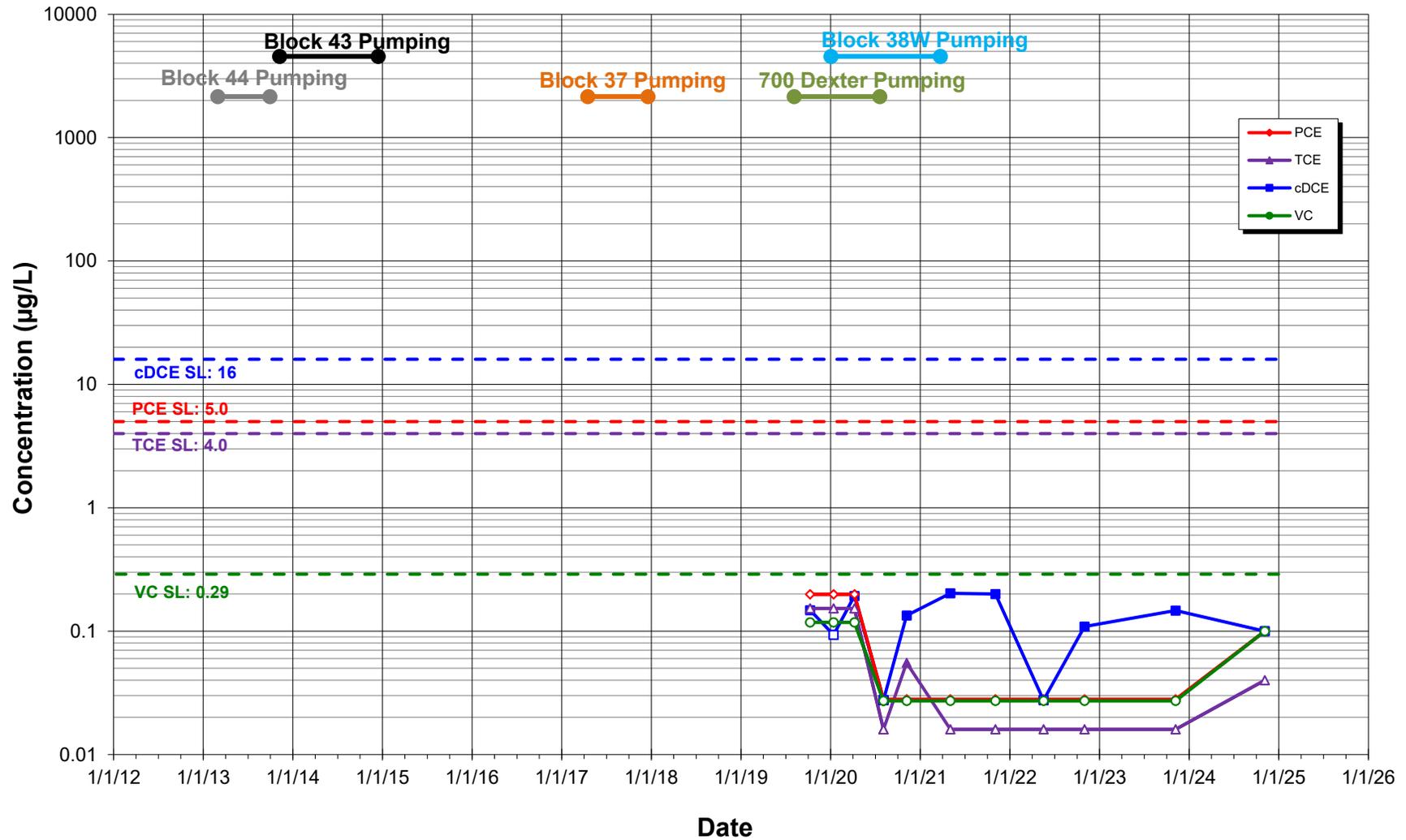
Concentration vs Time
MW-305 (37.4 to 27.4 feet NAVD), Roy St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

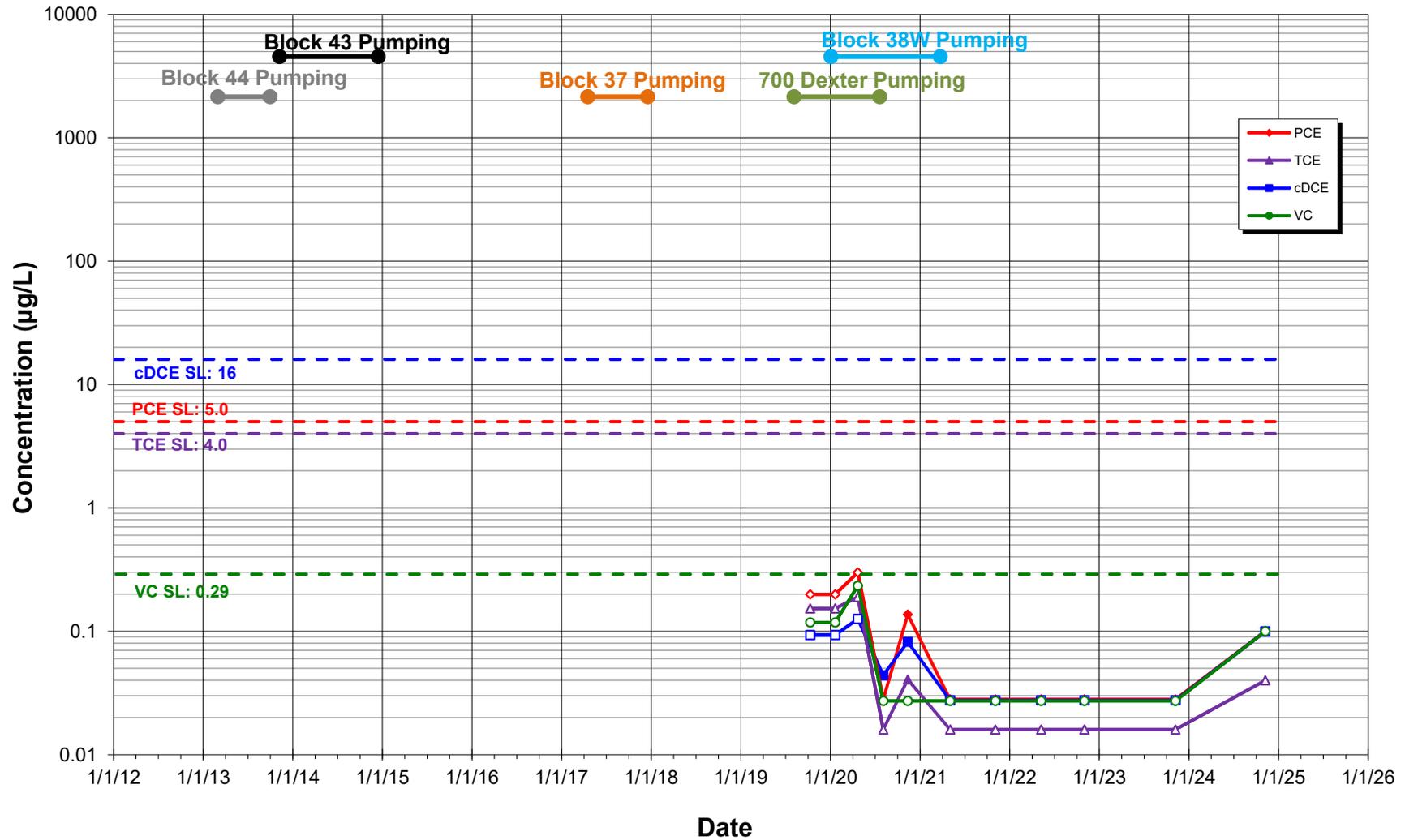
Concentration vs Time
MW-310 (19.2 to 9.2 feet NAVD), Alley E of Seattle Roy Aloha Shops
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

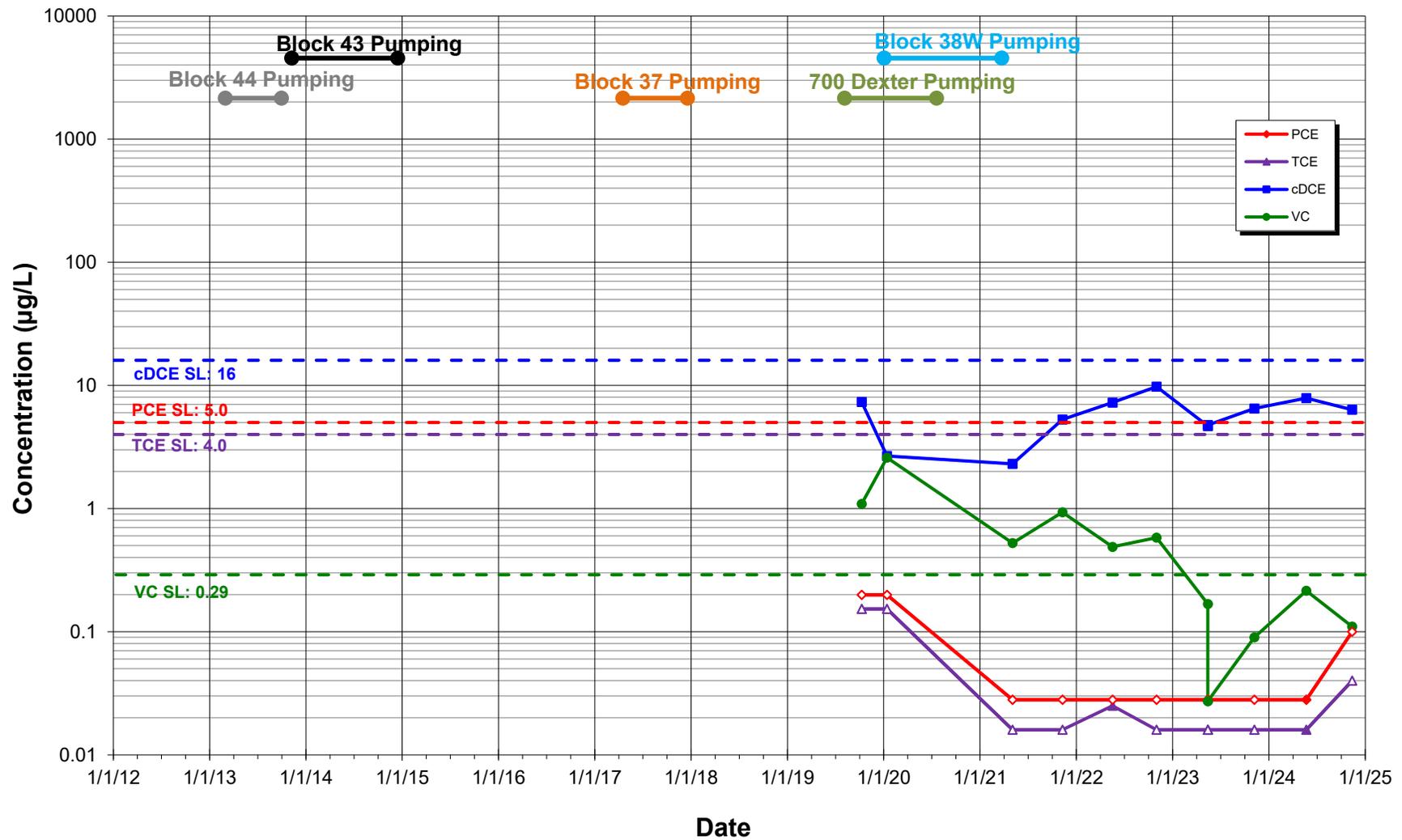
Concentration vs Time
MW-312 (19.9 to 9.9 feet NAVD), Alley E of Seattle Roy Aloha Shops
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

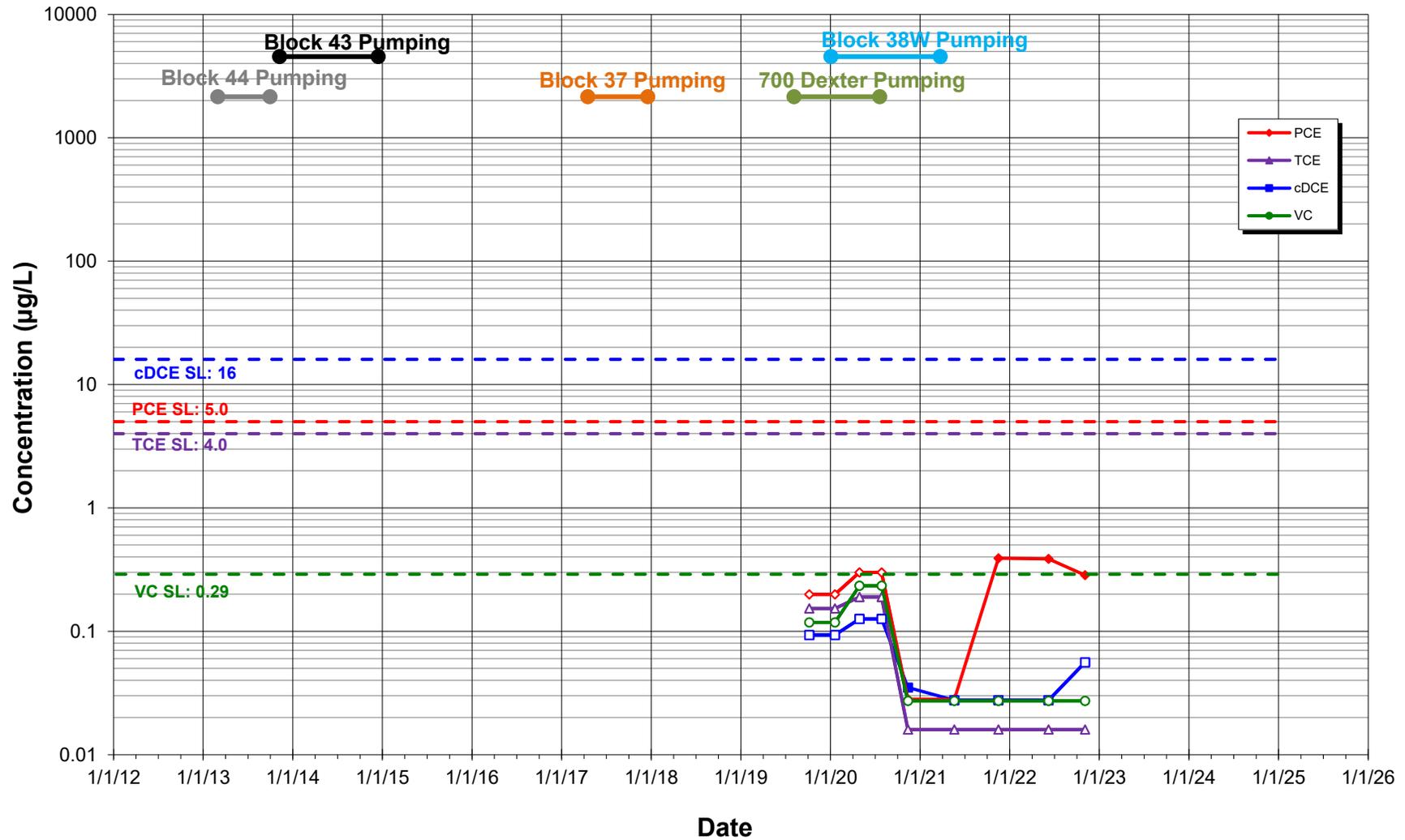
Concentration vs Time
MW-313 (20.4 to 10.4 feet NAVD), Alley E of Seattle Roy Aloha Shops
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

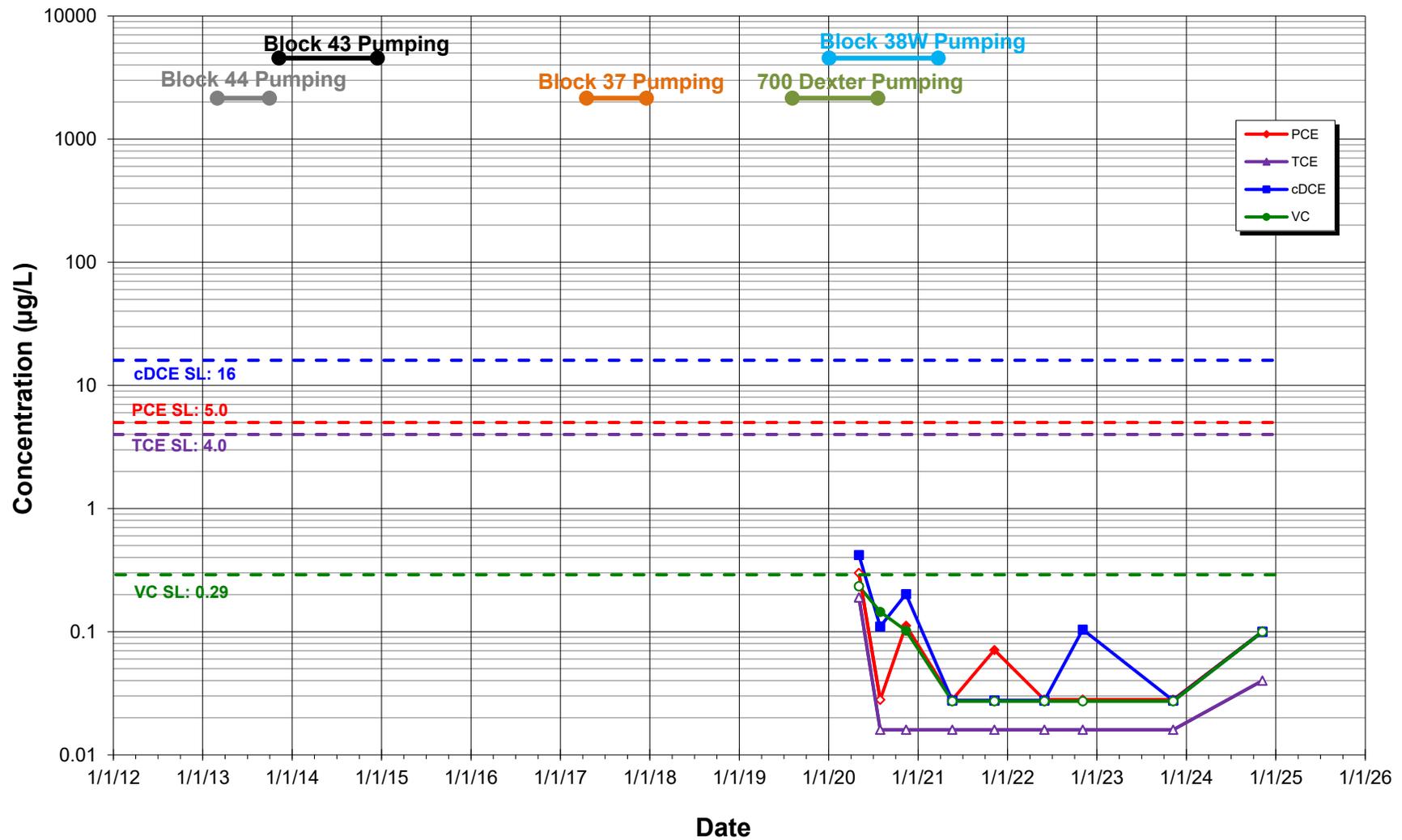
Concentration vs Time MW-320 (18.6 to 8.6 feet NAVD), 9th Ave N, W side American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

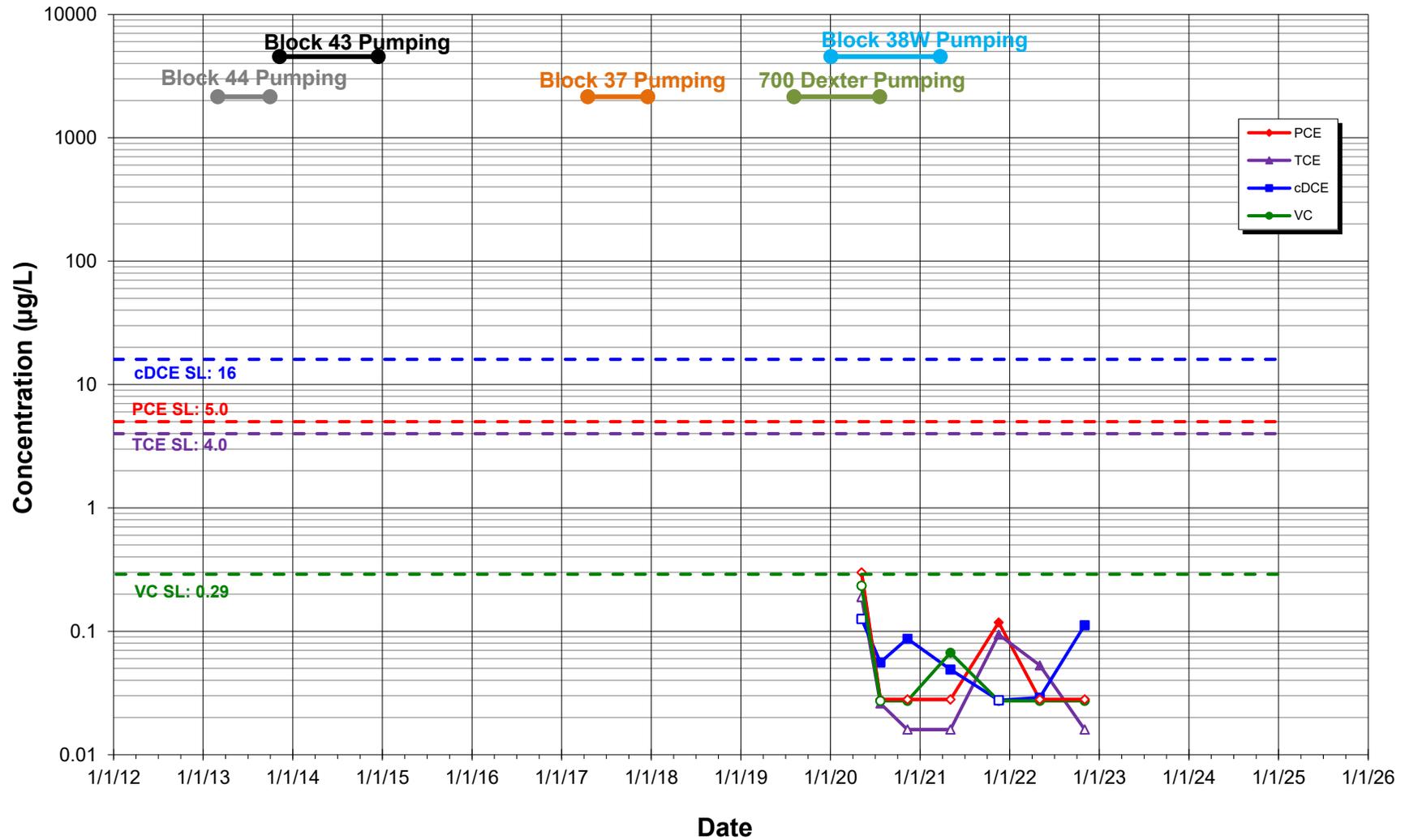
Concentration vs Time
MW-332 (16.0 to 6.0 feet NAVD), Roy St ROW, N side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

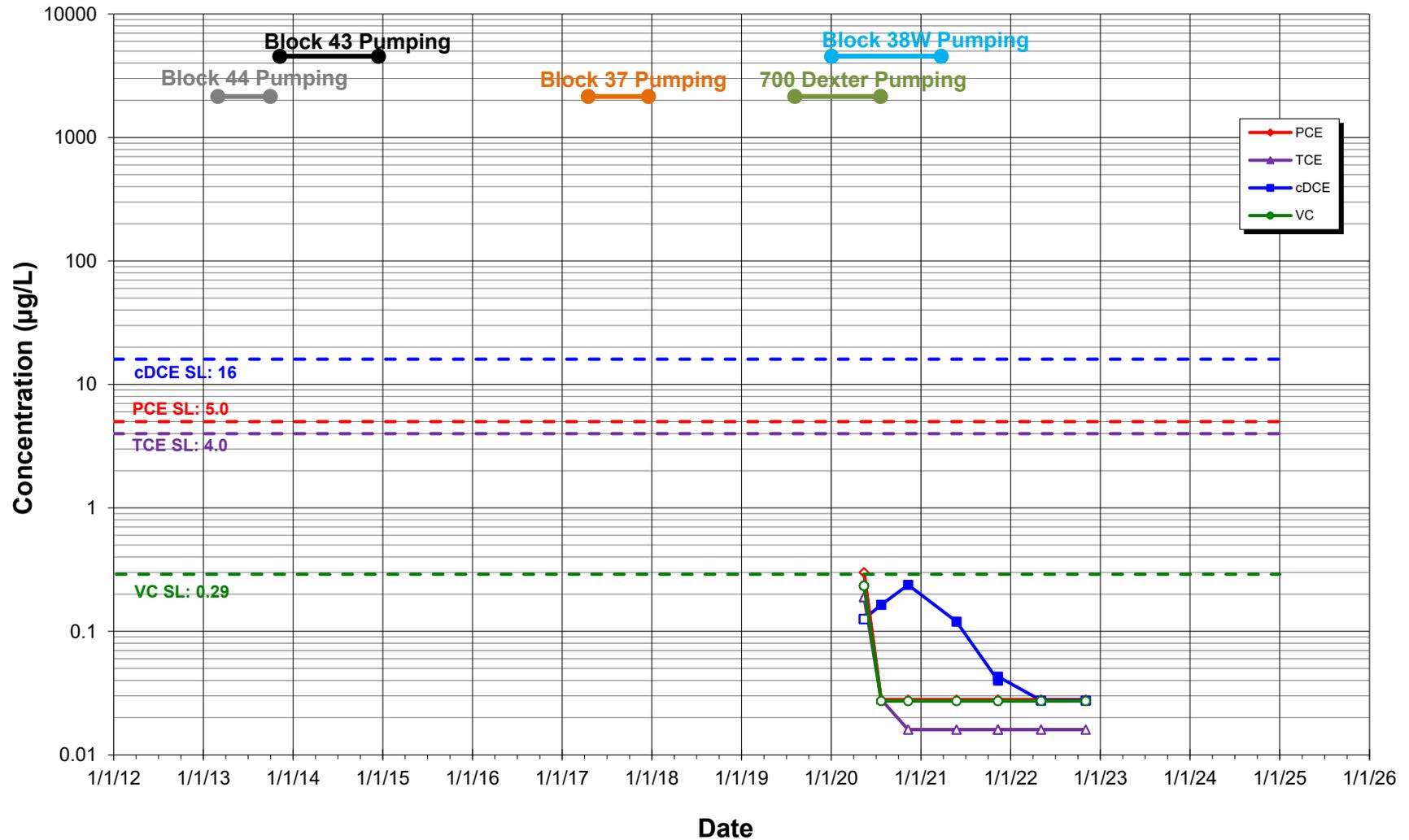
Concentration vs Time
MW-337 (18.1 to 8.1 feet NAVD), Lake Union Park, N end
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

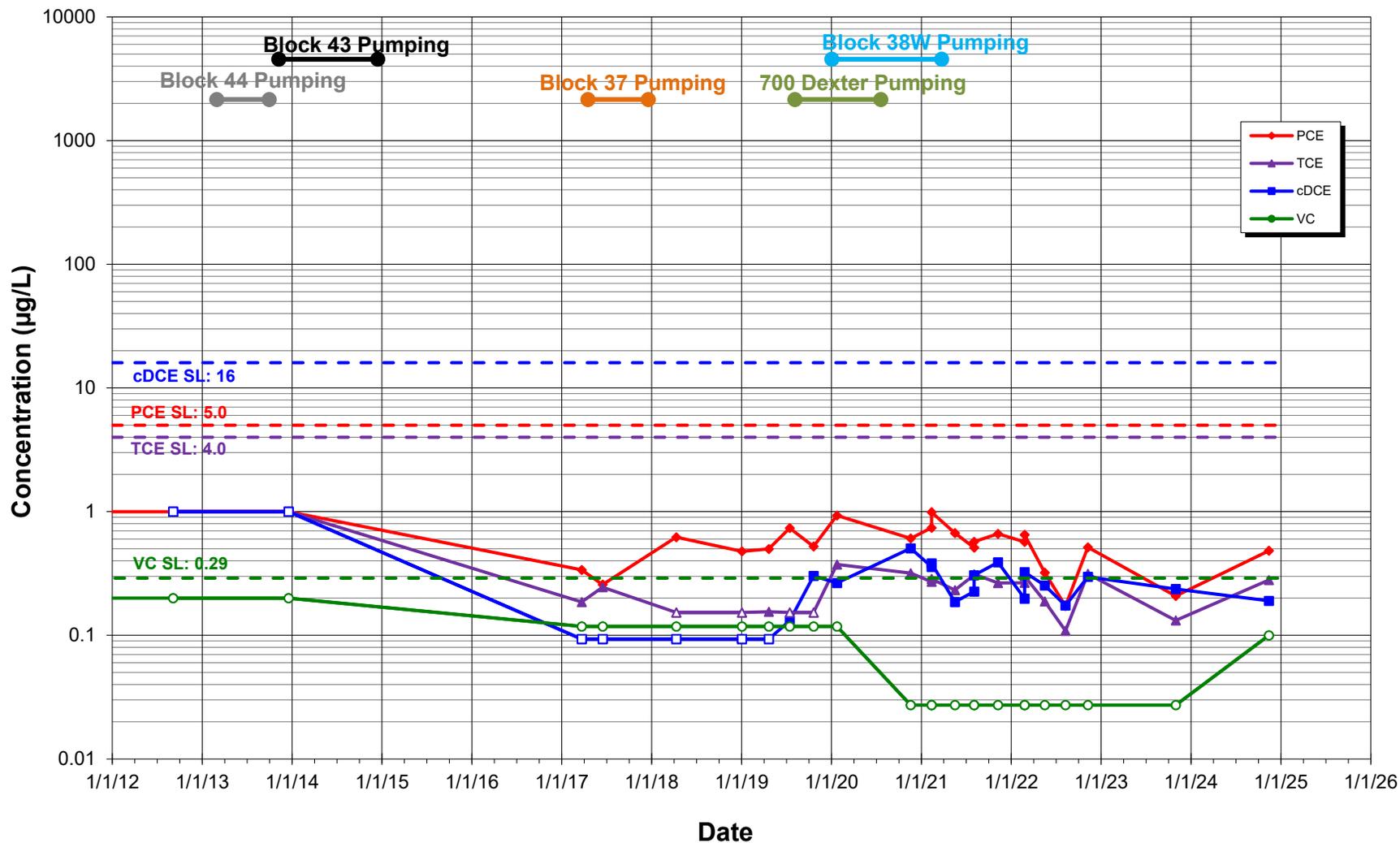
Concentration vs Time
MW-339 (18.2 to 8.2 feet NAVD), Lake Union Park, S end
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

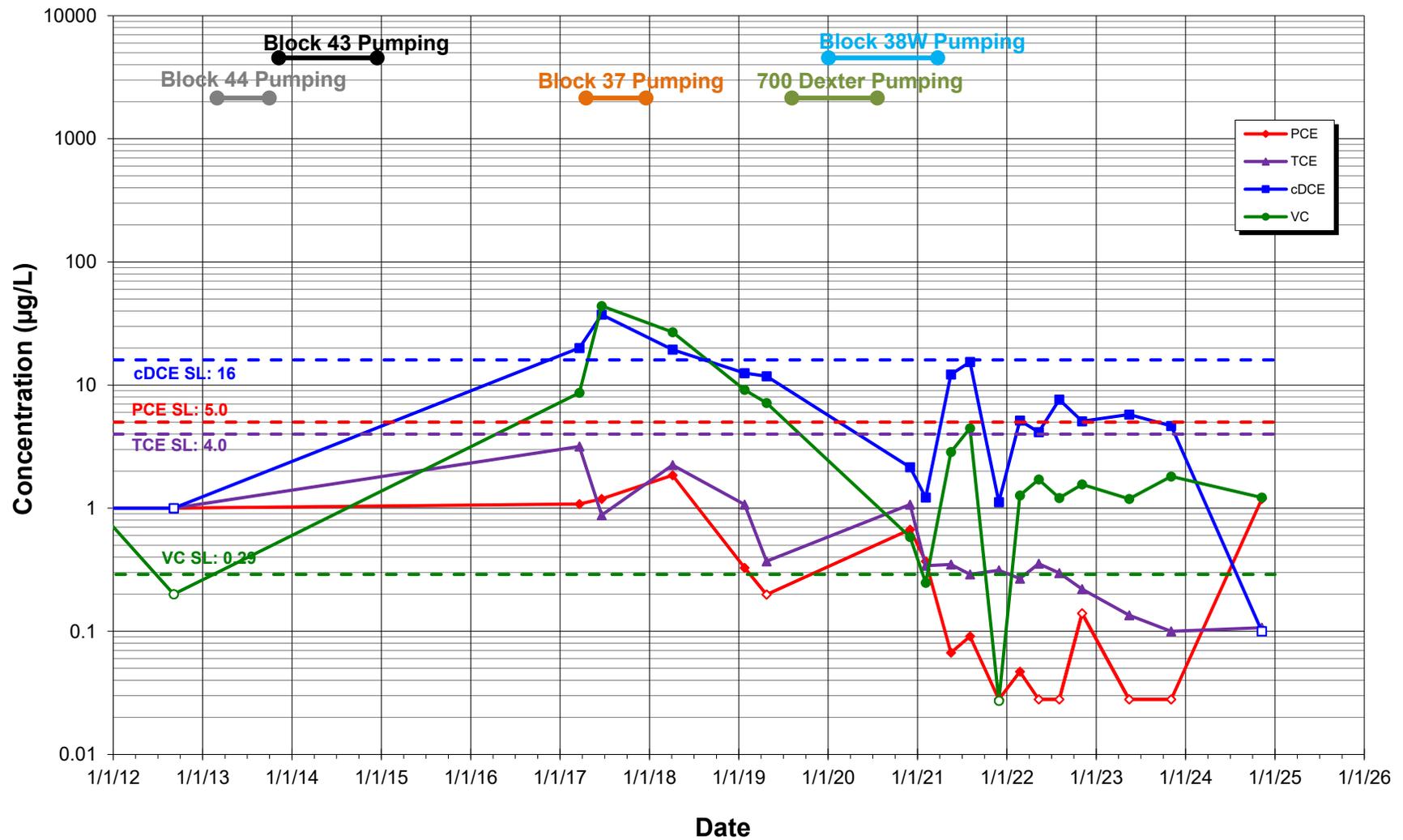
Concentration vs Time
R-MW5 (42.4 to 27.4 feet NAVD), Dexter Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

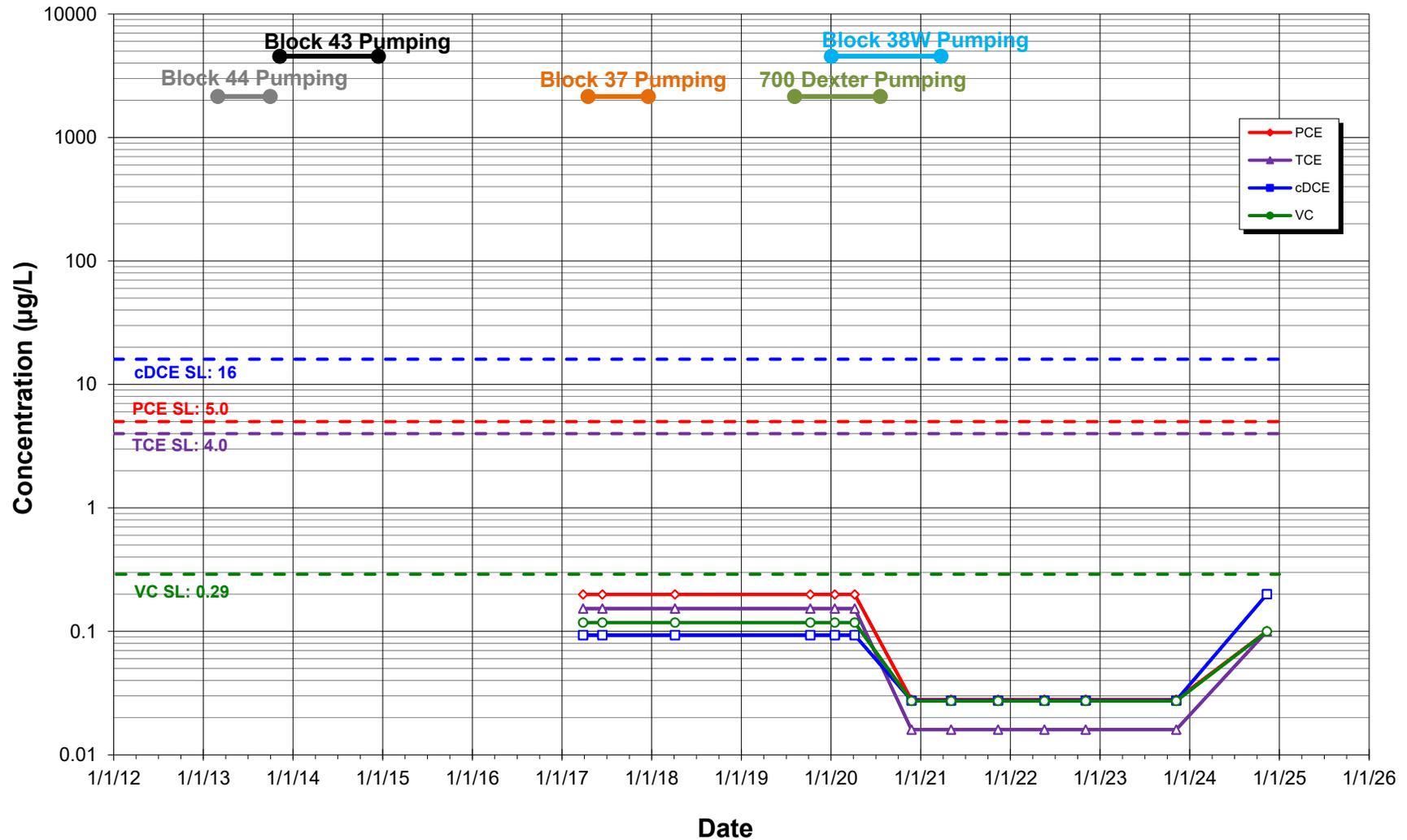
- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

Concentration vs Time
R-MW6 (33.3 to 23.3 feet NAVD), 8th Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



- Notes:
 1) All results detected below the laboratory MDLs are shown as hollow data points .
 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

Concentration vs Time
SCL-MW101 (25.5 to 15.5 feet NAVD), Alley E of Seattle Roy Aloha Shops
American Linen Supply Co Dexter Ave Site



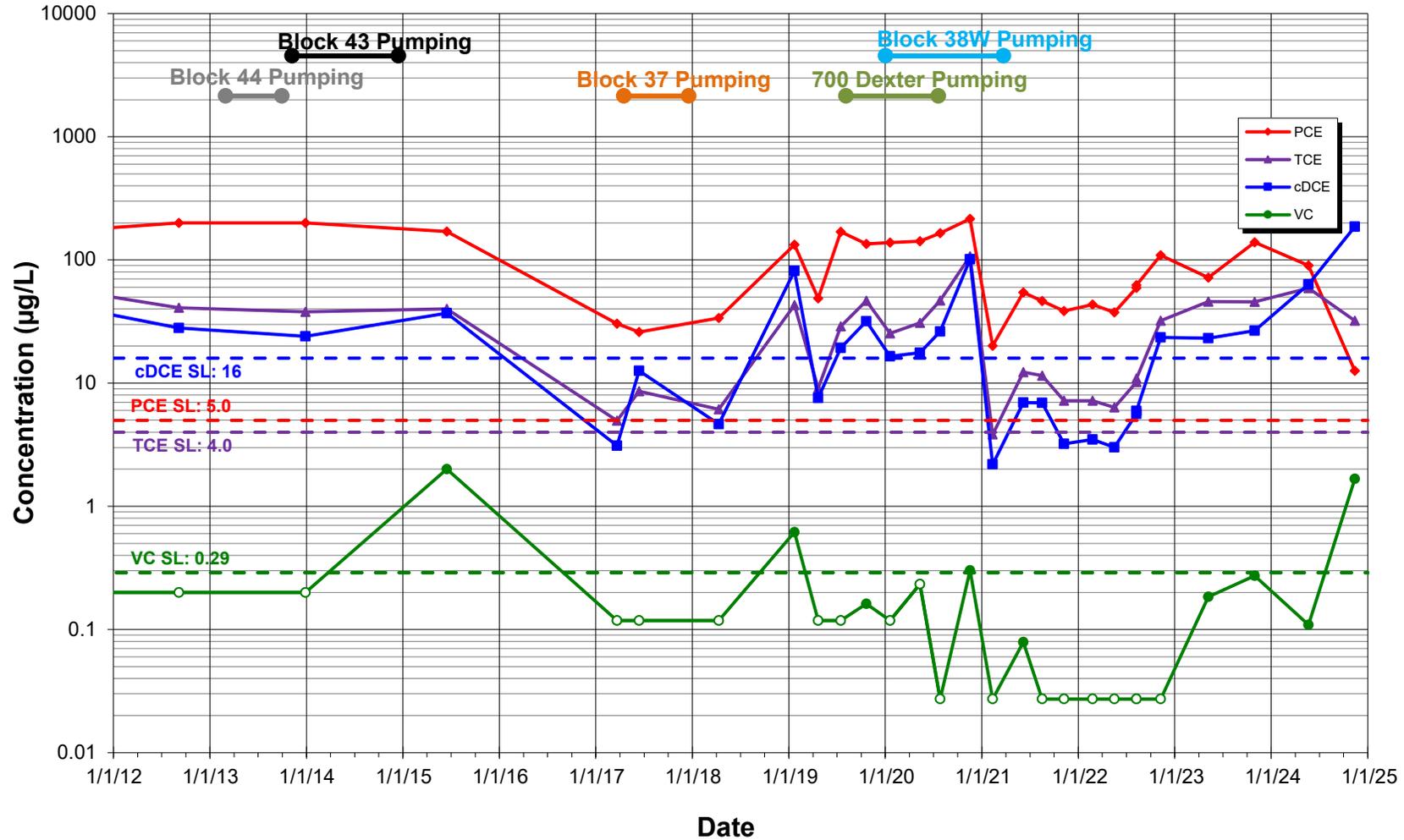
Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5 µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

CVOC Trend Plots

Intermediate A Zone

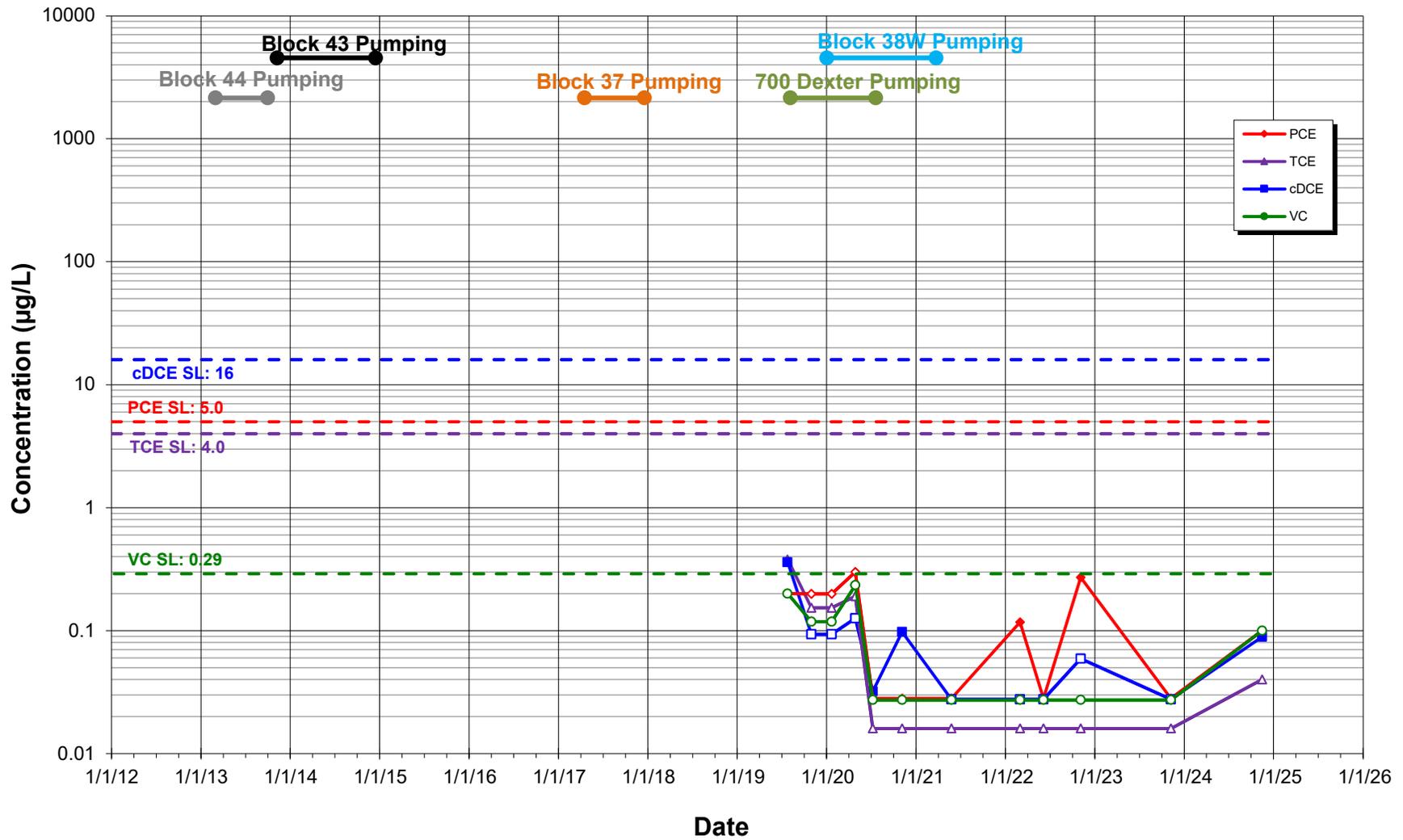
Concentration vs Time
BB-8 (14.0 to 4.0 feet NAVD), Roy St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE =4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

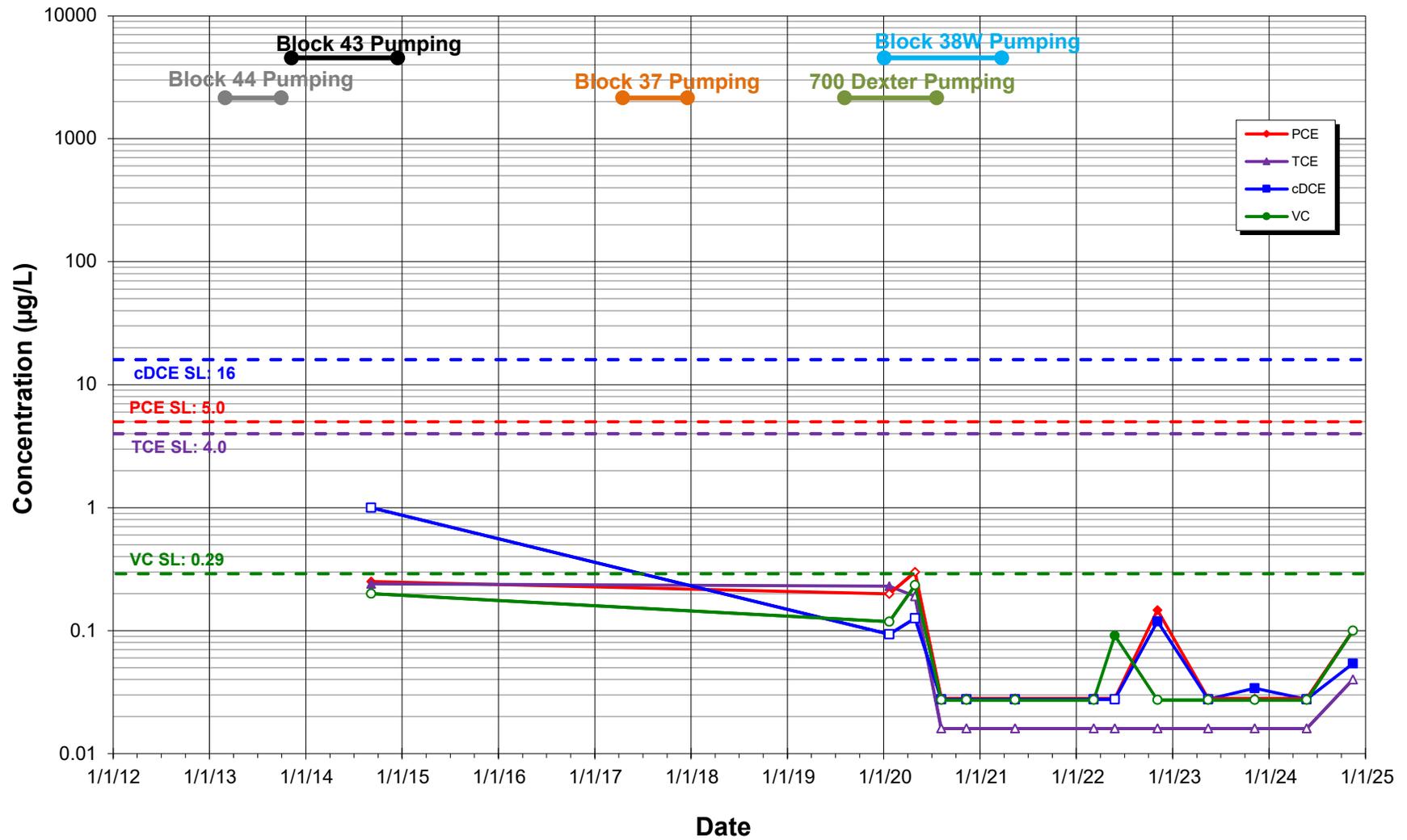
Concentration vs Time
FMW-142 (-4.2 to -9.6 feet NAVD), 9th Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE =4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

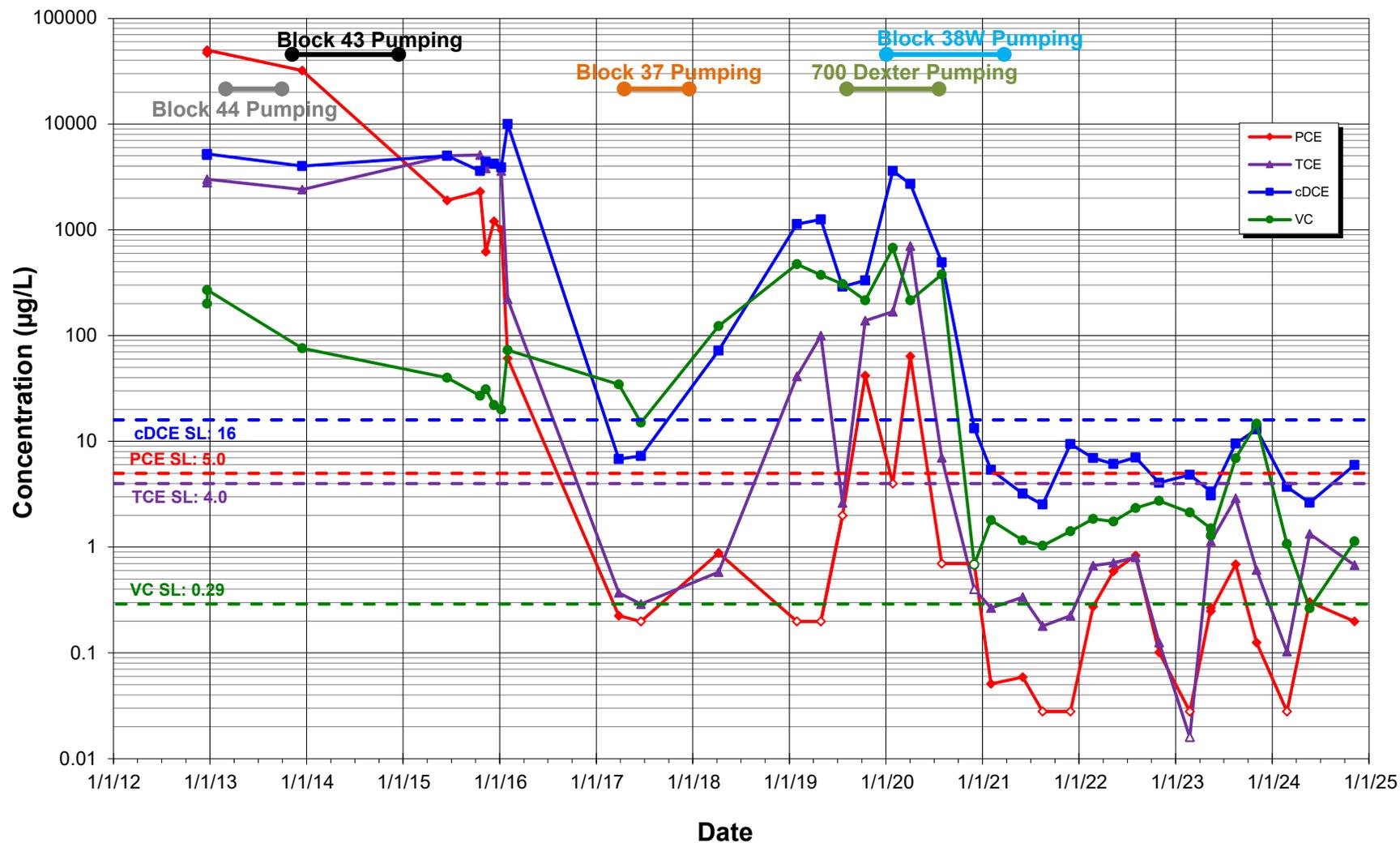
Concentration vs Time
GEI-MW-1 (-9.7 to -29.7 feet NAVD), Block 79 East, N end
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE =4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

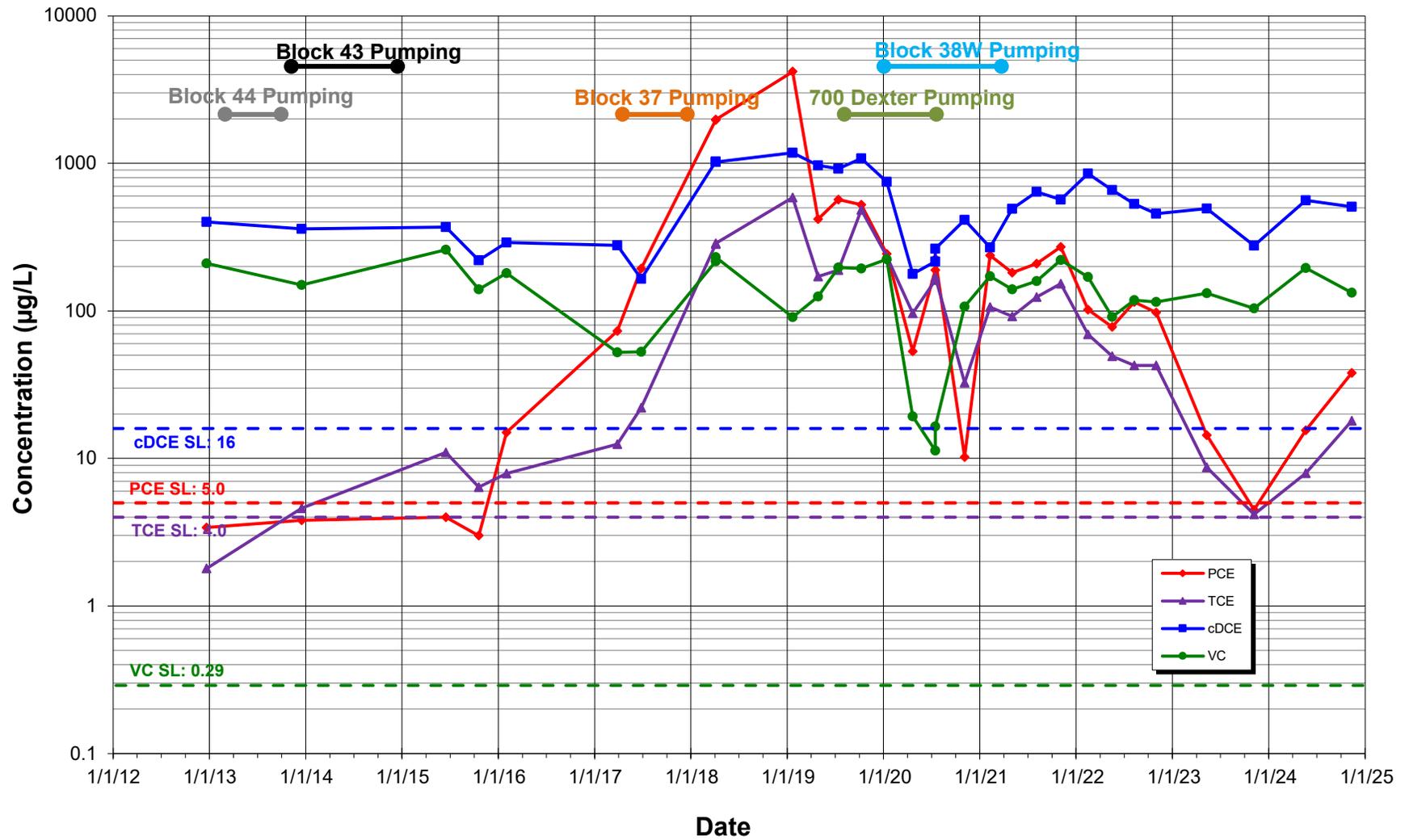
Concentration vs Time
MW107 (8.8 to -1.2 feet NAVD), 8th Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE =4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

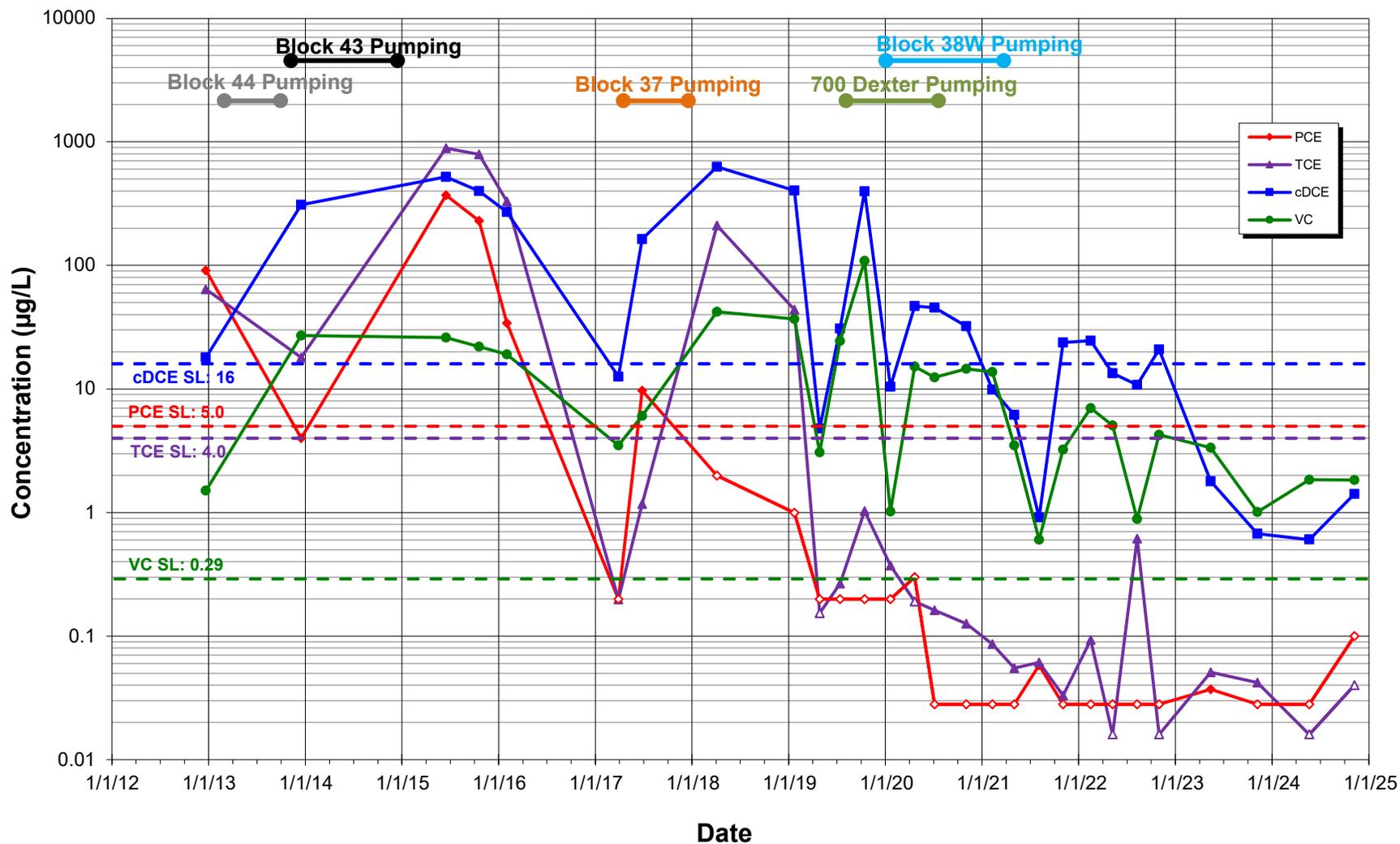
Concentration vs Time
MW108 (-7.2 to -17.2 feet NAVD), Alley E of Seattle Roy Aloho Shops
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE =4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

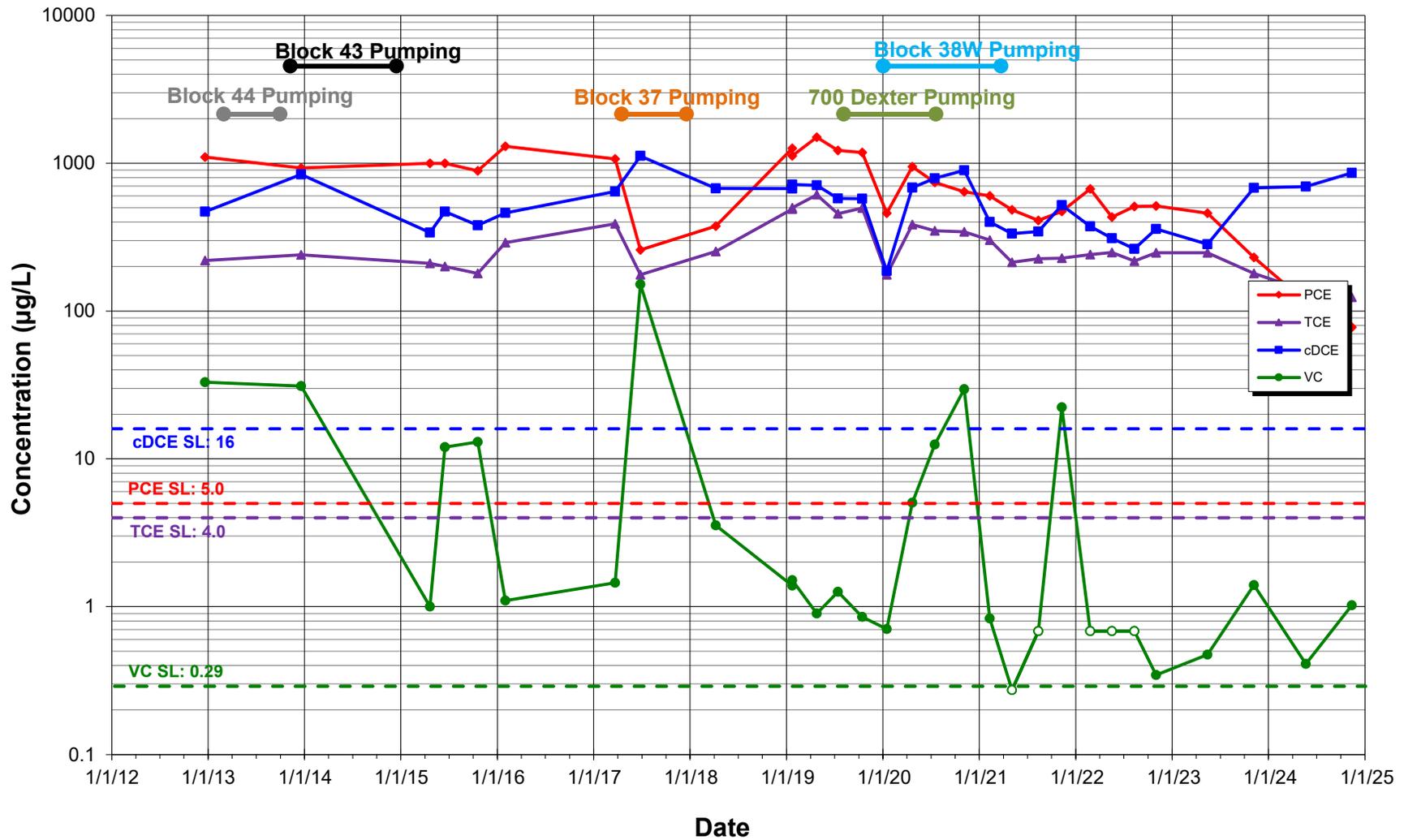
Concentration vs Time
MW109 (0.0 to -10.0 feet NAVD), Alley E of Seattle Roy Aloha Shops
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points.
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

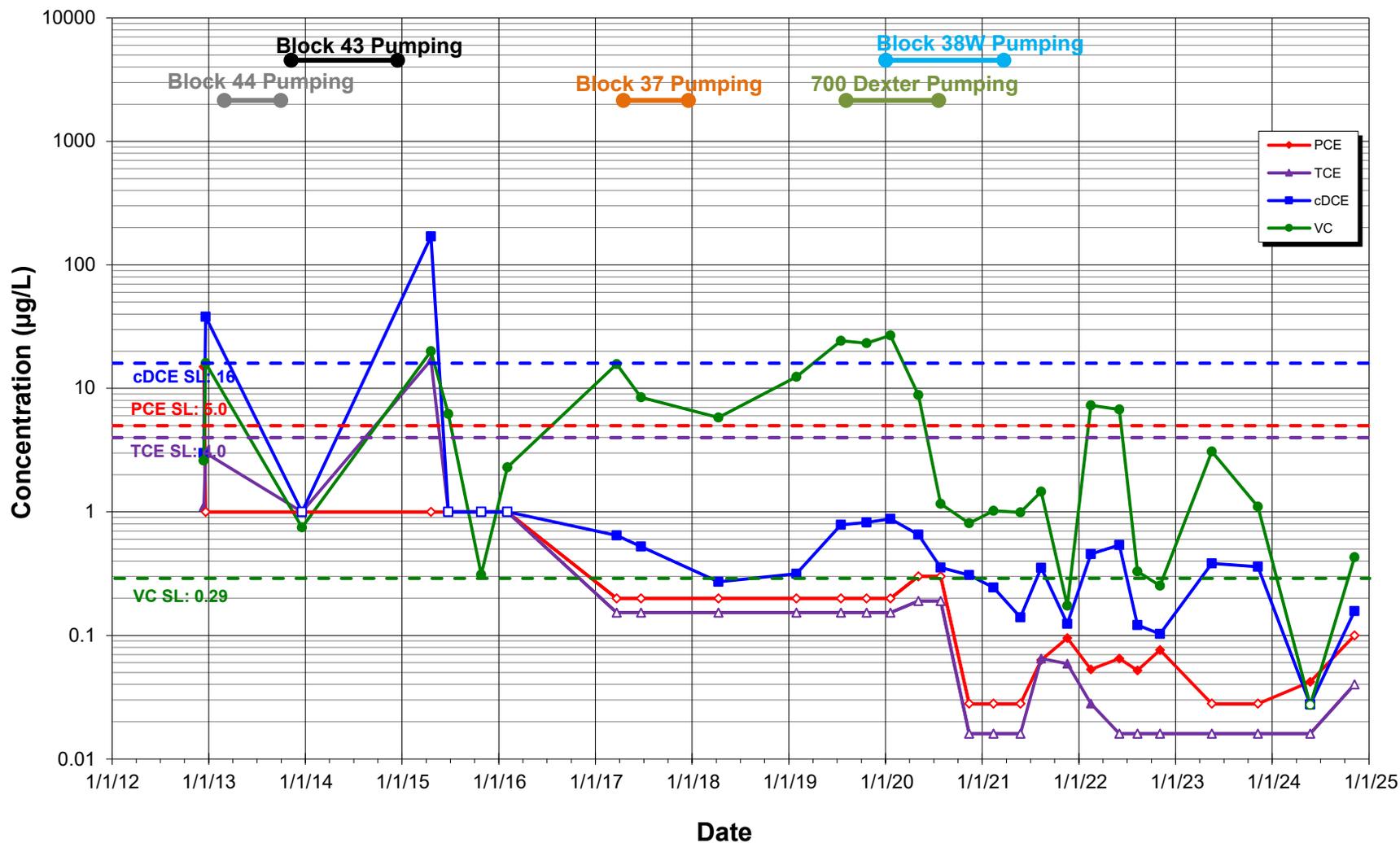
Concentration vs Time
MW110 (4.7 to -5.3 feet NAVD), Alley E of Seattle Roy Aloha Shops
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE =4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

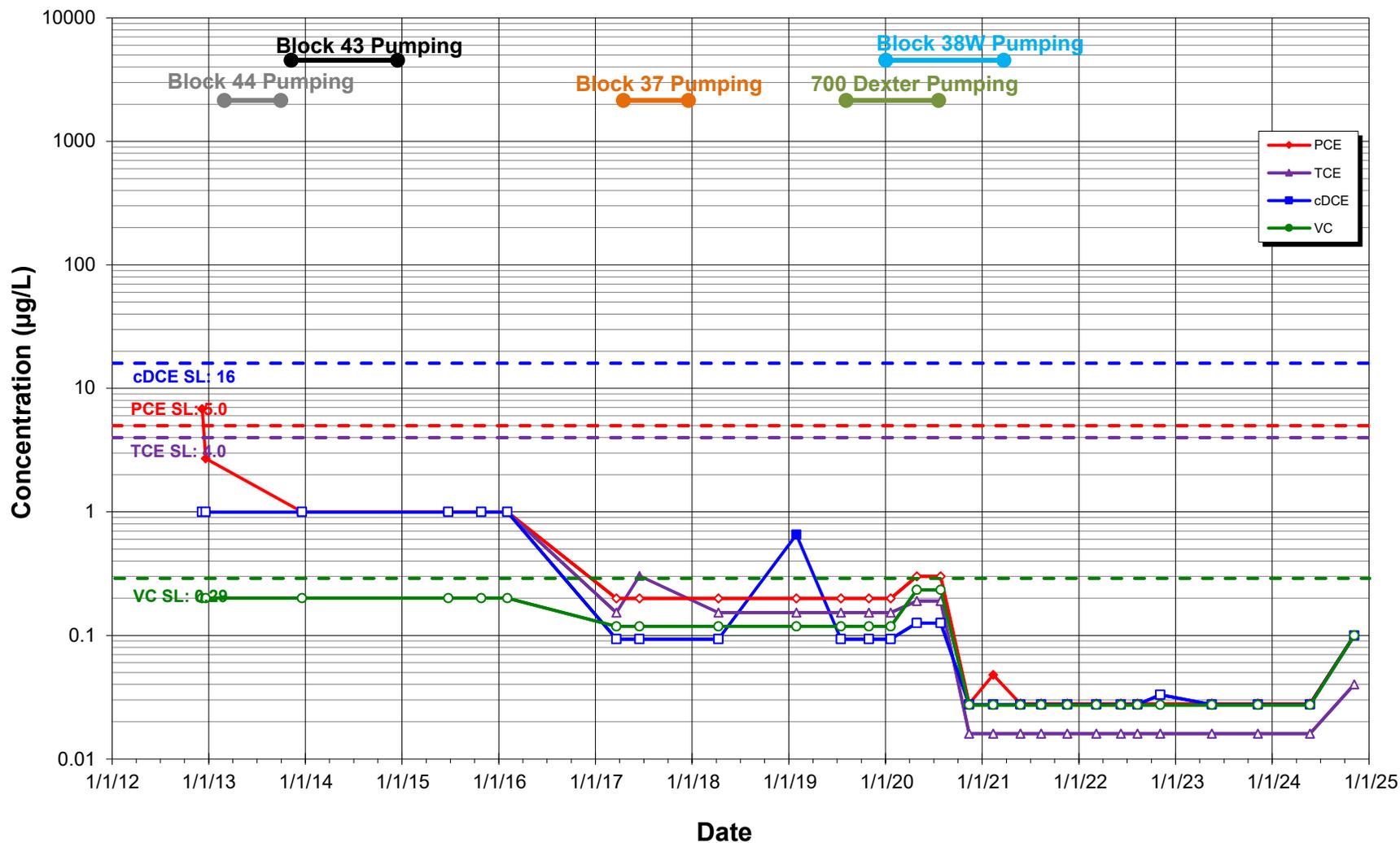
Concentration vs Time
MW115 (-0.6 to -10.6 feet NAVD), 9th Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

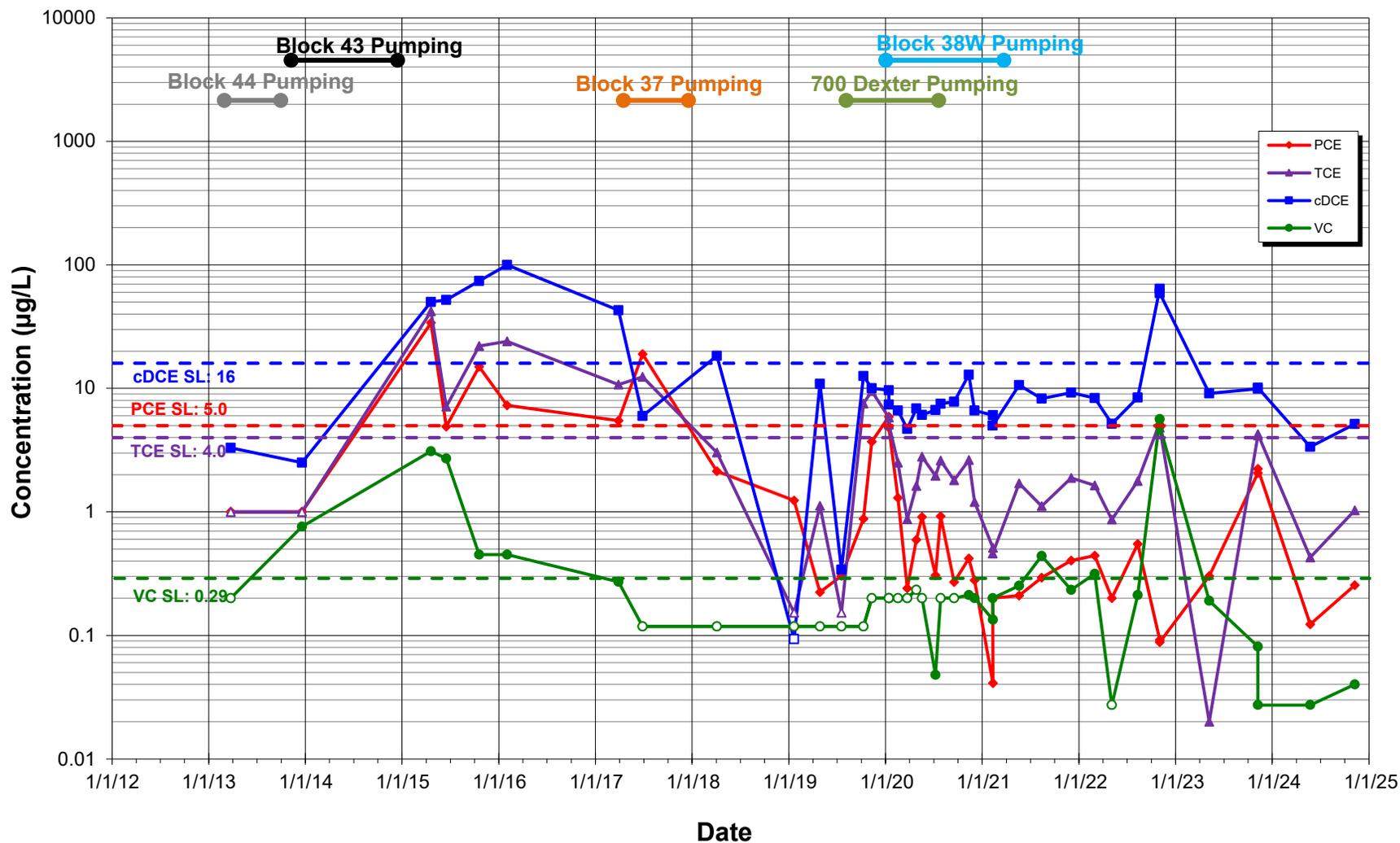
Concentration vs Time
MW116 (-3.1 to -13.1 feet NAVD) 9th Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

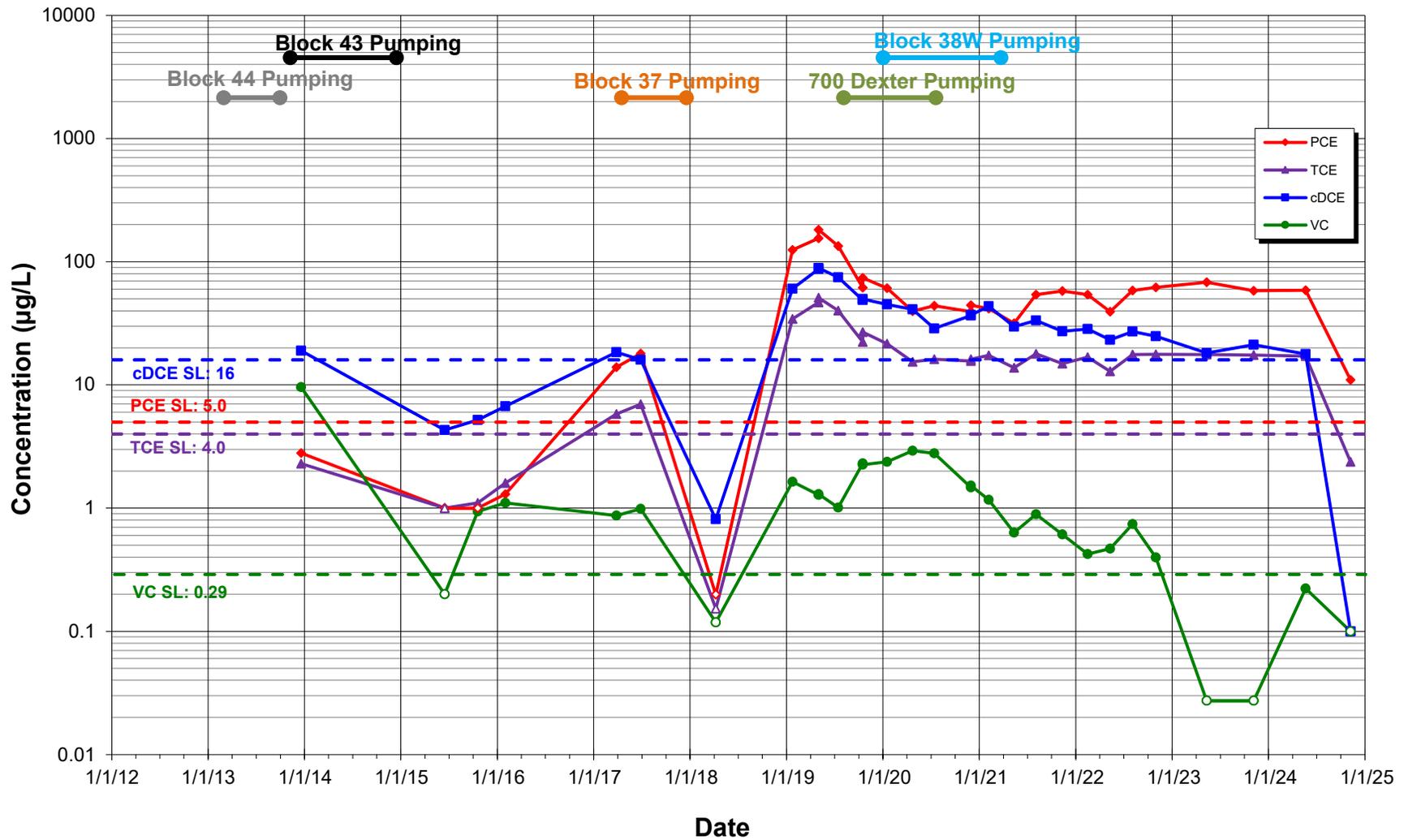
Concentration vs Time
MW119 (2.7 to -7.3 feet NAVD), 9th Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

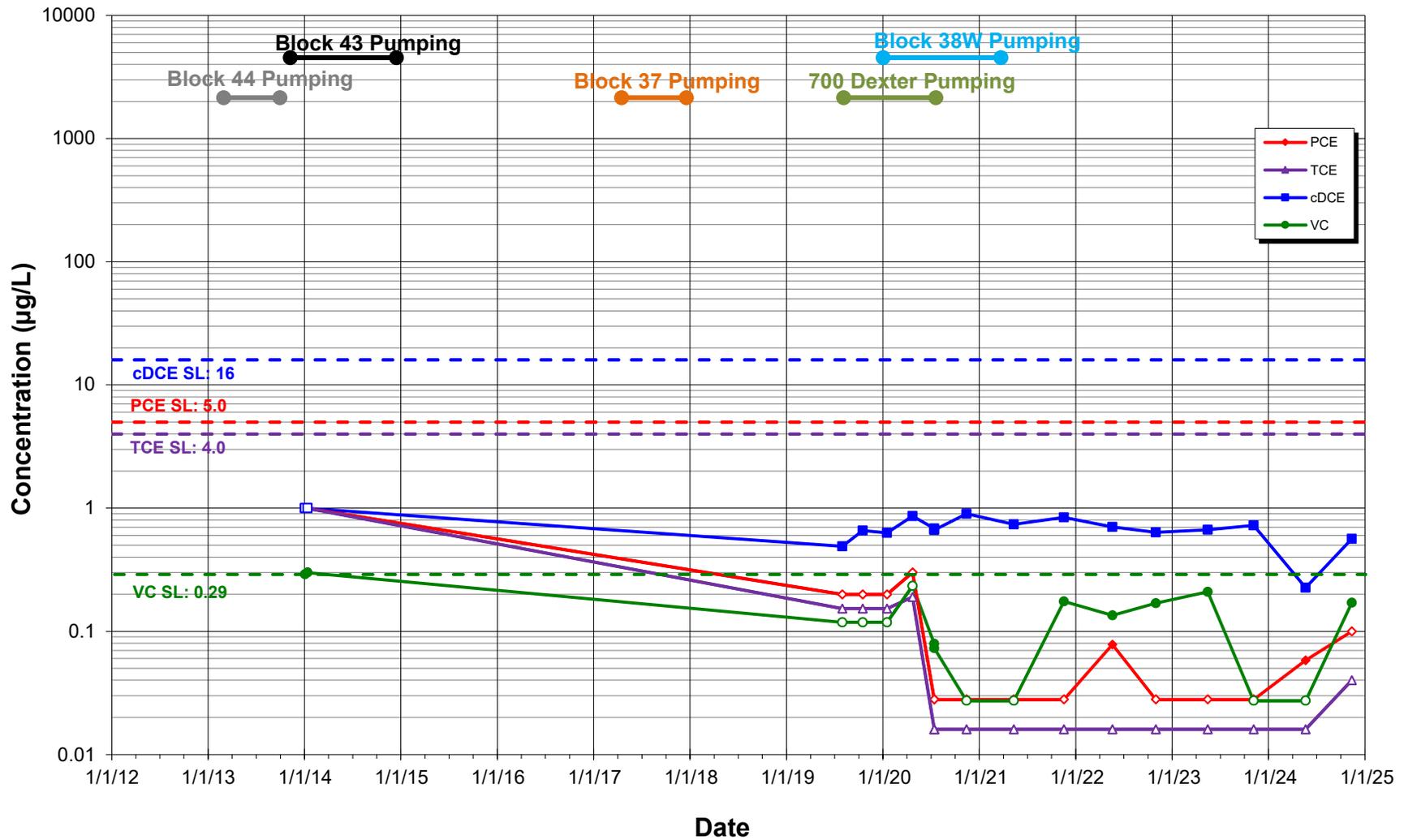
Concentration vs Time
MW120 (0.0 to -10.0 feet NAVD), 8th Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

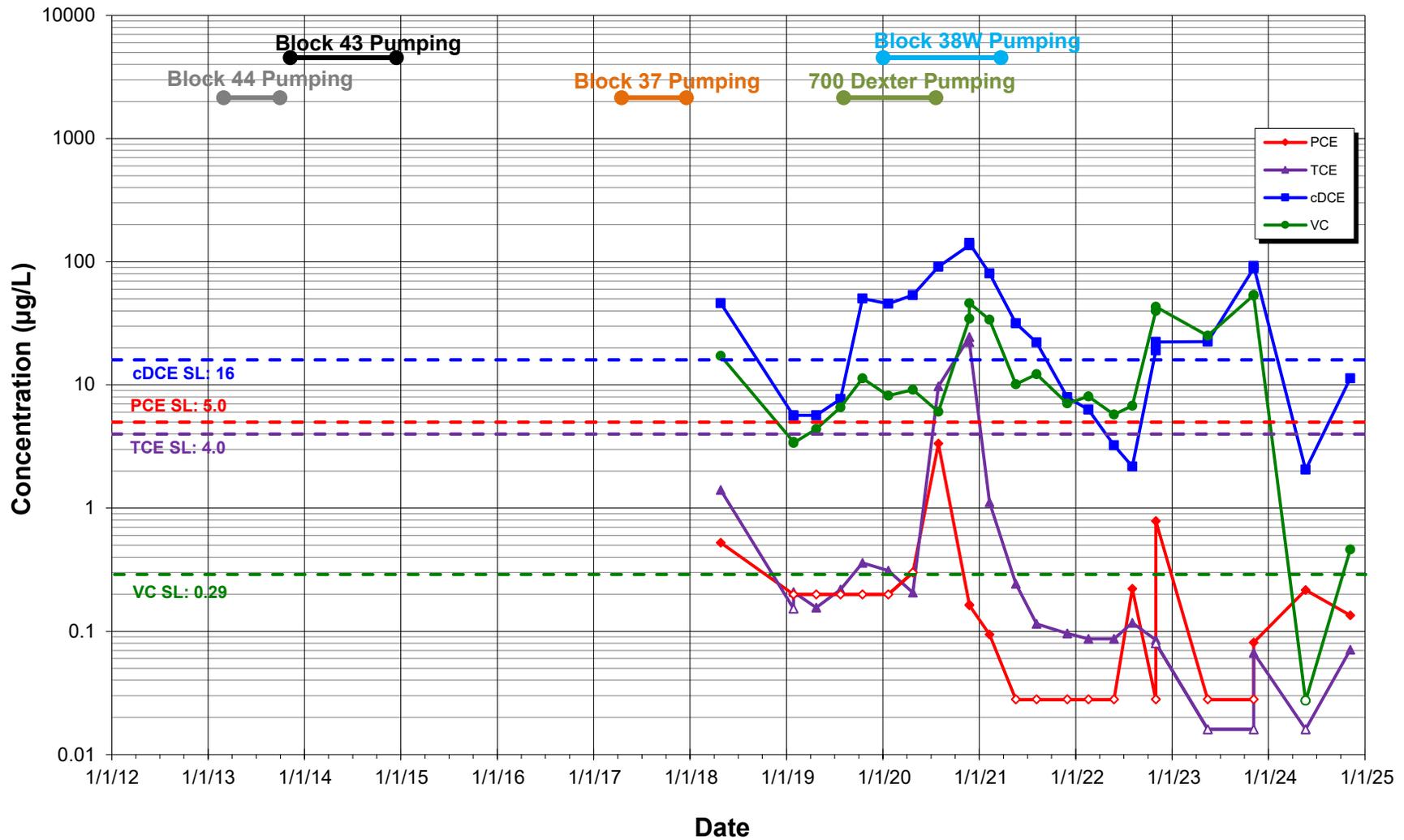
Concentration vs Time
MW127 (-1 to -11.0 feet NAVD), 8th Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

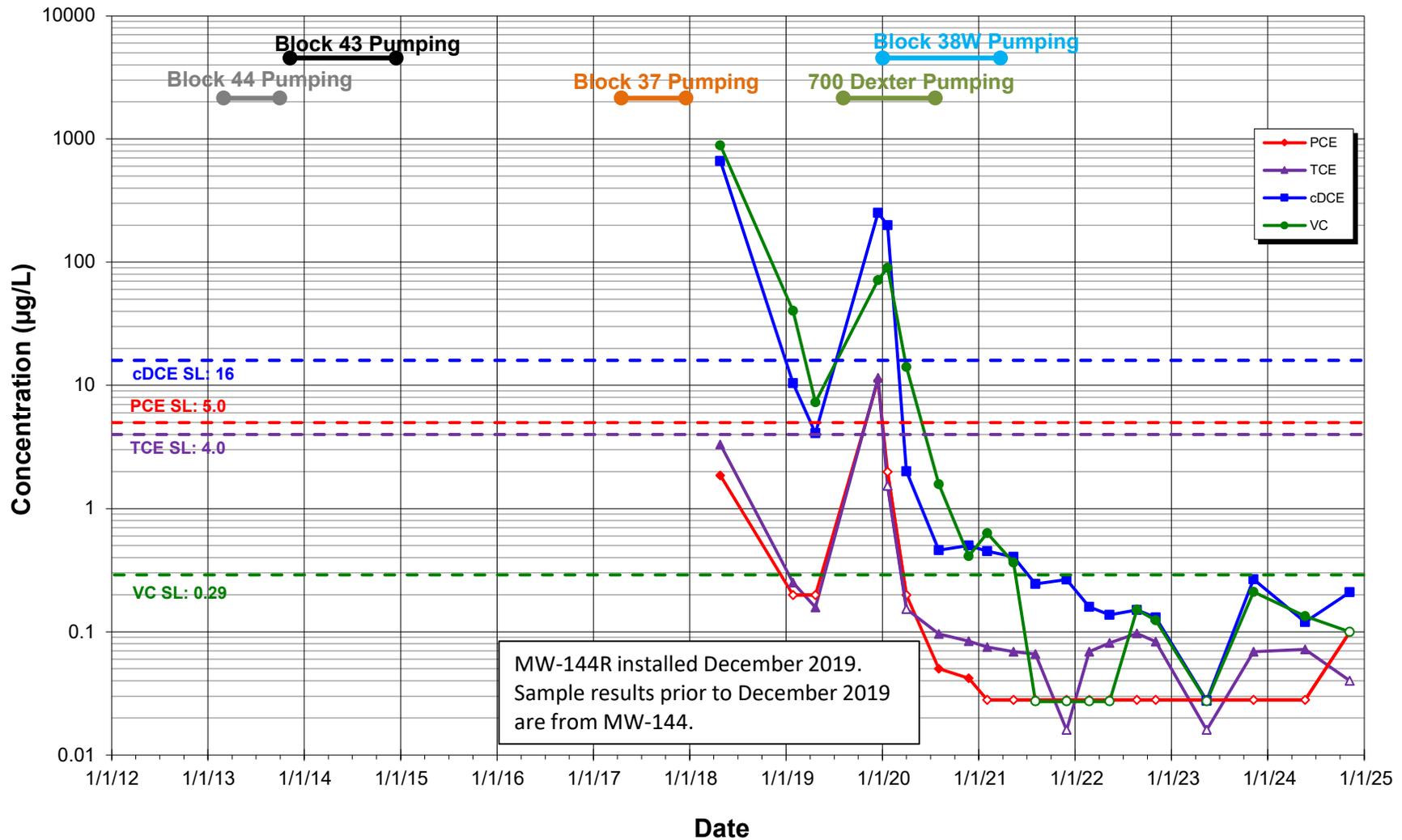
Concentration vs Time
MW-142 (2.4 to -7.6 feet NAVD), 8th Ave N ROW, E side
American Linen Supply Co–Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

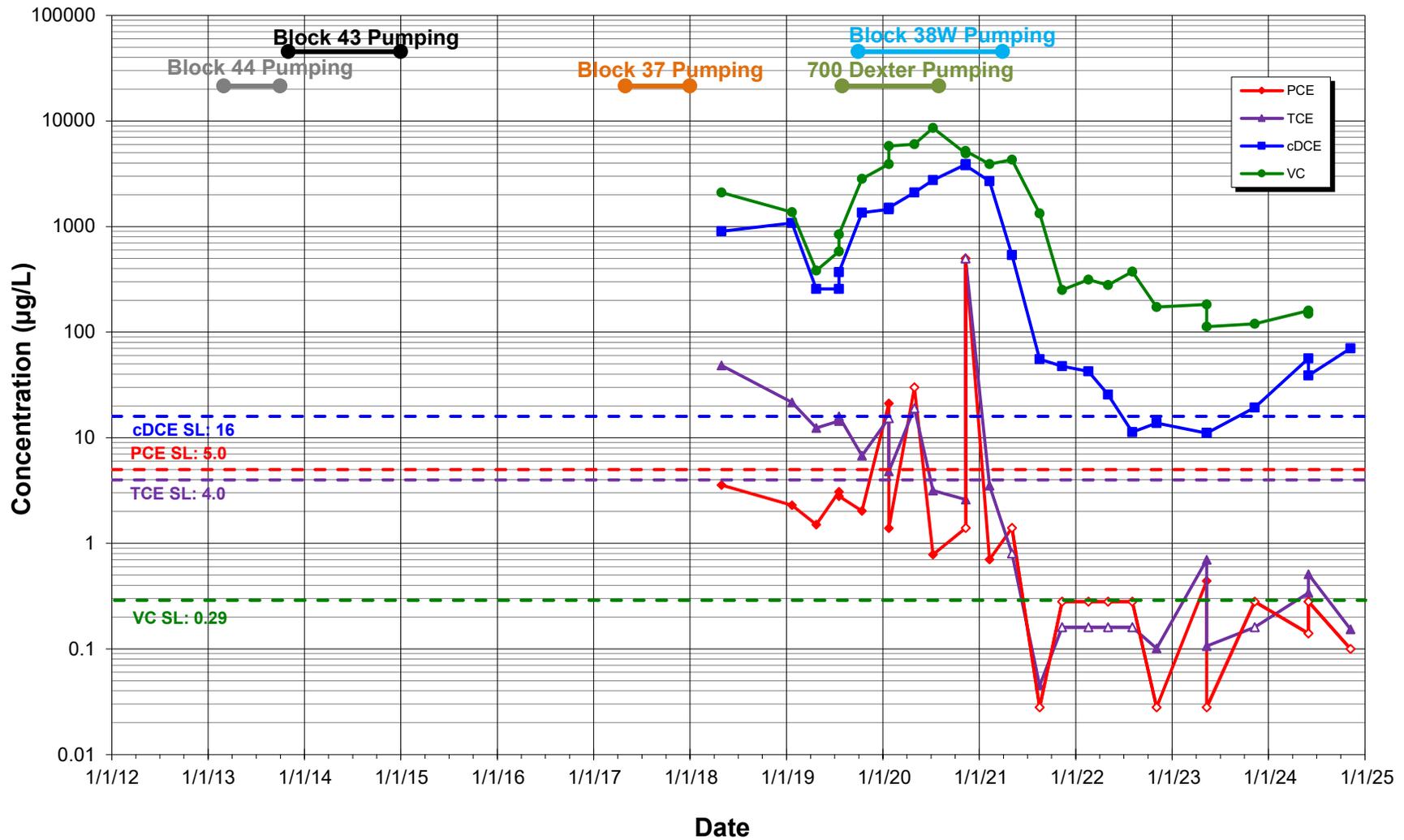
Concentration vs Time
MW-144R (3.9 to -6.5 feet NAVD), 8th Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

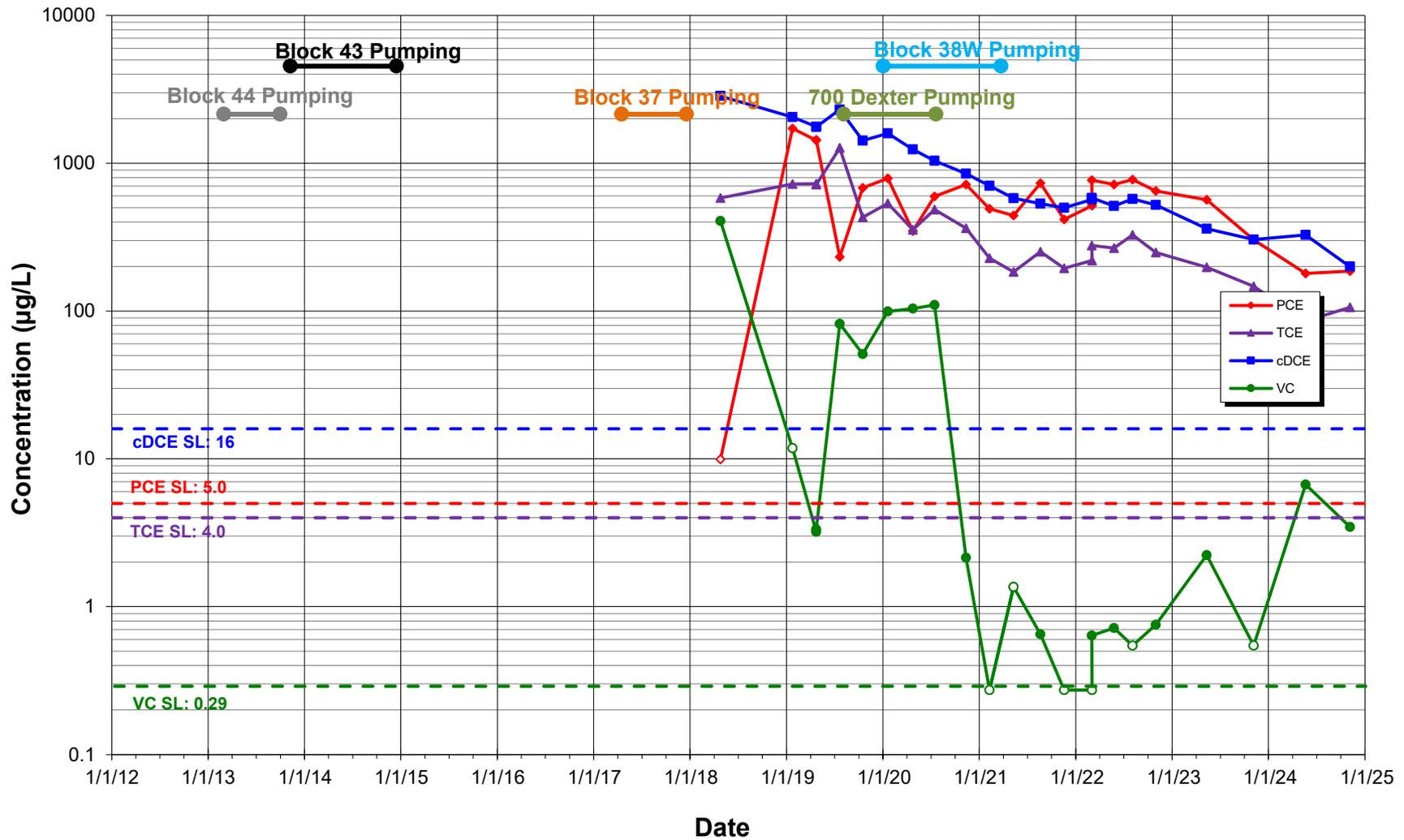
Concentration vs Time
MW-146 (12.8 to 2.8 feet NAVD), Roy St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

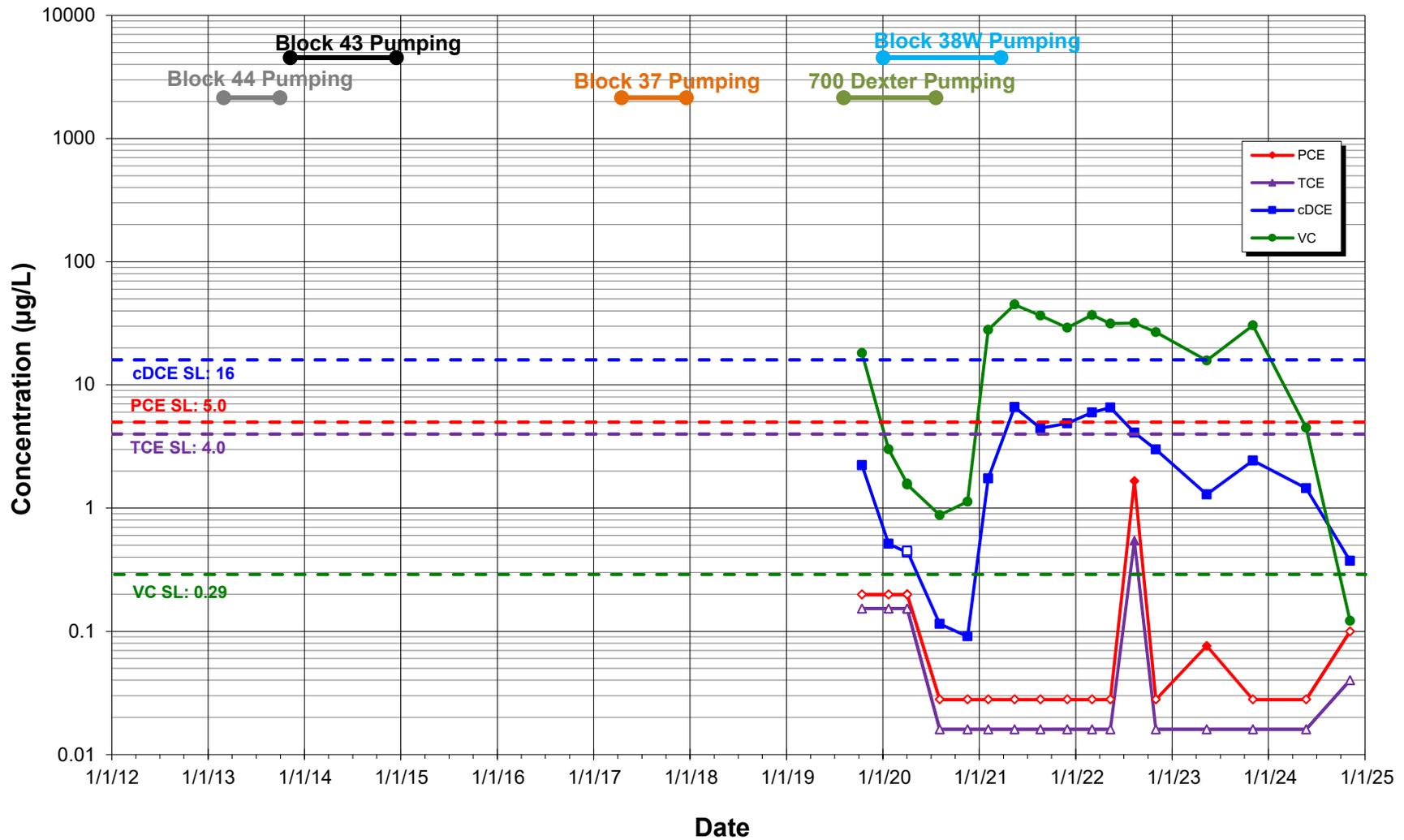
Concentration vs Time
MW-156 (2.0 to -8.0 feet NAVD), 8th Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

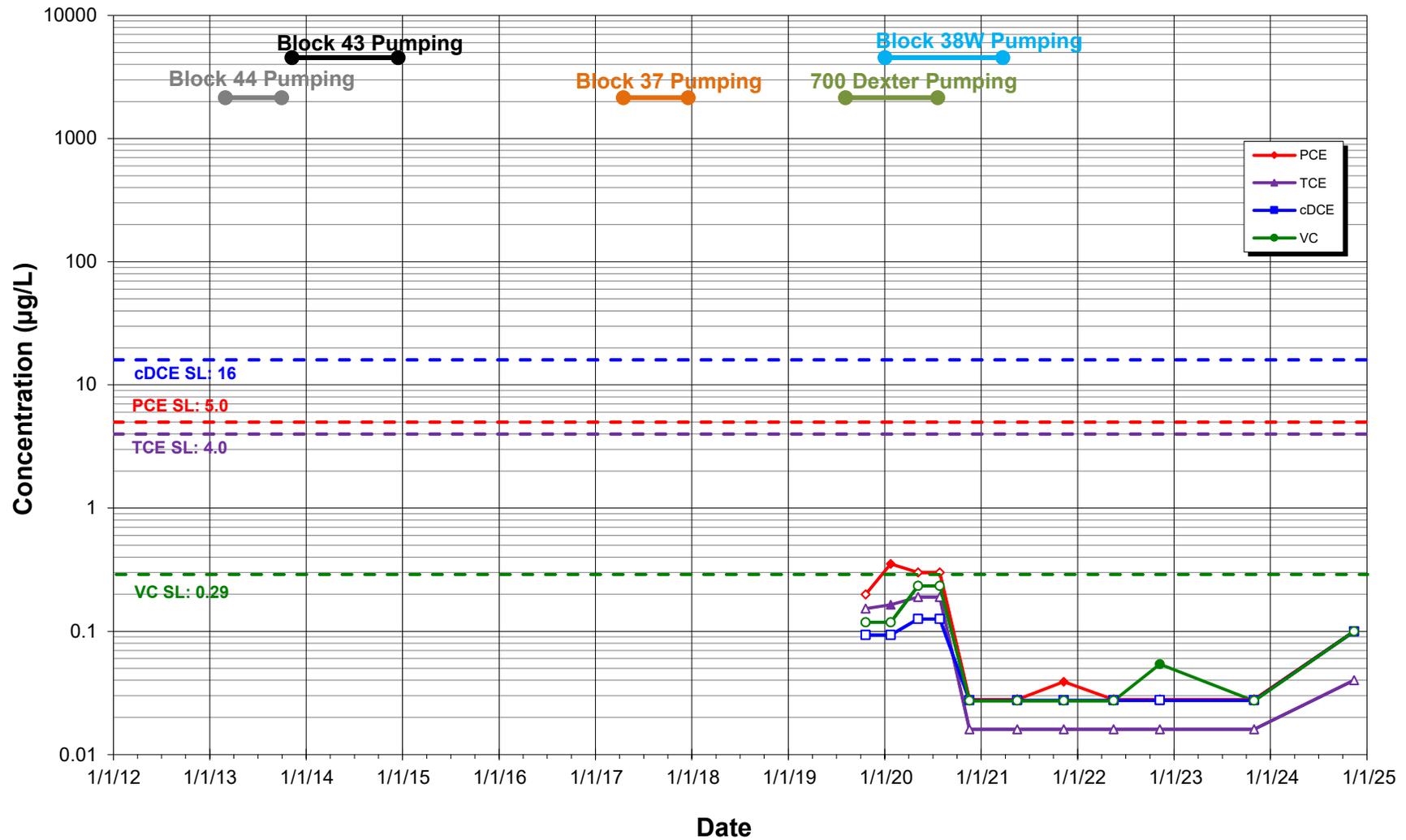
Concentration vs Time
MW-189 (-1.2 to -11.2 feet NAVD), Valley St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

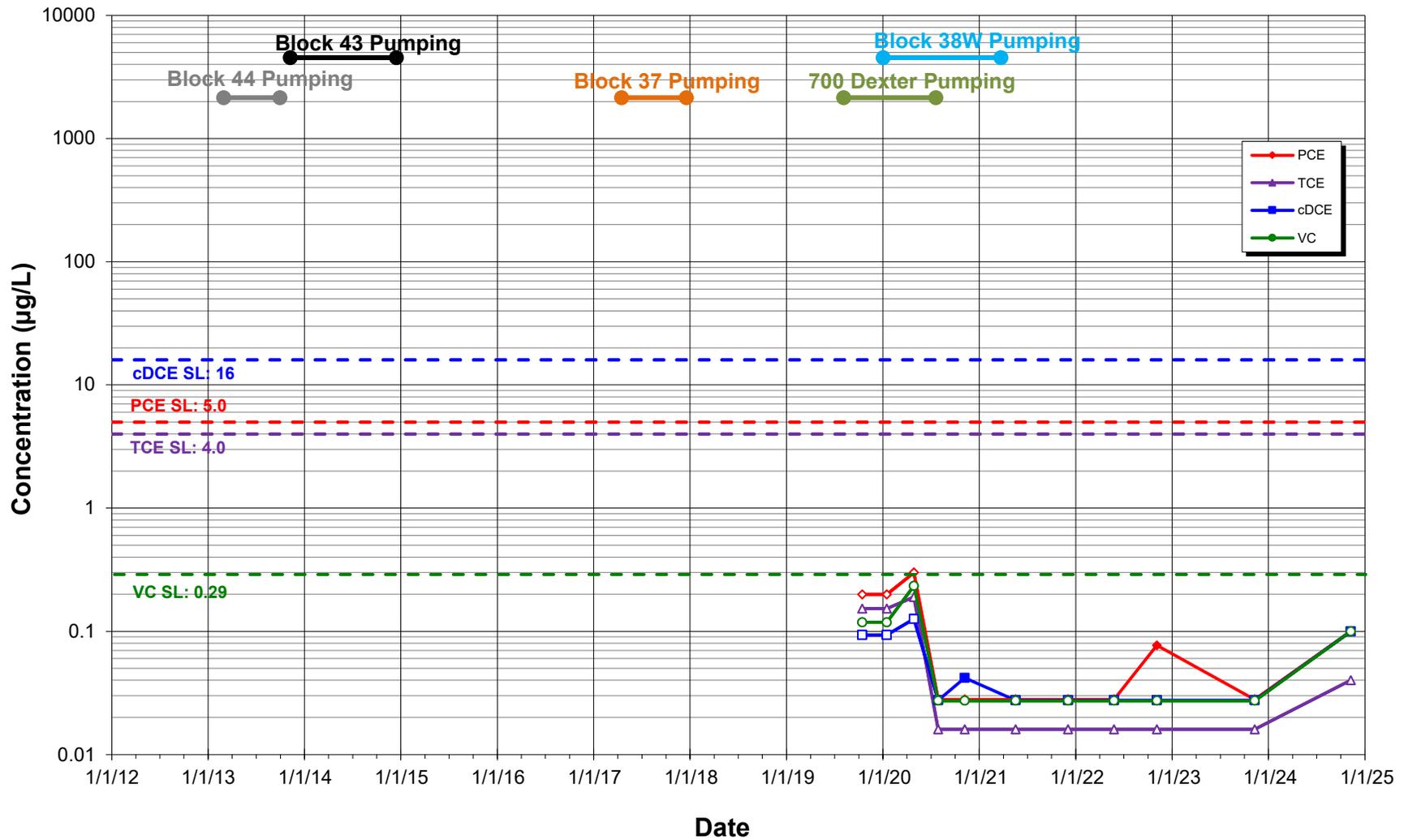
Concentration vs Time
MW-302 (3.0 to -7.0 feet NAVD), Dexter Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

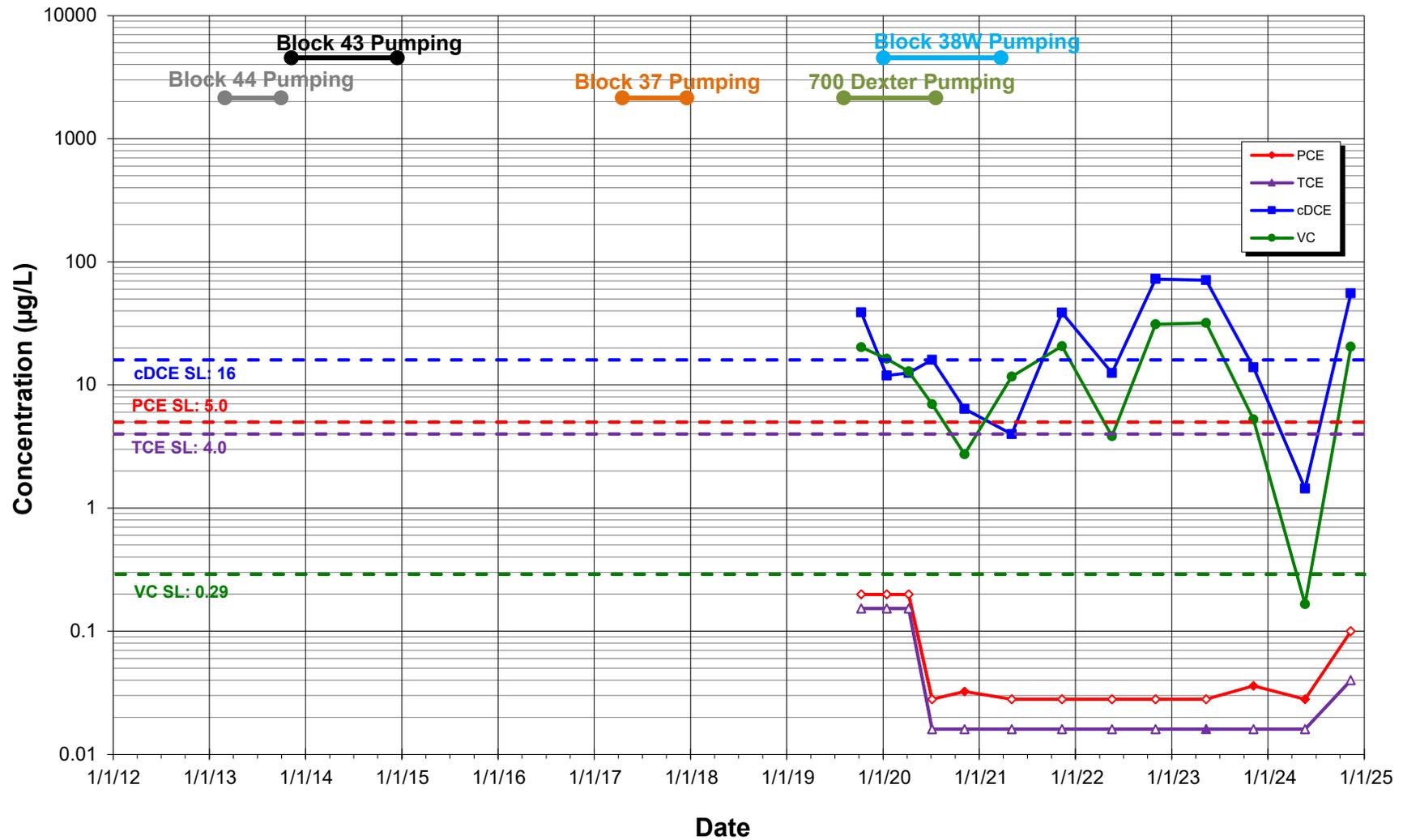
Concentration vs Time
MW-306 (17.2 to 7.2 feet NAVD), Roy St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

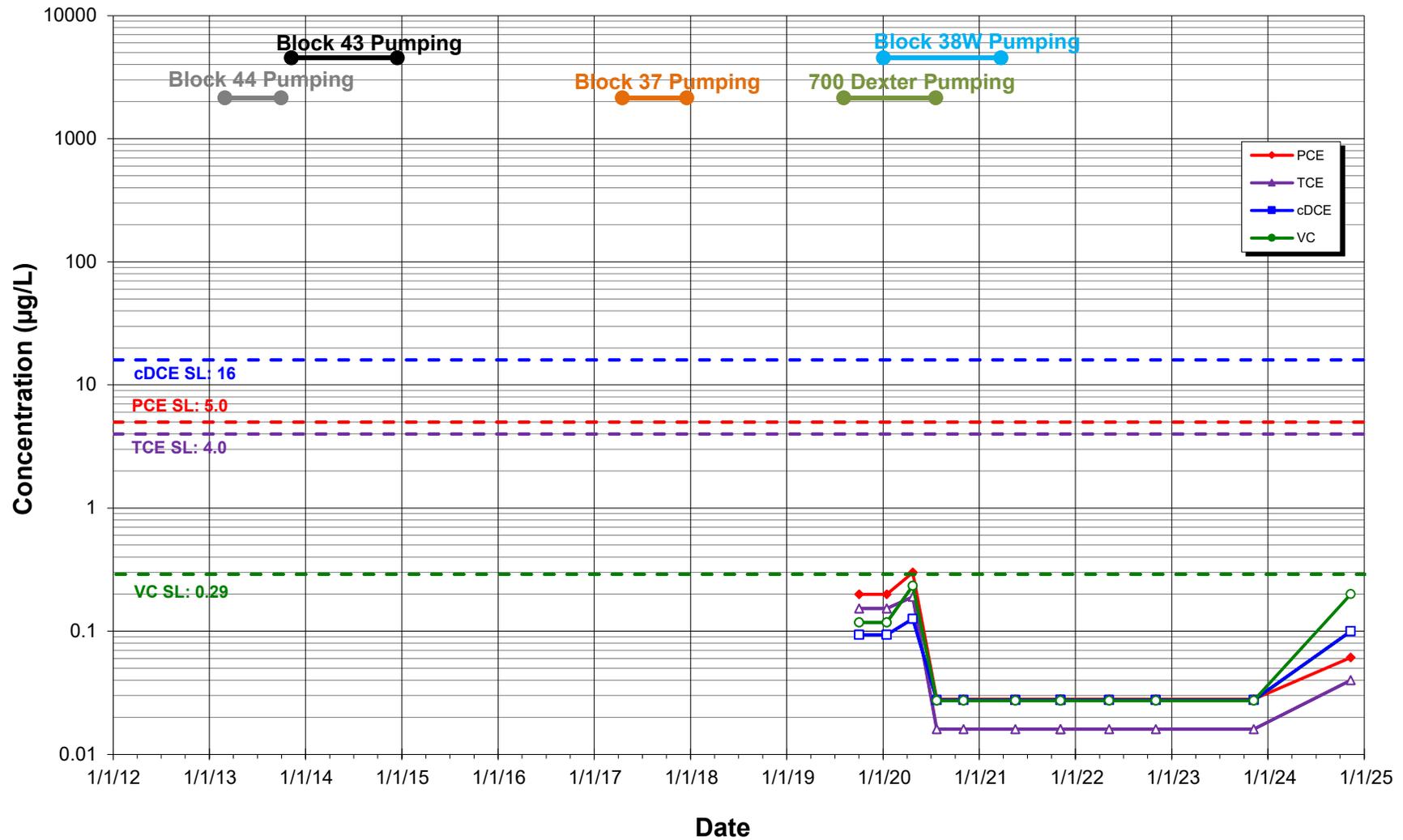
Concentration vs Time
MW-308 (-4.7 to -14.7 feet NAVD), Alley E of Seattle Roy Aloha Shops
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

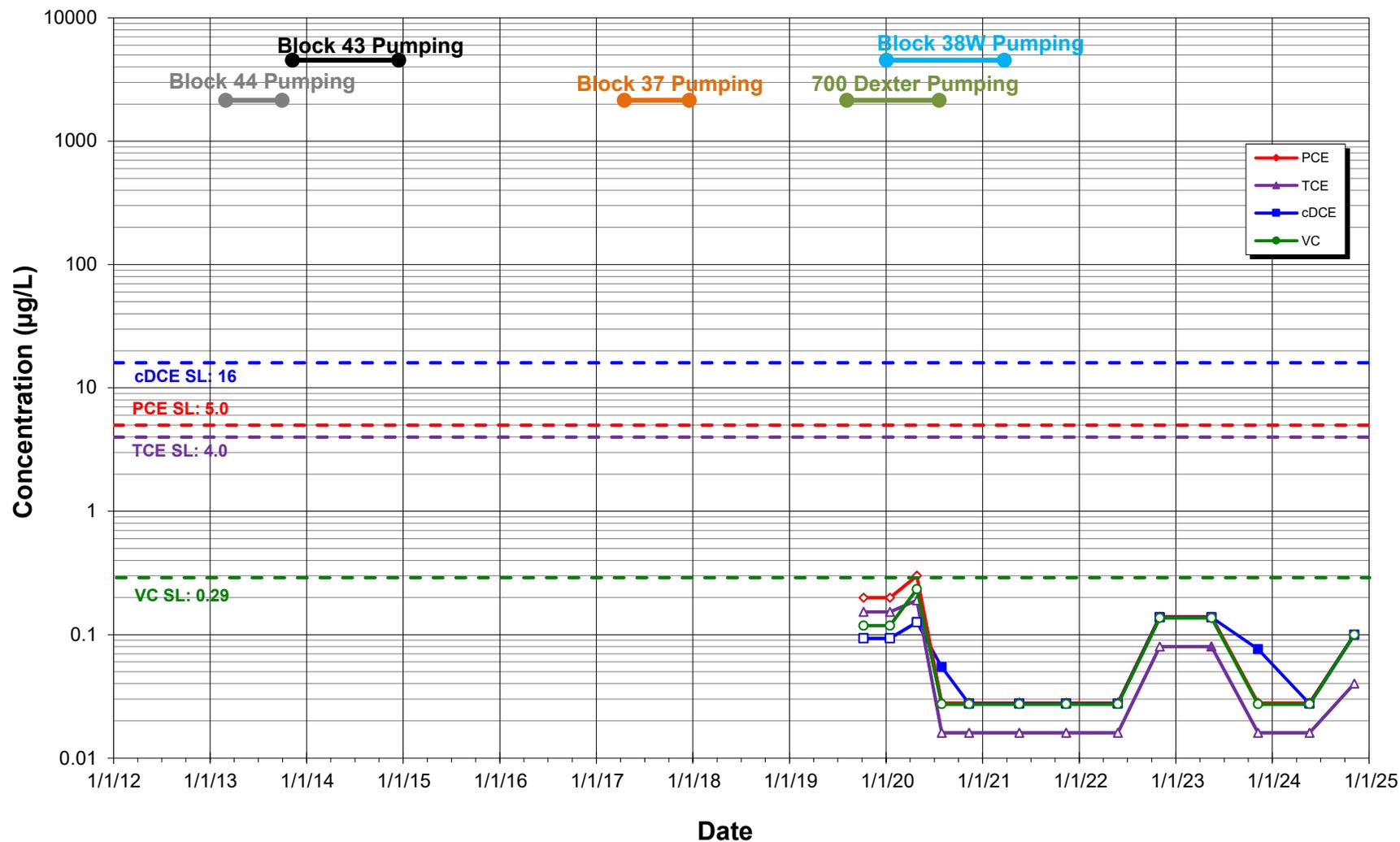
Concentration vs Time
MW-315 (12.2 to 2.3 feet NAVD), Mercer St ROW, N side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

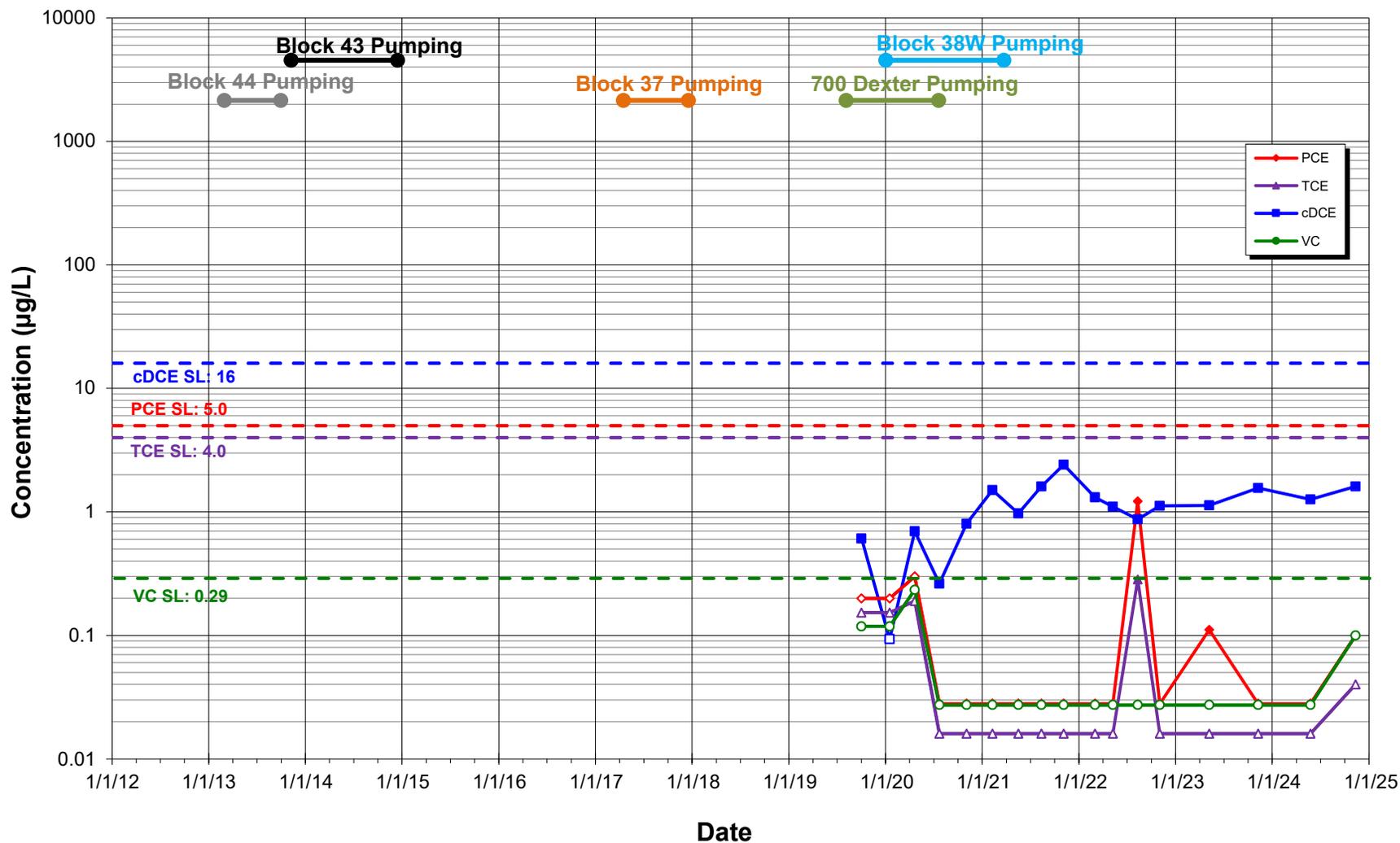
Concentration vs Time
MW-317 (3.4 to -6.6 feet NAVD), 9th Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

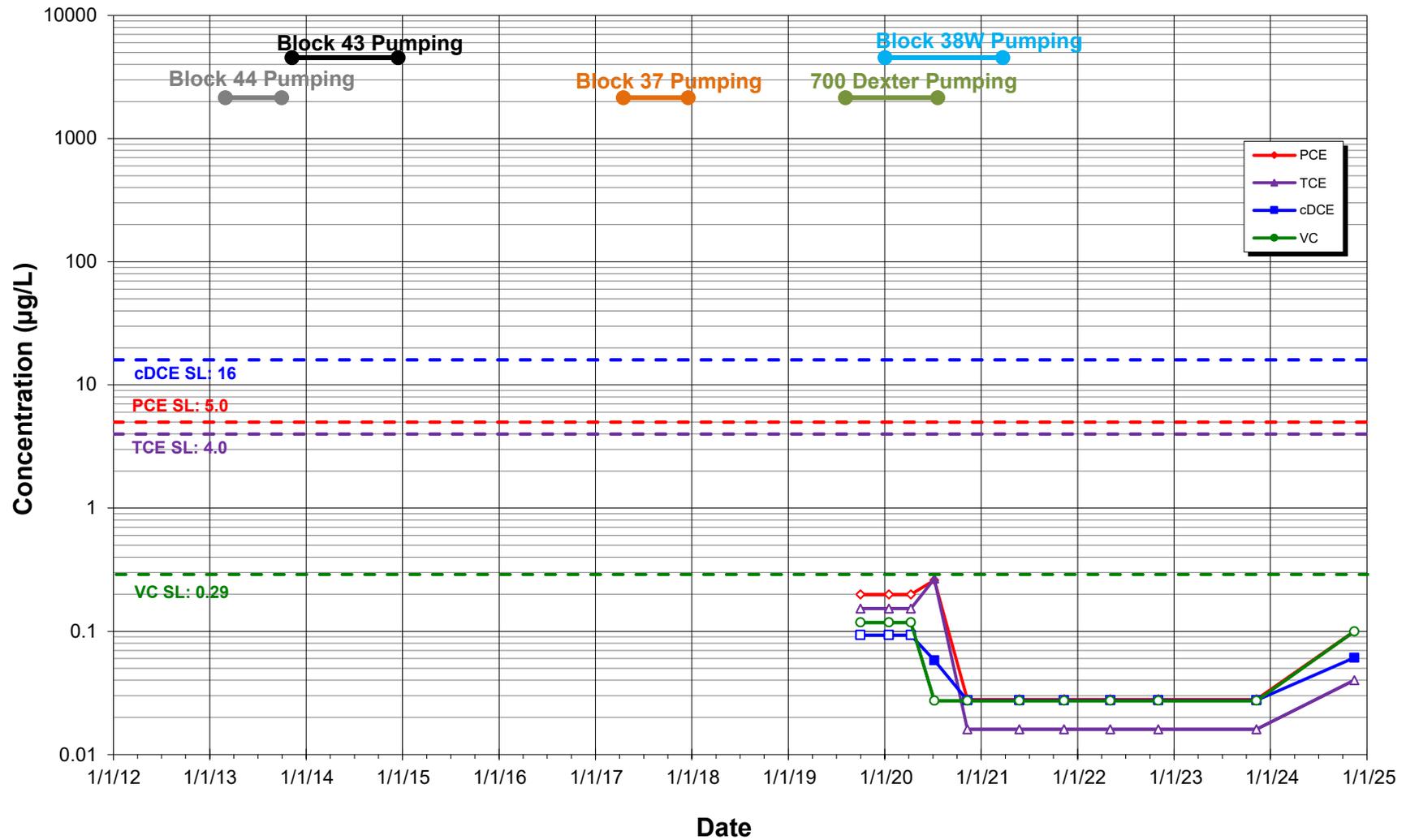
Concentration vs Time
MW-325 (7.0 to -3.0 feet NAVD), Mercer St ROW, N side
American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

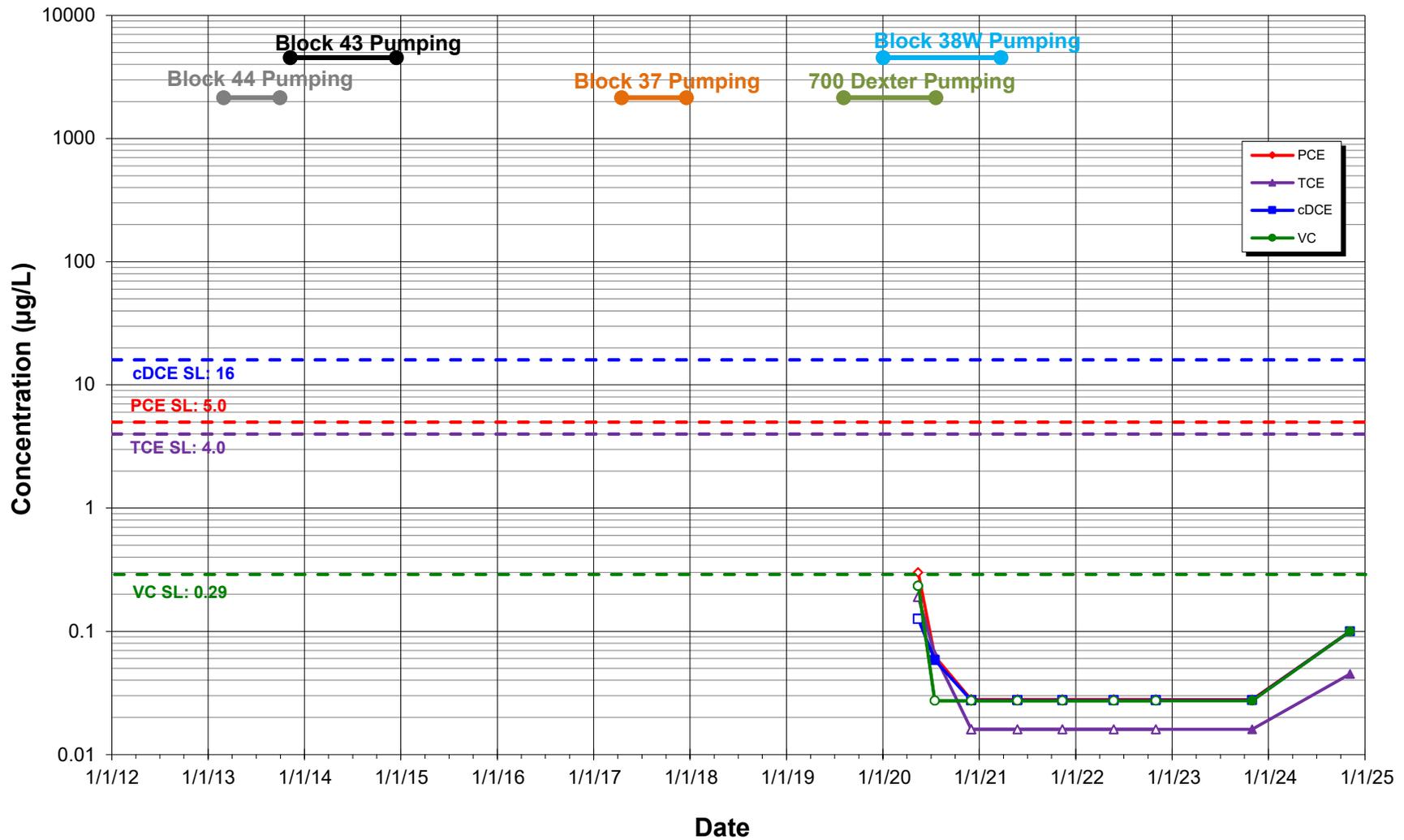
Concentration vs Time
MW-327 (3.6 to -6.3 feet NAVD), Lake Union Park, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

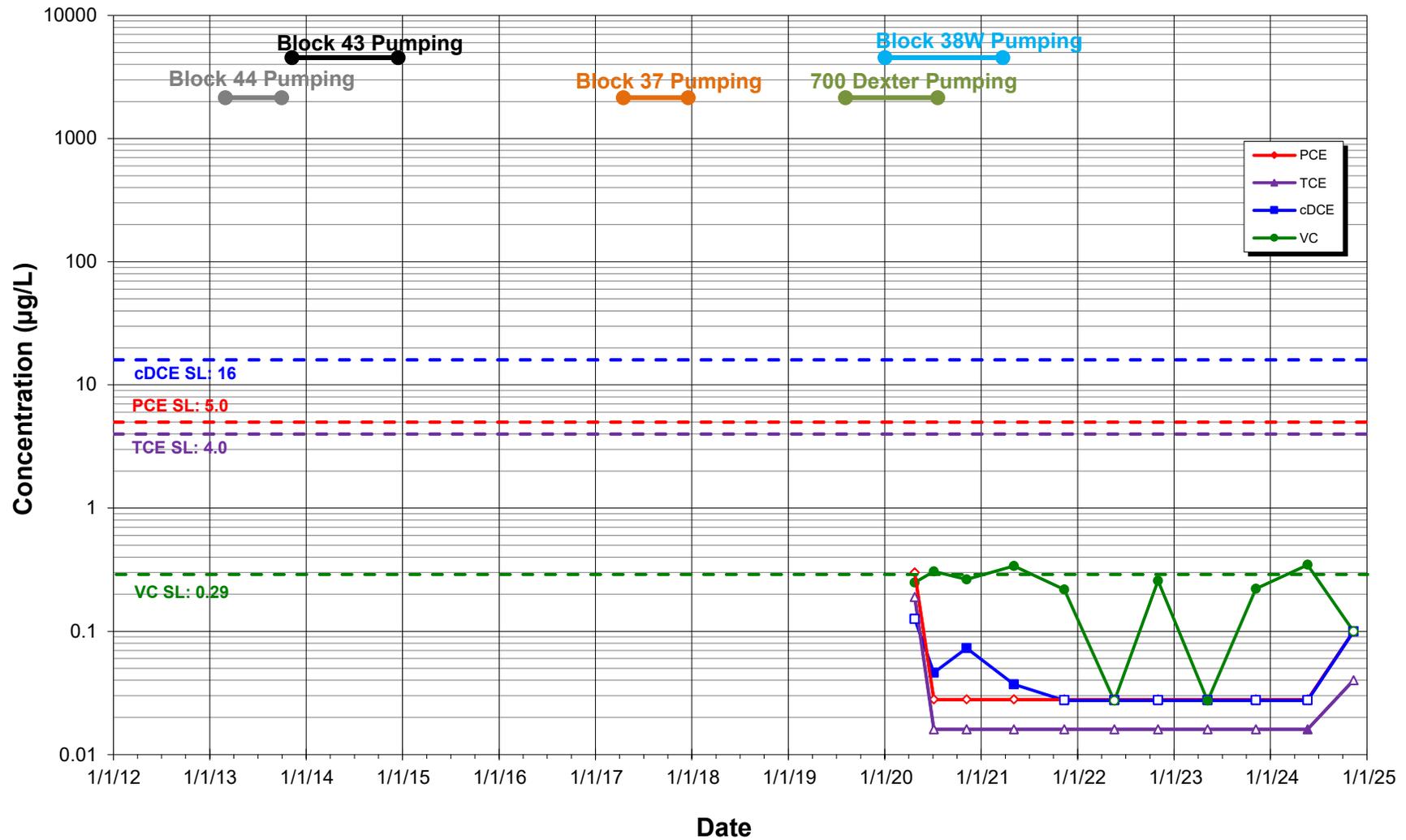
Concentration vs Time
MW-330 (0.0 to -10.0 feet NAVD), Valley St ROW, N side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

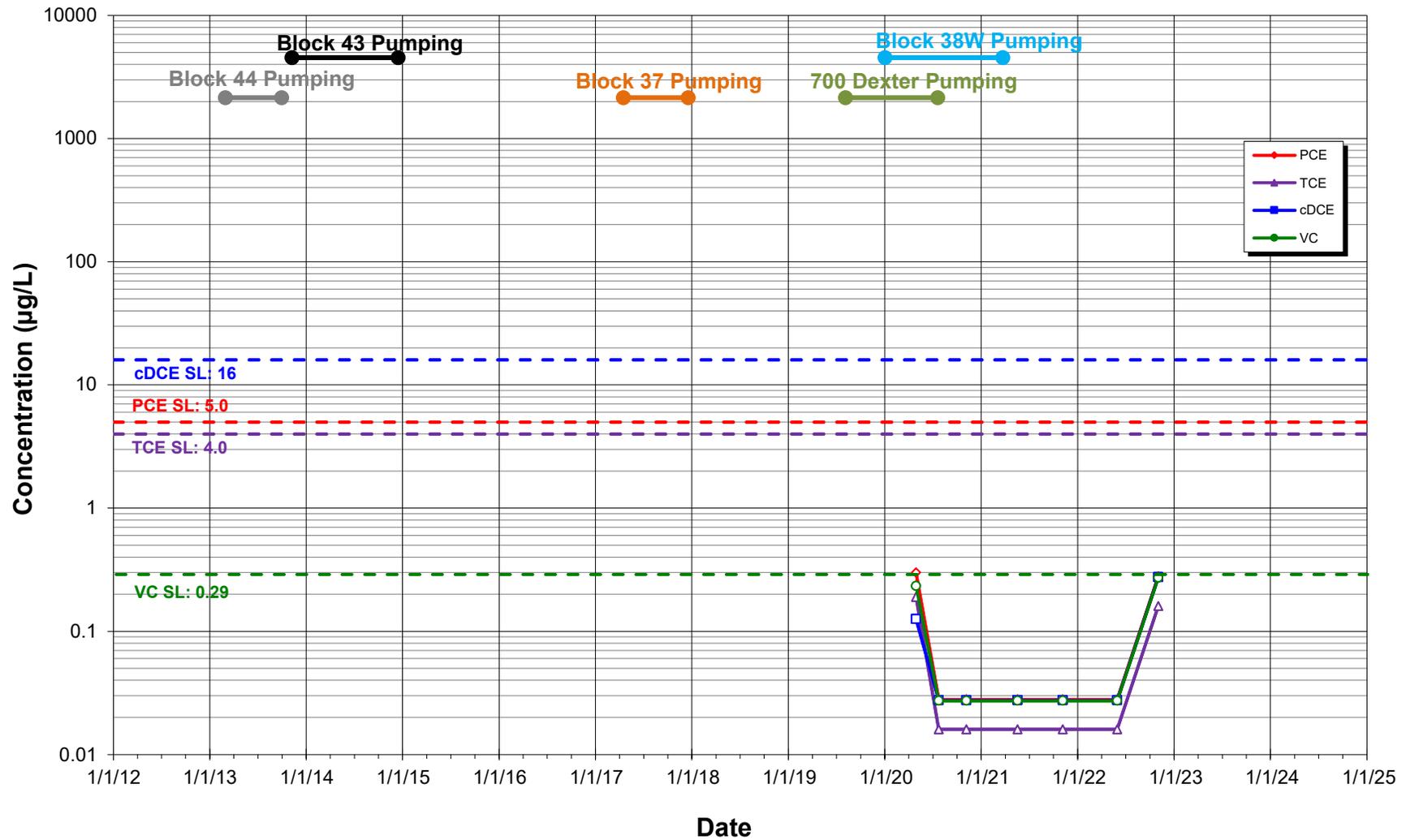
Concentration vs Time
MW-331 (-4.3 to -14.3 feet NAVD), Alley E of Seattle Roy Aloha Shops
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

Concentration vs Time
MW-333 (-1.5 to -11.5 feet NAVD), 900 Roy St, S end
American Linen Supply Co Dexter Ave Site



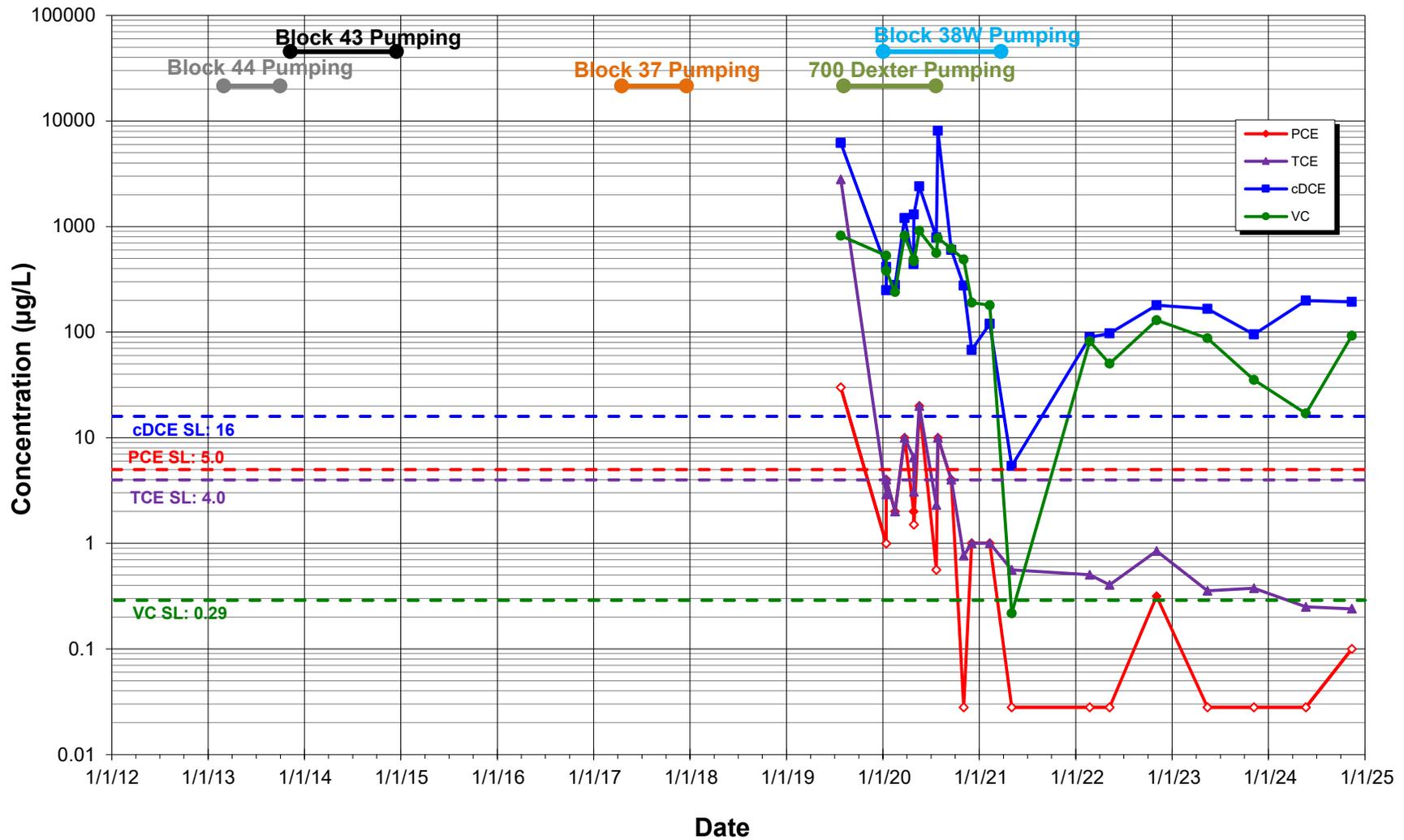
Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

CVOC Trend Plots

Intermediate B Zone

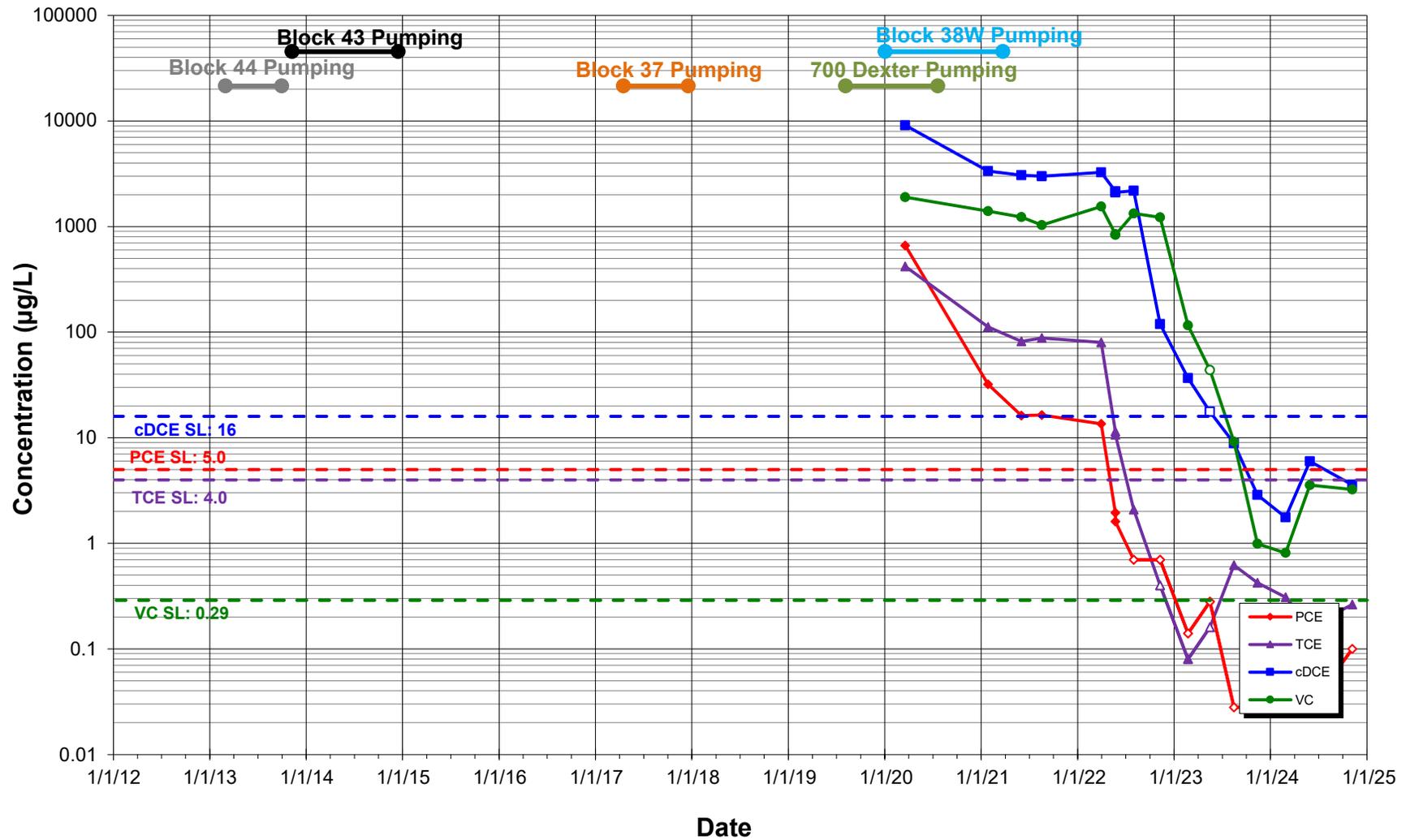
Concentration vs Time FMW-141 (-12.1 to -22.1 feet NAVD), Alley E of Seattle Roy Aloha Shops American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

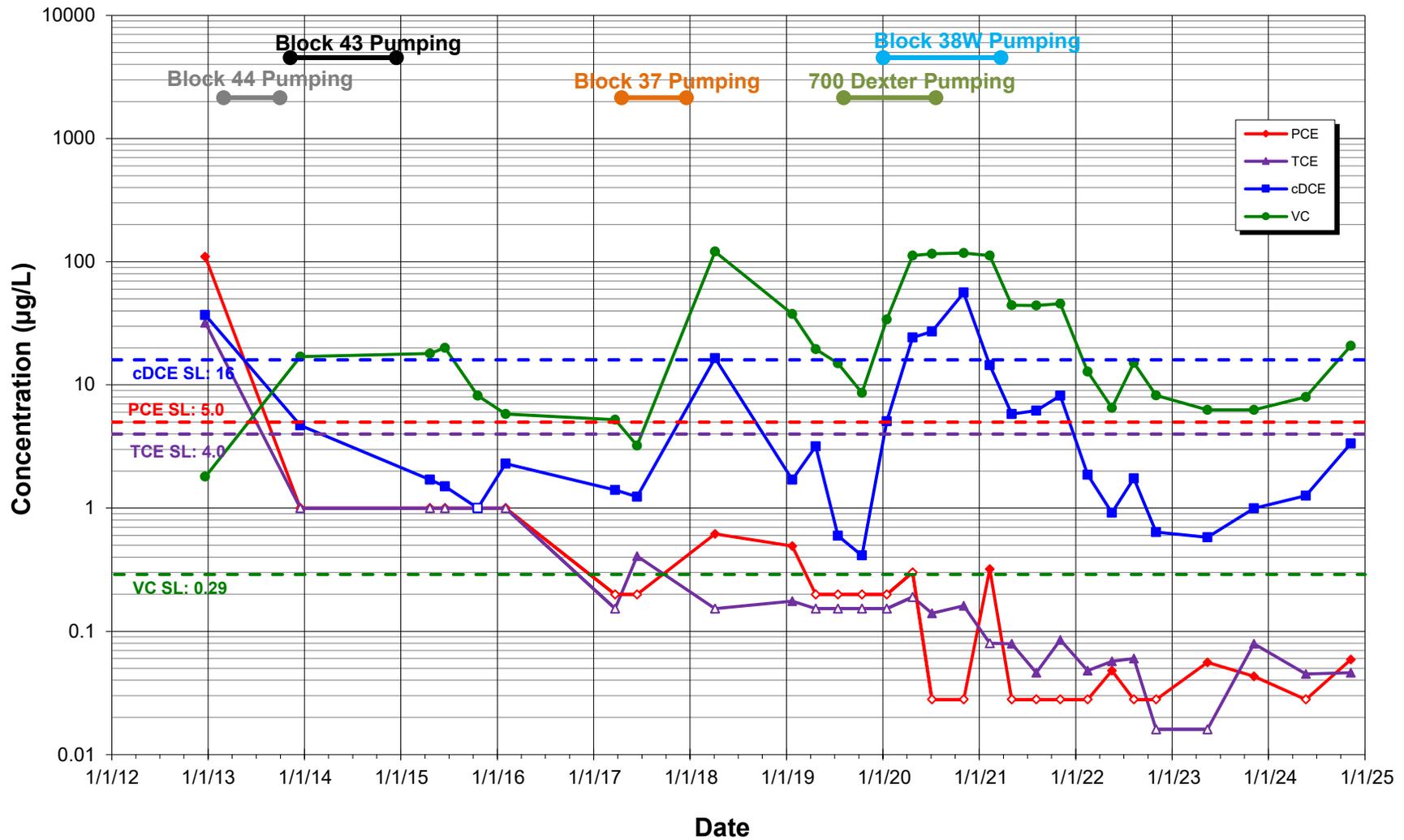
Concentration vs Time HMW-9IB (-1.6 to -11.6 feet NAVD), Seattle DOT Mercer Parcels, SW quadrant American Linen Supply Co–Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

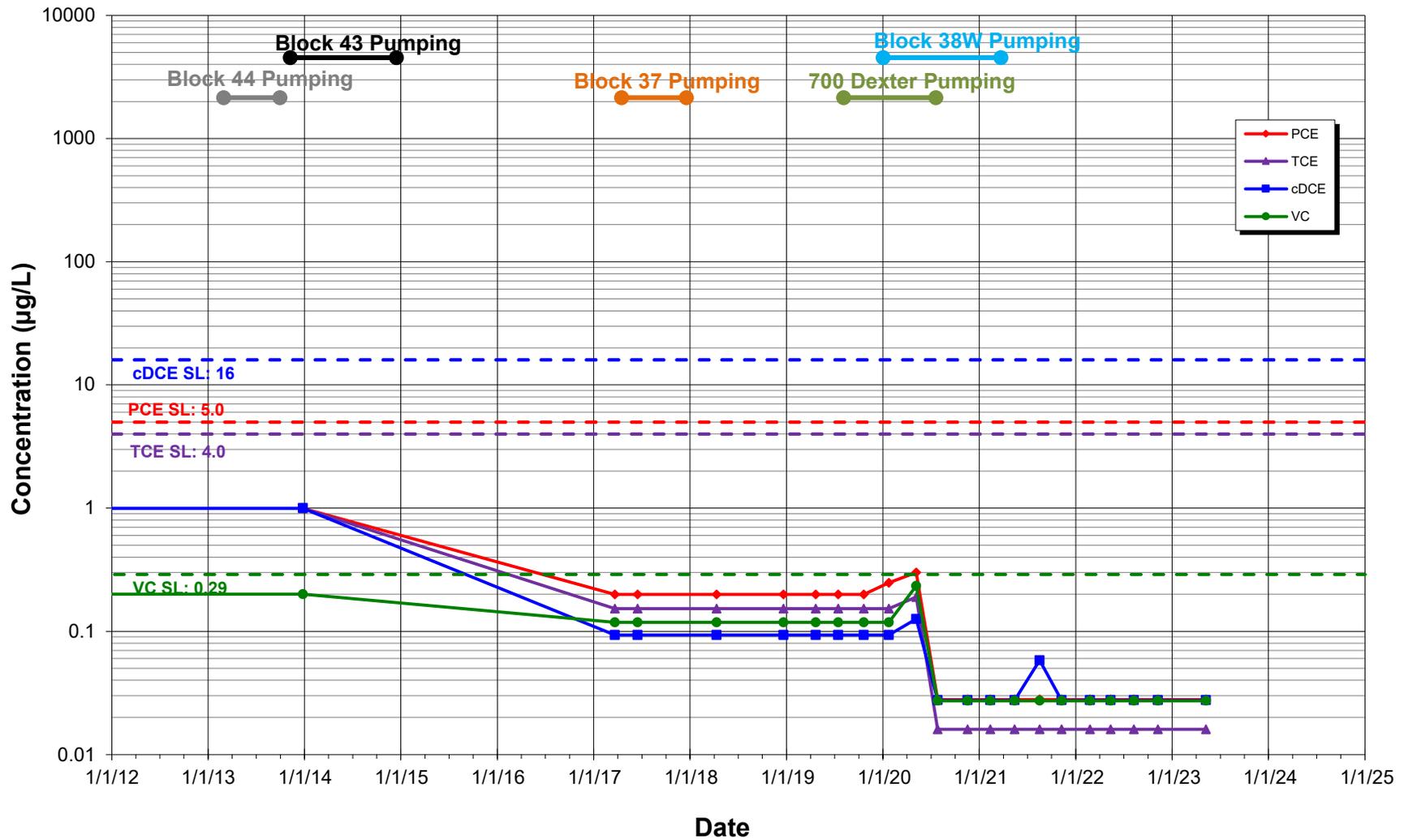
Concentration vs Time
MW111 (-33.5 to -43.5 feet NAVD), Alley E of Seattle Roy Aloha Shops
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

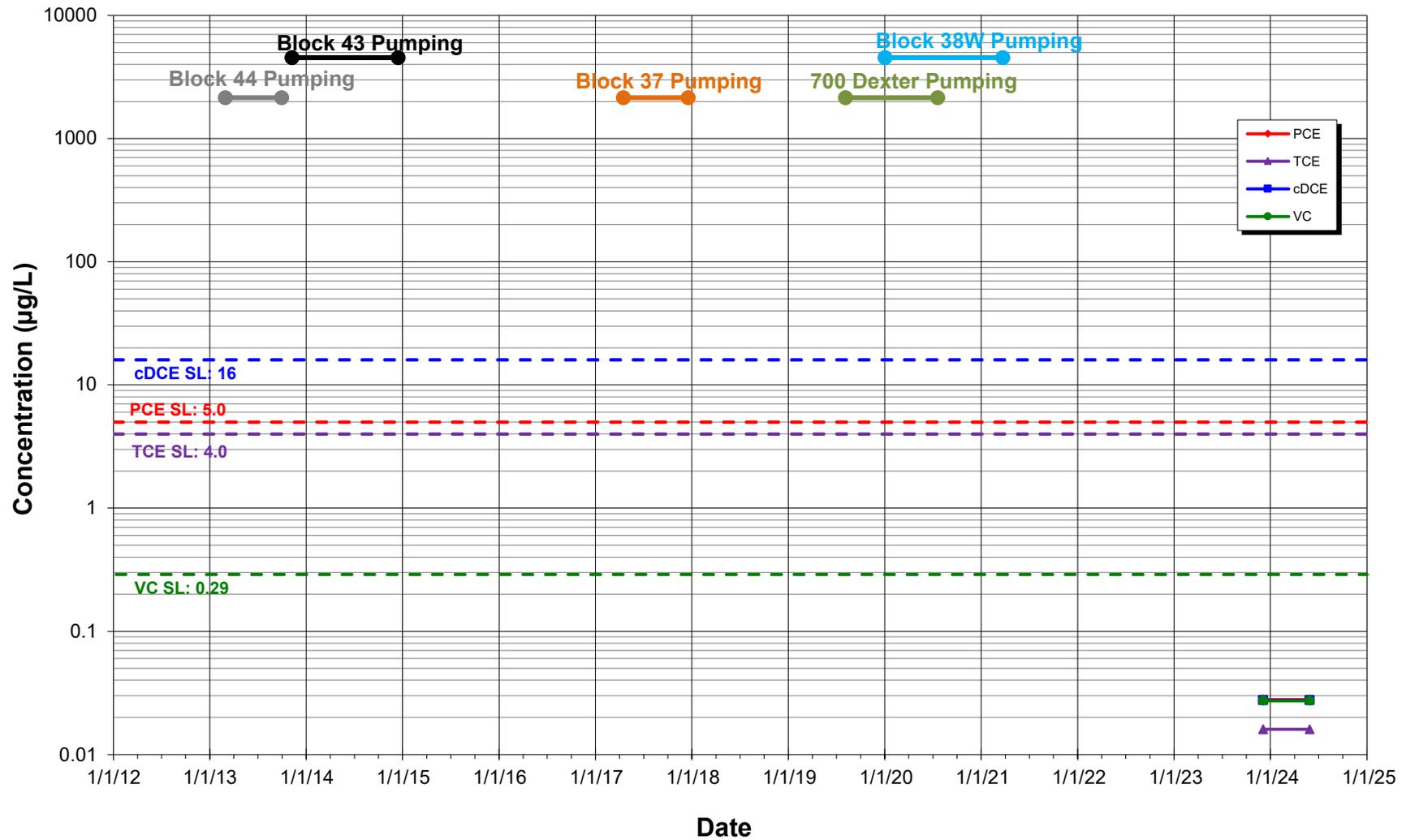
Concentration vs Time
MW112 (-17.2 to -27.2 feet NAVD), Dexter Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

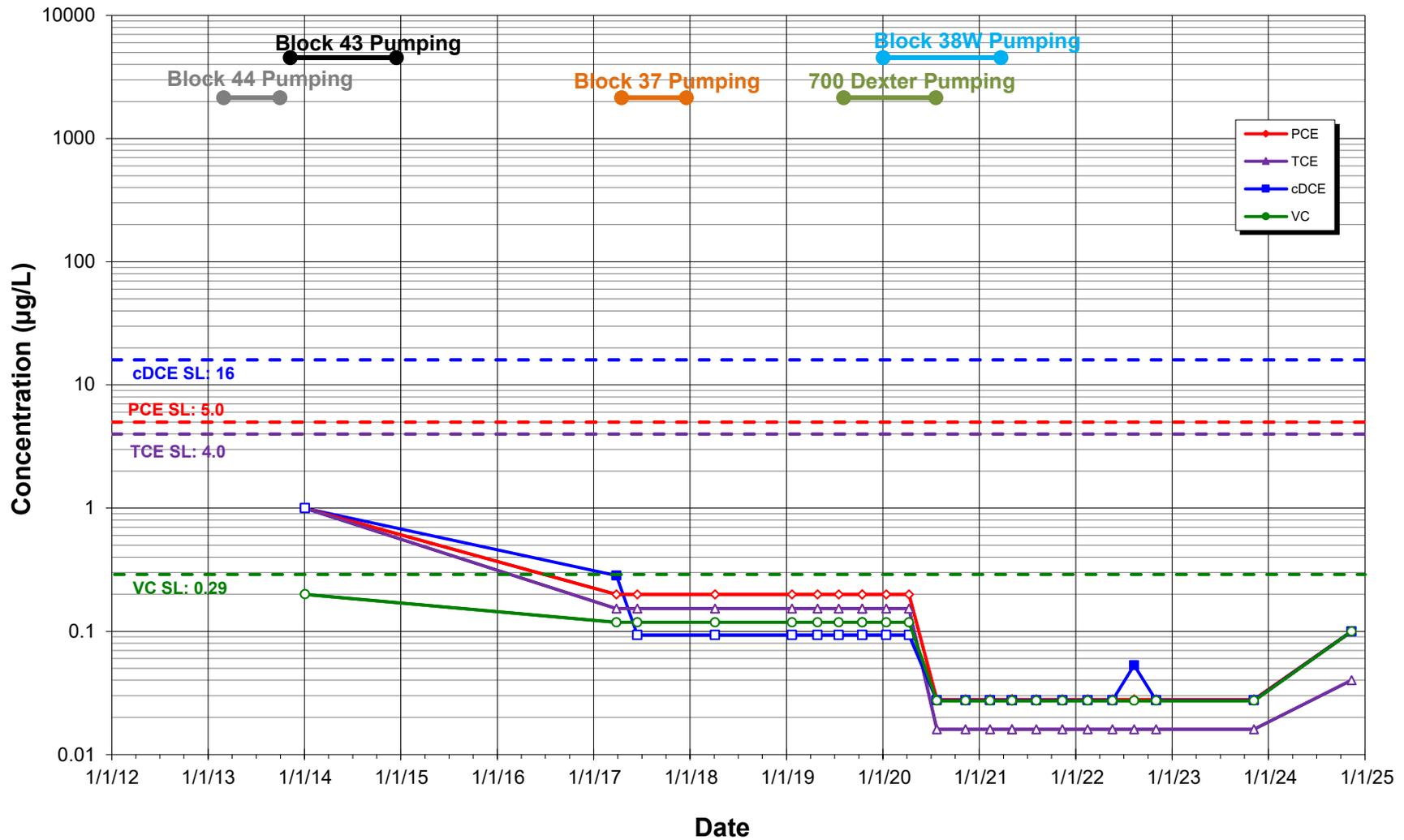
Concentration vs Time
MW112R (Not Yet Surveyed), Dexter Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

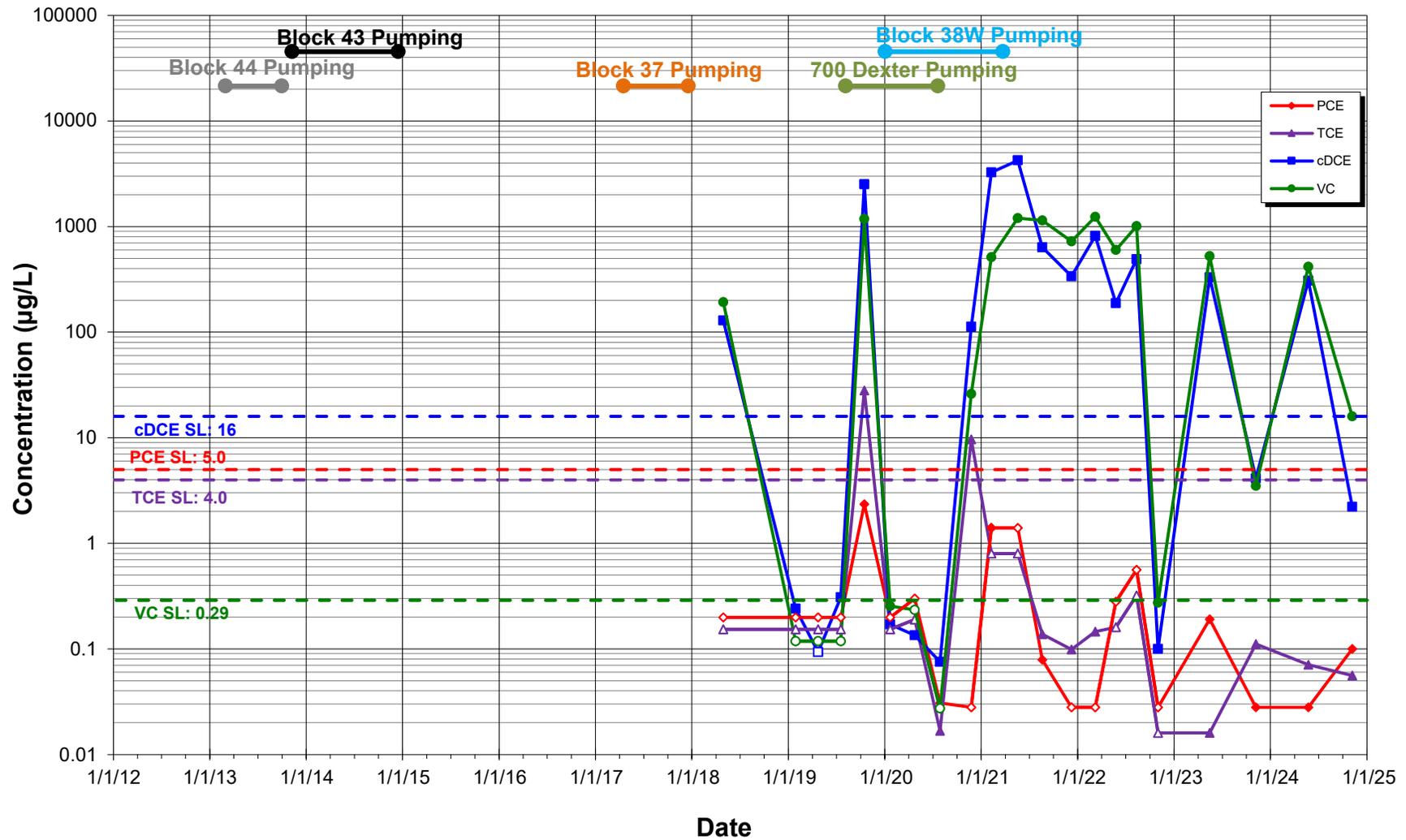
Concentration vs Time
MW126 (-54.1 to -64.1 feet NAVD), Alley E of Seattle Roy Aloha Shops
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

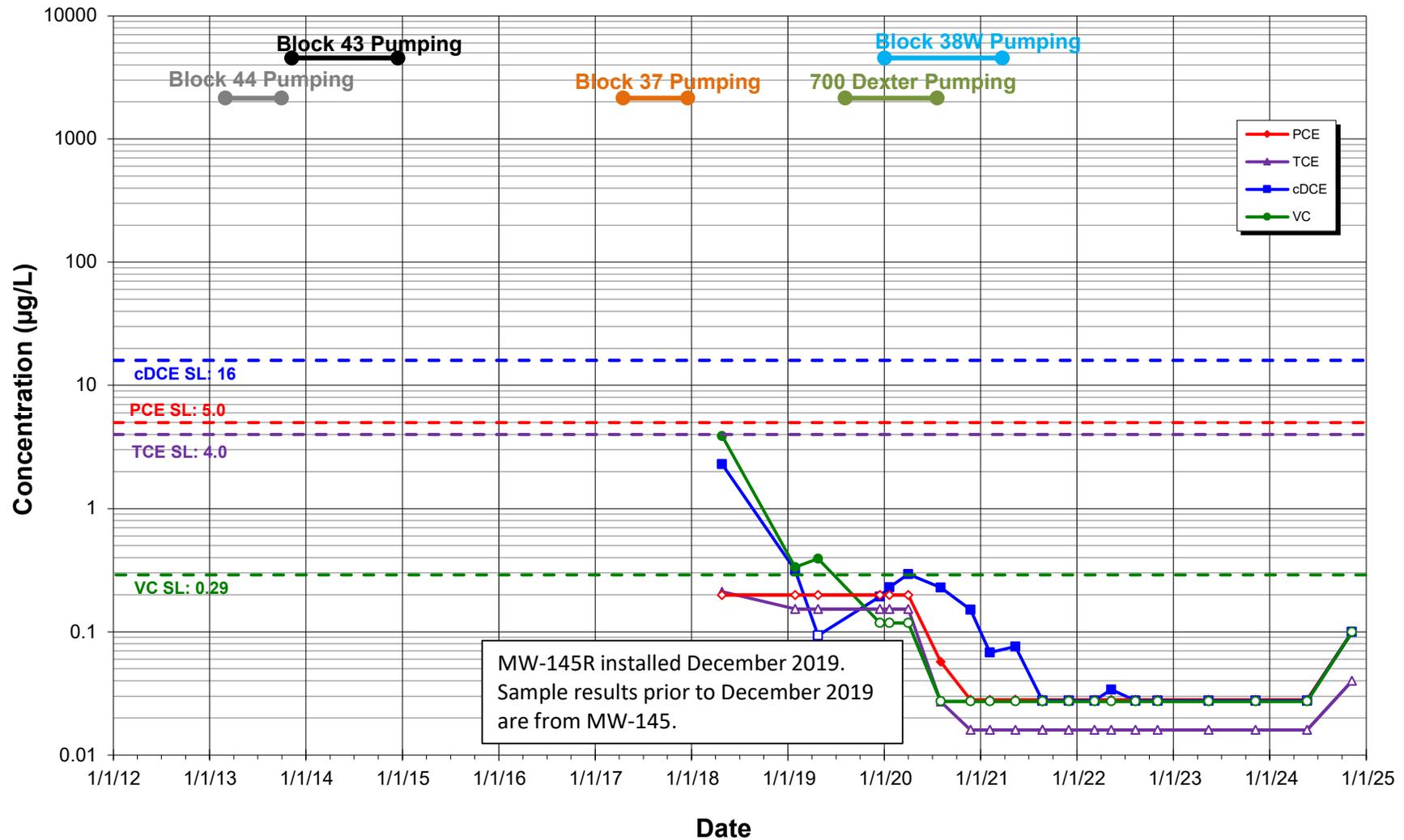
Concentration vs Time
MW-143 (-27.7 to -37.6 feet NAVD), 8th Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

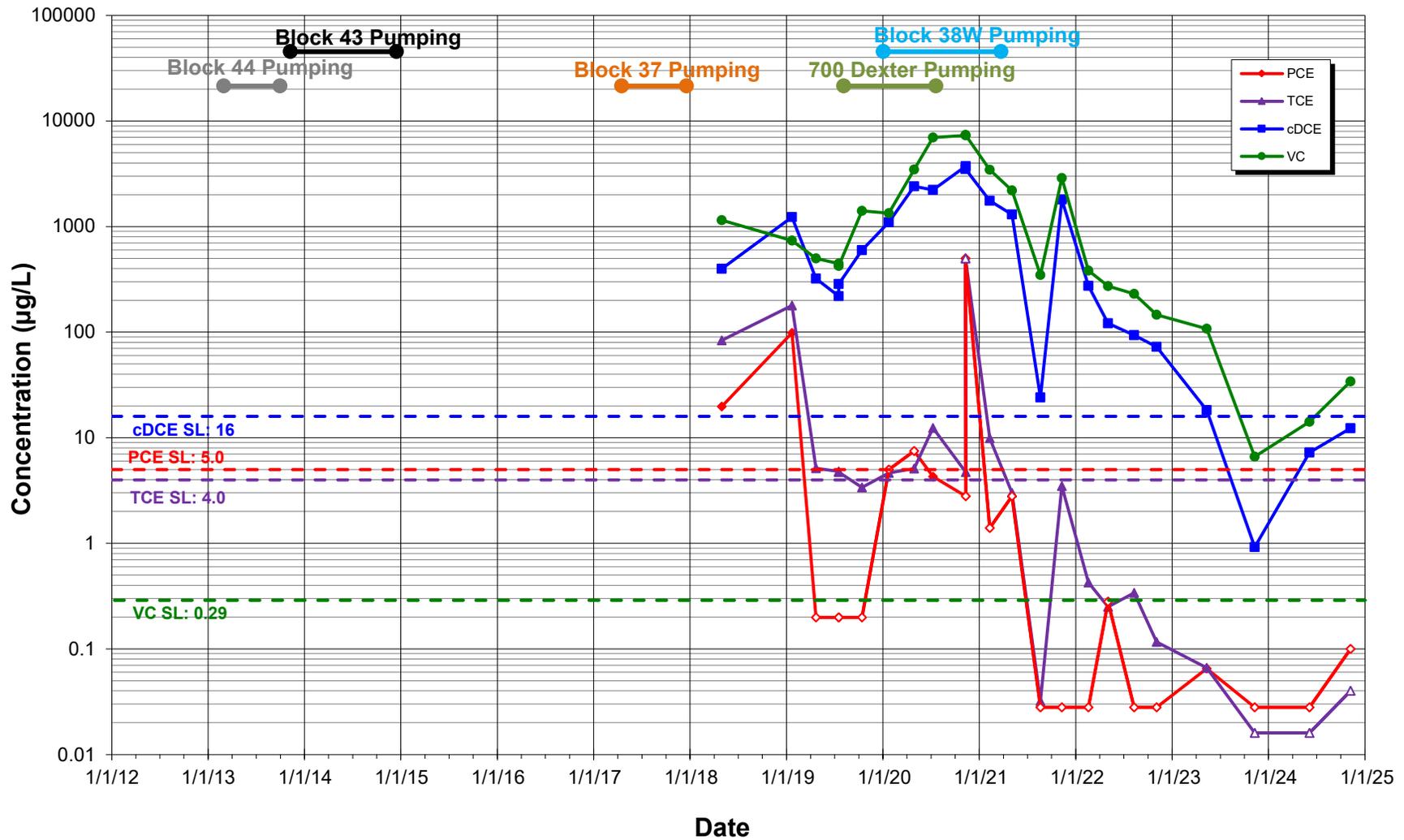
- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

Concentration vs Time
MW-145R (-27.2 to -37.2 feet NAVD), 8th Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



- Notes:**
- 1) All results detected below the laboratory MDLs are shown as hollow data points .
 - 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

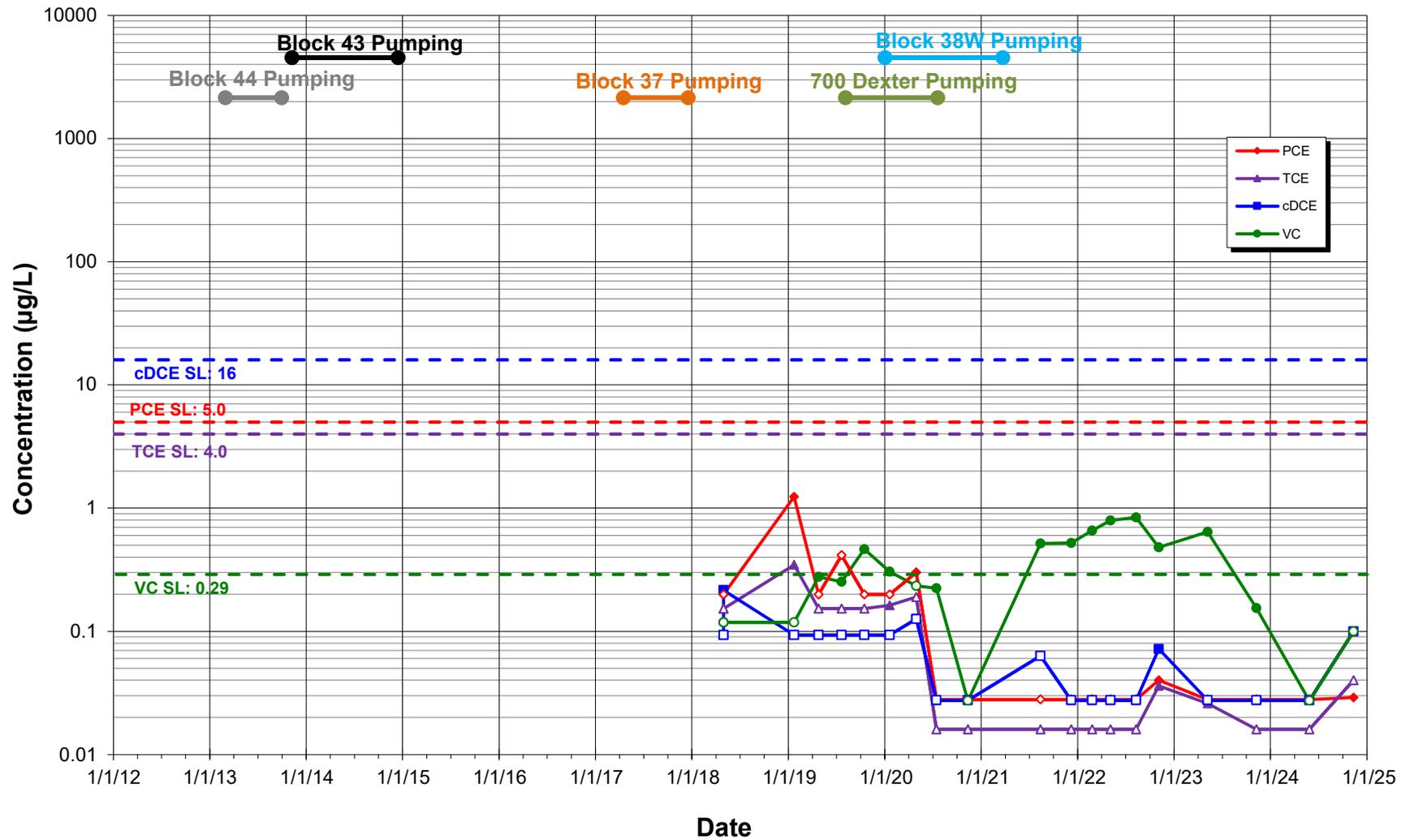
Concentration vs Time
MW-147 (-17.6 to -27.6 feet NAVD), Roy St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

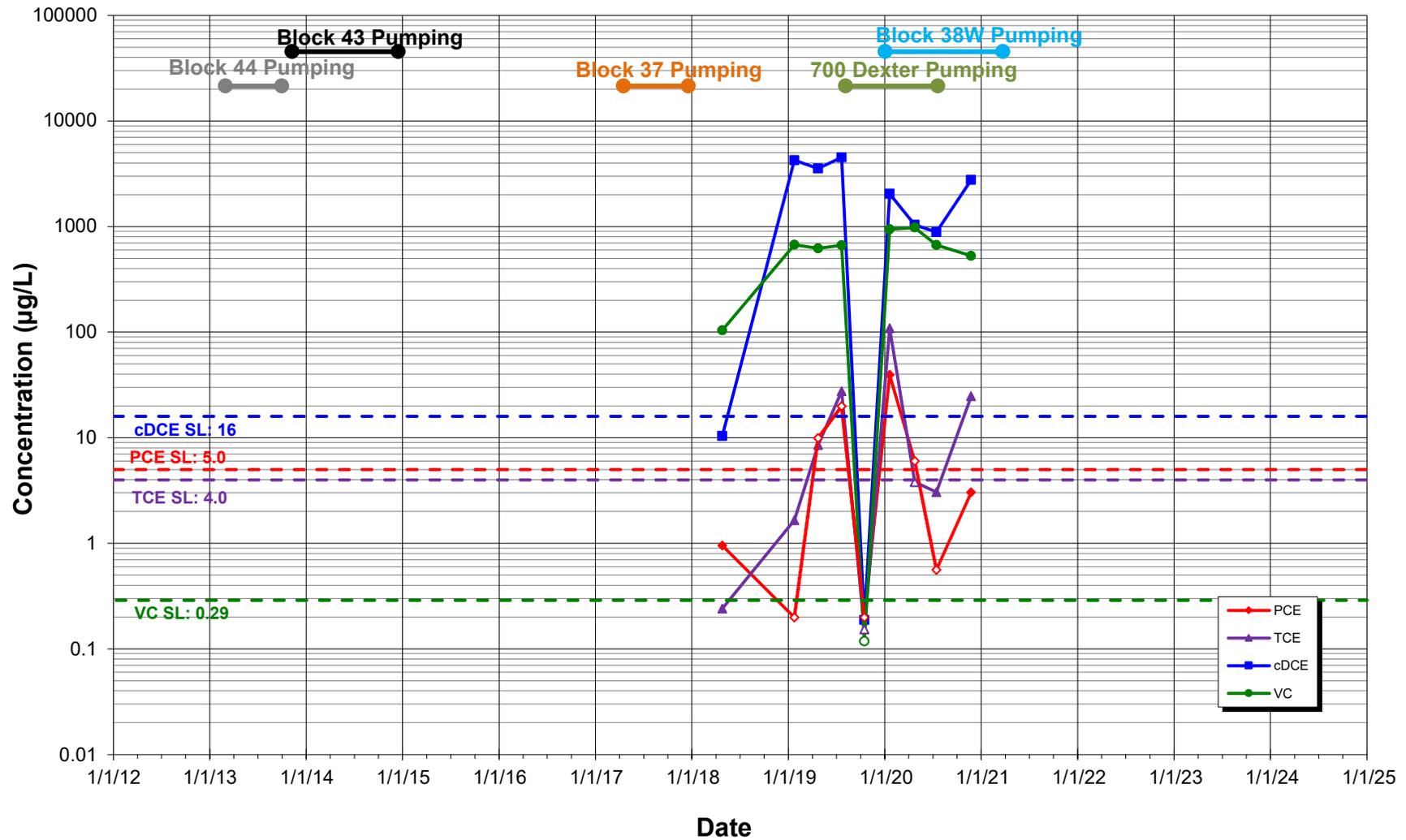
Concentration vs Time
MW-148 (-25.7 to -35.7 feet NAVD), Roy St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

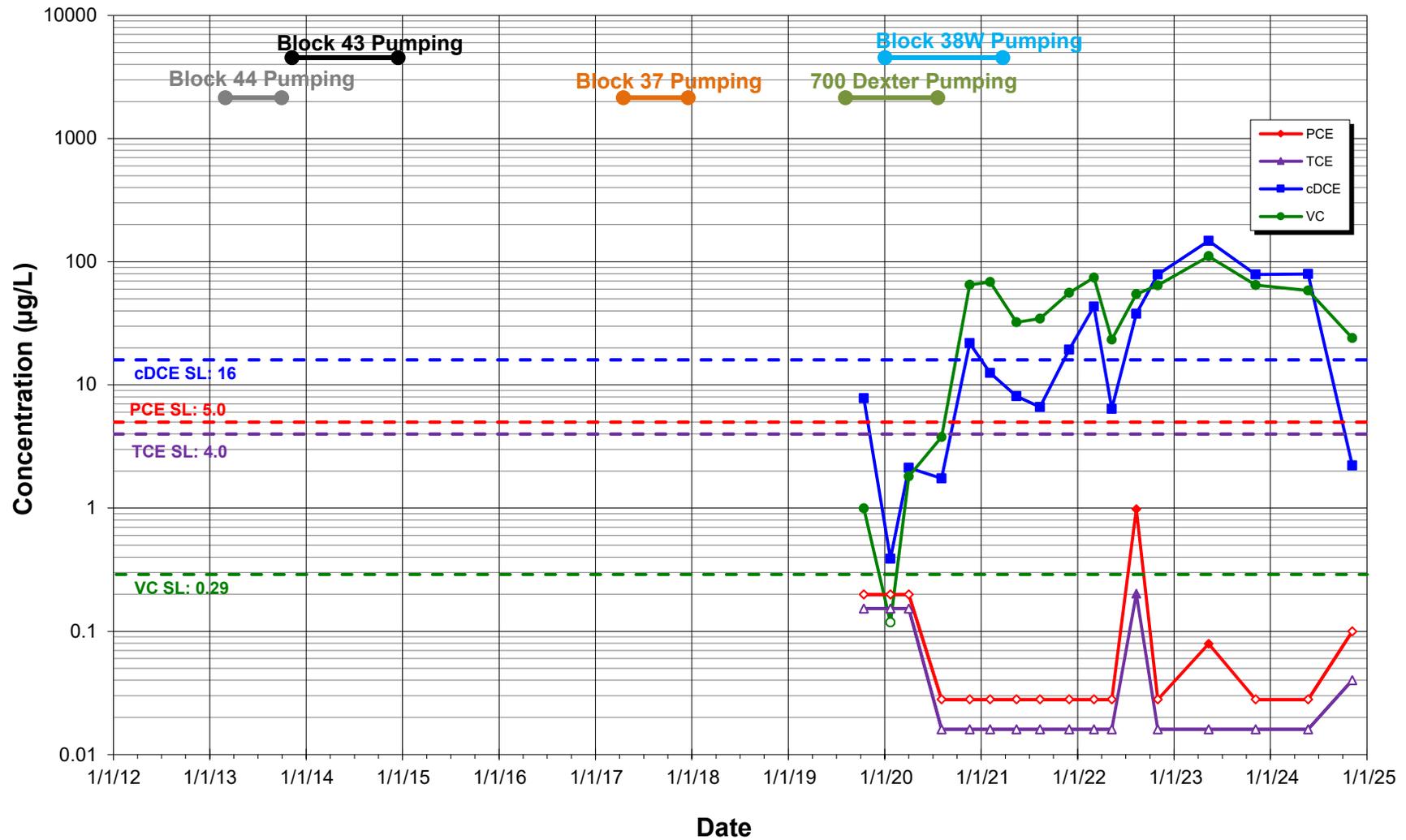
Concentration vs Time
MW-157 (-28.3 to -38.2 feet NAVD), 8th Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

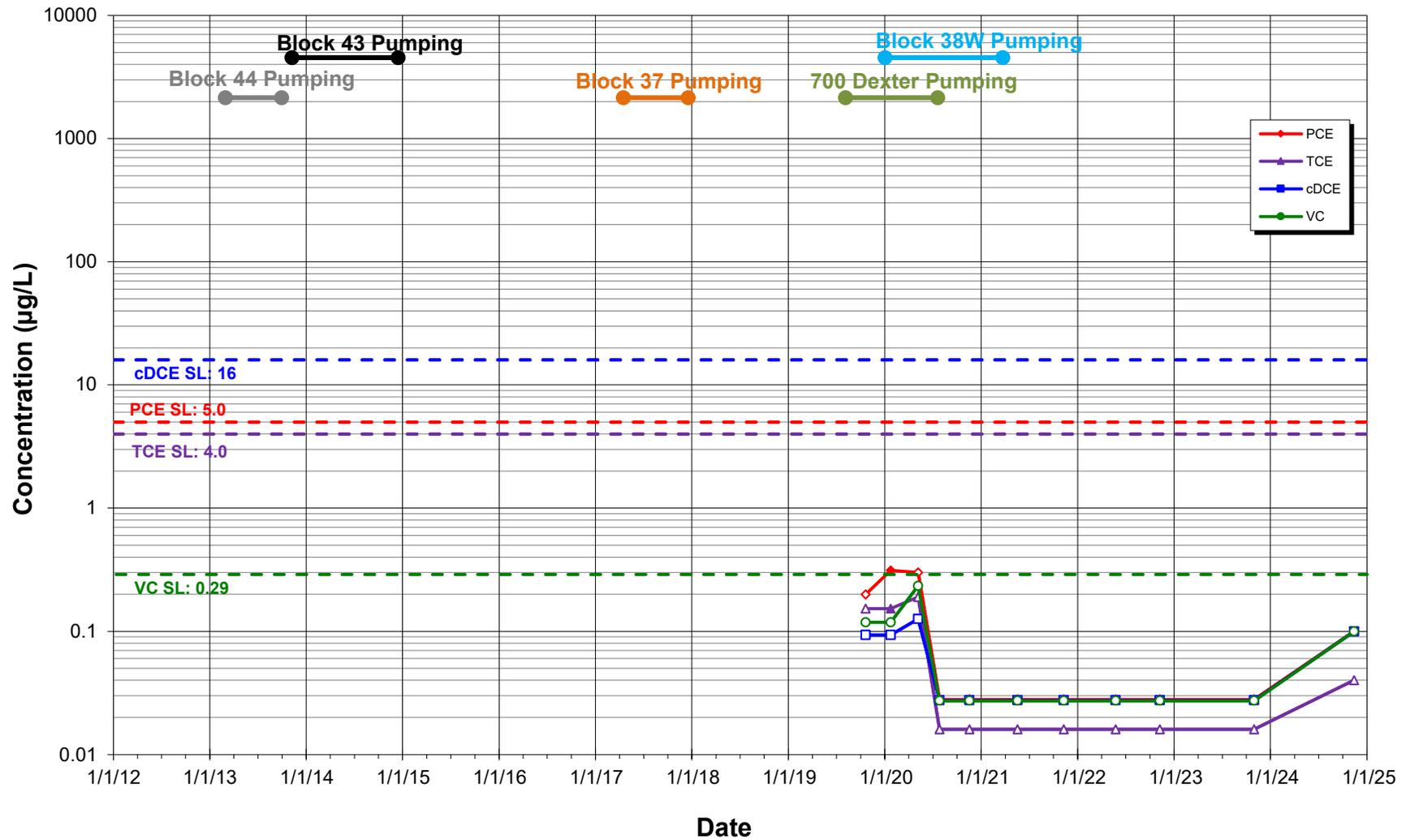
Concentration vs Time
MW-190 (-30.2 to -40.2 feet NAVD), Valley St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

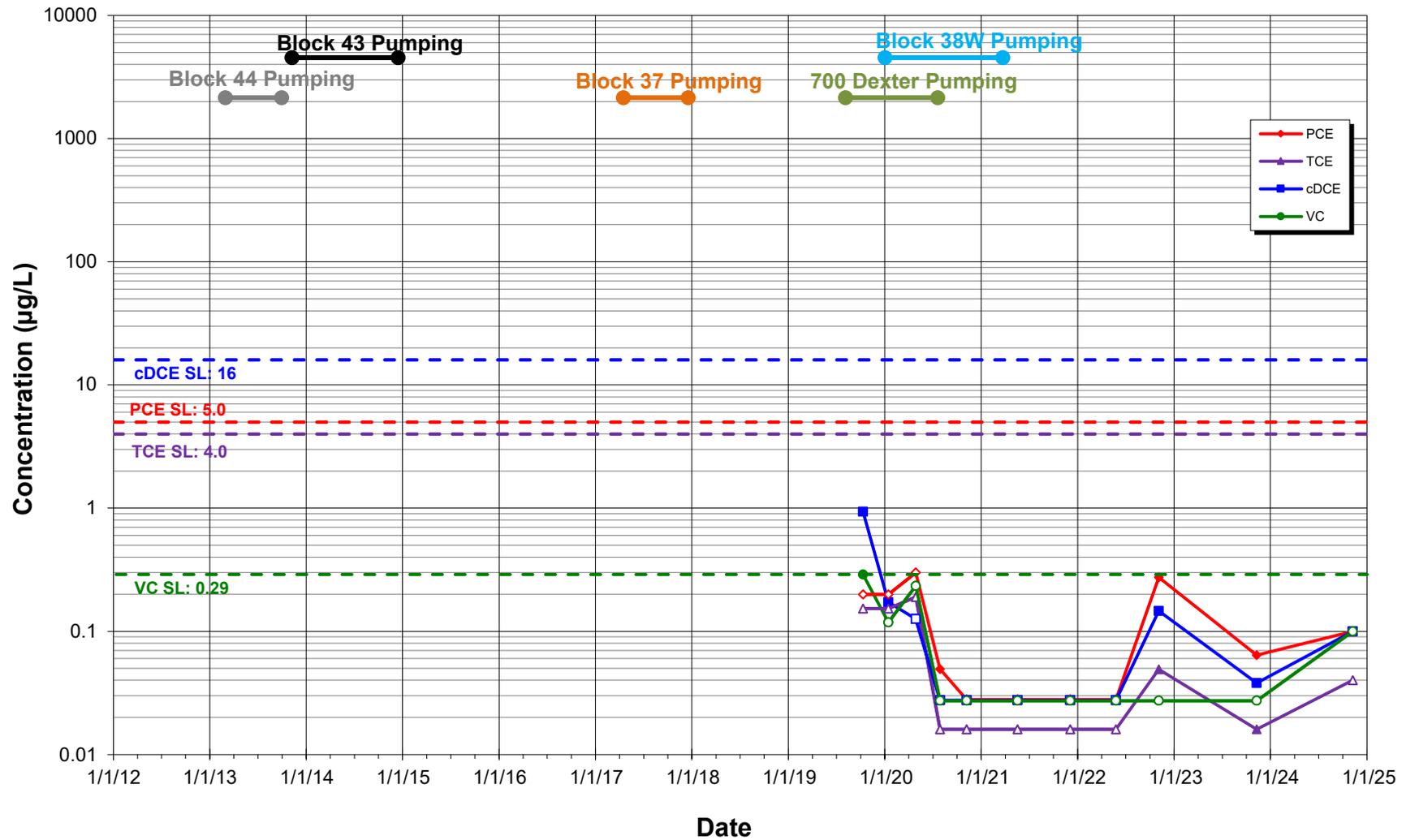
Concentration vs Time
MW-303 (-13.8 to -23.8 feet NAVD), Dexter Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

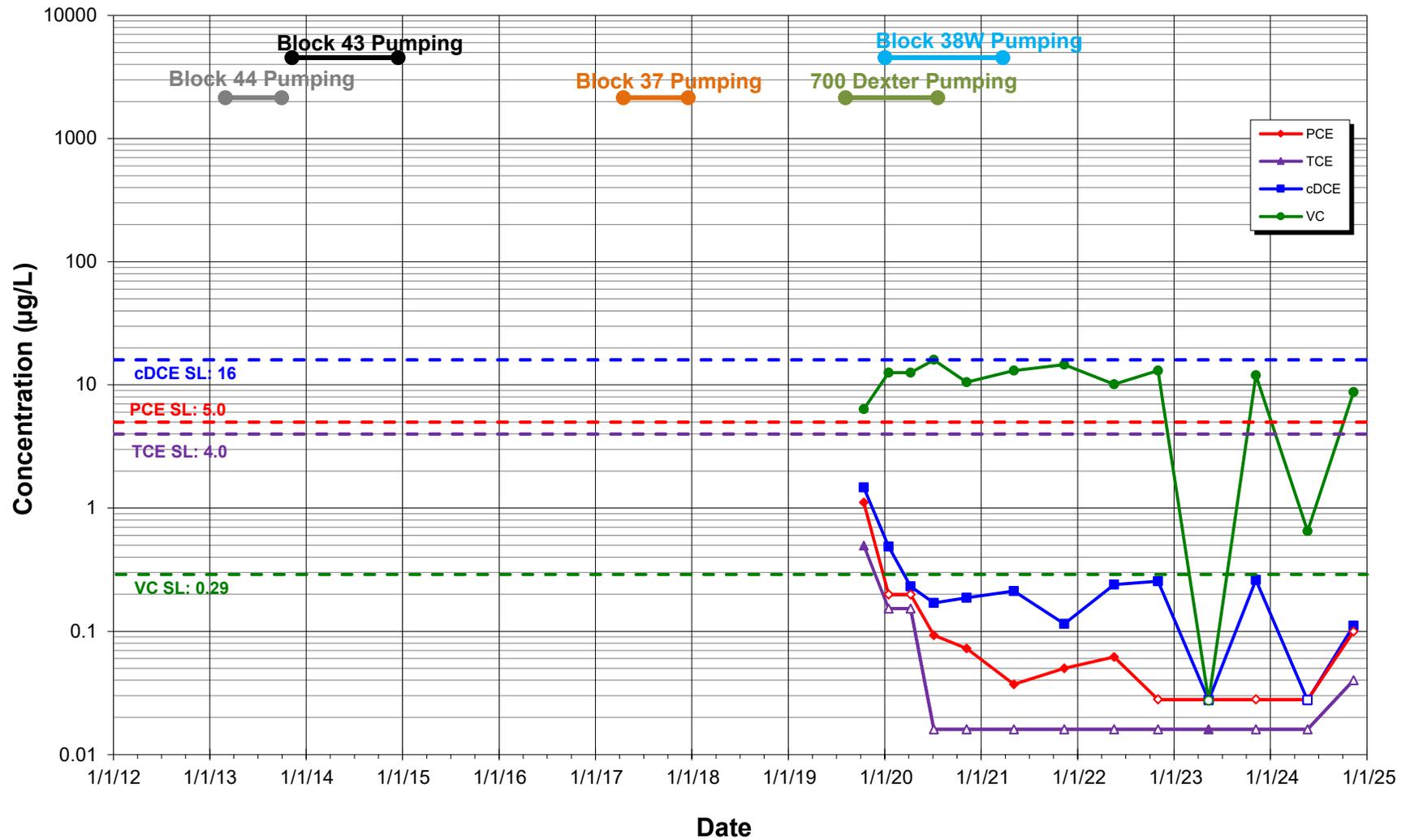
Concentration vs Time
MW-307 (-12.4 to -22.4 feet NAVD), Roy St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

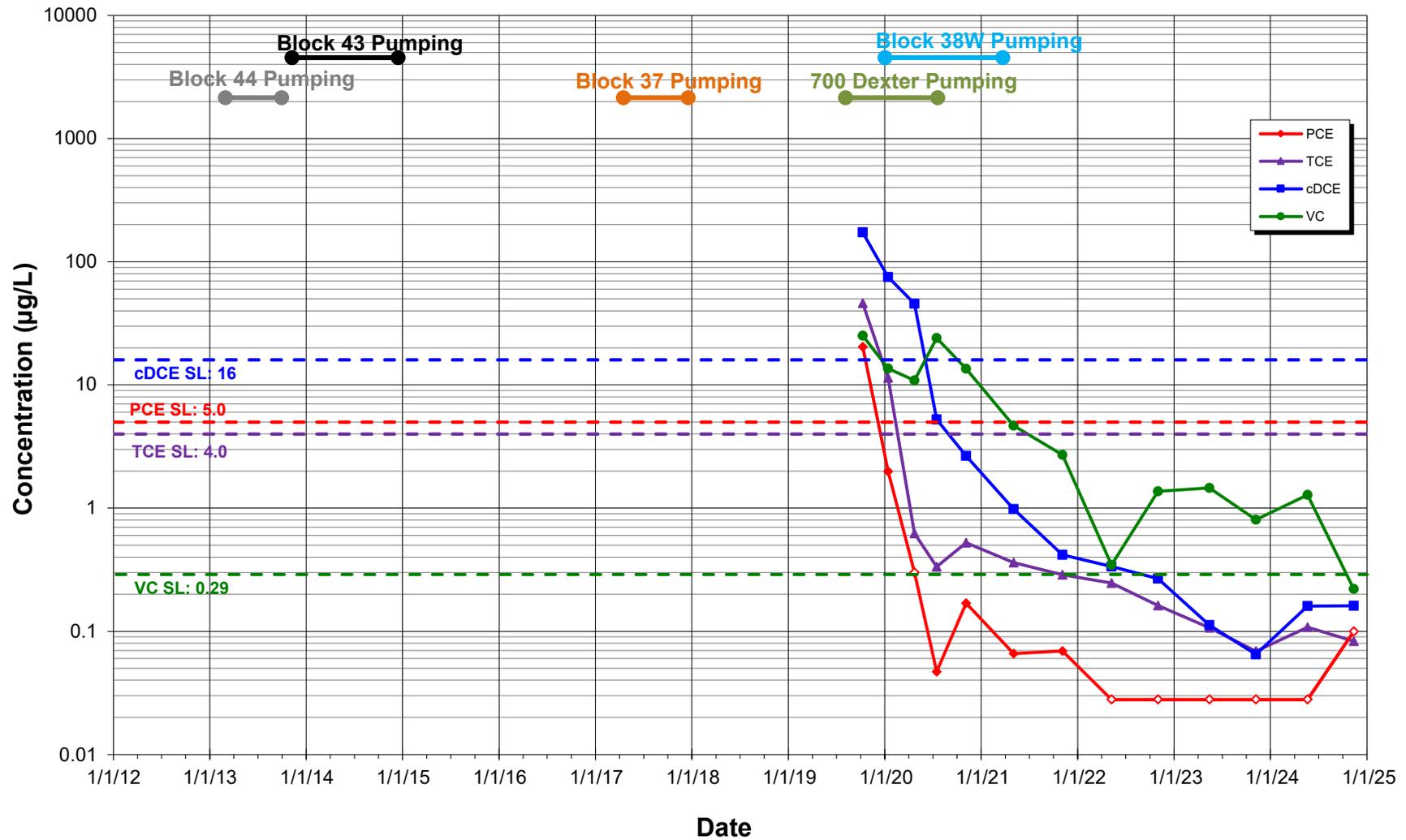
Concentration vs Time
MW-309 (-32.0 to -42.0 feet NAVD), Alley E of Seattle Roy Aloha Shops
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

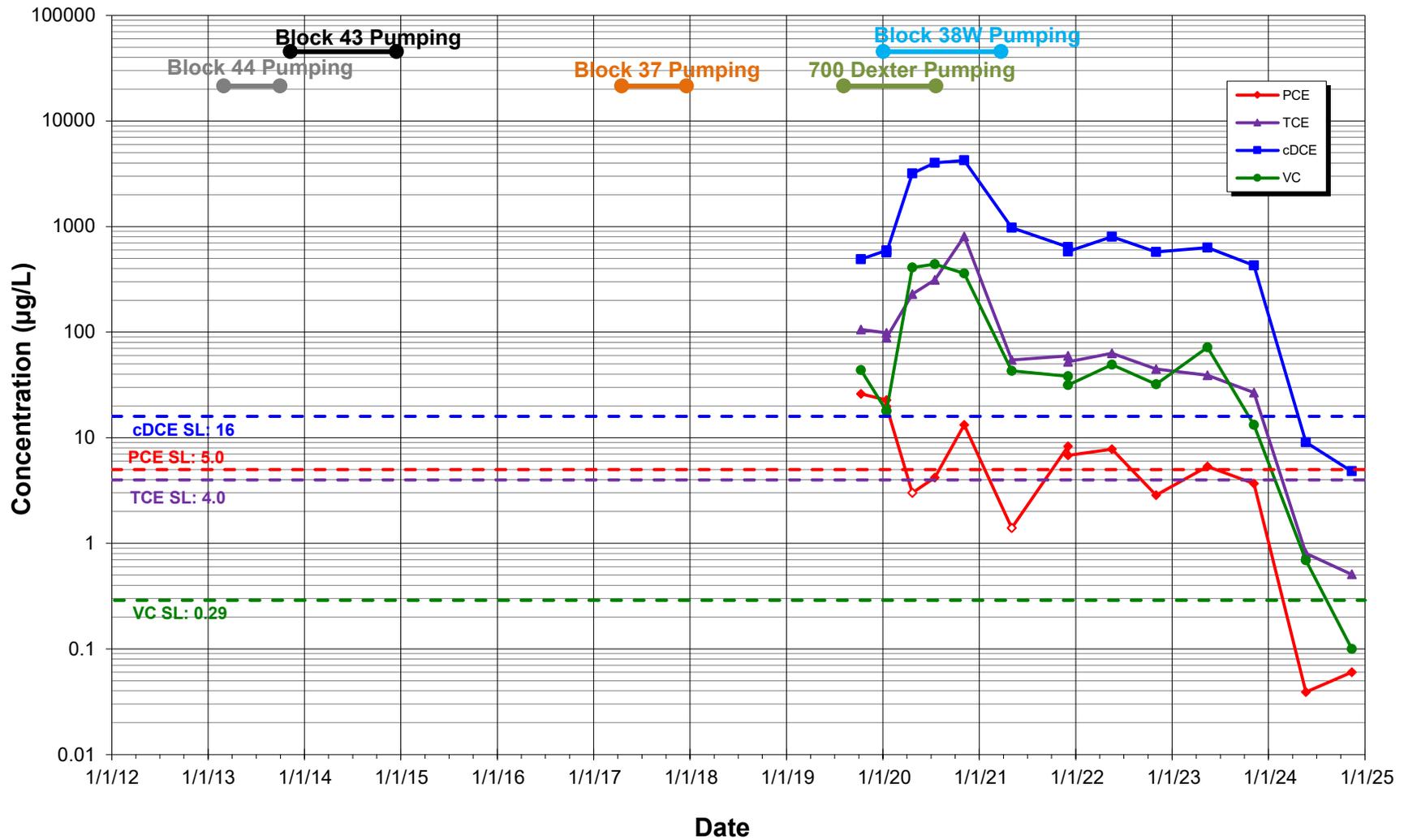
Concentration vs Time MW-311 (-29.1 to -39.1 feet NAVD), Alley E of Seattle Roy Aloha Shops American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

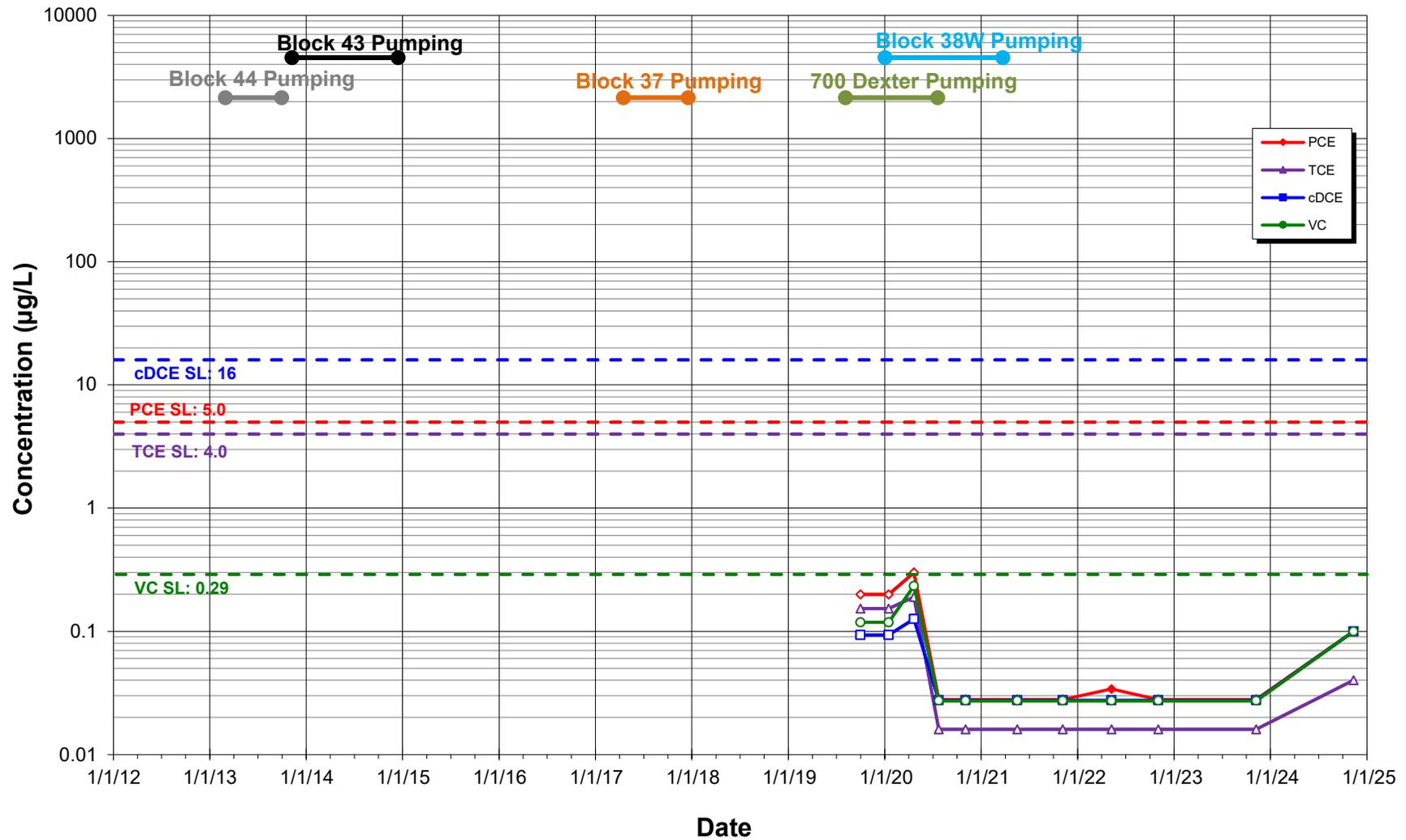
Concentration vs Time MW-314 (-28.0 to -38.0 feet NAVD), Alley E of Seattle Roy Aloha Shops American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

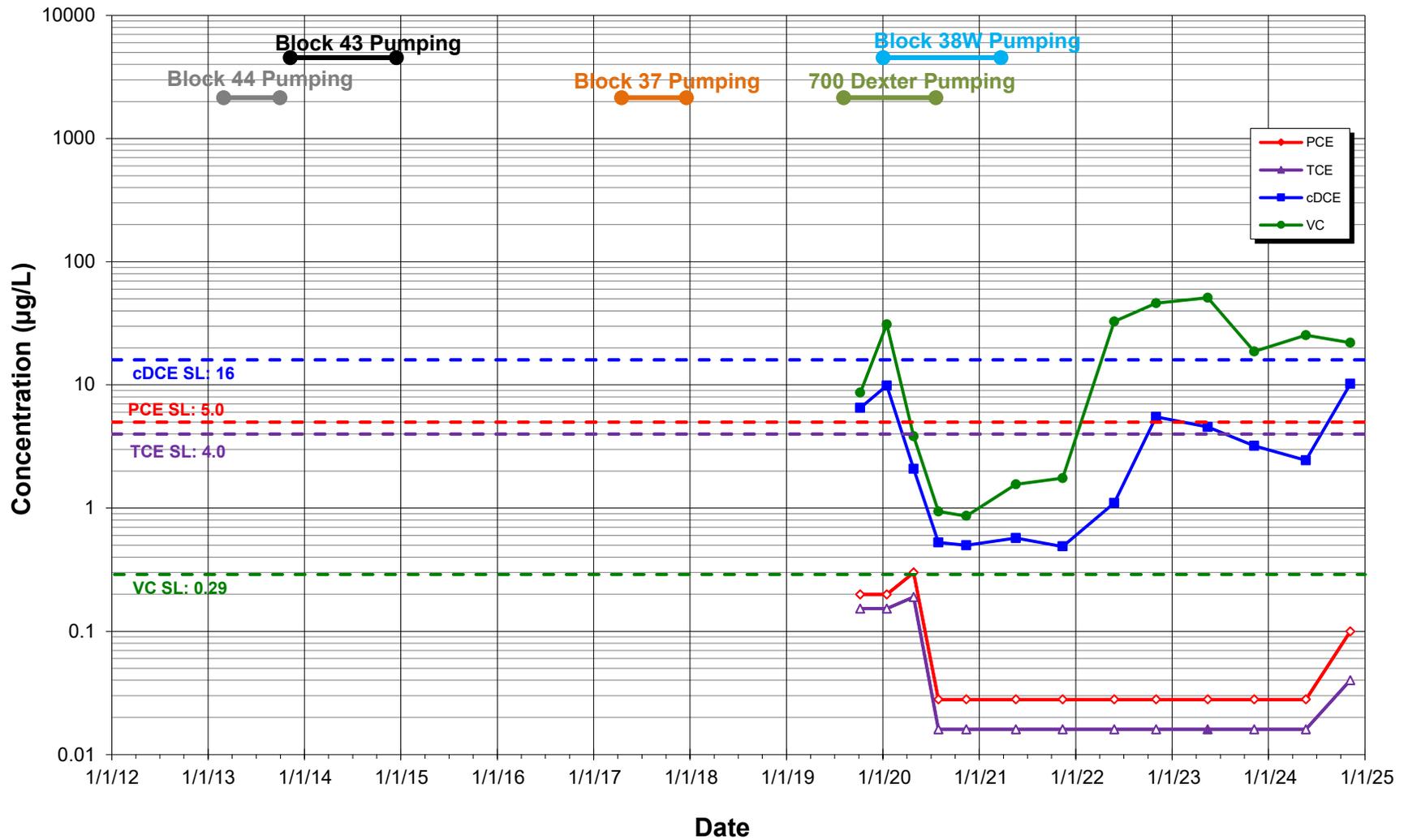
Concentration vs Time
MW-316 (-10.0 to -20.0 feet NAVD), Mercer St ROW, N side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

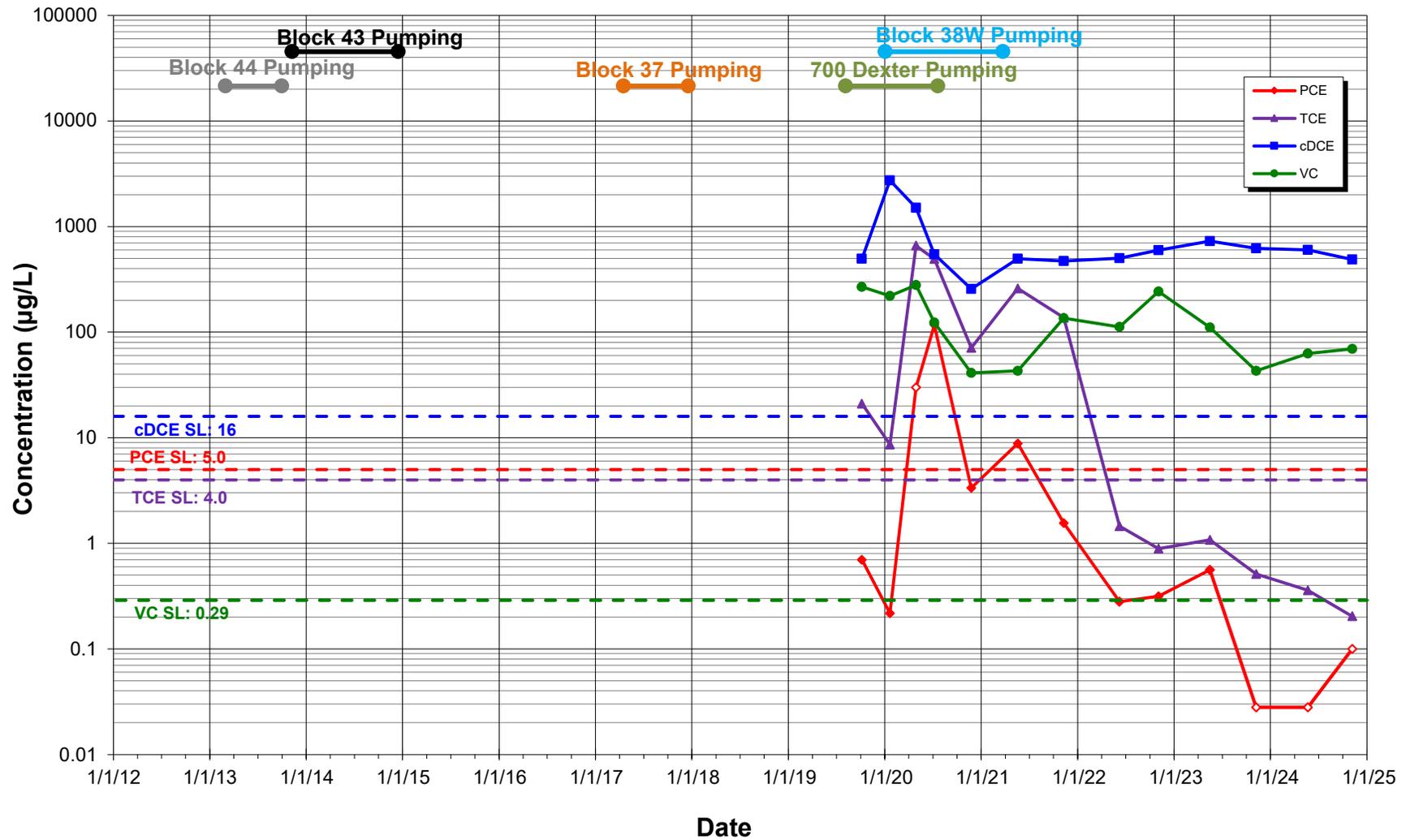
Concentration vs Time
MW-318 (-23.1 to -33.1 feet NAVD), 9th Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

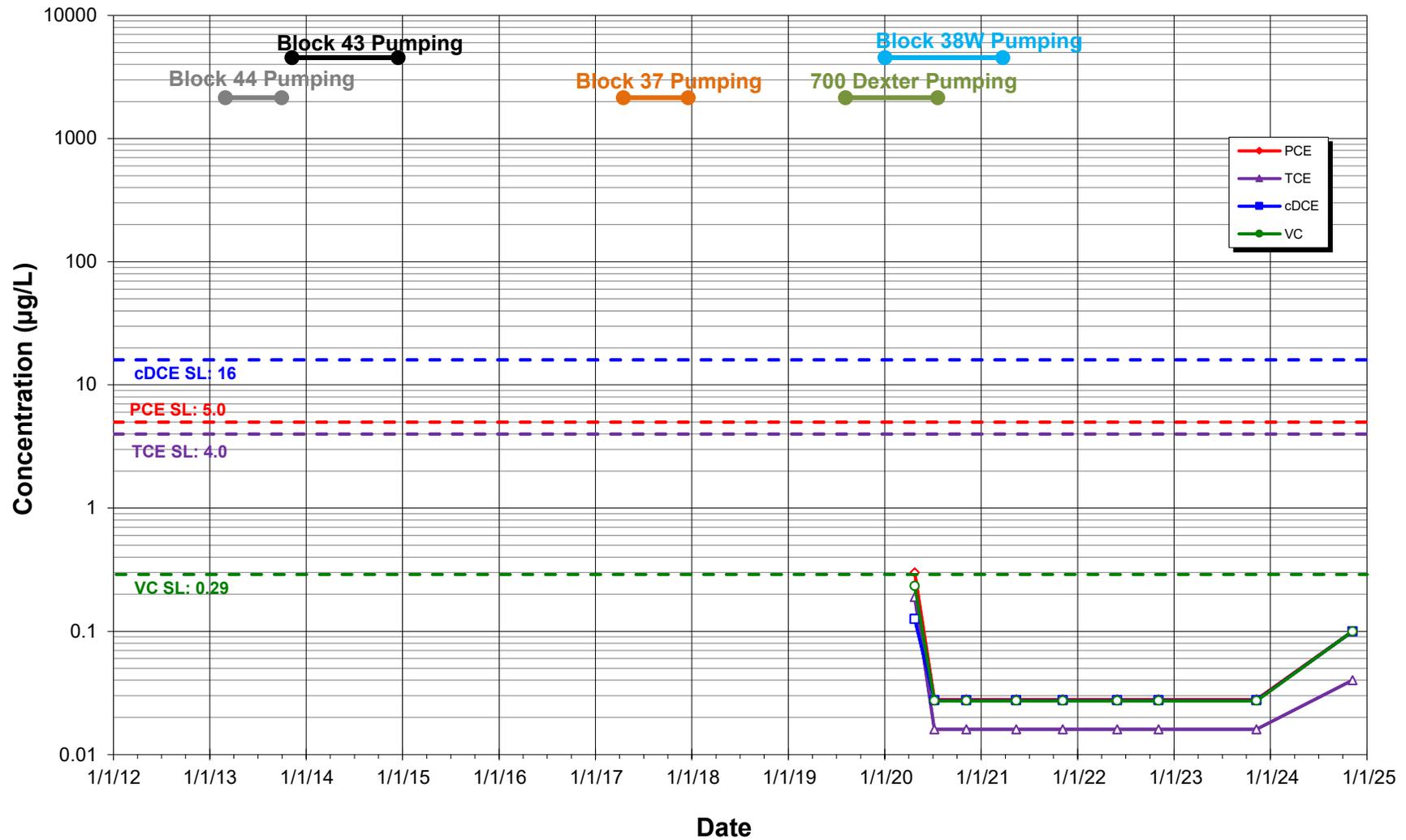
Concentration vs Time MW-322 (-23.1 to -31.3 feet NAVD), 9th Avenue North American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

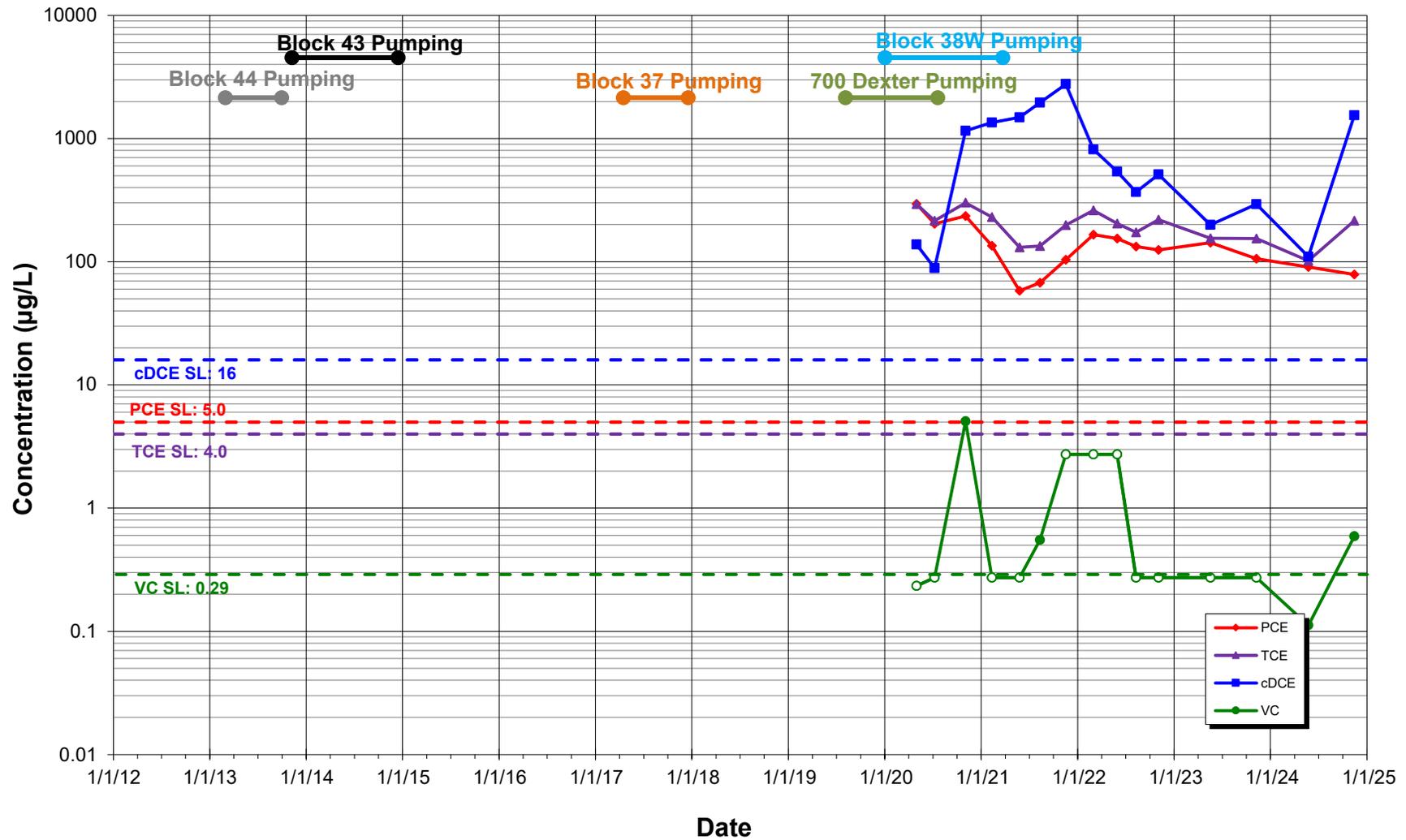
Concentration vs Time
MW-334 (-21.7 to -31.7 feet NAVD), 900 Roy Street, S end
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

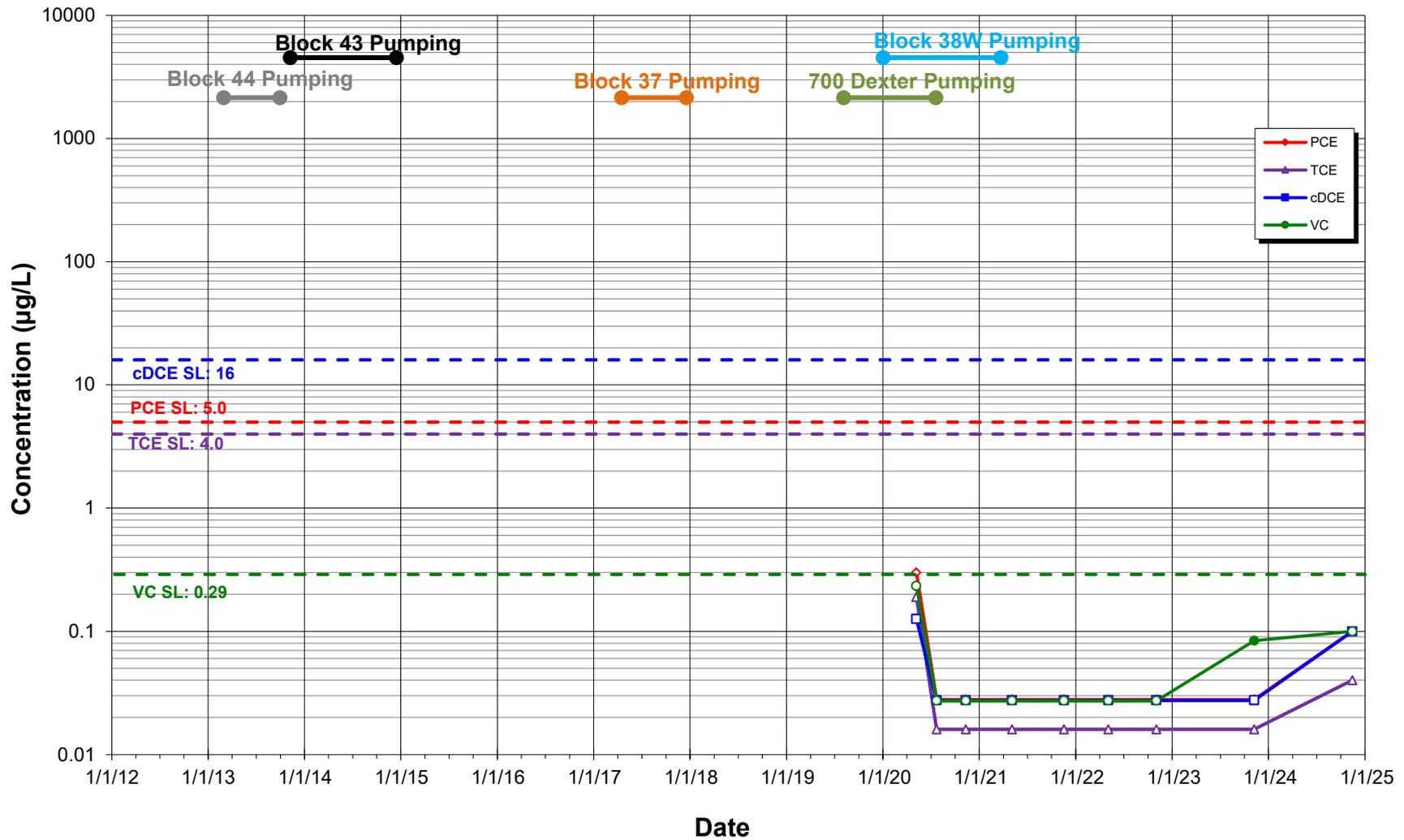
Concentration vs Time
MW-335 (-25.6 to -35.6 feet NAVD), Mercer St ROW, N side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

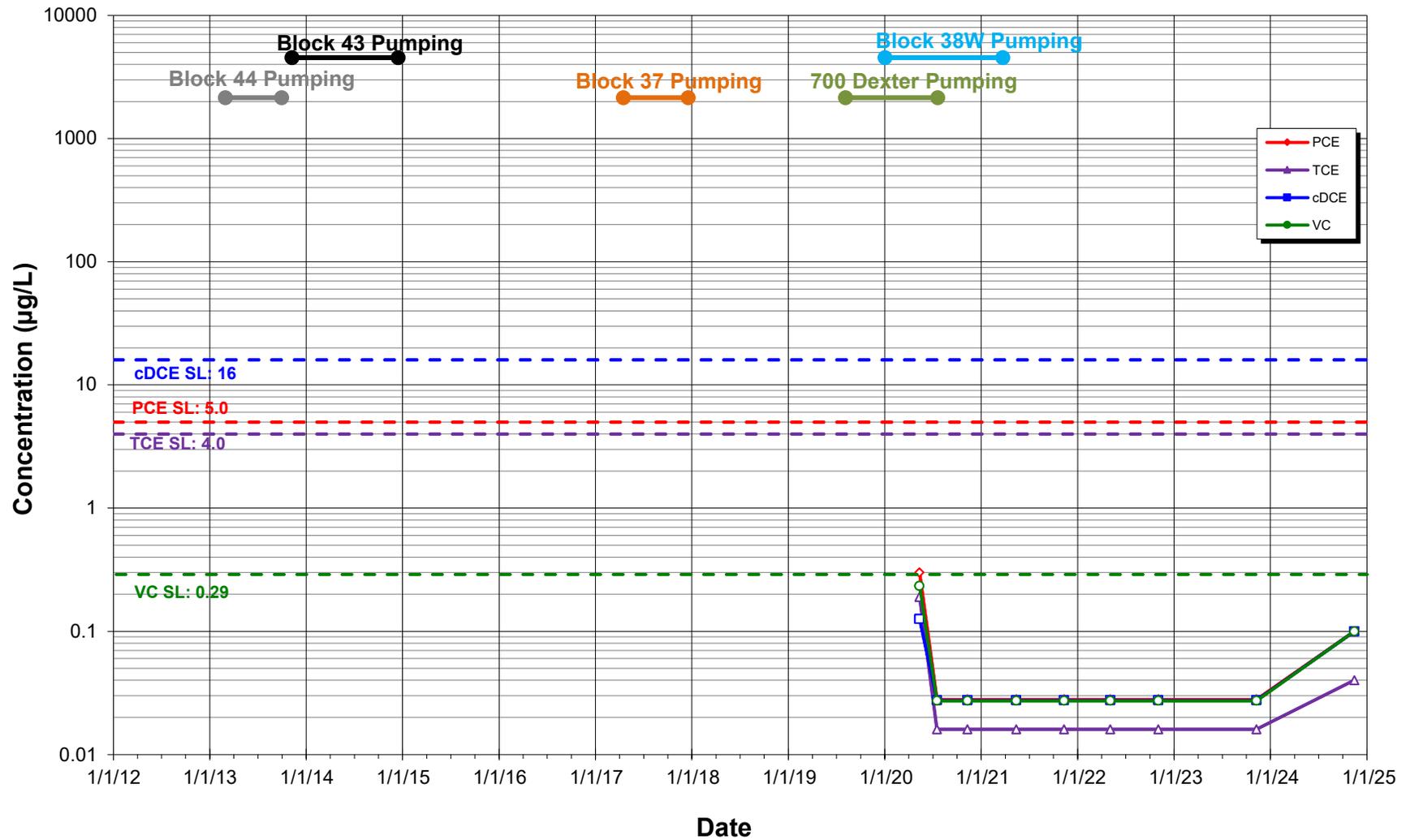
Concentration vs Time MW-338 (-16.6 to -26.6 feet NAVD), Lake Union Park, N end American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

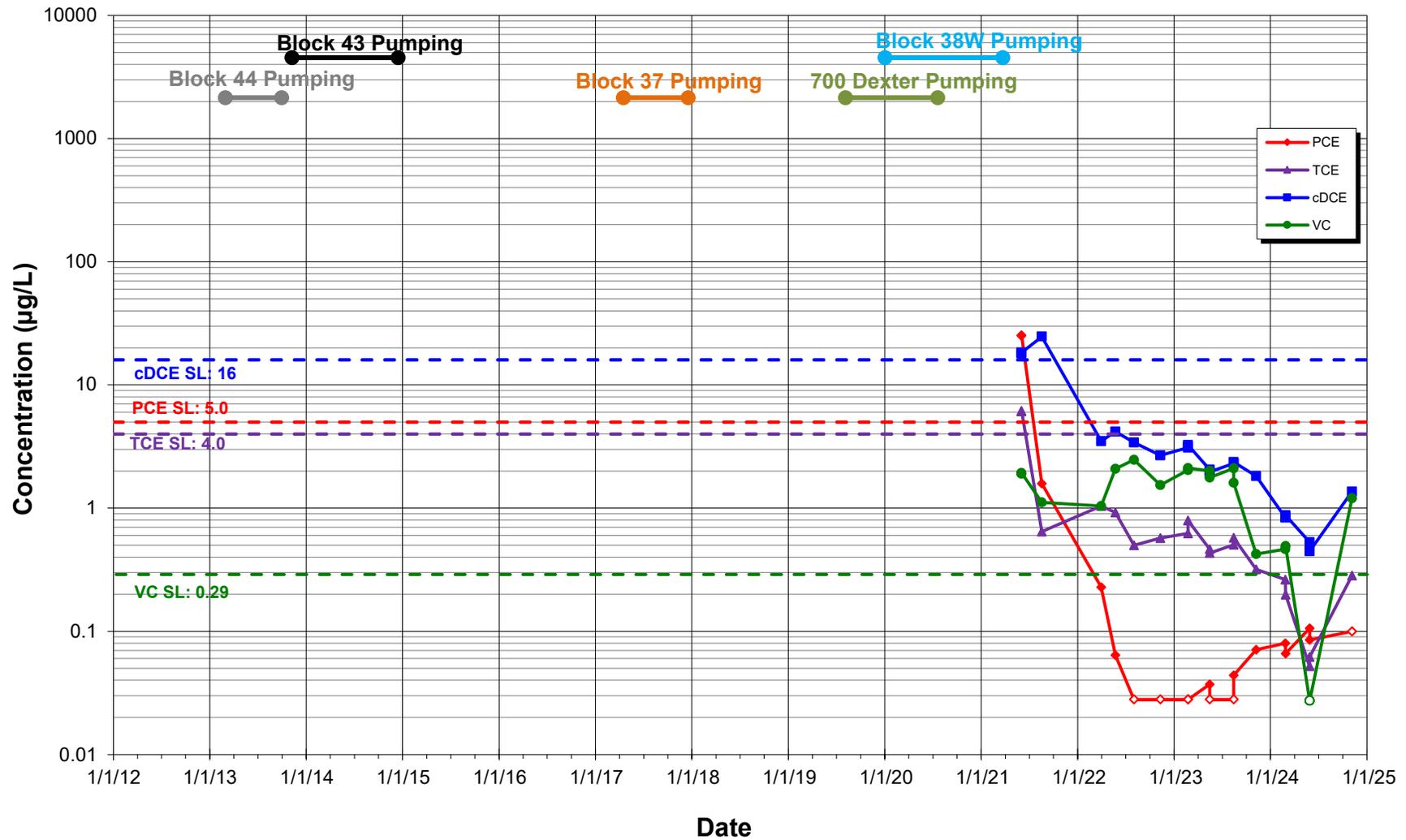
Concentration vs Time MW-340 (-16.1 to -26.1 feet NAVD), Lake Union Park, S end American Linen Supply Co–Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

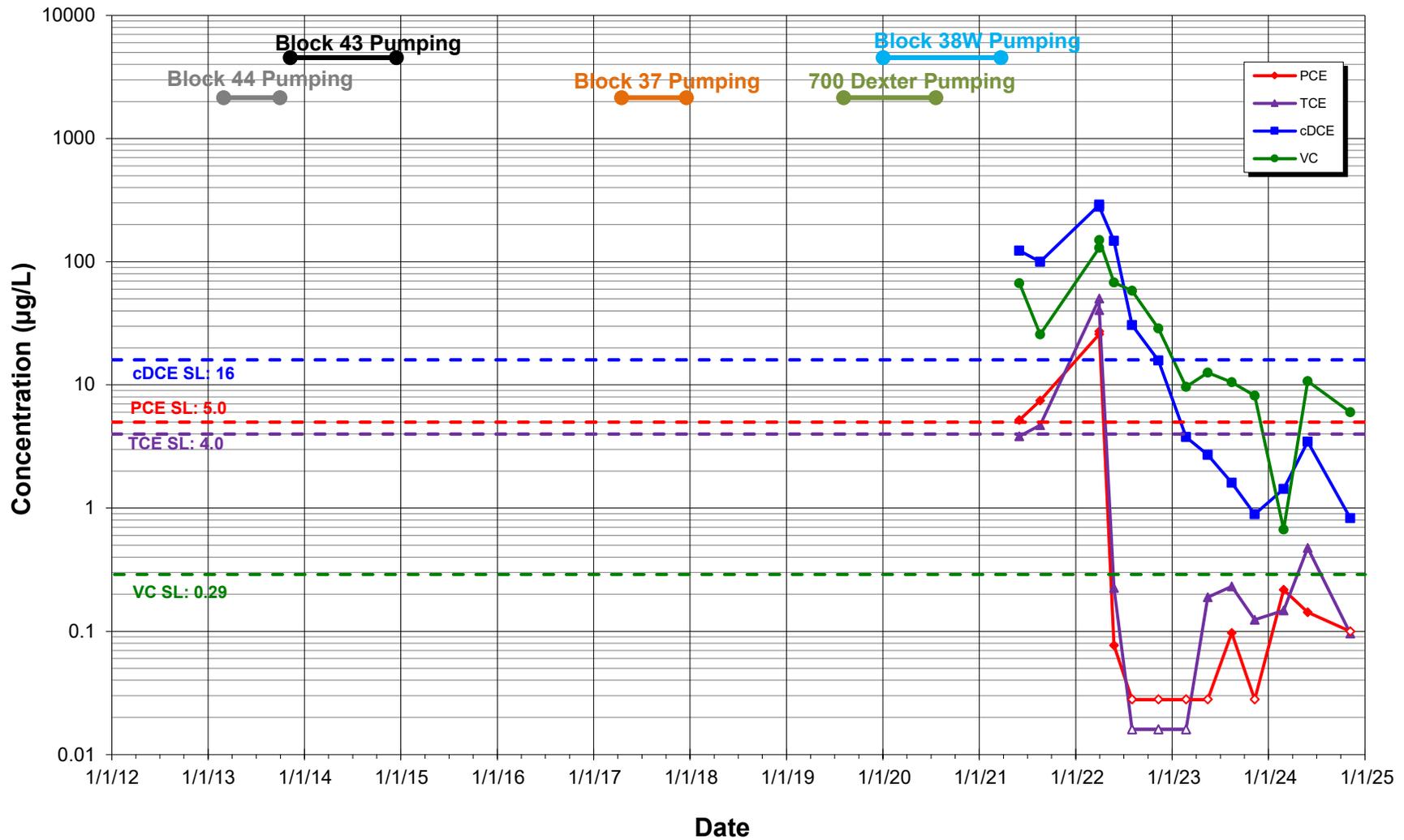
Concentration vs Time
MW-346 (-2.2 to -12.2 feet NAVD), Seattle DOT Mercer Parcels, NW quadrant
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

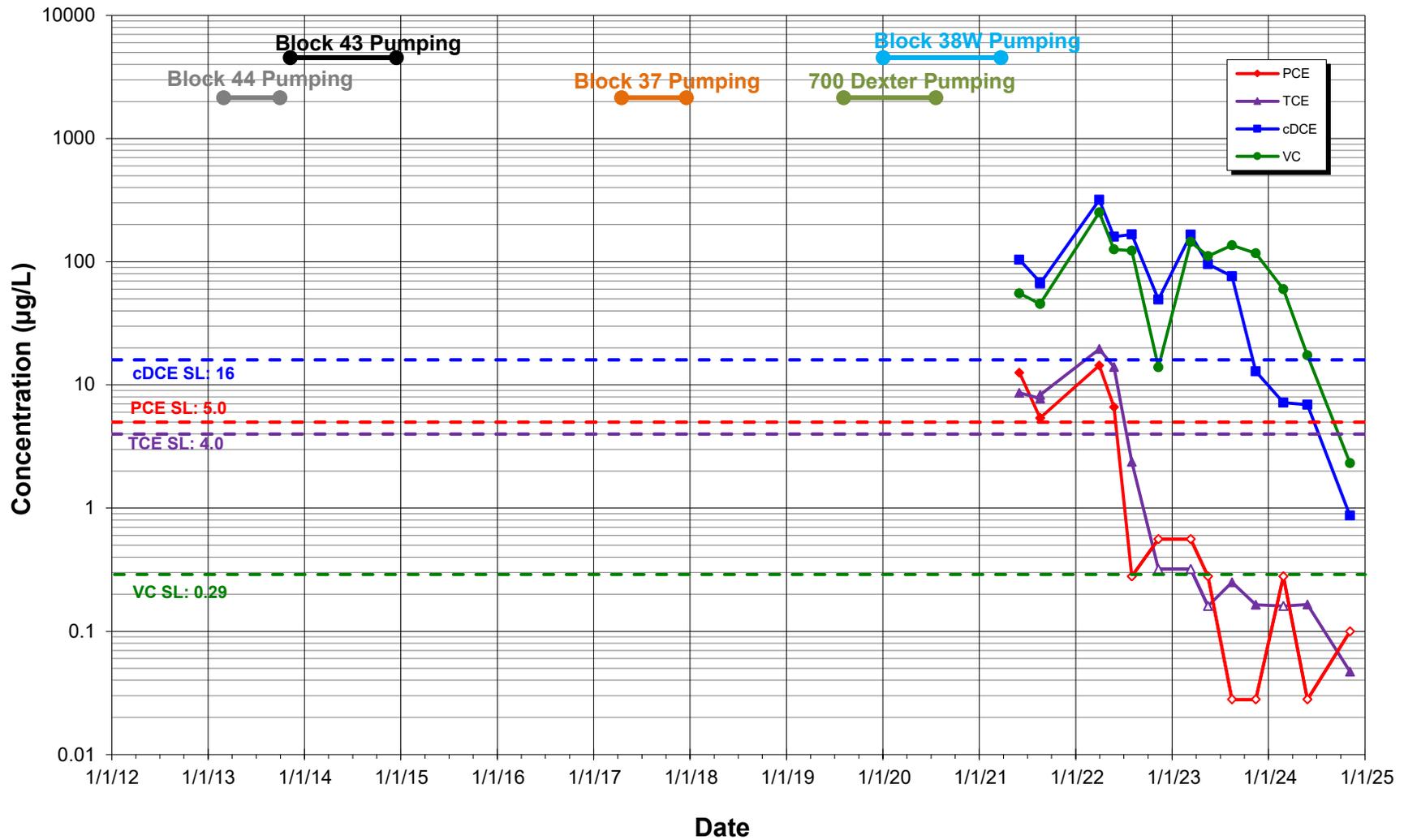
Concentration vs Time
MW-347 (-1.3 to -11.3 feet NAVD), Seattle DOT Mercer Parcels, NW quadrant
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

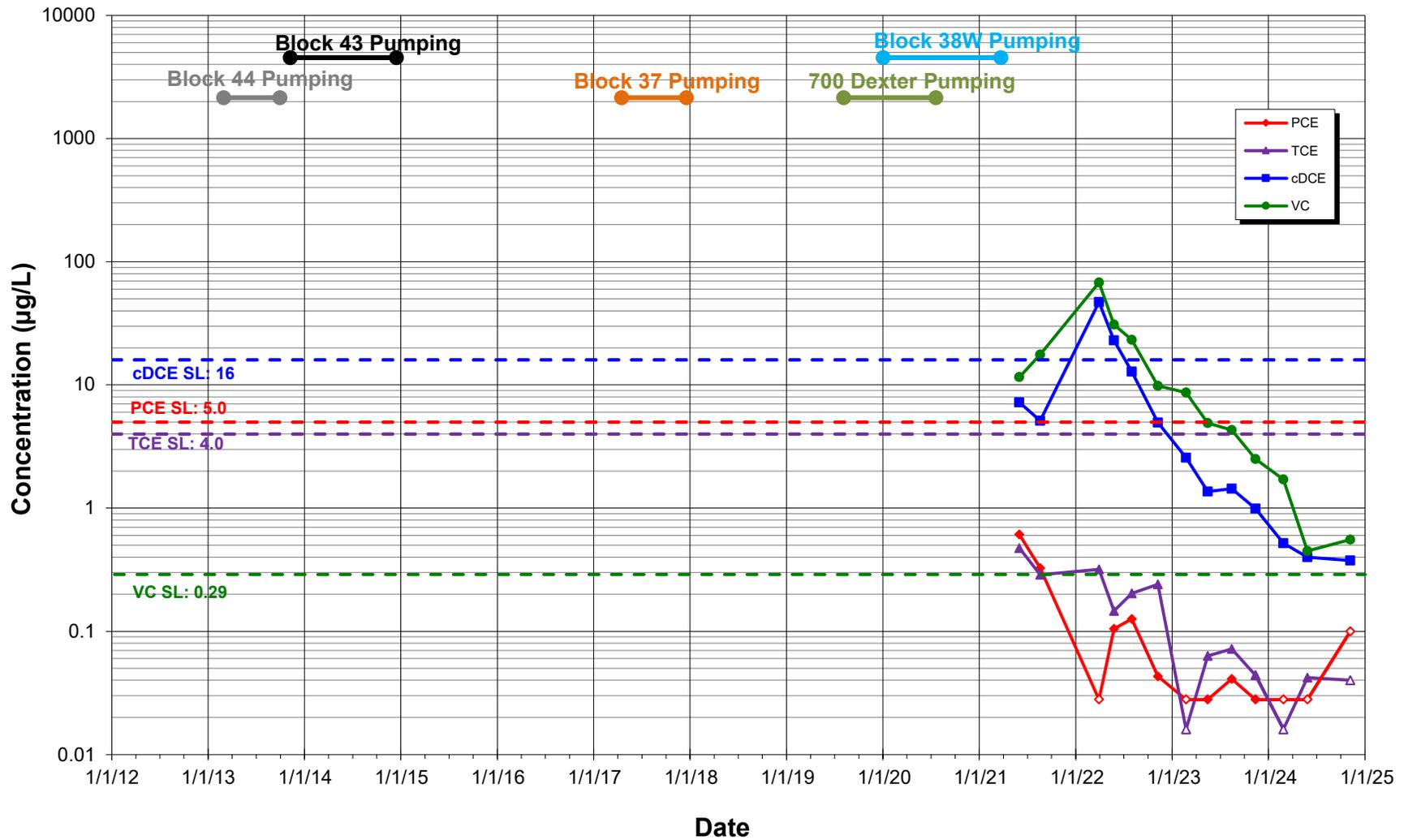
Concentration vs Time
MW-348 (-4.6 to -14.6 feet NAVD), Seattle DOT Mercer Parcels, SW quadrant
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

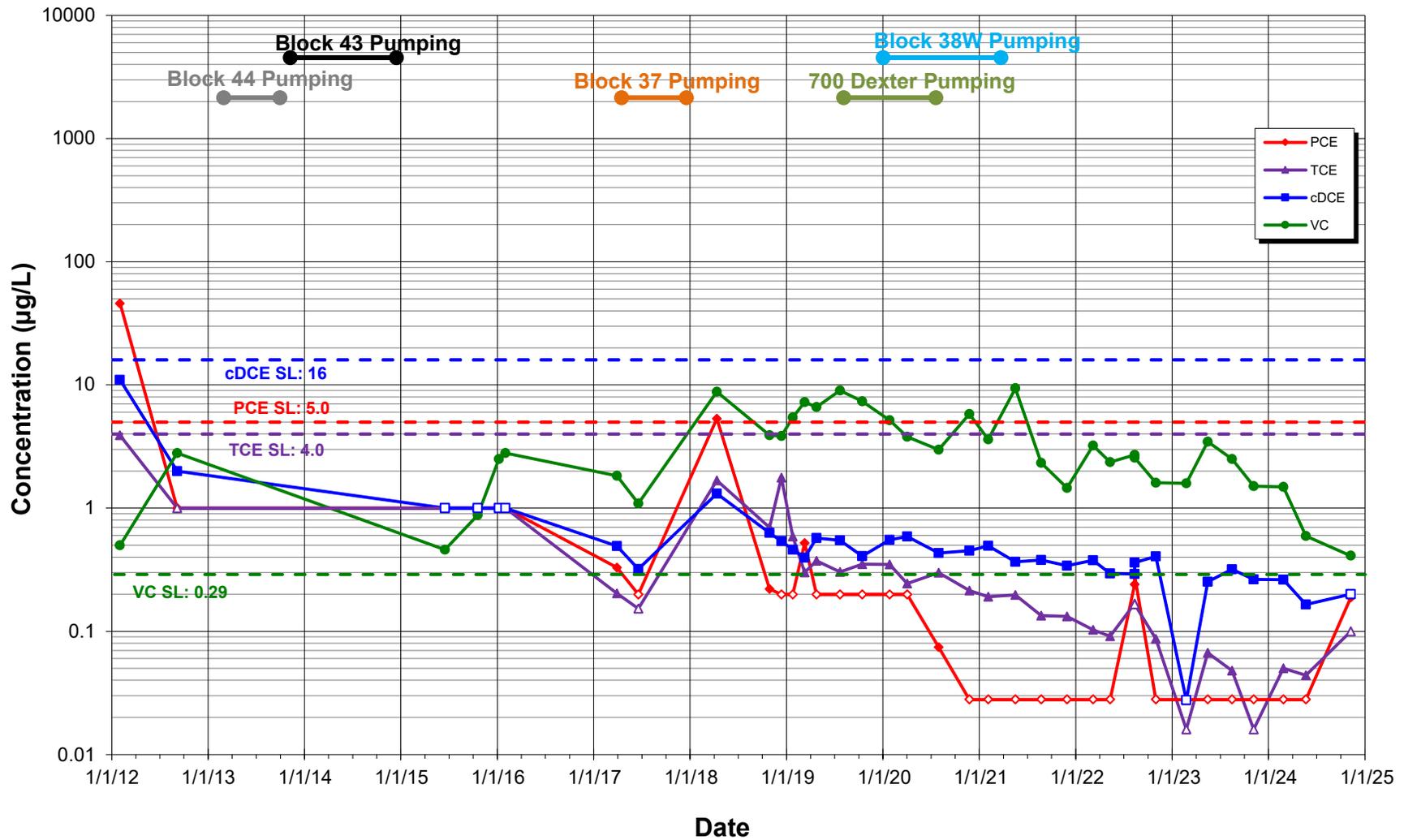
Concentration vs Time
MW-349 (-2.8 to -12.8 feet NAVD), Seattle DOT Mercer Parcels, SW quadrant
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

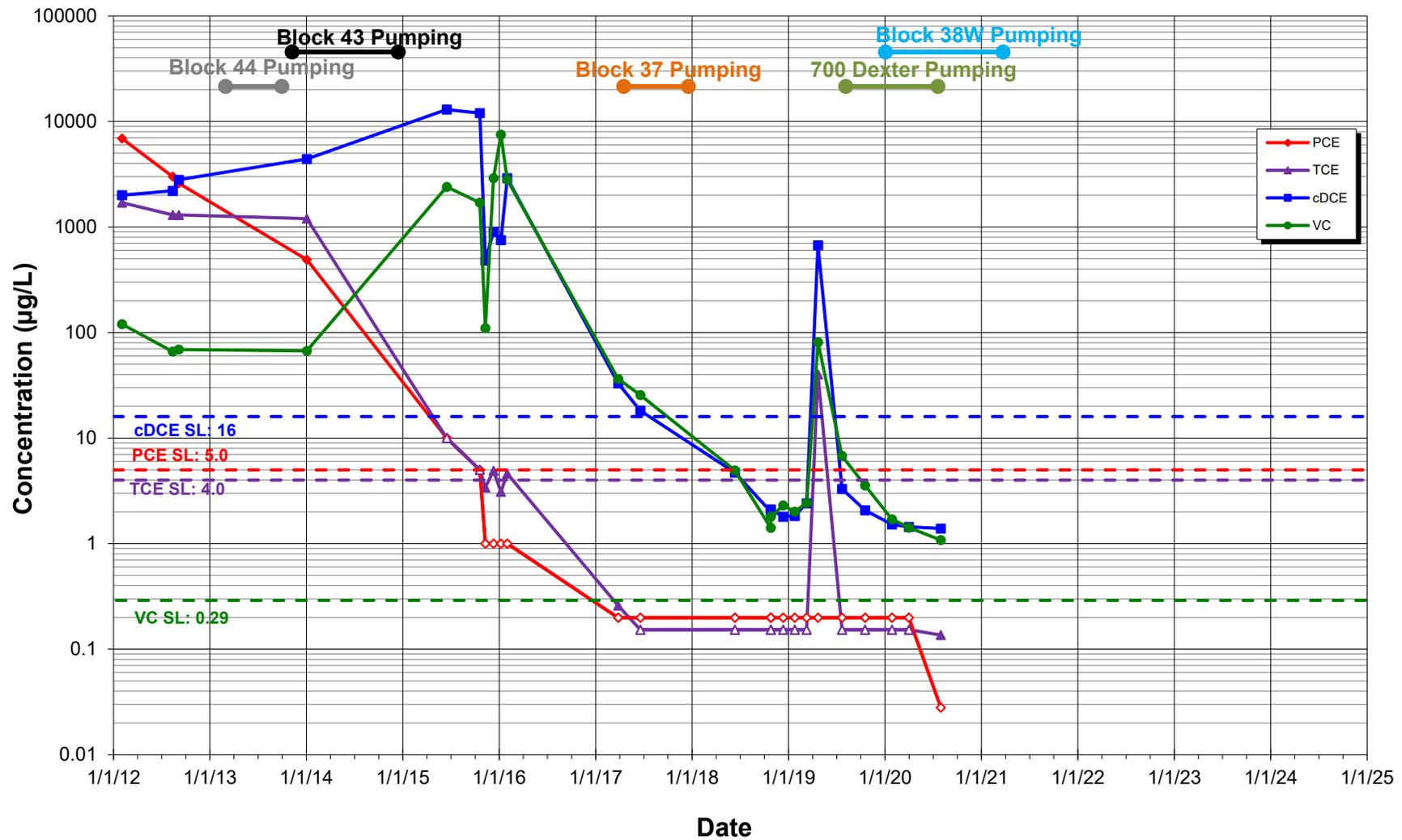
Concentration vs Time
W-MW-01 (-25.1 to -35.1 feet NAVD), 8th Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

Concentration vs Time W-MW-02 (-26.3 to -36.3 feet NAVD), 8th Ave N ROW, W side American Linen Supply Co Dexter Ave Site



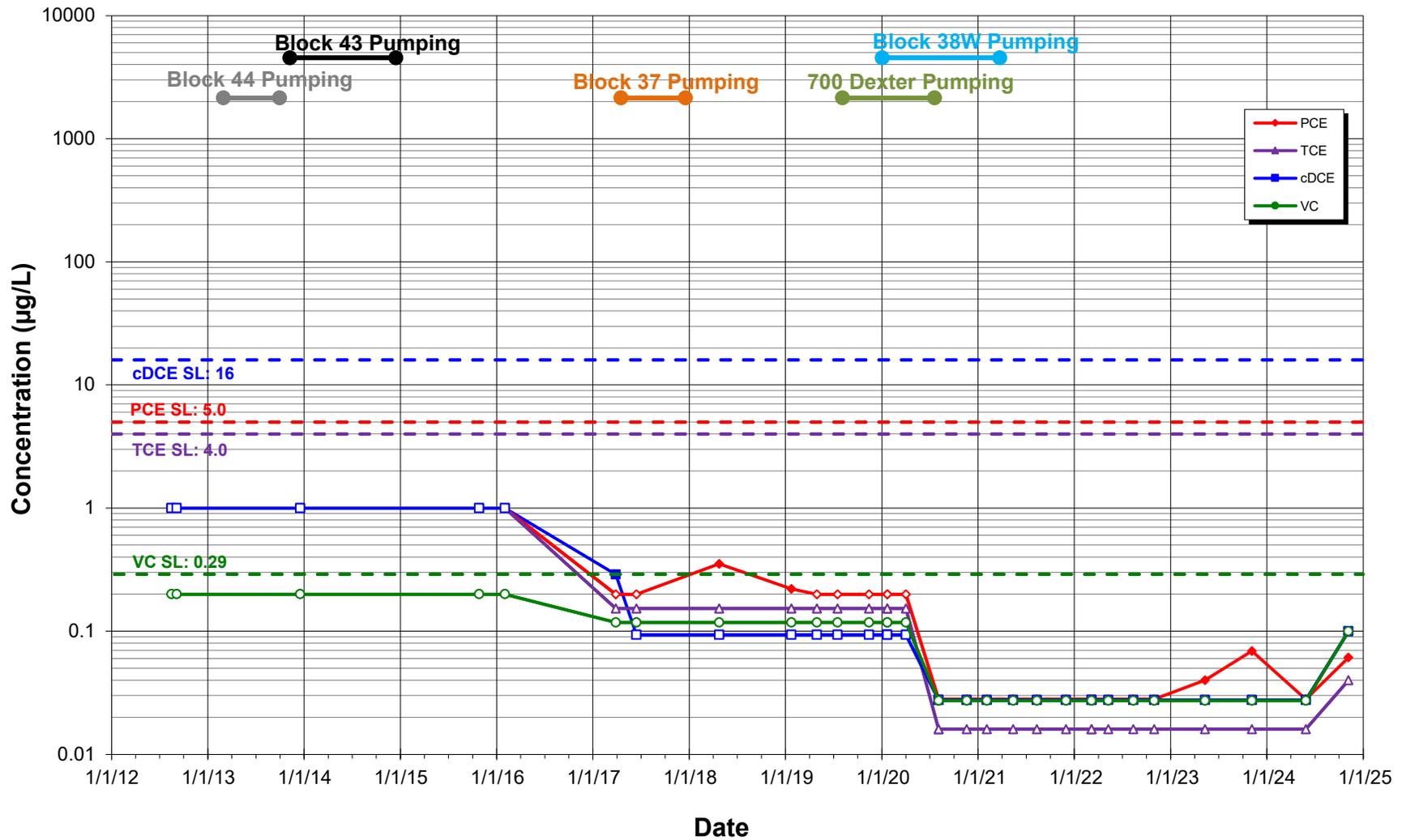
Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

CVOC Trend Plots

Deep Zone

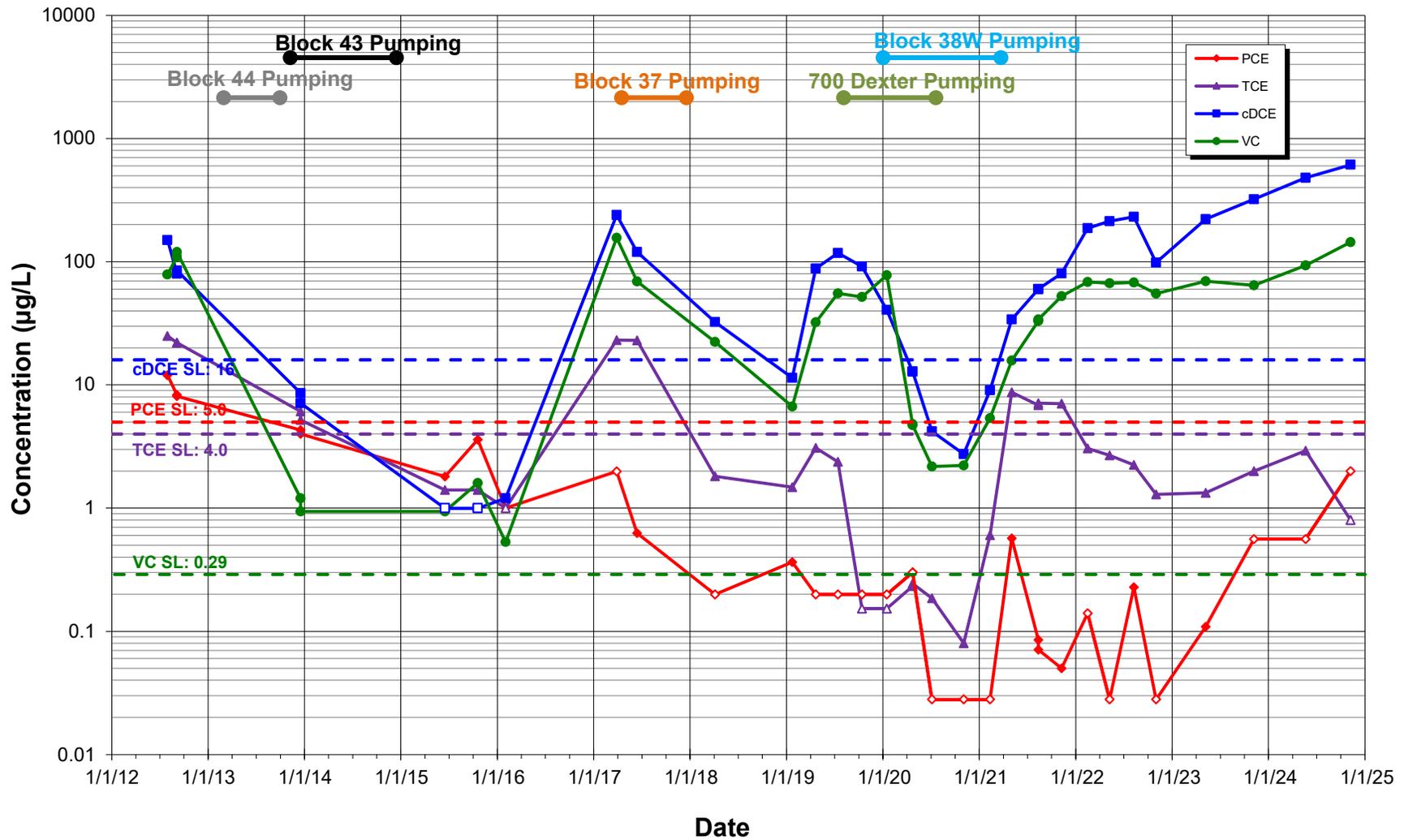
Concentration vs Time
MW102 (-65.8 to -75.8 feet NAVD), Valley St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

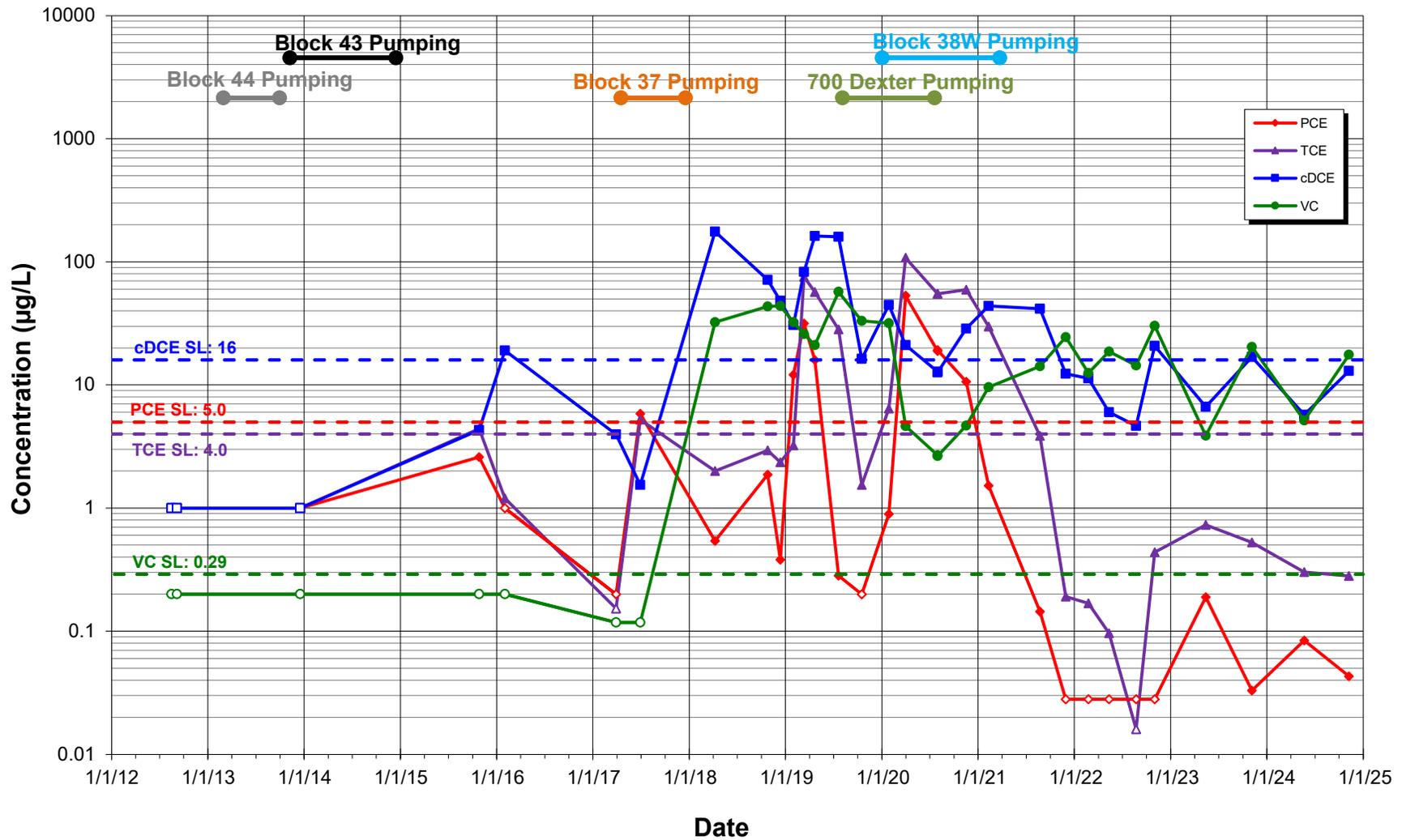
Concentration vs Time
MW103 (-67.6 to -77.6 feet NAVD), Alley E of Seattle Roy Aloha Shops
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

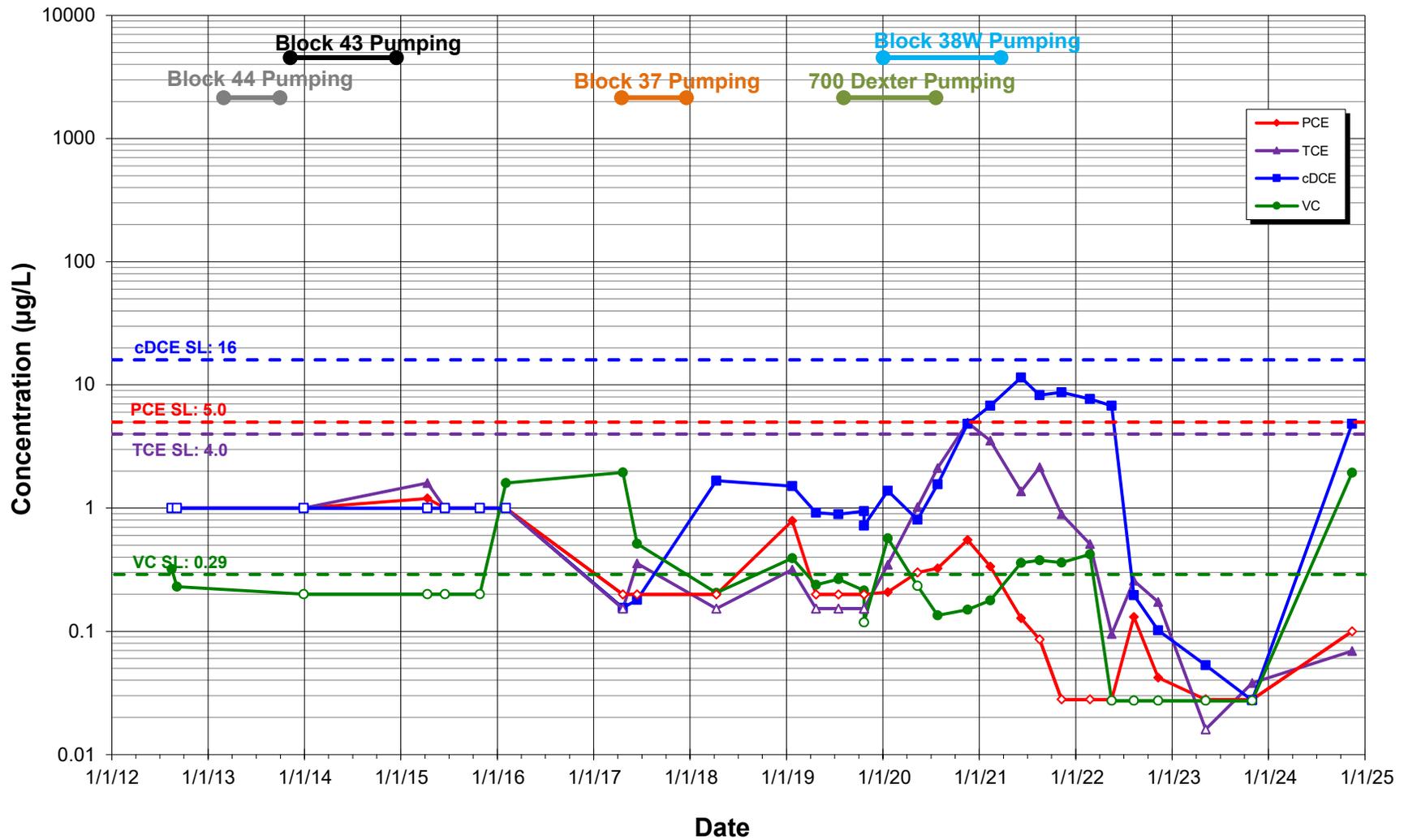
Concentration vs Time
MW104 (-76.3 to -86.3 feet NAVD), 8th Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

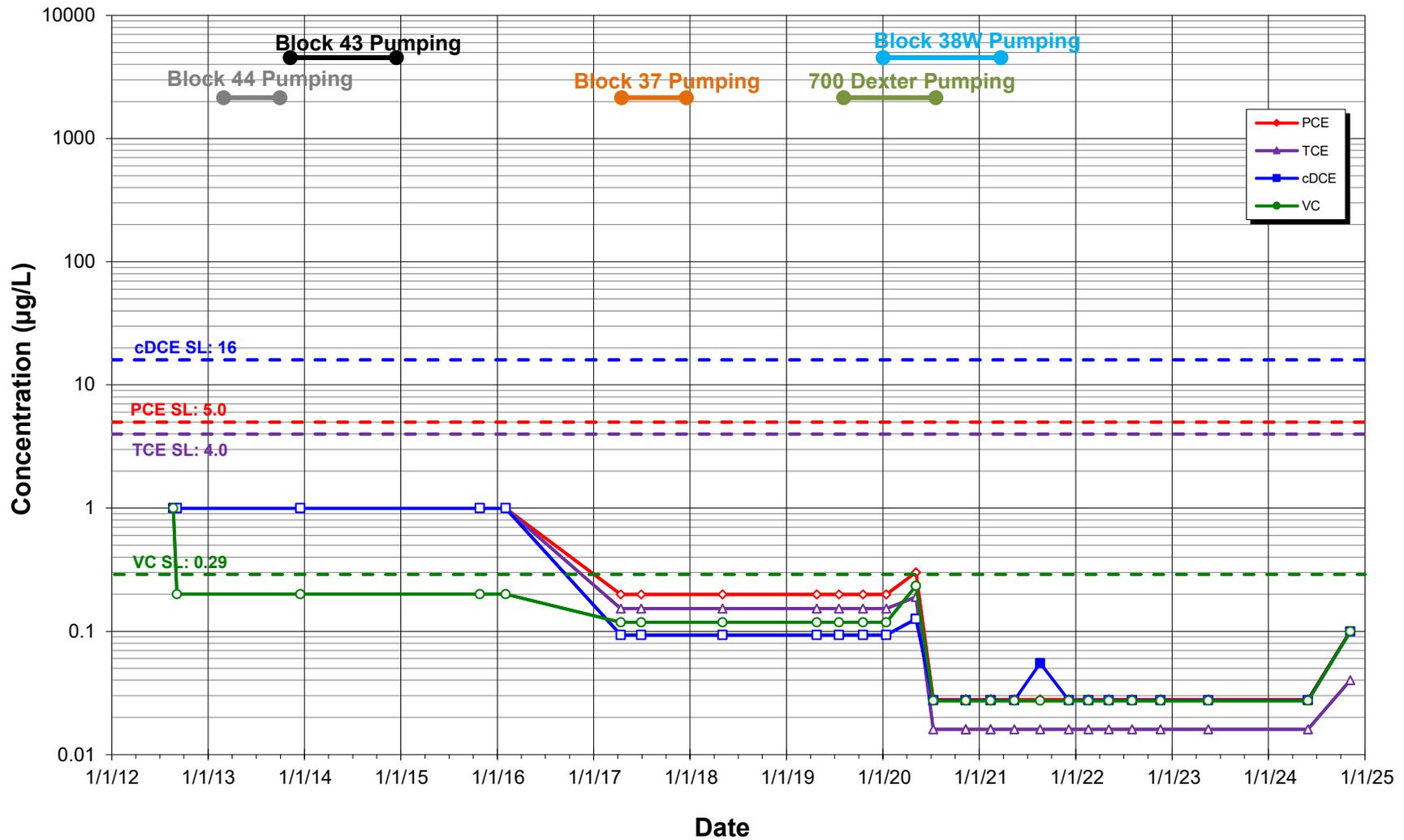
Concentration vs Time
MW105 (-85.8 to -95.8 feet NAVD), Roy St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

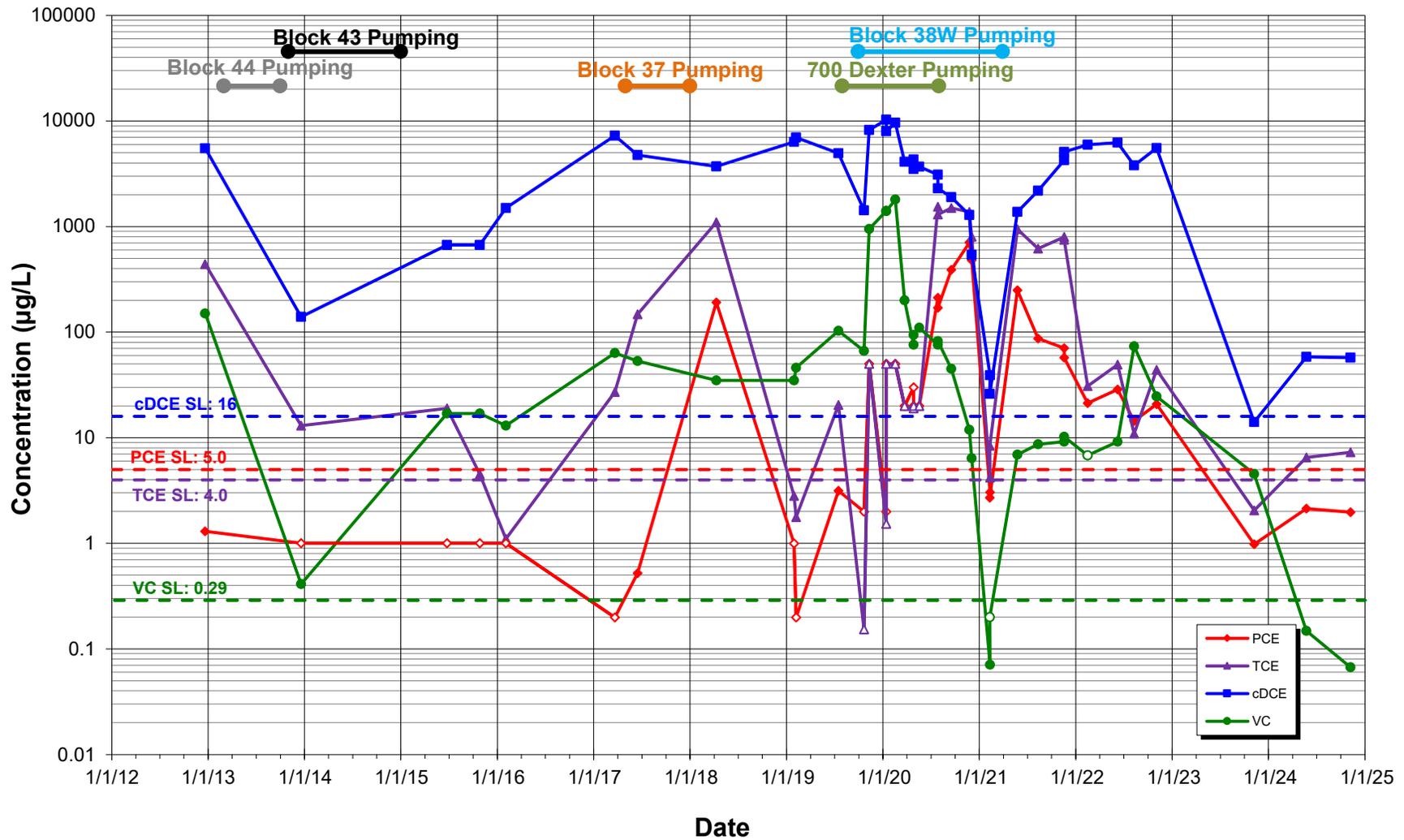
Concentration vs Time
MW106 (-78.0 to -88.0 feet NAVD), SDOT Mercer Parcels, NW quadrant
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

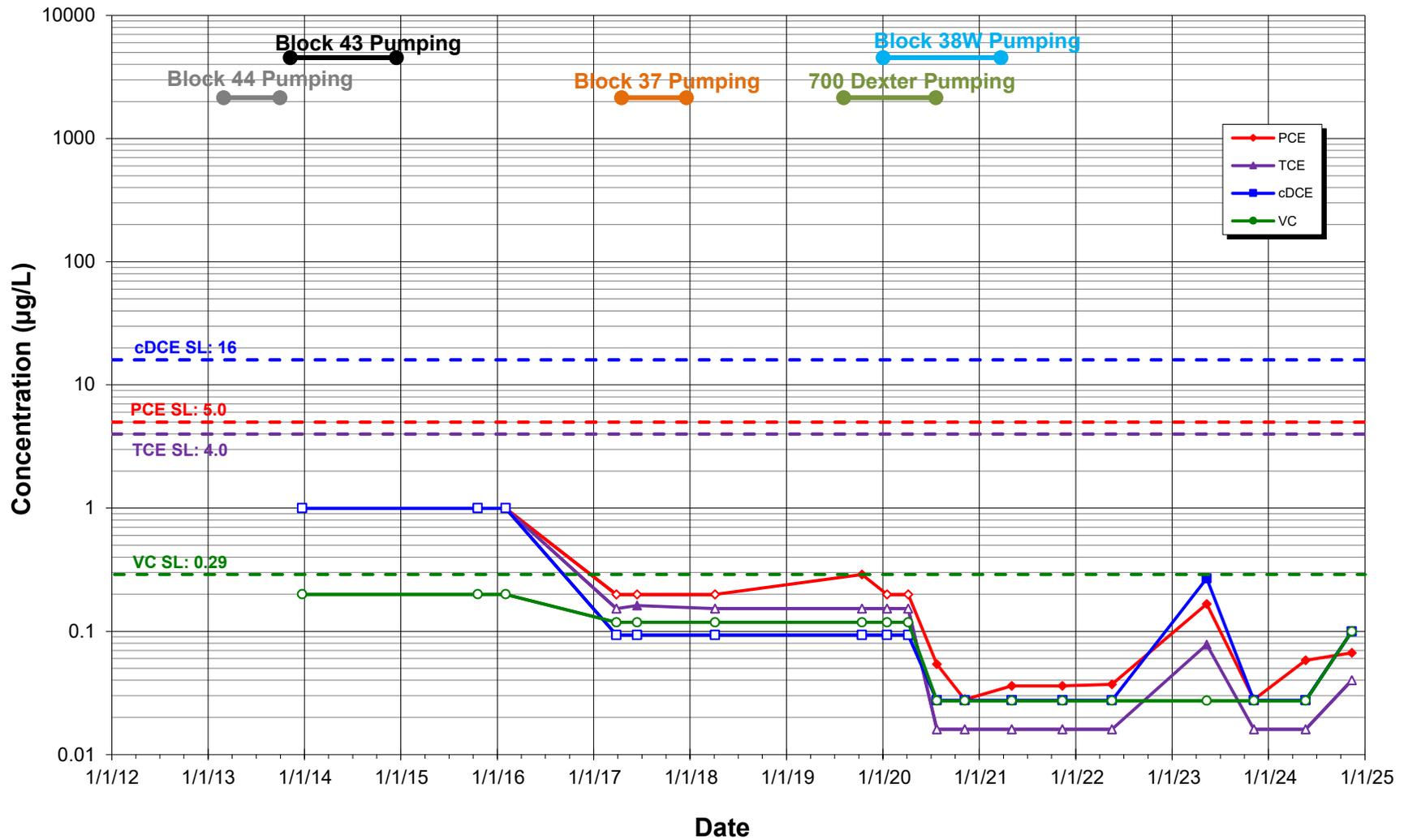
Concentration vs Time
MW113 (-37.1 to -47.1 feet NAVD), 9th Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

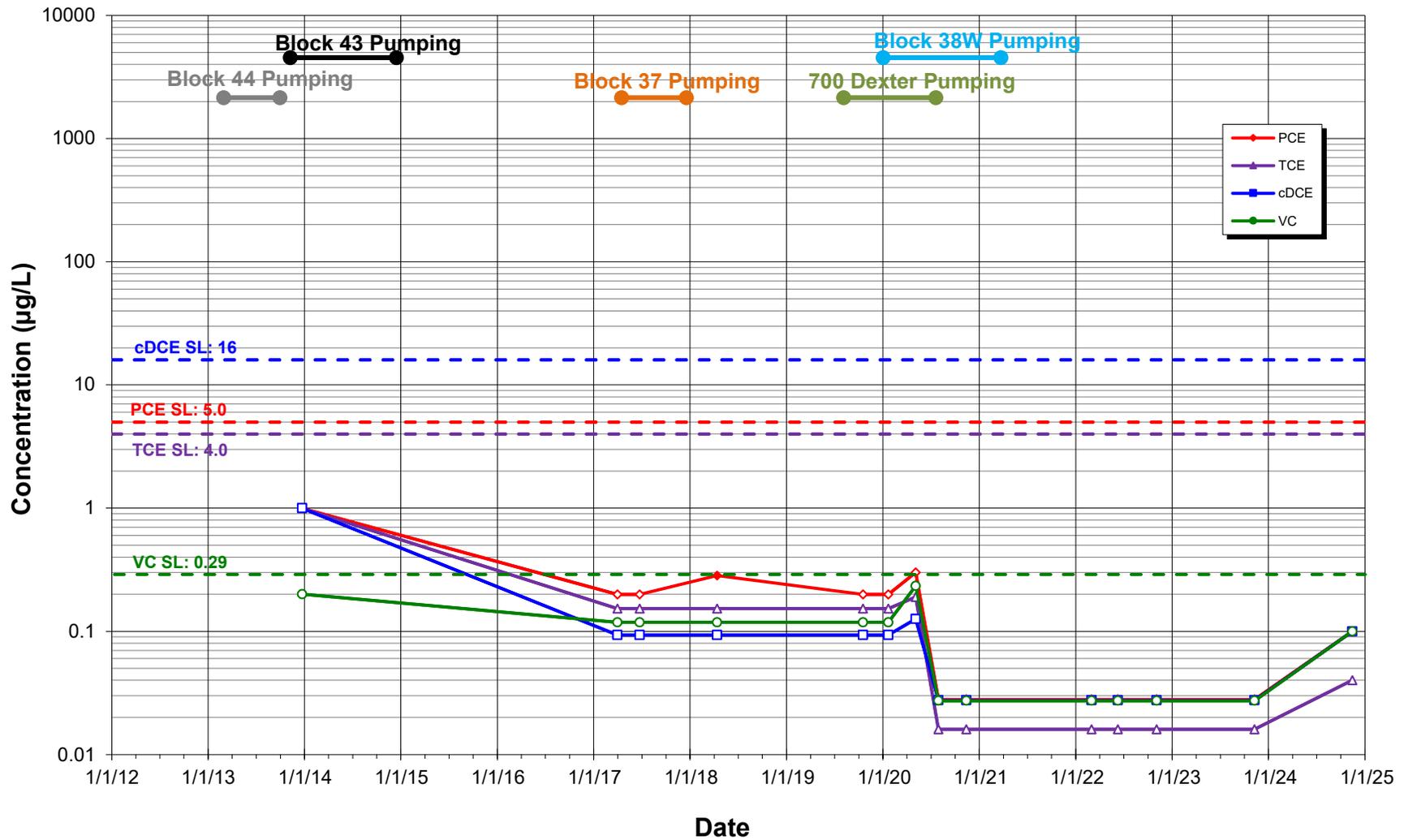
Concentration vs Time MW122 (-75.0 to -89.0 feet NAVD), Alley E of Seattle Roy Aloha Shops American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

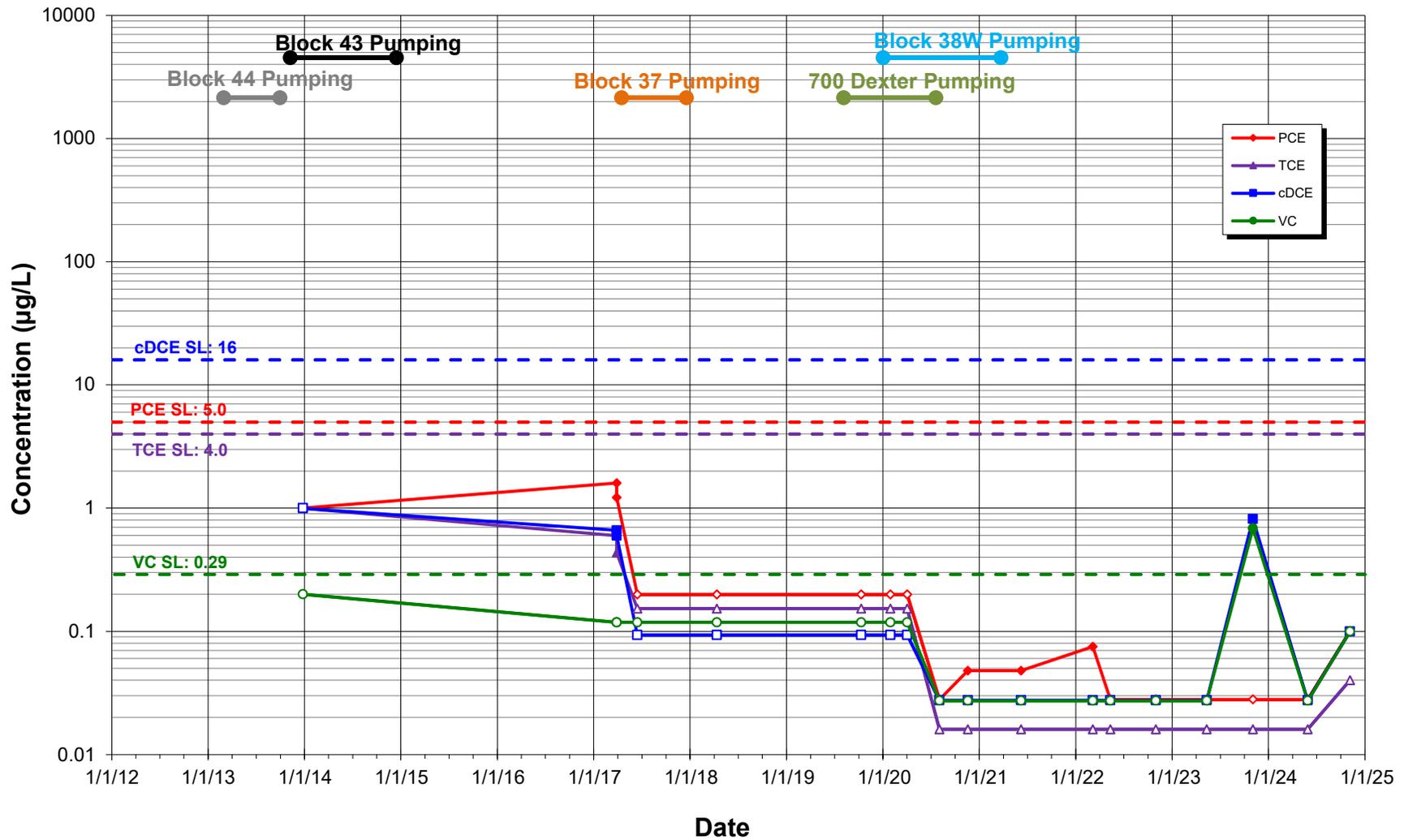
Concentration vs Time
MW123 (-42.5 to -52.5 feet NAVD), Westlake Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

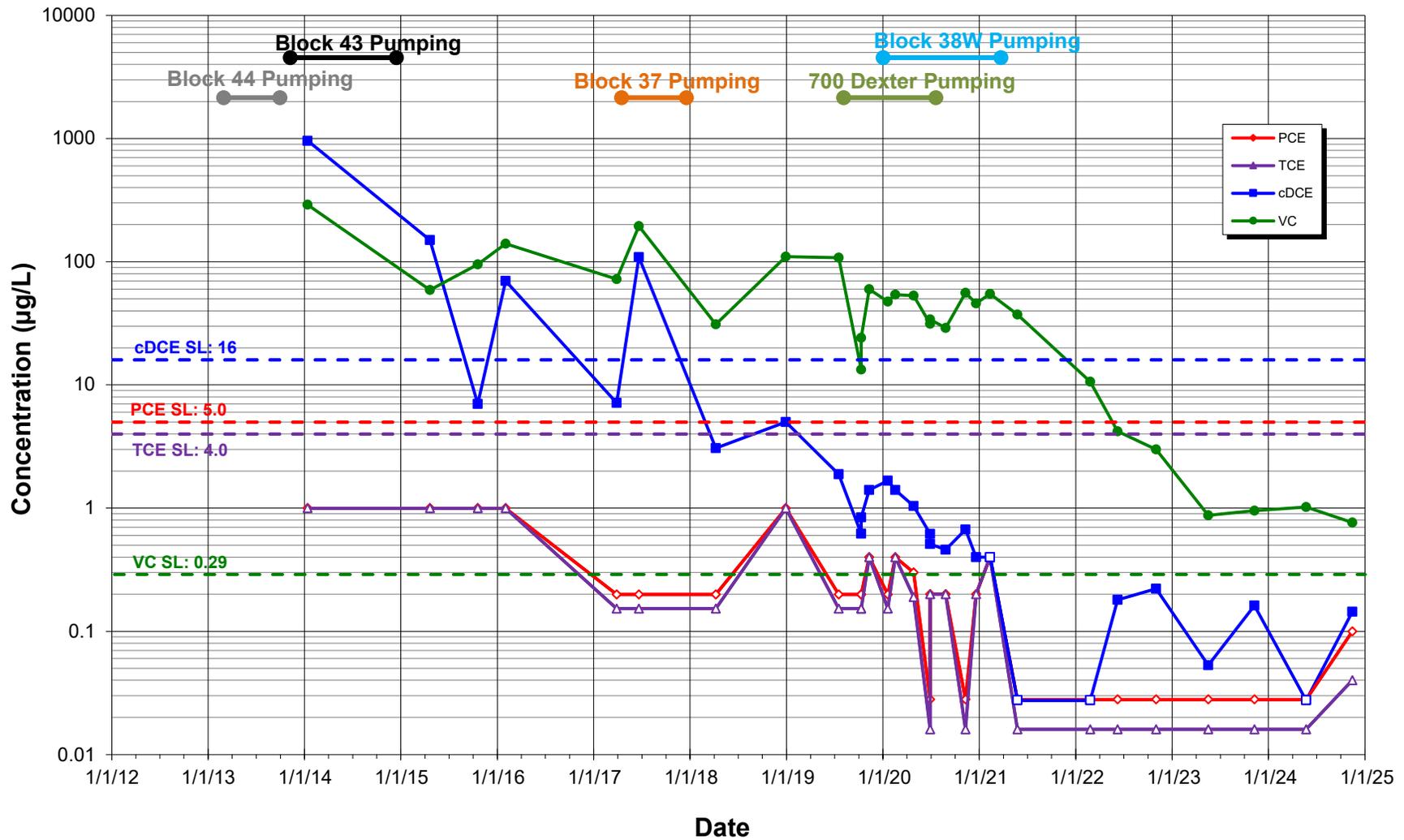
Concentration vs Time
MW124 (-53.8 to -63.8 feet NAVD), Valley St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

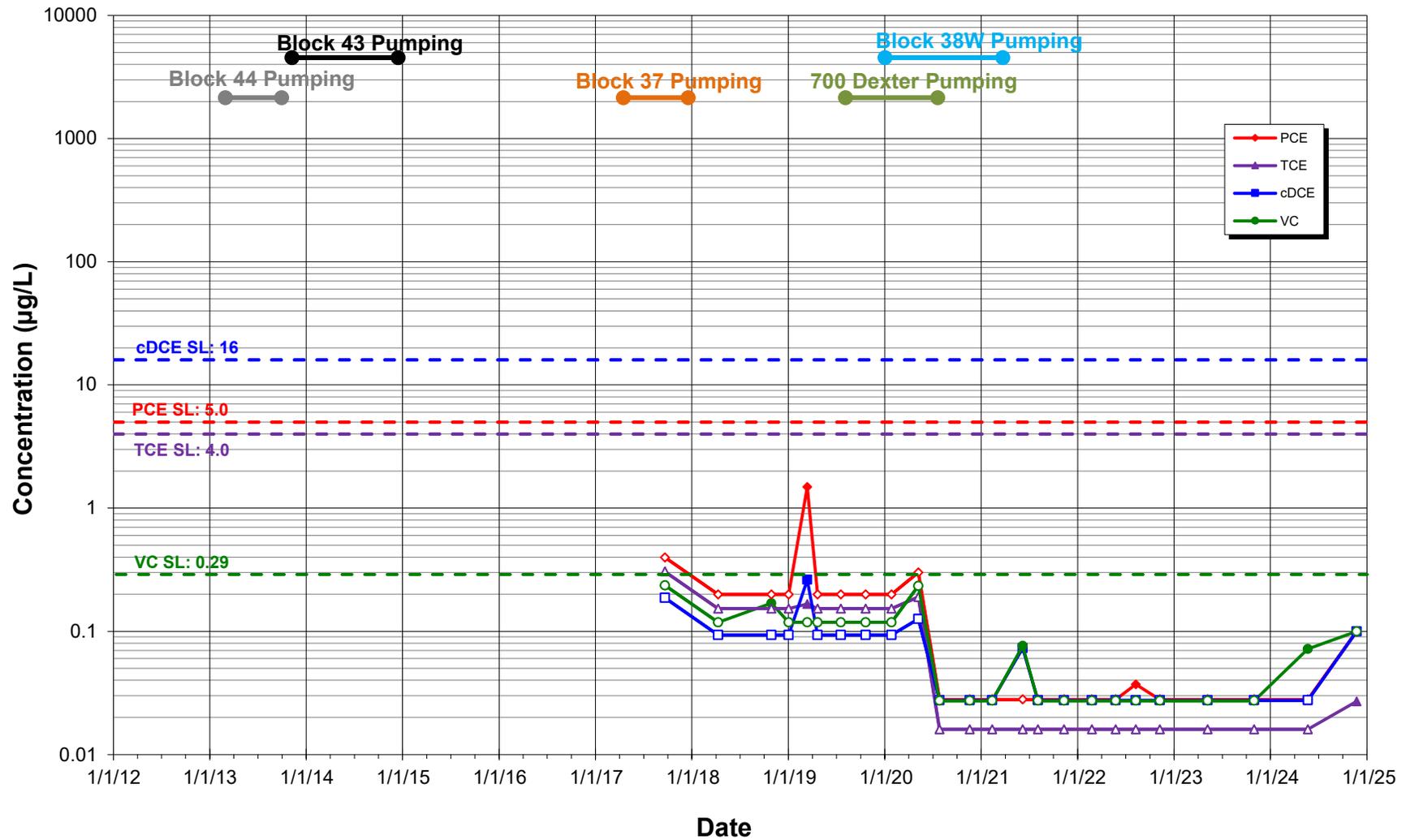
Concentration vs Time
MW128 (-30.8 to -40.8 feet NAVD), Westlake Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

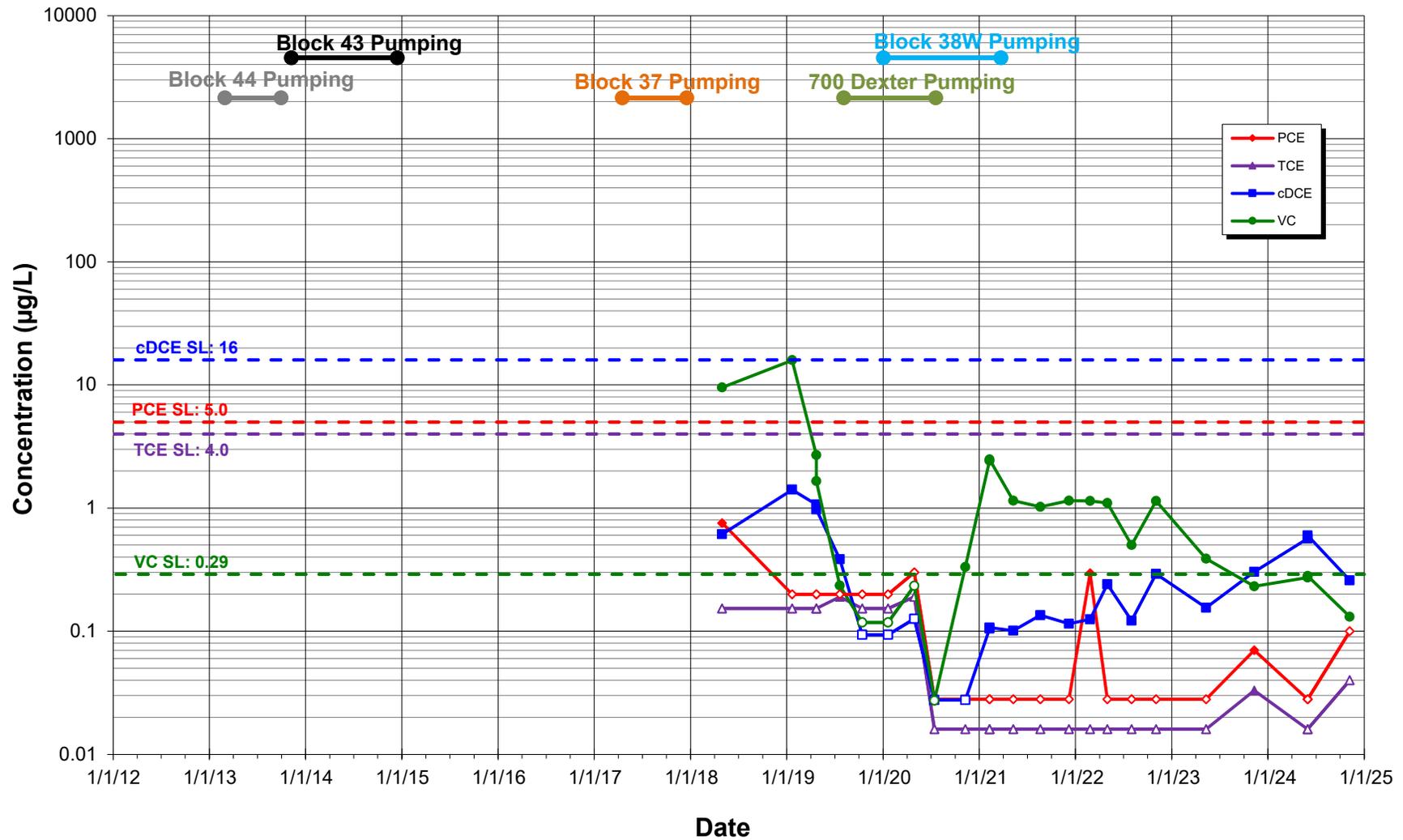
Concentration vs Time
MW-138 (-47.5 to -57.5 feet NAVD), Dexter Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

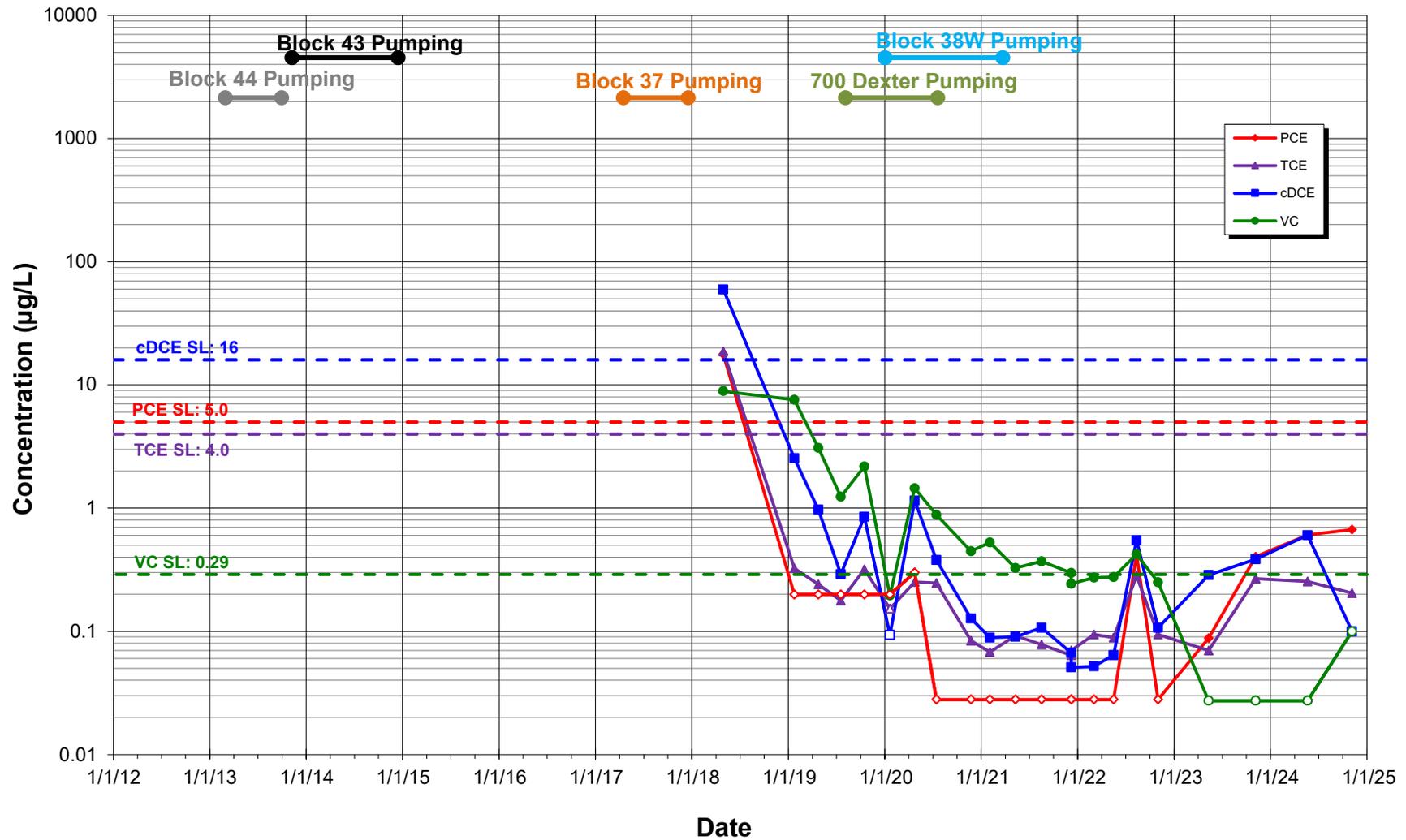
Concentration vs Time
MW-153 (-65.3 to -75.3 feet NAVD), Roy St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

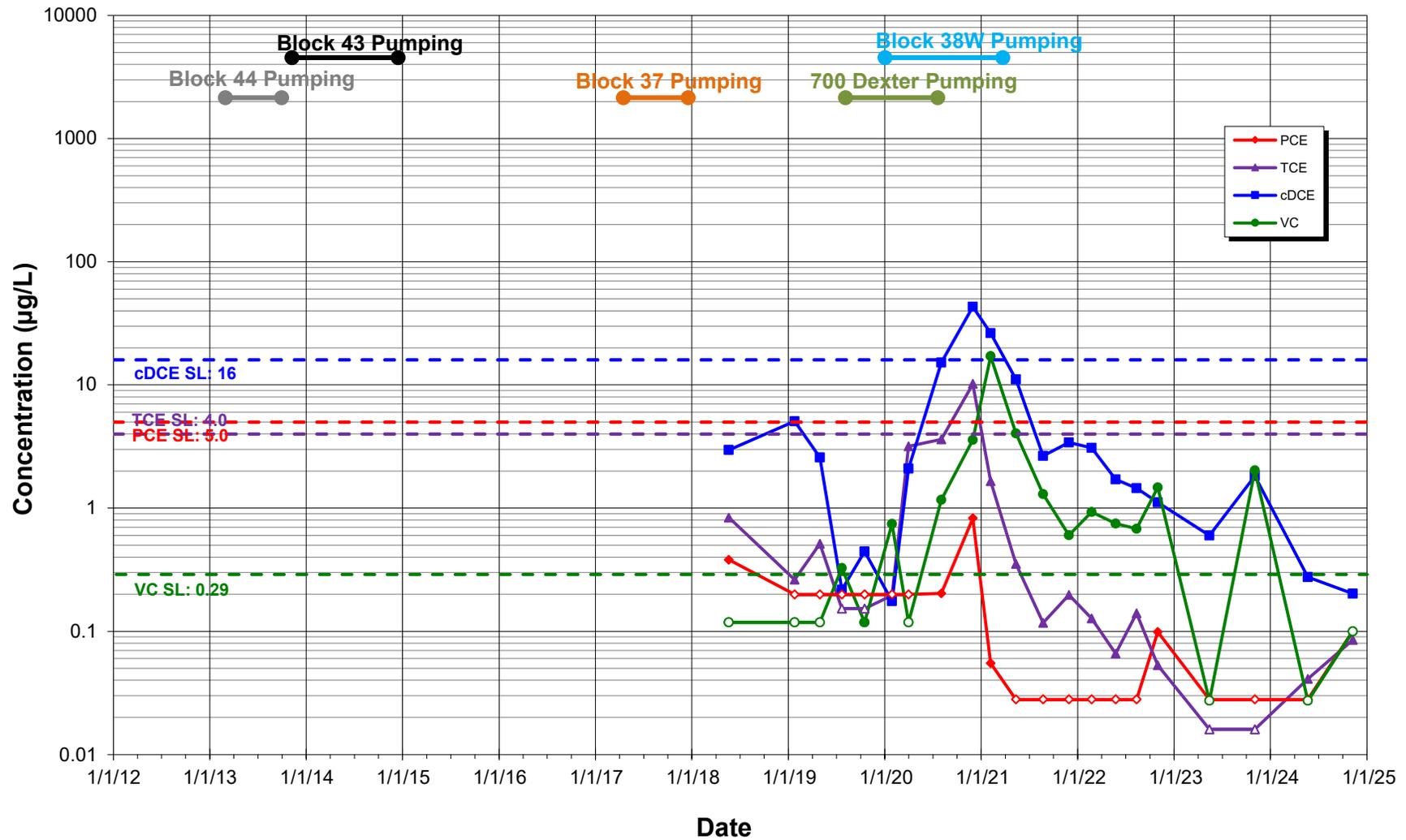
Concentration vs Time
MW-158A (-47.2 to -58.5 feet NAVD), 8th Ave N, ROW E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

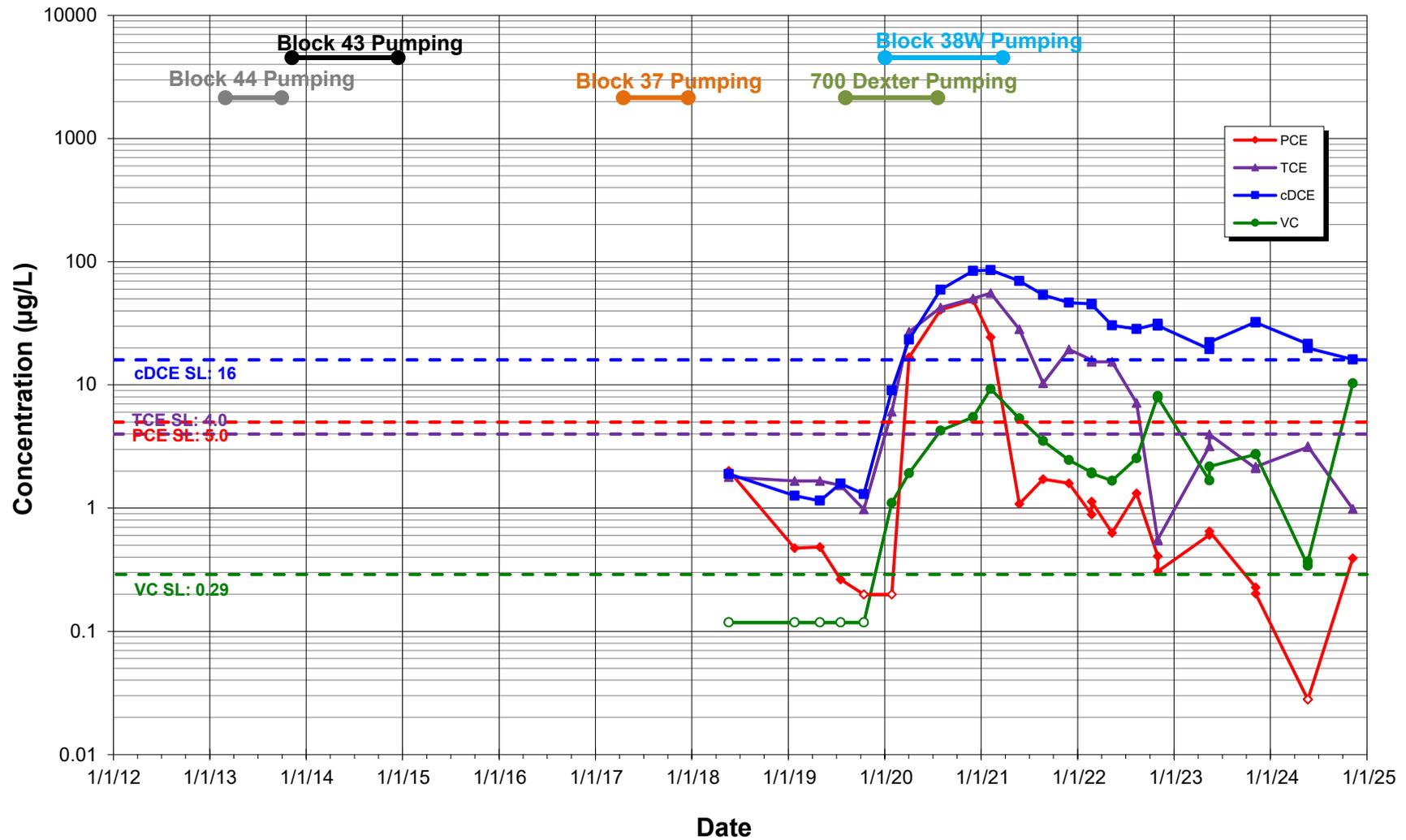
Concentration vs Time
MW-160 (-76.5 to -86.5 feet NAVD), 8th Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

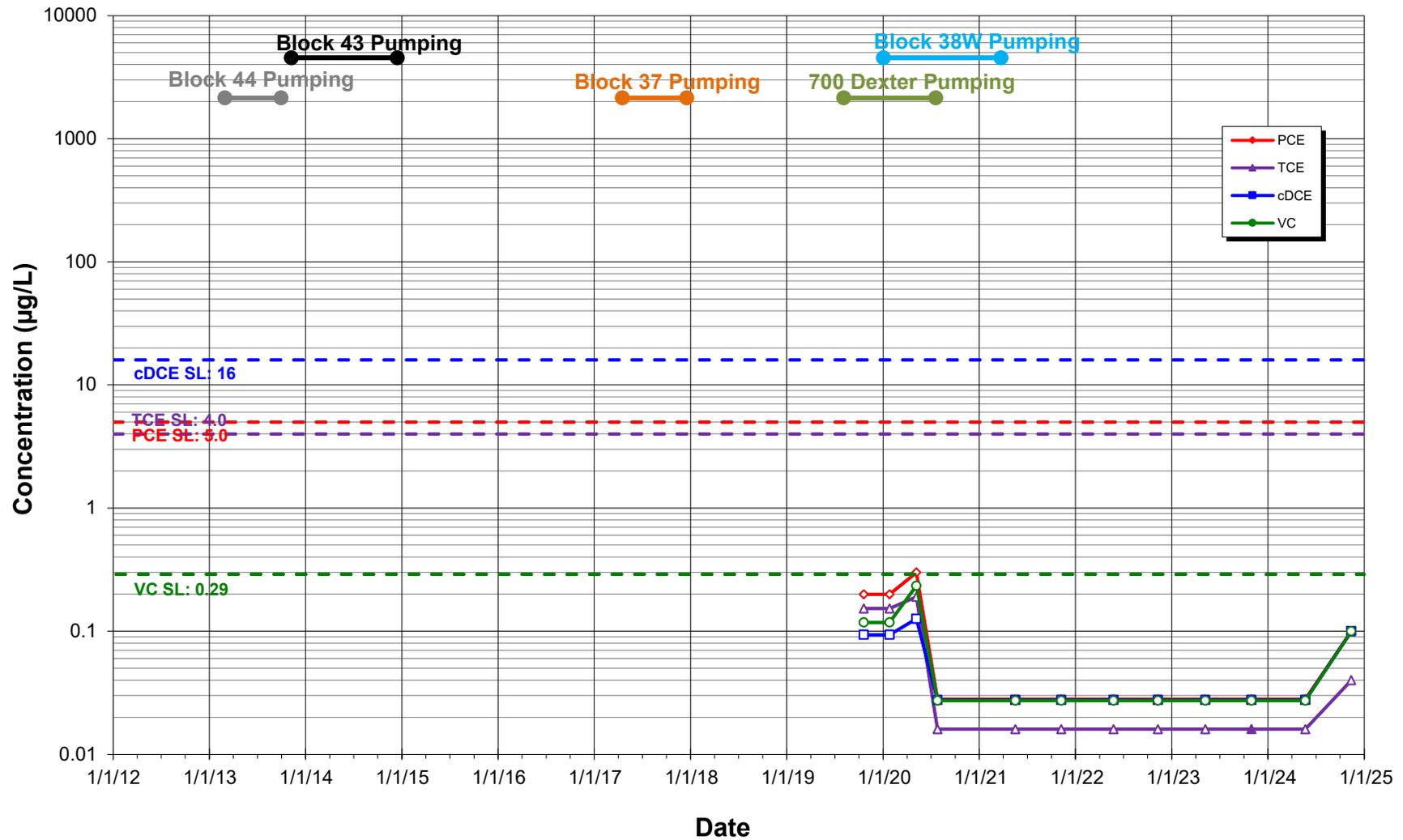
Concentration vs Time
MW-161 (-78.9 to -89.9 feet NAVD), 8th Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

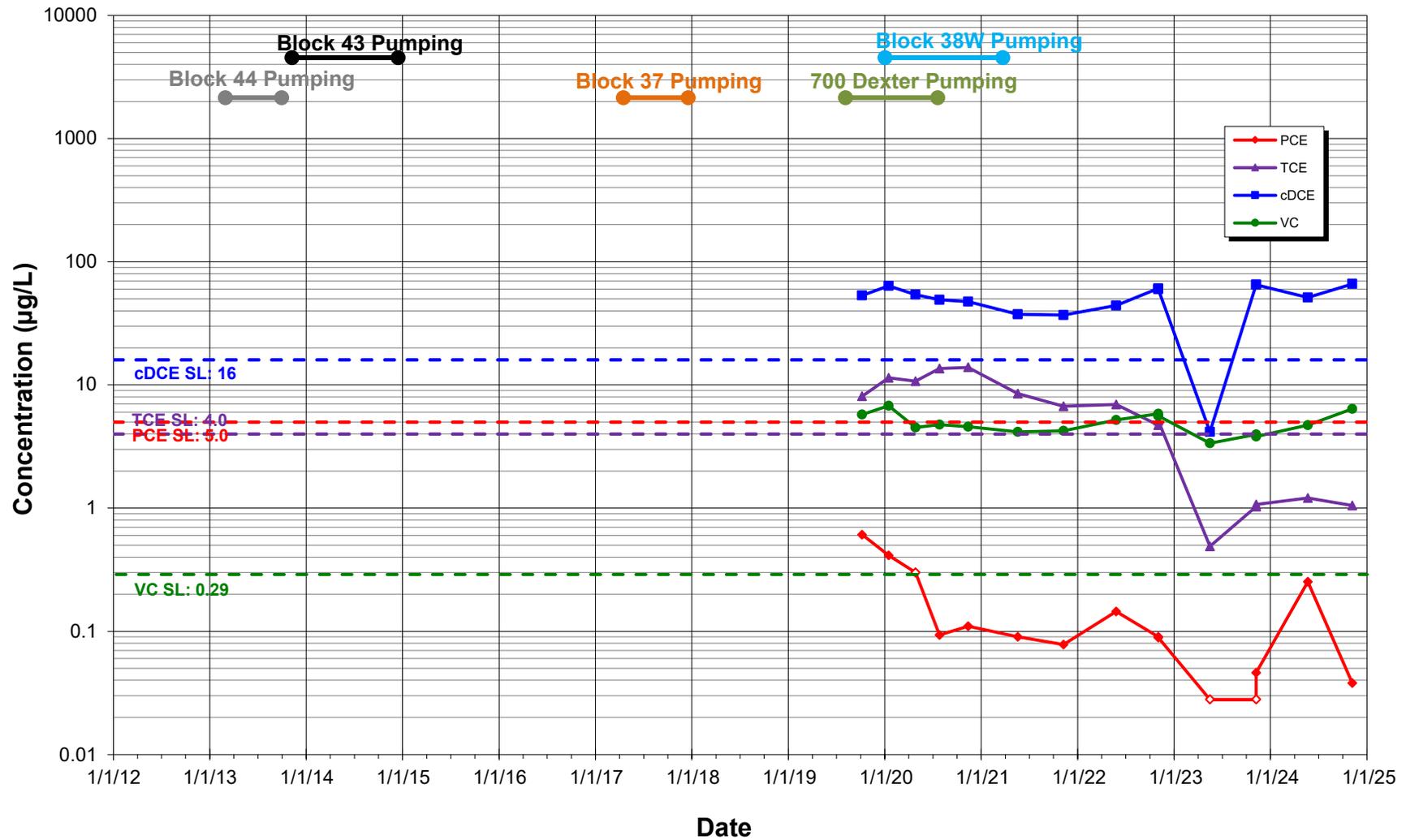
Concentration vs Time
MW-304 (-47.6 to -57.6 feet NAVD), Dexter Avenue N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

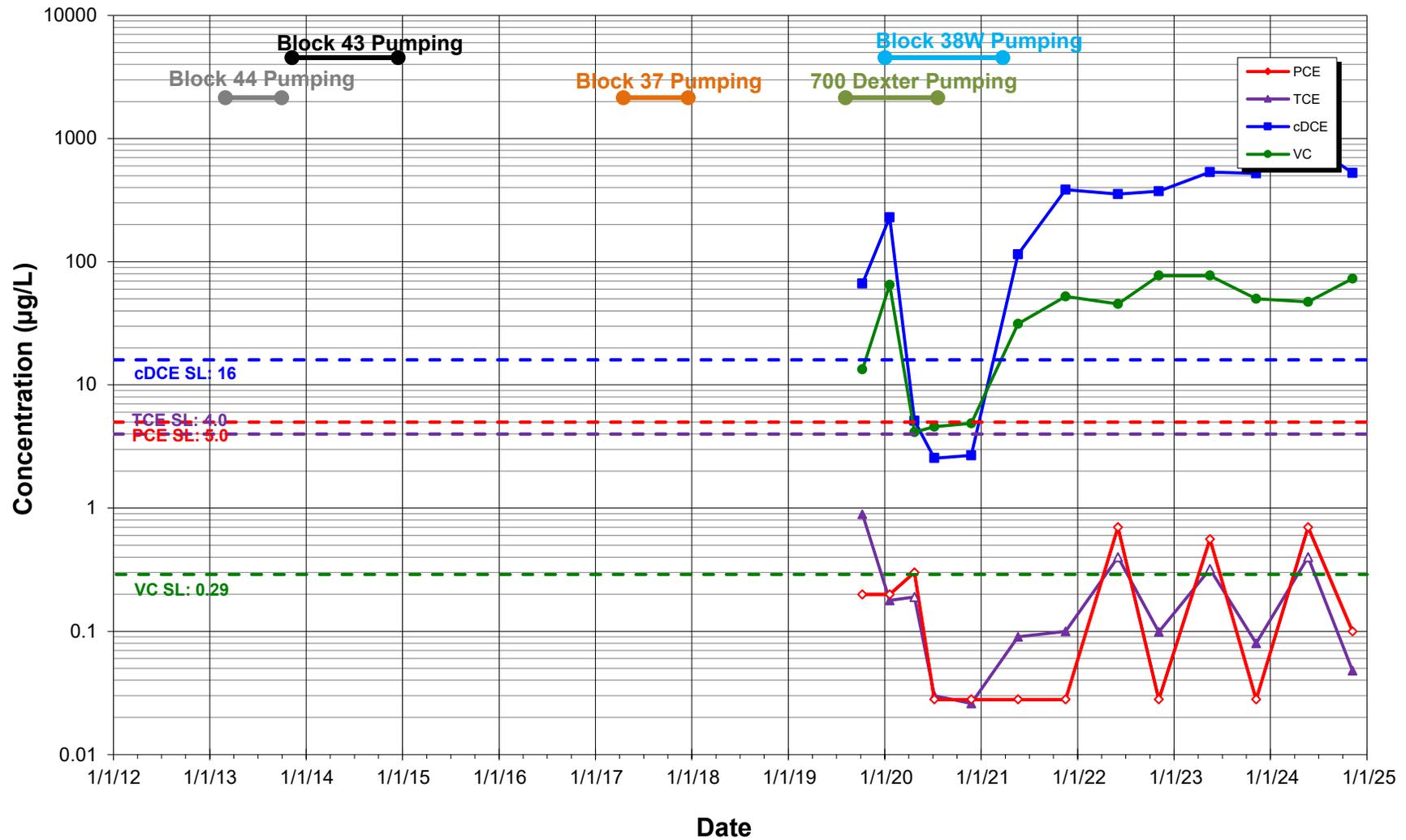
Concentration vs Time
MW-319 (-42.8 to -52.8 feet NAVD), 9th Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

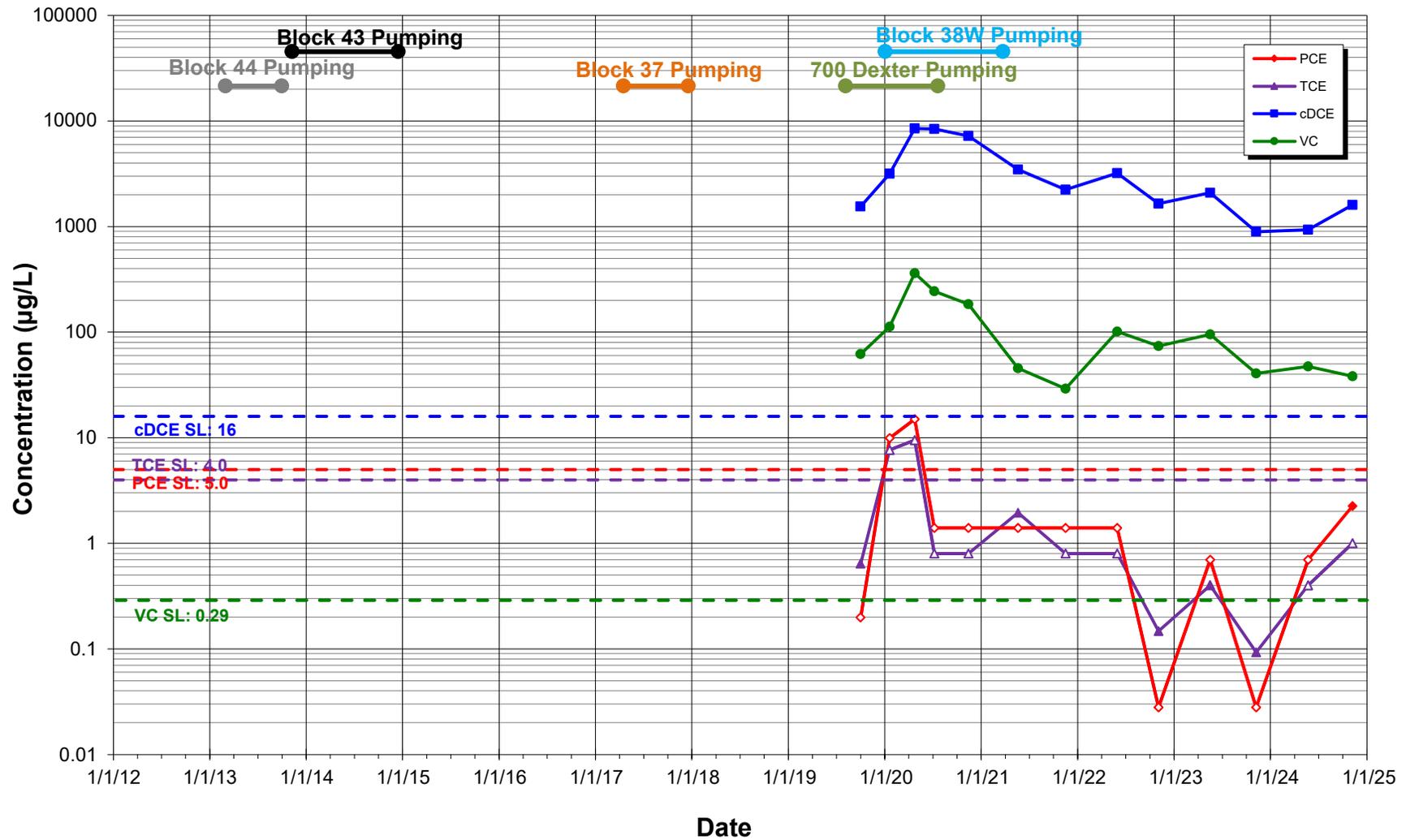
Concentration vs Time
MW-323 (-65.4 to -75.4 feet NAVD), 9th Ave N ROW, W side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

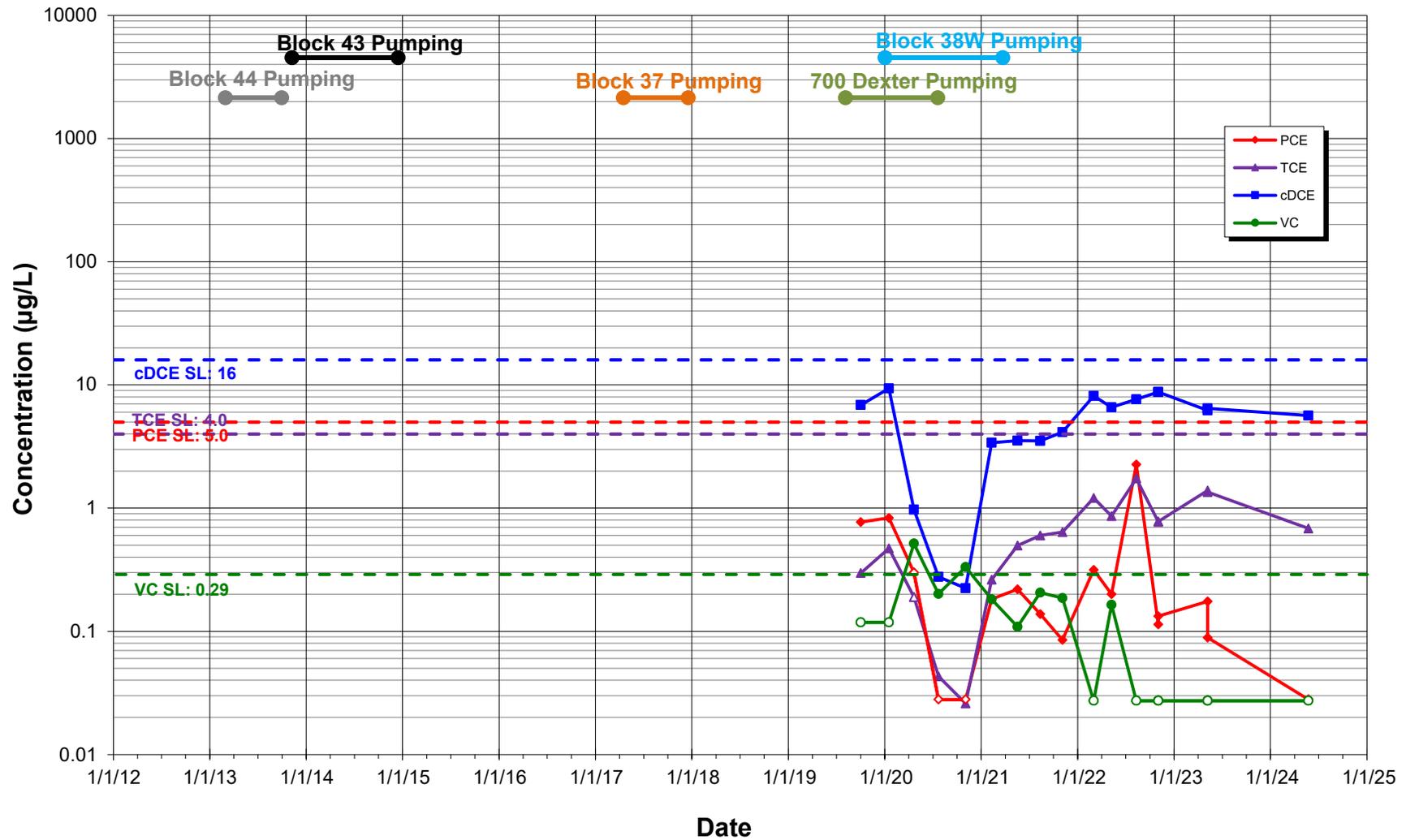
Concentration vs Time
MW-324 (-32.1 to -42.1 feet NAVD), Roy St ROW, N side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

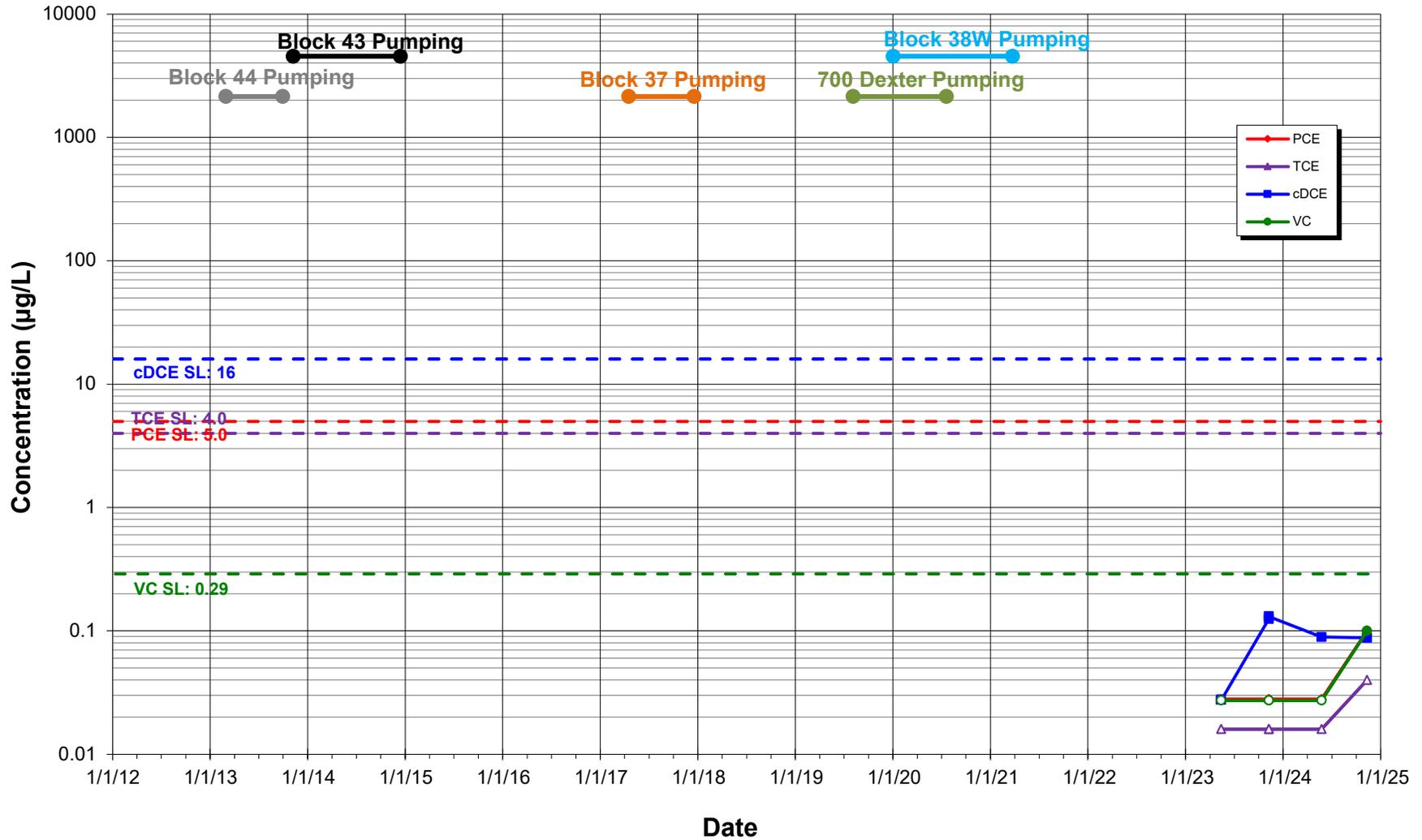
Concentration vs Time
MW-326 (-48.7 to -58.7 feet NAVD), Mercer St ROW, N side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

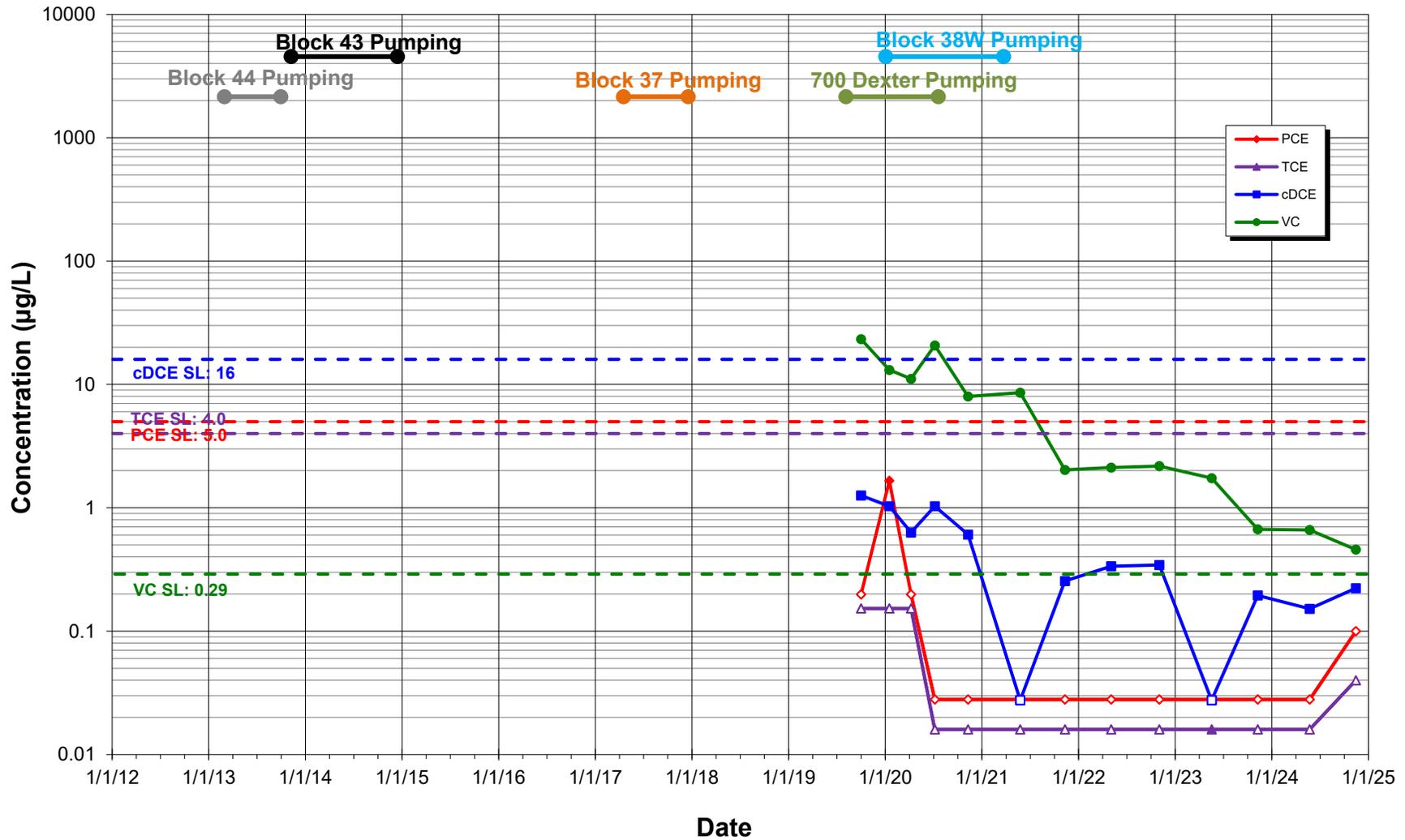
Concentration vs Time
MW-326R (-48.7 to -58.7 feet NAVD), Mercer St ROW, N side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

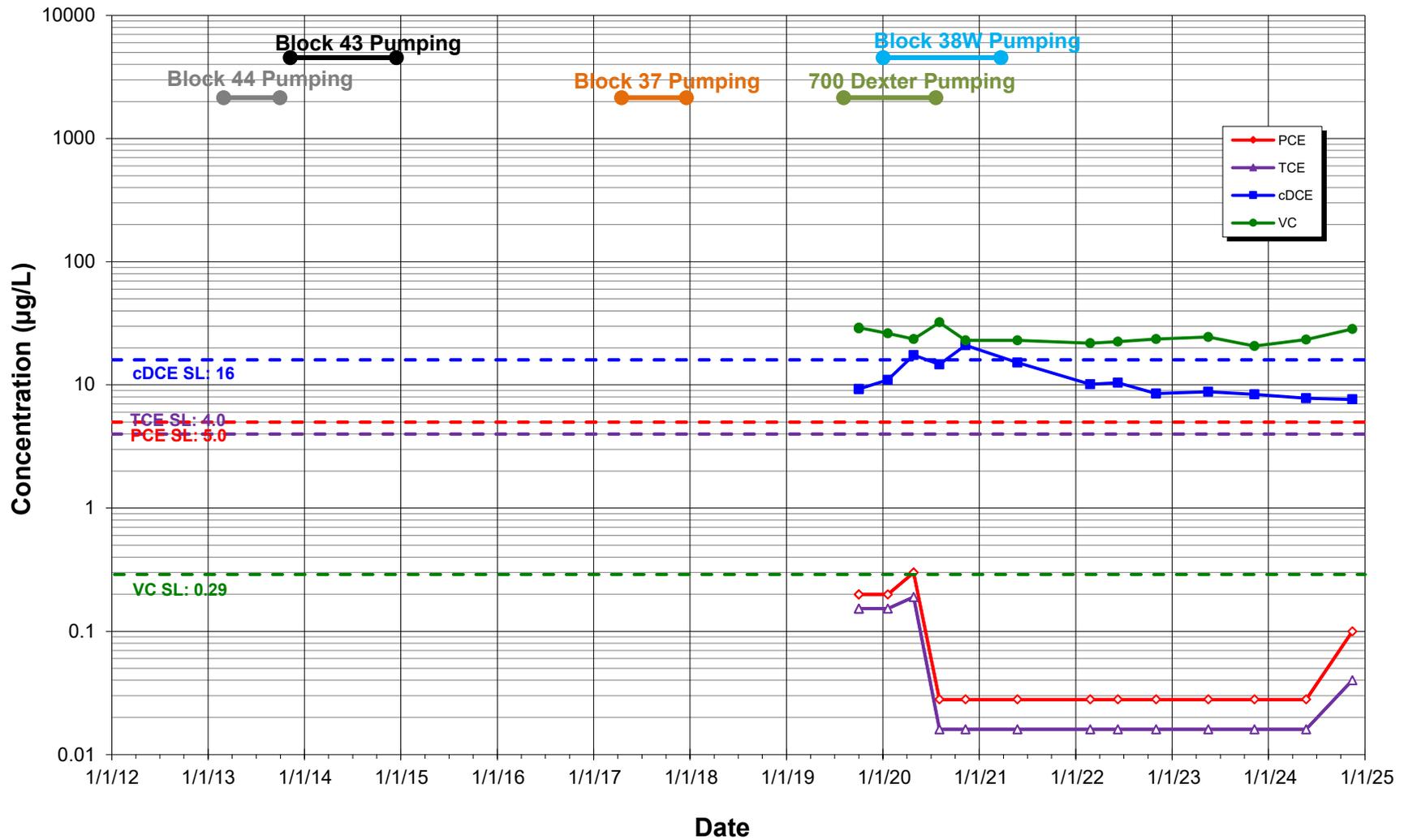
Concentration vs Time
MW-328 (-36.1 to -46.1 feet NAVD), Lake Union Park, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points.
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

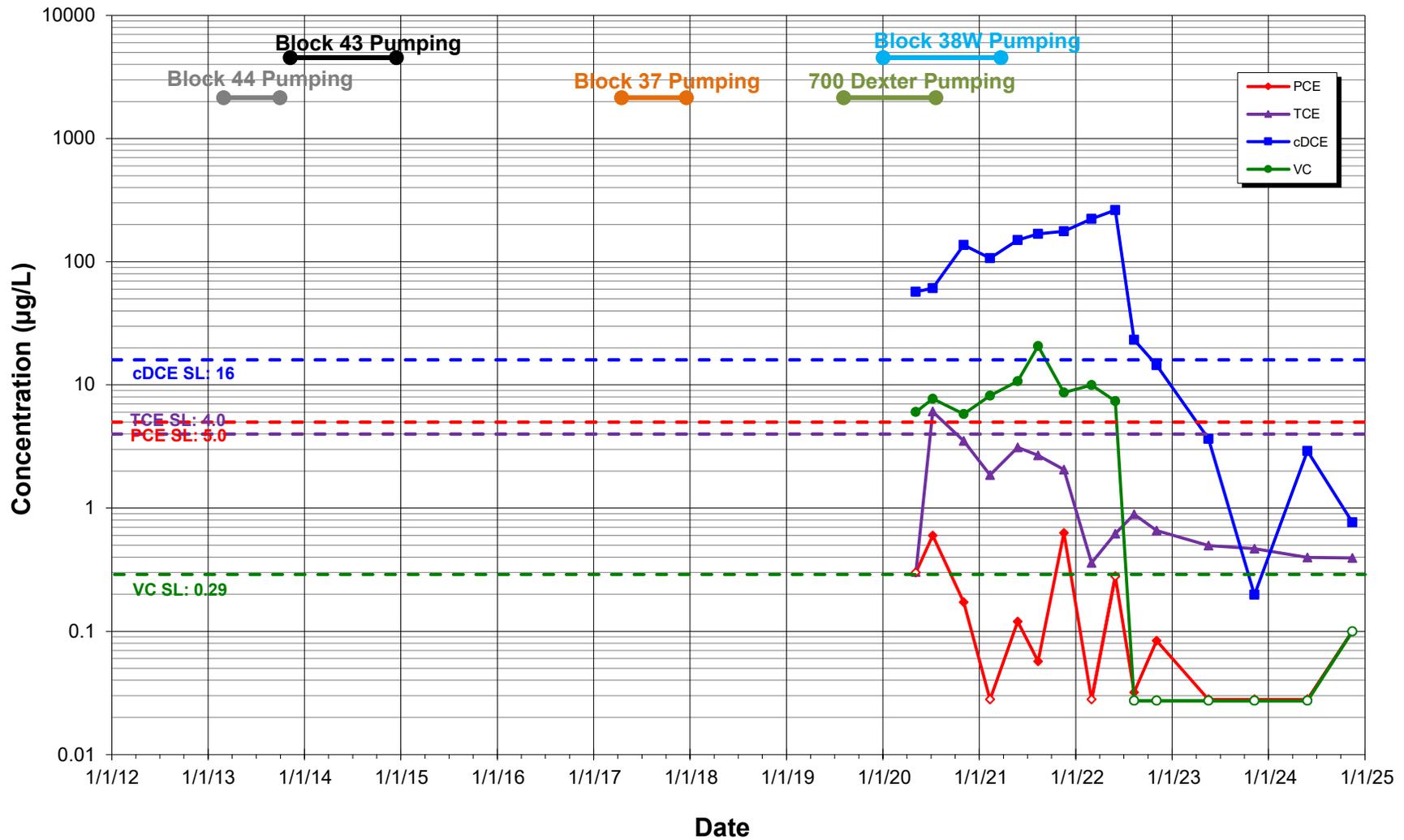
Concentration vs Time
MW-329 (-69.0 to -79.0 feet NAVD), Westlake Ave N ROW, E side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

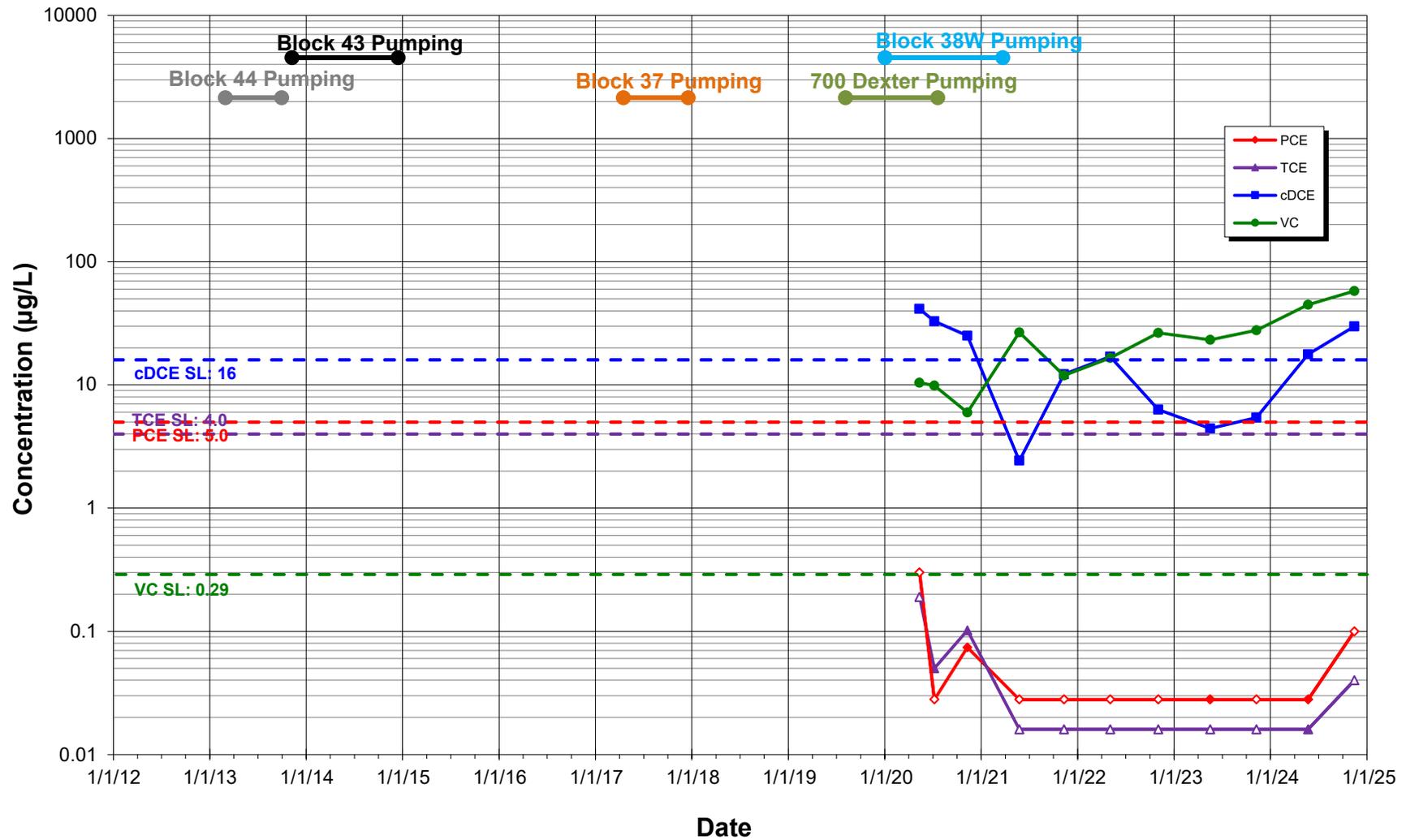
Concentration vs Time
MW-336 (-51.6 to -61.6 feet NAVD), Mercer St ROW, N side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

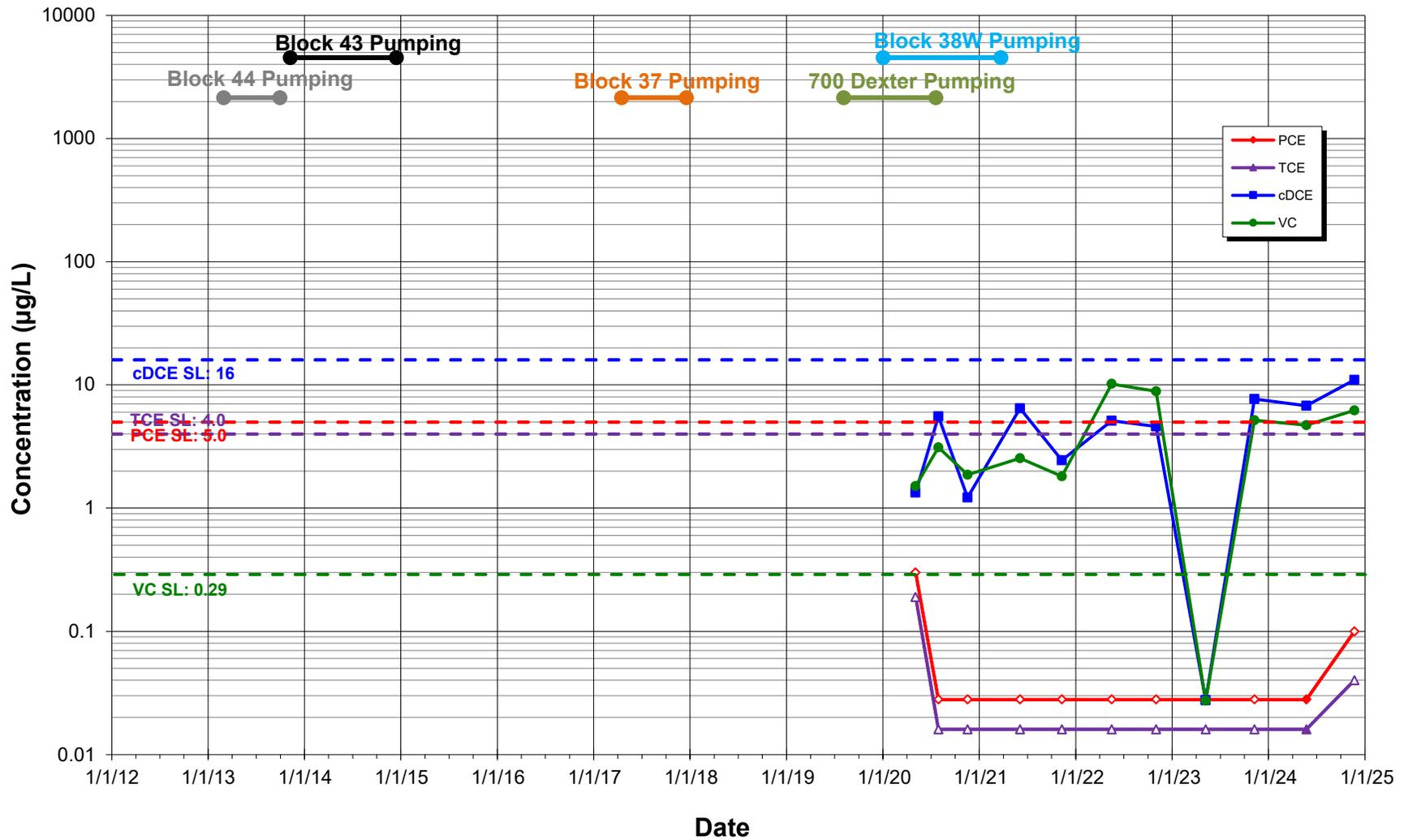
Concentration vs Time
MW-341 (-66.8 to -76.8 feet NAVD), Lake Union Park, S end
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

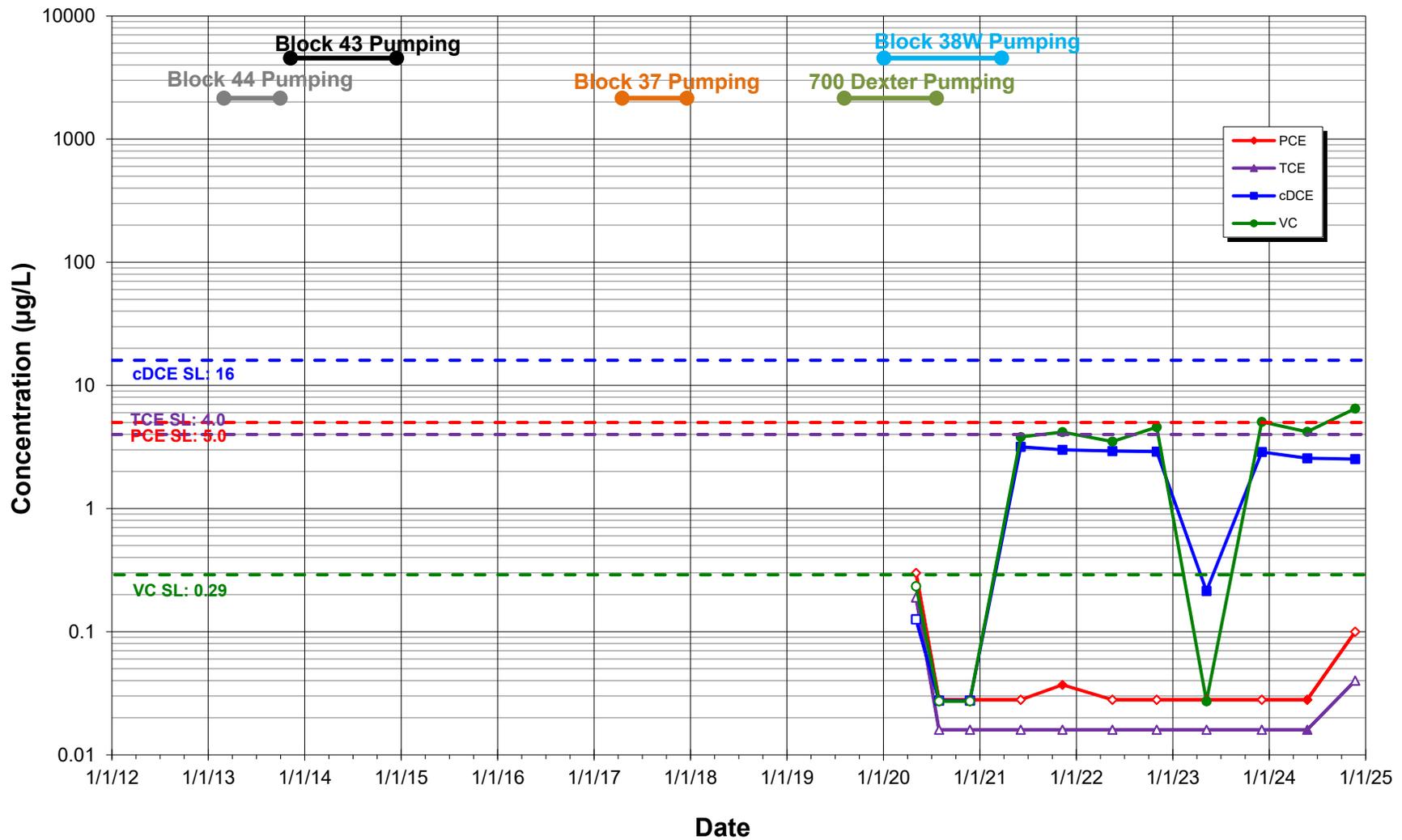
Concentration vs Time
MW-342 (-32.4 to -42.4 feet NAVD), Valley St ROW, S side
American Linen Supply Co Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

Concentration vs Time
MW-343 (-71.5 to -81.5 feet NAVD), Valley St ROW, S side
American Linen Supply Co Dexter Ave Site



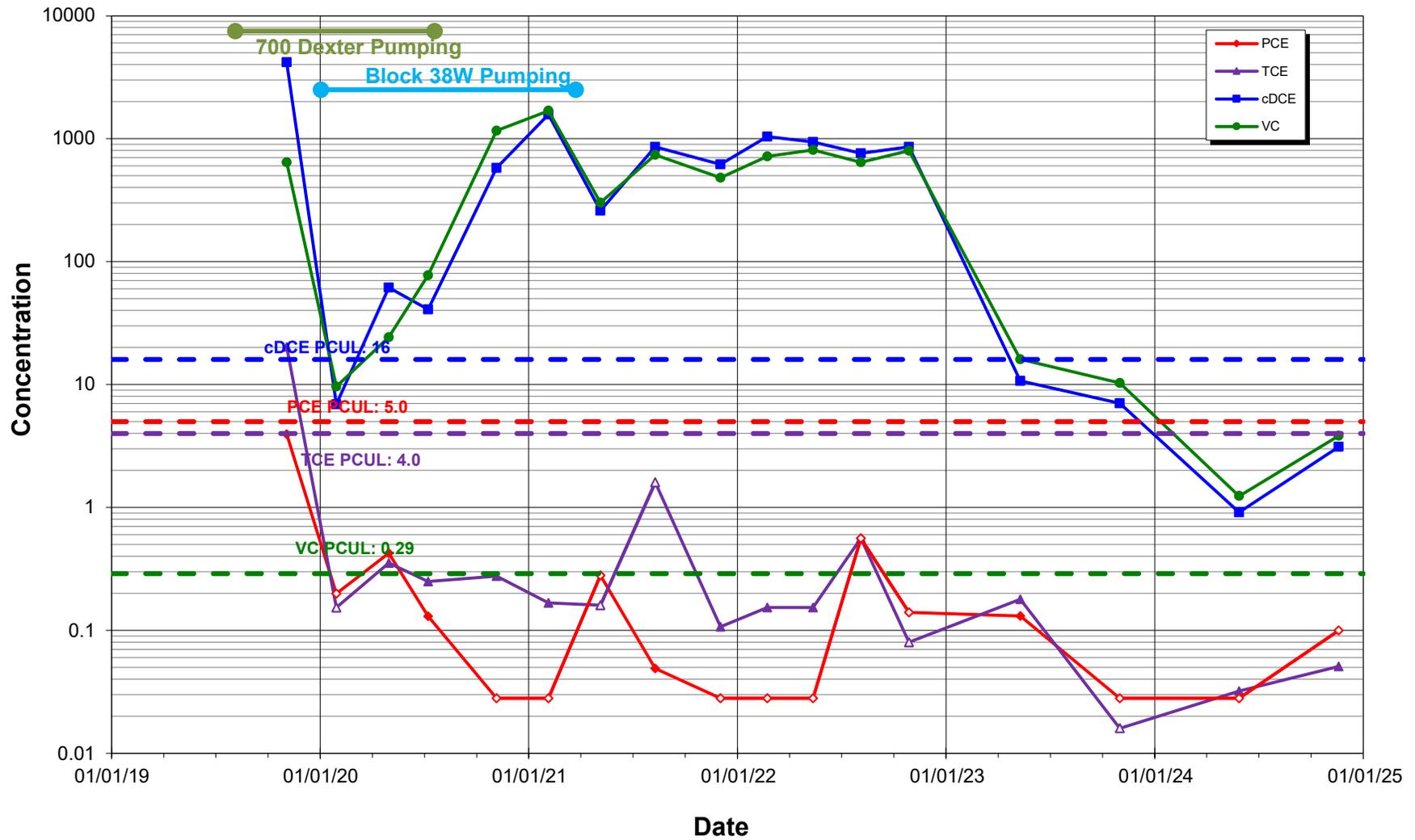
Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points.
- 2) Preliminary Screening Levels: PCE = 5.0 µg/L, TCE = 4.0 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

CVOC Trend Plots

Property

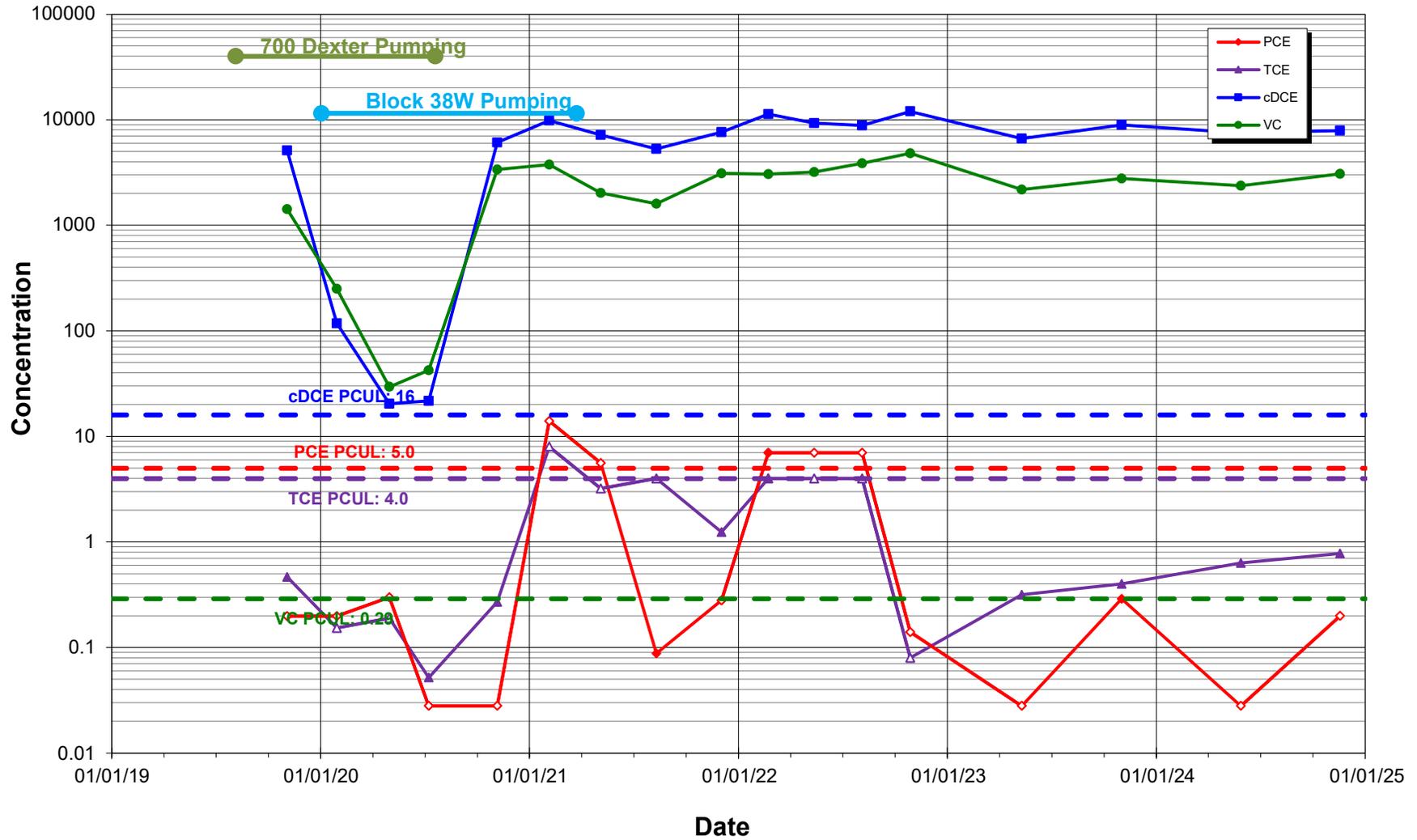
Concentration vs Time
MW-165 (1.3 to -8.8 feet NAVD), Cluster 1, Treatment Zone A
American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

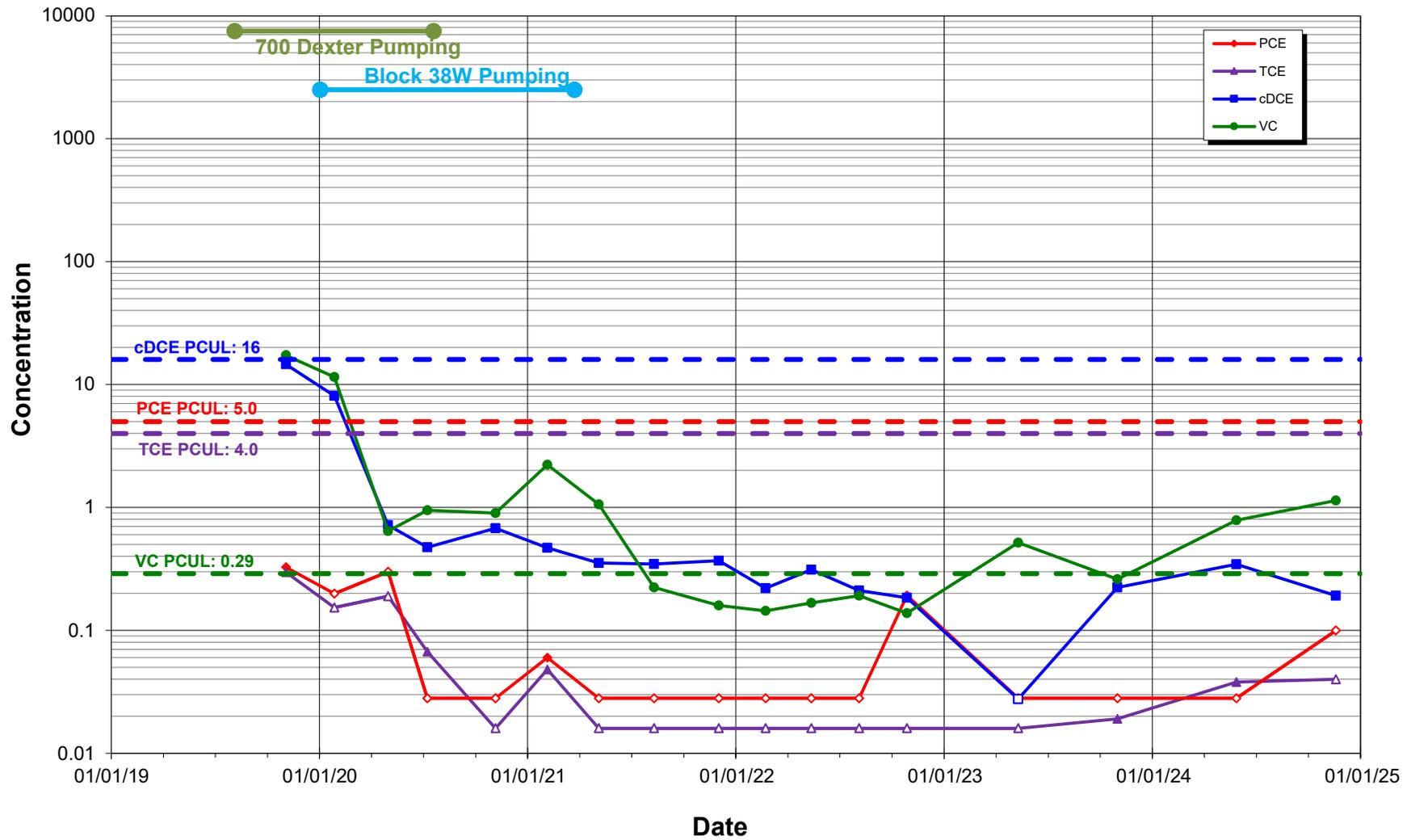
Concentration vs Time
MW-166 (-12.6 to -22.6 feet NAVD), Cluster 1, Treatment Zone B
American Linen Supply Co-Dexter Ave Site



Notes:

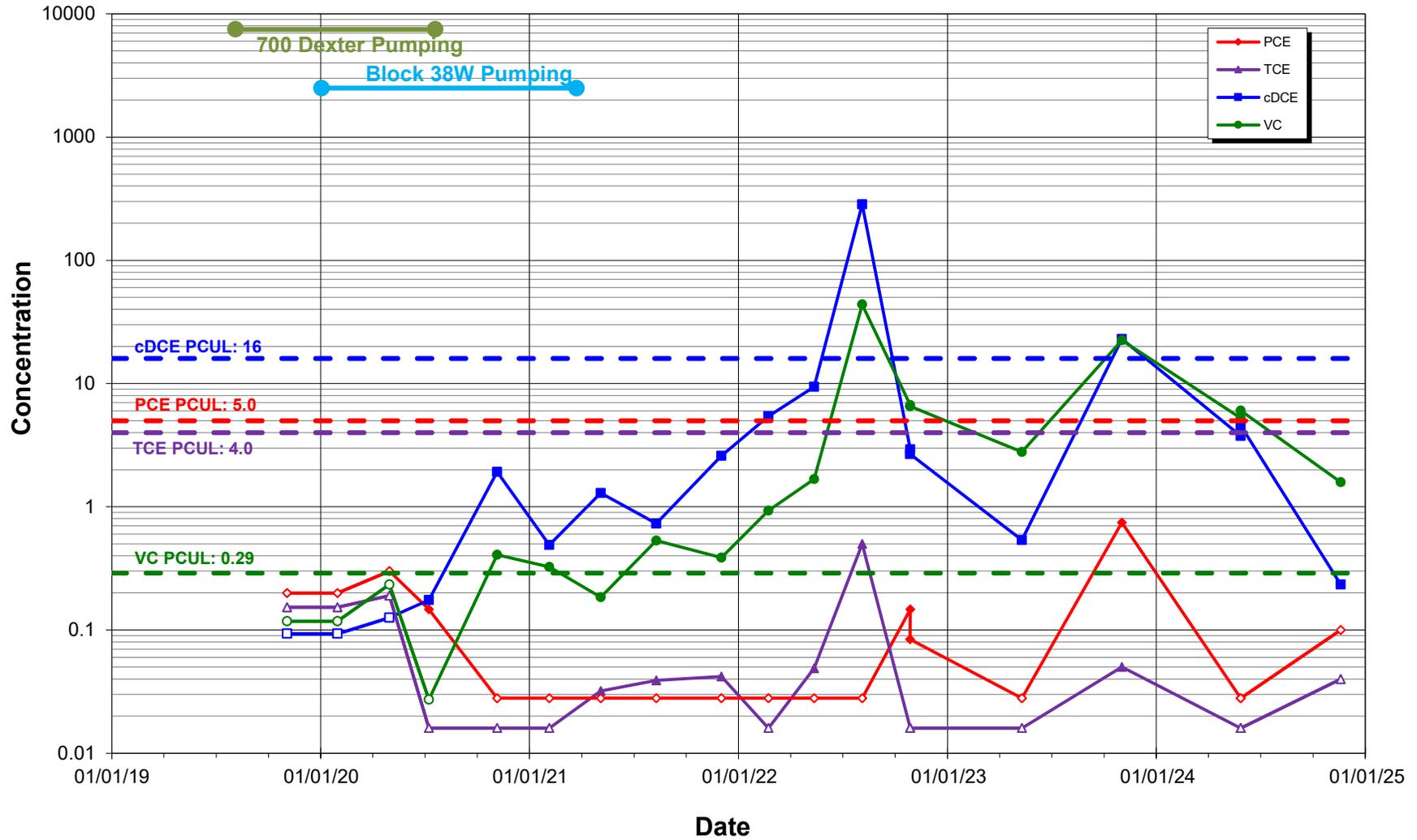
- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

Concentration vs Time
MW-167 (-27.9 to -37.9 feet NAVD), Cluster 1, Treatment Zone C
American Linen Supply Co-Dexter Ave Site



Notes:
 1) All results detected below the laboratory MDLs are shown as hollow data points .
 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

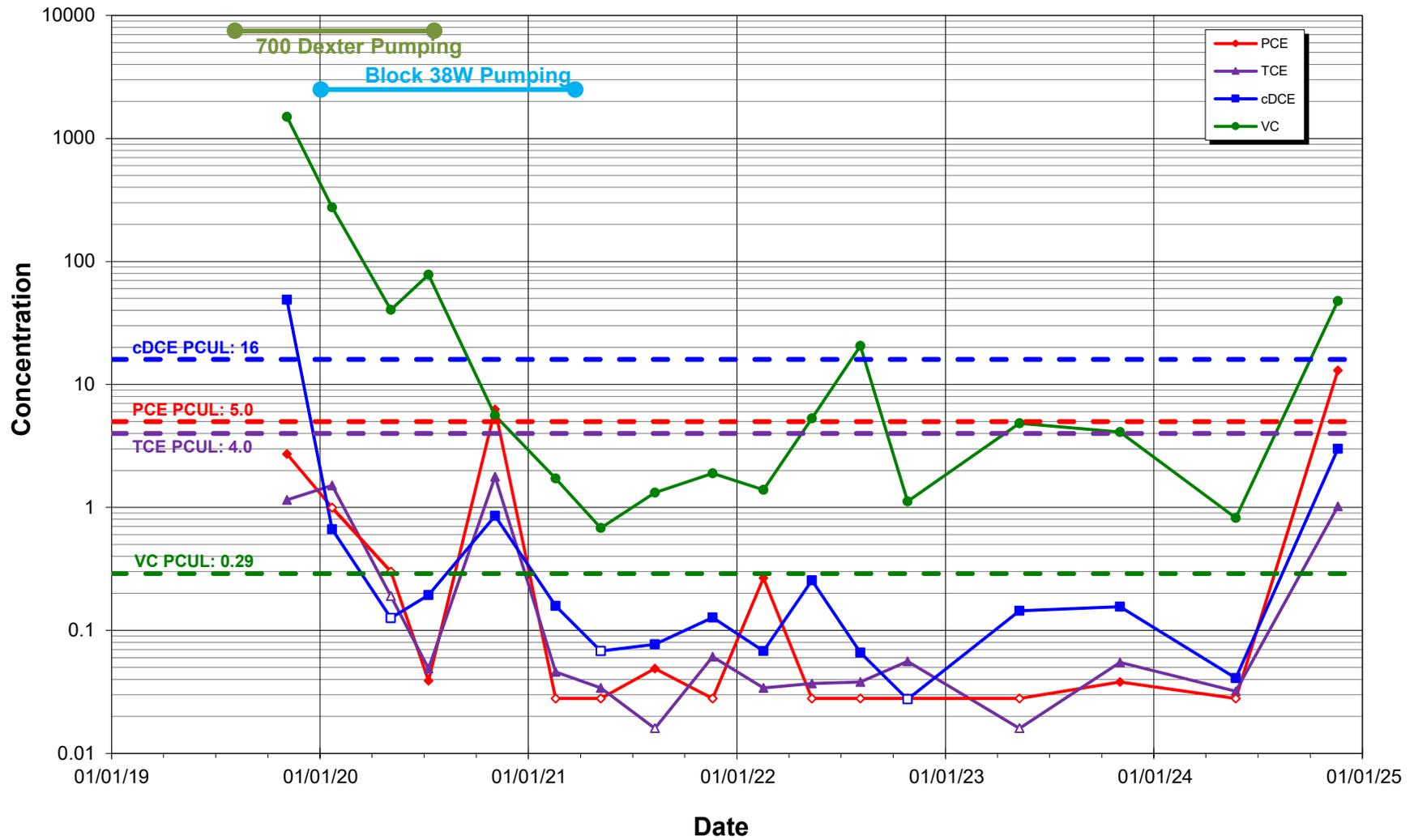
Concentration vs Time
MW-168 (-43 to -53 feet NAVD), Cluster 1, Treatment Zone D
American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

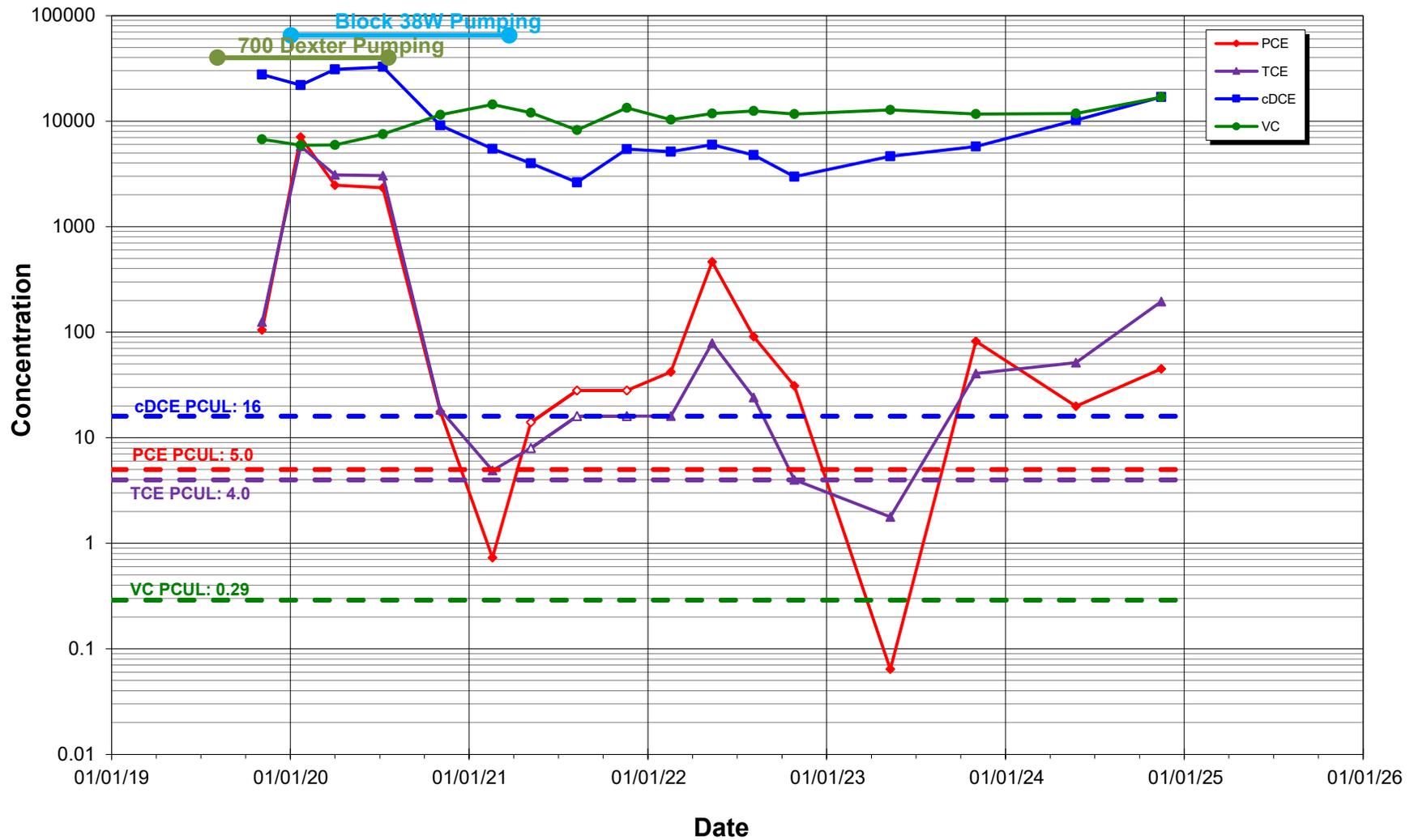
Concentration vs Time
MW-169 (1.2 to -8.8 feet NAVD), Cluster 2, Treatment Zone A
American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

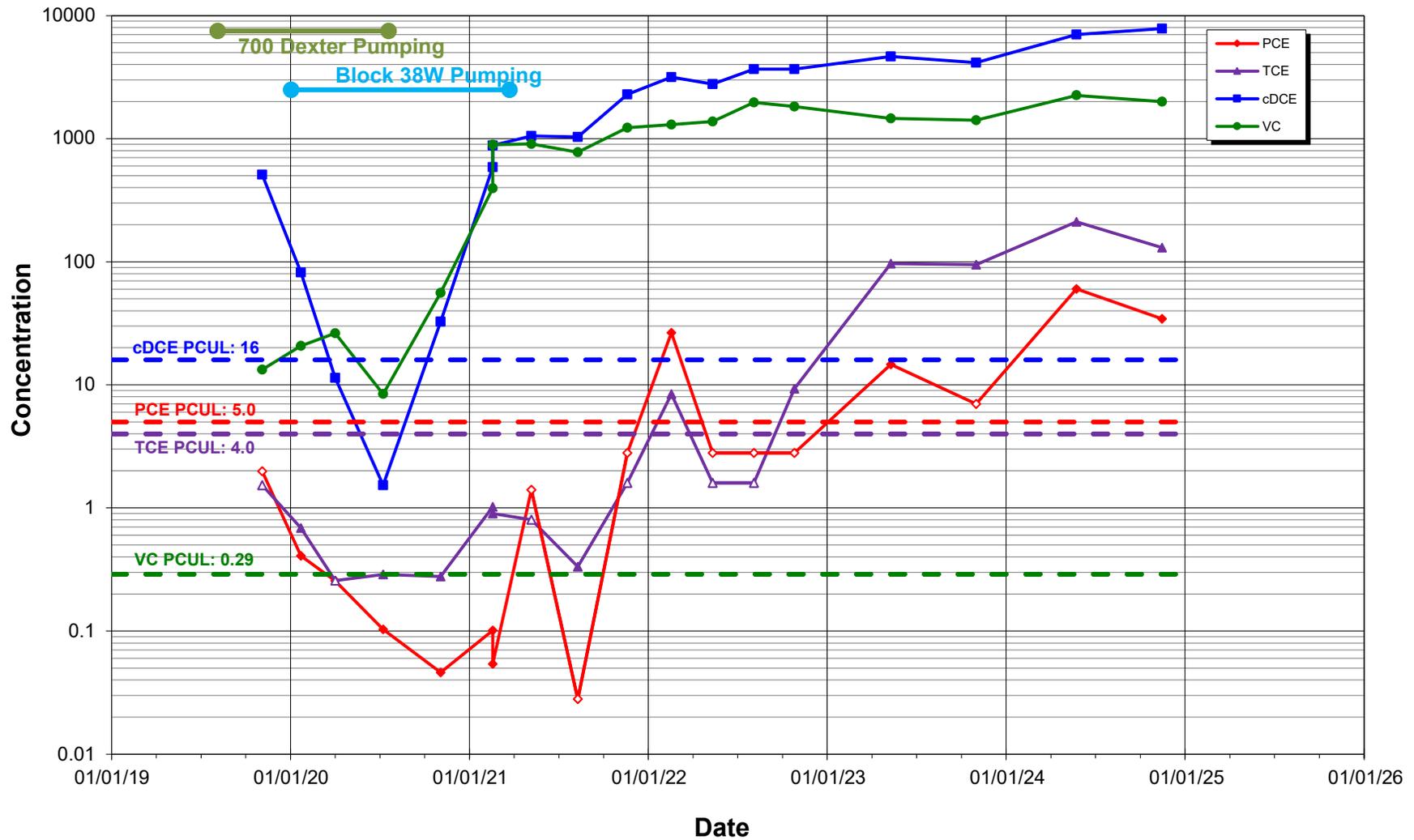
Concentration vs Time
MW-170 (-12.8 to -22.8 feet NAVD), Cluster 2, Treatment Zone B
American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

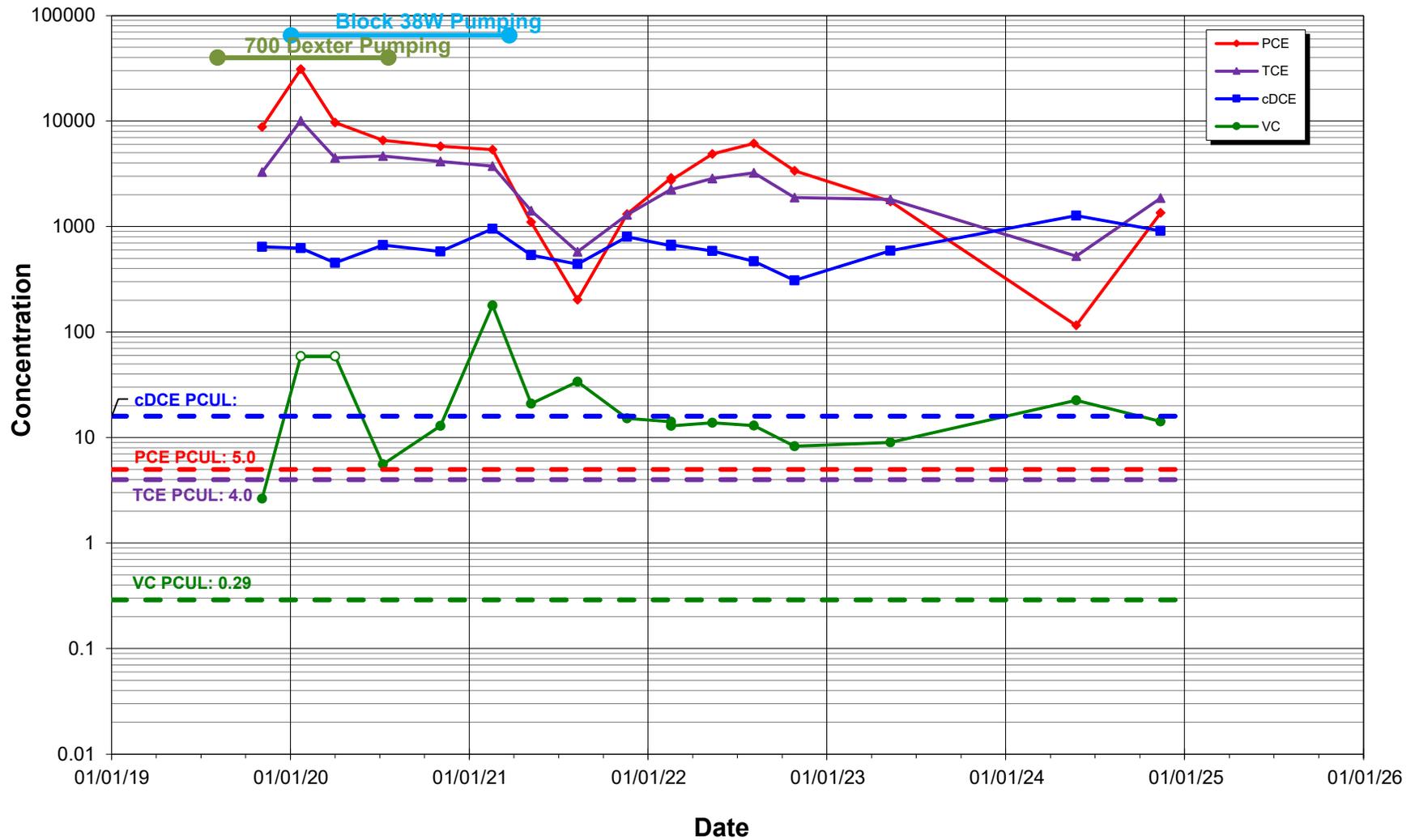
Concentration vs Time MW-171 (-27.6 to -37.6 feet NAVD), Cluster 2, Treatment Zone C American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

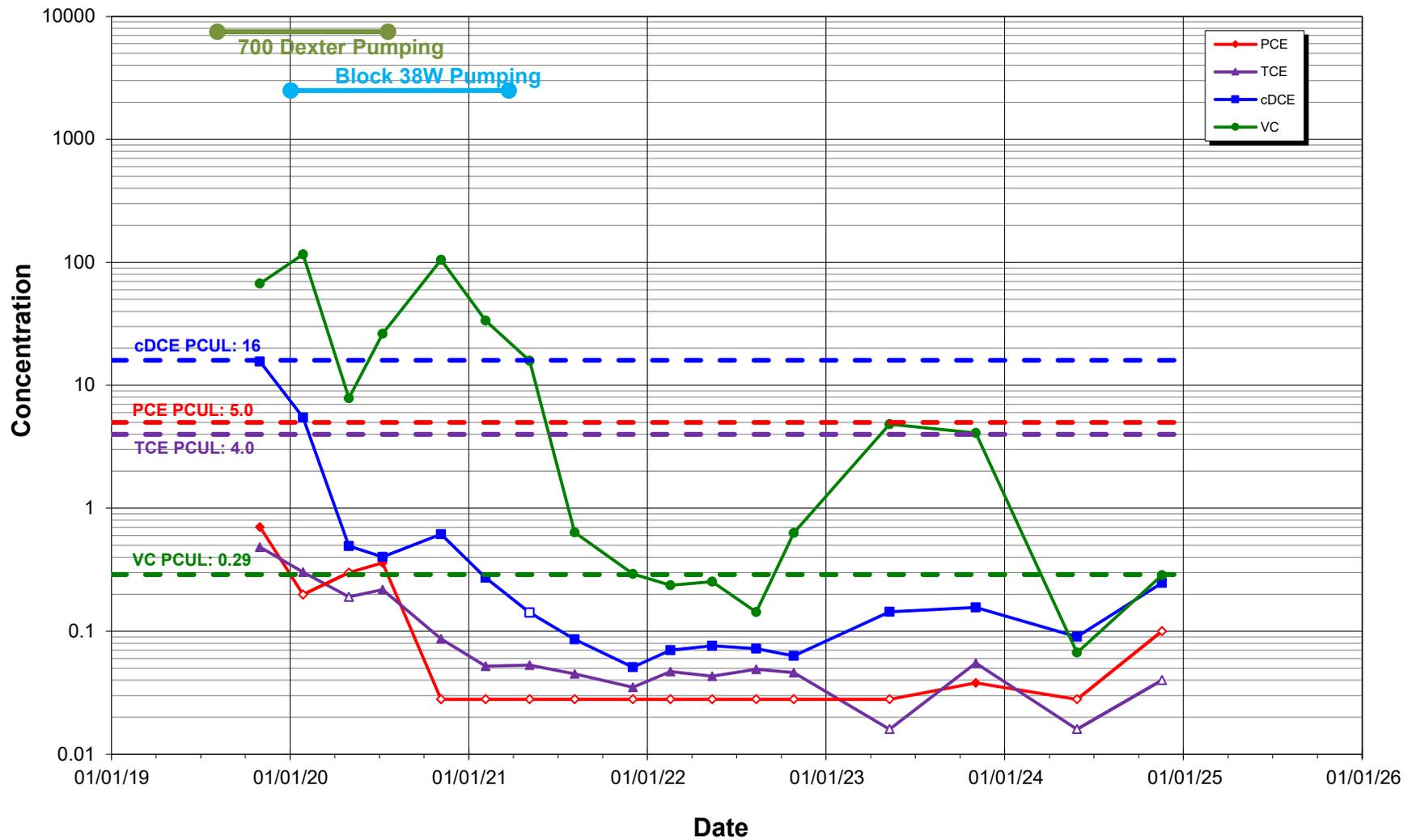
Concentration vs Time
MW-172 (-42.5 to -52.5 feet NAVD), Cluster 2, Treatment Zone D
American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

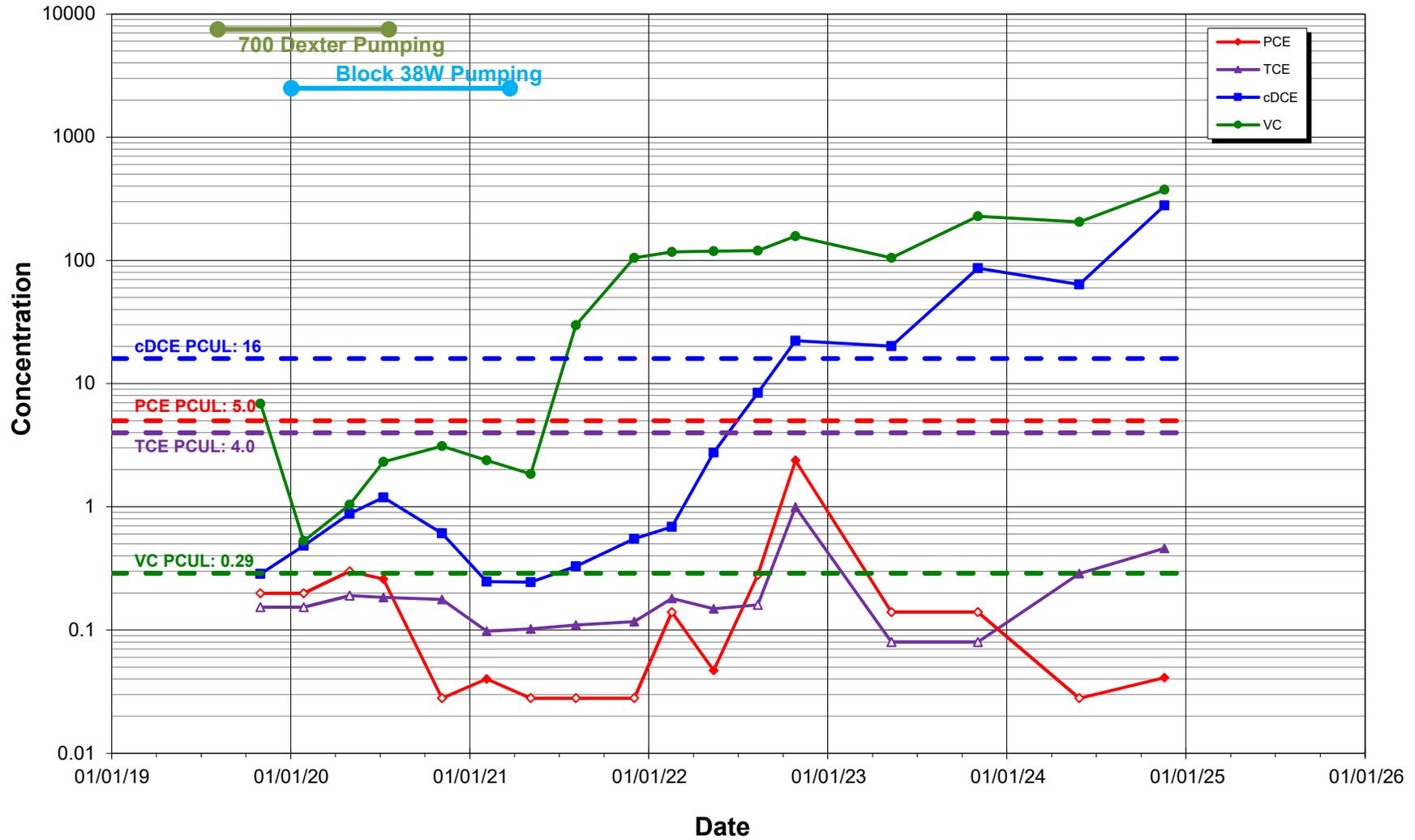
Concentration vs Time MW-173 (2.2 to -7.8 feet NAVD), Cluster 3, Treatment Zone A American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

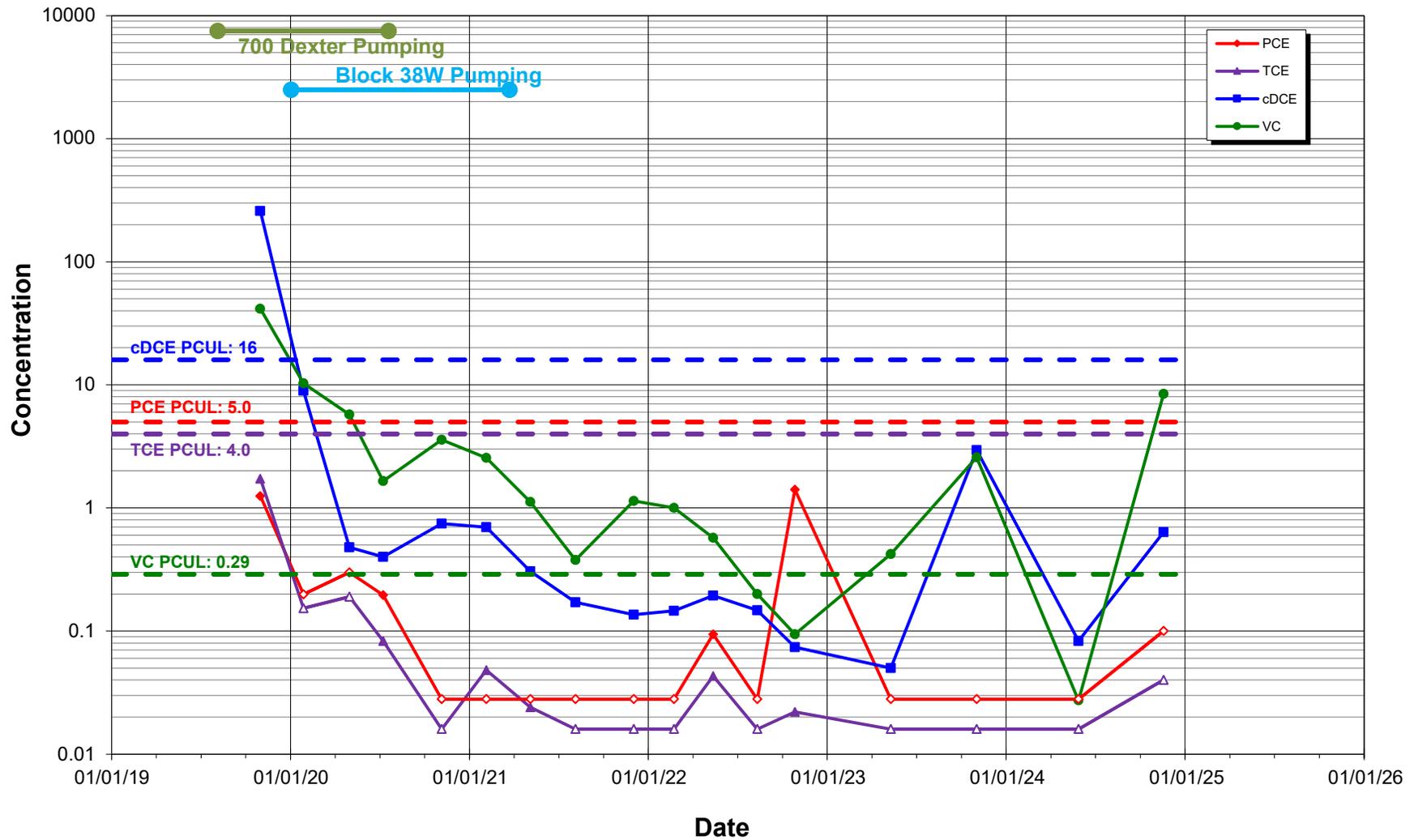
Concentration vs Time
MW-174 (-12.3 to -22.3 feet NAVD), Cluster 3, Treatment Zone B
American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cealnp Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

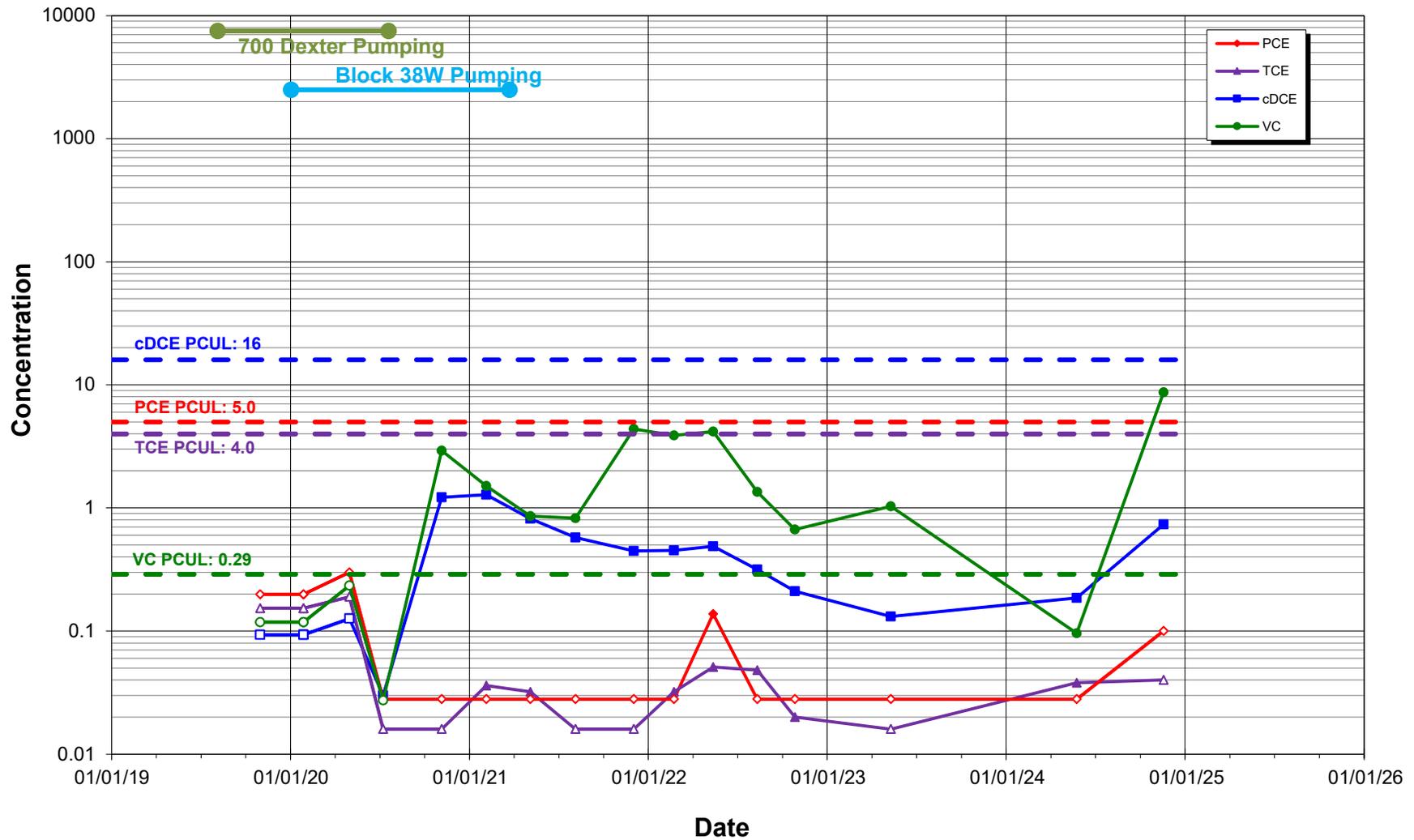
Concentration vs Time MW-175 (-27.8 to -37.8 feet NAVD), Cluster 3, Treatment Zone C American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

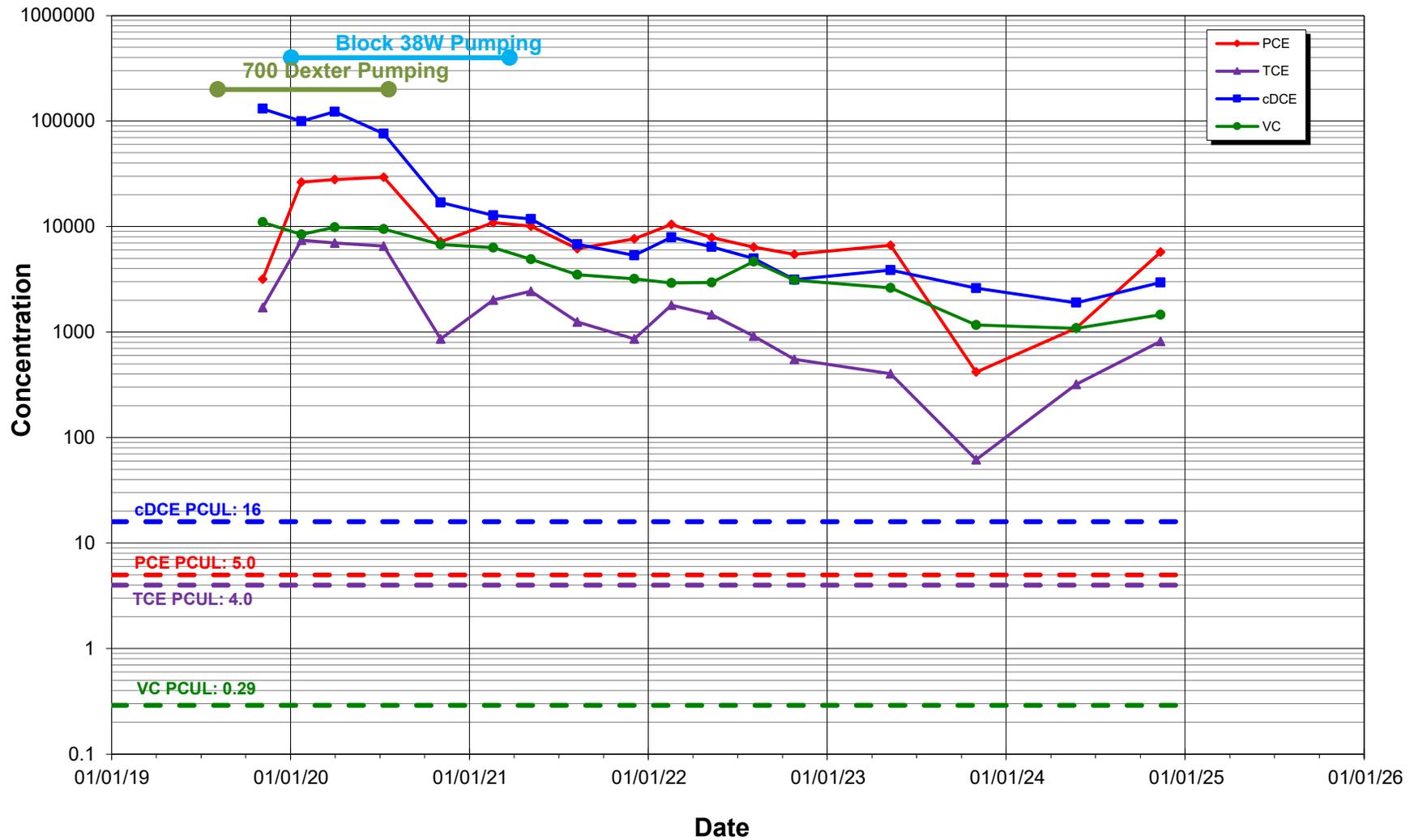
Concentration vs Time
MW-176 (-42.7 to -52.7 feet NAVD), Cluster 3, Treatment Zone D
American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

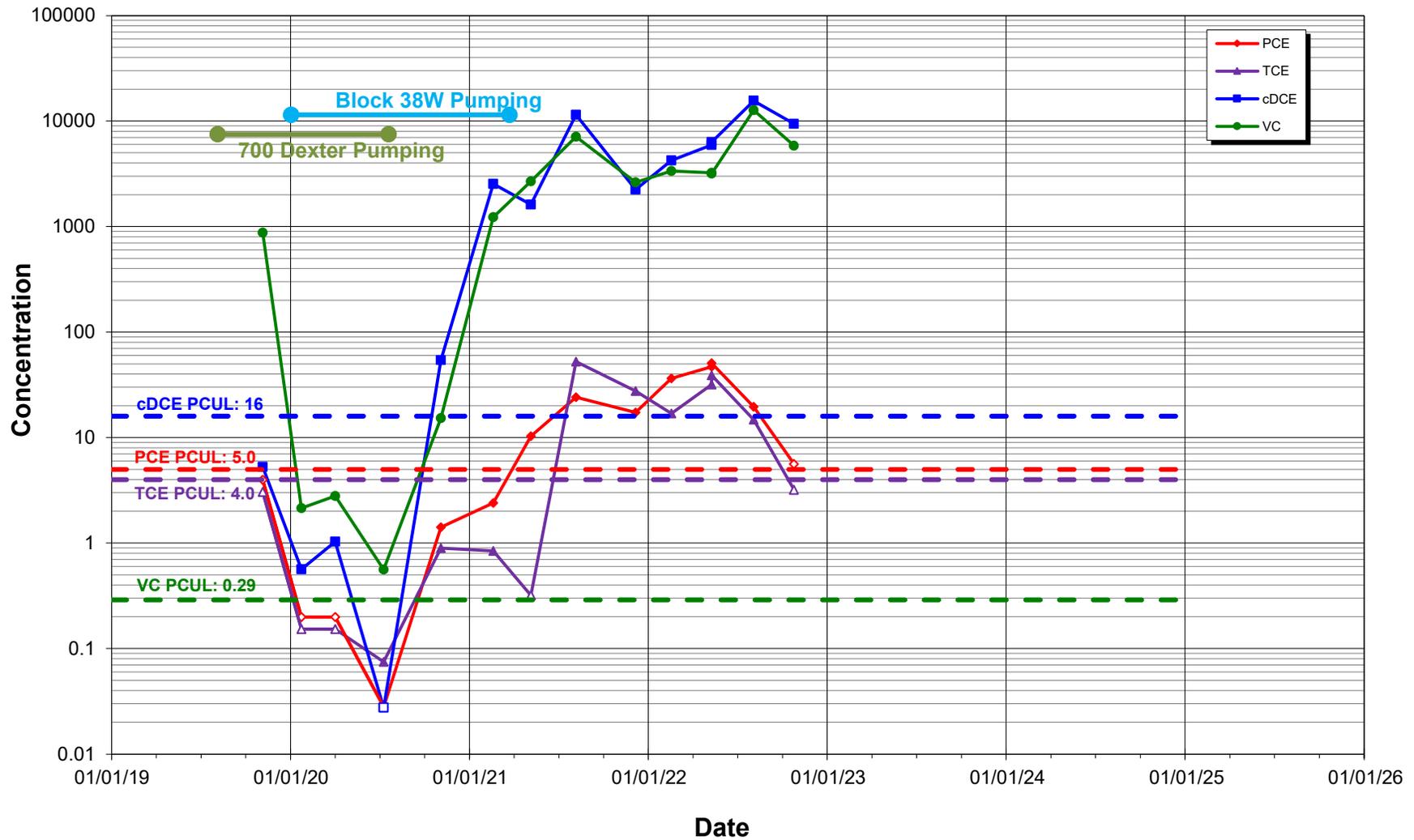
Concentration vs Time MW-177 (2.3 to -7.7 feet NAVD), Cluster 4, Treatment Zone A American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

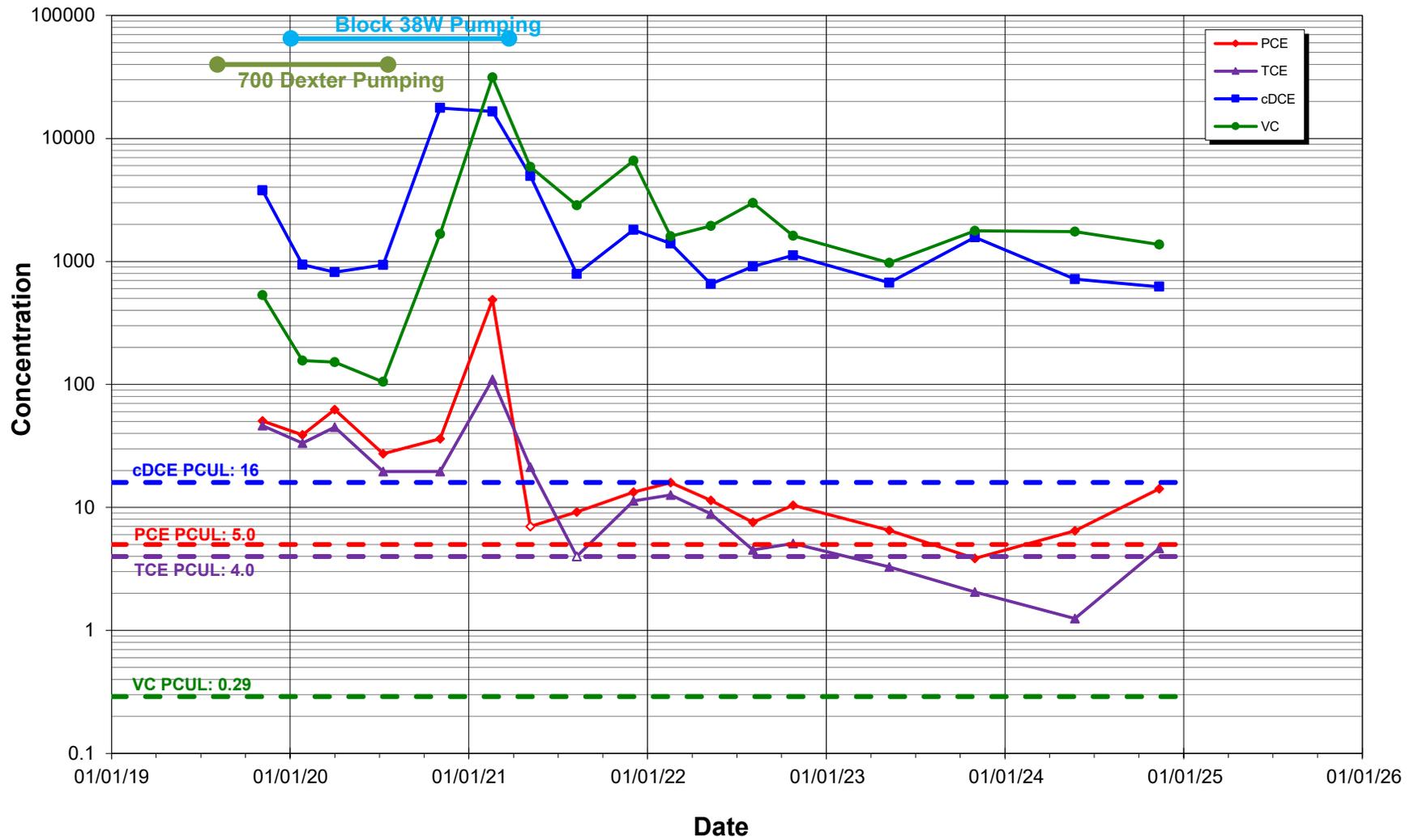
Concentration vs Time
MW-178 (-11.7 to -21.7 feet NAVD), Cluster 4, Treatment Zone B
American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

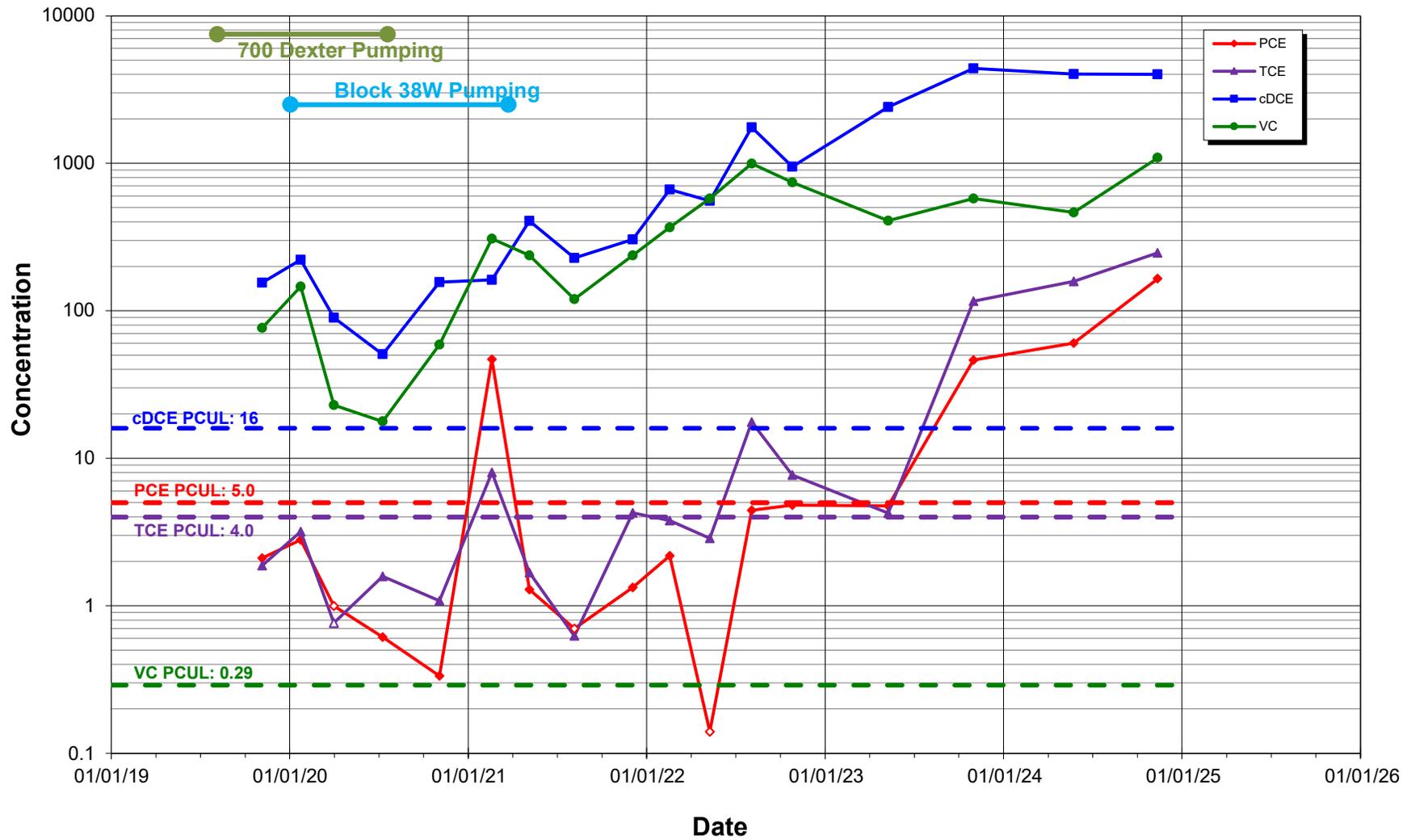
Concentration vs Time MW-179 (-27.2 to -37.2 feet NAVD), Cluster 4, Treatment Zone C American Linen Supply Co-Dexter Ave Site



Notes:

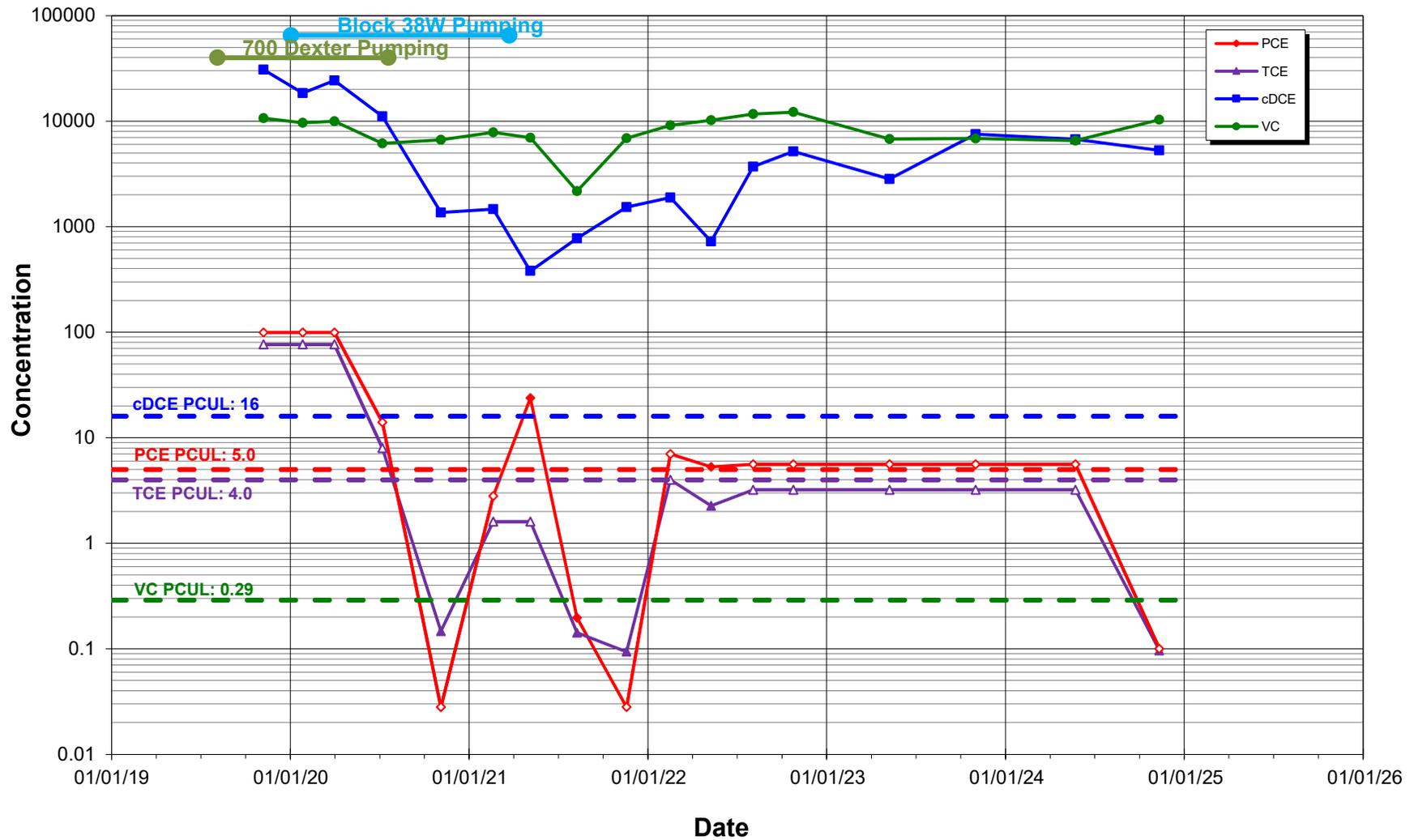
- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

Concentration vs Time
MW-180 (-42.5 to -52.5 feet NAVD), Cluster 4, Treatment Zone D
American Linen Supply Co-Dexter Ave Site



Notes:
 1) All results detected below the laboratory MDLs are shown as hollow data points.
 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

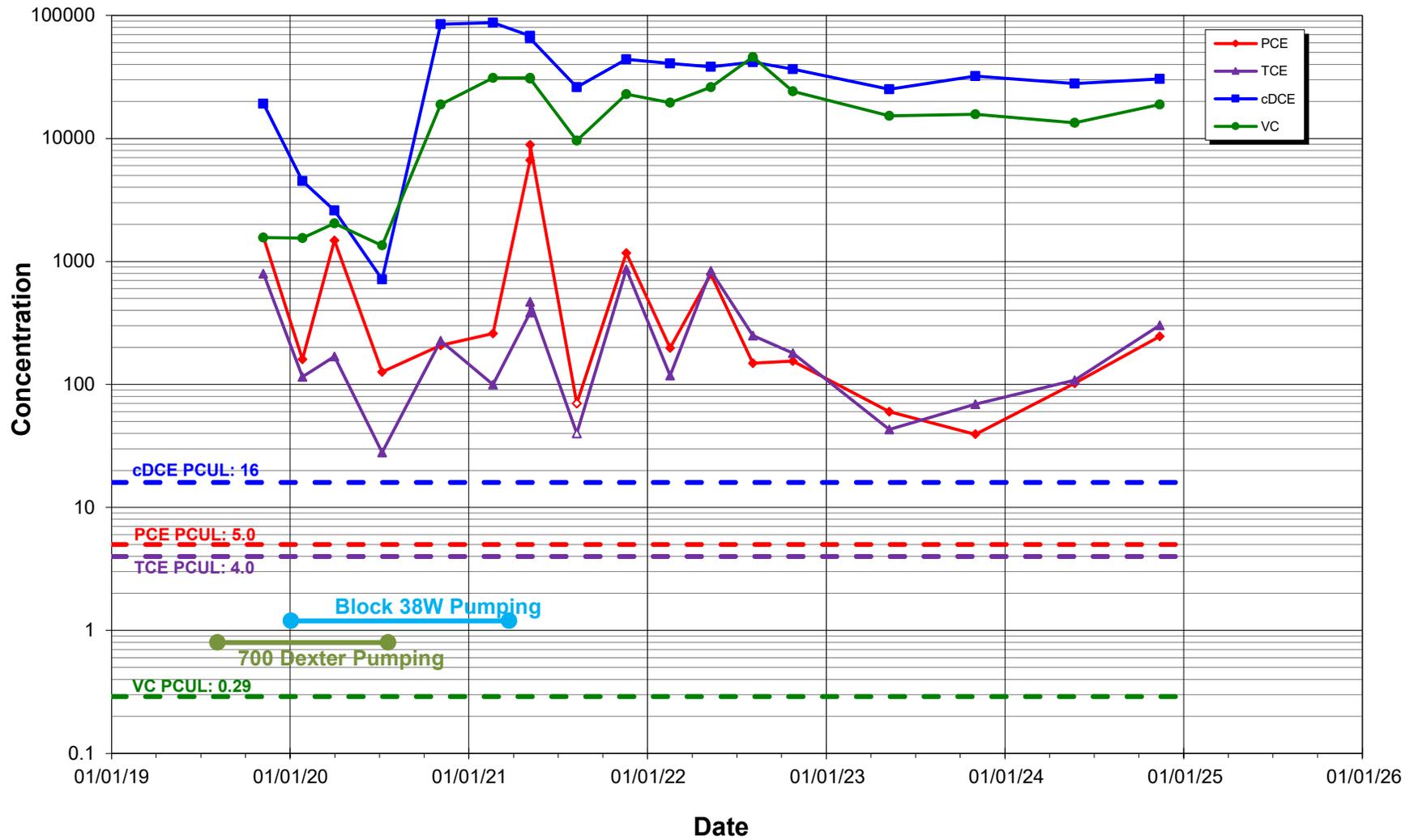
Concentration vs Time
MW-181 (1.5 to -8.5 feet NAVD), Cluster 5, Treatment Zone A
American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

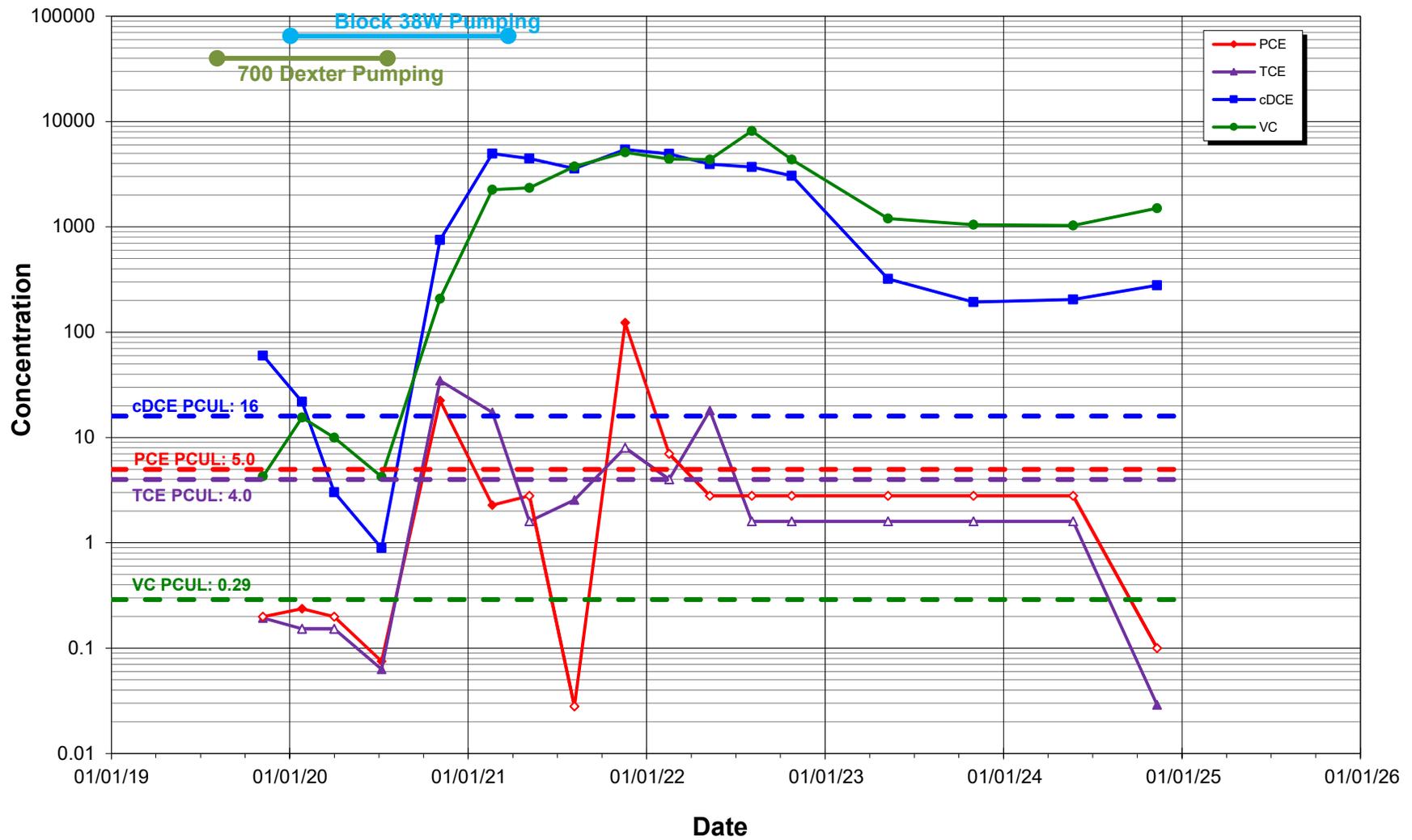
Concentration vs Time
MW-182 (-12.5 to -22.5 feet NAVD), Cluster 5, Treatment Zone B
American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

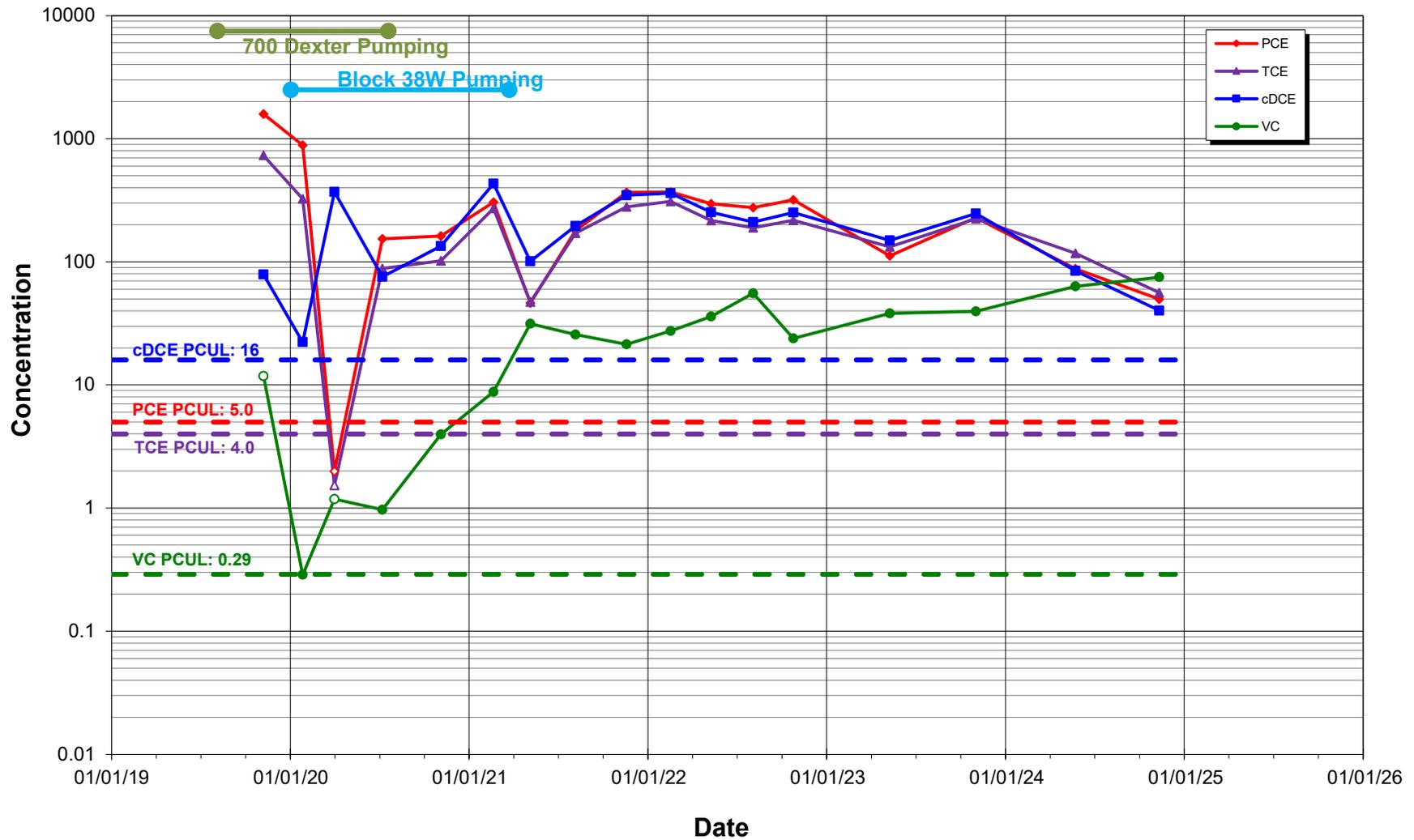
Concentration vs Time
MW-183 (-27.4 to -37.4 feet NAVD), Cluster 5, Treatment Zone C
American Linen Supply Co–Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

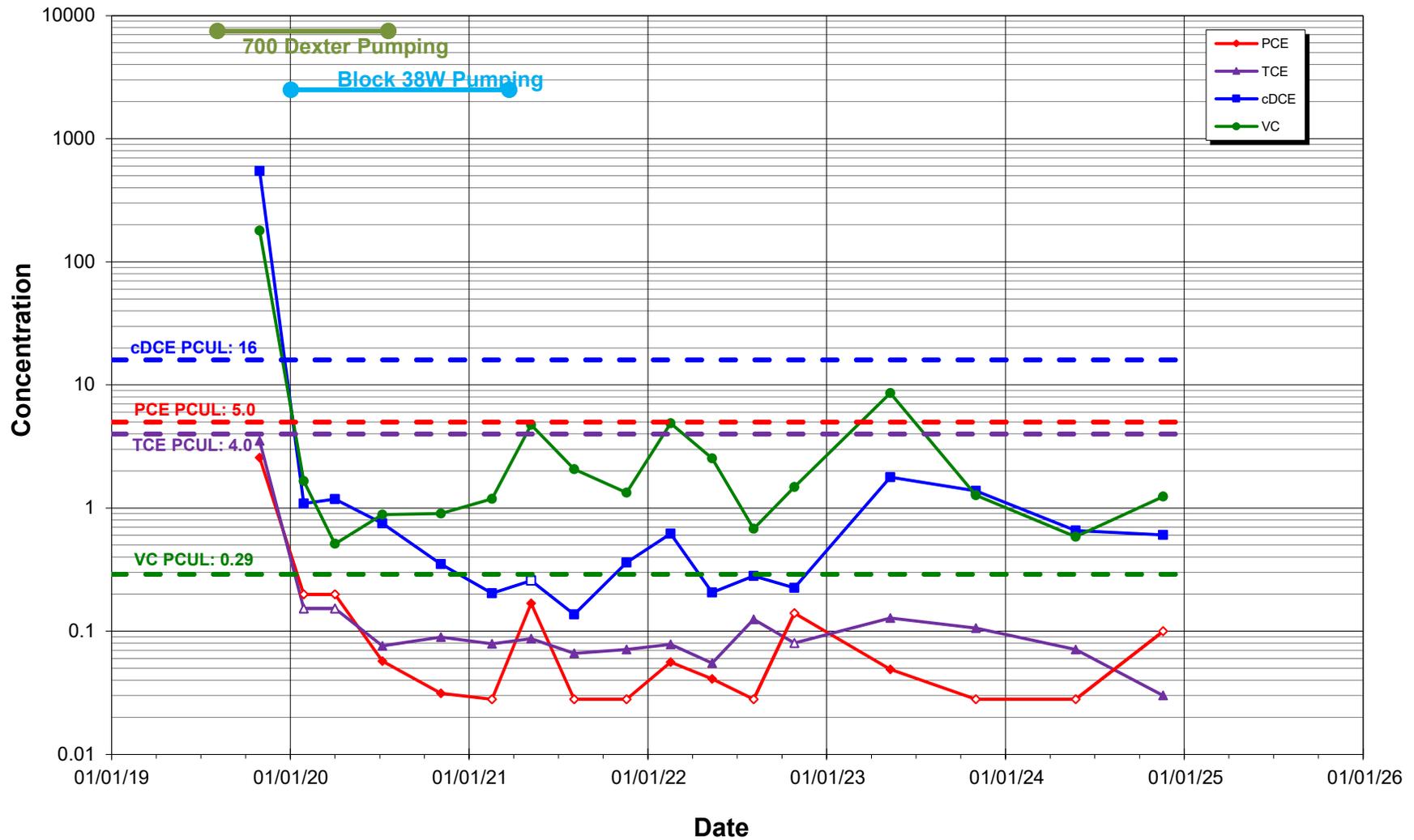
Concentration vs Time
MW-184 (-42.5 to -52.5 feet NAVD), Cluster 5, Treatment Zone D
American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

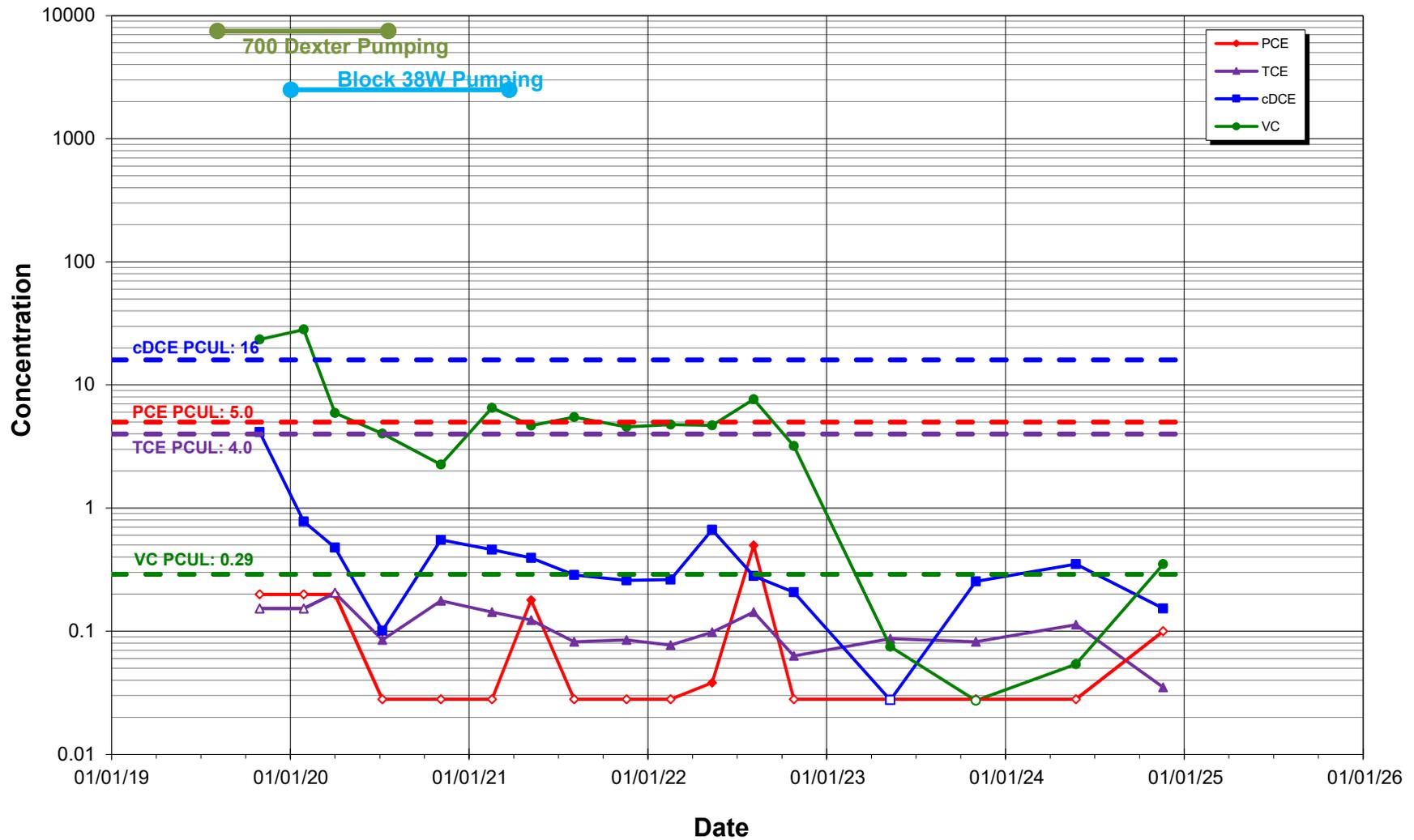
Concentration vs Time
MW-185 (1.4 to -8.7 feet NAVD), Cluster 6, Treatment Zone A
American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

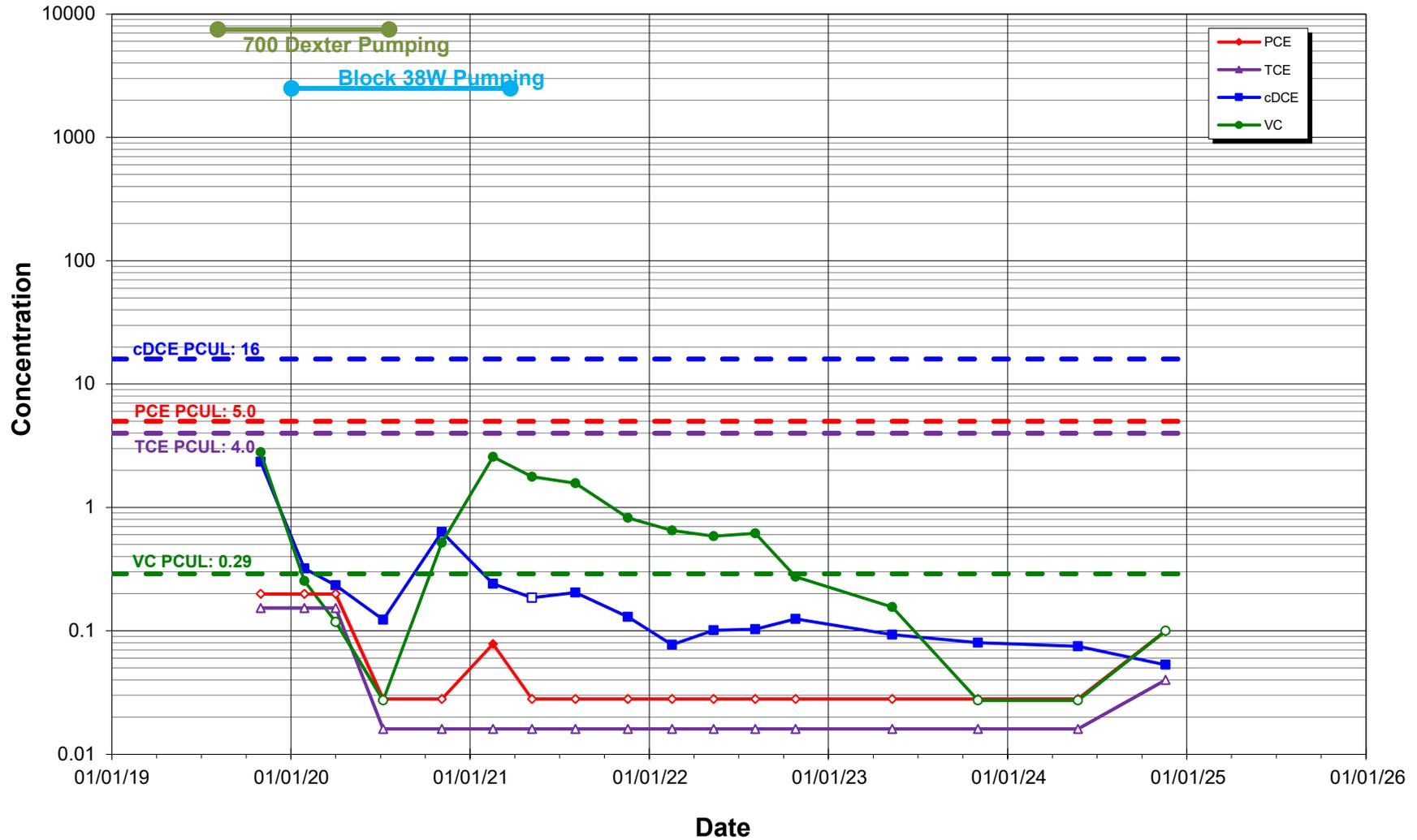
Concentration vs Time
MW-186 (-12.7 to -22.7 feet NAVD), Cluster 6, Treatment Zone B
American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

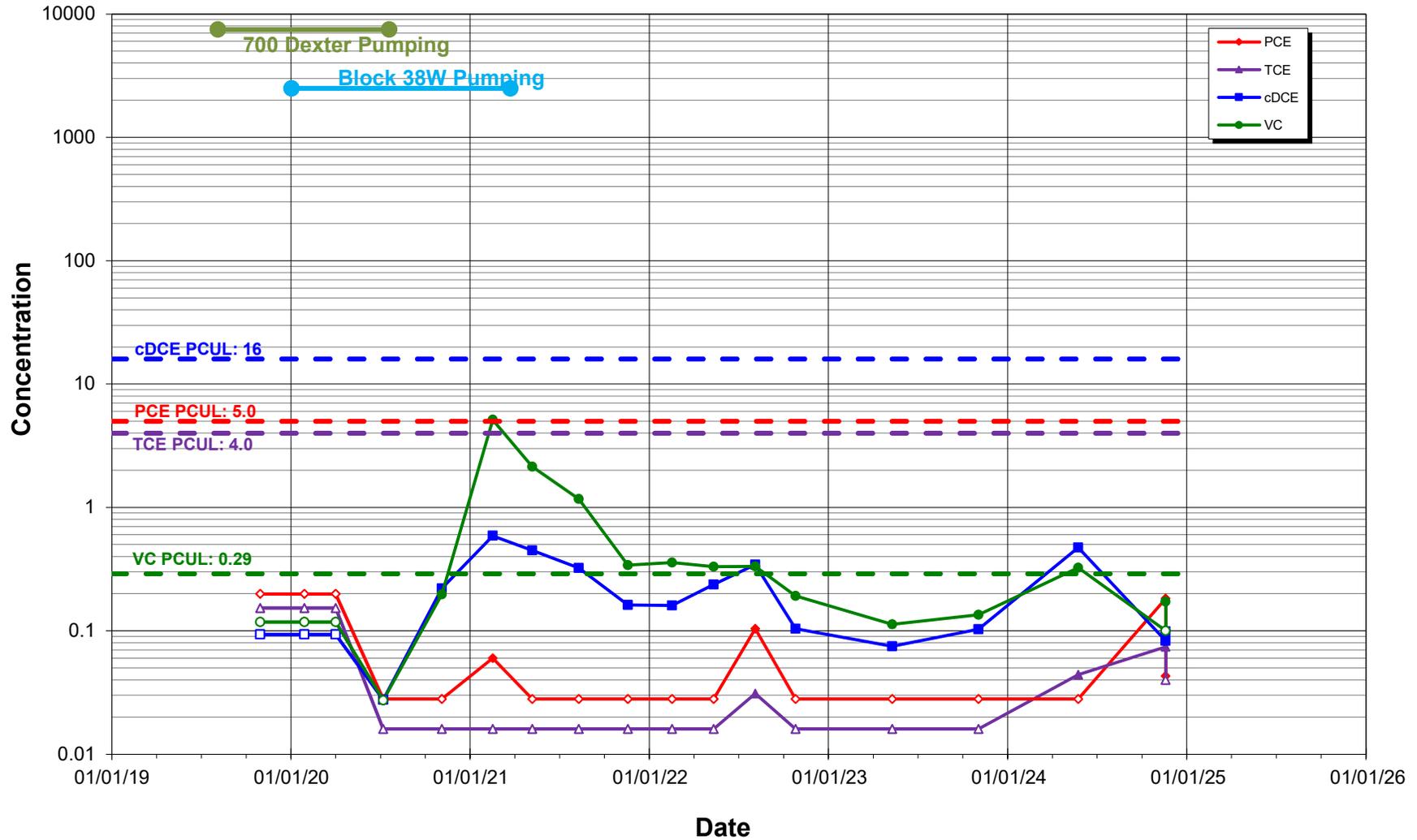
Concentration vs Time
MW-187 (-27.0 to -37.0 feet NAVD), Cluster 6, Treatment Zone C
American Linen Supply Co–Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

Concentration vs Time
MW-188 (-42.2 to -52.2 feet NAVD), Cluster 6, Treatment Zone D
American Linen Supply Co-Dexter Ave Site



Notes:

- 1) All results detected below the laboratory MDLs are shown as hollow data points .
- 2) Preliminary Cleanup Levels: PCE = 5µg/L, TCE = 4 µg/L, cDCE = 16 µg/L, and VC = 0.29 µg/L.

APPENDIX C

Utility Maps

N88°33'27"W 322.20'(M) 322.23'(5)

ALOHA STREET

N88°29'51"W
320.54'(C)

8TH AVE N.

VALLEY STREET

8TH AVE N.

ROY STREET

9TH AVENUE N
(DEDICATED PUBLIC RIGHT-OF-WAY)

CITY OF SEATTLE
LAKE UNION SHORELANDS
BLOCK 82

CITY OF SEATTLE
LAKE UNION SHORELANDS
BLOCK 80

EDEN ADDITION
CITY OF SEATTLE
BLOCK 8

1-STORY
MASONRY BUILDING
(DUCATI OF SEATTLE AND BUCCA DI
BEPPINO RESTAURANT)

PARCEL NO.: 408880-3435
701 9TH AVE N
SEATTLE, WA 98109
OWNER: BUCCA INC

PARCEL NO.: 408880-3530
800 ALOHA ST
SEATTLE, WA 98109
OWNER: SEATTLE CITY LIGHT
AREA: 66,000 SQ. FT
1.5151 AC.

PARCEL NO.:
408880-3585-01
SEATTLE, WA 98109
OWNER: 9TH & ALOHA,
LLC

PARCEL NO.:
408880-3585-02
SEATTLE, WA 98109
OWNER: 3D PROPERTIES,
LLC

FIN. BRASS PIN IN
4"x4" CONC. MON.
DOWN 0.6" IN CASE
ELEVATION: 144.725

N01°27'50"E 320.08'(M) 320.07'(C)

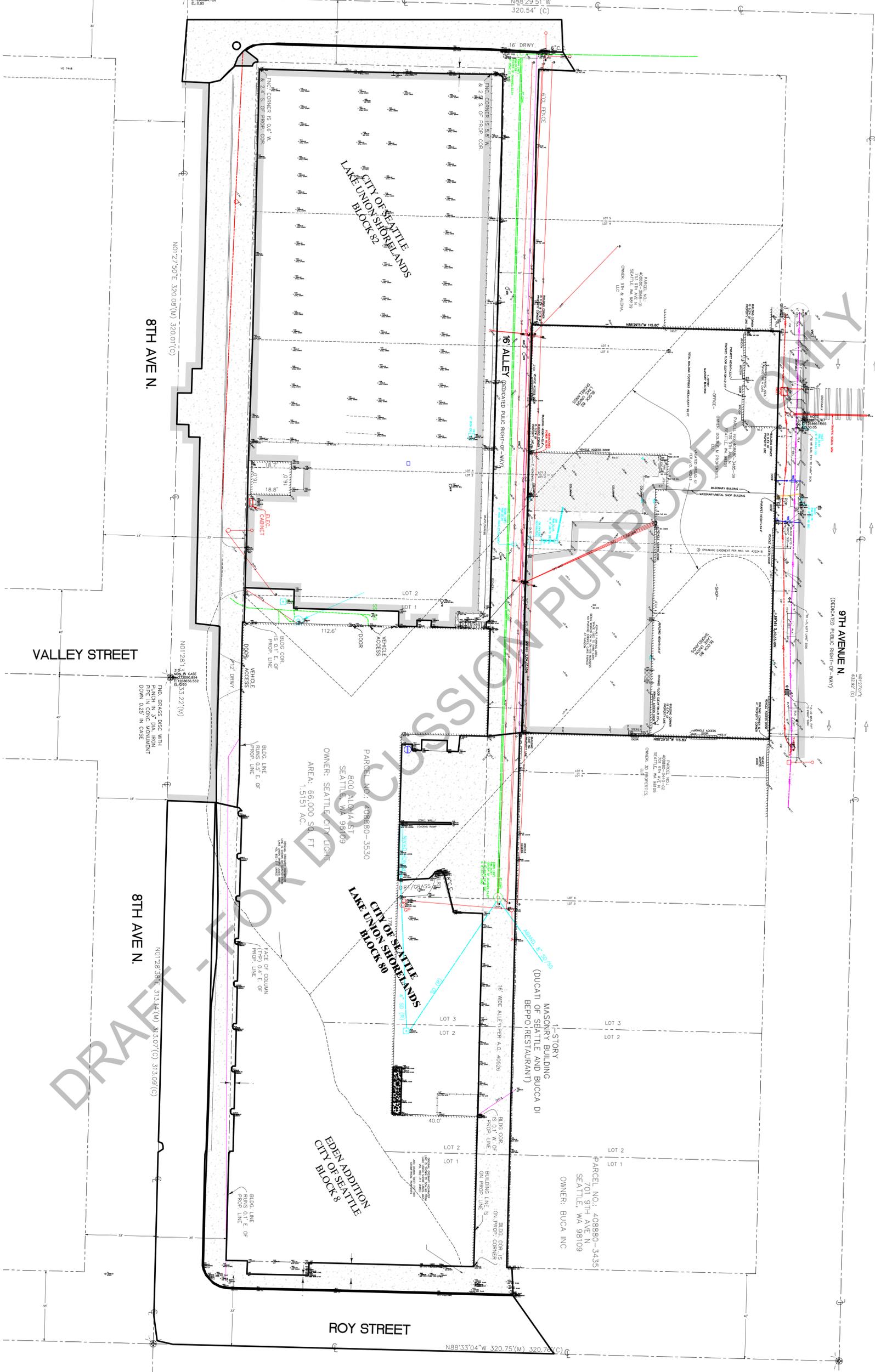
N01°28'11"E 333.22'(M)

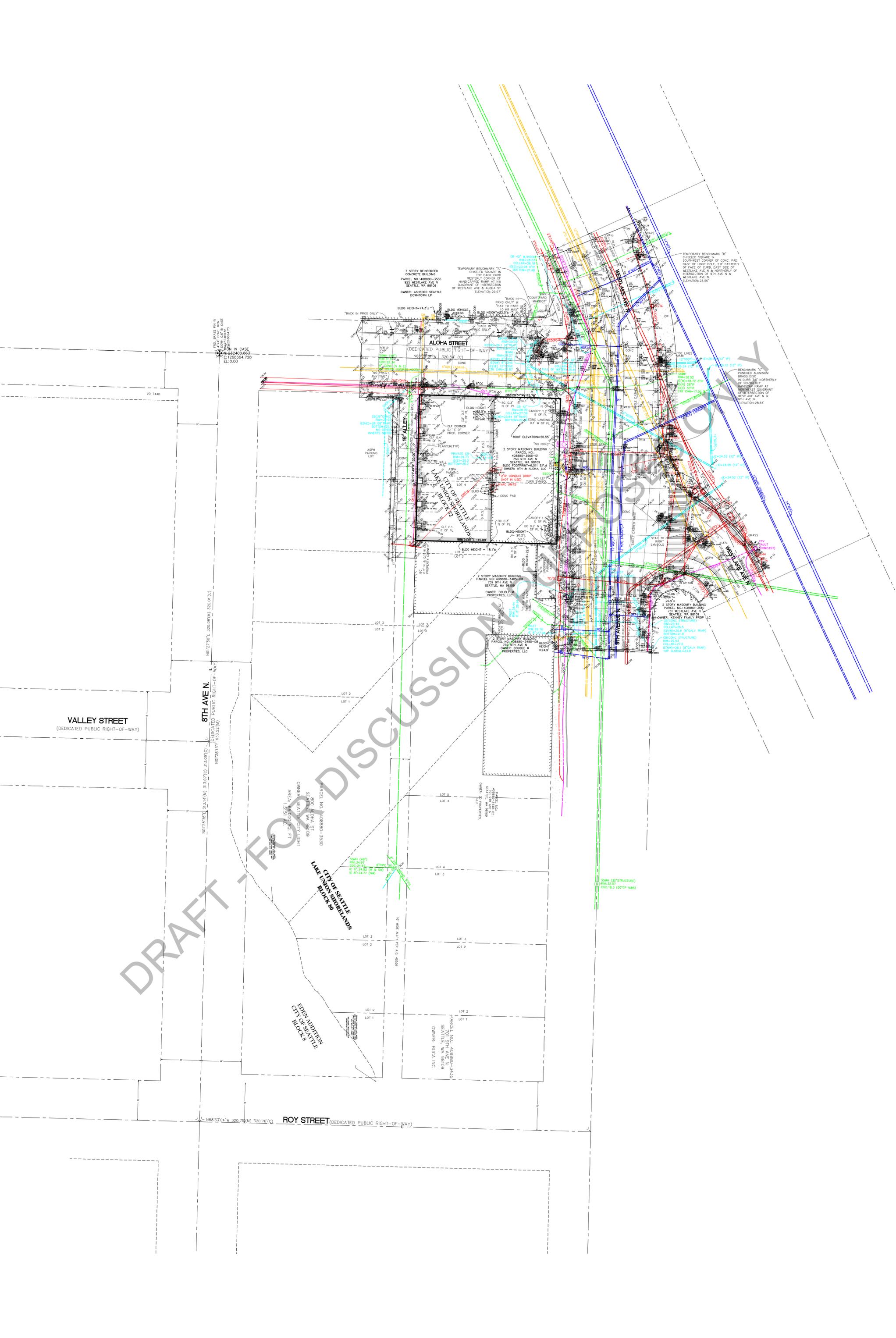
N01°28'38"E 313.44'(M) 313.07'(C) 313.09'(C)

N88°33'04"W 320.75'(M) 320.70'(C)

N01°27'07"E 632.82'(C)

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7 STORY REINFORCED CONCRETE BUILDING
PARCEL NO. 408880-3586
920 WESTLAKE AVE N
SEATTLE, WA 98109
OWNER: ASHFORD SEATTLE DOWNTOWN LP

TEMPORARY BENCHMARK "C"
CHISELED SQUARE IN
WESTERLY CORNER OF
HANDICAPPED RAMP AT NW
QUADRANT OF INTERSECTION
OF WESTLAKE AVE N & ALLOHA ST
ELEVATION: 29.67

TEMPORARY BENCHMARK "B"
CHISELED SQUARE IN
SOUTHWEST CORNER OF CONC. PAD
BASE OF LIGHT POLE, 2' EASTERLY
OF FACE OF CURB, EAST SIDE OF
WESTLAKE AVE N & NORTHERLY
OF INTERSECTION OF 9TH AVE N &
WESTLAKE AVE N
ELEVATION: 28.50

BENCHMARK "C"
FINISHED ALUMINUM
BRASS DISC
IN CURB 30' NORTHERLY
OF NORTHERLY
HANDICAP RAMP AT
NORTHEAST QUADRANT
OF INTERSECTION OF
WESTLAKE AVE N &
9TH AVE N
ELEVATION: 28.54

ALLOHA STREET
(DEDICATED PUBLIC RIGHT-OF-WAY)

WESTLAKE ALLEY

WESTLAKE AVE N

9TH AVENUE N

ROY STREET
(DEDICATED PUBLIC RIGHT-OF-WAY)

8TH AVE N
(DEDICATED PUBLIC RIGHT-OF-WAY)

VALLEY STREET
(DEDICATED PUBLIC RIGHT-OF-WAY)

CITY OF SEATTLE
LAKE UNION SHORELANDS
BLOCK #0

CITY OF SEATTLE
EDEN ADDITION
BLOCK #8

PARCEL NO. 408880-3530
800 ALLOHA ST
SEATTLE, WA 98109
OWNER: SEATTLE CITY LIGHT
AREA: 86000 SQ. FT.
1.5751 AC.

PARCEL NO. 408880-3435
710 ALLOHA ST
SEATTLE, WA 98109
OWNER: BLOCK INC

PARCEL NO. 408880-3485-08
730 9TH AVE N
SEATTLE, WA 98109
OWNER: DOUBLE PROPERTIES, LLC

PARCEL NO. 408880-3510
733 WESTLAKE AVE N
SEATTLE, WA 98109
OWNER: KENNETH FAMILY PROP, LLC

FIN. BRASS PIN IN
CONC. CURB
ELEVATION: 28.54
E: 126.864, 728
EL: 0.00

NO 127.50'E 320.05'(M) 320.01'(C)

NO 127.50'E 315.07'(C) 315.07'(C)

NO 127.50'E 315.07'(C) 315.07'(C)

N88°33'04"W 320.75'(M) 320.76'(C)

SSM (45°)
RM=34.97
COLLAR=24.82
E: 6°-24.82 (W & SW)
E: 6°-24.77 (NW)

SSM (30°) STRUCTURE
RM=30.57
COLLAR=18.9 (30°CP-N&S)

SSM (127°)
RM=28.52
COLLAR=18.72 (9°)
E: 127°-18.72 (9°)
E: 127°-18.72 (9°)
E: 127°-18.72 (9°)

SSM (30°) STRUCTURE
RM=30.57
COLLAR=18.9 (30°CP-N&S)

DRAFT - FOR DISCUSSION ONLY

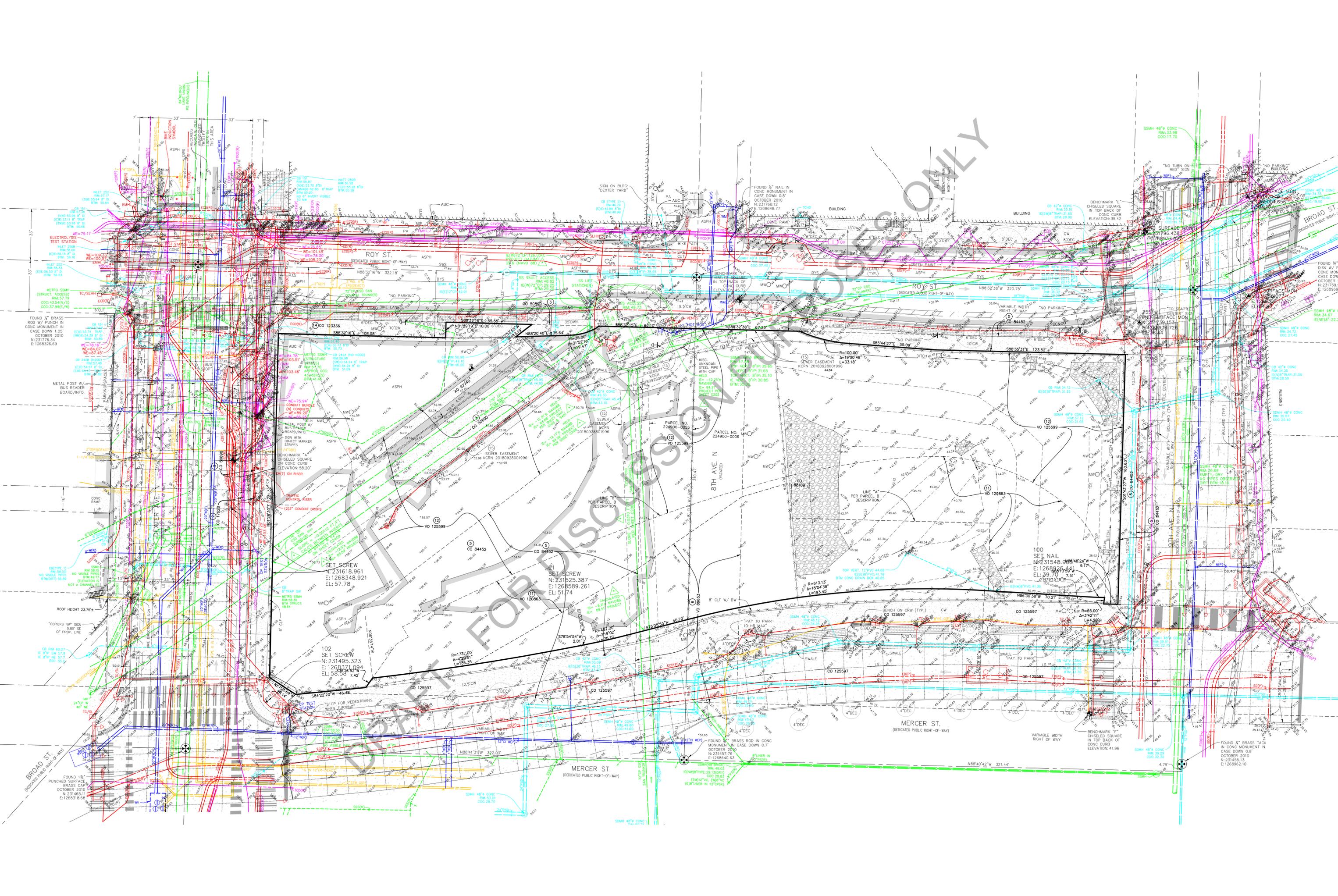


DRAFT - FOR PRELIMINARY PURPOSES ONLY

NO. IN CASE
DATE: 10/2016
BY: [Signature]

SEE SHEET [Number]
FOR [Description]

NO. IN CASE
DATE: 10/2016
BY: [Signature]



BROAD ST.
(DEDICATED PUBLIC RIGHT-OF-WAY)

ROY ST.
(DEDICATED PUBLIC RIGHT-OF-WAY)

MERCER ST.
(DEDICATED PUBLIC RIGHT-OF-WAY)

BROAD ST.
(DEDICATED PUBLIC RIGHT-OF-WAY)

8TH AVE. N
(WACATED)

MERCER ST.
(DEDICATED PUBLIC RIGHT-OF-WAY)

BROAD ST.
(DEDICATED PUBLIC RIGHT-OF-WAY)

FOUND 1" BRASS
ROD W/ PUNCH IN
CONC MONUMENT IN
CASE DOWN 1.05'
OCTOBER 2010
N: 231776.34
E: 1266326.69

ROOF HEIGHT 23.75'

CO 125597

CO 84452

CO 120863

CO 84452

CO 125597

CO 84452

CO 120863

CO 84452

CO 125597

CO 84452

CO 120863

CO 84452

CO 125597

CO 84452

CO 120863

SET SCREW
N: 231618.961
E: 1266348.921
EL: 57.78

SET SCREW
N: 231525.387
E: 1266589.261
EL: 51.74

102 SET SCREW
N: 231495.323
E: 1266371.094
EL: 58.58 7.42'

100 SET NAIL
N: 231548.098
E: 1266348.921
EL: 39.70 7.51'

FOUND 1" BRASS TACK
IN CONC MONUMENT IN
CASE DOWN 0.8'
OCTOBER 2010
N: 231455.13
E: 1266962.10

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 41.96

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42

BENCHMARK "T"
CHISELED SQUARE
IN TOP BACK OF
CONC CURB
ELEVATION: 35.42



GENERAL INFORMATION

ADDRESS OF PROPERTY:

739 9TH AVENUE NORTH
SEATTLE, WA 98109

BUILDING OWNER: BLOCK 79 LLC

PARCEL NUMBERS: 408880-3435 and 408880-3440

LEGAL DESCRIPTION: LAKE UNION SHORE LANDS ADD LOT 1 LYING E OF ALLEY. LAKE UNION SHORE LANDS ADD LOTS 2 THRU 4 & S 18.28 FT OF LOT 5 ALL LYING E OF ALLEY TGV PORTION VACATED STREET ADJ.

JURISDICTION: CITY OF SEATTLE

ZONE: SM-SLU 100/95

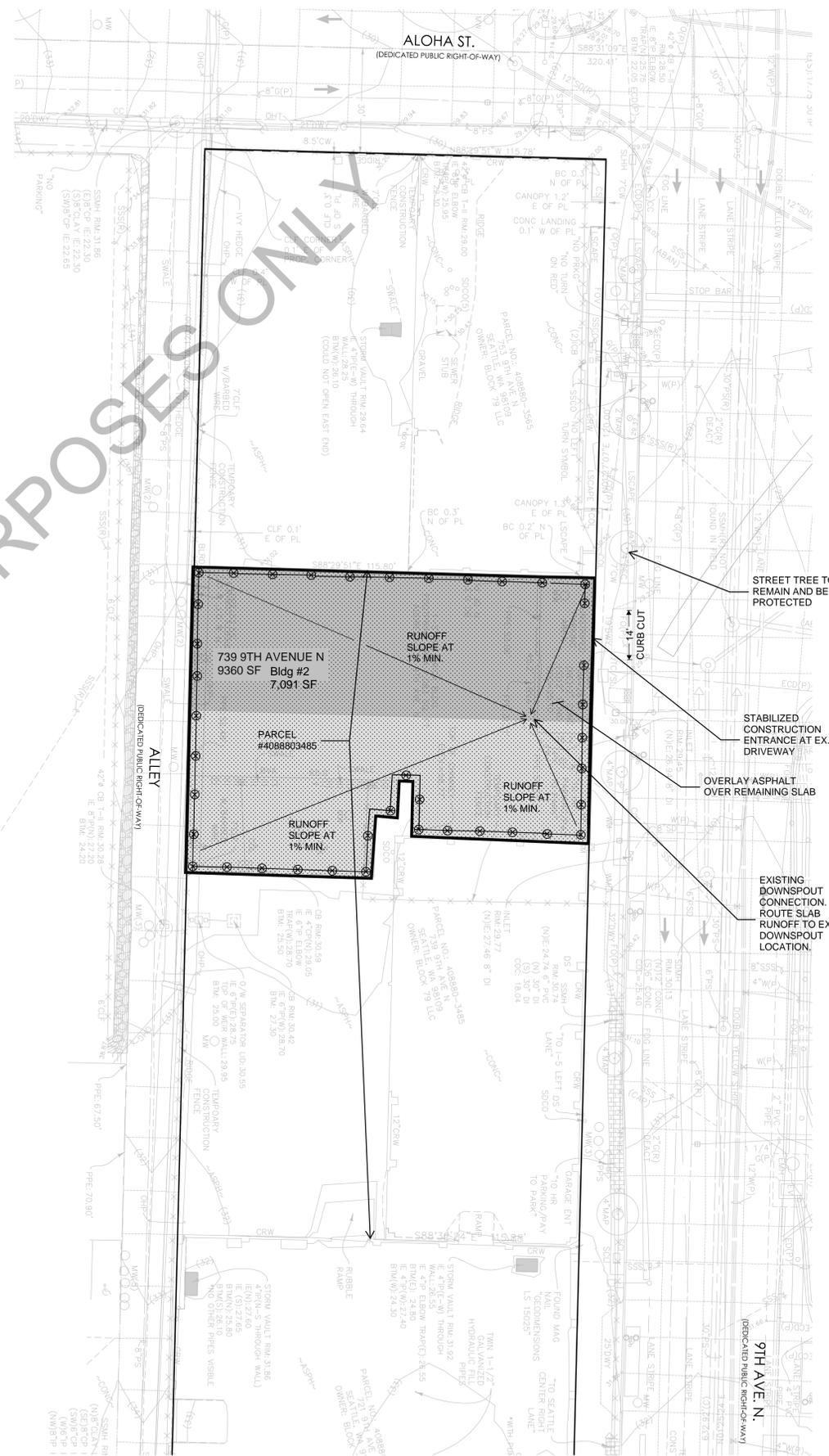
SCOPE OF WORK

DEMOLISH EXISTING 7,091 SQ FT ONE STORY MASONRY BUILDING TO FOUNDATION. EXISTING BUILDING INCLUDES FORMER MACCO REPAIR SHOP. EXISTING FOUNDATIONS, SLAB ON GRADE, CURBS AND PAVEMENTS TO REMAIN. CUT AND CAP UTILITIES PER DRAINAGE.

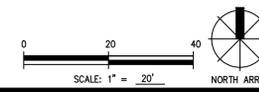
GENERAL NOTES

1. CONTRACTOR TO VERIFY THAT ALL UTILITIES SERVICES TO BUILDING HAVE BEEN DISCONNECTED. COORDINATE WORK WITH LOCAL UTILITY PROVIDERS.
2. MAINTAIN VEHICULAR AND PEDESTRIAN TRAFFIC ROUTES.
3. REMOVE EXISTING ABOVE GRADE IMPROVEMENTS. PROTECT ADJACENT PROPERTY AND PAVEMENTS.
4. THE SITE SHALL BE LEFT LEVEL AND FREE OF DEBRIS UPON COMPLETION OF DEMOLITION, AND ALL HOLES AND FALL HAZARDS SHALL BE FILLED OR PROTECTED WITH TEMPORARY FENCING.
5. CONTRACTOR SHALL MAKE PROVISIONS TO PREVENT THE ACCUMULATION OF WATER OR DAMAGE TO ANY FOUNDATIONS ON THE PREMISES OR PROPERTY.
6. CONTRACTOR TO SECURE PERIMETER OF SITE WITH TEMPORARY FENCING.
7. CAP EX. SIDE SEWERS (INCLUDING EX DOWNSPOUT CONNECTIONS AT PROPERTY LINE PER COS STDS UNLESS NOTED OTHERWISE)

DRAFT - FOR DISCUSSION PURPOSES ONLY



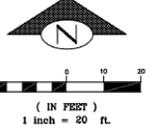
STORMWATER SITE PLAN



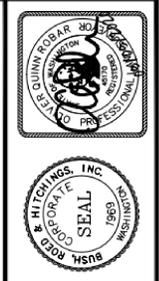
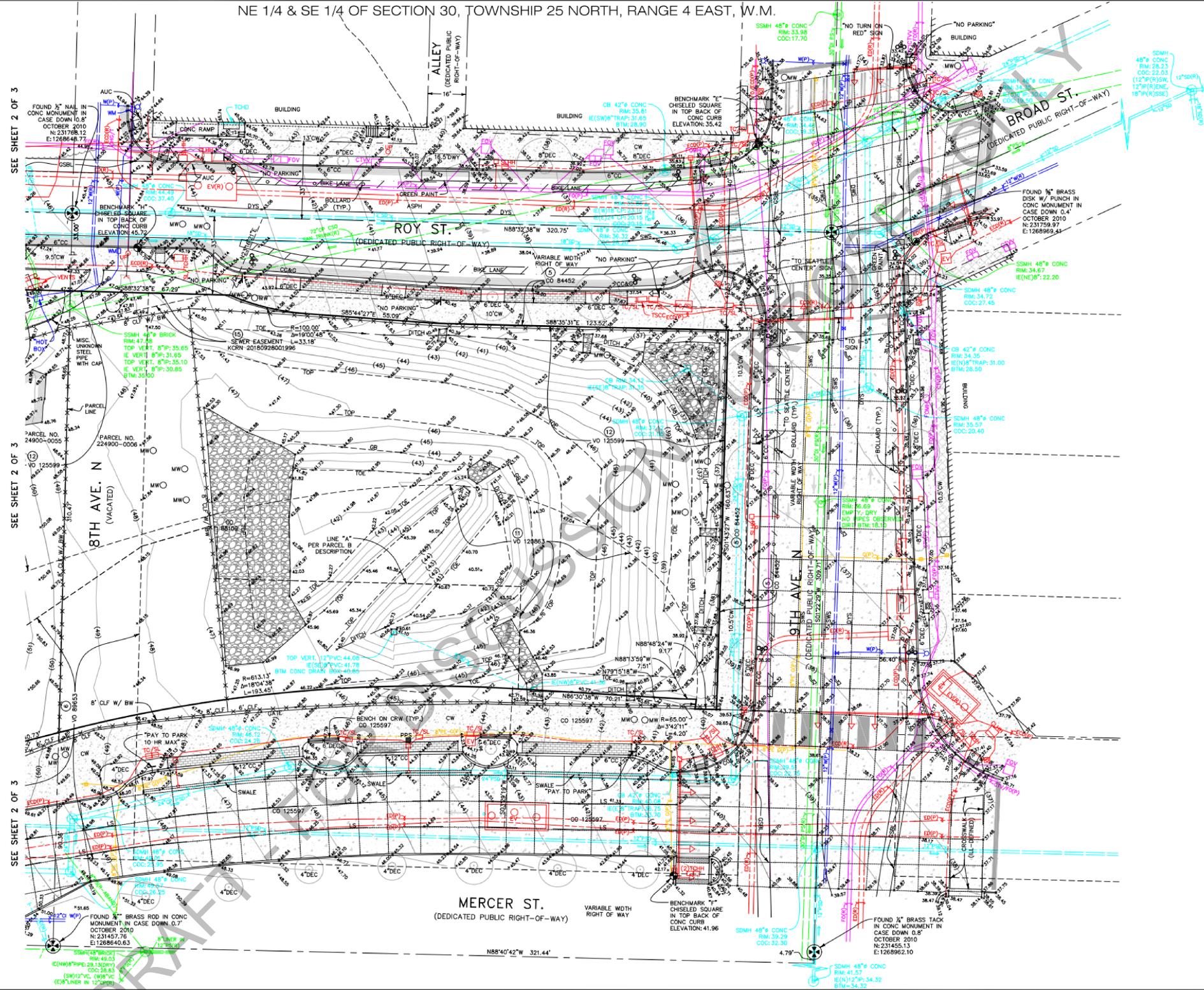
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NE 1/4 & SE 1/4 OF SECTION 30, TOWNSHIP 25 NORTH, RANGE 4 EAST, W.M.



- LEGEND**
- AUC AREA UNDER CONSTRUCTION
 - ASPH ASPHALT (ASPH)
 - BOLLARD
 - BRICK SURFACE
 - BUILDING LINE
 - BUILDING CORNER
 - BR RACK
 - BTM BOTTOM OF STRUCTURE
 - CANOPY
 - CB CATCH BASIN (CB)
 - CONC CONCRETE SURFACE
 - CONDUIT DOWN
 - CONCRETE/BRICK WALK
 - CONCRETE/WOOD RETAINING WALL
 - CONCRETE/EXTRUDED CURB
 - CONCRETE CURB & GUTTER
 - CONCRETE/IRON PIPE
 - CHAIN LINK FENCE (CLF)
 - CABLE TV
 - CLF CABLE TV VAULT
 - COL COLUMN
 - CRW/WRW CENTERLINE/ADJUNCTION LINE
 - DEC DECIDUOUS TREE
 - OMP CORRUGATED METAL PIPE
 - COC CENTER OF CHANNEL
 - DEC DECIDUOUS TREE
 - DRIVEWAY
 - DYS DOUBLE YELLOW STRIPE
 - ECD ELECTRICAL CONDUIT
 - ED ELECTRICAL DUCT
 - EHH ELECTRICAL HANDHOLE
 - EMH ELECTRICAL MANHOLE
 - EM ELECTRICAL METER
 - EV/ET ELECTRICAL VAULT/TRANSFORMER
 - FOUND SURVEY MONUMENT (AS NOTED)
 - FOUND BRASS DISC
 - FO FIRE HYDRANT
 - FOH FIBER OPTICS
 - FOH FIBER OPTICS MANHOLE
 - FOV FIBER OPTICS VAULT
 - FS FOG STRIPE
 - GB GRADE BREAK
 - G GAS MAIN
 - GM GAS METER
 - G VALVE
 - GY GUY ANCHOR
 - GR GROUND ROD
 - HR HANDRAIL
 - HOSE BIBB
 - IE INVERT ELEVATION
 - KCRN KING COUNTY RECORDING NUMBER
 - LS LIGHT POLE (METAL)
 - LS LIGHT POLE (WOOD)
 - LS LIGHT POLE (DECORATIVE)
 - LS LANE STRIPE
 - M MANHOLE
 - MW MONITOR WELL
 - OHG/OHT OVERHEAD POWER/TELEPHONE
 - OHG/OHB OVERHEAD GUYWIRE/BUS (TROLLEY)
 - PL PROPERTY LINE (PL)
 - PAINTED UTILITY LOCATION
 - PIPE FLOW DIRECTION
 - PE POLYETHYLENE
 - PFS PARKING PAY STATION
 - PS/PSS COMBINED/SANITARY SEWER
 - PSD STORM DRAIN
 - PSB PRIVATE CATCH BASIN
 - PPB PEDESTRIAN PUSH BUTTON (PPB)
 - PEDESTRIAN SIGNAL/PEDESTAL RECORD DATA
 - ROCK SURFACE
 - SCL/CLHH SEATTLE CITY LIGHT HANDHOLE
 - SD SERVICE DRAIN (STORM)
 - SSS SANITARY SIDE SEWER (RECORD)
 - SWS SOLID WHITE STRIPE
 - SN SIGN/STREET NAME SIGN
 - TEST PIT/SOIL BORING
 - TC/SL TRAFFIC CONTROL/STREET LIGHT HANDHOLE
 - TRAFFIC CONTROL CABINET (TRSC)
 - TRENCH DRAIN
 - TEMPORARY BENCHMARK (TBM)
 - TELEPHONE CONDUIT (BURIED)
 - TELEPHONE DUCT
 - TELEPHONE VAULT
 - TELEPHONE MANHOLE
 - TRAF FLOW DIRECTION
 - TRAF SIGNAL
 - TOE TOE OF SLOPE
 - TOP TOP OF BANK
 - UP UTILITY POLE (WOOD)
 - WATER VAULT
 - WATER MAIN
 - WM WATER METER
 - W WATER VALVE
 - WATER GATE VALVE/CHAMBER
 - VACATION/CONDEMNATION ORDINANCE
 - WE WIRE ELEVATION
 - WE WIRELESS INDUCTION SENSOR (RECORD)



BUSH, ROED & HITCHINGS, INC.
LAND SURVEYORS & CIVIL ENGINEERS

2009 MINOR AVE EAST
SEATTLE, WA 98108
TEL: (206) 323-4144
FAX: (206) 323-7755



NO	REVISION	DATE
1	REMOVED W/ NEW FIELD DATA	8/20/2020
2	REVISED PER ENGINEER COMMENTS	8/26/2020

TOPOGRAPHIC & BOUNDARY SURVEY
ALEXANDRIA REAL ESTATE EQUITIES, INC.
800 MERCER STREET
SEATTLE KING COUNTY WASHINGTON

Drawn by	checked by
FWH/MWH	OQR
Scale	date
1" = 20'	1/10/20
Job no.	
2019046.04	
Sheet	3 of 3

REGISTERED ARCHITECT
Tom

ARE MERCER BLOCKS

MASTER USE PERMIT

12/21/2021

MARK	DATE	DESCRIPTION

4/23/2021 MUP AG-032
SCALE PROJECT ARCHITECT
Designer

PROJECT NUMBER SDCI #3036395-EG,
#3035986-LU

SHEET NAME
SURVEY

SHEET NUMBER
MUP_AG-032

APPENDIX D

Well Development Procedure

D. Well Development Procedure

- Measure and record static water level and total well depth (this is the height of the initial water column).
- Install the pump intake near the top of the saturated screened interval. Begin pumping and record the pumping rate using a graduated volumetric container and turbidity using a turbidimeter. After pumping is initiated, slowly move the pump intake down and back up through the water column along the saturated screen interval to disturb and remove sediment that has accumulated in the well bottom. Be careful to not set the pump intake on the sediment surface, which may cause clogging.
- Discontinue pumping when either (a) turbidity stabilizes or (b) the well goes dry. Allow the monitoring well to recover to a minimum of 80 percent of its starting water column before proceeding with surging. In the case of a low-yielding well (i.e., 80 percent recovery is not complete within a few hours), additional methods of development such as jetting by a licensed driller should be considered.
- After each pumping (purge) cycle, surge the well using a surge block to flush groundwater across the entire length of the well screen in 1- to 2-foot strokes for a minimum of 10 surges across the entire length of the well screen. For example, for a well screened from 15 to 20 feet below ground surface (bgs), one would target surging across the 15-16.5, 16.5-18, and 18-20 foot bgs intervals for a minimum of 10 strokes in each interval. The surge block **must** fit tightly within the well casing and form a nearly air-tight seal. **The surging motion must be relatively gentle**—the surging is intended to remove fines entrained in the filter pack but should not exert enough pressure to create voids in the filter pack or to suspend additional fine particles from the surrounding formation.
- Measure the depth to the bottom of the well. If more than 10 percent of the screen is occluded by sediments, remove excess sediment with a bailer (a submersible pump can be used if it is capable of suspending and pumping sediment to the ground surface).
- Reset the pump and record pumping rate and initial turbidity. Pump until turbidity is below 50 NTU or stabilizes. If the well has been properly designed and constructed, the amount of pumping required to achieve the desired turbidity level will be substantially less than required in the first pumping cycle.
- Repeat surging and pumping until the well yields water of acceptable turbidity at the beginning of a pumping cycle (less than 25 NTU) or until a minimum of 10 casing volumes have been removed. Depending on whether groundwater quality is continuing to improve, removal of more than 10 casing volumes of

ASPECT CONSULTING

groundwater may be warranted. Likewise, if water is used during drilling (for instance, to mitigate heave), a minimum of two to three times the amount of water added should be removed during well development.

- Measure and record the final static water level and total well depth.
- Monitoring wells should be allowed to equilibrate for a minimum of 1 week after well development and prior to low-flow groundwater sampling.

APPENDIX E

Passive Flux Meter SOP



ENVIROFLUX

PFM Standard Operation Procedure

EnviroFlux, LLC
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Gainesville, FL 32601
Work) 352-554-5296
E-mail: jay.cho@enviroflux.com

1.0. PFM Construction, Storage, and Transport

1.1. Description of PFM

The PFM is a self-contained permeable unit that is inserted into a well or boring such that it intercepts groundwater flow but does not retain it (See Figure 1-1).

The interior composition of the flux meter is a matrix of hydrophobic and hydrophilic permeable sorbents that retain dissolved organic and/or inorganic contaminants present in fluid intercepted by the unit. The sorbent matrix is also impregnated with known amounts of one or more fluid soluble ‘resident tracers’. These tracers are leached from the sorbent at rates proportional to fluid flux.

After a specified period of exposure to groundwater flow, the flux meter is removed from the well or boring. Next, the sorbent is carefully extracted to quantify the mass of all contaminants intercepted by the flux meter and the residual masses of all resident tracers. The contaminants masses are used to calculate cumulative and time-averaged contaminant mass fluxes, while residual resident tracer masses are used to calculate cumulative or time- average fluid flux. Depth variations of both water and contaminant fluxes can be measured in an aquifer from a single flux meter by vertically segmenting the exposed sorbent packing, and analyzing for resident tracers and contaminants. Thus, at any specific well depth, an extraction from the locally exposed sorbent yields the mass of resident tracer remaining and the mass of contaminant intercepted. Note that multiple tracers with a range of partitioning coefficients are used to determine variability in groundwater flow with depth that could range over orders of magnitude. This data is used to estimate local cumulative water and contaminant fluxes.

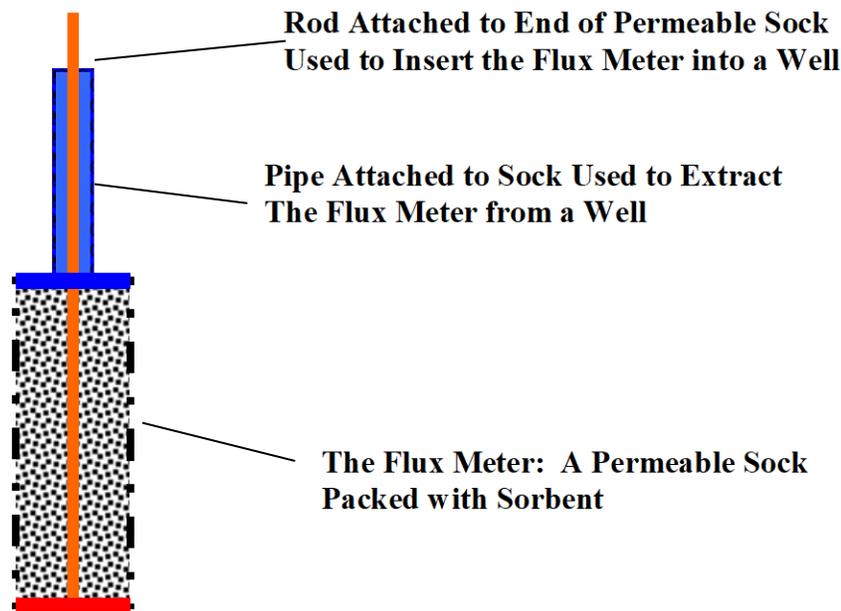


Figure 1-1. Schematic of a Flux meter comprised of a permeable sock filled with a selected sorbent.

1.2. Assembly of PFMs

The passive flux meters are constructed in a pipe having the same diameter as the well screen. The pipe used for construction should be slightly (0.1 inch) smaller diameter than the well screen. Prior to packing the PFMs with AC or AC with resin, the sock is attached to the center tube of the PFM. The center tube for 2-inch wells consists of 1/2 inch PVC. The bottom of the sock is clamped to the PVC pipe. AC is transferred into the PFM sock. After adding the required amount of AC up to the desired sampling interval, a thin viton washer is placed. This process is continued until completing. At the top of the PFM a thick viton washer is added followed by a sponge cut to the same size as the viton washer. The sponge is used to minimize AC loss from the top of the PFM. At this point the top of the sock is attached to the retrieval collar with a wire loop on which PFM retrieval rope is attached using a carabiner connector.

1.3. PFM Storage

If the PFMs are constructed for transport to the field site, the PFMs will be stored in tubes and a cooled area. PFM storage tubes are constructed using PVC pipe the same diameter as the packing tube. The PFM is then extruded from the packing tube into the storage tube. The storage tube is then sealed using gas tight mechanical plugs. The PFMs are then placed in cooled environment, under air conditioner until transport.

1.4. PFM Transport

The PFMs are transported in cardboard boxes to the site via FedEx air express.

2.0. PFM Deployment and Retrieval/sampling

2.1. PFM Installation

At the field site the PFM in the transport tube is prepared for PFM installation into the well casing. A rope is attached to the top of the PFM using a safety carabineer connector. The tube is lined up with the top of the well casing and section of push rod (or by hand) is used to push the PFM from the tube into the top section of well casing.

Once the PFM is placed on the top of well and insert the tip of weight into the PVC center tube of PFM. Then lower the PFM with a weight to the bottom of the well or the desired depth. Another option could be pushing PFM into position in the well using Geoprobe rods while holding retrieval rope.

If multiple PFMs are deployed on a single line, short sections of cable (about 5.2ft long) are thread through the upper PFM to link the PFMs together well. When inserting the PFM some back

pressure may build since the water in the well casing must flow through the center tube as the PFM is inserted. Proceed slowly as pressure builds. The weight should be retrieved back when done and used for next PFM installation. The PFM retrieval rope is then secured to the well lid using cable ties or others to ensure that it will not be lost to the well head.

2.2. PFM Retrieval

PFMs are retrieved using the rope. The top PFM in the well is extracted first by gently pulling up on the rope (heavy work gloves should be worn when pull on rope). The PFM should be pulled to the top of the well casing. The PFM will occasionally catch on joints in the well screen. Simply apply more pressure to overcome. If the PFM will not move look at troubleshooting options below. When the PFM is at the top of the well casing untangle any rope (or wires) that are twisted at the well head. Thread the retrieval rope through a 5ft transport PVC pipe and place the pipe over the well to guide and contain the extruded PFM. Move the PFM to the sampling workstation.

2.3. PFM Sampling

A tarpaulin acts as a ‘protective flooring’ for the work zone. A portable table is used as a work zone for sampling the PFMs. Nitrile protective gloves and necessary other protective clothing will be worn by all samplers. A lined bucket (5gal) is placed under the work area to capture un-sampled residual activated carbon from the retrieved PFM. The sock is extruded from the PVC pipe to the sampling interval extent. The flexible mesh packing material is cut and the sorbent (activated carbon) captured in plastic or stainless steel mixing bowls for homogenization using a stainless steel spatula. A sub-sample is then transferred into 120 mL jars. It is very important to take a well homogenized sample. The jars are stored in a cooler for transport back to the laboratory for analysis. The center tube and viton washers are measured to obtain the sample interval lengths in the PFM. Sampling materials, spatula, scissors, mixing bowls are wiped clean to remove carbon (or resin) particles prior to retrieving the next PFM.

2.4. Transportation and Storage of PFM samples: Sorbent (GAC) samples are stored on-site in coolers then shipped via overnight air express (e.g., FedEx) to the EnviroFlux laboratory. Samples are stored in a cold storage room or refrigerator at 4°C until analysis. Addition of preservatives is not necessary for PFM samples.

2.5. Troubleshooting PFM extraction

In the event that the PFM is difficult to remove from the well the following steps might be considered. If available, use metal rods or pvc pipes (1/2-inch for 2-inch PFM and 1-1/2-inch for 4-inch PFM), push down to move the PFM below the obstruction. Holding both the retrieval rope and the push rod, surge the PFM up and down to attempt to overcome the obstacle.

In the event that the rope breaks or becomes detached from the PFM, a corkscrew attachment can be added to the rod to attempt to “grab” the top of the PFM and advance it upwards. If this fails the corkscrew can be used to dig into the AC and viton washers again in an attempt to “grab” the PFM. Finally, a pump with tubing lowered to the top of the PFM can be used to extract the AC. This slow process obviously destroys the PFM, but can be successful in clearing the well.

3. Standard operating procedure for extraction and analysis of analytes from passive flux meter sorbents

3.1. Scope and application

This SOP describes the sample procedures used by EnviroFlux LLC., for extraction and analysis of target analytes (including tracers) from sorbents used in Passive flux meter (PFM) inserted in monitoring wells.

The Passive flux meter (PFM) contains a permeable sorbent (AC and/or resin) which allows groundwater flow through the device. The sorbent matrix (AC) should be preloaded with five resident tracers. The tracers are displaced from the sorbent at rates proportional to groundwater flux. Simultaneously the sorbent (AC and/or resin) retains dissolved contaminants such as TCE, PFAS in the GW flowing through PFM. After a 2-3 weeks period of exposure to GW, the PFMs are removed from the well. The sorbent (AC and/or resin) samples from the PFM are sub-sampled into a 125ml of glass jars for AC and a 125ml of HDPE bottle for resin in the field and transferred to the Enviroflux lab for analysis. The sorbent is then extracted to quantify the residual masses of all resident tracers and/or contaminants. The extracted samples are analyzed for Darcy and contaminants fluxes.

The selected constituents should be target field contaminants and alcohol tracers:

The alcohol tracers are methanol, ethanol, iso-propanol, t-butanol, and 2,4-dimethyl-3-pentanol and the contaminants could be VOCs, CVOCs, semi-VOCs, PFAS, pesticides, PAHs, metals, nutrients, others.

3.2. Purpose

The purpose of this SOP is to: (1) insure reliable and reproducible results, and (2) track possible sources of error in the extraction of alcohol tracers and contaminants from the PFM sorbents and the subsequent analysis by analytical methodology.

3.3. Procedures

Transportation and Sample Process

Transportation and Storage: The field samples should be shipped to the Enviroflux laboratory packed in coolers containing "blue ice or ice" via overnight air express (e.g., FedEx) and stored in the refrigerator.

Analytical lab: PFM sample analysis should be conducted by certified laboratories or those accredited by DOD ELAP, other professional analytical labs, or Enviroflux lab. Our contract laboratories accredited by DOD ELAP handle most contaminants, including PFAS, semi-VOCs, metals, PAHs, and nutrients. However, for certain VOC samples, the analytical lab within the Chemistry Department at the University of Florida should be utilized. For PFM trace analysis and select CVOC analyses, the Enviroflux lab should be used to ensure optimal PFM results. While this lab is not accredited, it adheres to QA/QC procedures comparable to those of accredited labs.

Sample Process: As received the PFM samples from the field site should be extracted to quantify the residual masses of all resident tracers and contaminants. If not, the PFM samples should be stored in a refrigerator at 4°C, until extraction/analysis, but no more than 1 month. 40 ml VOA vials are used for AC sampling. The vials are weighed empty (nearest 0.01 g) and recorded. A few grams of PFM sorbent samples from 125 ml sample jars should be subsampled into the pre-weighed 40-ml VOA vials. Following addition of AC, the vials are weighed. The vials weights are then recorded. The vials are then filled with extraction solvent using a fixed volume dispenser and sealed. Then the sample vials will be rotated, set at 20% rotation speed, for about 24 hours on a rotator (Glas-Col model RD 4512) and then refrigerated for several hours to allow suspended particulate matter to settle out.

Sub-sampling

When the suspended particle completely settled out, the supernatant should be taken into two separate 2-ml GC vials, one for alcohol tracer analysis and another for contaminants. Note that if the suspended particulate matter does not settle out, a syringe filter (0.22 micron) should be used to remove the suspended GAC or resin particles from the samples to protect analysis instruments. Then PFM samples will be sub-sampled into 2 ml GC vials. Pipets will be used to transfer samples from 40-mL sample vials to the 2-mL GC vials.

Chemicals and Laboratory Supplies and Materials

Certified ACS grade pure alcohols and solvent should be purchased from one or more of the following vendors; Fisher Scientific, VWR and/or Sigma-Aldrich and used as received. Alcohol tracers (methanol, ethanol, iso-propanol, tert-butanol, 2,4-dimethyl-3-pentanol) and extraction solvents are purchased from Sigma-Aldrich, all with purities >98%.

Volumetric class 'A' pipettes and volumetric class 'A' flasks for preparation of calibration standards and sample dilutions. Disposable Pasteur glass pipettes for sub-sampling. GC vials (2 mL) with Teflon-faced caps for GC analysis.

Calibration and Stock Standard Solutions

Contaminant stock standard solutions are purchased from Restek or Sigma Aldrich. If needed, individual alcohol tracer and some contaminant stock standard solutions are prepared in reagent solvent using volumetric glassware and stored in 20 or 40mL glass vials with Teflon-lined caps. Stock solutions should be kept in a refrigerator at 4°C. Fresh stock standards should be prepared every month and follow protocols outlined in the Federal Register, Rules and Regulations, "Standard Stock Solutions".

Mixed calibration standards should be prepared by diluting stock standards in reagent solvent using volumetric glassware. A minimum of four standards should be prepared and should bracket the expected concentration range.

Analytical Instrumentation

A ThermoScientific Orbitrap Exploris GC/MS, ThermoScientific Trace 1610, and Perkin Elmer Clarus 590 Gas Chromatograph equipped with FID and ECD detectors, autosampler, a temperature-programmable oven, heated auto-injector and detector zones, a 60 meter or greater capillary separations column, nitrogen carrier gas, standard compressed air and hydrogen flame gases and controlled by a PC-based data acquisition/analysis software system.

Sample Analysis

All analyses should be performed consistent with the quality assurance program of Enviroflux. Individual alcohol tracer and contaminant identification should be based on absolute retention times compared to calibration standards. Alcohol tracer and contaminant concentrations should be calculated on chromatographic peak area response converted to units of concentration in ug/L or mg/L based on standard calibration curves.

Interferences

Contamination by carry-over may occur when high-level and low-level samples are sequentially analyzed. Subsequent dilution and reanalysis should be completed on samples identified as outside the standard concentration bracket. Samples analyzed immediately following a 'high-concentration sample' should be reanalyzed. In an attempt to minimize carryover, samples suspected of being in a higher concentration range should be isolated and bracketed by the analysis of reagent solvent samples.

Safety

Gloves and eye protection will be worn during all extraction activities. The Materials Safety Data Sheets (MSDS) will be kept in the lab for information on toxicity, flammability, and other hazard data.

4. Standard operating procedure for the sampling, collection, extraction and analysis of Alcohol Tracers utilized at EnviroFlux

The following described Standard Operating Procedures (SOP) are currently utilized by EnviroFlux.

4.1 Scope and application

This Standard Operating Procedure (SOP) describes the extraction and analytical procedures of alcohol tracers from a sorbent (Granular Activated Carbon) packed into passive flux meters. These alcohols are used as “resident” tracers that are pre-loaded on to the sorbent packed into the flux meter sock; loss of tracers via desorption and advective/diffusive/dispersive transport resulting from groundwater flow under natural hydraulic gradients is measured to estimate cumulative groundwater and contaminant fluxes. The alcohol tracers are methanol, ethanol, isopropanol, t-butanol, and 2,4-dimethyl-3-pentanol.

4.2. Purpose

The purpose of this SOP is to: (1) insure reliable and reproducible results, and (2) track possible sources of error in the extraction of alcohols from a sorbent and the subsequent analysis by GC-FID analytical methodology.

4.3. Procedures

Sample Containers, Collection, Transportation and Storage

Sample Containers: Sorbent samples should be collected in 40mL VOA vials (Fisher Scientific Catalog # 05-719-106) sealed with Teflon-lined septa caps. Vials should contain 20mL of extraction solvent, prepared previously in the laboratory. All vials and caps are non-reusable.

Sample Collection: Sorbent aliquots collected over 1 to 5 foot increments from a Passive Flux meter should be transferred to a mixing bowl and homogenized well with a metal spatula. Approximately 10 to 20 grams of mixed sorbent should be placed into the 40 mL VOA vials containing extracting solvent.

Transportation and Storage: Field samples should be stored, on site, in coolers containing ice then shipped via overnight air express (e.g., FedEx) to the Enviroflux laboratory. Samples should be stored in a refrigerator at 4°C until extraction and GC analysis.

Holding Time: Adhere to holding times specified in the relevant standard method, typically 30 days for PFM samples.

Laboratory Supplies and Materials

Volumetric class 'A' pipettes and volumetric class 'A' flasks for preparation of calibration standards and sample dilutions. Disposable Pasteur glass pipettes (Fisher Catalog # 13-678-6A) for sub-sampling. GC vials (2 mL) with Teflon-faced caps (Fisher Catalog # 03-375-16A) for GC analysis.

Reagents

Certified ACS grade pure alcohols and solvent purchased from one or more of the following vendors: Fisher Scientific, VWR and/or Sigma-Aldrich and used as received.

Calibration Solutions

Individual alcohol stock standard solutions should be prepared in certified ACS grade solvent, methylene chloride, using volumetric glassware and stored in 20 mL glass vials with Teflon-lined caps. Stock solutions should be kept in a refrigerator at 4°C. Fresh stock standards should be prepared every.

Mixed calibration standards should be prepared by diluting stock standards in methylene chloride using volumetric glassware. A minimum of five standards should be prepared and should bracket the expected concentration range.

Instrument Calibration

Perform initial calibration using at least five concentration levels of calibration standards covering the expected range of analytes. Calculate calibration factors (CF) and establish the calibration curve.

Verify calibration daily before sample analysis with a mid-level calibration standard. Acceptable criteria for calibration verification are usually within $\pm 10\%$ of the expected value.

Sample Analysis

The established analytical method, a modified 8015C, for determining and quantifying alcohol concentrations in extracted samples involves the direct injection of the sample into a PerkinElmer Clarus 590 Gas Chromatograph (GC) equipped with a flame-ionization detector (FID). This method provides reliable and reproducible quantitation of alcohol at concentrations greater than or equal to 0.1 mg/L, which is the reportable minimum detection limit (MDL). The linear standard calibration range for the FID response is from the reported MDL up to a concentration of approximately 1500 mg/L per analyte of interest.

GC Procedure

Capillary GC; Rtx-624 Capillary Column (or J&W Scientific) ; 60m length; 0.53mm I.D.; 3.00microm df; Temp. Limits: -20 to 240 deg. C,

GC Analysis Method

Injection port temperature 200 C

FID detector temperature 230 C

Column Temperature Program:

Isothermal at 40C for 10 min; ramp to 110C at 5 C/min, hold 3min; ramp at 20C/min to 200C, hold 1 min.

Carrier gas Helium 99.9995% purity

Flame gases Air, 99.995% purity; Hydrogen, 99.995% purity

The temperature program can be changed dependent upon the sampling site (due to background baseline) and the target contaminants.

4.4 Quality Control

Method Blanks

Analyze method blanks to check for contamination during sample preparation and analysis. Ensure that blanks are free of target analytes or below the method detection limits (MDLs).

Laboratory Control Samples (LCS)

Analyze LCS to assess method accuracy. Prepare LCS by spiking a known quantity of target analytes into a clean matrix. Recovery should be within 70-130% of the expected value.

Matrix Spikes and Matrix Spike Duplicates (MS/MSD)

Analyze MS/MSD to evaluate matrix effects and method precision. Spike a known quantity of target analytes into a sample matrix and analyze in duplicate. Calculate the percent recovery and the relative percent difference (RPD). Acceptable recovery is typically 70-130%, and RPD should be $\leq 20\%$.

Duplicate Sample Analyses

Duplicate analyses are performed to evaluate the reproducibility of the method. Results of the duplicate analyses are used to determine the RPD between replicate samples. For each parameter analyzed, at least one duplicate sample is run per group of 20 samples.

Quality Control of GC System

GC injector septa should be changed every 100 to 150 injections, or sooner if instrument performance deteriorates. Injection port glass liner should be cleaned or changed after 100 to 150 injections or sooner if instrument performance deteriorates.

A method blank and matrix blank should be analyzed at the beginning of each sample set and after every 20 samples to monitor instrument background. A complete set of calibration standards (minimum 5) should be analyzed at the beginning of each day with a mid-range continuing calibration standard analyzed after every 20 samples.

4.5 Data Analysis:

Data Acquisition:

Acquire data ensuring adequate resolution and sensitivity to detect target analytes.

Integration and Quantification:

Integrate chromatographic peaks consistently. Manual integration should be minimized and justified. Quantify analytes using the calibration curve.

Quality Control Review:

Review QC sample results, including method blanks, LCS, duplicate, and MS/MSD. Ensure all QC criteria are met. Investigate and document any deviations.

Data Reporting:

Report concentrations of target analytes above the method detection limits (MDLs). Include any data qualifiers if QC criteria are not met.

Corrective Actions:

Investigate any QC failures to identify root causes. Implement corrective actions, such as reanalysis of samples, recalibration, or instrument maintenance.

4.6 Routine Maintenance:

Perform routine maintenance on the GC system to ensure optimal performance, including cleaning, column replacement, and leak checks. Conduct regular performance checks, such as checking for adequate resolution and sensitivity.

4.7 Training and Competency:

Ensure all personnel are adequately trained in GC operation and QA/QC procedures. Regularly assess the competency of personnel through proficiency testing and review of their analytical work. By following this QA/QC procedure, you can ensure the reliability and accuracy of alcohol analysis using GC FID, leading to confident and reproducible results.

5. Standard operating procedure for the sampling, collection, extraction and analysis of low range of CVOCs utilized at EnviroFlux

The following described Standard Operating Procedures (SOP) are currently utilized by EnviroFlux.

5.1. Scope and application

This Standard Operating Procedure (SOP) describes the extraction and analytical procedures of CVOCs from sorbent (Granular Activated Carbon or resin) packed into the passive flux meters. The mass of CVOCs accumulated by sorption on the sorbent from the groundwater passing through the passive flux meter is used to estimate the cumulative contaminant flux. The target analytes are CVOCs (e.g., TCE, PCE, EDB, etc).

5.2. Purpose

The purpose of this SOP is to: (1) insure reliable and reproducible results, and (2) track possible sources of error in the extraction of CVOCs from a sorbent and the subsequent analysis by analytical methodology.

5.3. Procedures

Sample Containers, Collection, Transportation and Storage

Sample Containers: Sorbent samples should be collected in 40mL VOA vials (Fisher Scientific Catalog # 05-719-106) sealed with Teflon-lined septa caps. Vials should contain 20mL of extraction solvent, prepared previously in the laboratory. All vials and caps are non-reusable.

Sample Collection: Sorbent aliquots collected over some increments from a Passive Flux meter should be transferred to a mixing bowl and homogenized well with a metal spatula. Approximately 10 grams of mixed sorbent should be placed into the 40 mL VOA vials containing extracting solvent.

Transportation and Storage: Field samples should be stored, on site, in coolers containing ice then shipped via overnight air express (e.g., FedEx) to the Enviroflux laboratory. Samples should be stored in a refrigerator at 4°C until extraction and GC analysis.

Holding Time: Adhere to holding times specified in the relevant standard method, typically 30 days for PFM samples.

Laboratory Supplies and Materials

Volumetric class 'A' pipettes and volumetric class 'A' flasks for preparation of calibration standards and sample dilutions. Disposable Pasteur glass pipettes for sub-sampling. GC vials (2 mL) with Teflon-faced caps for GC analysis.

Reagents

Certified ACS grade pure alcohols and solvent purchased from one or more of the following vendors: Fisher Scientific, VWR, QEC, and/or Sigma-Aldrich and used as received.

Calibration Solutions

Individual alcohol stock standard solutions should be prepared in certified ACS grade solvent, methylene chloride, using volumetric glassware and stored in 20 mL glass vials with Teflon-lined caps. Stock solutions should be kept in a refrigerator at 4°C. Fresh stock standards should be prepared every month.

Mixed calibration standards should be prepared by diluting stock standards in methylene chloride using volumetric glassware. A minimum of five standards should be prepared and should bracket the expected concentration range.

Instrument Calibration

Perform initial calibration using at least five concentration levels of calibration standard covering the expected range of analytes. Calculate calibration factors and establish the calibration curve.

Verify calibration daily before sample analysis with a mid-level calibration standard. Acceptable criteria for calibration verification are usually within $\pm 10\%$ of the expected value.

Sample Analysis

The established analytical method, a modified 551.1 with GC ECD for low level CVOCs, for determining and quantifying CVOCs concentrations in extracted samples is direct injection into a Perkin Elmer Clarus 590 Gas Chromatograph (GC) equipped with a Electron Capture detector (ECD). This method provides reliable and reproducible quantitation of CVOCs compounds at

concentrations greater than or equal to 1 ug/L, which is the reportable minimum detection limit (MDL).

GC Procedure

Capillary GC; Rtx-624 Capillary Column (or J&W Scientific); 60m length; 0.53mm I.D.; 3.00microm df; Temp. Limits: -20 to 240 deg. C,

GC Analysis Method

Injection port temperature 200-230 C

ECD detector temperature 300 C

Column Temperature Program:

Isothermal at 40C for 5 min; ramp to 100C at 5 C/min, hold 1min; ramp at 20C/min to 230C, hold 1 min.

Carrier gas Nitrogen 99.9995% purity

Make-up gases Nitrogen 99.9995% purity

The temperature program can be changed dependent upon the sampling site (due to background baseline) and the target contaminants.

5.4 Quality Control

Method Blanks

Analyze method blanks to check for contamination during sample preparation and analysis. Ensure that blanks are free of target analytes or below the method detection limits (MDLs).

Laboratory Control Samples (LCS)

Analyze LCS to assess method accuracy. Prepare LCS by spiking a known quantity of target analytes into a clean matrix. Recovery should be within 70-130% of the expected value.

Matrix Spikes and Matrix Spike Duplicates (MS/MSD)

Analyze MS/MSD to evaluate matrix effects and method precision. Spike a known quantity of target analytes into a sample matrix and analyze in duplicate. Calculate the percent recovery and the relative percent difference (RPD). Acceptable recovery is typically 70-130%, and RPD should be $\leq 20\%$.

Duplicate Sample Analyses

Duplicate analyses are performed to evaluate the reproducibility of the method. Results of the duplicate analyses are used to determine the RPD between replicate samples. For each parameter analyzed, at least one duplicate sample is run per group of 20 samples.

Quality Control of GC System

GC injector septa should be changed every 100 to 150 injections, or sooner if instrument performance deteriorates. Injection port glass liner should be cleaned or changed after 100 to 150 injections or sooner if instrument performance deteriorates.

A method blank and matrix blank should be analyzed at the beginning of each sample set and after every 20 samples to monitor instrument background. A complete set of calibration standards (minimum 5) should be analyzed at the beginning of each day with a mid-range continuing calibration standard analyzed after every 20 samples.

5.5 Data Analysis:

Data Acquisition:

Acquire data ensuring adequate resolution and sensitivity to detect target analytes.

Integration and Quantification:

Integrate chromatographic peaks consistently. Manual integration should be minimized and justified. Quantify analytes using the calibration curve.

Quality Control Review:

Review QC sample results, including method blanks, LCS, duplicate, and MS/MSD. Ensure all QC criteria are met. Investigate and document any deviations.

Data Reporting:

Report concentrations of target analytes above the method detection limits (MDLs). Include any data qualifiers if QC criteria are not met.

Corrective Actions:

Investigate any QC failures to identify root causes. Implement corrective actions, such as reanalysis of samples, recalibration, or instrument maintenance.

5.6 Routine Maintenance:

Perform routine maintenance on the GC system to ensure optimal performance, including cleaning, column replacement, and leak checks. Conduct regular performance checks, such as checking for adequate resolution and sensitivity.

5.7 Training and Competency:

Ensure all personnel are adequately trained in GC operation and QA/QC procedures. Regularly assess the competency of personnel through proficiency testing and review of their analytical work. By following this QA/QC procedure, you can ensure the reliability and accuracy of CVOC analysis using GC ECD, leading to confident and reproducible results.

6. This method involves the determination of VOCs and CVOCs in various matrices using Gas Chromatography/Mass Spectrometry (GC/MS) utilized at the University of Florida (Department of Chemistry)

6.1. Sample Collection:

Sample Collection:

Use appropriate, clean, and contaminant-free containers (e.g., 40 mL glass vials with Teflon-lined septa).

Sample Preservation:

Store samples at 4°C from the time of collection until analysis.

Holding Times:

Adhere to holding times specified in the relevant standard method, typically 30 days for PFM samples.

6.2. Instrument Calibration:

Initial Calibration:

Perform initial calibration using at least five concentration levels of calibration standards covering the expected range of analytes. Calculate calibration factors (CF) or response factors (RF) and establish the calibration curve.

Calibration Verification:

Verify calibration daily before sample analysis with a mid-level calibration standard. Acceptable criteria for calibration verification are usually within $\pm 20\%$ of the expected value.

6.3. Quality Control Samples:

Method Blanks:

Analyze method blanks to check for contamination during sample preparation and analysis. Ensure that blanks are free of target analytes or below the method detection limits (MDLs).

Laboratory Control Samples (LCS):

Analyze LCS to assess method accuracy. Prepare LCS by spiking a known quantity of target analytes into a clean matrix. Recovery should be within 70-130% of the expected value.

Matrix Spikes and Matrix Spike Duplicates (MS/MSD):

Analyze MS/MSD to evaluate matrix effects and method precision. Spike a known quantity of target analytes into a sample matrix and analyze in duplicate. Calculate the percent recovery and the relative percent difference (RPD). Acceptable recovery is typically 70-130%, and RPD should be $\leq 30\%$.

Internal Standards:

Add internal standards to all samples, standards, and QC samples to correct for variability in sample preparation and instrument response. Ensure internal standard responses are consistent and within $\pm 50\%$ of the average response in the calibration standards.

6.4. Sample Analysis:

Sample Introduction:

Use appropriate sample introduction techniques, such as direct injection.

GC/MS Procedure:

Follow the specific GC/MS operating conditions including column type, temperature program, and MS settings.

Mass Spectrometry: ThermoScientific Orbitrap Exploris GC

Ionization: electron ionization (EI), 70 eV

Ion source temperature = 250 C

Resolution: 30000

MS: SIM

Gas Chromatograph:

ThermoScientific Trace 1610:

GC Injection port: 250 C

GC helium carrier gas: constant flow, 1 mL/min: vacuum compensated.

Injection mode: split, split flow rate =10 mL/min)

Temperature program: 30C(0-4 min) => 125C@90C/min => 200C@50C/min

GC Column: Restek Corp. Rxi-5ms (30 meter x 0.25 mm i.d. and 0.25 um df)

Autosampler: ThermoScientific AI/AS1610; Injection volume: 1 µL

6.5. Data Analysis:

Data Acquisition:

Acquire data in selected ion monitoring (SIM) mode or full scan mode as required.

Ensure adequate resolution and sensitivity to detect target analytes.

Integration and Quantification:

Integrate chromatographic peaks consistently. Manual integration should be minimized and justified. Quantify analytes using the calibration curve. Correct for any internal standard variations.

Quality Control Review:

Review QC sample results, including method blanks, LCS, MS/MSD, and internal standards.

Ensure all QC criteria are met. Investigate and document any deviations.

Data Reporting:

Reporting Limits:

Report concentrations of target analytes above the method detection limits (MDLs).

Include any data qualifiers if QC criteria are not met.

Documentation:

Maintain detailed records of sample collection, analysis, and QC procedures. Store data and records in a secure and organized manner for future reference.

6.6. Corrective Actions:

QC Failure Investigation:

Investigate any QC failures to identify root causes. Implement corrective actions, such as reanalysis of samples, recalibration, or instrument maintenance.

Documentation of Corrective Actions:

Document all corrective actions taken, including the rationale and results of any reanalysis.

6.7. Instrument Maintenance:

Routine Maintenance:

Perform routine maintenance on the GC/MS system to ensure optimal performance, including cleaning, column replacement, and leak checks.

Performance Checks:

Conduct regular performance checks, such as tuning the MS and checking for adequate resolution and sensitivity.

7.0. Quality Assurance Project Plan

7.1. Purpose and Scope of the Plan

This Quality Assurance plan focuses on field installation, sampling and processing of data from the Flux Meters.

7.2. Quality Assurance Responsibilities

The responsibility for QA should be by the Lab Manager/Project Manager of EnviroFlux.

7.3. Data Quality Parameters

This section discusses measures to be taken to ensure the representativeness, completeness, comparability, accuracy, and precision of the data.

Accuracy

Accuracy is defined as the closeness of the results to the true value.

The percent recoveries of surrogates, QC check standards, and matrix-spiked analytes are used to evaluate the accuracy of an analysis. The percent recovery represented by X can be calculated using the following equations:

For surrogates and QC check standards:

$$X = \frac{SSR}{SA} \times 100 \quad 1$$

For matrix spikes:

$$X = \frac{SSR - SS}{SA} \times 100$$

where:

SSR = Spiked sample result

SS = Sample result

SA = Spike added from spiking mix

The mean percent recovery (X) is defined by:

$$\bar{X} = \frac{\sum_{i=1}^N X_i}{N} \quad 2$$

where:

X_i = The percent recovery value of a spike replicate

N = Number of spikes

Precision

Precision is a measure of the mutual agreement among individual measurements of the same parameters under prescribed similar conditions.

The analytical precision is determined using results from duplicate or replicate analyses of samples and from matrix spike results for a given matrix. The Relative Percent Difference (RPD) is used to evaluate the precision of duplicate analyses. Relative Percent Difference is defined in the following equation:

$$\%RPD = \frac{2(X1 - X2)}{x} \times 100 \quad 3$$

X1 = First duplicate value

X2 = Second duplicate value

When replicate analyses are performed, precision is measured in terms of the Standard Deviation (SD) which is defined in the following equation:

$$S = \sum_{i=1}^N \left[\frac{(X_i - \bar{X})^2}{N - 1} \right]^{1/2} \quad 4$$

where:

X_i = The recovery value of a spike replicate

X = Arithmetic average of the replicate values

N = Number of spikes

Completeness

Completeness is defined as the percent of parameters falling within acceptance criteria and the results subsequently reported. Acceptable recovery is typically 70-130%, and RPD should be ≤ 20%.

The general requirement of this quality assurance program is to analyze a sufficient number of standards, replicates, blanks, and spike samples to evaluate results adequately against numerical QA objectives.

7.4. Calibration Procedures, Quality Control Checks, and Corrective Action

The focus of the following section is to describe initial and continuing calibration procedures for analytical instrumentation, duplicate and control testing and data reduction, validation, and reporting.

Supplies and Quality Control Materials

All supplies (i.e., glassware, chemicals, reagents) used will be of the best possible quality to ensure proper instrument calibration and avoid contamination. All reagents used are prepared from Analytical Reagent Grade (AR) chemicals or higher purity grades, unless such purity is not available. The preparation of all reagents will be documented, including source, mass, and dilutions. Each reagent will be clearly labeled with the composition, concentration, date prepared, initials of preparer, expiration date, and special storage requirements, if any.

Reagents

Reagent solutions are stored in appropriate glass, plastic, or metal containers. Reagents are stored under conditions designed to maintain their integrity (refrigerated, dark, etc.). Shelf life is listed on the label and the reagent is discarded after it has expired. Dry reagents such as sodium sulfate, silica gel, alumina, and glass wool are either muffled at 400°C or extracted with solvent before use for organic chemical analyses. Water used in the laboratory is glass distilled or deionized, and periodically checked for purity. In addition, water used in the organics area is carbon-filtered or purchased as certified grade. All organic solvents used are either glass-distilled or pesticide grade. Solvents and reagent solutions are checked for contamination by employing reagent blanks, before use in any analysis.

Quality Control Reference Materials

All Quality Control Reference Materials are acquired only from authorized vendors or sources commonly used by U.S. EPA Regional Laboratories.

Standards Traceability

When standard reference materials arrive at the laboratory, they are registered in a bound log book, "Standards Notebook for Neat Materials and Primary Solutions." An example of a logging sequence is used to illustrate this process.

(1-S-XXX-12-4) (label and log sequence)

where:

- 1 = Notebook log number
- S = Standard Notebook--"Neat and Primary Standards"
- XXX = Receiving analyst's initials
- 12 = Notebook page
- 4 = Entry number on notebook page

All working standards prepared at the site lab are logged in the "Standards Notebook for Intermediate and Working Standards." A similar labeling convention has been adopted for classifying these working standard materials. An example is given below.

1-W-XXX-6-5 (label and log)

Where:

- 1 = Number of notebook
- W = Standards notebook - "Intermediate and Working" Standard
- XXX = Analyst's initial
- 6 = Page Number

5 = Page entry number in sequence

Instrument Calibration

Every instrument used to analyze samples must pass the calibration criteria established in the appropriate SOP. Initial calibration criteria for instrument linearity, sensitivity, resolution, and deactivation must be met before samples can be analyzed. Sustained performance is monitored periodically during sample analyses by the use of continuing calibration check standards.

GC Section

Initial Calibration

The linear calibration range of the instrument must be determined before the analysis of any samples. Gas chromatographic conditions used for sample analyses are used during calibration.

The calibration is performed in accordance with the SOP derived from the methods used. For most GC analyses, a 5-level calibration is run. The concentrations of the standards must bracket the linear range of the instrument. Calibration using fewer than 5-levels is done only when specifically allowed by the method.

Relative Retention Times and Relative Response Factors

Instrument calibration and sample analysis must be performed using appropriate internal standards to establish relative retention times (RRT) and relative response factors (RRF) where required. Internal standards appearing in a chromatogram will establish primary search windows for those target compounds nearby in the chromatogram. RRT are calculated using this equation:

$$RRT = \frac{RT^{target}}{RT^{is}} \quad 5$$

The RRF may be calculated as follows:

$$\text{Absolute Response Factor} = \text{RF} = \frac{\text{Area}}{\text{Amount}}$$

Note: Amount in this equation refers to the mass (e.g. ug) of compound mixed into the solution injected.

Each calibration standard is analyzed and the RRF is calculated for each analyte according to the following equation:

$$RRF = \frac{A_s \times C_{is}}{A_{is} \times C_s} \quad 6$$

- A_s = Area of analyte
- A_{is} = Area of internal standard
- C_{is} = Concentration of internal standard
- C_s = Concentration of analyte

Note: Certain data processors may calculate the RRF differently.

The standard deviation (SD) and the % coefficient of variation (CV) of RRFs for the compounds are calculated using the following equations:

$$S = \sum_{i=1}^N \left[\frac{(RRF_i - RRF_m)^2}{N - 1} \right]^{1/2} \% \quad 7$$

Where:

- RRF_i = Individual RRF
- RRF_m = Mean RRF
- N = Number of RRFs

and

$$\%CV = \frac{S \times 100}{RRF_m} \quad 8$$

Coefficient of Variation

The %CV of each compound must be less than 30 percent. This criterion must be achieved for the calibration to be valid.

If the %CV is less than 20 percent, the RRF of the compound can be assumed to be invariant, and the average RRF can be used for calculations.

If the %CV is between 20 percent and 30 percent, calculations must be made from the calibration curve. Both the slope and the intercept of the curve must be used to perform calculations.

Initial Calibration Verification

The calibration curve must be validated further by analyzing a QC check sample. The QC check sample must be obtained from EPA, another vendor, or it must be from another lot number. The QC check sample verifies the validity of the concentrations of the standards used to obtain the initial calibration.

All analytes in the QC check standard must be recovered within 80 to 100 percent. If any analyte exceeds this criterion, then a new calibration curve must be established. All sample results for a target analyte can be reported only from valid initial calibrations.

Continuing Calibration

The working calibration curve or RRF for each analyte must be verified daily by the analysis of a continuing calibration standard. The ongoing daily continuing calibration must be compared to the initial calibration curve to verify that the operation of the measurement system is in control.

The continuing calibration check must be performed during each day of analysis to verify the continuing calibration of the instrument. A day is defined as 24 hours from the start run time of the last valid continuing calibration. Generally, a continuing calibration check sample is injected every 20 samples.

Verification of continuing calibration is performed by the analysis of a midpoint standard containing all of the analytes of interest. Verification of continuing calibration of the measurement system is done by calculating the percent difference (%D) of the continuing calibration RRF from the mean RRF from the initial calibration curve using the following equation:

$$\%D = \frac{(RRF_m - RRF) \times 100}{RRF_m} \quad 9$$

where:

- RRF_m = The mean relative response factor from the initial calibration curve
- RRF = The relative response factor from the continuing calibration standard

The %D must meet the acceptance criteria established in the appropriate SOP. If these criteria are exceeded, a new calibration curve must be established.

Refrigerators

Refrigerators are maintained at 4°C, with control levels ranging from 1°C to 10°C. A temperature reading is taken each workday morning immediately after unlocking the refrigerator. The temperature reading is recorded and entered on the control chart posted on the door of the refrigerator. If a trend is apparent or if the temperature is outside the acceptable range, the Lab Manager is notified so that corrective action can be initiated if required.

Freezers

Freezers are maintained at -10°C, with control levels ranging from 0°C to -35°C. A temperature reading is taken each workday morning immediately after unlocking the freezer. The temperature reading is recorded and entered on the control chart posted on the door of the freezer. If a trend is apparent, or if the temperature is outside the acceptable range, the Lab Manager is notified so that corrective action can be initiated if required.

Calibration Standards

All calibration standards, including internal standards, are obtained from chemical suppliers with certificates of high purity and concentration.

Traceability

All standards are traceable to the National Institute of Standards and Testing (NITS) Standard Reference Materials (SRM) or to the U.S. EPA Reference Standards.

Working Standards

The commercial standards are used as stock standards. Working standards are made from the stock standards at appropriate concentrations to cover the linear range of the calibration curve. The working standards are used for initial calibration curves, continuing calibration checks, and preparation of analyte spiking solutions as appropriate for a particular analysis. All stock and working solutions are uniquely identified, dated, labeled, and initialed.

CORRECTIVE ACTIONS

Laboratory Imposed

Corrective actions will be initiated if the quality control criteria indicate an analysis is out of control.

- Check calculations for accuracy
- Check instrumentation to ensure it is operating properly. Recalibrate if necessary.
- Remake standards and reagents and reanalyze samples.
- Re-prepare and re-analyze samples.

The analyst is responsible for initiating corrective actions for analytical problems encountered during analysis of samples. Most problems which occur and are corrected during the analytical run will be explained in the run log or analytical bench sheet for that run. A corrective action report (CAR) may be necessary for some problems encountered, such as complete system failure, chronic calibration failure, or severe matrix interferences.

During data review, the reviewer may initiate corrective actions based on problems or questions arising from the review. A CAR will be initiated.

The Laboratory Manager may initiate corrective actions if a problem is noticed during a QC review of data, a system audit, or a performance audit. A CAR will be initiated.

CARs are signed and dated by Project Manager, and by the Laboratory Manager. CARs will be filed in appropriate department files and in the Lab Manger's files.

Agency Imposed

Any actions deemed necessary by regulatory agencies, such as EPA, will be taken. These actions are most likely to arise from a systems or performance audit, or from data review conducted by the agency.

Corrective Action Reports

The laboratory will have a Corrective Action System that ensures the proper documentation and dispositions of conditions requiring corrective action. The system will also ensure that the proper corrective action is implemented to prevent recurrence of the condition.

Situations Requiring Corrective Action Reports

The Corrective Action System applies to all situations that affect data quality. These situations include, but are not limited to, quality control criteria being exceeded, statistically out-of-control events, deviations from normally expected results, suspect data, deviations from the standard operating procedure, and special sample handling requirements. Corrective actions may also be initiated as a result of other QA activities, such as performance audits, systems audits, laboratory/interfield comparison studies, and QA project-related requirements of certifying agencies such as EPA.

Corrective Action Procedures

The procedure requires documenting the condition requiring corrective action on a Corrective Action Report and implementing corrective action based on the results of the investigation performed to determine the cause of the condition (Table 4-1 and 4-2).

When a condition requiring corrective action arises, the Corrective Action Report is initiated. The initiator describes the condition requiring corrective action. An investigation, if necessary, is conducted to determine the cause of the condition. A corrective action is recommended based on the results of the investigation. The Corrective Action Report is reviewed by the Project Manager and the Lab Manager who either approve the recommended corrective action or indicate a different corrective action. The originator has the responsibility of following up to be

sure that the corrective action is implemented. Implementation of the corrective action is documented by the Corrective Action Report being signed and dated by the person who implemented the corrective action.

Table 7-1. Corrective Actions		
QC Activity	Acceptance Criteria	Recommended Corrective Action
Initial instrument blank	Instrument response <MRL response	Prepare another blank, if same response, determine cause of contamination: reagents, environment, instrument equipment failure, etc.
Initial calibration standards	Coefficient of variation >0.995 or standard concentration value \pm 10% of expected value	Reanalyze standards. If still unacceptable, then remake standards
QC Check Standard	\pm 10% of expected value	Reanalyze standard. if still unacceptable, then remake standards, or use new primary standards if necessary
Continuing calibration Standards	\pm of expected value	Reanalyze standard. If still unacceptable, then recalibrate and rerun samples from the last cc stnd. Check
Method blank	<MDL	Reanalyze blank. If still positive, determine source of contamination. If necessary, reprocess (i.e., digest or extract) sample set

Table 7-2. Corrective Action Report Criteria for Control Charts	
Criteria	Corrective Action
A point outside ± 3 standard deviations	Attempt to determine the source of the problem. Verbally report the deviation and results of preliminary investigation to the Field Site Manager, who will decide jointly what action to take. After implementing corrective action, complete the Corrective Action Report and submit it to the Project Manager and the Field Site Manager for approval.
Three consecutive points accuracy outside \pm standard deviation	Conduct investigation. Check accuracy of data input, calculations, instrument, standards, etc., to locate the source of the problem. Document results in a Corrective Action Report. Have the report approved by the supervisor. No results can be reported until the Corrective Action Report

	has been approved. Send a copy of the Corrective Action Report and a copy of the QC chart to the Field Site Manager.
Obvious outlier.	Conduct investigation. Check accuracy of data input, calculations, dilutions, instrument, standard, etc.. present initial findings to the Field Site Manager. They will jointly decide what actions need to be taken. Document the results in a Corrective Action Report and have it approved by the Field Site Manager. No results can be reported until the Corrective Action Report is approved. Send a copy of the Corrective Action report and a copy of the control chart to the Field Site Manager.
Obvious shift in the mean.	Conduct investigation. Check calculations, data entry, standards, instrument, calibrations, etc. Document results in a Corrective Action Report. Have the Corrective Action Report approved by the Field Site Manager. No results can be reported until the report is approved. Send a copy of the Corrective Action Report and a copy of the QC chart to the Field Site Manager.

7.5. Demonstration Procedures

Maintenance Schedule

Preventive maintenance, such as lubrication, source cleaning, and detector cleaning, is performed according to the procedures delineated in the manufacturer's instrument manuals.

The frequency of preventive maintenance varies with different instruments. Routine maintenance performed includes cleaning and/or replacement of various instrument components. In general, the frequency recommended by the manufacturer is followed. In addition to the regular schedule, maintenance is performed as needed. Precision and accuracy data are examined for trends and excursions beyond control limits to determine evidence of instrument malfunction. Maintenance is performed when an instrument begins to degrade as evidenced by the degradation of peak resolution, shift in calibration curves, decreased ion sensitivity, or failure to meet one or another of the quality control criteria. GC injector septa is changed every 100 to 150 injections, or sooner if instrument performance deteriorates. Injection port glass liner is cleaned or changed after 100 to 150 injections or sooner if instrument performance deteriorated. A method blank is analyzed at the beginning of each sample set and after every 20 samples to monitor instrument background.

Instrument maintenance logbooks are maintained in the laboratory at all times. The logbook contains a complete history of past maintenance, both routine and nonroutine. The nature of work performed, the date, and the signature of the person who performed the work are recorded in the logbook. Preventive maintenance is scheduled according to each manufacturer's recommendation. Instrument downtime is minimized by keeping adequate supplies of all expendable items on hand. Expendable items are those with an expected lifetime of less than one year. Routine instrument preventive maintenance is handled by the instrument operator. Repair maintenance is performed by a full-time electronics technician, or by the manufacturer's service personnel.

7.6. Calculation of Data Quality Indicators

The focus of this section is to present methods of calculating data quality that will be used for this project.

Control Samples

The laboratory will employ control samples to assess the validity of the analytical results of the field samples. Determination of the validity of field sample results is based on the acceptance criteria being met by the control sample. The acceptance criteria for each type of control sample are delineated in the appropriate SOP. These acceptance criteria are based on the laboratory's statistical process capabilities determined from historical data, and meet the EPA CLP acceptance criteria as a minimum. Often, in-house criteria are more stringent than required by CLP. The control samples are analyzed in the same manner as the field samples. They are interspersed with the field samples at frequencies that are specified by the appropriate SOP.

Method Blank Analyses

A method blank is a "clean" sample (i.e., containing no analyte of concern), most often deionized water, to which all reagents are added and analytical procedures are performed. Method blanks are analyzed at a rate of one per sample lot or at least every 20 samples. The blank is analyzed in order to assess possible contamination from the laboratory or the procedure. If the analyte of interest is found in the blank at above reporting levels, inorganic analysis is suspended until the source of contamination is found and corrective action is taken. The Laboratory Manager is notified when blank results are unacceptably high, and may assist in the investigation.

Surrogate Spike Analyses

For certain analyses, each sample and blank is spiked with one or more surrogate compounds before preparatory operations such as purging or extraction. These surrogate standards are chosen for properties similar to sample analytes of interest, but are usually absent from the natural sample.

Surrogate spikes evaluate the efficiency of the analytical procedure in recovering the true amount of a known compound.

The results of surrogate standard determinations are compared with the true values spiked into the sample matrix prior to extraction and analysis, and the percent recoveries of the surrogate standards are determined. Recoveries should meet the upper and lower control limits as specified for each compound. If control limits are exceeded for surrogate standards, the following sequence of actions is taken:

- a. The sample is re-injected.
- b. Raw data and calculations are checked for errors.
- c. Internal standards and surrogate spiking solutions are checked for degradation, contamination, or solvent evaporation.
- d. Instrument performance is checked.
- e. If a, b, and c fail to reveal the cause of the noncompliance surrogate recoveries, the sample is re-purged or re-extracted.
- f. If all the measures listed above fail to correct the problem for laboratory blank surrogate analyses, the analytical system is considered out of control, and the instrument must be recalibrated and examined for mechanical faults.
- g. If all the measures listed above fail to correct the problem for field sample surrogate analyses, the deficiency probably is due to sample interferences, and not due to any procedural or mechanical problems in the laboratory. The surrogate spike recovery data and the sample data from both extractions are reported and are flagged. The Laboratory Manager is notified with an exceptions report and the corrective actions taken.

Matrix Spike/Matrix Spike Duplicate Analyses

To evaluate the effect of the sample matrix on the analytical methodology, two separate aliquot samples may be spiked with a standard mix of compounds appropriate to a given analysis. The matrix spike and the matrix spike duplicate (MS/MSD) are analyzed at a frequency of one per lot or one per 20 samples, whichever is more frequent. The percent recovery for each of the spiking compounds is calculated. The relative percent difference (RPD) between the MS/MSD is also calculated.

The observed percent recoveries (%R) and relative percent differences (RPD) between the MS/MSD are used to determine the accuracy and the precision of the analytical method for the sample matrix. If the percent recovery and RPD results exceed the control limits as specified for each spiking compound, the sample is not reanalyzed. Poor recovery in matrix spiked samples

does not necessarily represent an analytical system out of control. It is possible that unavoidable interferences and matrix effects from the sample itself preclude efficient recoveries. The poor recovery is documented for the Lab Manager.

Internal Standards Analysis

Once an instrument has been calibrated, it is necessary to confirm periodically that the analytical system remains in calibration. The continuing calibration and precision of the organics analytical system are checked for each sample analysis by monitoring the instrument response to internal standards. When internal standard addition is not appropriate to a particular method, other means of accuracy checks, such as standard addition, are used. Results from internal standard analyses are compared to the mean calibrated value. Deviation from this mean beyond a predetermined magnitude, depending on the type of analysis, defines an out-of-control condition. The system must then be brought back into control by:

- Checking the quality of the internal standards and reanalyzing the sample
- Recalibrating the system
- Correcting the malfunctions causing the instrument to fall out of calibration

Duplicate Sample Analyses

Duplicate analyses are performed for cations analyses and upon special request for selected other parameters to evaluate the reproducibility of the method. Results of the duplicate analyses are used to determine the RPD between replicate samples. For each parameter analyzed, at least one duplicate sample is run per group of 20 samples.

The precision value, RPD, is reviewed by the section supervisor and the division manager. If the precision value exceeds the control limit or the established protocol criteria for the given parameter, the sample set is reanalyzed for the parameter in question unless it is determined that heterogeneity of the sample has caused the high RPD.

QC Check Standard Analyses

Analysis of QC check standards is used to verify the preparation process or the standard curve, and is performed with each group of samples. Results of these data are summarized, evaluated, and presented to the section supervisor and the division manager for review.

The results of the QC check standard analysis are compared with the true values, and the percent recovery of the check standard is calculated. If correction of a procedure or instrument repair is done, the check standard is reanalyzed to demonstrate that the corrective action has been successful.

At least twice a year, a QC check standard for each parameter group is analyzed as a double-blind sample. Samples are prepared, submitted, and evaluated by the Laboratory Manager.

Other Quality Control Samples

Under some sampling analysis, additional quality control samples may be required. These may include:

a. **Blank/Spike**--Analyte of interest or surrogate is spiked into blank water rather than into a sample. The blank/spike goes through the entire analytical procedure, and percent recovery is calculated with no likelihood of matrix effect. For many contracts, an externally provided LCS sample (EPA) serves as a blank/spike sample.

b. **Trip Blank**--A sample bottle filled with laboratory blank water travels with the sample kit to the sampling site, and is sent back to the laboratory packed in the same container as any volatile samples collected. Trip blank analyses check for possible volatile contamination during shipping or sampling.

c. **Field Blank**--A field blank can be a sample container filled with laboratory blank water and sent to the sampling site, or it may be filled at the site with purchased distilled water or decontamination water. The field blank analysis checks for possible contamination by the sampling team.

d. **Equipment Rinsates**--After equipment has been cleaned in the field, many contracts require that the equipment be rinsed and the rinsate analyzed for the same parameters requested on the samples. The rinsate analysis proves the equipment has been cleaned properly and will not contaminate the next samples taken.

Instrument Detection Limits, Method Detection Limits, and Reporting Limits

Instrument Detection Limits (IDL)

Instrument Detection Limit (IDL) studies are performed for inorganic parameters when an instrument is installed, when major maintenance or repair work has been done, and routinely once per calendar quarter.

To determine IDL, seven consecutive measurements per day are made on a prepared standard solution (in reagent water) of an analyte at a concentration 3 to 5 times the instrument manufacturer's suggested IDL. Each measurement is performed as though it were a separate analytical sample. This procedure is repeated on three nonconsecutive days. The standard deviation is calculated for each set of seven replicates and the average of the standard deviations is obtained. This average is multiplied by 3 to give the instrument detection limit (IDL).

Method Detection Limits (MDL)

The Method Detection Limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the value is above zero. The sample must be carried through the entire method under ideal conditions. MDL is determined according to the method outlined in 40 CFR 136, Appendix B. MDLs are determined at least annually for all parameters. MDL studies are also conducted for new methods introduced in the lab, after major maintenance or modification to an instrument, and as part of the training of new analysts.

To determine MDL, seven replicate analyses are made of analytes spiked into blank water at 1 to 5 times the estimated method detection limit. The spiked samples must be carried through the entire analytical procedure, including any extraction, digestion, or distillation process, for MDL calculation. The SD of these replicates is calculated. Where: t = The student t value for a 99% confidence interval

$$MDL = t \times S \quad 10$$

S = Standard deviation of the replicate analyses

Reporting Limits

In most cases, final report forms list reporting limits rather than either IDL or MDL. Reporting limits are taken from EPA SW846 published limits or from historical data. Matrixes or analyte concentrations which require dilution will change the detection limits for that sample.

4.7. Performance and System Audits

In this section information is provided on performance audits.

Performance Evaluation Samples

Performance evaluation samples are analyzed throughout the project for all parameters, as a constant check on accuracy and precision for all analyses.

Audits

Internal audits of the laboratory are conducted in two phases. The first phase is conducted by the Laboratory Quality Assurance Coordinator during the fourth quarter of the year. This is usually a 2-day systems audit which covers all sections of the laboratory. An audit report is issued within 2 weeks of completion. The Lab Manager has the responsibility for coordinating all responses to the audit finding and for following up on the required corrective action. A followup audit is made when deemed necessary by the Lab Manager.

The second phase consists of quarterly audits performed by the Lab Manager. These are half-day or day-long audits, and are concentrated on specific areas that are deemed problem areas by the Lab Manager. An audit report is issued at the completion of the audit. Responses and followup corrective action to the audit findings are required, and are monitored by the Field Site Manager.

All audit reports are issued to management and circulated to all staff. Copies are filed with the Laboratory Manager.

7.8. Quality Assurance Reports

The performance of the laboratory as assessed by the quality monitoring systems in place is reported by the Lab Manager to management quarterly and as needed. Copies of all quality reports are maintained in the Laboratory Manager files.

Quality assurance reports to management include, but are not limited to, the following:

- Results of performance and systems audits
- Status of corrective actions
- Periodic assessment of data accuracy, precision, and completeness
- Significant QA problems and recommended solutions

In addition to the quarterly reports, a final report summarizing items covered in the quarterly reports is provided by the Lab Manager to the Project Manager.

7.9. Data Format

Introduction

In order to provide analytical data which is technically sound and defensible, a system of data management will be implemented in the laboratory. All activities which pertain to a sample are documented.

All data generated during the demonstration, except those that are generated by automated data collection systems, will be recorded directly, promptly, and legibly in ink. All data entries will be dated on the day of entry and signed or initialed by the person entering the data. Any change in entries will not obscure the original entry, will indicate the reason for such change, and will be dated and signed or identified at the time of the change.

In automated data collection systems, the individual responsible for direct data input will be identified at the time of data input. Any change in automated data entries will not obscure the original entry. Updated entries will indicate the reason for the change, the date, and the person responsible for making the change.

Data Tracking in the Laboratory

The Lab Manager is responsible for developing a system for tracking and maintaining sample identity between the collection point, analysis and reporting. This process will be periodically reviewed by the Project Manager.

Analyses and Data Reduction

The Lab Manager is responsible for the reduction of raw data when such steps are required to produce the correct data format for reporting. Data reduction may be done manually or through one of a number of computer programs used in the laboratory.

Chromatogram Identification

In the GC section computer software is used to identify chromatograms. A system-supplied file name (a hexadecimal date-time) and a user-supplied file name (related to an entry in the injection log) identify each acquisition.

Data Reduction Formulas

Linear regression formulas are used in a computer software system to calculate samples values for many general inorganic parameters and metals analyses. These programs use the general formula for linear regression:

$$Y' = a + bx \quad 11$$

where:

- Y' = The predicted value of y for a selected value of x
- a = The value of y when x = 0
- b = The slope of the straight line
- x = Any value of x selected

Sample values for GC/MS parameters are calculated by systems software using the general formula:

$$\frac{Area_{Target} \times Amount_{IS}}{Area_{IS} \times Response\ Factor} \quad 12$$

GC data is calculated using either an internal or an external standard. For internal standards:

$$Concentration = \left(\frac{A_x^{sample}}{A_x^{standard}} \right) \left(\frac{A_{IS}^{standard}}{A_{IS}^{sample}} \right) (amt_x^{standard}) \left(\frac{P}{T} \right) \left(\frac{amt_{IS}^{sample}}{Amt_{IS}^{standard}} \right) \quad 13$$

where: P = 1/fraction of extract to which IS is added

For calculations using an external standard:

$$\text{Concentration} = \left(\frac{A_x^{\text{sample}}}{A_x^{\text{standard}}} \right) (C_x^{\text{standard}}) \left(\frac{V}{T} \right) \quad 14$$

where: C = concentration of x in standard
V = volume of final extract
T = total sample extracted

7.10. Data Storage and Archiving Procedures.

Data will be saved in the computers using for instrument operation. This data will be batch processed into an Excel .csv file that can be easily converted to an Excel Worksheet. These files will be backed-up and transferred to individuals responsible for calculating flux results. All data related to the project will be organized for rapid retrieval and transfer to other interested parties.

APPENDIX F

Health and Safety Plan

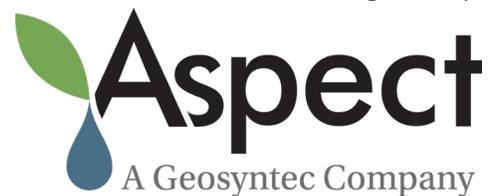
Prepared for

BMR-Dexter LLC (BMRD)
4570 Executive Dr Suite 400
San Diego, CA 92121

HEALTH AND SAFETY PLAN

American Linen Supply Co Dexter Ave Site
700 Dexter Avenue, Seattle, Washington

Prepared by



Aspect Consulting, a Geosyntec Company
350 Madison Ave North
Bainbridge Island, WA 98110

Project Number: AS240461

August 13, 2025

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H&S INCIDENT RESPONSE PROCEDURES

H&S Injury Response Procedures



For more Information:
 All work-related injuries, illnesses, and Good Catches! (near-miss situations), including vehicle accidents and general liability claims, must be documented and reported to the Health and Safety (H&S) team

Visit the H&S team on the intranet:
<http://home.geosyntec.com/Corp/EHS/>

Bob Poll 813-240-9231 Director – H&S	Dale Prokopchak 804-349-8067 Alternate	Ersin Yalcin 404-435-4722 Southern Region
Joe Esseichick 734-417-0909 Western Region	Mark Malchik 781-392-5440 Northern Region	Jason Ford 226-220-3401 Canadian Region

Geosyntec[®]
consultants

ROUTE TO HOSPITAL



VIRGINIA MASON MEDICAL CENTER

(206) 624-1144

1100 9th Ave

Seattle, WA 98101

DIRECTIONS TO HOSPITAL FROM SITE

Head south on Dexter Ave N toward Roy St (0.5 mi)

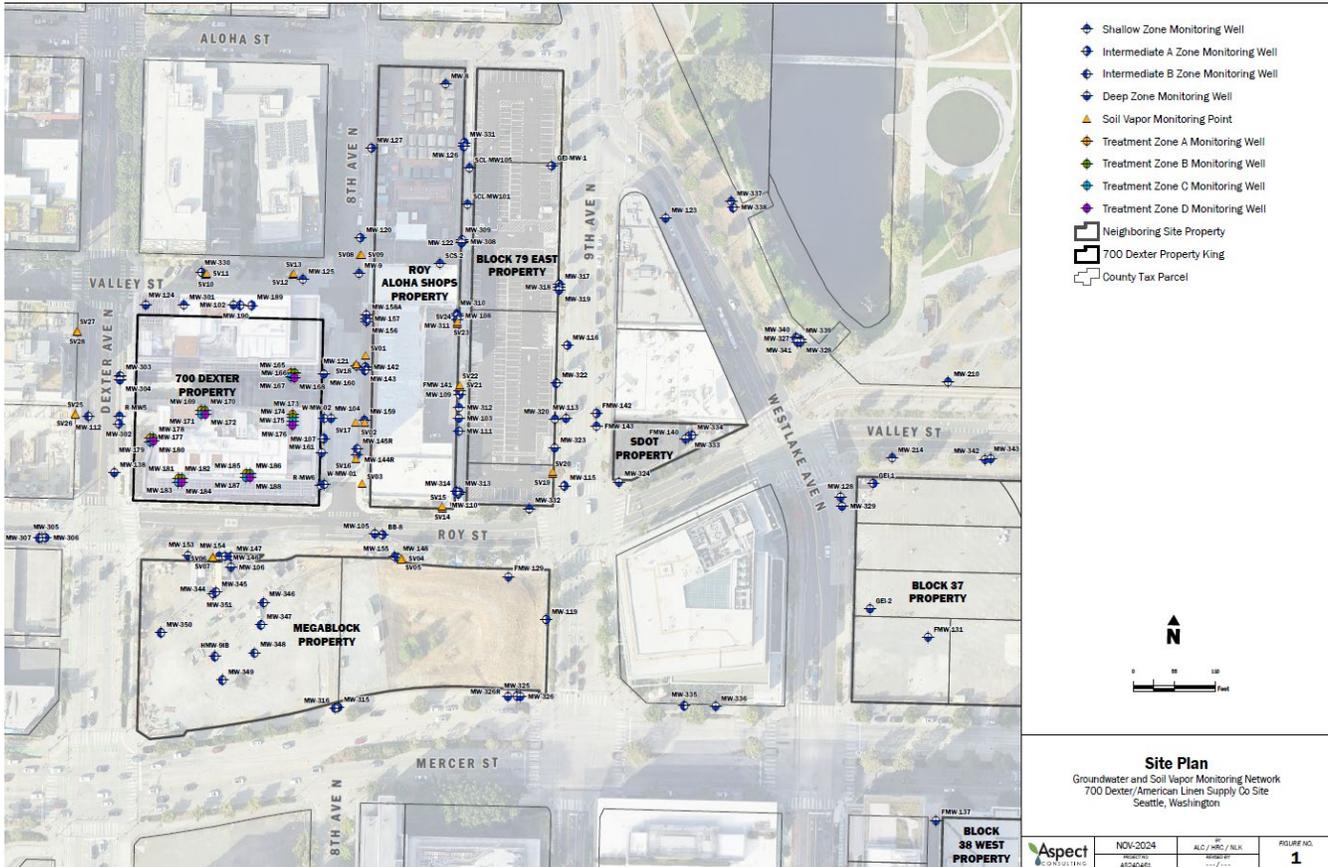
Turn left onto Denny Wy (0.3 mi)

Slight right onto Boren Ave (0.7 mi)

Turn right onto Seneca St (331 ft)

Turn left, destination will be on the right (69 ft)

SITE MAP



1. INTRODUCTION

This site-specific Health and Safety Plan (HASP) was prepared to address project-specific hazards known or suspected to be present associated with the existing conditions and work to be performed at the work site(s). This HASP was prepared to meet the requirements specified in Occupational Safety and Health (OSHA) Hazardous Waste Operations Emergency and Response (HAZWOPER) program, Geosyntec Consultants, Inc. (Geosyntec)’s Health and Safety (H&S) Procedure HS 301, and the H&S requirements of the client.

2. SIGNATURES

2.1 Preparers and Reviewers

This HASP must be maintained on-site when field work is being performed. The Site Health and Safety Officer (SHSO) can change or amend this document, in agreement with the Health and Safety Coordinator (HSC) or Project Manager (PM). Amendments (e.g., changes in personal protective equipment, addition of tasks, etc.) must be documented in Section 19 and in Appendix A. This HASP must be reviewed and amended on an annual basis for projects lasting more than one year.

Prepared by:	 <hr/> SHSO	<hr/> 6/17/2025 Date
Reviewed by:	 <hr/> Regional HSE Professional	<hr/> 06/11/2025 Date
Approved by:	 <hr/> Project Manager	<hr/> 8/13/2025 Date

This HASP has been given to the following H&S approved subcontractor(s).

Subcontractor	Representative	Date
Subcontractor	Representative	Date
Subcontractor	Representative	Date

2.2 Site Workers

This HASP must be reviewed by personnel prior to site work. Workers who are not in attendance at the initial meeting must be trained by the SHSO on the information covered in the pre-entry briefing. After reading the HASP and attending a pre-entry briefing, Geosyntec employees and other parties covered under this HASP must sign the following acknowledgment statement.



“I have read, understand, and will perform my work in accordance with the information set forth in this HASP.”

Signature

Printed Name

Date

_____	_____	_____
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3. EMERGENCY CONTACT INFORMATION

Contact	Telephone Numbers	
	Office	Alternate (Type)
Fire Department	911	
Police Department	911	
Hospital – Virginia Mason Medical Center	(206) 624-1144	911
Director of H&S – Bob Poll, CIH, CSP	(813) 379-4420	(813) 240-9231 (Cell)
H&S Regional Manager – Madison Mclaughlin	(858) 716-2900	(951) 990-2888 (Cell)
Project Manager – Lea Kane	(206) 858-4378	(925) 354-2791 (Cell)
Site Health & Safety Officer – Hannah Cohen	--	(206) 512-9091 (Cell)
Branch H&S Coordinator – Madeline Chavira	(206) 496-1463	--
Principal – Melissa Asher	(206) 496-1449	(574) 261-4358 (Cell)
Utility Emergencies	811	
EthicsPoint	(844) 231-3371	
WorkCare	(888) 449-7787	(714) 978-7488
Facility Contact – Elizabeth Dickey	(858) 207-5312	(858) 472-1977
Client Contact – John Moshy		(858) 829-7709

4. APPLICABILITY OF THIS HASP

This HASP was prepared in accordance with Geosyntec’s H&S Procedures for use by Geosyntec project staff and subcontractors. Subcontractors, at a minimum, shall ensure that their employees, and those of its lower tier subcontractors, comply with these procedures and other health, safety and security provisions in the Subcontract. Compliance with this HASP shall represent the minimum requirements to be met by subcontractors, who shall be responsible for examining all requirements and determining whether additional or more stringent health, safety and security provisions are appropriate for their portion of the work and implementing them accordingly. Therefore, for firms executing all or any portion of the work, this document and its contents should not be used without a thorough peer review by their health and safety managers. Prior to commencing work, such firms are responsible for reviewing and supplementing the HASP to add appropriate procedures specific to their portion of the work.

5. SITE/TASK/HAZARD DESCRIPTION

5.1 Site Background

The following is a brief description of the site, including information as to the location, approximate size, previous usage, and current usage. A description of the tasks to be performed is also presented.

Site Location:	<u>700 Dexter Avenue North, Seattle, Washington and portions of adjacent properties (Roy Aloha Shops Property, Block 79 East Property, Megablock Property, SDOT Property, Block 37 Property) and adjoining rights-of-way</u>
Approximate Size of Site:	<u>0.03 mile</u>
Previous Site Usage:	<u>Commercial use</u>
Current Site Usage:	<u>Mixed use retail, vacant and commercial</u>

Description of Surrounding Property/Population:

North:	Commercial/Courtyard Seattle Downtown/Lake Union Hotel	East:	Commercial/Google South Lake Union Office
South:	Commercial/UW Medicine Research Facility	West:	Commercial/The Ruins Event Venue

Summary of Previous Site Investigations (if available/applicable):

Previous groundwater, soil, and soil vapor investigations have been conducted by previous consultants since 1992 to evaluate primarily chlorinated VOCs (cVOCs) and/or petroleum hydrocarbon related constituents resulting from historical property operations. For more information, refer to the document repository online at [American Linen Supply Co Dexter Ave - \(12004\)](#)

Site is surrounded by mixed uses of retail, vacant, and commercial properties.

5.2 Task Descriptions

Task 1: Quarterly Measurement of Site-wide Water Levels, Well Maintenance, Groundwater Sampling

- Access the Dexter property, adjacent properties, and rights-of-way to record depth-to-groundwater and depth-to-bottom levels at 141 wells.
- Decon of equipment between monitoring wells.
- Replace necessary monitoring well parts as needed
- Use of hand tools and power tools
- Transportation of equipment and supplies around the site
- Work within traffic control setups
- Collection of groundwater in laboratory-provided sample bottles
- Decon of sample equipment

Task 2: Soil Vapor Sampling

- Use of hand tools and sampling equipment
- Collection of soil vapor samples in laboratory-provided canisters
- Transportation of equipment around the site
- Decon of sample equipment

Task 3: Well Installation

- Oversight of drilling rig mobilization and drilling
- Work within traffic control setups
- Collection of soil samples
- Use of hand tools and power tools
- Transportation of equipment and supplies around the site
- Well development

Task 4: Remedial Injections

- Oversight of in-situ injections using KB-1 Primer (SiREM), Sodium Lactate, SRS-SD (EVO), and SRS-ZVI
- Monitoring and data collection near pressurized injection hoses and equipment
- Transportation of equipment around the site
- Work within traffic control setups

Task Hazard Analyses (THAs) associated with these tasks are presented in Appendix B.

5.3 Chemical Hazards

The classes of chemicals that are known or suspected to be present that may be encountered while performing site work include the following:

- Chlorinated volatile organic compounds (cVOCs)
- Petroleum hydrocarbons related constituents, including benzene
- KB-1 Primer (SiREM) during injections
- Sodium Lactate during injections
- SRS-SD (EVO) during injections
- SRS-ZVI during injections

Controls for these hazards are presented in the THAs included in Appendix B. A summary of these chemical hazards is presented in Appendix C.

5.4 Physical Hazards

The following physical hazards have been identified associated with the work to be performed and the site conditions.

- Equipment handling
- Drum and container handling
- Eye injury
- Fall protection
- Hand/foot injury
- Heat stress

- Heavy equipment
- Knives/blades
- Lifting heavy loads
- Loud noise/vibration
- Slips, trips, and falls
- Thoroughfares/traffic
- Urban environments
- Utility protection
- Cutting
- Electrical/power tool
- High Pressure equipment

Controls for these hazards are presented in the THAs included in Appendix B.

5.5 Biological Hazards

The following biological hazards have been identified associated with the work to be performed and the site conditions.

- Himalayan blackberries
- Biting/stinging insects
- Human waste
- Needles and other sharp objects
- COVID-19

Controls for these hazards are presented in the THAs included in Appendix B.

6. GENERAL SAFE WORK PRACTICES

The following general safe work practices must be adhered to while performing site work:

- Basic personal protective equipment (PPE) shall be worn, including hard hats, safety glasses, hard-toed boots, and high-visibility vests. If conditions allow, the requirement for hard hats and hard-toed boots may be reduced with approval of the SHSO and PM.
- Minimize contact with impacted materials. Do not place equipment on the ground. Do not sit or kneel on potentially contaminated surfaces.

- Smoking, eating, or drinking after entering the work zone and before personal decontamination is not allowed. Employees who are suspected of being under the influence of illegal drugs or alcohol will be removed from the site. Workers taking prescribed medication that may cause drowsiness shall not operate heavy equipment and are prohibited from performing tasks where Level C or B PPE is required.
- Practice good housekeeping.
- Use of contact lenses is not allowed under certain hazardous working conditions.
- The following conditions must be observed when operating a motor vehicle:
 - Wearing of seat belts is mandatory.
 - The use of headlights is mandatory during periods of rain, fog, or other adverse weather or low-light conditions.
 - A backup warning system or use of vehicle horn is mandatory when the vehicle is engaged in a backward motion.
 - Posted traffic signs and directions from flagmen must be observed.
 - Equipment and/or samples transported in vehicles must be secured from movement.
 - The use of vehicles acquired by Geosyntec by non-Geosyntec personnel is prohibited.
- In an unknown situation, always assume the worst reasonable conditions.
- Be observant of your immediate surroundings and the surroundings of others. It is a team effort to notice and warn of dangerous situations. Withdrawal from a hazardous situation to reassess procedures is the preferred course of action.
- Conflicting situations may arise concerning safety requirements and working conditions. These must be addressed and resolved rapidly by the SHSO and PM to relieve motivations or pressures to circumvent established safety policies.
- Unauthorized breaches of specified safety protocol are not allowed. Workers unwilling or unable to comply with established procedures will be asked to leave the work site.
- During injections stay clear of pressurized equipment and let contractors handle chemical mixing and equipment.

7. EMERGENCY RESPONSE

This section discusses emergency response procedures and response equipment to be maintained on-site. A table presenting a list of contacts and telephone numbers for the applicable local and off-site emergency responders is provided inside the front cover of this HASP (after figures).

7.1 Injury and Emergency Response Procedures

In the event of an **injury** to an employee, the instructions for injury response and reporting, located in the front of this HASP, must be implemented immediately. In the event that an **emergency** develops, the following procedures are to be implemented:

- The SHSO, or designated alternate, should be immediately notified via the on-site communication system. The SHSO assumes control of the emergency response.
- If applicable, the SHSO must immediately notify off-site emergency responders (e.g., fire department, hospital, police department, etc.) and must inform the response team of the nature and location of the emergency on-site.
- If applicable, the SHSO may call for evacuation of the site. Site workers should move to their respective refuge stations using the evacuation routes provided on the Site Map.
- For small fires, flames should be extinguished using the appropriate type of fire extinguisher. Large fires should be handled by the local fire department.
- If a worker is injured, the procedures presented in “Instructions for Injury Response,” located in the front of this HASP, must be implemented immediately.
- After an incident has stabilized, the procedures presented in “Instructions for Incident Reporting,” located in the front of this HASP, must be followed.

7.2 Emergency Response Equipment

Emergency response equipment will be maintained in the work area as necessary for this project. Examples of emergency response equipment include first aid kits, fire extinguishers (Type ABC), and eyewash bottles.

8. KEY PERSONNEL AND HEALTH AND SAFETY RESPONSIBILITIES

Project personnel and their responsibilities in regard to health and safety concerns on this project are as follows:

Project Manager (PM): Lea Kane

- Approve this HASP and amendments, if any;
- Monitor the field logbooks for health and safety work practices employed;

- Coordinate with SHSO so that emergency response procedures are implemented;
- Check that corrective actions are implemented;
- Check and document that qualified personnel receive this plan and are aware of its provisions and potential hazards associated with site operations, and that they are instructed in safe work practices and familiar with emergency response procedures; and
- Provide for appropriate monitoring, PPE, and decontamination materials.

Site Health and Safety Officer (SHSO): Hannah Cohen (unless otherwise delegated)

- Prepare and implement project HASP and amendments, if any, and report to the PM for action if deviations from the anticipated conditions exist and authorize the cessation of work if necessary;
- Check that site personnel meet the training and medical requirements;
- Conduct pre-entry briefing and daily tailgate safety meetings;
- Check that monitoring equipment and PPE are operating correctly according to manufacturer's instructions and such equipment is utilized by on-site personnel. Calibrate or check calibration of monitoring equipment and record results;
- Check that decontamination procedures are being implemented;
- Implement site emergency response and follow-up procedures;
- Notify the HSC in the event an emergency occurs; and
- Perform and document weekly inspections.

Health and Safety Coordinator: Madeline Chavira

- Review and audit HASP and amendments;
- Notify Director of H&S when an emergency occurs;
- Assist with the implementation of the corporate health and safety program; and
- Consult with staff on health and safety issues.

Site Workers: (rotating)

- Provide verification of required health and safety training and medical surveillance prior to arriving at the site;
- Notify supervisors of workplace accommodation requirements as the result of physical limitations or medical conditions;
- Attend pre-entry briefings and daily tailgate safety meetings;

- Immediately report accidents and/or unsafe conditions to the SHSO;
- Be familiar with and abide by the HASP; and
- Be ultimately responsible for his or her own safety.

9. WORKER TRAINING AND MEDICAL SURVEILLANCE

Personnel involved in field activities subject to OSHA HAZWOPER 29 Code of Federal Regulations (CFR) 1910.120 will be required to participate in both a health and safety training program that complies with criteria primarily set forth by the OSHA HAZWOPER in 29 CFR 1910.120(e) and a medical surveillance program covered under 29 CFR 1910.120(f), or equivalent regulations based on the jurisdiction in which the project is performed.

9.1 Pre-Assignment and Annual Refresher Training

Prior to arrival on-site, the Geosyntec PM will be responsible for monitoring that their staff meet the requirements of pre-assignment training (40/24 hours per Procedure HS 301). In addition, personnel must be able to document dates of attendance at an annual 8-hour refresher and three days of fieldwork under a qualified supervisor. Failure to provide this documentation will prohibit entry to the active work area(s) (i.e., Exclusion Zone).

9.2 Site Supervisor Training

Consistent with OSHA 29 CFR 1910.120 (e)(4), prior to arrival on-site, individuals designated as site supervisors require an additional eight hours of specialized training.

9.3 Initial Site Safety Orientation and HASP Review

In addition to complying with 29 CFR 1910(e), site personnel will attend an initial safety orientation during which the HASP and applicable THAs will be reviewed prior to initiating field activities. This review will include the following:

- Understanding the lines of authority regarding health and safety and site personnel roles and responsibilities;
- Information of specific hazard agents related to the site and site operations will be discussed, such as health hazards of site chemicals and specific safety hazards of processes, tools, and equipment;
- Training in the proper use, maintenance, and decon protocol of PPE and Level(s) of Protection;
- Appropriate work practices and engineering controls to reduce/eliminate exposures to site hazards will be reviewed;
- Personnel will be informed of means for normal site and emergency communication(s);

- Air monitoring strategies will be discussed to include the frequency/types, action levels, sampling techniques, pre/post calibration techniques;
- Unique/site specific medical surveillance requirements that need to be considered based on site contaminants;
- Understanding site control measures, work zones, and proper decontamination procedures for personnel/tools/vehicles, etc. to reduce the potential for both on-/off-site contamination;
- Personnel will be trained to respond quickly and properly in the event of an emergency; and
- Personnel involved in specific hazardous activities, such as confined space entry, drum handling, sampling unknowns, etc. will receive specialized training in the appropriate techniques to employ prior to commencing these operations.

9.4 Baseline Medical Surveillance Exam

The baseline medical examination is used to identify physical capabilities and certain medical limitations that may have an impact on the candidate's ability to perform in the position and/or job activity for which he/she is being considered, as well as to establish certain baseline medical parameters. The initial test results can then be compared against future periodic or project-specific monitoring results.

9.5 Periodic/Annual/Biennial Medical Exam

The periodic medical examination is used to evaluate an employee's continued fitness for duty and to assess possible impact(s) occupational exposures may have had on their health status. The periodic examination includes an update to the medical and work history, results of previous occupational exposure assessments, and a detailed medical exam tailored to the job description.

The Medical Director from WorkCare determines the frequency of the periodic medical exams based on regulatory requirements, the position/work activities of the employee, and the level of exposure to physical, chemical, and biological agents.

9.6 Exposure/Activity/Project-Specific Medical Testing

Exposure-specific medical tests and/or evaluation of biological indices may be conducted to establish a baseline for certain project-specific parameters, to monitor the effectiveness of hazard controls, and/or to assess the impact of occupational exposures associated with a particular work activity or project. The Medical Director, in coordination with the H&S Department, will require or recommend an exposure-specific exam when deemed appropriate based on knowledge of project hazards, occurrence of employee health symptoms, or an unexpected exposure event. Requests for exposure-specific examinations will be forwarded to the H&S Department, who will process the requests in collaboration with the Medical Director. The Medical Director will

determine the type and frequency of the exposure-specific medical exams for employees designated to participate based on sound medical practice, latest toxicology information, and current regulatory requirements.

9.7 Exit Exam

An exit medical examination is offered when an employee leaves the medical surveillance program, either because of termination of employment with Geosyntec or because of reassignment to a position not designated or identified to participate in the medical surveillance program. This optional exit examination may be used to assess potential changes in medical status that have occurred during the course of employees' previous work activities, and to establish a medical baseline at the time of departure.

9.8 Exit/Termination

An exit medical examination is offered when an employee leaves the medical surveillance program, either because of termination of employment with Geosyntec or because of reassignment to a position not designated or identified to participate in the medical surveillance program. This optional exit examination assesses potential adverse impacts occupational exposures may have contributed to the employee's health status.

10. MAPS AND SITE CONTROL

10.1 Routes to Hospital and Urgent Care Facility

A hospital and an urgent care facility near the site have been identified. Maps to the hospital and urgent care are included after the Table of Contents of this HASP. Both figures also include the facility name and phone number.

10.2 Site Map

A site map is located inside the cover of this HASP. The site map is intended to show the location of the work zone(s), to provide on-site orientation, and to delineate evacuation routes. Changes may be made to the site map by the SHSO based on changing site conditions. The site map should be accessible in the work area.

10.3 Buddy System

The buddy system is required when work is performed in hazardous areas. The buddy system includes maintaining regular contact with one or more on-site Geosyntec personnel, clients, and/or contractors to periodically check on the condition of site workers such that each employee in the work group is observed by (or in verbal contact with) at least one other employee in the work group. For field visits with only one employee onsite, the buddy system shall be implemented via

periodic telephone contact with offsite Geosyntec personnel. The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency.

10.4 Controlled Work Zones

APPLIES TO TASK: NOT APPLICABLE

Three controlled work zones, including an Exclusion Zone, a Contaminant Reduction Zone (CRZ), and a Support Zone, are required for the task(s) indicated above. Geosyntec employees must not be allowed into the CRZ or Exclusion Zone or the Work Zone until they have received the proper personal protective equipment (PPE) and they have read, understand, and meet the requirements outlined in this HASP. The Exclusion Zone is defined as the area on site where contamination is suspected, and tasks are to be performed. The CRZ is defined as the area where equipment and workers are to be decontaminated as they leave the Exclusion Zone. The Support Zone is defined as the command area and may serve as a staging and storage area for supplies. The location and extent of the work zones may be modified as necessary as site investigation information becomes available. For sites that do not require the three controlled work zones, the area(s) where work is to be performed shall be called the Work Zone.

Visitors to the site may need to be continually escorted for safety purposes. Visitors under Geosyntec’s direction need to check in with the SHSO upon visiting the site.

For the tasks identified above, the boundaries of the Exclusion Zone, CRZ, and Support Zone, or the Work Zone, shall be marked using appropriate methods, including but not limited to warning tape, signs, traffic cones, fencing, or other appropriate means.

Controlled work zones are not applicable for the tasks for this HASP. Subcontractors may establish controlled work zones in accordance with their HASP, as required.

10.5 Site Access

Certain sites require controlled access to the work area. Examples of access controls include sign in/sign out logs, checking in with guards, and donning identification badges. Geosyntec personnel will adhere to the site-specific access requirements and monitor that subcontractors and other Geosyntec visitors abide by site-specific access control requirements.

10.6 Inspections

APPLICABLE NOT APPLICABLE

Based on the hazards identified for the project, periodic health and safety inspections may be performed. The H&S Inspection Checklist records should be kept on file at the project site. The frequency for periodic inspections is:

Weekly

Monthly

Other: _____

11. TAILGATE MEETINGS

Tailgate meetings must be held daily prior to starting work to discuss important health and safety issues concerning tasks to be performed during that shift. Non-Geosyntec site workers should also communicate health and safety concerns associated with the tasks they will be performing. Topics discussed in the tailgate meetings must be documented.

12. STOP WORK AUTHORITY

In accordance with the Company's Procedure HS 203 – Stop Work Authority, Geosyntec personnel and subcontractor personnel have the authority and responsibility to issue a Stop Work Order if unsafe actions and/or conditions are identified. The Stop Work Authority (SWA) process involves a stop, notify, correct, and resume approach for resolving observed unsafe work actions or conditions. The person issuing the work stoppage will first notify workers engaged in or affected by the unsafe activity or condition and require that associated work be stopped. After this Stop Work Order is issued, the Geosyntec project manager and the supervisors for affected or concerned contractors will also be notified. The Geosyntec project manager will document the issuance of the Stop Work Order on the form provided in Procedure HS 203. Work will not resume until the issues and concerns of the Stop Work Order have been adequately addressed.

13. AIR MONITORING

APPLIES TO TASK: NOT APPLICABLE

Air monitoring will be performed to evaluate airborne chemical and/or dust exposure levels within the breathing zone of site workers. Hazardous conditions may include concentrations that may cause acute or chronic illness, potential oxygen deficient environments, or potential explosive environments. Air monitoring may also be performed to evaluate the adequacy of engineering, administrative, and/or PPE controls. Air monitoring may be “real-time” (e.g., the instrument provides immediate results at the project), using multi-gas meters, photoionization detectors

(PIDs), or colorimetric tubes. Personal monitoring may also be performed by collecting samples and forwarding to a laboratory for analysis and quantification.

The type(s) of air monitoring equipment required, and associated action levels are outlined in Appendix D. Monitoring equipment must be calibrated based on the manufacturer's requirements. Calibration results and air monitoring measurements must be documented. Based on the results noted and site activities or scope of work changes, the frequency of air monitoring may be adjusted on site by the SHSO with the consent of the Project Manager and communication with the HSC.

14. PERSONAL PROTECTIVE EQUIPMENT

The levels of PPE required for each task are presented in Appendix E. Required equipment and types of protective clothing materials, as well as an indication of the initial level of protection to be utilized, are listed. The level of protection may be upgraded or downgraded by the SHSO according to controls requirements in Appendix E or according to action levels provided in Appendix D.

If respirators are worn, workers must abide by the company's Respiratory Protection Program in accordance with company's Respiratory Protection Program (HS 112).

15. DECONTAMINATION

The SHSO and Project Manager will determine the type and level of decontamination procedures for both personnel and equipment based on evaluation of specific work activities in the controlled work zones. Medical treatment will take precedence over decontamination in the event of a life threatening and/or serious injury/illness. Personnel will perform decontamination in designated and identified areas upon leaving "hot zones" where the potential exists for exposure to hazardous chemical, biological, or environmental conditions.

Decontamination of personnel in Level D (modified) will consist of proper containerization and disposal of coveralls, disposable boots, and gloves (if applicable).

Decontamination of personnel in Level C, if applicable, will consist, at a minimum, of:

- Removal and cleaning/disposal of boot covers, coveralls, and outer gloves;
- Removal, cleaning, and storage of respiratory protection;
- Washing of non-disposable PPE suspected of being contaminated using a soap solution followed by a water rinse; and
- Removal and disposal of inner gloves.

Hand tools and sampling equipment shall be decontaminated as needed by washing in decontamination basins with appropriate solutions, or, if possible, by dry decontamination. Wash solutions and PPE may require disposal at a licensed waste facility.

16. SPILL CONTAINMENT

The task(s) for this project may involve the handling of drums and/or containers that contain stored chemicals, hazardous materials, and/or wastes. The drums and/or containers may have been spilled/dislodged during site activities due to compromised construction of the drum/container, transportation accidents, improper packaging practices, and improper handling of hazardous materials during on/off loading. Containers shall be inspected, and their integrity assured prior to being moved and/or handled. If the integrity of the container is in question, the container shall be over packed, or its contents transferred. Operations shall be organized and coordinated to minimize movement of such containers. Where spills, leaks, or ruptures may potentially occur, a supply of sorbents shall be located in the immediate area. Additional preventative measures include:

- UN-approved 55-gallon drums, bins, and/or Baker tanks will be inspected for visible defects upon delivery to the site;
- UN-approved 55-gallon drums will also be inspected to ensure each drum includes a resealable lid with a small resealable sampling port near the top, or on the side of the drum and that the enclosure is not deformed and/or distorted;
- Drums will not be completely filled to allow for possible expansion of liquid and will be set on wooden pallets to facilitate transport by forklift;
- The storage area will be inspected to check for leaks weekly while the containers are being filled and immediately after a relocation to a temporary on-site storage area; and
- Flat areas will be selected for temporary storage away from high-traffic work areas/zones and storm/sewer drains.

In the event of an unplanned release or spill of unknown or hazardous substances, the site supervisor will designate personnel who will support the spill containment, control, and/or clean-up procedures. The team will request additional off-site emergency response assistance if necessary, based on the type of spill, volume, potential toxicity, etc.

The spill area will be isolated and restricted to only authorized personnel designated to assist with the containment, control, or clean-up activity. Authorized personnel will be trained to contain and clean spills from typical materials and quantities used at the project location. Physical barriers will be set up to warn unauthorized personnel to stay clear and evacuate the affected area. The spill, leak, or incident will be assessed by the team and characterized to determine the appropriate course(s) of action(s) to consider:

- Small spills (i.e., maximum volume of 55 gallons of a liquid or 100 pounds of a solid) may be remediated using absorbent materials by designated personnel;
- Large spills (i.e., liquid volumes greater than 55 gallons or solid weights greater than 100 pounds) and/or spills of highly toxic materials may require assistance by off-site hazardous materials (HAZMAT) teams;
- Attempts shall be made to identify and stop the source(s) of spillage immediately while donning proper PPE (based on action levels and the air monitoring program) and performing air monitoring;
- The site supervisor will direct spill-response operations and stay at the spill area until it has been cleaned, inspected, and cleared for re-entry; and
- The site supervisor will prepare a spill incident and clean-up report and will communicate findings to the Project and Branch Manager and H&S Department.

17. **CONFINED SPACE ENTRY**

APPLICABLE NOT APPLICABLE

The task(s) for this project involve confined-space entry. Workers must abide by the company's Confined Space Entry Program (Procedure HS 118).

18. **GLOBALLY-HARMONIZED SYSTEM FOR HAZARD COMMUNICATION**

APPLICABLE NOT APPLICABLE

The following procedures must be followed for chemicals brought onto the site by Geosyntec personnel or by subcontractors (i.e., decontamination solution, sampling preservatives, KB-1[®] solution, sodium permanganate, etc.) while performing the tasks of this project:

- Labels on primary chemical containers must not be defaced;
- Chemicals must be stored in appropriate storage containers;
- Secondary containers and storage cabinets must be correctly and clearly labeled;
- Chemicals incompatible with each other must not be stored together;
- Workers must receive training on the chemical hazards; and
- Safety Data Sheets (SDSs) must be added to Appendix F.

When chemicals are used on-site, workers must abide by Geosyntec's GHS Hazard Communication Program (Procedure HS 115).

19. HASP AMENDMENTS

Over the course of this project, it is possible that the project-specific hazards and working conditions will change. This HASP may be reviewed and amended as necessary to effectively describe the changing working conditions and measures to mitigate the potential health and safety issues that may arise during the project. Amendments to the HASP should be briefly described in the following spaces provided. The full text of the amendments should be provided in Appendix A and/or additional THAs should be added to Appendix B.

AMENDMENT 1:

Date: _____ Project Manager: _____ HSC: _____

Brief Description of Amendment:

AMENDMENT 2:

Date: _____ Project Manager: _____ HSC: _____

Brief Description of Amendment:

AMENDMENT 3:

Date: _____ Project Manager: _____ HSC: _____

Brief Description of Amendment:

Appendix B: Task Hazard Analyses

TASKS		
1	WL Gauging & Groundwater Sampling	<input type="radio"/>
2	Soil Vapor Sampling	<input type="radio"/>
3	Monitoring Well Installation	<input type="radio"/>
4	Remedial Injections	<input type="radio"/>

THAs for these tasks are maintained on file with Aspect Consulting, a Geosyntec Company.

Part A – PROJECT/TASK INFORMATION

Project/Site Name:	American Linen Supply Co-Dexter Avenue (700 Dexter)	Project Number/Org:	AS240461/3010
Site Address:	700 Dexter Avenue N, Seattle, WA (including adjacent properties)		
Task & Worksite Description:	Groundwater sampling – involves using a pump and other light equipment to retrieve groundwater samples from monitoring wells located around the site.		
Geosyntec Personnel:	Name	Office Phone	Cell Phone
Site Safety Lead/Officer	Hannah Cohen	(206)780-7724	(818) 224-0892
Task Technical Lead	Risi Naa	(206)780-7715	(603)205-5063
Project Manager	Lea Kane	(206) 858-4378	(925) 354-2791
Project Director	Melissa Asher	(206) 496-1449	(574) 261-4358
Local HSE Coordinator	Madeline Chavira		(206) 496-1463
Regional HSE Manager	Madison McLaughlin	(858) 716-2900	(951) 990-2888
Corporate HSE Director	Bob Poll	813-379-4420	813-240-9231
On-Site Subcontractor(s):	<input checked="" type="checkbox"/> Applicable; provide company name, work task and contact information for each Geosyntec subcontractor below: <input checked="" type="checkbox"/> Not Applicable		
	Garrett Hooper; K&D Services	425-374-5825	425-551-8297
Client, Contact(s):	John Moshy		(858)829-7709
ETHICS POINT HOTLINE	US & Canada: 844-231-3371 UK: 800-89-0011 or 800-89-0011	Australia: 800-551-155 or 800-811-011 Ireland: 800-222-55288 or 800-500-000	

Part B - EMERGENCY RESPONSE and FIRST AID

IMPORTANT: After initial emergency response actions and incident stabilization, contact appropriate project staff and/or HSE personnel listed in Part A

Site-Specific Notes, Clarifications:	
Emergency Communication / Alerting	<input checked="" type="checkbox"/> Verbal <input checked="" type="checkbox"/> Cell Phone <input type="checkbox"/> Land Line <input type="checkbox"/> 2-Way Radio <input type="checkbox"/> Satellite Phone <input type="checkbox"/> On-site alarm/signal system <input type="checkbox"/> Other:
To Summon Police, Fire, Ambulance	<input checked="" type="checkbox"/> DIAL 911 , for external responders <input type="checkbox"/> Other:
WorkCare (for non-emergency injuries)	24/7: 888-449-7787
Other Emergency Contacts (such as security, spill responder, utility-related):	
Nearest EMERGENCY ROOM Medical Services	Hospital Name: Virginia Mason Medical Center Address: 1100 9 th Ave, Seattle, WA Phone #: (206)624-1144 <input checked="" type="checkbox"/> See ATTACHMENT A, ROUTE to HOSPITAL
Emergency Evacuation - Route, Rally/Muster Point, Shelter Location(s)	If inside, evacuate buildings.
EMERGENCY and FIRST AID EQUIPMENT required for this work task is listed in PART C.2. – SAFETY EQUIPMENT LIST	

Attachment Hospital A: Route to Hospital

PART C – HAZARD ANALYSIS and EQUIPMENT LIST (Basis for Field Team Safety Orientations and Onsite Safety Discussions)

C.1 ONSITE TASK HAZARD ANALYSIS

INSTRUCTIONS:

- Begin your job safety analysis by reviewing “Pointers” (see lower right) and completing **Part D “HAZARD ANALYSIS AND CONTROLS** for your TASK(s).
- In **Columns 1 & 2** (below), list/describe **TASKS & WORK ASPECTS** and the associated **HAZARDS & RISKS**.
- In **Column 3** summarize **CONTROLS & SAFE WORK PRACTICES** (Brief summary descriptions with references to THA Sections).

REFERENCES - Copy and paste, as applicable, into **Column 3**:

See C.2. SAFETY EQUIPMENT LIST	See D.10. ELECTRICAL WORK TASKS
See D.1. BASELINE HAZARD PREPAREDNESS	See D.11. UTILITY-RELATED HAZARDS
See D.2. SPECIAL TRAFFIC/VEHICLE/TRANSPORTHAZARDS	See D.12. CONFINED/ENCLOSED SPACES
See D.3. WATER HAZARDS	See D.13. INFECTIOUS / PATHOGENIC BIOHAZARDS
See D.4. FALL HAZARDS	See D.14. COMMERCIAL CHEMICAL PRODUCTS
See D.5. HAND TOOLS	See D.15. SITE CONTAMINANTS, CHEMICAL WASTES
See D.6. POWERED TOOLS & EQUIPMENT	See D.16. RADIATION HAZARDS (Other than Sunlight)
See D.7. DRILLING	See D.17. HAZMAT/DANGEROUS GOODS SHIPPING.
See D.8. CONSTRUCTION, HEAVY/LIFT EQUIPMENT	See Part E AIR MONITORING, EXPOSURE MONITORING
See D.9. STORAGE OF BULK MATERIALS	See ATTACHMENT “X”

1. TASKS/WORK ASPECTS	2. HAZARDS/RISKS	3. CONTROLS / SAFE WORK PRACTICES
a. Natural Hazards (applicable to all work onsite)	Such as: - Plants, Insects	Blackberry bushes with thorns present throughout the site. Wear long pants and long sleeves for protection against insects and thorns. See D.1. BASELINE HAZARD PREPAREDNESS
b. Premises Hazards (applicable to all work onsite)	For example: - Driving hazards - Heavy equipment traffic onsite - Needles and other sharps objects - Human waste/biohazards	In addition to basic driving safety, limit speed to 5 mph (8 km/hr) while onsite; when exiting the site onto roadway, right turn only (no left turns across traffic). For all work, wear hard-toe work boots, proper work clothes, reflective/hi-viz vest, eye protection. Hearing protection near noise sources, appropriate work gloves. See: C.2. SAFETY EQUIPMENT LIST; D.1. BASELINE HAZARD PREPAREDNESS; D.3. WATER HAZARDS; D.8. CONSTRUCTION, HEAVY/LIFT EQUIPMENT
c. Manual Hand Tool Injuries	<input checked="" type="checkbox"/> Struck by <input checked="" type="checkbox"/> Pinch points/crushing injuries <input checked="" type="checkbox"/> Puncture <input checked="" type="checkbox"/> Cutting blade/laceration risk <input checked="" type="checkbox"/> Flying objects, eye hazards	<input checked="" type="checkbox"/> Proper tool for the job, maintain in good condition, use vise/clamp to hold work piece, proper follow through, Self and nearby personnel shall stay clear of “line of fire,” use appropriate work gloves, keep blades sharp, use wrist strap when dropped tool poses a hazard. <input checked="" type="checkbox"/> Utility/folding/collapsible knives and fixed-blade knives/cutting tools are <u>not</u> permitted, unless specifically authorized. Cutting tools with auto-retracting blades, or with enclosed/guarded blades are permitted. Use cut-resistant heavy work gloves, as applicable. HSE Program Documents: HSE SOP-640: Manual Hand Tools
d. Site Contaminants	Exposure to chemical contaminants via skin contact, inhalation, ingestion.	- Workers attend pre-work orientation on hazards, risks, onsite safety measures, emergency contingencies. - Implement site control plan - delineate Exclusion Zone(s), Contaminant Reduction Zone(s), Support Zone (aka EZ, CRZ, SZ).

- Include site map/figure depicting work locations and other relevant site-specific information.
- Site workers in EZ or CRZ shall have 40-hour HAZWOPER training, current 8-hour refresher, 3 days supervised field experience.
- Site supervisor(s) shall have 8-hour Supervisor training.
- Site workers in EZ or CRZ shall participate in medical monitoring program, as applicable.
- Implement site-specific procedures for worker protection via engineering controls, work practices, personal protective equipment (PPE), air monitoring, decontamination procedures, spill containment, emergency preparedness and response.
- Conduct air monitoring, as appropriate; see Part E, "Air Monitoring, Worker Exposure Monitoring."
- PPE program: Specify Levels of Protection and specific PPE to be used for applicable tasks;
 - Level D: No respirator, no chemical protective clothing, standard work clothes, basic PPE; (COVID-19 face covers allowed)
 - Modified Level D: No respirator, chemical protective clothing as appropriate; (COVID-19 face covers allowed)
 - Level C: Air-purifying respirator, chemical protective clothing as appropriate; consult with Corp. HSE Dept. required.
 - Level B: Air-supplied respirator, chemical protective clothing/suit as appropriate; consult with Corp. HSE Dept. required.
 - Level A: Fully encapsulating suit, self-contained breathing apparatus (SCBA); Level A prohibited for Geosyntec personnel.

4. ONSITE CHANGES, UNFORSEEN HAZARDS, THA "ADJUSTMENTS" (Recognized During Mobilization/Execution of Field Work)

Date:	Notes:
Date:	Notes:

C.2. SAFETY EQUIPMENT LIST (Gear to be brought to the worksite by Geosyntec personnel, or availability at the worksite confirmed)

Site-Specific Notes, Clarifications:			
<input type="checkbox"/>	WEATHER, CLIMATE, SEASONAL	<input type="checkbox"/> Project-provided drinking water <input type="checkbox"/> Canopy for shade, weather protection <input type="checkbox"/> Other:	<input type="checkbox"/> Sunscreen <input type="checkbox"/> Ice creepers (boot attachments) <input type="checkbox"/> Rock salt, traction sand <input type="checkbox"/> Portable heater (electric or kerosene)
<input checked="" type="checkbox"/>	HYGIENE PROVISIONS	<input type="checkbox"/> Hand washing equipment (soap & wash water) <input type="checkbox"/> Other:	<input type="checkbox"/> Hand sanitizer, disinfectant supplies <input checked="" type="checkbox"/> Sanitary facility, porta-toilet
<input checked="" type="checkbox"/>	BASIC PPE	<input checked="" type="checkbox"/> Standard work clothes appropriate for task <input checked="" type="checkbox"/> Hard-toed boots/shoes <input checked="" type="checkbox"/> Hardhat	<input checked="" type="checkbox"/> Safety glasses <input checked="" type="checkbox"/> Work gloves appropriate for task <input checked="" type="checkbox"/> Noise/hearing protection <input checked="" type="checkbox"/> High-visibility/reflective vest/apparel <input type="checkbox"/> Nuisance dust mask (voluntary use)
<input checked="" type="checkbox"/>	BIOLOGICAL HAZARDS	<input checked="" type="checkbox"/> Insect/tick repellent--DEET, picaridin, other <input type="checkbox"/> Permethrin-treated work clothing <input type="checkbox"/> Pant-leg "blousing"/gaiters (tick safe) <input type="checkbox"/> Tick removal kit <input type="checkbox"/> Wasp/hornet spray, insect fogging device, other <input type="checkbox"/> Poison ivy protection (Ivy Block skin cream, Tecnu skin wash) <input type="checkbox"/> Other:	<input type="checkbox"/> Animal warning device (for bears/cougars/wolves/large animals) <input type="checkbox"/> Snake chaps/gaiters, bite/scratch-resistant gloves, other protective gear for animal hazards <input checked="" type="checkbox"/> Hand sanitizer, hand washing supplies, personal hygiene supplies for infectious hazard control <input type="checkbox"/> Disinfectant solution and related supplies to mitigate source of infectious hazard <input type="checkbox"/> Masks, face covers, gloves, barriers, related gear to mitigate infectious hazard transmission
<input type="checkbox"/>	SPECIAL HAZARD CONTROLS	<input type="checkbox"/> Portable GFCI(s) for shock protection <input type="checkbox"/> Electrical-hazard-rated boots, gloves <input type="checkbox"/> Arc-resistant (AR) protection PPE for arc flash <input type="checkbox"/> Flame-resistant (FR) clothing <input type="checkbox"/> Work-area delineation supplies <input type="checkbox"/> Other:	<input type="checkbox"/> Lockout/tagout equipment <input type="checkbox"/> Portable lighting <input type="checkbox"/> Tripod/winch <input type="checkbox"/> Ventilation equipment (fan, blower) <input type="checkbox"/> Traffic control devices <input type="checkbox"/> Personal fall protection apparatus <input type="checkbox"/> Personal flotation device <input type="checkbox"/> Ring buoy & rope <input type="checkbox"/> Marine survival suit
<input checked="" type="checkbox"/>	CHEMICAL PPE and CHEMICAL SAFETY GEAR	<input checked="" type="checkbox"/> Goggles and/or face shield <input type="checkbox"/> Chemical protective gloves <input type="checkbox"/> Coveralls (Tyvek, or other) <input type="checkbox"/> Outer boots, boot covers <input type="checkbox"/> Air monitoring equipment, worker exposure monitoring device(s): <input type="checkbox"/> Other:	<input type="checkbox"/> Disposable N95 respirator <input type="checkbox"/> Half-face respirator (APR), cartridges <input type="checkbox"/> Full-face respirator (APR), cartridges <input type="checkbox"/> Exclusion Zone delineation supplies <input checked="" type="checkbox"/> Decon solution, related supplies <input checked="" type="checkbox"/> Receptacle for disposable PPE <input type="checkbox"/> Chemical hazard emergency gear – listed in "EMERGENCY EQUIPMENT" below
<input type="checkbox"/>	EMERGENCY EQUIPMENT	<input type="checkbox"/> Air horn, alarm, alerting equipment <input type="checkbox"/> 2-Way radios; other communication device <input type="checkbox"/> First aid kit(s) – onsite and/or in vehicles <input type="checkbox"/> Fire extinguisher – onsite and/or in vehicles <input type="checkbox"/> Other:	<input type="checkbox"/> Eyewash bottle(s) <input type="checkbox"/> 15-min. eyewash station <input type="checkbox"/> Emergency deluge shower <input type="checkbox"/> Chemical spill kit/supplies Vehicle emergency preparedness: <input type="checkbox"/> Fire extinguisher, first aid kit <input type="checkbox"/> Flares, lights, reflective device <input type="checkbox"/> Roadside assistance service

PART D – HAZARD ANALYSIS AND CONTROLS (Site-Specific Safety Analysis & Information)

D.1. “BASELINE” HAZARD PREPAREDNESS (This section applicable to ALL Tasks, covering natural hazards, driving/travel, basic safety & PPE)

a. Weather/Climate/Altitude Hazards

- Heat stress** – Prevent heat-related illness; At ambient temps > 80°F (27°C) **use Geo HeatTracker to assess hazard**, implement mitigations accordingly.
- Cold stress** – Prevent frostbite, hypothermia; multiple clothing layers, keep clothing dry, protect exposed skin, stay hydrated, frequent warming breaks.
- Sunburn, conjunctivitis** – Sun blocker, shade canopy, wide-brimmed hat, long sleeves/pants; protect eyes from glare near water/snow/sand
- Extreme weather** – Track weather, emergency plan: ID shelter/refuge, use weather app for lightning prediction at 10 mi./16 Km (use “30/30 rule” as backup).
- Weather-related conditions** – Use appropriate precautions for ice/snow/slippery conditions, flood, mold, soft ground, downed trees/wires, fire hazards, other.
- Acute Mountain Sickness (AMS)/Altitude Illness** – for work to be performed at ≥ 8,000 feet (2,450 meters) above sea level, see [THA Addendum on AMS](#).

Site-Specific Notes:

HSE Program Documents, [HSE SOP-409: Heat Illness Prevention](#), [HSE SOP-410: Cold Stress Prevention](#)

b. Biological Hazards

- Insect/tick/arthropod hazards/vector-borne disease** – Use insect repellent, permethrin-treated clothing/gear, tick checks, tuck pants/shirt, tick removal tool, wasp spray, bug zapper/trap, mosquito netting, fogging, other barriers and protective devices, habitat treatment/removal, as applicable.
- Plant hazards** – Know the hazards (e.g. poison ivy/oak/sumac, giant hogweed, poison hemlock, nettles, etc.), know the precautions for site habitat: barrier ointments, washes; long sleeves/pants, gloves, remove plants (avoid burning), launder work clothes (hot water/detergent), clean tools (alcohol or soap/water).
- Animal hazards** – Know the hazards/precautions for work site: avoidance, repellents, PPE, warning devices, habitat/food source removal, infection controls.
- Common unsanitary/allergenic hazards** – Use routine hygienic measures/precautions; hand washing/sanitizer, food hygiene, PPE, disinfectant cleaning.
- Infectious/pathogenic** - For site-specific infectious hazards (viral, bacterial, bloodborne pathogens, mold, other), see **D.13 “Infectious/Pathogenic Biohazards.”**

Site-Specific Notes:

HSE Program Documents: [HSE SOP-408: Biting/Stinging Arthropods and Poisonous Plants](#),

c. Routine Driving Hazards

- Routine work travel** – Use routine safe/defensive driving practices (seat belts, safe speeds, eyes ahead, no tailgating, limit distractions, safe cell phone use, no texting, clear windows, account for weather/road conditions, adequate sleep, other measures as appropriate).
- Unfamiliar location** – Before driving in roadway: view map, note key benchmark locations, plot your route and/or enter destination into navigation device.
- Unfamiliar vehicle** – Before driving in roadway: become familiar with vehicle controls; adjust seat, mirrors, vents, heat/AC, audio, lights, check brakes.
- Fatigue** – Minimize fatigue during long drives: frequent rest breaks, muscle stretches, eat light snacks-avoid heavy meals, stay hydrated, fresh air, no loud music, clean windshield; avoid/minimize long distance driving during your ordinary sleep hours; total *work time* and *drive time* should not exceed 14 hours per day.

Site-Specific Notes:

HSE Program Documents: [HSE SOP-220: Fatigue Management](#), [HSE SOP-605a: Driver Authorization Program](#)

d. General Safety

- General premises hazards** – Prevent slips/trips/falls (resulting from rough terrain, trip hazards, steep slope, slippery surfaces); maintain good housekeeping, be aware of on-site structures, utilities, overhead hazards, uneven/hazardous surfaces, obstacles, onsite traffic, restricted access/workspace.
- Musculoskeletal hazards** – Prevent strains/sprains from strenuous tasks, overexertion, repetitive motion/ergonomic/lifting (seek help/lift-aids over 49 lbs.)
- Worksite traffic hazards** – Implement measures to protect personnel (high-visibility/reflective clothing, on-person lighting, traffic control measures).
- Hazardous energy** – Use caution near electrical equipment/wet locations, machinery/physical hazards, stay out of hazard zone/line-of-fire, don't touch.
- Illumination hazards** – Illuminate work areas and/or access routes, use high-visibility and reflective clothing or on-person lighting, as appropriate.
- Security: high potential for crime/workplace violence/security breach** – Complete a [Risk Assessment for Working in High-Crime, High Security Risk Locations](#)
- Working alone** – Communicate a project-specific lone-work plan to coworkers, including procedures for periodic communication/contact.

Site-Specific Notes:

HSE Program Documents: [HSE SOP-205a: Manual Materials Handling/Back Injury Prevention](#), [HSE SOP-210: General Housekeeping](#), [HSE SOP-401: Lone Working](#), [HSE SOP-403: Management of Traffic](#), [HSE SOP-616: General Safety Rules](#)

e. Basic Personal Protection

- Head protection from overhead hazards** – Wear hardhat or “bump cap” as appropriate for hazard.
- Hand protection** – Wear gloves to protect from physical, chemical and biological hazards; select glove type (or types) specific for the task & hazard(s)
- Eye protection** – Wear safety glasses (with side shield or wrap around, either clear or shaded for sun protection), or other appropriate eye protection.
- Foot protection, rough terrain** – Wear work boots/shoes with hard toes, ankle support, puncture resistance, traction, as appropriate for conditions.
- Hearing protection** – use earplugs or earmuffs (or both) as appropriate for conditions; at a minimum where noise levels exceed 85 dBA.
- Protective clothing/nuisance dust mask** – For general protection against dust, dirt, oily residues, unsanitary conditions, as needed.
- Other personal protective gear** for task(s) covered in this THA is described in respective sections of this THA in Site-Specific Notes & Clarifications

Site-Specific Notes:

HSE Documents: [HSE STD-125: Personal Protective Equipment Program](#), [HSE STD-130: Respiratory Protection Program](#), [HSE STD-135: Hearing Protection Program](#)

D.2. SPECIAL TRAFFIC / VEHICLE / TRANSPORTATION HAZARDS

Applicable **Not Applicable, Not Anticipated**

(For water-transportation hazards, see D.3. "Water Hazards"; For construction traffic hazards, see D.8. "Construction, Heavy Equipment, Lift Equipment")

Site-Specific Notes & Clarifications:	
<input checked="" type="checkbox"/> THOROUGHFARE TRAFFIC HAZARDS Where the worksite is located in/near vehicle thoroughfare (road, highway, parking lot, etc.). Hazards: Injury to worker and general public from collision involving moving vehicle.	<input checked="" type="checkbox"/> Prepare Management of Traffic (MOT) Plan (address location hazards / client and regulatory requirements). <input type="checkbox"/> Wear DOT-approved reflective vests where exposed to traffic hazards. <input checked="" type="checkbox"/> Where possible, park vehicles as protective shield from oncoming traffic. <input checked="" type="checkbox"/> Configure work area and support vehicles to minimize worker exposure to traffic hazards. <input type="checkbox"/> Use DOT signal devices and/or signage to re-route vehicles around work area, site entrances/exits. <input checked="" type="checkbox"/> Use DOT-trained flaggers or police detail where appropriate or required. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-403: Management of Traffic</i></p>
<input checked="" type="checkbox"/> SPECIAL VEHICLE HAZARDS Off-Road Driving or use of non-typical vehicle, heavy vehicle, work truck, van, UTV/ATV Hazards: Worker injury due to vehicle collision, rollover	<input checked="" type="checkbox"/> For off-road driving, do not exceed capability of vehicle, beware of wet conditions, keep speed low, avoid unsafe orientation on slopes. <input type="checkbox"/> UTV/ATV-specific procedures for training, use roll-bar or helmet, operate per manufacturer's instructions. <input type="checkbox"/> Special Skills Required for Vehicle type – For vehicles requiring special skills (such as windowless van, heavy work vehicle, utility vehicle, similar) ensure operator is provided training and/or has appropriate operator skills through experience. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-652a-Utility Vehicles (US-only) (safe operation of mobile equipment)</i></p>
<input type="checkbox"/> TOWING/HAULING LOADS Hazards: Vehicle accident, occupant injury from shifting load, unsafe equipment, un-roadworthiness of trailer and/or vehicle.	<input type="checkbox"/> Ensure load within vehicle is firmly secured (rope, straps, load configuration) to prevent shifting during travel. <input type="checkbox"/> Slings, chains, strap, rope and related equipment used for towing, hauling, load-securing shall be appropriate for use, and used in a manner as to prevent an unsafe condition (generally, bungee cords not appropriate). <input type="checkbox"/> For trailer use, verify tow-hitch components are compatible, hitch/safety chains secure, signal/braking lights operational, rear-view mirrors effective, tires inflated to proper pressure and tread acceptable.
<input type="checkbox"/> RAILROAD RIGHT-OF-WAY HAZARD Hazards: Struck by train in R.R. right-of-way; electrical shock from third rail or overhead electrical lines	<input type="checkbox"/> Coordinate with rail company or on-site host facility and implement required safety and security measures. <input type="checkbox"/> Site workers shall receive safety training/certification (per railroad owner/operator) for railroad work.
<input type="checkbox"/> AIRPORT HAZARDS (on the ground) Hazard: Injury due to proximity on/near airport runway, flight path.	<input type="checkbox"/> Coordinate safety requirements with airport personnel and implement required safety measures. <input type="checkbox"/> Site workers shall receive safety training/certification (per airport owner/operator) for airport work. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP 628: General Aviation (Small Aircraft) Safety</i></p>
<input type="checkbox"/> LIGHT AIRCRAFT/HELICOPTER USE Hazards: Injury from collision during taxi/take-off/landing, aircraft crash and related general aviation hazards	<input type="checkbox"/> Review certifications/licenses/experience of pilot, airworthiness certificate for aircraft, safety practices of operator, aircraft safety rating, safety equipment/provisions on aircraft. <input type="checkbox"/> Passengers shall adhere to general passenger safety practices, and requirements of owner/operator/pilot. <input type="checkbox"/> For transport of HazMat/Dangerous Goods, see D.17. , "Transport/Shipping of Hazmat/Dangerous Goods" <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-628-General Aviation, Small Aircraft Safety</i></p>
<input type="checkbox"/> USE OF AERIAL "DRONE" Hazards: Airspace interference, collision with ground personnel, general public, infrastructure.	<input type="checkbox"/> For use of aerial drone--a.k.a. <i>small unmanned aerial system (sUAS), remote piloted aircraft (RPA) or unmanned aerial vehicle (UAV)</i> --review/adhere to requirements for regulatory certifications, authorizations & approvals, and pre-mob planning for pre-flight-, in-flight-, and post-flight checks, and unplanned events. <p style="text-align: right;"><i>HSE Program Documents: HSE MAN-003a: Unmanned Aerial Systems Manual (U.S. Only)</i></p>

D.3. WATER HAZARDS (Working Over/On/Near Water, Ash Ponds, Quicksand, Soft Ground) **Applicable** **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input type="checkbox"/> WATER HAZARDS Work/travel in watercraft or on equipment over water or over coal ash impoundment/pond: <input type="checkbox"/> Workboat, barge, over-water structures <input type="checkbox"/> Water transportation <input type="checkbox"/> Hazardous currents (river, tidal/riptide) <input type="checkbox"/> Towing, trailer, roadway <input type="checkbox"/> Other – describe above	<p>General water-safety measures for all work near water:</p> <input type="checkbox"/> Wear regulatory-approved personal flotation device (PFD) where drowning hazard is present. <input type="checkbox"/> Bring emergency rescue and/or signaling equipment (ring buoy and rope, reaching device, flares) <input type="checkbox"/> For fall protection over water, see D.4. "Fall Hazards." <input type="checkbox"/> For electrical hazards associated with water/wet locations, see D.10. "Electrical Work Tasks." <p>Boating-specific:</p> <input type="checkbox"/> Use fuel safety practices, fire extinguisher present in boat. <input type="checkbox"/> Develop/follow float plan, monitor weather, navigate/communicate as planned. <input type="checkbox"/> Confirm navigation/communication equipment operable before heading onto water.

Walking/wading into water, on shoreline, riverbank, dock, bulkhead, abutment, coal ash:

- Wading/walking into/near water, wetland
- Hazardous tidal zone or surf
- Water release, flash flood
- Coal ash pond, quicksand, soft ground
- Open culvert, arroyo, drainage/irrigation ditch
- Ice hazard on or near waterbody

Diving

- Scientific SCUBA diving

Hazards (as applicable):

- Drowning, cold immersion
- Boating collision, navigation, fog, darkness
- Fire/fuel hazards
- Entrapment (mud/silt/coal ash/quicksand)
- Slip/fall hazards – ice, mud, silt, wet surfaces
- Weather, heat/cold stress
- Equipment failure, hypoxia
- Chemical contaminant and/or biological hazard

- For work over very cold water, have immersion survival suit available.
- For tidal, flash flood, dam release hazards, plan/locate work accordingly.
- For towing a boat trailer, see **D.2. “Special Driving/Traffic/Transportation Hazards.”**

Wading in water or walking along shore/bank or on dock/pier/abutment:

- For ice/slip hazards, wear ice creepers, sand work area, use tether, other appropriate measures.
- For work on ice over water, verify safe thickness, have ring buoy & rope available
- For unsure/slippery footing in water, use wading staff, high-traction soles on waders.
- Have lifesaving skiff/boat available in circumstances where other rescue means are inadequate.
- Monitor hazardous tides, weather for flash floods, know water release schedule.

For soft ground, ash ponds, quicksand:

- Wear personal flotation device (PFD), as appropriate for the work task and work environment.
- Bring emergency rescue equipment (ring buoy and rope, reaching device)
- If walking on ash/quicksand, provide stable walking/working surface (4’x8’ plywood, or similar)

For diving:

- Develop a diving safety plan approved by Geosyntec’s diving coordinator

For chemical contaminant and/or biological/infectious hazard:

- See Section(s) **D.1.b.**, “Biological Hazards, **D.13.**, “Infectious/Allergenic Biohazards,” **D.14.**, “Commercial Chemical Products,” and/or **D.15.**, “Site Contaminants, Chemical Wastes”

HSE Program Documents: [HSE SOP-407: Working On/Near Water and Ice](#), [HSE SOP-630: Water Transportation Safety](#), [HSE MAN-005: Underwater Diving Operations Manual](#)

D.4. FALL HAZARDS (Falls to Lower Levels)

Applicable Not Applicable, Not Anticipated

Site-Specific Notes & Clarifications:

<input type="checkbox"/> WORKING AT HEIGHTS (GENERAL) Hazards: <ul style="list-style-type: none"> - Injury from falls onto lower surface or falls into hazardous equipment, chemicals, water - Overhead utilities/obstructions - Impalement hazard (such as from falling onto unprotected rebar and similar surface projections) - Hazard posed to ground personnel from falling tools, equipment, materials 	<p>Fall protection “trigger heights”: Built environment – US & CAN: 4 ft. (1.2 m.); Construction: US: 6 ft., 10 ft. for scaffolds; CAN: 10 ft. (3 m)</p> <p>Protect from <u>primary</u> (fall) hazards:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Restrict access to hazard (barriers, tape, sign) <input type="checkbox"/> Ensure safe access to height (ladder, stair, lift) <input type="checkbox"/> Ensure guardrails/stair-rails/handrails present <input type="checkbox"/> Ensure covers in place over holes <input type="checkbox"/> Use designated “watch person/monitor” <input type="checkbox"/> Use tether or positioning device <input type="checkbox"/> Use personal fall apparatus (PFA) <input type="checkbox"/> Use fall protection net <p>Protect from <u>secondary</u> (collateral) hazards:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Protect site ground personnel from falling objects (restrict access, toe-boards, tether tools) <input type="checkbox"/> Install caps on protruding rebar and similar <input type="checkbox"/> Working over water; see D.3, “Water Hazards” <input type="checkbox"/> Working over hazardous machinery/equipment; see D.6, “Power-Tools/Powered Equipment” <input type="checkbox"/> Overhead electrical; See D.11. “Utility-Related Hazards” <input type="checkbox"/> Working over chemical hazards; See D.14 and/or D.15 for chemical and/or contaminant hazards. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-405: Walking-Working Surfaces Protection, HSE SOP-415a: Fall Protection (North America-only), HSE SOP-434a: Overhead and Underground Utility Hazards (US-only)</i></p>
<input type="checkbox"/> LADDER / STAIRS <ul style="list-style-type: none"> <input type="checkbox"/> Extension/straight ladders <input type="checkbox"/> Step ladders <input type="checkbox"/> Fixed/installed ladders <input type="checkbox"/> Portable/mobile stairs <input type="checkbox"/> Job-made or scaffold stairs Hazards: <ul style="list-style-type: none"> - See general fall hazards, above. 	<p><input type="checkbox"/> Follow safe work practices:</p> <ul style="list-style-type: none"> • Use ladders according to safe practices and manufacturer’s instructions. • Maintain 3 points of contact at all times on ladder; keep center of gravity within side rails. • Do not use metal (conductive) ladder near electrical hazard. • Extension/straight ladders shall be properly footed, secured, angled, extend above upper work surface. • Stepladders are set on level ground or properly shimmed, spreaders locked; do not climb/stand on top step, top cap, or rear non-climbing side; use step ladder of sufficient reach height for work. • Equip stairs with stair handrails where more than 4 steps, and for stairway height of 4’ or more. • Ensure portable stairs are stable, plumb, and of sufficient reach height for task. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-415a: Fall Protection (North America-only), HSE SOP-638: Ladders and Stairways</i></p>
<input type="checkbox"/> SCAFFOLD <ul style="list-style-type: none"> <input type="checkbox"/> Supported scaffold <input type="checkbox"/> Suspended scaffold <input type="checkbox"/> Free-standing/mobile scaffold Hazards: <ul style="list-style-type: none"> - See general fall hazards, above - Equipment collapse 	<p><input type="checkbox"/> Follow safe work practices:</p> <ul style="list-style-type: none"> • Identify/coordinate operations with the scaffold “Competent Person.” • Supported scaffold level, stable, proper attachments, tiebacks, planking, • Suspended scaffolds anchored properly. • Guardrails or personal fall apparatus required above 10 feet. • Proper means of accessing scaffold (proper ladders, stair tower); don’t climb scaffold frames. • Total height of free-standing scaffold shall not exceed four times the minimum base dimension. • Don’t exceed load limits, distribute loads evenly, stage materials in quantities sufficient for immediate use. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-648: Scaffolds</i></p>

<input type="checkbox"/> AERIAL BOOM/SCISSOR LIFT Hazards: - See general fall hazards, above - Struck-by, run-over, tip over - Caught between (pinch points) - Fluid leaks/fuel hazards or battery-related hazards	<input type="checkbox"/> <u>Follow safe work practices:</u> <ul style="list-style-type: none"> • Operators shall be trained and certified. • Equipment is inspected after mobilization and is in good condition. • Harness & lanyard worn whenever operating a boom lift (optional for scissors lift). • Overhead hazards and surface obstructions shall be reviewed with operators prior to use. <p>HSE Program Documents: HSE SOP-650: Manlifts and Aerial Lift Platforms (safe operation of mobile equipment)</p>
<input type="checkbox"/> WARNING! Confirmed or possible close proximity to OVERHEAD ELECTRICAL UTILITY LINES.	<input type="checkbox"/> Follow safe work practices per D.11., "Utility-Related Hazards" <p>HSE Program Documents: HSE SOP-434a: Overhead and Underground Utility Hazards (US-only)</p>

D.5. HAND TOOLS (Manual, Hand-Powered)

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input checked="" type="checkbox"/> MANUAL HAND TOOL INJURIES <input checked="" type="checkbox"/> Struck by <input checked="" type="checkbox"/> Pinch points/crushing injuries <input checked="" type="checkbox"/> Puncture <input checked="" type="checkbox"/> Cutting blade/laceration risk <input checked="" type="checkbox"/> Flying objects, eye hazards <input type="checkbox"/> Other, describe above	<input checked="" type="checkbox"/> Proper tool for the job, maintain in good condition, use vise/clamp to hold work piece, proper follow through, Self and nearby personnel shall stay clear of "line of fire," use appropriate work gloves, keep blades sharp, use wrist strap when dropped tool poses a hazard. <input checked="" type="checkbox"/> Utility/folding/collapsible knives and fixed-blade knives/cutting tools are <u>not</u> permitted, unless specifically authorized. Cutting tools with auto-retracting blades, or with enclosed/guarded blades are permitted. Use cut-resistant heavy work gloves, as applicable. <input checked="" type="checkbox"/> Ground surface penetration (hand auger, probe) – requires utility clearance; see D.11. "Utility-Related Hazards" <p>HSE Program Documents: HSE SOP-640: Manual Hand Tools</p>
<input checked="" type="checkbox"/> MUSCULOSKELETAL (MSK) HAZARDS <input type="checkbox"/> Risk of acute physical MSK trauma (sprains, strains, soft tissue injuries) <input type="checkbox"/> Risk of cumulative/chronic MSK trauma, repetitive motion injuries	<input checked="" type="checkbox"/> For tools requiring high exertion (shovel, hand auger, sledgehammer, pickaxe, slide hammer, similar): do stretching exercises to prepare, clear hazard zone, use stable body position, take rest breaks, avoid overexertion. <input checked="" type="checkbox"/> For recognized musculoskeletal hazard, acute or chronic, resulting from unsafe acute exertion, or ergonomic/repetitive motion/cumulative trauma risks, seek advice on controls from Corporate HSE Dept. <p>HSE Program Documents: HSE SOP-205a: Manual Materials Handling/Back Injury Prevention</p>

D.6. POWERED TOOLS & EQUIPMENT (For Drilling & Heavy Equipment, see D.7 & D.8)

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input checked="" type="checkbox"/> Type of powered tools/equipment: <input checked="" type="checkbox"/> "Power tools" <input type="checkbox"/> Powered portable equipment <input type="checkbox"/> Powered fixed equipment Energy/power source: <input checked="" type="checkbox"/> DC battery- or solar-powered <input type="checkbox"/> AC electric-powered <input type="checkbox"/> 120V <input type="checkbox"/> 240V <input type="checkbox"/> 480V <input checked="" type="checkbox"/> Extension/flexible cords <input type="checkbox"/> Fuel-powered (gas or liquid) <input type="checkbox"/> Pneumatic <input type="checkbox"/> Hydraulic <input type="checkbox"/> Gunpowder-actuated Hazards of Power Tools and Powered Equipment: <input checked="" type="checkbox"/> Eye/hand/body injury <input checked="" type="checkbox"/> Point-of-operation hazards <input checked="" type="checkbox"/> Pinch points, moving parts	<input type="checkbox"/> <u>General safe work practices for operation of powered tools and equipment:</u> <ul style="list-style-type: none"> • Inspect before each use to ensure safe operating condition. • Clear personnel from hazard zone; keep personnel out of the "line-of-fire;" heed warning labels/signage. • Arrange worksite for safe access to equipment and sufficient work area clearance for safe use of tool; confirm no overhead obstructions; ensure adequate illumination. • Secure long hair/loose clothing/hanging jewelry near moving/rotating parts. • Ensure point-of-operation, mechanical power transmission, other moving parts are guarded with protective devices (as applicable); do not override interlocks, guards, protective devices. • Do not make any equipment modifications that create a greater hazard or bypass safety design features. • Use tool/equipment in accordance with manufacturer's use and safety instructions. • Use PPE and/or other safety protections, as appropriate, for eye/hearing/hand/head/body protection. • Provide training or verify operator competency for use of power tool/equipment. • Use ventilation, wet methods, respirators, other applicable means to mitigate inhalation hazard. • Move power cords/pressurized hoses to protect from damage during tool/equipment use. • For spark/heat generating tool/equipment, have fire extinguisher available, remove combustible/flammable materials, or use other means to control fire hazard (e.g. fire watch, fireproof blanket). • Use safe lifting practices and/or lift aids for moving heavy portable equipment, and use safe operating procedures to protect from acute strains/sprains, overexertion, and cumulative trauma injuries. • Implement safe work practices for compressed air, pressurized systems (pneumatic/hydraulic), stored energy. <input checked="" type="checkbox"/> <u>Additional requirements for power tools:</u> <ul style="list-style-type: none"> • Use vise/clamp/work bench or other means to hold/secure a portable/moveable work piece. • Don't carry electrical tools/equipment by the power cord; don't carry pneumatic tools by hoses. • Disconnect tool/equipment from power source before changing bits, blades or making adjustments.

<input type="checkbox"/> Line-of-fire hazards, struck by <input type="checkbox"/> Fire/explosion, ignition sources <input type="checkbox"/> Burns from hot surfaces, steam <input checked="" type="checkbox"/> Noise <input type="checkbox"/> Inhalation/atmospheric hazards <input type="checkbox"/> Working at heights, falls <input type="checkbox"/> Overhead obstruction(s) <input type="checkbox"/> Musculoskeletal hazards <input type="checkbox"/> Potential (stored) energy <input type="checkbox"/> Illumination	<input checked="" type="checkbox"/> Additional requirements for fixed powered equipment: <ul style="list-style-type: none"> • Implement lockout/tagout controls for repairs/adjustments/tooling changes. • Equip pneumatic hoses with whip checks; ensure factory fittings are used for high-pressure hose connections. <input type="checkbox"/> For climbing/fall hazards associated with large equipment, see D.4. "Fall Hazards." <input type="checkbox"/> For electrical hazards, see D.10. "Electrical Work Tasks." <input type="checkbox"/> For ground surface penetration, see D.11. "Utility-Related Hazards." <input type="checkbox"/> For fuel-safety practices, see D.14. "Commercial Chemical Products." <input type="checkbox"/> For air monitoring of atmospheric hazards, see Part E, "Air Monitoring, Worker Exposure Monitoring."
<input type="checkbox"/> WELDING, CUTTING, HOT WORK <input type="checkbox"/> Arc-welding (electrical arc) <input type="checkbox"/> Gas-welding/cutting (fuel gases) Hazards: <ul style="list-style-type: none"> - UV/IR light-eye/skin burns - hot-work hazards/fire - toxic metal welding fumes - compressed gases (physical hazards, fire, oxygen deficiency) - electrical shock 	<input type="checkbox"/> General safe work practices for operators of welding equipment: <ul style="list-style-type: none"> • Hot work permit system shall be implemented. • Operator properly protected (eye protection, clothing, apron, etc.). • Fire hazard controls (watcher, fire extinguisher, water, remove combustibles from work area). • Protect nearby personnel from hazardous UV, IR light (shielding, curtain); see D.16. "Radiation Hazards." <input type="checkbox"/> For welding gas cylinders, secure them upright with caps on when stored or not in use; protect cylinders from damage; NEVER secure gas cylinders to metal welding bench used for electrical arc welding; see D.14. "Commercial Chemical Products." <input type="checkbox"/> For arc welding, follow electrical safe work practices; see D.10. "Electrical Work Tasks." <input type="checkbox"/> For inhalation hazards from welding fumes (toxic metals) and gases (asphyxiant, flammable), see D.14. "Commercial Chemical Products."
<input type="checkbox"/> PORTABLE ELECTRIC GENERATOR Hazards: <ul style="list-style-type: none"> - Electrical shock - Carbon monoxide inhalation hazard - Fuel-related fire hazard - Injury from mechanical or lifting hazard - Burns from hot surfaces 	<input type="checkbox"/> Follow general safe work practices for Powered Tools & Equipment (above), and as follows: <ul style="list-style-type: none"> • Use in accordance with manufacturer's instructions, including instructions for grounding the generator. • Keep generator and work area dry. • Never use indoors, or near building air intake vents due to carbon monoxide hazard. • Provide for ventilation and/or air monitoring where hazardous accumulation of exhaust emissions is possible. • Use hearing protection in close proximity to operating generator (where noise level exceeds 85 dBA). • Use power cords/extension cords specified by instructions. • Use ground-fault circuit interrupters (GFCIs) in accordance with manufacturer's instructions; see D.10. "Electrical Work Tasks." • Shut down equipment before refueling; see safe practices for flammable/combustible liquids in D.14. "Commercial Chemical Products."
<input type="checkbox"/> PNEUMATIC / HYDRAULIC HAZARDS <input type="checkbox"/> Air compressor <input type="checkbox"/> Compressed air system <input type="checkbox"/> High-pressure liquid <input type="checkbox"/> Pressurized steam (For compressed gas cylinders, see D.14. "Commercial Chemical Products")	<input type="checkbox"/> Never direct outlet nozzle toward body; use guards, restraints, engineering controls as appropriate. <input type="checkbox"/> Never use compressed air for cleaning clothes you are wearing. <input type="checkbox"/> If compressed air is used for cleaning, restrict pressure to 30 psi or below, equip nozzle with chip guard. <input type="checkbox"/> Use PPE for eye (goggles or face shield)/hand/head/hearing/skin protection, as appropriate for the hazard. <input type="checkbox"/> Ensure tank, hoses, fittings are in good repair using factory fittings, equipped with whip-checks. <input type="checkbox"/> If pressure relief device poses a hazard to workers, reconfigure or shield device or restrict access by workers.
<input type="checkbox"/> PORTABLE HEATER <input type="checkbox"/> electric <input type="checkbox"/> fuel-powered Hazards: <ul style="list-style-type: none"> - Shock (electrical) - Carbon monoxide emissions and fuel-related fire hazards (fueled) - Fires/burns from hot surfaces. 	<input type="checkbox"/> Follow general safety practices for Operation of Equipment/Machinery (above), and as follows: <ul style="list-style-type: none"> • Keep heater dry and locate heater on level surface away from high traffic areas to prevent tipping. • Never use fuel-powered heaters indoors, or near air intake vents, due to carbon monoxide hazard. • Provide ventilation and/or air monitoring where hazardous accumulation of exhaust emissions is possible. • Keep combustible materials at least 3 feet from hot surfaces. • Plug electric heaters directly into wall outlet (don't use extension cord or power strip). • For electric heaters, see D.10., "Electrical Work Tasks." • Shut down fuel-powered equipment before refueling; see safe practices for flammable/combustible liquids and/or compressed gases in D.14. "Commercial Chemical Products."
<input type="checkbox"/> LOCKOUT/TAGOUT (LO/TO) OF HAZARDOUS ENERGY To prevent unplanned equipment start-up or release of energy when under maintenance/repair.	<input type="checkbox"/> Prepare site-specific written LO/TO <i>program</i> , and equipment-specific written LO/TO <i>procedures</i> (as applicable); implement control procedures for hazardous energy sources, provide locks/tags, train workers, designate "authorized" personnel, notify "affected" personnel.
<p>HSE Program Documents: HSE STD-125: Personal Protective Equipment Program, HSE STD-135: Hearing Protection Program, HSE STD-150: Globally Harmonized System for Hazard Communication (for fuel), HSE SOP-460: Field Site Exposure Monitoring, HSE SOP-452a: Lock-out/Tag-out (North America-only), HSE SOP-454a: General Electrical Safety (US-only), HSE SOP-642: Powered Hand Tools; HSE SOP-654: Welding, Cutting and Other Hot Work</p>	

D.7. DRILLING (Test Boring, Direct Push, Construction Drilling)

Applicable Not Applicable, Not Anticipated

Site-Specific Notes & Clarifications:

<input type="checkbox"/> DRILLING & DIRECT PUSH Includes hazards posed by drilling rig and associated equipment, heavy support vehicles, trailer/towing hazards, and similar mobile equipment. Hazards: <ul style="list-style-type: none"> - Struck-by equipment - Run over, roll-over - Caught between (pinch points) - Manual lifting, musculoskeletal - Fuel/fluid leaks, fuel hazards - Suspended equipment - Roadway hazards. 	<input type="checkbox"/> <u>Follow safe work practices, as applicable:</u> <ul style="list-style-type: none"> • Non-drilling personnel shall stay clear of drilling work zone when drill rig in operation. • Equipment shall be maintained in good repair, inspected daily upon mobilization; backup alarms and emergency stop operational, machine guards in place, whip checks on high pressure lines. • Leaks or defective safety equipment will be repaired before use. • Establish eye contact with operator and use hand signals prior to approaching the rig. • Use PPE near operating rig (eye/head/hearing/hand/foot protection, high visibility vests or equivalent). • Arrange personal/support vehicles to protect drill team and not obstruct travel lanes or other operations. • Operators/helpers must maintain safe distance from moving parts; secure loose hair/clothing, equipment. • Drill rigs will only be moved with masts lowered. • Maximum safe slope for rig will be followed, drill rig leveled, appropriate blocking/cribbing as needed. • Use safe practices for fuel handling/storage/transport; spill equipment available for fuel/fluid leaks. • Ventilate exhaust and conduct air monitoring, as appropriate, when drilling indoors. • Never climb drill mast without appropriate fall protection. • Use precautions for overhead and underground utilities
<input type="checkbox"/> MECHANICAL LIFTING, RIGGING Applies to lifting truck-mounted boom rig (e.g., drill rig), and all other drilling-related mechanical/electrical hoist equipment. Hazards: <ul style="list-style-type: none"> - Mechanical hazards - Elevated loads 	<input type="checkbox"/> <u>In addition to general drilling & direct push safety practices (above), as applicable:</u> <ul style="list-style-type: none"> • Slings, chains, rope, wire rope, as well as sheaves, boom, and attachments used for lifting/hoisting shall be maintained in good condition, inspected daily, and used/stored in a manner as to protect from damage. • Do not exceed loading limits of lifting equipment; perform work in accordance with equipment load chart. • Hooks will be equipped with safety latches. • Ensure anchor points for winch or other lift device are engineered for intended use. • Ensure personnel are not positioned beneath elevated loads.
<input type="checkbox"/> WARNING! Confirmed or possible close proximity to OVERHEAD or UNDERGROUND UTILITIES.	<input type="checkbox"/> Follow safe work practices per D.11. "Utility-Related Hazards."
HSE Program Documents: HSE SOP-430: Drilling Activities , SOP-434a: Overhead and Underground Utility Hazards (US-only) , HSE SOP-644: Working Around Heavy Equipment ,	

D.8. CONSTRUCTION, HEAVY EQUIPMENT, LIFT EQUIPMENT

Applicable Not Applicable, Not Anticipated

Site-Specific Notes & Clarifications:	
<input type="checkbox"/> WORKING NEAR MOBILE HEAVY EQUIPMENT, ON-SITE VEHICLES Hazards: <ul style="list-style-type: none"> - Struck-by - Caught between - Run over, roll over - Overhead hazards/obstructions - Elevated loads 	<input type="checkbox"/> <u>For personnel on-foot/on-the-ground near operating heavy equipment, follow safe work practices:</u> <ul style="list-style-type: none"> • High visibility vests for all personnel in construction vehicle work area, on-site roadways and travel lanes. • Maintain unobstructed vision: wear shaded eyewear only in bright sun; don't wear hoods. • Erect barriers and post signs to identify and isolate the equipment hazard zone, if possible. • Stay out of swing radius of equipment, both in front and operating end, as well as at the back of equipment. • Stay out of the travel path of operating heavy equipment. • When crossing vehicle pathway behind moving equipment, cross at a distance not less than 30 feet. • When approaching equipment, always be able to see operator so he/she can see you. • Make eye contact with operator and use hand signals or make radio contact prior to approaching equipment. • Operator shall provide "all off" hand signal when it is safe to approach within swing radius of equipment.
<input type="checkbox"/> OPERATION OF MOBILE HEAVY EQUIPMENT Hazards: <ul style="list-style-type: none"> - Struck-by - Run over, roll over - Caught between (pinch points) - Fluid leaks/fuel-/fire-hazards - Overhead hazards/obstructions - Potential for body entrapment/crushing - Rotating equipment, moving parts. 	<input type="checkbox"/> <u>Operators shall follow safe work practices for operation of heavy equipment:</u> <ul style="list-style-type: none"> • Only trained/qualified persons allowed to operate heavy equipment. • Wear seat belts; roll-over protection system present/deployed; do not exceed maximum safe slope. • No passengers on moving/operating equipment except where passenger seat/restraint is present. • Equipment inspected daily upon mobilization; maintained in good repair, backup alarms, windows clear. • Leaks or defective safety equipment should be repaired before use; fire extinguisher present. • Maintain eye contact with ground personnel and use hand signals to direct their approach near equipment. • High visibility vests for all personnel in construction vehicle work area, on-site roadways and travel lanes. • Cease operation if personnel enter swing radius, travel path or hazard zone of moving parts, elevated loads. • Use safe practices for fuel handling/storage/transport; spill equipment available for fuel/fluid leaks. • Equipment locked, secured, brakes set, buckets/forks lowered, extendable parts retracted, when not in use. • Shut down/lock out equipment to prevent crush situation beneath or between moving parts of equipment. • Ensure personal/support vehicles are parked/located to not obstruct equipment travel lanes/operating zones. • Mark temporary roadways clearly, provide berms/stops where needed. <p style="text-align: center;">HSE Program Documents: HSE SOP-644: Working Around Heavy Equipment</p>
<input type="checkbox"/> TRENCHING/EXCAVATION Hazards: <ul style="list-style-type: none"> - Cave-in, entrapment - Hazardous atmosphere - Water accumulation - Falls into excavations 	<input type="checkbox"/> <u>Safe work practices when personnel will enter trenches/excavations:</u> <ul style="list-style-type: none"> • Activities under supervision/oversight of Competent Person, conduct daily inspection of excavation. • Excavated materials placed at least 2' from trench sidewall. • Prevent water accumulation in trench. • Sloping & shoring for trenches/excavations >20' deep must be approved by a Professional Engineer. • Sloping/shoring/trench box for excavations >5' when persons enter trench/excavation.

	<ul style="list-style-type: none"> - Utility-related hazards - Undermining structures & foundations 	<ul style="list-style-type: none"> • Sloping/shoring/trench box for shallow (<5') trench/excavation with cave-in hazard. • Workers in trenches shall be within 25 feet of ladder or sloped entryway. • Excavations shall be protected by perimeter fencing (not barricade tape), if potential for personnel to fall into. • If potential for atmospheric hazard, see D.12. "Confined/Enclosed Spaces" <p style="text-align: center;">HSE Program Documents: HSE SOP-432: Excavation and Trenching Activities</p>
<input type="checkbox"/>	<p>FORKLIFT</p> <p>Hazards:</p> <ul style="list-style-type: none"> - Struck-by - Run over/roll over/tip over - Overhead utilities/obstructions - Caught between (pinch points) - Unstable/falling loads - Elevated forks - Fluid leaks 	<p><input type="checkbox"/> <u>In addition to general safety practices for heavy equipment (above), as applicable:</u></p> <ul style="list-style-type: none"> • Qualified operator, per established forklift training (certificate is required); Geosyntec operator must be approved by Director of Health and Safety. • Equipment inspected daily and documented on Forklift Preoperational Inspection Checklist. • Do not exceed lifting load limits. • Forklift shall not be moved/driven with empty forks in raised position. • When not in use, forks lowered, brake set, controls in neutral, key removed. <p style="text-align: center;">HSE Program Documents: HSE SOP-436: Safe Operation of Forklifts and Mobile Equipment</p>
<input type="checkbox"/>	<p>AERIAL BOOM/SCISSOR LIFT</p> <p>Hazards:</p> <ul style="list-style-type: none"> - Falls from basket - Overhead utilities/obstructions - Struck-by, run over, tip over - Caught between (pinch points) - Tip over - Fluid leaks. 	<p><input type="checkbox"/> <u>Follow safe work practices:</u></p> <ul style="list-style-type: none"> • Operators shall be appropriately trained and certified. • Equipment is inspected after mobilization and is in good condition. • Harness & lanyard worn when operating a boom lift (optional for scissor lift). • Overhead hazards and surface obstructions shall be reviewed with operators/riders prior to use. <p style="text-align: center;">HSE Program Documents: HSE SOP-650: Manlifts and Aerial Lift Platforms (safe operation of mobile equipment)</p>
<input type="checkbox"/>	<p>CRANES</p> <p>Hazards:</p> <ul style="list-style-type: none"> - electrocution by overhead utility - injury in swing radius - injury from falling load - crane tipping over due to overbalancing, high winds, unstable ground, unsafe slope, bad placement of outriggers - injury from mechanical hazards 	<p><input type="checkbox"/> <u>In addition to general safety practices for Operation of Heavy Equipment (above), as applicable:</u></p> <ul style="list-style-type: none"> • Only qualified persons operate cranes (certificate required). • Critical Lift Plan & Checklist prepared/executed (See Procedure) prior to mobilization. • Equipment shall be inspected prior to mobilization and daily by crane operator. • Crane operator will remain at the controls at all times during operation. • Crane operation must be performed under the direction of an appointed signal person at all times using hand signals and/or voice/radio communication. • Crane shall be level and stable (solid ground or crane mats/timbers, outriggers if present, cribbing); over-reaching or exceeding load limits is prohibited. • Keep area beneath suspended loads clear of personnel; tag lines used to maneuver load. • Rigging procedures – see Mechanical Lifts with Rigging, below.
<input type="checkbox"/>	<p>MECHANICAL LIFTS WITH RIGGING</p> <p>Applies to lifting by rigging attached to crane, truck-mounted boom rig (e.g. drill rig), heavy equipment, mechanical/electrical hoist, similar equipment.</p> <p>Hazards:</p> <ul style="list-style-type: none"> - Mechanical hazards, - Elevated loads 	<p><input type="checkbox"/> <u>In addition to general safety practices for Operation of Heavy Equipment and Cranes (above), as applicable:</u></p> <ul style="list-style-type: none"> • Slings, chains, rope, wire rope, as well as sheaves, boom and attachments used for lifting/hoisting shall be maintained in good condition, inspected daily, and used/stored in a manner as to protect from damage. • Coordinate lifting operations with competent person. • Do not exceed loading limits of lifting equipment; perform work in accordance with equipment load chart. • Hooks will be equipped with safety latches. • Ensure anchor points for winch or other lift device (such as davit arm) are engineered for intended use. • Ensure personnel are not positioned beneath elevated loads and that tag lines are used where appropriate.
<input type="checkbox"/>	<p>WARNING! Confirmed or possible close proximity to OVERHEAD or UNDERGROUND UTILITIES.</p>	<p><input type="checkbox"/> Follow safe work practices per D.11. "Utility-Related Hazards"</p> <p style="text-align: center;">HSE Program Documents: HSE SOP-434a: Overhead and Underground Utility Hazards (US-only)</p>
<input type="checkbox"/>	<p>DEMOLITION</p>	<p><input type="checkbox"/> Develop/implement a demolition safety plan.</p>
<input type="checkbox"/>	<p>BLASTING, UNEXPLODED ORDNANCE</p>	<p><input type="checkbox"/> Develop/implement safety plan for blasting, unexploded ordnance, as applicable.</p> <p style="text-align: center;">HSE Program Documents: HSE SOP-622: Blasting & Use of Explosives</p>
<input type="checkbox"/>	<p>PUBLIC AT RISK, SITE SECURITY</p>	<p><input type="checkbox"/> During site operations protect public (overhead protection, fencing, barriers, warning signs).</p> <p><input type="checkbox"/> During off hours, protect public with fencing, barriers, warning signs/lights, other measures as appropriate.</p> <p><input type="checkbox"/> Lock/secure hazardous materials and/or equipment.</p>

D.9. STORAGE/HANDLING OF BULK MATERIALS (for *Chemical* Storage, see D.14 & 15) **Applicable** **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:

<input type="checkbox"/>	<p>BULK STORAGE HAZARDS:</p> <p>Collapse/movement of stacked/stored bags, blocks, containers, pipe, boxes, equipment, and similar.</p> <p><input type="checkbox"/> Stack/pallet/rack/shelf</p> <p><input type="checkbox"/> CONEX-box storage, or similar</p>	<p><input type="checkbox"/> Store materials in stable manner (stacked, racked, blocked, interlocked, tied, wrapped, or otherwise secured) to prevent tipping, sliding, rolling, falling or collapse.</p> <p><input type="checkbox"/> Do not exceed load limits and ensure storage structure is stable, robust, secure for intended load.</p> <p><input type="checkbox"/> Ensure stored materials do not block aisles, passageways, electrical panels, emergency equipment, emergency access/egress routes, vehicle routes.</p>
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<input type="checkbox"/>	LIFTING/MANUAL MATERIAL HANDLING HAZARDS	<input type="checkbox"/> During manual handling of materials and equipment, use safe lifting practices and/or lift aids; do stretches and use safe postures to protect from acute strains/sprains, overexertion, and cumulative trauma injuries. HSE Program Documents: HSE SOP-205a: Manual Materials Handling/Back Injury Prevention
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D.10. ELECTRICAL WORK TASKS

Applicable Not Applicable, Not Anticipated

Site-Specific Notes & Clarifications:		
<input type="checkbox"/>	USE OF BATTERIES, BATTERY-POWERED EQUIPMENT <50 V, OR OTHER DC EQUIPMENT < 50 V Potential fire hazard (if terminals are shorted), eye/skin hazards (when electrolyte is replenished), inhalation hazard in enclosed spaces.	<input type="checkbox"/> Follow safe work practices to control hazards of voltage, shock, arcing, overheating, hazardous gases, irritant electrolytes, secondary hazards. <input type="checkbox"/> Prevent short-circuiting of terminals when battery is in use (segregated from tools, metal objects) and during transport (use battery transport container or install guard/cover on positive terminal). <input type="checkbox"/> For batteries requiring replenishment of electrolyte, use PPE for eye and skin protection, and have eyewash equipment at hand; see discussion of <i>acids/caustics/corrosives</i> in D.14. “Commercial Chemical Products.”
<input type="checkbox"/>	“NORMAL OPERATION” OF ELECTRICAL EQUIPMENT CONNECTED TO AC OR DC POWER SOURCE ≥ 50 V: Electrically powered tools, equipment, machinery, extension cords, portable generators, working near electrical equipment. Hazards: – Electrical shock – Fire Hazard – Secondary hazards (falls, other injuries).	<input type="checkbox"/> Follow “normal operation” requirements: <ul style="list-style-type: none"> • All electrical enclosures/guards/covers must be in place/closed/secured. • Electrical equipment maintained per codes/standards/manufacturer’s recommendations. • Ensure no indication of damage or impending failure (heat, smoke, buzzing, odors, arcing, melting). • Operate equipment in accordance with manufacturer’s standard operating procedures. <input type="checkbox"/> Follow general electrical safety work practices to minimize shock hazard and secondary hazards: <ul style="list-style-type: none"> • Control water-related/wet-location hazards in a manner appropriate for the job tasks/equipment/tool. • Never touch electrical equipment if you are wet or standing/kneeling in water or on wet surfaces. • Use extension cords/power cords properly, rated for use conditions and current draw, prevent damage. • Inspect tool/equipment/extension cords/power cords before each use; remove from use if damaged. • Use GFCI-protected outlet or portable GFCI in wet/moist locations, outdoors, basements, concrete floors. • Do not enter any space delineated by an electrical approach boundary.
<input type="checkbox"/>	HANDS-ON DIAGNOSTICS/REPAIR ON CIRCUIT(S) CONNECTED TO POWER SOURCE < 50 V: <input type="checkbox"/> AC <input type="checkbox"/> DC <input type="checkbox"/> Battery and/or solar power <input type="checkbox"/> Capacitor(s) <input type="checkbox"/> Stray voltage from soil electrodes	<input type="checkbox"/> Implement electrical safe work practices pertaining to: <ul style="list-style-type: none"> • Workers trained appropriately for the task. • Shock prevention measures. • Eye/skin protection for arcing hazards. • Protection from secondary hazards.
<input type="checkbox"/>	WORK WITHIN “APPROACH BOUNDARY” OF EXPOSED, ENERGIZED (OR POTENTIALLY ENERGIZED) CONDUCTORS AND/OR CIRCUIT PARTS CONNECTED TO POWER SOURCE 50-600 V*: <input type="checkbox"/> AC <input type="checkbox"/> DC <input type="checkbox"/> 3-phase <input type="checkbox"/> Battery and/or solar power <input type="checkbox"/> Capacitor(s) <input type="checkbox"/> Induced voltage <input type="checkbox"/> Stray voltage ≥50V from soil electrodes * Working on >600 V not permitted for Geosyntec personnel	<input type="checkbox"/> Prepare project-specific written “Electrical Safety Program” addressing (at a minimum): <ul style="list-style-type: none"> • Workers trained/designated as “Qualified Electrical Workers” per NFPA 70E (US)/CSA Z462 (CAN) • Assess risks of electrical shock (voltage levels and sources), arc flash hazard and secondary hazards. • Affix electrical hazard warning label to electrical enclosure(s) to be accessed. • Physically delineate arc flash- or limited approach boundary, whichever is farthest from hazard source. • Only “qualified” workers allowed within approach boundaries; prevent entry by non-qualified personnel. • Establish electrically safe working condition; work on live circuits prohibited (except for diagnostic testing). • Use PPE for shock/arc flash protection, as required. • Use other safe procedures/equipment required for the task, such as lockout/tagout.
<input type="checkbox"/>	LOCKOUT/TAGOUT (LO/TO) OF ELECTRICAL ENERGY To prevent unplanned start-up or release of energy when equipment is under maintenance/repair.	<input type="checkbox"/> Prepare site-specific written LO/TO <i>program</i> , and equipment-specific written LO/TO <i>procedures</i> (as applicable); implement control procedures for hazardous energy sources, provide locks/tags, train workers, designate “authorized” personnel, notify “affected” personnel.
<input type="checkbox"/>	WARNING! Confirmed or possible close proximity to OVERHEAD ELECTRICAL UTILITY LINES.	<input type="checkbox"/> Follow safe work practices per D.11. “Utility-Related Hazards.”
HSE Program Documents: HSE SOP-434a: Overhead and Underground Utility Hazards (US-only) , HSE SOP-452a: Lock-out/Tag-out (North America-only) HSE SOP-454a: General Electrical Safety (US-only)		

D.11. UTILITY-RELATED HAZARDS

Applicable Not Applicable, Not Anticipated

Site-Specific Notes & Clarifications:		
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<input type="checkbox"/>	OVERHEAD, ABOVE-GROUND UTILITIES	<input type="checkbox"/> Do not cross approach boundaries with personnel or equipment; employ other appropriate precautions for the conditions (specify above). <input type="checkbox"/> Use additional controls, as applicable: shielding, flagging, observer/monitor, or, <input type="checkbox"/> Arrange for power company/utility owner to de-energize power line.
<input type="checkbox"/>	UNDERGROUND UTILITIES	<input type="checkbox"/> Confirm appropriate underground utility clearance procedures have been completed prior to ground penetrations, and employ other utility clearance/locator practices, as appropriate for conditions. <input type="checkbox"/> Hand digging/augering or vacuum post-holing within 3' of utility locations or other high-risk condition.

HSE Program Documents: [HSE SOP-434a: Overhead and Underground Utility Hazards \(US-only\)](#)

D.12. CONFINED / ENCLOSED SPACES (Including Hazardous Indoor Spaces) **Applicable** **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input type="checkbox"/> Type of CONFINED/ENCLOSED/HAZARDOUS INDOOR Workspace: <input type="checkbox"/> Indoors (occupied) <input type="checkbox"/> Indoors (abandoned, vacant) <input type="checkbox"/> Basement, crawl space, attic <input type="checkbox"/> Tunnel, shaft, inspection gallery <input type="checkbox"/> Storage bin, locker <input type="checkbox"/> Culvert, catch basin, sewer <input type="checkbox"/> Well vault, utility vault, manhole <input type="checkbox"/> Tank, vessel, silo, vat, hopper <input type="checkbox"/> Trench, excavation <input type="checkbox"/> Machine/equipment pit <input type="checkbox"/> Transportation container, railcar <input type="checkbox"/> Other – describe above Confirmed or potential hazards: <input type="checkbox"/> Flammable/explosive <input type="checkbox"/> Oxygen deficiency <input type="checkbox"/> Hydrogen sulfide <input type="checkbox"/> VOCs <input type="checkbox"/> Carbon monoxide <input type="checkbox"/> Combustible dust <input type="checkbox"/> Combustion/exhaust emissions <input type="checkbox"/> Welding/cutting fumes <input type="checkbox"/> Electrical <input type="checkbox"/> Mechanical equipment <input type="checkbox"/> Entrap, engulf, drowning <input type="checkbox"/> Building-related hazards <input type="checkbox"/> Other – describe above	REQUIREMENTS: 1. Contact Corp. HSE Department will determine applicability of confined space entry regulations, and to determine safe work practices for entry into any confined, enclosed or hazardous indoor spaces. 2. Classify the work task by checking one of the following: <input type="checkbox"/> CONFINED SPACE classified by regulatory authority as a “Permit-Required Confined Space” or otherwise specifically-regulated as a confined space in the worksite’s geographic jurisdiction. <input type="checkbox"/> CONFINED/ENCLOSED/INDOOR space NOT specifically regulated as a Confined Space; develop site-specific entry procedure per applicable regulatory and Geosyntec safety requirements. 3. Delineate tasks, hazards and controls associated with the work in Section C.1. “Summary of Tasks, Hazards and Controls,” and in applicable sections in Parts C, D and E of this THA; incorporate or attach applicable safety provisions such as, but not limited to, the following: <ul style="list-style-type: none"> • Risk assessment; entry plan, entry permit system/safety checklist. • Air monitoring for atmospheric hazards. • Entry roles (supervisor, entrant, attendant), buddy system, regulatory training requirement. • Protect non-entry personnel from unauthorized entry (labels, signage, barriers) • Ingress/egress (stairway, ramp, ladder, tripod/winch, harness/lifeline, etc.). • Communication/alerting/rescue/emergency plan. • Entry hazard controls: <ul style="list-style-type: none"> - Isolate, clean, purge, inert, lockout/tagout, fire prevention. - <i>Dilution</i> ventilation to introduce fresh air - <i>Exhaust</i> ventilation to control point source of emissions. - Use duct/stack to direct hazardous emissions away from work area. - Respiratory protection. - Use PPE and safety gear to protect from chemical/physical/biological hazards. - Fall protection. - Traffic control.

HSE Program Documents: [HSE STD-125: Personal Protective Equipment Program](#), [HSE STD-130: Respiratory Protection Program](#), [HSE SOP-412a: Confined Space Entry Operations \(US-only\)](#), [HSE SOP-460: Field Site Exposure Monitoring](#)

D.13. INFECTIOUS / PATHOGENIC BIOHAZARDS **Applicable** **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input checked="" type="checkbox"/> HAZARD TYPE: <input type="checkbox"/> Contagious respiratory illness <input type="checkbox"/> Vector-borne infectious risk <input type="checkbox"/> Wastewater, sewer, landfill <input checked="" type="checkbox"/> Animal/human waste <input type="checkbox"/> Wildlife contact, infectious risk <input type="checkbox"/> Mold, fungi, valley fever <input type="checkbox"/> Bloodborne pathogens <input checked="" type="checkbox"/> Discarded syringes <input checked="" type="checkbox"/> Medical waste <input type="checkbox"/> Other (describe above)	<input type="checkbox"/> Follow internal guidance for mitigating airborne respiratory illness transmission (as applicable). <input type="checkbox"/> Implement vector-protective measures (see also Section D.1.b., “Biological Hazards”) <input type="checkbox"/> Use “Standard/Universal Precautions” as applicable to mitigate exposures to infectious/pathogenic hazards. <input checked="" type="checkbox"/> Low hazard – use basic hygiene: onsite hand washing (soap & water preferred) and protective apparel/PPE. <input checked="" type="checkbox"/> Med/high hazard – added PPE (gloves/barriers/respirator/dust mask), decon, remediation, as appropriate. <input type="checkbox"/> For bloodborne human pathogens follow Bloodborne Pathogen Program and Standard/Universal Precautions. <input type="checkbox"/> Contact HR Dept. for project-specific immunization (e.g. tetanus/diphtheria/pertussis [Tdap], hepatitis A/B). <input type="checkbox"/> Implement remedial actions to mitigate infectious hazard source (remove syringes, clean up unsanitary waste/debris, decon/disinfect surfaces, etc.) as appropriate for the scope/scale of work. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-240: Mitigating Respiratory Illness Transmission in the Workplace, HSE SOP-408: Biting/Stinging Arthropods and Poisonous Plants, HSE SOP-612a: Bloodborne Pathogens (US-only)</i></p>

D.14. COMMERCIAL CHEMICAL PRODUCTS (per HAZCOM or WHMIS) **Applicable** **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:
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<input type="checkbox"/> PRODUCTS REGULATED BY HAZCOM¹ (US) or WHMIS² (CAN)	<input type="checkbox"/> Safety Data Sheets (SDSs) available, either on site or readily available within same work shift, containers labelled properly, workers trained/oriented on hazards. <input type="checkbox"/> For subcontractor/contractor use of chemical products, confirm SDS availability for affected onsite workers.
¹ OSHA Hazard Communication Standard (United States); ² Workplace Hazardous Material Information System (Canada)	
<input type="checkbox"/> GENERAL SAFE WORK PRACTICES FOR FIELD USE OF CHEMICALS	<input type="checkbox"/> Consult SDS for HSE hazards, symptoms of exposure; ensure workers have been apprised of safe practices. <input type="checkbox"/> Handle with care, maintain good housekeeping, provide adequate illumination in work area. <input type="checkbox"/> Pour/dispense/transfer liquid chemicals on stable work surface. <input type="checkbox"/> Use chemicals in well-ventilated area; use fans/blowers/exhaust for active ventilation, as appropriate. <input type="checkbox"/> Have eyewash bottles, eyewash station, deluge capabilities, commensurate for the hazard, readily available. <input type="checkbox"/> Have spill/neutralization equipment, appropriate for the chemicals, readily available. <input type="checkbox"/> Conduct air monitoring as appropriate; see Part E, "Air Monitoring, Worker Exposure Monitoring."
<input type="checkbox"/> STORAGE/TRANSPORT OF CHEMICALS/HAZMAT <input type="checkbox"/> Non-Emergency (Routine) Chemical Storage Risk of personal contact and/or incidental release <input type="checkbox"/> HAZMAT Transport <input type="checkbox"/> Risk of Emergency Spill/Release <input type="checkbox"/> CFTAS (Chemical Facility Anti-Terrorism Standards) Applicability: On-site overnight storage of non-waste chemical product at quantity ≥ 25 gal(115L) or ≥ 250 lbs. (115 kg)	<input type="checkbox"/> Transport chemicals only in sealed containers, secured to prevent shifting/breakage during travel. <input type="checkbox"/> Store chemicals only in sealed containers; overnight storage in squirt/spray bottles prohibited. <input type="checkbox"/> Store flammable/combustible liquids in chemical storage cabinets, or other appropriate storage arrangement. <input type="checkbox"/> For liquids, provide secondary containment during storage. <input type="checkbox"/> Segregate incompatible chemicals during storage. <input type="checkbox"/> For <i>incidental release/spill</i> ; maintain spill kit suitable for low flammability/toxicity/quantity/volatility release. <input type="checkbox"/> DOT/TDG/IATA-Regulated transport: see D.17. "Hazmat/Dangerous Goods Shipping/ Transportation." <input type="checkbox"/> For <i>emergency spills</i> : describe spill/release hazard and response plan/procedure above, and indicate emergency response contact in Part B, "Emergency Response and First Aid." <input type="checkbox"/> Locate emergency gear (eyewash, fire extinguisher, spill kit, safety signage) near storage area, as applicable. <input type="checkbox"/> For CFTAS-applicable chemical storage, a safety and chemical management plan must be prepared and reviewed by a HSE Professional before bringing material to the site. (Does not apply to materials brought on to the site for daily work purposes and transported away at the end of each day)
<input type="checkbox"/> COMPRESSED GAS CYLINDERS <input type="checkbox"/> Flammable <input type="checkbox"/> Non-flammable <input type="checkbox"/> Toxic <input type="checkbox"/> Asphyxiant <input type="checkbox"/> Oxygen	<input type="checkbox"/> Secure cylinders upright, caps on when not in use. <input type="checkbox"/> Handle with care; use and store cylinders in a manner and location to prevent damage. <input type="checkbox"/> Propane cylinders not in use <u>must be stored outdoors</u> in a cage or similar secure ventilated enclosure. <input type="checkbox"/> Ensure acetylene cylinders are NOT secured to steel arc welding bench. <input type="checkbox"/> Segregate oxygen and fuel gases by distance (20') or fire-rated barrier. <input type="checkbox"/> Control ignition sources. <input type="checkbox"/> "No smoking" signage at cylinder storage area for flammable gases.
<input type="checkbox"/> FLAMMABLE/COMBUSTIBLE LIQUIDS	<input type="checkbox"/> Use proper fuel safety can (metal fuel container with self-closing spout and flame arrestor preferred). <input type="checkbox"/> Control/remove ignition sources near storage and use areas. <input type="checkbox"/> Grounding and bonding where appropriate. <input type="checkbox"/> Ensure a Type B or ABC fire extinguisher is readily available.
<input type="checkbox"/> ACIDS, CAUSTICS, OTHER CORROSIVES	<input type="checkbox"/> Use appropriate protection for eyes/face (goggles/face shield) and skin (gloves, sleeves, apron). <input type="checkbox"/> Use eyewash, deluge shower, drench hose, hand washing (with water), as appropriate. <input type="checkbox"/> For severe eye hazards (due to high corrosivity, large quantity), 15-min. eyewash required.
<input type="checkbox"/> TOXIC	<input type="checkbox"/> For toxic substances, use/store in a manner to control exposure hazards (inhalation, ingestion, skin contact, skin absorption); use active ventilation and/or PPE as appropriate.
<input type="checkbox"/> EMISSIONS FROM FUEL COMBUSTION, HOT PROCESSES <input type="checkbox"/> Gasoline <input type="checkbox"/> Diesel <input type="checkbox"/> Propane/Natural Gas <input type="checkbox"/> Welding/cutting/hot work <input type="checkbox"/> Vehicle/equipment exhaust <input type="checkbox"/> Other	<input type="checkbox"/> Position outdoor personnel upwind of exhaust source. <input type="checkbox"/> Avoid "idling" of equipment when not in use. <input type="checkbox"/> Use <i>passive ventilation</i> (air infiltration/air currents) to disperse atmospheric hazards in breathing zone. <input type="checkbox"/> Use <i>dilution ventilation</i> (blowers/fans) to provide fresh air to work area and dissipate atmospheric hazards. <input type="checkbox"/> Use <i>exhaust ventilation</i> (hood/duct/exhaust stack/blower) to capture/divert exhaust from work area. <input type="checkbox"/> Use respiratory protection for high levels of smoke, exhaust particulates, soot. <input type="checkbox"/> Conduct air monitoring as appropriate; see Part E, "Air Monitoring, Worker Exposure Monitoring."
<input type="checkbox"/> OTHER HAZARDS	<input type="checkbox"/> Describe other hazardous substances and safety measures under "Site-Specific Notes & Clarifications," above.
HSE Program Documents: HSE STD-125: Personal Protective Equipment Program , HSE STD-130: Respiratory Protection Program , HSE STD-145: Safety Training Program , HSE STD-150: Globally Harmonized System for Hazard Communication , HSE SOP-460: Field Site Exposure Monitoring	

D.15. SITE CONTAMINANTS, CHEMICAL WASTES

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:

CHECK ALL THAT APPLY. Provide site-specific notes/clarifications above.

<input checked="" type="checkbox"/> Soil/groundwater contaminants (historical release)	<input type="checkbox"/> Explosive dust	<input type="checkbox"/> Potential for flammable gas (methane)
<input type="checkbox"/> Recent release, known high concentrations	<input type="checkbox"/> Oxygen deficiency	<input type="checkbox"/> Corrosive, acids/caustics, strong irritants
<input type="checkbox"/> Former chemical disposal site, landfill	<input type="checkbox"/> Chlorinated volatile organic compounds (VOCs)	<input type="checkbox"/> Asbestos abatement work

<input type="checkbox"/> Urban fill, residual contaminants	<input type="checkbox"/> BTEX, petroleum derived VOCs	<input type="checkbox"/> Pesticides, herbicides, fungicides
<input type="checkbox"/> Containerized waste (drums, process equipment)	<input type="checkbox"/> Fuel oils, petroleum, waste oil, lubricants	<input type="checkbox"/> Sensitizers
<input type="checkbox"/> Buried drums (known or potential)	<input type="checkbox"/> Metals, metal compounds, metal dusts	<input type="checkbox"/> Radioactive contaminants
<input type="checkbox"/> Large containers, potential for spills	<input type="checkbox"/> Elemental mercury	<input type="checkbox"/> Controlled substances, drugs
<input type="checkbox"/> Contaminated building surfaces	<input type="checkbox"/> Polyaromatic hydrocarbons (PAHs)	<input type="checkbox"/> Wildfire smoke, see THA Addendum
<input type="checkbox"/> Unexploded ordnance	<input type="checkbox"/> Potential for flammable vapors	<input type="checkbox"/> Other - describe above
NOTE: For sites with one or more “high-risk contaminants” (below) designated/recognized as a <i>contaminant of concern</i> , or <i>exceeding an environmental reporting threshold</i> , or representing a <i>potential exceedance of an action level or exposure limit</i> , the THA must be reviewed by the HSE Dept. before initiating the work:		
<input type="checkbox"/> Asbestos	<input type="checkbox"/> Chromium VI (hexavalent chromium)	<input type="checkbox"/> Lead
<input type="checkbox"/> Arsenic/arsenic compounds	<input type="checkbox"/> Crystalline Silica (airborne)	<input type="checkbox"/> Methylene chloride
<input checked="" type="checkbox"/> Benzene	<input type="checkbox"/> Dioxins	<input type="checkbox"/> Polychlorinated biphenyls (PCBs)
<input type="checkbox"/> Beryllium	<input type="checkbox"/> Mercury	<input checked="" type="checkbox"/> Vinyl chloride
<input type="checkbox"/> Cadmium	<input type="checkbox"/> Hydrogen Cyanide (HCN)	
<input checked="" type="checkbox"/> FOR WORK CONSISTING OF CLEANUP OPERATIONS, CORRECTIVE ACTIONS, PRELIMINARY INVESTIGATIONS at an “UNCONTROLLED HAZ. WASTE SITE” (per HAZWOPER, 29 CFR 1910.120 or equivalent), delineate procedures in “Site-Specific Notes and Clarifications” (or attachments) addressing the following, as applicable to the work: <ul style="list-style-type: none"> - Workers attend pre-work orientation on hazards, risks, onsite safety measures, emergency contingencies. - Implement site control plan - delineate Exclusion Zone(s), Contaminant Reduction Zone(s), Support Zone (aka EZ, CRZ, SZ). - Include site map/figure depicting work locations and other relevant site-specific information. - Site workers in EZ or CRZ shall have 40-hour HAZWOPER training, current 8-hour refresher, 3 days supervised field experience. - Site supervisor(s) shall have 8-hour Supervisor training. - Site workers in EZ or CRZ shall participate in medical monitoring program, as applicable. - Implement site-specific procedures for worker protection via engineering controls, work practices, personal protective equipment (PPE), air monitoring, decontamination procedures, spill containment, emergency preparedness and response. - Conduct air monitoring, as appropriate; see Part E, “Air Monitoring, Worker Exposure Monitoring.” - PPE program: Specify Levels of Protection and specific PPE to be used for applicable tasks; <ul style="list-style-type: none"> o Level D: No respirator, no chemical protective clothing, standard work clothes, basic PPE; (COVID-19 face covers allowed) o Modified Level D: No respirator, chemical protective clothing as appropriate; (COVID-19 face covers allowed) o Level C: Air-purifying respirator, chemical protective clothing as appropriate; consult with Corp. HSE Dept. required. o Level B: Air-supplied respirator, chemical protective clothing/suit as appropriate; consult with Corp. HSE Dept. required. o Level A: Fully encapsulating suit, self-contained breathing apparatus (SCBA); Level A prohibited for Geosyntec personnel. 		
<input type="checkbox"/> FOR SITE WITH CHEMICAL CONTAMINANTS OR WASTE BUT NOT REGULATED BY HAZWOPER <ul style="list-style-type: none"> - Workers shall be knowledgeable/aware of chemical hazards thru safety training/orientation and availability of hazard information. - Implement controls to minimize worker exposure through engineering controls, work practices, PPE, decon, as appropriate. - Evaluate worker exposure via air monitoring/sampling, as applicable; see Part E, “Air Monitoring, Worker Exposure Monitoring.” 		
<input checked="" type="checkbox"/> STORAGE/TRANSPORT OF IDW* Spill/Release Risk: <input checked="" type="checkbox"/> Risk of <i>incidental spill/release</i> <input type="checkbox"/> Risk of <i>emergency spill/release</i> <i>* Investigation-Derived Waste</i>	<input type="checkbox"/> Describe site-specific procedures above for spill containment, container handling, as applicable. <input checked="" type="checkbox"/> For liquids, provide secondary containment during storage. <input type="checkbox"/> Segregate incompatible chemicals during storage. <input type="checkbox"/> Locate emergency gear (eyewash, fire extinguisher, spill kit, safety signage) near storage area, as applicable. <input checked="" type="checkbox"/> For <i>incidental spills</i> ; spill kit on-site for low-hazard releases (low-flammability/toxicity/quantity/volatility) <input type="checkbox"/> For <i>emergency spills</i> : describe spill/release hazard and response plan/procedure above, and indicate Emergency response contact in Part B, “Emergency Response and First Aid.” <input type="checkbox"/> DOT/TDG/IATA-Regulated transport: see D.17. “Hazmat/Dangerous Goods Shipping/Transportation.”	
<input type="checkbox"/> OFF-SITE MIGRATION OF AIRBORNE CONTAMINANTS	<input type="checkbox"/> Implement controls to minimize hazard migration (dust suppression, covers, foam, etc.). <input type="checkbox"/> Community/perimeter air monitoring will be conducted per perimeter air monitoring plan; see E.3 “Fence Line/Perimeter Air Monitoring.”	
HSE Program Documents: HSE STD-120: Occupational Medical Management Program , HSE STD-125: Personal Protective Equipment Program , HSE STD-130: Respiratory Protection Program , HSE STD-145: Safety Training Program , HSE STD-150: Globally Harmonized System for Hazard Communication , HSE SOP-301a: Contaminated Site Investigation & Remediation (US-only) , HSE SOP-460: Field Site Exposure Monitoring , HSE SOP-634: Drum Sampling , HSE SOP-636: Handling of Uncharacterized Hazardous Waste Containers , THA Addendum on Wildfire Smoke		

D.16. RADIATION HAZARDS (Other than Sunlight)

Applicable Not Applicable, Not Anticipated

D.17. SHIPPING/TRANSPORTATION HAZMAT/DANGEROUS GOODS

Applicable Not Applicable, Not Anticipated

MODE(S) OF TRANSPORT:	<input type="checkbox"/> Road	<input type="checkbox"/> Rail	<input type="checkbox"/> Air	<input type="checkbox"/> Sea	<input type="checkbox"/> Inland Waterway	<input type="checkbox"/> International
IMPORTANT: Ensure that each individual who will be involved in shipping/transportation of hazardous material is current with required training (awareness, function-specific, safety, security) in accordance with applicable regulatory authority (DOT, FAA, IATA, TDG), and ensure adherence to applicable regulations.						
HSE Program Documents: HSE SOP-235a: Hazardous Materials Shipping (US-only)						
Site-Specific Notes & Clarifications:						

PART E – AIR MONITORING, WORKER EXPOSURE MONITORING

E.1. AIR MONITORING

Applicable Not Applicable, Not Anticipated

Site-Specific Notes, Clarifications:

AIR-TESTING PARAMETERS - Select site-specific testing parameters; list associated equipment in Part C.2, Safety Equipment List.

<input type="checkbox"/> VOCs <input type="checkbox"/> PID (Photoionization detector): X eV <input type="checkbox"/> FID (Flame ionization detector) <input type="checkbox"/> Colorimetric indicator tubes – describe above	<input type="checkbox"/> O₂ (Oxygen) – 4 gas meter/GEM <input type="checkbox"/> LEL (Lower Explosive Level) - LEL meter <input type="checkbox"/> H₂S (Hydrogen Sulfide) – H ₂ S detector <input type="checkbox"/> CO (Carbon monoxide) – CO detector	<input type="checkbox"/> Particulates - total dust meter <input type="checkbox"/> % Methane – 4 gas meter/GEM <input type="checkbox"/> Calibration kit for each parameter <input type="checkbox"/> Other: CO₂ (Carbon dioxide) – 4 gas meter/GEM
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SUBSTANCE-SPECIFIC (PRE-SET) ACTION LEVELS - Sustained breathing zone action levels (sustained general work-area levels for LEL).

<input type="checkbox"/> O₂ (Oxygen)	19.5-23%	Acceptable to continue work without O ₂ -focused respiratory protection.
	<19.5%	STOP WORK, ventilate to raise O ₂ to >19.5% for re-entry. For persistent hazard, contact Corp. HSE Dept.
	>23.0%	STOP WORK, ventilate to lower O ₂ to <23% for re-entry. For persistent hazard, contact Corp. HSE Dept.
<input type="checkbox"/> LEL (Lower Explosive Limit)	IMPORTANT:	Confirm sufficient oxygen is present (min. 8-12%) to ensure accurate LEL readings.
	<10% LEL	Acceptable to continue working in work area; continue to monitor LEL.
	≥10% LEL	STOP WORK. Implement controls (reposition workers, ventilate, contain/eliminate source, etc.); resume work ONLY when LEL readings are <10%, sustained.
<input type="checkbox"/> H₂S (Hydrogen Sulfide)	< 1 ppm	Acceptable to continue work without H ₂ S-focused respiratory protection.
	1-10 ppm	Implement controls (reposition workers, ventilate, contain/eliminate source, scheduling, etc.) to limit exposures to <1ppm, or use APR* with VOC/acid-gas cartridges (yellow); do not exceed MUC* for respirator type; confirm acceptability of respirator usage with HSE Dept.
	> 10 ppm	Implement controls (reposition workers, ventilate, contain/eliminate source, scheduling, etc.) to limit exposures to <10ppm (with respirator), or <1ppm (without respirator). For persistent levels >10 ppm, STOP WORK, contact task lead, PM or HSE Dept.
<input type="checkbox"/> CO (Carbon Monoxide)	< 25 ppm	Acceptable to continue work without CO-focused respiratory protection.
	≥ 25 ppm	Implement controls (reposition workers, ventilate, contain/eliminate source, scheduling, etc.) to limit exposures to <25ppm. For persistent levels >25ppm, STOP WORK, contact PM and/or HSE Dept.
<input type="checkbox"/> WILDFIRE SMOKE (AQI for PM 2.5)	≤150	In this Air Quality Index (AQI) range, it's acceptable to continue work without respiratory protection.
	151-500	Voluntary use of N95 respirator is appropriate.
	>500	STOP WORK, or use APR* with approval of HSE Dept.
<input type="checkbox"/> <OTHER>		

SITE-DERIVED ACTION LEVELS – Sustained breathing zone action levels; derived based on site contaminants; REVIEW WITH CORP. HSE DEPT. REQUIRED.

<input type="checkbox"/> VOCs (Volatile Organic Compounds)	< X ppm	Acceptable to continue work without VOC-focused respiratory protection.
	> “ ppm	Implement controls (reposition workers, ventilation, containment, eliminate source, etc.) to lower VOC exposures to less than specified action level, or use APR* with approval of Corp. HSE Dept.
	X to X ppm	Use APR* with VOC cartridges (yellow or black); do not exceed MUC** for respirator type; confirm procedures for respirator usage with HSE Dept.
	> X ppm	STOP WORK. Implement controls, for persistent levels greater than action contact PM and/or HSE Dept.
<input type="checkbox"/> AIRBORNE DUST (Total Particulates)	< X mg/m³	Acceptable to continue work without particulate-focused respiratory protection.
	> “ mg/m³	Implement controls (water spray, reposition workers, ventilation, containment, etc.) to lower dust levels to less than specified action level, or use APR* with approval of HSE Dept.
	X to X mg/m³	Use APR* with particulate cartridges appropriate for the hazard; do not exceed MUC** for respirator type; confirm procedures for respirator usage with HSE Dept.
	> mg/m³	STOP WORK. Implement controls. For persistent levels greater than action level, contact PM and/or Corp HSE Dept.
<input type="checkbox"/> <OTHER>		

* Air-purifying respirator ** Maximum use concentration

HSE Program Documents: [HSE SOP-460: Field Site Exposure Monitoring](#), [HSE SOP-464: Lead Exposure Control](#), [HSE SOP-466: Hydrogen Sulfide Exposure Control](#), [Wildfire Smoke THA Addendum](#)

E.2. OTHER WORKER EXPOSURE MONITORING / SAMPLING

Applicable Not Applicable, Not Anticipated

<input type="checkbox"/> Heat/Cold Stress Testing/Monitoring <input type="checkbox"/> Air Sampling (sample collection, passive dosimeter) <input type="checkbox"/> Wipe/Bulk Sampling (to evaluate worker exposure)	<input type="checkbox"/> Wildfire Smoke – Tracking AQI (Air Quality Index) <input type="checkbox"/> Ionizing or Non-ionizing Radiation Testing <input type="checkbox"/> Noise Testing	<input type="checkbox"/> <Other> <input type="checkbox"/> <Other>
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Site-Specific Notes, Clarifications:



E.3. FENCELINE / PERIMETER AIR MONITORING

Applicable Not Applicable, Not Anticipated

Fence line/perimeter air monitoring to be conducted in accordance with a separate **“Perimeter Air Monitoring Plan”** for this work; results from *fence line/perimeter* air monitoring shall NOT be used as the sole basis for determining *work zone* atmospheric hazards.

Site-Specific Notes, Clarifications:

PART F – APPROVALS, ACKNOWLEDGEMENTS

F.1. THA PREPARATION, REVIEW/APPROVAL SIGNATURES A THA is typically prepared by project staff, often with input from an HSC, with review/approval, at a minimum, by PM and/or Field Lead. Corporate HSE staff must be consulted as required or otherwise deemed appropriate*.

PREPARER(S)	Printed Name	Signature	Date
	Risi Naa		
THA REVIEWED/ APPROVED BY: (Project Manager or PM- Designee, at a minimum)**	Printed Name	Signature	Date

* At a minimum, Corp. HSE **must** review/approve the THA review when Geosyntec staff will encounter “high hazards/high risks,” or perform critical tasks, such as (but not limited to):

- Work at heights >10', use personal fall apparatus
- Work at height near overhead electrical utility lines
- Operate a UTV/ATV, aerial lift or fork-lift
- Tow a trailer on roadway
- Oversee a hot-work permit system
- Enter a hazardous confined/enclosed space
- Use of unmanned aerial vehicle (drone)
- High-risk ergonomic/musculoskeletal hazard
- Implement lockout/tagout controls
- Enter a trench/excavation >5' deep
- Function as a construction “Competent Person”
- Operate a pneumatic or powder-actuated tool
- “Qualified” Electrical testing & maintenance >50 V
- High risk, non-typical infectious/pathogenic hazard
- Derive action levels for VOCs or toxic dusts
- Instrument monitoring for critical exposure risks
- Wear a respirator
- Presence of “high-risk” contaminant(s)
- Sustained exposure to wildfire smoke AQI_{PM2.5} >150
- Exposure to radioactive isotopes (α, β, γ)
- High-risk exposure to: non-ionizing (microwave, EMF, UV, IR) or ionizing (radio-isotope, x-ray) radiation.
- Onsite risk of emergency chemical spill
- Applicability of Chemical Anti-Terrorism Standards

Corporate HSE **must** also be consulted when Geosyntec subcontractors (*under Geosyntec’s oversight*) perform high hazard/high risk work (such as demolition, blasting, crane critical lifts, confined space entry, testing/maintenance of electrical systems, lockout/tagout, HAZWOPER cleanup activities). Consultation with Corp. HSE is encouraged for all questions/concerns regarding worker safety, regulatory compliance, risk/liability aspects, or project-specific safety requirements.

** It is recommended that THAs be approved/signed by both the PM and Field Lead (or alternate PM designee), unless due to small scope/scale or routine nature of task, or staff unavailability, only one approval is deemed sufficient by PM. Additional review and approval will be performed by Corp. HSE for high-hazard/high-risk tasks, or as otherwise requested.

HSE Program Documents: For more information, see [“HSE STD-105, Project Safety Management Handbook”](#).

F.2. GEOSYNTEC FIELD CREW ACKNOWLEDGEMENTS

Please sign below to acknowledge you reviewed and understand this THA, participated in project safety briefing and had an opportunity to ask questions about the information herein.

Printed Name	Signature	Employee No.	Date

F.3. SUBCONTRACTOR’S FIELD CREW ACKNOWLEDGEMENTS

Applicable Not Applicable

Please sign below to acknowledge this THA was made available to you, and you had an opportunity to ask questions about the information herein.

Printed Name	Signature	Company Name	Date



ATTACHMENTS:

Attachment A – Route to Hospital

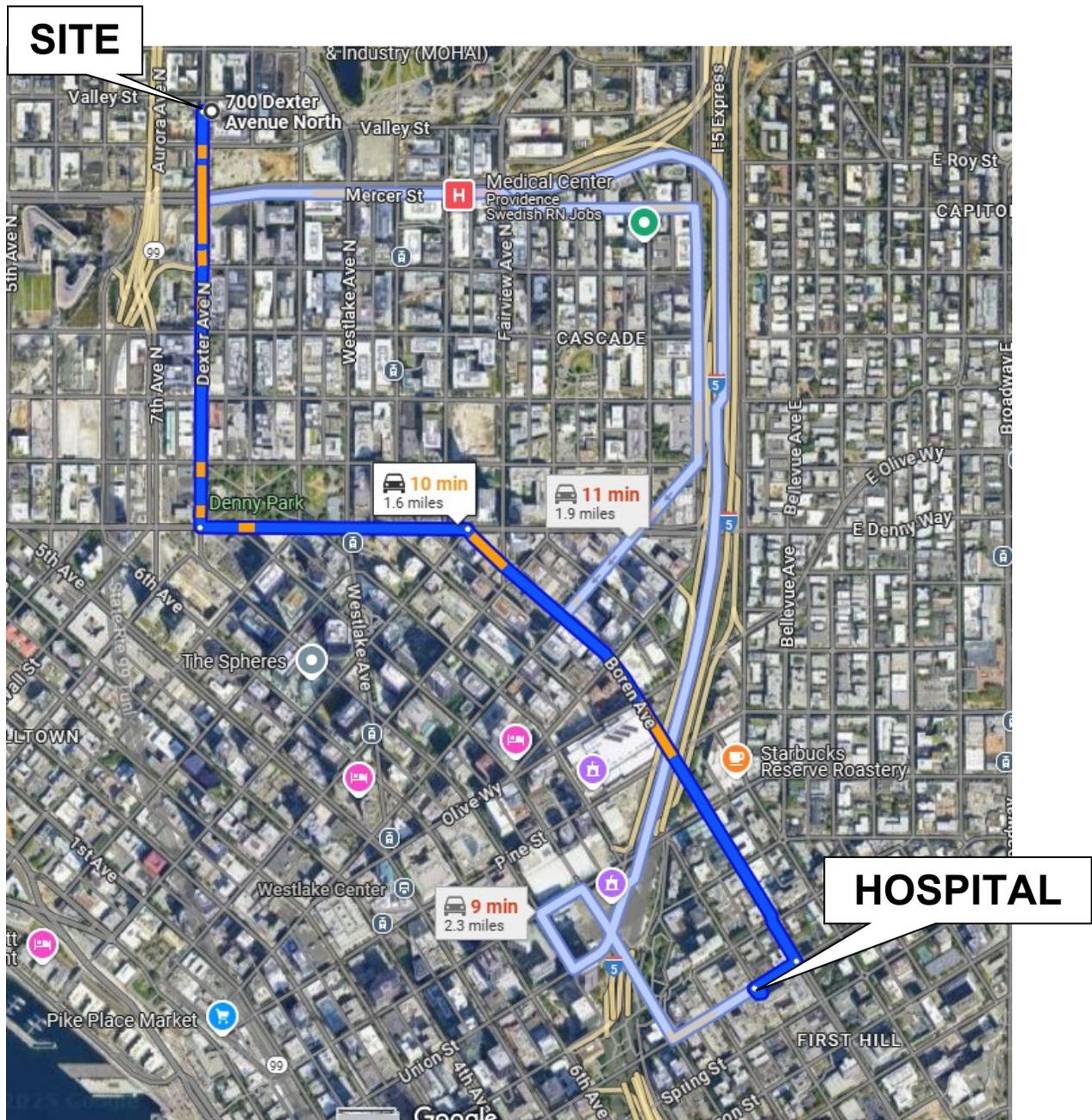
Attachment A – ROUTE TO HOSPITAL EMERGENCY ROOM

Hospital Name: Virginia Mason Medical Center

Address: 1100 9th Ave, Seattle, WA 98101

Phone Number: (206)624-1144

Driving Directions to Local Hospital: Head south on Dexter Ave N toward Roy St (0.5 mi), Turn left onto Denny Wy (0.3 mi), Slight right onto Boren Ave (0.7 mi), Turn right onto Seneca St (331 ft), Turn left, destination will be on the right (69 ft).



CHOOSE THE BEST PATH!



* 911 in North America; 112 in EU; 999 & 112 both applicable in UK; 000 in Australia; for other country- or site-specific numbers, see your Written Safety Plan or Office Emergency Plan
 ** First response actions by site/project team should always be in accordance with general-duty obligations, on-site roles, and training qualifications
 *** Employees may initiate a call for medical triage/support if no call-back received from HSE within 60 minutes of Event Notification, or if HSE is not available directly by phone. For the medical support contact in your location (*WorkCare in North America; location-specific elsewhere*) see your Written Safety Plan or Office Emergency Plan, as applicable

If you have questions or concerns about any workplace health and safety matter, please contact a member of your Corporate HSE Team for assistance:	Global HSE Director Bob Poll M: +1 813-240-9231	Multinational Region Jason Ford M: +1 226-220-3401	South Region Ersin Yalcin M: +1 404-435-4722	West Region Madison McLaughlin M: +1 351-990-2888	Kasey Shaw Australia M: +61 7 3173 1714
	HSE Programs Professional Andrew Thomas M: +1 508-649-3254	Canada Dean Zapishny M: +1 519-494-3031	Central Region Tony Schwegmann M: +1 309-634-5276	Kristoffer Lindo Europe M: +46 708 68 70 23	GEOSYNTEC FAMILY OF COMPANIES HSE Health, Safety, and Environment

TASK HAZARD ANALYSIS (Ver. 2, June 2015)

Geosyntec HS Procedures referenced herein are available on Geosyntec's H&S

SharePoint site and should be consulted, as appropriate, per project-specific needs. This THA prepared per HS-106-Accident Prevention Program, HS-204-Task Hazard Analysis, and meets the requirements for a "Site-Specific Health and Safety Plan" per Geosyntec HS Procedures and regulations referenced herein (see Section B.14.).

PART A – SITE SAFETY PLAN

A.1. PROJECT/TASK INFORMATION			
TASK:	Q1 Monitoring Event – Soil Vapor Sampling		
Project Name:	American Linen Supply Co-Dexter Avenue (700 Dexter)	Project Number/Org:	AS240461/3010
Project Address:	700 Dexter Avenue N, Seattle, WA (including adjacent properties)		
Description of Task & Worksite:	Soil vapor probe sampling – using the subslab and soil vapor kit, low-flow air pump, photoionization detector, and other light equipment to retrieve soil vapor samples from permanent soil vapor probes located around the site.		
Geosyntec Personnel	Name	Desktop Office Phone	Cell Phone
Site Lead/HS Officer	Hannah Cohen	(206)780-7724	(818) 224-0892
Project Manager	Lea Kane	(206) 858-4378	(925) 354-2791
Project Director	Melissa Asher	(206) 496-1449	(574) 261-4358
HS Coordinator	Madeline Chavira		(206) 496-1463
Regional HS Mngr.	Madison McLaughlin	(858) 716-2900	(951) 990-2888
Corp. HS Director	Bob Poll	813-379-4420	813-240-9231
Client Contact(s):	Mark Schultheis	714-465-1238	949-683-3840
Subcontractor(s):	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Applicable, provide contact information below:		
A.2. EMERGENCY RESPONSE <small>Based on analysis of worksite factors, client/regulatory requirements, availability of emergency services.</small>			
Consider all Relevant Risk Factors & Response Procedures (<i>fire/explosion, medical, chemicals/spills, security, site factors, weather, communications</i>).			
EXPLANATORY NOTES, CLARIFICATIONS:			
Available Means of Jobsite Emergency Communication/Alerting	<input checked="" type="checkbox"/> Verbal <input checked="" type="checkbox"/> Cell Phone <input type="checkbox"/> Land Line <input type="checkbox"/> 2-Way Radio <input type="checkbox"/> On-site alarm/signal system <input type="checkbox"/> Other:		
To Summon Emergency Services Police, Fire, Ambulance	<input checked="" type="checkbox"/> DIAL 911, for external responders <input type="checkbox"/> Other:		
Other Emergency Contacts, as needed <i>(such as security, spill responder, utility):</i>			
Nearest Emergency Medical Services	Hospital Name: Virginia Mason Medical Center Address: 1100 9 th Ave, Seattle, WA Phone #: (206)624-1144 <input checked="" type="checkbox"/> See Attached Directions		
For Non-Emergency Urgent Care	<input checked="" type="checkbox"/> Contact WorkCare, 24/7 at: 800-455-6155, menu option "3" <input type="checkbox"/> Other:		
Job-site Evacuation Procedure, Rally Point, Place of refuge:	If inside, evacuate buildings		
Special Emergency Equipment/Procedures			
IMPORTANT: After initial emergency response actions and incident stabilization, contact appropriate project personnel listed in Part A.1.			
A.3. SUMMARY OF WORK STEPS, HAZARDS, CONTROLS <small>Based on PART B, "HAZARD ANALYSIS," and worksite/client/project factors.</small>			
Summary/outline of work steps/hazards/controls, with references to applicable Sections in Parts B and C, as applicable:			
WORK STEPS	HAZARDS	CONTROLS	
Driving to/from site	Collision with objects	Follow speed limit, obey traffic signs, drive with lights on, keep two hands on the wheel, and wear seat belt Potentially bad weather, safe driving, practices, drive slowly Do not be distracted by cellphone	

Soil screening and sampling from soil cores. Soil screening for VOCs using photoionization detector (PID).	Heavy equipment Constituents of Potential Concern (COPCs) in soil Slips/trips/falls Noise, pinch points	Buddy system with subcontractor; maintain eye contact/communication when drill rig is moving. PPE Be cautious of surroundings, stop work authority to all
A.4. H&S EQUIPMENT LIST List worksite equipment for worker protection; provide details in Explanatory Notes, Clarifications.		
EXPLANATORY NOTES, CLARIFICATIONS:		
<input checked="" type="checkbox"/> ROUTINE PPE	<input checked="" type="checkbox"/> Standard work clothes appropriate for task <input checked="" type="checkbox"/> Hard-toed boots/shoes <input checked="" type="checkbox"/> Hardhat <input checked="" type="checkbox"/> Safety glasses <input checked="" type="checkbox"/> Basic PPE for protection from low-hazard chemical contact & dust (nitrile gloves, Tyvek suit, dust mask, boot covers).	<input checked="" type="checkbox"/> Work gloves appropriate for task <input checked="" type="checkbox"/> Noise/hearing protection <input checked="" type="checkbox"/> High-visibility/reflective vest <input type="checkbox"/> Ice creepers (boot attachments)
<input checked="" type="checkbox"/> ROUTINE H&S EQUIPMENT/GEAR	<input checked="" type="checkbox"/> First Aid Kit <input checked="" type="checkbox"/> Fire extinguisher <input type="checkbox"/> Emergency eyewash bottle(s) <input type="checkbox"/> Insect control (repellent, wasp spray, other) <input type="checkbox"/> Caution tape <input type="checkbox"/> Other:	<input checked="" type="checkbox"/> Sun protection (suntan, shade canopy, other) <input checked="" type="checkbox"/> Project-supplied drinking water and/or hygiene facilities <input type="checkbox"/> Poison ivy skin wash (Technu or similar) <input type="checkbox"/> Vehicle emergency kit (flares, lights, reflective device) <input checked="" type="checkbox"/> Traffic control warning devices (cones, or similar)
<input checked="" type="checkbox"/> NON-ROUTINE PERSONAL PROTECTIVE EQUIPMENT (PPE) (Indicate specific types of PPE in Explanatory Notes, Clarifications)	<input checked="" type="checkbox"/> Goggles and/or face shield <input type="checkbox"/> Chemical protective gloves <input type="checkbox"/> Coveralls (Tyvek, or other) <input type="checkbox"/> Outer boots, boot covers <input type="checkbox"/> Other:	<input type="checkbox"/> Disposable n-95 dust mask <input type="checkbox"/> Half-face respirator (APR), cartridges <input type="checkbox"/> Full-face respirator (APR), cartridges <input type="checkbox"/> Personal flotation device <input type="checkbox"/> Fire retardant clothing <input type="checkbox"/> Arc Flash Protection <input type="checkbox"/> Electrical-Hazard-rated boots, gloves <input type="checkbox"/> Personal fall apparatus
<input type="checkbox"/> SPECIAL HAZARD CONTROLS	<input type="checkbox"/> Portable GFCI <input type="checkbox"/> Eyewash - 15 min. flow <input type="checkbox"/> Other:	<input type="checkbox"/> Lockout/tagout equipment <input type="checkbox"/> Emergency deluge shower <input type="checkbox"/> Ventilation equipment (fan, blower) <input type="checkbox"/> Air horn, alarm
<input checked="" type="checkbox"/> DECON, PPE DISPOSAL	<input checked="" type="checkbox"/> Receptacle for disposable PPE <input type="checkbox"/> Other:	<input type="checkbox"/> Hand washing provisions <input checked="" type="checkbox"/> Decon solution, related supplies
<input type="checkbox"/> AIR MONITORING EQUIPMENT, OTHER EQUIPMENT FOR WORKER EXPOSURE TESTING	List equipment/devices to be brought to worksite; Use in accordance with procedures in Part C:	

PART B – HAZARD ANALYSIS Complete Section B.1., then subsequent sections as applicable to the task(s).

<p>B.1. ROUTINE HAZARD PREPAREDNESS This section required for all tasks.</p> <p>Explanatory Notes, Clarifications: Drink water to stay hydrated and apply sunscreen when outdoors. Maintain eye contact/communication with subcontractor when vehicle is moving. Use cones to delineate work zone. Don hardhat and hearing protection when around drill rig. Wear nitrile gloves and eye protection when handling soil and groundwater to protect against COPC.</p> <p>General Safety, Wellness, Preparedness – Delineate site-specific HS aspects, as appropriate, in “Explanatory Notes, Clarifications,” above.</p> <input type="checkbox"/> General premises hazards - housekeeping, rough terrain, trip hazards, steep slope, remote location. <input checked="" type="checkbox"/> Weather/climate-related hazards – heat stress/cold stress measures, sun screen, severe weather shelter/refuge, “30/30 rule” for lightning <input type="checkbox"/> Plant/Insect/Animal Hazards - Precautions: poison ivy wash; insect repellent; check for ticks; hornet nest spray; animal precautions. <input checked="" type="checkbox"/> Worksite traffic hazards – Implement measures to protect personnel (high visibility/reflective clothing, on-person lighting, traffic control measures). <input type="checkbox"/> Illumination hazards/night work - illuminate work areas and/or access routes, use reflective/hi-visibility clothing or on-person lighting, as appropriate. <input type="checkbox"/> Lifting, manual material handling – use proper lifting procedures, seek help for >50 lbs. <i>Geosyntec Procedures: HS-124-Heat Stress, HS-125-Cold Stress, HS-127-Ticks, HS-208-Housekeeping, HS-210-Walking and Working Surfaces, HS-401-Back Injury Prevention, HS 517 Traffic Safety</i> <p>Routine Personal Protection – Delineate site-specific HS aspects, as appropriate, in “Explanatory Notes, Clarifications,” above.</p> <input checked="" type="checkbox"/> Head protection from overhead hazards - Wear hardhat or “bump cap” as appropriate for hazard. <input checked="" type="checkbox"/> Hand protection - Wear protective work gloves appropriate for the hazard and work tasks. <input checked="" type="checkbox"/> Eye protection - Wear safety glasses (with side shield or wrap around, either clear or shaded for sun protection), or other appropriate eye protection. <input checked="" type="checkbox"/> Foot protection, rough terrain - Wear work boots/shoes with hard toes, ankle support, puncture resistance, traction, as appropriate for conditions. <input type="checkbox"/> Hearing protection – use earplugs, earmuffs (or both) as appropriate for conditions; at a minimum where noise levels exceed 85dBA. <input type="checkbox"/> Dust, unsanitary conditions – For general protection against minimal non-specific hazards, use protective clothing and/or disposable dust mask, as needed. <i>Geosyntec Procedures: HS-109-Hearing Conservation, HS 112-Respiratory Protection, HS-113-Personal Protective Equipment, HS-207-Working Alone, HS-105-Driver and Vehicle Safety</i> <p>Tools, Equipment, Machinery – Delineate site-specific HS aspects, as appropriate, in “Explanatory Notes, Clarifications,” above.</p> <input checked="" type="checkbox"/> Manual hand tools - proper tool for the job, maintain in good condition, use vise/clamp to hold work piece, proper follow through, stay clear of “line of fire.” <input checked="" type="checkbox"/> Knives, cutting tools - Utility/folding/collapsible knives and fixed open-bladed knives/cutting tools are <u>not</u> permitted, unless specifically authorized. Cutting tools with automatically-retracting blades, or with enclosed/guarded blades are permitted. See HS-502-Manual Hand Tools for additional information.
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- Working near powered tools/equipment/machinery** – safe distance, heed warning signs, stay out of “line of fire,” use PPE (for eye/hearing/dust protection).
- Operation/use of powered tools/equipment/machinery** – See Section B.5.

HS-502-Manual Hand Tools

Security– Delineate site-specific HS aspects, as appropriate, in “Explanatory Notes, Clarifications,” above.

- High crime, urban** – Use appropriate measures for personal security (such as buddy system, security service, work scheduling, other measures)
- Working alone** - Establish “check in” procedure with supervisor/project manager.

Geosyntec Procedures: HS-207-Working Alone

Routine Driving Hazards – Delineate site-specific HS aspects, as appropriate, in “Explanatory Notes, Clarifications,” above.

- Routine work travel** - Use routine safe/defensive driving practices (seat belts, safe speeds, eyes ahead, no tailgating, limit distractions, safe cell phone use, no texting, clear windows, account for weather/road conditions, adequate sleep, other measures as appropriate).
- Unfamiliar location** - Plan travel route before driving (assemble maps, enter destination in GPS).
- Long Distance or During Sleep Hours** – Minimize fatigue: rest breaks, light snacks (avoid heavy meals), stay hydrated, fresh air, no loud music, clean windshield.
- Unfamiliar vehicle** – Become familiar with vehicle operational controls and handling characteristics before operating vehicle.

Geosyntec Procedures: HS-105-Driver and Vehicle Safety

B.2. SPECIAL DRIVING/TRAFFIC/TRANSPORTATION HAZARDS **Applicable** **Not Applicable, Not Anticipated**

EXPLANATORY NOTES, CLARIFICATIONS:

<input type="checkbox"/>	<p>SPECIAL DRIVING HAZARDS Off-Road Driving or use of non-typical vehicle, heavy vehicle, van, golf/utility cart, ATV</p> <p>Hazards: Worker injury due to vehicle collision, rollover</p>	<ul style="list-style-type: none"> <input type="checkbox"/> For off road driving, do not exceed capability of vehicle, beware of wet conditions, speed low, avoid unsafe orientation on slopes. <input type="checkbox"/> Follow ATV specific procedures for training, safety equipment, operation, manufacturer’s instructions. <input type="checkbox"/> Special Skills Required for Vehicle type - For vehicles requiring special skills (such as windowless van, heavy work vehicle, utility vehicle, similar) ensure operator is provided training and/or has appropriate operator skills through experience. <p style="text-align: right;"><i>Geosyntec Procedure(s): HS-510-All Terrain Vehicles</i></p>
<input type="checkbox"/>	<p>TRANSPORTING MATERIALS, TOWING/HAULING LOADS Hazards: Vehicle accident, occupant injury from shifting load, unsafe equipment.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Ensure load is firmly secured (rope, straps, load configuration) to prevent shifting during travel. <input type="checkbox"/> Slings, chains, strap, rope and related equipment used for towing, hauling, load-securing shall be appropriate for use, and used in a manner as to prevent an unsafe condition. <input type="checkbox"/> For trailer use, verify signal/braking lights operational, rear-view mirrors effective, hitch/safety chains secure.
<input type="checkbox"/>	<p>WORKSITE TRAFFIC HAZARDS Where the project worksite is located in/near vehicle thoroughfare.</p> <p>Hazards: Worker injury from being struck by vehicle traveling in thoroughfare.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Wear reflective vests where exposed to traffic hazards. <input type="checkbox"/> Where possible, park vehicles as protective shield from oncoming traffic. <input type="checkbox"/> Configure work area and support vehicles to minimize worker exposure to traffic hazards. <input type="checkbox"/> Use DOT signal devices to re-route vehicles around work area, site entrances/exits. <input type="checkbox"/> Use DOT-trained flaggers or police detail where appropriate or required. <p style="text-align: right;"><i>Geosyntec Procedure(s): HS-517-Traffic Safety</i></p>
<input type="checkbox"/>	<p>RAILROAD HAZARD Hazard: Worker injury from being struck by train in R.R. right-of-way</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Coordinate with rail company and implement required safety and security measures. <input type="checkbox"/> Site workers to receive safety training for railroad work. <p style="text-align: right;"><i>Geosyntec Procedure(s): HS-305-Rail Operations</i></p>
<input type="checkbox"/>	<p>WATER TRANSPORTATION</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Follow HS 312 “Water Transportation Safety,” and Section B.3., “Water/Boating Hazards.” <p style="text-align: right;"><i>Geosyntec Procedure(s): HS-312-Water Transportation Safety</i></p>
<input type="checkbox"/>	<p>AIRPORT, AIRCRAFT Worker injury when working on/near airport runway, or use of helicopter, light aircraft</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Coordinate safety requirements with Airport personnel and implement required safety measures. <input type="checkbox"/> Site workers to receive safety training for railroad/airport work. <input type="checkbox"/> Follow provisions of applicable Geosyntec HS Procedures, below: <p style="text-align: right;"><i>Geosyntec Procedure(s): HS-310-Helicopter Safety, HS 311-General Aviation (Small Aircraft) Safety</i></p>
<input type="checkbox"/>	<p>TRAFFIC/VEHICLE HAZARDS REALATED TO HEAVY EQUIPMENT, CONSTRUCTION SITE ACTIVITIES</p>	<ul style="list-style-type: none"> <input type="checkbox"/> See Section B.7., “Construction, Heavy Equipment, Lift Equipment”

B.3. WATER/BOATING HAZARDS **Applicable** **Not Applicable or Not Anticipated**

EXPLANATORY NOTES, CLARIFICATIONS:

<input type="checkbox"/>	<p>OPERATOR OF WATER CRAFT OR PASSENGER/WORKER ON WATER CRAFT OR PLATFORM Hazards: Drowning, hypothermia, collision, motor/fuel hazards, navigation</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Wear regulatory-approved personal flotation device (PFD) or buoyant work vest. <input type="checkbox"/> Bring emergency rescue equipment (ring buoy, reaching device, flares). Use “reach, throw, row, go” strategy. <input type="checkbox"/> Use fuel safety practices, fire extinguisher present in boat. <input type="checkbox"/> Have lifesaving skiff/boat available. <input type="checkbox"/> Monitor weather, develop float plan, ensure navigation/communication equipment operable. <input type="checkbox"/> For tidal, flash flood, dam release hazards, plan/locate work accordingly, other precautions as appropriate.
<input type="checkbox"/>	<p>WORK NEAR WATER HAZARDS OR ENTERING WATER</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Where ice/slip hazards are present adjacent to water body, and for working directly on ice over water, wear ice creepers, sand work area, or take other appropriate measures to address slip hazard. <input type="checkbox"/> For high-hazard work over very cold water, have immersion survival suit available, as appropriate. <input type="checkbox"/> For electrical hazards associated with water/wet locations, see Section B.8., “Electrical Hazards.”

<input checked="" type="checkbox"/>	<p>POWERED HAND TOOLS</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Battery-operated <input checked="" type="checkbox"/> Electric-powered, 120v/240v <input type="checkbox"/> Fuel-powered <input type="checkbox"/> Pneumatic <input type="checkbox"/> Powder-actuated <p>Hazards: Eye/hand/body injury, fuel-related hazards, Inhalation hazards, noise, sparks, heat, fire hazard, electrical hazards</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> For all power tools: <ul style="list-style-type: none"> • Inspect tools to ensure safe operating condition before each use. • Use tool in accordance with manufacturer’s specifications. • Ensure guards are in place and no hazardous equipment modifications. • Use PPE or other safety practices, as appropriate, for eye/hearing/hand/head/body protection. • Provide training or verify operator competency for use of power tool. • Stay clear of hazard zone, “line of fire,” when working near where power tools are used. • For spark/heat generating tool, control fire hazards, segregate combustible/flammable materials. • Use vise/clamp/work bench or other appropriate means to hold/secure the work piece. <input type="checkbox"/> Use respirators, ventilation, wet methods, other appropriate means to control inhalation hazard. <input type="checkbox"/> See fuel-safety practices in Section B.13., “Commercial Chemical Products.” <input type="checkbox"/> For electrical hazards, see Section B.8., “Electrical Hazards”. <p style="text-align: right;">Geosyntec Procedure(s): HS-109-Hearing Conservation, HS-113-Personal Protective Equipment, HS-121-Electrical Safety, HS-503-Powered Hand Tools, Others as applicable</p>
<input checked="" type="checkbox"/>	<p>OPERATION OF EQUIPMENT/MACHINERY</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Point-of-operation hazards <input type="checkbox"/> Pinch points, moving parts <input type="checkbox"/> ‘Struck-by,’ ‘caught between’ <input type="checkbox"/> Hot surfaces, heat <input checked="" type="checkbox"/> Extension cords, flexible wire <input type="checkbox"/> Fuel related (gas or liquid) <input type="checkbox"/> Hydraulic pressure <input type="checkbox"/> Pneumatic pressure <input type="checkbox"/> Kinetic, stored energy <input type="checkbox"/> Noise <input type="checkbox"/> Emissions, discharge gases <input type="checkbox"/> Working at heights, falls <input checked="" type="checkbox"/> Lifting, repetitive motion <input type="checkbox"/> Illumination <input type="checkbox"/> Electrical 	<ul style="list-style-type: none"> <input type="checkbox"/> <u>General safety requirements for equipment, machinery:</u> <ul style="list-style-type: none"> • Arrange worksite for safe access to equipment/machinery. • Use equipment/machinery in accordance with manufacturer’s use and safety instructions. • Ensure point-of-operation, mechanical power transmission, other moving parts are guarded with protective devices; do not override interlocks, guards, protective devices. • Secure long hair/loose clothing/hanging jewelry near moving/rotating parts. • Heed warning signs/labels, keep safe distance; avoid locations of “struck by” and “caught between” hazards. • Implement lockout/tagout for repairs/adjustments/tooling changes. <input type="checkbox"/> Use safe lifting practices for movement of heavy portable equipment <input type="checkbox"/> Implement safe work practices for compressed air, pressurized systems (pneumatic/hydraulic), stored energy. <input type="checkbox"/> For climbing/fall hazards associated with large equipment, see Section B.4., “Fall Hazards.” <input type="checkbox"/> For electrical hazards, see Section B.8., “Electrical Hazards.” <input checked="" type="checkbox"/> Operate fuel-powered equipment in well ventilated location. <input type="checkbox"/> Use safe practices for fuels, see Section B.13., “Commercial Chemical Products.” <p style="text-align: right;">Geosyntec Procedure(s): HS-109-Hearing Conservation, HS-113-Personal Protective Equipment, HS-119-Lockout/Tagout, HS-121-Electrical Safety, HS-503-Powered Hand Tools, Others as applicable</p>
<input type="checkbox"/>	<p>LOCKOUT/TAGOUT OF HAZARDOUS ENERGY</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Implement control-of-hazardous-energy practices (lockout/tagout), provide lockout/tagout locks and devices, training workers, designate “authorized” personnel, notify “affected” personnel. <p style="text-align: right;">Geosyntec Procedure(s): HS-119-Lockout Tagout</p>
<input type="checkbox"/>	<p>WELDING, CUTTING, HOT WORK (GAS OR ARC)</p> <p>UV/IR light-eye/skin burns, hot-work hazards, toxic welding fumes, compressed gases, electrical shock</p>	<ul style="list-style-type: none"> <input type="checkbox"/> <u>General safe work practices:</u> <ul style="list-style-type: none"> • Hot work permit system to be implemented. • Operator properly protected (eye protection, clothing, apron, etc.). • Fire hazard controls (watcher, fire extinguisher, water, isolate combustibles). • Protect nearby personnel from hazardous UV, IR light (shielding, curtain). <input type="checkbox"/> For gas welding/cutting, use gas cylinder safe practices (secured, upright, caps on when not in use, prevent Damage; never secure gas cylinders to metal bench used for arc welding). <input type="checkbox"/> For arc welding, follow electrical safe work practices. See Section B.8., “Electrical Hazards.” <input type="checkbox"/> See Section B.13., “Commercial Chemical Products,” for hazards of welding rods (toxic metals), welding gases. <p style="text-align: right;">Geosyntec Procedure(s): HS-511-Welding, Cutting and Other Hot Work</p>
<input type="checkbox"/>	<p>COMPRESSED AIR, COMPRESSOR (for compressed gases, see Section B.13., “Compressed Gases”)</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Never direct nozzle toward body; do not use compressed air for cleaning clothes. <input type="checkbox"/> If compressed air is used for cleaning, restrict pressure to 30 psi or below, equip nozzle with chip guard. <input type="checkbox"/> Use eye protection. <input type="checkbox"/> Ensure air tank, hoses, fittings are in good repair using factory fittings.
<input type="checkbox"/>	<p>PORTABLE GENERATOR</p> <p>Hazards: Electrical shock, carbon monoxide in exhaust, fuel-related fire, injury from mechanical hazards, lifting</p>	<ul style="list-style-type: none"> <input type="checkbox"/> <u>Follow general safety practices for Operation of Equipment/Machinery (above), and as follows:</u> <ul style="list-style-type: none"> • Use in accordance with manufacturer’s instructions. • Keep generator and work area dry. • Never use indoors, or near building air intake vents due to carbon monoxide hazard. • Provide for ventilation and/or air monitoring where hazardous accumulation of exhaust emissions is possible. • Use hearing protection in close proximity to operating generator, as needed. • Use power cords/extension cords specified by instructions. • Use ground-fault circuit interrupters (GFCIs) in accordance with manufacturer’s instructions. • See Section B.8., “Electrical Hazards.” • Shut down equipment before refueling. See safe practices for flammable/combustible liquids in Section B.13., “Commercial Chemical Products.” <p style="text-align: right;">Geosyntec Procedures: HS-109-Hearing Conservation, HS-111-Air Monitoring, HS-115-Hazard Communication (for fuel), HS-121-Electrical Safety, Others as applicable</p>

PART D – APPROVALS, ACKNOWLEDGEMENTS

D.1. THA PREPARATION, REVIEW/APPROVAL SIGNATURES - THA typically prepared by project staff, reviewed/approved by Project Manager, Supervisor, qualified/knowledgeable designee, with support of HS personnel as deemed appropriate by the Project Manager.			
THA PREPARED BY: (minimum one person)	<i>Printed Name</i>	<i>Signature</i>	<i>Date</i>
	Risi Naa		02/24/2025
THA REVIEWED/ APPROVED BY: (minimum one person)	<i>Printed Name</i>	<i>Signature</i>	<i>Date</i>

D.2. FIELD CREW ACKNOWLEDGEMENTS

GEOSYNTEC FIELD CREW

Please sign below to acknowledge you reviewed and understand this THA, participated in project safety briefing and had an opportunity to ask questions about the information herein.

Printed Name	Signature	Employee No.	Date

SUBCONTRACTOR'S FIELD CREW

Please sign below to acknowledge that this THA was made available to you, and you had an opportunity to ask questions about the information herein.

Printed Name	Signature	Company Name	Date

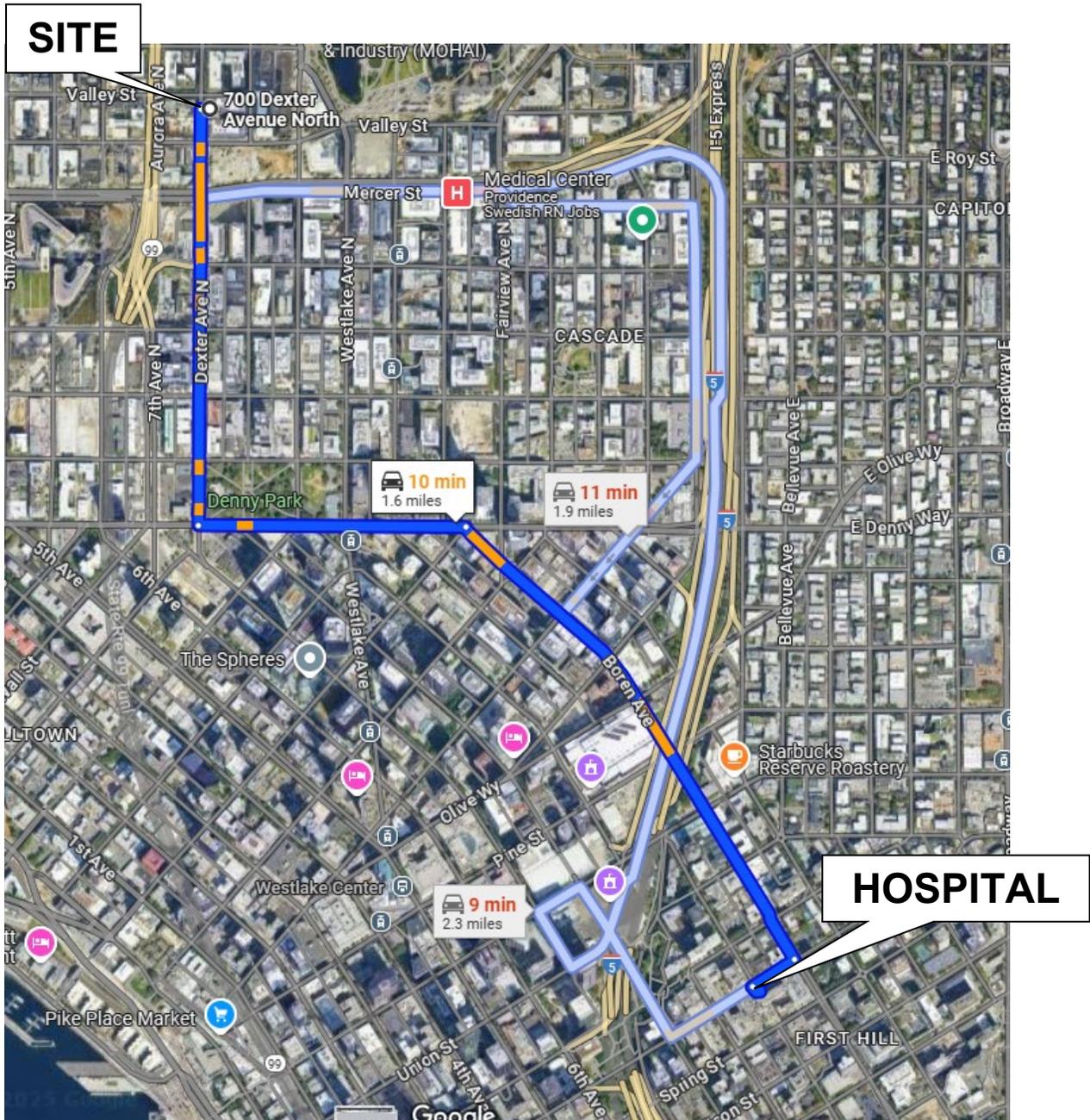
Attachment A – ROUTE TO HOSPITAL EMERGENCY ROOM

Hospital Name: Virginia Mason Medical Center

Address: 1100 9th Ave, Seattle, WA 98101

Phone Number: (206)624-1144

Driving Directions to Local Hospital: Head south on Dexter Ave N toward Roy St (0.5 mi), Turn left onto Denny Wy (0.3 mi), Slight right onto Boren Ave (0.7 mi), Turn right onto Seneca St (331 ft), Turn left, destination will be on the right (69 ft).



HSE Event Response and Notification

CHOOSE THE BEST PATH!



* 911 in North America; 112 in EU; 999 & 112 both applicable in UK; 000 in Australia; for other country- or site-specific numbers, see your Written Safety Plan or Office Emergency Plan
 ** First response actions by site/project team should always be in accordance with general-duty obligations, on-site roles, and training qualifications
 *** Employees may initiate a call for medical triage/support if no call-back received from HSE within 60 minutes of Event Notification, or if HSE is not available directly by phone. For the medical support contact in your location (*WorkCare in North America; location-specific elsewhere*) see your Written Safety Plan or Office Emergency Plan, as applicable

If you have questions or concerns about any workplace health and safety matter, please contact a member of your Corporate HSE Team for assistance:	Global HSE Director Bob Poll M: +1 813-240-9231	Multinational Region Jason Ford M: +1 226-220-3401	South Region Ersin Yalcin M: +1 404-435-4722	West Region Madison McLaughlin M: +1 351-990-2888	Kasey Shaw Australia M: +61 7 3173 1714
	HSE Programs Professional Andrew Thomas M: +1 508-649-3254	Canada Dean Zapishny M: +1 519-494-3031	Central Region Tony Schwegmann M: +1 309-634-5276	Kristoffer Lindo Europe M: +46 708 68 70 23	<small>GEOSYNTec FAMILY OF COMPANIES</small> HSE Health, Safety, and Environment

Part A – PROJECT/TASK INFORMATION

Project/Site Name:	American Linen Supply Co-Dexter Avenue (700 Dexter)	Project Number/Org:	AS240461/3010
Site Address:	700 Dexter Avenue N, Seattle, WA (including adjacent properties)		
Task & Worksite Description:	Drilling and installation of monitoring and injection wells.		
Geosyntec Personnel:	Name	Office Phone	Cell Phone
Site Safety Lead/Officer	Hannah Cohen	(206)780-7724	(818) 224-0892
Task Technical Lead	Risi Naa	(206)780-7715	(603)205-5063
Project Manager	Lea Kane	(206) 858-4378	(925) 354-2791
Project Director	Melissa Asher	(206) 496-1449	(574) 261-4358
Local HSE Coordinator	Madeline Chavira		(206) 496-1463
Regional HSE Manager	Madison McLaughlin	(858) 716-2900	(951) 990-2888
Corporate HSE Director	Bob Poll	813-379-4420	813-240-9231
On-Site Subcontractor(s):	<input checked="" type="checkbox"/> Applicable; provide company name, work task and contact information for each Geosyntec subcontractor below: <input type="checkbox"/> Not Applicable		
	Garrett Hooper; K&D Services	425-374-5825	425-551-8297
Client, Contact(s):	John Moshy		(858)829-7709
ETHICS POINT HOTLINE	US & Canada: 844-231-3371 UK: 800-89-0011 or 800-89-0011	Australia: 800-551-155 or 800-811-011 Ireland: 800-222-55288 or 800-500-000	

Part B - EMERGENCY RESPONSE and FIRST AID

IMPORTANT: After initial emergency response actions and incident stabilization, contact appropriate project staff and/or HSE personnel listed in Part A

Site-Specific Notes, Clarifications:	
Emergency Communication / Alerting	<input checked="" type="checkbox"/> Verbal <input checked="" type="checkbox"/> Cell Phone <input type="checkbox"/> Land Line <input type="checkbox"/> 2-Way Radio <input type="checkbox"/> Satellite Phone <input type="checkbox"/> On-site alarm/signal system <input type="checkbox"/> Other:
To Summon Police, Fire, Ambulance	<input checked="" type="checkbox"/> DIAL 911 , for external responders <input type="checkbox"/> Other:
WorkCare (for non-emergency injuries)	24/7: 888-449-7787
Other Emergency Contacts (such as security, spill responder, utility-related):	
Nearest EMERGENCY ROOM Medical Services	Hospital Name: Virginia Mason Medical Center Address: 1100 9 th Ave, Seattle, WA Phone #: (206)624-1144 <input checked="" type="checkbox"/> See ATTACHMENT A, ROUTE to HOSPITAL
Emergency Evacuation - Route, Rally/Muster Point, Shelter Location(s)	If inside, evacuate buildings.
EMERGENCY and FIRST AID EQUIPMENT required for this work task is listed in PART C.2. – SAFETY EQUIPMENT LIST	

Attachment Hospital A: Route to Hospital

PART C – HAZARD ANALYSIS and EQUIPMENT LIST (Basis for Field Team Safety Orientations and Onsite Safety Discussions)

C.1 ONSITE TASK HAZARD ANALYSIS

INSTRUCTIONS:

- Begin your job safety analysis by reviewing “Pointers” (see lower right) and completing **Part D “HAZARD ANALYSIS AND CONTROLS** for your TASK(s).
- In **Columns 1 & 2** (below), list/describe **TASKS & WORK ASPECTS** and the associated **HAZARDS & RISKS**.
- In **Column 3** summarize **CONTROLS & SAFE WORK PRACTICES** (Brief summary descriptions with references to THA Sections).

REFERENCES - Copy and paste, as applicable, into **Column 3**:

See C.2. SAFETY EQUIPMENT LIST	See D.10. ELECTRICAL WORK TASKS
See D.1. BASELINE HAZARD PREPAREDNESS	See D.11. UTILITY-RELATED HAZARDS
See D.2. SPECIAL TRAFFIC/VEHICLE/TRANSPORHAZARDS	See D.12. CONFINED/ENCLOSED SPACES
See D.3. WATER HAZARDS	See D.13. INFECTIOUS / PATHOGENIC BIOHAZARDS
See D.4. FALL HAZARDS	See D.14. COMMERCIAL CHEMICAL PRODUCTS
See D.5. HAND TOOLS	See D.15. SITE CONTAMINANTS, CHEMICAL WASTES
See D.6. POWERED TOOLS & EQUIPMENT	See D.16. RADIATION HAZARDS (Other than Sunlight)
See D.7. DRILLING	See D.17. HAZMAT/DANGEROUS GOODS SHIPPING.
See D.8. CONSTRUCTION, HEAVY/LIFT EQUIPMENT	See Part E AIR MONITORING, EXPOSURE MONITORING
See D.9. STORAGE OF BULK MATERIALS	See ATTACHMENT “X”

1. TASKS/WORK ASPECTS	2. HAZARDS/RISKS	3. CONTROLS / SAFE WORK PRACTICES
a. Natural Hazards (applicable to all work onsite)	Such as: - Plants, Insects	Blackberry bushes with thorns present throughout the site. Wear long pants and long sleeves for protection against insects and thorns. See D.1. BASELINE HAZARD PREPAREDNESS
b. Premises Hazards (applicable to all work onsite)	For example: - Driving hazards - Heavy equipment traffic onsite - Needles and other sharps objects - Human waste/biohazards	In addition to basic driving safety, limit speed to 5 mph (8 km/hr) while onsite; when exiting the site onto roadway, right turn only (no left turns across traffic). For all work, wear hard-toe work boots, proper work clothes, reflective/hi-viz vest, eye protection. Hearing protection near noise sources, appropriate work gloves. See: C.2. SAFETY EQUIPMENT LIST; D.1. BASELINE HAZARD PREPAREDNESS D.2. SPECIAL TRAFFIC/VEHICLE/TRANSPORHAZARDS D.8. CONSTRUCTION, HEAVY/LIFT EQUIPMENT
c. Manual Hand Tool Injuries	<input checked="" type="checkbox"/> Struck by <input checked="" type="checkbox"/> Pinch points/crushing injuries <input checked="" type="checkbox"/> Puncture <input checked="" type="checkbox"/> Cutting blade/laceration risk <input checked="" type="checkbox"/> Flying objects, eye hazards	Take care and use appropriate PPE when using hand tools. See D.5. HAND TOOLS
d. Injection Well Drilling and Installation	- Heavy Equipment - Exposure to site contaminants - Sampling and handling soil	Conduct and attend daily pre-work orientation on hazards. Wear proper PPE – level D

		<p>See;</p> <ul style="list-style-type: none"> C.2. SAFETY EQUIPMENT LIST D.1. BASELINE HAZARD PREPAREDNESS D.2. SPECIAL TRAFFIC/VEHICLE/TRANSPORTHAZARDS D.6. POWERED TOOLS & EQUIPMENT D.7. DRILLING D.8. CONSTRUCTION, HEAVY/LIFT EQUIPMENT D.15. SITE CONTAMINANTS, CHEMICAL WASTES
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4. ONSITE CHANGES, UNFORSEEN HAZARDS, THA "ADJUSTMENTS" (Recognized During Mobilization/Execution of Field Work)	
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Date:	Notes:
Date:	Notes:

C.2. SAFETY EQUIPMENT LIST (Gear to be brought to the worksite by Geosyntec personnel, or availability at the worksite confirmed)

Site-Specific Notes, Clarifications:			
<input checked="" type="checkbox"/>	WEATHER, CLIMATE, SEASONAL	<input checked="" type="checkbox"/> Project-provided drinking water <input checked="" type="checkbox"/> Canopy for shade, weather protection <input type="checkbox"/> Other:	<input checked="" type="checkbox"/> Sunscreen <input type="checkbox"/> Ice creepers (boot attachments) <input type="checkbox"/> Rock salt, traction sand <input type="checkbox"/> Portable heater (electric or kerosene)
<input checked="" type="checkbox"/>	HYGIENE PROVISIONS	<input type="checkbox"/> Hand washing equipment (soap & wash water) <input type="checkbox"/> Other:	<input checked="" type="checkbox"/> Hand sanitizer, disinfectant supplies <input checked="" type="checkbox"/> Sanitary facility, porta-toilet
<input checked="" type="checkbox"/>	BASIC PPE	<input checked="" type="checkbox"/> Standard work clothes appropriate for task <input checked="" type="checkbox"/> Hard-toed boots/shoes <input checked="" type="checkbox"/> Hardhat	<input checked="" type="checkbox"/> Safety glasses <input checked="" type="checkbox"/> Work gloves appropriate for task <input checked="" type="checkbox"/> Noise/hearing protection <input checked="" type="checkbox"/> High-visibility/reflective vest/apparel <input type="checkbox"/> Nuisance dust mask (voluntary use)
<input checked="" type="checkbox"/>	BIOLOGICAL HAZARDS	<input type="checkbox"/> Insect/tick repellent--DEET, picaridin, other <input type="checkbox"/> Permethrin-treated work clothing <input type="checkbox"/> Pant-leg "blousing"/gaiters (tick safe) <input type="checkbox"/> Tick removal kit <input type="checkbox"/> Wasp/hornet spray, insect fogging device, other <input type="checkbox"/> Poison ivy protection (Ivy Block skin cream, Tecnu skin wash) <input type="checkbox"/> Other:	<input type="checkbox"/> Animal warning device (for bears/cougars/wolves/large animals) <input type="checkbox"/> Snake chaps/gaiters, bite/scratch-resistant gloves, other protective gear for animal hazards <input checked="" type="checkbox"/> Hand sanitizer, hand washing supplies, personal hygiene supplies for infectious hazard control <input type="checkbox"/> Disinfectant solution and related supplies to mitigate source of infectious hazard <input type="checkbox"/> Masks, face covers, gloves, barriers, related gear to mitigate infectious hazard transmission
<input checked="" type="checkbox"/>	SPECIAL HAZARD CONTROLS	<input type="checkbox"/> Portable GFCI(s) for shock protection <input type="checkbox"/> Electrical-hazard-rated boots, gloves <input type="checkbox"/> Arc-resistant (AR) protection PPE for arc flash <input type="checkbox"/> Flame-resistant (FR) clothing <input checked="" type="checkbox"/> Work-area delineation supplies <input type="checkbox"/> Other:	<input type="checkbox"/> Lockout/tagout equipment <input type="checkbox"/> Portable lighting <input type="checkbox"/> Tripod/winch <input type="checkbox"/> Ventilation equipment (fan, blower) <input checked="" type="checkbox"/> Traffic control devices <input type="checkbox"/> Personal fall protection apparatus <input type="checkbox"/> Personal flotation device <input type="checkbox"/> Ring buoy & rope <input type="checkbox"/> Marine survival suit
<input checked="" type="checkbox"/>	CHEMICAL PPE and CHEMICAL SAFETY GEAR	<input type="checkbox"/> Goggles and/or face shield <input type="checkbox"/> Chemical protective gloves <input type="checkbox"/> Coveralls (Tyvek, or other) <input type="checkbox"/> Outer boots, boot covers <input type="checkbox"/> Air monitoring equipment, worker exposure monitoring device(s): <input type="checkbox"/> Other:	<input type="checkbox"/> Disposable N95 respirator <input type="checkbox"/> Half-face respirator (APR), cartridges <input type="checkbox"/> Full-face respirator (APR), cartridges <input type="checkbox"/> Exclusion Zone delineation supplies <input checked="" type="checkbox"/> Decon solution, related supplies <input checked="" type="checkbox"/> Receptacle for disposable PPE <input type="checkbox"/> Chemical hazard emergency gear – listed in "EMERGENCY EQUIPMENT" below
<input checked="" type="checkbox"/>	EMERGENCY EQUIPMENT	<input type="checkbox"/> Air horn, alarm, alerting equipment <input type="checkbox"/> 2-Way radios; other communication device <input checked="" type="checkbox"/> First aid kit(s) – onsite and/or in vehicles <input checked="" type="checkbox"/> Fire extinguisher – onsite and/or in vehicles	<input checked="" type="checkbox"/> Eyewash bottle(s) <input type="checkbox"/> 15-min. eyewash station <input type="checkbox"/> Emergency deluge shower <input type="checkbox"/> Chemical spill kit/supplies Vehicle emergency preparedness: <input checked="" type="checkbox"/> Fire extinguisher, first aid kit <input checked="" type="checkbox"/> Flares, lights, reflective device <input checked="" type="checkbox"/> Roadside assistance service
		Other:	

PART D – HAZARD ANALYSIS AND CONTROLS (Site-Specific Safety Analysis & Information)

D.1. “BASELINE” HAZARD PREPAREDNESS (This section applicable to ALL Tasks, covering natural hazards, driving/travel, basic safety & PPE)

a. Weather/Climature/Altitude Hazards

- Heat stress** – Prevent heat-related illness; At ambient temps > 80°F (27°C) use **Geo HeatTracker** to assess hazard, implement mitigations accordingly.
- Cold stress** – Prevent frostbite, hypothermia; multiple clothing layers, keep clothing dry, protect exposed skin, stay hydrated, frequent warming breaks.
- Sunburn, conjunctivitis** – Sun blocker, shade canopy, wide-brimmed hat, long sleeves/pants; protect eyes from glare near water/snow/sand
- Extreme weather** – Track weather, emergency plan: ID shelter/refuge, use weather app for lightning prediction at 10 mi./16 Km (use “30/30 rule” as backup).
- Weather-related conditions** – Use appropriate precautions for ice/snow/slippery conditions, flood, mold, soft ground, downed trees/wires, fire hazards, other.
- Acute Mountain Sickness (AMS)/Altitude Illness** – for work to be performed at $\geq 8,000$ feet (2,450 meters) above sea level, see [THA Addendum on AMS](#).

Site-Specific Notes:

HSE Program Documents, [HSE SOP-409: Heat Illness Prevention](#), [HSE SOP-410: Cold Stress Prevention](#)

b. Biological Hazards

- Insect/tick/arthropod hazards/vector-borne disease** – Use insect repellent, permethrin-treated clothing/gear, tick checks, tuck pants/shirt, tick removal tool, wasp spray, bug zapper/trap, mosquito netting, fogging, other barriers and protective devices, habitat treatment/removal, as applicable.
- Plant hazards** – Know the hazards (e.g. poison ivy/oak/sumac, giant hogweed, poison hemlock, nettles, etc.), know the precautions for site habitat: barrier ointments, washes; long sleeves/pants, gloves, remove plants (avoid burning), launder work clothes (hot water/detergent), clean tools (alcohol or soap/water).
- Animal hazards** – Know the hazards/precautions for work site: avoidance, repellents, PPE, warning devices, habitat/food source removal, infection controls.
- Common unsanitary/allergenic hazards** – Use routine hygienic measures/precautions; hand washing/sanitizer, food hygiene, PPE, disinfectant cleaning.
- Infectious/pathogenic** - For site-specific infectious hazards (viral, bacterial, bloodborne pathogens, mold, other), see **D.13 “Infectious/Pathogenic Biohazards.”**

Site-Specific Notes: Plant hazards involve blackberry bushes onsite not poisonous plants

HSE Program Documents: [HSE SOP-408: Biting/Stinging Arthropods and Poisonous Plants](#),

c. Routine Driving Hazards

- Routine work travel** – Use routine safe/defensive driving practices (seat belts, safe speeds, eyes ahead, no tailgating, limit distractions, safe cell phone use, no texting, clear windows, account for weather/road conditions, adequate sleep, other measures as appropriate).
- Unfamiliar location** – Before driving in roadway: view map, note key benchmark locations, plot your route and/or enter destination into navigation device.
- Unfamiliar vehicle** – Before driving in roadway: become familiar with vehicle controls; adjust seat, mirrors, vents, heat/AC, audio, lights, check brakes.
- Fatigue** – Minimize fatigue during long drives: frequent rest breaks, muscle stretches, eat light snacks-avoid heavy meals, stay hydrated, fresh air, no loud music, clean windshield; avoid/minimize long distance driving during your ordinary sleep hours; total *work time* and *drive time* should not exceed 14 hours per day.

Site-Specific Notes:

HSE Program Documents: [HSE SOP-220: Fatigue Management](#), [HSE SOP-605a: Driver Authorization Program](#)

d. General Safety

- General premises hazards** – Prevent slips/trips/falls (resulting from rough terrain, trip hazards, steep slope, slippery surfaces); maintain good housekeeping, be aware of on-site structures, utilities, overhead hazards, uneven/hazardous surfaces, obstacles, onsite traffic, restricted access/workspace.
- Musculoskeletal hazards** – Prevent strains/sprains from strenuous tasks, overexertion, repetitive motion/ergonomic/lifting (seek help/lift-aids over 49 lbs.)
- Worksite traffic hazards** – Implement measures to protect personnel (high-visibility/reflective clothing, on-person lighting, traffic control measures).
- Hazardous energy** – Use caution near electrical equipment/wet locations, machinery/physical hazards, stay out of hazard zone/line-of-fire, don't touch.
- Illumination hazards** – Illuminate work areas and/or access routes, use high-visibility and reflective clothing or on-person lighting, as appropriate.
- Security: high potential for crime/workplace violence/security breach** – Complete a [Risk Assessment for Working in High-Crime, High Security Risk Locations](#)
- Working alone** – Communicate a project-specific lone-work plan to coworkers, including procedures for periodic communication/contact.

Site-Specific Notes:

HSE Program Documents: [HSE SOP-205a: Manual Materials Handling/Back Injury Prevention](#), [HSE SOP-210: General Housekeeping](#), [HSE SOP-401: Lone Working](#), [HSE SOP-403: Management of Traffic](#), [HSE SOP-616: General Safety Rules](#)

e. Basic Personal Protection

- Head protection from overhead hazards** – Wear hardhat or “bump cap” as appropriate for hazard.
- Hand protection** – Wear gloves to protect from physical, chemical and biological hazards; select glove type (or types) specific for the task & hazard(s)
- Eye protection** – Wear safety glasses (with side shield or wrap around, either clear or shaded for sun protection), or other appropriate eye protection.
- Foot protection, rough terrain** – Wear work boots/shoes with hard toes, ankle support, puncture resistance, traction, as appropriate for conditions.
- Hearing protection** – use earplugs or earmuffs (or both) as appropriate for conditions; at a minimum where noise levels exceed 85 dBA.
- Protective clothing/nuisance dust mask** – For general protection against dust, dirt, oily residues, unsanitary conditions, as needed.
- Other personal protective gear** for task(s) covered in this THA is described in respective sections of this THA in Site-Specific Notes & Clarifications

Site-Specific Notes:

HSE Documents: [HSE STD-125: Personal Protective Equipment Program](#), [HSE STD-130: Respiratory Protection Program](#), [HSE STD-135: Hearing Protection Program](#)

D.2. SPECIAL TRAFFIC / VEHICLE / TRANSPORTATION HAZARDS

Applicable **Not Applicable, Not Anticipated**

(For water-transportation hazards, see D.3. "Water Hazards"; For construction traffic hazards, see D.8. "Construction, Heavy Equipment, Lift Equipment")

Site-Specific Notes & Clarifications: Towing and hauling risks apply to the drillers and their equipment.	
<input checked="" type="checkbox"/> THOROUGHFARE TRAFFIC HAZARDS Where the worksite is located in/near vehicle thoroughfare (road, highway, parking lot, etc.). Hazards: Injury to worker and general public from collision involving moving vehicle.	<input checked="" type="checkbox"/> Prepare Management of Traffic (MOT) Plan (address location hazards / client and regulatory requirements). <input checked="" type="checkbox"/> Wear DOT-approved reflective vests where exposed to traffic hazards. <input checked="" type="checkbox"/> Where possible, park vehicles as protective shield from oncoming traffic. <input checked="" type="checkbox"/> Configure work area and support vehicles to minimize worker exposure to traffic hazards. <input checked="" type="checkbox"/> Use DOT signal devices and/or signage to re-route vehicles around work area, site entrances/exits. <input checked="" type="checkbox"/> Use DOT-trained flaggers or police detail where appropriate or required. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-403: Management of Traffic</i></p>
<input checked="" type="checkbox"/> SPECIAL VEHICLE HAZARDS Off-Road Driving or use of non-typical vehicle, heavy vehicle, work truck, van, UTV/ATV Hazards: Worker injury due to vehicle collision, rollover	<input checked="" type="checkbox"/> For off-road driving, do not exceed capability of vehicle, beware of wet conditions, keep speed low, avoid unsafe orientation on slopes. <input type="checkbox"/> UTV/ATV-specific procedures for training, use roll-bar or helmet, operate per manufacturer's instructions. <input type="checkbox"/> Special Skills Required for Vehicle type – For vehicles requiring special skills (such as windowless van, heavy work vehicle, utility vehicle, similar) ensure operator is provided training and/or has appropriate operator skills through experience. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-652a-Utility Vehicles (US-only) (safe operation of mobile equipment)</i></p>
<input checked="" type="checkbox"/> TOWING/HAULING LOADS Hazards: Vehicle accident, occupant injury from shifting load, unsafe equipment, un-roadworthiness of trailer and/or vehicle.	<input checked="" type="checkbox"/> Ensure load within vehicle is firmly secured (rope, straps, load configuration) to prevent shifting during travel. <input checked="" type="checkbox"/> Slings, chains, strap, rope and related equipment used for towing, hauling, load-securing shall be appropriate for use, and used in a manner as to prevent an unsafe condition (generally, bungee cords not appropriate). <input checked="" type="checkbox"/> For trailer use, verify tow-hitch components are compatible, hitch/safety chains secure, signal/braking lights operational, rear-view mirrors effective, tires inflated to proper pressure and tread acceptable.
<input type="checkbox"/> RAILROAD RIGHT-OF-WAY HAZARD Hazards: Struck by train in R.R. right-of-way; electrical shock from third rail or overhead electrical lines	<input type="checkbox"/> Coordinate with rail company or on-site host facility and implement required safety and security measures. <input type="checkbox"/> Site workers shall receive safety training/certification (per railroad owner/operator) for railroad work.
<input type="checkbox"/> AIRPORT HAZARDS (on the ground) Hazard: Injury due to proximity on/near airport runway, flight path.	<input type="checkbox"/> Coordinate safety requirements with airport personnel and implement required safety measures. <input type="checkbox"/> Site workers shall receive safety training/certification (per airport owner/operator) for airport work. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP 628: General Aviation (Small Aircraft) Safety</i></p>
<input type="checkbox"/> LIGHT AIRCRAFT/HELICOPTER USE Hazards: Injury from collision during taxi/take-off/landing, aircraft crash and related general aviation hazards	<input type="checkbox"/> Review certifications/licenses/experience of pilot, airworthiness certificate for aircraft, safety practices of operator, aircraft safety rating, safety equipment/provisions on aircraft. <input type="checkbox"/> Passengers shall adhere to general passenger safety practices, and requirements of owner/operator/pilot. <input type="checkbox"/> For transport of HazMat/Dangerous Goods, see D.17. , "Transport/Shipping of Hazmat/Dangerous Goods" <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-628-General Aviation, Small Aircraft Safety</i></p>
<input type="checkbox"/> USE OF AERIAL "DRONE" Hazards: Airspace interference, collision with ground personnel, general public, infrastructure.	<input type="checkbox"/> For use of aerial drone--a.k.a. <i>small unmanned aerial system (sUAS), remote piloted aircraft (RPA) or unmanned aerial vehicle (UAV)</i> --review/adhere to requirements for regulatory certifications, authorizations & approvals, and pre-mob planning for pre-flight-, in-flight-, and post-flight checks, and unplanned events. <p style="text-align: right;"><i>HSE Program Documents: HSE MAN-003a: Unmanned Aerial Systems Manual (U.S. Only)</i></p>

D.3. WATER HAZARDS (Working Over/On/Near Water, Ash Ponds, Quicksand, Soft Ground) **Applicable** **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input type="checkbox"/> WATER HAZARDS Work/travel in watercraft or on equipment over water or over coal ash impoundment/pond: <input type="checkbox"/> Workboat, barge, over-water structures <input type="checkbox"/> Water transportation <input type="checkbox"/> Hazardous currents (river, tidal/riptide) <input type="checkbox"/> Towing, trailer, roadway <input type="checkbox"/> Other – describe above	<p>General water-safety measures for all work near water:</p> <input type="checkbox"/> Wear regulatory-approved personal flotation device (PFD) where drowning hazard is present. <input type="checkbox"/> Bring emergency rescue and/or signaling equipment (ring buoy and rope, reaching device, flares) <input type="checkbox"/> For fall protection over water, see D.4. "Fall Hazards." <input type="checkbox"/> For electrical hazards associated with water/wet locations, see D.10. "Electrical Work Tasks." <p>Boating-specific:</p> <input type="checkbox"/> Use fuel safety practices, fire extinguisher present in boat. <input type="checkbox"/> Develop/follow float plan, monitor weather, navigate/communicate as planned. <input type="checkbox"/> Confirm navigation/communication equipment operable before heading onto water.

Walking/wading into water, on shoreline, riverbank, dock, bulkhead, abutment, coal ash:

- Wading/walking into/near water, wetland
- Hazardous tidal zone or surf
- Water release, flash flood
- Coal ash pond, quicksand, soft ground
- Open culvert, arroyo, drainage/irrigation ditch
- Ice hazard on or near waterbody

Diving

- Scientific SCUBA diving

Hazards (as applicable):

- Drowning, cold immersion
- Boating collision, navigation, fog, darkness
- Fire/fuel hazards
- Entrapment (mud/silt/coal ash/quicksand)
- Slip/fall hazards – ice, mud, silt, wet surfaces
- Weather, heat/cold stress
- Equipment failure, hypoxia
- Chemical contaminant and/or biological hazard

- For work over very cold water, have immersion survival suit available.
- For tidal, flash flood, dam release hazards, plan/locate work accordingly.
- For towing a boat trailer, see **D.2. “Special Driving/Traffic/Transportation Hazards.”**

Wading in water or walking along shore/bank or on dock/pier/abutment:

- For ice/slip hazards, wear ice creepers, sand work area, use tether, other appropriate measures.
- For work on ice over water, verify safe thickness, have ring buoy & rope available
- For unsure/slippery footing in water, use wading staff, high-traction soles on waders.
- Have lifesaving skiff/boat available in circumstances where other rescue means are inadequate.
- Monitor hazardous tides, weather for flash floods, know water release schedule.

For soft ground, ash ponds, quicksand:

- Wear personal flotation device (PFD), as appropriate for the work task and work environment.
- Bring emergency rescue equipment (ring buoy and rope, reaching device)
- If walking on ash/quicksand, provide stable walking/working surface (4’x8’ plywood, or similar)

For diving:

- Develop a diving safety plan approved by Geosyntec’s diving coordinator

For chemical contaminant and/or biological/infectious hazard:

- See Section(s) **D.1.b.**, “Biological Hazards, **D.13.**, “Infectious/Allergenic Biohazards,” **D.14.**, “Commercial Chemical Products,” and/or **D.15.**, “Site Contaminants, Chemical Wastes”

HSE Program Documents: [HSE SOP-407: Working On/Near Water and Ice](#), [HSE SOP-630: Water Transportation Safety](#), [HSE MAN-005: Underwater Diving Operations Manual](#)

D.4. FALL HAZARDS (Falls to Lower Levels)

Applicable Not Applicable, Not Anticipated

Site-Specific Notes & Clarifications:

<p><input type="checkbox"/> WORKING AT HEIGHTS (GENERAL) Hazards:</p> <ul style="list-style-type: none"> - Injury from falls onto lower surface or falls into hazardous equipment, chemicals, water - Overhead utilities/obstructions - Impalement hazard (such as from falling onto unprotected rebar and similar surface projections) - Hazard posed to ground personnel from falling tools, equipment, materials 	<p>Fall protection “trigger heights”: Built environment – US & CAN: 4 ft. (1.2 m.); Construction: US: 6 ft., 10 ft. for scaffolds; CAN: 10 ft. (3 m)</p> <p>Protect from <u>primary</u> (fall) hazards:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Restrict access to hazard (barriers, tape, sign) <input type="checkbox"/> Ensure safe access to height (ladder, stair, lift) <input type="checkbox"/> Ensure guardrails/stair-rails/handrails present <input type="checkbox"/> Ensure covers in place over holes <input type="checkbox"/> Use designated “watch person/monitor” <input type="checkbox"/> Use tether or positioning device <input type="checkbox"/> Use personal fall apparatus (PFA) <input type="checkbox"/> Use fall protection net <p>Protect from <u>secondary</u> (collateral) hazards:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Protect site ground personnel from falling objects (restrict access, toe-boards, tether tools) <input type="checkbox"/> Install caps on protruding rebar and similar <input type="checkbox"/> Working over water; see D.3, “Water Hazards” <input type="checkbox"/> Working over hazardous machinery/equipment; see D.6, “Power-Tools/Powered Equipment” <input type="checkbox"/> Overhead electrical; See D.11. “Utility-Related Hazards” <input type="checkbox"/> Working over chemical hazards; See D.14 and/or D.15 for chemical and/or contaminant hazards. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-405: Walking-Working Surfaces Protection, HSE SOP-415a: Fall Protection (North America-only), HSE SOP-434a: Overhead and Underground Utility Hazards (US-only)</i></p>
<p><input type="checkbox"/> LADDER / STAIRS</p> <ul style="list-style-type: none"> <input type="checkbox"/> Extension/straight ladders <input type="checkbox"/> Step ladders <input type="checkbox"/> Fixed/installed ladders <input type="checkbox"/> Portable/mobile stairs <input type="checkbox"/> Job-made or scaffold stairs <p>Hazards:</p> <ul style="list-style-type: none"> - See general fall hazards, above. 	<p><input type="checkbox"/> Follow safe work practices:</p> <ul style="list-style-type: none"> • Use ladders according to safe practices and manufacturer’s instructions. • Maintain 3 points of contact at all times on ladder; keep center of gravity within side rails. • Do not use metal (conductive) ladder near electrical hazard. • Extension/straight ladders shall be properly footed, secured, angled, extend above upper work surface. • Stepladders are set on level ground or properly shimmed, spreaders locked; do not climb/stand on top step, top cap, or rear non-climbing side; use step ladder of sufficient reach height for work. • Equip stairs with stair handrails where more than 4 steps, and for stairway height of 4’ or more. • Ensure portable stairs are stable, plumb, and of sufficient reach height for task. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-415a: Fall Protection (North America-only), HSE SOP-638: Ladders and Stairways</i></p>
<p><input type="checkbox"/> SCAFFOLD</p> <ul style="list-style-type: none"> <input type="checkbox"/> Supported scaffold <input type="checkbox"/> Suspended scaffold <input type="checkbox"/> Free-standing/mobile scaffold <p>Hazards:</p> <ul style="list-style-type: none"> - See general fall hazards, above - Equipment collapse 	<p><input type="checkbox"/> Follow safe work practices:</p> <ul style="list-style-type: none"> • Identify/coordinate operations with the scaffold “Competent Person.” • Supported scaffold level, stable, proper attachments, tiebacks, planking, • Suspended scaffolds anchored properly. • Guardrails or personal fall apparatus required above 10 feet. • Proper means of accessing scaffold (proper ladders, stair tower); don’t climb scaffold frames. • Total height of free-standing scaffold shall not exceed four times the minimum base dimension. • Don’t exceed load limits, distribute loads evenly, stage materials in quantities sufficient for immediate use. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-648: Scaffolds</i></p>

<input type="checkbox"/> AERIAL BOOM/SCISSOR LIFT Hazards: - See general fall hazards, above - Struck-by, run-over, tip over - Caught between (pinch points) - Fluid leaks/fuel hazards or battery-related hazards	<input type="checkbox"/> <u>Follow safe work practices:</u> <ul style="list-style-type: none"> • Operators shall be trained and certified. • Equipment is inspected after mobilization and is in good condition. • Harness & lanyard worn whenever operating a boom lift (optional for scissors lift). • Overhead hazards and surface obstructions shall be reviewed with operators prior to use. <p>HSE Program Documents: HSE SOP-650: Manlifts and Aerial Lift Platforms (safe operation of mobile equipment)</p>
<input type="checkbox"/> WARNING! Confirmed or possible close proximity to OVERHEAD ELECTRICAL UTILITY LINES.	<input type="checkbox"/> Follow safe work practices per D.11., "Utility-Related Hazards" <p>HSE Program Documents: HSE SOP-434a: Overhead and Underground Utility Hazards (US-only)</p>

D.5. HAND TOOLS (Manual, Hand-Powered)

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input checked="" type="checkbox"/> MANUAL HAND TOOL INJURIES <input checked="" type="checkbox"/> Struck by <input checked="" type="checkbox"/> Pinch points/crushing injuries <input checked="" type="checkbox"/> Puncture <input checked="" type="checkbox"/> Cutting blade/laceration risk <input checked="" type="checkbox"/> Flying objects, eye hazards <input type="checkbox"/> Other, describe above	<input checked="" type="checkbox"/> Proper tool for the job, maintain in good condition, use vise/clamp to hold work piece, proper follow through, Self and nearby personnel shall stay clear of "line of fire," use appropriate work gloves, keep blades sharp, use wrist strap when dropped tool poses a hazard. <input checked="" type="checkbox"/> Utility/folding/collapsible knives and fixed-blade knives/cutting tools are <u>not</u> permitted, unless specifically authorized. Cutting tools with auto-retracting blades, or with enclosed/guarded blades are permitted. Use cut-resistant heavy work gloves, as applicable. <input checked="" type="checkbox"/> Ground surface penetration (hand auger, probe) – requires utility clearance; see D.11. "Utility-Related Hazards" <p>HSE Program Documents: HSE SOP-640: Manual Hand Tools</p>
<input checked="" type="checkbox"/> MUSCULOSKELETAL (MSK) HAZARDS <input checked="" type="checkbox"/> Risk of acute physical MSK trauma (sprains, sprains, soft tissue injuries) <input checked="" type="checkbox"/> Risk of cumulative/chronic MSK trauma, repetitive motion injuries	<input checked="" type="checkbox"/> For tools requiring high exertion (shovel, hand auger, sledgehammer, pickaxe, slide hammer, similar): do stretching exercises to prepare, clear hazard zone, use stable body position, take rest breaks, avoid overexertion. <input checked="" type="checkbox"/> For recognized musculoskeletal hazard, acute or chronic, resulting from unsafe acute exertion, or ergonomic/repetitive motion/cumulative trauma risks, seek advice on controls from Corporate HSE Dept. <p>HSE Program Documents: HSE SOP-205a: Manual Materials Handling/Back Injury Prevention</p>

D.6. POWERED TOOLS & EQUIPMENT (For Drilling & Heavy Equipment, see D.7 & D.8)

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input checked="" type="checkbox"/> Type of powered tools/equipment: <input checked="" type="checkbox"/> "Power tools" <input type="checkbox"/> Powered portable equipment <input checked="" type="checkbox"/> Powered fixed equipment Energy/power source: <input checked="" type="checkbox"/> DC battery- or solar-powered <input type="checkbox"/> AC electric-powered <input type="checkbox"/> 120V <input type="checkbox"/> 240V <input type="checkbox"/> 480V <input type="checkbox"/> Extension/flexible cords <input checked="" type="checkbox"/> Fuel-powered (gas or liquid) <input type="checkbox"/> Pneumatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Gunpowder-actuated Hazards of Power Tools and Powered Equipment: <input checked="" type="checkbox"/> Eye/hand/body injury <input checked="" type="checkbox"/> Point-of-operation hazards <input checked="" type="checkbox"/> Pinch points, moving parts	<input checked="" type="checkbox"/> <u>General safe work practices for operation of powered tools and equipment:</u> <ul style="list-style-type: none"> • Inspect before each use to ensure safe operating condition. • Clear personnel from hazard zone; keep personnel out of the "line-of-fire;" heed warning labels/signage. • Arrange worksite for safe access to equipment and sufficient work area clearance for safe use of tool; confirm no overhead obstructions; ensure adequate illumination. • Secure long hair/loose clothing/hanging jewelry near moving/rotating parts. • Ensure point-of-operation, mechanical power transmission, other moving parts are guarded with protective devices (as applicable); do not override interlocks, guards, protective devices. • Do not make any equipment modifications that create a greater hazard or bypass safety design features. • Use tool/equipment in accordance with manufacturer's use and safety instructions. • Use PPE and/or other safety protections, as appropriate, for eye/hearing/hand/head/body protection. • Provide training or verify operator competency for use of power tool/equipment. • Use ventilation, wet methods, respirators, other applicable means to mitigate inhalation hazard. • Move power cords/pressurized hoses to protect from damage during tool/equipment use. • For spark/heat generating tool/equipment, have fire extinguisher available, remove combustible/flammable materials, or use other means to control fire hazard (e.g. fire watch, fireproof blanket). • Use safe lifting practices and/or lift aids for moving heavy portable equipment, and use safe operating procedures to protect from acute strains/sprains, overexertion, and cumulative trauma injuries. • Implement safe work practices for compressed air, pressurized systems (pneumatic/hydraulic), stored energy. <input type="checkbox"/> <u>Additional requirements for power tools:</u> <ul style="list-style-type: none"> • Use vise/clamp/work bench or other means to hold/secure a portable/moveable work piece. • Don't carry electrical tools/equipment by the power cord; don't carry pneumatic tools by hoses. • Disconnect tool/equipment from power source before changing bits, blades or making adjustments.

<input checked="" type="checkbox"/> Line-of-fire hazards, struck by <input type="checkbox"/> Fire/explosion, ignition sources <input type="checkbox"/> Burns from hot surfaces, steam <input checked="" type="checkbox"/> Noise <input type="checkbox"/> Inhalation/atmospheric hazards <input type="checkbox"/> Working at heights, falls <input checked="" type="checkbox"/> Overhead obstruction(s) <input checked="" type="checkbox"/> Musculoskeletal hazards <input checked="" type="checkbox"/> Potential (stored) energy <input type="checkbox"/> Illumination	<input type="checkbox"/> Additional requirements for fixed powered equipment: <ul style="list-style-type: none"> • Implement lockout/tagout controls for repairs/adjustments/tooling changes. • Equip pneumatic hoses with whip checks; ensure factory fittings are used for high-pressure hose connections. <input type="checkbox"/> For climbing/fall hazards associated with large equipment, see D.4. "Fall Hazards." <input checked="" type="checkbox"/> For electrical hazards, see D.10. "Electrical Work Tasks." <input type="checkbox"/> For ground surface penetration, see D.11. "Utility-Related Hazards." <input checked="" type="checkbox"/> For fuel-safety practices, see D.14. "Commercial Chemical Products." <input type="checkbox"/> For air monitoring of atmospheric hazards, see Part E, "Air Monitoring, Worker Exposure Monitoring."
<input type="checkbox"/> WELDING, CUTTING, HOT WORK <input type="checkbox"/> Arc-welding (electrical arc) <input type="checkbox"/> Gas-welding/cutting (fuel gases) Hazards: <ul style="list-style-type: none"> - UV/IR light-eye/skin burns - hot-work hazards/fire - toxic metal welding fumes - compressed gases (physical hazards, fire, oxygen deficiency) - electrical shock 	<input type="checkbox"/> General safe work practices for operators of welding equipment: <ul style="list-style-type: none"> • Hot work permit system shall be implemented. • Operator properly protected (eye protection, clothing, apron, etc.). • Fire hazard controls (watcher, fire extinguisher, water, remove combustibles from work area). • Protect nearby personnel from hazardous UV, IR light (shielding, curtain); see D.16. "Radiation Hazards." <input type="checkbox"/> For welding gas cylinders, secure them upright with caps on when stored or not in use; protect cylinders from damage; NEVER secure gas cylinders to metal welding bench used for electrical arc welding; see D.14. "Commercial Chemical Products." <input type="checkbox"/> For arc welding, follow electrical safe work practices; see D.10. "Electrical Work Tasks." <input type="checkbox"/> For inhalation hazards from welding fumes (toxic metals) and gases (asphyxiant, flammable), see D.14. "Commercial Chemical Products."
<input type="checkbox"/> PORTABLE ELECTRIC GENERATOR Hazards: <ul style="list-style-type: none"> - Electrical shock - Carbon monoxide inhalation hazard - Fuel-related fire hazard - Injury from mechanical or lifting hazard - Burns from hot surfaces 	<input type="checkbox"/> Follow general safe work practices for Powered Tools & Equipment (above), and as follows: <ul style="list-style-type: none"> • Use in accordance with manufacturer's instructions, including instructions for grounding the generator. • Keep generator and work area dry. • Never use indoors, or near building air intake vents due to carbon monoxide hazard. • Provide for ventilation and/or air monitoring where hazardous accumulation of exhaust emissions is possible. • Use hearing protection in close proximity to operating generator (where noise level exceeds 85 dBA). • Use power cords/extension cords specified by instructions. • Use ground-fault circuit interrupters (GFCIs) in accordance with manufacturer's instructions; see D.10. "Electrical Work Tasks." • Shut down equipment before refueling; see safe practices for flammable/combustible liquids in D.14. "Commercial Chemical Products."
<input checked="" type="checkbox"/> PNEUMATIC / HYDRAULIC HAZARDS <input type="checkbox"/> Air compressor <input type="checkbox"/> Compressed air system <input checked="" type="checkbox"/> High-pressure liquid <input type="checkbox"/> Pressurized steam (For compressed gas cylinders, see D.14. "Commercial Chemical Products")	<input type="checkbox"/> Never direct outlet nozzle toward body; use guards, restraints, engineering controls as appropriate. <input type="checkbox"/> Never use compressed air for cleaning clothes you are wearing. <input type="checkbox"/> If compressed air is used for cleaning, restrict pressure to 30 psi or below, equip nozzle with chip guard. <input type="checkbox"/> Use PPE for eye (goggles or face shield)/hand/head/hearing/skin protection, as appropriate for the hazard. <input checked="" type="checkbox"/> Ensure tank, hoses, fittings are in good repair using factory fittings, equipped with whip-checks. <input checked="" type="checkbox"/> If pressure relief device poses a hazard to workers, reconfigure or shield device or restrict access by workers.
<input type="checkbox"/> PORTABLE HEATER <input type="checkbox"/> electric <input type="checkbox"/> fuel-powered Hazards: <ul style="list-style-type: none"> - Shock (electrical) - Carbon monoxide emissions and fuel-related fire hazards (fueled) - Fires/burns from hot surfaces. 	<input type="checkbox"/> Follow general safety practices for Operation of Equipment/Machinery (above), and as follows: <ul style="list-style-type: none"> • Keep heater dry and locate heater on level surface away from high traffic areas to prevent tipping. • Never use fuel-powered heaters indoors, or near air intake vents, due to carbon monoxide hazard. • Provide ventilation and/or air monitoring where hazardous accumulation of exhaust emissions is possible. • Keep combustible materials at least 3 feet from hot surfaces. • Plug electric heaters directly into wall outlet (don't use extension cord or power strip). • For electric heaters, see D.10., "Electrical Work Tasks." • Shut down fuel-powered equipment before refueling; see safe practices for flammable/combustible liquids and/or compressed gases in D.14. "Commercial Chemical Products."
<input type="checkbox"/> LOCKOUT/TAGOUT (LO/TO) OF HAZARDOUS ENERGY To prevent unplanned equipment start-up or release of energy when under maintenance/repair.	<input type="checkbox"/> Prepare site-specific written LO/TO <i>program</i> , and equipment-specific written LO/TO <i>procedures</i> (as applicable); implement control procedures for hazardous energy sources, provide locks/tags, train workers, designate "authorized" personnel, notify "affected" personnel.
<p>HSE Program Documents: HSE STD-125: Personal Protective Equipment Program, HSE STD-135: Hearing Protection Program, HSE STD-150: Globally Harmonized System for Hazard Communication (for fuel), HSE SOP-460: Field Site Exposure Monitoring, HSE SOP-452a: Lock-out/Tag-out (North America-only), HSE SOP-454a: General Electrical Safety (US-only), HSE SOP-642: Powered Hand Tools; HSE SOP-654: Welding, Cutting and Other Hot Work</p>	

D.7. DRILLING (Test Boring, Direct Push, Construction Drilling)

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:

<input checked="" type="checkbox"/> DRILLING & DIRECT PUSH Includes hazards posed by drilling rig and associated equipment, heavy support vehicles, trailer/towing hazards, and similar mobile equipment. Hazards: <ul style="list-style-type: none"> - Struck-by equipment - Run over, roll-over - Caught between (pinch points) - Manual lifting, musculoskeletal - Fuel/fluid leaks, fuel hazards - Suspended equipment - Roadway hazards. 	<input checked="" type="checkbox"/> <u>Follow safe work practices, as applicable:</u> <ul style="list-style-type: none"> • Non-drilling personnel shall stay clear of drilling work zone when drill rig in operation. • Equipment shall be maintained in good repair, inspected daily upon mobilization; backup alarms and emergency stop operational, machine guards in place, whip checks on high pressure lines. • Leaks or defective safety equipment will be repaired before use. • Establish eye contact with operator and use hand signals prior to approaching the rig. • Use PPE near operating rig (eye/head/hearing/hand/foot protection, high visibility vests or equivalent). • Arrange personal/support vehicles to protect drill team and not obstruct travel lanes or other operations. • Operators/helpers must maintain safe distance from moving parts; secure loose hair/clothing, equipment. • Drill rigs will only be moved with masts lowered. • Maximum safe slope for rig will be followed, drill rig leveled, appropriate blocking/cribbing as needed. • Use safe practices for fuel handling/storage/transport; spill equipment available for fuel/fluid leaks. • Ventilate exhaust and conduct air monitoring, as appropriate, when drilling indoors. • Never climb drill mast without appropriate fall protection. • Use precautions for overhead and underground utilities
<input checked="" type="checkbox"/> MECHANICAL LIFTING, RIGGING Applies to lifting truck-mounted boom rig (e.g., drill rig), and all other drilling-related mechanical/electrical hoist equipment. Hazards: <ul style="list-style-type: none"> - Mechanical hazards - Elevated loads 	<input checked="" type="checkbox"/> <u>In addition to general drilling & direct push safety practices (above), as applicable:</u> <ul style="list-style-type: none"> • Slings, chains, rope, wire rope, as well as sheaves, boom, and attachments used for lifting/hoisting shall be maintained in good condition, inspected daily, and used/stored in a manner as to protect from damage. • Do not exceed loading limits of lifting equipment; perform work in accordance with equipment load chart. • Hooks will be equipped with safety latches. • Ensure anchor points for winch or other lift device are engineered for intended use. • Ensure personnel are not positioned beneath elevated loads.
<input checked="" type="checkbox"/> WARNING! Confirmed or possible close proximity to OVERHEAD or UNDERGROUND UTILITIES.	<input checked="" type="checkbox"/> Follow safe work practices per D.11. "Utility-Related Hazards."
HSE Program Documents: HSE SOP-430: Drilling Activities , SOP-434a: Overhead and Underground Utility Hazards (US-only) , HSE SOP-644: Working Around Heavy Equipment ,	

D.8. CONSTRUCTION, HEAVY EQUIPMENT, LIFT EQUIPMENT

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input checked="" type="checkbox"/> WORKING NEAR MOBILE HEAVY EQUIPMENT, ON-SITE VEHICLES Hazards: <ul style="list-style-type: none"> - Struck-by - Caught between - Run over, roll over - Overhead hazards/obstructions - Elevated loads 	<input checked="" type="checkbox"/> <u>For personnel on-foot/on-the-ground near operating heavy equipment, follow safe work practices:</u> <ul style="list-style-type: none"> • High visibility vests for all personnel in construction vehicle work area, on-site roadways and travel lanes. • Maintain unobstructed vision: wear shaded eyewear only in bright sun; don't wear hoods. • Erect barriers and post signs to identify and isolate the equipment hazard zone, if possible. • Stay out of swing radius of equipment, both in front and operating end, as well as at the back of equipment. • Stay out of the travel path of operating heavy equipment. • When crossing vehicle pathway behind moving equipment, cross at a distance not less than 30 feet. • When approaching equipment, always be able to see operator so he/she can see you. • Make eye contact with operator and use hand signals or make radio contact prior to approaching equipment. • Operator shall provide "all off" hand signal when it is safe to approach within swing radius of equipment.
<input checked="" type="checkbox"/> OPERATION OF MOBILE HEAVY EQUIPMENT Hazards: <ul style="list-style-type: none"> - Struck-by - Run over, roll over - Caught between (pinch points) - Fluid leaks/fuel-/fire-hazards - Overhead hazards/obstructions - Potential for body entrapment/crushing - Rotating equipment, moving parts. 	<input checked="" type="checkbox"/> <u>Operators shall follow safe work practices for operation of heavy equipment:</u> <ul style="list-style-type: none"> • Only trained/qualified persons allowed to operate heavy equipment. • Wear seat belts; roll-over protection system present/deployed; do not exceed maximum safe slope. • No passengers on moving/operating equipment except where passenger seat/restraint is present. • Equipment inspected daily upon mobilization; maintained in good repair, backup alarms, windows clear. • Leaks or defective safety equipment should be repaired before use; fire extinguisher present. • Maintain eye contact with ground personnel and use hand signals to direct their approach near equipment. • High visibility vests for all personnel in construction vehicle work area, on-site roadways and travel lanes. • Cease operation if personnel enter swing radius, travel path or hazard zone of moving parts, elevated loads. • Use safe practices for fuel handling/storage/transport; spill equipment available for fuel/fluid leaks. • Equipment locked, secured, brakes set, buckets/forks lowered, extendable parts retracted, when not in use. • Shut down/lock out equipment to prevent crush situation beneath or between moving parts of equipment. • Ensure personal/support vehicles are parked/located to not obstruct equipment travel lanes/operating zones. • Mark temporary roadways clearly, provide berms/stops where needed. <p style="text-align: center;">HSE Program Documents: HSE SOP-644: Working Around Heavy Equipment</p>
<input type="checkbox"/> TRENCHING/EXCAVATION Hazards: <ul style="list-style-type: none"> - Cave-in, entrapment - Hazardous atmosphere - Water accumulation - Falls into excavations 	<input type="checkbox"/> <u>Safe work practices when personnel will enter trenches/excavations:</u> <ul style="list-style-type: none"> • Activities under supervision/oversight of Competent Person, conduct daily inspection of excavation. • Excavated materials placed at least 2' from trench sidewall. • Prevent water accumulation in trench. • Sloping & shoring for trenches/excavations >20' deep must be approved by a Professional Engineer. • Sloping/shoring/trench box for excavations >5' when persons enter trench/excavation.

	<ul style="list-style-type: none"> - Utility-related hazards - Undermining structures & foundations 	<ul style="list-style-type: none"> • Sloping/shoring/trench box for shallow (<5') trench/excavation with cave-in hazard. • Workers in trenches shall be within 25 feet of ladder or sloped entryway. • Excavations shall be protected by perimeter fencing (not barricade tape), if potential for personnel to fall into. • If potential for atmospheric hazard, see D.12. "Confined/Enclosed Spaces" <p>HSE Program Documents: HSE SOP-432: Excavation and Trenching Activities</p>
<input checked="" type="checkbox"/>	FORKLIFT Hazards: <ul style="list-style-type: none"> - Struck-by - Run over/roll over/tip over - Overhead utilities/obstructions - Caught between (pinch points) - Unstable/falling loads - Elevated forks - Fluid leaks 	<input checked="" type="checkbox"/> <u>In addition to general safety practices for heavy equipment (above), as applicable:</u> <ul style="list-style-type: none"> • Qualified operator, per established forklift training (certificate is required); Geosyntec operator must be approved by Director of Health and Safety. • Equipment inspected daily and documented on Forklift Preoperational Inspection Checklist. • Do not exceed lifting load limits. • Forklift shall not be moved/driven with empty forks in raised position. • When not in use, forks lowered, brake set, controls in neutral, key removed. <p>HSE Program Documents: HSE SOP-436: Safe Operation of Forklifts and Mobile Equipment</p>
<input type="checkbox"/>	AERIAL BOOM/SCISSOR LIFT Hazards: <ul style="list-style-type: none"> - Falls from basket - Overhead utilities/obstructions - Struck-by, run over, tip over - Caught between (pinch points) - Tip over - Fluid leaks. 	<input type="checkbox"/> <u>Follow safe work practices:</u> <ul style="list-style-type: none"> • Operators shall be appropriately trained and certified. • Equipment is inspected after mobilization and is in good condition. • Harness & lanyard worn when operating a boom lift (optional for scissor lift). • Overhead hazards and surface obstructions shall be reviewed with operators/riders prior to use. <p>HSE Program Documents: HSE SOP-650: Manlifts and Aerial Lift Platforms (safe operation of mobile equipment)</p>
<input type="checkbox"/>	CRANES Hazards: <ul style="list-style-type: none"> - electrocution by overhead utility - injury in swing radius - injury from falling load - crane tipping over due to overbalancing, high winds, unstable ground, unsafe slope, bad placement of outriggers - injury from mechanical hazards 	<input type="checkbox"/> <u>In addition to general safety practices for Operation of Heavy Equipment (above), as applicable:</u> <ul style="list-style-type: none"> • Only qualified persons operate cranes (certificate required). • Critical Lift Plan & Checklist prepared/executed (See Procedure) prior to mobilization. • Equipment shall be inspected prior to mobilization and daily by crane operator. • Crane operator will remain at the controls at all times during operation. • Crane operation must be performed under the direction of an appointed signal person at all times using hand signals and/or voice/radio communication. • Crane shall be level and stable (solid ground or crane mats/timbers, outriggers if present, cribbing); over-reaching or exceeding load limits is prohibited. • Keep area beneath suspended loads clear of personnel; tag lines used to maneuver load. • Rigging procedures – see Mechanical Lifts with Rigging, below.
<input type="checkbox"/>	MECHANICAL LIFTS WITH RIGGING Applies to lifting by rigging attached to crane, truck-mounted boom rig (e.g. drill rig), heavy equipment, mechanical/electrical hoist, similar equipment. Hazards: <ul style="list-style-type: none"> - Mechanical hazards, - Elevated loads 	<input type="checkbox"/> <u>In addition to general safety practices for Operation of Heavy Equipment and Cranes (above), as applicable:</u> <ul style="list-style-type: none"> • Slings, chains, rope, wire rope, as well as sheaves, boom and attachments used for lifting/hoisting shall be maintained in good condition, inspected daily, and used/stored in a manner as to protect from damage. • Coordinate lifting operations with competent person. • Do not exceed loading limits of lifting equipment; perform work in accordance with equipment load chart. • Hooks will be equipped with safety latches. • Ensure anchor points for winch or other lift device (such as davit arm) are engineered for intended use. • Ensure personnel are not positioned beneath elevated loads and that tag lines are used where appropriate.
<input checked="" type="checkbox"/>	WARNING! Confirmed or possible close proximity to OVERHEAD or UNDERGROUND UTILITIES.	<input checked="" type="checkbox"/> Follow safe work practices per D.11. "Utility-Related Hazards" <p>HSE Program Documents: HSE SOP-434a: Overhead and Underground Utility Hazards (US-only)</p>
<input type="checkbox"/>	DEMOLITION	<input type="checkbox"/> Develop/implement a demolition safety plan.
<input type="checkbox"/>	BLASTING, UNEXPLODED ORDNANCE	<input type="checkbox"/> Develop/implement safety plan for blasting, unexploded ordnance, as applicable. <p>HSE Program Documents: HSE SOP-622: Blasting & Use of Explosives</p>
<input checked="" type="checkbox"/>	PUBLIC AT RISK, SITE SECURITY	<input checked="" type="checkbox"/> During site operations protect public (overhead protection, fencing, barriers, warning signs). <input checked="" type="checkbox"/> During off hours, protect public with fencing, barriers, warning signs/lights, other measures as appropriate. <input checked="" type="checkbox"/> Lock/secure hazardous materials and/or equipment.

D.9. STORAGE/HANDLING OF BULK MATERIALS (for *Chemical* Storage, see D.14 & 15) **Applicable** **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:

<input type="checkbox"/>	BULK STORAGE HAZARDS: Collapse/movement of stacked/stored bags, blocks, containers, pipe, boxes, equipment, and similar. <input type="checkbox"/> Stack/pallet/rack/shelf <input type="checkbox"/> CONEX-box storage, or similar	<input checked="" type="checkbox"/> Store materials in stable manner (stacked, racked, blocked, interlocked, tied, wrapped, or otherwise secured) to prevent tipping, sliding, rolling, falling or collapse. <input checked="" type="checkbox"/> Do not exceed load limits and ensure storage structure is stable, robust, secure for intended load. <input checked="" type="checkbox"/> Ensure stored materials do not block aisles, passageways, electrical panels, emergency equipment, emergency access/egress routes, vehicle routes.
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<input type="checkbox"/>	LIFTING/MANUAL MATERIAL HANDLING HAZARDS	<input checked="" type="checkbox"/> During manual handling of materials and equipment, use safe lifting practices and/or lift aids; do stretches and use safe postures to protect from acute strains/sprains, overexertion, and cumulative trauma injuries. HSE Program Documents: HSE SOP-205a: Manual Materials Handling/Back Injury Prevention
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D.10. ELECTRICAL WORK TASKS

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:		
<input checked="" type="checkbox"/>	USE OF BATTERIES, BATTERY-POWERED EQUIPMENT <50 V, OR OTHER DC EQUIPMENT < 50 V Potential fire hazard (if terminals are shorted), eye/skin hazards (when electrolyte is replenished), inhalation hazard in enclosed spaces.	<input checked="" type="checkbox"/> Follow safe work practices to control hazards of voltage, shock, arcing, overheating, hazardous gases, irritant electrolytes, secondary hazards. <input checked="" type="checkbox"/> Prevent short-circuiting of terminals when battery is in use (segregated from tools, metal objects) and during transport (use battery transport container or install guard/cover on positive terminal). <input type="checkbox"/> For batteries requiring replenishment of electrolyte, use PPE for eye and skin protection, and have eyewash equipment at hand; see discussion of <i>acids/caustics/corrosives</i> in D.14. “Commercial Chemical Products.”
<input checked="" type="checkbox"/>	“NORMAL OPERATION” OF ELECTRICAL EQUIPMENT CONNECTED TO AC OR DC POWER SOURCE ≥ 50 V: Electrically powered tools, equipment, machinery, extension cords, portable generators, working near electrical equipment. Hazards: – Electrical shock – Fire Hazard – Secondary hazards (falls, other injuries).	<input checked="" type="checkbox"/> <u>Follow “normal operation” requirements:</u> <ul style="list-style-type: none"> All electrical enclosures/guards/covers must be in place/closed/secured. Electrical equipment maintained per codes/standards/manufacturer’s recommendations. Ensure no indication of damage or impending failure (heat, smoke, buzzing, odors, arcing, melting). Operate equipment in accordance with manufacturer’s standard operating procedures. <input checked="" type="checkbox"/> <u>Follow general electrical safety work practices to minimize shock hazard and secondary hazards:</u> <ul style="list-style-type: none"> Control water-related/wet-location hazards in a manner appropriate for the job tasks/equipment/tool. Never touch electrical equipment if you are wet or standing/kneeling in water or on wet surfaces. Use extension cords/power cords properly, rated for use conditions and current draw, prevent damage. Inspect tool/equipment/extension cords/power cords before each use; remove from use if damaged. Use GFCI-protected outlet or portable GFCI in wet/moist locations, outdoors, basements, concrete floors. Do not enter any space delineated by an electrical approach boundary.
<input type="checkbox"/>	HANDS-ON DIAGNOSTICS/REPAIR ON CIRCUIT(S) CONNECTED TO POWER SOURCE < 50 V: <input type="checkbox"/> AC <input type="checkbox"/> DC <input type="checkbox"/> Battery and/or solar power <input type="checkbox"/> Capacitor(s) <input type="checkbox"/> Stray voltage from soil electrodes	<input type="checkbox"/> <u>Implement electrical safe work practices pertaining to:</u> <ul style="list-style-type: none"> Workers trained appropriately for the task. Shock prevention measures. Eye/skin protection for arcing hazards. Protection from secondary hazards.
<input type="checkbox"/>	WORK WITHIN “APPROACH BOUNDARY” OF EXPOSED, ENERGIZED (OR POTENTIALLY ENERGIZED) CONDUCTORS AND/OR CIRCUIT PARTS CONNECTED TO POWER SOURCE 50-600 V*: <input type="checkbox"/> AC <input type="checkbox"/> DC <input type="checkbox"/> 3-phase <input type="checkbox"/> Battery and/or solar power <input type="checkbox"/> Capacitor(s) <input type="checkbox"/> Induced voltage <input type="checkbox"/> Stray voltage ≥50V from soil electrodes * Working on >600 V not permitted for Geosyntec personnel	<input type="checkbox"/> <u>Prepare project-specific written “Electrical Safety Program” addressing (at a minimum):</u> <ul style="list-style-type: none"> Workers trained/designated as “Qualified Electrical Workers” per NFPA 70E (US)/CSA Z462 (CAN) Assess risks of electrical shock (voltage levels and sources), arc flash hazard and secondary hazards. Affix electrical hazard warning label to electrical enclosure(s) to be accessed. Physically delineate arc flash- or limited approach boundary, whichever is farthest from hazard source. Only “qualified” workers allowed within approach boundaries; prevent entry by non-qualified personnel. Establish electrically safe working condition; work on live circuits prohibited (except for diagnostic testing). Use PPE for shock/arc flash protection, as required. Use other safe procedures/equipment required for the task, such as lockout/tagout.
<input type="checkbox"/>	<input type="checkbox"/> LOCKOUT/TAGOUT (LO/TO) OF ELECTRICAL ENERGY To prevent unplanned start-up or release of energy when equipment is under maintenance/repair.	<input type="checkbox"/> Prepare site-specific written LO/TO program, and equipment-specific written LO/TO procedures (as applicable); implement control procedures for hazardous energy sources, provide locks/tags, train workers, designate “authorized” personnel, notify “affected” personnel.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> WARNING! Confirmed or possible close proximity to OVERHEAD ELECTRICAL UTILITY LINES.	<input checked="" type="checkbox"/> Follow safe work practices per D.11. “Utility-Related Hazards.”
<p align="center">HSE Program Documents: HSE SOP-434a: Overhead and Underground Utility Hazards (US-only), HSE SOP-452a: Lock-out/Tag-out (North America-only) HSE SOP-454a: General Electrical Safety (US-only)</p>		

D.11. UTILITY-RELATED HAZARDS

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:		
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<input checked="" type="checkbox"/>	OVERHEAD, ABOVE-GROUND UTILITIES	<input checked="" type="checkbox"/> Do not cross approach boundaries with personnel or equipment; employ other appropriate precautions for the conditions (specify above). <input checked="" type="checkbox"/> Use additional controls, as applicable: shielding, flagging, observer/monitor, or, <input type="checkbox"/> Arrange for power company/utility owner to de-energize power line.
<input checked="" type="checkbox"/>	UNDERGROUND UTILITIES	<input checked="" type="checkbox"/> Confirm appropriate underground utility clearance procedures have been completed prior to ground penetrations, and employ other utility clearance/locator practices, as appropriate for conditions. <input checked="" type="checkbox"/> Hand digging/augering or vacuum post-holing within 3' of utility locations or other high-risk condition.

HSE Program Documents: [HSE SOP-434a: Overhead and Underground Utility Hazards \(US-only\)](#)

D.12. CONFINED / ENCLOSED SPACES (Including Hazardous Indoor Spaces) **Applicable** **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input type="checkbox"/> Type of CONFINED/ENCLOSED/HAZARDOUS INDOOR Workspace: <input type="checkbox"/> Indoors (occupied) <input type="checkbox"/> Indoors (abandoned, vacant) <input type="checkbox"/> Basement, crawl space, attic <input type="checkbox"/> Tunnel, shaft, inspection gallery <input type="checkbox"/> Storage bin, locker <input type="checkbox"/> Culvert, catch basin, sewer <input type="checkbox"/> Well vault, utility vault, manhole <input type="checkbox"/> Tank, vessel, silo, vat, hopper <input type="checkbox"/> Trench, excavation <input type="checkbox"/> Machine/equipment pit <input type="checkbox"/> Transportation container, railcar <input type="checkbox"/> Other – describe above Confirmed or potential hazards: <input type="checkbox"/> Flammable/explosive <input type="checkbox"/> Oxygen deficiency <input type="checkbox"/> Hydrogen sulfide <input type="checkbox"/> VOCs <input type="checkbox"/> Carbon monoxide <input type="checkbox"/> Combustible dust <input type="checkbox"/> Combustion/exhaust emissions <input type="checkbox"/> Welding/cutting fumes <input type="checkbox"/> Electrical <input type="checkbox"/> Mechanical equipment <input type="checkbox"/> Entrap, engulf, drowning <input type="checkbox"/> Building-related hazards <input type="checkbox"/> Other – describe above	REQUIREMENTS: 1. Contact Corp. HSE Department will determine applicability of confined space entry regulations, and to determine safe work practices for entry into any confined, enclosed or hazardous indoor spaces. 2. Classify the work task by checking one of the following: <input type="checkbox"/> CONFINED SPACE classified by regulatory authority as a “Permit-Required Confined Space” or otherwise specifically-regulated as a confined space in the worksite’s geographic jurisdiction. <input type="checkbox"/> CONFINED/ENCLOSED/INDOOR space NOT specifically regulated as a Confined Space; develop site-specific entry procedure per applicable regulatory and Geosyntec safety requirements. 3. Delineate tasks, hazards and controls associated with the work in Section C.1. “Summary of Tasks, Hazards and Controls,” and in applicable sections in Parts C, D and E of this THA; incorporate or attach applicable safety provisions such as, but not limited to, the following: <ul style="list-style-type: none"> • Risk assessment; entry plan, entry permit system/safety checklist. • Air monitoring for atmospheric hazards. • Entry roles (supervisor, entrant, attendant), buddy system, regulatory training requirement. • Protect non-entry personnel from unauthorized entry (labels, signage, barriers) • Ingress/egress (stairway, ramp, ladder, tripod/winch, harness/lifeline, etc.). • Communication/alerting/rescue/emergency plan. • Entry hazard controls: <ul style="list-style-type: none"> - Isolate, clean, purge, inert, lockout/tagout, fire prevention. - <i>Dilution</i> ventilation to introduce fresh air - <i>Exhaust</i> ventilation to control point source of emissions. - Use duct/stack to direct hazardous emissions away from work area. - Respiratory protection. - Use PPE and safety gear to protect from chemical/physical/biological hazards. - Fall protection. - Traffic control.
<i>HSE Program Documents: HSE STD-125: Personal Protective Equipment Program, HSE STD-130: Respiratory Protection Program, HSE SOP-412a: Confined Space Entry Operations (US-only), HSE SOP-460: Field Site Exposure Monitoring</i>	

D.13. INFECTIOUS / PATHOGENIC BIOHAZARDS **Applicable** **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input checked="" type="checkbox"/> HAZARD TYPE: <input type="checkbox"/> Contagious respiratory illness <input type="checkbox"/> Vector-borne infectious risk <input type="checkbox"/> Wastewater, sewer, landfill <input checked="" type="checkbox"/> Animal/human waste <input type="checkbox"/> Wildlife contact, infectious risk <input type="checkbox"/> Mold, fungi, valley fever <input type="checkbox"/> Bloodborne pathogens <input checked="" type="checkbox"/> Discarded syringes <input checked="" type="checkbox"/> Medical waste <input type="checkbox"/> Other (describe above)	<input type="checkbox"/> Follow internal guidance for mitigating airborne respiratory illness transmission (as applicable). <input type="checkbox"/> Implement vector-protective measures (see also Section D.1.b., “Biological Hazards”) <input type="checkbox"/> Use “Standard/Universal Precautions” as applicable to mitigate exposures to infectious/pathogenic hazards. <input checked="" type="checkbox"/> Low hazard – use basic hygiene: onsite hand washing (soap & water preferred) and protective apparel/PPE. <input checked="" type="checkbox"/> Med/high hazard – added PPE (gloves/barriers/respirator/dust mask), decon, remediation, as appropriate. <input type="checkbox"/> For bloodborne human pathogens follow Bloodborne Pathogen Program and Standard/Universal Precautions. <input type="checkbox"/> Contact HR Dept. for project-specific immunization (e.g. tetanus/diphtheria/pertussis [Tdap], hepatitis A/B). <input type="checkbox"/> Implement remedial actions to mitigate infectious hazard source (remove syringes, clean up unsanitary waste/debris, decon/disinfect surfaces, etc.) as appropriate for the scope/scale of work. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-240: Mitigating Respiratory Illness Transmission in the Workplace, HSE SOP-408: Biting/Stinging Arthropods and Poisonous Plants, HSE SOP-612a: Bloodborne Pathogens (US-only)</i></p>

D.14. COMMERCIAL CHEMICAL PRODUCTS (per HAZCOM or WHMIS) **Applicable** **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:
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<input type="checkbox"/>	PRODUCTS REGULATED BY HAZCOM¹ (US) or WHMIS² (CAN)	<input type="checkbox"/> Safety Data Sheets (SDSs) available, either on site or readily available within same work shift, containers labelled properly, workers trained/oriented on hazards. <input type="checkbox"/> For subcontractor/contractor use of chemical products, confirm SDS availability for affected onsite workers.
¹ OSHA Hazard Communication Standard (United States); ² Workplace Hazardous Material Information System (Canada)		
<input checked="" type="checkbox"/>	GENERAL SAFE WORK PRACTICES FOR FIELD USE OF CHEMICALS	<input checked="" type="checkbox"/> Consult SDS for HSE hazards, symptoms of exposure; ensure workers have been apprised of safe practices. <input checked="" type="checkbox"/> Handle with care, maintain good housekeeping, provide adequate illumination in work area. <input checked="" type="checkbox"/> Pour/dispense/transfer liquid chemicals on stable work surface. <input checked="" type="checkbox"/> Use chemicals in well-ventilated area; use fans/blowers/exhaust for active ventilation, as appropriate. <input checked="" type="checkbox"/> Have eyewash bottles, eyewash station, deluge capabilities, commensurate for the hazard, readily available. <input checked="" type="checkbox"/> Have spill/neutralization equipment, appropriate for the chemicals, readily available. <input type="checkbox"/> Conduct air monitoring as appropriate; see Part E, "Air Monitoring, Worker Exposure Monitoring."
<input checked="" type="checkbox"/>	STORAGE/TRANSPORT OF CHEMICALS/HAZMAT <input checked="" type="checkbox"/> Non-Emergency (Routine) Chemical Storage Risk of personal contact and/or incidental release <input type="checkbox"/> HAZMAT Transport <input type="checkbox"/> Risk of Emergency Spill/Release <input type="checkbox"/> CFTAS (Chemical Facility Anti-Terrorism Standards) Applicability: On-site overnight storage of non-waste chemical product at quantity ≥ 25 gal(115L) or ≥ 250 lbs. (115 kg)	<input checked="" type="checkbox"/> Transport chemicals only in sealed containers, secured to prevent shifting/breakage during travel. <input checked="" type="checkbox"/> Store chemicals only in sealed containers; overnight storage in squirt/spray bottles prohibited. <input checked="" type="checkbox"/> Store flammable/combustible liquids in chemical storage cabinets, or other appropriate storage arrangement. <input type="checkbox"/> For liquids, provide secondary containment during storage. <input type="checkbox"/> Segregate incompatible chemicals during storage. <input checked="" type="checkbox"/> For <i>incidental release/spill</i> ; maintain spill kit suitable for low flammability/toxicity/quantity/volatility release. <input type="checkbox"/> DOT/TDG/IATA-Regulated transport: see D.17. "Hazmat/Dangerous Goods Shipping/ Transportation." <input type="checkbox"/> For <i>emergency spills</i> : describe spill/release hazard and response plan/procedure above, and indicate emergency response contact in Part B, "Emergency Response and First Aid." <input type="checkbox"/> Locate emergency gear (eyewash, fire extinguisher, spill kit, safety signage) near storage area, as applicable. <input type="checkbox"/> For CFTAS-applicable chemical storage, a safety and chemical management plan must be prepared and reviewed by a HSE Professional before bringing material to the site. (Does not apply to materials brought on to the site for daily work purposes and transported away at the end of each day)
<input type="checkbox"/>	COMPRESSED GAS CYLINDERS <input type="checkbox"/> Flammable <input type="checkbox"/> Non-flammable <input type="checkbox"/> Toxic <input type="checkbox"/> Asphyxiant <input type="checkbox"/> Oxygen	<input type="checkbox"/> Secure cylinders upright, caps on when not in use. <input type="checkbox"/> Handle with care; use and store cylinders in a manner and location to prevent damage. <input type="checkbox"/> Propane cylinders not in use <u>must be stored outdoors</u> in a cage or similar secure ventilated enclosure. <input type="checkbox"/> Ensure acetylene cylinders are NOT secured to steel arc welding bench. <input type="checkbox"/> Segregate oxygen and fuel gases by distance (20') or fire-rated barrier. <input type="checkbox"/> Control ignition sources. <input type="checkbox"/> "No smoking" signage at cylinder storage area for flammable gases.
<input type="checkbox"/>	FLAMMABLE/COMBUSTIBLE LIQUIDS	<input type="checkbox"/> Use proper fuel safety can (metal fuel container with self-closing spout and flame arrestor preferred). <input type="checkbox"/> Control/remove ignition sources near storage and use areas. <input type="checkbox"/> Grounding and bonding where appropriate. <input type="checkbox"/> Ensure a Type B or ABC fire extinguisher is readily available.
<input type="checkbox"/>	ACIDS, CAUSTICS, OTHER CORROSIVES	<input type="checkbox"/> Use appropriate protection for eyes/face (goggles/face shield) and skin (gloves, sleeves, apron). <input type="checkbox"/> Use eyewash, deluge shower, drench hose, hand washing (with water), as appropriate. <input type="checkbox"/> For severe eye hazards (due to high corrosivity, large quantity), 15-min. eyewash required.
<input type="checkbox"/>	TOXIC	<input type="checkbox"/> For toxic substances, use/store in a manner to control exposure hazards (inhalation, ingestion, skin contact, skin absorption); use active ventilation and/or PPE as appropriate.
<input checked="" type="checkbox"/>	EMISSIONS FROM FUEL COMBUSTION, HOT PROCESSES <input checked="" type="checkbox"/> Gasoline <input checked="" type="checkbox"/> Diesel <input type="checkbox"/> Propane/Natural Gas <input type="checkbox"/> Welding/cutting/hot work <input type="checkbox"/> Vehicle/equipment exhaust <input type="checkbox"/> Other	<input checked="" type="checkbox"/> Position outdoor personnel upwind of exhaust source. <input checked="" type="checkbox"/> Avoid "idling" of equipment when not in use. <input type="checkbox"/> Use <i>passive ventilation</i> (air infiltration/air currents) to disperse atmospheric hazards in breathing zone. <input type="checkbox"/> Use <i>dilution ventilation</i> (blowers/fans) to provide fresh air to work area and dissipate atmospheric hazards. <input type="checkbox"/> Use <i>exhaust ventilation</i> (hood/duct/exhaust stack/blower) to capture/divert exhaust from work area. <input type="checkbox"/> Use respiratory protection for high levels of smoke, exhaust particulates, soot. <input type="checkbox"/> Conduct air monitoring as appropriate; see Part E, "Air Monitoring, Worker Exposure Monitoring."
<input type="checkbox"/>	OTHER HAZARDS	<input type="checkbox"/> Describe other hazardous substances and safety measures under "Site-Specific Notes & Clarifications," above.
HSE Program Documents: HSE STD-125: Personal Protective Equipment Program , HSE STD-130: Respiratory Protection Program HSE STD-145: Safety Training Program , HSE STD-150: Globally Harmonized System for Hazard Communication , HSE SOP-460: Field Site Exposure Monitoring		

D.15. SITE CONTAMINANTS, CHEMICAL WASTES

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:

CHECK ALL THAT APPLY. Provide site-specific notes/clarifications above.

<input checked="" type="checkbox"/> Soil/groundwater contaminants (historical release)	<input type="checkbox"/> Explosive dust	<input type="checkbox"/> Potential for flammable gas (methane)
<input type="checkbox"/> Recent release, known high concentrations	<input type="checkbox"/> Oxygen deficiency	<input type="checkbox"/> Corrosive, acids/caustics, strong irritants
<input type="checkbox"/> Former chemical disposal site, landfill	<input checked="" type="checkbox"/> Chlorinated volatile organic compounds (VOCs)	<input type="checkbox"/> Asbestos abatement work

<input type="checkbox"/> Urban fill, residual contaminants <input type="checkbox"/> Containerized waste (drums, process equipment) <input type="checkbox"/> Buried drums (known or potential) <input type="checkbox"/> Large containers, potential for spills <input type="checkbox"/> Contaminated building surfaces <input type="checkbox"/> Unexploded ordnance	<input checked="" type="checkbox"/> BTEX, petroleum derived VOCs <input checked="" type="checkbox"/> Fuel oils, petroleum, waste oil, lubricants <input type="checkbox"/> Metals, metal compounds, metal dusts <input type="checkbox"/> Elemental mercury <input type="checkbox"/> Polyaromatic hydrocarbons (PAHs) <input type="checkbox"/> Potential for flammable vapors	<input type="checkbox"/> Pesticides, herbicides, fungicides <input type="checkbox"/> Sensitizers <input type="checkbox"/> Radioactive contaminants <input type="checkbox"/> Controlled substances, drugs <input type="checkbox"/> Wildfire smoke, see THA Addendum <input type="checkbox"/> Other - describe above
NOTE: For sites with one or more "high-risk contaminants" (below) designated/recognized as a <i>contaminant of concern</i> , or <i>exceeding an environmental reporting threshold</i> , or representing a <i>potential exceedance of an action level or exposure limit</i> , the THA must be reviewed by the HSE Dept. before initiating the work:		
<input type="checkbox"/> Asbestos <input type="checkbox"/> Arsenic/arsenic compounds <input checked="" type="checkbox"/> Benzene <input type="checkbox"/> Beryllium <input type="checkbox"/> Cadmium	<input type="checkbox"/> Chromium VI (hexavalent chromium) <input type="checkbox"/> Crystalline Silica (airborne) <input type="checkbox"/> Dioxins <input type="checkbox"/> Mercury <input type="checkbox"/> Hydrogen Cyanide (HCN)	<input type="checkbox"/> Lead <input type="checkbox"/> Methylene chloride <input type="checkbox"/> Polychlorinated biphenyls (PCBs) <input checked="" type="checkbox"/> Vinyl chloride
<input checked="" type="checkbox"/> FOR WORK CONSISTING OF CLEANUP OPERATIONS, CORRECTIVE ACTIONS, PRELIMINARY INVESTIGATIONS at an "UNCONTROLLED HAZ. WASTE SITE" (per HAZWOPER, 29 CFR 1910.120 or equivalent), delineate procedures in "Site-Specific Notes and Clarifications" (or attachments) addressing the following, as applicable to the work: <ul style="list-style-type: none"> - Workers attend pre-work orientation on hazards, risks, onsite safety measures, emergency contingencies. - Implement site control plan - delineate Exclusion Zone(s), Contaminant Reduction Zone(s), Support Zone (aka EZ, CRZ, SZ). - Include site map/figure depicting work locations and other relevant site-specific information. - Site workers in EZ or CRZ shall have 40-hour HAZWOPER training, current 8-hour refresher, 3 days supervised field experience. - Site supervisor(s) shall have 8-hour Supervisor training. - Site workers in EZ or CRZ shall participate in medical monitoring program, as applicable. - Implement site-specific procedures for worker protection via engineering controls, work practices, personal protective equipment (PPE), air monitoring, decontamination procedures, spill containment, emergency preparedness and response. - Conduct air monitoring, as appropriate; see Part E, "Air Monitoring, Worker Exposure Monitoring." - PPE program: Specify Levels of Protection and specific PPE to be used for applicable tasks; <ul style="list-style-type: none"> o Level D: No respirator, no chemical protective clothing, standard work clothes, basic PPE; (COVID-19 face covers allowed) o Modified Level D: No respirator, chemical protective clothing as appropriate; (COVID-19 face covers allowed) o Level C: Air-purifying respirator, chemical protective clothing as appropriate; consult with Corp. HSE Dept. required. o Level B: Air-supplied respirator, chemical protective clothing/suit as appropriate; consult with Corp. HSE Dept. required. o Level A: Fully encapsulating suit, self-contained breathing apparatus (SCBA); Level A prohibited for Geosyntec personnel. 		
<input type="checkbox"/> FOR SITE WITH CHEMICAL CONTAMINANTS OR WASTE BUT NOT REGULATED BY HAZWOPER <ul style="list-style-type: none"> - Workers shall be knowledgeable/aware of chemical hazards thru safety training/orientation and availability of hazard information. - Implement controls to minimize worker exposure through engineering controls, work practices, PPE, decon, as appropriate. - Evaluate worker exposure via air monitoring/sampling, as applicable; see Part E, "Air Monitoring, Worker Exposure Monitoring." 		
<input checked="" type="checkbox"/> STORAGE/TRANSPORT OF IDW* Spill/Release Risk: <input checked="" type="checkbox"/> Risk of <i>incidental spill/release</i> <input type="checkbox"/> Risk of <i>emergency spill/release</i> <i>* Investigation-Derived Waste</i>	<input type="checkbox"/> Describe site-specific procedures above for spill containment, container handling, as applicable. <input checked="" type="checkbox"/> For liquids, provide secondary containment during storage. <input type="checkbox"/> Segregate incompatible chemicals during storage. <input type="checkbox"/> Locate emergency gear (eyewash, fire extinguisher, spill kit, safety signage) near storage area, as applicable. <input checked="" type="checkbox"/> For <i>incidental spills</i> ; spill kit on-site for low-hazard releases (low-flammability/toxicity/quantity/volatility) <input type="checkbox"/> For <i>emergency spills</i> : describe spill/release hazard and response plan/procedure above, and indicate Emergency response contact in Part B, "Emergency Response and First Aid." <input type="checkbox"/> DOT/TDG/IATA-Regulated transport: see D.17. "Hazmat/Dangerous Goods Shipping/Transportation."	
<input type="checkbox"/> OFF-SITE MIGRATION OF AIRBORNE CONTAMINANTS	<input type="checkbox"/> Implement controls to minimize hazard migration (dust suppression, covers, foam, etc.). <input type="checkbox"/> Community/perimeter air monitoring will be conducted per perimeter air monitoring plan; see E.3 "Fence Line/Perimeter Air Monitoring."	
<p style="text-align: center;">HSE Program Documents: HSE STD-120: Occupational Medical Management Program, HSE STD-125: Personal Protective Equipment Program, HSE STD-130: Respiratory Protection Program, HSE STD-145: Safety Training Program, HSE STD-150: Globally Harmonized System for Hazard Communication, HSE SOP-301a: Contaminated Site Investigation & Remediation (US-only), HSE SOP-460: Field Site Exposure Monitoring, HSE SOP-634: Drum Sampling, HSE SOP-636: Handling of Uncharacterized Hazardous Waste Containers, THA Addendum on Wildfire Smoke</p>		

D.16. RADIATION HAZARDS (Other than Sunlight)

Applicable Not Applicable, Not Anticipated

D.17. SHIPPING/TRANSPORTATION HAZMAT/DANGEROUS GOODS

Applicable Not Applicable, Not Anticipated

MODE(S) OF TRANSPORT:	<input type="checkbox"/> Road	<input type="checkbox"/> Rail	<input type="checkbox"/> Air	<input type="checkbox"/> Sea	<input type="checkbox"/> Inland Waterway	<input type="checkbox"/> International
IMPORTANT: Ensure that each individual who will be involved in shipping/transportation of hazardous material is current with required training (awareness, function-specific, safety, security) in accordance with applicable regulatory authority (DOT, FAA, IATA, TDG), and ensure adherence to applicable regulations. HSE Program Documents: HSE SOP-235a: Hazardous Materials Shipping (US-only)						
Site-Specific Notes & Clarifications:						

PART E – AIR MONITORING, WORKER EXPOSURE MONITORING

E.1. AIR MONITORING

Applicable Not Applicable, Not Anticipated

Site-Specific Notes, Clarifications:		
AIR-TESTING PARAMETERS - Select site-specific testing parameters; list associated equipment in Part C.2, Safety Equipment List.		
<input type="checkbox"/> VOCs <input type="checkbox"/> PID (Photoionization detector): X eV <input type="checkbox"/> FID (Flame ionization detector) <input type="checkbox"/> Colorimetric indicator tubes – describe above	<input type="checkbox"/> O ₂ (Oxygen) – 4 gas meter/GEM <input type="checkbox"/> LEL (Lower Explosive Level) - LEL meter <input type="checkbox"/> H ₂ S (Hydrogen Sulfide) – H ₂ S detector <input type="checkbox"/> CO (Carbon monoxide) – CO detector	<input type="checkbox"/> Particulates - total dust meter <input type="checkbox"/> % Methane – 4 gas meter/GEM <input type="checkbox"/> Calibration kit for each parameter <input type="checkbox"/> Other: CO ₂ (Carbon dioxide) – 4 gas meter/GEM
SUBSTANCE-SPECIFIC (PRE-SET) ACTION LEVELS - Sustained breathing zone action levels (sustained general work-area levels for LEL).		
<input type="checkbox"/> O ₂ (Oxygen)	19.5-23%	Acceptable to continue work without O ₂ -focused respiratory protection.
	<19.5%	STOP WORK, ventilate to raise O ₂ to >19.5% for re-entry. For persistent hazard, contact Corp. HSE Dept.
	>23.0%	STOP WORK, ventilate to lower O ₂ to <23% for re-entry. For persistent hazard, contact Corp. HSE Dept.
<input type="checkbox"/> LEL (Lower Explosive Limit)	IMPORTANT:	Confirm sufficient oxygen is present (min. 8-12%) to ensure accurate LEL readings.
	<10% LEL	Acceptable to continue working in work area; continue to monitor LEL.
	≥10% LEL	STOP WORK. Implement controls (reposition workers, ventilate, contain/eliminate source, etc.); resume work ONLY when LEL readings are <10%, sustained.
<input type="checkbox"/> H ₂ S (Hydrogen Sulfide)	< 1 ppm	Acceptable to continue work without H ₂ S-focused respiratory protection.
	1-10 ppm	Implement controls (reposition workers, ventilate, contain/eliminate source, scheduling, etc.) to limit exposures to <1ppm, or use APR* with VOC/acid-gas cartridges (yellow); do not exceed MUC* for respirator type; confirm acceptability of respirator usage with HSE Dept.
	> 10 ppm	Implement controls (reposition workers, ventilate, contain/eliminate source, scheduling, etc.) to limit exposures to <10ppm (with respirator), or <1ppm (without respirator). For persistent levels >10 ppm, STOP WORK, contact task lead, PM or HSE Dept.
<input type="checkbox"/> CO (Carbon Monoxide)	< 25 ppm	Acceptable to continue work without CO-focused respiratory protection.
	≥ 25 ppm	Implement controls (reposition workers, ventilate, contain/eliminate source, scheduling, etc.) to limit exposures to <25ppm. For persistent levels >25ppm, STOP WORK, contact PM and/or HSE Dept.
<input type="checkbox"/> WILDFIRE SMOKE (AQI for PM 2.5)	≤150	In this Air Quality Index (AQI) range, it's acceptable to continue work without respiratory protection.
	151-500	Voluntary use of N95 respirator is appropriate.
	>500	STOP WORK, or use APR* with approval of HSE Dept.
<input type="checkbox"/> <OTHER>		
SITE-DERIVED ACTION LEVELS – Sustained breathing zone action levels; derived based on site contaminants; REVIEW WITH CORP. HSE DEPT. REQUIRED.		
<input type="checkbox"/> VOCs (Volatile Organic Compounds)	< X ppm	Acceptable to continue work without VOC-focused respiratory protection.
	> “ ppm	Implement controls (reposition workers, ventilation, containment, eliminate source, etc.) to lower VOC exposures to less than specified action level, or use APR* with approval of Corp. HSE Dept.
	X to X ppm	Use APR* with VOC cartridges (yellow or black); do not exceed MUC** for respirator type; confirm procedures for respirator usage with HSE Dept.
	> X ppm	STOP WORK. Implement controls, for persistent levels greater than action contact PM and/or HSE Dept.
<input type="checkbox"/> AIRBORNE DUST (Total Particulates)	< X mg/m ³	Acceptable to continue work without particulate-focused respiratory protection.
	> “ mg/m ³	Implement controls (water spray, reposition workers, ventilation, containment, etc.) to lower dust levels to less than specified action level, or use APR* with approval of HSE Dept.
	X to X mg/m ³	Use APR* with particulate cartridges appropriate for the hazard; do not exceed MUC** for respirator type; confirm procedures for respirator usage with HSE Dept.
	> mg/m ³	STOP WORK. Implement controls. For persistent levels greater than action level, contact PM and/or Corp HSE Dept.
<input type="checkbox"/> <OTHER>		
* Air-purifying respirator ** Maximum use concentration		
HSE Program Documents: HSE SOP-460: Field Site Exposure Monitoring , HSE SOP-464: Lead Exposure Control , HSE SOP-466: Hydrogen Sulfide Exposure Control , Wildfire Smoke THA Addendum		

E.2. OTHER WORKER EXPOSURE MONITORING / SAMPLING

Applicable Not Applicable, Not Anticipated

<input type="checkbox"/> Heat/Cold Stress Testing/Monitoring <input type="checkbox"/> Air Sampling (sample collection, passive dosimeter) <input type="checkbox"/> Wipe/Bulk Sampling (to evaluate worker exposure)	<input type="checkbox"/> Wildfire Smoke – Tracking AQI (Air Quality Index) <input type="checkbox"/> Ionizing or Non-ionizing Radiation Testing <input type="checkbox"/> Noise Testing	<input type="checkbox"/> <Other> <input type="checkbox"/> <Other>
Site-Specific Notes, Clarifications:		
HSE Program Documents: HSE STD-135: Hearing Protection Program , HSE STD-140: Radiation Safety Program , HSE SOP-230: Ionizing and Non-ionizing Radiation Protection , HSE SOP-409: Heat Illness Prevention , HSE SOP-410: Cold Stress Prevention , HSE SOP-462: Asbestos Exposure Control , HSE SOP-464: Lead Exposure Control		

E.3. FENCELINE / PERIMETER AIR MONITORING

Applicable Not Applicable, Not Anticipated

Fence line/perimeter air monitoring to be conducted in accordance with a separate "Perimeter Air Monitoring Plan" for this work; results from fence line/perimeter air monitoring shall NOT be used as the sole basis for determining work zone atmospheric hazards.

Site-Specific Notes, Clarifications:

PART F – APPROVALS, ACKNOWLEDGEMENTS

F.1. THA PREPARATION, REVIEW/APPROVAL SIGNATURES A THA is typically prepared by project staff, often with input from an HSC, with review/approval, at a minimum, by PM and/or Field Lead. Corporate HSE staff must be consulted as required or otherwise deemed appropriate*.

PREPARER(S)	Printed Name	Signature	Date
	David Mackay		6/4/25
THA REVIEWED/ APPROVED BY: (Project Manager or PM- Designee, at a minimum)**	Printed Name	Signature	Date

* At a minimum, Corp. HSE **must** review/approve the THA review when Geosyntec staff will encounter "high hazards/high risks," or perform critical tasks, such as (but not limited to):

- Work at heights >10', use personal fall apparatus
- Work at height near overhead electrical utility lines
- Operate a UTV/ATV, aerial lift or fork-lift
- Tow a trailer on roadway
- Oversee a hot-work permit system
- Enter a hazardous confined/enclosed space
- Use of unmanned aerial vehicle (drone)
- High-risk ergonomic/musculoskeletal hazard
- Implement lockout/tagout controls
- Enter a trench/excavation >5' deep
- Function as a construction "Competent Person"
- Operate a pneumatic or powder-actuated tool
- "Qualified" Electrical testing & maintenance >50 V
- High risk, non-typical infectious/pathogenic hazard
- Derive action levels for VOCs or toxic dusts
- Instrument monitoring for critical exposure risks
- Wear a respirator
- Presence of "high-risk" contaminant(s)
- Sustained exposure to wildfire smoke AQIPM2.5 >150
- Exposure to radioactive isotopes (α, β, γ)
- High-risk exposure to: non-ionizing (microwave, EMF, UV, IR) or ionizing (radio-isotope, x-ray) radiation.
- Onsite risk of emergency chemical spill
- Applicability of Chemical Anti-Terrorism Standards

Corporate HSE **must** also be consulted when Geosyntec subcontractors (under Geosyntec's oversight) perform high hazard/high risk work (such as demolition, blasting, crane critical lifts, confined space entry, testing/maintenance of electrical systems, lockout/tagout, HAZWOPER cleanup activities). Consultation with Corp. HSE is encouraged for all questions/concerns regarding worker safety, regulatory compliance, risk/liability aspects, or project-specific safety requirements.

** It is recommended that THAs be approved/signed by both the PM and Field Lead (or alternate PM designee), unless due to small scope/scale or routine nature of task, or staff unavailability, only one approval is deemed sufficient by PM. Additional review and approval will be performed by Corp. HSE for high-hazard/high-risk tasks, or as otherwise requested.

HSE Program Documents: For more information, see "HSE STD-105, Project Safety Management Handbook".

F.2. GEOSYNTEC FIELD CREW ACKNOWLEDGEMENTS

Please sign below to acknowledge you reviewed and understand this THA, participated in project safety briefing and had an opportunity to ask questions about the information herein.

Printed Name	Signature	Employee No.	Date

F.3. SUBCONTRACTOR'S FIELD CREW ACKNOWLEDGEMENTS

Applicable Not Applicable

Please sign below to acknowledge this THA was made available to you, and you had an opportunity to ask questions about the information herein.

Printed Name	Signature	Company Name	Date



ATTACHMENTS:

Attachment A – Route to Hospital

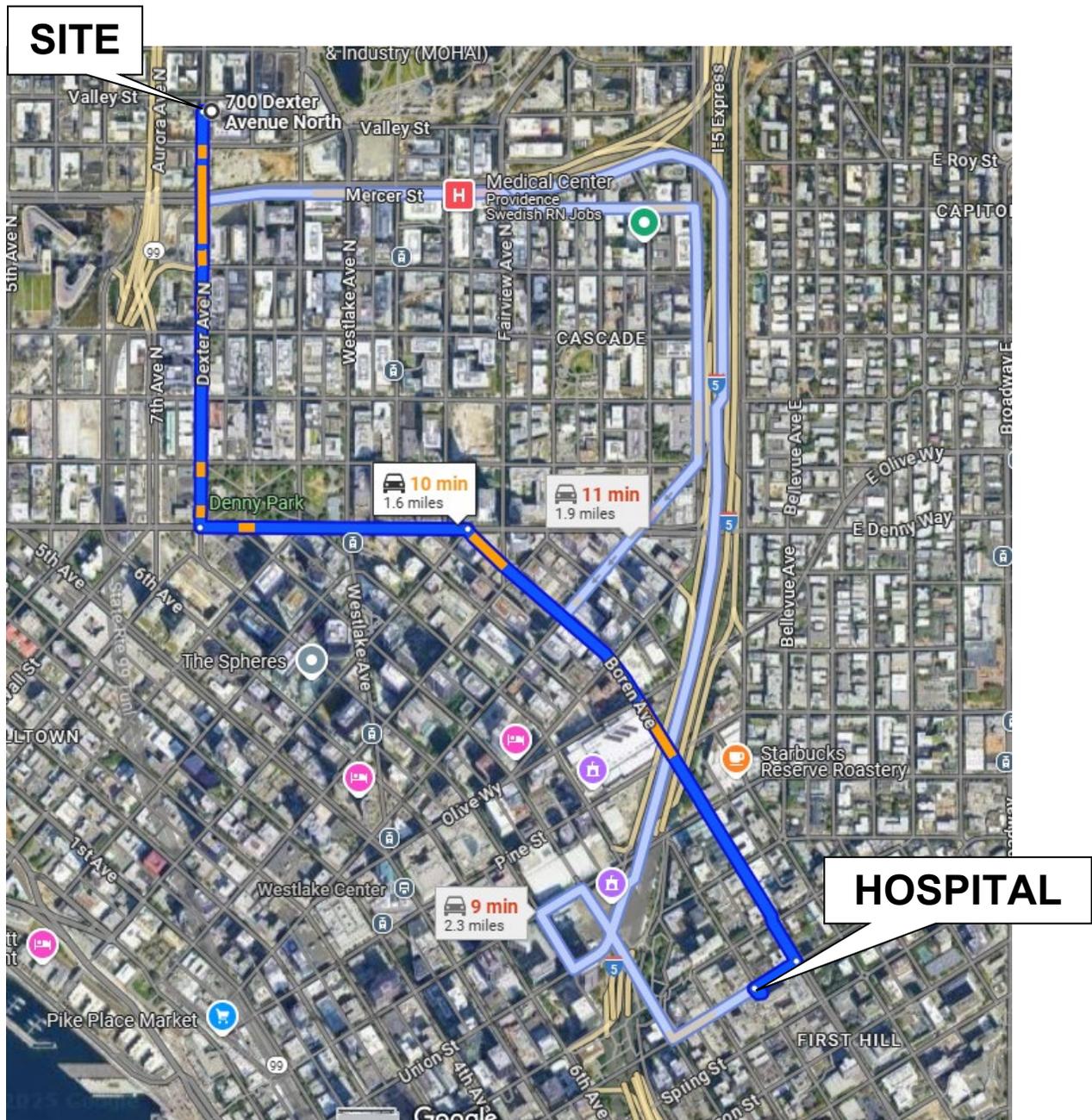
Attachment A – ROUTE TO HOSPITAL EMERGENCY ROOM

Hospital Name: Virginia Mason Medical Center

Address: 1100 9th Ave, Seattle, WA 98101

Phone Number: (206)624-1144

Driving Directions to Local Hospital: Head south on Dexter Ave N toward Roy St (0.5 mi), Turn left onto Denny Wy (0.3 mi), Slight right onto Boren Ave (0.7 mi), Turn right onto Seneca St (331 ft), Turn left, destination will be on the right (69 ft).



HSE Event Response and Notification

CHOOSE THE BEST PATH!



* 911 in North America; 112 in EU; 999 & 112 both applicable in UK; 000 in Australia; for other country- or site-specific numbers, see your Written Safety Plan or Office Emergency Plan
 ** First response actions by site/project team should always be in accordance with general-duty obligations, on-site roles, and training qualifications
 *** Employees may initiate a call for medical triage/support if no call-back received from HSE within 60 minutes of Event Notification, or if HSE is not available directly by phone. For the medical support contact in your location (*WorkCare in North America; location-specific elsewhere*) see your Written Safety Plan or Office Emergency Plan, as applicable

If you have questions or concerns about any workplace health and safety matter, please contact a member of your Corporate HSE Team for assistance:	Global HSE Director Bob Poll M: +1 813-240-9231	Multinational Region Jason Ford M: +1 226-220-3401	South Region Ersin Yalcin M: +1 404-435-4722	West Region Madison McLaughlin M: +1 351-990-2888	Kasey Shaw Australia M: +61 7 3173 1714
	HSE Programs Professional Andrew Thomas M: +1 508-649-3254	Canada Dean Zapishny M: +1 519-494-3031	Central Region Tony Schwegmann M: +1 309-634-5276	Kristoffer Lindo Europe M: +46 708 68 70 23	GEOSYNTEC FAMILY OF COMPANIES HSE Health, Safety, and Environment

Part A – PROJECT/TASK INFORMATION

Project/Site Name:	American Linen Supply Co-Dexter Avenue (700 Dexter)	Project Number/Org:	AS240461/3010
Site Address:	700 Dexter Avenue N, Seattle, WA (including adjacent properties)		
Task & Worksite Description:	Remedial In-situ Injections at 700 Dexter using KB-1 Primer (Sirem), Sodium Lactate, SRS-SD (EVO), and SRS-ZVI.		
Geosyntec Personnel:	Name	Office Phone	Cell Phone
Site Safety Lead/Officer	Hannah Cohen	(206)780-7724	(818) 224-0892
Task Technical Lead	Risi Naa	(206)780-7715	(603)205-5063
Project Manager	Lea Kane	(206) 858-4378	(925) 354-2791
Project Director	Melissa Asher	(206) 496-1449	(574) 261-4358
Local HSE Coordinator	Madeline Chavira		(206) 496-1463
Regional HSE Manager	Madison McLaughlin	(858) 716-2900	(951) 990-2888
Corporate HSE Director	Bob Poll	813-379-4420	813-240-9231
On-Site Subcontractor(s): <input type="checkbox"/> Not Applicable	<input checked="" type="checkbox"/> Applicable; provide company name, work task and contact information for each Geosyntec subcontractor below: Garrett Hooper; K&D Services		
		425-374-5825	425-551-8297
Client, Contact(s):	John Moshy		(858)829-7709
ETHICS POINT HOTLINE	US & Canada: 844-231-3371 UK: 800-89-0011 or 800-89-0011	Australia: 800-551-155 or 800-811-011 Ireland: 800-222-55288 or 800-500-000	

Part B - EMERGENCY RESPONSE and FIRST AID

IMPORTANT: After initial emergency response actions and incident stabilization, contact appropriate project staff and/or HSE personnel listed in Part A

Site-Specific Notes, Clarifications:	
Emergency Communication / Alerting	<input checked="" type="checkbox"/> Verbal <input checked="" type="checkbox"/> Cell Phone <input type="checkbox"/> Land Line <input type="checkbox"/> 2-Way Radio <input type="checkbox"/> Satellite Phone <input type="checkbox"/> On-site alarm/signal system <input type="checkbox"/> Other:
To Summon Police, Fire, Ambulance	<input checked="" type="checkbox"/> DIAL 911 , for external responders <input type="checkbox"/> Other:
WorkCare (for non-emergency injuries)	24/7: 888-449-7787
Other Emergency Contacts (such as security, spill responder, utility-related):	
Nearest EMERGENCY ROOM Medical Services	Hospital Name: Virginia Mason Medical Center Address: 1100 9 th Ave, Seattle, WA Phone #: (206)624-1144 <input checked="" type="checkbox"/> See ATTACHMENT A, ROUTE to HOSPITAL
Emergency Evacuation - Route, Rally/Muster Point, Shelter Location(s)	If inside, evacuate buildings.
EMERGENCY and FIRST AID EQUIPMENT required for this work task is listed in PART C.2. – SAFETY EQUIPMENT LIST	

Attachment Hospital A: Route to Hospital

PART C – HAZARD ANALYSIS and EQUIPMENT LIST (Basis for Field Team Safety Orientations and Onsite Safety Discussions)

C.1 ONSITE TASK HAZARD ANALYSIS

INSTRUCTIONS:

- Begin your job safety analysis by reviewing “Pointers” (see lower right) and completing **Part D “HAZARD ANALYSIS AND CONTROLS** for your TASK(s).
- In **Columns 1 & 2** (below), list/describe **TASKS & WORK ASPECTS** and the associated **HAZARDS & RISKS**.
- In **Column 3** summarize **CONTROLS & SAFE WORK PRACTICES** (Brief summary descriptions with references to THA Sections).

REFERENCES - Copy and paste, as applicable, into **Column 3**:

See C.2. SAFETY EQUIPMENT LIST	See D.10. ELECTRICAL WORK TASKS
See D.1. BASELINE HAZARD PREPAREDNESS	See D.11. UTILITY-RELATED HAZARDS
See D.2. SPECIAL TRAFFIC/VEHICLE/TRANSPORTHAZARDS	See D.12. CONFINED/ENCLOSED SPACES
See D.3. WATER HAZARDS	See D.13. INFECTIOUS / PATHOGENIC BIOHAZARDS
See D.4. FALL HAZARDS	See D.14. COMMERCIAL CHEMICAL PRODUCTS
See D.5. HAND TOOLS	See D.15. SITE CONTAMINANTS, CHEMICAL WASTES
See D.6. POWERED TOOLS & EQUIPMENT	See D.16. RADIATION HAZARDS (Other than Sunlight)
See D.7. DRILLING	See D.17. HAZMAT/DANGEROUS GOODS SHIPPING.
See D.8. CONSTRUCTION, HEAVY/LIFT EQUIPMENT	See Part E AIR MONITORING, EXPOSURE MONITORING
See D.9. STORAGE OF BULK MATERIALS	See ATTACHMENT “X”

1. TASKS/WORK ASPECTS	2. HAZARDS/RISKS	3. CONTROLS / SAFE WORK PRACTICES
a. Natural Hazards (applicable to all work onsite)	Such as: - Plants, Insects	Blackberry bushes with thorns present throughout the site. Wear long pants and long sleeves for protection against insects and thorns. See D.1. BASELINE HAZARD PREPAREDNESS
b. Premises Hazards (applicable to all work onsite)	For example: - Driving hazards - Heavy equipment traffic onsite - Needles and other sharps objects - Human waste/biohazards	In addition to basic driving safety, limit speed to 5 mph (8 km/hr) while onsite; when exiting the site onto roadway, right turn only (no left turns across traffic). For all work, wear hard-toe work boots, proper work clothes, reflective/hi-viz vest, eye protection. Hearing protection near noise sources, appropriate work gloves. See: C.2. SAFETY EQUIPMENT LIST; D.1. BASELINE HAZARD PREPAREDNESS D.2. SPECIAL TRAFFIC/VEHICLE/TRANSPORTHAZARDS D.8. CONSTRUCTION, HEAVY/LIFT EQUIPMENT
c. Manual Hand Tool Injuries	<input checked="" type="checkbox"/> Struck by <input checked="" type="checkbox"/> Pinch points/crushing injuries <input checked="" type="checkbox"/> Puncture <input checked="" type="checkbox"/> Cutting blade/laceration risk <input checked="" type="checkbox"/> Flying objects, eye hazards	Take care and use appropriate PPE when using hand tools. See D.5. HAND TOOLS
d. Remedial Injections	- Exposure to injection chemicals - High pressure equipment - Heavy Equipment	Conduct and attend daily pre-work orientation on hazards. Review SDS for injection chemicals. Wear proper PPE – level D and modified level D (face shield) for injection tasks.

	- Exposure to site contaminants	See; C.2. SAFETY EQUIPMENT LIST D.1. BASELINE HAZARD PREPAREDNESS D.2. SPECIAL TRAFFIC/VEHICLE/TRANSPORTHAZARDS D.6. POWERED TOOLS & EQUIPMENT D.8. CONSTRUCTION, HEAVY/LIFT EQUIPMENT D.9. STORAGE OF BULK MATERIALS D.14. COMMERCIAL CHEMICAL PRODUCTS D.15. SITE CONTAMINANTS, CHEMICAL WASTES
4. ONSITE CHANGES, UNFORSEEN HAZARDS, THA "ADJUSTMENTS" (Recognized During Mobilization/Execution of Field Work)		
Date:	Notes:	
Date:	Notes:	

C.2. SAFETY EQUIPMENT LIST (Gear to be brought to the worksite by Geosyntec personnel, or availability at the worksite confirmed)

Site-Specific Notes, Clarifications:			
<input checked="" type="checkbox"/>	WEATHER, CLIMATE, SEASONAL	<input checked="" type="checkbox"/> Project-provided drinking water <input checked="" type="checkbox"/> Canopy for shade, weather protection <input type="checkbox"/> Other:	<input checked="" type="checkbox"/> Sunscreen <input type="checkbox"/> Ice creepers (boot attachments) <input type="checkbox"/> Rock salt, traction sand <input type="checkbox"/> Portable heater (electric or kerosene)
<input checked="" type="checkbox"/>	HYGIENE PROVISIONS	<input type="checkbox"/> Hand washing equipment (soap & wash water) <input type="checkbox"/> Other:	<input checked="" type="checkbox"/> Hand sanitizer, disinfectant supplies <input checked="" type="checkbox"/> Sanitary facility, porta-toilet
<input checked="" type="checkbox"/>	BASIC PPE	<input checked="" type="checkbox"/> Standard work clothes appropriate for task <input checked="" type="checkbox"/> Hard-toed boots/shoes <input checked="" type="checkbox"/> Hardhat	<input checked="" type="checkbox"/> Safety glasses <input checked="" type="checkbox"/> Work gloves appropriate for task <input checked="" type="checkbox"/> Noise/hearing protection <input checked="" type="checkbox"/> High-visibility/reflective vest/apparel <input type="checkbox"/> Nuisance dust mask (voluntary use)
<input checked="" type="checkbox"/>	BIOLOGICAL HAZARDS	<input type="checkbox"/> Insect/tick repellent--DEET, picaridin, other <input type="checkbox"/> Permethrin-treated work clothing <input type="checkbox"/> Pant-leg "blousing"/gaiters (tick safe) <input type="checkbox"/> Tick removal kit <input type="checkbox"/> Wasp/hornet spray, insect fogging device, other <input type="checkbox"/> Poison ivy protection (Ivy Block skin cream, Tecnu skin wash) <input type="checkbox"/> Other:	<input type="checkbox"/> Animal warning device (for bears/cougars/wolves/large animals) <input type="checkbox"/> Snake chaps/gaiters, bite/scratch-resistant gloves, other protective gear for animal hazards <input checked="" type="checkbox"/> Hand sanitizer, hand washing supplies, personal hygiene supplies for infectious hazard control <input type="checkbox"/> Disinfectant solution and related supplies to mitigate source of infectious hazard <input type="checkbox"/> Masks, face covers, gloves, barriers, related gear to mitigate infectious hazard transmission
<input checked="" type="checkbox"/>	SPECIAL HAZARD CONTROLS	<input type="checkbox"/> Portable GFCI(s) for shock protection <input type="checkbox"/> Electrical-hazard-rated boots, gloves <input type="checkbox"/> Arc-resistant (AR) protection PPE for arc flash <input type="checkbox"/> Flame-resistant (FR) clothing <input checked="" type="checkbox"/> Work-area delineation supplies <input type="checkbox"/> Other:	<input type="checkbox"/> Lockout/tagout equipment <input type="checkbox"/> Portable lighting <input type="checkbox"/> Tripod/winch <input type="checkbox"/> Ventilation equipment (fan, blower) <input checked="" type="checkbox"/> Traffic control devices <input type="checkbox"/> Personal fall protection apparatus <input type="checkbox"/> Personal flotation device <input type="checkbox"/> Ring buoy & rope <input type="checkbox"/> Marine survival suit
<input checked="" type="checkbox"/>	CHEMICAL PPE and CHEMICAL SAFETY GEAR	<input checked="" type="checkbox"/> Goggles and/or face shield <input checked="" type="checkbox"/> Chemical protective gloves <input type="checkbox"/> Coveralls (Tyvek, or other) <input type="checkbox"/> Outer boots, boot covers <input type="checkbox"/> Air monitoring equipment, worker exposure monitoring device(s): <input type="checkbox"/> Other:	<input type="checkbox"/> Disposable N95 respirator <input type="checkbox"/> Half-face respirator (APR), cartridges <input type="checkbox"/> Full-face respirator (APR), cartridges <input type="checkbox"/> Exclusion Zone delineation supplies <input checked="" type="checkbox"/> Decon solution, related supplies <input checked="" type="checkbox"/> Receptacle for disposable PPE <input type="checkbox"/> Chemical hazard emergency gear – listed in "EMERGENCY EQUIPMENT" below
<input checked="" type="checkbox"/>	EMERGENCY EQUIPMENT	<input type="checkbox"/> Air horn, alarm, alerting equipment <input type="checkbox"/> 2-Way radios; other communication device <input checked="" type="checkbox"/> First aid kit(s) – onsite and/or in vehicles <input checked="" type="checkbox"/> Fire extinguisher – onsite and/or in vehicles <input type="checkbox"/> Other:	<input checked="" type="checkbox"/> Eyewash bottle(s) <input type="checkbox"/> 15-min. eyewash station <input type="checkbox"/> Emergency deluge shower <input type="checkbox"/> Chemical spill kit/supplies Vehicle emergency preparedness: <input checked="" type="checkbox"/> Fire extinguisher, first aid kit <input checked="" type="checkbox"/> Flares, lights, reflective device <input checked="" type="checkbox"/> Roadside assistance service

PART D – HAZARD ANALYSIS AND CONTROLS (Site-Specific Safety Analysis & Information)

D.1. “BASELINE” HAZARD PREPAREDNESS (This section applicable to ALL Tasks, covering natural hazards, driving/travel, basic safety & PPE)

a. Weather/Climature/Altitude Hazards

- Heat stress** – Prevent heat-related illness; At ambient temps > 80°F (27°C) use **Geo HeatTracker** to assess hazard, implement mitigations accordingly.
- Cold stress** – Prevent frostbite, hypothermia; multiple clothing layers, keep clothing dry, protect exposed skin, stay hydrated, frequent warming breaks.
- Sunburn, conjunctivitis** – Sun blocker, shade canopy, wide-brimmed hat, long sleeves/pants; protect eyes from glare near water/snow/sand
- Extreme weather** – Track weather, emergency plan: ID shelter/refuge, use weather app for lightning prediction at 10 mi./16 Km (use “30/30 rule” as backup).
- Weather-related conditions** – Use appropriate precautions for ice/snow/slippery conditions, flood, mold, soft ground, downed trees/wires, fire hazards, other.
- Acute Mountain Sickness (AMS)/Altitude Illness** – for work to be performed at ≥ 8,000 feet (2,450 meters) above sea level, see [THA Addendum on AMS](#).

Site-Specific Notes:

HSE Program Documents, [HSE SOP-409: Heat Illness Prevention](#), [HSE SOP-410: Cold Stress Prevention](#)

b. Biological Hazards

- Insect/tick/arthropod hazards/vector-borne disease** – Use insect repellent, permethrin-treated clothing/gear, tick checks, tuck pants/shirt, tick removal tool, wasp spray, bug zapper/trap, mosquito netting, fogging, other barriers and protective devices, habitat treatment/removal, as applicable.
- Plant hazards** – Know the hazards (e.g. poison ivy/oak/sumac, giant hogweed, poison hemlock, nettles, etc.), know the precautions for site habitat: barrier ointments, washes; long sleeves/pants, gloves, remove plants (avoid burning), launder work clothes (hot water/detergent), clean tools (alcohol or soap/water).
- Animal hazards** – Know the hazards/precautions for work site: avoidance, repellents, PPE, warning devices, habitat/food source removal, infection controls.
- Common unsanitary/allergenic hazards** – Use routine hygienic measures/precautions; hand washing/sanitizer, food hygiene, PPE, disinfectant cleaning.
- Infectious/pathogenic** - For site-specific infectious hazards (viral, bacterial, bloodborne pathogens, mold, other), see **D.13 “Infectious/Pathogenic Biohazards.”**

Site-Specific Notes: Plant hazards involve blackberry bushes onsite not poisonous plants

HSE Program Documents: [HSE SOP-408: Biting/Stinging Arthropods and Poisonous Plants](#),

c. Routine Driving Hazards

- Routine work travel** – Use routine safe/defensive driving practices (seat belts, safe speeds, eyes ahead, no tailgating, limit distractions, safe cell phone use, no texting, clear windows, account for weather/road conditions, adequate sleep, other measures as appropriate).
- Unfamiliar location** – Before driving in roadway: view map, note key benchmark locations, plot your route and/or enter destination into navigation device.
- Unfamiliar vehicle** – Before driving in roadway: become familiar with vehicle controls; adjust seat, mirrors, vents, heat/AC, audio, lights, check brakes.
- Fatigue** – Minimize fatigue during long drives: frequent rest breaks, muscle stretches, eat light snacks-avoid heavy meals, stay hydrated, fresh air, no loud music, clean windshield; avoid/minimize long distance driving during your ordinary sleep hours; total *work time* and *drive time* should not exceed 14 hours per day.

Site-Specific Notes:

HSE Program Documents: [HSE SOP-220: Fatigue Management](#), [HSE SOP-605a: Driver Authorization Program](#)

d. General Safety

- General premises hazards** – Prevent slips/trips/falls (resulting from rough terrain, trip hazards, steep slope, slippery surfaces); maintain good housekeeping, be aware of on-site structures, utilities, overhead hazards, uneven/hazardous surfaces, obstacles, onsite traffic, restricted access/workspace.
- Musculoskeletal hazards** – Prevent strains/sprains from strenuous tasks, overexertion, repetitive motion/ergonomic/lifting (seek help/lift-aids over 49 lbs.)
- Worksite traffic hazards** – Implement measures to protect personnel (high-visibility/reflective clothing, on-person lighting, traffic control measures).
- Hazardous energy** – Use caution near electrical equipment/wet locations, machinery/physical hazards, stay out of hazard zone/line-of-fire, don't touch.
- Illumination hazards** – Illuminate work areas and/or access routes, use high-visibility and reflective clothing or on-person lighting, as appropriate.
- Security: high potential for crime/workplace violence/security breach** – Complete a [Risk Assessment for Working in High-Crime, High Security Risk Locations](#)
- Working alone** – Communicate a project-specific lone-work plan to coworkers, including procedures for periodic communication/contact.

Site-Specific Notes:

HSE Program Documents: [HSE SOP-205a: Manual Materials Handling/Back Injury Prevention](#), [HSE SOP-210: General Housekeeping](#), [HSE SOP-401: Lone Working](#), [HSE SOP-403: Management of Traffic](#), [HSE SOP-616: General Safety Rules](#)

e. Basic Personal Protection

- Head protection from overhead hazards** – Wear hardhat or “bump cap” as appropriate for hazard.
- Hand protection** – Wear gloves to protect from physical, chemical and biological hazards; select glove type (or types) specific for the task & hazard(s)
- Eye protection** – Wear safety glasses (with side shield or wrap around, either clear or shaded for sun protection), or other appropriate eye protection.
- Foot protection, rough terrain** – Wear work boots/shoes with hard toes, ankle support, puncture resistance, traction, as appropriate for conditions.
- Hearing protection** – use earplugs or earmuffs (or both) as appropriate for conditions; at a minimum where noise levels exceed 85 dBA.
- Protective clothing/nuisance dust mask** – For general protection against dust, dirt, oily residues, unsanitary conditions, as needed.
- Other personal protective gear** for task(s) covered in this THA is described in respective sections of this THA in Site-Specific Notes & Clarifications

Site-Specific Notes: Face shield for injection tasks

HSE Documents: [HSE STD-125: Personal Protective Equipment Program](#), [HSE STD-130: Respiratory Protection Program](#), [HSE STD-135: Hearing Protection Program](#)

D.2. SPECIAL TRAFFIC / VEHICLE / TRANSPORTATION HAZARDS

Applicable **Not Applicable, Not Anticipated**

(For water-transportation hazards, see D.3. "Water Hazards"; For construction traffic hazards, see D.8. "Construction, Heavy Equipment, Lift Equipment")

Site-Specific Notes & Clarifications: Towing and hauling risks	
<input checked="" type="checkbox"/> THOROUGHFARE TRAFFIC HAZARDS Where the worksite is located in/near vehicle thoroughfare (road, highway, parking lot, etc.). Hazards: Injury to worker and general public from collision involving moving vehicle.	<input checked="" type="checkbox"/> Prepare Management of Traffic (MOT) Plan (address location hazards / client and regulatory requirements). <input checked="" type="checkbox"/> Wear DOT-approved reflective vests where exposed to traffic hazards. <input checked="" type="checkbox"/> Where possible, park vehicles as protective shield from oncoming traffic. <input checked="" type="checkbox"/> Configure work area and support vehicles to minimize worker exposure to traffic hazards. <input checked="" type="checkbox"/> Use DOT signal devices and/or signage to re-route vehicles around work area, site entrances/exits. <input checked="" type="checkbox"/> Use DOT-trained flaggers or police detail where appropriate or required. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-403: Management of Traffic</i></p>
<input checked="" type="checkbox"/> SPECIAL VEHICLE HAZARDS Off-Road Driving or use of non-typical vehicle, heavy vehicle, work truck, van, UTV/ATV Hazards: Worker injury due to vehicle collision, rollover	<input checked="" type="checkbox"/> For off-road driving, do not exceed capability of vehicle, beware of wet conditions, keep speed low, avoid unsafe orientation on slopes. <input type="checkbox"/> UTV/ATV-specific procedures for training, use roll-bar or helmet, operate per manufacturer's instructions. <input type="checkbox"/> Special Skills Required for Vehicle type – For vehicles requiring special skills (such as windowless van, heavy work vehicle, utility vehicle, similar) ensure operator is provided training and/or has appropriate operator skills through experience. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-652a-Utility Vehicles (US-only) (safe operation of mobile equipment)</i></p>
<input checked="" type="checkbox"/> TOWING/HAULING LOADS Hazards: Vehicle accident, occupant injury from shifting load, unsafe equipment, un-roadworthiness of trailer and/or vehicle.	<input checked="" type="checkbox"/> Ensure load within vehicle is firmly secured (rope, straps, load configuration) to prevent shifting during travel. <input checked="" type="checkbox"/> Slings, chains, strap, rope and related equipment used for towing, hauling, load-securing shall be appropriate for use, and used in a manner as to prevent an unsafe condition (generally, bungee cords not appropriate). <input checked="" type="checkbox"/> For trailer use, verify tow-hitch components are compatible, hitch/safety chains secure, signal/braking lights operational, rear-view mirrors effective, tires inflated to proper pressure and tread acceptable.
<input type="checkbox"/> RAILROAD RIGHT-OF-WAY HAZARD Hazards: Struck by train in R.R. right-of-way; electrical shock from third rail or overhead electrical lines	<input type="checkbox"/> Coordinate with rail company or on-site host facility and implement required safety and security measures. <input type="checkbox"/> Site workers shall receive safety training/certification (per railroad owner/operator) for railroad work.
<input type="checkbox"/> AIRPORT HAZARDS (on the ground) Hazard: Injury due to proximity on/near airport runway, flight path.	<input type="checkbox"/> Coordinate safety requirements with airport personnel and implement required safety measures. <input type="checkbox"/> Site workers shall receive safety training/certification (per airport owner/operator) for airport work. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP 628: General Aviation (Small Aircraft) Safety</i></p>
<input type="checkbox"/> LIGHT AIRCRAFT/HELICOPTER USE Hazards: Injury from collision during taxi/take-off/landing, aircraft crash and related general aviation hazards	<input type="checkbox"/> Review certifications/licenses/experience of pilot, airworthiness certificate for aircraft, safety practices of operator, aircraft safety rating, safety equipment/provisions on aircraft. <input type="checkbox"/> Passengers shall adhere to general passenger safety practices, and requirements of owner/operator/pilot. <input type="checkbox"/> For transport of HazMat/Dangerous Goods, see D.17. , "Transport/Shipping of Hazmat/Dangerous Goods" <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-628-General Aviation, Small Aircraft Safety</i></p>
<input type="checkbox"/> USE OF AERIAL "DRONE" Hazards: Airspace interference, collision with ground personnel, general public, infrastructure.	<input type="checkbox"/> For use of aerial drone--a.k.a. <i>small unmanned aerial system (sUAS), remote piloted aircraft (RPA) or unmanned aerial vehicle (UAV)</i> --review/adhere to requirements for regulatory certifications, authorizations & approvals, and pre-mob planning for pre-flight-, in-flight-, and post-flight checks, and unplanned events. <p style="text-align: right;"><i>HSE Program Documents: HSE MAN-003a: Unmanned Aerial Systems Manual (U.S. Only)</i></p>

D.3. WATER HAZARDS (Working Over/On/Near Water, Ash Ponds, Quicksand, Soft Ground) **Applicable** **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input type="checkbox"/> WATER HAZARDS Work/travel in watercraft or on equipment over water or over coal ash impoundment/pond: <input type="checkbox"/> Workboat, barge, over-water structures <input type="checkbox"/> Water transportation <input type="checkbox"/> Hazardous currents (river, tidal/riptide) <input type="checkbox"/> Towing, trailer, roadway <input type="checkbox"/> Other – describe above	<p>General water-safety measures for all work near water:</p> <input type="checkbox"/> Wear regulatory-approved personal flotation device (PFD) where drowning hazard is present. <input type="checkbox"/> Bring emergency rescue and/or signaling equipment (ring buoy and rope, reaching device, flares) <input type="checkbox"/> For fall protection over water, see D.4. "Fall Hazards." <input type="checkbox"/> For electrical hazards associated with water/wet locations, see D.10. "Electrical Work Tasks." <p>Boating-specific:</p> <input type="checkbox"/> Use fuel safety practices, fire extinguisher present in boat. <input type="checkbox"/> Develop/follow float plan, monitor weather, navigate/communicate as planned. <input type="checkbox"/> Confirm navigation/communication equipment operable before heading onto water.

Walking/wading into water, on shoreline, riverbank, dock, bulkhead, abutment, coal ash:

- Wading/walking into/near water, wetland
- Hazardous tidal zone or surf
- Water release, flash flood
- Coal ash pond, quicksand, soft ground
- Open culvert, arroyo, drainage/irrigation ditch
- Ice hazard on or near waterbody

Diving

- Scientific SCUBA diving

Hazards (as applicable):

- Drowning, cold immersion
- Boating collision, navigation, fog, darkness
- Fire/fuel hazards
- Entrapment (mud/silt/coal ash/quicksand)
- Slip/fall hazards – ice, mud, silt, wet surfaces
- Weather, heat/cold stress
- Equipment failure, hypoxia
- Chemical contaminant and/or biological hazard

- For work over very cold water, have immersion survival suit available.
- For tidal, flash flood, dam release hazards, plan/locate work accordingly.
- For towing a boat trailer, see **D.2. “Special Driving/Traffic/Transportation Hazards.”**

Wading in water or walking along shore/bank or on dock/pier/abutment:

- For ice/slip hazards, wear ice creepers, sand work area, use tether, other appropriate measures.
- For work on ice over water, verify safe thickness, have ring buoy & rope available
- For unsure/slippery footing in water, use wading staff, high-traction soles on waders.
- Have lifesaving skiff/boat available in circumstances where other rescue means are inadequate.
- Monitor hazardous tides, weather for flash floods, know water release schedule.

For soft ground, ash ponds, quicksand:

- Wear personal flotation device (PFD), as appropriate for the work task and work environment.
- Bring emergency rescue equipment (ring buoy and rope, reaching device)
- If walking on ash/quicksand, provide stable walking/working surface (4’x8’ plywood, or similar)

For diving:

- Develop a diving safety plan approved by Geosyntec’s diving coordinator

For chemical contaminant and/or biological/infectious hazard:

- See Section(s) **D.1.b.**, “Biological Hazards, **D.13.**, “Infectious/Allergenic Biohazards,” **D.14.**, “Commercial Chemical Products,” and/or **D.15.**, “Site Contaminants, Chemical Wastes”

HSE Program Documents: [HSE SOP-407: Working On/Near Water and Ice](#), [HSE SOP-630: Water Transportation Safety](#), [HSE MAN-005: Underwater Diving Operations Manual](#)

D.4. FALL HAZARDS (Falls to Lower Levels)

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:

<input type="checkbox"/> WORKING AT HEIGHTS (GENERAL) Hazards: <ul style="list-style-type: none"> - Injury from falls onto lower surface or falls into hazardous equipment, chemicals, water - Overhead utilities/obstructions - Impalement hazard (such as from falling onto unprotected rebar and similar surface projections) - Hazard posed to ground personnel from falling tools, equipment, materials 	<p>Fall protection “trigger heights”: Built environment – US & CAN: 4 ft. (1.2 m.); Construction: US: 6 ft., 10 ft. for scaffolds; CAN: 10 ft. (3 m)</p> <p>Protect from <u>primary</u> (fall) hazards:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Restrict access to hazard (barriers, tape, sign) <input type="checkbox"/> Ensure safe access to height (ladder, stair, lift) <input type="checkbox"/> Ensure guardrails/stair-rails/handrails present <input type="checkbox"/> Ensure covers in place over holes <input type="checkbox"/> Use designated “watch person/monitor” <input type="checkbox"/> Use tether or positioning device <input type="checkbox"/> Use personal fall apparatus (PFA) <input type="checkbox"/> Use fall protection net <p>Protect from <u>secondary</u> (collateral) hazards:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Protect site ground personnel from falling objects (restrict access, toe-boards, tether tools) <input type="checkbox"/> Install caps on protruding rebar and similar <input type="checkbox"/> Working over water; see D.3, “Water Hazards” <input type="checkbox"/> Working over hazardous machinery/equipment; see D.6, “Power-Tools/Powered Equipment” <input type="checkbox"/> Overhead electrical; See D.11. “Utility-Related Hazards” <input type="checkbox"/> Working over chemical hazards; See D.14 and/or D.15 for chemical and/or contaminant hazards. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-405: Walking-Working Surfaces Protection, HSE SOP-415a: Fall Protection (North America-only), HSE SOP-434a: Overhead and Underground Utility Hazards (US-only)</i></p>
<input type="checkbox"/> LADDER / STAIRS <ul style="list-style-type: none"> <input type="checkbox"/> Extension/straight ladders <input type="checkbox"/> Step ladders <input type="checkbox"/> Fixed/installed ladders <input type="checkbox"/> Portable/mobile stairs <input type="checkbox"/> Job-made or scaffold stairs Hazards: <ul style="list-style-type: none"> - See general fall hazards, above. 	<p><input type="checkbox"/> Follow safe work practices:</p> <ul style="list-style-type: none"> • Use ladders according to safe practices and manufacturer’s instructions. • Maintain 3 points of contact at all times on ladder; keep center of gravity within side rails. • Do not use metal (conductive) ladder near electrical hazard. • Extension/straight ladders shall be properly footed, secured, angled, extend above upper work surface. • Stepladders are set on level ground or properly shimmed, spreaders locked; do not climb/stand on top step, top cap, or rear non-climbing side; use step ladder of sufficient reach height for work. • Equip stairs with stair handrails where more than 4 steps, and for stairway height of 4’ or more. • Ensure portable stairs are stable, plumb, and of sufficient reach height for task. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-415a: Fall Protection (North America-only), HSE SOP-638: Ladders and Stairways</i></p>
<input type="checkbox"/> SCAFFOLD <ul style="list-style-type: none"> <input type="checkbox"/> Supported scaffold <input type="checkbox"/> Suspended scaffold <input type="checkbox"/> Free-standing/mobile scaffold Hazards: <ul style="list-style-type: none"> - See general fall hazards, above - Equipment collapse 	<p><input type="checkbox"/> Follow safe work practices:</p> <ul style="list-style-type: none"> • Identify/coordinate operations with the scaffold “Competent Person.” • Supported scaffold level, stable, proper attachments, tiebacks, planking, • Suspended scaffolds anchored properly. • Guardrails or personal fall apparatus required above 10 feet. • Proper means of accessing scaffold (proper ladders, stair tower); don’t climb scaffold frames. • Total height of free-standing scaffold shall not exceed four times the minimum base dimension. • Don’t exceed load limits, distribute loads evenly, stage materials in quantities sufficient for immediate use. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-648: Scaffolds</i></p>

<input type="checkbox"/> AERIAL BOOM/SCISSOR LIFT Hazards: - See general fall hazards, above - Struck-by, run-over, tip over - Caught between (pinch points) - Fluid leaks/fuel hazards or battery-related hazards	<input type="checkbox"/> <u>Follow safe work practices:</u> <ul style="list-style-type: none"> • Operators shall be trained and certified. • Equipment is inspected after mobilization and is in good condition. • Harness & lanyard worn whenever operating a boom lift (optional for scissors lift). • Overhead hazards and surface obstructions shall be reviewed with operators prior to use. <p>HSE Program Documents: HSE SOP-650: Manlifts and Aerial Lift Platforms (safe operation of mobile equipment)</p>
<input type="checkbox"/> WARNING! Confirmed or possible close proximity to OVERHEAD ELECTRICAL UTILITY LINES.	<input type="checkbox"/> Follow safe work practices per D.11., "Utility-Related Hazards" <p>HSE Program Documents: HSE SOP-434a: Overhead and Underground Utility Hazards (US-only)</p>

D.5. HAND TOOLS (Manual, Hand-Powered)

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input checked="" type="checkbox"/> MANUAL HAND TOOL INJURIES <input checked="" type="checkbox"/> Struck by <input checked="" type="checkbox"/> Pinch points/crushing injuries <input checked="" type="checkbox"/> Puncture <input checked="" type="checkbox"/> Cutting blade/laceration risk <input checked="" type="checkbox"/> Flying objects, eye hazards <input type="checkbox"/> Other, describe above	<input checked="" type="checkbox"/> Proper tool for the job, maintain in good condition, use vise/clamp to hold work piece, proper follow through, Self and nearby personnel shall stay clear of "line of fire," use appropriate work gloves, keep blades sharp, use wrist strap when dropped tool poses a hazard. <input checked="" type="checkbox"/> Utility/folding/collapsible knives and fixed-blade knives/cutting tools are <u>not</u> permitted, unless specifically authorized. Cutting tools with auto-retracting blades, or with enclosed/guarded blades are permitted. Use cut-resistant heavy work gloves, as applicable. <input checked="" type="checkbox"/> Ground surface penetration (hand auger, probe) – requires utility clearance; see D.11. "Utility-Related Hazards" <p>HSE Program Documents: HSE SOP-640: Manual Hand Tools</p>
<input checked="" type="checkbox"/> MUSCULOSKELETAL (MSK) HAZARDS <input checked="" type="checkbox"/> Risk of acute physical MSK trauma (sprains, sprains, soft tissue injuries) <input checked="" type="checkbox"/> Risk of cumulative/chronic MSK trauma, repetitive motion injuries	<input checked="" type="checkbox"/> For tools requiring high exertion (shovel, hand auger, sledgehammer, pickaxe, slide hammer, similar): do stretching exercises to prepare, clear hazard zone, use stable body position, take rest breaks, avoid overexertion. <input checked="" type="checkbox"/> For recognized musculoskeletal hazard, acute or chronic, resulting from unsafe acute exertion, or ergonomic/repetitive motion/cumulative trauma risks, seek advice on controls from Corporate HSE Dept. <p>HSE Program Documents: HSE SOP-205a: Manual Materials Handling/Back Injury Prevention</p>

D.6. POWERED TOOLS & EQUIPMENT (For Drilling & Heavy Equipment, see D.7 & D.8)

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input checked="" type="checkbox"/> Type of powered tools/equipment: <input checked="" type="checkbox"/> "Power tools" <input type="checkbox"/> Powered portable equipment <input checked="" type="checkbox"/> Powered fixed equipment Energy/power source: <input type="checkbox"/> DC battery- or solar-powered <input checked="" type="checkbox"/> AC electric-powered <input checked="" type="checkbox"/> 120V <input checked="" type="checkbox"/> 240V <input type="checkbox"/> 480V <input checked="" type="checkbox"/> Extension/flexible cords <input checked="" type="checkbox"/> Fuel-powered (gas or liquid) <input type="checkbox"/> Pneumatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Gunpowder-actuated Hazards of Power Tools and Powered Equipment: <input checked="" type="checkbox"/> Eye/hand/body injury <input checked="" type="checkbox"/> Point-of-operation hazards <input checked="" type="checkbox"/> Pinch points, moving parts	<input checked="" type="checkbox"/> <u>General safe work practices for operation of powered tools and equipment:</u> <ul style="list-style-type: none"> • Inspect before each use to ensure safe operating condition. • Clear personnel from hazard zone; keep personnel out of the "line-of-fire;" heed warning labels/signage. • Arrange worksite for safe access to equipment and sufficient work area clearance for safe use of tool; confirm no overhead obstructions; ensure adequate illumination. • Secure long hair/loose clothing/hanging jewelry near moving/rotating parts. • Ensure point-of-operation, mechanical power transmission, other moving parts are guarded with protective devices (as applicable); do not override interlocks, guards, protective devices. • Do not make any equipment modifications that create a greater hazard or bypass safety design features. • Use tool/equipment in accordance with manufacturer's use and safety instructions. • Use PPE and/or other safety protections, as appropriate, for eye/hearing/hand/head/body protection. • Provide training or verify operator competency for use of power tool/equipment. • Use ventilation, wet methods, respirators, other applicable means to mitigate inhalation hazard. • Move power cords/pressurized hoses to protect from damage during tool/equipment use. • For spark/heat generating tool/equipment, have fire extinguisher available, remove combustible/flammable materials, or use other means to control fire hazard (e.g. fire watch, fireproof blanket). • Use safe lifting practices and/or lift aids for moving heavy portable equipment, and use safe operating procedures to protect from acute strains/sprains, overexertion, and cumulative trauma injuries. • Implement safe work practices for compressed air, pressurized systems (pneumatic/hydraulic), stored energy. <input checked="" type="checkbox"/> <u>Additional requirements for power tools:</u> <ul style="list-style-type: none"> • Use vise/clamp/work bench or other means to hold/secure a portable/moveable work piece. • Don't carry electrical tools/equipment by the power cord; don't carry pneumatic tools by hoses. • Disconnect tool/equipment from power source before changing bits, blades or making adjustments.

<input checked="" type="checkbox"/> Line-of-fire hazards, struck by <input type="checkbox"/> Fire/explosion, ignition sources <input type="checkbox"/> Burns from hot surfaces, steam <input checked="" type="checkbox"/> Noise <input type="checkbox"/> Inhalation/atmospheric hazards <input type="checkbox"/> Working at heights, falls <input checked="" type="checkbox"/> Overhead obstruction(s) <input checked="" type="checkbox"/> Musculoskeletal hazards <input checked="" type="checkbox"/> Potential (stored) energy <input type="checkbox"/> Illumination	<input checked="" type="checkbox"/> Additional requirements for fixed powered equipment: <ul style="list-style-type: none"> • Implement lockout/tagout controls for repairs/adjustments/tooling changes. • Equip pneumatic hoses with whip checks; ensure factory fittings are used for high-pressure hose connections. <input type="checkbox"/> For climbing/fall hazards associated with large equipment, see D.4. "Fall Hazards." <input checked="" type="checkbox"/> For electrical hazards, see D.10. "Electrical Work Tasks." <input type="checkbox"/> For ground surface penetration, see D.11. "Utility-Related Hazards." <input checked="" type="checkbox"/> For fuel-safety practices, see D.14. "Commercial Chemical Products." <input type="checkbox"/> For air monitoring of atmospheric hazards, see Part E, "Air Monitoring, Worker Exposure Monitoring."
<input type="checkbox"/> WELDING, CUTTING, HOT WORK <input type="checkbox"/> Arc-welding (electrical arc) <input type="checkbox"/> Gas-welding/cutting (fuel gases) Hazards: - UV/IR light-eye/skin burns - hot-work hazards/fire - toxic metal welding fumes - compressed gases (physical hazards, fire, oxygen deficiency) - electrical shock	<input type="checkbox"/> General safe work practices for operators of welding equipment: <ul style="list-style-type: none"> • Hot work permit system shall be implemented. • Operator properly protected (eye protection, clothing, apron, etc.). • Fire hazard controls (watcher, fire extinguisher, water, remove combustibles from work area). • Protect nearby personnel from hazardous UV, IR light (shielding, curtain); see D.16. "Radiation Hazards." <input type="checkbox"/> For welding gas cylinders, secure them upright with caps on when stored or not in use; protect cylinders from damage; NEVER secure gas cylinders to metal welding bench used for electrical arc welding; see D.14. "Commercial Chemical Products." <input type="checkbox"/> For arc welding, follow electrical safe work practices; see D.10. "Electrical Work Tasks." <input type="checkbox"/> For inhalation hazards from welding fumes (toxic metals) and gases (asphyxiant, flammable), see D.14. "Commercial Chemical Products."
<input checked="" type="checkbox"/> PORTABLE ELECTRIC GENERATOR Hazards: - Electrical shock - Carbon monoxide inhalation hazard - Fuel-related fire hazard - Injury from mechanical or lifting hazard - Burns from hot surfaces	<input checked="" type="checkbox"/> Follow general safe work practices for Powered Tools & Equipment (above), and as follows: <ul style="list-style-type: none"> • Use in accordance with manufacturer's instructions, including instructions for grounding the generator. • Keep generator and work area dry. • Never use indoors, or near building air intake vents due to carbon monoxide hazard. • Provide for ventilation and/or air monitoring where hazardous accumulation of exhaust emissions is possible. • Use hearing protection in close proximity to operating generator (where noise level exceeds 85 dBA). • Use power cords/extension cords specified by instructions. • Use ground-fault circuit interrupters (GFCIs) in accordance with manufacturer's instructions; see D.10. "Electrical Work Tasks." • Shut down equipment before refueling; see safe practices for flammable/combustible liquids in D.14. "Commercial Chemical Products."
<input checked="" type="checkbox"/> PNEUMATIC / HYDRAULIC HAZARDS <input type="checkbox"/> Air compressor <input type="checkbox"/> Compressed air system <input checked="" type="checkbox"/> High-pressure liquid <input type="checkbox"/> Pressurized steam (For compressed gas cylinders, see D.14. "Commercial Chemical Products")	<input checked="" type="checkbox"/> Never direct outlet nozzle toward body; use guards, restraints, engineering controls as appropriate. <input type="checkbox"/> Never use compressed air for cleaning clothes you are wearing. <input type="checkbox"/> If compressed air is used for cleaning, restrict pressure to 30 psi or below, equip nozzle with chip guard. <input checked="" type="checkbox"/> Use PPE for eye (goggles or face shield)/hand/head/hearing/skin protection, as appropriate for the hazard. <input checked="" type="checkbox"/> Ensure tank, hoses, fittings are in good repair using factory fittings, equipped with whip-checks. <input checked="" type="checkbox"/> If pressure relief device poses a hazard to workers, reconfigure or shield device or restrict access by workers.
<input type="checkbox"/> PORTABLE HEATER <input type="checkbox"/> electric <input type="checkbox"/> fuel-powered Hazards: - Shock (electrical) - Carbon monoxide emissions and fuel-related fire hazards (fueled) - Fires/burns from hot surfaces.	<input type="checkbox"/> Follow general safety practices for Operation of Equipment/Machinery (above), and as follows: <ul style="list-style-type: none"> • Keep heater dry and locate heater on level surface away from high traffic areas to prevent tipping. • Never use fuel-powered heaters indoors, or near air intake vents, due to carbon monoxide hazard. • Provide ventilation and/or air monitoring where hazardous accumulation of exhaust emissions is possible. • Keep combustible materials at least 3 feet from hot surfaces. • Plug electric heaters directly into wall outlet (don't use extension cord or power strip). • For electric heaters, see D.10., "Electrical Work Tasks." • Shut down fuel-powered equipment before refueling; see safe practices for flammable/combustible liquids and/or compressed gases in D.14. "Commercial Chemical Products."
<input type="checkbox"/> LOCKOUT/TAGOUT (LO/TO) OF HAZARDOUS ENERGY To prevent unplanned equipment start-up or release of energy when under maintenance/repair.	<input type="checkbox"/> Prepare site-specific written LO/TO <i>program</i> , and equipment-specific written LO/TO <i>procedures</i> (as applicable); implement control procedures for hazardous energy sources, provide locks/tags, train workers, designate "authorized" personnel, notify "affected" personnel.
<p>HSE Program Documents: HSE STD-125: Personal Protective Equipment Program, HSE STD-135: Hearing Protection Program, HSE STD-150: Globally Harmonized System for Hazard Communication (for fuel), HSE SOP-460: Field Site Exposure Monitoring, HSE SOP-452a: Lock-out/Tag-out (North America-only), HSE SOP-454a: General Electrical Safety (US-only), HSE SOP-642: Powered Hand Tools; HSE SOP-654: Welding, Cutting and Other Hot Work</p>	

D.7. DRILLING (Test Boring, Direct Push, Construction Drilling)

Applicable Not Applicable, Not Anticipated

Site-Specific Notes & Clarifications:

<input type="checkbox"/> DRILLING & DIRECT PUSH Includes hazards posed by drilling rig and associated equipment, heavy support vehicles, trailer/towing hazards, and similar mobile equipment. Hazards: <ul style="list-style-type: none"> - Struck-by equipment - Run over, roll-over - Caught between (pinch points) - Manual lifting, musculoskeletal - Fuel/fluid leaks, fuel hazards - Suspended equipment - Roadway hazards. 	<input type="checkbox"/> <u>Follow safe work practices, as applicable:</u> <ul style="list-style-type: none"> • Non-drilling personnel shall stay clear of drilling work zone when drill rig in operation. • Equipment shall be maintained in good repair, inspected daily upon mobilization; backup alarms and emergency stop operational, machine guards in place, whip checks on high pressure lines. • Leaks or defective safety equipment will be repaired before use. • Establish eye contact with operator and use hand signals prior to approaching the rig. • Use PPE near operating rig (eye/head/hearing/hand/foot protection, high visibility vests or equivalent). • Arrange personal/support vehicles to protect drill team and not obstruct travel lanes or other operations. • Operators/helpers must maintain safe distance from moving parts; secure loose hair/clothing, equipment. • Drill rigs will only be moved with masts lowered. • Maximum safe slope for rig will be followed, drill rig leveled, appropriate blocking/cribbing as needed. • Use safe practices for fuel handling/storage/transport; spill equipment available for fuel/fluid leaks. • Ventilate exhaust and conduct air monitoring, as appropriate, when drilling indoors. • Never climb drill mast without appropriate fall protection. • Use precautions for overhead and underground utilities
<input type="checkbox"/> MECHANICAL LIFTING, RIGGING Applies to lifting truck-mounted boom rig (e.g., drill rig), and all other drilling-related mechanical/electrical hoist equipment. Hazards: <ul style="list-style-type: none"> - Mechanical hazards - Elevated loads 	<input type="checkbox"/> <u>In addition to general drilling & direct push safety practices (above), as applicable:</u> <ul style="list-style-type: none"> • Slings, chains, rope, wire rope, as well as sheaves, boom, and attachments used for lifting/hoisting shall be maintained in good condition, inspected daily, and used/stored in a manner as to protect from damage. • Do not exceed loading limits of lifting equipment; perform work in accordance with equipment load chart. • Hooks will be equipped with safety latches. • Ensure anchor points for winch or other lift device are engineered for intended use. • Ensure personnel are not positioned beneath elevated loads.
<input type="checkbox"/> WARNING! Confirmed or possible close proximity to OVERHEAD or UNDERGROUND UTILITIES.	<input type="checkbox"/> Follow safe work practices per D.11. "Utility-Related Hazards."
HSE Program Documents: HSE SOP-430: Drilling Activities , SOP-434a: Overhead and Underground Utility Hazards (US-only) , HSE SOP-644: Working Around Heavy Equipment ,	

D.8. CONSTRUCTION, HEAVY EQUIPMENT, LIFT EQUIPMENT

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input checked="" type="checkbox"/> WORKING NEAR MOBILE HEAVY EQUIPMENT, ON-SITE VEHICLES Hazards: <ul style="list-style-type: none"> - Struck-by - Caught between - Run over, roll over - Overhead hazards/obstructions - Elevated loads 	<input checked="" type="checkbox"/> <u>For personnel on-foot/on-the-ground near operating heavy equipment, follow safe work practices:</u> <ul style="list-style-type: none"> • High visibility vests for all personnel in construction vehicle work area, on-site roadways and travel lanes. • Maintain unobstructed vision: wear shaded eyewear only in bright sun; don't wear hoods. • Erect barriers and post signs to identify and isolate the equipment hazard zone, if possible. • Stay out of swing radius of equipment, both in front and operating end, as well as at the back of equipment. • Stay out of the travel path of operating heavy equipment. • When crossing vehicle pathway behind moving equipment, cross at a distance not less than 30 feet. • When approaching equipment, always be able to see operator so he/she can see you. • Make eye contact with operator and use hand signals or make radio contact prior to approaching equipment. • Operator shall provide "all off" hand signal when it is safe to approach within swing radius of equipment.
<input type="checkbox"/> OPERATION OF MOBILE HEAVY EQUIPMENT Hazards: <ul style="list-style-type: none"> - Struck-by - Run over, roll over - Caught between (pinch points) - Fluid leaks/fuel-/fire-hazards - Overhead hazards/obstructions - Potential for body entrapment/crushing - Rotating equipment, moving parts. 	<input type="checkbox"/> <u>Operators shall follow safe work practices for operation of heavy equipment:</u> <ul style="list-style-type: none"> • Only trained/qualified persons allowed to operate heavy equipment. • Wear seat belts; roll-over protection system present/deployed; do not exceed maximum safe slope. • No passengers on moving/operating equipment except where passenger seat/restraint is present. • Equipment inspected daily upon mobilization; maintained in good repair, backup alarms, windows clear. • Leaks or defective safety equipment should be repaired before use; fire extinguisher present. • Maintain eye contact with ground personnel and use hand signals to direct their approach near equipment. • High visibility vests for all personnel in construction vehicle work area, on-site roadways and travel lanes. • Cease operation if personnel enter swing radius, travel path or hazard zone of moving parts, elevated loads. • Use safe practices for fuel handling/storage/transport; spill equipment available for fuel/fluid leaks. • Equipment locked, secured, brakes set, buckets/forks lowered, extendable parts retracted, when not in use. • Shut down/lock out equipment to prevent crush situation beneath or between moving parts of equipment. • Ensure personal/support vehicles are parked/located to not obstruct equipment travel lanes/operating zones. • Mark temporary roadways clearly, provide berms/stops where needed. <p style="text-align: center;">HSE Program Documents: HSE SOP-644: Working Around Heavy Equipment</p>
<input type="checkbox"/> TRENCHING/EXCAVATION Hazards: <ul style="list-style-type: none"> - Cave-in, entrapment - Hazardous atmosphere - Water accumulation - Falls into excavations 	<input type="checkbox"/> <u>Safe work practices when personnel will enter trenches/excavations:</u> <ul style="list-style-type: none"> • Activities under supervision/oversight of Competent Person, conduct daily inspection of excavation. • Excavated materials placed at least 2' from trench sidewall. • Prevent water accumulation in trench. • Sloping & shoring for trenches/excavations >20' deep must be approved by a Professional Engineer. • Sloping/shoring/trench box for excavations >5' when persons enter trench/excavation.

	<ul style="list-style-type: none"> - Utility-related hazards - Undermining structures & foundations 	<ul style="list-style-type: none"> • Sloping/shoring/trench box for shallow (<5') trench/excavation with cave-in hazard. • Workers in trenches shall be within 25 feet of ladder or sloped entryway. • Excavations shall be protected by perimeter fencing (not barricade tape), if potential for personnel to fall into. • If potential for atmospheric hazard, see D.12. "Confined/Enclosed Spaces" <p>HSE Program Documents: HSE SOP-432: Excavation and Trenching Activities</p>
<input checked="" type="checkbox"/>	FORKLIFT Hazards: <ul style="list-style-type: none"> - Struck-by - Run over/roll over/tip over - Overhead utilities/obstructions - Caught between (pinch points) - Unstable/falling loads - Elevated forks - Fluid leaks 	<input checked="" type="checkbox"/> <u>In addition to general safety practices for heavy equipment (above), as applicable:</u> <ul style="list-style-type: none"> • Qualified operator, per established forklift training (certificate is required); Geosyntec operator must be approved by Director of Health and Safety. • Equipment inspected daily and documented on Forklift Preoperational Inspection Checklist. • Do not exceed lifting load limits. • Forklift shall not be moved/driven with empty forks in raised position. • When not in use, forks lowered, brake set, controls in neutral, key removed. <p>HSE Program Documents: HSE SOP-436: Safe Operation of Forklifts and Mobile Equipment</p>
<input type="checkbox"/>	AERIAL BOOM/SCISSOR LIFT Hazards: <ul style="list-style-type: none"> - Falls from basket - Overhead utilities/obstructions - Struck-by, run over, tip over - Caught between (pinch points) - Tip over - Fluid leaks. 	<input type="checkbox"/> <u>Follow safe work practices:</u> <ul style="list-style-type: none"> • Operators shall be appropriately trained and certified. • Equipment is inspected after mobilization and is in good condition. • Harness & lanyard worn when operating a boom lift (optional for scissor lift). • Overhead hazards and surface obstructions shall be reviewed with operators/riders prior to use. <p>HSE Program Documents: HSE SOP-650: Manlifts and Aerial Lift Platforms (safe operation of mobile equipment)</p>
<input type="checkbox"/>	CRANES Hazards: <ul style="list-style-type: none"> - electrocution by overhead utility - injury in swing radius - injury from falling load - crane tipping over due to overbalancing, high winds, unstable ground, unsafe slope, bad placement of outriggers - injury from mechanical hazards 	<input type="checkbox"/> <u>In addition to general safety practices for Operation of Heavy Equipment (above), as applicable:</u> <ul style="list-style-type: none"> • Only qualified persons operate cranes (certificate required). • Critical Lift Plan & Checklist prepared/executed (See Procedure) prior to mobilization. • Equipment shall be inspected prior to mobilization and daily by crane operator. • Crane operator will remain at the controls at all times during operation. • Crane operation must be performed under the direction of an appointed signal person at all times using hand signals and/or voice/radio communication. • Crane shall be level and stable (solid ground or crane mats/timbers, outriggers if present, cribbing); over-reaching or exceeding load limits is prohibited. • Keep area beneath suspended loads clear of personnel; tag lines used to maneuver load. • Rigging procedures – see Mechanical Lifts with Rigging, below.
<input type="checkbox"/>	MECHANICAL LIFTS WITH RIGGING Applies to lifting by rigging attached to crane, truck-mounted boom rig (e.g. drill rig), heavy equipment, mechanical/electrical hoist, similar equipment. Hazards: <ul style="list-style-type: none"> - Mechanical hazards, - Elevated loads 	<input type="checkbox"/> <u>In addition to general safety practices for Operation of Heavy Equipment and Cranes (above), as applicable:</u> <ul style="list-style-type: none"> • Slings, chains, rope, wire rope, as well as sheaves, boom and attachments used for lifting/hoisting shall be maintained in good condition, inspected daily, and used/stored in a manner as to protect from damage. • Coordinate lifting operations with competent person. • Do not exceed loading limits of lifting equipment; perform work in accordance with equipment load chart. • Hooks will be equipped with safety latches. • Ensure anchor points for winch or other lift device (such as davit arm) are engineered for intended use. • Ensure personnel are not positioned beneath elevated loads and that tag lines are used where appropriate.
<input checked="" type="checkbox"/>	WARNING! Confirmed or possible close proximity to OVERHEAD or UNDERGROUND UTILITIES.	<input checked="" type="checkbox"/> Follow safe work practices per D.11. "Utility-Related Hazards" <p>HSE Program Documents: HSE SOP-434a: Overhead and Underground Utility Hazards (US-only)</p>
<input type="checkbox"/>	DEMOLITION	<input type="checkbox"/> Develop/implement a demolition safety plan.
<input type="checkbox"/>	BLASTING, UNEXPLODED ORDNANCE	<input type="checkbox"/> Develop/implement safety plan for blasting, unexploded ordnance, as applicable. <p>HSE Program Documents: HSE SOP-622: Blasting & Use of Explosives</p>
<input checked="" type="checkbox"/>	PUBLIC AT RISK, SITE SECURITY	<input checked="" type="checkbox"/> During site operations protect public (overhead protection, fencing, barriers, warning signs). <input checked="" type="checkbox"/> During off hours, protect public with fencing, barriers, warning signs/lights, other measures as appropriate. <input checked="" type="checkbox"/> Lock/secure hazardous materials and/or equipment.

D.9. STORAGE/HANDLING OF BULK MATERIALS (for *Chemical* Storage, see D.14 & 15) **Applicable** **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:

<input checked="" type="checkbox"/>	BULK STORAGE HAZARDS: Collapse/movement of stacked/stored bags, blocks, containers, pipe, boxes, equipment, and similar. <input type="checkbox"/> Stack/pallet/rack/shelf <input type="checkbox"/> CONEX-box storage, or similar	<input checked="" type="checkbox"/> Store materials in stable manner (stacked, racked, blocked, interlocked, tied, wrapped, or otherwise secured) to prevent tipping, sliding, rolling, falling or collapse. <input checked="" type="checkbox"/> Do not exceed load limits and ensure storage structure is stable, robust, secure for intended load. <input checked="" type="checkbox"/> Ensure stored materials do not block aisles, passageways, electrical panels, emergency equipment, emergency access/egress routes, vehicle routes.
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<input checked="" type="checkbox"/>	LIFTING/MANUAL MATERIAL HANDLING HAZARDS	<input checked="" type="checkbox"/> During manual handling of materials and equipment, use safe lifting practices and/or lift aids; do stretches and use safe postures to protect from acute strains/sprains, overexertion, and cumulative trauma injuries. HSE Program Documents: HSE SOP-205a: Manual Materials Handling/Back Injury Prevention
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D.10. ELECTRICAL WORK TASKS

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:		
<input checked="" type="checkbox"/>	USE OF BATTERIES, BATTERY-POWERED EQUIPMENT <50 V, OR OTHER DC EQUIPMENT < 50 V Potential fire hazard (if terminals are shorted), eye/skin hazards (when electrolyte is replenished), inhalation hazard in enclosed spaces.	<input checked="" type="checkbox"/> Follow safe work practices to control hazards of voltage, shock, arcing, overheating, hazardous gases, irritant electrolytes, secondary hazards. <input checked="" type="checkbox"/> Prevent short-circuiting of terminals when battery is in use (segregated from tools, metal objects) and during transport (use battery transport container or install guard/cover on positive terminal). <input type="checkbox"/> For batteries requiring replenishment of electrolyte, use PPE for eye and skin protection, and have eyewash equipment at hand; see discussion of <i>acids/caustics/corrosives</i> in D.14. “Commercial Chemical Products.”
<input checked="" type="checkbox"/>	“NORMAL OPERATION” OF ELECTRICAL EQUIPMENT CONNECTED TO AC OR DC POWER SOURCE ≥ 50 V: Electrically powered tools, equipment, machinery, extension cords, portable generators, working near electrical equipment. Hazards: – Electrical shock – Fire Hazard – Secondary hazards (falls, other injuries).	<input checked="" type="checkbox"/> <u>Follow “normal operation” requirements:</u> <ul style="list-style-type: none"> • All electrical enclosures/guards/covers must be in place/closed/secured. • Electrical equipment maintained per codes/standards/manufacturer’s recommendations. • Ensure no indication of damage or impending failure (heat, smoke, buzzing, odors, arcing, melting). • Operate equipment in accordance with manufacturer’s standard operating procedures. <input checked="" type="checkbox"/> <u>Follow general electrical safety work practices to minimize shock hazard and secondary hazards:</u> <ul style="list-style-type: none"> • Control water-related/wet-location hazards in a manner appropriate for the job tasks/equipment/tool. • Never touch electrical equipment if you are wet or standing/kneeling in water or on wet surfaces. • Use extension cords/power cords properly, rated for use conditions and current draw, prevent damage. • Inspect tool/equipment/extension cords/power cords before each use; remove from use if damaged. • Use GFCI-protected outlet or portable GFCI in wet/moist locations, outdoors, basements, concrete floors. • Do not enter any space delineated by an electrical approach boundary.
<input type="checkbox"/>	HANDS-ON DIAGNOSTICS/REPAIR ON CIRCUIT(S) CONNECTED TO POWER SOURCE < 50 V: <input type="checkbox"/> AC <input type="checkbox"/> DC <input type="checkbox"/> Battery and/or solar power <input type="checkbox"/> Capacitor(s) <input type="checkbox"/> Stray voltage from soil electrodes	<input type="checkbox"/> <u>Implement electrical safe work practices pertaining to:</u> <ul style="list-style-type: none"> • Workers trained appropriately for the task. • Shock prevention measures. • Eye/skin protection for arcing hazards. • Protection from secondary hazards.
<input type="checkbox"/>	WORK WITHIN “APPROACH BOUNDARY” OF EXPOSED, ENERGIZED (OR POTENTIALLY ENERGIZED) CONDUCTORS AND/OR CIRCUIT PARTS CONNECTED TO POWER SOURCE 50-600 V*: <input type="checkbox"/> AC <input type="checkbox"/> DC <input type="checkbox"/> 3-phase <input type="checkbox"/> Battery and/or solar power <input type="checkbox"/> Capacitor(s) <input type="checkbox"/> Induced voltage <input type="checkbox"/> Stray voltage ≥50V from soil electrodes * Working on >600 V not permitted for Geosyntec personnel	<input type="checkbox"/> <u>Prepare project-specific written “Electrical Safety Program” addressing (at a minimum):</u> <ul style="list-style-type: none"> • Workers trained/designated as “Qualified Electrical Workers” per NFPA 70E (US)/CSA Z462 (CAN) • Assess risks of electrical shock (voltage levels and sources), arc flash hazard and secondary hazards. • Affix electrical hazard warning label to electrical enclosure(s) to be accessed. • Physically delineate arc flash- or limited approach boundary, whichever is farthest from hazard source. • Only “qualified” workers allowed within approach boundaries; prevent entry by non-qualified personnel. • Establish electrically safe working condition; work on live circuits prohibited (except for diagnostic testing). • Use PPE for shock/arc flash protection, as required. • Use other safe procedures/equipment required for the task, such as lockout/tagout.
<input type="checkbox"/>	LOCKOUT/TAGOUT (LO/TO) OF ELECTRICAL ENERGY To prevent unplanned start-up or release of energy when equipment is under maintenance/repair.	<input type="checkbox"/> Prepare site-specific written LO/TO <i>program</i> , and equipment-specific written LO/TO <i>procedures</i> (as applicable); implement control procedures for hazardous energy sources, provide locks/tags, train workers, designate “authorized” personnel, notify “affected” personnel.
<input checked="" type="checkbox"/>	WARNING! Confirmed or possible close proximity to OVERHEAD ELECTRICAL UTILITY LINES.	<input checked="" type="checkbox"/> Follow safe work practices per D.11. “Utility-Related Hazards.”
HSE Program Documents: HSE SOP-434a: Overhead and Underground Utility Hazards (US-only) , HSE SOP-452a: Lock-out/Tag-out (North America-only) HSE SOP-454a: General Electrical Safety (US-only)		

D.11. UTILITY-RELATED HAZARDS

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:		
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<input checked="" type="checkbox"/>	OVERHEAD, ABOVE-GROUND UTILITIES	<input checked="" type="checkbox"/> Do not cross approach boundaries with personnel or equipment; employ other appropriate precautions for the conditions (specify above). <input checked="" type="checkbox"/> Use additional controls, as applicable: shielding, flagging, observer/monitor, or, <input type="checkbox"/> Arrange for power company/utility owner to de-energize power line.
<input type="checkbox"/>	UNDERGROUND UTILITIES	<input type="checkbox"/> Confirm appropriate underground utility clearance procedures have been completed prior to ground penetrations, and employ other utility clearance/locator practices, as appropriate for conditions. <input type="checkbox"/> Hand digging/augering or vacuum post-holing within 3' of utility locations or other high-risk condition.

HSE Program Documents: [HSE SOP-434a: Overhead and Underground Utility Hazards \(US-only\)](#)

D.12. CONFINED / ENCLOSED SPACES (Including Hazardous Indoor Spaces) **Applicable** **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input type="checkbox"/> Type of CONFINED/ENCLOSED/HAZARDOUS INDOOR Workspace: <input type="checkbox"/> Indoors (occupied) <input type="checkbox"/> Indoors (abandoned, vacant) <input type="checkbox"/> Basement, crawl space, attic <input type="checkbox"/> Tunnel, shaft, inspection gallery <input type="checkbox"/> Storage bin, locker <input type="checkbox"/> Culvert, catch basin, sewer <input type="checkbox"/> Well vault, utility vault, manhole <input type="checkbox"/> Tank, vessel, silo, vat, hopper <input type="checkbox"/> Trench, excavation <input type="checkbox"/> Machine/equipment pit <input type="checkbox"/> Transportation container, railcar <input type="checkbox"/> Other – describe above Confirmed or potential hazards: <input type="checkbox"/> Flammable/explosive <input type="checkbox"/> Oxygen deficiency <input type="checkbox"/> Hydrogen sulfide <input type="checkbox"/> VOCs <input type="checkbox"/> Carbon monoxide <input type="checkbox"/> Combustible dust <input type="checkbox"/> Combustion/exhaust emissions <input type="checkbox"/> Welding/cutting fumes <input type="checkbox"/> Electrical <input type="checkbox"/> Mechanical equipment <input type="checkbox"/> Entrap, engulf, drowning <input type="checkbox"/> Building-related hazards <input type="checkbox"/> Other – describe above	REQUIREMENTS: 1. Contact Corp. HSE Department will determine applicability of confined space entry regulations, and to determine safe work practices for entry into any confined, enclosed or hazardous indoor spaces. 2. Classify the work task by checking one of the following: <input type="checkbox"/> CONFINED SPACE classified by regulatory authority as a “Permit-Required Confined Space” or otherwise specifically-regulated as a confined space in the worksite’s geographic jurisdiction. <input type="checkbox"/> CONFINED/ENCLOSED/INDOOR space NOT specifically regulated as a Confined Space; develop site-specific entry procedure per applicable regulatory and Geosyntec safety requirements. 3. Delineate tasks, hazards and controls associated with the work in Section C.1. “Summary of Tasks, Hazards and Controls,” and in applicable sections in Parts C, D and E of this THA; incorporate or attach applicable safety provisions such as, but not limited to, the following: <ul style="list-style-type: none"> • Risk assessment; entry plan, entry permit system/safety checklist. • Air monitoring for atmospheric hazards. • Entry roles (supervisor, entrant, attendant), buddy system, regulatory training requirement. • Protect non-entry personnel from unauthorized entry (labels, signage, barriers) • Ingress/egress (stairway, ramp, ladder, tripod/winch, harness/lifeline, etc.). • Communication/alerting/rescue/emergency plan. • Entry hazard controls: <ul style="list-style-type: none"> - Isolate, clean, purge, inert, lockout/tagout, fire prevention. - <i>Dilution</i> ventilation to introduce fresh air - <i>Exhaust</i> ventilation to control point source of emissions. - Use duct/stack to direct hazardous emissions away from work area. - Respiratory protection. - Use PPE and safety gear to protect from chemical/physical/biological hazards. - Fall protection. - Traffic control.

HSE Program Documents: [HSE STD-125: Personal Protective Equipment Program](#), [HSE STD-130: Respiratory Protection Program](#), [HSE SOP-412a: Confined Space Entry Operations \(US-only\)](#), [HSE SOP-460: Field Site Exposure Monitoring](#)

D.13. INFECTIOUS / PATHOGENIC BIOHAZARDS **Applicable** **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:	
<input checked="" type="checkbox"/> HAZARD TYPE: <input type="checkbox"/> Contagious respiratory illness <input type="checkbox"/> Vector-borne infectious risk <input type="checkbox"/> Wastewater, sewer, landfill <input checked="" type="checkbox"/> Animal/human waste <input type="checkbox"/> Wildlife contact, infectious risk <input type="checkbox"/> Mold, fungi, valley fever <input type="checkbox"/> Bloodborne pathogens <input checked="" type="checkbox"/> Discarded syringes <input checked="" type="checkbox"/> Medical waste <input type="checkbox"/> Other (describe above)	<input type="checkbox"/> Follow internal guidance for mitigating airborne respiratory illness transmission (as applicable). <input type="checkbox"/> Implement vector-protective measures (see also Section D.1.b., “Biological Hazards”) <input type="checkbox"/> Use “Standard/Universal Precautions” as applicable to mitigate exposures to infectious/pathogenic hazards. <input checked="" type="checkbox"/> Low hazard – use basic hygiene: onsite hand washing (soap & water preferred) and protective apparel/PPE. <input checked="" type="checkbox"/> Med/high hazard – added PPE (gloves/barriers/respirator/dust mask), decon, remediation, as appropriate. <input type="checkbox"/> For bloodborne human pathogens follow Bloodborne Pathogen Program and Standard/Universal Precautions. <input type="checkbox"/> Contact HR Dept. for project-specific immunization (e.g. tetanus/diphtheria/pertussis [Tdap], hepatitis A/B). <input type="checkbox"/> Implement remedial actions to mitigate infectious hazard source (remove syringes, clean up unsanitary waste/debris, decon/disinfect surfaces, etc.) as appropriate for the scope/scale of work. <p style="text-align: right;"><i>HSE Program Documents: HSE SOP-240: Mitigating Respiratory Illness Transmission in the Workplace, HSE SOP-408: Biting/Stinging Arthropods and Poisonous Plants, HSE SOP-612a: Bloodborne Pathogens (US-only)</i></p>

D.14. COMMERCIAL CHEMICAL PRODUCTS (per HAZCOM or WHMIS) **Applicable** **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:
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<input type="checkbox"/>	PRODUCTS REGULATED BY HAZCOM¹ (US) or WHMIS² (CAN)	<input type="checkbox"/> Safety Data Sheets (SDSs) available, either on site or readily available within same work shift, containers labelled properly, workers trained/oriented on hazards. <input type="checkbox"/> For subcontractor/contractor use of chemical products, confirm SDS availability for affected onsite workers.
¹ OSHA Hazard Communication Standard (United States); ² Workplace Hazardous Material Information System (Canada)		
<input checked="" type="checkbox"/>	GENERAL SAFE WORK PRACTICES FOR FIELD USE OF CHEMICALS	<input checked="" type="checkbox"/> Consult SDS for HSE hazards, symptoms of exposure; ensure workers have been apprised of safe practices. <input checked="" type="checkbox"/> Handle with care, maintain good housekeeping, provide adequate illumination in work area. <input checked="" type="checkbox"/> Pour/dispense/transfer liquid chemicals on stable work surface. <input checked="" type="checkbox"/> Use chemicals in well-ventilated area; use fans/blowers/exhaust for active ventilation, as appropriate. <input checked="" type="checkbox"/> Have eyewash bottles, eyewash station, deluge capabilities, commensurate for the hazard, readily available. <input checked="" type="checkbox"/> Have spill/neutralization equipment, appropriate for the chemicals, readily available. <input type="checkbox"/> Conduct air monitoring as appropriate; see Part E, "Air Monitoring, Worker Exposure Monitoring."
<input checked="" type="checkbox"/>	STORAGE/TRANSPORT OF CHEMICALS/HAZMAT <input checked="" type="checkbox"/> Non-Emergency (Routine) Chemical Storage Risk of personal contact and/or incidental release <input type="checkbox"/> HAZMAT Transport <input type="checkbox"/> Risk of Emergency Spill/Release <input type="checkbox"/> CFTAS (Chemical Facility Anti-Terrorism Standards) Applicability: On-site overnight storage of non-waste chemical product at quantity ≥ 25 gal(115L) or ≥ 250 lbs. (115 kg)	<input checked="" type="checkbox"/> Transport chemicals only in sealed containers, secured to prevent shifting/breakage during travel. <input checked="" type="checkbox"/> Store chemicals only in sealed containers; overnight storage in squirt/spray bottles prohibited. <input checked="" type="checkbox"/> Store flammable/combustible liquids in chemical storage cabinets, or other appropriate storage arrangement. <input type="checkbox"/> For liquids, provide secondary containment during storage. <input type="checkbox"/> Segregate incompatible chemicals during storage. <input checked="" type="checkbox"/> For <i>incidental release/spill</i> ; maintain spill kit suitable for low flammability/toxicity/quantity/volatility release. <input type="checkbox"/> DOT/TDG/IATA-Regulated transport: see D.17. "Hazmat/Dangerous Goods Shipping/ Transportation." <input type="checkbox"/> For <i>emergency spills</i> : describe spill/release hazard and response plan/procedure above, and indicate emergency response contact in Part B, "Emergency Response and First Aid." <input type="checkbox"/> Locate emergency gear (eyewash, fire extinguisher, spill kit, safety signage) near storage area, as applicable. <input type="checkbox"/> For CFTAS-applicable chemical storage, a safety and chemical management plan must be prepared and reviewed by a HSE Professional before bringing material to the site. (Does not apply to materials brought on to the site for daily work purposes and transported away at the end of each day)
<input type="checkbox"/>	COMPRESSED GAS CYLINDERS <input type="checkbox"/> Flammable <input type="checkbox"/> Non-flammable <input type="checkbox"/> Toxic <input type="checkbox"/> Asphyxiant <input type="checkbox"/> Oxygen	<input type="checkbox"/> Secure cylinders upright, caps on when not in use. <input type="checkbox"/> Handle with care; use and store cylinders in a manner and location to prevent damage. <input type="checkbox"/> Propane cylinders not in use <u>must be stored outdoors</u> in a cage or similar secure ventilated enclosure. <input type="checkbox"/> Ensure acetylene cylinders are NOT secured to steel arc welding bench. <input type="checkbox"/> Segregate oxygen and fuel gases by distance (20') or fire-rated barrier. <input type="checkbox"/> Control ignition sources. <input type="checkbox"/> "No smoking" signage at cylinder storage area for flammable gases.
<input type="checkbox"/>	FLAMMABLE/COMBUSTIBLE LIQUIDS	<input type="checkbox"/> Use proper fuel safety can (metal fuel container with self-closing spout and flame arrestor preferred). <input type="checkbox"/> Control/remove ignition sources near storage and use areas. <input type="checkbox"/> Grounding and bonding where appropriate. <input type="checkbox"/> Ensure a Type B or ABC fire extinguisher is readily available.
<input type="checkbox"/>	ACIDS, CAUSTICS, OTHER CORROSIVES	<input type="checkbox"/> Use appropriate protection for eyes/face (goggles/face shield) and skin (gloves, sleeves, apron). <input type="checkbox"/> Use eyewash, deluge shower, drench hose, hand washing (with water), as appropriate. <input type="checkbox"/> For severe eye hazards (due to high corrosivity, large quantity), 15-min. eyewash required.
<input type="checkbox"/>	TOXIC	<input type="checkbox"/> For toxic substances, use/store in a manner to control exposure hazards (inhalation, ingestion, skin contact, skin absorption); use active ventilation and/or PPE as appropriate.
<input checked="" type="checkbox"/>	EMISSIONS FROM FUEL COMBUSTION, HOT PROCESSES <input checked="" type="checkbox"/> Gasoline <input checked="" type="checkbox"/> Diesel <input type="checkbox"/> Propane/Natural Gas <input type="checkbox"/> Welding/cutting/hot work <input type="checkbox"/> Vehicle/equipment exhaust <input type="checkbox"/> Other	<input checked="" type="checkbox"/> Position outdoor personnel upwind of exhaust source. <input checked="" type="checkbox"/> Avoid "idling" of equipment when not in use. <input type="checkbox"/> Use <i>passive ventilation</i> (air infiltration/air currents) to disperse atmospheric hazards in breathing zone. <input type="checkbox"/> Use <i>dilution ventilation</i> (blowers/fans) to provide fresh air to work area and dissipate atmospheric hazards. <input type="checkbox"/> Use <i>exhaust ventilation</i> (hood/duct/exhaust stack/blower) to capture/divert exhaust from work area. <input type="checkbox"/> Use respiratory protection for high levels of smoke, exhaust particulates, soot. <input type="checkbox"/> Conduct air monitoring as appropriate; see Part E, "Air Monitoring, Worker Exposure Monitoring."
<input type="checkbox"/>	OTHER HAZARDS	<input type="checkbox"/> Describe other hazardous substances and safety measures under "Site-Specific Notes & Clarifications," above.
HSE Program Documents: HSE STD-125: Personal Protective Equipment Program , HSE STD-130: Respiratory Protection Program HSE STD-145: Safety Training Program , HSE STD-150: Globally Harmonized System for Hazard Communication , HSE SOP-460: Field Site Exposure Monitoring		

D.15. SITE CONTAMINANTS, CHEMICAL WASTES

Applicable **Not Applicable, Not Anticipated**

Site-Specific Notes & Clarifications:

CHECK ALL THAT APPLY. Provide site-specific notes/clarifications above.

<input checked="" type="checkbox"/> Soil/groundwater contaminants (historical release)	<input type="checkbox"/> Explosive dust	<input type="checkbox"/> Potential for flammable gas (methane)
<input type="checkbox"/> Recent release, known high concentrations	<input type="checkbox"/> Oxygen deficiency	<input type="checkbox"/> Corrosive, acids/caustics, strong irritants
<input type="checkbox"/> Former chemical disposal site, landfill	<input checked="" type="checkbox"/> Chlorinated volatile organic compounds (VOCs)	<input type="checkbox"/> Asbestos abatement work

<input type="checkbox"/> Urban fill, residual contaminants <input type="checkbox"/> Containerized waste (drums, process equipment) <input type="checkbox"/> Buried drums (known or potential) <input type="checkbox"/> Large containers, potential for spills <input type="checkbox"/> Contaminated building surfaces <input type="checkbox"/> Unexploded ordnance	<input checked="" type="checkbox"/> BTEX, petroleum derived VOCs <input checked="" type="checkbox"/> Fuel oils, petroleum, waste oil, lubricants <input type="checkbox"/> Metals, metal compounds, metal dusts <input type="checkbox"/> Elemental mercury <input type="checkbox"/> Polyaromatic hydrocarbons (PAHs) <input type="checkbox"/> Potential for flammable vapors	<input type="checkbox"/> Pesticides, herbicides, fungicides <input type="checkbox"/> Sensitizers <input type="checkbox"/> Radioactive contaminants <input type="checkbox"/> Controlled substances, drugs <input type="checkbox"/> Wildfire smoke, see THA Addendum <input type="checkbox"/> Other - describe above
NOTE: For sites with one or more "high-risk contaminants" (below) designated/recognized as a <i>contaminant of concern</i> , or <i>exceeding an environmental reporting threshold</i> , or representing a <i>potential exceedance of an action level or exposure limit</i> , the THA must be reviewed by the HSE Dept. before initiating the work:		
<input type="checkbox"/> Asbestos <input type="checkbox"/> Arsenic/arsenic compounds <input checked="" type="checkbox"/> Benzene <input type="checkbox"/> Beryllium <input type="checkbox"/> Cadmium	<input type="checkbox"/> Chromium VI (hexavalent chromium) <input type="checkbox"/> Crystalline Silica (airborne) <input type="checkbox"/> Dioxins <input type="checkbox"/> Mercury <input type="checkbox"/> Hydrogen Cyanide (HCN)	<input type="checkbox"/> Lead <input type="checkbox"/> Methylene chloride <input type="checkbox"/> Polychlorinated biphenyls (PCBs) <input checked="" type="checkbox"/> Vinyl chloride
<input checked="" type="checkbox"/> FOR WORK CONSISTING OF CLEANUP OPERATIONS, CORRECTIVE ACTIONS, PRELIMINARY INVESTIGATIONS at an "UNCONTROLLED HAZ. WASTE SITE" (per HAZWOPER, 29 CFR 1910.120 or equivalent), delineate procedures in "Site-Specific Notes and Clarifications" (or attachments) addressing the following, as applicable to the work: <ul style="list-style-type: none"> - Workers attend pre-work orientation on hazards, risks, onsite safety measures, emergency contingencies. - Implement site control plan - delineate Exclusion Zone(s), Contaminant Reduction Zone(s), Support Zone (aka EZ, CRZ, SZ). - Include site map/figure depicting work locations and other relevant site-specific information. - Site workers in EZ or CRZ shall have 40-hour HAZWOPER training, current 8-hour refresher, 3 days supervised field experience. - Site supervisor(s) shall have 8-hour Supervisor training. - Site workers in EZ or CRZ shall participate in medical monitoring program, as applicable. - Implement site-specific procedures for worker protection via engineering controls, work practices, personal protective equipment (PPE), air monitoring, decontamination procedures, spill containment, emergency preparedness and response. - Conduct air monitoring, as appropriate; see Part E, "Air Monitoring, Worker Exposure Monitoring." - PPE program: Specify Levels of Protection and specific PPE to be used for applicable tasks; <ul style="list-style-type: none"> o Level D: No respirator, no chemical protective clothing, standard work clothes, basic PPE; (COVID-19 face covers allowed) o Modified Level D: No respirator, chemical protective clothing as appropriate; (COVID-19 face covers allowed) o Level C: Air-purifying respirator, chemical protective clothing as appropriate; consult with Corp. HSE Dept. required. o Level B: Air-supplied respirator, chemical protective clothing/suit as appropriate; consult with Corp. HSE Dept. required. o Level A: Fully encapsulating suit, self-contained breathing apparatus (SCBA); Level A prohibited for Geosyntec personnel. 		
<input type="checkbox"/> FOR SITE WITH CHEMICAL CONTAMINANTS OR WASTE BUT NOT REGULATED BY HAZWOPER <ul style="list-style-type: none"> - Workers shall be knowledgeable/aware of chemical hazards thru safety training/orientation and availability of hazard information. - Implement controls to minimize worker exposure through engineering controls, work practices, PPE, decon, as appropriate. - Evaluate worker exposure via air monitoring/sampling, as applicable; see Part E, "Air Monitoring, Worker Exposure Monitoring." 		
<input checked="" type="checkbox"/> STORAGE/TRANSPORT OF IDW* Spill/Release Risk: <input checked="" type="checkbox"/> Risk of <i>incidental spill/release</i> <input type="checkbox"/> Risk of <i>emergency spill/release</i> <i>* Investigation-Derived Waste</i>	<input type="checkbox"/> Describe site-specific procedures above for spill containment, container handling, as applicable. <input checked="" type="checkbox"/> For liquids, provide secondary containment during storage. <input type="checkbox"/> Segregate incompatible chemicals during storage. <input type="checkbox"/> Locate emergency gear (eyewash, fire extinguisher, spill kit, safety signage) near storage area, as applicable. <input checked="" type="checkbox"/> For <i>incidental spills</i> ; spill kit on-site for low-hazard releases (low-flammability/toxicity/quantity/volatility) <input type="checkbox"/> For <i>emergency spills</i> : describe spill/release hazard and response plan/procedure above, and indicate Emergency response contact in Part B, "Emergency Response and First Aid." <input type="checkbox"/> DOT/TDG/IATA-Regulated transport: see D.17. "Hazmat/Dangerous Goods Shipping/Transportation."	
<input type="checkbox"/> OFF-SITE MIGRATION OF AIRBORNE CONTAMINANTS	<input type="checkbox"/> Implement controls to minimize hazard migration (dust suppression, covers, foam, etc.). <input type="checkbox"/> Community/perimeter air monitoring will be conducted per perimeter air monitoring plan; see E.3 "Fence Line/Perimeter Air Monitoring."	
<p style="text-align: center;">HSE Program Documents: HSE STD-120: Occupational Medical Management Program, HSE STD-125: Personal Protective Equipment Program, HSE STD-130: Respiratory Protection Program, HSE STD-145: Safety Training Program, HSE STD-150: Globally Harmonized System for Hazard Communication, HSE SOP-301a: Contaminated Site Investigation & Remediation (US-only), HSE SOP-460: Field Site Exposure Monitoring, HSE SOP-634: Drum Sampling, HSE SOP-636: Handling of Uncharacterized Hazardous Waste Containers, THA Addendum on Wildfire Smoke</p>		

D.16. RADIATION HAZARDS (Other than Sunlight)

Applicable Not Applicable, Not Anticipated

D.17. SHIPPING/TRANSPORTATION HAZMAT/DANGEROUS GOODS

Applicable Not Applicable, Not Anticipated

MODE(S) OF TRANSPORT:	<input type="checkbox"/> Road	<input type="checkbox"/> Rail	<input type="checkbox"/> Air	<input type="checkbox"/> Sea	<input type="checkbox"/> Inland Waterway	<input type="checkbox"/> International
IMPORTANT: Ensure that each individual who will be involved in shipping/transportation of hazardous material is current with required training (awareness, function-specific, safety, security) in accordance with applicable regulatory authority (DOT, FAA, IATA, TDG), and ensure adherence to applicable regulations. <p style="text-align: right;">HSE Program Documents: HSE SOP-235a: Hazardous Materials Shipping (US-only)</p>						
Site-Specific Notes & Clarifications:						



PART E – AIR MONITORING, WORKER EXPOSURE MONITORING

E.1. AIR MONITORING

Applicable Not Applicable, Not Anticipated

Site-Specific Notes, Clarifications:		
AIR-TESTING PARAMETERS - Select site-specific testing parameters; list associated equipment in Part C.2, Safety Equipment List.		
<input type="checkbox"/> VOCs <input type="checkbox"/> PID (Photoionization detector): X eV <input type="checkbox"/> FID (Flame ionization detector) <input type="checkbox"/> Colorimetric indicator tubes – describe above	<input type="checkbox"/> O ₂ (Oxygen) – 4 gas meter/GEM <input type="checkbox"/> LEL (Lower Explosive Level) - LEL meter <input type="checkbox"/> H ₂ S (Hydrogen Sulfide) – H ₂ S detector <input type="checkbox"/> CO (Carbon monoxide) – CO detector	<input type="checkbox"/> Particulates - total dust meter <input type="checkbox"/> % Methane – 4 gas meter/GEM <input type="checkbox"/> Calibration kit for each parameter <input type="checkbox"/> Other: CO ₂ (Carbon dioxide) – 4 gas meter/GEM
SUBSTANCE-SPECIFIC (PRE-SET) ACTION LEVELS - Sustained breathing zone action levels (sustained general work-area levels for LEL).		
<input type="checkbox"/> O ₂ (Oxygen)	19.5-23%	Acceptable to continue work without O ₂ -focused respiratory protection.
	<19.5%	STOP WORK, ventilate to raise O ₂ to >19.5% for re-entry. For persistent hazard, contact Corp. HSE Dept.
	>23.0%	STOP WORK, ventilate to lower O ₂ to <23% for re-entry. For persistent hazard, contact Corp. HSE Dept.
<input type="checkbox"/> LEL (Lower Explosive Limit)	IMPORTANT:	Confirm sufficient oxygen is present (min. 8-12%) to ensure accurate LEL readings.
	<10% LEL	Acceptable to continue working in work area; continue to monitor LEL.
	≥10% LEL	STOP WORK. Implement controls (reposition workers, ventilate, contain/eliminate source, etc.); resume work ONLY when LEL readings are <10%, sustained.
<input type="checkbox"/> H ₂ S (Hydrogen Sulfide)	< 1 ppm	Acceptable to continue work without H ₂ S-focused respiratory protection.
	1-10 ppm	Implement controls (reposition workers, ventilate, contain/eliminate source, scheduling, etc.) to limit exposures to <1ppm, or use APR* with VOC/acid-gas cartridges (yellow); do not exceed MUC* for respirator type; confirm acceptability of respirator usage with HSE Dept.
	> 10 ppm	Implement controls (reposition workers, ventilate, contain/eliminate source, scheduling, etc.) to limit exposures to <10ppm (with respirator), or <1ppm (without respirator). For persistent levels >10 ppm, STOP WORK, contact task lead, PM or HSE Dept.
<input type="checkbox"/> CO (Carbon Monoxide)	< 25 ppm	Acceptable to continue work without CO-focused respiratory protection.
	≥ 25 ppm	Implement controls (reposition workers, ventilate, contain/eliminate source, scheduling, etc.) to limit exposures to <25ppm. For persistent levels >25ppm, STOP WORK, contact PM and/or HSE Dept.
<input type="checkbox"/> WILDFIRE SMOKE (AQI for PM 2.5)	≤150	In this Air Quality Index (AQI) range, it's acceptable to continue work without respiratory protection.
	151-500	Voluntary use of N95 respirator is appropriate.
	>500	STOP WORK, or use APR* with approval of HSE Dept.
<input type="checkbox"/> <OTHER>		
SITE-DERIVED ACTION LEVELS – Sustained breathing zone action levels; derived based on site contaminants; REVIEW WITH CORP. HSE DEPT. REQUIRED.		
<input type="checkbox"/> VOCs (Volatile Organic Compounds)	< X ppm	Acceptable to continue work without VOC-focused respiratory protection.
	> “ ppm	Implement controls (reposition workers, ventilation, containment, eliminate source, etc.) to lower VOC exposures to less than specified action level, or use APR* with approval of Corp. HSE Dept.
	X to X ppm	Use APR* with VOC cartridges (yellow or black); do not exceed MUC** for respirator type; confirm procedures for respirator usage with HSE Dept.
	> X ppm	STOP WORK. Implement controls, for persistent levels greater than action contact PM and/or HSE Dept.
<input type="checkbox"/> AIRBORNE DUST (Total Particulates)	< X mg/m ³	Acceptable to continue work without particulate-focused respiratory protection.
	> “ mg/m ³	Implement controls (water spray, reposition workers, ventilation, containment, etc.) to lower dust levels to less than specified action level, or use APR* with approval of HSE Dept.
	X to X mg/m ³	Use APR* with particulate cartridges appropriate for the hazard; do not exceed MUC** for respirator type; confirm procedures for respirator usage with HSE Dept.
	> mg/m ³	STOP WORK. Implement controls. For persistent levels greater than action level, contact PM and/or Corp HSE Dept.
<input type="checkbox"/> <OTHER>		
* Air-purifying respirator ** Maximum use concentration		
HSE Program Documents: HSE SOP-460: Field Site Exposure Monitoring , HSE SOP-464: Lead Exposure Control , HSE SOP-466: Hydrogen Sulfide Exposure Control , Wildfire Smoke THA Addendum		

E.2. OTHER WORKER EXPOSURE MONITORING / SAMPLING

Applicable Not Applicable, Not Anticipated

<input type="checkbox"/> Heat/Cold Stress Testing/Monitoring <input type="checkbox"/> Air Sampling (sample collection, passive dosimeter) <input type="checkbox"/> Wipe/Bulk Sampling (to evaluate worker exposure)	<input type="checkbox"/> Wildfire Smoke – Tracking AQI (Air Quality Index) <input type="checkbox"/> Ionizing or Non-ionizing Radiation Testing <input type="checkbox"/> Noise Testing	<input type="checkbox"/> <Other> <input type="checkbox"/> <Other>
Site-Specific Notes, Clarifications:		
HSE Program Documents: HSE STD-135: Hearing Protection Program , HSE STD-140: Radiation Safety Program , HSE SOP-230: Ionizing and Non-ionizing Radiation Protection , HSE SOP-409: Heat Illness Prevention , HSE SOP-410: Cold Stress Prevention , HSE SOP-462: Asbestos Exposure Control , HSE SOP-464: Lead Exposure Control		

E.3. FENCELINE / PERIMETER AIR MONITORING

Applicable Not Applicable, Not Anticipated

Fence line/perimeter air monitoring to be conducted in accordance with a separate "Perimeter Air Monitoring Plan" for this work; results from fence line/perimeter air monitoring shall NOT be used as the sole basis for determining work zone atmospheric hazards.

Site-Specific Notes, Clarifications:

PART F – APPROVALS, ACKNOWLEDGEMENTS

F.1. THA PREPARATION, REVIEW/APPROVAL SIGNATURES A THA is typically prepared by project staff, often with input from an HSC, with review/approval, at a minimum, by PM and/or Field Lead. Corporate HSE staff must be consulted as required or otherwise deemed appropriate*.

PREPARER(S)	Printed Name	Signature	Date
	David Mackay		6/4/25
THA REVIEWED/ APPROVED BY: (Project Manager or PM- Designee, at a minimum)**	Printed Name	Signature	Date

* At a minimum, Corp. HSE **must** review/approve the THA review when Geosyntec staff will encounter "high hazards/high risks," or perform critical tasks, such as (but not limited to):

- Work at heights >10', use personal fall apparatus
- Work at height near overhead electrical utility lines
- Operate a UTV/ATV, aerial lift or fork-lift
- Tow a trailer on roadway
- Oversee a hot-work permit system
- Enter a hazardous confined/enclosed space
- Use of unmanned aerial vehicle (drone)
- High-risk ergonomic/musculoskeletal hazard
- Implement lockout/tagout controls
- Enter a trench/excavation >5' deep
- Function as a construction "Competent Person"
- Operate a pneumatic or powder-actuated tool
- "Qualified" Electrical testing & maintenance >50 V
- High risk, non-typical infectious/pathogenic hazard
- Derive action levels for VOCs or toxic dusts
- Instrument monitoring for critical exposure risks
- Wear a respirator
- Presence of "high-risk" contaminant(s)
- Sustained exposure to wildfire smoke AQI_{PM2.5} >150
- Exposure to radioactive isotopes (α, β, γ)
- High-risk exposure to: non-ionizing (microwave, EMF, UV, IR) or ionizing (radio-isotope, x-ray) radiation.
- Onsite risk of emergency chemical spill
- Applicability of Chemical Anti-Terrorism Standards

Corporate HSE **must** also be consulted when Geosyntec subcontractors (under Geosyntec's oversight) perform high hazard/high risk work (such as demolition, blasting, crane critical lifts, confined space entry, testing/maintenance of electrical systems, lockout/tagout, HAZWOPER cleanup activities). Consultation with Corp. HSE is encouraged for all questions/concerns regarding worker safety, regulatory compliance, risk/liability aspects, or project-specific safety requirements.

** It is recommended that THAs be approved/signed by both the PM and Field Lead (or alternate PM designee), unless due to small scope/scale or routine nature of task, or staff unavailability, only one approval is deemed sufficient by PM. Additional review and approval will be performed by Corp. HSE for high-hazard/high-risk tasks, or as otherwise requested.

HSE Program Documents: For more information, see "HSE STD-105, Project Safety Management Handbook".

F.2. GEOSYNTEC FIELD CREW ACKNOWLEDGEMENTS

Please sign below to acknowledge you reviewed and understand this THA, participated in project safety briefing and had an opportunity to ask questions about the information herein.

Printed Name	Signature	Employee No.	Date

F.3. SUBCONTRACTOR'S FIELD CREW ACKNOWLEDGEMENTS

Applicable Not Applicable

Please sign below to acknowledge this THA was made available to you, and you had an opportunity to ask questions about the information herein.

Printed Name	Signature	Company Name	Date

ATTACHMENTS:

Attachment A – Route to Hospital

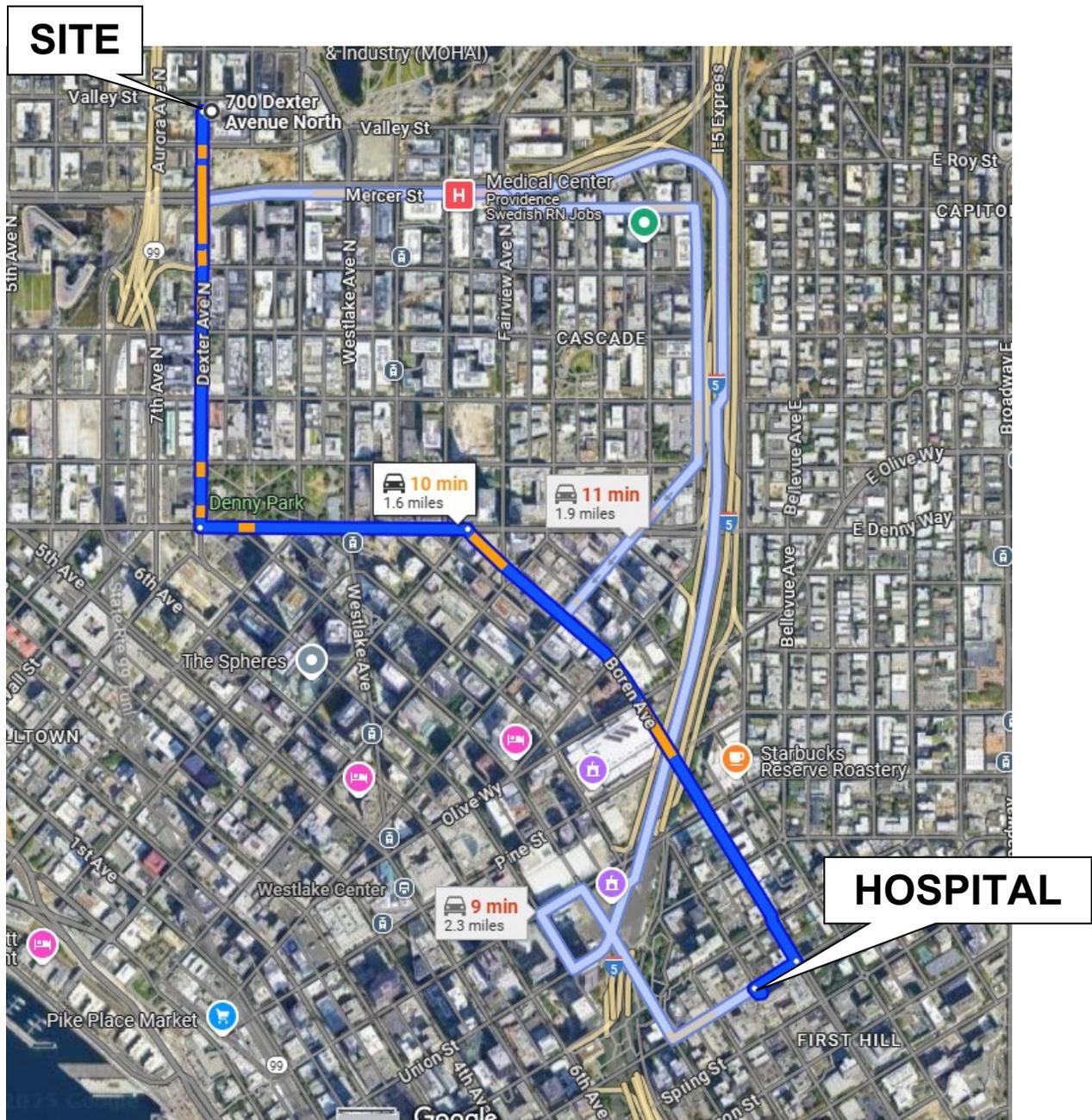
Attachment A – ROUTE TO HOSPITAL EMERGENCY ROOM

Hospital Name: Virginia Mason Medical Center

Address: 1100 9th Ave, Seattle, WA 98101

Phone Number: (206)624-1144

Driving Directions to Local Hospital: Head south on Dexter Ave N toward Roy St (0.5 mi), Turn left onto Denny Wy (0.3 mi), Slight right onto Boren Ave (0.7 mi), Turn right onto Seneca St (331 ft), Turn left, destination will be on the right (69 ft).



HSE Event Response and Notification

CHOOSE THE BEST PATH!



* 911 in North America; 112 in EU; 999 & 112 both applicable in UK; 000 in Australia; for other country- or site-specific numbers, see your Written Safety Plan or Office Emergency Plan
 ** First response actions by site/project team should always be in accordance with general-duty obligations, on-site roles, and training qualifications
 *** Employees may initiate a call for medical triage/support if no call-back received from HSE within 60 minutes of Event Notification, or if HSE is not available directly by phone. For the medical support contact in your location (*WorkCare in North America; location-specific elsewhere*) see your Written Safety Plan or Office Emergency Plan, as applicable

If you have questions or concerns about any workplace health and safety matter, please contact a member of your Corporate HSE Team for assistance:	Global HSE Director Bob Poll M: +1 813-240-9231	Multinational Region Jason Ford M: +1 226-220-3401	South Region Ersin Yalcin M: +1 404-435-4722	West Region Madison McLaughlin M: +1 351-990-2888	Kasey Shaw Australia M: +61 7 3173 1714
	HSE Programs Professional Andrew Thomas M: +1 508-649-3254	Canada Dean Zapishny M: +1 519-494-3031	Central Region Tony Schwegmann M: +1 309-634-5276	Kristoffer Lindo Europe M: +46 708 68 70 23	GEOSYNTEC FAMILY OF COMPANIES HSE Health, Safety, and Environment

Appendix C: Summary of Chemical Hazards

Chlorinated Solvents/Volatile Organic Compounds (VOCs)

Chlorinated VOCs are widely used as solvents in industrial operations such as degreasing, manufacturing, cleaning and dry cleaning, and are also present in household products and automotive fluids. They readily form vapors which can accumulate in indoor air spaces (i.e., via migration through the subsurface) and react with ozone to form sub-micron sized particles with the potential to cause adverse respiratory health effects. Free product releases (via surface or subsurface discharges or inadequate disposal) can migrate downward to significant depths and through fine-grained deposits to groundwater and can persist as wide-scale sources of vapor plumes for long periods of time.

Several cVOCs have been identified in soil, soil vapor, and groundwater at the site including tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cisDCE), trans-1,2-DCE, and vinyl chloride. The likely routes of exposure to chlorinated solvents include inhalation, ingestion and direct contact with the skin or eye. The toxicity of chlorinated solvents varies; many affect the CNS, and some are identified as carcinogens. PCE can affect the CNS and cause irritation of the skin, eyes, and upper respiratory tract. TCE can depress the CNS, affect kidneys, liver, and lungs and can cause rapid and irregular heartbeat. Toxic effects are increased when combined with alcohol, caffeine, and other drugs. These chlorinated solvents are not considered flammable and are only slightly soluble in water.

Exposure levels will be maintained below OSHA PEL or NIOSH REL as shown in the table below.

Chemical Name	PEL¹	REL²
PCE	100	Ca
TCE	100	Ca
cDCE	200	Ca
tDCE	200	Ca
VC	1	Ca

¹ OSHA Permissible Exposure Limit (PEL) in parts per million

² ACGIH Threshold Limit Value (TLV) in parts per million

Ca = Carcinogenic

Petroleum Hydrocarbons

Petroleum hydrocarbons likely at the site include tar and/or fuel-related materials in soils and sediments. Gasoline, diesel, oil, and heavier hydrocarbons, such as grease, may be present. Volatile components of gasoline include benzene, toluene, ethylbenzene, and xylenes (BTEX).

The primary exposure routes for petroleum hydrocarbons during site activities are inhalation, dermal contact, and ingestion of contaminated soil, sediment, dust, or water. Lighter petroleum hydrocarbons such as gasoline and benzene readily volatilize and are primarily an inhalation concern, whereas the primary route of exposure to heavier petroleum hydrocarbons such as aromatic hydrocarbons, oil, and grease is dermal contact. The target organs primarily affected by prolonged exposure to petroleum hydrocarbons are the respiratory system, central nervous system, kidneys, liver, and skin. Prolonged dermal contact with petroleum hydrocarbons can cause irritation or dermatitis. The BTEX compounds are known or suspected human carcinogens.

Petroleum hydrocarbons such as gasoline are also flammable and can be a physical hazard when present in high concentrations. Combustion of petroleum hydrocarbons can produce carbon dioxide, carbon monoxide, aldehydes, fumes, smoke (particulate matter) and other products of incomplete combustion. Intentional and inadvertent combustion of petroleum hydrocarbons is not expected during sampling activities; however, personnel will evacuate the area should a fire occur. The table below summarizes BTEX exposure limits.

Chemical Name	PEL ¹	TLV ²
Benzene	1	0.5
Toluene	100	50
Ethylbenzene	100	100
Xylene	100	100

¹ OSHA Permissible Exposure Limit (in parts per million)

² ACGIH Threshold Limit Value (in parts per million)

Appendix D: Air Monitoring

Applies to Task: Not Applicable

<input type="checkbox"/> <i>Photoionization Detector (PID)</i> Brand/Model No.: _____ eV: _____ Monitoring Frequency: _____	<input type="checkbox"/> <i>Oxygen (O₂) Meter</i> Brand/Model No.: _____ Monitoring Frequency: _____	<input type="checkbox"/> <i>Explosimeter</i> Brand/Model No.: _____ Monitoring Frequency: _____																														
<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%;">Breathing Zone Reading (ppm)</th> <th style="width: 75%;">Action</th> </tr> <tr> <td>_____ to _____</td> <td>Level D PPE</td> </tr> <tr> <td>_____ to _____</td> <td>Level C PPE</td> </tr> <tr> <td>Greater than _____</td> <td>Stop work. Evacuate the area. If upon return, levels still exceed the action level, stop work and implement engineering controls.</td> </tr> <tr> <td colspan="2">Note: _____</td> </tr> </table>	Breathing Zone Reading (ppm)	Action	_____ to _____	Level D PPE	_____ to _____	Level C PPE	Greater than _____	Stop work. Evacuate the area. If upon return, levels still exceed the action level, stop work and implement engineering controls.	Note: _____		<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%;">Reading (%)</th> <th style="width: 75%;">Action</th> </tr> <tr> <td>Less than 19.5</td> <td>Stop work. Evacuate the area.</td> </tr> <tr> <td>19.5 to 23.5</td> <td>Continue to work with caution.</td> </tr> <tr> <td>Greater than 23.5</td> <td>Stop work. Evacuate the area.</td> </tr> <tr> <td colspan="2">Note: _____</td> </tr> </table>	Reading (%)	Action	Less than 19.5	Stop work. Evacuate the area.	19.5 to 23.5	Continue to work with caution.	Greater than 23.5	Stop work. Evacuate the area.	Note: _____		<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%;">Source (% LEL)</th> <th style="width: 75%;">Action</th> </tr> <tr> <td>1 to 10</td> <td>Continue with caution.</td> </tr> <tr> <td>Greater than 10</td> <td>Stop work. Evacuate the area. If upon return, concentration still exceeds 10% LEL, ventilate until concentration is back to <10% LEL.</td> </tr> <tr> <td colspan="2">Note: _____</td> </tr> </table>	Source (% LEL)	Action	1 to 10	Continue with caution.	Greater than 10	Stop work. Evacuate the area. If upon return, concentration still exceeds 10% LEL, ventilate until concentration is back to <10% LEL.	Note: _____			
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Note: _____																																
<input type="checkbox"/> <i>Flame Ionization Detector (FID)</i> Brand/Model No.: _____ Monitoring Frequency: _____	<input type="checkbox"/> <i>Chemical Detector Tube</i> Brand/Model No.: _____ Monitoring Frequency: _____	<input type="checkbox"/> <i>Other</i> Brand/Model No.: _____ Monitoring Frequency: _____																														
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Note: _____																																

Appendix E: Personal Protective Equipment

	Task 1	Task 2	Task 3	Task 4	Task ○	Task ○	Task ○	Task ○
Potential PPE Level per Task:	<input checked="" type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D			
	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C
Modified Level D				Level C				
Equipment	Material/Type			Equipment	Material/Type			
<input checked="" type="checkbox"/> Safety glasses				<input type="checkbox"/> Full-face air-purifying respirator	Cartridge Type:			
<input checked="" type="checkbox"/> Hard-toed boots				<input type="checkbox"/> Half-mask air-purifying respirator	Cartridge Type:			
<input checked="" type="checkbox"/> Protective clothing				<input type="checkbox"/> Safety glasses				
<input checked="" type="checkbox"/> Hard hat*				<input type="checkbox"/> Hard-toed boots				
<input checked="" type="checkbox"/> Hearing protection*				<input type="checkbox"/> Protective clothing				
<input checked="" type="checkbox"/> High-visibility vest*				<input type="checkbox"/> Hard hat				
<input type="checkbox"/> Outer boots*				<input type="checkbox"/> Hearing protection*				
<input checked="" type="checkbox"/> Gloves				<input type="checkbox"/> High-visibility vest*				
<input checked="" type="checkbox"/> Other: Face Shield				<input type="checkbox"/> Outer boots*				
				<input type="checkbox"/> Outer gloves*				
				<input type="checkbox"/> Inner gloves*				
				<input type="checkbox"/> Other:				

* PPE items may be downgraded (only with concurrence of SHSO and PM).

Appendix F: Safety Data Sheets

Included in this HASP	Chemical
<input type="checkbox"/>	Acetone
<input checked="" type="checkbox"/>	Alconox
<input type="checkbox"/>	Ammonia
<input type="checkbox"/>	Bentonite
<input type="checkbox"/>	Diesel Fuel Oil No. 2-D
<input type="checkbox"/>	Gasoline
<input type="checkbox"/>	Helium
<input type="checkbox"/>	Hexane
<input type="checkbox"/>	Hydrochloric Acid
<input type="checkbox"/>	Hydrogen
<input type="checkbox"/>	Isobutylene Calibration Gas
<input type="checkbox"/>	Isopropyl Alcohol
<input type="checkbox"/>	KB-1
<input type="checkbox"/>	Methane Calibration Gas
<input type="checkbox"/>	Nitric Acid
<input type="checkbox"/>	Permanganate
<input type="checkbox"/>	Portland Cement
<input type="checkbox"/>	Sulfuric Acid
<input checked="" type="checkbox"/>	Other: <u>Sodium Lactate</u>
<input checked="" type="checkbox"/>	Other: <u>SRS-SD (EVO)</u>
<input checked="" type="checkbox"/>	Other: <u>SRS-ZVI</u>
<input checked="" type="checkbox"/>	Other: <u>KB-1 Primer</u>

Note: SDSs are for chemicals that used to perform project work, not site contaminants

Effective date: 11 May 2020
Trade Name: Alconox®

Revision: 11 May 2020

I Identification of the substance/mixture and of the supplier

I.1 GHS Product identifier

Trade Name: Alconox®
Product number: 1101, 1103, 1104, 1104-1, 1112, 1112-1, 1125, 1150

I.2 Application of the substance / the mixture: Cleaning material/Detergent

I.2.1 Recommended dilution ratio: 1 – 2% in water

I.3 Details of the supplier of the Safety Data Sheet

Manufacturer:

Alconox Inc.
30 Glenn St
White Plains, NY 10603
(914) 948-4040

Supplier:

Emergency telephone number:

ChemTel Inc
North America: 1-888-255-3924
International: +1 813-248-0573

2 Hazards identification

2.1 Classification of the substance or mixture:

In compliance with EC regulation No. 1272, 29CFR1910/1200 and GHS requirements.

Hazard-determining components of labeling:

Tetrasodium Pyrophosphate
Sodium tripolyphosphate
Sodium Alkylbenzene Sulfonate

2.2 Label elements:

Eye damage, category 1.
Skin irritation, category 2.

Product at recommended dilution:

Eye irritation, category 2B

Hazard pictograms:



Signal word: Danger

Hazard statements:

H315 Causes skin irritation.
H318 Causes serious eye damage.

Precautionary statements:

P264 Wash skin thoroughly after handling.

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P280 Wear protective gloves/protective clothing/eye protection/face protection.
 P302+P352 If on skin: Wash with soap and water.
 P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
 P321 Specific treatment (see supplemental first aid instructions on this label).
 P332+P313 If skin irritation occurs: Get medical advice/attention.
 P362 Take off contaminated clothing and wash before reuse.
 P501 Dispose of contents and container as instructed in Section 13.

Hazardous Elements at Use Dilution:

Hazard Pictograms:

**Signal Word:** Warning**Hazard Statements:**

H320 Causes eye irritation

Precautionary statements:

P302+P352 If on skin: Wash with soap and water.

P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.

P501 Dispose of contents and container as instructed in Section 13

Additional information: None.**Hazard description****Hazards Not Otherwise Classified (HNOC):** May cause surfaces to become slippery if wet. Use caution in areas of foot traffic if on floors.**Information concerning particular hazards for humans and environment:**

The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

Classification system:

The classification is according to EC regulation No. 1272, 29CFR1910/1200 and GHS Requirements, and extended by company and literature data. The classification is in accordance with the latest editions of international substances lists and is supplemented by information from technical literature and by information provided by the company.

3 Composition/information on ingredients**3.1 Chemical characterization:** Not determined or not available.**3.2 Description:** None**3.3 Hazardous components (percentages by weight)**

Identification	Chemical Name	Classification	Wt. %
CAS number: 7758-29-4	Sodium tripolyphosphate	Skin Irrit. 2; H315 Eye Irrit. 2; H319	12-28
CAS number: 68081-81-2 or 68411-30-3	Sodium Alkylbenzene Sulfonate	Acute Tox. 4; H303 Skin Irrit. 2; H315 Eye Dam. 1; H318	8-22
CAS number: 7722-88-5	Tetrasodium Pyrophosphate	Skin Irrit. 2; H315 Eye Irrit. 2; H319	2-16

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Trade Name: Alconox®

Revision: 11 May 2020

Hazardous components at use dilution (percentages by weight):

Identification	Chemical Name	Classification	Wt. %
CAS number: 7758-29-4	Sodium tripolyphosphate	Eye Irrit. 2; H319	0.12 - 0.28
CAS number: 68081-81-2 or 68411-30-3	Sodium Alkylbenzene Sulfonate	Eye Irrit. 2; H319	0.08 – 0.22
CAS number: 7722-88-5	Tetrasodium Pyrophosphate	Eye Irrit. 2; H319	0.02 – 0.16

3.4 Additional Information: None.

4 First aid measures

4.1 Description of first aid measures

General information: None.

After inhalation:

Maintain an unobstructed airway.

Loosen clothing as necessary and position individual in a comfortable position.

After skin contact:

Wash affected area with soap and water.

Seek medical attention if symptoms develop or persist.

After eye contact:

Rinse/flush exposed eye(s) gently using water for 15-20 minutes.

Remove contact lens(es) if able to do so during rinsing.

Seek medical attention if irritation persists or if concerned.

After swallowing:

Rinse mouth thoroughly.

Seek medical attention if irritation, discomfort, or vomiting persists.

4.2 Most important symptoms and effects, both acute and delayed

None

4.3 Indication of any immediate medical attention and special treatment needed:

No additional information.

First aid measure at recommended dilution:

General information: None.

After inhalation:

Maintain an unobstructed airway.

Loosen clothing as necessary and position individual in a comfortable position.

After skin contact:

Wash affected area with soap and water.

After eye contact:

Rinse/flush exposed eye(s) gently using water for 15-20 minutes.

Remove contact lens(es) if able to do so during rinsing.

After swallowing:

Rinse mouth thoroughly. Seek medical attention if irritation, discomfort, or vomiting develops.

5 Firefighting measures

Effective date: 11 May 2020
Trade Name: Alconox®

Revision: 11 May 2020

5.1 Extinguishing media

Suitable extinguishing agents:

Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition.

For safety reasons unsuitable extinguishing agents: None

5.2 Special hazards arising from the substance or mixture:

Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice for firefighters

Protective equipment:

Wear protective eye wear, gloves and clothing.

Refer to Section 8.

5.4 Additional information:

Avoid inhaling gases, fumes, dust, mist, vapor and aerosols.

Avoid contact with skin, eyes and clothing.

6 Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:

Ensure adequate ventilation.

Ensure air handling systems are operational.

6.2 Environmental precautions:

Should not be released into the environment.

Prevent from reaching drains, sewer or waterway.

6.3 Methods and material for containment and cleaning up:

Wear protective eye wear, gloves and clothing.

6.4 Reference to other sections: None

7 Handling and storage

7.1 Precautions for safe handling:

No expected hazards under normal use condition.

Avoid breathing mist or vapor if aerosolized.

Do not eat, drink, smoke or use personal products when handling chemical substances.

7.2 Conditions for safe storage, including any incompatibilities:

Store in a cool, well-ventilated area.

7.3 Specific end use(s):

No additional information.

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8 Exposure controls/personal protection



8.1 Control parameters:

- a) 7722-88-5, Tetrasodium Pyrophosphate, ACGIH TWA 10 mg/m³
- b) 7758-29-4, Sodium Tripolyphosphate, ACGIH TWA 10 mg/m³
- c) Dusts, non-specific OEL, Irish Code of Practice
 - (i) Total inhalable 10 mg/m³ (8hr)
 - (ii) Respirable 4 mg/m³ (8hr)
 - (iii) Tetrasodium Pyrophosphate, OSHA TWA 5 mg/m³, (8hr)

8.2 Exposure controls

Appropriate engineering controls:

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling.

Respiratory protection:

Not needed under normal use conditions.

Protection of skin:

Select glove material impermeable and resistant to the substance.

Eye protection:

Safety goggles or glasses, or appropriate eye protection. Recommended to comply with ANSI Z87.1 and/or EN 166.

General hygienic measures:

- Wash hands before breaks and at the end of work.
- Avoid contact with skin, eyes and clothing.

Exposure Control and Personal Protective Equipment at recommended dilution:

Under normal use and operational conditions, no special personal protective equipment or engineering controls will be necessary. Handle with care.

9 Physical and chemical properties

Appearance (physical state, color):	White and cream colored flakes - powder	Explosion limit lower: Explosion limit upper:	Not determined or not available. Not determined or not available.
Odor:	Not determined or not available.	Vapor pressure at 20°C:	Not determined or not available.
Odor threshold:	Not determined or not available.	Vapor density:	Not determined or not available.
pH-value:	9.5 (1% aqueous solution)	Relative density:	Not determined or not available.

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Melting/Freezing point:	Not determined or not available.	Solubilities:	Not determined or not available.
Boiling point/Boiling range:	Not determined or not available.	Partition coefficient (n-octanol/water):	Not determined or not available.
Flash point (closed cup):	Not determined or not available.	Auto/Self-ignition temperature:	Not determined or not available.
Evaporation rate:	Not determined or not available.	Decomposition temperature:	Not determined or not available.
Flammability (solid, gaseous):	Not determined or not available.	Viscosity:	a. Kinematic: Not determined or not available. b. Dynamic: Not determined or not available.
Density at 20°C:	Not determined or not available.		

10 Stability and reactivity

- 10.1 Reactivity:** Not determined or not available.
10.2 Chemical stability: Not determined or not available.
10.3 Possibility hazardous reactions: Not determined or not available.
10.4 Conditions to avoid: Not determined or not available.
10.5 Incompatible materials: Not determined or not available.
10.6 Hazardous decomposition products: Not determined or not available.

11 Toxicological information

11.1 Information on toxicological effects:

Acute Toxicity:

Oral:

: LD50 > 5000 mg/kg oral rat - Product.

Chronic Toxicity: No additional information.

Skin corrosion/irritation:

Sodium Alkylbenzene Sulfonate: Causes skin irritation.

Serious eye damage/irritation:

Sodium Alkylbenzene Sulfonate: Causes serious eye damage.

Tetrasodium Pyrophosphate: Risk of serious damage to eyes.

Product information at recommended dilution:

Eye irritation may occur upon direct contact with eyes. No specific hazards for skin contact, inhalation, or chronic exposure are expected within normal use parameters.

Respiratory or skin sensitization: No additional information.

Carcinogenicity: No additional information.

IARC (International Agency for Research on Cancer): None of the ingredients are listed.

NTP (National Toxicology Program): None of the ingredients are listed.

Germ cell mutagenicity: No additional information.

Reproductive toxicity: No additional information.

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STOT-single and repeated exposure: No additional information.

Additional toxicological information: No additional information.

12 Ecological information

12.1 Toxicity:

- Sodium Alkylbenzene Sulfonate: Fish, LC50 1.67 mg/l, 96 hours.
- Sodium Alkylbenzene Sulfonate: Aquatic invertebrates, EC50 Daphnia 2.9 mg/l, 48 hours.
- Sodium Alkylbenzene Sulfonate: Aquatic Plants, EC50 Algae 29 mg/l, 96 hours.
- Tetrasodium Pyrophosphate: Fish, LC50 - other fish - 1,380 mg/l - 96 h.
- Tetrasodium Pyrophosphate: Aquatic invertebrates, EC50 - Daphnia magna (Water flea) - 391 mg/l - 48 h.

12.2 Persistence and degradability: No additional information.

12.3 Bioaccumulative potential: No additional information.

12.4 Mobility in soil: No additional information.

General notes: No additional information.

12.5 Results of PBT and vPvB assessment:

- PBT:** No additional information.
- vPvB:** No additional information.

12.6 Other adverse effects: No additional information.

13 Disposal considerations

13.1 Waste treatment methods (consult local, regional and national authorities for proper disposal)

Relevant Information:

It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities. (US 40CFR262.11).

14 Transport information

14.1 UN Number: ADR, ADN, DOT, IMDG, IATA	None														
14.2 UN Proper shipping name: ADR, ADN, DOT, IMDG, IATA	None														
14.3 Transport hazard classes: ADR, ADN, DOT, IMDG, IATA	<table> <tr> <td>Class:</td> <td>None</td> </tr> <tr> <td>Label:</td> <td>None</td> </tr> <tr> <td>LTD. QTY:</td> <td>None</td> </tr> </table>	Class:	None	Label:	None	LTD. QTY:	None								
Class:	None														
Label:	None														
LTD. QTY:	None														
<hr/> <table> <tr> <td>US DOT Limited Quantity Exception:</td> <td>None</td> </tr> <tr> <td>Bulk:</td> <td>Non Bulk:</td> </tr> <tr> <td>RQ (if applicable): None</td> <td>RQ (if applicable): None</td> </tr> <tr> <td>Proper shipping Name: None</td> <td>Proper shipping Name: None</td> </tr> <tr> <td>Hazard Class: None</td> <td>Hazard Class: None</td> </tr> <tr> <td>Packing Group: None</td> <td>Packing Group: None</td> </tr> <tr> <td>Marine Pollutant (if applicable): No additional information.</td> <td>Marine Pollutant (if applicable): No additional information.</td> </tr> </table>		US DOT Limited Quantity Exception:	None	Bulk:	Non Bulk:	RQ (if applicable): None	RQ (if applicable): None	Proper shipping Name: None	Proper shipping Name: None	Hazard Class: None	Hazard Class: None	Packing Group: None	Packing Group: None	Marine Pollutant (if applicable): No additional information.	Marine Pollutant (if applicable): No additional information.
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Bulk:	Non Bulk:														
RQ (if applicable): None	RQ (if applicable): None														
Proper shipping Name: None	Proper shipping Name: None														
Hazard Class: None	Hazard Class: None														
Packing Group: None	Packing Group: None														
Marine Pollutant (if applicable): No additional information.	Marine Pollutant (if applicable): No additional information.														

Effective date: 11 May 2020
Trade Name: Alconox®

Revision: 11 May 2020

Comments: None	Comments: None
I4.4 Packing group: ADR, ADN, DOT, IMDG, IATA	None
I4.5 Environmental hazards:	None
I4.6 Special precautions for user: Danger code (Kemler): EMS number: Segregation groups:	None None None None
I4.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable.	
I4.8 Transport/Additional information: Transport category: Tunnel restriction code: UN "Model Regulation":	
	None None None

I5 Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture.

North American

SARA Section 313 (specific toxic chemical listings): None of the ingredients are listed. Section 302 (extremely hazardous substances): None of the ingredients are listed.
CERCLA (Comprehensive Environmental Response, Clean up and Liability Act) Reportable Spill Quantity: None of the ingredients are listed.
TSCA (Toxic Substances Control Act): Inventory: All ingredients are listed as active. Rules and Orders: Not applicable.
Proposition 65 (California): Chemicals known to cause cancer: None of the ingredients are listed. Chemicals known to cause reproductive toxicity for females: None of the ingredients are listed. Chemicals known to cause reproductive toxicity for males: None of the ingredients are listed. Chemicals known to cause developmental toxicity: None of the ingredients are listed.

Canadian Canadian Domestic Substances List (DSL): All ingredients are listed.

EU

REACH Article 57 (SVHC): None of the ingredients are listed.

Effective date: 11 May 2020
Trade Name: Alconox®

Revision: 11 May 2020

Germany MAK: Not classified.

EC 648/2004 – This is an industrial detergent. Contains >30% phosphate, 15-30% anionic surfactant, <5% EDTA salts

EC 551/2009 – This is not a laundry or dishwasher detergent

EC 907/2006 – Contains no enzymes, optical brighteners, perfumes, allergenic fragrances, or preservative agents

Asia Pacific

Australia

Australian Inventory of Chemical Substances (AICS): All ingredients are listed.

China

Inventory of Existing Chemical Substances in China (IECSC): All ingredients are listed.

Japan

Inventory of Existing and New Chemical Substances (ENCS): All ingredients are listed.

Korea

Existing Chemicals List (ECL): All ingredients are listed.

New Zealand

New Zealand Inventory of Chemicals (NZOIC): All ingredients are listed.

Philippines

Philippine Inventory of Chemicals and Chemical Substances (PICCS): All ingredients are listed.

Taiwan

Taiwan Chemical Substance Inventory (TSCI): All ingredients are listed.

16 Other information

Abbreviations and Acronyms: None

Summary of Phrases

Hazard statements:

H315 Causes skin irritation.
H318 Causes serious eye damage.

NFPA: 1-0-0

HMIS: 1-0-0

At recommended dilution:

NFPA: 1-0-0

HMIS: 1-0-0

Precautionary statements:

P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P321 Specific treatment (see supplemental first aid instructions on this label).
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362 Take off contaminated clothing and wash before reuse.
P501 Dispose of contents and container as instructed in Section 13.

Manufacturer Statement:

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.



INCORPORATED



Injection Ready 60% QRS-SL™ Sodium Lactate

Quick Release Substrate

SAFETY DATA SHEET

Effective Date: 01-01-2020

1. Product Identification

Synonyms: Quick Release Substrate (QRS™-SL); Sodium Lactate; Propanoic acid, 2-Hydroxy Monosodium salt; L-Lactic Acid, Sodium Salt

Recommended Use: Treatment of groundwater contaminated with chlorinated solvents and other anaerobically degradable compounds.

Supplier: Terra Systems, Inc.
130 Hickman Road, Suite 1
Claymont, Delaware 19703
Telephone (302) 798-9553
Fax (302) 798-9554
www.terrasystems.net

2. Hazards Identification

Emergency Overview

Caution: May cause eye irritation.

Health Rating: 1 - Slight

Flammability Rating: 0 - None

Reactivity Rating: 0 - None

Contact Rating: 1 - Slight

Protective Equipment: Goggles; Proper Gloves

Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation: Not expected to be a health hazard

Ingestion: Not expected to be a health hazard via ingestion

Skin Contact: No adverse effects expected

Eye Contact: May cause irritation, possible reddening

Chronic Exposure: No information found

Aggravation of Pre-existing Conditions: No information found



3. Composition/Information on Ingredients

Ingredient	CAS#	Percent	Hazardous
Sodium Lactate	72-17-3	60	Yes
Water	7732-18-5	40	No

4. First Aid Measures

Inhalation: Not expected to require first aid measures. Remove to fresh air. Get medical attention for any breathing difficulty.

Ingestion: If large amounts were swallowed, give water to drink and get medical advice.

Skin Contact: Not expected to require first aid measures. Wash exposed area with soap and water. Get medical advice if irritation develops.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.

5. Fire Fighting Measures

Fire: Flash point: 110 C (230 F). Not considered to be a fire hazard.

Explosion: Not considered to be an explosion hazard.

Fire Extinguishing Media: Use any means suitable for extinguishing surrounding fire.

Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Clean-up personnel may require protective clothing. Absorb in sand, paper towels, "Oil Dry", or other inert material. Scoop up and containerize for disposal. Flush trace residues to sewer with soap and water. Containerized waste may be sent to an approved waste disposal facility.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Avoid long storage times. Containers of this material may be hazardous when empty since they do retain product residues (vapors, liquid). Observe all warnings and precautions listed for the product.



8. Exposure Controls/Personal Protection

Airborne Exposure Limits:	None established.
Ventilation System:	Not expected to require any special ventilation.
Personal Respirators (NIOSH Approved):	Not expected to require personal respirator usage.
Skin Protection:	Wear protective gloves and clean body-covering clothing.
Eye Protection:	Use chemical safety goggles and/or a full face shield where splashing is possible. Provide readily accessible eye wash stations and safety showers.
Slips, Trips, and Falls:	Material is slippery when spilled. Clean up with sand, paper towels, or other inert material.

9. Physical and Chemical Properties

Appearance:	Colorless to yellow liquid.
Odor:	Odorless
Solubility:	100% soluble in water.
Specific Gravity (water=1):	1.32. (11.01 pounds per gallon)
pH:	6.5-8.5
% Volatiles by volume	
@ 21C (70F):	No information found.
Boiling Point:	110 C (230 F)
Melting Point:	17 C (63 F)
Flash Point (F):	No information found
Autoignition Temperature:	No information found
Decomposition Temperature:	No information found.
Vapor Density (Air=1):	0.7
Vapor Pressure (mm Hg):	14 @ 20 C (68 F)
Evaporation Rate (BuAc=1):	No information found
Viscosity @23 C (73 F):	100 centipoises
Partition Coefficient (octanol/water):	No information found

10. Stability and Reactivity

Stability:	Stable under ordinary conditions of use and storage.
Reactivity:	Not reactive under ordinary conditions.
Hazardous Decomposition Products:	Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:	Will not occur.
Incompatibilities:	Strong oxidizers, acids.
Conditions to Avoid:	Incompatibles. Isolate from heat and open flame.



11. Toxicological Information

Oral rat LD50: 2000 mg/Kg. Irritation Data for Sodium Lactate: (Std Draize, rabbit, eye): 100 mg - mild.

-----\Cancer Lists\-----

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Sodium Lactate (72-17-3)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

- Environmental Fate:** Mobile with water and readily biodegradable
- Environmental Toxicity:** Ecological injuries are not known or expected under normal use; (No effect on Daphnia @ 10g/L)
- Degradability:** This product is completely biodegradable under both aerobic and anaerobic conditions.
- Soil Mobility:** This compound will move with groundwater until the adsorbed onto the soil. Degradation products may be mobile.
- Bioaccumulation Potential:** No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.



15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----

Ingredient	TSCA	EC	Japan	Australia
Sodium Lactate (72-17-3)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----

Ingredient	--Canada--			
	Korea	DSL	NDSL	Phil.
Sodium Lactate (72-17-3)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----

Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical Catg.
Sodium Lactate (72-17-3)	No	No	No	No
Water (7732-18-5)	No	No	No	No

-----\Federal, State & International Regulations - Part 2\-----

Ingredient	-RCRA-		-TSCA-
	CERCLA	261.33	8(d)
Sodium Lactate (72-17-3)	No	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
 SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
 Reactivity: No (Mixture / Liquid)

16. Other Information

NFPA Ratings: Health: **1** Flammability: **0** Reactivity: **0**
Date Prepared: March 28, 2014
Revision Information: SDS Section(s) changed since last revision of document include: None.
Disclaimer: Terra Systems, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the



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Prepared by:
Phone Number:

Terra Systems, Inc.
(302) 798-9553 (U.S.A.)



Patented *Injection Ready* 60% SRS[®]-SD Small Droplet Emulsified Vegetable Oil (EVO) Substrate for Maximum Radius of Influence

United States Patent #RE40,448

SAFETY DATA SHEET

1. Product Identification

Synonyms: 60% Small Droplet Slow Release Substrate (SRS[®]-SD) Emulsified Vegetable Oil Substrate (EVO)

Recommended Use: Treatment of groundwater contaminated with chlorinated solvents and other anaerobically degradable compounds.

Supplier: Terra Systems, Inc.
130 Hickman Road, Suite 1
Claymont, Delaware 19703
Telephone (302) 798-9553
Fax (302) 798-9554
www.terrasystems.net

2. Hazards Identification

Emergency Overview

Caution: May cause eye irritation.

Health Rating: 1 - Slight

Flammability Rating: 1 - Slight

Reactivity Rating: 1 - Slight

Contact Rating: 1 - Slight

Protective Equipment: Goggles; Proper Gloves

Storage Color Code: Green (General Storage)

Potential Health Effects

Inhalation: Not expected to be a health hazard. If heated, may produce vapors or mists that irritate the mucous membranes and cause irritation, dizziness, and nausea. Remove to fresh air.

Ingestion: Not expected to be a health hazard via ingestion. Large doses may produce abdominal spasms or diarrhea.

Skin Contact: No adverse effects expected. May cause irritation or sensitization in sensitive individuals.

Eye Contact: May cause mild irritation, possible reddening.

Chronic Exposure: No information found.

Aggravation of Pre-existing Conditions: No information found.



3. Composition/Information on Ingredients

Ingredient	Synonyms	CAS #	Percent	Hazardous
Soy bean oil	Soya oil	8001-22-7	60%	No
Emulsifiers and proprietary nutrient package containing nitrogen, phosphorus and vitamin B ₁₂		Mixture	7.5 - 10%	No
Sodium lactate	2-hydroxypropionic acid sodium salt	72-17-3	5.5%	Yes
Water		7732-18-5	Difference	No

The emulsifiers and nutrient package mixture is a trade secret and consists of ingredients of unknown acute toxicity.

4. First Aid Measures

Inhalation: Not expected to require first aid measures. Remove to fresh air. Get medical attention for any breathing difficulty.

Ingestion: If large amounts were swallowed, give water to drink and get medical advice.

Skin Contact: Not expected to require first aid measures. Wash exposed area with soap and water. Get medical advice if irritation develops.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.

5. Fire Fighting Measures

Fire: Flash point: >200 C (>392 F). Not considered to be a fire hazard. Isolate from heat and open flame.

Explosion: Not considered to be an explosion hazard. Closed containers may explode if exposed to extreme heat.

Fire Extinguishing Media: Dry chemical, foam, or carbon dioxide. Water spray may be ineffective on fire but can protect fire-fighters and cool closed containers. Use fog nozzles if water is used.

Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Clean-up personnel may require protective clothing. Absorb in sand, paper towels, "Oil Dry", or other inert material. Scoop up and containerize for disposal. Flush trace residues to sewer with soap and water. Containerized waste may be sent to an approved waste disposal facility.



7. Handling and Storage

Store in a cool, dry, ventilated area. Do not store in sunlight or above 32 C (90 F). Keep container tightly closed and upright when not in use to prevent leakage. Observe all warnings and precautions listed for the product. Protect against physical damage.

If container begins to bulge, open cap slowly to release carbon dioxide from biological activity on the SRS-SD and call TSI.

Containers of this material are not hazardous when empty since they do not contain vapors or harmful substances; if drum or tote is observed to bulge, keep cap off as pressurization can occur on empty container with caps in place unless container is thoroughly rinsed.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:	None established.
Ventilation System:	Not expected to require any special ventilation.
Personal Respirators (NIOSH Approved):	Not expected to require personal respirator usage.
Skin Protection:	Wear protective gloves and clean body-covering clothing.
Eye Protection:	Use chemical safety goggles and/or a full-face shield where splashing is possible. Provide readily accessible eye wash stations and safety showers.
Slips, Trips, and Falls:	Material is slippery when spilled. Clean up with sand, paper towels, "Oil Dry", or other inert material.

9. Physical and Chemical Properties

Appearance:	White liquid.
Odor:	Vegetable oil.
Solubility:	Miscible in water.
Specific Gravity (water=1):	0.95-0.98. 8.09 pounds per gallon.
pH:	6-7 (40% aqueous solution)
% Volatiles by volume @ 21C (70F):	Negligible.
Boiling Point:	≥ 100C (≥ 212F)
Melting Point:	No information found.
Flash Point (F):	No information found.
Autoignition Temperature:	No information found.
Decomposition Temperature:	No information found.
Vapor Density (Air=1):	No information found.
Vapor Pressure (mm Hg):	< 1.0 @ 20C (68F).
Evaporation Rate (BuAc=1):	No information found.
Viscosity @23 C (73 F):	213 centipoises (1.2 centipoises diluted 1:10)
Partition Coefficient (octanol/water):	No information found.



10. Stability and Reactivity

Stability:	Stable under ordinary conditions of use and storage.
Reactivity:	Not reactive under ordinary conditions.
Hazardous Decomposition Products:	Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:	Will not occur.
Incompatibilities:	Strong oxidizers, acids.
Conditions to Avoid:	Incompatibles. Isolate from heat and open flame.

11. Toxicological Information

Soybean Oil:	No information found on toxicology. It is not a carcinogen listed by IARC, NTP, NIOSH, OSHA, or ACGIH.
Emulsifier/Nutrient Mixture:	No information found on toxicology. It is not a carcinogen listed by IARC, NTP, NIOSH, OSHA, or ACGIH.
Sodium Lactate:	Oral rat LD50: 2,000 mg/kg. 100 mg caused mild irritation to rabbit eye in Draize test. This compound is not listed as a carcinogen by IARC, NTP, NIOSH, OSHA, or ACGIH.
SRS-SD:	The toxicity of the mixture has not been measured.

12. Ecological Information

Environmental Fate:	No information found.
Environmental Toxicity:	No information found.
Degradability:	This product is completely biodegradable under both aerobic and anaerobic conditions.
Soil Mobility:	This compound will move with groundwater until the adsorbed onto the soil. Degradation products may be mobile.
Bioaccumulation Potential:	No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information



OSHA STATUS: This product is not hazardous under the criteria of the Federal OSHA hazard Communication Standard 29 CFR 1910.1200. However, thermal processing and decomposition fumes from this product may be hazardous as noted in Section 10.

TSCA STATUS: No component of this product is listed on the TSCA inventory.

CERCLA (Comprehensive Response Compensation, and Liability Act): Not reportable.

SARA TITLE III (Superfund Amendments and Reauthorization Act)

Section 312 Extremely Hazardous Substances: None

Section 311/312 Hazard Categories: Non-hazardous Under Section 311/312

Section 313 Toxic Chemicals: None

RCRA STATUS: If discarded in its purchased form, this product would not be a hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. (40 CFR 261.20-24)

CALIFORNIA PROPOSITION 65: The following statement is made in order to comply with the California safe Drinking Water and Toxic Enforcement Act of 1986. The product contains no chemicals known to the State of California to cause cancer.

16. Other Information

NFPA Ratings:

Health: **1** Flammability: **1** Reactivity: **1**

Date Prepared:

September 11, 2019

Revision Information:

SDS Section(s) changed since last revision of document include: Updated Section 3 Composition/Information on Ingredients.

Disclaimer:

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DAMAGES RESULTING FROM USE OF OR RELIANCE
UPON THIS INFORMATION.

Prepared by:
Phone Number:

Terra Systems, Inc.
(302) 798-9553 (U.S.A.)



SRS[®]-Z_{VI} (4 μm) Combined Emulsified Vegetable Oil Substrate and 4 μm Zero Valent Iron SAFETY DATA SHEET

January 1st, 2020

1. Product Identification

Synonyms: Combined Emulsified Vegetable Oil Substrate and 4 μm Zero Valent Iron [SRS[®]-Z_{VI} (4 μm)]; Emulsified Vegetable Oil (EVO) and Zero Valent Iron (ZVI)

Recommended Use: Treatment of groundwater contaminated with DNAPL level concentrations of chlorinated solvents and other anaerobically degradable compounds.

Supplier: Terra Systems, Inc.
130 Hickman Road, Suite 1
Claymont, Delaware 19703
Telephone (302) 798-9553
Fax (302) 798-9554
www.terrasystems.net

2. Hazards Identification

Emergency Overview

Caution: May cause eye irritation.

Health Rating: 1 - Slight

Flammability Rating: 1 - Slight

Reactivity Rating: 1 - Slight

Contact Rating: 1 - Slight

Protective Equipment: Goggles; Proper Gloves

Storage Color Code: Green (General Storage)

Potential Health Effects

Inhalation: Not expected to be a health hazard. May irritate lungs and mucous membranes and cause irritation, dizziness, and nausea. Remove to fresh air.

Ingestion: Not expected to be a health hazard via ingestion. Large doses may produce abdominal spasms, diarrhea.

Skin Contact: No adverse effects expected. May cause irritation or sensitization in sensitive individuals.

Eye Contact: May cause irritation, watering, and possible reddening.

Chronic Exposure: No information found.

Aggravation of Pre-existing Conditions: No information found.



3. Composition/Information on Ingredients

Ingredient	Synonyms	CAS #	Percent	Hazardous
Soybean oil	Soya oil	8001-22-7	52-54%	No
Iron suspension	ZVI	7439-89-6	10-12.5%	No
60% Sodium Lactate	2-hydroxypropionic acid sodium salt	72-17-3	4-5%	No
Emulsifiers and proprietary nutrient package containing nitrogen, phosphorus and vitamin B ₁₂		Mixture	6-7%	No

The emulsifiers are a trade secret and consists of ingredients of unknown acute toxicity.

4. First Aid Measures

- Inhalation:** Not expected to require first aid measures. Remove to fresh air. Get medical attention for any breathing difficulty.
- Ingestion:** If large amounts were swallowed, give water to drink and get medical advice.
- Skin Contact:** Not expected to require first aid measures. Wash exposed area with soap and water. Get medical advice if irritation develops.
- Eye Contact:** Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.

5. Fire Fighting Measures

- Fire:** The zero valent iron powder, when dry, may self-combust and has the potential to catch paper towels, rags, etc. on fire. Avoid airborne dispersion of fine powder in an enclosed area to reduce potential dust ignition. Keep SRS[®]-EZVI wet and avoid contact with combustible materials.
- Explosion:** May generate hydrogen gas vapors that can cause explosion when exposed to a spark or flame. Closed containers may explode if exposed to extreme heat.
- Fire Extinguishing Media:** Dry chemical, sand, foam, graphite, or carbon dioxide. Water spray may be ineffective on fire but can protect fire-fighters and cool closed containers. Use fog nozzles if water is used.
- Special Information:** In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.



6. Accidental Release Measures

Clean-up personnel may require protective clothing. Absorb in sand, paper towels, “Oil Dry”, or other inert material. Scoop up and containerize for disposal. Flush trace residues to sewer with soap and water. Containerized waste may be sent to an approved waste disposal facility.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Containers of this material are not hazardous when empty since they do not contain vapors or harmful substances; observe all warnings and precautions listed for the product. Do not store above 49 C (120 F). Keep container tightly closed and upright when not in use to prevent leakage.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:	None established.
Ventilation System:	Not expected to require any special ventilation.
Personal Respirators (NIOSH Approved):	Not expected to require personal respirator usage.
Skin Protection:	Wear protective gloves and clean body-covering clothing.
Eye Protection:	Use chemical safety goggles and/or a full-face shield where splashing is possible. Provide readily accessible eye wash stations and safety showers.
Slips, Trips, and Falls:	Material is slippery when spilled. Clean up with sand, paper towels, “Oil Dry”, or other inert material.

9. Physical and Chemical Properties

Appearance:	Gray viscous liquid.
Odor:	Vegetable oil.
Solubility:	Not soluble in water.
Specific Gravity (water=1):	1.07 (8.93 pounds per gallon)
pH:	6-8
% Volatiles by volume @ 21C (70F):	Negligible.
Boiling Point:	≥ 100C (≥ 212F)
Melting Point:	No information found.
Flash Point (F):	No information found.
Autoignition Temperature:	No information found.
Decomposition Temperature:	No information found.
Vapor Density (Air=1):	No information found.
Vapor Pressure (mm Hg):	< 1.0 @ 20C (68F).
Evaporation Rate (BuAc=1):	No information found.
Viscosity @ 23 C (73 F):	440-1,942 centipoises
Partition Coefficient (octanol/water):	No information found.



10. Stability and Reactivity

Stability:	Stable under ordinary conditions of use and storage. May generate hydrogen gas.
Reactivity:	Not reactive under ordinary conditions.
Hazardous Decomposition Products:	Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:	Will not occur.
Incompatibilities:	Strong oxidizers, acids.
Conditions to Avoid:	Incompatibles. Isolate from heat and open flame.

11. Toxicological Information

Soybean Oil:	No information found on toxicology. It is not a carcinogen listed by IARC, NTP, NIOSH, OSHA, or ACGIH.
Emulsifier/Nutrient Mixture:	No information found on toxicology. It is not a carcinogen listed by IARC, NTP, NIOSH, OSHA, or ACGIH.
Sodium Lactate:	Oral rat LD50: 2000 mg/kg. Irritation for sodium lactate: standard Draize 100 mg - mild. This compound is not listed as a carcinogen by IARC, NTP, NIOSH, OSHA, or ACGIH.
Zero Valent Iron:	No information found on toxicology. It is not a carcinogen listed by IARC, NTP, NIOSH, OSHA, or ACGIH.
Glycerol:	Practically non-toxic.
SRS-EZVI:	The toxicity of the mixture has not been measured.

12. Ecological Information

Environmental Fate:	No information found.
Environmental Toxicity:	No information found.
Degradability:	SRS is completely biodegradable under both aerobic and anaerobic conditions.
Soil Mobility:	SRS will move with groundwater until the adsorbed onto the soil. Degradation products may be mobile. The ZVI portion will not be mobile.
Bioaccumulation Potential:	No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use, or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.



14. Transport Information

Not regulated.

15. Regulatory Information

OSHA STATUS: This product is not hazardous under the criteria of the Federal OSHA hazard Communication Standard 29 CFR 1910.1200. However, thermal processing and decomposition fumes from this product may be hazardous as noted in Section 10.

TSCA STATUS: No component of this product is listed on the TSCA inventory.

CERCLA (Comprehensive Response Compensation, and Liability Act): Not reportable.

SARA TITLE III (Superfund Amendments and Reauthorization Act)

Section 312 Extremely Hazardous Substances: None

Section 311/312 Hazard Categories: Non-hazardous Under Section 311/312

Section 313 Toxic Chemicals: None

RCRA STATUS: If discarded in its purchased form, this product would not be a hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. (40 CFR 261.20-24)

CALIFORNIA PROPOSITION 65: The following statement is made in order to comply with the California safe Drinking Water and Toxic Enforcement Act of 1986. The product contains no chemicals known to the State of California to cause cancer.

16. Other Information

NFPA Ratings:

Health: **1** Flammability: **1** Reactivity: **1**

Date Revised:

January 1, 2018

Revision Information:

SDS Section(s) changed since last revision of document include: Added glycerol as component.

Disclaimer:

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PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, TERRA SYSTEMS, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

Prepared by:
Phone Number:

Terra Systems, Inc.
(302) 798-9553 (U.S.A.)

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

1.1 PRODUCT NAME:	KB-1[®] Primer
PRODUCT CODE:	N/A
CHEMICAL FAMILY NAME:	Mixture
U.N. NUMBER:	None
U.N. DANGEROUS GOODS CLASS:	Not Regulated
1.2 PRODUCT USE:	For preparation of anaerobic water for use in groundwater remediation. KB-1 [®] products are intended for laboratory research and field applications for groundwater remediation, and are not intended to be used as human or animal therapeutics, cosmetics, agricultural or pesticidal products, food additives, or as household chemicals.
1.3 SUPPLIER/MANUFACTURER'S NAME:	SiREM
ADDRESS:	130 Stone Road, West, Guelph, Ontario Canada N1G 3Z2
1.4 EMERGENCY PHONE:	519-515-0840
BUSINESS PHONE:	519-515-0840 (Product Information)
WEB SITE:	www.siremlab.com
1.5 DATE OF PREPARATION:	December 05, 2018
DATE OF LAST REVISION:	New

SECTION 2 - HAZARDS IDENTIFICATION

2.1 Classification of the mixture:

This product does meet the definition of a hazardous substance or preparation as defined by 29 CFR 1910.1200 AND the European Union Council Directives 67/548/EEC, 1999/45/EC, 1272/2008/EC, 2015/830/EU and subsequent Directives.

Component(s) Contributing to Classification(s)

L-Cysteine

2.2 GHS Label elements, including precautionary statements:

Pictogram(s):

None applicable.

Signal Word:

Warning!

GHS Hazard Classification(s):

Acute Toxicity Category 5 (Oral) Hazard

Statement(s):

H303: May be harmful if swallowed

Prevention Statement(s):

None Applicable

Response Statement(s):

P312: Call a POISON CENTER/doctor if you feel unwell.

Storage Statement(s):

None Applicable

Disposal Statement(s):

None Applicable.

2.3 Other Hazards:

This mixture does not meet the criteria for PBT or vPvB in accordance with Annex VII.

SECTION 3 - COMPOSITION and INFORMATION ON INGREDIENTS

3.1 Substances: Not applicable

3.2 Mixtures:

HAZARDOUS INGREDIENTS:	CAS #	EINECS #	Index #	WT %	GHS CLASSIFICATION
L-Cysteine	52-90-4	200-158-2	Not Listed	1-10%	ACUTE TOX. CAT 4 (ORAL)
Balance of other ingredients are non-hazardous or hazardous below the applicable cut-off level.					

Additional Information: See SECTION 16 for full classification phrases.

SECTION 4 - FIRST-AID MEASURES

4.1 Description of first aid measures:

Contaminated individuals of chemical exposure must be taken for medical attention if any adverse effect occurs. Rescuers should be taken for medical attention, if necessary. Take copy of label and SDS to health professional with contaminated individual.

EYE CONTACT: If product enters the eyes, open eyes while under gentle running water for at least 15 minutes. Seek medical attention if irritation persists.

SKIN CONTACT: Wash skin thoroughly after handling. Seek medical attention if irritation develops and persists. Remove contaminated clothing. Launder before re-use.

INHALATION: If breathing becomes difficult, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention.

INGESTION: If product is swallowed, call physician or poison control center for most current information. If professional advice is not available, do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow. Seek medical advice. Take a copy of the label and/or SDS with the victim to the health professional.

4.2 Most important symptoms and effects, both acute and delayed:

May be harmful if swallowed. See section 11 for additional information.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin problems may be aggravated by prolonged or repeated contact.

4.3 Indication of immediate medical attention and special treatment needed:

Treat symptoms and reduce over-exposure.

SECTION 5 - FIRE-FIGHTING MEASURES

5.1 Extinguishing media:

Use media suitable for surrounding area. Carbon dioxide, foam, dry chemical, halon, water spray.

5.2 Specific hazards arising from the chemical:

No data available for this product.

Explosion Sensitivity to Mechanical Impact: Not Sensitive.

Explosion Sensitivity to Static Discharge: Not Sensitive

Minimum Ignition Energy (M.I.E.): No Data at this time

5.3 Special firefighting Procedure:

Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Isolate materials not yet involved in the fire and protect personnel. Move containers from fire area if this can be done without risk; otherwise, cool with carefully applied water spray. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures:

No action shall be taken involving any personal risk or without suitable training. Do not touch or walk through spilled material. Avoid breathing dust. Provide adequate ventilation. Use appropriate respirator when ventilation is inadequate and use personal protective clothing as described in Section 8 of this safety data sheet. See section 11 for additional information on health hazards.

6.2 Environmental precautions:

No specific data available for this product.

6.3 Methods and material for containment and cleaning up:

Wear suitable protective clothing. Avoid dust formation. Avoid breathing dust. Carefully sweep up and remove. Place material in a dry container and cover. Remove from the area. Flush spill area with water. Do not let products enter drains. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations).

SECTION 7 - HANDLING and STORAGE

7.1 Precautions for safe handling:

As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Use in a well-ventilated location. Remove contaminated clothing immediately

7.2 Conditions for safe storage, including any incompatibilities:

Store in a tightly sealed container in a cool, dry and well-ventilated place. Store away from direct light. Avoid generation of dust. Do not breathe dust. Wash thoroughly after handling. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing. Segregate from strong oxidizing agents, acids, bases.

7.3 Specific end uses:

See section 1.2.

SECTION 8 - EXPOSURE CONTROLS - PERSONAL PROTECTION

8.1. Control parameters:

EXPOSURE LIMITS/GUIDELINES: None established for this product.

8.2 Exposure Controls:

Currently, International exposure limits are not established for the components of this product. Please check with competent authority in each country for the most recent limits in place.

VENTILATION AND ENGINEERING CONTROLS: Generally not required under normal conditions of use. If method of use will result in significant dust generation, use in lab hood or under conditions of adequate ventilation.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent standard of Canada, or standards of EU member states (including EN 149 for respiratory PPE, and EN 166 for face/eye protection), and those of Japan. Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below guidelines listed above, if applicable. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-93, the European Standard EN149, or EU member states.

EYE PROTECTION: Safety glasses or chemical goggles as appropriate to prevent eye contact. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or appropriate Canadian Standards.

HAND PROTECTION: Use chemical resistant gloves to prevent skin contact. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: Use body protection appropriate to prevent contact (e.g. lab coat, overalls). If necessary, refer to appropriate Standards of Canada, or appropriate Standards of the EU, Australian Standards, or relevant Japanese Standards.

SECTION 9 - PHYSICAL and CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties:

PHYSICAL STATE:	Solid (Granules)
APPEARANCE:	White to off-white powder or granules
ODOR:	Odorless
ODOR THRESHOLD (PPM):	Not Available
pH:	6-8 (aqueous solution)
MELTING / FREEZING POINT (C°):	Not Available
BOILING POINT (C°):	Not Available
FLASH POINT:	Not Available
EVAPORATION RATE (nBuAc = 1):	Not Available
FLAMMABILITY (solid, gas):	Not Available
FLAMMABLE LIMITS (in air by volume, %):	Not Available
VAPOR PRESSURE (mmHg):	Not Available
VAPOR DENSITY (AIR=1):	Not Available
RELATIVE DENSITY	2.4 to 2.6 g/cm ³ , depending on formulation
SOLUBILITY IN WATER (%)	Soluble
PARTITION COEFFICIENT: N-OCTANOL/WATER:	Not Available
AUTOIGNITION TEMPERATURE:	Not Available
DECOMPOSITION TEMPERATURE:	Not Available
VISCOSITY:	Not Available
EXPLOSIVE PROPERTIES:	Not Available
OXIDISING PROPERTIES:	Not Available

9.2 Other Information:

PACKING DENSITY:	Not Available
VOC:	Not Available

SECTION 10 - STABILITY and REACTIVITY

10.1 Reactivity: See section 10.5.

10.2 Chemical Stability: Product is stable.

10.3 Possibility of Hazardous Reactions: Under normal conditions of storage and use, hazardous reactions will not occur.

10.4 Conditions to avoid: Contact with incompatibles, exposure to light, and moist air.

10.5 Incompatible materials: Strong oxidizing agents, bases.

10.6 Hazardous Decomposition Products: Carbon monoxide, carbon dioxide, nitrogen oxides, sulfur oxides, potassium oxides.

SECTION 11 - TOXICOLOGICAL INFORMATION

11.1 Information on Toxicological Effects:

TOXICITY DATA:

L-Cysteine CAS# 52-90-4

Oral LD50 1890 mg/kg Rat

Oral LD50 660 mg/kg Mouse

11.1.2 Mixtures:

Acute toxicity	Acute Toxicity Category 5 (Oral)
Skin corrosion / irritation	Based on available data, the classification criteria are not met
Serious eye damage / irritation	Based on available data, the classification criteria are not met
Respiratory or skin sensitization	Based on available data, the classification criteria are not met
Germ cell mutagenicity	Based on available data, the classification criteria are not met
Carcinogenicity	Based on available data, the classification criteria are not met
Reproductive toxicity	Based on available data, the classification criteria are not met
STOT-single exposure	Based on available data, the classification criteria are not met
STOT-repeated exposure	Based on available data, the classification criteria are not met
Aspiration hazard	Based on available data, the classification criteria are not met

Other Information

POTENTIAL HEALTH HAZARDS OR RISKS FROM EXPOSURE:

ACUTE:

EYE CONTACT: Eye exposure may produce irritation.

SKIN CONTACT: Prolonged or repeated skin exposure may cause irritation.

INHALATION HAZARDS: Inhalation of dusts may cause irritation.

INGESTION HAZARDS: May be harmful if swallowed. May cause gastrointestinal tract irritation.

CHRONIC: None Known

TARGET ORGANS:

ACUTE: Organs

CHRONIC: None Known

CARCINOGENICITY: None of the ingredients are found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC and therefore are not considered to be, nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: Contact with this product can be irritating to skin and eyes.

SENSITIZATION OF PRODUCT: This product is not considered a skin sensitizer.

REPRODUCTIVE TOXICITY INFORMATION: No information concerning the effects of this product and its components on the human reproductive system.

MUTAGENICITY INFORMATION: This product does not contain a component that is suspected to be a mutagenicity hazard.

SPECIFIC TARGET ORGAN TOXICITY – SINGLE EXPOSURE: Data not sufficient for classification.

SPECIFIC TARGET ORGAN TOXICITY – REPEATED EXPOSURE: Data not sufficient for classification.

ASPIRATION HAZARD: Not applicable

SECTION 12 - ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

12.1 Toxicity:

No specific data available on this product.

12.2 Persistence and Degradability:

No specific data available on this product.

12.3 Bioaccumulative Potential:

No specific data available on this product.

12.4 Mobility in Soil:

No specific data available on this product.

12.5 Results of PBT and vPvB Assessment:

No specific data available on this product.

12.6 Other Adverse Effects:

No specific data available on this product.

12.7 Water Endangerment Class:

Not believed to be water endangering in accordance with EU Guideline 91/155-EWG. At present there are no ecotoxicological assessments for this product.

SECTION 13 - DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods:

Waste disposal must be in accordance with appropriate Federal, State, and local regulations, those of Canada, Australia, EU Member States and Japan.

SECTION 14 - TRANSPORTATION INFORMATION

14.1 Transport Information:

US DOT; IATA; IMO; ADR:

THIS PRODUCT IS NOT CLASSIFIED AS DANGEROUS GOODS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: None

HAZARD CLASS NUMBER and DESCRIPTION: Not Regulated

UN IDENTIFICATION NUMBER: None

PACKING GROUP: None

DOT LABEL(S) REQUIRED: None

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2016): None

MARINE POLLUTANT: This product does not contain ingredients that are classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B)

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:

This product is not classified as Dangerous Goods, per regulations of Transport Canada

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA):

This product is not classified as Dangerous Goods, by rules of IATA:

INTERNATIONAL MARITIME ORGANIZATION SHIPPING and MARITIME DANGEROUS GOODS CODE SHIPPING INFORMATION (IMO / IMDG):

This product is not classified as Dangerous Goods.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):

This product is not classified by the United Nations Economic Commission for Europe to be dangerous goods.

SECTION 15 - REGULATORY INFORMATION

15.1 Safety, Health and Environmental Regulations/Legislation Specific for the Substance or Mixture:

UNITED STATES REGULATIONS

SARA REPORTING REQUIREMENTS: This product is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows: None

TSCA: All components in this product are listed on the US Toxic Substances Control Act (TSCA) inventory of chemicals.

SARA 311/312:

Acute Health: No

Chronic Health: No

Fire: No

Reactivity: No

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for this product. The default Federal SDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): None

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): None of the ingredients are on the California Proposition 65 lists.

CANADIAN REGULATIONS:

CANADIAN DSL/NDL INVENTORY STATUS: All of the components of this product are on the DSL Inventory

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: No component of this product is on the CEPA First Priorities Substance Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: This product is categorized as per WHMIS 2015 Hazardous Product Regulations.

EUROPEAN ECONOMIC COMMUNITY INFORMATION:

EU LABELING AND CLASSIFICATION:

Classification of the mixture according to Regulation (EC) No1272/2008. See section 2 for details.

AUSTRALIAN INFORMATION FOR PRODUCT:

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: Components of this product are listed on the AICS.

STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS: Not applicable.

JAPANESE INFORMATION FOR PRODUCT:

JAPAN INDUSTRIAL SAFETY AND HEALTH LAW: This product has been classified per the Japan Industrial Safety and Health Law. See Section 2 for the GHS Classification.

KOREA ACT ON REGISTRATION AND EVALUATION OF CHEMICAL SUBSTANCES (K-REACH): This product has been classified per K-REACH. See Section 2 for the GHS Classification.

INTERNATIONAL CHEMICAL INVENTORIES:

Listing of the components on individual country Chemical Inventories is as follows:

Asia-Pac:	Listed
Australian Inventory of Chemical Substances (AICS):	Listed
Korean Existing Chemicals List (ECL):	Listed
Japanese Existing National Inventory of Chemical Substances (ENCS):	Listed
Philippines Inventory of Chemicals and Chemical Substances (PICCS):	Listed
Swiss Giftliste List of Toxic Substances:	Listed
U.S. TSCA:	Listed

15.2 Chemical Safety Assessment:

A chemical safety assessment has not been performed on this product.

SECTION 16 - OTHER INFORMATION

HMIS Rating (Scale 0-4)

Health hazard: 1
Flammability: 0
Physical Hazard: 0

NFPA Rating (Scale 0-4)

Health hazard: 1
Flammability: 0
Physical Hazard: 0

Caution: HMIS and NFPA ratings are based on a 0-4 rating scale

0= Minimal Hazard

1= Slight

2= Moderate

3= High

4= Extreme

Abbreviations and acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
CFR	Code of Federal Regulations
DOT	Federal Department of Transportation
GHS	The Globally Harmonized System of Classification and Labelling of Chemicals
HMIS	Hazardous Material Identification System
HCS	Hazard Communication Standard
IARC	International Agency for Research on Cancer
IATA	The International Air Transport Association
ICAO	The International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
LD50/LC50	Lethal Concentration/Dose, 50 percent
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OSHA	Occupational Safety and Health

PEL	<i>OSHA Permissible Exposure Limit</i>
SARA	<i>Superfund Amendments and Reauthorization Act</i>
TLV	<i>ACGIH Threshold Limit Value</i>
TWA	<i>Time-Weighted Average</i>
Acute Tox	<i>Acute Toxicity</i>
Skin Corr	<i>Skin Corrosion</i>

PREPARED BY: Chris Eigbrett

MSDS to GHS Compliance

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End of SDS Sheet