Final

2023 Performance Monitoring Report for Sites CPL006, CSS002, SS006/SS019, SS017, SS015, SS016, SS018, SS022, ST009, ST010, and FT001

Former Galena Forward Operating Location, Alaska

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ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AR	Administrative Record
AST	above ground storage tank
bgs	below ground surface
BHC	hexachlorocyclohexane (aka benzene hexachloride)
BTEX	benzene, toluene, ethylbenzene, and xylenes
btoc	below top of casing
BTV	background threshold value
CCR	Construction Completion Report
cells/mL	cells per milliliter
COC	constituent of concern
COI	constituent of interest
CUL	cleanup level
CVOC	chlorinated volatile organic compound
DCE	Dichloroethene
4,4-DDT	4,4-dichlorodiphenyltrichloroethane
DHC	*Dehalococcoides* species
DMPDB	dual-membrane passive diffusion bag
DOC	dissolved organic carbon
DRO	diesel-range organics
EAB	enhanced anaerobic bioremediation
EBT	enhanced biogeochemical transformation
EDB	ethylene dibromide
FD	field duplicate
FOL	Forward Operating Location
FY	fiscal year
GRO	gasoline-range organics
ISR	*in situ* respiration
ITRC	Interstate Technology and Regulatory Council
lbs	Pounds
LNAPL	light non-aqueous phase liquid
mg-TPH/kg-soil per day	milligrams total petroleum hydrocarbon per kilogram of soil per day
mg/L	milligrams per liter
mg/kg	milligrams per kilogram
MNA	monitored natural attenuation
mV	Millivolts

ACRONYMS AND ABBREVIATIONS (CONTINUED)

NAPL	non-aqueous phase liquid
OM&M	Operations, Maintenance and Monitoring
ORP	oxidation-reduction potential
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene (aka perchloroethene)
PFAS	per- and polyfluoroalkyl substances
PMR	Performance Monitoring Report
ppbv	parts per billion volume basis
ppmv	parts per million volume basis
PRB	permeable reactive barrier
PSZ	permanently saturated zone
qPCR	quantitative polymerase chain reaction
RAO	remedial action objectives
RD/RAWP	Remedial Design/Remedial Action Work Plan
RI	Remedial Investigation
ROD	Record of Decision
RPO	remedial process optimization
RRO	residual range organics
SVE	soil vapor extraction
SVOC	semi-volatile organic compound
TCA	trichloroethane
TCE	trichloroethene
TeCA	Tetrachloroethane
TOC	total organic carbon
TPH-g	total petroleum hydrocarbons – gasoline range
USAF	United States Air Force
UST	underground storage tank
VC	vinyl chloride
VMP	vapor monitoring point
VOC	volatile organic compound
VSZ	variably saturated zone
VW	vent well

1.0 INTRODUCTION

1.1 Purpose of Report

This Performance Monitoring Report (PMR) presents and evaluates performance monitoring data for sites at the Former Galena Forward Operating Location (FOL), Alaska managed by Parsons. These sites have an approved Cleanup Plan or Record of Decision (ROD), and had an active remedy installed and operating for fiscal year 2023 (FY2023; 1 October 2022 to 30 September 2023). The sites and remedies presented and evaluated herein are listed below. The locations of the sites are shown on **Figure 1-1**.

- Site CPL006 Area 3: Bioventing and Monitored Natural Attenuation (MNA)
- Site CSS002: Bioventing and Sulfate-Enhanced Bioremediation
- Site SS006/SS019: Soil Vapor Extraction (SVE), and Enhanced Anaerobic Bioremediation (EAB) and Enhanced Biogeochemical Transformation (EBT)
- Site SS017: Bioventing, Sulfate-Enhanced Bioremediation and Light Non-Aqueous Phase Liquid (LNAPL) Recovery (as feasible)
- Site SS015: SVE, EAB/EBT
- Site SS016: Bioventing and MNA
- Site SS018: Excavation and MNA
- Site SS022: SVE and MNA
- Site ST009: SVE and Sulfate-Enhanced Bioremediation
- Site ST010: Bioventing and MNA
- Site FT001: Bioventing and MNA

The purpose of this report is to provide an annual evaluation of how the remedies are progressing each site toward cleanup goals. This is accomplished in two ways: (1) a high-level overview on a site-by-site basis to summarize remedy performance, and (2) a more detailed evaluation of each remedy component/technology (provided in attachments).

The site performance overviews provide a summary of key performance indicators for remedy components using representative constituents of concern (COCs). Each site is evaluated for one or more of the following performance indicators (depending on the selected remedy):

- Groundwater monitoring results for indicator COCs.
- Groundwater geochemistry as an indicator of MNA or active groundwater remedy performance. Note that if groundwater geochemical parameters were not monitored at a site in 2023, the groundwater geochemistry subsection has been omitted for that site from this PMR.
- Sulfate concentrations in groundwater as an indicator of sulfate delivery at sulfate-enhanced bioremediation sites.
- Static soil gas monitoring results as an indicator of the concentrations of volatile organic compounds (VOCs) in soil.

- Cumulative COC or VOC mass removal as an indicator of SVE system performance.
- *In situ* respiration (ISR) test results as an indicator of bioventing system performance.
- LNAPL thickness measurements in wells.

Data for each of these performance indicators are presented in tables for each applicable site. These tables are updated annually to add new performance monitoring data. Once multiple sampling rounds have been conducted, concentration data may be graphed over time to evaluate trends in the performance indicators (typically at least three measurements for soil vapor and four to five measurements for groundwater are needed to discern a notable trend).

The United States Air Force (USAF) has issued a task order for Remedial Process Optimization (RPO) for the subject sites. Some FY2023 monitoring events incorporated RPO related sampling activities and analyses. The RPO activities and results are generally not addressed in this annual PMR but have been incorporated into the RPO evaluation report (Parsons, June 2023) and an addendum to the RPO evaluation report (Parsons, January 2024). A second addendum to the RPO evaluation report presenting FY2023 RPO activities is forthcoming.

Although sites may have multiple COCs, these performance summaries generally focus on one or more key representative or indicator COCs that are expected to have the greatest influence on remedy performance or time to cleanup complete. Indicator COCs may include diesel-range organics (DRO), gasoline-range organics (GRO), benzene, naphthalene, and trichloroethene (TCE). All constituents of interest (COIs) and COCs are monitored, and if other COCs appear to be controlling cleanup performance at a given site, the indicator COCs presented in the annual performance summary are updated.

The Cleanup Plans and RODs for most of the sites in this report were based on Alaska Department of Environmental Conservation (ADEC) cleanup levels (CULs) established in October 2008. ADEC updated the CULs in 2016 and again in 2018, as presented in the latest revision to 18 Alaska Administrative Code (AAC) 75 (ADEC, October 2023). This performance monitoring report compares groundwater concentrations to the 2018 ADEC Table C CULs. Soil data presented in this report are also compared to 2018 ADEC Method Two Table B CULs or site-specific Method Three alternative CULs for migration to groundwater. The most current CULs (2018 or any subsequent iteration) will be used as part of the Five-Year Review process.

1.2 Report Organization

- **Section 1, Introduction**: Introduction, purpose, and organization of this 2023 annual PMR
- **Section 2, Site CPL006 Area 3**: Site performance overview
- **Section 3, Site CSS002**: Site performance overview
- **Section 4, Site SS006/SS019**: Site performance overview
- **Section 5, Site SS017**: Site performance overview
- **Section 6, Site SS015**: Site performance overview
- **Section 7, Site SS016**: Site performance overview

- **Section 8, Site SS018**: Site performance overview
- **Section 9, Site SS022**: Site performance overview
- **Section 10, Site ST009**: Site performance overview
- **Section 11, Site ST010**: Site performance overview
- **Section 12, Site FT001**: Site performance overview
- **Section 13, 2021 Well Inspection, Repair and Maintenance Summary**: Overview of monitoring well inspections and repairs in 2023
- **Section 14, Summary of 2023 Performance Monitoring Recommendations**
- **Section 15, References**

Additional information, including detailed remedial system performance reports, are presented in the following attachments:

- **Attachment A** - Remedy Layout Figures from Construction Completion Reports (CCRs) or Design Documents
- **Attachment B** - 2023 Groundwater Geochemistry Evaluation
- **Attachment C** - 2023 Soil Vapor Extraction Systems Annual Report (provided separately)
- **Attachment D** - 2023 Bioventing Systems Annual Report (provided separately)
- **Attachment E** - 2023 Groundwater Data
- **Attachment F** - 2023 Well Inspections

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2.0 SITE CPL006 AREA 3

2.1 Remedy Summary

Site CPL006 includes four separate source areas. Performance monitoring was performed in 2023 at Area 3. The remedial approaches for the Site CPL006 source areas are described in the *Cleanup Plan for Site CPL006, Old Abandoned Pipeline, Former Galena Forward Operating Location, Alaska* (Cleanup Plan; Parsons, January 2017).

Remedy components for Site CPL006 Area 3 are:

- Excavation and landfarming of petroleum-contaminated surface soil.
- Bioventing for petroleum-contaminated soil in the vadose zone and variably saturated zone (VSZ).
- MNA for petroleum contaminants in groundwater.

The bioventing system at Area 3 was installed in 2016, startup testing was conducted in April/May 2017, and operations commenced in July 2017 (Parsons, September 2018a). Groundwater monitoring well CPL006-MW001 was also installed in 2016. Surface soil was excavated in 2017 (Parsons, September 2018b). Per the recommendations of the RPO evaluation (Parsons, June 2023), two additional VMPs were installed in the southern source area in 2023 to evaluate the ability of the bioventing system to maintain aerobic conditions in deep soils. The layout of the bioventing remedy for Site CPL006 Area 3 is illustrated on Figure A2-1 in **Attachment A**.

2.2 CPL006 Area 3 Constituents of Concern

COCs for Site CPL006 Area 3 include the following:

- Soil: GRO, DRO, benzene, toluene, ethylbenzene, xylenes, naphthalene, 1-methylnapthalene, and 2-methylnaphthalene
- Groundwater: DRO and benzene

2.3 CPL006 Area 3 Performance Monitoring Results and Evaluation

2.3.1 Groundwater Monitoring

The original groundwater monitoring program is detailed in the CUP (Parsons, January 2017). The groundwater monitoring program has evolved through subsequent recommendations in prior PMRs and the RPO evaluation (Parsons, June 2023). The current groundwater monitoring plan is presented in the table below. Concentrations of indicator contaminants in Site CPL006 Area 3 groundwater monitoring well CPL006-MW001 are listed in **Table 2-1** and presented on **Figure 2-1** and are presented as a ratio of the measured concentration to the ADEC Table C CUL for groundwater in **Figure 2-2**.

Monitoring Well	Screened Interval (feet bgs)	Current Frequency	Location - Purpose
CPL006	19-39	Monitor LNAPL annually at low groundwater. Biennially (odd years) for GRO, DRO, RRO, VOCs and PAHs. Once 1-methylnapthalene reaches its CUL, monitoring frequency for GRO and PAHs can be reduced to once every five years.	Source area well

DRO and benzene are the groundwater COCs used as indicators to track the performance of Site CPL006 Area 3 remedies on groundwater. Although not identified as a groundwater COC in the Cleanup Plan, naphthalene concentrations are also used to track performance of the CPL006 Area 3 remedy. The Table C CUL for naphthalene was reduced in 2016. Complete groundwater analytical results are presented in **Attachment E**.

DRO, benzene, and naphthalene all exceeded their Table C CULs in monitoring well CPL006-MW001 for the 2016 through 2023 monitoring events. Concentrations of benzene and naphthalene generally decreased since implementation of bioventing in 2016 through 2020 and then appear to have become relatively stable (**Table 2-1** and **Figure 2-2**). As compared to the FY2022 concentrations, there has been a decrease in the DRO, benzene, and naphthalene. However, DRO concentrations remain higher than they were in 2017. The apparent increasing DRO trend is most likely due to the formation of polar intermediate biodegradation products with greater solubility than the parent non-polar hydrocarbons. The RPO evaluation documented the DRO concentrations at CPL006-MW001 in 2020 and 2021 were between 91 and 95 percent polar metabolites (Parsons, June 2023). Entrainment of small NAPL blebs or sheen in the water sample may also contribute to the DRO concentrations.

2.3.2 Static Soil Gas Monitoring

Soil was sampled and analyzed for various COCs in several sampling events from 2011 to 2016. The highest concentrations of DRO and benzene detected in soil were 42,700 milligrams per kilogram (mg/kg) and 17.6 mg/kg respectively. Static soil gas sampling provides an indirect measure of VOC concentrations in soil in the VSZ, and sample results are used to evaluate the performance of the bioventing system.

Concentrations of total petroleum hydrocarbons-gasoline range (TPH-g) and benzene in static soil gas are presented in **Table 2-2**. Samples collected in April 2017 represent baseline (pre-bioventing) conditions. A sample could not be obtained from the shallow interval at vapor monitoring point (VMP) CPL006-VMP02 (**Attachment A**, Figure A2-1) during the baseline sampling event, but samples were collected during each year beginning in 2018. A sample was also collected from the shallow interval (6.5-7.5 feet below ground surface [bgs]) at CPL006-VMP04 in 2019 for the first time, and again in August 2020, April 2021, April 2022, and May 2023 to track progress of remediation in shallow soils in the southern source area. Because of apparent cross contamination, all 2019 soil vapor analytical sample results from Site CPL006 were rejected except one, CPL006-VMP02 (3.5-4.5 feet bgs) collected in July 2019.

At intervals CPL006-VMP02 (3.5-4.5 feet bgs) and CPL006-VMP07 (16-18 feet bgs) reductions in TPH-g and benzene concentrations have been lower than other intervals. At CPL006-VMP02 (3.5-4.5 feet bgs), the 2023 concentrations of TPH-g were less than the first (May 2018) sampling event by a factor of 1.6, while benzene concentrations were similar to the first (May

2018) sampling event but appear to be decreasing since 2019. At CPL006-VMP07 (16-18 feet bgs) the 2023 TPH-g concentration has decreased by a factor of 2 as compared to 2017 baseline; however, the benzene concentration has decreased by a factor of 310.

At the other five intervals sampled in 2023, static soil vapor results documented continued reductions in concentrations of TPH-g (between a factor of 88 and a factor of 1,600) and benzene (between a factor of 29 and a factor of 1,100) as compared to the first sampling event. Complete bioventing system monitoring results are provided in **Attachment D**.

2.3.3 Bioventing In Situ Respiration Testing and Biodegradation Rate Estimates

ISR testing was conducted from 25 April to 1 May 2023 at CPL006-VMP02 (3.5 to 4.5 feet bgs) and at CPL006-VMP06 (16 to 18 feet bgs). Historical fuel hydrocarbon biodegradation rates, calculated from the ISR test results, are summarized in **Table 2-3.** The estimated biodegradation rate for CPL006-VMP06 for 2023 was estimated to be 0.098 mg TPH/kg soil-day, which is over an order of magnitude less than it was in 2019 suggesting reductions in fuel hydrocarbons in this portion of the treatment area. The estimated biodegradation rate for CPL006-VMP02 is not presented because it is not considered representative. The rate for CPL006-VMP02 was based on only a few data points and was very high.

2.3.4 LNAPL Monitoring

Free product recovery was not identified as a remedy component in the Cleanup Plan for Site CPL006 (Parsons, January 2017); however, LNAPL has been detected in monitoring well CPL006-MW001. LNAPL measurements are presented in **Table 2-4**. LNAPL thickness was measured in April and September 2023.

The apparent thickness measured in the spring have generally decreased from the maximum thickness of 1.65 feet in April 2017 to 0.04 feet in April 2023; however, the LNAPL thickness was 1.27 feet in April 2022. The LNAPL thickness has exceeded 1 foot only during monitoring events when the depth to groundwater was greater than 30 feet below top of casing (btoc). This indicates a correlation between apparent LNAPL thickness and groundwater elevation.

The residual (non-mobile) saturation of LNAPL is generally lower in unsaturated soil relative to saturated soil due to the presence of other fluids such as water and gases (Interstate Technology and Regulatory Council [ITRC], March 2018). As the water table lowers and more of the VSZ is unsaturated, the difference in residual saturation mobilizes a portion of the LNAPL in the unsaturated zone, which accumulates at the water table. The greater the unsaturated vertical interval of the VSZ, the more LNAPL is mobilized and the greater the thickness of LNAPL that will be observed.

On 13 September 2023 only a sheen of LNAPL was present. Measurable LNAPL was not detected during relatively higher groundwater monitoring events in September 2016, July and September 2017, August 2018, August 2021, and September 2023.

An LNAPL baildown test was performed at monitoring well CPL006-MW001 in April 2018 as reported in Parsons (October 2019b). LNAPL recovery in well CPL006-MW001 was relatively rapid and based on the calculated LNAPL transmissivities it was determined that LNAPL recovery may be feasible during periods of low groundwater contingent on the groundwater elevation dropping below the interval with residual LNAPL. However, the proximity to the runway prevents any above ground collection devices and collection vessels, and from February through April when LNAPL is present the ground is covered with snow with temperatures below freezing making locating and accessing a product removal well difficult. This complicates LNAPL removal beyond use of a sorbent sock.

In the 2018 PMR (Parsons, October 2019a), it was recommended that free product be removed from the well each spring so that LNAPL does not accumulate in the well casing from year to year and that subsequent measurements are more representative. LNAPL sorbent socks were placed in the well in April 2019, August 2020, April 2022, and in April 2023. The socks were removed prior to sampling in the late summer of each year.

2.4 Summary of CPL006 Area 3 Performance Monitoring Observations

- All selected indicator COCs (DRO, benzene and naphthalene) concentrations in groundwater exceeded 2018 Table C CULs in well CPL006-MW001 in 2016 through 2023. Concentrations of benzene and naphthalene have decreased since implementation of bioventing. Concentrations of DRO have generally increased since bioventing was implemented, although the 2023 concentration was less than the 2022 concentration.
- Concentrations of TPH-g and benzene in static soil vapor have decreased as compared to baseline concentrations at most intervals; however, at one shallow interval both TPH-g and benzene have fluctuated but remain near baseline.
- ISR test data continue to show that contaminants are being biodegraded when aerobic conditions can be maintained, consistent with expectations for bioventing operations. The rate at the sole interval with a representative result in 2023 was over an order of magnitude less than it was in 2019 indicative of reductions in fuel hydrocarbons in this portion of the treatment area.
- Measurable thicknesses of LNAPL were present in CPL006-MW001 in 2017, 2018, 2019, 2021, 2022, and 2023 during low groundwater (in the early spring) but are generally not present or are very thin (<0.05 feet) when groundwater elevations were higher (in late summer/fall). The LNAPL thickness has exceeded 1 foot only during monitoring events when the depth to groundwater was greater than 30 feet btoc. A sorbent sock was installed in April 2023 and removed prior to groundwater sampling.

2.5 Recommendations

Continued operation and monitoring of the Site CPL006 Area 3 bioventing system and monitoring soil vapor are recommended. See **Attachment D** for detailed bioventing system operation, maintenance, and monitoring (OM&M) recommendations.

Per the recommendations of the RPO evaluation (Parsons, June 2023) two soil borings were sampled in the southern source area in 2023 to further delineate the extent of contamination in the lower VSZ. Both borings were completed as VMPs to evaluate the ability of the bioventing system to maintain aerobic conditions in deep soils. Results of the 2023 soil sampling will be presented in an addendum to the RPO evaluation report. The new VMP intervals were below groundwater at the time of installation and were sampled in the spring of 2024. Based on review of the soil and soil vapor sampling results, installation of deep VWs in the southern release area is not recommended at this time.

Because of the relatively long duration until Table C CULs are expected to be achieved, the RPO evaluation (Parsons, June 2023) recommended the frequency of groundwater monitoring be reduced from annually to biennially (every two years) after the 2023 sampling event. Biennial groundwater samples will be analyzed for GRO, DRO, RRO, VOCs and PAHs. Once 1-methylnapthalene reaches its CUL, monitoring frequency for GRO and PAHs can be reduced to once every five years to coincide with the Five-Year Review sampling event.

Benzene and naphthalene concentrations appear to be relatively stable and more aggressive treatment should be considered. Prior to evaluation of potential groundwater remedies, the extent of groundwater exceeding Table C CULs needs to be delineated. A grab groundwater sample investigation is recommended to delineate the extent of Table C CUL exceedances to the north, east, and west of CPL006-MW001.

Per the recommendations of the RPO evaluation (Parsons, June 2023), LNAPL thickness will be monitored annually in early spring when the groundwater elevation is low. Continue to remove free product when it is detected so that LNAPL does not accumulate in the well casing from year to year so that subsequent measurements are more representative.

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3.0 SITE CSS002

3.1 Remedy Summary

The remedial approach for Site CSS002 is described in *Phase I Construction Completion Report and Phase II Cleanup Plan for Site CSS002, Building 1812 Former Hazardous Waste Accumulation Point* (Parsons, August 2016). Remedy components are:

- Excavation and off-site disposal of polychlorinated biphenyl (PCB)-contaminated soil.
- Excavation and landfarming of petroleum-contaminated soil above 15 feet bgs to the extent possible, and application of chemical oxidant to floor of excavation.
- Bioventing for petroleum contaminated soil outside the limits of the excavation and at depths greater than 15 feet bgs.
- Sulfate-enhanced bioremediation for petroleum-contaminated soil in the permanently saturated zone (PSZ) and in groundwater.

Excavations and chemical oxidant application were completed in 2015. The bioventing system was installed in 2016, startup testing was conducted in April 2017, and operations commenced in July 2017. The bioventing system operated seasonally through April 2023 when bioventing treatment was ceased per the recommendations of the RPO evaluation (Parsons, June 2023). Two additional groundwater monitoring wells (CSS002-MW002 and CSS002-MW003) were installed in 2016. Gypsum was injected into the subsurface in July 2017. The layout of the remedies for Site CSS002 are illustrated on Figures A3-1 and A3-2 in **Attachment A**.

3.2 Constituents of Concern

- Soil: GRO, DRO, benzene, 1,2,4-trimethylbenzene, naphthalene, 1-methylnapthalene, 2-methylnaphthalene, TCE and tetrachloroethene (PCE)
- Groundwater: GRO, DRO, benzene, naphthalene, 1-methylnapthalene, 2-methylnaphthalene, and TCE

3.3 Performance Monitoring Results and Evaluation

3.3.1 Groundwater Monitoring

The original groundwater monitoring program is detailed in the CUP (Parsons, August 2016). The groundwater monitoring program has evolved through subsequent recommendations in prior PMRs and the RPO evaluation (Parsons, June 2023). The current groundwater monitoring plan is presented in the table below, with monitoring wells listed below in order from upgradient to downgradient (**Figure 3-1**).

DRO, benzene, and naphthalene are used to track the performance for Site CSS002 remedies on groundwater (and indirectly, performance of the remedies on soil in the VSZ and PSZ). Their concentrations in Site CSS002 groundwater monitoring wells are shown in **Table 3-1**. Groundwater performance monitoring results for 2023 are presented on **Figure 3-1**. GRO, 1-methylnaphthalene, 2-methylnaphthalene, and TCE are also groundwater COCs for Site CSS002 (data included in **Attachment E**). Neither GRO, 2-methylnaphthalene nor TCE exceed their Table C CUL in any monitoring well in 2023. 1-Methylnaphthalene exceeded its CUL in both monitoring wells in 2023. Complete groundwater analytical results are presented in **Attachment E**.

Monitoring Well	Screened Interval (feet bgs)	Current Frequency	Location - Purpose
CSS002-MW002	17 – 37	Annual for GRO, DRO, RRO, VOCs and PAHs	Monitor source zone
CSS002-MW003	17 – 37	Annual for GRO, DRO, RRO, VOCs and PAHs	Monitor downgradient
B1812-MW001	12 – 37	Annual for redox parameters only	Use for assessing redox conditions upgradient of Site ST009

DRO exceeded its Table C CUL in the source area monitoring well CSS002-MW002. Concentrations of DRO had increased between 2016 and 2019 (to 21.3 times its CUL), decreased between 2019 and 2021 to the lowest measured to date (3.7 times its CUL), and then increased again to 8.7 times its CUL in 2023. Since monitoring of CSS002-MW002 began in 2016, concentrations of benzene have decreased by over one order of magnitude and concentrations of naphthalene have decreased by over three orders of magnitude (**Figure 3-2**) and have been below their CULs since 2021.

In 2023 DRO and benzene exceeded their Table C CUL in both the primary and field duplicate (FD) samples in downgradient well CS002-MW003. 1-Methlynapthalene was also detected at concentrations at or slightly above its CUL in 2023 in both the primary and field duplicate samples (**Appendix E**).

DRO did not exceed Table C CULs in downgradient well CS002-MW003 in 2016, 2017, 2018 or 2020, but has exceeded the CUL since 2021. The data indicate the detections of DRO may be associated with increased concentrations of DRO polar metabolites resulting from active remediation in the upgradient source area. Benzene was consistently below its CUL until the 2023 sample event, when both the primary and duplicate sample exceeded the benzene CUL by a factor of 1.2. Naphthalene has consistently been below its CULs in well CSS002-MW003.

The increases in groundwater concentrations observed in September 2023 are likely not attributable to shutdown of the bioventing system in April 2023. Each year since startup in 2017 the bioventing system was shut down in April for high groundwater. The groundwater elevation was higher in 2023 than any of the prior monitoring events and remained high for an extended period. The slight rebounds in concentrations of DRO, benzene, and naphthalene observed in 2023 may be related to this high groundwater event.

Monitoring was not conducted in the downgradient well B1812 in 2023, due to historical concentrations of DRO, benzene, and naphthalene concentrations below Table C CULs. Benzene exceeded its Table C CUL in downgradient well B1812-MW001 only in 2016 but did not exceed its CUL in previous events dating back to 2013 or subsequent events since 2017.

3.3.2 Groundwater Geochemistry and Sulfate Monitoring

Per the recommendations of the RPO evaluation (Parsons, June 2023) monitoring for sulfate has been discontinued at Site CSS002. A discussion of the groundwater geochemistry for Site CSS002 is presented in **Attachment B**.

3.3.3 Static Soil Gas Monitoring

Soil was sampled and analyzed in several sampling events from 2010 to 2015. The highest concentration of DRO, GRO, and benzene remaining in soil after the 2015 excavation were 27,000 mg/kg, 3,100 mg/kg, and 0.18 mg/kg, respectively (Parsons, August 2016). Soil samples were collected in 2021 under the RPO project to evaluate the progress of bioventing at achieving remedial action objectives (RAOs); results are presented in the RPO evaluation (Parsons, June 2023).

Static soil gas sampling provides an indirect measure of VOC concentrations in soil in the VSZ and is an indicator of the performance of the bioventing system. Concentrations of TPH-g and benzene in static soil gas are presented in **Table 3-2**. Samples collected in April 2017 represent baseline (pre-bioventing) conditions. Because of apparent cross contamination, all 2019 analytical sample results from Site CSS002 were rejected.

As compared to 2017 baseline concentrations, TPH-g has decreased by between a factor of 46 and 200 and benzene has decreased to near or below reporting limits (between a factor of 67 and 4,200). Complete bioventing system monitoring results are provided in **Attachment D**.

3.4 Summary of Performance Observations

- Concentrations of benzene and naphthalene in groundwater have decreased several orders of magnitude in the source area well CSS002-MW002 since 2016 and are both below their CULs. Naphthalene has not exceeded CULs in downgradient wells since the beginning of the monitoring program (in 2016). Benzene exceeded its CUL in downgradient well CSS002-MW003 for the first time in 2023.
- Concentrations of DRO in groundwater exceeded its Table C CUL in the source area well CSS002-MW002 in 2023. Concentrations of DRO in well CSS002-MW002 increased between 2016 and 2019 but decreased in 2020 and 2021 and marginally increased in 2023. Concentrations of DRO in downgradient well CSS002-MW003 have been variable but were the greatest to date in 2023, exceeding the CUL by a factor of between 4 to 5.
- Concentrations of indicator COCs in soil vapor have continued to decrease as compared to 2017 baseline concentrations.

3.5 Recommendations

Based on 2021 soil sample results and the body of groundwater data, shutdown in the bioventing system was recommended in the RPO evaluation (Parsons, June 2023). The bioventing system was run through the winter of 2022/2023 and was turned off in April 2023. Decommissioning of the bioventing system is not recommended at this time. If future groundwater monitoring confirms RAOs have been met and concentrations of COCs have not rebounded, the USAF will seek approval from ADEC to decommission the bioventing system.

2023 concentrations of DRO and benzene in downgradient well CSS002-MW003 were the greatest observed to date. The unseasonably high groundwater in 2023 may have contributed to this increase. The increase in 2023 is not related to discontinuing bioventing because the system was shut down in April 2023 as it had been shut down each year in April for high groundwater. Continued annual groundwater monitoring is recommended to assess the impact of shutting down the bioventing system. Per the recommendations of the RPO evaluation (Parsons, June 2023), monitoring of well B1812-MW001 will be for redox parameters only. If concentrations of benzene or other COCs, excepting DRO, in CSS002-MW003 continue to exceed Table C CULs in future sampling events, sampling of well B1812-MW001 will be resumed. DRO in well CSS002-MW003 has exceeded Table C CULs for several sampling events but was comprised of between 84 and 100 percent polar metabolites in 2020 and 2021 RPO samples (Parsons, June 2023).

4.0 SITES SS006/SS019

4.1 Remedy Summary

The remedial approach for Sites SS006/SS019 was selected in the *Record of Decision for Trichloroethene (TCE) Area (Site SS006)/Building 1700 – Refueler Maintenance Shop (Site SS019)* (Parsons, July 2018a) and is described in *Remedial Design and Remedial Action Work Plan for Trichloroethene (TCE) Area (Site SS006)/Building 1700 – Refueler Maintenance Shop (Site SS019)* (Parsons, July 2018b). Remedy components are:

- Excavation of polycyclic aromatic hydrocarbon (PAH)- and pentachlorophenol-contaminated surface soil on the east side of Building 1844.
- Removal of a former dry well at Site SS019.
- SVE to address VOC contamination in vadose zone and VSZ soil.
- EAB/EBT to treat saturated soil and groundwater contamination in the source area.
- MNA to monitor and document reductions in COC concentrations in groundwater downgradient of the EAB/EBT treatment area and to document plume stability or contraction.

The SS019 dry well was removed and PAH- and pentachlorophenol-contaminated soils were excavated in 2018. EAB/EBT was also implemented in 2018 with injection of emulsified vegetable oil, sulfate, and a microbial bioaugmentation culture. Several new groundwater monitoring wells were also installed, developed, and sampled in 2018 in accordance with the Remedial Design and Remedial Action Work Plan (RD/RAWP). The activities completed in 2018 are documented in the 2018 CCR (Parsons, August 2019).

VWs and VMPs were installed at Site SS006/SS019 in 2018 and in 2019 the VWs were plumbed to the Site SS006 and Site SS019 SVE systems. The SVE system at Site SS006 was installed in 2019. A pilot-scale SVE system installed at Site SS019 in 2015 was expanded in 2019 as part of the final remedy. SVE system installation, expansion, and startup activities are documented in the *Construction Completion Report; Trichloroethene (TCE) Area (Site SS006)/Building 1700 – Refueler Maintenance Shop (Site SS019)* (Parsons, February 2020).

Layouts of the SVE remedy and EAB/EBT injection locations are illustrated on Figures A4-1 through A4-4 in **Attachment A**. **Figure 4-1** presents the groundwater monitoring network.

4.2 Constituents of Concern

Site SS006

- Soil: 1,1,2-trichloroethane (TCA); benzene; cis-1,2-dichloroethene (DCE); dibenzofuran; DRO; TCE; PCE; pentachlorophenol; and several PAHs (1-methylnaphthalene; 2-methylnaphthalene; acenaphthene; benzo[a]anthracene; benzo[a]pyrene; benzo[b]fluoranthene; benzo[k]fluoranthene; chrysene; dibenz[a,h]anthracene; dibenzofuran; fluoranthene; fluorene; indeno[1,2,3-cd]pyrene; naphthalene; phenanthrene; pyrene).
- Groundwater: 1,1,2-TCA; cis-1,2-DCE; DRO; TCE; vinyl chloride (VC).

Site SS019

- Soil: 1,2,4-trimethylbenzene; 1-methylnaphthalene; 2-methylnaphthalene; benzene; DRO; GRO; ethylbenzene; ethylene dibromide (EDB); isopropylbenzene; naphthalene; n-butylbenzene; sec-butylbenzene; toluene; TCE; xylenes.
- Groundwater: 1,2,4-trimethylbenzene; 1-methylnaphthalene; benzene; cis-1,2-DCE; DRO; ethylbenzene; EDB; naphthalene; toluene; TCE; VC; xylenes.

4.3 Performance Monitoring Results and Evaluation

4.3.1 Groundwater Monitoring

The original groundwater monitoring program is detailed in the RD/RAWP (Parsons, July 2018b). The groundwater monitoring program has evolved through subsequent recommendations in prior PMRs and the RPO evaluation (Parsons, June 2023). The current groundwater monitoring plan is presented in the table on page 4-3, with monitoring wells listed below in order from upgradient to downgradient.

Historically, TCE contamination has been greatest in the VSZ and upper portion of the PSZ. Performance monitoring wells are the wells where impacts of EAB/EBT are anticipated and these wells are sampled annually. Two in-plume wells (SS006-MW66 and SS006-MW69) that are screened deeper in the lower PSZ (below approximately 80 feet bgs), and one downgradient well screened in the upper PSZ (SS006-MW75) are sampled every five years to document plume stability (i.e., the plume is not migrating at the toe of the plume or at depth). These wells were sampled as part of the routine performance monitoring program in 2023 (prior to the Five-Year Review).

TCE is the primary analyte used to track the performance of Site SS006/SS019 remedies on groundwater (and indirectly, performance of the remedies on soil in the VSZ and PSZ). Cis-1,2-DCE, trans-1,2-DCE, VC, and ethene are also tracked as they are produced by the sequential reductive dechlorination of TCE to DCE to VC to ethene. Concentrations of TCE, 1,1,2-TCA, cis-1,2-DCE, 1,2-trans-DCE, VC, ethene and ethane in Site SS006 performance monitoring wells are shown in **Table 4-1**. Groundwater performance monitoring results are presented on **Figure 4-1**. Complete groundwater analytical results are presented in **Attachment E**.

4.3.1.1 Historical Trends in TCE

Most of the wells in the performance monitoring network have been sampled six times or less and are just beginning to have sufficient data to discern trends. There have only been six monitoring events since implementation of EAB/EBT in 2018. Long-term trends dating back to before implementation of EAB/EBT for monitoring wells 06-MW09/06-MW-09R, 06-MW-10, and SS006-MW67 are shown on **Figure 4-2a**. Source area well 06-MW-09R (screened in the upper PSZ) has been sampled ten times since 2004 including results from its predecessor 06-MW-09. The TCE concentration relative to its Table C CUL has gradually decreased over the monitoring period.

At co-located well 06-MW-10, screened in the middle of the PSZ, the concentrations of TCE have been considerably lower and have also decreased over time, and have been below the CUL since July 2010. These decreasing trends appear to be primarily due to natural attenuation. Concentrations of TCE at monitoring well SS006-MW67 had been relatively stable between 2011 and 2020 but decreased abruptly between 2020 and 2023 to below the CUL. The

Monitoring Well	Screened Interval (feet bgs)	Current Frequency	Location - Purpose
SS006-MW77	15-40	Every five years for GRO, DRO, RRO, VOCs, redox parameter, and dissolved arsenic.	Upgradient (background).
SS006-MW78	15-40	Annual for VOCs and redox parameters. Every five years for dissolved arsenic.	Source area - Downgradient of Permeable Reactive Barrier (PRB)-1 and screened in the VSZ/upper PSZ.
SS006-MW79	40-50		Source area – Downgradient of PRB-1 and screened in the upper PSZ.
SS006-MW80	40-50	Annual for VOCs, redox parameters, and microbial community parameters. Every five years for dissolved arsenic.	Source area – Directly downgradient of PRB-2.
SS019-MW84	13-18	Annual for GRO, DRO, RRO, and VOCs	Source area – Monitor SS019 drywell source area.
06-MW-09R	33-43	Annual for VOCs, redox parameters, and microbial community parameters. Every five years for dissolved arsenic.	Source area –Downgradient of PRB-2 in upper PSZ.
06-MW-10	60-70		Source area –Co-located with SS006-MW09R and screened in mid-PSZ.
SS006-MW81	15-35	Annual for VOCs and redox parameters. Every five years for dissolved arsenic.	In-plume -Upgradient of PRB-3 and screened in the VSZ/upper PSZ.
SS006-MW82	45-55		In-plume - Upgradient of PRB-3 and screened in the upper PSZ.
SS006-MW83	35-45	Annual for VOCs, redox parameters, and microbial community parameters. Every five years for dissolved arsenic.	In-plume - Directly Downgradient of PRB-3 in upper PSZ.
SS006-MW67	40-50		In-plume - Downgradient of PRB-3 in upper PSZ.
SS006-MW68	60-70		In-plume -Downgradient of PRB-3 in middle PSZ.
SS006-MW74	12-32	Every five years for VOCs	Downgradient - MNA downgradient of EAB/EBT treatment zone, at toe of plume in VSZ/upper PSZ.
SS018-MW003	13-33	Annual for VOCs	In-plume - Monitor for TCE and dechlorination products at Site SS018. Part of Site SS018 monitoring program.
CS002-MW003	17-37	Annual for VOCs	Side gradient - Monitor for TCE and dechlorination products at Site CSS002 and Water Treatment Plant. Part of the Site CSS002 monitoring program.
SS006-MW66	80-90	Every five years for VOCs	Source area – Clean well in center of plume in lower PSZ. Monitor to document plume stability.
SS006-MW69	78.6-88.6	Every five years for VOCs	In-plume -Downgradient of PRB-3 in lower PSZ. Monitor to document plume stability.
SS006-MW75	45-55	Every five years for VOCs	Downgradient - MNA downgradient of EAB/EBT treatment zone, at toe of plume in upper PSZ. Monitor to document plume stability.

abrupt decrease of TCE concentrations is paired with increases in VC and ethene, indicating reductive dechlorination caused by EAB/EBT treatment.

4.3.1.2 Performance Monitoring of Chlorinated VOCs

Groundwater monitoring results for key indicator COCs TCE, 1,1,2-TCA, cis-1,2-DCE, trans-1,2-DCE, VC, ethene and ethane are summarized in **Table 4-1**. **Figure 4-3** presents concentrations of TCE, cis-1,2-DCE, VC and ethene along the plume axis. This figure shows that the TCE plume is delineated and that decay products provide evidence of reductive dechlorination of TCE.

In upgradient monitoring well SS006-MW77, cis-1,2-DCE exceeded its 2018 Table C CUL in 2023. The cis-1,2-DCE concentration has been gradually decreasing since 2019.

TCE concentrations appear to be responding to treatment in wells. Abrupt decreases in TCE concentrations have been observed in several source area and in-plume wells (**Figure 4-2b**), in some wells beginning in 2019 and in others beginning in 2021 and 2022 (e.g., SS006-MW78, not shown on Figure 4-2b). Concentrations are decreasing but at a rate indicative of natural attenuation in source area well 06-MW-09R, and concentrations are fluctuating and show no trend in well SS006-MW79. Concentrations have decreased to below the CUL in several wells including source area well SS006-MW80, and in-plume wells SS006-MW67, SS006-MW82, and SS006-MW83. However, in source area well SS006-MW81, TCE concentrations have increased since 2021 and remain above the CUL. In source area well SS019-MW84, TCE concentrations have fluctuated and also remain above the CUL.

TCE concentrations are below the CUL in the most downgradient in-plume cluster SS006-MW67, SS006-MW68, and SS006-MW69, but remain slightly above the CUL in side-gradient well SS018-MW003.

1,1,2-TCA was detected in a single monitoring well (06-MW-09R) in 2023 at a concentration 585 times its CUL, which is a sharp increase since 2022.

Cis-1,2-DCE concentrations generally mirror the TCE concentration trends. VC and ethene concentrations have increased in many wells, particularly in 2021 and 2022, roughly corresponding to the decreases in TCE concentrations. VC and ethene concentrations have increased in wells 06-MW-09R (where TCE concentrations decreases have been gradual) and SS006-MW79 (where TCE concentrations have fluctuated), indicating significant reductive dechlorination activity despite the TCE trends.

VC concentrations currently exceed the CUL in several wells. VC concentrations in in-plume cluster SS006-MW82, and SS006-MW83 appear to have peaked in 2020 and 2019 respectively, and have decreased in more recent years; however, in the clustered well, SS006-MW81, the VC concentration in 2023 increased by more than 6 times its 2022 concentration. The highest recorded VC concentration in in-plume well SS006-MW67 was observed in 2022.

Figure 4-4a shows concentrations of TCE, cis-1,2-DCE, and VC in groundwater along the centerline of the Site SS006 plume in 2018 (baseline) and 2023 (centerline well locations are shown on **Figure 4-1**). TCE concentrations have decreased along the centerline of the TCE plume downgradient from PBR-2 except at two locations: SS006-MW79 and SS006-MW74. At SS006-MW79, TCE increased from 11 micrograms per liter (µg/L) to 70 µg/L (down from 310 µg/L in 2022). At SS006-MW74, TCE concentrations increased from 0.59 µg/L to 2.2 µg/L, which is still less than the CUL. Cis-1,2-DCE concentrations have increased in some wells while decreasing in others.

Concentrations of VC for 2018, 2020, and 2023 are shown on **Figure 4-4b**. Concentrations of VC were all less than or equal to 1.0 µg/L in 2018. By 2020, VC concentrations had increased at nearly all locations from monitoring well SS006-MW80 (just downgradient of PRB-2) to monitoring well SS006-MW67 (located downgradient of PRB-3). In 2023, VC was higher than 2018 baseline at five wells along the transect, including all wells between SS006-MW78 and SS006-MW81, located between PRB-1 and PBR-2. At wells located downgradient of PRB-3, SS006-MW67 and SS006-MW74, VC in 2023 was less than 1.0 µg/L, suggesting that dechlorination may be near complete downgradient of PRB-3.

The 2023 ethene data (**Figure 4-4c**) confirm the complete dechlorination of chlorinated ethenes is occurring throughout the plume, even at wells with elevated VC. In 2018, ethene was not detected throughout the length of the plume. By 2020 ethene was detected in all wells downgradient of PBR-2 except 06-MW-09R. In 2023, the ethene concentrations remain elevated compared to baseline, with concentrations ranging between 3 µg/L and 350 µg/L, and is generally increasing in concentration along the plume axis. These results indicate complete reductive dechlorination to ethene is occurring throughout most of the plume.

There is little evidence of reductive dechlorination in water table wells upgradient (SS006-MW77) of PRB-1 in the source area. However, there is evidence of reductive dechlorination downgradient of PRB-1 at SS006-MW78 (screened 15-40 feet bgs) where TCE has decreased and ethene concentrations have increased. There is also evidence of reductive dechlorination deeper in the aquifer downgradient of PRB-1 (SS006-MW79; 40-50 feet bgs) where VC and ethene concentrations have increased. Concentrations of dissolved organic carbon (DOC) remain near or below 10 mg/L in these wells (see Table 4-1 in **Attachment B**) and it does not appear they have been impacted by injection of emulsified vegetable oil into PRB-1.

4.3.1.3 Performance Monitoring – Site SS019

Monitoring well (SS019-MW84) was installed in the SS019 source area in 2018. Overall, TCE and cis-1,2-DCE concentrations have decreased over time, until 2023, when TCE increased by a factor of over four and cis-1,2-DCE increased by a factor of three compared to the 2022 concentrations. The unseasonably high groundwater in 2023 may have contributed to these increases. Concentrations of the reductive dechlorination product VC increased in 2021 and remained elevated through 2023.

All fuel-related analytes detected at SS019-MW84 in 2021 through 2023 were below their Table C CUL (**Attachment E**) except for naphthalene in 2023 (4.9 µg/L) which exceeded its CUL (1.7 µg/L). These data suggest SVE and excavation of petroleum-contaminated soil from the former dry well have greatly reduced the mass of fuel hydrocarbons in the vadose zone and VSZ at Site SS019, and in groundwater as a result. Monitoring of well SS019-MW84 continues to be monitored to track chlorinated VOCs associated with the Site SS006 source area.

4.3.2 Groundwater Geochemistry

Groundwater samples were analyzed for geochemical parameters in 2018 to establish baseline geochemical conditions. Groundwater samples were analyzed for geochemical parameters in 2023 to evaluate the effectiveness of EAB/EBT to stimulate biological activity and induce reducing conditions. Evaluation of geochemical parameters indicate that conditions in 2023 remain highly reducing at most monitoring wells located within the treatment zone with sulfate-reducing or methanogenic conditions present (**Attachment B**, Table 4-1). Wells screened predominantly in the PSZ exhibited more reducing conditions. In 2023 several of the wells were accidently sampled for total organic carbon (TOC) rather than DOC. TOC concentrations should be greater than DOC concentrations because they include both dissolved and non-dissolved organic carbon. DOC and TOC concentrations in samples collected in 2023 indicate that concentrations have dropped below the 20 mg/L DOC threshold considered optimal to support anaerobic biodegradation (i.e., greater than 10 to 20 mg/L) in several wells proximal to the PRBs. DOC concentrations in most wells that increased after the 2018 injections have gradually decreased in 2023. Increases in methane and elevated dissolved iron concentrations in treatment area wells as compared to 2018 baseline concentrations indicate that anaerobic conditions still exist and that the 2018 EAB/EBT injections have made conditions more favorable to reductive dechlorination (i.e., more reducing).

4.3.3 Microbial Community Parameters

Groundwater samples collected from six of the performance monitoring wells were analyzed for the *Dehalococcoides* species (DHC), as well as reductase genes that express the ability of DHC to degrade TCE (tceA) and VC (BAV1 VC and VC). The samples were analyzed by Microbial Insights, Inc. in Rockford, Tennessee using a molecular biological tool called quantitative polymerase chain reaction (qPCR). The suite of DHC and reductase genes is referred to as “Bio-Dechlor Census” by the laboratory and analytical results are presented in **Table 4-2**.

While several bacterial cultures capable of utilizing PCE and TCE as growth supporting electron acceptors have been isolated, DHC may be the most important because they are the only bacterial group that has been isolated to date which is capable of complete sequential reductive dechlorination of PCE and TCE to DCE to VC to non-toxic ethene. The DHC strain used in the KB-1® bioaugmentation culture injected at Site SS006 is known to fully dechlorinate cis-1,2-DCE and VC to ethene. Quantification of the reductase genes is used to confirm the potential for complete dechlorination to ethene.

DHC and the reductase genes are measured as the concentration of gene cells present per milliliter of sample (cells/mL). The three reductase genes encode the enzymes responsible for the dechlorination of TCE (tceA), dechlorination of VC to ethene (BAV1 VC), and dechlorination of both DCE and VC to ethene (VC).

Samples were collected from eight monitoring wells in 2018 to establish baseline concentrations of DHC and the reductase genes. Baseline concentrations of DHC in 2018 ranged from 2.10 E+00 cells/mL to 1.92E+01 cells/mL. The three reductase genes were not detected in 2018. While very low concentrations of DHC may be naturally present in groundwater at Site SS006, the lack of reductase genes indicates the native population of DHC was not actively, or only slowly active in, degrading TCE to cis-1,2-DCE or VC.

DHC was detected in 2023 groundwater samples from all six monitoring wells (SS006-MW80, 06-MW-09R, 06-MW-10, SS006-MW83, SS006-MW67, and SS006-MW68) at concentrations ranging from 1.74E+02 cells/mL in well 06-MW-10 to 3.85E+04 cells/mL in well SS006-MW67. The 2023 concentrations of DHC are substantially higher (one to two orders of magnitude) than detected in the same wells in August 2018, prior to the 2018 bioaugmentation injection. Additionally, DHC concentrations increased in five of the six wells between 2022 and 2023.

The following evaluation of the significance of the microbial census results is based on interpretive information provided by Microbial Insights:

- A concentration of 1.00E+04 (10,000) cells/mL can be used as a screening criterion to identify sites where reductive dechlorination will yield a generally useful biodegradation rate; ethene production has been observed at most sites with DHC concentrations equal to or exceeding this screening criterion. The concentrations of DHC at all wells, except for SS006-MW67, were below the 1.00E+04 cells/mL criterion in 2023 (**Table 4.2**).

- DHC concentrations ranging from 1.00E+01 to 1.00E+04 cells/mL are considered moderate and complete reductive dechlorination of TCE to ethene may still occur when VC reductase genes are also detected. In 2023, five of six wells had concentrations of DHC in this range and all showed detectable levels of the VC reductase gene.
- The reductase gene that encodes the enzyme responsible for reductive dechlorination of TCE (tceA) was detected in only one sample in 2023 (SS006-MW83 at 1.60E+00 cells/mL). The absence of tceA does not preclude the potential for reductive dechlorination of TCE in the field because the tceA gene is not universally distributed among all DHC species and is not present in other microorganisms capable of reductive dechlorination of TCE to cis-1,2-DCE (e.g., *Dehalobacter*).
- The VC reductase genes BAV1 VC and VC encode the enzymes responsible for reductive dechlorination of VC to ethene and cis-1,2-DCE and VC to ethene, respectively. Neither of these reductase genes was detected in baseline samples in 2018. The gene for the BAV1 VC reductase enzyme was not detected in any of the six wells sampled in 2023 (SS006-MW68 at 6.00E-1 J cells/mL). However, all six samples collected in 2023 had detected concentrations of the VC reductase gene ranging in concentration from 7.40E+00 to 1.31E+03 cells/mL. These results indicate that the bioaugmentation culture injected at Site SS006 has the potential for complete reductive dechlorination of TCE to DCE to VC to ethene.
- Ethene was detected at elevated concentrations in all six wells in 2023 (0.4 to 350 µg/L). At each of these locations ethene was not detected in 2018. These results provide evidence that the EAB/EBT bioaugmentation has enabled complete reductive dechlorination of TCE to DCE to VC to ethene.
- 2023 DOC or TOC concentrations were less than 10 mg/L in the wells sampled for DHC and the reductase genes excepting SS006-MW83 (DOC = 17.7 mg/L) (Table 4-1 in **Attachment B**). Despite DOC concentrations returning to levels near 2018 baseline in most wells, DHC and VC reductase concentrations remain elevated compared to baseline.
- While concentrations of DHC and the VR reductase gene remain elevated as compared to 2018 baseline, both have decreased in most wells from peak concentrations in 2020 or 2021.

Overall, the microbial census data indicate that the population of DHC has increased in all six wells in 2023 since the 2018 emulsified vegetable oil substrate and bioaugmentation culture injection. In all five of the six wells there were increases in DHC concentrations between 2022 and 2023 and in three of the six wells there were increases in VC reductase gene between 2022 and 2023. Elevated concentrations of DHC and VC reductase genes and evidence of sequential dechlorination to ethene were observed in wells with concentrations of DOC near 2018 baseline levels. This may indicate the remedy can operate effectively, if not optimally, at lower DOC concentrations than the design target of 10 mg/L. It is expected that the concentrations of DHC and VC reductase genes will continue decrease as TCE, DCE and VC are depleted, or as concentrations of DOC decrease.

4.3.4 Static Soil Gas Monitoring

4.3.4.1 Site SS006

Soil was sampled and analyzed for chlorinated VOCs and petroleum hydrocarbons at Site SS006 between 1992 and 2015, prior to the installation of the SVE system. The highest concentrations of TCE (those exceeding the human health Method Two CUL) in soil were detected between 0 and 15 feet bgs off the eastern edge of the concrete pad between former Buildings 1842 and 1844; however, elevated concentrations of TCE are found in deeper soil and over a much larger area. Petroleum related VOCs in soil were detected at three isolated locations at between 5 and 12 feet bgs.

Soil will not be sampled until soil gas results indicate the SVE remedy is complete. Static soil gas sampling provides an indirect measure of VOC concentrations in soil and performance of SVE system. Baseline static soil vapor samples were collected and analyzed in April 2019. Baseline concentrations of TPH-g, TCE, cis-1,2-DCE, and VC in static soil gas are presented in **Table 4-3**. Comprehensive soil vapor sample results are presented in the SVE Annual Report (**Attachment C**). These data are used to evaluate the progress of remediation of vadose zone and VSZ soil. Although VC was only detected in one of the samples, it is included as an indicator because it is a dechlorination (breakdown) product of TCE.

As compared to 2019 baseline concentrations:

- TCE concentrations decreased in five of the six VMP intervals sampled (between a factor of 2.7 and 250) and increased in one interval.
- Cis-1,2-DCE decreased in all six VMP intervals (between a factor of 1.8 and 100).
- The VC was not detected in any samples collected in 2023.
- TPH-g concentrations decreased in five of the six VMP intervals (between a factor of 2.4 and 315).
- The TPH-g concentration had increased by over 300 times at SS006-VMP02 at 3-4 feet bgs in 2021 but decreased between 2021 and 2022 to just 1.5 times it baseline concentration. A gasoline odor was observed in surface soil at this location in 2021. This location is adjacent to an active above ground storage tank [AST] used by the Galena Interior Learning Academy (see **Attachment C** for more details). A sample could not be retrieved from this interval in 2023.

4.3.4.2 Site SS019

Soil was sampled and analyzed for petroleum hydrocarbons and chlorinated VOCs at Site SS019 between 2007 and 2015 (prior to the installation of the SVE system). The highest chlorinated VOCs concentrations in soil were generally detected between 4 and 14 feet bgs in borings located near the former dry well and a former waste oil underground storage tank (UST). Soil samples were collected in 2021 under the RPO project to evaluate the progress of bioventing at achieving RAOs; results are presented in the RPO evaluation (Parsons, June 2023).

Static soil gas sampling provides an indirect measure of VOC concentrations in soil and is an indicator of the performance of the SVE system. TPH-g, benzene, and TCE are among the most widely distributed COCs at the site and are therefore chosen to represent performance of VOCs in Site SS019 soil gas. Concentrations of TPH-g, benzene, and TCE in static soil gas are presented in **Table 4-4**. Concentrations of TPH-g and TCE are plotted on **Figures 4-5** and **4-6**, respectively, for VMP intervals sampled at least three times. Comprehensive soil vapor sample results are presented in the SVE Annual Report (**Attachment C**).

As compared to the August 2015 baseline samples:

- TPH-g concentrations have decreased by between three and five orders of magnitude SS019-VMP02 and SS019-VMP05 and by between one and two orders of magnitude at SS019-VMP03 (**Attachment A**, Figure A4-3).
- Benzene concentrations have decreased by between nearly two and six orders of magnitude.
- TCE concentrations have decreased in five of six intervals by between a factor of 6.7 and 580 (over two orders of magnitude). In SS019-VMP03 (11-13 feet bgs) TCE had increased between 2015 and 2019 before decreasing between 2020 and 2023 (**Figure 4-6**) to near the 2015 baseline level.

4.3.5 Mass Removal by SVE System

4.3.5.1 Site SS006

Cumulative mass removal of VOCs, TCE, and cis-1,2-DCE by the SVE system is presented in **Table 4-5** and **Figure 4-7**. TCE and cis-1,2-DCE were chosen as the indicator parameters for the chlorinated VOCs because they are present at highest concentrations in SVE effluent samples. Monitoring the SVE effluent indicates that a total of 992 pounds (lbs) of total VOCs, 449 lbs of TCE, and 63.7 lbs of cis-1,2-DCE were removed from the subsurface since initiating SVE in July 2019 through 30 September 2023. VOC and TCE removal rates as a function of soil vapor volume removed have remained relatively constant since August 2020 (around 90 million cubic feet of extracted vapor).

4.3.5.2 Site SS019

The SS019 blower motor seized in late October 2022 and the system remained off for the remainder of the reporting period. The blower and motor were replaced in October 2023. Cumulative VOC and TCE removal by the Site SS019 SVE system are presented in **Table 4-6** and **Figure 4-8**. Monitoring the SVE effluent indicates that a total of 9,763 lbs of total VOCs and 55.8 lbs of TCE have been removed from the subsurface since initiating SVE in 2015. During FY2020, the SS019 system began extraction from three new deep VWs (SS006-VW02D, SS006-VW05D, and SS006-VW09D) when water levels are low enough. Prior to this extraction had been only from three shallow VWs. Extraction rates through the deep VWs, which are screened in more permeable sand and gravel, are much higher than rates through the shallow VWs.

The rate of total VOC removal has decreased and has become asymptotic. The TCE removal rate, although variable, had increased slightly through the end of FY2019 (around 60 million cubic feet of extracted vapor). After restart of the system with extraction from the deep VWs at the beginning of FY2020, the TCE removal rate as a function of soil vapor volume removed decreased, in part because of the very high volume of soil vapor extracted with operation of the three deep VWs. The TCE removal rate as a function of extracted soil vapor remained relatively constant (i.e., the curve has remained relatively linear) through end of FY2021 (around 123 million cubic feet of extracted vapor) indicating sustained TCE removal. In FY2022 the TCE removal rate decreased slightly.

4.4 Summary of Performance Observations

- TCE typically exceeded its 2018 Table C CUL in source area and in-plume wells except those screened deeper than about 40 to 50 feet bgs.
- TCE concentrations have decreased in several source area and in-plume wells. Concentrations have decreased to below the CUL in several wells including source area well SS006-MW80 and in-plume wells 06-MW-10, SS006-MW67, SS006-MW82, and SS006-MW83.
- TCE concentrations have generally decreased along the centerline of the TCE plume downgradient from PRB-2. Cis-1,2-DCE concentrations have increased in some wells while decreasing in others. Concentrations of VC and ethene have increased through much of the plume. In 2023, ethene was detected in all wells downgradient of PRB-1. Together these results indicate complete reductive dechlorination of TCE to DCE to VC to ethene is occurring throughout most of the plume.
- There is little evidence of reductive dechlorination in upgradient well SS006-MW77 but there is evidence of reductive dechlorination downgradient of PRB-1 at SS006-MW78. There is also evidence of reductive dechlorination deeper in the aquifer downgradient of PRB-1 (SS006-MW79; 40-50 feet bgs). Concentrations of DOC remain near or below 10 mg/L in these wells.
- No fuel-related COCs exceeded Table C CULs in the SS019 source area monitoring well (SS019-MW84), suggesting that SVE and removal of the dry well at Site SS019 has greatly reduced the mass of fuel hydrocarbons in the vadose zone and VSZ. TCE and cis-1,2-DCE concentrations had been decreasing at well SS019-MW84 but in 2023, both increased as compared to the 2022 concentrations and remain above CULs. The unseasonably high groundwater in 2023 may have contributed to these increases.
- The microbial census data indicate that the population of DHC has increased in all six wells in 2023 as compared to 2018; however, DHC and VC reductase genes have decreased in 2023 from maximums in 2020 or 2021 in all wells sampled other than in SS006-MW67. There is a clear correlation between elevated DOC and the wells with most elevated DHC and VC reductase genes. A general correlation between elevated DHC and VC reductase genes and sequential dechlorination to ethene indicates the remedy is operating as intended despite low concentrations of DOC (less than 10 mg/L) throughout much of the plume.
- Geochemical monitoring in 2023 indicates groundwater conditions in the EAB/EBT treatment zones have generally become more reducing as compared to baseline and that DOC has increased in wells in the immediate area of the PRBs. These data confirm that the 2018 EAB/EBT injections are working as designed.

- Overall, the groundwater data document that the EAB/EBT remedy is performing as designed, has led to reductive dechlorination of TCE to DCE to VC to ethene and the size of the TCE plume has decreased.
- Concentrations of TCE, cis-1,2-DCE and TPH-g generally decreased in Site SS006 static soil gas as compared to 2019 baseline.
- Concentrations of benzene, TCE, and TPH-g have decreased in Site SS019 static soil gas as compared to 2015 baseline.
- The total VOC removal rate by the Site SS019 SVE system has become asymptotic.
- Because of a motor failure, the SVE system ran for less than a month in FY2023.

4.5 Recommendations

Continued operation of the SVE systems and monitoring of soil vapor and groundwater to track performance of the remedy is recommended. Because GRO is not a COC in soil or groundwater discontinuing soil vapor sample analysis for TPH-g was recommended in the RPO evaluation (Parsons, June 2023). Future soil vapor samples will be analyzed only for VOCs (full list) by Method TO-15.

Per the RPO evaluation, it is recommended that influent concentrations at the VW heads be rescreened every 2 to 3 years and samples be collected for laboratory analysis (VOCs by Method TO-15) from VWs with PID screening results less than 10 parts per million volume basis (ppmv). This will provide data to optimize extraction flow rates and to select VWs to extract from during summer months. Further recommendations regarding SVE operation and monitoring are presented in **Section 14** and **Attachment C**.

An additional emulsified vegetable oil injection event to target areas of residual concentrations of chlorinated ethenes was recommended in the RPO evaluation (Parsons, June 2023).

Additionally, it was recommended in the RPO evaluation that the frequency of monitoring for upgradient, cross-gradient or downgradient beyond the influence of the EAB/EBT application should be reduced.

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5.0 SITE SS017

5.1 Remedy Summary

The remedial approach for Site SS017 is described in *Cleanup Plan for Site SS014, Birchwood Hangar and Site SS017, Truck Fill Stands* (Cleanup Plan; Parsons, November 2016). Site SS017 had been administratively coupled with adjacent Site SS014 until 2020. Several source areas were identified in the Cleanup Plan. Cleanup objectives have been met for all source areas associated with Site SS014. The cleanup approach for the Site SS014 portions of the Sites SS014/SS017 Cleanup Plan (Parsons, November 2016) has been fully implemented and all potential source features historically associated with Site SS014 have been addressed. Because the Cleanup Complete Determination has been made for Site SS014 source areas, the following discussion only addresses Site SS017.

Site SS017 soil source areas identified in the Cleanup Plan were:

- Main Source Area
- SS017_GP027/GP029 Source Area (later interpreted to be part of the Main Source Area)
- SS017_GP026 Source Area

Site SS017 remedy components are:

- Excavation and landfarming of petroleum-contaminated soil within the Main Source Area above 15 feet bgs to the extent possible (interim removal action in 2011).
- Excavation and landfarming of isolated NAPL-contaminated soil source area near SS017_GP027 and SS017_GP029 (completed in 2017).
- Bioventing for remaining petroleum-contaminated soil in vadose zone and VSZ of the Main Source Area and GP027/GP029 Source Area.
- Sulfate-enhanced bioremediation for petroleum-contaminated soil in the PSZ and groundwater.
- Free product recovery to the extent practicable.

Excavations were completed in 2011 and 2017. The bioventing system was installed in 2016, startup testing was conducted in April 2017, and operations commenced in July 2017. In 2018 a new VW (SS017N-VW10S) was installed in accordance with the recommendations of the 2017 CCR (Parsons, September 2018b). Nine additional groundwater monitoring wells were installed in 2016. In 2019 a replacement monitoring well (SS017-MW007R) was installed. Calcium sulfate (gypsum) was injected into the subsurface between July and September 2017. The layout of the bioventing and sulfate injection remedies are illustrated on Figures A5-1 and A5-2 in **Attachment A**. The groundwater monitoring network is presented on **Figure 5-1**.

5.2 Constituents of Concern

- Soil:
  - Main Source Area: GRO, DRO, benzene, naphthalene, 1-methylnaphthalene, 2-methylnaphthalene, 1,1,2-TCA, 1,1,2,2-tetrachloroethane (TeCA), TCE, and 1,2,3-trichloropropane

- SS017_GP027/GP029 Source Area: GRO and DRO
  - Groundwater: GRO, DRO, benzene, naphthalene, 1-methylnaphthalene, 2-methylnaphthalene, cis-1,2-DCE, TCE, EDB, and arsenic

5.3 Performance Monitoring Results and Evaluation

5.3.1 Groundwater Monitoring

The original groundwater monitoring program is detailed in the CUP (Parsons, November 2016). The groundwater monitoring program has evolved through subsequent recommendations in prior PMRs and the RPO evaluation (Parsons, June 2023). The current groundwater monitoring plan is presented in the table below, with monitoring wells listed below in order from upgradient to downgradient. Some wells serve multiple purposes.

Monitoring Well	Screened Interval (feet bgs)	Current Frequency	Purpose
SS017-MW005	15-35	Every five years for redox parameters only	Evaluate upgradient (background) redox conditions
SS017-MW006	15-35	Biennially GRO, DRO, RRO, VOCs and redox parameters. Every five years for PAHs.	Source area – Approximately 2 months groundwater travel time downgradient of first injection zone
SS017-MW001	15-35	Biennially (odd years) GRO, DRO, RRO, VOCs and redox parameters. Every five years for PAHs.	Source area (also free product well) - Approximately 10 months groundwater travel time from first injection zone
SS017-MW002	15-35	Biennially (odd years) GRO, DRO, RRO, VOCs and redox parameters. Every five years for PAHs.	Source area (also free product well) – Near second injection zone
SS017-MW003	17-37	Every five years for GRO, DRO, RRO, VOCs, PAHs and redox	Source area (also free product well) – Near second injection zone
SS017-MW004	17-37	Biennially (odd years) GRO, DRO, RRO, VOCs and redox parameters. Every five years for PAHs.	Source area (also free product well) – Near second injection zone
SS017-MW007R	15-35	Biennially (odd years) GRO, DRO, RRO, VOCs and redox parameters. Every five years for PAHs.	Source area - Approximately 4 months groundwater travel time from second injection zone
SS014-MW004	12-37	Biennially (odd years) GRO, DRO, RRO, VOCs and redox parameters. Every five years for PAHs.	Source area - Approximately 13 months groundwater travel time from second injection zone
SS014-MW005	45-55	Once every five years for GRO, DRO, RRO, VOCs, PAHs and redox	Source area - Approximately 13 months groundwater travel time from second injection zone
SS014-MW007	15-35	Biennially (odd years) GRO, DRO, RRO, VOCs and redox parameters. Every five years for PAHs.	Source area - Approximately 2 months groundwater travel time from third injection zone
SS014-MW006	30-40	Biennially (odd years) GRO, DRO, RRO, VOCs and redox parameters. Every five years for PAHs.	In-plume - Downgradient of Main Source Area and Chlorinated VOC Source Area
SS014-MW001	20-40	Every five years for GRO, DRO, RRO, VOCs, PAHs and redox	Monitor downgradient of treatment area
SS014-MW002	50-60	Every five years for GRO, DRO, RRO, VOCs, PAHs and redox	Monitor downgradient of treatment area

Most of the monitoring wells were installed in 2016 and first sampled in 2017, indicating baseline conditions at the startup of the bioventing and sulfate-enhanced bioremediation remedies. Wells SS014-MW001, SS014-MW002, and SS014-MW003 (all downgradient wells) have a sampling history dating back to 2011 and wells SS014-MW004 and SS014-MW005 (both at downgradient edge of NAPL-contaminated soil source area) have a sampling history dating back to 2013. Monitoring well SS017-MW004 was not sampled in August 2017 due to the presence of LNAPL in the well. SS017-MW007 was not sampled in 2018 because the well casing had broken; this well was replaced with SS017-MW007R in 2019.

DRO, benzene, and naphthalene are used to track the performance of Site SS017 remedies on groundwater (and indirectly, performance of the remedies on soil in the VSZ and PSZ). Concentrations of DRO, benzene, naphthalene in Site SS017 groundwater monitoring wells are shown in **Table 5-1**. Groundwater performance monitoring results are presented on **Figure 5-1**. Contaminant concentrations are compared to ADEC Table C CULs. Complete groundwater analytical results are presented in **Attachment E**.

GRO, TCE, and cis-1,2-DCE concentrations are below their Table C CULs in all monitoring well groundwater samples. 1-Methylnaphthalene and 2-methylnaphthalene detections have historically been co-located with naphthalene detections. Arsenic has historically been detected in groundwater above the Table C CUL. The RPO evaluation (Parsons, June 2023) established a background threshold value (BTV) for arsenic of 28.6 µg/L. In 2017, arsenic concentrations exceeded the BTV in seven of 14 wells sampled at Site SS017; however, these samples were analyzed for total arsenic (not dissolved) and concentrations may have been elevated if solids were captured during sampling. Therefore, monitoring the progress of petroleum contaminants is the primary focus of performance monitoring.

Of all groundwater COCs, naphthalene exceeds its Table C CUL by the greatest order of magnitude. Naphthalene in source area wells was detected in 2023 at concentrations up to 94 times its CUL (**Table 5-1**). Concentrations of DRO and benzene were also generally elevated in source area wells, all of which have had measurable LNAPL on one or more occasions (see **Section 5.3.5**). Concentrations of benzene and naphthalene have generally decreased from their historical levels in these source area wells since implementation of the remedies in 2017; however, benzene concentrations in several wells, including SS017-MW003, SS014-MW004, and MM014-MW007, have fluctuated and/or rebounded. **Figure 5.2b** illustrates the decreasing trends for source area well SS017-MW006. However, concentrations appear to have stalled in three wells (SS017-MW001 [**Figure 5-2a**], SS017-MW002, and SS017-MW004 [benzene only]) since 2019.

DRO, benzene, and naphthalene exceed their Table C CULs in monitoring well SS014-MW004, a shallow well at the downgradient edge of NAPL-contaminated soil source area which has been monitored since 2013 (**Figure 5-2c**). Although the naphthalene concentrations fluctuate, there appears to be on an overall decreasing trend. Benzene concentrations are relatively stagnant. DRO concentrations have increased but this may be due to the formation of intermediate polar metabolites as discussed in the RPO Report.

In shallow downgradient well SS014-MW001 (screened at 20-40 feet bgs) and intermediate depth downgradient well SS014-MW002 (screened at 50-60 feet bgs), DRO had been the only indicator COC to regularly exceed its Table C CUL since 2012. Naphthalene concentrations exceeded the Table C CUL in both wells in 2021 but not in 2022 or 2023; the 2021 detections may have been due to cross-contamination. DRO detected in these wells is primarily polar metabolites (per the RPO Report).

5.3.2 Groundwater Geochemistry and Sulfate Monitoring

Evaluation of geochemical parameters indicates that methanogenic and sulfate-reducing conditions are present in a majority of Site SS017 groundwater (**Attachment B,** Table 5-1). Sulfate concentrations in Site SS017 groundwater are presented in **Table 5-2**. Sulfate injections were conducted at Site SS017 from 14 July to 3 September 2017. Groundwater sampling in 2017 was conducted toward the end of the injection period (16 August through 5 September 2017), and follow-up sampling was conducted annually between 2018 and 2023. Background concentrations of sulfate are expected to range from 20 to 40 mg/L based on results from wells 06-MW-07 and BKGD-MW001 (**Attachment B,** Table 2-1) and upgradient well SS017-MW005.

Figure 5-3a presents sulfate concentrations along the plume axis in wells screened across the VSZ and upper PSZ. Sulfate concentrations in wells downgradient of the first injection zone decreased in 2023 compared to 2018 sample results following the injection. Wells SS017-MW001 and SS017-MW006 are located downgradient of the first injection zone (wells and injection zones shown in **Attachment A**, Figure A5-2) and previously had sulfate concentrations up to 120 mg/L, which decreased in 2023 to 0.957 mg/L in SS017-MW001. The sulfate concentration in SS017-MW006 peaked at 76.5 mg/L in 2018, up from 23.1 mg/L in 2017, and has decreased to 0.798 mg/L in 2023. The decreasing trends in sulfate concentrations in wells SS017-MW001 and SS017-MW006 indicates that the source of sulfate (gypsum) injected in 2017 is being depleted within the first injection zone.

Sulfate concentrations remain above background levels in wells SS017-MW003 and SS017-MW004, located within the second injection zone, with concentrations of 269 mg/L and 143 mg/L, respectively. Concentrations of sulfate have generally been decreasing in these wells and in well SS017-MW002, which had a concentration of 38.6 mg/L (38.5 mg/L in FD); however, the sulfate concentration increased in well SS017-MW003 in 2023.

Sulfate concentrations in wells between the second and third injection zones remain elevated compared to 2017 sample results. Sulfate had been increasing in samples collected from SS017-MW007R from 2019 to 2022 but decreased from 53.5 mg/L to 16.2 mg/L from 2022 to 2023. Sulfate concentrations increased in SS014-MW004 following the injection but remained below background concentrations through 2022; however, sulfate increased to 32.4 mg/L in 2023.

In downgradient well SS014-MW007, sulfate concentrations have decreased from the 2020 peak concentration. In downgradient well SS014-MW001, the 2023 has decreased compared to the 2020 peak concentration. Indications of sulfate depletion with migration towards these downgradient monitoring wells are unclear.

Increasing methane concentrations downgradient of injection zones had indicated that increased levels of methanogenesis was occurring in the treatment area (**Figure 5-3b**). Methane concentrations remain elevated in nearly all wells downgradient of the injections zones as compared to 2017 sample results.

5.3.3 Static Soil Gas Monitoring

Soil was sampled and analyzed for various contaminants in several sampling events from 2008 to 2016. Among the highest concentrations of widely detected COCs in soil, relative to their Method Two CULs, were benzene at 10.3 mg/kg, naphthalene at 418 mg/kg, 1-methylnaphthalene at 190 mg/kg, 2-methylnaphthalene at 331 mg/kg, GRO at 7,460 mg/kg, and DRO at 120,000 mg/kg. Static soil gas sampling provides an indirect measure of VOC concentrations in soil in the VSZ and performance of the bioventing system.

Concentrations of TPH-g and benzene in static soil gas are presented in **Table 5-3** and are plotted on **Figures 5-4a** and **5-4b**, respectively. Samples collected in April 2017 represent baseline (pre-bioventing) conditions. Because of apparent cross contamination, all 2019 analytical sample results from Site SS017 were rejected.

The 2023 static soil vapor results documented reductions in concentrations of TPH-g (between a factor of 2.6 and a factor of 16) and benzene (between a factor of 7.6 and a factor of 1130) compared to 2017 baseline concentrations. Benzene concentrations have decreased rapidly in the first several years of bioventing but have remained relatively stable over the past several years. Complete bioventing system monitoring results are provided in **Attachment D**.

5.3.4 Bioventing In Situ Respiration Testing and Biodegradation Rate Estimates

Per the recommendations of the 2021 Performance Monitoring Report (Parsons, August 2022a) the frequency of ISR testing has been reduced from annually to biennially. ISR test was conducted in April 2023.

Fuel hydrocarbon biodegradation rates, calculated from the ISR test results, are summarized in **Table 5-4.** At two deep intervals sampled in prior years, vapor samples could not be obtained in 2023. At one interval oxygen concentrations increased during the testing period. Estimated biodegradation rates have decreased by between a factor of two and eight as compared to baseline.

5.3.5 LNAPL Monitoring and Recovery

Apparent LNAPL thicknesses are presented in **Table 5-5**. LNAPL thickness is typically measured in the spring during low groundwater and during groundwater sampling in late summer when the water table is high.

LNAPL thicknesses were measured on 28 April 2023. LNAPL was not detected in wells SS017-MW005 or SS017-MW006. LNAPL was measured in wells SS017-MW001 (0.66 feet), SS017-MW004 (0.75 feet), and SS017-MW007R (0.02 feet). Wells SS017-MW002 and SS017-MW003 were both obstructed with ice in April 2023.

Similar thicknesses of LNAPL have been observed in these wells during past low-groundwater sampling events; although LNAPL thicknesses were less in April 2019 when the “low” groundwater elevation was several feet higher than during other April monitoring events. The greatest LNAPL thicknesses are during times when the depth to groundwater was greater than 25 feet btoc.

So that LNAPL does not accumulate in the well casing from year to year and that subsequent LNAPL measurements are more representative, sorbent socks were placed in all wells with measurable LNAPL in April 2023. The socks were removed prior to groundwater sampling in September 2023.

LNAPL thicknesses were measured on 10, 11, and 12 September 2023. A sheen was observed on purge water from well SS017-MW002. LNAPL was not detected in the other wells when monitored in September 2023. LNAPL thicknesses are generally greatest when the water table is low. When the water table is higher, LNAPL may still be present but at a much-reduced thickness.

In late April 2018 LNAPL baildown tests were performed on wells SS017-MW001, SS017-MW002, SS017-MW004, and SS017-MW007. In most cases, the data were a poor fit for the solution methods used to calculate LNAPL transmissivity and in some cases a solution could not be obtained at all. This was typically the result of minimal LNAPL recovery suggesting a low degree of LNAPL saturation and low (near zero) transmissivity (Parsons, October 2019b).

Based on the baildown test results, active LNAPL recovery was deemed not practical and is not recommended at this site (Parsons, October 2019b). Source area treatment (bioventing and sulfate enhanced bioremediation) can result in phase changes within LNAPL by increasing rates of LNAPL weathering thereby reducing dissolution of contaminants to groundwater (ITRC, December 2009) ultimately leading to reductions in apparent LNAPL thicknesses as LNAPL saturation deceases from the mobile to residual range. Performance monitoring of the bioventing system (**Attachment D**) has documented that the deep bioventing VWs provide oxygen to the lower VSZ during periods of low groundwater. The decreasing benzene and naphthalene concentrations observed in some source area wells since initiation of source area treatment suggest potential change of LNAPL composition.

5.4 Summary of Performance Observations

- In 2023, the concentrations of the indicator COCs DRO, benzene, and naphthalene in groundwater exceeded 2018 Table C CULs in several source area wells, and concentrations of DRO exceeded Table C CULs in several downgradient wells. Concentrations of benzene and naphthalene in source area wells have decreased since remedy implementation in 2017, but this decreasing trend appears to have stalled in three source area wells since 2019.
- In 2021, naphthalene exceeded Table C CUL in each well in the downgradient cluster for the first time since monitoring began in 2011; however, these detections were likely biased high based on contamination in an associated equipment blank. Naphthalene concentrations in 2022 and 2023 were back below detection limits.
- Sulfate is dissolving in groundwater and is detected at elevated concentrations relative to pre-injection conditions in wells within the second injection zone and at a few wells downgradient of the injection zone. Sulfate concentrations appear to be decreasing in many wells. Geochemical monitoring indicates sulfate-reducing and/or methanogenic conditions are present in groundwater. Sulfate consumption is likely occurring downgradient of the injection zones. Therefore, the sulfate-enhanced bioremediation remedy is performing as anticipated. The injections were designed to provide sulfate for five years; the decreasing sulfate concentrations are consistent with the design.
- The 2023 static soil vapor results documented continued reductions in concentrations of TPH-g at most sampled intervals compared to 2017 baseline concentrations; however, concentrations of benzene have been generally stable the past several years.
- ISR test data continue to show that contaminants are being biodegraded under aerobic conditions, consistent with expectations for bioventing operations. Biodegradation rates have decreased compared to the baseline rates, indicating reductions in fuel hydrocarbons in treatment area.
- Apparent LNAPL thicknesses ranged from 0.00 to 0.75 feet during low groundwater in April 2022. No measurable LNAPL was detected during high groundwater in August 2023. The presence of free product is seasonal, generally occurring during periods of low groundwater. The great greatest LNAPL thicknesses are during times when the depth to groundwater was greater than 25 feet btoc.

5.5 Recommendations

Continued groundwater monitoring in accordance with the monitoring program detailed in **Section 5.3.1** is recommended.

Continued operation and monitoring of the bioventing systems and monitor soil vapor through the spring of 2024 is recommended. Per the RPO evaluation, discontinuation of laboratory analysis of static soil vapor samples is recommended. Groundwater sampling will be used to track progress of the remedies in soil. Refer to **Attachment D** for more detailed recommendations on bioventing system operation and monitoring.

It is recommended that continued bioventing be reevaluated after the 2024 monitoring event is completed. The 2023 static soil vapor data showed depleted oxygen (less than 5 percent) in only 2 of the 24 sampled VMP intervals and 21 intervals had oxygen concentrations higher than 10 percent 7 days after the system was shut down. Levels of benzene in static soil vapor have remained relatively stable over the past several years. Continued bioventing may not enhance biodegradation in vadose zone and VSZ soils.

Per the recommendations of the RPO evaluation (Parsons, June 2023), LNAPL thickness will be monitored annually in early spring when the groundwater elevation is low. Free product should continue to be removed when it is detected so that LNAPL does not accumulate in the well casing from year to year and that subsequent measurements are more representative.

Although the sulfate-enhanced bioremediation remedy is performing as anticipated, the injections were designed to provide sulfate for five years. Additional injections were recommended in the RPO evaluation (Parsons, June 2023). Groundwater grab sample data collected in 2022 were used to provide recommendations to optimize the reinjections (Parsons, January 2024).

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6.0 SITE SS015

6.1 Remedy Summary

The remedial approach for Site SS015 was selected in the Record of Decision for South Apron Maintenance Area (Site SS015) (Parsons, October 2017a) and is described in Remedial Design and Remedial Action Work Plan for South Apron Maintenance Area (Site SS015) (Parsons, October 2017b). Remedy components are:

- SVE for contaminated soil in the vadose zone and VSZ.
- EAB and EBT to treat saturated soil and groundwater contamination in the source area.
- MNA to monitor and document reductions in COC concentrations in groundwater downgradient of the EAB/EBT treatment area and to document plume stability or contraction.

The SVE system VWs and VMPs were installed in September 2017, and the VWs were plumbed to the blower shed in summer 2018. Baseline soil vapor samples were collected from the VMPs in spring 2018 and the system was started in October 2018. In July 2020 it was determined that the SVE system motor needed to be replaced. The motor was replaced in September 2020 but when restarting the system, it was discovered that the positive displacement blower had seized. The replacement blower unit was installed in March 2021. Further detail is presented in the SVE Annual Report (**Attachment C**).

EAB/EBT was also implemented in 2018 with injection of emulsified vegetable oil, sulfate and a microbial bioaugmentation culture. A new groundwater monitoring well (SS015-MW088) was installed, developed, and sampled in 2018 in accordance with the RD/RAWP. The groundwater monitoring well network is presented on **Figure 6-1**. Layouts of the SVE remedy and EAB/EBT injection locations are illustrated on Figures A6-1 and A6-2 in **Attachment A**.

A pilot test bioreactor was installed at Site SS015 in 2010 and was actively operated through 2014. A summary of bioreactor operations and results is presented in the *Site SS015 Pilot-Test Bioreactor Fourth Progress Report* (Parsons, March 2015). In July 2019 the bioreactor was decommissioned by removing all piping and backfilling/compacting with clean sand and gravel.

6.2 Constituents of Concern

- Soil: 1,2,4-trimethylbenzene, benzene, DRO, GRO, cis-1,2-DCE, ethylbenzene, sec-butylbenzene, PCE, TCE, and xylenes
- Groundwater: cis-1,2-DCE, PCE, TCE, and VC

6.3 Performance Monitoring Results and Evaluation

6.3.1 Groundwater Monitoring

The original groundwater monitoring program is detailed in the RD/RAWP (Parsons, October 2017b). The groundwater monitoring program has evolved through subsequent recommendations in prior PMRs and the RPO evaluation (Parsons, June 2023). The current groundwater monitoring plan is presented in the table below, with monitoring wells listed below in order from upgradient to downgradient.

Monitoring Well	Screened Interval (feet bgs)	Current Frequency	Location – Purpose
Performance Monitoring Wells			
SS015-MW087	10-35	Biennial (odd years) for VOCs and geochemical indicator parameters	Upgradient (background).
SS015-MW043	19-24	Annual for VOCs and geochemical indicator parameters	Source area – Upgradient of PRB-1, screened in the lower VSZ.
SS015-BW02	29-54	Annual for VOCs and geochemical indicator parameters	Source area - Downgradient of PRB-2, screened in the upper PSZ.
SS015-EW02	25-50	Annual for VOCs and geochemical indicator parameters	Source area – Downgradient of PRB-2, screened in the upper PSZ.
SS015-MW088	68-78	Annual for VOCs and geochemical indicator parameters	In-plume - Upgradient of PRB-3, screened approximately 40 to 50 feet into the PSZ.
SS015-MW079	50-60	Annual for VOCs and geochemical indicator parameters	In-plume – Downgradient of PRB-3, screened approximately 21 to 31 feet into PSZ.
SS015-MW080	70.5-80.5	Annual for VOCs and geochemical indicator parameters	In-plume – Downgradient of PRB-3, screened approximately 42 to 52 feet into the PSZ.
Downgradient MNA Monitoring			
SS015-MW073	65-70	Biennial (odd years) for VOCs and geochemical indicator parameters	In-plume – Track MNA downgradient of EAB/EBT treatment zone, screened approximately 30 to 35 feet into the PSZ.
SS015-MW085	75-85	Biennial (odd years) for VOCs and geochemical indicator parameters	In-plume – Track MNA downgradient of EAB/EBT treatment zone near toe of plume, screened approximately 42 to 52 feet into the PSZ.

Note: Monitoring wells are listed in order from upgradient to downgradient.

Per the recommendations of the 2022 PMR (Parsons, May 2023), monitoring well SS015-EW01 was decommissioned in 2023 because emulsified vegetable oil accumulated in the well preventing sampling. Because there are other wells in the vicinity of SS015-EB01 replacement of this well is not necessary to document completion of the EAB/EBT remedy.

Groundwater sampling for several of the performance monitoring wells has been occurring since 2009, 2010, or 2011. The concentrations of Site SS015 COCs for groundwater (PCE, TCE, cis-1,2-DCE, and VC) in Site SS015 performance monitoring wells are shown in **Table 6-1**. Groundwater performance monitoring results are presented on **Figure 6-1**. A cross-section of monitoring results along the axis of the groundwater plume is shown on **Figure 6-2**.

Concentrations are compared to ADEC Table C CULs. These COCs are used to track the performance of Site SS015 remedies on groundwater (and indirectly, performance of the remedies on soil in the VSZ and PSZ). Complete groundwater analytical results are presented in **Attachment E**.

The EAB/EBT injections into PRB-1 and PRB-2 were completed by mid-July 2018, approximately one month before groundwater sampling was completed, while injections into PRB-3 were delayed and were completed after 2018 groundwater sampling was complete. Injections prior to groundwater sampling were not likely to influence the monitoring well network in 2018 and all sample results are considered baseline for comparison to performance of the EAB/EBT remedy.

Concentrations of TCE, cis-1,2-DCE and VC exceed CULs in upgradient well SS015-MW43. Concentrations of TCE have generally been steadily decreasing prior to and since EAB/EBT injections as shown on **Figure 6-3a** (2009 through 2023 results) and **Figure 6-3b** (2018 through 2023 results). Otherwise, concentrations of TCE and cis-1,2-DCE are below their CULs in all other wells monitored in 2023. VC modestly exceeds its CUL in all wells except furthest upgradient well SS015-MW087 and downgradient well SS015-MW079.

Concentrations of cis-1,2-DCE generally increased over time prior to the EAB/EBT injections in 2018 (**Figure 6-4a;** 2009 through 2023 results). This indicates some dechlorination of TCE to cis-1,2-DCE occurred prior to injection but further dechlorination of cis-1,2-DCE did not occur. Following injection in 2018, concentrations of cis-1,2-DCE decreased to below the Table C CUL (**Figure 6-4b;** 2018 through 2023 results) except for well SS015-MW043 as noted above. Dechlorination of cis-1,2-DCE to VC was stimulated by the EAB/EBT injection.

Figure 6-5a compares concentrations of TCE, cis-1,2-DCE, and VC along the plume axis for data in 2018 and in 2023. Both TCE and cis-1,2-DCE have uniformly decreased downgradient of PRB-1. Concentrations of VC in 2023 generally decrease with downgradient distance from PRB-1, indicating the sequential dechlorination of VC to ethene is ongoing. It is noted that monitoring well SS015-EW02 was within the influence of the pilot-scale bioreactor where VC was already being produced prior to the 2018 injections.

Figure 6-5b compares concentrations of VC, ethene, and ethane along the plume axis for data in 2018 and in 2023. Concentrations of ethene and ethane (produced from the dechlorination of VC) are higher in 2023 (except for SS015-EW02) as the result of the EAB/EBT injection. As noted for VC at well SS015-EW02, ethene was already being produced at this location because of the pilot-scale bioreactor.

These data indicate that remediation of chlorinated solvents is almost complete at Site SS015 except for a remaining source area of chlorinated VOCs north of PRB-1. VC downgradient of the PRBs is also expected to attenuate naturally over time and is not dependent on continued application of EAB/EBT downgradient of the PRBs.

6.3.2 Groundwater Geochemistry

Groundwater samples from Site SS015 were analyzed for geochemical parameters in 2018 to establish baseline geochemical conditions. Baseline conditions were determined to be at least manganese- or iron-reducing with instances of sulfate-reducing and methanogenic conditions observed in the source area near the former pilot test bioreactor (**Attachment B**, Table 4-1). Increases in concentrations of dissolved gases (methane and carbon dioxide); and increases in Mn(II), coupled with decreases in sulfate, indicate that anaerobic biodegradation is occurring.

Groundwater samples were analyzed for geochemical parameters in 2023 to evaluate the effectiveness of EAB/EBT at inducing even more reducing conditions. DOC concentrations in most wells downgradient of PRBs were increased to levels favorable for supporting anaerobic biodegradation (i.e., greater than 10 to 20 mg/L) in 2019 following the 2018 EAB injections. Since 2019, DOC concentrations have decreased to below the desired threshold of 10 to 20 mg/L in all source area and downgradient wells. Despite the low DOC concentrations, the source area and downgradient wells continued to exhibit strongly reducing conditions in 2023 (i.e., methanogenic conditions) (**Attachment B**, Table 4-1). Methane concentrations remain elevated in all wells downgradient of PRB-1 indicating nearly site-wide methanogenic conditions in 2023.

6.3.3 Microbial Community Parameters

Groundwater samples collected from seven of the performance monitoring wells in 2023 were analyzed for DHC, as well as reductase genes that express the ability of DHC to degrade TCE (tceA) and VC (BAV1 VC and VC). The samples were analyzed by Microbial Insights, Inc. in Rockford, Tennessee using qPCR. The suite of DHC and reductase genes is referred to as "Bio-Dechlor Census" and analytical results are presented in **Table 6-2**. As discussed in **Section 4.3.3**, the DHC strain used in the KB-1® bioaugmentation culture injected at Site SS015 is known to fully dechlorinate cis-1,2-DCE and VC to ethene. Quantification of the DHC and reductase genes is used to confirm the potential for complete dechlorination to ethene.

Samples were collected from eight monitoring wells in 2018 to establish baseline concentrations of DHC and the reductase genes (**Table 6-2**). Baseline concentrations of DHC in 2018 ranged from 8.00 E-01 cells/mL in upgradient well SS015-MW087 to 5.32E+03 cells/mL at well SS015-EW01. Monitoring well SS015-EW01 was installed as part of a bioreactor demonstration project that was amended with a bioaugmentation culture in 2014 (Parsons, March 2015).

DHC was detected 2023 groundwater samples from all seven monitoring wells, however, the concentration of DHC in upgradient monitoring well SS015-MW87 was low, at 1.30 E0 cells/mL This upgradient well was not expected to be influenced by the substrate and bioaugmentation injections in 2018. As described below, concentrations of DHC and the VC reductase gene decreased in most treatment area monitoring wells relative to peak concentrations.

The following evaluation of the significance of the microbial census results is based on interpretive information provided by Microbial Insights:

- A DHC concentration of 1.00E+04 cells/mL can be used as a screening criterion to identify sites where reductive dechlorination will yield a generally useful biodegradation rate; ethene production has been observed at most sites with DHC concentrations equal to or exceeding this screening criterion. Concentrations of DHC in 2023 did not exceed this criterion.
- DHC concentrations ranging from 1.00E+01 to 1.00E+04 cells/mL are considered moderate and complete reductive dechlorination of TCE to ethene may still occur when VC reductase genes are also detected. All monitoring wells except upgradient SS015-MW87 met this criterion in 2023 with concentrations of DHC ranging from 4.06+E01 cells/mL to 2.92+03 cells/mL.
- The reductase gene that encodes the enzyme responsible for reductive dechlorination of TCE (tceA) was not detected in any sample in 2018, 2019, 2021, or 2022, and 2023, except for two exceptions. It was detected in one sample in 2020 at a very low estimated concentration and in one sample in 2023, also at a very low concentration. The absence of tceA does not preclude the potential for reductive dechlorination of TCE in the field because the tceA gene is not universally distributed among all DHC and is not present in other microorganisms capable of reductive dechlorination of TCE to cis-1,2-DCE (e.g., *Dehalobacter*).
- The VC reductase genes BAV1 VC and VC encode the enzymes responsible for reductive dechlorination of VC to ethene and cis-1,2-DCE and VC to ethene, respectively.
  - BAV1 VC was only detected in the sample from SS015-MW43 (8.00-01 cell/mL) during baseline sampling in 2018 and was not detected in 2023.

  - The VC reductase gene was detected in three baseline samples (SS015-MW43, SS015-EW01, SS015-EW02) in 2018. The highest concentrations were detected in SS015-EW01 (6.82E+02 cells/mL) and SS015-EW02 (7.91E+02 cells/mL) which were influenced by bioaugmentation of the bioreactor pilot test.
  - Elevated concentrations (greater than 1.00E+00 cells/mL) of the VC reductase gene were detected in 2019, 2020, 2021 2022, and/or 2023 in samples from monitoring wells SS015-MW043 (elevated in 2021 through 2023), SS015-EW01 (not sampled in 2021 through 2023), SS015-EW02, SS015-BW02, SS015-MW088, SS015-MW079, SS015-MW080, and SS015-MW085 (sampled only in 2022). These data indicate that both DHC and the VC reductase genes have been distributed throughout most of the 2018 plume extent, from just upgradient of PRB-1 to well SS015-MW085 located 325 feet downgradient of PRB-3.

- The monitoring well locations downgradient of the PRBs with elevated concentrations of DHC and the VC reductase gene (SS015-EW01, SS015-BW02, SS015-EW02, SS015-MW088, SS015-MW079, and SS015-MW080) have indicated a strong potential for reductive dechlorination of DCE and VC to ethene between 2019 and 2023. TCE and DCE were below their Table C CULs in all these wells in 2023 (SS015-EW01 was not sampled). Ethene and/or ethane concentrations in these wells downgradient of the PRBs have increased as compared to 2018 (**Table 6-1, Figure 6-5b**). In 2018 ethene was non-detect at each of these wells, except SS015-EW01 and SS015-EW02. In 2023, ethene was detected in each of these wells that could be sampled, except in SS015-MW088, at concentrations ranging from 3.4 to 11 µg/L.
- Monitoring well SS015-MW43, located just upgradient of PRB-1, had elevated concentrations of DHC and the VC reductase gene for the first time in 2021 and concentrations increased in 2022, and then decreased in 2023. This well also has indications of reductive dechlorination of PCE to TCE to DCE to VC to ethene (**Table 6-1**). TCE is decreasing overall but remains well above its CUL. Ethene was detected in this well in 2021 through 2023. These data indicate reductive dechlorination despite persistently low DOC (3.24 B to 5.6 mg/L). Oxidation-reduction potential (ORP) was high in this well between 2018 and 2021 and in 2023 (29.4 to 250 millivolts [mV]). This well may be near the edge of the area impacted by PRB-1 injections.
- Concentrations of DOC were elevated (greater than 10 mg/L) in 2019 at monitoring wells SS015-EW01, SS015-BW02, SS015-EW02, SS015-MW088, SS015-MW079, and SS015-MW080 ranging from 22.3 mg/L to 190 mg/L (Table 4-1 in **Attachment B**). Concentrations of DOC were generally lower in 2020 and have further declined through 2023, with most concentrations less than 5 mg/L. SS015-EW01 had the highest DOC concentrations in 2018, 2019, and 2020 but was not sampled in 2021, 2022, or 2023 because emulsified vegetable oil was observed in the well.

The microbial census data had indicated that the population of DHC increased in all wells within and downgradient of the PRBs in 2019 and 2020 because of the 2018 emulsified oil substrate and bioaugmentation culture injection. The 2021 data documented a mix of increases and decreases in DHC concentrations as compared to 2020. The 2023 data document fluctuations in DHC concentrations at all wells as compared to 2019 through 2021 but generally sustained increases as compared to 2018, particularly in the downgradient wells. A general correlation between elevated DHC and VC reductase genes and sequential dechlorination to ethene and ethane indicates the remedy is operating as intended despite low concentrations of DOC (less than 5 mg/L) through most of the plume. The concentrations of parent compounds (TCE and cis-1,2-DC) and daughter product VC are nearly depleted downgradient of PRB-2.

In well SS015-MW43, located just upgradient of PRB-1, the microbial census data indicate increasing populations of DHC and VC reductase in 2021 and 2022 and a decline in 2023 to near 2021 levels. The VOC data from this well suggest sequential dechlorination of TCE to DCE to VC to ethene. However, concentrations of parent compounds (PCE, TCE and cis-1,2-DCE) remain high at this location while DOC is low, suggesting capacity for reductive dechlorination may be limited.

6.3.4 Static Soil Gas Monitoring

Soil was sampled and analyzed for chlorinated VOCs and petroleum hydrocarbons between 2009 and 2016, prior to the installation of the SVE system. The highest concentrations of PCE, TCE, and petroleum related VOCs in soil were detected between 4 and 14 feet bgs within and just off the south edge of the southeast corner of the former paved apron.

Soil sampling is not planned until soil gas and groundwater results indicate the SVE remedy is complete. Static soil gas sampling provides an indirect measure of VOC concentrations in soil and performance of SVE system. Baseline static soil vapor samples were collected and analyzed in April 2018. TPH-g, PCE, and TCE have been chosen as indicator COCs based on their frequency of detection in soil above CULs and detected concentrations in the baseline soil vapor samples collected in 2018. Concentrations of TPH-g, PCE, and TCE in static soil gas are presented in **Table 6-3**. Comprehensive soil vapor sample results are presented in the SVE Annual Report (**Attachment C**).

Because SS015-VMP08 was lost during decommissioning of the bioreactor in 2019, the 5-6 feet bgs interval at SS015-VMP07 was sampled for the first time in 2020. SS015-VMP08 was replaced with SS015-VMP08R in 2021. VMP locations are shown in **Attachment A**, Figure A6-1.

TPH-g concentrations have decreased by between a factor of 2.6 and 410 as compared to 2018 baseline or initial sample event for intervals not sampled in 2018. Reductions in PCE and TCE concentrations have been relatively moderate. The greatest reductions for PCE and TCE were in the 11.5-12.5 feet bgs intervals of SS015-VMP08R where concentrations have each decreased by factor of approximately 20 since first sampled in 2021. The overall moderate rate of reduction is slower than would be expected had the system operated as scheduled; however, because of maintenance issues the operating time of the SVE system in past years was limited resulting in lower overall mass removal.

6.3.5 Mass Removal by SVE System

Cumulative PCE and TCE removal by the SVE system is presented in **Table 6-4** and **Figure 6-6**. Monitoring of PCE and TCE in SVE effluent indicates that a total of 4.09 lbs of PCE and 7.28 lbs of TCE have been removed to date. Cumulative mass removal remains low because of limited operating time in FY2021 (22 days) and FY2022 (20 days) because of several electrical and mechanical issues. In FY2023 the system operated 172 days or 83.5 percent of the planned operating period.

The rate of PCE and TCE removal as a function of the volume of soil vapor removed had been linear (i.e., the removal rate has not yet uniformly decreased as more soil gas is extracted) since the first week of extraction through FY2020 (**Figure 6-6**). The data points for FY2021 and FY2022 (at 109 and 113 million cubic feet of extraction soil vapor) indicated a significant increase in the rate of removal. These increases are likely as the result of short periods of operation between extended periods of down time when VOC concentrations in soil vapor had rebounded (pulsed operations). In FY2023, when the system operated with fewer interruptions, removal rates decreased and appear slightly lower than those observed from startup through FY2020.

6.4 Summary of Performance Observations

- The data provide strong evidence that the 2018 EB/EBT injections have stimulated complete reductive dechlorination from PRB-1 downgradient through SS015-MW080. Remediation downgradient of PRB-1 is virtually complete with only modest CUL exceedances of VC (in most wells). A limited source of TCE may remain north of PRB-1 (indicated by well SS015-MW43) though TCE concentrations have been steadily decreasing at that location.
- The microbial census data indicate that the population of DHC remains elevated in all wells within and downgradient of the PRBs as compared to baseline because of the 2018 injection. A general correlation between elevated DHC and VC reductase genes and sequential dechlorination to ethene and ethane indicates the remedy is operating as intended despite low concentrations of DOC (less than 10 mg/L) throughout most of the plume. Elevated DHC and VC reductase genes and detectable ethene were both observed for the first time in 2021 and again in 2022 and 2023 at SS015-MW43 located upgradient of PRB-1.
- Geochemical monitoring in 2023 indicates groundwater conditions in the EAB/EBT treatment zones have generally become more reducing as compared to baseline in wells within and downgradient of the PRBs. However, DOC concentrations have decreased to below the target threshold of 10 to 20 mg/L. These data confirm that the 2018 EAB/EBT injections are working as designed but that the DOC source is being depleted. Despite the low DOC concentrations, geochemical conditions remain strongly reducing (methanogenic) in all wells downgradient of PRB-1.
- Static soil vapor sample results indicate moderate reductions in concentrations of indicator COCs.
- In FY2023 removal rates decreased and appear slightly lower than those observed from startup through FY2020 but are not yet asymptotic.

6.5 Recommendations

Continued operation of the SVE system, including extraction from the deep VWs when the groundwater elevation is low enough, and monitoring of soil vapor is recommended through the winter of 2023 and 2024. It is recommended that continued SVE beyond FY2024 be reevaluated after review of the 2024 monitoring data. Further recommendations regarding SVE operation and monitoring are presented in **Attachment C**.

Continued groundwater monitoring per the monitoring program outlined in **Section 6.3.1** is recommended. It is recommended that sampling for microbial community parameters be discontinued until EAB/EBT reinjections are performed. When planning for reinjections a revised sampling plan for microbial community parameters should be developed that targets the residual chlorinated VOC plume.

The 2023 data indicate DOC throughout most of the plume has dropped below 5 mg/L which is considered the threshold to support microbial decay. Much of the plume concentrations of parent compounds (PCE, TCE, cis-1,2-DCE) and daughter product VC have been reduced. However, at SS015-MW43 elevated concentrations of parent products, though decreasing, persist and DOC concentrations are low. It is recommended that an additional EAB/EBT injection be evaluated under the RPO project to target residual chlorinated VOCs in the PSZ. Additional groundwater grab sampling was performed in 2022 to define the extent of impacted groundwater between SS015-MW43 and upgradient well SS015-MW087 (Parsons, January 2024). It is recommended that an additional EAB/EBT injections be planned to target residual chlorinated VOCs in the PSZ near SS015-MW43.

7.0 SITE SS016

7.1 Remedy Summary

The remedial approach for Site SS016 is described in *Cleanup Plan for Site SS016, Building 2541 – Former Petroleum, Oil, and Lubricant Fuels Laboratory* (Cleanup Plan; Parsons, May 2016a). Remedy components are:

- Excavation and landfarming of petroleum-contaminated soil (2013 interim removal action).
- Bioventing for petroleum-contaminated soil in the vadose zone and VSZ beyond and below the 2013 excavation.
- MNA for petroleum contaminants in groundwater.

The bioventing system was installed in 2016, startup testing was conducted in April 2017, and operations commenced in July 2017 (Parsons, September 2018a). The layout of the bioventing remedy is illustrated on Figure A7-1 in **Attachment A**. Four additional groundwater monitoring wells were installed in 2016. The groundwater monitoring network is presented on **Figure 7-1**.

7.2 Constituents of Concern

- Soil: GRO, DRO, benzene, ethylbenzene, toluene, xylenes, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, n-propylbenzene, n-butylbenzene, sec-butylbenzene, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene
- Groundwater: GRO, DRO, benzene, toluene, ethylbenzene, xylenes, 1,2,4-trimethylbenzene, n-propylbenzene, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene

7.3 Performance Monitoring Results and Evaluation

7.3.1 Groundwater Monitoring

The original groundwater monitoring program is detailed in the RD/RAWP (Parsons, May 2016a). The groundwater monitoring program has evolved through subsequent recommendations in prior PMRs and the RPO evaluation (Parsons, June 2023). The current groundwater monitoring plan is presented in the table on the next page, with monitoring wells listed below in order from upgradient to downgradient.

Per the recommendations of the 2022 PMR (Parsons, May 2023) upgradient well 2541-MW-02 was decommissioned in 2023. The well was damaged and had filled with sediment to within two feet of the top of screen. The body of groundwater data has established that groundwater is clean at this upgradient location.

DRO, benzene, and naphthalene are used to track the performance in Site SS016 remedies on groundwater (and indirectly, performance of the remedies on soil in the VSZ and PSZ). Their concentrations in Site SS016 groundwater monitoring wells are shown in **Table 7-1**. Groundwater performance monitoring results are presented on **Figure 7-1**. DRO, benzene, and naphthalene exceed their CULs by the greatest amount. Complete groundwater analytical results are presented in **Attachment E**.

Monitoring Well	Screened Interval (feet bgs)	Current Frequency	Location - Purpose
SS016-MW002	12 – 37	Annual for GRO, DRO, RRO, and VOCs. Sample for PAHs only after other COCs meet CULs (closure sampling).	Monitoring source area
SS016-MW003	12 – 37	Annual for GRO, DRO, RRO, and VOCs Sample for PAHs only after other COCs meet CULs (closure sampling).	Monitoring downgradient
SS016-MW004	12 – 37	Annual for GRO, DRO, RRO, and VOCs Sample for PAHs only after other COCs meet CULs (closure sampling).	Monitoring downgradient
SS016-MW005	12 – 37	Every Five Years for GRO, DRO, RRO, VOCs and PAHs. Move to annual if other wells show rebound.	Monitoring downgradient

COCs did not exceeded their CULs in upgradient well 2541-MW-02 between 2016 and 2021.

In source area monitoring well SS016-MW002, concentrations of DRO, benzene, and naphthalene have generally been decreasing despite some minor increases in 2022 relative to 2021 (**Figure 7-2**). Concentrations decreased again in 2023 relative to 2022 and both benzene and naphthalene concentrations were below their Table C CULs. DRO concentrations increased between 2016 and 2018 but have generally decreased since 2018. DRO in source area well SS016-MW002 is the only COC that exceeds its CUL but appears to be on track to achieve its CUL in the next few years.

Concentrations of indicator COCs are below CULs in all downgradient wells since 2018 (well SS015-MW003 [**Figure 7-3**]) and 2019 (well SS016-MW004). COCs have not exceeded their CULs in downgradient well SS016-MW005 since monitoring began in 2016.

The other groundwater COCs including GRO, 1,2,4-trimethylbenzene, ethylbenzene, toluene, xylenes, n-propylbenzene 1-methylnaphthalene, 2-methylnaphthalene did not exceed their Table C CULs in any Site SS016 groundwater samples in 2023 (data in **Attachment E**).

7.3.2 Static Soil Gas Monitoring

Soil was sampled and analyzed for various contaminants in several sampling events from 2009 to 2016. Among the highest concentrations of COCs in soil were benzene at 5.1 mg/kg, naphthalene at 291 J mg/kg, and DRO at 58,000 mg/kg. Static soil gas sampling provides an indirect measure of VOC concentrations in soil in the vadose zone and VSZ and is an indicator of performance of the bioventing system. Soil samples were collected in 2021 under the RPO project to evaluate the progress of bioventing at achieving RAOs; results are presented in the RPO evaluation report (Parsons, June 2023). Additional soil samples were collected to 2022 under the RPO and were reported in the 2022 RPO evaluation addendum (Parsons, January 2024).

Concentrations of TPH-g and benzene in static soil gas are presented in **Table 7-2**. Samples collected in April 2017 represent baseline (pre-bioventing) conditions. VMP locations are shown in **Attachment A**, Figure A7-1.

The static soil vapor results documented reductions in concentrations of TPH-g (between a factor of 1.5 and a factor of 5,700) and benzene (between a factor of 3.1 and over five orders of magnitude) as compared to baseline concentrations. The measurements indicate that TPH-g and benzene concentrations in static soil gas are very low across the site except for SS016-VMP09, SS016-VMP10, and SS016-VMP11; each of which are in the east source area. Complete bioventing system monitoring results are provided in **Attachment D**.

7.3.3 Bioventing In Situ Respiration Testing and Biodegradation Rate Estimates

Because RPO evaluation (Parsons, June 2023) recommended bioventing be discontinued at Site SS016, ISR testing was not conducted in spring of 2023**.**

7.4 Summary of Performance Observations

- In 2023, only DRO exceeded its Table C CUL only in source area well SS016-MW002.
- COCs have not exceeded Table C CULs in any well outside of the source area since 2018.
- Static soil vapor results documented reductions in TPH-g and benzene as compared to baseline concentrations.

7.5 Recommendations

Based on 2021 soil sample results and the body of groundwater data, shutdown of the bioventing system was recommended in the RPO evaluation (Parsons, June 2023). The bioventing system was run through the winter of 2022/2023 and was turned off in April 2023. Decommissioning of the bioventing system is not recommended at this time. If future groundwater monitoring confirms RAOs have been met and concentrations of COCs have not rebounded, the USAF will seek approval from ADEC to decommission the bioventing system.

Continued groundwater monitoring is recommended to assess the impact of shutting down the bioventing system. Details of the groundwater monitoring program are presented in **Section 7.3.1**.

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8.0 SITE SS018

8.1 Remedy Summary

The remedial approach for Site SS018 was selected in the *Record of Decision for Waste Accumulation Area (Site SS018)* (Parsons, August 2017) and is described in *Remedial Design and Remedial Action Work Plan for Waste Accumulation Area (Site SS018)* (Parsons, October 2017c). Based on Remedial Investigation (RI) sampling results, Site SS018 was divided into five subareas (Figure A8-1, **Attachment A**). The COCs and major components of the selected remedy for each subarea are summarized in the table after Section 8.5.

In 2019, the excavation remedy for Subarea 5 was implemented, and included excavation of 444 cubic yards of petroleum contaminated soil to a depth of 10 feet bgs. Excavation activities, results, findings, and recommendations are presented in the *Construction Completion Report for Waste Accumulation Area (Site SS018) Subarea 5, Former Galena Forward Operating Location, Alaska* (Parsons, May 2020a). The extent of excavation is presented in Figure A8-2, **Attachment A**. A supplemental site characterization was conducted in 2021 to define the extent of contaminated soil to the east of the limits of the 2019 excavation (Parsons, August 2022b).

8.2 Constituents of Concern

COCs for each subarea are summarized in the table at the end of this section according to each subarea. The only groundwater COCs are DRO and RRO in Subarea 5 which resulted from a fuel pipeline release. While TCE has been detected above its Table C CUL in well SS018-MW003, it is attributed to Site SS006 as this well location is known to be within the Site SS006 TCE plume.

8.3 Performance Monitoring Results and Evaluation

8.3.1 Groundwater Monitoring

The original groundwater monitoring program is detailed in the RD/RAWP (Parsons, October 2017c). The groundwater monitoring program has evolved through subsequent recommendations in prior PMRs and the RPO evaluation (Parsons, June 2023). The current groundwater monitoring plan is presented in the table below, with monitoring wells listed below in order from upgradient to downgradient.

Monitoring Well	Screened Interval (feet bgs)	Current Frequency	Location - Purpose
SS018-MW001	12 – 32	Annual for GRO, DRO, RRO, and VOCs.	Monitoring source area
SS018-MW003	13 – 33	Annual for GRO, DRO, RRO, and VOCs.	Monitoring downgradient

The objective of Subarea 5 wells SS018-MW001 (located in the source area) and SS018-MW003 (located downgradient of the source area) is to evaluate MNA of petroleum hydrocarbons in groundwater. DRO and RRO are the groundwater COCs for Subarea 5 and are used to track the performance of the Subarea 5 soil excavation remedy on groundwater. Naphthalene is also being used to track performance of the remedy because it was detected at SS018-MW001 above its Table C CUL in 2019.

DRO, RRO, and naphthalene concentrations in Site SS018 monitoring wells are shown in **Table 8-1**. Groundwater performance monitoring results are presented on **Figure 8-1**. Complete groundwater analytical results are presented in **Attachment E**. DRO was the only COC to exceed its CUL in well SS018-MW001 prior to 2023. The DRO concentration in 2023 was less than its CUL in that well for the first time. Concentrations of DRO, RRO and naphthalene have been below their CULs in downgradient well SS018-MW003 since monitoring began in 2018.

TCE present in deeper soil beneath Site SS018 at levels exceeding its Method Two CUL is attributed to the Site SS006 TCE plume. TCE is not a COC for Site SS018 groundwater. TCE exceeded its Table C CUL in downgradient well SS018-MW003 (**Table 8-1**). This well location is known to be within the Site SS006 TCE plume and is included in the Site SS006 section of this report.

8.3.2 Intrinsic Remediation Soil Sampling

Periodic sampling of soil at Subarea 1 and Subarea 2 at Site SS018 is described in the *Remedial Design and Remedial Action Work Plan for Waste Accumulation Area (Site SS018)*, (Parsons, October 2017c). Soil sampling was performed in 2023 to support the second Five-Year Review scheduled for 2024. The following is a summary of the sampling actives and findings. A comprehensive summary of field activities and results including boring logs and complete analytical results will be presented in a forthcoming addendum to the RPO evaluation report.

8.3.2.1 SS018 Subarea 1

Pesticides, VOCs, semi-volatile organic compounds (SVOCs), and DRO in soil within Subarea 1 were detected in 1992-2011 at concentrations greater than the ADEC Method Two cleanup levels (CULs) for migration to groundwater. The remedy for Subarea 1 called for soil to be left in place for intrinsic remediation with periodic sampling to verify progress towards meeting cleanup goals.

Samples were collected in 2023 from 5-7 feet bgs from four locations within Subarea 1 (SS018_GP018 through SS018_GP021) as shown on **Figure 8.2**. Samples were analyzed for VOCs, PAHs, pesticides, and DRO/GRO/RRO. Only TCE in the two eastern samples and 4,4-dichlorodiphenyldichloroethane (4,4-DDD) in one sample exceeded their Method Two migration to groundwater CULs. Resampling in 2028 is recommended.

8.3.2.2 SS018 Subarea 2

Concentrations of TCE in soil at Subarea 2 were generally within an order of magnitude of the current ADEC Method Two CUL for migration to groundwater. The remedy for these soils is also attenuation by intrinsic remediation with periodic sampling to coincide with Five-Year Reviews.

Samples were collected from six locations within Subarea 2 (SS018_GP022 through SS018_GP027; **Figure 8.3**). Samples were collected from 5-7 feet bgs and 10-12 feet bgs within each location and were analyzed for VOCs. In the three western samples neither PCE or TCE exceeded their Method Two migration to groundwater CULs. In the three eastern samples TCE exceeded its Method Two migration to groundwater CULs. Resampling in 2028 is recommended.

8.4 Summary of Performance Observations

- Soil sampling in 2023 at Subareas 1 and 2 confirmed some COCs still exceed their Method Two migration to groundwater CULs.
- Site-related target analytes did not exceed Table C CULs for groundwater in Subarea 1 well SS018-MW002. The groundwater monitoring data supports the

assumption that Subarea 1 soil COCs are not resulting in exceedances of Table C CULs in groundwater.

- No COCs or other petroleum-related contaminants exceeded the Table C CULs for groundwater in 2023 in Subarea 5 source area well SS018-MW001. Concentrations of naphthalene in this well have decreased by over two orders of magnitude. No COCs or other petroleum-related contaminants exceeded Table C CULs for groundwater in Subarea 5 downgradient well SS018-MW003 documenting that the dissolved hydrocarbon plume is localized near the release area.
- TCE exceeded its Table C CUL in SS018-MW003. This well is located near the downgradient edge of the Site SS006 TCE plume and the presence of TCE is attributed to Site SS006.

8.5 Recommendations

Subarea 1: Collect soil samples in 2028 to document intrinsic remediation to coincide with the next Five-Year Review.

Subarea 2: Collect soil samples in 2028 to document intrinsic remediation to coincide with the next Five-Year Review.

Subarea 3: No further action is recommended in accordance with the RD/RAWP. COCs were not identified in the ROD and RD/RAWP for Subarea 3. Chlorinated VOCs in soil greater than 12 feet bgs and in groundwater beneath Subarea 3 are attributed to, and will be remediated under, Site SS006.

Subarea 4: As the result of intrinsic remediation, pesticides in Subarea 4 surface soil meet the requirements for Cleanup Complete. No further action is recommended.

Subarea 5: A supplemental site characterization was conducted in 2021 at Site SS018 to define the extent of soil contamination along the east side of the 2019 excavation. Based on the results, additional excavation of contaminated soil to the east and south of the 2019 excavation was recommended (Parsons, August 2022b). Monitoring of wells SS018-MW001 and SS018-MW003 should continue to be monitored annually until the remedy for Subarea 5 is complete.

Sub Area	Description	Constituents of Concern	Remedies	Remedy Status
1	• Area of approximately 5,800 square feet along road leading to the sewage treatment lagoon • Characterized by petroleum hydrocarbons, pesticides, VOCs, and SVOCs exceeding Method Two CULs for migration to groundwater in soil to approximately 10 feet bgs. • Method Two CULs for human health were not exceeded	Soil: 1-methylnaphthalene, 2-methylnaphthalene, 4,4-DDT, alpha-BHC, benzene, DRO, cis-1,2-DCE, dieldrin, gamma-BHC, heptachlor epoxide, naphthalene, and TCE Groundwater: None	• Groundwater monitoring to confirm that COCs in soils are not resulting in exceedances of Table C CULs in groundwater. • Soil at concentrations greater than the (October 2008) Method Two CULs for migration to groundwater will be left in place. • COCs in soil are expected to achieve CULs within 10 years by intrinsic remediation.	• Ongoing. • Groundwater monitoring (SS018-MW002) began in 2018. No COCs detected above CULs over 5 sampling events. Groundwater monitoring has been discontinued. • Soil samples collected in 2023 to document intrinsic remediation. Resampling in 2028 recommended.
2	• Low-level CVOCs from leaking/spilled wash/rinse water from drums or the concrete pad. • Area is approximately 14,400 square feet and includes most of the 30-foot by 50-foot concrete pad. • TCE concentrations greater than its Method Two CUL for migration to groundwater in soil to 12 feet bgs. • CVOCs do not exceed Method Two CULs for human health. • Approximately 200 square feet overlaps with Subarea 5 but CVOCs have not been detected in soil samples collected within the overlapping area. • Overlaps Subarea 3 laterally; however, these areas are separated vertically.	Soil: 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, isopropyl benzene, naphthalene, n-butylbenzene, n-propylbenzene, sec-butylbenzene, PCE, toluene, TCE, and total xylenes Groundwater: None	• CVOCs in soil at concentrations greater than the ADEC Method Two CULs for migration to groundwater will be left in place. • Groundwater is not impacted by COCs in soil in the western part of this Subarea. • The eastern part of the subarea overlaps deeper CVOC contamination within Subarea 3 that will be addressed with the remedy for Site SS006. • CVOCs in Subarea 2 are expected to naturally attenuate to within 30 years.	• Ongoing. • Soil samples collected in 2023 to document intrinsic remediation. Resampling in 2028 recommended.
3	• TCE in soil greater than 12 feet bgs that is attributed to the Site SS006 TCE plume. • In RI, Subarea 3 was defined as soil greater than 12 feet bgs; uncontaminated soil underlies the deeper TCE contaminated soil • TCE concentrations greater than the Method Two CUL for migration to groundwater in the saturated zone (i.e., deeper than approximately 28 feet bgs or 114 feet above mean sea level). • Area is approximately 24,100 square feet. • Overlaps Subarea 2 laterally; however, these areas are separated vertically.	Soil: None Groundwater: None	• No COCs were identified and no treatment is required. • CVOCs in soil and groundwater beneath Subarea 3 will be remediated under Site SS006.	• No further action is required in accordance with the RD/RAWP.
4	• Area with pesticides in surface soil (0 to 2 feet bgs) at concentrations greater than the Method Two CULs for migration to groundwater. • Pesticide concentrations did not exceed the CULs protective of human health. • Area of approximately 340 square feet.	Soil: gamma-BHC, dieldrin Groundwater: None	• Confirmation sampling to confirm that pesticides in surface soil are below ADEC CULs. • If contamination remains above ADEC CULs, the data will be evaluated to determine when or if an excavation is necessary. • Surface soil COCs have not migrated to groundwater in this subarea.	• Confirmation soil sampling completed in 2018. No COCs or other target analytes detected above ADEC CULs. • No further action was recommended in the 2018 PMR.

Sub Area	Description	Constituents of Concern	Remedies	Remedy Status
5	• Associated with the leak of an underground diesel fuel pipeline • Petroleum hydrocarbons present to 14 feet bgs • DRO RRO contamination in groundwater. Area of approximately 1,100 square feet.	Soil: 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1-methylnaphthalene, 2-methylnaphthalene, DRO, GRO, benzene, ethylbenzene, isopropyl benzene, naphthalene, n-butylbenzene, n-propylbenzene, sec-butylbenzene, toluene, and total xylenes Groundwater: DRO, RRO	• Excavation of petroleum-contaminated soil exceeding the Method Two CULs for human health. • Transportation of excavated soil to the Galena landfarm for treatment. • MNA for COCs in groundwater.	• In 2018, delineation soil sampling was completed and well SS018-MW003 installed and monitoring began. • In 2019, monitoring well SS018-MW001 installed and monitoring began. • In 2019, 444 cubic yards of contaminated soil was excavated in the SS018 Area 3 hydrocarbon source area. • A supplemental site characterization was completed in 2021 to define the extent of soil contamination to the east and under the concrete pad. Excavation of additional soil to the east and south of the 2019 excavation was recommended to remove soil exceeding Method Two CULs for human health.

Notes:
ADEC = Alaska Department of Conservation
bgs = below ground surface
BHC = hexachlorocyclohexane
COC = constituent of concern
CUL = cleanup level
CVOC = chlorinated volatile organic compound
DCE = dichloroethene
DDT = dichlorodiphenyltrichloroethane
GRO = gasoline range organics
DRO= diesel range organics
MNA = monitored natural attenuation
PCE = tetrachloroethene (aka, perchloroethene)
RI = Remedial Investigation
RD/RAWP = Remedial Design and Remedial Action Work Plan
RRO = residual range organics
SVOC = semi-volatile organic compound
TCE = trichloroethene
VOC = volatile organic compound

9.0 SITE SS022

9.1 Remedy Summary

The remedial approach for Site SS022 was selected in the *Record of Decision for B400 Building 400 Former CAA Air Force Weather Station (Site SS022)* (Parsons, September 2017) and is described in *Remedial Design and Remedial Action Work Plan for B400 Building 400 Former CAA Air Force Weather Station (Site SS022)* (Parsons, July 2017). Remedy components are:

- SVE for contaminated soil in the vadose zone and VSZ.
- MNA for contaminants in groundwater.

A pilot-scale SVE system installed in 2015 was expanded as part of the final remedy in 2017. SVE expansion included installation of new shallow and deep VWs (SS022-VW02S and SS022-VW02D) and installation of an additional VMP (SS022-VMP04). In 2023, one additional VW and one additional VMP were installed per the recommendations of the RPO evaluation (Parsons, June 2023) and the 2022 RPO results addendum (Parsons, January 2024). The layout of the SVE remedy is illustrated on Figure A9-1 in **Attachment A**. A new source area groundwater monitoring well (SS022-MW005) was installed in 2017 and grab groundwater samples were collected in 2017 to verify the extent of TCE in groundwater. A new downgradient groundwater well (SS022-MW006) was installed in 2018 as recommended in the 2017 CCR (Parsons, September 2018b). The groundwater monitoring network is presented on **Figure 9-1**.

9.2 Constituents of Concern

- Soil: TCE, PCE, GRO, and DRO
- Groundwater: TCE

9.3 Performance Monitoring Results and Evaluation

9.3.1 Groundwater Monitoring

The original groundwater monitoring program is detailed in the RD/RAWP (Parsons, July 2017). The groundwater monitoring program has evolved through subsequent recommendations in prior PMRs and the RPO evaluation (Parsons, June 2023). The current groundwater monitoring plan is presented in the table below, with monitoring wells listed below in order from upgradient to downgradient.

Monitoring Well	Screened Interval (feet bgs)	Current Frequency	Location - Purpose
SS014-MW001	20 – 40	Every five years for GRO, DRO, RRO, VOCs, PAHs and redox (part of Site SS017 network)	Monitoring upgradient
SS022-MW005	12 – 32	Annual for VOCs	Monitoring source area
SS022-MW003	12 – 32	Every five years for VOCs, GRO, and DRO.	Monitoring cross-gradient to source area
SS022-MW004	12 – 32	Biennially for VOCs (odd years). Change back to annual if expanded SVE.	Monitoring downgradient
SS022-MW006	12 – 32	Biennially for VOCs (odd years). Change back to annual if expanded SVE.	Monitoring downgradient

TCE concentrations in Site SS022 groundwater monitoring wells are shown in **Table 9-1** and on **Figure 9-1**. TCE concentrations are compared to the Table C CUL of 2.8 µg/L. Complete groundwater analytical results are presented in **Attachment E**.

In 2023, TCE exceeded the Table C CUL in the source area well SS022-MW005, downgradient plume well SS022-MW004, and downgradient plume edge well SS022-MW006. In 2022, the TCE concentration in SS022-MW005 was less than the Table C CUL. This rebound is not unexpected, due to the low SVE system operational runtime, 14.1%, for FY2023 at SS022, as is discussed in **Appendix C**.

Although TCE concentrations have fluctuated in all wells throughout the monitoring history, modest decreasing trends may exist in wells SS022-MW004 and SS022-MW005 (**Figure 9-2**).

9.3.2 Static Soil Gas Monitoring

Soil was sampled and analyzed for TCE between 2010 and 2015 (prior to the installation of the SVE system) and additional treatment area verification samples were collected in 2017 (Parsons, September 2018b). The highest TCE concentrations in soil (up to 1.2 mg/kg) were detected between 3 to 7 feet bgs off the west end of the former Building 400, near the revised location of the Former Wooden Covered Cesspool/Concrete Septic Tank (shown on **Figure 9-1**). Soil samples were collected in 2021 under the RPO project to evaluate the progress of bioventing at achieving RAOs; results are presented in the RPO Report (Parsons, June 2023). Based on the 2021 soil sampling results, passive soil vapor samples were collected in 2022 (Parsons, January 2024) and additional soil samples were collected in 2023. The 2023 soil sampling results will be presented in a forthcoming modification to the RPO evaluation.

Static soil gas sampling provides an indirect measure of TCE concentrations in soil and performance of SVE system. Concentrations of TCE in static soil gas are presented in **Table 9-2** and **Figure 9-3**. Because of apparent cross contamination, all 2019 analytical sample results from Site SS022 were rejected. Comprehensive soil vapor sample results are presented in the SVE Annual Report (**Attachment C**).

For the three intervals at SS022-VMP03, TCE concentrations have decreased by between one to over two orders of magnitude as compared to 2015 or 2016 baseline samples. At SS022-VMP04 (5.5-6.5 feet bgs) the TCE concentration has decreased through 2023 by a factor of 3.9 since it was first sampled in 2017. The TCE concentration in the 12 to 14 feet bgs interval of SS022-VMP04 was nearly the same in 2023 as 2021 when it was first sampled. This apparent rebound in this interval as compared to 2022 may be because the motor on the SS022 SVE blower seized in late October 2022 and the system did not operate over the winter of 2022/2023.

9.3.3 Mass Removal by SVE System

Cumulative TCE removal by the SVE system is presented in **Table 9-3** and **Figure 9-4**. Monitoring of TCE in SVE effluent indicates that a total of 3.31 lbs of TCE has been removed from the subsurface. The SS022 SVE blower seized in late October 2022 and the system did not operate over the winter of 2022/2023. Total operation time for the SS022 SVE system was only 29 days in FY2023. The rate of TCE removal as a function of soil vapor volume extracted is gradually decreasing.

9.4 Summary of Performance Observations

- Concentrations of TCE in groundwater in wells SS022-MW004 and SS022-MW006 continue to exceed the Table C CUL and in 2023, the TCE concentration in source area well SS022-MW005 also exceeded the Table C CUL. Although fluctuating throughout the monitoring history, the general TCE concentrations trends in source area well SS022-MW005 and downgradient plume well SS022-MW004 appear to be decreasing.
- As compared to baseline, static soil vapor TCE concentrations have decreased at most of the intervals at SS022-VMP03 and SS022-VMP04 sampled in 2023.
- TCE removal rates by the Site SS022 SVE system are low and decreasing but are not yet asymptotic.

9.5 Recommendations

Continue groundwater monitoring at Site SS022 per the monitoring plan presented in **Section 9.3.1**.

The Site SS022 SVE blower system failed in late October 2022 and was replaced and restarted in October 2023. Operation of the SVE through the winter of 2023/2024 is recommended.

Based on the 2022 RPO passive soil vapor data, additional soil samples were collected from one boring in 2023 and a new VW (SS022-VW03S) and VMP (SS022-VMP05) were installed. It is recommended that all three intervals of SS022-VMP05 be sampled in the spring of 2024. Results of the 2023 soil and vapor sampling and details of the new VW and VMP construction will be reported in a forthcoming addendum to the RPO evaluation.

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10.0 SITE ST009

10.1 Remedy Summary

The remedial approach for Site ST009 is described in *Cleanup Plan for Site ST009, West Unit JP-4 Fuel Spill* (Cleanup Plan; Parsons, July 2016). Remedy components are:

- SVE, to be later converted to bioventing, for contaminated soil in the vadose zone and VSZ.
- Sulfate-enhanced bioremediation for petroleum-contaminated soil in the PSZ and groundwater.

The SVE system was installed in 2016, startup testing was conducted in April 2017, and operations commenced in July 2017 (Parsons, September 2018a). Three additional groundwater monitoring wells were installed in 2016 (**Figure 10-1**). An additional VMP (ST009-VMP09) was installed in 2018 in accordance with the *Technical Memorandum, Expansion of Sites ST009 and ST010 Remediation Systems* (Parsons, April 2018). Sulfate (in the form of gypsum) was injected into the subsurface in September 2017. Layout of the remedies are illustrated on Figures A10-1, A10-2, and A10-3 in **Attachment A**.

10.2 Constituents of Concern

- Soil – North Source Area: GRO; DRO; benzene, toluene, ethylbenzene, and xylenes (BTEX); and 1,2,4-trimethylbenzene
- Soil – South Source Area: GRO, benzene
- Groundwater: GRO, DRO, benzene, toluene, ethylbenzene, and arsenic

10.3 Performance Monitoring Results and Evaluation

10.3.1 Groundwater Monitoring

The original groundwater monitoring program is detailed in the CUP (Parsons, July 2016). The groundwater monitoring program has evolved through subsequent recommendations in prior PMRs and the RPO evaluation (Parsons, June 2023). The current groundwater monitoring plan is presented in the table on page 10-2, with monitoring wells listed below in order from upgradient to downgradient.

DRO, GRO, and benzene are used to track the performance in Site ST009 remedies on groundwater (and indirectly, performance of the remedies on soil). Concentrations of DRO, GRO, and benzene in Site ST009 performance monitoring wells are shown in **Table 10-1**. Groundwater performance monitoring results are presented on **Figure 10-1**. Naphthalene was not identified as a COC in the Cleanup Plan but its Table C groundwater CUL was subsequently reduced to levels below concentrations detected within the plume. Toluene and ethylbenzene detections are co-located with benzene detections. Arsenic is present in groundwater because of dissolution of natural minerals caused by geochemical changes from petroleum hydrocarbon biodegradation; therefore, monitoring the progress of petroleum contaminants is the primary focus of performance monitoring. Complete groundwater analytical results are presented in **Attachment E**. Groundwater grab samples that were collected at Site ST009 in 2022 was part of the RPO evaluation (Parsons, January 2024) are also presented in **Figure 10-1**.

Monitoring Well	Screened Interval (feet bgs)	Current Frequency	Purpose
Performance Monitoring Wells			
B1812-MW001	12-37	Biennially (odd years) for redox parameters only	Upgradient (background)
ST009-MW004	13-33	Biennially (odd years) for VOCs. Every five years for GRO, DRO and PAHs.	Source area - immediately downgradient of initial injection zone
ST009-MW005	13-33	Biennially (odd years) for VOCs. Every five years for GRO, DRO and PAHs.	Source area – approximately 6 months travel time from initial injection zone.
ST009-MW006	13-33	Biennially (odd years) GRO, DRO, VOCs and PAHs.	Source area – approximately 13 months travel time from initial injection zone.
1572-MW-03	4-34	Biennially (odd years) GRO, DRO, VOCs and PAHs.	Source area – immediately downgradient of supplemental injection zone.
1572-MW-04	4-34	Biennially (odd years) VOCs, GRO, and DRO. Every five years for PAHs.	Downgradient well.
10-MW-03	5.33-44.9	Biennially (odd years) for VOCs. Every five years for GRO, DRO and PAHs.	Downgradient well.
10-MW-06	5-45	Biennially (odd years) for VOCs. Every five years for GRO, DRO and PAHs.	Downgradient well.
Downgradient Plume Monitoring Wells			
ST009-MW002	50-60	Every five years	Track long-term impacts of treatment.
ST009-MW003	65-75	Every five years	Track long-term impacts of treatment.
10-MW-04R	5-35	Every five years	Track long-term impacts of treatment.
10-MW-05	40-56.5	Every five years	Track long-term impacts of treatment.
ST009-MW001	66.5-76.5	Every five years	Track long-term impacts of treatment.
09-MW-15	5.4-34.7	Every five years	Track long-term impacts of treatment.
09-MW-24	44.91-54.91	Every five years	Track long-term impacts of treatment.
CG001-MW011	66-76	Every five years	Track long-term impacts of treatment.
CG001-MW012	85-95	Every five years	Track long-term impacts of treatment.
09-MW-30	65-70	Every five years	Track long-term impacts of treatment. Currently sampled annually under Site CG001 monitoring program.
CG001-MW018	20-40	Every five years	Track long-term impacts of treatment.
CG001-MW019	50-70	Every five years	Track long-term impacts of treatment.
CG001-MW020	80-100	Every five years	Track long-term impacts of treatment.
CG001-MW021	110-130	Every five years	Track long-term impacts of treatment.

The casings of wells 10-MW-04R and ST009-MW003 were both obstructed and the wells could not be sampled. Decomissioning of these wells is recommended (see **Section 13**).

Site ST009 COCs did not exceed their Table C CULs in upgradient well B1812-MW001 in 2022; this well was not sampled in 2023.

Concentrations of benzene exceed its Table C CUL by the greatest amount of any indicator COC. Benzene exceeded its CUL in 2023 in all source area wells and in all annually sampled downgradient wells, as well as in seven of the twelve downgradient monitoring wells that are sampled every five years.

Concentrations of DRO and GRO are below their CULs in the two most northern source area wells, ST009-MW004 (**Figure 10-2a**) and ST009-MW005 but benzene and naphthalene exceeded their CULs. Benzene and naphthalene concentrations had decreased in well ST009-MW004 through 2021 but rebounded in 2022, but benzene decreased again in 2023; overall, the concentrations have decreased since baseline in 2017. Benzene concentrations have decreased in well ST009-MW005 as compared to 2017 baseline. The low concentrations of DRO and GRO in these wells suggest that these wells may be outside of the main NAPL-contaminated soil source area.

Concentrations of DRO and GRO are higher in source area well ST009-MW006 (**Figure 10-2b**), suggesting that it is located within the NAPL contaminated soil source area. Benzene had decreased through 2020 but has increased in 2021 and remains elevated in 2023. The GRO concentration was at its Table C CUL in 2023. DRO was below its CUL for the first time in 2023. Despite fluctuations, concentrations of all indicator COCs have decreased since 2017.

Source area well 1572-MW-03 has a long sampling history (**Figure 10-2c**). While DRO concentrations have remained relatively stable over time, GRO, benzene and naphthalene follow common trends. Prior to active remediation in 2017, concentrations of these indicator COCs all showed a gradual decreasing trend indicating natural attenuation. Concentrations abruptly decreased in 2018 and 2019 following implementation of the remedies, but then increased in 2020 and 2021, returning to concentrations indicative of the long-term trend. Concentrations have decreased since 2021, with GRO concentrations decreasing to below the CUL. The reason for these changes in trends is uncertain, but it is possible that sulfate injections may have missed portions of the NAPL-contaminated soil source area given that injections were located to avoid underground utilities.

There are no obvious trends in indicator COC concentrations in downgradient wells 1572-MW-04 (**Figure 10-2d**) or 10-MW-03. GRO concentrations in well 1572-MW-04 have fluctuated near the CUL, and all indicator COCs except benzene are below their CULs in well 10-MW-03. Benzene concentrations appear to be mostly decreasing in downgradient well 10-MW-06, although it was slightly above the CUL in 2023.

In seven of the downgradient monitoring wells sampled on a five-year frequency (ST009-MW002, 10-MW-05, 09-MW-24, CG001-MW011, CG001-MW012, 09-MW-30, and CG001-MW019), benzene concentrations exceeded the CUL.

In the well cluster containing wells 09-MW-15, 09-MW-24, CG001-MW011 and CG001-MW012, located about 1,100 feet downgradient of the ST009 Primary Source Area, benzene exceeded its CUL in all but the shallowest well (screened 5 to 35 feet bgs). The greatest benzene concentration was in the deepest well, CG001-MW012 (screened 85 to 95 feet bgs).

In the furthest downgradient cluster, benzene exceeded its CUL in only the well screened 50 to 70 feet bgs of the four wells sampled; there were no exceedances from 20 to 40 or between 80 and 130 feet bgs.

DRO and GRO were not detected above their CULs in the five-year frequency downgradient monitoring wells except DRO at CG109-MW019 in the furthest downgradient cluster. DRO concentrations generally decreased downgradient of the ST009 Primary Source Area then begin to increase at the cluster located about 1,100 feet downgradient of the ST009 Primary Source Area. This increasing trend suggests the DRO in the distal wells may be associated with another source area.

10.3.2 Groundwater Geochemistry and Sulfate Monitoring

Evaluation of geochemical parameters indicates that at least sulfate-reducing conditions are present in a majority of Site ST009 groundwater, with areas of methanogenic conditions present as well (**Attachment B**, Table 5-1).

Sulfate concentrations in Site ST009 groundwater are presented in **Table 10-2**. The 2017 data were all collected prior to sulfate injection in September 2017 and represent baseline (pre-injection) sulfate concentrations. The 2017 baseline concentrations of sulfate ranged from 1.25 to 25.1 mg/L.

The concentration of sulfate in upgradient well B1812-MW001 increased from approximately 2.61 mg/L in 2017 to a maximum of 209 mg/L in 2018 and has been generally decreasing through 2023 to 36.6 mg/L. Sulfate concentrations remain significantly above the 2017 baseline concentration. The observed increase at this upgradient well is likely the result of its proximity to the nearest injection points (approximately 45 feet downgradient from B1812-MW001) and the seasonal change in groundwater flow direction.

In 2018, the concentration of sulfate increased in all source area wells (wells and injection zones shown in **Attachment A**, Figure A10-3). Since 2018, sulfate concentrations have generally decreased upgradient and between the injection zones and in 2023 are nearing their 2017 baseline concentrations (**Figure 10-3**). Downgradient of the second injection zone, sulfate concentrations are all below 40 mg/L and generally similar to 2018 concentrations.

The greatest post-injection increases in sulfate were at wells ST009-MW004, ST009-MW005, and ST009-MW006 located between the two sulfate injection zones. Sulfate concentration increases were more modest in wells 1572-MW-03, 1572-MW-04, and 10-MW-03 downgradient of the second injection zone. As of 2023, sulfate has returned to pre-injection levels in downgradient well 10-MW-03, however, it has increased in downgradient well 1572-MW-04 in 2023. Sulfate concentrations in downgradient well 10-MW-06, 300 feet downgradient of the injection zone, have been increasing in each annual sample since 2019 to 36.8 mg/L in 2023.

Methane concentrations increased in 2018 and 2019 in most treatment zone wells indicating an increase in biological activity including methanogenesis. Methane concentrations began to decrease in 2020 and have continued to decrease through 2023 as compared to 2019 sample results. However, methane concentrations in most site wells in 2023 remain elevated indicating methanogenic conditions are still present but groundwater may be shifting towards a less reducing condition.

10.3.3 Static Soil Gas Monitoring

Soil was sampled and analyzed for various contaminants between 2007 and 2010 and additional samples were collected in 2016 during installation of the SVE system. Additional soil samples were collected in the northwest portion of the site in 2022 as part of the RPO project (Parsons, January 2024). In the Northern Source Area, the highest concentrations of COCs in soil are in two vertical intervals: a shallow interval located between the ground surface and approximately 12 feet bgs and a deep interval spanning the bottom of the VSZ and top of the PSZ between approximately 25 and 30 feet bgs. Maximum concentrations of DRO, GRO, and benzene in the Northern Source Area were 7,010 mg/kg, 8,920 mg/kg, and 24 mg/kg, respectively. In the Southern Source Area, the highest concentrations of COCs in soil were detected at 4-6 feet bgs. Maximum concentrations of DRO, GRO, and benzene in the Southern Source Area were 2,458 mg/kg, 1,840 mg/kg, and 9.34 mg/kg, respectively.

Static soil gas sampling provides an indirect measure of VOC concentrations in soil and is an indicator of the performance of the SVE system. Concentrations of TPH-g and benzene in static soil gas are presented in **Table 10-3**. Samples collected in April 2017 represent baseline (pre-SVE) conditions. Because of apparent cross contamination, all 2019 soil vapor analytical sample results from Site ST009 were rejected. Comprehensive soil vapor sample results are presented in the SVE Annual Report (**Attachment C**).

The Site ST009 SVE system did not operate during FY2022 or FY2023. Comparison of 2021 and 2023 analytical soil vapor data showed a rebound of TPH-g by approximately an order of magnitude at both sampled intervals of ST009-VMP05 after two years without SVE operation. Benzene and total BTEX did not to rebound at the ST009-VMP05 intervals. Both intervals are within the VSZ and the rebound is likely the result of sorption of TPH-g from groundwater to soil during high water and desorption from soil to soil vapor after the water receded. There was little evidence of rebound in TPH-g and benzene as compared to 2021 results at the other two intervals sampled in April 2023 (at ST009-VMP03 and ST009-VMP06); only TPH-g at ST009-VMP06 (18-20 feet bgs) increased slightly.

Despite the rebound observed at ST009-VMP05, TPH-g has decreased between one and four orders of magnitude as compared to 2017 baseline results and benzene has decreased between four and five orders of magnitude at locations sampled in 2023.

10.3.4 Mass Removal by SVE System

Cumulative benzene, total BTEX, and VOC removal by the SVE system through FY2021 is presented in **Table 10-4** and **Figure 10-4**. The SVE system was not operated in FY2022 or FY2023 because the SVE blower seized and then the motor failed. A total of 60.5 lbs benzene, 575 lbs of total BTEX, and 47,600 lbs of total VOCs have been removed from the subsurface between initiating SVE in April 2017 and the end of FY2021.

Removal rates have decreased considerably since 2018 (125 million cubic feet of extracted soil vapor; **Figure 10-4**). The cumulative masses of benzene and total BTEX removed since startup in 2017 through April 2021 were essentially unchanged as compared to mass removed through FY2020 (300 million cubic feet of extracted soil vapor). The removal rate has decreased approximately one order of magnitude very two years since FY2017 (see inset on **Figure 10-4**). These data indicate the mass of benzene, total BTEX, and total VOCs in the vadose and VSZ have become depleted.

10.3.5 SVE In Situ Respiration Testing and Biodegradation Rate Estimates

Because the system was not operable in FY2023, ISR tests could not be completed. Fuel hydrocarbon biodegradation rates, calculated from the ISR test results, are summarized in **Table 10-5** for prior years**.**

10.4 Summary of Performance Observations

- Concentrations of indicator COCs DRO, GRO, and benzene, and naphthalene in groundwater exceeded Table C CULs in one or more of the source area monitoring wells in 2023. Concentrations appear to be decreasing in most wells despite some fluctuation. GRO appears to be reaching its CUL in a few wells. Benzene remains the indicator COC that exceeds its CUL by the greatest amount.
- Sulfate concentrations increased after the 2017 injections but have since decreased in most source area wells and in 2023 is rapidly approaching pre-injection baseline concentrations. Sulfate was detected at highest concentrations in source area wells between the injection zones and at lower concentrations downgradient of the injection zones. Geochemical monitoring indicates that sulfate-reducing and methanogenic redox conditions are present in groundwater. Sulfate consumption is likely occurring downgradient of the injection zones. Therefore, the sulfate-enhanced bioremediation remedy is performing as anticipated. Sulfate injections were designed for a five-year life cycle but appear to be largely depleted in 2023.
- Concentrations of TPH-g rebounded in a few VMP intervals because the SVE system did not operate during FY2022 and FY2023 but benzene did not rebound. Despite the SVE system not operating, static soil vapor data collected in April 2023 documented reductions in both TPH-g and benzene concentrations as compared to 2017 baseline results.

10.5 Recommendations

Continued groundwater monitoring following the program outlined in **Section 10.3.1** is recommended. The casings of wells 10-MW-04R and ST009-MW003 were both obstructed in 2023 and could not be sampled. Decomissioning of these wells is recommended.

The blower was replaced in 2022 but upon an attempt to restart in fall of 2022 the motor would not stay running and an electrician determined it also needed to be replaced. The motor was replaced and restarted in October 2023. Continued operation of the SVE system is recommended. Based on the findings and recommendations of the RPO evaluation, the system should continue to be operated at low flow rates with the primary goal of providing oxygen to sustain aerobic biodegradation (bioventing).

Per the recommendations of the RPO evaluation (Parsons, June 2023), future static soil gas samples will be analyzed for TPH-g but analysis for BTEX will be discontinued. Further recommendations regarding SVE operation and monitoring are presented in **Attachment C**.

Although the sulfate-enhanced bioremediation remedy is performing as anticipated, the injections were designed to provide sulfate for five years. Additional injections were recommended in the RPO evaluation (Parsons, June 2023). Groundwater grab sample data collected in 2022 were used to provide recommendations to optimize the reinjections (Parsons, January 2024).

11.0 SITE ST010

11.1 Remedy Summary

The remedial approach for Site ST010 is described in *Cleanup Plan for Site ST010, Southeast Runway Fuel Spill* (Cleanup Plan; Parsons, May 2016b). Remedy components are:

- Bioventing for petroleum-contaminated soil in the vadose zone and VSZ in the Primary and Secondary Source Areas.
- MNA for petroleum contaminants in groundwater.

The bioventing system was installed in 2016, startup testing was conducted in April 2017, and operations commenced in July 2017 (Parsons, September 2018a). Additional startup testing activities were completed in summer 2017. Two additional groundwater monitoring wells (ST010-MW013 and ST010-MW014) were installed in 2016 and one ST010-MW015) was installed in 2023 (**Figure 11-1**). Two new VWs (ST010-VW13 and ST010-VW014), four new VMPs (ST010-VMP09, ST010-VMP10, ST010-VMP11, and ST010-VMP12), and soil borings were sampled in 2018 in accordance with the *Technical Memorandum, Expansion of Sites ST009 and ST010 Remediation Systems* (Parsons, April 2018). In 2019, five new VWs (ST010-VW15 through ST010-VW019) and two new VMPs (ST010-VMP13 and ST010-VMP14) were installed and the new VWs were connected to the ST010 blower system as detailed in the 2019 CCR (Parsons, May 2020b). The layout of the bioventing remedy at Site ST010 remedy is illustrated on **Figure 11-1** in **Attachment A**.

11.2 Constituents of Concern

- Soil
  - Primary Source Area: GRO, DRO, benzene, ethylbenzene, naphthalene, 1- methylnaphthalene, and 2-methylnaphthalene
  - Secondary Source Area: GRO, DRO, benzene, ethylbenzene, 1,2,4-trimethylbenzene, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene
- Groundwater
  - Primary Source Area: DRO and benzene
  - Secondary Source Area: DRO, benzene, naphthalene, and 2-methylnaphthalene

11.3 Performance Monitoring Results and Evaluation

11.3.1 Groundwater Monitoring

The original groundwater monitoring program is detailed in the RD/RAWP (Parsons, July 2018b). The groundwater monitoring program has evolved through subsequent recommendations in prior PMRs and the RPO evaluation (Parsons, June 2023). The current groundwater monitoring plan is presented in the table on the following page, with monitoring wells listed below in order from upgradient to downgradient. In 2023 a new monitoring well (ST010-MW015) was installed downgradient of the center of the Primary Source Area and was sampled.

Monitoring Well	Screened Interval (feet bgs)	Current Frequency	Location - Purpose
SE-MW-01	6- 26	Biennially (odd years) for DRO, RRO and VOCs. Reduce VOC monitoring frequency with 3 successive sample events of naphthalene < CUL.	Monitoring source area
ST010-MW013	15.2 – 36.2	Every five years for DRO, RRO and VOCs.	Monitoring downgradient of primary source area
ST010-MW014	12 - 32	Annually for DRO, RRO, VOCs and PAHs to confirm that COCs do not rebound after bioventing is shut down.	Monitoring secondary source area
ST010-MW015	12 - 32	Annually for DRO, RRO, VOCs and PAHs	Monitoring downgradient of primary source area

DRO, benzene, and naphthalene are used to track the performance in Site ST010 remedies on groundwater (and indirectly, performance of the remedies on soil). Naphthalene was not identified in the Cleanup Plan as a COC in groundwater for the Primary Source Area because naphthalene concentrations for well SE-MW-01 were below the Table C CUL that was in place at the time the Cleanup Plan was approved. In October 2016, the Table C CUL for naphthalene was reduced from 730 µg/L to 1.7 µg/L. Naphthalene is used to track performance of the remedies in the Primary Source Area because it has periodically been detected above the revised Table C CUL. Concentrations of COCs in Site ST010 groundwater monitoring wells are shown in **Table 11-1**. Groundwater performance monitoring results are presented on **Figure 11-1**. Complete groundwater analytical results are presented in **Attachment E**.

Historically, DRO, benzene and naphthalene have all exceed their Table C CULs in source area monitoring well SE-MW-01. The well has been monitored since 1995 (**Figure 11-2**). The concentrations of benzene and naphthalene relative to their CULs were initially greater than the concentration of DRO relative to its CUL. However, in more recent years, DRO has become the COC that exceeds its CUL by the greatest amount. This may indicate weathering or natural attenuation of the petroleum constituents (i.e., generation of more soluble polar metabolites).

Since implementation of bioventing in 2017, concentrations of benzene have decreased in monitoring well SE-MW-01, and have generally been below its CULs since 2017 (**Figure 11-2**). Concentrations of naphthalene have been variable since 2017 and increased to just above its CUL in 2023. DRO concentrations increased between 2011 and 2020, but then has decreased since 2020. The increasing DRO trend is likely the result of formation of polar intermediate biodegradation products with greater solubility than the parent non-polar hydrocarbons. The RPO evaluation documented the DRO concentrations at SE-MW-01 in 2020 and 2021 were between 91 and 99 percent polar metabolites (Parsons, June 2023).

COCs have not exceeded Table C CULs in Primary Source Area downgradient well ST010-MW013 since installation in 2016 or in the Secondary Source Area monitoring well ST010-MW014 since 2018.

In ST010-MW015, the new well installed downgradient of the Primary Source Area in 2023, Table C CULs were exceeded for DRO, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, 1,2,4-trimethylbenzene, and ethylbenzene (**Appendix E**).

Monitoring well ST010-MW010 was sampled in 2020 through 2022 as part of the RPO project. Table C CULs were not exceeded in well ST010-MW010 in 2020 but DRO was detected at concentrations above its CUL in 2021 and 2022. Historical DRO concentrations from this well (2013, 2014, 2015, and 2020) were all below the Table C CUL. The recent increase in DRO concentrations is most likely due to upgradient biodegradation of DRO which generates more soluble polar metabolites of DRO.

11.3.2 Static Soil Gas Monitoring

Soil was sampled and analyzed for various contaminants in several sampling events from 1995 to 2018. Among the highest concentrations of COCs in soil were benzene at 3.35 mg/kg, naphthalene at 220 J mg/kg, and DRO at 40,000 mg/kg. Static soil gas sampling provides an indirect measure of VOC concentrations in soil in the VSZ and is an indicator of the performance of the bioventing system. Soil samples were collected in 2021 under the RPO project to evaluate the progress of bioventing at achieving RAOs; results are presented in the RPO Report (Parsons, June 2023).

Concentrations of TPH-g and benzene in static soil gas are presented in **Table 11-2**. Concentrations of TPH-g and benzene are plotted on **Figure 11-3a** and **Figure 11-3b**, respectively. Benzene results from ST010-VMP01 are not presented on **Figure 11-3b** because benzene has typically not been detected at this location. Samples collected in May and July 2017 represent baseline (pre-bioventing) conditions. Three VMP intervals that had 2021 TPH-g concentrations less than 20 ppmv (20,000 ppbv) were removed from the monitoring program in 2022. VMP locations are shown in **Attachment A**, Figure 11-1.

Static soil vapor results through 2023 document reductions in concentrations of TPH-g (between a factor of 2.8 and a factor of 400) and benzene (between two and over three orders of magnitude) as compared to baseline concentrations. Complete bioventing system monitoring results are provided in **Attachment D**.

11.3.3 Bioventing In Situ Respiration Testing and Biodegradation Rate Estimates

Per the recommendations of the 2021 Performance Monitoring Report (Parsons, August 2022a) the frequency of ISR testing has been reduced from annually to biennially. ISR testing was conducted in from 25 April to 1 May 2023 at ST010-VMP02 (5.5 to 6.5 feet bgs), ST010-VMP03 (5 to 6 feet bgs), ST010-VMP06 (19.5 to 21.5 feet bgs), and ST010-VMP07 (6 to 7 feet bgs). Fuel hydrocarbon biodegradation rates, calculated from the ISR test results, are summarized in **Table 11-3.**

The estimated biodegradation rates in 2023 ranged from 0.63 mg TPH/kg soil-day at ST010-VMP06 to 9.6 mg TPH/kg soil-day at ST010-VMP03. Generally, these rates were less than the estimated rates in 2021, except at ST010-VMP03 which increased to its highest measured rate.

11.3.4 LNAPL Monitoring

Free product recovery was not identified as a remedy component in the Cleanup Plan for Site ST010 (Parsons, May 2016b); however, because of the very high and increasing concentrations of DRO detected in well SE-MW-01, LNAPL monitoring of this well was recommended in the 2019 Performance Monitoring Report (Parsons, July 2020). LNAPL measurements are presented in **Table 11-4**. An LNAPL sheen (<0.01 feet) was detected in April 2023 but LNAPL was not detected August 2023. A sorbent sock was installed in April 2023 and removed prior to groundwater sampling in August.

11.4 Summary of Performance Observations

- In source area well SE-MW-01, concentrations of benzene have decreased since implementation of bioventing in 2016. DRO concentrations remain elevated and naphthalene has been highly variable.
- COCs have not exceeded Table C CULs in downgradient well ST010-MW013 since monitoring began in 2016.
- CULs were exceeded for several COCs including indicator COCs DRO, naphthalene in new well ST010-MW015 installed downgradient of the Primary Source Area in 2023.
- COCs have not exceeded Table CULs in the Secondary Source Area well ST010-MW014 in since 2018.
- Static soil vapor results documented continued reductions in TPH-g and benzene as compared to baseline concentrations.
- An LNAPL sheen was detected in well SE-MW-01 in April 2023 but LNAPL was not detected in August 2023.

11.5 Recommendations

Continued groundwater monitoring following the program outlined in **Section 11.3.1** is recommended. It is recommended that LNAPL monitoring of well SE-MW-01 be discontinued. The maximum LNAPL thickness detected was 0.01 feet and no more than a sheen has been detected since 2020.

Based on the results of 2021 soil sampling and the body of groundwater data, the RPO evaluation (Parsons, June 2023) recommended bioventing be discontinued for the Secondary Source Area of Site ST010. The bioventing system will continue operating to treat the Primary Source Area. No system components will be decommissioned until results of future groundwater sampling confirm concentrations of COC do not rebound. ADEC approval will be obtained before decommissioning any components of the bioventing system.

It is recommended to continue to monitor the Site ST010 bioventing system and soil vapor in the Primary Source Area. Per the recommendations of the RPO Report (Parsons, June 2023) analysis of static soil gas samples for TPH-g is recommended; however, analysis for BTEX will be discontinued. Refer to **Attachment D** for more detailed recommendations on bioventing system OM&M for Site ST010.

12.0 SITE FT001

12.1 Remedy Summary

The remedial approach for Site FT001 was selected in the *Interim Record of Decision for Fire Protection Training Area (Site FT001)* (Parsons, November 2017) and is described in *Remedial Design and Remedial Action Work Plan for Fire Protection Training Area (Site FT001)* (Parsons, February 2018). Interim remedy components are:

- Bioventing for petroleum-contaminated soil in the vadose zone and VSZ.
- An impermeable soil cover over the footprint of the bioventing system to enhance bioventing treatment, create a protective barrier to exposure to surface soil, and promote drainage away from the Fire Protection Treatment Area circle thereby reducing infiltration through the source area.
- MNA for petroleum contaminants in groundwater.

The soil cover and bioventing system were installed in 2018 and bioventing operations commenced in October 2018 (Parsons, April 2019). Layouts of the bioventing system (including VMP and VW locations) and soil cover are illustrated on Figures A12-1 and A12-2 in **Attachment A**. One additional groundwater monitoring well (FT001-MW013) was installed in 2018 (**Figure 12-1**).

The interim remedy does not address per- and polyfluoroalkyl substances (PFAS). The USAF is managing the evaluation of PFAS at Site FT001 under a separate program for emerging contaminants.

12.2 Constituents of Concern

- Soil: 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1-methylnaphthalane, 2-methylnaphthalene, benzene, DRO, GRO, ethylbenzene, EDB, isopropylbenzene, naphthalene, toluene, TCE, and total xylenes.
- Groundwater: GRO, DRO, benzene, toluene, and TCE.

12.3 Performance Monitoring Results and Evaluation

12.3.1 Groundwater Monitoring

The original groundwater monitoring program is detailed in the RD/RAWP (Parsons, July 2018b). The groundwater monitoring program has evolved through subsequent recommendations in prior PMRs and the RPO evaluation (Parsons, June 2023). The current groundwater monitoring plan is presented in the table on page 12-2, with monitoring wells listed below in order from upgradient to downgradient.

DRO, GRO, and benzene are used to track the performance of Site FT001 remedies for groundwater (and indirectly, performance of the remedies on soil). Their concentrations in Site FT001 groundwater monitoring wells are shown in **Table 12-1**. Only data collected during the period represented by source area, in-plume, and downgradient wells (2010 to present) is presented in **Table 12-1**. Groundwater performance monitoring results (2018 to 2022) are presented on **Figure 12-1**. Complete groundwater analytical results are presented in **Attachment E**.

Monitoring Well	Screened Interval (feet bgs)	Current Frequency	Location - Purpose
01-MW-03	12.5 – 22.5	Annual for redox parameters only	Monitoring upgradient
FT001-MW013	12 – 32	Annual for GRO, DRO, VOCs	Monitoring source area
01-MW-01	7.2 – 46.8	Annual for VOCs. Once every five years for GRO and DRO.	Monitoring along plume axis
FT001-MW009	13 – 38	Annual for VOCs. Once every five years for GRO and DRO	Monitoring downgradient
FT001-MW012	70 - 80	Annual for VOCs. Once every five years for GRO and DRO.	Monitoring downgradient

Concentrations of the indicator COCs GRO and DRO were below CULs in all wells in 2023. GRO was last detected above its CUL in 2018 and DRO in 2020.

Upgradient well 01-MW-03 has been monitored periodically since 1986. COCs have not historically exceeded current Table C CULs at this location.

Source area monitoring well FT001-MW013 was installed and first sampled in 2018. Concentrations of the indicator COCs in well FT001-MW013 have decreased steadily since implementation of the remedy in 2018, and in 2023 none of the indicator COCs exceeded their 2018 Table C CULs (**Figure 12-2**). As compared to 2018 levels, DRO has decreased by over two orders of magnitude, GRO has decreased by three orders of magnitude and benzene has decreased by four orders of magnitude.

Downgradient well 01-MW-01 was sampled in 2023 for the first time since 2011. This well was added to the monitoring program to track benzene between the source area and FT001-MW009. DRO, GRO and benzene were not detected in 2023. In 2011 DRO and GRO were not detected but benzene (17.4 µg/L) was detected above its CUL.

Downgradient well FT001-MW009 has been sampled periodically since 2010. Benzene concentrations exceed the Table C CUL, and historically concentrations have fluctuated and show no clearly discernable trend; however, 2022 and 2023 concentrations were lower than average. Wells FT001-MW010, FT001-MW011, and FT001-MW012 are in a cluster near the edge of the airfield, approximately 200 feet from the Yukon River. These wells have been sampled periodically since 2013. Table C CULs have not been exceeded for site COCs in either FT001-MW010 or FT001-MW011, the shallower two wells. In the deepest well, FT001-MW012, benzene concentrations exceed the Table C CUL and historically concentrations have fluctuated but in recent years show a slight decreasing trend.

No other groundwater COCs (toluene, TCE, vinyl chloride) were detected in any well in 2023.

12.3.2 Static Soil Gas Monitoring

Soil was sampled and analyzed for various contaminants in several sampling events from 1992 to 2016. Among the highest concentrations of COCs in soil were benzene at 225 mg/kg, ethylbenzene at 239 mg/kg, toluene at 935 mg/kg, total xylenes at 1,100 mg/kg, DRO at 21,000 mg/kg, and GRO at 19,300 mg/kg. Static soil gas sampling provides an indirect measure of VOC concentrations in soil in the VSZ and performance of the bioventing system.

Concentrations of TPH-g and benzene in static soil gas are presented in **Table 12-2**. Samples collected in September 2018 represent baseline (pre-bioventing) conditions. Because of apparent cross contamination, all 2019 analytical sample results from Site FT001 were rejected.

The 2022 static soil vapor results document reductions in concentrations at all intervals for TPH-g (by up to four order of magnitude) and benzene (between two and over four orders of magnitude) as compared to 2018 baseline concentrations. Complete bioventing system monitoring results are provided in **Attachment D**.

12.3.3 Bioventing In Situ Respiration Testing and Biodegradation Rate Estimates

Because RPO evaluation (Parsons, June 2023) recommended bioventing be discontinued at Site FT001, ISR testing was not conducted in spring of 2023**.**

12.4 Summary of Performance Observations

- GRO has not exceeded its Table C CUL in any well since 2018 when the remedies were implemented.
- DRO and benzene in well FT001-MW013 have decreased steadily since 2018 and none of the indicator COCs have exceeded their Table C CULs since 2020.
- Of the indicator COCs, only benzene exceeded its CUL in downgradient wells FT001-MW009 and FT001-MW012. There is no clear trend for benzene in downgradient well FT001-MW009; however, in 2022 and 2023 concentrations were lower than average. In downgradient well FT001-MW012 benzene concentrations show a slight decreasing trend in recent years.
- Static soil vapor sampling documented reductions in TPH-g and benzene as compared to 2018 baseline concentrations.

12.5 Recommendations

Per the findings of the RPO evaluation (Parsons, June 2023), temporary shutdown of the bioventing system has been recommended to evaluate the effectiveness of the soil cover alone in reducing leaching of COCs from source area soils. The bioventing system was run through the winter of 2022/2023 and was turned off in April 2023. Decommissioning of the bioventing system is not recommended at this time. If future groundwater monitoring confirms RAOs have been met and concentrations of COCs have not rebounded, the USAF will seek approval from ADEC to decommission the bioventing system.

Continued annual groundwater monitoring of site monitoring wells is recommended to assess the impact of shutting down the bioventing system. Recommendations regarding optimization of the monitoring program are presented in the RPO Report (Parsons, June 2023).

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13.0 2023 MONITORING WELL INSPECTION, REPAIR, AND MAINTENANCE SUMMARY

Monitoring well inspection, repair, and maintenance activities are discussed below and results presented in **Attachment F. Attachment F** is inclusive of wells throughout the Former Galena FOL, including wells associated at sites managed by Parsons and Jacobs/CH2M.

13.1 Well Inspections

In 2023, all monitoring wells were inspected and any deficiencies were noted on either the groundwater sampling form and/or in a field notebook. In addition, a general safety inspection of wellhead completions around the wells was conducted, and the condition noted on a master monitoring well list (**Attachment F-1**). All wells with visible signs of wellhead damage or frost jacking were opened and inspected. Any wellhead deficiencies were noted on well purge or sampling records. Any wells with missing or damaged bollards, missing bolts, or missing well markers were noted. Well repairs or maintenance completed during the 2023 field season are documented in **Attachment F-1**.

13.2 Well Repairs and Maintenance

Well repairs and maintenance are documented in **Attachment F-1**. During the 2023 field season the following wells had silt and/or overgrown grass removed:

- 09-MW-29
- SS015-MW076
- SS015-MW077
- SS015-MW082
- SS015-MW083
- SS015-MW44
- SS015-MW45

During the 2023 field season the following wells had locks replaced or added:

- 01-MW-03
- 01-MW-05
- 06-MW-03
- 09-RW-04
- CG001-MW022
- CG001-MW023

During the 2023 field season the following wells had the surface completions reset or replaced:

- SS015-EW02
- SS015-MW088
- SS017-MW007R

During the 2023 field season the following wells had bolts added or replaced to secure vault lids:

- 09-MW-10 (found and replaced Robco lid)
- 09-MW-29
- CG001-MW004
- CG001-MW016
- CG001-MW020
- CST011-MW001

- CST011-MW002
- CST011-AS03
- CST014-MW001
- SS005-MW003
- ST005-MW064
- ST005-MW066

The following wells had new compression caps installed and transducers removed (if present):

- 09-MW-29
- CG001-MW002
- CG001-MW016
- CST014-MW001
- SS005-MW003

The following wells were decommissioned in 2023:

- SS015-EW01
- 2541-MW-02
- B400-MW001
- B400-MW002

Approximately 8 inches of PVC was removed from well 09-RW-04 to allow the lid to close.

13.3 Monitoring Well Maintenance Recommendations

Well maintenance recommended for 2024 is listed in **Attachment F-1**. During the 2023 inspections, the following wells were observed to be missing bolts on their well covers or J-plugs:

- CSS002-MW002
- 01-MW-06R
- 01-MW-08R
- 09-MW-23
- GALNA-LF-MW003
- ST005-MW053
- ST005-MW054
- ST005-MW057
- ST005-MW058
- 06-MW-12
- 06-MW-17
- SS006-MW68
- SS015-MW074
- SS015-MW088
- SS015-MW42
- SS015-MW43
- SS022-MW003
- ST009-MW004
- SE-MW-04
- SE-MW-07
- SE-MW-08
- ST010-MW010
- TU001-MW002

Most of the wells listed above are simply missing full sets of bolts, a locking cap (J-plug) or need minor repair.

Five site wells have damaged surface completions that should be replaced in 2024:

- 09-MW-27
- ST005-MW055
- SS006-MW55
- SS017-MW003
- SE-MW-01

Two wells contained casings which have risen due to potential frost jacking. It is recommended that the PVC be cut to reduce pressure on the well cover for the following wells:

- SS016-MW003
- ST009-MW001

Several site wells could not be sampled, or sampling procedures had to be adjusted due to obstructions encountered in the well casings:

- 01-MW-03 Casing warped but can be sampled with a peristatic pump
- 09-MW-28 Obstruction at ~6 feet bgs
- 10-MW-04R Obstruction in casing at 16.7 feet bgs
- 10-MW-05 Obstruction in casing at 52 feet bgs but able to sample
- BKGD-MW006 Well frozen at 39 feet
- BKGD-MW007 Well frozen at 39 feet
- FT001-MW012 Obstruction at 29.5 feet (tubing was fished out of the well in 2024)
- ST009-MW003 Obstruction at 7.6 feet bgs. Potential frost jacking.
- ST010-MW013 Frozen at 30.5 feet bgs due to permafrost. Transducer frozen in well.
- SS016-MW001 20 feet of sediment in well screen.

Wells with obstructions from warped or damaged casings should be abandoned and replaced if necessary.

Decommissioning of the following wells is recommended due to obstruction that is likely the result of a damaged casing:

- 09-MW-28 Obstruction at 6 feet bgs
- 10-MW-04R Obstruction at 16.7 feet bgs
- ST009-MW003 Obstruction at 7.6 feet bgs
- SS016-MW001 ~20 feet of sediment in well screen

In general, monitoring wells will be considered for replacement if they are currently used for performance monitoring. Monitoring wells may also be considered for replacement at a future date if performance monitoring indicates the location would serve to fill a data gap or is necessary for confirmation sampling.

14.0 SUMMARY OF 2023 PERFORMANCE MONITORING RECOMMENDATIONS

The following is a summary of general and site-specific recommendations that are presented in the body of the 2023 Performance Monitoring Report and in the Soil Vapor Extraction Annual Report (**Attachment C**) and the Bioventing Annual Report (**Attachment D**).

The following recommendations incorporate recommendations based on the annual performance monitoring programs and recommendations from the RPO evaluation.

2023 Annual Performance Monitoring Report - Summary of Recommendations

General Recommendations
General Recommendations for SVE System OM&M
Continue to collect static soil vapor samples in early spring when groundwater is low. This will require shutting the systems off for a period of about one week prior to sampling to allow concentrations of VOCs to reach equilibrium. During static soil vapor sampling, collect samples for laboratory analysis in Summa™ canisters from the intervals sampled for laboratory analysis during the previous sampling event and/or alternate intervals as described below in the Soil Vapor Extraction Annual Report (**Attachment C**).
Except for Site SS006, leave SVE systems off after completion of static vapor sampling through the season of high groundwater elevation and the summer annual groundwater sampling event.
Restart the Site SS006 SVE system during the summer extracting from only shallow VWs once at least 5 feet of shallow VW screen intervals are exposed.
General Recommendations for Bioventing System OM&M
Continue to collect operational soil vapor samples in early spring. Discontinue operating soil gas sampling for VMP intervals where static oxygen concentrations during the prior two monitoring events are greater than 5 percent unless the interval is also used for ISR testing. If the static oxygen concentration, collected about 1 week after system shutdown, is greater than 5 percent then there is clearly oxygen influence at the location when the system is operating. If oxygen drops below 5 percent at an interval during future static soil vapor monitoring operating soil vapor sampling will be reinstated.
After operational soil vapor sampling is complete shut down the bioventing systems and conduct ISR tests (biennially) at intervals as described in the Bioventing Annual Report (**Attachment D**).
Approximately 7 days after system shut down, collect static soil vapor samples from all VMP intervals that had VOC concentrations greater than 20 ppmv and/or oxygen concentrations less than 5 percent during the previous static soil sampling event. During static soil vapor sampling, collect samples for laboratory analysis in Summa™ canisters from the intervals specified in the Bioventing Annual Report (**Attachment D**).
Restart bioventing systems after seasonal shutdown for high groundwater and annual groundwater sampling provided at least 5 feet of the VWs screened interval is exposed above groundwater.

2023 Annual Performance Monitoring Report - Summary of Recommendations (cont.)

Site Specific Recommendations	
Site CPL006 Area 3	Continue to operate and monitor the bioventing system and monitor soil vapor in accordance with the bioventing system recommendations **in Attachment D**. Continue to monitor LNAPL thickness in early spring when the groundwater elevation is low. Continue to remove free product when it is detected. A grab groundwater sample investigation is recommended to delineate the extent of Table C CUL exceedances to the north, east, and west of CPL006-MW001.
Site CSS002	The bioventing system was turned off in April 2023 per the recommendations in the RPO Report (Parsons, June 2023). Decommissioning of the bioventing system is not recommended at this time. Continue annual groundwater monitoring to assess the impact of shutting down the bioventing system. If future groundwater monitoring confirms RAOs have been met and concentrations of COCs have not rebounded, the USAF will seek approval from ADEC to decommission the bioventing system.
Site SS006/ SS019	An additional emulsified vegetable oil injection event was recommended in the RPO Report (Parsons, June 2023). Continue to operate the SS006 SVE system through the summer months, after students have left, with extraction through shallow VWs. Note that passive venting has been discontinued. Replace the failed blower at Site SS019. To optimize SVE extraction flow, rescreen influent concentrations at the VW heads and be collect samples for laboratory analysis (VOCs by Method TO-15) from VWs with PID screening results less than 10 ppmv.
Site SS017	Continue to monitor LNAPL thickness in early spring when the groundwater elevation is low. Continue to remove free product when it is detected. Additional sulfate injections are recommended. recommendations to optimize the reinjections were presented in the RPO evaluation addendum (Parsons, January 2024). Continue to operate and monitor the bioventing system and monitor soil vapor in accordance with the recommendations **in Attachment D**. Discontinue laboratory analysis of static soil vapor samples. Continued bioventing should be reevaluated after the 2024 monitoring event is completed.
Site SS015	Additional injections of EAB/EBT are recommended to target residual chlorinated VOCs in the PSZ near SS015-MW43. Continue to operate the SVE system and monitor groundwater and soil vapor. Discontinue sampling for microbial community parameters until EAB/EBT reinjections are performed. Continued SVE should be reevaluated after the 2024 monitoring event is completed.

2023 Annual Performance Monitoring Report - Summary of Recommendations (cont.)

Site Specific Recommendations (continued)	
Site SS016	The bioventing system was turned off in April 2023 per the recommendations in the RPO Report (Parsons, June 2023). Decommissioning of the bioventing system is not recommended at this time. Continue annual groundwater monitoring to assess the impact of shutting down the bioventing system. If future groundwater monitoring confirms RAOs have been met and concentrations of COCs have not rebounded, approval from ADEC to decommission the bioventing system.
Site SS018	Subarea 1 - Recommend collecting soil samples in 2028 to document intrinsic remediation to coincide with the next Five-Year Review. Subarea 2 - Collect soil samples to document intrinsic remediation in 2028 to coincide with the next Five-Year Review. Subarea 3 - No further action is recommended in accordance with the RD/RAWP. COCs were not identified in the ROD and RD/RAWP for Subarea 3. Chlorinated VOCs in soil greater than 12 feet bgs and in groundwater beneath Subarea 3 are attributed to, and will be remediated under, Site SS006. Subarea 4 - As the result of intrinsic remediation, pesticides in Subarea 4 surface soil meet the requirements for Cleanup Complete. No further action is recommended. Subarea 5 - A supplemental site characterization was conducted in 2021 at Site SS018 to define the extent of soil contamination along the east side of the 2019 excavation. Based on the results, additional excavation of contaminated soil to the east and south of the 2019 excavation was recommended (Parsons, August 2022b). Monitoring of wells SS018-MW001 and SS018-MW003 should continue to be monitored annually until the remedy for Subarea 5 is complete.
Site SS022	Continue groundwater monitoring at Site SS022. The Site SS022 SVE blower system failed in late October 2022 and was replaced and restarted in October 2023. Continue to operate and monitor the SVE and monitor soil vapor in accordance with the recommendations **in Attachment C**. Based on the 2022 RPO passive soil vapor data, additional soil samples were collected from one boring in 2023 and a new VW (SS022-VW03S) and VMP (SS022-VMP05) were installed. It is recommended that all three intervals of SS022-VMP05 be sampled in the spring of 2024.
Site ST009	Continue groundwater monitoring at Site ST009. The casings of wells 10-MW-04R and ST009-MW003 were both obstructed in 2023 and could not be sampled. Decommissioning of these wells is recommended. Continue to operate and monitor the SVE and monitor soil vapor in accordance with the recommendations **in Attachment C**. Continue operation of the SVE system at low flow rates with the primary goal of providing oxygen to sustain aerobic biodegradation (bioventing). Future static soil gas samples will be analyzed for TPH-g but analysis for BTEX will be discontinued. Additional sulfate injections are recommended. recommendations to optimize the reinjections were presented in the RPO evaluation addendum (Parsons, January 2024).

2023 Annual Performance Monitoring Report - Summary of Recommendations (cont.)

Site Specific Recommendations (continued)	
Site ST010	Continued groundwater monitoring is recommended. Bioventing in the Secondary Source Area of Site ST010 was discontinued in April 2023.. No system components will be decommissioned until results of future groundwater sampling confirm concentrations of COC do not rebound. ADEC approval will be obtained before decommissioning any components of the bioventing system. Continue to operate and monitor the bioventing system and monitor soil vapor in the Primary Source Area in accordance with the recommendations **in Attachment D**. Analysis of static soil gas samples for TPH-g is recommended; however, analysis for BTEX will be discontinued. Discontinue LNAPL thickness monitoring of well SE-MW-01.
Site FT001	Continue annual groundwater monitoring of site monitoring wells. The bioventing system was turned off in April 2023 per the recommendations in the RPO Report (Parsons, June 2023). Decommissioning of the bioventing system is not recommended at this time. If future groundwater monitoring confirms RAOs have been met and concentrations of COCs have not rebounded, the USAF will seek approval from ADEC to decommission the bioventing system.
Monitoring Well Maintenance Recommendations	
General	Perform minor repairs of wells listed in **Section 13.3**
General	Decommission wells listed in **Section 13.3**

15.0 REFERENCES

Alaska Department of Environmental Conservation (ADEC). September 2019. *18 Alaska Administrative Code (AAC) 78, Underground Storage Tanks.* Amended as of September 29, 2019.

ADEC. July 2020. *Decision Document: Cleanup Complete Determination Galena AFS / Airport – SS014 Birchwood Hangar*.

ADEC. October 2023. *18 Alaska Administrative Code (AAC) 75, Oil and Other Hazardous Substances Pollution Control.* As amended through October 18, 2023.

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ITRC. March 2018. *LNAPL-3: LNAPL Site Management: LCSM Evolution, Decision Process, and Remedial Technologies.*

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Figures

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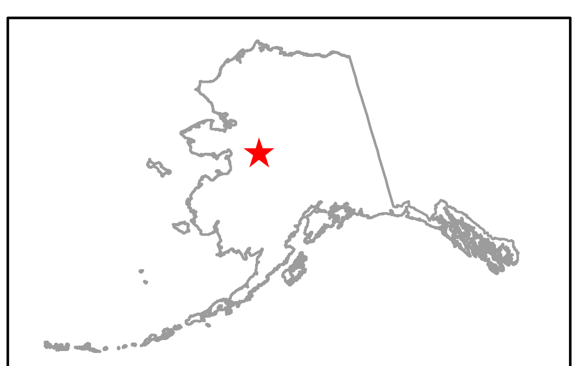

Legend

Performance Monitoring Sites

0 375 750
Feet

N

Figure 1-1

Site Locations
2023 Performance Monitoring Report

Former Galena Forward Operating Location, Alaska

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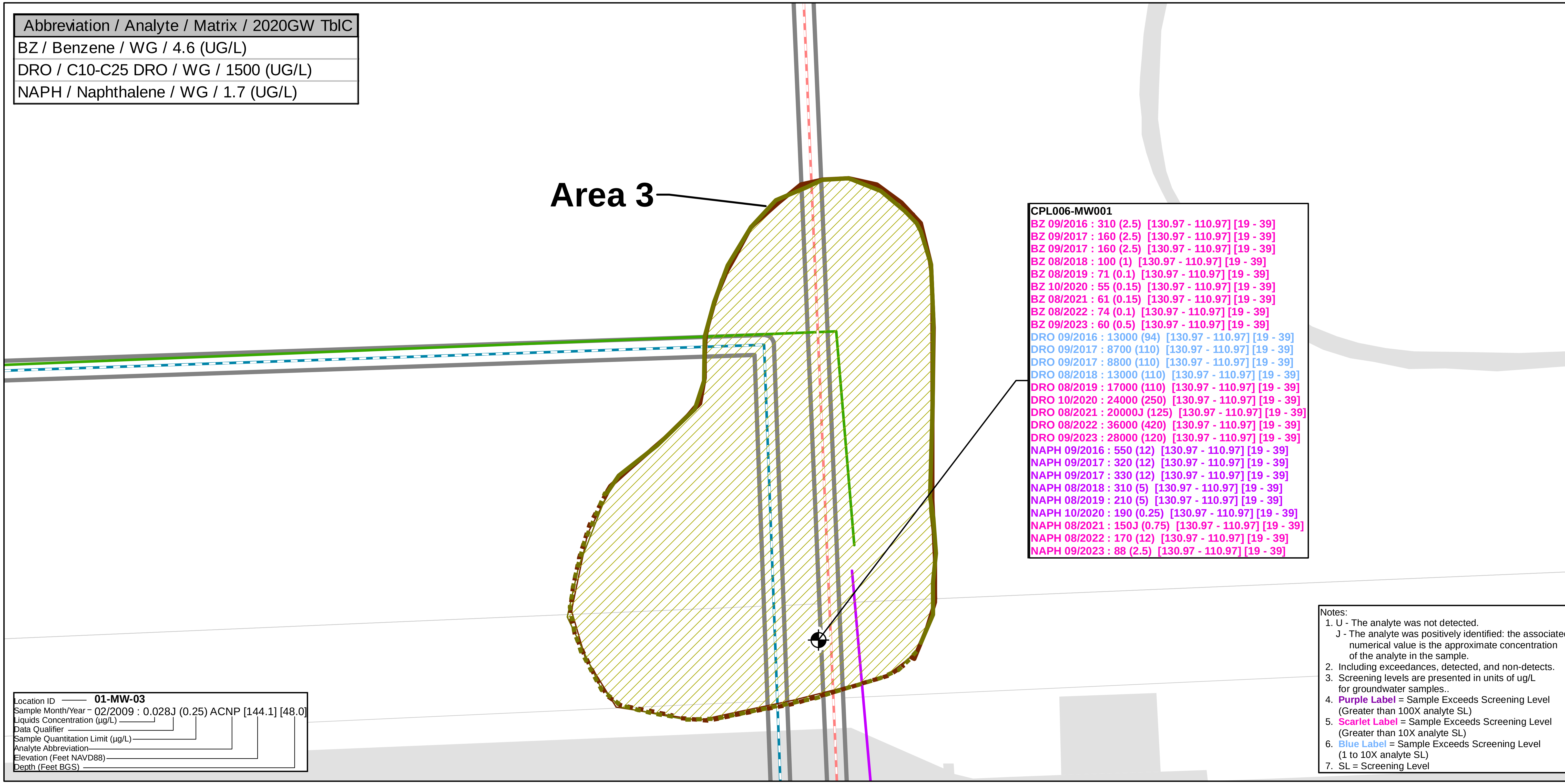


Legend

FSP OAP Locations

Abandoned Fuel Line (1952)

Abandoned Fuel Line (1962)

Revised OAP Locations

1952 and 1962 Aboveground Pipeline (1963 and 1985 Aerial)

1952 and 1962 Underground Pipeline (Not Visible on Aerials)

Aboveground Pipeline (1985 Aerial)

Abandoned 4-inch Underground Pipeline (2009 survey)

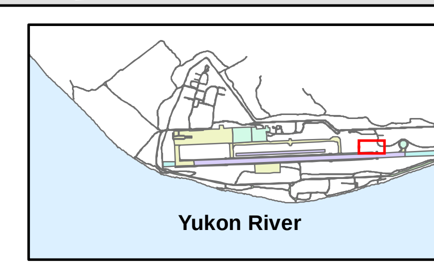
Active Fuel Line (Not Part of Site OAP)

Monitoring Well

Airfield Surface or Road

Estimated Extent of Constituents in Soil with Concentrations Greater than Remediation Target Concentration (Dashed Where Inferred)

NAPL-Contaminated Soil Source Area 3 (0 - 32 feet bgs) (Dashed Where Inferred)



0 25 50
Feet

N

FIGURE 2-1

Site CPL006 Area 3 Groundwater Performance Monitoring Results

Analytes: COCs
SL: 2020 ADEC Table C
Data Range: 2016 - 2023

2023 Performance Monitoring Report
Former Galena Forward Operating Location, Alaska

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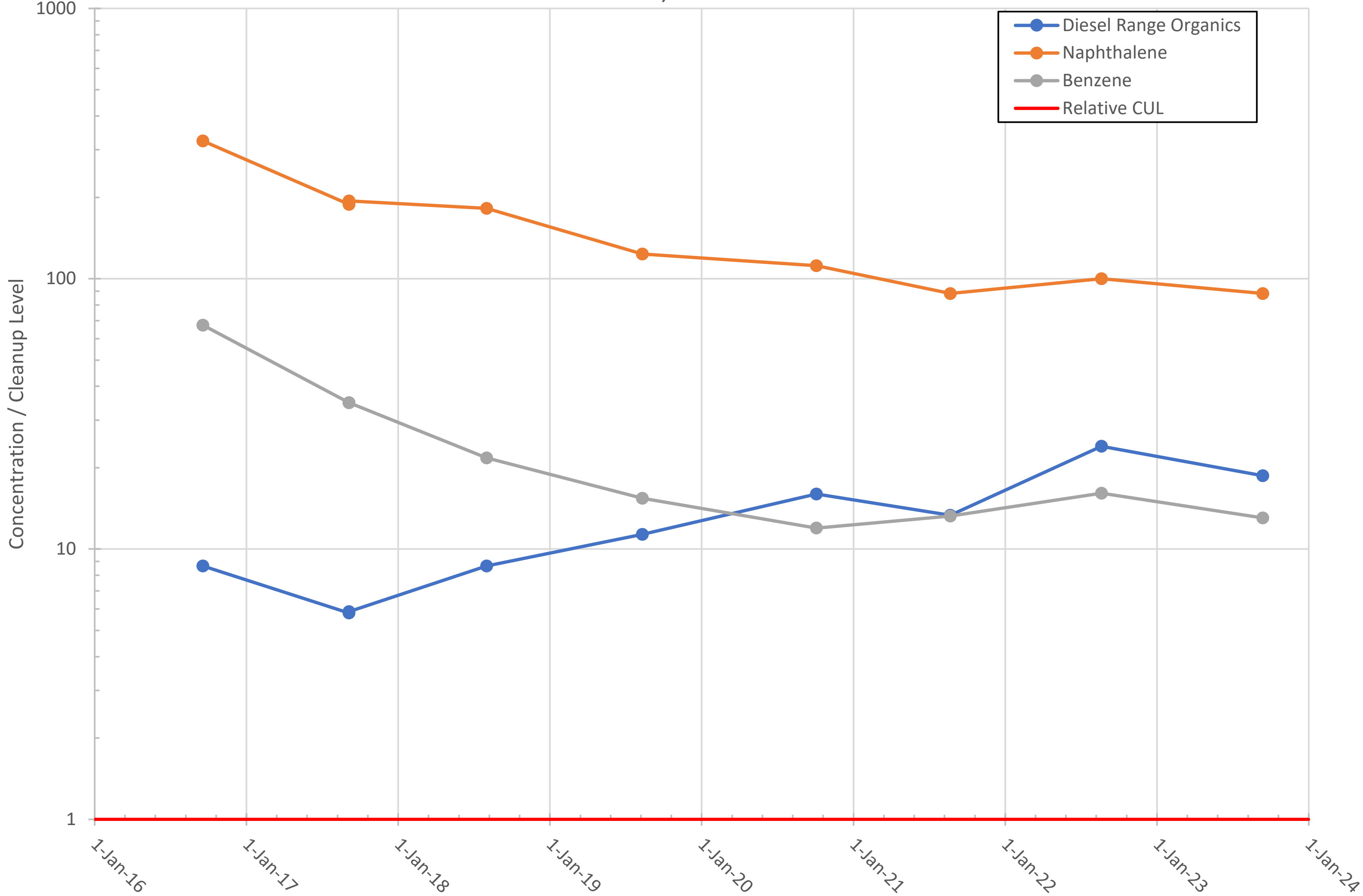
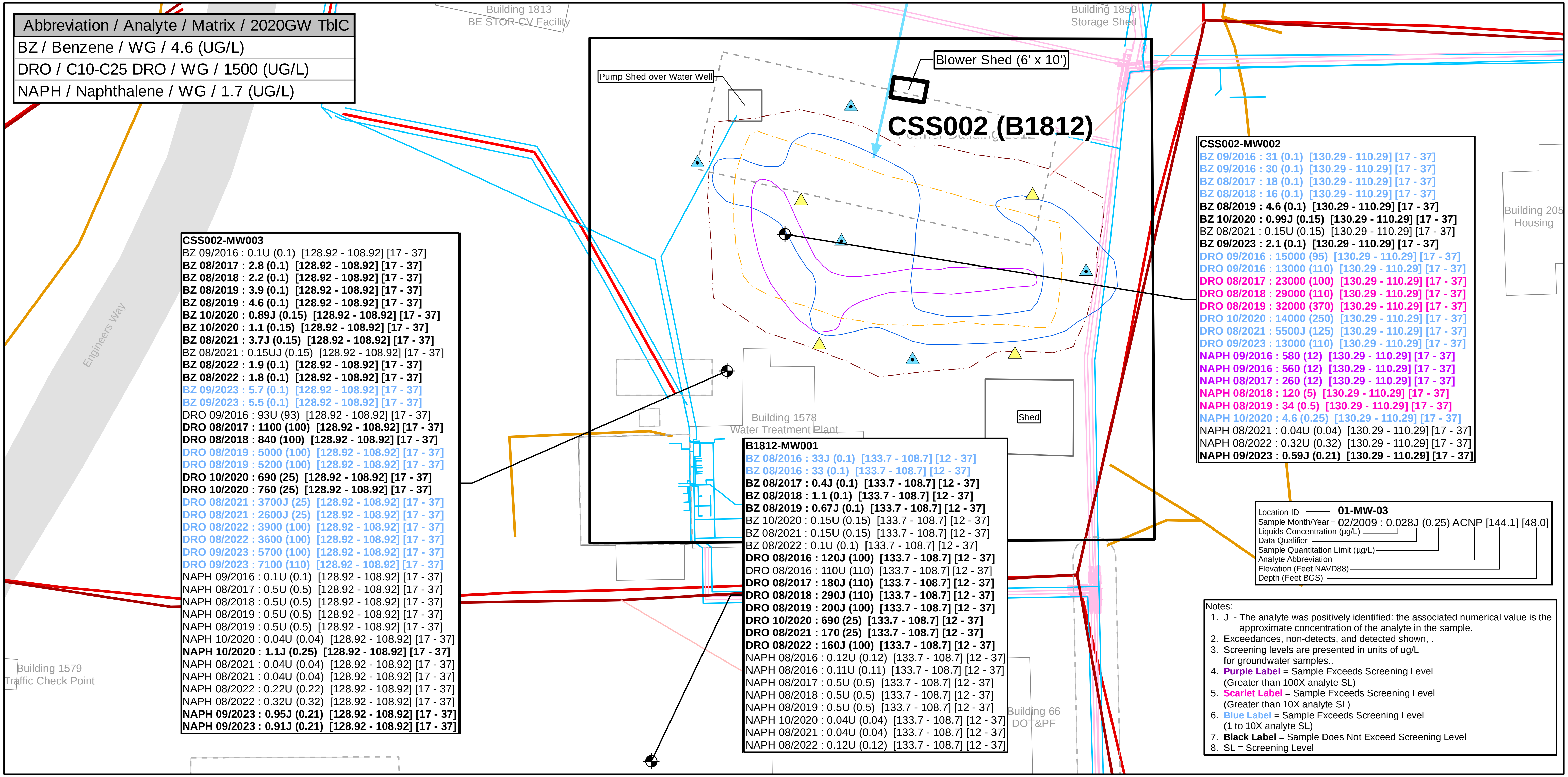
Figure 2-2
Concentrations of Indicator COCs in Groundwater Relative to CULs
Site CPL006 Area 3, Well CPL006-MW001



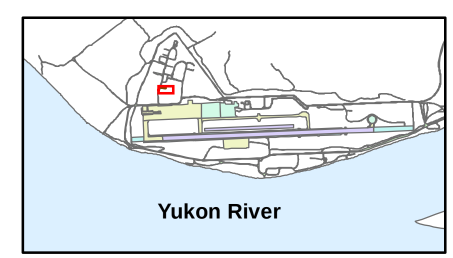


Legend

- Approximate Location of Former Feature
- Main Wastewater Line
- Service Wastewater Line
- Water Line
- Heating/Cooling Line

Underground Utility Locates - 2010

- Communications
- Electrical
- Potable Water
- Sanitary Sewer
- Groundwater Flow Direction
- NAPL-contaminated soil source area (0-15 ft bgs)
- NAPL-contaminated soil source area (15-25 feet bgs)
- Extent Top of the Excavation
- Extent Bottom of the Excavation
- Blower Location
- Monitoring Well
- Vent Well (VW)
- Vapor Monitoring Point (VMP)



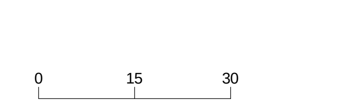


FIGURE 3-1

Site CSS002 Groundwater Performance Monitoring Results

Analytes: COCs
SL: 2020 ADEC Table C
Data Range: 2016 - 2023

2023 Performance Monitoring Report
Former Galena Forward Operating Location, Alaska

PARSONS

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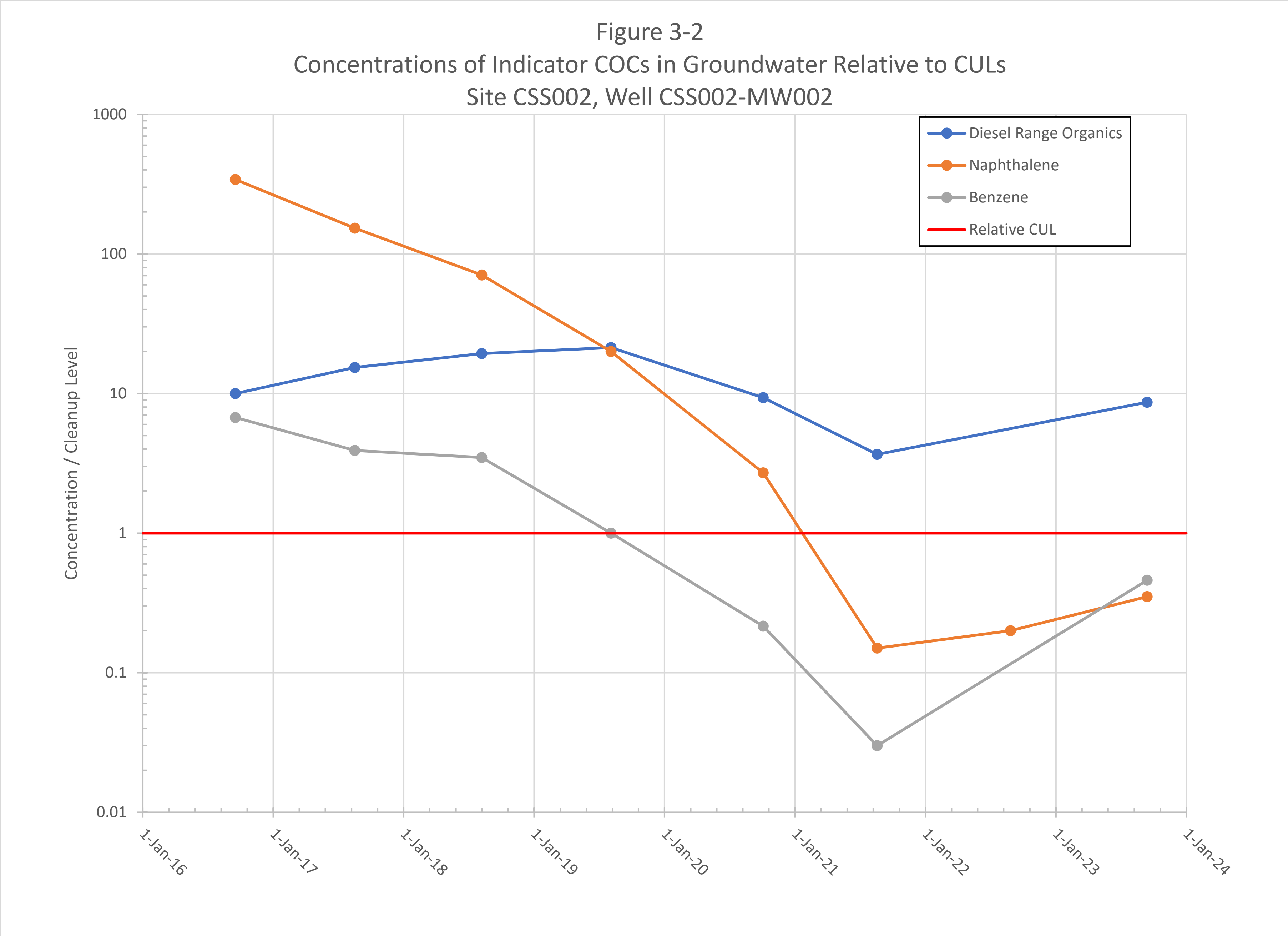


Figure 3-2
Concentrations of Indicator COCs in Groundwater Relative to CULs
Site CSS002, Well CSS002-MW002
Concentration / Cleanup Level
1000
100
10
1
0.1
0.01
1-Jan-16
1-Jan-17
1-Jan-18
1-Jan-19
1-Jan-20
1-Jan-21
1-Jan-22
1-Jan-23
1-Jan-24
Diesel Range Organics
Naphthalene
Benzene
Relative CUL

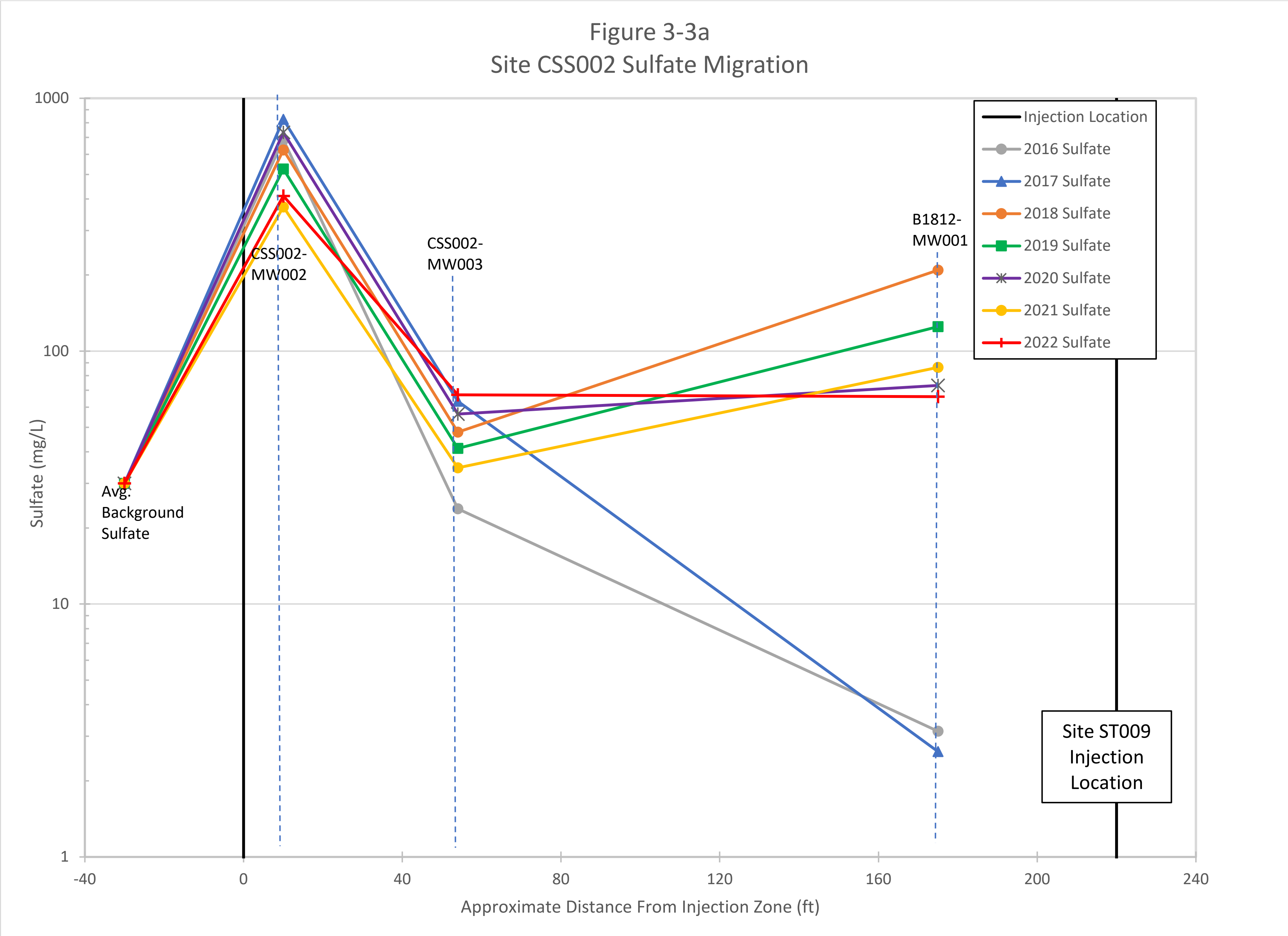


Figure 3-3a
Site CSS002 Sulfate Migration
1000
100
10
1
Sulfate (mg/L)
-40
0
40
80
120
160
200
240
Approximate Distance From Injection Zone (ft)
Avg. Background Sulfate
CSS002-MW002
CSS002-MW003
B1812-MW001
Site ST009 Injection Location
Injection Location
2016 Sulfate
2017 Sulfate
2018 Sulfate
2019 Sulfate
2020 Sulfate
2021 Sulfate
2022 Sulfate

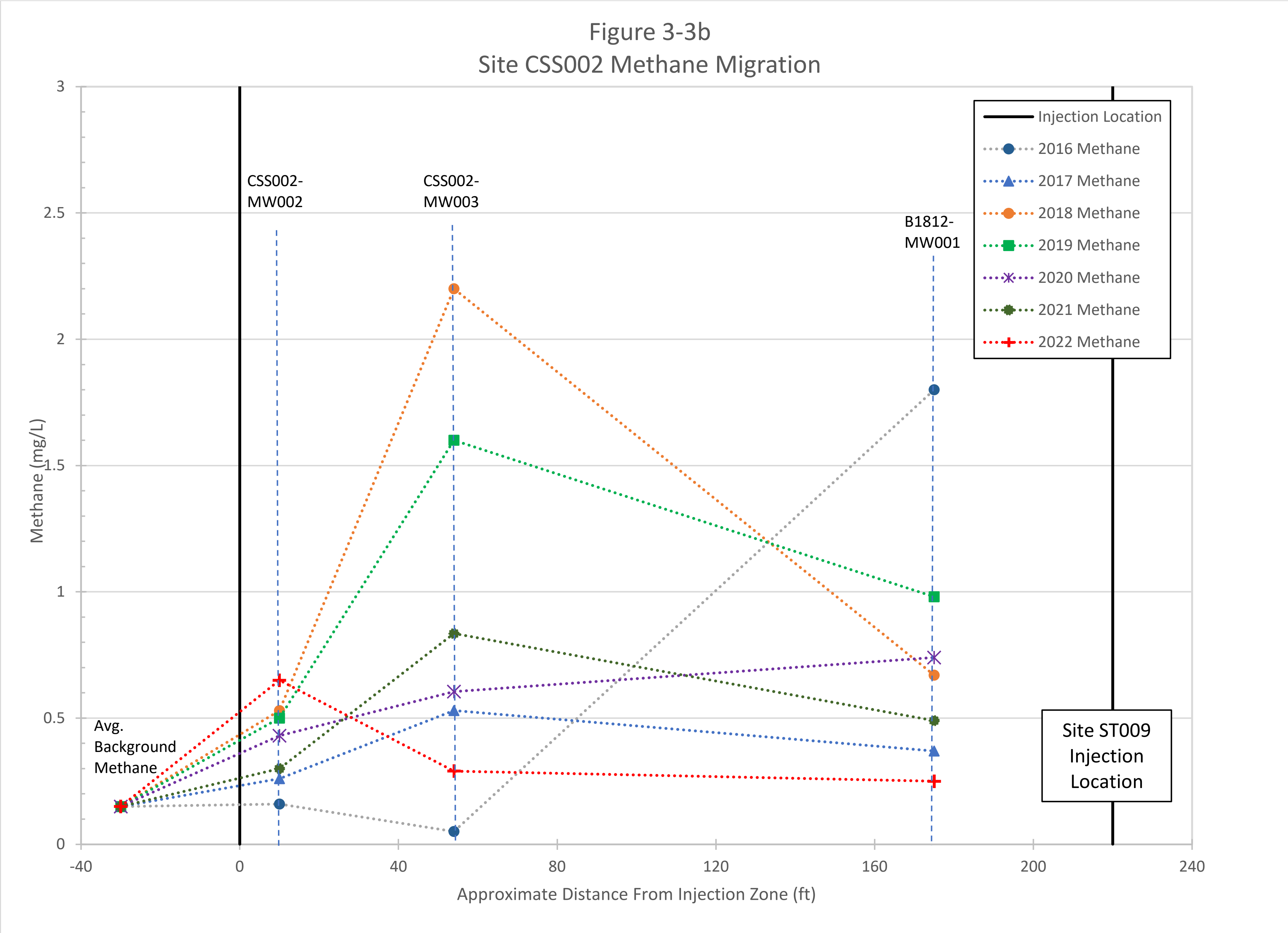
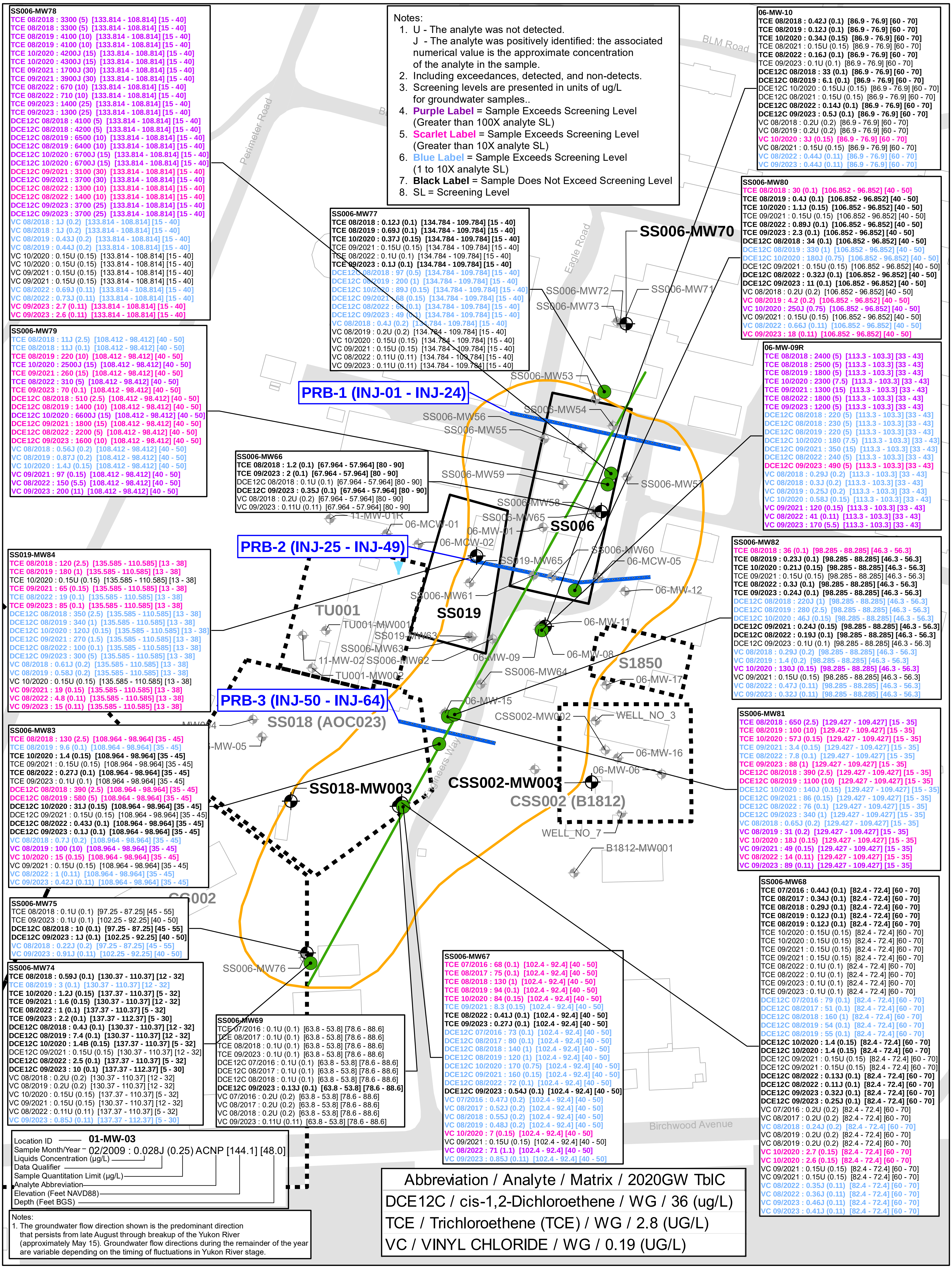


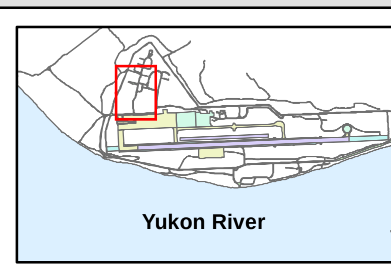
Figure 3-3b
Site CSS002 Methane Migration
Methane (mg/L)
Approximate Distance From Injection Zone (ft)
0
0.5
1
1.5
2
2.5
3
-40
0
40
80
120
160
200
240
CSS002-
MW002
CSS002-
MW003
B1812-
MW001
Avg.
Background
Methane
Site ST009
Injection
Location
Injection Location
2016 Methane
2017 Methane
2018 Methane
2019 Methane
2020 Methane
2021 Methane
2022 Methane



Abbreviation / Analyte / Matrix / 2020GW TblC
DCE12C / cis-1,2-Dichloroethene / WG / 36 (ug/L)
TCE / Trichloroethene (TCE) / WG / 2.8 (UG/L)
VC / VINYL CHLORIDE / WG / 0.19 (UG/L)

Legend

- SS006/SS019
- Approximate Groundwater Flow Direction
- Road
- Maximum TCE Contour at 2.8 µg/L 2010 - 2016
- General Alignment of Plume Centerline Concentrations Profiles (Figures 4-3a, 4-3b, 4-3c)
- Enhanced Anaerobic Bioremediation/Enhanced Biogeochemical Transformation (EAB/EBT) Permable Reactive Barrier
- Existing Well Included in Performance Monitoring Network
- Existing Well Excluded from Performance Monitoring Network
- Existing Well Included in Performance Monitoring Network and Included in Concentration Profiles (Figures 4-3a, 4-3b, 4-3c)



0 60 120
Feet
N

FIGURE 4-1

Sites SS006 and SS019 Groundwater Monitoring Network

SL: 2020 ADEC Table C
Data Range: 2016 - 2023

2023 Performance Monitoring Report
Former Galena Forward Operating Location, Alaska

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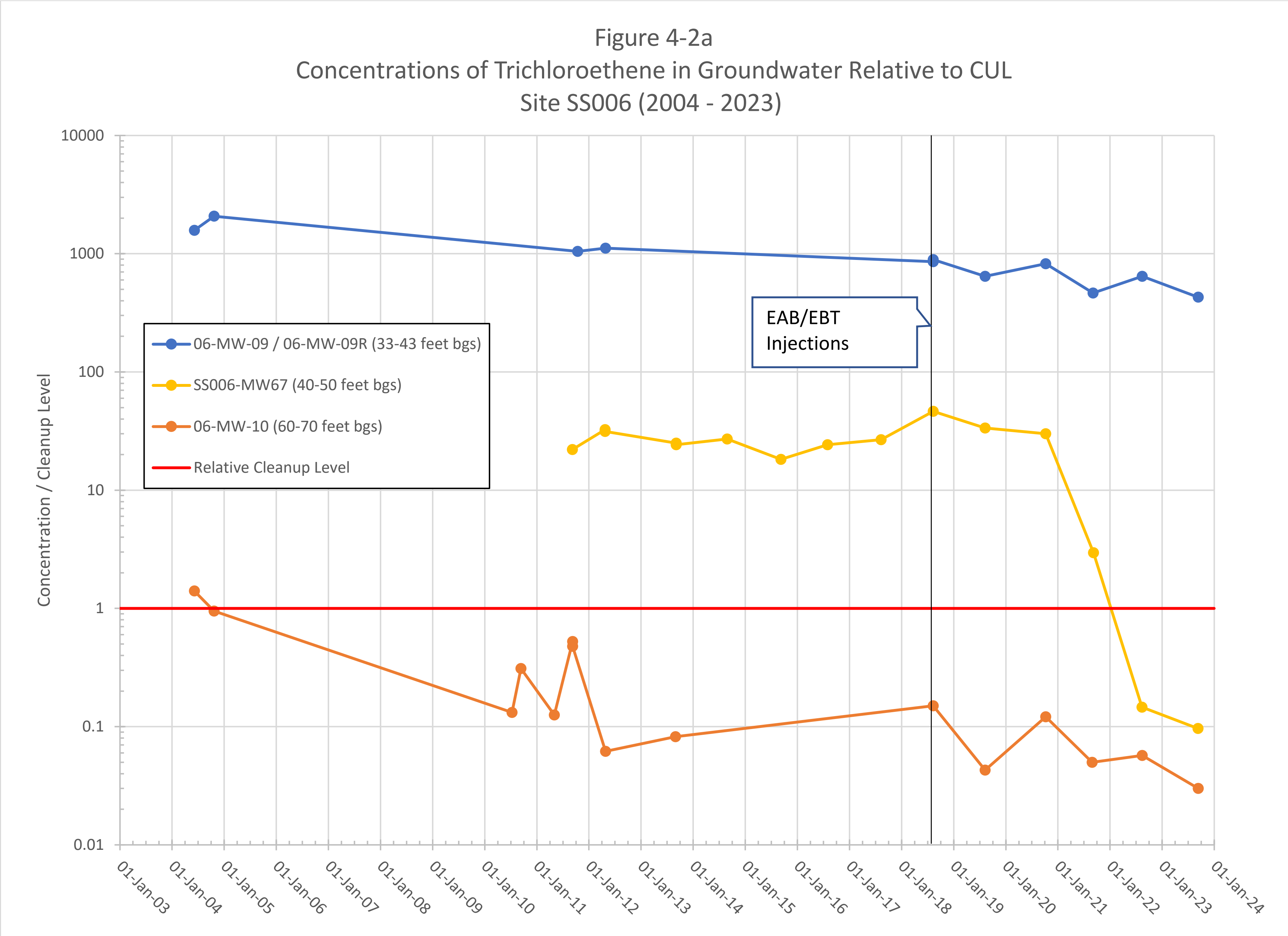


Figure 4-2a
Concentrations of Trichloroethene in Groundwater Relative to CUL
Site SS006 (2004 - 2023)
Concentration / Cleanup Level
10000
1000
100
10
1
0.1
0.01
06-MW-09 / 06-MW-09R (33-43 feet bgs)
SS006-MW67 (40-50 feet bgs)
06-MW-10 (60-70 feet bgs)
Relative Cleanup Level
EAB/EBT Injections
01-Jan-03
01-Jan-04
01-Jan-05
01-Jan-06
01-Jan-07
01-Jan-08
01-Jan-09
01-Jan-10
01-Jan-11
01-Jan-12
01-Jan-13
01-Jan-14
01-Jan-15
01-Jan-16
01-Jan-17
01-Jan-18
01-Jan-19
01-Jan-20
01-Jan-21
01-Jan-22
01-Jan-23
01-Jan-24

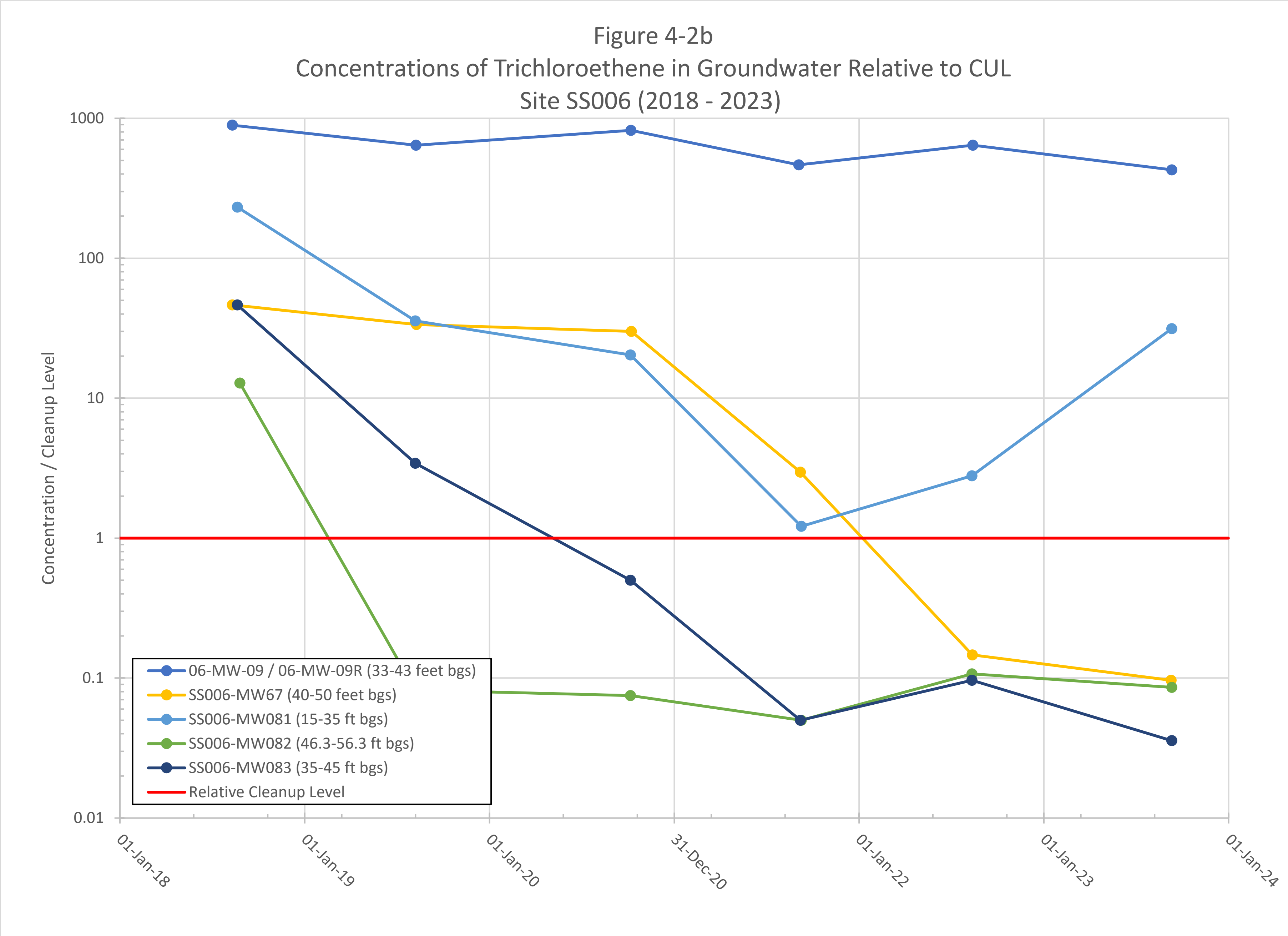
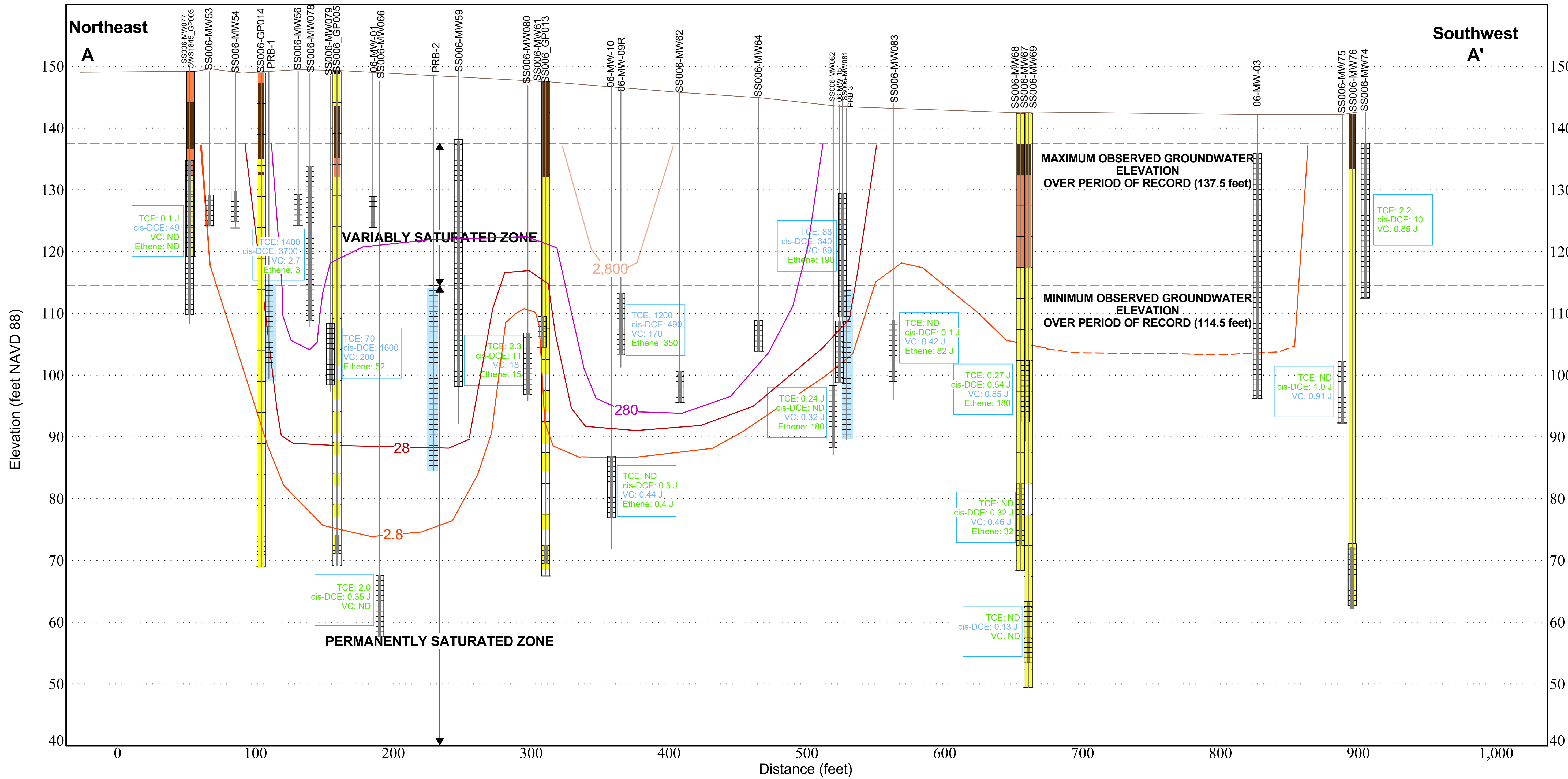


Figure 4-2b
Concentrations of Trichloroethene in Groundwater Relative to CUL
Site SS006 (2018 - 2023)
Concentration / Cleanup Level
1000
100
10
1
0.1
0.01
01-Jan-18
01-Jan-19
01-Jan-20
31-Dec-20
01-Jan-22
01-Jan-23
01-Jan-24
06-MW-09 / 06-MW-09R (33-43 feet bgs)
SS006-MW67 (40-50 feet bgs)
SS006-MW081 (15-35 ft bgs)
SS006-MW082 (46.3-56.3 ft bgs)
SS006-MW083 (35-45 ft bgs)
Relative Cleanup Level



LEGEND

GROUND SURFACE ELEVATION (feet NAVD 88)

SS006-GP003 SAMPLE LOCATION

18.2 ANALYTE CONCENTRATION IN GROUNDWATER (µg/L)

SAMPLE INTERVAL (feet)

GROUNDWATER ELEVATION

SCREEN INTERVAL

Maximum TCE Contours (µg/L)
2022

2.8 (dashed where inferred)

28 (dashed where inferred)

280 (dashed where inferred)

2,800 (dashed where inferred)

SOIL AND LITHOLOGY

RELATIVE PERMEABILITY

GW, GP, GW-GM, GP-GM, GW-GC, GP-GC, SW, SP, SW-SM, SP-SM, SP-SC

GM, GC, SM, SC

ML, MH, CL, CH

NO SAMPLE RECOVERY

EAB/EBT Permeable Reactive Barrier (PRB) treatment interval

NOTES:
Blue Label = Sample Exceeds ADEC Table C Groundwater CULs.
Green Label = Sample Does Not Exceed Cleanup Level.
B = The analyte was detected in the sample at a concentration less than or equal to five times (10 times for common laboratory contaminants) the blank concentration.
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
ND = Not detected.
NA = Not available.
NAVD 88 = North American Vertical Datum of 1988.
TCE = Trichloroethene.
CUL = Cleanup Level.
µg/L = Micrograms per liter
Seasonal groundwater elevations based on transducer information from wells 06-MW-08, 06-MW-09/9R, 06-MW-10, 06-MW-11.
EAB = Enhanced Anaerobic Bioremediation
EBT = Enhanced Biogeochemical Transformation

FIGURE 4-3

Site SS006/SS019

Cross Section A-A'

Chorinated Ethenes in Groundwater 2023

Sites SS006/SS019

2023 Performance Monitoring Report

Former Galena Forward Operating Location, Alaska

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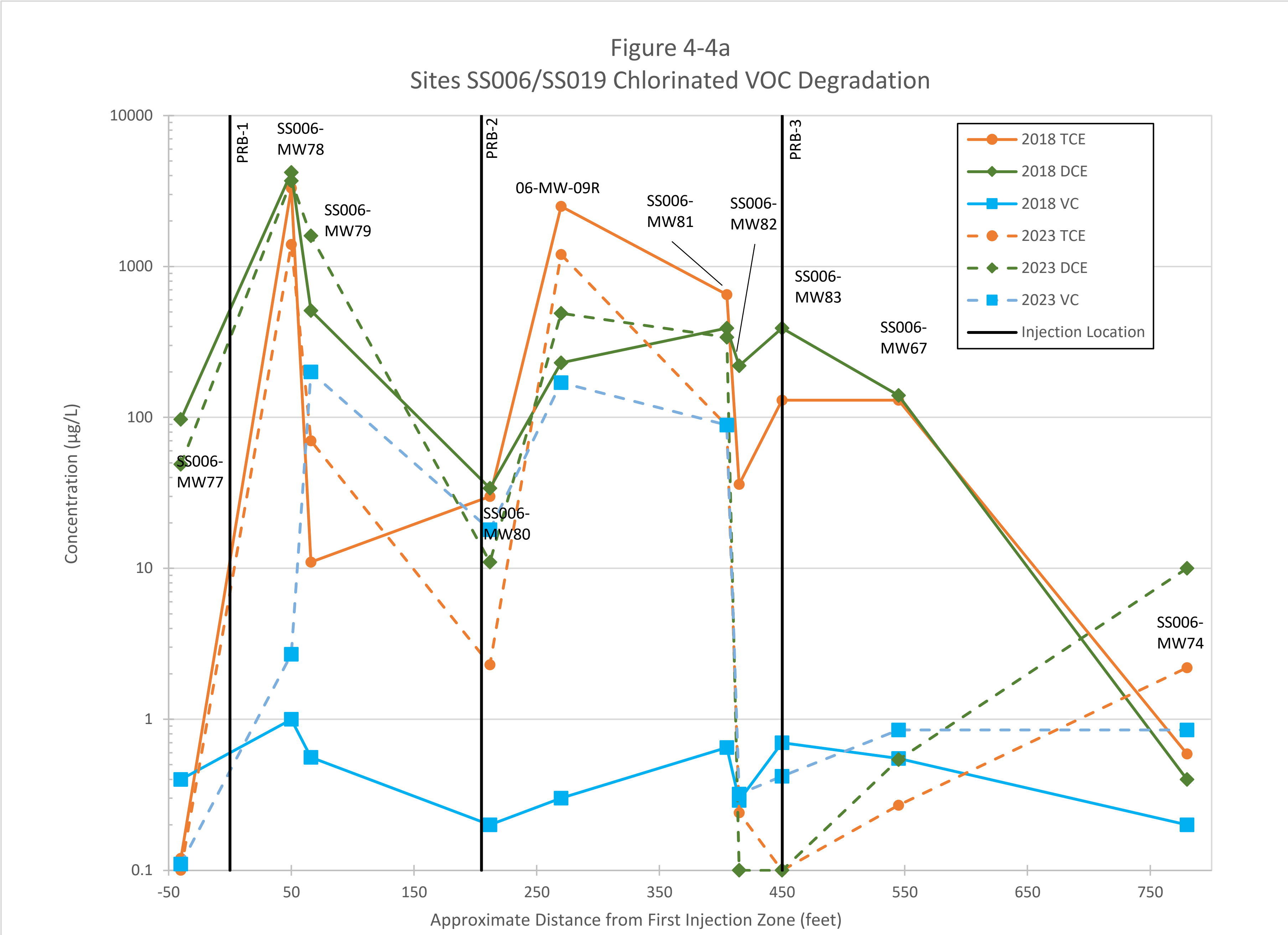


Figure 4-4a
Sites SS006/SS019 Chlorinated VOC Degradation
Concentration (µg/L)
Approximate Distance from First Injection Zone (feet)
10000
1000
100
10
1
0.1
-50
50
150
250
350
450
550
650
750
PRB-1
PRB-2
PRB-3
SS006-MW78
SS006-MW79
06-MW-09R
SS006-MW81
SS006-MW82
SS006-MW83
SS006-MW67
SS006-MW77
SS006-MW80
SS006-MW74
2018 TCE
2018 DCE
2018 VC
2023 TCE
2023 DCE
2023 VC
Injection Location

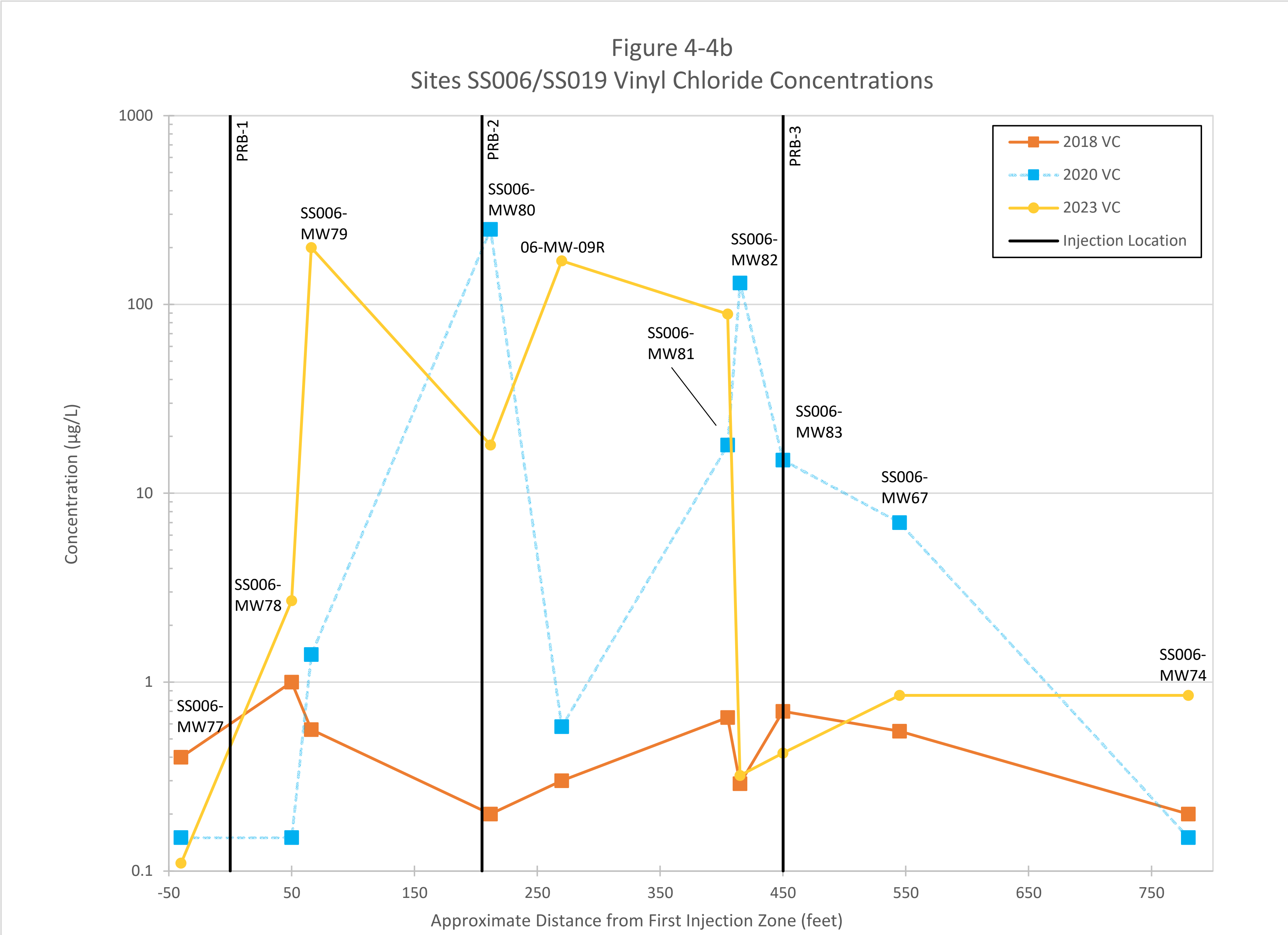


Figure 4-4b
Sites SS006/SS019 Vinyl Chloride Concentrations
1000
100
10
1
0.1
Concentration (µg/L)
-50
50
150
250
350
450
550
650
750
Approximate Distance from First Injection Zone (feet)
PRB-1
PRB-2
PRB-3
2018 VC
2020 VC
2023 VC
Injection Location
SS006-MW77
SS006-MW78
SS006-MW79
SS006-MW80
06-MW-09R
SS006-MW81
SS006-MW82
SS006-MW83
SS006-MW67
SS006-MW74

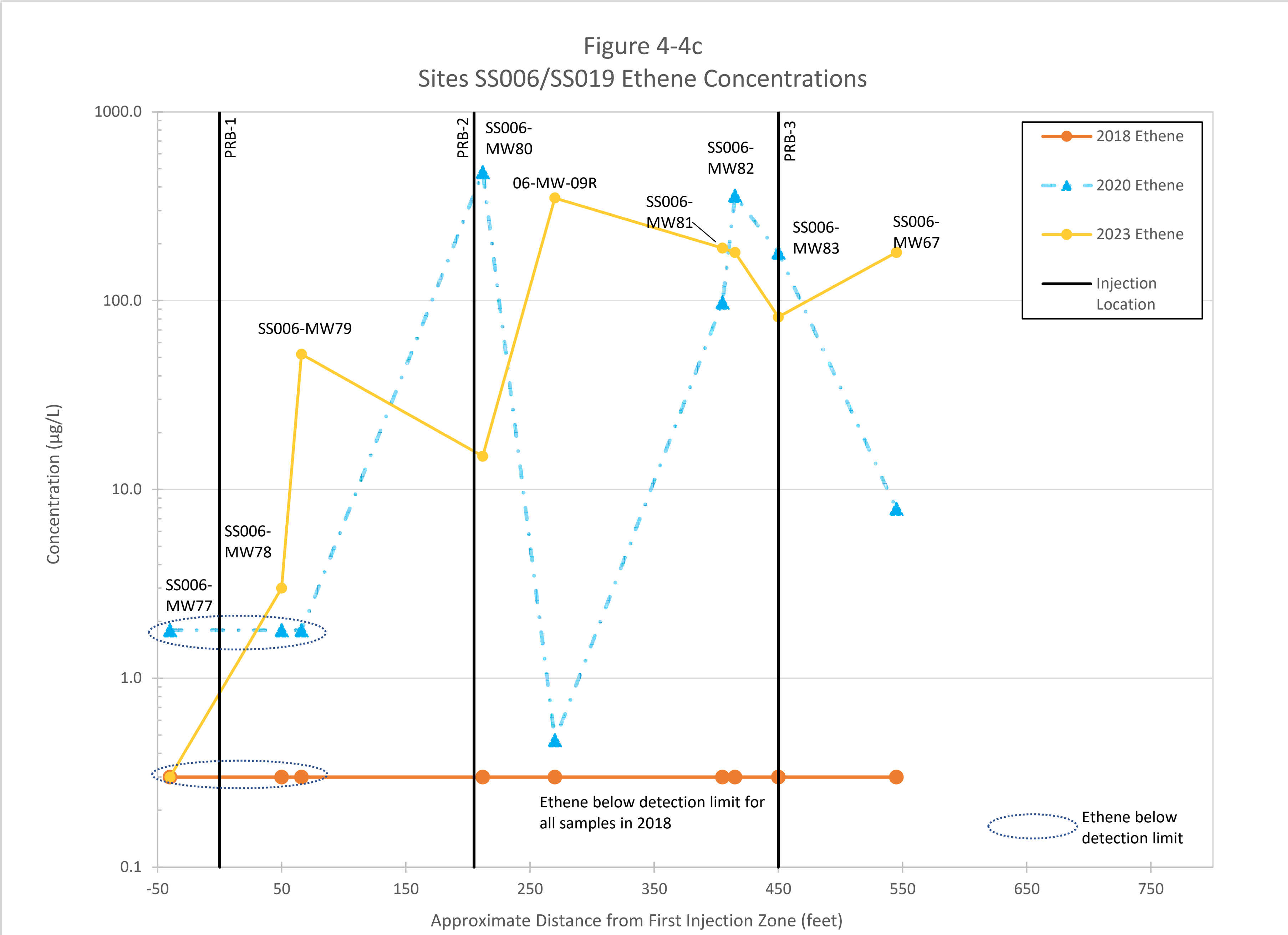


Figure 4-4c
Sites SS006/SS019 Ethene Concentrations
1000.0
100.0
10.0
1.0
0.1
Concentration (µg/L)
-50
50
150
250
350
450
550
650
750
Approximate Distance from First Injection Zone (feet)
PRB-1
PRB-2
PRB-3
SS006-MW80
06-MW-09R
SS006-MW82
SS006-MW81
SS006-MW83
SS006-MW67
SS006-MW79
SS006-MW78
SS006-MW77
Ethene below detection limit for all samples in 2018
2018 Ethene
2020 Ethene
2023 Ethene
Injection Location
Ethene below detection limit

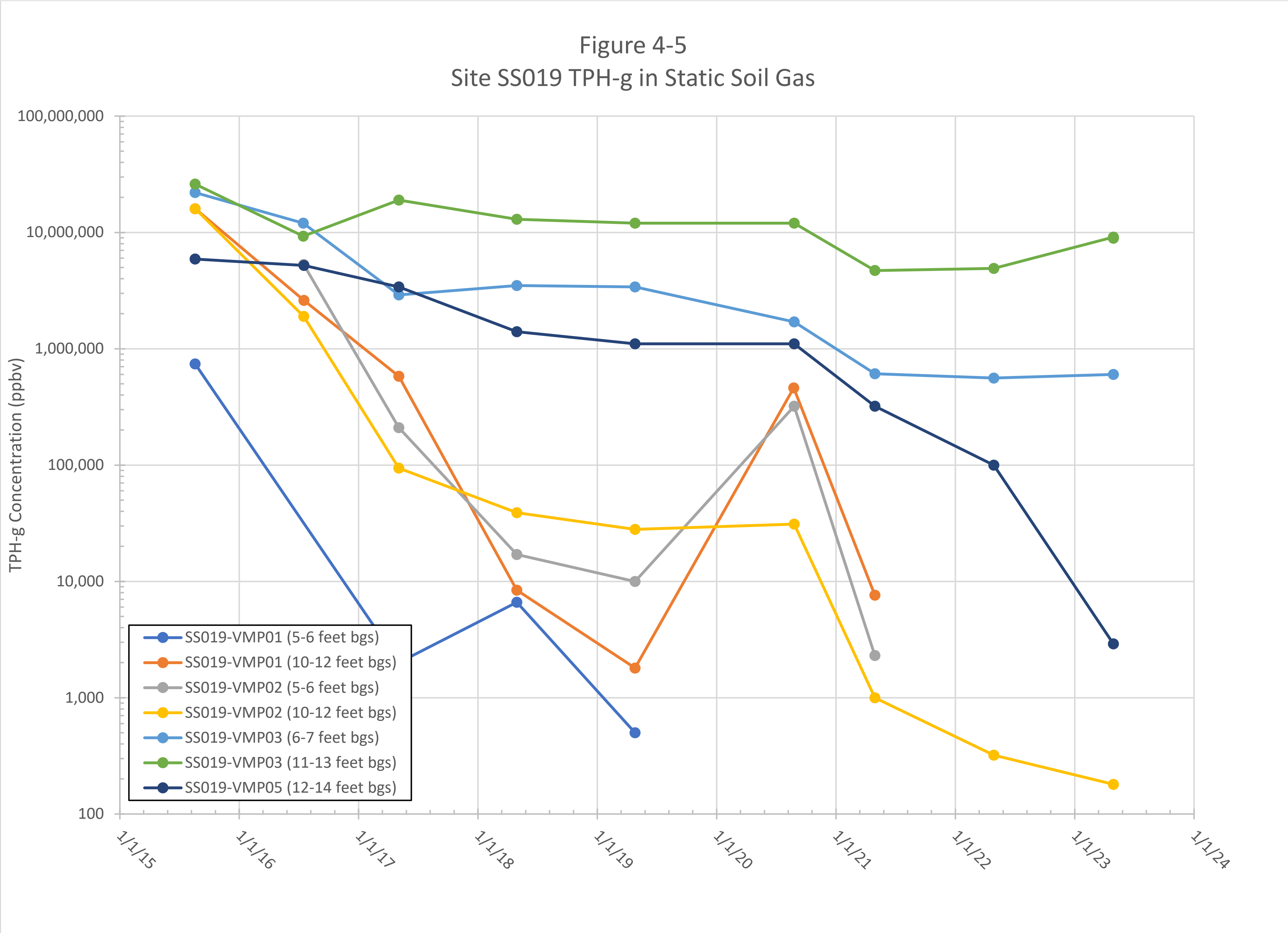


Figure 4-5
Site SS019 TPH-g in Static Soil Gas
TPH-g Concentration (ppbv)
100,000,000
10,000,000
1,000,000
100,000
10,000
1,000
100
1/1/15
1/1/16
1/1/17
1/1/18
1/1/19
1/1/20
1/1/21
1/1/22
1/1/23
1/1/24
SS019-VMP01 (5-6 feet bgs)
SS019-VMP01 (10-12 feet bgs)
SS019-VMP02 (5-6 feet bgs)
SS019-VMP02 (10-12 feet bgs)
SS019-VMP03 (6-7 feet bgs)
SS019-VMP03 (11-13 feet bgs)
SS019-VMP05 (12-14 feet bgs)

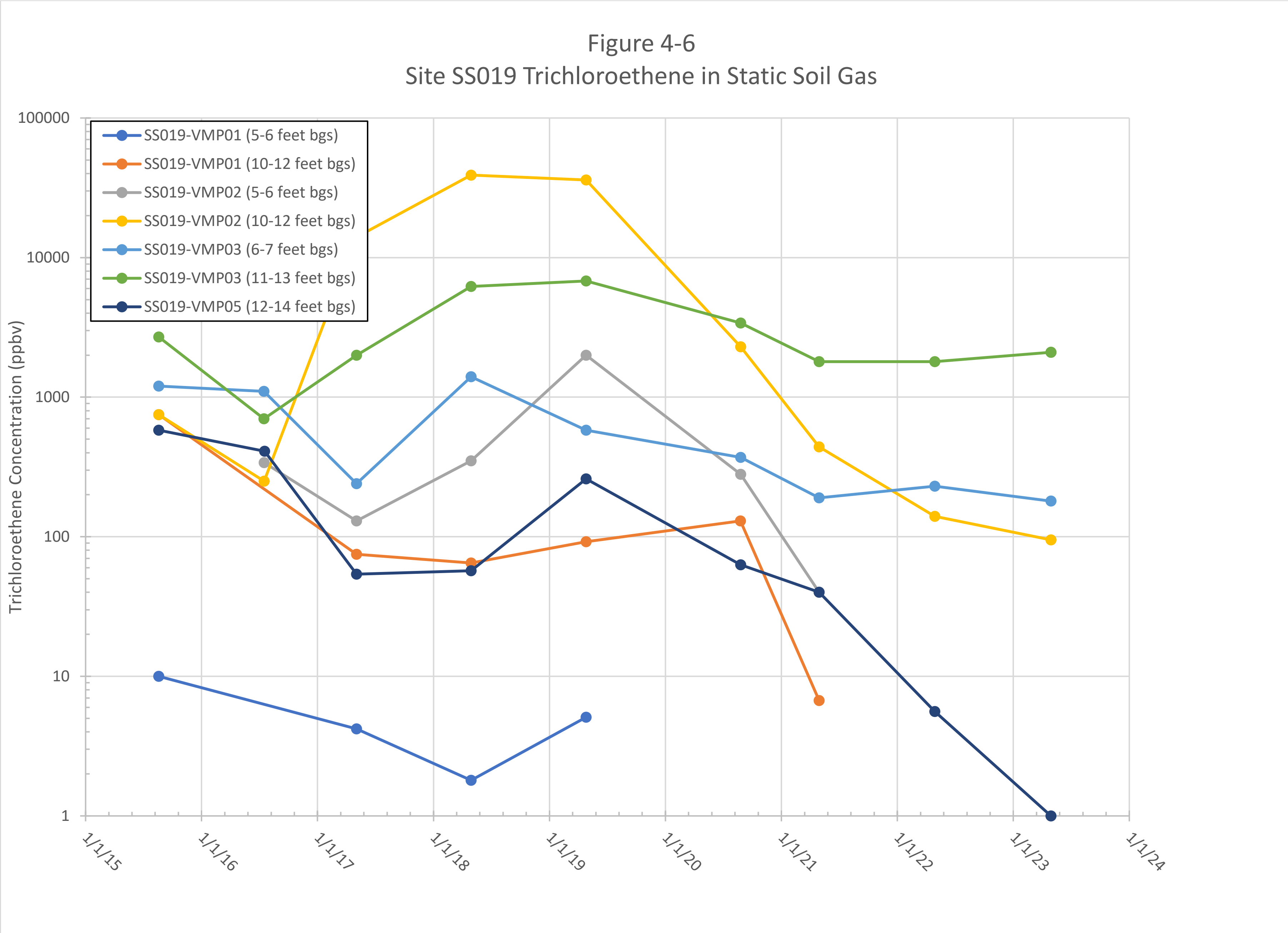


Figure 4-6
Site SS019 Trichloroethene in Static Soil Gas
Trichloroethene Concentration (ppbv)
100000
10000
1000
100
10
1
1/1/15
1/1/16
1/1/17
1/1/18
1/1/19
1/1/20
1/1/21
1/1/22
1/1/23
1/1/24
SS019-VMP01 (5-6 feet bgs)
SS019-VMP01 (10-12 feet bgs)
SS019-VMP02 (5-6 feet bgs)
SS019-VMP02 (10-12 feet bgs)
SS019-VMP03 (6-7 feet bgs)
SS019-VMP03 (11-13 feet bgs)
SS019-VMP05 (12-14 feet bgs)

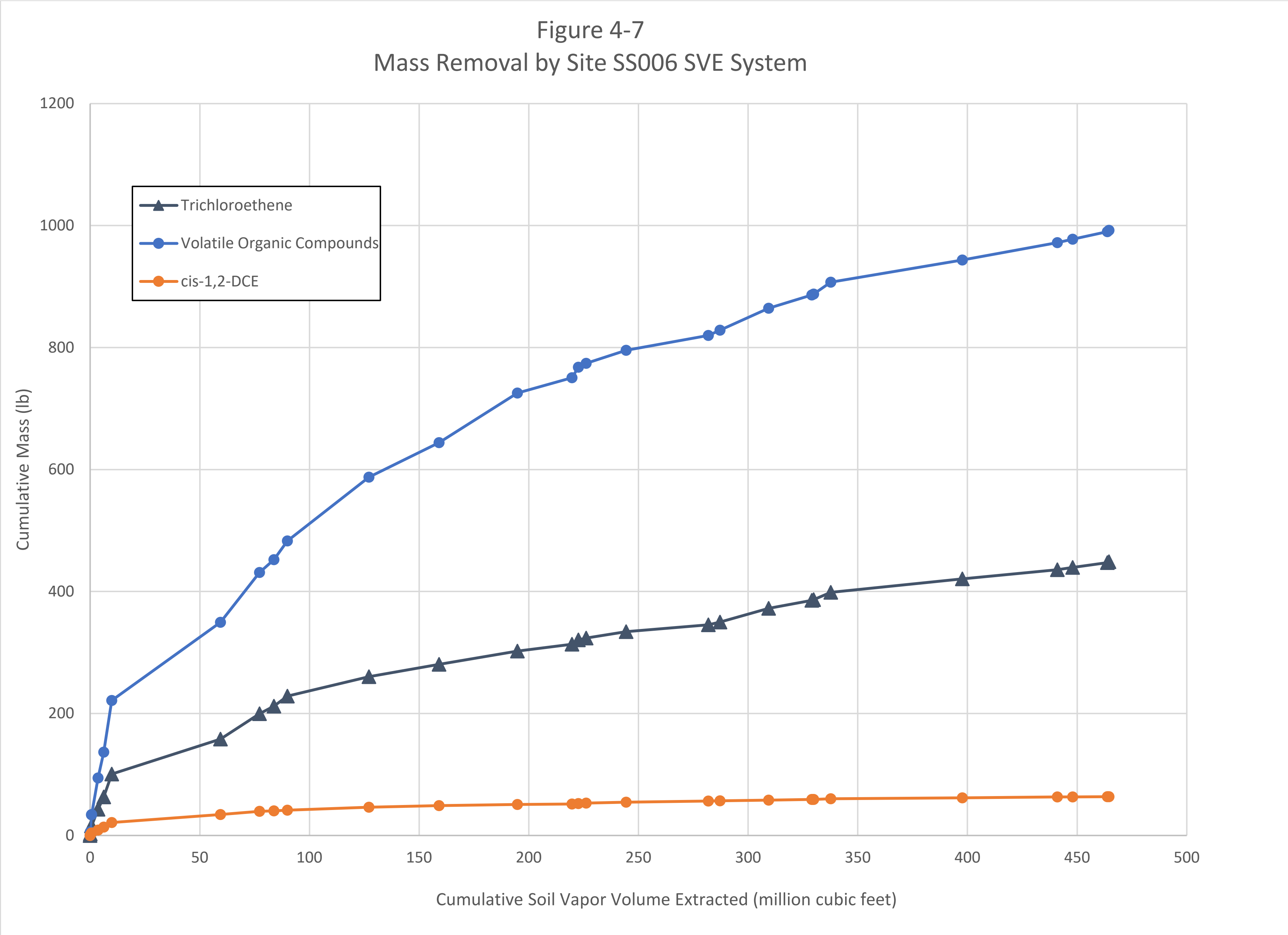


Figure 4-7
Mass Removal by Site SS006 SVE System
Trichloroethene
Volatile Organic Compounds
cis-1,2-DCE
Cumulative Mass (lb)
0
200
400
600
800
1000
1200
0
50
100
150
200
250
300
350
400
450
500
Cumulative Soil Vapor Volume Extracted (million cubic feet)

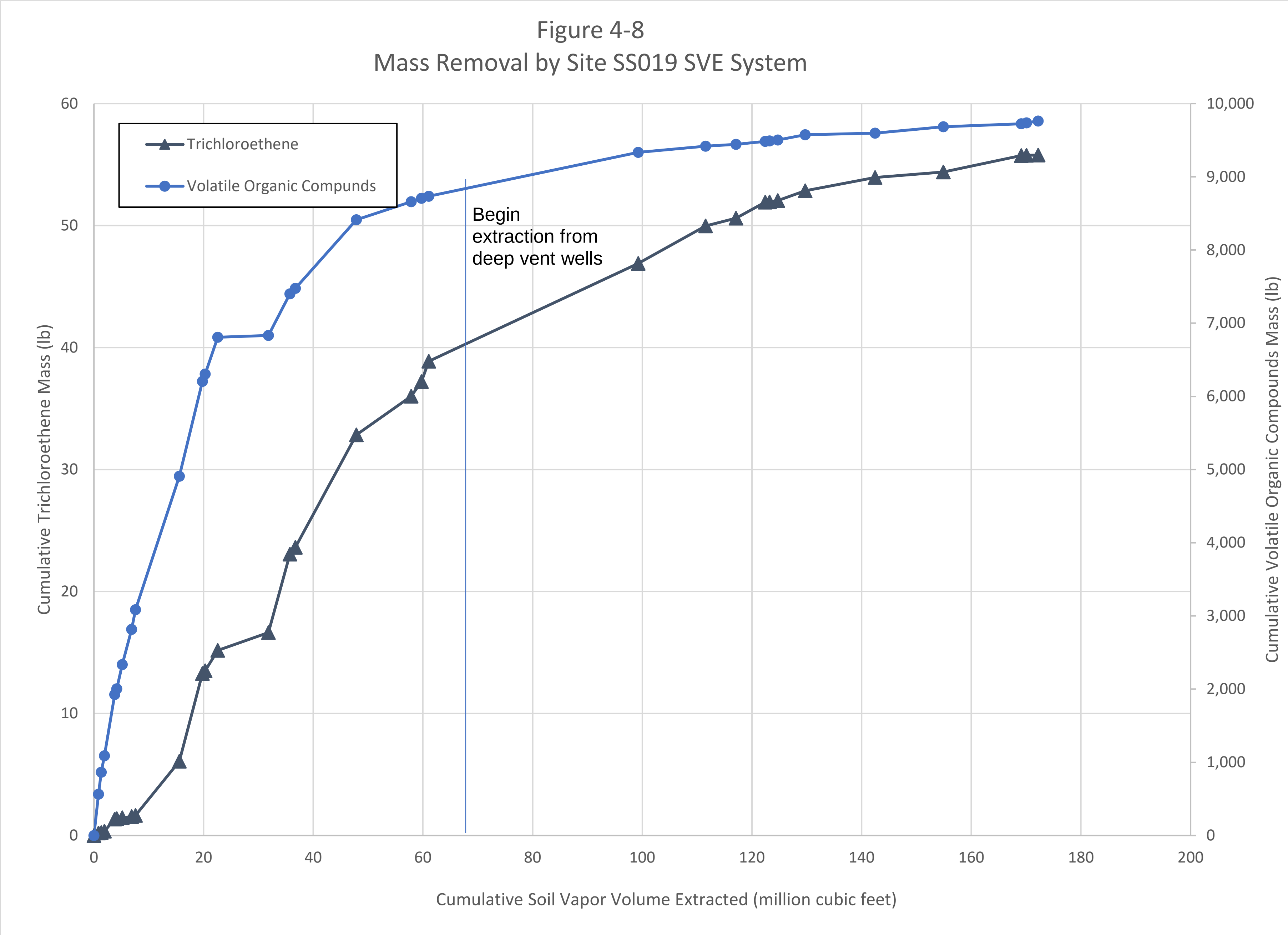
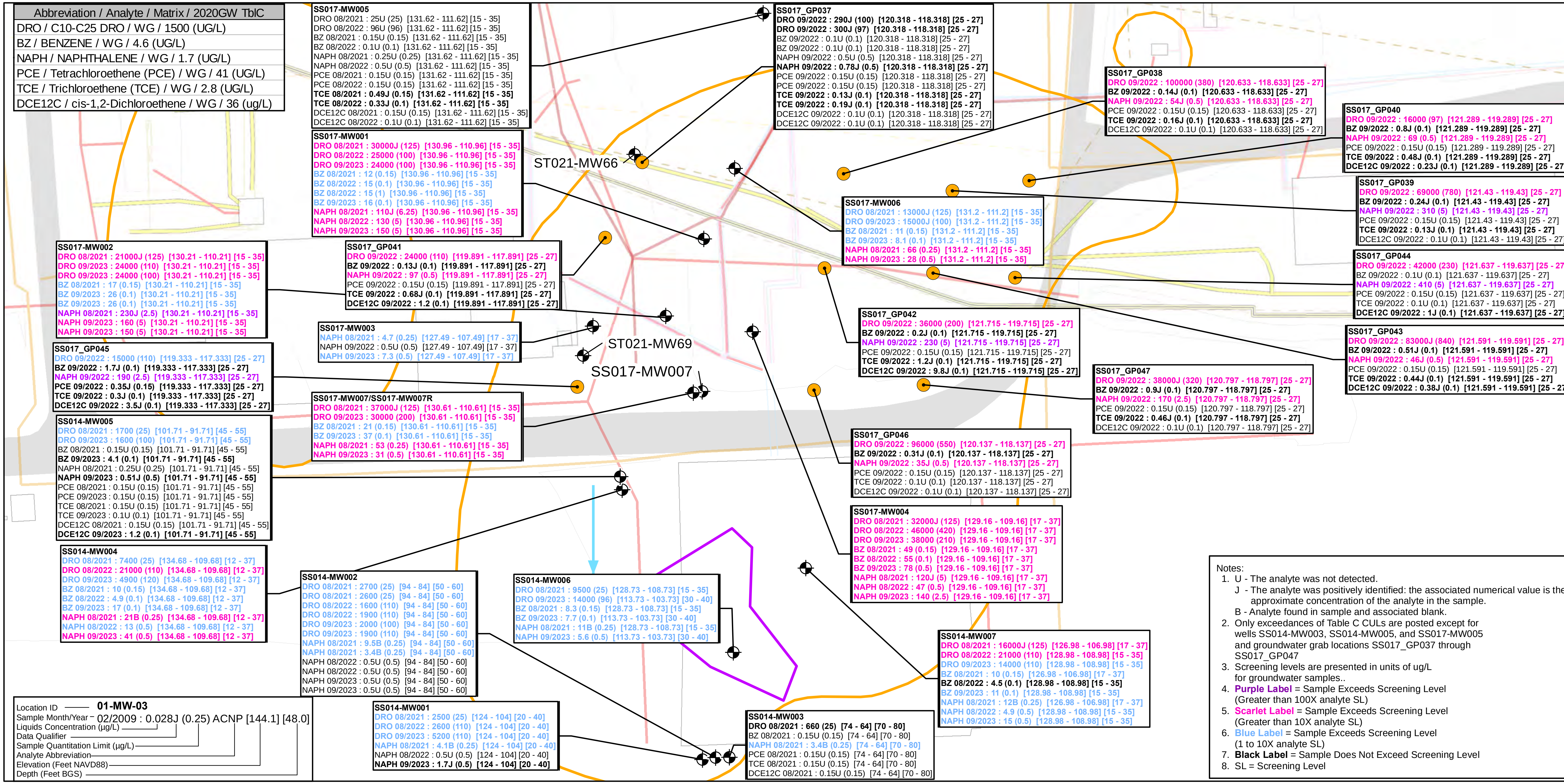


Figure 4-8
Mass Removal by Site SS019 SVE System
Trichloroethene
Volatile Organic Compunds
Begin extraction from deep vent wells
Cumulative Trichloroethene Mass (lb)
Cumulative Volatile Organic Compounds Mass (lb)
Cumulative Soil Vapor Volume Extracted (million cubic feet)
0
10
20
30
40
50
60
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
80
100
120
140
160
180
200



Legend

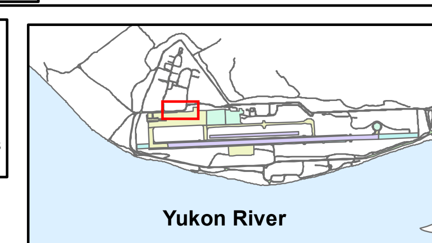
- Approximate Groundwater Flow Direction
- Main Wastewater Line
- Service Wastewater Line
- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)
- Abandoned Fuel Line
- Service Fuel Line
- Main Fuel Line
- Water Line
- Heating/Cooling Line

Underground Utility Locates - 2010
- Communications
- Electrical
- Fuel/Gas
- Potable Water
- Sanitary Sewer

- Existing Monitoring Well_add1
- Chlorinated VOC Source Area

Maximum DRO Contours (µg/L) 2007 - 2013
- 1,500 (dashed where inferred)
- Groundwater Grab Sample Location

Note:
1. The groundwater flow direction shown is the predominant direction that persists from late August through breakup of the Yukon River (approximately May 15). Groundwater flow directions during the remainder of the year are variable depending on the timing of fluctuations in Yukon River stage.



0 35 70
Feet

N

FIGURE 5-1

Site SS017
Groundwater Performance Monitoring Results

Analytes: COCs
SL: 2020 ADEC Table C
Data Range: 2021 - 2023

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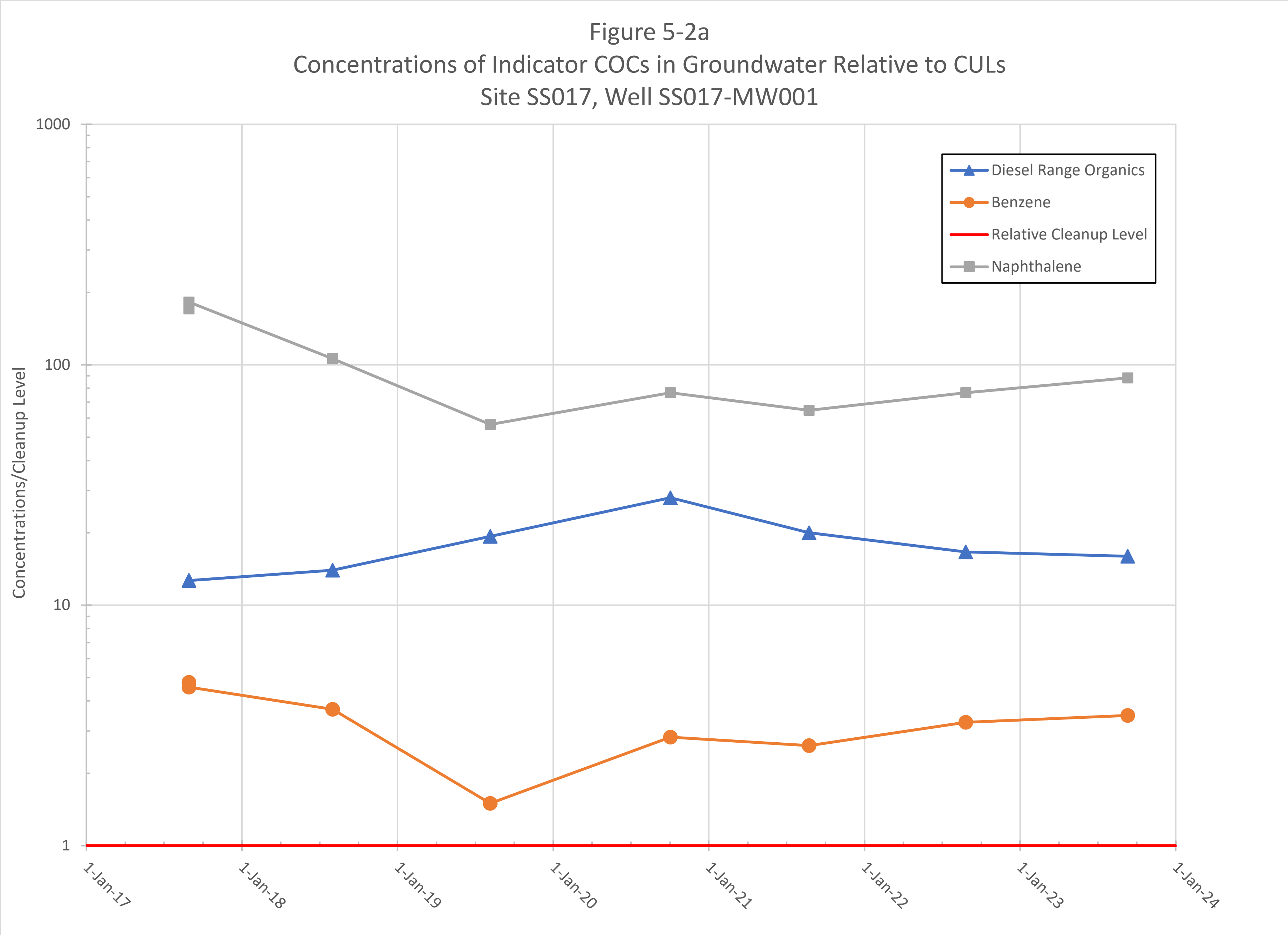


Figure 5-2a
Concentrations of Indicator COCs in Groundwater Relative to CULs
Site SS017, Well SS017-MW001
Concentrations/Cleanup Level
1000
100
10
1
1-Jan-17
1-Jan-18
1-Jan-19
1-Jan-20
1-Jan-21
1-Jan-22
1-Jan-23
1-Jan-24
Diesel Range Organics
Benzene
Relative Cleanup Level
Naphthalene

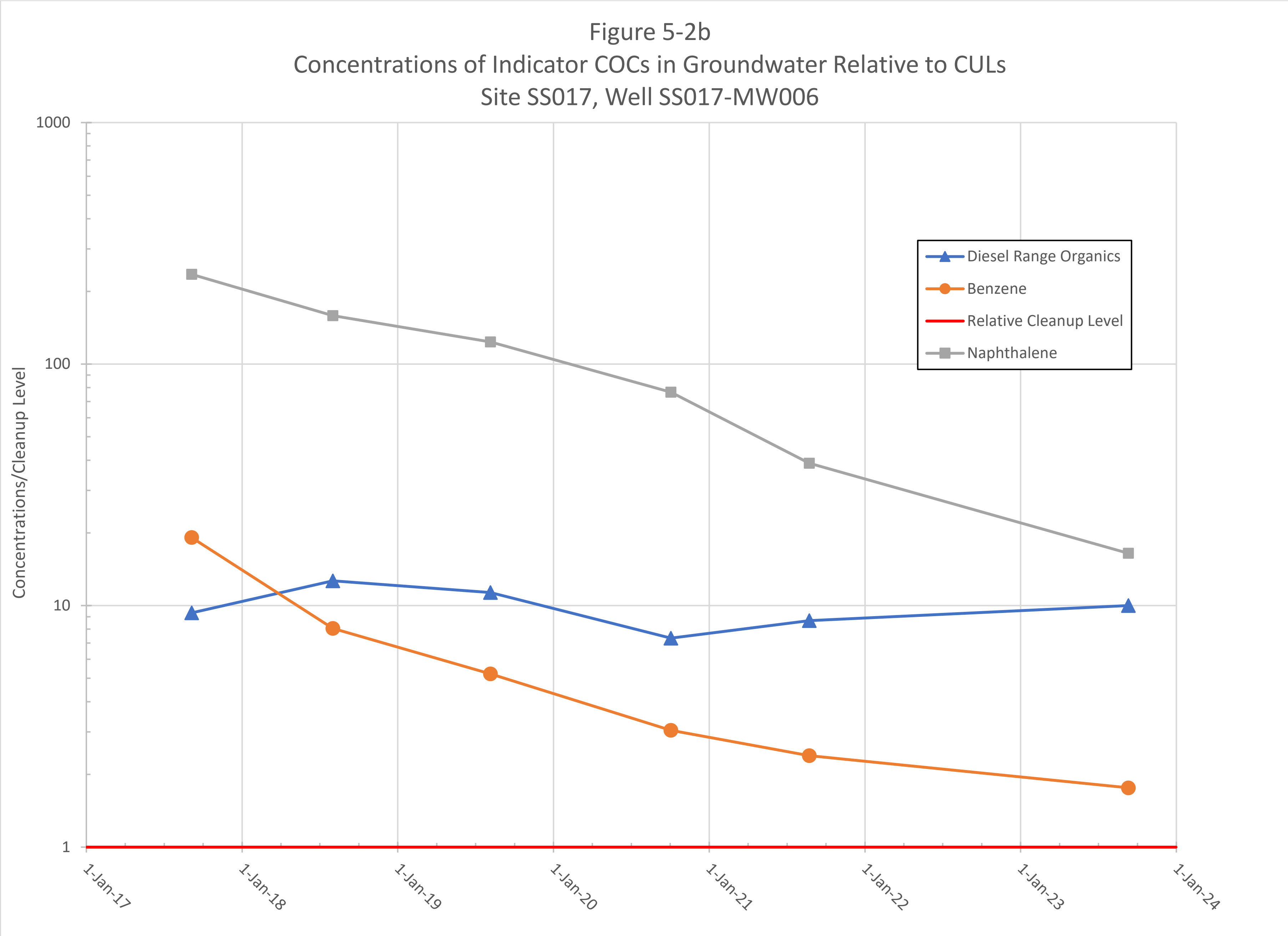


Figure 5-2b
Concentrations of Indicator COCs in Groundwater Relative to CULs
Site SS017, Well SS017-MW006
1000
100
10
1
Concentrations/Cleanup Level
Diesel Range Organics
Benzene
Relative Cleanup Level
Naphthalene
1-Jan-17
1-Jan-18
1-Jan-19
1-Jan-20
1-Jan-21
1-Jan-22
1-Jan-23
1-Jan-24

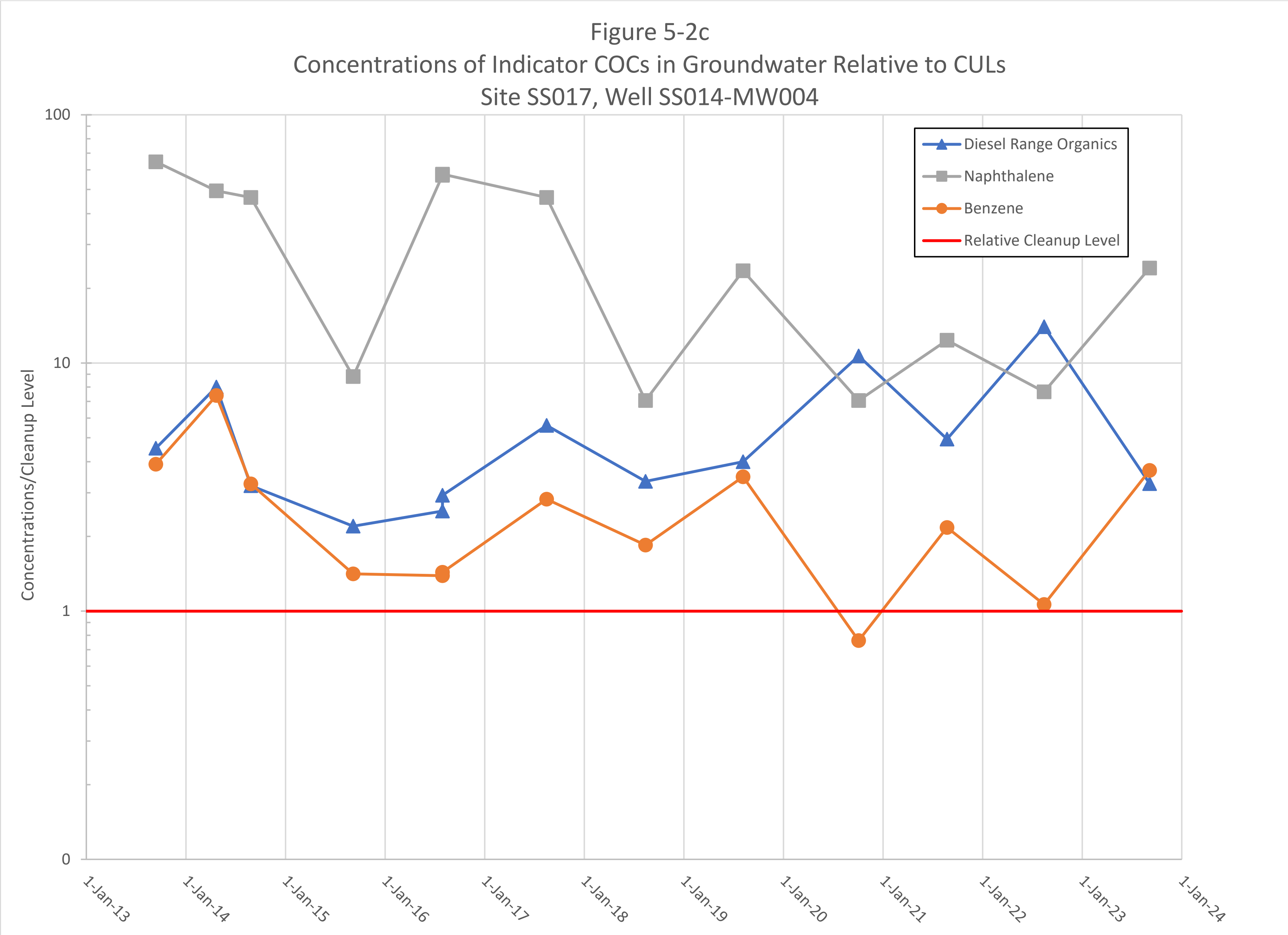


Figure 5-2c
Concentrations of Indicator COCs in Groundwater Relative to CULs
Site SS017, Well SS014-MW004
Concentrations/Cleanup Level
100
10
1
0
1-Jan-13
1-Jan-14
1-Jan-15
1-Jan-16
1-Jan-17
1-Jan-18
1-Jan-19
1-Jan-20
1-Jan-21
1-Jan-22
1-Jan-23
1-Jan-24
Diesel Range Organics
Naphthalene
Benzene
Relative Cleanup Level

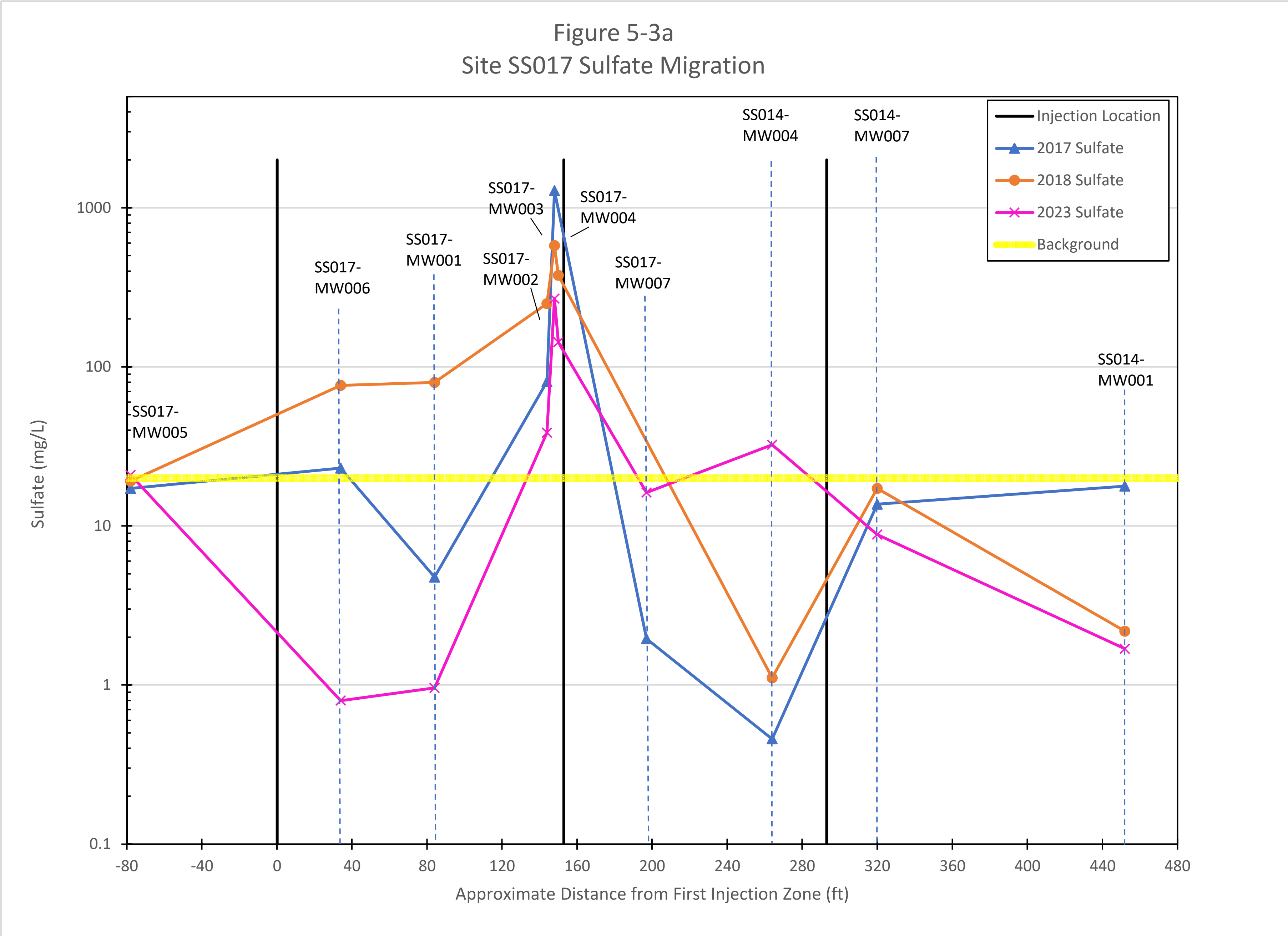


Figure 5-3a
Site SS017 Sulfate Migration
Injection Location
2017 Sulfate
2018 Sulfate
2023 Sulfate
Background
SS017-MW005
SS017-MW006
SS017-MW001
SS017-MW002
SS017-MW003
SS017-MW004
SS017-MW007
SS014-MW004
SS014-MW007
SS014-MW001
Sulfate (mg/L)
1000
100
10
1
0.1
-80
-40
0
40
80
120
160
200
240
280
320
360
400
440
480
Approximate Distance from First Injection Zone (ft)

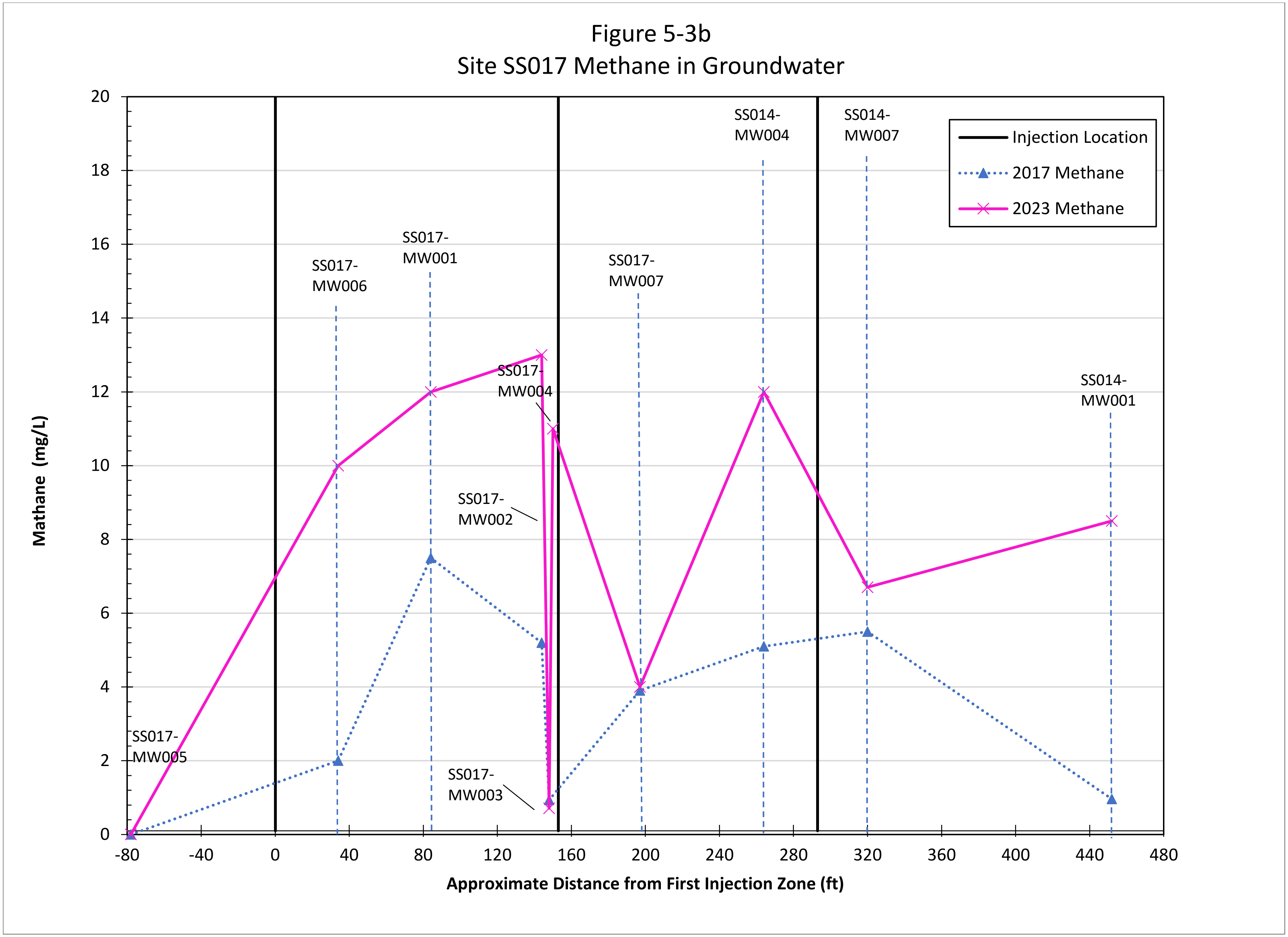


Figure 5-3b
Site SS017 Methane in Groundwater
Mathane (mg/L)
Approximate Distance from First Injection Zone (ft)
Injection Location
2017 Methane
2023 Methane
SS017-MW005
SS017-MW006
SS017-MW001
SS017-MW004
SS017-MW002
SS017-MW003
SS017-MW007
SS014-MW004
SS014-MW007
SS014-MW001
0
2
4
6
8
10
12
14
16
18
20
-80
-40
0
40
80
120
160
200
240
280
320
360
400
440
480

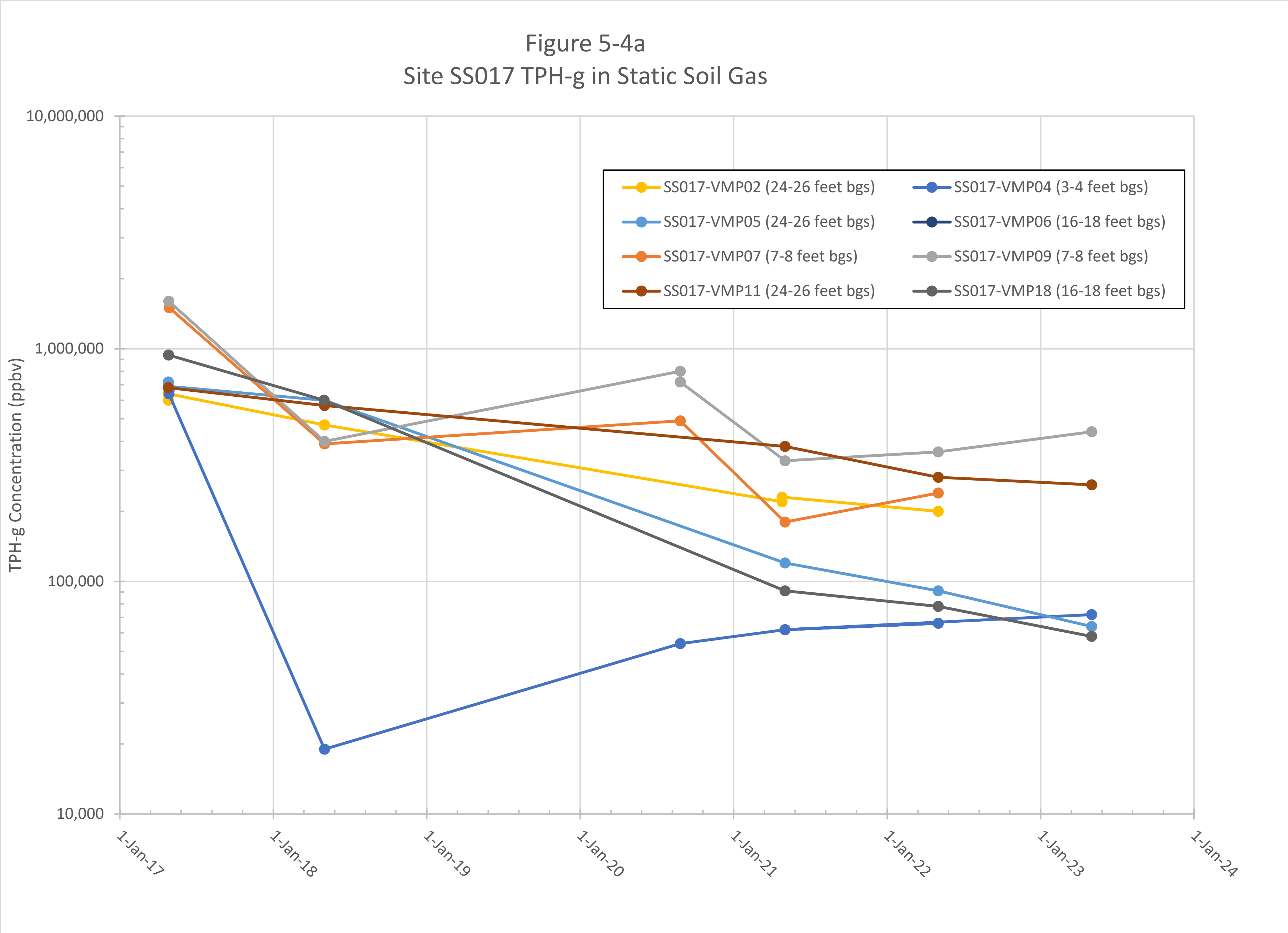


Figure 5-4a
Site SS017 TPH-g in Static Soil Gas
TPH-g Concentration (ppbv)
10,000,000
1,000,000
100,000
10,000
1-Jan-17
1-Jan-18
1-Jan-19
1-Jan-20
1-Jan-21
1-Jan-22
1-Jan-23
1-Jan-24
SS017-VMP02 (24-26 feet bgs)
SS017-VMP04 (3-4 feet bgs)
SS017-VMP05 (24-26 feet bgs)
SS017-VMP06 (16-18 feet bgs)
SS017-VMP07 (7-8 feet bgs)
SS017-VMP09 (7-8 feet bgs)
SS017-VMP11 (24-26 feet bgs)
SS017-VMP18 (16-18 feet bgs)

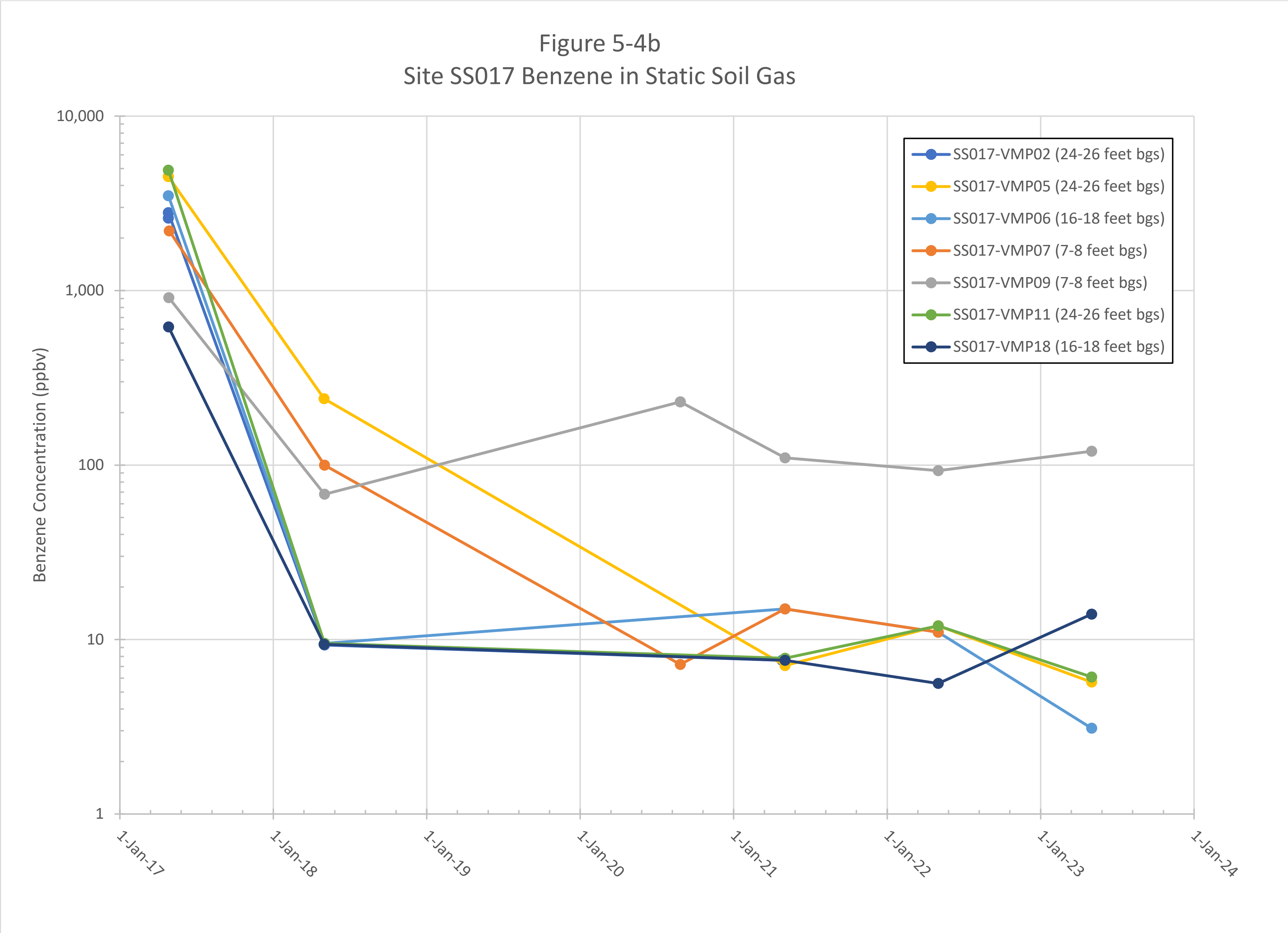
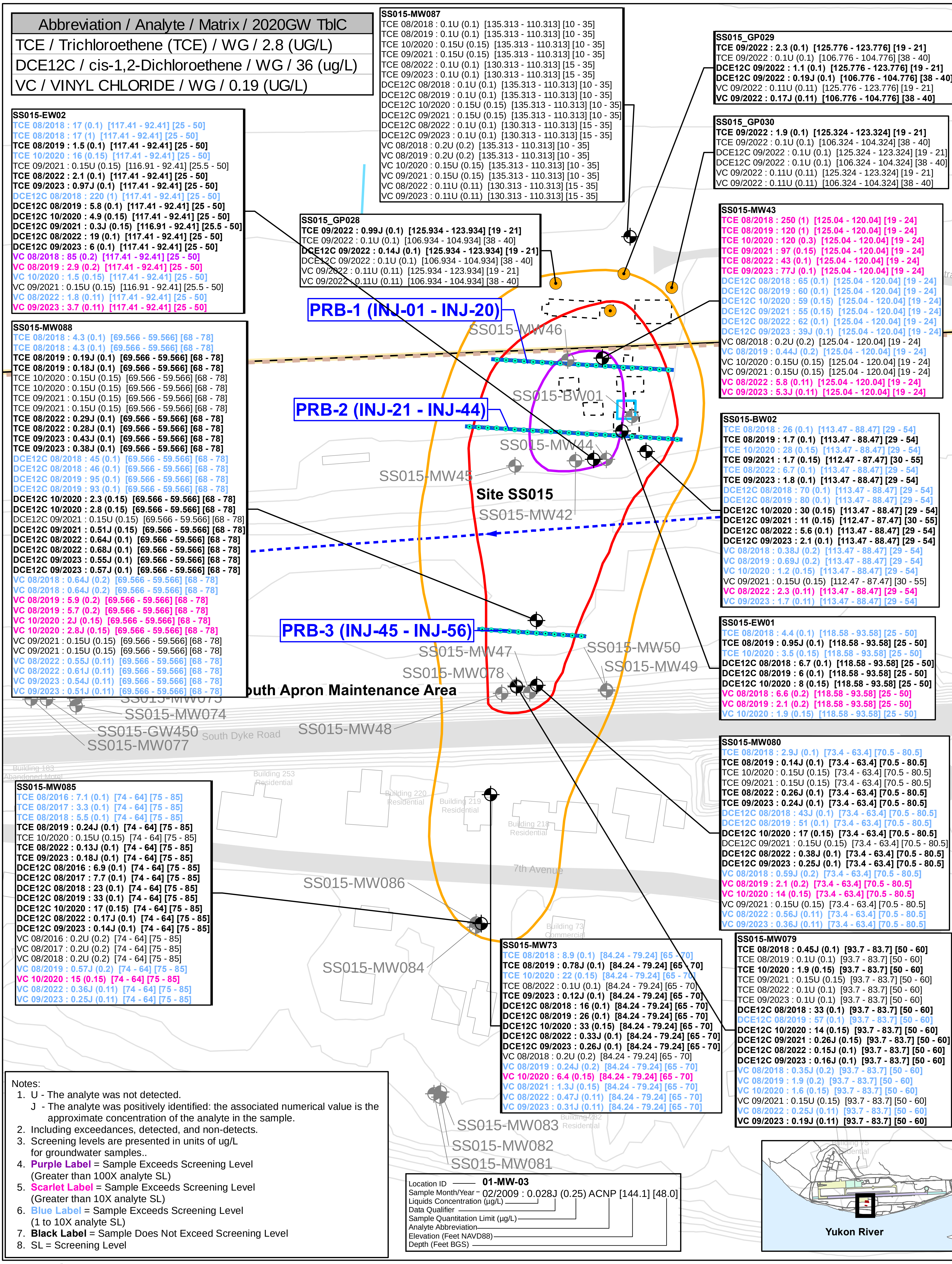


Figure 5-4b
Site SS017 Benzene in Static Soil Gas
Benzene Concentration (ppbv)
10,000
1,000
100
10
1
1-Jan-17
1-Jan-18
1-Jan-19
1-Jan-20
1-Jan-21
1-Jan-22
1-Jan-23
1-Jan-24
SS017-VMP02 (24-26 feet bgs)
SS017-VMP05 (24-26 feet bgs)
SS017-VMP06 (16-18 feet bgs)
SS017-VMP07 (7-8 feet bgs)
SS017-VMP09 (7-8 feet bgs)
SS017-VMP11 (24-26 feet bgs)
SS017-VMP18 (16-18 feet bgs)



Legend

Approximate Location of Former Feature
Structure
Approximate Groundwater Flow Direction
Abandoned Fuel Line
Main Fuel Line
Ground Surface Contour
Low Elevation, Temporarily Flooded Areas
Bioreactor Installation Area (20' x 20' x 15' Deep)
Approximate Location of Surface Drainage Swale Center Line and Seasonal Surface Water Flow Direction

Maximum TCE Contours (µg/L) 2010 - 2018
5
50
500

EAB/EBT Permable Reactive Barrier
Existing Groundwater Monitoring Well Included in Performance Monitoring Network
Existing Groundwater Monitoring Well Excluded from Performance Monitoring Network
Injection Point
Groundwater Grab Sample Location

0 50 100
Feet
N

Note:
The groundwater flow direction shown is the predominant direction that persists from late August through breakup of the Yukon River (approximately May 15). Groundwater flow directions during the remainder of the year are variable depending on the timing of fluctuations in Yukon River stage.

FIGURE 6-1

Site SS015 Groundwater Performance Monitoring Results

Analyte: TCE, DCE12C, and VC
Media: Groundwater
SLs: 2020 ADEC Table C Groundwater CULs
Data Range: 2018 - 2022

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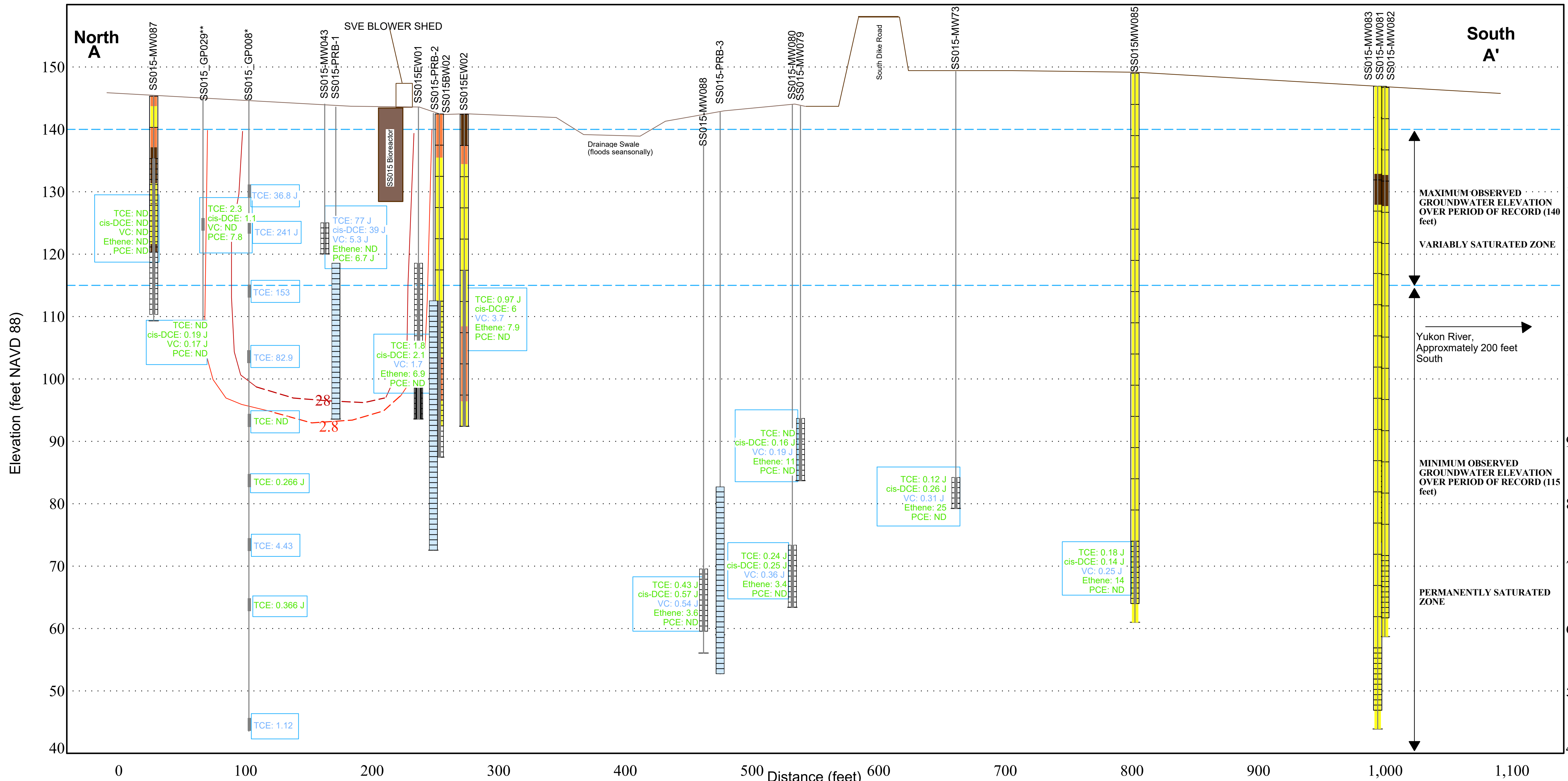

LEGEND

- GROUND SURFACE ELEVATION (feet NAVD 88)
- ST009-GP001 — SAMPLE LOCATION
- 18.2 — ANALYTE CONCENTRATION IN SOIL (mg/kg)
- 18.2 — ANALYTE CONCENTRATION IN GROUNDWATER (µg/L)
- SAMPLE INTERVAL (feet)
- GROUNDWATER ELEVATION
- SCREEN INTERVAL
- EAB/EBT INJECTION PERMEABLE REACTIVE BARRIER

MAXIMUM TCE Contours (ug/L) 2023

- 2.8 (dashed where inferred)
- 28 (dashed where inferred)
- 280 (dashed where inferred)

SOIL AND LITHOLOGY

RELATIVE PERMEABILITY

- GW, GP, GW-GM, GP-GM, GW-GC, GP-GC, SW, SP, SW-SM, SP-SM, SP-SC
- GM, GC, SM, SC
- ML, MH, CL, CH
- NO SAMPLE RECOVERY

NOTES:
Blue Label = Sample Exceeds ADEC Table C Groundwater CULs.
Green Label = Sample Does Not Exceed Cleanup Level.
B = The analyte was detected in the sample at a concentration less than or equal to five times (10 times for common laboratory contaminants) the blank concentration.
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
ND = Not detected.
NA=Not available.
NAVD 88 = North American Vertical Datum of 1988.
TCE=Trichloroethene.
PCE=Tetrachloroethene.
cis-DCE=cis-1,2-Dichloroethene.
VC=Vinyl Chloride.
Seasonal groundwater elevations based on transducer information from wells ST010 - SE-MW-07, located approximately 2,300 feet east of the site.
EAB = Enhanced Anaerobic Bioremediation
EBT = Enhanced Biogeochemical Transformation
SS015-MW081-MW083 Well cluster were non-detect for chlorinated Ethenes the last time they were sampled and are shown to bound the TCE plume.
*Groundwater Grab samples were collected at SS015_GP008 in 2011
**Groundwater Grab samples were collected at SS015_GP029 in 2022

FIGURE 6-2
Site SS015
Cross Section A-A'

Chorinated Ethenes in Groundwater 2023 for SS015
2023 Performance Monitoring Report
Former Galena Forward Operating Location, Alaska

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Figure 6-3a
Concentrations of Trichloroethene in Groundwater Relative to CUL
Site SS015 (2009 - 2023)

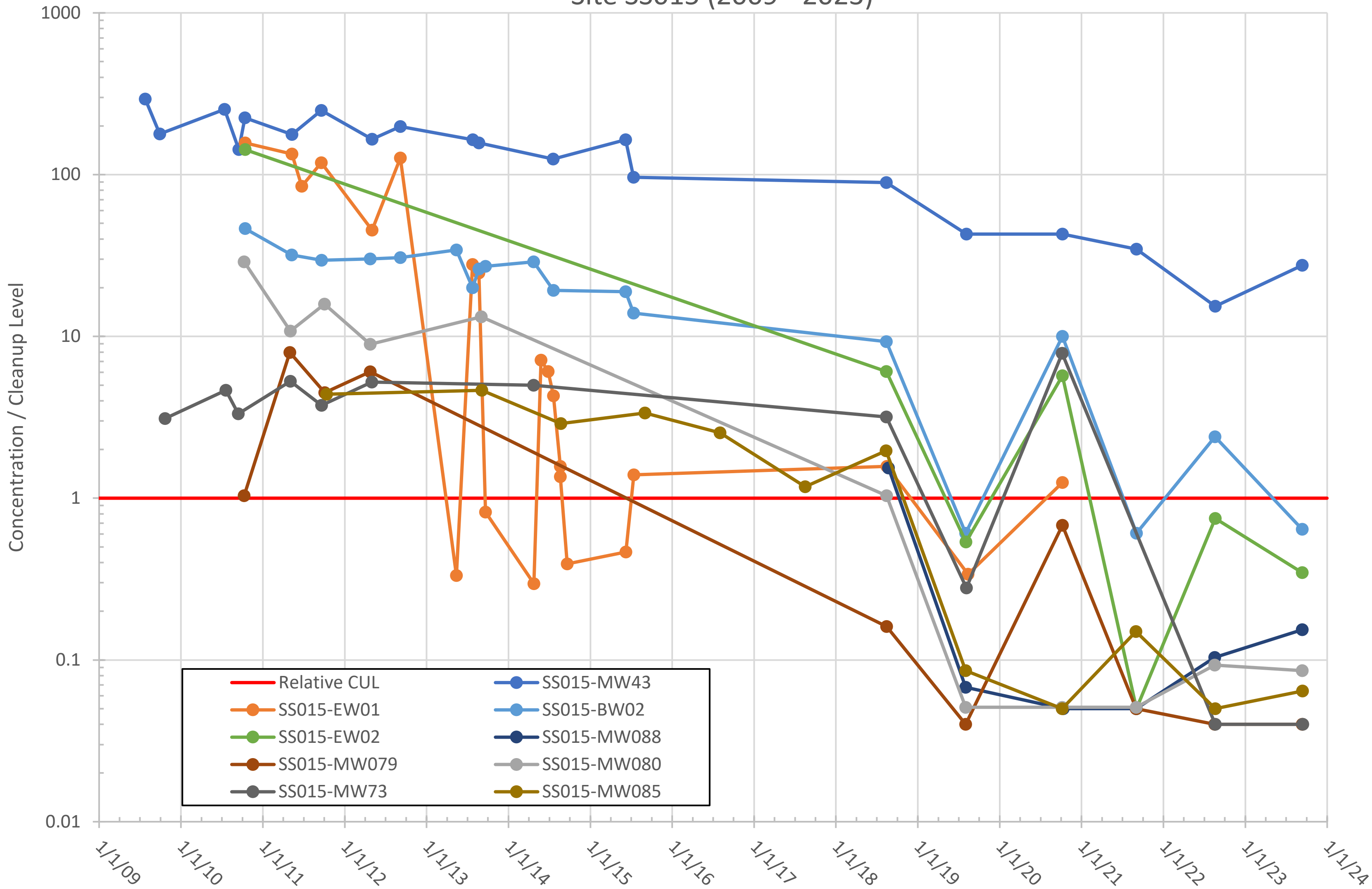


Figure 6-3b
Concentrations of Trichloroethene in Groundwater Relative to CUL
Site SS015 (2018 - 2023)

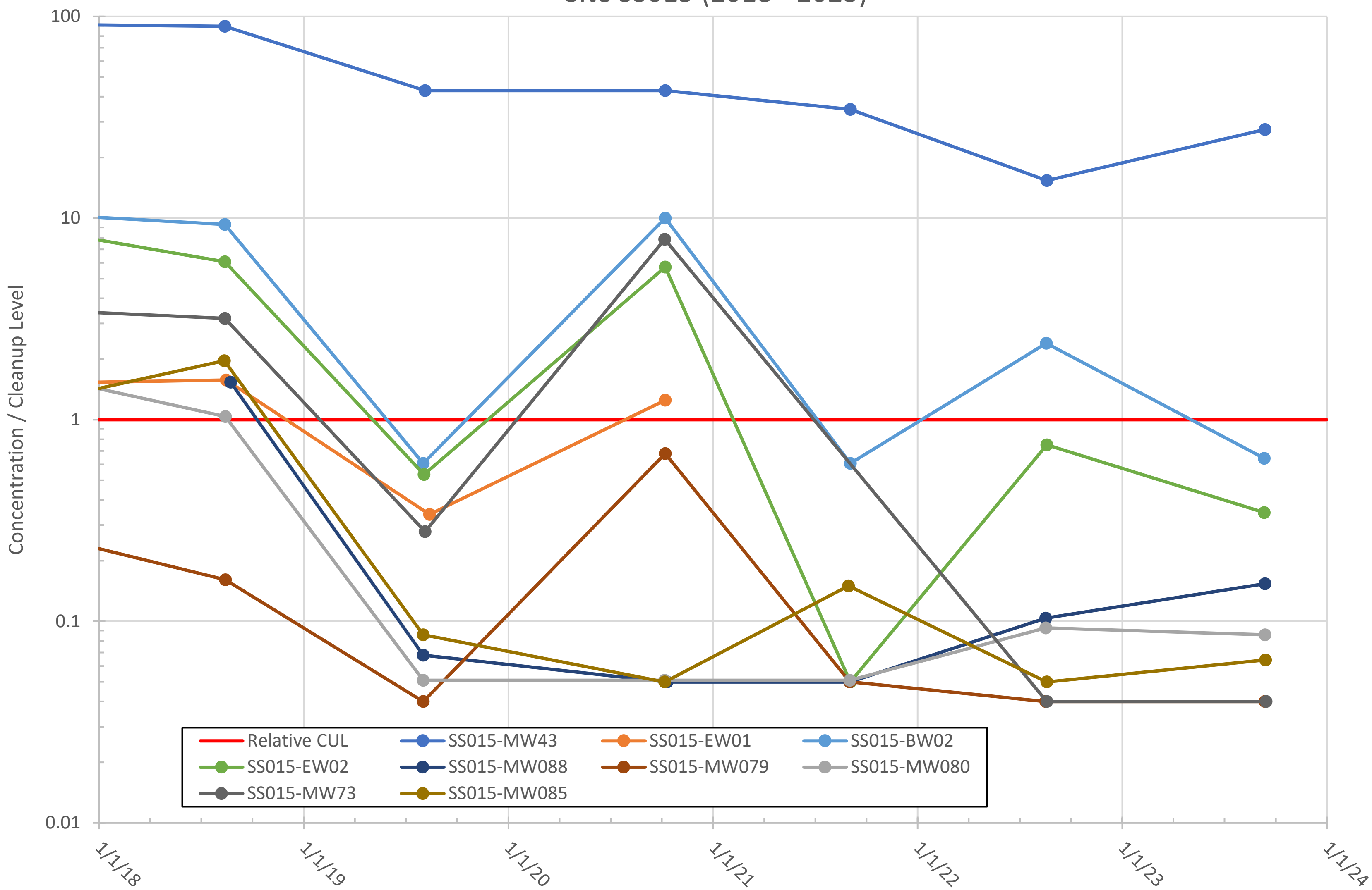
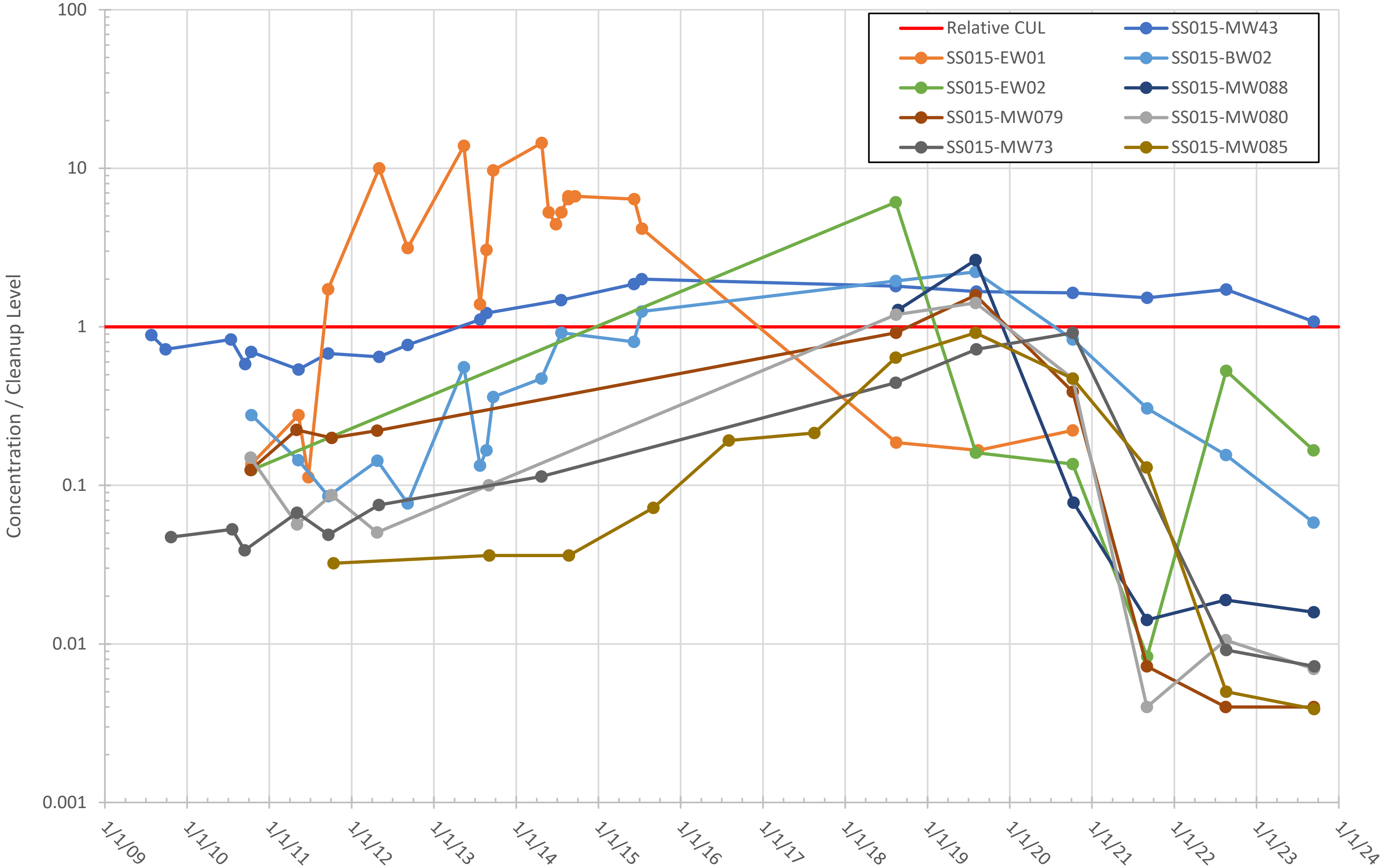


Figure 6-4a
Concentrations of cis-1,2-Dichloroethene in Groundwater Relative to CUL
Site SS015 (2009 - 2023)



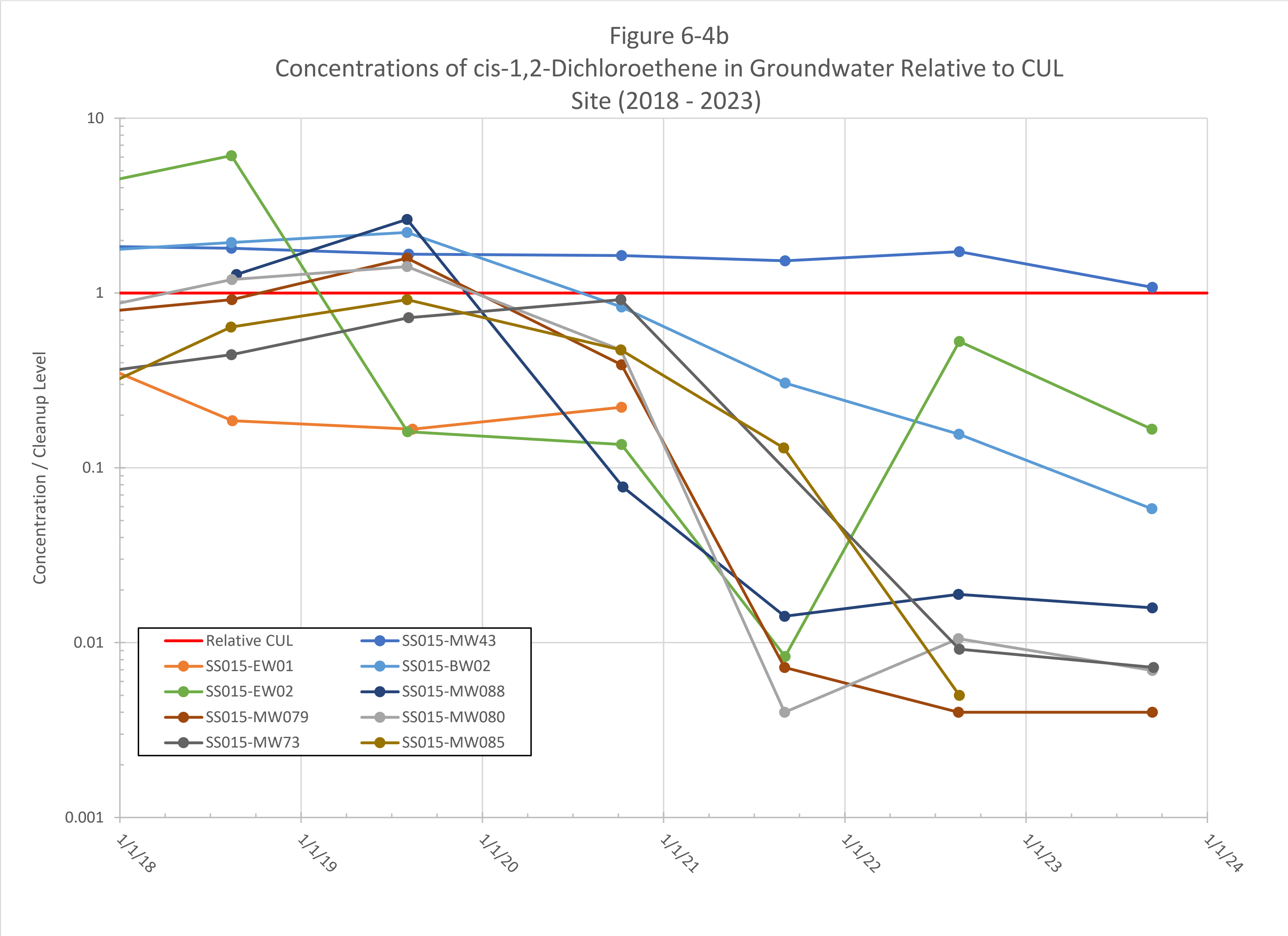


Figure 6-4b
Concentrations of cis-1,2-Dichloroethene in Groundwater Relative to CUL
Site (2018 - 2023)
Concentration / Cleanup Level
10
1
0.1
0.01
0.001
1/1/18
1/1/19
1/1/20
1/1/21
1/1/22
1/1/23
1/1/24
Relative CUL
SS015-EW01
SS015-EW02
SS015-MW079
SS015-MW73
SS015-MW43
SS015-BW02
SS015-MW088
SS015-MW080
SS015-MW085

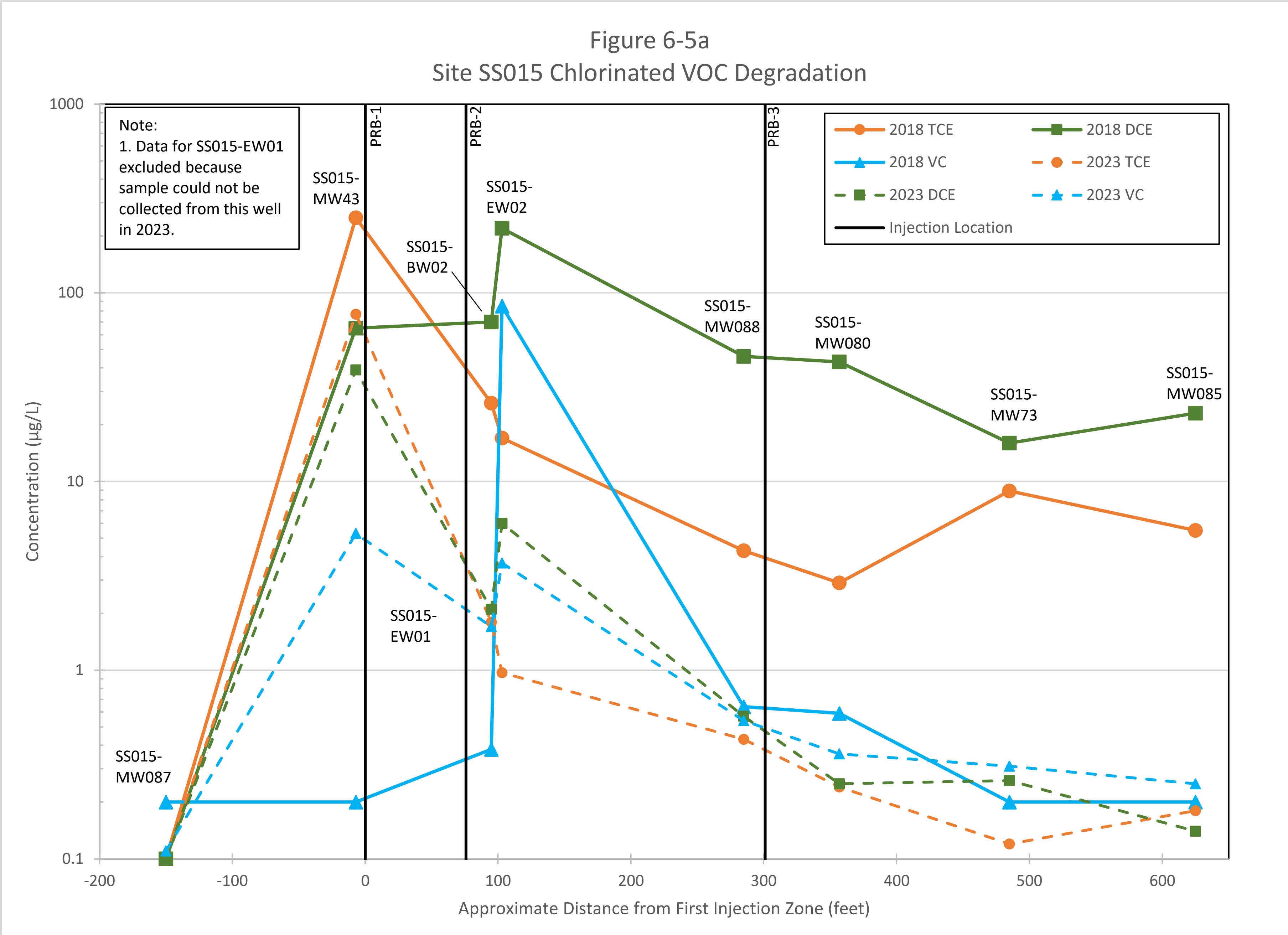


Figure 6-5a
Site SS015 Chlorinated VOC Degradation
Note:
1. Data for SS015-EW01 excluded because sample could not be collected from this well in 2023.
PRB-1
PRB-2
PRB-3
SS015-MW43
SS015-EW02
SS015-BW02
SS015-MW088
SS015-MW080
SS015-MW73
SS015-MW085
SS015-EW01
SS015-MW087
2018 TCE
2018 DCE
2018 VC
2023 TCE
2023 DCE
2023 VC
Injection Location
Concentration (µg/L)
Approximate Distance from First Injection Zone (feet)
1000
100
10
1
0.1
-200
-100
0
100
200
300
400
500
600

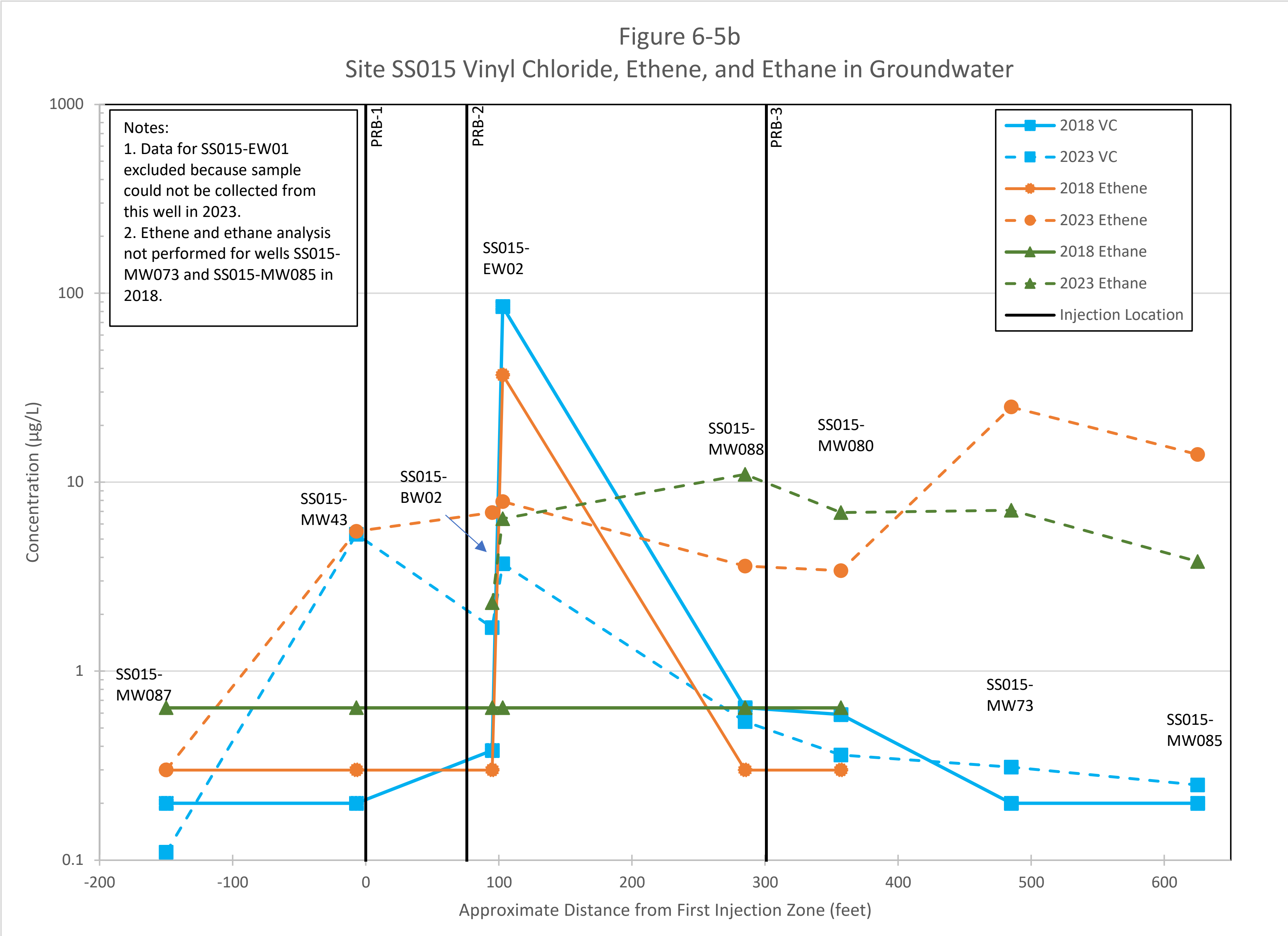


Figure 6-5b
Site SS015 Vinyl Chloride, Ethene, and Ethane in Groundwater
Notes:
1. Data for SS015-EW01 excluded because sample could not be collected from this well in 2023.
2. Ethene and ethane analysis not performed for wells SS015-MW073 and SS015-MW085 in 2018.
PRB-1
PRB-2
PRB-3
2018 VC
2023 VC
2018 Ethene
2023 Ethene
2018 Ethane
2023 Ethane
Injection Location
SS015-EW02
SS015-MW088
SS015-MW080
SS015-BW02
SS015-MW43
SS015-MW087
SS015-MW73
SS015-MW085
1000
100
10
1
0.1
Concentration (µg/L)
-200
-100
0
100
200
300
400
500
600
Approximate Distance from First Injection Zone (feet)

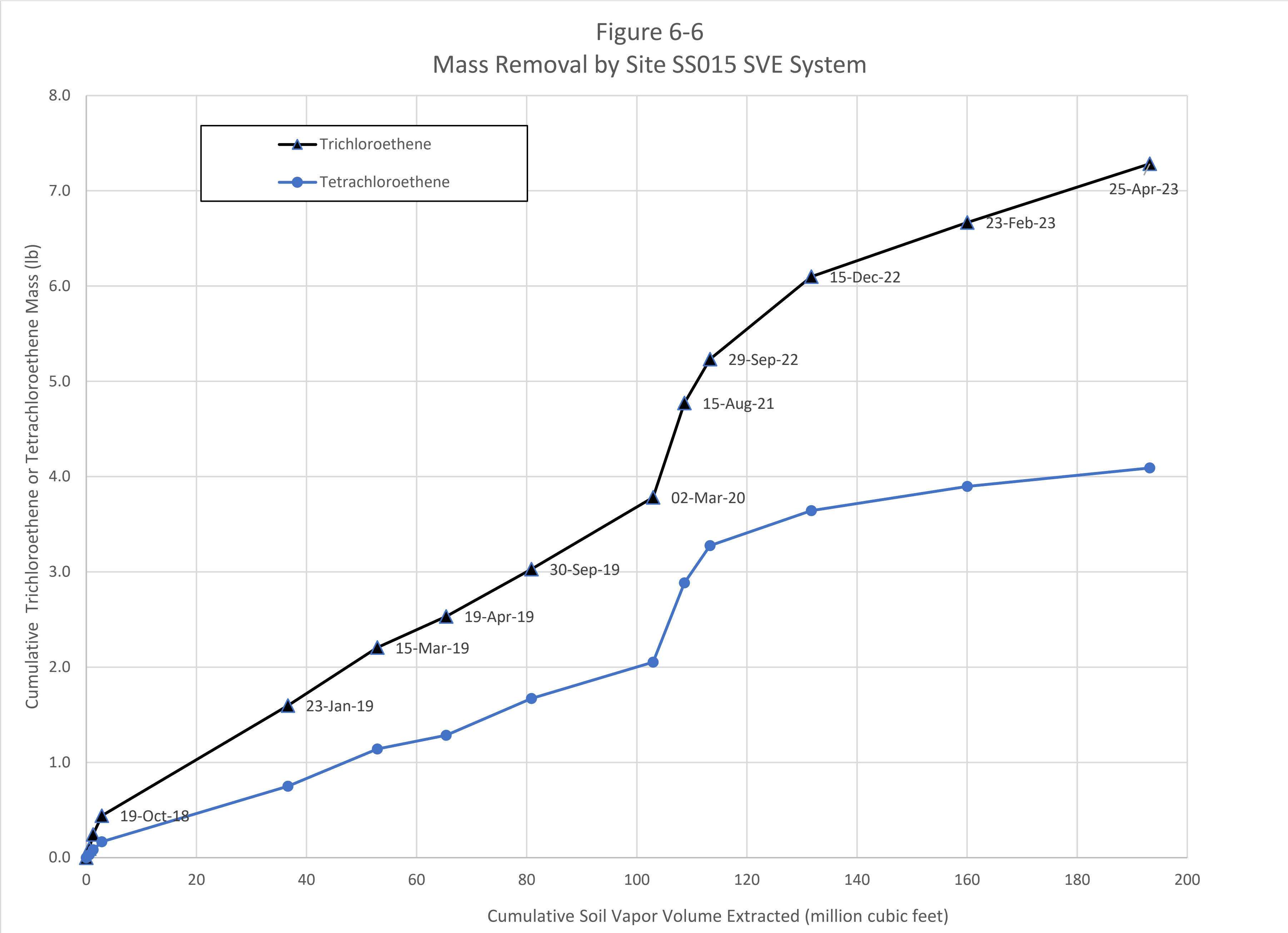
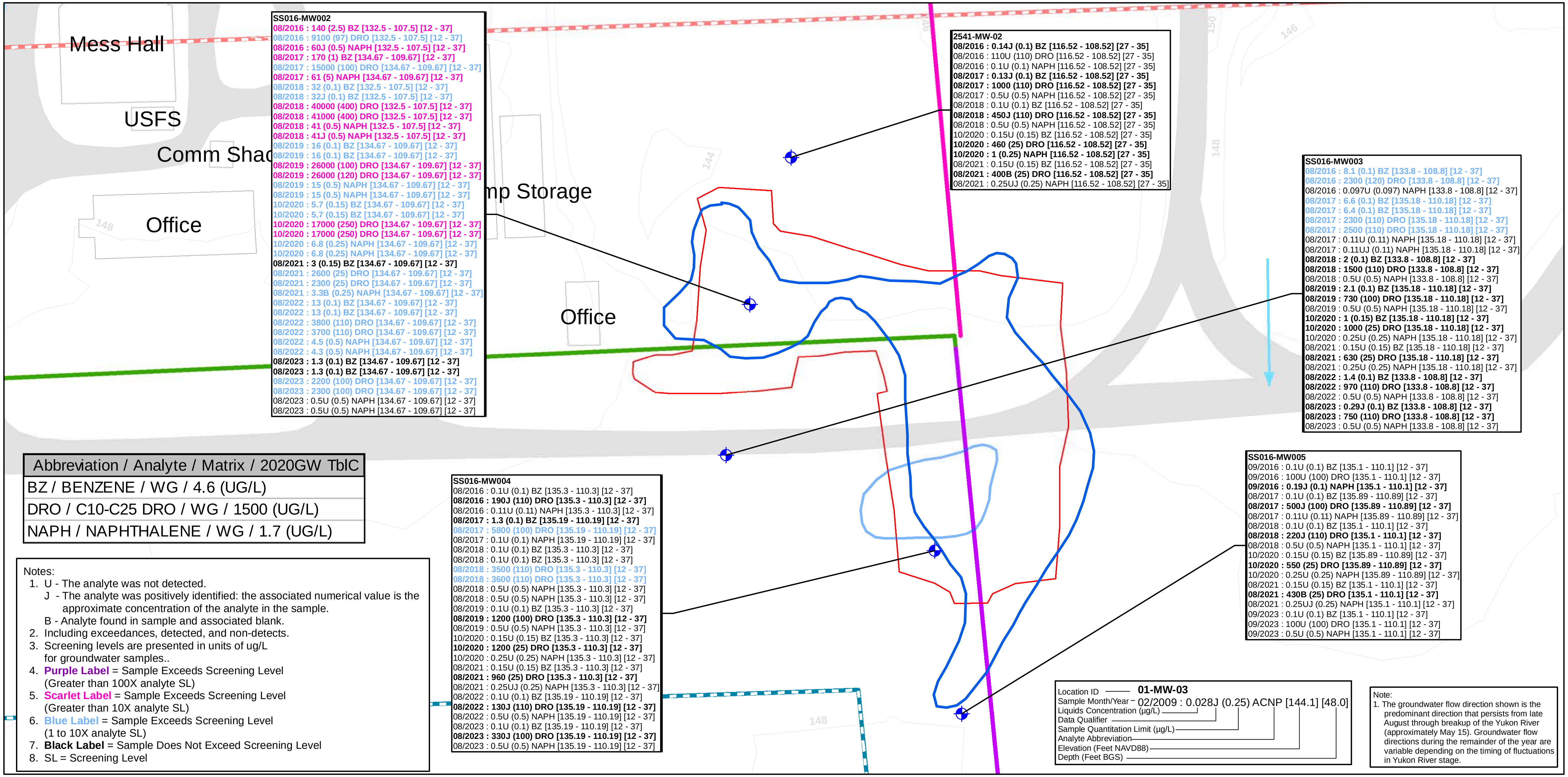
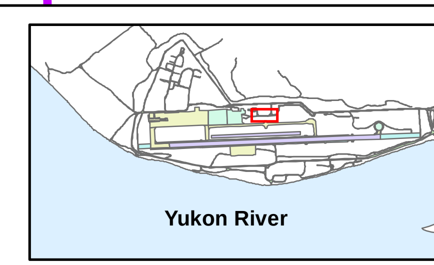


Figure 6-6
Mass Removal by Site SS015 SVE System
Trichloroethene
Tetrachloroethene
Cumulative Trichloroethene or Tetrachloroethene Mass (lb)
Cumulative Soil Vapor Volume Extracted (million cubic feet)
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
0
20
40
60
80
100
120
140
160
180
200
19-Oct-18
23-Jan-19
15-Mar-19
19-Apr-19
30-Sep-19
02-Mar-20
15-Aug-21
29-Sep-22
15-Dec-22
23-Feb-23
25-Apr-23



Legend

- Approximate Groundwater Flow Direction
- As Built Excavation Top Extents (2013)
- Extent of Residual Petroleum within the Vertical Interval (0-15 ft bgs)
- Extent of Residual Petroleum (15-25 ft bgs)
- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)
- 1952 and 1962 Aboveground Pipeline (1963 and 1985 Aerial)
- 1952 and 1962 Underground Pipeline (Not Visible on Aerials)
- Aboveground Pipeline (1985 Aerial)
- Monitoring Well



0 25 50
Feet

FIGURE 7-1

Site SS016 Groundwater Performance Monitoring Results

Analyte: COCs
SLs: 2020 ADEC Table C Groundwater CULs
Data Range: 2016 - 2023

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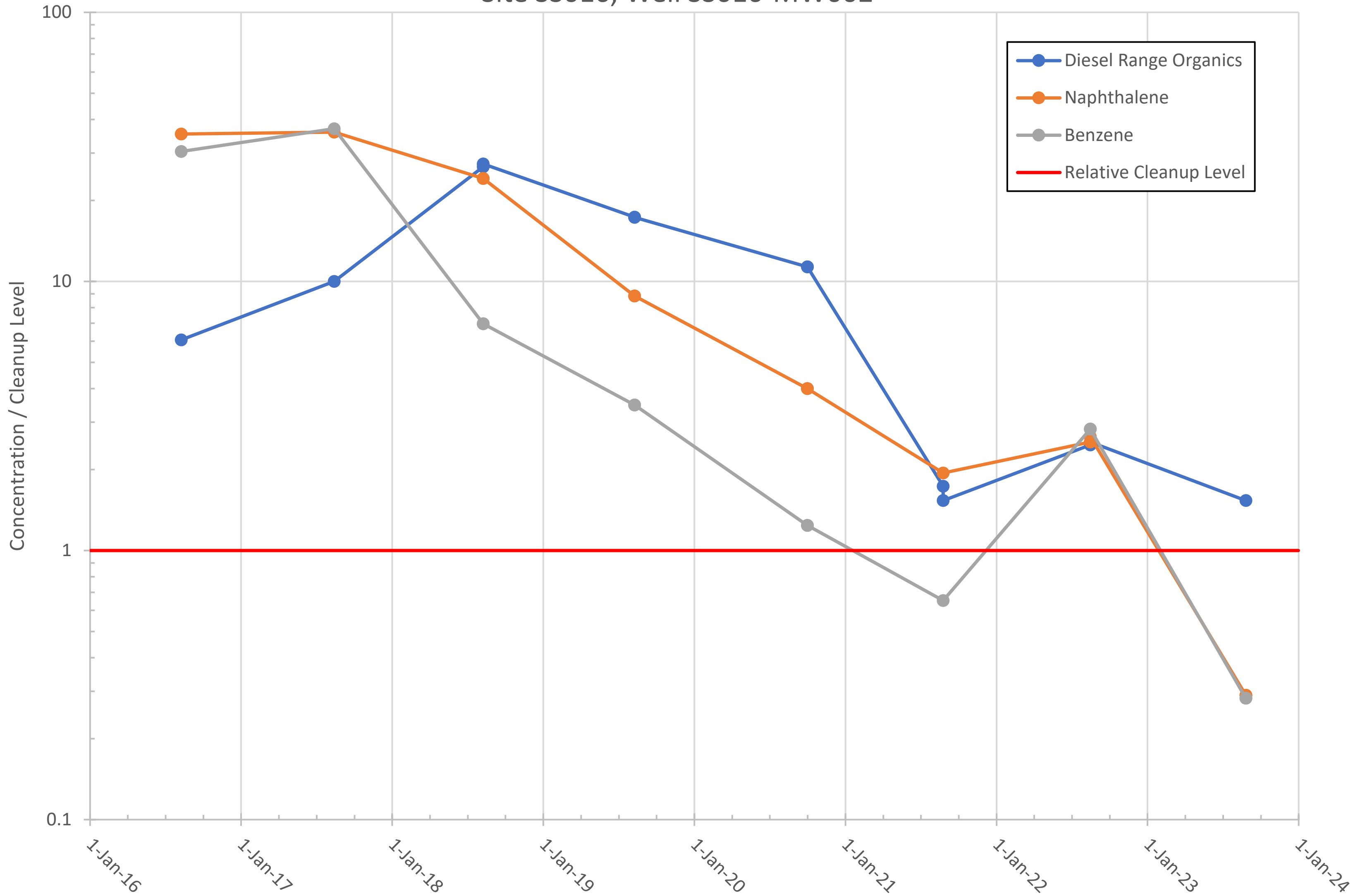
Figure 7-2
Concentrations of Indicator COCs in Groundwater Relative to CULs
Site SS016, Well SS016-MW002



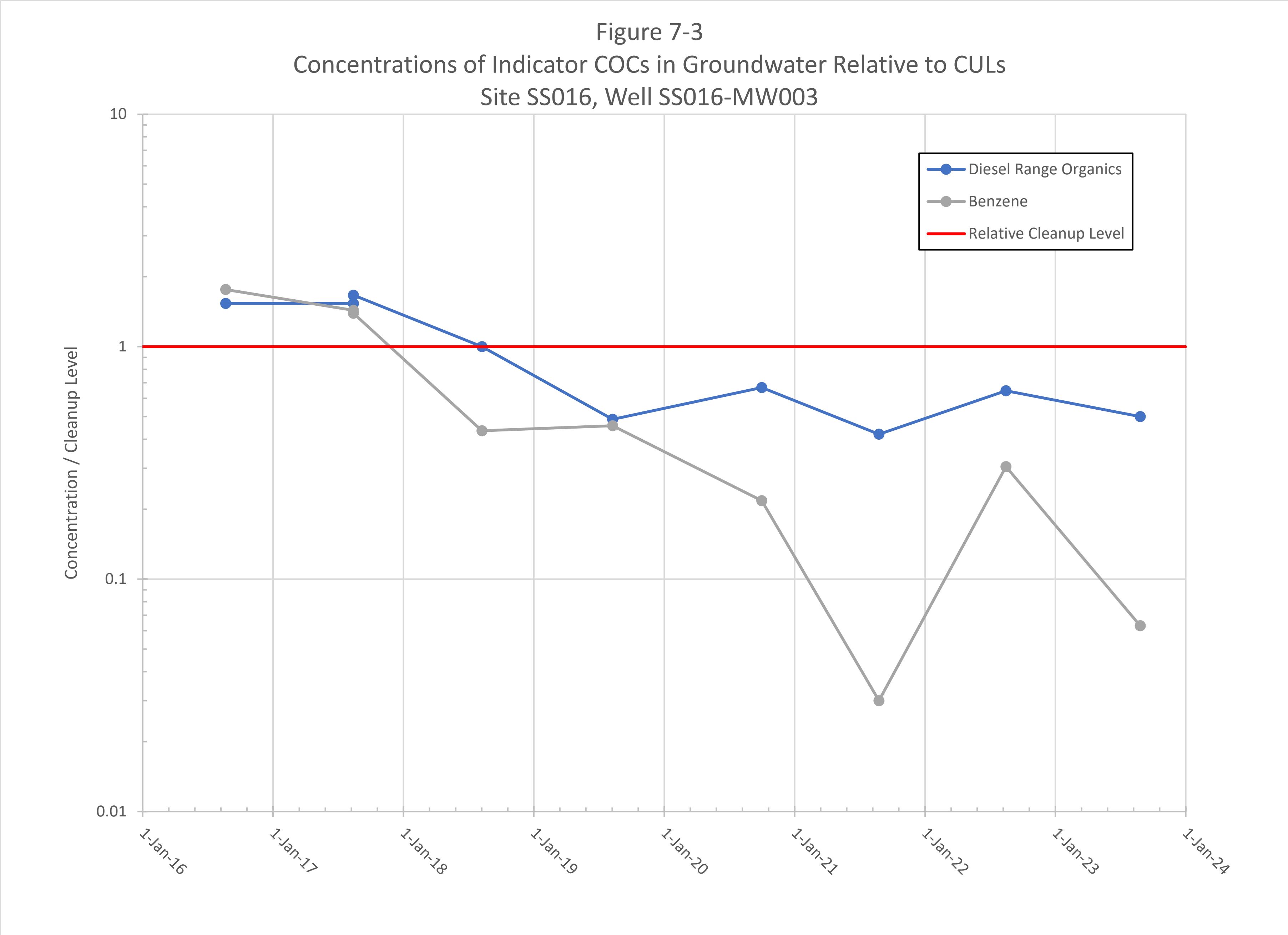
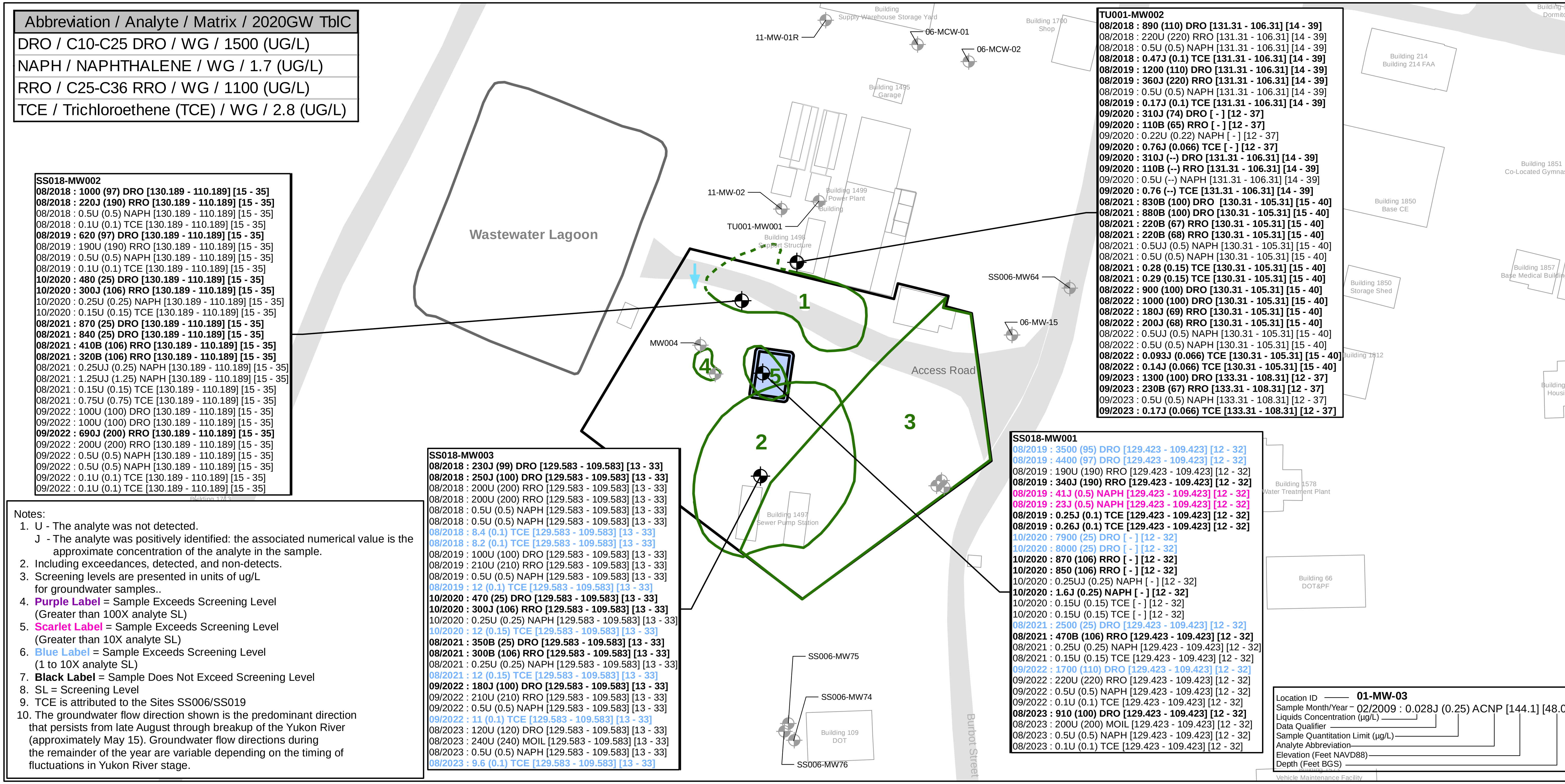


Figure 7-3
Concentrations of Indicator COCs in Groundwater Relative to CULs
Site SS016, Well SS016-MW003
Concentration / Cleanup Level
10
1
0.1
0.01
1-Jan-16
1-Jan-17
1-Jan-18
1-Jan-19
1-Jan-20
1-Jan-21
1-Jan-22
1-Jan-23
1-Jan-24
Diesel Range Organics
Benzene
Relative Cleanup Level

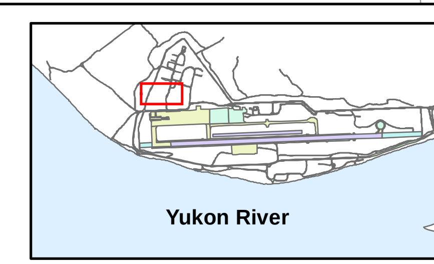


Abbreviation / Analyte / Matrix / 2020GW TblC
DRO / C10-C25 DRO / WG / 1500 (UG/L)
NAPH / NAPHTHALENE / WG / 1.7 (UG/L)
RRO / C25-C36 RRO / WG / 1100 (UG/L)
TCE / Trichloroethene (TCE) / WG / 2.8 (UG/L)

Notes:
1. U - The analyte was not detected.
   J - The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
2. Including exceedances, detected, and non-detects.
3. Screening levels are presented in units of ug/L for groundwater samples..
4. **Purple Label** = Sample Exceeds Screening Level (Greater than 100X analyte SL)
5. **Scarlet Label** = Sample Exceeds Screening Level (Greater than 10X analyte SL)
6. **Blue Label** = Sample Exceeds Screening Level (1 to 10X analyte SL)
7. **Black Label** = Sample Does Not Exceed Screening Level
8. SL = Screening Level
9. TCE is attributed to the Sites SS006/SS019
10. The groundwater flow direction shown is the predominant direction that persists from late August through breakup of the Yukon River (approximately May 15). Groundwater flow directions during the remainder of the year are variable depending on the timing of fluctuations in Yukon River stage.

Legend

- SS018
- Airfield Surface or Road
- Approximate Groundwater Flow Direction (See Note 10)
- Existing Well for Monitoring Well Network
- Existing Well
- Excavation Area
- Sample Subarea (dashed where inferred)



0 40 80
Feet

FIGURE 8-1

Site SS018 Groundwater Performance Monitoring Results

Analytes: COCs
SLs: 2020 ADEC Table C Groundwater CULs
Data Range: 2018 - 2023

2023 Performance Monitoring Report
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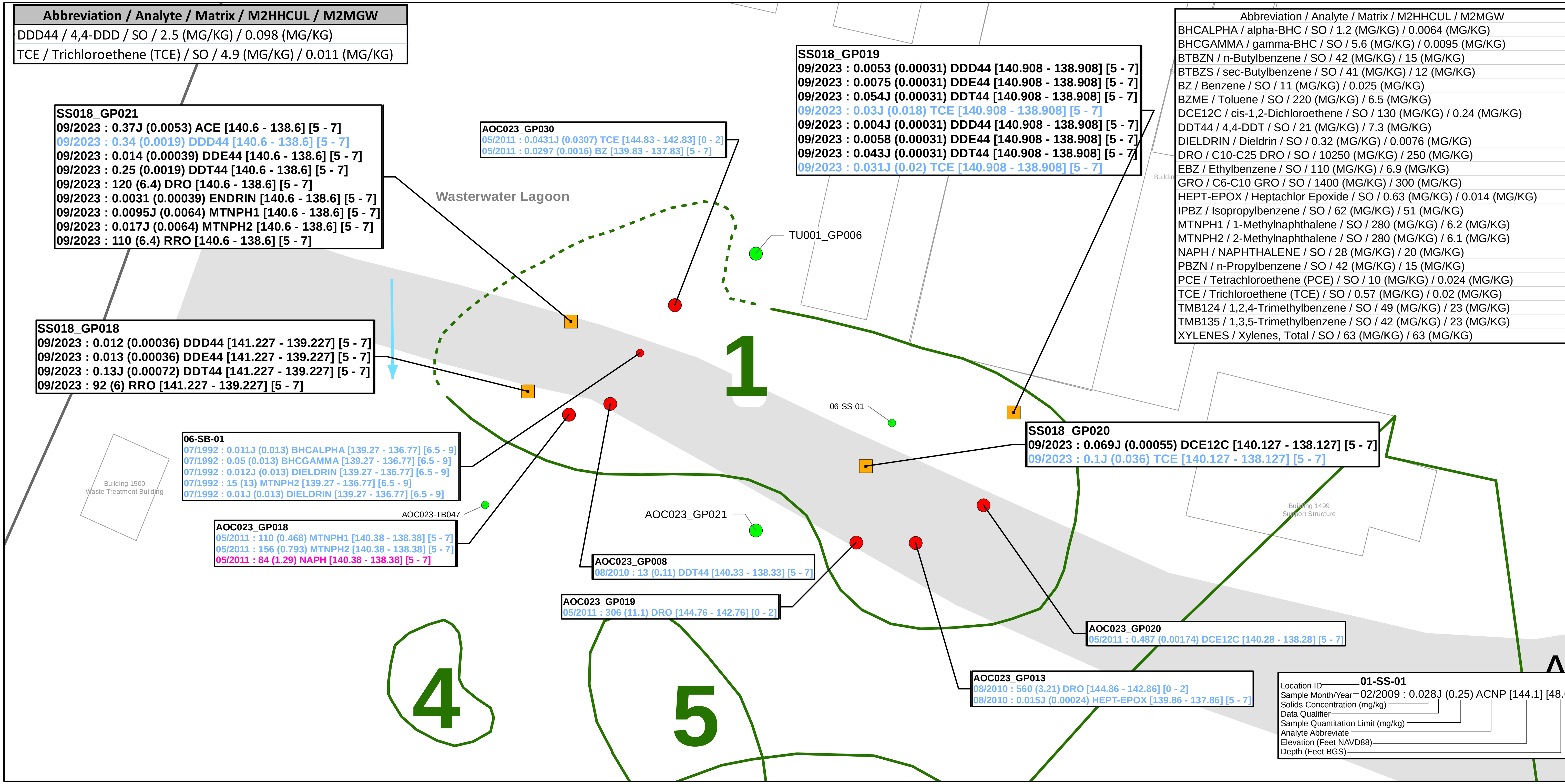
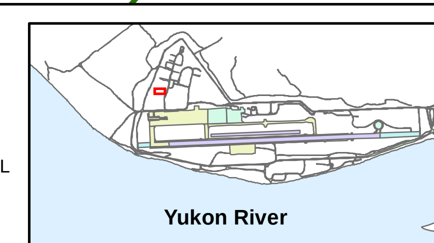


Legend

- Airfield Surface or Road
- Approximate Groundwater Flow Direction (See Note 1)
- 2010 - 2013 Sample (0-15 ft) Exceeds 2008 ADEC Migration to GW or Human Health Clean Up Level (CUL)
- 2010 - 2013 Sample Does Not Exceed 2008 ADEC Cleanup Level
- Historical Sample (0-15 ft) Exceeds 2008 ADEC Migration to GW or Human Health Clean Up Level (CUL)
- Historical Sample Does Not Exceed 2008 ADEC Cleanup Level
- Sample Subarea (dashed where inferred)
- 2023 Soil Sampling Location

Notes:
1. The groundwater flow direction shown is the predominant direction that persists from late August through breakup of the Yukon River (approximately May 15). Groundwater flow directions during the remainder of the year are variable depending on the timing of fluctuations in Yukon River stage.
2. Scarlet Label = Sample Exceeds 2020 ADEC Method Two Human Health CUL
3. Blue Label = Sample Exceeds 2020 ADEC Method Two Migration to Groundwater CUL



0 10 20
Feet

N

FIGURE 8-2

Site SS018 Subarea 1 Soil Sampling Locations

Analytes: COC Exceedances
Media: Soil (0-15 ft)
SLs: The Lower of the 2020 ADEC Method Two CULs
Data Range: Historical, 2010 - 2013, and 2023

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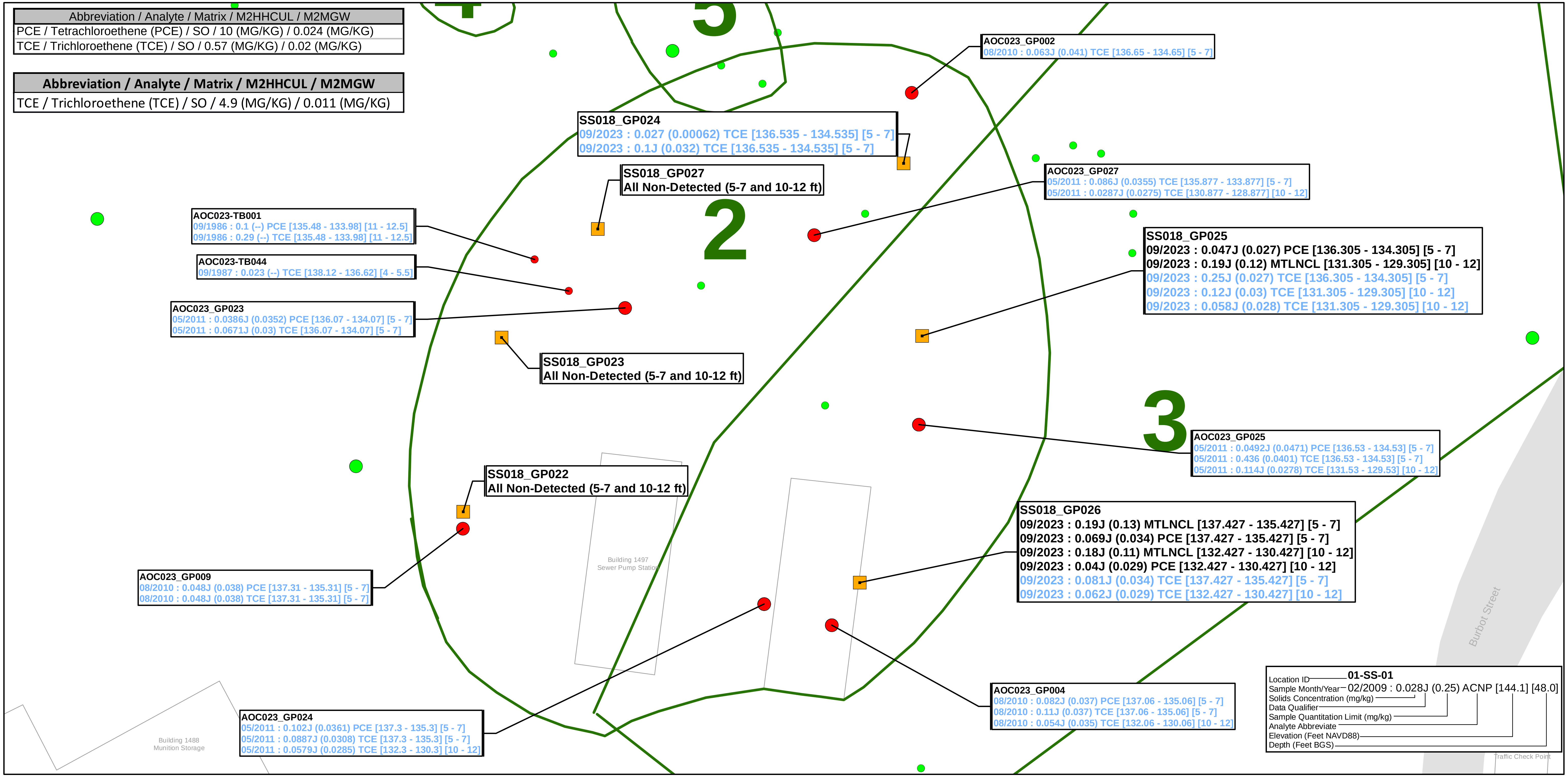
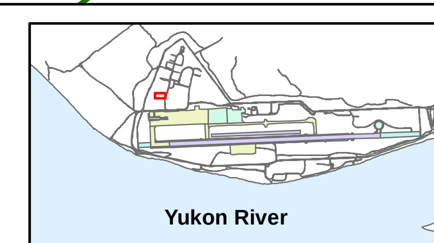


Legend

- Airfield Surface or Road
- Approximate Groundwater Flow Direction (See Note 1)
- 2010 - 2013 Sample (0-15 ft) Exceeds Migration to GW or Human Health Clean Up Level (CUL)
- 2010 - 2013 Sample Does Not Exceed Cleanup Level
- Historical Sample (0-15 ft) Exceeds Migration to GW or Human Health Clean Up Level (CUL)
- Historical Sample Does Not Exceed Cleanup Level
- Sample Subarea (dashed where inferred)
- 2023 Soil Sampling Location

Notes:
1. The groundwater flow direction shown is the predominant direction that persists from late August through breakup of the Yukon River (approximately May 15). Groundwater flow directions during the remainder of the year are variable depending on the timing of fluctuations in Yukon River stage.
2. Scarlet Label = Sample Exceeds 2020 Method Two Human Health CUL
3. Blue Label = Sample Exceeds 2020 Method Two Migration to Groundwater CUL



0 10 20
Feet

FIGURE 8-3

Site SS018 Subarea 2
Soil Sampling Locations

Analytes: TCE/PCE Exceedances
Media: Soil (0-15 ft)
SLs: Migration to Groundwater / Human Health CUL
Data Range: Historical, 2010 - 2013, and 2023

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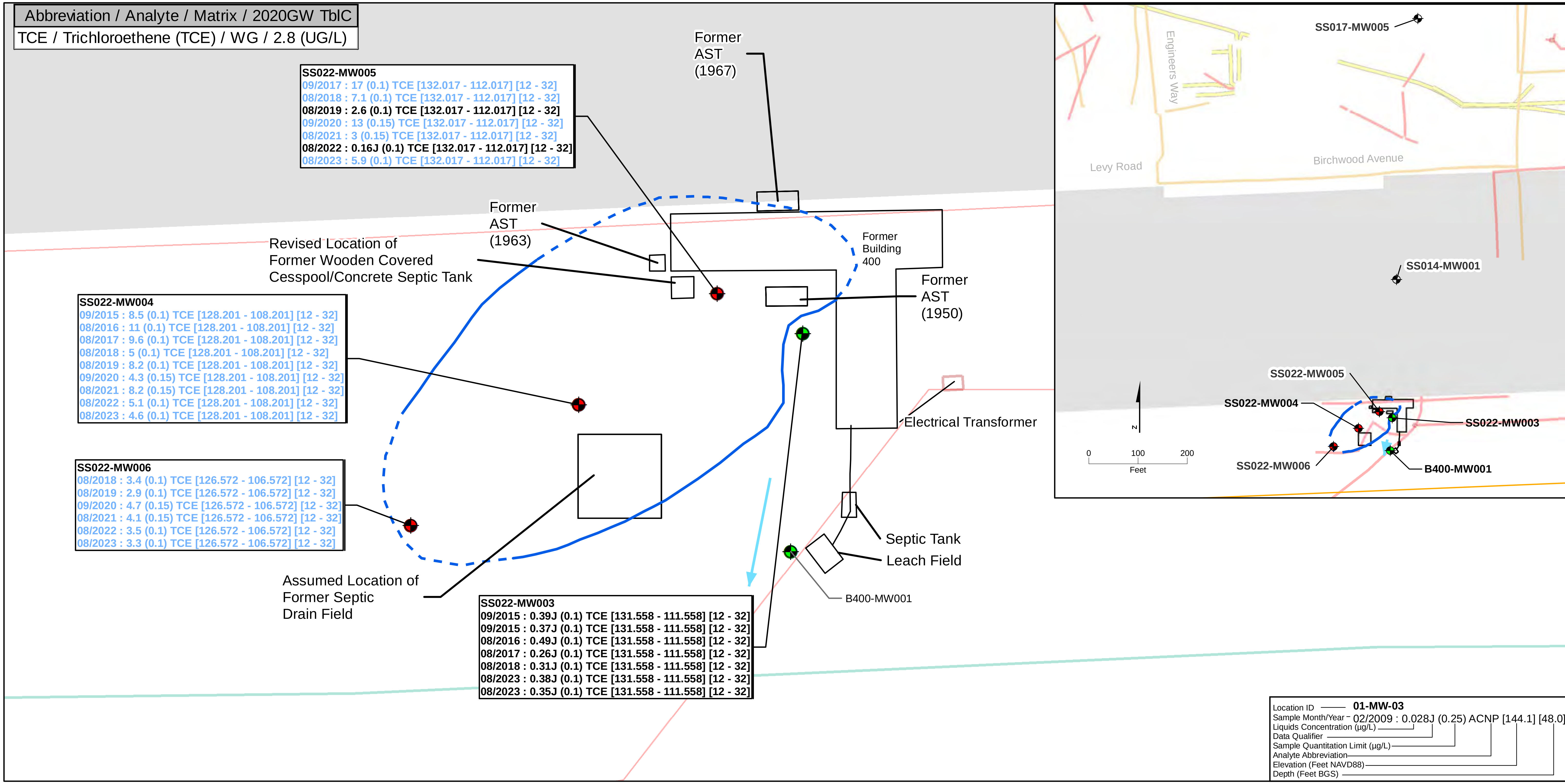


Legend

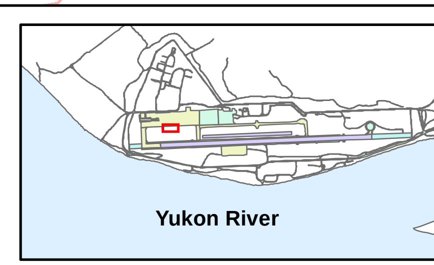
- Site Feature
- Approximate Groundwater Flow Direction (See Note 1)
- Storm Sewer Open Drainage Line
- Underground Airfield Cable

ADOT Runway Control Areas

- Approach (TERPS)
- OFA
- OFZ
- Safety Area
- Airfield Surface or Road

- 2015 - 2018 Sample Exceeds ADEC Table C Groundwater Clean Up Levels (CULs)
- 2015 - 2018 Sample Does Not Exceed ADEC Table C Groundwater Clean Up Levels (CULs)
- Existing Well for Monitoring Well Network

- Maximum Extent of TCE in Groundwater Greater than 2018 ADEC Groundwater CULs (Dashed Where Inferred)



0 15 30
Feet
N

Notes:

1. The groundwater flow direction shown is the predominant direction that persists from late August through breakup of the Yukon River (approximately May 15). Groundwater flow directions during the remainder of the year are variable depending on the timing of fluctuations in Yukon River stage.
2. Only exceedances and detects shown and non-detects excluded.
3. Screening levels are presented in units of ug/L for groundwater samples..
4. **Purple Label** = Sample Exceeds Screening Level (Greater than 100X analyte SL)
5. **Scarlet Label** = Sample Exceeds Screening Level (Greater than 10X analyte SL)
6. **Blue Label** = Sample Exceeds Screening Level (1 to 10X analyte SL)
7. **Black Label** = Sample Does Not Exceed Screening Level
8. SL = Screening Level

FIGURE 9-1

Site SS022 Groundwater Performance Monitoring Results

Analytes: TCE
SLs: 2020 ADEC Table C Groundwater CULs
Data Range: 2015 - 2023

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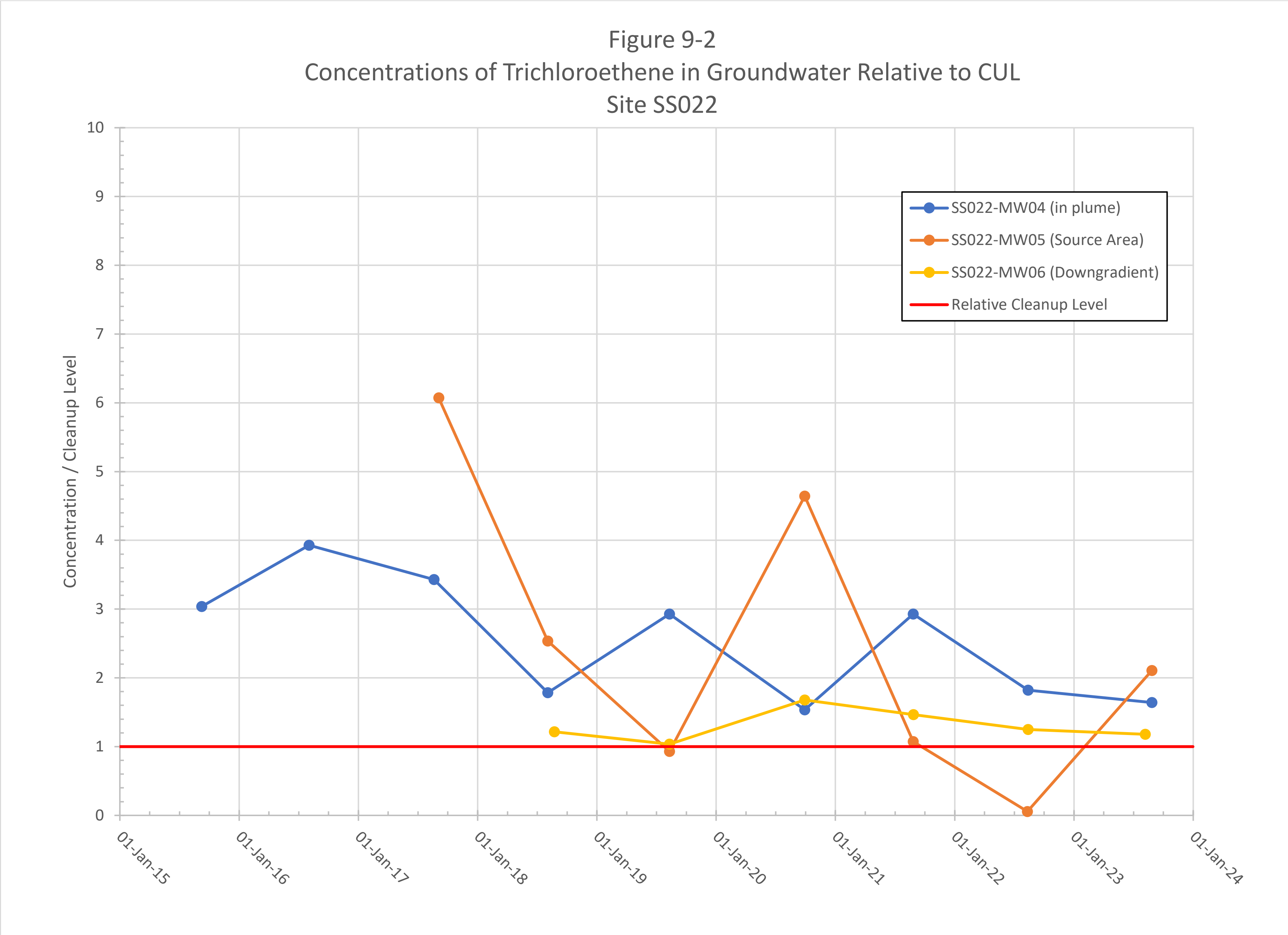


Figure 9-2
Concentrations of Trichloroethene in Groundwater Relative to CUL
Site SS022
Concentration / Cleanup Level
0
1
2
3
4
5
6
7
8
9
10
01-Jan-15
01-Jan-16
01-Jan-17
01-Jan-18
01-Jan-19
01-Jan-20
01-Jan-21
01-Jan-22
01-Jan-23
01-Jan-24
SS022-MW04 (in plume)
SS022-MW05 (Source Area)
SS022-MW06 (Downgradient)
Relative Cleanup Level

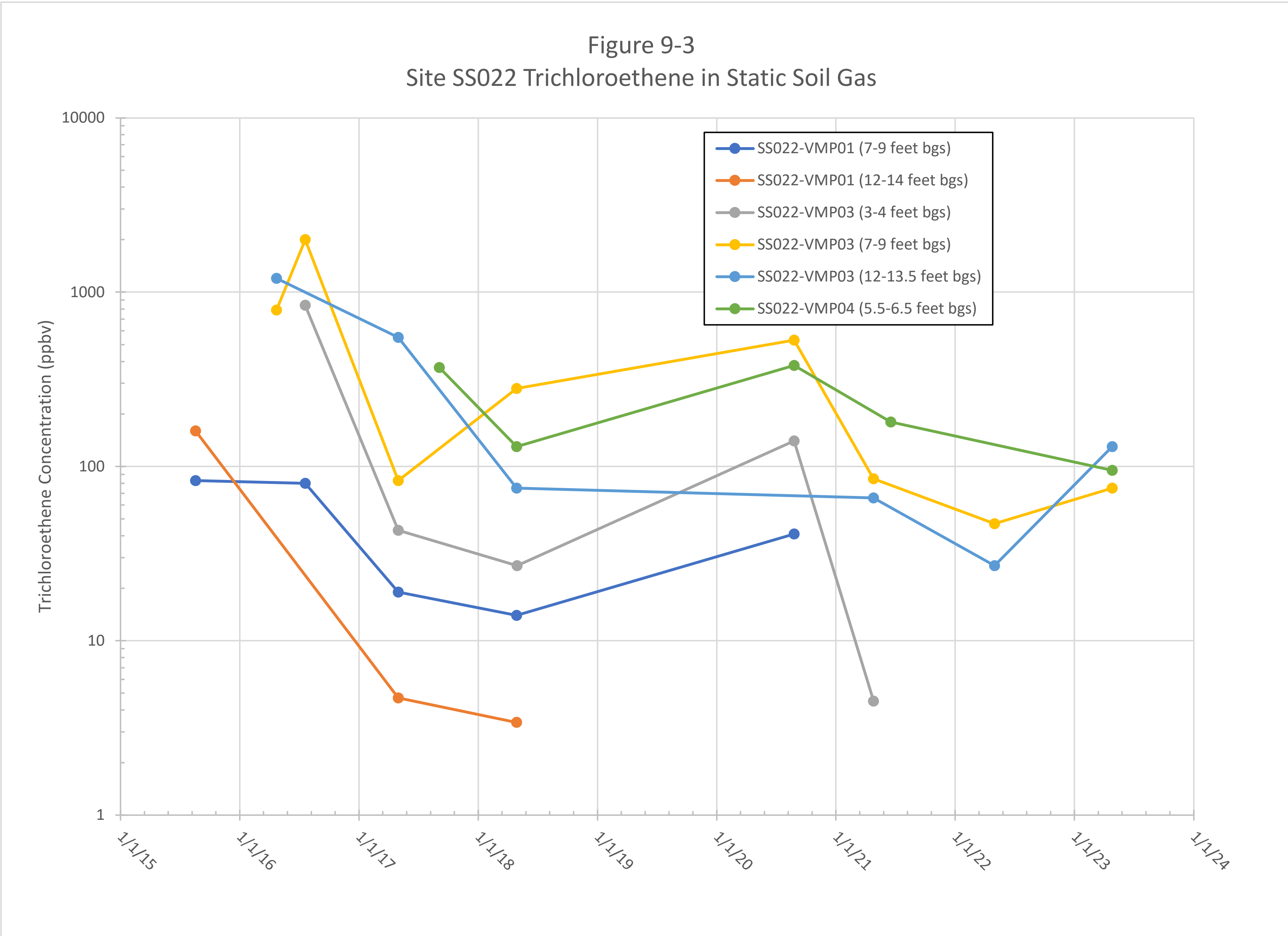


Figure 9-3
Site SS022 Trichloroethene in Static Soil Gas
Trichloroethene Concentration (ppbv)
10000
1000
100
10
1
1/1/15
1/1/16
1/1/17
1/1/18
1/1/19
1/1/20
1/1/21
1/1/22
1/1/23
1/1/24
SS022-VMP01 (7-9 feet bgs)
SS022-VMP01 (12-14 feet bgs)
SS022-VMP03 (3-4 feet bgs)
SS022-VMP03 (7-9 feet bgs)
SS022-VMP03 (12-13.5 feet bgs)
SS022-VMP04 (5.5-6.5 feet bgs)

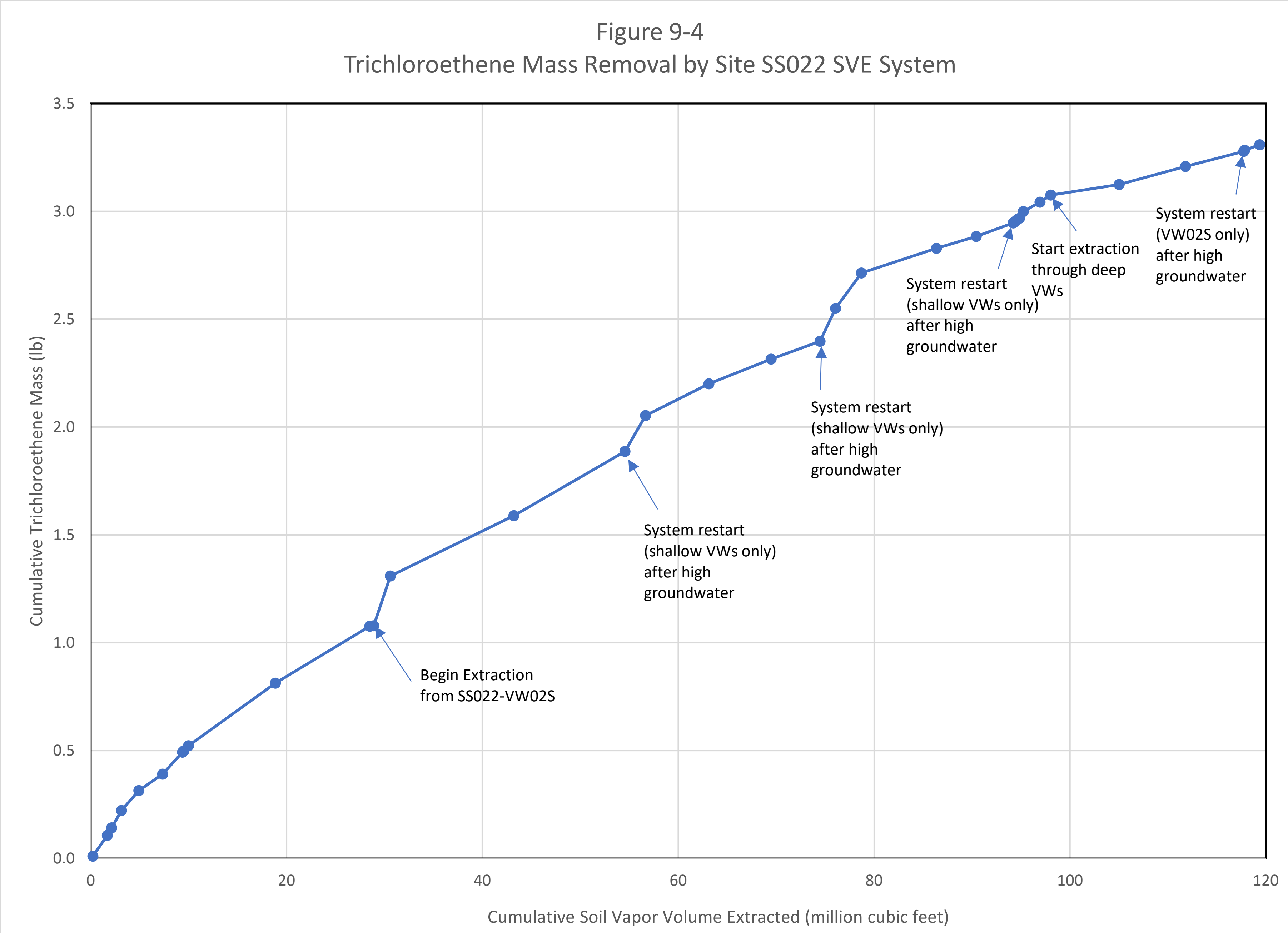
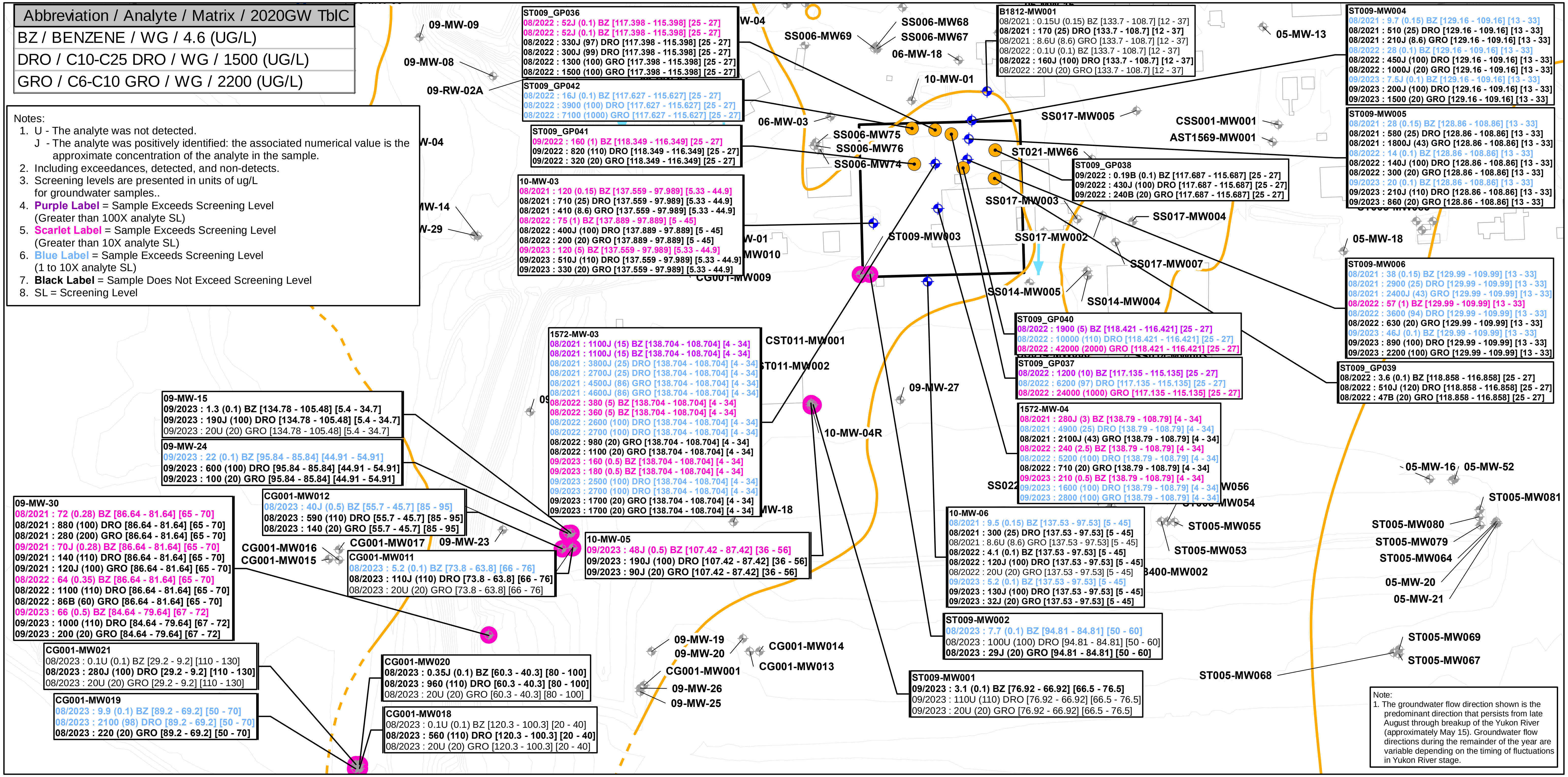


Figure 9-4
Trichloroethene Mass Removal by Site SS022 SVE System
Cumulative Trichloroethene Mass (lb)
Cumulative Soil Vapor Volume Extracted (million cubic feet)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
0
20
40
60
80
100
120
Begin Extraction from SS022-VW02S
System restart (shallow VWs only) after high groundwater
System restart (shallow VWs only) after high groundwater
System restart (shallow VWs only) after high groundwater
Start extraction through deep VWs
System restart (VW02S only) after high groundwater



Legend

ST009

Approximate Groundwater Flow Direction

Maximum Benzene Contours (µg/L) 2007 - 2013

5

5 (dashed where inferred)

Existing Monitoring Well

Performance Monitoring Well

Downgradient Plume Monitoring Sampling Program (Sampled every 5 years; 09-MW-30 Sampled Annually under Site CG001)

Groundwater Grab Sample Location

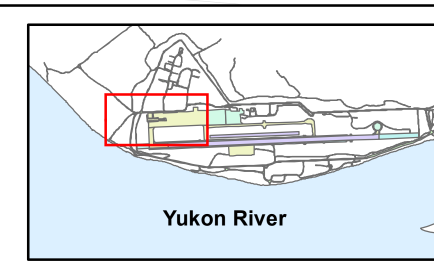


FIGURE 10-1

Site ST009 Groundwater Performance Monitoring Results

Analytes: COCs
SL: 2020 ADEC Table C
Data Range: 2021 - 2023

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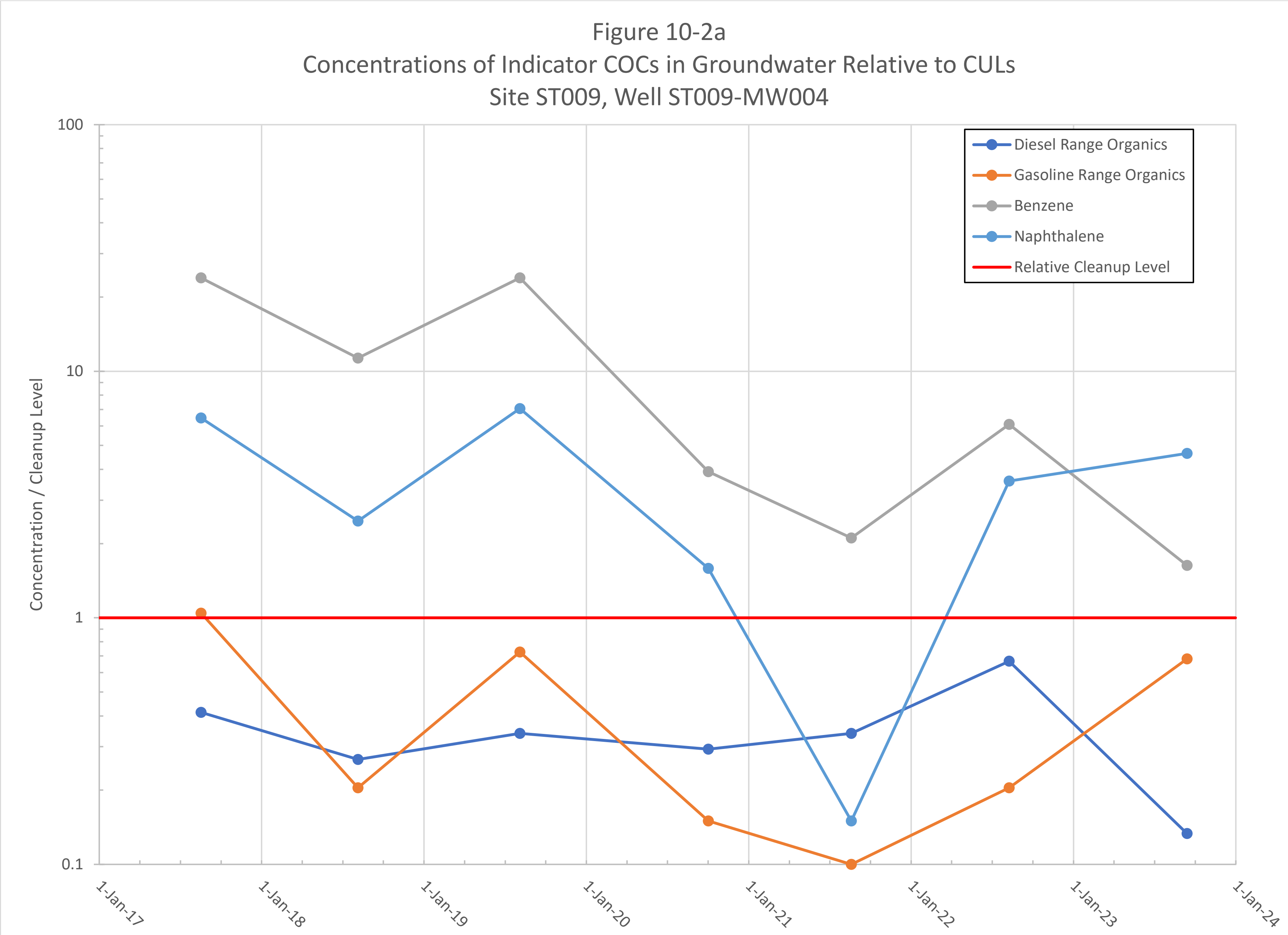


Figure 10-2a
Concentrations of Indicator COCs in Groundwater Relative to CULs
Site ST009, Well ST009-MW004
Concentration / Cleanup Level
100
10
1
0.1
1-Jan-17
1-Jan-18
1-Jan-19
1-Jan-20
1-Jan-21
1-Jan-22
1-Jan-23
1-Jan-24
Diesel Range Organics
Gasoline Range Organics
Benzene
Naphthalene
Relative Cleanup Level

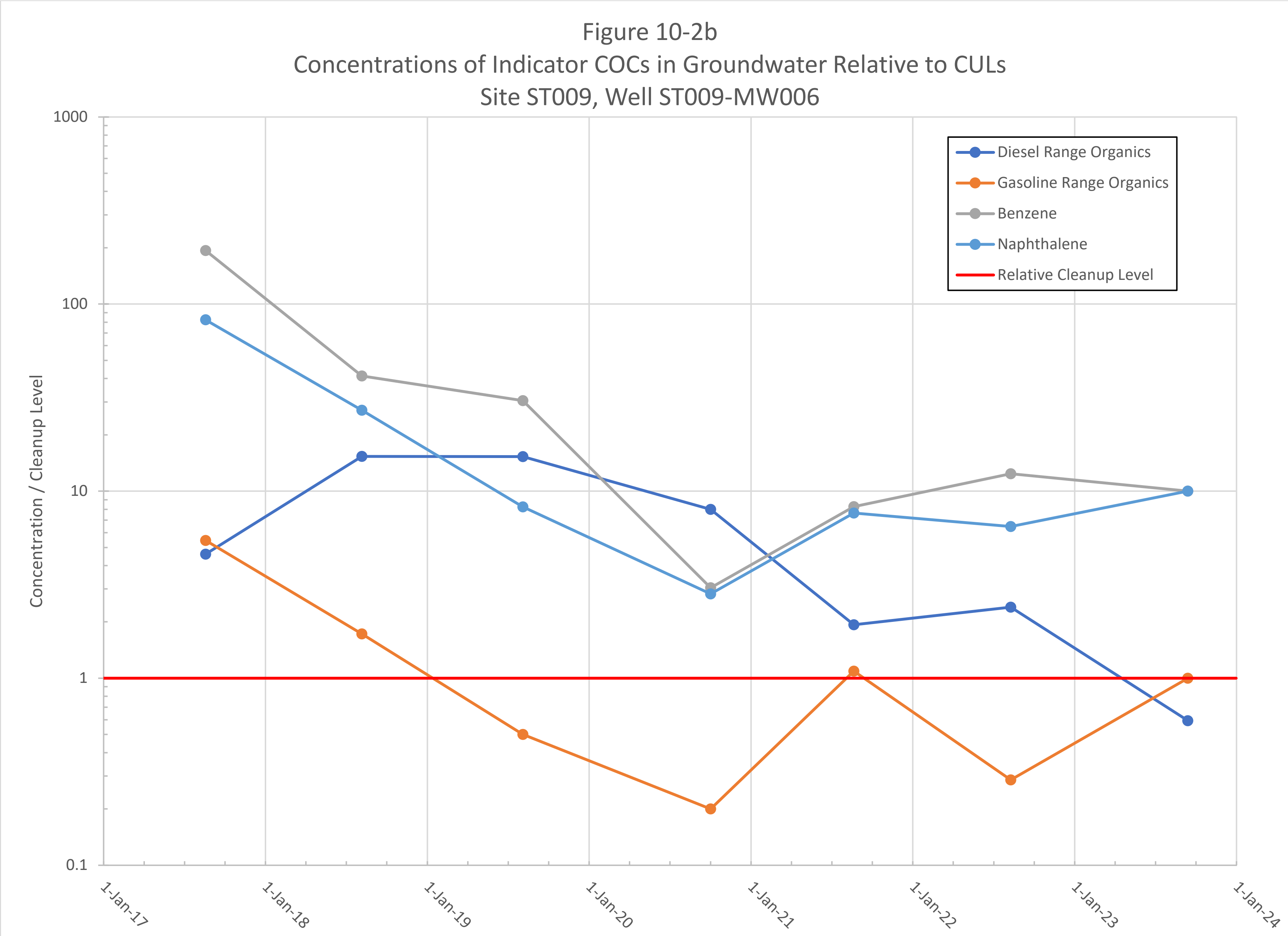


Figure 10-2b
Concentrations of Indicator COCs in Groundwater Relative to CULs
Site ST009, Well ST009-MW006
1000
100
10
1
0.1
Concentration / Cleanup Level
1-Jan-17
1-Jan-18
1-Jan-19
1-Jan-20
1-Jan-21
1-Jan-22
1-Jan-23
1-Jan-24
Diesel Range Organics
Gasoline Range Organics
Benzene
Naphthalene
Relative Cleanup Level

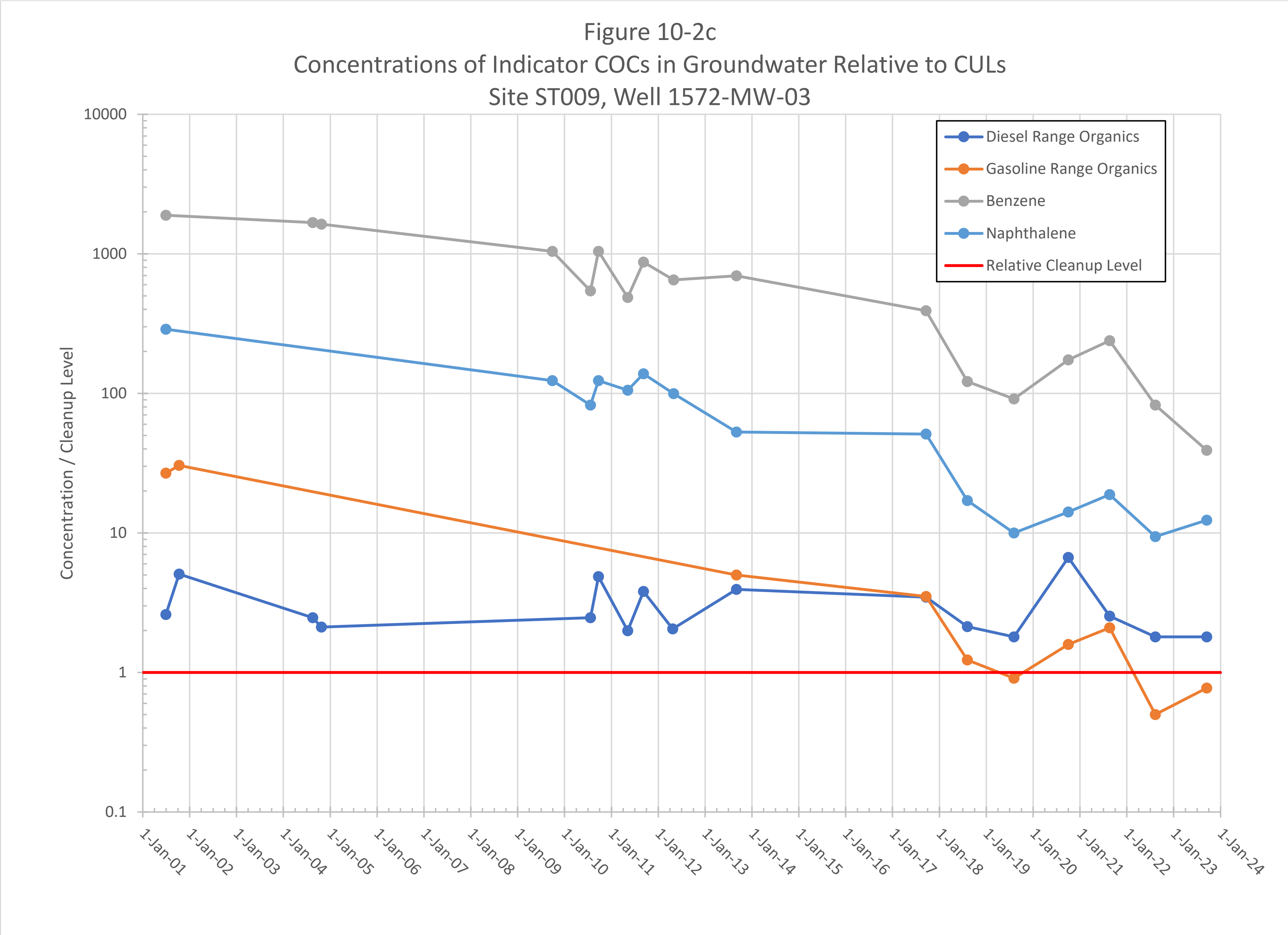


Figure 10-2c
Concentrations of Indicator COCs in Groundwater Relative to CULs
Site ST009, Well 1572-MW-03
Concentration / Cleanup Level
10000
1000
100
10
1
0.1
1-Jan-01
1-Jan-02
1-Jan-03
1-Jan-04
1-Jan-05
1-Jan-06
1-Jan-07
1-Jan-08
1-Jan-09
1-Jan-10
1-Jan-11
1-Jan-12
1-Jan-13
1-Jan-14
1-Jan-15
1-Jan-16
1-Jan-17
1-Jan-18
1-Jan-19
1-Jan-20
1-Jan-21
1-Jan-22
1-Jan-23
1-Jan-24
Diesel Range Organics
Gasoline Range Organics
Benzene
Naphthalene
Relative Cleanup Level

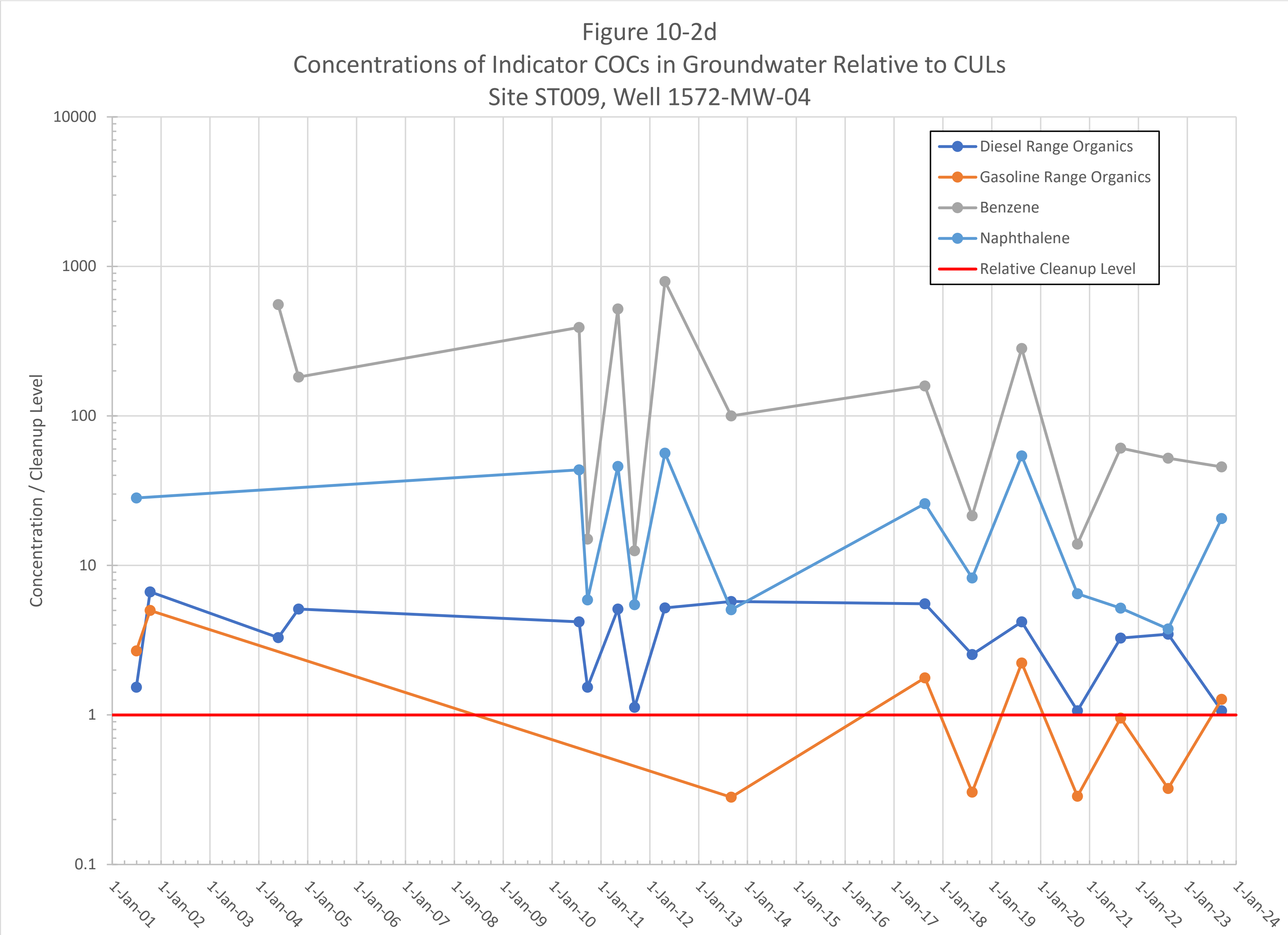


Figure 10-2d
Concentrations of Indicator COCs in Groundwater Relative to CULs
Site ST009, Well 1572-MW-04
Concentration / Cleanup Level
10000
1000
100
10
1
0.1
Diesel Range Organics
Gasoline Range Organics
Benzene
Naphthalene
Relative Cleanup Level
1-Jan-01
1-Jan-02
1-Jan-03
1-Jan-04
1-Jan-05
1-Jan-06
1-Jan-07
1-Jan-08
1-Jan-09
1-Jan-10
1-Jan-11
1-Jan-12
1-Jan-13
1-Jan-14
1-Jan-15
1-Jan-16
1-Jan-17
1-Jan-18
1-Jan-19
1-Jan-20
1-Jan-21
1-Jan-22
1-Jan-23
1-Jan-24

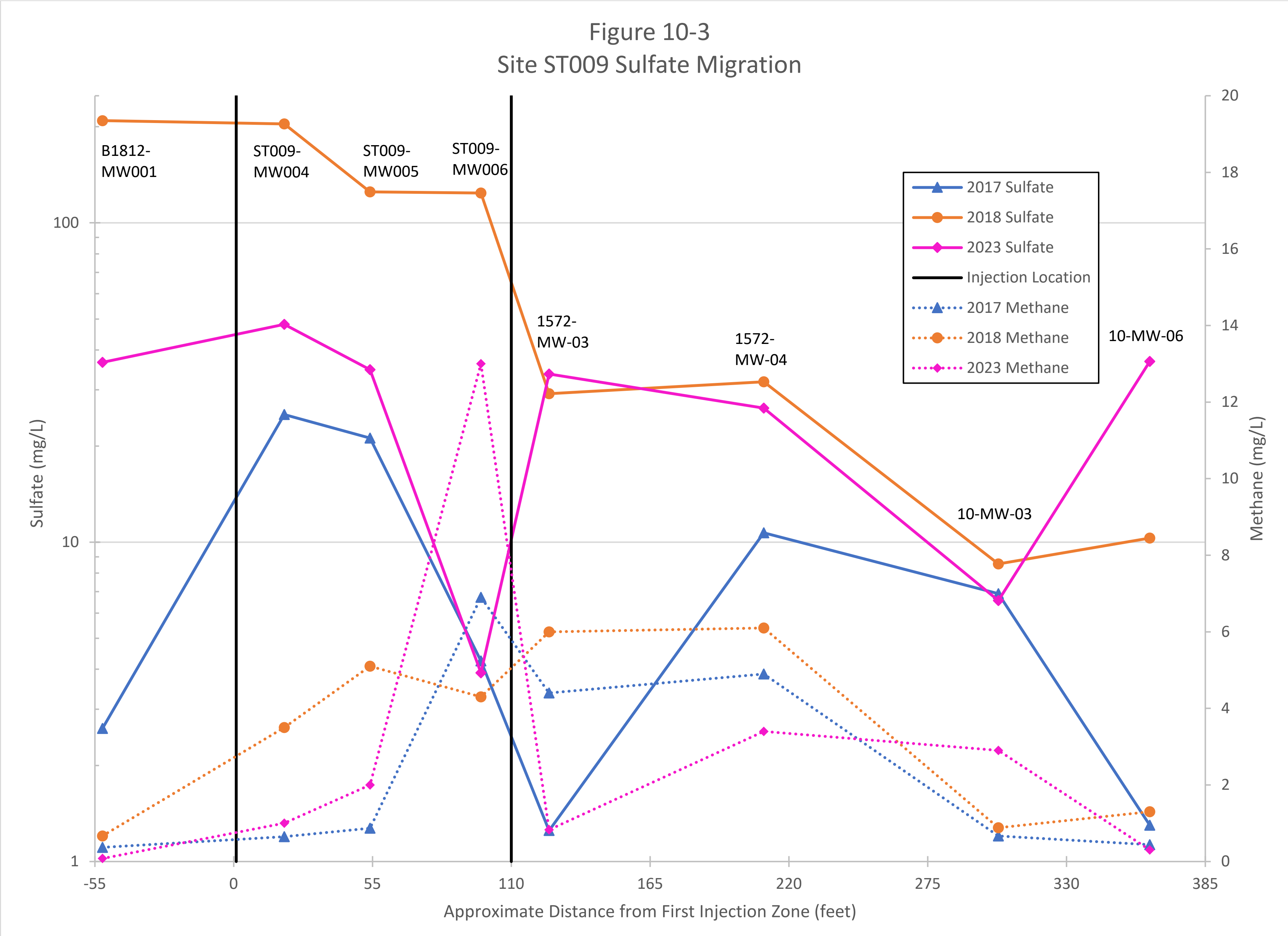
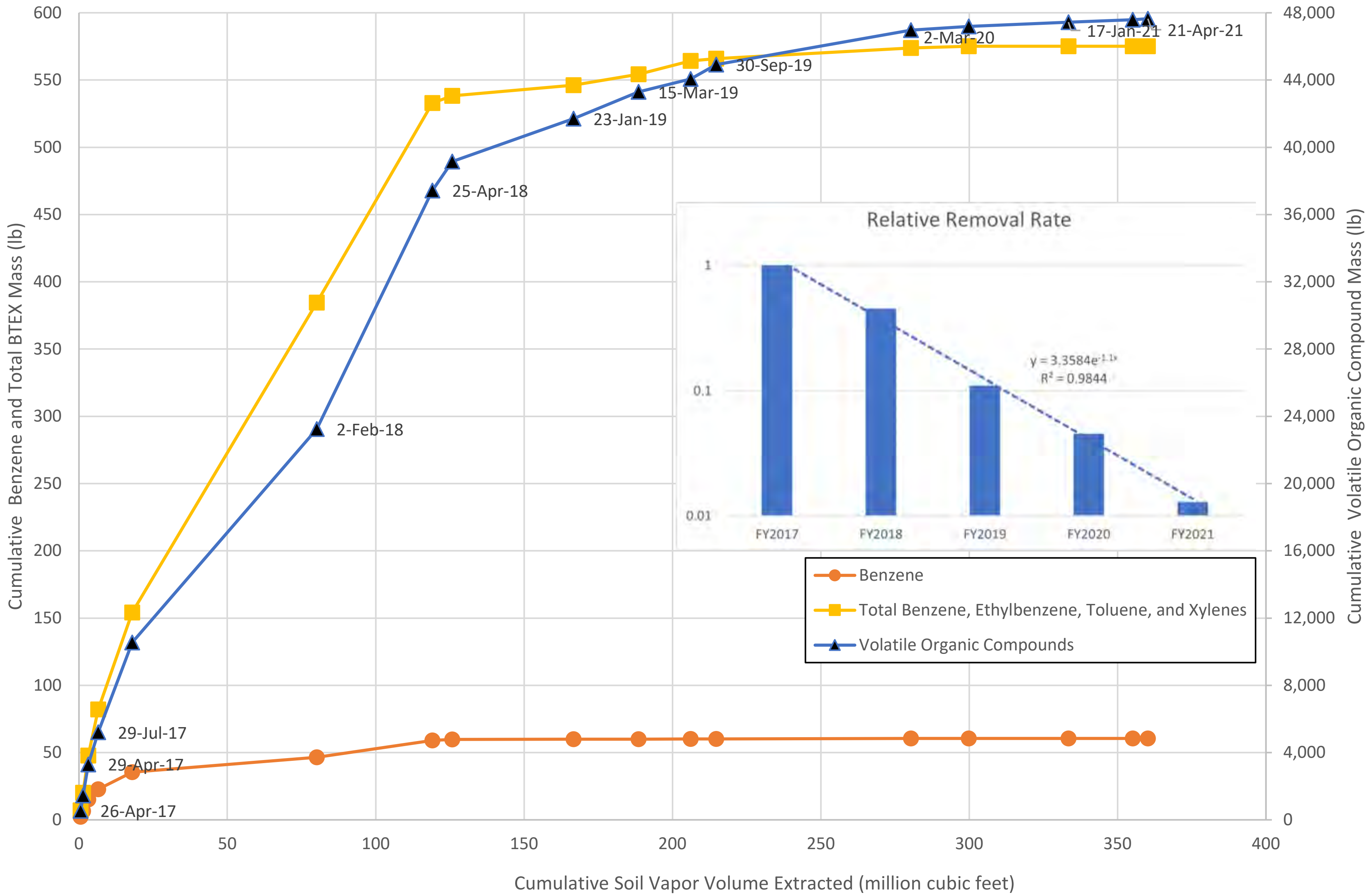
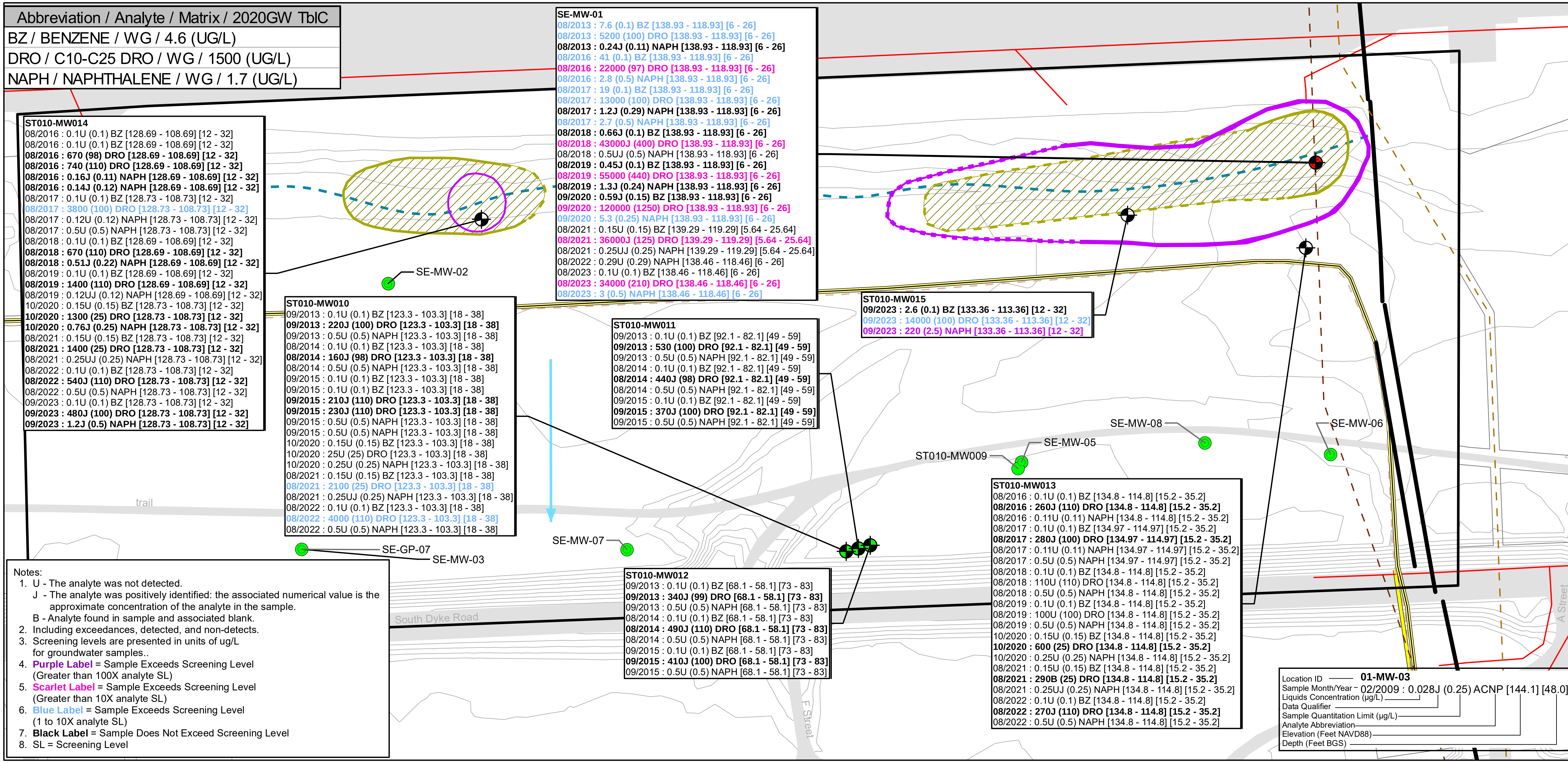


Figure 10-3
Site ST009 Sulfate Migration
B1812-
MW001
ST009-
MW004
ST009-
MW005
ST009-
MW006
1572-
MW-03
1572-
MW-04
10-MW-03
10-MW-06
2017 Sulfate
2018 Sulfate
2023 Sulfate
Injection Location
2017 Methane
2018 Methane
2023 Methane
Sulfate (mg/L)
Methane (mg/L)
100
10
1
20
18
16
14
12
10
8
6
4
2
0
-55
0
55
110
165
220
275
330
385
Approximate Distance from First Injection Zone (feet)

Figure 10-4
Mass Removal by Site ST009 SVE System



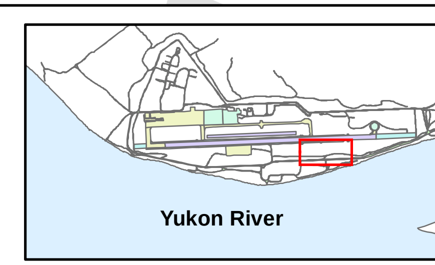


Legend

- Open Drainage Ditch
- Approximate Groundwater Flow Direction
- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)
- OAP Pipeline
- Abandoned Fuel Line
- Main Fuel Line
- Electrical Line
- Airfield Surface or Road

Underground Utility Locates - 2010
- Electrical
- Fuel/Gas
- 2010-2014 Well Sample Exceeds Table C CULs
- 2010-2014 Well Sample Does Not Exceed Table C CULs
- Previous Well Sample Exceeds Table C CULs
- Previous Well Sample Does Not Exceed Table C CULs

- Estimated Extent of Constituents in Groundwater with Concentrations Greater than ADEC Groundwater Table C CUL (Dash Where Inferred)
- Existing MNA Monitoring Well
- Estimated Extent of Constituents in Soil with Concentrations Greater than Remediation Target Concentrations within the target treatment interval (Dashed Where Inferred)



Notes:
1. The groundwater flow direction shown is the predominant direction that persists from late August through breakup of the Yukon River (approximately May 15). Groundwater flow directions during the remainder of the year are variable depending on the timing of fluctuations in Yukon River stage.
2. 2010 utilities shown are underground only.
3. CULs are presented in units of µg/L for WG (groundwater) samples.
4. Maximum DRO and Benzene concentrations are posted at locations with ADEC Table C Groundwater CUL Exceedances only

0 50 100
Feet

N

FIGURE 11-1

Site ST010 Groundwater Performance Monitoring Results

Analytes: Benzene, DRO, and Naphthalene
SL: 2020 ADEC Table C
Data Range: 2013 - 2023

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[redacted]

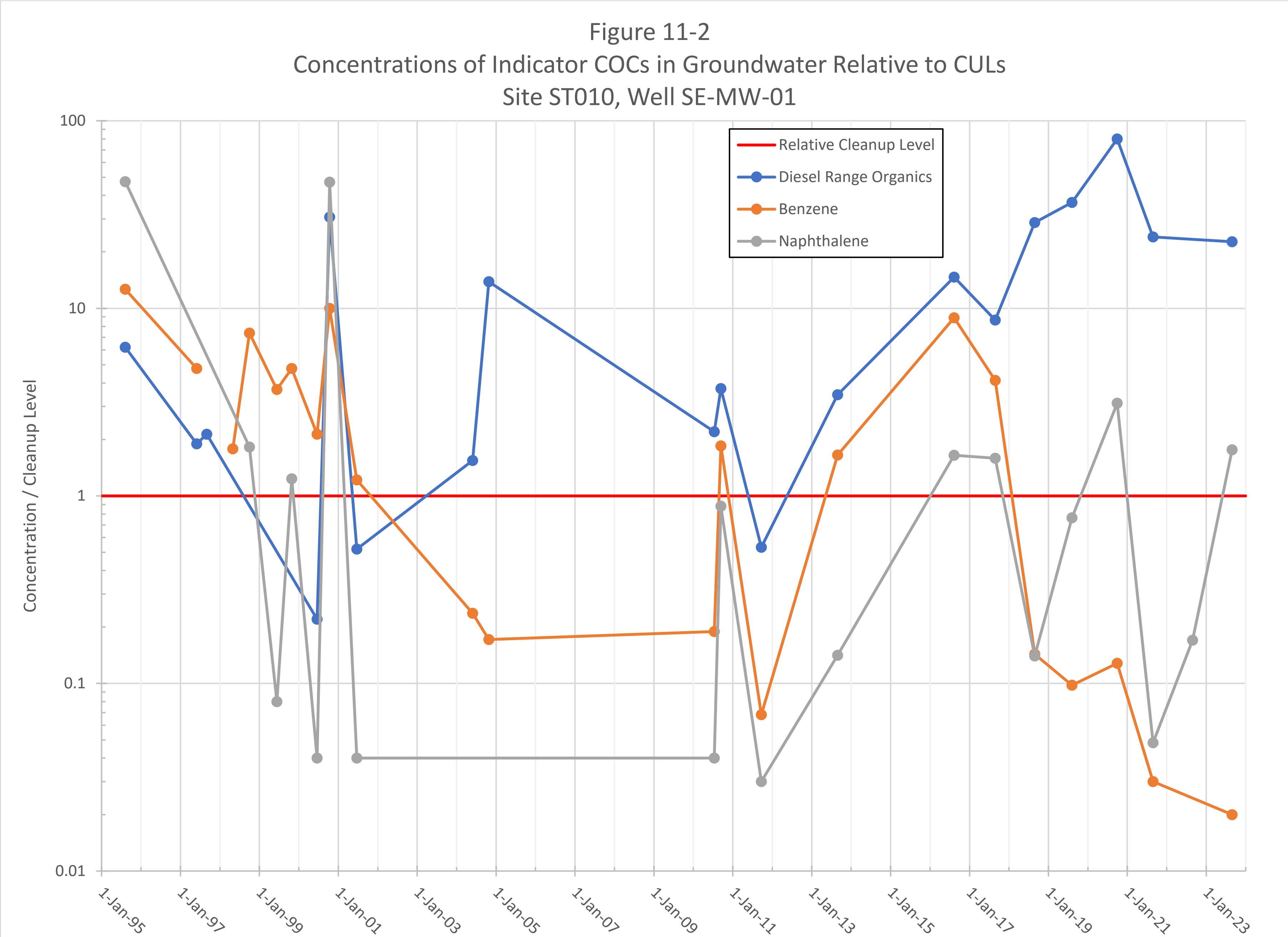
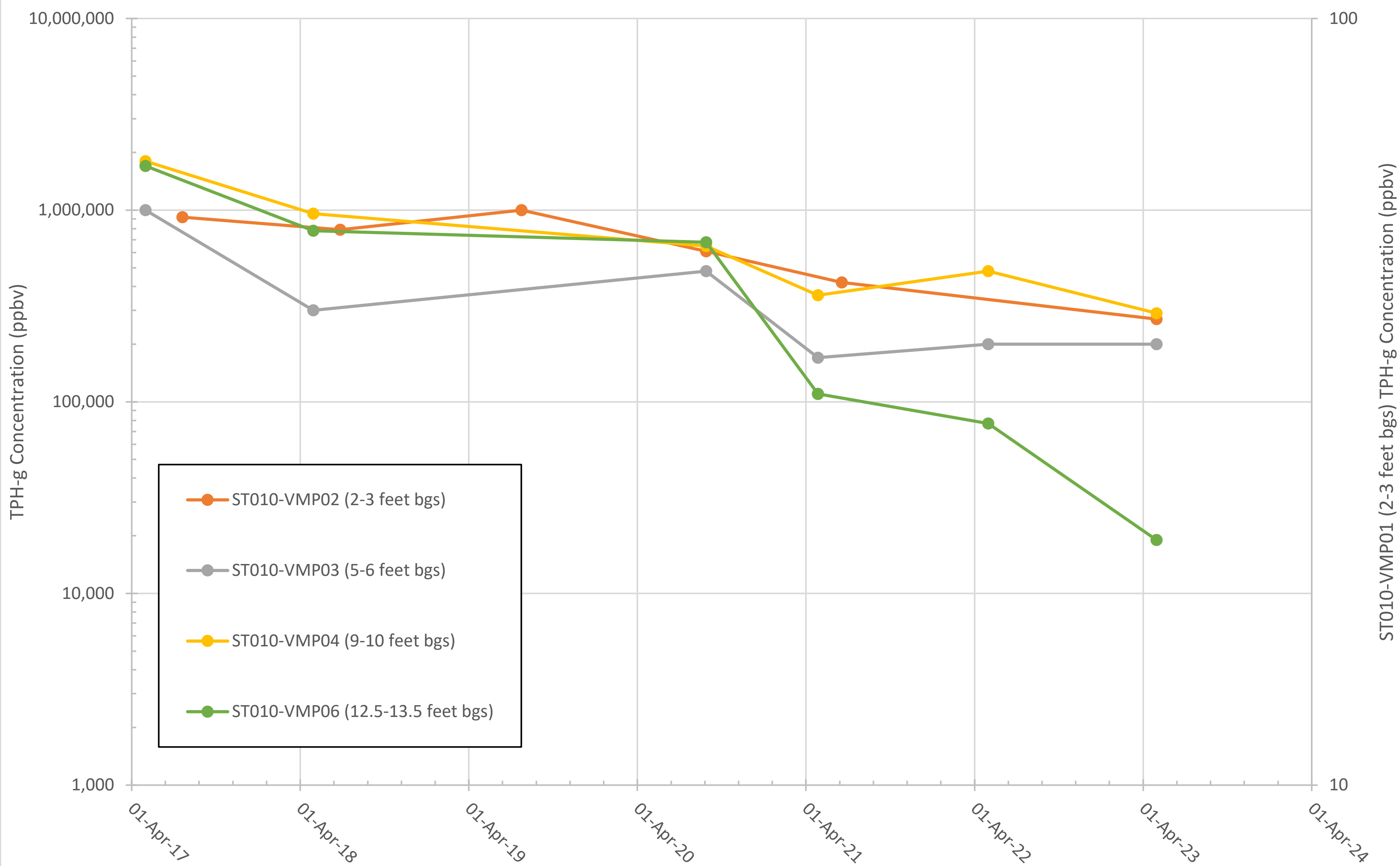


Figure 11-2
Concentrations of Indicator COCs in Groundwater Relative to CULs
Site ST010, Well SE-MW-01
Concentration / Cleanup Level
100
10
1
0.1
0.01
Relative Cleanup Level
Diesel Range Organics
Benzene
Naphthalene
1-Jan-95
1-Jan-97
1-Jan-99
1-Jan-01
1-Jan-03
1-Jan-05
1-Jan-07
1-Jan-09
1-Jan-11
1-Jan-13
1-Jan-15
1-Jan-17
1-Jan-19
1-Jan-21
1-Jan-23

Figure 11-3a
Site ST010 TPH-g in Static Soil Gas



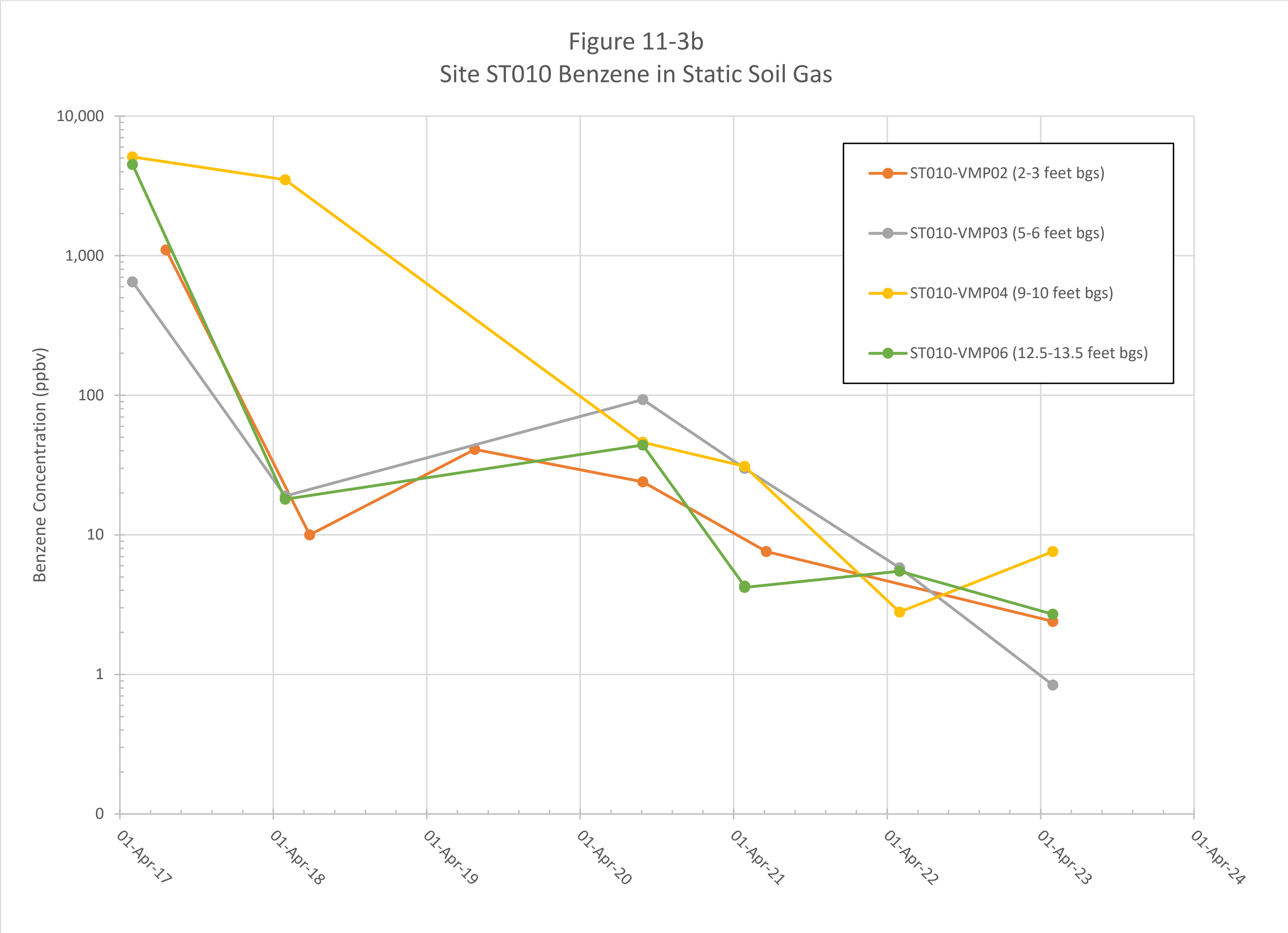
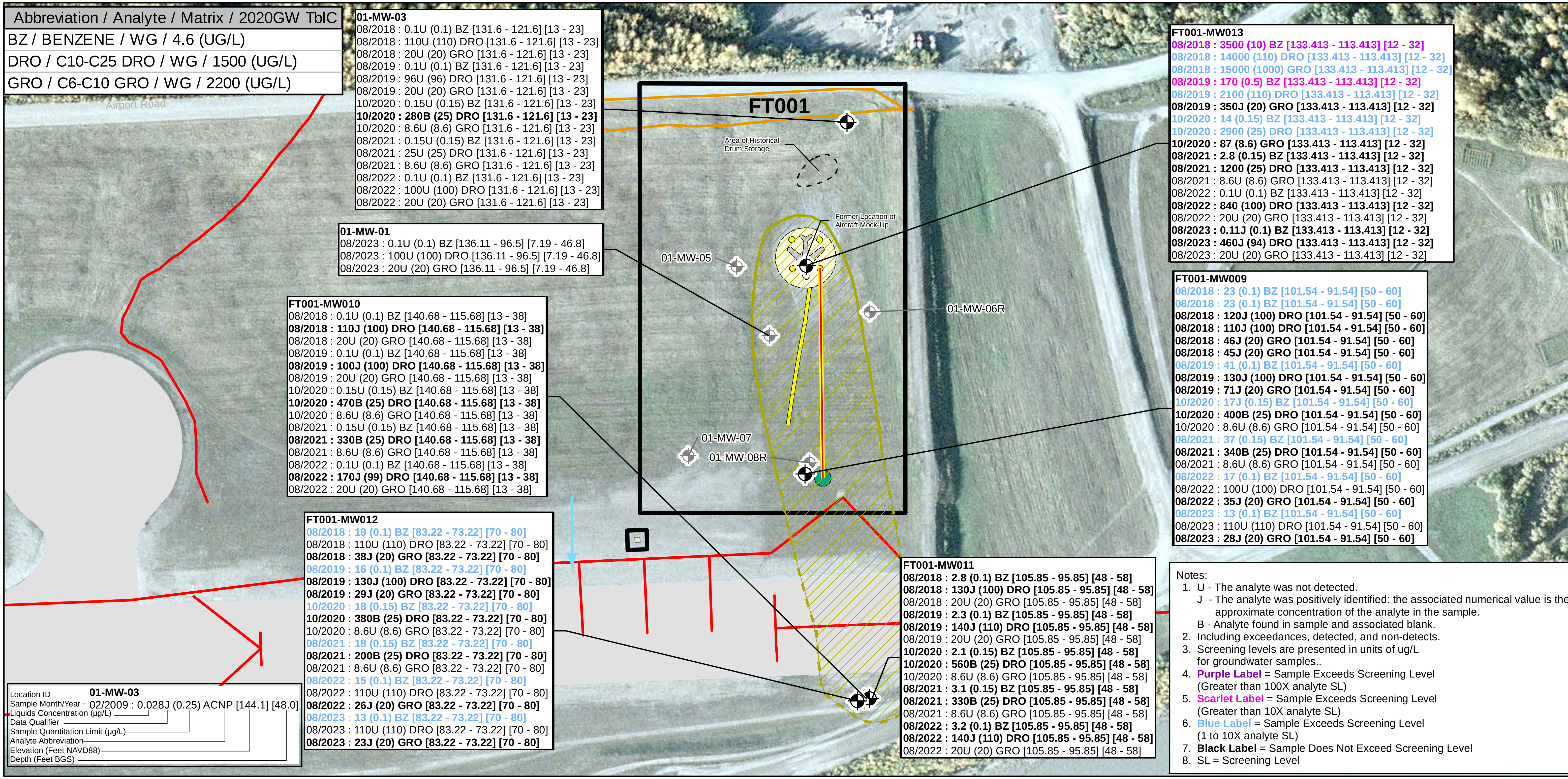


Figure 11-3b
Site ST010 Benzene in Static Soil Gas
Benzene Concentration (ppbv)
10,000
1,000
100
10
1
0
01-Apr-17
01-Apr-18
01-Apr-19
01-Apr-20
01-Apr-21
01-Apr-22
01-Apr-23
01-Apr-24
ST010-VMP02 (2-3 feet bgs)
ST010-VMP03 (5-6 feet bgs)
ST010-VMP04 (9-10 feet bgs)
ST010-VMP06 (12.5-13.5 feet bgs)



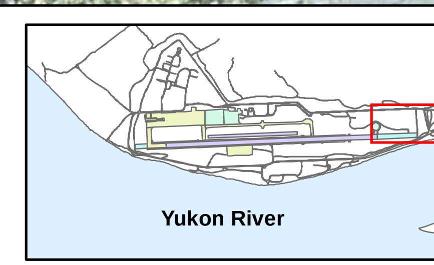
Legend

- FT001
- Approximate Location of Former Feature
- Fire Training Circle
- Former Fuel Sprayer
- Airfield Surface or Road
- Formerly Assumed Location of Aboveground Fillstand
- Formerly Assumed Location of Underground Fuel Transfer Pipe
- Underground Electrical Line
- Approximate Groundwater Flow Direction

Utility Locates - 2010

- Communications Line
- Fuel/Gas Line

- Existing well in Performance Monitoring Network
- Existing well not in Performance Monitoring Network
- Estimated Extent of Constituents in Groundwater with Concentrations Greater than ADEC Groundwater 2018 CULs (dashed where inferred)



0 75 150
Feet

FIGURE 12-1

Site FT001
Groundwater Performance Monitoring Results

Analytes: COCs
SL: 2020 ADEC Table C
Data Range: 2018 - 2023

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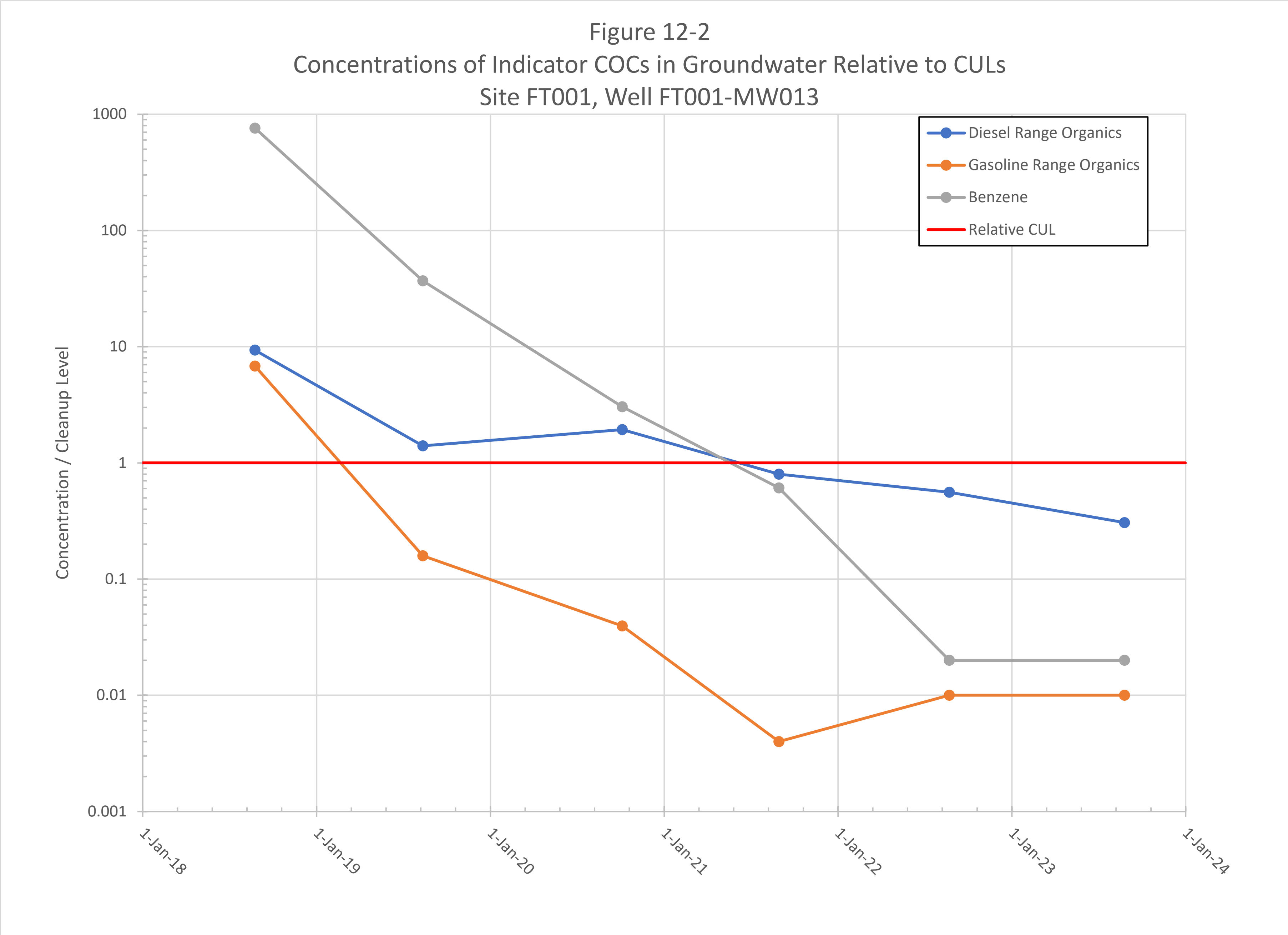
Figure 12-2
Concentrations of Indicator COCs in Groundwater Relative to CULs
Site FT001, Well FT001-MW013
Concentration / Cleanup Level
1000
100
10
1
0.1
0.01
0.001
1-Jan-18
1-Jan-19
1-Jan-20
1-Jan-21
1-Jan-22
1-Jan-23
1-Jan-24
Diesel Range Organics
Gasoline Range Organics
Benzene
Relative CUL

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Tables

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Table 2-1
Groundwater Monitoring - Site CPL006 Area 3

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	DRO		Benzene		Naphthalene	
				Concentration (µg/L)	Concentration Relative to CUL [a/] 1,500 µg/L	Concentration (µg/L)	Concentration Relative to CUL [a/] 4.6 µg/L	Concentration (µg/L)	Concentration Relative to CUL [a/] 1.7 µg/L
CPL006-MW001 Source Area (19 to 39)	18-Sep-16	N	16.49	**13,000**	8.67	**310**	67.4	**550**	324
	5-Sep-17	N	20.54	**8,700**	5.80	**160**	34.8	**320**	188
	5-Sep-17	FD		**8,800**	5.87	**160**	34.8	**330**	194
	2-Aug-18	N	18.91	**13,000**	8.67	**100**	21.7	**310**	182
	12-Aug-19	N	20.19	**17,000**	11.3	**71**	15.4	**210**	124
	4-Oct-20	N	18.42 [b/]	**24,000**	16.0	**55**	12.0	**190**	112
	22-Aug-21	N	18.77	**20,000 J**	13.3	**61**	13.3	**150 J**	88
	21-Aug-22	N	16.4 [c/]	**36,000**	24.0	**74**	16.1	**170**	100
	13-Sep-23	N	15.77	**28,000**	18.7	**60**	13.0	**88**	88

Notes:

[a/] Concentration Relative to CUL = Concentration/Table C CUL for groundwater

[b/] Sorbent sock was placed in well on 18 August 2020 and was removed on 4 October 2020.

[c/] Sorbent sock was placed in well on 27 April 2022 and was removed on 21 August 2022.

Bold indicates the analyte was detected

Bold and shaded indicates the concentration exceeds the CUL

µg/L = micrograms per liter
bgs = below ground surface
btoc = below top of casing
CUL = Table C cleanup level for groundwater (ADEC, November 2020)
DRO = diesel-range organics
FD = field duplicate sample
J = estimated value
N = normal sample

Table 2-2
Static Soil Gas - Site CPL006 Area 3

Vapor Monitoring Point	Depth Interval (feet bgs)	Date	Sample Type	Concentration (ppbv)	
				TPH-g	**Benzene**
CPL006-VMP02	3.5-4.5	04-May-18	N	16,000,000	40,000 J
		25-Jul-19	N	38,000,000	99,000 J
		24-Aug-20	N	28,000,000	110,000 J
		17-Jun-21	N	18,000,000	51,000
		03-May-22	N	12,000,000	32,000
		01-May-23	N	9,800,000	42,000
	14.5-16.5	23-Apr-17	N	1,200,000	6,900
		04-May-18	N	10,000	47
		02-May-19	N	650,000 R	140 R
		02-May-21	N	3,000	30
CPL006-VMP03	15.5-17.5	24-Apr-17	N	84,000	24
			FD	95,000	26
		04-May-18	N	2,400	0.95 U
			FD	2,700	0.92 U
		02-May-19	N	480,000 R	10 R
			FD	540,000 R	8.4 R
		02-May-21	N	290	0.28 U
CPL006-VMP04	6.5-7.5	02-May-19	N	1,100,000 R	280 R
		21-Aug-20	N	810,000	400
		02-May-21	N	180,000	3.9 U
		03-May-22	N	170,000	12 U
		01-May-23	N	92,000	14 U
	16-18	23-Apr-17	N	1,300,000	10,000
		04-May-18	N	640,000	50
		02-May-19	N	300,000 R	310 R
		02-May-21	N	140,000 J	1.1 J
		02-May-21	FD	140,000 J	7.5 U
		03-May-22	N	64,000	11 U
		01-May-23	N	43,000	9.4 U
CPL006-VMP07	16-18	23-Apr-17	N	1,100,000	1,200
		04-May-18	N	350,000	17
		02-May-19	N	1,400,000 R	13 R
		02-May-21	N	1,000,000	80 J
		03-May-22	N	940,000	18 J
		01-May-23	N	510,000	3.9 J
CPL006-VMP08	3-4	25-Apr-17	N	890,000	4,400
		04-May-18	N	260,000	28
		02-May-21	N	1,400	0.14 J
		03-May-22	N	2,200	19
		01-May-23	N	540	6

Notes:
bgs = below ground surface
FD = field duplicate sample
J = estimated value
N = normal sample
ppbv = parts per billion by volume
R = result is rejected and considered not usable because of apparent cross-contamination in the field.
TPH-g = total petroleum hydrocarbons - gasoline range
U = analyte not detected above reporting limit shown

Table 2-3
Biodegradation Rates - Site CPL006 Area 3

Vapor Monitoring Point	Depth Interval (feet bgs)	Date	Biodegradation Rate (mg-TPH/kg-soil day)
CPL006-VMP03 [a/]	15.5-17.5	06-May-17	0.27
		26-Apr-18	0.055
CPL006-VMP04	6.5-7.5	26-Apr-21	9.4
	16-18	06-May-17	1.7
		26-Apr-18	1.1
		26-Apr-19	3.2
		26-Apr-21	5.7
CPL006-VMP05 [a/]	15-17	06-May-17	0.23
		26-Apr-18	0.016
CPL006-VMP06	5.5-6.5	26-Apr-19	2.2
		26-Apr-21	0.58
		25-Apr-23	0.098

Notes:

[a/] Per recommendations in the 2018 Performance Monitoring Report, *in situ* respiration testing of this interval has been discontinued. These intervals are not within contaminated soil.

bgs = below ground surface
kg = kilogram
mg = milligram
TPH = total petroleum hydrocarbons
mg-TPH/kg-soil day = milligrams of TPH per kilogram of soil per day

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Table 2-4
LNAPL Monitoring - Site CPL006 Area 3

Monitoring Well (screened interval feet bgs)	Date	Depth to LNAPL (feet btoc)	Depth to Groundwater (feet btoc)	LNAPL Thickness (feet)
CPL006-MW001 (19-39)	18-Sep-16	--	16.49	0.00
	30-Apr-17	30.90	32.55	1.65
	19-Jul-17	--	20.09	0.00
	5-Sep-17	--	20.54	0.00
	1-May-18	32.60	34.18	1.58
	2-Aug-18	--	18.91	sheen
	21-Apr-19	28.36	28.67	0.31
	4-May-19	-- [a/]	27.36	0.00
	12-Aug-19	NM	20.19	NM
	5-May-20	--	26.50	0.00
	16-Aug-20	14.76	14.77	0.01
	4-Oct-20	-- [b/]	18.42	slight sheen
	24-Apr-21	29.36	29.51	0.15
	22-Aug-21	--	18.77	0.00
	27-Apr-22	30.60	31.87	1.27
	21-Aug-22	16.37 [c/]	16.40	0.03
	28-Apr-23	27.6 [d/]	27.64	0.04
	13-Sep-23	--	15.77	slight sheen

Notes:

[a/] Sorbent sock was placed in well on 21 April 2019 and was removed on 29 April 2019.

[b/] Sorbent sock was placed in well on 18 August 2020 and was removed on 4 October 2020.

[c/] Sorbent sock was placed in well on 27 April 2022 and was removed on 21 August 2022.

[d/] Sorbent sock was placed in well on 28 April 2023 and was removed on 13 September 2023.

-- = no discernible LNAPL present
bgs = below ground surface
btoc = below top of casing
LNAPL = light non-aqueous phase liquid
NM = a measurement for LNAPL thickness was not collected

Table 3-1
Groundwater Monitoring - Site CSS002

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	DRO Concentration (µg/L)	DRO Concentration Relative to CUL [a/] 1500 µg/L	Benzene Concentration (µg/L)	Benzene Concentration Relative to CUL [a/] 4.6 µg/L	Naphthalene Concentration (µg/L)	Naphthalene Concentration Relative to CUL [a/] 1.7 µg/L
CSS002-MW002 Source Area (17 to 37)	17-Sep-16	N	13.58	**15,000**	10.0	**31**	6.74	**580**	341
	17-Sep-16	FD		**13,000**	8.67	**30**	6.52	**560**	329
	17-Aug-17	N	16.52	**23,000**	15.3	**18**	3.91	**260**	153
	8-Aug-18	N	16.74	**29,000**	19.3	**16**	3.48	**120**	70.6
	5-Aug-19	N	17.44	**32,000**	21.3	**4.6**	1.00	**34**	20.0
	4-Oct-20	N	15.52	**14,000**	9.33	**0.99 J**	0.22	**4.6**	2.71
	19-Aug-21	N	16.41	**5,500 J**	3.67	0.15 U	<0.03	0.25 U	<0.15
	27-Aug-22	N	13.56	**-**	-	-	-	0.32 U	<0.2
	14-Sep-23	N	12.90	**13,000**	8.67	**2.1**	0.46	**0.59 J**	0.35
CSS002-MW003 Downgradient Edge (17 to 37)	16-Sep-16	N	12.28	93 U	< 0.06	0.1 U	< 0.02	0.1 U	< 0.06
	15-Aug-17	N	15.31	**1,100**	0.73	**2.8**	0.61	0.5 UJ	< 0.29
	08-Aug-18	N	15.61	**840**	0.56	**2.2**	0.48	0.5 U	< 0.29
	06-Aug-19	N	17.22	**5,000**	3.33	**3.9**	0.85	0.5 U	< 0.29
	06-Aug-19	FD		**5,200**	3.47	**4.6**	1.00	0.5 U	< 0.29
	4-Oct-20	N	14.43	**690**	0.46	**0.89 J**	0.19	0.25 UJ	<0.15
	4-Oct-20	FD		**760**	0.51	**1.1**	0.24	**1.1 J**	0.65
	19-Aug-21	N	15.25	**3,700 J**	2.47	**3.7 J**	0.19	0.25 U	<0.15
	19-Aug-21	FD		**2,600 J**	1.73	0.15 UJ	<0.03	0.25 U	<0.15
	27-Aug-22	FD	12.45	**3,600**	2.40	**1.8**	0.39	0.5 U	< 0.29
	27-Aug-22	N		**3,900**	2.60	**1.9**	0.41	0.5 U	< 0.29
	14-Sep-23	FD	11.78	**7,100**	4.73	**5.5**	1.20	**0.91 J**	0.54
	14-Sep-23	N		**5,700**	3.80	**5.7**	1.24	**0.95 J**	0.56
B1812-MW001 Downgradient (12 to 37)	11-Sep-13	N	16.45	**110 B**	0.07	**0.1**	< 0.02	0.5 U	< 0.29
	21-Apr-14	N	--	**240 J**	0.16	**0.1**	< 0.02	0.5 U	< 0.29
	23-Aug-14	N	13.91	**280 J**	0.19	**3.7 J**	0.80	0.11 U	< 0.06
	23-Aug-14	FD		**220 J**	0.15	**2.4 J**	0.52	0.11 U	< 0.06
	2-Sep-15	N	15.02	100 U	< 0.07	**0.22 J**	0.05	0.5 U	< 0.29
	7-Aug-16	N	10.17	**120 J**	0.08	**33**	7.17	0.12 U	< 0.07
	7-Aug-16	FD		110 U	< 0.07	**33 J**	7.17	0.11 U	< 0.06
	15-Aug-17	N	16.07	**180 J**	0.12	**0.4 J**	0.09	0.5 U	< 0.29
	08-Aug-18	N	16.45	**290 J**	0.19	**1.1**	0.24	0.5 U	< 0.29
	09-Aug-19	N	17.55	**200 J**	0.13	**0.67 J**	0.15	0.5 U	< 0.29
	4-Oct-20	N	15.48	**690**	0.46	0.15 U	<0.03	0.25 U	<0.15
	18-Aug-21	N	16.08	**170**	0.11	0.15 U	<0.03	0.25 U	<0.15
	27-Aug-22	N	13.31	**160 J**	0.11	0.1 U	< 0.02	0.5 U	< 0.29

Notes:
[a/] Concentration Relative to CUL = Concentration/Table C CUL for groundwater
Bold indicates the analyte was detected
Bold and shaded indicates the concentration exceeds the CUL
-- = not available or not recorded
< = result is less than the value shown
µg/L = micrograms per liter
B = analyte detected in associated blank
bgs = below ground surface
btoc = below top of casing
CUL = Table C cleanup level for groundwater (ADEC, November 2020)
DRO = diesel range organics
FD = field duplicate sample
J = estimated value
N = normal sample
U = analyte not detected above reporting limit shown
UJ = analvte was not detected but the detection limit is estimated

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Table 3-2
Static Soil Gas - Site CSS002

Vapor Monitoring Point	Depth Interval (feet bgs)	Date	Sample Type	Concentration (ppbv)	
				TPH-g	Benzene
CSS002-VMP01	15-17	20-Apr-17	N	520,000	1,400
		01-May-18	N	510,000	18 U
		01-May-18	FD	470,000	19 U
		30-Apr-19	N	490,000 R	13 R
		28-Apr-21	N	15,000 J	3.7 U
		29-Apr-22	N	14,000	5.8 U
		30-Apr-23	N	9,100	3.1
	20-22	20-Apr-17	N	920,000	2,000
		01-May-18	N	430,000	0.49 J
		30-Apr-19	N	380,000 R	67 R
		28-Apr-21	N	10,000 J	5.3 U
		29-Apr-22	N	10,000	14 U
		30-Apr-23	N	11,000	0.48 J
CSS002-VMP02	8-9	20-Apr-17	N	200,000	48
		01-May-18	N	250,000	18 U
		30-Apr-19	N	73,000 R	2.2 R
		26-Aug-20	N	80,000	4.6 J
		28-Apr-21	N	9,100 J	0.73 J
		29-Apr-22	N	4,700	0.71 U
		30-Apr-23	N	1,000	0.72 U
CSS002-VMP03	7-8	20-Apr-17	N	15,000	1.2 U
		01-May-18	N	4,200	0.29 J
		30-Apr-19	N	310,000 R	63 R
		26-Aug-20	N	1,500	0.65 U
		28-Apr-21	N	170	0.29 U
CSS002-VMP04	13-15	20-Apr-17	N	210,000	340
		01-May-18	N	250,000	9.5 U
		30-Apr-19	N	850,000 R	330 R
		28-Apr-21	N	16,000 J	3.7 U
		29-Apr-22	N	9,200	14 U
		30-Apr-23	N	4,600	1.4 U

Notes:
bgs = below ground surface
FD = field duplicate sample
J = estimated value
N = normal sample
ppbv = parts per billion by volume
R = result is rejected and considered not usable because of apparent cross contamination in the field.
TPH-g = total petroleum hydrocarbons-gasoline range
U = analyte not detected above reporting limit shown

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Table 4-1
Groundwater Monitoring - Sites SS006/SS019

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Trichloroethene		1,1,2-Trichloroethane		cis-1,2-Dichloroethene		trans-1,2-Dichloroethene		Vinyl Chloride		Ethene	Ethane
				Concentration (µg/L)	Concentration Relative to CUL [a/] 2.8 µg/L	Concentration (µg/L)	Concentration Relative to CUL [a/] 0.41 µg/L	Concentration (µg/L)	Concentration Relative to CUL [a/] 36 µg/L	Concentration (µg/L)	Concentration Relative to CUL [a/] 360 µg/L	Concentration (µg/L)	Concentration Relative to CUL [a/] 0.19 µg/L	Concentration (µg/L)	Concentration (µg/L)
SS006-MW77 Upgradient Edge (15 to 40)	21-Aug-18	N	18.97	0.12 J	0.043	0.1 U	<0.24	97	2.69	2.4	0.01	0.40 J	2.11	0.30 U	0.64 U
	10-Aug-19	N	20.8	0.69 J	0.25	0.1 U	<0.24	200	5.56	3.7	0.01	0.2 U	<1.05	0.30 U	0.64 U
	06-Oct-20	N	18.54	0.37 J	0.13	0.2 U	<0.49	89	2.47	2.8	0.01	0.15 U	<0.79	0.47 U	0.51 U
	06-Sep-21	N	17.82	0.15 U	<0.05	0.2 U	<0.49	68	1.89	1.2	0.003	0.15 U	<0.79	0.47 UJ	0.51 UJ
	11-Aug-22	N	16.18	0.1 U	0.036	0.1 U	<0.24	60	1.67	0.95 J	0.003	0.11 U	<0.58	0.3 U	0.64 U
	08-Sep-23	N	16.65	0.1 J	0.036	0.1 U	<0.24	49	1.36	1.9	0.005	0.11 U	<0.58	0.3 U	0.64 U
SS006-MW78 Source Area (15 to 40)	25-Aug-18	N	17.62	3300	1179	0.1 UJ	<0.24	4100	114	430	1.194	1.0 J	5.26	0.30 U	0.64 U
	25-Aug-18	FD		3300	1179	0.1 UJ	<0.24	4200	117	440	1.222	1.0 J	5.26	0.30 U	0.64 U
	08-Aug-19	N	19.96	4100	1464	0.43 J	1.05	6500	181	150	0.42	0.43 J	2.26	0.30 U	0.64 U
	08-Aug-19	FD		4100	1464	0.36 J	0.88	6400	178	150	0.42	0.44 J	2.32	0.30 U	0.64 U
	06-Oct-20	N	17.53	4200	1500	0.2 U	<0.49	6700	186	120	0.33	0.15 U	<0.79	0.47 U	0.51 U
	06-Oct-20	FD		4300 J	1536	0.2 U	<0.49	6700 J	186	120 J	0.33	0.15 U	<0.79	--	--
	04-Sep-21	N	16.89	1700 J	607	0.2 U	<0.49	3100	86	190 J	0.53	0.15 U	<0.79	0.47 U	0.51 U
	04-Sep-21	FD		3900J	1393	0.2 U	<0.49	3700	103	230	0.33	0.15 U	<0.79	0.47 U	0.51 U
	11-Aug-22	FD	15.19	710	254	0.1 U	<0.24	1400	39	43	0.12	0.73 J	3.84	4	0.64 U
	11-Aug-22	N		670	239	0.1 U	<0.24	1300	36	42	0.12	0.69 J	3.63	4.1	0.64 U
	08-Sep-23	FD	15.54	1300	464	0.1 U	<0.24	3700	103	640	1.78	2.6	13.68	3	0.64 U
	08-Sep-23	N		1400	500	0.1 U	<0.24	3700	103	640	1.78	2.7	14.21	3	0.64 U
SS006-MW79 Source Area (40 to 50)	25-Aug-18	N	17.21	11 J	3.93	0.1 UJ	<0.24	510	14.2	290	0.81	0.56 J	2.95	0.30 U	0.64 U
	08-Aug-19	N	19.52	220	78.6	0.1 U	<0.24	1400	38.9	370	1.03	0.87	4.58	0.30 U	0.64 U
	06-Oct-20	N	17.12	2500 J	893	0.2 U	<0.49	6600 J	183.3	1100 J	3.06	1.4 J	7.37	0.47 U	0.51 U
	04-Sep-21	N	16.45	260	92.9	0.2 U	<0.49	1800	50.0	590	1.64	97	511	120	0.51 U
	12-Aug-22	N	14.81	310	111	0.1 U	<0.24	2200	61.1	590	1.64	150	789	100	0.64 U
	08-Sep-23	N	15.15	70	25	0.1 U	<0.24	1600	44.4	540	1.50	200	1053	52	0.69 J
SS006-MW66 Source Area (80 to 90) Sampled every 5 years	28-Oct-11	N	22.6	0.611 J	0.22	0.32 U	< 0.78	0.15 U	<0.004	0.15 U	<0.0005	0.4 U	<2.10	--	--
	27-Apr-12	N	28.75	0.16 U	<0.06	0.32 U	< 0.78	0.15 U	<0.004	0.15 U	<0.0005	0.4 U	<2.10	--	--
	11-Aug-18	N	17.78	1.2	0.43	0.1 U	<0.24	0.1 U	<0.003	0.1 U	<0.0005	0.2 U	<1.05	0.30 U	0.64 U
	09-Sep-23	N	14.22	2	0.71	0.1 U	<0.24	0.35 J	0.010	0.34 J	0.001	0.11 U	<0.58	180	3.3
SS006-MW80 Source Area (40 to 50)	26-Aug-18	N	15.77	30	10.7	0.1 U	<0.24	34	0.94	60	0.17	0.2 U	<1.05	0.30 U	0.64 U
	09-Aug-19	N	18.14	0.4 J	0.1	0.1 U	<0.24	330	9.17	120	0.33	4.2	2.21	0.54 J	0.64 U
	06-Oct-20	N	15.88	1.1 J	0.4	0.2 UJ	<0.49	180 J	5.00	0.81 J	0.002	250 J	1316	480 J	0.51 UJ
	06-Sep-21	N	15.1	0.15 U	<0.05	0.2 U	<0.49	0.15 U	<0.004	0.15 U	<0.0005	0.15 U	<0.79	110	4.5 J
	12-Aug-22	N	13.56	0.89 J	0.32	0.1 U	<0.24	0.32 J	0.01	0.81 J	0.002	0.66 J	3.47	70	22
	08-Sep-23	N	13.72	2.3	0.82	0.1 U	<0.24	11	0.31	21	0.058	18	94.74	15	14
SS019-MW84 Source Area (13 to 38)	24-Aug-18	N	18.01	120	42.9	0.1 U	<0.24	350	9.72	40	0.11	0.61 J	3.21	--	--
	09-Aug-19	N	20.22	180	64.3	0.1 U	<0.24	340	9.44	36	0.10	0.58J	3.05	--	--
	06-Oct-20	N	17.91	0.15 U	<0.05	0.2 U	<0.488	120 J	3.33	14 J	0.04	0.15 U	<0.79	--	--
	04-Sep-21	N	17.2	65	23.2	0.2 U	<0.488	270	9.44	67	0.19	19	100	--	--
	13-Aug-22	N	15.69	19	6.8	0.1 U	<0.24	100	2.78	20	0.06	4.8	25	--	--
	11-Sep-23	N	15.14	85	30.4	0.1 U	<0.24	300	8.33	81	0.23	15	79	--	--
06-MW-09 Source Area (33.1 to 43.1)	05-Jun-04	N	17.3	4410 J	1575	0.96 J	2.34	175 J	4.86	18.4 J	0.05	0.43 J	2.26		--
	21-Oct-04	N	27.26	5810	2075	1.02	2.49	185 J	5.14	9.66	0.03	0.49 U	<2.5	--	--
06-MW-09R Source Area (33 to 43)	13-Oct-11	N	19.2	2930	1046	3.2 U	7.80	151	4.19	69.1	0.19	4 U	<21	-	--
	27-Apr-12	N	31.67	3120	1114	3.2 U	7.80	188	5.22	74.8	0.21	4 U	<21	--	--
	11-Aug-18	N	18.38	2400	857	0.61 J	1.49	220	6.11	150	0.42	0.29 J	1.53	0.30 U	0.64 U
	11-Aug-18	FD		2500	893	0.58 J	1.41	230	6.39	160	0.44	0.3 J	1.58	0.30 U	0.64 U
	09-Aug-19	N	20.81	1800	643	0.51 J	1.24	220	6.11	210	0.58	0.25 J	1.32	0.30 U	0.64 U
	07-Oct-20	N	18.71	2300	821	0.2 U	<0.49	180	5.00	150	0.42	0.58 J	3.05	0.47 U	0.51 U
	04-Sep-21	N	17.74	1300	464	0.49 J	1.20	350	9.72	500	1.39	120	632	140	0.51 U
	14-Aug-22	N	16.39	1800	643	0.34 J	0.83	240	6.67	220	0.61	41	216	30	0.64 U
	11-Sep-23	N	15.74	1200	429	240	585	490	13.61	240	0.67	170	895	350	7.6

Table 4-1
Groundwater Monitoring - Sites SS006/SS019

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Trichloroethene Concentration (µg/L)	Trichloroethene Concentration Relative to CUL [a/] 2.8 µg/L	1,1,2-Trichloroethane Concentration (µg/L)	1,1,2-Trichloroethane Concentration Relative to CUL [a/] 0.41 µg/L	cis-1,2-Dichloroethene Concentration (µg/L)	cis-1,2-Dichloroethene Concentration Relative to CUL [a/] 36 µg/L	trans-1,2-Dichloroethene Concentration (µg/L)	trans-1,2-Dichloroethene Concentration Relative to CUL [a/] 360 µg/L	Vinyl Chloride Concentration (µg/L)	Vinyl Chloride Concentration Relative to CUL [a/] 0.19 µg/L	Ethene Concentration (µg/L)	Ethane Concentration (µg/L)
06-MW-10 Source Area (60 to 70)	05-Jun-04	N	17.8	**3.93**	1.40	0.31 U	< 0.75	**2.85**	0.08	**1.8**	0.005	0.31 U	<1.6	--	--
	21-Oct-04	N	28.48	**2.66**	0.95	0.253 U	<0.61	**9.46**	0.26	**5.98**	0.02	0.49 U	<2.5	--	--
	11-Jul-10	N	21.54	**0.37 J**	0.13	0.11 U	<0.26	**5.6**	0.16	**6.8**	0.02	0.12 U	<0.63	--	--
	11-Sep-10	N	19.46	**0.87 J**	0.31	0.11 U	<0.26	**30**	0.83	**43**	0.12	0.12 U	<0.63	--	--
	03-May-11	N	30.9	**0.352 B**	0.13	0.32 U	< 0.78	**1.76**	0.05	**1.7**	0.005	0.4 U	<2.10	--	--
	09-Sep-11	N	18.75	**1.47**	0.53	0.32 U	< 0.78	**20.6**	0.57	**28.7**	0.08	0.4 U	<2.10	--	--
	09-Sep-11	FD		**1.34**	0.48	0.32 U	< 0.78	**20.3**	0.56	**28.5**	0.08	0.4 U	<2.10	--	--
	27-Apr-12	N	31.24	**0.173 J**	0.06	0.32 U	< 0.78	**1.62**	0.05	**1.14**	0.003	0.4 U	<2.10	--	--
	30-Aug-13	N	19.76	**0.23 J**	0.08	0.1 U	<0.24	**4.4**	0.12	**5.7**	0.02	0.2 U	<1.05	--	--
	10-Aug-18	N	20.18	**0.42 J**	0.15	0.1 U	<0.24	**33**	0.92	**40**	0.11	0.2 U	<1.05	0.30 U	0.64 U
	09-Aug-19	N	21.42	**0.12 J**	0.04	0.1 U	<0.24	**6.1**	0.17	**4.4**	0.01	0.2 U	<1.05	0.30 U	0.64 U
	07-Oct-20	N	19.33	**0.34 J**	0.12	0.2 UJ	<0.49	0.15 UJ	<0.004	**3.1 J**	0.01	**3 J**	15.8	**48 J**	0.51 UJ
	28-Aug-21	N	19.11	0.15 U	<0.05	0.2 U	<0.49	0.15 U	<0.004	0.15 U	<0.0005	0.15 U	<0.79	0.47 U	0.51 UJ
	14-Aug-22	N	16.97	**0.16 J**	0.06	0.1 U	<0.24	**0.14 J**	0.004	**0.76 J**	0.002	**0.44 J**	2.32	**52**	**13**
	12-Sep-23	N	16.35	0.1 U	<0.03	0.1 U	<0.24	**0.5 J**	0.014	**0.54 J**	0.002	**0.44 J**	2.32	**0.4 J**	0.64 U
SS006-MW81 In-Plume (15 to 35)	21-Aug-18	N	13.85	**650**	232	**0.28 J**	0.68	**390**	10.8	**100**	0.28	**0.65 J**	3.42	0.30 U	0.64 U
	08-Aug-19	N	15.94	**100**	35.7	0.1 U	<0.24	**1100**	30.6	**130**	0.36	**31**	163	**1.8 J**	0.64 U
	06-Oct-20	N	13.79	**57**	20.4	0.2 U	<0.49	**140**	3.9	**53**	0.15	**18**	95	**98**	0.51 U
	09-Sep-21	N	12.85	**3.4**	1.21	0.2 U	<0.49	**86**	2.4	**44**	0.12	**49**	258	**180**	0.51 U
	12-Aug-22	N	11.44	**7.8**	2.79	0.1 U	<0.24	**76**	2.1	**20**	0.06	**14**	74	**130**	**0.84 J**
	11-Sep-23	N	10.75	88	31.43	**0.1 U**	<0.24	**340**	9.4	**91**	0.25	**89**	468	**190**	**4**
SS006-MW82 In-Plume (46.3 to 56.3)	26-Aug-18	N	13.3	**36**	12.9	0.1 U	<0.24	**220 J**	6.11	**210 J**	0.58	**0.29 J**	1.53	0.30 U	0.64 U
	08-Aug-19	N	15.82	**0.23 J**	0.1	0.1 U	<0.24	**280**	7.78	**280**	0.78	**1.4**	7.37	**0.38 J**	0.64 U
	06-Oct-20	N	13.67	**0.21 J**	0.1	0.2 U	<0.49	**46**	1.28	**0.69 J**	0.002	**130**	684	**360**	0.51 U
	09-Sep-21	N	12.71	0.15 U	<0.05	0.2 U	<0.49	**0.24 J**	0.01	0.15 U	<0.0005	0.15 U	<0.79	**310**	0.51 U
	12-Aug-22	N	11.26	**0.3 J**	0.1	0.1 U	<0.24	**0.19 J**	0.005	**0.27 J**	0.0008	**0.47 J**	2.5	**320**	**1.4 J**
	11-Sep-23	N	10.51	**0.24 J**	0.1	0.1 U	<0.24	0.1 U	0.003	**0.15 J**	0.0004	**0.32 J**	1.7	**180**	**8.1**
SS006-MW83 In-Plume (35 to 45)	21-Aug-18	N	13.18	**130**	46.4	**0.12 J**	0.29	**390**	10.8	**240**	0.67	**0.7 J**	3.68	0.30 U	0.64 U
	08-Aug-19	N	15.25	**9.6**	3.4	0.1 U	<0.24	**580**	16.1	**190**	0.53	**100**	526	**22**	0.64 U
	06-Oct-20	N	13.2	**1.4**	0.5	0.2 U	<0.49	**31 J**	0.9	**21 J**	0.06	**15**	79	**180 J**	0.51 UJ
	07-Sep-21	N	12.11	0.15 U	<0.05	0.2 U	<0.49	0.15 U	<0.004	0.15 U	<0.0005	0.15 U	<0.79	**330 J**	0.51 U
	12-Aug-22	N	10.75	**0.27 J**	0.10	0.1 U	<0.24	**0.43 J**	0.01	**1.3**	0.004	**1**	5.3	**200**	**7.2 J**
	11-Sep-23	N	10.05	0.1 U	0.04	0.1 U	<0.24	**0.1 J**	0.003	**0.84 J**	0.002	**0.42 J**	2.2	**82 J**	**61 J**
SS006-MW67 In-Plume (40 to 50)	07-Sep-11	N	-	**61.9**	22.1	0.32 U	< 0.78	**8.92**	0.25	**0.672 J**	0.00	0.4 U	<2.10	--	--
	23-Apr-12	N	23.96	**91**	32.5	0.32 U	< 0.78	**19.6**	0.54	**2.43**	0.01	0.4 U	<2.10	--	--
	23-Apr-12	FD		**88**	31.4	0.32 U	< 0.78	**20.3**	0.56	**2.53**	0.01	0.4 U	<2.10	--	--
	04-Sep-13	N	12.66	**70**	25.0	0.1 U	<0.24	**37**	1.03	**5.7**	0.02	**0.31 J**	1.63	--	--
	04-Sep-13	FD		**68**	24.3	0.1 U	<0.24	**35**	0.97	**5.7**	0.02	**0.31 J**	1.63	--	--
	27-Aug-14	N	10.36	**76**	27.1	0.1 U	<0.24	**58**	1.61	**9.7**	0.03	**0.34 J**	1.79	--	--
	08-Sep-15	N	9.77	**51**	18.2	0.1 U	<0.24	**54**	1.50	**11**	0.03	**0.33 J**	1.74	--	--
	31-Jul-16	N	7.35	**68**	24.3	0.1 U	<0.24	**73**	2.03	**16**	0.04	**0.47 J**	2.47	--	--
	11-Aug-17	N	12.45	**75**	26.8	0.1 U	<0.24	**80**	2.22	**20**	0.06	**0.52 J**	2.74	--	--
	11-Aug-18	N	12.86	**130**	46.4	0.1 U	<0.24	**140**	3.89	**37**	0.10	**0.55 J**	2.89	0.30 U	0.64 U
	10-Aug-19	N	13.71	**94**	33.6	0.1 U	<0.24	**120**	3.33	**39**	0.11	**0.48 J**	2.53	0.30 U	0.64 U
	08-Oct-20	N	12.37	**84**	30.0	0.2 U	<0.49	**170**	4.72	**58**	0.16	**7**	36.8	**7.90**	0.51 U
	07-Sep-21	N	10.92	**8.3**	2.96	0.2 U	<0.49	**160**	4.44	**83**	0.23	0.15 U	<0.79	**94**	0.51 U
	13-Aug-22	N	9.59	**0.41 J**	0.15	0.1 U	<0.24	**72**	2.00	**9.7**	0.03	**71**	374	**160**	**0.72 J**
	10-Sep-23	N	8.95	**0.27 J**	0.10	0.1 U	<0.24	**0.54 J**	0.02	**0.26 J**	0.001	**0.85 J**	4.47	**180**	**3.3**

Table 4-1
Groundwater Monitoring - Sites SS006/SS019

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Trichloroethene Concentration (µg/L)	Trichloroethene Concentration Relative to CUL [a/] 2.8 µg/L	1,1,2-Trichloroethane Concentration (µg/L)	1,1,2-Trichloroethane Concentration Relative to CUL [a/] 0.41 µg/L	cis-1,2-Dichloroethene Concentration (µg/L)	cis-1,2-Dichloroethene Concentration Relative to CUL [a/] 36 µg/L	trans-1,2-Dichloroethene Concentration (µg/L)	trans-1,2-Dichloroethene Concentration Relative to CUL [a/] 360 µg/L	Vinyl Chloride Concentration (µg/L)	Vinyl Chloride Concentration Relative to CUL [a/] 0.19 µg/L	Ethene Concentration (µg/L)	Ethane Concentration (µg/L)
SS006-MW68	07-Sep-11	N	-	**1.36**	0.49	0.32 U	< 0.78	**87.6**	2.43	**76.2**	0.21	0.4 U	<2.10	--	--
In-Plume	27-Apr-12	N	23.65	**23.7**	8.46	0.32 U	< 0.78	**260**	7.22	**136**	0.38	**0.506 J**	2.66	--	--
(60 to 70)	05-Sep-13	N	12.65	**8.7**	3.11	0.1 U	<0.24	**170**	4.72	**120**	0.33	0.2 U	<1.05	--	--
	27-Aug-14	N	10.29	**2.7**	0.96	0.1 U	<0.24	**160**	4.44	**90**	0.25	0.2 U	<1.05	--	--
	08-Sep-15	N	9.63	**1.1**	0.39	0.1 U	<0.24	**36**	1.00	**29**	0.08	0.2 U	<1.05	--	--
	31-Jul-16	N	7.27	**0.44 J**	0.16	0.1 U	<0.24	**79**	2.19	**53**	0.15	0.2 U	<1.05	--	--
	11-Aug-17	N	13.49	**0.34 J**	0.12	0.1 U	<0.24	**51**	1.42	**36**	0.10	0.2 U	<1.05	--	--
	10-Aug-18	N	12.76	**0.29 J**	0.10	0.1 U	<0.24	**160**	4.44	**100**	0.28	**0.24 J**	1.26	0.30 U	0.64 U
	10-Aug-19	N	13.56	**0.12 J**	0.04	0.1 U	<0.24	**54**	1.50	**40**	0.11	0.2 U	<1.05	0.30 U	0.64 U
	10-Aug-19	FD		**0.12 J**	0.04	0.1U	<0.24	**55**	1.53	**40**	0.11	0.2 U	<1.05	0.30 U	0.64 U
	08-Oct-20	N	12.33	0.15 U	<0.05	0.2 U	<0.49	**1.4**	0.04	**12**	0.03	**2.7**	14.2	**100**	0.51 U
	08-Oct-20	FD		0.15 U	<0.05	0.2 U	<0.49	**1.4**	0.04	**13**	0.04	**2.6**	13.7	**110**	0.51 U
	07-Sep-21	N	10.92	0.15 U	<0.05	0.2 U	<0.49	0.15 U	<0.004	0.15 U	<0.0005	0.15 U	<0.79	**46**	0.51 U
	07-Sep-21	FD		0.15 U	<0.05	0.2 U	<0.49	0.15 U	<0.004	0.15 U	<0.0005	0.15 U	<0.79	**49**	0.51 U
	13-Aug-22	N	9.48	0.1 U	<0.04	0.1 U	<0.24	**0.13 J**	0.004	**0.16 J**	0.0004	**0.35 J**	1.84	**57**	0.64 U
	13-Aug-22	FD		0.1 U	<0.04	0.1 U	<0.24	**0.11 J**	0.003	**0.16 J**	0.0004	**0.36 J**	1.89	**55**	0.64 U
	10-Sep-23	N	8.82	0.1 U	<0.24	0.1 U	<0.24	**0.32 J**	0.009	**0.28 J**	0.0008	**0.46 J**	2.42	**32**	**8.1**
	10-Sep-23	FD		0.1 U	<0.24	0.1 U	<0.24	**0.25 J**	0.007	**0.27 J**	0.0008	**0.41 J**	2.16	**32**	**8.1**
SS006-MW69	07-Sep-11	N	-	0.16 U	<0.06	0.32 U	< 0.78	0.15 U	<0.004	0.15 U	<0.0005	0.4 U	<2.10	--	--
In-Plume	23-Apr-12	N	23.9	0.16 U	<0.06	0.32 U	< 0.78	0.15 U	<0.004	0.15 U	<0.0005	0.4 U	<2.10	--	--
(78.6 to 88.6)	22-Aug-14	N	10.07	0.1 UJ	<0.04	0.1 UJ	<0.24	0.1 UJ	<0.003	0.1 UJ	<0.0005	0.2 UJ	<1.05	--	--
Sampled every 5 years	08-Sep-15	N	9.62	0.1 U	<0.04	0.1 U	<0.24	0.1 U	<0.003	0.1 U	<0.0005	0.2 U	<1.05	--	--
	31-Jul-16	N	7.31	0.1 U	<0.04	0.1 U	<0.24	0.1 U	<0.003	0.1 U	<0.0005	0.2 U	<1.05	--	--
	11-Aug-17	N	12.31	0.1 U	<0.04	**0.12 J**	0.29	0.1 U	<0.003	0.1 U	<0.0005	0.2 U	<1.05	--	--
	10-Aug-18	N	12.83	0.1 U	<0.04	0.1 U	<0.24	0.1 U	<0.003	0.1 U	<0.0005	0.2 U	<1.05	0.30 U	0.64 U
	09-Sep-23	N	8.85	0.1 U	<0.04	0.1 U	<0.24	**0.13 J**	0.004	0.1 U	<0.0005	0.11 U	<0.58	--	--
SS018-MW003	23-Aug-18	N	11.54	**8.4**	3.00	0.1 U	<0.24	**34**	0.94	**9.3**	0.03	0.2 U	<1.05	0.30 U	0.64 U
In-Plume, Side Gradient	23-Aug-18	FD		**8.2**	2.93	0.1 U	<0.24	**35**	0.97	**9.6**	0.03	0.2 U	<1.05	0.30 U	0.64 U
(13 to 33)	13-Aug-19	N	13.77	**12**	4.29	0.1 U	<0.24	**31**	0.86	**7.3**	0.02	0.24 J	1.26	--	--
	01-Oct-20	N	11.03	**12**	4.29	0.2 U	<0.49	**15**	0.42	**3.2**	0.01	0.15 U	<0.79	--	--
	27-Aug-21	N	11.56	**12**	4.29	0.2 U	<0.49	**49**	1.36	**12**	0.03	0.15 U	<0.79	0.47 U	0.51 U
	07-Sep-22	N	10.21	**11**	3.93	0.1 U	<0.24	**11**	0.31	**1.9**	0.005	**0.22 J**	1.16	--	--
SS006-MW74	03-Sep-13	N	13.2	**0.7 J**	0.25	0.1 U	<0.24	**0.57 J**	0.02	0.1 U	<0.0005	0.2 U	<1.05	0.30 U	0.64 U
Downgradient	22-Apr-14	N	-	**5.3**	1.89	0.1 U	<0.24	**5.2**	0.14	**0.4 J**	0.001	0.2 U	<1.05	--	--
(12 to 32)	04-Aug-18	N	12.99	**0.59 J**	0.21	0.1 U	<0.24	**0.4 J**	0.01	**0.1 U**	<0.0005	0.2 U	<1.05	--	--
	10-Aug-19	N	14.03	**3.0**	1.07	0.1 U	<0.24	**7.4**	0.21	1.1	0.003	0.2 U	<1.05	--	--
	06-Oct-20	N	12.80	**1.2 J**	0.43	0.2 U	<0.49	**1.4 B**	0.04	**0.18 J**	0.001	0.15 U	<0.79	--	--
	07-Sep-21	N	11.40	**1.6**	0.57	0.2 U	<0.49	0.15 U	<0.004	**0.63 J**	0.002	0.15 U	<0.79	--	--
	13-Aug-22	N	10.13	**1**	0.36	0.1 U	<0.24	**2.5**	0.07	**0.23 J**	0.0006	0.11 U	<0.58	--	--
	09-Sep-23	N	9.30	**2.2**	0.79	0.1 U	<0.24	**10**	0.28	**3.5**	0.0097	**0.85 J**	4.47	--	--
SS006-MW75	03-Sep-13	N	13.05	0.1 U	<0.04	0.1 U	<0.24	**4.2**	0.12	**0.12 J**	0.000	0.2 U	<1.05	**0.37 J**	0.64 U
Downgradient	22-Apr-14	N	-	0.1 U	<0.04	0.1 U	<0.24	**9.6**	0.27	**0.32 J**	0.001	0.2 U	<1.05	--	--
(45 to 55)	04-Aug-18	N	12.78	0.1 U	<0.04	0.1 U	<0.24	**10**	0.28	**0.71 J**	0.002	**0.22 J**	1.16	--	--
Sampled every 5 years	09-Sep-23	N	9.17	0.1 U	<0.04	0.1 U	<0.24	**1 J**	0.03	0.1 U	<0.0003	**0.91 J**	4.79	--	--
CSS002-MW003	16-Sep-16	N	12.28	**0.84 J**	0.30	0.1 U	<0.24	0.1 U	<0.003	0.1 U	<0.0005	0.2 U	<1.05	0.30 U	0.64 U
Side Gradient	15-Aug-17	N	15.31	**0.14 J**	0.05	0.1 U	<0.24	**0.41 J**	0.01	0.1 U	<0.0005	0.2 U	<1.05	0.30 U	0.64 U
(17 to 37)	08-Aug-18	N	15.62	**0.2 J**	0.07	0.1 U	<0.24	**0.24 J**	0.007	0.1 U	<0.0005	0.2 U	<1.05	0.30 U	0.64 U
	06-Aug-19	N	17.22	0.1 U	0.04	0.1 U	<0.24	**0.16 J**	0.004	0.1 U	<0.0005	0.2 U	<1.05	0.30 U	0.64 U
	06-Aug-19	FD		0.1 U	0.04	0.1 U	<0.24	**0.21 J**	0.006	0.1 U	<0.0005	0.2 U	<1.05	0.30 U	0.64 U
	04-Oct-20	N	14.43	<0.15	<0.05	0.2 U	<0.49	0.15 UJ	<0.004	0.15 U	<0.0004	0.15 U	<0.79	--	--
	04-Oct-20	FD		<0.15	<0.05	0.2 U	<0.49	0.15 UJ	<0.004	0.15 U	<0.0004	0.15 U	<0.79	--	--
	19-Aug-21	N	15.25	<0.15	<0.05	0.2 U	<0.49	0.15 U	<0.004	0.15 U	<0.0004	0.15 U	<0.79	0.47 U	0.51 U
	19-Aug-21	FD		<0.15	<0.05	0.2 U	<0.49	0.15 U	<0.004	0.15 U	<0.0004	0.15 U	<0.79	0.47 U	0.51 U
	27-Aug-22	FD	12.45	0.1 U	0.04	0.1 U	<0.24	0.1 U	<0.003	0.1 U	<0.0005	0.11 U	0.58	0.3 U	0.64 U
	27-Aug-22	N		0.1 U	0.04	0.1 U	<0.24	0.1 U	<0.003	0.1 U	<0.0005	0.11 U	0.58	0.3 U	0.64 U

Notes:
[a/] Concentration Relative to CUL = Concentration / Table C CUL for groundwater
Bold indicates the analyte was detected
Bold and shaded indicates the concentration exceeds the CUL
Shaded only - analyte below detection but method detection limit exceeds the CUL
< indicates the result is less than the value shown
µg/L = micrograms per liter
btoc = below top of casing

bgs = below ground surface
CUL = Table C cleanup level for groundwater (ADEC, November 2020)
FD = field duplicate sample
J = estimated value
N = normal sample
U = analyte not detected above the detection limit shown
UJ = analyte was not detected but the detection limit is estimated

Table 4-2
Bio-Dechlor Census Screening Results - Site SS006

Sample Identification	Sampling Location	Screened Interval (feet bgs)	Sample Date	Dehalococcoides species (cells/mL)	Functional Genes [a/] tceA Reductase (cells/mL)	Functional Genes [a/] BAV1 VC Reductase (cells/mL)	Functional Genes [a/] VC Reductase (cells/mL)
SS006-MW66	Downgradient of PRB-1 PSZ beneath TCE plume	80-90	8/28/2018	**2.10E+00**	<0.400E-01	<0.400E-01	<0.400E-01
SS006-MW80	Directly downgradient of PRB-2	40-50	8/28/2018	**1.48E+01**	<0.400E-01	<0.400E-01	<0.400E-01
			8/18/2019	**2.38E+02**	< 5.00E-01	< 5.00E-01	**3.30E+00**
			10/11/2020	**1.19E+05**	< 5.00E-01	**2.00E-01 J**	**3.43E+04**
			9/13/2021	**8.54E+04**	<5.00E-01	<5.00E-01	**5.83E+03**
			9/13/2022	**1.02E+03**	<5.00E-01	<5.00E-01	**2.45E+02**
			9/18/2023	**5.06E+03**	<4.00E-01	<4.00E-01	**1.35E+02**
06-MW-09R	Downgradient of PRB-2 in upper PSZ	33-43	8/27/2018	**1.33E+01**	<0.400E-01	<0.400E-01	<0.400E-01
			8/18/2019	**5.92E+01**	< 5.00E-01	< 5.00E-01	**1.00E-01 J**
			10/11/2020	**1.23E+01**	< 5.00E-01	< 5.00E-01	**9.00E-01**
			9/13/2021	**2.90E+02**	<5.00E-01	<5.00E-01	**1.71E+01**
			9/13/2022	**3.27E+01**	<5.00E-01	<5.00E-01	**8.60E+00**
			9/18/2023	**3.76E+02**	<4.00E-01	<4.00E-01	**1.06E+01**
06-MW-10	Downgradient of PRB-2 in middle PSZ	60-70	8/28/2018	**1.57E+01**	<0.400E-01	<0.400E-01	<0.400E-01
			8/18/2019	**1.32E+02**	< 5.00E-01	< 5.00E-01	**1.05E+01**
			10/11/2020	**3.64E+03**	< 5.00E-01	< 5.00E-01	**8.40E+02**
			9/13/2021	**1.78E+03**	<5.00E-01	<5.00E-01	**1.71E+02**
			9/13/2022	**3.20E+02**	<5.00E-01	<5.00E-01	**1.02E+02**
			9/18/2023	**1.74E+02**	<3.00E-01	<3.00E-01	**7.40E+00**
SS006-MW83	Directly downgradient of PRB-3	35-45	8/27/2018	**1.26E+01**	<0.400E-01	<0.400E-01	<0.400E-01
			8/18/2019	**4.32E+02**	< 5.00E-01	**3.00E-01 J**	**3.24E+01**
			10/11/2020	**1.16E+05**	<1.30E-00	<1.30E-00	**1.29E+04**
			9/13/2021	**3.60E+04**	< 5.00E-01	< 5.00E-01	**1.27E+03**
			9/13/2022	**1.28E+03**	**1.60E+00**	<5.00E-01	**3.51E+02**
			9/18/2023	**1.98E+03**	**2.34E+01**	<3.00E-01	**7.69E+01**
SS006-MW67	Downgradient of PRB-3 in upper PSZ	40-50	8/27/2018	**1.92E+01**	<0.400E-01	<0.400E-01	<0.400E-01
			8/18/2019	**1.01E+02**	< 5.00E-01	< 5.00E-01	**2.00E-01 J**
			10/11/2020	**8.76E+02**	< 5.00E-01	< 5.00E-01	**2.16E+02**
			9/13/2021	**3.28E+03**	<4.00E-01	<4.00E-01	**2.77E+02**
			9/13/2022	**1.12E+03**	<5.00E-01	<5.00E-01	**3.26E+02**
			9/18/2023	**3.85E+04**	<3.00E-01	<3.00E-01	**1.31E+03**
SS006-MW68	Downgradient of PRB-3 in middle PSZ	60-70	8/27/2018	**3.60E+00**	<0.400E-01	<0.400E-01	<0.400E-01
			8/18/2019	**7.29E+01**	< 5.00E-01	< 5.00E-01	< 5.00E-01
			10/11/2020	**1.24E+04**	< 5.00E-01	< 5.00E-01	**2.59E+03**
			9/13/2021	**2.45E+02**	<3.00E-01	<3.00E-01	**1.64E+01**
			9/13/2022	**2.04E+01**	< 1.00E+00	**6.00E-01 J**	**9.60E+00**
			9/18/2023	**1.44E+03**	<3.00E-01	<3.00E-01	**5.82E+01**
SS006-MW69	Downgradient of PRB-3 in lower PSZ	78.6-88.6	8/27/2018	**2.70E+00**	<0.400E-01	<0.400E-01	<0.400E-01

Notes:

Wells listed in order from upgradient to downgradient.

[a/] tceA Reductase = trichloroethene (TCE) reductase enzyme responsible for reductive dechlorination of TCE; BAV1 VC Reductase = vinyl chloride (VC) reductase enzyme and VC Reductase = VC reductase enzyme both responsible for reductive dechlorination of VC.

< = indicates the result was not detected above the indicated practical quantitation limit (PQL)

bgs = below ground surface

cells/mL = cells per milliliter of sample

J = estimated value, gene copies are below the PQL but above the laboratory quantification limit (LQL)
PRB = permeable reactive barrier
PSZ = permenantly saturated zone
Bold indicates analyte was detected

Table 4-3
Static Soil Gas - Site SS006

Vapor Monitoring Point	Depth Interval (feet bgs)	Date	Sample Type	Concentration (ppbv)			
				TPH-g	TCE	cis-1,2-DCE	Vinyl Chloride
SS006-VMP02	3-4	4/28/19	N	22,000	31,000	800	15 U
		8/26/20	N	8,600	8,800	210	26 U
		5/1/21	N	7,100,000	4,800	380 U	380 U
		5/13/22	N	33,000 J	950 J	15 J	12 U
		5/13/22	FD	22,000 J	600 J	9.8 J	7.7 U
	14-15	4/28/19	N	260,000	1,400	310,000	210 U
		8/26/20	N	41,000	1,300	37,000	92 U
		4/28/21	N	19,000	4,600	8,600	16 U
		4/29/22	N	8,100	5,100	8,600	5.8 U
		5/3/23	N	4,500	2,900	3,100	9.1 U
		5/3/23	FD	4,300	2,700	3,000	7.1 U
SS006-VMP03	12-13	4/28/19	N	73,000	12,000	73,000	750
		4/28/21	N	64,000 J	7,300	52,000	220 J
		4/28/21	FD	64,000 J	7,800	52,000	260
		4/29/22	N	30,000	4,400	40,000	110
SS006-VMP04	21-22	4/28/19	N	200,000	210,000	13,000	160 U
		8/26/20	NS	NS	NS	NS	NS
		4/28/21	N	3,900	3,500	360	6.2U
		4/29/22	N	860	1,200	160	4.6 U
		4/29/22	FD	810	1,300	170	2.8 U
		5/3/23	N	780	850	180	2.9 U
SS006-VMP06	11-12	4/28/19	N	820,000	990,000	1,700	720 U
		8/26/20	N	230,000	240,000	790 J	890 U
		4/28/21	N	16,000	18,000	240	57 U
		4/29/22	N	6,500	12,000	100	5.6 U
		5/3/23	N	2,600	4,000	64	9.6 U
		5/3/23	FD	2,600	4,000	67	9.6 U
	20-21	4/28/19	N	230,000	350,000	2,900	230 U
		4/28/19	FD	240,000	360,000	2,900	220 U
		4/28/21	N	6,000	6,700	100	24 U
		4/29/22	N	2,900	4,200	48	9.5 U
		5/3/23	N	2,600	4,200	140	13 U
SS006-VMP12	3-4	8/26/20	N	61	0.53 U	0.53 U	0.53 U
	6-7	8/26/20	N	120	0.56 U	0.56 U	0.56 U
		8/26/20	FD	110	0.56 U	0.56 U	0.56 U

Notes:

bgs = below ground surface
DCE = dichloroethene
FD = field duplicate
N = normal
ppbv = parts per billion by volume
TCE = trichloroethene
TPH-g = total petroleum hydrocarbons-gasoline
U = analyte not detected above reporting limit shown

Table 4-4
Static Soil Gas - Site SS019

Vapor Monitoring Point	Depth Interval (feet bgs)	Date	Sample Type	Concentration (ppbv)		
				TPH-g	Benzene	TCE
SS019-VMP01	5-6	8/20/15	N	700,000	21 J	10 J
		8/20/15	FD	740,000	230	40 U
		5/4/17	N	2,000	7	4
		4/30/18	N	6,600	10	2
		4/27/19	N	500	1.2	5.1
	10-12	8/20/15	N	16,000,000	44,000	750
		7/18/16	N	2,600,000	14,000	1300 U
		5/4/17	N	580,000	97	75
		4/30/18	N	8,400	6	65
		4/27/19	N	1,800	2	92
		8/25/20	N	460,000	200 U	130 J
		4/30/21	N	7,600	3.5 U	6.7 J
SS019-VMP02	5-6	7/17/16	N	5,300,000	20,000	340
		5/4/17	N	210,000	27	130
		5/4/17	FD	170,000	26	130
		4/30/18	N	17,000	3 J	350
		4/27/19	N	10,000	5.2 U	2,000
		4/27/19	FD	9,700	4.9 U	2,000
		8/26/20	N	320,000	52 J	280
		4/30/21	N	2,300	0.16 J	40
	10-12	8/20/15	N	16,000,000	73,000	750
		7/17/16	N	1,900,000	4,800	250
		5/4/17	N	94,000	100	14,000
		4/30/18	N	39,000	50	39,000
		4/27/19	N	28,000	28	36,000
		8/26/20	N	31,000	24	2,300
		4/30/21	N	1,000	1.1 J	440
		4/29/22	N	320	0.68 U	140
		4/30/23	N	180	0.76 U	95
SS019-VMP03	6-7	8/20/15	N	22,000,000	240,000	1,200
		7/16/16	N	12,000,000	130,000	1,100 J
		5/4/17	N	2,900,000	4,500	240
		4/30/18	N	3,500,000	2,000	1,400
		4/27/19	N	3,400,000	2,600	580
		8/26/20	N	1,700,000	680	370
		4/30/21	N	610,000	120	190
		4/29/22	N	560,000	30 J	230 J
		4/30/23	N	600,000	32 J	180

Table 4-4
Static Soil Gas - Site SS019

Vapor Monitoring Point	Depth Interval (feet bgs)	Date	Sample Type	Concentration (ppbv)		
				TPH-g	Benzene	TCE
SS019-VMP03	11-13	8/20/15	N	26,000,000	620,000	2,700
		7/16/16	N	9,300,000	150,000	700
		7/16/16	FD	6,100,000	100,000	520 J
		5/4/17	N	19,000,000	150,000	2,000 U
		4/30/18	N	13,000,000	130,000	6,200
		4/27/19	N	12,000,000	60,000	6,800
		4/27/19	FD	11,000,000	59,000	6,800
		8/26/20	N	12,000,000	17,000	3,400
		4/30/21	N	4,700,000	9,100	1,800
		4/29/22	N	4,900,000	4800 J	1800 J
		4/30/23	N	9,100,000	8,900	2,100
		4/30/23	N	8,900,000	9,000	2,100
SS019-VMP05	12-14	8/20/15	N	5,900,000	14,000	580
		7/18/16	N	5,200,000	5,200	410
		5/4/17	N	3,400,000	160	54 U
		4/30/18	N	1,300,000	82 J	37 J
		4/30/18	FD	1,400,000	120 J	57 J
		4/27/19	N	1,100,000	63 U	260
		8/26/20	N	1,100,000	150 U	63 J
		8/26/20	FD	1,000,000	150 U	36 J
		4/30/21	N	320,000	27 U	40 J
		4/29/22	N	100,000	5.6 U	5.6 U
		4/30/23	N	2,900	2	0.99

Notes:
bgs = below ground surface
FD = field duplicate
J = estimated value
N = normal
ppbv = parts per billion by volume
TCE = trichloroethene
TPH-g = total petroleum hydrocarbons-gasoline
U = analyte not detected above reporting limit shown

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Table 4-5
Mass Removal by SVE System - Site SS006

Sample Date	Days of Operation	Combined Extraction Flow Rate (scfm)	Periodic				Cumulative			
			Extraction Flow (cubic feet)	VOCs Removed (lb)	TCE Removed (lb)	cis-1,2-DCE Removed (lb)	Flow (million cubic feet)	VOCs Removed (lb)	TCE Removed (lb)	cis-1,2-DCE Removed (lb)
20-Jul-19	2.1	23.5	72,000	6.02	2.58	0.917	0.072	6.00	2.58	0.917
24-Jul-19	5.8	66.0	550,000	28.0	12.9	3.02	0.62	34.0	15.5	3.93
27-Jul-19	0.2	71.5	20,000	0.54	0.280	0.049	0.64	34.5	15.8	3.98
17-Aug-19	21	97.7	2,950,000	59.8	27.1	5.00	3.59	94.3	42.9	8.99
05-Sep-19	19	95.4	2,610,000	42.3	20.5	4.65	6.20	137	63.4	13.6
29-Sep-19	24	106	3,670,000	84.8	37.5	7.75	9.87	221	101	21.4
02-Mar-20	130	264	49,500,000	128	57.1	13.1	59.4	350	158	34.4
01-May-20	38	327	17,900,000	81.6	41.5	5.18	77.3	431	199	39.6
13-Jul-20	35	129	6,500,000	21.2	12.6	0.72	83.8	452	212	40.3
31-Aug-20	24	178	6,150,000	30.8	16.4	0.98	89.9	483	229	41.3
17-Jan-21	77	335	37,140,000	104.6	31.73	4.85	127.1	588	260	46.2
05-Mar-21	64	347	31,980,000	56.4	20.28	2.99	159.0	644	281	49.2
06-Aug-21	44	564	35,740,000	81.2	21.81	1.73	194.8	725	302	50.9
17-Sep-21	30	576	24,880,000	25.1	11.34	0.88	219.7	750	314	51.8
30-Sep-21	13	156	2,920,000	17.2	6.83	0.58	222.6	768	321	52.4
26-Oct-21	25	97.9	3,520,000	6.39	3.12	0.81	226.1	774	324	53.2
26-Jan-22	22	592	18,320,000	21.7	10.6	1.38	244.4	796	334	54.5
15-Mar-22	48	543	37,450,000	24.1	11.1	1.79	281.9	820	345	56.3
22-Apr-22	8	481	5,270,000	8.57	4.68	0.55	287.1	828	350	56.9
14-Aug-22	51	302	22,180,000	36.2	22.3	1.16	309.3	865	372	58.0
25-Sep-22	42	325	19,680,000	21.5	13.3	0.93	329.0	886	386	59.0
29-Sep-22	3	190	820,000	1.55	0.96	0.08	329.8	888	387	59.1
14-Dec-22	34	161	7,870,000	19.36	11.97	1.04	337.7	907	399	60.1
22-Feb-23	70	595	59,930,000	36.40	22.05	1.76	397.6	944	421	61.9
25-Apr-23	62	486	43,380,000	28.67	15.24	1.35	441.0	972	436	63.2
21-Jul-23	21	229	6,920,000	5.50	3.51	0.08	447.9	978	439	63.3
18-Sep-23	59	187	15,900,000	12.20	8.02	0.36	463.8	990	447	63.7
02-Oct-23 [a/]	10	50	730,000	2.33	1.53	0.07	464.6	992	449	63.7

Notes:

[a/] 2 October 2023 sample result used to calculate removal through end of FY 2023 reporting period

VOC, TCE, and cis-1,2-DCE removal masses from SVE Annual Report Table 4-34 (Attachment C).

DCE = dichloroethene

lb = pound

scfm = standard cubic feet per minute

SVE = soil vapor extraction

TCE = trichloroethene

VOCs = volatile organic compounds

Table 4-6
Mass Removal by SVE System - Site SS019

Sample Date	Days of Operation	Combined Extraction Flow Rate (scfm)	Periodic			Cumulative		
			Extraction Flow (cubic feet)	VOCs Removed (lb)	TCE Removed (lb)	Flow (million cubic feet)	VOCs Removed (lb)	TCE Removed (lb)
25-Oct-15	10	58.9	848,000	565	0.202	0.85	565	0.202
16-Mar-16	7	49.4	500,000	299	0.042	1.35	864	0.244
28-Mar-16	12	32.1	554,000	225	0.110	1.90	1,089	0.354
25-Apr-16	29	44.9	1,870,000	838	0.996	3.77	1,927	1.35
27-Jul-16	5	52.7	380,000	77	0.027	4.15	2,004	1.38
21-Aug-16	24	29.3	1,010,000	332	0.078	5.16	2,336	1.46
29-Sep-16	29	40.5	1,690,000	480	0.096	6.85	2,816	1.55
21-Oct-16	22	22.5	713,000	270	0.087	7.57	3,086	1.64
03-Feb-17	105	52.9	7,992,000	1,822	4.45	15.6	4,908	6.09
24-Apr-17	84	34.9	4,230,000	1,298	7.18	19.8	6,206	13.3
24-Jul-17	6	56.8	490,000	100	0.237	20.3	6,306	13.5
20-Sep-17	30	53.3	2,303,000	501	1.66	22.6	6,807	15.2
26-Feb-18	148	43.3	9,230,000	26	1.45	31.8	6,833	16.6
24-Apr-18	57	47.8	3,930,000	567	6.43	35.7	7,400	23.1
19-Sep-18	13	52.5	980,000	77	0.563	36.7	7,477	23.6
23-Jan-19	114	68.0	11,160,000	937	9.22	47.9	8,414	32.8
15-Mar-19	51	136	9,970,000	245	3.17	57.9	8,659	36.0
21-Apr-19	13	100	1,870,000	46	1.19	59.7	8,705	37.2
06-Oct-19	5	187	1,350,000	29	1.68	61.1	8,734	38.9
02-Mar-20	143	185	38,180,000	600	8.01	99.3	9,334	46.9
01-May-20	60	142	12,290,000	84.2	3.09	111.5	9,418	50.0
09-Mar-21	22	175	5,550,000	25.6	0.63	117.1	9,444	50.6
22-Apr-21	22	168	5,320,000	39.2	1.32	122.4	9,483	51.9
20-Sep-21	15	37	800,000	7.21	0.02	123.2	9,490	51.9
27-Oct-21	26	40	1,520,000	12.5	0.100	124.7	9,502	52.0
15-Dec-21	49	70	4,970,000	71.1	0.812	129.7	9,573	52.9
26-Jan-22	42	211	12,740,000	21.9	1.09	142.4	9,595	53.9
15-Mar-22	48	180	12,470,000	89.9	0.444	154.9	9,685	54.4
21-Apr-22	38	260	14,210,000	39.8	1.35	169.1	9,725	55.7
29-Sep-22	13	50	940,000	12.3	0.012	170.1	9,737	55.8
28-Oct-22	27	55	2,130,000	25.8	0.026	172.2	9,763	55.8

Notes:
VOC and TCE removal masses from SVE Annual Report Table 4-29 (Attachment C).
lb = pound
scfm = standard cubic feet per minute
SVE = soil vapor extraction
TCE = trichloroethene
VOCs = volatile organic compounds

Table 5-1
Groundwater Monitoring - Site SS017

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Diesel Range Organics		Benzene		Naphthalene	
				Concentration (µg/L)	Concentration Relative to CUL [a/] 1500 µg/L	Concentration (µg/L)	Concentration Relative to CUL [a/] 4.6 µg/L	Concentration (µg/L)	Concentration Relative to CUL [a/] 1.7 µg/L
SS017-MW005 Upgradient (15 to 35)	26-Aug-17	N	16.58	110 U	< 0.07	0.1 U	< 0.02	0.5 U	< 0.29
	3-Aug-18	N	16.01	100 U	< 0.07	0.1 U	< 0.02	0.5 U	< 0.29
	7-Aug-19	N	17.90	100 U	< 0.07	0.1 U	< 0.02	0.5 U	< 0.29
	3-Oct-20	N	15.21	**280 B**	0.19	0.15 U	<0.03	0.25 U	<0.15
	23-Aug-21	N	15.76	25 U	<0.02	0.15 U	<0.03	0.25 U	<0.15
	26-Aug-22	N	13.19	96 U	<0.06	0.1 U	< 0.02	0.5 U	< 0.29
SS017-MW006 Source Area (15 to 35)	5-Sep-17	N	17.22	**14,000**	9.33	**88**	19.1	**400**	235
	2-Aug-18	N	15.47	**19,000**	12.7	**37**	8.04	**270**	159
	7-Aug-19	N	14.74	**17,000**	11.3	**24**	5.22	**210**	124
	3-Oct-20	N	14.80	**11,000**	7.33	**14**	3.04	**130**	76.5
	24-Aug-21	N	15.21	**13,000 J**	8.67	**11**	2.39	**66**	38.8
	11-Sep-23	N	12.13	**15,000 J**	10.00	**8.1**	1.76	**28**	16.5
SS017-MW001 Source Area (15 to 35)	30-Aug-17	N	16.14	**19,000**	12.7	**22**	4.78	**290**	171
	30-Aug-17	FD		**19,000**	12.7	**21**	4.57	**310**	182
	2-Aug-18	N	15.09	**21,000 J**	14.0	**17**	3.70	**180**	106
	7-Aug-19	N	16.97	**29,000**	19.3	**6.9 J**	1.50	**96 J**	56
	3-Oct-20	N	14.41	**42,000**	28.0	**13**	2.83	**130**	76
	24-Aug-21	N	14.78	**30,000 J**	20.0	**12**	2.61	**110 J**	65
	27-Aug-22	N	12.45	**25,000**	16.7	**15**	3.26	**130**	76
	11-Sep-23	N	11.70	**24,000**	16.0	**16**	3.48	**150**	88
SS017-MW002 Source Area (15 to 35)	6-Sep-17	N	16.33	**11,000**	7.33	**33**	7.17	**430**	253
	6-Sep-17	FD		**11,000**	7.33	**33**	7.17	**440**	259
	1-Aug-18	N	14.62	**58,000**	38.7	**18**	3.91	**260**	153
	7-Aug-19	N	16.48	**32,000**	21.3	**14**	3.04	**230**	135
	3-Oct-20	N	14.00	**31,000**	20.7	**20**	4.35	**200**	118
	24-Aug-21	N	14.38	**21,000 J**	14.0	**17**	3.70	**230 J**	135
	11-Sep-23	FD	11.34	**24000**	16.0	**26**	5.65	**150**	88
	11-Sep-23	N		**24000**	16.0	**26**	5.65	**160**	94
SS017-MW003 Source Area (17 to 37)	30-Aug-17	N	14.71	**1,400**	0.93	**0.33 J**	0.07	**4.9 J**	2.88
	3-Aug-18	N	13.80	**2,300**	1.53	0.1 U	< 0.02	**3.4**	2.00
	7-Aug-19	N	15.51	**1,800**	1.20	**0.51 J**	0.11	**5.5**	3.24
	3-Oct-20	N	12.98	**2,000**	1.33	0.15 U	<0.03	0.25 U	<0.15
	24-Aug-21	N	13.32	**830**	0.55	0.15 U	<0.03	**4.7**	2.76
	1-Sep-11	N	13.32	**980**	0.65	0.1 U	<0.02	0.5 U	<0.29
	11-Sep-23	N	10.15	**1400**	0.93	**1.7**	0.37	**7.3**	4.29

Table 5-1
Groundwater Monitoring - Site SS017

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Diesel Range Organics Concentration (µg/L)	Diesel Range Organics Concentration Relative to CUL [a/] 1500 µg/L	Benzene Concentration (µg/L)	Benzene Concentration Relative to CUL [a/] 4.6 µg/L	Naphthalene Concentration (µg/L)	Naphthalene Concentration Relative to CUL [a/] 1.7 µg/L
SS017-MW004 Source Area (17 to 37)	28-Aug-17	--	16.47	LNAPL	LNAPL	LNAPL	LNAPL	LNAPL	LNAPL
	2-Aug-18	N	15.57	**46,000**	30.7	**73**	15.9	**320**	188
	7-Aug-19	N	17.37	**4,200**	2.8	**42**	9.1	**240**	141
	3-Oct-20	N	14.90	**50,000**	33.3	**36**	7.8	**170**	100
	24-Aug-21	N	15.30	**32,000 J**	21.3	**49**	10.7	**120 J**	70.6
	27-Aug-22	N	12.93	**46,000**	30.7	**55**	12.0	**47**	27.6
	10-Sep-23	N	12.30	**38,000**	25.3	**78**	17.0	**140**	82.4
SS017-MW007	5-Sep-17	N	16.73	**28,000**	18.7	**79**	17.2	**330**	194
SS017-MW007R Source Area (15 to 35)	13-Aug-19	N	15.51	**12,000**	8.0	**53**	11.52	**250**	147
	3-Oct-20	N	14.05	**36,000**	24.0	**22**	4.78	**150**	88.2
	23-Aug-21	N	14.41	**37,000 J**	24.7	**21**	4.57	**53**	31.2
	12-Sep-23	N	11.33	**30,000**	20.0	**37**	8.04	**31**	18.2
SS014-MW004 Source Area (12 to 37)	13-Sep-13	N	17.52	**6,800**	4.53	**18**	3.91	**110**	64.7
	23-Apr-14	N		**12,000**	8.00	**34**	7.39	**84**	49.4
	27-Aug-14	N	15.17	**4,800**	3.20	**15**	3.26	**79**	46.5
	7-Sep-15	N	14.29	**3,300**	2.20	**6.5**	1.41	**15**	8.82
	30-Jul-16	N	12.12	**3,800**	2.53	**6.4**	1.39	**97**	57.1
	30-Jul-16	FD		**4,400**	2.93	**6.6 J**	1.43	**98 J**	57.6
	16-Aug-17	N	16.97	**8,400**	5.60	**13**	2.83	**79**	46.5
	14-Aug-18	N	17.18	**5,000**	3.33	**8.5 J**	1.85	**12 J**	7.06
	7-Aug-19	N	18.69	**6,000**	4.00	**16**	3.48	**40**	23.5
	4-Oct-20	N	16.61	**16,000**	10.7	**3.5**	0.76	**12**	7.06
	24-Aug-21	N	16.52	**7,400**	4.9	**10**	2.17	**21 B**	12.4
	15-Aug-22	N	14.35	**21,000**	14.0	**4.9**	1.07	**13**	7.6
	6-Sep-23	N	14.44	**4,900**	3.3	**17**	3.70	**41**	24.1
SS014-MW005 Source Area (45 to 55) sample frequency reduced to once every 5 years	13-Sep-13	N	17.55	**680**	0.45	**0.12 J**	0.03	0.5 U	< 0.29
	19-Apr-14	N	--	**580**	0.39	**0.11 J**	0.02	0.5 U	< 0.29
	16-Aug-17	N	17.01	**1,100**	0.73	**0.25 J**	0.05	0.1 U	< 0.06
	7-Aug-18	N	17.54	**480 J**	0.32	**0.25 J**	0.05	0.5 U	< 0.29
	4-Oct-20	N	16.65	**1,900**	1.27	**1.3**	0.28	0.25 U	<0.15
	24-Aug-21	N	16.58	**1,700**	1.13	0.15 U	<0.03	0.25 U	<0.15
	6-Sep-23	N	14.38	**1,600**	1.07	**4.1**	0.89	**0.51 J**	0.3
SS014-MW007 Source Area (15 to 35)	23-Aug-17	N	13.75	**16,000**	10.7	**10**	2.17	**88**	51.8
	23-Aug-17	FD		**15,000**	10.0	**9.8**	2.13	**88**	51.8
	22-Aug-18	N	12.77	**18,000**	12.0	**14**	3.04	**30**	17.6
	22-Aug-18	FD		**18,000**	12.0	**13**	2.83	**29**	17.1
	6-Aug-19	N	15.24	**19,000**	12.7	**13**	2.83	**9.2**	5.41
	3-Oct-20	N	12.90	**14,000**	9.33	**1.4**	0.30	**5.4**	3.18
	24-Aug-21	N	12.99	**16,000 J**	10.7	**10**	2.17	**12 B**	7.06
	15-Aug-22	N	10.85	**21,000**	14.0	**4.5**	0.98	**4.9**	2.88
	7-Sep-23	N	10.44	**14,000**	9.3	**11**	2.39	**15**	8.82

Table 5-1
Groundwater Monitoring - Site SS017

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Diesel Range Organics		Benzene		Naphthalene	
				Concentration (µg/L)	Concentration Relative to CUL [a/] 1500 µg/L	Concentration (µg/L)	Concentration Relative to CUL [a/] 4.6 µg/L	Concentration (µg/L)	Concentration Relative to CUL [a/] 1.7 µg/L
SS014-MW006 In-Plume (30 to 40)	23-Aug-17	N	13.46	**7,100**	4.73	**7.4**	1.61	**9.7**	5.71
	25-Aug-18	N	12.25	**7,100**	4.73	**7.9 J**	1.72	**2.3 J**	1.35
	7-Aug-19	N	14.74	**9,800**	6.53	**9.5**	2.07	**3.4**	2.00
	3-Oct-20	N	12.75	**10,000**	6.67	**9.6**	2.09	**17**	10.0
	23-Aug-21	N	16.97	**9,500**	6.33	**8.3**	1.80	**11 B**	6.47
	7-Sep-23	N	10.10	**14,000**	9.33	**7.7**	1.67	**5.6**	3.29
SS014-MW001 Downgradient (20 to 40)	8-Oct-11	N	17.14	**316**	0.21	**0.419 J**	0.09	0.22 U	< 0.13
	23-Apr-12	N	25.71	**2,430**	1.62	**3.63**	0.79	**0.237 J**	0.14
	7-Sep-13	N	14.65	**2,600**	1.73	**1.7**	0.37	0.5 U	< 0.29
	22-Aug-14	N	--	**1,900**	1.27	**1.6**	0.35	0.5 U	< 0.29
	3-Sep-15	N	11.82	**2,800**	1.87	**4**	0.87	0.5 U	< 0.29
	31-Jul-16	N	8.78	**3,000**	2.00	**3.2**	0.70	**0.82 J**	0.48
	24-Aug-17	N	14.29	**2,500**	1.67	**2.6**	0.57	**0.53 J**	0.31
	22-Aug-18	N	13.17	**2,900**	1.93	**3.7**	0.80	0.5 U	< 0.29
	6-Aug-19	N	15.63	**3,800**	2.53	**3.9**	0.85	0.5 U	< 0.29
	3-Oct-20	N	13.49	**820**	0.55	**0.41 B**	0.09	0.25 U	<0.15
	24-Aug-21	N	13.41	**2,500**	1.67	**2.9**	0.63	**4.1 B**	2.4
	15-Aug-22	N	11.26	**2,600**	1.73	**1.6**	0.35	0.5 U	< 0.29
	7-Sep-23	N	10.84	**5,200**	3.47	**4.5**	0.98	**1.7 J**	1.00
SS014-MW002 Downgradient (50 to 60)	11-Oct-11	N	17.62	**3,830**	2.55	**6.84**	1.49	0.22 U	< 0.13
	23-Apr-12	N	25.78	**4,220**	2.81	**6.32**	1.37	0.22 U	< 0.13
	7-Sep-13	N	14.69	**3,200**	2.13	**3.8**	0.83	0.5 U	< 0.29
	25-Aug-14	N	12.17	**3,400**	2.27	**3.9 J**	0.85	0.5 U	< 0.29
	3-Sep-15	N	11.82	**2,300**	1.53	**2.5**	0.54	0.5 U	< 0.29
	31-Jul-16	N	8.85	**1,700**	1.13	**1.7**	0.37	0.5 U	< 0.29
	24-Aug-17	N	14.37	**4,100**	2.73	**4.2**	0.91	0.5 U	< 0.29
	22-Aug-18	N	13.22	**3,300**	2.20	**3.5**	0.76	0.5 U	< 0.29
	6-Aug-19	N	15.70	**4,900**	3.27	**4.1**	0.89	0.5 U	< 0.29
	6-Aug-19	FD		**4,100**	2.73	**4.1**	0.89	0.5 U	< 0.29
	3-Oct-20	N	13.58	**3,100**	2.07	**3.5**	0.76	0.25 U	<0.15
	3-Oct-20	FD		**3,300**	2.20	**3.7**	0.80	0.25 U	<0.15
	24-Aug-21	N	13.49	**2,700**	1.80	**2.8**	0.61	**9.5 B**	5.6
	24-Aug-21	FD		**2,600**	1.73	**2.4**	0.52	**3.4 B**	2.0
	15-Aug-22	FD	11.35	**1,900**	1.27	**1.7**	0.37	0.5 U	< 0.29
	15-Aug-22	N		**1,600**	1.07	**1.7**	0.37	0.5 U	< 0.29
	7-Sep-23	FD	10.83	**1,900**	1.27	**2.2**	0.48	0.5 U	< 0.29
	7-Sep-23	N		**2,000**	1.33	**2.2**	0.48	0.5 U	< 0.29

Table 5-1
Groundwater Monitoring - Site SS017

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Diesel Range Organics		Benzene		Naphthalene	
				Concentration (μg/L)	Concentration Relative to CUL [a/] 1500 μg/L	Concentration (μg/L)	Concentration Relative to CUL [a/] 4.6 μg/L	Concentration (μg/L)	Concentration Relative to CUL [a/] 1.7 μg/L
SS014-MW003 Downgradient (70 to 80) sample frequency reduced to once every 5 years	11-Oct-11	N	17.54	**864**	0.58	0.16 U	< 0.03	0.22 U	< 0.13
	23-Apr-12	N	25.71	**775**	0.52	0.16 U	< 0.03	0.22 U	< 0.13
	7-Sep-13	N	14.62	**350 J**	0.23	0.1 U	< 0.02	0.5 U	< 0.29
	25-Aug-14	N	12.11	**240 J**	0.16	0.1 U	< 0.02	0.5 U	< 0.29
	3-Sep-15	N	11.70	**160 J**	0.11	0.1 U	< 0.02	0.5 U	< 0.29
	31-Jul-16	N	8.83	**350 J**	0.23	0.1 U	< 0.02	0.5 U	< 0.29
	24-Aug-17	N	13.29	**340 J**	0.23	0.1 U	< 0.02	0.5 U	< 0.29
	22-Aug-18	N	13.14	**340 J**	0.23	0.1 U	< 0.02	0.5 U	< 0.29
	3-Oct-20	N	13.59	**970**	0.65	0.15 U	<0.03	**1.3**	0.76
	25-Aug-21	N	13.30	**660**	0.44	0.15 U	<0.03	**3.4 B**	2.00

Notes:
[a/] Concentration Relative to CUL = Concentration/Table C CUL for groundwater
Bold indicates the analyte was detected
Bold and shading indicates the concentration exceeds the CUL
-- = not available or not recorded
< = result is less than value shown
bgs = below ground surface
btoc = below top of casing
CUL = Table C cleanup level for groundwater (ADEC, October 2018)
FD = field duplicate sample
J = estimated value

LNAPL = well not sampled because measureable light non-aqueous phase liquid was present.
N = normal sample
U = non-detect at the listed method detection limit
UJ = analyte was not detected but the detection limit is estimated
μg/L = micrograms per liter

Table 5-2
Sulfate Concentrations in Groundwater - Site SS017

Monitoring Well (screened interval feet bgs)	Date	Type	Sulfate Concentration (mg/L)
SS017-MW005 (Upgradient - screened 15-35)	26-Aug-17	N	17.2
	03-Aug-18	N	19.1
	07-Aug-19	N	20.3
	03-Oct-20	N	22.5 J
	23-Aug-21	N	27.9
	26-Aug-22	N	21.2
	11-Sep-23	N	20.9
SS017-MW006 (Source Area - screened 15-35)	05-Sep-17	N	23.1
	02-Aug-18	N	76.5
	07-Aug-19	N	57.7
	03-Oct-20	N	37.4
	24-Aug-21	N	2.04
	26-Aug-22	N	17.5 J
	11-Sep-23	N	0.798 B
SS017-MW001 (Source Area - screened 15-35)	30-Aug-17	N	4.76
	30-Aug-17	FD	4.68
	02-Aug-18	N	79.7
	07-Aug-19	N	120
	03-Oct-20	N	66.1
	24-Aug-21	N	15.1
	27-Aug-22	N	5.44
	11-Sep-23	N	0.957 B
SS017-MW002 (Source Area - screened 15-35)	06-Sep-17	N	77.6
	06-Sep-17	FD	80.6
	01-Aug-18	N	250
	07-Aug-19	N	159
	03-Oct-20	N	139
	24-Aug-21	N	73.2
	26-Aug-22	N	191
	11-Sep-23	N	38.6
	11-Sep-23	FD	38.5
SS017-MW003 (Source Area - screened 17-37)	30-Aug-17	N	1280
	03-Aug-18	N	578
	07-Aug-19	N	637
	03-Oct-20	N	76
	24-Aug-21	N	116
	01-Sep-22	N	125
	11-Sep-23	N	269
SS017-MW004 (Source Area - screened 17-37)	02-Aug-18	N	377
	07-Aug-19	N	600
	03-Oct-20	N	361
	24-Aug-21	N	217
	27-Aug-22	N	493
	11-Sep-23	N	143
SS017-MW007 (Source Area - screened 15-35)	05-Sep-17	N	1.95
SS017-MW007R (Source Area - screened 15-35)	13-Aug-19	N	20
	03-Oct-20	N	29.9
	23-Aug-21	N	32.7
	26-Aug-22	N	53.5
	12-Sep-23	N	16.2
SS014-MW004 (Source Area - screened 12-37)	13-Sep-13	N	0.462 J
	16-Aug-17	N	0.458 J
	14-Aug-18	N	1.11
	07-Aug-19	N	3.06
	04-Oct-20	N	11.3
	24-Aug-21	N	4.5
	15-Aug-22	N	6.96
	06-Sep-23	N	32.4

Table 5-2
Sulfate Concentrations in Groundwater - Site SS017

Monitoring Well (screened interval feet bgs)	Date	Type	Sulfate Concentration (mg/L)
SS014-MW005 (Source Area - screened 45-55)	13-Sep-13	N	0.492 J
	16-Aug-17	N	0.33 J
	07-Aug-18	N	1.41
	04-Oct-20	N	58.7
	24-Aug-21	N	54.5
	06-Sep-23	N	32.8
SS014-MW007 (Source Area - screened 15-35)	23-Aug-17	N	13.7
	23-Aug-17	FD	12.5
	22-Aug-18	N	17.2
	22-Aug-18	FD	16.8
	06-Aug-19	N	49.1
	03-Oct-20	N	54.2
	24-Aug-21	N	13.0
	15-Aug-22	N	7.58
	07-Sep-23	N	8.83
SS014-MW006 (Downgradient - screened 30-40)	23-Aug-17	N	0.304 B
	25-Aug-18	N	15
	07-Aug-19	N	13.5
	03-Oct-20	N	0.12 J
	24-Aug-21	N	<0.090
	27-Aug-22	N	0.782 B
	07-Sep-23	N	12.1
SS014-MW001 (Downgradient - screened 20-40)	24-Aug-17	N	17.8
	22-Aug-18	N	2.18
	06-Aug-19	N	4.3
	03-Oct-20	N	42.6
	24-Aug-21	N	1.39
	15-Aug-22	N	3.97
	07-Sep-23	N	1.69
SS014-MW002 (Downgradient - screened 50-60)	24-Aug-17	N	0.283 J
	22-Aug-18	N	0.329
	06-Aug-19	N	1.24 J
	06-Aug-19	FD	1.47
	03-Oct-20	N	1.3
	03-Oct-20	FD	1.2
	24-Aug-21	N	3.58
	24-Aug-21	FD	3.81
	15-Aug-22	N	4.67
	15-Aug-22	FD	4.76
	07-Sep-23	N	2.37
	07-Sep-23	FD	2.40
SS014-MW003 (Downgradient - screened 70-80)	24-Aug-17	N	0.245 J
	22-Aug-18	N	0.305
	03-Oct-20	N	1.1
	25-Aug-21	N	<0.090

Notes:
Shaded values are elevated as compared to estimated range of background sulfate concentrations (20 to 40 mg/L). See text for additional discussion.
B = analyte detected in associated blank
bgs = below ground surface
FD = field duplicate sample
J = estimated value
mg/L = milligrams per liter
N = normal sample

Table 5-3
Static Soil Gas - Site SS017

Vapor Monitoring Point	Depth Interval (feet bgs)	Type	Date	Concentration (ppbv)	
				TPH-g	Benzene
SS017-VMP02	24-26	N	26-Apr-17	600,000	2,600
		FD	26-Apr-17	640,000	2,800
		N	3-May-18	470,000	9.4 U
		FD	3-May-18	470,000	9.3
		N	26-Apr-21	220,000 J	7.6 U
		FD	26-Apr-21	230,000 J	7.5 U
		N	3-May-22	200,000	12 U
SS017-VMP04	3-4	N	27-Apr-17	660,000	6.2 U
		FD	27-Apr-17	640,000	6.1 U
		N	3-May-18	19,000	0.6 J
		N	3-May-19	190,000 R	4.5 R
		N	27-Aug-20	54,000	9.5 U
		N	3-May-21	62,000 J	7.8 U
		N	3-May-22	66,000	6.5 U
		N	3-May-23	73,000	1.4 U
		FD	3-May-23	72,000	1.4 U
SS017-VMP05	16-18	N	3-May-23	11,000	0.71 U
	24-26	N	26-Apr-17	720,000	4,500
		FD	26-Apr-17	690,000	4,500
		N	2-May-18	600,000	240 J
		N	30-Apr-19	570,000 R	13 R
		N	3-May-21	120,000 J	7.1 U
		N	3-May-22	91,000	12 U
		N	3-May-23	64,000	5.7 U
SS017-VMP06	16-18	N	26-Apr-17	1,200,000	3,500
		N	3-May-18	450,000	9.5 U
		N	3-May-19	370,000 R	7.1 R
		FD	3-May-19	350,000 R	11 R
		N	3-May-21	150,000 J	15 U
		N	3-May-22	160,000	11 U
		N	3-May-23	120,000	3.1 U
SS017-VMP07	7-8	N	28-Apr-17	1,500,000	2,200
		N	3-May-18	390,000	100
		N	3-May-19	500,000 R	10 R
		N	27-Aug-20	490,000	7.2 J
		N	3-May-21	180,000 J	15 U
		N	3-May-22	240,000	11 U
SS017-VMP09	7-8	N	27-Apr-17	1,600,000	910
		N	3-May-18	400,000	68
		N	3-May-19	670,000 R	220 R
		N	27-Aug-20	800,000	230
		FD	27-Aug-20	720,000	230
		N	3-May-21	330,000 J	110
		N	3-May-22	360,000	93 J
		N	3-May-23	440,000	120
SS017-VMP11	24-26	N	26-Apr-17	680,000	4,900
		N	3-May-18	570,000	9.5 U
		N	30-Apr-19	590,000 R	13 R
		N	3-May-21	380,000 J	7.8 U
		N	3-May-22	280,000	12 U
		N	3-May-23	260,000	6.1 J
SS017-VMP14	7-8	N	27-Apr-17	700,000	6.5 U
		N	2-May-18	250,000	2.7 J
		N	3-May-19	120,000 R	4.9 R
		N	27-Aug-20	830	9 U
SS017-VMP18	16-18	N	26-Apr-17	940,000	620
		N	2-May-18	600,000	9.4 U
		N	2-May-19	220,000 R	9.0 R
		FD	2-May-19	220,000 R	8.2 R
		N	3-May-21	91,000 J	7.6 U
		N	3-May-22	78,000	5.6 U
		N	3-May-23	58,000	14 U

Notes:
bgs = below ground surface
FD = field duplicate sample
J = estimated value
N = normal sample
ppbv = parts per billion by volume
R = result is rejected and considered not usable because of apparent cross contamination in the field.
TPH-g = total petroleum hydrocarbons-gasoline
U = non-detect at the listed method detection limit

Table 5-4
Biodegradation Rates - Site SS017

Vapor Monitoring Point (VMP)	Depth Interval (feet bgs)	Date	Biodegradation Rate (mg-TPH/kg-soil day)
SS017-VMP05	16-18	05-May-17	0.99
		26-Apr-18	0.36
		26-Apr-19	0.61
		25-Apr-21	0.44
SS017-VMP13	16-18	05-May-17	1.1
		26-Apr-18	0.68
		26-Apr-19	0.45
		25-Apr-21	0.47
SS017-VMP14	7-8	26-Apr-23	0.84
	16-18	05-May-17	2.0
		26-Apr-18	0.49
		26-Apr-19	0.43
		25-Apr-21	0.72
		26-Apr-23	0.79
SS017-VMP16	8-9	26-Apr-19	0.38
		25-Apr-21	0.22
		26-Apr-23	oxygen increased
	24-26	05-May-17	3.1
		26-Apr-18	1.5
		26-Apr-19	under water
		25-Apr-21	0.77
		26-Apr-23	NS
SS017-VMP17	16-18	05-May-17	4.3
		26-Apr-18	0.72
		26-Apr-19	1.7
		25-Apr-21	1.4
		26-Apr-23	0.53
	24-26	05-May-17	6.1
		26-Apr-18	1.1
		26-Apr-19	0.46
		25-Apr-21	1.40
		26-Apr-23	NS

Notes:
bgs = below ground surface
kg = kilogram
mg = milligram
NS = interval could not be sampled because of unknown obstruction
TPH = total petroleum hydrocarbons
mg-TPH/kg-soil day = milligrams of TPH per kilogram of soil per day

Table 5-5
LNAPL Monitoring - Site SS017

Monitoring Well (screened interval feet bgs)	Date	Depth to LNAPL (feet btoc)	Depth to Groundwater (feet btoc)	LNAPL Thickness (feet)
SS017-MW001 (15-35)	29-Apr-17	26.54	28.62	2.08
	19-Jul-17	sheen	16.20	<0.01
	28-Aug-17	--	15.99	0.00
	26-Apr-18	28.49	30.36	1.87
	2-Aug-18	sheen	15.09	<0.01
	21-Apr-19	24.30	24.45	0.15
	4-May-19	-- [a/]	23.07 [a/]	0.00
	7-Aug-19	NM[/c]	16.97	NM
	16-Aug-20	10.94	10.95	0.01
	3-Oct-20	--	14.41	0.00
	24-Apr-21	25.09	26.34	1.25
	24-Aug-21	--	14.78	0.00
	22-Apr-22	26.50	28.15	1.65
	26-Aug-22	12.45	12.50	0.05
	28-Apr-23	23.62	24.28	0.66
	11-Sep-23	--	11.70	0.00
SS017-MW002 (15-35)	29-Apr-17	26.11	27.82	1.71
	19-Jul-17	15.69	15.70	0.01
	28-Aug-17	15.53	15.54	0.01
	27-Apr-18	28.01	29.99	1.98
	1-Aug-18	sheen	14.62 [/b]	<0.01
	21-Apr-19	23.91	23.92	0.01
	4-May-19	-- [a/]	22.59 [a/]	0.00
	7-Aug-19	NM	16.48	NM
	16-Aug-20	10.52	10.53	0.01
	3-Oct-20	--	14.00	0.00
	24-Apr-21	24.70	26.31	1.61
	24-Aug-21	--	14.38	0.00
	22-Apr-22	26.30	27.48	1.18
	26-Aug-22	--	12.00	0.00
	28-Apr-23	casing obstructed with ice ~ 3.5 feet btoc		
	11-Sep-23	sheen	11.34	<0.01
SS017-MW003 (17-37)	29-Apr-17	25.37	25.39	0.02
	19-Jul-17	15.69 [b/]	15.70 [b/]	0.01
	28-Aug-17	--	14.54 [b/]	0.00
	26-Apr-18	--	27.30	0.00
	3-Aug-18	sheen	13.8 [b/]	<0.01
	21-Apr-19	--	22.86	0.00
	4-May-19	-- [a/]	21.54 [a/]	0.00
	7-Aug-19	NM	15.51 [b/]	NM
	16-Aug-20	--	9.52	0.00
	3-Oct-20	--	12.98	0.00
	24-Apr-21	23.81	23.82	0.01
	24-Aug-21	--	13.22	0.00
	25-Apr-22	--	25.30	0.00
	29-Apr-23	casing obstructed with ice		
	11-Sep-23	--	10.15	0.00

Table 5-5
LNAPL Monitoring - Site SS017

Monitoring Well (screened interval feet bgs)	Date	Depth to LNAPL (feet btoc)	Depth to Groundwater (feet btoc)	LNAPL Thickness (feet)
SS017-MW004 (17-37)	29-Apr-17	27.12	28.07	0.95
	19-Jul-17	16.60 [b/]	16.61 [b/]	0.01
	28-Aug-17	16.42 [b/]	16.47 [b/]	0.05
	26-Apr-18	28.92	31.00	2.08
	2-Aug-18	sheen	15.57 [b/]	<0.01
	21-Apr-19	--	24.79	0.00
	4-May-19	-- [a/]	23.47 [a/]	0.00
	7-Aug-19	NM	17.37	NM
	16-Aug-20	11.40	11.41	0.01
	3-Oct-20	14.89	14.90	0.01
	24-Apr-21	25.56	26.65	1.09
	24-Aug-21	15.21	15.30	0.09
	22-Apr-22	27.10	28.17	1.07
	27-Aug-22	12.93	12.95	0.02
	28-Apr-23	24.08	24.83	0.75
	10-Sep-23	--	12.30	0.00
SS017-MW005 (15-35)	29-Apr-17	NA	NA	NA
	19-Jul-17	--	17.11	0.00
	26-Aug-17	--	16.58	0.00
	26-Apr-18	--	29.63	0.00
	3-Aug-18	--	16.01	0.00
	21-Apr-19	--	25.21	0.00
	4-May-19	-- [a/]	24.06 [a/]	0.00
	7-Aug-19	NM	17.90	NM
	16-Aug-20	--	11.80	0.00
	3-Oct-20	--	15.21	0.00
	24-Apr-21	--	26.11	0.00
	23-Aug-21	--	15.76	0.00
	22-Apr-22	--	27.60	0.00
	26-Aug-22	--	13.19	0.00
	28-Apr-23	--	24.56	0.00
	10-Sep-23	--	12.79	0.00
SS017-MW006 (15-35)	29-Apr-17	27.25	27.31	0.06
	19-Jul-17	sheen	16.61	<0.01
	28-Aug-17	--	16.40	0.00
	26-Apr-18	29.15	29.20	0.05
	2-Aug-18	sheen	15.47	<0.01
	21-Apr-19	--	24.74	0.00
	4-May-19	-- [a/]	23.51 [a/]	0.00
	7-Aug-19	NM	17.42	NM
	16-Aug-20	--	11.35	0.00
	3-Oct-20	14.79	14.80	0.01
	24-Apr-21	--	25.65	0.00
	24-Aug-21	--	15.21	0.00
	22-Apr-22	27.20	27.30	0.10
	26-Aug-22	--	12.76	0.00
	28-Apr-23	--	24.01	0.00
	11-Sep-23	--	12.13	0.00

Table 5-5
LNAPL Monitoring - Site SS017

Monitoring Well (screened interval feet bgs)	Date	Depth to LNAPL (feet btoc)	Depth to Groundwater (feet btoc)	LNAPL Thickness (feet)
SS017-MW007 (15-35)	29-Apr-17	26.52	28.18	1.66
	19-Jul-17	16.05	16.06	0.01
	28-Aug-17	sheen	15.92	<0.01
	26-Apr-18	28.66	29.77	1.11
	2-Aug-18	unable to monitor - well obstructed		
	21-Apr-19	unable to monitor - well obstructed		
SS017-MW007R (15-35)	13-Aug-19	NM[\c]	15.34	NM
	16-Aug-20	10.58	10.61	0.03
	3-Oct-20	--	14.05	0.00
	24-Apr-21	unable to monitor - well obstructed		
	23-Aug-21	--	14.41	0.00
	22-Apr-22	26.42	27.00	0.58
	26-Aug-22	--	12.05	0.00
	29-Apr-23	23.48	23.50	0.02
	12-Sep-23	--	11.33	0.00

Notes:

[a/] Sorbent sock was placed in well on 21 April 2019, after measurements were completed, and was removed on 29 April 2019.

[b/] Groundwater and LNAPL elevation above top of screened interval.

[c/] An LNAPL measurement was not collected but a sheen was observed on purge water or sampling equipment.

-- = no discernable presence
< = result is less than the value shown
bgs = below ground surface
btoc = below top of casing
LNAPL = light non-aqueous phase liquid
NM = a measurement for LNAPL thickness was not collected

Table 6-1
Groundwater Monitoring Site SS015

Monitoring Well (screened interval feet bgs)	Date	Type	Static Water Level (feet botc)	Tetrachloroethene (PCE) Concentration (µg/L)	Tetrachloroethene (PCE) Concentration Relative to CUL	Trichloroethene (TCE) Concentration (µg/L)	Trichloroethene (TCE) Concentration Relative to CUL	cis-1,2-Dichloroethene Concentration (µg/L)	cis-1,2-Dichloroethene Concentration Relative to CUL	Vinyl Chloride Concentration (µg/L)	Vinyl Chloride Concentration Relative to CUL	Ethene Concentration (µg/L)	Ethane Concentration (µg/L)
					41 µg/L		2.8 µg/L		36 µg/L		0.19 µg/L		
SS015-MW087 (15 to 35) upgradient	18-Sep-16	N	13.06	0.2 U	<0.005	0.1 U	<0.04	0.1 U	<0.003	0.2 U	<1.05	--	--
	6-Sep-17	N	16.47	0.2 U	<0.005	0.1 U	<0.04	0.1 U	<0.003	0.2 U	<1.05	--	--
	13-Aug-18	N	14.93	0.2 U	<0.005	0.1 U	<0.04	0.1 U	<0.003	0.2 U	<1.05	0.30 U	0.64 U
	4-Aug-19	N	16.78	0.2 U	<0.005	0.1 U	<0.04	0.01 U	<0.003	0.2 U	<1.05	0.30 U	0.64 U
	11-Oct-20	N	16.68	0.15 U	<0.004	0.15 U	<0.05	0.15 U	<0.004	0.15 U	<0.79	0.47 U	0.51 U
	3-Sep-21	N	12.94	0.15 U	<0.004	0.15 U	<0.05	0.15 U	<0.004	0.15 U	<0.79	0.47 U	0.51 U
	20-Aug-22	N	12.19	0.15 U	<0.004	0.1 U	<0.04	0.1 U	<0.003	0.11 U	<0.58	0.3 U	0.64 U
	13-Sep-23	N	11.23	0.15 U	<0.004	0.1 U	<0.04	0.1 U	<0.003	0.11 U	<0.58	0.3 U	0.64 U
SS015-MW43 (19 to 24) approximately 7 feet upgradient of PRB-1	26-Jul-09	N	-	**71**	1.73	**820 J**	293	**32 J**	0.89	0.27 U	<1.42	--	--
	28-Sep-09	N	-	**50 J**	1.22	**500 J**	179	**26**	0.72	0.27 U	<1.42	**0.15**	**0.11**
	15-Jul-10	N	13.82	**68**	1.66	**710**	254	**30**	0.83	0.12 U	<0.63	--	--
	16-Sep-10	N	15.57	**37**	0.90	**400**	143	**21**	0.58	0.12 U	<0.63	--	--
	13-Oct-10	N	21.48	**64**	1.56	**630**	225	**25**	0.69	0.12 U	<0.63	0.30 U	0.32 U
	11-May-11	N	19.81	**44.2**	1.08	**496**	177	**19.4**	0.54	1.6 U	<8.42	0.0398 U	0.573 U
	19-Sep-11	N	15.72	**64.3**	1.57	**698**	249	**24.5**	0.68	0.8 U	<4.21	0.0398 U	0.573 U
	19-Sep-11	FD		**49.9**	1.22	**597**	213	**18.6**	0.52	0.8 U	<4.21	0.0398 U	0.573 U
	3-May-12	N	21.95	**48**	1.17	**464**	166	**23.3**	0.65	0.8 U	<4.21	0.0398 U	0.573 U
	6-Sep-12	N	15.46	**58.6**	1.43	**556**	199	**27.5**	0.76	0.8 U	<4.21	0.0398 U	0.573 U
	6-Sep-12	FD		**57.6**	1.40	**528**	189	**27.7**	0.77	0.8 U	<4.21	0.0398 U	0.573 U
	26-Jul-13	N	12.06	**59**	1.44	**460**	164	**40**	1.11	0.2 U	<1.05	0.30 U	0.64 U
	22-Aug-13	N	15.15	**57**	1.39	**440**	157	**44**	1.22	0.2 U	<1.05	0.30 U	0.64 U
	20-Jul-14	N	8.84	**41**	1.00	**350**	125	**53**	1.47	0.2 U	<1.05	0.30 U	0.64 U
	8-Jun-15	N	-	**51**	1.24	**460**	164	**67**	1.86	0.2 U	<1.05	0.30 U	0.64 U
	13-Jul-15	N	14.25	**36**	0.88	**270**	96.4	**72**	2.00	**0.22 J**	1.16	0.30 U	0.64 U
	14-Aug-18	N	14.26	**31**	0.76	**250**	89.3	**65**	1.81	0.2 U	<1.05	0.30 U	0.64 U
	6-Aug-19	N	15.69	**19**	0.46	**120**	42.9	**60**	1.67	**0.44 J**	2.32	0.30 U	0.64 U
	8-Oct-20	N	15.57	**21**	0.51	**120**	42.9	**59**	1.64	0.15 U	<0.79	0.47 U	0.51 U
	3-Sep-21	N	12.28	**14**	0.34	**97**	34.6	**55**	1.53	0.15 U	<0.79	**3.5 J**	0.51 U
	20-Aug-22	N	11.52	**7.8**	0.19	**43**	15.4	**62**	1.72	**5.8**	30.5	**1.7 J**	0.64 U
	13-Sep-23	N	11.56	**6.7 J**	0.02	**77 J**	27.5	**39 J**	1.08	**5.3 J**	27.9	**5.5**	32 U
SS015-EW01 (25 to 50) approximately 5 feet upgradient of PRB-2	14-Oct-10	N	20.86	**96**	2.34	**440**	157	**4.6**	0.13	0.12 U	<0.63	0.30 U	0.32 U
	14-Oct-10	FD		**97**	2.37	**430**	154	**4.9**	0.14	0.12 U	<0.63	0.30 U	0.32 U
	11-May-11	N	17.66	**29**	0.71	**376**	134	**10**	0.28	0.8 U	<4.21	0.0398 U	0.573 U
	24-Jun-11	N	-	**38.6**	0.94	**237**	84.6	**4.05**	0.11	0.4 U	<2.1	--	--
	19-Sep-11	N	14.98	**55.8**	1.36	**332**	119	**62.2**	1.73	**0.688 J**	3.62	0.0398 U	0.573 U
	3-May-12	N	18.75	**9.65**	0.24	**127**	45.4	**360**	10.0	**0.443 J**	2.33	0.0398 U	0.573 U
	3-May-12	FD		**9.59**	0.23	**126**	45.0	**355**	9.86	**0.424 J**	2.23	0.0398 U	0.573 U
	6-Sep-12	N	14.52	**14.1**	0.34	**355**	127	**113 J**	3.14	**0.543 J**	2.86	0.0398 U	0.573 U
	14-May-13	N	26.39	0.15 U	<0.004	**0.93 J**	0.33	**500**	13.9	**0.83 J**	4.37	**1.8 J**	0.64 U
	14-May-13	FD		0.15 U	<0.004	**0.83 J**	0.30	**470**	13.1	**0.85 J**	4.47	**35**	**0.67 J**
	25-Jul-13	N	-	**14**	0.34	**78**	27.9	**50**	1.39	0.2 U	<1.05	0.30 U	0.64 U
	25-Jul-13	FD		**13**	0.32	**77**	27.5	**50**	1.39	0.2 U	<1.05	0.30 U	0.64 U

Table 6-1
Groundwater Monitoring Site SS015

Monitoring Well (screened interval feet bgs)	Date	Type	Static Water Level (feet botc)	Tetrachloroethene (PCE) Concentration (µg/L)	Tetrachloroethene (PCE) Concentration Relative to CUL 41 µg/L	Trichloroethene (TCE) Concentration (µg/L)	Trichloroethene (TCE) Concentration Relative to CUL 2.8 µg/L	cis-1,2-Dichloroethene Concentration (µg/L)	cis-1,2-Dichloroethene Concentration Relative to CUL 36 µg/L	Vinyl Chloride Concentration (µg/L)	Vinyl Chloride Concentration Relative to CUL 0.19 µg/L	Ethene Concentration (µg/L)	Ethane Concentration (µg/L)
SS015-EW01 (25 to 50) approximately 5 feet upgradient of PRB-2	22-Aug-13	N	14.31	**10**	0.24	**69**	24.6	**110**	3.06	0.2 U	<1.05	0.30 U	0.64 U
	21-Sep-13	N	-	**0.5 J**	0.01	**2.3**	0.82	**350**	9.72	**0.23 J**	1.21	--	--
	25-Apr-14	N	33.01	0.76 UJ	<0.02	**0.83 J**	0.30	**520 J**	14.4	**1.4 J**	7.37	**1.0 J**	0.64 UJ
	26-May-14	N	17.62	**2**	0.05	**20**	7.14	**190**	5.28	0.2 U	<1.05	--	--
	26-May-14	FD		**2**	0.05	**20**	7.14	**170**	4.72	0.2 U	<1.05	--	--
	27-Jun-14	N	16.76	**5**	0.12	**17**	6.07	**160**	4.44	0.2 U	<1.05	--	--
	27-Jun-14	FD		**5.1**	0.12	**17**	6.07	**160**	4.44	0.2 U	<1.05	--	--
	21-Jul-14	N	15.26	**4.2**	0.10	**12**	4.29	**190**	5.28	0.2 U	<1.05	0.30 U	0.64 U
	21-Jul-14	FD		**4**	0.10	**11**	3.93	**190**	5.28	0.2 U	<1.05	0.30 U	0.64 U
	21-Aug-14	N	15.19	**0.89 J**	0.02	**4.4**	1.57	**240**	6.67	**0.25 J**	1.32	--	--
	21-Aug-14	N		**0.84 J**	0.02	**3.8**	1.36	**230**	6.39	**0.23 J**	1.21	--	--
	20-Sep-14	N	15.62	**0.53 J**	0.01	**1.1**	0.39	**220**	6.11	**0.44 J**	2.32	--	--
	20-Sep-14	FD		**0.53 J**	0.01	**0.98 J**	0.35	**240**	6.67	**0.42 J**	2.21	--	--
	9-Jun-15	N	-	0.15 U	<0.004	**1.2**	0.43	**230 J**	6.39	**12**	63.2	**0.45 J**	0.64 U
	9-Jun-15	FD		0.15 U	<0.004	**1.3**	0.46	**230**	6.39	**13**	68.4	**0.35 J**	0.64 U
	14-Jul-15	N	13.26	**1.1**	0.03	**3.9**	1.39	**150**	4.17	**14**	73.7	**2.8**	0.64 U
	16-Aug-18	N	14.61	0.2 U	<0.005	**4.4**	1.57	**6.7**	0.19	**6.6**	34.7	**30.0**	**2.7**
	14-Aug-19	N	13.2	0.26 J	0.01	**0.95 J**	0.34	**6**	0.17	**2.1**	11.1	**7.6**	**5.2**
	8-Oct-20	N	16.55	**0.48 B**	0.01	**3.5**	1.25	**8**	0.22	**1.9**	10.0	0.47 U	0.51 U
SS015-BW02 (29 to 54) approximately 15 feet downgradient of PRB-2	14-Oct-10	N	23.34	**4.2**	0.10	**130**	46.4	**10**	0.28	0.12 U	<0.63	0.30 U	0.32 U
	10-May-11	N	17.34	**0.717 J**	0.02	**89.3**	31.9	**5.2**	0.14	0.4 U	<2.1	0.0398 U	0.573 U
	20-Sep-11	N	13.82	**2.51**	0.06	**82.7**	29.5	**3.08**	0.09	0.4 U	<2.1	0.0398 U	0.573 U
	25-Apr-12	N	24.05	**1.15**	0.03	**84.3**	30.1	**5.16**	0.14	0.4 U	<2.1	0.0398 U	0.573 U
	6-Sep-12	N	13.44	**1.62**	0.04	**85.9**	30.7	**2.77**	0.08	0.4 U	<2.1	0.0398 U	0.573 U
	14-May-13	N	25.73	**0.88 J**	0.02	**96**	34.3	**20**	0.56	0.2 U	<1.05	0.30 U	0.64 U
	25-Jul-13	N	10.1	**1.9**	0.05	**56**	20.0	**4.8**	0.13	0.2 U	<1.05	0.30 U	0.64 U
	22-Aug-13	N	13.32	**3.5**	0.09	**73**	26.1	**6**	0.17	0.2 U	<1.05	0.30 U	0.64 U
	21-Sep-13	N	12.36	**1.7 J**	0.04	**70 J**	25.0	**13 J**	0.36	0.2 UJ	<1.05	--	--
	21-Sep-13	FD		**1.8**	0.04	**76**	27.1	**13**	0.36	0.2 U	<1.05	--	--
	23-Apr-14	N	24.02	**5.6 J**	0.14	**81 J**	28.9	**17 J**	0.47	0.2 UJ	<1.05	0.30 U	0.64 U
	21-Jul-14	N	6.9	**1.8**	0.04	**54**	19.3	**33**	0.92	0.2 U	<1.05	0.30 U	0.64 U
	8-Jun-15	N	-	**3.4**	0.08	**53**	18.9	**29**	0.81	0.2 U	<1.05	0.30 U	0.64 U
	13-Jul-15	N	12.25	**1.6**	0.04	**39**	13.9	**45**	1.25	0.2 U	<1.05	0.30 U	0.64 U
	14-Aug-18	N	12.17	**0.45 J**	0.01	**26**	9.29	**70**	1.94	**0.38 J**	2.00	0.30 U	0.64 U
	3-Aug-19	N	14.31	0.2 U	<0.005	**1.7**	0.61	**80**	2.22	**0.69 J**	3.63	0.30 U	0.64 U
	8-Oct-20	N	13.82	0.15 U	<0.004	**28**	10.0	**30**	0.83	**1.2**	6.32	0.47 U	0.51 U
	3-Sep-21	N	10.34	0.15 U	<0.004	**1.7**	0.61	**11**	0.31	0.15 U	<0.79	**29**	0.51 U
	19-Aug-22	N	9.84	0.15 U	<0.004	**6.7**	2.39	**5.6**	0.16	**2.3**	12.11	**4.1**	**0.84 J**
	12-Sep-23	N	8.5	0.15 U	<0.004	**1.8**	0.64	**2.1**	0.06	**1.7**	8.95	**6.9**	**2.3**

Table 6-1
Groundwater Monitoring Site SS015

Monitoring Well (screened interval feet bgs)	Date	Type	Static Water Level (feet botc)	Tetrachloroethene (PCE)		Trichloroethene (TCE)		cis-1,2-Dichloroethene		Vinyl Chloride		Ethene	Ethane
				Concentration (µg/L)	Concentration Relative to CUL	Concentration (µg/L)	Concentration Relative to CUL	Concentration (µg/L)	Concentration Relative to CUL	Concentration (µg/L)	Concentration Relative to CUL	Concentration (µg/L)	Concentration (µg/L)
					41 µg/L		2.8 µg/L		36 µg/L		0.19 µg/L		
SS015-EW02 (25 to 50) approximately 27 feet downgradient of PRB-2	14-Oct-10	N	20.1	**18**	0.44	**400**	143	**4.5**	0.13	0.12 U	<0.63	0.30 U	0.32 U
	14-Aug-18	N	12.3	0.2 U	<0.005	**17**	6.07	**220**	6.11	**85**	447	**37**	0.64 U
	4-Aug-19	N	14.3	0.2 U	<0.005	**1.5**	0.54	**5.8**	0.16	**2.9**	15.3	**120**	**0.94 J**
	8-Oct-20	N	25.05	0.15 U	<0.004	**16**	5.71	**4.9**	0.14	**1.5**	7.89	0.47 U	0.51 U
	3-Sep-21	N	10.48	0.15 U	<0.004	0.15 U	<0.05	**0.3 J**	0.0083	0.15 U	<0.79	39	3.4 J
	20-Aug-22	N	9.76	0.15 U	<0.004	**2.1**	0.75	**19**	0.53	**1.8**	9.47	**0.59 J**	**2 J**
	12-Sep-23	N	8.69	0.15 U	<0.004	**0.97 J**	0.35	**6**	0.17	**3.7**	19.47	**7.9**	**6.40**
SS015-MW088 (68 to 78) approximately 12 feet upgradient of PRB-3	24-Aug-18	N	5.92	0.2 U	<0.005	**4.3**	1.54	**45**	1.25	**0.64 J**	3.37	0.30 U	0.64 U
	24-Aug-18	FD		0.2 U	<0.005	**4.3**	1.54	**46**	1.28	**0.64 J**	3.37	0.30 U	0.64 U
	3-Aug-19	N	9.15	0.2 U	<0.005	**0.19 J**	0.07	**95**	2.64	**5.9**	31.1	**2.3**	0.64 U
	3-Aug-19	FD		0.2 U	<0.005	**0.18 J**	0.06	**93**	2.58	**5.7**	30.0	**2.2**	0.64 U
	11-Oct-20	N	9.7	0.15 U	<0.004	0.15 U	<0.05	**2.3**	0.06	**2 J**	10.5	**140**	0.51 U
	11-Oct-20	FD	9.7	0.15 U	<0.004	0.15 U	<0.05	**2.8**	0.08	**2.8 J**	14.7	**110**	0.51 U
	2-Sep-21	N	5.21	0.15 U	<0.004	0.15 U	<0.05	0.15 U	<0.004	0.15 U	<0.79	**46**	**7.2**
	2-Sep-21	FD	5.21	0.15 U	<0.004	0.15 U	<0.05	**0.51 J**	0.014	0.15 U	<0.79	**46**	**7.4**
	18-Aug-22	FD	4.87	0.15 U	<0.004	**0.28 J**	0.10	**0.68 J**	0.019	**0.61 J**	3.2	**--**	**--**
	18-Aug-22	N		0.15 U	<0.004	**0.29 J**	0.10	**0.64 J**	0.018	**0.55 J**	2.9	**8.7**	**5.2**
	13-Sep-23	N	3.71	0.15 U	<0.004	**0.43 J**	0.15	**0.55 J**	0.015	**0.54 J**	2.8	**3.6**	**11**
	13-Sep-23	FD		0.15 U	<0.004	**0.38 J**	0.14	**0.57 J**	0.016	**0.51 J**	2.7	**--**	**--**
SS015-MW079 (50 to 60) approximately 60 feet downgradient of PRB-3	10-Oct-10	N	20.71	0.16 U	<0.004	**2.9**	1.04	**4.5**	0.13	0.12 U	<0.63	--	--
	2-May-11	N	-	0.2 U	<0.005	**22.3**	7.96	**8.07**	0.22	0.4 U	<2.1	--	--
	5-Oct-11	N	17.07	0.2 U	<0.005	**12.6**	4.50	**7.17**	0.20	0.4 U	<2.1	0.0398 U	0.573 U
	5-Oct-11	FD		0.2 UJ	<0.005	**10.9 J**	3.89	**5.42 J**	0.15	0.4 UJ	<2.1	0.0398 U	0.573 U
	24-Apr-12	N	25.39	0.2 U	<0.005	**16.9**	6.04	**7.97**	0.22	0.4 U	<2.1	**1.01 J**	0.573 U
	15-Aug-18	N	13.03	0.2 U	<0.005	**0.45 J**	0.16	**33**	0.92	**0.35 J**	1.84	0.30 U	0.64 U
	3-Aug-19	N	15.29	0.2 U	<0.005	**0.1 U**	<0.04	**57**	1.58	**1.9**	10.0	**1.2 J**	0.64 U
	8-Oct-20	N	15.2	0.15 U	<0.004	**1.9**	0.68	**14**	0.39	**1.6**	8.42	0.47 U	0.51 U
	2-Sep-21	N	11.31	0.15 U	<0.004	0.15 U	<0.05	**0.26 J**	0.0072	0.15 U	<0.79	**55**	0.51 U
	18-Aug-22	N	11.01	0.15 U	<0.004	0.1 U	<0.04	**0.15 J**	0.0042	**0.25 J**	1.3	**16 J**	**1.4 J**
	13-Sep-23	N	9.74	0.15 U	<0.004	0.1 U	<0.04	**0.16 J**	0.0044	**0.19 J**	1.0	**11**	**9.2**
SS015-MW080 (70.5 to 80.5) approximately 58 feet downgradient of PRB-3	10-Oct-10	N	21.31	0.16 U	<0.004	**81**	28.9	**5.4**	0.15	0.12 U	<0.63	--	--
	4-May-11	N	23.81	0.2 U	<0.005	**30.2**	10.8	**2.04**	0.06	0.4 U	<2.1	--	--
	4-Oct-11	N	17.45	0.2 U	<0.005	**44.3**	15.8	**3.13**	0.09	0.4 U	<2.1	0.0398 U	0.573 U
	24-Apr-12	N	25.72	0.2 U	<0.005	**25**	8.93	**1.82**	0.05	0.4 U	<2.1	0.0398 U	0.573 U
	2-Sep-13	N	14.97	0.15 U	<0.004	**37**	13.2	**3.6**	0.10	0.2 U	<1.05	0.30 U	0.64 U
	15-Aug-18	N	13.42	0.2 UJ	<0.005	**2.9 J**	1.04	**43 J**	1.19	**0.59 J**	3.11	0.30 U	0.64 U
	3-Aug-19	N	15.62	0.2U	<0.005	**0.14 J**	0.05	**51**	1.42	**2.1**	11.1	**0.96 J**	0.64 U
	7-Oct-20	N	15.73	0.15 U	<0.004	0.15 U	<0.05	**17**	0.47	**14**	73.7	**57**	0.51 U
	2-Sep-21	N	11.68	0.15 U	<0.004	0.15 U	<0.05	0.15 U	<0.004	0.15 U	<0.79	**24**	**3.4 J**
	18-Aug-22	N	11.88	0.15 U	<0.004	**0.26 J**	0.09	**0.38 J**	0.01	**0.56 J**	2.9	**5.8 J**	**11 J**
	13-Sep-23	N	10.25	0.15 U	<0.004	**0.24 J**	0.09	**0.25 J**	0.01	**0.36 J**	1.9	**3.4**	**6.90**

Table 6-1
Groundwater Monitoring Site SS015

Monitoring Well (screened interval feet bgs)	Date	Type	Static Water Level (feet botc)	Tetrachloroethene (PCE)		Trichloroethene (TCE)		cis-1,2-Dichloroethene		Vinyl Chloride		Ethene	Ethane
				Concentration (µg/L)	Concentration Relative to CUL	Concentration (µg/L)	Concentration Relative to CUL	Concentration (µg/L)	Concentration Relative to CUL	Concentration (µg/L)	Concentration Relative to CUL	Concentration (µg/L)	Concentration (µg/L)
					41 µg/L		2.8 µg/L		36 µg/L		0.19 µg/L		
SS015-MW73 (65 to 70) Downgradient in Old Town	22-Oct-09	N	27.4	0.1 U	<0.002	**8.7**	3.11	**1.7**	0.05	0.27 U	<1.42	--	--
	20-Jul-10	N	18.52	0.16 U	<0.004	**13**	4.64	**1.9**	0.05	0.12 U	<0.63	--	--
	14-Sep-10	N	20.66	0.16 U	<0.004	**9.3**	3.32	**1.4**	0.04	0.12 U	<0.63	--	--
	4-May-11	N	29.61	0.2 U	<0.005	**14.8**	5.29	**2.42**	0.07	0.4 U	<2.1	--	--
	20-Sep-11	N	21.25	0.2 U	<0.005	**10.5**	3.75	**1.76**	0.05	0.4 U	<2.1	0.0398 U	0.573 U
	2-May-12	N	24.95	0.2 U	<0.005	**14.6**	5.21	**2.71**	0.08	0.4 U	<2.1	0.0398 U	0.573 U
	2-May-12	FD		0.2 U	<0.005	**14.5**	5.18	**2.69**	0.07	0.4 U	<2.1	0.0398 U	0.573 U
	23-Apr-14	N	-	0.15 U	<0.004	**14**	5.00	**4.1**	0.11	0.2 U	<1.05	--	--
	14-Aug-18	N	19.07	0.2 U	<0.005	**8.9**	3.18	**16**	0.44	0.2 U	<1.05	--	--
	6-Aug-19	N	20.5	0.2 U	<0.005	**0.78 J**	0.28	**26**	0.72	**0.24 J**	1.26	--	--
	7-Oct-20	N	21.15	0.15 U	<0.004	**22**	7.86	**33**	0.92	**6.4**	33.7	--	--
	31-Aug-21	N	17.24	0.15 R	--	0.15 R	--	0.15 R	--	**1.3 J**	6.8	--	--
	20-Aug-22	N	16.75	0.15 U	<0.004	0.1 U	<0.04	**0.33 J**	0.01	**0.47 J**	2.5	--	--
	15-Sep-23	N	16.19	0.15 U	<0.004	**0.12 J**	0.043	**0.26 J**	0.01	**0.31 J**	1.6	**25**	**7.1**
SS015-MW085 (75 to 85) Downgradient toe of plume in Old Town	13-Oct-11	N	24.59	0.2 U	<0.005	**12.3 J**	4.39	**1.16**	0.03	0.4 U	<2.1	--	--
	4-Sep-13	N	20.21	0.15 U	<0.004	**13**	4.64	**1.3**	0.04	0.2 U	<1.05	--	--
	23-Aug-14	N	17.74	0.15 U	<0.004	**8.1**	2.89	**1.3**	0.04	0.2 U	<1.05	--	--
	2-Sep-15	N	15.23	0.15 U	<0.004	**9.4**	3.36	**2.6**	0.07	0.2 U	<1.05	--	--
	2-Sep-15	FD		0.15 U	<0.004	**8.6**	3.07	**2.2**	0.06	0.2 U	<1.05	--	--
	2-Aug-16	N	12.79	0.2 U	<0.005	**7.1**	2.54	**6.9**	0.19	0.2 U	<1.05	--	--
	17-Aug-17	N	18.72	0.2 U	<0.005	**3.3**	1.18	**7.7**	0.21	0.2 U	<1.05	--	--
	13-Aug-18	N	18.5	0.2 U	<0.005	**5.5**	1.96	**23**	0.64	0.2 U	<1.05	--	--
	3-Aug-19	N	20.68	0.2 U	<0.005	**0.24 J**	0.09	**33**	0.92	**0.57 J**	3.00	--	--
	7-Oct-20	N	20.88	0.15 U	<0.004	0.15 U	<0.05	**17**	0.47	**15**	78.9	--	--
	31-Aug-21	N	16.77	0.15 R	--	0.15 R	--	0.15 R	--	0.15 R	--	--	--
	20-Aug-22	N	16.23	0.15 U	<0.004	**0.13 J**	0.046	**0.17 J**	0.005	**0.36 J**	1.89	--	--
	14-Sep-23	N	15.58	0.15 U	<0.004	**0.18 J**	0.064	**0.14 J**	0.004	**0.25 J**	1.32	**14**	**3.8**

Notes:
Bold indicates the analyte was detected
Bold and shading indicates the concentration exceeds the CUL
Shading only indicates the analyte was not detected but the method detection limit exceeds the CUL
< = result is less than the value shown
bgs = below ground surface
btoc = below top of casing
CUL = Table C cleanup level for groundwater (ADEC, October 2018)
FD = field duplicate
J = the result is estimated
N = normal sample
PRB = permeable reactive barrier
R = the data are rejected because of deficiencies in meeting QC criteria and may not be used for decision making
U = not-detected at the listed method detection limit
UJ = the analyte was not detected but the detection limit is estimated
µg/L = micrograms per liter

Table 6-2
Bio-Dechlor Census Screening Results - Site SS015

Sample Identification	Sampling Location	Screened Interval (feet bgs)	Sample Date	Dehalococcoides species (cells/mL)	Functional Genes [a/]		
					tceA Reductase (cells/mL)	BAV1 VC Reductase (cells/mL)	VC Reductase (cells/mL)
SS015-MW087	Upgradient in upper VSZ	19-24	8/29/2018	**8.00E-01**	<0.400E-01	<0.400E-01	<0.400E-01
			8/18/2019	**1.59E+01**	<5.00E-01	<5.00E-01	<5.00E-01
			10/11/2020	**2.60E+00**	<0.400E-01	<0.400E-01	<0.400E-01
			9/13/2021	**2.00E+00**	<5.00E-01	<5.00E-01	<5.00E-01
			9/13/2022	**5.00E-01 J**	<5.00E-01	<5.00E-01	<5.00E-01
			9/18/2023	**1.30E+00**	< 3.00E-01	< 3.00E-01	< 3.00E-01
SS015-MW43	Directly upgradient of PRB-1 in upper VSZ	19-24	8/29/2018	**1.30E+00**	<0.400E-01	**8.00E-01**	**0.400E-01 J**
			8/18/2019	**8.30E+00**	<5.00E-01	<5.00E-01	<5.00E-01
			10/11/2020	**2.10E+00**	<5.00E-01	<5.00E-01	1.00E-01 J
			9/13/2021	**1.67E+02**	<5.00E-01	<5.00E-01	**7.80E+00**
			9/13/2022	**4.98E+02**	<5.00E-01	<5.00E-01	**9.55E+01**
			9/18/2023	**3.16E+02**	<3.00E-01	<3.00E-01	**7.70E+00**
SS015-EW01	Downgradient of PRB-1, directly upgradient of PRB-2 in lower VSZ / upper PSZ	25-50	8/28/2018	**3.11E+03**	<1.00E+00	<1.00E+00	**6.82E+02**
			8/18/2019	**7.66E+03**	<1.80E+00	<1.80E+00	**6.44E+02**
			10/11/2020	**1.38E+03**	<2.60E+00	<2.60E+00	**2.35E+02**
SS015-BW02	Directly downgradient of PRB-2 in lower VSZ / upper PSZ	29-54	8/28/2018	**7.80E+00**	<0.400E-01	<0.400E-01	<0.400E-01
			8/18/2019	**1.88E+02**	<5.00E-01	**3.00E-01 J**	**8.20E+00**
			10/11/2020	**1.20E+01**	<5.00E-01	<5.00E-01	**2.00E-01 J**
			9/13/2021	**2.44E+03**	<5.00E-01	<5.00E-01	**7.85E+01**
			9/13/2022	**8.78E+01**	<5.00E-01	<5.00E-01	**1.75E+01**
			9/18/2023	**7.13E+02**	<3.00E-01	<3.00E-01	**2.01E+01**
SS015-EW02	Downgradient of PRB-2 in lower VSZ / upper PSZ	25-50	8/28/2018	**5.32E+03**	<1.20E+00	<1.20E+00	**7.91E+02**
			8/18/2019	**1.58E+05**	< 5.00E-01	< 5.00E-01	**1.63E+04**
			10/11/2020	**2.57E+02**	<1.40E+00	<1.40E+00	**8.39E+01**
			9/13/2021	**2.66E+03**	<2.00E+00	<2.00E+00	**1.24E+02**
			9/13/2022	**3.73E+01**	<5.00E-01	<5.00E-01	**1.12E+01**
			9/18/2023	**5.45E+02**	<6.00E-01	<6.00E-01	**1.98E+01**
SS015-MW088	Upgradient of PRB-3 in PSZ	70-80	8/28/2018	**1.02E+01**	<0.400E-01	<0.400E-01	<0.400E-01
			8/18/2019	**3.38E+03**	<5.00E-01	**2.00E-01 J**	**2.71E+02**
			10/11/2020	**1.18E+05**	<1.90E+00	<1.90E+00	**1.24E+04**
			9/13/2021	**7.71E+02**	<6.00E-01	<6.00E-01	**1.19E+02**
			9/13/2022	**1.14E+01**	<2.00E-00	<2.00E-00	**8.60E+00**
			9/18/2023	**4.06E+01**	<2.00E-00	<2.00E-00	**1.29E+01**
SS015-MW079	Downgradient of PRB-3 in upper PSZ	50-60	8/28/2018	**1.74E+01**	<0.400E-01	<0.400E-01	<0.400E-01
			8/18/2019	**1.36E+02**	<5.00E-01	**6.00E-01**	**3.50E+00**
			10/11/2020	**4.40E+02**	**7.00E-01 J**	<9.00E-01	**8.27E+01**
			9/13/2021	**6.73E+03**	<5.00E-01	<5.00E-01	**3.40E+02**
			9/13/2022	**2.32E+02**	<5.00E-01	<5.00E-01	**4.09E+01**
			9/18/2023	**2.90E+03**	<3.00E-01	<3.00E-01	**1.01E+02**
SS015-MW080	Downgradient of PRB-3 in PSZ	70.5-80.5	8/28/2018	**1.40E+00**	<0.400E-01	<0.400E-01	<0.400E-01
			8/18/2019	**6.95E+01**	<6.00E-01	**3.00E-01 J**	**1.51E+01**
			10/11/2020	**8.44E+02**	<2.50E+00	**1.40E+00 J**	**2.69E+02**
			9/13/2021	**3.93E+02**	<1.00E+00	<1.00E+00	**5.32E+01**
			9/18/2023	**2.92E+03**	**8.00E-01**	<5.00E-01	**1.45E+02**
SS015-MW085	Downgradient of PRB-3 in PSZ	75-85	9/13/2022	**9.75E+01**	<7.00E-01	<7.00E-01	**2.68E+01**

Notes:

Wells listed in order from upgradient to downgradient.

[a/] tceA Reductase = trichloroethene (TCE) reductase enzyme responsible for reductive dechlorination of TCE; BAV1 VC Reductase = vinyl chloride (VC) reductase enzyme and VC Reductase = VC reductase enzyme both responsible for reductive dechlorination of VC.

< = indicates the result was not detected above the indicated practical quantitation limit (PQL)

bgs = below ground surface

cells/mL = cells per milliliter of sample

J = estimated value, gene copies are below the PQL but above the laboratory quantification limit (LQL)

PRB = permeable reactive barrier

PSZ = permenantly saturated zone

VSZ = variably saturated zone

Bold indicates analyte was detected

Table 6-3
Static Soil Gas - Site SS015

Vapor Monitoring Point (VMP)	Depth Interval (feet bgs)	Date	Sample Type	Concentration (ppbv)		
				Gasoline Range Organics (GRO)	Tetrachloroethene (PCE)	Trichloroethene (TCE)
SS015-VMP01	6-7	4/28/18	N	86,000	34 J	280
		4/27/19	N	16,000	26	170
		8/27/20	N	43,000	75	250
		4/18/21	N	13,000	29	150
		4/30/22	N	4,100	26	120
SS015-VMP02	6-7	4/28/18	N	140,000	29 U	29 U
		4/27/19	N	33,000	0.46 J	1.9 U
		8/27/20	N	150,000	7.9 U	7.9 U
		4/18/21	N	46,000	9.4 U	9.4 U
		4/30/22	N	54,000	7 U	7 U
SS015-VMP06	2-3	5/2/23	N	54 J	0.73 J	3.2
	8-9	4/28/18	N	1,100	13	1,300
		4/27/19	N	1,200	17	1,500
		8/27/20	N	2,300	46	2,300
		8/27/20	FD	2,300	48	2,600
		4/18/21	N	790	18	1,200
		4/30/22	N	500	16	840
		5/2/23	N	400	6.7	320
	11-13	5/2/23	N	120	33	150
SS015-VMP07	3-4	5/2/23	N	100	90	24
	5-6	8/27/20	N	3,400	3,400	780
		4/18/21	N	690	880	280
		4/30/22	N	610	810	230
		4/30/22	FD	620	820	230
		5/2/23	N	400	450	110
		5/2/23	FD	330	380	100
	10-12	5/2/23	N	33 J	22	15
SS015-VMP08 [a/]	2-3	4/28/18	N	4,300	6,100	690
		4/27/19	N	200	120	16
	6-7	4/28/18	N	7,900	8,700	3,800
		4/27/19	N	1,700	1,800	400
SS015-VMP08R	2-3	9/18/21	N	450,000	550	260
		5/4/22	N	51,000	-- [b/]	-- [b/]
		5/2/23	N	1,100	460	47
	6-7	9/18/21	N	360,000	2,400	630
		4/30/22	N	970	1,200	290
		5/2/23	N	1,600	870	170
	11.5-12.5	9/18/21	N	210,000	450	250
		4/30/22	N	450	380	340
		5/2/23	N	880	23	12

Notes:
[a/] SS015-VMP08 was lost during decomisssioning of the bioreactor in 2019.
[b/] Sample was inadvertently submitted for analysis of BTEX only.
bgs = below ground surface
ppbv = parts per billion by volume
N = normal sample
NS = not sampled

Table 6-4
Mass Removal by SVE System - Site SS015

Sample Date	Days of Operation	Combined Extraction Flow Rate (scfm)	Periodic			Cumulative		
			Extraction Flow (cubic feet)	PCE Removed (lb)	TCE Removed (lb)	Flow (million cubic feet)	PCE Removed (lb)	TCE Removed (lb)
12-Oct-18	0.0	0	0	0	0.00	0	0.00	0.00
13-Oct-18	1.3	285	517,000	0.031	0.10	0.52	0.03	0.10
15-Oct-18	2	247	704,000	0.052	0.15	1.22	0.08	0.24
19-Oct-18	4	280	1,613,000	0.084	0.20	2.83	0.17	0.44
23-Jan-19	95	247	33,790,000	0.58	1.15	36.6	0.75	1.6
15-Mar-19	46	245	16,229,000	0.39	0.61	52.9	1.14	2.21
19-Apr-19	35	248	12,499,000	0.15	0.33	65.4	1.29	2.53
30-Sep-19	37	291	15,504,000	0.39	0.50	80.9	1.67	3.03
02-Mar-20	51	301	22,105,000	0.381	0.75	103	2.05	3.78
15-Aug-21	22.4	177	5,693,000	0.83	0.99	109	2.88	4.77
29-Sep-22	20	161	4,649,000	0.39	0.46	113	3.27	5.23
15-Dec-22	60	213	18,414,000	0.37	0.87	132	3.64	6.10
23-Feb-23	51	386	28,333,000	0.25	0.57	160	3.90	6.67
25-Apr-23	61	377	33,133,000	0.19	0.62	193	4.09	7.28

Notes:

TCE and VOC removal rates from SVE Annual Report Table 4.33 (Appendix C).
lb = pounds
PCE = perchloroethene (aka, tetrachloroethene)
scfm = standard cubic feet per minute
SVE = soil vapor extraction
TCE = trichloroethene

Table 7-1
Groundwater Monitoring - Site SS016

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Diesel Range Organics Concentration (µg/L)	Diesel Range Organics Concentration Relative to CUL [a/] 1500 µg/L	Benzene Concentration (µg/L)	Benzene Concentration Relative to CUL [a/] 4.6 µg/L	Naphthalene Concentration (µg/L)	Naphthalene Concentration Relative to CUL [a/] 1.7 µg/L
2541-MW-02 Upgradient (27 to 35)	29-Jun-01	N	--	**190**	0.13	**3.0**	0.65	**0.0073 F**	0.004
	11-Oct-01	N	--	**1,900**	1.27	NA	NA	NA	NA
	14-Jul-10	N	14.19	**320 J**	0.21	**0.11 J**	0.02	0.25 U	< 0.15
	23-Sep-10	N	14.75	**1,000**	0.67	**12**	2.61	0.25 U	< 0.15
	10-Sep-11	N	13.00	**1,040**	0.69	**5.72**	1.24	0.22 U	< 0.13
	9-Aug-16	N	7.69	110 U	< 0.07	**0.14 J**	0.03	0.1 U	< 0.06
	12-Aug-17	N	13.42	**1,000**	0.67	**0.13 J**	0.03	0.5 U	< 0.29
	9-Aug-18	N	14.11	**450 J**	0.30	0.1 U	< 0.02	0.5 U	< 0.29
	4-Oct-20	N	13.04	**460**	0.31	0.15 U	<0.03	**1**	0.59
	26-Aug-21	N	12.73	**400 B**	0.27	0.15 U	<0.03	0.25 UJ	< 0.15
SS016-MW002 Source Area (12 to 37)	9-Aug-16	N	9.92	**9,100**	6.07	**140**	30.4	**60 J**	35.3
	14-Aug-17	N	15.73	**15,000**	10.0	**170**	37.0	**61**	35.9
	9-Aug-18	N	16.32	**40,000**	26.7	**32**	6.96	**41**	24.1
	9-Aug-18	FD		**41,000**	27.3	**32 J**	6.96	**41 J**	24.1
	10-Aug-19	N	16.81	**26,000**	17.3	**16**	3.48	**15**	8.8
	10-Aug-19	FD		**26,000**	17.3	**16**	3.48	**15**	8.8
	1-Oct-20	N	14.81	**17,000**	11.3	**5.7**	1.24	**6.8**	4.00
	1-Oct-20	FD		**17,000**	11.3	**5.7**	1.24	**6.8**	4.00
	25-Aug-21	N	15.02	**2,600**	1.7	**3**	0.65	**3.3 B**	1.94
	25-Aug-21	FD		**2,300**	1.5	**--**	--	**--**	--
	16-Aug-22	FD	12.96	**3,700**	2.5	**13**	2.83	**4.3**	2.53
	16-Aug-22	N		**3,800**	2.5	**13**	2.83	**4.5**	2.65
	27-Aug-23	FD	15.19	**2,300**	1.5	1.3	0.28	0.5 U	< 0.29
	27-Aug-23	N		**2,200**	1.5	1.3	0.28	0.5 U	< 0.29
SS016-MW003 Downgradient - West (12 to 37)	21-Aug-16	N	10.09	**2,300**	1.53	**8.1**	1.76	0.097 U	< 0.06
	14-Aug-17	N	16.69	**2,300**	1.53	**6.6**	1.43	0.11 U	< 0.06
	14-Aug-17	FD		**2,500**	1.67	**6.4**	1.39	0.11 UJ	< 0.06
	9-Aug-18	N	17.26	**1,500**	1.00	**2.0**	0.43	0.5 U	< 0.29
	10-Aug-19	N	17.73	**730**	0.49	**2.1**	0.46	0.5 U	<0.29
	1-Oct-20	N	14.15	**1,000**	0.67	**1**	0.22	0.25 U	<0.15
	25-Aug-21	N	16.04	**630**	0.42	0.15 U	<0.03	0.25 U	< 0.15
	16-Aug-22	N	13.86	**970**	0.65	**1.4**	0.30	0.5 U	<0.29
	27-Aug-23	N	16.18	**750**	0.50	**0.29 J**	0.06	0.5 U	< 0.29
SS016-MW004 Downgradient Edge - East (12 to 37)	21-Aug-16	N	10.15	**190 J**	0.13	0.1 U	< 0.02	0.11 U	< 0.06
	16-Aug-17	N	16.62	**5,800**	3.87	**1.3**	0.28	0.1 U	< 0.06
	11-Aug-18	N	17.09	**3,500**	2.33	0.1 U	< 0.02	0.5 U	< 0.29
	11-Aug-18	FD		**3,600**	2.40	0.1 U	< 0.02	0.5 U	< 0.29
	10-Aug-19	N	17.73	**1,200**	0.80	0.1 U	<0.02	0.5 U	<0.29
	1-Oct-20	N	15.73	**1,200**	0.80	0.15 U	<0.03	0.25 U	<0.15
	26-Aug-21	N	15.84	**960**	0.64	0.15 U	<0.03	0.25 UJ	<0.15
	16-Aug-22	N	13.84	**130 J**	0.09	0.1 U	<0.02	0.5 U	<0.29
	27-Aug-23	N	16.12	**330 J**	0.22	0.1 U	< 0.02	0.5 U	< 0.29
SS016-MW005 Downgradient - East (12 to 37)	21-Aug-16	N	14.92	100 U	< 0.07	0.1 U	< 0.02	**0.19 J**	0.11
	16-Aug-17	N	17.37	**500 J**	0.33	**1.3**	0.28	0.11 U	< 0.06
	9-Aug-18	N	18.03	**220 J**	0.15	0.1 U	< 0.02	0.5 U	< 0.29
	1-Oct-20	N	16.44	**550**	0.37	0.15 U	<0.03	0.25 U	<0.15
	26-Aug-21	N	16.65	**430 B**	0.29	0.15 U	<0.03	0.25 UJ	<0.15
	15-Sep-23	N	14.05	100 U	< 0.07	0.1 U	< 0.02	0.5 U	< 0.29

Notes:
[a/] Concentration Relative to CUL = Concentration/Table C CUL for groundwater
Bold indicates the analyte was detected
Bold and shading indicates the concentration exceeds the CUL
-- = not available or not recorded
< = result is less than the value shown
bgs = below ground surface
btoc = below top of casing
CUL = Table C cleanup level for groundwater (ADEC, October 2018)
FD = field duplicate sample
J = estimated concentration
N = normal sample
NA = not analyzed
U = not-detected at the listed method detection limit
UJ = not-detected with an estimated method detection limit
µg/L = micrograms per liter

Table 7-2
Static Soil Gas - Site SS016

Vapor Monitoring Point (VMP)	Depth Interval (feet bgs)	Date	Sample Type	Concentration (ppbv)	
				TPH-g	Benzene
SS016-VMP03	22-24	22-Apr-17	N	7,400,000	200,000
		01-May-18	N	580,000	4.8
		30-Apr-19	N	650,000 R	81 R
		26-Apr-21	N	13,000	8.5 U
		02-May-22	N	23,000	5.8 U
		02-May-22	FD	21,000	7 U
		01-May-23	N	7,900	0.56 J
SS016-VMP04	13-15	22-Apr-17	N	9,300,000	110,000
		01-May-18	N	NS	NS
		26-Jul-19	N	11,000,000 R	650
		26-Apr-21	N	1,600,000	34
		02-May-22	N	NS	NS
		01-May-23	N	440,000	5.7 J
	22-24	22-Apr-17	N	4,200,000	120,000
		01-May-18	N	9,700	16
		30-Apr-19	N	480,000 R	100 R
		26-Apr-21	N	740	11
SS016-VMP08	9-10	23-Apr-17	N	230,000	120
		20-Sep-18	N	3,500	4.2
		01-May-19	N	820,000 R	100 R
		21-Aug-20	N	14,000	45.0
		26-Apr-21	N	690	0.15 J
	13-15	01-May-18	N	1,600	0.37 J
SS016-VMP09	9-10	01-May-19	N	2,900,000 R	2,700 R
		01-May-19	FD	2,400,000 R	2,400 R
		21-Aug-20	N	2,700,000	2,700
		26-Apr-21	N	1,400,000	1,800
		02-May-22	N	1,500,000	1,100 J
		01-May-23	N	1,200,000	870
SS016-VMP10	13-15	01-May-19	N	2,000,000 R	5,600 R
		26-Apr-21	N	1,100,000	2,400
		02-May-22	N	1,300,000	2,600 J
		01-May-23	N	1,300,000	1,800
SS016-VMP11	9-10	02-May-22	N	1,400,000	2,100 J
		01-May-23	N	1,500,000	1,800
	22-24	23-Apr-17	N	530,000	14 U
		01-May-18	N	1,700	1
SS016-VMP12	13-15	22-Apr-17	N	560,000	57
		01-May-18	N	7,200	0.53 J
		01-May-19	N	600,000 R	71 R
		26-Apr-21	N	560	0.65 J

Notes:
bgs = below ground surface
FD = field duplicate
J = estimated concentration
NS = not sampled, soil vapor could not be purged from the vapor monitoring point interval
ppbv = parts per billion by volume
R = result is rejected and considered not usable because of apparent cross contamination in the field.
TPH-g = total petroleum hydrocarbons-gasoline
U = not-detected at the listed method detection limit

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Table 8-1
Groundwater Monitoring - Site SS018

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Diesel Range Organics (DRO)		Residual Range Organics (RRO)		Naphthalene		Trichloroethene	
				Concentration (µg/L)	Concentration Relative to CUL [a/]	Concentration (µg/L)	Concentration Relative to CUL [a/]	Concentration (µg/L)	Concentration Relative to CUL [a/]	Concentration (µg/L)	Concentration Relative to CUL [a/]
					1,500 µg/L		1,100 µg/L		1.7 µg/L		2.8 µg/L
TU001-MW002 Upgradient (14 to 39)	23-Aug-18	N	14.8	**890**	0.59	220 U	<0.20	0.5 U	<0.29	**0.47 J**	0.17
	09-Aug-19	N	16.88	**1,200**	0.80	**360 J**	0.33	0.5 U	<0.29	**0.17 J**	0.06
	28-Sep-20	N	13.62	**310 J**	0.21	**110 B**	0.10	0.25 U	<0.15	**0.76**	0.27
	24-Aug-21	N	--	**830 B**	0.55	**220 B**	0.20	0.5 UJ	<0.29	**0.28**	0.10
	24-Aug-21	FD	--	**880 B**	0.59	**220 B**	0.20	0.5 U	<0.29	**0.29**	0.10
SS018-MW002 Subarea 1 Source Area & Upgradient of Subarea 5 (15 to 35)	23-Aug-18	N	14.08	**1,000**	0.67	**220 J**	0.20	0.5 U	<0.29	0.1 U	<0.04
	09-Aug-19	N	16.22	**620**	0.41	190 U	<0.17	0.5 U	<0.29	0.1 U	<0.04
	01-Oct-20	N	13.36	**480**	0.32	**300 J**	0.27	0.25 U	<0.15	0.15 U	<0.05
	26-Aug-21	N	14.13	**870**	0.58	**410 B**	0.37	0.25 UJ	<0.15	0.15 U	<0.05
	26-Aug-21	FD		**840**	0.56	**320 B**	0.29	1.25 UJ	<0.74	0.75 U	<0.27
	07-Sep-22	N	12.75	100 U	<0.07	**690 J**	0.63	0.5 U	<0.29	0.1 U	<0.04
	07-Sep-22	FD		100 U	<0.07	200 U	<0.18	0.5 U	<0.29	0.1 U	<0.04
SS018-MW001 Subarea 5 Source Area (12 to 32)	13-Aug-19	N	11.35	**3,500**	2.33	190 U	<0.17	**41 J**	24.1	**0.25 J**	0.09
		FD		**4,400**	2.93	**340 J**	0.31	**23 J**	13.5	**0.26 J**	0.09
	01-Oct-20	N	9.11	**7,900**	5.27	**870**	0.79	0.25 UJ	<0.15	0.15 U	<0.05
		FD		**8,000**	5.33	**850**	0.77	**1.6 J**	0.94	0.15 U	<0.05
	27-Aug-21	N	9.75	**2,500**	1.67	**470 B**	0.43	0.25 U	<0.15	0.15 U	<0.05
	07-Sep-22	N	8.41	**1,700**	1.13	200 U	<0.18	0.5 U	<0.29	0.1 U	<0.04
	28-Aug-23	N	22.24	**910**	0.61	200 U	<0.18	0.5 U	<0.29	0.1 U	<0.04
SS018-MW003 Downgradient (13 to 33)	23-Aug-18	N	11.54	**230 J**	0.15	200 U	<0.18	0.5 U	<0.29	**8.4**	3.00
		FD		**250 J**	0.17	200 U	<0.18	0.5 U	<0.29	**8.2**	2.93
	08-Aug-19	N	13.77	100 U	<0.07	200 U	<0.18	0.5 U	<0.29	**12**	4.29
	01-Oct-20	N	11.03	**470**	0.31	**300 J**	0.27	0.25 U	<0.15	**12**	4.29
	27-Aug-21	N	11.56	**350 B**	0.23	**300 B**	0.27	0.25 U	<0.15	**12**	4.29
	07-Sep-22	N	10.21	**180 J**	0.12	210 U	<0.19	0.5 U	<0.29	**11**	3.93
	28-Aug-23	N	11.64	120 U	<0.08	240 U	<0.22	0.5 U	<0.29	**9.6**	3.43

Notes:
[a/] Concentration Relative to CUL = Concentration/Table C CUL for groundwater
Bold indicates the analyte was detected
Bold and shading indicates the concentration exceeds the CUL
< = result is less than value shown
bgs = below ground surface
btoc = below top of casing
CUL = Table C cleanup level for groundwater (ADEC, October 2018)
FD = field duplicate sample
J = estimated value
N = normal sample
U = analyte not detected above reporting limit shown
µg/L = micrograms per liter

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Table 9-1
Groundwater Monitoring - Site SS022

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Trichloroethene (TCE) Concentration (µg/L)	Trichloroethene (TCE) Concentration Relative to CUL [a/] 2.8 µg/L
SS017-MW005 Upgradient (15 to 35)	26-Aug-17	N	16.52	**0.46 J**	0.16
	03-Aug-18	N	16.01	**0.68 J**	0.24
	07-Aug-19	N	17.90	**0.55 J**	0.20
	03-Oct-20	N	15.21	**0.41 J**	0.15
	23-Aug-21	N	15.76	**0.49 J**	0.18
	26-Aug-22	N	13.19	**0.33 J**	0.12
SS014-MW001 Upgradient (20 to 40)	08-Oct-11	N	17.14	**1.09**	0.39
	23-Apr-12	N	25.71	**2.47**	0.88
	07-Sep-13	N	14.65	**1.4**	0.50
	22-Aug-14	N	--	**0.54 J**	0.19
	03-Sep-15	N	11.82	**0.55 J**	0.20
	31-Jul-16	N	8.87	**0.54 J**	0.19
	24-Aug-17	N	14.29	**0.49 J**	0.18
	22-Aug-18	N	13.17	**0.71 J**	0.25
	06-Aug-19	N	15.63	**0.69 J**	0.25
	03-Oct-20	N	13.49	**1.9**	0.68
	24-Aug-21	N	13.41	0.15 U	<0.05
	15-Aug-22	N	11.26	**1.3**	0.46
	07-Sep-23	N	10.84	**0.63 J**	0.23
SS022-MW005 Source Area (12 to 32)	04-Sep-17	N	15.59	**17**	6.07
	04-Aug-18	N	14.24	**7.1**	2.54
	12-Aug-19	N	13.84	**2.6**	0.93
	29-Sep-20	N	12.83	**13**	4.64
	27-Aug-21	N	12.41	**3**	1.07
	12-Aug-22	N	9.82	**0.16 J**	0.06
	28-Aug-23	N	14.53	**5.9**	2.11
SS014_GP036 Cross Gradient Grab Sample (29 to 32.5)	26-Aug-18	N	10.41	**0.86 J**	0.31

Table 9-1
Groundwater Monitoring - Site SS022

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Trichloroethene (TCE) Concentration (µg/L)	Concentration Relative to CUL [a/] 2.8 µg/L
SS022-MW003 Cross Gradient (12-32) sample frequency reduced to every 5 years	09-Sep-15	N	9.96	**0.39 J**	0.14
	09-Sep-15	FD		**0.37 J**	0.13
	03-Aug-16	N	7.39	**0.49 J**	0.18
	21-Aug-17	N	13.56	**0.26 J**	0.09
	04-Aug-18	N	13.90	**0.31 J**	0.11
	28-Aug-23	N	13.21	**0.38 J**	0.14
	28-Aug-23	FD		**0.35 J**	0.13
SS022-MW004 In Plume, Downgradient (12-32)	09-Sep-15	N	6.61	**8.5**	3.04
	03-Aug-16	N	4.03	**11**	3.93
	21-Aug-17	N	10.41	**9.6**	3.43
	04-Aug-18	N	10.48	**5**	1.79
	12-Aug-19	N	9.99	**8.2**	2.93
	29-Sep-20	N	9.10	**4.3**	1.54
	27-Aug-21	N	8.89	**8.2**	2.93
	14-Aug-22	N	7.42	**5.1**	1.82
	28-Aug-23	N	9.78	**4.6**	1.64
SS022-MW006 Downgradient Edge (12 to 32)	24-Aug-18	N	7.45	**3.4**	1.21
	12-Aug-19	N	8.53	**2.9**	1.04
	29-Sep-20	N	7.88	**4.7**	1.68
	28-Aug-21	N	7.28	**4.1**	1.46
	14-Aug-22	N	6.12	**3.5**	1.25
	08-Aug-23	N	8.42	**3.3**	1.18

Notes:
[a/] Concentration Relative to CUL = Concentration/Table C CUL for groundwater
Bold indicates the analye was detected
Bold and shading indicates the concentration esceeds the CUL.
-- = not available or not recorded
µg/L = micrograms per liter
bgs = below ground surface
btoc = below top of casing
CUL = Table C cleanup level for groundwater (ADEC, October 2018)
FD = field duplicate sample
J = estimated value
N = normal sample

Table 9-2
Static Soil Gas - Site SS022

Vapor Monitoring Point (VMP)	Depth Interval (feet bgs)	Date	Sample Type	Concentration (ppbv) Trichloroethene (TCE)
SS022-VMP01	7-9	8/19/15	N	83
		7/20/16	N	80
		5/1/17	N	19
		4/29/18	N	14
		4/29/19	N	170 R
		8/26/20	N	41
	12-14	8/19/15	N	160
		8/19/15	FD	160
		5/1/17	N	4.7
		4/29/18	N	3.4
		4/29/19	N	170 R
SS022-VMP02	12-13.5	8/19/15	N	73
SS022-VMP03	3-4	7/20/16	N	840
		5/1/17	N	43
		4/30/18	N	27
		4/29/19	N	180 R
		8/26/20	N	140
		4/26/21	N	4.5
	7-9	4/23/16	N	790
		7/20/16	N	2,000
		7/20/16	FD	2,000
		5/1/17	N	83
		4/29/18	N	280
		4/29/18	FD	280
		4/29/19	N	240 R
		8/26/20	N	530
		8/26/20	FD	520
		4/26/21	N	85
		5/2/22	N	47
		4/27/23	N	75
	12-13.5	4/23/16	N	1,200
		5/1/17	N	550
		4/29/18	N	75
		4/29/19	N	140 R
		4/26/21	N	66
		4/26/21	FD	65
		5/2/22	N	27
		4/27/23	N	130
SS022-VMP04	3-4	6/15/21	N	33
	5.5-6.5	9/4/17	N	370
		4/29/18	N	130
		4/29/19	N	330 R
		8/26/20	N	380
		6/18/21	N	180
		4/27/23	N	95
	12-14	4/26/21	N	130
		5/2/22	N	25
		5/2/22	FD	24
		4/27/23	N	140

Notes:
bgs = below ground surface
FD = field duplicate
N = normal
R = result is rejected and considered not usable because of apparent cross contamination in the field.
ppbv = parts per billion by volume

Table 9-3
Mass Removal by SVE System - Site SS022

Sample Date	Days of Operation	Combined Extraction Flow Rate (scfm)	Periodic		Cumulative	
			Extraction Flow (cubic feet)	TCE Removed (lb)	Flow (million cubic feet)	TCE Removed (lb)
16-Oct-15	7	21.3	215,000	0.010	0.22	0.010
30-Nov-15	45	22.9	1,480,000	0.096	1.70	0.107
31-Dec-15	31	10	446,000	0.035	2.14	0.142
29-Jan-16	29	24.3	1,010,000	0.080	3.15	0.222
25-Feb-16	27	45.5	1,770,000	0.093	4.92	0.315
28-Mar-16	32	52.6	2,420,000	0.076	7.34	0.391
23-Apr-16	29	48.6	2,030,000	0.101	9.37	0.492
29-Sep-16	8	13.0	150,000	0.006	9.52	0.499
21-Oct-16	22	14.5	459,000	0.024	9.98	0.523
03-Feb-17	105	58.7	8,880,000	0.290	18.9	0.812
22-Apr-17	78	85.8	9,640,000	0.264	28.5	1.08
01-Aug-17	11	25.7	407,000	0.002	28.9	1.08
30-Sep-17	26	45.2	1,690,000	0.231	30.6	1.31
26-Jan-18	96	91.2	12,610,000	0.280	43.2	1.59
26-Apr-18	86	91.6	11,350,000	0.298	54.6	1.89
12-Aug-18 [a/]	27	54.0	2,100,000	0.166	56.7	2.05
23-Jan-19 [b/]	69	65.0	6,460,000	0.147	63.1	2.20
15-Mar-19	51	86.6	6,360,000	0.115	69.5	2.32
23-Apr-19	39	89.2	5,010,000	0.083	74.5	2.40
30-Sept-19 [c/]	36	30.5	1,580,000	0.152	76.1	2.55
8-Nov-19 [d/]	39	46.9	2,630,000	0.164	78.7	2.71
17-Jan-21	100	53.2	7,660,000	0.114	86.4	2.83
09-Mar-21	51	55.3	4,060,000	0.056	90.4	2.88
17-Apr-21	39	67.7	3,800,000	0.063	94.2	2.95
15-Aug-21	0.3	55.8	20,000	0.0013	94.2	2.95
18-Aug-21	3	50.5	220,000	0.0085	94.5	2.96
22-Aug-21	3.6	41.1	210,000	0.0078	94.7	2.96
30-Aug-21	4.1	30.3	180,000	0.0037	94.8	2.97
21-Sep-21	11	23.9	380,000	0.032	95.2	3.00
27-Oct-21	26	46.1	1,720,000	0.0433	96.9	3.04
14-Dec-21	48	15.9	1,100,000	0.0331	98.0	3.08
26-Jan-22	43	112.5	6,960,000	0.0483	105.0	3.12
15-Mar-22	48	98.2	6,790,000	0.0843	111.8	3.21
26-Apr-22	42	98.4	5,950,000	0.0695	117.7	3.28
29-Sep-22	6	8.7	80,000	0.0049	117.8	3.28
29-Oct-22 [e/]	28	38.8	1,560,000	0.0264	119.4	3.31

Notes:

[a/] From restart on 5 August till interruption of power supply on 1 September 2018.

[b/] From restart on 15 November 2018.

[c/] From restart on 24 August 2019.

[d/] From 9/30/19 till motor faulure on 8 November 2019.

[e/] From beginning of fiscall year till motor faulure on 28 October 2022.

lb = pound

scfm = standard cubic feet per minute

SVE = soil vapor extraction

TCE = trichloroethene

Table 10-1
Groundwater Monitoring - Site ST009

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Diesel Range Organics		Gasoline Range Organics		Benzene		Naphthalene	
				Concentration (µg/L)	Concentration Relative to CUL [a/]	Concentration (µg/L)	Concentration Relative to CUL [a/]	Concentration (µg/L)	Concentration Relative to CUL [a/]	Concentration (µg/L)	Concentration Relative to CUL [a/]
					1500 µg/L		2200 µg/L		4.6 µg/L		1.7 µg/L
B1812-MW001 Upgradient (12 to 37)	11-Sep-13	N	16.45	**110 B**	0.07	20 U	<0.01	0.1 U	<0.02	0.5 U	<0.29
	21-Apr-14	N	--	**240 J**	0.16	20 U	<0.01	0.1 U	<0.02	0.11 U	<0.06
	23-Aug-14	N	13.91	**220 J**	0.15	**21 J**	0.01	**3.7 J**	0.80	0.5 UJ	<0.29
	23-Aug-14	FD		**280 J**	0.19	20 U	<0.01	**2.4 J**	0.52	0.5 U	<0.29
	2-Sep-15	N	15.02	100 U	<0.07	**55 J**	0.03	**0.22 J**	0.05	0.5 U	<0.29
	7-Aug-16	N	10.17	120 J	0.08	**45 J**	0.02	**33 J**	7.17	0.12 U	<0.07
	7-Aug-16	FD		110 U	<0.07	**49 J**	0.02	**33**	7.17	0.11 U	<0.06
	15-Aug-17	N	16.07	**180 J**	0.12	**23 J**	0.01	**0.4 J**	0.09	0.5 U	<0.29
	8-Aug-18	N	16.45	**290 J**	0.19	20 U	<0.01	**1.1**	0.24	0.5 U	<0.29
	9-Aug-19	N	17.55	**200 J**	0.13	20 U	<0.01	**0.67 J**	0.15	0.5 U	<0.29
	4-Oct-20	N	15.48	**690**	0.46	8.6 U	<0.004	0.15 U	<0.03	0.25 U	<0.15
	18-Aug-21	N	16.08	**170**	0.11	8.6 U	<0.004	0.15 U	<0.03	0.25 U	<0.15
	27-Aug-22	N	13.31	**160 J**	0.11	20 U	<0.01	0.1 U	<0.02	0.5 U	<0.29
	14-Sep-23	N	12.52	-	-	-	-	-	-	-	-
ST009-MW004 Source Area - immediately downgradient of initial injection zone (13 to 33)	18-Aug-17	N	11.82	**620**	0.41	**2300**	1.05	**110**	23.9	**11 J**	6.47
	6-Aug-18	N	11.96	**400 J**	0.27	**450**	0.20	**52 J**	11.3	**4.2 J**	2.47
	5-Aug-19	N	13.63	**510 J**	0.34	**1600 J**	0.73	**110**	23.9	**12 J**	7.06
	2-Oct-20	N	10.63	**440 B**	0.29	**330 J**	0.15	**18 J**	3.9	**2.7**	1.59
	20-Aug-21	N	11.53	**510**	0.34	**210 J**	0.10	**9.7**	2.1	0.25 U	<0.15
	10-Aug-22	N	8.94	**1,000 J**	0.67	**450 J**	0.20	**28**	6.1	**6.1**	3.59
	14-Sep-23	N	8.18	**200 J**	0.13	**1500**	0.68	**7.5 J**	1.6	**7.9 J**	4.65
ST009-MW005 Source Area - 6 months downgradient of initial injection zone (13 to 33)	18-Aug-17	N	11.34	**390 J**	0.26	**1100**	0.50	**61**	13.3	**6.0**	3.5
	6-Aug-18	N	11.40	**470 J**	0.31	**400**	0.18	**53**	11.5	**2.6**	1.5
	5-Aug-19	N	13.19	**370 J**	0.25	**390**	0.18	**54**	11.7	**1.6 J**	0.9
	2-Oct-20	N	10.63	**330 B**	0.22	**450**	0.20	**7.8**	1.7	**2**	1.2
	21-Aug-21	N	10.97	**580**	0.39	**1800 J**	0.82	**28**	6.1	**8.9 B**	5.2
	10-Aug-22	N	8.39	**140 J**	0.09	**300**	0.14	**14**	3.0	**3.4**	2.0
	14-Sep-23	N	7.71	**210 J**	0.14	**860**	0.39	**20**	4.3	**3.6**	2.1
ST009-MW006 Source Area - 13 months downgradient of initial injection zone (13-33)	19-Aug-17	N	12.94	**6900**	4.60	**12000**	5.45	**890**	193	**140**	82.4
	7-Aug-18	N	13.13	**23000**	15.3	**3800**	1.73	**190**	41.3	**46 J**	27.1
	5-Aug-19	N	14.68	**23000**	15.3	**1100 J**	0.50	**140**	30.4	**14**	8.24
	2-Oct-20	N	11.75	**12000**	8.00	**440**	0.20	**14**	3.04	**4.8**	2.82
	21-Aug-21	N	12.51	**2900**	1.93	**2,400 J**	1.09	**38**	8.26	**13 B**	7.65
	10-Aug-22	N	10.04	**3600**	2.40	**630**	0.29	**57**	12.39	**11**	6.47
	14-Sep-23	N	9.20	**890**	0.59	**2200**	1.00	**46 J**	10.0	**17 J**	10.0

Table 10-1
Groundwater Monitoring - Site ST009

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Diesel Range Organics		Gasoline Range Organics		Benzene		Naphthalene	
				Concentration (µg/L)	Concentration Relative to CUL [a/]	Concentration (µg/L)	Concentration Relative to CUL [a/]	Concentration (µg/L)	Concentration Relative to CUL [a/]	Concentration (µg/L)	Concentration Relative to CUL [a/]
					1500 µg/L		2200 µg/L		4.6 µg/L		1.7 µg/L
1572-MW-03 Source Area - immediately downgradient of supplemental injection zone (4 to 34)	30-Jun-01	N	--	3900	2.60	59000	26.8	8700	1891	490	288
	11-Oct-01	N	--	7600	5.07	67000	30.5	--	--	--	--
	18-Aug-04	N	14.72	3700	2.47	--	--	7,700 J	1674	--	--
	24-Oct-04	N	--	3170	2.11	--	--	7,200 M	1630	--	--
	29-Sep-09	N	--	--	--	--	--	4800	1043	210 J	124
	22-Jul-10	N	13.15	3700	2.47	--	--	2500	543	140	82
	23-Sep-10	N	14.13	7300	4.87	--	--	4800	1043	210	124
	9-May-11	N	--	2990	1.99	--	--	2240	487	179	105
	9-Sep-11	N	9.32	5720	3.81	--	--	4020	874	235	138
	23-Apr-12	N	25.00	3080	2.05	--	--	--	--	--	--
	30-Apr-12	N	24.23	--	--	--	--	2990	650	169	99
	2-Sep-13	N	13.30	5900	3.93	11000	5.00	3200	696	90	52.9
	18-Sep-17	N	13.29	5200	3.47	7700	3.50	1800	391	87	51.2
	7-Aug-18	N	13.16	2800	1.87	2700	1.23	560	122	28 J	16.5
	7-Aug-18	FD		3200	2.13	2500	1.14	560	122	29 J	17.1
	5-Aug-19	N	14.70	2700	1.80	2000	0.91	420	91	17	10.0
	5-Aug-19	FD		2700	1.80	1800	0.82	370	80	16 J	9.4
	2-Oct-20	N	11.84	10000	6.67	3500	1.59	800	174	24	14.1
	2-Oct-20	FD		9300	6.20	3500	1.59	740	161	23	13.5
	21-Aug-21	N	12.59	3,800 J	2.53	4,500 J	2.05	1100 J	239	30	17.6
	21-Aug-21	FD		2,700 J	1.80	4,600 J	2.09	1100 J	239	32	18.8
	11-Aug-22	N	10.19	2600	1.73	980	0.45	380	83	16	9.4
	11-Aug-22	FD		2700	1.80	1100	0.50	360	78	15	8.8
	15-Sep-23	N	9.52	2500	1.67	1700	0.77	160	35	17 J	10.0
	15-Sep-23	FD		2700	1.80	1700	0.77	180	39	21	12.4
1572-MW-04 Downgradient (4 to 34)	30-Jun-01	N	--	2300	1.53	5900 M	2.68	120	26.1	48	28
	11-Oct-01	N	--	10000	6.67	11000	5.00	--	--	--	--
	25-May-04	N	15.35	4,940 J	3.29	--	--	2,560 J	557	--	--
	24-Oct-04	N	--	7,660 J	5.11	--	--	836 M	182	--	--
	22-Jul-10	N	13.03	6300	4.20	--	--	1800	391	74	43.5
	23-Sep-10	N	14.14	2300	1.53	--	--	69	15.0	10	5.9
	9-May-11	N	22.18	7680	5.12	--	--	2390	520	69.2	40.7
	9-May-11	FD		6790	4.53	--	--	2340	509	78.1	45.9
	10-Sep-11	N	12.35	1700	1.13	--	--	55.8	12.1	8.48	5.0
	10-Sep-11	FD		1690	1.13	--	--	57.6	12.5	9.29	5.5
	24-Apr-12	N	24.67	7800	5.20	--	--	3400	739	89.5	52.6
	24-Apr-12	FD		7540	5.03	--	--	3650	793	96	56.5
	2-Sep-13	N	13.30	8600	5.73	590	0.27	460	100	8.1	4.8
	2-Sep-13	FD		7700	5.13	620	0.28	460	100	8.6	5.1
	19-Aug-17	N	13.10	8300	5.53	3900	1.77	730	159	44 J	25.9
	7-Aug-18	N	13.35	3800	2.53	670	0.30	99	21.5	14	8.24
	12-Aug-19	N	13.58	6300	4.20	4900	2.23	1300	283	92	54.12
	2-Oct-20	N	11.99	1600	1.07	630	0.29	64	13.9	11	6.47
	21-Aug-21	N	12.61	4900	3.27	2,100 J	0.95	280 J	60.9	8.8 B	5.18
	11-Aug-22	N	10.30	5200	3.47	710	0.32	240	52.2	6.4	3.76
	15-Sep-23	N	9.56	1600	1.07	2800	1.27	210	45.7	35	20.6

Table 10-1
Groundwater Monitoring - Site ST009

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Diesel Range Organics		Gasoline Range Organics		Benzene		Naphthalene	
				Concentration (µg/L)	Concentration Relative to CUL [a/]	Concentration (µg/L)	Concentration Relative to CUL [a/]	Concentration (µg/L)	Concentration Relative to CUL [a/]	Concentration (µg/L)	Concentration Relative to CUL [a/]
					1500 µg/L		2200 µg/L		4.6 µg/L		1.7 µg/L
10-MW-03 Downgradient (5.33 to 44.9)	7-Sep-92	N	--	--	--	--	--	--	--	9.8 U	<5.8
	7-Jun-93	N	--	**500**	0.33	**380**	0.17	**88.1**	19.2	**0.751**	0.44
	11-Sep-94	N	--	**42 J**	0.03	**590**	0.27	**82.9**	18.0	**0.679 J**	0.40
	1-Feb-97	N	--	**0.74**	0.00	**1220**	0.55	**130**	28.3	--	--
	1-Jun-97	N	--	**206**	0.14	**534**	0.24	**130**	28.3	--	--
	1-Sep-97	N	--	**93 J**	0.06	**78.8**	0.04	**15**	3.26	--	--
	1-May-98	N	--	**680**	0.45	**1400**	0.64	**257 J**	55.9	--	--
	1-Oct-98	N	18.70	--	--	--	--	**58**	12.6	**0.36 J**	0.21
	13-Jun-99	N	--	--	--	--	--	**160**	34.8	**2.0**	1.2
	30-Oct-99	N	--	--	--	--	--	**97**	21.1	**0.60**	0.35
	19-Jun-00	N	--	**160 B**	0.11	**460**	0.21	**82**	17.8	0.072 U	
	13-Oct-00	N	--	**150**	0.10	**89 J**	0.04	**23**	5.00	0.072 U	
	22-Jun-01	N	--	**200**	0.13	**730**	0.33	**130 J**	28.3	--	--
	23-Aug-02	N	--	--	--	--	--	**120**	26.1	--	--
	2-Oct-02	N	--	--	--	--	--	**53**	11.5	**4.8**	2.8
	2-Jun-04	N	14.97	**243 F**	0.16	--	--	**104**	22.6	**1.89**	1.1
	2-Jun-04	FD		**216 B**	0.14	--	--	**104**	22.6	**1.65**	1.0
	24-Oct-04	N	--	**390 J**	0.26	--	--	**198**	43.0	--	--
	21-Jul-10	N	17.64	**220 J**	0.15	--	--	**160**	34.8	**2.0**	1.2
	6-Oct-10	N	21.45	**200 J**	0.13	--	--	**54**	11.7	**0.086**	0.05
	4-May-11	N	28.53	**842**	0.56	--	--	**218**	47.4	**1.22**	0.72
	9-Sep-11	N	16.88	**131 J**	0.09	--	--	**1.65**	0.36	**0.351 J**	0.21
	29-Apr-12	N	28.72	**747**	0.50	--	--	**387**	84.1	**2.42**	1.4
	22-Aug-17	N	16.05	**510 J**	0.34	**250**	0.11	**80**	17.4	0.5 U	<0.29
	6-Aug-18	N	16.23	**280 J**	0.19	**100**	0.05	**59**	12.8	0.5 U	<0.29
	5-Aug-19	N	17.70	**420 J**	0.28	**160**	0.07	**71**	15.4	0.5 U	<0.29
	5-Oct-20	N	16.90	**460 B**	0.31	**240**	0.11	**56**	12.2	0.25 U	<0.15
	20-Aug-21	N	15.55	**710**	0.47	**410**	0.19	**120**	26.1	0.25 U	<0.15
	10-Aug-22	N	13.17	**400 J**	0.27	**200**	0.09	**75**	16.3	0.5 U	<0.29
	15-Sep-23	N	5.29	**510 J**	0.34	**330**	0.15	**120**	26.1	0.11 U	<0.06
10-MW-06 Downgradient (5 to 45)	30-Aug-06	N	10.38	--	--	--	--	**67**	14.6	**0.89 J**	0.52
	21-Jul-10	N	12.77	**200 J**	0.13	--	--	**34 J**	7.39	0.25 U	<0.15
	21-Jul-10	FD		**120 J**	0.08	--	--	**34**	7.39	0.25 U	<0.16
	23-Sep-10	N	14.11	**58 J**	0.04	--	--	**17**	3.70	0.25 U	<0.17
	22-Sep-11	N	13.87	**240 J**	0.16	--	--	**27**	5.87	**1.16**	0.68
	28-Apr-12	N	24.06	**467**	0.31	--	--	**60.5**	13.2	**1.39**	0.82
	11-Sep-13	N	13.28	**240 B**	0.16	**340**	0.15	**38**	8.26	**0.77 J**	0.45
	27-Aug-14	N	11.11	**270 J**	0.18	**210**	0.10	**35**	7.61	0.5 U	<0.29
	7-Sep-15	N	9.62	**130 J**	0.09	**96 J**	0.04	**12**	2.61	0.5 U	<0.29
	1-Aug-16	N	7.52	**200 J**	0.13	**48 J**	0.02	**13**	2.83	0.5 U	<0.29
	13-Aug-17	N	12.68	**130 J**	0.09	**93 J**	0.04	**15**	3.26	0.5 U	<0.29
	6-Aug-18	N	13.34	**100 U**	<0.07	20 U	<0.009	**3.9**	0.85	0.5 U	<0.29
	9-Aug-19	N	14.11	**210 J**	0.14	**88 J**	0.04	**21**	4.57	0.5 U	<0.29
	2-Oct-20	N	12.12	**260 B**	0.17	**40**	0.02	**2.6**	0.57	0.25 U	<0.15
	20-Aug-21	N	12.60	**300**	0.20	8.6 U	<0.004	**9.5**	2.07	0.25 U	<0.15
	10-Aug-22	N	10.25	**120 J**	0.08	20 U	<0.009	**4.1**	0.89	0.5 U	<0.29
	15-Sep-23	N	9.58	**130 J**	0.09	**32 J**	0.01	**5.2**	1.13	0.1 UJ	<0.06

Table 10-1
Groundwater Monitoring - Site ST009

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Diesel Range Organics		Gasoline Range Organics		Benzene		Naphthalene	
				Concentration (µg/L)	Concentration Relative to CUL [a/]	Concentration (µg/L)	Concentration Relative to CUL [a/]	Concentration (µg/L)	Concentration Relative to CUL [a/]	Concentration (µg/L)	Concentration Relative to CUL [a/]
					1500 µg/L		**2200 µg/L**		**4.6 µg/L**		**1.7 µg/L**
ST009-MW002 Downgradient (50 to 60)	31-Aug-23	N	14.70	100 U	< 0.07	**29 J**	0.01	**7.7**	1.67	0.5 U	<0.29
ST009-MW001 Downgradient (66.5 to 76.5)	2-Sep-23	N	12.62	110 U	<0.07	20 U	<0.01	**3.1**	0.67	0.5 U	<0.29
10-MW-05 Downgradient (50 to 56.5)	2-Sep-23	N	12.56	**190 J**	0.13	**90 J**	0.04	**48 J**	10.4	0.5 U	<0.29
09-MW-15 Downgradient (5.4 to 34.7)	6-Sep-23	N	7.02	**190 J**	0.13	20 U	<0.01	**1.3**	0.28	0.5 U	<0.29
09-MW-24 Downgradient (44.91 to 54.91)	6-Sep-23	N	7.39	**600**	0.40	**100**	0.05	**22**	4.78	0.5 U	<0.29
CG001-MW011 Downgradient (66 to 76)	29-Aug-23	N	9.64	**110 J**	0.07	20 U	<0.01	**5.2**	1.13	0.5 U	<0.29
CG001-MW012 Downgradient (85 to 95)	29-Aug-23	N	10.53	**590**	0.39	**140**	0.06	**40 J**	8.70	0.5 U	<0.29
09-MW-30 Downgradient (65 to 70)	12-Sep-23	N	18.28	**1000**	0.67	**200**	0.09	**66**	14.3	**1.1 B**	0.65
CG001-MW018 Downgradient (20 to 40)	30-Aug-23	N	9.92	**560**	0.37	20 U	<0.01	0.1 U	<0.02	0.5 U	<0.29
CG001-MW019 Downgradient (50 to 70)	30-Aug-23	N	8.95	**2100**	1.40	**220**	0.10	**9.9**	2.15	0.5 U	<0.29
CG001-MW020 Downgradient (80 to 100)	30-Aug-23	N	9.95	**960**	0.64	20 U	<0.01	**0.35 J**	0.08	0.5 U	<0.29
CG001-MW021 Downgradient (110 to 130)	31-Aug-23	N	8.20	**280 J**	0.19	20 U	<0.01	0.1 U	<0.02	0.5 U	<0.29

Notes:
[a/] Concentration Relative to CUL = Concentration/Table C CUL level for groundwater
Bold indicates the analyte was detected
Bold and shading indicates the analyte exceeded the CUL.
Shaded only indicates the analyte was not detected but the detection limit exceeded the CUL.
-- = Not analyzed or not available
< = result is less than the value shown
B = analyte detected in associated blank
bgs = below ground surface
btoc = below top of casing
CUL = Table C cleanup level for groundwater (ADEC, October 2018)
F = analyte was positively identified, but the associated numerical value is below the reporting level
FD = field duplicate sample
J = estimated value
M = matrix interference
N = normal sample
U = not-detected at the listed method detection limit
µg/L = micrograms per liter

Table 10-2
Sulfate Concentrations in Groundwater - Site ST009

Monitoring Well	Date	Sample Type	Sulfate Concentration (mg/L)
B1812-MW001 (Upgradient)	07-Aug-16	N	2.78 J
	07-Aug-16	FD	3.14
	15-Aug-17	N	2.61
	08-Aug-18	N	209
	09-Aug-19	N	125
	04-Oct-20	N	73.2
	18-Aug-21	N	86.3
	27-Aug-22	N	66.1
	14-Sep-23	N	36.6
ST009-MW004 (Source Area)	18-Aug-17	N	25.1
	06-Aug-18	N	204
	05-Aug-19	N	213
	02-Oct-20	N	74.9
	20-Aug-21	N	111
	10-Aug-22	N	48.6
	14-Sep-23	N	48.1
ST009-MW005 (Source Area)	18-Aug-17	N	21.2
	06-Aug-18	N	125
	05-Aug-19	N	82.8
	02-Oct-20	N	49.8
	21-Aug-21	N	34.7
	10-Aug-22	N	31.7
	14-Sep-23	N	34.7
ST009-MW006 (Source Area)	19-Aug-17	N	4.25
	07-Aug-18	N	124
	05-Aug-19	N	68.3
	02-Oct-20	N	57.6
	21-Aug-21	N	27.8
	10-Aug-22	N	9.7
	14-Sep-23	N	3.9
1572-MW-03 (Source Area)	02-Sep-13	N	0.18 J
	19-Aug-17	N	1.25
	07-Aug-18	N	28.8
	07-Aug-18	FD	29.2
	05-Aug-19	N	30.5
	05-Aug-19	FD	29.9
	02-Oct-20	N	28.7
	02-Oct-20	FD	27.9
	21-Aug-21	N	11.7
	21-Aug-21	FD	11.5
	11-Aug-22	N	40.7
	11-Aug-22	FD	37.9
	15-Sep-23	FD	33.6
	15-Sep-23	N	32.5
1572-MW-04 (Downgradient)	02-Sep-13	N	10.3
	02-Sep-13	FD	10.2
	19-Aug-17	N	10.7
	07-Aug-18	N	31.8
	12-Aug-19	N	22.5
	02-Oct-20	N	15
	21-Aug-21	N	11.7
	11-Aug-22	N	8.28
	15-Sep-23	N	26.3
10-MW-03 (Downgradient)	02-Jun-04	FD	0.348 J
	02-Jun-04	N	0.858 J
	24-Oct-04	N	7.22
	22-Aug-17	N	6.9
	06-Aug-18	N	8.55
	05-Aug-19	N	5.26
	02-Oct-20	N	6.1
	20-Aug-21	N	4.38
	10-Aug-22	N	4.76
	15-Sep-23	N	6.57
10-MW-06 (Downgradient)	13-Aug-17	N	1.3
	06-Aug-18	N	10.3
	09-Aug-19	N	5.11
	02-Oct-20	N	19.5
	20-Aug-21	N	20.0
	10-Aug-22	N	22.3
	15-Sep-23	N	36.8

Notes:
Shaded values are elevated as compared to estimated range of background sulfate concentrations (20 to 40 mg/L). See text for additional discussion.
FD = field duplicate sample
mg/L = milligrams per liter
J = estimated value
N = normal sample

Table 10-3
Static Soil Gas - Site ST009

Vapor Monitoring Point (VMP)	Depth Interval (feet bgs)	Date	Sample Type	Concentration (ppbv)	
				TPH-g	Benzene
ST009-VMP02	13-15	4/24/17	N	180,000	2.4 U
		5/2/18	N	2800 J	0.41 J
		5/2/18	FD	1900 J	0.92 U
		5/1/19	N	210,000 R	67 R
		4/28/21	N	130	0.16 J
ST009-VMP03	6-7	4/25/17	N	7,200,000	27,000
		6/19/18	N	520,000	51 J
		8/26/20	N	17,000	25
		4/28/21	N	460	0.24 J
		4/30/22	N	480	0.72 U
		4/28/23	N	220	0.66 U
ST009-VMP05	13-15	4/24/17	N	21,000,000	280,000
		5/2/18	N	1,600,000	120
		4/30/19	N	740,000 R	340 R
		4/28/21	N	2,600	5.3
		4/28/21	FD	2,400	4.3
		4/30/22	N	24,000	8.3
		4/28/23	N	69,000	4.0
		4/28/23	FD	67,000	4.2
	18-20	4/24/17	N	23,000,000	320,000
		4/24/17	FD	23,000,000	320,000
		5/2/18	N	3,100,000	620
		4/30/19	N	790,000 R	200 R
		4/28/21	N	51,000	47
		4/30/22	N	620,000	12 J
		4/30/22	FD	630,000	12 J
		4/28/23	N	790,000	35 J

Table 10-3
Static Soil Gas - Site ST009

Vapor Monitoring Point (VMP)	Depth Interval (feet bgs)	Date	Sample Type	Concentration (ppbv)	
				TPH-g	Benzene
ST009-VMP06	13-15	4/24/17	N	4,000,000	7,500
		4/24/17	FD	3,900,000	9,000
		5/2/18	N	2,100	0.72 J
		4/30/19	N	870,000 R	170 R
		4/28/21	N	98	0.099 J
	18-20	4/24/17	N	9,400,000	23,000
		5/2/18	N	330,000	18 U
		4/30/19	N	1,800,000 R	160 R
		4/28/21	N	980	0.89J
		4/30/22	N	1,200	0.56 J
		4/28/23	N	1,400	0.6 J
ST009-VMP08 (South Source Area)	6-7	4/24/17	N	12,000	53
		5/2/18	N	9,300	0.92 U
		5/1/19	N	290,000 R	25 R
		5/1/19	FD	280,000 R	69 R
		8/26/20	N	240	0.59 U
		4/28/21	N	110	0.081 J
		6/23/21	N	210	0.52 J

Notes:
bgs = below ground surface
FD = field duplicate sample
J = estimated value
N = normal sample
R = result is rejected and considered not usable because of apparent cross contamination in the field.
ppbv = parts per billion by volume
TPH-g = total petroleum hydrocarbons-gasoline
U = not-detected at the listed method detection limit

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Table 10-4
Mass Removal by SVE System - Site ST009

Sample Date	Days of Operation	Combined Extraction Flow Rate (scfm)	Periodic				Cumulative			
			Extraction Flow (cubic feet)	Benzene Removed (lb)	Total BTEX Removed (lb)	VOCs Removed (lb)	Flow (million cubic feet)	Benzene Removed (lb)	Total BTEX Removed (lb)	VOCs Removed (lb)
26-Apr-17	0.72	558	580,000	2.35	7.13	542	0.58	2.35	7.1	542
27-Apr-17	0.99	560	800,000	4.22	13.1	913	1.38	6.57	20.2	1,455
29-Apr-17	2.17	570	1,777,000	8.64	27.6	1,844	3.16	15.2	47.8	3,299
29-Jul-17	8	290	3,343,000	7.45	34.4	1,908	6.50	22.7	82.1	5,207
20-Sep-17 [a/]	27	294	11,442,000	12.8	71.9	5,343	17.9	35.4	154	10,550
2-Feb-18	127	340	62,216,000	11.1	231	12,689	80.2	46.5	385	23,239
25-Apr-18	79	343	38,974,000	12.6	148	14,183	119.1	59.1	533	37,422
14-Aug-18 [a/]	15	308	6,644,000	0.73	5.35	1,726	125.8	59.8	538	39,148
23-Jan-19	95	299	40,931,000	0.19	7.99	2,553	166.7	60.0	546	41,701
15-Mar-19	51	298	21,863,000	0.00	8.09	1,591	188.6	60.0	554	43,292
21-Apr-19 [b/]	39	313	17,567,000	0.11	10.1	777	206.1	60.1	564	44,069
30-Sep-19	33	180	8,573,000	0.00	1.49	854	214.7	60.1	566	44,923
2-Mar-20	154	296	65,641,000	0.32	8.00	2,048	280.4	60.5	574	46,972
1-May-20	46	294	19,475,000	0.02	1.22	220	299.8	60.5	575	47,191
17-Jan-21	76	307	33,598,000	0.0000	0.021	253	333.4	60.5	575	47,444
8-Mar-21	50	302	21,722,000	0.0000	0.082	147	355.1	60.5	575	47,591
21-Apr-21	19	185	5,048,000	0.0025	0.079	57.7	360.2	60.5	575	47,648

Notes:

Periodic mass removal from SVE Annual Report Table 4-30 (Attachment C).

[a/] Date of last sample. Mass removal extrapolated through 30 September, the end of the reporting period.

[b/] Date of sample. Mass removal extrapolated through 23 April when system shut down for high groundwater.

BTEX = benzene, toluene, ethylbenzene, and xylenes

lb = pounds

scfm = standard cubic feet per minute

VOCs = volatile organic compounds

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Table 10-5
Biodegradation Rates - Site ST009

Vapor Monitoring Point	Depth Interval (feet bgs)	Date	Biodegradation Rate (mg-TPH/kg-soil day)
ST009-VMP03	6-7	23-Apr-19	1.2
		22-Apr-21	1.0
ST009-VMP04	6-7	23-Apr-19	0.55
ST009-VMP05	13-15	29-Apr-17	1.0
		25-Apr-18	0.21
		23-Apr-19	0.58
		22-Apr-21	0.96
ST009-VMP05	18-20	29-Apr-17	1.1
		25-Apr-18	0.31
		23-Apr-19	0.45
		22-Apr-21	1.3
ST009-VMP06	13-15	29-Apr-17	1.4
		25-Apr-18	0.62
		23-Apr-19	0.43
		22-Apr-21	0.24
ST009-VMP06	18-20	29-Apr-17	0.49
		25-Apr-18	0.68
		23-Apr-19	0.32
		22-Apr-21	0.35

Notes:
bgs = below ground surface
mg = milligram
kg = kilogram
TPH = total petroleum hydrocarbons
mg-TPH/kg-soil day = milligrams of TPH per kilogram of soil per day

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Table 11-1
Groundwater Monitoring - Site ST010

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Diesel Range Organics		Benzene		Naphthalene	
				Concentration (µg/L)	Concentration Relative to CUL [a/] 1500 µg/L	Concentration (µg/L)	Concentration Relative to CUL [a/] 4.6 µg/L	Concentration (µg/L)	Concentration Relative to CUL [a/] 1.7 µg/L
SE-MW-01 Source Area Primary (5.64 to 25.64)	9-Aug-95	N	--	**9,300**	6.20	**58.1**	12.6	**80.5**	47.4
	1-Jun-97	N	--	**2,840**	1.89	**22**	4.8	--	--
	1-Sep-97	N	--	**3,200**	2.13	0 U	0.00	--	--
	1-May-98	N	--	--	--	**8.2**	1.78	--	--
	1-Oct-98	N	20.76	--	--	**34**	7.39	**3.1**	1.82
	13-Jun-99	N	--	--	--	**17**	3.7	0.13 U	< 0.08
	29-Oct-99	N	--	--	--	**22**	4.8	**2.1**	1.24
	18-Jun-00	N	--	**330 B**	0.22	**9.8 B**	2.1	0.072 U	< 0.04
	13-Oct-00	N	--	**46,000 J**	30.7	**46**	10.0	**80 J**	47.1
	22-Jun-01	N	--	**780**	0.52	**5.6**	1.2	0.072 U	< 0.04
	28-May-04	N	18.21	**2,320**	1.55	**1.09**	0.2	--	--
	25-Oct-04	N	--	**20,800 J**	13.9	**0.79 J**	0.2	--	--
	13-Jul-10	N	17.77	**3,300**	2.20	**0.87 J**	0.2	**0.067 J**	< 0.04
	14-Sep-10	N	15.01	**5,600**	3.73	**8.5**	1.8	**1.5**	0.88
	23-Sep-11	N	15.24	**798**	0.53	**0.314 J**	0.1	**0.0539 B**	0.03
	28-Aug-13	N	15.00	**5200**	3.47	**7.6**	1.7	**0.24 J**	0.14
	12-Aug-16	N	8.87	**22000**	14.7	**41**	8.9	**2.8**	1.65
	26-Aug-17	N	14.86	**13000**	8.67	**19**	4.13	**2.7**	2
	27-Aug-18	N	13.27	**43,000 J**	28.7	**0.66 J**	0.14	0.24 UJ	<0.14
	4-Aug-19	N	16.09	**55000**	36.7	**0.45 J**	0.10	**1.3 J**	0.76
	30-Sep-20	N	13.19	**120000**	80.0	**0.59 J**	0.13	**5.3**	3.12
	26-Aug-21	N	13.40	**36,000 J**	24.0	0.15 U	<0.03	**0.082 J**	0.05
	28-Aug-22	N	16.80	--	--	--	--	0.29 U	<0.17
	29-Aug-23	N	13.85	**34,000**	22.7	0.1 U	<0.02	**3**	1.76
ST010-MW015 Downgradient (12 to 32)	13-Sep-23	N	9.74	**14,000**	9.3	**2.6**	0.57	**220**	129.4
ST010-MW013 Downgradient (15.2 to 35.2)	7-Aug-16	N	13.99	**260 J**	0.17	0.1 U	< 0.02	0.11 U	< 0.06
	25-Aug-17	N	20.80	**280 J**	0.19	0.1 U	< 0.02	0.5 U	< 0.29
	14-Aug-18	N	18.52	110 U	<0.07	0.1 U	< 0.02	0.12 UJ	<0.07
	12-Aug-19	N	20.11	100 U	<0.067	0.1 U	<0.02	0.5 U	<0.29
	1-Oct-20	N	18.67	**600**	0.40	0.15 U	<0.03	0.25 U	<0.15
	26-Aug-21	N	18.55	**290 B**	0.19	0.15 U	<0.03	0.25 UJ	<0.15
	17-Aug-22	N	16.71	**270 J**	0.18	0.1 U	<0.02	0.5 U	<0.29
	29-Aug-23	N	18.97	**120 J**	0.08	0.1 U	<0.02	0.5 U	<0.29
ST010-MW014 Source Area Secondary (12 to 32)	11-Aug-16	N	4.47	**670**	<0.07	0.1 U	< 0.02	**0.16 J**	0.09
	11-Aug-16	FD		**740**	0.49	0.1 U	< 0.02	**0.14 J**	0.08
	25-Aug-17	N	10.88	**3800**	2.53	0.1 U	< 0.02	0.5 U	< 0.29
	27-Aug-18	N	8.32	**670**	0.45	0.1 U	< 0.02	**0.51 J**	0.30
	4-Aug-19	N	12.05	**1400**	0.93	0.1 U	<0.02	0.5 U	<0.29
	4-Oct-20	N	10.81	**1300**	0.87	0.15 U	<0.03	**0.76 J**	0.45
	26-Aug-21	N	9.17	**1400**	0.93	0.15 U	<0.03	0.25 UJ	<0.15
	17-Aug-22	N	7.63	**540 J**	0.36	0.1 U	< 0.02	0.5 U	<0.29
	15-Sep-23	N	7.05	**480 J**	0.32	0.1 U	<0.02	**1.2 J**	0.71

Table 11-1
Groundwater Monitoring - Site ST010

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Diesel Range Organics Concentration (µg/L)	Diesel Range Organics Concentration Relative to CUL [a/] 1500 µg/L	Benzene Concentration (µg/L)	Benzene Concentration Relative to CUL [a/] 4.6 µg/L	Naphthalene Concentration (µg/L)	Naphthalene Concentration Relative to CUL [a/] 1.7 µg/L
ST010-MW010 Downgradient (18-38)	15-Aug-11	N	8.68	**460**	0.31	0.16 U	<0.03	0.22 U	< 0.29
	06-Oct-11	N	15.03	31 U	<0.02	0.16 U	<0.03	**0.00968 J**	0.01
	10-Sep-13	N	11.66	**220 J**	0.15	0.1 U	< 0.02	0.5 U	< 0.29
	24-Aug-14	N	9.76	**160 J**	0.11	0.1 U	< 0.02	0.5 U	< 0.29
	03-Sep-15	N	7.36	**230 J**	0.15	0.1 U	< 0.02	0.5 U	< 0.29
	03-Sep-15	FD		**210 J**	0.14	0.1 U	< 0.02	0.5 U	< 0.29
	4-Oct-20	N	12.10	25 U	<0.02	0.15 U	<0.03	0.25 U	<0.15
	26-Aug-21	N	9.74	**2100**	1.4	0.15 U	<0.03	0.25 UJ	<0.15
	17-Aug-22	N	8.39	**4000**	2.7	0.1 U	< 0.02	0.5 U	<0.29

Notes:
[a/] Concentration Relative to CUL = Concentration/Table C cleanup level for groundwater
Bold indicates the analyate was detected
Bold and shading indicates the analyte exceeds the CUL
-- = Not analyzed (analytes) or not available (static water level)
< = result is less than the value shown
B = target analyte detected in associated blank
bgs = below ground surface
btoc = below top of casing
CUL = Table C cleanup level for groundwater (ADEC, November 2020)
FD = field duplicate sample
J = estimated value
N = normal sample
U = not-detected at the listed method detection limit
UJ = analyte not detected but detection limit is estimated
µg/L = micrograms per liter

Table 11-2
Static Soil Gas - Site ST010

Vapor Monitoring Point (VMP)	Source Area	Depth Inteval (feet bgs)	Date	Sample Type	Concentration (ppbv)	
					TPH-g	Benzene
ST010-VMP01	Secondary Source Area	2-3	20-Jul-17	N	65,000	0.69 U
			27-Jun-18	N	1,400	0.95 U
			02-May-19	N	500,000 R	6.6 R
			28-Aug-20	N	140	0.54 U
			18-Jun-21	N	330	0.13 J
ST010-VMP02		2-3	20-Jul-17	N	920,000	1,100
			27-Jun-18	N	770,000	9.7 U
			27-Jun-18	FD	790,000	10 U
			25-Jul-19	N	1,000,000	41
			28-Aug-20	N	610,000	24 J
			18-Jun-21	N	420,000	7.6 J
			01-May-23	N	270,000	2.4 J
ST010-VMP03	Primary Source Area	5-6	01-May-17	N	1,000,000	650
			30-Apr-18	N	300,000	19 U
			02-May-19	N	710,000 R	11 R
			02-May-19	FD	630,000 R	13 R
			28-Aug-20	N	480,000	93 U
			27-Apr-21	N	170,000	30 U
			01-May-22	N	200,000	5.8 U
			01-May-23	N	200,000	0.84 J
ST010-VMP04		9-10	01-May-17	N	1,800,000	5,100
			30-Apr-18	N	960,000	3,500
			02-May-19	N	1,500,000 R	1200 R
			28-Aug-20	N	650,000	46 J
			27-Apr-21	N	360,000	31 U
			01-May-22	N	480,000	2.8 J
			01-May-23	N	290,000	7.6 J
ST010-VMP05		10.5-11.5	01-May-17	N	1,600,000	6,000
			30-Apr-18	N	1,400,000	17 U
			02-May-19	N	1,100,000 R	120 R
			28-Aug-20	NS	NS	NS
			27-Apr-21	N	13,000	3.4
ST010-VMP06		12.5-13.5	01-May-17	N	1,700,000	4,500
			30-Apr-18	N	780,000	18 U
			02-May-19	N	1,100,000 R	8.6 R
			28-Aug-20	N	680,000	27 J
			28-Aug-20	FD	660,000	44
			27-Apr-21	N	110,000	4.3 J
			27-Apr-21	FD	110,000	4.2 J
			01-May-22	N	77,000	5.5 J
			01-May-23	N	19,000	2.7 J
ST010-VMP07		11-12	01-May-17	N	1,500,000	4,600
			21-Jun-18	N	NS	NS
			24-Jul-19	N	74,000	55
			28-Aug-20	N	NS	NS
			27-Apr-21	N	3,700	1.7
ST010-VMP09		5-6	01-May-22	N	390,000	8.2 J
			01-May-23	N	400,000	9.5 U
ST010-VMP10		11-12	01-May-23	N	620,000	2.1 J
ST010-VMP11		8-9	02-May-19	N	670,000 R	3.1 R
			28-Aug-20	N	110,000	18 U
			27-Apr-21	N	40,000	30 U
ST010-VMP13		10-11	01-May-22	N	340,000	11 U
			01-May-23	N	280,000	7.5 U

Notes:
bgs = below ground surface
FD = field duplicate sample
J = estimated concentration
N = normal sample
NS = not sampled; unable to recover sample because of high vacuum and/or water
ppbv = parts per billion (volume)
R = result is rejected and considered not usable because of apparent cross contamination in the field.
TPH-g = total petroleum hydrocarbons-gasoline
U = not-detected at the listed method detection limit

Table 11-3
Biodegradation Rates - Site ST010

Vapor Monitoring Point (VMP)	Source Area	Depth Inteval (feet bgs)	Date	Biodegradation Rate (mg-TPH/kg-soil day)
ST010-VMP02	Secondary Source Area	5.5-6.5	03-Sep-17	5.3
			17-Sep-18	5.4
			12-Sep-19	4.2
			21-Apr-21	inundated
			25-Apr-23	3.5
ST010-VMP03	Primary Source Area	5-6	03-Sep-17	1.1
			22-Apr-18	1.6
			26-Apr-19	2.6
			21-Apr-21	2.4
			25-Apr-23	9.6
		10.5-11.5	03-Sep-17	1.1
			22-Apr-18	0.40
			26-Apr-19	0.30
ST010-VMP04		9-10	03-Sep-17	1.5
			22-Apr-18	0.91
			26-Apr-19	1.6
			21-Apr-21	3.7
			25-Apr-23	no calculated, initial oxygen < 5%
ST010-VMP06		19.5-21.5	21-Apr-21	0.44
			25-Apr-23	0.63
ST010-VMP07		6-7	26-Apr-19	7.8
			21-Apr-21	5.8
			25-Apr-23	3.1

Notes:
bgs = below ground surface
kg = kilogram
mg = milligram
TPH = total petroleum hydrocarbons
mg-TPH/kg-soil day = milligrams of TPH per kilogram of soil per day

Table 11-4
LNAPL Monitoring - Site ST010 Primary Source Area

Monitoring Well (screened interval feet bgs)	Date	Depth to LNAPL (feet btoc)	Depth to Groundwater (feet btoc)	LNAPL Thickness (feet)
SE-MW-01 (6-26)	30-Sep-20	13.18	13.19	0.01
	26-Aug-21	--	13.40	0.00
	24-Apr-22	--	24.61	0.00
	17-Aug-22	--	8.39	0.00
	28-Apr-23	sheen	22.90	<0.01
	29-Aug-23	--	13.85	0.00

Notes:
-- = no discernible LNAPL
bgs = below ground surface
btoc = below top of casing
LNAPL = light non-aqueous phase liquid

Table 12-1
Groundwater Monitoring - Site FT001

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Diesel Range Organics Concentration (µg/L)	Diesel Range Organics Concentration Relative to CUL[a/] 1500 µg/L	Gasoline Range Organics Concentration (µg/L)	Gasoline Range Organics Concentration Relative to CUL[a/] 2200 µg/L	Benzene Concentration (µg/L)	Benzene Concentration Relative to CUL[a/] 4.6 µg/L
01-MW-03 Upgradient (12.5 to 22.5)	12-Jul-10	N	18.15	**52 B**	0.03	5 U	<0.002	0.1 U	<0.02
	25-Sep-10	N	19.1	25 U	<0.02	**13 B**	0.01	0.1 U	<0.02
	22-Sep-11	N	18.06	30.9 U	<0.02	**10.6 B**	0.005	0.16 U	<0.03
	22-Sep-11	FD		31.3 U	<0.02	**9.3 B**	0.004	0.16 U	<0.03
	16-Aug-18	N	17.07	110 U	<0.07	20 U	<0.01	0.1 U	<0.02
	13-Aug-19	N	17.2	96 U	<0.06	20 U	<0.01	0.1 U	<0.02
	5-Oct-20	N	16.9	**280 B**	0.19	8.6 U	<0.004	0.15 U	<0.03
	30-Aug-21	N	15.85	25 U	<0.02	8.6 U	<0.004	0.15 U	<0.03
	23-Aug-22	N	14.21	100 U	<0.07	20 U	<0.01	0.1 U	<0.02
	15-Sep-23	N	16.19	--	--	--	--	--	--
FT001-MW013 Source Area (12 to 32)	25-Aug-18	N	13.43	**14,000**	9.33	**15,000**	6.82	**3,500**	761
	13-Aug-19	N	14.14	**2,100**	1.40	**350 J**	0.16	**170**	37.0
	5-Oct-20	N	17.43	**2,900**	1.93	**87**	0.04	**14**	3.04
	30-Aug-21	N	12.91	**1,200**	0.80	8.6 U	<0.004	**2.8**	0.61
	23-Aug-22	N	11.69	**840**	0.56	20 U	<0.01	0.1 U	<0.02
	26-Aug-23	N	13.52	**460 J**	0.31	20 U	<0.01	**0.11 J**	0.02
01-MW-01 In-Plume Downgradient (7.2 to 46.8)	26-Aug-23	N	15.38	100 U	<0.07	20 U	<0.01	0.1 U	<0.02
FT001-MW009 In-Plume Downgradient (50 to 60)	14-Oct-10	N	29.12	**130 J**	0.09	--	--	**6.4**	1.39
	4-May-11	N	30.96	**406 J**	0.27	**110**	0.05	**40.3**	8.76
	23-Sep-11	N	22.44	**198 J**	0.13	**38.1 B**	0.02	**11.9**	2.59
	1-May-12	N	28.84	**357**	0.24	**113**	0.05	**32.8**	7.13
	7-Sep-13	N	21.29	110 U	<0.07	20 U	<0.01	**20**	4.35
	21-Apr-14	N	-	**130 J**	0.09	20 U	<0.01	**9.8**	2.13
	16-Aug-18	N	20.71	**120 J**	0.08	**46 J**	0.02	**23**	5.00
	16-Aug-18	FD		**110 J**	0.07	**45 J**	0.02	**23**	5.00
	13-Aug-19	N	20.44	**130 J**	0.09	**71 J**	0.03	**41**	8.91
	5-Oct-20	N	21.82	**400 B**	0.27	8.6 U	<0.004	**17 J**	3.70
	30-Aug-21	N	19.42	**340 B**	0.23	8.6 U	<0.004	**37**	8.91
	29-Aug-22	N	18.81	100 U	<0.07	**35 J**	0.02	**17**	3.70
	27-Aug-23	N	20.79	110 U	<0.07	**28 J**	0.01	**13**	2.83
FT001-MW010 Downgradient (13 to 38)	7-Sep-13	N	24.47	110 U	<0.07	20 U	<0.01	0.1 U	<0.02
	21-Apr-14	N	-	**270 J**	0.18	20 U	<0.01	**0.48 J**	0.10
	26-Aug-14	N	22.33	**130 J**	0.09	20 U	<0.01	0.1 U	<0.02
	6-Sep-15	N	19.87	120 U	<0.08	20 U	<0.01	0.1 U	<0.02
	1-Aug-16	N	18.41	**170 J**	0.11	20 U	<0.01	0.1 U	<0.02
	12-Aug-17	N	23.26	100 U	<0.07	20 U	<0.01	0.1 U	<0.02
	15-Aug-18	N	23.38	**110 J**	0.07	20 U	<0.01	0.1 U	<0.02
	12-Aug-19	N	22.75	**100 J**	0.07	20 U	<0.01	0.1 U	<0.02
	5-Oct-20	N	12.71	**470 B**	0.31	8.6 U	<0.004	0.15 U	<0.03
	29-Aug-21	N	21.82	**330 B**	0.22	8.6 U	<0.004	0.15 U	<0.03
	24-Aug-22	N	21.21	**170 J**	0.11	20 U	<0.01	0.1 U	<0.02

Table 12-1
Groundwater Monitoring - Site FT001

Monitoring Well (screened interval feet bgs)	Date	Sample Type	Static Water Level (feet btoc)	Diesel Range Organics		Gasoline Range Organics		Benzene	
				Concentration (µg/L)	Concentration Relative to CUL[a/]	Concentration (µg/L)	Concentration Relative to CUL[a/]	Concentration (µg/L)	Concentration Relative to CUL[a/]
					1500 µg/L		2200 µg/L		4.6 µg/L
FT001-MW011 Downgradient (48 to 58)	8-Sep-13	N	24.47	**190 J**	0.13	20 U	<0.01	**1.3**	0.28
	23-Apr-14	N	-	**170 J**	0.11	20 U	<0.01	**3.4 J**	0.74
	26-Aug-14	N	22.5	**260 J**	0.17	20 U	<0.01	**2.9**	0.63
	6-Sep-15	N	19.96	**150 J**	0.10	20 U	<0.01	**2.5**	0.54
	1-Aug-16	N	18.59	**290 J**	0.19	20 U	<0.01	**3.6**	0.78
	12-Aug-17	N	23.41	95 U	<0.06	20 U	<0.01	**1.3**	0.28
	15-Aug-18	N	23.55	**130 J**	0.09	20 U	<0.01	**2.8**	0.61
	12-Aug-19	N	22.5	**140 J**	0.09	20 U	<0.01	**2.3**	0.50
	5-Oct-20	N	25.45	**560 B**	0.37	8.6 U	<0.004	**2.1**	0.46
	29-Aug-21	N	21.98	**330 B**	0.22	8.6 U	<0.004	**3.1**	0.67
	24-Aug-22	N	21.39	**140 J**	0.09	20 U	<0.01	**3.2**	0.70
FT001-MW012 Downgradient (70 to 80)	8-Sep-13	N	23.8	100 U	<0.07	20 U	<0.01	**22**	4.78
	24-Apr-14	N	-	**150 J**	0.10	20 U	<0.01	**33 J**	7.17
	26-Aug-14	N	21.84	**550 J**	0.37	20 U	<0.01	**0.21 J**	0.05
	6-Sep-15	N	19.32	110 U	<0.07	20 U	<0.01	**17**	3.70
	1-Aug-16	N	17.77	120 U	<0.08	20 U	<0.01	**15**	3.26
	12-Aug-17	N	22.78	96 U	<0.06	**38 J**	0.02	**23**	5.00
	16-Aug-18	N	22.74	110 U	<0.07	**38 J**	0.02	**19**	4.13
	12-Aug-19	N	22.13	**130 J**	0.09	**29 J**	0.01	**16**	3.48
	5-Oct-20	N	24.75	**380 B**	0.25	8.6 U	<0.004	**18**	3.91
	29-Aug-21	N	21.31	**200 B**	0.13	8.6 U	<0.004	**18**	3.91
	24-Aug-22	N	20.75	110 U	<0.07	**26 J**	0.012	**15**	3.26
	27-Aug-23	N	23.48	110 U	<0.07	**23 J**	0.01	**13**	2.83

Notes:
[a/] Concentration Relative to CUL = Concentration/Table C CUL for groundwater
Bold indicates the analyte was detected
Bold and shading indicates the analyte exceeded the CUL
< = result is less than the value shown
B = analyte detected in associated blank sample
bgs = below ground surface
btoc = feet below top of casing
CUL = Table C cleanup level for groundwater (ADEC, November 2020)
FD = field duplicate sample
J = estimated concentration
N = normal sample
U = analyte not detected above reporting limit shown
µg/L = micrograms per liter

Table 12-2
Static Soil Gas - Site FT001

Vapor Monitoring Point (VMP)	Depth Interval (feet bgs)	Date	Concentration (ppbv)	
			TPH-g	Benzene
FT001-VMP01	5-6	9/3/18	10,000,000	30,000
		5/1/19	750,000 R	52 R
		8/22/20	620,000	130
		5/2/21	6,700	6.4
		5/1/22	2,500	2.4
		4/30/23	1,600	1.6
FT001-VMP02	3-4	9/3/18	39,000,000	670,000 J
		9/3/18 FD	37,000,000	630,000
		5/1/19	27,000,000 R	480,000 R
		8/20/20	4,800,000	700
		5/2/21	1,100,000	42 J
		5/1/22	320,000	7 J
		5/1/22 FD	350,000	5.5 J
		4/30/23	260,000	11 J
FT001-VMP04R	6-7	9/3/18	9,400,000	51,000
		5/1/19	560,000 R	34 R
		8/20/20	2,100,000	370
		5/2/21	36,000	8.8 J
		5/1/22	3,900	1.9
		4/30/23	1,000	0.64 J
FT001-VMP05	3-4	9/3/18	21,000,000	89,000
		5/1/19	24,000,000 R	56,000 R
		8/20/20	27,000,000	19,000 J
		5/2/21	13,000,000	1,100 J
		5/1/22	16,000,000	4,800 J
		4/30/23	7,200,000	640
FT001-VMP06	7-8	9/3/18	19,000,000	9,000
		5/1/19	10,000,000 R	1,200 R
		8/20/20	4,600,000	220 J
		5/2/21	390,000	26 U
		5/1/22	NS	NS
		4/30/23	5,400	0.51 J

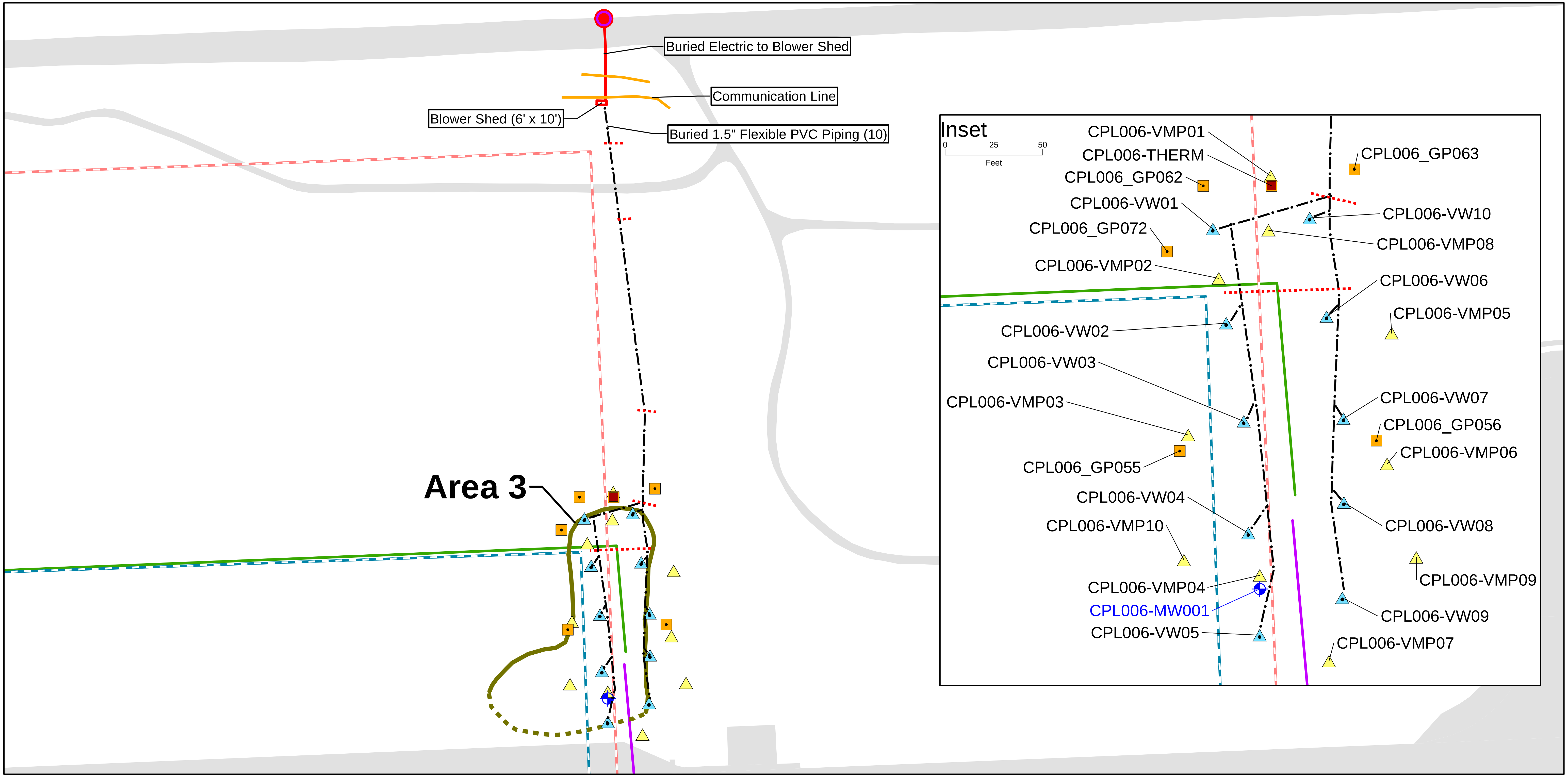
Notes:
bgs = below ground surface
FD = field duplicate
J = estimated concentration
ppbv = parts per billion by volume
R = result is rejected and considered not usable because of apparent cross contamination in the field.
TPH-g = total petroleum hydrocarbons-gasoline range

Table 12-3
Biodegradation Rates - Site FT001

Vapor Monitoring Point	Depth Interval (feet bgs)	Date	Biodegradation Rate (mg-TPH/kg-soil day)
FT001-VMP02	12-14	24-Apr-19	3.8
		26-Apr-21	0.57
FT001-VMP03	2-3	24-Apr-19	3.8
		26-Apr-21	6.5
FT001-VMP04	13-15	24-Apr-19	2.2
		26-Apr-21	0.22
FT001-VMP04R	6-7	24-Apr-19	0.64
		26-Apr-21	0.50

Notes:
bgs = below ground surface
kg = kilogram
mg = milligram
TPH = total petroleum hydrocarbons
mg-TPH/kg-soil day = milligrams TPH per kilogram of soil per day

Attachment A
Remedy Layout Figures from Construction Completion Reports (CCRs) or Design Documents



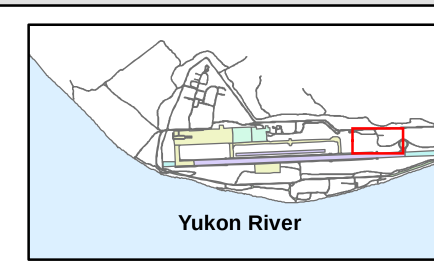
Legend

FSP OAP Locations

- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)

Revised OAP Locations

- 1952 and 1962 Aboveground Pipeline (1963 and 1985 Aerial)
- 1952 and 1962 Underground Pipeline (Not Visible on Aerials)
- Airfield Surface or Road
- Thermister String
- Power Pole
- Monitoring Well
- Verification Sampling Location
- Vent Well (VW)
- Vapor Monitoring Point (VMP)
- Unmarked Utility
- Estimated Extent of Constituents in Soil with Concentrations Greater than Remediation Target Concentrations (Dashed Where Inferred)



0 50 100
Feet

N

FIGURE A2-1

Site CPL006 Area 3
As-Built of Bioventing System

2023 Remedial Process Optimization
Former Galena Forward Operating Location, Alaska

PARSONS

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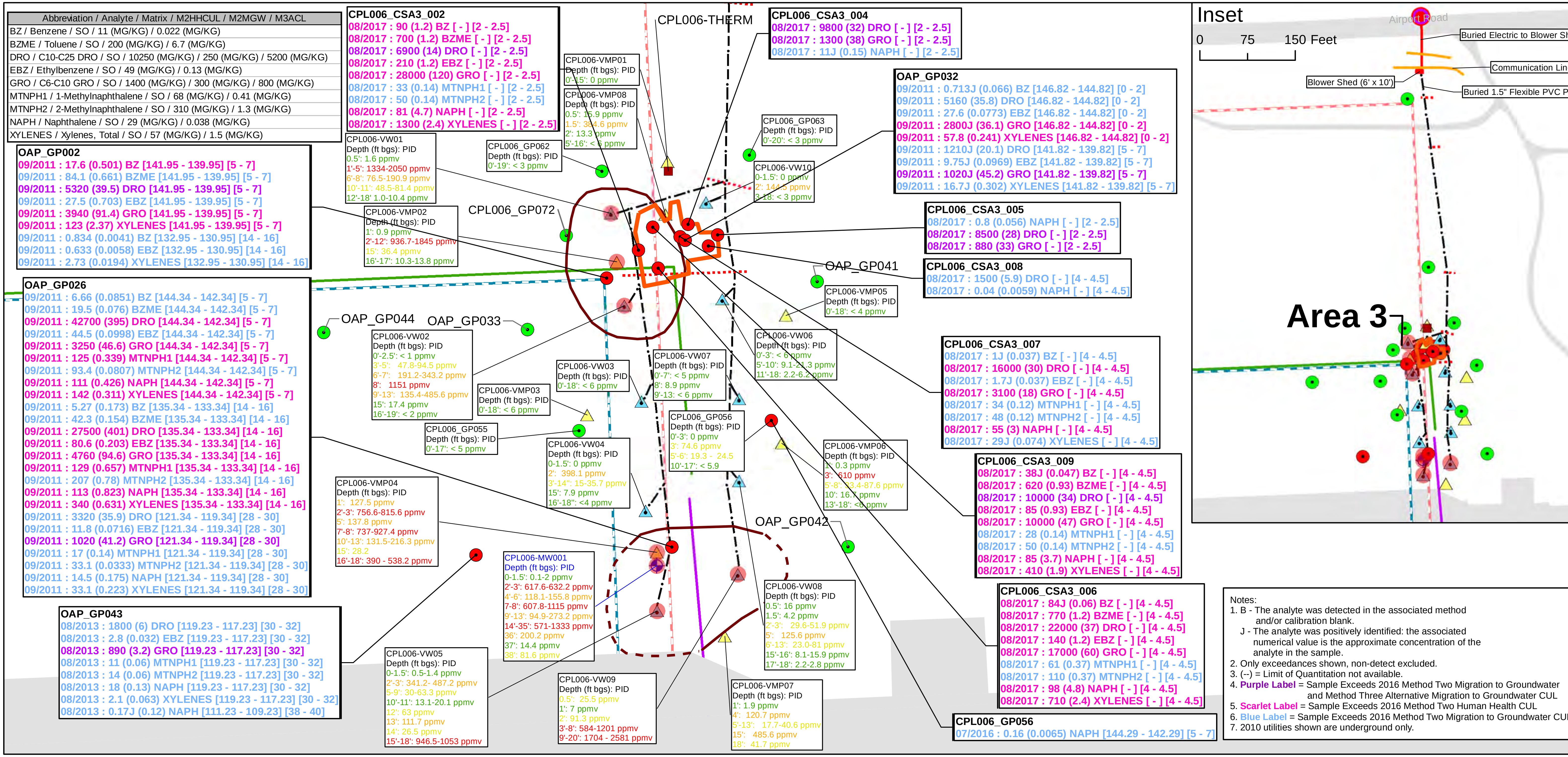


Legend

FSP OAP Locations

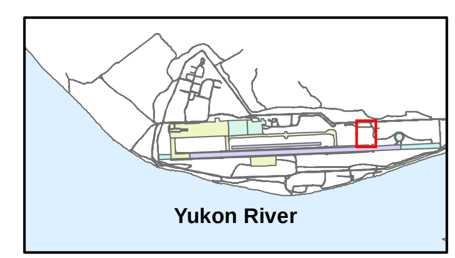
- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)

Revised OAP Locations

- 1952 and 1962 Aboveground Pipeline (1963 and 1985 Aerial)
- 1952 and 1962 Underground Pipeline (Not Visible on Aerials)
- Airfield Surface or Road
- Power Pole
- Monitoring Well
- Thermister Location
- Vent Well (VW)
- Vapor Monitoring Point (VMP)
- Unmarked Utility
- Biovent System Air Supply Piping
- Limits of 2017 Excavation
- Concentrations Greater than Remediation Target Concentration
- Concentrations Not Detected or Not Exceed Remediation Target Concentration
- Boring with Headspace PID > 100 ppmv over thickness greater than 3 feet
- Approximate limits of source areas in vadose and variably saturated zones (dashed where inferred)

Approximate PID Headspace Range

0-20 ppmv
20-100 ppmv
100-500 ppmv
500-1000 ppmv



0 25 50 Feet

FIGURE A2-2

Site CPL006 Area 3
Treatment Area
Verification Sample Results

2019 Construction Completion Report
Former Galena Forward Operating Location, Alaska

PARSONS

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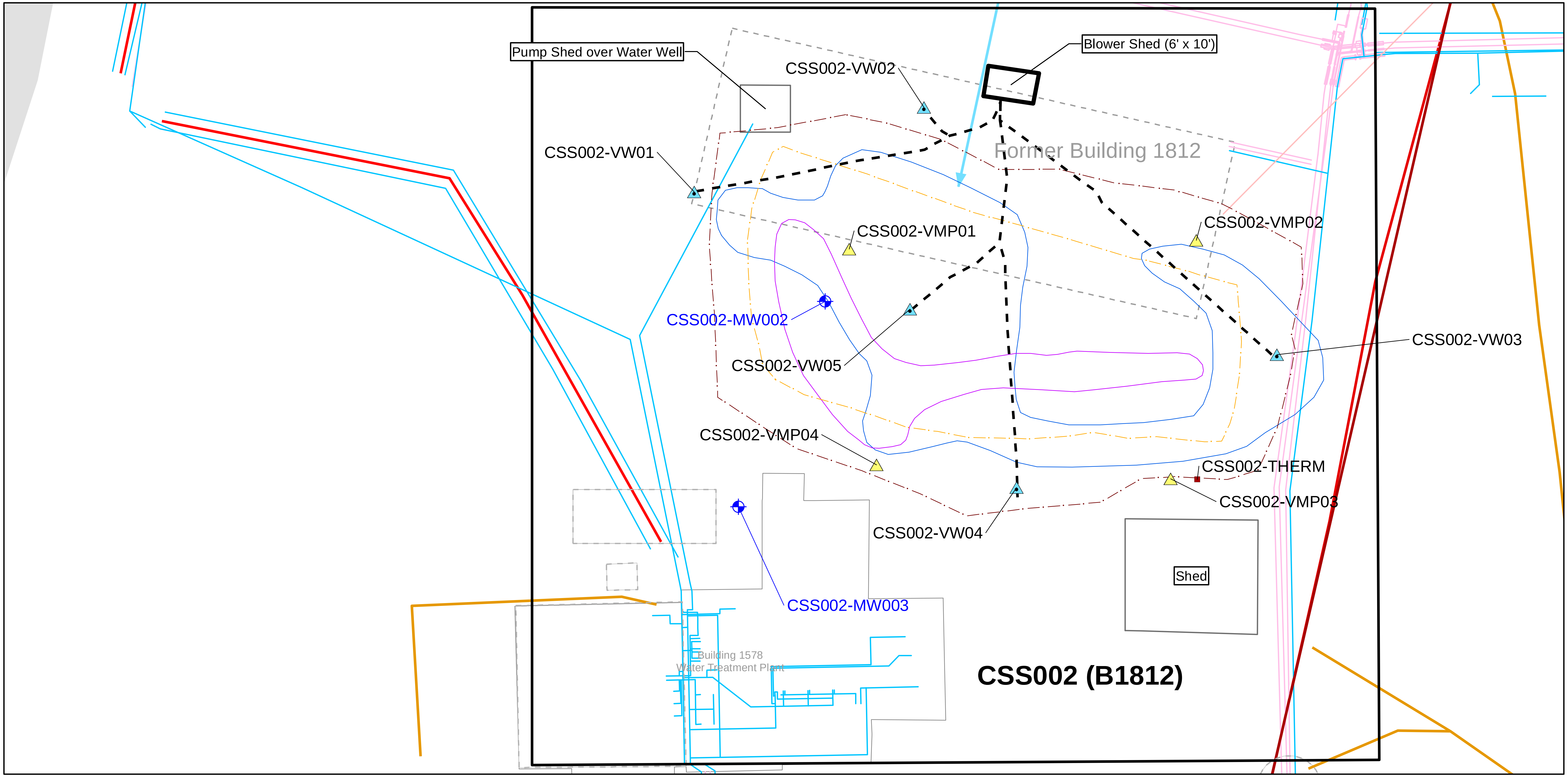

Legend

- Approximate Location of Former Feature
- Main Wastewater Line
- Service Wastewater Line
- Water Line
- Heating/Cooling Line

Underground Utility Locates - 2010
- Communications
- Electrical
- Potable Water
- Sanitary Sewer
- Groundwater Flow Direction

- NAPL-contaminated soil source area (0-15 ft bgs)
- NAPL-contaminated soil source area (15-25 feet bgs)
- Extent Top of the Excavation
- Extent Bottom of the Excavation
- Blower Location

- Monitoring Well
- Vent Well (VW)
- Vapor Monitoring Point (VMP)
- Thermister Location
- Buried Piping

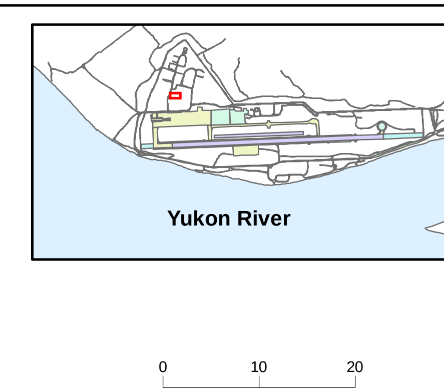

FIGURE A3-1

Site CSS002 (B1812)
As-Built of Bioventing System

Construction Completion Report
Former Galena Forward Operating Location, Alaska

PARSONS

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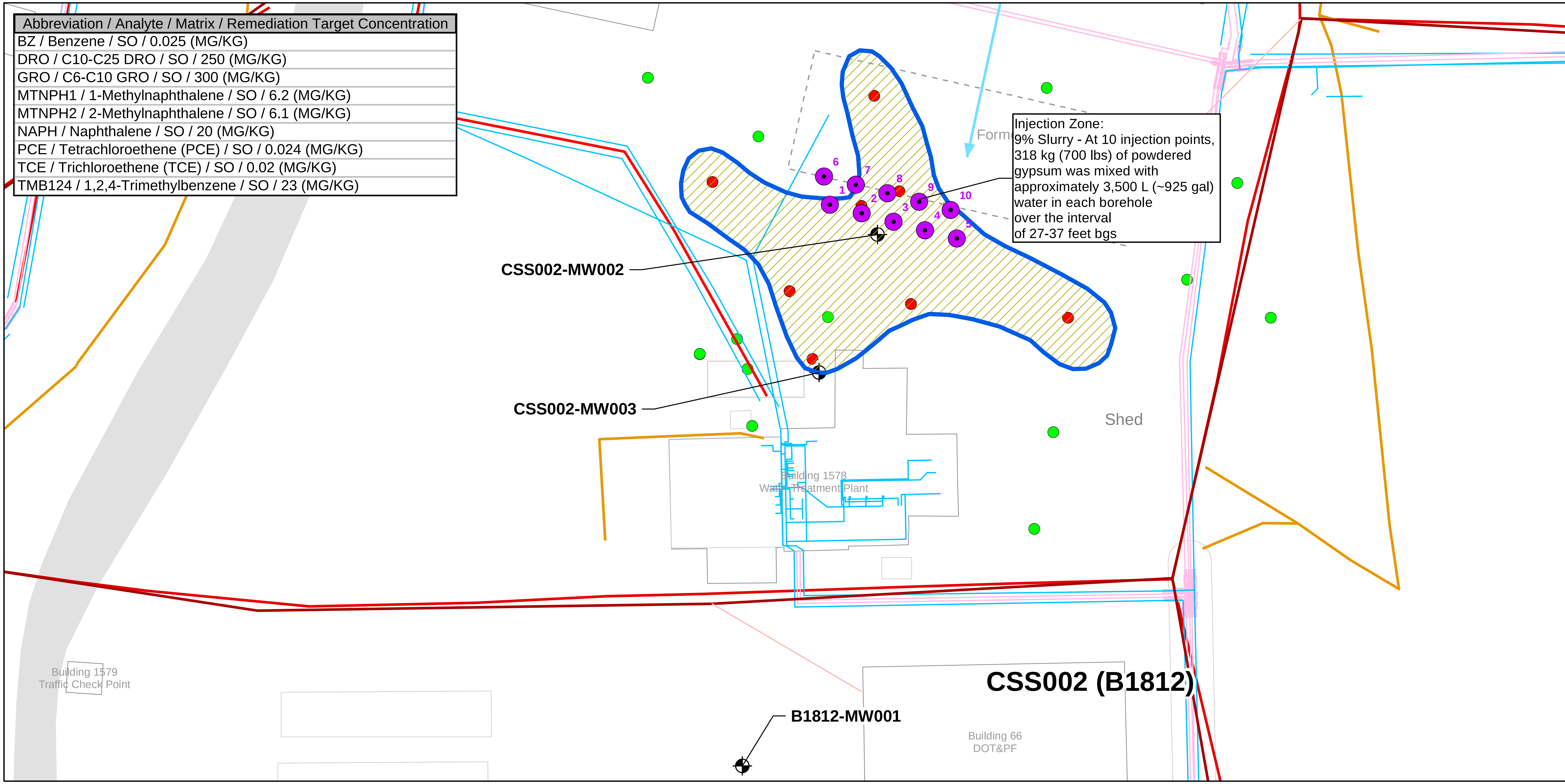


Abbreviation / Analyte / Matrix / Remediation Target Concentration
BZ / Benzene / SO / 0.025 (MG/KG)
DRO / C10-C25 DRO / SO / 250 (MG/KG)
GRO / C6-C10 GRO / SO / 300 (MG/KG)
MTNPH1 / 1-Methylnaphthalene / SO / 6.2 (MG/KG)
MTNPH2 / 2-Methylnaphthalene / SO / 6.1 (MG/KG)
NAPH / Naphthalene / SO / 20 (MG/KG)
PCE / Tetrachloroethene (PCE) / SO / 0.024 (MG/KG)
TCE / Trichloroethene (TCE) / SO / 0.02 (MG/KG)
TMB124 / 1,2,4-Trimethylbenzene / SO / 23 (MG/KG)

Legend

- Main Wastewater Line
- Service Wastewater Line
- Water Line
- Heating/Cooling Line

Underground Utility Locates - 2010

- Communications
- Electrical
- Potable Water
- Sanitary Sewer

- Concentrations Greater than Remediation Target Concentrations Soil Depth >25 ft
- Concentrations Not Detected or Not Exceed Remediation Target Concentrations Soil Depth >25 ft
- Groundwater Flow Direction
- NAPL-contaminated soil source area (>25 ft bgs)
- Extent of Petroleum COCs Greater than Remediation Target Concentrations (>25 ft bgs)
- Sulfate Injection Point at 9% Slurry
- Existing Monitoring Well

0 15 30
Feet

FIGURE A3-2

Site CSS002 (B1812)
Sulfate-Enhanced Bioremediation
(> 25 feet bgs)

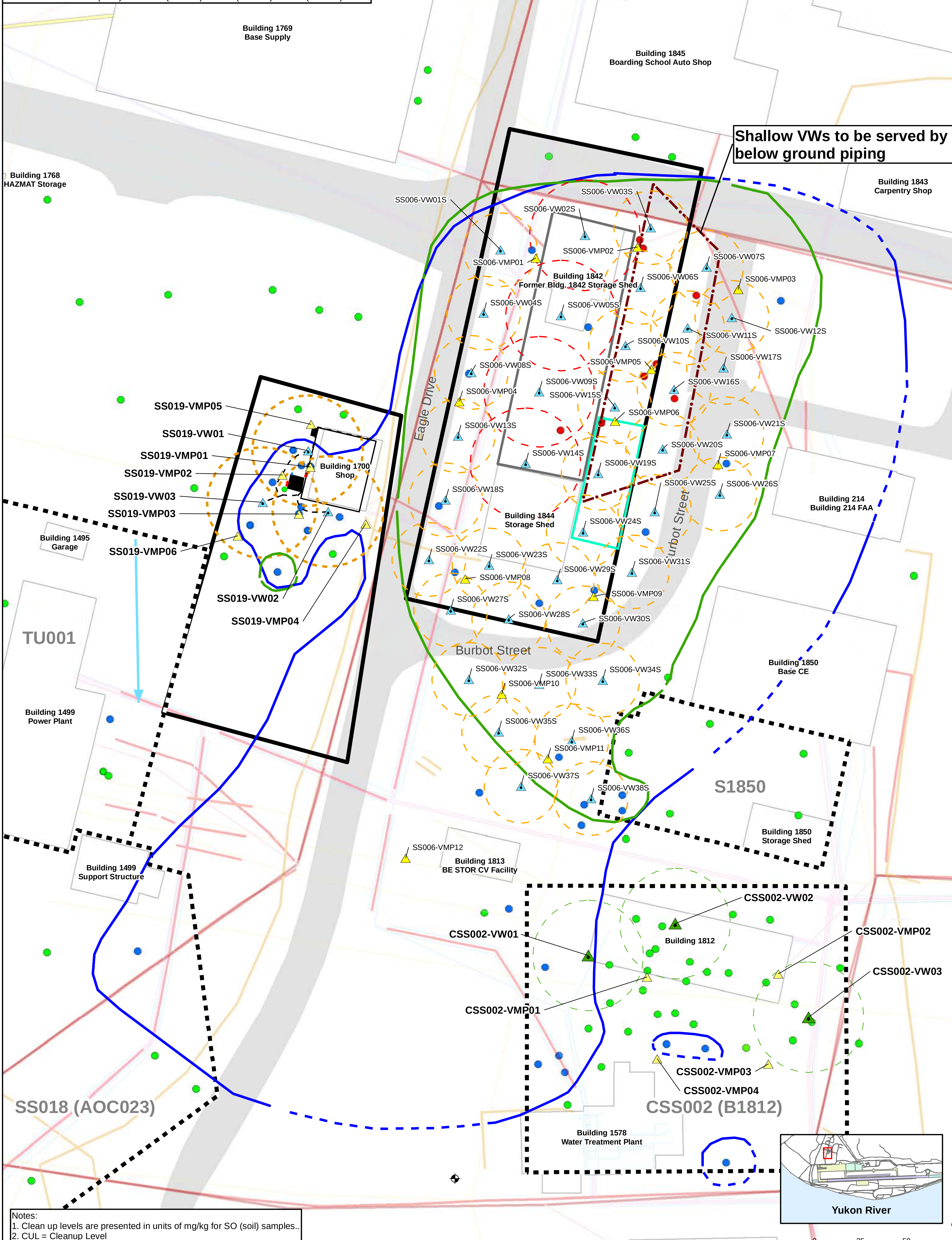
Analytes: COCs
SL: Remediation Target Concentrations
Data Range: All

2017 Construction Completion Report
Former Galena Forward Operating Location, Alaska

PARSONS

S:\ES\Remed\749388_Galena_FOL_PBR\Database\GIS\CSS002\CP_CSS002_SO_SulfateInject_GT25ft_Fig7-1.mxd lxh 10/25/2017

COCs for Site SS006
Abbreviation / Analyte / Matrix / M2HHCUL / M2MGW / M3ACL
TCE / Trichloroethene (TCE) / SO / 4.9 (MG/KG) / 0.011 (MG/KG) / 0.03 (MG/KG)
COCs for Site SS019
Abbreviation / Analyte / Matrix / M2HHCUL / M2MGW / M3ACL
TCE / Trichloroethene (TCE) / SO / 4.9 (MG/KG) / 0.011 (MG/KG) / 0.024 (MG/KG)



Notes:
1. Clean up levels are presented in units of mg/kg for SO (soil) samples..
2. CUL = Cleanup Level
3. ACL = Alternative Cleanup Level

Legend

- SS006/SS019
- Adjacent Sites
- Structure
- Approximate Groundwater Flow Direction
- Main Wastewater Line
- Service Wastewater Line
- Water Line
- Electrical Line
- Heating/Cooling Line
- 30-foot Radius Of Influence
- Road Area
- Utility Pole Storage

Underground Utility Locates - 2010
- Communications
- Electrical
- Fuel/Gas
- Potable Water
- Sanitary Sewer
- Extent of COCs Exceeding 2016 Method Two Migration to Groundwater CULs (Dashed where Inferred)
- Extent of TCE Exceeding 0.5 mg/kg

- 2010 - 2015 RI Boring Exceeds Method Three Migration to Groundwater ACL and Human Health CUL
- 2010 - 2015 RI Boring Exceeds Method Three Migration to Groundwater ACL
- 2010 - 2015 RI Boring Does Not Exceed Human Health CUL or Method Three ACL
- Pre-RI Boring Exceeds Method Three Migration to Groundwater ACL and Human Health CUL
- Pre-RI Boring Exceeds Method Three Migration to Groundwater ACL
- Pre-RI Boring Does Not Exceed Human Health CUL or Method Three ACL

- Site CSS002 Shallow Bioventing well
- Sites SS006/SS019 Shallow Vent Well (VW)
- Existing Vapor Monitoring Point
- Approximate Extent of Concrete pad
- 20 ft - Radius of Influence
- 30 ft - Radius of Influence
- 30 ft - Radius of Influence

FIGURE A4-1

As-Built Locations of Shallow Vent Wells and Approximated Radius of Vacuum Influence Shallow Soil (0-15 feet bgs)

Media: Soil (0-15 ft)
SLs: (2016) Method Three Migration to Groundwater ACL and Method Two Human Health CUL
Data Range: 2007 - 2016

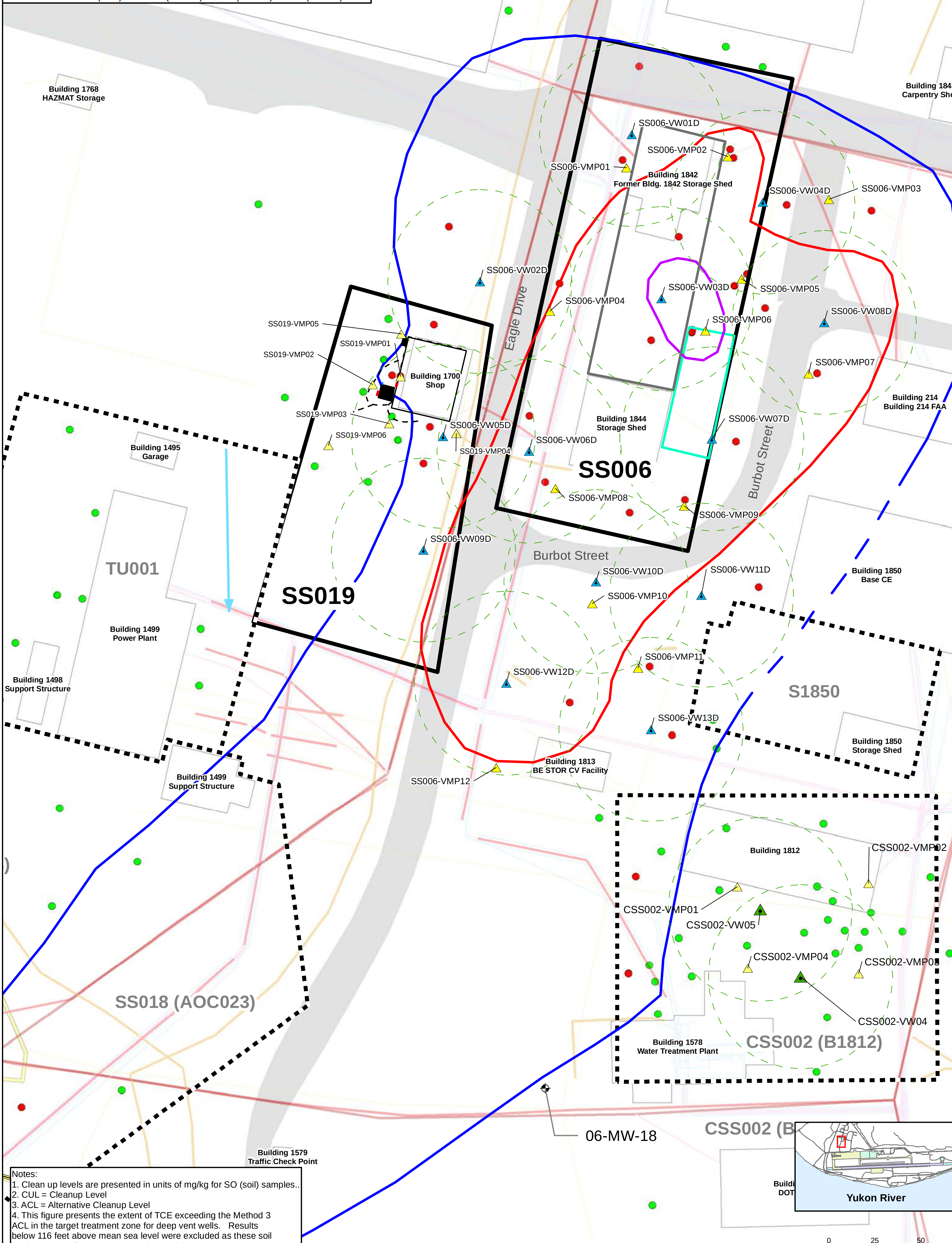
Sites SS006/SS019 Construction Completion Report
Former Galena Forward Operating Location, Alaska

PARSONS

S:\ES\Remed\749388_Galena_FOL_PBR\Database\GIS\SS006\CCR\CCR_SS006_019_Fig4-1_SO_0-15ft_TCE_M3ACL_HH.mxd lxh 11/6/2019

COCs for Site SS006
Abbreviation / Analyte / Matrix / M2HHCUL / M2MGW / M3ACL
TCE / Trichloroethene (TCE) / SO / 4.9 (MG/KG) / 0.011 (MG/KG) / 0.03 (MG/KG)

COCs for Site SS019
Abbreviation / Analyte / Matrix / M2HHCUL / M2MGW / M3ACL
TCE / Trichloroethene (TCE) / SO / 4.9 (MG/KG) / 0.011 (MG/KG) / 0.024 (MG/KG)



Notes:
1. Clean up levels are presented in units of mg/kg for SO (soil) samples..
2. CUL = Cleanup Level
3. ACL = Alternative Cleanup Level
4. This figure presents the extent of TCE exceeding the Method 3 ACL in the target treatment zone for deep vent wells. Results below 116 feet above mean sea level were excluded as these soil are below the effective treatment depth of the SVE system.

Legend

- SS006/SS019
- Adjacent Sites
- Structure
- Approximate Groundwater Flow Direction
- Main Wastewater Line
- Service Wastewater Line
- Water Line
- Electrical Line
- Heating/Cooling Line

Underground Utility Locates - 2010
- Communications
- Electrical
- Fuel/Gas
- Potable Water
- Sanitary Sewer
- Utility Pole Storage
- Extent of TCE Exceeding Method Three Migration to Groundwater CUL (0.03 mg/kg) (dash where inferred)
- Extent of TCE Exceeding 1 mg/kg
- Extent of TCE Exceeding 10 mg/kg

- 2010 - 2015 RI Boring Exceeds Method Three Migration to Groundwater Alternative Cleanup Level (ACL)
- 2010 - 2015 RI Boring Does Not Exceed Method Three Migration to Groundwater ACL
- Pre-RI Boring Exceeds Method Three Migration to Groundwater ACL
- Pre-RI Boring Does Not Exceed Method Three Migration to Groundwater ACL
- Approximate Extent of Concrete pad

- Site CSS002 Deep Bioventing well
- Sites SS006/SS019 Deep Vent Well (VW)
- Existing Vapor Monitoring Point (VMP)
- 50 ft - Radius of Influence

FIGURE A4-2

As-Built Locations of Deep Vent Wells and Approximated Radius of Vacuum Influence Deep Soil (15-30 feet bgs)

SLs: Method Three Migration to Groundwater ACL
Data Range: 2007 - 2016

Sites SS006/SS019 Construction Completion Report
Former Galena Forward Operating Location, Alaska

PARSONS

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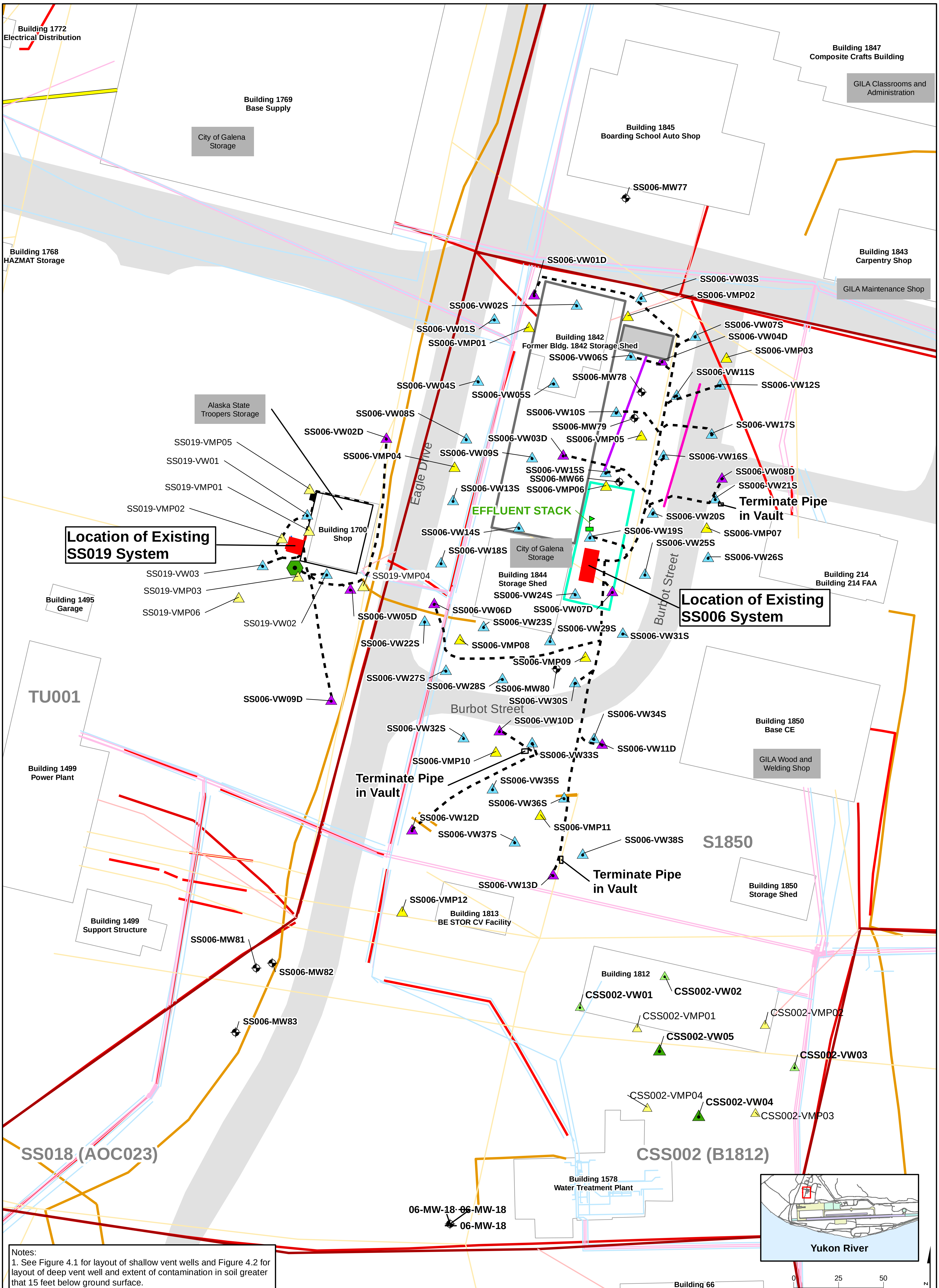

Notes:
1. See Figure 4.1 for layout of shallow vent wells and Figure 4.2 for layout of deep vent well and extent of contamination in soil greater that 15 feet below ground surface.
2. GILA = Galena Interior Learning Academy

Legend

- Structure
- Main Wastewater Line
- Service Wastewater Line
- Water Line
- Electrical Line
- Heating/Cooling Line
- Road Area
- Utility Pole Storage

Underground Utility Locates - 2010
- Communications
- Electrical
- Fuel/Gas
- Potable Water
- Sanitary Sewer
- Piping Layout
- Abandoned Electric
- Abandoned Steam Lines

- Existing Deep Bioventing Well
- Existing Shallow Bioventing Well
- Monitoring Well
- Deep Vapor Extraction Well
- Shallow Vapor Extraction Well
- Vapor Monitoring Point
- Approximate Extent of Concrete pad

Historic Building Use

Current Building Use if Different from Historical Use

FIGURE A4-3

Sites SS006 and SS019 Soil Vapor Extraction System Layout

Sites SS006/SS019 Construction Completion Report
Former Galena Forward Operating Location, Alaska

PARSONS

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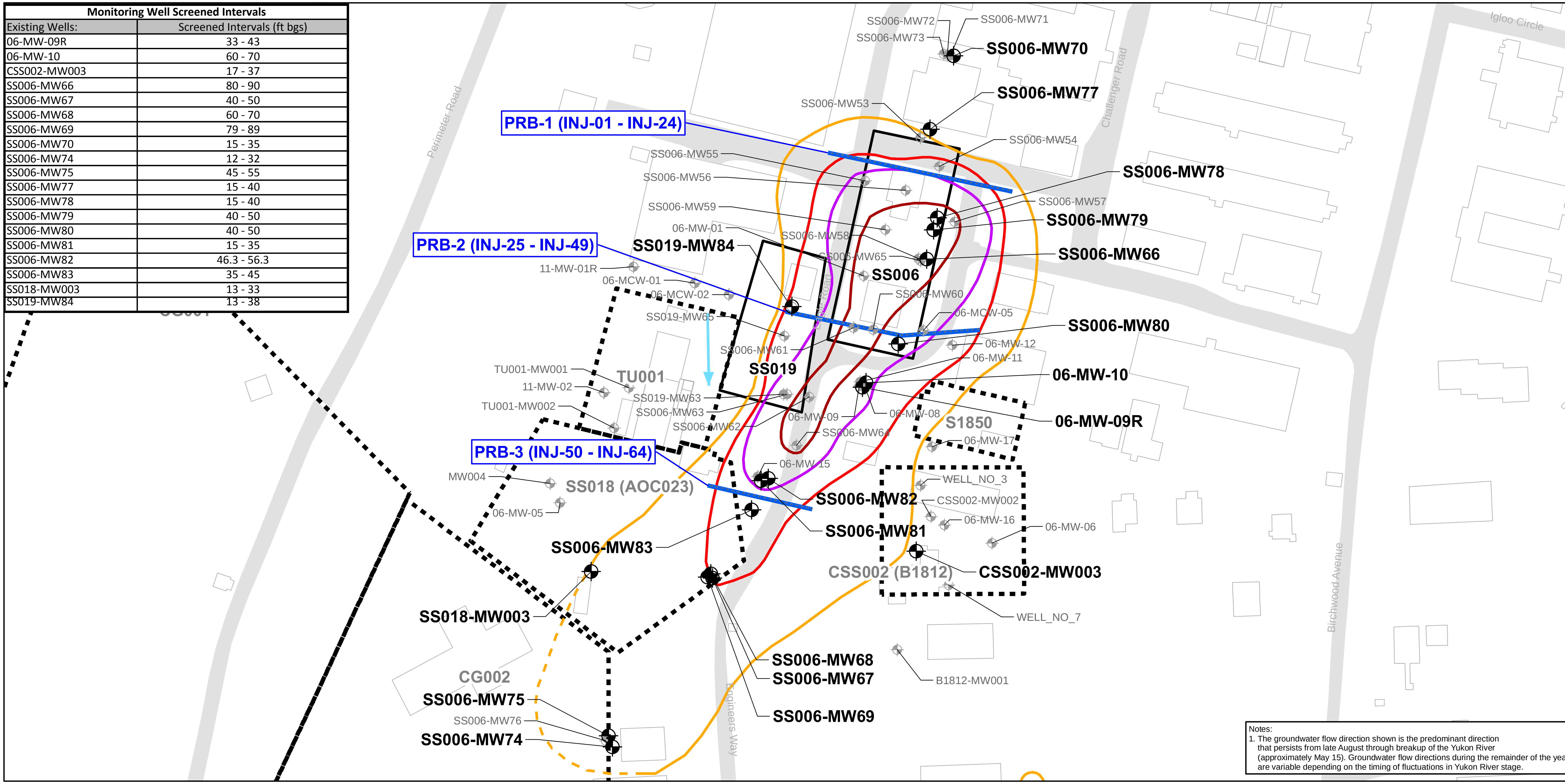
Monitoring Well Screened Intervals	
Existing Wells:	Screened Intervals (ft bgs)
06-MW-09R	33 - 43
06-MW-10	60 - 70
CSS002-MW003	17 - 37
SS006-MW66	80 - 90
SS006-MW67	40 - 50
SS006-MW68	60 - 70
SS006-MW69	79 - 89
SS006-MW70	15 - 35
SS006-MW74	12 - 32
SS006-MW75	45 - 55
SS006-MW77	15 - 40
SS006-MW78	15 - 40
SS006-MW79	40 - 50
SS006-MW80	40 - 50
SS006-MW81	15 - 35
SS006-MW82	46.3 - 56.3
SS006-MW83	35 - 45
SS018-MW003	13 - 33
SS019-MW84	13 - 38



Notes:
1. The groundwater flow direction shown is the predominant direction that persists from late August through breakup of the Yukon River (approximately May 15). Groundwater flow directions during the remainder of the year are variable depending on the timing of fluctuations in Yukon River stage.

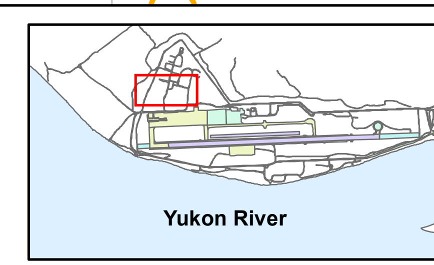
Legend

- SS006/SS019
- Approximate Groundwater Flow Direction
- Road

Maximum TCE Contours (µg/L) 2010 - 2016

- 2.8
- 50
- 500
- 5,000

- Enhanced Anaerobic Bioremediation/Enhanced Biogeochemical Transformation (EAB/EBT) Permeable Reactive Barrier
- Existing Well Included in Performance Monitoring Well Network
- Existing Well Excluded from Performance Monitoring Well Network



0 60 120
Feet

FIGURE A4-4

EAB/EBT Injection Layout and Groundwater Monitoring Network

Media: Groundwater

Site SS006/SS019 Constuction Completion Report
Former Galena Forward Operating Location, Alaska

PARSONS

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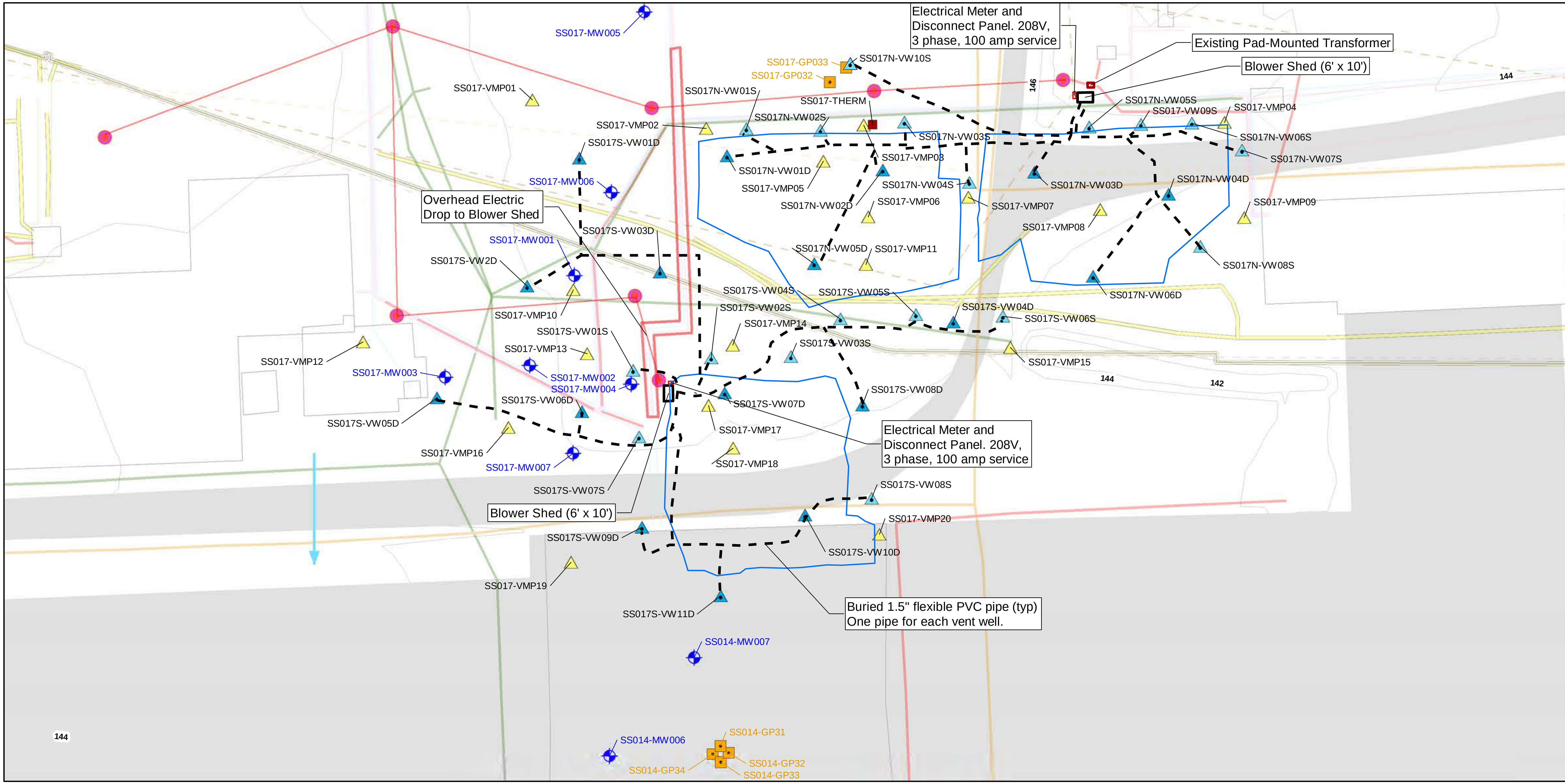
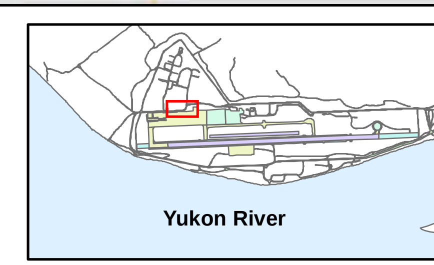


Legend

- Airfield Surface or Road
- Approximate Groundwater Flow Direction
- Main Wastewater Line
- Service Wastewater Line
- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)
- Abandoned Fuel Line
- Service Fuel Line
- Main Fuel Line
- Water Line
- Heating/Cooling Line

Underground Utility Locates - 2010

- Communications
- Electrical
- Fuel/Gas
- Potable Water
- Sanitary Sewer
- Above Ground Utilidor
- Verification Sampling Location
- Monitoring Well
- Shallow Vent Well (VW)
- Deep Vent Well (VW)
- Vapor Monitoring Point (VMP)
- Overhead Electric
- Power Pole
- Thermister String
- Excavation Boundary



Note: Locations of power poles are approximate

0 30 60
Feet

FIGURE A5-1

Sites SS014/SS017
As-Built of Bioventing System

2018 Bioventing Annual Report
Former Galena Forward Operating Location, Alaska

PARSONS

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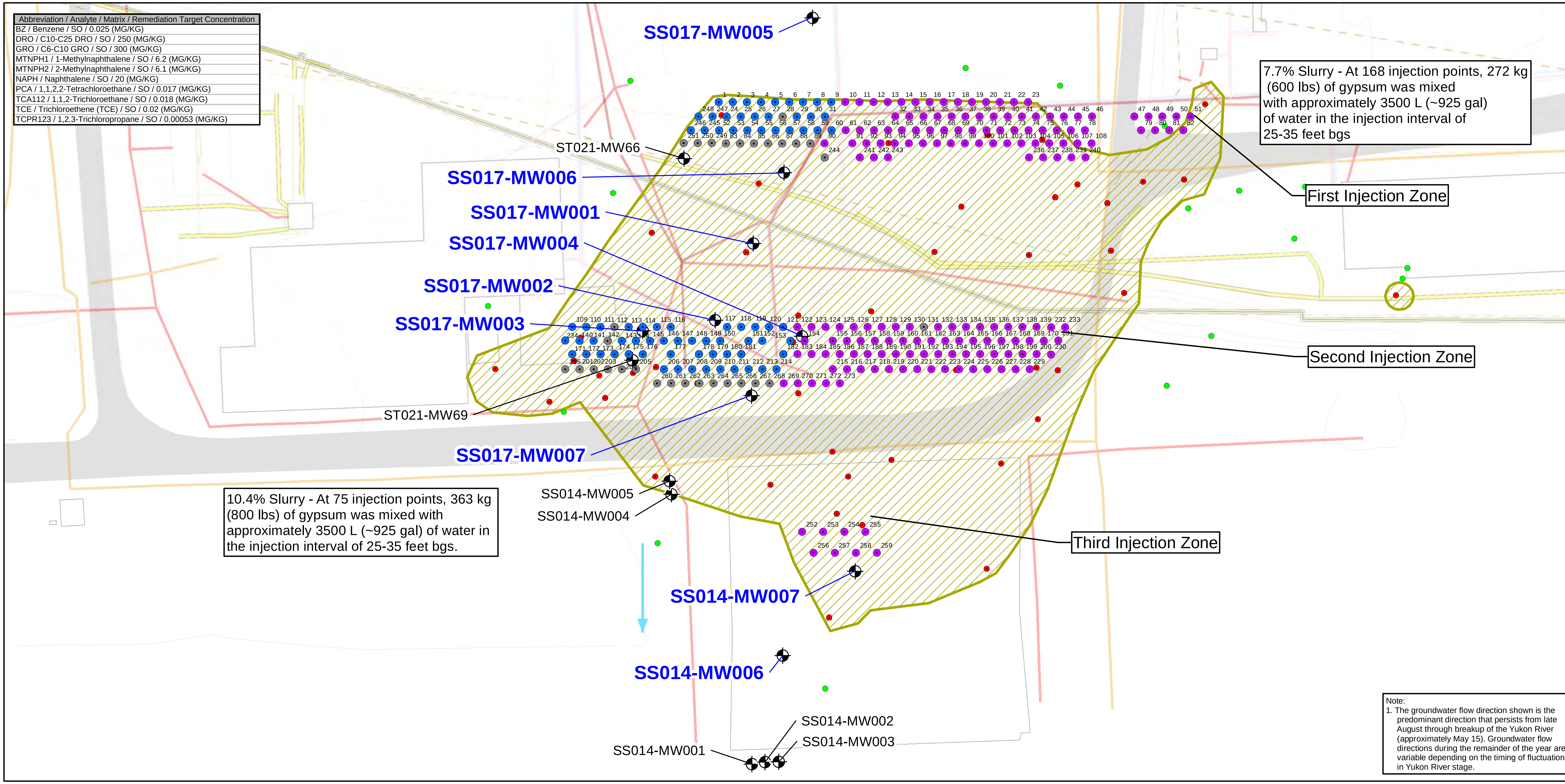


Abbreviation / Analyte / Matrix / Remediation Target Concentration
BZ / Benzene / SO / 0.025 (MG/KG)
DRO / C10-C25 DRO / SO / 250 (MG/KG)
GRO / C6-C10 GRO / SO / 300 (MG/KG)
MTNPH1 / 1-Methylnaphthalene / SO / 6.2 (MG/KG)
MTNPH2 / 2-Methylnaphthalene / SO / 6.1 (MG/KG)
NAPH / Naphthalene / SO / 20 (MG/KG)
PCA / 1,1,2,2-Tetrachloroethane / SO / 0.017 (MG/KG)
TCA112 / 1,1,2-Trichloroethane / SO / 0.018 (MG/KG)
TCE / Trichloroethene (TCE) / SO / 0.02 (MG/KG)
TCPR123 / 1,2,3-Trichloropropane / SO / 0.00053 (MG/KG)

Note:
1. The groundwater flow direction shown is the predominant direction that persists from late August through breakup of the Yukon River (approximately May 15). Groundwater flow directions during the remainder of the year are variable depending on the timing of fluctuations in Yukon River stage.

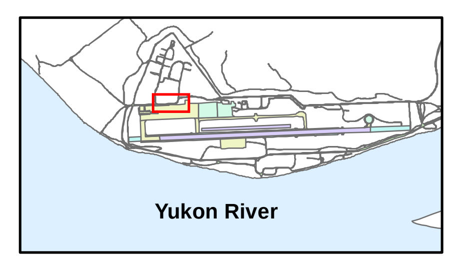
Legend

- Approximate Groundwater Flow Direction
- Main Wastewater Line
- Service Wastewater Line
- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)
- Abandoned Fuel Line
- Service Fuel Line
- Main Fuel Line
- Water Line
- Heating/Cooling Line

Underground Utility Locates - 2010
- Communications
- Electrical
- Fuel/Gas
- Potable Water
- Sanitary Sewer

- Concentrations Greater than Remediation Target Concentration Soil Depth > 25 ft
- Concentrations Not Detected or Not Exceed Remediation Target Concentration Soil Depth > 25 ft
- Sulfate Injection Point at 7.7% Slurry
- Sulfate Injection Point at 10.4% Slurry
- Sulfate Injection Point Eliminated
- Existing Monitoring Well

- Estimated Extent of Constituents in Soil with Concentrations Greater than Remediation Target Concentrations (>25 ft)



0 35 70
Feet
N

FIGURE A5-2

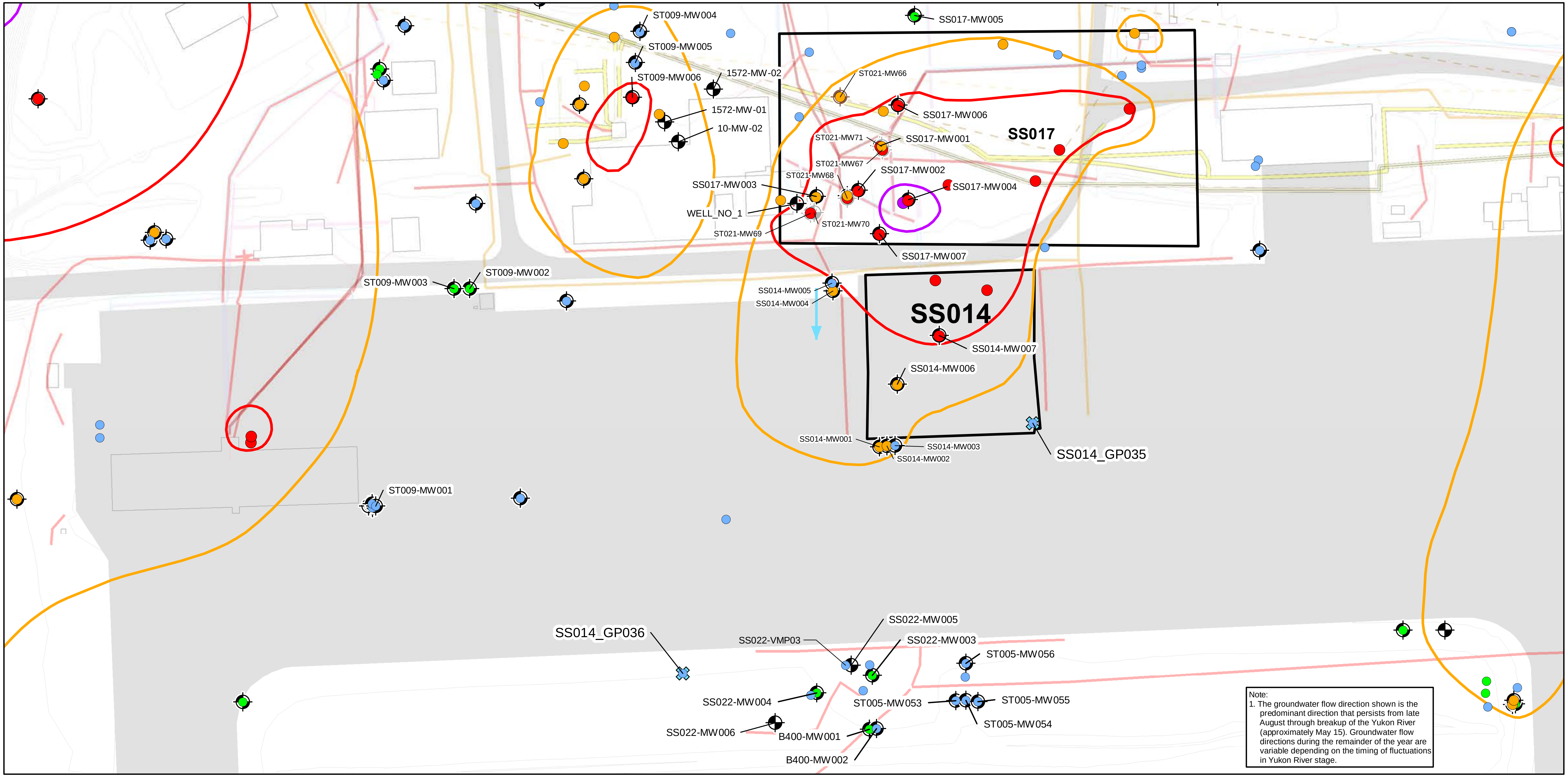
Sites SS014/SS017 Sulfate-Enhanced Bioremediation Injection Zones and Monitoring Wells

Analytes: COCs
SL: Remediation Target Concentrations
Data Range: All

2017 Construction Completion Report
Former Galena Forward Operating Location, Alaska

PARSONS

S:\ES\Remed\749388_Galena_FOL_PBR\Database\GIS\SS014\CCR_SS014_017_021_SO_RTC_SulfateInj_Fig7-2.mxd lxh 10/25/2017



Note:
1. The groundwater flow direction shown is the predominant direction that persists from late August through breakup of the Yukon River (approximately May 15). Groundwater flow directions during the remainder of the year are variable depending on the timing of fluctuations in Yukon River stage.

Legend

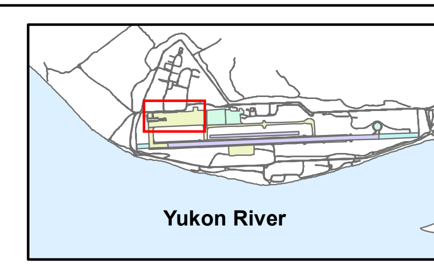
SS014/17
Airfield Surface or Road
Approximate Groundwater Flow Direction
Main Wastewater Line
Service Wastewater Line
Abandoned Fuel Line (1952)
Abandoned Fuel Line (1962)

Abandoned Fuel Line
Service Fuel Line
Main Fuel Line
Water Line
Heating/Cooling Line
Underground Utility Locates - 2010
Communications
Electrical
Fuel/Gas
Potable Water
Sanitary Sewer

Existing Monitoring Well
Abandoned Monitoring Well
Existing Monitoring Well Not Included in Monitoring Network
2018 Groundwater Grab Samples
Pre-2018 Groundwater Grab Sample Location (color filled based on DRO concentration)

Maximum DRO Contours (µg/L)
2010 - 2018
1,500 (dashed where inferred)
15,000
150,000

Maximum DRO Concentration (µg/L)
Monitoring Wells: 2010 - 2018
<= 1,500
1,500 to <= 15,000
15,000 to <= 150,000
150,000 to <= 1,500,000
Not Detected



0 60 120
Feet

N

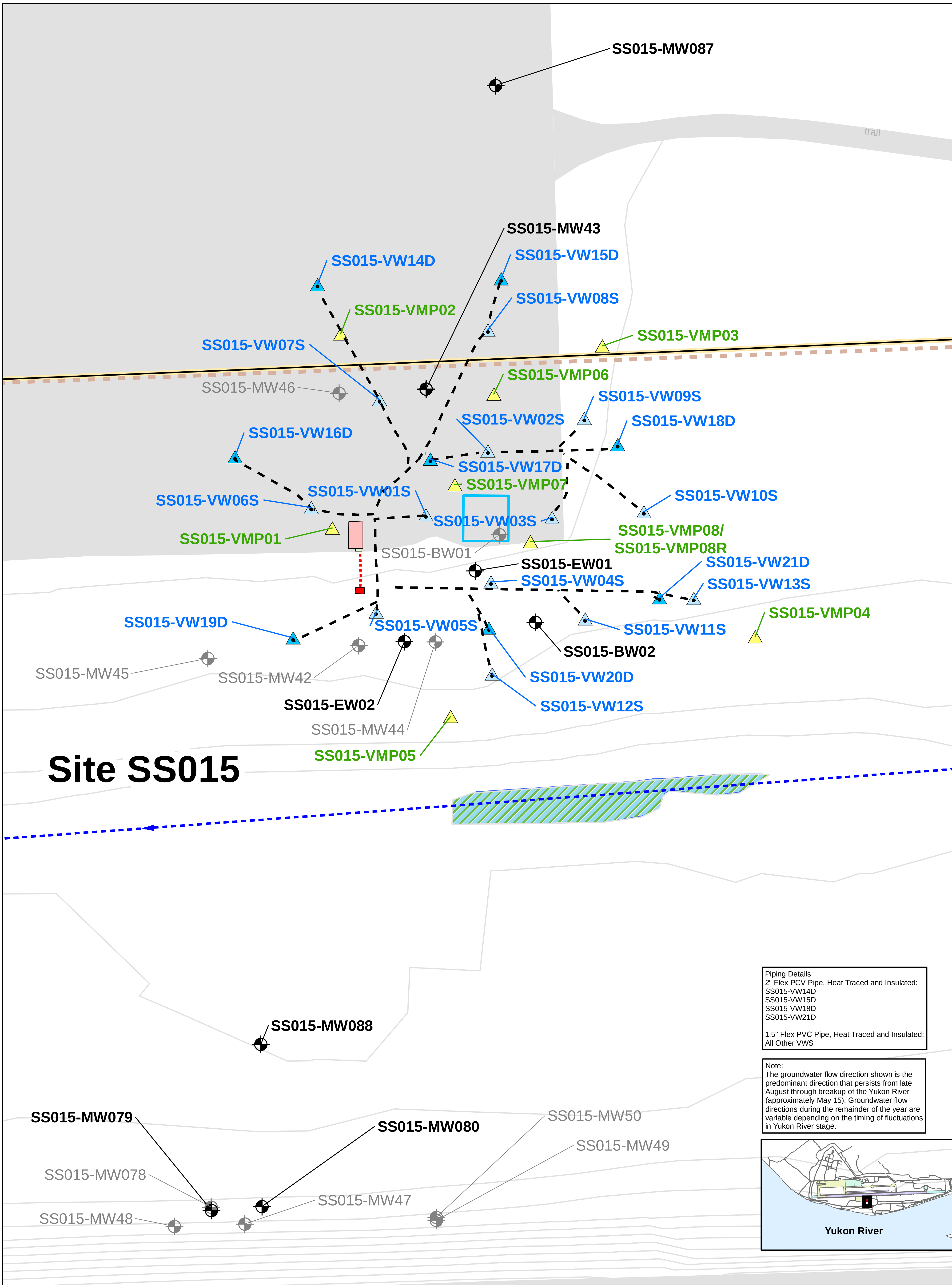
FIGURE A5-3

Site SS014/SS017 Groundwater Plume Verification Sampling Results

2018 Construction Completion Report
Former Galena Forward Operating Location, Alaska

PARSONS

S:\ES\Remed\749388_Galena_FOL_PBR\Database\GIS\SS014\CCR\CCR_SS014_017_021_SO_RTC_MW_Fig4-4_DownGradientMW.mxd lxh 12/19/2018



Legend

- Structure
- Approximate Groundwater Flow Direction
- Airfield Surface or Road
- Abandoned Fuel Line
- Main Fuel Line
- Ground Surface Contour
- Low Elevation, Temporarily Flooded Areas
- Bioreactor Installation Area (20' x 20' x 15' Deep)
- Approximate Location of Surface Drainage Swale Center Line and Seasonal Surface Water Flow Direction
- Residential Well Location
- Existing Groundwater Monitoring Well Included in Performance Monitoring Network
- Existing Groundwater Monitoring Well Excluded from Performance Monitoring Network
- Vapor Monitoring Point
- Shallow Vent Well
- Deep Vent Well
- Blower Shed Location (6' x 12')
- Electric Meter and Disconnect Panel
- Electric service in 2" SCH 40 PVC Conduit
- Approximate Location new transformer

0 20 40
Feet

N

FIGURE A6-1

Site SS015
As-Built of Soil Vapor Extraction System

2021 Remedial System Annual Report
Former Galena Forward Operating Location, Alaska

PARSONS

S:\ES\Remed\749388_Galena_FOL_PBR\Database\GIS\WholeSite\2021\SVE_Fig2-5_SS015_WG_MWN_2021.mxd lxh 11/16/2021

Monitoring Well Screened Intervals

Existing Wells:	Screened Intervals (ft bgs)
SS015-BW02	29 – 54
SS015-EW01	25 – 50
SS015-EW02	25 – 50
SS015-MW043	19 – 24
SS015-MW73	65 – 70
SS015-MW079	50 – 60
SS015-MW085	75 – 85
SS015-MW080	70.5 – 80.5
SS015-MW087	10 – 35
SS015-MW088	70 – 80

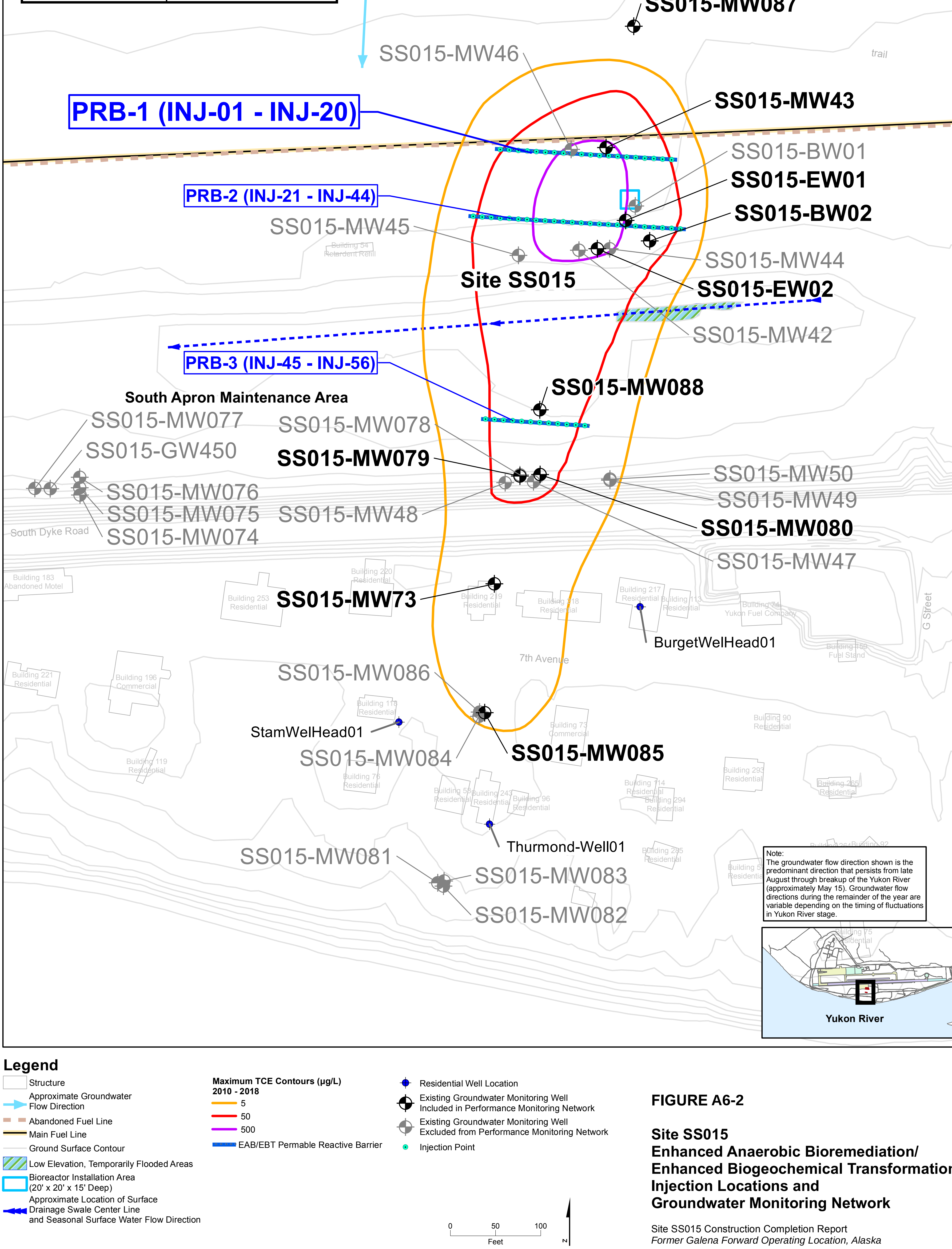


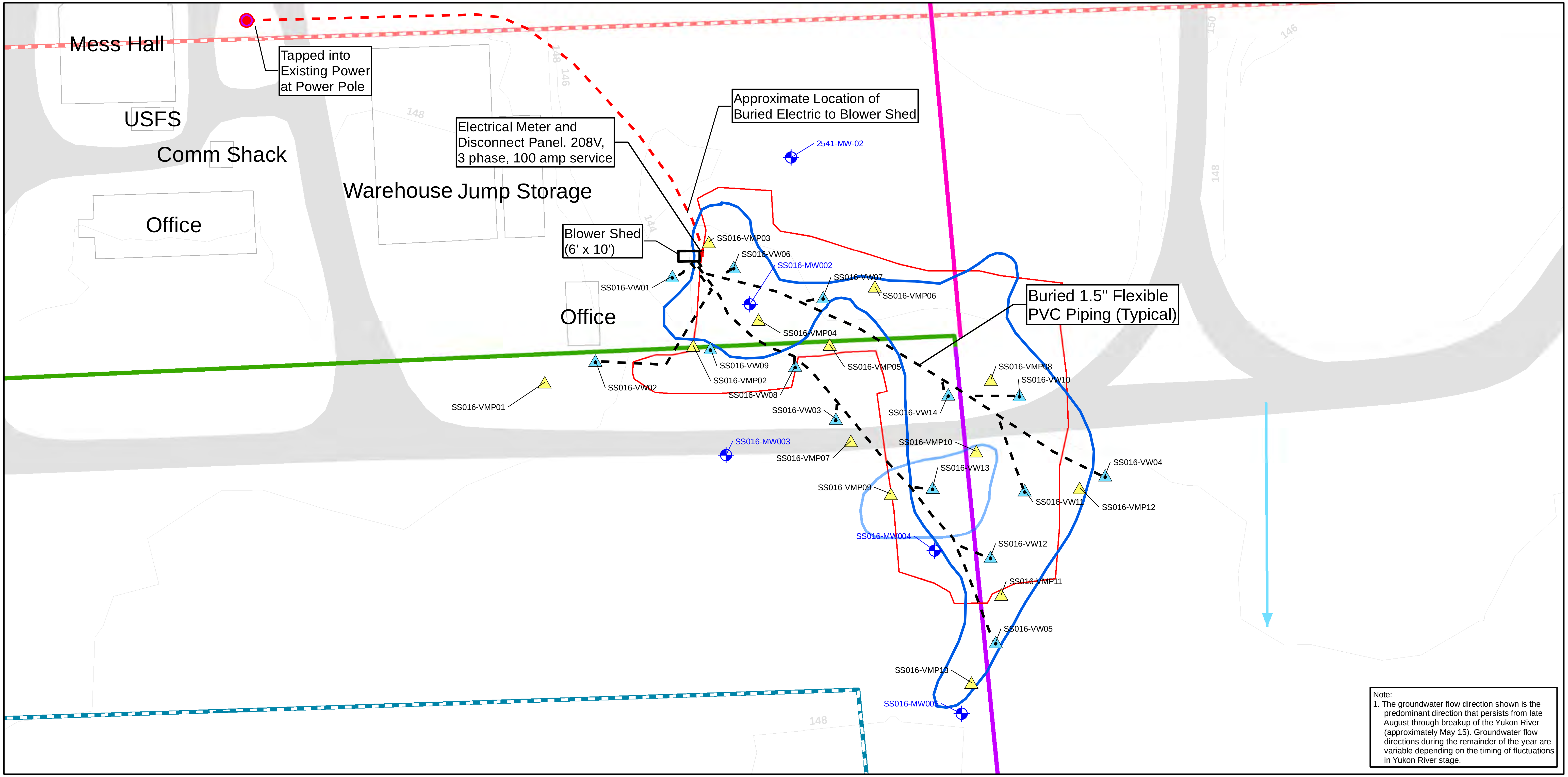
FIGURE A6-2

Site SS015
Enhanced Anaerobic Bioremediation/
Enhanced Biogeochemical Transformation
Injection Locations and
Groundwater Monitoring Network

Site SS015 Construction Completion Report
Former Galena Forward Operating Location, Alaska

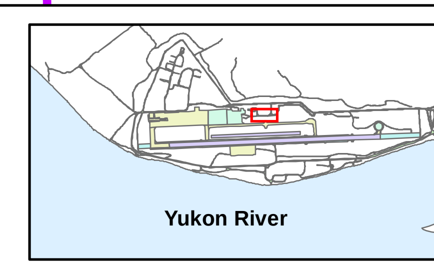
S:\ES\Remed\749388_Galena_FOL_PBR\Database\GIS\Groundwater\2019\PMR_SS015_WG_MWN_FigA7-2.mxd lxh 12/26/2019

PARSONS



Legend

- Approximate Groundwater Flow Direction
- As Built Excavation Top Extents (2013)
- Extent of Residual Petroleum within the Vertical Interval (0-15 ft bgs)
- Extent of Residual Petroleum (15-25 ft bgs)
- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)
- 1952 and 1962 Aboveground Pipeline (1963 and 1985 Aerial)
- 1952 and 1962 Underground Pipeline (Not Visible on Aerials)
- Aboveground Pipeline (1985 Aerial)
- Monitoring Well
- Vent Well (VW)
- Vapor Monitoring Point (VMP)
- Power Pole



0 25 50
Feet

FIGURE A7-1

Site SS016
As-Built of Bioventing System

Construction Completion Report
Former Galena Forward Operating Location, Alaska

PARSONS

S:\ES\Remed\749388_Galena_FOL_PBR\Database\GIS\SS016\CCR_SS016_SO_BioVentSys_AsBuilt_Fig8-3.mxd lxh 7/17/2017

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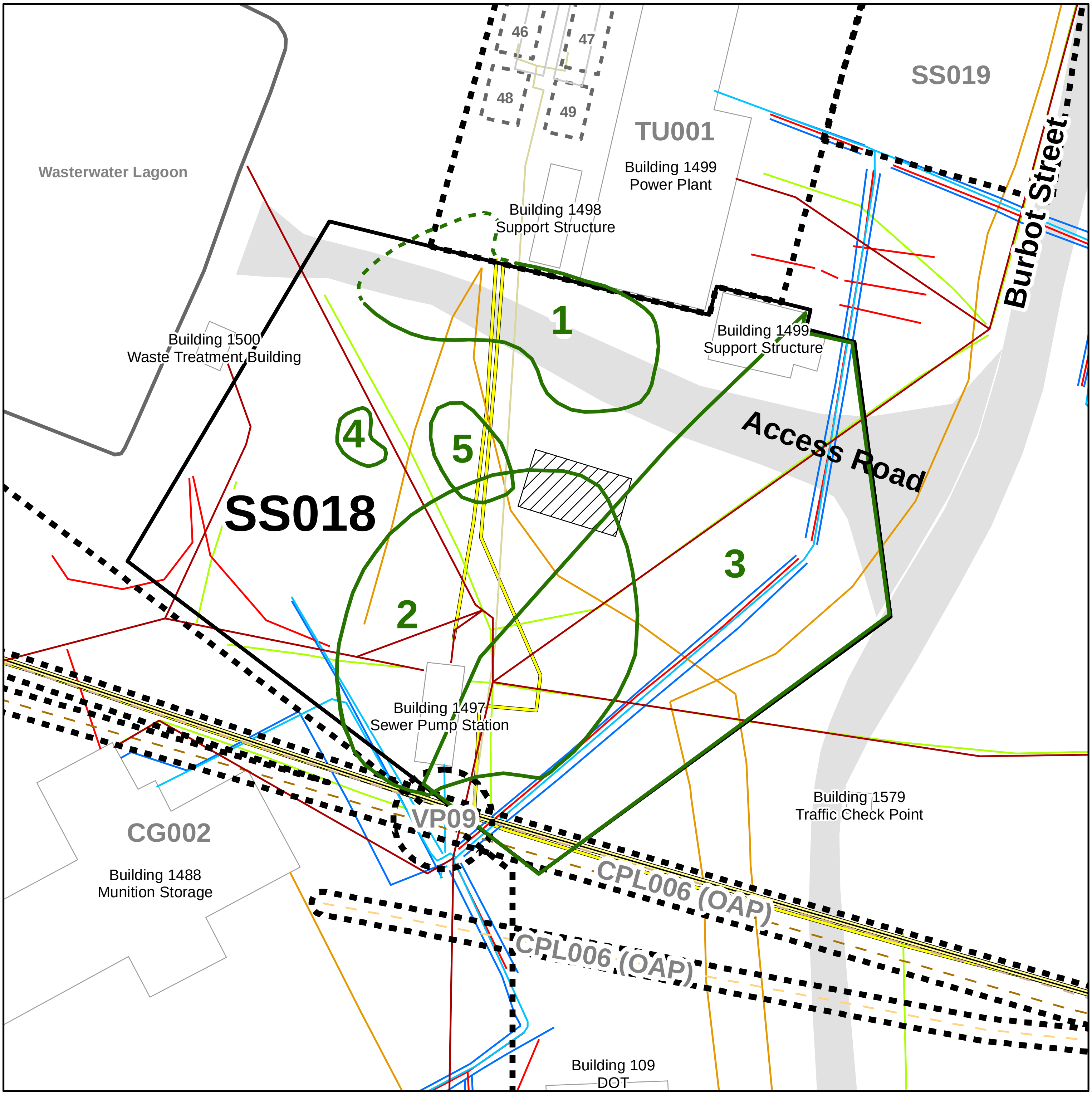
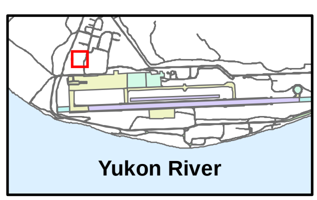


Legend

Airfield Surface or Road
Main Wastewater Line
Service Wastewater Line
Abandoned Fuel Line (1952)
Abandoned Fuel Line (1962)
Abandoned Fuel Line
Service Fuel Line
Main Fuel Line
Water Line

Underground Utility Locates - 2010
Communications
Electrical
Fuel/Gas
Potable Water
Sanitary Sewer
SS018
Adjacent Site
Approximate Location of Former Diesel Storage Tank
Concrete Drum Storage Pad

Sample Subarea (dashed where inferred)



0 30 60
Feet

N

FIGURE A8-1

Site SS018
Site Features and Utilities

Remedial Design/Remedial Action Work Plan
Former Galena Forward Operating Location, Alaska

PARSONS

S:\ES\Remed\749388_Galena_FOL_PBR\Database\GIS\SS018\RAWP\FS_SS018_SiteFeature_Utilities_Fig2-1.mxd lxh 6/16/2017

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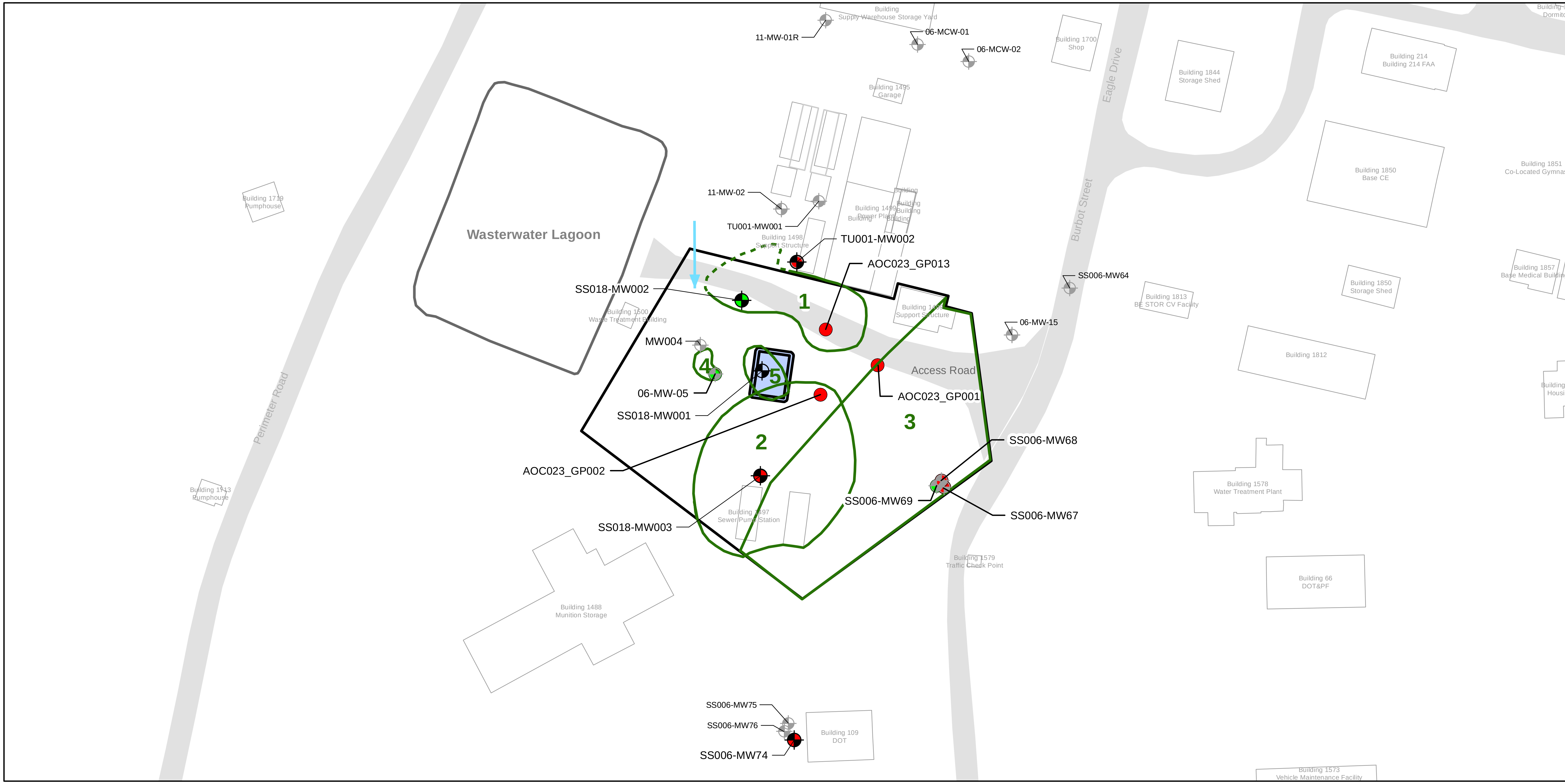

Legend

- SS018
- Airfield Surface or Road
- Approximate Groundwater Flow Direction (See Note 1)
- 2010 - 2018 Sample Exceeds 2018 ADEC Table C Groundwater Clean Up Levels (CULs)
- 2010 - 2018 Sample Does Not Exceed 2018 ADEC Cleanup Level
- Existing Well for Monitoring Well Network
- Existing Well
- Excavation Area
- Sample Subarea (dashed where inferred)

Notes:

1. The groundwater flow direction shown is the predominant direction that persists from late August through breakup of the Yukon River (approximately May 15). Groundwater flow directions during the remainder of the year are variable depending on the timing of fluctuations in Yukon River stage.

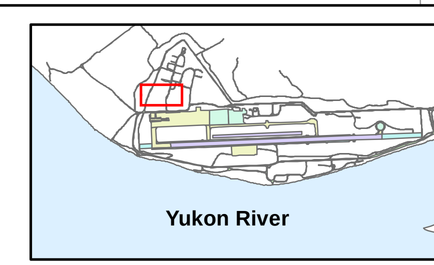

FIGURE A8-2

Site SS018
SubArea 5 Excavation Layout

2018 Construction Completion Report
Former Galena Forward Operating Location, Alaska

PARSONS

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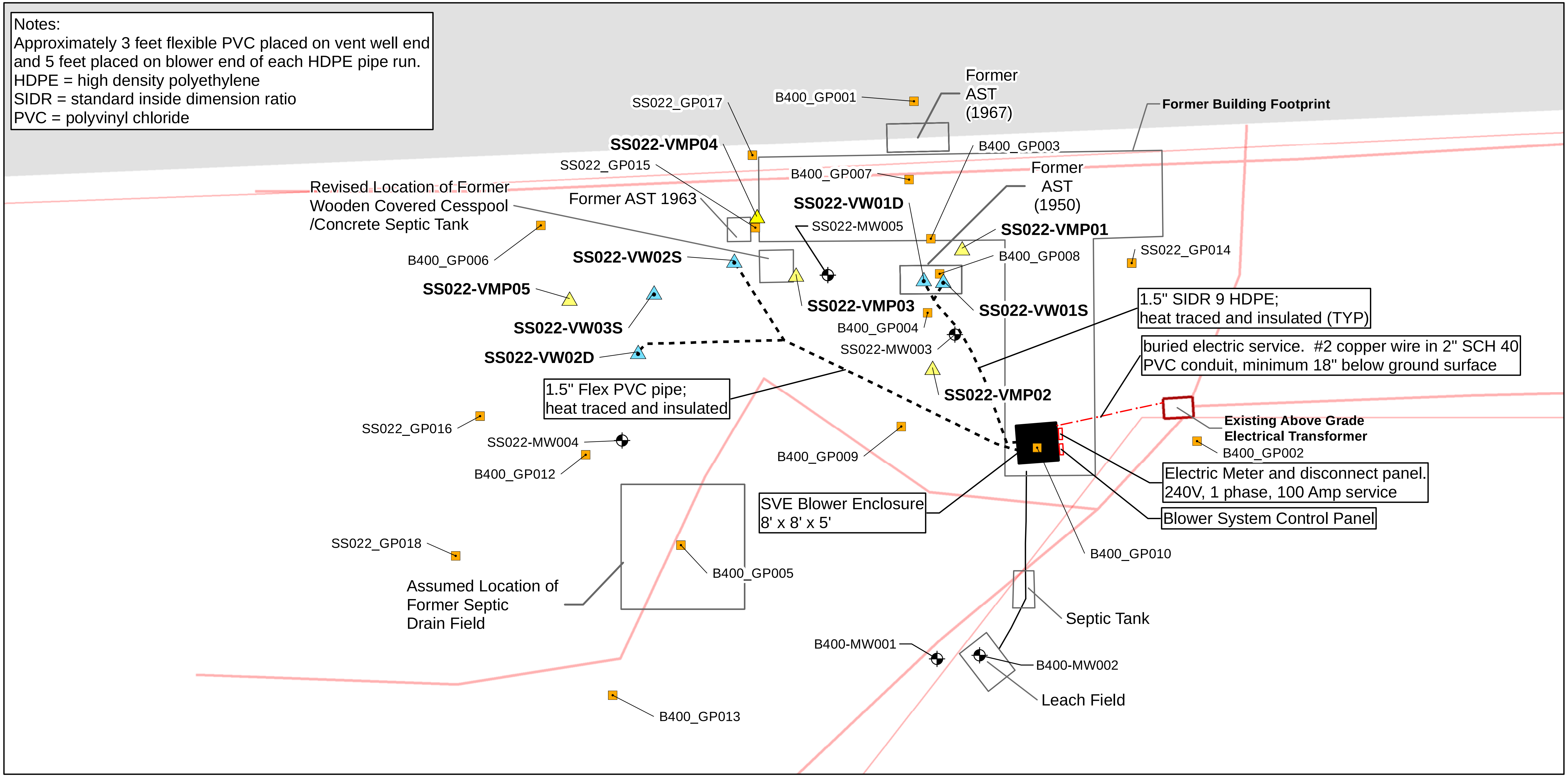
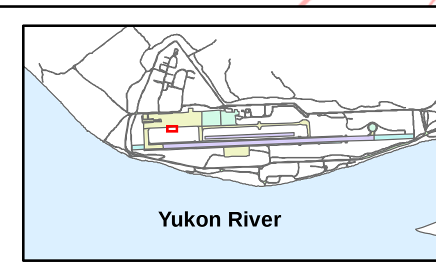


Legend

- Site Feature
- Storm Sewer Open Drainage Line
- Underground Airfield Cable
- Electrical Transformer
- Airfield Surface or Road

Underground Utility Locates - 2010

- Communications
- Electrical
- Monitoring Well
- Soil Boring
- Vapor Extraction Well
- Vapor Monitoring Point
- Vapor Monitoring Point and soil and groundwater grab sampling location
- Piping for SVE System



0 10 20
Feet

N

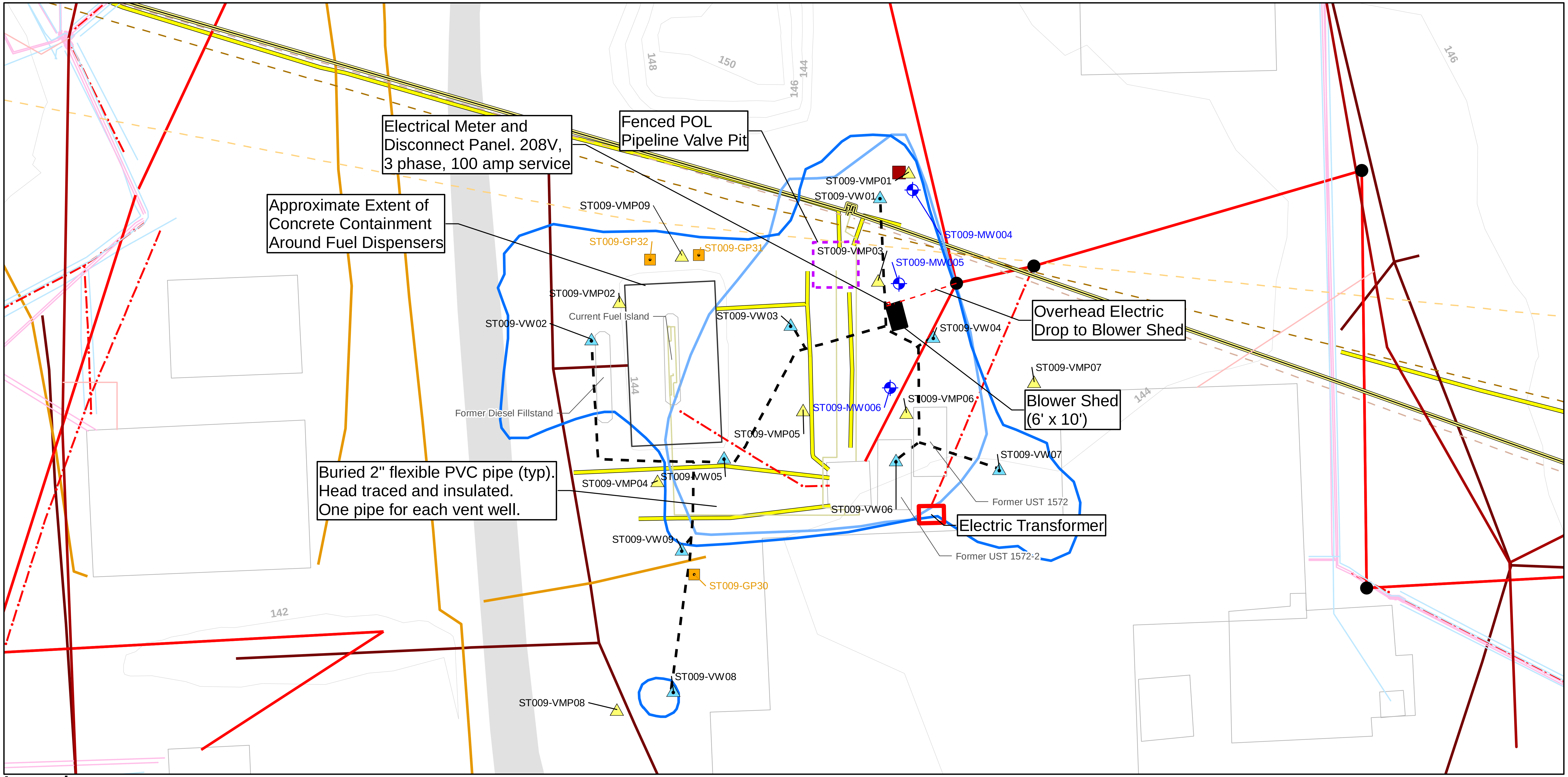
Figure A9-1

Site SS022
As-Built of the Soil Vapor Extraction System

2023 Remedial Process Optimization
Former Galena Forward Operating Location, Alaska

PARSONS

S:\ES\Remed\110216_Galena_FOL_ RPO\Database\GIS\RPO_Annual\2023\RPO_CCR_SVE_SS022_As-Built_FigA9-1.mxd lxh 11/16/2023



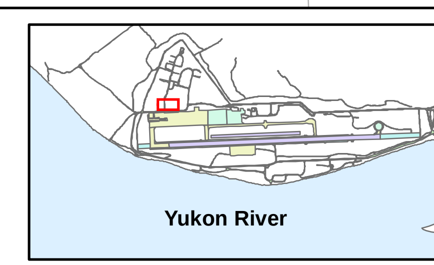
Legend

- Main Wastewater Line
- Service Wastewater Line
- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)
- Abandoned Fuel Line
- Service Fuel Line
- Main Fuel Line
- Water Line
- Heating/Cooling Line

Underground Utility Locates - 2010
- Communications
- Electrical
- Fuel/Gas
- Potable Water
- Sanitary Sewer
- Estimated Extent of Constituents in Soil with Concentrations Greater than Remediation Target Concentration (0-15 ft)
- Estimated Extent of Constituents in Soil with Concentrations Greater than Remediation Target Concentration (15-25 ft)

- Existing Overhead Electric
- Existing Buried Electric
- Power Pole
- Thermister String

- Verification Sampling Location
- Monitoring Well
- Vent Well (VW)
- Vapor Monitoring Point (VMP)



Note: Trench locations were not surveyed and are approximate.

0 20 40
Feet

N

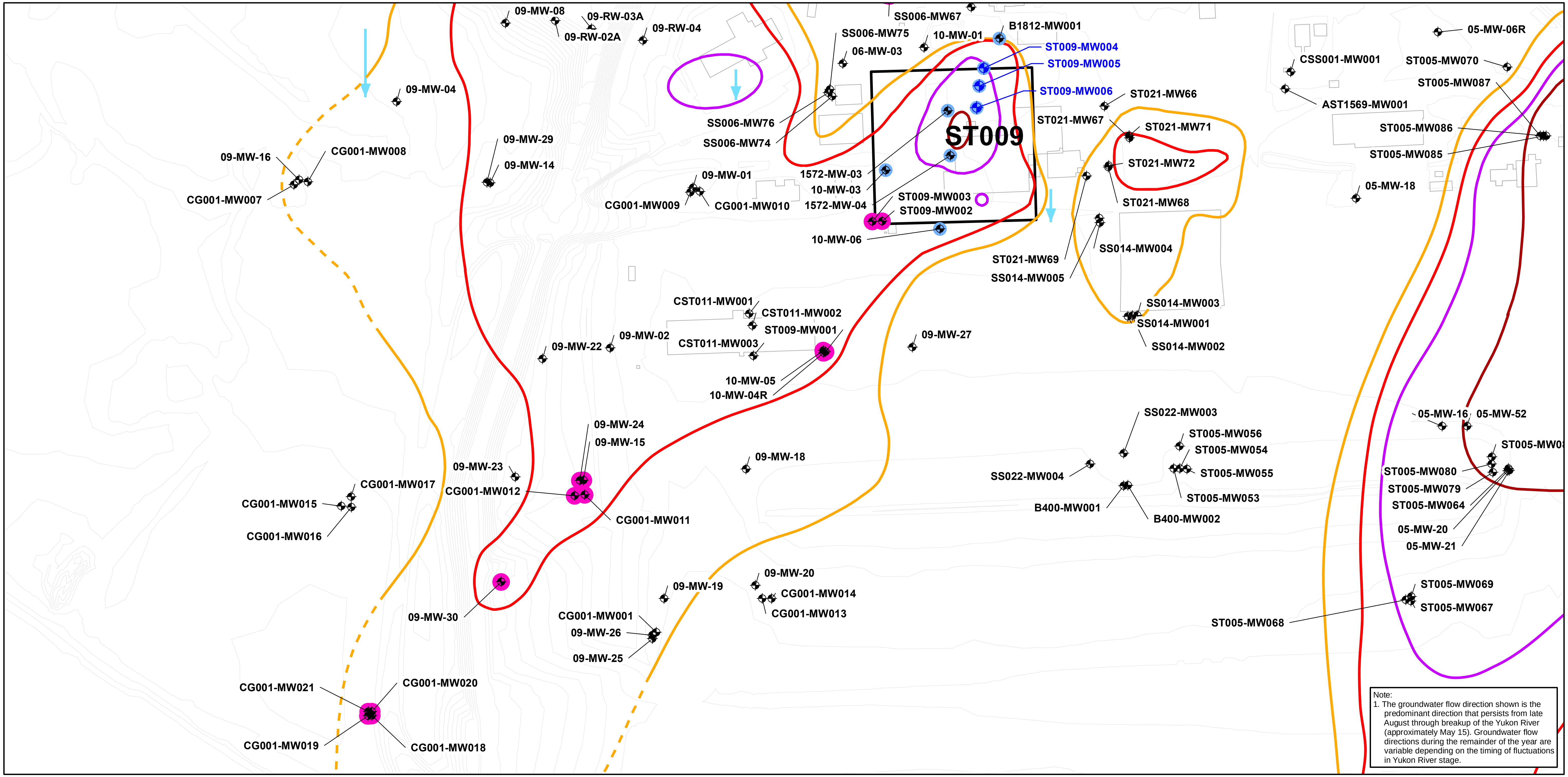
FIGURE A10-1

Site ST009 As-Built of Soil Vapor Extraction/Bioventing System

2018 Remedial System Annual Report
Former Galena Forward Operating Location, Alaska

PARSONS

S:\ES\Remed\749388_Galena_FOL_PBR\Database\GIS\ST009\RSAR_2018_ST009_SO_SVE_AsBuilt_Fig2-5.mxd lxh 11/27/2018



Legend

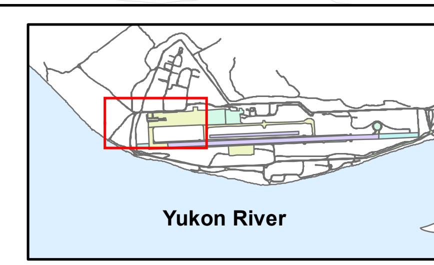
ST009

Approximate Groundwater Flow Direction

Maximum Benzene Contours (µg/L)
2007 - 2013

- 5,000
- 500
- 50
- 5
- 5 (dashed where inferred)

- Existing Monitoring Well
- Proposed Monitoring Well
- Proposed for ST009 Performance Monitoring Well
- Downgradient Plume Monitoring Sampling Program



0 100 200
Feet

N

FIGURE A10-2

Site ST009 Monitoring Wells On-Site and in Downgradient Comingled Plumes

Analytes: Benzene
Media: Groundwater
SLs: N/A
Data Range: 2007 - 2015

Site ST009 Cleanup Plan
Former Galena Forward Operating Location, Alaska

PARSONS

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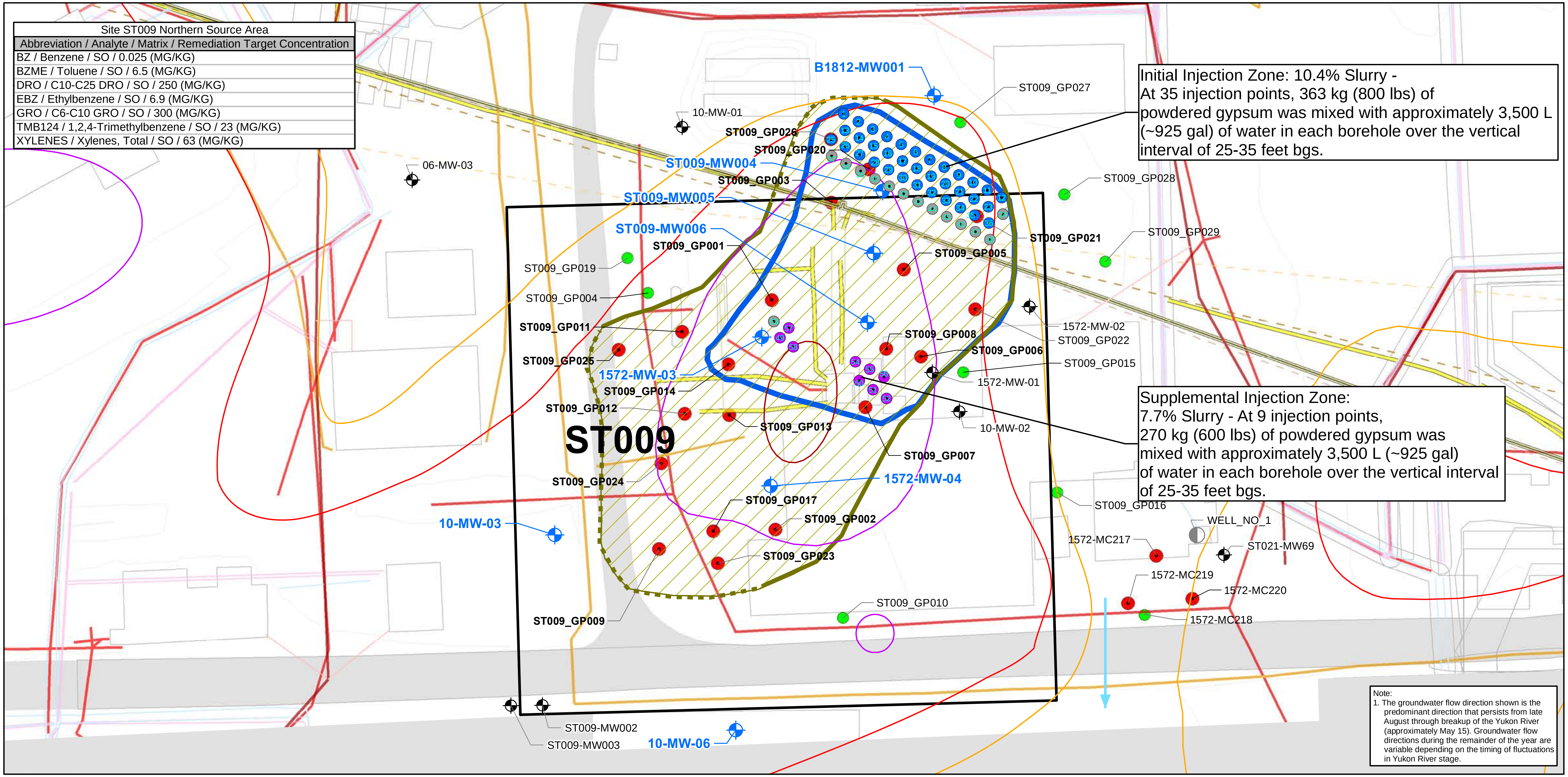


Legend

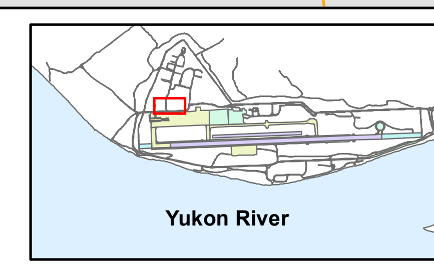
- ST009
- Airfield Surface or Road
- Approximate Groundwater Flow Direction
- Main Wastewater Line
- Service Wastewater Line
- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)
- Abandoned Fuel Line
- Service Fuel Line
- Main Fuel Line
- Water Line
- Heating/Cooling Line

Underground Utility Locates - 2010

- Communications
- Electrical
- Fuel/Gas
- Potable Water
- Sanitary Sewer
- Concentrations Greater than Remediation Target Concentration Soil Depth >25 ft
- Concentrations Not Detected or Not Exceed Remediation Target Concentration Soil Depth >25 ft
- Existing Monitoring Well
- Production Well
- Sulfate Injection Point at 7.7% Slurry
- Sulfate Injection Point at 10.4% Slurry
- Sulfate Injection Point Eliminated
- Performance Monitoring Well
- Extent of Residual Petroleum (>25 ft bgs)
- Estimated Extent of Constituents in Soil with Concentrations Greater than Remediation Target Concentration (Dashed Where Inferred)

Maximum Benzene Contours (µg/L)
2007 - 2013

- 5,000
- 500
- 50
- 5
- 5 (dashed where inferred)



0 30 60
Feet

FIGURE A10-3

Site ST009
Sulfate-Enhanced Bioremediation

Analytes: Northern Source Area Soil COCs
SL: Remediation Target Concentration
Data Range: 2007 - 2013

2017 Construction Completion Report
Former Galena Forward Operating Location, Alaska

PARSONS

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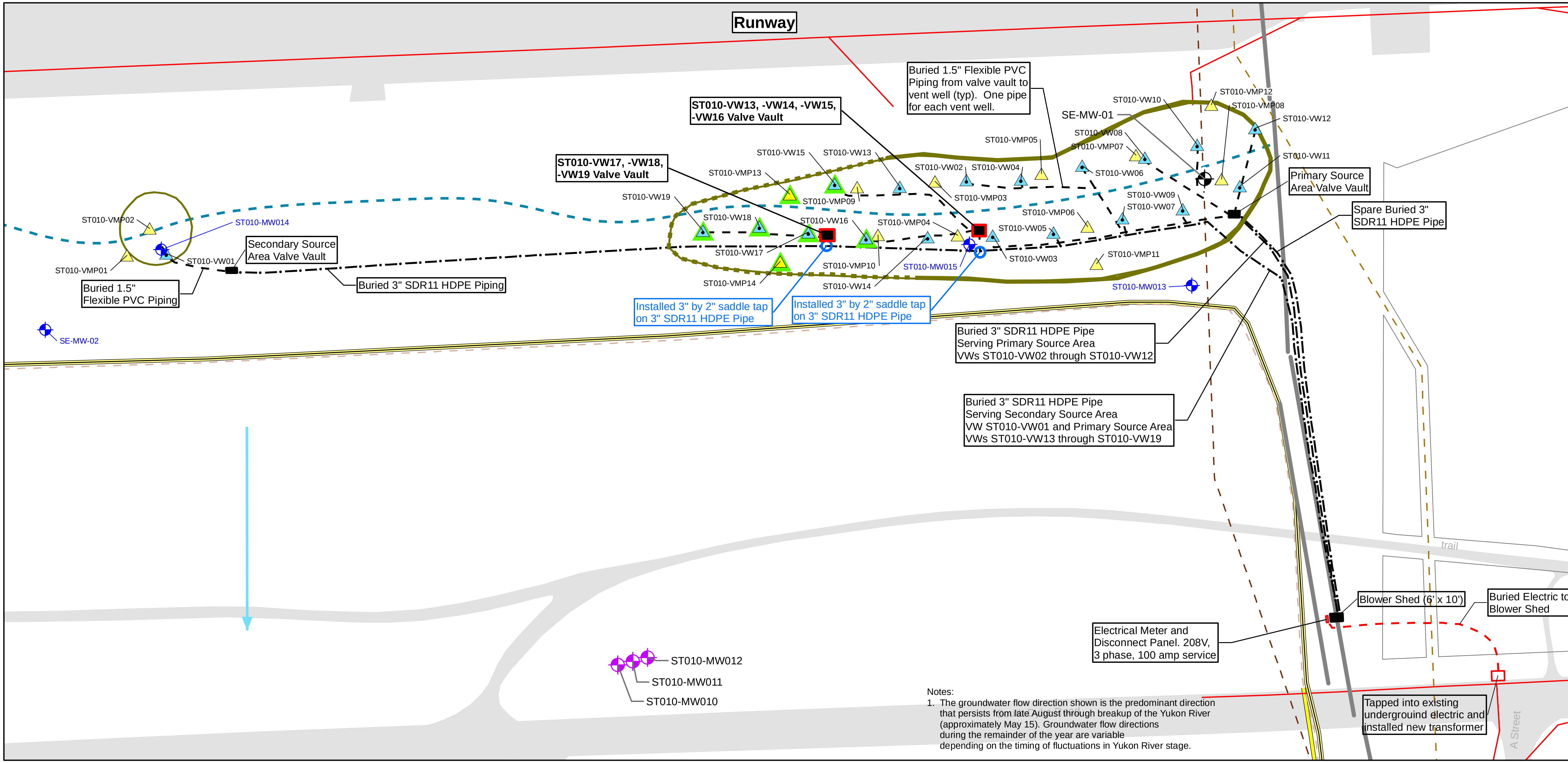


Notes:
1. The groundwater flow direction shown is the predominant direction that persists from late August through breakup of the Yukon River (approximately May 15). Groundwater flow directions during the remainder of the year are variable depending on the timing of fluctuations in Yukon River stage.

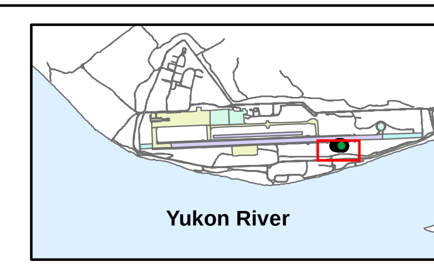
Legend

- Open Drainage Ditch
- Approximate Groundwater Flow Direction
- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)
- OAP Pipeline
- Abandoned Fuel Line
- Main Fuel Line
- Electrical Line
- Airfield Surface or Road

Underground Utility Locates - 2010
- Communications
- Electrical
- Fuel/Gas
- Potable Water

Estimated Extent of Constituents in Soil with Concentrations Greater than Remediation Target Concentrations within the target treatment interval (Dashed Where Inferred)

- Existing MNA Monitoring Well
- Sentry Well
- Monitoring Well
- Shallow Vent Well (VW)
- Vapor Monitoring Point (VMP)
- Installed in 2019



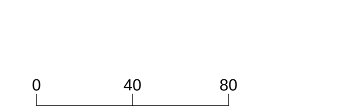


FIGURE A11-1

Site ST010
As-Built of Bioventing System

2023 Remedial Process Optimization
Former Galena Forward Operating Location, Alaska

PARSONS

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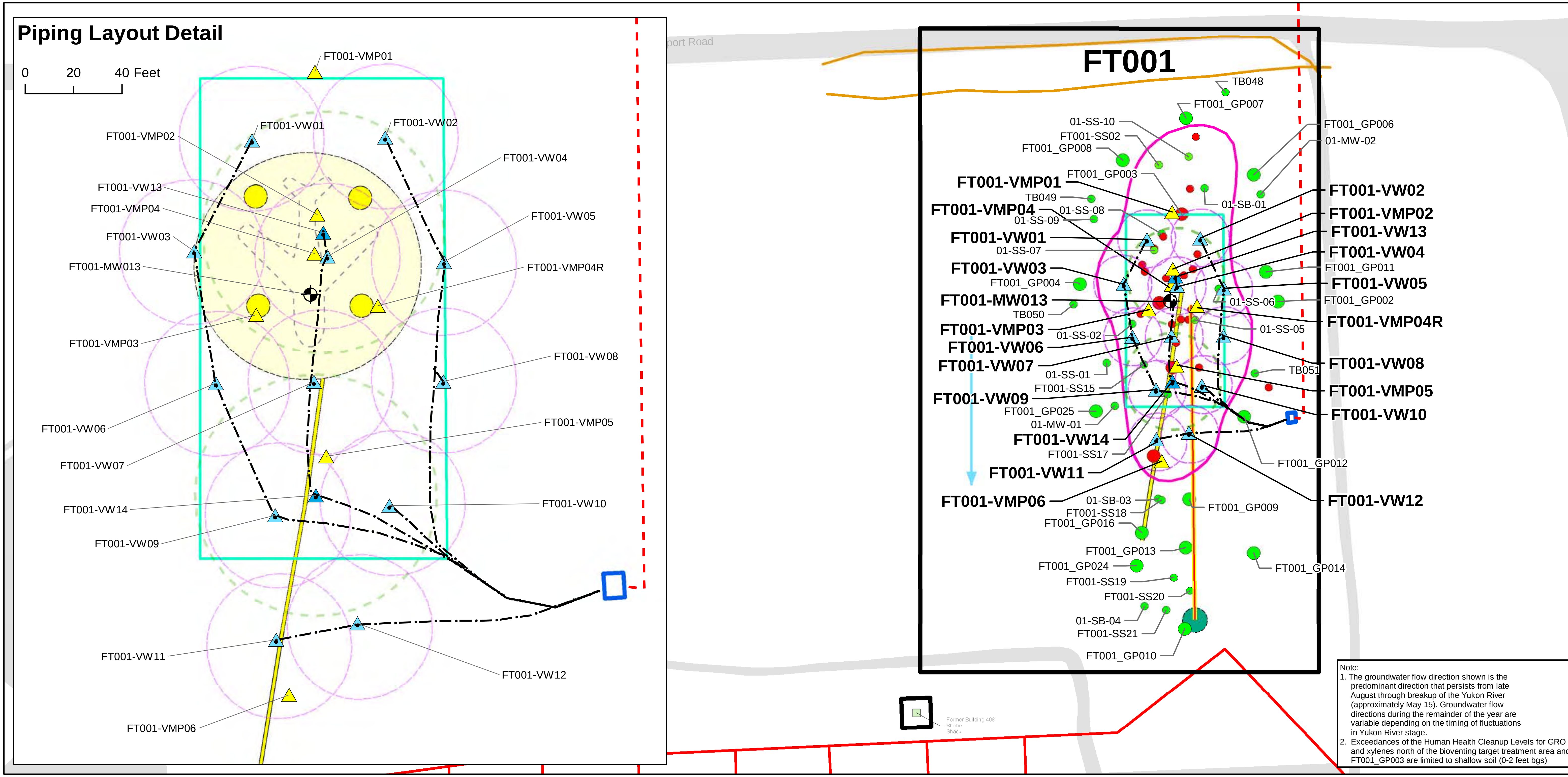

Legend

- FT001
- Fire Training Circle
- Former Fuel Sprayer
- Airfield Surface or Road
- Formerly Assumed Location of Aboveground Fillstand
- Formerly Assumed Location of Underground Fuel Transfer Pipe
- Underground Electrical Line
- Approximate Groundwater Flow Direction

Utility Locates - 2010

- Communications Line
- Fuel/Gas Line
- 2010 - 2013 RI Boring Exceeds 2018 Migration to GW or Human Health Clean Up Levels (CULs)
- 2010 - 2013 RI Boring Does Not Exceed Any 2018 CULs
- Pre-RI Boring Exceeds 2018 Migration to GW or Human Health Clean Up Levels (CULs)
- Pre-RI Boring Does Not Exceed Any 2018 CULs
- Extent of COCs Exceeding 2018 Human CULs in Combined Surface and Subsurface Soil (0 - 15 ft)
- PVC Vapor Barrier 100' x 200', 30 mil.
- Radius of Influence (Shallow)
- Radius of Influence (Deep)
- Monitoring Well
- Shallow Vent Well (VW)
- Deep Vent Well (VW)
- Vapor Monitoring Point
- Blower Location
- Piping for Bioventing System
- Approximate Location Buried Electrical Service

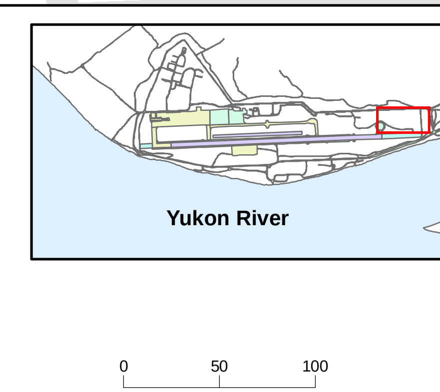

FIGURE A12-1

Site FT001
Bioventing System Layout

Analytes: GRO and VOCs
Media: Soil (0 - 15 ft)
SLs: The Lower of the 2018 Method Two CULs
Data Range: Historical and 2010 - 2013

Site FT001 Construction Completion Report
Former Galena Forward Operating Location, Alaska

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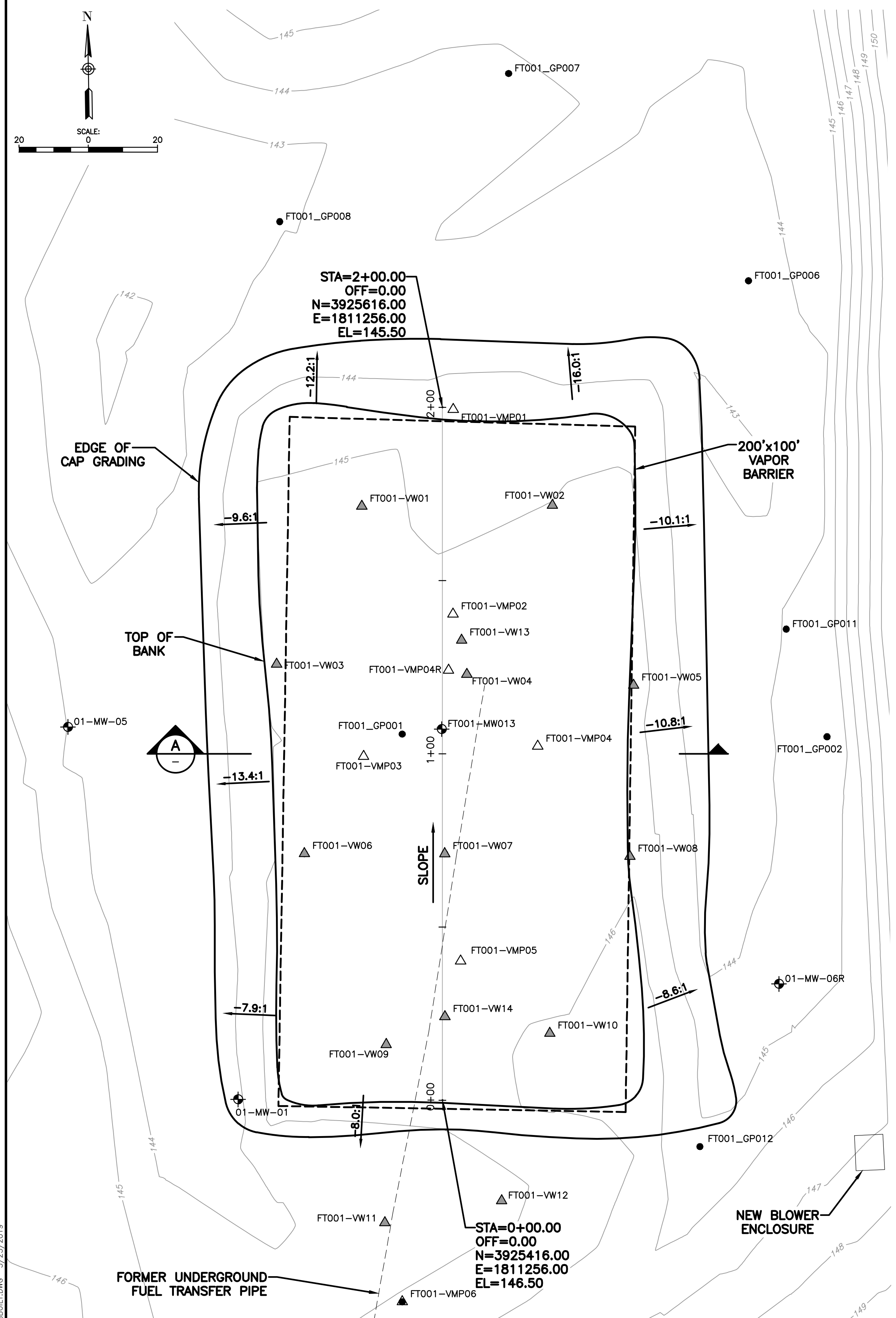
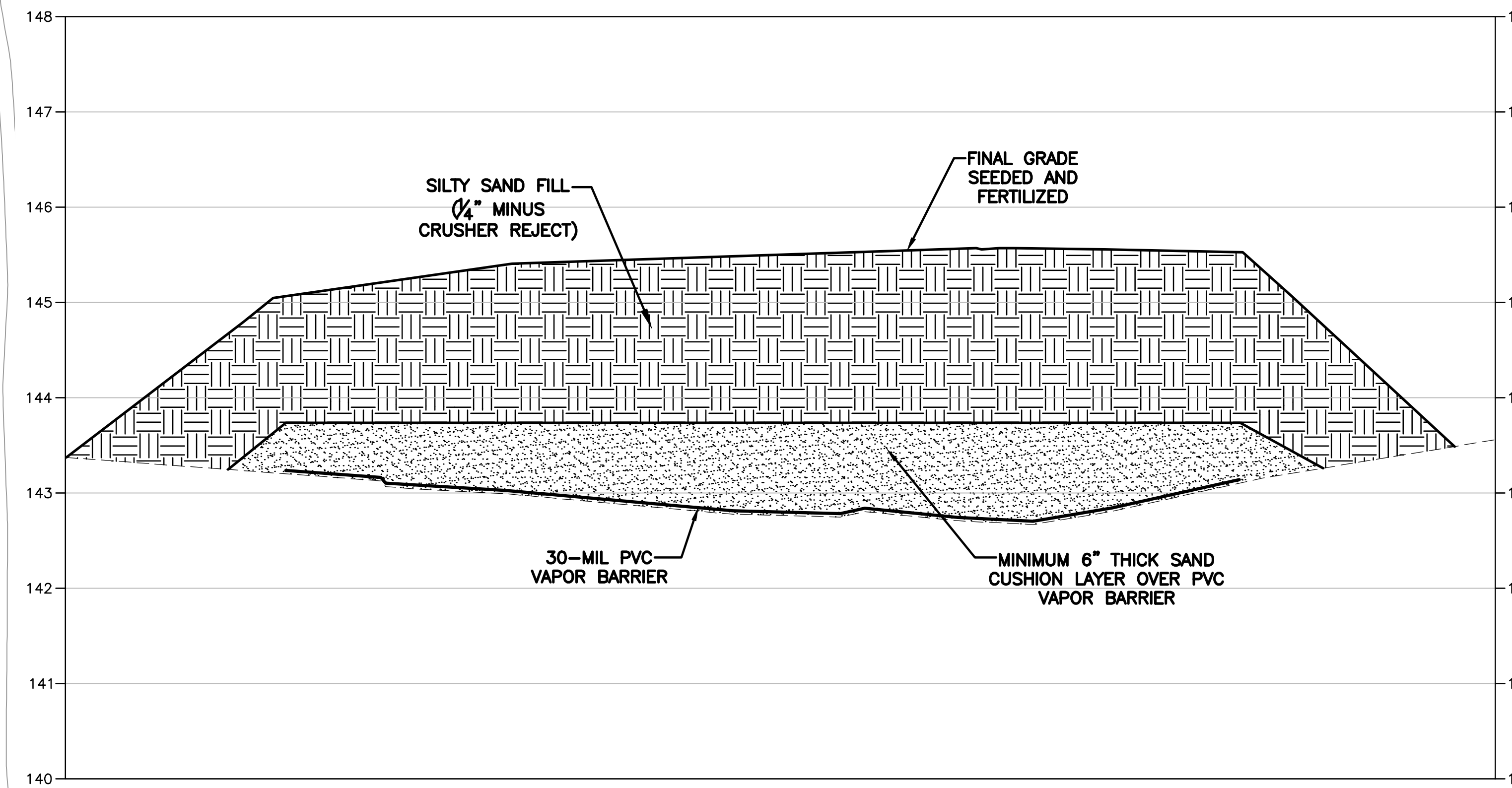
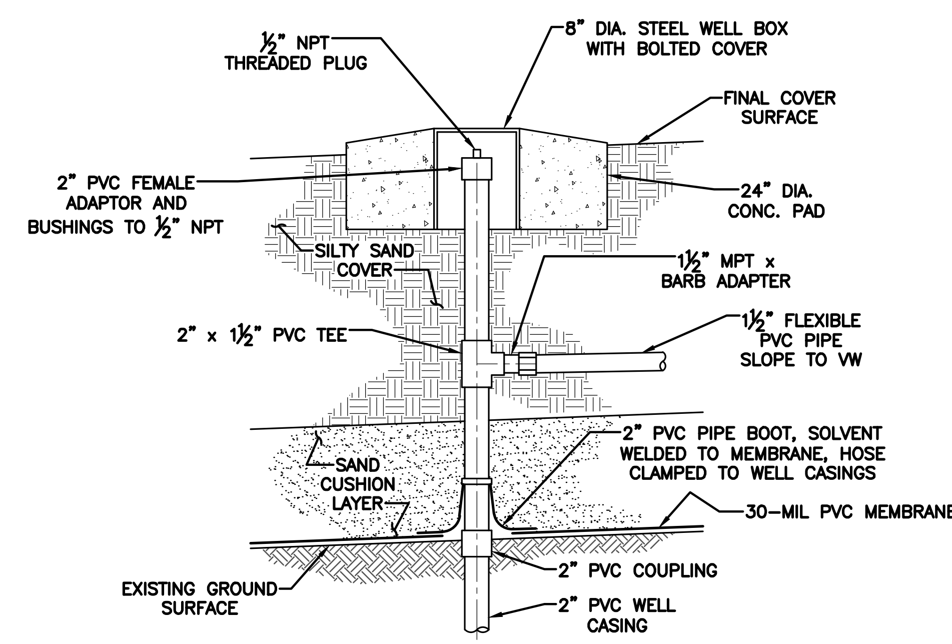


GRADING PLAN
SCALE: 1"=20'



CAP SECTION @ STA. 1+00 (A/–)
HORZ. SCALE: 1"=10', VERT. SCALE: 1"=1'



VENT WELL – COVER PENETRATION DETAIL (1/–)
N.T.S.

NOTES:
1. DRAWING COORDINATES ARE IN NAD83 ALASKA STATE PLANE 6 (FIPS 5006) FEET.

REV. NO.	BY	DATE	REVISION DESCRIPTION
1	BB	12/13/18	AS-BUILT DRAWING

PARSONS
PARSONS GOVERNMENT SERVICES

FORMER GALENA FORWARD OPERATING LOCATION, ALASKA
SITE FT001

AS-BUILT GRADING PLAN AND SECTION

NOTES	NAME	DATE
DRAWN BY	SDM	6/17
CHECKED BY		
REVIEWED BY		
APPROVED BY		
SCALE: VARIES		
REVISION: 1		
DRAWING: A12-2		
SHEET: - OF -		

749388-FT001-CAPPLAN ASBUILT.DWG 3/25/2019

Attachment B
2023 Groundwater Geochemistry Evaluation

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1.0 INTRODUCTION

Geochemical parameters are collected with certain groundwater samples to help interpret the potential for biodegradation of contaminants of concern (COCs) in groundwater and to evaluate changes in contaminant concentrations.

During biodegradation of organic chemicals such as petroleum hydrocarbons, electrons are donated from organic molecules (electron donors) to electron acceptors. Microbes use electron acceptors sequentially preferring those that provide more energy; the preferred order is oxygen, nitrate, manganese, iron, sulfate, and finally carbon dioxide (methanogenesis). Evaluating the relative concentrations of electron acceptors (oxygen, nitrate, sulfate) and reduction by-products (ferrous iron [Fe(II)], reduced manganese [Mn(II)], sulfide, and methane) in groundwater provides secondary lines of evidence of biodegradation (where the primary line of evidence is a decrease in concentrations of COCs).

Alternatively, some microbes can use chlorinated compounds such as trichloroethene (TCE) as an electron acceptor. This process, referred to as reductive dechlorination, occurs under anaerobic reducing conditions given a suitable organic substrate is present as the electron donor (for example, emulsified vegetable oil). Evaluating the relative concentrations of natural electron acceptors provides insight into whether conditions are sufficiently reducing for reductive dechlorination to occur.

These data are useful for interpreting natural attenuation of COCs in groundwater. In addition, some of the remedies selected for Galena involve manipulating groundwater geochemistry to promote biodegradation, and monitoring geochemistry provides evidence that the remedies are working as intended. Groundwater geochemical monitoring is used as follows:

- **Monitored Natural Attenuation (MNA):** Successive depletion of electron acceptors along a flow path is a secondary line of evidence that biodegradation is occurring.
- **Enhanced Anaerobic Bioremediation (EAB)/ Enhanced Biogeochemical Transformation (EBT):** Changing groundwater geochemistry to a more reducing condition, particularly sulfate-reducing or methanogenic, is preferred for EAB/EBT.
- **Sulfate-Enhanced Bioremediation:** Increased sulfate concentrations and subsequent depletion downgradient of the point of injection is evidence that sulfate is supplied and utilized as intended.

Geochemical parameters are evaluated by reviewing concentrations and attempting to define the oxidation-reduction (redox) condition of the groundwater at the monitoring location (i.e., which chemicals are donating or accepting electrons). Several authors, including Lyngkilde et al. (1991) and Chapelle et al. (2003) have developed processes for defining the redox condition, which have been adapted for Galena as described below:

- **Aerobic or Oxygen-Reducing:** Groundwater with dissolved oxygen concentration above 0.5 milligrams per liter (mg/L) is considered to have primarily oxygen-reducing conditions. Dissolved oxygen concentrations below 0.5 mg/L indicate a different electron acceptor is predominant. Because atmospheric oxygen can quickly dissolve into a water sample after it is collected, dissolved oxygen concentrations above 0.5 mg/L may be judged to be other than oxygen-reducing depending on its location and concentrations of other geochemical parameters.

- **Nitrate-Reducing:** If dissolved oxygen concentrations are below 0.5 mg/L and nitrate concentrations are above 0.5 mg/L, the redox condition is generally considered to be nitrate-reducing. Background concentrations of nitrate at Galena are typically low (less than 1 to 2 mg/L) and nitrate-reduction is not expected to be a significant factor in biodegradation. Other indicators of nitrate-reducing conditions may include nitrite concentrations above 0.1 mg/L, and iron or manganese concentrations at background levels.

- **Iron/Manganese-Reducing:** If oxygen and nitrate are depleted, and manganese and/or iron concentrations increase above background, sulfate is not being depleted and methane is not present, then the redox condition is primarily manganese or iron reducing. Oxidized manganese (Mn[IV]) and iron (Fe[III]) have low solubility and are present in a solid mineral form. Under aerobic conditions, dissolved manganese and iron in Galena groundwater are often less than 0.1 mg/L. However, they are more soluble in the reduced form (Mn[II] and Fe[II]) and are found in high concentrations dissolved in contaminated groundwater where conditions are reducing. Concentrations above 0.2 mg/L may be interpreted as evidence of manganese or iron reducing conditions.

- **Sulfate-Reducing:** Sulfate reducing conditions are characterized by depletion of dissolved sulfate and production of sulfide. Sulfide is likely to precipitate as iron sulfide minerals (e.g., pyrite). Background concentrations of sulfate in Galena groundwater range from 8 to over 80 mg/L, with higher concentrations tending to be observed at the east end of the runway and lower concentrations (no greater than 40 mg/L) observed in the “triangle” area. Other characteristics of sulfate-reducing conditions are depleted oxygen and nitrate, elevated dissolved iron and manganese, but no or limited methane. Depleted sulfate concentrations (below 5.0 mg/L) are interpreted as sulfate-reducing conditions. However, sulfate-reducing conditions may be present even with higher concentrations of sulfate, and it can be difficult to distinguish between iron-reducing and sulfate-reducing conditions. At sites where gypsum has been added, sulfate concentrations may be very high.

- **Methanogenesis:** The most highly reducing zone is the methanogenic zone. This zone is characterized by increased dissolved methane (above 0.5 to 1.0 mg/L), and depleted oxygen, nitrate, and sulfate.

- **Oxidation-Reduction Potential (ORP):** ORP (or Eh) is a measure of the electrochemical potential (e.g., availability of electrons), relative to the standard hydrogen electrode, developed at the interface between a noble metal electrode and an aqueous solution containing electro-active redox species. Theoretical ORP values can be calculated for each electron acceptor (per electron equivalent): oxygen = +810 millivolts (mV); nitrate = +750 mV; manganese (IV) = +580 mV; iron (III) = +60 mV; sulfate = -210 mV; and methanogenesis = -240 mV. Note that ORP is measured in the field using a silver/silver chloride (Ag/AgCl) electrode, which provides an ORP measurement that is approximately 200 mV lower than a standard hydrogen electrode (Eh). ORP measured in the field may register potential from a combination of potentials, but the relative value can be helpful at ascertaining the redox condition in the water sample.

- **pH:** Intermediate degradation products of organic compounds include organic acids; therefore, decreased pH is generally consistent with biodegradation. Low pH (below 6.0) may slow or “stall” reductive dechlorination of TCE at cis-1,2-dichloroethene (cis-1,2-DCE), and is closely monitored for EAB applications.

Concentrations of geochemical parameters can indicate inconsistent conditions for several reasons. Well sampling procedures may inadvertently introduce atmospheric oxygen and impact dissolved oxygen and ORP measurements. The groundwater flow direction at Galena changes because of ice-breakup on the Yukon River, which can mix aerobic upgradient groundwater with contaminant-impacted groundwater with more reducing conditions. Remedies can also impact geochemistry; bioventing and soil vapor extraction (SVE) can cause more oxygen to be delivered to groundwater near the water table. Sulfate enhanced bioremediation is designed to drive methanogenic zones to sulfate-reducing zones, so groundwater impacted by gypsum injections may have both high sulfate and high methane.

Care should also be exercised in evaluating redox conditions in monitoring wells downgradient of a source area. Reduced (soluble) Mn(II) and Fe(II) may remain in solution until equilibrium conditions result in oxidation and mineralization to remove Mn(II) and Fe(II) from solution. Similarly, methane may remain in solution until groundwater is sufficiently aerobic for oxidation to remove the methane from groundwater. ORP may be used to evaluate whether the redox condition correlates to active manganese reduction, iron reduction, or methanogenesis at the monitoring location. Groundwater redox zones are interpreted using a holistic approach considering all geochemical values and considering factors such as anticipated background concentrations, reliability of analyses, location of the monitoring well and time of year, and potential impacts of remedial systems.

2.0 BACKGROUND WELLS

Sample results from upgradient or background wells were evaluated to provide information on expected baseline redox conditions and background concentrations of various electron acceptors. Background wells were selected based on their location and past sample history of geochemical parameters. Many of these sampling results have been previously presented in the *Groundwater Contaminant Characterization Report for 2010 and 2011, Former Galena Forward Operating Location, Alaska* (CH2M HILL, September 2013). Results from selected background wells are presented in **Table 2-1**. Most of the results are historical but geochemical data were collected from well 01-MW-03 in 2023.

The background wells are:

- 01-MW-03: Upgradient from Site FT001
- 2541-MW-02: Upgradient from Site SS016
- 05-MW-19: Upgradient from Site ST005
- 06-MW-07: Upgradient from Site SS006
- 09-MW-28: Upgradient from Site CG001
- BKGD-MW001, BKGD-MW002 and BKGD-MW003: Upgradient of the “Triangle”

Most of the wells are screened in shallow groundwater across the variably saturated zone (VSZ) and into the top of the permanently saturated zone (PSZ). Wells BKGD-MW002 and BKGD-MW003 are screened deeper within the PSZ.

Most of the shallow background wells (01-MW-03, 05-MW-19, 06-MW-07 and 09-MW-28) show consistently aerobic geochemical conditions. Background concentrations of nitrate tend to be less than 2.0 mg/L (reported as nitrogen [N]), and dissolved iron and manganese concentrations were less than 0.1 mg/L. Sulfate concentrations vary across the site but were generally from 6.0 to 100 mg/L. Historically, well 01-MW-03 has had elevated sulfate concentrations with concentrations up to 468 mg/L in 2007. The sample collected in 2023 from 01-MW-03 had a sulfate concentration of 81.7 mg/L. Dissolved oxygen (DO) and ORP field measurements collected from well 01-MW-03 have increased over time indicating aerobic conditions. Well 06-MW-07 has lower dissolved oxygen than the other wells but has some of the higher recorded nitrate concentrations; redox conditions at this well may be on the cusp of transitioning from oxygen-reducing to nitrate-reducing conditions.

Redox evaluation results for well 2541-MW-02 are inconsistent. The dissolved oxygen concentration was high enough to indicate aerobic conditions, but depleted nitrate, elevated manganese and iron, and partially depleted sulfate concentrations would indicate iron- or sulfate-reducing conditions. Monitoring well 2541-MW-02 was upgradient but relatively close the Site SS016 non-aqueous phase liquid (NAPL)-contaminated soil source area and is within the footprint of the historical plume. It may be that redox conditions at this well are impacted by more reducing conditions when groundwater flow is to the north in the spring. Well 2541-MW-02 was damaged and had filled with sediment to within two feet of the top of the screen. Because of this the sample was collected from higher in the water column than other wells which may have impacted the geochemistry results.

DO and ORP measurements and manganese sample results collected from wells BKGD-MW001, BKGD-MW002, and BKGD-MW003 indicate slightly aerobic conditions in BKGD-MW001 and slightly reducing conditions in BKGD-MW003. DO measured in well BKGD-MW002 indicate aerobic conditions; however, elevated manganese concentrations and ORP measurements were in the iron and manganese reducing range. Unlike well 2541-MW-02, these wells are not near any known source areas and therefore truly represent background conditions. Historically, the well screened across the VSZ, BKGD-MW001, had relatively high dissolved oxygen indicating aerobic conditions, but also had depleted nitrate and slightly elevated manganese indicating manganese-reducing conditions. The two deeper wells, BKGD-MW002 and BKGD-MW003, have historically had lower oxygen, depleted nitrate, and elevated manganese and iron. The interpretation is that while background redox conditions in groundwater in or near the VSZ are aerobic, in deeper groundwater redox transitions toward more reducing conditions.

3.0 MONITORED NATURAL ATTENUATION SITES

The purpose of geochemical monitoring at MNA sites is to provide secondary lines of evidence of biodegradation. In accordance with the Cleanup Plans (CUPs), sampling for MNA parameters was performed during the baseline event and will only occur when COC monitoring indicates that the baseline conceptual site model may have changed. Samples for evaluation of MNA were collected during the 2021 groundwater monitoring event as part of the Remedial Process Optimization (RPO) project. Samples were collected from three wells at Site FT001 for evaluation of MNA in 2023.

Monitoring wells FT001-MW022 and FT001-MW023 were installed in 2023. Samples were collected for dissolved manganese, ferrous iron, sulfate, sulfide, and methane from these wells. FT001-MW022 contained dissolved oxygen at a concentration of 3.0 mg/L. The elevated dissolved oxygen, sulfate within the background range at 35 mg/L, and absence of significant ferrous iron or methane indicate aerobic conditions are present in FT001-MW022. MNA parameter concentrations were similar in FT001-MW023 except ferrous iron concentrations were above background at 1.2 mg/L and DO was depleted at a concentration of 0.6 mg/L suggesting iron reducing conditions at this location. Dissolved oxygen was measured at 3.7 mg/L in well 01-MW-03. The absence of significant concentrations of methane, ferrous iron, and manganese and sulfate concentrations within the site background range indicate aerobic conditions in well 01-MW-03.

Results of the current and past geochemical sampling and redox zone evaluations are summarized in **Table 3-1** for MNA sites.

4.0 ENHANCED ANAEROBIC BIODEGRADATION SITES/ENHANCED BIOGEOCHEMICAL TRANSFORMATION SITES

At chlorinated volatile organic compound (VOC) sites, reducing conditions amenable for reductive dechlorination are desired. The purpose of geochemical monitoring at EAB/EBT sites is to provide secondary lines of evidence of biodegradation. Evidence that redox conditions are suitable for EAB include Mn(II) and Fe(II) production, sulfate reduction, and methanogenesis by anaerobic microbial processes. The complimentary technology EBT involves the *in situ* formation of reactive mineral species by the precipitation of sulfide (from sulfate reduction) with Mn and Fe to produce magnetite (MnS) and reduced iron sulfide minerals (FeS and FeS_2). Performance monitoring data are used to determine whether redox conditions in the treatment zones have converted to sulfate-reducing or methanogenic conditions and to document sulfate dissolution and utilization.

To determine the presence of sufficient electron donor for anaerobic reducing conditions, groundwater samples were analyzed for dissolved organic carbon (DOC) as a qualitative measurement. DOC concentrations of greater than 20 mg/L in the contaminated area are optimal (United States Environmental Protection Agency, 1998) to induce and sustain anerobic conditions. Pre-treatment samples were collected and analyzed for alkalinity to determine the buffering capacity in the treatment area. Alkalinity concentrations greater than 100 mg/L are favorable to maintain a pH greater than 6.0 for EAB/EBT technologies to be effective (Interstate Technology & Regulatory Council, 2008).

Results of geochemical sampling and redox zone evaluations are presented in **Table 4-1** for Sites SS006/SS019 and SS015. Annual sampling conducted from 2019 to 2023 was performed to track post injection geochemical conditions within the treatment network.

4.1 Site SS006/SS019

Thirteen (13) wells were sampled for geochemical parameters at Site SS006/SS019 in 2018, and eleven (11) wells were sampled in 2019, 2020, 2021 and 2022. Twelve well were sampled in 2023. Monitoring well locations are shown on Figure 4-1 in the *2023 Performance Monitoring Report*. Listed in order from upgradient to downgradient:

- SS006-MW77: Upgradient of Permeable Reactive Barrier (PRB)-1 and the TCE plume and screened in the VSZ/upper PSZ.
- SS006-MW78: Downgradient of PRB-1 and screened in the VSZ/upper PSZ.
- SS006-MW79: Downgradient of PRB-1 and screened in the upper PSZ.
- SS006-MW66: Clean well in center of plume in the lower PSZ beneath the TCE plume. This well was sampled for baseline/near-baseline conditions in 2018 but is only sampled every 5 years. SS006-MW66 was sampled in 2023.

- SS006-MW80: Directly downgradient of PRB-2 and screened in the upper PSZ.
- 06-MW-09R: Downgradient of PRB-2 and screened in the upper PSZ.
- 06-MW-10: Collocated with 06-MW-09R and screened in the middle PSZ.
- SS006-MW82: Upgradient of PRB-3 and screened in the upper PSZ.
- SS006-MW81: Upgradient of PRB-3 and screened in the VSZ/upper PSZ.
- SS006-MW83: Directly downgradient of PRB-3 and screened the upper PSZ.
- SS006-MW67: Downgradient of PRB-3 and screened in the upper PSZ.
- SS006-MW68: Downgradient of PRB-3 and screened in the middle PSZ.
- SS006-MW69: Downgradient of PRB-3 and screened in the lower PSZ. This well was sampled for baseline/near-baseline conditions in 2018 but is only sampled every 5 years. SS006-MW69 was sampled in 2023.

EAB injections were conducted at Site SS006/SS019 from August to 2 October 2018. 2023 groundwater sampling was conducted from 8 to 12 September 2023.

Groundwater redox conditions during the 2018 and 2019 sampling events in the upgradient well screened in the VSZ/upper PSZ (SS006-MW077) were sulfate-reducing. Following the EAB injection, sulfate concentrations increased from 3.10 mg/L in 2019 to 23.0 mg/L in 2020 and have remained above background concentrations through 2023 (46.2 mg/L). The elevated sulfate concentrations may be due to the calcium sulfate component of the EAB amendment migrating upgradient of PRB-1 during the spring breakup when groundwater flow temporarily shifts to the north.

The ferrous iron concentration at SS006-MW77 increased to 1.2 mg/L in 2023 from 0.0914 mg/L J (J-flag indicates the concentration is estimated) in the sample collected in 2022. The dissolved manganese concentration of 26.2 mg/L in the sample collected in 2023 is like previous samples collected from 2018 to 2022. DOC concentrations have decreased since 2019 from 12.1 mg/L to 5.18 mg/L in 2022. Due to sample collection error, Total Organic Carbon (TOC) was collected from SS006-MW077 in 2023. The TOC concentration of 4.31 mg/L is similar to DOC concentration of 5.18 mg/L in the sample collected in 2022. Redox conditions in 2022 and 2023 were in the manganese or iron reducing range. The elevated sulfate concentration and depleted ferrous iron may indicate the shift to manganese reducing range. As previously observed, reducing conditions at upgradient well SS006-MW077 are likely the result of co-located petroleum hydrocarbons in groundwater.

Methane concentrations increased in SS006-MW078, screened in the VSZ downgradient of PRB-1, following the 2018 EAB injections. The methane concentration decreased from to 23 mg/L in the 2022 primary sample (25 mg/L in FD) to 12 mg/L in the 2023 primary sample (15 mg/L in FD). Despite this decrease, the elevated methane concentration indicates methanogenic conditions downgradient of PRB-1.

In well SS006-MW81, which is also screened in the VSZ, the methane concentrations are elevated compared to samples collected prior to the EAB Injections. The methane concentration in 2018 was 0.33 mg/L. Following the EAB injections the methane concentrations have ranged between 10 mg/L in 2021 and 17 mg/L in 2023. Sulfate concentrations have decreased from a high of 25.2 mg/L in 2020 to 2.84 mg/L in the sample collected in 2023. The elevated methane concentration and depleted sulfate concentration indicates methanogenic conditions persist in 2023 in the vicinity of PRB-3 following the EAB injections.

Most of the wells screened predominantly in the PSZ exhibited strongly reducing conditions. Wells SS006-MW80, 06-MW-10, SS006-MW82, SS006-MW83, and SS006-MW067 continued to show evidence of strongly reducing methanogenic conditions in 2023. Methane concentrations in 06-MW-09R increased from 2.5 mg/L in 2022 to 15 mg/L in 2023 indicating a transition to more reducing conditions at this well location. Methane concentrations have been decreasing in wells SS006-MW079 and 06-MW-10 and ferrous iron has increased in these wells indicating a transition to less reducing conditions at these locations (i.e., sulfate and iron reducing). Methane concentrations in all other PSZ screened wells remain much higher than the 2018 baseline concentrations in samples collected in 2023. Methane concentrations have increased over time following the EAB injection in wells located downgradient of the treatment zones (SS006-MW67 and SS006-MW83). This may be a result of methane migration from the upgradient PRB-3 treatment zones.

Several wells were sampled for TOC in 2023 due to a sample collection error. The results of the 2023 TOC analysis have been compared to DOC results from previous sampling events for this evaluation. Concentrations of DOC in wells downgradient of the PRBs exhibited impacts from the 2018 emulsified oil injections and had concentrations favorable for supporting anaerobic biodegradation (i.e., greater than 10 to 20 mg/L). DOC concentrations increased between 2018 and 2019 in wells located immediately upgradient or downgradient of PRBs (SS006-MW080, SS006-MW082, SS006-MW083). In 2020, DOC concentrations increased in some wells further down gradient from PRBs. DOC concentrations in most wells that increased after the 2018 injections had decreased as of 2021. DOC and TOC concentrations in samples collected in 2023 continue to decrease as the injection substrate is consumed and migrates downgradient of the injection zones. DOC concentrations in all SS006/SS019 site wells has dropped below the 20 mg/L threshold considered optimal for EAB sites.

Alkalinity concentrations ranged from 480 to 970 mg/L in samples tested 2023. Alkalinity concentrations were greater than the 100 mg/L threshold to maintain a pH greater than 6.0 in all wells sampled in 2023. Existing conditions should provide sufficient buffering capacity to maintain pH above 6.0 during EAB/EBT treatment. Adverse lowering of pH was not observed in 2023 groundwater samples for Sites SS006/SS019.

Increases in methane and carbon dioxide concentrations compared to baseline indicates that methanogenesis is occurring and provides an indication that conditions are sufficiently anaerobic for reductive dechlorination of TCE, cis-1,2-DCE, and vinyl chloride to occur. Following the EAB injections, sulfate concentrations increased in several wells near the PRBs. Sulfate concentrations have generally decreased in site wells due to the consumption of sulfate component of the EAB injections over time. Increases of sulfate in some site wells is likely due to groundwater migration from upgradient EAB injection zones. Typically, decreases in sulfate are observed when methanogenic conditions are present.

Beginning in 2021, dissolved Fe(II) and dissolved Mn(II) were quantified by an analytical laboratory. In previous sampling events, Fe (II) and Mn (II) were field screened using Hach colorimetric methods. Iron (II) concentrations for most samples analyzed by the laboratory were between one and two orders of magnitude higher than samples that were field screened during previous sampling events. Dissolved manganese (II) samples analyzed by the laboratory had decreased concentrations in all samples compared to field screening measurements collected in previous sampling events. The difference in concentrations in 2021, 2022 and 2023 compared to previous sampling events is likely a result of using different and more accurate laboratory analytical methods.

Notable decreases in concentrations of TCE and increases in concentrations of dechlorination products cis-1,2-DCE and/or vinyl chloride were observed up- and downgradient of PRB-2 (SS019-MW84 and SS006-MW80), and up- and down-gradient of PRB-3 (SS006-MW81, SS006-MW82, SS006-MW83, and SS006-MW67), as shown on Figure 4-2 of the *2023 Performance Monitoring Report*. This provides a primary line of evidence that reductive dechlorination has been enhanced. Ethene was detected in has been detected in site monitoring wells beginning in 2020 and was present in wells several site wells in samples collected in 2023 (see Figure 4.4-c of the *2023 Performance Monitoring Report*). Ethene was not detected in any site wells prior to the EAB injections. Increased ethene concentrations throughout the plume provides a line of evidence that complete reductive dechlorination of TCE to cis-1,2-DCE to vinyl chloride to ethene has been enhanced.

4.2 Site SS015

Seven wells were sampled for geochemical parameters in in 2023. SS015-EW01 was decommissioned in 2023 because the well was fouled by emulsified vegetable oil from the EAB injection. Monitoring well locations are shown on Figure 6-1 in the *2023 Performance Monitoring Report*. Listed from upgradient to downgradient:

- SS015-MW087: Upgradient background well and screened in the VSZ/upper PSZ.
- SS015-MW43: Upgradient of PRB-1 and screened in the VSZ.
- SS015-EW01: Downgradient of PRB-1, upgradient of PRB-2, and screened in the lower VSZ/upper PSZ. Decommissioned in 2023.
- SS015-BW02: Downgradient of PRB-1 and screened in the upper PSZ.
- SS015-EW02: Downgradient of PRB-1 and screened in the lower VSZ/upper PSZ.
- SS015-MW088: Upgradient of PRB-3 and screened in the middle to lower PSZ.
- SS015-MW079: Downgradient of PRB-3 and screened in the middle to lower PSZ.
- SS015-MW080: Downgradient of PRB-3 and screened in the lower PSZ.

EAB injections were conducted at Site SS015 intermittently from 26 June to 3 October 2018, with injections to PRB-1 and PRB 2 completed by mid-July 2018. Injections at PRB-3 began following groundwater sampling. Sampling conducted in 2019 through 2023 was performed to provide data for post-injection groundwater conditions throughout the treatment area monitoring network.

Upgradient well SS015-MW087 had been aerobic based on elevated DO concentrations in 2020, 2021 and 2022. In 2023 DO decreased and dissolved iron and manganese concentrations increased indicating a transition to iron- and manganese-reducing conditions. Upgradient well SS015-MW43 continued to exhibit manganese- and iron-reducing conditions based primarily on elevated iron and manganese, ORP measurements, elevated sulfate concentrations, and relatively low methane concentrations.

Most source area and downgradient wells exhibited a transition to strongly reducing conditions (i.e., methanogenic) following the EAB injections. Methane concentrations remained elevated in

2023 in source area and downgradient wells, ranging from 9.5 mg/L to 49 mg/L. Sulfate concentrations are depleted in source area and downgradient wells indicating reducing conditions in the EAB injection areas.

DOC concentrations in most wells downgradient of PRBs exhibited impacts from the 2018 emulsified oil injections and had concentrations favorable for supporting anaerobic biodegradation (i.e., greater than 10 to 20 mg/L) in samples collected in 2019. DOC concentrations have gradually decreased in samples collected in from 2019 to 2023. DOC concentrations are below the desired threshold of 10 to 20 mg/L in all source area and downgradient wells in samples collected in 2023.

Alkalinity concentrations ranged from 232 mg/L to 528 mg/L in source area and down gradient wells in 2023. Concentrations remain above the 100 mg/L threshold to provide sufficient buffering capacity to maintain pH above 6.0 during EAB/EBT in downgradient and source area wells. Measurements of pH in 2023 were above 6.0 in all Site SS015 wells.

Decreases in DOC to below the desired concentration 20 mg/L, decreasing methane concentrations, and decreasing concentrations of carbon dioxide are expected over time as sulfate and dissolved organic carbon from the EAB treatment are consumed resulting in less reducing conditions. Decreasing concentrations of methane and carbon dioxide have been observed in well SS015-MW088 in samples collected between 2020 and 2023. Methane concentrations in samples collected in 2023 are elevated in all site wells indicating the site conditions remain methanogenic.

Figure 6-5a of the *2023 Performance Monitoring Report* shows TCE, cis-DCE, and VC concentrations along the centerline of the plume in 2018 and 2023. A decrease in the concentration of TCE was observed upgradient of PRB-1 at location SS015-MW43. The cis-DCE concentration in SS015-MW43 decreased from 65 mg/L in 2018 to 39 mg/L in 2023. VC increased from 0.2 mg/L in 2018 to 5.3 in 2023 indicating reductive dichlorination of TCE and cis-DCE may be occurring at the upgradient location.

Downgradient of PRB-2 in 2023, cis-DCE was below its CUL in all wells and TCE only exceeded its CUL at well SS015-BW02. VC exceeded its CUL in all wells downgradient of PRB-2. Ethene and ethane concentrations in 2023 were elevated as compared to 2018 baseline at all plume wells from SS015-MW43 and downgradient, excepting SS015-EW02 (see Figure 6-5a of the *2023 Performance Monitoring Report*). Elevated ethene concentrations in SS015-EW02 in 2018 are likely due to the pilot study bioreactor that was located close to this well. Data collected in 2023 indicate reductive dechlorination continues throughout the plume downgradient of PRB-2 including near wells SS015-MW073, SS015-MW078, SS015-MW080, SS015-MW085 and SS015-MW088. There is also evidence of reductive dichlorination upgradient of PRB-1 near well SS015-MW43.

5.0 SULFATE-ENHANCED BIOREMEDIATION SITES

At petroleum-contaminated sites, utilization of electron acceptors is used as evidence of biodegradation. Sulfate (in the form of gypsum) has been injected at Sites CSS002, SS017, and ST009 as a source of electron acceptor to stimulate biodegradation. The purpose of geochemical monitoring at sulfate-enhanced bioremediation sites is to provide secondary lines of evidence of biodegradation, to look for evidence of methanogenic zones converted to sulfate-reducing zones, and to document sulfate dissolution, transport, and utilization. Results of geochemical sampling and redox zone evaluations are presented in **Table 5-1** for Sites CSS002, SS017, and ST009.

Three wells were sampled for geochemical parameters at Site CSS002 from 2016 through 2022. The RPO evaluation found that concentrations of groundwater COCs were on track to meet the CULs in a few years and that additional sulfate injections were unlikely to be needed. The RPO also recommended analysis for redox parameters for Site CSS002 wells be discontinued except for well B1812-MW001 where it was retained to assess redox conditions upgradient of Site ST009 (see Section 5.2).

5.1 Site SS017

Thirteen wells were sampled for geochemical parameters at Site SS017 in 2023. Monitoring well locations are shown on Figure 5-1 in the *2023 Performance Monitoring Report*. Listed upgradient to downgradient:

- SS017-MW005: Upgradient well.
- SS017-MW006 and MW001: Within NAPL-contaminated soil source area, downgradient of first sulfate injection zone.
- SS017-MW002, MW003, MW004, and MW007R: Within NAPL-contaminated soil source area; within, or downgradient of, second sulfate injection zone.
- SS014-MW004 and MW005: Downgradient edge of NAPL-contaminated soil source area.
- SS014-MW007: Within NAPL-contaminated soil area, downgradient of third sulfate injection zone.
- SS014-MW006: Downgradient of NAPL-contaminated soil source area and downgradient of chlorinated VOC soil area.
- SS014-MW001, MW002 and MW003: Downgradient wells.

Sulfate injections were conducted at Site SS017 from 14 July to 3 September 2017. Groundwater sampling was conducted toward the end of the 2017 injection period (16 August through 5 September 2017).

Redox conditions in upgradient well SS017-MW005 were aerobic in 2017 through 2022 based primarily on DO concentrations greater than 1.0 mg/L. Dissolved oxygen concentrations decreased to 0.44 mg/L in the 2023 measurement indicating a transition to a sulfate-reducing condition. Redox conditions in treatment zone and downgradient wells are also consistently sulfate-reducing or methanogenic throughout 2017 through 2023.

Sulfate concentrations in site wells are shown on Figure 5-3a of the *2023 Performance Monitoring Report*. Background concentrations of sulfate upgradient of Site SS017 (well SS017-MW005) range between 17.2 and 27.9 mg/L in samples collected between 2017 and 2023. The sulfate concentration in the sample collected in 2023 was 20.9 mg/L. Treatment area sulfate concentrations increased relative to the 2017 baseline and background following the injection. In 2023 only wells SS017-MW003 and SS017-MW004 had sulfate concentrations well above background and only three treatment area or downgradient wells (SS017-MW007R, SS014-MW004, and SS014-MW005) had concentrations above 2017 baseline. Sulfate concentrations increased from 2022 in one well (SS017-MW003) located between injection areas PRB-1 and PRB-2 in samples collected in 2023 and decreased in SS017-MW006, SS017-MW001, and

SS017-MW002. Sulfate concentrations in source area wells SS017-MW001 (0.957B mg/L) and SS017-MW006 (0.798 B mg/L) were below background concentrations in 2023.

Methane concentrations are elevated in all treatment zone wells in 2023 as shown on Figure 5-3b of the *2023 Performance Monitoring Report*. Methane concentrations were greater than the 0.5 mg/L threshold for methanogenic conditions in all samples collected in 2023 except for SS017-MW005 located upgradient of the treatment zone. Sulfate and methane concentrations detected in 2023 indicate that redox conditions remained primarily sulfate-reducing and methanogenic conditions in treatment area wells. Some wells (SS017-MW001, SS017-MW006) may be transitioning from sulfate-reducing to methanogenic as the sulfate amendments are depleted.

5.2 Site ST009

Eight wells were sampled for geochemical parameters at Site ST009 in 2017 through 2023 including well B1812-MW001, located between Sites CSS002 and ST009. Wells 10-MW-03, 1572-MW-03, and 1572-MW-04 were also sampled in 2004 or 2013. Monitoring well locations are shown on Figure 10-1 of the *2023 Performance Monitoring Report*. Listed from upgradient to downgradient:

- B1812-MW001: Upgradient well
- ST009-MW004, MW005, and MW006: Within NAPL-contaminated soil source area, near or downgradient of first sulfate injection zone.
- 1572-MW-03 and 1572-MW-04: Within NAPL-contaminated soil source area; near or downgradient of second sulfate injection zone.
- 10-MW-03 and 10-MW-06: Downgradient wells.

Sulfate injections were conducted at Site ST009 from 3 to 10 September 2017. Groundwater sampling in 2017 was conducted in August prior to any sulfate injections at Site ST009.

Redox conditions in upgradient well B1812-MW001 have been inconsistent. The well was sulfate-reducing or methanogenic in 2016 prior to sulfate injections. Sulfate concentrations increased dramatically in 2018 and 2019, possibly because of groundwater flow to the north in the spring (i.e., sulfate was carried north from the Site ST009 injection points). In 2019, increased concentrations of DO suggested aerobic conditions. Since 2019 DO concentrations have decreased to between 0.13 mg/L in 2021 to 0.32 mg/L in 2023. The methane concentration decreased from 0.25 mg/L in 2022 to 0.079 mg/L in 2023. Sulfate decreased from 66.1 mg/L in 2022 to 36.6 mg/L in 2023 but remains elevated compared to the 2017 baseline (2.78 J mg/L). ORP readings in 2023 were consistent with other geochemical data collected from B1812-MW001 that indicate iron or manganese-reducing conditions.

Redox conditions in treatment area and downgradient wells at Site ST009 are sulfate-reducing or methanogenic in 2023 and have remained relatively consistent over time. DO readings ranged from 0.16 mg/L to 0.47 mg/L and ORP measurements collected in 2023 indicate an anaerobic reducing condition.

Sulfate concentrations in Site ST009 wells are included on Figure 10-3 of the *2023 Performance Monitoring Report.* Following injections in 2017, sulfate concentrations in source area wells were elevated compared to 2017. Sulfate concentrations in several site wells remain elevated in samples collected in 2023 at sufficient concentrations to maintain sulfate and methanogenic conditions. Increasing sulfate concentrations in downgradient wells 10-MW-06, 10-MW-03, and 1572-MW-04 suggests that not all sulfate is being depleted as it migrates downgradient from the injection area.

Methane concentrations remain elevated compared to background in most treatment zone and downgradient wells, indicating an increase in biological activity. Methane has decreased in downgradient wells 1572-MW-03 and 1572-MW-04 as compared to 2017 baseline.

6.0 REFERENCES

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Attachment B Tables

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Table 2-1
Groundwater Geochemistry Evaluation for Background Wells

Monitoring Well	Screened Interval (feet bgs)	Date	Sample Type	DO (mg/L)	Nitrate-Nitrite (as Nitrogen, mg/L)	Manganese (mg/L)	Manganese, Dissolved (mg/L)	Iron (mg/L)	Iron, Dissolved (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Methane (mg/L)	ORP (millivolts)	pH (standard units)	Redox Zone*
01-MW-03	12.5-22.5	05-Oct-07	N	-	1.59 M	0.0038	-	0.2 U	-	468	-	0.01 U	46.8	-	O
		22-Sep-11	N	0.86	0.869	-	-	0.0345 J	0.0258 B	80.1	0.793 UJ	0.000218 U	-51.7	6.42	O
		22-Sep-11	FD	0.86	0.874	-	0.00279 B	0.0297 J	0.022 U	76.6	0.793 UJ	0.000218 U	-51.7	6.42	O
		16-Aug-18	N	2.25	-	-	0.00219	-	0.0401 J	99.6	-	0.00035 U	138.1	6.19	O
		15-Sep-23	N	3.70	-	-	0.00302	-	0.0633 J	81.7	1 U	0.0024 B	140.7	7.02	O
05-MW-19	8-37.8	07-Jun-04	N	1.71	0.034 F	-	-	0.28	-	7.29	-	0.007	-55	7.61	O
		27-Sep-11	N	-	0.442	-	-	-	-	5.95	0.793 UJ	0.000218 U	-	-	O
		26-Sep-11	N	3.18	-	-	-	0.453	0.0397 B	-	-	-	109.7	6.91	O
06-MW-07	9.2-38.5	02-Jun-04	N	0.46	1.97	0.0554	-	0.062 U	-	40.4	-	0.0031 F	147	6.62	O or NO3
		02-Jun-04	FD	0.46	1.68	0.0538	-	0.062 U	-	32.7	-	0.0006 F	147	6.62	O or NO3
		22-Oct-04	N	-	2.08	0.0524	-	-	-	42.8	-	0.00141 B	-	-	O or NO3
09-MW-28	5-35	21-Oct-04	N	-	0.0983 BH	-	-	-	-	21.9	-	0.00125 B	-	-	O
		16-Sep-11	N	1.06	-	-	-	0.0486 J	0.022 U	-	-	-	37	6.54	O
2541-MW-02	5-35	09-Aug-16	N	1.02	0.0166 J	-	0.752	-	3.38	1.47	-	0.048	-43.9	6.66	O, Fe or S
BKGD-MW001	19.5-29.5	21-Sep-11	N	1.71	0.0886 J	0.755	0.496	1.62	0.0646 B	20.2	0.793 UJ	0.000218 U	-72.7	6.78	O or Mn
		05-Sep-22	N	1.5	-	-	0.00119 B	-	-	-	-	-	178.8	6.83	O
BKGD-MW002	47-57	22-Sep-11	N	0.48	0.019 U	-	-	4.2	4.3	15.1	0.793 UJ	0.0158	67.7	6.67	Fe
		22-Sep-11	FD	0.48	0.019 U	-	-	4.32	4.22	15	0.793 UJ	0.0162	67.7	6.67	Fe
		25-Aug-22	N	1.46	-	-	0.592	-	-	-	-	-	122.5	6.86	O or Fe/Mn
BKGD-MW003	70-80	21-Sep-11	N	0.1	0.019 U	2.47	2.27	20.9	20.5	8.62	0.793 UJ	0.0134	101.2	6.77	Fe
		05-Sep-22	N	0.25	-	-	2.23	-	-	-	-	-	-11.6	6.65	Fe, Mn or S
		05-Sep-22	FD	0.25	-	-	2.22	-	-	-	-	-	-11.6	6.65	Fe, Mn or S

Notes:
- = not analyzed
B = analyte detected in associated blank
bgs = below ground surface
DO = dissolved oxygen
F = analyte was positively identified, but the associated numerical value is below the reporting level
FD = field duplicate sample
J = estimated value
H = sample analyzed outside of holding time
M = matrix interference
mg/L = milligrams per liter
N = normal sample
ORP = oxidation-reduction potential
U = not-detected at the listed method detection limit
UJ = not-detected with an estimated method detection limit

* Redox Zone condition notation: O = aerobic (oxygen reducing); NO3 = nitrate reducing; Mn = manganese reducing; Fe = iron reducing; S= sulfate reducing

Table 3-1
Groundwater Geochemistry Evaluation for Monitored Natural Attenuation Sites

Site ID	Monitoring Well	Screened Interval (feet bgs)	Date	Sample Type	DO (mg/L)	Dissolved Manganese[a/] (mg/L)	Dissolved Ferrous Iron[a/] (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Methane (mg/L)	ORP (millivolts)	pH (standard units)	Redox Zone [b/]
FT001	01-MW-03	12.5-22.5	16-Aug-18	N	2.25	0.00219	0.0401 J	99.6	-	2 U	138.1	6.19	O
			30-Aug-21	N	6.67	0.003 B	0.0378 B	7.41	0.6 U	0.00025 U	191.5	6.96	O
			23-Aug-22	N	9.40	0.00136 B	-	-	-	-	149.2	7.07	O
			15-Sep-23	N	3.70	0.00302	0.0633 J	81.7	1 U	0.0024 B	140.7	7.02	O
	FT001-MW013	12-32	25-Aug-18	N	0.04	2.58	124	3.9	-	0.42	-77.9	6.75	Fe or S
			30-Aug-21	N	0.27	0.0003 U	0.0136 U	29.8		0.15	-70.6	6.52	S
			23-Aug-22	N	1.25	-	-	-	-	-	-45.8	6.78	S
	FT001-MW009	50-60	16-Aug-18	N	0.03	4.41	36.3	10.0	-	0.11	-92.2	6.66	Fe or S
			16-Aug-18	FD	-	4.59	36.4	9.99	-	0.11	-	-	Fe or S
			30-Aug-21	N	0.48	4.62	38.8	93.6		0.1	-14.9	6.59	Fe
			29-Aug-22	N	0.22	-	-	-	-	-	-11.9	6.81	Fe
	FT001-MW010	13-38	15-Aug-18	N	2.60	2.45	1.3	19.4	-	0.04	114.5	5.79	O
			29-Aug-21	N	0.45	3.8	3.38	18	-	0.19	51.4	6.46	Fe
			24-Aug-22	N	0.08	-	-	-	-	-	-45.1	6.75	Fe
	FT001-MW011	48-58	15-Aug-18	N	2.11	14.5	51.2	33.3	-	0.044	82.1	5.96	O
			29-Aug-21	N	0.37	12	42.4	24.4		0.1	-54.1	6.40	Fe
			24-Aug-22	N	0.19	-	-	-	-	-	-20.1	6.93	Fe
	FT001-MW012	70-80	16-Aug-18	N	2.61	3.77	41.5	10.1	-	0.11	123.5	6.22	O
			29-Aug-21	N	0.38	3.1	38.5	5.56	-	0.058	-40.7	6.59	Fe
			24-Aug-22	N	0.22	-	-	-	-	-	-37.4	6.85	Fe
	FT001-MW022	12-32	04-Sep-23	N	3.00	1.3	0.021 UJ	35	0.022 U	0.039 J	65.5	6.57	O
	FT001-MW023	80-90	12-Sep-23	N	0.60	1.8	1.2 J	2.3 J	0.022 U	0.46 J	-66.2	6.96	Fe
CPL006	CPL006-MW001	19-39	18-Sep-16	N	1.21	25.7	96.1	131	-	0.12	-120.8	6.77	Fe
			05-Sep-17	N	0.56	29.6	71.2	2.33	1 U	0.16	-50.2	6.82	S
			05-Sep-17	FD	-	29.4	71.3	2.33	1 U	0.15	-	-	S
			22-Aug-21	N	0.10	30.8	60	5.04	-	1.3	-87.3	6.39	Me
			21-Aug-22	N	0.34	-	-	-	-	-	-79.4	6.67	Me
SS016	2541-MW-02	5-35	09-Aug-16	N	1.02	0.752	3.38	1.47	-	0.048	-43.9	6.66	O or S
			26-Aug-21	N	0.28	0.496	3.86	2.74		0.42	-88.4	6.69	S
	SS016-MW002	12-37	09-Aug-16	N	2.15	1.26	37.1	16.8	-	0.14	-86.5	6.65	O or Fe
			25-Aug-21	N	0.41	1.9	3.36	4	-	0.3	19.7	6.72	S
			25-Aug-21	FD	-	2.16	3.94	4.21	-	-	-	-	S
			16-Aug-22	N	0.00	-	-	-	-	-	-29.6	6.71	S
	SS016-MW003	12-37	21-Aug-16	N	0.12	21.6	12.8	4.92	-	0.28	-75.8	6.76	S
			25-Aug-21	N	0.54	0.909	0.06 B	50.3 J		0.067	153.0	6.85	O
			16-Aug-22	N	0.00	-	-	-	-	-	64.5	6.88	Fe
	SS016-MW004	12-37	21-Aug-16	N	0.08	0.485	0.169 J	39.3	-	0.00047 J	120.9	6.67	Mn
			26-Aug-21	N	0.39	1.44	0.628	27.3	-	0.032	267.3	6.55	Mn or Fe
			16-Aug-22	N	3.26	-	-	-	-	-	152.7	6.82	O or Mn
	SS016-MW005	12-37	19-Sep-16	N	5.52	1.75	0.304	23.7	-	0.0094	107.3	6.48	O or Mn
			26-Aug-21	N	1.42	0.0054 B	0.116 B	52.5	-	0.00025 U	251.8	6.89	O

Table 3-1
Groundwater Geochemistry Evaluation for Monitored Natural Attenuation Sites

Site ID	Monitoring Well	Screened Interval (feet bgs)	Date	Sample Type	DO (mg/L)	Dissolved Manganese[a/] (mg/L)	Dissolved Ferrous Iron[a/] (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Methane (mg/L)	ORP (millivolts)	pH (standard units)	Redox Zone [b/]
SS022	SS022-MW003	12-32	21-Aug-17	N	2.01	-	-	-	-	-	158.7	6.49	O
			22-Aug-17	N	-	0.179	0.0418 B	19.4	-	0.00035 U	-	-	O
	SS022-MW004	12-32	21-Aug-17	N	0.66	-	-	-	-	-	158.6	6.48	O
			22-Aug-17	N	-	0.161	0.025 U	29.1	-	0.00042 B	-	-	O
			27-Aug-21	N	0.47	0.163	0.0837 B	22	-	0.0021 J	164.2	6.53	Mn or Fe
			14-Aug-22	N	1.05	-	-	-	-	-	198.3	6.44	O
	SS022-MW005	12-32	04-Sep-17	N	4.03	0.635	0.262	40.1	-	0.0024	67.9	6.61	O
			27-Aug-21	N	0.52	0.557	0.113 B	11.3	-	0.0045 J	156.7	6.53	O or Mn
			13-Aug-22	N	4.68	-	-	-	-	-	174.7	6.80	O
	SS022-MW006	12-32	28-Aug-21	N	0.32	1.79	13.4	10.4		0.011	201.9	6.21	Mn or Fe
			14-Aug-22	N	0.00	-	-	-	-	-	-8.6	6.54	Fe
ST010	SE-MW-01	5.64-25.64	23-Sep-11	N	0.37	0.288	3.93	0.232 U	0.793 UJ	7.83	-47.8	6.00	Me
			12-Aug-16	N	1.68	3.21	95.9	1.09	-	3.3	-135.5	6.57	Me
			26-Aug-21	N	0.07	3.37	37.8	8.63	-	3.4	-64.2	6.65	Me
			28-Aug-22	N	0.09	-	-	-	-	-	-48.7	6.94	Me
	ST010-MW010	18-38	26-Aug-21	N	0.09	29.9	-	-	-	-	-93.7	6.65	Mn
			17-Aug-22	N	0.21	-	-	-	-	-	-61.5	6.68	Mn
	ST010-MW013	15.2-35.2	07-Aug-16	N	0.09	7	0.0876 J	107	-	0.089	-477.5	6.59	NO3/Mn
			26-Aug-21	N	4.20	0.0116 B	0.0253 B	81.7	-	0.0039 J	123.0	6.62	O
			17-Aug-22	N	5.23	-	-	-	-	-	80.4	7.09	O
	ST010-MW014	12-32	11-Aug-16	N	2.51	21.6	26.4	21.4	-	0.25	-101.3	6.63	S
			11-Aug-16	FD	-	21.4	27.2	21.4	-	0.29	-	-	S
			26-Aug-21	N	0.14	16.5	14.1	9.44	-	0.65	4.9	6.59	S
			17-Aug-22	N	0.00	-	-	-	-	-	29.6	6.82	S
SS018	TU001-MW002	14-39	23-Aug-18	N	0.04	5.69	8.27	22.1	-	0.16	-1.3	6.64	Fe
	SS018-MW002	15-35	23-Aug-18	N	0.30	-	-	-	-	-	-72.9	6.73	-
			26-Aug-21	N	0.31	6.79 J	10.2 J	22.7	-	0.056 J	-32.4	6.62	Fe
			26-Aug-21	FD	-	6.8	10.5	22.5	-	0.07	-	-	Fe
			07-Sep-22	N	1.42	-	-	-	-	-	251.2	6.78	-
	SS018-MW001	12-32	13-Aug-19	N	0.68	10.6	49.4	16.5	-	1.01	-58.4	6.72	Fe/Me
			13-Aug-19	FD	-	10.5	49.3	16.5	-	0.91	-	-	Fe/Me
			27-Aug-21	N	0.35	10	29.3	18.1	-	0.63	-42.7	6.49	Fe
			07-Sep-22	N	0.07	-	-	-	-	-	86.6	6.53	-
SS018	SS018-MW003	13-23	23-Aug-18	N	0.38	6.97	8.55	19.5	-	0.24	-10.4	6.63	NO3/Mn
			23-Aug-18	FD	-	7.24	8.84	19.4	-	0.25	-	-	NO3/Mn
			27-Aug-21	N	0.31	4.52	2.95	19.3	-	0.92	6.9	6.43	Fe or Mn
			07-Sep-22	N	2.11	-	-	-	-	-	288.2	6.62	-

Notes:
Wells listed from upgradient to downgradient.
[a/] 2016 through 2020 dissolved iron and manganense were quantified using field test kits. In 2021, 2022 and 2023 dissolved iron and manganese were quantified by an analytical laboratory.
[b/] Redox Zone condition notation: O = aerobic (oxygen reducing); Mn = manganese reducing; Fe = iron reducing; S= sulfate reducing; Me = methanogenic
B = analyte detected in field or laboratory blank
bgs = below ground surface
DO = dissolved oxygen
FD = field duplicate sample
J = estimated value
mg/L = milligrams per liter
N = normal sample
ORP = oxidation-reduction potential
U = not-detected at the listed method detection limit

Table 4-1
Groundwater Geochemistry Evaluation for Enhanced Anaerobic Biodegradation/Enhanced Biogeochemical Transformation

Site ID	Monitoring Well	Screened Interval (feet bgs)	Date	Sample Type	Dissolved Organic Carbon (mg/L)	Total Organic Carbon (mg/L)	DO (mg/L)	Dissolved Manganese[a/] (mg/L)	Dissolved Ferrous Iron [a/] (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Methane (mg/L)	Ethane (mg/L)	Ethene (mg/L)	Alkalinity (mg/L)	Carbon Dioxide (mg/L)	ORP (millivolts)	pH (standard units)	Redox Zone [b/]
SS006/ SS019	SS006-MW77	15-40	21-Aug-18	N	6.46	-	0.48	29.8	8.96	2.99	1 UJ	0.430	0.00064 U	0.0003 U	770	630	-67.3	6.05	S
			10-Aug-19	N	12.1	-	1.28	22.0	2.05	3.10	1 U	0.26	0.00064 U	0.0003 U	1005	884	-35.4	6.44	S
			6-Oct-20	N	8.25	-	0.46	-	1.86	23.0	0.6 U	0.18 B	0.00051 U	0.00047 U	545	648	136.7	6.24	Fe/S
			6-Sep-21	N	4.46 J	-	0.46	18.1 J	3.75	14.6	0.6 R	0.490 J	0.00051 UJ	0.00047 UJ	140	378	135.1	9.36	Fe/S
			11-Aug-22	N	5.18	-	0.06	19.4	0.0914 J	40.5	1.0 U	0.17	0.00064 U	0.00003 U	650	478	133.4	6.41	Mn/Fe
			8-Sep-23	N	-	4.31	2.8	26.2	1.2	46.2	1 U	0.27	0.00064 U	0.0003 U	548	358	121.5	6.4	Mn/Fe
	SS006-MW78	15-40	25-Aug-18	N	7.81	-	0.16	6.30	0.90	13.6	1 UJ	0.78	0.00064 U	0.0003 U	794	-	79.0	6.73	Mn/Fe
				FD	7.10	-	0.16	6.30	0.90	13.1	1 U	0.81	0.00064 U	0.0003 U	794	-	79.0	6.73	Mn/Fe
			8-Aug-19	N	10.0	-	1.30	0.70	0.00	59.0	1 U	0.0097	0.00064 U	0.0003 U	818	466	110.1	6.78	Mn
				FD	9.74	-	1.30	0.70	0.00	59.1	1 U	0.012	0.00064 U	0.0003 U	818	466	110.1	6.78	Mn
			6-Oct-20	N	9.91	-	1.40	-	0.00	54.4	0.6 U	2.4	0.00051 U	0.00047 U	760	404	151.4	6.72	S/Me
			6-Oct-20	FD	-	-	1.40	-	0.00	-	-	-	-	-	760	404	151.4	6.72	S/Me
			4-Sep-21	N	7.06 J	-	0.49	0.651	0.061 B	41.8	0.6 R	2.7	0.00051 U	0.00047 U	225	408	196.5	6.71	S/Me
			4-Sep-21	FD	35.0 J	-	-	0.75	0.0539 B	41.5	0.6 R	3	0.00051 U	0.00047 U	-	-	-	-	S/Me
			11-Aug-22	N	10.4	-	0.28	1.2	0.0862 J	46.6	1.0 U	23	0.00064 U	0.0041	905	352	111	6.78	Me
			11-Aug-22	FD	10.4	-	0.28	1.12	0.0825 J	41.1	1.0 U	25	0.00064 U	0.004	905	352	111	6.78	Me
			8-Sep-23	N	-	10.1	3.1	2.54	0.224	19.7	1 U	12	0.00064 U	0.003	782	392	152.1	6.81	Me
			8-Sep-23	FD	-	10	3.1	2.57	0.228	20.3	1 UJ	15	0.00064 U	0.003	782	392	152.1	6.81	Me
	SS006-MW79	40-50	25-Aug-18	N	6.02	-	0.20	10.70	2.66	12.50	1 U	0.36	0.00064 U	0.0003 U	790	-	38.0	6.85	Mn/Fe
			8-Aug-19	N	6.82	-	0.73	22.00	1.94	14.10	1 U	0.56	0.00064 U	0.0003 U	850	676	-81.7	6.71	Fe/S
			6-Oct-20	N	6.92	-	0.43	-	0.07	4.94	0.6 UJ	2.3	0.00051 U	0.00047 U	960	644	78.9	6.69	Me
			4-Sep-21	N	5.60 J	-	0.48	3.95	55.1	0.985 J	0.6 R	2.1	0.00051 U	0.12	210	756	137.1	6.61	Me
			12-Aug-22	N	6.65	-	0.14	4.01	54.6	1.270 B	1.0 U	1.3	0.00064 U	0.1	1315	318	-72.6	6.54	Me
			8-Sep-23	N	-	6.6	4	4.3	60.7	7.53	1 U	1.1	0.00069 J	0.052	860	144	19.8	6.81	S/Fe
	SS006-MW66	80-90	11-Aug-18	N	4.73	-	0.21	10.30	11.32	0.898	1 U	0.64	0.00064 U	0.0003 U	389	364	-62.0	6.79	S/Me
			9-Sep-23	-	-	-	0.4	-	-	-	-	-	-	-	660	96	49.6	6.58	-
	SS006-MW80	40-50	26-Aug-18	N	6.08	-	0.01	9.20	1.61	18.90	1 U	0.11	0.00064 U	0.0003 U	810	-	-24.8	6.80	Fe
			9-Aug-19	N	109	-	0.73	22.00	2.76	0.695 B	1 U	1.40	0.00064 U	0.00054 J	1160	892	-96	6.66	Me
			6-Oct-20	N	67.4	-	0.33	-	>3.3	66.5	0.6 U	44 J	0.00051 UJ	0.480 J	1045	830	-20.3	6.76	Me
			6-Sep-21	N	18.6 J	-	0.43	6.470 J	138	0.09 U	0.6 R	17	0.0045 J	0.11	1090	178	95.5	9.28	Me
			12-Aug-22	N	35.2	-	0.00	5.85	118	0.421 B	1.0 U	46	0.022	0.07	1195	180	-93.9	6.76	Me
			8-Sep-23	N	-	6.71	0.46	4.81	96	4.07	1 U	26	0.014	0.015	910	108	3.4	6.8	Me
	06-MW-09R	33-43	11-Aug-18	N	4.21	-	0.42	6.00	2.05	27.1	1 U	0.150	0.00064 U	0.0003 U	736	540	21.8	6.51	Mn/Fe
				FD	4.20	-	0.42	6.00	2.05	27.7	1 U	0.150	0.00064 U	0.0003 U	736	540	21.8	6.51	Mn/Fe
			9-Aug-19	N	4.22 B	-	0.72	6.40	1.71	25.7	1 U	0.100	0.00064 U	0.0003 U	1080	642	42.2	6.64	Mn/Fe
			7-Oct-20	N	4.31	-	1.24	-	1.13	28.4	0.6 UJ	0.31	0.00051 U	0.00047 U	715	320	143.30	6.60	Mn/Fe
			4-Sep-21	N	3.6 B	-	0.48	4.55	11	8.73	0.6 R	1.9	0000.51 U	0.14	130	544	179.20	6.61	S/Me
			14-Aug-22	N	4.43	-	1.71	4.64	14.7	13.3	1.0 U	2.5	0.00064 U	0.03	1030	544	-16.4	6.6	S/Me
			11-Sep-23	N	4.81	-	0.19	5.76	23.2	8.78	1 U	15	0.0076	0.35	830	164	96.5	6.82	Me
	06-MW-10	60-70	10-Aug-18	N	4.60	-	0.44	6.70	6.30	25.4	1 U	0.078	0.00064 U	0.0003 U	650	NR	-56.0	6.74	Mn/Fe
			9-Aug-19	N	7.55	-	0.83	18.90	2.66	0.426 B	1 U	0.21	0.00064 U	0.0003 U	520	502	-80.3	6.73	S
			7-Oct-20	N	29.1	-	1.67	-	2.61	0.278 B	0.6 UJ	29 J	0.00051 UJ	0.048 J	815	784	149.6	6.43	Me
			28-Aug-21	N	4.620 B	-	0.13	2.66	34.4	0.410 J	0.6 R	2.3	0.00051 U	0.00047 U	560	490	23.0	6.56	S/Me
			14-Aug-22	N	6.68	-	0.12	4.43	64.8	5.7	1.0 U	28	0.013	0.052	845	312	-80.8	6.67	Me
			12-Sep-23	N	4.05	-	0.15	2.37	27.4	2.39	1 U	0.22	0.00064 U	0.0004 J	735	202	133.8	6.79	S/Fe
	SS006-MW82	46.3-56.3	26-Aug-18	N	5.70	-	0.14	13.30	3.34	7.41	1 U	0.25	0.00064 U	0.0003 U	404	-	27.8	6.81	Mn/Fe
			8-Aug-19	N	42.5	-	0.57	14.10	1.55	0.444 B	1 U	0.41	0.00064 U	0.00038 J	638	632	-119.5	6.62	S
			6-Oct-20	N	24.4	-	1.18	-	1.07	0.147 B	0.6 U	23	0.00051 U	0.36	760	672	153.5	7.15	Me
			9-Sep-21	N	16.6 J	-	0.42	3.83	71.2	0.090 U	.6 UJ	14	0.00051 U	0.31	800	720	18.0	6.71	S/Me
			12-Aug-22	N	39.3	-	0.00	5.03	91.3	0.408 B	1.0 U	37	0.0014 J	0.32	1175	564	-96.6	6.81	Me
			11-Sep-23	N	6.65	-	0.15	4.8	84.3	0.413 B	1 U	21	0.0081	0.18	875	184	34.2	6.90	Me

Table 4-1
Groundwater Geochemistry Evaluation for Enhanced Anaerobic Biodegradation/Enhanced Biogeochemical Transformation

Site ID	Monitoring Well	Screened Interval (feet bgs)	Date	Sample Type	Dissolved Organic Carbon (mg/L)	Total Organic Carbon (mg/L)	DO (mg/L)	Dissolved Manganese[a/] (mg/L)	Dissolved Ferrous Iron[a/] (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Methane (mg/L)	Ethane (mg/L)	Ethene (mg/L)	Alkalinity (mg/L)	Carbon Dioxide (mg/L)	ORP (millivolts)	pH (standard units)	Redox Zone[b/]
SS006/ SS019	SS006-MW81	15-35	21-Aug-18	N	5.19	-	0.71	3.90	0.63	12.2	1 U	0.33	0.00064 U	0.0003 U	704	460	-25.6	6.29	Mn/Fe
			8-Aug-19	N	10.2	-	0.58	22.00	2.69	3.70	1 U	0.40	0.00064 U	0.0018 J	802	504	-130.7	6.90	S
			6-Oct-20	N	8.37	-	1.15	-	3.57	25.2	0.6 U	16	0.00051 U	0.098	610	522	165.6	6.92	S/Me
			9-Sep-21	N	10.4 J	-	0.45	14.3	68.4	1.39	0.6 UJ	10	0.00051 U	0.18	365	364	-4.3	6.78	S/Me
			12-Aug-22	N	31	-	0.00	21.8	71.9	5.07	1.0 U	16	0.00084 J	0.13	920	262	-126.1	7.13	Me
			11-Sep-23	N	11.2	-	0.29	18.7	77.7	2.84	1 U	17	0.004	0.19	950	160	22.1	6.98	Me
	SS006-MW83	35-45	21-Aug-18	N	5.21	-	0.43	18.00	5.84	7.26	1 U	0.35	0.00064 U	0.0003 U	714	548	-93.1	6.34	S
			8-Aug-19	N	30.3	-	0.44	22.00	>3.3	2.85	1 UJ	1.52	0.00064 U	0.022	962	-	-159.5	6.92	S/Me
			6-Oct-20	N	66.6	-	0.91	-	>3.3	1.23 B	0.6 UJ	30	0.00051 UJ	0.18 J	885	1156	164.4	7.53	Me
			7-Sep-21	N	26.4 J	-	0.46	7.18 J	136	0.090 U	0.6 R	21	0.00051 U	0.330 J	185	858	13.8	7.12	Me
			12-Aug-22	N	27.2	-	0.30	8.15	130	0.794 B	1.0 UJ	26	0.0072 J	0.2	1355	306	-122.5	7.01	Me
			11-Sep-23	N	17.7	-	0.28	7.31	207	0.981 B	1 UJ	46	0.061 J	0.082 J	970	158	-12.4	6.78	Me
	SS006-MW67	40-50	11-Aug-18	N	5.27	-	0.55	17.70	8.80	10.5	1 U	0.22	0.00064 U	0.0003 U	582	249	-45.7	6.80	S
			10-Aug-19	N	4.98 B	-	2.81	19.40	1.62	45.8	1 U	0.22	0.00064 U	0.0003 U	728	502	-29.6	6.57	Fe
			8-Oct-20	N	5.96	-	1.69	-	0.44	14.7	0.6 U	0.70	0.00051 U	0.0079	685	604	131.6	7.13	Fe
			7-Sep-21	N	6.180 J	-	0.58	4.5 J	28.7	0.611 J	0.6 R	5.1	0.00051 U	0.094	250	582	95.2	6.70	Me
			13-Aug-22	N	12.2	-	0.00	5.6	36.7	0.691 B	1.0 U	14	0.00072 J	0.16	935	350	-80	6.91	Me
			10-Sep-23	N	-	9.02	4.42	6.81	41.4	0.421 B	1 U	12	0.0033	0.18	810	344	12.9	7.01	Me
	SS006-MW68	60-70	10-Aug-18	N	5.21	-	0.48	11.64	6.60	0.50	1 U	3.42	0.00064 U	0.0003 U	556	-	-58.0	7.01	Me
			10-Aug-19	N	5.46	-	1.01	18.60	1.42	0.421 B	1 U	0.75	0.00064 U	0.0003 U	544	544	-60.7	6.80	Me
				FD	5.44	-	1.01	18.60	1.42	0.37 B	1 U	0.71	0.00064 U	0.0003 U	544	544	-60.7	6.80	Me
			8-Oct-20	N	12.9	-	1.65	-	2.03	0.258 B	0.6 U	19	0.00051 U	0.10	845	460	114.90	7.26	Me
			8-Oct-20	FD	12.9	-	1.65	-	2.03	0.232 B	0.6 U	20	0.00051 U	0.11	845	460	114.90	7.26	Me
			7-Sep-21	N	4.25 J	-	0.49	2.35 J	30.5	0.090 U	0.6 R	3.5	0.00051 U	0.046	85	492	71.10	6.73	S/Me
			7-Sep-21	FD	4.28 J	-		2.54 J	33.4	0.090 U	0.6 R	3.3	0.00051 U	0.049	-	-	-	-	S/Me
			13-Aug-22	N	5.98	-	0.00	2.93	35.3	0.487 B	1.0 U	8.2	0.00064 U	0.057	835	430	-70.9	6.79	S/Me
			13-Aug-22	FD	5.91	-	0.00	2.87	35.1	0.323 B	1.0 U	7.6	0.00064 U	0.055	835	430	-70.9	6.79	S/Me
			10-Sep-23	N	-	4.74	2.1	2.92	34.1	0.374 B	1 U	6.4	0.0081	0.032	480	292	11.4	6.7	S/Me
	SS006-MW69	78.6-88.6	10-Aug-18	N	5.44	-	0.30	2.80	12.84	0.14 U	1 U	2.90	0.00064 U	0.0003 U	360	302	-65.7	6.93	Me
SS015	SS015-MW087	10-35	13-Aug-18	N	7.45	-	0.03	17.10	0.70	25.60	1 UJ	0.015	0.00064 U	0.0003 U	520	580	122.4	6.55	Mn/Fe
			4-Aug-19	N	6.96	-	0.28	13.30	0.00	27.50	1 U	0.013	0.00064 U	0.0003 U	546	562	210.3	6.33	Mn/Fe
			11-Oct-20	N	7.26	-	1.56	-	0.05	34.3	0.6 U	0.3	0.00051 U	0.00047 U	535	392	146.1	6.51	O
			3-Sep-21	N	3.51 B	-	1.16	3.79	0.105 B	26	0.6 R	0.0072	0.00051 U	0.00047 U	92	474	186.5	6.46	O
			20-Aug-22	N	5.17	-	2.04	1.86	0.147 J	37.2	1.0 U	0.16	0.00064 U	0.0003 U	326	292	135.6	6.44	O
			13-Sep-23	N	5.62	-	0.2	4.07	2.52	30.4	1 UJ	0.82	0.00064 U	0.0003 U	528	207	178.9	6.48	Mn/Fe
	SS015-MW43	19-24	14-Aug-18	N	6.07	-	0.14	4.00	0.24	29.80	1 U	0.052	0.00064 U	0.0003 U	590	690	89.5	6.41	Mn/Fe
			6-Aug-19	N	6.39	-	0.72	9.60	0.10	33.20	1 U	0.0029	0.00064 U	0.0003 U	646	470	50.5	6.62	Mn/Fe
			8-Oct-20	N	4.82	-	0.58	-	0.00	39.1	0.6 U	0.28	0.00051 U	0.00047 U	380	408	145.8	6.55	Mn/Fe
			3-Sep-21	N	3.24 B	-	0.77	6.31	0.381 B	48	0.6 R	0.98	0.00051 U	0.0035 J	460	366	250.1	6.31	Mn/Fe
			20-Aug-22	N	6.9	-	0.19	24.5	11.3	33.5	1.0 U	0.24	0.00064 U	0.0017 J	615	648	-7	6.61	Mn/Fe
			13-Sep-23	N	4.11	-	0.37	21	2.72	32.6	1 U	1.1	0.00064 U	0.0055	485	1076	29.4	6.54	Mn/Fe
	SS015-EW01	25-50	16-Aug-18	N	57.6	-	0.01	10.80	2.69	5.20	1 U	7.60	0.0027	0.030	532	542	-249.3	6.49	S/Me
			14-Aug-19	N	192	-	0.25	26.80	1.79	11.50	1 U	47.0	0.0052	0.0076	452	822	28.2	6.08	Mn
			8-Oct-20	N	114	-	0.70	-	1.90	0.191 B	0.6 U	42	0.00051 U	0.00047 U	400	742	113.9	6.14	Me
	SS015-BW02	29-54	14-Aug-18	N	3.88	-	0.17	8.70	22.50	10.50	1 U	0.16	0.00064 U	0.0003 U	470	372	-76.7	6.68	S
			3-Aug-19	N	17.9	-	0.21	0.80	11.10	0.68	1 U	0.83	0.00064 U	0.0003 U	254	240	-80.8	6.86	Me
			8-Oct-20	N	9.02	-	0.55	-	2.68	4.37	0.6 U	24	0.00051 U	0.00047 U	250	188	155.0	6.84	Me
			3-Sep-21	N	4.04 B	-	0.54	0.741	19.5	0.655 J	0.6 R	20	0.00051 U	0.029	165	140	85.5	6.53	Me
			19-Aug-22	N	2.930 B	-	0.00	0.571	11.8	2.64	1.0 U	29	0.00084 J	0.0041	132	256	3.1	6.56	Me
			12-Sep-23	N	2.18	-	0.21	2.35	30.8	0.892 B	1 U	47	0.0023	0.0069	248	240	143.7	6.63	Me

Table 4-1
Groundwater Geochemistry Evaluation for Enhanced Anaerobic Biodegradation/Enhanced Biogeochemical Transformation

Site ID	Monitoring Well	Screened Interval (feet bgs)	Date	Sample Type	Dissolved Organic Carbon (mg/L)	Total Organic Carbon (mg/L)	DO (mg/L)	Dissolved Manganese[a/] (mg/L)	Dissolved Ferrous Iron [a/] (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Methane (mg/L)	Ethane (mg/L)	Ethene (mg/L)	Alkalinity (mg/L)	Carbon Dioxide (mg/L)	ORP (millivolts)	pH (standard units)	Redox Zone [b/]
SS015	SS015-EW02	25-50	14-Aug-18	N	7.67	-	0.10	17.10	2.77	8.50	1 U	3.60	0.00064 U	0.037	622	410	-94.5	6.80	S/Me
			4-Aug-19	N	34.90	-	0.32	5.20	1.36	0.61	1 U	12.0	0.0094 J	0.12	398	330	-118.9	6.96	Me
			8-Oct-20	N	3.03 B	-	0.56	-	0.71	5.24	0.6 U	23	0.00051 U	0.00047 U	160	192	141.5	6.71	S/Me
			3-Sep-21	N	3.86 B	-	0.42	2.65	28.8	0.674 J	0.6 R	18	0.0034 J	0.039	125	124	92.5	6.77	Me
			20-Aug-22	N	3.62	-	0.16	4.08	8.79	1.37	1.0 U	27	0.002 J	0.00059 J	240	252	-57.9	6.76	Me
			12-Sep-23	N	3.7	-	0.19	10.6	19.4	1.51 B	1 U	34	0.0064	0.0079	232	186	151.7	6.86	Me
	SS015-MW088	68-78	24-Aug-18	N	4.84	-	0.17	11.00	1.05	0.877	1 U	0.32	0.00064 U	0.0003 U	404	478	-38.7	6.74	S
				FD	5.27	-	0.17	11.00	1.05	0.669	1 U	0.32	0.00064 U	0.0003 U	404	478	-38.7	6.74	S
			3-Aug-19	N	22.3	-	0.05	2.20	1.51	0.377 J	1 U	5.90	0.00064 U	0.0022	456	338	-84.3	6.70	Me
				FD	22.4	-	0.05	2.20	1.51	0.397 J	1 U	5.50	0.00064 U	0.0023	456	338	-84.3	6.70	Me
			11-Oct-20	N	13.4	-	2.06	-	2.47	0.109 J	0.6 U	59 J	0.00051 U	0.14	475	460	151.4	5.84	Me
			11-Oct-20	FD	13.6	-	2.06	-	2.47	0.0924 J	0.6 U	41 J	0.00051 U	0.11	475	460	151.4	5.84	Me
			2-Sep-21	N	4.77 B	-	0.42	2.29	33.6	0.090 U	0.6 R	30	0.0072	0.046	225	158	146.6	6.56	Me
			2-Sep-21	FD	-	-	-	2.14	-	-	-	26	0.0074	0.046	-	-	-	-	Me
			18-Aug-22	N	14.7	-	0.00	3.02	24.7	16.6	1.0 U	18	0.0052	0.0087	500	430	-75.1	6.68	Me
			13-Sep-23	N	4.11	-	0.37	2.22	32.1	0.585 B	1 U	9.5	0.011	0.0036	466	162	160.4	6.72	Me
			13-Sep-23	FD	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SS015-MW080	71-81	15-Aug-18	N	5.16	-	1.93	18.50	1.87	0.701	1 U	0.31	0.00064 U	0.0003 U	410	424	81.6	6.30	O
			3-Aug-19	N	30.2	-	0.13	8.40	1.74	0.385	1 U	6.60	0.00064 U	0.00096 J	392	436	-79.1	6.67	Me
			8-Oct-20	N	47.0	-	1.54	-	2.34	0.190 B	0.6 U	42	0.00051 U	0.057	465	484	116.0	7.17	Me
			2-Sep-21	N	4.55 B	-	0.31	2.23	31.7	0.090 U	0.6 R	22	0.0034 J	0.024	153	260	124.6	6.56	Me
			18-Aug-22	N	5.680 B	-	0.00	2.21	30.1	0.303 B	1.0 U	31 J	0.0011 J	0.0058 J	560	544	-5.5	6.66	Me
			13-Sep-23	N	4.01	-	0.7	2.38	31.8	0.452 B	1 U	14	0.0069	0.0034	348	128	139.1	6.71	Me
	SS015-MW079	50-60	15-Aug-18	N	37.4	-	1.35	16.50	10.60	3.02	1 U	0.34	0.00064 U	0.0003 U	390	474	66.0	6.19	O
			3-Aug-19	N	38.6	-	0.07	3.2	8.96	0.39	1 U	2.00	0.00064 U	0.0012 J	344	398	-102.9	6.77	Me
			8-Oct-20	N	37.6	-	1.35	-	3.04	0.090 U	0.6 U	23	0.00051 U	0.00047 U	415	452	107.1	7.46	Me
			2-Sep-21	N	3.98 B	-	0.29	2.3	0.472	0.090 U	0.6 R	32	0.00051 U	0.055	360	410	107.2	6.71	Me
			18-Aug-22	N	4.840 B	-	0.00	2.18	43.9	0.251 B	1.0 U	46 J	0.0014 J	0.016 J	535	394	-23.1	6.74	Me
			13-Sep-23	N	3.74	-	0.16	2.37	58.2	0.689 B	1 U	49	0.0092	0.011	468	109	116.1	6.66	Me

Notes:

[a/] In 2018, 2019, and 2020 dissolved iron and manganense were quantified using field test kits. In 2021, 2022 and 2023 dissolved iron and manganese were quantified by an analytical laboratory.
[b/] Redox Zone condition notation: O = aerobic (oxygen reducing); Mn = manganese reducing; Fe = iron reducing; S= sulfate reducing; Me = methanogenic
Wells listed from upgradient to downgradient.
- = not analyzed
B = analyte detected in associated blank
bgs = below ground surface
DO = dissolved oxygen
FD = field duplicate sample
mg/L = milligrams per liter
N = normal sample
ORP = oxidation-reduction potential
R = the data are rejected because of deficiencies in meeting QC criteria and may not be used for decision making
U = not-detected at the listed method detection limit
UJ = not-detected with an estimated method detection limit

Table 5-1
Groundwater Geochemistry Evaluation for Sulfate-Enhanced Bioremediation Sites

Site ID	Monitoring Well	Screened Interval (feet bgs)	Date	Sample Type	DO (mg/L)	Nitrate-Nitrite (as Nitrogen, mg/L)	Manganese (mg/L)	Dissolved Manganese[a/] (mg/L)	Iron (mg/L)	Dissolved Ferrous Iron [a/] (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Methane (mg/L)	ORP (millivolts)	pH (standard units)	Redox Zone [b/]
SS017	SS017-MW005	15-35	26-Aug-17	N	1.5	-	0.0151	0.00769	0.0942 J	0.0417 J	17.2	1 U	0.0018 J	41.3	6.68	O
			03-Aug-18	N	1.86	-	-	0.0464	-	0.0376 J	19.1	1 U	0.00035 U	102.2	6.40	O
			07-Aug-19	N	1.64	-	-	0.00261 B	-	0.025 U	20.3	1 U	0.00035 U	50.9	6.64	O
			03-Oct-20	N	2.57	-	-	0.0377 B	-	0.107	22.5 J	0.6 UJ	0.00025 U	96.4	6.69	O
			23-Aug-21	N	1.05	-	-	0.0027 B	-	0.0264 B	27.9	0.6 UJ	0.00025 U	226.7	6.42	O
			26-Aug-22	N	1.17	-	-	0.0206	0.025 J		21.2	1.0 U	0.00035 U	248	6.85	O
			10-Sep-23	N	0.44	-	-	0.00937	-	0.025 U	20.9	1 U	0.00068 B	49.3	6.71	S
	SS017-MW006	15-35	05-Sep-17	N	0.46	-	2.4	2.39	125	124	23.1	1 U	2	-42.9	6.54	S/Me
			02-Aug-18	N	0.50	-	-	8.53	-	67.7	76.5	1 UJ	5.5	-17.0	6.13	S/Me
			07-Aug-19	N	0.39	-	-	11.4	-	58.5	57.7	1 U	9.4	-81.3	6.45	S/Me
			03-Oct-20	N	0.27	-	-	11.1	-	61.2	37.4	0.6 U	5.7	54.8	6.48	S/Me
			24-Aug-21	N	0.13	-	-	13	-	67.3	2.04	0.6 U	3.3	-22.9	6.41	S/Me
			26-Aug-22	N	0.43	-	-	10.6	-	82.8	17.5 J	1.0 U	6.9	-10.2	6.87	S/Me
			11-Sep-23	N	0.51	-	-	8.86	-	95.7	0.798 B	1 UJ	10	-59	6.66	S/Me
	SS017-MW001	15-35	30-Aug-17	N	0.65	-	2.34	2.28	106	105	4.76	1 U	6.8	-43	6.65	S/Me
				FD	0.65	-	2.28	2.23	105	105	4.68	1 U	7.5	-43	6.65	S/Me
			02-Aug-18	N	0.45	-	-	5.96	-	78	79.7	1 U	12	-29.8	6.11	S/Me
			07-Aug-19	N	0.6	-	-	7.9	-	68.6	120	1 U	8.3	-57.7	6.35	S/Me
			03-Oct-20	N	0.11	-	-	10.0	-	105	66.1	0.6 U	15	23.5	6.44	S/Me
			24-Aug-21	N	0.09	-	-	8.76	-	95	15.1	0.6 U	9.7	-43.1	6.35	S/Me
			27-Aug-22	N	0.39	-	-	7.32	-	117	5.44	1.0 U	15	-79.1	6.7	S/Me
			11-Sep-23	N	0.44	-	-	6.33	-	129	0.957 B	1 U	12	-80.4	6.63	S/Me
	SS017-MW002	15-35	06-Sep-17	N	0.43	-	1.93	1.91	112	113	77.6	1 U	5.2	-24.4	6.54	S/Me
				FD	0.43	-	1.9	1.87	111	108	80.6	1 U	5.2	-24.4	6.54	S/Me
			01-Aug-18	N	0.43	-	-	10.1	-	104	250	1 U	9.6	-37.5	6.01	S/Me
			07-Aug-19	N	0.73	-	-	8.9	-	94	159	1 U	7.4	-87.2	6.55	S/Me
			03-Oct-20	N	0.12	-	-	11.7	-	114	139	0.66 J	8.5	13.9	6.51	S/Me
			24-Aug-21	N	0.11	-	-	7.71	-	97.2	73.2	0.6 U	3.5	-65.3	6.16	S/Me
			26-Aug-22	N	0.36	-	-	6.93	-	114	191	1.0 U	12	-13.7	6.78	S/Me
			11-Sep-23	N	0.46	-	-	6.38	-	117	38.6	1 U	12	-81.4	6.7	S/Me
	SS017-MW003	17-37	30-Aug-17	N	0.56	-	2.12	2.15	27.8	28.4	1280	1 U	0.94	50.4	6.59	S/Me
			03-Aug-18	N	0.49	-	-	1.44	-	3.67	578	1 U	0.42	37.1	6.47	S
			07-Aug-19	N	0.43	-	-	1.75	-	17.2	637	1 U	1.1	-45.5	6.60	S/Me
			03-Oct-20	N	0.18	-	-	0.981	-	9.71	76	0.6 U	0.32	84.5	6.84	S
			24-Aug-21	N	0.15	-	-	0.798	-	2.04	116	0.6 U	0.32	116.1	6.51	S
			01-Sep-22	N	0.17	-	-	0.755	-	3.86	125	1.0 U	0.54	101.5	6.78	S
			11-Sep-23	N	0.53	-	-	2.23	-	76.4	269	1 U	0.71	-74.8	6.82	S
	SS017-MW004	15-35	02-Aug-18	N	0.47	-	-	5.32	-	96.8	377	1 U	9.1	-48.0	5.82	S/Me
			07-Aug-19	N	0.91	-	-	6.06	-	86.3	600	1 U	9.5	-49.5	6.46	S/Me
			03-Oct-20	N	0.10	-	-	7.59	-	124	361	0.6 U	11	23.5	6.42	S/Me
			24-Aug-21	N	0.10	-	-	5.72	-	87.6	217	0.6 U	3.4	-37.7	6.24	S/Me
			27-Aug-22	N	0.42	-	-	7.39	-	130	493	1.0 U	12	-55.7	6.75	S/Me
			10-Sep-23	N	0.27			3.86		107	143	1 U	11	-81.4	6.56	S/Me

Table 5-1
Groundwater Geochemistry Evaluation for Sulfate-Enhanced Bioremediation Sites

Site ID	Monitoring Well	Screened Interval (feet bgs)	Date	Sample Type	DO (mg/L)	Nitrate-Nitrite (as Nitrogen, mg/L)	Manganese (mg/L)	Dissolved Manganese[a/] (mg/L)	Iron (mg/L)	Dissolved Ferrous Iron [a/] (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Methane (mg/L)	ORP (millivolts)	pH (standard units)	Redox Zone [b/]
SS017	SS017-MW007R	15-35	05-Sep-17	N	0.51	-	2.78	2.69	92.7	91.7	1.95	1 UJ	3.9	-2.6	6.29	S/Me
			13-Aug-19	N	0.94	-	-	1.96	-	120	20	1 U	14	-88	6.79	S/Me
			03-Oct-20	N	0.20	-	-	17.8	-	73	29.9	0.6 U	9.1	79.8	6.29	S/Me
			23-Aug-21	N	0.11	-	-	26.2	-	67.4	32.7	0.6 U	3.7	-82.2	6.34	S/Me
			26-Aug-22	N	0.49	-	-	11.6	-	82.1	53.5	1.0 U	7.3	0	6.7	S/Me
			12-Sep-23	N	0.38	-	-	12.1	-	107	16.2	1 U	4	-73.5	6.65	S/Me
	SS014-MW004	12-37	13-Sep-13	N	0.21	0.01 U	-	5.07	-	96.8	0.462 J	1 U	5.1	-75	6.62	Me
			16-Aug-17	N	0.64	-	5.26	5.18	107	105	0.458 J	1 U	3.7	-112.7	6.78	Me
			14-Aug-18	N	0.09	-	-	6.08	-	78.2	1.11	1 U	12	-125.1	6.80	Me
			07-Aug-19	N	0.24	-	-	5.42	-	87.3	3.06	1 U	18	-121.8	6.11	S/Me
			04-Oct-20	N	0.87	-	-	6.73	-	74.5	11.3	0.83 J	11	125.7	6.61	S/Me
			24-Aug-21	N	0.27	-	-	6.56	-	99.3	4.5	0.6 U	0.52	-106.0	6.63	S
			15-Aug-22	N	0	-	-	7.55	-	70.3	6.96	1.0 U	13	-46.5	6.52	Me
			6-Sep-23	N	1.5	-	-	6.56	-	110	32.4	1 U	12	28.6	6.72	Me
	SS014-MW005	45-55	13-Sep-13	N	0.12	0.01 U	-	4.21	-	43.5	0.492 J	1 U	1.2	-33.8	6.65	Me
			16-Aug-17	N	0.50	-	5.03	4.84	54.3	52.6	0.33 J	1 U	0.62	-115.9	6.80	Me
			07-Aug-18	N	0.52	-	-	5.40	-	59.4	1.41	1 UJ	1.1	-81.4	6.30	Me
			04-Oct-20	N	1.27	-	-	5.60	-	63.8	58.7	0.6 U	0.30	108.1	6.29	S
			24-Aug-21	N	0.31	-	-	5.22	-	60	54.5	0.6 U	0.13	-90.6	6.71	S
			6-Sep-23	N	1.1	-	-	4.81	-	55.9	32.8	1 U	0.11	49.7	6.78	S
	SS014-MW007	15-35	23-Aug-17	N	0.47	-	5.64	5.26	82.9	93.1	13.7	1 U	5.5	-57.1	6.32	S/Me
				FD	0.47	-	5.31	5.38	87.9	93.6	12.5	1 U	5	-57.1	6.32	S/Me
			22-Aug-18	N	0.41	-	-	8.05	-	95	17.2	1 U	12	-76.0	5.91	S/Me
				FD	0.41	-	-	8.31	-	100	16.8	1 U	12	-76.0	5.91	S/Me
			06-Aug-19	N	0.27	-	-	4.42	-	131	49.1	1 U	18	-99.1	6.40	S/Me
			03-Oct-20	N	0.91	-	-	9.94	-	39.9	54.2	0.6 U	2.80	126.8	6.46	S/Me
			24-Aug-21	N	0.32	-	-	4.06	-	126	13	0.6 U	2.3	-87.1	6.39	S/Me
			15-Aug-22	N	0	-	-	4.87	-	77.8	7.58	1.0 U	5.5	-34.7	6.56	S/Me
			7-Sep-23	N	1.4	-	-	3.17	-	111	8.83	1 U	6.7	48.5	6.7	S/Me
	SS014-MW006	30-40	23-Aug-17	N	0.55	-	3.76	3.71	125	125	0.304 B	1 UJ	3.5	-116.2	6.63	Me
			25-Aug-18	N	0.11	-	-	3.86	-	123	15	1 U	9.9	-69.3	6.82	S/Me
			07-Aug-19	N	0.84	-	-	3.43	-	112	13.5	1 U	9.2	-100.5	6.77	S/Me
			03-Oct-20	N	1.12	-	-	3.52	-	135	0.12 J	0.7 J	17	117.5	6.81	S/Me
			23-Aug-21	N	0.54	-	-	3.7	-	124	0.090 U	0.6 U	6	-88.5	6.48	Me
			27-Aug-22	N	0.59	-	-	3.22	-	115	0.782 B	1.0 U	16	-83.4	6.93	Me
			7-Sep-23	N	1.5	-	-	3.92	-	118	12.1	1 U	4.2	21.8	6.73	S/Me
	SS014-MW001	20-40	24-Aug-17	N	0.52	-	3.89	3.92	97.8	96.2	17.8	1 U	0.96	-94.2	6.67	Fe/S
			22-Aug-18	N	0.44	-	-	3.62	-	83.4	2.18	1 U	2.6	-113.8	6.24	S/Me
			06-Aug-19	N	0.27	-	-	3.74	-	72.8	4.3	1 U	0.66	-100.4	6.56	S
			03-Oct-20	N	1.62	-	-	1.65	-	21.1	42.6	0.6 U	1.2	133.8	6.81	S/Me
			24-Aug-21	N	0.29	-	-	3.06	-	74.3	1.39	0.6 U	2.3	-99.4	6.63	S/Me
			15-Aug-22	N	0	-	-	3	-	66.7	3.97	1.0 U	0.77	-97.3	6.78	S/Me
			7-Sep-23	N	1.1	-	-	3.31	-	84	1.69	1 U	8.5	7	6.75	S/Me

Table 5-1
Groundwater Geochemistry Evaluation for Sulfate-Enhanced Bioremediation Sites

Site ID	Monitoring Well	Screened Interval (feet bgs)	Date	Sample Type	DO (mg/L)	Nitrate-Nitrite (as Nitrogen, mg/L)	Manganese (mg/L)	Dissolved Manganese[a/] (mg/L)	Iron (mg/L)	Dissolved Ferrous Iron [a/] (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Methane (mg/L)	ORP (millivolts)	pH (standard units)	Redox Zone [b/]
SS017	SS014-MW002	50-60	24-Aug-17	N	0.63	-	4.47	4.29	96.8	94	0.283 J	1 U	3.5	-104.6	6.78	Me
			22-Aug-18	N	0.64	-	-	4.3	-	91.8	0.329 J	1 U	5.6	-110.4	6.23	Me
			06-Aug-19	N	0.25	-	-	3.95	-	98	1.24 J	1 U	10	-11.5	6.62	S/Me
				FD	0.25	-	-	4.04	-	98.5	1.47	1 U	9.8	-11.5	6.62	S/Me
			03-Oct-20	N	0.82	-	-	4.20	-	98.1	1.3	0.6 U	8.9 J	104.0	6.99	S/Me
			03-Oct-20	FD	0.82	-	-	4.23	-	99.5	1.2	0.6 U	4.2 J	104.0	6.99	Me
			24-Aug-21	N	0.29	-	-	3.7	-	86.4	3.58	0.6 U	1.7	-100.1	6.45	Me
			24-Aug-21	FD	0.29	-	-	3.67	-	86.3	3.81	0.6 U	1.3	-100.1	6.45	Me
			15-Aug-22	N	0	-	-	3.73	-	76.2	4.67	1.0 UJ	0.6	-82.8	6.61	Me
			15-Aug-22	FD	0	-	-	3.59	-	73.4	4.76	1.0 U	0.55	-82.8	6.61	Me
			7-Sep-23	N	1.3	-	-	3.78	-	81.9	2.37	1 U	2	29.3	6.78	Me
			7-Sep-23	FD	1.3	-	-	3.98	-	83.6	2.4	1 U	2.2	29.3	6.78	Me
	SS014-MW003	70-80	24-Aug-17	N	0.51	-	2.83	2.79	28.1	27.4	0.245 J	1 U	1.5	-93.5	6.83	Me
			22-Aug-18	N	0.48	-	-	3.26	-	31.3	0.305 J	1 U	3.8	-110.0	5.91	Me
			03-Oct-20	N	0.96	-	-	3.77	-	38.1	1.1	0.6 U	2.4	99.7	7.12	Me
			25-Aug-21	N	0.28	-	-	3.33	-	33.8	0.090 U	0.6 U	1.4	-87.5	6.63	Me
	SS017_GP037	25-27	07-Sep-22	FD	-	-	-	2.78	-	5.65	13.1	1.0 U	0.062 J	-	-	Fe/Mn
	SS017_GP037	25-27	07-Sep-22	N	-	-	-	2.87	-	5.06	13.5	1.0 U	0.044 J	-	-	Fe/Mn
	SS017_GP038	25-27	07-Sep-22	N	-	-	-	11.2	-	4.91	30	1.0 U	0.0085	-	-	Fe/Mn
	SS017_GP039	25-27	10-Sep-22	N	-	-	-	19.2	-	7.51 J	4.87 J	1.0 UJ	0.78	-	-	S/Me
	SS017_GP040	25-27	10-Sep-22	N	-	-	-	17.6	-	11.8	3.76	1.0 U	10	-	-	Me
	SS017_GP041	25-27	07-Sep-22	N	-	-	-	8.25	-	20.8	2.63 B	1.0 U	0.63	-	-	S/Me
	SS017_GP042	25-27	10-Sep-22	N	-	-	-	22.5	-	16.6	5.93	1.0 U	0.43	-	-	S
	SS017_GP043	25-27	10-Sep-22	N	-	-	-	25	-	11.2	24	1.0 U	0.71	-	-	S/Me
	SS017_GP044	25-27	10-Sep-22	N	-	-	-	22.7	-	4.48	4.66	1.0 U	0.65	-	-	S/Me
	SS017_GP045	25-27	07-Sep-22	N	-	-	-	7.64	-	52.8	38.9	1.0 U	22	-	-	Me
	SS017_GP046	25-27	07-Sep-22	N	-	-	-	21.6	-	13.1	14.6	1.0 U	0.14	-	-	S
	SS017_GP047	25-27	10-Sep-22	N	-	-	-	19	-	44.1	6.36	1.0 U	17	-	-	Me
ST009	B1812-MW001	12-37	07-Aug-16	N	0.41	-	-	11.3	-	31.5	2.78 J	1 U	1.5	-85.3	6.71	S/Me
				FD	0.41	-	-	11.6	-	32.9	3.14	1 U	1.8	-85.3	6.71	S/Me
			15-Aug-17	N	0.48	-	-	11.5	-	8.32	2.61	1 U	0.37	-37.6	6.63	S
			08-Aug-18	N	0.50	-	-	8.21	-	0.729	209	1 U	0.67	127.6	6.19	Fe
			09-Aug-19	N	2.15	-	-	8.83	-	3.77	125	1 U	0.98	3.6	6.68	O
			04-Oct-20	N	0.14	-	-	3.47	-	0.13	73.2	0.6 U	0.74	131.9	6.83	O/Fe
			18-Aug-21	N	0.13	-	-	11.1	-	1.98	86.3	0.6 U	0.49	64.4	6.59	Fe/Mn
			27-Aug-22	N	0.15	-	-	9.01	-	6.43	66.1	1.0 UJ	0.25	23.3	6.82	Fe/Mn
			14-Sep-23	N	0.32	-	-	14.5	-	8.49	36.6	1 U	0.079	-16.7	6.76	Fe/Mn
	ST009-MW004	13-33	18-Aug-17	N	0.47	-	-	9.06	-	57.4	25.1	1 UJ	0.65	-89.0	6.70	Fe or S
			06-Aug-18	N	0.42	-	-	8.49	-	16.6	204	1 U	3.5	-2.8	6.47	S/Me
			05-Aug-19	N	0.29	-	-	7.11	-	33.8	213.0	1 UJ	7.35	-60.7	6.64	S/Me
			02-Oct-20	N	1.84	-	-	2.80 J	-	5.73 J	74.9	0.6 UJ	6.7	194.5	6.48	S/Me
			20-Aug-21	N	0.03	-	-	3.57 J	-	14.1 J	111	0.6 UJ	1.9	-46.7	6.62	S/Me
			10-Aug-22	N	0.13	-	-	4.72	-	35.3	48.6	1.0 UJ	2.8	-87.5	6.54	S/Me
			14-Sep-23	N	0.38			5.15		33.7	48.1	1 UJ	1	-84.2	6.84	Fe or S

Table 5-1
Groundwater Geochemistry Evaluation for Sulfate-Enhanced Bioremediation Sites

Site ID	Monitoring Well	Screened Interval (feet bgs)	Date	Sample Type	DO (mg/L)	Nitrate-Nitrite (as Nitrogen, mg/L)	Manganese (mg/L)	Dissolved Manganese[a/] (mg/L)	Iron (mg/L)	Dissolved Ferrous Iron [a/] (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Methane (mg/L)	ORP (millivolts)	pH (standard units)	Redox Zone [b/]
ST009	ST009-MW005	13-33	18-Aug-17	N	0.50	-	-	6.15	-	52.5	21.2	1 U	0.87	-88.6	6.65	Fe or S
			06-Aug-18	N	0.39	-	-	7.23	-	34.4	125	1 U	5.1	-4.0	6.42	S/Me
			05-Aug-19	N	0.33	-	-	5.82	-	30.1	82.8	1 U	5.4	-51.0	6.68	S/Me
			02-Oct-20	N	1.13	-	-	2.75	-	12.9	49.8	0.6 U	7.7	153.9	6.74	S/Me
			21-Aug-21	N	0.04	-	-	4.54 J	-	38.8 J	34.7	0.6 U	3.6	-77.1	6.48	S/Me
			10-Aug-22	N	0.28	-	-	4.7	-	34.1	31.7	1.0 U	4.3	-42.8	6.8	S/Me
			14-Sep-23	N	0.28	-	-	5.81	-	55.5	34.7	1 U	2	-78.6	6.89	S/Me
	ST009-MW006	13-33	19-Aug-17	N	0.53	-	-	5.42	-	116	4.25	1 U	6.9	-85.1	6.41	S/Me
			07-Aug-18	N	0.44	-	-	20.6	-	83.5	124	1 U	4.3	-58.2	6.16	S/Me
			05-Aug-19	N	0.48	-	-	15.0	-	75	68.3	1 U	8.7	-80.2	6.57	S/Me
			02-Oct-20	N	1.28	-	-	14.6	-	40.1	57.6	0.6 U	6.3	140.4	6.38	S/Me
			21-Aug-21	N	0.04	-	-	10.6	-	50.3	27.8	0.6 U	6.2	-59.4	6.42	S/Me
			10-Aug-22	N	0.22	-	-	9.44	-	52.9	9.7	1.0 U	9.6	-50.7	6.24	S/Me
			14-Sep-23	N	0.25	-	-	9.99	-	63.9	3.9	1 U	13	-70.3	6.73	S/Me
	1572-MW-03	4-34	02-Sep-13	N	0.41	0.01 U	-	10.3	-	109	0.18 J	1 U	2.4	-66.2	6.61	Me
			19-Aug-17	N	0.51	-	-	5.54	-	88	1.25	1 U	4.4	-69.2	6.50	S/Me
			07-Aug-18	N	0.44	-	-	12.5	-	69.7	28.8	1 U	5.7	-57.1	6.20	S/Me
				FD	0.44	-	-	12.7	-	70.8	29.2	1 U	6.0	-57.1	6.20	S/Me
			05-Aug-19	N	0.48	-	-	11.5	-	44.8	30.5	1 U	11	-59.9	6.51	S/Me
				FD	0.48	-	-	11.6	-	47.1	29.9	1 U	12	-59.9	6.51	S/Me
			02-Oct-20	N	0.05	-	-	10.1	-	33.0	28.7	0.6 U	7.3	62.1	6.43	S/Me
			02-Oct-20	FD	0.05	-	-	9.99	-	32.1	27.9	0.6 U	6.0	62.1	6.43	S/Me
			21-Aug-21	N	0.03	-	-	10.7	-	35.8	11.7	0.6 U	8.3 J	-37.6	6.40	S/Me
			21-Aug-21	FD	-	-	-	11.5	-	45.4	11.5	0.6 U	5.8 J	-	-	S/Me
			11-Aug-22	N	0	-	-	10.3	-	42.6	40.7	1.0 U	2.5	-14.1	6.43	S/Me
			11-Aug-22	FD	0	-	-	10.3	-	41.3	37.9	1.0 U	2.6	-14.1	6.43	S/Me
			15-Sep-23	N	0.3	-	-	6.82	-	22.2	32.5	1 U	0.83	27.6	6.38	S
			15-Sep-23	FD	0.3	-	-	6.7	-	20.7	33.6	1 U	0.7	27.6	6.38	S
	1572-MW-04	4-34	02-Sep-13	N	0.35	0.01 U	-	2.29	-	36.4	10.3	1 U	2.7 J	-26.9	6.39	S/Me
				FD	0.35	0.01 U	-	2.29	-	37	10.2	1 U	3.6 J	-26.9	6.39	S/Me
			19-Aug-17	N	0.63	-	-	3.85	-	87.9	10.7	1 U	4.9	-66.5	6.40	S/Me
			07-Aug-18	N	0.53	-	-	0.829	-	10.1	31.8	1 U	6.1	-11.3	6.20	S/Me
			12-Aug-19	N	1.07	-	-	3.81	-	97.8	22.5	1 U	21	-78	6.62	S/Me
			02-Oct-20	N	0.03	-	-	0.912	-	15.1	15.0	0.6 U	6.6	75.5	6.48	S/Me
			21-Aug-21	N	0.74	-	-	0.857	-	24.4	11.7	0.6 U	3.9	-24.2	6.44	S/Me
			11-Aug-22	N	0.04	-	-	1.26	-	24.3	8.28	1.0 U	10	-21.9	6.2	S/Me
			15-Sep-23	N	0.47	-	-	1.84	-	42.7	26.3	1 U	3.4	-27.1	6.61	S/Me
	10-MW-03	5-45	02-Jun-04	N	0.24	0.035 F	7.21	-	59.5	-	0.858 J	-	1.31	-114	6.96	Me
				FD	0.24	0.031 U	7.28	-	61	-	0.348 J	-	1.23	-114	6.96	Me
			24-Oct-04	N	-	0.001 U	7.78	-	-	-	7.22	-	0.303	-	-	S
			22-Aug-17	N	1.28	-	-	5.53	-	51.8	6.9	1 U	0.67	-63.2	6.61	S
			06-Aug-18	N	1.37	-	-	6.35	-	50.7	8.55	1 U	0.88	-19.0	6.51	S
			05-Aug-19	N	0.52	-	-	5.85	-	48	5.26	1 U	1.5	-94.1	6.75	S/Me
			02-Oct-20	N	0.32	-	-	4.45	-	38.3	6.1	0.6 U	2.7	82.2	6.70	S/Me
			20-Aug-21	N	0.09	-	-	5.57 J	-	58.0 J	4.38	0.6 U	1.3	47.6	6.58	S/Me
			10-Aug-22	N	0.32	-	-	4.97	-	42.9	4.76	1.0 U	0.98	-27.3	6.66	S/Me
			15-Sep-23	N	0.2	-	-	6.41	-	63.6	6.57	1 U	2.9	-69.7	6.84	S/Me

Table 5-1
Groundwater Geochemistry Evaluation for Sulfate-Enhanced Bioremediation Sites

Site ID	Monitoring Well	Screened Interval (feet bgs)	Date	Sample Type	DO (mg/L)	Nitrate-Nitrite (as Nitrogen, mg/L)	Manganese (mg/L)	Dissolved Manganese[a/] (mg/L)	Iron (mg/L)	Dissolved Ferrous Iron [a/] (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Methane (mg/L)	ORP (millivolts)	pH (standard units)	Redox Zone [b/]
ST009	10-MW-06	5-45	13-Aug-17	N	0.43	-	-	5.55	-	71.9	1.3	1 UJ	0.44	-133.9	6.74	S
			06-Aug-18	N	0.52	-	-	4.17	-	0	10.3	1 U	1.3	-30.1	6.51	S/Me
			09-Aug-19	N	0.97	-	-	4.91	-	69.1	5.11	1 U	1.5	-103.6	6.81	S/Me
			02-Oct-20	N	0.06	-	-	3.32	-	21.4	19.5	0.6 U	0.38	51.7	6.51	S
			20-Aug-21	N	0.06	-	-	4.1 J	-	51.5 J	20	0.6 U	0.98	-90.2	6.61	S
			10-Aug-22	N	0.07	-	-	3.46	-	40.9	22.3	1.0 U	0.54	-53.3	6.85	S
			15-Sep-23	N	0.16	-	-	4.25	-	49	36.8	1 U	0.3	-49.6	6.72	S
	ST009_GP038	25-27	01-Sep-22	N	-	-	-	10.7	-	35.8	1.62 B	1.0 UJ	9.8	-	-	Me
	ST009_GP039	25-27	31-Aug-22	N	-	-	-	5.02	-	22.8	7.3	1.0 U	0.86	-	-	S/Me
	ST009_GP040	25-27	31-Aug-22	N	-	-	-	14.6	-	145	1.39 B	1.0 U	13	-	-	Me
	ST009_GP041	25-27	01-Sep-22	N	-	-	-	11.5	-	67.7	3.77	1.0 U	9	-	-	Me
	ST009_GP042	25-27	31-Aug-22	N	-	-	-	4.67	-	30.6	0.605 B	1.0 UJ	19	-	-	Me

Notes:
Wells listed from upgradient to downgradient.

[a/] 2016 through 2020 dissolved iron and manganense were quantified using field test kits. In 2021, 2022 and 2023 dissolved iron and manganese were quantified by an analytical laboratory.

[b/] Redox Zone condition notation: O = aerobic (oxygen reducing); Mn = manganese reducing; Fe = iron reducing; S= sulfate reducing; Me = methanogenic

- = not analyzed
B = analyte detected in associated blank
bgs = below ground surface
DO = dissolved oxygen
F = analyte was positively identified, but the associated numerical value is below the reporting level
FD = field duplicate sample
J = estimated value
mg/L = milligrams per liter
N = normal sample
ORP = oxidation-reduction potential
U = not-detected at the listed method detection limit
UJ = not-detected with an estimated method detection limit

Attachment C
2023 Soil Vapor Extraction Systems Annual Report

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Attachment D
2023 Bioventing Systems Annual Report

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Attachment E
2023 Groundwater Data

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ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

	Location	01-MW-01	01-MW-03	06-MW-09R	06-MW-10	09-MW-15	09-MW-24	09-MW-30	10-MW-03	10-MW-05	10-MW-06	1572-MW-03	1572-MW-03	1572-MW-04	B1812-MW001	CG001-MW011	CG001-MW012
	Sample ID	01-MW-01	01-MW-03	06-MW-09R	06-MW-10	09-MW-15	09-MW-24	09-MW-30	10-MW-03	10-MW-05	10-MW-06	1572-MW-03	1572-MW-03	1572-MW-04	B1812-MW001	CG001-MW011	CG001-MW012
	Depth (feet)	7.19 - 46.8	12.5 - 22.5	33 - 43	60 - 70	5.4 - 34.7	44.91 - 54.91	67 - 72	5.33 - 44.9	36 - 56	5 - 45	4 - 34	4 - 34	4 - 34	12 - 37	66 - 76	85 - 95
	Sample Date	8/26/2023	9/15/2023	9/11/2023	9/12/2023	9/6/2023	9/6/2023	9/12/2023	9/15/2023	9/2/2023	9/15/2023	9/15/2023	9/15/2023	9/15/2023	9/14/2023	8/29/2023	8/29/2023
Analyte	**Sample Type**	N	N	N	N	N	N	N	N	N	N	FD	N	N	N	N	N
	2020 ADEC Table C CULs																
Sulfate by SW9056 (µg/L)																	
Sulfate	--	-	**81700**	**8780**	**2390**	-	-	-	**6570**	-	**36800**	**33600**	**32500**	**26300**	**36600**	-	-
Sulfide by A4500SF (mg/L)																	
Sulfide	--	-	1000 U	1000 U	1000 U	-	-	-	1000 U	-	1000 U	1000 U	1000 U	1000 U	1000 U	-	-
Hydrocarbons C6-C10 GRO (µg/L)																	
C6-C10 GRO	2200	20 U	-	-	-	20 U	**100**	**200**	**330**	**90 J**	**32 J**	**1700**	**1700**	**2800**	-	20 U	**140**
Hydrocarbons C10-C25 DRO (µg/L)																	
C10-C25 DRO	1500	100 U	-	-	-	**190 J**	**600**	**1000**	**510 J**	**190 J**	**130 J**	**2700**	**2500**	**1600**	-	**110 J**	**590**
Hydrocarbons C25-C36 RRO (µg/L)																	
C25-C36 RRO	1100	-	-	-	-	200 U	200 U	220 U	210 U	200 U	200 U	**420 J**	**350 J**	210 U	-	220 U	230 U
PAHs by SW8270 SIM (ug/L)																	
1-Methylnaphthalene	11	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	**3.5**	**4.1**	**3.7 J**	-	-	-
2-METHYLNAPHTHALENE	36	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	**2.5 J**	**4.4 J**	**2.5 J**	-	-	-
ACENAPHTHENE	530	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	0.12 U	0.11 U	0.12 UJ	-	-	-
ACENAPHTHYLENE	260	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	0.12 U	0.11 U	0.12 UJ	-	-	-
ANTHRACENE	43	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	0.12 U	0.11 U	0.12 UJ	-	-	-
BENZO(a)ANTHRACENE	0.3	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	0.12 U	0.11 U	0.12 UJ	-	-	-
BENZO(a)PYRENE	0.25	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	0.12 U	0.11 U	0.12 UJ	-	-	-
BENZO(b)FLUORANTHENE	2.5	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	0.12 U	0.11 U	0.12 UJ	-	-	-
BENZO(g,h,i)PERYLENE	0.26	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	0.12 U	0.11 U	0.12 UJ	-	-	-
BENZO(k)FLUORANTHENE	0.8	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	0.12 U	0.11 U	0.12 UJ	-	-	-
CHRYSENE	2	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	0.12 U	0.11 U	0.12 UJ	-	-	-
DIBENZ(a,h)ANTHRACENE	0.25	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	0.12 U	0.11 U	0.12 UJ	-	-	-
FLUORANTHENE	260	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	0.12 U	0.11 U	0.12 UJ	-	-	-
FLUORENE	290	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	0.12 U	0.11 U	0.12 UJ	-	-	-
Indeno(1,2,3-cd)pyrene	0.19	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	0.12 U	0.11 U	0.12 UJ	-	-	-
NAPHTHALENE	1.7	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	**7.9 J**	**11 J**	0.12 UJ	-	-	-
PHENANTHRENE	170	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	**0.17 J**	**0.19 J**	0.12 UJ	-	-	-
PYRENE	120	-	-	-	-	-	-	-	0.11 U	-	0.1 UJ	0.12 U	0.11 U	0.12 UJ	-	-	-
Dissolved Gases by RSK175 (µg/L)																	
Ethane	--	-	0.64 U	**7.6**	0.64 U	-	-	-	0.64 U	-	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	-	-
Ethylene	--	-	0.3 U	**350**	**0.4 J**	-	-	-	**5.7**	-	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	-	-
Methane	--	-	**2.4 B**	**15000**	**220**	-	-	-	**2900**	-	**300**	**700**	**830**	**3400**	**79**	-	-
Metals (µg/L)																	
Arsenic, Dissolved	0.52	-	**0.621 J**	**1.74**	**0.221 J**	-	-	-	**26.3**	-	**16.8**	**10.6**	**11.5**	**28.6**	-	-	-
Iron, Dissolved	--	-	**63.3 J**	**23200**	**27400**	-	-	-	**63600**	-	**49000**	**20700**	**22200**	**42700**	**8490**	-	-
Manganese, Dissolved	430	-	**3.02**	**5760**	**2370**	-	-	-	**6410**	-	**4250**	**6700**	**6820**	**1840**	**14500**	-	-

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	**Location**	01-MW-01	01-MW-03	06-MW-09R	06-MW-10	09-MW-15	09-MW-24	09-MW-30	10-MW-03	10-MW-05	10-MW-06	1572-MW-03	1572-MW-03	1572-MW-04	B1812-MW001	CG001-MW011	CG001-MW012
	Sample ID	01-MW-01	01-MW-03	06-MW-09R	06-MW-10	09-MW-15	09-MW-24	09-MW-30	10-MW-03	10-MW-05	10-MW-06	1572-MW-03	1572-MW-03	1572-MW-04	B1812-MW001	CG001-MW011	CG001-MW012
	Depth (feet)	7.19 - 46.8	12.5 - 22.5	33 - 43	60 - 70	5.4 - 34.7	44.91 - 54.91	67 - 72	5.33 - 44.9	36 - 56	5 - 45	4 - 34	4 - 34	4 - 34	12 - 37	66 - 76	85 - 95
	Sample Date	8/26/2023	9/15/2023	9/11/2023	9/12/2023	9/6/2023	9/6/2023	9/12/2023	9/15/2023	9/2/2023	9/15/2023	9/15/2023	9/15/2023	9/15/2023	9/14/2023	8/29/2023	8/29/2023
	Sample Type	N	N	N	N	N	N	N	N	N	N	FD	N	N	N	N	N
	2020 ADEC Table C CULs																
VOCs by SW8260C (µg/L)																	
1,1,1,2-TETRACHLOROETHANE	5.7	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
1,1,1-TRICHLOROETHANE	8000	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
1,1,2,2-TETRACHLOROETHANE	0.76	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
1,1,2-TRICHLOROETHANE	0.41	0.1 U	-	**0.23 J**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
1,1-DICHLOROETHANE	28	0.1 U	-	**0.21 J**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
1,1-DICHLOROETHENE	280	0.1 U	-	**4.1**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
1,1-DICHLOROPROPENE	--	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
1,2,3-TRICHLOROBENZENE	7	0.3 U	-	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	-	0.3 U	0.3 U
1,2,3-TRICHLOROPROPANE	0.0075	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**1.4 J**	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	0.25 U
1,2,4-TRICHLOROBENZENE	4	0.3 U	-	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	-	0.3 U	0.3 U
1,2,4-TRIMETHYLBENZENE	56	0.3 U	-	0.3 U	0.3 U	0.3 U	0.3 U	**0.71 J**	**1.1**	**0.49 J**	0.3 U	**27**	**20**	**56**	-	0.3 U	**0.57 J**
1,2-DIBROMO-3-CHLOROPROPANE	--	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	0.25 U
1,2-DICHLOROBENZENE	300	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
1,2-DICHLOROETHANE	1.7	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
1,2-DICHLOROPROPANE	8.2	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.46 J**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
1,3,5-Trimethylbenzene	60	0.3 U	-	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	**12**	**9.8 J**	**17**	-	0.3 U	0.3 U
1,3-DICHLOROBENZENE	300	0.2 U	-	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	-	0.2 U	0.2 U
1,3-DICHLOROPROPANE	--	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
1,4-DICHLOROBENZENE	4.8	0.2 U	-	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	-	0.2 U	0.2 U
2,2-DICHLOROPROPANE	--	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	0.25 U
2-Butanone (MEK)	5600	5 U	-	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	-	5 U	5 U
2-CHLOROTOLUENE	--	0.3 U	-	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	-	0.3 U	0.3 U
2-HEXANONE	38	5 U	-	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	-	5 U	5 U
4-CHLOROTOLUENE	--	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	0.25 U
4-Methyl-2-Pentanone (MIBK)	6300	5 U	-	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	-	5 U	5 U
ACETONE	14000	5 U	-	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	-	5 U	5 U
BENZENE	4.6	0.1 U	-	**0.12 J**	0.1 U	**1.3**	**22**	**66**	**120**	**48 J**	**5.2**	**180**	**160**	**210**	-	**5.2**	**40 J**
BROMOBENZENE	62	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
BROMOCHLOROMETHANE	--	0.2 U	-	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	-	0.2 U	0.2 U
BROMODICHLOROMETHANE	1.3	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
BROMOFORM	33	0.3 U	-	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	-	0.3 U	0.3 U
BROMOMETHANE	7.5	0.3 U	-	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	-	0.3 U	0.3 U
CARBON DISULFIDE	810	0.5 U	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	-	0.5 U	0.5 U
CARBON TETRACHLORIDE	4.6	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
CHLOROBENZENE	78	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
CHLOROETHANE	21000	0.5 U	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	-	0.5 U	0.5 U
CHLOROFORM	2.2	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
CHLOROMETHANE	190	0.3 U	-	0.3 U	**0.39 B**	0.3 U	**0.35 B**	0.3 U	0.3 U	0.3 U	0.3 U	**0.54 B**	0.3 U	**0.48 B**	-	0.3 U	**0.35 J**
cis-1,2-Dichloroethene	36	0.1 U	-	**490**	**0.5 J**	**1.6**	**6.2**	**3.5**	**1**	**0.67 J**	**0.32 J**	0.1 U	0.1 U	**0.15 J**	-	**0.68 J**	**6.8**
cis-1,3-DICHLOROPROPENE	4.7	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	Location	01-MW-01	01-MW-03	06-MW-09R	06-MW-10	09-MW-15	09-MW-24	09-MW-30	10-MW-03	10-MW-05	10-MW-06	1572-MW-03	1572-MW-03	1572-MW-04	B1812-MW001	CG001-MW011	CG001-MW012
	Sample ID	01-MW-01	01-MW-03	06-MW-09R	06-MW-10	09-MW-15	09-MW-24	09-MW-30	10-MW-03	10-MW-05	10-MW-06	1572-MW-03	1572-MW-03	1572-MW-04	B1812-MW001	CG001-MW011	CG001-MW012
	Depth (feet)	7.19 - 46.8	12.5 - 22.5	33 - 43	60 - 70	5.4 - 34.7	44.91 - 54.91	67 - 72	5.33 - 44.9	36 - 56	5 - 45	4 - 34	4 - 34	4 - 34	12 - 37	66 - 76	85 - 95
	Sample Date	8/26/2023	9/15/2023	9/11/2023	9/12/2023	9/6/2023	9/6/2023	9/12/2023	9/15/2023	9/2/2023	9/15/2023	9/15/2023	9/15/2023	9/15/2023	9/14/2023	8/29/2023	8/29/2023
	Sample Type	N	N	N	N	N	N	N	N	N	N	FD	N	N	N	N	N
	2020 ADEC Table C CULs																
DIBROMOCHLOROMETHANE	8.7	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
DIBROMOMETHANE	8.3	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
DICHLORODIFLUOROMETHANE	200	0.3 U	-	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	-	0.3 U	0.3 U
ETHYLBENZENE	15	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**51**	**41 J**	**83**	-	0.1 U	0.1 U
Ethylene Dibromide (EDB)	0.075	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U
HEXACHLOROBUTADIENE	1.4	0.5 U	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	-	0.5 U	0.5 U
Isopropylbenzene	450	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**6**	0.1 U	0.1 U	**3.4**	**2.7 J**	**14**	-	0.1 U	0.1 U
m- & p-Xylene	190	0.4 U	-	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	**130 J**	**93 J**	**280**	-	0.4 U	0.4 U
Methyl tert-Butyl Ether (MTBE)	140	0.2 U	-	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	-	0.2 U	0.2 U
METHYLENE CHLORIDE	110	0.5 U	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	-	0.5 U	0.5 U
NAPHTHALENE	1.7	0.5 U	-	0.5 U	0.5 U	0.5 U	0.5 U	**1.1 B**	0.5 U	0.5 U	0.5 U	**21**	**17 J**	**35**	-	0.5 U	0.5 U
n-BUTYLBENZENE	1000	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**1.5**	**1.3 J**	**1.4**	-	0.25 U	0.25 U
n-PROPYLBENZENE	660	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**3**	**2.4 J**	**11**	-	0.25 U	0.25 U
o-Xylene	190	0.2 U	-	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	**82**	**72 J**	**79**	-	0.2 U	0.2 U
p-Isopropyltoluene	--	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**1.2**	**1.1 J**	**1.4**	-	0.25 U	0.25 U
sec-BUTYL ALCOHOL	--	10 U	-	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	-	10 U	10 U
SEC-BUTYLBENZENE	2000	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**1.1**	0.25 U	0.25 U	0.25 U	**0.66 J**	**1.8**	-	0.25 U	0.25 U
STYRENE	1200	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	0.25 U
Tert-butylbenzene	690	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	0.25 U
Tetrachloroethene (PCE)	41	0.15 U	-	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	-	0.15 U	0.15 U
TOLUENE	1100	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**130**	**100**	**280**	-	0.1 U	0.1 U
trans-1,2-DICHLOROETHENE	360	0.1 U	-	**240**	**0.54 J**	0.1 U	**0.35 J**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	**0.18 J**
trans-1,3-DICHLOROPROPENE	4.7	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	0.25 U
Trichloroethene (TCE)	2.8	0.1 U	-	**1200**	0.1 U	0.1 U	**0.14 J**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.26 J**	-	0.1 U	0.1 U
TRICHLOROFLUOROMETHANE	5200	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	0.25 U
VINYL CHLORIDE	0.19	0.11 U	-	**170**	**0.44 J**	0.11 U	0.11 U	0.11 U	**0.47 J**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	0.11 U	0.11 U
XYLENES, TOTAL	190	0.2 U	-	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	**190**	**140**	**360**	-	0.2 U	0.2 U
DOC and TOC by SW9060 (µg/L)																	
DISSOLVED ORGANIC CARBON, Dissolved	--	-	-	**4810**	**4050**	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL ORGANIC CARBON	--	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	Location	CG001-MW018	CG001-MW019	CG001-MW020	CG001-MW021	CPL006-MW001	CSS002-MW002	CSS002-MW003	CSS002-MW003	FT001-MW009	FT001-MW012	FT001-MW013	GAC EFFLUENT	GAC INFLUENT
	Sample ID	CG001-MW018	CG001-MW019	CG001-MW020	CG001-MW021	CPL006-MW001	CSS002-MW002	CSS002-MW003	CSS002-MW003	FT001-MW009	FT001-MW012	FT001-MW013	GAC EFFLUENT	GAC INFLUENT
	Depth (feet)	20 - 40	50 - 70	80 - 100	110 - 130	19 - 39	17 - 37	17 - 37	17 - 37	50 - 60	70 - 80	12 - 32	0 - 0	0 - 0
	Sample Date	8/30/2023	8/30/2023	8/30/2023	8/31/2023	9/13/2023	9/14/2023	9/14/2023	9/14/2023	8/27/2023	8/27/2023	8/26/2023	9/16/2023	9/16/2023
	Sample Type	N	N	N	N	N	N	FD	N	N	N	N	N	N
	2020 ADEC Table C CULs													
Sulfate by SW9056 (µg/L)														
Sulfate	--	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfide by A4500SF (mg/L)														
Sulfide	--	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydrocarbons C6-C10 GRO (µg/L)														
C6-C10 GRO	2200	20 U	**220**	20 U	20 U	**880**	**99 B**	**98 B**	**97 B**	**28 J**	**23 J**	20 U	-	-
Hydrocarbons C10-C25 DRO (µg/L)														
C10-C25 DRO	1500	**560**	**2100**	**960**	**280 J**	**28000**	**13000**	**7100**	**5700**	110 U	110 U	**460 J**	-	-
Hydrocarbons C25-C36 RRO (µg/L)														
C25-C36 RRO	1100	220 U	200 U	220 U	200 U	**1700**	**690 J**	**290 J**	210 U	-	-	-	-	-
PAHs by SW8270 SIM (ug/L)														
1-Methylnaphthalene	11	-	-	-	-	**32**	**7.9**	**18**	**17**	-	-	-	-	-
2-METHYLNAPHTHALENE	36	-	-	-	-	**27**	0.21 U	0.21 U	0.21 U	-	-	-	-	-
ACENAPHTHENE	530	-	-	-	-	0.36 U	0.21 U	**0.41 J**	**0.42 J**	-	-	-	-	-
ACENAPHTHYLENE	260	-	-	-	-	0.36 U	0.21 U	0.21 U	0.21 U	-	-	-	-	-
ANTHRACENE	43	-	-	-	-	0.36 U	0.21 U	0.21 U	0.21 U	-	-	-	-	-
BENZO(a)ANTHRACENE	0.3	-	-	-	-	0.36 U	0.21 U	0.21 U	0.21 U	-	-	-	-	-
BENZO(a)PYRENE	0.25	-	-	-	-	0.36 U	0.21 U	0.21 U	0.21 U	-	-	-	-	-
BENZO(b)FLUORANTHENE	2.5	-	-	-	-	0.36 U	0.21 U	0.21 U	0.21 U	-	-	-	-	-
BENZO(g,h,i)PERYLENE	0.26	-	-	-	-	0.36 U	0.21 U	0.21 U	0.21 U	-	-	-	-	-
BENZO(k)FLUORANTHENE	0.8	-	-	-	-	0.36 U	0.21 U	0.21 U	0.21 U	-	-	-	-	-
CHRYSENE	2	-	-	-	-	0.36 U	0.21 U	0.21 U	0.21 U	-	-	-	-	-
DIBENZ(a,h)ANTHRACENE	0.25	-	-	-	-	0.36 U	0.21 U	0.21 U	0.21 U	-	-	-	-	-
FLUORANTHENE	260	-	-	-	-	0.36 U	0.21 U	0.21 U	0.21 U	-	-	-	-	-
FLUORENE	290	-	-	-	-	0.36 U	**0.3 J**	**0.49 J**	**0.49 J**	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	0.19	-	-	-	-	0.36 U	0.21 U	0.21 U	0.21 U	-	-	-	-	-
NAPHTHALENE	1.7	-	-	-	-	**50**	**0.59 J**	**0.91 J**	**0.95 J**	-	-	-	-	-
PHENANTHRENE	170	-	-	-	-	0.36 U	0.21 U	0.21 U	0.21 U	-	-	-	-	-
PYRENE	120	-	-	-	-	0.36 U	0.21 U	0.21 U	0.21 U	-	-	-	-	-
Dissolved Gases by RSK175 (µg/L)														
Ethane	--	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylene	--	-	-	-	-	-	-	-	-	-	-	-	-	-
Methane	--	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals (µg/L)														
Arsenic, Dissolved	0.52	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron, Dissolved	--	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese, Dissolved	430	-	-	-	-	-	-	-	-	-	-	-	-	-

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	Location	CG001-MW018	CG001-MW019	CG001-MW020	CG001-MW021	CPL006-MW001	CSS002-MW002	CSS002-MW003	CSS002-MW003	FT001-MW009	FT001-MW012	FT001-MW013	GAC EFFLUENT	GAC INFLUENT
	Sample ID	CG001-MW018	CG001-MW019	CG001-MW020	CG001-MW021	CPL006-MW001	CSS002-MW002	CSS002-MW003	CSS002-MW003	FT001-MW009	FT001-MW012	FT001-MW013	GAC EFFLUENT	GAC INFLUENT
	Depth (feet)	20 - 40	50 - 70	80 - 100	110 - 130	19 - 39	17 - 37	17 - 37	17 - 37	50 - 60	70 - 80	12 - 32	0 - 0	0 - 0
	Sample Date	8/30/2023	8/30/2023	8/30/2023	8/31/2023	9/13/2023	9/14/2023	9/14/2023	9/14/2023	8/27/2023	8/27/2023	8/26/2023	9/16/2023	9/16/2023
	Sample Type	N	N	N	N	N	N	FD	N	N	N	N	N	N
	2020 ADEC Table C CULs													
VOCs by SW8260C (µg/L)														
1,1,1,2-TETRACHLOROETHANE	5.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,1-TRICHLOROETHANE	8000	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2,2-TETRACHLOROETHANE	0.76	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2-TRICHLOROETHANE	0.41	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-DICHLOROETHANE	28	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-DICHLOROETHENE	280	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-DICHLOROPROPENE	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2,3-TRICHLOROBENZENE	7	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2,3-TRICHLOROPROPANE	0.0075	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2,4-TRICHLOROBENZENE	4	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2,4-TRIMETHYLBENZENE	56	0.3 U	0.3 U	0.3 U	0.3 U	**96**	**0.43 J**	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	**4.7**
1,2-DIBROMO-3-CHLOROPROPANE	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2-DICHLOROBENZENE	300	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.15 J**	**0.49 J**	**0.51 J**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-DICHLOROETHANE	1.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-DICHLOROPROPANE	8.2	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,3,5-Trimethylbenzene	60	0.3 U	0.3 U	0.3 U	0.3 U	**19**	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	**1.9**
1,3-DICHLOROBENZENE	300	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-DICHLOROPROPANE	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,4-DICHLOROBENZENE	4.8	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,2-DICHLOROPROPANE	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-Butanone (MEK)	5600	5 U	5 U	5 U	5 U	5 U	**8.5 J**	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-CHLOROTOLUENE	--	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2-HEXANONE	38	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-CHLOROTOLUENE	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-Methyl-2-Pentanone (MIBK)	6300	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
ACETONE	14000	5 U	5 U	5 U	5 U	**7.3 J**	**8.5 B**	5 U	5 U	5 U	5 U	5 U	5 U	**11 J**
BENZENE	4.6	0.1 U	**9.9**	**0.35 J**	0.1 U	**60**	**2.1**	**5.5**	**5.7**	**13**	**13**	**0.11 J**	0.1 U	**3.4**
BROMOBENZENE	62	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
BROMOCHLOROMETHANE	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
BROMODICHLOROMETHANE	1.3	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
BROMOFORM	33	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMOMETHANE	7.5	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CARBON DISULFIDE	810	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	4.6	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROBENZENE	78	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROETHANE	21000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	2.2	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROMETHANE	190	0.3 U	0.3 U	0.3 U	0.3 U	**0.6 B**	**0.61 J**	0.3 U	0.3 U	**0.38 J**	**0.35 J**	**0.51 J**	0.3 U	0.3 U
cis-1,2-Dichloroethene	36	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.1 J**	**0.11 J**	**0.14 J**	**0.13 J**	0.1 U	0.1 U	**0.5 J**
cis-1,3-DICHLOROPROPENE	4.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	Location	CG001-MW018	CG001-MW019	CG001-MW020	CG001-MW021	CPL006-MW001	CSS002-MW002	CSS002-MW003	CSS002-MW003	FT001-MW009	FT001-MW012	FT001-MW013	GAC EFFLUENT	GAC INFLUENT
	Sample ID	CG001-MW018	CG001-MW019	CG001-MW020	CG001-MW021	CPL006-MW001	CSS002-MW002	CSS002-MW003	CSS002-MW003	FT001-MW009	FT001-MW012	FT001-MW013	GAC EFFLUENT	GAC INFLUENT
	Depth (feet)	20 - 40	50 - 70	80 - 100	110 - 130	19 - 39	17 - 37	17 - 37	17 - 37	50 - 60	70 - 80	12 - 32	0 - 0	0 - 0
	Sample Date	8/30/2023	8/30/2023	8/30/2023	8/31/2023	9/13/2023	9/14/2023	9/14/2023	9/14/2023	8/27/2023	8/27/2023	8/26/2023	9/16/2023	9/16/2023
	Sample Type	N	N	N	N	N	N	FD	N	N	N	N	N	N
	2020 ADEC Table C CULs													
DIBROMOCHLOROMETHANE	8.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
DIBROMOMETHANE	8.3	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
DICHLORODIFLUOROMETHANE	200	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
ETHYLBENZENE	15	0.1 U	0.1 U	0.1 U	0.1 U	**52**	**6.5**	**2.4**	**2.6**	0.1 U	0.1 U	0.1 U	0.1 U	**2.9**
Ethylene Dibromide (EDB)	0.075	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
HEXACHLOROBUTADIENE	1.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	450	0.1 U	0.1 U	0.1 U	0.1 U	**25**	**2.6**	**3.3**	**3.6**	0.1 U	0.1 U	0.1 U	0.1 U	**1.3**
m- & p-Xylene	190	0.4 U	0.4 U	0.4 U	0.4 U	**36**	**0.88 J**	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	**5.9**
Methyl tert-Butyl Ether (MTBE)	140	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
METHYLENE CHLORIDE	110	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
NAPHTHALENE	1.7	0.5 U	0.5 U	0.5 U	0.5 U	**88**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**13**
n-BUTYLBENZENE	1000	0.25 U	0.25 U	0.25 U	0.25 U	**8.2**	**0.77 J**	**0.97 J**	**1.1**	0.25 U	0.25 U	0.25 U	0.25 U	**0.62 J**
n-PROPYLBENZENE	660	0.25 U	0.25 U	0.25 U	0.25 U	**32**	**2.9**	**1.6**	**1.9**	0.25 U	0.25 U	0.25 U	0.25 U	**0.92 J**
o-Xylene	190	0.2 U	0.2 U	0.2 U	0.2 U	**0.27 J**	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	**0.87 J**
p-Isopropyltoluene	--	0.25 U	0.25 U	0.25 U	0.25 U	**6.2**	**0.46 J**	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**0.51 J**
sec-BUTYL ALCOHOL	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
SEC-BUTYLBENZENE	2000	0.25 U	0.25 U	0.25 U	0.25 U	**8.6**	**1**	**1.7**	**1.9**	0.25 U	0.25 U	0.25 U	0.25 U	**0.35 J**
STYRENE	1200	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Tert-butylbenzene	690	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**0.25 J**	**0.31 J**	**0.32 J**	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene (PCE)	41	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
TOLUENE	1100	0.1 U	**130 J**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.53 J**
trans-1,2-DICHLOROETHENE	360	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.28 J**
trans-1,3-DICHLOROPROPENE	4.7	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Trichloroethene (TCE)	2.8	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.57 J**
TRICHLOROFLUOROMETHANE	5200	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
VINYL CHLORIDE	0.19	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
XYLENES, TOTAL	190	0.2 U	0.2 U	0.2 U	0.2 U	**36**	**0.88 J**	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	**6.8**
DOC and TOC by SW9060 (µg/L)														
DISSOLVED ORGANIC CARBON, Dissolved	--	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL ORGANIC CARBON	--	-	-	-	-	-	-	-	-	-	-	-	-	-

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	Location	GAC INTERMEDIATE	SE-MW-01	SS006-MW66	SS006-MW67	SS006-MW68	SS006-MW68	SS006-MW69	SS006-MW74	SS006-MW75	SS006-MW77	SS006-MW78	SS006-MW78	SS006-MW79	SS006-MW80
	Sample ID	GAC INTERMEDIATE	SE-MW-01	SS006-MW66	SS006-MW67	SS006-MW68	SS006-MW68	SS006-MW69	SS006-MW74	SS006-MW75	SS006-MW77	SS006-MW78	SS006-MW78	SS006-MW79	SS006-MW80
	Depth (feet)	0 - 0	6 - 26	80 - 90	40 - 50	60 - 70	60 - 70	78.6 - 88.6	5 - 30	40 - 50	15 - 40	15 - 40	15 - 40	40 - 50	40 - 50
	Sample Date	9/16/2023	8/29/2023	9/9/2023	9/10/2023	9/10/2023	9/10/2023	9/9/2023	9/9/2023	9/9/2023	9/8/2023	9/8/2023	9/8/2023	9/8/2023	9/8/2023
	Sample Type	N	N	N	N	FD	N	N	N	N	N	FD	N	N	N
	2020 ADEC Table C CULs														
Sulfate by SW9056 (µg/L)															
Sulfate	--	-	-	-	**421 B**	**377 B**	**374 B**	-	-	-	**46200**	**20300**	**19700**	**7530**	**4070**
Sulfide by A4500SF (mg/L)															
Sulfide	--	-	-	-	1000 U	1000 U	1000 U	-	-	-	1000 U	1000 UJ	1000 U	1000 U	1000 U
Hydrocarbons C6-C10 GRO (µg/L)															
C6-C10 GRO	2200	-	-	-	-	-	-	-	-	-	20 U	-	-	-	-
Hydrocarbons C10-C25 DRO (µg/L)															
C10-C25 DRO	1500	-	**34000**	-	-	-	-	-	-	-	100 U	-	-	-	-
Hydrocarbons C25-C36 RRO (µg/L)															
C25-C36 RRO	1100	-	**4100**	-	-	-	-	-	-	-	**370 J**	-	-	-	-
PAHs by SW8270 SIM (ug/L)															
1-Methylnaphthalene	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-METHYLNAPHTHALENE	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ACENAPHTHENE	530	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ACENAPHTHYLENE	260	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ANTHRACENE	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BENZO(a)ANTHRACENE	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BENZO(a)PYRENE	0.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BENZO(b)FLUORANTHENE	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BENZO(g,h,i)PERYLENE	0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BENZO(k)FLUORANTHENE	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CHRYSENE	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DIBENZ(a,h)ANTHRACENE	0.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FLUORANTHENE	260	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FLUORENE	290	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	0.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NAPHTHALENE	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHENANTHRENE	170	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PYRENE	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Gases by RSK175 (µg/L)															
Ethane	--	-	-	-	**3.3**	**8.1**	**8.1**	-	-	-	0.64 U	0.64 U	0.64 U	**0.69 J**	**14**
Ethylene	--	-	-	-	**180**	**32**	**32**	-	-	-	0.3 U	**3**	**3**	**52**	**15**
Methane	--	-	-	-	**12000**	**5400**	**6400**	-	-	-	**270**	**15000**	**12000**	**1100**	**26000**
Metals (µg/L)															
Arsenic, Dissolved	0.52	-	-	-	**19**	0.2 U	0.2 U	-	-	-	**0.238 J**	**0.973 J**	**0.942 J**	**19.3**	**28**
Iron, Dissolved	--	-	-	-	**41400**	**33000**	**34100**	-	-	-	**1200**	**228**	**224**	**60700**	**96000**
Manganese, Dissolved	430	-	-	-	**6810**	**2830**	**2920**	-	-	-	**26200**	**2570**	**2540**	**4300**	**4810**

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	Location	GAC INTERMEDIATE	SE-MW-01	SS006-MW66	SS006-MW67	SS006-MW68	SS006-MW68	SS006-MW69	SS006-MW74	SS006-MW75	SS006-MW77	SS006-MW78	SS006-MW78	SS006-MW79	SS006-MW80
	Sample ID	GAC INTERMEDIATE	SE-MW-01	SS006-MW66	SS006-MW67	SS006-MW68	SS006-MW68	SS006-MW69	SS006-MW74	SS006-MW75	SS006-MW77	SS006-MW78	SS006-MW78	SS006-MW79	SS006-MW80
	Depth (feet)	0 - 0	6 - 26	80 - 90	40 - 50	60 - 70	60 - 70	78.6 - 88.6	5 - 30	40 - 50	15 - 40	15 - 40	15 - 40	40 - 50	40 - 50
	Sample Date	9/16/2023	8/29/2023	9/9/2023	9/10/2023	9/10/2023	9/10/2023	9/9/2023	9/9/2023	9/9/2023	9/8/2023	9/8/2023	9/8/2023	9/8/2023	9/8/2023
	Sample Type	N	N	N	N	FD	N	N	N	N	N	FD	N	N	N
	2020 ADEC Table C CULs														
VOCs by SW8260C (µg/L)															
1,1,1,2-TETRACHLOROETHANE	5.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,1-TRICHLOROETHANE	8000	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2,2-TETRACHLOROETHANE	0.76	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2-TRICHLOROETHANE	0.41	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-DICHLOROETHANE	28	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.12 J**	**0.39 J**	**0.4 J**	**0.54 J**	**0.14 J**
1,1-DICHLOROETHENE	280	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.12 J**	0.1 U	**0.18 J**	**4.2**	**4.4**	**2.2**	0.1 U
1,1-DICHLOROPROPENE	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2,3-TRICHLOROBENZENE	7	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2,3-TRICHLOROPROPANE	0.0075	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2,4-TRICHLOROBENZENE	4	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2,4-TRIMETHYLBENZENE	56	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-DIBROMO-3-CHLOROPROPANE	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2-DICHLOROBENZENE	300	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-DICHLOROETHANE	1.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-DICHLOROPROPANE	8.2	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,3,5-Trimethylbenzene	60	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,3-DICHLOROBENZENE	300	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-DICHLOROPROPANE	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,4-DICHLOROBENZENE	4.8	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,2-DICHLOROPROPANE	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-Butanone (MEK)	5600	5 U	**5.5 J**	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-CHLOROTOLUENE	--	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2-HEXANONE	38	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-CHLOROTOLUENE	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-Methyl-2-Pentanone (MIBK)	6300	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
ACETONE	14000	5 U	**5.4 J**	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BENZENE	4.6	0.1 U	0.1 U	0.1 U	**0.13 J**	**0.15 J**	**0.14 J**	0.1 U	**0.54 J**	**0.58 J**	**0.16 J**	**1.4**	**1.4**	**0.57 J**	0.1 U
BROMOBENZENE	62	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
BROMOCHLOROMETHANE	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
BROMODICHLOROMETHANE	1.3	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
BROMOFORM	33	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMOMETHANE	7.5	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CARBON DISULFIDE	810	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	4.6	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROBENZENE	78	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROETHANE	21000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	2.2	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROMETHANE	190	**0.41 J**	0.3 U	**0.47 B**	**0.45 B**	0.3 U	**0.51 B**	0.3 U	0.3 U	**0.34 B**	0.3 U	0.3 U	0.3 U	**0.57 B**	0.3 U
cis-1,2-Dichloroethene	36	0.1 U	0.1 U	**0.35 J**	**0.54 J**	**0.25 J**	**0.32 J**	**0.13 J**	**10**	**1 J**	**49**	**3700**	**3700**	**1600**	**11**
cis-1,3-DICHLOROPROPENE	4.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	Location	GAC INTERMEDIATE	SE-MW-01	SS006-MW66	SS006-MW67	SS006-MW68	SS006-MW68	SS006-MW69	SS006-MW74	SS006-MW75	SS006-MW77	SS006-MW78	SS006-MW78	SS006-MW79	SS006-MW80
	Sample ID	GAC INTERMEDIATE	SE-MW-01	SS006-MW66	SS006-MW67	SS006-MW68	SS006-MW68	SS006-MW69	SS006-MW74	SS006-MW75	SS006-MW77	SS006-MW78	SS006-MW78	SS006-MW79	SS006-MW80
	Depth (feet)	0 - 0	6 - 26	80 - 90	40 - 50	60 - 70	60 - 70	78.6 - 88.6	5 - 30	40 - 50	15 - 40	15 - 40	15 - 40	40 - 50	40 - 50
	Sample Date	9/16/2023	8/29/2023	9/9/2023	9/10/2023	9/10/2023	9/10/2023	9/9/2023	9/9/2023	9/9/2023	9/8/2023	9/8/2023	9/8/2023	9/8/2023	9/8/2023
	Sample Type	N	N	N	N	FD	N	N	N	N	N	FD	N	N	N
	2020 ADEC Table C CULs														
DIBROMOCHLOROMETHANE	8.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
DIBROMOMETHANE	8.3	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
DICHLORODIFLUOROMETHANE	200	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	**0.89 J**	0.3 U	0.3 U	0.3 U	0.3 U
ETHYLBENZENE	15	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Ethylene Dibromide (EDB)	0.075	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
HEXACHLOROBUTADIENE	1.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	450	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
m- & p-Xylene	190	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Methyl tert-Butyl Ether (MTBE)	140	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
METHYLENE CHLORIDE	110	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
NAPHTHALENE	1.7	0.5 U	**3**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
n-BUTYLBENZENE	1000	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
n-PROPYLBENZENE	660	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
o-Xylene	190	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
p-Isopropyltoluene	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**0.68 J**
sec-BUTYL ALCOHOL	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
SEC-BUTYLBENZENE	2000	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
STYRENE	1200	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Tert-butylbenzene	690	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene (PCE)	41	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
TOLUENE	1100	0.1 U	**1.1**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.34 J**	0.1 U
trans-1,2-DICHLOROETHENE	360	0.1 U	0.1 U	**0.34 J**	**0.26 J**	**0.27 J**	**0.28 J**	0.1 U	**3.5**	0.1 U	**1.9**	**640**	**640**	**540**	**21**
trans-1,3-DICHLOROPROPENE	4.7	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Trichloroethene (TCE)	2.8	0.1 U	0.1 U	**2**	**0.27 J**	0.1 U	0.1 U	0.1 U	**2.2**	0.1 U	**0.1 J**	**1300**	**1400**	**70**	**2.3**
TRICHLOROFLUOROMETHANE	5200	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
VINYL CHLORIDE	0.19	0.11 U	0.11 U	0.11 U	**0.85 J**	**0.41 J**	**0.46 J**	0.11 U	**0.85 J**	**0.91 J**	0.11 U	**2.6**	**2.7**	**200**	**18**
XYLENES, TOTAL	190	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
DOC and TOC by SW9060 (µg/L)															
DISSOLVED ORGANIC CARBON, Dissolved	--	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL ORGANIC CARBON	--	-	-	-	**9020**	**4680**	**4740**	-	-	-	**4310**	**10000**	**10100**	**6600**	**6710**

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	Location	SS006-MW81	SS006-MW82	SS006-MW83	SS014-MW001	SS014-MW002	SS014-MW002	SS014-MW004	SS014-MW005	SS014-MW006	SS014-MW007	SS015-BW02	SS015-EW02	SS015-MW079
	Sample ID	SS006-MW81	SS006-MW82	SS006-MW83	SS014-MW001	SS014-MW002	SS014-MW002	SS014-MW004	SS014-MW005	SS014-MW006	SS014-MW007	SS015-BW02	SS015-EW02	SS015-MW079
	Depth (feet)	15 - 35	46.3 - 56.3	35 - 45	20 - 40	50 - 60	50 - 60	12 - 37	45 - 55	30 - 40	15 - 35	29 - 54	25 - 50	50 - 60
	Sample Date	9/11/2023	9/11/2023	9/11/2023	9/7/2023	9/7/2023	9/7/2023	9/6/2023	9/6/2023	9/7/2023	9/7/2023	9/12/2023	9/12/2023	9/13/2023
	Sample Type	N	N	N	N	FD	N	N	N	N	N	N	N	N
	2020 ADEC Table C CULs													
Sulfate by SW9056 (µg/L)														
Sulfate	--	**2840**	**413 B**	**981 B**	**1690**	**2400**	**2370**	**32400**	**32800**	**12100**	**8830**	**892 B**	**1510 B**	**689 B**
Sulfide by A4500SF (mg/L)														
Sulfide	--	1000 U	1000 U	1000 UJ	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Hydrocarbons C6-C10 GRO (µg/L)														
C6-C10 GRO	2200	-	-	-	**110**	**41 J**	**52 J**	**240**	20 U	**130**	**140**	-	-	-
Hydrocarbons C10-C25 DRO (µg/L)														
C10-C25 DRO	1500	-	-	-	**5200**	**1900**	**2000**	**4900**	**1600**	**14000**	**14000**	-	-	-
Hydrocarbons C25-C36 RRO (µg/L)														
C25-C36 RRO	1100	-	-	-	**620 J**	**340 J**	**300 J**	230 U	210 U	**1600**	**1600**	-	-	-
PAHs by SW8270 SIM (ug/L)														
1-Methylnaphthalene	11	-	-	-	**5.4**	0.11 U	0.12 U	**16**	0.19 U	**18**	**13**	-	-	-
2-METHYLNAPHTHALENE	36	-	-	-	**0.27 J**	0.11 U	0.12 U	**4.2**	0.19 U	0.12 U	0.23 U	-	-	-
ACENAPHTHENE	530	-	-	-	**0.48 J**	0.11 U	0.12 U	**0.45 J**	0.19 U	**0.46 J**	**0.41 J**	-	-	-
ACENAPHTHYLENE	260	-	-	-	0.12 U	0.11 U	0.12 U	0.2 U	0.19 U	0.12 U	0.23 U	-	-	-
ANTHRACENE	43	-	-	-	0.12 U	0.11 U	0.12 U	0.2 U	0.19 U	0.12 U	0.23 U	-	-	-
BENZO(a)ANTHRACENE	0.3	-	-	-	0.12 U	0.11 U	0.12 U	0.2 U	0.19 U	0.12 U	0.23 U	-	-	-
BENZO(a)PYRENE	0.25	-	-	-	0.12 U	0.11 U	0.12 U	0.2 U	0.19 U	0.12 U	0.23 U	-	-	-
BENZO(b)FLUORANTHENE	2.5	-	-	-	0.12 U	0.11 U	0.12 U	0.2 U	0.19 U	0.12 U	0.23 U	-	-	-
BENZO(g,h,i)PERYLENE	0.26	-	-	-	0.12 U	0.11 U	0.12 U	0.2 U	0.19 U	0.12 U	0.23 U	-	-	-
BENZO(k)FLUORANTHENE	0.8	-	-	-	0.12 U	0.11 U	0.12 U	0.2 U	0.19 U	0.12 U	0.23 U	-	-	-
CHRYSENE	2	-	-	-	0.12 U	0.11 U	0.12 U	0.2 U	0.19 U	0.12 U	0.23 U	-	-	-
DIBENZ(a,h)ANTHRACENE	0.25	-	-	-	0.12 U	0.11 U	0.12 U	0.2 U	0.19 U	0.12 U	0.23 U	-	-	-
FLUORANTHENE	260	-	-	-	0.12 U	0.11 U	0.12 U	0.2 U	0.19 U	0.12 U	0.23 U	-	-	-
FLUORENE	290	-	-	-	**0.67**	0.11 U	0.12 U	**1.2**	0.19 U	**1.2**	**0.67 J**	-	-	-
Indeno(1,2,3-cd)pyrene	0.19	-	-	-	0.12 U	0.11 U	0.12 U	0.2 U	0.19 U	0.12 U	0.23 U	-	-	-
NAPHTHALENE	1.7	-	-	-	**1.3**	0.11 U	0.12 U	**11**	0.19 U	**2.7**	**6.2**	-	-	-
PHENANTHRENE	170	-	-	-	0.12 U	0.11 U	0.12 U	**0.33 J**	0.19 U	**0.37 J**	0.23 U	-	-	-
PYRENE	120	-	-	-	0.12 U	0.11 U	0.12 U	0.2 U	0.19 U	0.12 U	0.23 U	-	-	-
Dissolved Gases by RSK175 (µg/L)														
Ethane	--	**4**	**8.1**	**61 J**	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	**2.3**	**6.4**	**9.2**
Ethylene	--	**190**	**180**	**82 J**	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	**6.9**	**7.9**	**11**
Methane	--	**17000**	**21000**	**46000**	**8500**	**2200**	**2000**	**12000**	**110**	**4200**	**6700**	**47000**	**34000**	**49000**
Metals (µg/L)														
Arsenic, Dissolved	0.52	**23.8**	**10**	**59.4**	**43.9**	**5.84**	**5.71**	**67.2**	**0.509 J**	**58.5**	**78.1**	**13.5**	**7.57**	**3.52**
Iron, Dissolved	--	**77700**	**84300**	**207000**	**84000**	**83600**	**81900**	**110000**	**55900**	**118000**	**111000**	**30800**	**19400**	**58200**
Manganese, Dissolved	430	**18700**	**4800**	**7310**	**3310**	**3980**	**3780**	**6560**	**4810**	**3920**	**3170**	**2350**	**10600**	**2370**

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	**Location**	SS006-MW81	SS006-MW82	SS006-MW83	SS014-MW001	SS014-MW002	SS014-MW002	SS014-MW004	SS014-MW005	SS014-MW006	SS014-MW007	SS015-BW02	SS015-EW02	SS015-MW079
	Sample ID	SS006-MW81	SS006-MW82	SS006-MW83	SS014-MW001	SS014-MW002	SS014-MW002	SS014-MW004	SS014-MW005	SS014-MW006	SS014-MW007	SS015-BW02	SS015-EW02	SS015-MW079
	Depth (feet)	15 - 35	46.3 - 56.3	35 - 45	20 - 40	50 - 60	50 - 60	12 - 37	45 - 55	30 - 40	15 - 35	29 - 54	25 - 50	50 - 60
	Sample Date	9/11/2023	9/11/2023	9/11/2023	9/7/2023	9/7/2023	9/7/2023	9/6/2023	9/6/2023	9/7/2023	9/7/2023	9/12/2023	9/12/2023	9/13/2023
	Sample Type	N	N	N	N	FD	N	N	N	N	N	N	N	N
	2020 ADEC Table C CULs													
VOCs by SW8260C (µg/L)														
1,1,1,2-TETRACHLOROETHANE	5.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,1-TRICHLOROETHANE	8000	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2,2-TETRACHLOROETHANE	0.76	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2-TRICHLOROETHANE	0.41	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-DICHLOROETHANE	28	**0.13 J**	0.1 U	0.1 U	**1.1**	**0.15 J**	**0.16 J**	**1.2**	0.1 U	**0.57 J**	**0.27 J**	0.1 U	0.1 U	0.1 U
1,1-DICHLOROETHENE	280	**1.6**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-DICHLOROPROPENE	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2,3-TRICHLOROBENZENE	7	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2,3-TRICHLOROPROPANE	0.0075	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2,4-TRICHLOROBENZENE	4	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2,4-TRIMETHYLBENZENE	56	0.3 U	0.3 U	0.3 U	**18**	**7.2**	**7.8**	**25**	0.3 U	**11**	**12**	0.3 U	0.3 U	0.3 U
1,2-DIBROMO-3-CHLOROPROPANE	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2-DICHLOROBENZENE	300	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.12 J**	0.1 U	**0.33 J**	**0.42 J**	0.1 U	0.1 U	0.1 U
1,2-DICHLOROETHANE	1.7	**0.12 J**	0.1 U	0.1 U	**0.2 J**	**0.14 J**	**0.14 J**	0.1 U	**0.48 J**	**0.34 J**	**0.43 J**	0.1 U	0.1 U	0.1 U
1,2-DICHLOROPROPANE	8.2	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,3,5-Trimethylbenzene	60	0.3 U	0.3 U	0.3 U	**3.3**	**0.76 J**	**0.77 J**	**9.5**	0.3 U	**0.39 J**	**4.6**	0.3 U	0.3 U	0.3 U
1,3-DICHLOROBENZENE	300	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-DICHLOROPROPANE	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,4-DICHLOROBENZENE	4.8	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,2-DICHLOROPROPANE	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-Butanone (MEK)	5600	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-CHLOROTOLUENE	--	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2-HEXANONE	38	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-CHLOROTOLUENE	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-Methyl-2-Pentanone (MIBK)	6300	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
ACETONE	14000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BENZENE	4.6	**0.14 J**	**0.12 J**	**0.19 J**	**4.5**	**2.2**	**2.2**	**17**	**4.1**	**7.7**	**11**	0.1 U	0.1 U	**0.13 J**
BROMOBENZENE	62	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
BROMOCHLOROMETHANE	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
BROMODICHLOROMETHANE	1.3	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
BROMOFORM	33	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMOMETHANE	7.5	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CARBON DISULFIDE	810	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	4.6	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROBENZENE	78	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROETHANE	21000	**1.2 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	2.2	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROMETHANE	190	0.3 U	0.3 U	0.3 U	0.3 U	**0.71 B**	0.3 U	0.3 U	**0.38 B**	0.3 U	0.3 U	**0.37 B**	0.3 U	**0.35 B**
cis-1,2-Dichloroethene	36	**340**	0.1 U	**0.1 J**	**0.59 J**	0.1 U	**0.11 J**	**9.7**	**1.2**	**0.33 J**	**0.43 J**	**2.1**	**6**	**0.16 J**
cis-1,3-DICHLOROPROPENE	4.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	Location	SS006-MW81	SS006-MW82	SS006-MW83	SS014-MW001	SS014-MW002	SS014-MW002	SS014-MW004	SS014-MW005	SS014-MW006	SS014-MW007	SS015-BW02	SS015-EW02	SS015-MW079
	Sample ID	SS006-MW81	SS006-MW82	SS006-MW83	SS014-MW001	SS014-MW002	SS014-MW002	SS014-MW004	SS014-MW005	SS014-MW006	SS014-MW007	SS015-BW02	SS015-EW02	SS015-MW079
	Depth (feet)	15 - 35	46.3 - 56.3	35 - 45	20 - 40	50 - 60	50 - 60	12 - 37	45 - 55	30 - 40	15 - 35	29 - 54	25 - 50	50 - 60
	Sample Date	9/11/2023	9/11/2023	9/11/2023	9/7/2023	9/7/2023	9/7/2023	9/6/2023	9/6/2023	9/7/2023	9/7/2023	9/12/2023	9/12/2023	9/13/2023
	Sample Type	N	N	N	N	FD	N	N	N	N	N	N	N	N
	2020 ADEC Table C CULs													
DIBROMOCHLOROMETHANE	8.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
DIBROMOMETHANE	8.3	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
DICHLORODIFLUOROMETHANE	200	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
ETHYLBENZENE	15	0.1 U	0.1 U	0.1 U	**0.25 J**	0.1 U	0.1 U	**5.3**	0.1 U	**0.82 J**	**5.6**	0.1 U	0.1 U	0.1 U
Ethylene Dibromide (EDB)	0.075	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
HEXACHLOROBUTADIENE	1.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	450	0.1 U	0.1 U	0.1 U	**3.6**	0.1 U	0.1 U	**3.1**	0.1 U	**3.8**	**4.8**	0.1 U	0.1 U	0.1 U
m- & p-Xylene	190	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	**7**	0.4 U	**0.45 J**	**0.82 J**	0.4 U	0.4 U	0.4 U
Methyl tert-Butyl Ether (MTBE)	140	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
METHYLENE CHLORIDE	110	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
NAPHTHALENE	1.7	0.5 U	0.5 U	0.5 U	**1.7 J**	0.5 U	0.5 U	**41**	**0.51 J**	**5.6**	**15**	0.5 U	0.5 U	0.5 U
n-BUTYLBENZENE	1000	0.25 U	0.25 U	0.25 U	**1.5**	0.25 U	0.25 U	**2.8**	0.25 U	0.25 U	**2.2**	0.25 U	0.25 U	0.25 U
n-PROPYLBENZENE	660	0.25 U	0.25 U	0.25 U	**2.4**	0.25 U	0.25 U	**2.5**	0.25 U	**3.3**	**4.5**	0.25 U	0.25 U	0.25 U
o-Xylene	190	0.2 U	0.2 U	0.2 U	**0.32 J**	0.2 U	0.2 U	**0.69 J**	0.2 U	**0.2 J**	0.2 U	0.2 U	0.2 U	0.2 U
p-Isopropyltoluene	--	0.25 U	0.25 U	0.25 U	**0.74 J**	0.25 U	0.25 U	**1.2**	0.25 U	**1.5**	**1.9**	0.25 U	0.25 U	0.25 U
sec-BUTYL ALCOHOL	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
SEC-BUTYLBENZENE	2000	0.25 U	0.25 U	0.25 U	**1.7**	0.25 U	0.25 U	**1.7**	0.25 U	**2**	**1.8**	0.25 U	0.25 U	0.25 U
STYRENE	1200	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Tert-butylbenzene	690	0.25 U	0.25 U	0.25 U	**0.36 J**	0.25 U	0.25 U	0.25 U	0.25 U	**0.36 J**	**0.33 J**	0.25 U	0.25 U	0.25 U
Tetrachloroethene (PCE)	41	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
TOLUENE	1100	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
trans-1,2-DICHLOROETHENE	360	**91**	**0.15 J**	**0.84 J**	0.1 U	0.1 U	0.1 U	**0.17 J**	0.1 U	0.1 U	0.1 U	**16**	**9.6**	**21**
trans-1,3-DICHLOROPROPENE	4.7	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Trichloroethene (TCE)	2.8	**88**	**0.24 J**	0.1 U	**0.63 J**	0.1 U	0.1 U	**0.23 J**	0.1 U	**0.14 J**	**0.15 J**	**1.8**	**0.97 J**	0.1 U
TRICHLOROFLUOROMETHANE	5200	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
VINYL CHLORIDE	0.19	**89**	**0.32 J**	**0.42 J**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**1.7**	**3.7**	**0.19 J**
XYLENES, TOTAL	190	0.2 U	0.2 U	0.2 U	**0.32 J**	0.2 U	0.2 U	**7.7**	0.2 U	**0.65 J**	**0.82 J**	0.2 U	0.2 U	0.2 U
DOC and TOC by SW9060 (µg/L)														
DISSOLVED ORGANIC CARBON, Dissolved	--	**11200**	**6650**	**17700**	-	-	-	-	-	-	-	**2180**	**3700**	**3740**
TOTAL ORGANIC CARBON	--	-	-	-	-	-	-	-	-	-	-	-	-	-

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	Location	SS015-MW080	SS015-MW085	SS015-MW087	SS015-MW088	SS015-MW088	SS015-MW43	SS015-MW73	SS016-MW002	SS016-MW002	SS016-MW003	SS016-MW004	SS016-MW005	SS017-MW001
	Sample ID	SS015-MW080	SS015-MW085	SS015-MW087	SS015-MW088	SS015-MW088	SS015-MW43	SS015-MW73	SS016-MW002	SS016-MW002	SS016-MW003	SS016-MW004	SS016-MW005	SS017-MW001
	Depth (feet)	70.5 - 80.5	75 - 85	15 - 35	68 - 78	68 - 78	19 - 24	65 - 70	12 - 37	12 - 37	12 - 37	12 - 37	12 - 37	15 - 35
	Sample Date	9/13/2023	9/14/2023	9/13/2023	9/13/2023	9/13/2023	9/13/2023	9/15/2023	8/27/2023	8/27/2023	8/27/2023	8/27/2023	9/15/2023	9/11/2023
	Sample Type	N	N	N	FD	N	N	N	FD	N	N	N	N	N
	2020 ADEC Table C CULs													
Sulfate by SW9056 (µg/L)														
Sulfate	--	**452 B**	**662 B**	**30400**	-	**585 B**	**32600**	**756 B**	-	-	-	-	-	**957 B**
Sulfide by A4500SF (mg/L)														
Sulfide	--	1000 U	1000 U	1000 UJ	-	1000 U	1000 U	1000 U	-	-	-	-	-	1000 U
Hydrocarbons C6-C10 GRO (µg/L)														
C6-C10 GRO	2200	-	-	-	-	-	-	-	**31 J**	**34 J**	**22 J**	20 U	20 U	**710 J**
Hydrocarbons C10-C25 DRO (µg/L)														
C10-C25 DRO	1500	-	-	-	-	-	-	-	**2300**	**2200**	**750**	**330 J**	100 U	**24000**
Hydrocarbons C25-C36 RRO (µg/L)														
C25-C36 RRO	1100	-	-	-	-	-	-	-	210 U	**260 J**	220 U	210 U	210 U	**960 J**
PAHs by SW8270 SIM (ug/L)														
1-Methylnaphthalene	11	-	-	-	-	-	-	-	-	-	-	-	0.11 U	**45**
2-METHYLNAPHTHALENE	36	-	-	-	-	-	-	-	-	-	-	-	0.11 U	**42**
ACENAPHTHENE	530	-	-	-	-	-	-	-	-	-	-	-	0.11 U	**1.2 J**
ACENAPHTHYLENE	260	-	-	-	-	-	-	-	-	-	-	-	0.11 U	**0.42 J**
ANTHRACENE	43	-	-	-	-	-	-	-	-	-	-	-	0.11 U	**0.36 J**
BENZO(a)ANTHRACENE	0.3	-	-	-	-	-	-	-	-	-	-	-	0.11 U	0.32 U
BENZO(a)PYRENE	0.25	-	-	-	-	-	-	-	-	-	-	-	0.11 U	0.32 U
BENZO(b)FLUORANTHENE	2.5	-	-	-	-	-	-	-	-	-	-	-	0.11 U	0.32 U
BENZO(g,h,i)PERYLENE	0.26	-	-	-	-	-	-	-	-	-	-	-	0.11 U	0.32 U
BENZO(k)FLUORANTHENE	0.8	-	-	-	-	-	-	-	-	-	-	-	0.11 U	0.32 U
CHRYSENE	2	-	-	-	-	-	-	-	-	-	-	-	0.11 U	0.32 U
DIBENZ(a,h)ANTHRACENE	0.25	-	-	-	-	-	-	-	-	-	-	-	0.11 U	0.32 U
FLUORANTHENE	260	-	-	-	-	-	-	-	-	-	-	-	0.11 U	0.32 U
FLUORENE	290	-	-	-	-	-	-	-	-	-	-	-	0.11 U	**3.2**
Indeno(1,2,3-cd)pyrene	0.19	-	-	-	-	-	-	-	-	-	-	-	0.11 U	0.32 U
NAPHTHALENE	1.7	-	-	-	-	-	-	-	-	-	-	-	0.11 U	**83**
PHENANTHRENE	170	-	-	-	-	-	-	-	-	-	-	-	0.11 U	**0.91 J**
PYRENE	120	-	-	-	-	-	-	-	-	-	-	-	0.11 U	0.32 U
Dissolved Gases by RSK175 (µg/L)														
Ethane	--	**6.9**	**3.8**	0.64 U	-	**11**	32 U	**7.1**	-	-	-	-	-	0.64 U
Ethylene	--	**3.4**	**14**	0.3 U	-	**3.6**	**5.5**	**25**	-	-	-	-	-	0.3 U
Methane	--	**14000**	**12000**	**820**	-	**9500**	**250 R**	**18000**	-	-	-	-	-	**12000**
Metals (µg/L)														
Arsenic, Dissolved	0.52	0.2 U	-	**0.682 J**	-	**2.14**	**2.96**	0.2 U	-	-	-	-	-	**85.7**
Iron, Dissolved	--	**31800**	**33900**	**2520**	-	**32100**	**2720**	**38600**	-	-	-	-	-	**129000**
Manganese, Dissolved	430	**2380**	**2530**	**4070**	-	**2220**	**21000**	**2390**	-	-	-	-	-	**6330**

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	**Location**	SS015-MW080	SS015-MW085	SS015-MW087	SS015-MW088	SS015-MW088	SS015-MW43	SS015-MW73	SS016-MW002	SS016-MW002	SS016-MW003	SS016-MW004	SS016-MW005	SS017-MW001
	Sample ID	SS015-MW080	SS015-MW085	SS015-MW087	SS015-MW088	SS015-MW088	SS015-MW43	SS015-MW73	SS016-MW002	SS016-MW002	SS016-MW003	SS016-MW004	SS016-MW005	SS017-MW001
	Depth (feet)	70.5 - 80.5	75 - 85	15 - 35	68 - 78	68 - 78	19 - 24	65 - 70	12 - 37	12 - 37	12 - 37	12 - 37	12 - 37	15 - 35
	Sample Date	9/13/2023	9/14/2023	9/13/2023	9/13/2023	9/13/2023	9/13/2023	9/15/2023	8/27/2023	8/27/2023	8/27/2023	8/27/2023	9/15/2023	9/11/2023
	Sample Type	N	N	N	FD	N	N	N	FD	N	N	N	N	N
	2020 ADEC Table C CULs													
VOCs by SW8260C (µg/L)														
1,1,1,2-TETRACHLOROETHANE	5.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,1-TRICHLOROETHANE	8000	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2,2-TETRACHLOROETHANE	0.76	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2-TRICHLOROETHANE	0.41	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-DICHLOROETHANE	28	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-DICHLOROETHENE	280	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-DICHLOROPROPENE	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2,3-TRICHLOROBENZENE	7	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2,3-TRICHLOROPROPANE	0.0075	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2,4-TRICHLOROBENZENE	4	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2,4-TRIMETHYLBENZENE	56	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	**110**
1,2-DIBROMO-3-CHLOROPROPANE	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2-DICHLOROBENZENE	300	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.24 J**
1,2-DICHLOROETHANE	1.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-DICHLOROPROPANE	8.2	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,3,5-Trimethylbenzene	60	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	**55**
1,3-DICHLOROBENZENE	300	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-DICHLOROPROPANE	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,4-DICHLOROBENZENE	4.8	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,2-DICHLOROPROPANE	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-Butanone (MEK)	5600	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	**43**
2-CHLOROTOLUENE	--	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2-HEXANONE	38	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-CHLOROTOLUENE	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-Methyl-2-Pentanone (MIBK)	6300	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
ACETONE	14000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	**9.6 B**
BENZENE	4.6	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**1.3**	**1.3**	**0.29 J**	0.1 U	0.1 U	**16**
BROMOBENZENE	62	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
BROMOCHLOROMETHANE	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
BROMODICHLOROMETHANE	1.3	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
BROMOFORM	33	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMOMETHANE	7.5	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CARBON DISULFIDE	810	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	4.6	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROBENZENE	78	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROETHANE	21000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.88 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	2.2	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROMETHANE	190	**0.44 B**	0.3 U	0.3 U	**0.41 B**	**0.33 B**	**0.34 B**	0.3 U	0.3 U	0.3 U	**0.48 J**	0.3 U	**0.39 B**	0.3 U
cis-1,2-Dichloroethene	36	**0.25 J**	**0.14 J**	0.1 U	**0.57 J**	**0.55 J**	**39**	**0.26 J**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**11**
cis-1,3-DICHLOROPROPENE	4.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

ATTACHMENT E
SUMMARY OF GROUNDWATER
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Analyte	**Location**	SS015-MW080	SS015-MW085	SS015-MW087	SS015-MW088	SS015-MW088	SS015-MW43	SS015-MW73	SS016-MW002	SS016-MW002	SS016-MW003	SS016-MW004	SS016-MW005	SS017-MW001
	Sample ID	SS015-MW080	SS015-MW085	SS015-MW087	SS015-MW088	SS015-MW088	SS015-MW43	SS015-MW73	SS016-MW002	SS016-MW002	SS016-MW003	SS016-MW004	SS016-MW005	SS017-MW001
	Depth (feet)	70.5 - 80.5	75 - 85	15 - 35	68 - 78	68 - 78	19 - 24	65 - 70	12 - 37	12 - 37	12 - 37	12 - 37	12 - 37	15 - 35
	Sample Date	9/13/2023	9/14/2023	9/13/2023	9/13/2023	9/13/2023	9/13/2023	9/15/2023	8/27/2023	8/27/2023	8/27/2023	8/27/2023	9/15/2023	9/11/2023
	Sample Type	N	N	N	FD	N	N	N	FD	N	N	N	N	N
	2020 ADEC Table C CULs													
DIBROMOCHLOROMETHANE	8.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
DIBROMOMETHANE	8.3	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
DICHLORODIFLUOROMETHANE	200	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
ETHYLBENZENE	15	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.2 J**	**0.18 J**	0.1 U	0.1 U	0.1 U	**20**
Ethylene Dibromide (EDB)	0.075	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
HEXACHLOROBUTADIENE	1.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	450	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.14 J**	**0.13 J**	0.1 U	0.1 U	0.1 U	**6.5**
m- & p-Xylene	190	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	**25**
Methyl tert-Butyl Ether (MTBE)	140	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
METHYLENE CHLORIDE	110	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
NAPHTHALENE	1.7	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**150**
n-BUTYLBENZENE	1000	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**8.5**
n-PROPYLBENZENE	660	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**7.7**
o-Xylene	190	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	**1.2**
p-Isopropyltoluene	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**2.1**
sec-BUTYL ALCOHOL	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
SEC-BUTYLBENZENE	2000	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**2.2**
STYRENE	1200	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Tert-butylbenzene	690	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene (PCE)	41	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	**6.7**	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
TOLUENE	1100	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.26 J**
trans-1,2-DICHLOROETHENE	360	**3.4**	**2.4**	0.1 U	**3.9**	**4**	**1.7**	**8.1**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.35 J**
trans-1,3-DICHLOROPROPENE	4.7	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Trichloroethene (TCE)	2.8	**0.24 J**	**0.18 J**	0.1 U	**0.38 J**	**0.43 J**	**77**	**0.12 J**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.19 J**
TRICHLOROFLUOROMETHANE	5200	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
VINYL CHLORIDE	0.19	**0.36 J**	**0.25 J**	0.11 U	**0.51 J**	**0.54 J**	**5.3**	**0.31 J**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**0.16 J**
XYLENES, TOTAL	190	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	**0.25 J**	**0.23 J**	0.2 U	0.2 U	0.2 U	**26**
DOC and TOC by SW9060 (µg/L)														
DISSOLVED ORGANIC CARBON, Dissolved	--	**4010**	**3890**	**5620**	**4000**	**4110**	**4110**	**3600**	-	-	-	-	-	-
TOTAL ORGANIC CARBON	--	-	-	-	-	-	-	-	-	-	-	-	-	-

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	Location	SS017-MW002	SS017-MW002	SS017-MW003	SS017-MW004	SS017-MW005	SS017-MW006	SS017-MW007R	SS018-MW001	SS018-MW003	SS019-MW84	SS022-MW003	SS022-MW003	SS022-MW004
	Sample ID	SS017-MW002	SS017-MW002	SS017-MW003	SS017-MW004	SS017-MW005	SS017-MW006	SS017-MW007R	SS018-MW001	SS018-MW003	SS019-MW84	SS022-MW003	SS022-MW003	SS022-MW004
	Depth (feet)	15 - 35	15 - 35	17 - 37	17 - 37	15 - 35	15 - 35	15 - 35	12 - 32	13 - 33	13 - 38	12 - 32	12 - 32	12 - 32
	Sample Date	9/11/2023	9/11/2023	9/11/2023	9/10/2023	9/10/2023	9/11/2023	9/12/2023	8/28/2023	8/28/2023	9/11/2023	8/28/2023	8/28/2023	8/28/2023
	Sample Type	FD	N	N	N	N	N	N	N	N	N	FD	N	N
	2020 ADEC Table C CULs													
Sulfate by SW9056 (µg/L)														
Sulfate	--	**38500**	**38600**	**269000**	**143000**	**20900**	**798 B**	**16200**	-	-	-	-	-	-
Sulfide by A4500SF (mg/L)														
Sulfide	--	1000 U	1000 U	1000 U	1000 U	1000 U	1000 UJ	1000 U	-	-	-	-	-	-
Hydrocarbons C6-C10 GRO (µg/L)														
C6-C10 GRO	2200	**670 J**	**620**	**38 J**	**590**	-	**260**	**380 J**	20 U	20 U	**67 J**	20 U	20 U	-
Hydrocarbons C10-C25 DRO (µg/L)														
C10-C25 DRO	1500	**24000**	**24000**	**1400**	**38000**	-	**15000 J**	**30000**	**910**	120 U	100 U	110 U	110 U	-
Hydrocarbons C25-C36 RRO (µg/L)														
C25-C36 RRO	1100	**1200**	**1000 J**	220 U	**2900**	-	**430 J**	**2100**	200 U	240 U	210 U	210 U	220 U	-
PAHs by SW8270 SIM (ug/L)														
1-Methylnaphthalene	11	**59**	**55**	**1.2 J**	**60**	-	**29**	**22**	-	-	-	-	-	-
2-METHYLNAPHTHALENE	36	**2.8**	**2.3**	0.22 UJ	**6**	-	**1.6**	**3.9**	-	-	-	-	-	-
ACENAPHTHENE	530	**1.1 J**	**1.2 J**	0.22 UJ	**1.3 J**	-	**0.71 J**	**1.3 J**	-	-	-	-	-	-
ACENAPHTHYLENE	260	0.32 U	0.33 U	0.22 UJ	0.31 U	-	0.23 U	0.34 U	-	-	-	-	-	-
ANTHRACENE	43	0.32 U	0.33 U	0.22 UJ	0.31 U	-	0.23 U	0.34 U	-	-	-	-	-	-
BENZO(a)ANTHRACENE	0.3	0.32 U	0.33 U	0.22 UJ	0.31 U	-	0.23 U	0.34 U	-	-	-	-	-	-
BENZO(a)PYRENE	0.25	0.32 U	0.33 U	0.22 UJ	0.31 U	-	0.23 U	0.34 U	-	-	-	-	-	-
BENZO(b)FLUORANTHENE	2.5	0.32 U	0.33 U	0.22 UJ	0.31 U	-	0.23 U	0.34 U	-	-	-	-	-	-
BENZO(g,h,i)PERYLENE	0.26	0.32 U	0.33 U	0.22 UJ	0.31 U	-	0.23 U	0.34 U	-	-	-	-	-	-
BENZO(k)FLUORANTHENE	0.8	0.32 U	0.33 U	0.22 UJ	0.31 U	-	0.23 U	0.34 U	-	-	-	-	-	-
CHRYSENE	2	0.32 U	0.33 U	0.22 UJ	0.31 U	-	0.23 U	0.34 U	-	-	-	-	-	-
DIBENZ(a,h)ANTHRACENE	0.25	0.32 U	0.33 U	0.22 UJ	0.31 U	-	0.23 U	0.34 U	-	-	-	-	-	-
FLUORANTHENE	260	0.32 U	0.33 U	0.22 UJ	0.31 U	-	0.23 U	0.34 U	-	-	-	-	-	-
FLUORENE	290	**3**	**2.9**	**0.24 J**	**2.5**	-	**2.1**	**2.1**	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	0.19	0.32 U	0.33 U	0.22 UJ	0.31 U	-	0.23 U	0.34 U	-	-	-	-	-	-
NAPHTHALENE	1.7	**100**	**96**	**0.86 J**	**69**	-	**15**	**11**	-	-	-	-	-	-
PHENANTHRENE	170	**0.69 J**	**0.68 J**	0.22 UJ	0.31 U	-	**0.46 J**	0.34 U	-	-	-	-	-	-
PYRENE	120	0.32 U	0.33 U	0.22 UJ	0.31 U	-	0.23 U	0.34 U	-	-	-	-	-	-
Dissolved Gases by RSK175 (µg/L)														
Ethane	--	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	0.64 UJ	0.64 U	-	-	-	-	-	-
Ethylene	--	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	-	-	-	-	-	-
Methane	--	**13000**	**12000**	**710**	**11000**	**0.68 B**	**10000**	**4000**	-	-	-	-	-	-
Metals (µg/L)														
Arsenic, Dissolved	0.52	**90.5**	**93.1**	**58.5**	**105**	**0.302 J**	**48.7**	**48.7**	-	-	-	-	-	-
Iron, Dissolved	--	**117000**	**117000**	**76400**	**107000**	25 U	**95700**	**107000**	-	-	-	-	-	-
Manganese, Dissolved	430	**6190**	**6380**	**2230**	**3860**	**9.37**	**8860**	**12100**	-	-	-	-	-	-

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	Location	SS017-MW002	SS017-MW002	SS017-MW003	SS017-MW004	SS017-MW005	SS017-MW006	SS017-MW007R	SS018-MW001	SS018-MW003	SS019-MW84	SS022-MW003	SS022-MW003	SS022-MW004
	Sample ID	SS017-MW002	SS017-MW002	SS017-MW003	SS017-MW004	SS017-MW005	SS017-MW006	SS017-MW007R	SS018-MW001	SS018-MW003	SS019-MW84	SS022-MW003	SS022-MW003	SS022-MW004
	Depth (feet)	15 - 35	15 - 35	17 - 37	17 - 37	15 - 35	15 - 35	15 - 35	12 - 32	13 - 33	13 - 38	12 - 32	12 - 32	12 - 32
	Sample Date	9/11/2023	9/11/2023	9/11/2023	9/10/2023	9/10/2023	9/11/2023	9/12/2023	8/28/2023	8/28/2023	9/11/2023	8/28/2023	8/28/2023	8/28/2023
	Sample Type	FD	N	N	N	N	N	N	N	N	N	FD	N	N
	2020 ADEC Table C CULs													
VOCs by SW8260C (µg/L)														
1,1,1,2-TETRACHLOROETHANE	5.7	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,1-TRICHLOROETHANE	8000	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2,2-TETRACHLOROETHANE	0.76	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2-TRICHLOROETHANE	0.41	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-DICHLOROETHANE	28	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	**0.38 J**	0.1 U	0.1 U	0.1 U
1,1-DICHLOROETHENE	280	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	**0.65 J**	0.1 U	0.1 U	0.1 U
1,1-DICHLOROPROPENE	--	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2,3-TRICHLOROBENZENE	7	0.3 U	0.3 U	0.3 U	0.3 U	-	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2,3-TRICHLOROPROPANE	0.0075	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2,4-TRICHLOROBENZENE	4	0.3 U	0.3 U	0.3 U	0.3 U	-	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2,4-TRIMETHYLBENZENE	56	**94**	**95**	**3.8**	**34**	-	**33**	**15**	0.3 U	0.3 U	**0.62 J**	0.3 U	0.3 U	0.3 U
1,2-DIBROMO-3-CHLOROPROPANE	--	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2-DICHLOROBENZENE	300	**0.26 J**	**0.28 J**	0.1 U	0.1 U	-	0.1 U	**0.21 J**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-DICHLOROETHANE	1.7	0.1 U	0.1 U	0.1 U	**2.6**	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-DICHLOROPROPANE	8.2	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,3,5-Trimethylbenzene	60	**45**	**44**	0.3 U	**31**	-	**1.1**	**31**	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,3-DICHLOROBENZENE	300	0.2 U	0.2 U	0.2 U	0.2 U	-	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-DICHLOROPROPANE	--	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,4-DICHLOROBENZENE	4.8	0.2 U	0.2 U	0.2 U	**0.4 J**	-	0.2 U	**0.32 J**	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,2-DICHLOROPROPANE	--	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-Butanone (MEK)	5600	5 U	5 U	5 U	**6.5 J**	-	5 U	**8.5 J**	5 U	5 U	5 U	5 U	5 U	5 U
2-CHLOROTOLUENE	--	0.3 U	0.3 U	0.3 U	0.3 U	-	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2-HEXANONE	38	5 U	5 U	5 U	5 U	-	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-CHLOROTOLUENE	--	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-Methyl-2-Pentanone (MIBK)	6300	5 U	5 U	5 U	5 U	-	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
ACETONE	14000	**6.5 B**	**6.8 B**	5 U	5 U	-	5 U	**6.4 B**	5 U	5 U	5 U	5 U	5 U	5 U
BENZENE	4.6	**26**	**26**	**1.7**	**78**	-	**8.1**	**37**	**0.15 J**	**0.7 J**	**0.43 J**	0.1 U	0.1 U	0.1 U
BROMOBENZENE	62	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
BROMOCHLOROMETHANE	--	0.2 U	0.2 U	0.2 U	0.2 U	-	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
BROMODICHLOROMETHANE	1.3	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
BROMOFORM	33	0.3 U	0.3 U	0.3 U	0.3 U	-	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMOMETHANE	7.5	0.3 U	0.3 U	0.3 U	0.3 U	-	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CARBON DISULFIDE	810	0.5 U	0.5 U	0.5 U	0.5 U	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	4.6	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROBENZENE	78	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROETHANE	21000	0.5 U	0.5 U	0.5 U	0.5 U	-	0.5 U	0.5 U	0.5 U	0.5 U	**0.85 J**	0.5 U	0.5 U	0.5 U
CHLOROFORM	2.2	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROMETHANE	190	**0.38 B**	**0.8 B**	**0.53 B**	**0.41 B**	-	**0.56 B**	**0.46 B**	**0.64 J**	**0.4 J**	**0.33 B**	**0.44 J**	**0.45 J**	**0.39 J**
cis-1,2-Dichloroethene	36	**35**	**35**	**2.3**	**28**	-	**0.18 J**	**12**	**0.38 J**	**10**	**300**	0.1 U	0.1 U	**0.3 J**
cis-1,3-DICHLOROPROPENE	4.7	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte														
	Location	SS017-MW002	SS017-MW002	SS017-MW003	SS017-MW004	SS017-MW005	SS017-MW006	SS017-MW007R	SS018-MW001	SS018-MW003	SS019-MW84	SS022-MW003	SS022-MW003	SS022-MW004
	Sample ID	SS017-MW002	SS017-MW002	SS017-MW003	SS017-MW004	SS017-MW005	SS017-MW006	SS017-MW007R	SS018-MW001	SS018-MW003	SS019-MW84	SS022-MW003	SS022-MW003	SS022-MW004
	Depth (feet)	15 - 35	15 - 35	17 - 37	17 - 37	15 - 35	15 - 35	15 - 35	12 - 32	13 - 33	13 - 38	12 - 32	12 - 32	12 - 32
	Sample Date	9/11/2023	9/11/2023	9/11/2023	9/10/2023	9/10/2023	9/11/2023	9/12/2023	8/28/2023	8/28/2023	9/11/2023	8/28/2023	8/28/2023	8/28/2023
	Sample Type	FD	N	N	N	N	N	N	N	N	N	FD	N	N
	2020 ADEC Table C CULs													
DIBROMOCHLOROMETHANE	8.7	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
DIBROMOMETHANE	8.3	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
DICHLORODIFLUOROMETHANE	200	0.3 U	0.3 U	0.3 U	0.3 U	-	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
ETHYLBENZENE	15	**39**	**39**	**1.2**	**20**	-	**5.3**	**8.6**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Ethylene Dibromide (EDB)	0.075	0.1 U	0.1 U	0.1 U	0.1 U	-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
HEXACHLOROBUTADIENE	1.4	0.5 U	0.5 U	0.5 U	0.5 U	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	450	**8.3**	**8.1**	**1.4**	**5**	-	**3.4**	**3.1**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
m- & p-Xylene	190	**28**	**28**	0.4 U	**22**	-	**0.76 J**	**3.9**	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Methyl tert-Butyl Ether (MTBE)	140	0.2 U	0.2 U	0.2 U	0.2 U	-	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
METHYLENE CHLORIDE	110	0.5 U	0.5 U	0.5 U	0.5 U	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
NAPHTHALENE	1.7	**150**	**160**	**7.3**	**140**	-	**28**	**31**	0.5 U	0.5 U	**4.9**	0.5 U	0.5 U	0.5 U
n-BUTYLBENZENE	1000	**6.3**	**6.1**	**0.36 J**	**5.6**	-	**2.1**	**5**	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
n-PROPYLBENZENE	660	**8.5**	**8.4**	**0.66 J**	**5.2**	-	**4.2**	**2.8**	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
o-Xylene	190	**1.6**	**1.6**	0.2 U	**0.34 J**	-	**0.54 J**	**0.56 J**	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
p-Isopropyltoluene	--	**3.2**	**3.1**	0.25 U	**3.8**	-	**0.73 J**	**1.2**	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
sec-BUTYL ALCOHOL	--	10 U	10 U	10 U	10 U	-	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
SEC-BUTYLBENZENE	2000	**1.9**	**1.9**	**0.82 J**	**1.6**	-	**1.8**	**0.66 J**	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
STYRENE	1200	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Tert-butylbenzene	690	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	**0.84 J**	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene (PCE)	41	0.15 U	0.15 U	0.15 U	0.15 U	-	0.15 U	0.15 U	0.15 U	**1.2**	0.15 U	0.15 U	0.15 U	0.15 U
TOLUENE	1100	0.1 U	0.1 U	0.1 U	0.1 U	-	**0.1 J**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
trans-1,2-DICHLOROETHENE	360	**0.58 J**	**0.58 J**	0.1 U	**0.5 J**	-	0.1 U	**0.23 J**	0.1 U	**1.3**	**81**	0.1 U	0.1 U	0.1 U
trans-1,3-DICHLOROPROPENE	4.7	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Trichloroethene (TCE)	2.8	**0.44 J**	**0.44 J**	**0.14 J**	**1.2**	-	0.1 U	**0.16 J**	0.1 U	**9.6**	**85**	**0.35 J**	**0.38 J**	**4.6**
TRICHLOROFLUOROMETHANE	5200	0.25 U	0.25 U	0.25 U	0.25 U	-	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
VINYL CHLORIDE	0.19	**0.31 J**	**0.29 J**	0.11 U	**0.12 J**	-	0.11 U	**0.13 J**	0.11 U	0.11 U	**15**	0.11 U	0.11 U	0.11 U
XYLENES, TOTAL	190	**30**	**30**	0.2 U	**22**	-	**1.3 J**	**4.5**	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
DOC and TOC by SW9060 (µg/L)														
DISSOLVED ORGANIC CARBON, Dissolved	--	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL ORGANIC CARBON	--	-	-	-	-	-	-	-	-	-	-	-	-	-

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	Location	SS022-MW005	SS022-MW006	ST009-MW001	ST009-MW002	ST009-MW004	ST009-MW005	ST009-MW006	ST010-MW013	ST010-MW014	ST010-MW015
	Sample ID	SS022-MW005	SS022-MW006	ST009-MW001	ST009-MW002	ST009-MW004	ST009-MW005	ST009-MW006	ST010-MW013	ST010-MW014	ST010-MW015
	Depth (feet)	12 - 32	12 - 32	66.5 - 76.5	50 - 60	13 - 33	13 - 33	13 - 33	15.2 - 35.2	12 - 32	12 - 32
	Sample Date	8/28/2023	8/28/2023	9/2/2023	8/31/2023	9/14/2023	9/14/2023	9/14/2023	8/29/2023	9/15/2023	9/13/2023
	Sample Type	N	N	N	N	N	N	N	N	N	N
	2020 ADEC Table C CULs										
Sulfate by SW9056 (µg/L)											
Sulfate	--	-	-	-	-	**48100**	**34700**	**3900**	-	-	-
Sulfide by A4500SF (mg/L)											
Sulfide	--	-	-	-	-	1000 UJ	1000 U	1000 U	-	-	-
Hydrocarbons C6-C10 GRO (µg/L)											
C6-C10 GRO	2200	-	-	20 U	**29 J**	**1500**	**860**	**2200**	-	-	-
Hydrocarbons C10-C25 DRO (µg/L)											
C10-C25 DRO	1500	-	-	110 U	100 U	**200 J**	**210 J**	**890**	**120 J**	**480 J**	**14000**
Hydrocarbons C25-C36 RRO (µg/L)											
C25-C36 RRO	1100	-	-	210 U	210 U	210 U	220 U	210 U	210 U	**210 J**	**540 J**
PAHs by SW8270 SIM (ug/L)											
1-Methylnaphthalene	11	-	-	-	-	**2.4**	**1.5 J**	**5.5**	-	0.1 U	**84**
2-METHYLNAPHTHALENE	36	-	-	-	-	**2.5**	**0.25 J**	**3.3**	-	0.1 U	**43**
ACENAPHTHENE	530	-	-	-	-	0.11 U	0.1 UJ	0.11 U	-	0.1 U	0.21 U
ACENAPHTHYLENE	260	-	-	-	-	0.11 U	0.1 UJ	0.11 U	-	0.1 U	0.21 U
ANTHRACENE	43	-	-	-	-	0.11 U	0.1 UJ	0.11 U	-	0.1 U	0.21 U
BENZO(a)ANTHRACENE	0.3	-	-	-	-	0.11 U	0.1 UJ	0.11 U	-	0.1 U	0.21 U
BENZO(a)PYRENE	0.25	-	-	-	-	0.11 U	0.1 UJ	0.11 U	-	0.1 U	0.21 U
BENZO(b)FLUORANTHENE	2.5	-	-	-	-	0.11 U	0.1 UJ	0.11 U	-	0.1 U	0.21 U
BENZO(g,h,i)PERYLENE	0.26	-	-	-	-	0.11 U	0.1 UJ	0.11 U	-	0.1 U	0.21 U
BENZO(k)FLUORANTHENE	0.8	-	-	-	-	0.11 U	0.1 UJ	0.11 U	-	0.1 U	0.21 U
CHRYSENE	2	-	-	-	-	0.11 U	0.1 UJ	0.11 U	-	0.1 U	0.21 U
DIBENZ(a,h)ANTHRACENE	0.25	-	-	-	-	0.11 U	0.1 UJ	0.11 U	-	0.1 U	0.21 U
FLUORANTHENE	260	-	-	-	-	0.11 U	0.1 UJ	0.11 U	-	0.1 U	0.21 U
FLUORENE	290	-	-	-	-	0.11 U	0.1 UJ	0.11 U	-	0.1 U	0.21 U
Indeno(1,2,3-cd)pyrene	0.19	-	-	-	-	0.11 U	0.1 UJ	0.11 U	-	0.1 U	0.21 U
NAPHTHALENE	1.7	-	-	-	-	**2.9**	**1.6 J**	**9.6**	-	0.1 U	**120**
PHENANTHRENE	170	-	-	-	-	0.11 U	0.1 UJ	0.11 U	-	0.1 U	0.21 U
PYRENE	120	-	-	-	-	0.11 U	0.1 UJ	0.11 U	-	0.1 U	0.21 U
Dissolved Gases by RSK175 (µg/L)											
Ethane	--	-	-	-	-	0.64 UJ	0.64 U	0.64 U	-	-	-
Ethylene	--	-	-	-	-	0.3 UJ	0.3 U	0.3 U	-	-	-
Methane	--	-	-	-	-	**1000**	**2000**	**13000**	-	-	-
Metals (µg/L)											
Arsenic, Dissolved	0.52	-	-	-	-	-	-	-	-	-	-
Iron, Dissolved	--	-	-	-	-	**33700**	**55500**	**63900**	-	-	-
Manganese, Dissolved	430	-	-	-	-	**5150**	**5810**	**9990**	-	-	-

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte											
	Location	SS022-MW005	SS022-MW006	ST009-MW001	ST009-MW002	ST009-MW004	ST009-MW005	ST009-MW006	ST010-MW013	ST010-MW014	ST010-MW015
	Sample ID	SS022-MW005	SS022-MW006	ST009-MW001	ST009-MW002	ST009-MW004	ST009-MW005	ST009-MW006	ST010-MW013	ST010-MW014	ST010-MW015
	Depth (feet)	12 - 32	12 - 32	66.5 - 76.5	50 - 60	13 - 33	13 - 33	13 - 33	15.2 - 35.2	12 - 32	12 - 32
	Sample Date	8/28/2023	8/28/2023	9/2/2023	8/31/2023	9/14/2023	9/14/2023	9/14/2023	8/29/2023	9/15/2023	9/13/2023
	Sample Type	N	N	N	N	N	N	N	N	N	N
	2020 ADEC Table C CULs										
VOCs by SW8260C (µg/L)											
1,1,1,2-TETRACHLOROETHANE	5.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,1-TRICHLOROETHANE	8000	**0.12 J**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2,2-TETRACHLOROETHANE	0.76	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2-TRICHLOROETHANE	0.41	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-DICHLOROETHANE	28	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-DICHLOROETHENE	280	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-DICHLOROPROPENE	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2,3-TRICHLOROBENZENE	7	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2,3-TRICHLOROPROPANE	0.0075	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2,4-TRICHLOROBENZENE	4	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2,4-TRIMETHYLBENZENE	56	0.3 U	0.3 U	0.3 U	0.3 U	**60**	**27**	**78**	0.3 U	0.3 U	**65**
1,2-DIBROMO-3-CHLOROPROPANE	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2-DICHLOROBENZENE	300	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-DICHLOROETHANE	1.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-DICHLOROPROPANE	8.2	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,3,5-Trimethylbenzene	60	0.3 U	0.3 U	0.3 U	0.3 U	**19 J**	**6.8**	**21 J**	0.3 U	0.3 U	**12**
1,3-DICHLOROBENZENE	300	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-DICHLOROPROPANE	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,4-DICHLOROBENZENE	4.8	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,2-DICHLOROPROPANE	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-Butanone (MEK)	5600	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-CHLOROTOLUENE	--	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2-HEXANONE	38	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-CHLOROTOLUENE	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-Methyl-2-Pentanone (MIBK)	6300	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
ACETONE	14000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	**6.5 J**
BENZENE	4.6	0.1 U	0.1 U	**3.1**	**7.7**	**7.5 J**	**20**	**46 J**	0.1 U	0.1 U	**2.6**
BROMOBENZENE	62	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
BROMOCHLOROMETHANE	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
BROMODICHLOROMETHANE	1.3	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
BROMOFORM	33	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMOMETHANE	7.5	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CARBON DISULFIDE	810	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	4.6	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROBENZENE	78	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROETHANE	21000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	2.2	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CHLOROMETHANE	190	**0.35 J**	**0.5 J**	**0.38 J**	0.3 U	**0.3 J**	**0.32 J**	**0.35 J**	0.3 U	**0.35 B**	**0.77 B**
cis-1,2-Dichloroethene	36	**0.25 J**	**0.51 J**	**0.25 J**	**2**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
cis-1,3-DICHLOROPROPENE	4.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

ATTACHMENT E
SUMMARY OF GROUNDWATER
ANALYTICAL RESULTS
2023 PROGRESS MONITORING REPORT

Analyte	Location	SS022-MW005	SS022-MW006	ST009-MW001	ST009-MW002	ST009-MW004	ST009-MW005	ST009-MW006	ST010-MW013	ST010-MW014	ST010-MW015
	Sample ID	SS022-MW005	SS022-MW006	ST009-MW001	ST009-MW002	ST009-MW004	ST009-MW005	ST009-MW006	ST010-MW013	ST010-MW014	ST010-MW015
	Depth (feet)	12 - 32	12 - 32	66.5 - 76.5	50 - 60	13 - 33	13 - 33	13 - 33	15.2 - 35.2	12 - 32	12 - 32
	Sample Date	8/28/2023	8/28/2023	9/2/2023	8/31/2023	9/14/2023	9/14/2023	9/14/2023	8/29/2023	9/15/2023	9/13/2023
	Sample Type	N	N	N	N	N	N	N	N	N	N
	2020 ADEC Table C CULs										
DIBROMOCHLOROMETHANE	8.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
DIBROMOMETHANE	8.3	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
DICHLORODIFLUOROMETHANE	200	0.3 U	0.3 U	**0.65 J**	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
ETHYLBENZENE	15	0.1 U	0.1 U	0.1 U	0.1 U	**46 J**	**29**	**54 J**	0.1 U	0.1 U	**34**
Ethylene Dibromide (EDB)	0.075	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
HEXACHLOROBUTADIENE	1.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	450	0.1 U	0.1 U	0.1 U	0.1 U	**17 J**	**13**	**32 J**	0.1 U	0.1 U	**11**
m- & p-Xylene	190	0.4 U	0.4 U	0.4 U	0.4 U	**73 J**	**64**	**140**	0.4 U	0.4 U	**22**
Methyl tert-Butyl Ether (MTBE)	140	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
METHYLENE CHLORIDE	110	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
NAPHTHALENE	1.7	0.5 U	0.5 U	0.5 U	0.5 U	**7.9 J**	**3.6**	**17 J**	0.5 U	**1.2 J**	**220**
n-BUTYLBENZENE	1000	0.25 U	0.25 U	0.25 U	0.25 U	**1.7 J**	**0.68 J**	**2.7 J**	0.25 U	0.25 U	**6.3**
n-PROPYLBENZENE	660	0.25 U	0.25 U	0.25 U	0.25 U	**16 J**	**7.7**	**26 J**	0.25 U	0.25 U	**15**
o-Xylene	190	0.2 U	0.2 U	0.2 U	0.2 U	**4.4 J**	**0.49 J**	**12 J**	0.2 U	0.2 U	**1**
p-Isopropyltoluene	--	0.25 U	0.25 U	0.25 U	0.25 U	**1.6 J**	**0.73 J**	**2.3 J**	0.25 U	0.25 U	**7.5**
sec-BUTYL ALCOHOL	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
SEC-BUTYLBENZENE	2000	0.25 U	0.25 U	0.25 U	0.25 U	**3.4 J**	**2.5**	**5.1 J**	0.25 U	0.25 U	**4**
STYRENE	1200	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Tert-butylbenzene	690	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene (PCE)	41	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
TOLUENE	1100	0.1 U	0.1 U	0.1 U	0.1 U	**0.11 J**	0.1 U	**3.2 J**	0.1 U	0.1 U	**0.25 J**
trans-1,2-DICHLOROETHENE	360	0.1 U	**0.64 J**	0.1 U	**2.1**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
trans-1,3-DICHLOROPROPENE	4.7	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Trichloroethene (TCE)	2.8	**5.9**	**3.3**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
TRICHLOROFLUOROMETHANE	5200	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
VINYL CHLORIDE	0.19	0.11 U	0.11 U	0.11 U	**0.51 J**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
XYLENES, TOTAL	190	0.2 U	0.2 U	0.2 U	0.2 U	**77 J**	**64**	**150**	0.2 U	0.2 U	**23**
DOC and TOC by SW9060 (µg/L)											
DISSOLVED ORGANIC CARBON, Dissolved	--	-	-	-	-	-	-	-	-	-	-
TOTAL ORGANIC CARBON	--	-	-	-	-	-	-	-	-	-	-

Notes:
B = The analyte was detected in the associated method and/or calibration blank.
CUL = cleanup level
DMPDB = dual membrane passive diffusion bag
DRO = diesel-range organics
FD = field duplicate
GRO = gasoline-range organics
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
ug/L= micrograms per liter
mg/L = milligrams per liter
N = normal sample
NA = not available; no screening level identified
PAHs = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
R = the data are rejected because of deficiencies in meeting QC criteria and may not be used for decision making
RRO = residual-range organics
SVOCs = semivolatile organic compounds
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.
VOCs = volatile organic compounds
Bold indicates the analyte was detected
Shading indicates the result exceeded screening criteria
The Remedial Action Objectives for these sites use the ADEC Table C Groundwater Cleanup Levels per 18 AAC 75, Table C, as amended through 18 November 2021.

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Attachment F

2023 Well Inspections

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Attachment F-1

Well Inspection Master List

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ATTACHMENT F
2023 WELL INSPECTIONS
2023 PERFORMANCE MONITORING REPORT

Site ID	Lead Contractor	Well ID	2022 Date or Month of Inspection	2022 Condition of Well	2022 Maintenance Activities	Comments/Additional Work needed for 2023	2023 Date or Month of Inspection	2023 Condition of Well	2023 Maintenance Activities	Comments/Additional Work needed for 2024
BKGD	PARSONS	BKGD-MW001	9/5/2022	Good	--	--	9/16/2023	Good	--	Needs new lock
BKGD	PARSONS	BKGD-MW002	8/25/2022	Good	--	--	9/16/2023	Good	--	Needs new lock
BKGD	PARSONS	BKGD-MW003	9/5/2022	Good	--	--	9/16/2023	Good	--	--
BKGD	PARSONS	BKGD-MW004	9/5/2022	--	--	--	9/16/2023	Good	--	--
BKGD	PARSONS	BKGD-MW005	8/25/2022	Good	--	--	9/16/2023	Good	--	--
BKGD	PARSONS	BKGD-MW006	August 2022	Poor	--		9/16/2013	Poor	--	Well Frozen at 39-feet
BKGD	PARSONS	BKGD-MW007	August 2022	Poor	--		9/16/2023	Poor	--	Well Frozen at 39-feet
CB001	CH2M	BRWELL	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CB001	CH2M	EW-01	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CB001	CH2M	EW-02	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CB001	CH2M	EW-03	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CB001	CH2M	EW-04	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CB001	CH2M	EW-05	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CB001	CH2M	EW-06	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-30-01	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-02-P3	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-06-P3	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-10-P1	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-10-P2	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-10-P3	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-11-P1	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-11-P2	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-BV-01	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-01	8/1/2022	Good	--	--	September	Good	--	--
CG001	CH2M	09-MW-02	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-03	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-04	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-05	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-06	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-07	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-08	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-09	Not inspected in 2022	--	--	Looked with Schonstedt at presumed location but not found in 2021	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-10	8/1/2022	Poor	--	Missing 6" Robco vault lid	September	Missing vault lid	The lid was found beneath a pile of leaves near the well. Reinstalled.	None
CG001	CH2M	09-MW-11	8/1/2022	Good	--	--	September	Good	--	--
CG001	CH2M	09-MW-14	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-16	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-17	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-19	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-20	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-21	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-22	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-23	Not inspected in 2022	--	--	Missing 1 bolt	Not inspected in 2023	--	--	Reinstall missing bolt
CG001	CH2M	09-MW-24	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-25	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-26	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-MW-28	8/1/2022	Poor	--	Obstruction at 6 feet. Sand and silt on WL probe.	September	Not Sampled. Obstruction at ~6 feet	--	Recommend Decommission
CG001	CH2M	09-MW-29	8/1/2022	Fair	--	One bolt missing from flushmount	September	Soil and vegetation covering vault.	Vegetation cleared, new compression cap installed, and two bolts added to secure cover.	None
CG001	CH2M	09-MW-30	8/1/2022	Good	--	--	September	Good	--	--
CG001	CH2M	09-RW-01	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-RW-03	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-RW-03A	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--

ATTACHMENT F
2023 WELL INSPECTIONS
2023 PERFORMANCE MONITORING REPORT

Site ID	Lead Contractor	Well ID	2022 Date or Month of Inspection	2022 Condition of Well	2022 Maintenance Activities	Comments/Additional Work needed for 2023	2023 Date or Month of Inspection	2023 Condition of Well	2023 Maintenance Activities	Comments/Additional Work needed for 2024
CG001	CH2M	09-RW-04	8/1/2022	Fair	--	Top of the PVC is flush with top of the protective casing, can't put the lid on, prevents the outer protective cap from closing	September	PVC was above the outer casing, preventing lid from closing.	Approximately 8 inches of PVC was removed, allowing the lid to close. A lock was added to the lid.	None
CG001	CH2M	09-RW-05	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-RW-06A	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-RW-06B	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-RW-06C	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-RW-10	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-RW-11	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-SVE-01	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	09-SVE-06	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW001	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW002	8/1/2022	Good	--	--	September	No sand in annular space of protective casing.	The transducer was removed, a compression cap installed, and pea gravel was added to the annular space.	None
CG001	CH2M	CG001-MW003	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW004	8/1/2022	Good	--	Missing 3 screws	September	No bolts on lid	Two bolts were added to secure the vault lid.	None
CG001	CH2M	CG001-MW005	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW007	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW008	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW009	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW010	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW011	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW012	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW013	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW014	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW015	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW016	8/1/2022	Good	--	Missing 2 bolts	September	No bolts on lid	The transducer was removed, a compression cap installed, and two bolts were added to secure the lid.	None
CG001	CH2M	CG001-MW017	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW018	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW019	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW020	8/1/2022	Good	--	--	September	No bolts on lid	Two bolts were added to secure the vault lid.	None
CG001	CH2M	CG001-MW021	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CG001	CH2M	CG001-MW022					September	No lock	A lock was added to the outer casing	None
CG001	CH2M	CG001-MW023					September	No lock	A lock was added to the outer casing	None
CG109	Parsons	CG109-MW001	8/24/2022	Good	--	--	8/11/2023	Good	--	--
CG110	Parsons	CG109-MW002	9/29/2022	Good	--	--	8/5/2023	Good	--	--
CG111	Parsons	CG109-MW003	--	not installed	--	--	9/4/2023	Good	--	--
CG112	Parsons	CG109-MW004	--	not installed	--	--	9/4/2023	Good	--	--
CG113	Parsons	CG109-MW005	9/29/2022	Good	--	--	8/8/2023	Good	--	--
CG114	Parsons	CG109-MW006	9/29/2022	Good	--	--	8/8/2023	Good	--	--
CG115	Parsons	CG109-MW007	--	not installed	--	--	9/12/2023	Good	--	--
CST011	CH2M	10-MW-04R	8/1/2022	Poor	--	Not sampled. Obstruction at 21.85 feet	9/16/2023	Obstruction at 16.7 feet	--	Recommend Decommission
CST011	CH2M	10-MW-05	Not inspected in 2022	--	--	--	9/16/2023	Obstruction at 52 feet (screen is 40-56)	--	--
CG002	CH2M	09-MW-01	8/1/2022	Good	--	--	Not inspected in 2023	--	--	--
CITY OF GALENA	PARSONS	WELL_NO_1	9/8/2022	Good	--	Discharge pipe broken in utilodor. Well in good condition	9/18/2023	Pump inoperable	--	Discharge pipe broken in utilodor. Well in good condition

Site ID	Lead Contractor	Well ID	2022 Date or Month of Inspection	2022 Condition of Well	2022 Maintenance Activities	Comments/Additional Work needed for 2023	2023 Date or Month of Inspection	2023 Condition of Well	2023 Maintenance Activities	Comments/Additional Work needed for 2024
CITY OF GALENA	PARSONS	WELL_NO_3	6/21/2022	Good	--	--	9/18/2023	Good	--	--
CITY OF GALENA	PARSONS	WELL_NO_7	6/17/2022	Good	--	--	9/18/2023	Good	--	--
CPL006	PARSONS	CPL006-MW001	8/21/2022	Good	--	Strong fuel odor	9/13/2023	Good	--	--
CSS002	PARSONS	CSS002-MW002	8/11/2022	Good	--	--	9/16/2023	Cover missing bolts	--	Replace bolts
CSS002	PARSONS	CSS002-MW003	8/27/2022	Good	--	--	9/16/2023	Good	--	--
CST011	CH2M	CST011-AS01	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST011	CH2M	CST011-AS02	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST011	CH2M	CST011-AS03	8/1/2022	Good	--	--	September	No bolts on lid	Two bolts were added to secure the vault lid.	None
CST011	CH2M	CST011-AS04	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST011	CH2M	CST011-MW001	8/1/2022	Fair	--	Missing one out of two bolts, and a cut/modified PVC cap, one of the ears is missing so replacing the screw wouldn't help	September	Good	The transducer was removed, a compression cap installed, and bolts were added to secure the lid.	--
CST011	CH2M	CST011-MW002	8/1/2022	Good	--	Missing 1 bolt	September	Good	Bolt replaced	--
CST011	CH2M	CST011-MW003	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST011	CH2M	CST011-PW01	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST011	CH2M	CST011-PW02	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST014	CH2M	06-MW-07	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST014	CH2M	CST014-AS01	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST014	CH2M	CST014-AS02	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST014	CH2M	CST014-AS03	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST014	CH2M	CST014-AS04	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST014	CH2M	CST014-AS05	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST014	CH2M	CST014-AS06	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST014	CH2M	CST014-AS07	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST014	CH2M	CST014-AS08	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST014	CH2M	CST014-MW001	8/1/2022	Fair	--	Missing the flushmount bolts	September	No bolts on lid	The transducer was removed, a compression cap installed, and two bolts were added to secure the lid.	None
CST014	CH2M	UST1859-MW001	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST014	CH2M	UST1859-MW002	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CST014	CH2M	UST1859-MW003	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
DP023	PARSONS	DP023-MW001	Not inspected in 2022	--	--	--	9/16/2023	Good	--	--
DP023	PARSONS	DP023-MW002	Not inspected in 2022	--	--	--	9/16/2023	Good	--	--
FT001	PARSONS	01-MW-01	9/2/2022	Good	--	--	9/16/2023	Good	--	--
FT001	PARSONS	01-MW-03	8/23/2022	Fair	--	Well casing is warped >10' bgs, could not use a submersible pump	9/17/2023	Lock stuck. Water in outer casing. Casing still warped.	Replaced lock	Replacement not needed, can be sampled with peristaltic pump.
FT001	PARSONS	01-MW-05	Not inspected in 2022	--	--	--	9/17/2023	Lock Rusted Shut	Replaced lock	--
FT001	PARSONS	01-MW-06R	Not inspected in 2022	--	--	--	9/16/2023	Rusted bolt. Can't open well	--	Replace bolt
FT001	PARSONS	01-MW-07	Not inspected in 2022	--	--	--	9/16/2023	Need tool to open	--	Need tool to open
FT001	PARSONS	01-MW-08R	8/29/2022	Good	--	--	9/16/2023	Missing bolts	--	Needs well ID tag. Replace bolts.
FT001	PARSONS	FT001-MW009	8/29/2022	Good	--	--	9/16/2023	Good	--	--
FT001	PARSONS	FT001-MW010	8/24/2022	Good	--	--	9/16/2023	Good	--	--
FT001	PARSONS	FT001-MW011	8/24/2022	Good	--	--	9/16/2023	Good	--	--
FT001	PARSONS	FT001-MW012	8/24/2022	Fair	--	Obstruction at 29.5 feet in well. Can not install submersible pump for sampling	9/16/2023	Good	--	Remove HDPE tubing from PFAS sampling causing obstruction
FT001	PARSONS	FT001-MW013	8/23/2022	Good	--	--	9/16/2023	Good	--	--
FT001	PARSONS	FT001-MW014	8/22/2022	Good	--	--	9/16/2023	Good	--	--
FT001	PARSONS	FT001-MW015	8/23/2022	Fair	--	Well purges dry when low flow sampling. Bailed >25 feet.	9/16/2023	Good	--	--
FT001	PARSONS	FT001-MW016	--	New	--	--	8/9/2023	Good	--	--
FT001	PARSONS	FT001-MW017	--	New	--	--	8/9/2023	Good	--	--
FT001	PARSONS	FT001-MW018	--	not installed	--	--	9/4/2023	New	--	--
FT001	PARSONS	FT001-MW019	--	not installed	--	--	9/4/2023	New	--	--

Site ID	Lead Contractor	Well ID	2022 Date or Month of Inspection	2022 Condition of Well	2022 Maintenance Activities	Comments/Additional Work needed for 2023	2023 Date or Month of Inspection	2023 Condition of Well	2023 Maintenance Activities	Comments/Additional Work needed for 2024
FT001	PARSONS	FT001-MW020	--	not installed	--	--	9/12/2023	New	--	--
FT001	PARSONS	FT001-MW022	--	not installed	--	--	9/4/2023	New	--	--
FT001	PARSONS	FT001-MW023	--	not installed	--	--	9/12/2023	New	--	--
GALNA_LF	PARSONS	GALNA-LF-MW003	Not inspected in 2022	--	--	--	9/17/2023	Missing plug cap	--	Replace cap
Multiple Sites - TBD	PARSONS	09-MW-15	8/30/2022	Good	--	--	9/16/2023	Evidence of frost jacking	--	--
Multiple Sites - TBD	PARSONS	09-MW-27	Not inspected in 2022	--	--	--	9/16/2023	Manhole broken	--	Replace surface completion
Multiple Sites - TBD	PARSONS	10-MW-01	Not inspected in 2022	--	--	--	9/16/2023	PVC rusty.disconnected from main well	--	--
Multiple Sites - TBD	PARSONS	B1812-MW001	8/27/2022	Good	--	--	9/16/2023	Good	--	--
Multiple Sites - TBD	PARSONS	ST005-MW051	Not inspected in 2022	--	--	--	9/17/2023	No observations	--	Could not locate
Multiple Sites - TBD	PARSONS	ST005-MW053	8/31/2022	Good	--	--	9/17/2023	Good. Missing one bolt	--	Replace missing bolt
Multiple Sites - TBD	PARSONS	ST005-MW054	Not inspected in 2022	--	--	--	9/17/2023	Missing bolts	--	Replace missing bolts
Multiple Sites - TBD	PARSONS	ST005-MW055	8/31/2022	Good	--	--	9/17/2023	No vault	--	Replace well completion
Multiple Sites - TBD	PARSONS	ST005-MW056	8/31/2022	Good	--	--	9/17/2023	Good	--	--
Multiple Sites - TBD	PARSONS	ST005-MW057	8/12/2022	Good	--	--	9/17/2023	Good. Missing one bolt	--	Replace missing bolt
Multiple Sites - TBD	PARSONS	ST005-MW058	Not inspected in 2022	--	--	--	9/17/2023	No bolts	--	Replace bolts
Multiple Sites - TBD	PARSONS	ST005-MW059	8/23/2022	Good	--	--	9/17/2023	Good	--	--
Multiple Sites - TBD	PARSONS	ST005-MW061	8/12/2022	Good	--	--	9/17/2023	Good	--	--
PRIVATE	PARSONS	BurgetWelHead01	Not inspected in 2022	--	--	--	9/17/2023	Not inspected	--	No access. Homeowner not present
PRIVATE	PARSONS	Thurmond-Well01	Not inspected in 2022	--	--	--	9/17/2023	Destroyed	--	Follow up. Photo document
SS005	CH2M	SS005-AS01	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
SS005	CH2M	SS005-AS02	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
SS005	CH2M	SS005-AS03	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
SS005	CH2M	SS005-AS04	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
SS005	CH2M	SS005-AS05	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
SS005	CH2M	SS005-AS06	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
SS005	CH2M	SS005-MW001	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
SS005	CH2M	SS005-MW002	8/1/2022	Good	--	--	September	Good	--	--
SS005	CH2M	SS005-MW003	8/1/2022	Good	--	Bolts are missing	September	No bolts on lid	The transducer was removed, a compression cap installed, and two bolts were added to secure the lid.	None
SS005	CH2M	SS005-MW004	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
SS005	CH2M	ST005-MW065	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
SS005	CH2M	ST005-MW066	8/1/2022	Fair	--	Missing 3 bolts	September	No bolts on lid	Two bolts were added to secure the vault lid.	None
SS006	PARSONS	06-MW-01	Not inspected in 2022	--	--	--	9/2/2023	Good	--	--
SS006	PARSONS	06-MW-08	8/14/2022	Good	--	--	9/2/2023	Good	--	--
SS006	PARSONS	06-MW-09R	8/14/2022	Good	--	--	9/17/2023	Good	--	--
SS006	PARSONS	06-MW-10	8/14/2022	Good	--	--	9/17/2023	Good	--	--
SS006	PARSONS	06-MW-11	Not inspected in 2022	--	--	--	9/17/2023	Good	--	--
SS006	PARSONS	06-MW-12	Not inspected in 2022	--	--	--	9/17/2023	Good. Missing one bolt	--	Replace bolt
SS006	PARSONS	06-MW-17	Not inspected in 2022	--	--	--	9/17/2023	Bolt stuck. Unable to open	--	Remove and replace bolt.
SS006	PARSONS	SS006-MW55	Not inspected in 2022	--	--	--	9/2/2023	Completion destroyed. Well lid missing. Plug is in place	--	Install new well completion

ATTACHMENT F
2023 WELL INSPECTIONS
2023 PERFORMANCE MONITORING REPORT

Site ID	Lead Contractor	Well ID	2022 Date or Month of Inspection	2022 Condition of Well	2022 Maintenance Activities	Comments/Additional Work needed for 2023	2023 Date or Month of Inspection	2023 Condition of Well	2023 Maintenance Activities	Comments/Additional Work needed for 2024
SS006	PARSONS	SS006-MW59	Not inspected in 2022	--	--	--	9/2/2023	Good	--	--
SS006	PARSONS	SS006-MW65	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
SS006	PARSONS	SS006-MW66	Not inspected in 2022	--	--	--	9/17/2023	Good	--	--
SS006	PARSONS	SS006-MW67	8/13/2022	Good	--	--	9/17/2023	Good	--	--
SS006	PARSONS	SS006-MW68	8/13/2022	Good	--	--	9/17/2023	Good. 1 bolt missing	--	Replace missing bolt
SS006	PARSONS	SS006-MW69	Not inspected in 2022	--	--	--	9/17/2023	Good	--	--
SS006	PARSONS	SS006-MW70	Not inspected in 2022	--	--	--	9/17/2023	Good	--	Covered in dirt
SS006	PARSONS	SS006-MW71	Not inspected in 2022	--	--	--	9/17/2023	Good	--	Covered in dirt
SS006	PARSONS	SS006-MW72	Not inspected in 2022	--	--	--	9/17/2023	Good	--	--
SS006	PARSONS	SS006-MW73	Not inspected in 2022	--	--	--	9/17/2023	Good	--	--
SS006	PARSONS	SS006-MW74	8/13/2022	Good	--	--	9/17/2023	Good	--	--
SS006	PARSONS	SS006-MW75	Not inspected in 2022	--	--	--	9/17/2023	Good	--	--
SS006	PARSONS	SS006-MW76	Not inspected in 2022	--	--	--	9/17/2023	Good	--	--
SS006	PARSONS	SS006-MW77	8/11/2022	Good	--	--	9/17/2023	Good	--	--
SS006	PARSONS	SS006-MW78	8/11/2022	Good	--	--	9/17/2023	Good	--	--
SS006	PARSONS	SS006-MW79	8/12/2022	Good	--	--	9/17/2023	Good	--	--
SS006	PARSONS	SS006-MW80	8/12/2022	Good	--	--	9/17/2023	Good	--	--
SS006	PARSONS	SS006-MW81	8/12/2022	Good	--	--	9/17/2023	Good	--	--
SS006	PARSONS	SS006-MW82	8/12/2022	Good	--	--	9/17/2023	Good	--	--
SS006	PARSONS	SS006-MW83	8/12/2022	Good	--	--	9/17/2023	Good	--	--
SS014	PARSONS	SS014-MW001	8/15/2022	Good	--	--	9/17/2023	Good	--	--
SS014	PARSONS	SS014-MW002	8/15/2022	Good	--	--	9/17/2023	Good	--	--
SS014	PARSONS	SS014-MW003	Not inspected in 2022	--	--	--	9/17/2023	Good	--	--
SS014	PARSONS	SS014-MW004	8/15/2022	Good	--	--	9/16/2023	Lock jammed.	--	Replace lock
SS014	PARSONS	SS014-MW005	Not inspected in 2022	--	--	--	9/16/2023	Good	--	--
SS014	PARSONS	SS014-MW006	8/12/2022	Good	--	--	9/17/2023	Good	--	--
SS014	PARSONS	SS014-MW007	8/15/2022	Good	--	--	9/17/2023	Good	--	--
SS015	PARSONS	SS015-BW02	8/19/2022	Good	--	--	9/17/2023	Good	--	--
SS015	PARSONS	SS015-EW01	August 2022	Poor	--	Not Sampled. Obstruction from veg oil. Needs to be redeveloped to sample.	9/17/2023	Crushed	Decommissioned	--
SS015	PARSONS	SS015-EW02	8/20/2022	Fair	None	Surface completion damaged. Repair surface completion.	9/16/2023	Damaged by mower	Replaced surface completion	--
SS015	PARSONS	SS015-MW073	8/20/2022	Good	--	--	9/17/2023	Good	--	--
SS015	PARSONS	SS015-MW074	8/13/2022	Good	--	--	9/17/2023	Missing one bolt. One bolt rounded off	--	Replace bolts
SS015	PARSONS	SS015-MW075	Not inspected in 2022	--	--	--	9/17/2023	Unable to screw in bolts	--	--
SS015	PARSONS	SS015-MW076	8/13/2022	Good	--	--	9/17/2023	Good	Removed overgrown grass	--
SS015	PARSONS	SS015-MW077	8/13/2022	Good	--	--	9/17/2023	Good	Removed overgrown grass	--
SS015	PARSONS	SS015-MW078	8/19/2022	Good	--	--	9/17/2023	Good	--	--
SS015	PARSONS	SS015-MW079	8/18/2022	Good	--	--	9/16/2023	Good	--	--
SS015	PARSONS	SS015-MW080	8/18/2022	Good	--	--	9/17/2023	Good	--	--
SS015	PARSONS	SS015-MW081	8/25/2022	Good	--	--	9/16/2023	Good	--	--
SS015	PARSONS	SS015-MW082	Not inspected in 2022	--	--	--	9/17/2023	Good. Covered with silt	Removed silt	--
SS015	PARSONS	SS015-MW083	Not inspected in 2022	--	--	--	9/17/2023	Good. Covered with silt	Removed silt	--
SS015	PARSONS	SS015-MW084	8/25/2022	Good	--	--	9/16/2023	Good	--	--
SS015	PARSONS	SS015-MW085	8/20/2022	Good	--	--	9/16/2023	Good	--	--
SS015	PARSONS	SS015-MW086	8/16/2022	Good	--	--	9/16/2023	Good	--	--
SS015	PARSONS	SS015-MW087	8/20/2022	Good	--	--	9/16/2023	Good	--	--
SS015	PARSONS	SS015-MW088	8/18/2022	Fair	None	Flush Mount Damaged. Reset surface completion	9/16/2023	Missing j-plug. Evidence of frost jacking	Reset surface completion	--
SS015	PARSONS	SS015-MW42	8/25/2022	Good	--	--	9/16/2023	Needs bolts	--	Replace bolts
SS015	PARSONS	SS015-MW43	Not inspected in 2022	--	--	--	9/16/2023	Bolt hole broken. Needs 1 bolt.	--	Replace bolt
SS015	PARSONS	SS015-MW44	Not inspected in 2022	--	--	--	9/17/2023	Good	Removed overgrown grass	--
SS015	PARSONS	SS015-MW45	Not inspected in 2022	--	--	--	9/17/2023	Good	Removed overgrown grass	--
SS015	PARSONS	SS015-MW47	Not inspected in 2022	--	--	--	9/16/2023	Transducer in well. J-plug does not fit.	--	--
SS015	PARSONS	SS015-MW50	Not inspected in 2022	--	--	--	9/16/2023	Good	--	--
SS016	PARSONS	2541-MW-02	August 2022	Poor	None	Abandon well per recommendeation of RPO.	9/17/2023	Crooked pad. Missing one bolt	Decommissioned	--

Site ID	Lead Contractor	Well ID	2022 Date or Month of Inspection	2022 Condition of Well	2022 Maintenance Activities	Comments/Additional Work needed for 2023	2023 Date or Month of Inspection	2023 Condition of Well	2023 Maintenance Activities	Comments/Additional Work needed for 2024
SS016	PARSONS	SS016-MW001	9/1/2022	Poor	--	~20 feet of sediment in well screen	9/17/2023	Poor. ~20 feet of sediment in well screen.	--	Recommend Decommission
SS016	PARSONS	SS016-MW002	8/16/2022	Good	--	--	9/17/2023	Good	--	--
SS016	PARSONS	SS016-MW003	8/16/2022	Good	--	--	9/17/2023	Evidence of frost jacking. PVC cap cracked and pushing on manhole lid.	--	Cut PVC.
SS016	PARSONS	SS016-MW004	8/16/2022	Good	--	--	9/17/2023	Good	--	--
SS016	PARSONS	SS016-MW005	8/16/2022		--	--	9/17/2023	Good	--	--
SS016	PARSONS	SS016-VMP01	Not inspected in 2022	--	--	--	9/17/2023	Good	--	--
SS016	PARSONS	SS016-VMP02	Not inspected in 2022	--	--	--	9/17/2023	Good	--	--
SS016	PARSONS	SS016-VMP03	Not inspected in 2022	--	--	--	9/17/2023	Good	--	--
SS016	PARSONS	SS016-VMP04	Not inspected in 2022	--	--	--	9/17/2023	Good	--	--
SS016	PARSONS	SS016-VMP05	Not inspected in 2022	--	--	--	9/17/2023	Good	--	--
SS016	PARSONS	SS016-VMP06	Not inspected in 2022	--	--	--	9/17/2003	Good	--	--
SS016	PARSONS	SS016-VW11	Not inspected in 2022	--	--	--	9/17/2023	Good	--	--
SS017	PARSONS	SS017-MW001	8/27/2022	Good	--	--	9/11/2023	Good	--	--
SS017	PARSONS	SS017-MW002	8/11/2022	Good	--	--	9/16/2023	Good	--	--
SS017	PARSONS	SS017-MW003	9/1/2022	Good	--	--	9/16/2023	Missing well cap and bolts	--	Replace surface completion
SS017	PARSONS	SS017-MW004	8/27/2022	Good	--	--	9/16/2023	Good	--	--
SS017	PARSONS	SS017-MW005	8/26/2022	Good	--	--	9/10/2023	Good	--	--
SS017	PARSONS	SS017-MW006	8/12/2022	Good	--	--	9/11/2023	Good	--	--
SS017	PARSONS	SS017-MW007R	8/11/2022	Fair	Placed cover back on well	Surface completion was hit by snowplow. Well cover was at location of snow stockpile. Put cover back on well. Surface completion should be replaced.	9/16/2023	Cover damaged. Missing 2 bolts	Replaced surface completion	--
SS018	PARSONS	06-MW-15	Not inspected in 2022	--	--	--	9/17/2023	Good. Needs ID tag	--	Install ID tag
SS018	PARSONS	SS018-MW001	9/7/2022	Good	--	--	9/17/2023	Good	--	--
SS018	PARSONS	SS018-MW002	9/7/2022	Good	--	--	9/17/2023	Good	--	--
SS018	PARSONS	SS018-MW003	9/7/2022	Good	--	--	9/17/2023	Good	--	--
SS019	PARSONS	SS019-MW65	Not inspected in 2022	--	--	--	9/17/2023	Good	--	Covered by driveway
SS019	PARSONS	SS019-MW084	Not inspected in 2022	--	--	--	9/17/2023	Good. Missing ID tag	--	Install ID tag
SS022	PARSONS	B400-MW001	Not inspected in 2022	--	--	--	9/17/2023	Good	Decommissioned	--
SS022	PARSONS	B400-MW002	Not inspected in 2022	--	--	--	9/17/2023	Missing one bolt	Decommissioned	--
SS022	PARSONS	SS022-MW003	Not inspected in 2022	--	--	--	9/17/2023	Missing one bolt	--	Replace missing bolt
SS022	PARSONS	SS022-MW004	8/14/2022	Good	--	--	9/17/2023	Good. Needs ID tag	--	Install ID tag
SS022	PARSONS	SS022-MW005	8/13/2022	Good	--	--	9/17/2023	Good	--	--
SS022	PARSONS	SS022-MW006	8/14/2022	Good	--	--	9/17/2023	Good	--	Needs well ID tag
ST005	CH2M	05-01-P2	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-01-P3	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-02-P1	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-02-P2	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-03-P1	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-03-P2	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-03-P3	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-BV-01	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-BV-02	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-BV-03	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-MW-02	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-MW-03	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-MW-06R	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-MW-07	8/1/2022	Good	--	--	September	Good	--	--
ST005	CH2M	05-MW-08	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-MW-09	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-MW-10	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-MW-13	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-MW-16	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-MW-17	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-MW-18	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-MW-19	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--

Site ID	Lead Contractor	Well ID	2022 Date or Month of Inspection	2022 Condition of Well	2022 Maintenance Activities	Comments/Additional Work needed for 2023	2023 Date or Month of Inspection	2023 Condition of Well	2023 Maintenance Activities	Comments/Additional Work needed for 2024
ST005	CH2M	05-MW-20	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-MW-21	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-MW-51	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-MW-52	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-MWS-01R	8/1/2022	Good	--	--	September	Good	--	--
ST005	CH2M	05-RW-01	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-RW-02	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-RW-03	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-RW-03A	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-RW-04	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-RW-05	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-RW-06	8/1/2022	Good	--	--	September	Well has a Fernco rubber cap to prevent vapors when the horizontal well is operating.	None	None
ST005	CH2M	05-RW-07	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-RW-07A	8/1/2022	Fair	--	--	September	Well has a Fernco rubber cap to prevent vapors when the horizontal well is operating.	None	None
ST005	CH2M	05-RW-08	8/1/2022	Fair	--	--	September	Well has a Fernco rubber cap to prevent vapors when the horizontal well is operating.	None	None
ST005	CH2M	05-VMP-04D	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-VMP-04M	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-VMP-04S	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-VMP-05D	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-VMP-05M	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-VMP-05S	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-VMP-06D	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-VMP-06M	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-VMP-06S	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-VMP-07D	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-VMP-07M	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	05-VMP-07S	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	POLBVSB01	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW062	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW063	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW064	8/1/2022	Fair	--	Slightly cracked flushmount cap, missing two out of 2 bolts	September	No bolts on lid	Two bolts were added to secure the vault lid.	None
ST005	CH2M	ST005-MW067	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW068	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW069	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW070	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW071	8/1/2022	Good	--	Well marker destroyed	September	Good	--	--
ST005	CH2M	ST005-MW072	8/1/2022	Good	--	--	September	Good	--	--
ST005	CH2M	ST005-MW073	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW074	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW075	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW076	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW077	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW078	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW079	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW080	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW081	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW082	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW083	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW084	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW085R	Aug-22	Good		Replacement for ST005-MW085	September	Good	--	--

ATTACHMENT F
2023 WELL INSPECTIONS
2023 PERFORMANCE MONITORING REPORT

Site ID	Lead Contractor	Well ID	2022 Date or Month of Inspection	2022 Condition of Well	2022 Maintenance Activities	Comments/Additional Work needed for 2023	2023 Date or Month of Inspection	2023 Condition of Well	2023 Maintenance Activities	Comments/Additional Work needed for 2024
ST005	CH2M	ST005-MW086	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW087	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
ST005	CH2M	ST005-MW091	8/1/2022	Good	--	--	Not inspected in 2023	--	--	--
ST009	PARSONS	06-MW-03	Not inspected in 2022	--	--	--	9/17/2023	Lock stuck. Water in outer casing	Replaced lock	--
ST009	PARSONS	10-MW-03	8/10/2022	Fair	None	6.5' of sediment obstructing bottom of screen	9/16/2023	Fair	--	6.5' of sediment obstructing bottom of screen
ST009	PARSONS	10-MW-06	8/10/2022	Good	--	--	9/16/2023	Good	--	--
ST009	PARSONS	1572-MW-03	8/11/2022	Good	--	--	9/16/2023	Good	--	--
ST009	PARSONS	1572-MW-04	8/11/2022	Good	--	--	9/16/2023	Mud in outer casing	--	
ST009	PARSONS	ST009-MW001	Not inspected in 2022	--	--	--	9/16/2023	Potential frost jacking	--	Cut PVC.
ST009	PARSONS	ST009-MW002	Not inspected in 2022	--	--	--	9/16/2023	Good	--	--
ST009	PARSONS	ST009-MW003	Not inspected in 2022	--	--	--	9/16/2023	Poor. Potential frost jacking. Obstruction at 7.6 feet bgs.	--	Recommend Decommission
ST009	PARSONS	ST009-MW004	8/10/2022	Good	--	--	9/16/2023	Missing one bolt	--	Replace missing bolt
ST009	PARSONS	ST009-MW005	8/10/2022	Good	--	--	9/16/2023	Good	--	--
ST009	PARSONS	ST009-MW006	8/10/2022	Good	--	--	9/16/2023	Good	--	--
ST010	PARSONS	SE-MW-01	8/11/2022	Good	--	--	9/16/2023	Pad sinking, PVC cracked	--	Replace surface completion
ST010	PARSONS	SE-MW-02	Not inspected in 2022	--	--	--	9/17/2023	Good	--	Overgrown with grass
ST010	PARSONS	SE-MW-03	8/25/2022	Good	--	--	9/16/2023	Good	--	--
ST010	PARSONS	SE-MW-04	Not inspected in 2022	--	--	--	9/16/2023	J-plug needs replacement	--	Replace j-plug
ST010	PARSONS	SE-MW-05	Not inspected in 2022	--	--	--	9/16/2023	Good	--	Overgrown
ST010	PARSONS	SE-MW-07	Not inspected in 2022	--	--	--	9/17/2023	Good. Missing one bolt	--	Replace missing bolt
ST010	PARSONS	SE-MW-08	Not inspected in 2022	--	--	--	9/16/2023	Rounded Bolt. Can't open	--	Replace bolt
ST010	PARSONS	ST010-MW009	Not inspected in 2022	--	--	--	9/16/2023	Good	--	--
ST010	PARSONS	ST010-MW010	8/17/2022	Good	--	--	9/16/2023	Sunken on one side. Missing one bolt	--	Replace bolt
ST010	PARSONS	ST010-MW011	8/17/2022	Good	--	--	9/16/2023	Good	--	--
ST010	PARSONS	ST010-MW012	8/17/2022	Good	--	--	9/16/2023	Good	--	--
ST010	PARSONS	ST010-MW013	8/17/2022	Poor	--	Transducer stuck in well. Possibly due to frozen water in well from permafrost. Obstruction at 30.5 feet	9/16/2022	Good	--	Transducer stuck in well. Possibly due to frozen water in well from permafrost. Obstruction at 30.5 feet
ST010	PARSONS	ST010-MW014	8/17/2022		--	--	9/16/2023	Good	--	
TU001	CH2M	TU001-AS01	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
TU001	CH2M	TU001-AS02	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
TU001	CH2M	TU001-AS03	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
TU001	CH2M	TU001-AS04	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
TU001	CH2M	TU001-AS05	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
TU001	CH2M	TU001-AS06	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
TU001	CH2M	TU001-MW001R	Not inspected in 2022	--	--	Replacement for TU001-MW001R	September	Good	--	--
TU001	CH2M	TU001-MW002	8/1/2022	Fair	--	Missing 2 bolts	September	Good	--	Replace missing bolts
SS025	CH2M	SS025-MW001	8/1/2022	Good	--	--	September	Good	--	--
CPL006	PARSONS	CPL006-MW002	Not inspected in 2022	--	--	--	Not inspected in 2023	--	--	--
CPL006	PARSONS	CPL006-THERM	Not inspected in 2022	--	--	--	9/17/2023	Good	--	--
CSS002	PARSONS	CSS002-THERM	Not inspected in 2022	--	--	--	9/16/2023	Good	--	--

Attachment G
Response to Alaska Department of Environmental Conservation Comments

Document: **2023 Performance Monitoring Report (PMR) for Sites CPL006, CSS002, SS006/SS019, SS017, SS015, SS016, SS018, SS022, ST009, ST010, and FT001, Former Galena Forward Operating Location (FOL)**

Comment No.	Page/ Section	DEC Comment/Recommendation: 12/10/2024	Response: 12/16/2024 DEC Response: 1/9/2025
1.	Section 2.5	Statement: "Benzene and naphthalene concentrations appear to be relatively stable and more aggressive treatment should be considered." The 2022 PMR indicated that sulfate-enhanced bioremediation was being considered. Is this still the case, or is there another treatment option being considered?	**Clarification**. The 2023 PMR acknowledges additional treatment may be needed and recommends a grab groundwater investigation prior to remedy evaluation/selection. Sulfate enhanced bioremediation is one potential remedial option that may be considered. **DEC Response**: Accepted.
2.	Section 3.5	Statement: "Per the recommendations of the RPO evaluation…monitoring of well B1812-MW001 will be for redox parameters only." If MW003 sees increased exceedances of COCs in subsequent sampling events, DEC recommends considering sampling MW001 for COCs to evaluate if significant migration is occurring.	**Agree**. The following text has been added to the end of the paragraph. *If concentrations of benzene or other COCs, excepting DRO, in CSS002-MW003 continue to exceed Table C CULs in future sampling events, sampling of well B1812-MW001 will be resumed. DRO in well CSS002-MW003 has exceeded Table C CULs for several sampling events but was comprised of between 84 and 100 percent polar metabolites in 2020 and 2021 RPO samples (Parsons, June 2023).* Note that DRO and benzene concentrations in CSS002-MW003 decreased in 2024 as compared to 2023 **DEC Response**: Accepted with backcheck.
3.	Section 4.3.1.3	The increase in TCE and cis-1,2-DCE concentrations in SS019-MW084 don't appear to be captured adequately in Section 4.4, and no suspected reasoning for the sudden increase is provided.	**Agree**. The following text has been added to first paragraph of Section 4.3.1.3: *The unseasonably high groundwater in 2023 may have contributed to these increases.* The 5th bullet of Section 4.4 has been revised to read: *TCE and cis-1,2-DCE concentrations had been decreasing at well SS019-MW84 but in 2023, both increased as compared to the 2022 concentrations and remain above CULs. The unseasonably high groundwater in 2023 may have contributed to these increases.* Note that TCE and cis-1,2-DCE concentrations in SS019-MW084 decreased in 2024 as compared to 2023. **DEC Response**: Accepted with backcheck.

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4.	Section 13.3	09-MW-10, 09-MW-23, CST011-MW001, CST011-MW002, and TU001-MW002 were missing bolts according to the 2022 MW Inspection. Additionally, 01-MW-03's casing was identified as being warped, and FT001-MW012 was obstructed. Recommendations for these wells don't seem to be included in this list, and there is no indication these wells were repaired in this document. Please clarify.	**Agree with Clarifications.** The following changes have been made. 09-MW-10: The 2022 PMR listed the vault lid as missing and Table F-1 of the 2023 PMR shows that the lid was found and reinstalled. This well has been added to the bullet list in Section 13.2. Note that this type of completion (Robco) does not have bolts. 09-MW-23 and TU001-MW002: The bolts were not replaced in 2023. Replacement of bolts was recommended in the Comments/Additional Work Needed column of Table F-1. These wells have been added to the bullet list in Section 13.3. CST011-MW001 and CST011-MW002: the bolts were replaced as listed in the "2023 Maintenance Activities" column of Table F-1. These wells have been added to the bullet list in Section 13.2. Table F-1 has been revised to clarify that the casing of well 01-MW-03 was still warped as of the 2023 inspection. Added well to bullet list in Section 13.3. Replacement of this well is not recommended at this time as it can still be sampled using a peristaltic pump. Currently this upgradient well is only monitored for redox parameters under this project. Table F-1 has been revised to clarify that FT001-MW012 was obstructed at 29.5 feet in 2023. Added to bullet list in Section 13.3 and noted that in 2024 the obstruction (HDPE tubing used for PFAS sampling) was fished out of the well. **DEC Response**: Accepted with backcheck, thank you.
5.		End of comments.	