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SCANNED

AECOM

10 Patewood Drive, Bldg. 6, Ste. 500, Greenville, SC 29615

March 1, 2024

Ms. Kim Kuhn
South Carolina Department of Health and Environmental Control
Bureau of Land and Waste Management
State Remediation Section
2600 Bull Street
Columbia, South Carolina 29201

RECEIVED
MAR 05 2024
SITE ASSESSMENT, REMEDIATION, & REVITALIZATION

Re: Feasibility Study Technical Memorandum
Former Shakespeare Composite Structures Site
Newberry County
Voluntary Cleanup Contract 14-6271-RP
Site ID # 51025

Dear Ms. Kuhn:

Signify North America Corporation (Signify) and AECOM Technical Services, Inc. (AECOM) are transmitting the enclosed Feasibility Study Technical Memorandum (FS Tech Memo) to SCDHEC. After completion of the groundwater pilot study and submittal of the pilot study report in May 2023, the responsible party, Signify, requested that AECOM evaluate the Newberry site regarding whether there were any outstanding gaps in the characterization of groundwater which should be addressed before completing the FS. Upon review of the analytical data from the 2022 sitewide monitoring event and the pilot study data, Signify and AECOM determined that several data gaps existed. The following data gaps were identified:

- Additional groundwater assessment in the area of the foam room (TMW-31 area) and paint room inside and outside of the main building, to further evaluate a potential VOC source in this area;
- Additional assessment of the subslab vapor and soil in the area upgradient of the foam room, to further evaluate a VOC source in this area;
- Evaluation of the bedrock surface and depth to bedrock outside the building and downgradient of the groundwater plume to the north of the site using seismic geophysical tools, to evaluate potential preferential pathways of groundwater migration from the building areas; and
- Evaluation of groundwater trichloroethene (TCE) concentration trends in selected monitoring wells on site and off site, to see if TCE concentrations are increasing or significantly decreasing in these areas.

These four potential data gaps were addressed through field activities from June 2023 to January 2024. In addition, the groundwater pilot test wells were sampled at least once during this time period. AECOM originally intended to include the field and laboratory results and conclusions from these activities in the FS Report. However, because of the extensive volume of data generated during this time period, this separate tech memo was developed. This document contains summaries of the objectives, approaches and procedures, observations and data, and conclusions and recommendations for each of the data gaps and for the additional pilot study area sampling.

Based on the results of these additional assessments, AECOM does not recommend any additional monitoring well installation or any further groundwater assessment prior to completion of the FS Report. We recommend moving forward to complete the Report. The FS Report is being developed in accordance with the SCDHEC-approved FS Work Plan dated May 15, 2019 and approved on June 4, 2019.

After submittal of the FS Report and the subsequent Remedial Design Work Plan, additional monitoring wells will be installed for baseline sampling. Those additional wells will continue to be monitored after implementation of the selected remedy, to better evaluate the results of the groundwater remedy.

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As discussed in the AECOM and SCDHEC telephone call of February 7, 2024, we request SCDHEC review of this tech memo data summary, and we also request Department review of the alternatives currently undergoing detailed analysis according to CERCLA criteria. AECOM plans to send to SCDHEC a summary of the alternatives currently undergoing detailed analysis in a separate transmittal via email, in preparation for our March 8, 2024 meeting at the SCDHEC office in Columbia. As discussed on February 7, Signify and AECOM wish to continue to proceed with the FS process, with the target of beginning remedy implementation as early as September 2024.

Should you have any questions regarding the information included in this package, please contact me at 864-380-6950 or Scott Ross at 803-201-9662, at your convenience.

Sincerely,

David R. Oliphant
Senior Project Manager

cc: Mr. Emil Filc - Signify
Mr. Scott Ross - AECOM

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AECOM

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Feasibility Study Technical Memorandum Shakespeare Composite Structures Site

RP-VCC-14-6271-RP

February 2024

Project # 60721186

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FEASIBILITY STUDY TECHNICAL MEMORANDUM

SHAKESPEARE COMPOSITE STRUCTURES SITE
19845 US HIGHWAY 76, NEWBERRY, SC

VCC 14-6271-RP

PREPARED FOR:

SIGNIFY NORTH AMERICA CORPORATION

PREPARED BY:

AECOM

GREENVILLE, SC

FEBRUARY 2024

Quality information

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Prepared for:

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1.0 INTRODUCTION

A feasibility study (FS) is currently being conducted at the former Shakespeare Composite Structures Newberry Site (the Site). This technical memorandum was developed to address data gaps identified after completion of the remedial investigation (RI) completed in 2018, the groundwater pilot test conducted in 2021 and 2022, and the sitewide groundwater monitoring event of 2022. The field and laboratory analytical activities to address these data gaps were performed from June 2023 to January 2024.

The Site is located at 19845 US Highway 76, approximately 1 mile northwest of Newberry, South Carolina **(Figure 1-1**). The Site is centered on the Valmont Composite Structures (Valmont) facility and includes several surrounding properties (**Figure 1-2**). The facility was originally opened to produce fiberglass products, and it has continued to be used for this manufacturing process. Operations at the facility include the design and manufacture of large fiberglass utility poles and cross arms and a variety of other fiberglass outdoor products such as posts, signs, sheet pilings, and signposts. Manufacturing is conducted inside two separate buildings – the Main Building and the Pole Winder Building.

1.1 Feasibility Study Approach Report Development

Remedial action at the Site is being addressed under the Voluntary Cleanup Contract (VCC) No. 14-6271-RP. The responsible party is Signify North America Corporation (Signify). Signify no longer owns or occupies the Site but retains responsibility for legacy environmental issues occurring prior to the sale to the current owner Valmont.

In response to VCC requirements, Signify has conducted an RI at the site, with assistance from its environmental consultant AECOM. The RI Report was submitted to SCDHEC in 2018. After completion of the RI and submittal of the RI Report, AECOM developed a FS Work Plan which was submitted to SCDHEC on May 15, 2019 (**AECOM, 2019**). SCDHEC approved the FS Work Plan in correspondence dated June 4, 2019. A bench scale treatability study and a groundwater pilot study were conducted, along with a sitewide groundwater monitoring event, to provide additional data needed for the FS.

The results of each of these FS components are briefly discussed below.

1.2 Bench-Scale Treatability Study (BSTS) and Total Oxidant Demand Study Results Summary

Two potential remedies were evaluated in the BSTS as possible treatment options for Site-related chloriated volatile organic compounds (CVOCs): in situ chemical oxidation (ISCO) and in situ enhanced reductive dechlorination (ISERD). Both ISCO and ISERD are active groundwater remedial approaches that can degrade CVOCs via chemical oxidation or via biololgical reductive dechlorination. In September 2019, soil and groundwater samples were collected and shipped to

Redox Tech, LLC (Redox Tech) in Cary, North Carolina for ISCO total oxidant demand (TOD) testing. Soil and groundwater samples were also submitted to SiREM Laboratories (SiREM) in Ontario, Canada for bench-scale evaluation of the various ERD treatments.

Based on the results of the TOD testing and a subsequent discussion with Redox Tech, a TOD value of 1 to 2 g/kg was considered adequate for ISCO design purposes. Because the Site TOD value is relatively low, these results indicated that ISCO might be a suitable remedial option to treat CVOC-impacted Site groundwater.

The BSTS for ERD evaluated the effectiveness of multiple treatment amendments for CVOC-impacted Site media including EDS-ER™ (an emulsified vegetable oil [EVO]), which promotes in situ bioremediation (ISB) via reductive dechlorination, MicroEVO™ (sulfidated zero valent iron [ZVI]), which promotes abiotic in situ chemical reduction (ISCR), and KB- 1® Plus (a chlorinated solvent bio-augmentation microbial culture). One of the EDS-ER™ amended treatment microcosms and one of the MicroEVO™ ISCR amended treatment microcosms were also buffered using sodium bicarbonate to maintain the pH within the optimal range (i.e., 6 to 8 standard units [S.U.]) for reductive dechlorination to occur.

Based on the results of the BSTS, both ISCO and ISERD (using a combination of ISB and ISCR) were determined to be potentially applicable remediation technologies that could be used to address CVOC contamination in Site groundwater. A field-based pilot study (PS) was recommended as the next logical step in order to evaluate effectiveness, implementability, and cost associated with full-scale implementation of one or both technologies. In their approval letter, SCDHEC reviewed and concurred with the BSTS results and recommendation for the completion of the PS. A Pilot Study Work Plan (PSWP, **AECOM, 2020**) was submitted to SCDHEC on October 1, 2020. SCDHEC approved the PSWP on October 16, 2020.

1.3 Groundwater Pilot Study Summary

A field-scale, groundwater treatability (PS) was initiated in August 2021, and the final performance monitoring event was completed in December 2022. The PS Report (**AECOM, 2023a**) was submtted to SCDHEC in April 2023. It was recommended that both ISCO and ISERD should be retained as potential treatment technologies and for remedial alternatives development in the FS.

1.3.1 ISCO Pilot Study

Review of field observations and measurements along with analytical results from the ISCO study area monitoring wells indicate the following ISCO PS conclusions:

- Treatment using potassium permanganate (KMnO4) oxidant was effective in decreasing the TCE concentrations to non-detection levels in the area where obstructions did not limit access to the injection direct push technology (DPT) equipment.

- The December 2022 TCE concentration of 3,600 µg/L in groundwater at source area well TMW-31 indicated that a significant TCE source still exists in groundwater under the building in that area.

- Because of overhead obstructions inside the eastern end of the building, another approach to accessing appropriate injection locations in the TMW-31 CVOC groundwater source area may need to be identified.

1.3.2 ISERD Pilot Study

Review of field observations and measurements along with analytical results from the ISERD study area monitoring wells indicate the following PS conclusions:

- CVOC and the biogeochemical concentrations indicate that overall conditions, with enhancement, in the treatment areas remain favorable for continued degradation to occur in the vicinity of MW-10, MW-10I, and ERD-OBSW-1I. The distance of ERD-OBSW-1S from the injection locations prevented treatment at this well due to the tight lithology associated with the shallow zone groundwater aquifer.

- An increase in other parameters such as dissolved iron, TOC, and methane also support the conclusion that conditions still could be favorable for continued degradation of CVOCs.

- The ERD technology worked favorably for the intermediate zone, as evidenced by the decline in TCE concentrations and increase in cis-1,2-DCE. The pH may have been a limiting factor for success in the shallow zone.

- The bioaugmentation injection event conducted in December 2021 did not result in a significant increase in *DHC* and associated reductase enzymes, which indicates limited effectiveness of this procedure.

- If ISERD is conducted in the future, buffering to increase the targeted groundwater pH will need to be closely controlled in order to avoid increasing the pH to above 8 S.U., which is outside the favorable range for reductive dechlorination to occur.

- A radius of influence (ROI) of at most 10 feet was confirmed during the pilot study.

1.4 Sitewide Groundwater Monitoring Event Summary

The sitewide groundwater monitoring event was conducted in February and March 2022. The monitoring event included sampling of 65 monitoring wells located at the Site. This includes 39 shallow zone wells, 12 intermediate zone wells, and 14 deep (bedrock) zone wells. Wells

monitored and the groundwater elevations in those wells during the sitewide event are indicated in **Figure 1-3** (shallow zone), **Figure 1-4** (intermediate zone), and **Figure 1-5** (deep zone). The Sitewide Groundwater Monitoring Report (**AECOM, 2023b**) was submitted to SCDHEC in May 2023.

1.5 Technical Memorandum Organization

The observations, data, and conclusions generated during the June 2023 to January 2024 period are summarized in this technical memorandum. Section 2.0 of this document discusses the various assessments performed during this period. Section 3.0 contains conclusions and next step actions resulting from these additional assessments.

2.0 ADDITIONAL ASSESSMENTS OF JUNE 2023 THROUGH JANUARY 2024

2.1 Data Gaps to be Addressed Prior to Completion of the FS

Signify requested that AECOM evaluate the Newberry site for whether there were any meaningful gaps in the characterization of groundwater that should be filled before selecting a remedial alternative for the management of CVOCs in the groundwater. Upon completion of the groundwater pilot study testing in December 2022, and review of the groundwater analytical data received from the laboratory in February 2023, Signify and AECOM determined that several data gaps existed. The following data gaps needed to be addressed prior to development of the FS Report:

- Additional groundwater assessment in the area of the foam room (TMW-31 area) and paint room inside and outside of the main building;
- Additional assessment of the subslab vapor and soil in the area upgradient of the foam room;
- Evaluation of the bedrock surface and depth to bedrock outside the building and downgradient of the groundwater plume to the north of the site; and
- Evaluation of groundwater trichloroethene (TCE) concentration trends in selected monitoring wells on site and off site.

2.2 Objectives and Approaches to Address the Data Gaps

As a result, the following objectives were established and approaches were formulated for each of the four data gaps. Observations and data from each of the four events to assess data gaps are also summarized below.

2.2.1 Additional Groundwater Assessment of June 2023

Objectives of this assessment: (1) evaluate a presumed VOC source area, as indicated by the TCE concentration of 3,600 ug/L at well TMW-31 located in the foam room on the east side of the main building, and (2) determine the horizontal extent of VOCs inside and outside the building in this area.

Approach and Procedures: In May 2023, a work plan and well installation permit was submitted to SCDHEC, and the Department issued a well installation permit in written correspondence dated May 22, 2023. On June 1, 2023, a private utility locator firm was retained to mark underground utilities inside and outside the building in this area, and this subcontracted firm also marked utilities in other areas outside the building. Those locations were later surveyed. Locations of the marked utilities from June 2023 are indicated in **Figure 2-1A** and **Figure 2-1B**.

During the period of June 5 to 7, 2023, groundwater monitoring wells were installed inside and outside the foam room area, using a Geoprobe 6610-DT direct push rig drill rig. A number of other borings were attempted for well installation, but refusal due to shallow bedrock was

encountered. The locations of the installed wells and refusal points are indicated in **Figure 2-2**. Boring logs, well installation details, water well records, and survey data are included in **Attachment 1**.

On June 8 and 9, 2023, the newly-installed wells, along with several existing pilot study wells, were sampled for VOCs. Monitoring well locations were surveyed on June 9, 2023. Groundwater samples were analyzed for VOCs by a South Carolina certified laboratory using EPA Method 8260D.

Observations and Data: Both field and laboratory analytical data were generated during this assessment phase. Field sampling logs are contained in **Attachment 2**. Laboratory analytical data appear in **Attachment 3**. The June 2023 groundwater field and analytical data are included in the groundwater table containing the June 2023 to January 2024 additional assessment groundwater data (**Table 2-1**).

Data on the groundwater sampling collection records indicate that for the two inside wells, MW-34 and MW-35, dissolved oxygen values ranged from 1 to 2 mg/L and oxidation reduction potential (ORP) was negative, ranging between -220 and -270 millivolts. Both of these wells are located upgradient of the ISCO pilot test area and the foam room.

TCE concentrations were 681 ug/L (well MW-35) and 0.36 ug/L (well MW-34). Both concentrations were significantly less than the 3,600 ug/L detected in December 2022 at well TMW-31 inside the pilot test area, at the end of the pilot study test. The 681 ug/L at well MW-35 is the same TCE magnitude as well TMW-31 for the 920 ug/L baseline in August 2021 and 480 ug/L and 860 ug/L during the pilot study. TCE concentrations in this area from June and September 2023 and prior dates in this area are shown in **Figure 2-3**. The only TCE degradation product detected in groundwater from well MW-34 or MW-35 was cis-1,2-DCE at 6.0 ug/L at MW-35, indicating that very little anaerobic biodegradation is occurring. These data led Signify and AECOM to decide to conduct the subslab vapor (SSV) and soil sampling in September 2023.

In the three new monitoring wells (MW-36 through -38) installed in June 2023 outside the building, TCE concentrations ranged from 10.0 to 21.1 ug/L. No TCE degradation products were detected in any of those samples.

Two of the existing wells (MW-10 and ERD-OBSW-1S) in the vicinity of the ISERD pilot study area were also sampled for VOCs in June 2023. TCE concentrations were 464 ug/L at MW-10 and 199 ug/L at ERD-OBSW-1S, similar to the December 2022 concentrations at the conclusion of the pilot test performance monitoring period.

Conclusions from the groundwater data of June 2023 are listed in **Section 3.1** of this document.

2.2.2 Additional Subslab Vapor and Soil Assessment of September 2023

Objectives of this assessment: (1) evaluate subslab vapor concentrations along the floor drain and piping system, to see if VOC source areas may be present in soil adjacent to or underlying the subslab sewer system; (2) resample two groundwater monitoring wells in the foam room area which had not been sampled since December 2022, to see if there are significant changes in VOC

concentrations; and (3) if potential subslab vapor hot spot areas are indicated, collect some soil samples to see if one or more soil hot spot source area are present.

Approach and Procedures: On September 28, 2023, the private utility locator subcontractor mobilized to the site to mark underground utilities, drains, and piping. Then, core holes were advanced through the concrete floor near the drains and piping in the vicinity and upgradient of the foam room and paint room. A total of 10 vapor pins for monitoring subslab vapor (SSV) were installed through the floor, and the pin assemblies were leak tested. Photoionization detector (PID) field readings for organic vapor were recorded in each location, before the vapor pins were installed. Field observations and notes are contained in **Attachment 4**. SSV sampling was performed on September 29 using 1-liter summa canisters for a 5-minute run time.

On September 29 after the SSV samples were collected, soil samples were collected from four of the holes, using a fabricated “rod in tube” apparatus. A "slide hammer" was used to advance the outer rod (like a Shelby tube®) down to a depth of approximately 6 inches below the concrete floor. The rod apparatus advancement continued until there was an adequate volume of soils for sampling. The maximum depth of advancement was approximately 2 feet. Then the apparatus was raised from the hole, and the inner rod was used to remove soil samples for containerization into the sampling bottles. Soil samples were collected from four locations, all along the subslab sewer line, to look for a source and chlorinated organics upgradient of well TMW-31 in the foam room. These were locations where the field PID organic vapor readings were the highest. Initial organic vapor readings prior to insertion of the vapor pins ranged from 64 to 81 ppm; final PID readings after soil sampling ranged from 39 to 53 ppm. Terracore® sampling kits were used to collect the soil samples. Once the samples were collected, the vapor pins were pulled out of each hole, and the holes grouted with concrete patch. Finally, the locations were surveyed.

In addition to the SSV and soil sampling, groundwater samples were collected on September 29 at two locations: TMW-31 inside the foam room and ISCO-OBSW-1S outside the building. This is the area where the ISCO pilot test was performed in 2021-2022. The SSV, soil, and groundwater samples were shipped to the Pace Analytical Laboratory under chain of custody.

Observations and Data: The laboratory analytical reports for the September 2023 event are contained in **Attachment 5**. Subslab vapor samples were analyzed using EPA Method TO-15. Soil and groundwater samples were analyzed for VOCs using Method 8260D. Subslab vapor data and soil data were added to the 2018 RI data and are shown in **Table 2-2** and **Table 2-3**, respectively. The results from September have been added to **Figure 2-4** and **Figure 2-5,** respectively.

A large number of compounds were detected in the SSV samples. Acetone and styrene, chemicals used in the Valmont manufacturing process, were among the high concentrations reported. The maximum acetone concentration was 2100 ug/m^3, and the maximum detected styrene concentration was 4010 ug/m^3, as indicated in the laboratory analytical report in **Attachment 5**. The main chemical of interest for legacy environmental purposes is TCE, but TCE was only detected in 6 of the 10 SSV samples. The highest detected TCE value was 24 ug/m^3, compared with 1020 ug/m^3 at the other end of the main building in 2018 during the RI.

For soil, no TCE, cis-1,2-DCE, or vinyl chloride was detected in any of the four samples collected from the area adjacent to the subslab sewer line.

The groundwater data from the September 2023 sampling event were added to **Table 2-1**

Conclusions from the SSV, soil, and groundwater data of September 2023 are listed in **Section 3.2** of this document.

2.2.3 Seismic Geophysical Evaluation of November 2023

Objectives of this assessment: (1) determine/verify the depths of the competent bedrock surface at accessible areas beneath the Site; (2) use information obtained during this survey to try to determine if and/or where underlying bedrock influences horizontal and vertical migration pathways for the TCE impacted groundwater beneath the Site.

Approach and Procedures: The approach and procedures utilized in the seismic evaluation are summarized in the report contained in **Attachment 6**. The geophysical investigation consisted of seismic refraction and multichannel analysis of surface waves (MASW) surveys. The two methods were selected to provide flexibility to evaluate the depth to bedrock across the variable site conditions encountered at the site. Site conditions of specific concern included high ambient noise conditions associated with plant operations and vehicle traffic, unfavorable surface coverings including pavements and dense packed gravel, irregular topography, thick vegetation in undeveloped areas and surface obstructions. As a result of these obstructions, both methods were utilized.

The geophysical field investigation was completed in one mobilization from November 7 to 11, 2023. Data collection of combined seismic refraction and MASW occurred along 9 lines as shown on **Figure 2-6**. Due to unfavorable site conditions including surface obstructions, pavements, and high noise and traffic levels, the locations of some of the proposed lines (**Figure 2-6**) were adjusted significantly while others were eliminated. Data could not be collected along proposed Line 3 located behind and parallel to the building. Proposed Lines 4 and 5 were combined and renamed as Line 4. Initial testing along Lines 1 and 2 indicated that the high noise levels at the site significantly impacted the quality and resolution of the seismic refraction data. After discussions with the project team, it was decided to complete the remainder of the investigation using solely the MASW method as it is less susceptible to negative data quality issues associated with high ambient noise levels. A total of 1,650 linear feet of seismic refraction and 2,740 linear feet of MASW were collected as part of this investigation.

Observations and Data: The observations and data from the seismic evaluation are summarized in the report contained in **Attachment 6**, for both the seismic refraction and MASW methods. The following is a summary of the observations and data:

To further refine the top-of-rock topography and further evaluate its potential to control contaminant migration, geophysical surveys were conducted in November 2023. The results of the geophysical surveys as reported in AECOM's geophysical survey memo (**Attachment 6**) suggest a relatively flat-lying interface between the overburden (saprolite) and the bedrock (partially weathered bedrock and/or competent bedrock) at about 10 to 25 feet below ground

surface, instead of a highly variable surface with as much as 100 feet of relief as indicated by boring logs. This discrepancy suggests that the bedrock surface is more of a pinnacled surface with abrupt changes in depth, instead of a smooth surface with gradual slopes between data points. These observations suggest that the potential for preferential groundwater/contaminant flow paths is present, but that further refinement of the bedrock surface is unlikely with remote sensing tools that are feasible at this site (i.e., the useful data will come from any additional drilled borings).

Conclusions from the seismic evaluation are listed in **Section 3.3** of this document.

2.2.4 Additional Groundwater Monitoring and Trend Plots of January 2024

Objectives of this assessment: (1) evaluate the TCE concentration trends in approximately 20 monitoring wells: 12 shallow zone wells, 6 intermediate zone wells, and 2 deep (bedrock) zone wells; (2) based on the trend data, evaluate if there is evidence of a not yet identified, ongoing TCE source that needs to be addressed in the FS alternative.

Approach and Procedures: The majority of the wells were sampled using passive diffusion bags (PDBs). However due to the narrow 1-inch diameter of the TMW series wells , those wells were sampled using low flow sampling technology. Also, wells MW-10 and MW-10I were utilized during the ERD pilot study efforts, where residual injection solution could still be present and could interfere with the PDB technology. Therefore, these two wells were also sampled using low flow sampling techniques. Samples were analyzed for VOCs using Method 8260D.

Observations and Data: Field sampling logs for the January 2024 sampling event are contained in **Attachment 7**. Depth to groundwater readings are shown in **Table 2-4**, where they are compared with previous data from 2017, 2018, and 2022. The groundwater samples were shipped to the Pace Analytical Laboratory under chain of custody. The laboratory analytical reports for the January 2024 event are contained in **Attachment 8**. The groundwater data from the January 2024 sampling event were added to **Table 2-1**. Comprehensive tables from 2014 to January 2024, for the shallow zone, intermediate zone, and deep zone are contained in **Attachment 9**.

From data in those three comprehensive tables in **Attachment 9**, Mann Kendall trend plots for TCE concentrations in groundwater were developed. The trend plots and concentration data used appear in **Attachment 10**. Results from the statistical calculations in Mann Kendall are summarized below:

Shallow Zone:
MW-5 - No Trend
MW-8 - Decreasing
MW-9 - Decreasing
MW-10 - Decreasing (this was a pilot test well, although showed little influence during pilot test)
MW-12 - Stable
MW-14 - Increasing (maximum concentration of 139 ug/L in January 2024)

MW-16 - No Trend
TMW-21 - Decreasing
TMW-22 - Decreasing
TMW-23 - No Trend
TMW-24 - No Trend
TMW-25 - Increasing (but maximum concentration [Jan. 2024] was only 52 ug/L)
TMW-31 is a pilot test monitoring well and not good for trend plot

Intermediate Zone:
MW-5I - Stable
MW-6I - Stable
MW-7I - Stable
MW-9I - No Trend
MW-10I (this is a pilot test monitoring well and not good for trend plot)
MW-20I - Decreasing

Deep (Bedrock) Zone:
MW-6D – Probably Decreasing
MW-12D – No Trend

The locations of the wells for which the trend plots were developed are shown in **Figures 2-7A and 2-7B** (shallow zone wells), **Figure 2-8** (intermediate zone wells), and **Figure 2-9** (deep/bedrock zone wells). Also shown on those three figures are the statistical results (e.g., decreasing, stable, no trend, increasing, or other determination) for groundwater from each well evaluated.

Conclusions from the trend plot evaluations and other data generated are listed in **Section 3.4** of this document.

2.3 Additional Sampling of Pilot Test Wells

In addition to the data gap assessment, pilot test wells were sampled during the June 2023 to January 2024 period, to evaluate any continued active groundwater treatment in the areas of the 2021-2022 groundwater pilot test. Objectives, approach and procedures, and observations and data are discussed in this section.

Objectives of this assessment: (1) to evaluate if there is any evidence of continued active treatment of groundwater from the ISCO and ISERD pilot tests, and (2) develop trends and baseline at both areas before initiating the proposed remedial action, which could occur before the end of 2024.

Approach and Procedures: In June 2023, two ISERD pilot test monitoring wells, MW-10 and ERD-OBSW-1, were sampled for VOCs, at the ISERD pilot study area. In September 2023, two ISCO pilot study wells, TMW-31 and ISCO-OBSW-1, were sampled for VOCs. In January 2024,

the two ISERD pilot wells, MW-10 and MW-10i, were sampled for VOCs. Well TMW-31 in the ISCO pilot test area also was sampled in January 2024; however, the analytical results looked anomalous, since VOCs were almost non-detect. Groundwater samples were analyzed for VOCs using Method 8260D.

Observations and Data: Field data for pilot test wells from those three sampling events were recorded on the data logs contained in **Attachments 2, 4, and 7**, respectively. Laboratory analytical data from those three events are contained in the laboratory reports in **Attachment 3, Attachment 5,** and **Attachment 8**, respectively. Field and laboratory data are shown on **Table 2-1**, and also are contained in **Table 2-5** and **Table 2-6**. These data have been included on the updates for **Figure 2-10** and **Figure 2-11**, for the ISCO and ISERD pilot studies, respectively. For most of the wells, TCE concentrations during the June 2023 to January 2024 period were back to the magnitude observed during the baseline test of August 2021 before initiation of the pilot test.

Additional observations are summarized below for the two pilot tests:

ISCO Pilot Test Area (**Table 2-5**):

- There was TCE rebound at observation well ISCO-OBSW-1S downgradient of the pilot test treatment area, as indicated below:
    - ISCO-OBSW-1S (909 ug/L in September 2023), compared with <25 ug/l from March to December 2022. The baseline TCE concentration in August 2021 was 960 ug/L.
- There was a decline in the TCE concentration at the presumed pilot test source area well as indicated below:
    - TMW-31 from December 2022 (3600 ug/L which likely was mobilized during the pilot test) to September 2023 (1800 ug/L). The baseline TCE concentration in August 2021 was 920 ug/L, similar to the 960 ug/L at the observation well.

ISERD Pilot Test Area (**Table 2-6**):

- There was no additional appreciable TCE concentration decline in groundwater in the shallow zone at the two ISERD area pilot study wells compared with either the December 2022 data collected at the end of the pilot test or the August 2021 baseline data prior to the pilot test.
    - MW-10 (467 ug/L and 567 ug/L in June 2023 and January 2024, respectively), compared with 500 ug/L in December 2022 at the end of the pilot test;
    - ERD-OBSW-1S (199 ug/L in June 2023), compared with 240 ug/L in December 2022 at the end of the pilot test.

- At the intermediate zone, the ISERD pilot test showed promising results (at well MW-10I: 50 to 57 ug/L from March through December 2022, compared with 870 ug/L baseline in August 2021). However, rebound at MW-10I occurred as indicated below:
    - MW-10I (617 ug/L in January 2024), compared with 55 ug/L in December 2022 at the end of the pilot test.