PAINT AND OIL LOCKER, SWMU 067
SOUTHERN TREATMENT AREA AIR SPARGE SYSTEM
CONSTRUCTION COMPLETION AND PERFORMANCE MONITORING
AND
PAINT AND OIL LOCKER, NORTHERN AREA (SWMU 067) AND
SUPPLY WAREHOUSE #3, SWMU 088
LONG-TERM MONITORING REPORT
KENNEDY SPACE CENTER, FLORIDA

Prepared for:

National Aeronautics and Space Administration
Kennedy Space Center, Florida

February 2023
Revision 0

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AIR SPARGE SYSTEM CONSTRUCTION COMPLETION
AND PERFORMANCE MONITORING REPORT
FOR
PAINT AND OIL LOCKER, SWMU 067, SOUTHERN TREATMENT AREA
AND
LONG-TERM MONITORING REPORT
FOR
PAINT AND OIL LOCKER, NORTHERN AREA (SWMU 067) AND
SUPPLY WAREHOUSE #3, SWMU 088
JOHN. F. KENNEDY SPACE CENTER, FLORIDA

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February 2023

PROFESSIONAL ENGINEER CERTIFICATION

This Air Sparge System Construction Completion and Performance Monitoring Report for Paint and Oil Locker (POL) Southern Treatment Area, Solid Waste Management Unit (SWMU) 067, and Long-Term Monitoring Report for POL Northern Area (SWMU 067) and Supply Warehouse #3, SWMU 088, at Kennedy Space Center, Florida, dated February 2023, has been prepared by or under the responsible supervision, direction, or control of the Florida-licensed professional engineer whose signature and seal appear below. This document and the work described herein complies with standard professional practices and requirements of Chapter 62-780, Florida Administrative Code (F.A.C.) and other rules of the Florida Department of Environmental Protection according to Rule 62-780.400(1), F.A.C.

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ABBREVIATIONS AND ACRONYMS

10x NADC	Ten times Natural Attenuation Default Concentration
ACGIH	American Conference of Governmental Industrial Hygienists
ADP	Advance Data Package
AS	Air Sparge
ASTM	American Society of Testing and Materials
bls	below land surface
BOSS	Base Operations and Spaceport Services
CCB	Converter Compressor Building
CCR	Construction Completion Report
cDCE	cis-1,2-Dichloroethene
cfm	cubic feet per minute
CMD	Corrective Measures Design
CMI	Corrective Measures Implementation
COC	Contaminant of Concern
DO	Dissolved Oxygen
DPT	Direct Push Technology
EE	Engineering Evaluation
EZVI	Emulsified Zero-Valent Iron
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
GCTL	Groundwater Cleanup Target Level
GN2	Nitrogen Gas
HAP	Hazardous Air Pollutants
HCP	High Concentration Plume
HDPE	High-Density Polyethylene
HMI	Human-Machine Interface
HS	Hot Spot
HS1	Hot Spot 1
HS2	Hot Spot 2

ACRONYMS AND ABBREVIATIONS (CONTINUED)

HS3	Hot Spot 3
I.D.	Inside Diameter
IDIQ	Indefinite Delivery Indefinite Quantity
IDW	Investigation-Derived Waste
IM	Interim Measure
IMWP	Interim Measures Work Plan
IWP	Implementation Work Plan
KSC	Kennedy Space Center
KSCRT	Kennedy Space Center Remediation Team
LBS	Load Break Switch
LCP	Low Concentration Plume
LTM	Long-Term Monitoring
mg/L	milligrams per liter
MNA	Monitored Natural Attenuation
msl	mean sea level
mV	millivolt
NAD	North American Datum
NADC	Natural Attenuation Default Concentration
NASA	National Aeronautics and Space Administration
NAVD	North American Vertical Datum
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric units
OM&M	Operation, Maintenance, and Monitoring
OMMR	Operations, Maintenance, and Monitoring Report
ORP	Oxidation Reduction Potential
OSHA	Occupational Safety and Health Administration
PARM	Post-Active Remediation Monitoring
PEL	Permissible Exposure Limit
PID	Photoionization Detector

ACRONYMS AND ABBREVIATIONS (CONTINUED)

PLC	Programmable Logic Controller
POL	Paint and Oil Locker
psi	pound per square inch
psig	pound per square inch, gauge
PVC	Polyvinyl Chloride
Q	Quarter
RAE	Remedial Alternatives Evaluation
RCRA	Resource Conservation and Recovery Act
REC	Record of Environmental Consideration
RFI	RCRA Facility Investigation
ROI	Radius of Influence
SAP	Sampling and Analysis Plan
scfm	standard cubic feet per minute
SDR	Standard Diameter Ratio
SOP	Standard Operating Procedure
SSHASP	Site-Specific Health and Safety Plan
SZ	Source Zone
SW3	Supply Warehouse #3
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution Prevention Plan
SZ	Source Zone
TCE	Trichloroethene
tDCE	trans-1,2-Dichloroethene
Tetra Tech	Tetra Tech, Inc.
TLV	Threshold Limit Values
TOC	Top of Casing
VC	Vinyl Chloride
VOC	Volatile Organic Compound
µg/L	micrograms per liter

ACRONYMS AND ABBREVIATIONS (CONTINUED)

µS/cm	microSiemens per centimeter
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

This Air Sparge (AS) System Construction Completion, Performance Monitoring, and Long-Term Monitoring (LTM) Report presents activities conducted at the Paint and Oil Locker (POL) (Solid Waste Management Unit [SWMU] 067) and Supply Warehouse #3 (SW3) (SWMU 088) sites located at the Kennedy Space Center (KSC), Florida. Activities include implementation and Year 1 (Quarters [Q] 1 through 4) and Q5 operation, maintenance, and monitoring (OM&M) activities and performance monitoring results for the AS Interim Measure (IM) in the POL Southern Treatment Area, LTM results for the POL Northern Area and SW3, and supplemental direct push technology (DPT) sampling at both sites to support the LTM and performance monitoring programs. The timeframe for activities included in this report extends from August 2019 to August 2022.

The scope for these sites currently includes two main components, which are documented within this report: (1) LTM at SW3 and POL Northern Area where an AS system began operation at these sites in May 2009 and June 2013, respectively, and subsequently turned off for both sites in March 2018 (during the previous reporting period); and (2) Active AS operations and performance monitoring in the POL Southern Treatment Area where an AS system was installed and began operation in 2021.

The AS IM in the POL Southern Treatment Area was implemented between 2019 and 2021 to treat a chlorinated solvent groundwater plume that resulted from historic operations supporting the National Aeronautics and Space Administration's (NASA) Space Program. The objective of the AS IM is to remediate groundwater within the treatment zone to support transition to monitored natural attenuation (MNA). The overall Corrective Action objective is to reduce concentrations of trichloroethene (TCE), cis-1,2-dichloroethene (cDCE), trans-1,2-dichloroethene (tDCE), and vinyl chloride (VC) present in groundwater to levels below their respective State of Florida Groundwater Cleanup Target Levels (GCTLs). The AS IM was installed in the POL Southern Treatment Area to target the high concentration plume (HCP), which includes a source zone (SZ) area where TCE was found to exceed 11,000 micrograms per liter (µg/L), and extend to a depth of 30 feet below land surface (bls).

This report includes the following information:

- AS system installation activities in the POL Southern Treatment Area (including installation of wells, piping, and distribution manifold and compressor trailers), which were conducted between August 2019 and January 2021. The completed system includes 145 AS wells, with screens ranging from 23 feet to 55 feet bls. The AS system is designed to treat approximately 4.1 acres of groundwater contamination.

- AS system startup and commissioning in the POL Southern Treatment Area, which was completed between January and February 2021.

- Performance monitoring activities for the POL Southern Treatment Area AS IM, to include baseline groundwater monitoring well sampling in April 2020 (prior to system startup – 24 wells), quarterly sampling (after system startup – 24 wells) for Year 1 (Q1 to Q4) in June 2021, September 2021, December 2021, and March 2022, and also the fifth quarterly event (Q5) in June 2022. Semi-annual sampling events, which included expanded sampling of an additional 19 wells, was completed during the September 2021 (Q2) and March 2022 (Q4) events.

- OM&M activities for the POL Southern Treatment Area AS system for first year operations conducted from February 2021 (full-scale startup) to August 2022. Ambient air sampling was also conducted as part of Year 1 OM&M.

- Annual LTM sampling events for the POL Northern Area and SW3 conducted in October 2019, November 2020, and October 2021, as well as supplemental sampling events conducted at one monitoring well (POL-MW0034S) in the POL Northern Area to monitor TCE fluctuations.

- Supplemental DPT sampling events at both POL and SW3, including:

    - October 2021 event at POL Southern Treatment Area to confirm presence or absence of low concentration plume (LCP) plume migration;

- January and October 2021 events at SW3 to delineate the southern extent of the LCP and investigate the VC HCP area; and,

- August 2022 event at POL Southern Treatment Area to confirm the Year 1 performance monitoring analytical results and determine whether any SZ or hot spot (HS) plume migration has occurred.

OM&M activities and results from Year 1 and Q5 indicate that the AS system at POL Southern Treatment Area is meeting performance criteria and operating in a modified configuration, with Zones 1 and 2 and select wells in Zones 3 and 4 off. The air pulse cycles, which operate between eight treatment zones, are all functioning properly, and the AS wells are operating at the designed flowrates and pressures. The overall runtime of the AS system for the Year 1 and Q5 reporting period (February 2021 to August 2022) was approximately 67%, with downtime primarily attributed to performance monitoring events, DPT sampling activities, and system maintenance. Air samples collected during the reporting period were less than applicable human health and air emissions permit criteria.

Groundwater performance monitoring results from the POL Southern Treatment Area indicate that within the first year of operation, TCE concentrations in plume wells across all treated depth intervals have been reduced by more than 75% (average). The highest TCE concentration during baseline sampling in April 2020 was 10,000 µg/L at MW0043I, which was reduced to 6.2 µg/L during the June 2022 sampling event. Similarly, cDCE and VC concentration averages of plume monitoring wells across the entire saturated treatment area have been reduced by 87% and more than 85%, respectively. Following the June 2022 (Q5) sampling event, groundwater concentrations continued to exceed GCTLs in 4 of the 43 performance monitoring wells, but all concentrations were below NADCs. The supplemental DPT events conducted in the POL Southern Treatment Area confirmed that the performance monitoring well network is adequately tracking degradation progress in the former SZ and HS areas and that the LCP has not migrated.

LTM activities at SW3 and POL Northern Area, where an AS system previously ran and was shut down in March 2018, has shown generally decreasing or stable trends of COCs over the recent annual sampling events between 2019 and 2021. Supplemental DPT sampling events

conducted to support the LTM program have also shown that the residual groundwater plumes have an effective monitoring well network; although, additional wells are recommended to monitor the LCP (see below).

Based on Year 1 and Q5 OM&M and performance monitoring results in the POL Southern Treatment Area, the IM objective has been met to reduce concentrations to below NADCs. It is recommended to continue with Year 2 AS system OM&M for POL Southern Treatment Area through at least March 2023 (the period currently under contract) to further decrease groundwater concentrations to reach the site's overall objective of GCTLs.

For performance monitoring in POL Southern Treatment Area, a reduced Year 2 monitoring program is recommended, as follows:

- Remove the following 22 monitoring wells from performance sampling (POL-): MW0008S, MW0011S, MW0011I, MW0014S, MW0016S, MW0016I, MW0016D, MW0018S, MW0018I, MW0018D, MW0035S, MW0039ID, MW0043S, MW0043D, MW0044I, MW0045S, MW0045D, MW0046D, MW0046DD, MW0047I, MW0047D, and MW0047DD. Each of these performance monitoring wells will be discontinued based on all VOCs measuring below GCTLs during the last three or four quarterly sampling events.

- Continue to sample the following seven performance monitoring wells on a semi-annual frequency (POL-): MW0012S, MW0014ID, MW0026S, MW0026I, MW0028S, MW0028I, and MW0035SI. Note, MW0026S is also recommended to be assessed as part of the POL Northern Area LTM program.

- Transition the following eight performance monitoring wells from a quarterly to a semi-annual sampling frequency: MW0008I, MW0036SI, MW0036I, MW0041SI, MW0042SI, MW0043I, MW0044D, and MW0045I.

- Transition the following six performance monitoring wells from quarterly or semi-annual to an annual sampling frequency (POL-): MW0012I, MW0014SI, MW0014I, MW0017S, MW0022I, and MW0022D.

- Conduct one annual round of ambient air sampling at the five previous sampled locations (POL-AMB05 through POL-AMB09).

For the LTM at POL Northern Area and SW3, the following is recommended:

- Transition POL-MW0031S, POL-MW0026S, and POL-MW0034S to a semi-annual sampling frequency.
- Remove SW3-MW0001 and SW3-MW0006 from the LTM program.
- Re-incorporate POL-MW009S into the sampling network to track contaminant degradation.
- Conduct LTM sampling at the following wells at each site:
    - SW3: Annual sampling of SW3-MW0009, SW3-MW0024, SW3-MW0025, SW3-MW0027, and SW3-MW0028.
    - POL Northern Area: Annual sampling at POL-MW009S and POL-MW0031SI, and semi-annual sampling at POL-MW0026S (also part of POL Southern Treatment Area performance monitoring schedule), POL-MW0031S, and POL-MW0034S.

The contents of this report, including the above recommendations, were presented at the June 2020 KSCRT meeting (2019 LTM Groundwater Sampling Results, POL and SW3), September 2021 KSCRT meeting (POL Southern Treatment Area IM Construction Completion and POL Northern Area and SW3 LTM Program), and the October 2022 KSCRT meeting (POL Southern Treatment Area IM Year 1 and Q5 performance data and POL Northern Area and SW3 LTM) where Team consensus was reached on the recommendations and path forward for POL Southern Treatment Area, POL Northern Area, and SW3.

In addition to the recommendations above that received Team consensus, an additional nine monitoring wells are proposed to be installed to monitor the LCP along the POL and SW3 southern perimeter. The addition of these downgradient wells will provide an adequate network

to monitor any plume migration. Following installation, these new wells will be incorporated into the annual LTM program.

SECTION I
INTRODUCTION

This Air Sparge (AS) System Construction Completion, Performance Monitoring, and Long-Term Monitoring (LTM) Report presents activities conducted at the Paint and Oil Locker (POL) and Supply Warehouse #3 (SW3) sites located at the Kennedy Space Center (KSC), Florida. Activities include implementation and Year 1 (Quarters [Q] 1 to Q4) and Q5 performance monitoring and operation, maintenance, and monitoring (OM&M) of an AS Interim Measure (IM) in the POL Southern Treatment Area, LTM for POL Northern Area and SW3, and supplemental direct push technology (DPT) sampling at both sites to support the LTM and performance monitoring programs. POL and SW3 have been designated as Solid Waste Management Unit (SWMU) 067 and SWMU 088, respectively, under KSC's Resource Conservation and Recovery Act (RCRA) Corrective Action Program. The locations of POL and SW3 within the boundaries of KSC are shown on Figure 1-1.

Remediation and reporting of POL and SW3 have been streamlined over the years due to proximity of these two sites. The scope for these sites currently include two main components: (1) LTM at SW3 and POL Northern Area where an AS system began operation at these sites in May 2009 (with expansion in December 2012) and June 2013, respectively, and subsequently turned off for both sites in March 2018 (NASA, 2019a); and (2) Active AS operations and performance monitoring in the POL Southern Treatment Area where an AS system was installed and began operation in 2021. This report was prepared by Tetra Tech, Inc. (Tetra Tech), for the National Aeronautics and Space Administration (NASA) under Indefinite Delivery Indefinite Quantity (IDIQ) Contract 80KS019D0011 / 80KSC019F0098.

The timeframe for activities extends from August 2019 to August 2022, and this report includes the following information:

- AS system installation activities in the POL Southern Treatment Area (including installation of wells, piping, and distribution manifold and compressor trailers), which were conducted between August 2019 and January 2021. The completed system includes

145 AS wells, with screens ranging from 23 to 55 feet below land surface (bls). The AS system is designed to treat approximately 4.1 acres of groundwater contamination.

- AS system startup and commissioning in the POL Southern Treatment Area, which was completed between January and February 2021.

- Performance monitoring activities for the POL Southern Treatment Area AS IM, to include baseline groundwater monitoring well sampling in April 2020 (prior to system startup) and quarterly/semi-annual sampling (after system startup) for Year 1 in June 2021, September 2021, December 2021, and March 2022, and also the fifth quarterly event in June 2022. Of note, baseline DPT sampling was completed in October 2019 to refine the treatment area prior to AS system implementation, and was reported in the POL Southern Treatment Area Implementation Work Plan (IWP) (NASA, 2020). An overview of this DPT event is discussed in Section 1.3 of this report.

- OM&M activities for the POL Southern Treatment Area AS system for first year operations conducted from February 2021 (full-scale startup) to August 2022. Air sampling was also conducted as part of Year 1 OM&M.

- Annual LTM sampling events for the POL Northern Area and SW3 conducted in October 2019, November 2020, and October 2021, as well as supplemental sampling events conducted at one monitoring well (POL-MW0034S) in the POL Northern Area to monitor trichloroethene (TCE) fluctuations.

- Supplemental DPT sampling events at both POL and SW3, including:

    - October 2021 event at POL Southern Treatment Area to confirm presence or absence of low concentration plume (LCP) plume migration;

    - January and October 2021 events at SW3 to delineate the southern extent of the LCP and investigate the vinyl chloride (VC) high concentration plume (HCP) area; and,

- August 2022 event at POL Southern Treatment Area to confirm the Year 1 performance monitoring analytical results and determine whether any source zone (SZ) or hot spot (HS) plume migration has occurred.

The objective of the POL Southern Treatment Area AS IM is to remediate contaminated groundwater within the treatment zone to support transition to monitored natural attenuation (MNA), as done in the POL Northern Area and SW3 where an AS system previously ran in those areas between 2009 and 2018. The POL Southern Treatment Area HCP, defined as groundwater with contaminant concentrations exceeding respective Florida Department of Environmental Protection (FDEP) Natural Attenuation Default Concentrations (NADCs), was previously presented to the KSC Remediation Team (KSCRT) in the December 2016 Site Characterization Advance Data Package (ADP). At that time, the HCP consisted of four separate HSs, defined as areas where volatile organic compound (VOC) concentrations are greater than ten times NADCs (10x NADCs), as well as three SZ areas where TCE concentrations exceeded 11,000 micrograms per liter (µg/L) (NASA, 2016). However, based on the October 2019 baseline DPT groundwater investigation, which is described in detail in the POL Southern Treatment Area IWP (NASA, 2020), the HCP was re-defined as two separate HSs and one SZ.

1.1 PURPOSE

The purpose of this report is to summarize the activities that were performed to install, operate, and monitor the AS system at POL Southern Treatment Area to treat the SZ and HCP, present the first year of performance monitoring results, and present the POL Northern Area and SW3 LTM results. Supplemental DPT sampling events are also presented in this report, which were completed at both SW3 and POL to collect additional to support the LTM and performance monitoring programs. The reporting period for activities included in this report extends from August 2019 to August 2022. These activities were conducted in accordance with the Interim Measures Work Plan (IMWP) (NASA, 2018), the IWP (NASA, 2020), the Site-Specific Safety and Health Plan (SSHASP) (NASA, 2019b), the last issued OM&M Report (NASA, 2019a), and KSCRT-related decisions for AS implementation in POL Southern Treatment Area and for the LTM programs at POL Northern Area and SW3 (referenced throughout this report).

Recommendations for future OM&M, performance monitoring, and LTM are also included in this report.

1.2 SITE BACKGROUND

KSC is located on the northern section of Merritt Island, a barrier island bordered on the east by the Banana River Lagoon and west by the Indian River Lagoon. POL and SW3 are located within the Industrial Area of KSC in Brevard County, Florida (Figure 1-1). Within KSC, POL and SW3 are located south of 4th Street and west of C Avenue, as shown on Figure 1-2.

POL is located east of the SW3 property and houses the currently occupied POL Building (M6-894), a warehouse, and several cylinder storage lockers. To the east of the property is a former wastewater treatment facility (Sewage Treatment Plant #1) that currently functions only as a lift station. South of 5th Street is the POL Southern Treatment Area, which consists of undeveloped land and the former polishing pond for the former wastewater treatment plant. North of the POL facility is the Communications, Maintenance, and Storage Facility, and to the northwest is the Vehicle Maintenance Facility. The SW3 property, sharing the western boundary of the POL facility, houses the SW3 building (M6-891), constructed in 1967 and currently used for the storage of assorted building materials such as drywall and door frames. The locations of these structures are shown on Figure 1-2. Detailed descriptions of the site background, area setting, site history, RCRA Facility Investigation (RFI) findings, and other pre-Corrective Measures Design (CMD) findings are presented in the POL CMD Report (NASA, 2004) and SW3 CMD Report (NASA, 2007).

1.3 SITE CHARACTERIZATION AND PREVIOUS REMEDIATION

The information in this section is focused on site characterization and remediation at POL (SWMU 067) to provide background for the AS system installed at POL Southern Treatment Area in 2021 (documented within this report). Information regarding site characterization and previous remediation at SW3 (SWMU 088), which includes an AS system that began operation in May 2009 (with expansion in December 2012) and subsequently turned off in March 2018, can be found in the previous Operations, Maintenance, and Monitoring Report (OMMR)(NASA, 2019a) and SW3 Construction Completion Report (CCR) (NASA, 2013a).

The initial POL Corrective Measures Implementation (CMI) Work Plan (NASA, 2005), completed in 2004, identified two areas of groundwater contamination at POL. The first, located along 5th Street, was an HCP with TCE concentrations greater than its FDEP NADC. The second, was an LCP with TCE concentrations less than the NADC, but greater than the State of Florida Groundwater Cleanup Target Level (GCTL).

Between December 2005 and December 2006, in accordance with the POL CMD, areas containing the HCP with TCE concentrations exceeding 1,000 µg/L were treated via in-situ chemical oxidation using sodium permanganate. The goals of this treatment were to oxidize TCE and reduce TCE concentrations to less than 1,000 µg/L. During that same period, groundwater in the remainder of the HCP was treated via enhanced in-situ biodegradation with ethyl lactate through four separate events to reduce VOC concentrations in groundwater to less than NADCs.

In December 2007, TCE concentrations persisting above 1,000 µg/L were found in the vicinity of 5th Street at MW0026S. To respond to the concentration levels, a fifth ethyl lactate injection event was implemented in the portion of the groundwater contaminant plume underlying the central area of the site. A DPT groundwater investigation was initiated in March 2008 to determine the northern boundaries of the HCP and further delineate the extent of NADC exceedances within the HS areas. Two residual TCE HSs were identified in an area approximately 80 feet north of the monitoring well MW0029S, where an exceedance was previously discovered in 2007. An additional HS was detected approximately 70 feet north of monitoring well MW0024S. To follow up with the findings, a DPT investigation was conducted six months later in September 2008, at the POL Southern Treatment Area.

In March and April 2009, a HS was identified south of 5th Street, approximately 120 feet south of monitoring well MW0012, with a TCE concentration of 39,000 µg/L. This prompted additional DPT sampling in July and August 2009, with a focus on delineating the northern and southern extents of the groundwater plume. The DPT investigation successfully defined the limits of TCE GCTL exceedances and VC NADC exceedances north of 5th Street.

In February 2011, a Site Characterization for POL was presented to the KSCRT. The KSCRT reached consensus that the northern part of the POL groundwater contamination was delineated,

and that a Remedial Alternatives Evaluation (RAE) should be completed for both HS1 and HS2. The KSCRT also stated that additional delineation was required for HS3 located south of 5th Street (Meeting Minute 1102-M13, Decisions 1102-D44 and D46). To follow up, a DPT investigation was conducted at POL and the RAE was presented to the KSCRT in May 2011. The POL groundwater plume north of 5th Street was designated as the Northern Active Remediation Zone. Additional delineation was also deemed necessary for GCTL exceedances to the south of 5th Street. The KSCRT reached consensus that an IMWP should be prepared with AS as the selected method of groundwater remediation for the shallow portion of the Northern Active Remediation Zone.

During these DPT investigations, VC concentrations exceeding 10x NADC were encountered in the groundwater south of the established SW3 Active Remediation Zone. In May 2011, a CMI was proposed for the adjoining property to the west (SW3) to address AS expansion extending south of 5th Street. In October 2011, the initial POL IMWP was presented at the KSCRT Meeting. Upon Team discussion, consensus was met to install the AS system with modifications. In December 2011, the IMWP outlining the design of the proposed AS system was submitted to FDEP (NASA, 2011). A follow-up DPT investigation took place in June 2012 at POL, and an isolated TCE HCP was identified along the northern fence of POL. This TCE HCP was identified as the Northern TCE HCP.

The results of the POL 2008 to 2012 investigations were presented to the KSCRT in October 2012. Team consensus was reached to conduct additional DPT investigations along the Northern TCE HCP for further plume delineation. The intent was to use this data for the design of an AS system expansion in this area upon confirmation of the effectiveness of the AS system in the shallow zone of HS1.

The POL CMI Annual Groundwater Monitoring Report (NASA, 2013b) was presented at the KSCRT in February 2013. Groundwater monitoring activities indicated that TCE concentrations were increasing at monitoring well MW0011, suggesting a potential southern migration of the groundwater plume. The KSCRT reached consensus for the three zones within the Northern Active Remediation Zone to be treated via the AS trailer located on SW3, which was already operational for the SW3 plume. The three zones in the Northern Active Remediation Zone

requiring treatment included, shallow Zone 1 at 10.5 feet below mean sea level (msl), shallow-intermediate Zone 2 at 20.5 feet below msl, and intermediate Zone 3 at 30.5 feet below msl. The three Northern Active Remediation Zone zones were treated concurrently with the two SW3 zones (north and south). Design modifications included two additional manifold lines inside the trailer and the installation of three 3-inch trunk lines leading from the trailer to the POL site.

Follow-up DPT sampling for POL was conducted in conjunction with initial operation of the AS system. The three zones of the Northern Active Remediation Zones were targeted. The AS system for the three Northern Active Remediation Zone zones was installed as outlined in the POL CCR (NASA, 2014), and began operation in June 2013.

A Performance Monitoring ADP for the original POL AS system via the SW3 AS trailer was presented to the KSCRT in January 2015. Team consensus was reached to expand the AS system to treat the Northern HCP near the northern fence line of the facility by installing seven shallow AS wells and associated air supply lines. In July 2016, AS expansion construction for the Northern HCP was initiated, with system operation beginning in August 2016. The POL Site Characterization ADP (formerly Step 1 Engineering Evaluation [EE]) was presented to the KSCRT in December 2016 (NASA, 2016). Consensus was reached that the northern and southern extents of the plume had been delineated. Approval to proceed to the RAE was given for this expanded project area.

In the KSCRT meeting that took place in February 2017, the OMMR (NASA, 2017a) from 2016 was presented. Consensus was reached that the northern and southern extents of the plume have been delineated. Approval to proceed to the RAE was then given for this expanded project area.

The following KSCRT meeting in March 2018 was dedicated to the presentation of the POL Southern Treatment Area IMWP ADP (formerly Step 3 EE). The KSCRT reached consensus to shut down the POL and SW3 AS system, and conduct post-active remediation monitoring (PARM) of 13 monitoring wells at POL Northern Area and 10 monitoring wells at SW3 with further optimization after two quarterly events (Meeting Minutes 1803-M17 and -M19, Decisions 1803-D61 to D64). Specific reasons for turning off the AS system included significant reduction in groundwater concentrations within the POL and SW3 remediation zones (with the

exception of POL-MW0034S, located north of 5th Street, Northern Active Remediation Zone) and difficulty in maintaining the design flow of 5.0 standard cubic feet per meter (scfm).

A baseline DPT Investigation was conducted from October 14 to October 31, 2019 to confirm and refine the AS treatment area for the POL Southern Treatment Area. Results from this DPT investigation were presented in the POL Southern Treatment Area IWP (NASA, 2020). An overview of results from this DPT investigation are displayed aerially on Figure 1-3.

1.4 LITHOLOGY

Soil borings were completed in 2002 for the POL facility as part of the 2002 POL RFI Report (NASA, 2002). Additionally, seven soil borings were completed in October 2019 to provide additional lithologic evaluations along the Southern Treatment Area plume centerline and to confirm the geology of previously interpolated zones. Transects connecting the soil borings for POL are shown on Figure 1-3. The corresponding geologic cross-sections are presented on Figure 1-4 through Figure 1-7, which were also included in the POL Southern Treatment Area IWP (NASA, 2020). A summary of the lithology encountered at POL is presented below.

The surficial soils at POL generally consist of undulating layers of unconsolidated sediments deposited in a marine coastal environment. From ground surface to approximately five feet below land surface (bls), tan to yellowish brown fine-grained sand was typically encountered across POL. Below this interval, dark brown to black fine-grained sand with organics was encountered to about 10 feet bls, where brown fine-grained sand with silt was found, persisting to a depth of approximately 22 feet bls. From 22 to 66 feet bls, the soils were generally classified as gray fine-grained sand with 20 to 50-percent shell fragments and olive gray fine-grained dense sand with 20-percent shell fragments. At this interval, shell fragments appeared to increase in abundance toward the northwestern section of the site, with trace to little clay and silt common in narrow 1-3 foot lenses. From 66 feet bls to about 73 feet bls, olive gray, dense fine-grained sand with 20-percent shell fragments was noted. These strata grade into a hard, olive gray clay from 73 to 88 feet bls, marking the vertical extent of the soil borings.

Lithology at SW3 has been found to be similar to POL based on previous sampling and proximity of these sites.

1.5 HYDROLOGY

The topography of the POL and SW3 sites is generally flat, with elevations of approximately eight feet above msl, relative to the North American Vertical Datum (NAVD) of 1988. The average groundwater elevation is approximately 5 feet above msl. Based on groundwater elevation data collected from site monitoring wells, groundwater at POL generally flows to the south-southeast, toward the lower-lying areas of the former Sewage Treatment Plant #1 polishing pond and ditch system oriented east to west along the southern extent of the POL treatment area. Groundwater at SW3 generally flows to the south, toward the same ditch system. This ditch system ultimately connects to Gator Pond, the Region I Stormwater Basin, located approximately 0.60 miles to the southeast of the POL and SW3 sites.

1.6 INTERIM MEASURE OBJECTIVE

The objective for the POL Southern Treatment Area IM is to remediate contaminated groundwater within the treatment zone to support transition to MNA. The overall Corrective Action objective of the site is to reduce concentrations of TCE, cis-1,2-dichloroethene (cDCE), and VC present in groundwater to levels below their respective FDEP GCTLs. Based on performance of the IM, AS operations may be modified, as appropriate, to achieve the IM objective.

The VOC groundwater plume at the POL Southern Treatment Area had been divided into four areas:

- LCP defined as an area with individual VOC concentrations higher than GCTLs but less than NADCs.
- HCP defined as an area within individual VOC concentrations high than NADCs.
- HS3 defined by VOC concentrations higher than 10x NADC within the POL Southern Treatment Area.
- Source Zone where TCE concentrations exceed 11,000 µg/L.

The AS IM presented in this document addresses the HCP at POL Southern Treatment Area. The table below (Table 1-1) provides the NADC IM cleanup levels.

Table 1-1. Site-Specific Interim Measure Cleanup Levels

Constituent	NADC (µg/L)
TCE	300
cDCE	700
trans-1,2-Dichloroethene (tDCE)	1,000
VC	100

1.7 INTERIM MEASURE PROJECT TEAM

POL Southern Treatment Area AS IM activities (documented in this report) were performed at KSC on behalf of NASA by Tetra Tech. Well drilling and installation services at POL Southern Treatment Area were provided by DrillPro, LLC of Orlando, Florida. Analytical services for all samples collected at POL Southern Treatment Area were analyzed by either a fixed-based laboratory or mobile laboratory for all COCs using United States Environmental Protection Agency (USEPA) Method SW-846 8260D. All monitoring wells were installed in accordance with Section 4.5 of the KSC Sampling and Analysis Plan (SAP) for the RCRA Corrective Action Program (NASA, 2017b). If specialized maintenance was needed on the air compressor, it was performed by Atlas Copco of Orlando, Florida. All electrical installation services were provided by Chrome Electric, LLC of Titusville, Florida.

1.8 REPORT ORGANIZATION

The remainder of this document is organized as follows:

Section II: Air Sparge System Construction (POL Southern Treatment Area) – This section presents information regarding construction of the AS system installed to remediate the HCP and SZ in the POL Southern Treatment Area. The purpose of this section is to provide information certifying that the IM was implemented in accordance with the IWP (NASA, 2020).

Section III: Baseline Sampling for the POL Southern Treatment Area – This section presents results from baseline groundwater monitoring conducted prior to start-up of the POL Southern Treatment Area AS system to verify levels of contamination identified in the IMWP (NASA, 2018) and IWP (NASA, 2020), and to provide a baseline for comparison during system operation.

Section IV: System Operation and Maintenance (POL Southern Treatment Area) – This section provides information and data collected during start-up of the AS system in POL Southern Treatment Area, including site preparation and mobilization. This section also discusses air monitoring conducted, and details efforts associated with routine events for operation and maintenance of the AS system during Year 1 of operations.

Section V: Performance Monitoring for the POL Southern Treatment Area – This section provides a summary of the quarterly performance monitoring results collected during Year 1 operations (Q1 to Q4) and the fifth quarterly event (Q5) of the POL Southern Treatment Area AS IM. Supplemental DPT sampling events in the POL Southern Treatment Area to support the performance monitoring program are also presented in this section.

Section VI: POL Northern Area and SW3 Long-Term Monitoring – This section provides a summary of the LTM analytical results for the POL Northern Area and adjacent site SW3. Supplemental DPT sampling events at SW3 to support the LTM program are also presented in this section.

Section VII: Conclusions and Recommendations – This section provides a summary of activities conducted in support of the POL Southern Treatment Area AS IM and POL Northern Area and SW3 LTM programs, and presents recommendations based on groundwater monitoring results and system operations

Section VIII: References – This section provides a listing of the references cited in this report.

FIGURE 1-1 SUPPLY WAREHOUSE #3 AND PAINT AND OIL LOCKER AREA LOCATION MAP

SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

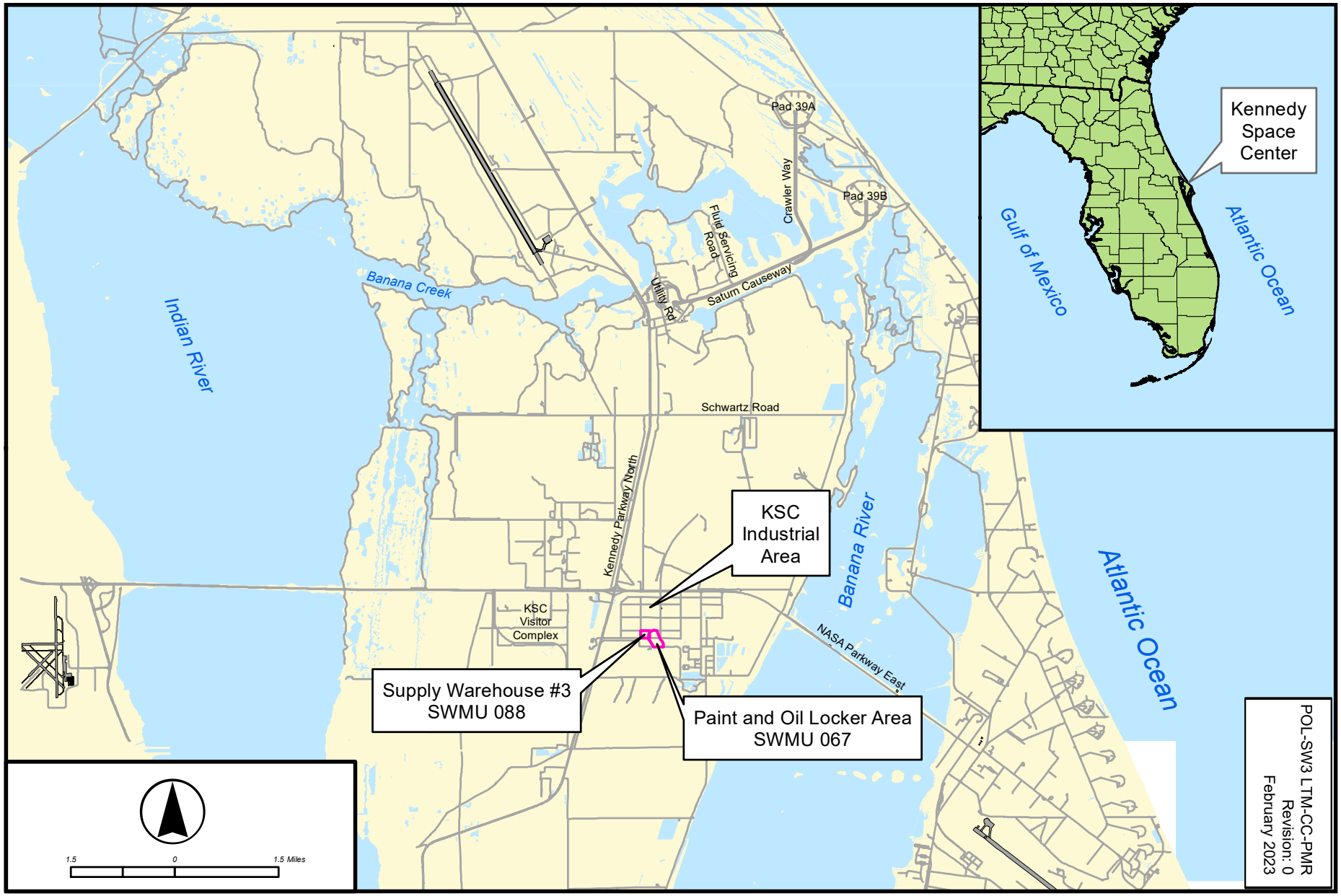

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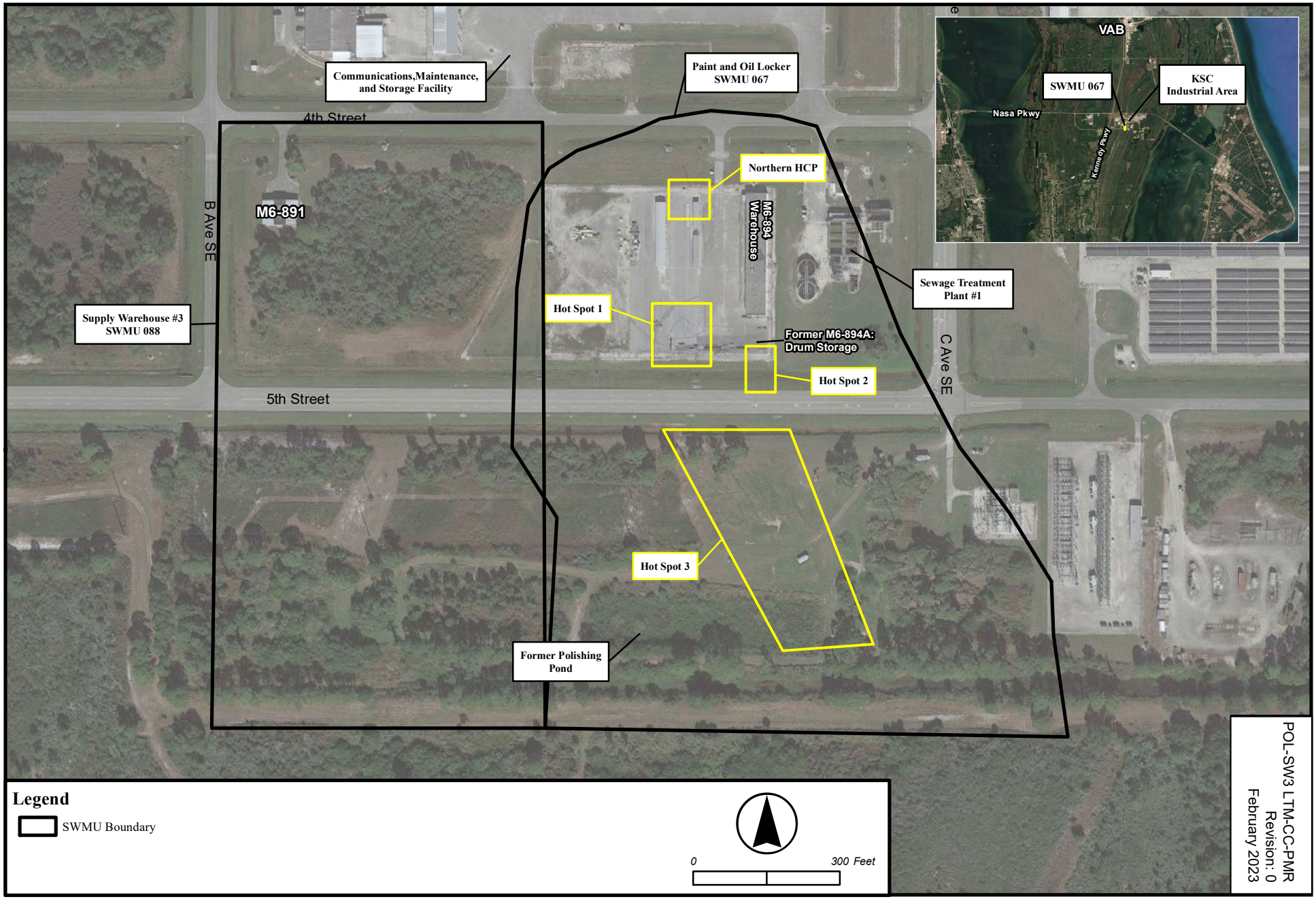
FIGURE 1-2 PROJECT AREA MAP
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



JAX C:\GIS\KSC\MXD\POL\STEP4\1-2_POL_PROJECT_AREA.MXD 02/03/23

FIGURE 1-3 CROSS SECTION LOCATIONS - OCTOBER 2019 DIRECT-PUSH TECHNOLOGY (DPT) POL BASELINE EVENT
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

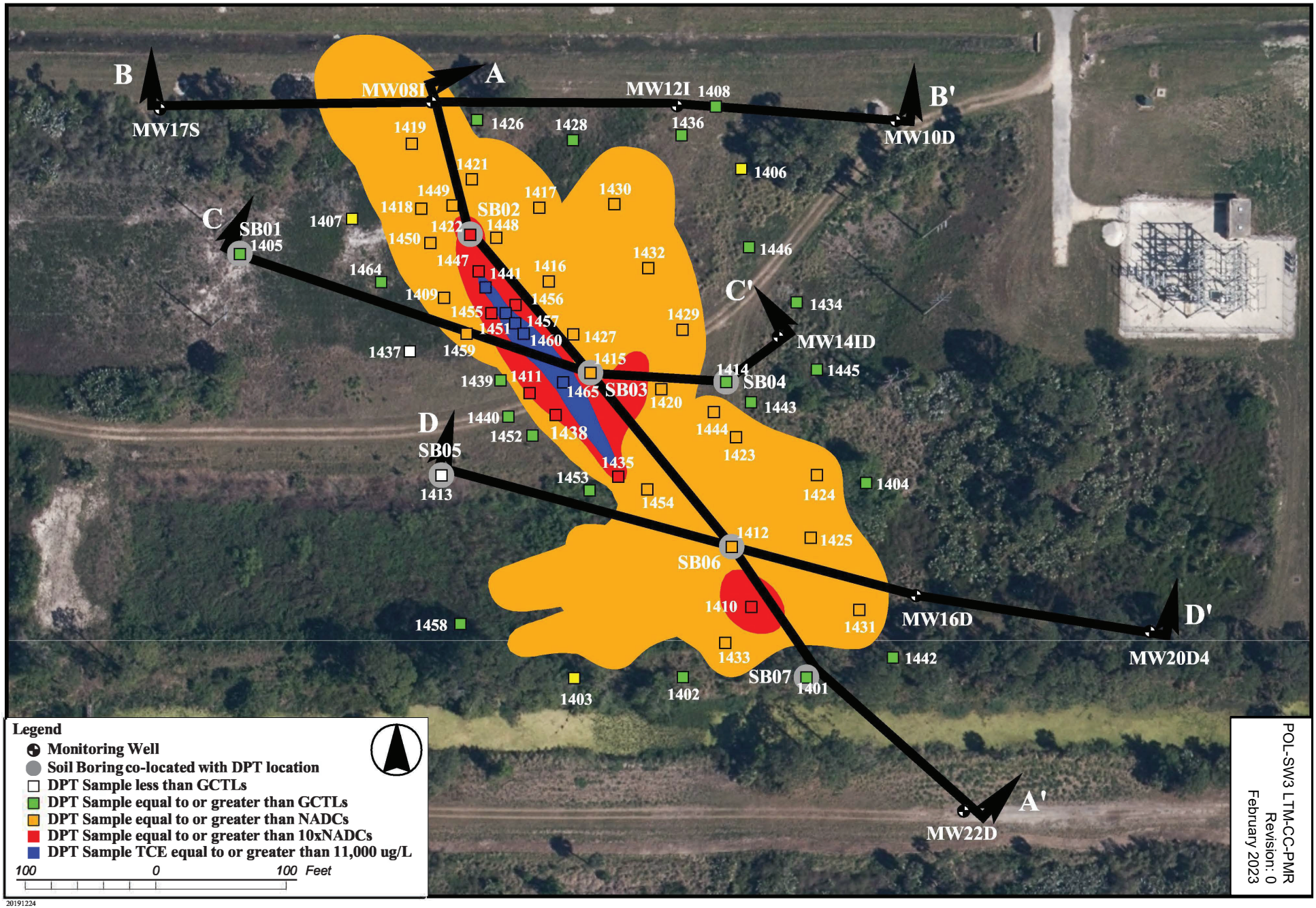
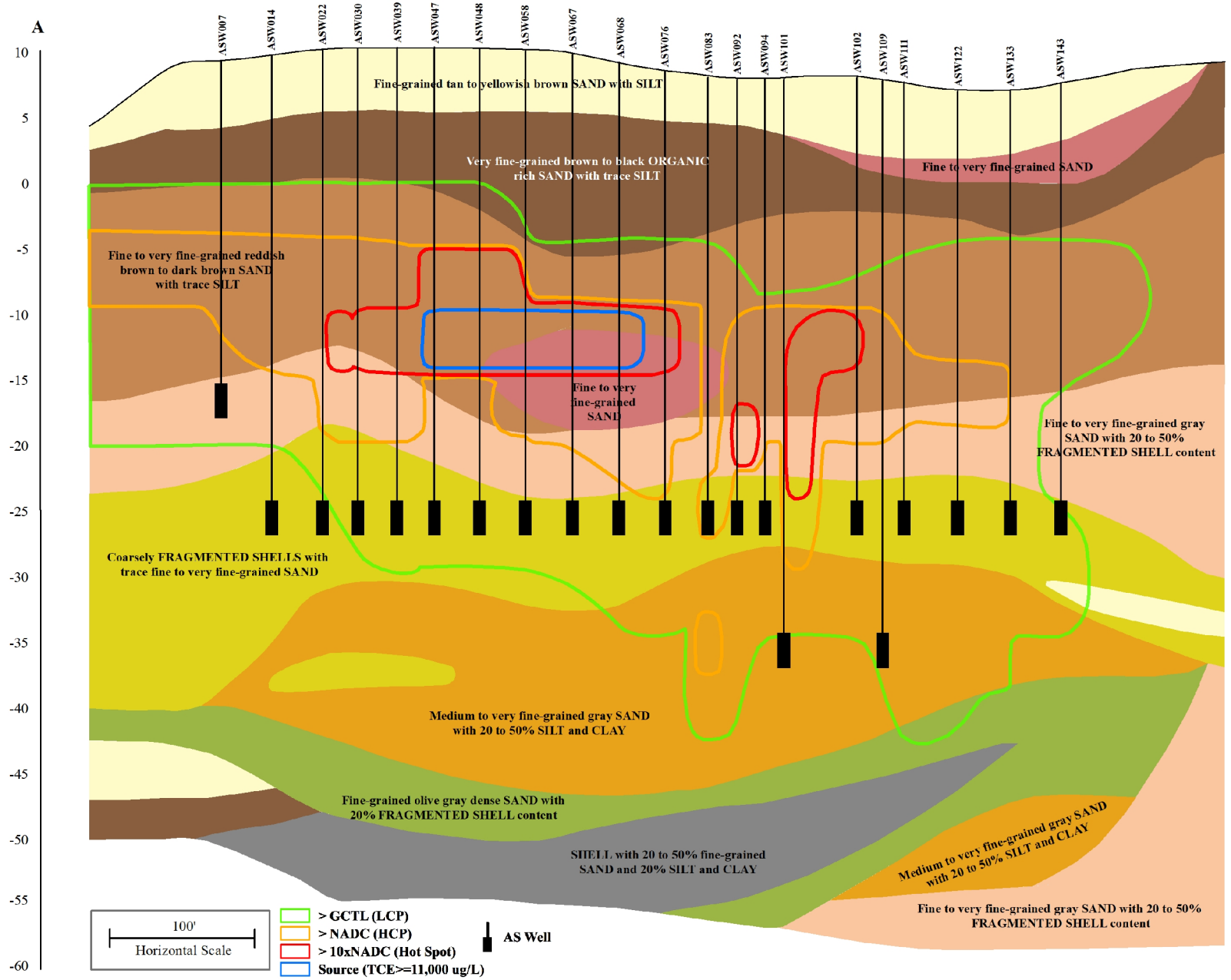


FIGURE 1-4.4CROSS SECTION A - A' AIR SPARGE WELL
LAYOUT SWMU 067 AND SWMU 088 KENNEDY SPACE CENTER,
FLORIDA



POL-SW3 LTM-CC-PMR
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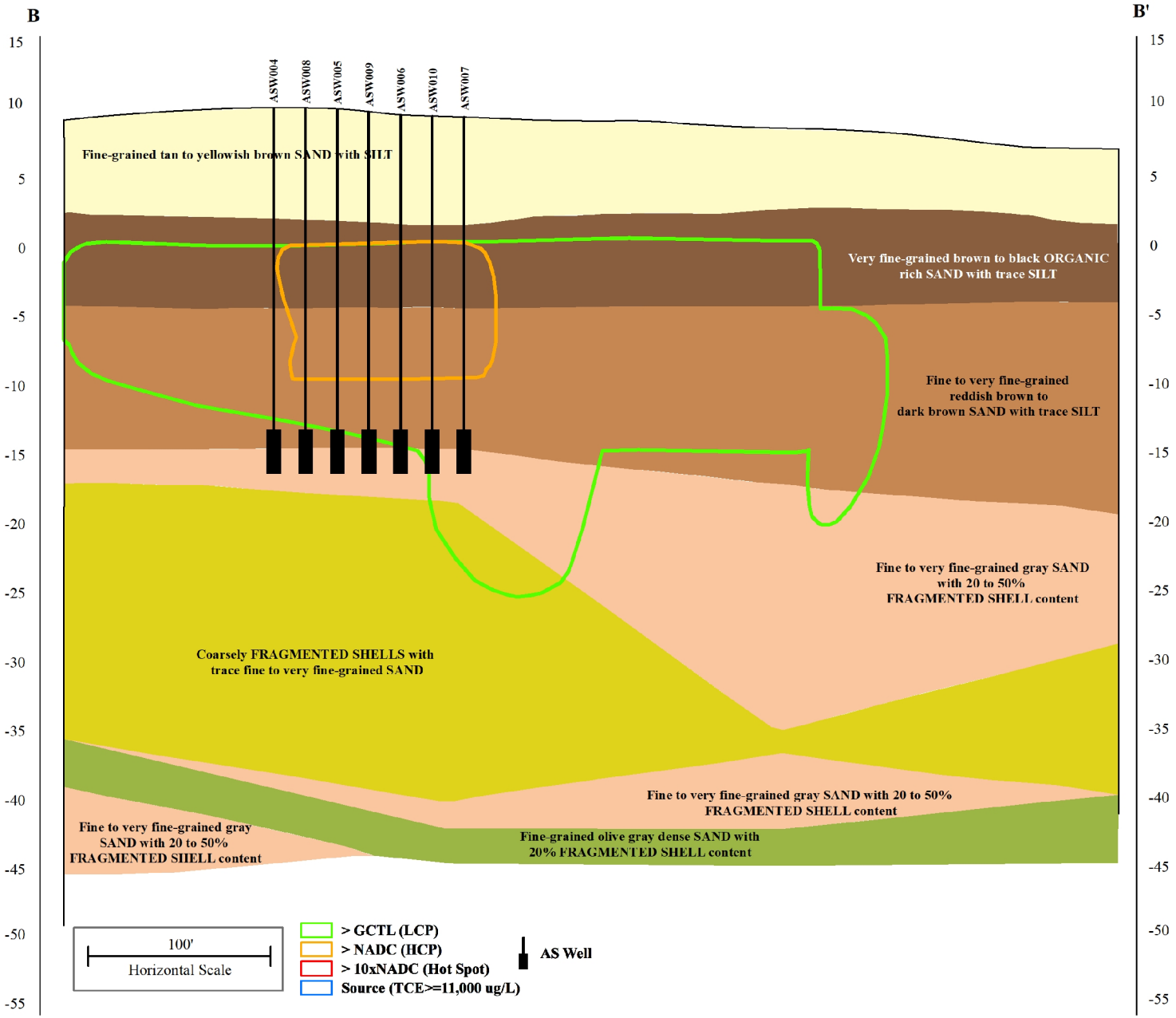
JAX C:\GIS\KSC\MXD\POL\CROSS SECTION DATA\AA CROSS SECTION\A40_AA_PLUMES_COMPOSITE_AS_WELLS_TITLEBLOCK.MXD 01/09/20

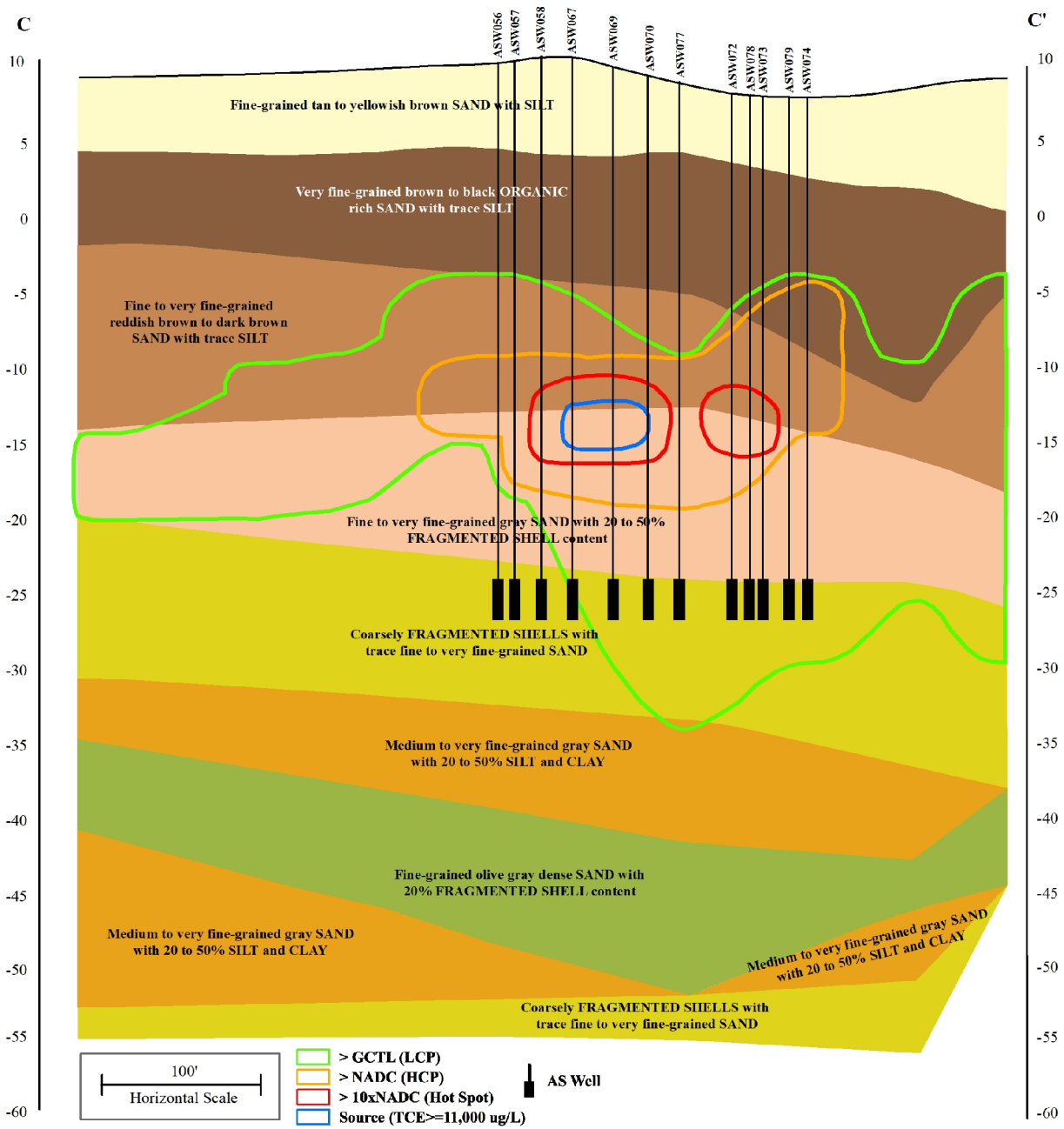
FIGURE 1-5.5CROSS SECTION B - B' AIR SPARGE WELL LAYOUT
SWMU 067, KENNEDY SPACE CENTER, FLORIDA



POL-SW3 LTM-CC-PMR
Revision: 0
February 2023

JAX C:\GIS\KSC\MXD\POL\CROSS SECTION DATA\BB CROSS SECTION\A41_BB_PLUMES_COMPOSITE_AS_WELLS_TITLEBLOCK.MXD 01/09/20

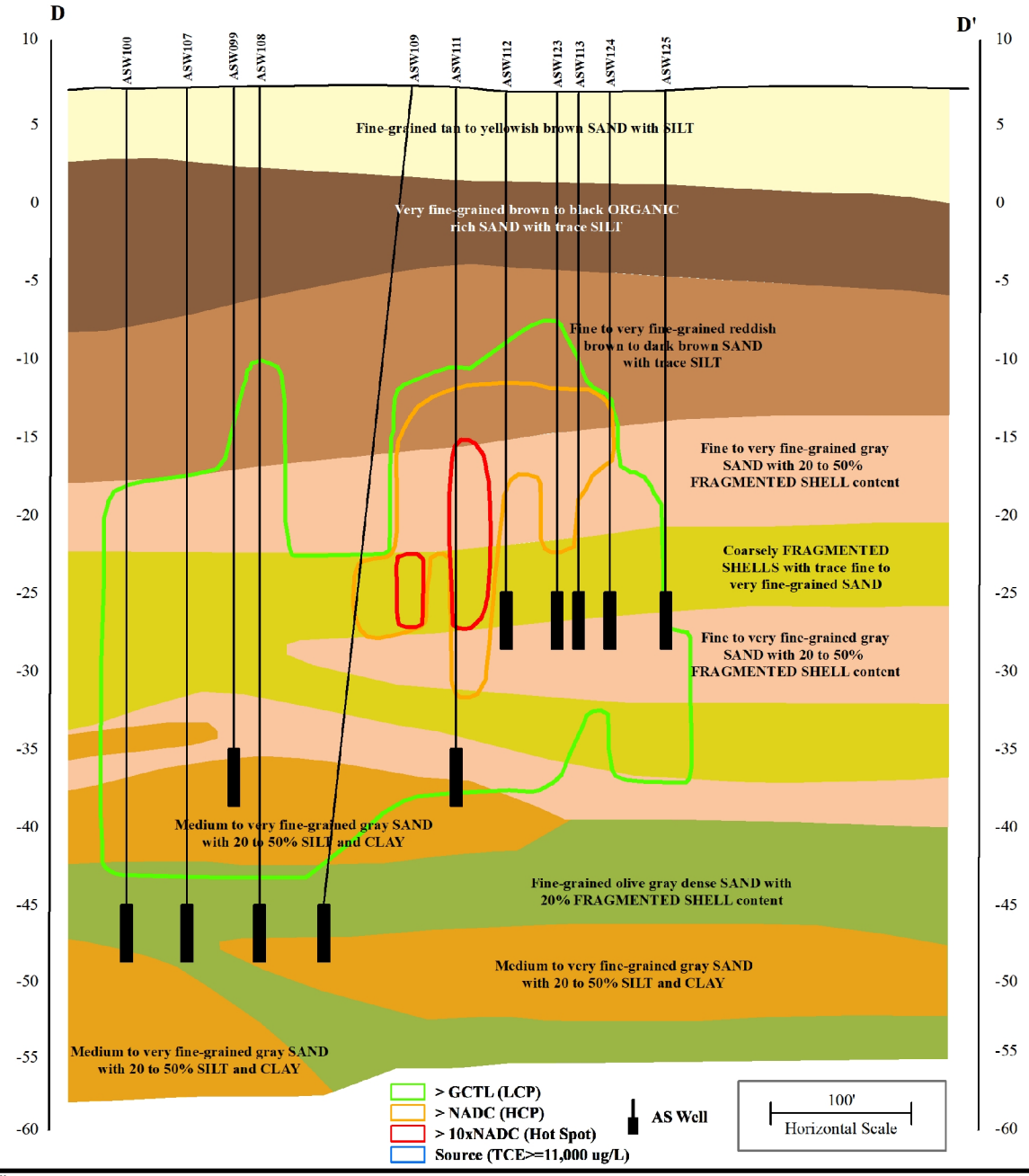
FIGURE 1-6. CROSS SECTION C - C' AIR SPARGE WELL LAYOUT
SWMU 067, KENNEDY SPACE CENTER, FLORIDA



POL-SW3 LTM-CC-PMR
Revision: 0
February 2023

JAX C:\GIS\KSC\MXD\POL\CROSS SECTION DATA\CC CROSS SECTION\A42_CC_PLUMES_COMP_ASW_TITLEBLOCK.MXD 01/09/20

FIGURE 1-7. CROSS SECTION D - D' AIR SPARGE WELL LAYOUT
SWMU 067, KENNEDY SPACE CENTER, FLORIDA



POL-SW3 LTM-CC-PMR
Revision: 0
February 2023

JAX C:\GIS\KSC\MXD\POL\CROSS SECTION DATA\DD CROSS SECTION\A43_DD_PLUMES_COMP_ASW.MXD 01/09/20

SECTION II
AIR SPARGE SYSTEM CONSTRUCTION (POL SOUTHERN TREATMENT AREA)

Construction of the POL Southern Treatment Area AS IM was conducted in accordance with the approved IMWP (NASA, 2018), IWP (NASA, 2020), and SSHASP (NASA, 2019b). Some minor deviations from the IWP were performed based on site conditions (i.e., AS wells moved or angled due to presence of utility lines). The following sections provide an overview of construction activities associated with the AS IM, to include: pre-construction activities, mobilization, and AS system installation. A photographic log of construction activities is presented in Appendix A. Construction completion information was presented to the KSCRT during the September 2021 meeting (Meeting Minute 2109-M05).

2.1 PRE-CONSTRUCTION ACTIVITIES

2.1.1 October 2019 DPT Confirmation Study

Prior to AS system construction, baseline confirmation DPT sampling was conducted in October 2019 at the POL Southern Treatment Area to further support the design and target areas of the AS system. These results were compared to the 2016 Site Characterization results. The POL Southern Treatment Area IWP (NASA, 2020) provides detailed information about this sampling event. This DPT event also included sampling at SW3 and around MW0034S in the POL Northern Area. The following provides a summary of the DPT results with respect to the three investigation target areas:

POL Southern Treatment Area:

- The October 2019 DPT sampling results indicated that the SZ migrated toward the southeast and farther downgradient, as compared to the 2016 Site Characterization.
- Analytical results showed that the northern HS footprint had decreased, as degradation likely occurred along the lateral fringes of the HS.

- The HS migrated farther downgradient toward the southeast, showing a more elongated orientation of the northern HS running diagonally from the northwest toward the southeast through the center portion of the site.

SW3 Area (further discussed in Section 6.3):

- DPT sampling was conducted in areas that were cross-gradient and downgradient of the historic SW3 AS treatment area.

- Observed VC concentrations in the northern portions of the HCP only exceeded State of Florida GCTLs and were below the NADC of 100 µg/L.

- As DPT samples were collected in a progressively downgradient direction toward a surface water canal, observed VC concentrations began increasing, with several intervals exceeding the NADC of 100 µg/L.

Area North of 5th Street (MW0034S, further discussed in Section 6.4.4):

- TCE was detected at a concentration of 130 µg/L, below the NADC of 300 µg/L, indicating a significant concentration reduction from the October 2018 monitoring well sampling event.

- The results of the DPT sampling performed at 25-foot step-outs from monitoring well MW0034S indicated that TCE concentrations exceeded the GCTL of 3 µg/L but were less than its NADC.

Results from the 2019 DPT confirmation study suggested that within the main POL Southern Treatment Area, the northern HS became elongated and ran diagonally from the northwest toward the southeast through the center portion of the site, as compared to the 2016 Site Characterization results, thereby allowing for AS system design optimization and refinement. Further, these results indicated that SW3 required more study prior to incorporating any VC NADC exceedances into the AS system network. The 2019 DPT results also suggested that north of 5th Street, the former TCE HS around monitoring well MW0034S had degraded. Based on this

updated information, it was determined that AS treatment system construction within this area was not warranted.

2.1.2 Project Kickoff

A project kick-off meeting was held at KSC on September 23, 2019, following the KSC Safety Group's review of the SSHASP. Project details, including construction requirements and components of the IMWP, IWP, and KNPR 8715.7 (KSC Construction Contractor Safety and Health Practices Procedural Requirements), were discussed. Permitting and actions required by the KSC Record of Environmental Consideration (REC), Utility Locate/Excavation Permit, Threatened and Endangered Species Survey, Site Plan, and monitoring well permits were obtained or completed prior to field activities. This information, if not previously provided in the IWP (NASA, 2020), is included in Appendix B.

A biological survey was performed by KSC personnel on October 8, 2019. This survey indicated that wetlands and protected and/or threatened and endangered species were not present within the area impacted by construction activities. Well permits were also required to be submitted by the drilling subcontractors to Brevard County for each well. A National Pollutant Discharge Elimination System (NPDES) stormwater construction general permit and Storm Water Pollution Prevention Plan (SWPPP) were required for the proposed site construction activities based on the areas impacted by IM implementation activities. Appropriate pollution prevention control techniques were incorporated to minimize erosion, sedimentation, and properly manage storm water. No air permits were needed, as calculations for COCs and hazardous air pollutants (HAPs) emitted during plume treatment operations were determined to be covered under the current KSC Title V Air Operation Permit (NASA, 2020). A stakeout survey was also completed prior to the utility clearance by the KSC excavation inspectors to mark the locations of new monitoring and AS wells with wooden stakes.

2.2 MOBILIZATION

Project details, including KSC-specific construction requirements and components of the IWP (NASA, 2020) and the SSHASP (NASA, 2019b), were discussed with Tetra Tech field staff and subcontractors prior to initiating installation activities. In addition, daily health and safety

tailgate meetings were held each day prior to work and attended by all Tetra Tech field staff and subcontractor personnel.

2.3 WELL INSTALLATION

Well installation activities were conducted from January 27 to February 25, 2020, and included installation of monitoring wells for performance monitoring, and AS wells for remedial system construction. A field geologist was present during all well installation operations and was responsible for oversight of the Florida-licensed drilling subcontractor, geologic logging, recording of well construction details, and decontamination procedures. Monitoring well completion reports for all newly installed monitoring and AS wells and soil boring logs interpreted during AS well installation are provided in Appendix C. Soil and water generated during the installation and development of wells were handled as Investigation-Derived Waste (IDW) per the KSC IDW Management Plan (NASA, 2006) and as detailed in the POL Southern Treatment Area IWP (NASA, 2020) (see documentation in Appendix H). Soil IDW drums are being processed for disposal at a permitted facility.

2.3.1 Monitoring Well Installation

A total of 13 monitoring wells were installed at varying depths to monitor performance of the AS IM (POL-MW0043S, -MW0043I, -MW0043D, -MW0044I, -MW0044D, -MW0045S, -MW0045I, -MW0045D, -MW0046D, -MW0046DD, -MW0047I, -MW0047D, and -MW0047DD). These wells are further discussed in the baseline and performance monitoring sections of this report, and are shown on Figure 2-1. Well construction details for all newly installed monitoring wells are provided in Table 2-1.

Wells were completed using rotosonic drilling techniques. Each monitoring well was constructed in accordance with the IWP using 1-inch inside diameter (I.D.) Schedule 40 polyvinyl chloride (PVC) casing. Casing sections were flush-joint threaded with a neoprene “O” ring on male threaded end to render the joints airtight. Well screens were 0.010-inch slotted Schedule 40 PVC and were pre-packed with 20/30 grade filter pack. The annular space of the borehole was backfilled with an American Society of Testing and Materials (ASTM) 30/65 fine sand seal

followed by grout (Portland cement-bentonite slurry). The slurry weight of the grout was a minimum of 12.5 pounds per gallon (verified by a mud scale).

Surface completion at each new monitoring well is a stick-up completion (approximately 3-feet) with a 4-inch PVC above-grade protector and centered in a 2-foot by 2-foot concrete pad. Well identification tags were also installed for each new well to properly identify and label each well. Following installation, each monitoring well was developed via purging and evacuation. Each well was professionally surveyed in July 2020 (see Section 2.5).

2.3.2 Air Sparge Well Installation

As shown on Figures 2-1 and 2-2, a total of 145 AS wells were installed within eight treatment zones, and at depths, angles, and diameters identified in Table 2-2. In accordance with the IWP (NASA, 2020), the number of AS wells was based on the area of the HCP and the anticipated radius of influence (ROI) ranging from 15 to 20 feet. Spacing of AS wells in the SZ is based on a conservative ROI of 15 feet to provide overlap and minimize gaps in coverage. Spacing of AS wells in the HS and HCP is based on an ROI of 20 feet. The AS wells were installed using a Geoprobe 8140 sonic drill rig. A total of 65 of the 145 wells were installed via angled drilling in order to avoid tree obstructions, the proximity to the nitrogen gas (GN2) line, general grade instability, and overhead utility lines. Construction details for each AS well, including installation angle for each angled well, are provided in Table 2-2. Additional details about the AS well installation process are provided in the following paragraphs.

During advancement of the 4-inch diameter soil boring at each AS well location, a soil core was collected from the bottom 10-feet of the screened interval to confirm lithologic conditions were conducive for AS screen placement. The soil cores were photographed, and the soil lithology was logged by the field geologist. Each AS well was constructed with one of the following four screened intervals (approximate):

- 11 Shallow (23 to 25 and 25 to 27 feet bls screened intervals);
- 88 Shallow-Intermediate (33 to 35, 33.5 to 35.5, 34 to 36, and 35 to 37 feet bls screened intervals);
- 17 Intermediate (40 to 42, 41 to 43, 42 to 44, and 43 to 45 feet bls screened intervals); or

- 29 Deep (47 to 49, 48 to 50, 50 to 52, 51 to 53, 53 to 55, and 53.5 to 55.5 feet bls screened intervals).

All 145 AS wells were constructed with 1-inch I.D. Schedule 40 PVC. The 1-inch AS wells were installed to various termination depths and constructed with 1-inch 40-micron Shumasoil® diffuser wells screens (20 inches in length). Each well casing was constructed of 1-inch I.D. Schedule 40 PVC.

The filter packs for all AS wells were installed using silica sand of ASTM gradation 20/30. A minimum of 3 feet of bentonite was placed above the filter pack and allowed to hydrate for a minimum of 15 minutes before grouting the wells. Wells were grouted to the surface with a slurry of Portland cement and bentonite. The slurry weight was a minimum of 12.5 pounds per gallon (verified by a mud-scale). The well annulus was pressurized to ensure an adequate seal between the grout and native material. Each AS well was developed until the purge water was clear, which was typically after 5 to 15 gallons of groundwater were purged.

Following trenching and piping activities (described below in Section 2.4), a threaded plug was placed at the top-end of the well tee fitting and in the port on the tee-fitting. The wellhead was buried with hand-compacted soil, and the soil was brought to grade.

2.4 AIR SPARGE SYSTEM INSTALLATION

Mobilization for installation of the AS system was conducted from January 13 to February 25, 2020. Mobilization activities included delivery of straw wattles for erosion control, open excavation signage, excavation equipment, and high-density polyethylene (HDPE) piping spool.

Trenching and piping installation activities were performed from March 19 to May 21, 2020. The header trenching network was excavated to a minimum depth of 24 inches for installation of compressed air conveyance piping from the AS system trailer to the distribution manifold trailer. A total of eight 2-inch header lines were installed from the compressor trailer to the distribution trailer. As specified in the POL Southern Treatment Area IWP (NASA, 2020), the compressor trailer from the Convertor Compressor Building (CCB) site (SWMU 089) was utilized for POL Southern Treatment Area. The compressor in this trailer is capable of 350 cubic feet per minute

(cfm) and 90 pounds per square inch, gauge (psig) at the discharge of the system manifold. The trailer was leveled and anchored to the subsurface in accordance with the Trailer/Equipment Tiedown Plan (NASA, 2001).

From the distribution manifold trailer, lateral piping of 1 inch I.D. HDPE were trenched and installed to each of the 145 AS wells. Soft digging was conducted where trenches were within three feet of identified utilities. The header trenching and lateral trenching layout, as well as cross-sectional details of the trenches, are shown on Figure 2-2 and Figure 2-3, respectively. During excavation activities, straw wattles were placed around trenches to avoid sediment migration and temporary rope fencing with warning signs were installed outside all trenches to warn personnel and public of danger and to prevent accidents.

For AS well connection, AS wellheads were modified to accept the AS conveyance piping. One-inch I.D. Standard Diameter Ratio (SDR)-11 HDPE compressed air conveyance piping was installed from the distribution manifold trailer location to each AS well. Connections of HDPE piping sections and fittings were welded via socket fusion with a heater plate assembly, following piping manufacturer recommendations for heating and cooling times.

From January 13 to 26, 2021, the prefabricated distribution manifold trailer for the AS system was installed and the header and lateral lines were plumbed in. The distribution manifold trailer was installed in a centrally located area to the AS well network as shown on Figure 2-2. Manifold blocks were installed and wall-mounted in the trailer with approximate dimensions of 8 feet wide by 24 feet long. The trailer was leveled and anchored to the subsurface in accordance with the Trailer/Equipment Tiedown Plan (NASA, 2001).

The manifolds were connected directly to the main header lines, which run directly from the AS trailer. From each manifold outlet, quick-connect fittings, a flow meter (0 to 14 scfm), flow regulating needle valve, and pressure gauge (0 to 90 psig scale range) were installed on each line. Check valves were installed on the outlets following the pressure gauge and exit the back of the manifold enclosure through the 5/8-inch opening via push-connect bulkhead fittings. Flexible polyurethane tubing was connected to the bulkhead fittings to push-connect adapters on the 1-inch lateral stub-up from each well. The airflow at each AS well is independently adjustable, and

each AS well has a dedicated manual flow control valve, flow meter, check valve, and pressure gauge at each manifold leg. Each manifold leg can be removed and repaired via compressed air push-connect fittings.

Electrical installation was performed from January 11 to 12, 2021 by Chrome Electric, LLC of Titusville, Florida. Trenching was completed for installation of ground wire and conduit at a minimum depth of 2-feet per the National Electric Code. Single-conductor #10 insulated wire and detectable utility marking tape was installed in all trenches at a depth of approximately 6-inches below land surface for future utility detection. Trenches were backfilled with native soil, compacted, and resurfaced to match existing conditions. Three-phase, 460-volt, 60-hertz, 200-amp power was supplied via position S1 within Load Break Switch (LBS) 415 through a new step-down transformer. The new transformer, cabling, and disconnect were tested by Chrome Electric, LLC. A dedicated enclosure containing a fused disconnect and meter was installed at the southeast corner of 5th Street and C Avenue Southeast. Conduit, groundwire, and cables were installed from the enclosure to the compressor trailer and connected by Chrome Electric, LLC. A metering device was installed to monitor power usage by the AS system for monthly reporting.

Of note, a significant delay occurred between AS well installation (January/February 2020) and electrical installation due to length of time to acquire power for the system. On October 30, 2019, a meeting was conducted between Base Operations and Spaceport Services (BOSS) and NASA electrical departments to formalize the final design approach to complete the electrical design, gain BOSS and NASA approvals, procure the electrical subcontractor, order and receive parts and materials, construct the transformer pad and install conduit, and schedule multiple outages and inspections with BOSS before power was ultimately connected. Additionally, the transformer required 23-weeks from order to receipt. Scheduling of outages could not be conducted until electrical parts were installed and tested onsite.

2.5 AS-BUILT SURVEY

Surveying was conducted by a Florida-licensed land surveyor, Kugelmann Land Surveying, Inc., on July 20, 2020 to provide as-built and topographic details for the post-IM implementation activities. The survey included general topography and significant existing features such as

concrete structures and new monitoring wells. Each monitoring well was marked with a notch on their riser pipe to indicate the proper survey (and water level measurement) location. Horizontal locations were measured to the third order, in meters, and relative to the Florida State Plane Coordinate System, East Zone (North American Datum [NAD] of 1983). Vertical locations were referenced to the NAVD of 1988 with 0.1-foot precision for ground elevations and 0.01-foot precision for top of casting (TOC) elevations. Survey documentation is included in Appendix C.

Table 2-1. Monitoring Well Construction Details

Well Name (POL-)	Installation Date	Well Diameter (inches)	Screen Type	Flush or Above-grade Completion	Total Well Depth (feet)	Screened Interval (feet bls)	T.O.C Elevation (feet above msl)	Coordinates	
								Northing (meters)	Easting (meters)
MW0043S	2/11/2020	1	0.010-inch slot	Above	20	10 - 20	12.95	463365.538	233816.310
MW0043I	2/11/2020	1	0.010-inch slot	Above	30	20 - 30	12.91	463365.693	233814.929
MW0043D	2/11/2020	1	0.010-inch slot	Above	40	30 - 40	12.82	463365.901	233813.141
MW0044I	2/11/2020	1	0.010-inch slot	Above	30	20 - 30	12.89	463380.156	233831.848
MW0044D	2/11/2020	1	0.010-inch slot	Above	40	30 - 40	12.96	463381.652	233831.983
MW0045S	2/11/2020	1	0.010-inch slot	Above	20	10 - 20	12.71	463350.224	233829.356
MW0045I	2/11/2020	1	0.010-inch slot	Above	30	20 - 30	12.72	463348.920	233829.424
MW0045D	2/11/2020	1	0.010-inch slot	Above	40	30 - 40	12.77	463347.507	233829.514
MW0046D	2/11/2022	1	0.010-inch slot	Above	40	30 - 40	11.59	463330.370	233861.545
MW0046DD	2/11/2022	1	0.010-inch slot	Above	50	40 - 50	11.71	463328.994	233861.338
MW0047I	2/11/2020	1	0.010-inch slot	Above	30	20 - 30	10.51	463307.104	233866.414
MW0047D	2/11/2020	1	0.010-inch slot	Above	40	30 - 40	10.49	463305.550	233866.507
MW0047DD	2/11/2020	1	0.010-inch slot	Above	50	40 - 50	10.60	463304.066	233866.564

Notes:

Coordinates are given in NAD_1983_StatePlane_Florida_East (meters), based on a professional survey performed on 7/21/2020

MW = monitoring well

T.O.C. = top of casing

bls = below land surface

msl = mean sea level

Table 2-2. Air Sparge Well Installation Details

Air Sparge Well ID	Operation Location (Zone)	Well Diameter (inch)	Screen Interval (ft bls)	Screen Type	Boring Depth (feet)	Boring Length (feet)	Direction Boring	Boring Angle	Easting	Northing
ASW001	1	1	25-27	40-micron Schumasoil	**25**	**27.5**	**Yes**	**66°**	233,771.13	463,433.03
ASW002	1	1	25-27	40-micron Schumasoil	**27**	**27.5**	**Yes**	**66°**	233,780.58	463,433.03
ASW003	1	1	25-27	40-micron Schumasoil	**27**	**27.5**	**Yes**	**66°**	233,790.03	463,433.03
ASW004	1	1	23-25	40-micron Schumasoil	**25**	**29.2**	**Yes**	**60°**	233,766.41	463,418.45
ASW005	1	1	23-25	40-micron Schumasoil	**25**	**29.2**	**Yes**	**60°**	233,775.85	463,418.45
ASW006	1	1	23-25	40-micron Schumasoil	**25**	**29**	**Yes**	**60°**	233,785.30	463,418.45
ASW007	1	1	23-25	40-micron Schumasoil	**25**	**29**	**Yes**	**60°**	233,794.75	463,418.45
ASW008	1	1	23-25	40-micron Schumasoil	**25**	**29**	**Yes**	**60°**	233,771.13	463,416.66
ASW009	1	1	23-25	40-micron Schumasoil	30	30	No	90°	233,780.58	463,416.66
ASW010	1	1	23-25	40-micron Schumasoil	30	30	No	90°	233,790.03	463,416.66
ASW011	1	1	23-25	40-micron Schumasoil	30	30	No	90°	233,799.48	463,416.66
ASW012	2	1	35-37	40-micron Schumasoil	40	40	No	90°	233,775.85	463,408.48
ASW013	2	1	33-35	40-micron Schumasoil	40	40	No	90°	233,785.30	463,408.48
ASW014	2	1	33-35	40-micron Schumasoil	40	40	No	90°	233,794.75	463,408.48
ASW015	2	1	33-35	40-micron Schumasoil	40	40	No	90°	233,804.20	463,408.48
ASW016	2	1	33-35	40-micron Schumasoil	40	40	No	90°	233,813.65	463,408.48
ASW017	2	1	33-35	40-micron Schumasoil	40	40	No	90°	233,823.10	463,408.48
ASW018	2	1	33-35	40-micron Schumasoil	40	40	No	90°	233,832.55	463,408.48
ASW019	2	1	33-35	40-micron Schumasoil	40	40	No	90°	233,842.00	463,408.48
ASW020	2	1	33-35	40-micron Schumasoil	40	40	No	90°	233,780.58	463,400.29
ASW021	2	1	33-35	40-micron Schumasoil	40	40	No	90°	233,790.03	463,400.29
ASW022	2	1	33-35	40-micron Schumasoil	40	40	No	90°	233,799.48	463,400.29
ASW023	2	1	33-35	40-micron Schumasoil	40	40	No	90°	233,808.93	463,400.29
ASW024	2	1	35-37	40-micron Schumasoil	40	40	No	90°	233,818.37	463,400.29
ASW025	2	1	35-37	40-micron Schumasoil	40	40	No	90°	233,827.82	463,400.29
ASW026	2	1	33.5-35.5	40-micron Schumasoil	40	40	No	90°	233,837.27	463,400.29
ASW027	2	1	33-35	40-micron Schumasoil	40	40	No	90°	233,846.72	463,400.29
ASW028	2	1	33-35	40-micron Schumasoil	**35**	**40**	**Yes**	**74°**	233,785.30	463,392.11

Table 2-2. Air Sparge Well Installation Details - Continued

Air Sparge Well ID	Operation Location (Zone)	Well Diameter (inch)	Screen Interval (ft bls)	Screen Type	Boring Depth (feet)	Boring Length (feet)	Direction Boring	Boring Angle	Easting	Northing
ASW029	3	1	33-35	40-micron Schumasoil	**35**	**38**	**Yes**	**67°**	233,789.68	463,391.38
ASW030	3	1	33-35	40-micron Schumasoil	**35**	**36.5**	**Yes**	**74°**	233,797.28	463,393.00
ASW031	3	1	33-35	40-micron Schumasoil	**39.5**	**40**	**Yes**	**82°**	233,804.88	463,394.63
ASW032	2	1	33-35	40-micron Schumasoil	**35**	**36.5**	**Yes**	**74°**	233,813.65	463,392.11
ASW033	2	1	33-35	40-micron Schumasoil	**38.5**	**40**	**Yes**	**74°**	233,823.10	463,392.11
ASW034	2	1	33-35	40-micron Schumasoil	**35**	**36.5**	**Yes**	**74°**	233,832.55	463,392.11
ASW035	2	1	33-35	40-micron Schumasoil	**38.5**	**40**	**Yes**	**74°**	233,842.00	463,392.11
ASW036	2	1	33-35	40-micron Schumasoil	**35**	**36.5**	**Yes**	**74°**	233,851.44	463,392.11
ASW037	4	1	33-35	40-micron Schumasoil	40	40	No	90°	233,790.03	463,383.93
ASW038	3	1	33-35	40-micron Schumasoil	**39.5**	**40**	**Yes**	**82°**	233,794.88	463,385.61
ASW039	3	1	33-35	40-micron Schumasoil	**35**	**40**	**Yes**	**74°**	233,802.49	463,387.23
ASW040	3	1	33-35	40-micron Schumasoil	**35**	**38**	**Yes**	**67°**	233,810.09	463,388.86
ASW041	4	1	33-35	40-micron Schumasoil	40	40	No	90°	233,818.37	463,383.93
ASW042	4	1	34-36	40-micron Schumasoil	40	40	No	90°	233,827.82	463,383.93
ASW043	4	1	34-36	40-micron Schumasoil	40	40	No	90°	233,837.27	463,383.93
ASW044	4	1	34-36	40-micron Schumasoil	40	40	No	90°	233,846.72	463,383.93
ASW045	4	1	33-35	40-micron Schumasoil	40	40	No	90°	233,856.17	463,383.93
ASW046	4	1	33-35	40-micron Schumasoil	**39.5**	**40**	**Yes**	**82°**	233,794.75	463,375.75
ASW047	3	1	33-35	40-micron Schumasoil	40	40	No	90°	233,800.09	463,379.84
ASW048	3	1	33-35	40-micron Schumasoil	**35**	**36.5**	**Yes**	**74°**	233,805.30	463,374.07
ASW049	3	1	33-35	40-micron Schumasoil	40	40	No	90°	233,807.69	463,381.46
ASW050	3	1	33-35	40-micron Schumasoil	**39.5**	**40**	**Yes**	**82°**	233,812.90	463,375.69
ASW051	4	1	33-35	40-micron Schumasoil	40	40	No	90°	233,815.29	463,383.09
ASW052	4	1	33-35	40-micron Schumasoil	**35**	**35.5**	**Yes**	**82°**	233,823.10	463,375.75
ASW053	4	1	33-35	40-micron Schumasoil	**39.5**	**40**	**Yes**	**82°**	233,832.55	463,375.75
ASW054	4	1	33-35	40-micron Schumasoil	40	40	No	90°	233,842.00	463,375.75
ASW055	4	1	33-35	40-micron Schumasoil	**35**	**35.5**	**Yes**	**82°**	233,851.44	463,375.75
ASW056	4	1	33-35	40-micron Schumasoil	**35**	**35.5**	**Yes**	**82°**	233,799.48	463,367.56

Table 2-2. Air Sparge Well Installation Details - Continued

Air Sparge Well ID	Operation Location (Zone)	Well Diameter (inch)	Screen Interval (ft bls)	Screen Type	Boring Depth (feet)	Boring Length (feet)	Direction Boring	Boring Angle	Easting	Northing
ASW057	3	1	33-35	40-micron Schumasoil	**35**	**35.5**	**Yes**	**82°**	233,802.91	463,366.67
ASW058	3	1	33-35	40-micron Schumasoil	**35**	**36.5**	**Yes**	**74°**	233,810.51	463,368.30
ASW059	3	1	33-35	40-micron Schumasoil	**35**	**38**	**Yes**	**67°**	233,818.11	463,369.92
ASW060	4	1	33-35	40-micron Schumasoil	**35**	**36.5**	**Yes**	**74°**	233,827.82	463,367.56
ASW061	4	1	33-35	40-micron Schumasoil	**35**	**36.5**	**Yes**	**74°**	233,837.27	463,367.56
ASW062	4	1	33-35	40-micron Schumasoil	**35**	**36.5**	**Yes**	**74°**	233,846.72	463,367.56
ASW063	4	1	33-35	40-micron Schumasoil	**35**	**36.5**	**Yes**	**74°**	233,856.17	463,367.56
ASW064	4	1	33-35	40-micron Schumasoil	40	40	No	90°	233,804.20	463,359.38
ASW065	3	1	33-35	40-micron Schumasoil	40	40	No	90°	233,808.11	463,360.90
ASW066	3	1	33-35	40-micron Schumasoil	40	40	No	90°	233,813.32	463,355.13
ASW067	3	1	33-35	40-micron Schumasoil	40	40	No	90°	233,815.71	463,362.53
ASW068	3	1	33-35	40-micron Schumasoil	40	40	No	90°	233,820.92	463,356.76
ASW069	3	1	33-35	40-micron Schumasoil	40	40	No	90°	233,823.31	463,364.15
ASW070	3	1	33-35	40-micron Schumasoil	40	40	No	90°	233,828.52	463,358.38
ASW071	4	1	33-35	40-micron Schumasoil	**35**	**35.5**	**Yes**	**82°**	233,830.92	463,365.78
ASW072	4	1	33-35	40-micron Schumasoil	40	40	No	90°	233,836.12	463,360.01
ASW073	4	1	33-35	40-micron Schumasoil	40	40	No	90°	233,843.72	463,361.63
ASW074	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,851.44	463,359.38
ASW075	3	1	34-36	40-micron Schumasoil	40	40	No	90°	233,818.53	463,349.36
ASW076	3	1	34-36	40-micron Schumasoil	40	40	No	90°	233,826.13	463,350.99
ASW077	3	1	34-36	40-micron Schumasoil	40	40	No	90°	233,833.73	463,352.61
ASW078	4	1	33-35	40-micron Schumasoil	40	40	No	90°	233,841.33	463,354.24
ASW079	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,846.72	463,351.20
ASW080	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,856.17	463,351.20
ASW081	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,865.62	463,351.20
ASW082	6	1	43-45	40-micron Schumasoil	**45**	**47**	**Yes**	**74°**	233,823.75	463,345.77
ASW083	6	1	43-45	40-micron Schumasoil	**45**	**45.5**	**Yes**	**80.5°**	233,831.34	463,345.71
ASW084	6	1	43-45	40-micron Schumasoil	50	50	No	90°	233,838.94	463,346.84

Table 2-2. Air Sparge Well Installation Details - Continued

Air Sparge Well ID	Operation Location (Zone)	Well Diameter (inch)	Screen Interval (ft bls)	Screen Type	Boring Depth (feet)	Boring Length (feet)	Direction Boring	Boring Angle	Easting	Northing
ASW085	6	1	43-45	40-micron Schumasoil	**45**	**47.5**	**Yes**	**72°**	233,842.02	463,345.62
ASW086	6	1	43-45	40-micron Schumasoil	**45**	**47**	**Yes**	**72.5°**	233,851.47	463,345.54
ASW087	5	1	33-35	40-micron Schumasoil	**35**	**37.5**	**Yes**	**68.5°**	233,860.91	463,345.46
ASW088	5	1	33-35	40-micron Schumasoil	**35**	**37.5**	**Yes**	**68.5°**	233,870.38	463,345.38
ASW089	5	1	33-35	40-micron Schumasoil	**35**	**37.5**	**Yes**	**69°**	233,879.81	463,345.30
ASW090	6	1	43-45	40-micron Schumasoil	50	50	No	90°	233,829.01	463,345.73
ASW091	6	1	41-43	40-micron Schumasoil	**43**	**45.5**	**Yes**	**71°**	233,834.19	463,336.54
ASW092	6	1	43-45	40-micron Schumasoil	**45**	**52**	**Yes**	**60°**	233,836.60	463,345.67
ASW093	6	1	41-43	40-micron Schumasoil	**43**	**44**	**Yes**	**78°**	233,841.77	463,336.48
ASW094	6	1	43-45	40-micron Schumasoil	50	50	No	90°	233,846.73	463,336.44
ASW095	6	1	42-44	40-micron Schumasoil	50	50	No	90°	233,856.18	463,336.36
ASW096	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,865.62	463,334.83
ASW097	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,875.07	463,334.83
ASW098	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,884.52	463,334.83
ASW099	7	1	48-50	40-micron Schumasoil	**50**	**65**	**Yes**	**50.5°**	233,832.63	463,336.56
ASW100	7	1	48-50	40-micron Schumasoil	**50**	**59.5**	**Yes**	**57.5°**	233,843.30	463,336.48
ASW101	7	1	48-50	40-micron Schumasoil	**50**	**59.5**	**Yes**	**57.5°**	233,851.53	463,336.40
ASW102	6	1	43-45	40-micron Schumasoil	48.8	48.8	No	90°	233,860.89	463,326.65
ASW103	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,870.34	463,326.65
ASW104	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,879.79	463,326.65
ASW105	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,889.24	463,326.65
ASW106	7	1	51-53	40-micron Schumasoil	**53**	**70.5**	**Yes**	**49°**	233,818.53	463,336.67
ASW107	7	1	48-50	40-micron Schumasoil	**50**	**65**	**Yes**	**50.5°**	233,827.98	463,336.59
ASW108	7	1	48-50	40-micron Schumasoil	**50**	**65**	**Yes**	**50.5°**	233,837.42	463,336.52
ASW109	7	1	48-50	40-micron Schumasoil	**50**	**65**	**Yes**	**51°**	233,860.89	463,319.99
ASW110	7	1	48-50	40-micron Schumasoil	**50**	**52.5**	**Yes**	**74°**	233,860.89	463,318.47
ASW111	6	1	40-42	40-micron Schumasoil	50	50	No	90°	233,865.62	463,318.47
ASW112	5	1	33-35	40-micron Schumasoil	50	50	No	90°	233,875.07	463,318.47

Table 2-2. Air Sparge Well Installation Details - Continued

Air Sparge Well ID	Operation Location (Zone)	Well Diameter (inch)	Screen Interval (ft bls)	Screen Type	Boring Depth (feet)	Boring Length (feet)	Direction Boring	Boring Angle	Easting	Northing
ASW113	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,884.52	463,318.47
ASW114	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,893.96	463,318.47
ASW115	7	1	51-53	40-micron Schumasoil	**53**	**70.5**	**Yes**	**49°**	233,805.72	463,293.92
ASW116	7	1	51-53	40-micron Schumasoil	**53**	**70.5**	**Yes**	**49°**	233,815.17	463,293.92
ASW117	7	1	51-53	40-micron Schumasoil	**53**	**70.5**	**Yes**	**49°**	233,824.62	463,293.92
ASW118	7	1	51-53	40-micron Schumasoil	**53**	**70.5**	**Yes**	**49°**	233,834.07	463,293.92
ASW119	7	1	51-53	40-micron Schumasoil	**53**	**70.5**	**Yes**	**49°**	233,843.52	463,293.92
ASW120	7	1	51-53	40-micron Schumasoil	**53**	**61.5**	**Yes**	**60°**	233,860.89	463,311.81
ASW121	8	1	47-49	40-micron Schumasoil	55	55	No	90°	233,860.89	463,310.28
ASW122	6	1	40-42	40-micron Schumasoil	50	50	No	90°	233,870.34	463,310.28
ASW123	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,879.79	463,310.28
ASW124	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,889.24	463,310.28
ASW125	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,898.69	463,310.28
ASW126	8	1	51-53	40-micron Schumasoil	**53**	**59.5**	**Yes**	**63°**	233,808.93	463,293.92
ASW127	8	1	51-53	40-micron Schumasoil	**53**	**59.5**	**Yes**	**63°**	233,818.37	463,293.92
ASW128	8	1	51-53	40-micron Schumasoil	**53**	**59.5**	**Yes**	**63°**	233,827.82	463,293.92
ASW129	8	1	51-53	40-micron Schumasoil	**53**	**59.5**	**Yes**	**63°**	233,837.27	463,293.92
ASW130	8	1	51-53	40-micron Schumasoil	**53**	**59.5**	**Yes**	**63°**	233,846.72	463,293.92
ASW131	8	1	51-53	40-micron Schumasoil	**53**	**55**	**Yes**	**74°**	233,860.89	463,302.10
ASW132	8	1	53.5-55.5	40-micron Schumasoil	60	60	No	90°	233,865.62	463,302.10
ASW133	6	1	43-45	40-micron Schumasoil	50	50	No	90°	233,875.07	463,302.10
ASW134	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,884.52	463,302.10
ASW135	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,893.96	463,302.10
ASW136	8	1	53-55	40-micron Schumasoil	60	60	No	90°	233,813.65	463,293.92
ASW137	8	1	51-53	40-micron Schumasoil	60	60	No	90°	233,823.10	463,293.92
ASW138	8	1	50-52	40-micron Schumasoil	60	60	No	90°	233,832.55	463,293.92
ASW139	8	1	51-53	40-micron Schumasoil	55	55	No	90°	233,842.00	463,293.92
ASW140	8	1	48-50	40-micron Schumasoil	55	55	No	90°	233,851.44	463,293.92

Table 2-2. Air Sparge Well Installation Details - Continued

Air Sparge Well ID	Operation Location (Zone)	Well Diameter (inch)	Screen Interval (ft bls)	Screen Type	Boring Depth (feet)	Boring Length (feet)	Direction Boring	Boring Angle	Easting	Northing
ASW141	8	1	50-52	40-micron Schumasoil	55	55	No	90°	233,860.89	463,293.92
ASW142	8	1	48-50	40-micron Schumasoil	60	60	No	90°	233,870.34	463,293.92
ASW143	6	1	41-43	40-micron Schumasoil	50	50	No	90°	233,879.79	463,293.92
ASW144	6	1	43-45	40-micron Schumasoil	50	50	No	90°	233,889.24	463,293.92
ASW145	5	1	33-35	40-micron Schumasoil	40	40	No	90°	233,898.69	463,293.92

Notes:

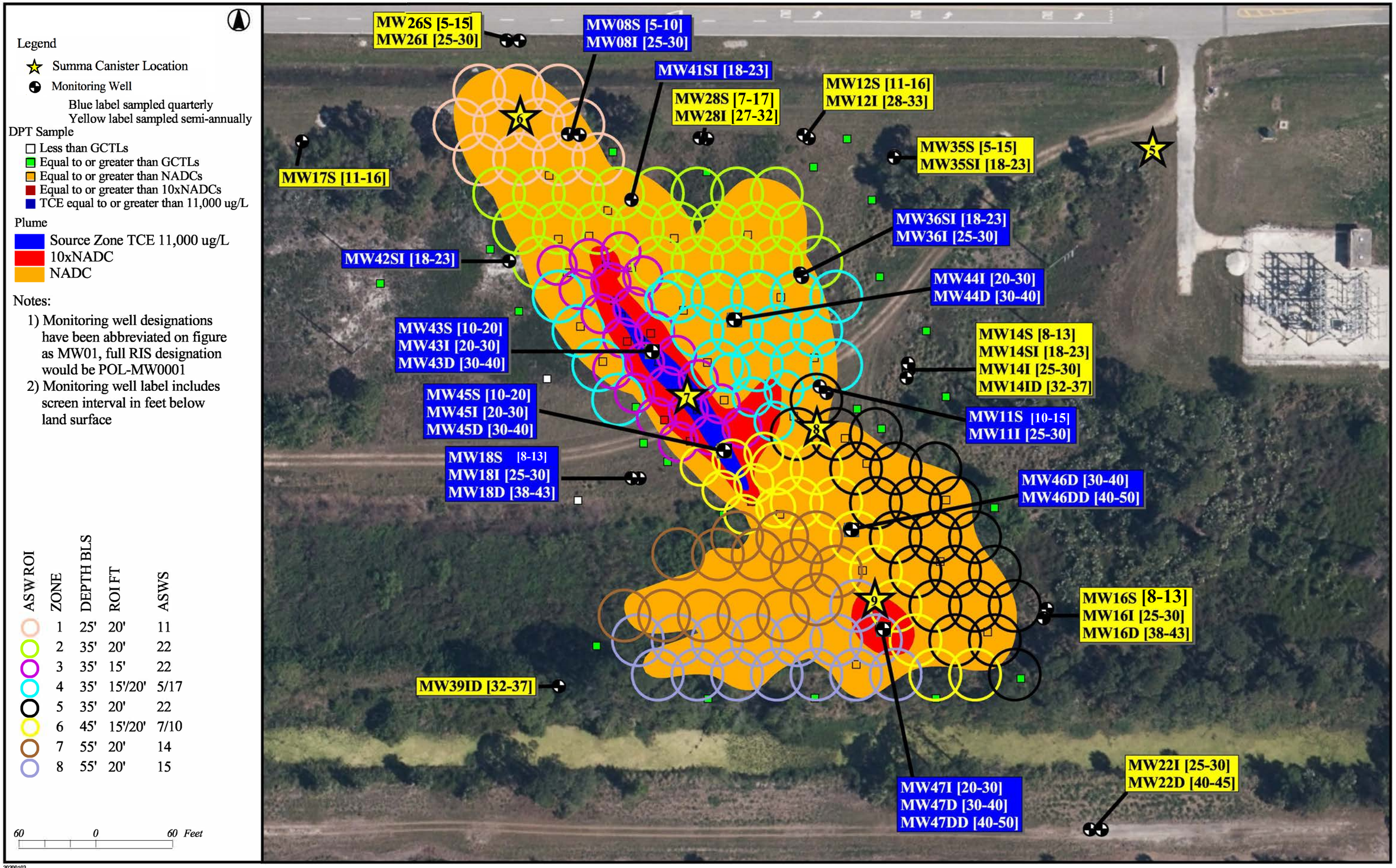
ft bls = feet below land surface.

All final air sparge well surface completion is subsurface.

Air sparge wells were installed between January 29, 2020 and February 24, 2020.

All air sparge well coordinates were collected by field hand-held Global Positioning System with submeter accuracy.

Easting and Northing readings in meters


Legend
Summa Canister Location
Monitoring Well
Blue label sampled quarterly
Yellow label sampled semi-annually
DPT Sample
Less than GCTLs
Equal to or greater than GCTLs
Equal to or greater than NADCs
Equal to or greater than 10xNADCs
TCE equal to or greater than 11,000 ug/L
Plume
Source Zone TCE 11,000 ug/L
10xNADC
NADC
Notes:
1) Monitoring well designations have been abbreviated on figure as MW01, full RIS designation would be POL-MW0001
2) Monitoring well label includes screen interval in feet below land surface
ASW ROI
ZONE
DEPTH BLS
ROI FT
ASWS
1 25' 20' 11
2 35' 20' 22
3 35' 15' 22
4 35' 15'/20' 5/17
5 35' 20' 22
6 45' 15'/20' 7/10
7 55' 20' 14
8 55' 20' 15
60 0 60 Feet
MW26S [5-15]
MW26I [25-30]
MW08S [5-10]
MW08I [25-30]
MW41SI [18-23]
MW28S [7-17]
MW28I [27-32]
MW12S [11-16]
MW12I [28-33]
MW17S [11-16]
MW35S [5-15]
MW35SI [18-23]
MW36SI [18-23]
MW36I [25-30]
MW42SI [18-23]
MW44I [20-30]
MW44D [30-40]
MW43S [10-20]
MW43I [20-30]
MW43D [30-40]
MW14S [8-13]
MW14SI [18-23]
MW14I [25-30]
MW14ID [32-37]
MW45S [10-20]
MW45I [20-30]
MW45D [30-40]
MW11S [10-15]
MW11I [25-30]
MW18S [8-13]
MW18I [25-30]
MW18D [38-43]
MW46D [30-40]
MW46DD [40-50]
MW16S [8-13]
MW16I [25-30]
MW16D [38-43]
MW39ID [32-37]
MW47I [20-30]
MW47D [30-40]
MW47DD [40-50]
MW22I [25-30]
MW22D [40-45]

20200103

FIGURE 2-2 TRENCHING AIR SPARGING LAYOUT MAP
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

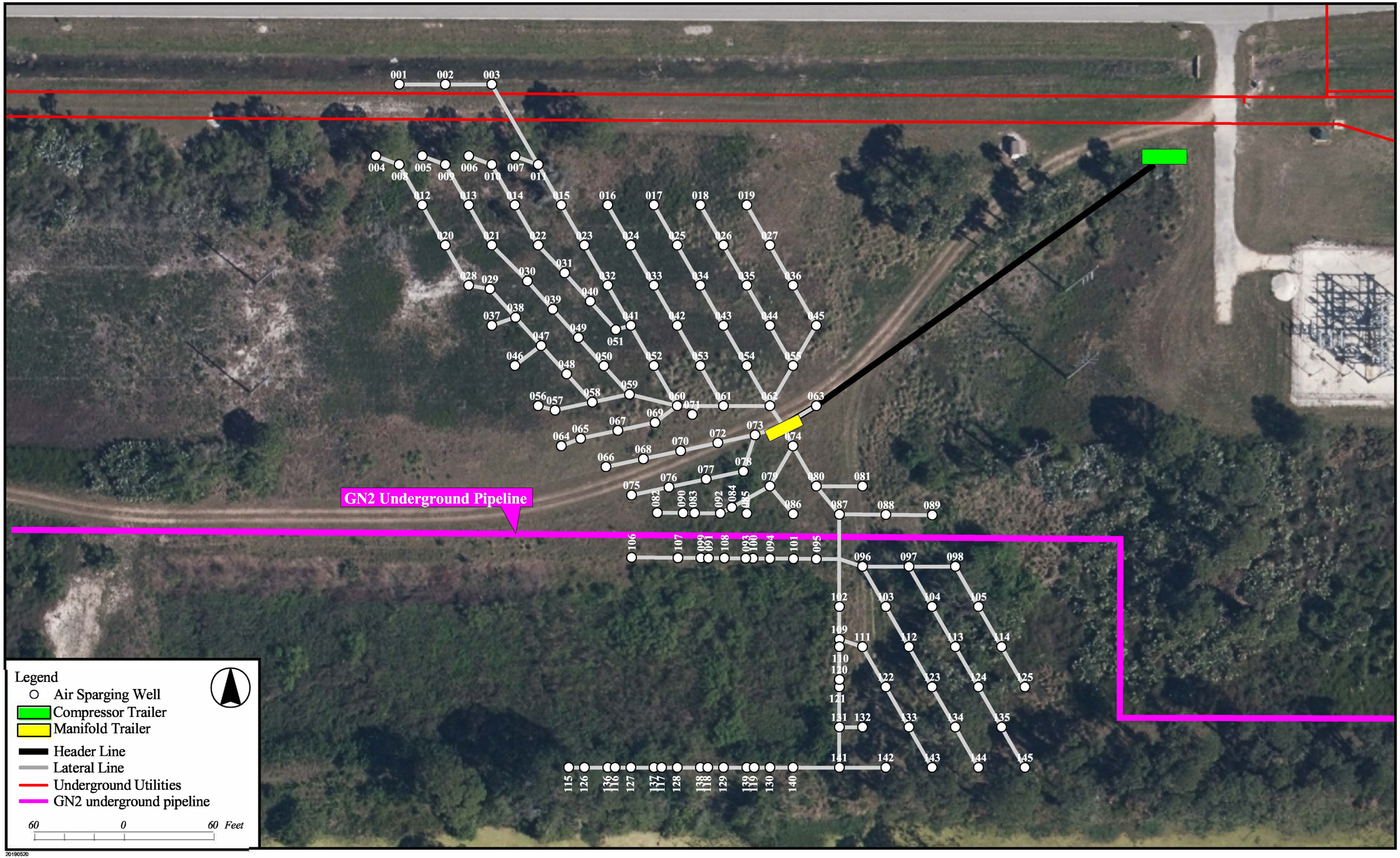
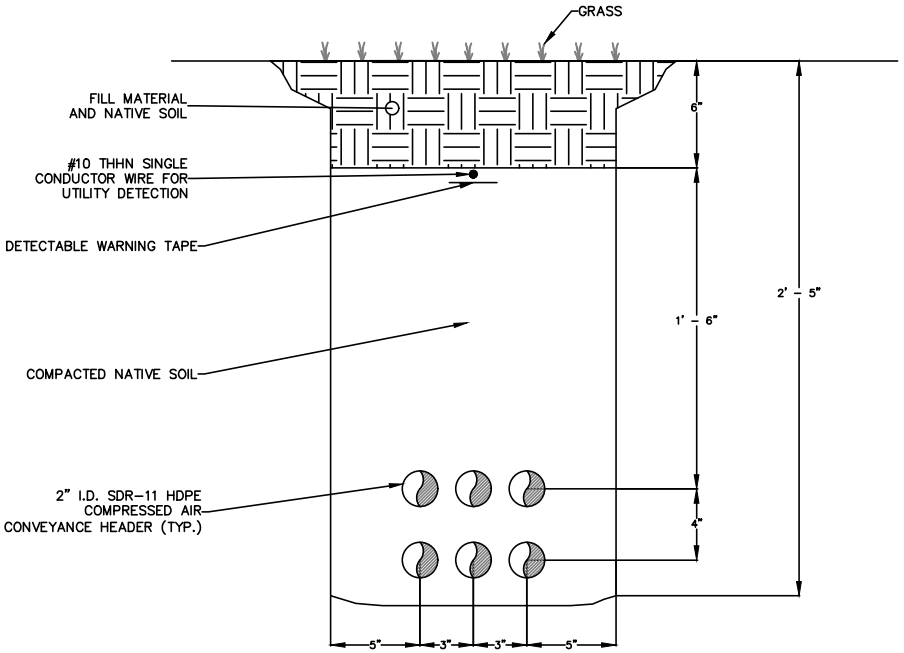


FIGURE 2-3 TYPICAL CROSS SECTION DETAIL

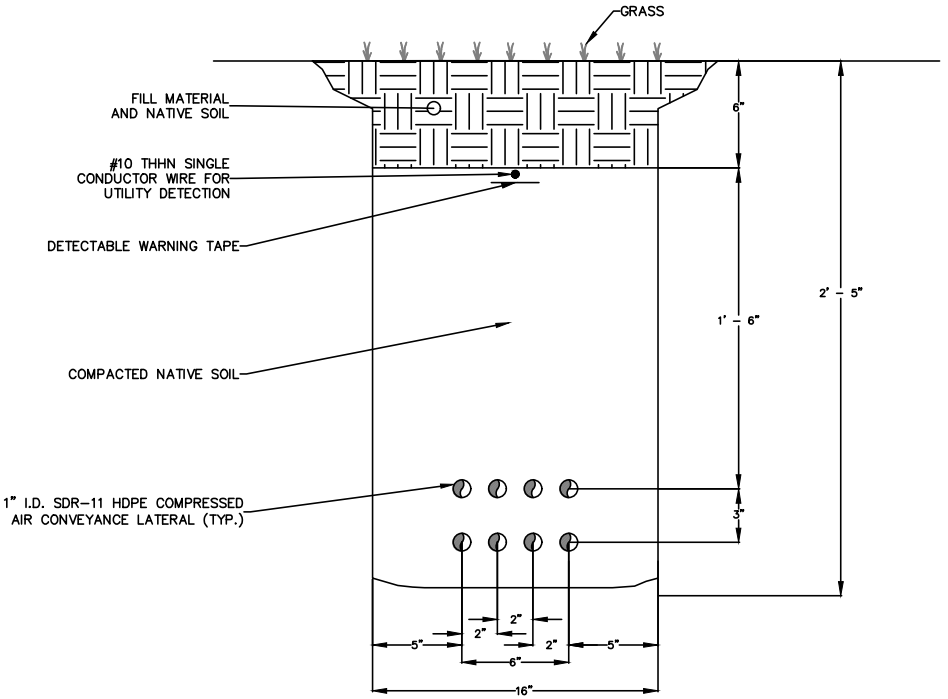
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



HEADER

TRENCH CROSS SECTION C–C'

NOT TO SCALE



LATERAL

TRENCH CROSS SECTION D–D'

NOT TO SCALE

NOT TO SCALE

POL-SW3 LTM-CC-PMR
Revision: 0
February 2023

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SECTION III
BASELINE SAMPLING FOR THE POL SOUTHERN TREATMENT AREA

A baseline groundwater sampling event was conducted prior to startup and operation of the POL Southern Treatment Area AS system to verify levels of contamination identified in the IMWP (NASA, 2018) and IWP (NASA, 2020), as well as to provide a baseline for comparison during system operation. Baseline air quality data was also collected prior to AS system construction and startup.

3.1 GROUNDWATER SAMPLING METHODS

Baseline groundwater sampling was conducted from April 21 to 23, 2020 (before system startup) and included 24 performance monitoring wells (see Table 3-1 for list of baseline sampling wells). Groundwater sampling activities were conducted in accordance with the KSC SAP for the RCRA Program at KSC (NASA, 2017b) and FDEP Standard Operating Procedure (SOP) FS 2200 (FDEP, 2017b). Baseline depth-to-water was recorded in October 2020, and is further discussed in Section V of this report. Peristaltic pumps were used for purging and sampling. Baseline dissolved oxygen (DO) concentrations were recorded, and VOC samples were collected using a low-flow sampling technique. Samples were submitted to ENCO of Orlando, Florida for analysis of VOCs via USEPA Method SW-846 8260D. Sample log sheets are provided in Appendix D, and chain-of-custody forms and laboratory analytical results are provided in Appendix E.

3.2 BASELINE GROUNDWATER RESULTS

Based on depth-to-water measurements collected during the baseline sampling event in April 2020, groundwater generally flows downgradient from the northwest section of the Southern Treatment Area to the southeast. Towards the southern end of the site, groundwater flow direction turns to have a more southerly flow.

Results from the baseline groundwater sampling event for COCs (TCE, cDCE, tDCE, and VC) are summarized in Table 5-1; this table also includes data from quarterly performance monitoring events, which are later discussed in Section V. Monitoring well locations (in relation

to AS radius of influence) are presented on Figure 2-1, and baseline analytical results are presented on Figures 3-1 to 3-3. The baseline analytical figures show the groundwater plume configuration for each interval (shallow, intermediate, deep) using baseline monitoring well sampling results from April 2020. The boundaries shown do not incorporate all the data from the baseline DPT event in October 2019, which was documented in the POL Southern Treatment Area IWP and used to refine the AS treatment footprint (previously discussed in Section 1.3 and shown on Figure 2-1). The baseline monitoring well plume configuration will be used to evaluate changes in plume conditions using performance monitoring well data (later discussed in Section V).

TCE was detected in eight of the 24 groundwater samples collected, with all eight samples above the GCTL of 3 µg/L. The highest TCE concentration of 10,000 µg/L was observed at monitoring well MW0043I, which is screened from 20 to 30 feet bls. In general, the highest TCE concentrations were detected in monitoring wells screened between 20 to 30 feet bls (2,400 µg/L at MW0045I; 190 µg/L at MW0036SI; and 130 µg/L at MW0011I).

Concentrations of cDCE ranged from non-detect to 1,500 µg/L. The highest cDCE concentrations of 1,500 µg/L and 830 µg/L were measured in groundwater collected from MW0043I and MW0045I, respectively, which are the same two locations that had the highest TCE concentrations.

Concentrations of tDCE ranged from non-detect to 400 µg/L. The highest tDCE concentrations of 400 µg/L and 280 µg/L were measured in groundwater collected from MW0045I and MW0043I, respectively, which are both screened in SZ in the 20 to 30 foot bls interval.

VC was detected above the GCTL in groundwater collected from 13 of the 24 monitoring wells sampled during the April 2020 baseline sampling event. The highest VC concentration of 360 µg/L was detected in MW0047I, which is screened from 20 to 30 feet bls.

3.3 BASELINE AIR MONITORING

During construction activities, photoionization detector (PID) readings were collected from the breathing zone continuously each day. No PID readings were detected above pre-construction

ambient air conditions. Prior to and during system startup, 8-hour composite air samples were collected from five locations, as shown on Figure 2-1. Air samples were collected at the five locations using a 6-liter Summa canister and an 8-hour composite pressure regulator, which occurred on January 25, 2021 (prior to startup), and January 24, 2022 (one year after startup). The Summa canister samples were analyzed by ENCO Laboratories, Inc. of Jacksonville, Florida using USEPA Method TO-15.

No analytes were detected at concentrations exceeding the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs) or American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) during these sampling events. Table 3-2 provides a summary of the air sample collection dates and laboratory analytical results for corresponding groundwater COCs. Laboratory analytical results are provided in Appendix E.

Table 3-1. POL STA Performance Monitoring Sampling Rationale.

Monitoring Well (POL-)	Screened Interval (feet bls)	Baseline and Quarterly Sampling	Semi-annual Sampling	Rationale
MW0008S	5 to 10	X	-	Monitor treatment performance in the HCP.
MW0008I	25 to 30	X	-	Monitor treatment performance in the HCP.
MW0011S	10 to 15	X	-	Monitor treatment performance in the HCP.
MW0011I	25 to 30	X	-	Monitor treatment performance in the HCP.
MW0012S	11 to 16	-	X	Monitor upgradient and eastern edge of HCP.
MW0012I	28 to 33	-	X	Monitor upgradient and eastern edge of HCP and treatment zone.
MW0014S	8 to 13	-	X	Monitor eastern edge of HCP.
MW0014SI	18 to 23	-	X	Monitor eastern edge of HCP.
MW0014I	25 to 30	-	X	Monitor eastern edge of HCP.
MW0014ID	32 to 37	-	X	Monitor eastern edge of HCP.
MW0016S	8 to 13	-	X	Monitor downgradient of STA.
MW0016I	25 to 30	-	X	Monitor downgradient of STA.
MW0016D	38 to 43	-	X	Monitor downgradient of STA.
MW0017S	11 to 16	-	X	Monitor west of HCP and STA treatment zone.
MW0018S	8 to 13	X	-	Monitor treatment performance at HCP edge and downgradient of SZ.
MW0018I	25 to 30	X	-	Monitor treatment performance at HCP edge and downgradient of SZ.
MW0018D	38 to 43	X	-	Monitor treatment performance at HCP edge and downgradient of SZ.
MW0022I	25 to 30	-	X	Monitor downgradient of STA.
MW0022D	40 to 45	-	X	Monitor downgradient of STA.
MW0026S	5 to 15	-	X	Monitor upgradient of treatment zone and HCP.
MW0026I	25 to 30	-	X	Monitor upgradient of treatment zone and HCP.
MW0028S	7 to 17	-	X	Monitor upgradient of treatment zone and HCP.
MW0028I	27 to 32	-	X	Monitor upgradient of treatment zone and HCP.
MW0035S	5 to 15	-	X	Monitor upgradient of treatment zone and HCP.
MW0035SI	18 to 23	-	X	Monitor upgradient of treatment zone and HCP.
MW0036SI	18 to 23	X	-	Monitor treatment performance in HCP area.
MW0036I	25 to 30	X	-	Monitor treatment performance in HCP area.
MW0039ID	32 to 37	-	X	Monitor downgradient of HCP.
MW0041SI	18 to 23	X	-	Monitor treatment performance in HCP area.
MW0042SI	18 to 23	X	-	Monitor treatment performance at HCP edge.
MW0043S	10 to 20	X	-	Monitor treatment performance in SZ area.
MW0043I	20 to 30	X	-	Monitor treatment performance in SZ area.
MW0043D	30 to 40	X	-	Monitor treatment performance in SZ area.
MW0044I	20 to 30	X	-	Monitor treatment performance in the HCP area.
MW0044D	30 to 40	X	-	Monitor treatment performance in the HCP area.
MW0045S	10 to 20	X	-	Monitor treatment performance in SZ area.
MW0045I	20 to 30	X	-	Monitor treatment performance in SZ area.
MW0045D	30 to 40	X	-	Monitor treatment performance in SZ area.
MW0046D	30 to 40	X	-	Monitor treatment performance in the HCP area.
MW0046DD	40 to 50	X	-	Monitor treatment performance in the HCP area.
MW0047I	20 to 30	X	-	Monitor treatment performance in the HS area.
MW0047D	30 to 40	X	-	Monitor treatment performance in the HS area.
MW0047DD	40 to 50	X	-	Monitor treatment performance in the HS area.

Notes:
bls = below land surface.
HCP = high concentration plume.
HS = hot spot.
SZ = source zone.

Table 3-2. Air Sample Analytical Results

LOCATION ID (POL-)	SAMPLE ID	SAMPLE DATE	TCE ($\mu g/m^3$)	cDCE ($\mu g/m^3$)	tDCE ($\mu g/m^3$)	VC ($\mu g/m^3$)	Freon 113 ($\mu g/m^3$)
AMB5	POL-AMB5-20210125	1/25/2021	2.47 U	1.98 U	1.67 U	1.89 U	3.22 U
AMB6	POL-AMB6-20210125	1/25/2021	2.58 U	2.06 U	1.74 U	1.94 U	3.37 U
AMB7	POL-AMB7-20210125	1/25/2021	2.58 U	2.06 U	1.74 U	1.97 U	3.37 U
AMB8	POL-AMB8-20210125	1/25/2021	2.63 U	2.10 U	1.78 U	1.99 U	3.45 U
AMB9	POL-AMB9-20210125	1/25/2021	2.69 U	2.18 U	1.82 U	2.07 U	3.53 U
AMB5	POL-AMB5-20220124	1/24/2022	2.5 U	2.0 U	1.7 U	1.9 U	3.3 U
AMB6	POL-AMB6-20220124	1/24/2022	2.5 U	2.0 U	1.7 U	1.9 U	3.3 U
AMB7	POL-AMB7-20220124	1/24/2022	2.6 U	2.0 U	1.7 U	1.9 U	3.3 U
AMB8	POL-AMB8-20220124	1/24/2022	2.5 U	2.0 U	1.7 U	1.9 U	3.3 U
AMB9	POL-AMB9-20220124	1/24/2022	2.4 U	2.0 U	1.6 U	1.9 U	3.2 U
OSHA PEL	--	--	100,000	NV	NV	NV	7,600,000
ACGIH TLV	--	--	10,000	NV	NV	1,000	1,000,000

Notes:

$\mu g/m^3$ - micrograms per cubic meter.

U = Value was reported as below the method detection limit, therefore the detection limit is shown.

cDCE = cis-1,2-dichloroethene.

TCE = Trichloroethene.

tDCE = trans-1,2-dichloroethene

VC = vinyl chloride.

OSHA PEL refers to the Occupational Safety and Health Administration Permissable Exposure Limits

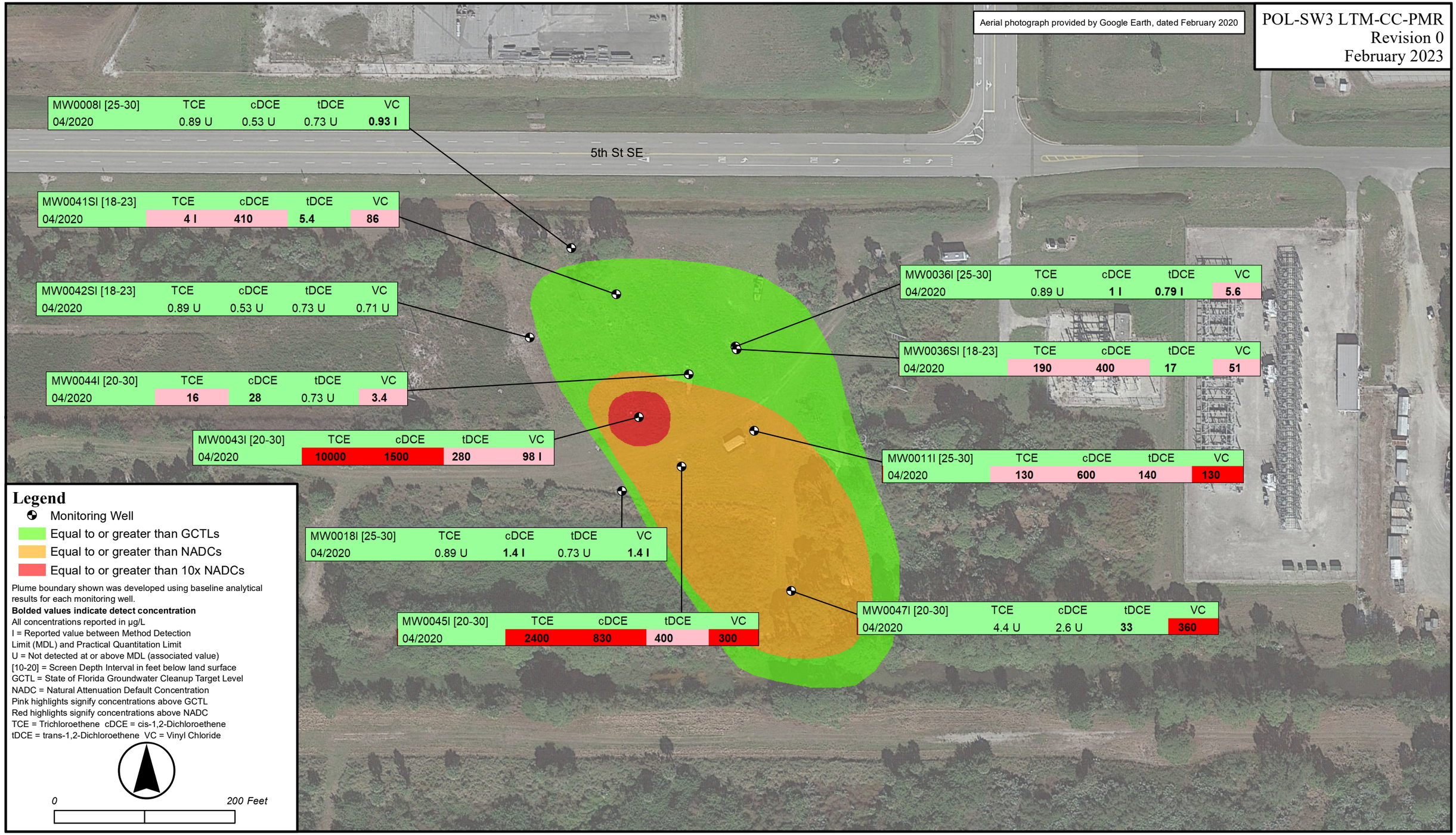
ACGIH TLV refers to the American Conference of Governmental Industrial Hygienists Threshold Limit Values

NV = No Value

FIGURE 3-1 POL SOUTHERN TREATMENT AREA BASELINE GROUNDWATER CONCENTRATIONS – SHALLOW ZONE
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

JAX C:\GIS\KSC\MXD\POL\STEP4\3-1_POL_MWRESULTS_JULY2022_SHALLOW_BASELINE.MXD 02/16/23

FIGURE 3-2 POL SOUTHERN TREATMENT AREA BASELINE GROUNDWATER CONCENTRATIONS – INTERMEDIATE ZONE
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



JAX C:\GIS\KSC\MXD\POL\STEP4\3-2_POL_MWRESULTS_JULY2022_INT_BASELINE.MXD 02/16/23

FIGURE 3-3 POL SOUTHERN TREATMENT AREA BASELINE GROUNDWATER CONCENTRATIONS – DEEP ZONE
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

Aerial photograph provided by Google Earth, dated February 2020

POL-SW3 LTM-CC-PMR
Revision 0
February 2023

5th St SE

MW0043D [30-40]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	0.53 U	0.73 U	0.71 U

MW0044D [30-40]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	**3.6**	0.73 U	**4.6**

MW0018D [38-43]	TCE	cDCE	tDCE	VC
04/2020	**40**	**96**	**4.3**	**9.8**

MW0046D [30-40]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	**15**	**8.4**	**32**

MW0046DD [40-50]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	0.53 U	**6.1**	**0.96 I**

MW0045D [30-40]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	0.53 U	0.73 U	**2.9**

MW0047D [30-40]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	**0.75 I**	**11**	**50**

MW0047DD [40-50]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	0.53 U	**1.2 I**	**1.2 I**

Legend

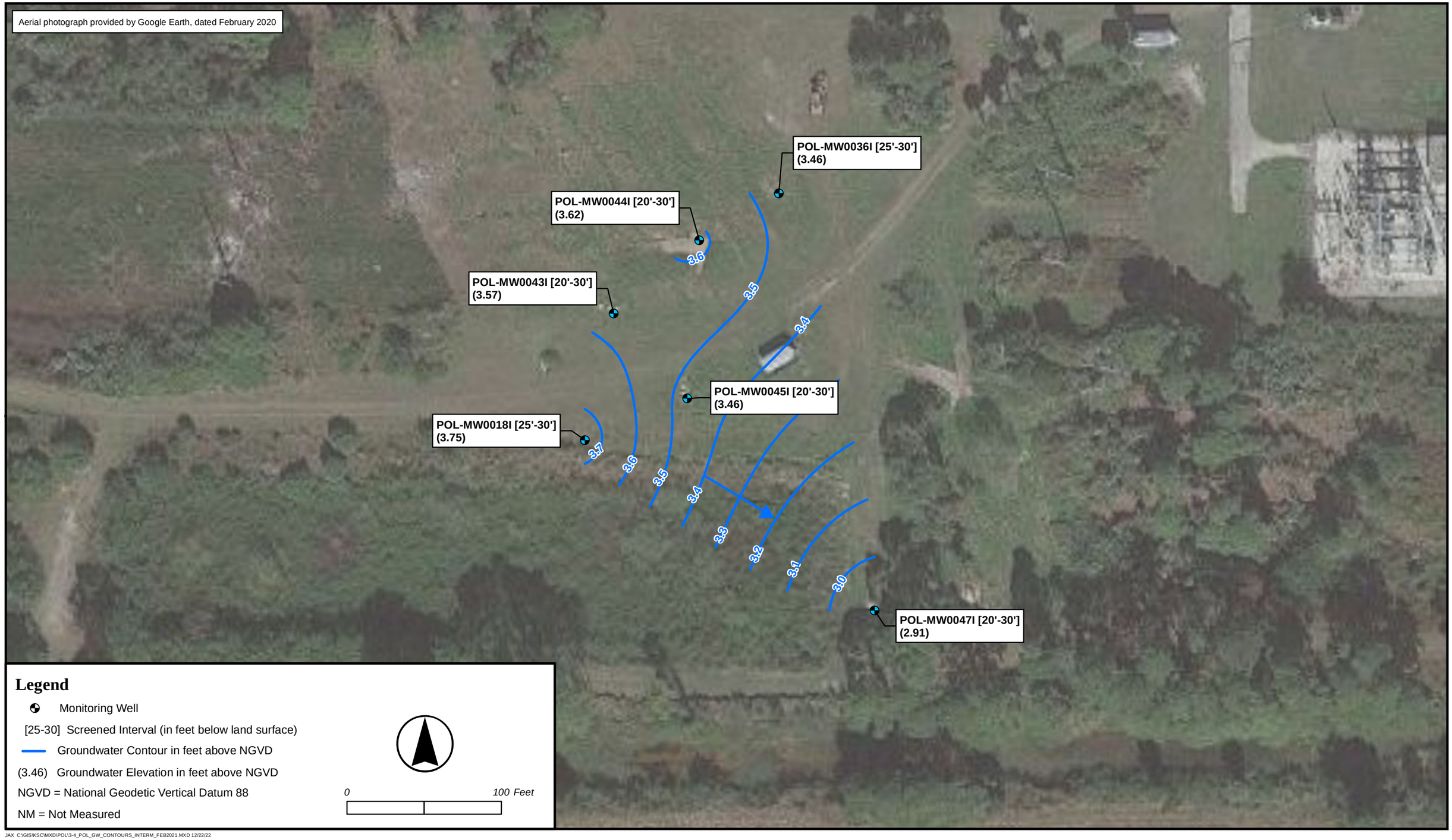
- Monitoring Well
- Equal to or greater than GCTLs

Plume boundary shown was developed using baseline analytical results for each monitoring well.
Bolded values indicate detect concentration
All concentrations reported in µg/L
I = Reported value between Method Detection Limit (MDL) and Practical Quantitation Limit
U = Not detected at or above MDL (associated value)
[10-20] = Screen Depth Interval in feet below land surface
GCTL = State of Florida Groundwater Cleanup Target Level
Pink highlights signify concentrations above GCTL
TCE = Trichloroethene cDCE = cis-1,2-Dichloroethene
tDCE = trans-1,2-Dichloroethene VC = Vinyl Chloride

0 200 Feet

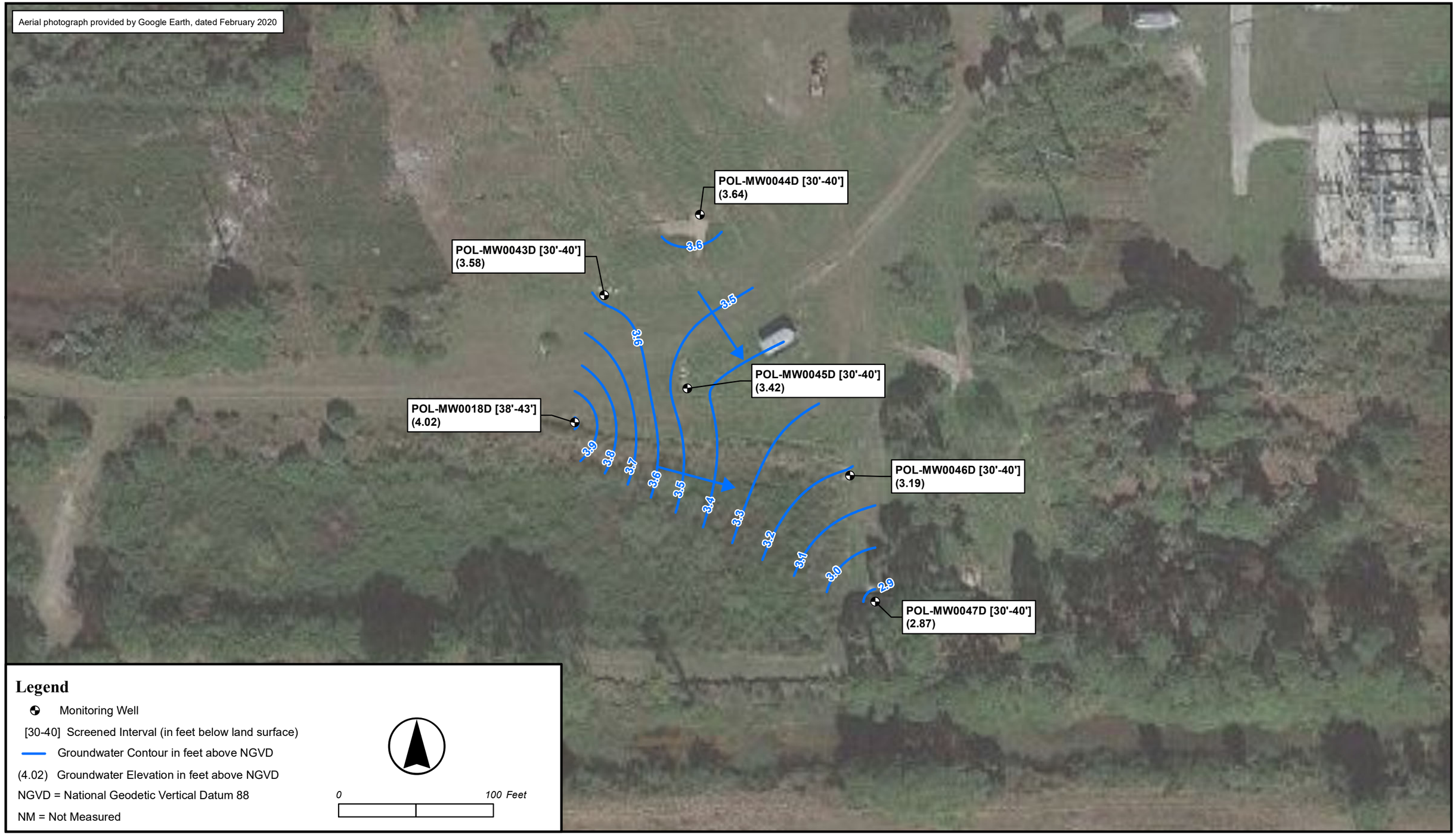
JAX C:\GIS\KSC\MXD\POL\STEP4\3-3_POL_MWRESULTS_JULY2022_DEEP_BASELINE.MXD 02/16/23

FIGURE 3-4 INTERMEDIATE GROUNDWATER CONTOUR MAP - OCTOBER 2020
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



JAX C:\GIS\KSC\MXD\POL\3-4_POL_GW_CONTOURS_INTERM_FEB2021.MXD 12/22/22

FIGURE 3-5 DEEP GROUNDWATER CONTOUR MAP - OCTOBER 2020
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



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SECTION IV
SYSTEM OPERATION AND MAINTENANCE
(POL SOUTHERN TREATMENT AREA)

This section identifies the activities conducted during startup and commissioning, full-scale operation, and Year 1 (Q1 to Q4) and Q5 of AS system operation for the POL Southern Treatment Area AS system. Air monitoring activities are also discussed in this section. The Year 1 and Q5 reporting period for AS operations presented in this report runs from January 2021 to August 2022. System startup and full-scale operational information was presented to the KSCRT during the September 2021 meeting (Meeting Minute 2109-M05) and October 2022 meeting (Meeting Minute 2210-M12).

4.1 SYSTEM START-UP

AS system commissioning and start-up procedures were initiated on January 22, 2021 and continued through February 23, 2021. The objective of commissioning was to confirm that the AS system had been constructed as designed and operates as specified to facilitate any necessary modifications to the system, as well as to gather and evaluate initial operational data.

The inspections verified that all the components of the system, below and above ground, were properly installed in accordance with the IWP (NASA, 2020). A site-specific checklist was completed to ensure that all equipment and instrumentation were properly prepared and lubricated and that protective covers on rotating equipment were in place. Inspections of equipment lockout, safety valves and/or pressure relief devices, and site security devices were also completed. Performance checks and individual component testing were performed to verify that the manifold legs cycled appropriately.

Startup of the AS system was performed sequentially, with focus on each specific unit at a given time. The strategy for startup was to conduct these activities sequentially in order to compare observations and test data to design and performance criteria. The startup check-out involved demonstrating proper functionality of the fail-safe instrumentation and logic, rotary screw air compressor, refrigerated air dryer, all valves and orifices, and condensate treatment. All related

health, safety, and emergency response procedures were in place and reviewed before the startup phase of operation. Before process systems were started, a final check was conducted on the alignment and positioning of all motor drives, valves, safety devices, and control setpoints.

After operation was verified and acceptable at the AS system location, conditions were inspected at the distribution manifolds. At the distribution manifolds, all wells were initially set at 5.0 cfm and at pressures of 14, 20, 26, and 33 psi in the shallow, shallow-intermediate, intermediate, and deep depths, respectively. The distribution manifolds were checked to ensure that the wellhead pressure applied to each well was within design. The pressure regulators at the system manifolds were adjusted to reach the following pressures at the lateral pressure gauges:

- Leg 1 (shallow) - 19.5 psig;
- Legs 2 through 5 (shallow-intermediate) - 26.7 psig;
- Leg 6 (intermediate) - 32.2 psig;
- Leg 7 (deep) - 32.2 psig; and
- Leg 8 (deep) - 38.4 psig.

After the system was running within the expected operating conditions and in accordance with the flow design provided in Table 4-1, the entire system was checked. Readings for flow and pressure at each AS well were collected, as well as operational flows, pressures, and temperatures at all monitoring points in the system. Field data recorded during system startup included temperature and pressure readings at the air dryer discharge and manifold legs, and the total flow from the discharge of the air compressor and manifold legs. In addition, headspace within select performance monitoring wells was screened once per week for the first four weeks of operation with a PID for health and safety monitoring, as well as to verify surface emissions of VOCs were in compliance with the KSC Title V Air Operation Permit. During the startup phase, OM&M activities were performed daily during Week 1 to conduct troubleshooting and debugging activities, as well as to ensure that the system operated as designed. The equipment operations manual was followed for detailed direction of system OM&M.

Startup activities concluded when the design and equipment performance was documented to comply with specifications, and the system was ready for transition into the OM&M phase. All

relevant observations collected in the startup field logbook are provided in Appendix F. System adjustments were made until the system reached a steady-state condition wherein all design criteria were satisfied. Steady-state operation occurred when all systems were running without shutdowns, the mechanical systems were functioning, and the flowrates stabilized. At that point, commissioning and startup of the system was considered complete.

4.2 SYSTEM OPERATION

Following completion of commissioning and startup activities on February 19, 2021, the AS system entered steady-state operation. Prove-out OM&M was performed for the remaining first month of operation to ensure all components of the AS system continued to operate within the design parameters.

Following Month 1 of operation, the remedial system operated as a stand-alone system and only required monthly OM&M visits. Monthly OM&M visits included the following:

- Inspection of the AS system for leakage and excessive vibration, noise, or temperature;
- Inspection of oil levels and lubrication;
- Inspection of the condensate treatment system (air water separator);
- Inspection of the refrigerated air dryer;
- Assessment of differential pressure across filtration units and process equipment;
- Recording of system operational data and comparing data to design conditions and previous operating data; and
- Performing housekeeping.

The system was operated in automatic mode, with the ON/OFF/AUTO and START/STOP functions of the system controlled by the Programmable Logic Controller (PLC) and observed through a Windows-based Human-Machine Interface (HMI). Table 4-1 shows the initial flow design and pulse cycle that ran from start-up to June 2022, with modifications made in January

2022 as indicated in the table. AS flowrates were able to consistently meet the design rate of 5 cfm. During each site visit, the AS wells were observed to meet the design wellhead pressures for each respective depth of 14 pound per square inch (psi) (shallow depth), 20 psi (shallow-intermediate depth), 26 psi (intermediate depth), and 33 psi (deep depth).

The system was shut down for various monitoring and maintenance activities throughout the Year 1 and Q5 operational period. The AS system (including receiver tank, manifolds, etc.) and associated process lines were depressurized prior to conducting maintenance activities. The AS system was shut-down approximately one week prior to each groundwater sampling event in June 2021, September 2021, December 2021, March 2022, and June 2022. Additional system shutdowns included:

- DPT sampling events in March, October, and November 2021 and February and August 2022;
- Replacement of fan bearings and motor fan in April 2021; and
- 8,000-hour compressor maintenance in August 2021.

Another significant factor in downtime included troubleshooting air distribution pathways. During multiple site visits from January through March 2022, preferential pathways were observed in the 5th Street SE south ditch where bubbling and potholes in surface soil were observed at ground surface from adjacent AS well influence. Breakthrough of these preferential pathways were not observed during startup activities, but began after approximately one year of operation. Corrective actions during this time included shutting off the Zone 1 and Zone 2 AS wells to identify the source of the preferential pathways and conduct repairs and earthwork grading in the ditch. Additionally, Zones 3 and 4 were found to be contributing to the bubbling and potholes. Eleven AS wells in Zone 3 and 12 AS wells in Zone 4 were additionally shut off to minimize the preferential pathways. The AS wells have remained off due to less than GCTL VOC concentrations in the performance monitoring wells in this area (MW0036SI, MW0036I, and MW0041SI) and to allow air to be further allocated to other zones.

A summary of system runtime and system downtime during Year 1 (Q1 to Q4) and Q5 is provided in Table 4-2. The overall runtime over the reporting period with full-scale operation (February 2021 through August 2022) was 67%.

Table 4-1. POL STA Pulsing Flow Balance

Zone [Based on Interval]	Zone Number	Number of AS Wells	Flow Per Well (cfm)	Total Zone Flow (cfm)	Time 0:00	4:00	8:00	12:00	16:00	20:00	Operational Hours/Day	cf/day
Shallow 1 [S1]	Zone 1	11	5	55	55	-	-	55	-	-	8	26,400
Shallow Intermediate 1 [SI1]	Zone 2	22	5	110	110	-	-	110	-	-	8	52,800
Shallow Intermediate 2 [SI2]	Zone 3	22	5	110	110	-	-	110	-	-	8	52,800
Shallow Intermediate 3 [SI3]	Zone 4	22	5	110	-	110	-	-	110	-	8	52,800
Shallow Intermediate 4 [SI4]	Zone 5	22	5	110	-	110	-	-	110	-	8	52,800
Intermediate 1 [I1]	Zone 6	17	5	85	-	-	85	-	-	85	8	40,800
Deep 1 [D1]	Zone 7	14	5	70	-	-	70	-	-	70	8	33,600
Deep 2 [D2]	Zone 8	15	5	75	-	-	75	-	-	75	8	36,000
Total AS Wells		**145**	**Total Flow (cfm)**		**275**	**220**	**230**	**275**	**220**	**230**	**64**	**840,000**
			Within System		Under	Under	Under	Under	Under	Under	(Target 90%)	
			Compressor Duty		79%	63%	66%	79%	63%	66%		
			Wells Operating		55	44	46	55	44	46		

Notes:
System Compressor: Atlas Copco GA 75VSD (75 HP) 230/460V/3P motor operating at 350 cfm at 90 psi
AS - air sparge.
cfm - cubic feet per minute.
cf - cubic feet.
Between January and March 2022, all of Zone 1, all of Zone 2, 11 wells in Zone 3, and 12 wells in Zone 4 were shut off due to short circuiting in the 5th Street SE south ditch. These wells remained off due to consistent non-detect VOC concentrations in the performance monitoring wells in this area and to allow air to be further allocated to other areas.

Table 4-2. POL Southern Treatment Area System Operation Runtime

Operational Reporting Period	Total Available Time			System Operational Time				Downtime Contributing Factor
	Month	Days in Month	Hours in Month	Downtime (day)	Downtime (hour)	Runtime (hour)	Runtime (%)	
Year 1: January 2021 through August 2022	Jan-21	NA	NA	NA	NA	NA	NA	System commissioning.
	Feb-21	28	672	6.50	156	516	77%	Outside contractor sampling; System start-up, running at full capacity; DPT sampling.
	Mar-21	31	744	7.50	180	564	76%	DPT sampling.
	Apr-21	30	720	2.00	48	672	93%	Atlas Copco replaced fan bearing and motor fan replaced.
	May-21	31	744	14.00	336	408	55%	Performance monitoring sampling.
	Jun-21	30	720	9.50	228	492	68%	Performance monitoring sampling.
	Jul-21	31	744	0.00	0	744	100%	-
	Aug-21	31	744	4.00	96	648	87%	8,000-hour maintenance (Atlas Copco); groundwater sampling.
	Sep-21	30	720	16.00	384	336	47%	Performance monitoring sampling.
	Oct-21	31	744	9.50	228	516	69%	DPT sampling.
	Nov-21	30	720	4.50	108	612	85%	DPT sampling.
	Dec-21	31	744	19.00	456	288	39%	Performance monitoring sampling.
	Jan-22	31	744	19.25	462	282	38%	Trouble shooting 5th Street SE south ditch short circuits; partial zone operation.
	Feb-22	28	672	12.75	306	366	54%	Trouble shooting 5th Street SE south ditch short circuits; partial zone operation, DPT sampling.
	Mar-22	31	744	18.58	445.92	298	40%	Trouble shooting 5th Street SE south ditch short circuits; partial zone operation, performance monitoring sampling.
	Apr-22	30	720	4.50	108	612	85%	Trouble shooting 5th Street SE south ditch short circuits.
	May-22	31	744	5.50	132	612	82%	Trouble shooting 5th Street SE south ditch short circuits; system shutdown to stabilize after repairing and regrading soil potholes in ditch.
	Jun-22	30	720	14.54	348.96	371	52%	Performance monitoring sampling.
	Jul-22	31	744	8.33	199.92	544	73%	Compressor maintenance.
	Aug-22	31	744	14.50	348	396	53%	DPT sampling.
	Total Year End	**577**	**13,848**	**190.45**	**4570.8**	**9276**	**67%**	

Notes:
NA = not applicable
DPT = direct push technology.

SECTION V
PERFORMANCE MONITORING FOR THE POL SOUTHERN TREATMENT AREA

5.1 PERFORMANCE MONITORING

Performance monitoring was conducted to establish if the AS system is operating properly and if additional action or adjustments are needed. This section discusses the performance monitoring program to evaluate the progress and performance of the POL Southern Treatment Area AS IM. As stated in Section 4.2, the AS system was shut-down approximately one week prior to each groundwater sampling event. Year 1 (Q1 to Q4) and Q5 performance monitoring activities and results, including from supplemental DPT sampling events, were presented to the KSCRT during the October 2022 meeting (Meeting Minute 2210-M12).

5.2 PERFORMANCE MONITORING PROGRAM

Groundwater performance monitoring was conducted on a quarterly basis during the first year of operation in June 2021, September 2021, December 2021, and March 2022 (Q1 to Q4), and in the fifth quarter (Q5) in June 2022. Performance monitoring results were compared to baseline results, which were collected in April 2020 prior to system startup (see Section 3.2). A total of 24 performance monitoring wells were sampled during the baseline and each quarterly event (5 shallow wells, 11 intermediate wells, and 8 deep wells), and an additional 19 monitoring wells were sampled semi-annually (during the Q2 - September 2021 and Q4 - March 2022 events] (7 shallow wells, 8 intermediate wells, and 4 deep wells) to provide a larger dataset to evaluate overall plume conditions in the POL Southern Treatment Area. The locations of the 43 performance monitoring wells are shown on Figure 2-1. All groundwater samples collected were analyzed for VOCs by USEPA Method 8260D. Table 3-1 summarizes the performance monitoring program locations, sampling rationale, and frequencies.

Prior to groundwater sample collection, depth-to-water measurements were obtained from each performance monitoring well to generate groundwater elevation contour maps and determine groundwater flow direction. Low-flow sampling techniques were employed during groundwater sampling activities, and each monitoring well was purged and sampled using a peristaltic pump

and dedicated HDPE tubing. Sample tubing was placed at the mid-point of the well screen. All monitoring wells were purged and sampled in accordance with FDEP SOPs (FDEP, 2017a and 2017b), and applicable sections of the KSC SAP for the RCRA Corrective Action Program (NASA, 2017b). In some instances, both preserved and non-preserved vials were utilized for sample collection due to visibly observed effervescent issues. Unpreserved vials were analyzed within the required hold times. All purge water generated through sampling was containerized on-site in new 55-gallon drums. The drums were placed on a NASA-provided spill pallet and the bell cover was secured with a strap. The bell cover and drums were labeled. Each drum of purge water was sampled and characterized for disposal. After sampling and analysis demonstrated that aqueous IDW was not hazardous waste, it was treated through granular activated carbon and re-sampled to verify results below GCTLs. IDW information is provided in Appendix H.

As previously discussed in Section 3.3, eight-hour composite air samples were collected on January 25, 2021 (prior to startup) and on January 24, 2022 (one year after startup) from the five locations shown in Figure 2-1 (POL-AMB05 through POL-AMB09). The air samples were collected using a 6-liter Summa canister and an 8-hour composite pressure regulator. The Summa canister samples were analyzed by ENCO Laboratories, Inc. of Jacksonville, Florida using USEPA Method TO-15. These samples were used for health and safety monitoring, as well as to verify compliance with the KSC Title V Air Operation Permit. No analytes were detected during either of these sampling events (Table 3-2).

In addition to performance monitoring well results presented in this section, two DPT sampling events are presented, which were conducted in October 2021 (eight months post-startup) and August 2022 (18 months post-startup). These DPT events were conducted to provide additional data points in support of POL Southern Treatment Area performance sampling program, as well as to evaluate LCP boundaries and determine if plume migration is occurring outside of established boundaries.

Sample log sheets are provided in Appendix D, and chain-of-custody forms and laboratory analytical results for all groundwater and air samples are provided in Appendix E.

5.3 PERFORMANCE MONITORING RESULTS

The results of groundwater performance monitoring events were used to assess and confirm the performance of the AS IM and to support optimization of the IM. The Year 1 (Q1 to Q4) and Q5 analytical groundwater results are shown with the baseline results in Table 5-1. A groundwater elevation summary table for the five quarterly performance monitoring events is provided in Table 5-2. Baseline groundwater water levels of select monitoring wells, collected in October 2020, are also provided in Table 5-2 for reference. Field measurement data including pH, temperature, conductivity, turbidity, DO, and oxidation reduction potential (ORP) are shown in Table 5-3. These data are discussed in the following sections.

5.3.1 Water Levels

Water levels were measured at permanent monitoring wells during a baseline water level event in October 2020, and in subsequent quarterly and semi-annual sampling events. These synoptic measurements were converted to groundwater elevations (see Table 5-2), organized into shallow (0 to 20 feet bls), intermediate (20 to 30 feet bls), and deep (30 to 50 feet bls) zones in accordance with the screened intervals, and interpreted onto groundwater contour maps. The resulting potentiometric surface maps, presented as Figures 3-4 and 3-5 for the October 2020 baseline water level event (prior to system start-up), and Figures 5-1 to 5-14 for the June 2021 (water levels collected in May 2021), September 2021, December 2021, March 2022, and June 2022 post-startup quarterly/semi-annual events, were used to illustrate the behavior of groundwater flow specific to each zone and measurement event, and how flow may be affected by AS system operations. Of note, water levels from shallow monitoring wells were not collected during the October 2020 baseline water level event. Additionally, a shallow water level map was not developed for the May/June 2021 water level event based on limited dataset. The following presents a more detailed discussion of the groundwater flow trends as AS system operations progressed during its first year and Q5 of operation.

5.3.1.1 Potentiometric Surface of the Shallow Zone

During Year 1 (Q1 to Q4) and Q5, groundwater flow in the shallow zone of the surficial aquifer showed an initial flow trend to the southeast after six months of AS system operation (September 2021). During the September 2021 synoptic water level measurement, groundwater generally

flows southeast and southwest toward the center of the AS treatment area, then resumes to the south. Specifically, mounding at MW0008S with well-defined radial flow is noted. Downgradient of MW0008S to the east, mounding is also observed at MW0035S. Flow converges from MW0035S to the southwest toward the AS trailer from MW0035S and to the southeast from MW0008S where a southern flow trend continues south of the treatment area toward the canal. In December 2021, a similar trend was observed based on the same reference points. Note, the December 2021 analysis is based upon a limited set of three data points. In March 2022, after approximately one year of AS operation, flow toward the southeast from the northern boundaries of the study area and a northwestern flow toward the ditch parallel to 5th Street S.E was observed. Further, a southwestern flow was noted, with the aforementioned southeastern and the southwestern flow patterns converging toward the center of the site in the vicinity of the AS trailer. During the Q5 performance sampling event (June 2022), groundwater flow in the shallow zone was observed to the southeast; however, this analysis was based on limited data (three points) and did not include the flow elements occurring to the east and west of the AS trailer.

5.3.1.2 Potentiometric Surface of the Intermediate Zone

During the May 2021 performance monitoring event, flow within the intermediate zone of the surficial aquifer at POL trends to the southeast from the northern section of the site, bending more eastward from the center of the site, toward the AS trailer with a steeper gradient approaching the canal to the south. South of the AS trailer, flow becomes more southeastern after three months of system operation. In September 2021, after six months of AS system operation, the intermediate zone shows a convergence of flow toward the center of the site, returning to a southeastern to southern flow direction south of the AS trailer. During the December 2021 Q3 synoptic event, groundwater continues to flow toward the southeast from the northern area of the site, with a slight mounding occurring in the vicinity of the AS trailer, where a northeastern flow element is noted before continuing to flow to the southeast. In March 2022 (Q4), marking one year of system operation, intermediate flow is predominantly to the southeast, with some convergence occurring at a shallower gradient toward the AS trailer. Three months later, during the June 2022 synoptic measurement event, flow maintains a similar path with the predominant

flow direction to the southeast and some convergence toward the AS trailer at a shallow gradient before continuing to the southeast.

5.3.1.3 Potentiometric Surface of the Deep Zone

In May 2021, groundwater within the deep zone generally flows from the northwest to the southeast during this first quarter of Year 1 AS system operation, with convergence noted toward the AS trailer to the south and east and continuing a southeastern flow trend toward POL-MW0047D. In September 2021, after six months of AS operation, the potentiometric surface within the deep zone shows a similar trend, with flow predominating to the southeast and converging toward the center of the site, then flowing more uniformly to the southeast. Three months later, a more uniform southeastern flow was observed starting from the northern section of the site with slight convergence toward the AS trailer, then a steeper hydraulic gradient noted to the southeast and bending to the south and southwest toward the canal to the south. In March 2022 (Q4), marking one year of AS system operation, the deep groundwater contours bend uniformly to the south and southeast toward the center of the site, continuing on a southeast trend toward the lower-lying former wastewater treatment plant holding ponds. In June 2022, representing the fifth quarter of AS system operation, groundwater flow maintains a general southeastern trend, with slight bending toward the center of the site before continuing to the southeast.

5.4 FIELD MEASUREMENTS

Temperature, pH, specific conductance, DO, turbidity, and ORP were measured and recorded in the field during monitoring well sampling activities. These field measurements, compiled during baseline sampling activities in April 2020 and also during the quarterly sampling events during the initial year and Q5 of AS system operation, are summarized in Table 5-3. The sample log sheets prepared in the field are presented in Appendix D.

For each well, groundwater was pumped using a low-flow technique and field readings were collected at set time intervals until the readings stabilized. At that time, a groundwater sample was collected for laboratory analysis. The field measurements were collected and stabilized in accordance with FDEP's SOP for Field Sampling (FS 2200) before groundwater sample

collection, ensuring samples were representative of surficial aquifer conditions. It should be noted that during each quarterly sampling event, select monitoring wells exhibited elevated DO concentrations and turbidity values, which are likely attributed to disturbance from AS activities even though the system was turned off in advance of each sampling event. Table 6-1, detailed in Section VI, provides groundwater field measurements representative of aquifer conditions outside the influence of the AS system. Water pumped from each well was collected and managed as IDW (see IDW logs included in Appendix H).

The following presents a summary of field measurements taken prior to each of the quarterly and semi-annual sampling events conducted during Year 1 and Q5 of AS system operation at POL Southern Treatment Area.

During the April 2020 baseline sampling event, groundwater temperatures in 24 wells sampled ranged from 23.89 to 26.36°C, with an average of 25.21°C. Readings of pH ranged from 4.03 to 6.98, with an average of 5.92. Specific conductance ranged from 124 to 2,976 microSiemens per centimeter (µS/cm), with an average of 1,020 µS/cm. DO values varied from 0.04 to 0.41 milligrams per liter (mg/L), with an average value of 0.14 mg/L. Turbidity readings ranged from 1.62 to 12.33 nephelometric units (NTU), with an average value of 5.40 NTU. ORP readings ranged from -272.1 to -78.5 millivolts (mV), with an average reading of -173.1 mV.

During the June 2021 first quarter sampling event, groundwater temperatures in 24 wells ranged from 27.33 to 32.08°C, with an average of 29.67°C. Readings of pH ranged from 3.44 to 7.30, with an average of 5.51. Specific conductance ranged from 150 to 6,480 µS/cm, with an average of 2,644 µS/cm. DO values varied from 0.08 to 8.10 mg/L, with an average of 0.81 mg/L. Only three monitoring wells, MW0011S, MW0011I, and MW0046DD, reported DO values greater than 20% saturation. Turbidity readings ranged from 1.54 to 1,315.90 NTU, with an average of 60.73 NTU. Only one monitoring well, MW0011I, reported a turbidity reading exceeding 20 NTU. ORP readings ranged from -139.20 to 388.5 mV, with an average reading of 129.10 mV.

During the September 2021 second quarter sampling event (first semi-annual event), groundwater temperatures in 42 wells (readings could not be collected at one well due to dry conditions) ranged from 24.39 to 32.45°C, with an average of 28.76 °C. Readings of pH ranged

from 3.08 to 7.30, with an average of 5.62. Specific conductance ranged from 88 to 5,354 µS/cm, with an average 2,230 µS/cm. DO values varied from 0.03 to 3.65 mg/L, with an average of 0.48 mg/L. Only 6 monitoring wells, MW0008S, MW0016S, MW0028S, MW0043I, MW0046DD, and MW0047DD, reported DO values greater than 20% saturation. Turbidity readings ranged from 1.08 to 61.20 NTU, with an average of 6.73 NTU. Only one monitoring well, MW0028S, reported a turbidity reading exceeding 20 NTU. ORP readings ranged from -215.3 to 444 mV, with an average of 99.2 mV.

During the December 2021 third quarter sampling event, groundwater temperatures in 24 wells ranged from 21.90 to 27.50°C, with an average reading of 25.60°C. Readings of pH ranged from 2.89 to 7.54, with an average of 5.27. Specific conductance ranged from 146 to 4,460 µS/cm, with an average reading of 2,743 µS/cm. DO values varied from 0.03 to 5.40 mg/L, with an average reading of 1,03 mg/L. Only five monitoring wells, MW0011S, MW0011I, MW0046DD, MW0047D, and MW0047DD, reported DO values greater than 20% saturation. Turbidity readings ranged from 1.73 to 53.50 NTU, with one reading also out of range, and with an average of 7.77 NTU. In addition to the well out of range (MW0011I), one other monitoring well, MW0008I, reported a turbidity reading exceeding 20 NTU. ORP readings ranged from -229.2 to 414.0 mV, with an average reading of 123.74 mV.

During the March 2022 fourth quarter sampling event (second semi-annual event), groundwater temperatures in 43 wells ranged from 21.90 to 28.60°C, with an average reading of 25.59°C. Readings of pH ranged from 2.89 to 7.69, with an average reading of 5.88. Specific conductance ranged from 1 to 4,331 µS/cm, with an average of 1,883 µS/cm. DO values varied from 0.03 to 5.91 mg/L, with an average reading of 0.69 mg/L. Only six monitoring wells, MW0011I, MW0035S, MW0045I, MW0046DD, MW0047D, and MW0047DD, reported DO values greater than 20% saturation. Turbidity readings from 0.03 to 27.50 NTU, with one reading out of range, and with an average reading of 4.64 NTU. In addition to the well out of range (MW0026S), one other monitoring well, MW0011I, reported a turbidity value greater than 20 NTU. ORP readings ranged from -161.5 to 546 mV, with an average reading of 46.9 mV.

During the June 2022 fifth quarter sampling event, groundwater temperatures in 24 wells ranged from 25.70 to 30.18°C, with an average reading of 28.90°C. Readings of pH ranged from 3.38 to

7.27, with an average reading of 5.29. Specific conductance ranged from 233 to 4,726 µS/cm, with an average reading of 3,331 µS/cm. DO values varied from 0.04 to 7.10 mg/L, with an average reading of 1.27 mg/L. Only five monitoring wells, MW0011I, MW0045I, MW0046DD, MW0047D, and MW0047DD, reported DO values greater than 20% saturation. Turbidity readings ranged from 2.44 to 62.02 NTU, with an average reading of 11.92 NTU. Only two monitoring wells, MW0011I and MW0047D, reported turbidity readings greater than 20 NTU. ORP readings ranged from -72.7 to 440.7 mV, with an average reading of 156.2 mV.

5.4.1 Groundwater Analytical Results

Quarterly and semi-annual performance monitoring groundwater samples were collected and analyzed in accordance with the prescribed schedule and analyte list (Table 3-1). A summary of results for the baseline event and Year 1 (Q1 to Q4) and Q5 quarterly and semi-annual performance monitoring events for the site's primary COCs are presented in Table 5-1. Laboratory analytical reports are provided in Appendix E. Analytical data is presented on Figures 5-15 to 5-17, with trend graphs presented on Figures 5-18 to 5-20.

Note, monitoring wells located outside but nearby to the active AS area were sampled during the same timeframes as the POL Southern Treatment Area performance monitoring wells, but are part of the POL Northern Area LTM program (discussed in Section VI). Data from select LTM wells have been incorporated into the quarterly discussions below, where applicable, to relate plume conditions outside and nearby to the AS footprint. For example, during the September 2021 event (Q2), MW0034S and MW0033S/I were sampled as part of the annual POL Northern Area LTM program, but are also included in the Q2 discussion and on applicable figures in this section to facilitate visual evaluation of nearby plume conditions. Data for all LTM wells are tabulated in Section VI tables. Also note, MW0026S is part of the POL Southern Treatment Area performance monitoring network (semi-annual schedule) and also the POL Northern Area LTM sampling network (annual schedule), and is therefore included in the discussions below and also later in Section VI.

Figures 5-15 to 5-17 show the groundwater plume configuration for each interval (shallow, intermediate, deep) following the last sampling event from performance monitoring wells documented in this report. The boundaries shown were used to compare to the baseline

monitoring well plume configurations previously discussed in Section III of this report and shown on Figures 3-1 to 3-3.

5.4.1.1 First Quarter Results – June 2021

The first quarter performance monitoring event (Q1) was conducted from June 7-9, 2021, approximately four months after the completion of system startup activities. This event included sampling of 24 monitoring wells (Table 3-1), with five shallow wells (MW0008S, MW0011S, MW0018S, MW0043S, and MW0045S), 11 intermediate wells (MW0008I, MW0011I, MW0018I, MW0036SI, MW0036I, MW0041SI, MW0042SI, MW0043I, MW0044I, MW0045I, and MW0047I), and eight deep wells (MW0018D, MW0043D, MW0044D, MW0045D, MW0046D, MW0046DD, MW0047D, and MW0047DD). Of note, two wells (MW0011S and MW0011I) were not sampled in June 2021 due to monitoring well obstructions. These obstructions were rectified and MW0011S and MW0011I were sampled in August 2021. For the purposes of discussion below, these samples are included in the June 2021 evaluation.

Maximum concentrations in June 2021 were: 71 µg/L (TCE), 270 µg/L (cDCE), 7.9 µg/L (tDCE), and 3.7 µg/L (VC). Of the 24 samples collected, none of samples had COC concentrations greater than NADCs during this sampling event. Only 4 of the 24 samples collected had concentrations of at least one COC that exceeded GCTLs. June 2021 groundwater sample locations and performance monitoring results are shown on Figures 5-15, 5-16, and 5-17, for the shallow, intermediate, and deep intervals, respectively.

Shallow Wells: Five shallow wells sampled in June 2021 (Q1) are located within the AS treatment area, south of 5th Street. After four months of system operation, these locations revealed a decrease in TCE concentrations at MW0043S from above GCTL at 15 µg/L to below GCTL at 2.8 µg/L. However, to the south and southeast of this location, TCE concentrations increased slightly from non-detect at MW0018S during pre-startup to a positive detection of 1.2 µg/L. Similarly, at MW0045S, TCE concentrations increased from non-detect during pre-startup to 3.4 µg/L after four months of AS operation. MW0008S and MW0011S continued to show non-detect levels for TCE, cDCE, tDCE, and VC. On the southwestern side of the manifold trailer, cDCE levels increased from non-detect in MW0018S and MW0045S to 0.63 µg/L and

1.4 µg/L, respectively. Monitoring well, MW0043S, remained relatively stable with a cDCE concentration of 8 µg/L, compared to the 8.6 µg/L baseline concentration.

Intermediate Wells: After four months of system operation, the 11 wells sampled in June 2021 (Q1) within the intermediate zone generally showed a significant reduction in TCE except at MW0036I and MW0042SI. Located northwest of the AS manifold trailer, TCE levels at MW0042SI increased from non-detect during baseline to 14 µg/L. At MW0036I, TCE concentrations increased from non-detect in baseline to 1.7 µg/L. Concentrations of TCE remained above its GCTL at three locations; however, decreasing from pre-startup levels. These concentrations include 9.3 µg/L (down from 190 µg/L) at MW0036SI, 17 µg/L (down from 2,400 µg/L) at MW0045I, and 71 µg/L (down from 10,000 µg/L) at MW0043I. Other GCTL exceedances included 270 µg/L cDCE (down from 400 µg/L) at MW0036SI. No tDCE concentrations were detected above GCTL within the intermediate zone during the Q1 sampling event. VC concentrations above GCTL were found at one location, MW0042SI, with 3.7 µg/L detected, increasing from non-detect during pre-startup.

Deep Wells: During the June 2021 (Q1) sampling event, the eight deep wells sampled revealed a general decrease in COCs. No GCTL exceedances were detected at any of the eight wells. At MW0018D, TCE, cDCE, and VC levels decreased from above GCTLs to non-detect. Specifically, TCE decreased from 40 µg/L, cDCE decreased from 96 µg/L, and VC decreased from 9.8 µg/L from the April 2020 pre-startup event. At MW0044D, MW0045D, MW0046D, and MW0047D, the VC levels were reduced from 4.6 µg/L, 2.9 µg/L, 32 µg/L, and 50 µg/L, respectively, to non-detect.

5.4.1.2 Second Quarter Results – September 2021

The second quarter performance monitoring event (Q2) was conducted in September 2021, approximately seven months after completion of system startup activities. This was also the first semi-annual event where additional wells were sampled. As shown in Table 3-1, a total of 43 wells were sampled during this event and included: 12 shallow monitoring wells (MW0008S, MW0011S, MW0012S, MW0014S, MW0016S, MW0017S, MW0018S, MW0026S, MW0028S, MW0035S, MW0043S, and MW0045S), 19 intermediate wells (MW0008I, MW0011I, MW0012I, MW0014I, MW0014SI, MW0016I, MW0018I, MW0022I, MW0026I, MW0028I,

MW0035SI, MW0036SI, MW0036I, MW0041SI, MW0042SI, MW0043I, MW0044I, MW0045I, and MW0047I) and 12 deep wells (MW0014ID, MW0016D, MW0018D, MW0022D, MW0039ID, MW0043D, MW0044D, MW0045D, MW0046D, MW0046DD, MW0047D, and MW0047DD).

The following summarizes the chemical analyses results for these 43 wells sampled with respect to each sampling interval and the COCs encountered there. During this same timeframe, in September-October 2021, the annual LTM event for POL Northern Area was being conducted (discussed later in Section 6.4); therefore, results from select wells north of the POL Southern Treatment Area (i.e., MW0034S and MW0033I) have been incorporated into the discussion below to relate plume conditions outside of the current POL Southern Treatment Area AS footprint. Note, MW0026S is also part of the POL Northern Area LTM sampling network and is therefore included in the discussion below, and also later in Section VI.

Maximum concentrations in September 2021 were: 27 µg/L (TCE), 66 µg/L (cDCE), 3.9 µg/L (tDCE), and 9.8 µg/L (VC). Of the 43 samples collected, none had COC concentrations greater than NADCs during this sampling event. Only 6 of the 43 samples collected had concentrations of at least one COC that exceeded GCTLs. September 2021 groundwater sample locations and performance monitoring results are shown on Figures 5-15, 5-16, and 5-17, for the shallow, intermediate, and deep intervals, respectively.

Shallow Wells: During the Q2 sampling event in September 2021, the expanded sampling area included 12 shallow wells located near the center of the site, south of 5th Street, and within the roadway. After eight months of system operation, these locations continued to show a general decrease in TCE concentrations. North of the road at MW0034S (located outside of the POL Southern Treatment Area AS treatment zone and sampled as part of the POL Northern Area LTM program where a historical AS system ran until 2018), TCE concentrations decreased from above its NADC at 560 µg/L to below its NADC at 130 µg/L. Along the southern shoulder of 5th Street at MW0026S, TCE levels decreased to below the GCTL from 3.3 µg/L during pre-startup to 2.5 µg/L during the Q2 sampling event. At MW0043S, TCE concentrations further decreased from above the GCTL at 15 µg/L during pre-startup to below the GCTL at 2.8 µg/L during Q1, then to non-detect during the Q2 sampling event. To the south and southeast of this

location, the monitoring well that showed an increase in TCE concentrations from pre-startup to Q1 (MW0018S), was non-detect during the Q2 sampling event. Similarly, at MW0045S, TCE concentrations which increased from non-detect during pre-startup to 3.1 µg/L after four months of AS operation in Q1 was non-detect during the Q2 sampling event. Adjacent to the manifold trailer to the northeast, MW0011S continued to show non-detect levels for TCE, cDCE, tDCE, and VC. The same was true for MW0008S, located in the northwestern section of the treatment area, approaching 5th Street.

On the southwestern side of the manifold trailer, cDCE levels that rose from non-detect to 1.4 µg/L and to 0.63 µg/L at MW0045S and MW0018S, respectively, were non-detect during the Q2 sampling event. Farther north at MW0043S, cDCE decreased to non-detect in Q2 from 8 µg/L in Q1 and 8.6 µg/L during pre-startup. VC exceedances were detected at three wells, located in the vicinity of the road, with concentrations of 9.8 µg/L (MW0026S), 6.9 µg/L (MW0012S), and 2.7 µg/L (MW0017S).

Intermediate Wells: After seven months of system operation, the 19 wells sampled within the intermediate zone in September 2021 (Q2), south and north of 5th Street, generally showed TCE concentrations continuing to decrease. Located northwest of the AS manifold trailer, TCE levels at MW0041SI have continued to decrease from 4.0 µg/L during pre-startup to below its GCTL at 1.7 µg/L during the initial quarter of sampling, and then to non-detect during Q2. Alternately, at MW0036I, TCE concentrations increased from non-detect during pre-startup to 1.7 µg/L during Q1 and 2.1 µg/L in Q2. At MW0047I, non-detect results for TCE persisted through Q2. Concentrations of TCE were above its GCTL at two locations during this sampling event, including 5.7 µg/L at MW0042SI and 27 µg/L at MW0043I. At MW0045I, TCE concentrations continued to decline from the pre-startup level of 2,400 µg/L to 2.1 µg/L in Q2.

The highest cDCE concentration of 270 µg/L during Q1 at MW0036SI decreased to 4 µg/L during Q2, so no GCTL exceedances remained for cDCE during the Q2 sampling event. Concentrations of tDCE showed a general decrease, and all results were below the GCTL. One VC concentration was found to slightly exceed its GCTL during Q2, with a detection of 2.1 µg/L at MW0026I.

In October 2021, MW0033I, which is located north of 5th Street (outside of the POL Southern Treatment Area AS treatment zone) within the fenced area of the POL facility, was sampled as part of the POL Northern Area LTM program. Here, TCE was detected at 160 µg/L, which is greater than the previous GCTL exceedance of 35 µg/L during the November 2020 annual LTM event. A historical AS system previously ran in this area until 2018. Increases of cDCE, tDCE, and VC were also detected in MW0033I, but remained below GCTLs for these compounds.

Deep Wells: During the September 2021 (Q2) sampling event, the expanded sampling network of 12 deep wells showed no TCE detections and a general stabilization of concentrations below the GCTL for cDCE at MW0043D (1.6 µg/L) and MW0044D (2 µg/L). As with the Q1 sampling results in the deep zone, no GCTL exceedances were detected at any of the wells sampled. At MW0018D, TCE, cDCE, and VC levels in Q2 remained at non-detect like in Q1, where GCTL exceedances were previously detected pre-startup. No VC was detected within the deep zone during the Q2 sampling event.

5.4.1.3 Third Quarter Results – December 2021

The third quarter performance monitoring event (Q3) was conducted in December 2021, approximately 10 months after completion of system startup activities. This event included sampling of 24 monitoring wells (Table 3-1), with five shallow wells (MW0008S, MW0011S, MW0018S, MW0043S, and MW0045S), 11 intermediate wells (MW0008I, MW0011I, MW0018I, MW0036SI, MW0036I, MW0041SI, MW0042SI, MW0043I, MW0044I, MW0045I, and MW0047I), and eight deep wells (MW0018D, MW0043D, MW0044D, MW0045D, MW0046D, MW0046DD, MW0047D, and MW0047DD). Of note, MW0034S (part of the POL Northern Area LTM program) was also sampled during this quarterly event, as this well transitioned into a quarterly schedule after the October 2021 annual LTM event (further discussed under Section 6.4).

The following summarizes the chemical analyses results for the wells sampled in December 2021 with respect to each sampling interval and the COCs encountered there.

Maximum concentrations in December 2021 were: 35 µg/L (TCE), 33 µg/L (cDCE), and 3.2 µg/L (tDCE). VC had no detections during the December 2021 event in any of the monitoring wells sampled. Of the 24 samples collected, none had COC concentrations greater

than NADCs during this sampling event. Only 2 of the 24 samples collected had concentrations of at least one COC that exceeded GCTLs. December 2021 groundwater sample locations and performance monitoring results are shown on Figures 5-15, 5-16, and 5-17, for the shallow, intermediate, and deep intervals, respectively.

Shallow Wells: During the Q3 sampling event in December 2021, the sampling area included five shallow wells located within the AS treatment area, south of 5th Street, and MW0034S located north of 5th Street outside of the AS treatment area. After eight months of system operation, only one location (MW0034S) exhibited TCE above its GCTL with a concentration of 90 µg/L, which was a reduction from 130 µg/L detected three months prior. At MW0043S, TCE remained non-detect in Q3, which was a location that originally had a GCTL exceedance of 15 µg/L during pre-startup. To the south and southeast of this location, MW0018S and MW0045S were also non-detect in Q3. These two wells had slight increases in TCE concentrations from pre-startup to Q1, but both have remained non-detect since. Adjacent to the manifold trailer to the northeast, MW0011S continued to show non-detect levels for TCE, cDCE, tDCE, and VC during Q3. The same was true for MW0008S, located in the northwestern section of the treatment area, approaching 5th Street.

On the southwestern side of the manifold trailer, cDCE concentrations that rose from non-detect to 1.4 µg/L and to 0.63 µg/L at MW0045S and MW0018S, respectively, were non-detect during Q2 and Q3 sampling. Farther north at MW0043S, the Q1 cDCE concentration of 8 µg/L, which was a decrease from the 8.6 µg/L detected during pre-startup, was non-detect in September and December 2021 (Q2 and Q3). No VC exceedances were detected during December 2021; however, monitoring wells showing prior VC exceedances were not sampled during this event (i.e., MW0026S).

Intermediate Wells: After ten months of system operation, the 11 wells sampled within the intermediate zone in December 2021 (Q3), south of 5th Street, generally showed TCE concentrations continuing to decrease. Located northwest of the AS manifold trailer, TCE concentrations at MW0041SI continued to oscillate since startup, with a detection of 1.7 µg/L in December 2021. At MW0036I, TCE concentrations increased from non-detect pre-startup to 1.7 µg/L during Q1, and then remaining relatively constant at 2.1 µg/L during Q2 and 2.0 µg/L three

months later in Q3. At MW0047I, non-detect results for TCE persisted through Q2 and continued during Q3. Concentrations of TCE remained above its GCTL at two locations, MW0042SI and MW0043I, with concentrations of 6.2 µg/L and 35 µg/L, respectively. At MW0045I, TCE concentrations continued to decline, decreasing slightly from 2.1 µg/L during Q2 to 1.1 µg/L during Q3.

There were no cDCE or tDCE exceedances in Q3. At MW0036SI, where the Q1 cDCE concentration was 270 µg/L, cDCE decreased to 4 µg/L in Q2 and further decreased to 0.85 µg/L in Q3, so no GCTL exceedances remained for cDCE during the Q3 sampling event. At the two wells where tDCE had pre-startup GCTL exceedances in April 2020 (MW0043I at 280 µg/L and MW0011I at 140 µg/L), tDCE has decreased to 0.8 µg/L and non-detect, respectively, in Q3. No VC was detected during the Q3 sampling event within the intermediate zone; however, the areas of prior VC exceedance in Q2 were not sampled during this event (i.e., MW0026I).

Deep Wells: During the December 2021 (Q3) sampling event, the eight deep wells continued to show no TCE detections, and continued to show stabilization of concentrations below the GCTL for cDCE at MW0044D (2.0 µg/L during Q2 to 1.4 µg/L in Q3) and the reduction of cDCE to non-detect levels at MW0043D. As with the Q1 and Q2 sampling results, no GCTL exceedances were detected at any of the eight wells sampled within the deep zone during Q3. No VC has been detected during any of the post-startup sampling events (Q1 to Q3) within the deep zone.

5.4.1.4 Fourth Quarter Results – March 2022

The fourth quarter performance monitoring event (Q4) was conducted in March 2022, approximately 13 months after completion of system startup activities. This was the second semi-annual event where additional wells were sampled. As shown in Table 3-1, a total of 43 wells were sampled during this event and included: 12 shallow monitoring wells (MW0008S, MW0011S, MW0012S, MW0014S, MW0016S, MW0017S, MW0018S, MW0026S, MW0028S, MW0035S, MW0043S, and MW0045S), 19 intermediate wells (MW0008I, MW0011I, MW0012I, MW0014I, MW0014SI, MW0016I, MW0018I, MW0022I, MW0026I, MW0028I, MW0035SI, MW0036SI, MW0036I, MW0041SI, MW0042SI, MW0043I, MW0044I, MW0045I, and MW0047I) and 12 deep wells (MW0014ID, MW0016D, MW0018D, MW0022D, MW0039ID, MW0043D, MW0044D, MW0045D, MW0046D, MW0046DD,

MW0047D, and MW0047DD). Of note, MW0034S (part of the POL Northern Area LTM program) was also sampled during this quarterly event, as this well transitioned into a quarterly schedule after the October 2021 annual LTM event (further discussed under Section 6.4) and is therefore mentioned in this section below to relate plume conditions north of the active AS treatment area.

The following summarizes the chemical analyses results for the wells sampled in March 2022 with respect to each sampling interval and the COCs encountered there. Note, MW0026S is also part of the POL Northern Area LTM sampling network, but sampled semi-annually to evaluate AS IM performance, and is therefore included in the discussion below, and also later in Section VI.

Maximum concentrations in March 2022 were: 41 µg/L (TCE), 140 µg/L (cDCE), 8.4 µg/L (tDCE), and 18 µg/L (VC). Of the 43 samples collected, none of samples had COC concentrations greater than NADCs during this sampling event. Only 5 of the 43 samples collected had concentrations of at least one COC that exceeded GCTLs. March 2022 groundwater sample locations and performance monitoring results are shown on Figures 5-15, 5-16, and 5-17, for the shallow, intermediate, and deep intervals, respectively.

Shallow Wells: During the Q4 sampling event in March 2022, the sampling area included 12 shallow wells located within the AS treatment area, south of 5th Street, and MW0034S located north of 5th Street outside of the AS treatment area. After 13 months of system operation, these locations continued to show a general decrease in TCE concentrations except for MW0034S, where concentrations increased from 90 µg/L in December 2021 (Q3) to 170 µg/L in March 2022 (Q4). Along the southern shoulder of 5th Street at MW0026S, TCE levels decreased slightly from 3.3 µg/L during pre-startup event in November 2020 to 2.5 µg/L during the Q2 sampling event and to 2.3 µg/L during Q4. At MW0043S, TCE concentrations further decreased from above GCTL at 15 µg/L during pre-startup to below GCTL at 2.8 µg/L during Q1, then to non-detect during the Q2, Q3, and Q4 sampling events. TCE concentrations at MW0018S remained non-detect during the Q4 sampling event.

MW0008S, MW0011S, MW0014S, MW0016S, MW0018S, MW0031S, MW0035S, MW0043S, and MW0045S continued to show non-detect levels for TCE, cDCE, tDCE, and VC. Two wells detected cDCE above its GCTL, at MW0026S (140 µg/L, located on the southside of the roadway) and MW0034S (84 µg/L, located north of the roadway). There were no tDCE exceedances during the Q4 sampling event. VC exceedances were detected at two wells, located in the vicinity of the road, with concentrations exceeding the VC GCTL at 18 µg/L at MW0026S (increasing from 9.8 µg/L in the last semi-annual event in Q2), and at 9.9 µg/L at MW0012S (increasing from 6.9 µg/L in the last semi-annual event in Q2). At MW0017S, VC concentrations decreased from above its GCTL at 2.7 µg/L during the last semi-annual sampling event in Q2 to non-detect during this sampling event (Q4, second semi-annual sampling event).

Intermediate Wells: After 13 months of system operation, the 19 wells sampled within the intermediate zone in March 2022 (Q4), south and north of 5th Street, generally showed TCE concentrations stabilizing, with seven positive detections. Of these detections, two were above the GCTL (MW0042SI at 6.2 µg/L and MW0043I at 41 µg/L). No GCTL exceedances were detected in the intermediate zone for cDCE or tDCE during the Q4 sampling event. VC was detected above its GCTL at one intermediate zone location (MW0042SI at 1.6 µg/L) during this event in March 2022.

Deep Wells: During the March 2022 (Q4) sampling event, the expanded sampling network of 12 deep wells continued to show no TCE detections and continued stabilization of concentrations below the GCTL for cDCE at MW0044D (1.8 µg/L during Q4 from 1.4 µg/L in Q3) and the non-detect levels at MW0043D. All tDCE results were non-detect in Q4. VC was the only COC with a GCTL exceedance in Q4 in the deep zone, at MW0044D, with a concentration of 1.5 µg/L.

5.4.1.5 Fifth Quarter Results – June 2022

The fifth quarter performance monitoring event (Q5) was conducted in June 2022, approximately one year and four months after completion of system startup activities. This event included sampling of 24 monitoring wells (Table 3-1), with five shallow monitoring wells (MW0008S, MW0011S, MW0018S, MW0043S, and MW0045S), 11 intermediate wells (MW0008I, MW0011I, MW0018I, MW0036SI, MW0036I, MW0041SI, MW0042SI, MW0043I, MW0044I,

MW0045I, and MW0047I), and eight deep wells (MW0018D, MW0043D, MW0044D, MW0045D, MW0046D, MW0046DD, MW0047D, and MW0047DD). Of note, MW0034S (part of the POL Northern Area LTM program) was also sampled during this quarterly event, as this well transitioned into a quarterly schedule after the October 2021 annual LTM event (further discussed under Section 6.4).

The following summarizes the chemical analyses results for the wells sampled in June 2022 with respect to each sampling interval and the COCs encountered there.

Maximum concentrations in June 2022 were: 10 µg/L (TCE), 23 µg/L (cDCE), 2 µg/L (tDCE), and 2.2 µg/L (VC). Of the 24 samples collected, none had COC concentrations greater than NADCs during this sampling event. Only 3 of the 24 samples collected had concentrations of at least one COC that exceeded GCTLs. June 2022 groundwater sample locations and performance monitoring results are shown on Figures 5-15, 5-16, and 5-17, for the shallow, intermediate, and deep intervals, respectively.

Shallow Wells: The five shallow wells sampled in June 2022 during the Q5 performance monitoring event are located within the AS treatment area, south of 5th Street, and MW0034S located north of 5th Street outside of the AS treatment area. After 16 months of system operation, the five shallow wells sampled within the AS treatment area revealed no detections of TCE, cDCE, tDCE, or VC. The same was true for these five locations during the March 2022 (Q4) sampling event. Further analyses of this trend will be conducted when additional wells are sampled as part of future performance monitoring events to determine if any COCs remain within the shallow zone in the POL Southern Treatment Area AS treatment area. At MW0034S, located north of the roadway within the historical AS treatment area, TCE, cDCE and VC continued to show GCTL exceedances.

Intermediate Wells: After 16 months of system operation, the 11 wells sampled within the intermediate zone in June 2022 (Q5), south of 5th Street, generally showed TCE concentrations either remaining non-detect or continuing to decrease. Specifically, at MW0008I and MW0045I, concentrations fell from 1.9 µg/L to non-detect and from 1.6 µg/L to 1.2 µg/L, respectively. At MW0036I, MW0036SI, and MW0041SI TCE levels increased but were still below GCTLs and within 2 µg/L of the previous value. Two wells exhibited TCE concentrations above its GCTL

(MW0042SI and MW0043I). At MW0042SI, TCE levels increased from 6.2 µg/L to 10 µg/L, while at MW0043I TCE levels decreased from 41 µg/L to 6.2 µg/L, as compared to Q4 results three months prior.

No cDCE GCTL exceedances were detected during Q5 sampling, with concentrations remaining relatively consistent with previous values. At MW0043I, cDCE concentrations decreased slightly from 3.5 µg/L to 0.93 µg/L, whereas other locations observed slight increases in cDCE concentrations (i.e., MW0041SI, MW0042S, etc.). All tDCE concentrations were non-detect in Q5, except MW0042SI with detection of 2 µg/L, which is below the GCTL The only VC concentration above the GCTL was also detected at MW0042SI where concentrations increased slightly from 1.6 µg/L to 2.2 µg/L from Q4 to Q5, respectively.

Deep Wells: During the June 2022 (Q5) sampling event, the eight deep wells continued with either non-detect or the general decreasing trend for all COCs. No GCTL exceedances were detected at any of these eight wells. Further, all TCE and tDCE concentrations were non-detect during this Q5 event within the deep zone. cDCE continues to be detected at low concentrations in MW0044D at 1.3 µg/L, slightly reduced from its Q4 value of 1.8 µg/L. Of the five VC GCTL exceedances encountered during pre-startup, only one location (MW0044D) showed a positive value in Q5 (1.2 µg/L, down from 1.5 µg/L in March 2022).

5.5 PERFORMANCE EVALUTION AND CONTAMINANT REDUCTION

Trend analysis graphs for TCE, cDCE, and VC are provided on Figures 5-18 through 5-20, respectively, with an overview provided for each interval below. Concentration reduction calculations for TCE, cDCE, and VC are included in Tables 5-4 to 5-6, respectively. The percent reduction values presented in this section (when referencing multiple wells for a certain contaminant) are based on the geometric means between the baseline (April 2020) and June 2022 datasets. The percent reduction evaluation uses data from centerline wells that are part of the POL Southern Treatment Area performance monitoring program.

Shallow: In the shallow interval from 5 to 20 feet bls, one sample collected from monitoring well (MW0043S) had a detection of TCE greater than the GCTL during baseline sampling. TCE concentrations at MW0043S decreased from 15 µg/L to 0.89 U µg/L (non-detect) over the

course of Year 1 and Q5 operations, which represents a 94% reduction of TCE since baseline sampling. All other monitoring wells were non-detect for TCE and remained at non-detect values in June 2022 sampling event.

The sample collected from monitoring well MW0043S during baseline sampling had a cDCE concentration 8.6 µg/L and by June 2022 the concentration was reduced to 0.53 U µg/L (non-detect), representing a 94% reduction of cDCE since baseline. All other monitoring wells were non-detect for cDCE and remained at non-detect values in June 2022 sampling event.

No samples in the shallow interval reported VC at detectable levels during baseline. The VC concentrations in the shallow interval remained non-detect throughout the reporting period.

Intermediate: In the intermediate interval from 18 to 30 feet bls, six samples had concentrations of TCE great than the GCTL during baseline sampling. Two of these six samples had concentrations of TCE greater than the NADC, with concentrations of 10,000 µg/L and 2,400 µg/L in monitoring wells MW0043I and MW0045I, respectively. TCE concentrations in monitoring well MW0043I have decreased from 10,000 µg/L during baseline to 6.2 µg/L in June 2022, a 99.94% reduction. TCE concentrations in monitoring well MW0045I have decreased from 2,400 µg/L during baseline to 1.2 µg/L in June 2022, a 99.95% reduction. The average TCE reduction over this reporting period in the six monitoring wells where concentrations were greater than the GCTL is an average of 99.05%.

cDCE was observed in five monitoring wells at concentrations greater than the GCTL during baseline sampling. Monitoring well MW0043I had a peak cDCE baseline concentration of 1,500 µg/L, exceeding the NADC. By June 2022, the cDCE concentration in MW0043I was reduced to 0.93 µg/L, a 99.94% reduction. Through the five quarters of sampling in the intermediate interval, cDCE has been reduced by an average of 99.90% in the five monitoring wells that reported GCTL exceedances during baseline.

VC was observed in seven monitoring wells at concentrations greater than the GCTL in the intermediate interval during baseline sampling. Two of those seven samples had concentrations exceeding the NADC, with a peak concentration of 300 µg/L in monitoring well MW0045I.

Groundwater concentrations at the seven monitoring wells where VC was detected above the GCTL (MW0011I, MW0036I, MW0036SI, MW0041SI, MW0043I, MW0044I, and MW0045I) have all been reduced to non-detect levels by June 2022, representing a 96 % (average) reduction of the first five quarters of operation.

Deep: In the deep interval from 30 to 50 feet bls, only monitoring well MW0018D reported a TCE concentration greater than the GCTL. Over the five quarters of sampling, TCE in MW0018D reduced from 40 µg/L during baseline to 0.89 U µg/L (non-detect) in June 2022, a 97.78% reduction. All other monitoring wells remained at non-detect concentrations throughout the reporting period.

cDCE was observed at a concentration greater than the GCTL in only one monitoring well in the deep interval, MW0018D, during baseline sampling. From April 2020 to June 2022, the cDCE concentration in MW0018D was reduced from 96 µg/L to 0.53 µg/L, a 99.45% reduction. All other monitoring wells throughout this reporting period remained below the GCTL, with only slight detections periodically.

VC was observed in five monitoring wells at concentrations greater than the GCTL in the deep interval during baseline sampling, with a peak concentration of 50 µg/L in MW0047D. Groundwater concentrations at the five monitoring wells where VC was detected above the GCTL (MW0018D, MW0044D, MW0045D, MW0046D, and MW0047D) have all been reduced to less than or equal to the GCTL by June 2022, representing a 93.20% (average) reduction of the first five quarters of operation.

Overall: After the first five quarters of operation, overall reduction in contaminant concentrations for TCE, cDCE, and VC were approximately 75%, 87%, and 85%, respectively (see Tables 5-4 to 5-6). These values are based on the geometric means between the baseline (April 2020) and June 2022 (Q5) datasets. Reduction calculations for individual wells are also provided in the tables.

5.6 OCTOBER 2021 POL SOUTHERN TREATMENT AREA DPT SAMPLING EVENT

In October-November 2021, approximately eight months after AS system startup, DPT sampling was completed in the POL Southern Treatment Area and SW3 areas to provide additional data points to support the POL Southern Treatment Area performance monitoring and SW3 LTM programs. Further, this DPT sampling was conducted to evaluate LCP boundaries and determine if plume migration is occurring outside of established boundaries. The October 2021 POL Southern Treatment Area DPT sampling event is discussed in this section, while the SW3 DPT sampling event is discussed later in this report under Section VI.

The AS system was shutdown prior to conducting the DPT investigation to accommodate sampling efforts, resuming once DPT sampling was complete. The following presents the results from the October 2021 POL Southern Treatment Area DPT investigation.

To supplement the POL Southern Treatment Area performance sampling dataset (collected via monitoring wells), 13 locations were sampled via DPT (designated as DPT1466 to DPT1477, and DPT1479 on Figure 5-21) to selected depths (up to 52 feet bls) in October-November 2021 to confirm the presence or absence of LCP migration. Note, DPT1478 was errantly skipped in the sampling order when assigning sample IDs. A total of 94 groundwater samples were collected along the southern and eastern edges of the LCP, and within locations overlapping previous areas of GCTL exceedances. No samples were collected within the former SZ areas during this event. The samples collected were analyzed for target VOCs (TCE, cDCE, tDCE, and VC) via USEPA Method 8260D by mobile laboratory, ALF. These real-time analyses allowed for optimization of sampling locations and depths. The following intervals were sampled during this event: 10 to 14 feet bls, 15 to 19 feet bls, 20 to 24 feet bls, 25 to 29 feet bls, 30 to 34 feet bls, 35 to 39 feet bls, 40 to 44 feet bls, 45 to 49 feet bls, and 50 to 54 feet bls.

Results from the October 2021 POL Southern Treatment Area DPT sampling event are shown on Figure 5-21 and in Table 5-7. No concentrations of TCE, cDCE, tDCE, or VC were observed exceeding their respective GCTLs during this sampling event. Three samples showed cDCE detections but were significantly below the GCTL of 70 µg/L. At DPT1476, located east of the

LCP, cDCE was detected at 1 µg/L and 2 µg/L in the 35 to 39 and 40 to 44 feet bls intervals, respectively. At sampling location DPT1474, located hydraulically downgradient of the Southern Treatment Area and at the southeastern extent of the LCP, cDCE was detected at 2 µg/L in the 20 to 24 feet bls interval.

At three locations (DPT1466, DPT1468, and DPT1479), which were located in areas with previous GCTL exceedances, all results were below laboratory detection limits. This DPT sampling event confirmed that no LCP migration has occurred offsite or any further downgradient since the October 2019 baseline DPT sampling event.

The October 2021 DPT groundwater sample locations and analytical results for POL Southern Treatment Area are shown on Figure 5-21 and included in Table 5-7. The laboratory analytical report is provided in Appendix E.

5.7 AUGUST 2022 POL SOUTHERN TREATMENT AREA DPT SAMPLING EVENT

In August 2022, approximately 18 months after AS system startup and 10 months after the previous DPT sampling event, another DPT event was completed to confirm the Year 1 performance monitoring analytical results, with a focus on the SZ and HS areas. Further, this August 2022 study was conducted to determine if plume migration had occurred beyond the performance monitoring well network.

The AS system was shutdown prior to conducting the DPT investigation to accommodate sampling efforts, resuming once DPT sampling was complete. The following presents the results from the August 2022 POL Southern Treatment Area DPT investigation.

The scope of the DPT investigation included 60 groundwater samples collected at 11 DPT locations (designated as DPT1480 to DPT1490 on Figure 5-22). The samples collected were analyzed for VOCs via USEPA Method 8260B by SGS of Orlando, a fixed-base laboratory. The sampling plan for this event consisted of the following:

- Three DPT sampling locations within the (former) TCE SZ area;
- Five DPT sampling locations within the (former) HS area; and

- Three DPT sampling locations within the (former) HCP area.

The locations were sampled to various depths (up to 52 feet bls), within the following depth intervals: 10 to 14 feet bls, 15 to 19 feet bls, 20 to 24 feet bls, 25 to 29 feet bls, 30 to 34 feet bls, 35 to 39 feet bls, 40 to 44 feet bls, 45 to 49 feet bls, and 50 to 54 feet bls. Note, samples were not collected from all intervals at each DPT location.

The results of the August 2022 DPT event revealed TCE concentrations exceeding its GCTL at two sampling locations and VC concentrations exceeding its GCTL at three locations, with one location exhibiting exceedances at two consecutive sampling intervals. No cDCE or tDCE concentrations were detected above GCTLs at any of the locations sampled. PCE, not a COC at POL Southern Treatment Area, was initially detected at one location, but was re-sampled with non-detect results. These results are presented on Figure 5-22 and discussed by COC in greater detail below.

TCE concentrations detected during this DPT sampling event showed slight GCTL exceedances at the northern and southern extent of the original TCE SZ. These concentrations were 4 µg/L to the north at DPT1483 (20 to 24 feet bls) and 4.3 µg/L (35 to 39 feet bls) to the south at DPT1481, which is significantly below SZ concentrations detected in 2019 where TCE exceeded 11,000 µg/L in this area. At DPT1483, TCE concentrations were non-detect at shallower depths to 19 feet bls, with TCE levels reduced to 1.5 µg/L within the 25 to 29 feet bls interval (below the interval with GCTL exceedance), and decreasing to non-detect or near non-detect levels down to the 40 to 44 feet bls interval. At DPT1481, all TCE results were non-detect in the shallower depths sampled (15 to 34 feet bls). At the center of the SZ, DPT1480 showed non-detect TCE results for all intervals sampled (7 to 52 feet bls), except for 1.3 µg/L detected within the 10 to 14 feet bls interval.

Compared to the June 2022 (Q5) performance monitoring results, TCE results from DPT1483 (4 µg/L at 22 feet bls) representing the northern extent of the 2019 SZ plume, correlate well with the 6.2 µg/L detected at MW0043I (20 to 30 feet bls screened interval), located approximately 50 feet hydrologically downgradient to the southeast. Conversely, MW0045D (30 to 40 feet bls screened interval), approximately 25 feet hydrologically upgradient from DPT1481, but within

the same sampling interval, showed non-detect TCE results in June 2022, but a slight detection of 1.2 µg/L within the 20 to 30 feet bls screened interval of adjacent well MW0045I. DPT1487, located to the west of the SZ, approximately 20 feet north of monitoring well cluster MW0018S/I/D, showed non-detect levels at all depths sampled (15 to 44 feet bls). This correlates with the non-detect results for TCE at these three monitoring wells, representing the 8 to 43 feet bls interval within the fringes of the 2019 NADC plume. Moreover, the MW0047I/D/DD well cluster, representing the 20 to 50 feet bls interval, was compared to nearby DPT1484 and DPT1485. DPT1484, located approximately 30 feet to the northwest and DPT1485, approximately 20 feet to the southeast of the well cluster, are both within the separate southeastern component of the 2019 10xNADC plume. Both DPT locations showed non-detect TCE concentrations from 20 to 44 feet bls, with the exception of one interval at DPT1484 where TCE was detected at 0.31 µg/L. These values are consistent with the non-detect June 2022 values at the corresponding MW0047I/D/DD well cluster. Within the eastern flank of the 10xNADC plume, DPT1482 showed TCE concentrations of 1.9 µg/L, 0.6 µg/L, and 0.38 µg/L in the 15 to 19 feet bls, 20 to 24 feet bls, and 25 to 29 feet bls sampling intervals, respectively. These low-level detections are generally compatible with the June 2022 non-detect TCE results at nearby monitoring wells MW0011S and MW0011I, located approximately 40 feet to the east, within the former NADC area of the plume. The remaining August 2022 DPT locations generally confirm non-detect TCE levels to the west and east of the areas outside of the 2019 NADC plume. Based on this supplemental data, TCE appears to be sufficiently captured by the current performance monitoring well network.

cDCE concentrations detected during the August 2022 DPT event were all below GCTLs; however, positive detections were noted at nine of the 11 DPT sampling locations. These values were significantly below the cDCE GCTL of 70 µg/L, with the maximum concentration of 6.5 µg/L found at DPT1483 within the 25 to 29 feet bls interval, representing the northern end of the 2019 TCE SZ. At this location, cDCE was found at all intervals sampled except the shallowest (10 to 14 feet bls) and the mid-level 30 to 34 feet bls interval. To the east of the SZ, inside the 2019 10xNADC plume, cDCE was found at 4.9 µg/L within the 14 to 19 feet bls sampling interval, with concentrations decreasing with depth. Overall, depths of these low-level cDCE occurrences ranged from 15 to 49 feet bls, showing variability based on specific DPT sampling

locations. Results from the June 2022 (Q5) performance monitoring sampling event, for wells sampled within the vicinity of the August 2022 DPT sampling locations, were found to be below the detection limits for cDCE, thereby showing comparable results.

Detections of tDCE during the August 2022 DPT event were found at only two locations, DPT1483 and DPT1481, marking the northern and southern extent of the 2019 SZ TCE plume, respectively. Results at DPT1483 were 0.27 µg/L within the 20 to 24 feet bls interval, and 0.82 µg/L within the 25 to 29 feet bls interval. To the south at DPT1481, tDCE was found at 0.38 µg/L within the 35 to 39 feet bls interval. The June 2022 (Q5) performance monitoring sampling event results for wells in the vicinity of the August 2022 DPT event were all below detection limits for tDCE, including the two wells within the SZ. These results are comparable to the August 2022 DPT results, with the only positive concentrations found in the SZ, slightly above detection limits. West of the 2019 NADC plume, the DPT locations showed non-detect results for tDCE beyond the performance monitoring well network, therefore indicating that the performance monitoring well network is adequately capturing the areal extent of this COC.

For VC, the August 2022 DPT sampling results showed slight GCTL exceedances ranging from 2 µg/L to 3.1 µg/L at three locations (DPT1482, DPT1483, and DPT1490). At DPT1483, representing the northern end of the SZ plume, 3 µg/L was detected within the 40 to 44 feet bls interval, with decreasing concentrations seen at shallower depths of 0.66 µg/L within the 25 to 29 feet bls interval, then resolving to non-detect levels. To the west of the NADC plume, DPT1490 showed a 3.1 µg/L VC concentration at the 35 to 39 feet bls interval, with a decrease to 2 µg/L at the next sampled depth of 40 to 44 feet bls. East of the central area of the SZ, DPT1482 showed a VC level of 2.3 µg/L within the 30 to 34 feet bls interval, with non-detect VC levels throughout the remainder of the 15 to 44 feet bls sampling sequence at this location.

Overall, the objectives of the POL Southern Treatment Area DPT sampling events completed in October 2021 and August 2022 were met, showing that performance monitoring well network is adequately tracking degradation progress in the former SZ and HS areas and that the LCP has not migrated. Additional monitoring wells are proposed for installation to monitor the LCP boundary (see Section VII). The August 2022 DPT groundwater sample locations and analytical results for

POL Southern Treatment Area are shown on Figure 5-22 and included in Table 5-8. The laboratory analytical report is provided in Appendix E.

Table 5-1. Contaminants of Concern Year 1 Performance Monitoring Analytical Results

Sample Location (POL-)	Screened Interval (feet bls)	Sample Date	TCE	cDCE	tDCE	VC
MW0008I	25 to 30	Apr-20	0.89 U	0.53 U	0.73 U	**0.93 I**
		Jun-21	0.89 U	0.53 U	0.73 U	0.71 U
		Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Dec-21	**1.2 J**	**0.83 J**	0.73 U	0.71 U
		Mar-22	**1.9 I**	**1 I**	0.73 U	0.71 U
		Jun-22	0.89 U	**1.6 I**	0.73 U	0.71 U
MW0008S	5 to 10	Apr-20	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-21	0.89 U	0.53 U	0.73 U	0.71 U
		Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0011I	25 to 30	Apr-20	**130**	**600**	**140**	**130**
		Aug-21	0.89 U	0.53 U	0.73 U	0.71 U
		Sep-21	**1.3 I**	0.53 U	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0011S	10 to 15	Apr-20	0.89 U	0.53 U	0.73 U	0.71 U
		Aug-21	0.89 U	0.53 U	0.73 U	0.71 U
		Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0012I	28 to 33	Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	**0.76 I**
MW0012S	11 to 16	Sep-21	**3.4**	**54**	**3.1**	**6.9**
		Mar-22	**1.3 I**	**35**	**2 I**	**9.9**
MW0014I	25 to 30	Sep-21	0.89 U	**0.55 I**	0.73 U	0.71 U
		Mar-22	0.89 U	**0.64 J**	0.73 U	0.71 U
MW0014ID	32 to 37	Sep-21	0.89 U	**0.54 I**	0.73 U	0.71 U
		Mar-22	0.89 U	**0.93 I**	0.73 U	0.71 U
MW0014S	8 to 13	Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0014SI	18 to 23	Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	**0.9 I**	0.73 U	0.71 U
MW0016D	38 to 43	Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0016I	25 to 30	Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0016S	8 to 13	Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0017S	11 to 16	Sep-21	0.89 U	0.53 U	0.73 U	**2.7**
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0018D	38 to 43	Apr-20	**40**	**96**	**4.3**	**9.8**
		Jun-21	0.89 U	0.53 U	0.73 U	0.71 U
		Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0018I	25 to 30	Apr-20	0.89 U	**1.4 I**	0.73 U	**1.4 I**
		Jun-21	0.89 U	0.53 U	0.73 U	0.71 U
		Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U

Table 5-1. Contaminants of Concern Year 1 Performance Monitoring Analytical Results (Continued)

Sample Location (POL-)	Screened Interval (feet bls)	Sample Date	TCE	cDCE	tDCE	VC
MW0018S	8 to 13	Apr-20	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-21	1.2 J	0.63 J	0.73 U	0.71 U
		Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0022D	40 to 45	Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0022I	25 to 30	Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0026I	25 to 30	Sep-21	0.89 U	2 I	0.73 U	2.1 I
		Mar-22	0.89 U	1.8 I	0.73 U	0.84 I
MW0026S	5 to 15	Nov-20	3.3	46	2.6	6.4
		Sep-21	2.5	66	2.8	9.8
		Mar-22	2.3 I	140	8.4	18
MW0028I	27 to 32	Sep-21	0.89 U	0.53 U	0.73 U	1.2 I
		Mar-22	0.89 U	0.53 U	0.73 U	1.4 I
MW0028S	7 to 17	Sep-21	1.3 I	0.53 U	0.73 U	0.71 U
		Mar-22	0.91 I	0.94 I	0.73 U	0.71 U
MW0035S	5 to 15	Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0035SI	18 to 23	Sep-21	0.89 U	1.8 I	0.73 U	0.71 U
		Mar-22	0.89 U	2.3 I	0.73 U	0.71 U
MW0036I	25 to 30	Apr-20	0.89 U	1 I	0.79 I	5.6
		Jun-21	1.7 J	2.8	0.73 U	0.71 U
		Sep-21	2.1 I	20	0.83 I	0.71 U
		Dec-21	2 J	7	0.73 U	0.71 U
		Mar-22	1.5 I	1.3 I	0.73 U	0.71 U
		Jun-22	3.3	4.5	0.73 U	0.71 U
MW0036SI	18 to 23	Apr-20	190	400	17	51
		Jun-21	9.3 J	270	7.9 J	3.6 U
		Sep-21	2 I	4	0.73 U	0.71 U
		Dec-21	2.1 J	0.85 J	0.73 U	0.71 U
		Mar-22	1.8 I	0.53 U	0.73 U	0.71 U
		Jun-22	2.1 I	0.53 U	0.73 U	0.71 U
MW0039ID	32 to 37	Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0041SI	18 to 23	Apr-20	4 I	410	5.4	86
		Jun-21	1.7 J	2.5	0.73 U	0.71 U
		Sep-21	0.89 U	0.55 I	0.73 U	0.71 U
		Dec-21	1.7 J	0.53 U	0.73 U	0.71 U
		Mar-22	1.1 I	0.71 I	0.73 U	0.71 U
		Jun-22	2.2 I	0.85 I	0.73 U	0.71 U
MW0042SI	18 to 23	Apr-20	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-21	14	44	4.6	3.7
		Sep-21	5.7	49	3.9	0.71 U
		Dec-21	6.2	33	3.2	0.71 U
		Mar-22	6.2	19	1.6 I	1.6 I
		Jun-22	10	23	2 I	2.2 I
MW0043D	30 to 40	Apr-20	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-21	0.89 U	2 J	0.73 U	0.71 U
		Sep-21	0.89 U	1.6 I	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0043I	20 to 30	Apr-20	10,000	1,500	280	98 I
		Jun-21	71	65	4.5	0.82 J
		Sep-21	27	1.9 I	0.73 U	0.71 U
		Dec-21	35	2.4 J	0.8 J	0.71 U
		Mar-22	41	3.5	0.75 I	0.71 U
		Jun-22	6.2	0.93 I	0.73 U	0.71 U

Table 5-1. Contaminants of Concern Year 1 Performance Monitoring Analytical Results (Continued)

Sample Location (POL-)	Screened Interval (feet bls)	Sample Date	TCE	cDCE	tDCE	VC
MW0043S	10 to 20	Apr-20	**15**	**8.6**	0.73 U	0.71 U
		Jun-21	**2.8**	**8**	**1.2 J**	0.71 U
		Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0044D	30 to 40	Apr-20	0.89 U	**3.6**	0.73 U	**4.6**
		Jun-21	0.89 U	**1.6 J**	0.73 U	0.71 U
		Sep-21	0.89 U	**2 I**	0.73 U	0.71 U
		Dec-21	0.89 U	**1.4 J**	0.73 U	0.71 U
		Mar-22	0.89 U	**1.8 I**	0.73 U	**1.5 I**
		Jun-22	0.89 U	**1.3 I**	0.73 U	**1.2 I**
MW0044I	20 to 30	Apr-20	**16**	**28**	0.73 U	**3.4**
		Jun-21	0.89 U	**0.53 J**	0.73 U	0.71 U
		Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0045D	30 to 40	Apr-20	0.89 U	0.53 U	0.73 U	**2.9**
		Jun-21	0.89 U	0.53 U	0.73 U	0.71 U
		Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0045I	20 to 30	Apr-20	**2,400**	**830**	**400**	**300**
		Jun-21	**17**	**2.1 J**	**1.2 J**	0.71 U
		Sep-21	**2.1 I**	0.53 U	0.73 U	0.71 U
		Dec-21	**1.1 J**	**0.74 J**	0.73 U	0.71 U
		Mar-22	**1.6 I**	0.53 U	0.73 U	0.71 U
		Jun-22	**1.2 I**	0.53 U	0.73 U	0.71 U
MW0045S	10 to 20	Apr-20	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-21	**3.4**	**1.4 J**	0.73 U	0.71 U
		Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0046D	30 to 40	Apr-20	0.89 U	**15**	**8.4**	**32**
		Jun-21	0.89 U	0.53 U	0.73 U	0.71 U
		Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0046DD	40 to 50	Apr-20	0.89 U	0.53 U	**6.1**	**0.96 I**
		Jun-21	0.89 U	0.53 U	0.73 U	0.71 U
		Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0047D	30 to 40	Apr-20	0.89 U	**0.75 I**	**11**	**50**
		Jun-21	0.89 U	0.53 U	0.73 U	0.71 U
		Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U
MW0047DD	40 to 50	Apr-20	0.89 U	0.53 U	**1.2 I**	**1.2 I**
		Jun-21	0.89 U	0.53 U	0.73 U	0.71 U
		Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U

Table 5-1. Contaminants of Concern Year 1 Performance Monitoring Analytical Results (Continued)

Sample Location (POL-)	Screened Interval (feet bls)	Sample Date	TCE	cDCE	tDCE	VC
MW0047I	20 to 30	Apr-20	4.4 U	2.6 U	**33**	**360**
		Jun-21	0.89 U	0.53 U	0.73 U	**1.4 J**
		Sep-21	0.89 U	0.53 U	0.73 U	0.71 U
		Dec-21	0.89 U	0.53 U	0.73 U	0.71 U
		Mar-22	0.89 U	0.53 U	0.73 U	0.71 U
		Jun-22	0.89 U	0.53 U	0.73 U	0.71 U

Notes:
Concentrations in µg/L.
bls = below land surface.
TCE = trichloroethene.
cDCE = cis-1,2-dichloroethene.
tDCE = trans-1,2-dichloroethene.
VC = vinyl chloride.
U = Value was reported as below the method detection limit, therefore the detection limit is shown.
I = Value is between method detection limit and practical quantitation limit.
J = The result was an estimated value with an unknown bias.
Shading indicates State of Florida Groundwater Cleanup Target Level (GCTL) exceedance, TCE = 3 µg/L, cDCE = 70 µg/L, tDCE = 100 µg/L, VC = 1 µg/L.
Bolding indicates a concentration is greater than the method detection limit.

Table 5-2. POL Southern Treatment Area Groundwater Elevations

Monitoring Well Name (POL-)	Screened Interval (feet bls)	Measurement Date	Depth to Groundwater (in feet bls)	Top of Casing Elevation (feet above NGVD88)	Groundwater Elevation (feet above NGVD 88)
MW0008S	5-10	5/21/2021	6.09	8.80	2.71
		9/22/2021	3.98	8.80	4.82
		12/21/2021	4.85	8.80	3.95
		3/15/2022	5.01	8.80	3.79
		6/10/2022	5.78	8.80	3.02
MW00011S	10-15	5/21/2021	7.70	NA	NA
		9/22/2021	5.05	NA	NA
		12/21/2021	5.95	NA	NA
		3/15/2022	6.09	NA	NA
		6/10/2022	6.77	NA	NA
MW0012S	11-16	5/21/2021	NM	7.70	NM
		9/22/2021	3.98	7.70	3.72
		12/21/2021	NM	7.70	NM
		3/15/2022	4.52	7.70	3.18
		6/10/2022	NM	7.70	NM
MW0014S	8-13	5/21/2021	NM	NA	NM
		9/22/2021	4.25	NA	NA
		12/21/2021	NM	NA	NM
		3/15/2022	5.02	NA	NA
		6/10/2022	NM	NA	NM
MW0016S	8-13	5/21/2021	NM	NA	NM
		9/22/2021	3.92	NA	NA
		12/21/2021	NM	NA	NM
		3/15/2022	5.25	NA	NA
		6/10/2022	NM	NA	NM
MW0017S	11-16	5/21/2021	NM	7.92	NM
		9/22/2021	4.07	7.92	3.85
		12/21/2021	NM	7.92	NM
		3/15/2022	4.45	7.92	3.47
		6/10/2022	NM	7.92	NM
MW0018S	8-13	5/21/2021	6.35	NA	NA
		9/22/2021	4.29	NA	NA
		12/21/2021	4.91	NA	NA
		3/15/2022	5.09	NA	NA
		6/10/2022	5.82	NA	NA
MW0026S	5-15	5/21/2021	NM	6.69	NM
		9/22/2021	2.80	6.69	3.89
		12/21/2021	NM	6.69	NM
		3/15/2022	3.29	6.69	3.40
		6/10/2022	NM	6.69	NM
MW0028S	7-17	5/21/2021	NM	9.17	NM
		9/22/2021	5.45	9.17	3.72
		12/21/2021	NM	9.17	NM
		3/15/2022	5.99	9.17	3.18
		6/10/2022	NM	9.17	NM
MW00035S	5-15	5/21/2021	NM	7.18	NM
		9/22/2021	2.91	7.18	4.27
		12/21/2021	3.75	7.18	3.43
		3/15/2022	3.82	7.18	3.36
		6/10/2022	NM	7.18	NM
MW0043S	10-20	5/21/2021	12.01	12.95	0.94
		9/22/2021	9.72	12.95	3.23
		12/21/2021	10.17	12.95	2.78
		3/15/2022	10.12	12.95	2.83
		6/10/2022	10.73	12.95	2.22

Table 5-2. POL STA Groundwater Elevations (Continued)

Monitoring Well Name (POL-)	Screened Interval (feet bls)	Measurement Date	Depth to Groundwater (in feet bls)	Top of Casing Elevation (feet above NGVD88)	Groundwater Elevation (feet above NGVD 88)
MW0045S	10-20	5/21/2021	11.98	12.71	0.73
		9/22/2021	9.52	12.71	3.19
		12/21/2021	9.87	12.71	2.84
		3/15/2022	10.02	12.71	2.69
		6/10/2022	10.63	12.71	2.08
MW0008I	25-30	5/21/2021	7.00	8.80	1.80
		9/22/2021	5.01	8.80	3.79
		12/21/2021	5.46	8.80	3.34
		3/15/2022	5.56	8.80	3.24
		6/10/2022	6.09	8.80	2.71
MW0011I	25-30	5/21/2021	NM	8.64	NM
		9/22/2021	5.40	8.64	3.24
		12/21/2021	5.93	8.64	2.71
		3/15/2022	5.88	8.64	2.76
		6/10/2022	6.46	8.64	2.18
MW00012I	28-33	5/21/2021	NM	7.65	NM
		9/22/2021	3.94	7.65	3.71
		12/21/2021	NM	7.65	NM
		3/15/2022	4.50	7.65	3.15
		6/10/2022	NM	7.65	NM
MW0014I	25-30	5/21/2021	NM	7.88	NM
		9/22/2021	4.55	7.88	3.33
		12/21/2021	NM	7.88	NM
		3/15/2022	5.15	7.88	2.73
		6/10/2022	NM	7.88	NM
MW0014SI	18-23	5/21/2021	NM	7.62	NM
		9/22/2021	4.29	7.62	3.33
		12/21/2021	NM	7.62	NM
		3/15/2022	4.90	7.62	2.72
		6/10/2022	NM	7.62	NM
MW0016I	25-30	5/21/2021	NM	7.82	NM
		9/22/2021	5.05	7.82	2.77
		12/21/2021	NM	7.82	NM
		3/15/2022	5.62	7.82	2.20
		6/10/2022	NM	7.82	NM
MW0018I	25-30	10/1/2020	4.81	8.56	3.75
		5/21/2021	7.25	8.56	1.31
		9/22/2021	5.14	8.56	3.42
		12/21/2021	5.59	8.56	2.97
		3/15/2022	5.57	8.56	2.99
		6/10/2022	6.13	8.56	2.43
MW0022I	25-30	5/21/2021	NM	9.25	NM
		9/22/2021	7.81	9.25	1.44
		12/21/2021	NM	9.25	NM
		3/15/2022	7.28	9.25	1.97
		6/10/2022	NM	9.25	NM
MW0026I	25-30	9/22/2021	2.60	6.62	4.02
		12/21/2021	NM	6.62	NM
		3/15/2022	3.10	6.62	3.52
		6/10/2022	NM	6.62	NM
MW0028I	27-32	5/21/2021	NM	9.11	NM
		9/22/2021	5.83	9.11	3.28
		12/21/2021	NM	9.11	NM
		3/15/2022	5.84	9.11	3.27
		6/10/2022	NM	9.11	NM
MW0035SI	18-23	9/22/2021	3.60	7.25	3.65
		12/21/2021	NM	7.25	NM
		3/15/2022	4.14	7.25	NM
		6/10/2022	NM	7.25	NM

Table 5-2. POL STA Groundwater Elevations (Continued)

Monitoring Well Name (POL-)	Screened Interval (feet bls)	Measurement Date	Depth to Groundwater (in feet bls)	Top of Casing Elevation (feet above NGVD88)	Groundwater Elevation (feet above NGVD 88)
MW0036I	25-30	10/1/2020	8.87	12.33	3.46
		5/21/2021	11.46	12.33	0.87
		9/22/2021	9.24	12.33	3.09
		12/21/2021	9.75	12.33	2.58
		3/15/2022	9.26	12.33	3.07
		6/10/2022	10.27	12.33	2.06
MW0036SI	18-23	5/21/2021	11.01	12.20	1.19
		9/22/2021	8.85	12.20	3.35
		12/21/2021	9.30	12.20	2.90
		3/15/2022	9.31	12.20	2.89
		6/10/2022	9.86	12.20	2.34
MW0041SI	18-23	5/21/2021	10.71	12.06	1.35
		9/22/2021	8.51	12.06	3.55
		12/21/2021	8.96	12.06	3.10
		3/15/2022	8.95	12.06	3.11
		6/10/2022	9.47	12.06	2.59
MW0042SI	18-23	5/21/2021	9.99	11.49	1.50
		9/22/2021	7.92	11.49	3.57
		12/21/2021	8.37	11.49	3.12
		3/15/2022	8.34	11.49	3.15
		6/10/2022	8.89	11.49	2.60
MW0043I	20-30	10/1/2020	9.34	12.91	3.57
		5/21/2021	11.89	12.91	1.02
		9/22/2021	9.73	12.91	3.18
		12/21/2021	10.18	12.91	2.73
		3/15/2022	10.19	12.91	2.72
		6/10/2022	10.74	12.91	2.17
MW0044I	20-30	10/1/2020	9.27	12.89	3.62
		5/21/2021	11.86	12.89	1.03
		9/22/2021	9.63	12.89	3.26
		12/21/2021	10.19	12.89	2.70
		3/15/2022	10.15	12.89	2.74
		6/10/2022	10.71	12.89	2.18
MW0045I	20-30	10/1/2020	9.26	12.72	3.46
		5/21/2021	11.76	12.72	0.96
		9/22/2021	9.68	12.72	3.04
		12/21/2021	10.14	12.72	2.58
		3/15/2022	10.12	12.72	2.60
		6/10/2022	10.66	12.72	2.06
MW0047I	20-30	10/1/2020	7.60	10.51	2.91
		5/21/2021	9.73	10.51	0.78
		9/22/2021	7.95	10.51	2.56
		12/21/2021	8.40	10.51	2.11
		3/15/2022	8.45	10.51	2.06
		6/10/2022	8.84	10.51	1.67
MW0014ID	32-37	5/21/2021	NM	7.63	NM
		9/22/2021	4.29	7.63	3.34
		12/21/2021	NM	7.63	NM
		3/15/2022	4.89	7.63	2.74
		6/10/2022	NM	7.63	NM
MW0016D	38-43	5/21/2021	NM	7.57	NM
		9/22/2021	4.77	7.57	2.80
		12/21/2021	NM	7.57	NM
		3/15/2022	5.30	7.57	2.27
		6/10/2022	NM	7.57	NM

Table 5-2. POL STA Groundwater Elevations (Continued)

Monitoring Well Name (POL-)	Screened Interval (feet bls)	Measurement Date	Depth to Groundwater (in feet bls)	Top of Casing Elevation (feet above NGVD88)	Groundwater Elevation (feet above NGVD 88)
MW0018D	38-43	10/1/2020	4.40	8.42	4.02
		5/21/2021	7.32	8.42	1.10
		9/22/2021	5.19	8.42	3.23
		12/21/2021	5.60	8.42	2.82
		3/15/2022	5.61	8.42	2.81
		6/10/2022	6.17	8.42	2.25
MW0022D	40-45	5/21/2021	NM	9.02	NM
		9/22/2021	6.38	9.02	2.64
		12/21/2021	NM	9.02	NM
		3/15/2022	6.89	9.02	2.13
		6/10/2022	NM	9.02	NM
MW0039ID	32-37	5/21/2021	NM	8.91	NM
		9/22/2021	5.92	8.91	2.99
		12/21/2021	NM	8.91	NM
		3/15/2022	6.31	8.91	2.60
		6/10/2022	NM	8.91	NM
MW0043D	30-40	10/1/2020	9.24	12.82	3.58
		5/21/2021	11.82	12.82	1.00
		9/22/2021	9.63	12.82	3.19
		12/21/2021	10.10	12.82	2.72
		3/15/2022	10.02	12.82	2.80
		6/10/2022	10.60	12.82	2.22
MW0044D	30-40	10/1/2020	9.32	12.96	3.64
		5/21/2021	11.85	12.96	1.11
		9/22/2021	9.58	12.96	3.38
		12/21/2021	10.09	12.96	2.87
		3/15/2022	10.05	12.96	2.91
		6/10/2022	10.62	12.96	2.34
MW0045D	30-40	10/1/2020	9.35	12.77	3.42
		5/21/2021	11.89	12.77	0.88
		9/22/2021	9.73	12.77	3.04
		12/21/2021	10.16	12.77	2.61
		3/15/2022	10.19	12.77	2.58
		6/10/2022	10.72	12.77	2.05
MW0046D	30-40	10/1/2020	8.40	11.59	3.19
		5/21/2021	10.78	11.59	0.81
		9/22/2021	8.75	11.59	2.84
		12/21/2021	9.19	11.59	2.40
		3/15/2022	9.26	11.59	2.33
		6/10/2022	9.70	11.59	1.89
MW0046DD	40-50	5/21/2021	10.75	11.71	0.96
		9/22/2021	8.84	11.71	2.87
		12/21/2021	9.37	11.71	2.34
		3/15/2022	9.35	11.71	2.36
		6/10/2022	9.84	11.71	1.87
MW0047D	30-40	10/1/2020	7.62	10.49	2.87
		5/21/2021	9.75	10.49	0.74
		9/22/2021	7.91	10.49	2.58
		12/21/2021	8.48	10.49	2.01
		3/15/2022	8.48	10.49	2.01
		6/10/2022	8.87	10.49	1.62
MW0047DD	40-50	5/21/2021	9.84	10.60	0.76
		9/22/2021	7.91	10.60	2.69
		12/21/2021	8.50	10.60	2.10
		3/15/2022	8.51	10.60	2.09
		6/10/2022	8.89	10.60	1.71

Notes:
bls means below land surface
NGVD88 means National Geodetic Vertical Datum 1988
NA means not available due to lack of top of casing elevation data
NM means not measured during this sampling event

Table 5-3. Field Measurements

Well ID (POL-)	Sample Date	pH (S.U.)	Temp. (°C)	Cond. (µS/cm)	DO (mg/L)	Turbidity (NTU)	ORP (mV)
MW0008S	Apr-20	4.03	24.87	227	0.19	4.87	-78.5
	Jun-21	3.98	29.23	254	0.17	6.16	-8.9
	Sep-21	3.89	30.60	185	1.50	5.65	225.3
	Dec-21	3.95	22.00	146	1.5/17.2%	7.94	79.0
	Mar-22	4.05	23.70	139	1.55	8.06	68.3
	Jun-22	3.91	28.36	233	0.37	16.67	183.0
MW0008I	Apr-20	6.85	26.36	2144	0.13	6.10	-175.9
	Jun-21	7.10	27.90	3218	0.11	5.78	-139.2
	Sep-21	6.94	28.52	3485	0.08	3.96	-85.5
	Dec-21	4.03	23.70	3555	0.13	53.50	32.0
	Mar-22	4.46	25.70	3025	0.07	9.90	11.6
	Jun-22	4.46	25.70	3025	0.07	9.90	11.6
MW0011S	Apr-20	4.49	25.15	156	0.04	6.26	-142.7
	Jun-21	4.27	31.38	2107	4.10	6.72	388.5
	Sep-21	4.22	30.16	1901	0.13	3.00	239.1
	Dec-21	4.09	27.30	1102	1.65/20.8%	15.20	314.0
	Mar-22	4.31	25.10	685	1.03	12.00	329.0
	Jun-22	4.07	29.72	837	0.09	18.01	302.2
MW0011I	Apr-20	6.48	26.15	660	0.04	3.68	-199.7
	Jun-21	4.71	31.02	3375	8.10	1315.90	336.6
	Sep-21	4.12	31.14	1528	1.31	17.80	305.7
	Dec-21	6.72	26.90	3214	5.48/69%	overrange	97.0
	Mar-22	6.68	26.70	3307	2.24	27.50	15.8
	Jun-22	6.81	29.28	4603	5.30	62.02	147.2
MW0012S	Sep-21	6.08	28.15	604	0.09	3.86	22.4
	Mar-22	6.20	24.40	352	0.08	9.70	-57.0
MW0012I	Sep-21	6.95	27.65	905	0.09	3.63	-96.8
	Mar-22	7.40	25.40	727	0.07	0.75	-153.3
MW0014S	Sep-21	5.74	27.14	588	0.08	3.30	-16.2
	Mar-22	5.75	24.00	452	0.20	8.75	50.3
MW0014SI	Sep-21	4.43	26.37	132	0.12	13.35	99.5
	Mar-22	4.28	25.20	540	0.05	1.24	80.2
MW0014I	Sep-21	6.88	26.60	2405	0.12	7.92	-49.9
	Mar-22	7.30	24.50	2708	0.12	1.17	-63.9
MW0014ID	Sep-21	6.87	25.94	803	0.06	2.78	-62.2
	Mar-22	7.24	24.60	789	0.09	1.11	-115.2
MW0016S	Sep-21	6.15	28.97	119	2.67	18.84	159.5
	Mar-22	5.66	24.40	188	0.45	12.20	105.9
MW0016I	Sep-21	6.99	26.99	2409	0.09	2.88	-1.3
	Mar-22	7.22	24.90	2177	0.12	0.03	-72.0
MW0016D	Sep-21	7.27	26.96	4018	0.14	3.03	-43.2
	Mar-22	7.51	24.90	3446	0.09	2.37	-48.9
MW0017S	Sep-21	6.70	26.02	1313	0.10	8.61	-55.0
	Mar-22	6.97	23.20	718	0.13	2.95	-100.8

Table 5-3. Field Measurements (Continued)

Well ID (POL-)	Sample Date	pH (S.U.)	Temp. (°C)	Cond. (µS/cm)	DO (mg/L)	Turbidity (NTU)	ORP (mV)
MW0018S	Apr-20	6.13	26.33	253	0.41	2.62	-189.4
	Jun-21	6.34	28.12	230	0.14	4.13	-79.5
	Sep-21	6.18	29.36	387	0.24	10.47	-43.3
	Dec-21	6.13	26.70	287	0.13	14.40	-42.7
	Mar-22	6.51	25.60	394	0.13	1.03	1.6
	Jun-22	5.68	28.33	381	0.34	2.44	115.3
MW0018I	Apr-20	6.58	25.37	2976	0.41	1.62	-111.7
	Jun-21	6.77	28.25	2118	0.15	1.88	-106.2
	Sep-21	6.61	29.66	3217	0.08	2.82	-94.4
	Dec-21	6.74	27.50	3550	0.20	3.39	-132.0
	Mar-22	6.93	27.90	3132	0.07	0.54	-131.8
	Jun-22	6.33	28.91	4310	0.05	5.37	-72.7
MW0018D	Apr-20	6.58	25.37	124	0.13	2.04	-168.8
	Jun-21	6.97	27.33	3300	0.21	1.54	43.5
	Sep-21	6.94	28.88	4098	0.15	8.59	0.6
	Dec-21	7.06	27.10	3394	0.15	2.34	-76.9
	Mar-22	7.25	27.10	3226	0.11	0.32	-71.6
	Jun-22	6.67	28.30	4121	0.49	5.47	-46.9
MW0022I	Sep-21	7.19	24.52	2696	0.09	3.25	-47.8
	Mar-22	7.63	23.70	2450	0.15	0.36	-142.6
MW0022D	Sep-21	7.23	24.39	3786	0.14	5.90	40.0
	Mar-22	7.69	24.00	3273	0.11	0.47	-147.7
MW0026S	Sep-21 *	-	-	-	-	-	-
	Mar-22	5.24	21.90	550	0.41	off scale	38.6
MW0026I	Sep-21	6.81	28.79	1133	0.09	8.50	-58.4
	Mar-22	7.26	27.00	825	0.06	4.37	-161.5
MW0028S	Sep-21	3.09	29.90	2035	2.37	61.20	105.7
	Mar-22	3.75	25.70	548	0.38	18.40	546.0
MW0028I	Sep-21	6.58	27.70	1983	0.08	1.21	4.3
	Mar-22	6.99	25.80	1301	0.05	5.37	-134.2
MW0035S	Sep-21	4.21	27.50	88	0.08	5.36	135.1
	Mar-22	4.20	22.40	1	2.63	8.92	75.0
MW0035SI	Sep-21	5.74	25.92	148	0.06	4.77	-80.6
	Mar-22	5.79	24.20	126	0.02	0.53	-114.4
MW0036SI	Apr-20	4.97	24.70	172	0.07	12.33	-214.9
	Jun-21	3.62	30.21	3384	0.16	9.37	334.0
	Sep-21	3.23	32.15	5354	0.06	5.06	396.5
	Dec-21	3.14	27.30	3264	0.04	3.29	335.3
	Mar-22	3.42	27.30	3264	0.04	1.67	323.5
	Jun-22	3.57	28.71	4108	0.05	6.61	321.5

Table 5-3. Field Measurements (Continued)

Well ID (POL-)	Sample Date	pH (S.U.)	Temp. (°C)	Cond. (µS/cm)	DO (mg/L)	Turbidity (NTU)	ORP (mV)
MW0036I	Apr-20	6.65	25.43	626	0.14	7.49	-183.1
	Jun-21	6.58	30.29	3820	0.13	13.69	79.7
	Sep-21	3.26	30.80	3937	0.05	6.26	414.5
	Dec-21	6.04	27.10	3450	0.05	3.07	-24.6
	Mar-22	6.32	28.60	3678	0.05	2.08	-80.9
	Jun-22	6.03	29.66	4591	0.16	5.50	25.7
MW0039ID	Sep-21	6.64	24.76	1838	0.11	2.99	-27.3
	Mar-22	7.08	23.00	1561	0.11	1.21	-88.5
MW0041SI	Apr-20	4.95	25.05	185	0.13	7.41	-201.4
	Jun-21	3.44	32.08	6480	0.12	6.34	316.9
	Sep-21	3.42	31.91	2409	0.04	3.20	175.4
	Dec-21	3.08	23.90	4460	0.06	2.18	295.5
	Mar-22	3.61	26.20	4331	0.08	4.6211`	179.7
	Jun-22	3.84	29.26	4626	0.05	7.98	203.3
MW0042SI	Apr-20	4.28	25.20	221	0.09	2.21	-167.2
	Jun-21	3.93	28.99	1229	0.12	3.29	-13.0
	Sep-21	3.63	29.95	4168	0.06	3.33	-215.3
	Dec-21	3.50	27.40	2670	0.06	6.40	-66.7
	Mar-22	3.75	24.90	1923	0.15	2.32	24.0
	Jun-22	3.85	27.96	2218	0.05	2.60	77.4
MW0043S	Apr-20	4.53	24.70	142	0.09	5.86	-176.1
	Jun-21	3.49	29.96	3051	0.14	2.05	352.1
	Sep-21	3.64	31.78	1317	0.05	8.87	191.9
	Dec-21	3.16	23.90	1205	0.06	2.24	324.0
	Mar-22	3.42	26.50	963	0.05	4.40	334.5
	Jun-22	3.59	29.55	1215	0.06	9.88	342.5
MW0043I	Apr-20	6.03	24.42	587	0.17	5.31	-209.5
	Jun-21	3.71	30.08	3349	0.13	4.49	360.7
	Sep-21	3.46	32.45	3366	2.40	2.02	396.1
	Dec-21	2.89	23.90	3487	0.40	2.00	372.5
	Mar-22	2.89	26.50	3535	0.15	1.80	362.2
	Jun-22	3.38	30.06	4726	1.45	11.53	410.0
MW0043D	Apr-20	6.37	24.70	2048	0.11	4.76	-171.0
	Jun-21	6.74	28.65	2615	0.09	2.82	74.1
	Sep-21	6.61	30.83	2257	0.05	5.73	74.5
	Dec-21	6.73	22.80	2984	0.13	1.73	97.0
	Mar-22	6.91	27.60	2536	0.06	0.95	-30.5
	Jun-22	6.48	29.56	3208	0.06	2.94	34.6

Table 5-3. Field Measurements (Continued)

Well ID (POL-)	Sample Date	pH (S.U.)	Temp. (°C)	Cond. (µS/cm)	DO (mg/L)	Turbidity (NTU)	ORP (mV)
MW0044I	Apr-20	5.70	25.29	414	0.13	7.23	-223.7
	Jun-21	3.68	30.52	2907	0.11	11.96	382.3
	Sep-21	3.26	30.80	3937	0.05	6.26	414.5
	Dec-21	2.89	27.40	3429	0.03	5.85	244.9
	Mar-22	3.15	26.80	385	0.13	2.07	384.5
	Jun-22	3.45	29.37	4131	0.07	5.15	374.0
MW0044D	Apr-20	6.37	25.64	2327	0.09	8.48	-176.1
	Jun-21	6.77	29.32	2178	0.10	3.23	58.1
	Sep-21	6.64	29.66	2216	0.03	3.71	61.5
	Dec-21	6.81	25.70	2017	0.05	2.10	-229.2
	Mar-22	6.98	27.30	1900	0.04	0.63	-56.2
	Jun-22	6.48	29.74	2783	0.09	2.66	-10.7
MW0045S	Apr-20	4.36	25.79	196	0.08	3.39	-161.4
	Jun-21	4.02	29.87	150	0.11	13.92	245.7
	Sep-21	3.42	30.60	1421	0.22	1.67	360.4
	Dec-21	3.49	27.10	887	0.23	7.61	312.0
	Mar-22	3.68	25.20	708	0.13	2.95	309.0
	Jun-22	3.73	30.18	1245	0.08	14.74	316.1
MW0045I	Apr-20	6.24	25.68	585	0.10	6.59	-272.1
	Jun-21	4.14	30.05	2341	0.18	5.56	283.4
	Sep-21	3.08	30.80	4475	0.41	1.18	444.0
	Dec-21	3.03	25.40	3463	1.55	5.72	414.0
	Mar-22	3.53	25.80	2881	1.98	2.70	393.0
	Jun-22	3.58	30.13	4014	2.76	5.59	440.7
MW0045D	Apr-20	6.57	26.12	2147	0.13	2.86	-163.7
	Jun-21	6.76	30.50	3057	0.13	3.21	76.7
	Sep-21	6.72	29.80	3752	0.04	4.57	150.2
	Dec-21	6.89	26.00	3590	0.10	9..27	-110..2
	Mar-22	7.05	25.80	3192	0.08	0.72	56.5
	Jun-22	6.58	30.01	4431	0.04	2.83	107.2
MW0046D	Apr-20	6.56	24.82	789	0.17	6.16	-125.7
	Jun-21	6.90	29.52	2373	0.12	8.38	43.9
	Sep-21	6.88	28.57	2793	0.18	4.19	173.6
	Dec-21	7.13	26.40	2824	0.33	5.15	85.0
	Mar-22	7.13	27.90	2559	0.08	7.70	-35.2
	Jun-22	6.90	27.97	3263	0.57	15.36	113.6

Table 5-3. Field Measurements (Continued)

Well ID (POL-)	Sample Date	pH (S.U.)	Temp. (°C)	Cond. (µS/cm)	DO (mg/L)	Turbidity (NTU)	ORP (mV)
MW0046DD	Apr-20	6.84	25.22	2623	0.13	8.07	-150.6
	Jun-21	7.30	29.91	3065	2.83	4.91	87.0
	Sep-21	7.30	28.26	2366	3.65	2.48	145.3
	Dec-21	7.54	25.50	3083	5.26	3.94	91.0
	Mar-22	7.64	27.70	3181	5.07	2.00	17.6
	Jun-22	7.27	28.33	4158	7.10	14.56	108.1
MW0047I	Apr-20	6.71	23.89	765	0.14	2.48	-192.6
	Jun-21	6.92	29.86	2655	0.08	2.03	-105.8
	Sep-21	6.84	29.00	3039	0.09	2.02	123.3
	Dec-21	6.95	26.00	3566	0.19	5.71	25.0
	Mar-22	7.19	28.20	3349	1.45	0.88	-0.5
	Jun-22	6.51	28.88	4663	0.93	6.39	96.7
MW0047D	Apr-20	6.75	24.01	1213	0.15	4.40	-153.1
	Jun-21	7.02	29.86	2645	0.65	17.71	33.4
	Sep-21	6.90	28.80	2108	0.52	2.35	128.8
	Dec-21	7.11	25.60	3150	2.44	13.70	106.0
	Mar-22	7.26	26.80	2880	3.84	15.10	49.1
	Jun-22	6.73	28.81	4470	5.27	42.28	49.2
MW0047DD	Apr-20	6.98	24.78	2904	0.19	7.30	-146.0
	Jun-21	7.18	29.13	3548	1.28	2.54	55.4
	Sep-21	7.24	29.37	2961	2.10	1.08	137.7
	Dec-21	7.40	21.90	3055	4.55	1.90	194.0
	Mar-22	7.43	26.20	3080	5.91	3.15	32.5
	Jun-22	6.85	27.41	4599	5.57	13.88	80.4

Notes:

Field measurements displayed are final stabilized measurements collected before sampling.

SC = Specific conductance in microsiemens per centimeter (µS/cm).

DO = Dissolved oxygen in milligrams per liter (mg/L).

Turb. = Turbidity in nephelometric turbidity units (NTUs).

ORP = Oxidation/reduction potential in millivolts (mV).

NM = Not measured.

S.U. = Standard Units.

°C = Degree Celsius.

Values have been rounded from the source material field notes as follows: conductivity has been rounded to the nearest whole number, temperature and turbidity are shown to 2 decimal places, and ORP is shown to one decimal place.

* Monitoring well went dry before measurments could be collected.

Table 5-4. Groundwater TCE System Evaluation Data Summary

Monitoring Well (POL-)	Screened Interval (ft bls)	Baseline Prior to System Startup	Operation									
		April-20	June-21		September-21		December-21		March-22		June-22	
		TCE (µg/L)	TCE (µg/L)	Concentration Reduction	TCE (µg/L)	Concentration Reduction	TCE (µg/L)	Concentration Reduction	TCE (µg/L)	Concentration Reduction	TCE (µg/L)	Concentration Reduction
Southern Treatment Area Plume Centerline Wells												
MW0008S	5-10	0.89 U	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%
MW0011S	10-15	0.89 U	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%
MW0018S	8-13	0.89 U	1.2 J	-34.83%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%
MW0043S	10-20	**15**	2.8	81.33%	0.89 U	94.07%	0.89 U	94.07%	0.89 U	94.07%	0.89 U	94.07%
MW0045S	10-20	0.89 U	3.4	-282.02%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%
MW0008I	25-30	0.89 U	0.89 U	0.00%	0.89 U	0.00%	1.2 J	-34.83%	1.9 J	-113.48%	0.89 U	0.00%
MW0011I	25-30	**130**	0.89 U	99.32%	1.3 I	99.00%	0.89 U	99.32%	0.89 U	99.32%	0.89 U	99.32%
MW0036I	18-23	0.89 U	1.7 J	-91.01%	2.1 I	-135.96%	2 J	-124.72%	1.5 I	-68.54%	3.3	-270.79%
MW0036SI	18-23	**190**	**9.3 J**	95.11%	2 I	98.95%	2.1 J	98.89%	1.8 J	99.05%	2.1 I	98.89%
MW0041SI	18-23	**4 I**	**1.7 J**	57.50%	0.89 U	77.75%	1.7 J	57.50%	1.1 J	72.50%	2.2 J	45.00%
MW0042SI	18-23	0.89 U	**14**	-1473.03%	**5.7**	-540.45%	**6.2**	-596.63%	**6.2**	-596.63%	**10**	-1023.60%
MW0043I	20-30	**10,000**	**71**	99.29%	**27**	99.73%	**35**	99.65%	**41**	99.59%	**6.2**	99.94%
MW0044I	20-30	**16**	0.89 U	94.44%	0.89 U	94.44%	0.89 U	94.44%	0.89 U	94.44%	0.89 U	94.44%
MW0045I	20-30	**2,400**	**17**	99.29%	2.1 I	99.91%	1.1 J	99.95%	1.6 J	99.93%	1.2 I	99.95%
MW0018D	38-43	**40**	0.89 U	97.78%	0.89 U	97.78%	0.89 U	97.78%	0.89 U	97.78%	0.89 U	97.78%
MW0043D	30-40	0.89 U	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%
MW0044D	30-40	0.89 U	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%
MW0045D	30-40	0.89 U	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%
MW0046D	30-40	0.89 U	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%
MW0046DD	40-50	0.89 U	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%
MW0047D	30-40	0.89 U	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%
MW0047DD	40-50	0.89 U	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%	0.89 U	0.00%
Source Well Geo Mean	--	**5.14**	1.89	63.35%	1.29	74.91%	1.31	74.61%	1.31	74.48%	1.26	75.41%

Highlighted concentrations exceed the goal for active remediation (FDEP NADC for TCE of 300 µg/L).

Bolded concentrations exceed the final goal (State of Florida GCTL 3 µg/L).

ft bls = Feet below land surface.

U = Not detected.

I = Value is between method detection limit and practical quantitation limit.

J = The result was an estimated value with an unknown bias.

Table 5-5. Groundwater cDCE System Evaluation Data Summary

Monitoring Well (POL-)	Screened Interval (ft bls)	Baseline Prior to System Startup	Operation									
		April-20	June-21		September-21		December-21		March-22		June-22	
		cDCE (µg/L)	cDCE (µg/L)	Concentration Reduction	cDCE (µg/L)	Concentration Reduction	cDCE (µg/L)	Concentration Reduction	cDCE (µg/L)	Concentration Reduction	cDCE (µg/L)	Concentration Reduction
Southern Treatment Area Plume Centerline Wells												
MW0008S	5-10	0.53 U	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%
MW0011S	10-15	0.53 U	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%
MW0018S	8-13	0.53 U	0.63 J	-18.87%	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%
MW0043S	10-20	8.6	8	6.98%	0.53 U	93.84%	0.53 U	93.84%	0.53 U	93.84%	0.53 U	93.84%
MW0045S	10-20	0.53 U	1.4 J	-164.15%	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%
MW0008I	25-30	0.53 U	0.53 U	0.00%	0.53 U	0.00%	0.83 J	-56.60%	1.0 J	-88.68%	1.6 J	-201.89%
MW0011I	25-30	**600**	0.53 U	99.91%	0.53 U	99.91%	0.53 U	99.91%	0.53 U	99.91%	0.53 U	99.91%
MW0036I	18-23	1 I	2.8	-180.00%	20.0	-1900.00%	7	-600.00%	1.3 J	-30.00%	4.5	-350.00%
MW0036SI	18-23	**400**	**270**	32.50%	4	99.00%	0.85 J	99.79%	0.53 U	99.87%	0.53 U	99.87%
MW0041SI	18-23	**410**	2.5	99.39%	0.55 I	99.87%	0.53 U	99.87%	0.71 J	99.83%	0.85 I	99.79%
MW0042SI	18-23	0.53 U	44	-8201.89%	49	-9145.28%	33	-6126.42%	19	-3484.91%	23	-4239.62%
MW0043I	20-30	**1,500**	65	95.67%	1.9 I	99.87%	2.4 J	99.84%	3.5	99.77%	0.93 I	99.94%
MW0044I	20-30	28	0.53 J	98.11%	0.53 U	98.11%	0.53 U	98.11%	0.53 U	98.11%	0.53 U	98.11%
MW0045I	20-30	**830**	2.1 J	99.75%	0.53 U	99.94%	0.74 J	99.91%	0.53 U	99.94%	0.53 U	99.94%
MW0018D	38-43	**96**	0.53 U	99.45%	0.53 U	99.45%	0.53 U	99.45%	0.53 U	99.45%	0.53 U	99.45%
MW0043D	30-40	0.53 U	2.0 J	-277.36%	1.6 J	-201.89%	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%
MW0044D	30-40	3.6	1.6 J	55.56%	2.0 I	44.44%	1.4 J	61.11%	1.8 J	50.00%	1.3 J	63.89%
MW0045D	30-40	0.53 U	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%
MW0046D	30-40	15	0.53 U	96.47%	0.53 U	96.47%	0.53 U	96.47%	0.53 U	96.47%	0.53 U	96.47%
MW0046DD	40-50	0.53 U	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%
MW0047D	30-40	0.75 I	0.53 U	29.33%	0.53 U	29.33%	0.53 U	29.33%	0.53 U	29.33%	0.53 U	29.33%
MW0047DD	40-50	0.53 U	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%	0.53 U	0.00%
Source Well Geo Mean	--	**6.12**	**1.76**	71.30%	**1.00**	83.68%	**0.85**	86.07%	**0.78**	87.24%	**0.80**	86.99%

Notes:

Highlighted concentrations exceed the goal for active remediation (FDEP NADC for cDCE of 700 µg/L).

Bolded concentrations exceed the final goal (State of Florida GCTL 70 µg/L).

ft bls = Feet below land surface.

U = Not detected.

I = Value is between method detection limit and practical quantitation limit.

J = The result was an estimated value with an unknown bias.

Table 5-6. Groundwater VC System Evaluation Data Summary

Monitoring Well (POL-)	Screened Interval (ft bls)	Baseline Prior to System Startup	Operation									
		April-20	June-21		September-21		December-21		March-22		June-22	
		VC (µg/L)	VC (µg/L)	Concentration Reduction	VC (µg/L)	Concentration Reduction	VC (µg/L)	Concentration Reduction	VC (µg/L)	Concentration Reduction	VC (µg/L)	Concentration Reduction
Southern Treatment Area Plume Centerline Wells												
MW0008S	5-10	0.71 U	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%
MW0011S	10-15	0.71 U	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%
MW0018S	8-13	0.71 U	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%
MW0043S	10-20	0.71 U	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%
MW0045S	10-20	0.71 U	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%
MW0008I	25-30	0.93 I	0.71 U	23.66%	0.71 U	23.66%	0.71 U	23.66%	0.71 U	23.66%	0.71 U	23.66%
MW0011I	25-30	**130**	0.71 U	99.45%	0.71 U	99.45%	0.71 U	99.45%	0.71 U	99.45%	0.71 U	99.45%
MW0036I	18-23	**5.6**	0.71 U	87.32%	0.71 U	87.32%	0.71 U	87.32%	0.71 U	87.32%	0.71 U	87.32%
MW0036SI	18-23	**51**	3.6 U	92.94%	0.71 U	98.61%	0.71 U	98.61%	0.71 U	98.61%	0.71 U	98.61%
MW0041SI	18-23	**86**	0.71 U	99.17%	0.71 U	99.17%	0.71 U	99.17%	0.71 U	99.17%	0.71 U	99.17%
MW0042SI	18-23	0.71 U	**3.7**	-421.13%	0.71 U	0.00%	0.71 U	0.00%	**1.6 J**	-125.35%	**2.2 I**	-209.86%
MW0043I	20-30	**98 I**	0.82 J	99.16%	0.71 U	99.28%	0.71 U	99.28%	0.71 U	99.28%	0.71 U	99.28%
MW0044I	20-30	**3.4**	0.71 U	79.12%	0.71 U	79.12%	0.71 U	79.12%	0.71 U	79.12%	0.71 U	79.12%
MW0045I	20-30	**300**	0.71 U	99.76%	0.71 U	99.76%	0.71 U	99.76%	0.71 U	99.76%	0.71 U	99.76%
MW0018D	38-43	**9.8**	0.71 U	92.76%	0.71 U	92.76%	0.71 U	92.76%	0.71 U	92.76%	0.71 U	92.76%
MW0043D	30-40	0.71 U	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%	0.71 U	0.00%
MW0044D	30-40	**4.6**	0.71 U	84.57%	0.71 U	84.57%	0.71 U	84.57%	**1.5 J**	67.39%	1.2 I	73.91%
MW0045D	30-40	**2.9**	0.71 U	75.52%	0.71 U	75.52%	0.71 U	75.52%	0.71 U	75.52%	0.71 U	75.52%
MW0046D	30-40	**32**	0.71 U	97.78%	0.71 U	97.78%	0.71 U	97.78%	0.71 U	97.78%	0.71 U	97.78%
MW0046DD	40-50	0.96 I	0.71 U	26.04%	0.71 U	26.04%	0.71 U	26.04%	0.71 U	26.04%	0.71 U	26.04%
MW0047D	30-40	**50**	0.71 U	98.58%	0.71 U	98.58%	0.71 U	98.58%	0.71 U	98.58%	0.71 U	98.58%
MW0047DD	40-50	1.2 I	0.71 U	40.83%	0.71 U	40.83%	0.71 U	40.83%	0.71 U	40.83%	0.71 U	40.83%
Source Well Geo Mean	--	**5.23**	**0.83**	84.15%	**0.71**	86.43%	**0.71**	86.43%	**0.76**	85.44%	**0.77**	85.37%

Notes:

Highlighted concentrations exceed the goal for active remediation (FDEP NADC for VC of 100 µg/L).

Bolded concentrations exceed the final goal (State of Florida GCTL 1 µg/L).

ft bls = Feet below land surface.

U = Not detected.

I = Value is between method detection limit and practical quantitation limit.

J = The result was an estimated value with an unknown bias.

Table 5-7. October 2021 POL DPT Analytical Results

Sample Location (POL-)	Screened Interval (feet bls)	TCE	cDCE	tDCE	VC
DPT1466	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT1467	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT1468	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT1469	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT1470	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT1471	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U

Table 5-7. October 2021 POL DPT Analytical Results (Continued)

Sample Location (POL-)	Screened Interval (feet bls)	TCE	cDCE	tDCE	VC
DPT1472	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
DPT1473	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
DPT1474	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	**2**	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
DPT1475	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT1476	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	**1**	1 U	1 U
	40 to 44	1 U	**2**	1 U	1 U
DPT1477	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
DPT1479	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U

Table 5-7. October 2021 POL DPT Analytical Results (Continued)

Notes:
Concentrations in µg/L.
bls = below land surface.
TCE = trichloroethene.
cDCE = cis-1,2-dichloroethene.
tDCE = trans-1,2-dichloroethene.
VC = vinyl chloride.
U = Value was reported as below the method detection limit, therefore the detection limit is shown.
I = Value is between method detection limit and practical quantitation limit.
Shading indicates State of Florida Groundwater Cleanup Target Level (GCTL) exceedance, TCE = 3 µg/L, cDCE = 70 µg/L, tDCE = 100 µg/L, VC = 1 µg/L.
Bolding indicates concentration is greater than the method detection limit.

Table 5-8. August 2022 POL DPT Analytical Results

Sample Location (POL-)	Screened Interval (feet bls)	TCE	cDCE	tDCE	VC
DPT1480	5 to 9	0.31 U	0.34 U	0.26 U	0.23 U
	10 to 14	1.3	0.34 U	0.26 U	0.23 U
	15 to 19	0.31 U	0.34 U	0.26 U	0.23 U
	20 to 24	0.31 U	0.34 U	0.26 U	0.23 U
	25 to 29	0.31 U	0.34 U	0.26 U	0.23 U
	30 to 34	0.31 U	0.34 U	0.26 U	0.23 U
	35 to 39	0.31 U	0.34 U	0.26 U	0.23 U
	40 to 44	0.31 U	0.34 U	0.26 U	0.23 U
	45 to 49	0.31 U	0.60 I	0.26 U	0.85 I
	50 to 54	0.31 U	0.34 U	0.26 U	0.23 U
DPT1481	10 to 14	0.31 U	0.34 U	0.26 U	0.23 U
	15 to 19	0.31 U	0.34 U	0.26 U	0.23 U
	20 to 24	0.31 U	0.34 U	0.26 U	0.23 U
	25 to 29	0.31 U	0.34 U	0.26 U	0.23 U
	30 to 34	0.31 U	0.34 U	0.26 U	0.23 U
	35 to 39	4.3	0.98 I	0.38 I	0.23 U
DPT1482	15 to 19	1.9	4.9	0.26 U	0.23 U
	20 to 24	0.6 I	1.8	0.26 U	0.23 U
	25 to 29	0.38 I	0.85 I	0.26 U	0.23 U
	30 to 34	0.31 U	0.36 I	0.26 U	2.3
	35 to 39	0.31 U	0.34 U	0.26 U	0.23 U
	40 to 44	0.31 U	0.34 U	0.26 U	0.23 U
DPT1483	10 to 14	0.31 U	0.34 U	0.26 U	0.23 U
	15 to 19	0.31 U	0.37 I	0.26 U	0.23 U
	20 to 24	4	1.1	0.27 I	0.23 U
	25 to 29	1.5	6.5	0.82 I	0.66 I
	30 to 34	0.31 U	0.34 U	0.26 U	0.23 U
	35 to 39	0.38 I	0.86 I	0.26 U	1.1
	40 to 44	0.31 U	0.43 I	0.26 U	3
DPT1484	20 to 24	0.31 U	0.34 U	0.26 U	0.23 U
	25 to 29	0.31 U	0.34 U	0.26 U	0.23 U
	30 to 34	0.31 U	0.34 U	0.26 U	0.23 U
	35 to 39	0.31 I	0.36 I	0.26 U	0.23 U
	40 to 44	0.31 U	0.34 U	0.26 U	0.23 U
DPT1485	20 to 24	0.31 U	0.34 U	0.26 U	0.23 U
	25 to 29	0.31 U	0.34 U	0.26 U	0.23 U
	30 to 34	0.31 U	0.34 U	0.26 U	0.23 U
	35 to 39	0.31 U	0.34 U	0.26 U	0.23 U
	40 to 44	0.31 U	0.34 U	0.26 U	1
DPT1486	15 to 19	0.31 U	0.34 U	0.26 U	0.23 U
	20 to 24	0.31 U	0.34 U	0.26 U	0.23 U
	25 to 29	0.31 U	0.34 U	0.26 U	0.23 U
	30 to 34	0.31 U	0.34 U	0.26 U	0.23 U
	35 to 39	0.31 U	0.34 U	0.26 U	0.23 U
	40 to 44	0.31 U	0.34 U	0.26 U	0.23 U
DPT1487	15 to 19	0.31 U	0.34 U	0.26 U	0.23 U
	20 to 24	0.31 U	0.34 U	0.26 U	0.23 U
	25 to 29	0.31 U	0.34 U	0.26 U	0.23 U
	30 to 34	0.31 U	0.61 I	0.26 U	0.23 U
	35 to 39	0.31 U	0.34 U	0.26 U	0.23 U
	40 to 44	0.31 U	0.34 U	0.26 U	0.23 U

Table 5-8. August 2022 POL DPT Analytical Results (Continued)

Sample Location (POL-)	Screened Interval (feet bls)	TCE	cDCE	tDCE	VC
DPT1488	10 to 14	0.31 U	0.34 U	0.26 U	0.23 U
	15 to 19	0.31 U	0.34 U	0.26 U	0.23 U
	20 to 24	0.31 U	0.34 U	0.26 U	0.23 U
	25 to 29	0.31 U	**0.49 I**	0.26 U	0.23 U
	30 to 34	0.31 U	**0.71 I**	0.26 U	0.23 U
	35 to 39	0.31 U	0.34 U	0.26 U	0.23 U
	40 to 44	0.31 U	0.34 U	0.26 U	0.23 U
DPT1489	25 to 29	0.31 U	0.34 U	0.26 U	0.23 U
	30 to 34	0.31 U	0.34 U	0.26 U	0.23 U
	35 to 39	0.31 U	**4.6**	0.26 U	0.23 U
	40 to 44	0.31 U	0.34 U	0.26 U	**0.84 I**
DPT1490	25 to 29	0.31 U	0.34 U	0.26 U	0.23 U
	30 to 34	0.31 U	**1.5**	0.26 U	0.23 U
	35 to 39	0.31 U	**5.6**	0.26 U	**3.1**
	40 to 44	0.31 U	**1.1**	0.26 U	**2**

Notes:
Concentrations in µg/L.
bls = below land surface.
TCE = trichloroethene.
cDCE = cis-1,2-dichloroethene.
tDCE = trans-1,2-dichloroethene.
VC = vinyl chloride.
U = Value was reported as below the method detection limit, therefore the detection limit is shown.
I = Value is between method detection limit and practical quantitation limit.
Shading indicates State of Florida Groundwater Cleanup Target Level (GCTL) exceedance, TCE = 3 µg/L, cDCE = 70 µg/L, tDCE = 100 µg/L, VC = 1 µg/L.
Bolding indicates a concentration is greater than the method detection limit.

FIGURE 5-1 INTERMEDIATE GROUNDWATER CONTOUR MAP - MAY 2021
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

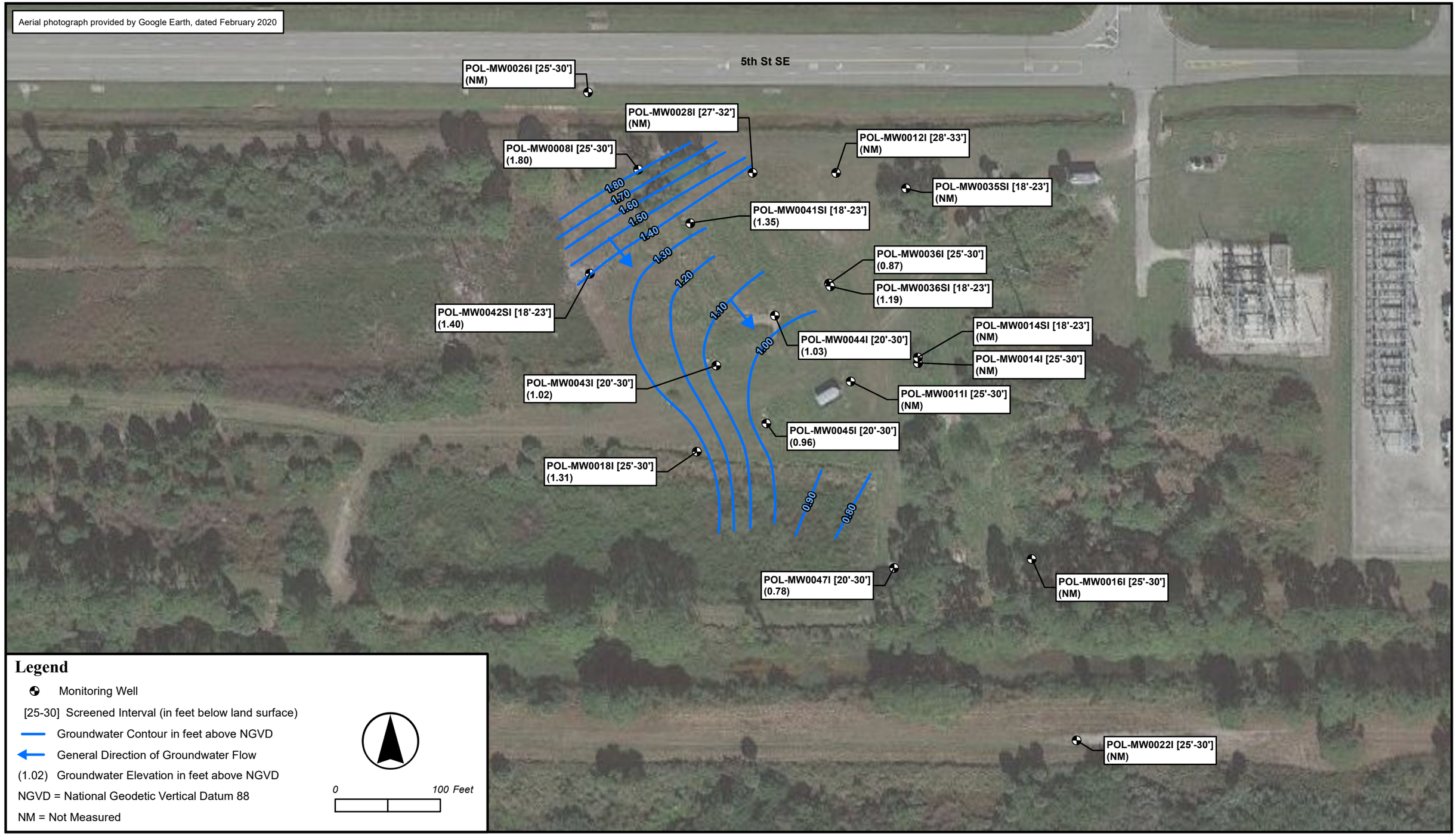


FIGURE 5-2 DEEP GROUNDWATER CONTOUR MAP - MAY 2021
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

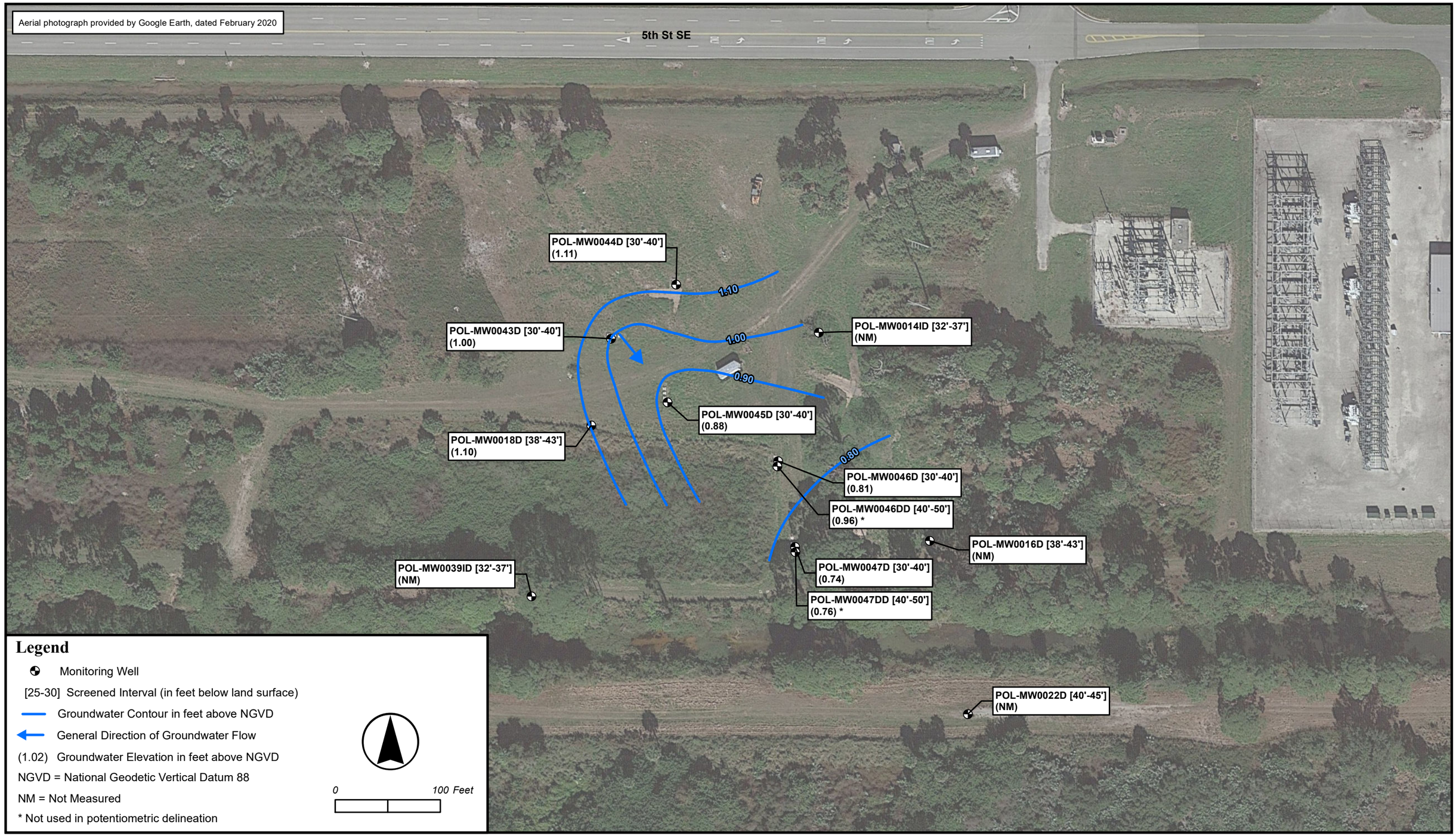
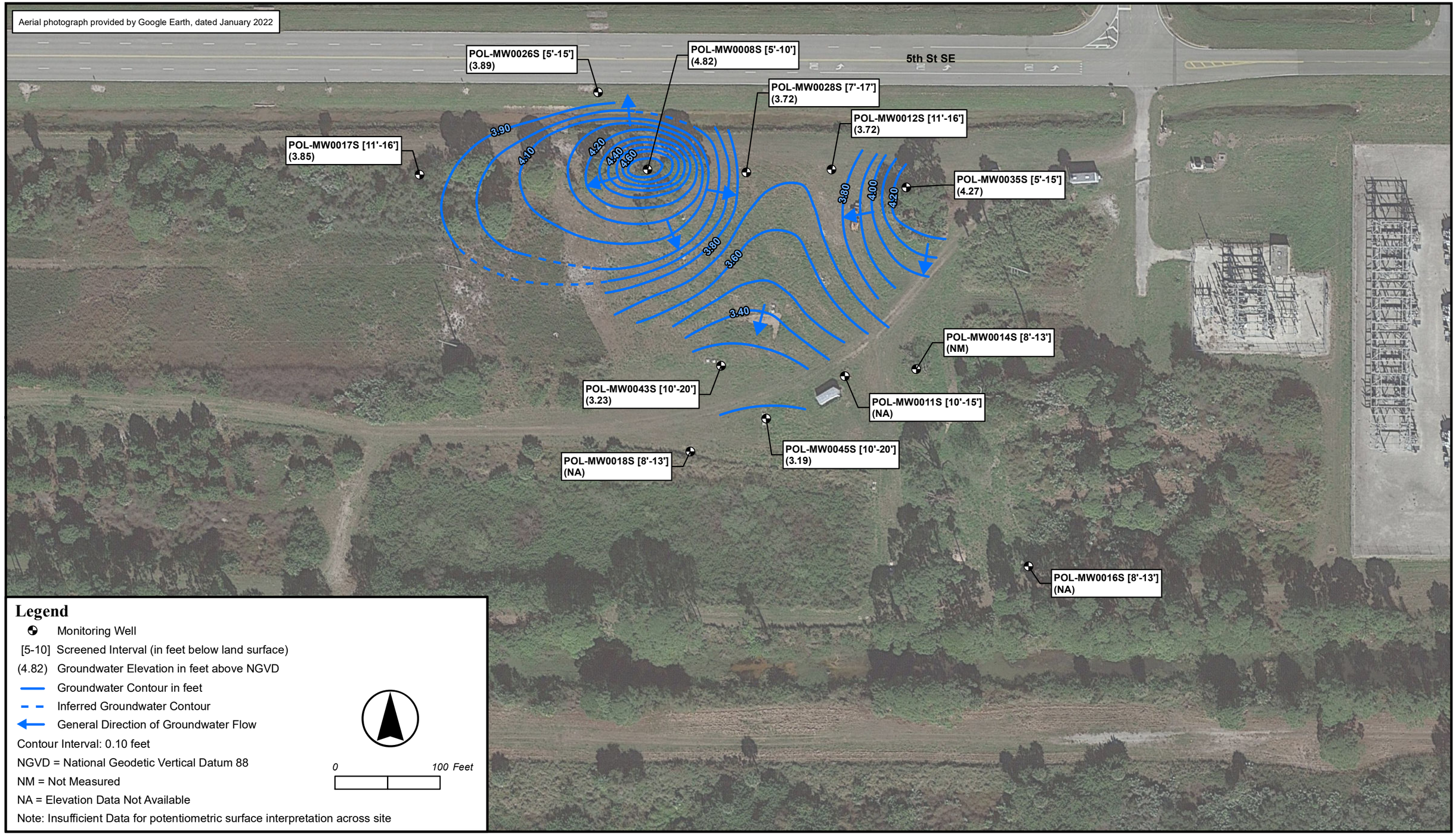
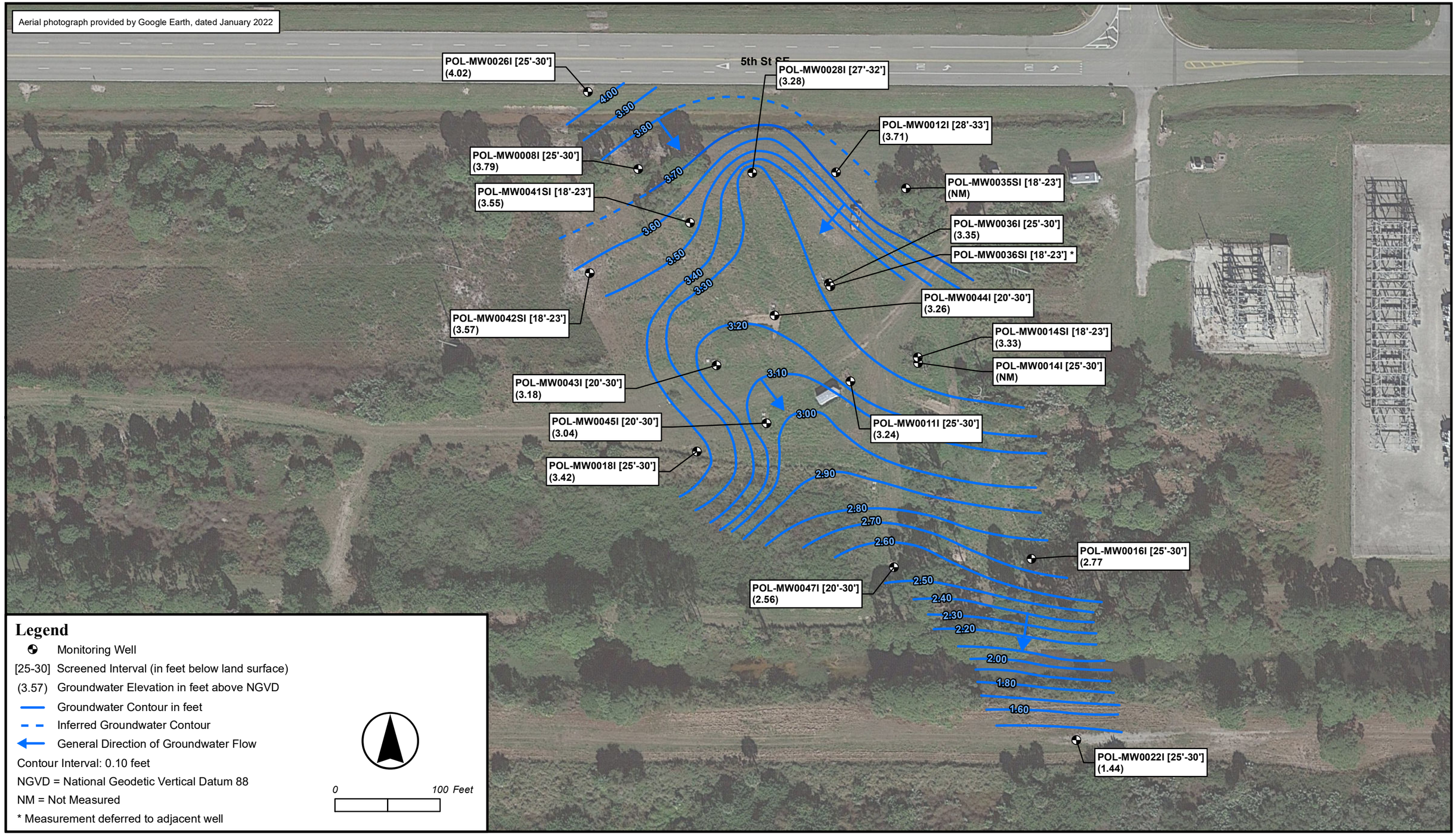


FIGURE 5-3 SHALLOW GROUNDWATER CONTOUR MAP - SEPTEMBER 2021
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



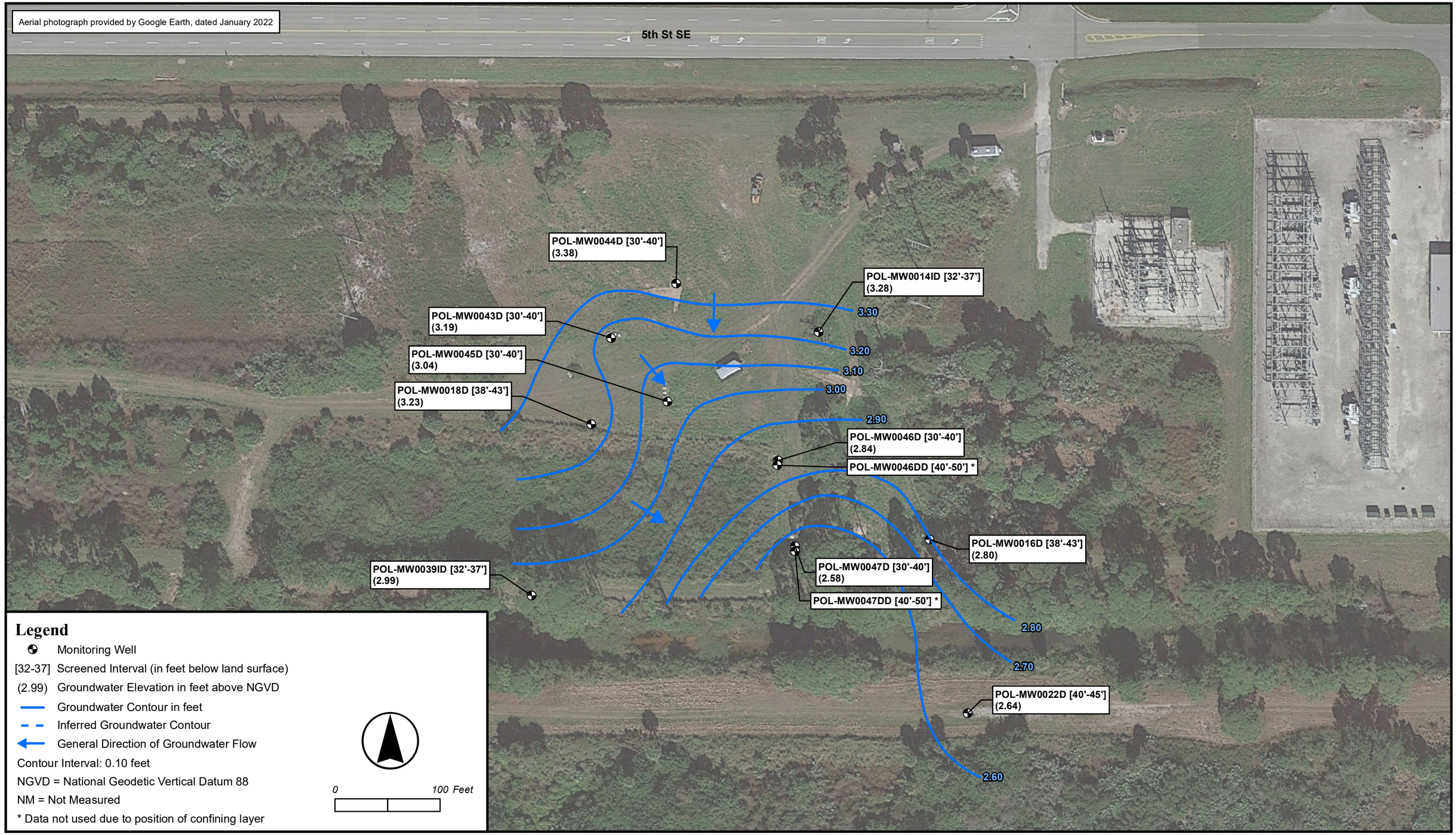
JAX C:\GIS\KSC\MXD\POL\5-3_POL_SEPT2021_SHALLOW_CONTOURS_REV1.MXD 01/04/23

FIGURE 5-4 INTERMEDIATE GROUNDWATER CONTOUR MAP - SEPTEMBER 2021
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



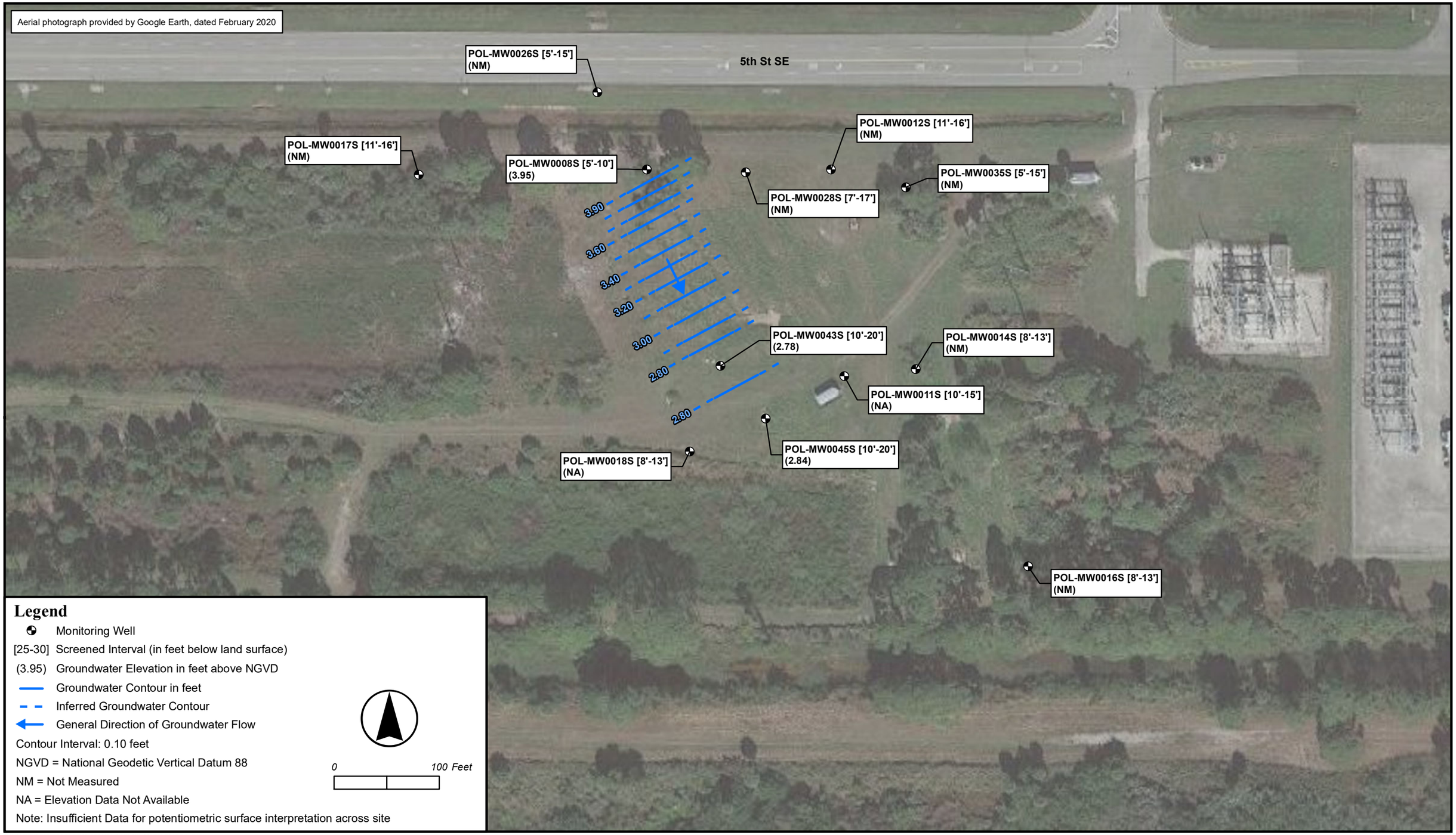
JAX C:\GIS\KSC\MXD\POL\5-4_POL_SEPT2021_INTERMEDIATE_CONTOURS_REV1.MXD 01/04/23

FIGURE 5-5 DEEP GROUNDWATER CONTOUR MAP - SEPTEMBER 2021
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



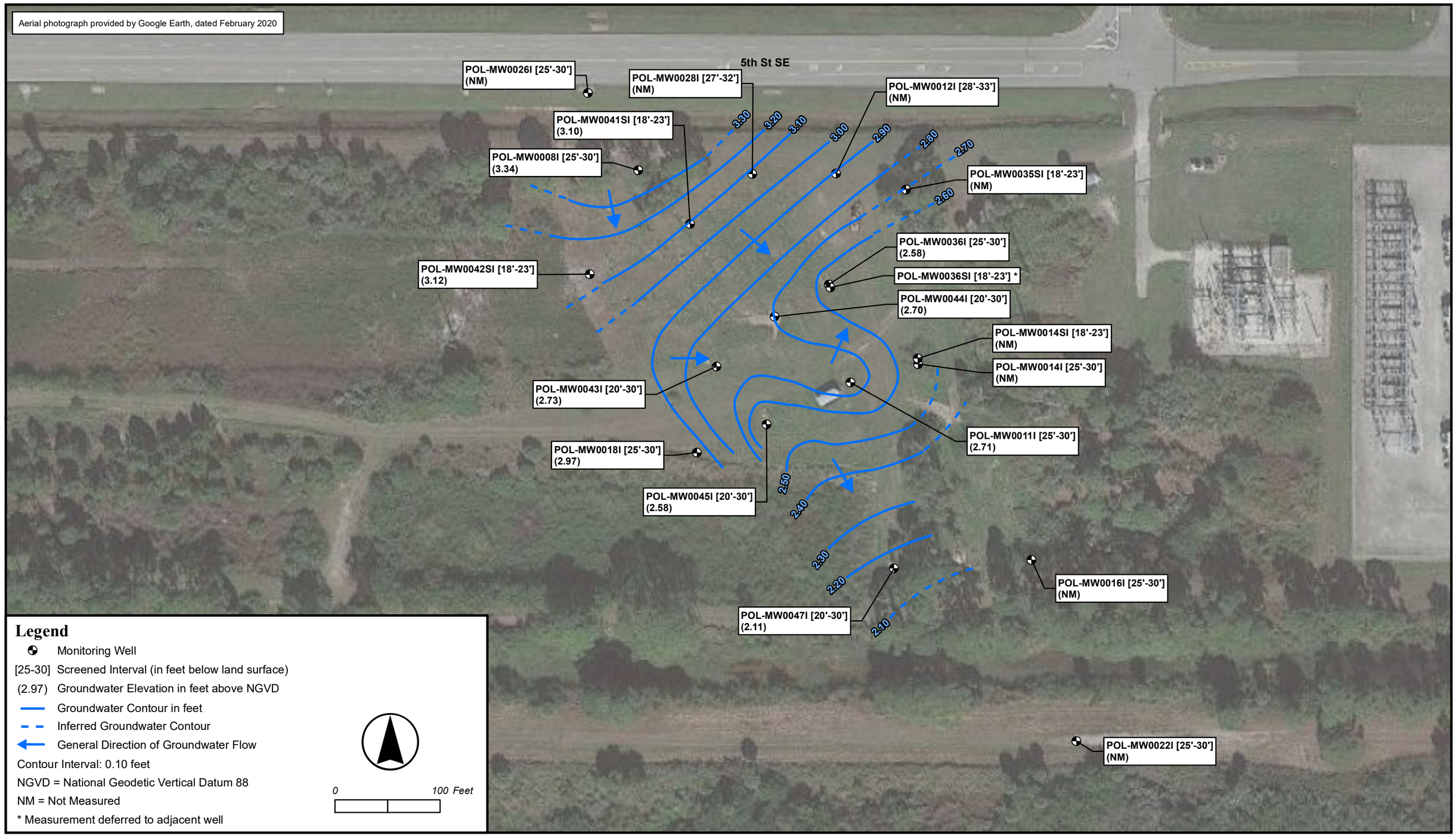
JAX C:\GIS\KSC\MXD\POL\5-5_POL_SEPT2021_DEEP_CONTOURS_REV1.MXD 01/04/23

FIGURE 5-6 SHALLOW GROUNDWATER CONTOUR MAP - DECEMBER 2021
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



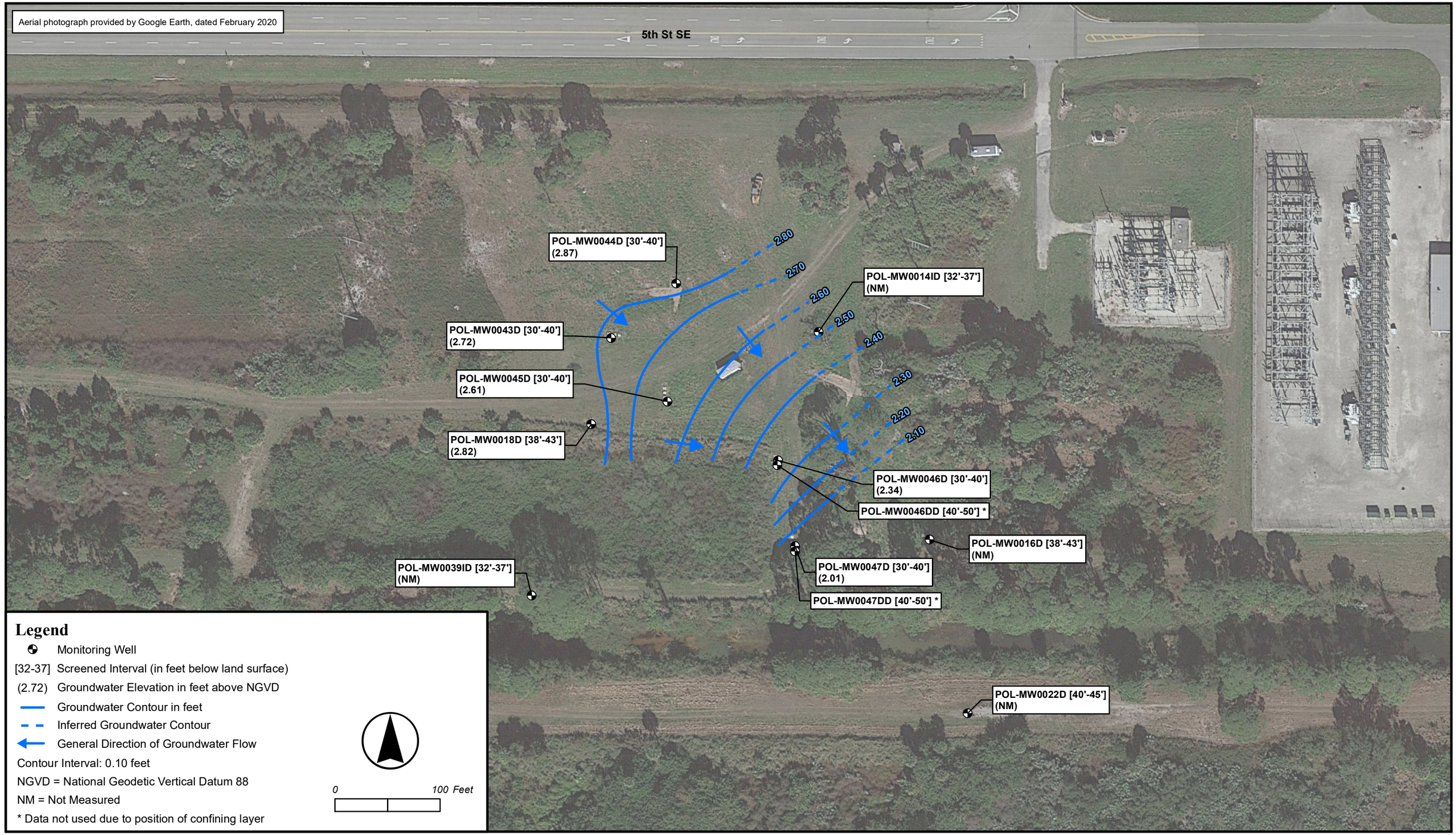
JAX C:\GIS\KSC\MXD\POL\5-6_POL_DEC2021_SHALLOW_CONTOURS.MXD 01/04/23

FIGURE 5-7 INTERMEDIATE GROUNDWATER CONTOUR MAP - DECEMBER 2021
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



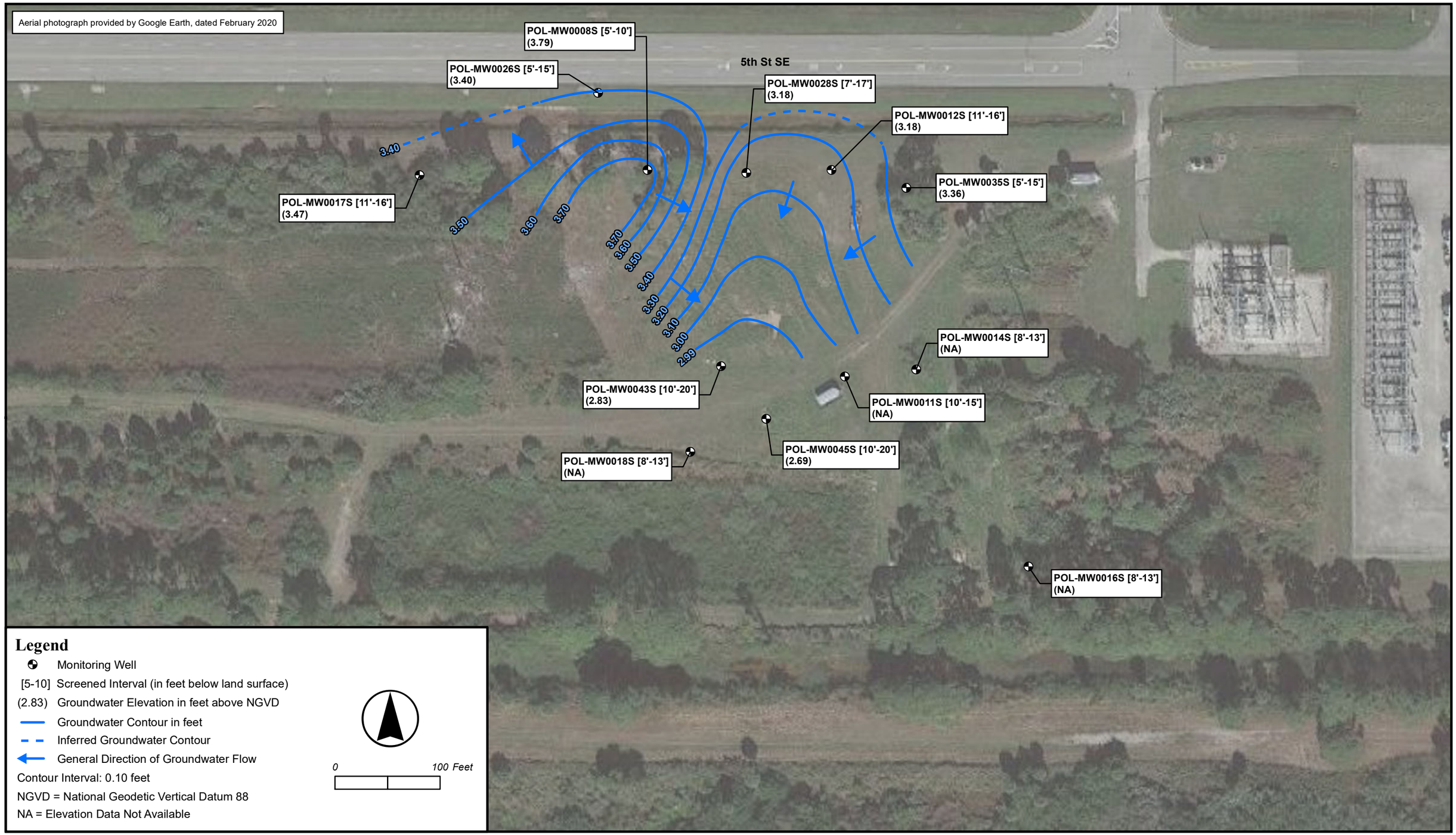
JAX C:\GIS\KSC\MXD\POL\5-7_POL_DEC2021_INTERMEDIATE_CONTOURS.MXD 01/04/23

FIGURE 5-8 DEEP GROUNDWATER CONTOUR MAP - DECEMBER 2021
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



JAX C:\GIS\KSC\MXD\POL\5-8_POL_DEC2021_DEEP_CONTOURS.MXD 01/04/23

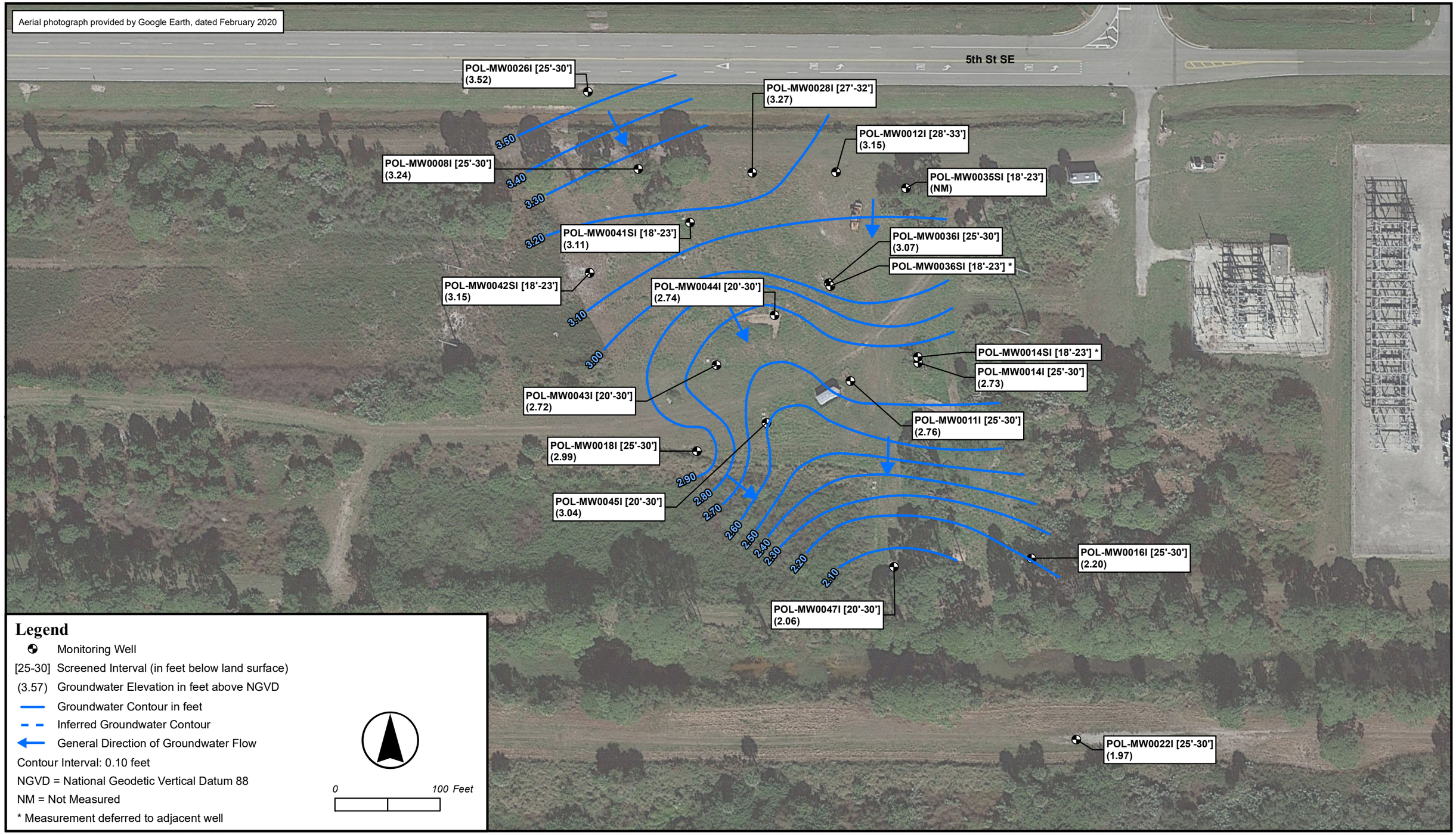
FIGURE 5-9 SHALLOW GROUNDWATER CONTOUR MAP - MARCH 2022
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



JAX C:\GIS\KSC\MXD\POL\5-9_POL_MARCH2022_SHALLOW_CONTOURS.MXD 01/04/23

FIGURE 5-10 INTERMEDIATE GROUNDWATER CONTOUR MAP - MARCH 2022
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

POL-SW3 LTM-CC-PMR
Revision: 0
February 2023



JAX C:\GIS\KSC\MXD\POL\5-10_POL_MARCH2022_INTERMEDIATE_CONTOURS.MXD 01/04/23

FIGURE 5-11 DEEP GROUNDWATER CONTOUR MAP - MARCH 2022
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

Aerial photograph provided by Google Earth, dated February 2020

5th St SE

POL-MW0044D [30'-40']
(2.91)

POL-MW0043D [30'-40']
(2.80)

POL-MW0014ID [32'-37']
(2.74)

POL-MW0045D [30'-40']
(2.58)

POL-MW0018D [38'-43']
(2.81)

POL-MW0046D [30'-40']
(2.33)

POL-MW0046DD [40'-50'] *

POL-MW0039ID [32'-37']
(2.60)

POL-MW0016D [38'-43']
(2.27)

POL-MW0047DD [40'-50'] *

POL-MW0047D [30'-40']
(2.01)

POL-MW0022D [40'-45']
(2.13)

2.90
2.80
2.70
2.60
2.50
2.40
2.30
2.20
2.10

Legend

- Monitoring Well
- [32-37] Screened Interval (in feet below land surface)
- (2.99) Groundwater Elevation in feet above NGVD
- Groundwater Contour in feet
- Inferred Groundwater Contour
- General Direction of Groundwater Flow

Contour Interval: 0.10 feet
NGVD = National Geodetic Vertical Datum 88
NM = Not Measured
* Data not used due to position of confining layer

0 100 Feet

JAX C:\GIS\KSC\MXD\POL\5-11_POL_MARCH2022_DEEP_CONTOURS.MXD 01/04/23

FIGURE 5-12 SHALLOW GROUNDWATER CONTOUR MAP - JUNE 2022
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

Aerial photograph provided by Google Earth, dated February 2020

5th St SE

POL-MW0026S [5'-15'] (NM)
POL-MW0028S [7'-17'] (NM)
POL-MW0012S [11'-16'] (NM)
POL-MW0008S [5'-10'] (3.02)
POL-MW0017S [11'-16'] (NM)
POL-MW0035S [5'-15'] (NM)
POL-MW0014S [8'-13'] (NA)
POL-MW0043S [10'-20'] (2.22)
POL-MW0011S [10'-15'] (NA)
POL-MW0045S [10'-20'] (2.08)
POL-MW0018S [8'-13'] (NA)
POL-MW0016S [8'-13'] (NM)

3.00
2.80
2.60
2.40
2.20

Legend

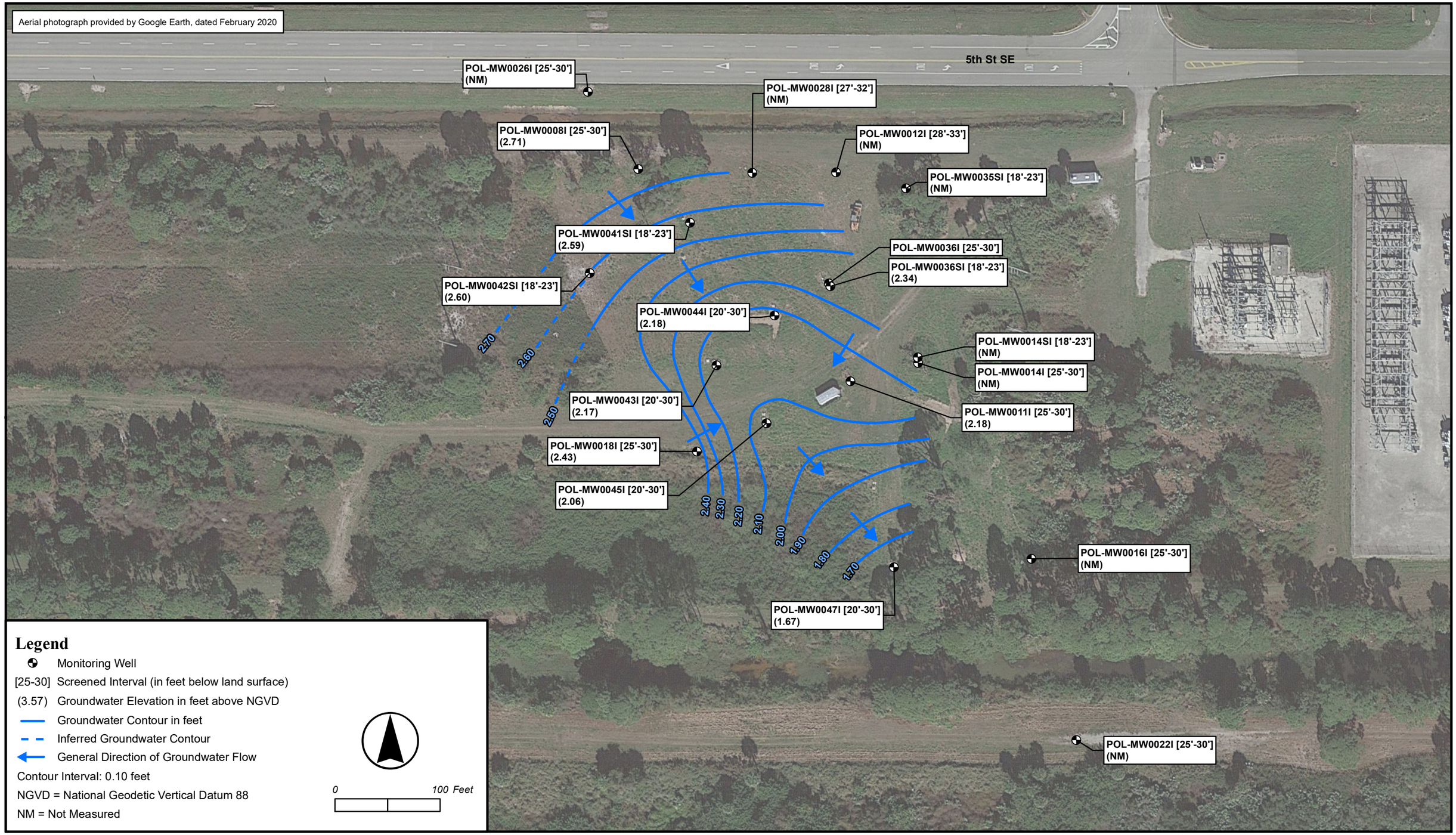
- Monitoring Well
- [5-10] Screened Interval (in feet below land surface)
- (2.83) Groundwater Elevation in feet above NGVD
- Groundwater Contour in feet
- Inferred Groundwater Contour
- General Direction of Groundwater Flow

Contour Interval: 0.10 feet
NGVD = National Geodetic Vertical Datum 88
NA = Elevation Data Not Available
NM = Not Measured

0 100 Feet

JAX C:\GIS\KSC\MXD\POL\5-12_POL_JUNE2022_SHALLOW_CONTOURS.MXD 01/04/23

FIGURE 5-13 INTERMEDIATE GROUNDWATER CONTOUR MAP - JUNE 2022
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



JAX C:\GIS\KSC\MXD\POL\5-13_POL_JUNE2022_INTERMEDIATE_CONTOURS.MXD 01/04/23

FIGURE 5-14 DEEP GROUNDWATER CONTOUR MAP - JUNE 2022
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

Aerial photograph provided by Google Earth, dated February 2020

5th St SE

POL-MW0044D [30'-40'] (2.34)

POL-MW0043D [30'-40'] (2.22)

POL-MW0045D [30'-40'] (2.05)

POL-MW0018D [38'-43'] (2.25)

POL-MW0039ID [32'-37'] (NM)

POL-MW0014ID [32'-37'] (NM)

POL-MW0046D [30'-40'] (1.89)

POL-MW0046DD [40'-50'] *

POL-MW0016D [38'-43'] (NM)

POL-MW0047DD [40'-50'] *

POL-MW0047D [30'-40'] (1.62)

POL-MW0022D [40'-45'] (NM)

2.30
2.20
2.10
2.00
1.90
1.80
1.70

Legend

- Monitoring Well
- [32-37] Screened Interval (in feet below land surface)
- (2.99) Groundwater Elevation in feet above NGVD
- Groundwater Contour in feet
- Inferred Groundwater Contour
- General Direction of Groundwater Flow

Contour Interval: 0.10 feet

NGVD = National Geodetic Vertical Datum 88

NM = Not Measured

* Data not used due to position of confining layer

0 100 Feet

JAX C:\GIS\KSC\MXD\POL\5-14_POL_JUNE2022_DEEP_CONTOURS.MXD 01/04/23

FIGURE 5-15 POL SOUTHERN TREATMENT AREA PERFORMANCE MONITORING GROUNDWATER CONCENTRATIONS - SHALLOW ZONE
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

JAX C:\GIS\KSC\MXD\POL\STEP4\5-15_POL_MWRESULTS_JULY2022_SHALLOW.MXD 02/16/23

FIGURE 5-16 POL SOUTHERN TREATMENT AREA PERFORMANCE MONITORING GROUNDWATER CONCENTRATIONS - INTERMEDIATE ZONE
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

POL-SW3 LTM-CC-PMR
Revision 0
February 2023

Aerial photograph provided by Google Earth, dated February 2020

5th St SE

MW0028I [27-32]	TCE	cDCE	tDCE	VC
09/2021	0.89 U	0.53 U	0.73 U	**1.2 I**
03/2022	0.89 U	0.53 U	0.73 U	**1.4 I**

MW0008I [25-30]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	0.53 U	0.73 U	**0.93 I**
06/2021	0.89 U	0.53 U	0.73 U	0.71 U
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
12/2021	**1.2 I**	**0.83 I**	0.73 U	0.71 U
03/2022	**1.9 I**	**1 I**	0.73 U	0.71 U
06/2022	0.89 U	**1.6 I**	0.73 U	0.71 U

MW0041SI [18-23]	TCE	cDCE	tDCE	VC
04/2020	**4 I**	**410**	**5.4**	**86**
06/2021	**1.7 I**	**2.5**	0.73 U	0.71 U
09/2021	0.89 U	**0.55 I**	0.73 U	0.71 U
12/2021	**1.7 I**	0.53 U	0.73 U	0.71 U
03/2022	**1.1 I**	**0.71 I**	0.73 U	0.71 U
06/2022	**2.2 I**	**0.85 I**	0.73 U	0.71 U

MW0042SI [18-23]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	0.53 U	0.73 U	0.71 U
06/2021	**14**	**44**	**4.6**	**3.7**
09/2021	**5.7**	**49**	**3.9**	0.71 U
12/2021	**6.2**	**33**	**3.2**	0.71 U
03/2022	**6.2**	**19**	**1.6 I**	**1.6 I**
06/2022	**10**	**23**	**2 I**	**2.2 I**

MW0044I [20-30]	TCE	cDCE	tDCE	VC
04/2020	**16**	**28**	0.73 U	**3.4**
06/2021	0.89 U	**0.53 J**	0.73 U	0.71 U
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
12/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U
06/2022	0.89 U	0.53 U	0.73 U	0.71 U

MW0033I [25-30]	TCE	cDCE	tDCE	VC
11/2020	**35**	**30**	**15**	**0.8 J**
10/2021	**160**	**57**	**42**	**1.3 J**

MW0026I [25-30]	TCE	cDCE	tDCE	VC
09/2021	0.89 U	**2 I**	1 U	**2.1 I**
03/2022	0.89 U	**1.8 I**	1 U	**0.84 I**

MW0012I [28-33]	TCE	cDCE	tDCE	VC
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	**0.76 I**

MW0035SI [18-23]	TCE	cDCE	tDCE	VC
09/2021	0.89 U	**1.8 I**	0.73 U	0.71 U
03/2022	0.89 U	**2.3 I**	0.73 U	0.71 U

MW0036I [25-30]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	**1 I**	**0.79 I**	**5.6**
06/2021	**1.7 I**	**2.8**	0.73 U	0.71 U
09/2021	**2.1 I**	**20**	**0.83 I**	0.71 U
12/2021	**2 I**	**7**	0.73 U	0.71 U
03/2022	**1.5 I**	**1.3 I**	0.73 U	0.71 U
06/2022	**3.3**	**4.5**	0.73 U	0.71 U

MW0036SI [18-23]	TCE	cDCE	tDCE	VC
04/2020	**190**	**400**	**17**	**51**
06/2021	**9.3 I**	**270**	**7.9 J**	3.6 U
09/2021	**2 I**	**4**	0.73 U	0.71 U
12/2021	**2.1 I**	**0.85 J**	0.73 U	0.71 U
03/2022	**1.8 I**	0.53 U	0.73 U	0.71 U
06/2022	**2.1 I**	0.53 U	0.73 U	0.71 U

MW0014SI [18-23]	TCE	cDCE	tDCE	VC
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	**0.9 I**	0.73 U	0.71 U

MW0014I [25-30]	TCE	cDCE	tDCE	VC
09/2021	0.89 U	**0.55 I**	0.73 U	0.71 U
03/2022	0.89 U	**0.64 J**	0.73 U	0.71 U

MW0011I [25-30]	TCE	cDCE	tDCE	VC
04/2020	**130**	**600**	**140**	**130**
08/2021	0.89 U	0.53 U	0.73 U	0.71 U
09/2021	**1.3 I**	0.53 U	0.73 U	0.71 U
12/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U
06/2022	0.89 U	0.53 U	0.73 U	0.71 U

MW0016I [25-30]	TCE	cDCE	tDCE	VC
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U

MW0047I [20-30]	TCE	cDCE	tDCE	VC
04/2020	4.4 U	2.6 U	**33**	**360**
06/2021	0.89 U	0.53 U	0.73 U	**1.4 J**
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
12/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U
06/2022	0.89 U	0.53 U	0.73 U	0.71 U

MW0022I [25-30]	TCE	cDCE	tDCE	VC
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U

MW0043I [20-30]	TCE	cDCE	tDCE	VC
04/2020	**10000**	**1500**	**280**	**98 I**
06/2021	**71**	**65**	**4.5**	**0.82 J**
09/2021	**27**	**1.9 I**	0.73 U	0.71 U
12/2021	**35**	**2.4 J**	**0.75 I**	0.71 U
03/2022	**41**	**3.5**	**0.75 J**	0.71 U
06/2022	**6.2**	**0.93 I**	0.73 U	0.71 U

MW0018I [25-30]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	**1.4 I**	0.73 U	**1.4 I**
06/2021	0.89 U	0.53 U	0.73 U	0.71 U
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
12/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U
06/2022	0.89 U	0.53 U	0.73 U	0.71 U

MW0045I [20-30]	TCE	cDCE	tDCE	VC
04/2020	**2400**	**830**	**400**	**300**
06/2021	**17**	**2.1 J**	**1.2 J**	0.71 U
09/2021	**2.1 I**	0.53 U	0.73 U	0.71 U
12/2021	**1.1 J**	**0.74 J**	0.73 U	0.71 U
03/2022	**1.6 I**	0.53 U	0.73 U	0.71 U
06/2022	**1.2 I**	0.53 U	0.73 U	0.71 U

Legend

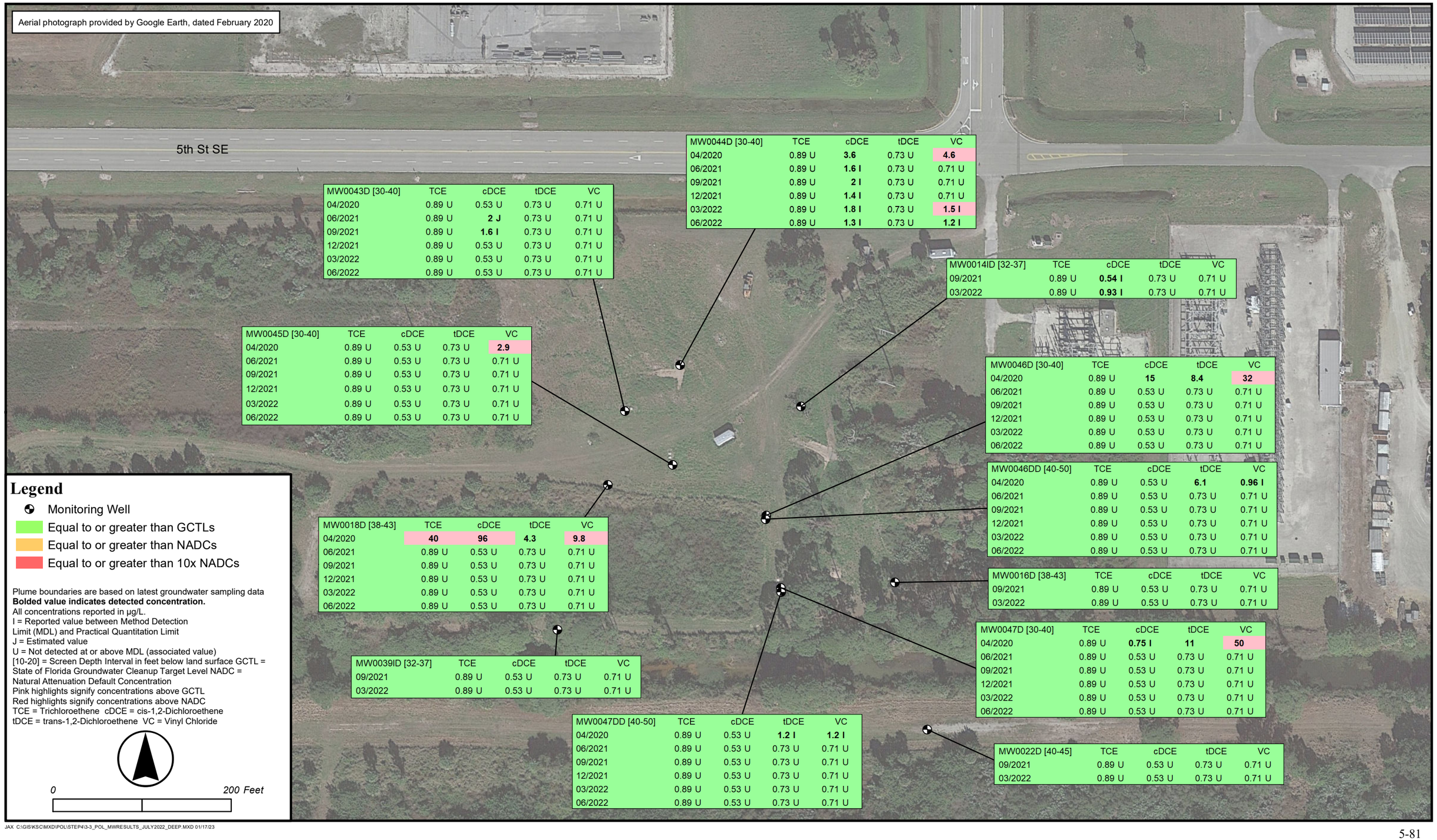
- Monitoring Well
- Equal to or greater than GCTLs
- Equal to or greater than NADCs
- Equal to or greater than 10x NADCs

MW0033I is not part of Southern Treatment Area PM program, but shown to indicate plume conditions in northern area of site
Plume boundaries are based on latest groundwater sampling data
Bolded values indicate detect concentration
All concentrations reported in µg/L
D = Sample was analyzed at dilution
I = Reported value between Method Detection Limit (MDL) and Practical Quantitation Limit
J = Estimated value
U = Not detected at or above MDL (associated value)
[10-20] = Screen Depth Interval in feet below land surface
GCTL = State of Florida Groundwater Cleanup Target Level
NADC = Natural Attenuation Default Concentration
Pink highlights signify concentrations above GCTL
Red highlights signify concentrations above NADC
TCE = Trichloroethene cDCE = cis-1,2-Dichloroethene
tDCE = trans-1,2-Dichloroethene VC = Vinyl Chloride

0 200 Feet

JAX C:\GIS\KSC\MXD\POL\STEP4\5-16_POL_MWRESULTS_JULY2022_INT.MXD 02/16/23

FIGURE 5-17 POL SOUTHERN TREATMENT AREA PERFORMANCE MONITORING GROUNDWATER CONCENTRATIONS - DEEP ZONE
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



MW0043D [30-40]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	0.53 U	0.73 U	0.71 U
06/2021	0.89 U	**2 J**	0.73 U	0.71 U
09/2021	0.89 U	**1.6 I**	0.73 U	0.71 U
12/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U
06/2022	0.89 U	0.53 U	0.73 U	0.71 U

MW0044D [30-40]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	**3.6**	0.73 U	**4.6**
06/2021	0.89 U	**1.6 I**	0.73 U	0.71 U
09/2021	0.89 U	**2 I**	0.73 U	0.71 U
12/2021	0.89 U	**1.4 I**	0.73 U	0.71 U
03/2022	0.89 U	**1.8 I**	0.73 U	**1.5 I**
06/2022	0.89 U	**1.3 I**	0.73 U	**1.2 I**

MW0014ID [32-37]	TCE	cDCE	tDCE	VC
09/2021	0.89 U	**0.54 I**	0.73 U	0.71 U
03/2022	0.89 U	**0.93 I**	0.73 U	0.71 U

MW0045D [30-40]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	0.53 U	0.73 U	**2.9**
06/2021	0.89 U	0.53 U	0.73 U	0.71 U
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
12/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U
06/2022	0.89 U	0.53 U	0.73 U	0.71 U

MW0046D [30-40]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	**15**	**8.4**	**32**
06/2021	0.89 U	0.53 U	0.73 U	0.71 U
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
12/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U
06/2022	0.89 U	0.53 U	0.73 U	0.71 U

MW0046DD [40-50]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	0.53 U	**6.1**	**0.96 I**
06/2021	0.89 U	0.53 U	0.73 U	0.71 U
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
12/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U
06/2022	0.89 U	0.53 U	0.73 U	0.71 U

MW0018D [38-43]	TCE	cDCE	tDCE	VC
04/2020	**40**	**96**	**4.3**	**9.8**
06/2021	0.89 U	0.53 U	0.73 U	0.71 U
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
12/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U
06/2022	0.89 U	0.53 U	0.73 U	0.71 U

MW0016D [38-43]	TCE	cDCE	tDCE	VC
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U

MW0039ID [32-37]	TCE	cDCE	tDCE	VC
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U

MW0047D [30-40]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	**0.75 I**	**11**	**50**
06/2021	0.89 U	0.53 U	0.73 U	0.71 U
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
12/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U
06/2022	0.89 U	0.53 U	0.73 U	0.71 U

MW0047DD [40-50]	TCE	cDCE	tDCE	VC
04/2020	0.89 U	0.53 U	**1.2 I**	**1.2 I**
06/2021	0.89 U	0.53 U	0.73 U	0.71 U
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
12/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U
06/2022	0.89 U	0.53 U	0.73 U	0.71 U

MW0022D [40-45]	TCE	cDCE	tDCE	VC
09/2021	0.89 U	0.53 U	0.73 U	0.71 U
03/2022	0.89 U	0.53 U	0.73 U	0.71 U

Legend

- Monitoring Well
- Equal to or greater than GCTLs
- Equal to or greater than NADCs
- Equal to or greater than 10x NADCs

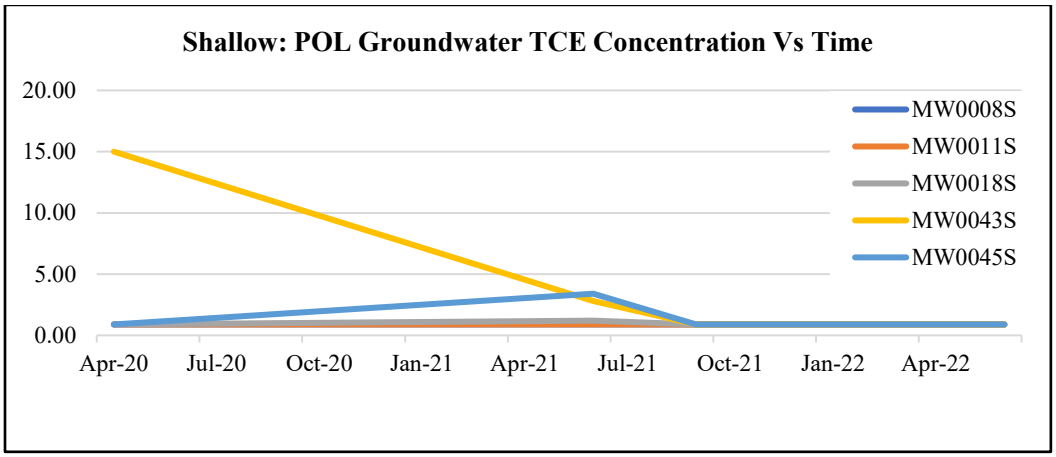
Plume boundaries are based on latest groundwater sampling data
Bolded value indicates detected concentration.
All concentrations reported in µg/L.
I = Reported value between Method Detection Limit (MDL) and Practical Quantitation Limit
J = Estimated value
U = Not detected at or above MDL (associated value)
[10-20] = Screen Depth Interval in feet below land surface GCTL = State of Florida Groundwater Cleanup Target Level NADC = Natural Attenuation Default Concentration
Pink highlights signify concentrations above GCTL
Red highlights signify concentrations above NADC
TCE = Trichloroethene cDCE = cis-1,2-Dichloroethene
tDCE = trans-1,2-Dichloroethene VC = Vinyl Chloride

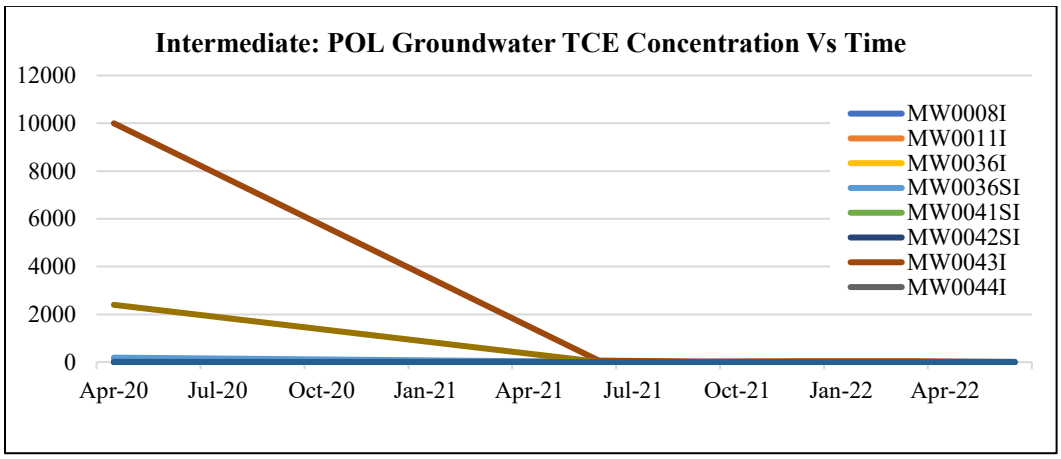
0 200 Feet

JAX C:\GIS\KSC\MXD\POL\STEP4\3-3_POL_MWRESULTS_JULY2022_DEEP.MXD 01/17/23

FIGURE 5-18

POL SOUTHERN TREATMENT AREA YEAR 1 TCE CONCENTRATION TREND GRAPHS





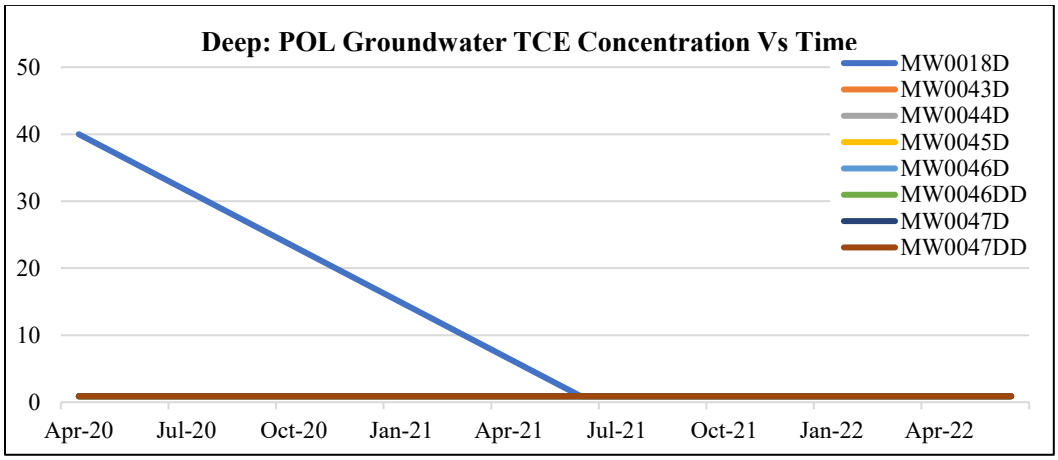


FIGURE 5-19

POL SOUTHERN TREATMENT AREA YEAR 1 cDCE CONCENTRATION TREND GRAPHS

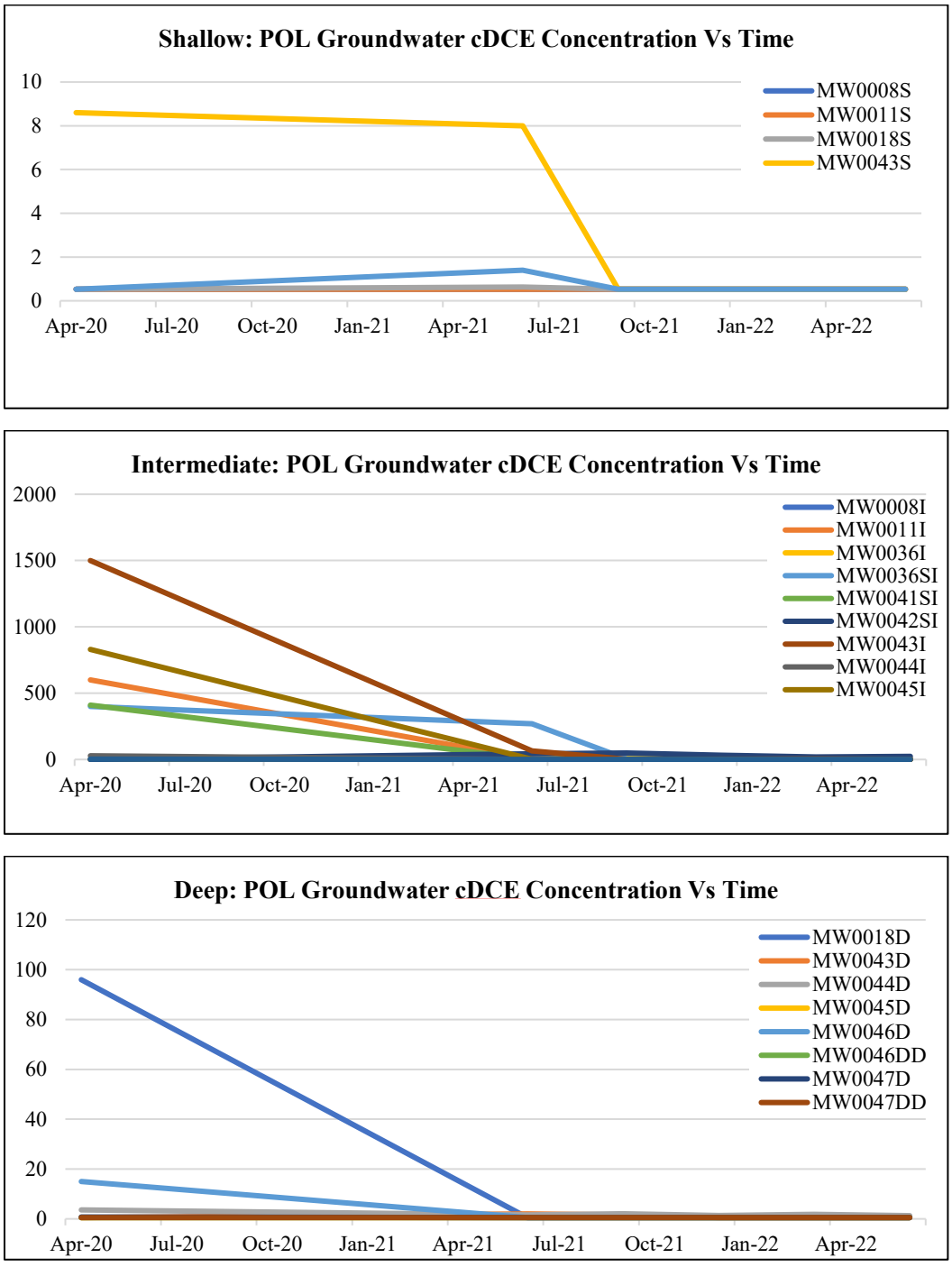
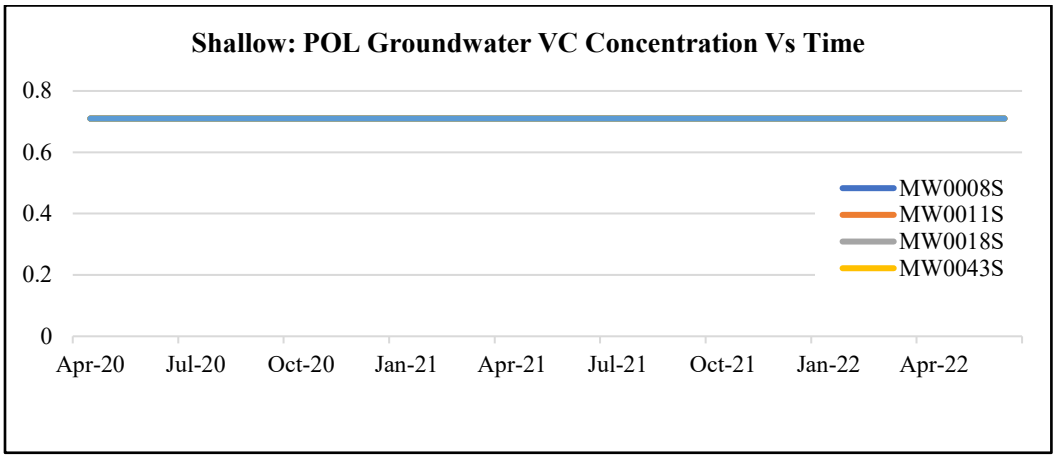
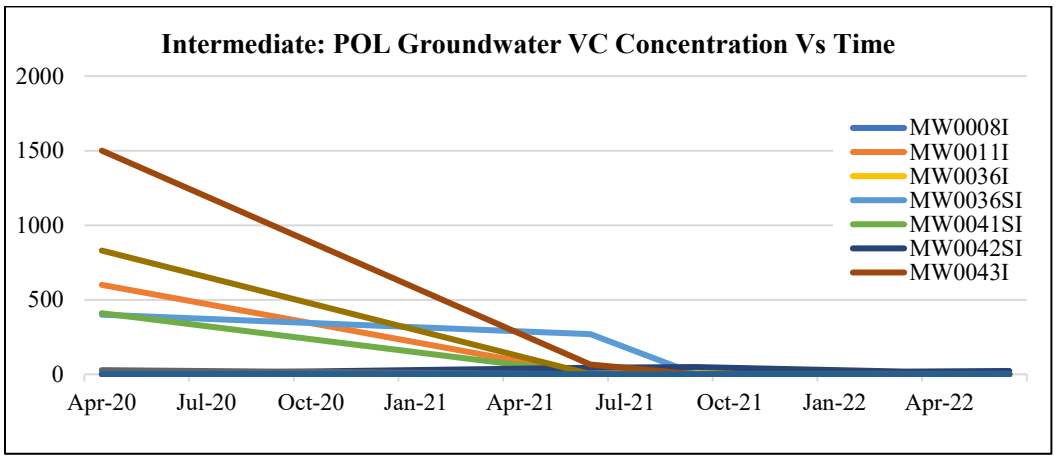
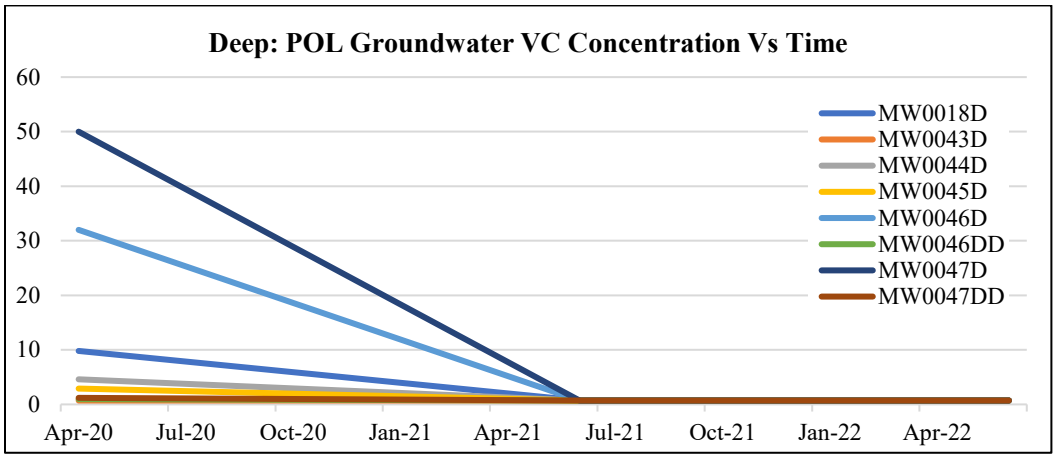


FIGURE 5-20

POL SOUTHERN TREATMENT AREA YEAR 1 VC CONCENTRATION TREND GRAPHS







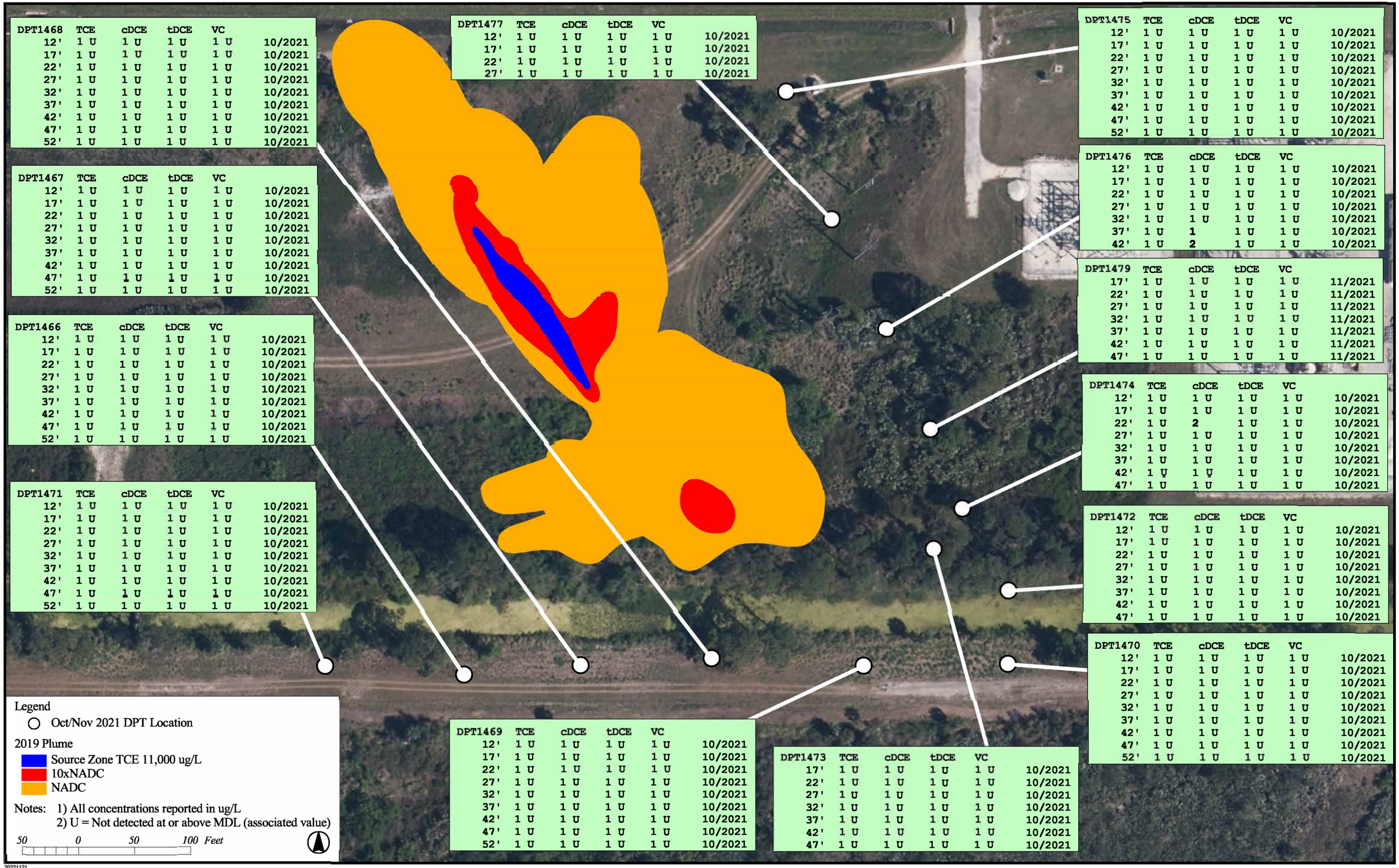

DPT1468 TCE cDCE tDCE VC
12' 1 U 1 U 1 U 1 U 10/2021
17' 1 U 1 U 1 U 1 U 10/2021
22' 1 U 1 U 1 U 1 U 10/2021
27' 1 U 1 U 1 U 1 U 10/2021
32' 1 U 1 U 1 U 1 U 10/2021
37' 1 U 1 U 1 U 1 U 10/2021
42' 1 U 1 U 1 U 1 U 10/2021
47' 1 U 1 U 1 U 1 U 10/2021
52' 1 U 1 U 1 U 1 U 10/2021
DPT1467 TCE cDCE tDCE VC
12' 1 U 1 U 1 U 1 U 10/2021
17' 1 U 1 U 1 U 1 U 10/2021
22' 1 U 1 U 1 U 1 U 10/2021
27' 1 U 1 U 1 U 1 U 10/2021
32' 1 U 1 U 1 U 1 U 10/2021
37' 1 U 1 U 1 U 1 U 10/2021
42' 1 U 1 U 1 U 1 U 10/2021
47' 1 U 1 U 1 U 1 U 10/2021
52' 1 U 1 U 1 U 1 U 10/2021
DPT1466 TCE cDCE tDCE VC
12' 1 U 1 U 1 U 1 U 10/2021
17' 1 U 1 U 1 U 1 U 10/2021
22' 1 U 1 U 1 U 1 U 10/2021
27' 1 U 1 U 1 U 1 U 10/2021
32' 1 U 1 U 1 U 1 U 10/2021
37' 1 U 1 U 1 U 1 U 10/2021
42' 1 U 1 U 1 U 1 U 10/2021
47' 1 U 1 U 1 U 1 U 10/2021
52' 1 U 1 U 1 U 1 U 10/2021
DPT1471 TCE cDCE tDCE VC
12' 1 U 1 U 1 U 1 U 10/2021
17' 1 U 1 U 1 U 1 U 10/2021
22' 1 U 1 U 1 U 1 U 10/2021
27' 1 U 1 U 1 U 1 U 10/2021
32' 1 U 1 U 1 U 1 U 10/2021
37' 1 U 1 U 1 U 1 U 10/2021
42' 1 U 1 U 1 U 1 U 10/2021
47' 1 U 1 U 1 U 1 U 10/2021
52' 1 U 1 U 1 U 1 U 10/2021
DPT1477 TCE cDCE tDCE VC
12' 1 U 1 U 1 U 1 U 10/2021
17' 1 U 1 U 1 U 1 U 10/2021
22' 1 U 1 U 1 U 1 U 10/2021
27' 1 U 1 U 1 U 1 U 10/2021
DPT1475 TCE cDCE tDCE VC
12' 1 U 1 U 1 U 1 U 10/2021
17' 1 U 1 U 1 U 1 U 10/2021
22' 1 U 1 U 1 U 1 U 10/2021
27' 1 U 1 U 1 U 1 U 10/2021
32' 1 U 1 U 1 U 1 U 10/2021
37' 1 U 1 U 1 U 1 U 10/2021
42' 1 U 1 U 1 U 1 U 10/2021
47' 1 U 1 U 1 U 1 U 10/2021
52' 1 U 1 U 1 U 1 U 10/2021
DPT1476 TCE cDCE tDCE VC
12' 1 U 1 U 1 U 1 U 10/2021
17' 1 U 1 U 1 U 1 U 10/2021
22' 1 U 1 U 1 U 1 U 10/2021
27' 1 U 1 U 1 U 1 U 10/2021
32' 1 U 1 U 1 U 1 U 10/2021
37' 1 U 1 1 U 1 U 10/2021
42' 1 U 2 1 U 1 U 10/2021
DPT1479 TCE cDCE tDCE VC
17' 1 U 1 U 1 U 1 U 11/2021
22' 1 U 1 U 1 U 1 U 11/2021
27' 1 U 1 U 1 U 1 U 11/2021
32' 1 U 1 U 1 U 1 U 11/2021
37' 1 U 1 U 1 U 1 U 11/2021
42' 1 U 1 U 1 U 1 U 11/2021
47' 1 U 1 U 1 U 1 U 11/2021
DPT1474 TCE cDCE tDCE VC
12' 1 U 1 U 1 U 1 U 10/2021
17' 1 U 1 U 1 U 1 U 10/2021
22' 1 U 2 1 U 1 U 10/2021
27' 1 U 1 U 1 U 1 U 10/2021
32' 1 U 1 U 1 U 1 U 10/2021
37' 1 U 1 U 1 U 1 U 10/2021
42' 1 U 1 U 1 U 1 U 10/2021
47' 1 U 1 U 1 U 1 U 10/2021
DPT1472 TCE cDCE tDCE VC
12' 1 U 1 U 1 U 1 U 10/2021
17' 1 U 1 U 1 U 1 U 10/2021
22' 1 U 1 U 1 U 1 U 10/2021
27' 1 U 1 U 1 U 1 U 10/2021
32' 1 U 1 U 1 U 1 U 10/2021
37' 1 U 1 U 1 U 1 U 10/2021
42' 1 U 1 U 1 U 1 U 10/2021
47' 1 U 1 U 1 U 1 U 10/2021
DPT1470 TCE cDCE tDCE VC
12' 1 U 1 U 1 U 1 U 10/2021
17' 1 U 1 U 1 U 1 U 10/2021
22' 1 U 1 U 1 U 1 U 10/2021
27' 1 U 1 U 1 U 1 U 10/2021
32' 1 U 1 U 1 U 1 U 10/2021
37' 1 U 1 U 1 U 1 U 10/2021
42' 1 U 1 U 1 U 1 U 10/2021
47' 1 U 1 U 1 U 1 U 10/2021
52' 1 U 1 U 1 U 1 U 10/2021
DPT1469 TCE cDCE tDCE VC
12' 1 U 1 U 1 U 1 U 10/2021
17' 1 U 1 U 1 U 1 U 10/2021
22' 1 U 1 U 1 U 1 U 10/2021
27' 1 U 1 U 1 U 1 U 10/2021
32' 1 U 1 U 1 U 1 U 10/2021
37' 1 U 1 U 1 U 1 U 10/2021
42' 1 U 1 U 1 U 1 U 10/2021
47' 1 U 1 U 1 U 1 U 10/2021
52' 1 U 1 U 1 U 1 U 10/2021
DPT1473 TCE cDCE tDCE VC
17' 1 U 1 U 1 U 1 U 10/2021
22' 1 U 1 U 1 U 1 U 10/2021
27' 1 U 1 U 1 U 1 U 10/2021
32' 1 U 1 U 1 U 1 U 10/2021
37' 1 U 1 U 1 U 1 U 10/2021
42' 1 U 1 U 1 U 1 U 10/2021
47' 1 U 1 U 1 U 1 U 10/2021
Legend
Oct/Nov 2021 DPT Location
2019 Plume
Source Zone TCE 11,000 ug/L
10xNADC
NADC
Notes: 1) All concentrations reported in ug/L
2) U = Not detected at or above MDL (associated value)
50 0 50 100 Feet
20221121

FIGURE 5-22 POL SOUTHERN TREATMENT AREA AUGUST 2022 DPT ANALYTICAL RESULTS
SWMU 067, POL, KENNEDY SPACE CENTER, FLORIDA

DPT1483	TCE	cDCE	tDCE	VC	
12'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
17'	0.31 U	0.37 I	0.26 U	0.23 U	08/2022
22'	4	1.1	0.27 I	0.23 U	08/2022
27'	1.5	6.5	0.82 I	0.66 I	08/2022
32'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
37'	0.38 I	0.86 I	0.26 U	1.1	08/2022
42'	0.31 U	0.43 I	0.26 U	3	08/2022

DPT1488	TCE	cDCE	tDCE	VC	
12'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
17'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
22'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
27'	0.31 U	0.49 I	0.26 U	0.23 U	08/2022
32'	0.31 U	0.71 I	0.26 U	0.23 U	08/2022
37'	0.35 U	0.28 U	0.22 U	0.41 U	08/2022
42'	0.35 U	0.28 U	0.22 U	0.41 U	08/2022

DPT1490	TCE	cDCE	tDCE	VC	
27'	0.35 U	0.28 U	0.22 U	0.41 U	08/2022
32'	0.35 U	1.5	0.22 U	0.41 U	08/2022
37'	0.35 U	5.6	0.22 U	3.1	08/2022
42'	0.35 U	1.1	0.22 U	2	08/2022

DPT1489	TCE	cDCE	tDCE	VC	
27'	0.35 U	0.28 U	0.22 U	0.41 U	08/2022
32'	0.35 U	0.28 U	0.22 U	0.41 U	08/2022
37'	0.35 U	4.6	0.22 U	0.41 U	08/2022
42'	0.35 U	0.28 U	0.22 U	0.84 I	08/2022

DPT1487	TCE	cDCE	tDCE	VC	
17'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
22'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
27'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
32'	0.31 U	0.61 I	0.26 U	0.23 U	08/2022
37'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
42'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022

DPT1480	TCE	cDCE	tDCE	VC	
7'	0.35 U	0.28 U	0.22 U	0.41 U	08/2022
12'	1.3	0.34 U	0.26 U	0.23 U	08/2022
12'	0.35 U	0.28 U	0.22 U	0.41 U	08/2022
17'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
22'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
27'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
32'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
37'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
42'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
47'	0.31 U	0.6 I	0.26 U	0.85 I	08/2022
52'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022

DPT8268	TCE	cDCE	tDCE	VC	
17'	1.9	4.9	0.26 U	0.23 U	08/2022
22'	0.6 I	1.8	0.26 U	0.23 U	08/2022
27'	0.38 I	0.85 I	0.26 U	0.23 U	08/2022
32'	0.31 U	0.36 I	0.26 U	2.3	08/2022
37'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
42'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022

DPT1486	TCE	cDCE	tDCE	VC	
17'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
22'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
27'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
32'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
37'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
42'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022

DPT1481	TCE	cDCE	tDCE	VC	
17'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
22'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
27'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
32'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
37'	4.3	0.98 I	0.38 I	0.23 U	08/2022

DPT1484	TCE	cDCE	tDCE	VC	
22'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
27'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
32'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
37'	0.31 I	0.36 I	0.26 U	0.23 U	08/2022
42'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022

DPT1485	TCE	cDCE	tDCE	VC	
22'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
27'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
32'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
37'	0.31 U	0.34 U	0.26 U	0.23 U	08/2022
42'	0.31 U	0.34 U	0.26 U	1	08/2022

MW42SI [18-23]
MW41SI [18-23]
MW43S [10-20]
MW43I [20-30]
MW43D [30-40]
MW36SI [18-23]
MW36I [25-30]
MW44I [20-30]
MW44D [30-40]
MW11S [18-23]
MW11I [25-30]
MW14S [8-13]
MW14SI [18-23]
MW14I [25-30]
MW14ID [32-37]
MW46D [30-40]
MW46DD [40-50]
MW45S [10-20]
MW45I [20-30]
MW45D [30-40]
MW18S [18-23]
MW18I [25-30]
MW18D [38-43]
MW47I [20-30]
MW47D [30-40]
MW47DD [40-50]
MW16S [18-23]
MW16I [25-30]
MW16D [38-43]
MW39ID [32-37]
MW22I [25-30]
MW22D [40-45]

Legend

- August 2022 DPT Location
- Monitoring Well
  - Blue label sampled quarterly
  - Yellow label sampled semi-annually

2019 Plume

- Source Zone TCE 11,000 ug/L
- 10xNADC
- NADC

Notes:
1) All concentrations reported in ug/L
2) I = Reported value between Method Detection Limit (MDL) and Practical Quantitation Limit
3) U = Not detected at or above MDL (associated value)
4) Pink highlights signify concentrations above GCTL

50 0 50 Feet

20221121

SECTION VI
POL NORTHERN AREA AND SW3 LONG-TERM MONITORING

In March 2018, the AS system treating SW3 and POL Northern Area was shut down and each site transitioned to an LTM program per KSCRT consensus (Meeting Minutes 1803-M17 and M19, Decisions 1803-D61 to D64). AS operations at SW3 and POL Northern Area had been operational since May 2009 (with expansion in December 2012) and June 2013, respectively. Following system shutdown, groundwater sampling events were conducted in March, May, and October 2018 (NASA, 2019a), with subsequent transition to an annual sampling schedule. At the December 2018 KSCRT meeting, the Team reached consensus for annual sampling of eight monitoring wells at SW3 (SW3-MW0001, SW3-MW0006, SW3-MW0009, SW3-MW0024, SW3-MW0025, SW3-MW0026, SW3-MW0027, and SW3-MW0028), and eight monitoring wells at the POL Northern Area (POL-MW0001S, POL-MW0009S, POL-MW0026S, POL-MW0031S, POL-MW0033S, POL-MW0033SI, POL-MW0033I, and POL-MW0034S) (Meeting Minute 1812-M12, Decision 1812-D46; and Meeting Minute 1812-M13, Decision 1812-D47).

Annual LTM events were conducted in October 2019, November 2020, and October 2021 in the POL Northern Area and adjacent site SW3. POL-MW0034S was also sampled at various times outside of the annual event schedule in November 2019, September 2021, December 2021, March 2022, and June 2022 to better monitor fluctuations of TCE concentrations and because this well was incorporated into the POL Southern Treatment Area quarterly sampling schedule in 2021 (Meeting Minute 2109-M05, Decision 2109-D05). Additionally, POL-MW0026S was also included in the POL Southern Treatment Area semi-annual sampling program. These wells were therefore also discussed in the POL Southern Treatment Area section of this report (Section V). Additional DPT events were also conducted at SW3 in January and October 2021 to delineate the southern extent of the LCP and to further investigate the area where VC was detected above its NADC during the October 2019 DPT event (NASA, 2020).

The sampling events included in this section were completed since the last report submissions (NASA, 2019a and 2020). Data from events included in this report were presented at the June 2020, September 2021, or October 2022 KSCRT meetings (Meeting Minutes 2006-M04, 2109-M05, and 2210-M12), and include:

- SW3: Annual LTM events in October 2019, November 2020, and October 2021, as well as supplemental DPT events in January and October 2021 to delineate the southern extent of the LCP and investigate VC HCP concentrations detected during a previous DPT event in October 2019.

- POL Northern Area: Annual LTM events in October 2019, November 2020, and October 2021, as well as additional samples collected at MW0034S in November 2019, September 2021, December 2021, March 2022, and June 2022 to supplement the annual monitoring dataset.

Samples collected during each LTM event were submitted to ENCO of Orlando, Florida for analysis of VOCs by USEPA Method 8260D. DPT samples at SW3 were analyzed for target VOCs (TCE, cDCE, tDCE, and VC) by mobile laboratory, ALF. Field forms for the long-term monitoring sampling events are provided in Appendix D. Laboratory analytical reports are provided in Appendix E. Analytical data is presented on Figures 6-1 to 6-3, and in Tables 6-2 and 6-3.

6.1 FIELD MEASUREMENT RESULTS

Temperature, pH, conductivity, turbidity, dissolved oxygen, and oxidation-reduction potential (ORP) were measured and recorded in the field during monitoring well sampling activities (see sample log sheets in Appendix D). A summary of groundwater quality parameter data is provided in Table 6-1. The field measurements were collected and stabilized in accordance with FDEP's SOP for Field Sampling (FS 2200) before groundwater sample collection, ensuring samples were representative of surficial aquifer conditions. The water pumped from each well was collected and managed as IDW (see IDW logs included in Appendix H). The following presents a summary of field measurements taken prior to each LTM sampling event.

6.1.1 SW3 LTM Field Measurements.

During the October 2019 sampling event, groundwater temperatures in eight wells sampled ranged from 23.00 to 27.85°C, with an average of 25.81°C. Readings of pH ranged from 4.72 to 6.76, with an average of 6.20. Specific conductance ranged from 186 to 3,477 µS/cm, with an

average of 2,413 µS/cm. DO values varied from 0.15 to 2.19 mg/L, with an average value of 0.76 mg/L. Only one monitoring well, SW3-MW0028, reported a DO value greater than 20% saturation. Turbidity readings ranged from 0.99 to 12.90 NTU, with an average value of 6.38 NTU. ORP readings ranged from -69.0 to 113.4 mV, with an average reading of -18.1 mV.

During the November 2020 sampling event, groundwater temperatures in six wells ranged from 20.30 to 22.70°C, with an average of 21.55°C. Readings of pH ranged from 5.10 to 6.91, with an average of 6.29. Specific conductance ranged from 86 to 2,009 µS/cm, with an average of 1,061 µS/cm. DO values varied from 0.13 to 0.57 mg/L, with an average of 0.40 mg/L. Turbidity readings ranged from 1.69 to 18.30 NTU, with an average of 8.54 NTU. ORP readings ranged from -44.7 to 89.4 mV, with an average reading of -16.63 mV.

During the October 2021 sampling event, groundwater temperatures in seven wells ranged from 26.10 to 28.40°C, with an average of 27.33°C. Readings of pH ranged from 4.45 to 6.92, with an average of 6.23. Specific conductance ranged from 68 to 2,983 µS/cm, with an average 1,705 µS/cm. DO values varied from 0.05 to 0.16 mg/L, with an average of 0.11 mg/L. Turbidity readings ranged from 0.49 to 9.31 NTU, with an average of 3.47 NTU. ORP readings ranged from -113.7 to 95.4 mV, with an average of -58.4 mV.

6.1.2 POL LTM Field Measurements.

During the October 2019 sampling event, groundwater temperatures in eight wells sampled ranged from 27.70 to 32.04°C, with an average of 29.26°C. Readings of pH ranged from 3.59 to 6.14, with an average of 5.01. Specific conductance ranged from 229 to 4,324 µS/cm, with an average of 1,460 µS/cm. DO values varied from 0.32 to 6.74 mg/L, with an average value of 1.70 mg/L. Only two monitoring wells, POL-MW0026S and POL-MW0034S, reported DO concentrations greater than 20% saturation. Turbidity readings ranged from 0.98 to 12.54 NTU, with an average value of 7.47 NTU. ORP readings ranged from -68.3 to 162.5 mV, with an average reading of 80.3 mV.

During the November 2020 sampling event, groundwater temperatures in six wells ranged from 24.60 to 26.40°C, with an average of 25.53°C. Readings of pH ranged from 4.06 to 6.44, with an average of 5.32. Specific conductance ranged from 148 to 2,006 µS/cm, with an average of

885 µS/cm. DO values varied from 0.11 to 2.25 mg/L, with an average of 0.64 mg/L. Only one monitoring well, POL-MW0026S which is located south of 5th Street SE, reported a DO value greater than 20% saturation. Turbidity readings ranged from 1.02 to 40.00 NTU, with an average of 12.72 NTU. Only one monitoring well, POL-MW0026S, reported a turbidity reading exceeding 20 NTU. ORP readings ranged from -88.4 to 172.2 mV, with an average reading of 50.4 mV.

During the October 2021 sampling event, groundwater temperatures in five wells ranged from 22.00 to 33.33°C, with an average of 28.99 °C. Readings of pH ranged from 4.78 to 6.50, with an average of 5.73. Specific conductance ranged from 187 to 1,575 µS/cm, with an average of 575 µS/cm. DO values varied from 0.07 to 1.08 mg/L, with an average of 0.49 mg/L. Turbidity readings ranged from 1.75 to 11.92 NTU, with an average of 6.11 NTU. Additionally, POL-MW0026S was reported to have a turbidity over range. ORP readings ranged from -107.7 to 116.6 mV, with an average of 40.3 mV.

6.2 SW3 LONG-TERM MONITORING ANALYTICAL RESULTS

6.2.1 October 2019.

Eight monitoring wells were sampled at SW3 in October 2019 to support the LTM program (SW3-MW0001, SW3-MW0006, SW3-MW0009, SW3-MW0024, SW3-MW0025, SW3-MW0026, SW3-MW0027, and SW3-MW0028). TCE was detected in three of the eight monitoring wells sampled. A peak TCE concentration of 7.5 µg/L was observed in monitoring well SW3-MW0025, above the GCTL of 3 µg/L. Concentrations of TCE decreased across the site or remained non-detect since October 2018, with the exception of SW3-MW0001 (increased from 4.2 to 4.9 µg/L) and SW3-MW0025 (increased from 4 to 7.5 µg/L).

cDCE was detected in five of the eight monitoring wells sampled. A peak concentration of 25 µg/L was observed in monitoring well SW3-MW0009, below the GCTL of 70 µg/L. In four monitoring wells (SW3-MW0001, SW3-MW0006, SW3-MW0025, and SW3-MW0026), cDCE showed a slight increase but stable concentrations since October 2018. The well with the highest cDCE result (SW3-MW0009) decreased to below GCTLs from 90 to 25 µg/L.

tDCE was detected in three of the eight monitoring wells sampled. A peak concentration of 3.8 µg/L was observed in monitoring well SW3-MW0009, well below the GCTL of 100 µg/L. tDCE concentrations in the LTM wells have generally remained stable with only slight variations from the October 2018 event.

VC was detected in six of the eight monitoring wells sampled. A peak concentration of 66 µg/L was observed in monitoring well SW3-MW0027, exceeding the GCTL of 1 µg/L. Across the site, VC showed some concentration increases since the October 2018 sampling event. Increased VC concentrations were observed in SW3-MW0009 from 44 to 63 µg/L, SW3-MW0024 from 4.5 to 5 µg/L, and SW3-MW0027 from 58 to 66 µg/L, and SW3-MW0028 from 2.2 to 34 µg/L.

Following the October 2019 groundwater sampling event, monitoring well SW3-MW0026 was discontinued from further sampling based on two consecutive years of concentrations below GCTLs (no exceedances since 2015) (Meeting Minute 2006-M04, Decision 2006-D04).

6.2.2 November 2020.

Seven monitoring wells were sampled at SW3 in November 2020 to support the LTM program (SW3-MW0001, SW3-MW0006, SW3-MW0009, SW3-MW0024, SW3-MW0025, SW3-MW0027, and MW0028). TCE was detected in three of the seven monitoring wells sampled. A peak TCE concentration 3.4 µg/L was observed in monitoring well SW3-MW0001, which meets the GCTL of 3 µg/L (due to rounding rule). TCE concentrations showed consistent reductions in all monitoring wells since the October 2019 groundwater sampling event.

cDCE was detected in five of the seven monitoring wells sampled. A peak concentration of 13 µg/L was observed in monitoring well SW3-MW0009, below the GCTL of 70 µg/L. tDCE was detected in four of the seven monitoring wells sampled, with a peak concentration of 2.2 µg/L in monitoring well SW3-MW0009, below the GCTL of 100 µg/L. cDCE and tDCE concentrations remained generally stable with only slight oscillations since the October 2019 sampling event.

VC was detected in six of the seven monitoring wells sampled. A peak concentration of 40 µg/L was observed in monitoring well SW3-MW0027, exceeding the GCTL of 1 µg/L. VC showed reduction in concentrations from the October 2019 event in all monitoring wells sampled in

November 2020, with SW3-MW0006 reduced from 3.4 to 1.4 µg/L, SW3-MW0009 reduced from 63 to 30 µg/L, MW0024 reduced from 5 to 2 µg/L, SW3-MW0025 reduced from 14 to 6.3 µg/L, SW3-MW0027 reduced from 66 to 40 µg/L, and SW3-MW0028 reduced from 34 to 15 µg/L.

6.2.3 October 2021.

Seven monitoring wells were sampled at SW3 in October 2021 to support the LTM program (SW3-MW0001, SW3-MW0006, SW3-MW0009, SW3-MW0024, SW3-MW0025, SW3-MW0027, and SW3-MW0028). TCE was detected in three of the seven monitoring wells sampled in October 2021, with a peak TCE concentration of 2.7 µg/L observed in monitoring well SW3-MW0001, below the GCTL of 3 µg/L. TCE has not exceeded the GCTL at SW3 since October 2019, where concentrations were observed in SW3-MW0001 and SW3-MW0025 at 4.9 and 7.5 µg/L, respectively. Historically, the maximum concentration of TCE at SW3 in these monitoring wells was observed in SW3-MW0001 in October 2008 (prior to AS operations) at a concentration of 13,300 µg/L, greater than ten times the NADC of 300 µg/L.

cDCE was detected in five of the seven monitoring well sampled in October 2021. A maximum concentration of 13 µg/L was detected in monitoring well SW3-MW0009, below the GCTL of 70 µg/L. cDCE has not exceeded the GCTL at SW3 since October 2018, where concentrations were observed in SW3-MW0009 at 90 µg/L. Historically, the maximum concentration of cDCE at SW3 in these monitoring wells was observed in SW3-MW0001 in October 2008 (prior to AS operations) at a concentration of 6,620 µg/L, greater than the NADC of 700 µg/L.

tDCE was detected in three of the seven samples collected in October 2021, with a maximum concentration of 2.2 µg/L detected in monitoring well SW3-MW0009, below the GCTL of 100 µg/L. tDCE has not exceeded the GCTL at SW3 throughout the monitoring well sampling events that have occurred since October 2008.

VC was detected in six of the seven monitoring wells sampled in October 2021. Of the six detections, five exceeded the GCTL of 1 µg/L with a peak concentration of 29 µg/L observed in SW3-MW0009. Historically, the maximum concentration of VC at SW3 in these monitoring

wells was observed in SW3-MW0027 in December 2012 at concentration of 930 µg/L, exceeding the NADC of 100 µg/L.

6.3 JANUARY AND OCTOBER 2021 SW3 DPT SAMPLING

In October 2019, eight DPT locations were sampled at SW3 (SW3-DPT0100 to SW3-DPT0107) to determine the extent of the remaining VC plume following AS system shutdown in March 2018. This sampling event was presented during the June 2020 KSCRT meeting and was documented in the POL Southern Treatment Area IWP (NASA, 2020). DPT results found VC concentrations increasing towards the surface water canal at the southern end of SW3, with several sample intervals exceeding the NADC of 100 µg/L. Based on these results, two additional sampling events were completed in January 2021 and October 2021, and are described below.

In January 2021, DPT groundwater sampling was conducted at SW3 to determine if any plume migration has occurred south of monitoring well SW3-MW0028. A total of 105 samples were collected from 14 locations (SW3-DPT0108 to SW3-DPT0121) and analyzed by a mobile lab for VOCs via USEPA Method 8260D. These samples were collected from areas around monitoring well SW3-MW0028, as well as from locations recommended as A through F in the June 2020 ADP (designated as SW3-DPT0108 to SW3-DPT0113). The locations were sampled to various depths (up to 52 feet bls) within the following depth intervals: 15 to 19 feet bls, 20 to 24 feet bls, 25 to 29 feet bls, 30 to 34 feet bls, 35 to 39 feet bls, 40 to 44 feet bls, 45 to 49 feet bls, and 50 to 54 feet bls.

Sampling around and south of monitoring well SW3-MW0028 revealed multiple locations with concentrations of VC exceeding the State of Florida GCTL in intervals ranging from 17 to 47 feet bls. A peak VC concentration of 110 µg/L, exceeding the NADC of 100 µg/L, was observed in SW3-DPT119 at a depth of 42 feet bls. SW3-DPT0119 is located approximately 300 feet south-southwest of MW0028, indicating a southern VC migration has occurred (see Figure 6-2).

Based on results of the January 2021 DPT sampling event, a follow-on DPT sampling event was conducted in October-November 2021 to delineate the southern extent of the LCP. A total of 105 samples were collected from 13 DPT locations (SW3-DPT0122 to SW3-DPT0134) and analyzed

by a mobile lab for VOCs via USEPA Method 8260D. These samples were collected from areas within the LCP plume and along the southern and western extent of the previously established 2019 LCP plume boundary. The locations were sampled to various depths (up to 52 feet bls) within the following depth intervals: 10 to 14 feet bls, 15 to 19 feet bls, 20 to 24 feet bls, 25 to 29 feet bls, 30 to 34 feet bls, 35 to 39 feet bls, 40 to 44 feet bls, 45 to 49 feet bls, and 50 to 54 feet bls.

Sampling conducted along the fringes of the LCP plume revealed two slight VC exceedances, one along the eastern edge of the LCP and one along the western edge. Along the eastern edge of the LCP boundary, VC was detected at a concentration of 2 µg/L at SW3-DPT0132 within the 35 to 39 feet bls interval, slightly exceeding its GCTL. Along the western edge of the LCP boundary, VC was detected at location SW3-DPT0126 at 2 µg/L within the 30 to 34 feet bls interval. The remaining samples collected along the fringes of the LCP were below the laboratory detection limits (non-detect) for TCE, cDCE, tDCE, and VC.

The confirmatory samples collected within the eastern interior portions of the LCP, northeast of the previous area of NADC exceedances, indicated VC exceedances at three locations. These VC concentrations were found at greater depths closer to the previous NADC plume, but concentrations became progressively higher to the northeast at shallower depths moving away from this area. Specifically, the sampling location closest to the former NADC exceedance area (SW3-DPT0129) exhibited VC concentrations of 2 µg/L within the 50 to 54 feet bls interval, and increasing to 30 µg/L within the 45 to 49 feet bls interval. These concentrations stabilized at 25 µg/L and 26 µg/L at the 40 to 44 feet bls and the 35 to 39 feet bls sampling intervals, respectively. At shallower depths, the VC concentration decreased to 4 µg/L within the 30 to 34 feet bls interval and to non-detect levels within the 25 to 29 feet bls interval.

At SW3-DPT0130, approximately 120 feet to the northeast, VC concentrations were undetected within the deepest sampling interval of 50 to 54 feet bls but were encountered above the GCTL at 12 µg/L within the 45 to 49 feet bls interval. These concentrations increased to 39 µg/L and 42 µg/L at the shallower depths of 40 to 44 feet bls and 35 to 39 feet bls, respectively. Within the 30 to 34 feet bls interval, the VC concentration decreased to 5 µg/L, still remaining above the GCTL for that COC. No VC exceedances were detected from 15 to 29 feet bls at this location.

Approximately 100 feet northward, VC concentrations at SW3-DPT0128 were non-detect over the two deeper sampling intervals (from 45 to 54 feet bls) but increased to levels slightly above its GCTL within the 40 to 44 feet bls (2 µg/L) and the 35 to 39 feet bls (3 µg/L) intervals. Here, concentrations steadily increased as depths decreased. Specifically, VC concentrations of 16 µg/L and 45 µg/L, were detected within the 25 to 29 feet bls and the 20 to 24 feet bls sampling intervals, respectively. At the 15 to 19 feet bls interval, VC concentrations decreased slightly to 31 µg/L at DPT0128 but remained significantly above its GCTL at this location's uppermost sampling interval.

Overall, the January and October 2021 SW3 DPT sampling events were able to achieve the objective of delineation of the LCP to the south, east, and west. Based on the DPT sampling results, the plume boundary is expanding and migrating to the south and west. Additional monitoring wells are proposed for installation to monitor the LCP boundary (see Section VII). The January and October 2021 SW3 DPT groundwater sample locations and analytical results are shown on Figure 6-2 and included in Table 6-3. Laboratory analytical reports are provided in Appendix E.

6.4 POL NORTHERN AREA LONG-TERM MONITORING ANALYTICAL RESULTS

6.4.1 October 2019.

Eight monitoring wells were sampled in the POL Northern Area in October 2019 to support the LTM program (POL-MW0001S, POL-MW0009S, POL-MW0026S, POL-MW0031S, POL-MW0033S, POL-MW0033SI, POL-MW0033I, and POL-MW0034S). TCE was detected in six of the eight monitoring wells sampled, with a peak TCE concentration of 130 µg/L observed in monitoring well POL-MW0034S, above the GCTL of 3 µg/L. Note, the POL-MW0034S sample was analyzed at dilution due to suspected matrix interference. Three wells (POL-MW0009S, POL-MW0026S, and POL-MW0033SI) showed slight increases in TCE concentrations since the October 2018 sampling event, while POL-MW0033I, POL-MW0033S, and POL-MW0034S showed TCE reductions since the October 2018 event. POL-MW0034S showed a substantial drop in TCE concentration, reducing from 3,300 µg/L in October 2018 to 130 µg/L in October 2019.

cDCE was detected in six of the eight monitoring wells sampled, with a peak concentration of 82 µg/L observed in monitoring well POL-MW0026S, which is above the GCTL of 70 µg/L. cDCE increased in several wells across the site from October 2018 to October 2019 with the most significant increase observed in monitoring well POL-MW0026S, where concentrations increased from 5.9 to 82 µg/L.

tDCE was detected in only one of the eight monitoring wells sampled (POL-MW0026) with a concentration of 5.0 µg/L, below the GCTL of 100 µg/L.

VC was detected in one of the eight monitoring wells sampled (POL-MW0026S) with a concentration of 15 µg/L, exceeding the GCTL of 1 µg/L. This was an increase from the October 2018 event where VC was non-detect in this well.

Following the October 2019 sampling event, POL-MW0001S and POL-MW0033S were removed from the POL Northern Area LTM sampling plan based on two consecutive sampling events with results below GCTLs (Meeting Minute 2006-M04, Decision 2006-D04).

6.4.2 November 2020.

Six monitoring wells were sampled in the POL Northern Area in November 2020 to support the LTM program (POL-MW0009S, POL-MW0026S, POL-MW0031S, POL-MW0033SI, POL-MW0033I, and POL-MW0034S). TCE was detected in five of the six monitoring wells sampled. A peak TCE concentration 560 µg/L was observed in monitoring well POL-MW0034S. Note, for POL-MW0034S, the initial results for TCE was over the calibration range of the instrument. The sample was re-analyzed at a dilution. TCE general increased across the site in November 2020 from the previous sampling event with POL-MW0009S increasing from 5.6 to 22 µg/L, POL-MW0033I increasing from 5.4 to 35 µg/L, POL-MW0033SI increasing from 3.6 to 12 µg/L, and POL-MW0034S increasing from 130 to 560 µg/L.

cDCE was detected in five of the six monitoring wells sampled. A peak concentration of 46 µg/L was observed in monitoring well POL-MW0026S, below the GCTL of 70 µg/L. cDCE remained relatively stable across the site, with the exception of POL-MW0026S which saw a decrease in concentration to below the GCTL from 82 to 46 µg/L.

tDCE was detected in three of the six monitoring wells sampled. A peak concentration of 15 µg/L was observed in monitoring well POL-MW0033I, below the GCTL of 100 µg/L. tDCE remained relatively stable across the site, with the exception of POL-MW0033I and POL-MW0033SI, where concentrations rose from non-detect to 15 and 2.8 µg/L, respectively.

VC was detected in two of the six monitoring wells sampled. A peak concentration of 6.4 µg/L was observed in monitoring well POL-MW0026S, exceeding the GCTL of 1 µg/L. VC has remained generally at non-detect levels across the site, with the exception of POL-MW0026S and POL-MW0033I, where concentrations have increased from non-detect values in October 2018 to 6.4 and 0.78 µg/L, respectively.

During the following October 2021 POL Northern Area LTM sampling event (see below), POL-MW0009S was inadvertently not sampled. This monitoring well will be re-incorporated into the annual LTM sampling network during a subsequent sampling event.

6.4.3 October 2021.

Five monitoring wells were sampled in the POL Northern Area in September-October 2021 to support the LTM program (POL-MW0026S, POL-MW0031S, POL-MW0033SI, POL-MW0033I, and POL-MW0034S). POL-MW009S was inadvertently not sampled during this event. TCE was detected in four of the five monitoring wells sampled in October 2021, with a peak concentration of 160 µg/L observed in POL-MW0033I, exceeding the GCTL of 3 µg/L. TCE was also detected above the GCTL in POL-MW0033SI at 34 µg/L and POL-MW0034S at 130 µg/L, and below the GCTL in POL-MW0026S at 2.5 µg/L.

cDCE was detected in four of the five monitoring wells sampled in October 2021, with a peak concentration of 66 µg/L was detected in POL-MW0026S, below the GCTL of 70 µg/L. Historically, the maximum cDCE concentration in this monitoring wells was observed to be 14,000 µg/L in March 2010.

tDCE was detected in three of the five monitoring wells sampled in October 2021, with a peak concentration of 5.3 µg/L in POL-MW0033SI, significantly below the GCTL of 100 µg/L. tDCE has not exceeded the GCTL in the monitoring wells sampled since September 2012, when a concentration of 140 µg/L was reported in POL-MW0026S.

In October 2021, VC was detected in two of the five monitoring wells sampled, at POL-MW0026S with a concentration of 9.8 µg/L, exceeding the GCTL of 1 µg/L, and at POL-MW0033I, with a concentration of 1.3 µg/L, which meets the GCTL. Historically, the maximum concentration of VC reported in these monitoring wells was found to be 1,400 µg/L in POL-MW0026S in September 2012.

Following the October 2021 sampling event, POL-MW0034S was incorporated into the POL Southern Treatment Area quarterly sampling schedule. The additional quarterly sampling events were previously discussed under Section V and are individually presented in the following section.

6.4.4 POL-MW0034S Supplementary Sampling Events.

Following AS system shutdown in March 2018, TCE concentrations in POL-MW0034S significantly increased to 3,330 µg/L during the October 2018 sampling event from the previously observed concentration of 770 µg/L in September 2017 (NASA, 2019a). This significant increase in concentration warranted additional sampling to develop a higher resolution trend of TCE concentrations in POL-MW0034S. In addition to the annual sampling events discussed above in October 2019, November 2020, and September 2021, an additional sampling event was conducted in November 2019 to confirm the October 2019 results, and quarterly sampling of POL-MW0034S was also conducted in December 2021, and March and June 2022.

TCE concentrations between this time period fluctuated from 130 µg/L in October 2019 to 200 µg/L in June 2022, with the highest detection of 560 µg/L in November 2020. During three consecutive sampling events in this time period (October 2019, November 2019, and November 2020), TCE concentrations were analyzed at dilution, with results of 130 µg/L, 120 µg/L, and 560 µg/L, respectively. As stated in Section 6.4.1, the reasoning for dilution during the October 2019 event was due to suspected matrix interference. For both the November 2019 re-sample event and the November 2020 event (Section 6.4.2), the reasoning was that the initial result for TCE was above the calibration range of the instrument, and therefore the sample was re-analyzed at a dilution.

cDCE remained relatively stable in POL-MW0034S, but increased to 84 µg/L in June 2022, above the GCTL of 70 µg/L. tDCE remained below detection limits throughout these events, until June 2022 where a detected concentration of 1.2 µg/L was reported (below the GCTL of 100 µg/L). Likewise, VC remained below detectable limits throughout these events, until June 2022 when the concentration rose to 3 µg/L, exceeding the GCTL of 1 µg/L.

Additionally, in order to ensure any contaminant had not migrated away from the POL-MW0034S area, a DPT sampling event was conducted in October 2019. Results from this DPT event found TCE concentrations exceeding the GCTL, but less than the NADC. This investigation concluded that the former TCE HS around monitoring POL-MW0034S had degraded and no AS treatment would be planned in this area. A shallow hardpan layer has been identified in the POL-MW0034S area, which may be contributing to the slow TCE degradation rate around this well. The October 2019 DPT investigation and data around POL-MW0034S is further detailed in the POL Southern Treatment Area IWP (NASA, 2020), and in the June 2020 LTM ADP (Meeting Minute 2006-M04) and September 2021 POL Southern Treatment Area CCR ADP (Meeting Minute 2109-M05).

Table 6-1. POL and SW3 LTM Field Parameters

Well ID	Sample Date	pH (S.U.)	Temp. (°C)	Cond. (µS/cm)	DO (mg/L)	Turbidity (NTU)	ORP (mV)
SW3-MW0001	Oct-19	5.38	27.85	3,011	0.59	10.90	49.1
	Nov-20	6.13	21.30	962	0.43	18.30	-40.3
	Oct-21	5.61	26.80	1,827	0.05	9.31	-31.7
SW3-MW0006	Oct-19	6.69	23.30	3,477	0.15	9.60	-69.0
	Nov-20	6.13	20.30	712	0.50	9.61	-41.3
	Oct-21	6.77	28.20	2,265	0.10	3.57	-87.3
SW3-MW0009	Oct-19	4.72	26.49	186	0.51	12.90	113.4
	Nov-20	5.10	21.60	86	0.45	5.13	89.4
	Oct-21	4.45	26.10	68	0.15	4.19	95.4
SW3-MW0024	Oct-19	6.76	23.00	1,900	0.36	4.34	-68.4
	Nov-20	6.91	22.70	1,400	0.13	1.69	-23.8
	Oct-21	6.85	27.50	1,457	0.10	2.09	-89.6
SW3-MW0025	Oct-19	6.60	25.96	2,724	0.69	2.62	-55.2
	Nov-20	6.88	21.50	1,200	0.57	9.61	-44.7
	Oct-21	6.92	26.60	937	0.13	1.25	-108.0
SW3-MW0026	Oct-19	6.66	26.17	3,351	0.73	4.54	-37.2
SW3-MW0027	Oct-19	6.51	26.87	2,048	0.87	0.99	-30.0
	Nov-20	6.60	21.90	2,009	0.34	6.91	-39.1
	Oct-21	6.57	28.40	2,400	0.16	3.36	-73.7
SW3-MW0028	Oct-19	6.31	26.86	2,612	2.19	5.13	-47.6
	Oct-21	6.42	27.70	2,983	0.11	0.49	-113.7
POL-MW0001S	Oct-19	5.38	27.85	3,011	0.59	10.90	49.1
POL-MW0009S	Oct-19	3.59	29.68	2,200	0.32	9.40	137.0
	Nov-20	4.06	24.60	2,006	0.11	9.04	119.4
POL-MW0026S[(1)]	Oct-19	4.40	32.04	632	6.74	11.50	162.5
	Nov-20	4.77	25.60	620	2.25	40.00	1.6
	Oct-21	5.23	22.00	564	1.08	Over Range	64.9
POL-MW0031S	Oct-19	5.76	27.70	296	0.82	2.96	-21.4
	Nov-20	5.67	26.40	148	0.67	16.20	-25.4
	Oct-21	5.72	33.33	190	0.55	6.49	30.9
POL-MW0033S	Oct-19	5.00	29.24	229	1.24	6.62	117.0
POL-MW0033SI	Oct-19	3.72	29.13	713	0.82	0.98	201.6
	Nov-20	4.52	26.00	377	0.12	1.02	123.0
	Oct-21	4.78	30.00	360	0.07	1.75	97.0
POL-MW0033I	Oct-19	6.09	29.14	4,324	0.82	4.88	-68.3
	Nov-20	6.44	25.70	1,960	0.13	3.47	-88.4
	Oct-21	6.50	29.60	1,575	0.08	4.28	-107.7
POL-MW0034S	Oct-19	6.14	29.29	278	2.26	12.54	64.8
	Nov-19	6.54	24.90	178	0.61	16.10	155.0
	Nov-20	6.43	24.90	197	0.57	6.57	172.2
	Sep-21	6.41	30.02	187	0.68	11.92	116.6
	Dec-21	6.54	26.10	198	1.35	6.12	47.8
	Mar-22	6.76	24.20	142	1.90	9.20	98.5
	Jun-22	5.45	28.22	195	0.79	7.67	174.4

Table 6-1. POL and SW3 LTM Field Parameters (Continued

Notes:

(1) Well pumped dry. Allowed well to recharge prior to sampling.

Field measurements displayed are final stabilized measurements collected before sampling.

SC = Specific conductance in microSiemens per centimeter (µS/cm).

DO = Dissolved oxygen in milligrams per liter (mg/L).

Turb. = Turbidity in nephelometric turbidity units (NTUs).

ORP = Oxidation/reduction potential in millivolts (mV).

NM = Not measured.

S.U. = Standard Units.

°C = Degree Celcius.

Values have been rounded from the source material field notes as follows: conductivity has been rounded to the nearest whole number, temperature and turbidity are shown to 2 decimal places, and ORP is shown to one decimal place.

Table 6-2. Contaminants of Concern Long Term Monitoring Analytical Results

Sample Location	Screened Interval (feet bls)	Sample Date	TCE	cDCE	tDCE	VC
Supply Warehouse #3						
SW3-MW0001	**15-25**	Oct-19	**4.9**	**1.7 I**	0.73 U	0.71 U
		Nov-20	**3.4**	**0.84 J**	0.73 U	0.71 U
		Oct-21	**2.7**	**1.2 I**	0.73 U	0.71 U
SW3-MW0006	**35-45**	Oct-19	0.89 U	**1.3 I**	0.73 U	**3.4**
		Nov-20	0.89 U	**0.70 J**	**0.77 J**	**1.4 J**
		Oct-21	0.89 U	**1.1 I**	0.73 U	**1.1 I**
SW3-MW0009	**15-25**	Oct-19	**1.3 I**	**25**	**3.8**	**63**
		Nov-20	**1.1 J**	**13**	**2.2 J**	**30**
		Oct-21	**2.1 I**	**13**	**2.2 I**	**29**
SW3-MW0024	**35-45**	Oct-19	0.89 U	0.53 U	0.73 U	**5.0**
		Nov-20	0.89 U	**0.73 J**	0.73 U	**2.0 J**
		Oct-21	0.89 U	**0.85 I**	0.73 U	**2 I**
SW3-MW0025	**35-45**	Oct-19	**7.5**	**23**	**3.2**	**14**
		Nov-20	**2.2 J**	**7.9**	**2.0 J**	**6.3**
		Oct-21	**1.1 I**	**11**	**2.1 I**	**5.3**
SW3-MW0026	**35-45**	Oct-19	0.89 U	**1.7 I**	0.73 U	0.71 U
SW3-MW0027	**27-37**	Oct-19	0.89 U	0.53 U	**1.5 I**	**66**
		Nov-20	0.89 U	0.53 U	**1.4 J**	**40**
		Oct-21	0.89 U	0.53 U	**1.6 I**	**32**
SW3-MW0028	**27-37**	Oct-19	0.89 U	0.53 U	0.73 U	**34**
		Nov-20	0.89 U	0.53 U	0.73 U	**15**
		Oct-21	0.89 U	0.53 U	0.73 U	**20**
Paint and Oil Locker, Northern Area						
POL-MW0001S	**3-13**	Oct-19	0.89 U	0.53 U	0.73 U	0.71 U
POL-MW0009S	**7-12**	Oct-19	**5.6**	**4.4**	0.73 U	0.71 U
		Nov-20	**22**	**3.2**	0.73 U	0.71 U
POL-MW0026S	**5-15**	Oct-19	**4.4**	**82**	**5.0**	**15**
		Nov-20	**3.3**	**46**	**2.6**	**6.4**
		Sep-21	**2.5**	**66**	**2.8**	**9.8**
POL-MW0031S	**5-15**	Oct-19	0.89 U	0.53 U	0.73 U	0.71 U
		Nov-20	0.89 U	0.53 U	0.73 U	0.71 U
		Oct-21	0.89 U	0.53 U	0.73 U	0.71 U
POL-MW0033I	**25-30**	Oct-19	**5.4**	**1.2 J**	0.73 U	0.71 U
		Nov-20	**35**	**30**	**15**	**0.78 J**
		Oct-21	**160**	**57**	**42**	**1.3 J**
POL-MW0033S	**5-15**	Oct-19	**1.5 J**	**0.66 J**	0.73 U	0.71 U
POL-MW0033SI	**18-23**	Oct-19	**3.6**	**1.8 J**	0.73 U	0.71 U
		Nov-20	**12**	**5.1**	**2.8**	0.71 U
		Oct-21	**34**	**7.9**	**5.3**	0.71 U
POL-MW0034S	**5-15**	Oct-19	**130 D**	**5.9**	0.73 U	0.71 U
		Nov-19	**120 D**	**4.4**	0.73 U	0.71 U
		Nov-20	**560 D**	**18**	0.73 U	0.71 U
		Sep-21	**130**	**24**	0.73 U	0.71 U
		Dec-21	**90**	**27**	0.73 U	0.71 U
		Mar-22	**170**	**22**	0.73 U	0.71 U
		Jun-22	**200**	**84**	**1.2 I**	**3**

Notes:
Concentrations in µg/L.
bls = below land surface.
TCE = trichloroethene.
cDCE = cis-1,2-dichloroethene.
tDCE = trans-1,2-dichloroethene.
VC = vinyl chloride.
D = Sample was analyzed at dilution.
U = Value was reported as below the method detection limit, therefore the detection limit is shown.
J = Estimated value.
I = Value is between method detection limit and practical quantitation limit.
Shading indicates State of Florida Groundwater Cleanup Target Level (GCTL) exceedance, TCE = 3 µg/L, cDCE = 70 µg/L, tDCE = 100 µg/L, VC = 1 µg/L.
Bolding indicates a concentration is greater than the method detection limit.

Table 6-3. January and October 2021 SW3 DPT Analytical Results

Sample Location (SW3-)	Screened Interval (feet bls)	TCE	cDCE	tDCE	VC
DPT0100	25 to 29	1 U	1 U	1 U	48
	30 to 34	1 U	1 U	2	54
	35 to 39	1 U	1 U	1	49
	40 to 44	1 U	1 U	1 U	43
	45 to 49	1 U	1 U	1 U	2
DPT0101	25 to 29	1 U	1 U	1 U	5
	30 to 34	1 U	1 U	1	60
	35 to 39	1 U	1 U	1 U	32
	40 to 44	1 U	1	1 U	75
	45 to 49	1 U	1 U	1 U	6
DPT0102	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	10
	35 to 39	1 U	1 U	1 U	15
	40 to 44	1 U	1 U	1 U	71
	45 to 49	1 U	1 U	1 U	3
DPT0103	25 to 29	1 U	1 U	1 U	7
	30 to 34	1 U	1 U	2	2
	35 to 39	1 U	1 U	1 U	6
	40 to 44	1 U	1 U	1 U	71
	45 to 49	1 U	1 U	1 U	5
DPT0104	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	28
	35 to 39	1 U	1 U	1 U	89
	40 to 44	1 U	1 U	1 U	130
	45 to 49	1 U	1 U	1 U	73
DPT0105	30 to 34	1 U	1 U	1 U	36
	35 to 39	1 U	1 U	1 U	43
	40 to 44	1 U	1 U	1 U	100
	45 to 49	1 U	1 U	1 U	8
DPT0106	30 to 34	1 U	1 U	1 U	60
	35 to 39	1 U	1 U	1 U	42
	40 to 44	1 U	1 U	1 U	190
	45 to 49	1 U	1 U	1 U	9
DPT0107	30 to 34	1 U	1 U	1 U	5
	35 to 39	1 U	1	1 U	38
	40 to 44	1 U	1 U	1 U	67
	45 to 49	1 U	1 U	1 U	9
DPT0108	25 to 29	1 U	1 U	1 U	63
	30 to 34	1 U	1 U	1 U	64
	35 to 39	1 U	1 U	1 U	48
	40 to 44	1 U	1 U	1 U	66
	45 to 49	1 U	1 U	1 U	63
	50 to 54	1 U	1 U	1 U	1 U
DPT0109	25 to 29	1 U	1 U	1 U	11
	30 to 34	2 U	1 U	2 U	73
	35 to 39	1 U	1	1 U	64
	40 to 44	1 U	1 U	1 U	77
	45 to 49	1 U	1 U	1 U	93
	50 to 54	1 U	1 U	1 U	1 U
DPT0110	25 to 29	1 U	1 U	1 U	3
	30 to 34	1 U	5	1 U	53
	35 to 39	1 U	2	1 U	19
	40 to 44	1 U	1	1 U	16
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U

Table 6-3. January and October 2021 SW3 DPT Analytical Results

Sample Location (SW3-)	Screened Interval (feet bls)	TCE	cDCE	tDCE	VC
DPT0111	25 to 29	1 U	1 U	1 U	3
	30 to 34	1 U	1 U	1 U	11
	35 to 39	1 U	1	1 U	25
	40 to 44	1 U	1 U	1 U	32
	45 to 49	1 U	1 U	1 U	29
	50 to 54	1 U	1 U	1 U	1 U
DPT0112	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	18
	40 to 44	1 U	1 U	1 U	46
	45 to 49	1 U	1 U	1 U	71
	50 to 54	1 U	1 U	1 U	1 U
DPT0113	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	40
	35 to 39	1 U	1 U	1 U	16
	40 to 44	1 U	1 U	1 U	77
	45 to 49	1 U	1 U	1 U	46
	50 to 54	1 U	1 U	1 U	1 U
DPT0114	15 to 19	1 U	1 U	1 U	9
	20 to 24	1 U	1 U	1 U	13
	25 to 29	1 U	1 U	1 U	18
	30 to 34	1 U	2	1 U	17
	35 to 39	1 U	1 U	1 U	17
	40 to 44	1 U	1	1 U	16
	45 to 49	1 U	1 U	1 U	6
	50 to 54	1 U	1 U	1 U	1 U
DPT0115	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT0116	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT0117	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U

Table 6-3. January and October 2021 SW3 DPT Analytical Results

Sample Location (SW3-)	Screened Interval (feet bls)	TCE	cDCE	tDCE	VC
DPT0118	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT0119	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	**41**
	30 to 34	1 U	1 U	1 U	**67**
	35 to 39	1 U	1 U	1 U	**55**
	40 to 44	1 U	1 U	1 U	**110**
	45 to 49	1 U	1 U	1 U	**82**
	50 to 54	1 U	1 U	1 U	1 U
DPT0120	15 to 19	1 U	1 U	1 U	**28**
	20 to 24	1 U	1 U	1 U	**60**
	25 to 29	1 U	1 U	1 U	**39**
	30 to 34	1 U	1 U	1 U	**32**
	35 to 39	1 U	1 U	1 U	**51**
	40 to 44	1 U	1 U	1 U	**62**
	45 to 49	1 U	1 U	1 U	**11**
	50 to 54	1 U	1 U	1 U	1 U
DPT0121	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	**3**
	30 to 34	1 U	1 U	1 U	**5**
	35 to 39	1 U	1 U	1 U	**2**
	40 to 44	1 U	1 U	1 U	**4**
	45 to 49	1 U	1 U	1 U	**1**
	50 to 54	1 U	1 U	1 U	1 U
DPT0122	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT0123	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U

Table 6-3. January and October 2021 SW3 DPT Analytical Results

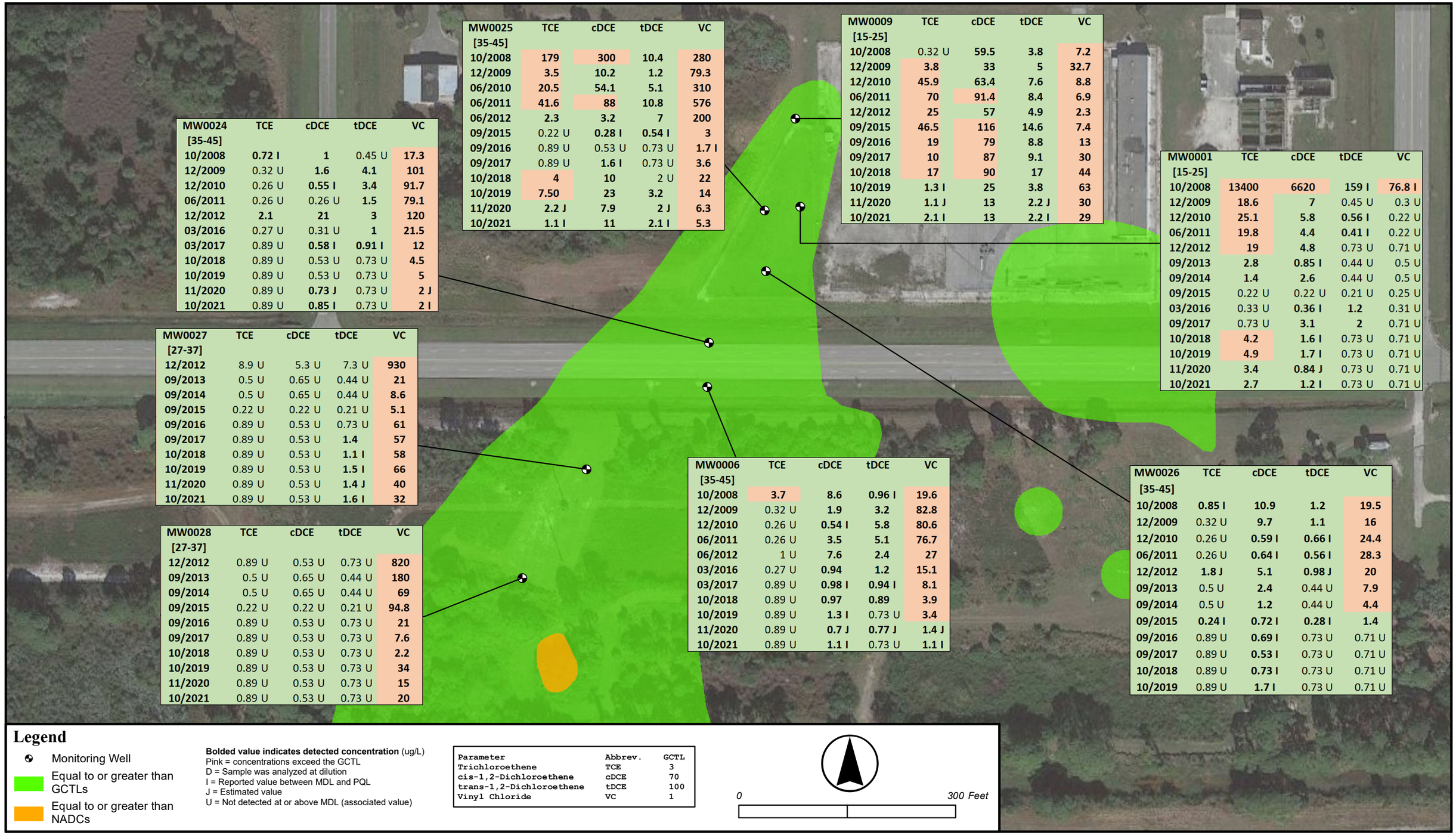
Sample Location (SW3-)	Screened Interval (feet bls)	TCE	cDCE	tDCE	VC
DPT0124	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT0125	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT0126	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	**2**
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT0127	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT0128	15 to 19	1 U	**2**	1 U	**31**
	20 to 24	1 U	**7**	1 U	**45**
	25 to 29	**2**	**11**	**2**	**16**
	30 to 34	**2**	**6**	**2**	**10**
	40 to 44	1 U	**2**	1 U	**2**
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT0129	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	**4**
	35 to 39	1 U	**1**	1 U	**26**
	40 to 44	1 U	**2**	1 U	**25**
	45 to 49	1 U	**2**	1 U	**30**
	50 to 54	1 U	1 U	1 U	**2**
DPT0130	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	**5**
	35 to 39	1 U	**4**	**1**	**42**
	40 to 44	1 U	**4**	1 U	**39**
	45 to 49	1 U	**2**	1 U	**12**
	50 to 54	1 U	1 U	1 U	1 U

Table 6-3. January and October 2021 SW3 DPT Analytical Results

Sample Location (SW3-)	Screened Interval (feet bls)	TCE	cDCE	tDCE	VC
DPT0131	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U
DPT0132	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	**1**
	35 to 39	1 U	1 U	1 U	**2**
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
DPT0133	10 to 14	1 U	1 U	1 U	1 U
	15 to 19	1 U	1 U	1 U	1 U
	20 to 24	1 U	1 U	1 U	1 U
	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	**1**	1 U	1 U	1 U
	40 to 44	**1**	1 U	1 U	1 U
	45 to 49	1 U	1 U	1 U	1 U
DPT0134	25 to 29	1 U	1 U	1 U	1 U
	30 to 34	1 U	1 U	1 U	1 U
	35 to 39	1 U	1 U	1 U	1 U
	40 to 44	1 U	1 U	1 U	1 U
	45 to 49	1 U	**1**	1 U	1 U
	50 to 54	1 U	1 U	1 U	1 U

Notes:
Concentrations in µg/L.
bls = below land surface.
TCE = trichloroethene.
cDCE = cis-1,2-dichloroethene.
tDCE = trans-1,2-dichloroethene.
VC = vinyl chloride.
U = Value was reported as below the method detection limit, therefore the detection limit is shown.
I = Value is between method detection limit and practical quantitation limit.
Shading indicates State of Florida Groundwater Cleanup Target Level (GCTL) exceedance, TCE = 3 µg/L, cDCE = 70 µg/L, tDCE =
Bolding indicates a concentration is greater than the method detection limit.

FIGURE 6-1 SW3 LTM GROUNDWATER ANALYTICAL RESULTS
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



MW0024 [35-45]	TCE	cDCE	tDCE	VC
10/2008	0.72 I	1	0.45 U	17.3
12/2009	0.32 U	1.6	4.1	101
12/2010	0.26 U	0.55 I	3.4	91.7
06/2011	0.26 U	0.26 U	1.5	79.1
12/2012	2.1	21	3	120
03/2016	0.27 U	0.31 U	1	21.5
03/2017	0.89 U	0.58 I	0.91 I	12
10/2018	0.89 U	0.53 U	0.73 U	4.5
10/2019	0.89 U	0.53 U	0.73 U	5
11/2020	0.89 U	0.73 J	0.73 U	2 J
10/2021	0.89 U	0.85 I	0.73 U	2 I

MW0025 [35-45]	TCE	cDCE	tDCE	VC
10/2008	179	300	10.4	280
12/2009	3.5	10.2	1.2	79.3
06/2010	20.5	54.1	5.1	310
06/2011	41.6	88	10.8	576
06/2012	2.3	3.2	7	200
09/2015	0.22 U	0.28 I	0.54 I	3
09/2016	0.89 U	0.53 U	0.73 U	1.7 I
09/2017	0.89 U	1.6 I	0.73 U	3.6
10/2018	4	10	2 U	22
10/2019	7.50	23	3.2	14
11/2020	2.2 J	7.9	2 J	6.3
10/2021	1.1 I	11	2.1 I	5.3

MW0009 [15-25]	TCE	cDCE	tDCE	VC
10/2008	0.32 U	59.5	3.8	7.2
12/2009	3.8	33	5	32.7
12/2010	45.9	63.4	7.6	8.8
06/2011	70	91.4	8.4	6.9
12/2012	25	57	4.9	2.3
09/2015	46.5	116	14.6	7.4
09/2016	19	79	8.8	13
09/2017	10	87	9.1	30
10/2018	17	90	17	44
10/2019	1.3 I	25	3.8	63
11/2020	1.1 J	13	2.2 J	30
10/2021	2.1 I	13	2.2 I	29

MW0001 [15-25]	TCE	cDCE	tDCE	VC
10/2008	13400	6620	159 I	76.8 I
12/2009	18.6	7	0.45 U	0.3 U
12/2010	25.1	5.8	0.56 I	0.22 U
06/2011	19.8	4.4	0.41 I	0.22 U
12/2012	19	4.8	0.73 U	0.71 U
09/2013	2.8	0.85 I	0.44 U	0.5 U
09/2014	1.4	2.6	0.44 U	0.5 U
09/2015	0.22 U	0.22 U	0.21 U	0.25 U
03/2016	0.33 U	0.36 I	1.2	0.31 U
09/2017	0.73 U	3.1	2	0.71 U
10/2018	4.2	1.6 I	0.73 U	0.71 U
10/2019	4.9	1.7 I	0.73 U	0.71 U
11/2020	3.4	0.84 J	0.73 U	0.71 U
10/2021	2.7	1.2 I	0.73 U	0.71 U

MW0027 [27-37]	TCE	cDCE	tDCE	VC
12/2012	8.9 U	5.3 U	7.3 U	930
09/2013	0.5 U	0.65 U	0.44 U	21
09/2014	0.5 U	0.65 U	0.44 U	8.6
09/2015	0.22 U	0.22 U	0.21 U	5.1
09/2016	0.89 U	0.53 U	0.73 U	61
09/2017	0.89 U	0.53 U	1.4	57
10/2018	0.89 U	0.53 U	1.1 I	58
10/2019	0.89 U	0.53 U	1.5 I	66
11/2020	0.89 U	0.53 U	1.4 J	40
10/2021	0.89 U	0.53 U	1.6 I	32

MW0028 [27-37]	TCE	cDCE	tDCE	VC
12/2012	0.89 U	0.53 U	0.73 U	820
09/2013	0.5 U	0.65 U	0.44 U	180
09/2014	0.5 U	0.65 U	0.44 U	69
09/2015	0.22 U	0.22 U	0.21 U	94.8
09/2016	0.89 U	0.53 U	0.73 U	21
09/2017	0.89 U	0.53 U	0.73 U	7.6
10/2018	0.89 U	0.53 U	0.73 U	2.2
10/2019	0.89 U	0.53 U	0.73 U	34
11/2020	0.89 U	0.53 U	0.73 U	15
10/2021	0.89 U	0.53 U	0.73 U	20

MW0006 [35-45]	TCE	cDCE	tDCE	VC
10/2008	3.7	8.6	0.96 I	19.6
12/2009	0.32 U	1.9	3.2	82.8
12/2010	0.26 U	0.54 I	5.8	80.6
06/2011	0.26 U	3.5	5.1	76.7
06/2012	1 U	7.6	2.4	27
03/2016	0.27 U	0.94	1.2	15.1
03/2017	0.89 U	0.98 I	0.94 I	8.1
10/2018	0.89 U	0.97	0.89	3.9
10/2019	0.89 U	1.3 I	0.73 U	3.4
11/2020	0.89 U	0.7 J	0.77 J	1.4 J
10/2021	0.89 U	1.1 I	0.73 U	1.1 I

MW0026 [35-45]	TCE	cDCE	tDCE	VC
10/2008	0.85 I	10.9	1.2	19.5
12/2009	0.32 U	9.7	1.1	16
12/2010	0.26 U	0.59 I	0.66 I	24.4
06/2011	0.26 U	0.64 I	0.56 I	28.3
12/2012	1.8 J	5.1	0.98 J	20
09/2013	0.5 U	2.4	0.44 U	7.9
09/2014	0.5 U	1.2	0.44 U	4.4
09/2015	0.24 I	0.72 I	0.28 I	1.4
09/2016	0.89 U	0.69 I	0.73 U	0.71 U
09/2017	0.89 U	0.53 I	0.73 U	0.71 U
10/2018	0.89 U	0.73 I	0.73 U	0.71 U
10/2019	0.89 U	1.7 I	0.73 U	0.71 U

Legend

- Monitoring Well
- Equal to or greater than GCTLs
- Equal to or greater than NADCs

Bolded value indicates detected concentration (ug/L)
Pink = concentrations exceed the GCTL
D = Sample was analyzed at dilution
I = Reported value between MDL and PQL
J = Estimated value
U = Not detected at or above MDL (associated value)

Parameter	Abbrev.	GCTL
Trichloroethene	TCE	3
cis-1,2-Dichloroethene	cDCE	70
trans-1,2-Dichloroethene	tDCE	100
Vinyl Chloride	VC	1

0 — 300 Feet

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FIGURE 6-2 SW3 JANUARY AND OCTOBER 2021 DPT ANALYTICAL RESULTS
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

POL-SW3 LTM-CC-PMR
Revision: 0
February 2023

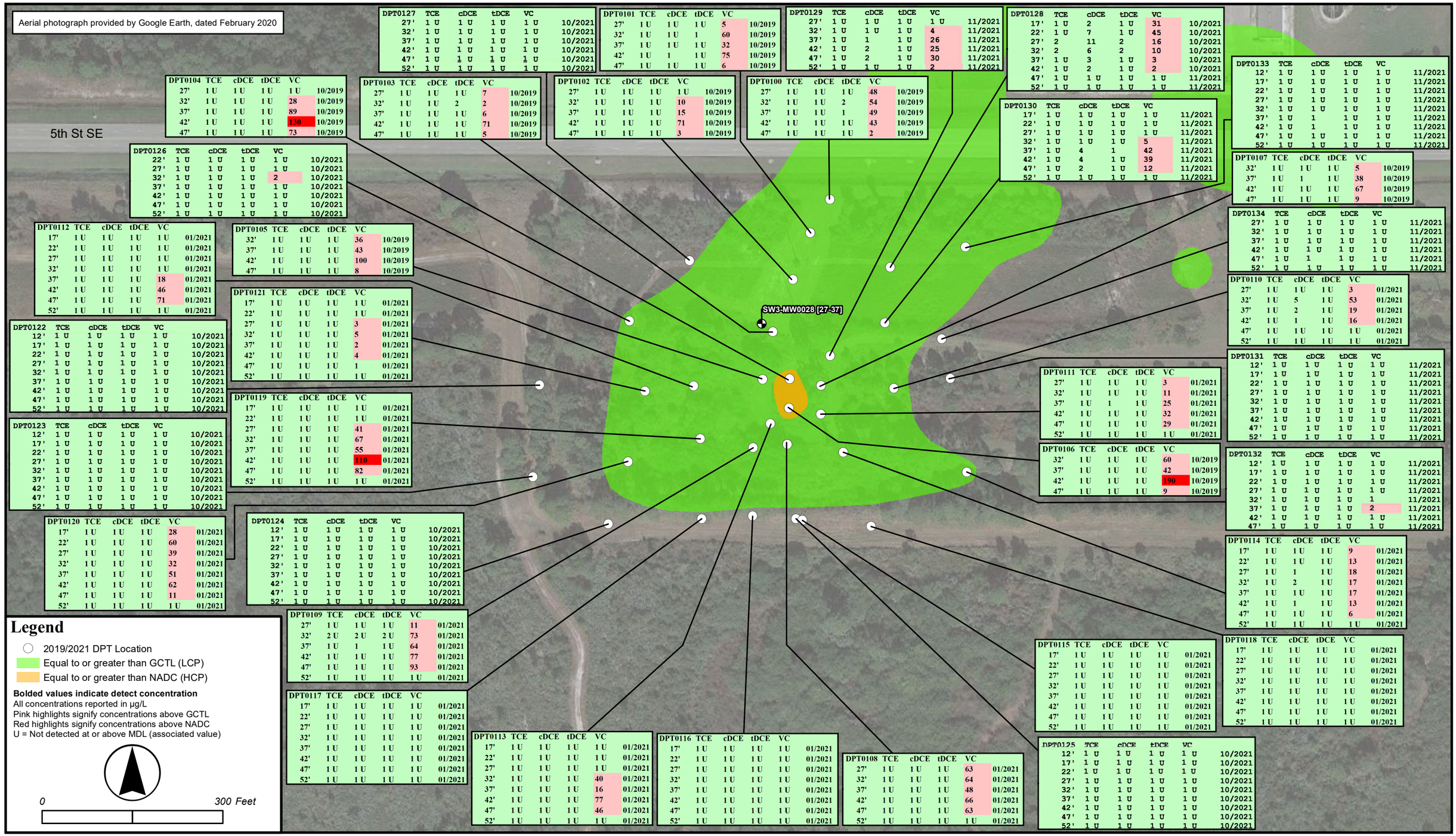

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FIGURE 6-3 POL LTM GROUNDWATER ANALYTICAL RESULTS
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

POL-SW3 LTM-CC-PMR
Revision: 0
February 2023

MW0033I [25-30]	TCE	cDCE	tDCE	VC
03/2010	1400	350	51	180
03/2011	1000	280	26	64
09/2012	1200	190	24	22
09/2013	130	9.4	1 U	1 U
09/2014	11	0.91 I	1 U	1 U
09/2015	1 U	1 U	1 U	1 U
12/2016	2.2	1 U	1 U	1 U
12/2017	5.50	0.53 U	0.73 U	0.71 U
10/2018	16	1 I	0.73 U	0.71 U
10/2019	5.4	1.2 J	0.73 U	0.71 U
11/2020	35	30	15	0.78 J
10/2021	160	57	42	1.3 J

MW0033S [5-15]	TCE	cDCE	tDCE	VC
03/2010	61	40	7.8	0.48 U
09/2011	22	33	28	1 U
09/2012	35	20	9	1 U
09/2013	21	4.1	0.84 J	1 U
09/2014	3.8	1 U	1 U	1 U
09/2015	1 U	1 U	1 U	1 U
12/2016	6.2	1 U	1 U	1 U
09/2017	6.5	0.53 U	0.73 U	0.71 U
10/2018	2.5	0.53 U	0.73 U	0.71 U
10/2019	1.5 J	0.66 J	0.73 U	0.71 U

MW0034S [5-15]	TCE	cDCE	tDCE	VC
03/2010	2100	830	3	0.48 U
09/2011	1800	100	50 U	50 U
09/2012	1700	16 J	10 U	10 U
09/2013	46	1 U	1 U	1 U
09/2014	81	1 U	1 U	1 U
09/2015	210	1.2 J	1 U	1 U
09/2016	440	1.8 J	2.5 U	2.5 U
09/2017	770	43	3.6 U	6.1 J
10/2018	3300	26	36 U	36 U
10/2019	130 D	5.9	0.73 U	0.71 U
11/2019	120 D	4.4	0.73 U	0.71 U
11/2020	560 D	18	0.73 U	0.71 U
09/2021	130	24	0.73 U	0.71 U
12/2021	90	27	0.73 U	0.71 U
03/2022	170	22	0.73 U	0.71 U
06/2022	200	84	1.2 I	3

MW0033SI [18-23]	TCE	cDCE	tDCE	VC
03/2010	670	140	88	0.48 U
09/2011	640	100	63	5 U
09/2012	820	84	52	5 U
09/2013	33	4.9	1 U	1 U
09/2014	3.8	1 U	1 U	1 U
09/2015	1 U	1 U	1 U	1 U
12/2016	1.5 J	1 U	1 U	1 U
12/2017	3	0.53 U	0.73 U	0.71 U
10/2018	2.2	0.53 U	0.73 U	0.71 U
10/2019	3.6	1.8 J	0.73 U	0.71 U
11/2020	12	5.1	2.8	0.71 U
10/2021	34	7.9	5.3	0.71 U

MW0001S [3-13]	TCE	cDCE	tDCE	VC
03/2010	0.93 I	3.5	0.47 U	0.48 U
03/2011	1 U	1 U	1 U	1 U
03/2012	1 U	1 U	1 U	1 U
09/2013	11	0.91 J	1 U	1 U
09/2014	1 U	1 U	1 U	1 U
09/2015	1 U	1 U	1 U	1 U
12/2016	1 U	1 U	1 U	1 U
12/2017	0.89 U	0.53 U	0.73 U	0.71 U
10/2018	0.89 U	0.53 U	0.73 U	0.71 U
10/2019	0.89 U	0.53 U	0.73 U	0.71 U

MW0009S [7-12]	TCE	cDCE	tDCE	VC
03/2010	190	620	39	18
09/2011	2.8	4.7	1 U	1 U
09/2012	4.5	140	5.3	2.4
09/2013	65	31	1.6 J	1 U
09/2014	5.7	4.2	1 U	1 U
09/2015	1 U	4.6	1 U	1 U
09/2016	1 U	1 U	1 U	1 U
12/2017	0.89 U	0.53 U	0.73 U	0.71 U
10/2018	1.6 I	0.68 I	0.73 U	0.71 U
10/2019	5.6	4.4	0.73 U	0.71 U
11/2020	22	3.2	0.73 U	0.71 U

MW0026S [5-15]	TCE	cDCE	tDCE	VC
03/2010	16	14000	270	1100
09/2011	100 U	8600	380	610
09/2012	72 J	7800	140	1400
09/2013	20 U	2200	49	630
09/2014	5	440	20	130
09/2015	1	8.9	0.83 J	1.6 J
09/2016	0.95 J	3.1	1 U	1 U
12/2017	2.70	11	0.84 I	0.9 I
10/2018	0.89	5.9	0.73 U	0.71 U
10/2019	4.4	82	5	15
11/2020	3.3	46	2.6	6.4
09/2021	2.5	66	2.8	9.8
03/2022	2.3 J	140	8.4	18

MW0031S [5-15]	TCE	cDCE	tDCE	VC
03/2010	96	170	4.4	60
03/2011	13	170	1.7	46
09/2012	1 U	45	1 U	10
09/2013	2.8	7.6	1 U	1 U
09/2014	1 U	2.3	1 U	1 U
09/2015	1 U	1.1 J	1 U	1 U
12/2016	1 U	1 U	1 U	1 U
12/2017	0.89 U	0.53 U	0.73 U	0.71 U
10/2018	0.89 U	0.53 U	0.73 U	0.71 U
10/2019	0.89 U	0.53 U	0.73 U	0.71 U
11/2020	0.89 U	0.53 U	0.73 U	0.71 U
10/2021	0.89 U	0.53 U	0.73 U	0.71 U

DPT1462
DPT1461
DPT1463

Legend

- Monitoring Well
- Equal to or greater than GCTLs
- Equal to or greater than NADCs
- DPT Location

Bolded values indicate detect concentration
All concentrations reported in µg/L
Pink highlights signify concentrations above GCTL
Red highlights signify concentrations above NADC
D = Sample was analyzed at dilution
I = Reported value between MDL and PQL
J = Estimated value
U = Not detected at or above MDL (associated value)

Parameter	Abbrev.	GCTL
Trichloroethene	TCE	3
cis-1,2-Dichloroethene	cDCE	70
trans-1,2-Dichloroethene	tDCE	100
Vinyl Chloride	VC	1

0 300 Feet

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SECTION VII
CONCLUSIONS AND RECOMMENDATIONS

Installation and operation of the POL Southern Treatment Area AS IM was completed in accordance with the IMWP (NASA, 2018) and IWP (NASA, 2020). The AS system was installed between December 2019 and August 2020, and includes a total of 145 AS wells with screens ranging from 23 feet to 55 feet bls. Baseline sampling was conducted in April 2020 (prior to system start-up activities), which were completed in February 2021. Year 1 and Q5 performance monitoring activities were conducted on a quarterly schedule in June 2021, September 2021, December 2021, March 2022, and June 2022. Air sampling was also conducted as part of performance monitoring for health and safety monitoring, to verify compliance with the KSC Title V Air Operation Permit.

Based on Year 1 and Q5 system operation and performance monitoring results, the AS system at POL Southern Treatment Area is operating in a modified configuration, with Zones 1 and 2 and select wells in Zones 3 and 4 off. The air pulse cycles are operating and functioning properly, with the AS wells operating at the designed flowrate of 5 cfm/well and wellhead pressures of 14, 20, 26, and 33 psig at the shallow, shallow-intermediate, intermediate, and deep depths, respectively. The overall runtime of the AS system for the Year 1 and Q5 reporting period (February 2021 to August 2022) was approximately 67%, with downtime primarily attributed to performance monitoring events, DPT sampling activities, system maintenance, and short circuiting in the 5th Street SE south ditch.

Performance monitoring results indicate that within the first year of operation, TCE concentrations in groundwater in plume centerline wells across all depth zones have been reduced by approximately 81.3%. Similarly, cDCE and VC concentrations of plume centerline monitoring wells across the entire saturated treatment area have been reduced by approximately 91.7% and 88.7%, respectively. As of June 2022, concentrations exceeded GCTLs in groundwater at three of the 24 performance monitoring wells, with no wells exceeding NADCs. Continued operation of the AS system is required to meet the IM objective to reduce COC groundwater concentrations to support transition to MNA. The overall Corrective Action objective is to reduce concentrations of TCE, cDCE, and VC present in groundwater to levels

below their respective GCTLs. Continued operation of the AS system will advance this Corrective Action Objective.

LTM activities at SW3 and POL Northern Area, where an AS system previously ran and was shut down in March 2018, has shown generally decreasing or stable trends of COCs over the recent annual events conducted in October 2019, November 2020, and October 2021. Supplemental DPT sampling events conducted to support the LTM program have also shown that the residual groundwater plumes have an effective monitoring well network; although, additional wells are recommended to monitor the LCP (see below).

The contents of this report were presented during the June 2020, September 2021, and October 2022 KSCRT meetings, which included recommendations for continued OM&M, performance monitoring, LTM, and future activities. During the October 2022 meeting, Team consensus was reached to continue with Year 2 AS system OM&M for POL Southern Treatment Area through at least March 2023 (the period currently under contract) to further decrease groundwater concentrations to reach the site's overall objective of GCTLs, with the following modifications to the performance monitoring program at POL Southern Treatment Area:

- Transition the following eight performance monitoring wells from quarterly to semi-annual sampling (POL-): MW0008I, MW0036SI, MW0036I, MW0041SI, MW0042SI, MW0043I, MW0044D, and MW0045I.

- Continue to sample the following seven performance monitoring wells on a semi-annual frequency (POL-): MW0012S, MW0014ID, MW0026S, MW0026I, MW0028S, MW0028I, and MW0035SI. Note, MW0026S is also recommended to be assessed as part of the POL Northern Area LTM program.

- Transition the following six performance monitoring wells from quarterly or semi-annual to annual sampling (POL-): MW0012I, MW0014SI, MW0014I, MW0017S, MW0022I, and MW0022D.

- Remove the following 22 wells from the performance sampling program (POL-): MW0008S, MW0011S, MW0011I, MW0014S, MW0016S, MW0016I, MW0016D,

MW0018S, MW0018I, MW0018D, MW0035S, MW0039ID, MW0043S, MW0043D, MW0044I, MW0045S, MW0045D, MW0046D, MW0046DD, MW0047I, MW0047D, and MW0047DD. These 22 monitoring wells will be discontinued based on all VOCs measuring below GCTLs during the last three quarterly sampling events at MW0011I, the last four quarters at MW0043D, and non-detect VOCs at the remaining 20 monitoring well locations in the last four quarters.

- Reduce air sampling to one annual ambient air sampling event during the Year 2 reporting period. This is based on no OSHA PEL or ACGIH TLV exceedances detected during either the pre-startup or Year 1 air monitoring sampling events. Air sampling will be conducted at the same five locations sampled during Year 1 (POL-AMB05 through POL-AMB09 – see Figure 2-1).

Table 7-1 provides the Year 2 performance monitoring recommendations. The performance monitoring well locations and sampling frequency for Year 2 are provided on Figure 7-1.

Additional recommendations for the POL Northern Area and SW3 LTM program include:

- Transition POL-MW0031S, POL-MW0026S, and POL-MW0034S to a semi-annual sampling frequency; and
- Remove SW3-MW0001 and SW3-MW0006 from the LTM program.

Additionally, POL-MW009S will be re-incorporated into the sampling network as this well inadvertently did not move forward following the October 2021 LTM event for POL Northern Area. Table 7-2 provides the monitoring wells that are proposed to be sampled for the LTM program for POL Northern Area and SW3.

The above recommendations for POL and SW3 were presented at the October 2022 KSCRT Meeting (NASA, 2022), and Team consensus was reached on the recommended path forward (Meeting Minute 2210-M12, Decisions D13 to D15). The October 2022 KSCRT Meeting Minutes are included in Appendix G.

Additionally, based on performance monitoring data, LTM data, and DPT sampling conducted in 2021 and 2022, the following monitoring wells are proposed to be installed to monitor the LCP

along the POL and SW3 southern perimeter (see Figure 7-2 and Table 7-3) and sampled on an annual frequency.

The following table includes proposed downgradient monitoring wells.

Table 7-3 Proposed Downgradient Monitoring Well Installations.

Well ID	Screened Interval (feet bls)	Northing (meters)	Easting (meters)
SW3-MW0029	15-25	463,355.513	233,450.834
SW3-MW0030	35-45	463,355.513	233,450.834
SW3-MW0031	45-50	463,355.513	233,450.834
SW3-MW0032	45-50	463,256.814	233,444.254
SW3-MW0033	25-35	463,260.778	233,583.966
SW3-MW0034	35-45	463,260.778	233,583.966
SW3-MW0035	45-50	463,260.778	233,583.966
POL-MW0048I	25-35	463,258.452	233,754.911
POL-MW0048D	35-45	463,258.452	233,754.911

Note: Each monitoring well will be 1-inch in diameter and have a 0.010-inch slotted screen.

Table 7-1. POL Southern Treatment Area Year 2 Performance Monitoring Plan

Montoring Well (POL-)	Screen Interval (ft bls)	Monitoring Function	Sampling Frequency
MW0008I	[25 - 30]	Monitor treatment performance in HCP area.	Semi-annual
MW0012S	[11 - 16]	Monitor upgradient and eastern edge of HCP.	Semi-annual
MW0012I	[28 - 33]	Monitor upgradient and eastern edge of HCP and treatment zone.	Annual
MW0014SI	[18 - 23]	Monitor eastern edge of HCP.	Annual
MW0014I	[25 - 30]	Monitor eastern edge of HCP.	Annual
MW0014ID	[32 - 37]	Monitor eastern edge of HCP.	Semi-annual
MW0017S	[11 - 16]	Monitor west of HCP and STA treatment zone.	Annual
MW0022I	[25 - 30]	Monitor downgradient of STA.	Annual
MW0022D	[40 - 45]	Monitor downgradient of STA.	Annual
MW0026S	[5 - 15]	Monitor upgradient of treatment zone and HCP.	Semi-annual
MW0026I	[25 - 30]	Monitor upgradient of treatment zone and HCP.	Semi-annual
MW0028S	[5 - 15]	Monitor upgradient of treatment zone and HCP.	Semi-annual
MW0028I	[25 - 30]	Monitor upgradient of treatment zone and HCP.	Semi-annual
MW0035SI	[18 - 23]	Monitor upgradient of treatment zone and HCP.	Semi-annual
MW0036SI	[18 - 23]	Monitor treatment performance in HCP area.	Semi-annual
MW0036I	[25 - 30]	Monitor treatment performance in HCP area.	Semi-annual
MW0041SI	[18 - 23]	Monitor treatment performance in HCP area.	Semi-annual
MW0042SI	[18 - 23]	Monitor treatment performance at HCP edge.	Semi-annual
MW0043I	[20 - 30]	Monitor treatment performance in SZ area.	Semi-annual
MW0044D	[30 - 40]	Monitor treatment performance in HCP area.	Semi-annual
MW0045I	[20 - 30]	Monitor treatment performance in SZ area.	Semi-annual

Notes:
All monitoring wells to be sampled for VOCs via USEPA Method 8260D.
ft bls = feet below land surface.
HCP = High Concentration Plume.
HS = Hot Spot.
NADC = Natural Attenuation Default Concentrations.
SZ = Source Zone.
VOC = volatile organic compound.

Table 7-2. Proposed POL Northern Area and SW3 LTM Wells.

Site	Monitoring Well	Screened Interval (feet bls)	Sampling Frequency
SW3	MW0009	15-25	Annual
	MW0024	35-45	
	MW0025	35-45	
	MW0027	27-37	
	MW0028	27-37	
POL	MW0009S	7-12	
	MW0026S*	5-15	Semi-Annual
	MW0031S	5-15	
	MW0033SI	18-23	Annual
	MW0034S	5-15	Semi-Annual

Notes:
SW3 = Supply Warehouse #3.
POL = Paint and Oil Locker.
LTM = Long-Term Monitoring.
bls = below land surface.
* = Monitoring well also recommended for POL Southern Treatmetn Area performance monitoring on a semi-annual schedule.

FIGURE 7-1 POL SOUTHERN TREATMENT AREA YEAR 2 AND LTM MONITORING WELL SCHEDULE
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA

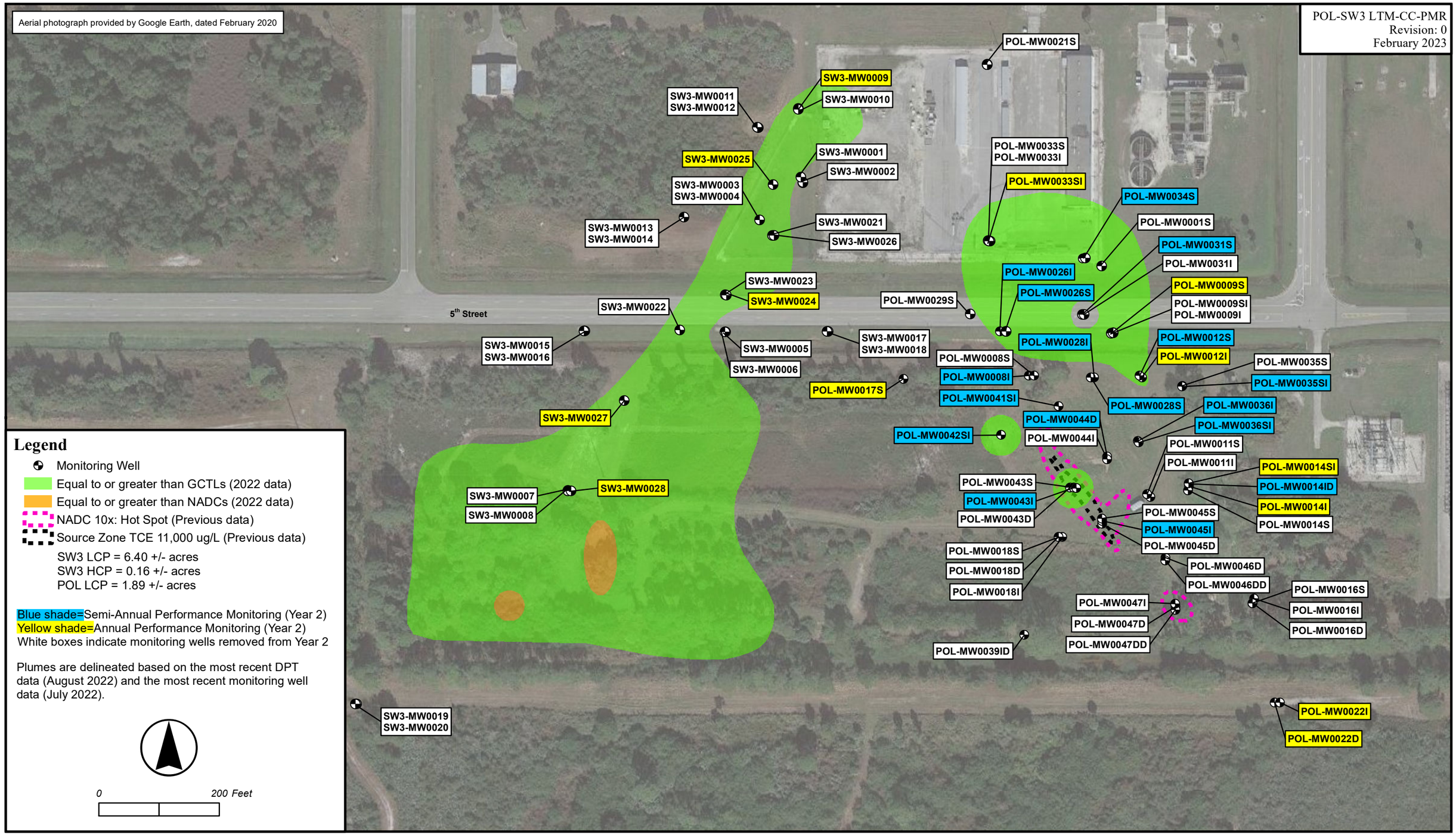

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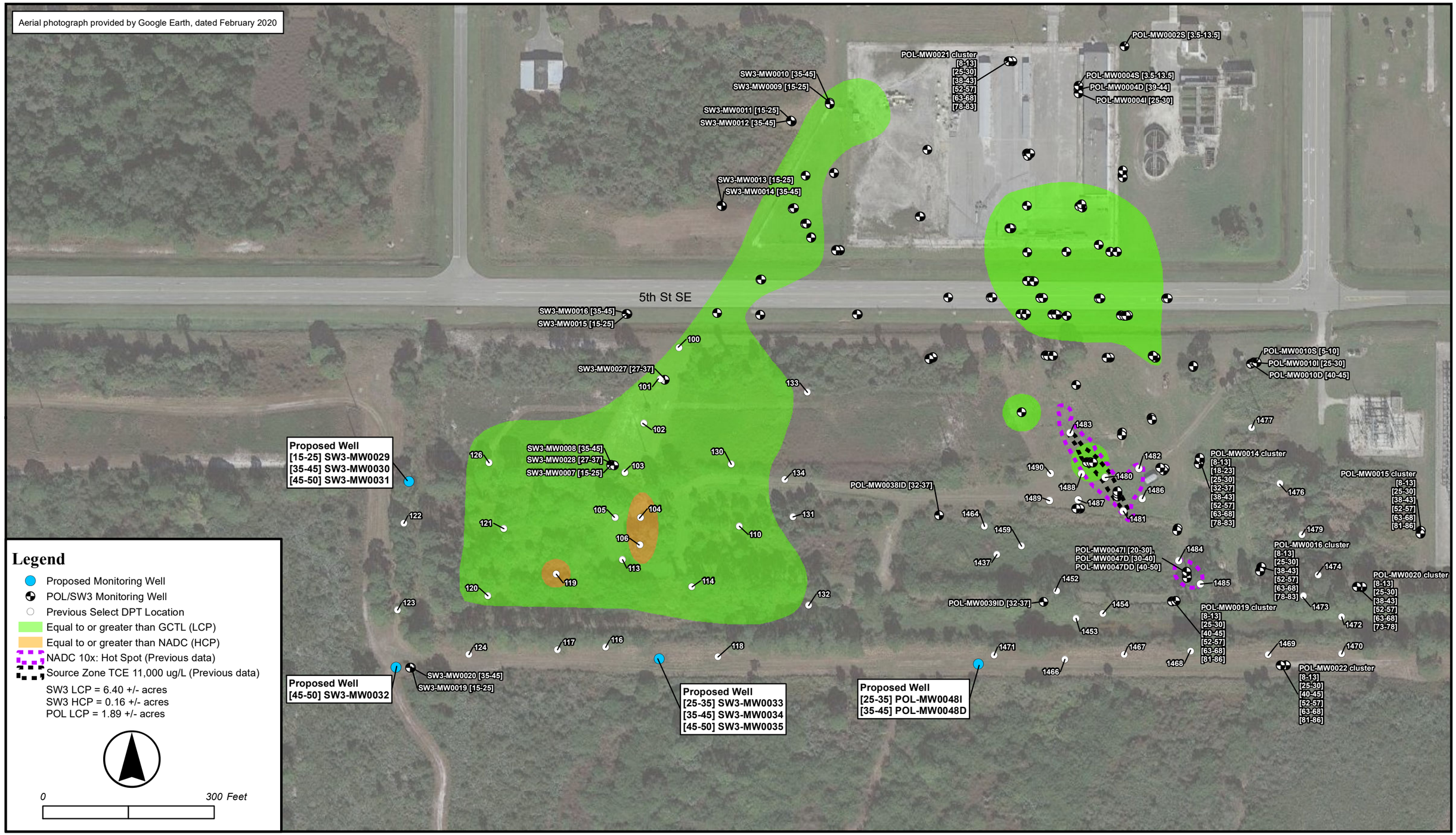
FIGURE 7-2 PROPOSED MONITORING WELLS
SWMU 067 AND SWMU 088, KENNEDY SPACE CENTER, FLORIDA



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