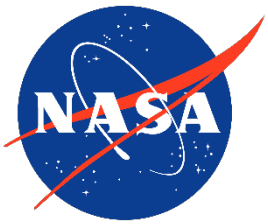
2019 CORRECTIVE MEASURES IMPLEMENTATION AND INTERMIM MEASURES ANNUAL STATUS REPORT: SUMMARY OF BIOSPARGE SYSTEM OPERATION AND MAINTENANCE, AND INTERIM GROUNDWATER MONITORING

MOBILE LAUNCH PLATFORM / VEHICLE ASSEMBLY BUILDING AREA (SWMU 056)

KENNEDY SPACE CENTER, FLORIDA

Prepared for:



Environmental Assurance Branch
National Aeronautics and Space Administration
Kennedy Space Center, Florida 32899

A-E Contract 80KSC019D0010
Task Order 80KSC019F0075

April 2020
Revision 0

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In accordance with the provisions of Florida Statutes, Chapter 471, this Corrective Measures Implementation and Interim Measures Annual Status Report for the Kennedy Space Center Mobile Launch Platform / Vehicle Assembly Building Area located in Merritt Island, Florida, has been prepared under the direct supervision of a Professional Engineer registered in the State of Florida. This work was performed in accordance with generally accepted professional engineering practices pursuant to Chapter 471 of the Florida Statutes. The data, findings, recommendations, specifications or professional opinions were prepared solely for the use of the National Aeronautics and Space Administration and the Florida Department of Environmental Protection. AECOM makes no other warranty; either expressed or implied and is not responsible for the interpretation by others of these data.

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ABBREVIATIONS, ACRONYMS, AND SYMBOLS

ADP	Advanced Data Package
AECOM	AECOM Technical Services, Inc.
bls	below land surface
BTEX	benzene, toluene, ethyl benzene, and xylene
cDCE	cis-1,2-dichloroethene
CCR	Construction Completion Report
CAO	Corrective Action Objective
CMD	Corrective Measures Design
CMI	Corrective Measures Implementation
COC	Contaminants of Concern
CVOC	chlorinated volatile organic compound
DO	dissolved oxygen
DPT	direct push technology
EE	Engineering Evaluation
ft	feet
FDEP	Florida Department of Environmental Protection
Geosyntec	Geosyntec Consultants, Inc.
GCTL	Groundwater Cleanup Target Level
HCP	High Concentration Plume
IGM	interim groundwater monitoring
IM	Interim Measure
IDW	investigation derived waste
KSC	Kennedy Space Center
KSCRT	KSC Remediation Team
LCP	Low Concentration Plume
LNAPL	light non-aqueous phase liquid
LTM	long term monitoring

ABBREVIATIONS, ACRONYMS, AND SYMBOLS (CONTINUED)

MTBE	methyl tert-butyl ether
µg/L	micrograms per liter
mg/L	milligrams per liter
MLP	Mobile Launch Platform
MLPV	Mobile Launch Platform/Vehicle Assembly Building
NADC	Natural Attenuation Default Concentration
10xNADC	10 times the Natural Attenuation Default Concentration
NASA	National Aeronautics and Space Administration
NELAP	National Environmental Laboratory Accreditation Program
NFA	No Further Action
O&M	operation and maintenance
OM&M	operation, maintenance, and monitoring
OFW	Outstanding Florida Water
ORP	oxidation reduction potential
%	percent
P&ID	Piping and Instrumentation Diagram
PAH	polycyclic aromatic hydrocarbon
psi	pounds per square inch
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RIS	Remediation Information System
SAP	Sampling and Analysis Plan
SGS	SGS North America, Inc.
STS	Space Transportation System
SOP	standard operating procedure
scfm	standard cubic feet per minute
SWMU	Solid Waste Management Unit

ABBREVIATIONS, ACRONYMS, AND SYMBOLS (CONTINUED)

TRPH	total recoverable petroleum hydrocarbons
TCE	trichloroethene
tDCE	trans-1,2-dichloroethene
UIC	Underground Injection Control
USEPA	U.S. Environmental Protection Agency
VAB	Vehicle Assembly Building
VABRA	Vehicle Assembly Building Reassessment Area
VC	vinyl chloride

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EXECUTIVE SUMMARY

This report presents a summary of the Corrective Measures Implementation (CMI) and Interim Measure (IM) implementation activities that occurred from May 2019 through December 2019 at the Mobile Launch Platform/Vehicle Assembly Building (MLPV) Area, Solid Waste Management Unit 056 (SWMU 056), located at the John F. Kennedy Space Center, Florida.

The following summaries briefly describe four Hot Spot areas identified by historical site investigation activities and remedial actions implemented to date.

- Former Hot Spot 1 was located near the Vehicle Assembly Building (VAB) where trichloroethene (TCE) impacts were previously identified at concentrations greater than 11,000 micrograms per liter (µg/L), which represents 1 percent (%) of literature solubility, and was identified as a source zone during Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) activities and later renamed Hot Spot 1. Former Hot Spot 1 was addressed through the implementation of bioremediation and the area was transitioned to the VAB area Long Term Monitoring (LTM) Program in August 2015. To mitigate discharge of the dissolved plume that migrated from Former Hot Spot 1 to adjacent wetlands, a biosparge barrier system was installed as a CMI to treat groundwater immediately upgradient of the wetland where vinyl chloride (VC) concentrations were greater than 100 µg/L (NASA, August 2019). The barrier has been operating since April 2005 and was expanded in February 2016. Details of the biosparge system operation, maintenance, and monitoring (OM&M) are included in this report. Active remediation within Former Hot Spot 1 is discontinued; however, LTM continues as part of the VAB LTM activities. The next annual VAB LTM event is scheduled for May 2020 and will be reported as relating to the VAB Area; therefore, no additional activities have been reported for the Hot Spot 1 site.
- Hot Spot 2 is located downgradient of the Former Hot Spot 1 area and was defined as the area with cis-1,2-dichloroethene (cDCE) concentrations greater than the Florida Department of Environmental Protection (FDEP) Natural Attenuation Default Concentration (NADC) of 7,000 µg/L and TCE concentrations greater than the NADC of 300 µg/L. Air sparging was implemented in the Hot Spot 2 area in 2012 as an IM (NASA, August 2019). The air sparge system operated until April 2018 and groundwater quality continues to be monitored with interim groundwater sampling. Direct push technology (DPT) groundwater sampling performed in and around the air sparge treatment area, post system shutdown in 2018, to evaluate the air sparge system operation and a possible expansion of the air sparge system indicated the system can remain off. Details of the last air sparge system OM&M and DPT groundwater sampling activities are included in the *2018 CMI and IM Annual Report* prepared by Geosyntec Consultants (Geosyntec) dated August 2019 (NASA, August 2019). This report includes details of the October 2019 semi-annual interim groundwater monitoring (IGM) event.

- Hot Spot 3 is located adjacent to and underneath the western MLP structure and was defined as the area where chlorinated volatile organic compound (CVOC) impacts are greater than 10 times NADCs (10xNADC). Bioremediation and DPT groundwater sampling were implemented as an IM in this area. A summary of the activities associated with the Hot Spot 3 Area Bioremediation IM is included in the *2018 CMI and IM Annual Report* (NASA, August 2019). The Western MLP Park site has been leased to a commercial partner and access to the area during the lease is restricted (area includes the Hot Spot 3 Bioremediation IM Area). Therefore, the Hot Spot 3 Bioremediation IM area monitoring wells (VABRA-MW0001 through VABRA-MW00005 and VABRA-IW0065 through VABRA-IW0075) were abandoned in April 2019. No additional work is planned for this site until the lease is terminated or access is reestablished.
- The dissolved plume from Hot Spot 3 is located near an Outstanding Florida Water (OFW) and the toe of the dissolved plume (referred to as the Hot Spot 3 OFW area) is in IGM (NASA, August 2019). The details of the October 2019 semi-annual IGM activities at the Hot Spot 3 OFW area are included in this report. Based on data from this reporting period, IGM is recommended to be performed annually.
- Hot Spot 4 is located near the northeast corner of the eastern MLP structure and was defined as the area with 2-methylnaphthalene concentrations in groundwater above the NADC of 280 μg/L and where light non-aqueous phase liquid (LNAPL) was identified in one monitoring well (VABRA-MW0010). IGM is performed annually and a passive skimmer was installed in VABRA-MW0010 to recover LNAPL until the future of the MLP structure was determined (NASA, August 2019). Monthly inspection of the passive skimmer indicated LNAPL was no longer present or detected with an in-well probe since April 2017. May 2018 IGM data indicated contaminant concentrations from monitoring well VABRA-MW0010 were below the GCTL; therefore, measurement of LNAPL was discontinued in September 2018. In a letter dated January 30, 2020, FDEP approved removal of the LNAPL skimmer and abandonment of monitoring wells VABRA-MW0007 through VABRA-MW0009. Additional data are needed from VABRA-MW0010 to comply with No Further Action (NFA) criteria when the remainder of SWMU 056 achieves closure requirements.

OM&M activities associated with the biosparge barrier system are provided in this report for May through December 2019. Biosparge barrier system OM&M activities included weekly telemetric monitoring of the sparge system, collection of operational readings from the sparge system, performance of sparge system maintenance, collection of operational readings from biosparge wells, and performance monitoring well sampling. Additional site visits were performed to troubleshoot the compressor and replace or repair system parts. Results from the biosparge system OM&M activities indicated the following:

- Biosparge system operated 81.6%.
- The compressor motor needs repair.
- Concentrations of CVOCs downgradient of the barrier have decreased.
- Biosparge barrier is sustaining aerobic conditions.

Groundwater elevations were collected during the 2019 IGM activities. Sampling events for MLPV IGM are conducted seasonally during the dry and wet seasons (May and September). Monitoring locations in the MLPV IGM program fall within semi-annual, annual, or biennial sampling frequencies based on historical trends. It should be noted that due to contract transitions, 2019 dry season activities were conducted during October and November 2019, while wet season activities for 2020 resumed in March 2020.

The sampling frequencies for the MLPV areas are as follows:

- Biosparge Area: Semi-annually
- Hot Spot 2 (Air Sparge Area): Semi-annually
- Hot Spot 3 (OFW): Annually during the dry season (September)
- VAB area LTM: Biennially during the wet season (May)

The path forward for each MLPV area is summarized below:

- Biosparge Barrier: Continue operation of the biosparge barrier system, which includes weekly telemetric readings, monthly operation and maintenance activities, semi-annual biosparge well cleanouts (as needed), and semi-annual performance monitoring for CVOCs.
- Air Sparge: The air sparge system for the Hot Spot 2 area will remain off and the area will be monitored using IGM. A path forward for the area will be evaluated in the future.
- Hot Spot 3 Bioremediation IM area: After site access restrictions are removed, conduct DPT groundwater sampling to evaluate the CVOC concentrations present and evaluate monitoring well installation and/or the preparation of a Bioremediation Implementation Work Plan Addendum.
- Hot Spot 3 (OFW): Continue IGM; however, transition sampling frequency from semi-annual to annually.
- Hot Spot 4: FDEP approved removal of the LNAPL skimmer and abandonment of monitoring wells MW0007, MW0008, and MW0009 that were scheduled for completion in 2020. Monitoring well MW0010 will remain in active status for confirmation sampling during SMWU closure. NFA status can be achieved when SWMU 056 meets closure criteria.
- VAB Area: LTM activities and analytical results will be included in the next reporting period.

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1.0 INTRODUCTION

1.1 OVERVIEW

The National Aeronautics and Space Administration (NASA), through its Environmental Assurance Branch, is managing cleanup of four sites in the Mobile Launch Platform (MLP)/Vehicle Assembly Area (MLPV) of Kennedy Space Center (KSC), Florida. The MLPV Area has been designated Solid Waste Management Unit Number 056 (SWMU 056) under KSC's Resource Conservation and Recovery Action (RCRA) Corrective Action Program.

AECOM Technical Services, Inc. (AECOM) has prepared this report and completed the referenced site activities for NASA under Contract No. 80KSC019D0010, Task Order No. 80KSC019F0075. The Advanced Data Package (ADP), presented in preparation for this report, received KSC Remediation Team (KSCRT) approval at the February 6, 2020 KSCRT meeting. The February 2020 ADP is provided as **Appendix A** and meeting minutes are included in **Appendix B.** This report presents the activities, findings, and recommendations for interim groundwater monitoring (IGM) and biosparge barrier system operation, from May through December 2019, following the transition of remediation consultants from Geosyntec Consultants, Inc. (Geosyntec) to AECOM

1.2 SITE LOCATION

KSC is located on the east-central Atlantic Coast of Florida in the northern portion of Merritt Island, between the Indian River and Banana River Lagoons in Brevard County (**Figure 1-1**). The MLPV Area is located within KSC in Sections 7, 8, 17, and 18 of Township 22 South, Range 37 East, as shown on the Orsino, Florida Quadrangle map (United States Geological Survey 1976; **Figure 1-2**).

The MLPV facilities were originally built to support the Apollo/Saturn V vehicle assembly and were later modified (1975) to support Space Transportation System (STS) shuttle missions. The MLP area was used to repair post launch corrosion and/or blast damage on the launch platforms prior to reuse. The Vehicle Assembly Building (VAB) was used to stack and prepare the space vehicles prior to launch (NASA, August 2019).

1.3 BACKGROUND

During the RCRA Facility Investigation (RFI) and pre-Corrective Measures Design (CMD) activities, chlorinated volatile organic compound (CVOC) groundwater impacts encompassing an area of approximately 115 acres were delineated (NASA, August 2000; September 2003). In addition, a trichloroethene (TCE) source area was identified (within the CVOC impacted area) beneath the parking lot northeast of the VAB, which was associated with an anecdotal TCE spill (approximately 4,000 gallons) that occurred in 1966. A CMD presented a multicomponent remedial strategy developed for the source area and the 115-acre CVOC plume (NASA, June 2004).

Additional assessment that occurred at the site included a reassessment of the VAB area that was commissioned by Ground Systems Development & Operations following the completion of the STS Program. The reassessment activities were performed throughout the VAB Reassessment Area (VABRA) from 2012 through 2014. These activities evaluated the absence or presence of groundwater and soil impacts associated with electrical equipment (NASA, June 2015). Through the various site investigations, four Hot Spot areas were identified (Hot Spots 1 through Hot Spot 4; **Figure 1-3**). Sections 1.3.1 through 1.3.4 provide details regarding the impacts identified in each Hot Spot area and a brief description of remedial actions implemented.

1.3.1 Hot Spot 1

Former Hot Spot 1 is the area near the VAB where TCE impacts were identified at concentrations greater than 11,000 micrograms per liter (µg/L), which represents 1 percent (%) of literature solubility, and was identified as a source zone during RFI activities and later renamed Hot Spot 1. The CMD to address the 115-acre CVOC plume and Hot Spot 1 included:

- Long term monitoring (LTM) of the low concentration dissolved plume;
- Biosparging with air to promote the in situ aerobic bioremediation of vinyl chloride (VC) to mitigate the potential discharge of the associated high concentration VC plume (concentrations greater than the Florida Department of Environmental Protection [FDEP] Natural Attenuation Default Concentration [NADC] of 100 µg/L) to adjacent wetland areas (surface water); and
- Enhanced bioremediation of the source area (Hot Spot 1).

LTM of the low concentration dissolved plume has been conducted since May 2005 and involves the sampling of monitoring wells throughout the VAB area. The results of the LTM sampling and data evaluation are submitted under a separate cover. The most recent LTM report was the 2018 Biennial Groundwater Monitoring Results report (NASA, March 2019). Details of VAB LTM activities will be incorporated into the next MLPV report following the 2020 sampling event.

The biosparge barrier has been operating since April 2005 and was expanded in February 2016 (NASA, May 2016b). Monthly operation and maintenance (O&M) has been performed on the biosparge barrier, along with scheduled groundwater sampling of performance monitoring wells. In the 2018 CMI and IM Annual Report (NASA, August 2019), it was recommended to continue operation of the biosparge system and performance monitoring as the biosparge barrier was effectively mitigating contaminant migration to the adjacent wetlands. Details of the recommended actions from the 2018 CMI and IM Annual Report (NASA, August 2019) are included in this report.

Enhanced bioremediation of the TCE source area was implemented from August 2006 until March 2009 using ethyl lactate as an electron donor. The Corrective Action Objective (CAO) was achieved and documentation of the enhanced bioremediation activities and results are presented in the Biotreatability Study Implementation Annual Reports (NASA, February 2008 and NASA, May 2009). IGM (which was previously referred to as interim LTM) of the TCE source zone was recommended to the KSCRT and was implemented following KSCRT approval in 2009. IGM was

terminated in 2015 and two of the monitoring wells in the former source area (SAMW0001 and SAMW0003) were transitioned into the VAB LTM program (documented in the 2015 CMI and IM Annual Report [NASA, November 2015]).

1.3.2 Hot Spot 2

Following achievement of the CAO within Hot Spot 1, supplemental assessment activities occurred within the area downgradient of the Former Hot Spot 1 to refine the understanding of the CVOC mass distribution of the dissolved plume (primary plume swath) that extended from the Former Hot Spot 1 toward the biosparge barrier. During supplemental assessment activities, investigations followed the KSCRT multi-step Engineering Evaluation (EE) Process (NASA, October 2012). During this process TCE and cis-1,2-dichloroethene (cDCE) were delineated to their respective FDEP Groundwater Cleanup Target Levels (GCTLs) and VC was delineated to its NADC. The area of the primary plume swath with TCE concentrations greater than the NADC of 300 µg/L and cDCE concentrations greater than 7,000 µg/L (10 times the NADC of 700 µg/L [10xNADC]) was designated as Hot Spot 2.

An air sparge IM was implemented in Hot Spot 2 and the air sparge system was installed in 2012, with system startup in August 2012 (NASA, January 2013). The existing remediation system used for operation of the biosparge barrier was modified to add two legs to supply the Hot Spot 2 air sparge wells, so that both biosparge and air sparge operations could run off the same compressor. Additional details on the EE Process for Hot Spot 2 and air sparge system implementation are provided in the following documents:

- Site Characterization EE ADP (formerly referred to as a Step 1 EE) (NASA, February 2011);
- Remedial Alternative Evaluation EE ADP (formerly referred to as a Step 2 EE) (NASA, May 2011);
- 2011 CMI Report: Summary of Interim LTM, Supplemental Assessment, and Biosparge System O&M (NASA, August 2011);
- Air Sparge IM Work Plan EE ADP (formerly referred to as a Step 3 EE) (NASA, October 2011);
- Air Sparge IM Work Plan (NASA, November 2011);
- Air Sparge Construction Completion Report (CCR) ADP (formerly referred to as a Step 4a EE) (NASA, October 2011);
- Air Sparge System CCR (NASA, January 2013); and
- Air Sparge System and Biosparge System Re-Start and Initial Performance Monitoring (Re-Start through Month 6) ADP (NASA, March 2014).

As documented in the 2013 CMI and IM report (NASA, June 2013), the compressor for the sparge system, which delivered air to both the biosparge and the air sparge well networks, reached the end of its useful life in September 2012; and the sparge system was shut down. The sparge system compressor was replaced in May 2013, and operation of the biosparge and air sparge systems

began in June and July 2013, respectively, following troubleshooting activities. System restart after the compressor replacement and results from the following three years of operation are documented in the 2014 CMI and IM Annual Report (NASA, September 2014) and associated ADP (NASA, August 2014), the 2015 CMI and IM Annual Report (NASA, November 2015) and associated ADP (NASA, August 2015), the 2016 CMI and IM Annual Report (NASA, November 2016) and the associated ADP (NASA, September 2016).

The sparge system again ceased operations in May 2016 due to compressor failure. The compressor was unable to be successfully repaired by a certified manufacturer technician; therefore, a new compressor was provided and successfully restarted in May 2017. After one year of operation, the Hot Spot 2 air sparge system was shut down in April 2018 to evaluate effectiveness. Post shutdown performance monitoring events in May 2018 and March 2019 indicated limited rebound of CVOC concentrations occurred in the treatment area, an overall reduction in NADC plume footprint, and no detections under the treatment area (55 to 65 feet [ft] at MLPV-IW0030).

In addition to post shutdown groundwater monitoring, results from the direct push technology (DPT) groundwater sampling events (February and June 2018) within and outside the air sparge treatment area supported the evaluation and decision to shut down the Hot Spot 2 air sparge system. Details of these activities are summarized in the 2018 CMI and IM Annual Report (NASA, August 2019) and associated ADP (NASA, June 2019). Based on the analyses, it was recommended for the air sparge system to remain off and groundwater monitoring to continue for one year. Following one year of monitoring, the sampling frequency and locations are to be evaluated, as well as a statistical analysis performed to evaluate trends post-air sparge system shutdown. This report summarized one semi-annual sampling event post-air sparge system shutdown.

1.3.3 Hot Spot 3 and Hot Spot 3 OFW Area

During VAB reassessment activities an area with CVOC concentrations greater than 10 times their respective NADCs (10xNADC) was identified adjacent to the western MLP structure (NASA, June 2015). This area (Hot Spot 3) is located partially beneath and south of the western MLP structure and adjacent to the crawler tracks **(Figure 1-3)**. Other groundwater impacts associated with Hot Spot 3 include a TCE source zone (TCE greater than 11,000 µg/L), a High Concentration Plume (HCP; [CVOCs greater than NADCs]), and a Low Concentration Plume (LCP; [CVOCs greater than GCTLs]). The activities in this area followed the KSCRT multi-step EE Process and details are provided in the following documents:

- Site Characterization EE ADP (formerly referred to as Step 1 EE) (NASA, April 2015);
- Remedial Alternative Evaluation EE ADP (formerly referred to as Step 2 EE) (NASA, January 2016);
- Hot Spot 3 Bioremediation IM Work Plan (NASA, May 2016a);
- Hot Spot 3 Bioremediation Implementation Work Plan (NASA, June 2017);
- Hot Spot 3 Bioremediation CCR (NASA, February 2018); and
- Hot Spot 3 Bioremediation IM Annual Report (NASA, December 2018).

In the Hot Spot 3 Bioremediation IM Annual Report, it was recommended to: (i) perform semiannual performance monitoring; (ii) discontinue Underground Injection Control (UIC) monitoring; (iii) complete a DPT groundwater sampling event within the bioremediation treatment area to evaluate CVOC concentration changes since the pre-IM DPT sampling event; and (iv) utilize performance monitoring results and DPT groundwater sampling results to develop a Bioremediation Implementation Work Plan Addendum for additional injection activities. Details of the Hot Spot 3 Bioremediation IM activities from October 2018 through April 2019 are included in the 2018 CMI and IM Annual Report (NASA, August 2019). Analytical data following bioremediation activities indicated an approximate 80% to 100% mass reduction of CVOC down to 30 ft below land surface (bls), aquifer conditions are favorable to microbial reductive dechlorination in both the shallow and deep treatment areas, and microbial reduction of CVOC was occurring. Due to the access restrictions imposed from a commercial leasing partner in 2019, the site monitoring wells were abandoned. Installation of replacement monitoring wells and additional DPT sampling will occur when the lease is terminated, or access is granted, to evaluate the need for additional bioremediation IM activities.

1.3.3.1 Hot Spot 3 OFW Area

In October 2015, two monitoring wells (MW0011 and MW0012) were installed northwest of the railroad tracks to evaluate the extent of the dissolved VC plume identified adjacent to the Outstanding Florida Water (OFW) that is the portion of the LCP downgradient from the Hot Spot 3 area. Groundwater samples collected from those monitoring wells indicated that VC concentrations were greater than the NADC and/or the GCTL. Subsequent sampling events completed in January and July 2016 indicated that VC concentrations in groundwater samples collected from both monitoring wells were less than the NADC, but were greater than the GCTL. Due to the fluctuating VC concentrations, an investigation of the area (using DPT groundwater sampling) was performed to evaluate if an additional source area was present. No additional source areas were identified during this investigation. The results of the investigation and the delineation of the 1 µg/L VC plume were presented in the Hot Spot 3 OFW Site Characterization ADP (NASA, January 2018). In the Hot Spot 3 OFW Site Characterization ADP, KSCRT consensus was obtained to transition the area to IGM with semi-annual sampling and to install two additional monitoring wells in the area. Monitoring wells VABRA-MW0013 and VABRA-MW0014 were installed on September 13, 2018. DPT groundwater sampling was performed in March 2019 at four historical DPT locations (DPT0578, DPT0579, DPT0597, and DPT0601) to evaluate downgradient VC concentrations in the OFW area. Additional details of the monitoring well installation and the DPT IGM sampling are provided in the 2018 CMI and IM Annual Report (NASA, August 2019).

1.3.4 Hot Spot 4

During the VAB reassessment activities, light non-aqueous phase liquid (LNAPL) was identified in samples collected from monitoring well VABRA-MW0006, which was located near the eastern MLP structure (**Figure 1-3**). Hot Spot 4 is defined as the area around monitoring well VABRA-MW0006 where the concentration of 2-methylnaphthalene was greater than its NADC. Other groundwater contaminants of concern (COC) identified within Hot Spot 4 included polycyclic aromatic hydrocarbons (PAHs) 1-methlynaphthalene and naphthalene at concentrations greater

than their respective GCTLs. Details of the Hot Spot 4 delineation activities were presented in the Site Characterization EE ADP (NASA, April 2015) and IGM was selected to monitor the stability of the LNAPL and groundwater concentrations until the future of the MLP structure is known.

Monitoring well VABRA-MW006 was over-drilled with a larger diameter well (VABRA-MW0010) to allow installation of a passive LNAPL skimmer in November 2015. A passive remedial action was selected because the area of impacts is in the immediate vicinity of the MLP structure construction activities and implementing an active remedial action for the very limited area of LNAPL was not feasible at the time due to site constraints. Following recommendations from the 2017 CMI and IM Annual Report (NASA, March 2018), the skimmer was monitored monthly and no LNAPL was collected. An oil-water interface probe did not detect LNAPL greater than 0.01 ft in monitoring wells VABRA-MW0007 through VABRA-MW0009 and only a sheen was identified in VABRA-MW0010; therefore, a groundwater sample was collected from monitoring well VABRA-MW0010 in May 2018. The analytical results indicated that PAHs, benzene, toluene, ethyl benzene, and xylene (BTEX), methyl tert-butyl ether (MTBE), and total recoverable petroleum hydrocarbons (TRPH) concentrations were not detected. Details of the associated activities are provided in the 2018 CMI and IM Annual Report (NASA, August 2019), which recommended the skimmer be removed and monitoring wells be abandoned. An NFA for Hot Spot 4 was requested and no additional work has been performed to date.

1.3.5 Vehicle Assembly Building Area

The VAB area is one of five areas (Fire Station #6 Area [SWMU No. 106], Former Development and Testing Laboratory Area [SWMU No. 075], C-5 Electrical Substation Area [SWMU No. 066], Shuttle Flight Operations Contract Generator Maintenance Facility Area [SWMU No. 081], and the VAB Area [multiple SWMUs]); historically included in the VAB LTM Program. The VAB area was removed from the VAB LTM Program and added to LTM activities associated with MLPV (SWMU 056). Sampling frequency for LTM in the VAB area remains biennial. Results from the previous (2018) sampling event are detailed in the VAB 2018 Biennial LTM report (NASA, March 2019. The next sampling event is scheduled for May 2020; thus, no activities were performed at this site during the reporting period.

1.4 PURPOSE

The purpose of this report is to provide an updated status on CMI and IM activities by summarizing the field activities and presenting the results associated with:

(i) CMI activities related to the biosparge barrier (May through December 2019);

(ii) IM activities associated with the Hot Spot 2 area (Air Sparge Area, May through December 2019); and

(iii) IGM activities associated with the Hot Spot 3 OFW area (May through December 2019).

2.0 REMEDIAL ACTION FIELD ACTIVITIES

2.1 OVERVIEW

One remedial action effort, the biosparge system, continued during the reporting period (May through December 2019). As reported in Section 1.0, three additional remedial action efforts have been implemented at this site (Air Sparge System, bioremediation, and passive LNAPL skimmer), and are complete or no longer active. Remedial action (bioremediation) within Former Hot Spot 1 (the former source area) was implemented through the CMD and is complete (NASA, February 2008; NASA, May 2009). O&M logs for the reporting period are provided in **Appendix C**.

2.2 BIOSPARGE SYSTEM OPERATION AND MAINTENANCE

O&M activities associated with the biosparge barrier are reported from May through December 2019. However, it should be noted that the air compressor failed on November 28, 2019 and the system was shut down. System repairs are in progress. The biosparge barrier layout is presented on **Figure 2-1**. Biosparge operational readings were collected monthly during active remediation to document biosparge system operation and confirm that the biosparge barrier was operating properly. The biosparge barrier operational readings collected included the parameters listed below:

- Flow at each biosparge well (collected at each individual wellhead);
- Pressure at each biosparge well (collected at each individual wellhead); and
- Dissolved oxygen (DO), temperature, and oxygen reduction potential (ORP) measurements at two piezometers (ASPZ0001R and ASPZ0002) and six monitoring wells (ASMW0001 through ASMW0006).

Cleanout of biosparge wells is performed semi-annually to remove silt and very fine sand that accumulates in the biosparge well screens. During a biosparge well cleanout performed on September 13, 2019, the eastern biosparge wells (ASW01 through ASW25) were cleaned out using compressed air, and the total depth of the biosparge wells were measured before and after cleaning. At the western biosparge wells (expansion biosparge wells, BSW26 through BSW31), only total depth measurements are collected because sediment is not expected with the type of screens used (40-micron SCHUMASOIL© screens). An average of 0.21 ft of sediment was removed from the eastern biosparge wells during the September 2019 event (**Appendix C**, Biosparge Well Cleanouts). AECOM notes that because the system has been inactive since December 2019, an additional cleanout in March 2020 was not performed. AECOM will perform a cleanout as needed once the biosparge system is returned to normal operation following compressor repair, reinstallation, and restart.

2.2.1 Telemetric Monitoring

Telemetric monitoring of the sparge system is performed weekly to confirm the sparge system is operating properly, and the results of the telemetric monitoring are detailed in **Table 2-1**. During the reporting period, the biosparge system was operational 1,228.8 out of 1,506 hours (approximately 81.6 %). The dates and reasons for loss of operation are summarized below:

- August 30, 2019 to September 6, 2019: The sparge system was shut down in preparation for Hurricane Dorian.
- October 28, 2019 to November 4, 2019: The sparge system was shut down for the semi-annual air sparge and biosparge performance monitoring event and restarted upon completion of the sampling event.
- November 28, 2019 to December 30, 2019: The air compressor failed on November 28, 2019 and remained shut down through the end of the reporting period.

While operational, the telemetry system operated as expected, with the exception of some connectivity issues in September 2019 and subsequent issues with the pressure transmitter in November 2019. The telemetry system's wireless modem was replaced on October 16, 2019, and full connectivity was restored. Following the November 4, 2019 system maintenance and O&M visit, the pressure transmitter was identified as no longer functioning. The transmitter was replaced on November 26, 2019. Following restart of the system, the pressure transmitter data were not being sent wirelessly, eliminating the ability to remotely determine whether the system was operating. The issue with the telemetry system was resolved on December 30, 2019. Upon arrival for the December 30, 2019 O&M visit, the biosparge compressor was seized and inoperable. The biosparge system remains off while repairs are in progress.

2.2.2 Operational Data

A summary of the sparge system operational readings is provided in **Table 2-2** and a piping and instrumentation diagram (P&ID) for the sparge system (as of November 2019) is presented on **Figure 2-2**.

The summary of the sparge system operational parameters during biosparge operation are presented for nine events from May through December 2019 for Legs 1, 2, and 5. The operational parameter summary is provided below:

- Leg 1:
  - Air flow rates ranged from 17.0 to 24.6 standard cubic feet per minute (scfm) with an average of 21.3 scfm.
  - Pressures ranged from 22.0 to 25.0 pounds per square inch (psi) with an average of 22.7 psi.
- Leg 2:
  - Air flow rates ranged from 17.0 to 21.0 scfm, with an average of 19.1 scfm.
  - Pressures ranged from 23.0 to 25.0 psi, with an average of 24.1 psi.

- Leg 5:
  - Air flow rates ranged from 17.0 to 24.0 scfm, with an average of 22.0 scfm.
  - Pressures ranged from 21.5 to 23.0 psi, with an average of 21.7 psi.

2.2.3 Wellhead Pressures and Flow Rates

The pressures and air flow rates collected at the biosparge wellheads are provided in **Table 2-3**, and a summary of the May through December 2019 air flow rates and pressures are provided below:

- Air flow rates in the original biosparge barrier wells (Legs 1 and 2) ranged from 1.7 to 14.6 scfm (average of 3.6 scfm) and the pressures ranged from 2.0 to 21.0 psi (average of 18.5 psi).
- Air flow rates in the expansion biosparge barrier wells (Leg 5) ranged from 2.2 to 4.3 scfm (average of 3.5 scfm) and the pressures ranged from 19.0 to 23.5 psi (average of 20.8 psi).

The average flow rates at biosparge wells in Legs 1, 2, and 5 were within the design flow rate of 3 to 5 scfm.

2.2.4 Dissolved Oxygen Barrier Results

The goal of the biosparge barrier is to create a zone of elevated DO in the groundwater surrounding the biosparge barrier, enhancing the aerobic degradation of VC. To assess the extent of the zone of elevated DO, concentrations were measured in and around the existing biosparge barrier at the two piezometers (ASPZ0001R and ASPZ0002, in-line with the existing biosparge barrier) and six monitoring wells (ASMW0001 through ASMW0006, upgradient or downgradient). The DO measurements for the reporting period are presented in **Table 2-4** and are summarized below.

- The average measured DO concentrations were 2.04 milligrams per liter (mg/L) at piezometer ASPZ0001R and 3.55 mg/L at piezometer ASPZ0002.
- The average DO concentration measured at the monitoring wells (ASMW0001 through ASMW0006) was 2.81 mg/L.

The measured DO concentrations suggest that an aerobic zone exists around the biosparge barrier and extends approximately 40 to 50 ft from the biosparge barrier (the monitoring wells are approximately 40 to 50 ft from the biosparge barrier) the background DO is approximately 0.5 mg/L based on data from upgradient monitoring wells MLPV-IW0057 through MLPV-IW0059.

Based on DO concentrations in monitoring wells surrounding the biosparge barrier, the biosparge barrier appears to be meeting the objective of providing an aerobic groundwater environment for the treatment of VC.

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3.0 PERFORMANCE AND INTERIM GROUNDWATER MONITORING ACTIVITIES AND RESULTS

On October 31 and November 1, 2019, semi-annual groundwater sampling was performed at the Biosparge Area, Hot Spot 2 (Air Sparge Area), and Hot Spot 3 (OFW). The VAB area, which is now part of the MLPV monitoring program, was not included, as it is sampled biennially. Monitoring well purging and sampling activities were conducted in general accordance with FDEP Standard Operating Procedures (SOPs), (FDEP, May 2005), the KSC Sampling and Analysis Plan (SAP), (NASA, August 2017) and the FDEP Petroleum Storage Systems Petroleum Cleanup Program SOPs, (FDEP, April 2018), where applicable. During monitoring well purging, the following geochemical parameters were recorded at regular intervals: pH, temperature, DO, conductivity, ORP, salinity, and turbidity. Groundwater samples were submitted to a fixed-based laboratory, SGS North America, Inc. (SGS), for analysis under chain-of-custody protocol. SGS is certified within the state of Florida under the National Environmental Laboratory Accreditation Program (NELAP). Investigation derived waste (IDW) from field activities included purge water, which was contained in properly labeled 55-gallon drums. The drums were stored on NASA-provided spill pallets and secured with cargo straps to be properly disposed of by NASA at a later date.

Field notes are provided in **Appendix D**. Groundwater sampling logs are provided in **Appendix E**. Groundwater level measurements were recorded from site wells prior to sampling and are summarized in **Table 3-1**. The water level measurement log is provided in **Appendix F**. Groundwater analytical and geochemical results are summarized in **Tables 3-2** through **3-4** and **Tables 3-5** through **3-7**, respectively. Laboratory analytical reports are provided in **Appendix G**. Data were uploaded to KSC's Remediation Information System (RIS) upon receipt. RIS completion tickets are provided in **Appendix H**.

3.1 BIOSPARGE AREA PERFORMANCE MONITORING

On October 31 and November 1, 2019, a network of 12 semi-annual performance monitoring wells, MLPV-IW0057, MLPV-IW0058, MLPV-IW0059, MLPV-IW0060, MLPV-ASMW0004, MLPV-ASMW000S, MLPV-ASMW0006, MLPV-IW0031, MLPV-IW0061, MLPV-IW0062, MLPV-IW0063, and MLPV-IW0064, were sampled and analyzed for CVOCs using U.S. Environmental Protection Agency (USEPA) Method 8260B by a fixed-base laboratory. Note that the biosparge system was shut down 72 hours prior to sampling. Analytical results are summarized by depth and segment in the subsections below. Groundwater analytical results for the biosparge system area are illustrated on **Figures 3-1** and **3-2**. Trend charts are provided in **Appendix I**.

3.1.1 25 to 35 ft bls Sampling Interval Results

Laboratory analytical results indicate CVOCs concentrations remained less than GCTLs in MLPV-IW0031.).

3.1.2 35 to 40 ft bls Sampling Interval Results

Laboratory analytical results indicate CVOC concentrations were less than GCTLs in MLPV-ASMW004, MLPV-ASMW005, MLPV-ASMW006, and MLPV-IW0063. cDCE, trans-1,2-dichloroethene (tDCE), and TCE are less than GCTLs in MLPV-IW0063. Exceedances were as follows:

- GCTL: VC in MLPV-IW0061 (20.6 µg/L)
- NADC: No exceedances

3.1.3 40 to 50 ft bls Sampling Interval Results

Laboratory analytical results indicate CVOC concentrations were less than GCTLs in MLPV-IW0060 and MLPV-IW0064. cDCE, tDCE, and TCE were less than GCTLs in MLPV-IW0057, MLPV-IW0058, MLPV-IW0059, and MLPV-IW0062, with overall reduction of CVOCs in both MLPV-IW0058 and MLPV-IW0059. Exceedances were as follows:

- GCTL: VC in MLPV-IW0058 (77.1 µg/L) and MLPV-IW0059 (6.9 µg/L)
- NADC: VC in MLPV-IW0057 (920 µg/L) and MLPV-IW0062 (834 µg/L)

3.1.4 Original Biosparge Barrier Overall Results

Monitoring wells upgradient of the barrier, MLPV-IW0057 through MLPV-IW0059, were sampled for evaluating the potential collapse of the cDCE and VC plumes. Results from these wells indicate reduction of CVOC concentrations in MLPV-IW0058 and MLPV-IW0059, specifically VC concentrations, which were less than the NADC. Concentrations of cDCE in MLPV-IW0058 (23.8 µg/L) was less than one-half of the previous concentrations (61 µg/L), and VC remained relatively unchanged at 920 µg/L, greater than the NADC. Remaining contaminants cDCE, tDCE, and TCE were less than GCTLs in each well.

Monitoring wells downgradient of the barrier include MLPV-ASMW0004, MLPV-ASMW0005, MLPV-ASMW0006, and MLPV-IW0031. Concentrations of cDCE, tDCE, and TCE were less than GCTLs in each well.

3.1.5 Biosparge Barrier Expansion Overall Results

Monitoring wells upgradient of the barrier expansion include MLPV-IW0061 and MLPV-IW0062. Results indicate that CVOC concentrations remained relatively unchanged and within the same order of magnitude as the previous sampling event.

Monitoring wells downgradient of the barrier expansion include MLPV-IW0031, MLPV-IW0063, and MLPV-IW0064. CVOC concentrations were less than GCTLs or laboratory method detection limits.

3.2 HOT SPOT 2 (AIR SPARGE) INTERIM GROUNDWATER MONITORING

On October 31, 2019, the semi-annual network of 13 monitoring wells was sampled and analyzed for CVOCs using USEPA Method 8260B by a fixed-base laboratory. The monitoring well network included MLPV-IW00111, MLPV-IW0033, MLPV-IW0034, MLPV-IW0035, MLPV-IW0036, MLPV-IW0037, MLPV-IW0039, MLPV-IW0041, MLPV-IW0043, MLPV-IW0044, MLPV-IW0045, MLPV-SAMW004D, and MLPV-SAMW00041. Four wells, MLPV-IW0032, MLPV-IW0038, MLPV-IW0040, and MLPV-IW0042, were not sampled for this reporting period, since they are sampled annually. Analytical results are summarized by depth and area in the subsections below. Groundwater analytical results for Hot Spot 2 are illustrated on **Figure 3-3**. Trend charts are provided in **Appendix I**.

3.2.1 30 to 40 ft bls Sampling Interval Results

Laboratory analytical results indicate CVOC concentrations were less than GCTLs in MLPV-IW0011I and MLPV-IW0034. Concentrations of cDCE, tDCE, and TCE were less than GCTLs in MLPV-SAMW0004I. Exceedances were as follows:

- GCTL: VC in MLPV-SAMW0004I (15.9 µg/L).
- NADC: No exceedances

3.2.2 40 to 50 ft bls Sampling Interval Results

Laboratory analytical results indicate concentrations of cDCE, tDCE, and TCE were less than GCTLs in MLPV-IW0033, MLPV-IW0035, MLPV-IW0036, MLPV-IW0039, MLPV-IW0041, MLPV-IW0044, MLPV-IW0045, and MLPV-SAMW0004D. Concentrations of tDCE and TCE remained less than GCTLs in MLPV-IW0037, MLPV-IW0039, and MLPV-IW0043. Exceedances were as follows:

- GCTL: VC in MLPV-IW0036 (9.1 µg/L), MLPV-IW0045 (97.2 µg/L), and MLPV-SAMW0004D (2.6 µg/L)

  cDCE in MLPV-IW0037 (135 µg/L), MLPV-IW0039 (198 µg/L), and MLPV-IW0043 (149 µg/L)

- NADC: VC in MLPV-IW0033 (365 µg/L), MLPV-IW0035 (152 µg/L), MLPV-IW0037 (178 µg/L), MLPV-IW0039 (241 µg/L), MLPV-IW0041 (166 µg/L), MLPV-IW0043 (155 µg/L), and MLPV-IW0044 (458 µg/L)

3.2.3 Centerline Results

Eight monitoring wells, MLPV-IW0032, MLPV-IW0033, and MLPV-IW0038 through MLPV-IW0043, are located within the centerline of the Hot Spot 2 area plume and centerline of the air sparge treatment well layout. These wells are sampled to monitor air sparge system performance. Centerline analytical results (excluding annual wells MLPV-IW0032, MLPV-IW0038, MLPV-IW0040, and MLPV-IW0042) indicate the following:

- 30 to 40 ft bls: CVOC concentrations were less than GCTLs or not detected, except for VC in MLPV-IW0038.
- 40 to 50 ft bls: CVOC concentrations were below GCTLs or not detected, except for VC in MLPV-IW0033, MLPV-IW0041, MLPV-IW0039, and MLPV-IW0043. Additionally, concentrations of cDCE exceeded GCTLs in MLPV-IW0039 and MLPV-IW0043.

3.2.4 Perimeter Results

Nine monitoring wells, MLPV-SAMW0004D, MLPV-SAMW0004I, MLPV-IW0011I, MLPV-IW0034 through MLPV-IW0037, MLPV-IW0044, and MLPV-IW0045, are designated perimeter wells located on the periphery of the air sparge system. These wells are sampled to monitor contamination migration. Perimeter analytical results indicate the following:

- 30 to 40 ft bls: CVOC concentrations were less than GCTLs or not detected, except for VC in MLPV-SAMW0004I.
- 40 to 50 ft bls: CVOC concentrations were less than GCTLs or not detected, except for VC in MLPV-IW0035, MLPV-IW0036, MLPV-IW0037, MLPV-IW0044, MLPV-IW0045, and MLPV-SAMW0004D. Additionally, concentrations of cDCE exceeded GCTLs in MLPV-IW0037.

Iso-concentration contours illustrating the overall footprint of the cDCE and VC plumes in the Hot Spot 2 area are provided in **Figures 3-4** through **3-7**.

3.3 HOT SPOT 3 (OFW AREA) INTERIM GROUNDWATER MONITORING

On October 31, 2019, the semi-annual network of four monitoring wells, VABRA-MW0011, VABRA-MW0012, VABRA-MW0013, and VABRA-MW0014, were sampled and analyzed for CVOCs using USEPA Method 8260B by a fixed-base laboratory. Analytical results are summarized by depth in the subsections below. Iso-concentration contours for COC plumes in the Hot Spot 3 (OFW) area are illustrated on **Figure 3-8**. Trend charts are provided in **Appendix I**.

3.3.1 15 to 25 ft bls Sampling Interval Results

Laboratory analytical results indicate CVOC concentrations were less than GCTLs or not detected, with the exception of VC in VABRA-MW0013 (2.6 µg/L).

3.3.2 25 to 30 ft bls Sampling Interval Results

Laboratory analytical results indicate CVOC contaminants were not detected.

4.0 CONCLUSTIONS, RECOMMENDATIONS AND EXIT STRATEGY

4.1 BIOSPARGE AREA

4.1.1 Conclusions

Based on O&M and groundwater sampling activities performed during this reporting period, the following conclusions are provided:

- The biosparge system operated 81.6 % of the time during the reporting period.
- Dissolved oxygen (DO) levels indicate an aerobic zone exists at a distance of 40 to 50 ft from the biosparge barrier.
- Biosparge treatment wells operated within the average flow rate design of 3 to 5 scfm.
- The performance monitoring well network remains adequate to evaluate biosparge barrier performance.
- VC concentrations are decreasing in wells with exceedances and an overall decrease in CVOC has occurred.
- Analytical results indicate the biosparge barrier has been effectively mitigating discharge to the adjacent wetland during this reporting period.
- AECOM will request the BMAP modeling for review if the BMAP does not provide sufficient information to determine outfall locations.

4.1.2 Recommendations

Repair of the compressor for continued operation of the biosparge system is recommended to mitigate potential discharge of VC beyond the biosparge barrier. Following repair, weekly telemetric readings, monthly O&M activities, semi-annual sparge well cleanouts, and biosparge performance monitoring are recommended to continue. The 2020 sampling and analysis plan is provided as **Table 4-1**, with a reduced analyte list to include TCE, cDCE, tDCE, and VC only.

4.1.3 Exit Strategies

The biosparge barrier (biosparge barrier and biosparge barrier expansion) is creating a zone of elevated DO to promote aerobic VC degradation to mitigate potential discharge to the adjacent wetlands. The biosparge barrier will continue to operate until plume collapse is observed (to be evaluated using data from monitoring wells south of Launcher Road) (NASA, August 2019).

4.2 HOT SPOT 2

4.2.1 Conclusions

The air sparge system has remained off since it was shut down in April 2018. Based on groundwater sampling activities performed during this reporting period, the following conclusions are provided:

- The monitoring well network remains adequate to evaluate groundwater quality in the air sparge area.
- Decreasing concentrations were observed at selected locations in comparison to concentrations from DPT investigations performed in 2016 through 2018.
- No or limited change has occurred in overall plume footprint.
- Sampling results from the periphery monitoring wells indicate that dissolved plumes are stable and not expanding since shut down of the air sparge system.

4.2.2 Recommendations

The objective of the air sparge system was to reduce CVOC concentrations to less than their respective NADCs. It is recommended that the air sparge system remain off and continue IGM with an annual sampling event (**Table 4-1**) and reduced analyte list (TCE, cDCE, tDCE, and VC). Following one year of post-system shutdown, the cumulative data will be used to evaluate the sampling frequency, monitoring well network, and statistical trends (plume stability).

4.2.3 Exit Strategy

The exit strategy for this site will need to be modified based on new potential paths forward, as listed in Section 8.2.3 of the 2018 CMI and IM Annual Report (NASA, August 2019), which may be established following the evaluation of forthcoming analytical data.

4.3 HOT SPOT 3 (OFW)

4.3.1 Conclusions

Based on the groundwater analytical data, CVOC concentrations are less than GCTLs in every well except VABRA-MW0013, which also demonstrates decreasing concentrations of VC.

4.3.2 Recommendations

Continued sampling is recommended on a modified frequency from semi-annually to annually (**Table 4-1**) with a reduced analyte list (TCE, cDCE, tDCE, and VC only). When access is reestablished around the MLP structure, additional DPT groundwater sampling is recommended to evaluate the Hot Spot 3 Bioremediation IM area. Based on these results, an evaluation of the

need for replacement monitoring wells, and the need for a Bioremediation Implementation Work Plan Addendum for additional injections of an electron donor should be performed.

4.3.3 Exit Strategy

The source of the VC impacts in the OFW area was treated through the Hot Spot 3 Bioremediation IM (area with CVOC impacts greater than the 10xNADC). It is anticipated that treatment of this area will lead to plume collapse, and that IGM will continue until concentrations are reduced less than GCTLs (NASA, August 2019).

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TABLES

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Table 2-1
Sparge System Telemetric Monitoring
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Date/time system was checked		System Operational Yes/No	Identify Any Operational Abnormalities and Corrective Action Taken to Restore Operation
06/11/2007	8:30	Yes	None
06/22/2007	9:27	Yes	None
06/28/2007	7:49	No	System was shut down from 6/28/07 through 7/30/07 for a mandatory telemetric unit upgrade
08/06/2007	8:08	No	System was down due to electrical phase loss; reset system to restore operation
08/13/2007	8:15	Yes	None
08/20/2007	8:00	Yes	None
08/28/2007	8:07	Yes	None
09/07/2007	8:11	Yes	None
09/15/2007	15:00	Yes	None
09/21/2007	7:30	Yes	None
09/27/2007	9:30	No	Electrical service to system is disabled by contractors doing electrical work in the area
10/05/2007	9:45	No	Electrical service to system is disabled by contractors doing electrical work in the area
10/10/2007	7:40	No	Electrical service to system is disabled by contractors doing electrical work in the area
10/16/2007	8:00	No	Electrical service to system is disabled by contractors doing electrical work in the area
10/23/2007	8:01	No	Electrical service to system is disabled by contractors doing electrical work in the area
10/29/2007	19:00	No	Electrical service to system is disabled by contractors doing electrical work in the area
11/07/2007	20:48	No	Electrical service to system is disabled by contractors doing electrical work in the area
11/14/2007	8:00	Yes	Electrical service to system is disabled by contractors doing electrical work in the area
11/21/2007	10:00	Yes	None
11/27/2007	10:20	Yes	None
12/03/2007	9:48	Yes	None
12/14/2007	8:00	Yes	None
12/17/2007	8:15	Yes	None
12/24/2007	8:00	Yes	None
12/31/2007	8:20	Yes	None
01/12/2008	17:44	Yes	None
01/19/2008	22:00	Yes	None
01/25/2008	8:30	Yes	None
02/01/2008	8:25	Yes	None
02/04/2008	8:30	Yes	None
02/11/2008	7:30	Yes	None
02/18/2008	8:45	Yes	None
02/29/2008	8:00	Yes	None
03/05/2008	21:00	Yes	None
03/10/2008	12:23	Yes	None
03/21/2008	8:45	Yes	None
03/26/2008	8:30	Yes	None
04/02/2008	20:00	Yes	None
04/12/2008	15:00	Yes	None
04/17/2008	18:00	Yes	None

Sparge System Telemetric Monitoring
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Date/time system was checked		System Operational Yes/No	Identify Any Operational Abnormalities and Corrective Action Taken to Restore Operation
04/26/2008	14:30	Yes	None
05/02/2008	19:00	Yes	None
03/26/2008	8:30	Yes	None
04/02/2008	20:00	Yes	None
04/12/2008	15:00	Yes	None
04/17/2008	18:00	Yes	None
04/26/2008	14:30	Yes	None
05/02/2008	19:00	Yes	None
05/05/2008	21:00	Yes	None
05/16/2008	8:30	Yes	None
05/20/2008	17:35	Yes	None
05/30/2008	12:10	Yes	None
06/07/2008	9:45	Yes	None
06/09/2008	20:25	Yes	None
06/18/2008	8:00	Yes	None
06/27/2008	18:00	No	System was down due to electrical phase loss; power was restored on 1 July 2008
07/04/2008	19:00	Yes	None
07/11/2008	16:30	Yes	None
07/20/2008	17:30	Yes	None
08/04/2008	8:00	Yes	None
08/11/2008	8:00	Yes	None
08/18/2008	8:00	No	System shut down due to Tropical Storm Fay; system restarted on 20 August 2008
08/26/2008	8:57	Yes	None
09/06/2008	12:00	Yes	None
09/10/2008	9:00	Yes	None
09/17/2008	8:00	Yes	None
09/17/2008	14:42	Yes	None
09/22/2008	9:17	Yes	None
09/29/2008	10:05	Yes	System off to allow for cleaning of the air sparge well - system was turned back on 10 October 2008
10/15/2008	8:22	Yes	None
10/22/2008	9:36	Yes	None
10/30/2008	12:58	Yes	None
11/07/2008	9:16	Yes	None
11/14/2008	9:20	Yes	None
11/21/2008	10:44	Yes	None
11/27/2008	9:14	Yes	None
12/05/2008	9:55	Yes	None
12/12/2008	9:41	Yes	None
12/19/2008	8:26	Yes	None
12/24/2008	10:51	Yes	None

Sparge System Telemetric Monitoring
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Date/time system was checked		System Operational Yes/No	Identify Any Operational Abnormalities and Corrective Action Taken to Restore Operation
12/30/2008	9:22	Yes	None
01/09/2009	8:45	Yes	None
01/16/2009	9:29	Yes	None
01/23/2009	1:55	Yes	None
01/30/2009	3:45	Yes	None
02/06/2009	9:12	Yes	None
02/13/2009	11:52	Yes	None
02/20/2009	8:45	Yes	None
02/27/2009	14:12	Yes	None
03/06/2009	13:51	Yes	None
03/10/2009	8:44	Yes	None
03/18/2009	13:45	Yes	None
03/27/2009	17:03	Yes	None
04/03/2009	16:00	Yes	Power turned off for oil change, power turned back on after completion
04/10/2009	10:00	No	3 to 13 April System Power, but blower was non-functioning
04/17/2009	10:42	Yes	Blower repaired 13 April at 10:30a.m. - system is operational and functional
04/24/2009	17:05	Yes	None
05/29/2009	11:00	Yes	None
06/01/2009	16:16	Yes	None
06/08/2009	8:00	Yes	None
06/15/2009	18:30	Yes	None
06/22/2009	9:15	Yes	None
06/29/2009	9:00	Yes	None
07/03/2009	9:00	Yes	System functioning normally according to telemetry, but compressor not turning on (determined on 28 July)
07/10/2009	10:00	Yes	
07/17/2009	9:30	Yes	
07/24/2009	10:00	Yes	
07/28/2009	15:00	No	Onsite to read electric meter and system not operational, determined voltage controller malfunction (will be replaced), turned system off (appears system has not been operational since power outage on 1 July)
08/06/2009	10:00	Yes	On site, replaced voltage controller, system operational, verified the sparge transmitter is malfunctioning, ordered replacement
08/12/2009	10:15	Yes	On site for O&M, system operational
08/21/2009	11:55	Yes	None
08/28/2009	0:00	Yes	None
09/04/2009	10:00	Yes	On site to clean out sparge wells, system operational
09/10/2009	8:15	Yes	None
09/22/2009	7:52	Yes	power outage reported on 9/14 - had to reset system to make operational today
09/30/2009	15:16	Yes	None
10/06/2009	9:44	Yes	on site and checked system
10/14/2009	14:41	Yes	None
10/15/2009	10:00	No	system shut-down to allow DPT groundwater sampling near biosparge wall; system turned back on ~1600

Sparge System Telemetric Monitoring
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Date/time system was checked		System Operational Yes/No	Identify Any Operational Abnormalities and Corrective Action Taken to Restore Operation
10/21/2009	16:30	Yes	sparge pressure status listed as not reported; Dave Sizemore to site 10/22 verified system operating properly and removed/inspected pressure transmitter; sparge pressure transmission restored
10/28/2009	9:05	Yes	None
11/03/2009	12:03	Yes	system pressure = 26.6 psi
11/13/2009	15:33	Yes	system pressure = 26.6 psi
11/18/2009	15:44	Yes	system pressure = 26.7 psi
11/24/2009	11:23	Yes	system pressure = 27.1 psi
12/07/2009	15:05	Yes	system pressure = NR
12/18/2009	6:13	Yes	system pressure = 26.3 psi
12/31/2009	8:30	Yes	system pressure = ~ 25 psi (on site for O&M)
01/04/2009	9:15	Yes	system pressure = 27.0 psi
01/08/2009	14:42	Yes	system pressure = 26.1 psi
01/14/2009	15:11	Yes	system pressure = 25.9 psi
01/22/2009	8:23	Yes	system pressure = 26.6 psi
01/29/2010	8:30	Yes	system pressure = ~24.5 psi (on site for O&M)
02/07/2010	8:23	Yes	system pressure = 25.8 psi
02/12/2010	8:43	Yes	system pressure = 26.1 psi
02/19/2010	8:40	Yes	system pressure = 25.4 psi
02/26/2010	8:11	Yes	system pressure = 25.8 psi
03/05/2010	8:40	Yes	system pressure = 24.9 psi
03/12/2010	7:52	Yes	system pressure = 26.1 psi
03/19/2010	7:52	Yes	system pressure = 26.1 psi
03/26/2010	8:42	Yes	system pressure = 25.7 psi
04/02/2010	8:24	Yes	system pressure = 20.4 psi
04/09/2010	8:49	Yes	system pressure = 25.5 psi
04/20/2010	9:45	Yes	system pressure = 25.9 psi
04/25/2010	17:12	Yes	system pressure = 25.2 psi
04/30/2010	8:47	Yes	system pressure = 26.1 psi
05/11/2010	9:10	Yes	system pressure = 25.2 psi
05/18/2010	9:55	Yes	system pressure = 25.7 psi
05/21/2010	8:52	Yes	system pressure = 25.8 psi
05/28/2010	12:11	Yes	system pressure = 25.0 psi
06/04/2010	2:16	Yes	system pressure = 25.4 psi
06/11/2010	11:13	Yes	system pressure = 25.4 psi
06/18/2010	8:55	Yes	system pressure = 25.6 psi
06/24/2010	10:41	Yes	system pressure = 25.2 psi
07/02/2010	13:11	Yes	system pressure = 25.0 psi
07/09/2010	11:13	Yes	system pressure = 25.1 psi
07/16/2010	9:15	Yes	system pressure = 24.1 psi
07/30/2010	8:13	Yes	system pressure = 23.9 psi
08/06/2010	9:15	Yes	system pressure = 24.1 psi

Sparge System Telemetric Monitoring
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Date/time system was checked		System Operational Yes/No	Identify Any Operational Abnormalities and Corrective Action Taken to Restore Operation
08/13/2010	9:16	Yes	system pressure = 23.8 psi
08/20/2010	8:47	Yes	system pressure = 24.0 psi
08/27/2010	11:43	Yes	system pressure = 25.9 psi; power outage on 26 Aug - had to reset system today to get compressor running
09/03/2010	8:45	Yes	system pressure = 23.7 psi
09/10/2010	11:22	Yes	system pressure = 24.2 psi
09/17/2010	8:20	Yes	system pressure = 24.4 psi
09/24/2010	18:15	Yes	power outage starting 20 Sept; power restored 24 Sept; reset system; system pressure = 24.9 psi
10/01/2010	8:11	Yes	system pressure = 24.1 psi
10/08/2010	8:20	Yes	system pressure = 24.0 psi
10/15/2010	8:18	Yes	system pressure = 24.1 psi
10/22/2010	8:15	Yes	system pressure = 24.1 psi
10/29/2010	8:17	Yes	system pressure = 24.2 psi
11/05/2010	8:13	Yes	system pressure = 23.9 psi
11/12/2010	8:10	Yes	system pressure = 23.9 psi
11/19/2010	8:13	Yes	system pressure = 24.0 psi
11/29/2010	8:16	Yes	system pressure = 24.4 psi
12/03/2010	8:13	Yes	system pressure = 24.3 psi
12/10/2010	8:14	Yes	system pressure = 24.2 psi
12/17/2010	8:15	Yes	system pressure = 24.3 psi
12/27/2010	7:44	Yes	system pressure = 24.5 psi
01/03/2011	8:42	Yes	system pressure = 24.2 psi
01/10/2011	8:52	Yes	system pressure = 24.6 psi
01/14/2011	7:54	Yes	system pressure = 24.7 psi
01/24/2011	13:46	Yes	system pressure = 24.8 psi
01/27/2011	9:15	No	telemetric unit removed for upgrade
02/09/2011	10:30	Yes	telemetric unit installed, activated, and reset system
02/11/2011	8:16	Yes	system pressure = 25.0 psi
02/18/2011	8:23	Yes	system pressure = 24.7 psi
02/28/2011	8:18	Yes	system pressure = 24.9 psi
03/05/2011	11:19	Yes	system pressure = 24.6 psi
03/11/2011	8:19	Yes	system pressure = 24.9 psi
03/18/2011	8:18	Yes	system pressure = 23.5 psi
03/28/2011	7:43	Yes	system pressure = 23.2 psi
04/01/2011	8:24	Yes	system pressure = 24.0 psi
04/09/2011	22:43	Yes	system pressure = 24.0 psi
04/18/2011	7:15	Yes	system pressure = 23.9 psi
04/22/2011	10:54	Yes	system pressure = 24.0 psi
04/29/2011	12:19	Yes	system pressure = 23.9 psi
05/06/2011	8:18	Yes	system pressure = 23.9 psi
05/13/2011	8:20	Yes	system pressure = 23.8 psi

Sparge System Telemetric Monitoring
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Date/time system was checked		System Operational Yes/No	Identify Any Operational Abnormalities and Corrective Action Taken to Restore Operation
05/23/2011	8:17	Yes	system pressure = 23.6 psi
05/27/2011	8:27	Yes	system pressure = 23.7 psi
06/03/2011	16:45	Yes	system pressure = 23.4 psi
06/10/2011	8:18	Yes	system pressure = 23.6 psi
06/19/2011	8:23	Yes	system pressure = 23.9 psi
06/26/2011	7:24	Yes	system pressure = 24.0 psi
07/01/2011	11:15	Yes	system pressure = 23.6 psi
07/08/2011	8:16	Yes	system pressure = 24.0 psi
07/12/2011	8:19	Yes	system pressure = 24.3 psi
07/22/2011	7:59	Yes	system pressure = 24.2 psi
07/29/2011	8:26	Yes	system pressure = 23.9 psi
08/05/2011	8:24	Yes	system pressure = 24.1 psi
08/12/2011	15:18	Yes	system pressure = 24.2 psi
08/19/2011	8:22	Yes	system pressure = 24.2 psi
08/25/2011	16:30	No	System shut down due to HURCON IV condition
08/29/2011	12:44	Yes	System returned to service
09/02/2011	8:23	Yes	system pressure = 24.5 psi
09/18/2011	12:20	Yes	power outage starting 10 Sept; power restored 18 Sept; reset system; system pressure = 25.6 psi
09/23/2011	7:54	Yes	system pressure = 24.5 psi
10/01/2011	8:19	Yes	system pressure = 24.2 psi
10/08/2011	13:28	Yes	system pressure = 25.3 psi
10/15/2011	9:30	Yes	power outage starting 10 Oct; power restored 15 Oct; reset system; system pressure = 26.0 psi
10/21/2011	8:29	Yes	system pressure = 25.0 psi
10/28/2011	8:01	Yes	system pressure = 24.6 psi
11/04/2011	8:25	Yes	system pressure = 24.8 psi
11/11/2011	3:56	Yes	system pressure = 25.0 psi
11/18/2011	8:59	Yes	system pressure = 24.9 psi
11/25/2011	10:23	Yes	system pressure = 25.0 psi
12/02/2011	8:50	Yes	system pressure = 24.8 psi
12/09/2011	16:01	Yes	system pressure = 24.7 psi
12/16/2011	10:55	Yes	system pressure = 24.7 psi
12/23/2011	10:51	Yes	system pressure = 24.6 psi
12/30/2011	9:03	Yes	system pressure = 24.8 psi
01/07/2012	20:38	No	Power outage starting 4 Jan; anticipated to be off for 5 weeks
02/10/2012	9:45	No	Power restored 10 Feb; startup sheared apart internal coupling of compressor, out of service until repaired
02/16/2012	9:00	No	Initial site visit by Chris S. of Equitech to assess damage to compressor; replacement coupling and pressure relief valve ordered 2/22/12
03/16/2012	10:00	No	New coupling insert and bushing installed by Beau B. of Equitech; power outage starting 16 March at 14:36
05/03/2012	10:00	No	Interim pressure relief valve replaced and oil changed by Beau B. of Equitech
05/14/2012	13:56	No	Power restored, however system still unresponsive.

Sparge System Telemetric Monitoring
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Date/time system was checked		System Operational Yes/No	Identify Any Operational Abnormalities and Corrective Action Taken to Restore Operation
05/18/2012	14:00	No	Problem determined to be blown fuse and unresponsive solenoid valve after consulting with Dana B. and Kevin L. of PRM; replaced 2 amp fuse (FU 1) with 5 amp fuse; removed partially closed solenoid valve (SV 1); restarted system
05/20/2012	16:26	Yes	system pressure = 24.8 psi
05/25/2011	10:02	Yes	system pressure = 24.8 psi
06/01/2012	8:24	Yes	system pressure = 25.3 psi
06/08/2012	8:03	Yes	system pressure = 25.6 psi
06/15/2012	7:58	Yes	system pressure = 25.5 psi
06/22/2012	8:32	Yes	system pressure = 25.5 psi
06/30/2012	15:55	Yes	system pressure = 25.5 psi
07/08/2012	15:34	Yes	system pressure = 25.4 psi
07/13/2012	15:51	Yes	system pressure = 25.6 psi
07/20/2012	8:03	Yes	system pressure = 25.8 psi
07/27/2012	9:01	Yes	system pressure = 26.2 psi
08/03/2012	7:58	No	System was shutdown on 7/31/12 for modifications regarding air sparge IM - installation of 2 new legs including solenoid valves, gate valves, and flow meters (rotometers)
08/31/2012	16:28	No	System was restarted on 8/28/12 and ran through 8/30/12, when system was shut off due to high temp alarm; system reset on 8/31/12; system pressure = 31.7 psi
09/07/2012	8:01	Yes	system pressure = 28.7 psi
09/14/2012	11:08	Yes	Timer program needs to be edited, multiple legs were observed to be open at same time; timer will be reprogramed next week, system pressure = 29.4 psi
09/20/2012	10:00	Yes	Timer switch for leg 4 was set to 'on' since last O&M visit on 9/14/12 at 08:00; changed to 'auto' for normal operation
09/21/2012	19:03	Yes	system pressure = 26.3 psi
09/25/2012	13:36	No	System was shutdown, confirmed in the field that the compressor has reached the end of its useful life and needs to be replaced
06/14/2013	10:12	Yes	System (biosparge only) restarted on 6/14/13 at 10:00am. System pressure = 28.5 psi
06/21/2013	10:05	Yes	system pressure = 28.9 psi
06/28/2013	10:09	Yes	system pressure = 28.5 psi
07/05/2013	10:13	Yes	system pressure = 28.5 psi
07/12/2013	11:25	No	System shutdown on 7/11/13 for system modifications (VFD reprogramming; compressor power run re-wiring) and troubleshooting (leg 3 channel of timer not functioning; reduced flow from compressor)
07/19/2013	17:18	Yes	System restarted on 7/17/13. System only ran 15 hours from 7/17 through 7/19 due to faulty breaker for compressor tripping after limited operation; breaker will be replaced next week; system pressure = 23.6 psi
07/26/2013	18:40	Yes	system pressure = 28.0 psi; 100 amp breaker replaced and system restarted on 7/25/13; system was off since 7/21/13 due to high temp alarm
07/29/2013	8:17	No	System off due to high temperature alarm on 7/28/13 at 10:33 am; system restarted, system pressure = 26.0 psi; system off due to high temp alarm on 7/29/13 at 11:42 am; system restarted at 4:14 pm
08/02/2013	17:30	Yes	system pressure = 24.0 psi
08/09/2013	8:37	No	System off due to high temp alarm on 8/3/13 at 11:50am; system restarted, system pressure = 26.9 psi
08/16/2013	7:36	Yes	system pressure = 24.9 psi
08/23/2013	17:16	Yes	system pressure = 24.1 psi
09/04/2013	7:37	Yes	Checked telemetry on 8/30/13, discovered system was shutdown since 8/25/13; the system was not responding to restart command; site visit on 9/3/13 revealed the VFD was shutdown due to 'Fault 9 - MOT Overtemp' error (VFD motor overheating); the VFD was reset and the system was restarted; system pressure = 24.3 psi
09/06/2013	13:15	Yes	system pressure = 23.6 psi
09/13/2013	7:42	Yes	system pressure = 23.8 psi
09/21/2013	10:05	Yes	system pressure = 22.3 psi

Sparge System Telemetric Monitoring
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Date/time system was checked		System Operational Yes/No	Identify Any Operational Abnormalities and Corrective Action Taken to Restore Operation
09/27/2013	12:13	No	System was shutdown on 9/26/13 at 8am due to a power outage in the area; system has not responded to restart command; will verify if system is functional in field on Monday (9/30/13); system remained off since 9/26/13 due to govt. shutdown; system restarted on 10/29/13
11/01/2013	8:30	Yes	system pressure = 23.6 psi
11/08/2013	7:49	Yes	system pressure = 24.1 psi
11/15/2013	8:15	Yes	system pressure = 23.7 psi
11/22/2013	8:49	Yes	system pressure = 24.1 psi
11/29/2013	14:14	Yes	system pressure = 24.0 psi
12/06/2013	8:11	Yes	system pressure = 23.9 psi
12/13/2013	7:50	Yes	system pressure = 23.9 psi
12/20/2013	8:20	Yes	system pressure = 23.8 psi
12/29/2013	19:35	No	System was shutdown on 12/23/13 at 12:54 due to high temperature alarm; system restarted, system pressure = 25.6 psi
01/03/2014	9:33	Yes	system pressure = 25.0 psi
01/10/2014	13:17	Yes	system pressure = 23.7 psi
01/17/2014	21:30	Yes	system pressure = 24.1 psi
01/24/2014	7:25	Yes	system pressure = 23.2 psi
01/31/2014	8:15	Yes	System was shutdown 1/27/14 and 1/28/14 for semiannual performance monitoring; restarted upon completion; system pressure = 23.4 psi
02/07/2014	8:11	Yes	system pressure = 23.6 psi
02/14/2014	19:46	Yes	system pressure = 23.4 psi
02/21/2014	18:24	Yes	system pressure = 27.1 psi
02/28/2014	16:33	Yes	system pressure = 23.6 psi
03/07/2014	14:11	Yes	system pressure = 23.5 psi
03/14/2014	8:23	Yes	system pressure = 23.6 psi
03/22/2014	12:47	Yes	system pressure = 26.8 psi
03/28/2014	17:00	No	System is shutdown due to broken oil plug - broke off during routine oil change; system can not be restarted until plug replaced
05/09/2014	8:13	Yes	Oil plug replaced, oil topped off, and system restarted on 5/5/14; system pressure = 22.9 psi
05/16/2014	7:44	Yes	system pressure = 26.8 psi
05/23/2014	10:12	Yes	system pressure = 23.4 psi
05/30/2014	8:36	Yes	system pressure = 22.8 psi
06/06/2014	7:49	Yes	system pressure = 26.0 psi
06/13/2014	8:58	Yes	Biosparge system (Legs 1 and 2) shutdown on 6/12/14 at 09:42 for DPT GW assessment in the area from 6/16/14 through 6/20/14; system pressure = 24.0 psi
06/20/2014	8:12	Yes	system pressure = 23.9 psi
06/27/2014	7:49	Yes	Biosparge system (Legs 1 and 2) restarted on 6/24/14 at 09:00; system pressure = 26.3 psi
07/07/2014	7:42	Yes	system pressure = 26.4 psi
07/11/2014	7:44	Yes	system pressure = 26.7 psi
07/18/2014	7:46	Yes	system pressure = 26.5 psi; system shutdown at 16:00 on 7/18 prior to Annual Performance MW Sampling (7/21-7/23); system was restarted on 7/23/14
07/25/2014	8:33	Yes	system pressure = 24.0 psi
08/01/2014	8:12	Yes	system pressure = 24.3 psi
08/08/2014	18:17	Yes	system pressure = 27.6 psi
08/15/2014	17:17	Yes	system pressure = 25.0 psi

Sparge System Telemetric Monitoring
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Date/time system was checked		System Operational Yes/No	Identify Any Operational Abnormalities and Corrective Action Taken to Restore Operation
08/22/2014	7:49	Yes	Hour meter discovered to have been inadvertently wired to VFD during modifications (July 2013) and was recording hours of operation of the VFD, not the blower; hour Meter re-wired on 8/18/14 to record hours of operation by the blower only; system pressure = 26.7 psi
08/29/2014	7:50	Yes	system pressure = 29.2 psi; VFD for biosparge operation changed from 40 Hz to 47 Hz
09/05/2014	16:46	Yes	system pressure = 23.8 psi
09/16/2014	8:09	Yes	system pressure = 23.0 psi
09/19/2014	9:51	Yes	system pressure = 23.1 psi
09/26/2014	8:30	Yes	system pressure = 23.5 psi
10/03/2014	9:26	Yes	system pressure = 25.1 psi
10/11/2014	13:20	Yes	system pressure = 28.4 psi
10/17/2014	8:18	Yes	system pressure = 24.5 psi
10/24/2014	8:46	Yes	Biosparge legs shutdown on 10/23/14 at 18:00 in preparation for biosparge MW sampling; biosparge legs restarted on 10/27/14 at 13:15; system pressure = 24.6 psi
10/31/2014	10:07	Yes	system pressure = 26.0 psi
11/10/2014	10:51	Yes	system pressure = 24.1 psi
11/14/2014	8:11	Yes	system pressure = 24.4 psi
11/21/2014	8:02	Yes	system pressure = 24.3 psi
11/28/2014	13:28	Yes	system pressure = 25.2 psi
12/05/2014	8:15	Yes	Biosparge legs shutdown on 12/1/14 in preparation for biosparge MW sampling; biosparge legs restarted on 12/4/14; system pressure = 25.0 psi
12/12/2014	9:34	Yes	system pressure = 25.4 psi
12/19/2014	8:01	Yes	system pressure = 24.5 psi
12/26/2014	9:13	Yes	system pressure = 25.7 psi
01/02/2015	15:20	Yes	System was shutdown on 12/27/14 through 12/30/14 due to a power outage in the area; system pressure = 25.2 psi
01/10/2015	20:49	Yes	system pressure = 24.8 psi
01/16/2015	11:00	No	System was shutdown on 1/16/15 at 09:45 in preparation for Semi-Annual groundwater sampling event; system restarted on 1/23/15 at 08:45
01/23/2015	9:04	Yes	system pressure = 26.6 psi
01/30/2015	9:35	Yes	system pressure = 25.0 psi
02/06/2015	8:08	Yes	system pressure = 24.5 psi
02/13/2015	8:45	Yes	system pressure = 25.1 psi
02/20/2015	10:32	Yes	system pressure = 24.5 psi
02/27/2015	9:16	Yes	system pressure = 25.4 psi
03/06/2015	7:41	Yes	system pressure = 24.4 psi
03/13/2015	9:17	Yes	system pressure = 24.1 psi
03/20/2015	9:03	Yes	system pressure = 24.1 psi
03/27/2015	8:10	Yes	system pressure = 23.9 psi
04/03/2015	9:16	Yes	Biosparge legs shutdown on 4/3/15 at 09:30 in preparation for biosparge MW sampling; system pressure = 24.0 psi; biosparge legs restarted on 4/6/15 at 13:30
04/10/2015	9:01	Yes	system pressure = 23.8 psi
04/19/2015	16:21	Yes	system pressure = 24.7 psi
04/24/2015	9:18	Yes	system pressure = 24.4 psi
05/01/2015	8:22	Yes	system pressure = 23.8 psi
05/08/2015	15:16	Yes	system pressure = 24.0 psi

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Date/time system was checked		System Operational Yes/No	Identify Any Operational Abnormalities and Corrective Action Taken to Restore Operation
05/15/2015	8:55	Yes	system pressure = 23.9 psi
05/22/2015	15:18	Yes	system pressure = 23.9 psi
05/31/2015	18:30	Yes	system pressure = 28.1 psi
06/05/2015	10:11	Yes	system pressure = 24.5 psi
06/12/2015	8:16	Yes	system pressure = 24.0 psi
06/19/2015	8:32	Yes	system pressure = 23.8 psi
06/26/2015	8:55	Yes	System was shutdown on 6/24/15 at 2:04pm due to high temperature alarm; the system was restarted on 6/26/15 at 8:50am; system pressure = 24.6 psi
06/28/2015	10:00	No	System was confirmed in the field to be shutdown due to high temp alarm caused by heat exchanger reaching the end of its useful life; checked telemetry history - system was shutdown on 6/26/15 at 09:00 due to high temp alarm
07/27/2015	7:41	Yes	Heat Exchanger was replaced and system was restarted on 7/20/15; system pressure = 28.7 psi
08/03/2015	9:14	Yes	system pressure = 24.5 psi
08/07/2015	7:56	Yes	system pressure = 16.1 psi; confirmed in field on 8/4/15 that pressure relief valve on compressor is failing (opening at less than factory preset maximum pressure of 31.9 psi); compressor will remain operational, maintaining lower than design flows, until the valve can be replaced
08/14/2015	10:23	Yes	Pressure relief valve replaced on 8/11/15; system pressure = 24.8 psi
08/21/2015	8:32	Yes	system pressure = 24.5 psi
08/28/2015	8:13	Yes	System shutdown due to high temp alarm on 8/26/15 at 16:39; system restarted 8/28/15 at 07:45; system pressure = 26.3 psi; system shutdown on 8/28 at 17:00 in preparation for HURCON IV condition; system restarted on 8/31/15 at 08:45
09/04/2015	9:07	Yes	system pressure = 25.0 psi
09/11/2015	8:15	Yes	system pressure = 25.2 psi
09/18/2015	15:13	Yes	system pressure = 25.7 psi
09/27/2015	20:09	Yes	system pressure = 24.9 psi
10/02/2015	8:19	Yes	system pressure = 24.9 psi
10/11/2015	17:12	Yes	The air sparge system (Legs 3 and 4 only) was shutdown on 10/2/15 in preparation for air sparge performance monitoring well sampling and was restarted on 10/9/15 upon completion; system pressure = 24.4 psi
10/16/2015	8:40	Yes	system pressure = 25.2 psi
10/23/2015	9:09	Yes	System was shutdown on 10/18/15 due to a power outage in the area; system was restarted on 10/23/15; system pressure = 24.6 psi
11/03/2015	8:49	Yes	system pressure = 24.1 psi
11/06/2015	9:59	Yes	system pressure = 23.3 psi
11/13/2015	14:39	Yes	Pressure relief valve replaced and bleed air valve installed on biosparge legs; system pressure = 27.2 psi
11/20/2015	14:35	Yes	system pressure = 26.9 psi
11/28/2015	10:09	Yes	system pressure = 25.2 psi
12/04/2015	8:38	Yes	system pressure = 25.6 psi
12/11/2015	9:40	Yes	system pressure = 24.5 psi
12/18/2015	8:24	Yes	system pressure = 25.3 psi
12/27/2015	8:10	Yes	system pressure = 25.6 psi
01/03/2016	18:55	Yes	system pressure = 25.8 psi
01/11/2016	8:18	No	System shutdown on 1/8/16 at 09:00 in preparation for GW sampling event; system restarted on 1/12/16 at 15:00
01/15/2016	10:20	Yes	system pressure = 24.2 psi
01/22/2016	9:53	Yes	system pressure = 24.2 psi
01/29/2016	9:25	Unknown	Telemetry system is currently being reported as deactivated for unknown reason; will contact the vendor to assess error

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Date/time system was checked		System Operational Yes/No	Identify Any Operational Abnormalities and Corrective Action Taken to Restore Operation
02/06/2016	16:00	Unknown	Telemetry system is currently being reported as deactivated for unknown reason; system vendor working to resolve issue
02/12/2016	13:45	Yes	Telemetry system is deactivated, working with vendor to resolve issue; traveled to site to verify operation; system pressure = 24.5 psi
02/19/2016	10:04	Yes	Telemetry system is deactivated, working with vendor to resolve issue; traveled to site to verify operation; system pressure = 24.5 psi
02/26/2016	15:45	Yes	System shutdown on 2/23/16 at 08:00 and restarted on 2/24/16 at 09:30 for system modification; telemetry system is deactivated, working with vendor to resolve issue; verified system operation on site; system pressure = 24.5 psi
03/04/2016	9:00	Yes	Telemetry system is deactivated, working with vendor to resolve issue; verified system operation on site; system pressure = 25.0 psi
03/14/2016	10:43	Yes	Telemetry system was reactivated on 3/11/16; system pressure = 24.6 psi
03/18/2016	9:46	Yes	system pressure = 24.0 psi
03/25/2016	10:54	Yes	Biosparge system only (Legs 1, 2, and 5) was shutdown on 3/25/16 at 11:50 in preparation for the biosparge expansion Month 1 performance monitoring sampling; system pressure = 25.2 psi
04/01/2016	10:02	Yes	Biosparge system restarted on 3/30/16 at 08:00; system pressure = 25.8 psi
04/08/2016	13:14	Yes	Air sparge system only (Legs 3 and 4) was shutdown on 4/8/16 at 08:50 in preparation for DPT groundwater sampling; system pressure = 27.6 psi
04/15/2016	11:30	Yes	Air sparge system only (Legs 3 and 4) started on 4/15/16 at 09:26; system pressure = 25.1 psi
04/25/2016	12:06	Yes	system pressure - 24.5 psi
04/29/2016	10:14	Yes	system pressure - 25.1 psi
05/06/2016	10:55	Yes	system pressure - 25.0 psi
05/13/2016	9:45	Yes	system pressure - 24.1 psi
05/20/2016	13:51	No	System pressure reading at 0.0 psi and system not responding to remote reset; personnel sent to field to inspect the system; determined compressor not operational; working with vendor to resolve issue
05/27/2016	10:35	No	System still not operational; power shutdown to main circuit breaker of the system on 5/23/16 at 13:40
06/03/2016	10:25	No	System shutdown due to compressor failure; working with vendor to resolve issue
06/10/2016	11:02	No	System shutdown due to compressor failure; working with vendor to resolve issue
06/17/2016	9:01	No	System shutdown due to compressor failure; working with vendor to resolve issue
06/24/2016	10:00	No	System shutdown due to compressor failure; working with vendor to resolve issue
07/01/2016	9:05	No	System shutdown due to compressor failure; working with vendor to resolve issue
07/08/2016	10:00	No	System shutdown due to compressor failure; working with vendor to resolve issue
07/15/2016	10:00	No	System shutdown due to compressor failure; working with vendor to resolve issue
07/22/2016	10:00	No	System shutdown due to compressor failure; working with vendor to resolve issue
07/29/2016	9:15	No	System shutdown due to compressor failure; working with vendor to resolve issue
08/05/2016	9:30	No	System still not operational. Working with vendor to resolve issue.
08/12/2016	9:00	No	System still not operational. Working with vendor to resolve issue.
08/19/2016	9:30	No	System still not operational. Working with vendor to resolve issue.
08/26/2016	9:30	No	System still not operational. Working with vendor to resolve issue.
09/02/2016	9:00	No	System still not operational. Working with vendor to resolve issue.
09/09/2016	9:20	No	System still not operational. Working with vendor to resolve issue.
05/05/2017	Not Recorded	Yes	System restarted on 5/3/2017, but only ran until 03:00 on 5/4/2017 after the float and guide rail in the flow meter for Leg 3 broke and became lodged in the flow meter outlet (causing a high pressure alarm and system shutdown). Flow meter float and guide rail are removed and system is restarted without measurement ability on Leg 3. Flow meter will be replaced during the next O&M event.
05/08/2017	10:00	Yes	System restarted; system pressure - 21.8 psi.

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Date/time system was checked		System Operational Yes/No	Identify Any Operational Abnormalities and Corrective Action Taken to Restore Operation
05/12/2017	9:50	Yes	System off due to multiple high pressure alarms on 5/9/2017 and 5/10/2017. System down from 19:00 on 5/9/2017 to 09:00 on 5/10/2017 and 13:00 to 16:30 on 5/10/2017. The bleed valve on the biosparge legs was opened to 3/4 open to reduce potential pressure applied during change over from Leg 4 to the biosparge legs. Adjusted to 1/2 open on 5/11/2017 and operated without over pressurizing; system pressure - 21.4 psi.
05/19/2017	9:05	Yes	system pressure - 20.9 psi.
05/26/2017	14:30	Yes	System off due to a phase loss alarm at 00:13 on 5/23/2017. Source of phase loss was a power outage in the area reported to have occurred at 00:15 on 5/23/2017. System restarted at 08:00 on 5/23/2017; system pressure - 23.8 psi on 5/26/2017.
06/02/2017	05:35	Yes	system pressure - 22.1 psi.
06/09/2017	9:55	Yes	system pressure - 20.3 psi.
06/16/2017	10:55	Yes	system pressure - 22.1 psi.
06/23/2017	8:00	No	System turned off at 10:55 on 6/19/2017 for air sparge well cleanouts. Restarted at 10:55 on 6/22/2017. System off at 06:55 on 6/23/2017 for high pressure alarm. System restarted at 09:15 on 6/23/2017.
06/30/2017	14:50	Yes	System off at 00:55 on 6/28/2017 for high pressure alarm - remained off for biosparge cleanouts. System restarted at 17:00 on 6/28/2017. System off at 18:55 on 6/28/2017 for high pressure alarm. System restarted on 6/29/2017 for routine O&M. system pressure - 24.1 psi.
07/07/2017	16:45	Yes	system pressure - 22.5 psi.
07/15/2017	13:15	Yes	System pressure - 24.1 psi.
07/21/2017	17:30	Yes	System pressure - 22.8 psi.
07/28/2017	17:30	Yes	System pressure - 22.4 psi.
08/04/2017	18:30	Yes	System pressure - 22.2 psi.
08/11/2017	9:25	Yes	System off at 15:30 on 8/5/2017 in anticipation of the quarterly biosparge expansion performance monitoring. System restarted at 17:00 on 8/9/2017. System pressure - 21.8 psi.
08/18/2017	11:00	Yes	System pressure - 22.4 psi.
08/25/2017	10:45	Yes	System pressure - 22.1 psi.
09/01/2017	11:25	Yes	System pressure - 22.1 psi.
09/08/2017	9:00	No	System turned off on 9/6/2017 in preparation for Hurricane Irma.
09/15/2017	9:55	No	System remains off due to Hurricane Irma. Kennedy Space Center is still not open to non-mission essential personnel.
09/22/2017	18:15	No	System restarted on 9/18/2017 after Kennedy Space Center is reopened to non-mission essential personnel. System off due to high pressure at on 9/21/2017 at 14:50. Personnel will troubleshoot problem during scheduled O&M the week of 9/25/2017 due to the upcoming weekend.
09/29/2017	Not Recorded	Yes	System restarted on 9/26/2017 during the routine O&M. The system telemetry not operating, but system operation confirmed on site (readings not collected). A Uninterruptable Power Supply was removed as it had reached the end of its useful life, which prevent telemetry from working.
10/06/2017	Not Recorded	Yes	System telemetry not operating, but system operation confirmed on site (readings not collected).
10/13/2017	12:05	Yes	System telemetry operational after router reset. System pressure - 23.8 psi.
10/20/2017	8:51	No	System down due to a high pressure alarm on 10/13/2017 at 18:55. System restarted on 10/19/2017 at 11:30, but went down due to high pressure 12:00, after technician had left site. Issue to be addressed by Sam Graves during routine O&M on 10/24/2017 due to upcoming weekend.
10/27/2017	18:00	Yes	System restarted on 10/24/17 at 10:15 during the routine O&M. System was experiencing high pressure alarms due to the water table being elevated. System currently operating with a pressure of 22.8 psi.
11/03/2017	8:45	Yes	System down due to a high pressure alarm on 10/30/17 at 01:00, likely due to a high water table. System restarted on 10/30/17 at 12:30 after the bleed valve on the biosparge legs was opened more. System pressure - 26.2 psi.
11/14/2017	22:05	Yes	System turned off on 11/4/2017 at 07:55 prior to performance monitoring activities starting on 11/7/2017. System restarted on 11/12/2017 at 15:50. System currently operating with a pressure of 22.9 psi.
11/19/2017	18:55	Yes	System pressure - 18.0 psi.
11/24/2017	11:40	Yes	System pressure - 22.5 psi.

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Date/time system was checked		System Operational Yes/No	Identify Any Operational Abnormalities and Corrective Action Taken to Restore Operation
12/01/2017	10:45	Yes	system pressure - 22.6 psi.
12/08/2017	11:50	Yes	system pressure - 22.3 psi.
12/15/2017	10:45	Yes	system pressure - 22.1 psi.
12/29/2017	11:05	Yes	system pressure - 22.6 psi.
01/05/2018	10:00	Yes	system pressure - 22.9 psi.
01/12/2018	19:50	Yes	system pressure - 22.2 psi.
01/19/2018	12:45	No	System down due to a high pressure alarm on 1/18/2018 at 06:00. System restarted at 16:55. System down due to a high pressure alarm on 1/19/2018 at 00:00. System restarted at 16:40, after biosparge bleed valve opened more. System down due to high pressure alarm on 1/20/2018 at 06:00. System restarted at 10:15 after the biosparge bleed valve was opened all the way.
01/26/2018	10:15	Yes	System telemetry operational. system pressure - 22.8 psi on 1/26/2018.
02/02/2018	9:50	Yes	System down due to a high pressure alarm on 1/29/2018 at 18:00 (bleed valve was closed partially during system maintenance). Restarted at 08:00 on 1/30/2018 during the routine O&M and bleed valve adjusted to reduce pressure on biosparge legs. System down again due to a high pressure alarm at 18:00 on 1/30/2018. System restarted at 08:00 on 1/31/2018 after trouble shooting and bleed valve being adjusted further. System pressure - 22.8 psi on 2/2/2018
02/09/2018	14:15	Yes	system pressure - 22.0 psi.
02/16/2018	9:05	Yes	System telemetry operational. system pressure - 23.0 psi on 2/16/2018. System turned off at 09:50 on 2/16/2018 in anticipation of DPT groundwater sampling activities the week of 2/19/2018.
02/23/2018	14:00	No	System off (all legs) due to DPT groundwater sampling near the air sparge system and monitoring well sampling at the biosparge barrier.
03/02/2018	11:20	Yes	System restarted at 08:00 on 2/26/2018 prior to routine O&M. System pressure - 22.1 psi
03/09/2018	13:15	Yes	system pressure - 24.1 psi
03/16/2018	11:00	Yes	system pressure - 22.0 psi
03/23/2018	18:35	Yes	system pressure - 22.1 psi
04/01/2018	21:30	Yes	system pressure - 21.7 psi
04/06/2018	11:15	Yes	system pressure - 22.1 psi
04/13/2018	11:35	Yes	system pressure - 21.4 psi
04/20/2018	11:35	Yes	system pressure - 21.5 psi
04/27/2018	13:35	Yes	Legs 3 and 4 (air sparge) turned off on 4/25/2018. Only Legs 1, 2, and 5 (biosparge) are operational. System pressure - 22.5 psi.
05/06/2018	9:40	Yes	system pressure - 22.4 psi
05/11/2018	13:39	Yes	system pressure - 22.5 psi
05/18/2018	9:35	Yes	system pressure - 22.7 psi
05/25/2018	7:30	Yes	system pressure - 22.8 psi
06/01/2018	9:53	Yes	System turned off at 11:25 on 5/25/2018 prior to performance monitoring activities on 5/29/2018. System restarted on 5/30/2018 at 9:50 after samples from biosparge monitoring wells were collected. System pressure - 21.9 psi.
06/08/2018	8:55	Yes	system pressure - 21.9 psi
06/15/2018	9:35	Yes	system pressure - 21.7 psi
06/22/2018	13:15	Yes	system pressure - 21.3 psi
06/29/2018	13:45	Yes	system pressure - 23.6 psi
07/06/2018	13:15	No	System off at 03:55 on 7/1/2018 due to a high pressure alarm.
07/13/2018	9:55	Yes	System restarted at 13:30 on 7/9/2018. System off at 4:00 on 7/10/2018 due to high pressure alarm. Restarted at 17:20 on 7/11/2018. System pressure - 22.0 psi
07/20/2018	9:35	Yes	system pressure - 22.1 psi
07/27/2018	7:40	Yes	system pressure - 22.4 psi
08/03/2018	8:30	Yes	system pressure - 22.3 psi

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Date/time system was checked		System Operational Yes/No	Identify Any Operational Abnormalities and Corrective Action Taken to Restore Operation
08/10/2018	9:45	Yes	system pressure - 22. 2 psi
08/17/2018	9:50	Yes	system pressure - 22.1 psi
08/24/2018	9:35	Yes	system pressure - 22.0 psi
08/31/2018	14:22	Yes	System was off at 16:00 on 8/27/2018 due to a high pressure alarm and restarted at 11:10 on 8/29/2018. System off at 11:50 on 8/29/2018 due to a high pressure alarm. System restarted at 12:20 on 8/31/2018. System pressure - 22.6 psi
09/07/2018	19:05	Yes	System off at 18:55 on 9/6/2018 due to a high pressure alarm. System restarted on at 16:45 on 9/7/2018. System pressure - 22.7 psi
09/14/2018	8:30	Yes	System turned off on 9/11/2018 at 9:40 to investigate and fix a leak in biosparge well BSW0028. System restarted on 9/11/2018 at 13:45.
09/21/2018	20:20	Yes	system pressure - 22.4 psi
09/28/2018	9:00	Yes	system pressure - 22.4 psi
10/05/2018	7:05	Yes	system pressure - 22.6 psi
10/12/2018	9:55	Yes	system pressure - 22.2 psi
10/19/2018	14:35	Yes	system pressure - 22.6 psi
10/26/2018	15:54	Yes	system pressure - 22.3 psi
11/02/2018	13:30	Yes	System off at 18:00 on 10/31/2018 due to a high pressure alarm. System restarted at 12:00 on 11/2/2018. System pressure - 22.1 psi
11/09/2018	7:15	No	System off at 15:00 on 11/8/2018 in preparation for groundwater sampling activities the week of 11/12/2018.
11/16/2018	20:14	Yes	System restarted at 17:30 on 11/16/2018 following groundwater sampling activities. System pressure - 24.7 psi
11/23/2018	14:35	Yes	System pressure - 24.3 psi
11/30/2018	18:20	Yes	System pressure - 24.8 psi
12/07/2018	8:50	Yes	System pressure - 24.5 psi
12/14/2018	12:45	Yes	System pressure - 24.5 psi
12/21/2018	8:35	Yes	System pressure - 24.2 psi
12/28/2018	10:55	No	System turned off on 12/21/2018 at 15:30 due to the government shutdown.
01/04/2019	12:50	No	System off due to government shutdown.
01/11/2019	16:00	No	System off due to government shutdown.
01/18/2019	16:00	No	System off due to government shutdown.
01/25/2019	11:00	No	System off due to government shutdown.
02/01/2019	19:30	No	The system was restarted at 11:35 on 1/30/2019 following reopening of the government. Access to the telemetry website has been unavailable and regular updates have not been sent out. Field staff restarted the router at 15:20 on 2/1/2019 and corrected the issue of connectivity to the telemetry website by power cycling the router which is inside the trailer. The system was operating at 19:30 on 2/1/2019 with a pressure of 24.3 psi.
02/08/2019	18:30	Yes	The access to the telemetry website was not available when checked at 13:45 on 2/3/2019. Router restarted at 15:15 on 2/4/2019. Router went down at 09:00 on 2/5/2019. Connectivity issues with the router are suspected for not sending the regular updates. Data log indicates system has been operating as normal during past week while issues with the router continue. Router restarted at 13:30 on 2/6/2019. Suggested path forward is adding a larger antenna which would extend above the building and/or replacing the router. System pressure - 23.4 psi
02/15/2019	14:55	Yes	system pressure - 23.1 psi
02/22/2019	7:45	Yes	system pressure - 23.1 psi
03/01/2019	8:45	Yes	The system was not accessible from 03:00 on 2/25/2019 through 17:15 on 2/27/2019 due to connectivity issues with the router. The system was confirmed to be operating normally during this time. System pressure - 23.0 psi
03/08/2019	9:00	Yes	System off at 18:00 on 3/1/2019 due to a high pressure alarm. System restarted at 12:15 on 3/5/2019. System turned off at 11:55 on 3/7/2019 in preparation for groundwater sampling of the biosparge performance monitoring wells on 3/11/2019.

Sparge System Telemetric Monitoring
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Date/time system was checked		System Operational Yes/No	Identify Any Operational Abnormalities and Corrective Action Taken to Restore Operation
03/15/2019	15:55	Yes	System restarted at 13:00 on 3/14/2019 following groundwater sampling of the biosparge performance monitoring wells. System pressure - 23.5 psi
03/22/2019	15:35	Yes	system pressure - 23.6 psi
03/29/2019	7:20	Yes	system pressure - 23.8 psi
04/05/2019	8:55	Yes	system pressure - 23.4 psi
04/12/2019	19:40	Yes	system pressure - 23.4 psi
04/19/2019	15:50	Yes	system pressure - 23.3 psi
04/26/2019	9:45	Yes	system pressure - 23.3 psi
05/03/2019	9:15	Yes	System pressure - 23.2 psi
05/11/2019	13:20	Yes	System pressure - 23.5 psi
05/17/2019	9:50	Yes	System pressure - 23.5 psi
05/24/2019	15:00	Yes	System pressure - 23.3 psi
05/31/2019	9:20	Yes	System pressure - 23.4 psi
06/07/2019	9:17	Yes	System pressure - 23.7 psi
06/14/2019	7:25	Yes	System pressure - 24.3 psi
06/21/2019	9:35	Yes	System pressure - 23.9 psi
06/28/2019	9:30	Yes	System pressure - 24.0 psi
07/05/2019	14:30	Yes	System pressure - 23.1 psi
07/12/2019	13:20	Yes	System pressure - 23.7 psi
07/19/2019	13:20	Yes	System pressure - 23.6 psi
7/26/2019	8:20	Yes	System pressure - 23.5 psi
08/02/2019	19:51	Yes	System pressure - 23.4 psi
08/09/2019	13:14	Yes	System pressure - 23.7 psi
08/16/2019	9:50	Yes	System pressure - 23.2 psi
08/23/2019	9:20	Yes	System pressure - 23.3 psi
08/30/2019	12:00	No	System turned off at 11:30 on 8/30/2019 in preparation for Hurricane Dorian.
09/06/2019	13:00	No	System turned back on at 11:15 on 9/6/2019 after Hurricane Dorian. Access to the telemetry website is not available.
09/13/2019	10:00	Yes	The telemetry website is not available, but the system was confirmed to be operational in person prior to shut down for biosparge well cleanouts at 10:00 on 9/13/2019.
09/20/2019	17:47	Yes	System restarted at 17:45 on 9/13/2019 following biosparge well cleanouts. System is operational, but access to the telemetry website is not available. Troubleshooting was attempted on 9/16/2019, but a permanent solution was not identified.
09/27/2019	12:32	Yes	System is operational, but access to the telemetry website is not available.
10/16/2019	10:30	Yes	System Pressure - 24.7 psi
10/23/2019	10:30	Yes	System pressure - 24.3 psi
10/28/2019	10:40	Yes	System Pressure - 24.1 psi
11/07/2019	10:30	Yes	System Pressure - 0 psi on PLC or Telemetry, need to replace pressure transmitter
11/27/2019	9:30	Yes	System Pressure - 25 psi on PLC, - psi on telemetry. Need to troubleshoot telemetry with PRM.
12/30/2019	10:15	No	Compressor seized, shutdown for repair.

Notes:

1. O&M = operation and maintenance.
2. psi = pounds per square inch.
3. Gray highlighting indicates that the telemetric monitoring was performed during the reporting period (May through December 2019).
4. PLC = Program logic control
5. PRM = Product Recovery Management, Inc.

Table 2-2
Sparge System Operational Readings
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

O&M Date	Hour Meter	Total Run Time	Vacuum (PI-1)	Temperature after Compressor (TI-1)	Temperature after Aftercooler (TI-2)	Biosparge									Air Sparge			
						Leg 1			Leg 2			Leg 5			Leg 3		Leg 4	
			Biosparge / Air Sparge			Differential	Flow Rate (FI-1)	Pressure (PI-2)	Differential	Flow Rate (FI-2)	Pressure (PI-3)	Flow Rate (FI-5)	Pressure (PI-6)	Biosparge Total Flow (Zone 1, Zone 2, and Zone 5 [expansion])	Flow Rate (FI-3)	Pressure (PI-4)	Flow Rate (FI-4)	Pressure (PI-5)
		(hrs/month)	(inches H_20)	(^oF)	(^oF)	(inches H_20)	(scfm)	(psi)	(inches H_20)	(scfm)	(psi)	(scfm)	(psi)	(scfm)	(scfm)	(psi)	(scfm)	(psi)
12/30/2008	9488.7	384.9	7.0	225	90	9	50.0	23.0	9	50.0	22.0	NI	NI	100	NI	NI	NI	NI
01/30/2009	9826.3	337.6	13.0	275	90	7	45.0	25.0	5	40.0	28.0	NI	NI	85	NI	NI	NI	NI
02/27/2009	10031.3	205.0	10.0	250	95	6	43.0	26.0	6	43.0	26.0	NI	NI	86	NI	NI	NI	NI
03/31/2009	10031.6	0.3	11.0	260	95	5	40.0	28.0	6	41.5	24.0	NI	NI	82	NI	NI	NI	NI
04/29/2009	10203.6	172.0	10.0	250	89	5	39.0	25.0	5	39.0	25.0	NI	NI	78	NI	NI	NI	NI
05/29/2009	10380.6	177.0	NR	150	110	5	39.0	27.0	4	42.0	28.0	NI	NI	81	NI	NI	NI	NI
06/29/2009	10609.9	229.3	5.0	225	90	5	39.0	22.0	5	39.0	25.0	NI	NI	78	NI	NI	NI	NI
08/12/2009	89.3	89.3	10.0	285	122	5	38.0	25.0	1	17.0	25.0	NI	NI	55	NI	NI	NI	NI
09/08/2009	236.3	147.0	10.0	240	90	5	38.0	25.0	5	38.0	25.0	NI	NI	76	NI	NI	NI	NI
09/30/2009	541.0	304.7	10.0	245	95	5	38.0	24.0	5	38.0	25.0	NI	NI	76	NI	NI	NI	NI
10/27/2009	722.5	181.5	9.0	249	95	5	38.0	24.0	5	38.0	25.0	NI	NI	76	NI	NI	NI	NI
11/23/2009	926.6	204.1	10.0	250	85	5	38.0	25.0	5	38.0	25.0	NI	NI	76	NI	NI	NI	NI
12/31/2009	1428.9	502.3	5.0	225	85	5	37.5	23.0	5	38.0	25.0	NI	NI	76	NI	NI	NI	NI
01/29/2010	1704.7	275.8	5.0	230	75	5	38.5	25.0	5	38.0	24.0	NI	NI	77	NI	NI	NI	NI
03/02/2010	2120.5	415.8	5.0	195	80	5	37.0	22.0	5	38.0	24.0	NI	NI	75	NI	NI	NI	NI
03/19/2010	2243.2	122.7	6.0	180	75	5	37.0	22.0	5	37.0	22.0	NI	NI	74	NI	NI	NI	NI
04/20/2010	2589.1	345.9	16.6	213	104	3.3	30.0	24.2	1.1	20.0	23.7	NI	NI	50	NI	NI	NI	NI
05/28/2010	3005.2	416.1	17.0	230	115	5	38.0	24.0	3.5	33.0	23.5	NI	NI	71	NI	NI	NI	NI
06/30/2010	3370.4	365.2	17.3	225	125	5	38.0	24.0	3.5	32.0	23.0	NI	NI	70	NI	NI	NI	NI
07/29/2010	3687.0	316.6	0.0	150	85	5	38.0	24.0	3.5	30.0	20.0	NI	NI	68	NI	NI	NI	NI
08/28/2010	4002.4	315.4	5.0	145	80	4.5	36.0	23.0	3	30.0	21.0	NI	NI	66	NI	NI	NI	NI
09/25/2010	4262.3	259.9	5.0	250	98	3.5	32.0	25.0	3	30.0	25.0	NI	NI	62	NI	NI	NI	NI
10/29/2010	4632.6	370.3	3.6	180	104	3.8	33.0	24.0	1.2	19.0	24.5	NI	NI	52	NI	NI	NI	NI
11/29/2010	4985.0	352.4	5.0	165	100	4	34.0	25.0	2.5	27.0	25.0	NI	NI	61	NI	NI	NI	NI
12/23/2010	5238.1	253.1	4.0	220	95	1.5	21.0	23.9	3	30.0	24.6	NI	NI	51	NI	NI	NI	NI
01/26/2011	5609.0	370.9	4.2	220	98	3.2	31.0	24.8	1.1	19.0	25.9	NI	NI	50	NI	NI	NI	NI
03/01/2011	5828.7	219.7	3.5	190	95	2.5	27.0	24.5	2	24.0	25.5	NI	NI	51	NI	NI	NI	NI
04/01/2011	6164.0	335.3	4.0	220	95	3.5	32.0	24.5	2	24.5	25.0	NI	NI	57	NI	NI	NI	NI
04/26/2011	6438.0	274.0	4.0	210	120	3	29.0	24.0	2	24.5	25.0	NI	NI	54	NI	NI	NI	NI
05/31/2011	6822.3	384.3	4.5	250	130	2.5	27.0	24.0	1	17.0	24.5	NI	NI	44	NI	NI	NI	NI
06/23/2011	7075.8	253.5	3.0	249	126	2.5	27.0	24.0	2	24.0	25.0	NI	NI	51	NI	NI	NI	NI
07/27/2011	7448.6	372.8	3.0	225	140	2.3	25.5	24.0	2	24.0	25.0	NI	NI	50	NI	NI	NI	NI
08/29/2011	7757.6	309.0	3.0	175	95	3	30.0	25.0	2.5	27.0	24.5	NI	NI	57	NI	NI	NI	NI
09/28/2011	7974.9	217.3	3.5	220	125	2.2	25.0	24.5	1	17.0	24.5	NI	NI	42	NI	NI	NI	NI
10/24/2011	8226.9	252.0	2.0	215	110	2.3	26.0	25.0	1.5	21.0	25.0	NI	NI	47	NI	NI	NI	NI
11/21/2011	8532.1	305.2	3.5	225	115	3	30.0	25.0	1	17.0	26.0	NI	NI	47	NI	NI	NI	NI
12/30/2011	9003.1	471.0	2.0	190	68	3	29.0	22.0	2	23.0	23.0	NI	NI	52	NI	NI	NI	NI

Sparge System Operational Readings
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

O&M Date	Hour Meter	Total Run Time	Vacuum (PI-1) Biosparge / Air Sparge		Temperature after Compressor (TI-1)	Temperature after Aftercooler (TI-2)	Biosparge									Air Sparge			
							Leg 1			Leg 2			Leg 5			Leg 3		Leg 4	
							Differential	Flow Rate (FI-1)	Pressure (PI-2)	Differential	Flow Rate (FI-2)	Pressure (PI-3)	Flow Rate (FI-5)	Pressure (PI-6)	Biosparge Total Flow (Zone 1, Zone 2, and Zone 5 [expansion])	Flow Rate (FI-3)	Pressure (PI-4)	Flow Rate (FI-4)	Pressure (PI-5)
		(hrs/month)	(inches H_20)		(^oF)	(^oF)	(inches H_20)	(scfm)	(psi)	(inches H_20)	(scfm)	(psi)	(scfm)	(psi)	(scfm)	(scfm)	(psi)	(scfm)	(psi)
05/30/2012	9147.7	144.6	3.0		200	130	3	31.0	27.0	3	30.0	25.0	NI	NI	61	NI	NI	NI	NI
06/29/2012	9472.9	325.2	4.0		290	115	7	46.0	26.0	2	24.0	26.0	NI	NI	70	NI	NI	NI	NI
08/28/2012	9764.5	291.6	3.5		340	130	NI	31.0	27.5	NI	31.0	30.0	NI	NI	62	65.0	29.0	70.0	26.0
08/29/2012	9784.1	19.6	3.5		345	130	NI	33.0	28.5	NI	33.0	30.0	NI	NI	66	66.0	28.0	70.0	26.0
08/30/2012	9805.6	21.5	3.5		325	126	NI	37.0	29.5	NI	25.0	28.5	NI	NI	62	65.0	28.0	68.0	27.0
09/07/2012	9970.9	165.3	4.5		375	125	NI	NR	28.0	NI	25.0	28.0	NI	NI	NR	65.0	26.0	70.0	26.0
09/14/2012	10128.4	157.5	3.5		340	130	NI	38.0	29.0	NI	38.0	31.0	NI	NI	76	70.0	26.0	70.0	24.0
09/21/2012	10288.1	159.7	1.5		325	125	NI	35.0	28.0	NI	37.0	29.0	NI	NI	72	68.0	25.0	69.0	26.0
06/12/2013	10370.8	82.7	3.5		200	95	NI	NR	NR	NI	NR	NR	NI	NI	NR	85.0	19.0	85.0	21.0
06/14/2013	10418.3	47.5	2.0		130	100	NI	30.0	27.0	NI	30.0	27.0	NI	NI	60	NR	NR	NR	NR
07/17/2013	11192.0	773.7	2.0	4.0	345	120	NI	43.0	27.0	NI	44.0	28.0	NI	NI	87	146.0	23.5	147.0	24.0
07/18/2013	11200.7	8.7	2.0	4.0	290	105	NI	46.0	27.0	NI	42.0	29.0	NI	NI	88	144.0	21.5	147.0	23.0
07/19/2013	11207.6	6.9	2.0	3.0	370	135	NI	39.0	26.5	NI	41.0	29.0	NI	NI	80	126.0	21.5	128.0	23.0
07/26/2013	11374.9	167.3	1.5	4.0	370	140	NI	39.0	26.5	NI	32.0	28.0	NI	NI	71	141.0	22.0	144.0	23.0
08/02/2013	11542.2	167.3	1.5	4.0	345	140	NI	38.0	24.0	NI	32.0	28.0	NI	NI	70	142.0	22.5	138.0	23.0
08/09/2013	11711.5	169.3	1.5	4.0	345	135	NI	39.0	26.0	NI	32.0	28.5	NI	NI	71	143.0	23.0	143.0	23.5
08/16/2013	11878.6	167.1	1.5	4.0	340	140	NI	31.0	25.0	NI	33.0	29.5	NI	NI	64	142.0	22.5	143.0	23.0
10/29/2013	12753.6	875.0	1.5	4.0	335	135	NI	36.0	25.5	NI	32.0	28.0	NI	NI	68	135.0	22.5	128.0	23.0
11/26/2013	13425.9	672.3	2.0	4.5	340	115	NI	32.0	25.5	NI	32.0	27.0	NI	NI	64	136.0	22.0	134.0	23.0
12/30/2013	14241.4	815.5	1.5	4.5	320	120	NI	36.0	25.5	NI	32.0	27.0	NI	NI	68	139.0	22.0	137.0	22.5
01/31/2014	14984.2	742.8	2.5	6.0	315	120	NI	33.0	25.5	NI	32.0	27.0	NI	NI	65	139.0	21.5	133.0	23.0
02/26/2014	15608.6	624.4	4.5	9.5	320	115	NI	32.0	25.5	NI	32.0	27.0	NI	NI	64	135.0	21.5	130.0	22.5
03/28/2014	16329.8	721.2	8.0	16.0	325	130	NI	33.0	25.5	NI	29.0	27.0	NI	NI	62	132.0	21.5	127.0	22.0
05/05/2014	17241.9	912.1	4.0	9.0	340	140	NI	31.0	25.5	NI	29.0	27.5	NI	NI	60	128.0	22.5	135.0	23.0
05/30/2014	17840.7	598.8	NR	NR	315	130	NI	33.0	25.5	NI	32.0	26.0	NI	NI	65	135.0	22.0	132.0	23.0
06/27/2014	18511.6	670.9	1.0	4.0	310	130	NI	38.0	25.5	NI	27.0	26.0	NI	NI	65	135.0	22.0	132.0	23.0
07/30/2014	19308.7	797.1	1.0	3.5	310	130	NI	36.0	25.0	NI	27.0	26.0	NI	NI	63	143.0	23.0	127.0	22.0
08/28/2014	19990.6	681.9	1.0	4.0	315	135	NI	31.0	25.5	NI	29.0	27.5	NI	NI	60	134.0	22.5	131.0	23.0
09/29/2014	20725.2	734.6	1.0	3.5	285	105	NI	31.0	26.5	NI	28.0	29.0	NI	NI	59	133.0	24.0	131.0	24.5
10/29/2014	21406.2	681.0	1.0	3.8	305	110	NI	32.0	25.0	NI	29.0	25.5	NI	NI	61	134.0	24.5	131.0	23.0
11/26/2014	21985.8	579.6	1.0	3.5	325	140	NI	31.0	26.5	NI	29.0	28.0	NI	NI	60	131.0	22.0	129.0	23.5
12/30/2014	22711.5	725.7	1.0	2.5	320	140	NI	32.0	27.0	NI	29.0	29.0	NI	NI	61	131.0	22.5	129.0	23.0
01/29/2015	23284.1	572.6	1.0	2.5	315	125	NI	33.0	25.0	NI	33.0	30.0	NI	NI	66	134.0	23.0	130.0	23.5
02/27/2015	23906.8	622.7	1.0	4.0	290	120	NI	32.0	26.5	NI	30.0	29.0	NI	NI	62	143.0	22.5	141.0	23.0
03/30/2015	24617.9	711.1	1.0	4.0	295	120	NI	32.0	26.0	NI	30.0	30.0	NI	NI	62	143.0	22.0	137.0	22.5
04/29/2015	25286.2	668.3	1.0	4.0	350	155	NI	30.0	25.0	NI	28.0	28.0	NI	NI	58	123.0	20.5	131.0	21.5
05/29/2015	25972.0	685.8	1.0	4.0	305	125	NI	28.0	25.5	NI	29.0	28.0	NI	NI	57	134.0	21.5	132.0	22.5
07/28/2015	26735.0	763.0	1.0	4.0	350	110	NI	25.0	29.0	NI	29.0	25.5	NI	NI	54	67.0	20.5	68.0	21.0

Sparge System Operational Readings
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

O&M Date	Hour Meter	Total Run Time	Vacuum (PI-1) Biosparge / Air Sparge		Temperature after Compressor (TI-1)	Temperature after Aftercooler (TI-2)	Biosparge									Air Sparge			
							Leg 1			Leg 2			Leg 5			Leg 3		Leg 4	
							Differential	Flow Rate (FI-1)	Pressure (PI-2)	Differential	Flow Rate (FI-2)	Pressure (PI-3)	Flow Rate (FI-5)	Pressure (PI-6)	Biosparge Total Flow (Zone 1, Zone 2, and Zone 5 [expansion])	Flow Rate (FI-3)	Pressure (PI-4)	Flow Rate (FI-4)	Pressure (PI-5)
		(hrs/month)	(inches H_20)		(^oF)	(^oF)	(inches H_20)	(scfm)	(psi)	(inches H_20)	(scfm)	(psi)	(scfm)	(psi)	(scfm)	(scfm)	(psi)	(scfm)	(psi)
08/28/2015	27434.0	699.0	1.0	4.0	325	110	NI	32.0	27.0	NI	24.0	26.0	NI	NI	56	69.0	22.0	68.0	21.5
09/30/2015	28093.5	659.5	1.0	4.0	270	100	NI	29.0	25.5	NI	29.0	26.0	NI	NI	58	133.0	23.5	129.0	24.5
10/28/2015	28498.7	405.2	1.0	4.0	285	105	NI	19.0	24.5	NI	19.0	25.0	NI	NI	38	115.0	22.5	116.0	23.0
11/25/2015	29138.9	640.2	1.5	4.5	310	105	NI	19.0	24.5	NI	19.0	25.5	NI	NI	38	53.0	21.0	76.0	22.0
12/30/2015	29445.0	306.1	1.5	4.0	320	105	NI	19.0	24.5	NI	19.0	25.5	NI	NI	38	67.0	20.5	68.0	21.5
01/28/2016	30515.0	1070.0	1.5	4.5	310	100	NI	19.0	24.5	NI	21.0	25.5	**Leg 5 operational 2/24/16**		40	68.0	21.0	69.0	22.0
02/25/2016	31134.0	619.0	4.0	4.0	310	100	NI	22.0	25.0	NI	25.0	27.0	48.0	25.0	95	61.0	21.0	70.0	22.5
03/04/2016	31317.0	183.0	4.0	4.0	300	100	NI	29.0	25.0	NI	25.0	28.0	32.0	24.0	86	138.0	22.0	134.0	24.0
03/31/2016	31898.0	581.0	4.0	4.3	315	105	NI	24.0	25.0	NI	36.0	27.0	31.0	23.5	91	132.0	23.0	133.0	24.0
04/28/2016	32436.7	538.7	4.0	4.0	325	110	NI	23.0	24.0	NI	35.0	26.5	32.0	23.0	90	131.0	23.0	133.0	24.0
05/03/2017	32960.4	523.7	>20	>20	175	105	NI	28.0	23.0	NI	20.0	23.0	31.0	23.0	79	138.0	22.0	136.0	23.0
05/23/2017	33383.4	423.0	>20	>20	180	120	NI	15.0	21.0	NI	15.0	21.5	15.0	20.0	45	166.0	22.0	138.0	23.0
06/26/2017	34171.8	788.4	>20	>20	178	120	NI	19.0	22.0	NI	18.0	23.0	21.0	23.0	58	161.0	23.0	138.0	23.0
07/31/2017	34982.5	810.7	32.0	NR	175	113	NI	23.0	23.0	NI	20.0	23.0	23.0	23.0	66	NR	NR	NR	NR
08/31/2017	35623.9	641.4	28.0	24.0	175	110	NI	25.0	22.5	NI	15.0	23.0	30.0	22.0	70	170.0	23.0	162.0	23.0
09/26/2017	35780.4	156.5	28.0	25.0	180	110	NI	26.0	23.0	NI	23.0	23.5	34.0	23.0	83	162.0	23.0	143.0	25.0
10/24/2017	35901.0	120.6	28.0	28.0	160	100	NI	25.0	22.5	NI	16.0	23.0	31.0	22.0	72	171.0	23.0	144.0	25.0
11/27/2017	36529.3	628.3	100.0	95.0	175	110	NI	28.0	23.0	NI	19.0	23.0	31.0	23.0	78	173.0	24.5	147.0	23.0
12/20/2017	37057.8	528.5	44.5	20.0	174	105	NI	31.0	23.0	NI	31.0	24.0	19.0	23.0	81	168.0	22.0	140.0	23.5
01/30/2018	37946.1	888.3	23.0	24.5	145	70	NI	28.0	23.0	NI	20.0	24.5	29.0	23.0	77	177.0	23.5	164.0	25.0
02/27/2018	38360.8	414.7	21.5	23.5	170	106	NI	23.0	22.5	NI	19.0	24.0	28.0	22.5	70	157.0	22.5	148.0	23.5
03/27/2018	39031.0	670.2	23.5	26.0	165	100	NI	28.0	22.5	NI	19.0	24.0	31.0	22.5	78	157.0	23.5	156.0	23.0
04/24/2018	39710.5	679.5	20.0	24.0	155	100	NI	25.0	22.0	NI	19.0	23.0	31.0	22.0	75	156.0	23.0	155.0	22.5
05/22/2018	40046.1	335.6	23.0	NM	160	110	NI	23.0	22.0	NI	19.0	23.0	30.0	22.0	72	NM	NM	NM	NM
06/26/2018	40405.8	359.7	19.0	NM	140	105	NI	28.0	23.0	NI	19.0	24.0	34.0	22.5	81	NM	NM	NM	NM
07/23/2018	40601.4	195.6	20.5	NM	140	105	NI	19.0	22.0	NI	15.0	23.0	33.0	21.5	67	NM	NM	NM	NM
08/27/2018	41026.3	424.9	21.5	NM	150	105	NI	19.0	22.0	NI	19.0	24.5	27.0	21.5	65	NM	NM	NM	NM
09/25/2018	41315.9	289.6	19.5	NM	140	105	NI	15.0	21.0	NI	15.0	23.0	24.0	21.0	54	NM	NM	NM	NM
10/30/2018	41742.0	426.1	23.5	NM	180	115	NI	26.0	22.5	NI	27.0	25.0	30.0	21.5	83	NM	NM	NM	NM
11/20/2018	41863.4	121.4	17.5	NM	130	99	NI	18.0	22.0	NI	19.0	25.0	18.0	21.5	55	NM	NM	NM	NM
12/18/2018	42209.0	345.6	24.0	NM	170	105	NI	21.0	22.0	NI	27.0	25.0	18.0	21.5	66	NM	NM	NM	NM
01/31/2019	42253.9	44.9	25.0	NM	171	110	NI	19.0	23.0	NI	30.0	25.0	18.0	21.0	67	NM	NM	NM	NM
02/28/2019	42606.1	352.2	20.0	NM	169	110	NI	20.0	22.5	NI	27.0	26.0	21.0	21.5	68	NM	NM	NM	NM
03/27/2019	42791.0	184.9	22.5	NM	162	105	NI	23.0	22.0	NI	24.0	24.0	21.0	21.5	68	NM	NM	NM	NM
04/23/2019	43116.0	325.0	21.0	NM	162	100	NI	25.0	22.0	NI	22.0	24.0	24.0	21.0	71	NM	NM	NM	NM
05/29/2019	43548.6	432.6	20.0	NM	142	105	NI	23.0	22.0	NI	19.0	24.5	24.0	21.5	66	NM	NM	NM	NM
06/27/2019	43895.0	346.4	25.0	NM	178	106	NI	22.0	22.5	NI	21.0	24.5	24.0	22.0	67	NM	NM	NM	NM
07/31/2019	44305.3	410.3	25.0	NM	175	115	NI	21.0	22.5	NI	19.0	24.5	21.0	21.5	61	NM	NM	NM	NM

Sparge System Operational Readings
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

O&M Date	Hour Meter	Total Run Time (hrs/month)	Vacuum (PI-1) Biosparge / Air Sparge (inches H_20)		Temperature after Compressor (TI-1) (^oF)	Temperature after Aftercooler (TI-2) (^oF)	Biosparge									Air Sparge			
							Leg 1			Leg 2			Leg 5			Leg 3		Leg 4	
							Differential (inches H_20)	Flow Rate (FI-1) (scfm)	Pressure (PI-2) (psi)	Differential (inches H_20)	Flow Rate (FI-2) (scfm)	Pressure (PI-3) (psi)	Flow Rate (FI-5) (scfm)	Pressure (PI-6) (psi)	Biosparge Total Flow (Zone 1, Zone 2, and Zone 5 [expansion]) (scfm)	Flow Rate (FI-3) (scfm)	Pressure (PI-4) (psi)	Flow Rate (FI-4) (scfm)	Pressure (PI-5) (psi)
08/27/2019	44627.6	322.3	23.5	NM	175	110	NI	18.0	22.5	NI	17.0	24.5	21.0	21.5	56	NM	NM	NM	NM
09/24/2019	44877.1	249.5	25.0	NM	170	105	NI	17.0	22.0	NI	17.0	24.0	21.0	21.5	55	NM	NM	NM	NM
10/28/2019	45288.0	410.9	24.0	NM	175	110	NI	21.6	23.0	NI	17.0	23.0	17.0	23.0	56	NM	NM	NM	NM
11/04/2019	45288.5	0.5	25.0	NM	175	100	NR	19.5	23.0	NR	20.0	25.0	22.9	21.5	56	NM	NM	NM	NM
11/26/2019	45553.4	264.9	25.0	NM	160	70	NR	24.6	25.0	NR	20.0	23.0	23.5	21.5	68	NM	NM	NM	NM
12/30/2019	45573.2	19.8	Compressor seized upon arrival. Pending Repair in 2020.																

Notes:

1. hrs = hours.
2. inches H2O = inches of water.
3. oF = degrees Fahrenheit.
4. psi = pounds per square inch.
5. scfm = standard cubic feet per minute.
6. NI = not installed.
7. NR = not recorded.
8. NM = that air sparge operational parameters were not collected because the air sparge system was turned off following the April 2018 O&M.
9. hrs/month = hours per month.
10. O&M = Operation and maintenance.
11. Flow Meter (FI-1) was broken on 7 September 2012, so a flow rate was not recorded.
12. Variable frequency drive installed (30 May 2013) and compressor programmed to operate at different capacities for biosparge and air sparge legs (12 July 2013).
13. Flow rates reported after 17 July 2013 are corrected because observed flow rates are based on standard temperature and pressure.
14. Flow rates reported for 28 July 2015 event are low due to a broken pressure relief valve.
15. Vacuum gauge was replaced on 31 August 2017 after it was determined that the existing vacuum gauge was broken and was unable to measure the applied vacuum.
16. Vacuum reported on 27 November 2017 was high due to a broken vacuum gauge. This was replaced with a magnehelic gauge on 20 December 2017.
17. Gray highlighting indicates that the operational parameters were collected during the reporting period (May through December 2019).

Table 2-3
Biosparge Barrier Well Head Pressure and Air Flow Measurements
Mobile Launch Platform/Vehicle Assembly buildig Area, SWMU 056

	ASW01		ASW02		ASW03		ASW04		ASW05		ASW06		ASW07		ASW08		ASW09		ASW10	
Screen Interval (ft BLS)	**48 to 50.5**		**48 to 50.5**		**48 to 50.5**		**48 to 50.5**		**48 to 50.5**		**48 to 50.5**		**48 to 50.5**		**48 to 50.5**		**48 to 50.5**		**48 to 50.5**	
Sample Date	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**
05/19/2007	18.20	5.51	15.90	3.64	19.90	4.07	20.00	5.76	18.70	5.56	17.50	4.13	18.90	3.95	18.10	3.88	18.00	3.87	15.70	5.11
06/28/2007	21.00	6.55	20.20	5.87	20.50	5.77	20.50	5.63	21.50	6.61	22.00	7.18	21.60	6.49	21.90	6.67	22.20	6.71	22.00	6.68
07/30/2007	19.50	4.92	18.50	5.53	19.20	5.49	19.00	5.16	18.80	4.98	17.90	5.12	18.70	4.97	19.00	5.60	18.70	5.41	20.20	4.08
08/28/2007	20.60	5.81	20.01	5.73	20.40	5.78	19.90	5.71	20.10	5.74	20.00	6.25	19.70	5.68	20.00	5.72	20.40	5.78	20.30	5.76
11/27/2007	20.20	4.11	20.00	5.78	19.70	4.97	19.90	4.07	20.00	5.01	20.00	5.41	19.10	4.90	20.80	5.11	19.80	5.75	19.90	5.00
12/31/2007	19.50	4.97	19.50	4.97	18.90	4.89	19.00	4.90	20.00	5.03	19.60	6.18	19.50	5.29	19.80	5.00	19.40	5.11	19.50	5.12
01/31/2008	21.00	4.41	17.00	4.86	18.00	4.08	20.00	5.61	20.00	6.08	19.00	5.27	19.00	5.14	19.00	6.08	21.00	6.24	20.00	5.27
02/29/2008	20.00	5.27	20.00	5.27	19.00	5.14	20.00	5.27	20.00	4.30	19.00	5.27	20.00	5.27	19.00	5.27	20.00	5.27	19.00	5.14
03/31/2008	21.00	6.24	19.00	5.14	20.00	5.27	20.00	4.30	19.00	5.14	19.00	5.27	19.00	5.14	19.00	5.14	19.00	5.93	19.00	5.14
04/29/2008	19.30	5.17	19.00	5.13	19.20	4.21	19.00	5.92	19.20	5.95	19.10	5.29	19.00	5.92	19.50	5.20	19.10	5.14	19.30	5.17
05/29/2008	16.50	5.52	17.00	4.86	17.00	4.86	16.90	4.84	16.60	3.92	16.60	4.93	17.00	4.85	16.70	3.93	16.80	4.83	16.90	4.84
06/27/2008	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
07/29/2008	15.90	4.70	15.00	4.24	14.30	4.14	15.00	4.56	15.50	3.78	15.30	3.86	15.20	3.75	15.70	4.34	15.20	3.75	15.50	4.63
08/27/2008	17.00	3.96	16.90	4.83	16.43	4.44	16.53	4.62	16.93	4.84	16.72	4.42	16.00	4.71	16.13	4.72	16.55	5.24	16.77	4.31
10/23/2008	19.30	5.17	19.30	6.68	19.20	5.96	19.40	4.83	19.20	5.16	19.30	5.82	19.20	5.16	19.20	5.96	19.30	5.17	19.40	5.19
11/25/2008	19.72	6.08	18.12	5.05	19.68	5.26	19.66	4.29	19.66	4.50	19.64	5.36	19.62	5.25	19.54	6.77	19.52	6.05	19.53	6.76
12/30/2008	20.02	6.84	19.97	5.80	19.99	6.11	19.90	5.29	20.01	6.12	20.01	6.25	19.95	6.83	19.96	5.75	19.93	6.11	19.90	6.82
01/30/2009	19.98	6.84	19.92	6.11	19.96	6.41	19.88	5.28	19.91	5.28	19.90	6.81	19.85	6.09	19.80	6.08	19.77	6.08	19.84	6.81
02/27/2009	20.05	7.49	19.79	6.79	20.00	6.11	19.93	6.10	20.09	6.13	19.97	6.98	20.00	6.11	19.91	6.10	19.89	6.09	19.99	6.11
03/31/2009	19.42	4.24	19.39	4.63	19.41	5.68	19.41	5.70	19.43	4.64	19.46	4.77	19.48	5.37	19.51	5.04	19.41	4.66	19.61	5.06
04/29/2009	19.19	5.96	19.25	5.97	19.30	6.68	19.35	7.08	19.65	6.74	19.50	6.17	19.53	6.01	19.79	5.06	19.23	7.06	19.60	6.73
05/29/2009	20.00	5.01	19.95	5.77	19.90	6.45	19.50	5.71	19.97	7.07	20.10	5.42	19.92	5.77	19.99	5.01	20.00	5.48	19.92	5.00
06/29/2009	19.25	5.67	19.00	4.87	19.10	6.92	18.95	3.97	19.30	6.34	19.19	7.49	19.98	5.77	20.05	4.66	19.14	6.92	19.25	6.33
08/12/2009	19.90	1.80	19.85	1.27	19.82	2.53	19.83	3.35	19.89	1.79	19.90	2.41	19.70	2.20	19.70	5.34	19.68	3.34	19.60	6.29
09/08/2009	22.30	6.82	21.90	7.40	22.70	5.99	22.30	6.10	20.50	5.85	20.30	5.07	21.70	5.70	20.90	5.90	21.30	5.17	21.20	5.79
09/30/2009	22.90	6.02	23.05	6.19	22.50	4.93	22.30	5.78	22.00	6.05	22.30	5.71	22.50	5.79	20.80	5.88	21.80	4.85	21.05	5.12
10/27/2009	22.90	6.17	23.00	5.35	22.50	5.29	22.30	5.27	23.05	6.63	23.15	6.72	23.18	5.88	24.00	5.99	24.01	7.07	22.30	5.78
11/23/2009	20.90	5.90	20.00	5.00	21.10	5.62	19.90	5.90	20.50	4.53	20.20	5.06	20.00	4.65	20.20	5.03	21.00	4.77	20.30	4.51
12/31/2009	20.20	5.82	21.00	6.63	21.00	7.02	20.55	6.56	19.97	6.47	19.98	6.69	20.00	6.47	21.25	7.06	20.15	6.50	20.05	6.22
01/29/2010	21.80	6.06	21.00	6.65	21.20	6.68	21.90	6.79	21.00	7.04	21.10	7.45	21.50	6.73	21.25	7.08	21.80	6.06	21.50	6.45
03/02/2010	20.00	6.47	21.05	7.03	21.00	7.27	21.10	7.28	21.05	6.37	20.80	7.12	21.10	7.28	21.20	7.05	21.15	6.66	21.00	6.63
03/19/2010	19.21	9.05	19.65	7.08	19.64	5.78	19.68	5.80	19.58	7.09	17.61	5.86	19.65	5.80	19.55	8.14	19.55	5.76	19.55	8.14
04/20/2010	19.41	4.02	19.42	5.73	19.44	4.03	19.43	4.05	19.41	8.08	19.38	6.15	19.36	4.04	19.35	9.90	19.38	6.98	19.37	4.03
05/28/2010	19.33	4.89	19.30	3.99	19.31	4.55	19.29	3.59	19.35	2.83	19.27	3.07	19.25	10.60	19.23	4.56	19.26	4.37	19.26	4.00
06/30/2010	19.10	2.17	19.03	2.34	18.99	1.97	19.02	2.93	19.08	2.50	19.04	2.89	18.98	1.98	18.95	5.72	18.99	2.50	19.01	4.99
07/29/2010	20.20	5.76	19.70	6.98	20.10	4.07	20.00	5.73	19.00	6.85	19.50	9.75	20.10	7.05	21.00	5.88	19.80	5.71	20.10	7.04
08/28/2010	21.90	7.35	22.00	6.03	21.50	5.98	21.00	7.22	22.00	6.03	21.50	7.93	21.30	7.29	21.50	5.95	21.70	7.33	22.00	6.03
09/25/2010	20.00	3.64	19.50	3.81	19.30	3.34	19.90	3.63	21.00	3.48	20.90	4.04	19.90	3.86	19.80	4.05	20.20	3.65	20.00	3.14
10/29/2010	19.50	2.01	20.00	2.41	20.20	1.29	83.00	2.63	21.20	2.65	19.80	2.60	19.50	2.37	20.30	4.00	19.80	2.72	19.60	5.13
11/29/2010	20.00	5.00	20.00	4.08	20.30	3.67	20.50	4.52	20.90	2.95	19.90	3.11	19.20	4.19	20.00	4.99	19.90	4.07	19.70	4.96
12/23/2010	19.21	3.15	19.15	1.81	19.20	2.57	19.21	2.87	19.23	2.23	19.21	2.90	19.17	2.72	19.19	4.64	19.20	3.15	19.19	3.15
01/26/2011	20.02	2.07	20.05	2.26	20.03	2.93	20.03	2.45	19.99	2.44	19.97	3.12	19.96	2.77	20.04	4.24	19.93	2.26	19.94	5.69
03/01/2011	19.40	2.57	19.39	3.62	19.40	2.71	19.41	3.74	19.40	3.00	19.37	3.07	19.41	3.84	19.38	5.27	19.36	3.72	19.55	5.66
04/01/2011	19.89	5.21	19.70	3.42	19.75	2.90	19.75	4.10	19.73	4.67	19.74	3.40	19.84	4.86	19.73	4.29	19.70	5.00	19.72	5.01
04/26/2011	19.28	3.11	19.27	2.54	19.51	2.85	19.24	4.39	19.25	3.11	19.23	3.35	19.35	2.54	19.27	4.00	19.21	3.58	19.22	5.94
05/31/2011	19.00	2.51	18.90	2.51	19.00	2.17	19.01	2.80	18.94	2.50	18.92	2.35	18.91	1.77	18.93	4.15	18.93	2.79	18.87	5.44
06/23/2011	18.95	2.79	19.05	2.17	20.00	2.87	18.72	2.77	18.21	2.12	18.14	2.66	18.13	2.12	18.75	2.78	20.12	1.82	20.05	2.23
07/27/2011	19.09	1.77	19.12	2.17	19.19	2.18	20.09	1.29	19.21	2.18	19.21	1.94	19.02	2.17	19.23	2.18	19.16	2.18	19.21	1.78
08/29/2011	19.29	1.79	20.54	1.31	20.16	2.25	20.05	2.59	19.10	2.52	19.00	3.04	19.20	2.53	18.92	2.81	19.21	2.19	19.09	2.52
09/28/2011	19.80	2.86	19.96	2.23	19.82	2.22	19.83	3.74	19.82	1.81	19.83	2.78	19.77	2.86	19.81	4.61	19.80	3.38	19.77	3.38
10/24/2011	18.93	3.77	19.51	3.60	19.92	4.64	19.05	4.37	19.29	4.22	19.34	2.75	19.25	3.59	19.64	4.06	19.37	4.41	19.29	4.76
11/21/2011	19.80	2.23	19.78	2.87	19.84	2.23	19.82	3.61	19.81	2.57	19.85	1.97	19.76	2.22	19.77	4.45	19.75	3.40	19.75	6.45
12/30/2011	19.80	2.92	20.12	2.93	21.23	2.71	20.21	2.28	21.12	2.69	19.92	2.41	19.78	2.60	20.21	2.28	19.96	1.85	20.00	2.62
05/30/2012	19.50	2.22	20.25	1.85	20.05	2.25	19.98	1.84	19.59	2.23	20.22	3.14	19.69	2.23	20.19	1.85	19.25	2.21	19.96	2.60

Biosparge Barrier Well Head Pressure and Air Flow Measurements
Mobile Launch Platform/Vehicle Assembly buildig Area, SWMU 056

	ASW01		ASW02		ASW03		ASW04		ASW05		ASW06		ASW07		ASW08		ASW09		ASW10	
Screen Interval (ft BLS)	48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5	
Sample Date	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)
06/29/2012	21.45	5.98	20.92	3.74	20.84	4.16	20.78	6.44	20.70	2.27	21.19	4.07	20.76	4.15	20.61	5.39	20.60	3.92	21.10	4.77
08/28/2012	20.83	2.93	20.63	3.90	20.62	5.81	20.61	5.03	20.57	2.59	20.58	3.47	20.54	5.18	20.55	6.38	20.55	3.18	20.48	6.49
08/29/2012	20.20	3.67	20.13	4.09	20.22	3.43	20.85	6.32	20.25	3.44	20.24	3.72	20.25	4.85	20.23	6.49	20.27	3.18	20.26	6.49
08/30/2012	20.49	3.47	20.44	4.34	20.43	3.46	20.41	6.27	20.32	3.45	20.30	3.98	20.22	4.11	20.24	6.51	20.22	3.44	20.14	6.49
09/07/2012	20.00	2.88	19.90	3.15	19.80	2.87	20.10	3.42	20.00	2.58	19.50	3.08	20.10	2.58	20.00	2.88	19.90	2.57	19.90	2.57
09/14/2012	19.88	2.23	19.89	2.59	19.91	2.89	19.90	3.42	19.86	3.17	19.90	3.41	19.92	3.42	19.88	3.87	19.95	2.89	19.90	3.65
09/21/2012	19.85	2.89	19.79	3.16	19.80	1.83	19.75	3.16	19.90	2.59	19.82	3.41	19.29	3.60	19.53	1.81	19.91	2.24	19.80	2.58
06/12/2013	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
06/14/2013	20.35	3.17	20.32	3.88	20.33	2.58	20.31	4.29	20.31	2.24	20.24	3.14	20.22	4.28	20.20	4.99	20.22	2.89	20.21	4.83
07/17/2013	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
07/18/2013	20.20	1.83	20.26	2.59	20.23	1.30	20.18	4.09	20.13	1.29	20.11	1.98	20.09	5.63	20.10	4.28	20.09	1.82	20.05	5.77
07/19/2013	20.02	1.83	20.01	2.24	20.16	1.30	20.08	4.67	20.05	1.29	19.90	1.97	19.88	4.99	19.87	4.26	19.82	1.82	19.86	5.60
07/26/2013	19.58	1.28	19.75	2.57	19.64	1.81	19.78	5.75	19.79	1.82	19.90	2.79	19.60	4.43	19.72	4.63	19.76	2.22	19.54	4.25
08/02/2013	19.26	2.18	19.67	2.54	19.23	2.18	19.22	3.55	19.26	1.78	19.63	2.77	19.64	4.02	19.50	3.58	19.49	2.83	19.41	2.83
08/09/2013	20.34	1.83	20.33	3.17	20.36	2.59	20.30	2.89	20.24	1.82	20.29	2.81	20.22	3.41	20.31	4.09	20.25	3.16	20.29	3.16
08/16/2013	19.77	1.28	19.78	2.56	19.74	1.81	19.75	2.56	19.69	2.21	19.77	2.78	19.79	3.39	19.80	3.14	19.77	2.55	19.81	2.56
10/29/2013	19.95	2.59	19.97	3.41	20.01	1.83	19.99	2.59	19.97	2.58	19.92	3.41	19.98	3.16	19.95	3.88	19.95	2.89	19.92	1.83
11/26/2013	19.74	1.83	19.78	2.24	19.75	1.29	19.74	2.24	19.72	1.83	19.71	2.40	19.74	3.16	19.73	3.17	19.76	2.24	19.71	2.24
12/30/2013	19.69	2.25	19.60	2.90	19.58	2.24	19.59	2.59	19.60	1.84	19.64	2.77	19.59	3.17	19.57	3.66	19.62	3.19	19.56	2.24
01/31/2014	19.90	1.85	19.87	2.62	19.85	1.85	19.85	2.26	19.82	1.85	19.79	2.41	19.79	3.45	19.77	3.69	19.72	2.61	19.73	2.26
02/26/2014	19.62	1.83	19.60	2.59	19.63	NR	19.60	NR	19.66	NR	19.65	NR	19.63	NR	19.60	NR	19.61	NR	19.63	NR
03/28/2014	19.54	1.81	19.42	2.21	19.31	1.80	19.34	2.55	19.30	1.27	19.31	3.63	19.29	2.21	19.30	3.12	19.28	2.84	19.26	2.20
05/05/2014	19.94	1.29	19.91	2.22	19.87	1.28	19.90	2.22	19.87	1.28	19.85	3.11	19.81	2.22	19.82	2.87	19.80	3.62	19.75	1.81
05/30/2014	19.32	1.26	19.29	2.52	19.30	1.26	19.30	2.52	19.27	1.26	19.23	2.74	19.23	2.52	19.22	3.55	19.25	3.08	19.24	2.51
06/27/2014	19.83	1.28	19.79	2.21	19.80	1.28	19.76	1.27	19.79	1.28	19.71	2.40	19.72	2.55	19.69	2.20	19.63	3.81	19.63	2.84
07/30/2014	19.92	1.28	19.69	1.28	19.05	2.17	19.69	1.28	19.25	1.26	19.55	2.39	19.69	2.21	19.63	2.20	19.61	2.54	19.50	2.54
08/28/2014	19.83	2.21	19.86	1.81	19.96	3.39	19.99	2.56	20.00	1.81	19.95	2.42	19.95	2.56	19.93	1.81	19.95	1.81	19.93	1.81
09/29/2014	20.36	1.84	20.41	1.83	20.37	1.30	20.39	1.30	20.40	1.83	20.33	2.44	20.34	1.83	20.32	1.83	20.29	2.24	20.28	2.24
10/29/2014	20.50	1.31	20.25	1.83	20.35	1.30	21.18	1.88	20.30	1.83	20.29	1.99	20.25	1.29	21.09	1.87	20.25	2.25	20.25	1.83
11/26/2014	20.06	1.83	19.99	2.24	20.03	1.30	20.06	2.60	20.05	1.30	19.98	2.42	20.00	1.83	20.01	1.84	20.02	2.59	20.03	2.60
12/30/2014	20.00	1.83	20.02	1.30	20.03	1.84	20.05	1.30	20.01	1.84	20.04	1.98	20.02	2.25	20.02	1.84	20.03	2.25	20.03	1.84
01/29/2015	21.02	2.31	20.55	1.86	20.46	2.28	20.00	1.84	19.75	2.58	20.25	2.43	20.35	1.85	20.19	2.26	21.00	2.30	20.23	1.85
02/27/2015	19.91	1.32	19.88	2.63	19.87	1.31	19.85	2.28	19.85	1.32	19.81	1.97	19.79	1.31	19.79	1.32	19.77	1.86	19.79	1.85
03/30/2015	19.48	2.55	19.44	3.37	19.73	2.86	19.70	2.87	19.69	2.22	19.67	2.77	19.63	2.57	19.59	2.87	19.64	3.39	19.59	3.38
04/29/2015	19.34	2.20	19.51	3.12	19.52	2.55	19.53	2.21	19.48	3.61	19.51	3.38	19.54	2.55	19.53	2.56	19.54	3.61	19.54	3.13
05/29/2015	19.33	1.78	19.37	1.79	19.35	2.19	19.29	1.78	19.27	1.78	19.26	1.94	19.20	1.26	19.23	1.25	19.19	1.77	19.24	1.25
07/28/2015	19.88	1.29	19.86	2.22	19.66	2.54	19.65	2.83	19.67	2.84	19.67	3.10	19.67	2.84	19.66	2.20	19.64	1.79	19.62	2.54
08/28/2015	20.33	2.90	20.23	2.25	20.25	2.25	20.25	2.90	20.25	3.18	20.22	3.72	20.28	1.84	20.32	2.25	20.28	1.84	20.29	1.30
09/30/2015	19.96	1.82	20.09	1.29	20.12	1.83	20.08	1.83	20.08	2.24	20.10	2.42	20.02	1.83	20.08	2.24	20.09	1.83	20.03	1.82
10/28/2015	19.65	1.25	19.65	1.28	19.66	0.91	19.66	0.91	19.64	1.28	19.67	1.38	19.66	1.28	19.66	1.28	19.71	1.28	19.68	0.91
11/25/2015	19.68	1.82	19.70	2.23	19.71	2.23	19.72	2.23	19.71	1.82	19.70	1.96	19.66	1.82	19.71	2.23	19.68	2.23	19.68	1.82
12/30/2015	19.50	1.81	19.48	2.21	19.45	1.81	19.41	2.21	19.43	1.80	19.39	2.38	19.37	2.21	19.48	1.81	19.45	2.56	19.38	1.80
01/28/2016	19.71	1.84	19.72	1.84	19.69	1.59	19.70	1.60	19.72	2.61	19.69	2.19	19.72	1.84	19.70	2.44	19.68	2.26	19.73	2.44
02/25/2016	19.94	2.27	19.91	2.63	19.91	2.27	19.95	2.63	19.91	2.27	19.94	2.61	19.94	1.86	19.91	2.78	19.93	2.08	19.94	2.63
03/04/2016	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
03/31/2016	19.40	2.22	19.50	2.22	19.40	2.22	19.40	2.86	19.50	2.22	19.60	2.19	19.50	2.87	19.50	2.57	19.50	2.73	19.60	2.41
04/28/2016	19.39	2.38	19.39	2.38	19.36	2.37	19.39	2.54	19.43	2.55	19.44	2.75	19.44	2.55	19.40	2.20	19.44	2.21	19.44	2.01
05/03/2017	19.75	3.59	19.68	2.93	19.74	7.08	19.67	3.16	19.69	3.78	19.72	3.38	19.71	4.47	19.65	3.16	19.72	3.97	19.70	3.38
05/23/2017	18.88	4.69	18.85	3.31	18.96	4.69	18.92	4.39	18.93	3.10	18.92	4.23	18.74	5.61	18.95	5.75	18.91	4.98	18.81	6.09
06/26/2017	19.60	3.36	19.60	3.36	19.50	3.14	19.60	3.36	19.60	3.14	19.60	3.14	19.60	3.14	19.60	3.36	19.60	3.14	19.60	3.14
07/31/2017	20.00	3.18	20.00	3.40	20.00	3.18	20.00	3.18	20.00	2.94	20.00	3.18	20.00	3.18	20.00	3.40	20.00	3.18	20.00	3.18
08/31/2017	20.00	3.17	20.00	3.17	20.00	2.94	20.00	2.94	20.00	2.94	20.00	2.94	20.00	3.39	20.00	3.39	20.00	3.39	20.00	3.39
09/26/2017	21.00	3.22	21.00	3.22	21.00	3.22	21.00	2.98	21.00	2.98	21.00	2.98	21.00	3.44	21.00	3.44	21.00	3.44	21.00	3.44
10/24/2017	21.00	3.22	21.00	3.22	21.00	2.98	21.00	2.98	21.00	2.98	21.00	2.98	21.00	3.44	21.00	3.44	21.00	3.44	21.00	3.44
11/27/2017	19.60	3.79	19.50	3.79	19.60	3.79	19.60	2.94	19.60	3.79	19.50	3.79	19.60	3.79	19.50	3.39	19.50	3.79	19.60	3.79

Biosparge Barrier Well Head Pressure and Air Flow Measurements
Mobile Launch Platform/Vehicle Assembly buildig Area, SWMU 056

	ASW01		ASW02		ASW03		ASW04		ASW05		ASW06		ASW07		ASW08		ASW09		ASW10	
Screen Interval (ft BLS)	48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5	
Sample Date	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)
12/20/2017	19.70	3.78	19.70	3.78	19.60	3.77	19.60	3.77	19.60	3.77	19.60	3.77	19.70	3.78	19.60	3.77	19.70	3.78	19.70	3.78
01/30/2018	20.20	3.23	20.20	3.45	20.10	3.44	20.20	3.45	20.10	3.44	20.20	3.45	20.10	3.44	20.20	3.86	20.20	3.45	20.20	3.45
02/27/2018	19.78	3.39	19.80	2.94	19.85	3.17	19.78	3.59	19.84	3.79	19.84	3.39	19.80	3.39	19.85	3.39	19.80	3.39	19.82	3.39
03/27/2018	19.91	3.39	19.75	3.38	19.87	3.39	19.65	3.78	19.84	3.79	19.90	3.39	19.84	3.39	19.75	3.38	19.88	3.39	19.67	3.38
04/24/2018	19.74	3.38	19.60	3.37	19.56	3.37	19.53	3.77	19.54	3.77	19.53	2.92	19.54	3.37	19.44	3.37	19.42	3.37	19.42	3.37
05/22/2018	19.82	3.39	19.75	3.39	19.80	3.39	19.76	3.39	19.79	3.39	19.85	2.94	19.82	3.39	19.72	3.39	19.75	3.39	19.84	3.39
06/26/2018	19.77	3.38	19.81	3.38	19.67	3.38	19.79	3.38	19.84	3.38	19.80	3.38	19.75	3.38	19.77	3.38	19.57	3.37	19.67	3.38
07/23/2018	19.81	3.38	19.71	3.38	19.88	3.39	19.56	3.37	19.80	3.38	19.72	3.38	19.65	3.38	19.58	3.37	19.78	3.38	19.56	3.37
08/27/2018	19.75	3.38	19.65	3.38	19.76	3.38	19.55	3.37	19.61	3.37	19.71	3.38	19.63	3.37	19.55	3.37	19.70	3.38	19.55	3.37
09/25/2018	19.55	3.37	19.60	3.38	19.49	3.37	19.51	3.37	19.54	3.37	19.58	3.37	19.52	3.37	19.53	3.37	19.66	3.38	19.52	3.37
10/30/2018	19.62	3.16	19.71	3.16	19.54	3.15	19.64	3.37	19.70	3.16	19.59	3.15	19.65	3.16	19.67	3.16	19.72	3.16	19.52	3.37
11/20/2018	19.67	3.38	19.69	3.38	19.65	3.38	19.72	3.38	19.82	3.39	19.65	3.16	19.69	3.38	19.62	3.38	19.72	3.38	19.77	3.38
12/18/2018	18.77	3.14	18.95	2.91	19.12	3.15	19.07	3.15	19.02	2.92	18.98	3.15	19.15	3.16	19.14	2.92	19.08	3.15	19.02	3.15
01/31/2019	18.00	4.73	19.00	5.63	19.00	5.08	18.50	5.57	19.00	5.35	18.00	5.27	18.50	5.33	18.50	5.31	19.50	5.39	18.00	5.27
02/28/2019	19.00	2.07	19.00	2.92	19.00	2.06	19.00	2.06	19.00	2.92	19.00	4.77	19.00	2.39	19.00	2.39	19.00	1.69	19.00	1.69
03/27/2019	19.00	2.91	19.00	2.91	19.00	2.66	19.00	2.38	19.00	2.91	19.00	3.37	19.00	2.66	19.00	2.66	19.00	2.38	19.00	2.66
04/23/2019	19.00	2.91	19.00	2.91	19.00	2.65	19.00	2.91	19.00	2.91	19.00	2.91	19.00	2.65	19.00	2.65	19.00	2.37	19.00	2.37
05/29/2019	19.00	2.89	19.00	3.12	19.00	2.89	19.00	2.89	19.00	2.89	19.00	2.89	19.00	2.64	19.00	3.12	19.00	2.36	19.00	2.36
06/27/2019	19.00	2.89	19.00	2.89	19.00	3.12	19.00	2.89	19.00	2.89	19.00	2.89	19.00	2.89	19.00	3.12	19.00	2.64	19.00	2.36
07/31/2019	19.00	2.89	19.00	2.36	19.00	2.89	19.00	2.89	19.00	2.89	19.00	2.89	19.00	2.89	19.00	2.36	19.00	2.89	19.00	2.64
08/27/2019	19.00	2.90	19.00	2.37	19.00	2.90	19.00	2.65	19.00	2.65	19.00	2.90	19.00	2.90	19.00	2.65	19.00	2.65	19.00	2.65
09/24/2019	19.00	2.89	19.00	2.64	19.00	2.89	19.00	2.64	19.00	2.89	19.00	2.89	19.00	2.89	19.00	2.64	19.00	2.89	19.00	2.89
10/28/2019	20.00	5.10	20.00	NR	20.00	4.50	20.00	5.10	20.00	4.20	20.00	5.10	20.00	NR	20.00	NR	20.00	5.40	20.00	4.50
11/26/2019	2.00	NR	NR	NR	8.30	10.80	8.20	9.80	8.20	9.80	8.30	14.60	8.30	NR	8.20	NR	8.20	9.80	8.20	10.70

Biosparge Barrier Well Head Pressure and Air Flow Measurements
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	ASW11		ASW12		ASW13		ASW14		ASW15		ASW16		ASW17		ASW18		ASW19		ASW20	
Screen Interval (ft BLS)	**48 to 50.5**		**48 to 50.5**		**48 to 50.5**		**48 to 50.5**		**48 to 50.5**		**48 to 50.5**		**48 to 50.5**		**48 to 50.5**		**48 to 50.5**		**48 to 50.5**	
Sample Date	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**
05/19/2007	14.30	4.87	15.70	5.11	16.20	3.67	16.40	6.39	16.00	3.65	15.40	5.06	15.50	6.21	14.80	3.50	17.00	3.76	24.90	5.31
06/28/2007	22.50	6.76	22.50	6.76	20.90	6.52	21.10	6.42	21.00	6.54	21.20	6.57	22.20	6.73	22.10	6.71	20.90	6.53	21.00	6.54
07/30/2007	21.00	5.43	20.90	5.09	19.30	4.89	19.50	5.67	20.00	5.45	19.50	5.07	20.00	5.30	20.00	5.30	19.70	5.26	19.90	4.96
08/28/2007	20.00	5.72	19.80	5.69	20.10	5.73	20.50	5.79	20.10	5.74	20.00	5.72	19.90	5.71	20.10	5.74	20.10	5.73	19.50	5.65
11/27/2007	19.80	4.07	19.70	4.97	20.20	5.03	20.30	5.83	20.20	5.04	19.70	4.06	19.80	4.98	19.90	4.99	19.90	5.77	20.30	5.05
12/31/2007	19.00	4.90	19.10	5.07	19.20	4.92	19.40	5.24	19.30	5.41	19.40	5.26	19.10	4.57	19.00	5.37	19.00	5.06	18.90	4.89
01/31/2008	16.00	5.44	18.00	4.83	22.00	5.53	21.00	6.97	18.00	5.77	19.00	7.26	21.00	6.97	20.00	6.09	16.00	6.08	19.00	7.26
02/29/2008	18.00	5.00	19.00	5.14	20.00	5.27	19.00	5.14	19.00	5.14	19.00	5.93	20.00	5.27	20.00	5.27	19.00	4.19	19.00	6.63
03/31/2008	20.00	5.27	19.00	5.14	20.00	5.27	19.00	5.14	19.00	5.14	19.00	5.14	19.00	5.14	19.00	5.14	20.00	4.31	20.00	5.27
04/29/2008	19.50	6.00	19.70	5.22	19.20	5.16	19.00	5.92	19.60	6.01	19.80	5.23	19.00	5.93	19.60	4.25	19.30	4.22	19.00	5.13
05/29/2008	17.00	3.96	16.60	4.80	16.90	5.30	17.00	3.96	16.90	4.84	16.50	3.91	17.00	4.86	16.90	3.50	16.50	4.78	16.50	3.90
06/27/2008	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
07/29/2008	15.30	4.60	15.50	4.31	15.40	3.77	15.50	4.31	15.80	4.68	15.90	4.69	15.50	4.15	15.60	4.16	15.90	4.37	15.30	4.60
08/27/2008	16.06	5.44	16.10	5.45	16.59	5.25	16.60	5.25	16.50	4.45	17.00	4.85	16.92	4.51	16.83	4.83	16.55	5.24	16.55	5.24
10/23/2008	19.50	4.25	19.40	5.19	19.10	5.94	19.30	5.97	19.20	5.16	19.30	5.17	19.20	5.16	19.30	5.17	19.20	5.65	19.30	4.81
11/25/2008	19.56	6.06	18.20	5.06	19.18	5.69	20.56	5.38	20.56	4.39	20.62	5.73	20.56	5.38	20.55	6.21	20.53	5.37	20.62	5.73
12/30/2008	19.85	6.09	19.89	6.10	19.97	5.80	19.92	5.79	19.94	6.11	19.82	6.81	19.75	7.19	19.71	6.79	19.80	7.46	19.89	6.54
01/30/2009	19.87	6.10	19.90	6.10	19.96	6.11	19.93	5.29	19.89	6.10	19.80	6.80	19.82	6.09	19.79	6.80	19.87	6.82	19.94	6.11
02/27/2009	20.15	6.14	20.13	6.86	20.91	6.25	20.75	6.22	21.00	7.00	19.97	6.11	21.09	6.27	20.75	6.22	21.00	7.00	20.79	6.68
03/31/2009	19.75	5.43	19.91	4.72	20.07	5.12	19.89	5.09	19.93	4.71	20.21	5.12	20.34	5.14	20.38	5.14	20.35	4.35	20.41	6.48
04/29/2009	19.75	6.04	19.29	6.41	19.29	6.41	19.89	6.07	19.95	6.07	20.00	5.77	19.15	7.05	19.21	6.66	19.71	6.04	19.81	5.24
05/29/2009	19.90	5.47	20.09	5.02	19.98	5.78	19.19	5.37	19.25	5.37	19.97	5.48	20.09	5.79	21.00	5.62	20.50	5.70	20.05	5.01
06/29/2009	19.90	4.07	19.56	4.60	19.49	4.93	19.10	5.77	19.10	5.64	19.80	4.97	19.50	5.70	19.80	4.98	19.05	5.64	19.00	4.88
08/12/2009	19.68	6.32	19.58	3.78	19.55	1.78	20.00	1.80	20.00	6.36	20.00	3.60	20.00	2.20	20.00	1.80	20.00	1.80	20.00	1.80
09/08/2009	21.00	6.20	21.50	5.98	22.30	5.78	22.00	5.90	22.20	6.80	22.00	7.29	22.50	6.28	21.80	6.02	21.00	6.62	20.30	6.23
09/30/2009	20.80	5.09	21.25	6.64	22.00	4.68	21.80	6.02	21.30	5.95	22.00	5.23	21.95	5.73	22.00	6.05	21.55	6.42	22.20	6.08
10/27/2009	22.80	5.33	22.25	5.44	23.50	6.25	23.00	5.35	22.90	6.17	22.50	5.29	23.50	5.42	23.50	5.93	23.82	5.45	24.05	5.48
11/23/2009	19.90	4.99	20.10	5.49	19.30	5.38	19.90	5.46	19.90	5.76	19.70	4.97	20.40	4.70	20.10	4.49	20.20	5.03	20.20	4.11
12/31/2009	19.79	6.44	19.80	6.44	20.03	6.86	19.57	6.40	20.12	7.11	19.89	7.07	20.15	6.49	20.10	6.87	20.05	6.85	20.10	7.10
01/29/2010	21.60	6.03	19.80	6.46	21.20	7.20	21.00	7.28	21.70	6.34	19.89	7.09	22.10	6.54	22.00	6.80	21.40	6.00	20.10	7.13
03/02/2010	21.05	6.64	20.50	7.17	21.05	7.03	21.00	7.26	20.10	7.11	21.05	7.03	21.13	7.04	21.16	7.04	21.15	7.29	20.90	7.25
03/19/2010	19.68	7.05	19.54	7.03	19.04	5.68	21.77	7.43	21.64	10.48	21.91	7.45	21.72	8.57	21.74	7.38	21.95	9.61	21.87	8.54
04/20/2010	19.61	4.04	19.32	5.67	18.90	6.88	20.52	8.27	20.45	7.50	20.41	8.24	21.20	8.41	20.70	8.29	20.58	5.85	20.51	9.24
05/28/2010	19.25	3.79	19.23	7.02	19.21	NR	20.48	3.18	20.48	3.90	20.46	3.67	21.21	5.30	20.81	4.35	20.65	2.61	20.59	4.87
06/30/2010	19.00	2.17	19.02	4.84	28.45	NR	20.80	3.45	20.30	3.65	20.40	3.43	20.32	2.58	20.12	2.39	20.28	2.88	20.73	2.60
07/29/2010	19.50	8.00	19.90	7.01	20.00	9.93	20.90	7.19	20.00	5.74	19.50	6.93	20.20	8.16	21.00	7.21	20.50	5.81	20.00	5.74
08/28/2010	22.50	4.31	NR	NR	21.50	7.30	22.00	6.03	21.50	7.29	22.00	6.03	21.10	7.23	20.50	5.83	21.00	7.22	22.00	6.05
09/25/2010	21.00	4.57	19.50	4.92	20.50	5.67	19.50	2.84	20.00	3.64	21.00	3.94	20.00	3.86	19.30	3.34	19.50	2.84	19.90	3.40
10/29/2010	20.20	5.23	20.50	3.80	21.00	2.64	20.30	1.84	21.00	4.67	21.00	1.65	19.80	2.40	20.20	1.83	21.20	2.96	20.50	2.44
11/29/2010	20.10	2.89	20.50	4.71	20.90	2.94	20.00	3.41	21.00	4.17	20.80	4.15	19.90	4.06	20.00	2.88	20.80	4.55	20.00	3.16
12/23/2010	19.19	1.82	19.16	4.72	19.01	2.86	21.81	2.91	21.91	6.22	21.93	3.23	21.93	2.75	21.90	2.38	21.86	2.38	21.83	2.74
01/26/2011	19.97	2.06	19.93	1.51	19.66	1.83	22.77	2.20	22.78	6.08	22.70	2.61	22.83	2.42	22.80	2.20	22.84	2.20	22.82	2.20
03/01/2011	19.32	3.49	19.36	4.79	19.28	3.13	22.25	5.32	22.18	6.86	22.20	4.23	22.20	3.75	22.08	3.87	22.12	3.99	22.14	3.99
04/01/2011	19.74	2.59	19.72	3.99	19.25	3.83	21.64	3.31	21.45	6.74	21.28	3.41	21.18	2.99	21.07	4.43	21.05	3.39	21.00	3.39
04/26/2011	19.20	2.53	19.21	3.80	18.61	2.49	21.13	3.75	21.10	3.25	21.11	2.96	21.06	4.17	21.09	2.95	21.01	2.63	20.94	2.64
05/31/2011	18.90	2.49	18.91	3.06	NR	NR	21.05	2.94	20.81	5.73	21.08	2.95	20.98	2.28	20.87	2.93	21.04	4.15	21.00	2.63
06/23/2011	19.73	2.55	18.97	2.16	20.13	1.82	19.95	2.56	20.20	4.07	19.93	3.14	18.25	1.73	18.97	2.50	19.32	2.81	19.41	1.79
07/27/2011	19.26	2.18	19.13	1.77	19.20	2.18	19.21	1.78	19.25	2.18	19.31	1.78	19.21	1.78	19.20	2.18	19.49	2.19	19.15	1.25
08/29/2011	18.54	1.76	18.78	2.17	19.19	2.53	20.51	1.85	18.43	2.48	18.92	2.80	20.12	2.24	20.10	2.58	20.20	1.83	19.73	2.56
09/28/2011	19.83	3.84	19.77	4.23	19.34	1.79	21.84	5.69	21.80	5.87	21.96	2.69	21.89	1.91	21.85	2.52	21.72	2.68	21.86	2.12
10/24/2011	19.36	3.82	19.45	4.94	19.45	4.03	19.34	3.59	19.72	3.84	19.92	4.82	19.83	3.15	20.01	3.16	20.21	2.90	19.35	3.59
11/21/2011	19.76	2.88	19.74	3.64	19.62	2.22	22.45	2.38	22.44	6.88	22.35	2.74	22.03	2.35	22.36	2.74	22.33	2.37	22.01	2.72
12/30/2011	19.95	1.85	20.12	2.94	20.20	2.63	19.97	2.26	19.20	1.81	20.14	2.94	21.26	1.91	19.95	2.61	19.72	2.25	19.69	2.25
05/30/2012	20.25	2.27	20.12	1.84	19.52	2.22	19.79	2.24	19.94	2.25	19.99	1.84	19.93	2.60	19.27	2.21	19.24	2.21	20.13	1.84

Biosparge Barrier Well Head Pressure and Air Flow Measurements
Mobile Launch Platform/Vehicle Assembly buildig Area, SWMU 057

	ASW11		ASW12		ASW13		ASW14		ASW15		ASW16		ASW17		ASW18		ASW19		ASW20	
Screen Interval (ft BLS)	48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5	
Sample Date	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**	**Pressure (psi)**	**Flow Rate (scfm)**
06/29/2012	20.56	6.53	20.58	5.39	22.13	3.59	22.81	4.13	22.70	6.87	22.66	2.74	22.54	2.73	22.57	2.37	22.69	2.74	22.55	2.36
08/28/2012	20.48	4.09	20.43	2.59	20.34	3.42	22.60	3.34	21.94	6.71	22.50	3.34	22.39	5.27	22.45	3.05	22.40	3.04	22.35	3.04
08/29/2012	20.28	5.95	20.27	3.43	20.28	3.45	22.23	4.30	22.10	6.76	22.18	3.83	22.18	6.52	22.15	3.83	22.12	3.57	22.13	3.02
08/30/2012	20.18	4.69	20.14	3.43	19.06	3.10	21.93	4.28	21.86	6.76	21.97	3.59	21.94	6.21	21.96	3.58	21.98	3.58	21.99	3.58
09/07/2012	19.90	2.88	19.90	2.87	20.10	2.24	21.70	2.69	21.50	4.23	21.50	2.31	21.60	3.28	21.60	3.00	21.50	2.67	21.50	3.28
09/14/2012	19.91	2.89	19.91	2.24	19.95	2.24	19.90	3.42	19.89	3.16	19.92	5.01	19.92	2.24	19.95	2.89	19.89	3.16	19.92	2.58
09/21/2012	19.73	3.41	19.49	2.22	19.79	1.83	19.64	2.23	19.65	2.88	19.70	3.15	19.90	2.59	19.72	2.23	19.73	2.23	19.79	3.16
06/12/2013	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
06/14/2013	20.21	2.58	20.20	2.23	20.18	1.84	21.12	2.29	21.04	18.73	21.06	2.28	21.05	3.95	21.04	2.28	21.03	1.86	21.01	2.28
07/17/2013	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
07/18/2013	20.06	2.58	20.07	1.29	19.99	4.86	21.97	3.31	21.85	5.56	23.32	2.41	23.28	4.40	23.30	1.39	23.24	1.39	23.16	1.96
07/19/2013	19.98	1.82	19.82	1.81	19.95	1.83	23.37	6.69	23.33	5.02	23.42	1.97	23.37	5.92	23.22	1.96	23.40	1.97	23.25	1.97
07/26/2013	19.53	2.85	19.58	2.21	19.68	2.56	22.34	4.32	22.51	5.48	20.66	2.62	21.91	4.87	22.18	1.92	22.61	1.94	22.52	2.74
08/02/2013	19.43	3.58	19.40	2.53	19.33	1.80	22.88	4.35	23.16	3.91	23.16	3.09	23.05	3.91	23.18	2.39	22.81	3.08	22.70	2.37
08/09/2013	20.24	3.16	20.25	2.58	20.22	2.89	24.22	4.89	24.46	3.17	24.02	2.43	24.34	4.47	24.03	1.98	23.52	1.96	24.31	1.99
08/16/2013	19.84	2.22	19.78	2.55	19.78	1.81	24.93	4.54	24.96	3.52	25.02	3.21	24.91	4.30	24.79	2.48	24.87	2.48	24.95	2.48
10/29/2013	19.98	2.24	19.94	1.83	19.88	1.83	22.62	3.08	22.51	2.37	22.55	3.07	22.36	4.34	23.30	1.40	23.34	2.43	23.21	1.40
11/26/2013	19.75	2.58	19.73	1.83	19.72	1.29	22.31	1.94	22.21	1.94	22.14	3.35	22.07	3.35	22.12	1.94	22.09	2.37	22.06	2.74
12/30/2013	19.59	2.25	19.61	1.30	19.58	2.25	22.34	1.96	22.35	2.40	22.37	3.10	22.32	3.66	22.30	1.38	22.32	1.95	22.31	3.66
01/31/2014	19.76	1.30	19.73	1.84	19.74	1.31	22.53	1.39	22.39	1.96	22.37	2.78	22.42	1.96	22.31	1.38	22.35	1.96	22.28	3.91
02/26/2014	19.59	NR	19.61	NR	19.58	NR	21.94	NR	22.14	NR	21.98	NR	21.99	NR	21.99	NR	22.07	NR	21.97	NR
03/28/2014	19.27	1.80	19.28	1.27	19.23	1.28	22.02	2.72	21.93	1.92	21.97	3.33	21.96	1.36	21.91	1.36	21.95	2.36	21.89	4.51
05/05/2014	19.79	1.81	19.74	1.28	19.71	1.81	22.43	2.36	22.40	2.36	22.37	3.33	22.35	1.36	22.24	1.36	22.28	3.04	22.35	4.31
05/30/2014	19.25	2.18	19.23	1.78	19.25	1.78	21.04	2.63	21.08	1.86	21.05	2.63	21.01	1.32	21.00	1.31	20.99	2.28	20.95	3.71
06/27/2014	19.60	2.20	19.56	4.01	19.52	2.21	21.72	1.89	21.72	2.31	21.65	2.31	21.74	1.89	21.71	1.89	21.70	2.31	21.60	3.77
07/30/2014	19.70	1.80	19.49	3.11	19.29	2.19	19.20	2.18	20.00	2.23	19.90	2.22	19.95	2.22	20.59	2.25	20.93	2.28	21.00	2.95
08/28/2014	19.91	1.81	19.88	1.28	19.89	1.81	22.64	2.73	22.70	1.93	22.69	3.61	22.75	1.93	22.67	1.93	22.65	1.93	22.62	4.92
09/29/2014	20.25	1.83	20.19	1.82	20.11	1.29	23.54	2.42	23.55	1.98	23.56	2.42	23.59	1.98	23.55	1.40	23.53	1.40	23.62	2.43
10/29/2014	20.19	1.83	20.20	1.83	20.15	1.83	21.90	2.33	21.75	1.90	21.89	2.33	22.59	1.93	19.95	1.29	22.25	2.35	23.00	1.95
11/26/2014	20.01	2.60	20.02	1.30	20.04	1.30	23.58	2.82	23.47	2.43	23.49	2.81	23.57	2.44	23.55	1.99	23.49	2.44	23.45	2.81
12/30/2014	20.02	2.25	20.00	2.59	20.02	1.84	23.60	1.41	23.47	1.99	23.49	1.99	23.50	1.99	23.46	1.41	23.45	1.99	23.53	1.41
01/29/2015	20.21	2.26	20.05	2.25	20.20	2.61	21.00	2.30	22.90	1.97	23.00	2.41	22.73	2.40	23.10	2.42	22.91	1.97	23.00	1.97
02/27/2015	19.76	2.27	19.72	1.31	19.71	1.32	24.46	2.53	24.70	2.08	24.59	3.28	24.67	2.93	24.68	1.47	24.63	1.47	24.64	3.28
03/30/2015	19.56	3.62	19.57	2.22	19.51	2.86	24.63	3.54	24.61	3.81	24.62	4.56	24.59	3.23	24.76	2.90	24.59	2.88	24.66	4.57
04/29/2015	19.51	2.85	19.52	2.21	19.51	3.39	23.99	4.01	24.05	3.75	24.20	4.03	24.04	4.48	24.07	3.48	24.10	2.84	23.95	2.45
05/29/2015	19.21	2.18	19.20	1.78	19.24	1.26	22.95	1.94	23.00	1.95	22.93	2.38	22.84	2.74	23.02	1.38	22.96	1.37	22.92	2.74
07/28/2015	19.66	3.82	19.66	4.02	19.66	4.03	24.44	2.83	24.28	2.84	24.39	2.01	24.36	2.46	23.74	2.43	24.42	1.42	24.26	2.45
08/28/2015	20.32	3.18	20.34	1.59	20.43	1.85	22.03	4.28	21.80	4.26	21.38	2.31	21.40	4.42	21.50	1.89	21.52	2.31	21.53	1.89
09/30/2015	20.03	2.58	20.05	2.58	20.04	2.89	21.69	2.68	21.71	2.68	21.73	1.89	21.40	2.67	21.50	1.34	21.52	1.33	21.54	1.34
10/28/2015	19.76	0.91	19.67	0.91	19.69	2.23	21.10	1.33	21.10	2.30	21.12	0.94	21.16	2.31	21.13	0.94	21.11	0.94	21.18	0.94
11/25/2015	19.68	1.82	19.70	2.57	19.67	2.57	21.52	2.68	21.50	1.90	21.45	2.32	21.46	2.69	21.45	1.90	21.46	1.90	21.46	2.32
12/30/2015	19.44	2.56	19.39	1.80	19.43	2.86	21.50	2.33	21.56	3.01	21.60	1.90	21.68	3.02	21.67	2.34	21.70	1.91	21.62	1.91
01/28/2016	19.68	2.25	19.69	1.84	19.67	2.60	21.21	2.14	21.23	3.31	21.18	1.65	21.20	1.65	21.15	1.65	21.17	3.02	21.18	1.65
02/25/2016	19.94	2.94	19.93	2.62	19.96	2.94	22.43	2.41	22.43	3.11	22.56	2.96	22.61	3.13	22.50	2.41	22.55	2.96	22.55	2.61
03/04/2016	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
03/31/2016	19.40	2.56	19.50	2.72	19.70	2.58	21.10	2.83	21.10	3.27	21.20	2.32	21.10	2.67	21.10	2.50	21.10	2.98	21.10	2.67
04/28/2016	19.41	2.55	19.43	2.55	19.45	2.55	21.98	2.71	21.96	2.71	22.00	2.54	22.05	2.72	22.02	2.54	22.01	2.72	22.08	2.72
05/03/2017	19.68	3.16	19.68	3.96	19.65	3.16	20.44	3.42	20.51	3.20	20.38	3.19	20.35	3.19	20.41	3.62	20.43	3.20	20.38	3.19
05/23/2017	18.87	7.51	18.72	4.53	18.51	3.50	19.40	5.15	19.40	2.05	19.48	2.64	19.57	3.13	19.51	4.58	19.39	4.42	19.31	4.86
06/26/2017	19.60	3.14	19.60	3.14	19.60	3.14	20.30	3.18	20.40	3.18	20.30	3.18	20.40	3.18	20.40	3.18	20.40	3.18	20.40	3.18
07/31/2017	20.00	3.18	20.00	3.18	20.00	3.18	20.00	3.18	20.00	3.18	20.00	3.40	20.00	3.18	20.00	3.40	20.00	3.18	20.00	3.18
08/31/2017	20.00	3.39	20.00	3.39	20.00	3.39	20.00	3.39	20.00	3.39	20.00	3.39	20.00	3.17	20.00	3.39	20.00	2.94	20.00	3.39
09/26/2017	21.00	3.44	21.00	2.98	21.00	3.44	21.00	2.98	21.00	3.44	21.00	3.44	21.00	3.22	21.00	3.44	21.00	2.98	21.00	2.98
10/24/2017	21.00	3.44	21.00	3.44	21.00	3.44	21.00	3.44	21.00	3.44	21.00	3.44	21.00	3.22	21.00	3.44	21.00	2.98	21.00	3.44
11/27/2017	19.60	3.79	19.60	2.94	19.60	3.79	20.80	3.86	20.80	3.86	20.60	3.44	20.80	3.86	20.80	3.86	20.80	3.86	20.60	2.98

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	ASW11		ASW12		ASW13		ASW14		ASW15		ASW16		ASW17		ASW18		ASW19		ASW20	
Screen Interval (ft BLS)	48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5		48 to 50.5	
Sample Date	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)
12/20/2017	19.70	3.78	19.70	3.78	19.60	3.77	20.10	3.80	20.00	3.80	20.10	3.80	20.10	3.80	20.10	3.80	20.00	3.80	20.00	3.80
01/30/2018	20.10	3.44	20.20	3.45	19.80	3.83	19.80	3.21	19.80	3.43	19.80	3.43	19.80	3.83	19.80	3.83	19.80	3.43	19.90	3.43
02/27/2018	19.84	2.94	19.80	3.39	19.82	3.39	19.48	3.37	19.82	3.39	19.52	3.38	19.44	3.37	19.40	3.37	19.45	3.37	19.42	3.37
03/27/2018	19.59	2.92	19.65	3.38	19.51	3.37	19.48	3.37	19.68	3.38	19.39	3.37	19.48	3.37	19.50	3.37	19.45	3.37	19.38	3.37
04/24/2018	19.51	3.37	19.38	3.36	19.45	3.37	20.52	3.42	20.55	3.42	20.48	3.42	20.39	3.41	20.45	3.42	20.58	3.42	20.51	3.42
05/22/2018	19.85	3.39	19.79	3.39	19.82	3.39	20.50	3.42	20.47	3.42	20.52	3.43	20.45	3.42	20.49	3.42	20.52	3.43	20.54	3.43
06/26/2018	19.72	3.38	19.82	3.38	19.66	3.38	20.52	3.42	20.42	3.41	20.53	3.42	20.39	3.41	20.48	3.42	20.55	3.42	20.50	3.42
07/23/2018	19.70	3.38	19.75	3.38	19.55	3.37	20.11	3.40	20.27	3.41	20.30	3.41	20.21	3.40	20.31	3.41	20.20	3.40	20.21	3.40
08/27/2018	19.65	3.38	19.68	3.38	19.51	3.37	21.72	3.48	21.55	3.47	21.51	3.47	21.59	3.47	21.45	3.46	21.42	3.46	21.46	3.46
09/25/2018	19.61	3.38	19.48	3.37	19.50	3.37	20.95	3.44	20.88	3.44	20.97	3.44	21.02	3.44	20.88	3.44	20.99	3.44	20.95	3.44
10/30/2018	19.58	3.15	19.53	3.15	19.74	3.16	22.03	3.26	21.99	3.26	21.95	3.49	22.07	3.27	22.05	3.49	22.03	3.26	21.98	3.26
11/20/2018	19.85	3.39	19.55	3.37	19.65	3.38	21.41	3.46	21.48	3.47	21.52	3.25	21.65	3.25	21.50	3.24	21.44	3.47	21.49	3.47
12/18/2018	19.39	2.93	19.25	3.16	19.13	3.16	21.14	3.01	21.22	3.02	21.15	3.01	21.11	3.01	21.22	3.02	21.30	3.02	21.19	3.26
01/31/2019	18.50	5.31	18.50	5.31	18.50	5.97	21.50	6.79	21.00	5.50	21.50	6.20	22.00	5.59	21.50	6.79	21.50	6.79	21.50	6.79
02/28/2019	19.00	2.39	19.00	1.69	19.00	1.71	21.00	4.61	21.00	2.13	21.00	3.48	21.00	1.74	21.25	1.74	21.00	3.01	21.00	2.13
03/27/2019	19.00	2.38	19.00	2.38	19.00	2.38	21.00	3.25	21.00	2.75	21.00	3.25	21.00	2.46	21.25	2.47	21.00	3.01	21.00	2.75
04/23/2019	19.00	2.37	19.00	2.37	19.00	2.37	20.00	3.18	20.00	2.69	20.00	2.95	20.00	2.41	20.00	2.95	20.00	2.95	20.00	2.95
05/29/2019	19.00	2.36	19.00	2.36	19.00	2.36	20.00	2.93	20.00	2.68	20.00	2.93	20.00	2.39	20.00	2.93	20.00	2.93	20.00	2.93
06/27/2019	19.00	2.64	19.00	2.36	19.00	2.36	21.00	2.97	21.00	2.71	21.00	2.97	21.00	2.43	21.00	2.97	21.00	2.97	21.00	3.21
07/31/2019	19.00	2.89	19.00	2.36	19.00	2.36	21.00	2.98	21.00	2.43	21.00	2.72	21.00	2.43	21.00	3.22	21.00	2.98	21.00	2.98
08/27/2019	19.00	2.90	19.00	2.65	19.00	2.65	21.00	2.98	21.00	2.44	21.00	2.44	21.00	2.72	21.00	2.98	21.00	2.98	21.00	2.98
09/24/2019	19.00	3.12	19.00	2.89	19.00	2.64	21.00	2.97	21.00	2.87	21.00	2.71	21.00	2.43	21.00	2.97	21.00	2.71	21.00	2.97
10/28/2019	20.00	4.50	20.00	4.50	NR	NR	21.00	3.40	21.00	4.20	21.00	3.40	21.00	3.40	21.00	3.00	21.00	2.40	21.00	3.00
11/26/2019	9.60	11.90	8.30	11.60	NR	NR	9.50	NR	9.50	10.10	9.50	9.00	9.50	NR	9.50	6.40	9.50	6.40	9.50	4.50

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	ASW21		ASW22		ASW23		ASW24		ASW25		BSW26		BSW27		BSW28		BSW29		BSW30		BSW31	
Screen Interval (ft BLS)	48 to 50.5		48 to 50.5		47.5 to 50		47.5 to 50		47.5 to 50		46 to 48		46 to 48		46 to 48		46 to 48		46 to 48		46 to 48	
Sample Date	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)
05/19/2007	18.00	3.87	19.70	4.05	18.80	5.59	15.50	6.21	20.00	4.08	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
06/28/2007	22.30	6.74	22.10	6.71	22.00	6.69	21.70	6.65	22.50	6.64	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
07/30/2007	20.00	5.45	20.00	4.98	20.00	4.98	19.90	5.73	20.00	5.74	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
08/28/2007	20.00	5.72	20.50	5.79	20.10	5.74	20.00	5.72	20.20	5.74	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
11/27/2007	19.70	4.06	19.80	4.98	19.90	4.08	20.20	5.03	19.40	4.93	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
12/31/2007	19.00	4.90	19.00	5.22	19.00	5.06	18.70	4.86	19.30	5.10	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
01/31/2008	17.00	6.87	19.00	5.93	20.00	6.08	19.00	5.93	19.00	6.63	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
02/29/2008	19.00	5.93	19.00	5.93	19.00	5.93	19.00	5.93	19.00	5.93	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
03/31/2008	19.00	5.14	19.00	5.14	19.00	5.14	19.00	5.93	19.00	5.93	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
04/29/2008	19.30	5.17	19.20	5.95	19.00	5.13	19.00	4.19	19.50	6.00	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
05/29/2008	16.50	4.10	16.90	3.95	16.50	4.78	16.70	3.93	16.90	3.95	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
06/27/2008	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
07/29/2008	15.30	4.61	15.40	4.30	15.50	4.64	15.00	3.72	15.40	4.62	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
08/27/2008	16.61	4.79	16.50	4.78	16.45	4.77	16.65	4.47	16.82	4.32	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
10/23/2008	19.10	5.94	19.50	6.00	19.40	5.19	19.30	5.17	19.20	5.16	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
11/25/2008	18.48	5.89	18.11	5.05	20.51	4.39	20.54	5.36	20.43	5.35	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
12/30/2008	19.80	6.81	19.92	5.79	19.98	6.12	19.99	6.84	19.97	7.23	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
01/30/2009	19.86	6.82	19.88	6.10	19.94	6.11	19.97	6.83	19.95	6.11	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
02/27/2009	20.08	6.85	20.77	6.23	20.50	6.92	20.49	6.91	20.16	6.14	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
03/31/2009	19.31	5.36	19.41	5.38	19.52	5.39	19.57	5.05	19.08	5.33	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
04/29/2009	20.02	5.27	19.95	6.08	20.00	5.77	19.90	6.07	19.93	6.08	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
05/29/2009	14.20	5.45	20.03	7.08	20.00	5.78	19.96	6.46	19.93	6.45	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
06/29/2009	19.94	4.99	19.95	5.76	20.00	4.66	19.09	5.63	19.89	5.76	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
08/12/2009	20.00	3.36	20.00	2.20	20.00	1.80	20.00	2.20	20.00	2.54	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
09/08/2009	20.70	6.30	20.10	5.93	20.90	5.90	20.00	5.92	20.50	6.54	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
09/30/2009	22.90	5.85	22.00	5.89	21.74	6.71	21.50	5.17	22.80	4.96	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
10/27/2009	23.00	5.36	23.20	5.38	22.50	5.81	23.00	5.53	22.80	5.84	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
11/23/2009	20.00	4.47	19.80	5.45	20.30	4.87	20.00	5.00	20.70	5.09	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
12/31/2009	20.09	5.80	20.00	6.47	20.16	6.88	20.20	7.01	19.98	5.93	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
01/29/2010	20.09	6.99	21.00	7.29	21.30	6.96	20.20	7.02	20.70	7.46	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
03/02/2010	20.80	6.60	21.00	6.63	20.55	7.17	21.75	7.13	21.09	7.03	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
03/19/2010	21.78	6.04	21.83	6.07	22.01	9.60	21.91	7.40	21.67	7.36	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
04/20/2010	20.47	7.16	20.36	5.82	21.02	8.35	20.66	7.18	20.03	NR	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
05/28/2010	20.53	4.11	20.39	3.89	21.09	2.95	20.28	4.29	29.96	7.85	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
06/30/2010	20.45	2.74	20.43	2.42	20.36	2.74	20.30	2.89	19.72	5.25	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
07/29/2010	19.80	9.04	20.00	7.02	20.50	5.81	20.00	5.74	19.90	5.72	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
08/28/2010	20.50	8.25	20.90	7.20	21.00	5.89	21.50	5.96	21.50	7.31	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
09/25/2010	19.90	4.05	20.00	3.85	19.60	3.36	19.80	3.84	20.10	4.98	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
10/29/2010	20.50	2.64	21.00	4.13	22.00	1.91	21.00	2.47	20.80	3.22	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
11/29/2010	19.80	3.63	20.10	5.48	20.90	2.94	20.50	4.13	20.80	4.74	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
12/23/2010	21.86	2.38	21.92	2.38	21.94	1.95	21.91	2.75	21.65	1.93	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
01/26/2011	22.81	1.97	22.76	2.79	22.85	2.21	22.79	2.79	22.82	2.41	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
03/01/2011	22.19	5.31	22.17	3.49	22.11	3.62	22.21	3.87	22.02	4.32	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
04/01/2011	21.69	3.17	21.40	3.29	21.29	4.23	20.77	3.98	21.06	3.26	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
04/26/2011	21.03	3.72	21.12	3.23	21.12	4.17	21.07	3.97	21.05	5.62	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
05/31/2011	20.93	4.15	20.97	3.22	21.01	2.97	21.00	3.48	20.94	4.35	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
06/23/2011	19.10	2.17	19.21	2.51	19.39	2.82	19.97	2.57	19.15	2.18	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
07/27/2011	19.23	1.78	19.29	2.18	19.39	2.19	19.12	2.51	19.29	1.78	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
08/29/2011	19.91	2.57	20.05	2.24	19.34	2.84	19.53	NR	20.12	3.88	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
09/28/2011	21.94	2.34	21.87	2.70	21.81	2.85	21.93	2.34	21.59	2.12	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
10/24/2011	19.69	4.44	19.74	4.06	19.50	4.42	20.12	3.17	19.53	4.60	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
11/21/2011	22.48	1.94	22.35	2.37	22.42	3.06	22.26	2.73	22.21	2.37	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
12/30/2011	19.76	2.60	19.89	2.26	21.01	2.32	21.04	3.00	19.93	2.92	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
05/30/2012	19.96	2.25	19.95	1.84	20.23	2.26	20.25	2.26	19.96	2.25	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

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	ASW21		ASW22		ASW23		ASW24		ASW25		BSW26		BSW27		BSW28		BSW29		BSW30		BSW31	
Screen Interval (ft BLS)	48 to 50.5		48 to 50.5		47.5 to 50		47.5 to 50		47.5 to 50		46 to 48		46 to 48		46 to 48		46 to 48		46 to 48		46 to 48	
Sample Date	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)
06/29/2012	22.36	2.72	22.39	2.72	22.29	4.29	22.15	2.35	21.88	1.90	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
08/28/2012	22.39	3.33	22.30	3.32	22.33	6.78	22.32	3.59	22.26	3.32	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
08/29/2012	22.07	3.30	22.09	3.31	21.96	6.73	22.05	3.81	21.91	3.29	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
08/30/2012	21.97	3.83	22.02	3.58	21.93	6.75	21.96	3.57	21.91	3.82	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
09/07/2012	21.60	3.00	21.60	1.89	21.60	3.79	21.60	3.00	21.00	3.96	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
09/14/2012	19.93	2.59	19.85	2.58	19.90	2.58	19.83	2.88	19.95	2.59	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
09/21/2012	19.72	2.88	19.65	2.57	19.72	2.88	19.72	2.23	19.81	2.89	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
06/12/2013	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
06/14/2013	21.01	2.94	20.96	2.27	20.95	14.75	20.94	2.63	20.89	1.86	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
07/17/2013	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
07/18/2013	23.11	1.96	23.09	1.95	23.13	5.01	23.68	3.14	23.54	1.98	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
07/19/2013	23.00	1.95	23.19	2.40	22.32	4.90	23.51	3.42	23.12	2.40	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
07/26/2013	21.84	2.34	22.69	2.75	22.91	5.49	23.26	2.78	22.84	1.95	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
08/02/2013	22.85	2.75	22.94	1.38	23.15	3.92	23.06	2.77	22.97	3.91	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
08/09/2013	24.19	1.99	24.27	2.44	24.39	4.00	23.92	2.43	23.93	2.81	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
08/16/2013	25.03	2.88	24.96	2.49	24.87	4.30	24.75	2.48	24.86	2.03	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
10/29/2013	23.16	1.39	23.32	2.42	23.29	3.42	23.14	1.40	23.22	1.40	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
11/26/2013	22.08	1.37	22.07	2.37	22.08	1.93	22.06	2.37	22.16	2.74	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
12/30/2013	22.28	1.38	22.33	2.39	22.25	2.77	22.23	2.39	22.26	1.95	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
01/31/2014	22.38	1.39	22.33	1.96	22.32	1.96	22.35	1.97	22.29	1.39	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
02/26/2014	21.98	NR	21.96	NR	21.97	NR	21.92	NR	22.00	NR	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
03/28/2014	21.99	1.36	21.92	1.92	22.01	1.92	21.65	2.34	21.69	1.35	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
05/05/2014	22.24	1.36	22.26	1.36	22.29	2.71	22.19	2.72	22.12	1.35	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
05/30/2014	20.99	1.31	20.95	1.32	21.02	2.28	20.86	1.86	20.79	3.71	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
06/27/2014	21.63	1.88	21.64	2.31	21.60	1.33	21.35	1.88	21.56	1.88	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
07/30/2014	20.65	2.26	20.85	2.27	20.95	2.63	20.45	2.25	20.69	2.92	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
08/28/2014	22.56	1.36	22.61	3.62	22.63	2.36	22.68	1.93	22.57	1.37	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
09/29/2014	23.52	1.40	23.60	1.40	23.70	2.43	23.49	1.40	23.59	1.40	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
10/29/2014	22.95	1.38	22.73	1.94	21.97	2.34	22.03	1.91	22.28	2.36	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
11/26/2014	23.52	1.99	23.47	1.99	23.49	2.81	23.50	1.99	23.56	1.41	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
12/30/2014	23.50	1.99	23.49	1.99	23.52	1.99	23.47	2.43	23.49	1.99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
01/29/2015	23.05	2.41	23.00	1.97	23.15	2.42	23.05	2.41	23.55	2.44	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
02/27/2015	24.64	1.47	24.57	1.46	24.62	3.28	24.56	1.47	24.50	1.47	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
03/30/2015	24.64	2.50	24.61	2.88	24.67	3.82	24.30	2.87	24.41	2.04	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
04/29/2015	24.39	1.43	24.41	2.86	24.30	2.02	22.72	3.09	24.32	2.86	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
05/29/2015	22.98	1.38	22.85	1.37	22.88	2.37	22.99	1.37	22.85	1.37	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
07/28/2015	24.34	2.01	24.11	2.00	24.33	3.47	24.25	2.00	23.01	2.39	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
08/28/2015	21.52	1.89	21.54	1.34	21.52	2.67	21.58	1.90	21.61	2.32	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
09/30/2015	21.43	1.33	21.44	1.33	21.59	3.55	21.42	1.34	21.47	1.34	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
10/28/2015	21.14	0.94	21.13	0.94	21.15	1.33	21.02	0.94	21.05	0.94	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
11/25/2015	21.44	1.89	21.46	1.90	21.51	2.68	21.48	2.32	21.38	1.89	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
12/30/2015	21.73	2.34	21.75	1.91	21.70	3.02	21.74	1.91	21.92	1.92	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
01/28/2016	21.15	1.65	21.16	1.91	21.14	2.70	21.14	1.91	21.10	3.01	Biosparge expansion (BSW) wells in operation 2/24/16											
02/25/2016	22.53	2.61	22.50	2.41	22.99	3.15	23.05	2.64	23.06	2.99	20.00	5.89	19.00	5.81	20.00	5.58	20.00	5.89	20.00	5.89	21.00	5.98
03/04/2016	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	21.00	4.67	20.00	4.61	20.00	4.61	20.00	4.61	21.00	4.83	21.00	4.83
03/31/2016	21.20	2.50	21.00	2.49	21.10	2.67	21.10	2.67	21.10	2.98	20.50	4.60	20.00	4.14	21.00	3.73	20.50	3.40	20.50	4.17	20.50	3.55
04/28/2016	22.09	2.36	22.09	1.93	22.12	2.16	22.13	3.05	22.09	3.05	18.50	3.58	19.50	3.64	20.00	3.82	20.00	4.43	20.00	3.97	20.00	4.27
05/03/2017	20.40	4.00	20.36	3.82	20.45	3.82	20.56	3.63	20.38	3.62	19.00	3.30	19.50	4.23	13.00	7.61	21.00	7.41	20.00	3.95	20.00	3.95
05/23/2017	19.44	3.55	19.44	4.58	19.41	4.73	19.38	4.42	19.42	5.01	18.00	2.20	19.00	2.23	15.00	6.98	20.00	4.23	20.00	2.26	19.00	2.23
06/26/2017	20.40	3.18	20.40	3.18	20.40	3.18	20.50	3.18	20.40	3.18	20.00	3.03	20.00	3.03	3.00	2.16	20.00	3.03	20.00	3.03	20.00	3.03
07/31/2017	20.00	3.40	20.00	3.18	20.00	3.18	20.00	2.94	20.00	3.18	20.00	3.04	21.00	3.09	3.00	2.17	20.00	3.80	20.00	3.04	20.00	3.80
08/31/2017	20.00	3.39	20.00	3.39	20.00	3.39	20.00	2.94	20.00	3.39	20.00	5.32	20.00	2.28	19.00	5.99	21.00	6.17	20.00	3.04	20.00	2.28
09/26/2017	21.00	2.98	21.00	3.44	21.00	3.44	21.00	2.98	21.00	3.44	20.00	3.80	20.00	3.80	10.00	3.21	21.00	4.32	21.00	3.39	21.00	2.78
10/24/2017	21.00	3.44	21.00	3.44	21.00	3.44	21.00	2.98	21.00	3.44	20.00	5.32	20.00	2.28	19.00	6.00	21.00	6.17	20.00	3.04	20.00	2.28
11/27/2017	20.80	3.86	20.80	3.86	20.80	3.86	20.80	2.99	21.00	3.87	20.00	3.82	20.00	3.82	20.00	3.06	21.00	3.88	20.00	2.75	20.00	3.06

Biosparge Barrier Well Head Pressure and Air Flow Measurements
Mobile Launch Platform/Vehicle Assembly buildig Area, SWMU 058

	ASW21		ASW22		ASW23		ASW24		ASW25		BSW26		BSW27		BSW28		BSW29		BSW30		BSW31	
Screen Interval (ft BLS)	48 to 50.5		48 to 50.5		47.5 to 50		47.5 to 50		47.5 to 50		46 to 48		46 to 48		46 to 48		46 to 48		46 to 48		46 to 48	
Sample Date	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)
12/20/2017	20.10	3.80	20.10	3.80	20.10	3.80	20.00	3.80	20.10	3.80	21.00	5.40	20.00	4.56	20.00	3.04	21.00	3.86	20.00	3.80	20.00	3.80
01/30/2018	19.80	3.43	19.80	3.43	19.80	3.43	19.80	3.43	19.80	3.83	22.00	4.75	20.00	4.62	21.00	4.69	21.00	4.69	21.00	3.88	22.00	3.96
02/27/2018	19.45	3.37	19.50	3.37	19.40	3.37	19.41	3.37	19.45	3.37	22.00	3.91	20.00	4.57	10.00	3.85	21.00	4.63	20.00	3.81	22.00	3.13
03/27/2018	19.50	3.37	19.42	3.37	19.39	3.37	19.44	3.37	19.47	3.37	22.00	4.69	20.00	4.57	4.00	3.35	21.00	4.63	22.00	4.66	21.00	4.63
04/24/2018	20.48	3.82	20.49	3.42	20.52	3.42	20.50	3.42	20.55	3.42	22.00	4.69	20.00	4.56	13.00	5.43	20.00	4.56	21.00	3.08	22.00	3.13
05/22/2018	20.42	3.42	20.60	3.43	20.50	3.42	20.52	3.43	20.58	3.43	22.00	4.70	21.00	6.18	15.00	5.63	21.00	6.18	21.00	3.09	22.00	3.13
06/26/2018	20.45	3.41	20.52	3.42	20.51	3.42	20.46	3.41	20.49	3.42	22.00	4.69	21.00	6.17	17.00	5.81	22.00	6.25	22.00	4.69	22.00	4.69
07/23/2018	20.25	3.40	20.31	3.41	20.32	3.41	20.25	3.40	20.44	3.41	22.00	4.69	21.00	4.59	16.00	5.72	21.00	4.62	20.50	3.06	22.00	3.13
08/27/2018	21.52	3.47	21.55	3.47	21.61	3.47	21.55	3.47	21.58	3.47	22.00	4.06	21.00	4.59	16.00	5.72	21.00	4.62	21.00	4.62	22.00	3.13
09/25/2018	21.05	3.44	21.02	3.44	21.10	3.45	20.98	3.44	21.05	3.44	22.00	3.91	20.00	4.56	18.00	2.95	21.00	4.63	20.00	3.04	22.00	3.13
10/30/2018	21.92	3.02	22.10	3.27	22.02	3.26	22.17	3.27	22.02	3.26	22.00	4.69	20.00	4.56	20.00	4.56	20.00	4.56	21.00	4.62	22.00	4.69
11/20/2018	21.30	3.46	21.52	3.25	21.60	3.47	21.44	3.24	21.65	3.48	21.00	3.09	20.00	3.04	18.00	2.95	20.00	2.28	20.00	3.04	21.00	3.09
12/18/2018	21.21	3.26	21.18	3.01	21.14	2.75	21.17	2.75	20.89	3.24	22.00	2.36	20.00	3.06	18.00	2.97	20.00	2.30	20.00	3.06	21.00	1.55
01/31/2019	21.50	5.54	21.50	5.54	21.50	6.79	21.50	6.79	22.00	6.26	22.00	3.17	20.00	2.77	19.00	3.03	20.00	2.46	21.00	3.10	22.00	2.22
02/28/2019	21.00	1.74	20.75	3.00	21.00	3.02	21.25	3.51	21.50	1.76	21.00	4.05	20.00	2.92	20.00	2.14	19.00	2.10	21.00	3.71	22.00	1.58
03/27/2019	21.00	2.46	21.00	3.01	21.00	3.01	21.00	3.25	21.50	3.03	22.00	3.78	21.00	3.70	20.00	3.95	19.00	3.62	21.00	3.73	22.00	3.47
04/23/2019	20.00	2.41	21.00	2.99	20.00	2.41	20.00	2.95	20.00	2.95	22.00	3.76	20.00	3.66	19.00	3.28	19.00	3.91	21.00	3.71	22.00	3.74
05/29/2019	20.00	2.93	21.00	2.43	20.00	2.39	20.00	3.17	20.00	2.93	22.00	4.06	21.00	3.97	20.00	3.77	19.00	3.89	21.00	4.00	22.00	4.06
06/27/2019	21.00	2.97	21.00	2.71	21.00	2.97	21.00	2.97	21.00	2.97	22.00	4.05	21.00	4.27	20.00	3.79	19.00	3.88	21.00	3.69	22.00	2.81
07/31/2019	21.00	2.98	21.00	2.43	21.00	2.72	21.00	2.98	21.00	2.72	22.00	3.90	20.00	3.80	20.00	3.62	19.00	3.59	21.00	3.85	21.00	2.46
08/27/2019	21.00	2.72	21.00	2.44	21.00	2.72	21.00	2.72	21.00	2.44	22.00	3.44	21.00	4.29	21.00	3.98	19.00	3.60	21.00	3.86	22.00	3.13
09/24/2019	21.00	2.97	21.00	2.43	21.00	2.71	21.00	2.71	21.00	3.43	22.00	3.12	21.00	3.66	21.00	3.05	19.00	3.58	21.00	3.84	22.00	3.12
10/28/2019	21.00	1.70	21.00	2.40	21.00	1..7	21.00	3.00	21.00	3.00	21.00	3.10	21.00	3.10	21.00	2.70	21.00	3.40	21.00	3.10	21.00	2.30
11/26/2019	9.50	4.50	9.60	6.40	9.50	NR	9.50	3.20	9.40	6.40	23.50	3.20	20.00	3.40	20.50	3.10	19.00	2.90	21.00	3.40	22.00	2.20

Notes:

1. ASW and BSW indicate biosparge wells.
2. ft bls = feet below land surface.
3. psi = pounds per square inch.
4. scfm ind=icates standard cubic feet per minute.
5. NR = not recorded.
6. NI = not installed.
7. ASW15 and ASW23 measured on 6/14/13 had broken pitot tubes. Measurement not accurate.
8. The January 2019 flow rate data is not usable due to a faulty magnehelic gauge.
9. Gray highlighting indicates that the operational parameters were collected during the reporting period (May through December 2019).
10. Pressure data from 11/26/19 does not appear usable. Suspect bad field pressure gauge. Replaced pressure gauge for subsequent field readings.

Table 2-4
Biosparge Barrier Dissolved Oxygen Measurements
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Location	ASMW01	ASMW02	ASMW03	ASMW04	ASMW05	ASMW06	ASPZ01R*	ASPZ02
Screen Interval (ft BLS)	35 to 40	35 to 40	35 to 40	35 to 40	35 to 40	35 to 40	30 to 40	30 to 40
Sample Date	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)
05/19/2007	0.99	1.23	1.21	0.77	2.64	1.29	8.51	8.30
06/28/2007	1.50	0.87	0.91	1.11	1.25	1.57	7.99	8.03
07/30/2007	1.00	0.90	0.90	1.00	1.10	1.10	5.49	6.02
08/28/2007	0.00	0.25	0.27	0.27	0.62	0.00	0.29	4.28
11/27/2007	0.90	1.00	1.04	3.75	5.42	4.98	4.51	3.93
12/31/2007	0.50	0.50	0.70	2.19	2.93	1.98	3.95	2.98
01/31/2008	1.09	1.00	1.25	2.40	2.99	1.78	2.31	2.11
02/29/2008	1.05	1.23	1.09	2.11	1.97	1.59	1.50	2.30
03/31/2008	1.95	1.89	2.05	2.04	1.59	1.60	2.00	3.10
04/28/2008	2.16	1.61	1.91	2.00	1.14	1.41	1.51	2.59
05/29/2008	2.06	1.25	1.39	2.25	1.00	1.12	1.50	2.95
06/27/2008	0.02	0.00	0.00	0.00	0.00	0.00	NR	NR
07/29/2008	2.09	1.57	1.50	2.39	1.15	2.87	1.39	3.01
08/27/2008	2.14	1.27	1.93	2.04	3.02	2.85	2.09	2.58
09/22/2008	0.00	0.00	0.00	0.80	0.90	0.51	0.00	0.91
10/23/2008	NR	NR	NR	NR	NR	NR	1.63	1.98
11/25/2008	0.86	0.00	0.00	0.52	0.67	0.12	0.86	2.35
12/18/2008	1.46	1.05	1.09	0.87	1.23	1.01	NR	NR
12/30/2008	1.79	1.12	1.98	2.08	0.73	1.05	1.02	1.98
01/30/2009	0.54	0.86	0.92	0.84	0.62	0.71	NR	0.92
02/27/2009	1.01	0.99	1.23	1.15	1.12	1.17	1.07	0.94
03/05/2009	0.93	1.02	0.82	0.63	1.15	1.05	0.73	6.28
03/31/2009	1.16	0.92	0.88	0.82	1.22	0.72	0.87	1.34
04/29/2009	0.90	0.80	0.59	0.47	0.95	0.47	1.75	3.74
05/29/2009	1.74	2.01	1.24	1.68	1.89	2.00	2.09	2.97
06/29/2009	0.98	0.68	0.43	0.69	0.31	0.25	2.35	1.75
08/12/2009	0.25	0.17	0.17	0.19	1.45	0.27	0.10	4.78
09/08/2009	1.61	1.14	1.00	1.65	1.70	1.21	1.50	1.82
09/30/2009	2.00	1.01	0.98	0.52	0.99	1.01	1.29	1.97
10/27/2009	2.00	1.43	1.85	1.81	0.56	1.00	1.35	1.89
11/23/2009	1.09	0.65	0.48	0.50	0.81	0.50	1.69	2.98
12/31/2009	1.09	1.10	0.98	0.69	1.07	1.02	1.25	2.00
01/29/2010	1.54	1.98	1.74	1.82	1.69	1.73	1.45	2.06
03/02/2010	1.98	1.73	1.79	2.22	1.20	2.30	2.12	2.39
03/19/2010	0.62	0.46	0.43	0.41	1.30	0.28	0.45	6.35
04/20/2010	0.28	0.30	0.23	0.26	0.71	0.20	0.16	6.12
05/28/2010	1.78	1.80	1.09	0.73	1.06	1.41	0.72	6.95
06/30/2010	0.23	0.08	0.19	0.26	0.61	0.33	0.29	6.62
07/29/2010	0.89	1.00	0.95	0.92	1.25	1.40	0.59	0.90
08/28/2010	0.90	0.89	0.93	0.98	1.01	1.02	0.48	0.79
09/25/2010	0.32	0.14	0.11	0.31	0.89	0.29	NR	NR
10/29/2010	1.14	0.53	0.53	0.45	0.52	0.39	0.46	7.27
11/29/2010	0.63	0.25	0.31	0.19	0.30	0.56	0.50	2.98
12/23/2010	0.34	0.48	0.77	0.40	1.55	0.29	0.38	7.13
01/26/2011	0.60	0.72	0.95	0.28	0.81	0.64	0.25	6.20
03/01/2011	1.03	0.98	0.37	0.53	0.93	0.31	0.96	7.68
03/15/2011	1.46	0.96	0.51	1.17	2.19	1.95	NR	NR
04/01/2011	1.73	1.39	1.29	0.58	0.81	0.79	1.10	6.75
04/26/2011	2.27	1.81	0.82	0.19	0.55	0.18	0.62	7.43
05/31/2011	0.67	0.42	0.62	0.77	1.01	0.78	1.53	7.67
06/23/2011	1.92	1.23	0.97	1.75	0.95	0.89	1.69	5.93
07/27/2011	2.73	2.69	1.98	2.34	2.39	1.75	1.25	4.65
08/29/2011	0.29	0.25	0.50	0.85	2.34	0.62	0.79	1.93
09/23/2011	NR	1.64	0.72	NR	1.93	1.03	NR	NR
09/26/2011	0.26	NR	NR	1.22	NR	NR	NR	NR
09/28/2011	0.26	0.16	0.95	1.22	1.29	0.22	0.25	3.75
10/24/2011	0.20	0.17	0.79	1.05	1.21	0.30	0.19	1.23
11/21/2011	0.46	0.24	0.25	0.54	0.94	0.26	0.35	4.76
12/30/2011	0.45	0.25	0.19	0.59	0.45	0.14	0.29	2.31
05/30/2012	0.85	0.54	0.60	0.29	0.30	0.45	0.50	2.39
06/29/2012	0.24	0.27	0.23	0.64	1.64	0.30	0.17	2.36
08/28/2012	0.94	0.81	0.26	1.78	0.91	0.29	0.35	0.39
08/29/2012	1.03	0.76	0.71	0.62	0.69	0.70	0.64	1.64
08/30/2012	1.04	0.68	0.35	0.40	0.72	0.57	0.72	0.57
09/07/2012	1.25	0.74	0.51	0.53	1.04	0.30	1.25	0.74
09/14/2012	2.82	2.18	1.76	1.73	2.26	2.04	1.35	3.76
09/21/2012	2.29	1.93	1.29	1.89	2.50	2.02	1.49	2.75
06/12/2013	NR	NR	NR	NR	NR	NR	NR	NR
06/14/2013	0.68	0.61	0.54	0.52	0.56	0.65	0.49	0.54
07/17/2013	NR	NR	NR	NR	NR	NR	NR	NR
07/18/2013	0.46	0.48	0.61	0.40	0.31	0.36	0.37	1.02
07/19/2013	0.56	0.50	0.51	0.60	0.28	0.35	0.57	1.02
07/26/2013	0.37	0.25	0.18	0.42	0.14	0.21	0.19	1.96
08/02/2013	0.46	0.52	0.88	0.59	0.40	0.45	0.54	4.13
08/09/2013	0.41	0.52	0.88	0.54	0.38	0.52	0.43	0.48

Biosparge Barrier Dissolved Oxygen Measurements
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Location	ASMW01	ASMW02	ASMW03	ASMW04	ASMW05	ASMW06	ASPZ01R*	ASPZ02
Screen Interval (ft BLS)	35 to 40	35 to 40	35 to 40	35 to 40	35 to 40	35 to 40	30 to 40	30 to 40
Sample Date	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)
08/16/2013	0.57	0.64	0.91	0.61	0.44	0.48	0.38	3.11
10/29/2013	1.68	1.28	1.00	1.13	1.18	1.12	0.76	1.03
11/26/2013	0.47	0.33	0.20	0.55	0.17	0.19	0.10	2.55
12/30/2013	0.52	0.31	0.36	0.58	0.34	0.35	0.23	1.41
01/31/2014	0.22	0.19	0.16	0.54	0.18	0.14	0.10	4.68
02/26/2014	0.24	0.15	0.15	0.86	0.18	0.17	0.28	2.90
03/28/2014	0.61	0.35	0.21	0.77	0.25	0.25	0.26	5.54
05/05/2014	0.85	0.37	0.33	0.18	0.36	0.26	0.08	0.23
05/30/2014	0.47	0.20	0.22	0.52	0.14	0.20	0.16	4.85
06/27/2014	0.37	0.25	0.28	0.86	0.17	0.19	0.14	4.36
07/30/2014	0.29	0.09	0.23	0.37	0.10	0.26	0.30	1.20
08/28/2014	0.42	0.39	0.30	0.77	0.46	0.70	0.66	4.85
09/29/2014	1.19	0.50	0.51	1.21	0.43	0.44	0.37	2.26
10/27/2014	NR	NR	NR	1.20	0.79	0.45	NR	NR
11/26/2014	0.48	0.35	0.39	NR	1.07	NR	0.81	4.82
12/30/2014	0.50	0.29	0.35	0.21	1.00	0.26	0.65	1.65
01/29/2015	1.00	0.65	0.47	0.20	0.63	0.43	0.50	1.23
02/27/2015	1.43	0.87	0.67	2.41	1.01	0.50	0.37	6.14
03/30/2015	0.16	0.17	0.16	1.51	0.82	0.22	0.22	4.99
04/29/2015	1.02	0.88	1.39	2.23	1.25	0.88	1.21	4.49
05/29/2015	0.49	0.35	0.32	1.88	0.86	0.27	0.37	5.22
07/28/2015	0.42	0.37	0.68	1.17	0.56	0.07	0.46	3.50
08/28/2015	1.16	0.20	0.28	1.99	0.98	1.39	0.17	1.75
09/30/2015	0.36	0.64	0.37	2.73	1.00	0.17	0.17	1.58
10/30/2015	0.24	0.16	0.16	1.93	0.88	0.07	0.32	3.14
11/25/2015	0.16	0.59	0.13	1.91	0.74	0.24	0.11	2.20
12/30/2015	0.40	0.32	0.27	2.10	0.94	0.21	0.57	2.37
01/28/2016	1.44	0.51	0.90	2.80	1.00	0.33	0.95	2.60
02/25/2016	0.45	0.37	2.78	3.14	1.81	0.36	0.62	3.76
03/31/2016	0.53	0.14	0.51	2.47	3.22	0.41	0.13	3.82
04/28/2016	0.48	0.15	0.20	2.23	1.33	0.07	0.11	5.55
05/23/2017	0.63	2.49	0.20	0.19	0.46	0.22	0.24	0.18
06/26/2017	0.21	0.24	0.20	0.35	0.16	0.32	0.14	5.66
07/31/2017	0.11	0.03	1.29	0.25	0.10	0.29	0.20	1.23
08/31/2017	0.86	0.11	0.81	0.31	0.14	0.35	1.18	0.16
09/26/2017	0.31	1.79	0.19	0.61	0.19	0.38	0.18	5.24
10/24/2017	1.07	0.18	1.35	0.68	0.19	0.79	1.57	0.37
11/27/2017	0.16	0.35	0.23	0.14	1.72	0.12	0.10	0.13
12/20/2017	0.66	0.20	0.14	0.20	1.63	0.12	0.38	3.53
01/30/2018	0.71	0.37	0.19	0.24	2.05	0.10	0.43	3.58
02/27/2018	0.13	0.06	0.05	0.60	1.56	0.04	0.07	0.06
03/27/2018	0.15	0.08	0.07	0.71	1.35	0.06	0.09	0.08
04/24/2018	0.19	0.10	0.09	0.85	1.12	0.09	0.11	0.10
05/22/2018	0.58	0.51	0.24	1.17	3.70	0.31	5.09	0.24
06/26/2018	0.62	0.48	0.29	1.29	3.07	0.45	4.78	0.31
07/23/2018	0.79	0.55	0.42	1.55	2.98	0.55	4.55	0.39
08/27/2018	0.75	0.61	0.45	1.77	3.19	0.51	4.27	0.45
09/25/2018	0.88	0.75	0.68	1.55	2.89	0.55	3.56	0.49
10/30/2018	2.49	0.70	0.81	0.71	0.38	0.54	0.25	4.07
11/20/2018	1.37	1.14	1.13	0.65	1.66	1.01	3.75	2.59
12/18/2018	1.51	1.09	0.31	3.05	5.08	0.32	0.37	8.37
01/31/2019	0.43	0.69	0.19	1.43	2.83	0.40	0.64	2.79
02/28/2019	1.57	1.33	0.91	1.29	2.20	0.77	0.65	4.40
03/27/2019	1.79	1.59	1.12	1.42	2.42	0.96	0.78	4.10
04/23/2019	2.11	1.62	1.29	1.55	2.63	1.26	0.88	4.25
05/29/2019	2.29	2.25	1.56	2.08	2.25	1.58	1.02	3.56
06/27/2019	2.59	2.15	1.86	1.69	2.14	1.85	1.22	3.25
07/31/2019	2.17	2.41	2.07	1.85	2.27	1.62	1.29	2.89
08/27/2019	1.88	1.95	1.75	1.58	2.07	1.55	1.36	2.51
09/24/2019	1.96	2.19	1.95	1.51	2.22	1.69	1.54	2.36
11/04/2019	3.80	3.78	4.77	2.95	5.34	2.73	8.22	3.12
11/26/2019	6.22	5.56	4.46	4.23	4.41	4.86	0.76	8.08
12/30/2019[7]	5.55	4.75	3.49	4.77	3.61	0.74	0.94	2.64
Historical Avg	**1.06**	**0.88**	**0.82**	**1.18**	**1.33**	**0.79**	**1.18**	**3.14**

Notes:

1. mg/L = milligrams per liter.
2. ft BLS = feet below land surface.
3. DO = dissolved oxygen.
4. * = that the original biosparge well ASPZ01 was replaced with ASPZ01R (same construction details) on 16 October 2008.
5. NR = not recorded.
6. Gray highlighting indicates that the operational parameters were collected during the reporting period (May through December 2019).
7. Compressor had been inactive for 32 days when these readings were collected

Table 3-1
MLPV Monitoring Well Groundwater Elevations (Sitewide)
Mobile Launch Platform / Vehicle Assembly Building Area , SWMU 056

SHALLOW WELL ID:	MLPV-IW0001S		VABU-IW0004S		OPF3-IW0006S		PRES-IW0001SR		PRES-IW0006S	
Area:	VAB		VAB		VAB		VAB		VAB	
Sceened Interval (ft bls):	2 - 12		3 - 13		10 - 20		6 - 16		3 - 13	
TOC Elevation (ft NAVD88):	4.78		6.52		5.44		7.93		4.04	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	3.72	1.06	3.87	2.65	3.79	1.65	6.59	1.34	4.24	-0.2
11/10/2010	4.46	0.32	4.74	1.78	6.5	-1.06	7.49	0.44	6.55	-2.51
5/9/2011	-0.37	5.15	4.94	1.58	5.14	0.3	7.76	0.17	5.69	-1.65
11/1/2011	3	1.78	3.9	2.62	3.1	2.34	5.7	2.15	5.42	-1.38
11/27/2012	4.21	0.57	4.17	2.35	4.37	1.07	NM	NM	6.17	-2.13
5/28/2013	3.51	1.27	4.13	2.39	3.76	1.68	6.55	1.38	4.45	-0.41
11/19/2014	3.7	1.08	4.03	2.49	3.75	1.69	6.37	1.56	4.21	-0.17
5/23/2016	3.63	1.15	4.24	2.28	4.3*	1.14	6.82*	1.11	NM	NM
09/18-20/18	5.27	-0.49	4.49	2.03	4.92	0.52	7.18	0.75	4.9	-0.86

INTERMEDIATE WELL ID:	MLPV-IW0002I		MLPV-IW0006IR		MLPV-IW0011I		MLPV-IW0009I		MLPV-IW0012I	
Area:	VAB		VAB		Hot Spot 2		VAB		VAB	
Sceened Interval (ft bls):	28 - 33		28 - 33		35 - 40		28 - 33		35 - 40	
TOC Elevation (ft NAVD88):	5.58		2.87		4.03		5.78		5.41	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	4.67	0.91	2.82	0.05	2.2	1.83	4.38	1.4	3.43	1.98
11/10/2010	5.52	0.06	2.86	0.01	3.53	0.5	5.49	0.29	4.74	0.67
1/11/2011	NM	NM	NM	NM	1.48	2.55	NM	NM	NM	NM
5/9/2011	5.99	-0.41	3.5	-0.63	3.9	0.13	5.94	-0.16	5.15	0.26
11/1/2011	3.98	1.6	1.45	1.42	NM	NM	3.66	2.12	2.72	2.69
11/27/2012	5	0.58	NM	NM	NM	NM	4.98	0.8	4.26	1.15
5/28/2013	NM	NM	3.84	-0.97	2.32	1.71	4.37	1.41	3.58	1.83
2/5/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/6/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/19/2014	NM	NM	2.21	0.66	1.21	2.82	3.98	1.8	2.8	2.61
2/25/2015	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
3/2/2015	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/23/2016	NM	NM	2.15	0.72	2.65	1.38	4.65	1.13	3.9	1.51
09/18-20/18	NM	NM	3.52	-0.65	3.41	0.62	5.7	0.08	4.94	0.47
10/30/2019	NM	NM	NM	NM	1.74	2.29	NM	NM	NM	NM

DEEP WELL ID:	MLPV-IW0001D		MLPV-IW0009D		MLPV-IW0012D		MLPV-IW0018D		MLPV-IW0020D	
Area	VAB		VAB		VAB		VAB		VAB	
Sceened Interval (ft bls):	50 - 55		45 - 50		45 - 50		50 - 55		45 - 50	
TOC Elevation (ft NAVD88):	4.51		5.77		5.40		8.78		8.33	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	3.45	1.06	4.42	1.35	3.43	1.97	6.63	2.15	NM	NM
11/10/2010	4.37	0.14	5.51	0.26	4.68	0.72	8.02	0.76	NM	NM
5/9/2011	4.91	-0.4	5.91	-0.14	5.1	0.3	8.23	0..55	NM	NM
11/1/2011	3	1.51	3.68	2.09	2.69	2.71	5.91	2.87	NM	NM
11/27/2012	3.87	0.64	4.95	0.82	4.19	1.21	7.41	1.37	NM	NM
5/28/2013	3.42	1.09	4.35	1.42	3.53	1.87	6.73	2.05	NM	NM
11/19/2014	3.71	0.8	4.08	1.69	3.13	2.27	6.71	2.07	NM	NM
5/23/2016	3.85	0.66	4.61	1.16	3.85	1.55	7.25	1.53	NM	NM
09/18-20/18	5.09	-0.58	5.58	0.19	4.85	0.55	7.97	0.81	7.48	0.85
10/30/2019	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM

MLPV Monitoring Well Groundwater Elevations (Sitewide)
Mobile Launch Platform / Vehicle Assembly Building Area , SWMU 056

SHALLOW WELL ID:	PRES-IW0007S		PCCA-MW0004		PCCA-MW0007		PCCA-MW0008		PCCA-MW0009	
Area:	VAB		VAB		VAB		VAB		VAB	
Sceened Interval (ft bls):	1 - 11		5 - 15		5 - 15		5 - 15		5 - 15	
TOC Elevation (ft NAVD88):	1.65		7.96		8.22		7.22		7.6	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	1.93	-0.28	4.87	3.09	5.18	3.04	3.99	3.23	4.3	3.3
11/10/2010	2.71	-1.06	5.72	2.24	6.01	2.21	4.7	2.52	5.11	2.49
5/9/2011	3.63	-1.98	5.98	1.98	6.35	1.87	4.93	2.29	5.26	2.34
11/1/2011	1.73	-0.08	4.26	3.7	4.66	3.56	3.26	3.96	3.67	3.93
11/27/2012	NM	NM	5.57	2.39	5.94	2.28	4.44	2.78	4.85	2.75
5/28/2013	2.14	-0.49	4.91	3.05	5.05	3.17	4.78	2.44	4.24	3.36
11/19/2014	1.91	-0.26	4.75	3.21	5.07	3.15	3.58	3.64	4.02	3.58
5/23/2016	NM	NM	5.23	2.73	5.56	2.66	4.22	3	4.72	2.88
09/18-20/18	NM	NM	5.73	2.23	5.98	2.24	4.66	2.56	5.01	2.59

INTERMEDIATE WELL ID:	MLPV-IW0014I		MLPV-IW0017I		MLPV-IW0027I		MLPV-IW0028I		MLPV-IW0031	
Area:	VAB		VAB		VAB		VAB		Biosparge Area	
Sceened Interval (ft bls):	35 - 40		35 - 40		28 - 33		28 - 33		25 - 35	
TOC Elevation (ft NAVD88):	5.24		5.85		2.08		2.08		2.61	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	3.15	2.09	3.97	1.88	0.8	1.28	1.9	0.18	NM	NM
11/10/2010	4.42	0.82	5.32	0.53	2.01	0.07	2.68	-0.6	NM	NM
1/11/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/9/2011	4.73	0.51	5.69	0.16	2.51	-0.43	3.16	-1.08	NM	NM
11/1/2011	2.39	2.85	3.25	2.6	0.64	1.44	1.37	0.71	NM	NM
11/27/2012	NM	NM	4.82	1.03	1.53	0.55	2.21	-0.13	NM	NM
5/28/2013	3.21	2.03	4.16	1.69	0.96	1.12	1.72	0.36	NM	NM
2/5/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/6/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/19/2014	2.71	2.53	3.45	2.4	1.43	0.65	1.71	0.37	NM	NM
2/25/2015	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
3/2/2015	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/23/2016	3.6	1.64	4.45	1.4	1.5	0.58	2.06	0.02	NM	NM
09/18-20/18	4.6	0.64	5.54	0.31	2.63	-0.55	3.12	-1.04	NM	NM
10/30/2019	NM	NM	NM	NM	NM	NM	NM	NM	1.50	1.11

DEEP WELL ID:	MLPV-IW0022D		MLPV-IW0027D		MLPV-IW0028D		MLPV-IW0029D		MLPV-IW0033	
Area	VAB		VAB		VAB		VAB		Hot Spot 2	
Sceened Interval (ft bls):	48 - 53		45 - 50		45 - 50		42 - 47		40 - 50	
TOC Elevation (ft NAVD88):	8.26		1.99		3.03		6.84		2.13	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	6.11	2.15	0.85	1.14	2.26	0.77	4.66	2.18	NM	NM
11/10/2010	8.02	0.24	2.02	-0.03	3.11	-0.08	5.88	0.96	NM	NM
5/9/2011	7.45	0.81	2.48	-0.49	3.59	-0.56	6.19	0.65	NM	NM
11/1/2011	5.42	2.84	0.63	1.36	1.67	1.36	3.88	2.96	NM	NM
11/27/2012	6.8	1.46	1.46	0.53	1.99	1.04	5.46	1.38	NM	NM
5/28/2013	6.11	2.15	1.07	0.92	2.06	0.97	4.7	2.14	NM	NM
11/19/2014	6.09	2.17	1.2	0.79	1.98	1.05	4.47	2.37	NM	NM
5/23/2016	6.48	1.78	1.48	0.51	2.38	0.65	5.06	1.78	NM	NM
09/18-20/18	7.18	1.08	2.56	-0.57	3.42	-0.39	5.95	0.89	NM	NM
10/30/2019	NM	NM	NM	NM	NM	NM	NM	NM	0.17	1.96

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SHALLOW WELL ID:	PCCA-MW0010		PCCA-MW0011		PCCA-MW0012		PCCA-MW0013		PCCA-MW0014	
Area:	VAB		VAB		VAB		VAB		VAB	
Sceened Interval (ft bls):	5 - 15		5 - 15		5 - 15		5 - 15		5 - 15	
TOC Elevation (ft NAVD88):	7.86		7.59		7.89		6.99		7.25	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	4.46	3.4	4.19	3.4	4.37	3.52	2.89	4.1	4.12	3.13
11/10/2010	4.21	3.65	4.92	2.67	5.15	2.74	4.02	2.97	4.79	2.46
5/9/2011	5.42	2.44	5.24	2.35	5.32	2.57	4.19	2.8	5.15	2.1
11/1/2011	3.74	4.12	3.39	4.2	3.59	4.3	2.23	4.76	3.22	4.03
11/27/2012	5.03	2.83	7.02	0.57	4.98	2.91	3.88	3.11	4.7	2.55
5/28/2013	4.43	3.43	3.97	3.62	4.22	3.67	3.12	3.87	4.98	2.27
11/19/2014	4.27	3.59	3.94	3.65	4.09	3.8	2.71	4.28	3.84	3.41
5/23/2016	4.74	3.12	4.54	3.05	4.73	3.16	3.36	3.53	4.42	2.83
09/18-20/18	5.2	2.66	4.93	2.66	5.13	2.76	4.11	2.88	4.81	2.44

INTERMEDIATE WELL ID:	MLPV-IW0032		MLPV-IW0034		MLPV-IW0038		MLPV-IW0040		MLPV-IW0042	
Area:	Hot Spot 2		Hot Spot 2		Hot Spot 2		Hot Spot 2		Hot Spot 2	
Sceened Interval (ft bls):	30 - 40		30 - 40		30 - 40		30 - 40		30 - 40	
TOC Elevation (ft NAVD88):	2.22		4.65		3.84		5.15		3.35	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/10/2010	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
1/11/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/9/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/1/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/27/2012	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/28/2013	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
2/5/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/6/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/19/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
2/25/2015	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
3/2/2015	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/23/2016	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
09/18-20/18	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
10/30/2019	0.24	1.98	2.47	2.18	1.77	2.07	2.86	2.29	1.12	2.23

DEEP WELL ID:	MLPV-IW0035		MLPV-IW0036		MLPV-IW0037		MLPV-IW0039		MLPV-IW0041	
Area	Hot Spot 2		Hot Spot 2		Hot Spot 2		Hot Spot 2		Hot Spot 2	
Sceened Interval (ft bls):	40 - 50		40 - 45		40 - 50		40 - 50		40 - 50	
TOC Elevation (ft NAVD88):	4.66		5.79		3.87		3.76		5.14	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/10/2010	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/9/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/1/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/27/2012	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/28/2013	NM	NM	NM	NM	2.25	1.62	NM	NM	NM	NM
11/19/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/23/2016	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
09/18-20/18	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
10/30/2019	2.57	2.09	3.40	2.39	1.79	2.08	1.70	2.06	2.79	2.35

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SHALLOW WELL ID:	WCPS-IW0001SR		WCPS-IW0002SR		WCPS-IW0005S		WCPS-IW0006S		WCPS-IW0009S	
Area:	VAB		VAB		VAB		VAB		VAB	
Sceened Interval (ft bls):	2.5 - 12.5		2.5 - 12.5		2 - 12		3 - 13		2.5 - 12.5	
TOC Elevation (ft NAVD88):	4.23		5.39		4.48		4.88		5.3	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	3.06	1.17	4.21	1.18	3.38	1.1	3.92	0.96	3.84	1.46
11/10/2010	3.65	0.58	4.81	58	4.1	0.38	4.5	0.38	4.64	0.66
5/9/2011	4.1	0.13	5.18	0.21	4.61	-0.13	4.88	0	5.06	0.24
11/1/2011	2.27	1.96	3.28	2.11	2.84	1.64	2.95	1.93	3.06	2.24
11/27/2012	3.13	1.1	4.37	1.02	3.72	0.76	3.93	0.95	4.19	1.11
5/28/2013	2.8	1.43	3.37	2.02	3.4	1.08	3.61	1.27	3.88	1.42
11/19/2014	2.56	1.67	NM	NM	3.05	1.43	3.45	1.43	3.63	1.67
5/23/2016	3.02	1.21	NM	NM	3.45	1.03	3.81	1.07	4.02	1.28
09/18-20/18	3.63	0.6	NM	NM	4.14	0.34	4.44	0.44	4.7	0.6

INTERMEDIATE WELL ID:	MLPV-IW0046		MLPV-IW0047		MLPV-IW0053		MLPV-IW0056		MLPV-SAMW0004I	
Area:	VAB		VAB		VAB		VAB		Hot Spot 2	
Sceened Interval (ft bls):	35 - 40		35 - 40		35 - 40		30 - 40		35 - 40	
TOC Elevation (ft NAVD88):	2.7		5.87		4.76		7.9		ND	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/10/2010	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
1/11/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/9/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/1/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/27/2012	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/28/2013	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
2/5/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/6/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/19/2014	1.71	0.99	3.19	2.68	2.93	1.83	5.77	2.13	NM	NM
2/25/2015	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
3/2/2015	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/23/2016	2.07	0.63	4.8	1.07	3.6	1.16	6.09	1.81	NM	NM
09/18-20/18	3.16	-0.46	5.75	0.12	4.63	0.13	6.82	1.08	NM	NM
10/30/2019	NM	NM	NM	NM	NM	NM	NM	NM	3.14	-

DEEP WELL ID:	MLPV-IW0043		MLPV-IW0044		MLPV-IW0045		MLPV-IW0048		MLPV-IW0049	
Area	Hot Spot 2		Hot Spot 2		Hot Spot 2		VAB		VAB	
Sceened Interval (ft bls):	40 - 50		40 - 50		40 - 50		40 - 50		38 - 48	
TOC Elevation (ft NAVD88):	3.33		2.28		3.79		4.23		8.11	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/10/2010	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/9/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/1/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/27/2012	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/28/2013	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/19/2014	NM	NM	NM	NM	NM	NM	2.59	1.64	5.9	2.21
5/23/2016	NM	NM	NM	NM	NM	NM	2.91	1.32	6.25	1.86
09/18-20/18	NM	NM	NM	NM	NM	NM	3.81	0.42	6.93	1.18
10/30/2019	1.09	2.24	0.42	1.86	1.80	1.99	NM	NM	NM	NM

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SHALLOW WELL ID:	WCPS-IW0010S		WCPS-IW0012S		WCPS-IW0013S		WCPS-IW0014S		WCPS-IW0015S	
Area:	VAB		VAB		VAB		VAB		VAB	
Sceened Interval (ft bls):	2.5 - 12.5		2 - 12		2.5 - 12.5		4 - 14		3 - 13	
TOC Elevation (ft NAVD88):	5.83		4.77		5.79		6.88		5.63	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	4.4	1.43	3.07	1.7	3.8	1.63	5.16	1.72	4.59	1.04
11/10/2010	5.19	0.64	4.06	0.71	4.61	0.82	5.98	0.9	5.31	0.32
5/9/2011	5.59	0.24	4.53	0.24	5.04	0.39	6.37	0.51	5.72	-0.09
11/1/2011	3.53	2.3	2.33	2.44	NM	NM	4.25	2.63	4.23	1.4
11/27/2012	4.7	1.13	NM	NM	4.26	1.17	5.63	1.25	4.83	0.8
5/28/2013	4.19	1.64	NM	NM	NM	NM	4.98	1.9	4.71	0.92
11/19/2014	4.11	1.72	NM	NM	3.7	2.09	4.92	1.96	4.56	1.07
5/23/2016	NM	NM	NM	NM	4.12	1.67	5.36	1.52	4.9	0.73
09/18-20/18	5.14	0.69	4.1	0.67	4.73	1.06	6.02	0.86	5.43	0.2

INTERMEDIATE WELL ID:	MLPV-ASMW0004		MLPV-ASMW0005		MLPV-ASMW0006		PCCA-MW0015		PCCA-MW0016	
Area:	Biosparge Area		Biosparge Area		Biosparge Area		VAB		VAB	
Sceened Interval (ft bls):	35 - 40		35 - 40		35 - 40		15 - 25		15 - 25	
TOC Elevation (ft NAVD88):	5.00		5.00		5.00		8.11		7.33	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	NM	NM	NM	NM	NM	NM	5.12	2.99	4.17	3.16
11/10/2010	NM	NM	NM	NM	NM	NM	6.03	2.08	5.12	2.21
1/11/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/9/2011	NM	NM	NM	NM	NM	NM	6.34	1.77	5.49	1.84
11/1/2011	NM	NM	NM	NM	NM	NM	4.55	3.56	3.62	3.71
11/27/2012	NM	NM	NM	NM	NM	NM	5.84	2.27	4.89	2.44
5/28/2013	NM	NM	NM	NM	NM	NM	5.24	2.87	4.27	3.06
2/5/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/6/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/19/2014	NM	NM	NM	NM	NM	NM	5	3.11	4.1	3.23
2/25/2015	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
3/2/2015	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/23/2016	NM	NM	NM	NM	NM	NM	5.55	2.56	4.62	2.71
09/18-20/18	NM	NM	NM	NM	NM	NM	6.03	2.08	5.15	2.18
10/30/2019	0.96	4.04	1.54	3.46	0.74	4.26	NM	NM	NM	NM

DEEP WELL ID:	MLPV-IW0050		MLPV-IW0051		MLPV-IW0052		MLPV-IW0054		MLPV-IW0055	
Area	VAB		VAB		VAB		VAB		VAB	
Sceened Interval (ft bls):	40 - 50		45 - 55		40 - 50		40 - 50		40 - 50	
TOC Elevation (ft NAVD88):	7.15		6.12		7.09		6.96		7.60	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/10/2010	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/9/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/1/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/27/2012	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/28/2013	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/19/2014	5.2	1.95	4.65	1.47	4.69	2.4	4.98	1.98	4.75	2.85
5/23/2016	5.5	1.65	4.65	1.47	5.38	1.71	5.35	1.61	5.84	1.76
09/18-20/18	6.11	1.04	5.18	0.94	6.28	0.81	6.29	0.67	6.68	0.92
10/30/2019	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM

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SHALLOW WELL ID:
Area:
Sceened Interval (ft bls):
TOC Elevation (ft NAVD88):
Date:
5/19/2010
11/10/2010
5/9/2011
11/1/2011
11/27/2012
5/28/2013
11/19/2014
5/23/2016
09/18-20/18

INTERMEDIATE WELL ID:	PCCA-MW0017		PCCA-MW0018		PCCA-MW0019		PCCA-MW0020		VABU-IW0001I	
Area:	VAB		VAB		VAB		VAB		VAB	
Sceened Interval (ft bls):	15 - 25		15 - 25		15 - 25		25 - 35		20 - 30	
TOC Elevation (ft NAVD88):	7.59		7.55		7.01		7.38		8.36	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	4.35	3.24	4.33	3.22	3.68	3.33	4.19	3.19	NM	NM
11/10/2010	5.34	2.25	5.31	2.24	4.71	2.3	5.18	2.2	NM	NM
1/11/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/9/2011	5.68	1.91	5.66	1.89	5.05	1.96	5.5	1.88	NM	NM
11/1/2011	3.78	3.81	3.71	3.84	3.14	3.87	3.68	3.7	NM	NM
11/27/2012	5.16	2.43	5.04	2.51	4.45	2.56	4.96	2.42	NM	NM
5/28/2013	4.48	3.11	4.47	3.08	3.91	3.1	4.35	3.03	NM	NM
2/5/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/6/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/19/2014	4.3	3.29	4.3	3.25	3.66	3.35	4.1	3.28	NM	NM
2/25/2015	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
3/2/2015	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/23/2016	4.82	2.77	4.8	2.75	4.18	2.83	4.62	2.76	NM	NM
09/18-20/18	5.37	2.22	5.33	2.22	4.75	2.26	5.18	2.2	7.33	1.03
10/30/2019	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM

DEEP WELL ID:	MLPV-IW0057		MLPV-IW0058		MLPV-IW0059		MLPV-IW0060		MLPV-IW0061	
Area	Biosparge Area		Biosparge Area		Biosparge Area		Biosparge Area		Biosparge Area	
Sceened Interval (ft bls):	40 - 50		45 - 50		45 - 50		40 - 50		35 - 40	
TOC Elevation (ft NAVD88):	5.52		5.54		6.18		1.88		5.78	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/10/2010	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/9/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/1/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/27/2012	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/28/2013	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/19/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/23/2016	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
09/18-20/18	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
10/30/2019	4.24	1.28	4.28	1.26	4.79	1.39	0.86	1.02	4.60	1.18

MLPV Monitoring Well Groundwater Elevations (Sitewide)
Mobile Launch Platform / Vehicle Assembly Building Area , SWMU 056

SHALLOW WELL ID:
Area:
Sceened Interval (ft bls):
TOC Elevation (ft NAVD88):
Date:
5/19/2010
11/10/2010
5/9/2011
11/1/2011
11/27/2012
5/28/2013
11/19/2014
5/23/2016
09/18-20/18

INTERMEDIATE WELL ID:	WCPS-IW0016		PRES-IW0007I		PRES-IW0008I		SATV-IW0009I		SATV-IW0010	
Area:	VAB		VAB		VAB		VAB		VAB	
Sceened Interval (ft bls):	15 - 25		32 - 37		38 - 42		22 - 27		35 - 45	
TOC Elevation (ft NAVD88):	4.57		4.62		6.18		6.93		6.85	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	NM	NM	3.49	1.13	4.8	1.38	4.85	2.08	NM	NM
11/10/2010	NM	NM	4.3	0.32	5.68	0.5	6.9	0.03	NM	NM
1/11/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/9/2011	NM	NM	4.84	-0.22	6.09	0.09	6.21	0.72	NM	NM
11/1/2011	NM	NM	3.28	1.34	4.52	1.66	4.28	2.65	NM	NM
11/27/2012	NM	NM	4.09	0.53	5.37	0.81	5.63	1.3	NM	NM
5/28/2013	NM	NM	3.7	0.92	4.95	1.23	4.84	2.09	NM	NM
2/5/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/6/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/19/2014	3.15	1.42	3.55	1.07	4.86	1.32	4.89	2.04	4.87	1.98
2/25/2015	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
3/2/2015	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/23/2016	2.52	2.05	3.78	0.84	NM	NM	5.25	1.68	5.25	1.6
09/18-20/18	4.05	0.52	4.12	0.5	5.53	0.65	5.85	1.08	5.82	1.03
10/30/2019	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM

DEEP WELL ID:	MLPV-IW0062		MLPV-IW0063		MLPV-IW0064		MLPV-SAMW0001		MLPV-SAMW0003	
Area	Biosparge Area		Biosparge Area		Biosparge Area		VAB		VAB	
Sceened Interval (ft bls):	40 - 45		35 - 40		40 - 45		43 - 48		43 - 48	
TOC Elevation (ft NAVD88):	5.84		3.67		3.64		6.80		6.80	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/10/2010	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/9/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/1/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/27/2012	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/28/2013	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/19/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/23/2016	NM	NM	NM	NM	NM	NM	3.48	3.32	4.03	2.77
09/18-20/18	NM	NM	NM	NM	NM	NM	4.43	2.37	4.94	1.86
10/30/2019	4.71	1.13	2.64	1.03	2.65	0.99	NM	NM	NM	NM

MLPV Monitoring Well Groundwater Elevations (Sitewide)
Mobile Launch Platform / Vehicle Assembly Building Area , SWMU 056

SHALLOW WELL ID:
Area:
Sceened Interval (ft bls):
TOC Elevation (ft NAVD88):
Date:
5/19/2010
11/10/2010
5/9/2011
11/1/2011
11/27/2012
5/28/2013
11/19/2014
5/23/2016
09/18-20/18

INTERMEDIATE WELL ID:	TPF-MW0001		VABRA-MW0011		VABRA-MW0012		VABRA-MW0013		VABRA-MW0014	
Area:	VAB		Hot Spot 3 (OFW)		Hot Spot 3 (OFW)		Hot Spot 3 (OFW)		Hot Spot 3 (OFW)	
Sceened Interval (ft bls):	23 - 28		25 - 30		15 - 25		20 - 25		25 - 30	
TOC Elevation (ft NAVD88):	7.62		ND		ND		ND		ND	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	5.99	1.63	NM	NM	NM	NM	NM	NM	NM	NM
11/10/2010	6.87	0.75	NM	NM	NM	NM	NM	NM	NM	NM
1/11/2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
5/9/2011	7.3	0.32	NM	NM	NM	NM	NM	NM	NM	NM
11/1/2011	5.22	2.4	NM	NM	NM	NM	NM	NM	NM	NM
11/27/2012	6.49	1.13	NM	NM	NM	NM	NM	NM	NM	NM
5/28/2013	5.99	1.63	NM	NM	NM	NM	NM	NM	NM	NM
2/5/2014	NM	NM	6.68	0.12	5.84	0.33	5	0.97	3.74	2.15
11/6/2014	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/19/2014	5.77	1.85	NM	NM	NM	NM	NM	NM	NM	NM
2/25/2015	NM	NM	5.93	-	4.94	-	4.9	-	3.07	-
3/2/2015	NM	NM	5.93	-	4.94	-	4.9	-	3.07	-
5/23/2016	6.2	1.42	NM	NM	NM	NM	NM	NM	NM	NM
09/18-20/18	6.85	0.77	NM	NM	NM	NM	NM	NM	NM	NM
10/30/2019	NM	NM	2.20	-	2.21	-	1.78	-	2.33	-

DEEP WELL ID:	MLPV-SAMW0004D		VABU-IW0005D		VABU-IW0006D		PRES-IW0002D		PRES-IW0007D	
Area	Hot Spot 2		VAB		VAB		VAB		VAB	
Sceened Interval (ft bls):	45 - 50		52 - 57		42 - 47		42 - 47		42 - 47	
TOC Elevation (ft NAVD88):	ND		7.41		6.29		5.11		4.63	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	NM	NM	NM	NM	4.48	1.81	4.13	0.98	3.53	1.1
11/10/2010	NM	NM	NM	NM	5.52	0.77	5	0.11	4.38	0.25
5/9/2011	NM	NM	NM	NM	5.82	0.47	5.55	-0.44	4.9	-0.27
11/1/2011	NM	NM	NM	NM	3.88	2.41	3.92	1.19	3.34	1.29
11/27/2012	NM	NM	NM	NM	5.11	1.18	NM	NM	3.97	0.66
5/28/2013	NM	NM	NM	NM	4.59	1.7	4.36	0.75	3.74	0.89
11/19/2014	NM	NM	NM	NM	4.47	1.82	4.15	0.96	3.6	1.03
5/23/2016	NM	NM	NM	NM	4.84	1.45	NM	NM	3.84	0.79
09/18-20/18	NM	NM	4.88	2.53	5.36	0.93	4.7	0.41	4.13	0.5
10/30/2019	3.10	-	NM	NM	NM	NM	NM	NM	NM	NM

MLPV Monitoring Well Groundwater Elevations (Sitewide)
Mobile Launch Platform / Vehicle Assembly Building Area , SWMU 056

SHALLOW WELL ID:
Area:
Sceened Interval (ft bls):
TOC Elevation (ft NAVD88):
Date:
5/19/2010
11/10/2010
5/9/2011
11/1/2011
11/27/2012
5/28/2013
11/19/2014
5/23/2016
09/18-20/18

INTERMEDIATE WELL ID:
Area:
Sceened Interval (ft bls):
TOC Elevation (ft NAVD88):
Date:
5/19/2010
11/10/2010
1/11/2011
5/9/2011
11/1/2011
11/27/2012
5/28/2013
2/5/2014
11/6/2014
11/19/2014
2/25/2015
3/2/2015
5/23/2016
09/18-20/18
10/30/2019

DEEP WELL ID:	PRES-IW0009		PRES-IW0010		SATV-IW0003D	
Area	VAB		VAB		VAB	
Sceened Interval (ft bls):	40 - 50		40 - 50		40 - 45	
TOC Elevation (ft NAVD88):	5.17		2.26		7.10	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/19/2010	NM	NM	NM	NM	5.15	1.95
11/10/2010	NM	NM	NM	NM	6.13	0.97
5/9/2011	NM	NM	NM	NM	6.45	0.65
11/1/2011	NM	NM	NM	NM	4.6	2.5
11/27/2012	NM	NM	NM	NM	5.9	1.2
5/28/2013	NM	NM	NM	NM	5.22	1.88
11/19/2014	3.7	1.47	1.16	1.1	4.47	2.63
5/23/2016	3.97	1.2	1.3	0.96	5.51	1.59
09/18-20/18	4.46	0.71	1.68	0.58	NM	NM
10/30/2019	NM	NM	NM	NM	NM	NM

Notes:

1. BTOC = below top of casing
2. SATV-IW0003D and SATV-IW0004I were abandoned
3. ft bls = feet below land survace
4. NM = not measured
5. VAB = Vehicle Assembly Building
6. NAVD (88) = North American Vertical Datum of 1988
7. ND = No data available
8. Historical data presented in this table reported from 2010 to present. Elevation data prior to 2010 is available in the VAB Area 2018 Biennnial Groundwater Monitoring Results Report, (NASA, March 2019)

Table 3-2
Biosparge Area
Chlorinated Volatile organic Compound (CVOC) Analytical Results
Mobile Launch Platform/Vehicle Assembly Area (MLPV) Long Term Monitoring (LTM)
October & November 2019

Location ID	Sample ID	Sample Date	Screened interval (ft bls)	Concentration (ug/L)			
			Analyte	c-DCE	t-DCE	TCE	VC
			FDEP 62-777 GCTLs	70	100	3	1
			FDEP NADCs	700	1000	300	100
MLPV-ASMW0004	MLPV-ASMW0004-040.0-20070528	28 May 2007	35 - 40	**12.2**	0.5 U	0.5 U	0.5 U
	MLPV-ASMW0004-040.0-20070906	06 Sep 2007		**2.4**	0.2 U	0.38 U	0.34 U
	MLPV-ASMW0004-040.0-20071231	31 Dec 2007		**7.7**	0.2 U	0.38 U	**0.39 I**
	MLPV-ASMW0004-040.0-20080331	31 Mar 2008		**8**	0.2 U	0.38 U	**0.65 I**
	MLPV-ASMW0004-040.0-20080627	27 Jun 2008		**7.5**	0.45 U	0.32 U	0.3 U
	MLPV-ASMW0004-040.0-20081218	18 Dec 2008		**48.4**	**0.73 I**	0.32 U	**8.4**
	MLPV-ASMW0004-040.0-20090305	05 Mar 2009		**37.7**	**0.57 I**	0.32 U	**1.8**
	MLPV-ASMW0004-037.5-20090922	22 Sep 2009		**9.9**	0.45 U	0.32 U	0.3 U
	MLPV-ASMW0004-037.5-20100324	24 Mar 2010		**1**	0.34 U	0.24 U	0.28 U
	MLPV-ASMW0004-037.5-20101001	01 Oct 2010		**5**	0.34 U	0.24 U	0.28 U
	MLPV-ASMW0004-037.5-20110315	15 Mar 2011		**0.45 I**	0.35 U	0.26 U	0.22 U
	MLPV-ASMW0004-037.5-20110926	26 Sep 2011		**5.9**	0.35 U	0.26 U	0.22 U
	MLPV-ASMW0004-037.5-20120316	16 Mar 2012		**40.8**	0.35 U	0.26 U	0.22 U
	MLPV-ASMW0004-037.5-20120828	28 Aug 2012		**18.8**	0.35 U	0.26 U	0.22 U
	MLPV-ASMW0004-037.5-20130318	18 Mar 2013		**87.3**	**0.79 I**	0.31 U	0.44 U
	MLPV-ASMW0004-37.5-20140127	27 Jan 2014		**73.7**	**1.5**	0.3 U	**1.2**
	MLPV-ASMW0004-037.5-20140417	17 Apr 2014		**45**	**0.54 I**	0.3 U	**5.1**
	MLPV-ASMW0004-037.5-20140722	22 Jul 2014		**1.3**	0.44 U	0.5 U	0.5 U
	MLPV-ASMW0004-037.5-20150119	19 Jan 2015		**26**	0.37 U	0.48 U	**0.78 I**
	MLPV-ASMW0004-037.5-20150406	06 Apr 2015		**12**	0.67 U	0.61 U	0.71 U
	MLPV-ASMW0004-037.5-20150714	14 Jul 2015		**12**	0.67 U	0.61 U	0.71 U
	MLPV-ASMW0004-040.0-20160111	11 Jan 2016		**17**	0.67 U	0.61 U	0.71 U
	MLPV-ASMW0004-037.5-20160712	12 Jul 2016		**37**	**1.1**	0.61 U	0.71 U
	MLPV-ASMW0004-037.5-20170306	06 Mar 2017		**200**	**7.8**	1.2 U	**500**
	MLPV-ASMW0004-037.5-20171108	08 Nov 2017		**53**	**3.2**	0.61 U	**1.7**
	MLPV-ASMW0004-037.5-20180530	30 May 2018		**16**	**0.76 I**	0.61 U	**1.7**
	MLPV-ASMW0004-037.5-20181115	15 Nov 2018		**9.3**	0.39 U	0.61 U	**1.9**
	MLPV-ASMW0004-037.5-20190311	11 Mar 2019		**0.98 I**	0.39 U	0.61 U	**0.41 I**
	MLPV-ASMW0004-037.5-20191101	01 Nov 2019		**8.4**	**0.52 I**	0.35 U	0.41 U
MLPV-ASMW0005	MLPV-ASMW0005-040.0-20070528	28 May 2007	35 - 40	0.5 U	0.5 U	0.5 U	0.5 U
	MLPV-ASMW0005-040.0-20070906	06 Sep 2007		**0.35 I**	0.2 U	0.38 U	0.34 U
	MLPV-ASMW0005-040.0-20071231	31 Dec 2007		0.28 U	0.2 U	0.38 U	0.34 U
	MLPV-ASMW0005-040.0-20080331	31 Mar 2008		**0.28 I**	0.2 U	0.38 U	0.34 U
	MLPV-ASMW0005-040.0-20080627	27 Jun 2008		**0.32 I**	0.45 U	0.32 U	0.3 U
	MLPV-ASMW0005-040.0-20081218	18 Dec 2008		**0.69 I**	0.45 U	0.32 U	**0.44 I**
	MLPV-ASMW0005-040.0-20090305	05 Mar 2009		0.2 U	0.45 U	0.32 U	0.3 U
	MLPV-ASMW0005-037.5-20090922	22 Sep 2009		**1.4**	0.45 U	0.32 U	0.3 U
	MLPV-ASMW0005-037.5-20100324	24 Mar 2010		**0.48 I**	0.34 U	0.24 U	0.28 U
	MLPV-ASMW0005-037.5-20101001	01 Oct 2010		**5.6**	0.34 U	0.24 U	0.28 U
	MLPV-ASMW0005-037.5-20110315	15 Mar 2011		**0.67 I**	0.35 U	0.26 U	0.22 U
	MLPV-ASMW0005-037.5-20110923	23 Sep 2011		**1.6**	0.35 U	0.26 U	0.22 U
	MLPV-ASMW0005-037.5-20120316	16 Mar 2012		**5.3**	0.35 U	0.26 U	0.22 U
	MLPV-ASMW0005-037.5-20120828	28 Aug 2012		**2.4**	0.35 U	0.26 U	0.22 U
	MLPV-ASMW0005-037.5-20130318	18 Mar 2013		**7.3**	0.23 U	0.31 U	0.44 U
	MLPV-ASMW0005-37.5-20140127	27 Jan 2014		**52.1**	**1.6**	0.3 U	**27.5**
	MLPV-ASMW0005-037.5-20140417	17 Apr 2014		**62.3**	**1.5**	0.3 U	**44.2**
	MLPV-ASMW0005-037.5-20140722	22 Jul 2014		**25**	**0.68 I**	0.5 U	**21**
	MLPV-ASMW0005-037.5-20150119	19 Jan 2015		**26**	**0.60 I**	0.48 U	0.5 U
	MLPV-ASMW0005-037.5-20150406	06 Apr 2015		**99**	**1.1**	0.61 U	0.71 U
	MLPV-ASMW0005-037.5-20150714	14 Jul 2015		**50**	**0.95 I**	0.61 U	0.71 U
	MLPV-ASMW0005-040.0-20160111	11 Jan 2016		**78**	**1.8**	0.61 U	0.71 U
	MLPV-ASMW0005-037.5-20160712	12 Jul 2016		**28**	**0.68 I**	0.61 U	0.71 U

Biosparge Area
Chlorinated Volatile organic Compound (CVOC) Analytical Results
Mobile Launch Platform/Vehicle Assembly Area (MLPV) Long Term Monitoring (LTM)
October & November 2019

Location ID	Sample ID	Sample Date	Screened interval (ft bls)	Concentration (ug/L)			
			Analyte	c-DCE	t-DCE	TCE	VC
			FDEP 62-777 GCTLs	70	100	3	1
			FDEP NADCs	700	1000	300	100
MLPV-ASMW0005 (continued)	MLPV-ASMW0005-037.5-20170306	06 Mar 2017	35 - 40	140	7.9	0.61 U	3.9
	MLPV-ASMW0005-037.5-20171108	08 Nov 2017		4.1	0.67 U	0.61 U	0.81 I
	MLPV-ASMW0005-037.5-20180530	30 May 2018		1.2	0.39 U	0.61 U	0.26 U
	MLPV-ASMW0005-037.5-20181116	16 Nov 2018		0.32 U	0.39 U	0.61 U	0.26 U
	MLPV-ASMW0005-037.5-20190311	11 Mar 2019		0.32 U	0.39 U	0.61 U	0.26 U
	MLPV-ASMW0005-037.5-20191101	01 Nov 2019		0.28 U	0.22 U	0.35 U	0.41 U
MLPV-ASMW0006	MLPV-ASMW0006-040.0-20070528	28 May 2007	35 - 40	0.5 U	0.5 U	0.5 U	0.5 U
	MLPV-ASMW0006-040.0-20070906	06 Sep 2007		3.5	0.2 U	0.38 U	1.1
	MLPV-ASMW0006-040.0-20071231	31 Dec 2007		1.3	0.2 U	0.38 U	1
	MLPV-ASMW0006-040.0-20080331	31 Mar 2008		1	0.2 U	0.38 U	0.82 I
	MLPV-ASMW0006-040.0-20080627	27 Jun 2008		8.8	0.45 U	0.32 U	3.4
	MLPV-ASMW0006-040.0-20081218	18 Dec 2008		37.6	0.67 I	0.32 U	8.2
	MLPV-ASMW0006-040.0-20090305	05 Mar 2009		18.1	0.56 I	0.32 U	13.6
	MLPV-ASMW0006-037.5-20090922	22 Sep 2009		10.7	0.45 U	0.32 U	3.4
	MLPV-ASMW0006-037.5-20100324	24 Mar 2010		33	0.50 I	0.24 U	1.5
	MLPV-ASMW0006-037.5-20101001	01 Oct 2010		12.3	0.34 U	0.24 U	1.1
	MLPV-ASMW0006-037.5-20110315	15 Mar 2011		15.3	0.37 I	0.26 U	2
	MLPV-ASMW0006-037.5-20110923	23 Sep 2011		2.7	0.35 U	0.26 U	0.22 U
	MLPV-ASMW0006-037.5-20120316	16 Mar 2012		24.2	0.52 I	0.26 U	2.1
	MLPV-ASMW0006-037.5-20120824	24 Aug 2012		113	4.4	0.26 U	1.5
	MLPV-ASMW0006-037.5-20130318	18 Mar 2013		137	8.6	0.63 U	9.9
	MLPV-ASMW0006-37.5-20140127	27 Jan 2014		493	18.9	3 U	902
	MLPV-ASMW0006-037.5-20140417	17 Apr 2014		569	25.2	3 U	1350
	MLPV-ASMW0006-037.5-20140620	20 Jun 2014		380	18	1.9 U	820
	MLPV-ASMW0006-037.5-20140722	22 Jul 2014		290	10	1 U	690
	MLPV-ASMW0006-037.5-20150119	19 Jan 2015		0.85 I	0.37 U	0.48 U	2.2
	MLPV-ASMW0006-037.5-20150406	06 Apr 2015		0.67 I	0.67 U	0.61 U	4.7
	MLPV-ASMW0006-037.5-20150714	14 Jul 2015		4.3	0.67 U	0.61 U	1.3
	MLPV-ASMW0006-040.0-20160111	11 Jan 2016		0.65 U	0.67 U	0.61 U	1.2
	MLPV-ASMW0006-037.5-20160712	12 Jul 2016		30	4.2	0.61 U	4.6
	MLPV-ASMW0006-037.5-20170306	06 Mar 2017		180	13	0.61 U	120
	MLPV-ASMW0006-037.5-20171108	08 Nov 2017		1100	64	18	210
	MLPV-ASMW0006-037.5-20180220	20 Feb 2018		100	5.5	1.2 U	67
	MLPV-ASMW0006-037.5-20180529	29 May 2018		8.7	3.6	0.61 U	28
	MLPV-ASMW0006-037.5-20181116	16 Nov 2018		0.69 I	1 I	0.61 U	5
	MLPV-ASMW0006-037.5-20190311	11 Mar 2019		0.59 I	1.6 I	0.61 U	1.9
	MLPV-ASMW0006-037.5-20191101	01 Nov 2019		0.28 U	0.22 U	0.35 U	0.47 I
MLPV-IW0031	MLPV-IW0031-030.0-20110927	27 Sep 2011	25 - 35	1.8	0.70 I	0.26 U	115
	MLPV-IW0031-030.0-20120316	16 Mar 2012		2	0.64 I	0.26 U	99.2
	MLPV-IW0031-030.0-20120824	24 Aug 2012		2.2	0.77 I	0.26 U	152
	MLPV-IW0031-030.0-20130318	18 Mar 2013		1.5	0.51 I	0.31 U	86.5
	MLPV-IW0031-030.0-20140417	17 Apr 2014		1.5	0.66 I	0.3 U	79.5
	MLPV-IW0031-030.0-20150120	20 Jan 2015		1.4	0.49 I	0.48 U	46
	MLPV-IW0031-030.0-20150714	14 Jul 2015		1.3	0.67 U	0.61 U	51
	MLPV-IW0031-030.0-20160111	11 Jan 2016		1.4	0.67 U	0.61 U	42
	MLPV-IW0031-030.0-20160531	31 May 2016		1.8	0.67 U	0.61 U	32
	MLPV-IW0031-030.0-20170306	06 Mar 2017		0.65 U	0.67 U	0.61 U	5.8
	MLPV-IW0031-030.0-20170809	09 Aug 2017		0.65 U	0.67 U	0.61 U	7.4
	MLPV-IW0031-030.0-20171108	08 Nov 2017		0.65 U	0.67 U	0.61 U	1.9
	MLPV-IW0031-030.0-20180220	20 Feb 2018		0.32 U	0.39 U	0.61 U	0.26 U
	MLPV-IW0031-030.0-20180529	29 May 2018		0.36 I	0.39 U	0.61 U	1.6
	MLPV-IW0031-030.0-20181116	16 Nov 2018		0.32 U	0.39 U	0.61 U	0.26 U
	MLPV-IW0031-030.0-20190312	12 Mar 2019		0.32 U	0.39 U	0.61 U	0.26 U
	MLPV-IW0031-030.0-20191101	01 Nov 2019		0.28 U	0.22 U	0.35 U	0.41 U

Biosparge Area
Chlorinated Volatile organic Compound (CVOC) Analytical Results
Mobile Launch Platform/Vehicle Assembly Area (MLPV) Long Term Monitoring (LTM)
October & November 2019

Location ID	Sample ID	Sample Date	Screened interval (ft bls)	Concentration (ug/L)			
			Analyte	c-DCE	t-DCE	TCE	VC
			FDEP 62-777 GCTLs	70	100	3	1
			FDEP NADCs	700	1000	300	100
MLPV-IW0057	MLPV-IW0057-045.0-20150119	19 Jan 2015	40 - 50	360	12	2.4 U	800
	MLPV-IW0057-045.0-20150714	14 Jul 2015		300	14	1.2 U	1100
	MLPV-IW0057-045.0-20160111	11 Jan 2016		250	13	1.2 U	960
	MLPV-IW0057-045.0-20160711	11 Jul 2016		220	12	3.1 U	720
	MLPV-IW0057-045.0-20170306	06 Mar 2017		110	10	3.1 U	1100
	MLPV-IW0057-045.0-20171108	08 Nov 2017		48	8.1	1.2 U	660
	MLPV-IW0057-045.0-20180529	29 May 2018		84	8.8	1.2 U	970
	MLPV-IW0057-045.0-20181114	14 Nov 2018		45	8.3 I	6.1 U	1000
	MLPV-IW0057-045.0-20190312	12 Mar 2019		61	6.2 I	3.1 U	950
	MLPV-IW0057-045.0-20191101	01 Nov 2019		23.8	6.9	0.35 U	920
MLPV-IW0058	MLPV-IW0058-047.5-20150119	19 Jan 2015	45 - 50	440	20	2.4 U	420
	MLPV-IW0058-047.5-20150717	17 Jul 2015		880	52	6.1 U	940
	MLPV-IW0058-047.5-20160111	11 Jan 2016		1500	60	6.1 U	1700
	MLPV-IW0058-047.5-20160711	11 Jul 2016		210	15	0.61 U	570
	MLPV-IW0058-047.5-20170306	06 Mar 2017		44	2.2	0.61 U	150
	MLPV-IW0058-047.5-20171108	08 Nov 2017		12	0.77 I	0.61 U	86
	MLPV-IW0058-047.5-20180529	29 May 2018		21	1.1 I	0.61 U	140
	MLPV-IW0058-047.5-20181114	14 Nov 2018		12	0.82 I	0.61 U	120
	MLPV-IW0058-047.5-20190312	12 Mar 2019		9.7	0.60 I	0.61 U	110
	MLPV-IW0058-047.5-20191101	01 Nov 2019		6.5	0.22 U	0.35 U	77.1
MLPV-IW0059	MLPV-IW0059-047.5-20150119	19 Jan 2015	45 - 50	51	5.4	0.48 U	92
	MLPV-IW0059-047.5-20150714	14 Jul 2015		510	35	0.61 U	770
	MLPV-IW0059-047.5-20160111	11 Jan 2016		250	30	0.61 U	400
	MLPV-IW0059-047.5-20160711	11 Jul 2016		1400	96	6.1 U	2300
	MLPV-IW0059-047.5-20170306	06 Mar 2017		3000	200	6.1 U	4000
	MLPV-IW0059-047.5-20171108	08 Nov 2017		2.4	54	1.2 U	600
	MLPV-IW0059-047.5-20180529	29 May 2018		17	110	3.1 U	1200
	MLPV-IW0059-047.5-20181116	16 Nov 2018		0.74 I	45	0.61 U	170
	MLPV-IW0059-047.5-20190312	12 Mar 2019		2.5	6.8	0.61 U	45
	MLPV-IW0059-047.5-20191031	31 Oct 2019		0.38 I	2.0	0.35 U	6.9
MLPV-IW0060	MLPV-IW0060-045.0-20150119	19 Jan 2015	40 - 50	2.3	0.41 I	0.48 U	0.5 U
	MLPV-IW0060-045.0-20150406	06 Apr 2015		1.4	0.67 U	0.61 U	0.71 U
	MLPV-IW0060-045.0-20150714	14 Jul 2015		1.2	0.67 U	0.61 U	0.79 I
	MLPV-IW0060-045.0-20160111	11 Jan 2016		0.75 I	0.67 U	0.61 U	0.71 U
	MLPV-IW0060-045.0-20160713	13 Jul 2016		68	6.1	0.61 U	0.71 U
	MLPV-IW0060-045.0-20170306	06 Mar 2017		120	16	0.61 U	1.6
	MLPV-IW0060-045.0-20171108	08 Nov 2017		2500	190	36	740
	MLPV-IW0060-045.0-20180220	20 Feb 2018		240	15	3.1	9.4
	MLPV-IW0060-045.0-20180529	29 May 2018		420	43	8	4.8
	MLPV-IW0060-045.0-20181115	15 Nov 2018		18	9.3	0.61 U	2.8
	MLPV-IW0060-045.0-20190311	11 Mar 2019		3.8	2.4	0.61 U	2.5
	MLPV-IW0060-045.0-20191101	01 Nov 2019		0.82 I	0.22 U	0.35 U	0.90 I
MLPV-IW0061	MLPV-IW0061-037.5-20160118	18 Jan 2016	35 - 40	0.75 I	0.67 U	0.61 U	59
	MLPV-IW0061-037.5-20160328	28 Mar 2016		0.65 U	0.67 U	0.61 U	47
	MLPV-IW0061-037.5-20160531	31 May 2016		0.65 U	0.67 U	0.61 U	48
	MLPV-IW0061-037.5-20170307	07 Mar 2017		0.65 U	0.67 U	0.61 U	53
	MLPV-IW0061-037.5-20170809	09 Aug 2017		0.65 U	0.67 U	0.61 U	38
	MLPV-IW0061-037.5-20171108	08 Nov 2017		0.65 U	0.67 U	0.61 U	41
	MLPV-IW0061-037.5-20180220	20 Feb 2018		0.35 I	0.39 U	0.61 U	29
	MLPV-IW0061-037.5-20180530	30 May 2018		0.52 I	0.39 U	0.61 U	37
	MLPV-IW0061-037.5-20181114	14 Nov 2018		0.32 U	0.39 U	0.61 U	24
	MLPV-IW0061-037.5-20190312	12 Mar 2019		0.57 I	0.39 U	0.61 U	25
	MLPV-IW0061-037.5-20191031	31 Oct 2019		0.28 U	0.22 U	0.35 U	20.6

Biosparge Area
Chlorinated Volatile organic Compound (CVOC) Analytical Results
Mobile Launch Platform/Vehicle Assembly Area (MLPV) Long Term Monitoring (LTM)
October & November 2019

Location ID	Sample ID	Sample Date	Screened interval (ft bls)	Concentration (ug/L)			
			Analyte	c-DCE	t-DCE	TCE	VC
			FDEP 62-777 GCTLs	70	100	3	1
			FDEP NADCs	700	1000	300	100
MLPV-IW0062	MLPV-IW0062-042.5-20160118	18 Jan 2016	40 - 45	**53**	1.3 U	1.2 U	**730**
	MLPV-IW0062-042.5-20160328	28 Mar 2016		**39**	**0.89 I**	0.61 U	**540**
	MLPV-IW0062-042.5-20160531	31 May 2016		**37**	**0.92 I**	0.61 U	**480**
	MLPV-IW0062-042.5-20170307	07 Mar 2017		**25**	1.3 U	1.2 U	**790**
	MLPV-IW0062-042.5-20170809	09 Aug 2017		**21**	3.4 U	3.1 U	**560**
	MLPV-IW0062-042.5-20171108	08 Nov 2017		**16**	1.3 U	1.2 U	**800**
	MLPV-IW0062-042.5-20180220	20 Feb 2018		**12**	1.9 U	3.1 U	**530**
	MLPV-IW0062-042.5-20180530	30 May 2018		**11**	0.78 U	1.2 U	**1100**
	MLPV-IW0062-042.5-20181114	14 Nov 2018		**7.3 I**	3.9 U	6.1 U	**920**
	MLPV-IW0062-042.5-20190312	12 Mar 2019		**7.8**	1.9 U	3.1 U	**1000**
	MLPV-IW0062-042.5-20191031	31 Oct 2019		**5.0**	**0.57 I**	0.35 U	**834**
MLPV-IW0063	MLPV-IW0063-037.5-20160118	18 Jan 2016	35 - 40	**18**	**0.99 I**	0.61 U	**260**
	MLPV-IW0063-037.5-20160328	28 Mar 2016		**4.3**	0.67 U	0.61 U	**38**
	MLPV-IW0063-037.5-20160531	31 May 2016		**15**	**1.1**	0.61 U	**180**
	MLPV-IW0063-037.5-20170307	07 Mar 2017		**6.9**	0.67 U	0.61 U	**150**
	MLPV-IW0063-037.5-20170809	09 Aug 2017		**12**	**0.82 I**	0.61 U	**180**
	MLPV-IW0063-037.5-20171108	08 Nov 2017		**3.1**	0.67 U	0.61 U	**2.3**
	MLPV-IW0063-037.5-20180220	20 Feb 2018		**2.9**	0.39 U	0.61 U	**4.7**
	MLPV-IW0063-037.5-20180529	29 May 2018		**1.2**	0.39 U	0.61 U	**6.1**
	MLPV-IW0063-037.5-20181114	14 Nov 2018		**1.6**	0.39 U	0.61 U	**3.8**
	MLPV-IW0063-037.5-20190311	11 Mar 2019		**0.96 I**	0.39 U	0.61 U	**0.59 I**
	MLPV-IW0063-037.5-20191101	01 Nov 2019		0.28 U	0.22 U	0.35 U	0.41 U
MLPV-IW0064	MLPV-IW0064-042.5-20160118	18 Jan 2016	40 - 45	**12**	0.67 U	0.61 U	**82**
	MLPV-IW0064-042.5-20160328	28 Mar 2016		**9.1**	0.67 U	0.61 U	**82**
	MLPV-IW0064-042.5-20160531	31 May 2016		**8.8**	0.67 U, J3	0.61 U	**59**
	MLPV-IW0064-042.5-20170307	07 Mar 2017		**7.8**	0.67 U	0.61 U	**70**
	MLPV-IW0064-042.5-20170809	09 Aug 2017		**13**	0.67 U	0.61 U	**93**
	MLPV-IW0064-042.5-20171108	08 Nov 2017		**1.4**	0.67 U	0.61 U	**2**
	MLPV-IW0064-042.5-20180220	20 Feb 2018		**2.6**	0.39 U	0.61 U	**7.9**
	MLPV-IW0064-042.5-20180529	29 May 2018		**2.4**	0.39 U	0.61 U	**12**
	MLPV-IW0064-042.5-20181114	14 Nov 2018		**3.5**	0.39 U	0.61 U	**8.8**
	MLPV-IW0064-042.5-20190311	11 Mar 2019		**1.5**	0.39 U	0.61 U	**0.70 I**
	MLPV-IW0064-042.5-20191101	01 Nov 2019		**0.93 I**	0.22 U	0.35 U	0.41 U

Notes:

ft bls = feet below ground surface

I = The analyte was detected but below the repoting limit

J = Estimated value

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

µg/L = microgram per liter

All results and screening criteria presented in µg/L (micrograms per liter)

Bolded results indicate the presence of an analyte at the specified concentration

FDEP GCTLs = Florida Department of Environmental Protection Groundwater Cleanup Target Levels, Chapter 62-777 Florida Administrative Code, Table 1 (April 2005)

FDEP NADCs = Natural Attenuation Default Concentration, Chapter 62-777 Florida Administrative Code, Table V (April 2005)

Highlighted cell indicates an exceedance of FDEP NADCs

Red font indicates an exceedance of FDEP GCTLs

The numeric value presented for non-detects is the sample-specific reporting detection limit

cDCE = CIS-1,2-DICHLOROETHENE

tDCE = TRANS-1,2-DICHLOROETHENE

TCE = TRICHLOROETHENE

VC = VINYL CHLORIDE

Table 3-3
Hot Spot 2 (Air Sparge System Area)
Chlorinated Volatile Organic Compound (CVOC) Analytical Results
Mobile Launch Platform/Vehicle Assembly Area (MLPV) Long Term Monitoring (LTM)
October & November 2019

Location ID	Sample ID	Sample Date	Screened interval (ft bls)	Concentration (ug/L)			
			Analyte	c-DCE	t-DCE	TCE	VC
			FDEP 62-777 GCTLs	70	100	3	1
			FDEP NADCs	700	1000	300	100
MLPV-IW0011I	MLPV-IW0011I-040.0-19971215	15 Dec 1997	35 - 40	180	16 U	26 U	2200
	MLPV-IW0011I-040.0-19981005	05 Oct 1998		24 U	34 U	20 U	770
	MLPV-IW0011I-040.0-20000717	17 Jul 2000		24 I, J	4.4 U	2.8 U	940
	MLPV-IW0011I-040.0-20020121	21 Jan 2002		8.1	2	2 U	192
	MLPV-IW0011I-040.0-20030227	27 Feb 2003		35.2	2.9 J	10 U	238
	MLPV-IW0011I-040.0-20040203	03 Feb 2004		51.7	4.2	2 U	322
	MLPV-IW0011I-040.0-20040810	10 Aug 2004		56.2	5.2 J	20 U	418
	MLPV-IW0011I-040.0-20050504	04 May 2005		31.7	6.3 J	5 U	306
	MLPV-IW0011I-040.0-20051028	28 Oct 2005		4.6 I	2.9 I	2.5 U	157
	MLPV-IW0011I-040.0-20060516	16 May 2006		8.8	7.9	0.5 U	451
	MLPV-IW0011I-040.0-20061109	09 Nov 2006		3.3	5.7	0.5 U	302
	MLPV-IW0011I-040.0-20070522	22 May 2007		1.7	4.3	0.5 U	263
	MLPV-IW0011I-037.5-20071115	15 Nov 2007		1.6 I	2.6 I	1.9 U	301
	MLPV-IW0011I-037.5-20080523	23 May 2008		1.7	3.2	0.32 U	242
	MLPV-IW0011I-037.5-20081113	13 Nov 2008		3.6	3	0.32 U	677
	MLPV-IW0011I-037.5-20090519	19 May 2009		7.9	2.6	0.32 U	267
	MLPV-IW0011I-037.5-20091109	09 Nov 2009		12	2	0.15 U	190
	MLPV-IW0011I-037.5-20100518	18 May 2010		6.5	1.8	0.12 U	170
	MLPV-IW0011I-037.5-20101108	08 Nov 2010		3.6	1.9	0.16 U	120
	MLPV-IW0011I-037.5-20110510	10 May 2011		3.1	1.9	0.16 U	120
	MLPV-IW0011I-034.5-20111101	01 Nov 2011		0.36 U	0.12 U	0.16 U	0.68 I
	MLPV-IW0011I-037.5-20120529	29 May 2012		2.9	1.9	0.26 U	58.3
	MLPV-IW0011I-37.5-20140127	27 Jan 2014		1.3	1.1	0.3 U	5.6
	MLPV-IW0011I-037.5-20140722	22 Jul 2014		0.65 U	0.75 I	0.5 U	4.5
	MLPV-IW0011I-037.5-20150121	21 Jan 2015		0.41 U	0.81 I	0.48 U	3.4
	MLPV-IW0011I-037.5-20150715	15 Jul 2015		0.65 U	0.91 I	0.61 U	2.7
	MLPV-IW0011I-037.5-20160112	12 Jan 2016		0.65 U	0.67 U	0.61 U	2.9
	MLPV-IW0011I-037.5-20160711	11 Jul 2016		1.1	0.67 U	0.61 U	4.4
	MLPV-IW0011I-037.5-20171107	07 Nov 2017		1.1	0.67 U	0.61 U	0.26 U
	MLPV-IW0011I-037.5-20180531	31 May 2018		0.93 I	0.39 U	0.61 U	1.9
	MLPV-IW0011I-037.5-20190306	06 Mar 2019		0.72 I	0.39 U	0.61 U	1.4
	MLPV-IW0011I-037.0-20191031	31 Oct 2019		0.28 U	0.22 U	0.35 U	0.48 I
MLPV-IW0032	MLPV-IW0032-035.0-20120531	31 May 2012	30 - 40	1.7	2.2	0.26 U	2.4
	MLPV-IW0032-035.0-20120926	26 Sep 2012		121	11.2	21	35.7
	MLPV-IW0032-035.0-20130819	19 Aug 2013		302	44.5	130	77.8
	MLPV-IW0032-035.0-20140127	27 Jan 2014		195	9.3	41.1	0.44 I
	MLPV-IW0032-035.0-20140416	16 Apr 2014		226	13.9	21.1	1.8 I
	MLPV-IW0032-035.0-20140721	21 Jul 2014		280	14	52	1
	MLPV-IW0032-035.0-20150120	20 Jan 2015		170	28	56	0.5 U
	MLPV-IW0032-035.0-20150715	15 Jul 2015		32	9.3	6.2	4.7
	MLPV-IW0032-035.0-20160112	12 Jan 2016		7.6	2.8	0.61 U	0.71 U
	MLPV-IW0032-035.0-20160713	13 Jul 2016		33	8	0.61 U	0.71 U
	MLPV-IW0032-035.0-20171107	07 Nov 2017		0.65 U	0.67 U	0.61 U	0.26 U
	MLPV-IW0032-035.0-20180531	31 May 2018		0.36 I	0.39 U	0.61 U	0.26 U
	MLPV-IW0032-035.0-20190306	06 Mar 2019		0.74 I	0.39 U	0.61 U	0.26 U

Hot Spot 2 (Air Sparge System Area)
Chlorinated Volatile Organic Compound (CVOC) Analytical Results
Mobile Launch Platform/Vehicle Assembly Area (MLPV) Long Term Monitoring (LTM)
October & November 2019

Location ID	Sample ID	Sample Date	Screened interval (ft bls)	Concentration (ug/L)			
			Analyte	c-DCE	t-DCE	TCE	VC
			FDEP 62-777 GCTLs	70	100	3	1
			FDEP NADCs	700	1000	300	100
MLPV-IW0033	MLPV-IW0033-045.0-20120531	31 May 2012	40 - 50	8270	492	521	3300
	MLPV-IW0033-045.0-20120926	26 Sep 2012		8250	617	863	2990
	MLPV-IW0033-045.0-20130819	19 Aug 2013		6720	471	1290	2800
	MLPV-IW0033-045.0-20140127	27 Jan 2014		1300	88.7	33.7	771
	MLPV-IW0033-045.0-20140416	16 Apr 2014		2190	116	34.6	770
	MLPV-IW0033-045.0-20140721	21 Jul 2014		3200	220	170	810
	MLPV-IW0033-045.0-20150120	20 Jan 2015		370	39	9.9	280
	MLPV-IW0033-045.0-20150715	15 Jul 2015		500	45	2.1	540
	MLPV-IW0033-045.0-20160112	12 Jan 2016		72	8.8	0.61 U	150
	MLPV-IW0033-045.0-20160713	13 Jul 2016		120	12	0.64 I	350
	MLPV-IW0033-045.0-20170307	07 Mar 2017		100	17	0.61 U	470
	MLPV-IW0033-045.0-20171107	07 Nov 2017		24	6.3	0.61 U	68
	MLPV-IW0033-045.0-20180531	31 May 2018		21	3	0.61 U	120
	MLPV-IW0033-045.0-20190306	06 Mar 2019		46	6	1.2 U	400
	MLPV-IW0033-045.0-20191031	31 Oct 2019		58.4	1.1 U	1.7 U	365
MLPV-IW0034	MLPV-IW0034-035.0-20120529	29 May 2012	30 - 40	1.4	4.9	0.26 U	80.4
	MLPV-IW0034-035.0-20140127	27 Jan 2014		133	9	33.2	468
	MLPV-IW0034-035.0-20140722	22 Jul 2014		130	9.8	4.6	120
	MLPV-IW0034-035.0-20150121	21 Jan 2015		200	35	13	600
	MLPV-IW0034-035.0-20150715	15 Jul 2015		5.8	2.8	0.61 U	94
	MLPV-IW0034-035.0-20160111	11 Jan 2016		5.9	0.67 U	0.61 U	27
	MLPV-IW0034-035.0-20160713	13 Jul 2016		2.8	0.80 I	0.61 U	37
	MLPV-IW0034-035.0-20171107	07 Nov 2017		0.65 U	0.67 U	0.61 U	13
	MLPV-IW0034-035.0-20180531	31 May 2018		0.40 I	0.39 U	0.61 U	5.5
	MLPV-IW0034-035.0-20190306	06 Mar 2019		1.4	0.39 U	0.61 U	2.4
	MLPV-IW0034-032.5-20191031	31 Oct 2019		0.28 U	0.22 U	0.35 U	0.41 U
MLPV-IW0035	MLPV-IW0035-045.0-20120529	29 May 2012	40 - 50	573	38.7	1.3 U	900
	MLPV-IW0035-045.0-20140127	27 Jan 2014		173	28.9	3 U	1350
	MLPV-IW0035-045.0-20140722	22 Jul 2014		640	57	8.2	1200
	MLPV-IW0035-045.0-20150121	21 Jan 2015		690	49	7.4	960
	MLPV-IW0035-045.0-20150715	15 Jul 2015		130	33	1.2 U	960
	MLPV-IW0035-045.0-20160111	11 Jan 2016		1.6	7.3	0.61 U	260
	MLPV-IW0035-045.0-20160713	13 Jul 2016		0.82 I	9.3	0.61 U	400
	MLPV-IW0035-045.0-20171107	07 Nov 2017		1.8	5.4	0.61 U	220
	MLPV-IW0035-045.0-20180531	31 May 2018		1.2	6.9	0.61 U	330
	MLPV-IW0035-045.0-20190306	06 Mar 2019		2.3	3.3	0.61 U	150
	MLPV-IW0035-045.0-20191031	31 Oct 2019		0.69 U	0.55 U	0.86 U	152
MLPV-IW0036	MLPV-IW0036-042.5-20120529	29 May 2012	40 - 45	0.26 U	0.35 U	0.26 U	0.22 U
	MLPV-IW0036-042.5-20140128	28 Jan 2014		0.33 U	0.34 U	0.3 U	5
	MLPV-IW0036-042.5-20140722	22 Jul 2014		0.65 U	0.44 U	0.5 U	4.5
	MLPV-IW0036-042.5-20150122	22 Jan 2015		0.47 I	0.37 U	0.48 U	6
	MLPV-IW0036-042.5-20150715	15 Jul 2015		0.65 U	0.67 U	0.61 U	42
	MLPV-IW0036-045.5-20160112	12 Jan 2016		0.65 U	0.67 U	0.61 U	42
	MLPV-IW0036-045.5-20160713	13 Jul 2016		0.65 U	0.67 U	0.61 U	170
	MLPV-IW0036-042.5-20171107	07 Nov 2017		0.65 U	0.67 U	0.61 U	87
	MLPV-IW0036-042.5-20180530	30 May 2018		0.32 U	0.63 I	0.61 U	80
	MLPV-IW0036-042.5-20190306	06 Mar 2019		0.41 I	0.39 U	0.61 U	32
	MLPV-IW0036-042.5-20191031	31 Oct 2019		0.28 U	0.33 I	0.35 U	9.1

Hot Spot 2 (Air Sparge System Area)
Chlorinated Volatile Organic Compound (CVOC) Analytical Results
Mobile Launch Platform/Vehicle Assembly Area (MLPV) Long Term Monitoring (LTM)
October & November 2019

Location ID	Sample ID	Sample Date	Screened interval (ft bls)	Concentration (ug/L)			
			Analyte	c-DCE	t-DCE	TCE	VC
			FDEP 62-777 GCTLs	70	100	3	1
			FDEP NADCs	700	1000	300	100
MLPV-IW0037	MLPV-IW0037-045.0-20120529	29 May 2012	40 - 50	835	19.1	1.3 U	926
	MLPV-IW0037-045.0-20140127	27 Jan 2014		151	1.5	0.3 U	210
	MLPV-IW0037-045.0-20140722	22 Jul 2014		340	4	1 U	520
	MLPV-IW0037-045.0-20150121	21 Jan 2015		560	9.3	2.4 U	600
	MLPV-IW0037-045.0-20150715	15 Jul 2015		550	8.2	1.2 U	970
	MLPV-IW0037-045.0-20160112	12 Jan 2016		390	7	3.1 U	550
	MLPV-IW0037-045.0-20160711	11 Jul 2016		300	3.9	1.2 U	890
	MLPV-IW0037-045.0-20171107	07 Nov 2017		150	1.2	0.61 U	280
	MLPV-IW0037-045.0-20180531	31 May 2018		94	1.2 I	0.61 U	360
	MLPV-IW0037-045.0-20190306	06 Mar 2019		160	0.89 I	0.61 U	270
	MLPV-IW0037-045.0-20191031	31 Oct 2019		135	0.44 U	0.69 U	178
MLPV-IW0038	MLPV-IW0038-035.0-20120529	29 May 2012	30 - 40	217	19.9	95.3	446
	MLPV-IW0038-035.0-20120926	26 Sep 2012		863	55.9	764	364
	MLPV-IW0038-035.0-20130819	19 Aug 2013		1010	55.8	386	263
	MLPV-IW0038-035.0-20140127	27 Jan 2014		235	27	45	42.3
	MLPV-IW0038-035.0-20140416	16 Apr 2014		136	6.9	30.3	1.6 I
	MLPV-IW0038-035.0-20140722	22 Jul 2014		29	5.7	5.3	0.5 U
	MLPV-IW0038-035.0-20150121	21 Jan 2015		3.6	0.93 I	0.48 U	4.6
	MLPV-IW0038-035.0-20150714	14 Jul 2015		2.9	0.67 U	0.61 U	0.71 U
	MLPV-IW0038-035.0-20160112	12 Jan 2016		1.2	0.67 U	0.61 U	0.71 U
	MLPV-IW0038-035.0-20160713	13 Jul 2016		2.8	0.67 U	0.61 U	0.71 U
	MLPV-IW0038-035.0-20171107	07 Nov 2017		0.78 I	0.67 U	0.61 U	0.26 U
	MLPV-IW0038-035.0-20180531	31 May 2018		0.48 I	0.39 U	0.61 U	0.26 U
	MLPV-IW0038-035.0-20190306	06 Mar 2019		0.94 I	0.39 U	0.61 U	1.1
MLPV-IW0039	MLPV-IW0039-045.0-20120529	29 May 2012	40 - 50	13200	648	8980	6200
	MLPV-IW0039-045.0-20120926	26 Sep 2012		10000	502	6650	3070
	MLPV-IW0039-045.0-20130819	19 Aug 2013		6480	269	3720	1520
	MLPV-IW0039-045.0-20140127	27 Jan 2014		3470	147	683	841
	MLPV-IW0039-045.0-20140416	16 Apr 2014		3060	116	549	955
	MLPV-IW0039.045.0-20140722	22 Jul 2014		2200	130	430	640
	MLPV-IW0039-045.0-20150121	21 Jan 2015		270	17	5.8	220
	MLPV-IW0039-045.0-20150714	14 Jul 2015		180	13	3.3	250 J3
	MLPV-IW0039-045.0-20160112	12 Jan 2016		160	10	2.7	130
	MLPV-IW0039-045.0-20160713	13 Jul 2016		82	6.9	3.3	38
	MLPV-IW0039-045.0-20170307	07 Mar 2017		200	11	2.6	250
	MLPV-IW0039-045.0-20171107	07 Nov 2017		92	5.1	1.5	55
	MLPV-IW0039-045.0-20180531	31 May 2018		45	3.2	1.3 I	55
	MLPV-IW0039-045.0-20190306	06 Mar 2019		160	7.1	0.83 I	250
	MLPV-IW0039-045.0-20191031	31 Oct 2019		198	4.6	0.86 U	241

Hot Spot 2 (Air Sparge System Area)
Chlorinated Volatile Organic Compound (CVOC) Analytical Results
Mobile Launch Platform/Vehicle Assembly Area (MLPV) Long Term Monitoring (LTM)
October & November 2019

Location ID	Sample ID	Sample Date	Screened interval (ft bls)	Concentration (ug/L)			
			Analyte	c-DCE	t-DCE	TCE	VC
			FDEP 62-777 GCTLs	70	100	3	1
			FDEP NADCs	700	1000	300	100
MLPV-IW0040	MLPV-IW0040-035.0-20120529	29 May 2012	30 - 40	90.9	59.7	1.9	3410
	MLPV-IW0040-035.0-20120926	26 Sep 2012		2450	161	1300	1210
	MLPV-IW0040-035.0-20130819	19 Aug 2013		643	44.8	157	464
	MLPV-IW0040-035.0-20140127	27 Jan 2014		189	4.2 I	68.3	18
	MLPV-IW0040-035.0-20140416	16 Apr 2014		78.2	7	20.1	56.7
	MLPV-IW0040-035.0-20140723	23 Jul 2014		9.3	1.6	13	8.2
	MLPV-IW0040-035.0-20150122	22 Jan 2015		5.6	0.37 U	0.89 I	0.5 U
	MLPV-IW0040-035.0-20150715	15 Jul 2015		0.68 I	0.67 U	0.61 U	0.71 U
	MLPV-IW0040-035.0-20160111	11 Jan 2016		0.91 I	0.67 U	0.61 U	0.71 U
	MLPV-IW0040-035.0-20160713	13 Jul 2016		0.65 U	0.67 U	0.61 U	0.71 U
	MLPV-IW0040-035.0-20171107	07 Nov 2017		0.65 U	0.67 U	0.61 U	0.26 U
	MLPV-IW0040-035.0-20180530	30 May 2018		0.58 I	0.39 U	0.61 U	0.36 I
	MLPV-IW0040-035.0-20190305	05 Mar 2019		0.32 U	0.39 U	0.61 U	0.26 U
MLPV-IW0041	MLPV-IW0041-045.0-20120529	29 May 2012	40 - 50	14600	737	15300	5260
	MLPV-IW0041-045.0-20120926	26 Sep 2012		11000	556	8500	3880
	MLPV-IW0041-045.0-20130819	19 Aug 2013		5380	277	1380	4150
	MLPV-IW0041-045.0-20140127	27 Jan 2014		1570	56.5	19.3 I	993
	MLPV-IW0041-045.0-20140416	16 Apr 2014		2660	114	685	2030
	MLPV-IW0041-045.0-20140723	23 Jul 2014		2400	120	450	1900
	MLPV-IW0041-045.0-20150122	22 Jan 2015		14	2.6	1	150
	MLPV-IW0041-045.0-20150715	15 Jul 2015		89	4.5	0.61 U	290
	MLPV-IW0041-045.0-20160111	11 Jan 2016		80	6.3	0.61 U	360
	MLPV-IW0041-045.0-20160713	13 Jul 2016		20	4.2	0.61 U	230
	MLPV-IW0041-045.0-20170307	07 Mar 2017		63	3.8	0.61 U	330
	MLPV-IW0041-045.0-20171107	07 Nov 2017		140	5.2	0.61 U	300
	MLPV-IW0041-045.0-20180530	30 May 2018		9.7	3.9	0.61 U	230
	MLPV-IW0041-045.0-20190305	05 Mar 2019		76	2.6	0.65 I	260
	MLPV-IW0041-047.5-20191031	31 Oct 2019		14	2.3	0.39 I	166
MLPV-IW0042	MLPV-IW0042-035.0-20120529	29 May 2012	30 - 40	0.26 U	0.92 I	0.26 U	571
	MLPV-IW0042-035.0-20120926	26 Sep 2012		0.24 U	0.63 I	0.31 U	97.9
	MLPV-IW0042-035.0-20130819	19 Aug 2013		1	0.23 U	0.31 U	5.9
	MLPV-IW0042-035.0-20140128	28 Jan 2014		2.4	0.34 U	1.5	2.2
	MLPV-IW0042-035.0-20140416	16 Apr 2014		1.1	0.34 U	0.3 U	5.6
	MLPV-IW0042-035.0-20140722	22 Jul 2014		4.5	0.44 U	0.5 U	7.9
	MLPV-IW0042-035.0-20150120	20 Jan 2015		20	0.45 I	0.48 U	4.4
	MLPV-IW0042-035.0-20150714	14 Jul 2015		6.4	0.67 U	0.61 U	1.7
	MLPV-IW0042-035.0-20160111	11 Jan 2016		11	0.67 U	0.61 U	1.4
	MLPV-IW0042-035.0-20160713	13 Jul 2016		2.4	0.67 U	0.61 U	0.71 U
	MLPV-IW0042-035.0-20171107	07 Nov 2017		0.86 I	0.67 U	0.61 U	0.26 U
	MLPV-IW0042-035.0-20180530	30 May 2018		0.32 I	0.39 U	0.61 U	0.34 I
	MLPV-IW0042-035.0-20190306	06 Mar 2019		0.32 U	0.39 U	0.61 U	0.26 U

Hot Spot 2 (Air Sparge System Area)
Chlorinated Volatile Organic Compound (CVOC) Analytical Results
Mobile Launch Platform/Vehicle Assembly Area (MLPV) Long Term Monitoring (LTM)
October & November 2019

Location ID	Sample ID	Sample Date	Screened interval (ft bls)	Concentration (ug/L)			
			Analyte	c-DCE	t-DCE	TCE	VC
			FDEP 62-777 GCTLs	70	100	3	1
			FDEP NADCs	700	1000	300	100
MLPV-IW0043	MLPV-IW0043-045.0-20120529	29 May 2012	40 - 50	7320	348	6620	2540
	MLPV-IW0043-045.0-20120926	26 Sep 2012		2910	101	2900	887
	MLPV-IW0043-045.0-20130819	19 Aug 2013		2790	128	3400	828
	MLPV-IW0043-045.0-20140128	28 Jan 2014		531	24.4	274	190
	MLPV-IW0043-045.0-20140416	16 Apr 2014		289	9	56.2	117
	MLPV-IW0043-045.0-20140722	22 Jul 2014		1800	51	11	340
	MLPV-IW0043-045.0-20150120	20 Jan 2015		1400	52	4.8 U	360
	MLPV-IW0043-045.0-20150714	14 Jul 2015		190	7.6	1.2 U	200
	MLPV-IW0043-045.0-20160111	11 Jan 2016		50	2.7	0.61 U	140
	MLPV-IW0043-045.0-20160713	13 Jul 2016		150	2.4	0.61 U	180
	MLPV-IW0043-045.0-20170307	07 Mar 2017		190	4.9	0.61 U	330
	MLPV-IW0043-045.0-20171107	07 Nov 2017		42	1.9	0.61 U	120
	MLPV-IW0043-045.0-20180530	30 May 2018		31	0.96 I	0.61 U	140
	MLPV-IW0043-045.0-20190306	06 Mar 2019		100	2.7	0.77 I	150
	MLPV-IW0043-045.0-20191031	31 Oct 2019		149	2.4 I	0.86 U	155
MLPV-IW0044	MLPV-IW0044-045.0-20120706	06 Jul 2012	40 - 50	1240	90.2 I	0.26 U	4960
	MLPV-IW0044-045.0-20140128	28 Jan 2014		60.5	4 I	1.5 U	686
	MLPV-IW0044-045.0-20140723	23 Jul 2014		140	7.8 I	5 U	2300
	MLPV-IW0044-045.0-20150120	20 Jan 2015		67	14 I	12 U	1700
	MLPV-IW0044-045.0-20150715	15 Jul 2015		10	6.7 U	6.1 U	2100
	MLPV-IW0044-045.0-20160112	12 Jan 2016		4.3	3.3	1.2 U	600
	MLPV-IW0044-045.0-20160712	12 Jul 2016		39	18	3.1 U	1700
	MLPV-IW0044-045.0-20171107	07 Nov 2017		18	14	6.1 U	1500
	MLPV-IW0044-045.0-20180530	30 May 2018		7.5	6.4	1.2 U	810
	MLPV-IW0044-045.0-20190305	05 Mar 2019		3.7	2.9 I	1.2 U	510
	MLPV-IW0044-045.0-20191031	31 Oct 2019		2.9	1.8	0.35 U	458

Hot Spot 2 (Air Sparge System Area)
Chlorinated Volatile Organic Compound (CVOC) Analytical Results
Mobile Launch Platform/Vehicle Assembly Area (MLPV) Long Term Monitoring (LTM)
October & November 2019

Location ID	Sample ID	Sample Date	Screened interval (ft bls)	Concentration (ug/L)			
			Analyte	c-DCE	t-DCE	TCE	VC
			FDEP 62-777 GCTLs	70	100	3	1
			FDEP NADCs	700	1000	300	100
MLPV-IW0045	MLPV-IW0045-045.0-20120706	06 Jul 2012	40 - 50	10300	520	115	7360
	MLPV-IW0045-045.0-20140127	27 Jan 2014		2360	164	192	2050
	MLPV-IW0045-045.0-20140722	22 Jul 2014		5200	330	600	4000
	MLPV-IW0045-045.0-20150120	20 Jan 2015		390	51	5.7	360
	MLPV-IW0045-045.0-20150715	15 Jul 2015		860	110	49	960
	MLPV-IW0045-045.0-20160112	12 Jan 2016		79	61	1.2 U	570
	MLPV-IW0045-045.0-20160712	12 Jul 2016		35	41	0.61 U	180
	MLPV-IW0045-045.0-20171107	07 Nov 2017		7.7	7.9	0.61 U	200
	MLPV-IW0045-045.0-20180530	30 May 2018		2.4	10	0.61 U	270
	MLPV-IW0045-045.0-20190306	06 Mar 2019		3.2	6.8	0.61 U	170
	MLPV-IW0045-045.0-20191031	31 Oct 2019		4.8	3.6	0.35 U	97.2
MLPV-SAMW0004D	MLPV-SAMW0004D-047.5-20191031	31 Oct 2019	45 - 50	0.32 I	0.37 I	0.35 U	2.6
MLPV-SAMW0004I	MLPV-SAMW0004I-037.5-20191031	31 Oct 2019	35 - 40	0.40 I	0.22 U	0.35 U	15.9

Notes:

ft bls = feet below ground surface

I = The analyte was detected but below the repoting limit

J = Estimated value

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

µg/L = microgram per liter

All results and screening criteria presented in µg/L (micrograms per liter)

Bolded results indicate the presence of an analyte at the specified concentration

FDEP GCTLs = Florida Department of Environmental Protection Groundwater Cleanup Target Levels, Chapter 62-777 Florida Administrative Code, Table 1 (April 20

FDEP NADCs = Natural Attenuation Default Concentration, Chapter 62-777 Florida Administrative Code, Table V (April 2005)

Highlighted cell indicates an exceedance of FDEP NADCs

Red font indicates an exceedance of FDEP GCTLs

The numeric value presented for non-detects is the sample-specific method detection limit

cDCE = CIS-1,2-DICHLOROETHENE

tDCE = TRANS-1,2-DICHLOROETHENE

TCE = TRICHLOROETHENE

VC = VINYL CHLORIDE

Table 3-4
Hot Spot 3 (OFW Area)
Chlorinated Volatile Organic Compounds (CVOCs) Analytical Results
Mobile Launch Platform/Vehicle Assembly Area (MLPV) Long Term Monitoring (LTM)
October 2019

Location ID	Sample ID	Sample Date	Screened interval (ft bgs)	Concentration (ug/L)			
			Analyte	c-DCE	t-DCE	TCE	VC
			FDEP 62-777 GCTLs	70	100	3	1
			FDEP NADCs	700	1000	300	100
VABRA-MW0011	VABRA-MW0011-030.0-20151110	10 Nov 2015	25 - 30	**24**	**5.6**	0.61 U	**110**
	VABRA-MW0011-030.0-20160111	11 Jan 2016		**1.7**	**2.7**	0.61 U	**11**
	VABRA-MW0011-030.0-20160711	11 Jul 2016		**0.83 I**	**3.1**	0.61 U	**6.8**
	VABRA-MW0011-030.0-20160220	20 Feb 2017		0.65 U	**2.3**	0.61 U	**3.8**
	VABRA-MW0011-030.0-20170809	09 Aug 2017		0.65 U	**1**	0.61 U	**2.6**
	VABRA-MW0011-030.0-20180219	19 Feb 2018		0.32 U	**0.81 I**	0.61 U	**1.4**
	VABRA-MW0011-030.0-20180806	06 Aug 2018		0.32 U	0.39 U	0.61 U	0.26 U
	VABRA-MW0011-030.0-20190218	18 Feb 2019		0.32 U	**0.44 I**	0.61 U	**0.49 I**
	VABRA-MW0011-030.0-20191031	31 Oct 2019		0.28 U	0.22 U	0.35 U	0.41 U
VABRA-MW0012	VABRA-MW0012-020.0-20151110	10 Nov 2015	15 - 25	0.65 U	**0.67 I**	0.61 U	**4.2**
	VABRA-MW0012-020.0-20160111	11 Jan 2016		0.65 U	0.67 U	0.61 U	**1.6**
	VABRA-MW0012-020.0-20160711	11 Jul 2016		**7.0**	**1.9**	0.61 U	**20**
	VABRA-MW0012-020.0-20160220	20 Feb 2017		0.65 U	**0.81 I**	0.61 U	**1.7**
	VABRA-MW0012-020.0-20170809	09 Aug 2017		**2.5**	**1.1**	0.61 U	**7.2**
	VABRA-MW0012-020.0-20180219	19 Feb 2018		0.32 U	0.39 U	0.61 U	0.26 U
	VABRA-MW0012-020.0-20180806	06 Aug 2018		0.32 U	0.39 U	0.61 U	0.26 U
	VABRA-MW0012-020.0-20190218	18 Feb 2019		0.32 U	0.39 U	0.61 U	0.26 U
	VABRA-MW0012-020.0-20191031	31 Oct 2019		**0.69 I**	0.22 U	0.35 U	**1.0**

Hot Spot 3 (OFW Area)
Chlorinated Volatile Organic Compounds (CVOCs) Analytical Results
Mobile Launch Platform/Vehicle Assembly Area (MLPV) Long Term Monitoring (LTM)
October 2019

Location ID	Sample ID	Sample Date	Screened interval (ft bgs)	Concentration (ug/L)			
			Analyte	c-DCE	t-DCE	TCE	VC
			FDEP 62-777 GCTLs	70	100	3	1
			FDEP NADCs	700	1000	300	100
VABRA-MW0013	VABRA-MW0013-022.5-20180913	13 Sep 2018	20 -25	**3.0**	**1.1 I**	0.61 U	**8.8**
	VABRA-MW0013-022.5-20190218	18 Feb 2019		**5.5**	**0.97 I**	0.61 U	**9.3**
	VABRA-MW0013-022.5-20191031	31 Oct 2019		**0.86 I**	**1.3**	0.35 U	**2.6**
VABRA-MW0014	VABRA-MW0014-027.5-20180913	13 Sep 2018	25 - 30	**0.45 I**	**0.76 I**	0.61 U	**3.5**
	VABRA-MW0014-027.5-20190218	18 Feb 2019		0.32 U	**0.53 I**	0.61 U	**0.68 I**
	VABRA-MW0014-027.5-20191031	31 Oct 2019		0.28 U	0.22 U	0.35 U	0.41 U

Notes:

ft bgs = feet below ground surface

I = The analyte was detected but below the repoting limit

J = Estimated value

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

µg/L = microgram per liter

All results and screening criteria presented in µg/L (micrograms per liter)

Bolded results indicate the presence of an analyte at the specified concentration

FDEP GCTLs = Florida Department of Environmental Protection Groundwater Cleanup Target Levels, Chapter 62-777 Florida Administrative Code, Table 1 (April 2005)

FDEP NADCs = Natural Attenuation Default Concentration, Chapter 62-777 Florida Administrative Code, Table V (April 2005)

Highlighted cell indicates an exceedance of FDEP NADCs

Red font indicates an exceedance of FDEP GCTLs

The numeric value presented for non-detects is the sample-specific method detection limit

cDCE = CIS-1,2-DICHLOROETHENE

tDCE = TRANS-1,2-DICHLOROETHENE

TCE = TRICHLOROETHENE

VC = VINYL CHLORIDE

Table 3-5
Biosparge Barrier
Groundwater Geochemical Parameters
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Location	Screened Interval (ft bls)	Date	Temp. (°C)	pH (S.U.)	Cond-uctivity (mS/cm)	Turbidity (NTU)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Salinity (%)	Total Dissolved Solids (g/L)	Color
ASMW0001	35 to 40	09/22/2009	25.5	7.5	0.85	5.4	-275	0.87	0.41	0.55	clear
		03/23/2010	23.6	7.29	0.76	12.7	-184	0.62	0.37	0.49	clear
		10/01/2010	24.7	7.5	0.84	1.7	-80	0.32	0.41	0.55	clear
		03/15/2011	23.8	7.54	0.65	8.3	-151	1.46	0.32	0.43	clear
		09/26/2011	25.2	7.18	0.77	1.54	-128	0.26	0.37	0.5	clear
		03/16/2012	24.2	7.24	0.75	0.88	-141	0.27	0.37	0.49	clear
		08/24/2012	24.9	7.23	1.27	1.77	-146	8.59	0.63	0.83	clear
		03/18/2013	24.6	7.07	0.76	2.12	-106	0.15	0.37	0.5	clear
		10/25/2013	24.6	7.25	0.74	0.28	-133	0.66	0.36	0.48	clear
ASMW0002	35 to 40	09/22/2009	26.2	7.04	0.68	6.7	-314	0.74	0.32	0.43	clear
		03/23/2010	23.9	7.12	0.62	6.1	-278	0.46	0.3	0.4	clear
		10/01/2010	24.2	7.35	0.67	1.3	-176	0.14	0.33	0.44	clear
		03/15/2011	23.9	7.46	0.55	2.3	-225	0.96	0.27	0.36	clear
		09/23/2011	25	6.84	0.68	0.77	-202	1.64	0.33	0.44	clear
		03/16/2012	24.3	7.17	0.63	0.52	-198	0.29	0.31	0.41	clear
		08/23/2012	24.5	7.16	0.91	0.62	-293	1.5	0.44	0.59	clear
		03/18/2013	24.5	6.98	0.64	1.13	-206	0.17	0.31	0.41	clear
		10/25/2013	24.5	7.18	0.63	0.41	-217	1.17	0.3	0.41	clear
ASMW0003	35 to 40	09/22/2009	25.7	7.43	0.56	2.8	-318	0.59	0.27	0.36	clear
		03/23/2010	23.8	7.2	0.51	1.69	-271	0.43	0.25	0.33	clear
		10/01/2010	24.6	7.4	0.58	1.2	-166	0.11	0.28	0.38	clear
		03/15/2011	24	7.59	0.5	10.2	-223	0.51	0.24	0.33	clear
		09/23/2011	24.7	4.06	0.6	0.47	-247	0.72	0.29	0.39	clear
		03/16/2012	24.3	7.2	0.56	0.87	-212	0.26	0.27	0.37	clear
		08/23/2012	24.8	7.4	0.81	1.55	-207	6.69	0.39	0.53	clear
		03/18/2013	24.4	7	0.57	1.11	-190	0.16	0.27	0.37	clear
		10/25/2013	24.6	7.21	0.55	0.7	-178	0.84	0.26	0.36	clear
ASMW0004	35 to 40	09/22/2009	25.4	7.2	7.21	12	-38.2	0.18	3.97	4.7	clear
		03/24/2010	23	7.06	6.49	4.57	-94.9	0.41	3.54	4.22	clear
		10/01/2010	25.2	7.14	5.82	3	-108	0.31	3.15	3.78	clear
		03/15/2011	23.6	7.79	4.3	6.5	60.1	1.17	2.45	3.1	clear
		09/26/2011	24.7	7.15	6.33	3.49	-128	1.22	3.5	4.11	clear
		03/16/2012	24.1	7.29	4.54	1.26	-82.9	0.36	2.42	2.95	clear
		08/28/2012	25.1	7.08	7.09	2.12	-105	0.89	3.89	4.61	clear
		03/18/2013	23.8	7.04	4.14	2.08	-69.1	0.12	2.19	2.69	clear
		10/25/2013	24.4	7.05	4.26	2.26	-95.6	0.94	2.26	2.77	clear
		01/27/2014	23.8	7.1	4.31	6.31	35.8	0.51	1.4	2.52	clear
		04/17/2014	23.8	6.91	4.2	7.4	-62	0.21	2.23	2.73	clear
		07/22/2014	25.3	7.19	4.75	4.21	-131	0.64	2.54	3.11	clear
		10/27/2014	24.8	7.04	6.18	7.27	1	1.2	3.36	4.02	clear
		01/19/2015	23.7	7.42	5.04	9.39	-80	1.37	2.71	3.28	clear
		04/06/2015	24.7	7.13	3.8	3.1	195	1.29	2.01	2.45	clear
		07/14/2015	26.3	7.12	4.57	10.2	-61.2	0.38	2.43	2.97	clear
		01/11/2016	23.5	7.75	3.7	10.1	5.6	1.59	1.95	2.41	clear
		07/12/2016	26.3	7.42	3.11	3.09	-127	0.2	1.62	2.03	clear
		03/06/2017	23.9	7.39	2.31	4.8	-168	0.18	1.18	1.5	clear
		11/08/2017	25.2	9.23	3.37	1.75	-40.9	0.28 *	0.18	2.18	clear
		05/30/2018	25.8	7.2	3.51	7.96	-65.7	0.66	0.18	2.28	clear
		11/15/2018	24.2	7.21	4.01	5.45	-74	0.94	0.21	2.61	clear
		03/11/2019	25.3	6.78	4.26	7.24	15.8	1.45	-	-	clear
		11/1/2019	24.88	7.45	4.1	0.65	299.5	1.71	-	-	clear

Biosparge Barrier
Groundwater Geochemical Parameters
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Location	Screened Interval (ft bls)	Date	Temp. (°C)	pH (S.U.)	Cond-uctivity (mS/cm)	Turbidity (NTU)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Salinity (%)	Total Dissolved Solids (g/L)	Color
ASMW0005	35 to 40	09/22/2009	26.7	7.46	32.7	0.45	-148	0.7	1.64	2.05	clear
		03/24/2010	23.3	7.27	2.49	3.16	9.5	1.3	1.28	1.62	clear
		10/01/2010	24.8	7.26	2.39	2.2	-96.3	0.89	1.22	1.56	clear
		03/15/2011	23.1	7.94	2.36	5.2	-7.5	2.19	1.26	1.51	clear
		09/23/2011	25.1	6.91	2.38	0.38	17.7	1.93	1.22	1.55	clear
		03/16/2012	23.9	7.33	1.41	0.37	-84.7	0.34	0.71	0.92	clear
		08/28/2012	25.2	7.11	3.01	0.78	-72.7	1.14	1.56	1.96	clear
		03/18/2013	23.8	7.03	1.71	0.8	-64.6	0.11	0.86	1.11	clear
		10/25/2013	24.4	6.97	2.26	0.36	-107	1.14	1.16	1.47	clear
		01/27/2014	23.7	7.17	2.22	3.79	1.8	0.34	1.21	1.15	clear
		04/17/2014	23.5	6.83	2.47	4.68	-39.3	0.15	1.27	1.6	clear
		07/22/2014	25.7	7.09	4.73	7.24	-135	0.46	2.5	3.06	clear
		10/27/2014	24.7	6.88	2.99	1.18	-40.4	0.79	1.55	1.94	clear
		01/19/2015	23.2	7.27	2.68	7.68	-71.6	0.44	1.39	1.74	clear
		04/06/2015	24.4	7.06	2.23	5.3	145	1.19	1.14	1.45	clear
		07/14/2015	25.1	7.17	2.34	2.17	119	0.94	1.2	1.52	clear
		01/11/2016	23.3	7.74	2.33	5.16	-26.4	0.66	1.2	1.51	clear
		07/12/2016	25.4	7.26	2.35	3.72	-28.2	0.65	1.2	1.53	clear
		03/06/2017	23.8	7.29	1.91	7.7	-109	0.17	0.97	1.24	clear
		11/08/2017	25.3	7.06	2.48	4.31	44.7	1.54	1.27	1.61	clear
		05/30/2018	25.1	7.14	2.78	1.86	7.4	1.87	0.14	1.81	clear
		11/16/2018	23.6	7.05	2.92	3.59	69.7	1.94	0.15	1.9	clear
		03/11/2019	25.2	6.6	3.27	3.13	58	2.63	-	-	clear
		11/1/2019	25.02	7.33	3.94	0.49	-244.2	4.28	-	-	clear
ASMW0006	35 to 40	09/22/2009	25.7	7.73	4.05	11	-363	0.69	2.11	2.6	clear
		03/24/2010	23.6	6.92	3.45	0.44	-124	0.28	1.81	2.24	clear
		10/01/2010	24.8	6.95	3.66	2.3	-110	0.29	1.93	2.38	clear
		03/15/2011	23.3	8.13	2.93	3.3	-88.9	1.95	1.56	1.96	clear
		09/23/2011	24.9	7.12	3.74	2.46	-131	1.03	1.97	2.43	clear
		03/16/2012	24.1	7.15	3.36	1.83	-84.7	0.34	1.76	2.18	clear
		08/24/2012	24.9	6.85	5.4	12.6	-128	0.56	2.91	5.4	clear
		03/18/2013	23.9	6.87	3.15	1.31	-95	0.12	1.64	2.05	clear
		10/25/2013	24.2	6.96	3.26	0.64	-88.3	1.15	1.7	2.12	clear
		01/27/2014	23.5	7.22	3.13	1.76	-1.8	0.2	1.73	2.03	clear
		04/17/2014	23.7	6.88	3.44	6.69	-51.1	0.18	1.8	2.24	clear
		06/20/2014	25	6.9	3.48	8.4	-80	0.16	1.82	2.26	clear
		07/22/2014	25.6	7.19	3.21	3.26	-113	0.27	1.68	2.1	clear
		10/27/2014	24.8	6.99	4.13	0.52	-69	0.45	2.19	2.69	clear
		01/19/2015	23.5	7.24	3.83	6.64	-106	0.22	2.02	2.49	clear
		04/06/2015	24.5	7.41	3.11	7.7	-82.1	0.73	1.62	2.02	clear
		07/14/2015	26	7.45	3.74	7.96	-119	1.01	1.97	2.43	clear
		01/11/2016	23.5	8.03	3.34	1.03	-106	0.34	1.75	2.17	clear
		07/12/2016	25.6	7.44	2.6	4.36	-134	0.07	1.34	1.69	clear
		03/06/2017	23.8	7.09	2.6	13.2	-65.3	0.18	1.34	1.69	clear
		11/08/2017	25.3	8.41	3.5	14.1	19.4	0.07 *	0.18	2.26	clear
		02/20/2018	24.5	7.04	3.33	4.04	-115	0.41	0.17	-	clear
		05/29/2018	26.6	6.91	3.16	1	-90.6	0.14 *	0.17	2.06	clear
		11/16/2018	23.9	7.03	3.02	10.2	-97.2	0.43	0.16	1.96	clear
		03/11/2019	25.2	6.86	3.19	0.95	-57.7	1.18	-	-	clear
		11/1/2019	25,19	7.33	3.98	0.61	-289.1	0.23	-	-	clear

Biosparge Barrier
Groundwater Geochemical Parameters
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Location	Screened Interval (ft bls)	Date	Temp. (°C)	pH (S.U.)	Cond-uctivity (mS/cm)	Turbidity (NTU)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Salinity (%)	Total Dissolved Solids (g/L)	Color
IW0031	25 to 35	09/27/2011	25.4	7.39	2.8	14.3	-137	0.85	1.45	1.82	clear
		08/24/2012	25.3	7.11	4.66	1.31	-177	1.43	2.49	3.03	clear
		03/18/2013	24.7	7.27	2.69	7.4	-75.8	0.15	1.39	1.75	clear
		10/25/2013	24.5	7.43	2.54	3.95	-117	0.96	1.31	1.65	clear
		04/17/2014	23.9	7.34	2.84	16.7	-100	0.08	1.47	1.85	yellow tint
		10/27/2014	25.2	7.38	2.71	10.6	-84.3	0.85	1.4	1.76	clear
		01/20/2015	24	7.7	2.67	6.94	-96.8	0.23	1.38	1.74	clear
		07/14/2015	26.3	7.36	2.32	7.68	-187	0.13	1.19	1.51	clear
		01/11/2016	23.8	7.9	2.33	1.4	-163	0.32	1.19	1.51	clear
		05/31/2016	25.5	7.58	2.17	4.31	-44.1	0.5	1.09	1.39	clear
		03/06/2017	24.6	7.49	2	7.2	-66.5	0.13	1.02	1.3	clear
		08/09/2017	26.3	7.61	1.77	2.7	-61.4	0.14	0.92	1.18	clear
		11/08/2017	25.7	6.69	1.98	3.55	-83.1	0.11	1	1.29	clear
		02/20/2018	24.7	7.22	2.03	3.17	-121	0.52	0.1	-	clear
		05/29/2018	25.6	7.14	2.14	6.08	431	0.1	0.11	1.39	clear
		11/16/2018	22.7	7.1	1.91	-	-96.2	0.5	0.1	1.24	clear
		03/12/2019	24.3	7.35	1.97	1.66	40	0.53	-	-	clear
		11/1/2019	25.17	7.14	2.04	1.18	-78.5	0.26	-	-	clear
IW0057	40 to 50	12/04/2014	23.9	7.14	0.75	14.3	-143	0.49	0.37	0.49	clear
		01/19/2015	24.2	7.46	6.02	18.6	-169	0.15	3.27	3.91	clear
		07/14/2015	25.1	7.09	5.19	15.3	-164	0.31	2.79	3.37	clear
		01/11/2016	23	7.85	5.36	5.39	-111	0.34	2.9	3.49	clear
		07/11/2016	26.5	7.69	4.26	2.96	-97.2	0.18	2.19	2.69	clear
		03/06/2017	24.3	7.24	5.46	15.5	-115	0.51	2.94	3.55	clear
		11/08/2017	25.3	7.27	5.25	3.7	-101	0.11	2.82	3.41	clear
		05/29/2018	26.5	7.07	5.52	5.54	-108	0.35 *	-	-	clear
		11/14/2018	25.5	7.05	5.33	2.86	-98.1	0.55	0.17	3.46	clear
		03/12/2019	24.4	7.09	5.59	9.15	-59.7	0.13	-	-	cloudy
		11/1/2019	24.5	7.19	5.34	0.59	-114	0.95	-	-	clear
IW0058	45 to 50	12/04/2014	23.8	7.25	1.78	18.6	-159	0.01	0.9	1.16	clear
		01/19/2015	24	7.47	2.13	18.2	-153	0.32	1.09	1.39	clear
		07/17/2015	24.7	7.09	2.66	12.7	-108	0.24	1.37	1.73	clear
		01/11/2016	22.9	8.02	3.32	11.2	-86.8	0.4	1.74	2.16	clear
		07/11/2016	26.9	7.51	2.04	4.1	-67.2	0.17	1	1.29	clear
		03/06/2017	24.1	7.26	3.14	15.3	-90.3	0.27	1.63	2.04	clear
		11/08/2017	25.2	9.40 *	3.51	5.54	117	0.07 *	0.18	2.27	clear
		05/29/2018	26.2	7.04	3.93	12.4	-99.2	0.18 *	0.21	2.56	clear
		11/14/2018	25.1	6.97	4	5.03	-91.5	0.69	0.21	2.6	clear
		03/12/2019	24.6	7.11	4.14	7.99	-52.5	-	-	-	cloudy
		11/1/2019	24.6	7.14	4.33	1.32	-117	0.66	-	-	clear
IW0059	45 to 50	12/04/2014	23.7	7.27	5.63	13.1	-167	0.72	3.04	3.65	clear
		01/19/2015	23.3	7.55	0.72	13.9	-192	0.18	0.35	0.47	clear
		07/14/2015	24.8	7.02	0.86	13.4	-227	0.24	0.42	0.58	clear
		01/11/2016	23.2	7.85	1.23	2.99	-196	0.33	0.64	0.83	clear
		07/11/2016	25.5	6.99	1.19	15.5	-153	0.26	0.59	0.78	clear
		03/06/2017	24.2	7.07	2.7	7.9	-96.3	0.26	1.41	1.75	clear
		11/08/2017	25.8	7.1	3.14	0.99	-146	0.12	1.63	2.06	clear
		05/29/2018	27.6	6.91	3.7	41.1	-117	0.54 *	0.19	2.41	clear
		11/16/2018	22.9	7.06	3.29	8.68	-137	0.6	0.17	2.14	clear
		03/12/2019	24.5	7.04	3.34	8.98	-33.2	0.23	-	-	cloudy
		11/1/2019	27.5	7.07	3.07	0.38	-172	0.31	-	-	clear

Biosparge Barrier
Groundwater Geochemical Parameters
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Location	Screened Interval (ft bls)	Date	Temp. (°C)	pH (S.U.)	Cond-uctivity (mS/cm)	Turbidity (NTU)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Salinity (%)	Total Dissolved Solids (g/L)	Color
IW0060	40 to 50	12/04/2014	23.8	7.14	7.41	13.2	-155	0.02	4.08	4.81	clear
		01/19/2015	22.6	7.8	8.44	4.84	-246	0.16	4.69	5.46	clear
		04/06/2015	24.7	7.25	7.22	10.9	-231	0.25	3.99	4.72	clear
		07/14/2015	26	7.54	6.49	5.65	-124	1.1	3.53	4.21	clear
		01/11/2016	23.4	7.74	7.4	4.79	-137	0.29	4.08	4.8	clear
		07/13/2016	25.3	7.37	6.21	3.19	-91.8	0.1	3.35	4	clear
		03/06/2017	23.8	7.26	6.1	15.5	-74	0.17	3.25	3.96	clear
		11/08/2017	25.1	8.14	6.69	4.57	67.5	0.06 *	0.36	4.29	clear
		02/20/2018	24.5	7.07	7.55	4.89	-110	0.8	0.42	-	clear
		05/29/2018	25.8	7.04	6.69	18.2	-86.9	0.19 *	0.37	4.34	clear
		11/15/2018	24.5	7.14	6.38	4.28	-107	0.97	0.35	4.14	clear
		03/11/2019	25.3	7.02	5.71	5.12	-57	0.49	-	-	clear
		11/1/2019	25.28	7.56	6.71	5.57	-374.3	0.2	-	-	clear
IW0061	35 to 40	01/18/2016	22.4	7.15	1.97	53.1	-192	0.25	1	1.28	light grey
		03/28/2016	24.8	8.83	2.2	155	-81.1	0.33	1.12	1.41	cloudy grey
		05/31/2016	24.3	7.88	2.04	6.91	-123	0.6	1.05	1.34	clear
		03/07/2017	24.6	7.63	2.08	16.2	-122	0.57	1.06	1.36	clear
		08/09/2017	25.9	7.31	1.81	3.73	-97.1	0.22	0.91	1.18	clear
		11/08/2017	25.5	10.6 *	2.08	0.98	17.7	0.05 *	0.11	1.34	clear
		02/20/2018	25.4	4.71	2.07	3.19	-172	0.22	0.1	-	clear
		05/30/2018	25.3	7.39	2.22	0.83	326	0.1	0.11	1.44	clear
		11/14/2018	25.4	7.25	2.05	0.68	-129	0.6	0.1	1.33	clear
		03/12/2019	24.2	7.28	2.04	11.6	-111	0.32	-	-	clear
		10/31/2019	27.5	7.44	2.16	0.51	-198	0.4	-	-	clear
IW0062	40 to 45	01/18/2016	19.6	6.86	12	155	-422	0.16	6.86	7.83	grey
		03/28/2016	24.7	7.74	13.3	160	-68.2	0.25	7.62	8.62	cloudy grey
		05/31/2016	24.7	7.58	11.3	3.22	-124	0.62	6.48	7.41	clear
		03/07/2017	24.5	7.25	11.2	13.6	-126	0.26	6.33	7.25	clear
		08/09/2017	26	7.32	9.71	9.52	-96.8	0.19	5.45	6.31	clear
		11/08/2017	25.4	11.0 *	10.5	5.24	-49.6	0.07 *	0.59	6.81	clear
		02/20/2018	25.8	7.19	10.8	11.8	-118	0.27	0.61	-	clear
		05/30/2018	25	7.17	11	3.34	275	0	0.63	2.16	clear
		11/14/2018	25.5	7.15	9.59	2.67	-120	0.76	0.54	6.23	clear
		03/12/2019	24	7.36	9.89	14.4	-91	0.18	-	-	cloudy
		10/31/2019	28.6	7.18	9.84	2.65	-138	0.4	-	-	clear
IW0063	35 to 40	01/18/2016	20.2	7.18	7.51	107	-484	0.17	4.17	4.9	grey
		03/28/2016	25	8.03	8.17	339	-78.7	0.21	4.53	5.32	cloudy grey
		05/31/2016	25.1	7.62	6.99	14.6	-130	0.5	3.82	4.53	clear
		03/07/2017	24.6	7.42	6.78	8.3	-117	0.15	3.71	4.41	clear
		08/09/2017	26	7.37	5.96	3.38	-88.4	0.14	3.23	3.87	clear
		11/08/2017	25.9	6.99	5.55	2.09	-121	0.11	2.99	3.6	clear
		02/20/2018	25	6.92	5.79	4.14	-117	0.35	0.31	-	clear
		05/29/2018	26	7.01	6.13	2.52	403	0.1	0.33	3.98	clear
		11/14/2018	26.2	6.72	5.92	2.51	-65.4	0.61	0.32	3.85	clear
		03/11/2019	25.9	6.21	6.2	13.2	-15.2	1.3	-	-	clear
		11/1/2019	25.6	6.95	5.75	0.79	-30.5	0.35	-	-	clear

Biosparge Barrier
Groundwater Geochemical Parameters
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Location	Screened Interval (ft bls)	Date	Temp. (°C)	pH (S.U.)	Cond-uctivity (mS/cm)	Turbidity (NTU)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Salinity (%)	Total Dissolved Solids (g/L)	Color
IW0064	40 to 45	01/18/2016	24	6.95	16.4	115	-475	0.16	9.61	10.7	grey
		03/28/2016	24.9	7.77	18.5	14.2	-65.6	0.22	10.9	12	clear
		05/31/2016	24.9	7.39	15.7	10.6	-110	0.5	9.21	10.3	clear
		03/07/2017	24.7	7.24	16	16.6	-90.5	0.2	9.32	10.4	clear
		08/09/2017	26.1	7.18	13.9	12.3	-63.3	0.13	8	9	clear
		11/08/2017	25.9	7	14.5	15.6	-114	0.16	8.38	9.38	clear
		02/20/2018	24.9	6.88	14.9	4.21	-115	0.34	0.85	-	clear
		05/29/2018	26.2	6.94	15.4	0.78	437	0.09	0.89	9.95	clear
		11/14/2018	25.9	6.86	14.5	5.59	-97	0.48	0.84	9.4	clear
		03/11/2019	25.5	6.41	15.2	7.1	-54	0.2	-	-	clear
		11/1/2019	25.4	7.06	13.93	1.36	-103.9	0.23	-	-	clear

Notes:

1. ft bls = feet below land surface.
2. °C = degrees Celsius.
3. pH = negative log of hydrogen ion concentration.
4. S.U. = standard units.
5. mS/cm = milliSiemens per centimeter.
6. NTU = Nephelometric Turbidity Unit.
7. mV = millivolts.
8. mg/L = milligrams per liter.
9. % = percent.
10. g/L = grams per liter.
11. - = not recorded.
12. * = probe failed continuing calibration verification (CCV).
13. ASMW0001 through ASMW0003 were removed from the sampling program in March 2014.
14. Locations have prefix "MLPV-"

Table 3-6
Hot Spot 2 (Air Sparge Area)
Groundwater Geochemical Parameters
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Location	Screened Interval (ft bls)	Date	Temp. (°C)	pH (S.U.)	Cond-uctivity (mS/cm)	Turbidity (NTU)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Salinity (%)	Total Dissolved Solids (g/L)	Color
IW0011I	35 to 40	05/29/2012	24.3	6.99	1.21	2.1	46	0.55	0.61	0.8	clear yellow
		01/27/2014	24.2	7.41	6.78	7.8	-93	0.27	2.81	2.65	clear
		07/22/2014	26.2	7.76	1.76	6.8	-147	0.44	0.85	1.09	clear
		01/21/2015	24.1	7.6	1.47	5.4	54	0.23	0.74	0.96	clear
		07/15/2015	26	7.11	1.64	17.2	-76	0.13	0.82	1.06	clear
		01/12/2016	23.4	7.21	1.45	5.1	-147	0.24	0.73	0.94	clear
		07/11/2016	26.9	7.26	1.52	2.1	-147	0.24	0.8	1.02	clear
		11/07/2017	25.5	7.2	2.41 *	1.9	-249	0.15 *	0.23	1.56	clear
		05/31/2018	26.2	7.35	2.52	5.9	230	0.23	0.13	1.63	clear
		03/06/2019	21.6	7.06	20.2	1.4	-246	0.43 *	0.11	1.43	clear
		10/31/2019	25.98	7.23	2.15	4.03	-254.3	0.09	-	-	clear
IW0030	55 to 65	06/28/2010	29.2	7.19	2.97	11.1	-145	0.28	1.53	1.93	clear
		05/31/2012	27.1	7.47	3.65	13.8	-128	0.53	1.95	3.7	clear
		07/23/2014	26	7.55	3.31	11.4	-103	0.8	1.73	2.17	clear
		07/15/2015	25.9	7.49	3.14	14.3	-151	0.23	1.63	2.04	clear
		01/12/2016	20.3	7.53	3.33	2	-75	0.45	1.75	2.16	clear
		07/13/2016	29.2	7.49	3.2	5	-114	0.15	1.66	2.08	clear
		11/08/2017	24.5	7.56	3.41	0.7	-83	0.2	0.18	2.22	clear
		05/30/2018	27.5	7.54	3.6	13	375	0.09	0.19	2.34	clear
		03/05/2019	20.7	7.48	3.19	1.9	-16	0.28	0.17	20.07	clear
IW0032	30 to 40	05/31/2012	26.7	7.19	1.92	8.9	-252	0.28	0.97	1.25	clear
		09/26/2012	24.7	7.07	0.91	1.9	-105	0.95	0.45	0.59	clear
		08/19/2013	24.9	6.63	1.04	2.5	151	1.89	0.51	0.67	clear
		10/24/2013	24.2	6.91	1.05	7.7	-23	0.66	0.52	0.68	clear
		01/27/2014	24.2	7.25	1.01	8	32	0.69	0.52	0.66	clear
		04/16/2014	23.4	6.81	2.28	6	230	0.29	1.17	1.48	clear
		07/21/2014	25.4	7.38	3.88	14.7	-17	6.01	2.03	2.5	clear
		01/20/2015	24.7	7.28	2.4	10.1	35	4.63	1.23	1.56	clear
		07/15/2015	26.8	7.04	2.28	2.7	-17	1.11	1.17	1.48	clear
		10/06/2015	24.9	6.74	2.26	2.3	102	5.89	1.16	1.47	clear
		01/12/2016	23.2	7.19	1.97	2.5	94	5.49	1	1.28	clear
		07/13/2016	25.6	7.11	2.77	6.1	1	0.58	1.43	1.8	clear
		11/07/2017	26	8.61 *	2.23	0.86	160	5.10 *	0.11	1.45	clear
		05/31/2018	25.2	7.56	2.61	2.2	253	0.19	0.14	1.72	clear
		03/06/2019	21.1	7.08	2.46	0.39	-151	0.28 *	0.13	1.6	clear
IW0033	40 to 50	05/31/2012	24.9	7.26	22.8	11.7	-152	0.23	13.75	14.82	clear
		09/26/2012	24.5	7.2	6.24	8.5	-89	0.79	3.42	4.11	clear
		08/19/2013	24.9	6.85	3.13	5.4	36	0.58	1.63	2.04	clear
		10/24/2013	24	7.01	7.4	4	-67	0.57	4.07	4.81	clear
		01/27/2014	23.6	7.25	5.3	9.9	10	0.2	2.81	3.7	clear
		04/16/2014	23.5	6.95	6.83	4	-62	0.21	3.74	4.43	clear
		07/21/2014	25.1	7.28	7.72	11.3	-108	0.91	4.21	4.98	clear
		01/20/2015	24.3	7.2	5.01	10.8	-47	1.59	2.69	3.25	clear
		07/15/2015	26	6.98	6.11	8.9	-80	0.4	3.31	4	clear
		10/06/2015	24.6	6.62	6.33	14.1	5	2.92	3.5	4.11	clear
		01/12/2016	23.4	7.06	4.6	3	-4	1.4	2.46	2.99	clear
		07/13/2016	25.8	6.94	6.65	12	-37	0.18	3.64	4.34	clear
		03/07/2017	24.2	7.31	6.42	13.5	-97	0.67	3.51	4.19	clear
		11/07/2017	25.1	8.79 *	5.63	30	165	1.83 *	0.3	3.65	clear
		05/31/2018	25.2	7.66	5.08	3.3	146	0.18	0.27	3.32	clear
		03/06/2019	20.6	6.96	5.29	4.2	-129	0.29 *	0.29	3.43	clear
		10/31/2019	25.81	7.22	6.52	2.09	-107.5	0.11	-	-	yellow

Hot Spot 2 (Air Sparge Area)
Groundwater Geochemical Parameters
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Location	Screened Interval (ft bls)	Date	Temp. (°C)	pH (S.U.)	Cond-uctivity (mS/cm)	Turbidity (NTU)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Salinity (%)	Total Dissolved Solids (g/L)	Color
IW0034	30 to 40	05/29/2012	25.5	6.96	5.48	13.1	-188	0.18	3.92	3.49	clear
		01/27/2014	24.6	7.03	5.53	10.9	-3	0.6	2.73	2.39	clear
		07/22/2014	26.2	7	2.8	5.3	-81	0.5	1.45	1.82	clear
		01/21/2015	24.7	6.86	2.4	16.3	-123	0.25	1.23	1.56	clear
		07/15/2015	26.2	6.98	2.34	2.3	-118	1.32	1.2	1.52	clear
		01/11/2016	24.2	7.08	1.8	5.1	-146	0.38	0.91	1.17	clear
		07/13/2016	26.1	7.05	2.48	16.3	-158	0.11	1.27	1.61	clear
		11/07/2017	26	8.69 *	1.77	17.1	185	2.20 *	0.09	1.13	clear
		05/31/2018	26.6	6.9	1.71	5.8	-26	0.75	0.09	1.12	clear
		03/06/2019	22.5	7.07	1.81	3.5	-63	0.31	0.09	1.18	clear
		10/31/2019	27.34	7.26	1.56	57.1	-85.5	0.22	-	-	brown
IW0035	40 to 50	05/29/2012	25.9	7	10.93	13.7	-154	0.17	6.27	7.24	clear
		01/27/2014	24.7	7.2	3.72	13.5	-19	0.16	1.6	1.54	clear
		07/22/2014	26.3	7.08	6.58	10.1	-88	0.62	3.59	4.28	clear
		01/21/2015	24.5	7.1	6.03	8.8	-88	0.22	3.28	3.92	clear
		07/15/2015	26.1	7.09	5.13	6.4	-90	1.29	2.75	3.33	clear
		01/11/2016	23.4	7.14	4.1	12.9	-82	0.34	2.18	2.67	clear
		07/13/2016	27	7.04	4.8	3.9	-70	0.14	2.56	3.12	clear
		11/07/2017	26	9.91 *	5.08	3.7	43	0.11 *	0.27	3.24	clear
		05/31/2018	26	7.02	4.66	4.2	-80	0.25	0.25	3.03	clear
		03/06/2019	22.6	7.11	4.92	2.4	-48	0.24	0.26	3.2	clear
		10/31/2019	27.19	7.14	5.01	21.4	-108.3	0.18	-	-	clear
IW0036	40 to 45	05/29/2012	25.5	7.15	14.99	12.3	-326	0.39	8.69	9.73	clear
		01/28/2014	24.9	7.53	2.54	11.9	-81	0.28	1.3	1.63	clear
		07/22/2014	25.1	7.61	2.54	10.4	-71	0.95	1.31	1.62	clear
		01/22/2015	24.3	7.49	3.19	14.6	-216	0.19	1.66	2.07	clear
		07/15/2015	26.4	7.44	3	5	-250	1.11	1.55	1.95	clear
		01/12/2016	24	7.3	2.85	4.1	-193	0.42	1.48	1.85	clear
		07/13/2016	26.3	7.22	2.51	1.8	-168	0.1	1.2	1.63	clear
		11/07/2017	25.8	9.44 *	2.24	1.6	125	0.14 *	0.12	1.43	clear
		05/30/2018	25.9	7.3	2.08	1.2	438	0.01	0.11	1.36	clear
		03/06/2019	22.3	7.46	2.23	1.3	-85	0.32	0.11	1.45	clear
		10/31/2019	26.5	7.27	2.68	1.27	-203.7	0.28	-	-	clear
IW0037	40 to 50	05/29/2012	24.2	7.13	6.25	18.7	-17	1.14	3.41	4.06	clear
		01/27/2014	23.8	7.37	4.66	7.2	-35	0.08	2.6	3.15	clear
		07/22/2014	25.7	7.21	7.95	16.9	-111	0.31	4.41	5.2	clear
		01/21/2015	23.9	7.09	8.11	17.5	-85	0.22	4.5	5.28	clear
		07/15/2015	25.5	7.11	7.9	18.9	-122	0.1	4.36	5.13	clear
		01/12/2016	23	7.26	5.74	12.9	-112	0.39	3.12	3.73	clear
		07/11/2016	26.4	7.67	6.23	15.7	-83	0.17	3.27	3.92	clear
		11/07/2017	25.7	7.19	6.19 *	12.2	-95	0.81 *	3.36	4.02	clear
		05/31/2018	25	7.24	6.97	3.9	234	0.2	0.38	4.54	clear
		10/31/2019	25.87	7.26	8.1	1.41	-78.8	0.16	-	-	clear
		03/06/2019	20.6	7.1	6.72	0.82	-112	0.23 *	0.37	4.37	clear

Hot Spot 2 (Air Sparge Area)
Groundwater Geochemical Parameters
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Location	Screened Interval (ft bls)	Date	Temp. (°C)	pH (S.U.)	Cond-uctivity (mS/cm)	Turbidity (NTU)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Salinity (%)	Total Dissolved Solids (g/L)	Color
IW0038	30 to 40	05/29/2012	24.1	7.13	0.74	11.1	-79	1.17	0.36	0.48	clear
		09/26/2012	25	7.03	1.49	6.2	-59	0.95	1.48	0.9	clear
		08/19/2013	26.5	6.62	1.92	8.1	96	1.38	0.97	1.24	clear
		10/24/2013	25	6.75	2.54	13.5	-44	0.63	1.31	1.65	clear
		01/27/2014	25.1	7.03	2.6	8.3	-40	0.32	1.31	1.66	clear
		04/16/2014	25.8	6.77	3.38	6.4	43	0.59	1.77	2.2	clear
		07/22/2014	26.4	6.92	4.3	5.9	5	4.97	2.28	2.79	clear
		01/21/2015	25.7	7.06	4.03	5.1	29	5.84	2.13	2.62	clear
		07/14/2015	27.6	7.61	3.97	0.81	-14	1.03	2.09	2.58	clear
		10/06/2015	27.2	6.82	4.02	1.2	102	9.73	2.12	2.62	clear
		01/12/2016	25.5	7.18	3.24	2.4	140	8.61	1.69	2.11	clear
		07/13/2016	28.4	7.04	4.23	6.2	20	0.29	2.24	2.75	clear
		11/07/2017	26.8	7.05	2.86 *	2.5	154	7.23 *	1.48	1.86	clear
		05/31/2018	26	6.99	3.3	0.42	9.8	0.85	0.17	2.15	clear
		03/06/2019	21.9	7.02	3.06	0.28	30	0.54 *	0.16	1.99	clear
IW0039	40 to 50	05/29/2012	23.7	7.13	6.82	14.4	-56	0.5	3.74	4.43	clear
		09/26/2012	25.1	7.1	7.34	8.9	-120	0.79	4.04	4.77	clear
		08/19/2013	26.7	6.9	2.67	7.6	-78	0.36	1.37	1.74	clear
		10/24/2013	24.8	6.98	7.55	6.9	-92	0.47	4.16	4.9	clear
		01/27/2014	25.2	7.19	4.34	3.2	-15	0.11	1.75	1.65	clear
		04/16/2014	25.1	6.92	7.48	13.1	-62	0.15	4.12	4.87	clear
		07/22/2014	26.4	7.51	5.74	15	-92	0.53	3.14	3.83	clear
		01/21/2015	25.3	6.88	5.15	7.5	-71	0.21	2.76	3.34	clear
		07/14/2015	27.2	7.29	5.1	6.2	-94	0.94	2.73	3.31	clear
		10/06/2015	26.7	6.64	4.64	7.2	-52	0.52	2.47	3.01	clear
		01/12/2016	25.4	7.02	3.91	3.7	-27	0.44	2.06	2.54	clear
		07/13/2016	27.2	6.9	4.91	3.7	-30	0.15	2.62	3.19	clear
		03/07/2017	24.3	7.13	6.27	15.1	-52	0.21	3.42	4.08	clear
		11/07/2017	26.4	6.95	4.30 *	2.6	0	0.45 *	2.27	2.79	clear
		05/31/2018	25.8	6.94	4.73	8.6	-41	0.3	0.25	3.08	clear
		03/06/2019	22.3	7.11	6.37	3.7	-68	0.86 *	0.35	4.14	clear
		10/31/2019	26.25	7.28	6.19	4	-76.3	0.16	-	-	clear
IW0040	30 to 40	05/29/2012	25.7	7.08	9.81	18.6	-175	0.13	4.27	5.92	clear
		09/26/2012	25.4	7.3	2.14	6.2	-118	0.41	1.09	1.39	clear
		08/19/2013	26.3	6.95	2.07	5	24	1.89	1.05	1.34	clear
		10/24/2013	24.9	7.03	1.85	5.8	-156	0.66	0.94	1.2	clear
		01/27/2014	24.8	7.35	1.87	9.1	-6	0.84	0.96	1.2	clear
		04/16/2014	25.3	6.81	2.49	10.2	-93	0.12	1.28	2.5	clear
		07/23/2014	25.6	7.3	4.36	15.4	-46	0.41	2.31	2.83	clear
		01/22/2015	24.6	7.24	4.25	2.9	6	2.65	2.25	2.76	clear
		07/15/2015	26.3	7.15	3.95	18.8	-41	1.2	2.08	2.57	clear
		10/06/2015	25.8	6.99	3.67	11.4	20	5.47	1.93	2.38	clear
		01/11/2016	22.3	7.23	3.19	2	96	5.5	1.67	2.07	clear
		07/13/2016	27.5	7.22	3.01	13.1	-11	0.3	1.56	1.96	clear
		11/07/2017	26.3	8.34 *	2.76	10.6	281	3.19 *	0.14	1.75	clear
		05/30/2018	25.9	7.18	2.39	11.8	-83	0.52	0.12	1.55	clear
		03/05/2019	22.4	7.06	2.44	19.7	-72	0.81	0.13	1.59	clear

Hot Spot 2 (Air Sparge Area)
Groundwater Geochemical Parameters
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Location	Screened Interval (ft bls)	Date	Temp. (°C)	pH (S.U.)	Cond-uctivity (mS/cm)	Turbidity (NTU)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Salinity (%)	Total Dissolved Solids (g/L)	Color
IW0041	40 to 50	05/29/2012	25.2	7.11	19.21	78.4	-143	0.07	11.15	12.25	cloudy
		09/26/2012	25.4	7.32	8.5	11.5	-138	0.75	4.76	5.59	clear
		08/19/2013	26	6.87	2.95	16.4	-78	0.27	1.53	1.92	clear
		10/24/2013	24.6	6.93	8.21	12.8	-79	0.2	4.55	5.34	clear
		01/27/2014	24.3	7.23	1.85	15.4	-31	0.2	1	1.19	clear
		04/16/2014	24.8	6.83	8.12	13.6	-85	0.08	4.5	5.27	clear
		07/23/2014	24.3	7.52	2.12	10.2	-22	0.69	1.4	1.61	clear
		01/22/2015	24.4	7.39	4.48	10.3	-88	0.22	2.39	2.91	clear
		07/15/2015	26.4	7.08	4.9	15.8	-110	0.12	2.62	3.19	clear
		10/06/2015	26.3	6.9	4.18	10.5	-91	0.25	2.21	2.73	clear
		01/11/2016	23.3	7.19	4.3	16.2	-91	0.45	2.28	2.79	clear
		07/13/2016	27.2	7.02	4.34	7	-52	0.09	2.35	2.82	clear
		03/07/2017	24.5	7.19	5.63	10.7	-83	0.17	3.04	3.65	clear
		11/07/2017	25.9	8.54 *	4.87	1.9	279	0.12 *	0.26	3.11	clear
		05/30/2018	26.4	7.1	4.2	10.9	-60	0.4	0.22	2.73	clear
		03/05/2019	22.7	7.17	5.26	2.1	-56	0.26	0.28	3.42	clear
		10/31/2019	27.54	7.2	4.7	20.9	-134	0.16	-	-	clear
IW0042	30 to 40	05/29/2012	23.8	7.3	0.91	47.6	-108	0.43	0.45	0.59	clear
		09/26/2012	25.3	7.3	0.79	17.9	-211	0.35	0.38	0.51	clear
		08/19/2013	26.1	6.88	0.9	16.2	-110	0.22	0.44	0.59	clear
		10/24/2013	24.8	6.94	1.26	15.1	-128	0.41	0.62	0.82	clear
		01/28/2014	24.8	7.11	1.2	10.5	-105	0.41	0.6	0.78	clear
		04/16/2014	25.2	6.69	1.87	15.2	-75	0.18	0.95	1.22	clear
		07/22/2014	25.7	7.1	1.83	12.3	-126	0.2	0.93	1.2	clear
		01/20/2015	25.2	7.13	3.17	12.1	-81	0.16	1.65	2.06	clear
		07/14/2015	26.8	6.69	3.88	18.3	-123	0.12	2.04	2.51	clear
		10/06/2015	26.3	6.52	3.53	4.7	-36	0.19	1.85	2.29	clear
		01/11/2016	23.3	6.88	2.58	11.3	-96	0.37	1.33	1.68	clear
		07/13/2016	27.8	6.75	3.41	5.9	31	0.1	1.78	2.22	clear
		11/07/2017	26.2	7.07	2.28 *	5	-17	0.17 *	1.16	1.48	clear
		05/30/2018	25	7.05	3.61	8.9	-64	0.3	0.19	2.35	clear
		03/06/2019	22.7	7.64	2.58	0.7	-46	0.29	0.13	1.68	clear
IW0043	40 to 50	05/29/2012	24.8	7.2	7.54	76.8	31	0.39	4.15	4.9	clear
		09/26/2012	25.2	7.39	7.27	10.9	-139	0.89	4.04	4.8	clear
		08/19/2013	25.6	6.94	2.36	6.8	-80	0.27	1.21	1.54	clear
		10/24/2013	24.7	7.1	8.98	9.7	-100	0.3	5.02	5.84	clear
		01/28/2014	25	7.13	4.86	8.8	-75	0.17	2.9	3.95	clear
		04/16/2014	24.7	6.97	8.71	12.9	-94	0.1	4.86	5.66	clear
		07/22/2014	25.7	7.22	7.08	8.7	-124	0.75	3.9	4.62	clear
		01/20/2015	24.9	7.29	6.01	9.2	-113	0.11	3.26	3.91	clear
		07/14/2015	26.6	6.95	6.48	12.9	-143	0.08	3.51	4.2	clear
		10/06/2015	26.4	6.7	5.45	6.2	-89	0.27	2.93	3.54	clear
		01/11/2016	22.6	7.17	5.73	2.6	-103	0.44	3.1	3.72	clear
		07/13/2016	27.8	7.05	4.84	17.3	-65	0.11	2.58	3.14	clear
		03/07/2017	24.5	7.14	7.64	17.5	-78	0.21	4.2	4.95	clear
		11/07/2017	26	7.09	5.13 *	1.6	-82	0.17 *	2.75	3.33	clear
		05/30/2018	25.1	7.15	4.43	14.7	-82	0.25	0.24	2.88	clear
		03/06/2019	21.6	7.52	6.97	2.1	-59	0.32	0.41	4.84	clear
		10/31/2019	27.96	7.38	6.11	0.61	-83.7	0.26	-	-	clear

Hot Spot 2 (Air Sparge Area)
Groundwater Geochemical Parameters
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Location	Screened Interval (ft bls)	Date	Temp. (°C)	pH (S.U.)	Cond-uctivity (mS/cm)	Turbidity (NTU)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Salinity (%)	Total Dissolved Solids (g/L)	Color
IW0044	40 to 50	07/06/2012	24.4	7.13	5.61	58.7	-119	0.37	3.03	3.64	clear
		01/28/2014	23.8	7.58	2.49	10	-61	0.24	1.26	1.6	clear
		07/23/2014	25	7.08	2.5	15.4	-54	1.1	1.31	1.63	clear
		01/20/2015	23.2	7.46	6.6	18	-116	0.12	3.61	4.29	clear
		07/15/2015	24.2	7.05	6.45	16.6	-109	0.53	3.52	4.19	clear
		01/12/2016	23.7	7	7.69	42	-124	0.28	4.25	5	clear
		07/12/2016	26.5	7.03	6.21	11.7	-113	0.1	3.37	4.03	clear
		11/07/2017	24.8	7.1	4.81 *	6.3	-130	0.70 *	2.57	3.12	clear
		05/30/2018	24.1	7.16	7.72	3.5	325	0.01	0.43	5.02	clear
		03/05/2019	23	7.18	6.16	2.3	-99	0.47	0.34	4	clear
		10/31/2019	25.45	7.17	5	5.33	-167.2	0.21	-	-	clear
IW0045	40 to 50	07/06/2012	24.1	7.04	3.47	64.5	-100	0.16	1.82	2.25	clear
		01/27/2014	23.4	7.17	3.25	9.7	6	0.32	1.7	2.1	clear
		07/22/2014	24.6	7.35	5.42	15.9	-81	0.75	2.9	3.48	clear
		01/20/2015	22.3	7.14	4.12	17.9	-91	0.27	2.19	2.68	clear
		07/15/2015	26.2	6.92	4.08	15.1	-80	0.69	2.16	2.65	clear
		01/12/2016	24.6	6.93	4.6	2.2	-145	0.28	2.45	2.99	clear
		07/12/2016	26.7	6.99	4.35	16.6	-131	0.09	2.3	2.83	clear
		11/07/2017	25.5	9.66 *	4.61	7.7	78	0.11 *	0.2	2.98	clear
		05/30/2018	25.1	7.62	4.85	1.2	358	0.01	0.26	3.16	clear
		03/06/2019	21.7	6.9	4.51	2.7	-84	0.33 *	0.24	2.94	clear
		10/31/2019	25.95	7.14	4.79	1.44	-107	0.13	-	-	clear
SAMW0004I	35 to 40	05/29/2012	25.3	7.03	9.01	12.5	-182	0.16	5.04	5.85	clear
		01/28/2014	24.4	7.38	2.21	8.8	-71	0.2	1.14	1.43	clear
		07/22/2014	25	7.43	6	14.3	-93	0.21	2.51	2.6	clear
		01/22/2015	24.3	7.48	1.08	3.3	-161	0.14	0.54	0.7	clear
		07/15/2015	27.5	7.4	1.12	1.3	-130	1.11	0.55	0.73	clear
		01/12/2016	24.2	7.23	1.11	4.5	-144	0.36	0.55	0.72	clear
		07/13/2016	28.2	7.17	1.04	3	-90	0.14	0.51	0.68	clear
		11/07/2017	26	7.18	1.01 *	2.2	-191	0.20 *	0.5	0.66	clear
		05/30/2018	25.4	7.12	1.36	0.86	363	0.08	0.07	0.89	clear
		03/06/2019	23	7.73	1.31	2.3	-67	0.33	0.07	0.85	clear
		10/31/2019	27.36	7.2	1.32	2.38	-168.6	0.18	-	-	clear
SAMW0004D	45 to 50	05/29/2012	25.3	6.93	18.97	4.3	-102	0.13	11.28	12.36	clear
		01/28/2014	23.4	7.3	2.49	9.9	-87	0.21	1.3	1.62	clear
		07/22/2014	25.2	7.03	7.75	8.3	-100	0.98	3.95	4.64	clear
		01/22/2015	24.2	7.05	8.24	4.7	-157	0.16	4.57	5.36	clear
		07/15/2015	27.6	7.14	8.73	2.2	-146	0.98	4.85	5.68	clear
		01/12/2016	24.1	6.86	8.83	2.2	-194	0.3	4.93	5.74	clear
		07/13/2016	27.8	7.08	7.18	17.8	-276	0.05	3.91	4.66	clear
		11/07/2017	26.1	7.15	6.56 *	0.86	-252	0.21 *	3.59	4.29	clear
		05/30/2018	24.6	7.16	6.86	2.6	302	0.02	0.38	4.45	clear
		03/06/2019	22.6	7.33	8.61	1	-122	0.3	0.48	5.59	clear
		10/31/2019	27.15	7.12	8.33	2.43	-221.5	0.24	-	-	clear

Notes:

1. ft bls = feet below land surface.
2. °C = degrees Celsius.
3. pH = negative log of hydrogen ion concentration.
4. S.U. = standard units.
5. mS/cm = milliSiemens per centimeter.
6. NTU = Nephelometric Turbidity Unit.
7. mV = millivolts.
8. mg/L = milligrams per liter.
9. % = percent.
10. g/L = grams per liter.
11. - = not recorded.
12. * = probe failed continuing calibration verification (CCV).
13. Locations have prefix "MLPV-"

Table 3-7
Hot Spot 3 (OFW Area)
Groundwater Geochemical Parameters
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

Location	Screened Interval (ft bls)	Date	Temp. (°C)	pH (S.U.)	Cond-uctivity (mS/cm)	Turbidity (NTU)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Salinity (%)	Total Dissolved Solids (g/L)	Color
MW0011	25 to 35	11/10/2015	25.5	6.83	0.82	17.3	-299	0.38	0.4	0.53	clear
		01/11/2016	23.5	7.66	1.7	15.2	-236	0.29	0.86	1.11	clear
		07/11/2016	27.6	7.77	0.56	13.9	-250	0.21	0.26	0.35	clear
		02/20/2017	23.5	7.24	0.67	9	-336	0.13	0.34	0.45	clear
		08/09/2017	28	7.44	0.56	2.3	-233	0.13	0.27	0.36	clear
		02/19/2018	25.3	7.27	0.62	5.9	-261	0.05	0.03	-	clear
		08/06/2018	27.7	7.95	0.66	2.1	-329	0.1	0.03	0.43	clear
		02/18/2019	25.2	7.34	0.66	1.6	-325	0.50 *	0.03	0.43	clear
		10/31/2019	27.9	7.2	0.67	0.78	-311	0.79	-	-	clear
MW0012	15 to 25	11/10/2015	26.1	6.71	0.54	11.8	-238	0.13	0.26	0.35	clear
		01/11/2016	24.5	7.64	0.6	6.7	-267	0.22	0.29	0.39	clear
		07/11/2016	28.5	7.7	0.51	13.3	-234	0.17	0.23	0.31	clear
		02/20/2017	23.5	7.21	0.61	11.3	-344	0.09	0.3	0.41	clear
		08/09/2017	27.6	7.35	0.51	1.6	-237	0.1	0.24	0.33	clear
		02/19/2018	25.4	7.26	0.61	8.9	-294	0.07	0.03	-	clear
		08/06/2018	27	7.45	0.64	1.3	-341	0.01	0.03	0.42	clear
		02/18/2019	25	7.3	0.6	2	-313	0.57 *	0.03	0.39	clear
		10/31/2019	28	7.18	0.59	1.13	-322	0.78	-	-	clear
MW0013	20 to 25	09/13/2018	27.9	7.41	0.66	13.4	-312	0.4	0.32	0.43	clear
		02/18/2019	25	7.37	0.7	5	-224	0.51 *	0.03	0.45	clear
		10/31/2019	28.2	7.23	0.67	1.89	-319	0.36	-	-	clear
MW0014	25 to 30	09/13/2018	26.9	7.4	0.67	11.4	-315	0.51	0.32	0.44	clear
		02/18/2019	25.1	7.38	0.66	9.4	-317	0.45 *	0.03	0.43	clear
		10/31/2019	27.3	7.22	0.69	12.4	-474	0.08	-	-	clear

Notes:

1. ft bls = feet below land surface.
2. °C = degrees Celsius.
3. pH = negative log of hydrogen ion concentration.
4. S.U. = standard units.
5. mS/cm = milliSiemens per centimeter.
6. NTU = Nephelometric Turbidity Unit.
7. mV = millivolts.
8. mg/L = milligrams per liter.
9. % = percent.
10. g/L = grams per liter.
11. * = probe failed continuing calibration verification (CCV).
12. - = not recorded.
13. OFW = Outstanding Florida Waters.
14. Locations have prefix "VABRA-".

Table 4-1
2020 Sampling and Analysis Plan
Mobile Launch Platform/Vehicle Assembly Building Area, SWMU 056

System Monitored	Location	Screen Interval (ft bls)	Frequency	Month	Analytical Parameters
Biosparge Barrier	MLPV-IW0057	40 to 50	Semi-Annual	March & September	CVOCs (TCE, cDCE, tDCE, VC)
	MLPV-IW0058	45 to 50			
	MLPV-IW0059	45 to 50			
	MLPV-IW0060	40 to 50			
	MLPV-ASMW0004	35 to 40			
	MLPV-ASMW0005	35 to 40			
	MLPV-ASMW0006	35 to 40			
	MLPV-IW0031	25 to 35			
	MLPV-IW0061	35 to 40			
	MLPV-IW0062	40 to 45			
	MLPV-IW0063	35 to 40			
	MLPV-IW0064	40 to 45			
Air Sparge System	MLPV-IW0011I	35 to 40	Semi-Annual	March (annual) & September	CVOCs (TCE, cDCE, tDCE, VC)
	MLPV-IW0032	30 to 40	Annual		
	MLPV-IW0033	40 to 50	Semi-Annual		
	MLPV-IW0034	30 to 40	Semi-Annual		
	MLPV-IW0035	40 to 50	Semi-Annual		
	MLPV-IW0036	40 to 45	Semi-Annual		
	MLPV-IW0037	40 to 50	Semi-Annual		
	MLPV-IW0038	30 to 40	Annual		
	MLPV-IW0039	40 to 50	Semi-Annual		
	MLPV-IW0040	30 to 40	Annual		
	MLPV-IW0041	40 to 50	Semi-Annual		
	MLPV-IW0042	30 to 40	Annual		
	MLPV-IW0043	40 to 50	Semi-Annual		
	MLPV-IW0044	40 to 50	Semi-Annual		
	MLPV-IW0045	40 to 50	Semi-Annual		
	MLPV-SAMW0004I	35 to 40	Semi-Annual		
	MLPV-SAMW0004D	45 to 50	Semi-Annual		
Hot Spot 3 OFW Area	VABRA-MW0011	25 to 35	Annual	March	CVOCs (TCE, cDCE, tDCE, VC)
	VABRA-MW0012	15 to 25			
	VABRA-MW0013	20 to 25			
	VABRA-MW0014	25 to 30			
VAB Area	MLPV-IW0009D	45 to 50	Biennial	May	CVOCs (Full List)
	MLPV-IW0009I	28 to 33			
	MLPV-IW0012D	45 to 50			
	MLPV-IW0018D	50 to 55			
	MLPV-IW0020D	45 to 50			
	MLPV-IW0028I	28 to 33			
	MLPV-IW0029D	42 to 47			
	MLPV-IW0046	35 to 45			
	MLPV-IW0047	35 to 45			
	MLPV-IW0052	40 to 50			
	MLPV-IW0053	35 to 45			
	MLPV-SAMW0001	43 to 48			
	MLPV-SAMW0003	43 to 48			
	PRES-IW0009	40 to 50			
	SATV-IW0009I	22 to 27			
	VAB-IW0005D	52 to 57			
	VABU-IW0001I	20 to 30			
	WCPS-IW0001SR	2.5 to 12.5			
	WCPS-IW0016	15 to 25			
	*WCPS-IW0006S	3 to 13			
	*MLPV-IW0002I	28 to 33			
	*MLPV-IW0001D	50 to 55			
	*MLPV-SAMW0002	43 to 48			

Notes:

1. ft bls = feet below land surface.
2. CVOC = chlorinated volatile organic compounds.
3. OFW = Outstanding Florida Waters.
4. * = Wells added to sampling plan following analytical assessement of 2018 data
5. VAB Area sampling results will report the full list of CVOCs, as previously reported. A reduced CVOC list will be reported upon KSC approval, based on reported results.
5. TCE = trichloroethylene
6. cDCE = cis-1,2-dichloroethylene
7. tDCE = trans-1,2-dichloroethene
8. VC = vinyl chloride

FIGURES

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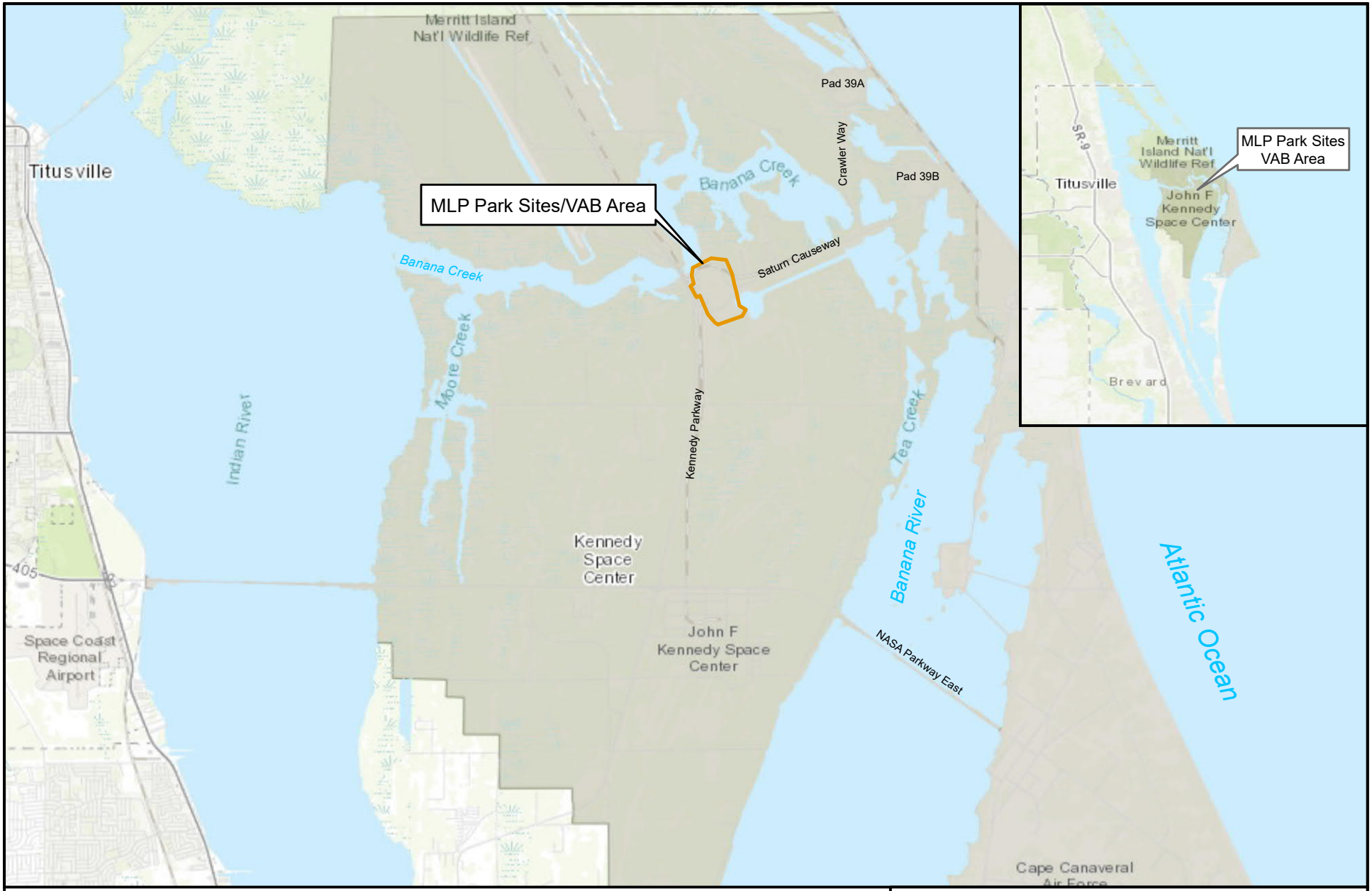


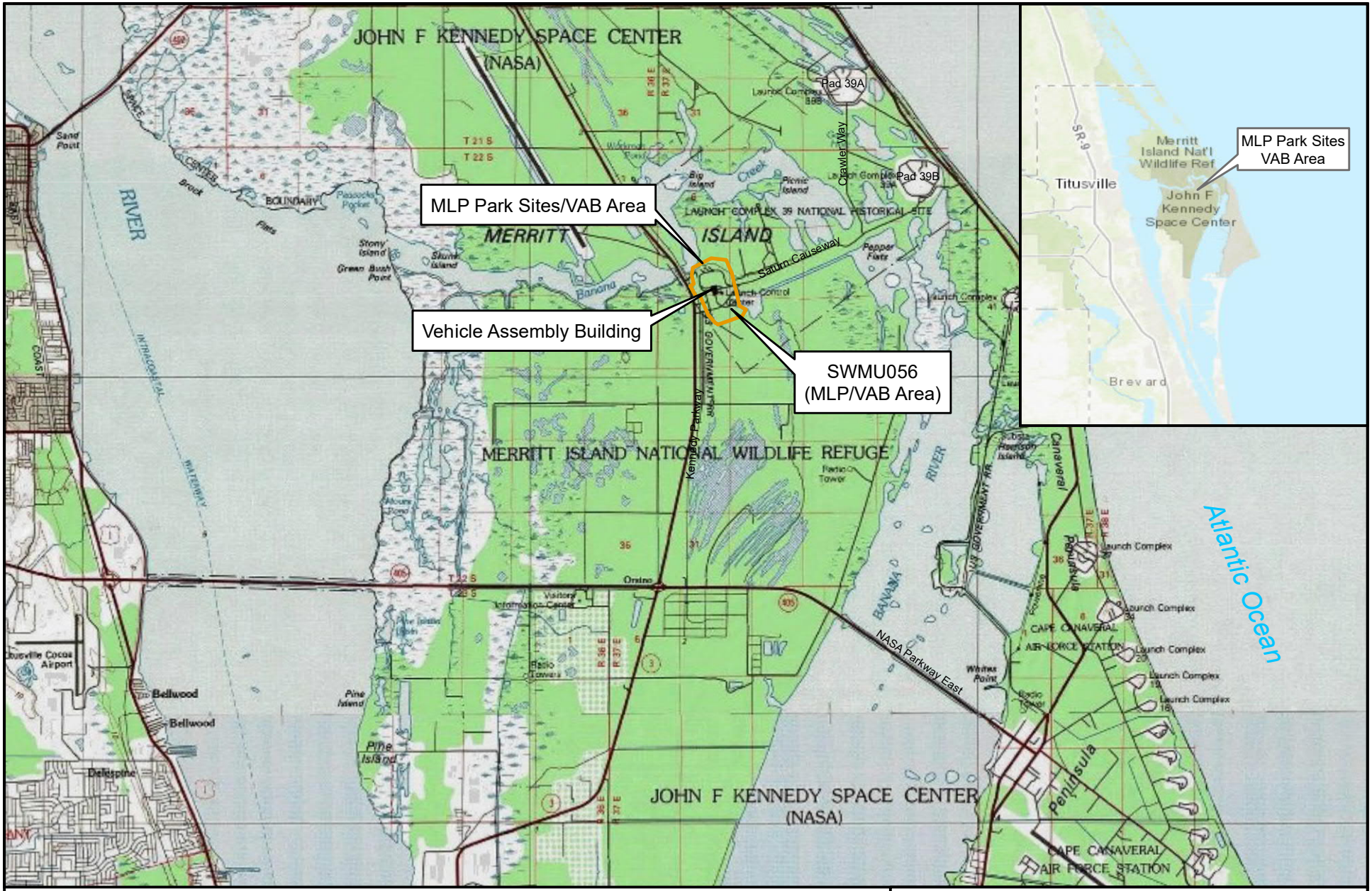
Notes:
1. MLPV indicates Mobile Launch Platform (MLP)/Vehicle Assembly Building (VAB).
2. Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

N

0 10,000 20,000 Feet

FIGURE 1-1
MLPV Location Map

MLPV (SWMU 056)
NASA Kennedy Space Center, Florida



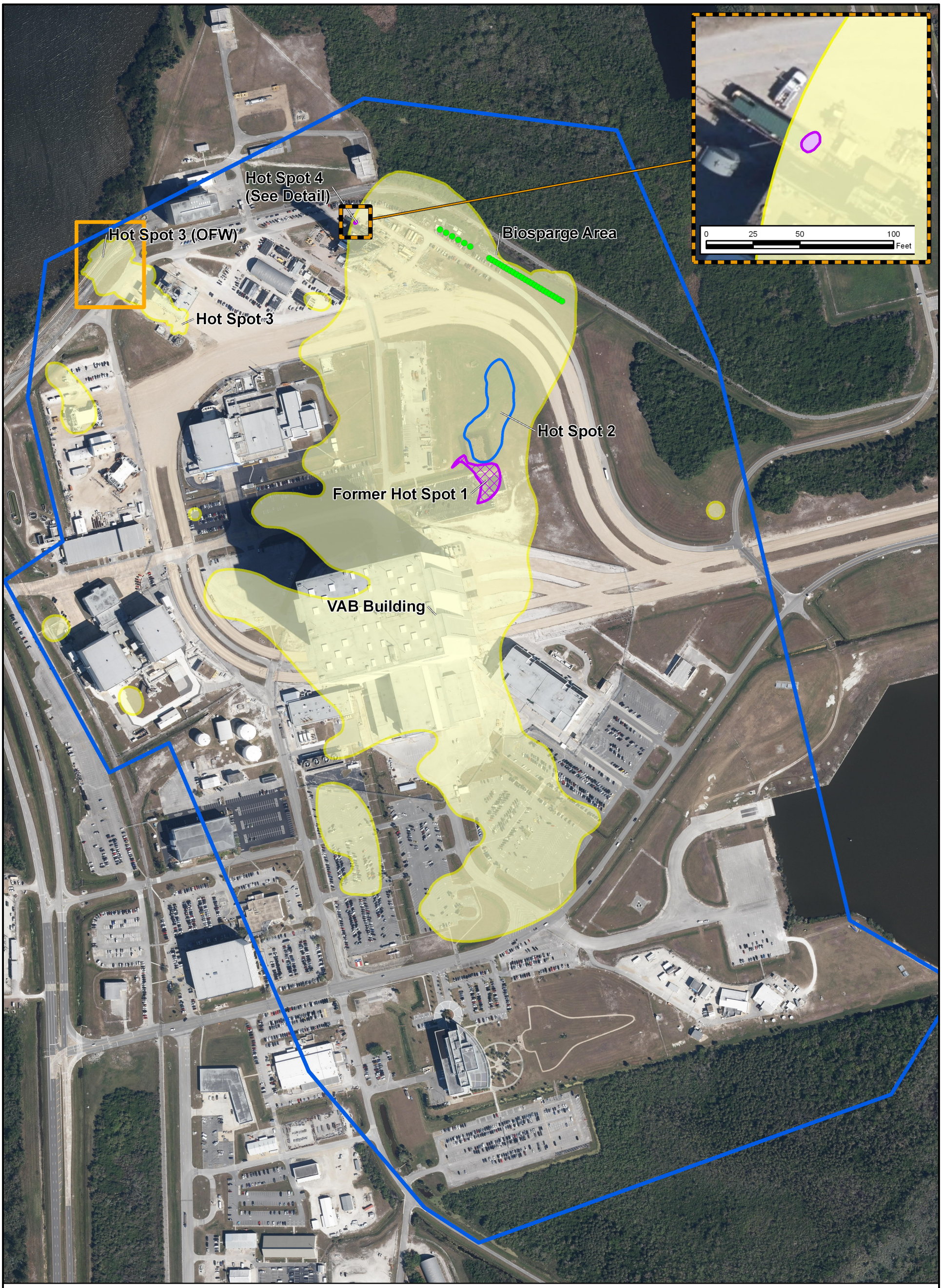
Notes:
1. MLPV indicates Mobile Launch Platform (MLP)/Vehicle Assembly Building (VAB).
2. Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

N

0 10,000 20,000 Feet

FIGURE 1-2
Topographic Quadrangle Map

MLPV (SWMU 056)
NASA Kennedy Space Center, Florida



Legend

- Biosparge Well Location
- SWMU056 (MLP Park Sites/VAB Area)
- OFW Investigation area
- Overall NADC Contour
- Former Hot Spot 1 LTM Area
- CVOC Greater than NADC
- CVOC Greater than GCTL

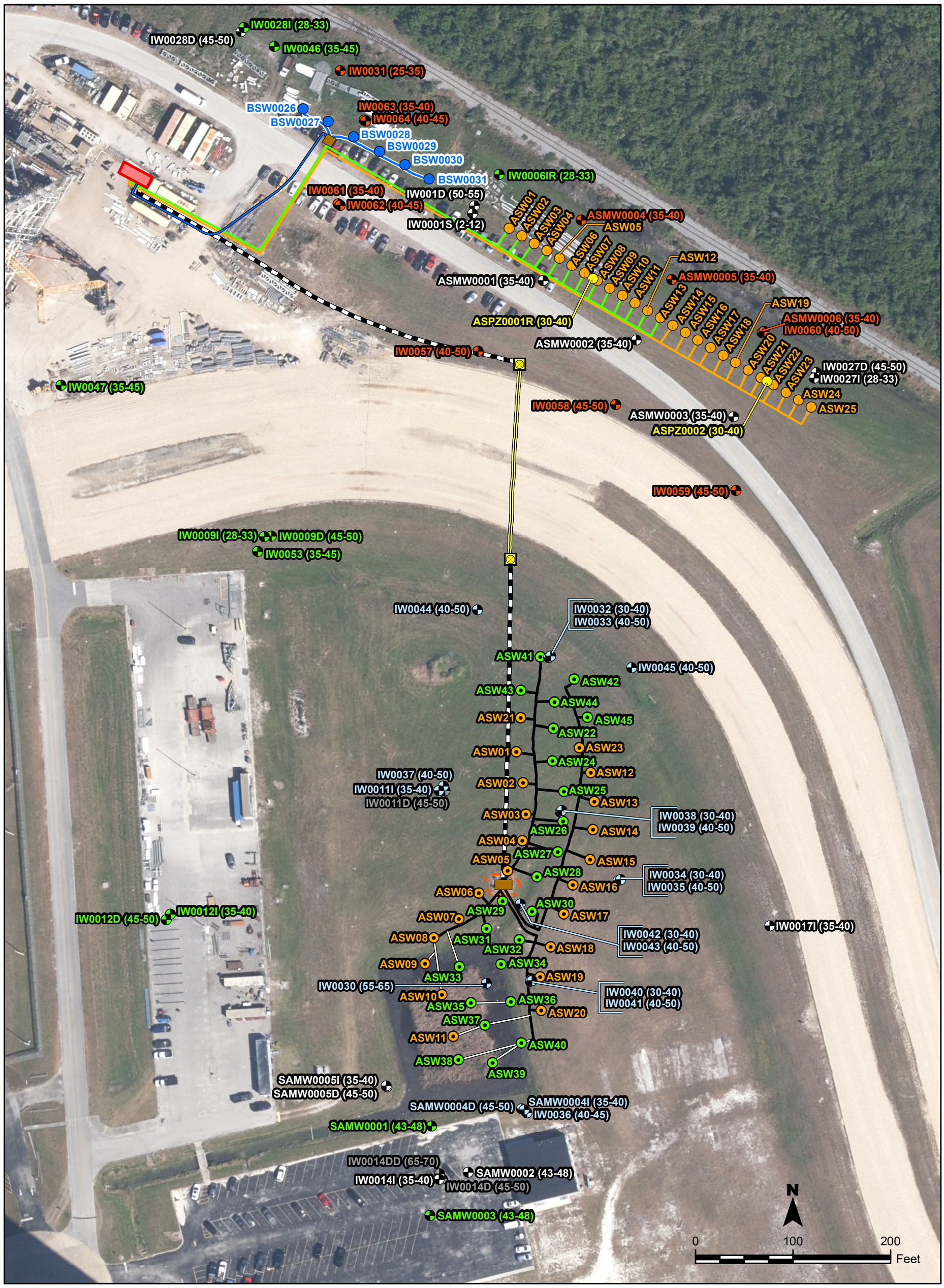
Notes:
1. MLPV indicates Mobile Launch Platform (MLP)/Vehicle Assembly Building (VAB).
2. Source of 2018 aerial: Florida Department of Transportation Aerial Photo Lookup System website.
3. Source of plume boundaries: 2018 Annual CMI and IM report that included additional data form DPT sampling locations.

N

0 400 800 Feet

FIGURE 1-3
Hot Spots

MLPV (SWMU 056)
NASA Kennedy Space Center, Florida



Legend

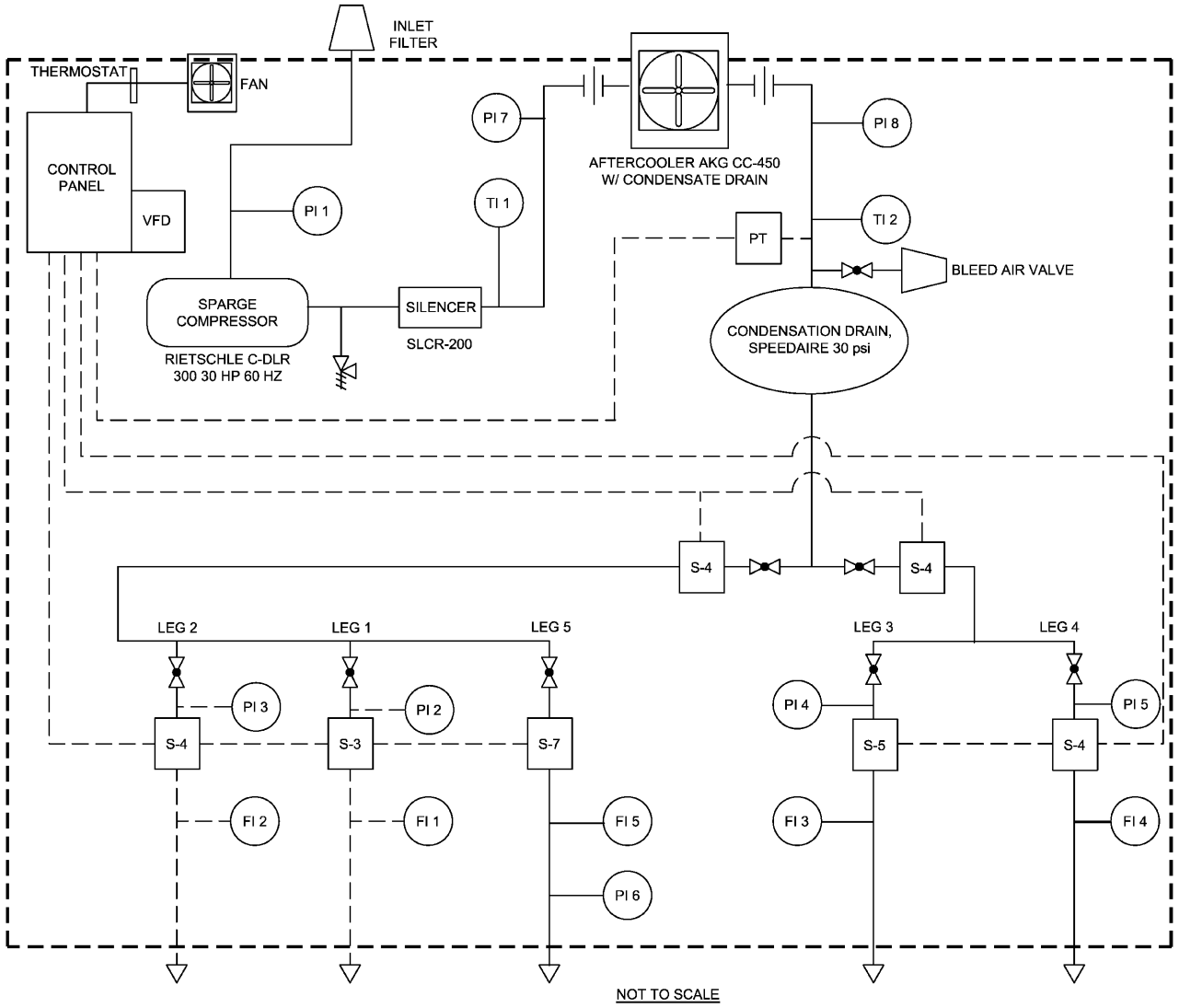
- Air Sparge Monitoring Well Location (screen interval [ft bls])
- Biosparge Monitoring Well Location (screen interval [ft bls])
- Long Term Monitoring Program Monitoring Well Location (screen interval [ft bls])
- Abandoned Monitoring Well Location (screen interval [ft bls])
- Other Monitoring Well Location (screen interval [ft bls])
- Piezometer Location (screen interval [ft bls])
- Biosparge Well Location
- Biosparge Expansion Well Location
- Air Sparge Well Location, Leg 3
- Air Sparge Well Location, Leg 4
- Junction Box
- Sparge Manifold Location (not to scale)

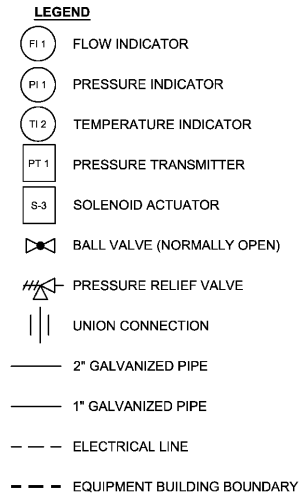
- Biosparge Header Pipe - Leg 1
- Biosparge Header Pipe - Leg 2
- Biosparge Expansion Piping - 2" Sch. 80 PVC
- Biosparge Expansion Piping - 1" Sch. 80 PVC
- Air Sparge Piping - 2, 4" SCH 80 PVC pipes
- Air Sparge Piping - 2, 4" High-Density Polyethylene (HDPE) pipes under Crawler Track
- Air Sparge Piping - 1" Flexhose
- Air Sparge Piping - 1" SCH 80 PVC from Manifold to Well
- Temporary Construction Fencing
- Equipment Building

Notes:
1. Biosparge header piping placement is approximate.
2. Source of 2018 aerial: FDOT
3. MLPV (SWMU 056) indicates Mobile Launch Platform/Vehicle Assembly Area (Stormwater Waste Management Unit 056)

FIGURE 2-1
Airsparge and Biosparge System Layout

MLPV (SWMU 056)
NASA Kennedy Space Center, Florida

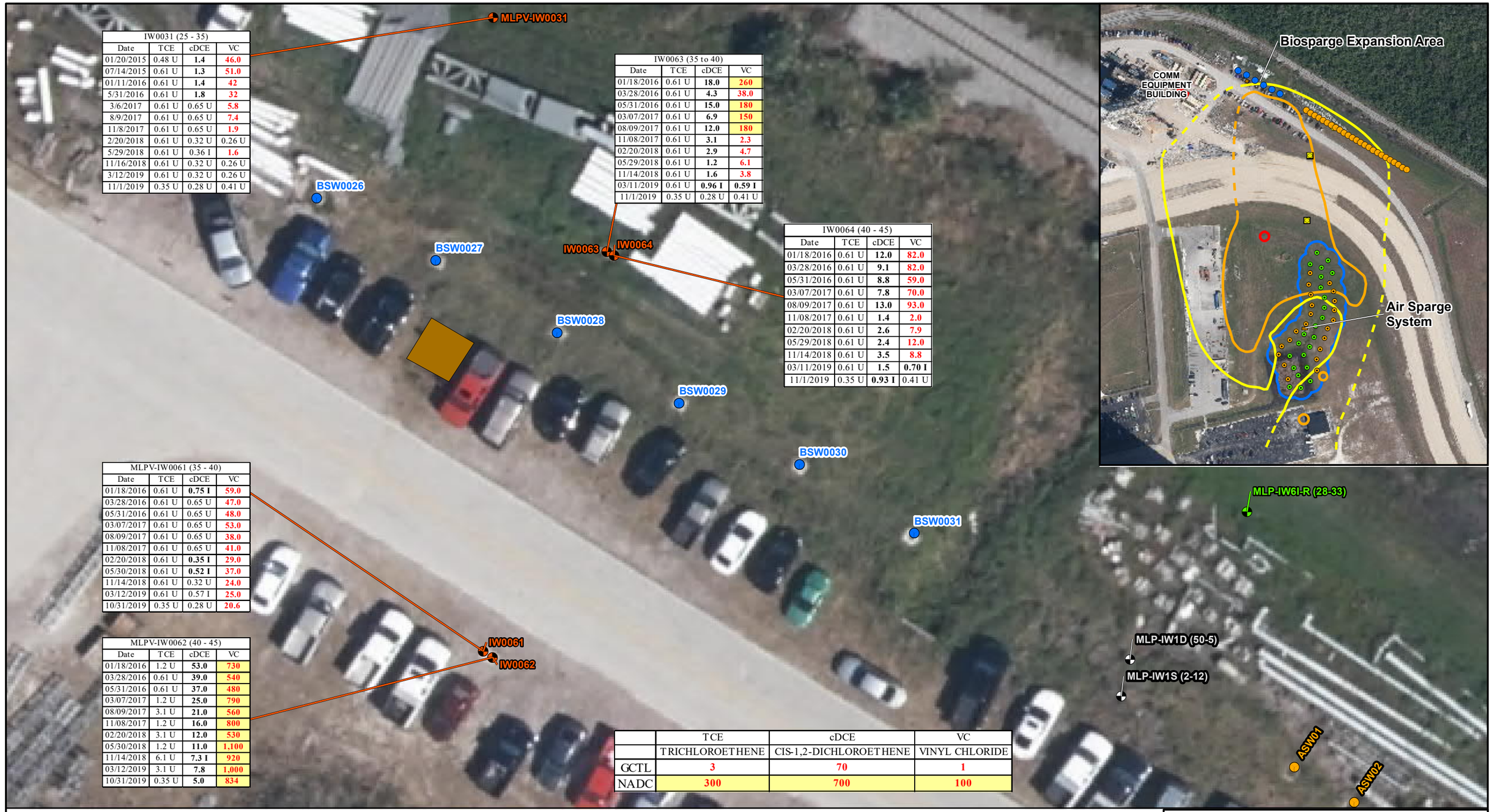




Notes:
1. MLPV indicates Mobile Launch Platform (MLP)/Vehicle Assembly Building (VAB), Stormwater Waste Managment Unit 056 (SWMU 056)

FIGURE 2-2
Sparge System Piping and Instrumentation Diagram

MLPV (SWMU 056)
NASA Kennedy Space Center, Florida



IW0031 (25 - 35)

Date	TCE	cDCE	VC
01/20/2015	0.48 U	**1.4**	46.0
07/14/2015	0.61 U	**1.3**	51.0
01/11/2016	0.61 U	**1.4**	42
5/31/2016	0.61 U	**1.8**	32
3/6/2017	0.61 U	0.65 U	5.8
8/9/2017	0.61 U	0.65 U	7.4
11/8/2017	0.61 U	0.65 U	1.9
2/20/2018	0.61 U	0.32 U	0.26 U
5/29/2018	0.61 U	0.36 I	1.6
11/16/2018	0.61 U	0.32 U	0.26 U
3/12/2019	0.61 U	0.32 U	0.26 U
11/1/2019	0.35 U	0.28 U	0.41 U

IW0063 (35 to 40)

Date	TCE	cDCE	VC
01/18/2016	0.61 U	**18.0**	260
03/28/2016	0.61 U	**4.3**	38.0
05/31/2016	0.61 U	**15.0**	180
03/07/2017	0.61 U	**6.9**	150
08/09/2017	0.61 U	**12.0**	180
11/08/2017	0.61 U	**3.1**	2.3
02/20/2018	0.61 U	**2.9**	4.7
05/29/2018	0.61 U	**1.2**	6.1
11/14/2018	0.61 U	**1.6**	3.8
03/11/2019	0.61 U	**0.96 I**	**0.59 I**
11/1/2019	0.35 U	0.28 U	0.41 U

IW0064 (40 - 45)

Date	TCE	cDCE	VC
01/18/2016	0.61 U	**12.0**	82.0
03/28/2016	0.61 U	**9.1**	82.0
05/31/2016	0.61 U	**8.8**	59.0
03/07/2017	0.61 U	**7.8**	70.0
08/09/2017	0.61 U	**13.0**	93.0
11/08/2017	0.61 U	**1.4**	2.0
02/20/2018	0.61 U	**2.6**	7.9
05/29/2018	0.61 U	**2.4**	12.0
11/14/2018	0.61 U	**3.5**	8.8
03/11/2019	0.61 U	**1.5**	**0.70 I**
11/1/2019	0.35 U	**0.93 I**	0.41 U

MLPV-IW0061 (35 - 40)

Date	TCE	cDCE	VC
01/18/2016	0.61 U	**0.75 I**	59.0
03/28/2016	0.61 U	0.65 U	47.0
05/31/2016	0.61 U	0.65 U	48.0
03/07/2017	0.61 U	0.65 U	53.0
08/09/2017	0.61 U	0.65 U	38.0
11/08/2017	0.61 U	0.65 U	41.0
02/20/2018	0.61 U	**0.35 I**	29.0
05/30/2018	0.61 U	**0.52 I**	37.0
11/14/2018	0.61 U	0.32 U	24.0
03/12/2019	0.61 U	0.57 I	25.0
10/31/2019	0.35 U	0.28 U	20.6

MLPV-IW0062 (40 - 45)

Date	TCE	cDCE	VC
01/18/2016	1.2 U	**53.0**	730
03/28/2016	0.61 U	**39.0**	540
05/31/2016	0.61 U	**37.0**	480
03/07/2017	1.2 U	**25.0**	790
08/09/2017	3.1 U	**21.0**	560
11/08/2017	1.2 U	**16.0**	800
02/20/2018	3.1 U	**12.0**	530
05/30/2018	1.2 U	**11.0**	1,100
11/14/2018	6.1 U	**7.3 I**	920
03/12/2019	3.1 U	**7.8**	1,000
10/31/2019	0.35 U	**5.0**	834

	TCE	cDCE	VC
	TRICHLOROETHENE	CIS-1,2-DICHLOROETHENE	VINYL CHLORIDE
GCTL	3	70	1
NADC	300	700	100

Legend

- Air Sparge Well Location (screen interval (ft bls))
- Biosparge Monitoring Well Location (screen interval (ft bls))
- Former Source Area IGM
- Long Term Monitoring Program Monitoring Well Location (screen interval (ft bls))
- Other Monitoring Well Location (screen interval (ft bls))
- Biosparge Expansion Well Location
- Sparge Manifold

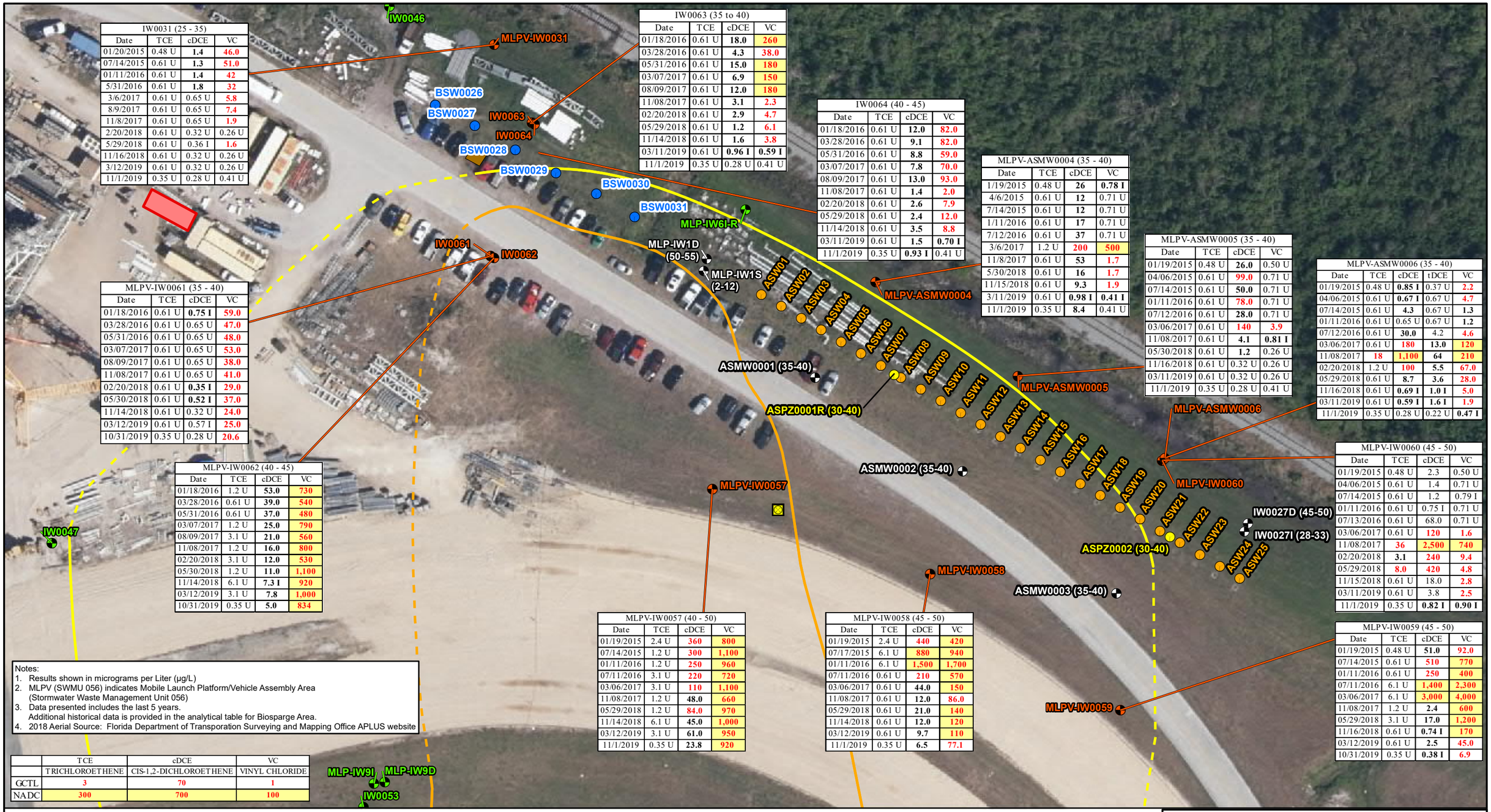
Notes:
1. Results shown in micrograms per Liter (µg/L)
2. Historical data source: RIS
3. Data presented includes the last 5 years. Additional historical data is provided in the analytical table for Biosparge Area.
4. 2018 Aerial Source: Florida Department of Transporation Surveying and Mapping Office APLUS website
5. MLPV (SWMU 056) indicates Mobile Launch Platform/Vehicle Assembly Area (Stormwater Waste Management Unit 056)

N

0 20 40 Feet

FIGURE 3-1
Groundwater Analytical Results
Composite CVOC
October-November 2019

Biosparge Expansion Area
MLPV (SWMU 056)
NASA Kennedy Space Center, Florida



IW0031 (25 - 35)			
Date	TCE	cDCE	VC
01/20/2015	0.48 U	**1.4**	46.0
07/14/2015	0.61 U	**1.3**	51.0
01/11/2016	0.61 U	**1.4**	42
5/31/2016	0.61 U	**1.8**	32
3/6/2017	0.61 U	0.65 U	5.8
8/9/2017	0.61 U	0.65 U	7.4
11/8/2017	0.61 U	0.65 U	1.9
2/20/2018	0.61 U	0.32 U	0.26 U
5/29/2018	0.61 U	0.36 I	1.6
11/16/2018	0.61 U	0.32 U	0.26 U
3/12/2019	0.61 U	0.32 U	0.26 U
11/1/2019	0.35 U	0.28 U	0.41 U

IW0063 (35 to 40)			
Date	TCE	cDCE	VC
01/18/2016	0.61 U	**18.0**	260
03/28/2016	0.61 U	**4.3**	38.0
05/31/2016	0.61 U	**15.0**	180
03/07/2017	0.61 U	**6.9**	150
08/09/2017	0.61 U	**12.0**	180
11/08/2017	0.61 U	**3.1**	2.3
02/20/2018	0.61 U	**2.9**	4.7
05/29/2018	0.61 U	**1.2**	6.1
11/14/2018	0.61 U	**1.6**	3.8
03/11/2019	0.61 U	**0.96 I**	**0.59 I**
11/1/2019	0.35 U	0.28 U	0.41 U

IW0064 (40 - 45)			
Date	TCE	cDCE	VC
01/18/2016	0.61 U	**12.0**	82.0
03/28/2016	0.61 U	**9.1**	82.0
05/31/2016	0.61 U	**8.8**	59.0
03/07/2017	0.61 U	**7.8**	70.0
08/09/2017	0.61 U	**13.0**	93.0
11/08/2017	0.61 U	**1.4**	2.0
02/20/2018	0.61 U	**2.6**	7.9
05/29/2018	0.61 U	**2.4**	12.0
11/14/2018	0.61 U	**3.5**	8.8
03/11/2019	0.61 U	**1.5**	**0.70 I**
11/1/2019	0.35 U	**0.93 I**	0.41 U

MLPV-ASMW0004 (35 - 40)			
Date	TCE	cDCE	VC
1/19/2015	0.48 U	**26**	**0.78 I**
4/6/2015	0.61 U	**12**	0.71 U
7/14/2015	0.61 U	**12**	0.71 U
1/11/2016	0.61 U	**17**	0.71 U
7/12/2016	0.61 U	**37**	0.71 U
3/6/2017	1.2 U	200	500
11/8/2017	0.61 U	**53**	1.7
5/30/2018	0.61 U	**16**	1.7
11/15/2018	0.61 U	**9.3**	1.9
3/11/2019	0.61 U	**0.98 I**	**0.41 I**
11/1/2019	0.35 U	**8.4**	0.41 U

MLPV-ASMW0005 (35 - 40)			
Date	TCE	cDCE	VC
01/19/2015	0.48 U	**26.0**	0.50 U
04/06/2015	0.61 U	99.0	0.71 U
07/14/2015	0.61 U	**50.0**	0.71 U
01/11/2016	0.61 U	78.0	0.71 U
07/12/2016	0.61 U	**28.0**	0.71 U
03/06/2017	0.61 U	140	3.9
11/08/2017	0.61 U	**4.1**	**0.81 I**
05/30/2018	0.61 U	**1.2**	0.26 U
11/16/2018	0.61 U	0.32 U	0.26 U
03/11/2019	0.61 U	0.32 U	0.26 U
11/1/2019	0.35 U	0.28 U	0.41 U

MLPV-ASMW0006 (35 - 40)				
Date	TCE	cDCE	tDCE	VC
01/19/2015	0.48 U	**0.85 I**	0.37 U	2.2
04/06/2015	0.61 U	**0.67 I**	0.67 U	4.7
07/14/2015	0.61 U	**4.3**	0.67 U	**1.3**
01/11/2016	0.61 U	0.65 U	0.67 U	**1.2**
07/12/2016	0.61 U	**30.0**	4.2	4.6
03/06/2017	0.61 U	180	**13.0**	120
11/08/2017	18	1,100	**64**	210
02/20/2018	1.2 U	100	**5.5**	67.0
05/29/2018	0.61 U	**8.7**	**3.6**	28.0
11/16/2018	0.61 U	**0.69 I**	**1.0 I**	5.0
03/11/2019	0.61 U	**0.59 I**	**1.6 I**	1.9
11/1/2019	0.35 U	0.28 U	0.22 U	**0.47 I**

MLPV-IW0061 (35 - 40)			
Date	TCE	cDCE	VC
01/18/2016	0.61 U	**0.75 I**	59.0
03/28/2016	0.61 U	0.65 U	47.0
05/31/2016	0.61 U	0.65 U	48.0
03/07/2017	0.61 U	0.65 U	53.0
08/09/2017	0.61 U	0.65 U	38.0
11/08/2017	0.61 U	0.65 U	41.0
02/20/2018	0.61 U	**0.35 I**	29.0
05/30/2018	0.61 U	**0.52 I**	37.0
11/14/2018	0.61 U	0.32 U	24.0
03/12/2019	0.61 U	0.57 I	25.0
10/31/2019	0.35 U	0.28 U	20.6

MLPV-IW0062 (40 - 45)			
Date	TCE	cDCE	VC
01/18/2016	1.2 U	**53.0**	730
03/28/2016	0.61 U	**39.0**	540
05/31/2016	0.61 U	**37.0**	480
03/07/2017	1.2 U	**25.0**	790
08/09/2017	3.1 U	**21.0**	560
11/08/2017	1.2 U	**16.0**	800
02/20/2018	3.1 U	**12.0**	530
05/30/2018	1.2 U	**11.0**	1,100
11/14/2018	6.1 U	**7.3 I**	920
03/12/2019	3.1 U	**7.8**	1,000
10/31/2019	0.35 U	**5.0**	834

MLPV-IW0057 (40 - 50)			
Date	TCE	cDCE	VC
01/19/2015	2.4 U	360	800
07/14/2015	1.2 U	300	1,100
01/11/2016	1.2 U	250	960
07/11/2016	3.1 U	220	720
03/06/2017	3.1 U	110	1,100
11/08/2017	1.2 U	**48.0**	660
05/29/2018	1.2 U	84.0	970
11/14/2018	6.1 U	**45.0**	1,000
03/12/2019	3.1 U	**61.0**	950
11/1/2019	0.35 U	**23.8**	920

MLPV-IW0058 (45 - 50)			
Date	TCE	cDCE	VC
01/19/2015	2.4 U	440	420
07/17/2015	6.1 U	880	940
01/11/2016	6.1 U	1,500	1,700
07/11/2016	0.61 U	210	570
03/06/2017	0.61 U	**44.0**	150
11/08/2017	0.61 U	**12.0**	86.0
05/29/2018	0.61 U	**21.0**	140
11/14/2018	0.61 U	**12.0**	120
03/12/2019	0.61 U	**9.7**	110
11/1/2019	0.35 U	**6.5**	77.1

MLPV-IW0060 (45 - 50)			
Date	TCE	cDCE	VC
01/19/2015	0.48 U	**2.3**	0.50 U
04/06/2015	0.61 U	**1.4**	0.71 U
07/14/2015	0.61 U	**1.2**	0.79 I
01/11/2016	0.61 U	0.75 I	0.71 U
07/13/2016	0.61 U	68.0	0.71 U
03/06/2017	0.61 U	120	1.6
11/08/2017	36	2,500	740
02/20/2018	**3.1**	240	9.4
05/29/2018	**8.0**	420	4.8
11/15/2018	0.61 U	18.0	2.8
03/11/2019	0.61 U	3.8	2.5
11/1/2019	0.35 U	**0.82 I**	**0.90 I**

MLPV-IW0059 (45 - 50)			
Date	TCE	cDCE	VC
01/19/2015	0.48 U	**51.0**	92.0
07/14/2015	0.61 U	510	770
01/11/2016	0.61 U	250	400
07/11/2016	6.1 U	1,400	2,300
03/06/2017	6.1 U	3,000	4,000
11/08/2017	1.2 U	**2.4**	600
05/29/2018	3.1 U	**17.0**	1,200
11/16/2018	0.61 U	**0.74 I**	170
03/12/2019	0.61 U	**2.5**	45.0
10/31/2019	0.35 U	**0.38 I**	6.9

Notes:
1. Results shown in micrograms per Liter (µg/L)
2. MLPV (SWMU 056) indicates Mobile Launch Platform/Vehicle Assembly Area (Stormwater Waste Management Unit 056)
3. Data presented includes the last 5 years. Additional historical data is provided in the analytical table for Biosparge Area.
4. 2018 Aerial Source: Florida Department of Transporation Surveying and Mapping Office APLUS website

	TCE	cDCE	VC
	TRICHLOROETHENE	CIS-1,2-DICHLOROETHENE	VINYL CHLORIDE
GCTL	3	70	1
NADC	300	700	100

Legend

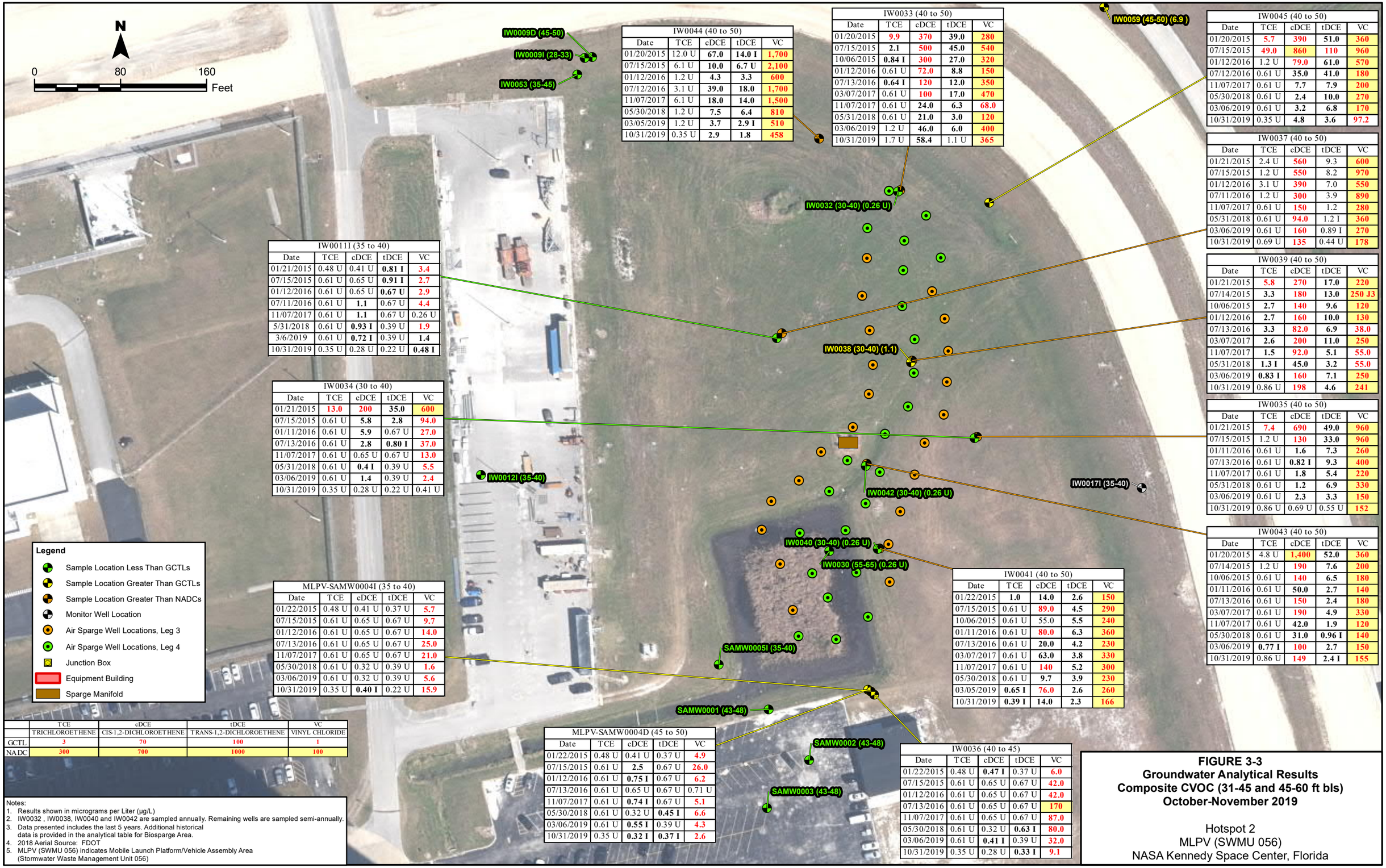
- Abandoned Montoring Well Location
- Air Sparge Well Location (screen interval (ft bls)
- Biosparge Monitoring Well Location (screen interval (ft bls))
- Former Source Area IGM
- Long Term Monitoring Program Monitoring Well Location (screen interval (ft bls)
- Other Monitoring Well Location (screen interval (ft bls))
- Biosparge Expansion Well Location
- Biosparge Piezometer Well Location (screen interval ft bls))
- Approximate Extent of VOCs Greater Than GCTLs
- Approximate Extent of VOCs Greater Than NADCs
- Equipment Building
- Sparge Manifold

N

0 60 120 Feet

FIGURE 3-2
Groundwater Analytical Results
Composite CVOC
October-November 2019

Biosparge Area
MLPV (SWMU 056)
NASA Kennedy Space Center, Florida



IW0044 (40 to 50)

Date	TCE	cDCE	tDCE	VC
01/20/2015	12.0 U	**67.0**	**14.0 I**	1,700
07/15/2015	6.1 U	**10.0**	**6.7 U**	2,100
01/12/2016	1.2 U	**4.3**	**3.3**	600
07/12/2016	3.1 U	**39.0**	**18.0**	1,700
11/07/2017	6.1 U	**18.0**	**14.0**	1,500
05/30/2018	1.2 U	**7.5**	**6.4**	810
03/05/2019	1.2 U	**3.7**	**2.9 I**	510
10/31/2019	0.35 U	**2.9**	**1.8**	458

IW0033 (40 to 50)

Date	TCE	cDCE	tDCE	VC
01/20/2015	9.9	370	**39.0**	280
07/15/2015	**2.1**	500	**45.0**	540
10/06/2015	**0.84 I**	300	**27.0**	320
01/12/2016	0.61 U	72.0	**8.8**	150
07/13/2016	**0.64 I**	120	**12.0**	350
03/07/2017	0.61 U	100	**17.0**	470
11/07/2017	0.61 U	**24.0**	**6.3**	68.0
05/31/2018	0.61 U	**21.0**	**3.0**	120
03/06/2019	1.2 U	**46.0**	**6.0**	400
10/31/2019	1.7 U	**58.4**	1.1 U	365

IW0045 (40 to 50)

Date	TCE	cDCE	tDCE	VC
01/20/2015	5.7	390	**51.0**	360
07/15/2015	49.0	860	110	960
01/12/2016	1.2 U	79.0	**61.0**	570
07/12/2016	0.61 U	**35.0**	**41.0**	180
11/07/2017	0.61 U	**7.7**	**7.9**	200
05/30/2018	0.61 U	**2.4**	**10.0**	270
03/06/2019	0.61 U	**3.2**	**6.8**	170
10/31/2019	0.35 U	**4.8**	**3.6**	97.2

IW0011I (35 to 40)

Date	TCE	cDCE	tDCE	VC
01/21/2015	0.48 U	0.41 U	**0.81 I**	3.4
07/15/2015	0.61 U	0.65 U	**0.91 I**	2.7
01/12/2016	0.61 U	0.65 U	**0.67 U**	2.9
07/11/2016	0.61 U	**1.1**	0.67 U	4.4
11/07/2017	0.61 U	**1.1**	0.67 U	0.26 U
5/31/2018	0.61 U	**0.93 I**	0.39 U	1.9
3/6/2019	0.61 U	**0.72 I**	0.39 U	**1.4**
10/31/2019	0.35 U	0.28 U	0.22 U	**0.48 I**

IW0037 (40 to 50)

Date	TCE	cDCE	tDCE	VC
01/21/2015	2.4 U	560	9.3	600
07/15/2015	1.2 U	550	8.2	970
01/12/2016	3.1 U	390	7.0	550
07/11/2016	1.2 U	300	3.9	890
11/07/2017	0.61 U	150	1.2	280
05/31/2018	0.61 U	94.0	1.2 I	360
03/06/2019	0.61 U	160	0.89 I	270
10/31/2019	0.69 U	135	0.44 U	178

IW0039 (40 to 50)

Date	TCE	cDCE	tDCE	VC
01/21/2015	5.8	270	**17.0**	220
07/14/2015	**3.3**	180	**13.0**	250 J3
10/06/2015	**2.7**	140	**9.6**	120
01/12/2016	**2.7**	160	**10.0**	130
07/13/2016	**3.3**	82.0	**6.9**	38.0
03/07/2017	**2.6**	200	**11.0**	250
11/07/2017	**1.5**	92.0	**5.1**	55.0
05/31/2018	**1.3 I**	**45.0**	**3.2**	55.0
03/06/2019	**0.83 I**	160	**7.1**	250
10/31/2019	0.86 U	198	**4.6**	241

IW0034 (30 to 40)

Date	TCE	cDCE	tDCE	VC
01/21/2015	13.0	200	**35.0**	600
07/15/2015	0.61 U	**5.8**	**2.8**	94.0
01/11/2016	0.61 U	**5.9**	0.67 U	27.0
07/13/2016	0.61 U	**2.8**	**0.80 I**	37.0
11/07/2017	0.61 U	0.65 U	0.67 U	13.0
05/31/2018	0.61 U	**0.4 I**	0.39 U	5.5
03/06/2019	0.61 U	**1.4**	0.39 U	2.4
10/31/2019	0.35 U	0.28 U	0.22 U	0.41 U

IW0035 (40 to 50)

Date	TCE	cDCE	tDCE	VC
01/21/2015	7.4	690	**49.0**	960
07/15/2015	1.2 U	130	**33.0**	960
01/11/2016	0.61 U	**1.6**	**7.3**	260
07/13/2016	0.61 U	**0.82 I**	**9.3**	400
11/07/2017	0.61 U	**1.8**	**5.4**	220
05/31/2018	0.61 U	**1.2**	**6.9**	330
03/06/2019	0.61 U	**2.3**	**3.3**	150
10/31/2019	0.86 U	0.69 U	0.55 U	152

IW0043 (40 to 50)

Date	TCE	cDCE	tDCE	VC
01/20/2015	4.8 U	1,400	**52.0**	360
07/14/2015	1.2 U	190	**7.6**	200
10/06/2015	0.61 U	140	**6.5**	180
01/11/2016	0.61 U	**50.0**	**2.7**	140
07/13/2016	0.61 U	150	**2.4**	180
03/07/2017	0.61 U	190	**4.9**	330
11/07/2017	0.61 U	**42.0**	**1.9**	120
05/30/2018	0.61 U	**31.0**	**0.96 I**	140
03/06/2019	**0.77 I**	100	**2.7**	150
10/31/2019	0.86 U	149	**2.4 I**	155

MLPV-SAMW0004I (35 to 40)

Date	TCE	cDCE	tDCE	VC
01/22/2015	0.48 U	0.41 U	0.37 U	5.7
07/15/2015	0.61 U	0.65 U	0.67 U	9.7
01/12/2016	0.61 U	0.65 U	0.67 U	14.0
07/13/2016	0.61 U	0.65 U	0.67 U	25.0
11/07/2017	0.61 U	0.65 U	0.67 U	21.0
05/30/2018	0.61 U	0.32 U	0.39 U	1.6
03/06/2019	0.61 U	0.32 U	0.39 U	5.6
10/31/2019	0.35 U	**0.40 I**	0.22 U	15.9

IW0041 (40 to 50)

Date	TCE	cDCE	tDCE	VC
01/22/2015	**1.0**	**14.0**	**2.6**	150
07/15/2015	0.61 U	89.0	**4.5**	290
10/06/2015	0.61 U	55.0	**5.5**	240
01/11/2016	0.61 U	80.0	**6.3**	360
07/13/2016	0.61 U	**20.0**	**4.2**	230
03/07/2017	0.61 U	**63.0**	**3.8**	330
11/07/2017	0.61 U	140	**5.2**	300
05/30/2018	0.61 U	**9.7**	**3.9**	230
03/05/2019	**0.65 I**	76.0	**2.6**	260
10/31/2019	**0.39 I**	**14.0**	**2.3**	166

MLPV-SAMW0004D (45 to 50)

Date	TCE	cDCE	tDCE	VC
01/22/2015	0.48 U	0.41 U	0.37 U	4.9
07/15/2015	0.61 U	**2.5**	0.67 U	26.0
01/12/2016	0.61 U	**0.75 I**	0.67 U	6.2
07/13/2016	0.61 U	0.65 U	0.67 U	0.71 U
11/07/2017	0.61 U	**0.74 I**	0.67 U	5.1
05/30/2018	0.61 U	0.32 U	**0.45 I**	6.6
03/06/2019	0.61 U	**0.55 I**	0.39 U	4.3
10/31/2019	0.35 U	**0.32 I**	**0.37 I**	2.6

IW0036 (40 to 45)

Date	TCE	cDCE	tDCE	VC
01/22/2015	0.48 U	**0.47 I**	0.37 U	6.0
07/15/2015	0.61 U	0.65 U	0.67 U	42.0
01/12/2016	0.61 U	0.65 U	0.67 U	42.0
07/13/2016	0.61 U	0.65 U	0.67 U	170
11/07/2017	0.61 U	0.65 U	0.67 U	87.0
05/30/2018	0.61 U	0.32 U	**0.63 I**	80.0
03/06/2019	0.61 U	**0.41 I**	0.39 U	32.0
10/31/2019	0.35 U	0.28 U	**0.33 I**	9.1

	TCE	cDCE	tDCE	VC
	TRICHLOROETHENE	CIS-1,2-DICHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE
GCTL	3	70	100	1
NADC	300	700	1000	100

Notes:
1. Results shown in micrograms per Liter (µg/L)
2. IW0032 , IW0038, IW0040 and IW0042 are sampled annually. Remaining wells are sampled semi-annually.
3. Data presented includes the last 5 years. Additional historical data is provided in the analytical table for Biosparge Area.
4. 2018 Aerial Source: FDOT
5. MLPV (SWMU 056) indicates Mobile Launch Platform/Vehicle Assembly Area (Stormwater Waste Management Unit 056)

FIGURE 3-3
Groundwater Analytical Results
Composite CVOC (31-45 and 45-60 ft bls)
October-November 2019

Hotspot 2
MLPV (SWMU 056)
NASA Kennedy Space Center, Florida

Notes:
1. If value was qualified with a "U", one half of the value was used to generate isopleths.
2. Monitoring well data is from the most recent sampling event for each location:
   a. SAMW0002 and SAMW0005I - August 2014
   b. IW0006IR and IW0012I - May 2016
   c. IW0009I, IW0047, IW053, SAMW0001, and SAMW0003 - October 2018
   d. ASMW0004, ASMW0005, ASMW0006, IW0011I, IW0031 to IW0045, IW0057, IW0060 to IW0064, and SAMW0004I - October and November 2019
3. * indicates not used to generate contours.
4. Results presented are the highest concentration detected within the interval.
5. All DPT locations have prefix "MLPV-DPT".
6. All monitoring well locations have prefix the "MLPV-".
7. Only monitoring wells with screen intervals within this sampling interval are presented.
8. MLPV (SWMU 056) indicates Mobile Launch Platform/Vehicle Assembly Area (Stormwater Waste Management Unit 056)

0547
0548
IW0031 (25-35) (0.28 U)
0542
0541
IW0063 (35-40) (0.28 U)
IW0064 (40-45) (0.93 I)
0506
0549
0540
0507
0485
IW0006IR (28-33)
0486
IW0061 (35-40) (0.28 U)
IW0062 (40-45) (5.0)
0481
0505
ASMW0004 (35-40) (8.4)
0478
0483
0474
0480
ASPZ0001 (30-40)
ASMW0001 (35-40)
ASMW0005 (35-40) (0.28 U)
0477
0484
0462
0559
ASMW0006 (35-40) (0.28 U)
IW0060 (40-50) (0.82 I)
0472
0482
ASMW0002 (35-40)
0463
0563
0562
0544
0479
0566
0564
IW0027D (45-50)
0508
0466
IW0047 (35-45) (0.39 I)
IW0057 (40-50) (23.8)
ASPZ0002 (30-40)
0557
0464
0561
0565
0473
IW0027I (28-33)
0558
ASMW0003 (35-40)
0560
0539
0465
0543
0567
0538
0456
0467
0459 (1.4)
IW0009I (28-33) (0.43 I)
0468
0504
0537
IW0053 (35-45) (4.3)
0452
0612 (41.4)
0475
0469
0455
IW0044 (40-50)(2.9)
0458
0461
0613 (78.7)
0444
0611 (1.1)
0453 (360)
IW0032 (30-40) (0.74 I)
IW0033 (40-50) (58.4)
0457
0620 (32.2)
0438
0470
0445
0610 (5.3)
0437 (15.0)
0614 (8.4)
0619 (160)
IW0045 (40-50) (4.8)
0460
0487
0471
0443
0454
0436
0446
0609 (24.2)
0624
0625
0428
0439
0615 (35.4)
0622 (25.3)
0442
0503
0608 (8.1)
0425 (240)
0435
0607 (61.9)
0550
0449
IW0038 (30-40) (0.94 I)
IW0037 (40-50) (135)
0426 (530)
0421
IW0039 (40-50) (198)
0451
IW0011I (35-40) (0.28 U)
0556
0447
0441
0616 (11.7)
0606 (31.3)
0422
0434
0440
0618 (54.9)
0551
IW0042 (30-40)
0496
0417
0427
0430
IW0034 (30-40) (0.28 U)
IW0043 (40-50) (149)
0450
IW0035 (40-50) (0.69 U)
0502
0423
0490
0555
0433
0448
IW0012I (35-40)
0605 (0.33 I)
0621 (0.66 I)
0603 (68.0)
0488
0552
IW0017I (35-40)
0500
0416
0491
0418
0509
0553
0497
0501
0429
0520
0512
0432
0495
0617 (0.17 I)
0419
0517
0515
0489
0554
0494
0604 (2.8)
0513
0415
0420
0424
0518
0492
0516
IW0040 (30-40)
0476
0414
IW0041 (40-50) (14.0)
0519
0514
SAMW0005I (35-40)
0498
0493
0413
0431
IW0036 (40-45) (0.28 U)
SAMW0004I (35-40) (0.40 I)
0499
SAMW0001 (43-48) (0.52 I)
0511
0510
0532
0623 (24.7)
SAMW0002 (43-48) (1.8)
0522
IW0014I (35-40)
0527
0521
SAMW0003 (43-48) (1.1)
0526
0524
0531
0523
0546
0525
0528

Legend

- DPT sampling location (highest cDCE concentration (µg/L))
- DPT location last sampled in 2016
- DPT location last sampled in 2018
- Monitoring well location (screen interval (ft bls)) (most recent cDCE concentration (µg/L))
- Biosparge well location
- Biosparge piezometer well location
- Air sparge area of influence (based on 35 ft radius of influence)
- 70 µg/L cDCE isopleth
- IW0041 — Blue halo around well ID indicates well sampled during current reporting period

Symbology Color Coding

- cDCE concentration less than or equal to 70 µg/L (GCTL)
- cDCE concentration greater than 70 µg/L (GCTL) and less than or equal to 700 µg/L (NADC)
- cDCE concentration greater than 700 µg/L (NADC) and less than or equal to 7,000 µg/L (10xNADC)
- cDCE concentration greater than 7,000 µg/L (10xNADC)
- Location last sampled prior to 2016 or location within the air sparge area of influence and last sampled prior to system shut down (April 2018) - data not presented
- Location not sampled at this depth interval

N

0 100 200 Feet

FIGURE 3-4
Summary of cis-1,2-Dichloroethene Results
31 to 45 ft BLS
2018 DPT and October / November 2019 IGM

Hot Spot 2
MLPV (SWMU 056)
NASA Kennedy Space Center, Florida

Notes:
1. All results in micrograms per liter (µg/L).
2. If value was qualified with a "U", one half of the value was used to generate isopleths.
3. Monitoring well data is from the most recent sampling event for each location:
   a. SAMW0002 and SAMW0005I - August 2014
   b. IW0009D, IW0012S, SAMW001, and SAMW003 - October 2018
   c. IW0033, IW0035, IW0037, IW0039, IW0041, IW043, IW0044,
   d. IW0045, IW0057 to IW0060, and SAMW0004D - October and November 2019
4. * indicates not used to generate contours.
5. Results presented are the highest concentration detected within the interval.
6. All DPT locations have prefix "MLPV-DPT".
7. All monitoring well locations have prefix the "MLPV-".
8. Only monitoring wells with screen intervals within this sampling interval are presented.
9. MLPV (SWMU 056) indicates Mobile Launch Platform/Vehicle Assembly Area (Stormwater Waste Management Unit 056)

Legend

- DPT sampling location (highest cDCE concentration (µg/L))
- DPT location last sampled in 2016
- DPT location last sampled in 2018
- Monitoring well location (screen interval (ft bls)) (most recent cDCE concentration (µg/L))
- Biosparge well location
- Air sparge area of influence (based on 35 ft radius of influence)
- 70 µg/L cDCE isopleth (dashed where inferred)
- 700 µg/L cDCE isopleth
- IW0041 — Blue halo around well ID indicates well sampled during current reporting period

Symbology Color Coding

- cDCE concentration less than or equal to 70 µg/L (GCTL)
- cDCE concentration greater than 70 µg/L (GCTL) and less than or equal to 700 µg/L (NADC)
- cDCE concentration greater than 700 µg/L (NADC) and less than or equal to 7,000 µg/L (10xNADC)
- cDCE concentration greater than 7,000 µg/L (10xNADC)
- Location last sampled prior to 2016 or location within the air sparge area of influence and last sampled prior to system shut down (April 2018) - data not presented
- Location not sampled at this depth interval

N

0 100 200 Feet

FIGURE 3-5
Summary of cis-1,2-Dichloroethene Results
45 to 50 ft BLS
2018 DPT and October / November 2019 IGM

Hot Spot 2
MLPV (SWMU 056)
NASA Kennedy Space Center, Florida

Notes:
1. All results shown in micrograms per liter (µg/L).
2. If value was qualified with a "U", one half of the value was used to generate isopleths.
3. Monitoring well data is from the most recent sampling event for each location:
   a. SAMW0002 and SAMW0005I - August 2014
   b. IW0006IR and IW0012I - May 2016
   c. IW0009I, IW0047, IW053, SAMW0001, and SAMW0003 - October 2018
   d. ASMW0004, ASMW0005, ASMW0006, IW0011I, IW0031 to IW0045, IW0057, IW0060 to IW0064, and SAMW0004I - October and November 2019
4. * indicates not used to generate contour.
5. Results presented are the highest concentration detected within the interval.
6. All DPT locations have prefix "MLPV-DPT".
7. All monitoring well locations have prefix the "MLPV-".
8. Only monitoring wells with screen intervals within this sampling interval are presented.
9. MLPV indicates Mobile Launch Platform (Stormwater Waste Managment Unit 056)

Legend

- DPT sampling location (highest VC concentration (µg/L))
- DPT location last sampled in 2016
- DPT location last sampled in 2018
- Monitoring well location (screen interval (ft bls)) (most recent VC concentration (µg/L))
- Biosparge well location
- Biosparge piezometer well location
- Air sparge area of influence (based on 35 ft radius of influence)
- 1 µg/L VC isopleth (dashed where inferred)
- 100 µg/L VC isopleth (dashed where inferred)
- 1,000 µg/L VC isopleth
- 1 µg/L VC sink
- IW0041 — Blue halo around well ID indicates well sampled during current reporting period

Symbology Color Coding

- VC concentration less than or equal to 1 µg/L (GCTL)
- VC concentration greater than 1 µg/L (GCTL) and less than or equal to 100 µg/L (NADC)
- VC concentration greater than 100 µg/L (NADC) and less than or equal to 1,000 µg/L (10xNADC)
- VC concentration greater than 1,000 µg/L (10xNADC)
- Location last sampled prior to 2016 or location within the air sparge area of influence and last sampled prior to system shut down (April 2018) - data not presented
- Location not sampled at this depth interval

N

0 100 200 Feet

FIGURE 3-6
Summary of Vinyl Chloride Results
(31 to 45 ft BLS)
2018 DPT and October / November 2019 IGM

Hot Spot 2
MLPV (SWMU 056)
NASA Kennedy Space Center, Florida

Notes:
1. All results shown in micrograms per liter (µg/L).
2. If value was qualified with a "U", one half of the value was used to generate isopleths.
3. Monitoring well data is from the most recent sampling event for each location:
   a. SAMW0002 and SAMW0005I - August 2014
   b. IW0009D, IW0012D, SAMW001, and SAMW003 - October 2018
   c. IW0033, IW0035, IW0037, IW0039, IW0041, IW043, IW0044, IW0045, IW0057 to IW0060, and SAMW0004D - October and November 2019
4. * indicates not used to generate contour.
5. Results presented are the highest concentration detected within the interval.
6. All DPT locations have prefix "MLPV-DPT".
7. All monitoring well locations have prefix the "MLPV-".
8. Only monitoring wells with screen intervals within this sampling interval are presented.
9. MLPV indicates Mobile Launch Platform (Stormwater Waste Managment Unit 056)

Legend

- DPT sampling location (highest VC concentration (µg/L))
- DPT location last sampled in 2016
- DPT location last sampled in 2018
- Monitoring well location (screen interval (ft bls)) (most recent VC concentration (µg/L))
- Biosparge well location
- Air sparge area of influence (based on 35 ft radius of influence)
- 1 µg/L VC isopleth (dashed where inferred)
- 100 µg/L VC isopleth (dashed where inferred)
- IW0041 — Blue halo around well ID indicates well sampled during current reporting period

Symbology Color Coding

- VC concentration less than or equal to 1 µg/L (GCTL)
- VC concentration greater than 1 µg/L (GCTL) and less than or equal to 100 µg/L (NADC)
- VC concentration greater than 100 µg/L (NADC) and less than or equal to 1,000 µg/L (10xNADC)
- VC concentration greater than 1,000 µg/L (10xNADC)
- Location last sampled prior to 2016 or location within the air sparge area of influence and last sampled prior to system shut down (April 2018) - data not presented
- Location not sampled at this depth interval

N

0 100 200 Feet

FIGURE 3-7
Summary of Vinyl Chloride Results
(45 to 50 ft BLS)
2018 DPT and October / November 2019 IGM

Hot Spot 2
MLPV (SWMU 056)
NASA Kennedy Space Center, Florida

MW0014 (25 to 30)				
Date	TCE	cDCE	tDCE	VC
09/13/2018	0.61 U	**0.45 I**	**0.76 I**	3.5
02/18/2019	0.61 U	0.32 U	**0.53 I**	**0.68 I**
10/31/2019	0.35 U	0.28 U	0.22 U	0.41 U

MW0013 (25 to 30)				
Date	TCE	cDCE	tDCE	VC
09/13/2018	0.61 U	**3.0**	**1.1 I**	8.8
02/18/2019	0.61 U	**5.5**	**0.97 I**	9.3
10/31/2019	0.35 U	**0.86 I**	**1.3**	2.6

MW0011 (25 to 35)				
Date	TCE	cDCE	tDCE	VC
11/10/2015	0.61 U	**24**	**5.6**	110
01/11/2016	0.61 U	**1.7**	**2.7**	11
07/11/2016	0.61 U	**0.83 I**	**3.1**	6.8
02/20/2017	0.61 U	0.65 U	**2.3**	3.8
08/09/2017	0.61 U	0.65 U	**1.0**	2.6
02/19/2018	0.61 U	0.32 U	**0.81 I**	**1.4**
08/06/2018	0.61 U	0.32 U	0.39 U	0.26 U
02/18/2019	0.61 U	0.32 U	**0.44 I**	**0.49 I**
10/31/2019	0.35 U	0.28 U	0.22 U	0.41 U

MW0012 (15 to 25)				
Date	TCE	cDCE	tDCE	VC
11/10/2015	0.61 U	0.65 U	**0.67 I**	4.2
01/11/2016	0.61 U	0.65 U	0.67 U	1.6
07/11/2016	0.61 U	**7.0**	**1.9**	20
02/20/2017	0.61 U	0.65 U	**0.81 I**	1.7
08/09/2017	0.61 U	**2.5**	**1.1**	7.2
02/19/2018	0.61 U	0.32 U	0.39 U	0.26 U
08/06/2018	0.61 U	0.32 U	0.39 U	0.26 U
02/18/2019	0.61 U	0.32 U	**0.39 U**	0.26 U
10/31/2019	0.35 U	**0.69 I**	0.22 U	**1.0**

	TCE	cDCE	tDCE	VC
	TRICHLOROETHENE	CIS-1,2-DICHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE
GCTL	3	70	100	1
NADC	300	700	1000	100

Legend

- Monitoring Well Location
- DPT Sampling Locations
- DPT Location Sampled in 2019
- Composite GCTL Isocontour (2012-2019 Data)

Notes:
1. Results shown in micrograms per Liter (µg/L)
2. Prefix for all direct push technology (DPT) locations is "VABRA-DPT". Monitoring wells have prefix "VABRA-"
3. OFW indicates Outstanding Florida Waters
4. 2018 Aerial Source: Florida Department of Transporation Surveying and Mapping Office APLUS website
5. MLPV (SWMU 056) indicates Mobile Launch Platform/Vehicle Assembly Area (Stormwater Waste Management Unit 056)

N

0 40 80 Feet

FIGURE 3-8
October 2019 Groundwater Analytical Results
Composite CVOC

Hot Spot 3 (OFW)
MLPV (SWMU 056)
NASA Kennedy Space Center, Florida

APPENDIX A
FEBRUARY 2020 ADVANCED DATA PACKAGE

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January 21, 2020

Ms. Anne Chrest
Remediation Project Manager
National Aeronautics and Space Administration
Mail Code SI-E2
Building K6-1547 (Logistics Facility)
John F. Kennedy Space Center
Kennedy Space Center, FL 32899-0001

Subject: **Mobile Launch Platform (MLP)/Vehicle Assembly Building (VAB) Area (Solid Waste Management Unit [SWMU] 056), Annual Corrective Measures Implementation (CMI) and Interim Measures (IM) Update**
February 2020 Kennedy Space Center Remediation Team (KSCRT) Meeting Advanced Data Package (ADP)

Reference: **Indefinite Delivery Indefinite Quantity (IDIQ) Contract 80KSC019D0010**

Dear Ms. Chrest:

AECOM Technical Services, Inc. (AECOM) is pleased to provide Kennedy Space Center (KSC), National Aeronautics and Space Administration (NASA), with the ADP for the MLP/VAB Area (SWMU 056). The purpose of the ADP is to present activities and data associated with groundwater interim measures (IM), continued operation and maintenance of the biosparge system, and groundwater monitoring of the low concentration plume, Hot Spot (HS) 3 Outstanding Florida Waters (OFW) Area, and HS2 Area. Field efforts summarized in the ADP include operation and maintenance (O&M) of the biosparge system from May 2019 through December 2019 and semi-annual groundwater sampling in October/November 2019 from HS2, Biosparge Area, and HS3 OFW Areas for chlorinated volatile organic compounds (CVOCs). Monthly visits for O&M activities included collection of operational readings from treatment wells, dissolved oxygen and stress readings from performance monitoring wells to observe influence, replacement of in-well flow meters, a safety relief valve, condensation separator, and air filters, as well as troubleshooting of the telemetry system and air compressor. The system currently remains shut down since personnel discovered the compressor seized on December 30, 2019. The objective of the ADP is to evaluate the existing groundwater quality based on current data, trends, and remediation system effectiveness, in order to determine if modifications to the sampling schedule and/or operating systems are warranted.

The following consensus statements will be presented to the KSCRT:

- HS2
  - The air sparge system will remain off
  - Continue interim groundwater monitoring (IGM) on an annual and/or semi-annual basis for select CVOCs trichloroethylene (TCE), cis-1,2-dichloroethylene (cDCE), trans-1,2-dichloroethene (tDCE), and vinyl chloride (VC). The semi-annual monitoring well network includes 13 wells: MLPV-IW0011I, MLPV-IW0033, MLPV-IW0034, MLPV-IW0035, MLPV-IW0036, MLPV-IW0037, MLPV-IW0039, MLPV-IW0041, MLPV-IW0043, MLPV-IW0044, MLPV-IW0045, MLPV-SAMW004D, and MLPV-SAMW0004I. The annual monitoring well network includes the semi-annual network plus four additional monitoring wells MLPV-IW0032, MLPV-IW0038, MLPV-IW0040, MLPV-IW0042.

- Biosparge Area
  - Following the repair of the biosparge system, continue operation
  - Continue IGM on a semi-annual basis for select CVOCs (TCE, cDCE, tDCE, and VC) from the 12 monitoring wells IW0057, IW0058, IW0059, IW0060, ASMW0004, ASMW0005, ASMW0006, IW0031, IW0061, IW0062, IW0063, and IW0064.

- HS3 OWF
    - Modify IGM frequency to annual for monitoring wells MW0011 through MW0014
    - Reduce reported analyte list to select CVOCs (TCE, cDCE, tDCE, and VC).

Should you require additional information, please contact Randy Sillan at randy.sillan@aecom.com or via phone at 850.528.2410.

Sincerely,

AECOM Technical Services, Inc.

Randy Sillan, PhD, PE, BCEE
Task Order Manager

Krista Sommerfeldt, PE
Program Manager

Enclosures:

Five copies of the Mobile Launch Platform/Vehicle Assembly Area ADP

Cc: John Winters, FDEP
Richard Smith, HGL
Mark Speranza, Tetra Tech
AECOM Project File 60615493

Mobile Launch Platform (MLP)/Vehicle Assembly Building (VAB) Area (Solid Waste Management Unit [SWMU] 056)

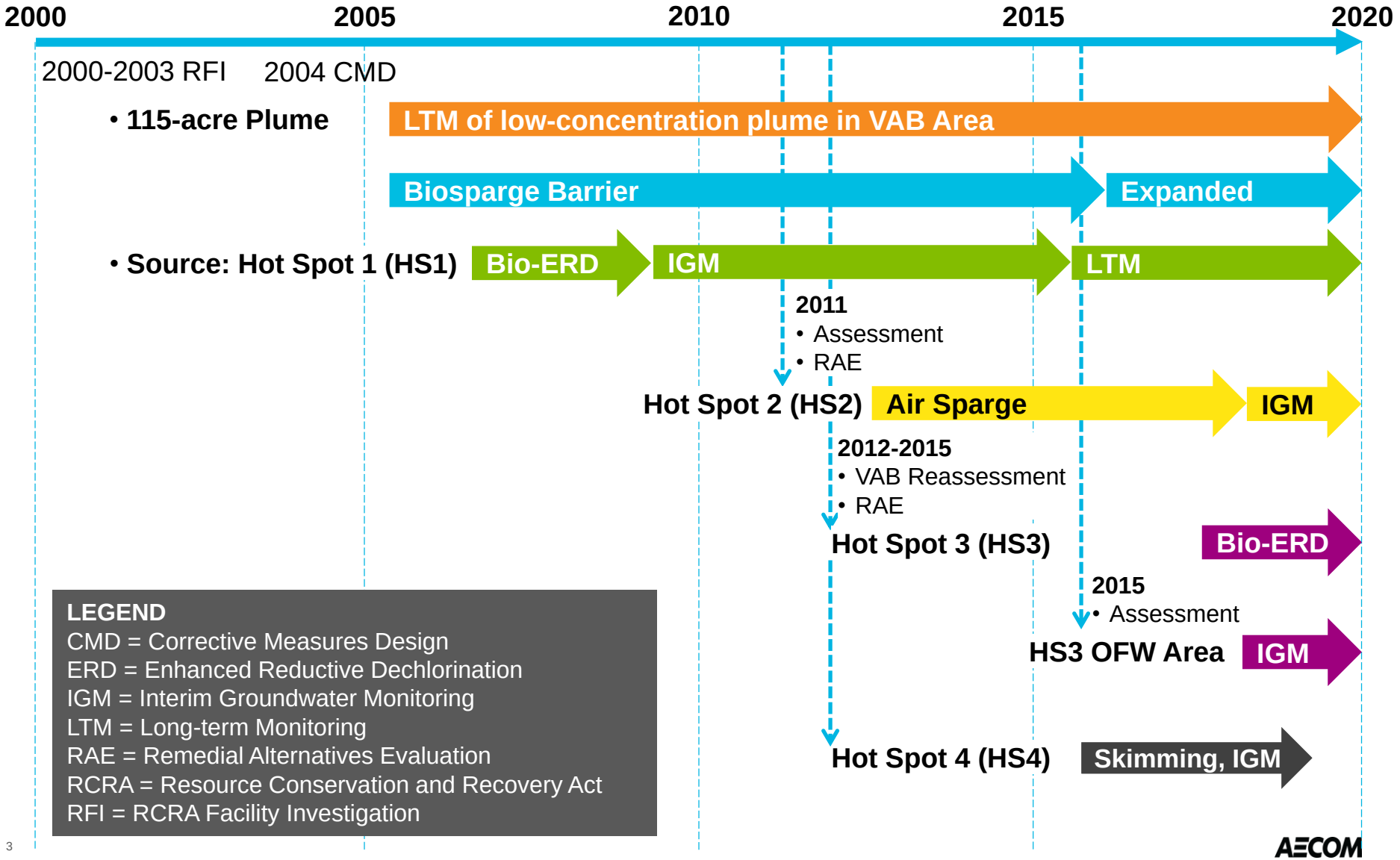
Annual Corrective Measures Implementation (CMI) and Interim Measures (IM) Update

February 2020

Outline

1. Brief Site Background and Overview
2. Hot Spot 2 (HS2) (Air Sparge Area)
3. Biosparge System Area
4. Hot Spot 3 (HS3) Area
5. Hot Spot 3 Outstanding Florida Waters (HS3 OFW) Area

Brief Site Background and Overview



LEGEND
CMD = Corrective Measures Design
ERD = Enhanced Reductive Dechlorination
IGM = Interim Groundwater Monitoring
LTM = Long-term Monitoring
RAE = Remedial Alternatives Evaluation
RCRA = Resource Conservation and Recovery Act
RFI = RCRA Facility Investigation

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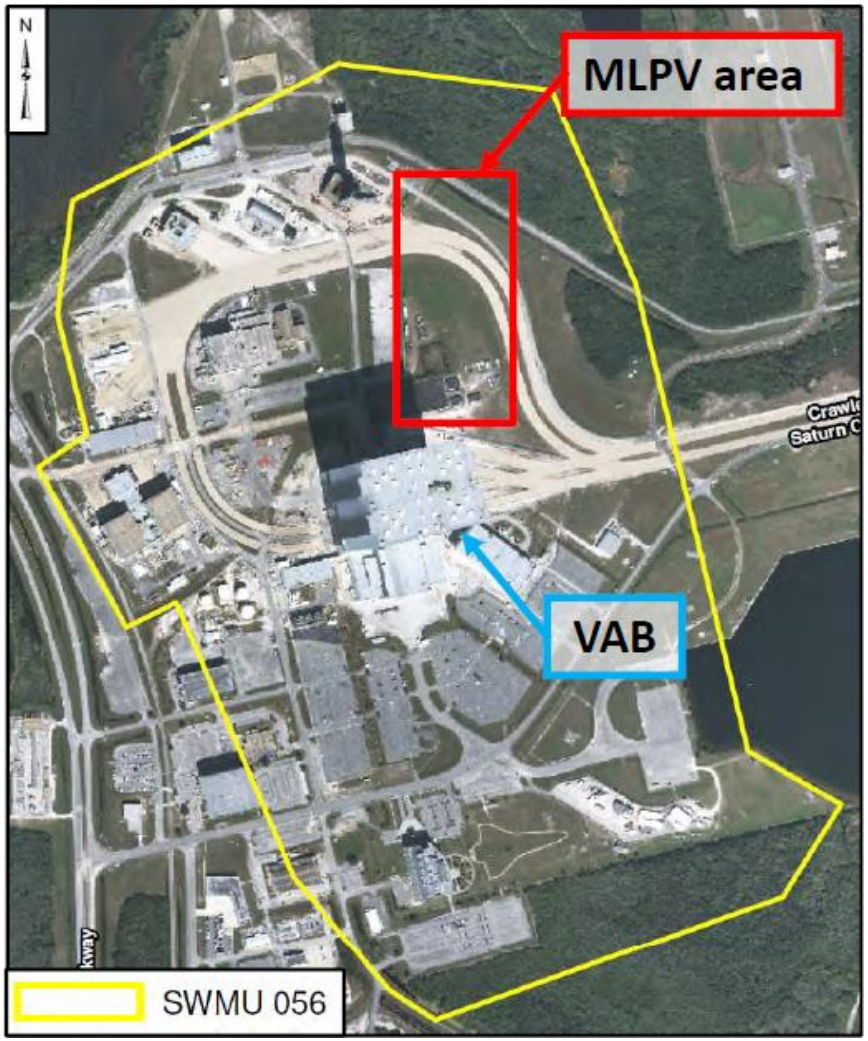
Brief Site Background and Overview

Mobile Launch Platform (MLP) / Vehicle Assembly Building (VAB) Area

1



Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

- 2000 and 2003 - RCRA Facility Investigation
  - Delineated 115-acre chlorinated volatile organic compound (CVOC) plume
  - Identified trichloroethylene (TCE) source area
    - Associated with a 4,000-gallon TCE spill in the VAB in 1966
- 2004 - CMD incorporated multi-component remedial strategy
  - Biosparge barrier to treat vinyl chloride (VC) plume swath above Natural Attenuation Default Criteria (NADC) migrating northeast of VAB area
  - Biostimulation using ethyl lactate in source area (Former HS1)
  - LTM of low concentration dissolved plume (primarily VC)
    - LTM details reported separately through 2018 (will be added to this report moving forward)

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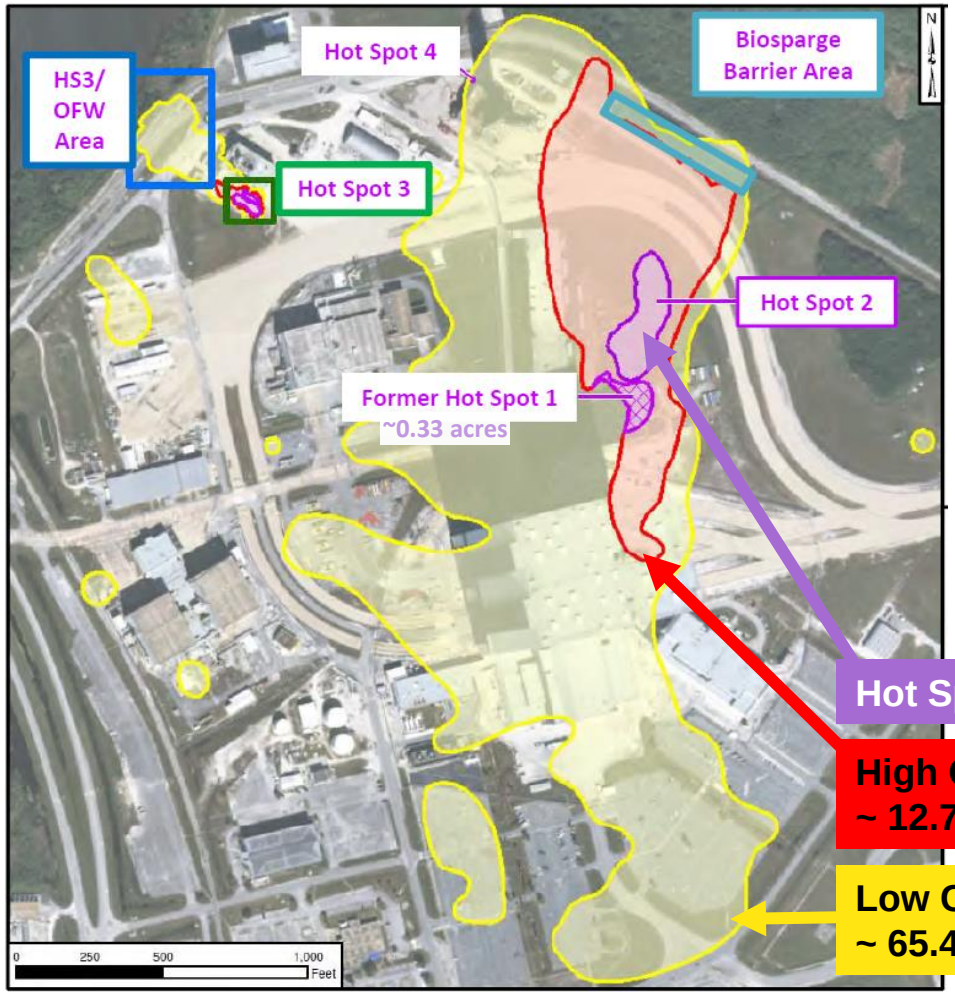
Brief Site Background and Overview

MLP/VAB Area



- After Corrective Measures Implementation (CMI)
  - 3 Hot Spots identified during multiple assessment phases
    - HS2 (1.17 acres) identified during MLPV/VAB Assessment activities
    - HS3 (0.08 acres) & HS4 (0.002 acres) identified during Environmental Conditions Assessment activities (aka VAB Reassessment)

Hot Spot Areas

High Concentration Plume (HCP)
~ 12.78 acres

Low Concentration Plume (LCP)
~ 65.44 acres

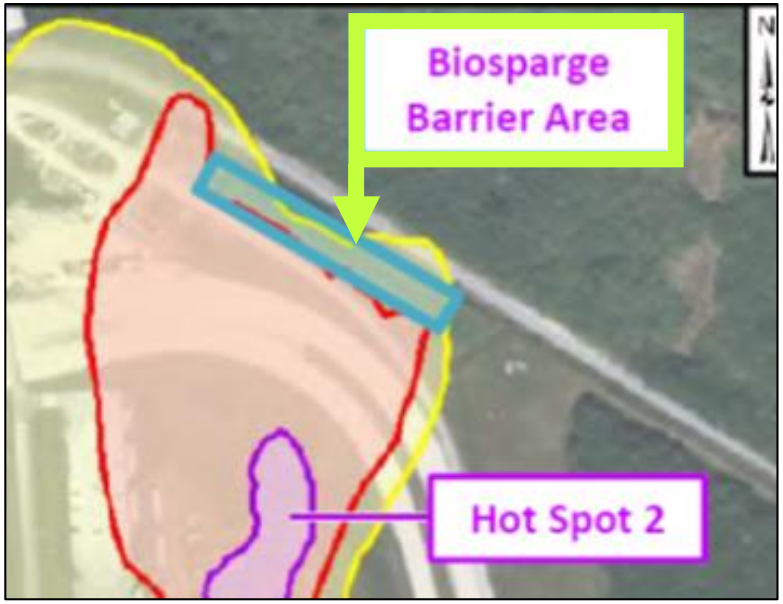
Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

Brief Site Background and Overview

Biosparge Barrier

1

- Downgradient of Former HS1 and HS2 CVOC plume
- CMI
- Installed in 2005 to treat area with VC concentrations greater than 100 micrograms per liter (µg/L)
- Goal is to mitigate potential discharge to adjacent wetlands
- Create zone of elevated dissolved oxygen (DO) to promote aerobic degradation of VC
- 25 biosparge wells across 360 linear feet (ft)



Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

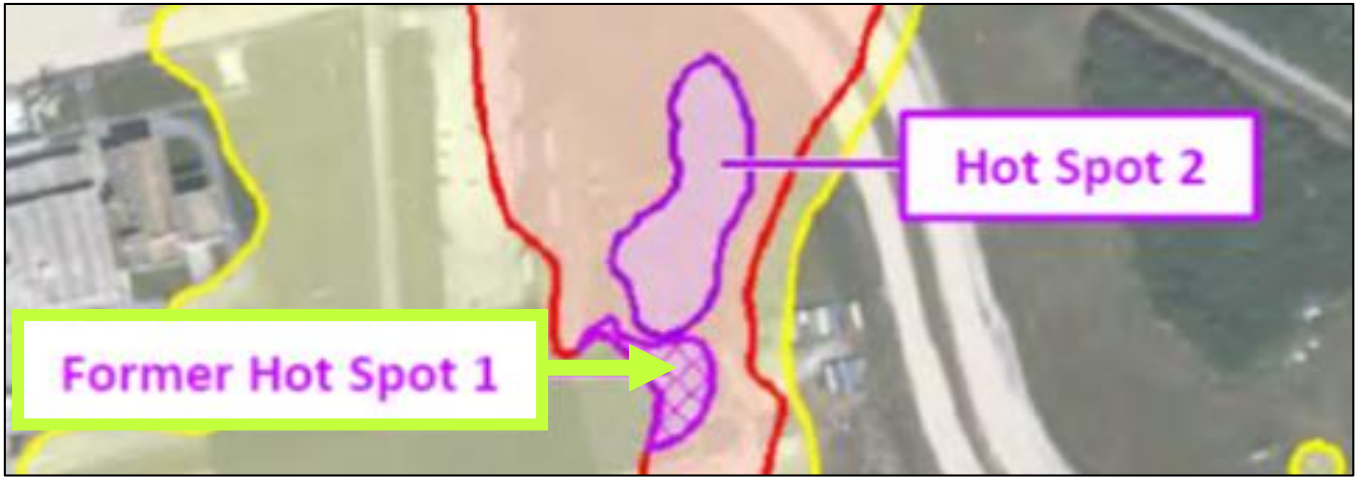
AECOM

Brief Site Background and Overview

HS1 (Former Source Area)

1

- Northeast of VAB Building
  - Treatment area generally where TCE concentrations > 1,000 µg/L
  - TCE concentrations up to 95,000 µg/L
  - Bioremediation implemented Aug 2006 to Mar 2009
  - Achieved remedial goals in less than 2 years (concentrations < NADC)
  - Transitioned to IGM in 2009
  - Transitioned to VAB area LTM program in Aug 2015 (SAMW01 and SAMW03)
  - No activities were performed for this reporting period



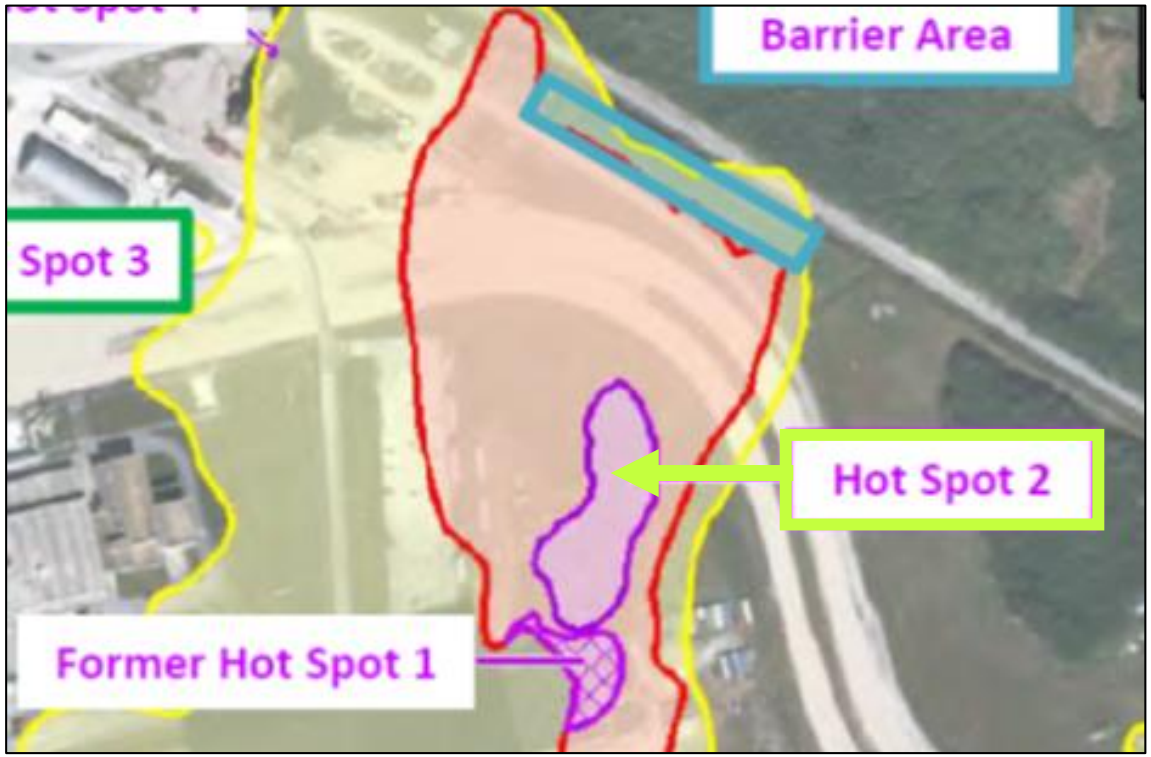
Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

AECOM

Brief Site Background and Overview

HS2

- Between HS1 and Biosparge Barrier
  - HS2 defined as area where TCE > 300 µg/L and cis-1,2-dichloroethylene (cDCE) > 7,000 µg/L
  - Air sparging implemented in HS2



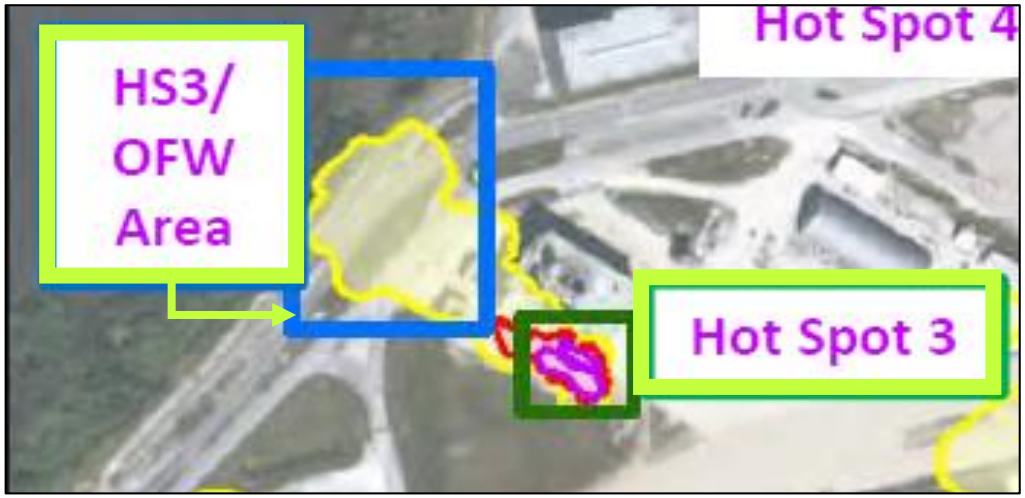
Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

AECOM

Brief Site Background and Overview

HS3 & OFW

- Adjacent and underneath western MLP structure
  - CVOC (TCE, cDCE, and VC) concentrations > 10xNADC
  - Bioremediation implemented as an IM
- Adjacent to OFW
  - Where VC concentrations > 1 µg/L
  - IGM performed to evaluate VC concentrations
  - Evaluated separately from bioremediation IM area due to fluctuating VC concentrations in IGM wells



Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

AECOM

Brief Site Background and Overview

HS4

1

- Near eastern MLP structure
  - Area with 2-methylnaphthtalene above NADC
    - light non-aqueous phase liquid (LNAPL) detected in one monitoring well (MW006)
  - Passive skimmer installed and IGM performed
    - MW0006 was later over-drilled and MW010 was installed in its place (larger diameter monitoring well) where skimmer was deployed
  - 2019 CMI and IM Report – NASA requested no further action (NFA)
    - Groundwater impacts remained below Groundwater Cleanup Target Levels (GCTLs) since 2015
    - LNAPL not present above 0.01 ft since April 2017
    - Upon NFA approval, the skimmer will be removed and four monitoring wells abandoned
  - 2020 FDEP Response
    - No NFA until whole SWMU meets requirements
    - Skimmer removal approved
    - MW0010 to be resampled prior to NFA

No additional activities were performed during the current reporting period.

Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

AECOM

Advance Data Package (ADP) Presentation Objectives

1

- Present HS2 (Air Sparge) Area
  - Area background
  - IGM activities
- Present Biosparge System Area
  - Area background (combined with Air Sparge Area)
  - IGM activities
  - System O&M activities
- Present HS3 Area
  - Area background
  - HS3 OFW Area IGM activities
- Test Consensus
  - After each section where requested

HS2 (Air Sparge Area) Background (inclusive of Biosparge Area)

HS2 (Air Sparge) Background

2011

- Feb – Site Characterization
  - Delineated TCE and cDCE (10xNADC, NADC, and GCTL) plumes
  - Additional sampling via direct push technology (DPT) proposed to delineate 100 µg/L VC plume
- May – Remedial Alternatives Evaluation
  - Team consensus obtained to implement air sparging in area where TCE > 300 µg/L and cDCE > 7,000 µg/L (HS2)
- Aug – Annual CMI ADP
  - Team consensus of delineation of 100 µg/L VC
  - Team consensus for installation of new monitoring well in area where DPT VC exceedances are > 100 µg/L adjacent to biosparge wall (IW31)
- Oct – Air Sparge IM Work Plan (IMWP)
  - ADP Team consensus to install air sparge system
  - Max depth of air sparge wells proposed to 50 and 54 ft below land surface (BLS)

HS2 (Air Sparge) Background

Oct – Air Sparge Construction Completion Report (CCR)

2011 2012

HCP plume treatment area increased from 1.08 acres to 1.17 acres based on baseline groundwater sampling

GCTL

Air sparge Area of Influence

NADC

10xNADC

100xNADC

Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

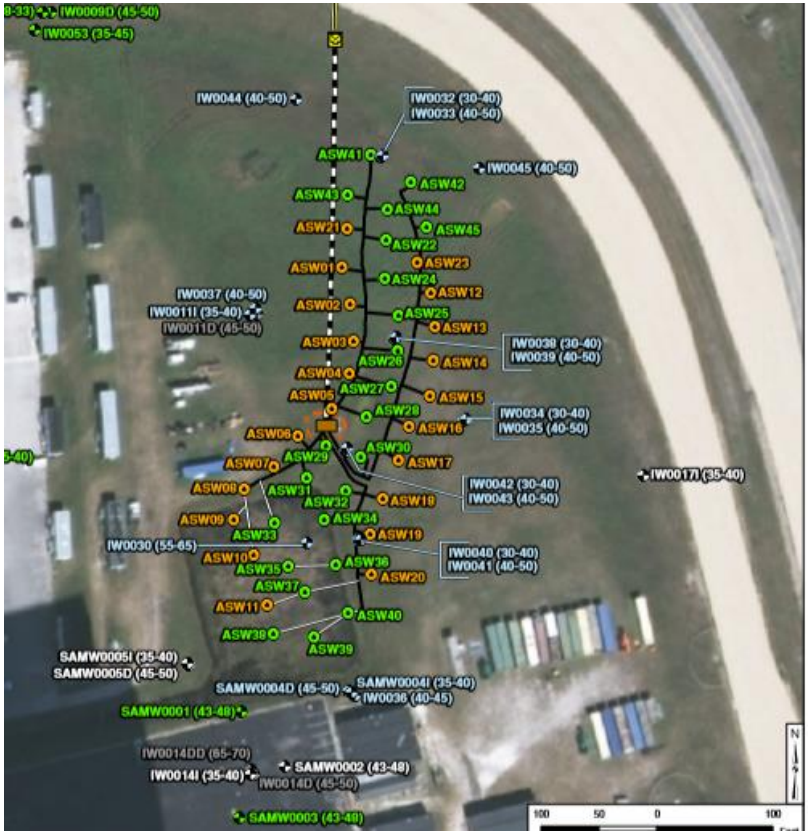
AECOM

HS2 (Air Sparge) Background

Oct – Air Sparge CCR

2011 2012

- 45 air sparge wells
  - Five air sparge wells added to design (Team consensus during basket item Jun 2012)
  - Silty/clayey sand layer shallower than anticipated during install
    - Total depth of ~42 ft BLS and ~46 ft BLS (wells set just above low permeability layer)
- Air sparge system installation complete and system startup in Aug 2012
- Used existing compressor for biosparge system to also operate the air sparge system



Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

AECOM

HS2 (Air Sparge) Background

May – CMI and IM Annual Report ADP

2

2011 2012 **2013**

- Abandoned 30 injection wells associated with HS1 bioremediation implementation and IW14D and IW14DD
- Compressor for sparge system reached end of useful life Sep 2012
- Air sparge system operated ~1 month before compressor shut down

HS2 (Air Sparge) Background

2

Mar – Step 4B Engineering Evaluation ADP (6 months post startup)

- Compressor replaced in May 2013
- Systems restarted
  - Biosparge system - June 14, 2013
  - Air sparge system - July 17, 2013 after additional relays installed
- Increase in cDCE and VC concentrations in Oct 2013 was observed in biosparge downgradient monitoring wells
- Team consensus reached to conduct DPT sampling around biosparge barrier to investigate increased concentrations in downgradient wells

AECOM

HS2 (Air Sparge) Background

Aug – Annual CMI ADP

2

2011 2012 2013 **2014**

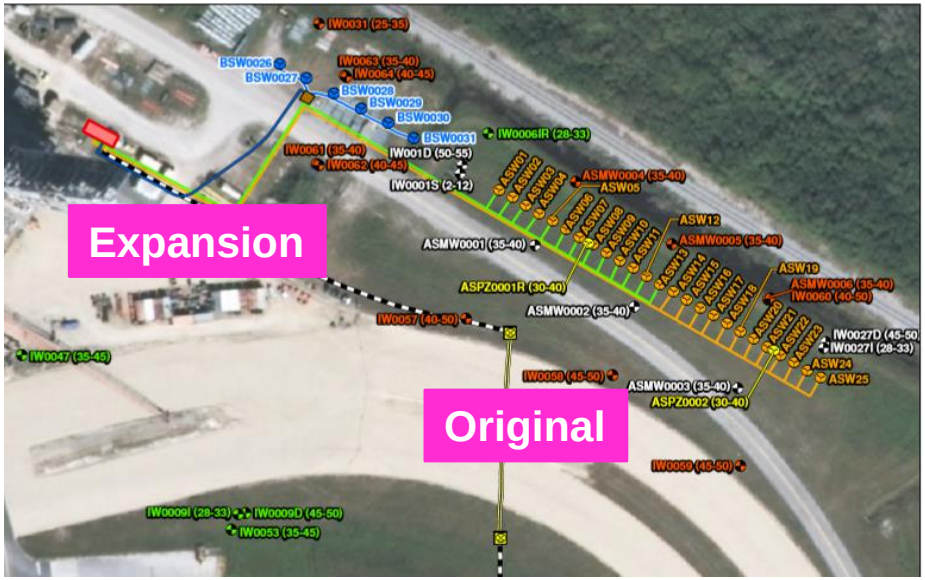
- Presented DPT groundwater sampling data from locations around biosparge barrier
  - Team consensus - CVOC concentrations observed in downgradient monitoring wells attributed to extended downtime of biosparge barrier
  - Team consensus reached to install four monitoring wells based on DPT sampling results:
    - Three wells to evaluate upgradient concentrations and plume collapse (IW57, IW58, IW59)
    - One well adjacent to ASMW06 to monitor impacts from 40-50 ft BLS (IW60)

HS2 (Air Sparge) Background

Aug and Nov

2011 — 2012 — 2013 — 2014 — **2015**

- Aug – Annual CMI ADP
  - Team consensus reached to conduct DPT sampling in air sparge treatment area
  - Evaluate concentrations and potentially shut down system
  - Team consensus reached to prepare Biosparge Expansion IMW
  - Address VC impacts to the west of existing biosparge barrier
- Nov – Biosparge Barrier Expansion IMWP
  - Designed to treat VC concentrations > 100 µg/L identified from 31 to 45 ft BLS



Figures: Geosyntec Consultants MLPV CMI and IM Report, August 2019, Figure 2-1

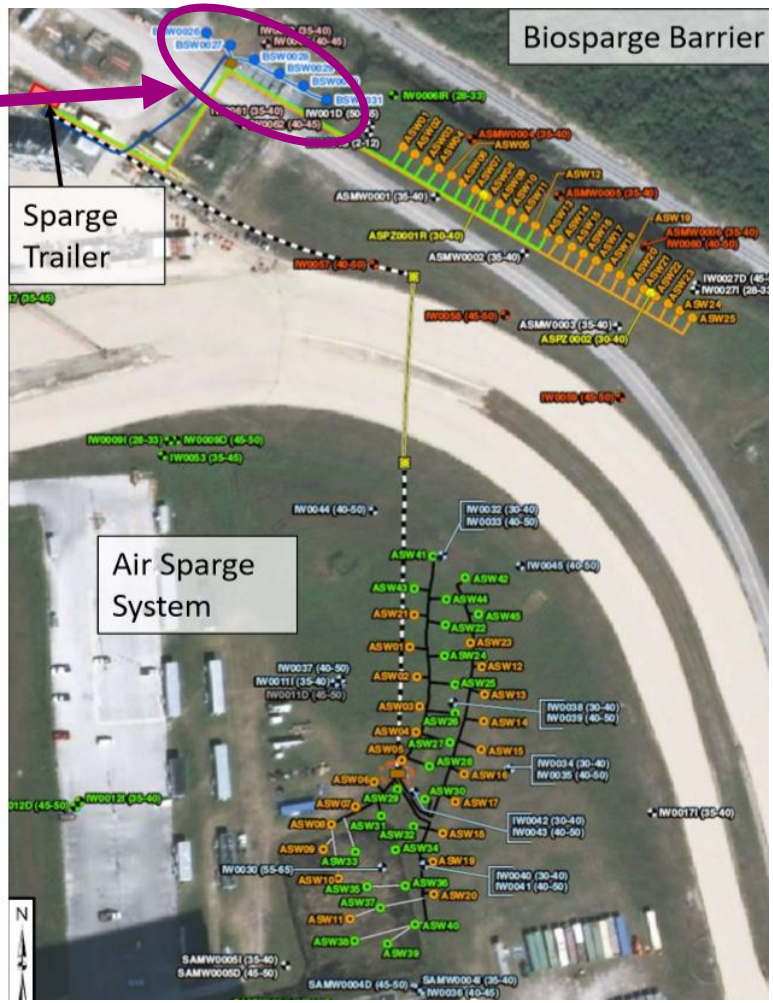
AECOM

HS2 (Air Sparge) Background

May – Biosparge Expansion CCR submitted (no ADP)

2011 — 2012 — 2013 — 2014 — 2015 — **2016**

- Installed 6 biosparge wells with max depth of 48 ft BLS
- Two performance monitoring well clusters
- Expansion startup in Feb 2016



- Biosparge Well
- Biosparge Expansion Well
- Air Sparge Well, Leg 3
- Air Sparge Well, Leg 4

Figures: Geosyntec Consultants MLPV CMI and IM Report, August 2019, Figure 2-1

AECOM

HS2 (Air Sparge) Background

Sep – Annual CMI and IM ADP

2011 | 2012 | 2013 | 2014 | 2015 | **2016**

- May 20, 2016: system compressor down
  - Both systems off (compressor operates both)
  - Continue biosparge expansion quarterly performance monitoring upon restart (three events remained)
- DPT groundwater sampling conducted to evaluate CVOC reduction in low permeability lithology within air sparge treatment area
  - CVOC concentrations reduced, but remained above NADCs
- Team consensus reached to conduct future DPT groundwater sampling events
  - Prior to air sparge system shutdown to evaluate treatment area
  - Outside the treatment area to evaluate an air sparge expansion

Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

AECOM

HS2 (Air Sparge) Background

Jan 2018 – Annual CMI and IM ADP

2

- May 3, 2017: Both systems restarted after installing new compressor
  - Upgrades made to variable frequency drive (VFD) and antenna/telemetry service
- "Re-baseline" performance monitoring conducted prior to system restart
- Two quarterly performance monitoring events conducted for biosparge barrier expansion
  - One quarterly event remaining after Nov 2017
- Consensus Summary
  - Continue biosparge system operation
    - Semi-annual sampling of biosparge performance wells after quarterly event
    - Collect samples from IW60 and ASMW06 during Feb 2018 sampling to confirm CVOC detections from Nov 2017 sampling event
    - Final quarterly sampling event for the biosparge expansion monitoring wells for Feb 2018

AECOM

HS2 (Air Sparge) Background

Jan 2018 – Annual CMI and IM ADP

2

- Consensus Summary, Continued
  - Continue air sparge system operation through Apr 2018 to evaluate effect on impacts in low permeability lithology 1 year from system restart
    - Evaluate air sparge system shutdown/restart
  - Sample performance monitoring wells post-shutdown
  - DPT groundwater sampling in treatment area
    - Evaluate concentrations within cDCE NADC and VC 10xNADC areas using DPT groundwater sampling
    - Utilize data to evaluate expansion of air sparge system

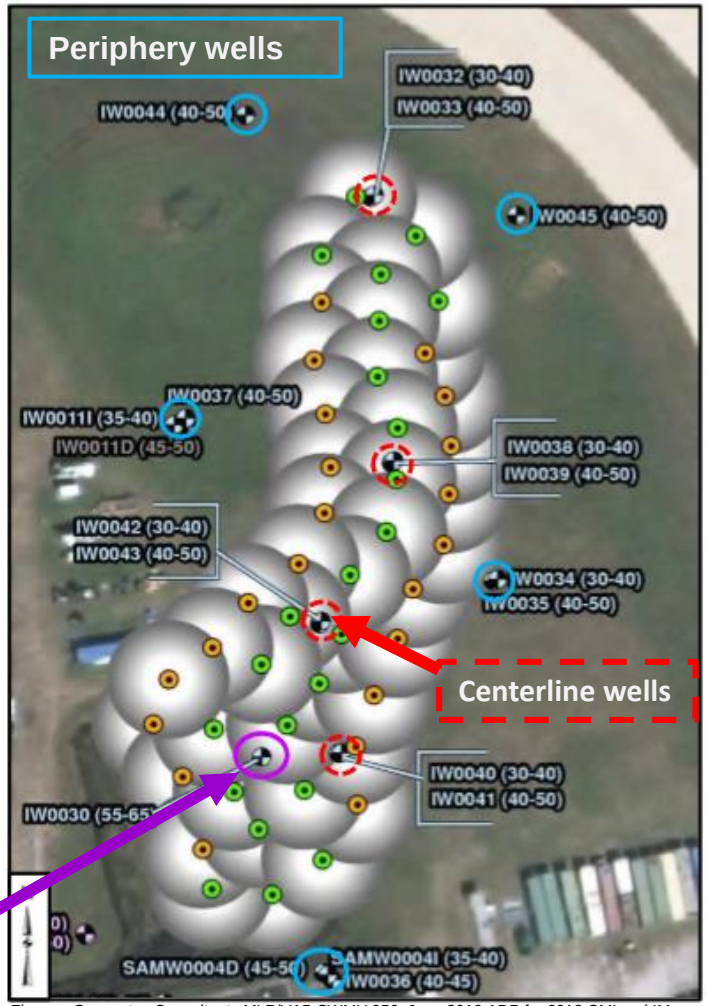
AECOM

HS2 (Air Sparge) Background

Aug 2019 – Annual CMI and IM

2011 – 2012 – 2013 – 2014 – 2015 – 2016 – 2017 – **2018** – **2019**

- Air sparge system shut down Apr 2018
  - Monthly O&M activities (with biosparge O&M)
    - 82% run time (maintenance, sampling, and government shutdown)
    - ~4.2 years of operational time and ~ 99% mass reduction
    - Three cycles alternating between each leg for 3 hours (Leg 1) or 9 hours (Leg 4) each day (pre-shutdown)
- Air sparge performance monitoring
  - May 2018 (~1 month after shutdown) and Mar 2019 (~1 year after shutdown)
    - 30-40 ft BLS in centerline: no rebound, CVOCs < GCTLs
    - 40-50 ft BLS in centerline: minimal rebound
      - cDCE concentrations increased above GCTL (3 monitoring wells)
      - VC concentrations increased in 2 monitoring well
    - Underneath treatment area: no detections (IW0030)
    - Periphery: No change



Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

AECOM

HS2 (Air Sparge) Background

Aug 2019 – Annual CMI and IM, Continued

2011 – 2012 – 2013 – 2014 – 2015 – 2016 – 2017 – **2018** – **2019**

- Pre-shutdown DPT groundwater sampling
  - Feb 2018 to evaluate system expansion 22 locations, 102 samples
  - Based on May 2018 data, post-shutdown DPT groundwater sampling was performed to evaluate remaining concentrations in the treatment area
    - Jun 2018 to evaluate system performance16 locations, 72 samples

Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

AECOM

HS2 (Air Sparge) Background

Aug 2019 – Annual CMI and IM, Continued

2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | **2018** | **2019**

- Biosparge barrier continued operation
  - Monthly O&M with air sparge O&M
    - Cycled from 6 hours/day (three, 2-hour cycles for Legs 1, 2, 5) to 12 hours/day (four, 3-hr cycles)
    - Well cleanouts (not SCHUMASOIL expansion wells) and repair (BSW28 wellhead and pad)
- Biosparge Performance Monitoring
  - Final quarterly (expansion area)
    - Feb 2018 – CVOCs downgradient of barrier decreased to < NADC
  - Semi-annual
    - May and Nov 2018
    - Mar 2019 – CVOCs below GCTLs at each well, except ASMW006 for VC

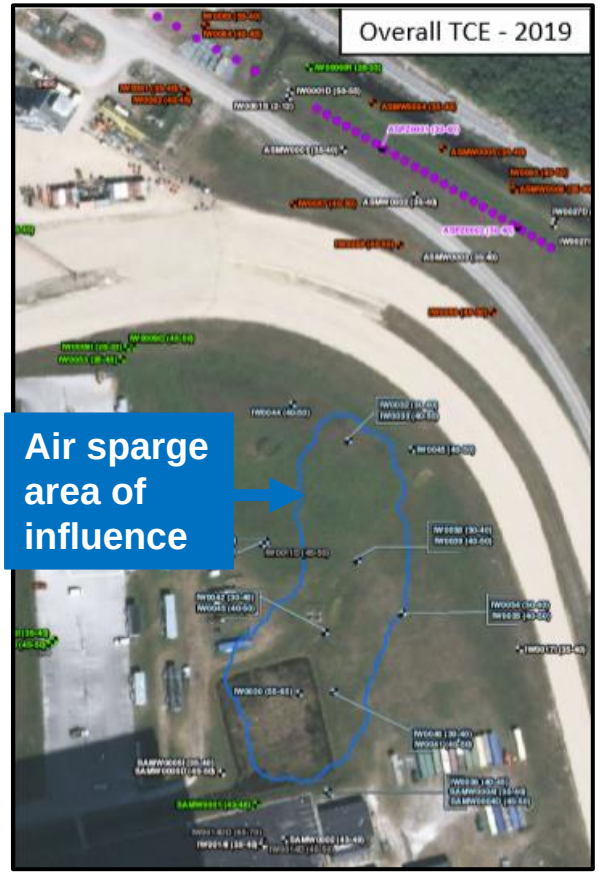
Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

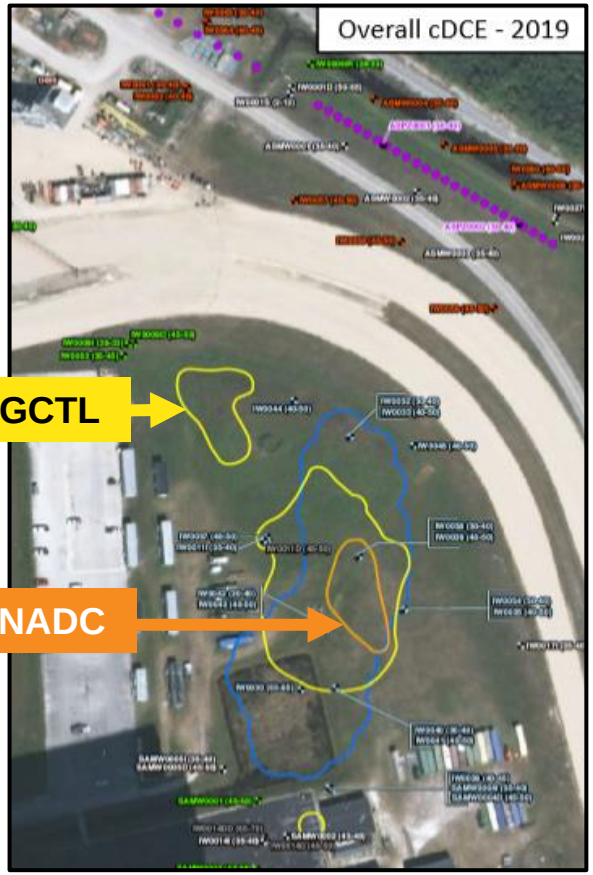
AECOM

HS2 (Air Sparge) Background

Overview Results

2011 – 2012 – 2013 – 2014 – 2015 – 2016 – 2017 – 2018 – **2019** →





Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

AECOM

HS2 (Air Sparge) Background

Aug 2019 – Annual CMI and IM, Continued

- Consensus Summary
  - Air sparge expansion not warranted at this time based on overall sampling results
  - Transition air sparge area to IGM
- Semi-annual for CVOCs from wells with CVOCs > GCTLs (IW11I, IW33 to IW37, IW39, IW41, IW43 to IW45, SAMW04I, and SAMW04D)
  - Annual for CVOCs at centerline wells with CVOCs < GCTLs (IW32, IW38, IW40, IW42)
  - Remove well beneath treatment area (has remained below GCTLs)
  - After 1 year of IGM, evaluate sampling frequency and well locations in Sampling and Analysis Plan (SAP)
    - Conduct statistical analyses to evaluate trends since system shutdown
- Continue to operate biosparge system until monitoring well sampling results south of Launch Road suggest plume collapse and associated plume stability occurs
  - Performance well network is adequate to evaluate biosparge system performance
  - Sample 12 performance wells semi-annually (ASMW04 to ASMW06, IW31, and IW57 to IW64) for CVOCs

HS2 (Air Sparge Area) IGM Activities

HS2 (Air Sparge Area) IGM Activities

Outline of Activities

2

- Semi-annual Performance Monitoring Well Sampling
  - October 31 and November 1, 2019 - First sampling event to fulfill 1 year of IGM
  - 13 wells
  - Selected CVOC analysis - cDCE, perchloroethylene (PCE), trans-1,2-dichloroethene (tDCE), TCE, and VC (based on previously approved analyte list)

2019 Sampling and Analysis Plan

System Monitored	Location	Screen Interval (ft BLS)	Frequency	Analytical Parameters
Air Sparge System	IW0011I	35 to 40	Semi-Annual	CVOCs
	IW0032	30 to 40	Annual	
	IW0033	40 to 50	Semi-Annual	
	IW0034	30 to 40	Semi-Annual	
	IW0035	40 to 50	Semi-Annual	
	IW0036	40 to 45	Semi-Annual	
	IW0037	40 to 50	Semi-Annual	
	IW0038	30 to 40	Annual	
	IW0039	40 to 50	Semi-Annual	
	IW0040	30 to 40	Annual	
	IW0041	40 to 50	Semi-Annual	
	IW0042	30 to 40	Annual	
	IW0043	40 to 50	Semi-Annual	
	IW0044	40 to 50	Semi-Annual	
	IW0045	40 to 50	Semi-Annual	
	SAMW0004I	35 to 40	Semi-Annual	
	SAMW0004D	45 to 50	Semi-Annual	

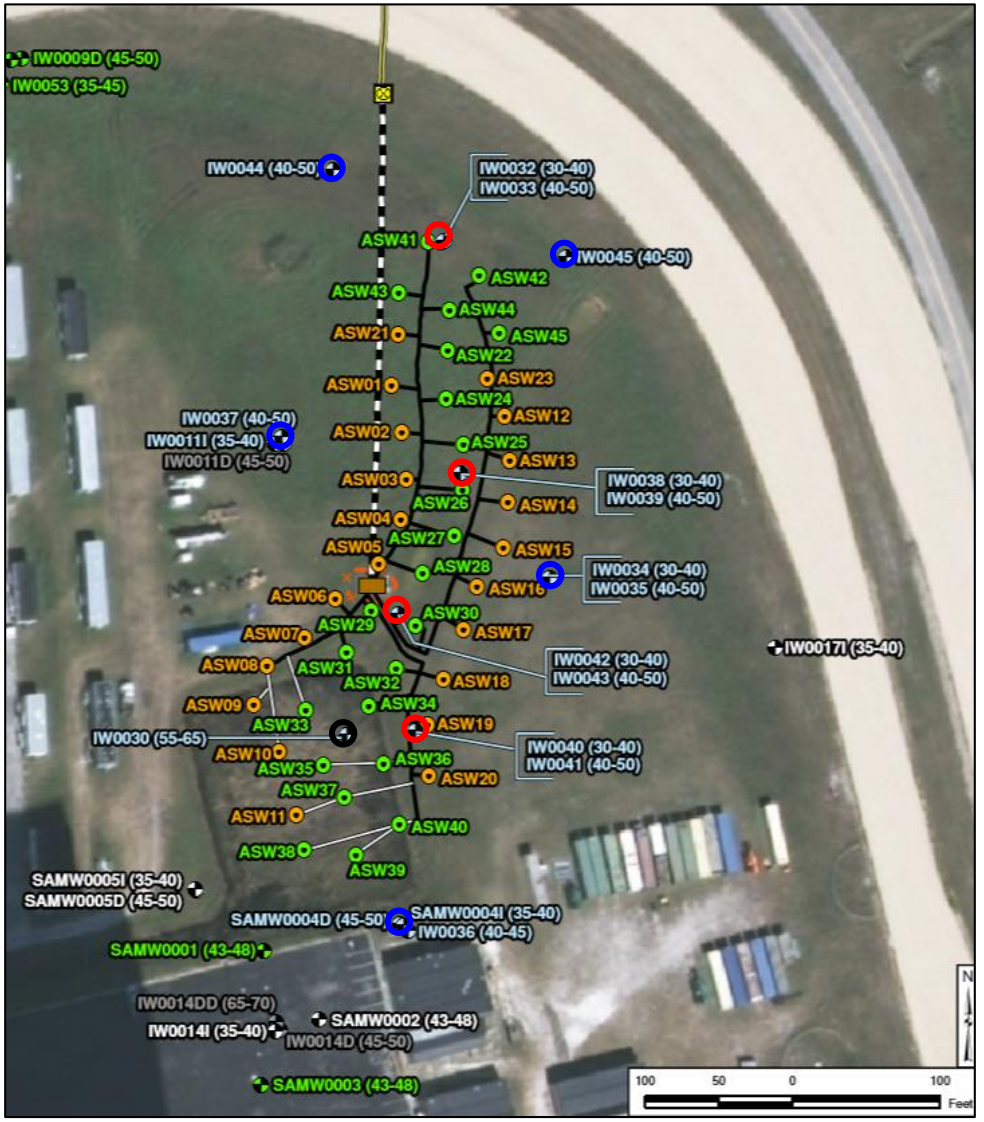
Semi-Annual: November 2019
Annual: May 2020

AECOM

HS2 (Air Sparge Area) IGM Activities

Performance Monitoring Wells

- Centerline -
- Periphery -
- Underlying well IW0030 removed from SAP since remained below GCTLs

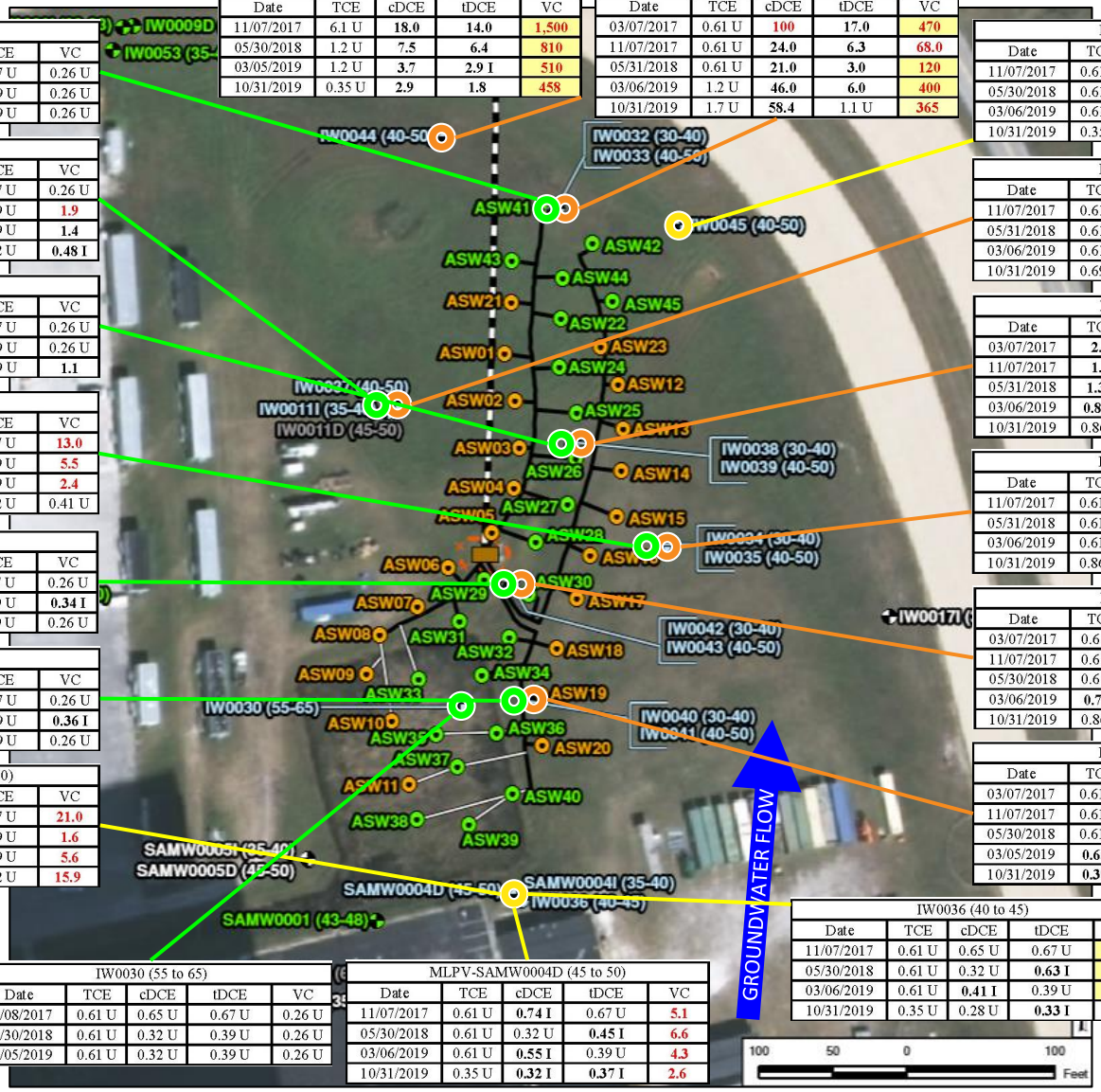


AECOM

HS2 (Air Sparge Area) IGM Activities

Semi-annual Performance Monitoring

Shallower Wells (above 40 ft BLS)



IW0032 (30 to 40)				
Date	TCE	cDCE	tDCE	VC
11/7/2017	0.61 U	0.65 U	0.67 U	0.26 U
5/31/2018	0.61 U	**0.36 I**	0.39 U	0.26 U
3/6/2019	0.61 U	**0.74 I**	0.39 U	0.26 U

IW0011I (35 to 40)				
Date	TCE	cDCE	tDCE	VC
11/07/2017	0.61 U	**1.1**	0.67 U	0.26 U
5/31/2018	0.61 U	**0.93 I**	0.39 U	**1.9**
3/6/2019	0.61 U	**0.72 I**	0.39 U	**1.4**
10/31/2019	0.35 U	0.28 U	0.22 U	**0.48 I**

IW0038 (30 to 40)				
Date	TCE	cDCE	tDCE	VC
11/07/2017	0.61 U	**0.78 I**	0.67 U	0.26 U
05/31/2018	0.61 U	**0.48 I**	0.39 U	0.26 U
03/06/2019	0.61 U	**0.94 I**	0.39 U	**1.1**

IW0034 (30 to 40)				
Date	TCE	cDCE	tDCE	VC
11/07/2017	0.61 U	0.65 U	0.67 U	**13.0**
05/31/2018	0.61 U	**0.4 I**	0.39 U	**5.5**
03/06/2019	0.61 U	**1.4**	0.39 U	**2.4**
10/31/2019	0.35 U	0.28 U	0.22 U	0.41 U

IW0042 (30 to 40)				
Date	TCE	cDCE	tDCE	VC
11/07/2017	0.61 U	**0.86 I**	0.67 U	0.26 U
05/30/2018	0.61 U	**0.32 I**	0.39 U	**0.34 I**
03/06/2019	0.61 U	0.32 U	0.39 U	0.26 U

IW0040 (30 to 40)				
Date	TCE	cDCE	tDCE	VC
11/07/2017	0.61 U	0.65 U	0.67 U	0.26 U
05/30/2018	0.61 U	**0.58 I**	0.39 U	**0.36 I**
03/05/2019	0.61 U	0.32 U	0.39 U	0.26 U

MLPV-SAMW0004I (35 to 40)				
Date	TCE	cDCE	tDCE	VC
11/07/2017	0.61 U	0.65 U	0.67 U	**21.0**
05/30/2018	0.61 U	0.32 U	0.39 U	**1.6**
03/06/2019	0.61 U	0.32 U	0.39 U	**5.6**
10/31/2019	0.35 U	**0.40 I**	0.22 U	**15.9**

IW0044 (40 to 50)				
Date	TCE	cDCE	tDCE	VC
11/07/2017	6.1 U	**18.0**	**14.0**	**1,500**
05/30/2018	1.2 U	**7.5**	**6.4**	**810**
03/05/2019	1.2 U	**3.7**	**2.9 I**	**510**
10/31/2019	0.35 U	**2.9**	**1.8**	**458**

IW0033 (40 to 50)				
Date	TCE	cDCE	tDCE	VC
03/07/2017	0.61 U	**100**	**17.0**	**470**
11/07/2017	0.61 U	**24.0**	**6.3**	**68.0**
05/31/2018	0.61 U	**21.0**	**3.0**	**120**
03/06/2019	1.2 U	**46.0**	**6.0**	**400**
10/31/2019	1.7 U	**58.4**	1.1 U	**365**

IW0045 (40 to 50)				
Date	TCE	cDCE	tDCE	VC
11/07/2017	0.61 U	7.7	7.9	**200**
05/30/2018	0.61 U	**2.4**	**10.0**	**270**
03/06/2019	0.61 U	**3.2**	**6.8**	**170**
10/31/2019	0.35 U	**4.8**	**3.6**	**97.2**

IW0037 (40 to 50)				
Date	TCE	cDCE	tDCE	VC
11/07/2017	0.61 U	**150**	1.2	**280**
05/31/2018	0.61 U	**94.0**	1.2 I	**360**
03/06/2019	0.61 U	**160**	0.89 I	**270**
10/31/2019	0.69 U	**135**	0.44 U	**178**

IW0039 (40 to 50)				
Date	TCE	cDCE	tDCE	VC
03/07/2017	**2.6**	**200**	**11.0**	**250**
11/07/2017	**1.5**	**92.0**	**5.1**	**55.0**
05/31/2018	**1.3 I**	**45.0**	**3.2**	**55.0**
03/06/2019	**0.83 I**	**160**	**7.1**	**250**
10/31/2019	0.86 U	**198**	**4.6**	**241**

IW0035 (40 to 50)				
Date	TCE	cDCE	tDCE	VC
11/07/2017	0.61 U	**1.8**	**5.4**	**220**
05/31/2018	0.61 U	**1.2**	**6.9**	**330**
03/06/2019	0.61 U	**2.3**	**3.3**	**150**
10/31/2019	0.86 U	0.69 U	0.55 U	**152**

IW0043 (40 to 50)				
Date	TCE	cDCE	tDCE	VC
03/07/2017	0.61 U	**190**	**4.9**	**330**
11/07/2017	0.61 U	**42.0**	**1.9**	**120**
05/30/2018	0.61 U	**31.0**	**0.96 I**	**140**
03/06/2019	**0.77 I**	**100**	**2.7**	**150**
10/31/2019	0.86 U	**149**	**2.4 I**	**155**

IW0041 (40 to 50)				
Date	TCE	cDCE	tDCE	VC
03/07/2017	0.61 U	**63.0**	**3.8**	**330**
11/07/2017	0.61 U	**140**	**5.2**	**300**
05/30/2018	0.61 U	**9.7**	**3.9**	**230**
03/05/2019	**0.65 I**	**76.0**	**2.6**	**260**
10/31/2019	**0.39 I**	**14.0**	**2.3**	**166**

IW0036 (40 to 45)				
Date	TCE	cDCE	tDCE	VC
11/07/2017	0.61 U	0.65 U	0.67 U	**87.0**
05/30/2018	0.61 U	0.32 U	**0.63 I**	**80.0**
03/06/2019	0.61 U	**0.41 I**	0.39 U	**32.0**
10/31/2019	0.35 U	0.28 U	**0.33 I**	**9.1**

IW0030 (55 to 65)				
Date	TCE	cDCE	tDCE	VC
11/08/2017	0.61 U	0.65 U	0.67 U	0.26 U
05/30/2018	0.61 U	0.32 U	0.39 U	0.26 U
03/05/2019	0.61 U	0.32 U	0.39 U	0.26 U

MLPV-SAMW0004D (45 to 50)				
Date	TCE	cDCE	tDCE	VC
11/07/2017	0.61 U	**0.74 I**	0.67 U	**5.1**
05/30/2018	0.61 U	0.32 U	**0.45 I**	**6.6**
03/06/2019	0.61 U	**0.55 I**	0.39 U	**4.3**
10/31/2019	0.35 U	**0.32 I**	**0.37 I**	**2.6**

- <GCTL
- >GCTL
- >NADC

ADP limited to ≥2017 data. See report for more historical data.

AECOM

HS2 (Air Sparge Area) IGM Activities

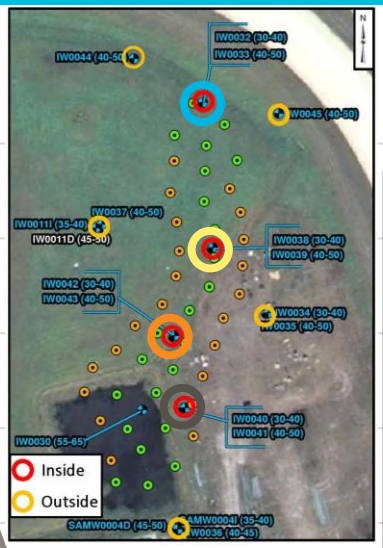
Semi-annual Performance Monitoring

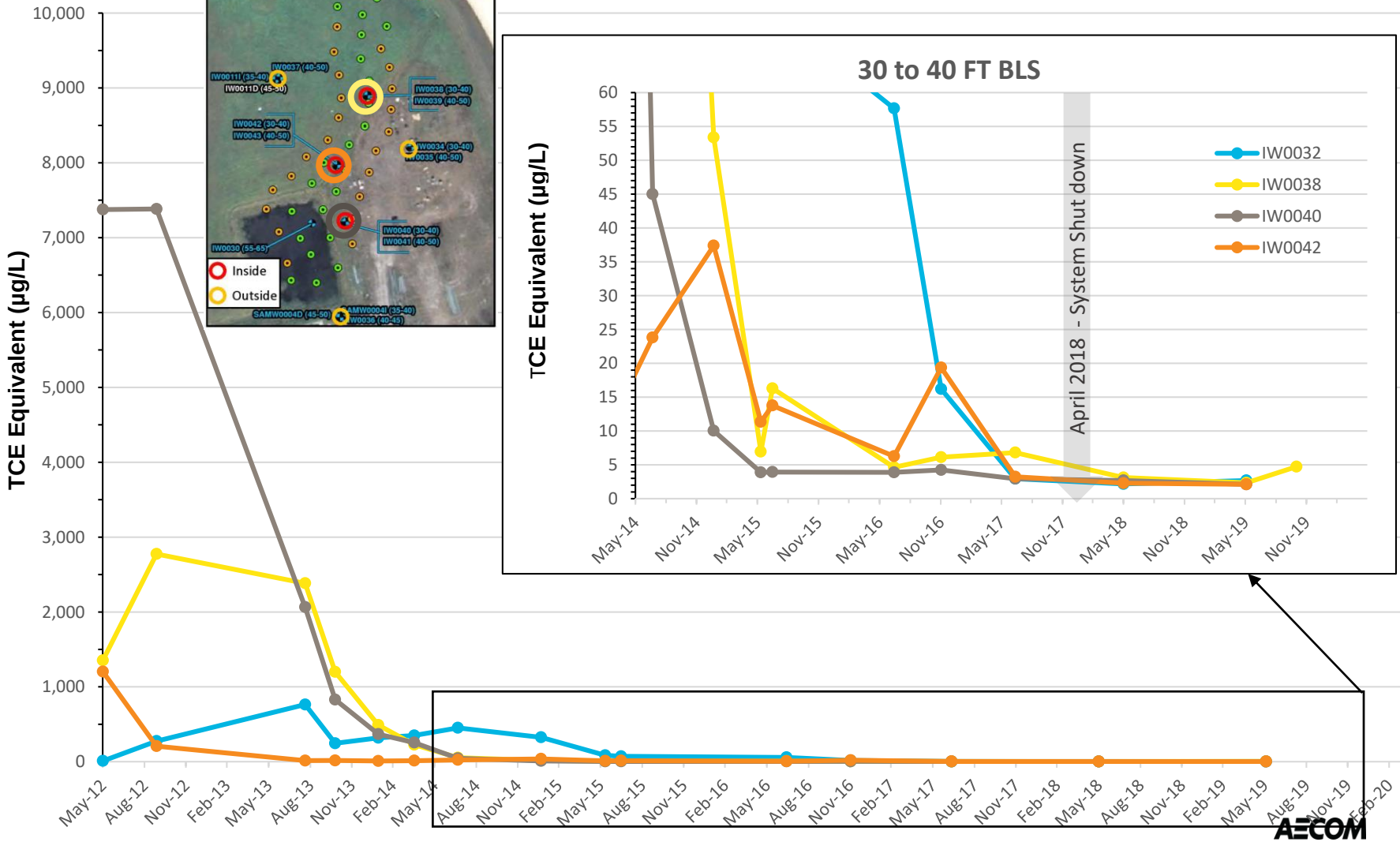
- Semi-annual analytical results indicate decreases in VOC mass (decreasing concentrations) at select locations when compared to concentrations from DPT investigations (2016-2018)
- No or limited change in overall plume footprints
- Plume extent maps will be revised following annual performance monitoring event (March) and LTM biennial sampling (May)

HS2 (Air Sparge Area) IGM Activities

Semi-annual Performance Monitoring

The next annual sampling event is schedule for Mar 2020

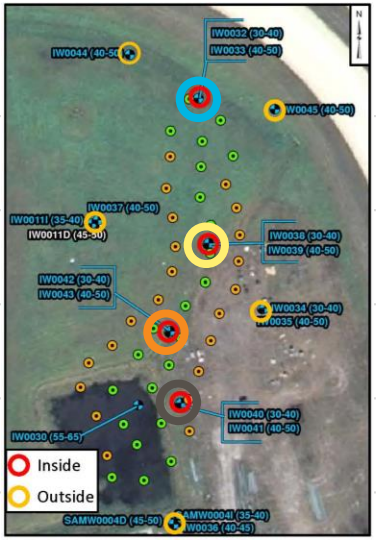


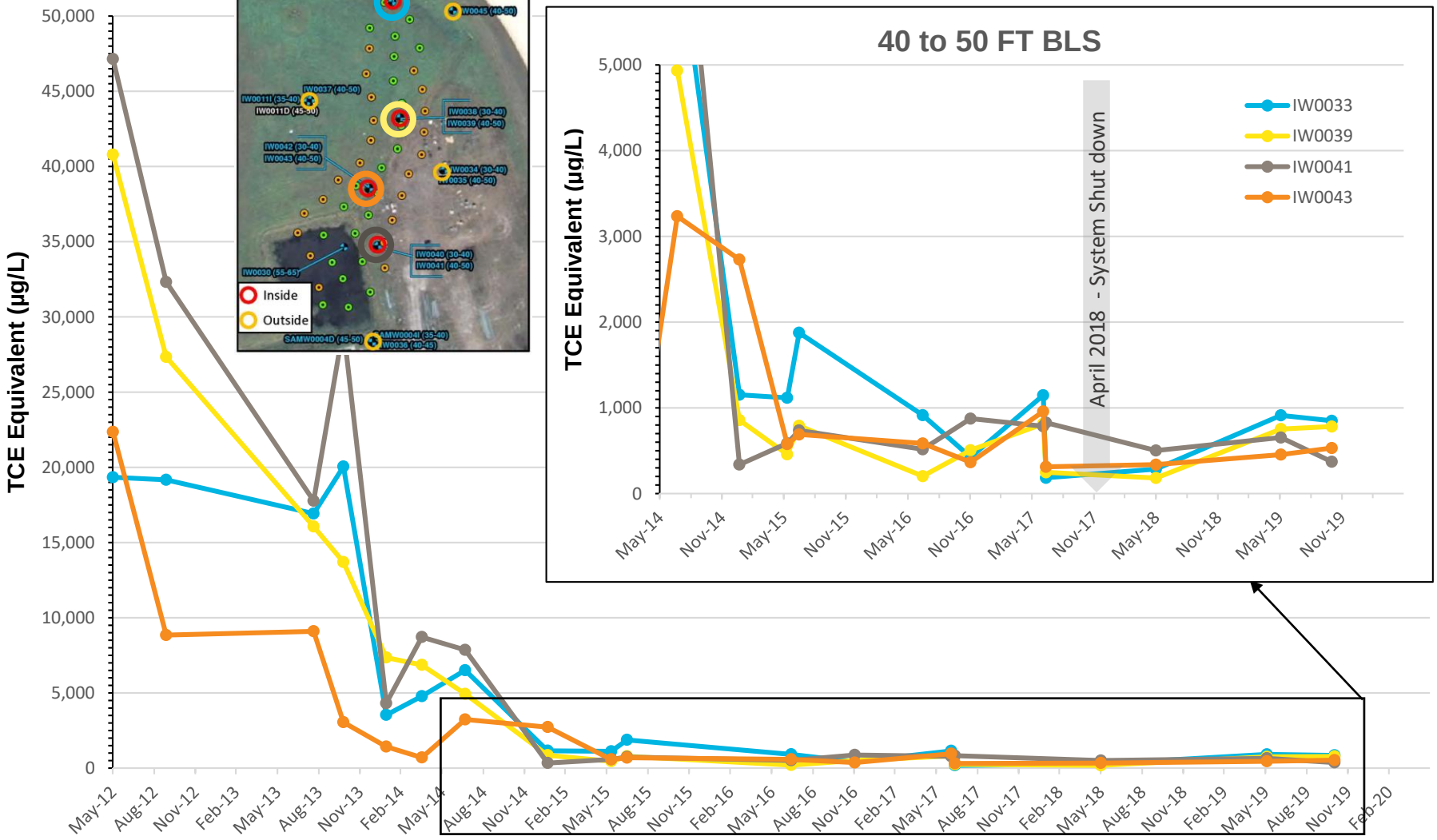


AECOM

HS2 (Air Sparge Area) IGM Activities

Semi-annual Performance Monitoring





AECOM

HS2 (Air Sparge Area) IGM Activities

Summary of Semi-annual Performance Monitoring

2

- 30-40 ft BLS:
  - TCE: less than GCTL
  - tDCE: less than GCTL
  - cDCE: less than GCTL
  - VC: SAMW0004I (15.9 µg/L) exceeded GCTL - increase since Mar 2019 (5.6 µg/L)
- 40-50 ft BLS:
  - TCE: less than GCTL
  - tDCE: less than GCTL
  - cDCE: IW0037 (135 µg/L), IW0039 (198 µg/L), IW0043 (149 µg/L) exceeded GCTL
  - VC: exceeded GCTL - overall decrease since Mar 2019

HS2 (Air Sparge Area) IGM Activities

- Exit Strategy
  - Continue with previously established path forward of interim groundwater monitoring (IGM) for Air Sparge Area

- **Test Consensus**
  - The air sparge system to remain off
  - Continue IGM on an annual and semiannual basis (as presented) for select CVOCs:
    - TCE, cDCE, tDCE, and VC

2020 Sampling and Analysis Plan

System Monitored	Location	Screen Interval (ft BLS)	Frequency	Analytical Parameters
Air Sparge Area	MLPV-IW0011I	35 - 40	Semi-Annual	TCE cDCE tDCE VC
	MLPV-IW0032	30 - 40	Annual	
	MLPV-IW0033	40 -50	Semi-Annual	
	MLPV-IW0034	30 - 40	Semi-Annual	
	MLPV-IW0035	40 - 50	Semi-Annual	
	MLPV-IW0036	40 - 45	Semi-Annual	
	MLPV-IW0037	40 - 50	Semi-Annual	
	MLPV-IW0038	30 - 40	Annual	
	MLPV-IW0039	40 - 50	Semi-Annual	
	MLPV-IW0040	30 - 40	Annual	
	MLPV-IW0041	40 - 50	Semi-Annual	
	MLPV-IW0042	30 - 40	Annual	
	MLPV-IW0043	40 - 50	Semi-Annual	
	MLPV-IW0044	40 - 50	Semi-Annual	
	MLPV-IW0045	40 - 50	Semi-Annual	
	MLPV-SAMW0004D	45 - 50	Semi-Annual	
	MLPV-SAMW0004I	35 - 40	Semi-Annual	

Annual: March 2020
Semi-annual: March 2020 and September 2020

Biosparge System Area

Biosparge System Area Activities – O&M

Biosparge Area System Overview

- System History/Objective
  - System Installed in 2005 to address areas of VC concentrations > 100 µg/L
  - Goal is to mitigate potential discharge to adjacent wetlands
  - Create zone of elevated DO to promote aerobic biooxidation of VC
  - Operate until plume collapse is observed
  - System overview/layout: 31 biosparge wells over 510 linear ft
    - Zone/Leg 1: ASW01 through ASW13 (Screened 48-50 ft BLS)
    - Zone/Leg 2: ASW14 through ASW25 (Screened 48-50 ft BLS)
    - Zone/Leg 5: ASW26 through ASW31(Screened 46-48 ft BLS)
- Current Reporting Period: (251 Calendar Days)
- April 23, 2019 through December 30, 2019
- Target Operation for Compressor
  - Legs 1,2,5: 3 hours on/3 hours off operating simultaneously (12 total hours/day)
  - Target air flow rate = 3 to 5 standard cubic feet per minute (SCFM) per well
  - Zone/Leg 3 and Zone/Leg 4 air sparge zones inactive since April 25, 2018 (HS1 & HS2)

Biosparge System Area Activities – O&M

3

Biosparge Area System Layout

Legend

- Air Sparge Monitoring Well Location (screen interval [ft BLS])
- Biosparge Monitoring Well Location (screen interval [ft BLS])
- Long Term Monitoring Program Monitoring Well Location (screen interval [ft BLS])
- Abandoned Monitoring Well Location (screen interval [ft BLS])
- Other Monitoring Well Location (screen interval [ft BLS])
- Piezometer Location (screen interval [ft BLS])
- Biosparge Well Location
- Biosparge Expansion Well Location
- Air Sparge Well Location, Leg 3
- Air Sparge Well Location, Leg 4
- Junction Box
- Sparge Manifold Location (not to scale)
- Equipment Building
- Biosparge Header Pipe - Leg 1
- Biosparge Header Pipe - Leg 2
- Biosparge Expansion Piping - 2" Sch. 80 PVC
- Biosparge Expansion Piping - 1" Sch. 80 PVC
- Air Sparge Piping - 2, 4" SCH 80 PVC pipes
- Air Sparge Piping - 2, 4" High-Density Polyethylene (HDPE) pipes under Crawler Track
- Air Sparge Piping - 1" Flexhose
- Air Sparge Piping - 1" SCH 80 PVC from Manifold to Well
- Temporary Construction Fencing

Notes:
1. ft BLS indicates feet below land surface.
2. PVC indicates polyvinyl chloride.
3. Biosparge header piping placement is approximate.
4. Source of 2015 aerial: Florida Department of Transportation Aerial Photo Lookup System website.

AECOM

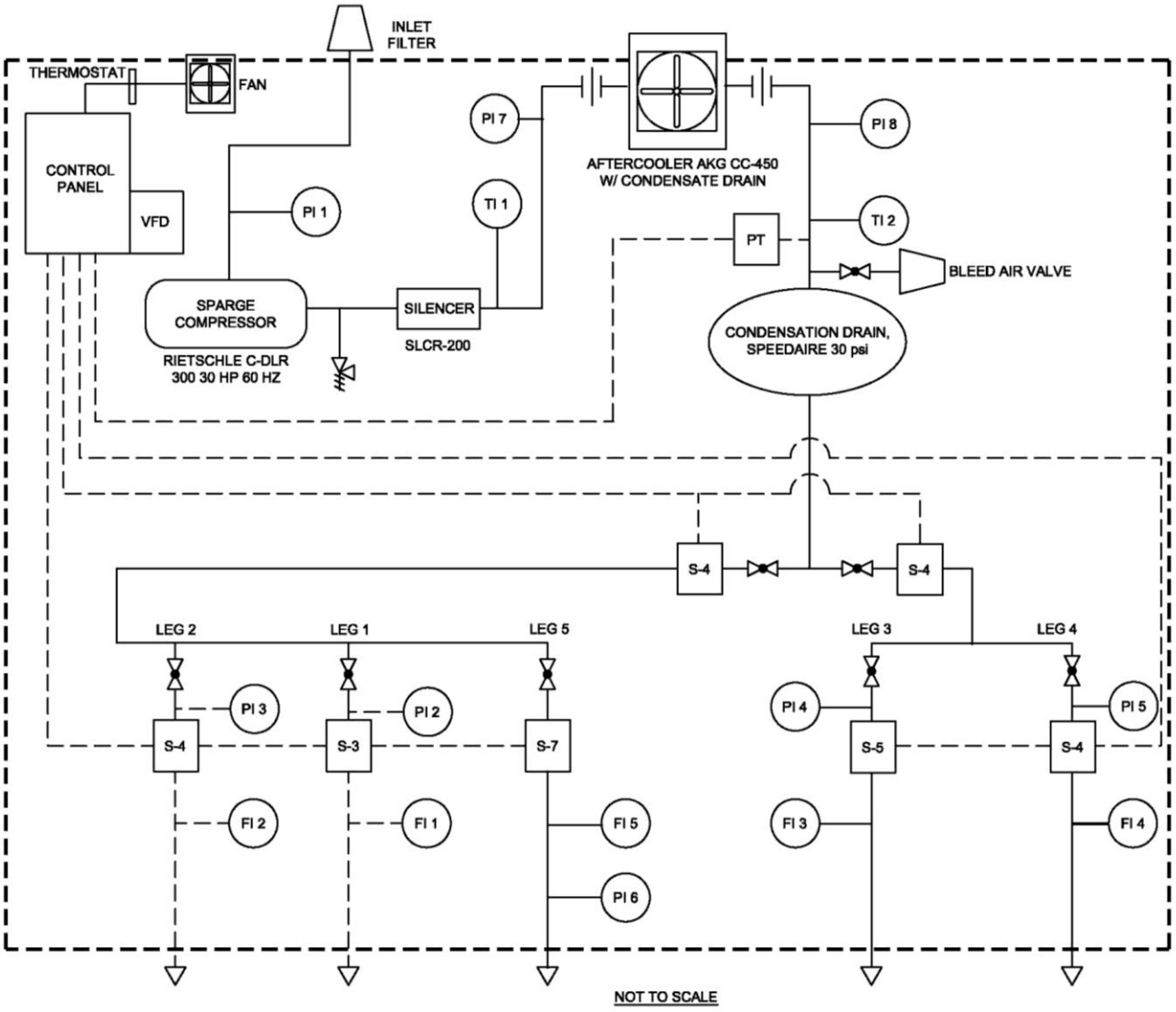
Biosparge System Area Activities – O&M

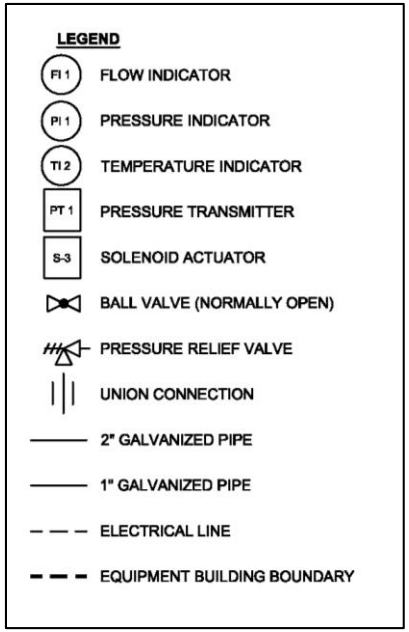
Biosparge System Maintenance Activities (May 2019 – Dec 2019)

- Monthly Operation and Maintenance (O&M) Activities (Typical)
  - Equipment maintenance per manufacturer's specifications or as needed
  - Daily system telemetry monitoring
  - Collect equipment shed readings operational data
  - Biosparge field readings
    - Pressure, temperature, and flow to ASW/BSW treatment wells
    - DO, temperature, and oxidation-reduction potential (ORP) measurements from selected piezometers and monitoring wells
- Non-routine Maintenance Performed
  - Telemetry wireless router replaced
  - Automatic condensation drain installed
  - Post Heat Exchanger pressure gauge replaced (PI-8)
  - Mainline pressure gauge added (PI-7/pre-dilution)
  - Pressure transmitter replaced (PT)
  - Extensive cleaning/clearing of equipment shed, surrounding vicinity, and wellfield
  - ASW Cleanouts (ASW01 through ASW25)

Biosparge System Area Activities – O&M

Biosparge System Process 7 Instrumentation Diagram



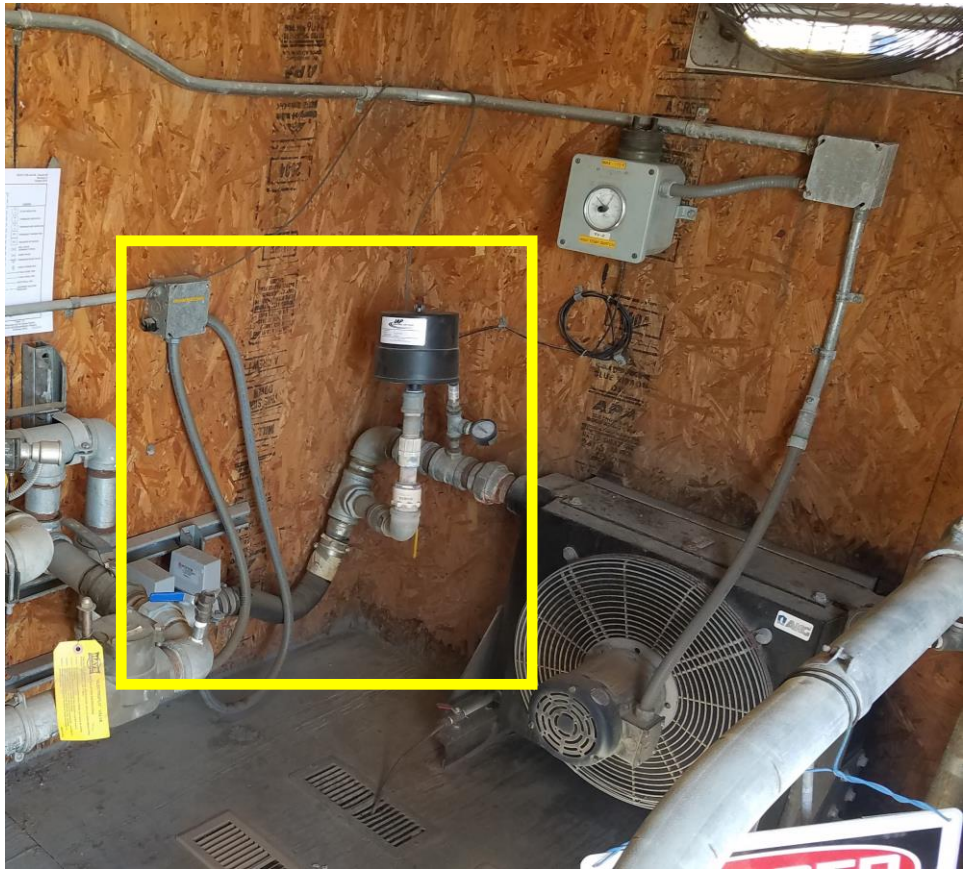


AECOM

Biosparge System Area Activities – O&M

Condensation Separator Installation – Oct 29, 2019

3



System Manifold Before Condensation Separator Installation

Manifold After Installation

AECOM

Biosparge System Area Activities – O&M

Biosparge System Maintenance Activities (May 2019 – Dec 2019)

3

11 Planned Visits/3 Unscheduled Repair Visits

- May 29, 2019 – Routine O&M event
- June 27, 2019 – Routine O&M event
- July 31, 2019 – Routine O&M event
- August 27, 2019 – Routine O&M event
- September 13, 2019 – ASW cleanout event (ASW01 through ASW25 only)
- September 24, 2019 – Routine O&M event
- October 16, 2019 – Handover to AECOM visit and telemetry router replaced
- October 28, 2019 – Routine O&M event, system deactivated for repairs/groundwater sampling following O&M
- October 29, 2019 – Planned system maintenance/upgrades
  - Speedaire 2-inch Aluminum Automatic Condensation Drain installed after Heat Exchanger
  - Compressor's inlet filter (ZVF-50) replaced
  - Extensive weed-eating to compound and wellfield completed
  - Heat Exchanger vents cleaned

Biosparge System Area Activities – O&M

Biosparge System Maintenance Activities (May 2019 – Dec 2019)

3

- November 4, 2019- Supplemental Repair/System Restart event
  - Faulty pressure relief valve replaced with Watts M30, 30 pounds per square inch (psi) setpoint
  - Replaced pressure gauge PI-7/8 with PRM 0-30 psi gauge
  - Increased flow/pressure slightly to Legs 1 and 2, which were lower than usual
- November 7, 2019 – Brief troubleshooting visit to investigate pressure transmitter, determined transmitter needed to be replaced
- November 26, 2019 – Routine O&M event
- November 27, 2019 – Replaced pressure transmitter (Dwyer 628 series), pressure shows on programmable logic controller (PLC) after repair but not remotely
- December 30, 2019 – Routine O&M, discovered compressor was seized, system fully deactivated for repairs
  - Repaired telemetry unit. Pressure available remotely on telemetry again

Biosparge System Area Activities – O&M

Biosparge Operating Parameters (Apr 23 through Dec 30, 2019)

3

- Average Flow (per legs 1, 2, and 5)
  - Leg 1 = 17.0 – 24.6 SCFM (Average = 21.3 SCFM)
  - Leg 2 = 17.0 – 25.0 SCFM (Average = 19.1 SCFM)
  - Leg 5 = 17.0 – 24.0 SCFM (Average = 22.0 SCFM)
- Average Pressure (per leg)
  - Leg 1 = 22.0 – 25.0 psi (Average = 22.7 psi)
  - Leg 2 = 23.0 – 25.0 psi (Average = 24.1 psi)
  - Leg 5 = 21.5 – 23.0 psi (Average = 21.7 psi)
- Average DO (milligrams per liter [mg/L]) Readings
  - Upgradient monitoring wells (ASMW01-ASMW03) = 2.69 mg/L
  - Downgradient monitoring wells (ASMW04-ASMW06) = 2.41 mg/L
  - Piezometer ASPZ01R = 2.04 mg/L
  - Piezometer ASPZ02 = 3.75 mg/L
  - Previously reported site background DO <0.50 mg/L
    - Based on data from IW57, IW58, and IW59 (upgradient)
- Radius of influence (ROI) was previously estimated to be > 25 ft based on Upgradient/Downgradient well readings
  - Design ROI ~ 7.5 ft (15-ft well spacing)

Biosparge System Area Activities – O&M

System Uptime/Downtime Summary

3

- Runtime (%) = 81.8% for Period of Apr 23 through Dec 30, 2019 (251 Operational Days Possible)
  - Days shut down for sampling/ASW cleanout activities = 9 (3.6 % of downtime)
  - Minor system repairs and miscellaneous shutdowns = 5 (1.9 % of downtime)
  - Major failure = November 28, 2019 through December 30, 2019. System pressure not showing remotely, no other alarm notifications (32 days/12.7 % of runtime)
  - Total operational days of downtime = 46
- Outstanding Maintenance/Repair Items
  - Broken in-well pitot tubes for ASW02, ASW07, ASW08, ASW13 will be replaced during January 2020 O&M visit
  - Compressor removed for repair evaluation in January 2020

Biosparge System Area Activities – Monitoring

Performance Monitoring

- Semi-annual Performance Monitoring Well Sampling
  - October 31 and November 1, 2019
    - First sampling event to fulfill 1 year of IGM
    - System shut down 72 hours before sampling
  - 13 wells
  - Select CVOC analysis
    - PCE, TCE, cDCE, tDCE, and VC (based on previously approved analyte list)

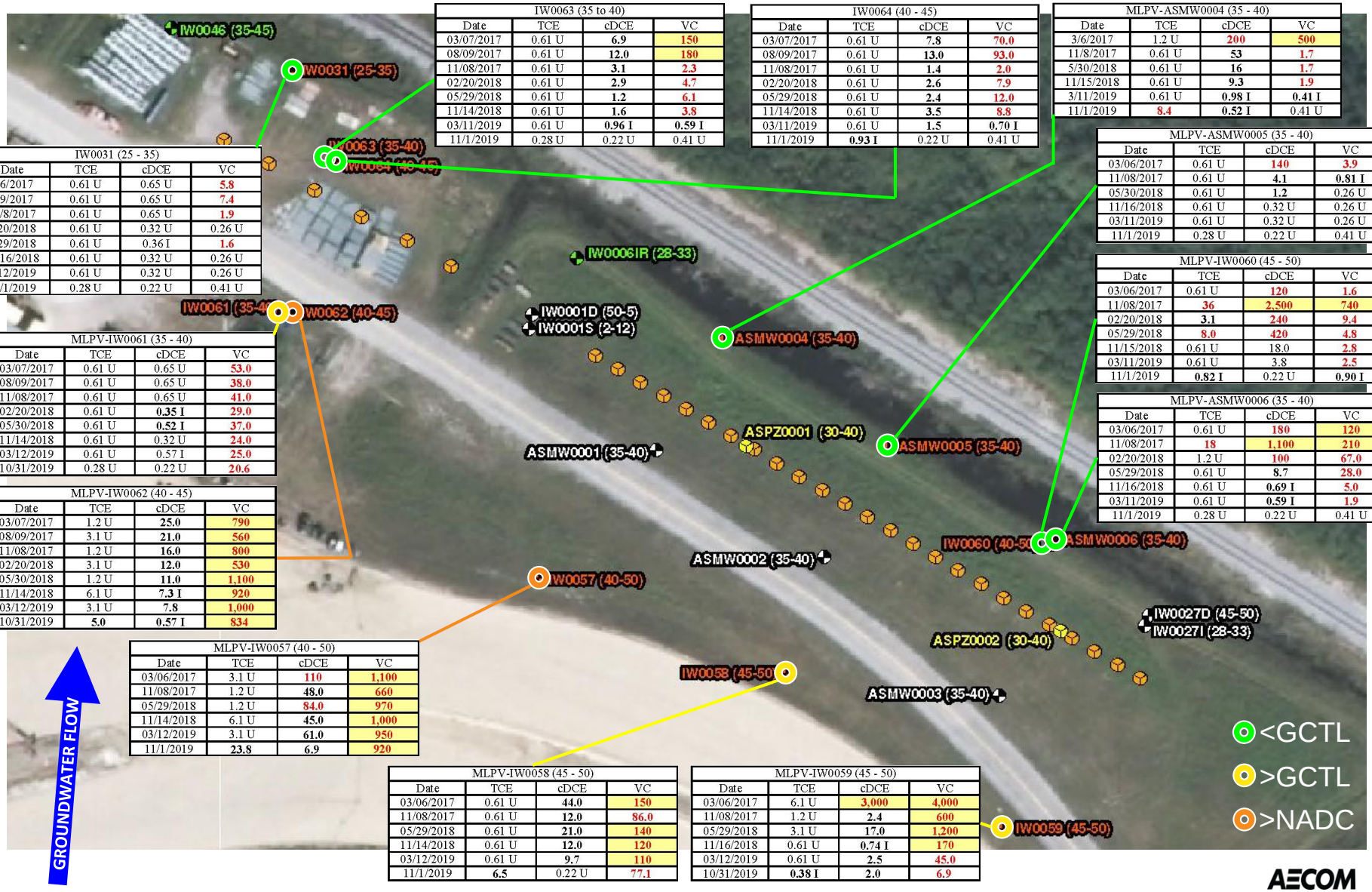
2019 Sampling and Analysis Plan

System Monitored	Location	Screen Interval (ft BLS)	Frequency	Analytical Parameters
Biosparge Barrier	IW0057	40 to 50	Semi-Annual	CVOCs
	IW0058	45 to 50		
	IW0059	45 to 50		
	IW0060	40 to 50		
	ASMW0004	35 to 40		
	ASMW0005	35 to 40		
	ASMW0006	35 to 40		
	IW0031	25 to 35		
	IW0061	35 to 40		
	IW0062	40 to 45		
	IW0063	35 to 40		
	IW0064	40 to 45		

Biosparge System Area Activities – Monitoring

3

Performance Monitoring



IW0031 (25 - 35)

Date	TCE	cDCE	VC
3/6/2017	0.61 U	0.65 U	5.8
8/9/2017	0.61 U	0.65 U	7.4
11/8/2017	0.61 U	0.65 U	1.9
2/20/2018	0.61 U	0.32 U	0.26 U
5/29/2018	0.61 U	0.36 I	1.6
11/16/2018	0.61 U	0.32 U	0.26 U
3/12/2019	0.61 U	0.32 U	0.26 U
11/1/2019	0.28 U	0.22 U	0.41 U

IW0063 (35 to 40)

Date	TCE	cDCE	VC
03/07/2017	0.61 U	6.9	150
08/09/2017	0.61 U	12.0	180
11/08/2017	0.61 U	3.1	2.3
02/20/2018	0.61 U	2.9	4.7
05/29/2018	0.61 U	1.2	6.1
11/14/2018	0.61 U	1.6	3.8
03/11/2019	0.61 U	0.96 I	0.59 I
11/1/2019	0.28 U	0.22 U	0.41 U

IW0064 (40 - 45)

Date	TCE	cDCE	VC
03/07/2017	0.61 U	7.8	70.0
08/09/2017	0.61 U	13.0	93.0
11/08/2017	0.61 U	1.4	2.0
02/20/2018	0.61 U	2.6	7.9
05/29/2018	0.61 U	2.4	12.0
11/14/2018	0.61 U	3.5	8.8
03/11/2019	0.61 U	1.5	0.70 I
11/1/2019	0.93 I	0.22 U	0.41 U

MLPV-ASMW0004 (35 - 40)

Date	TCE	cDCE	VC
3/6/2017	1.2 U	200	500
11/8/2017	0.61 U	53	1.7
5/30/2018	0.61 U	16	1.7
11/15/2018	0.61 U	9.3	1.9
3/11/2019	0.61 U	0.98 I	0.41 I
11/1/2019	8.4	0.52 I	0.41 U

MLPV-ASMW0005 (35 - 40)

Date	TCE	cDCE	VC
03/06/2017	0.61 U	140	3.9
11/08/2017	0.61 U	4.1	0.81 I
05/30/2018	0.61 U	1.2	0.26 U
11/16/2018	0.61 U	0.32 U	0.26 U
03/11/2019	0.61 U	0.32 U	0.26 U
11/1/2019	0.28 U	0.22 U	0.41 U

MLPV-IW0060 (45 - 50)

Date	TCE	cDCE	VC
03/06/2017	0.61 U	120	1.6
11/08/2017	36	2,500	740
02/20/2018	3.1	240	9.4
05/29/2018	8.0	420	4.8
11/15/2018	0.61 U	18.0	2.8
03/11/2019	0.61 U	3.8	2.5
11/1/2019	0.82 I	0.22 U	0.90 I

MLPV-ASMW0006 (35 - 40)

Date	TCE	cDCE	VC
03/06/2017	0.61 U	180	120
11/08/2017	18	1,100	210
02/20/2018	1.2 U	100	67.0
05/29/2018	0.61 U	8.7	28.0
11/16/2018	0.61 U	0.69 I	5.0
03/11/2019	0.61 U	0.59 I	1.9
11/1/2019	0.28 U	0.22 U	0.41 U

MLPV-IW0061 (35 - 40)

Date	TCE	cDCE	VC
03/07/2017	0.61 U	0.65 U	53.0
08/09/2017	0.61 U	0.65 U	38.0
11/08/2017	0.61 U	0.65 U	41.0
02/20/2018	0.61 U	0.35 I	29.0
05/30/2018	0.61 U	0.52 I	37.0
11/14/2018	0.61 U	0.32 U	24.0
03/12/2019	0.61 U	0.57 I	25.0
10/31/2019	0.28 U	0.22 U	20.6

MLPV-IW0062 (40 - 45)

Date	TCE	cDCE	VC
03/07/2017	1.2 U	25.0	790
08/09/2017	3.1 U	21.0	560
11/08/2017	1.2 U	16.0	800
02/20/2018	3.1 U	12.0	530
05/30/2018	1.2 U	11.0	1,100
11/14/2018	6.1 U	7.3 I	920
03/12/2019	3.1 U	7.8	1,000
10/31/2019	5.0	0.57 I	834

MLPV-IW0057 (40 - 50)

Date	TCE	cDCE	VC
03/06/2017	3.1 U	110	1,100
11/08/2017	1.2 U	48.0	660
05/29/2018	1.2 U	84.0	970
11/14/2018	6.1 U	45.0	1,000
03/12/2019	3.1 U	61.0	950
11/1/2019	23.8	6.9	920

MLPV-IW0058 (45 - 50)

Date	TCE	cDCE	VC
03/06/2017	0.61 U	44.0	150
11/08/2017	0.61 U	12.0	86.0
05/29/2018	0.61 U	21.0	140
11/14/2018	0.61 U	12.0	120
03/12/2019	0.61 U	9.7	110
11/1/2019	6.5	0.22 U	77.1

MLPV-IW0059 (45 - 50)

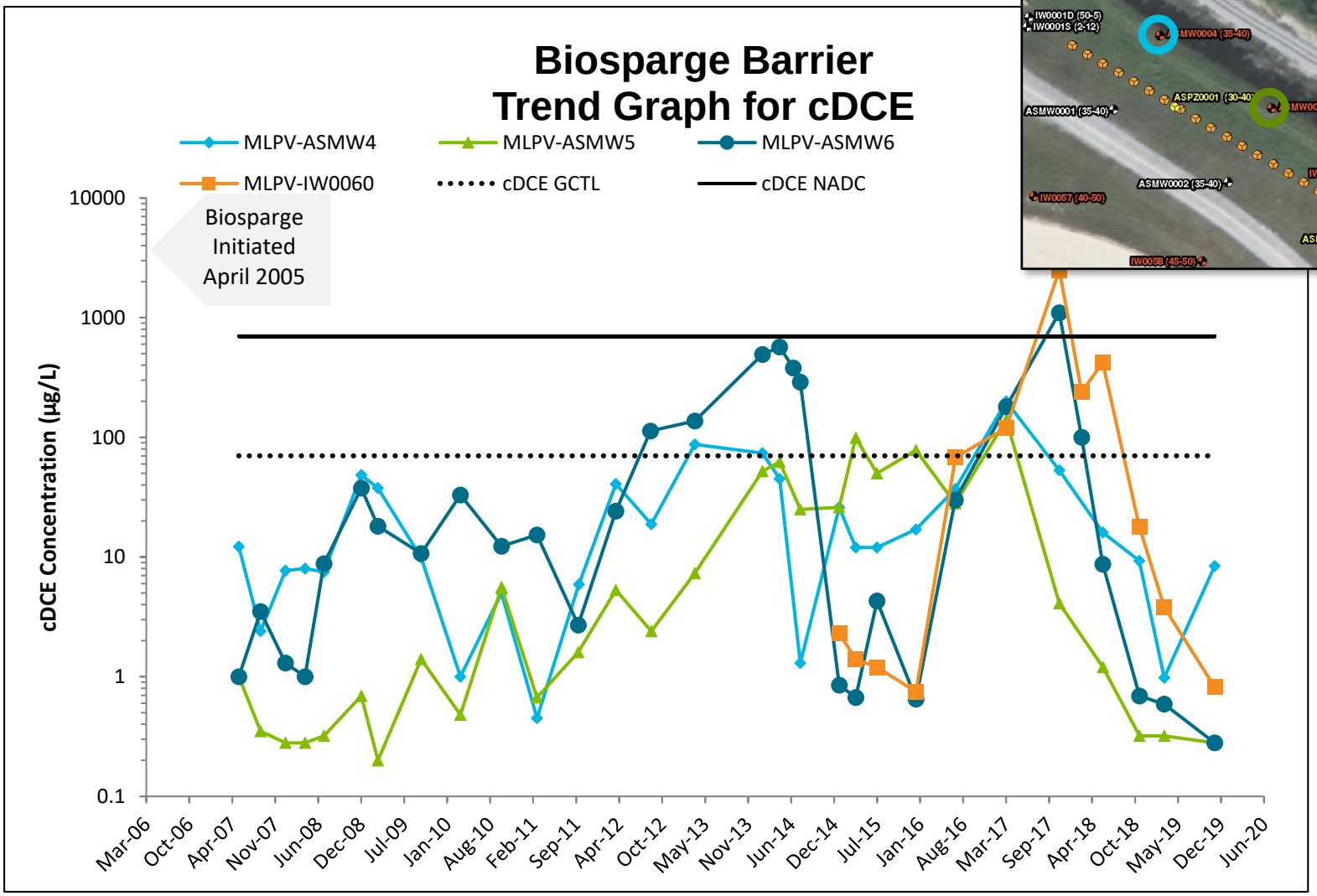
Date	TCE	cDCE	VC
03/06/2017	6.1 U	3,000	4,000
11/08/2017	1.2 U	2.4	600
05/29/2018	3.1 U	17.0	1,200
11/16/2018	0.61 U	0.74 I	170
03/12/2019	0.61 U	2.5	45.0
10/31/2019	0.38 I	2.0	6.9

AECOM

Biosparge System Area Activities – Monitoring

3

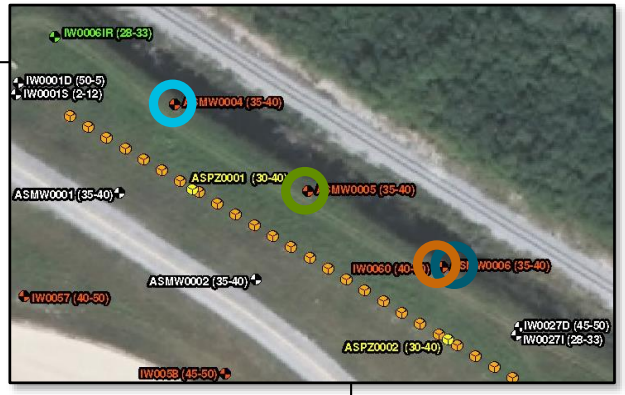
Performance Monitoring

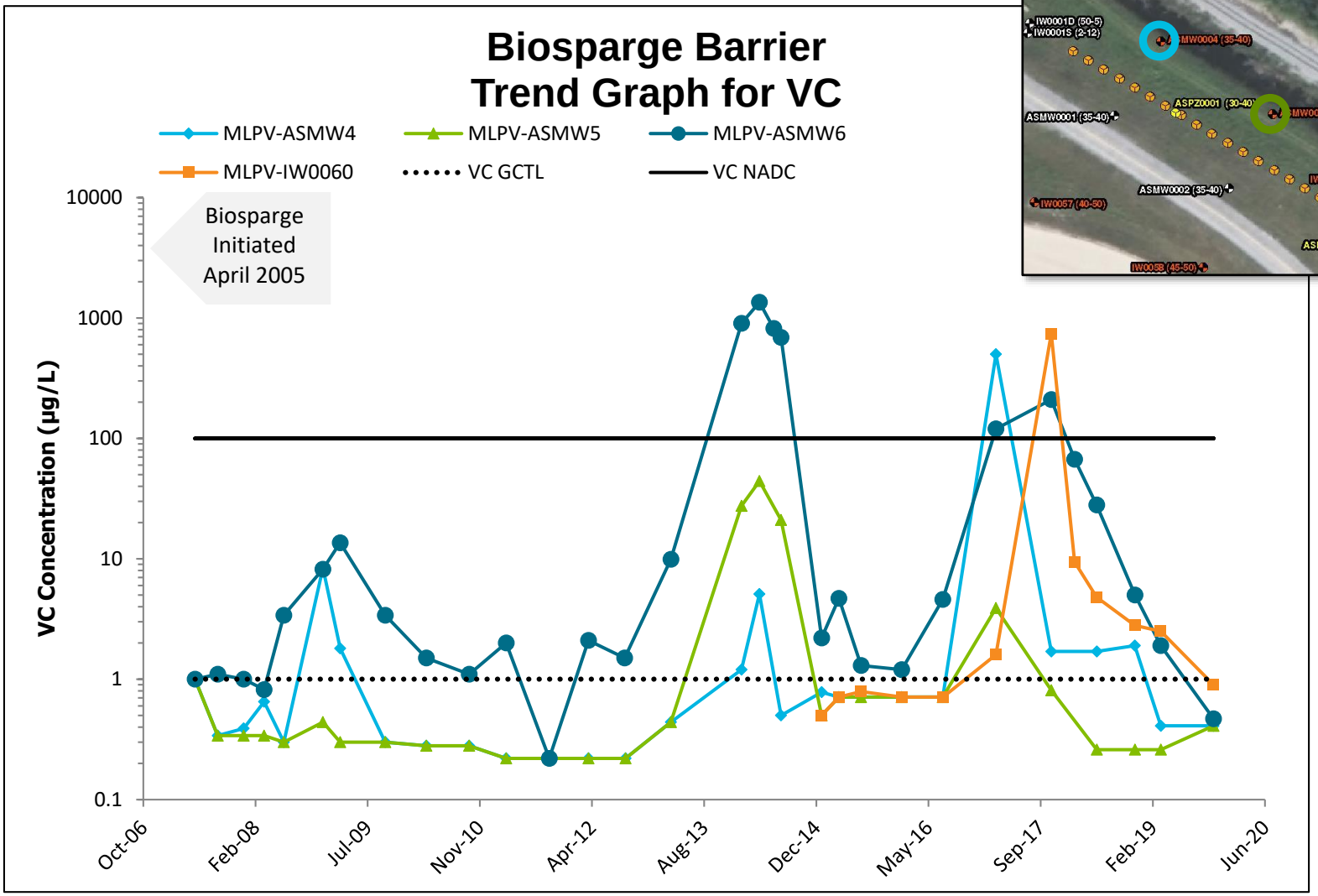


AECOM

Biosparge System Area Activities – Monitoring

Performance Monitoring





AECOM

Biosparge System Area Activities – Monitoring

Performance Monitoring

3

Biosparge Barrier Expansion Trend Graph for VC

MLPV-IW0031
MLPV-IW0063
MLPV-IW0064
VC GCTL
VC NADC

Biosparge Initiated April 2005

Expansion Startup Feb 2016

VC Concentration (µg/L)

1000
100
10
1
0.1

Sep-11
Apr-12
Oct-12
May-13
Nov-13
Jun-14
Dec-14
Jul-15
Jan-16
Aug-16
Mar-17
Sep-17
Apr-18
Oct-18
May-19
Dec-19
Jun-20

AECOM

Biosparge System Area Activities – Monitoring

Summary of Semi-annual Analytical Results

3

- Original Biosparge Area
  - Sampled ASMW0004, ASMW0005, ASMW0006, IW0057, IW0058, IW0059, IW0060
    - VC concentrations less than GCTL in performance wells, except wells upgradient of barrier: IW0057 (920 µg/L), IW0058 (77.1 µg/L), and IW0059 (6.9 µg/L)
    - VC concentrations decreasing in wells with exceedances
  - Remaining concentrations are less than GCTLs
  - Overall decrease in CVOC concentrations
- Expansion Biosparge Area
  - Sampled IW0031, IW0061, IW0062, IW0063, IW0064
    - VC concentrations less than GCTL in performance wells, except wells upgradient of barrier: IW0061 (20.6 µg/L) and IW0062 (834 µg/L)
      - VC concentrations decreasing in wells with exceedances
    - Remaining concentrations are less than GCTLs
    - Overall decrease in CVOC concentrations

Biosparge System Area Activities – Monitoring

- Exit Strategy
  - Continue interim groundwater monitoring (IGM) for both biosparge areas
- **Test Consensus**
  - Following the repair of the biosparge system, continue operation
  - Continue IGM on a semi-annual basis (as presented) for select CVOCs
    - TCE, cDCE, tDCE, and VC

2020 Sampling and Analysis Plan

System Monitored	Location	Screen Interval (ft BLS)	Frequency	Analytical Parameters
Biosparge Area	IW0057	40 to 50	Semi-Annual: March 2020 September 2020	TCE cDCE tDCE VC
	IW0058	45 to 50		
	IW0059	45 to 50		
	IW0060	40 to 50		
	ASMW0004	35 to 40		
	ASMW0005	35 to 40		
	ASMW0006	35 to 40		
	IW0031	25 to 35		
	IW0061	35 to 40		
	IW0062	40 to 45		
	IW0063	35 to 40		
	IW0064	40 to 45		

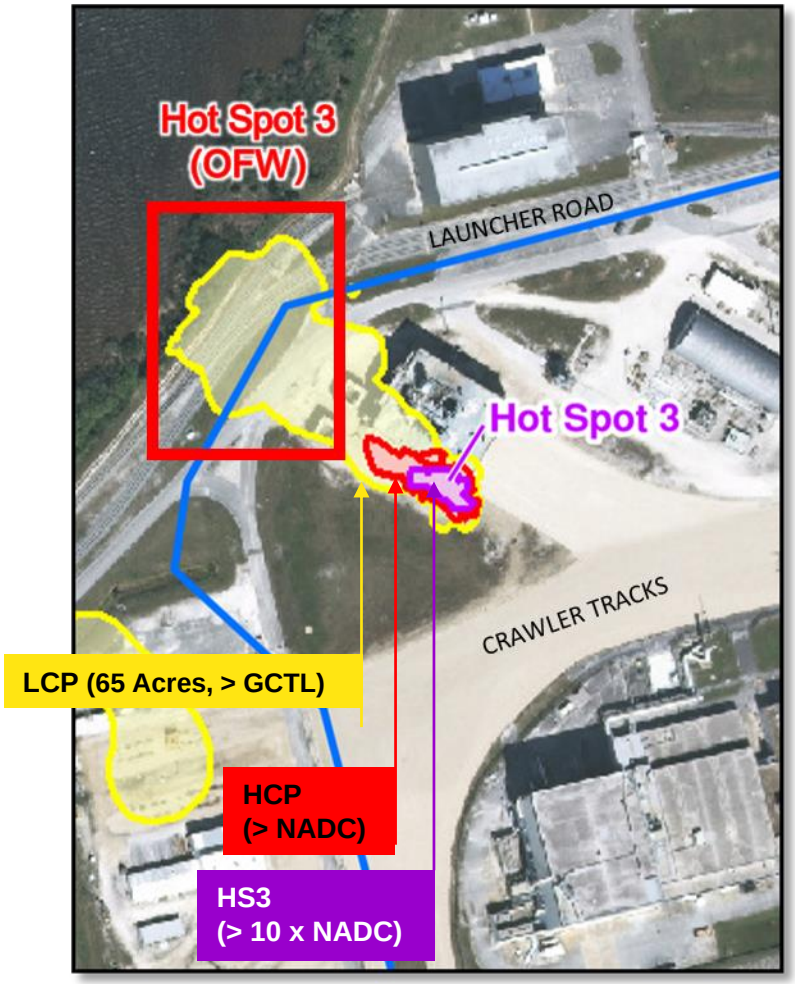
HS3 Area Background

HS3 and HS3 OFW Area

August 2013 and April 2015

2013 **2014** **2015**

- Aug 2013 - Environmental Conditions Assessment Report Update
  - Identified HS3 where area with CVOC concentrations > 10xNADC
- Apr 2015 - HS3 and HS4 Site Characterization ADP
  - Delineated TCE, cDCE, tDCE, VC
    - GCTL, NADC, 10xNADC including TCE Source Zone (SZ) area (1% solubility for TCE [11,000 µg/L])
  - Selected remedial technologies evaluated for HS3
  - Team consensus reached to install a well cluster near the OFW to evaluate if VC groundwater impacts may be impacting adjacent OFW



Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

AECOM

HS3 and HS3 OFW Area

Jan 2016 – Remedial Alternatives Evaluation

2013 2014 2015 **2016**

- Bioremediation selected to be implemented in 10xNADC area
  - Located partially under and south of the western MLP structure
  - Located around MLP footers
  - Located adjacent to crawler tracks
  - ~47 to 61 ft BLS the lithology is clayey sand with sandy clay and shell fragments

Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

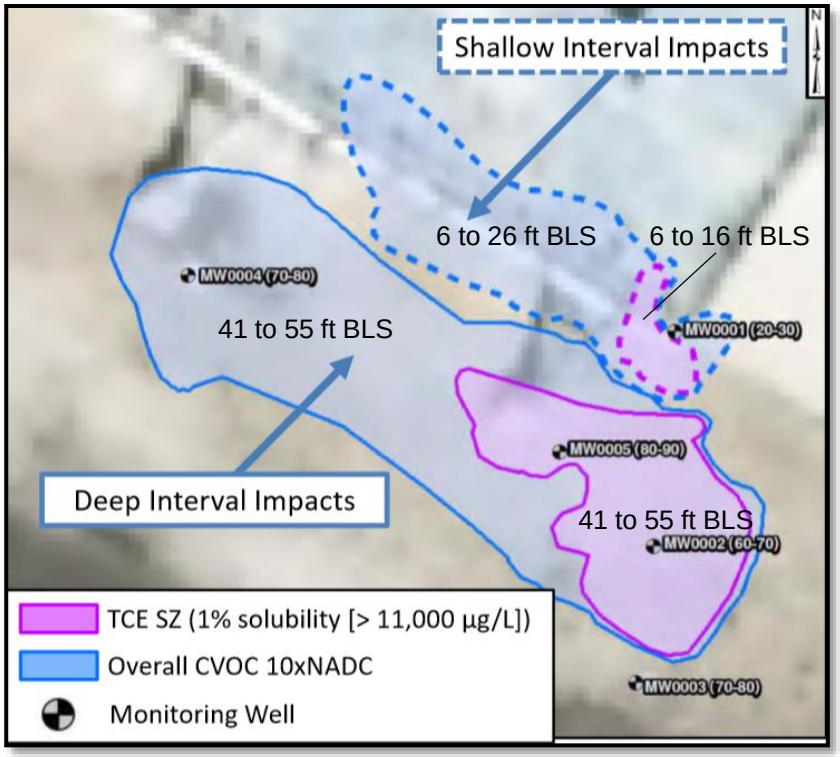
AECOM

HS3 and HS3 OFW Area

May 2016 & June 2017

2013 | 2014 | 2015 | **2016** | 2017

- May 2016 – IMWP ADP
  - Pre-Implementation Work Plan proposed activities
    - Baseline DPT groundwater sampling, baseline UIC sampling, GPR survey
  - Biostimulation and bioaugmentation by low pressure and high pressure injection
  - Performance monitoring by monitoring well installation
- Jun 2017 – Implementation WP (no ADP)
  - Supplemental DPT sampling
    - TCE SZ area increased from 0.015 acres (653 ft^2 - May 2016) to 0.023 acres (1,002 ft^2 - Jun 2017)
    - CVOC concentrations > 10xNADC (excluding SZ area) decreased from approximately 0.074 acres (3,223 ft^2 - May 2016) to approximately 0.068 acres (2,962 ft^2 - Jun 2017)



Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

AECOM

HS3 and HS3 OFW Area

Dec 2017 – Bioremediation IM CCR ADP

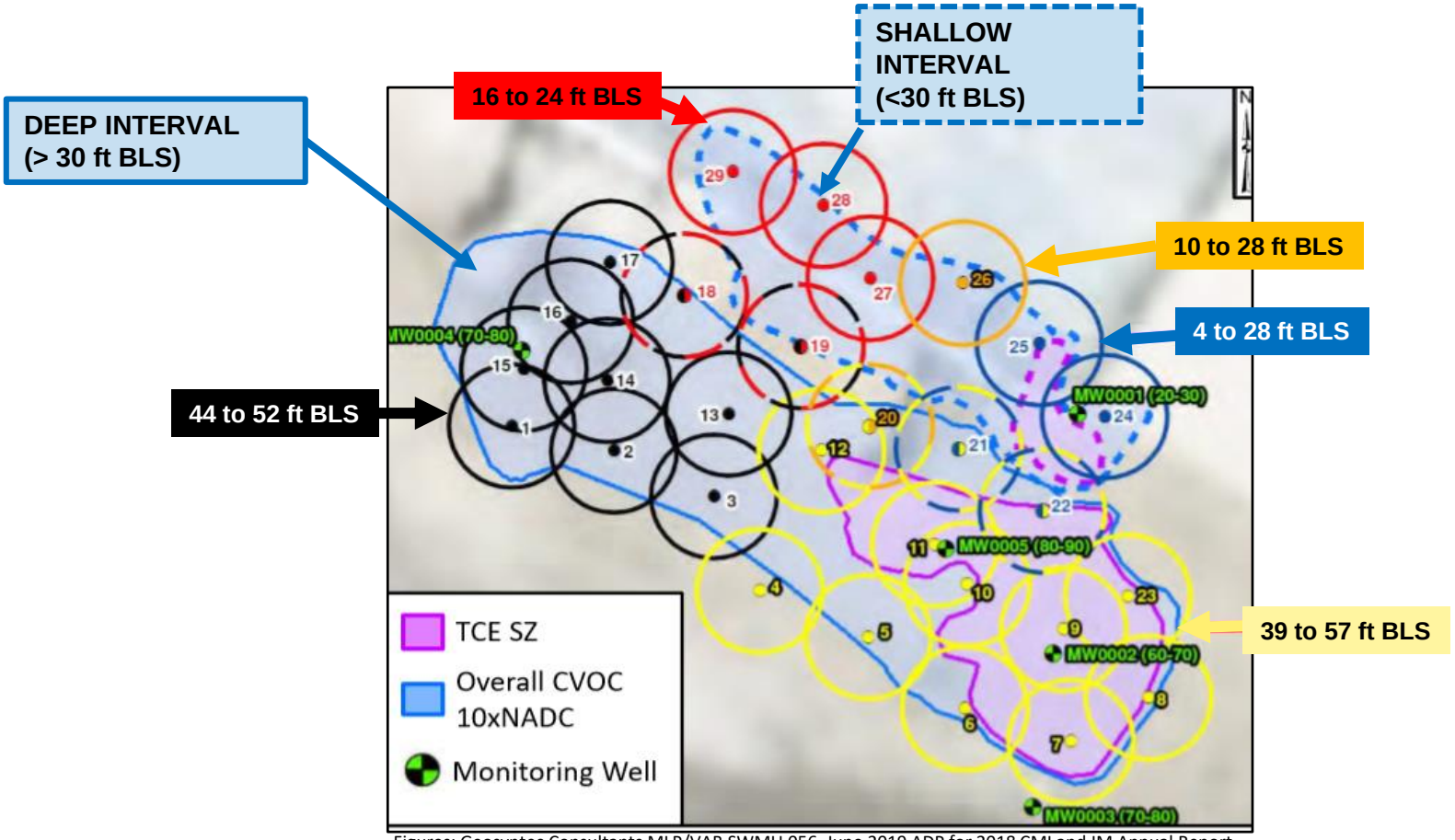
4

2013 2014 2015 2016 **2017**

- Bioremediation IM implemented Jul 17 to Aug 15, 2017
- Treatment area: TCE SZ and CVOCs 10xNADC
- 29 DPT injection locations
  - Low pressure injection (above 51 ft BLS)
  - High pressure injection (51 to 57 ft BLS)
- Total SRS®-SD diluted solution injected: 174,300 gallons (38 drums SRS®-SD)
- Total chase water injected: ~4,275 gallons
- Total KB-1 injected: ~43 liters
- Installation of 9 monitoring wells post-injection activities
  - Baseline sampling occurred Aug 25, 2017

HS3 and HS3 OFW Area

2013 2014 2015 2016 2017



Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

16 to 24 & 44 to 52 ft BLS | 4 to 28 & 39 to 57 ft BLS | 10 to 28 & 39 to 57 ft BLS

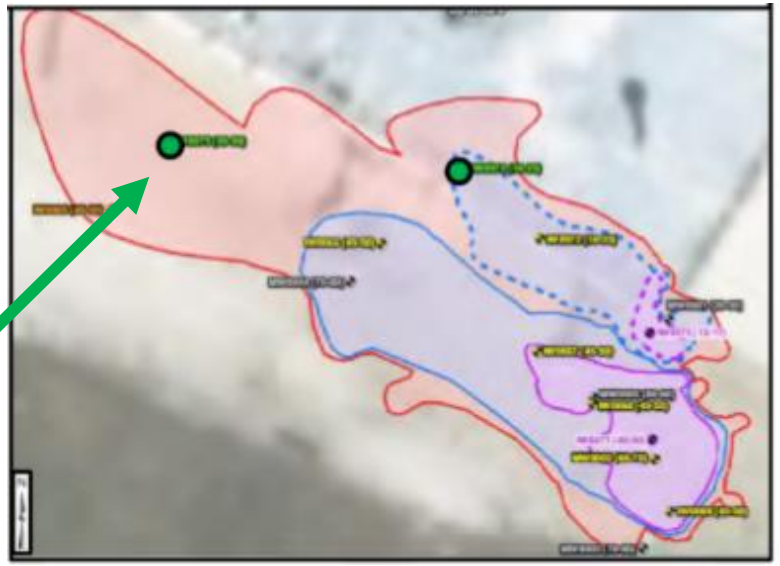
AECOM

HS3 and HS3 OFW Area

Bioremediation Performance Monitoring

2013 — 2014 — 2015 — 2016 — 2017 — **2018**

- Jan 2018 – Site Characterization: HS3 OFW Area ADP
  - Proposed to install two monitoring wells in the NADC plume to evaluate post-bioremediation IM plume collapse
    - Sampled Feb and Aug 2018
- Dec 2018 – HS3 Bioremediation Annual IM Report
  - Semi-annual performance monitoring
    - 9 or 10 monitoring wells sampled
  - Two monitoring wells installed
    - IW74 and IW75
  - CVOC mass reduction:
    - 80% to >99% in shallow interval
    - ~96% in deep interval
  - Total organic carbon (TOC) concentrations low in some areas



Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

HS3 and HS3 OFW Area

Aug 2019 – CMI and IM Report

4

- Performance monitoring well sampling
  - Feb 2019 –18 months post injection
    - Sampling 9 monitoring wells for CVOCs
    - No UIC monitoring
- DPT groundwater sampling
  - Mar 2019
  - 87 samples, 19 locations for CVOCs, and TOC at selected locations
- Evaluate post-bioremediation IM conditions (~1.5 years post-injection)
  - CVOC mass reduction from baseline to 18 months post injection
    ~80% to ~100% mass reduction for shallow intervals
    - ~94% mass reduction for deep intervals
    - Minimal change from Month 12 monitoring
  - Conditions in some areas appear favorable for ongoing reductions of remaining mass from single injection event

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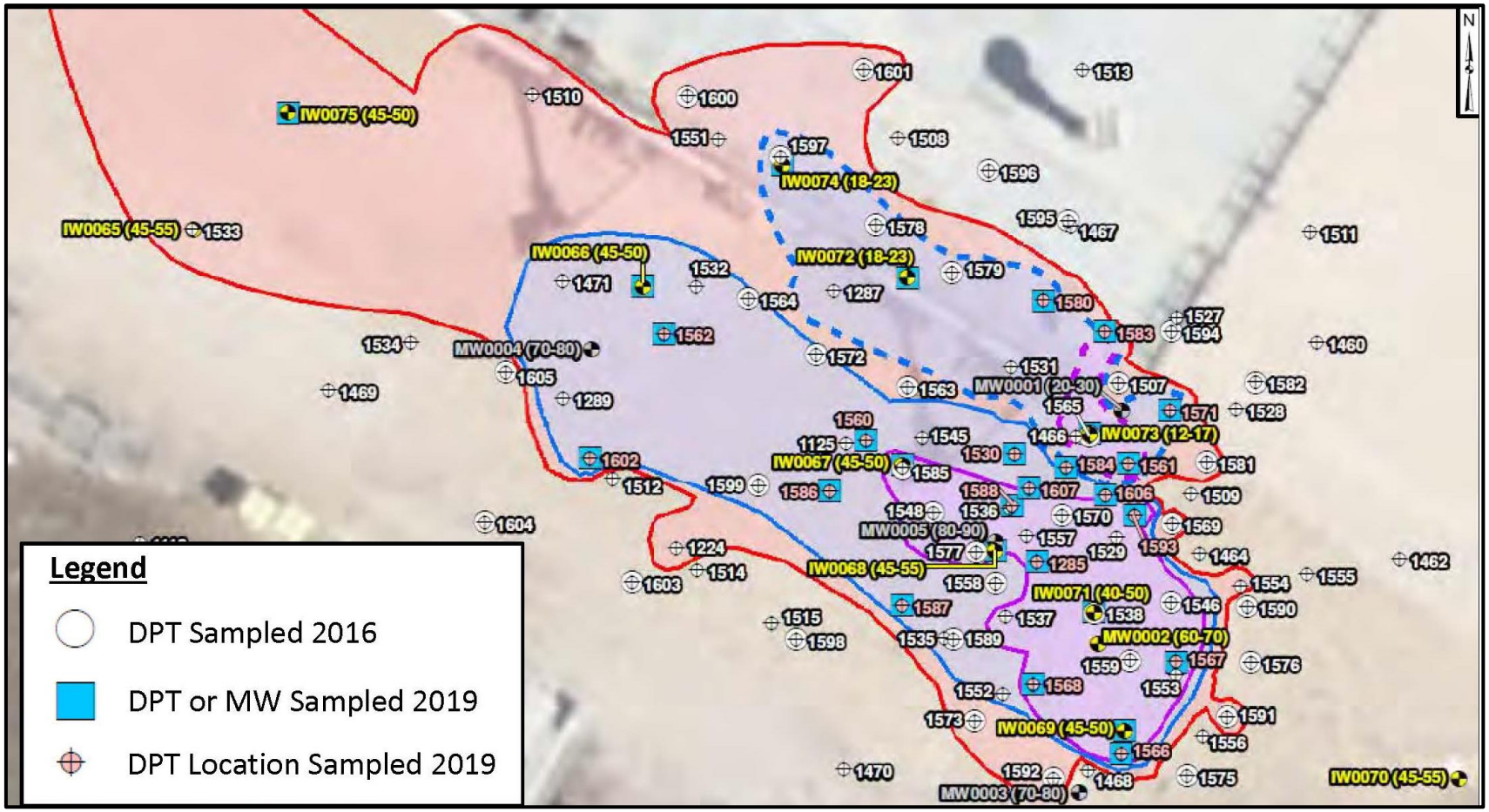
HS3 and HS3 OFW Area

2013 — 2014 — 2015 — 2016 — 2017 — 2018 — **2019**

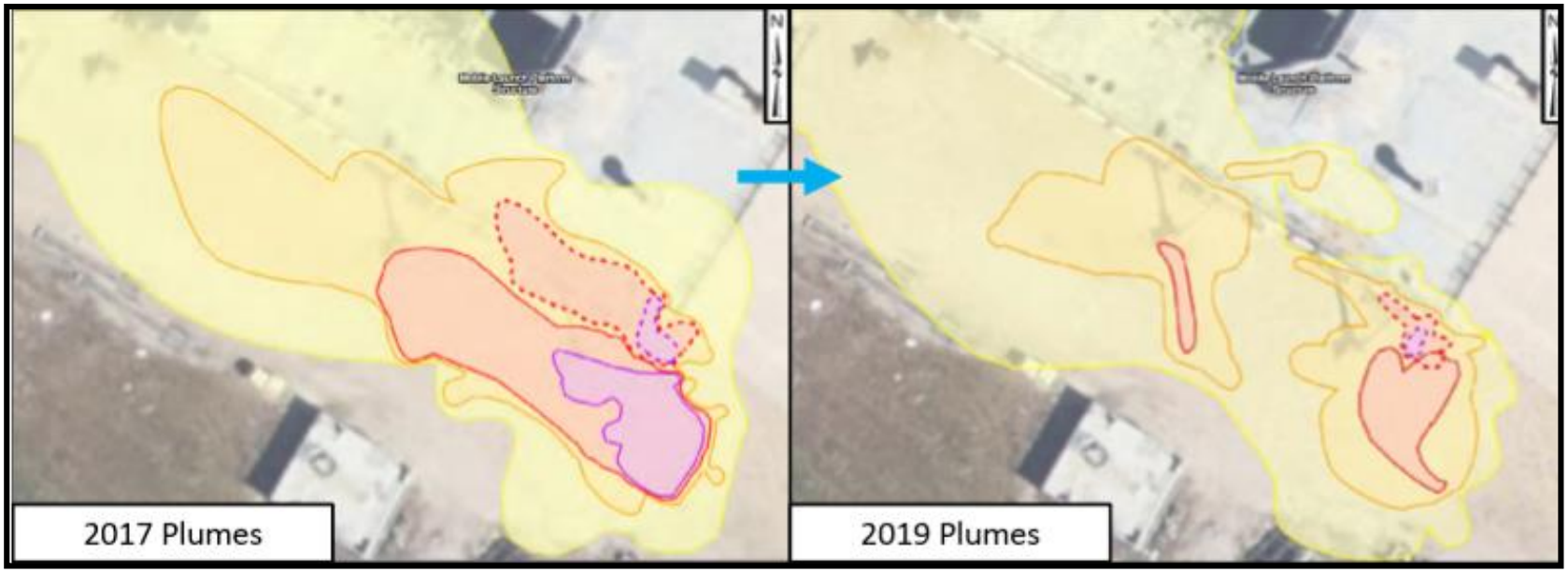


Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

AECOM

HS3 and HS3 OFW Area

2013 — 2014 — 2015 — 2016 — 2017 — 2018 — **2019**



Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

Legend - Isopleths

- Overall TCE SZ (dashed = 6 to 16 ft BLS solid = 41 to 55 ft BLS)
- Overall CVOC 10xNADC (dashed = 6 to 26 ft BLS solid = 36 to 55 ft BLS)
- Overall CVOC NADC
- Overall CVOC GCTL

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HS3 and HS3 OFW Area

Aug 2019 – CMI and IM Report, Continued

2013 — 2014 — 2015 — 2016 — 2017 — 2018 — **2019**

- Consensus/Path Forward
  - The western MLP Park Site was leased to a commercial partner (blue outline)
  - Abandon wells because of damage risk during construction and operation of large/heavy equipment
- Abandoned monitoring wells (MW01 to MW05 and IW65 to IW75) April 2019
- When lease ends, perform DPT groundwater sampling to evaluate HS3 Area
  - Evaluate reinstallation of wells
  - Evaluate need for Bioremediation Implementation WP Addendum for injection of additional EVO

No additional activities were performed during this reporting period

Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

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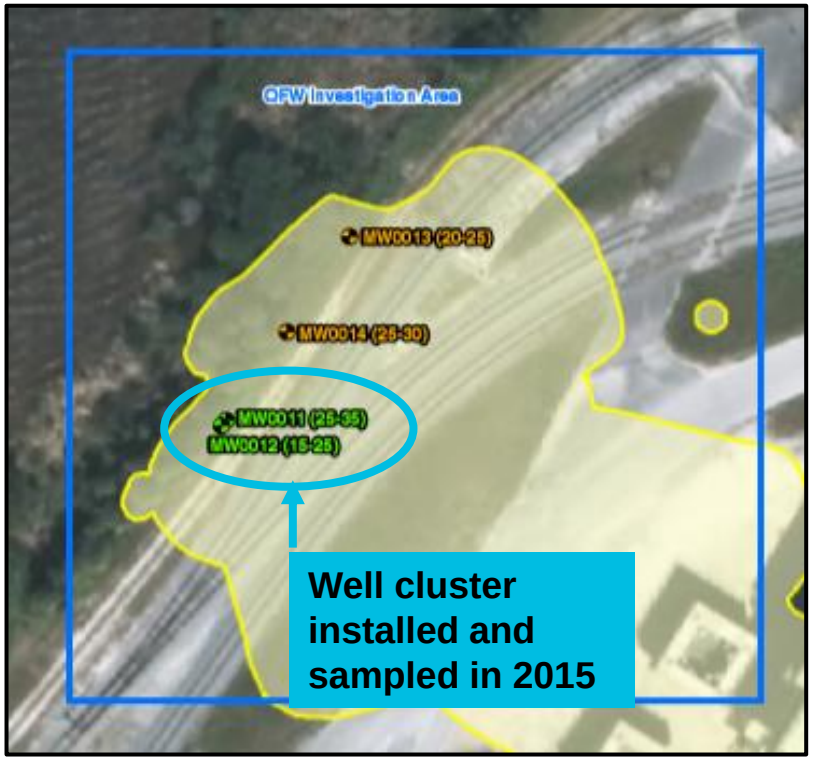
HS3 OFW Area Background

HS3 and HS3 OFW Area

OFW Area – Oct 2016 – 2016 CMI and IM Annual Report

2013 2014 **2015** **2016**

- Documented sampling of monitoring wells installed to evaluate VC concentrations adjacent to the OFW
  - VC concentrations > NADC in MW11 and above GCTL in MW12 (Nov 2015)
  - Confirmation sampling performed and concentrations were > GCTL, but < NADC (Jan 2016)
- DPT groundwater sampling proposed to evaluate the VC impacts adjacent to the OFW
- Obtained Team consensus to present DPT sampling results as a Site Characterization ADP
- Obtained Team consensus to sample MW11 and MW12 semi-annually for CVOCs



Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

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HS3 and HS3 OFW Area

OFW Area – Jan 2018 – Site Characterization HS3 OFW Area ADP

2013 — 2014 — 2015 — 2016 — 2017 — **2018**

- Delineation of VC groundwater impacts to GCTL (1 µg/L)
  - No additional source areas identified
  - No VC identified > NADC
- Transition groundwater impacts in the vicinity of the OFW to IGM
  - IGM approved since treatment of source (HS3) expected to reduce VC concentrations to less than GCTL
  - Proposed to install two monitoring wells in the OFW area
  - Semi-annual sampling of the 4 areas (MW11, MW12, and 2 new MWs) for CVOCs

Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

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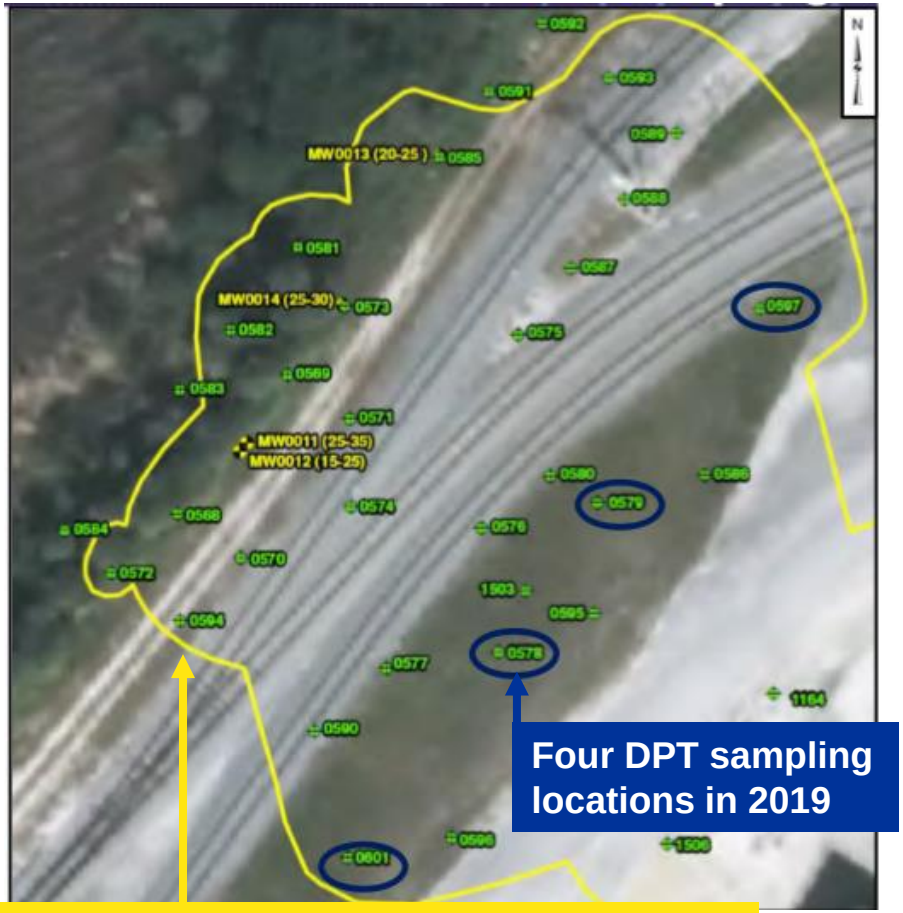
HS3 and HS3 OFW Area

Aug 2019 – CMI and IM Report

2013 — 2014 — 2015 — 2016 — 2017 — 2018 — **2019**

- IGM performed Feb 2019
  - MW0011 through MW0014
  - VC only detected > GCTL in MW0013 and MW0014
  - VC < NADC
- DPT groundwater sampling (March)
  - 4 samples analyzed for CVOCs - sampled to evaluate downgradient VC impacts
  - DPT0578, DPT0579, DPT0597, and DPT0601
  - 11 to 45 ft BLS at each location
- Team consensus to continue semi-annual IGM until < GCTL and evaluate sampling frequency



Overall GCTL Isocontour determined by evaluating monitoring well and DPT analytical results

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HS3 OFW Area Activities

HS3 and HS3 OFW Area

HS3 OFW Outline of Activities

- Semi-annual Performance Monitoring Well Sampling
  - October 31, 2019
  - MW0011, MW0012, MW0013, MW0014
  - CVOC analysis
    - Full list of analyses was run to remain consistent with previous sampling event
    - Modified analytical list will be determined based on evaluation of results

Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report

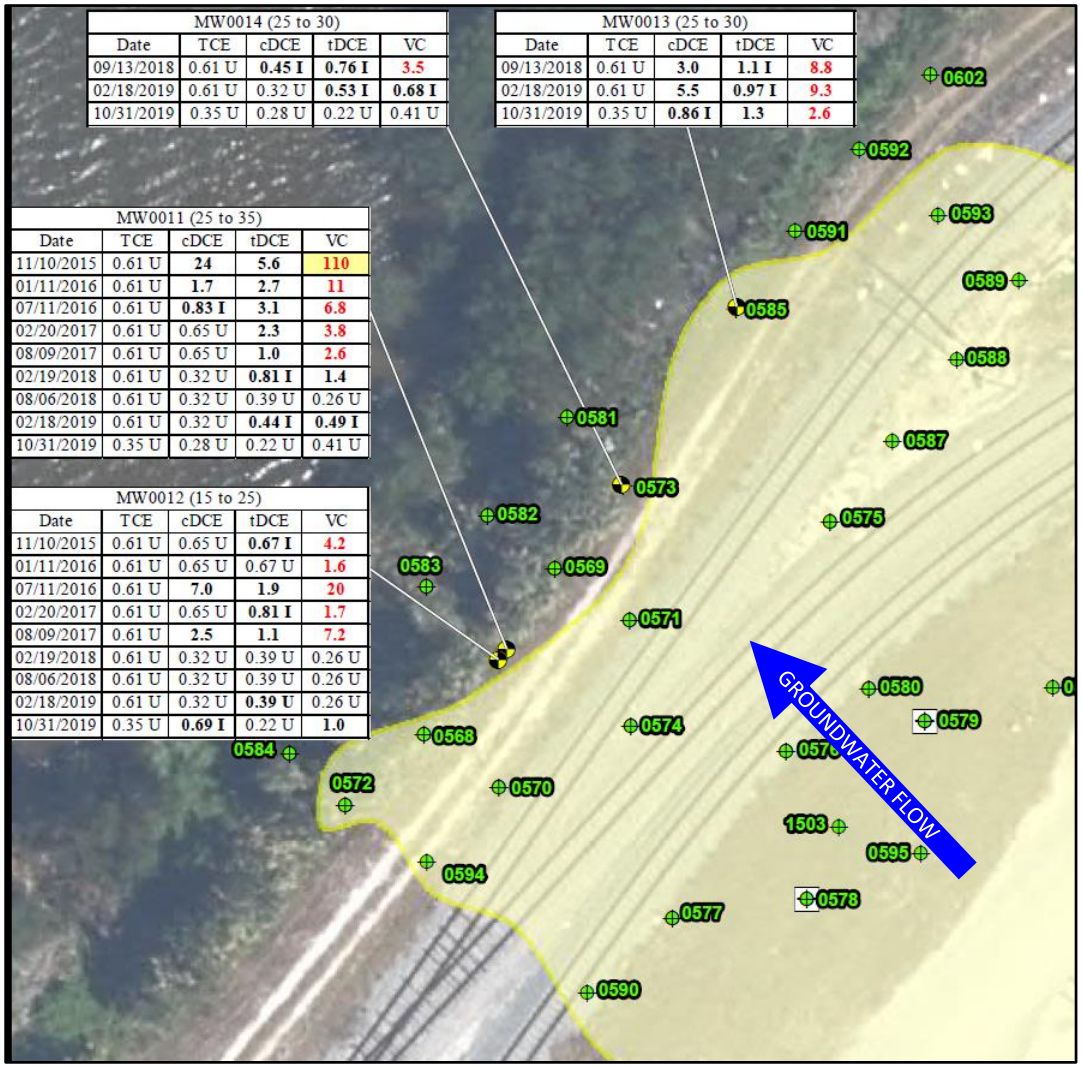
2019 Sampling and Analysis Plan

System Monitored	Location	Screen Interval (ft BLS)	Frequency	Analytical Parameters
Hot Spot 3 OFW Area	MW0011	25 to 35	Semi-Annual	CVOCs
	MW0012	15 to 25		
	MW0013	20 to 25		
	MW0014	25 to 30		

HS3 and HS3 OFW Area

HS3 OFW – Summary of Semi-annual Analytical Results

- CVOCs below GCTL in every well except MW0013
  - VC > GCTL at MW0013
    - VC in MW0013 decreased since last sampling event
  - TCE below laboratory method detection limits (MDL)
  - cDCE < GCTL or ND (MW0012 and MW0013)
  - tDCE < GCTL or ND (MW0013)



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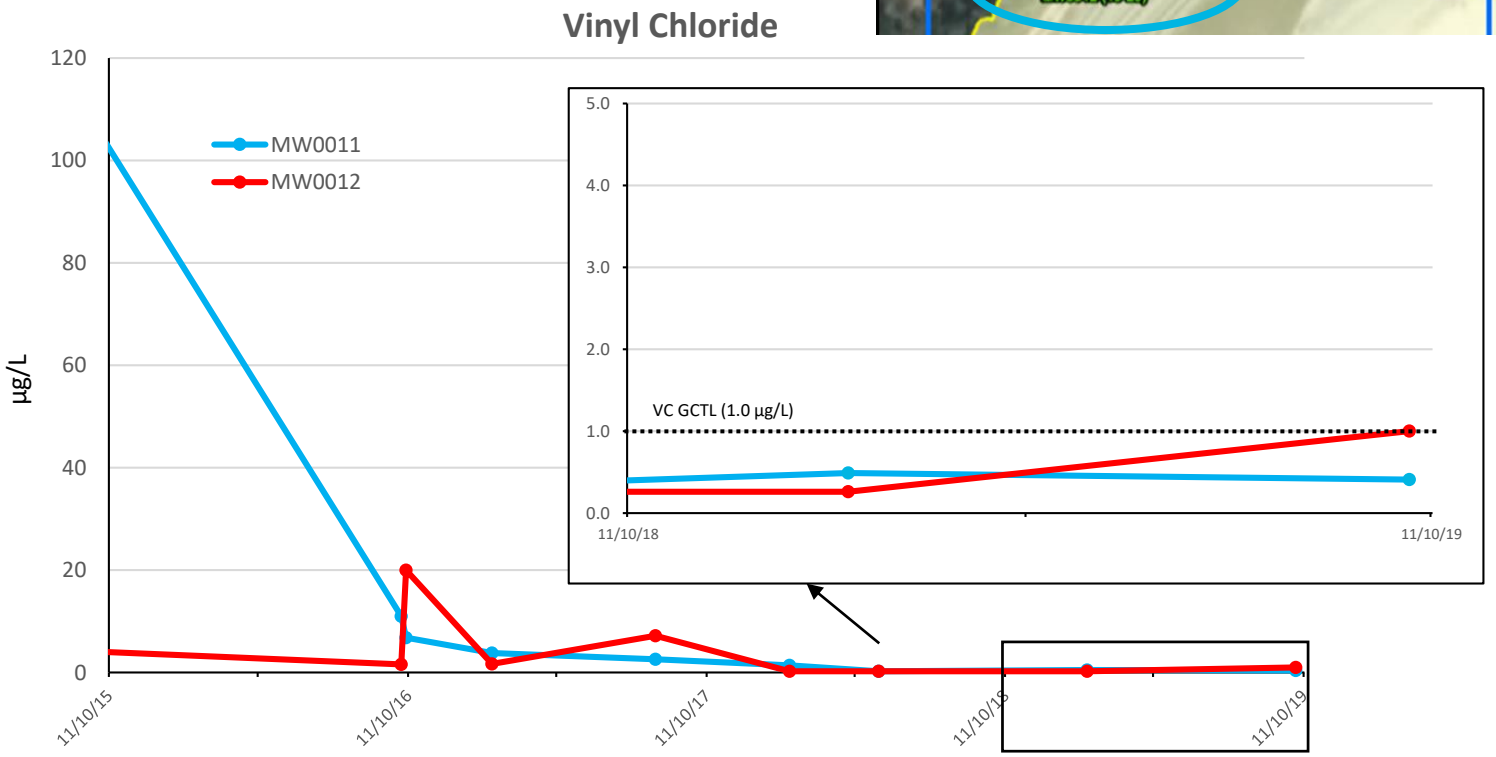
HS3 and HS3 OFW Area

HS3 OFW

- MW0011 (25 to 35 ft BLS)
  - TCE, cDCE, tDCE remain below GCTL
  - VC remains < GCTL
- MW0012 (15 to 25 ft BLS)
  - TCE, cDCE, tDCE remain below GCTL
  - VC increased to GCTL

Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report



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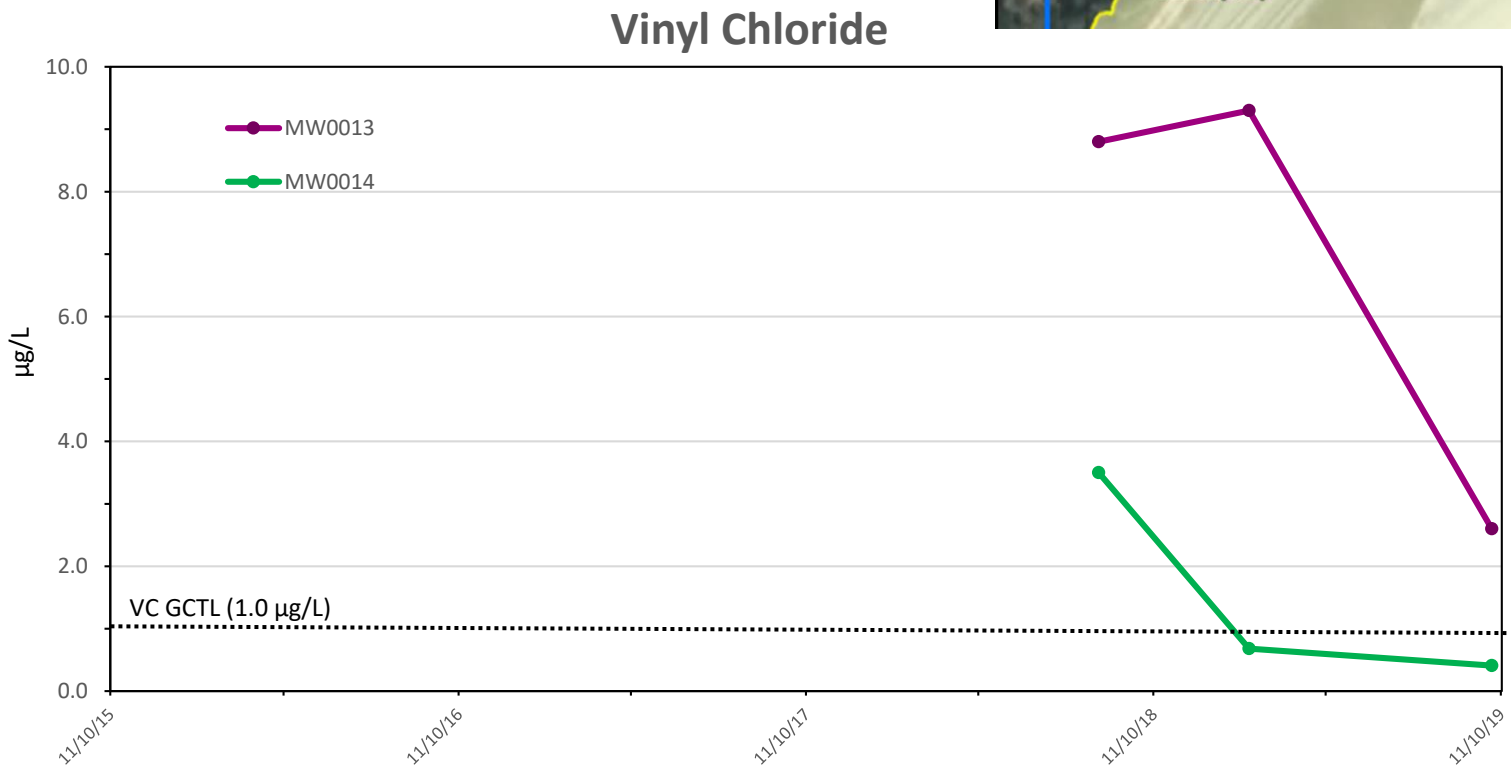
HS3 and HS3 OFW Area

HS3 OFW

- MW0013 (20 to 25 ft BLS)
  - TCE, cDCE, tDCE remain below GCTL
  - VC decreased 72% since Feb 2019
- MW0014 (25 to 30 ft BLS)
  - TCE, cDCE, tDCE remain below GCTL
  - VC remains below GCTL

Figures: Geosyntec Consultants MLP/VAB SWMU 056, June 2019 ADP for 2018 CMI and IM Annual Report



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HS3 and HS3 OFW Area

- HS3 OFW
  - Based on evaluation of analytical results from 2017 to present, recommend annual sampling
- **Test Consensus**
  - Modify IGM frequency to annual (as presented)
  - Reduce reported analyte list to select CVOCs: TCE, cDCE, tDCE, VC

2020 Sampling and Analysis Plan

System Monitored	Location	Screen Interval (ft BLS)	Frequency	Analytical Parameters
HS3 OFW Area	MW0011	25 to 35	Annual: September 2020	TCE cDCE tDCE VC
	MW0012	15 to 25		
	MW0013	20 to 25		
	MW0014	25 to 30		

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APPENDIX B
KENNEDY SPACE CENTER REMEDIATION TEAM MEETING MINUTES

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Revision 0 Meeting Minutes for February 6 & 7, 2020

Attendees:

John Winters/FDEP
Mike Deliz/NASA
Anne Chrest/NASA
Dinh Vo/NASA
Ryan O'Meara/NASA
Michelle Moore/KEMCON
Mark Speranza/Tetra Tech
Mark Jonnet/Tetra Tech
Debbie Wilson/Tetra Tech
Chris Neumann/Tetra Tech
Krista Sommerfeldt/AECOM
Chris Johnson/AECOM
Megan Garcia/AECOM
Linnea King/AECOM
Chris Marshall/AECOM
Chad Lee/AECOM
Randy Sillan/AECOM
Mike McCoy/AECOM
Matt Zenker/AECOM
Amy Eason/AECOM
Junaid Sadeque/AECOM
Richard Smith/HGL
Scott Starr/HGL

2002-M01 Team

Meeting Minutes and Miscellaneous Items

Team consensus was reached that Revision 0 of the meeting minutes for the October 2019 Team meeting are final. Team members acknowledged and did not object to the fact that the meeting minutes may become public as part of a final report at a later date (**2002-D01**).

Open action items were reviewed by the Team. The following action item was closed:

1908-A01 (NASA Remediation Program-wide) - An action item was added for the National Aeronautics and Space Administration (NASA) Remediation Program to begin adding a references section in all the new and revised Land Use Control Implementation Plan (LUCIP) documents moving forward. This action is closed with Florida Department of Environmental Protection's (FDEP) approval on the addition of a Site-Specific Document References section for all new and revised NASA LUCIPs moving forward with the specific language, "Site-specific documentation is available for review by contacting the Environmental Assurance Branch (EAB) at telephone number (321)867-6971".

Result: Decision item 2002-D01

2002-M02 Mark Jonnet/Tetra Tech

Area South of K7-0561 (516S) Solid Waste Management (SWMU) 100 and Eastern Components Cleaning Facility (eCCF) Interim

Measure (IM) Operation, Maintenance, and Monitoring (OM&M) and Interim Groundwater Monitoring

Goal: Summarize groundwater interim measure (IM) for chlorinated volatile organic compounds (CVOCs) and interim groundwater monitoring (IGM) activities at 516S from March 30 through December 31, 2019, in addition to the interim groundwater monitoring activities for CVOCs at eCCF.

Discussion: The 516S groundwater interim measure operates 24 air sparging wells (ASW) in two areas along the Barge Canal to be protective of the Outstanding Florida Waters (OFW) and 20 ASWs in the former Hot Spot to prevent upgradient contamination from impacting the remediated Hot Spot. Field activities associated with the IM include monthly site visits to inspect equipment, routine maintenance, collection of readings from individual ASWs, semi-annual performance monitoring conducted in June and December 2019 for the OFW area and annual performance monitoring conducted in December 2019 for the former Hot Spot. The data collected during the operational period was compiled and evaluated to support the determination that air sparing is meeting the performance criteria and IM objectives. All system components operated properly during the operational period. There was some downtime for the 4,000-hour compressor maintenance service and occasional ASW instrumentation maintenance. No other major system repairs were necessary, and the system continues to operate efficiently.

Tetra Tech recommends continued operation of the air sparging wells and monitoring well sampling to confirm the efficacy of the remedy protecting OFW and to prevent upgradient contamination from impacting the former Hot Spot. The Team reached consensus that the annual sampling event will include 29 wells to be sampled biennially. These wells include: MW01, MW02, MW04, MW05, MW06, IW07ID, MW09, MW10, MW11, MW12, MW13, MW14, MW15, MW20, MW44, MW44, MW45, MW46, MW47, MW48, MW49, MW50, MW51, MW70, MW71, MW72, MW73, MW74, MW75, & MW76 (**2002-D02**). The Team reached consensus to continue operating the air sparge wells in the configuration they are currently in (**2002-D03).**

The Team reached consensus to sample wells 13, 14, and 15 on an annual basis instead of a semi-annual basis (**2002-D04**). The Team discussed the temporal trends of the wells overtime. Tetra Tech explained the numbers are the same except for well 15. The detection numbers seem to be higher in June versus December. The Team reached consensus to conduct semi-annual sampling of the following 8 monitoring wells in the eastern OFW Area: MW16, MW18, MW54, MW59, MW60, MW61, MW77, MW78 (**2002-D05**). The Team reached consensus to continue air sparging in the Eastern OFW Area to be protective of the OFW (**2002-D06).**

The results of the annual interim groundwater monitoring conducted in December 2019 at 516S and eCCF identified that trans-1,2-dichloroethylene (tDCE) and vinyl chloride (VC) were the only VOCs that exceeded Florida Department of Environmental Protection (FDEP) groundwater cleanup target levels (GCTLs) in the 12 wells sampled. Two of the monitoring wells sampled had concentrations less than GCTLs, 9 wells exceeded VC GCTL, and MW42 had tDCE exceeding GCTL and VC exceeding natural attenuation default concentrations (NADC). Tetra Tech believes that the monitoring wells are appropriately located to monitor plume conditions upgradient of the OFW sparging barrier and recommends continuing annual sampling. The Team reached consensus to conduct the 2020 annual sampling event that will include the following 12 wells: MW23, MW24, MW25, MW27, MW29, MW30, MW37, MW38, MW39, MW40, MW41, and MW42 (**2002-D07**). The Team reached consensus to conduct the 2020 semi-annual sampling of the following 10 wells in the western OFW area: MW31, MW32, MW63, MW68, MW69, MW79, MW36, MW33, MW35, and MW80 (**2002-D08**). The Team reached consensus to continue air sparging in the Western OFW Area to be protective of the OFW (**2002-D09**). A team member inquired how long the system operates on a daily basis and Tetra Tech responded that it runs 12 hours currently. In summary, year 2020 monitoring plan will include sampling of 18 monitoring wells in June and 59 monitoring wells in December to confirm the efficacy of the remedy protecting OFW and former Hot Spot at 516S.

The interim groundwater monitoring for CVOCs in the eCCF area was suspended during the electrical resistance heating (ERH) IM and the high concentration plume (HCP) Reassessment. The monitoring program resumed in 2019. The HCP Reassessment was presented to

the KSC Remediation Team (KSCRT) in December 2018 and consensus was reached pending the results of additional direct push technology (DPT) sampling to complete the cis-1,2-dichloroethene (cDCE) HCP delineation in the area of DPTs 492 and 527. In addition to the HCP Reassessment, an Interim Measure Work Plan (IMWP) implementing air sparging was presented and approved by the KSCRT. The installation of monitoring wells in the former ERH area has been delayed due to elevated temperature in groundwater, therefore the interim groundwater monitoring program was limited to wells remaining in place and previously sampled for interim groundwater monitoring.

For the interim groundwater monitoring program, twelve wells were sampled in June and December of 2019. Concentrations of trichloroethene (TCE), cDCE, and VC exceeded GCTLs in all of the wells in June and nine Wells in December. Concentrations of cDCE and VC also exceed NADCs in five wells. The objective of the interim groundwater monitoring is to "evaluate plume stability over time until remedial actions are implemented". Eleven of the monitoring wells are not in optimal locations to meet this objective. Therefore, Tetra Tech proposes DPT sampling in the area of DPT locations 553, 568, 569, and 570 to determine an appropriate location for installation of a monitoring well within the former ERH treatment foot print and six additional monitoring well locations based on DPT samples collected during the HCP Reassessment. These new wells will replace eleven wells of the twelve wells sampled in 2019. These new wells and MW35 would be sampled for the annual interim groundwater monitoring. The Team reached consensus to conduct eCCF DPT sampling to complete the cDCE HCP delineation northeast of DPTs 492 and 527 (**2002-D10**). The Team reached consensus on the resampling of CCF-DPTs 553, 568, 569 and 570 to determine the appropriate location to install a monitoring well within the former ERH area (**2002-D11**). The Team reached consensus on the installation of six monitoring wells (MW-A through MW-H), to replace eleven of the twelve wells sampled in 2019. MW-A to be co-located with DPT0534; MW-B to be determined based on resampling results of DPTs 553, 568, 569 & 570; MW-C co-located with DPT-0529; MD-D co-located with DPT-0491; MW-E co-located with DPT-0499; MW-E co-located with DPT-0499; MW-F co-located with DPT-0547; MW-H located between DPTs 542 & 546. These wells will be sampled annually for VOCs in December 2020 (**2002-D12**). The Team also reached

consensus to continue sampling of CCF-IW35 in the annual Interim Groundwater Monitoring (IGWM) program (**2002-D013**). FDEP inquired if the previous 11 wells would be brought back in for sampling at a later time. Tetra Tech explained that they would be leaving those wells in the ground, but just use the new wells for the next sampling event. In comparing the new wells to the previous 11 wells, half of the new wells were from the IM and the other half were going to be installed regardless as a result of the plume changing over time.

Nineteen electrodes remain in the former ERH treatment area installed to 64ft in a 12" diameter borehole. Tetra Tech proposed electrode abandonment to prevent the electrodes from being a potential pathway from ground surface to subsurface. Team consensus was reached to abandon the electrodes according the to the proposed abandonment method (**2002-D14**). FDEP asked if there were any abandonment requirements. Tetra Tech stated that if it was a monitoring well, they would grout from the bottom up. As of now that is the method they are proposing for the electrodes. Most electrodes will be removed and grouted from 65ft and up. If not able to go down that far, they will at least grout the top 10ft, but there are no requirements for electrodes.

Result: Decision item 2002-D02 through D14

2002-M03 Chris Pike/Tetra Tech

<u>Hydrocarbon Burn Facility (HBF) (SWMU 007) Interim Groundwater Sampling Results</u>

Goal: To present the Interim Groundwater Monitoring (IGWM) findings of IGWM completed in September 2019 for the Northern Volatile Organic Compound (VOC) Area of the Hydrocarbon Burn Facility (HBF) at Kennedy Space Center.

Discussion: The IGWM was implemented for the Northern VOC Area to provide additional data, to be evaluated along with previous long-term monitoring data, to determine future IGWM options and to evaluate the efficacy of monitored natural attenuation (MNA) as a passive remedial measure in comparison to active remedies for the Northern VOC Area. The primary contaminants of concern in the Northern VOC Area are trichloroethene (TCE), cis-1,2-dichloroethene (cDCE), vinyl chloride (VC), and benzene.

The annual IGWM event for the Northern VOC Area at HBF was conducted from September 10 to 13, 2019. This is the first year of sampling after decreasing the frequency from semi-annual to annual at the end of 2018. In September 2019, groundwater samples were collected from 35 wells for VOC analysis. Samples from 4 of these 35 wells were also were also analyzed for methane, ethane, and ethene, and samples from two of those four wells were also analyzed for sulfide, sulfate, chloride, volatile fatty acids, total organic carbon, and microbial analyses (Dehalococcoides and associated functional genes BA, Vl, VC reductase, TCE reductase, and VC reductase).

The following conclusions are based on the evaluation of the September 2019 IGWM data: 1) The plume footprint appears stable (with some downgradient migration) and is consistent with results from the Site Characterization Advanced Data Package (ADP) and previous sampling activities, 2) Two existing wells (IW0044I and IW0045I) will be sampled during the next IGWM event to evaluate plume stability to the north of IW0080I to evaluate downgradient migration – results will be used to determine if additional investigation in these areas is needed, 3) MNA parameters indicate some potential for complete reductive dechlorination, but high sulfide concentrations and pH of ~6.0 may be inhibiting; this will continue to be evaluated as additional data are gathered during subsequent IGWM events, 4) Chlorinated VOC parent-to-daughter molar ratios indicate degradation, accumulation, and migration appear to be occurring. Degradation and migration in southern portion of the plume and degradation/migration to northern plume.

Based on these conclusions, annual monitoring is providing sufficient groundwater data to adequately evaluate MNA, plume stability, and concentration trends. The Team reached consensus to continue annual IGWM (**2002-D15**). The next IGWM sampling will be conducted in September 2020. No wells are proposed for elimination in 2020, and existing wells IW0044I and IW0045I were proposed to be added to the sampling program to evaluate plume stability in these directions and determine if additional investigation north and east of IW0080I is needed. The Team reached consensus to add existing wells IW0044I and IW0045I to next year's sampling program (**2002-D16**). The next IGWM event will include the same analytical parameters as the September 2019 IGWM. The KSCRT reached consensus that following the next annual sampling event, the

Team will re-evaluate the need for additional downgradient investigation (**2002-D17**).

Results: Decision item D2002-D15 through D17.

2002-M04 Chris Neumann/Tetra Tech

Launch Complex 34 (LC34) (SWMU CC054) T-2 Area Soil Interim Measure

Goal: The goal was to present the field efforts conducted from September to December 2019 for the T-2 Area Soil Interim Measure (IM) at Launch Complex 34.

Discussion: The IM was conducted to remove all soil with PCBs exceeding 1.0 mg/kg that was accessible without altering the transformer bays and cable wall based on the National Historic Landmark status. A fence was installed to minimize potential contact with polychlorinated biphenyls (PCBs) left in place on and underneath the transformer pads. This was in accordance with the IM Work Plan approved by the EPA and FDEP. The Team reached consensus of No Further Action (NFA) for the 20 areas remediated during the T-2 Area IM (**2002-D18**).

In an effort to reduce land use restrictions, post-excavation 95% upper confidence limits (UCLs) were calculated for samples left in place outside the fence with PCB concentrations between 0.5 and 1 mg/kg. Tetra Tech proposed that the calculated UCLs for the 0-0.5, 0.5-2, and 2-4ft bls intervals calculated are less than the residential soil cleanup target levels (RSCTL) of 0.5mg/kg. Therefore, Tetra Tech proposed that the samples are considered safe to remain onsite and the area outside the fence can be eliminated from the Land Use Control (LUC) boundary. The Team discussed NFA requirements for soil and groundwater. NASA would need to get NFA for the all media at a site and state the soils meet NFA requirements within Chapter 62-780 Florida Administrative Code (F.A.C.), but FDEP would not give a NFA designation for a single media in the meantime.

The Team reached consensus that the LUC boundary area will only include PCB-contaminated concrete and soil left in place inside the fence (**2002-D19**).

Results: Decision item 2002-D18, D19

2002-M05 Randy Sillan &
Chris Johnson/AECOM

Mobile Launch Platform (MLP)/Vehicle Assembly Building (VAB) (SWMU 056) Annual Corrective Measures Implementation (CMI) and Interim Measures (IM) Update

Goal: The purpose of the ADP was to present activities and data associated with groundwater interim measures (IM), continued operation and maintenance of the biosparge system, and groundwater monitoring of the low concentration plume, Hot Spot (HS) 3 Outstanding Florida Waters (OFW) Area, and HS2 Area.
The ADP evaluated the existing groundwater quality based on current data, trends, and remediation system effectiveness, in order to determine if modifications to the sampling schedule and/or operating systems are warranted.

Discussion: With the presentation of a brief background on the MLPVAB Hot Spot (HS) 4, NASA inquired if it would be best to create a new number for HS4 (e.g., SWMU 056A) to close it out. FDEP stated there should be a follow up telecom to go over the soil and groundwater concerns in this area to ensure this was acceptable, but this is an option. NASA stated they would schedule this telecom to provide a synopsis and if agreed, would submit an site rehabilitation completion order (SRCO) for this portion of the SWMU 056 site.

Field efforts summarized included the operation and maintenance (O&M) of the biosparge system from May 2019 through December 2019, and semi- annual groundwater sampling in October/November 2019 from HS2, Biosparge Area, and HS3 OFW Areas for chlorinated volatile organic compounds (CVOCs).

Monthly visits for O&M activities included collection of operational readings from treatment wells, dissolved oxygen and stress readings from performance monitoring wells to observe influence, replacement of in-well flow meters, a safety relief valve, condensation separator, and air filters, as well as troubleshooting of the telemetry system and air compressor. The system currently remains shut down since personnel discovered the compressor seized on December 30, 2019. For the Hot Spot 2 location, the Team reached consensus that the air sparge system will remain off (**2002-D20**). The Team reached consensus to continue interim groundwater monitoring (IGM) on an annual and/or semi-annual basis for select

CVOCs trichloroethylene (TCE), cis-1,2-dichloroethylene (cDCE), trans-1,2-dichloroethene (tDCE), and vinyl chloride (VC). The semi-annual monitoring well network includes 13 wells: MLPV-IW00111, MLPV-IW0033, MLPV-IW0034, MLPV-IW0035, MLPV-IW0036, MLPV-IW0037, MLPV-IW0039, MLPV-IW0041, MLPV-IW0043, MLPV-IW0044, MLPV-IW0045, MLPV-SAMW004D, and MLPV-SAMW00041. The annual monitoring well network includes the semi-annual network plus four additional monitoring wells MLPV-IW0032, MLPV-IW0038, MLPV-IW0040, MLPV-IW0042 (**2002-D21**).

After the site turnover took place in October 2019, AECOM completed troubleshooting, repairs, improvements, and housekeeping at the site. Evaluation of the biosparge system indicated additional repairs were needed as a result of a seized compressor. AECOM priced out the compressor repair cost ($5k) versus replacement cost ($17k), and proposed to repair the system to keep it running until the objective is reached. The system has been fully deactivated for repair. The Team reached consensus to continue the biosparge system operation following repairs to the biosparge system (**2002-D22**). The Team reached consensus to continue IGW on a semi-annual basis for select CVOCs (TCE, cDCE, tDCE, and VC) from the 12 monitoring wells IW0057, IW0058, IW0059, IW0060, ASMW0004, ASMW000S, ASMW0006, IW0031, IW0061, IW0062, IW0063, and IW0064 (**2002-D23**).

The area containing Hot Spot 3 is currently leased to a third party. The Team reached consensus to perform DPT groundwater sampling to evaluate the HS3 Area once the lease ends. This includes evaluating to potentially reinstall wells at the site and the need for bioremediation implementation work plan addendum for injection of additional EVO (**2002-D24**).

A review of the HS3 and HS3 OFW area semi-annual analytical results revealed that CVOCs are below GCTLs in every well except MW0013. Based on the evaluation of the analytical results from 2017 to present, AECOM recommended annual sampling for monitoring wells MW0011 through MW0014. The Team reached consensus to modify IGM frequency in the HS3 OWF area to annual for monitoring wells MW0011 through MW0014 (**2002-D25).** The

Team also reached consensus to reduce the reported analytes list to select CVOCs (TCE, cDCE, tDCE, and VC) (**2002-D26**).

Results: Decision item 2002-D20 through D26.

2002-M06 Mike McCoy/AECOM

GSA Reclamation Yard (SWMU 010) Performance Monitoring and Long-Term Groundwater Monitoring Results

Goal: The presentation provides a brief background of the site, and a summary of work performed in November and December 2019.

Discussion: In November and December 2019, AECOM installed and surveyed eight new monitoring wells (MWs), measured water levels from 14 MWs to determine groundwater flow direction, and collected groundwater samples from eight MWs for analysis of chemicals of concern (COCs). These COCs included tetrachloroethene (PCE), trichloroethene (TCE), trans-1,2-dichloroethene (trans-1,2-DCE), cis- 1,2-dichloroethene (cis-1,2-DCE), 1,1-dichloroethene (1,1-DCE), and vinyl chloride (VC), using Environmental Protection Agency (EPA) Method 8260. In addition AECOM collected Underground Injection Control (UIC) parameters from three MWs for the analysis of total recoverable petroleum hydrocarbons (TRPH), iron, and total dissolved solids (TDS) using EPA Methods FL-PRO, 6010B, and SM2540C, respectively.

Groundwater flow at the site in December 2019 was to the southwest. Analytical results indicate that site COCs were at or below groundwater cleanup target levels, and UIC parameters remained above applicable target level criteria.

The recommended path forward includes completing the May 2020 sampling event and evalatuion of that data, the evaluation of proximity of the existing MWs to confirm degradation of the high concentration and low concentration plume areas, and if additional MWs are needed, conduct a limited groundwater assessment event using DPT to determine installation locations. The Team reached consensus to continue semi-annual sampling of MW0067 through MW007 4, for the site COCs; PCE, TCE, trans-1,2-DCE, cis-1,2-DCE, 1, 1-DCE, and VC (**2002-D27**). The Team reached consensus to continue semi-annual sampling of MW0067, MW0071, and MW0073 for UIC parameters (TRPH, iron, TDS) (**2002-D28**). The Team reached consensus to continue semi-annual water level measurements at MW0002S, MW0002IS, MW0009S, MW0013M, MW0014M, MW0015M, and MW0067 through MW0074.

The Team reached consensus to conduct the next sampling event in May 2020 (**2002-D29**).

Results: Decision item 2002-D27 through D29.

2002-M07 Matt Zenker/AECOM

Center-wide Per- and Polyfluoroalkyl Substances (PFAS) Investigation SWMU Assessment (SA) Phase II Work Plan

Goal: The purpose of the ADP is to present the Work Plan objectives and methodology that will be the foundation for identifying areas (not previously investigated in Phase I) that could potentially contain PFAS compounds, identify other adjacent/surrounding businesses or operations not under the control of KSC that are potentially responsible for a PFAS release, and identify candidate PFAS background locations (background referring to locations that are not influenced by the releases from KSC).

Discussion: Resources within the KSC Environmental Program, such as the Phase I SWMU Assessment and Confirmatory Sampling Report (dated September 2019) and Hydrocarbon Burn Facility (HCBF) documents were reviewed along with research and review of PFAS occurrence data generated outside of the KSC Environmental Program (i.e., studies involving loggerhead turtles, alligator plasma, striped mullet, and Brevard County's PFAS study). Investigation will also focus on identifying common (e.g., aqueous film-forming foam [AFFF]) and Center-specific PFAS sources, enhanced by the development of questionnaires to be completed during interviews and presented in the report.

The Phase II SWMU Assessment (SA) will continue to work the initiated Phase I and address any data gaps that exist. The Phase II will also focus on identifying other PFAS source locations and will be complementary to the Predictive Integrated Stratigraphic Modeling (PRISM®) Work/Plan Report.

Potential investigation areas not included in the Phase I SA that will be included in the Phase II SA include the microwave scanning beam, manhole 19, Kennedy Athletic Recreational and Social (KARS) Park, and the gun range. NASA pointed out that manhole 19 was pointed out by FDEP previously as a location to keep track of. In regards to the gun range, the fire department would test their equipment along the road by the gun range. FDEP inquired if there were any crashes from rockets, fires from rockets mishaps, or hangars that could be potential contributing sources of PFAS. NASA clarified that they operate one hangar and that it does not

contain AFFF, and that there have not been any mishaps on any of the NASA pads. NASA would like to add to the list of interview questions knowledge of crashes by interviewees.

The Team reached consensus to use the following NASA sources for researched in the Phase II SWMU Assessment Work Plan Implementation: Remediation Information System (RIS), Geographic Information System (GIS), Safety Data Sheets (SDS), and Technology Evaluation for Environmental Risk Mitigation (TEERM) (**2002-D30**). The Team reached consensus to use the following outside sources will be researched for the Phase II SWMU Assessment Work Plan Implementation: Florida Department of Environmental Protection (FDEP) Map Direct, FDEP Division of Waste Management Database, OCULUS records, Florida Department of Health PFAS Location Database, historical aerial photographs, and federal on-line resources (**2002-D31**). FDEP noted that as more resources become available, they could have more to refer to in the future. AECOM agreed that this is a living document that can evolve as the investigation progresses.

The Team reached consensus that the six NASA PFAS Preliminary Assessment questionnaires (general, emergency response, fire chief, base historian, fire protection, and public works) and listed personnel (fire station personnel, Richard Anderson [Fire Chief], Chris Young [Deputy Chief], Jeff Dudley, Roads and Grounds personnel, and Glenn Willis [Pest Control]) will be utilized/interviewed during the Work Plan implementation (**2002-D32**). This will serve as a basis for a consistent questionnaire that will be updated as needed. NASA requested that any updates to the questionnaire be provided to Mark Speranza with Tetra Tech so he can utilize those same questions at other areas where Tetra Tech is investigating PFAS (**2002-A01**). FDEP inquired if NASA tracks chemicals coming on center with some type of check and balance method regarding chemical components. Tetra Tech took the chemical list at other PFAS investigation sites and cross referenced with the EPA CAS list to identify PFAS components in chemicals used at these locations, and recommended that AECOM consider adding this additional investigative approach for KSC.

The Team reached consensus that RIS search and PRISM® will be utilized to identify PFAS background locations within KSC (**D2002-D33**). FDEP noted that there are guidance documents for PFAS on both soil and groundwater, and recommended highly that these documents be utilized and perhaps reach out to the University of Florida (UF) to ask for help with reviews. If the Team gets UF on board from the beginning with this review, they may be able to

provide additional insight that may help with the investigation on already tested methods. AECOM stated this would play into the anthropogenic and they are identifying the statistical data to develop this. AECOM agreed that involving UF up front is a good idea. They can begin creating the background now and Brian Doherty with FDEP can assist with connecting with UF.

NASA inquired if FDEP could investigate whether any FDEP response to comments have been issued with regards to the presentation "White Paper: Development of Surface Water Criteria for PFOA and PFOS based on the protection of aquatic receptors" published by the (**2002-A02**).

Results: Decision item 2002-D30 through D33, Action item 2002-A01, A02.

2002-M08 Matt Zenker
& Junaid Sadeque/AECOM

Center-wide PFAS Investigation PRISM® Work Plan

Goal: The purpose of the ADP is to present objectives, scope, methodology, and preliminary analysis results of the PRISM® process.

Discussion: PRISM® is a holistic investigative approach that combines environmental sequence stratigraphy (ESS), facies analysis, and geophysical mapping techniques to provide a detailed understanding of subsurface geology. The overall scope of the Center-wide Phase II SWMU Assessment will be presented prior to the presentation of the PRIMS Work Plan. The primary objective of the PRISM® analysis at KSC is to improve the existing conceptual site model (CSM) to better understand and predict fate and transport of PFAS compounds in soil, groundwater, and surface water. A series of three preliminary regional geologic cross-sections were developed and presented in the ADP.

The Team reached consensus to collect additional subsurface data and create six local, plume-scale cross sections in areas known to contain PFAS in groundwater. This will consist of installing 12 new monitoring wells to 50ft BLS for logging soil type and performing spectral gamma logging, and the performance of gamma logging of 60 existing monitoring wells will be conducted. (**2002-D34**). NASA inquired if casing for gamma matters. AECOM stated that PVC is the best for gamma. NASA noted that the site Wilson Corners has Teflon and maybe some stainless steel casing. Tetra Tech inquired if

NASA should consider drilling wells to 100ft? Maybe discuss later into looking at other constituents as well. NASA agreed to brainstorm on this.

The Team reached consensus to collect additional data to create a high-resolution potentiometric surface map of KSC by measuring the potentiometric surface elevation in 106 wells (over two synoptic events; one in dry season and one in rainy season), and installing 15 data logging transducers (12 groundwater, 3 surface water) to collect water elevation, temperature, and salinity – logging at 15 minute intervals for three months deployed between dry and rainy seasons (**2002-D35**).

The Team reached consensus on the creation and calibration of a stormwater pollutant model that will be utilized to predict PFAS loading to surface water by collecting site-specific and regional stormwater information, and by developing and calibrating a stormwater model using publicly available and site-specific data (**2002-D36**).

The Team discussed surface and stormwater modeling, and possible data gaps based on flow observed at groundwater sites. AECOM agreed that the model will only be as good as the data that is used, but in utilizing transducer data and topography, they will have to do the best they can to model a center-wide massive scale. Tetra Tech stated they have 3 depth intervals at the Hydrocarbon Burn Facility (SWMU 007) and will be installing transducers. Data from those may help out once they are done.

Results: Decision item 2002-D34 through D36.

2002-M09 Chris Pike/Tetra Tech

<u>Central Heat Plant (SWMU 045) Update on Baseline DPT Sampling</u>

Goal: The purpose of the ADP is to present the DPT sampling results and provide an update on the air sparging system installation.

Discussion: The IMWP was completed/approved in 2017. The IMWP objective is to reduce the CVOC concentrations within the treatment area to concentrations that facilitate transition to LTM. The air sparging system layout was presented in the IMWP. The IM also includes excavation of the soil berm and a relocation of gopher tortoises. DPT sampling was conducted in November 2019 to verify the plume location to support air sparging installation (previous site characterizations were completed in 2011 and 2013). Initial DPT

sampling locations were focused on previously defined source zone, hot spot, and HCP boundaries. Step-out samples were collected to define revised boundaries.

Three soil cores were collected which confirmed a confining unit at 48' to 50 ft bgs. Fifty-one DPT locations were sampled over a 10-day effort and a mobile lab was on site to analyze groundwater samples for CVOCs. Site Characterization will be completed to delineate horizontally and vertically to GCTLs in all directions and capture plume edges. The plume is expanding in all directions (primarily at a depth of 45ft bgs). Eight deep monitoring wells we be sampled and analyzed for CVOCs to confirm vertical delineation.

AS well installation is scheduled to begin late February. One hundred and twenty five well system designed to treat original HCP (includes source zone and hot spot). The compressor system design from the IMWP may be adjusted for a larger system. Proceeding with installation while site characterization continues with the goal of treating with the potential to shut down with the objective for a few of the zones to meet goal or close to meeting goal before any new zones would be added based on the site characterization. The overall goal of the IM is to reduce CVOC concentrations within the treatment area to concentrations that facilitate a transition to LTM.

NASA inquired what Tetra Tech was doing with the IDW. Tetra Tech stated they are segregating the IDW to the south. NASA has high hits of PFAS in that area. NASA inquired if the row to the east on slide 17 was clean. Tetra Tech stated all but DPT 208 (above GCTLs). The size of the plume is about three times as large as it was thought to be. NASA stated they were focused on the source zone and hot spot for three years. They were only delineating the HCP. As a positive, NASA has started doing baseline sampling for their sites prior to investing in our cleanups. DPT baseline required before constructing now. Tetra Tech noted that there are 8 deep monitoring wells here we can still sample with potential for gamma logging. In the process of sampling for vertical delineation. Tetra Tech is going to restart the air sparge process and hope to knock down some of the concentrations. They are currently working on the well locations for the HCP.

2002-M10 NASA

<u>Basket Item: Update on how and what files to provide for the KSCRT Meetings in the future</u>

Goal: To standardize and streamline the process of documents received and what to provide for presentations at Team Meetings.

Discussion: NASA requests that all A&E firms please large file transfer the .pdf and PowerPoint versions of the ADPs being presented so they can be uploaded to the folder and utilized for the team meeting. Cover letters should summarize the goal of the ADPs and the consensus statements should be provided for the minutes (**2002-A03**). The minutes should be stand alone, and should not regurgitate the ADP. In addition, please list out individual wells for the consensus statements unless your annual monitoring lists an abundance of wells. These PowerPoint slides help NASA with the UEL as they use certain slides from presentations to support and supplement documentation for presentation.

Lastly, when the minutes are sent out please review. This is a good way to catch what we are not doing as well. If we decide not to do something, need to capture why we did not do this. Please review the minutes and make sure it captures what was said and what the action items and consensus items were. AECOM inquired if the cover letter should be provided separate or with the ADP. NASA stated to attach the cover letter to the ADP so they can have it all together.

Results: Action items 2002-A03

2002-M11 Chris Marshall/AECOM

<u>Industrial Area LTM – Update on Sampling Results</u>

Goal: The purpose of the ADP is to present activities and data associated with six of the IA LTM sites which include: Communication, Maintenance, and Storage (CMS) Facility (Solid Waste Management Unit [SWMU] 082), Vertical Processing Facility (VPF) (SWMU 077), Building M7-0505 Treatment Tank Area (M7-505J (SWMU 039), Fuel Storage Area #1 (FSA1) Underground Storage Tank (UST) (Potential Release Location [PRL] 157), Launch Equipment Test Facility (LETF) (SWMU 091), General Services Administration Seized Property (GSSP) (SWMU 095).

Discussion: Field efforts summarized in the ADP include LTM sampling from August 2019 through December 2019 and direct-push investigation activities conducted in November 2019 at the CMS site. The objective of the ADP is to evaluate the groundwater quality based on current data and trends in order to determine if

modifications to the sampling schedule arid/or additional measures are warranted.

Monitored Natural Attenuation (MNA) of the groundwater was the selected remediation strategy to monitor concentrations of COCs at the CMS site. LTM began at CMS at 2012, with sampling being conducted annually. Groundwater elevation measurements (34 wells) and sampling (28 wells) were conducted at the site. Groundwater flow directions are generally consistent with historical flow patterns. Overall cis-1,2-DCE concentrations continue to decline, resulting in slight plume area concentration. Overall VC concentrations are slowly declining, except for a sharp increase at the center portion of the plume (VC hotspot). High-density DPT effort to delineate >10xNADC area strongly correlated with previous DPT data from 2004-2007.

FDEP inquired what past activities have occurred at this site and where the chlorinated solvents come from. It is possible if a source has been identified, that the DPT sampling grid could be shortened. NASA stated in 2011 there was an engineering evaluation (EE) conducted and the plume was delineated at that time. Since the site is in MNA, this DPT is a 5 year assessment to support MNA as a remedy. No source material was identified during site characterization in 2011.

Additional Team discussion was had regarding the possibility of source material at the site. The team agreed that following additional DPT investigation, a summary of past investigations in the next ADP would be beneficial in order to reevaluate the path forward for the site.

The current scope of MNA remains appropriate and viable remedy for CMS. The Team reached consensus to continue annual LTM sampling at the CMS site of 28 monitoring wells for select volatile organic compounds (VOCs), including tetrachloroethene (PCE), trichloroethane (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), 1, 1-dichloroethane (1, 1-DCA), 1, 1-dichloroethene (1, 1-DCE) and vinyl chloride (VC) and collect 34 water level measurements in May 2020 (**2002-D37**). The Team reached consensus to conduct additional high-density direct-push assessment to determine the extent of areas with contaminants of

concern at concentrations exceeding 10 times the Natural Attenuation Default Concentrations (NADCs) (**2002-D38**).

LTM at the VPF began in March 2018, with sampling currently conducted annually. The current scope of MNA remains appropriate and viable remedy for VPF. The next groundwater sampling event is scheduled for November 2020, and will include 34 water level measurements and 8 monitoring well samples. AECOM recommends revising the laboratory analysis to select VOCs (TCE, cis-1,2-DCE, and VC). The Team reached consensus to continue annual LTM sampling at the VPF site of eight monitoring wells for select VOCs (TCE, cis-1,2-DCE, and VC) and collect 34 water level measurements in November 2020 (**2002-D39**).

At M7-505, VOC concentration trends are generally stable and/or declining. The current scope of MNA remains an appropriate and viable remedy for the site. The next groundwater sampling event is scheduled for November 2020, and will include 35 water levels and 11 monitoring well samples. AECOM recommends revising the laboratory analysis to select VOCs (TCE, cis-1,2-DCE, and VC). The Team reached consensus to continue annual LTM sampling at M7-505 of 11 monitoring wells for select VOCs (TCE, cis-1,2-DCE, and VC) and collect 35 water level measurements in November 2020 (**2002-D40**).

At FSA1, the VOC concentration trends are generally stable and/or declining. In accordance with the LTM program, the next groundwater sampling events are scheduled for May and November 2020, and will include 17 water levels and 6 monitoring well samples. AECOM recommends revising the laboratory analysis to select VOCs (benzene, ethylbenzene, and isopropylbenzene), PAHs (naphthalene, 1-methylnapthalene, 2-methylnapthalene), and TRPH.

FDEP inquired about what was found in the two wells to the west? NASA stated isopropylbenzene. FDEP believes this could possibly be an anthropogenic source. The values for adjacent road use and the slope of the ditch should be considered. If that contaminant stays in those wells and the other plume shrinks, NASA may be able to easily dismiss the western plume. NASA disclosed that there was a huge JP8 release at this location a long time ago. The most recent DPT event revealed the isopropylbenzene in those wells, and it seems like it may be moving toward the ditch. The building is scheduled for demolition soon. Hopefully with the bldg. going away

the issue will also go away. AECOM recommended if it does to use RMO1 closing with the use of health based values.

The Team reached consensus to continue annual LTM sampling at FSA1 of six monitoring wells for select VOCs (benzene, ethylbenzene, and isopropylbenzene), polynuclear aromatic hydrocarbons (PAHs) (naphthalene, 1-methylnaphthalene, 2- Methylnaphthalene), and total recoverable petroleum hydrocarbons (TRPH), and collect 17 water level measurements in May 2020 (**2002-D41**). The Team also reached consensus to continue monitoring the program/path forward for the site, which will be re-evaluated following assessment of soil and groundwater within the footprint of Facility 1044 following demolition completion (**2002-D42**).

The LETF is not scheduled for a sampling event during 2020. VC concentrations were below GCTLs at the LETF in 2019. In accordance with the LTM program, the next groundwater sampling events are scheduled for 2021, and will include 14 water levels and 4 monitoring well samples. AECOM recommends increasing the sampling frequency by moving up the next scheduled sampling event to May 2020.

The Team discussed requirements for NFA within Chapter 62-780 F.A.C. FDEP recommended sampling all wells in the current sampling plan and as long as there are two clean data points within a year, the site will qualify for NFA. NASA stated the path forward for now is keeping the wells.

The Team reached consensus to increase sampling frequency at the LETF site by moving up next scheduled sampling event to May 2020, which includes LTM sampling of four monitoring wells for VC and collection of 14 water level measurements (**2002-D43**).

The next groundwater sampling event for the GSSP is schedule for November 2020, and will include 33 water levels and 23 monitoring wells. Continued LTM shows the source remains low and the hot spot at this site is contracting. AECOM recommends revising the laboratory analysis to select VOCs (PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and VC), and naphthalene. The Team reached consensus to continue annual LTM sampling at the GSSP of 23 monitoring wells for select VOCs (PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and

VC) and naphthalene, and collect 33 water level measurements in November 2020 (**2002-D44**).

Results: Decision items 2002-D37 through D44.

2002-M12 Ryan O'Meara/NASA

Launch Complex 39A Operations Support Building Area (AOSB) (SWMU 111) Interim Land Use Control Implementation Plan (LUCIP)

Goal: To provide the draft Interim LUCIP for AOSB for comment and review.

Discussion: This Rev 0 of the AOSB Interim LUCIP was presented by email earlier in the week to the Team for review and response comments.

NASA explained the PAHs at LOC 1 (Stormwater Outfalls) were from the adjacent parking lot and the outfalls are part of a grandfathered-in stormwater system. Since the stormwater outfalls were determined not to be a RCRA issue, FDEP requested the sampling data be provided to the NASA Permitting and Compliance Group. FDEP understands and agrees with this rationale of being a NPDES permit compliance issue.

Please provide any additional comments to Ryan O'Meara for incorporation into the AOSB LUCIP moving forward. In addition, an open action item for NASA existed with regards to providing a reference section and reference documents along with all new and revised LUCIPs submitted. The Team reached consensus that utilizing the addition of a Site-Specific Document References section for all new and revised NASA LUCIPs moving forward with the specific language, "Site-specific documentation is available for review by contacting the Environmental Assurance Branch at telephone number (321)867-6971", would close out this action item.

Results: Action item 1908-A01 was closed out

2002-M13 Scott Starr/HGL

Contractor's Road Heavy Equipment Area (SWMU 055) Interim Groundwater Monitoring and Performance Monitoring

Goal: The objective of the ADP is to evaluate and summarize the results of the 2019 annual site-wide IGM, HSI bioremediation performance monitoring, and vapor intrusion evaluation. Based upon evaluation of the data, recommendations are presented to obtain consensus on the path forward.

Discussion: The site-wide IGM activities completed in December 2019 and results are presented along with a summary of the site assessment history and background. The 2019 sampling and analysis plan specified the annual sampling of 13 monitoring wells for chlorinated volatile organic compounds (CVOCs) and four wells for 1,4 dioxane. In addition, groundwater levels were collected from 48 out of 51 wells. One well (MW0043) was damaged and two wells could not be located. The collected data for each well were evaluated with trend plots and Mann-Kendall statistical analysis to evaluate concentration trends. NASA stated that they will evaluate whether or not they can have well 43 redeveloped, and if they cannot, they will abandon and place another well. HGL asked if they could use NASA's (Dinh Vo) contract to perform this work under. NASA agreed they could.

The data evaluation indicate that vinyl chloride is the primary constituent remaining above the GCTLs and the low concentration plume is not expanding. Geochemical groundwater conditions are generally favorable for natural attenuation with near neutral pH, negative ORP, and anaerobic groundwater.

The Team reached consensus to continue annual IGM activities in Summer 2020 with the following modifications: Sample the following 12 wells for CVOCs: HS1: sample wells MW0026, MW0029; HS2: sample wells MW0031, MW0032, MW0042; Northern Area: sample wells MW0017I, MW0019I, MW0034; Down Gradient: sample wells MW0035, MW0037, MW0039, MW0041; and eliminate MW0040 since no historical detections in deep well (**2002-D45**). The Team reached consensus to sample three wells (MW0025, MW0026, MW0035) for 1,4-dioxane and eliminate MW0029 which has no historical exceedances in five events since 2013 (**2002-D46**).

The Team reached consensus to collect depth to water measurements from 49 site-wide monitoring wells assuming damaged MW0043 is replaced, and eliminate MW0016I and MW0020I due to unable to

locate (**2002-D47**). The Team reached consensus to generate Mann-Kendall statistics for all applicable IGM wells (that meet the criteria for using Mann-Kendall) (**2002-D48**).

For the HS1 bioremediation performance monitoring, bioremediation activities were conducted in phases at the site. The first event was implemented in November and December 2016 in the Eastern area of HS 1. In April and May 2018, bioremediation interim measures were implemented in the Western area of HSI. As part of Interim Measure activities, performance monitoring will be conducted until CVOC concentrations support transition to IGM and/or supplemental focused treatment. In December 2019, bioremediation interim measure performance monitoring was conducted and included the following: Eastern Area 5 wells sampled annually for CVOCs and dechlorination parameters and 4 wells sampled semi-annually for CVOCs and dechlorination parameters including functional gene assay; Western Area -10 wells sampled semi-annually for CVOCs with subset of wells sampled for UIC and dechlorination parameters.

Within the Eastern bioremediation treatment area, MW0044, MW0046 through MW0050 were sampled and indicate no TCE exceedances. CVOCs were less than GCTLs at MW0044 and MW0055. Vinyl chloride concentration at MW0048 of24,600 µg/L was 10 times greater than the NADC. cDCE and tDCE also exceeded screening criteria at MW0048. Geochemical parameters remain conducive for anaerobic reductive dechlorination. The dissolved mass within the treatment area remains stable between 2018 and 2019. The predominance of dissolved mass in groundwater is located at MW0048.

Within the Western bioremediation treatment area, MW0045, MW0053 through MW0056 were sampled and indicate no TCE, cDCE, and tDCE exceedances. CVOCs were less than GCTLs at MW0045, MW0053, MW0054, and MW0055. Vinyl chloride concentration of 4.5 µg/L at MW0056 is the only exceedance within the bioremediation treatment area. Vinyl chloride (377µg/L) exceeds the NADC at down gradient MW0027. Vinyl chloride and cDCE exceed the GCTLs at down gradient MW0058 but within the GCTLs at MW0057 and MW0026. Geochemical parameters remain conducive for anaerobic reductive dechlorination. The dissolved mass within the treatment area is very low with 99 .9% dissolved mass reduction in area.

The Team reached consensus to continue the Eastern Area Performance Monitoring activities in June 2020 and sample nine wells as follows: continue wet/dry annual sampling at MW0044, MW0046, MW0050 through MW0052 for CVOCs and eliminate MEE and TOC sampling at these wells; modify MW0047 to wet/dry annual sampling as two most recent events are less than NADCs and eliminate MEE and TOC sampling at MW0047; and continue semi-annual sampling at MW0025, MW0048, and MW0049; and eliminate Dhc sampling at MW0048 and MW0049 (**2002-D49**).

The Team reached consensus to continue Western Area Performance Monitoring in June 2020 and sample nine wells as follows: continue semi-annual sampling at MW0027, MW0043, and MW0058 for CVOCs; modify MW0045, MW0053 through MW0057 to wet/dry annual sampling as two most recent events are less than NADCs; eliminate MEE and TOC sampling at MW0045 and MW0053 through MW0056; eliminate Dhc sampling; and eliminate UIC sampling at MW0025; no exceedances in 6 sampling events (**2002-D50**).

Sub slab soil gas samples were collected by others on June 5, 2019 from four existing vapor monitoring probes installed inside Heavy Equipment Office Building K6-1996H. Tetrachloroethene was the only constituent detected in the June 2019 sampling. The CVOCs in the groundwater along with degradation of the groundwater plume through IM activities are not creating sub-slab vapors that may pose an unacceptable risk to the building occupants. The Team reached consensus to conduct an annual Sub Slab Soil Gas (SSSG) sampling event (CVOCs and methane) in June 2020 to evaluate if there have been changes in SSSG in the four vapor probes due to IM activities. If no changes in the SSSG are documented, it is recommended to discontinue the collection of SSSG samples (**2002-D51**).

FDEP inquired if the sampling was for PCE, methane, or both. HGL stated the sampling was for all of it. NASA stated that their industrial hygiene department approved. AECOM mentioned that there is sub-slab sampling guidance out there for future reference if needed. If it is a 5ppm and above in the water (which you have) with methane, you are the reaching solubility limit. With a good vadose zone, you have to evaluate methane when you get those higher concentrations. NASA stated for the next two events, we will

collect COCs and methane and can potentially eliminate vapor intrusion sampling unless it pops up higher than 5ppm. Methane should be added to well 56 and for vapor intrusion.

Results: Decision items 2002-D44 through D51

2002-M14 Team

Next meeting dates are April 16th and 17th, 2020; these may be adjusted based on coordination with U.S. Air Force meeting dates.

Projected future meeting dates for 2020:

- April 16-17, 2020
- June 18-19, 2020
- August 13-14, 2020
- October 8-9, 2020 (revised dates)
- December 10-11, 2020

Agenda Build at the meeting is as follows:

AECOM
Soil IM
VAB LTM 2019 results
GSRY northeast

HGL
Soil IM
PRL 238 SAR
PRL 239 SAR

Tetra Tech
CHP step 1
LC34 annual OMM
CCB O&M

NASA requested that each A-E email agenda topics for the April meeting to the Team leader Krista Sommerfeldt.

February 2020 Decision items Rev 0		
Decision No.	**Minutes Reference**	**Decision**
2002-D01	2002-M01	Team consensus was reached that Revision 0 of the meeting minutes for the October 2019 meeting are final. Team members acknowledged and did not object to the fact that the meeting minutes may become public as part of a final report at a later date.
2002-D02	2002-M02	Area South of K7-0561 (516S) (SWMU #100) and Eastern Components Cleaning Facility (eCCF) Interim Measure Operation, Maintenance, and Monitoring and Interim Groundwater Monitoring - The Team reached consensus that the annual sampling event will include 29 wells to be sampled biennially. These wells include: MW01, MW02, MW04, MW05, MW06, IW07ID, MW09, MW10, MW11, MW12, MW13, MW14, MW15, MW20, MW44, MW44, MW45, MW46, MW47, MW48, MW49, MW50, MW51, MW70, MW71, MW72, MW73, MW74, MW75, & MW76.
2002-D03	2002-M02	Area South of K7-0561 (516S) (SWMU #100) and Eastern Components Cleaning Facility (eCCF) Interim Measure Operation, Maintenance, and Monitoring and Interim Groundwater Monitoring - The Team reached consensus to continue operating the air sparge wells in the configuration they are currently in.
2002-D04	2002-M02	Area South of K7-0561 (516S) (SWMU #100) and Eastern Components Cleaning Facility (eCCF) Interim Measure Operation, Maintenance, and Monitoring and Interim Groundwater Monitoring - The Team reached consensus to sample wells 13, 14, and 15 on an annual basis instead of a semi-annual basis.
2002-D05	2002-M02	Area South of K7-0561 (516S) (SWMU #100) and Eastern Components Cleaning Facility (eCCF) Interim Measure Operation, Maintenance, and Monitoring and Interim Groundwater Monitoring - The Team reached consensus to conduct semi-annual sampling of the following 8 monitoring wells in the eastern OFW Area: MW16, MW18, MW54, MW59, MW60, MW61, MW77, MW78.
2002-D06	2002-M02	Area South of K7-0561 (516S) (SWMU #100) and Eastern Components Cleaning Facility (eCCF) Interim Measure Operation, Maintenance, and Monitoring and Interim Groundwater Monitoring - The Team reached consensus to continue air sparging in the Eastern OFW Area to be protective of the OFW.
2002-D07	2002-M02	Area South of K7-0561 (516S) (SWMU #100) and Eastern Components Cleaning Facility (eCCF) Interim Measure Operation, Maintenance, and Monitoring and Interim Groundwater Monitoring - The Team reached consensus to conduct the 2020 annual sampling event that will include the following 12 wells: MW23, MW24, MW25, MW27, MW29, MW30, MW37, MW38, MW39, MW40, MW41, and MW42.
2002-D08	2002-M02	Area South of K7-0561 (516S) (SWMU #100) and Eastern Components Cleaning Facility (eCCF) Interim Measure Operation, Maintenance, and Monitoring and Interim Groundwater Monitoring - The Team reached consensus to conduct the 2020 semi-annual sampling of the following 10 wells in the western OFW area: MW31, MW32, MW63, MW68, MW69, MW79, MW36, MW33, MW35, and MW80.

February 2020 Decision items Rev 0		
Decision No.	**Minutes Reference**	**Decision**
2002-D09	2002-M02	Area South of K7-0561 (516S) (SWMU #100) and Eastern Components Cleaning Facility (eCCF) Interim Measure Operation, Maintenance, and Monitoring and Interim Groundwater Monitoring - The Team reached consensus to continue air sparging in the Western OFW Area to be protective of the OFW.
2002-D10	2002-M02	Area South of K7-0561 (516S) (SWMU #100) and Eastern Components Cleaning Facility (eCCF) Interim Measure Operation, Maintenance, and Monitoring and Interim Groundwater Monitoring - The Team reached consensus to conduct eCCF DPT sampling to complete the cDCE HCP delineation northeast of DPTs 492 and 527.
2002-D11	2002-M02	Area South of K7-0561 (516S) (SWMU #100) and Eastern Components Cleaning Facility (eCCF) Interim Measure Operation, Maintenance, and Monitoring and Interim Groundwater Monitoring - The Team reached consensus on the resampling of CCF-DPTs 553, 568, 569 and 570 to determine the appropriate location to install a monitoring well within the former ERH area.
2002-D12	2002-M02	Area South of K7-0561 (516S) (SWMU #100) and Eastern Components Cleaning Facility (eCCF) Interim Measure Operation, Maintenance, and Monitoring and Interim Groundwater Monitoring - The Team reached consensus on the installation of six monitoring wells (MW-A through MW-H), to replace eleven of the twelve wells sampled in 2019. MW-A to be co-located with DPT0534; MW-B to be determined based on resampling results of DPTs 553, 568, 569 & 570; MW-C co-located with DPT-0529; MD-D co-located with DPT-0491; MW-E co-located with DPT-0499; MW-E co-located with DPT-0499; MW-F co-located with DPT-0547; MW-H located between DPTs 542 & 546. These wells will be sampled annually for VOCs in December 2020.
2002-D13	2002-M02	Area South of K7-0561 (516S) (SWMU #100) and Eastern Components Cleaning Facility (eCCF) Interim Measure Operation, Maintenance, and Monitoring and Interim Groundwater Monitoring - The Team also reached consensus to continue sampling of CCF-IW35 in the annual IGWM program.
2002-D14	2002-M02	Area South of K7-0561 (516S) (SWMU #100) and Eastern Components Cleaning Facility (eCCF) Interim Measure Operation, Maintenance, and Monitoring and Interim Groundwater Monitoring - The Team reached consensus on the following proposed abandonment method to include: the removal of surface completion; removal of each element and associated cable (if unable to remove element abandon in place); drill to the bottom of the electrode with a small diameter tooling and pressure grout from bottom of electrode flush to ground surface; if unable to drill through conductive backfill, bentonite cement, and sand propose leaving electrodes in place and grout from 10 feet bls to ground surface. Electrodes are not considered wells therefore SJRWMD does not require permit for abandonment.

February 2020 Decision items Rev 0		
Decision No.	**Minutes Reference**	**Decision**
2002-D15	2002-M03	Hydrocarbon Burn Facility (SWMU 007) Interim Groundwater Monitoring Results - The Team reached consensus to continue annual IGWM.
2002-D16	2002-M03	Hydrocarbon Burn Facility (SWMU 007) Interim Groundwater Monitoring Results -The Team reached consensus to add existing wells IW0044I and IW0045I to next year's sampling program.
2002-D17	2002-M03	Hydrocarbon Burn Facility (SWMU 007) Interim Groundwater Monitoring Results - The Team reached consensus that following the next annual sampling event, the Team will re-evaluate the need for additional downgradient investigation.
2002-D18	2002-M04	Launch Complex 34 (LC34) (SWMU CC054) T-2 Area Soil Interim Measure - The Team reached consensus of No Further Action (NFA) fort the 20 areas remediated during the T-2 Area IM.
2002-D19	2002-M04	Launch Complex 34 (LC34) (SWMU CC054) T-2 Area Soil Interim Measure - The Team reached consensus that the LUC boundary area will only include PCB-contaminated concrete and soil left in place inside the fence.
2002-D20	2002-M05	Mobile Launch Platform (MLP)/Vehicle Assembly Building (VAB) (SWMU 056) Annual Corrective Measures Implementation (CMI) and Interim Measures (IM) Update - The Team reached consensus that the air sparge system will remain off in the area of Hot Spot 2.
2002-D21	2002-M05	Mobile Launch Platform (MLP)/Vehicle Assembly Building (VAB) (SWMU 056) Annual Corrective Measures Implementation (CMI) and Interim Measures (IM) Update - The Team reached consensus to continue interim groundwater monitoring (IGM) on an annual and/or semi-annual basis for select CVOCs trichloroethylene (TCE), cis-1,2-dichloroethylene (cDCE), trans-1,2-dichloroethene (tDCE), and vinyl chloride (VC). The semi-annual monitoring well network includes 13 wells: MLPV-IW00111, MLPV-IW0033, MLPV-IW0034, MLPV-IW0035, MLPV-IW0036, MLPV-IW0037, MLPV-IW0039, MLPV-IW0041, MLPV-IW0043, MLPV-IW0044, MLPV-IW0045, MLPV-SAMW004D, and MLPV-SAMW00041. The annual monitoring well network includes the semi-annual network plus four additional monitoring wells MLPV-IW0032, MLPV-IW0038, MLPV-IW0040, MLPV-IW0042.

February 2020 Decision items Rev 0		
Decision No.	**Minutes Reference**	**Decision**
2002-D22	2002-M05	Mobile Launch Platform (MLP)/Vehicle Assembly Building (VAB) (SWMU 056) Annual Corrective Measures Implementation (CMI) and Interim Measures (IM) Update - The Team reached consensus to continue the biosparge system operation following repairs to the biosparge system.
2002-D23	2002-M05	Mobile Launch Platform (MLP)/Vehicle Assembly Building (VAB) (SWMU 056) Annual Corrective Measures Implementation (CMI) and Interim Measures (IM) Update - The Team reached consensus to continue IGW on a semi-annual basis for select CVOCs (TCE, cDCE, tDCE, and VC) from the 12 monitoring wells IW0057, IW0058, IW0059, IW0060, ASMW0004, ASMW000S, ASMW0006, IW0031, IW0061, IW0062, IW0063, and IW0064.
2002-D24	2002-M05	Mobile Launch Platform (MLP)/Vehicle Assembly Building (VAB) (SWMU 056) Annual Corrective Measures Implementation (CMI) and Interim Measures (IM) Update - The Team reached consensus to perform DPT groundwater sampling to evaluate the HS3 Area once the lease ends. This includes evaluating to potentially reinstall wells at the site and the need for bioremediation implementation work plan addendum for injection of additional EVO.
2002-D25	2002-M05	Mobile Launch Platform (MLP)/Vehicle Assembly Building (VAB) (SWMU 056) Annual Corrective Measures Implementation (CMI) and Interim Measures (IM) Update - The Team reached consensus to modify IGM frequency in the HS3 OWF area to annual for monitoring wells MW0011 through MW0014.
2002-D26	2002-M05	Mobile Launch Platform (MLP)/Vehicle Assembly Building (VAB) (SWMU 056) Annual Corrective Measures Implementation (CMI) and Interim Measures (IM) Update - The Team reached consensus to reduce the reported analyte list to select CVOCs (TCE, cDCE, tDCE, and VC).
2002-D27	2002-M06	GSA Reclamation Yard (SWMU 010) Performance Monitoring and Long-Term Groundwater Monitoring Results - The Team reached consensus to continue semi-annual sampling of MW0067 through MW007 4, for the site COCs; PCE, TCE, trans-1,2-DCE, cis-1,2-DCE, 1, 1-DCE, and VC.
2002-D28	2002-M06	GSA Reclamation Yard (SWMU 010) Performance Monitoring and Long-Term Groundwater Monitoring Results - The Team reached consensus to continue semi-annual sampling of MW0067, MW0071, and MW0073 for UIC parameters (TRPH, iron, TDS).
2002-D29	2002-M06	GSA Reclamation Yard (SWMU 010) Performance Monitoring and Long-Term Groundwater Monitoring Results - The Team reached consensus to continue semi-annual water level measurements at MW0002S, MW0002IS, MW0009S, MW0013M, MW0014M, MW0015M, and MW0067 through MW0074. The Team reached consensus to conduct the next sampling event in May 2020.
2002-D30	2002-M07	Center-wide PFAS Investigation SWMU Assessment Phase II Work Plan - The Team reached consensus to use the following NASA sources for researched in the Phase II SWMU Assessment Work Plan Implementation: Remediation Information System (RIS), GIS, Safety Data Sheets (SDS), and Technology Evaluation for Environmental Risk Mitigation (TEERM).

February 2020 Decision items Rev 0		
Decision No.	**Minutes Reference**	**Decision**
2002-D31	2002-M07	Center-wide PFAS Investigation SWMU Assessment Phase II Work Plan - The Team reached consensus to use the following outside sources will be researched for the Phase II SWMU Assessment Work Plan Implementation: Florida Department of Environmental Protection (FDEP) Map Direct, FDEP Division of Waste Management Database, OCULUS records, Florida Department of Health PFAS Location Database, historical aerial photographs, and federal on-line resources.
2002-D32	2002-M07	Center-wide PFAS Investigation SWMU Assessment Phase II Work Plan - The Team reached consensus that the six NASA PFAS Preliminary Assessment questionnaires (general, emergency response, fire chief, base historian, fire protection, and public works) and listed personnel (fire station personnel, Richard Anderson [Fire Chief], Chris Young [Deputy Chief], Jeff Dudley, Roads and Grounds personnel, and Glenn Willis [Pest Control]) will be utilized/interviewed during the Work Plan implementation.
2002-D33	2002-M07	Center-wide PFAS Investigation SWMU Assessment Phase II Work Plan - The Team reached consensus that RIS search and PRISM® will be utilized to identify PFAS background locations within KSC.
2002-D34	2002-M08	Center-wide PFAS Investigation PRISM Work Plan - The Team reached consensus to collect additional subsurface data and create six local, plume-scale cross sections in areas known to contain PFAS in groundwater. This will consist of installing 12 new monitoring wells to 50ft BLS for logging soil type and performing spectral gamma logging, and the performance of gamma logging of 60 existing monitoring wells will be conducted.
2002-D35	2002-M08	Center-wide PFAS Investigation PRISM Work Plan - The Team reached consensus to collect additional data to create a high-resolution potentiometric surface map of KSC by measuring the potentiometric surface elevation in 106 wells (over two synoptic events; one in dry season and one in rainy season), and installing 15 data logging transducers (12 groundwater, 3 surface water) to collect water elevation, temperature, and salinity – logging at 15 minute intervals for three months deployed between dry and rainy seasons.
2002-D36	2002-M08	Center-wide PFAS Investigation PRISM Work Plan - The Team reached consensus on the creation and calibration of a stormwater pollutant model that will be utilized to predict PFAS loading to surface water by collecting site-specific and regional stormwater information, and by developing and calibrating a stormwater model using publicly available and site-specific data.
2002-D37	2002-M11	Industrial Area LTM – Update on Sampling Results - The Team reached consensus to continue annual LTM sampling at the CMS site of 28 monitoring wells for select volatile organic compounds (VOCs), including tetrachloroethene (PCE), trichloroethane (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), 1, 1-dichloroethane (1, 1-DCA), 1, 1-dichloroethene (1, 1-DCE) and vinyl chloride (VC) and collect 34 water level measurements in May 2020.
2002-D38	2002-M11	Industrial Area LTM – Update on Sampling Results - The Team reached consensus to conduct additional high-density direct-push assessment to determine the extent of areas with contaminants of concern at concentrations exceeding 10 times the Natural Attenuation Default Concentrations (NADCs).

February 2020 Decision items Rev 0		
Decision No.	**Minutes Reference**	**Decision**
2002-D39	2002-M11	Industrial Area LTM – Update on Sampling Results - The Team reached consensus to continue annual LTM sampling at the VPF site of eight monitoring wells for select VOCs (TCE, cis-1,2-DCE, and VC) and collect 34 water level measurements in November 2020.
2002-D40	2002-M11	Industrial Area LTM – Update on Sampling Results - The Team reached consensus to continue annual LTM sampling at M7-505 of 11 monitoring wells for select VOCs (TCE, cis-1,2-DCE, and VC) and collect 35 water level measurements in November 2020.
2002-D41	2002-M11	Industrial Area LTM – Update on Sampling Results - The Team reached consensus to continue annual LTM sampling at FSA1 of six monitoring wells for select VOCs (benzene, ethylbenzene, and isopropylbenzene), polynuclear aromatic hydrocarbons (PAHs) (naphthalene, 1-methylnaphthalene, 2- Methylnaphthalene), and total recoverable petroleum hydrocarbons (TRPH), and collect 17 water level measurements in May 2020.
2002-D42	2002-M11	Industrial Area LTM – Update on Sampling Results - The Team also reached consensus to continue monitoring the program/path forward for the site, which will be re-evaluated following assessment of soil and groundwater within the footprint of Facility 1044 following demolition completion.
2002-D43	2002-M11	Industrial Area LTM – Update on Sampling Results -The Team reached consensus to increase sampling frequency at the LETF site by moving up next scheduled sampling event to May 2020, which includes LTM sampling of four monitoring wells for VC and collection of 14 water level measurements.
2002-D44	2002-M11	Industrial Area LTM – Update on Sampling Results - The Team reached consensus to continue annual LTM sampling at the GSSP of 23 monitoring wells for select VOCs (PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and VC) and naphthalene, and collect 33 water level measurements in November 2020.
2002-D45	2002-M13	Contractor's Road Heavy Equipment Area (SWMU 055) Interim Groundwater Monitoring and Performance Monitoring - Team reached consensus to continue annual IGM activities in Summer 2020 with the following modifications: Sample the following 12 wells for CVOCs: HS1: sample wells MW0026, MW0029; HS2: sample wells MW0031, MW0032, MW0042; Northern Area: sample wells MW0017I, MW0019I, MW0034; Down Gradient: sample wells MW0035, MW0037, MW0039, MW0041; and eliminate MW0040 since no historical detections in deep well.
2002-D46	2002-M13	Contractor's Road Heavy Equipment Area (SWMU 055) Interim Groundwater Monitoring and Performance Monitoring - The Team reached consensus to sample three wells (MW0025, MW0026, MW0035) for 1,4-dioxane and eliminate MW0029 which has no historical exceedances in five events since 2013.
2002-D47	2002-M13	Contractor's Road Heavy Equipment Area (SWMU 055) Interim Groundwater Monitoring and Performance Monitoring - The Team reached consensus to collect depth to water measurements from 49 site-wide monitoring wells assuming damaged MW0043 is replaced, and eliminate MW0016I and MW0020I due to unable to locate.

February 2020 Decision items Rev 0		
Decision No.	**Minutes Reference**	**Decision**
2002-D48	2002-M13	Contractor's Road Heavy Equipment Area (SWMU 055) Interim Groundwater Monitoring and Performance Monitoring - The Team reached consensus to generate Mann-Kendall statistics for all applicable IGM wells (that meet the criteria for using Mann-Kendall).
2002-D49	2002-M13	Contractor's Road Heavy Equipment Area (SWMU 055) Interim Groundwater Monitoring and Performance Monitoring - The Team reached consensus to continue the Eastern Area Performance Monitoring activities in June 2020 and sample nine wells as follows: continue wet/dry annual sampling at MW0044, MW0046, MW0050 through MW0052 for CVOCs and eliminate MEE and TOC sampling at these wells; modify MW0047 to wet/dry annual sampling as two most recent events are less than NADCs and eliminate MEE and TOC sampling at MW0047; and continue semi-annual sampling at MW0025, MW0048, and MW0049; and eliminate Dhc sampling at MW0048 and MW0049.
2002-D50	2002-M13	Contractor's Road Heavy Equipment Area (SWMU 055) Interim Groundwater Monitoring and Performance Monitoring - The Team reached consensus to continue Western Area Performance Monitoring in June 2020 and sample nine wells as follows: continue semi-annual sampling at MW0027, MW0043, and MW0058 for CVOCs; modify MW0045, MW0053 through MW0057 to wet/dry annual sampling as two most recent events are less than NADCs; eliminate MEE and TOC sampling at MW0045 and MW0053 through MW0056; eliminate Dhc sampling; and eliminate UIC sampling at MW0025; no exceedances in 6 sampling events.
2002-D51	2002-M13	Contractor's Road Heavy Equipment Area (SWMU 055) Interim Groundwater Monitoring and Performance Monitoring - The Team reached consensus to conduct an annual Sub Slab Soil Gas (SSSG) sampling event (CVOCs and methane) in June 2020 to evaluate if there have been changes in SSSG in the four vapor probes due to IM activities. If no changes in the SSSG are documented, it is recommended to discontinue the collection of SSSG samples.

APPENDIX C

O&M LOGS, AIR SPARGE / BIOSPARGE SHED MAINTENANCE LOG, AND HISTORICAL BIOSPARGE WELL CLEANOUT

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Geosyntec consultants

Site: MLPV Biosparge
Project #: FR0579D
Date: 1/24/2018

Well #	Install Measurements		Field Measurements					
	Well Depth		Water	Well Depth Before Sparging		Well Depth After Sparging		Sediment Removed
	(ft BLS)	(ft BTOC)	Level	(ft BLS)	(ft BTOC)	(ft BLS)	(ft BTOC)	(ft)
ASW01	50.75	50.0	1.95	49.28	48.48	49.78	48.98	0.50
ASW02	50.80	50.0	2.02	50.20	49.40	50.70	49.90	0.50
ASW03	50.90	50.1	3.02	49.31	48.51	50.73	49.93	1.42
ASW04	50.80	50.0	3.00	49.99	49.19	50.65	49.85	0.66
ASW05	50.90	50.1	2.95	49.65	48.85	50.38	49.58	0.73
ASW06	50.80	50.0	3.05	50.75	49.95	50.77	49.97	0.02
ASW07	50.80	50.0	3.15	50.00	49.20	50.75	49.95	0.75
ASW08	50.58	49.8	2.97	49.95	49.15	50.60	49.80	0.65
ASW09	50.50	49.7	2.95	49.95	49.15	50.39	49.59	0.44
ASW10	50.50	49.7	1.79	49.30	48.50	50.45	49.65	1.15
ASW11	50.50	49.7	2.55	48.80	48.00	50.49	49.69	1.69
ASW12	50.50	49.7	2.75	49.60	48.80	50.50	49.70	0.90
ASW13	51.50	50.7	2.69	49.80	49.00	51.00	50.20	1.20
ASW14	50.50	49.7	2.53	49.75	48.95	50.50	49.70	0.75
ASW15	50.50	49.7	2.57	49.85	49.05	50.35	49.55	0.50
ASW16	50.50	49.7	3.19	49.80	49.00	50.48	49.68	0.68
ASW17	50.58	49.8	3.25	48.95	48.15	50.55	49.75	1.60
ASW18	50.67	49.9	3.30	49.95	49.15	50.70	49.90	0.75
ASW19	50.50	49.7	3.19	49.95	49.15	50.46	49.66	0.51
ASW20	50.50	49.7	3.11	49.75	48.95	50.48	49.68	0.73
ASW21	50.33	49.5	3.10	49.75	48.95	50.25	49.45	0.50
ASW22	50.25	49.5	2.99	49.55	48.75	50.30	49.50	0.75
ASW23	50.16	49.4	NM	NM	NM	NM	NM	NM
ASW24	50.02	49.2	2.80	49.75	48.95	49.99	49.19	0.24
ASW25	49.94	49.1	3.05	48.90	48.10	49.80	49.00	0.90
BSW26	49.80	48.80	3.00	49.75	48.75	NM	NM	NM
BSW27	49.60	48.60	2.95	49.61	48.61	NM	NM	NM
BSW28	49.30	48.30	2.75	49.25	48.25	NM	NM	NM
BSW29	49.10	48.10	3.25	49.00	48.00	NM	NM	NM
BSW30	49.30	48.30	3.30	49.32	48.32	NM	NM	NM
BSW31	50.00	49.00	3.35	49.79	48.79	NM	NM	NM

Notes:

1. ft BTOC indicates feet below top of casing.
2. ft BLS indicates feet below land surface.
3. Assumed screen length to be 2.5 feet for biosparge wells ASW01 through ASW25.
4. ASW well depth measurements come from Jacobs Well Construction Logs provided in the Corrective Measures Report (June 2006).
5. Assumed screen length to be 2.3 feet for biosparge wells BSW26 and BSW31 (filter pack extends 1.2 ft above top of screen).
6. BSW well depth measurements come from Geosyntec Well Construction Logs provided in the Construction Completion Report (May 2016).
7. Sediment removed calculated using depth to bottom in ft BLS.
8. NM indicates not measured
9. NA indicates the length of sediment removed is not applicable as the result is negative, and likely due to a measurement error in the field.

MLPV Air Sparge/Biosparge Shed Maintenance Log
National Aeronautics and Space Administration
Kennedy Space Center, Florida

Date	Component	Hours	Activity Type	Activity Description	Field Staff
07/19/2013	FI-4	11,208	Repair	Float in flow meter repaired	J. Bartlett (GeoSyntec)
08/16/2013	Heat Exchanger	11,879	Maintenance	Filter cleaned with compressed air	J. Bartlett (GeoSyntec)
10/29/2013	PRV	127,536	Repair	PRV replaced	J. Bartlett (GeoSyntec)
11/26/2013	Pressure Gauge	13,426	Repair	Replace broken pressure gauge with 1/4-inch plug	J. Bartlett (GeoSyntec)
03/28/2014	Air Compressor	16,330	Maintenance	Oil Change (~1 L of ISO 150 Synthetic Blend Gear Oil)	J. Bartlett (GeoSyntec)
			Repair	Oil plug breaks after oil change completed	
			Maintenance	Inlet filter cleaned with compressed air at office	
05/05/2014	Air Compressor	17,242	Maintenance	Oil replaced prior to system restart	J. Bartlett (GeoSyntec)
			Repair	Oil plug repaired	
05/28/2014	Air Compressor	17,800	Modification	Air inlet moved to outside of sparge shed; new exhaust fan and additional louvres installed	J. Barfus (GeoSyntec)
08/18/2014	Hour Meter	NR	Modification	Hour meter rewired to monitor when system is operating - previously wired to variable frequency drive	J. Bartlett (GeoSyntec)
07/20/2015	Heat Exchanger	NR	Repair	Remove heat exchanger that reached end of useful life and replace with CC-450 AKG Aftercooler	B. Coppenger (GeoSyntec)
07/28/2015	Air Compressor	26,735	Maintenance	Oil Change (Gear-Lube 150 oil)	A. Warzinski (GeoSyntec)
08/11/2015	PRV	27,059	Repair	PRV replaced	B. Coppenger (GeoSyntec)
09/30/2015	Air Compressor	28,094	Repair	Condensate drain line replaced	J. Bartlett (GeoSyntec)
11/13/2015	PRV	NR	Repair	PRV replaced	D. Sizemore (GeoSyntec)
	System Piping		Modification	Bleed filter added to bleed valve	
02/23/2016	System Piping	NR	Modification	System expanded to include 6 new biosparge wells	A. Warzinski (GeoSyntec)
02/25/2016	Air Compressor	31,134	Maintenance	Compressor motor greased	A. Warzinski (GeoSyntec)
03/31/2016	Air Compressor	31,898	Maintenance	Oil Change (Gear-Lube 150 oil)	A. Warzinski (GeoSyntec)
05/20/2016	Air Compressor	NR	Repair	System troubleshooting - system not operational upon arrival (no flow observed)	A. Warzinski (GeoSyntec)
9/22-23/2016	Air Compressor	NR	Modification	Telemetry system upgraded (PLC and monitoring system upgrade). Hood for air inlet added to protect from rain (installed during compressor reinstallation/repair attempt).	A. Warzinski (GeoSyntec)
09/27/2016	Air Compressor	NR	Repair	System troubleshooting - compressor confirmed locked-up. Compressor and motor removed from system trailer for servicing	A. Warzinski (GeoSyntec)
11/04/2016	Air Compressor	NR	Repair	Compressor re-install and testing. Compressor locked-up again during testing, so compressor and motor removed from air sparge trailer again for repairs	B. Coppenger (GeoSyntec)
12/28/2016	System Piping	NR	Modification	Added a pressure gauge prior to heat exchanger and replaced an old temperature gauge prior to heat exchanger.	A. Warzinski (GeoSyntec)
			Maintenance	Solenoid membranes inspected and cleaned; pressure gauges PI-2, PI-3, and PI-6 are replaced.	
04/29/2017	VFD	NR	Replacement	Variable Frequency Drive replacement completed.	J. Bartlett (GeoSyntec)
05/01/2017	System Piping	NR	Modification	Bleed valve installed prior to air sparge Legs (in front of solenoid S-2).	S. Graves (GeoSyntec)
05/03/2017	Air Compressor	32,960	Replacement	Air compressor replacement complete, and operation restarted.	S. Graves (GeoSyntec)

MLPV Air Sparge/Biosparge Shed Maintenance Log
National Aeronautics and Space Administration
Kennedy Space Center, Florida

Date	Component	Hours	Activity Type	Activity Description	Field Staff
05/05/2017	System Piping	NR	Modification	Flow meter broken on Leg 3. Internal components removed until replacement is received.	D. Sizemore (GeoSyntec)
05/22/2017	Solenoids	33,834	Replacement	Solenoid internals for Legs 3 and 4 (S-5 and S-6) replaced due to routine wear & tear.	S. Graves (GeoSyntec)
	System Piping		Replacement	Flow meter for Leg 3 replaced with a 2-inch, 10-100 scfm air flow meter from PRM.	
08/31/2017	System Piping	35,623	Modification	Added a 0 to -100 inch H_2O vacuum gauge to the compressor inlet. The previous vacuum gauge could not read vacuums that high.	S. Graves (GeoSyntec)
	Air Compressor		Maintenance	Replaced air filter on the air compressor intake.	
09/20/2017	Telemetry	NR	Replacement	UPS battery backup removed (reached end of its useful life). Replacement ordered.	P. Duttenhaver (GeoSyntec)
10/01/2017	Telemetry	NR	Replacement	UPS battery backup replacement installed.	P. Duttenhaver (GeoSyntec)
12/20/2017	System Piping	37,057	Replacement	McMaster-Carr vacuum gauge installed on the compressor inlet is replaced with a Dwyer magnehelic gauge (0 to 50 inches H_2O) after the McMaster-Carr reached the end of its useful life.	S. Graves (GeoSyntec)
02/26/2018	System Piping	38,361	Replacement	Replace rotameter on Leg 3 with a PRM 20-200 SCFM (Model FMDFG51). Installed a 0 to 30 psi pressure gauge following the aftercooler.	S. Graves (GeoSyntec)
03/26/2018	System Piping	39,031	Replacement	Replace the rotameter on Leg 4 with a PRM 20-200 SCFM (Model FMDFG51).	S. Graves (GeoSyntec)
03/27/2018	Air Compressor	39,031	Maintenance	Oil Change (Gardner Denver ISO 150 oil)	S. Graves (GeoSyntec)
05/23/2018	Air Compressor	40,046	Maintenance	Replaced air filter on the air compressor intake.	S. Graves (GeoSyntec)
09/24/2018	Air Compressor	44,877	Maintenance	Oil Change (Gardner Denver ISO 150 oil)	S. Graves (GeoSyntec)
10/16/2019	Telemetry	NR	Replacement	Telemetry router replaced via identical router provided by PRM	C. Johnson/J. Lerch (AECOM)
10/28/2019	Air Compressor	46,288	Replacement	Compressor inlet filter replaced (ZVF-50). Condensation separator installed after heat exchanger	C. Johnson/J. Lerch (AECOM)
11/04/2019	Air Compressor	46,288	Replacement	Pressure Relief Valve (Watts M-30) replaced. Factory set @ 30psi trip point. Pressure guage PI-7 and pressure gauge immediately after heat exchanger (no label on PI&D) replaced by PRM gauges 0-30 psi.	C. Johnson/J. Lerch (AECOM)
11/26/2019	Pressure Transmitte	45,553	Replacement	Pressure transmitter replaced with identical Dwyer Instruments 628-08-GH-P1-E2-S1 , 0-30 psi, 4-20mA	J. Lerch/J. Bradford (AECOM)

Notes:

1) NR indicates not recorded.

2) Maintenance Log starts following compressor replacement in May 2013.

3) PRV indicates pressure relief valve.

MLP/VAB O&M

MLP/VAB Area, SWMU No. 56

Kennedy Space Center, Florida

Personnel:	Chris Johnson/Josh Lerch	Date:	10/28/2019	Time:	9:00 AM

Maintenance & Monitoring

Item	Frequency	Completed (yes/no)	Comments or Notes
System Operational on Arrival (yes/no)	Each Visit	Yes	
System Operational on Departure (yes/no)	Each Visit	No	Shut off for GW sampling/repair
Clean Inlet Filters (In-line, Bleed Air)	Each Visit	Yes	Replaced
Drain Condensate and Clean Air Cooler	Each Visit	Yes	Also installed condensation separator
Check Oil Level in Compressor (Gear-Lube 150)	Each Visit	Yes	Added approxmately 1/5 quart
Oil Change	5,000 hrs.	No	Completed during Septemeber 2019 visit

Equipment Shed Readings (Biosparge)

Pre-Compressor				Post-Compressor				
Hour Meter	46288.0	hrs	TI-1 (°F)	Leg/Location #	Compressor Outlet	Leg 1 (ASW01 to 13)	Leg 2 (ASW14 to 25)	Leg 5 (ASW26 to 31)
AMPs	45.4	amps	175					
Electric Meter	817891	kWhr	TI-2 (°F)	Pressure (PSI)	Main Header	PI-2	PI-3	PI-6
Vacuum (PI-I)	24.0	in. WC	110		NF	23	23	23
				Observed Flow Rate (ACFM)	Total Flow (sum)	FI-1	FI-2	FI-5
					36.0	14.0	11.0	11.0
				Corrected Flow Rate (SCFM)	55.6	21.6	17.0	17.0

$$Corrected\ Flow\ Rate = Observed\ Flow\ Rate * \left(\frac{SG * T + 460}{36 * [P + 14.7]}\right)^{-1}$$

Biosparge System Readings

MAKE SURE COMPRESSOR IS RUNNING BEFORE TAKING MEASUREMENTS. IF PRESSURE LESS THAN 18 PSI OR IF PRESSURE VARIES MORE THAN 1 PSI BETWEEN WELLS, CALL PROJECT MANAGER IMMEDIATELY.

	ASW01	ASW02	ASW03	ASW04	ASW05	ASW06	ASW07	ASW08
Pressure (PSI)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Temp. (°F)	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
Differential (in. WC)	0.09	NF	0.07	0.09	0.06	0.09	NF	NF
Flow (SCFM)	5.1	NF	4.5	5.1	4.2	5.1	NF	NF
	ASW09	ASW10	ASW11	ASW12	ASW13	ASW14	ASW15	ASW16
Pressure (PSI)	20.0	20.0	20.0	20.0	NF	21.0	21.0	21.0
Temp. (°F)	82.0	82.0	82.0	82.0	NF	82.0	82.0	82.0
Differential (in. WC)	0.10	0.07	0.07	0.07	NF	0.04	0.06	0.04
Flow (SCFM)	5.4	4.5	4.5	4.5	NF	3.4	4.2	3.4
	ASW17	ASW18	ASW19	ASW20	ASW21	ASW22	ASW23	ASW24
Pressure (PSI)	21	21	21	21	21	21	21	21
Temp. (°F)	82	82	82	82	82	82	82	82
Differential (in. WC)	0.04	0.03	0.02	0.03	0.01	0.02	0.01	0.03
Flow (SCFM)	3.4	3.0	2.4	3.0	1.7	2.4	1.7	3.0
	ASW25	Biosparge Expansion	BSW26 (Leg 5)	BSW27 (Leg 5)	BSW28 (Leg 5)	BSW29 (Leg 5)	BSW30 (Leg 5)	BSW31 (Leg 5)
Pressure (PSI)	21.0							
Temp. (°F)	82.0	Pressure (PSI)	21.0	21.0	21.0	21.0	21.0	21.0
Differential (in. WC)	0.03	Flow (ACFM)	2.0	2.0	1.8	2.2	2.0	1.5
Flow (SCFM)	3.0	Flow (SCFM)	3.1	3.1	2.7	3.4	3.1	2.3

Dissolved Oxygen (DO) in mg/L, Temperature in °C, and Oxidation-Reduction Potential (ORP) in mV, DTW in feet below top of casing

	ASPZ-1R	ASPZ-2	ASMW-1	ASMW-2	ASMW-3	ASMW-4	ASMW-5	ASMW-6
Depth to Water (feet BTOC)								
Dissolved Oxygen (mg/L)								
Temperature °C								
ORP (mV)								

Comments

ASW02, ASW07, ASW08, and ASW13 dwyer in-well flowmeters are broken and need replacement

Installed condensation separator after Heat Exchanger

Pressure relief valve tripped at tail end of O&M. When taken apart for investigation, internal bushings/seals fell apart. Will need to replace entire valve.

Mainline pressure gauges before and after heat exchanger were not functioning, noted for replacement during next visit

System left off for upcoming GW sampling and additional repairs needed for relief valve

Monitor well readings not collected due to system malfunctioning at end of O&M

1. NR indicates not recorded.

2. Biosparge expansion started Feb 2016. AS system remains shut down since 24-Apr 2018. System operates in 3 hour cycles, 4 times per day: 3hrs on and 3 hrs off

3. NF = Gauge/meter not functional

MLP/VAB O&M

MLP/VAB Area, SWMU No. 56

Kennedy Space Center, Florida

Personnel:	C.Johnson/J.Lerch	**Date:**	11/4/2019	**Time:**	09:30am

Maintenance & Monitoring

Item	Frequency	Completed (yes/no)	Comments or Notes
System Operational on Arrival (yes/no)	Each Visit	No	Down for repairs/GW sampling last week
System Operational on Departure (yes/no)	Each Visit	Yes	System restarted @ 10:15am
Clean Inlet Filters (In-line, Bleed Air)	Each Visit	No	Completed Last Week
Drain Condensate and Clean Air Cooler	Each Visit	Yes	
Check Oil Level in Compressor (Gear-Lube 150)	Each Visit	Yes	
Oil Change	5,000 hrs.	No	Completed on 9/24 visit

Equipment Shed Readings (Biosparge)

Pre-Compressor			Post-Compressor				
Hour Meter	45288.5	hrs	TI-1 (°F)				
AMPs	49.5	amps	175	Leg/Location #	Compressor Header	Leg 1 (ASW01 to 13)	Leg 2 (ASW14 to 25)	Leg 5 (ASW26 to 31)
Electric Meter	817903	kWhr	TI-2 (°F)	Pressure (PSI)	PI-7/After Hex	PI-2	PI-3	PI-6
Vacuum (PI-I)	25.0	in. WC	100		27/26	23	25	21.5
				Observed Flow Rate (ACFM)	Total Flow (sum)	FI-1	FI-2	FI-5
					40.0	12.5	12.5	15.0
				Corrected Flow Rate (SCFM)	62.3	19.5	20.0	22.9

$$Corrected\ Flow\ Rate = Observed\ Flow\ Rate * \left(\frac{SG * T + 460}{36 * [P + 14.7]}\right)^{-1}$$

Biosparge System Readings

MAKE SURE COMPRESSOR IS RUNNING BEFORE TAKING MEASUREMENTS. IF PRESSURE LESS THAN 18 PSI OR IF PRESSURE VARIES MORE THAN 1 PSI BETWEEN WELLS, CALL PROJECT MANAGER IMMEDIATELY.

	ASW01	ASW02	ASW03	ASW04	ASW05	ASW06	ASW07	ASW08
Pressure (PSI)								
Temp. (°F)								
Differential (in. WC)								
Flow (SCFM)								
	ASW09	**ASW10**	**ASW11**	**ASW12**	**ASW13**	**ASW14**	**ASW15**	**ASW16**
Pressure (PSI)								
Temp. (°F)								
Differential (in. WC)								
Flow (SCFM)								
	ASW17	**ASW18**	**ASW19**	**ASW20**	**ASW21**	**ASW22**	**ASW23**	**ASW24**
Pressure (PSI)								
Temp. (°F)								
Differential (in. WC)								
Flow (SCFM)								
	ASW25	**Biosparge Expansion**	**BSW26 (Leg 5)**	**BSW27 (Leg 5)**	**BSW28 (Leg 5)**	**BSW29 (Leg 5)**	**BSW30 (Leg 5)**	**BSW31 (Leg 5)**
Pressure (PSI)								
Temp. (°F)		Pressure (PSI)						
Differential (in. WC)		Flow (ACFM)						
Flow (SCFM)		Flow (SCFM)						

Dissolved Oxygen (DO) in mg/L, Temperature in °C, and Oxidation-Reduction Potential (ORP) in mV, DTW in feet below top of casing

	ASPZ-1R	ASPZ-2	ASMW-1	ASMW-2	ASMW-3	ASMW-4	ASMW-5	ASMW-6
Depth to Water (feet BTOC)	2.70	2.05	4.02	4.15	4.70	0.05	0.85	0.10
Stress (" H2O)	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0
Dissolved Oxygen (mg/L)	8.22	3.12	3.80	3.78	4.77	2.95	5.34	2.73
Temperature °C	27.0	27.0	27.1	29.0	27.6	27.1	27.2	27.0
ORP (mV)	-127	125	63	172	-70	93	149	137

Comments

Replaced PRV w/ Watts M-30, set at 30 psi

Replaced 2 pressure gauges PI-7 and right after Heat Exchanger

Purged condensation from manifold header

Noted a lot of dirt in well ASPZ-2, will need to redevelop during next visit

1. NR indicates not recorded.

2. Biosparge expansion started Feb 2016. AS system remains shut down since 24-Apr 2018. System operates in 3 hour cycles, 4 times per day: 3hrs on and 3 hrs off

3. NF = Gauge/meter not functional

AECOM

MLP/VAB O&M

MLP/VAB Area, SWMU No. 56

Kennedy Space Center, Florida

Personnel:	Josh Lerch & James Bradford	**Date:**	11/26/2019	**Time:**	900

Maintenance & Monitoring

Item	Frequency	Completed (yes/no)	Comments or Notes
System Operational on Arrival (yes/no)	Each Visit	Yes	Shutdown at 9:00 am as intended
System Operational on Departure (yes/no)	Each Visit	Yes	
Clean Inlet Filters (In-line, Bleed Air)	Each Visit	Checked	
Drain Condensate and Clean Air Cooler	Each Visit	N/A	Condensate Drained Added Previously
Check Oil Level in Compressor (Gear-Lube 150)	Each Visit	OK	
Oil Change	5,000 hrs.	N/A	

Equipment Shed Readings (Biosparge)

Pre-Compressor			Post-Compressor				
Hour Meter	45553.4	hrs	**TI-1 (°F)**	**Leg/Location #**	**Compressor Header**	**Leg 1 (ASW01 to 13)**	**Leg 2 (ASW14 to 25)**	**Leg 5 (ASW26 to 31)**
AMPs	48.7	amps	160	**Pressure (PSI)**	**PI-7/After Hex**	**PI-2**	**PI-3**	**PI-6**
Electric Meter	822688	kWhr	**TI-2 (°F)**		25	25	23	21.5
Vacuum (PI-I)	25.0	in. WC	70	**Observed Flow Rate (ACFM)**	**Total Flow (sum)**	**FI-1**	**FI-2**	**FI-5**
					42.5	15.0	12.5	15.0
				Corrected Flow Rate (SCFM)	68.2	24.6	20.0	23.5

$$Corrected\ Flow\ Rate = Observed\ Flow\ Rate * \left(\frac{SG * T + 460}{36 * [P + 14.7]}\right)^{-1}$$

Biosparge System Readings

MAKE SURE COMPRESSOR IS RUNNING BEFORE TAKING MEASUREMENTS. IF PRESSURE LESS THAN 18 PSI OR IF PRESSURE VARIES MORE THAN 1 PSI BETWEEN WELLS, CALL PROJECT MANAGER IMMEDIATELY.

	ASW01	ASW02	ASW03	ASW04	ASW05	ASW06	ASW07	ASW08
Pressure (PSI)	8.2	Broken	8.3	8.2	8.2	8.3	8.3	8.2
Temp. (°F)	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0
Differential (in. WC)	Broken	Broken	0.60	0.50	0.50	1.10	Broken	Broken
Flow (SCFM)	#VALUE!	#VALUE!	10.8	9.8	9.8	14.6	#VALUE!	#VALUE!
	ASW09	**ASW10**	**ASW11**	**ASW12**	**ASW13**	**ASW14**	**ASW15**	**ASW16**
Pressure (PSI)	8.2	8.2	9.6	8.3	Broken	9.5	9.5	9.5
Temp. (°F)	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0
Differential (in. WC)	0.50	0.60	0.70	0.70	Broken	Broken	0.50	0.40
Flow (SCFM)	9.8	10.7	11.9	11.6	#VALUE!	#VALUE!	10.1	9.0
	ASW17	**ASW18**	**ASW19**	**ASW20**	**ASW21**	**ASW22**	**ASW23**	**ASW24**
Pressure (PSI)	9.5	9.5	9.5	9.5	9.5	9.6	9.5	9.5
Temp. (°F)	75	75	75	75	75	75	75	75
Differential (in. WC)	Broken	0.20	0.20	0.10	0.10	0.20	Broken	0.05
Flow (SCFM)	#VALUE!	6.4	6.4	4.5	4.5	6.4	#VALUE!	3.2
	ASW25	**Biosparge Expansion**	**BSW26 (Leg 5)**	**BSW27 (Leg 5)**	**BSW28 (Leg 5)**	**BSW29 (Leg 5)**	**BSW30 (Leg 5)**	**BSW31 (Leg 5)**
Pressure (PSI)	9.4							
Temp. (°F)	75.0	Pressure (PSI)	23.5	20.0	20.5	19.0	21.0	22.0
Differential (in. WC)	0.20	Flow (ACFM)	2.0	2.2	2.0	1.9	2.2	1.4
Flow (SCFM)	6.4	Flow (SCFM)	3.2	3.4	3.1	2.9	3.4	2.2

Dissolved Oxygen (DO) in mg/L, Temperature in °C, and Oxidation-Reduction Potential (ORP) in mV, DTW in feet below top of casing

	ASPZ-1R	ASPZ-2	ASMW-1	ASMW-2	ASMW-3	ASMW-4	ASMW-5	ASMW-6
Depth to Water (feet BTOC)	3.34	2.67	4.60	4.48	5.02	0.80	1.22	0.44
Stress (" H2O)	NR	NR	NR	NR	NR	NR	NR	NR
Dissolved Oxygen (mg/L)	0.76	8.08	6.22	5.56	4.46	4.23	4.41	4.86
Temperature °C	24.7	23.7	25.3	25.1	25.3	22.4	22.9	21.9
ORP (mV)	-69	179	28	124	138	10	120	164

Comments

Changed out battery backup for wireless telemetry

1. NR indicates not recorded.

2. Biosparge expansion started Feb 2016. AS system remains shut down since 24-Apr 2018. System operates in 3 hour cycles, 4 times per day: 3hrs on and 3 hrs off

3. NF = Gauge/meter not functional

MLP/VAB O&M

MLP/VAB Area, SWMU No. 56

Kennedy Space Center, Florida

Personnel:	Josh Lerch & James Bradford	**Date:**	12/30/2019	**Time:**	8:45 am

Maintenance & Monitoring

Item	Frequency	Completed (yes/no)	Comments or Notes
System Operational on Arrival (yes/no)	Each Visit	No	system off on arriveal, compressor seized
System Operational on Departure (yes/no)	Each Visit	No	remains off until repaired
Clean Inlet Filters (In-line, Bleed Air)	Each Visit		
Drain Condensate and Clean Air Cooler	Each Visit		
Check Oil Level in Compressor (Gear-Lube 150)	Each Visit		
Oil Change	5,000 hrs.		

Equipment Shed Readings (Biosparge)

Pre-Compressor				Post-Compressor				
Hour Meter	45573.2	hrs	**TI-1 (°F)**	**Leg/Location #**	**Compressor Header**	**Leg 1 (ASW01 to 13)**	**Leg 2 (ASW14 to 25)**	**Leg 5 (ASW26 to 31)**
AMPs		amps						
Electric Meter	823166	kWhr	**TI-2 (°F)**	**Pressure (PSI)**	**PI-7/After Hex**	**PI-2**	**PI-3**	**PI-6**
Vacuum (PI-I)		in. WC						
$Corrected\ Flow\ Rate = Observed\ Flow\ Rate * \left(\frac{\sqrt{SG * T + 460}}{\sqrt{36 * [P + 14.7]}}\right)^{-1}$				**Observed Flow Rate (ACFM)**	**Total Flow (sum)**	**FI-1**	**FI-2**	**FI-5**
				Corrected Flow Rate (SCFM)				

Biosparge System Readings

MAKE SURE COMPRESSOR IS RUNNING BEFORE TAKING MEASUREMENTS. IF PRESSURE LESS THAN 18 PSI OR IF PRESSURE VARIES MORE THAN 1 PSI BETWEEN WELLS, CALL PROJECT MANAGER IMMEDIATELY.

	ASW01	ASW02	ASW03	ASW04	ASW05	ASW06	ASW07	ASW08
Pressure (PSI)								
Temp. (°F)								
Differential (in. WC)								
Flow (SCFM)								
	ASW09	**ASW10**	**ASW11**	**ASW12**	**ASW13**	**ASW14**	**ASW15**	**ASW16**
Pressure (PSI)								
Temp. (°F)								
Differential (in. WC)								
Flow (SCFM)								
	ASW17	**ASW18**	**ASW19**	**ASW20**	**ASW21**	**ASW22**	**ASW23**	**ASW24**
Pressure (PSI)								
Temp. (°F)								
Differential (in. WC)								
Flow (SCFM)								
	ASW25	**Biosparge Expansion**	**BSW26 (Leg 5)**	**BSW27 (Leg 5)**	**BSW28 (Leg 5)**	**BSW29 (Leg 5)**	**BSW30 (Leg 5)**	**BSW31 (Leg 5)**
Pressure (PSI)								
Temp. (°F)		Pressure (PSI)						
Differential (in. WC)		Flow (ACFM)						
Flow (SCFM)		Flow (SCFM)						

Dissolved Oxygen (DO) in mg/L, Temperature in °C, and Oxidation-Reduction Potential (ORP) in mV, DTW in feet below top of casing

	ASPZ-1R	ASPZ-2	ASMW-1	ASMW-2	ASMW-3	ASMW-4	ASMW-5	ASMW-6
Depth to Water (feet BTOC)								
Stress (" H2O)								
Dissolved Oxygen (mg/L)								
Temperature °C								
ORP (mV)								

Comments

APPENDIX D
FIELD NOTES

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Projects (continued)

10/16/19

Josh Lerch (AECOM)
Chris Johnson (AECOM)
Anne Christ (NASA)
Geoff Card (NASA)

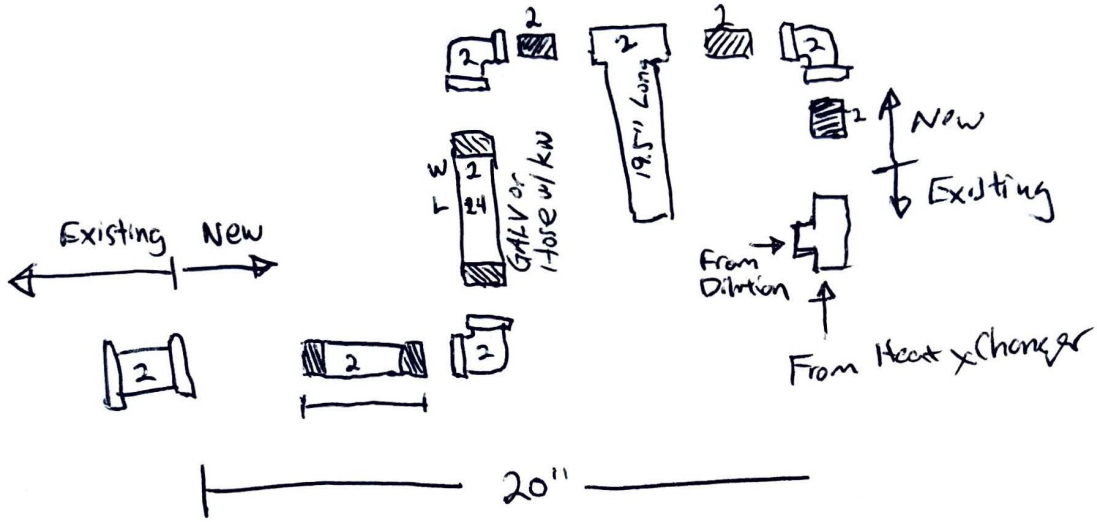
weather: 84°F, sunny
(system operating)

6:45 - onsite for Nuts + Bolts meeting and to conduct repairs on telemetry system. AC already onsite, waiting on GC to conduct N+B meeting. Held TGSM meeting

9:10 - GC arrives, conduct N+B meeting. Only notable item discussed was LOTO procedures. Since this system is an isolated power source and does NOT affect any other NASA facilities or personnel, LOTO doesn't apply to most repairs/maintenance. We will perform proper LOTO if the system is left off for an extended period of time for maintenance or repair

9:25 - GC offsite and AC offsite. CJ + JL begin repair of telemetry
- modem was replaced w/ Cradlepoint identical router (provided by PRM)
- after replacing, telemetry system verified to be working

10:45 - CJ/JL offsite, system operating



- 0845 - J. Lerch + C. Johnson onsite
  - Anne Crest with NASA onsite Already.
  - waiting for Jeff Card to arrive onsite for Nuts + Bolts
- 0910 - Jeff onsite
  - Complete Nuts + Bolts meeting
  - H+S tailgate (AECOM)

  - begin event
  - change out telemetry modem
  - verify connection via hotspot and computer
  - sync Day/Time on two PLC timers.
  - take photos and put together parts list for moisture separator install

10/28/19 Chris Johnson (AECOM)
Josh Lerch (AECOM)

weather: 83°F, sunny
system operating upon arrival

9:00 - Arrive onsite to perform O+M event. Held TGSM + setup equipment. Calibrate DO meter.
9:10 - Begin O+M readings, system placed in manual mode. *See 10/28/19 O+M log for readings collected.

Notable Items / Issues

- We noted many of the wells were covered by weeds/dirt and haven't been accessed in some time, majority of ASW
- We were unable to locate monitor wells, will need to return tomorrow w/ metal detector + weed eater (bad overgrowth)

9:40 - DO meter placed in ASPZ000IR to log
~11:00 - after majority of ASW/BSW readings collected, we heard an air leak in equipment shed. We discovered the pressure relief valve had popped open for no apparent reason.
11:15 - We shut system off to investigate

10/28/19 CJ/JL

Issues

- after disassembling relief valve, it fell apart (internals). It appears the valve had never been serviced
- Due to planned maintenance/repairs and upcoming GWR sampling, system will be left off for remainder of week
- Placed LOTO tag on compressor breaker due to repairs needed

~12:00pm - collect DO meter from ASPZ000IR stop data logging. Will extract data @ a later time.

- ASW02, ASW07, ASW08, ASW13 dwyer DS300-1 ball valves broken. Unable to collect flow @ wellheads until they are repaired
- Will return tomorrow to complete maintenance/repairs on system.
- Pressure relief valve will need to be replaced before restarting system next week.

12:20 - offsite for office

10/29/19 Chris Johnson (AECOM)
weather: 85°F, sunny Josh Leich
system turned off yesterday for GW sampling/repair
9:00 - Arrive onsite to perform system maintenance and install condensation separator. Held TGSM.

9:15-11:15 JL works on installing condensate drain while CJ uses weedeater to trim around all system wells and equipment shed.

11:15 - All wells located/cleared, condensation drain installed after heat exchanger
11:20 - Begin checking maintenance items
ZVF50 - inlet filter badly clogged, we replaced
150 Gear lube - oil level a little low, topped off oil
- cleaned/swept trailer
- cleaned heat exchanger vent using leaf blower
- pressure gauges on main line before and after heat exchanger noted for replacement, readings from yesterday were off
12:15 - electric meter readings were collected ← 817894 kWhr
12:35 - offsite, system left off for sampling and repairs

10/29/19 Chris Johnson (AECOM)
Josh Leich

weather: 85°F, sunny

system turned off yesterday for GW sampling/repair

9:00 - Arrive onsite to perform system maintenance and install condensation separator. Held TGSM.

9:15-11:15 JL works on installing condensate drain while CJ uses weedeater to trim around all system wells and equipment shed.

11:15 - All wells located/cleared, condensation drain installed after Heat Exchanger

11:20 - Begin checking maintenance items

~~ZVF50~~ - inlet filter badly clogged, we replaced

150 Gear - oil level a little low, topped off oil

- leaned/swept trailer
- cleaned heat exchanger vent using leaf blower
- pressure gauges on maint. before and after heat exchanger noted for replacement, readings from yesterday were off ← 817894 kWhr

12:15 - electric meter readings were collected

12:35 - offsite, system left off for sampling and repairs

11/4/2019 Chris Johnson
Josh Leich
(AECOM)

weather: 75°F, overcast

9:30 - Onsite to perform system repairs & restart following GW sampling. Held TGSM. System off.

Put DO meter down well ASP2000IR to log prior to starting system.

Repairs Performed

- pressure relief valve replaced w/ Watts M30, set @ 30 psi
- PI-7 before Heat Exchanger replaced w/ PRM gauge 0-30 psi
- Pressure gauge after Heat Exchanger replaced w/ PRM 0-30 psi (No label on PID)
- Spare PRM gauge placed in storage bins
- System hours 45,288.2 hrs

System Timing:
12am - 3:00 - ON
12pm - 15:00 - ON
6am - 9am - ON
6pm - 9pm - ON

10:21 - start system

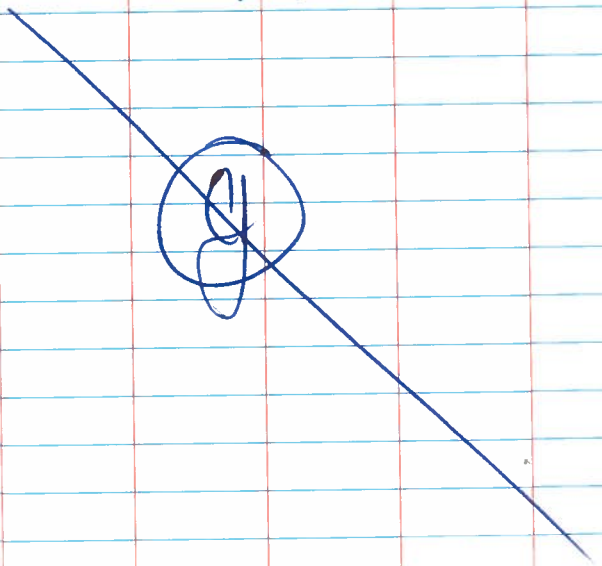
11/4/19 Chris Johnson
Josh Lerch

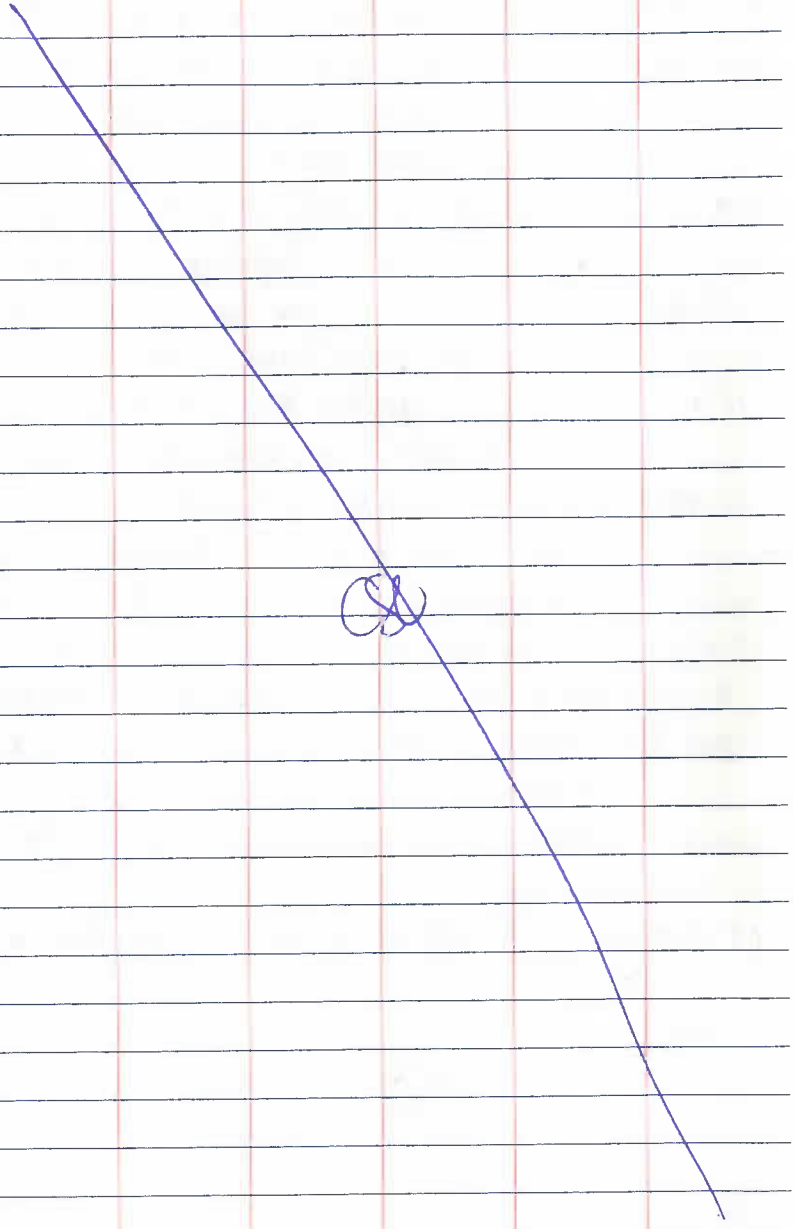
(Cont'd from previous page)

- We adjusted/increased Legs 1/2, flows were slightly lower than previous visits.

- We collected equipment shed readings, then monitor well readings.
  *See 11/4/19 O+M log for readings.

12:45. System operating upon departure





NASA - KSC - MLPV

10/30/19 Water Levels p.1 of 3 CL/GK

08:30 Chad Lee (CL) & Greg Kusel (GK) onsite at the LES Bldg. H&S reviews. & then a Nuts & Bolts with Geoff Card (NASA safety) and Lindsay Morgan (VAB LTM NASA RPM) for the VAB LTM Project.

10:00 CL/GK to Hot Spot 2 (HS2) on the MLPV Site to begin venting wells. Breathing Zone is monitored at every well after venting, using a MiniRAE 3000 PID S/N 592-916905.

11:15 CL/GK to Hot Spot 3 (HS3) to vent wells.

11:40 CL/GK to vent Biosparge Area Wells (BS).

13:00 Lunch

13:35 Water Levels @ HS3. A Solinst Model 101 water level meter (AECOM #10) is used to measure DTW below TOC in FT. Data is recorded on the Water Level Log.

13:47 Water Levels @ the BS Area.

14:24 Water Levels @ HS2.

14:57 CL/GK to the VAB LTM Sites (LC 39OGA).

NOTE: Oppm was observed at every well upon opening on the PID.

KSC - NASA - MLPV

10/31/19 GW Sampling. p.2 of 3 CL/GK/DS

09:00 CL onsite. GK & Dustin Slater (DS) - AECOM already onsite.

09:10 H&S meeting & discuss scope.

09:45 GK/DS to HS2 to begin sampling & CL to HS3.

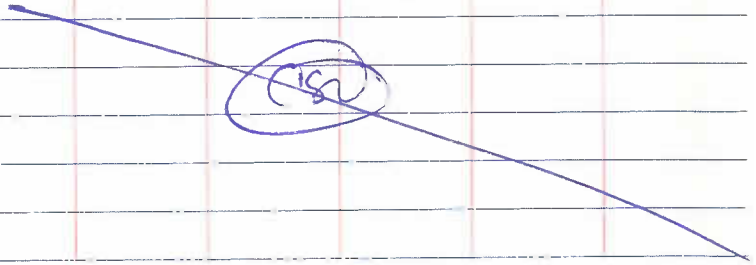
12:40 Lunch

13:35 GK/DS to HS2 to continue sampling & CL to the Biosparge Area.

NOTE: All wells are sampled for 8260 VOCs using low-flow. A Geopump II peristaltic pump with 1/4" OD HDPE tubing is used & equipment volumes are used for purging. Each sampler is collecting geochemical parameters with a 556 MPS YSI multi-meter & a 2100Q Hach turbidity meter. Data is recorded using Earthsoft Edge on a Laptop.

16:10 Crew coordinates with Michelle Moore (NASA) on drum placement/labels/barcodes.

16:50 Crew offsite.



KSC - NASA - MLPV

11/01/19 GW Sampling p.3 of 3 CL/DS/GK

08:30 CL onsite @ Logistics Bldg to pick up barcodes/Drum Labels/Strups. No Barcodes to be found.

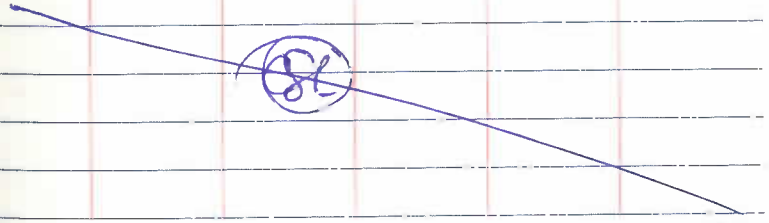
09:00 CL/GK/DS onsite @ the Biosparge area to continue sampling. H&S meeting.

09:15 Crew off to sample using low-flow & sampling for 8260 VOCs.

11:30 Crew to Logistic Bldg to Complete COCs & get drum Barcodes.

12:45 Crew to CCF to setup & transfer purge water into the drum. A new clamshell w/ 1 drum (216793) is set up (216794) along the eastern fence, approximately 40 feet north of the yard entrance. The drum (216793) is locate in the NE spot inside clamshell (216794) and is approximately 50% full of purge water from the MLPV sampling.

13:40 Crew offsite to mobe to the AECOM Depot.



11/26/2019

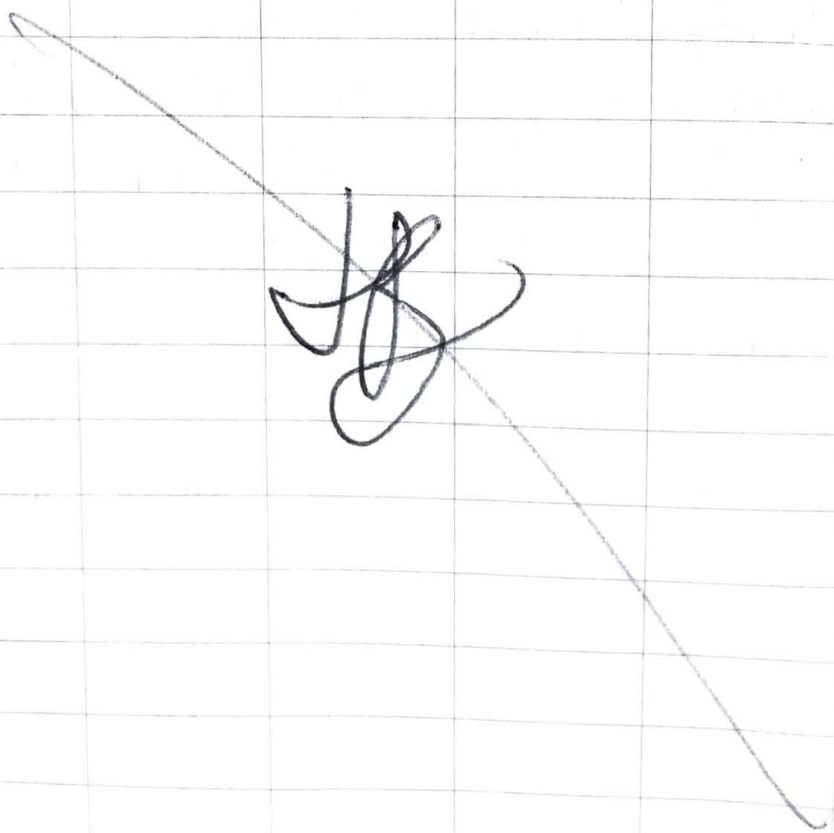
Josh Lerch
James Bradford

Weather: ~70° mostly clear

0855 Arrive onsite. System shuts off at ~900. No alarms.

- Collected readings for O&M & FOR DETAILS, REFER TO O&M LOG
- Checked pressure transmitter. Requires replacement, DO NOT have one onsite.
- Replaced battery backup

1200 Depart site



12/30/19 plof 1 Josh Leach
James Bradfo

weather: 75°F, cloudy
0845 onsite, H+S tailgate, begin audit
- system off upon arrival, AS High pressure alarm is tripped
- inspection reveals air end of compressor is ceased. attempt to dislodge with no luck.
- discuss with project manager Chris Johnson.
- Troubleshoot pressure transmitter, appears to be working on web interface.

- HR Reading: 45573.2
- kWhr Reading: 823166

11:00 offsite

APPENDIX E
GROUNDWATER SAMPLING LOGS

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GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Biosparge Barrier

Project No: 60615493

Sample ID: MLPV-ASMW0004-037.5-20191101 Sampler: Dustin Slater

Well ID: MLPV-ASMW0004 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	1.02
Top of Screen (ft-BTOR):	35	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	40	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	39.17	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
11/1/2019	10:43				1.02									
11/1/2019	10:58	0.05	0.75	0.75	N/A	7.45	4049	1.77	1.60	24.80	-297.5	2.15	NONE	NONE
11/1/2019	11:00	0.05	0.10	0.85	N/A	7.45	4070	1.77	1.01	24.80	-298.3	2.17	NONE	NONE
11/1/2019	11:02	0.05	0.10	0.95	N/A	7.45	4085	1.75	0.88	24.83	-298.6	2.17	NONE	NONE
11/1/2019	11:04	0.05	0.10	1.05	N/A	7.45	4103	1.71	0.65	24.88	-299.5	2.18	NONE	NONE

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
10:43	11:04	21	1.05	7.45	4103	1.71	0.65	24.88	-299.5

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Biosparge Barrier

Project No: 60615493

Sample ID: MLPV-ASMW0005-037.5-20191101 Sampler: Dustin Slater

Well ID: MLPV-ASMW0005 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	1.58
Top of Screen (ft-BTOR):	35	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	40	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	39.28	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
11/1/2019	10:15				1.58									
11/1/2019	10:25	0.05	0.50	0.50	N/A	7.39	3841	4.77	0.89	25.09	-227.6	2.02	NONE	NONE
11/1/2019	10:27	0.05	0.10	0.60	N/A	7.36	3896	4.35	0.44	25.07	-235.1	2.05	NONE	NONE
11/1/2019	10:29	0.05	0.10	0.70	N/A	7.34	3924	4.29	0.55	25.03	-240.4	2.07	NONE	NONE
11/1/2019	10:31	0.05	0.10	0.80	N/A	7.33	3935	4.28	0.49	25.02	-244.2	2.08	NONE	NONE

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
10:15	10:31	16	0.80	7.33	3935	4.28	0.49	25.02	-244.2

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Biosparge Barrier

Project No: 60615493

Sample ID: MLPV-ASMW0006-037.5-20191101 Sampler: Dustin Slater

Well ID: MLPV-ASMW0006 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	0.8
Top of Screen (ft-BTOR):	35	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	40	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	39	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
11/1/2019	9:51				0.93									
11/1/2019	10:01	0.05	0.50	0.50	N/A	7.37	3913	0.31	1.32	25.19	-359.7	2.06	NONE	NONE
11/1/2019	10:03	0.05	0.10	0.60	N/A	7.35	3941	0.27	0.89	25.18	-296.1	2.07	NONE	NONE
11/1/2019	10:05	0.05	0.10	0.70	N/A	7.33	3972	0.24	0.59	25.19	-313.1	2.09	NONE	NONE
11/1/2019	10:07	0.05	0.10	0.80	N/A	7.33	3982	0.23	0.61	25.19	-289.1	2.10	NONE	NONE

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
9:51	10:07	16	0.80	7.33	3982	0.23	0.61	25.19	-289.1

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Biosparge Barrier

Project No: 60615493

Sample ID: MLPV-IW0031-030.0-20191101 Sampler: Greg Kusel

Well ID: MLPV-IW0031 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	1	Static Water Level (ft-BTOR):	1.56
Top of Screen (ft-BTOR):	25	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	35	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	34.5	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
11/1/2019	9:50				1.56									
11/1/2019	10:10	0.04	0.8	0.8	1.59	7.17	2017	0.30	3.67	24.92	-75.4	1.03	none	none
11/1/2019	10:12	0.04	0.08	0.88	1.59	7.17	2022	0.28	2.45	25.06	-75.7	1.03	none	none
11/1/2019	10:14	0.04	0.08	0.96	1.59	7.15	2041	0.27	0.51	25.29	-76.2	1.03	none	none
11/1/2019	10:16	0.04	0.08	1.04	1.59	7.14	2039	0.26	1.18	25.17	-78.5	1.03	none	none

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
9:50	10:16	26	1.04	7.14	2039	0.26	1.18	25.17	-78.5

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Biosparge Barrier

Project No: 60615493

Sample ID: MLPV-IW0057-045.0-20191101 Sampler: Chad Lee

Well ID: MLPV-IW0057 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	4.32
Top of Screen (ft-BTOR):	40	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	50	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	50	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
11/1/2019	10:01	0.05	0.30	0.30	N/A	7.18	5064	0.94	0.80	24.6	-113	2.69	NONE	NONE
11/1/2019	10:03	0.05	0.10	0.40	N/A	7.19	5240	0.96	0.71	24.6	-113	2.82	NONE	NONE
11/1/2019	10:05	0.05	0.10	0.50	N/A	7.19	5292	0.97	0.65	24.6	-113	2.86	NONE	NONE
11/1/2019	10:07	0.05	0.10	0.60	N/A	7.19	5338	0.95	0.59	24.5	-114	2.88	NONE	NONE

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
09:55	10:07	12	0.60	7.19	5338	0.95	0.59	24.5	-114

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Biosparge Barrier

Project No: 60615493

Sample ID: MLPV-IW0058-047.5-20191101 Sampler: Chad Lee

Well ID: MLPV-IW0058 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	4.38
Top of Screen (ft-BTOR):	45	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	50	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	50	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
11/1/2019	10:36	0.05	0.30	0.30	N/A	7.15	4038	0.77	2.08	24.8	-120	2.15	NONE	NONE
11/1/2019	10:38	0.05	0.10	0.40	N/A	7.14	4243	0.68	1.59	24.7	-120	2.26	NONE	NONE
11/1/2019	10:40	0.05	0.10	0.50	N/A	7.14	4303	0.67	1.54	24.6	-118	2.29	NONE	NONE
11/1/2019	10:42	0.05	0.10	0.60	N/A	7.14	4330	0.66	1.32	24.6	-117	2.30	NONE	NONE

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
10:30	10:42	12	0.60	7.14	4330	0.66	1.32	24.6	-117

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Biosparge Barrier

Project No: 60615493

Sample ID: MLPV-IW0059-047.5-20191031 Sampler: Chad Lee

Well ID: MLPV-IW0059 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	4.83
Top of Screen (ft-BTOR):	45	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	50	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	50	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	15:13	0.05	0.30	0.30	N/A	7.08	2700	0.47	0.68	27.5	-181	1.40	NONE	NONE
10/31/2019	15:15	0.05	0.10	0.40	N/A	7.07	2950	0.37	0.46	27.4	-179	1.51	NONE	NONE
10/31/2019	15:17	0.05	0.10	0.50	N/A	7.07	3000	0.33	0.44	27.5	-176	1.56	NONE	NONE
10/31/2019	15:19	0.05	0.10	0.60	N/A	7.07	3067	0.31	0.38	27.5	-172	1.61	NONE	NONE

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
15:07	15:19	12	0.60	7.07	3067	0.31	0.38	27.5	-172

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Biosparge Barrier

Project No: 60615493

Sample ID: MLPV-IW0060-045.0-20191101 Sampler: Dustin Slater

Well ID: MLPV-IW0060 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	0.93
Top of Screen (ft-BTOR):	40	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	50	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	49.52	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
11/1/2019	9:28				0.80									
11/1/2019	9:38	0.05	0.50	0.50	N/A	7.64	6882	0.21	14.9	25.32	-373.5	3.74	NONE	NONE
11/1/2019	9:40	0.05	0.10	0.60	N/A	7.61	6784	0.20	7.60	25.31	-373.7	3.69	NONE	NONE
11/1/2019	9:42	0.05	0.10	0.70	N/A	7.59	6736	0.20	6.45	25.32	-373.8	3.66	NONE	NONE
11/1/2019	9:44	0.05	0.10	0.80	N/A	7.56	6714	0.20	5.57	25.28	-374.3	3.59	NONE	NONE

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
9:28	9:44	16	0.80	7.56	6714	0.20	5.57	25.28	-374.3

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Biosparge Barrier

Project No: 60615493

Sample ID: MLPV-IW0061-037.5-20191031 Sampler: Chad Lee

Well ID: MLPV-IW0061 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	4.62
Top of Screen (ft-BTOR):	35	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	40	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	40	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	14:36	0.05	0.30	0.30	N/A	7.45	2058	0.61	1.64	28.1	-195	1.04	NONE	NONE
10/31/2019	14:38	0.05	0.10	0.40	N/A	7.44	2096	0.51	0.75	27.7	-196	1.07	NONE	NONE
10/31/2019	14:40	0.05	0.10	0.50	N/A	7.44	2142	0.44	0.55	27.6	-197	1.10	NONE	NONE
10/31/2019	14:42	0.05	0.10	0.60	N/A	7.44	2164	0.40	0.51	27.5	-198	1.10	NONE	NONE

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
14:30	14:42	12	0.60	7.44	2164	0.40	0.51	27.5	-198

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Biosparge Barrier

Project No: 60615493

Sample ID: MLPV-IW0062-042.5-20191031 Sampler: Chad Lee

Well ID: MLPV-IW0062 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	4.73
Top of Screen (ft-BTOR):	40	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	45	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	45	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	14:18	0.05	0.30	0.30	N/A	7.19	9375	0.44	6.26	28.7	-135	5.25	NONE	NONE
10/31/2019	14:20	0.05	0.10	0.40	N/A	7.19	9630	0.41	4.67	28.7	-135	5.38	NONE	NONE
10/31/2019	14:22	0.05	0.10	0.50	N/A	7.19	9796	0.40	3.62	28.6	-137	5.48	NONE	NONE
10/31/2019	14:24	0.05	0.10	0.60	N/A	7.18	9841	0.40	2.65	28.6	-138	5.51	NONE	NONE

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
14:12	14:24	12	0.60	7.18	9841	0.40	2.65	28.6	-138

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Biosparge Barrier

Project No: 60615493

Sample ID: MLPV-IW0063-037.5-20191101 Sampler: Greg Kusel

Well ID: MLPV-IW0063 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	2.73
Top of Screen (ft-BTOR):	35	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	40	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	39.57	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
11/1/2019	11:05				2.73									
11/1/2019	11:15	0.05	0.5	0.5	N/A	6.97	5640	0.52	0.84	25.57	-22.1	3.01	none	none
11/1/2019	11:17	0.05	0.1	0.6	N/A	6.96	5674	0.46	0.75	25.65	-24.3	3.02	none	none
11/1/2019	11:19	0.05	0.1	0.7	N/A	6.95	5747	0.41	1.66	25.70	-28.3	3.06	none	none
11/1/2019	11:21	0.05	0.1	0.8	N/A	6.95	5748	0.35	0.79	25.60	-30.5	3.07	none	none

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
11:05	11:21	16	0.8	6.95	5748	0.35	0.79	25.60	-30.5

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Biosparge Barrier

Project No: 60615493

Sample ID: MLPV-IW0064-042.5-20191101 Sampler: Greg Kusel

Well ID: MLPV-IW0064 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	2.75
Top of Screen (ft-BTOR):	40	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	45	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	45	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
11/1/2019	10:42				2.75									
11/1/2019	10:52	0.05	0.5	0.5	N/A	7.06	13874	0.25	1.10	25.50	-102.5	7.93	none	none
11/1/2019	10:54	0.05	0.1	0.6	N/A	7.06	13909	0.23	1.31	25.49	-103.0	7.95	none	none
11/1/2019	10:56	0.05	0.1	0.7	N/A	7.06	13900	0.23	1.38	25.38	-103.7	7.97	none	none
11/1/2019	10:58	0.05	0.1	0.8	N/A	7.06	13930	0.23	1.36	25.40	-103.9	7.98	none	none

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
10:42	10:58	16	0.8	7.06	13930	0.23	1.36	25.40	-103.9

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 2

Project No: 60615493

Sample ID: MLPV-IW0011I-037.0-20191031 Sampler: Dustin Slater

Well ID: MLPV-IW0011I Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	2	Static Water Level (ft-BTOR):	1.83
Top of Screen (ft-BTOR):	35	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	40	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	39.65	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	10:01				1.83									
10/31/2019	10:11	0.05	0.50	0.50	2.25	7.24	2126	0.14	5.72	26.09	-242.4	1.06	none	sulfur
10/31/2019	10:13	0.05	0.10	0.60	2.25	7.24	2133	0.12	4.99	26.03	-245.9	1.06	none	sulfur
10/31/2019	10:15	0.05	0.10	0.70	2.25	7.23	2139	0.10	3.75	26.01	-247.6	1.07	none	sulfur
10/31/2019	10:17	0.05	0.10	0.80	2.25	7.23	2146	0.09	4.03	25.98	-254.3	1.07	none	sulfur

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
10:01	10:17	16	0.80	7.23	2146	0.09	4.03	25.98	-254.3

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 2

Project No: 60615493

Sample ID: MLPV-IW0033-045.0-20191031 Sampler: Dustin Slater

Well ID: MLPV-IW0033 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	0.37
Top of Screen (ft-BTOR):	40	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	50	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	49.51	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	11:57				0.37									
10/31/2019	12:09	0.04	0.50	0.50	N/A	7.26	6411	0.16	14.7	25.91	-110.6	3.43	ELLOW	NONE
10/31/2019	12:11	0.05	0.10	0.60	N/A	7.24	6466	0.14	4.21	25.88	-108.5	3.46	ELLOW	NONE
10/31/2019	12:13	0.05	0.10	0.70	N/A	7.23	6507	0.11	2.56	25.85	-107.8	3.49	ELLOW	NONE
10/31/2019	12:15	0.05	0.10	0.80	N/A	7.22	6519	0.11	2.09	25.81	-107.5	3.50	ELLOW	NONE

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
11:57	12:15	18	0.80	7.22	6519	0.11	2.09	25.81	-107.5

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 2

Project No: 60615493

Sample ID: MLPV-IW0034-032.5-20191031 Sampler: Greg Kusel

Well ID: MLPV-IW0034 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	2.56
Top of Screen (ft-BTOR):	30	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	40	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	33.5	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	14:52				2.56									
10/31/2019	15:09	0.05	0.1	1.35	N/A	7.16	1536	0.22	58.6	27.26	-91.0	0.73	: brown	none
10/31/2019	15:11	0.05	0.1	1.45	N/A	7.11	1529	0.21	70.9	27.31	-93.3	0.73	: brown	none
10/31/2019	15:13	0.05	0.1	1.55	N/A	7.08	1528	0.20	68.0	27.29	-95.3	0.73	: brown	none
10/31/2019	15:17	0.05	1.25	1.25	N/A	7.26	1556	0.22	57.1	27.34	-85.5	0.74	: brown	none

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
14:52	15:17	25	1.25	7.26	1556	0.22	57.1	27.34	-85.5

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 2

Project No: 60615493

Sample ID: MLPV-IW0035-045.0-20191031 Sampler: Greg Kusel

Well ID: MLPV-IW0035 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	2.62
Top of Screen (ft-BTOR):	40	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	50	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	50	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	14:15				2.62									
10/31/2019	14:23	0.05	0.4	0.4	N/A	7.16	5061	0.22	21.1	27.32	-105.4	2.58	none	none
10/31/2019	14:25	0.05	0.1	0.5	N/A	7.15	5064	0.22	22.6	27.42	-106.0	2.58	none	none
10/31/2019	14:27	0.05	0.1	0.6	N/A	7.14	5038	0.18	23.4	27.36	-107.6	2.57	none	none
10/31/2019	14:29	0.05	0.1	0.7	N/A	7.14	5007	0.18	21.4	27.19	-108.3	2.56	none	none

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
14:15	14:29	14	0.7	7.14	5007	0.18	21.4	27.19	-108.3

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 2

Project No: 60615493

Sample ID: MLPV-IW0036-042.5-20191031 Sampler: Greg Kusel

Well ID: MLPV-IW0036 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	3.49
Top of Screen (ft-BTOR):	40	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	45	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	45	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	10:29	0.05	0.4	0.4	N/A	7.26	2641	0.26	2.12	26.48	-197.3	1.32	none	none
10/31/2019	10:31	0.05	0.1	0.5	N/A	7.26	2662	0.26	1.88	26.53	-199.8	1.33	none	none
10/31/2019	10:33	0.05	0.1	0.6	N/A	7.27	2677	0.26	1.60	26.53	-202.4	1.34	none	none
10/31/2019	10:35	0.05	0.1	0.7	N/A	7.27	2684	0.28	1.27	26.50	-203.7	1.34	none	none

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
10:15	10:35	20	0.7	7.27	2684	0.28	1.27	26.50	-203.7

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 2

Project No: 60615493

Sample ID: MLPV-IW0037-045.0-20191031 Sampler: Dustin Slater

Well ID: MLPV-IW0037 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	1.85
Top of Screen (ft-BTOR):	40	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	50	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	49.77	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	10:30				1.85									
10/31/2019	10:40	0.05	0.50	0.50	N/A	7.26	7777	0.21	2.73	25.96	-74.2	4.22	none	none
10/31/2019	10:42	0.05	0.10	0.60	N/A	7.26	7976	0.20	2.35	26.01	-78.6	4.32	none	none
10/31/2019	10:44	0.05	0.10	0.70	N/A	7.26	8070	0.16	1.55	25.88	-80.7	4.45	none	none
10/31/2019	10:46	0.05	0.10	0.80	N/A	7.26	8102	0.16	1.41	25.87	-78.8	4.47	none	none

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
10:30	10:46	16	0.80	7.26	8102	0.16	1.41	25.87	-78.8

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 2

Project No: 60615493

Sample ID: MLPV-IW0039-045.0-20191031 Sampler: Dustin Slater

Well ID: MLPV-IW0039 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	1.75
Top of Screen (ft-BTOR):	40	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	50	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	49.64	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	14:26				1.75									
10/31/2019	14:36	0.05	0.50	0.50	N/A	7.31	6247	0.18	5.88	26.30	-81.5	3.31	NONE	NONE
10/31/2019	14:38	0.05	0.10	0.60	N/A	7.29	6242	0.17	5.16	26.26	-80.5	3.30	NONE	NONE
10/31/2019	14:40	0.05	0.10	0.70	N/A	7.28	6209	0.16	4.36	26.25	-76.6	3.29	NONE	NONE
10/31/2019	14:42	0.05	0.10	0.80	N/A	7.28	6190	0.16	4.00	26.25	-76.3	3.27	NONE	NONE

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
14:26	14:42	16	0.80	7.28	6190	0.16	4.00	26.25	-76.3

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 2

Project No: 60615493

Sample ID: MLPV-IW0041-047.5-20191031 Sampler: Greg Kusel

Well ID: MLPV-IW0041 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	2.85
Top of Screen (ft-BTOR):	40	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	50	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	49.16	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	12:05				2.85									
10/31/2019	12:25	0.05	1.0	1.0	N/A	7.21	4624	0.19	24.6	27.19	-131.0	2.35	none	none
10/31/2019	12:27	0.05	0.1	1.1	N/A	7.20	4648	0.18	23.2	27.18	-132.8	2.37	none	none
10/31/2019	12:29	0.05	0.1	1.2	N/A	7.20	4668	0.16	22.5	27.38	-134.1	2.37	none	none
10/31/2019	12:31	0.05	0.1	1.3	N/A	7.20	4697	0.16	20.9	27.54	-134.0	2.38	none	none

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
12:05	12:31	26	1.3	7.20	4697	0.16	20.9	27.54	-134.0

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 2

Project No: 60615493

Sample ID: MLPV-IW0043-045.0-20191031 Sampler: Dustin Slater

Well ID: MLPV-IW0043 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	1.14
Top of Screen (ft-BTOR):	40	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	50	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	49.80	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	13:51				1.14									
10/31/2019	14:01	0.05	0.50	0.50	N/A	7.45	5825	0.29	2.58	28.09	-77.4	2.96	NONE	NONE
10/31/2019	14:03	0.05	0.10	0.60	N/A	7.40	6110	0.27	2.59	28.03	-81.8	3.11	NONE	NONE
10/31/2019	14:05	0.05	0.10	0.70	N/A	7.39	6120	0.26	1.20	27.98	-82.3	3.12	NONE	NONE
10/31/2019	14:07	0.05	0.10	0.80	N/A	7.38	6114	0.26	0.61	27.96	-83.7	3.12	NONE	NONE

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
13:51	14:07	16	0.80	7.38	6114	0.26	0.61	27.96	-83.7

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 2

Project No: 60615493

Sample ID: MLPV-IW0044-045.0-20191031 Sampler: Dustin Slater

Well ID: MLPV-IW0044 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	0.71
Top of Screen (ft-BTOR):	40	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	50	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	49.18	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	11:05				0.71									
10/31/2019	11:15	0.05	0.50	0.50	N/A	7.24	4808	0.24	11.3	25.63	-179.4	2.54	NONE	NONE
10/31/2019	11:17	0.05	0.10	0.60	N/A	7.21	4868	0.23	13.2	25.59	-177.2	2.57	NONE	NONE
10/31/2019	11:19	0.05	0.10	0.70	N/A	7.18	4966	0.20	6.01	25.46	-171.9	2.64	NONE	NONE
10/31/2019	11:21	0.05	0.10	0.80	N/A	7.17	4998	0.21	5.33	25.45	-167.2	2.67	NONE	NONE

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
11:05	11:21	16	0.80	7.17	4998	0.21	5.33	25.45	-167.2

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 2

Project No: 60615493

Sample ID: MLPV-IW0045-045.0-20191031 Sampler: Dustin Slater

Well ID: MLPV-IW0045 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	1.88
Top of Screen (ft-BTOR):	40	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	50	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	49.10	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	14:57				1.88									
10/31/2019	15:07	0.05	0.50	0.50	N/A	7.17	4591	0.15	6.55	25.71	-98.1	2.41	NONE	NONE
10/31/2019	15:09	0.05	0.10	0.60	N/A	7.16	4643	0.14	5.25	25.69	-100.1	2.44	NONE	NONE
10/31/2019	15:11	0.05	0.10	0.70	N/A	7.15	4713	0.13	4.98	25.78	-102.4	2.48	NONE	NONE
10/31/2019	15:13	0.05	0.10	0.80	N/A	7.14	4767	0.13	1.60	25.82	-104.4	2.50	NONE	NONE
10/31/2019	15:15	0.05	0.10	0.90	N/A	7.14	4788	0.13	1.44	25.95	-107.0	2.54	NONE	NONE

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
14:57	15:15	18	0.90	7.14	4788	0.13	1.44	25.95	-107.0

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 2

Project No: 60615493

Sample ID: MLPV-SAMW0004D-047.5-20191031 Sampler: Greg Kusel

Well ID: MLPV-SAMW0004D Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	1	Static Water Level (ft-BTOR):	3.19
Top of Screen (ft-BTOR):	35	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	40	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	49.7	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	10:56				3.19									
10/31/2019	11:05	0.05	0.4	0.4	3.29	7.10	8410	0.23	4.65	27.23	-215.8	4.47	none	none
10/31/2019	11:07	0.05	0.1	0.5	3.29	7.11	8408	0.23	2.65	27.36	-217.7	4.44	none	none
10/31/2019	11:09	0.05	0.1	0.6	3.29	7.12	8370	0.24	3.45	27.24	-219.9	4.43	none	none
10/31/2019	11:11	0.05	0.1	0.7	3.29	7.12	8330	0.24	2.43	27.15	-221.5	4.42	none	none

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
10:56	11:11	15	0.7	7.12	8330	0.24	2.43	27.15	-221.5

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 2

Project No: 60615493

Sample ID: MLPV-SAMW0004I-037.5-20191031 Sampler: Greg Kusel

Well ID: MLPV-SAMW0004I Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	1	Static Water Level (ft-BTOR):	3.22
Top of Screen (ft-BTOR):	45	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	50	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	50	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	11:26				3.22									
10/31/2019	11:34	0.05	0.4	0.4	3.26	7.21	1283	0.23	2.15	27.07	-166.7	0.61	none	none
10/31/2019	11:36	0.05	0.1	0.5	3.26	7.21	1294	0.20	2.59	27.09	-167.4	0.62	none	none
10/31/2019	11:38	0.05	0.1	0.6	3.26	7.20	1309	0.20	2.10	27.24	-168.0	0.62	none	none
10/31/2019	11:40	0.05	0.1	0.7	3.26	7.20	1316	0.18	2.38	27.36	-168.6	0.62	none	none

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
11:26	11:40	14	0.7	7.20	1316	0.18	2.38	27.36	-168.6

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 3

Project No: 60615493

Sample ID: VABRA-MW0011-030.0-20191031 Sampler: Chad Lee

Well ID: VABRA-MW0011 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	2.21
Top of Screen (ft-BTOR):	25	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	35	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	35	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	11:54	0.075	0.30	0.30	N/A	7.20	660	0.78	1.22	28.2	-307	0.32	NONE	SULFUR
10/31/2019	11:56	0.075	0.15	0.45	N/A	7.20	667	0.79	0.95	28.1	-309	0.32	NONE	SULFUR
10/31/2019	11:58	0.075	0.15	0.60	N/A	7.20	671	0.79	0.92	28.0	-310	0.32	NONE	SULFUR
10/31/2019	12:00	0.075	0.15	0.75	N/A	7.20	673	0.79	0.78	27.9	-311	0.32	NONE	SULFUR

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
11:50	12:00	10	0.75	7.20	673	0.79	0.78	27.9	-311

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 3

Project No: 60615493

Sample ID: VABRA-MW0012-020.0-20191031 Sampler: Chad Lee

Well ID: VABRA-MW0012 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	2.22
Top of Screen (ft-BTOR):	15	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	25	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	25	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	12:12	0.05	0.25	0.25	N/A	7.21	584	0.76	1.84	28.1	-314	0.27	NONE	SULFUR
10/31/2019	12:14	0.05	0.10	0.35	N/A	7.19	591	0.78	1.40	28.0	-317	0.28	NONE	SULFUR
10/31/2019	12:16	0.05	0.10	0.45	N/A	7.18	593	0.79	1.22	28.0	-319	0.28	NONE	SULFUR
10/31/2019	12:18	0.05	0.10	0.55	N/A	7.18	594	0.78	1.13	28.0	-322	0.28	NONE	SULFUR

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
12:07	12:18	11	0.55	7.18	594	0.78	1.13	28.0	-322

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 3

Project No: 60615493

Sample ID: VABRA-MW0013-022.5-20191031 Sampler: Chad Lee

Well ID: VABRA-MW0013 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	1.78
Top of Screen (ft-BTOR):	20	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	25	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	25	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	11:20	0.075	0.30	0.30	N/A	7.23	663	0.46	2.70	28.4	-314	0.32	NONE	SULFUR
10/31/2019	11:22	0.075	0.15	0.45	N/A	7.24	670	0.36	1.65	28.2	-325	0.32	NONE	SULFUR
10/31/2019	11:24	0.075	0.15	0.60	N/A	7.24	671	0.35	1.44	28.2	-326	0.32	NONE	SULFUR
10/31/2019	11:26	0.075	0.15	0.75	N/A	7.23	668	0.36	1.89	28.2	-319	0.32	NONE	SULFUR

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
11:16	11:26	10	0.75	7.23	668	0.36	1.89	28.2	-319

GROUNDWATER SAMPLE LOG SHEET

AECOM

Event: Kennedy Space Center MLPV LTM

Site Name: Mobile Launch Platform Park Sites/Vehicle Assembly Building Area (SWMU 056) - Hot Spot 3

Project No: 60615493

Sample ID: VABRA-MW0014-027.5-20191031 Sampler: Chad Lee

Well ID: VABRA-MW0014 Well Type: Monitoring Well

Remark:

Well Information

Well Diameter (in.):	0.75	Static Water Level (ft-BTOR):	3.13
Top of Screen (ft-BTOR):	25	H/S PID Monitor Reading (ppm):	0
Bottom of Screen (ft-BTOR):	30	Purge/Sample Method:	Low flow - peristalic
Total Depth of Well (ft-BTOR):	30	Sample Analysis:	VOCs Full List

Purge Information

Date	Time	Purge Rate (gal/min)	Volume Purged (gal)	Cum Vol Purged (gal)	Depth To Water (ft)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)	Salinity (S.U.)	Color	Odor
10/31/2019	10:47	0.05	0.25	0.25	N/A	7.21	685	0.08	49.6	27.4	-461	0.33	NONE	Sulfur
10/31/2019	10:49	0.05	0.10	0.35	N/A	7.21	686	0.07	37.4	27.4	-455	0.33	NONE	Sulfur
10/31/2019	10:51	0.05	0.10	0.45	N/A	7.22	686	0.08	20.3	27.4	-476	0.33	NONE	Sulfur
10/31/2019	10:53	0.05	0.10	0.55	N/A	7.21	686	0.08	16.8	27.3	-475	0.33	NONE	Sulfur
10/31/2019	10:55	0.05	0.10	0.65	N/A	7.22	685	0.08	12.4	27.3	-474	0.33	NONE	Sulfur

Start Purge	End Purge	Duration (min)	Total Vol (gal)	pH (S.U.)	S.C. (µS/cm)	DO (mg/l)	Turbidity (NTUs)	Temp (C)	ORP (mV)
10:42	10:55	13	0.65	7.22	685	0.08	12.4	27.3	-474

US Environmental Rental Corporation

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5C South Gold Dr, Hamilton, NJ 08691 (609) 570-8555
1202 Tech Blvd., Suite 108, Tampa, FL 33619 (813) 628-4200
781 Industrial Dr, Elmhurst, IL 60126 (630) 501-1847

Order No.: 34949
Date: 10/28/2019
Technician: SVE

Company: AECOM
Contact: Greg Kusel
Phone #: #N/A

Packing List

Item	Serial Number	Included	QC
MiniRAE 3000	**592-916905**	✓	
Manual		✓	
Charger		✓	
Probe Tip		✓	
Alkaline Battery Pack		✓	
External Filters		✓	
Software			
Comm. Cable			
Regulator		✓	
Tedlar Bag		✓	
Calibration Gas		✓	
Tube Holder			
Zero Tubes		✓	

Calibration Report

Item		Information	
MiniRAE 3000	**592-916905**		
Calibration Gas:		***Isobutylene***	
Lot Number:		FBJ-248-100-2	
Span Setting:		***100.00***	***ppm***
Correction Factor:		***1.00***	
Zero Reading:		***0.00***	***ppm***
Span Reading:		***100.00***	***ppm***
Post-Cal Bump Test:		***100.30***	***ppm***
Lamp		***10.6***	

This document certifies that US Environmental Rental Corporation has provided this rental equipment and all accessories in good working order. It is the renter's responsibility to: a) review all included items upon receipt, b) verify that all items are in acceptable condition and function properly, and c) contact a US Environmental associate immediately if any item is missing, damaged, and/or not functioning properly. Any delay in notifying US Environmental will be considered as the Renter taking responsibility for such missing, damaged, and/or malfunctioning item.

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781 Industrial Dr, Elmhurst, IL 60126 (630) 501-1847

Order No.: 34949
Date: 10/28/2019
Technician: SVE

YSI

Company: AECOM
Contact: Greg Kusel
Phone #: #N/A

Packing List

Item	Serial Number	Tech	QC
556	0	✓	
Handheld Display	11G100865	✓	

Item	Tech	QC	Item	Tech	QC
Cable 4 M	✓		AC Adaptor		
Flow Cell	✓		Stand		
Barb Kit	✓		D.O Kit	✓	
Storage / Cal Cup	✓		Calibration Kit	✓	
Sensor Guard	✓				
Manual					
Sonde Cap					
Software					
Extra Batteries	✓				
Display Comm. Cable					
Sonde Comm. Cable					

Calibration Report

556			0	
Parameter	**Accuracy**	**Before**	**After**	**Lot #**
Conductivy 1413 µs/cm	(+/-.5%)	1397	1413	190618D
pH 7 Buffer	(+/- .2)	7.15	7.00	190618B
pH mV for 7 Buffer	(0 +/- 50)		**-8.6**	
pH 4 Buffer	(+/- .2)	4.06	4.00	190618C
pH mV for 4 Buffer	(180 +/- 50)		**164.0**	
pH 10 Buffer	(+/- .2)	9.97	10.00	190618A
pH mV for 10 Buffer	(-180 +/- 50)		**-179.1**	
ORP mV, 237.5	(+/- 20 mV)	230.9	238.00	9GB139
DO 100% Sat	(+/- 2%)	104.9%	100.5%	
0% DO Check	(+/- 2%)		0.40	
Turbidity 0 NTU	(+/- 5%)			
Turbidity 126 NTU	(+/- 5%)			
Lab Conditions during calibration				

All calibration standards are NIST traceable. Calibration must be performed according to manufacturer's specifications.

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Missing, damaged, and/or malfunctioning equipment and accessories will result in additional fees.

Boldly "X" this box if there is qualified data on this page.

Form FD9000-8 **CALIBRATION LOG (FDEP SOP FT 1000-FT 1500, FD 1000-FD 4000)** 11-10-05

Project/Site: NASA · KSC MLPV Date: 11/1/19 Meter # 11G100865

Temperature (Quarterly) *For Date of Last Temperature Verification see* ____ *in log book* ____

Dissolved Oxygen	**DEP SOP FT 1500**	Initials	Date	Time	Probe Charge	Probe Gain	mg/L	Temp °c	% DO	Saturation mg/L (from chart)	Pass or Fail
											Acceptance Criteria: +/-0.3mg/l
(CAL) ICV CCV		CSL	11/1	09:21	—	—	8.29	24.8	100	8.29	(P) F
CAL ICV (CCV)		CSL	11/1	10:48	—	—	8.17	25.4	100	8.20	(P) F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F

Specific Conductance	**DEP SOP FT 1200**	Initials	Date	Time	Standard µmhos/cm	Exp. Date	Lot #	Bottle #	Cell Constant	Reading µmhos/cm	Pass or Fail
											Acceptance Criteria: +/- 5%
(CAL) ICV CCV		CSL	11/1	09:23	1413	6/20	9GF392	—	—	1413	(P) F
CAL ICV (CCV)		CSL	11/1	10:50	1413	6/20	9GF392	—	—	1408	(P) F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F

pH	**DEP SOP FT 1100**	Initials	Date	Time	Standard SU	Exp. Date	Lot #	Bottle #	Slope	Reading SU	Pass or Fail
										Acceptance Criteria: +/- 0.2 SU	
(CAL) ICV CCV		CSL	11/1	09:25	7.00	6/21	9GF357	—	—	7.01	(P) F
CAL ICV (CCV) 100		↓	↓	↓	4.00	6/21	9GF132	—	—	4.00	(P) F
(CAL) ICV CCV		↓	↓	↓	10.00	1/21	9GA565	—	—	9.98	(P) F
CAL ICV (CCV)		↓	↓	10:53	7.00	6/21	9GF357	—	—	7.10	(P) F
CAL ICV (CCV)		↓	↓	↓	4.00	6/21	9GF132	—	—	4.05	(P) F
CAL ICV (CCV)		↓	↓	↓	10.00	1/21	9GA565	—	—	10.02	(P) F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F

Maintenance: Weekly pH Slope: _____ Specific Conductance Probe Cleaned? Yes No Dissolved Oxygen Membrane Changed: Yes No

Notes:

Perform only in Calibrate Mode: **CAL** - Calibrate -
Perform only in Run Mode: **ICV** - Initial Calibration Verification
Perform only in Run Mode: **CCV** - Continuing Calibration Verification

DEP-SOP-001/01: Form FD 9000-8 (June 20, 2001)

Field Instrument Calibration Records

INSTRUMENT **HACH 2100Q #** Extra #1 **Serial #** 120600018309

PARAMETER: ***Turbidity***

STANDARDS: *[Specify the type(s) of standards used for calibration, the origin of the standards, the standard values, and the date the standards were prepared or purchased]*

Standard A GELEX 0-10 NTU (+/- 10%)

Standard B GELEX 10-100 NTU (+/- 6.5%)

Standard C GELEX 100-1000 NTU (+/- 5%)

DATE (mm/dd/yy)	TIME (hr:min)	STD (A, B, C)	STD VALUE	INSTRUMENT RESPONSE	% DEV	CALIBRATED (YES, NO)	TYPE (INIT, CONT)	SAMPLER INITIALS
10/31/19	10:21	A	10	10.08	+0.8	NO	INITIAL	CSL
"	"	B	100	102	+2.0	"	"	"
"	"	C	800	790	-1.3	"	"	"
10/31/19	15:25	A	10	10.16	+1.6	NO	FINAL	CSL
"	"	B	100	98	-2.0	"	"	"
"	"	C	800	795	-0.6	"	"	"
11/01/19	09:29	A	10	10.24	+2.4	NO	INITIAL	CSL
"	"	B	100	103	+3.0	"	"	"
"	"	C	800	794	-0.8	"	"	"
11/01/19	10:58	A	10	10.21	+2.1	NO	FINAL	CSL
"	"	B	100	101	+1.0	"	"	"
"	"	C	800	789	-1.4	"	"	"
		A				NO	INITIAL	
"	"	B				"	"	"
"	"	C				"	"	"
		A				NO	FINAL	
"	"	B				"	"	"
"	"	C				"	"	"

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5C South Gold Dr, Hamilton, NJ 08691 (609) 570-8555
1202 Tech Blvd., Suite 108, Tampa, FL 33619 (813) 628-4200
781 Industrial Dr, Elmhurst, IL 60126 (630) 501-1847

Order No.: 34949
Date: 10/28/2019
Technician: SVE

Company: AECOM
Contact: Greg Kusel
Phone #: #N/A

Packing List

Item	Serial Number	Tech	QC
556	0	✓	
Handheld Display	05C1159AJ	✓	

Item	Tech	QC	Item	Tech	QC
Cable 4 M	✓		AC Adaptor		
Flow Cell	✓		Stand		
Barb Kit	✓		D.O Kit	✓	
Storage / Cal Cup	✓		Calibration Kit	✓	
Sensor Guard	✓				
Manual					
Sonde Cap					
Software					
Extra Batteries	✓				
Display Comm. Cable					
Sonde Comm. Cable					

Calibration Report

556			0	
Parameter	**Accuracy**	**Before**	**After**	**Lot #**
Conductivy 1413 µs/cm	(+/-.5%)	1406	1413	190618D
pH 7 Buffer	(+/- .2)	7.05	7.00	190618B
pH mV for 7 Buffer	(0 +/- 50)		**-2.7**	
pH 4 Buffer	(+/- .2)	4.10	4.00	190618C
pH mV for 4 Buffer	(180 +/- 50)		**167.2**	
pH 10 Buffer	(+/- .2)	9.89	10.00	190618A
pH mV for 10 Buffer	(-180 +/- 50)		**-166.3**	
ORP mV, 237.5	(+/- 20 mV)	228.1	238.00	9GB139
DO 100% Sat	(+/- 2%)	97.5%	99.8%	
0% DO Check	(+/- 2%)		1.00	
Turbidity 0 NTU	(+/- 5%)			
Turbidity 126 NTU	(+/- 5%)			
Lab Conditions during calibration				

All calibration standards are NIST traceable. Calibration must be performed according to manufacturer's specifications.

This document certifies that US Environmental Rental Corporation has provided this rental equipment and all accessories in good working order. It is the renter's responsibility to: a) review all included items upon receipt, b) verify that all items are in acceptable condition and function properly, and c) contact a US Environmental associate immediately if any item is missing, damaged, and/or not functioning properly. Any delay in notifying US Environmental will be considered as the Renter taking responsibility for such missing, damaged, and/or malfunctioning item.

Missing, damaged, and/or malfunctioning equipment and accessories will result in additional fees.

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Form FD9000-8 **CALIBRATION LOG (FDEP SOP FT 1000-FT 1500, FD 1000-FD 4000)** 11-10-05

Project/Site: NASA KSC MLPU Date: 11/1/19 Meter # 05C1159AJ

Temperature (Quarterly) *For Date of Last Temperature Verification see* _____ *in log book*

Dissolved Oxygen	**DEP SOP FT 1500**	Initials	Date	Time	Probe Charge	Probe Gain	mg/L	Temp °C	% DO	Saturation mg/L (from chart)	Pass or Fail
										Acceptance Criteria: +/-0.3mg/l	
(CAL) ICV CCV		DS	11/1	09:15	—	—	8.60	22.8	100	8.61	(P) F
CAL ICV (CCV)		↓	↓	11:08	—	—	8.18	25.9	↓	8.13	(P) F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F

Specific Conductance	**DEP SOP FT 1200**	Initials	Date	Time	Standard µmhos/cm	Exp. Date	Lot #	Bottle #	Cell Constant	Reading µmhos/cm	Pass or Fail
										Acceptance Criteria: +/- 5%	
(CAL) ICV CCV		DS	11/1	09:16	1413	6/20	9GF392	—	—	1410	(P) F
CAL ICV (CCV)		↓	↓	11:12	1413	6/20	↓	—	—	1392	(P) F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F

pH	**DEP SOP FT 1100**	Initials	Date	Time	Standard SU	Exp. Date	Lot #	Bottle #	Slope	Reading SU	Pass or Fail
										Acceptance Criteria: +/- 0.2 SU	
(CAL) ICV CCV		DS	11/1	09:18	7.00	6/21	9GF357	—	—	7.01	(P) F
(CAL) ICV CCV		↓	↓	↓	4.00	6/21	9GF132	—	—	4.02	(P) F
(CAL) ICV CCV					10.00	1/21	9GA565	—	—	10.01	(P) F
CAL ICV (CCV)				11:15	7.00	6/21	9GF357	—	—	7.06	(P) F
CAL ICV (CCV)					4.00	6/21	9GF132	—	—	4.03	(P) F
CAL ICV (CCV)		↓	↓	↓	10.00	1/21	9GA565	—	—	9.97	(P) F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F

Maintenance: Weekly pH Slope: _____ Specific Conductance Probe Cleaned? Yes No Dissolved Oxygen Membrane Changed: Yes No

Notes:

Perform only in Calibrate Mode: **CAL** - Calibrate -
Perform only in Run Mode: **ICV** - Initial Calibration Verification
Perform only in Run Mode: **CCV** - Continuing Calibration Verification

DEP-SOP-001/01: Form FD 9000-8 (June 20, 2001)

Field Instrument Calibration Records

INSTRUMENT **HACH 2100Q #** 8 **Serial #** _____

PARAMETER: ***Turbidity***

STANDARDS: *[Specify the type(s) of standards used for calibration, the origin of the standards, the standard values, and the date the standards were prepared or purchased]*

Standard A GELEX 0-10 NTU (+/- 10%)

Standard B GELEX 10-100 NTU (+/- 6.5%)

Standard C GELEX 100-1000 NTU (+/- 5%)

DATE (mm/dd/yy)	TIME (hr:min)	STD (A, B, C)	STD VALUE	INSTRUMENT RESPONSE	% DEV	CALIBRATED (YES, NO)	TYPE (INIT, CONT)	SAMPLER INITIALS
10/31/19	09:50	A	10	9.83	-1.7	NO	INITIAL	DS
"	"	B	100	102	+2.0	"	"	"
"	"	C	800	795	-0.6	"	"	"
10/31/19	15:20	A	10	9.91	-0.9	NO	FINAL	DS
"	"	B	100	100	—	"	"	"
"	"	C	800	792	-1.0	"	"	"
11/1/19	09:22	A	10	9.95	-0.5	NO	INITIAL	DS
"	"	B	100	101	+1.0	"	"	"
"	"	C	800	794	-0.8	"	"	"
11/1/19	11:18	A	10	9.96	-0.4	NO	FINAL	DS
"	"	B	100	103	+3.0	"	"	"
"	"	C	800	790	-1.3	"	"	"
		A				NO	INITIAL	
"	"	B				"	"	"
"	"	C				"	"	"
		A				NO	FINAL	
"	"	B				"	"	"
"	"	C				"	"	"

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1202 Tech Blvd., Suite 108, Tampa, FL 33619 (813) 628-4200
781 Industrial Dr, Elmhurst, IL 60126 (630) 501-1847

Order No.: 34949
Date: 10/28/2019
Technician: SVE

Company: AECOM
Contact: Greg Kusel
Phone #: #N/A

Packing List

Item	Serial Number	Tech	QC
556	0	✓	
Handheld Display	06E1427AN	✓	

Item	Tech	QC	Item	Tech	QC
Cable 4 M '	✓		AC Adaptor		
Flow Cell	✓		Stand		
Barb Kit	✓		D.O Kit	✓	
Storage / Cal Cup	✓		Calibration Kit	✓	
Sensor Guard	✓				
Manual					
Sonde Cap					
Software					
Extra Batteries	✓				
Display Comm. Cable					
Sonde Comm. Cable					

Calibration Report

556			0	
Parameter	**Accuracy**	**Before**	**After**	**Lot #**
Conductivy 1413 µs/cm	(+/-.5%)	1375	1413	190618D
pH 7 Buffer	(+/- .2)	7.31	7.00	190618B
pH mV for 7 Buffer	(0 +/- 50)		**-18.0**	
pH 4 Buffer	(+/- .2)	4.04	4.00	190618C
pH mV for 4 Buffer	(180 +/- 50)		**156.1**	
pH 10 Buffer	(+/- .2)	9.86	10.00	190618A
pH mV for 10 Buffer	(-180 +/- 50)		**-183.4**	
ORP mV, 237.5	(+/- 20 mV)	220.3	238.00	9GB139
DO 100% Sat	(+/- 2%)	98.1%	100.5%	
0% DO Check	(+/- 2%)		1.10	
Turbidity 0 NTU	(+/- 5%)			
Turbidity 126 NTU	(+/- 5%)			
Lab Conditions during calibration				

All calibration standards are NIST traceable. Calibration must be performed according to manufacturer's specifications.

This document certifies that US Environmental Rental Corporation has provided this rental equipment and all accessories in good working order. It is the renter's responsibility to: a) review all included items upon receipt, b) verify that all items are in acceptable condition and function properly, and c) contact a US Environmental associate immediately if any item is missing, damaged, and/or not functioning properly. Any delay in notifying US Environmental will be considered as the Renter taking responsibility for such missing, damaged, and/or malfunctioning item.

Missing, damaged, and/or malfunctioning equipment and accessories will result in additional fees.

Boldly "X" this box if there is qualified data on this page.

Form FD9000-8 **CALIBRATION LOG (FDEP SOP FT 1000-FT 1500, FD 1000-FD 4000)** 11-10-05

Project/Site: NASA KSC MLPV Date: 11/1/2019 Meter # 06E1427AN

Temperature (Quarterly) *For Date of Last Temperature Verification see* _____ *in log book* _____

Dissolved Oxygen	**DEP SOP FT 1500**	Initials	Date	Time	Probe Charge	Probe Gain	mg/L	Temp °c	% DO	Saturation mg/L (from chart)	Pass or Fail
											Acceptance Criteria: +/-0.3mg/l
(CAL) ICV CCV		GK	11/1	0930			8.91	21.3	100	8.863	(P) F
CAL ICV (CCV)		↓	↓	1127			8.21	25.8	100	8.143	(P) F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F

Specific Conductance	**DEP SOP FT 1200**	Initials	Date	Time	Standard µmhos/cm	Exp. Date	Lot #	Bottle #	Cell Constant	Reading µmhos/cm	Pass or Fail
										Acceptance Criteria: +/- 5%	
(CAL) ICV CCV		GK	11/1	0930	1413	6/20	96F392			1414	(P) F
CAL ICV (CCV)		↓	↓	1127	↓	6/20	↓			1702	(P) F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F

pH	**DEP SOP FT 1100**	Initials	Date	Time	Standard SU	Exp. Date	Lot #	Bottle #	Slope	Reading SU	Pass or Fail
										Acceptance Criteria: +/- 0.2 SU	
(CAL) ICV CCV		GK	11/1	0930	4.0	6/21	96F132			4.08	(P) F
(CAL) ICV CCV		↓	↓	↓	7.0	6/21	96F357			6.95	(P) F
(CAL) ICV CCV		↓	↓	↓	10.0	1/21	96A565			9.97	(P) F
CAL ICV (CCV)		↓	↓	1127	4.0	6/21	96F132			4.10	(P) F
CAL ICV (CCV)		↓	↓	↓	7.0	6/21	96F357			6.92	(P) F
CAL ICV (CCV)		↓	↓	↓	10.0	1/21	96A565			9.98	(P) F
CAL ICV CCV											P F
CAL ICV CCV											P F
CAL ICV CCV											P F

Maintenance: Weekly pH Slope: _____ Specific Conductance Probe Cleaned? Yes No Dissolved Oxygen Membrane Changed: Yes No

Notes:

Perform only in Calibrate Mode: **CAL** - Calibrate -
Perform only in Run Mode: **ICV** - Initial Calibration Verification
Perform only in Run Mode: **CCV** - Continuing Calibration Verification

DEP-SOP-001/01: Form FD 9000-8 (June 20, 2001)

Field Instrument Calibration Records

INSTRUMENT **HACH 2100Q #** 10 **Serial #** 160100047448

PARAMETER: ***Turbidity***

STANDARDS: *[Specify the type(s) of standards used for calibration, the origin of the standards, the standard values, and the date the standards were prepared or purchased]*

Standard A GELEX 0-10 NTU (+/- 10%)

Standard B GELEX 10-100 NTU (+/- 6.5%)

Standard C GELEX 100-1000 NTU (+/- 5%)

DATE (mm/dd/yy)	TIME (hr:min)	STD (A, B, C)	STD VALUE	INSTRUMENT RESPONSE	% DEV	CALIBRATED (YES, NO)	TYPE (INIT, CONT)	SAMPLER INITIALS
10/31/19	0948	A	10	9.72	-2.8	NO	INITIAL	GK
"	"	B	20	20.3	+1.5	"	"	"
"	"	C	800	790	-1.3	"	"	"
10/31/19	1532	A	10	9.83	-1.7	NO	FINAL	GK
"	"	B	20	20.1	+0.5	"	"	"
"	"	C	800	792	-1.0	"	"	"
11/1/19	0930	A	10	9.64	-3.6	NO	INITIAL	GK
"	"	B	20	20.2	+1.0	"	"	"
"	"	C	800	793	-0.9	"	"	"
11/1/19	1127	A	10	9.59	-4.1	NO	FINAL	GK
"	"	B	20	20.0	—	"	"	"
"	"	C	800	795	-0.6	"	"	"
		A				NO	INITIAL	
"	"	B				"	"	"
"	"	C				"	"	"
		A				NO	FINAL	
"	"	B				"	"	"
"	"	C				"	"	"

APPENDIX F
WATER LEVEL LOG

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Date 10/30/19

MLPV Water Level Log

Hot Spot 2 (Air Sparge System Area)

Well ID	Diam.	SI.	Time	Depth (feet below top of casing)	Notes
IW0011I	2	35-40	14:32	1.74	
IW0032	0.75	30-40	14:28	0.24	
IW0033	0.75	40-50	14:27	0.17	
IW0034	0.75	30-40	14:50	2.47	
IW0035	0.75	40-50	14:49	2.57	
IW0036	0.75	40-45	14:40	3.40	
IW0037	0.75	40-50	14:31	1.79	
IW0038	0.75	30-40	14:48	1.77	
IW0039	0.75	40-50	14:47	1.70	
IW0040	0.75	30-40	14:44	2.86	
IW0041	0.75	40-50	14:43	2.79	
IW0042	0.75	30-40	14:45	1.12	In middle of Ditch
IW0043	0.75	40-50	14:46	1.09	" " "
IW0044	0.75	40-50	14:29	0.42	
IW0045	0.75	40-50	14:26	1.80	
SAMW0004I	1	35-40	14:41	3.14	
SAMW0004D	1	45-50	14:42	3.10	

Hot Spot 3 (OFW Area)

Well ID	Diam.	SI.	Time	Depth (feet below top of casing)	Notes
MW0011	0.75	25-30	13:42	2.20	
MW0012	0.75	15-25	13:40	2.21	
MW0013	0.75	20-25	~~13:39~~ 13:45	~~2.35~~ 1.78	
MW0014	0.75	25-30	13:44	2.33	

Biosparge Area

Well ID	Diam.	SI.	Time	Depth (feet below top of casing)	Notes
IW0057	0.75	40-50	13.52	4.24	
IW0058	0.75	45-50	13:54	4.28	
IW0059	0.75	45-50	13:58	4.79	
IW0060	0.75	40-50	~~14:08~~ 14:08	0.86	
ASMW0004	1	35-40	14:19	0.96	NO MANHOLE COVER
ASMW0005	1	35-40	14:17	1.54	
ASMW0006	1	35-40	14:15	0.74	
IW0031	1	25-35	14:22	1.50	
IW0061	0.75	35-40	13:49	4.60	
IW0062	0.75	40-45	13:50	4.71	
IW0063	0.75	35-40	14:21	2.64	
IW0064	0.75	40-45	14:20	2.65	

APPENDIX G
LABORATORY ANALYTICAL REPORTS

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Space Administration

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12/27/18 — Date

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Company Representative Phone: 407-425-6700
Company Representative E-Mail: caitlin.brice@sgs.com

The results set forth herein are provided by SGS North America Inc.

e-Hardcopy 2.0
Automated Report

Technical Report for

AECOM, INC.

NASA KSC, Hot Spot 3 (OFW Area)

60615493.4

SGS Job Number: FA69564

Sampling Date: 10/31/19

Report to:

andrea.colby@sgs.com

Total number of pages in report: 34

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Caitlin Brice, M.S.
General Manager

Client Service contact: Andrea Colby 407-425-6700

Certifications: FL(E83510), LA(03051), KS(E-10327), IL(200063), NC(573), NJ(FL002), NY(12022), SC(96038001) DoD ELAP(ANAB L2229), AZ(AZ0806), CA(2937), TX(T104704404), PA(68-03573), VA(460177), AK, AR, IA, KY, MA, MS, ND, NH, NV, OK, OR, UT, WA, WV

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SGS North America Inc.

Sample Summary

AECOM, INC.

Job No: FA69564

NASA KSC, Hot Spot 3 (OFW Area)
Project No: 60615493.4

Sample Number	Collected Date	Time	By	Received	Matrix Code	Matrix Type	Client Sample ID
FA69564-1	10/31/19	12:01	CL	11/01/19	AQ	Ground Water	VABRA-MW0011-030.0-20191031
FA69564-2	10/31/19	12:19	CL	11/01/19	AQ	Ground Water	VABRA-MW0012-020.0-20191031
FA69564-3	10/31/19	11:27	CL	11/01/19	AQ	Ground Water	VABRA-MW0013-022.5-20191031
FA69564-4	10/31/19	10:56	CL	11/01/19	AQ	Ground Water	VABRA-MW0014-027.5-20191031
FA69564-5	10/31/19	12:30	CL	11/01/19	AQ	Trip Blank Water	VABRA-TB01-20191031

SAMPLE DELIVERY GROUP CASE NARRATIVE

Client: AECOM, INC. **Job No:** FA69564

Site: NASA KSC, Hot Spot 3 (OFW Area) **Report Date** 3/2/2020 2:14:35 PM

4 Samples, 1 Trip Blank were collected on 10/31/2019 and were received at SGS North America Inc - Orlando on 11/01/2019 properly preserved, at 1.7 Deg. C and intact. These Samples received an SGS Orlando job number of FA69564. A listing of the Laboratory Sample ID, Client Sample ID and dates of collection are presented in the Results Summary Section. Except as noted below, all method specified calibrations and quality control performance criteria were met for this job. For more information, please refer to QC summary pages.

MS Volatiles By Method SW846 8260B

Matrix: AQ **Batch ID:** V5E853

All samples were analyzed within the recommended method holding time.

Sample(s) FA69559-2MS, FA69559-2MSD were used as the QC samples indicated.

All method blanks for this batch meet method specific criteria.

Matrix Spike Recovery(s) for cis-1,3-Dichloropropene, Styrene, trans-1,3-Dichloropropene are outside control limits. Probable cause is due to matrix interference.

Matrix Spike Duplicate Recovery(s) for Methylene Bromide, trans-1,3-Dichloropropene are outside control limits. Probable cause is due to matrix interference.

RPD(s) for MSD for 1,1,2,2-Tetrachloroethane, 1,2-Dichloropropane, Bromochloromethane, Methyl Tert Butyl Ether, p-Chlorotoluene, Vinyl Chloride are outside control limits for sample FA69559-2MSD. Probable cause is due to sample non-homogeneity.

SGS Orlando certifies that this report meets the project requirements for analytical data produced for the samples as received at SGS Orlando and as stated on the COC. SGS Orlando certifies that the data meets the Data Quality Objectives for precision, accuracy and completeness as specified in the SGS Orlando Quality Manual except as noted above. This report is to be used in its entirety. SGS Orlando is not responsible for any assumptions of data quality if partial data packages are used.

Narrative prepared by:

_____

Ariel Hartney, Client Services *(Signature on file)*

Summary of Hits

Job Number: FA69564
Account: AECOM, INC.
Project: NASA KSC, Hot Spot 3 (OFW Area)
Collected: 10/31/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	PQL	MDL	Units	Method
FA69564-1	**VABRA-MW0011-030.0-20191031**					
No hits reported in this sample.						
FA69564-2	**VABRA-MW0012-020.0-20191031**					
cis-1,2-Dichloroethylene		0.69 I	1.0	0.28	ug/l	SW846 8260B
Vinyl Chloride		1.0	1.0	0.41	ug/l	SW846 8260B
FA69564-3	**VABRA-MW0013-022.5-20191031**					
cis-1,2-Dichloroethylene		0.86 I	1.0	0.28	ug/l	SW846 8260B
trans-1,2-Dichloroethylene		1.3	1.0	0.22	ug/l	SW846 8260B
Vinyl Chloride		2.6	1.0	0.41	ug/l	SW846 8260B
FA69564-4	**VABRA-MW0014-027.5-20191031**					
No hits reported in this sample.						
FA69564-5	**VABRA-TB01-20191031**					
No hits reported in this sample.						

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	VABRA-MW0011-030.0-20191031		
Lab Sample ID:	FA69564-1	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 3 (OFW Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5E18979.D	1	11/08/19 17:38	SO	n/a	n/a	V5E853
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	PQL	MDL	Units	Q
67-64-1	Acetone	10 U	25	10	ug/l	
71-43-2	Benzene	0.31 U	1.0	0.31	ug/l	
108-86-1	Bromobenzene	0.37 U	1.0	0.37	ug/l	
74-97-5	Bromochloromethane	0.45 U	1.0	0.45	ug/l	
75-27-4	Bromodichloromethane	0.24 U	1.0	0.24	ug/l	
75-25-2	Bromoform	0.41 U	1.0	0.41	ug/l	
78-93-3	2-Butanone (MEK)	2.0 U	5.0	2.0	ug/l	
104-51-8	n-Butylbenzene	0.23 U	1.0	0.23	ug/l	
135-98-8	sec-Butylbenzene	0.24 U	1.0	0.24	ug/l	
98-06-6	tert-Butylbenzene	0.31 U	1.0	0.31	ug/l	
75-15-0	Carbon Disulfide	0.53 U	2.0	0.53	ug/l	
56-23-5	Carbon Tetrachloride	0.36 U	1.0	0.36	ug/l	
108-90-7	Chlorobenzene	0.20 U	1.0	0.20	ug/l	
75-00-3	Chloroethane	0.67 U	2.0	0.67	ug/l	
67-66-3	Chloroform	0.30 U	1.0	0.30	ug/l	
95-49-8	o-Chlorotoluene	0.22 U	1.0	0.22	ug/l	
106-43-4	p-Chlorotoluene	0.31 U	1.0	0.31	ug/l	
110-82-7	Cyclohexane	0.39 U	1.0	0.39	ug/l	
124-48-1	Dibromochloromethane	0.28 U	1.0	0.28	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	1.0 U	5.0	1.0	ug/l	
106-93-4	1,2-Dibromoethane	0.28 U	2.0	0.28	ug/l	
75-71-8	Dichlorodifluoromethane	0.50 U	2.0	0.50	ug/l	
95-50-1	1,2-Dichlorobenzene	0.32 U	1.0	0.32	ug/l	
541-73-1	1,3-Dichlorobenzene	0.22 U	1.0	0.22	ug/l	
106-46-7	1,4-Dichlorobenzene	0.26 U	1.0	0.26	ug/l	
75-34-3	1,1-Dichloroethane	0.34 U	1.0	0.34	ug/l	
107-06-2	1,2-Dichloroethane	0.31 U	1.0	0.31	ug/l	
75-35-4	1,1-Dichloroethylene	0.32 U	1.0	0.32	ug/l	
156-59-2	cis-1,2-Dichloroethylene	0.28 U	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	0.43 U	1.0	0.43	ug/l	
142-28-9	1,3-Dichloropropane	0.31 U	1.0	0.31	ug/l	

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VABRA-MW0011-030.0-20191031		
Lab Sample ID:	FA69564-1	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 3 (OFW Area)		

VOA 8260 List

CAS No.	Compound	Result	PQL	MDL	Units	Q
594-20-7	2,2-Dichloropropane	0.24 U	1.0	0.24	ug/l	
563-58-6	1,1-Dichloropropene	0.34 U	1.0	0.34	ug/l	
10061-01-5	cis-1,3-Dichloropropene	0.29 U	1.0	0.29	ug/l	
10061-02-6	trans-1,3-Dichloropropene	0.21 U	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	0.36 U	1.0	0.36	ug/l	
76-13-1	Freon 113	0.48 U	1.0	0.48	ug/l	
87-68-3	Hexachlorobutadiene	0.30 U	2.0	0.30	ug/l	
591-78-6	2-Hexanone	2.0 U	10	2.0	ug/l	
98-82-8	Isopropylbenzene	0.22 U	1.0	0.22	ug/l	
99-87-6	p-Isopropyltoluene	0.21 U	1.0	0.21	ug/l	
79-20-9	Methyl Acetate	5.0 U	20	5.0	ug/l	
74-83-9	Methyl Bromide	0.59 U	2.0	0.59	ug/l	
74-87-3	Methyl Chloride	0.50 U	2.0	0.50	ug/l	
74-95-3	Methylene Bromide	0.37 U	2.0	0.37	ug/l	
75-09-2	Methylene Chloride	2.0 U	5.0	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone (MIBK)	1.0 U	5.0	1.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	0.23 U	1.0	0.23	ug/l	
91-20-3	Naphthalene	1.0 U	5.0	1.0	ug/l	
103-65-1	n-Propylbenzene	0.29 U	1.0	0.29	ug/l	
100-42-5	Styrene	0.22 U	1.0	0.22	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	0.28 U	1.0	0.28	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	0.30 U	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
108-88-3	Toluene	0.30 U	1.0	0.30	ug/l	
87-61-6	1,2,3-Trichlorobenzene	0.61 U	2.0	0.61	ug/l	
120-82-1	1,2,4-Trichlorobenzene	0.50 U	2.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	0.25 U	1.0	0.25	ug/l	
79-00-5	1,1,2-Trichloroethane	0.47 U	1.0	0.47	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-69-4	Trichlorofluoromethane	0.50 U	2.0	0.50	ug/l	
96-18-4	1,2,3-Trichloropropane	0.63 U	2.0	0.63	ug/l	
95-63-6	1,2,4-Trimethylbenzene	0.32 U	1.0	0.32	ug/l	
108-67-8	1,3,5-Trimethylbenzene	0.27 U	1.0	0.27	ug/l	
75-01-4	Vinyl Chloride	0.41 U	1.0	0.41	ug/l	
	m,p-Xylene	0.47 U	2.0	0.47	ug/l	
95-47-6	o-Xylene	0.26 U	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	0.72 U	3.0	0.72	ug/l	

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VABRA-MW0011-030.0-20191031		
Lab Sample ID:	FA69564-1	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 3 (OFW Area)		

VOA 8260 List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	111%		83-118%
17060-07-0	1,2-Dichloroethane-D4	119%		79-125%
2037-26-5	Toluene-D8	99%		85-112%
460-00-4	4-Bromofluorobenzene	102%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VABRA-MW0012-020.0-20191031		
Lab Sample ID:	FA69564-2	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 3 (OFW Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5E18980.D	1	11/08/19 18:01	SO	n/a	n/a	V5E853
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	PQL	MDL	Units	Q
67-64-1	Acetone	10 U	25	10	ug/l	
71-43-2	Benzene	0.31 U	1.0	0.31	ug/l	
108-86-1	Bromobenzene	0.37 U	1.0	0.37	ug/l	
74-97-5	Bromochloromethane	0.45 U	1.0	0.45	ug/l	
75-27-4	Bromodichloromethane	0.24 U	1.0	0.24	ug/l	
75-25-2	Bromoform	0.41 U	1.0	0.41	ug/l	
78-93-3	2-Butanone (MEK)	2.0 U	5.0	2.0	ug/l	
104-51-8	n-Butylbenzene	0.23 U	1.0	0.23	ug/l	
135-98-8	sec-Butylbenzene	0.24 U	1.0	0.24	ug/l	
98-06-6	tert-Butylbenzene	0.31 U	1.0	0.31	ug/l	
75-15-0	Carbon Disulfide	0.53 U	2.0	0.53	ug/l	
56-23-5	Carbon Tetrachloride	0.36 U	1.0	0.36	ug/l	
108-90-7	Chlorobenzene	0.20 U	1.0	0.20	ug/l	
75-00-3	Chloroethane	0.67 U	2.0	0.67	ug/l	
67-66-3	Chloroform	0.30 U	1.0	0.30	ug/l	
95-49-8	o-Chlorotoluene	0.22 U	1.0	0.22	ug/l	
106-43-4	p-Chlorotoluene	0.31 U	1.0	0.31	ug/l	
110-82-7	Cyclohexane	0.39 U	1.0	0.39	ug/l	
124-48-1	Dibromochloromethane	0.28 U	1.0	0.28	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	1.0 U	5.0	1.0	ug/l	
106-93-4	1,2-Dibromoethane	0.28 U	2.0	0.28	ug/l	
75-71-8	Dichlorodifluoromethane	0.50 U	2.0	0.50	ug/l	
95-50-1	1,2-Dichlorobenzene	0.32 U	1.0	0.32	ug/l	
541-73-1	1,3-Dichlorobenzene	0.22 U	1.0	0.22	ug/l	
106-46-7	1,4-Dichlorobenzene	0.26 U	1.0	0.26	ug/l	
75-34-3	1,1-Dichloroethane	0.34 U	1.0	0.34	ug/l	
107-06-2	1,2-Dichloroethane	0.31 U	1.0	0.31	ug/l	
75-35-4	1,1-Dichloroethylene	0.32 U	1.0	0.32	ug/l	
156-59-2	cis-1,2-Dichloroethylene	0.69	1.0	0.28	ug/l	I
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	0.43 U	1.0	0.43	ug/l	
142-28-9	1,3-Dichloropropane	0.31 U	1.0	0.31	ug/l	

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VABRA-MW0012-020.0-20191031		
Lab Sample ID:	FA69564-2	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 3 (OFW Area)		

VOA 8260 List

CAS No.	Compound	Result	PQL	MDL	Units	Q
594-20-7	2,2-Dichloropropane	0.24 U	1.0	0.24	ug/l	
563-58-6	1,1-Dichloropropene	0.34 U	1.0	0.34	ug/l	
10061-01-5	cis-1,3-Dichloropropene	0.29 U	1.0	0.29	ug/l	
10061-02-6	trans-1,3-Dichloropropene	0.21 U	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	0.36 U	1.0	0.36	ug/l	
76-13-1	Freon 113	0.48 U	1.0	0.48	ug/l	
87-68-3	Hexachlorobutadiene	0.30 U	2.0	0.30	ug/l	
591-78-6	2-Hexanone	2.0 U	10	2.0	ug/l	
98-82-8	Isopropylbenzene	0.22 U	1.0	0.22	ug/l	
99-87-6	p-Isopropyltoluene	0.21 U	1.0	0.21	ug/l	
79-20-9	Methyl Acetate	5.0 U	20	5.0	ug/l	
74-83-9	Methyl Bromide	0.59 U	2.0	0.59	ug/l	
74-87-3	Methyl Chloride	0.50 U	2.0	0.50	ug/l	
74-95-3	Methylene Bromide	0.37 U	2.0	0.37	ug/l	
75-09-2	Methylene Chloride	2.0 U	5.0	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone (MIBK)	1.0 U	5.0	1.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	0.23 U	1.0	0.23	ug/l	
91-20-3	Naphthalene	1.0 U	5.0	1.0	ug/l	
103-65-1	n-Propylbenzene	0.29 U	1.0	0.29	ug/l	
100-42-5	Styrene	0.22 U	1.0	0.22	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	0.28 U	1.0	0.28	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	0.30 U	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
108-88-3	Toluene	0.30 U	1.0	0.30	ug/l	
87-61-6	1,2,3-Trichlorobenzene	0.61 U	2.0	0.61	ug/l	
120-82-1	1,2,4-Trichlorobenzene	0.50 U	2.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	0.25 U	1.0	0.25	ug/l	
79-00-5	1,1,2-Trichloroethane	0.47 U	1.0	0.47	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-69-4	Trichlorofluoromethane	0.50 U	2.0	0.50	ug/l	
96-18-4	1,2,3-Trichloropropane	0.63 U	2.0	0.63	ug/l	
95-63-6	1,2,4-Trimethylbenzene	0.32 U	1.0	0.32	ug/l	
108-67-8	1,3,5-Trimethylbenzene	0.27 U	1.0	0.27	ug/l	
75-01-4	Vinyl Chloride	1.0	1.0	0.41	ug/l	
	m,p-Xylene	0.47 U	2.0	0.47	ug/l	
95-47-6	o-Xylene	0.26 U	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	0.72 U	3.0	0.72	ug/l	

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VABRA-MW0012-020.0-20191031		
Lab Sample ID:	FA69564-2	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 3 (OFW Area)		

VOA 8260 List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	112%		83-118%
17060-07-0	1,2-Dichloroethane-D4	120%		79-125%
2037-26-5	Toluene-D8	99%		85-112%
460-00-4	4-Bromofluorobenzene	103%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VABRA-MW0013-022.5-20191031		
Lab Sample ID:	FA69564-3	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 3 (OFW Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5E18981.D	1	11/08/19 18:24	SO	n/a	n/a	V5E853
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	PQL	MDL	Units	Q
67-64-1	Acetone	10 U	25	10	ug/l	
71-43-2	Benzene	0.31 U	1.0	0.31	ug/l	
108-86-1	Bromobenzene	0.37 U	1.0	0.37	ug/l	
74-97-5	Bromochloromethane	0.45 U	1.0	0.45	ug/l	
75-27-4	Bromodichloromethane	0.24 U	1.0	0.24	ug/l	
75-25-2	Bromoform	0.41 U	1.0	0.41	ug/l	
78-93-3	2-Butanone (MEK)	2.0 U	5.0	2.0	ug/l	
104-51-8	n-Butylbenzene	0.23 U	1.0	0.23	ug/l	
135-98-8	sec-Butylbenzene	0.24 U	1.0	0.24	ug/l	
98-06-6	tert-Butylbenzene	0.31 U	1.0	0.31	ug/l	
75-15-0	Carbon Disulfide	0.53 U	2.0	0.53	ug/l	
56-23-5	Carbon Tetrachloride	0.36 U	1.0	0.36	ug/l	
108-90-7	Chlorobenzene	0.20 U	1.0	0.20	ug/l	
75-00-3	Chloroethane	0.67 U	2.0	0.67	ug/l	
67-66-3	Chloroform	0.30 U	1.0	0.30	ug/l	
95-49-8	o-Chlorotoluene	0.22 U	1.0	0.22	ug/l	
106-43-4	p-Chlorotoluene	0.31 U	1.0	0.31	ug/l	
110-82-7	Cyclohexane	0.39 U	1.0	0.39	ug/l	
124-48-1	Dibromochloromethane	0.28 U	1.0	0.28	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	1.0 U	5.0	1.0	ug/l	
106-93-4	1,2-Dibromoethane	0.28 U	2.0	0.28	ug/l	
75-71-8	Dichlorodifluoromethane	0.50 U	2.0	0.50	ug/l	
95-50-1	1,2-Dichlorobenzene	0.32 U	1.0	0.32	ug/l	
541-73-1	1,3-Dichlorobenzene	0.22 U	1.0	0.22	ug/l	
106-46-7	1,4-Dichlorobenzene	0.26 U	1.0	0.26	ug/l	
75-34-3	1,1-Dichloroethane	0.34 U	1.0	0.34	ug/l	
107-06-2	1,2-Dichloroethane	0.31 U	1.0	0.31	ug/l	
75-35-4	1,1-Dichloroethylene	0.32 U	1.0	0.32	ug/l	
156-59-2	cis-1,2-Dichloroethylene	0.86	1.0	0.28	ug/l	I
156-60-5	trans-1,2-Dichloroethylene	1.3	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	0.43 U	1.0	0.43	ug/l	
142-28-9	1,3-Dichloropropane	0.31 U	1.0	0.31	ug/l	

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VABRA-MW0013-022.5-20191031		
Lab Sample ID:	FA69564-3	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 3 (OFW Area)		

VOA 8260 List

CAS No.	Compound	Result	PQL	MDL	Units	Q
594-20-7	2,2-Dichloropropane	0.24 U	1.0	0.24	ug/l	
563-58-6	1,1-Dichloropropene	0.34 U	1.0	0.34	ug/l	
10061-01-5	cis-1,3-Dichloropropene	0.29 U	1.0	0.29	ug/l	
10061-02-6	trans-1,3-Dichloropropene	0.21 U	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	0.36 U	1.0	0.36	ug/l	
76-13-1	Freon 113	0.48 U	1.0	0.48	ug/l	
87-68-3	Hexachlorobutadiene	0.30 U	2.0	0.30	ug/l	
591-78-6	2-Hexanone	2.0 U	10	2.0	ug/l	
98-82-8	Isopropylbenzene	0.22 U	1.0	0.22	ug/l	
99-87-6	p-Isopropyltoluene	0.21 U	1.0	0.21	ug/l	
79-20-9	Methyl Acetate	5.0 U	20	5.0	ug/l	
74-83-9	Methyl Bromide	0.59 U	2.0	0.59	ug/l	
74-87-3	Methyl Chloride	0.50 U	2.0	0.50	ug/l	
74-95-3	Methylene Bromide	0.37 U	2.0	0.37	ug/l	
75-09-2	Methylene Chloride	2.0 U	5.0	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone (MIBK)	1.0 U	5.0	1.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	0.23 U	1.0	0.23	ug/l	
91-20-3	Naphthalene	1.0 U	5.0	1.0	ug/l	
103-65-1	n-Propylbenzene	0.29 U	1.0	0.29	ug/l	
100-42-5	Styrene	0.22 U	1.0	0.22	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	0.28 U	1.0	0.28	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	0.30 U	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
108-88-3	Toluene	0.30 U	1.0	0.30	ug/l	
87-61-6	1,2,3-Trichlorobenzene	0.61 U	2.0	0.61	ug/l	
120-82-1	1,2,4-Trichlorobenzene	0.50 U	2.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	0.25 U	1.0	0.25	ug/l	
79-00-5	1,1,2-Trichloroethane	0.47 U	1.0	0.47	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-69-4	Trichlorofluoromethane	0.50 U	2.0	0.50	ug/l	
96-18-4	1,2,3-Trichloropropane	0.63 U	2.0	0.63	ug/l	
95-63-6	1,2,4-Trimethylbenzene	0.32 U	1.0	0.32	ug/l	
108-67-8	1,3,5-Trimethylbenzene	0.27 U	1.0	0.27	ug/l	
75-01-4	Vinyl Chloride	2.6	1.0	0.41	ug/l	
	m,p-Xylene	0.47 U	2.0	0.47	ug/l	
95-47-6	o-Xylene	0.26 U	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	0.72 U	3.0	0.72	ug/l	

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VABRA-MW0013-022.5-20191031		
Lab Sample ID:	FA69564-3	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 3 (OFW Area)		

VOA 8260 List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	111%		83-118%
17060-07-0	1,2-Dichloroethane-D4	120%		79-125%
2037-26-5	Toluene-D8	98%		85-112%
460-00-4	4-Bromofluorobenzene	101%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VABRA-MW0014-027.5-20191031		
Lab Sample ID:	FA69564-4	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 3 (OFW Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5E18982.D	1	11/08/19 18:47	SO	n/a	n/a	V5E853
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	PQL	MDL	Units	Q
67-64-1	Acetone	10 U	25	10	ug/l	
71-43-2	Benzene	0.31 U	1.0	0.31	ug/l	
108-86-1	Bromobenzene	0.37 U	1.0	0.37	ug/l	
74-97-5	Bromochloromethane	0.45 U	1.0	0.45	ug/l	
75-27-4	Bromodichloromethane	0.24 U	1.0	0.24	ug/l	
75-25-2	Bromoform	0.41 U	1.0	0.41	ug/l	
78-93-3	2-Butanone (MEK)	2.0 U	5.0	2.0	ug/l	
104-51-8	n-Butylbenzene	0.23 U	1.0	0.23	ug/l	
135-98-8	sec-Butylbenzene	0.24 U	1.0	0.24	ug/l	
98-06-6	tert-Butylbenzene	0.31 U	1.0	0.31	ug/l	
75-15-0	Carbon Disulfide	0.53 U	2.0	0.53	ug/l	
56-23-5	Carbon Tetrachloride	0.36 U	1.0	0.36	ug/l	
108-90-7	Chlorobenzene	0.20 U	1.0	0.20	ug/l	
75-00-3	Chloroethane	0.67 U	2.0	0.67	ug/l	
67-66-3	Chloroform	0.30 U	1.0	0.30	ug/l	
95-49-8	o-Chlorotoluene	0.22 U	1.0	0.22	ug/l	
106-43-4	p-Chlorotoluene	0.31 U	1.0	0.31	ug/l	
110-82-7	Cyclohexane	0.39 U	1.0	0.39	ug/l	
124-48-1	Dibromochloromethane	0.28 U	1.0	0.28	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	1.0 U	5.0	1.0	ug/l	
106-93-4	1,2-Dibromoethane	0.28 U	2.0	0.28	ug/l	
75-71-8	Dichlorodifluoromethane	0.50 U	2.0	0.50	ug/l	
95-50-1	1,2-Dichlorobenzene	0.32 U	1.0	0.32	ug/l	
541-73-1	1,3-Dichlorobenzene	0.22 U	1.0	0.22	ug/l	
106-46-7	1,4-Dichlorobenzene	0.26 U	1.0	0.26	ug/l	
75-34-3	1,1-Dichloroethane	0.34 U	1.0	0.34	ug/l	
107-06-2	1,2-Dichloroethane	0.31 U	1.0	0.31	ug/l	
75-35-4	1,1-Dichloroethylene	0.32 U	1.0	0.32	ug/l	
156-59-2	cis-1,2-Dichloroethylene	0.28 U	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	0.43 U	1.0	0.43	ug/l	
142-28-9	1,3-Dichloropropane	0.31 U	1.0	0.31	ug/l	

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VABRA-MW0014-027.5-20191031		
Lab Sample ID:	FA69564-4	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 3 (OFW Area)		

VOA 8260 List

CAS No.	Compound	Result	PQL	MDL	Units	Q
594-20-7	2,2-Dichloropropane	0.24 U	1.0	0.24	ug/l	
563-58-6	1,1-Dichloropropene	0.34 U	1.0	0.34	ug/l	
10061-01-5	cis-1,3-Dichloropropene	0.29 U	1.0	0.29	ug/l	
10061-02-6	trans-1,3-Dichloropropene	0.21 U	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	0.36 U	1.0	0.36	ug/l	
76-13-1	Freon 113	0.48 U	1.0	0.48	ug/l	
87-68-3	Hexachlorobutadiene	0.30 U	2.0	0.30	ug/l	
591-78-6	2-Hexanone	2.0 U	10	2.0	ug/l	
98-82-8	Isopropylbenzene	0.22 U	1.0	0.22	ug/l	
99-87-6	p-Isopropyltoluene	0.21 U	1.0	0.21	ug/l	
79-20-9	Methyl Acetate	5.0 U	20	5.0	ug/l	
74-83-9	Methyl Bromide	0.59 U	2.0	0.59	ug/l	
74-87-3	Methyl Chloride	0.50 U	2.0	0.50	ug/l	
74-95-3	Methylene Bromide	0.37 U	2.0	0.37	ug/l	
75-09-2	Methylene Chloride	2.0 U	5.0	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone (MIBK)	1.0 U	5.0	1.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	0.23 U	1.0	0.23	ug/l	
91-20-3	Naphthalene	1.0 U	5.0	1.0	ug/l	
103-65-1	n-Propylbenzene	0.29 U	1.0	0.29	ug/l	
100-42-5	Styrene	0.22 U	1.0	0.22	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	0.28 U	1.0	0.28	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	0.30 U	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
108-88-3	Toluene	0.30 U	1.0	0.30	ug/l	
87-61-6	1,2,3-Trichlorobenzene	0.61 U	2.0	0.61	ug/l	
120-82-1	1,2,4-Trichlorobenzene	0.50 U	2.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	0.25 U	1.0	0.25	ug/l	
79-00-5	1,1,2-Trichloroethane	0.47 U	1.0	0.47	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-69-4	Trichlorofluoromethane	0.50 U	2.0	0.50	ug/l	
96-18-4	1,2,3-Trichloropropane	0.63 U	2.0	0.63	ug/l	
95-63-6	1,2,4-Trimethylbenzene	0.32 U	1.0	0.32	ug/l	
108-67-8	1,3,5-Trimethylbenzene	0.27 U	1.0	0.27	ug/l	
75-01-4	Vinyl Chloride	0.41 U	1.0	0.41	ug/l	
	m,p-Xylene	0.47 U	2.0	0.47	ug/l	
95-47-6	o-Xylene	0.26 U	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	0.72 U	3.0	0.72	ug/l	

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VABRA-MW0014-027.5-20191031		
Lab Sample ID:	FA69564-4	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 3 (OFW Area)		

VOA 8260 List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	111%		83-118%
17060-07-0	1,2-Dichloroethane-D4	120%		79-125%
2037-26-5	Toluene-D8	99%		85-112%
460-00-4	4-Bromofluorobenzene	102%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VABRA-TB01-20191031		
Lab Sample ID:	FA69564-5	**Date Sampled:**	10/31/19
Matrix:	AQ - Trip Blank Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 3 (OFW Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5E18969.D	1	11/08/19 13:46	SO	n/a	n/a	V5E853
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	PQL	MDL	Units	Q
67-64-1	Acetone	10 U	25	10	ug/l	
71-43-2	Benzene	0.31 U	1.0	0.31	ug/l	
108-86-1	Bromobenzene	0.37 U	1.0	0.37	ug/l	
74-97-5	Bromochloromethane	0.45 U	1.0	0.45	ug/l	
75-27-4	Bromodichloromethane	0.24 U	1.0	0.24	ug/l	
75-25-2	Bromoform	0.41 U	1.0	0.41	ug/l	
78-93-3	2-Butanone (MEK)	2.0 U	5.0	2.0	ug/l	
104-51-8	n-Butylbenzene	0.23 U	1.0	0.23	ug/l	
135-98-8	sec-Butylbenzene	0.24 U	1.0	0.24	ug/l	
98-06-6	tert-Butylbenzene	0.31 U	1.0	0.31	ug/l	
75-15-0	Carbon Disulfide	0.53 U	2.0	0.53	ug/l	
56-23-5	Carbon Tetrachloride	0.36 U	1.0	0.36	ug/l	
108-90-7	Chlorobenzene	0.20 U	1.0	0.20	ug/l	
75-00-3	Chloroethane	0.67 U	2.0	0.67	ug/l	
67-66-3	Chloroform	0.30 U	1.0	0.30	ug/l	
95-49-8	o-Chlorotoluene	0.22 U	1.0	0.22	ug/l	
106-43-4	p-Chlorotoluene	0.31 U	1.0	0.31	ug/l	
110-82-7	Cyclohexane	0.39 U	1.0	0.39	ug/l	
124-48-1	Dibromochloromethane	0.28 U	1.0	0.28	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	1.0 U	5.0	1.0	ug/l	
106-93-4	1,2-Dibromoethane	0.28 U	2.0	0.28	ug/l	
75-71-8	Dichlorodifluoromethane	0.50 U	2.0	0.50	ug/l	
95-50-1	1,2-Dichlorobenzene	0.32 U	1.0	0.32	ug/l	
541-73-1	1,3-Dichlorobenzene	0.22 U	1.0	0.22	ug/l	
106-46-7	1,4-Dichlorobenzene	0.26 U	1.0	0.26	ug/l	
75-34-3	1,1-Dichloroethane	0.34 U	1.0	0.34	ug/l	
107-06-2	1,2-Dichloroethane	0.31 U	1.0	0.31	ug/l	
75-35-4	1,1-Dichloroethylene	0.32 U	1.0	0.32	ug/l	
156-59-2	cis-1,2-Dichloroethylene	0.28 U	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	0.43 U	1.0	0.43	ug/l	
142-28-9	1,3-Dichloropropane	0.31 U	1.0	0.31	ug/l	

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: VABRA-TB01-20191031
Lab Sample ID: FA69564-5
Matrix: AQ - Trip Blank Water
Method: SW846 8260B
Project: NASA KSC, Hot Spot 3 (OFW Area)

Date Sampled: 10/31/19
Date Received: 11/01/19
Percent Solids: n/a

VOA 8260 List

CAS No.	Compound	Result	PQL	MDL	Units	Q
594-20-7	2,2-Dichloropropane	0.24 U	1.0	0.24	ug/l	
563-58-6	1,1-Dichloropropene	0.34 U	1.0	0.34	ug/l	
10061-01-5	cis-1,3-Dichloropropene	0.29 U	1.0	0.29	ug/l	
10061-02-6	trans-1,3-Dichloropropene	0.21 U	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	0.36 U	1.0	0.36	ug/l	
76-13-1	Freon 113	0.48 U	1.0	0.48	ug/l	
87-68-3	Hexachlorobutadiene	0.30 U	2.0	0.30	ug/l	
591-78-6	2-Hexanone	2.0 U	10	2.0	ug/l	
98-82-8	Isopropylbenzene	0.22 U	1.0	0.22	ug/l	
99-87-6	p-Isopropyltoluene	0.21 U	1.0	0.21	ug/l	
79-20-9	Methyl Acetate	5.0 U	20	5.0	ug/l	
74-83-9	Methyl Bromide	0.59 U	2.0	0.59	ug/l	
74-87-3	Methyl Chloride	0.50 U	2.0	0.50	ug/l	
74-95-3	Methylene Bromide	0.37 U	2.0	0.37	ug/l	
75-09-2	Methylene Chloride	2.0 U	5.0	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone (MIBK)	1.0 U	5.0	1.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	0.23 U	1.0	0.23	ug/l	
91-20-3	Naphthalene	1.0 U	5.0	1.0	ug/l	
103-65-1	n-Propylbenzene	0.29 U	1.0	0.29	ug/l	
100-42-5	Styrene	0.22 U	1.0	0.22	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	0.28 U	1.0	0.28	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	0.30 U	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
108-88-3	Toluene	0.30 U	1.0	0.30	ug/l	
87-61-6	1,2,3-Trichlorobenzene	0.61 U	2.0	0.61	ug/l	
120-82-1	1,2,4-Trichlorobenzene	0.50 U	2.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	0.25 U	1.0	0.25	ug/l	
79-00-5	1,1,2-Trichloroethane	0.47 U	1.0	0.47	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-69-4	Trichlorofluoromethane	0.50 U	2.0	0.50	ug/l	
96-18-4	1,2,3-Trichloropropane	0.63 U	2.0	0.63	ug/l	
95-63-6	1,2,4-Trimethylbenzene	0.32 U	1.0	0.32	ug/l	
108-67-8	1,3,5-Trimethylbenzene	0.27 U	1.0	0.27	ug/l	
75-01-4	Vinyl Chloride	0.41 U	1.0	0.41	ug/l	
	m,p-Xylene	0.47 U	2.0	0.47	ug/l	
95-47-6	o-Xylene	0.26 U	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	0.72 U	3.0	0.72	ug/l	

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VABRA-TB01-20191031		
Lab Sample ID:	FA69564-5	**Date Sampled:**	10/31/19
Matrix:	AQ - Trip Blank Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 3 (OFW Area)		

VOA 8260 List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	106%		83-118%
17060-07-0	1,2-Dichloroethane-D4	107%		79-125%
2037-26-5	Toluene-D8	98%		85-112%
460-00-4	4-Bromofluorobenzene	103%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

SGS North America Inc - Orlando
Chain of Custody

4405 Vineland Road, Suite C-15 Orlando, Fl 32811
TEL. 407-425-6700 FAX: 407-425-0707
www.sgs.com

SGS - ORLANDO JOB #: FA69564 PAGE 1 OF 1

SGS - ORLANDO Quote # | SKIFF #

Client / Reporting Information

Company Name: AECOM
Address: 150 N. Orange Ave, Ste 200
City: Orlando State: FL Zip: 32801
Project Contact: Megan Garcia Email: megan.garcia@
Phone #:
Sampler(s) Name(s) (Printed) Sampler 1: Chad Lee Sampler 2: NA

Project Information

Project Name: NASA KSC Hot Spot 3 (OPW Area)
Street: Launcher Road
City: Titusville State: FL
Project #: 60615493.4
Fax #:
Client Purchase Order #

Analytical Information

SGS Orlando Sample #	Field ID / Point of Collection	Collection Date	Collection Time	Sampled By:	Matrix	Total # of Bottles	Container Information	8260 VOCs (USEPA SW)
1	VABRA-MW0011-030.0-20191031	10/31/19	12:06	CL	GW	3	HCl	X
2	VABRA-MW0012-020.0-20191031		12:19	CL		3	HCl	X
3	VABRA-MW0013-022.5-20191031		11:27	CL		3	HCl	X
4	VABRA-MW0014-027.5-20191031		10:56	CL		3	HCl	X
~~6~~	~~VABRA-TRIP BLANK-20191031~~	~~10/31/19~~	~~12:30~~	~~SGS~~	~~WW~~	~~2~~		~~X~~
5	VABRA-TB01	10/31/19	12:30	SGS	WW	2	HCl	X

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL - Sludge
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid

LAB USE ONLY

Turnaround Time (Business days)

10 Day (Business) Approved By: / Date:
7 Day
5 Day
3 Day *RUSH*
2 Day *RUSH*
1 Day *RUSH*
Other
Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information

- COMMERCIAL "A" (RESULTS ONLY)
- COMMERCIAL "B" (RESULTS PLUS QC)
- REDT1 (EPA LEVEL 3)
- FULLT1 (EPA LEVEL 4)
- EDD'S

Comments / Remarks

Samples delivered to SGS-Orlando by AECOM.
Temp Blank in Cooler.

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
1	Chad Lee	11/1/19 1440	2		3	4
5	Relinquished by/Affiliation	Date Time:	6 Received By/Affiliation	7 Relinquished By/Affiliation	Date Time:	8 Received By/Affiliation

Lab Use Only : Cooler Temperature (s) Celsius (corrected): 7°

http://www.sgs.com/en/terms-and-conditions

ORLD-SMT-0001-03-FORM-COC (1) Rev 031318

SGS Sample Receipt Summary

Job Number: FA69564 **Client:** AECOM **Project:** NASA KSC HOT SPOT 3

Date / Time Received: 11/1/2019 2:40:00 PM **Delivery Method:** DROP OFF **Airbill #'s:** N/A

Therm ID: IR 1; **Therm CF:** -0.8; **# of Coolers:** 1

Cooler Temps (Raw Measured) °C: Cooler 1: (2.5);

Cooler Temps (Corrected) °C: Cooler 1: (1.7);

Cooler Information	Y	or	N
1. Custody Seals Present	☑		☐
2. Custody Seals Intact	☑		☐
3. Temp criteria achieved	☑		☐
4. Cooler temp verification	IR Gun		
5. Cooler media	Ice (Bag)		

Trip Blank Information	Y	or	N	N/A
1. Trip Blank present / cooler	☐		☐	☑
2. Trip Blank listed on COC	☐		☐	☑

	W	or	S	N/A
3. Type Of TB Received	☐		☐	☑

Sample Information	Y	or	N	N/A
1. Sample labels present on bottles	☑		☐	
2. Samples preserved properly	☑		☐	
3. Sufficient volume/containers recvd for analysis:	☑		☐	
4. Condition of sample	Intact			
5. Sample recvd within HT	☑		☐	
6. Dates/Times/IDs on COC match Sample Label	☑		☐	
7. VOCs have headspace	☐		☐	☑
8. Bottles received for unspecified tests	☐		☑	
9. Compositing instructions clear	☐		☐	☑
10. Voa Soil Kits/Jars received past 48hrs?	☐		☐	☑
11. % Solids Jar received?	☐		☐	☑
12. Residual Chlorine Present?	☐		☐	☑

Misc. Information

Number of Encores: 25-Gram _____ 5-Gram _____ Number of 5035 Field Kits: _____ Number of Lab Filtered Metals: _____

Test Strip Lot #s: pH 0-3 230315 pH 10-12 219813A Other: (Specify) _____ _____

Residual Chlorine Test Strip Lot #: _____

Comments

SM001
Rev. Date 05/24/17

Technician: TRINITYM Date: 11/1/2019 2:40:00 PM Reviewer: _____ Date: _____

5.1

5

FA69564: Chain of Custody
Page 2 of 2

MS Volatiles

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QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA69564
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 3 (OFW Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5E853-MB	5E18961.D	1	11/08/19	SO	n/a	n/a	V5E853

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69564-1, FA69564-2, FA69564-3, FA69564-4, FA69564-5

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.31	ug/l	
108-86-1	Bromobenzene	ND	1.0	0.37	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.45	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.24	ug/l	
75-25-2	Bromoform	ND	1.0	0.41	ug/l	
78-93-3	2-Butanone (MEK)	ND	5.0	2.0	ug/l	
104-51-8	n-Butylbenzene	ND	1.0	0.23	ug/l	
135-98-8	sec-Butylbenzene	ND	1.0	0.24	ug/l	
98-06-6	tert-Butylbenzene	ND	1.0	0.31	ug/l	
75-15-0	Carbon Disulfide	ND	2.0	0.53	ug/l	
56-23-5	Carbon Tetrachloride	ND	1.0	0.36	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.67	ug/l	
67-66-3	Chloroform	ND	1.0	0.30	ug/l	
95-49-8	o-Chlorotoluene	ND	1.0	0.22	ug/l	
106-43-4	p-Chlorotoluene	ND	1.0	0.31	ug/l	
110-82-7	Cyclohexane	ND	1.0	0.39	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.28	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	5.0	1.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	0.28	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	0.50	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.32	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.22	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.26	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.34	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.31	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.32	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.43	ug/l	
142-28-9	1,3-Dichloropropane	ND	1.0	0.31	ug/l	
594-20-7	2,2-Dichloropropane	ND	1.0	0.24	ug/l	
563-58-6	1,1-Dichloropropene	ND	1.0	0.34	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.29	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	

Method Blank Summary

Job Number: FA69564
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 3 (OFW Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5E853-MB	5E18961.D	1	11/08/19	SO	n/a	n/a	V5E853

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69564-1, FA69564-2, FA69564-3, FA69564-4, FA69564-5

CAS No.	Compound	Result	RL	MDL	Units	Q
100-41-4	Ethylbenzene	ND	1.0	0.36	ug/l	
76-13-1	Freon 113	ND	1.0	0.48	ug/l	
87-68-3	Hexachlorobutadiene	ND	2.0	0.30	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.22	ug/l	
99-87-6	p-Isopropyltoluene	ND	1.0	0.21	ug/l	
79-20-9	Methyl Acetate	ND	20	5.0	ug/l	
74-83-9	Methyl Bromide	ND	2.0	0.59	ug/l	
74-87-3	Methyl Chloride	ND	2.0	0.50	ug/l	
74-95-3	Methylene Bromide	ND	2.0	0.37	ug/l	
75-09-2	Methylene Chloride	ND	5.0	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone (MIBK)	ND	5.0	1.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.23	ug/l	
91-20-3	Naphthalene	ND	5.0	1.0	ug/l	
103-65-1	n-Propylbenzene	ND	1.0	0.29	ug/l	
100-42-5	Styrene	ND	1.0	0.22	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	ND	1.0	0.28	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.22	ug/l	
108-88-3	Toluene	ND	1.0	0.30	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	2.0	0.61	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.25	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.47	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.35	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.50	ug/l	
96-18-4	1,2,3-Trichloropropane	ND	2.0	0.63	ug/l	
95-63-6	1,2,4-Trimethylbenzene	ND	1.0	0.32	ug/l	
108-67-8	1,3,5-Trimethylbenzene	ND	1.0	0.27	ug/l	
75-01-4	Vinyl Chloride	ND	1.0	0.41	ug/l	
	m,p-Xylene	ND	2.0	0.47	ug/l	
95-47-6	o-Xylene	ND	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.72	ug/l	

Method Blank Summary

Job Number: FA69564
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 3 (OFW Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5E853-MB	5E18961.D	1	11/08/19	SO	n/a	n/a	V5E853

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69564-1, FA69564-2, FA69564-3, FA69564-4, FA69564-5

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	103%	83-118%
17060-07-0	1,2-Dichloroethane-D4	102%	79-125%
2037-26-5	Toluene-D8	99%	85-112%
460-00-4	4-Bromofluorobenzene	101%	83-118%

Blank Spike Summary

Job Number: FA69564
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 3 (OFW Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5E853-BS	5E18959.D	1	11/08/19	SO	n/a	n/a	V5E853

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69564-1, FA69564-2, FA69564-3, FA69564-4, FA69564-5

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
67-64-1	Acetone	125	148	118	50-147
71-43-2	Benzene	25	28.5	114	81-122
108-86-1	Bromobenzene	25	27.7	111	80-121
74-97-5	Bromochloromethane	25	28.3	113	76-123
75-27-4	Bromodichloromethane	25	28.5	114	79-123
75-25-2	Bromoform	25	29.5	118	66-123
78-93-3	2-Butanone (MEK)	125	140	112	56-143
104-51-8	n-Butylbenzene	25	29.6	118	79-126
135-98-8	sec-Butylbenzene	25	29.4	118	83-133
98-06-6	tert-Butylbenzene	25	27.9	112	80-133
75-15-0	Carbon Disulfide	25	30.1	120	66-148
56-23-5	Carbon Tetrachloride	25	29.4	118	76-136
108-90-7	Chlorobenzene	25	27.6	110	82-124
75-00-3	Chloroethane	25	26.4	106	62-144
67-66-3	Chloroform	25	28.0	112	80-124
95-49-8	o-Chlorotoluene	25	27.6	110	81-127
106-43-4	p-Chlorotoluene	25	27.7	111	83-130
110-82-7	Cyclohexane	25	30.5	122	73-138
124-48-1	Dibromochloromethane	25	29.1	116	78-122
96-12-8	1,2-Dibromo-3-chloropropane	25	27.9	112	64-123
106-93-4	1,2-Dibromoethane	25	28.7	115	75-120
75-71-8	Dichlorodifluoromethane	25	24.8	99	42-167
95-50-1	1,2-Dichlorobenzene	25	27.8	111	82-124
541-73-1	1,3-Dichlorobenzene	25	28.1	112	84-125
106-46-7	1,4-Dichlorobenzene	25	27.4	110	78-120
75-34-3	1,1-Dichloroethane	25	29.1	116	81-122
107-06-2	1,2-Dichloroethane	25	27.1	108	75-125
75-35-4	1,1-Dichloroethylene	25	30.4	122	78-137
156-59-2	cis-1,2-Dichloroethylene	25	29.2	117	78-120
156-60-5	trans-1,2-Dichloroethylene	25	28.2	113	76-127
78-87-5	1,2-Dichloropropane	25	28.7	115	76-124
142-28-9	1,3-Dichloropropane	25	26.9	108	80-118
594-20-7	2,2-Dichloropropane	25	29.5	118	74-139
563-58-6	1,1-Dichloropropene	25	30.2	121	79-131
10061-01-5	cis-1,3-Dichloropropene	25	27.4	110	75-118
10061-02-6	trans-1,3-Dichloropropene	25	28.3	113	80-120

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA69564
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 3 (OFW Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5E853-BS	5E18959.D	1	11/08/19	SO	n/a	n/a	V5E853

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69564-1, FA69564-2, FA69564-3, FA69564-4, FA69564-5

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
100-41-4	Ethylbenzene	25	27.3	109	81-121
76-13-1	Freon 113	25	29.2	117	72-134
87-68-3	Hexachlorobutadiene	25	31.3	125	75-142
591-78-6	2-Hexanone	125	138	110	61-129
98-82-8	Isopropylbenzene	25	29.4	118	83-132
99-87-6	p-Isopropyltoluene	25	29.8	119	79-130
79-20-9	Methyl Acetate	125	138	110	65-126
74-83-9	Methyl Bromide	25	23.6	94	59-143
74-87-3	Methyl Chloride	25	21.5	86	50-159
74-95-3	Methylene Bromide	25	28.4	114	78-119
75-09-2	Methylene Chloride	25	27.9	112	69-135
108-10-1	4-Methyl-2-pentanone (MIBK)	125	135	108	66-122
1634-04-4	Methyl Tert Butyl Ether	25	28.1	112	72-117
91-20-3	Naphthalene	25	30.1	120	63-132
103-65-1	n-Propylbenzene	25	27.9	112	82-133
100-42-5	Styrene	25	28.7	115	78-119
630-20-6	1,1,1,2-Tetrachloroethane	25	27.7	111	77-122
79-34-5	1,1,2,2-Tetrachloroethane	25	30.1	120	72-120
127-18-4	Tetrachloroethylene	25	27.6	110	76-135
108-88-3	Toluene	25	27.3	109	80-120
87-61-6	1,2,3-Trichlorobenzene	25	30.0	120	68-131
120-82-1	1,2,4-Trichlorobenzene	25	29.4	118	73-129
71-55-6	1,1,1-Trichloroethane	25	27.7	111	75-130
79-00-5	1,1,2-Trichloroethane	25	28.1	112	76-119
79-01-6	Trichloroethylene	25	27.7	111	81-126
75-69-4	Trichlorofluoromethane	25	26.9	108	71-156
96-18-4	1,2,3-Trichloropropane	25	29.8	119	77-120
95-63-6	1,2,4-Trimethylbenzene	25	27.3	109	79-120
108-67-8	1,3,5-Trimethylbenzene	25	28.8	115	79-120
75-01-4	Vinyl Chloride	25	22.4	90	69-159
	m,p-Xylene	50	55.2	110	79-126
95-47-6	o-Xylene	25	27.1	108	80-127
1330-20-7	Xylene (total)	75	82.3	110	80-126

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA69564
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 3 (OFW Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5E853-BS	5E18959.D	1	11/08/19	SO	n/a	n/a	V5E853

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69564-1, FA69564-2, FA69564-3, FA69564-4, FA69564-5

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	101%	83-118%
17060-07-0	1,2-Dichloroethane-D4	98%	79-125%
2037-26-5	Toluene-D8	97%	85-112%
460-00-4	4-Bromofluorobenzene	99%	83-118%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA69564
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 3 (OFW Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA69559-2MS	5E18983.D	1	11/08/19	SO	n/a	n/a	V5E853
FA69559-2MSD	5E18984.D	1	11/08/19	SO	n/a	n/a	V5E853
FA69559-2	5E18972.D	1	11/08/19	SO	n/a	n/a	V5E853

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69564-1, FA69564-2, FA69564-3, FA69564-4, FA69564-5

CAS No.	Compound	FA69559-2 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	25 U		125	129	103	125	137	110	6	50-147/21
71-43-2	Benzene	1.0 U		25	24.4	98	25	28.1	112	14	81-122/14
108-86-1	Bromobenzene	1.0 U		25	22.5	90	25	25.9	104	14	80-121/14
74-97-5	Bromochloromethane	1.0 U		25	24.0	96	25	27.8	111	15*	76-123/14
75-27-4	Bromodichloromethane	1.0 U		25	26.4	106	25	28.7	115	8	79-123/19
75-25-2	Bromoform	1.0 U		25	17.7	71	25	19.3	77	9	66-123/21
78-93-3	2-Butanone (MEK)	5.0 U		125	128	102	125	138	110	8	56-143/18
104-51-8	n-Butylbenzene	1.0 U		25	24.5	98	25	28.4	114	15	79-126/16
135-98-8	sec-Butylbenzene	1.0 U		25	24.4	98	25	28.1	112	14	83-133/16
98-06-6	tert-Butylbenzene	1.0 U		25	24.8	99	25	28.1	112	12	80-133/16
75-15-0	Carbon Disulfide	2.0 U		25	22.8	91	25	26.5	106	15	66-148/23
56-23-5	Carbon Tetrachloride	1.0 U		25	29.1	116	25	32.2	129	10	76-136/23
108-90-7	Chlorobenzene	1.0 U		25	23.5	94	25	26.7	107	13	82-124/14
75-00-3	Chloroethane	2.0 U		25	24.9	100	25	28.5	114	13	62-144/20
67-66-3	Chloroform	1.0 U		25	26.6	106	25	29.6	118	11	80-124/15
95-49-8	o-Chlorotoluene	1.0 U		25	23.1	92	25	26.7	107	14	81-127/15
106-43-4	p-Chlorotoluene	1.0 U		25	23.0	92	25	27.0	108	16*	83-130/15
110-82-7	Cyclohexane	1.0 U		25	23.7	95	25	27.9	112	16	73-138/18
124-48-1	Dibromochloromethane	1.0 U		25	20.9	84	25	23.6	94	12	78-122/19
96-12-8	1,2-Dibromo-3-chloropropane	5.0 U		25	23.8	95	25	27.3	109	14	64-123/18
106-93-4	1,2-Dibromoethane	2.0 U		25	24.1	96	25	27.5	110	13	75-120/13
75-71-8	Dichlorodifluoromethane	2.0 U		25	26.9	108	25	29.8	119	10	42-167/19
95-50-1	1,2-Dichlorobenzene	1.0 U		25	23.1	92	25	26.7	107	14	82-124/14
541-73-1	1,3-Dichlorobenzene	1.0 U		25	23.8	95	25	27.2	109	13	84-125/14
106-46-7	1,4-Dichlorobenzene	1.0 U		25	22.9	92	25	26.4	106	14	78-120/15
75-34-3	1,1-Dichloroethane	1.0 U		25	25.5	102	25	29.2	117	14	81-122/15
107-06-2	1,2-Dichloroethane	1.0 U		25	27.8	111	25	30.7	123	10	75-125/14
75-35-4	1,1-Dichloroethylene	1.0 U		25	27.3	109	25	30.9	124	12	78-137/18
156-59-2	cis-1,2-Dichloroethylene	20.8		25	42.6	87	25	48.1	109	12	78-120/15
156-60-5	trans-1,2-Dichloroethylene	9.1		25	30.9	87	25	35.6	106	14	76-127/17
78-87-5	1,2-Dichloropropane	1.0 U		25	23.4	94	25	27.1	108	15*	76-124/14
142-28-9	1,3-Dichloropropane	1.0 U		25	22.7	91	25	25.7	103	12	80-118/13
594-20-7	2,2-Dichloropropane	1.0 U		25	27.5	110	25	30.3	121	10	74-139/17
563-58-6	1,1-Dichloropropene	1.0 U		25	26.8	107	25	30.4	122	13	79-131/16
10061-01-5	cis-1,3-Dichloropropene	1.0 U		25	17.2	69*	25	19.4	78	12	75-118/23
10061-02-6	trans-1,3-Dichloropropene	1.0 U		25	16.5	66*	25	18.4	74*	11	80-120/22

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA69564
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 3 (OFW Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA69559-2MS	5E18983.D	1	11/08/19	SO	n/a	n/a	V5E853
FA69559-2MSD	5E18984.D	1	11/08/19	SO	n/a	n/a	V5E853
FA69559-2	5E18972.D	1	11/08/19	SO	n/a	n/a	V5E853

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69564-1, FA69564-2, FA69564-3, FA69564-4, FA69564-5

CAS No.	Compound	FA69559-2 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
100-41-4	Ethylbenzene	1.0 U		25	23.8	95	25	27.1	108	13	81-121/14
76-13-1	Freon 113	1.0 U		25	26.1	104	25	29.8	119	13	72-134/20
87-68-3	Hexachlorobutadiene	2.0 U		25	25.5	102	25	29.2	117	14	75-142/19
591-78-6	2-Hexanone	10 U		125	135	108	125	147	118	9	61-129/18
98-82-8	Isopropylbenzene	1.0 U		25	26.3	105	25	29.6	118	12	83-132/15
99-87-6	p-Isopropyltoluene	1.0 U		25	24.9	100	25	28.7	115	14	79-130/16
79-20-9	Methyl Acetate	20 U		125	105	84	125	121	97	14	65-126/18
74-83-9	Methyl Bromide	2.0 U		25	22.4	90	25	25.7	103	14	59-143/19
74-87-3	Methyl Chloride	2.0 U		25	19.2	77	25	22.1	88	14	50-159/19
74-95-3	Methylene Bromide	2.0 U		25	27.2	109	25	30.4	122*	11	78-119/14
75-09-2	Methylene Chloride	5.0 U		25	23.5	94	25	27.1	108	14	69-135/16
108-10-1	4-Methyl-2-pentanone (MIBK)	5.0 U		125	130	104	125	142	114	9	66-122/16
1634-04-4	Methyl Tert Butyl Ether	1.0 U		25	25.3	101	25	29.3	117	15*	72-117/14
91-20-3	Naphthalene	5.0 U		25	23.4	94	25	28.3	113	19	63-132/25
103-65-1	n-Propylbenzene	1.0 U		25	22.9	92	25	26.6	106	15	82-133/15
100-42-5	Styrene	1.0 U		25	18.1	72*	25	21.5	86	17	78-119/23
630-20-6	1,1,1,2-Tetrachloroethane	1.0 U		25	25.1	100	25	27.7	111	10	77-122/19
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U		25	24.4	98	25	28.7	115	16*	72-120/14
127-18-4	Tetrachloroethylene	1.0 U		25	23.6	94	25	26.7	107	12	76-135/16
108-88-3	Toluene	1.0 U		25	22.5	90	25	25.8	103	14	80-120/14
87-61-6	1,2,3-Trichlorobenzene	2.0 U		25	23.4	94	25	27.8	111	17	68-131/25
120-82-1	1,2,4-Trichlorobenzene	2.0 U		25	23.8	95	25	27.4	110	14	73-129/20
71-55-6	1,1,1-Trichloroethane	1.0 U		25	27.4	110	25	30.3	121	10	75-130/16
79-00-5	1,1,2-Trichloroethane	1.0 U		25	23.5	94	25	27.0	108	14	76-119/14
79-01-6	Trichloroethylene	2.6		25	28.6	104	25	31.7	116	10	81-126/15
75-69-4	Trichlorofluoromethane	2.0 U		25	30.9	124	25	33.0	132	7	71-156/21
96-18-4	1,2,3-Trichloropropane	2.0 U		25	24.9	100	25	28.0	112	12	77-120/16
95-63-6	1,2,4-Trimethylbenzene	1.0 U		25	23.1	92	25	26.4	106	13	79-120/18
108-67-8	1,3,5-Trimethylbenzene	1.0 U		25	23.8	95	25	27.6	110	15	79-120/19
75-01-4	Vinyl Chloride	0.60	J	25	20.4	79	25	25.0	98	20*	69-159/18
	m,p-Xylene	2.0 U		50	49.3	99	50	55.5	111	12	79-126/15
95-47-6	o-Xylene	1.0 U		25	23.7	95	25	27.0	108	13	80-127/14
1330-20-7	Xylene (total)	3.0 U		75	73.0	97	75	82.5	110	12	80-126/15

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA69564
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 3 (OFW Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA69559-2MS	5E18983.D	1	11/08/19	SO	n/a	n/a	V5E853
FA69559-2MSD	5E18984.D	1	11/08/19	SO	n/a	n/a	V5E853
FA69559-2	5E18972.D	1	11/08/19	SO	n/a	n/a	V5E853

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69564-1, FA69564-2, FA69564-3, FA69564-4, FA69564-5

CAS No.	Surrogate Recoveries	MS	MSD	FA69559-2	Limits
1868-53-7	Dibromofluoromethane	108%	105%	108%	83-118%
17060-07-0	1,2-Dichloroethane-D4	120% [a]	114%	113%	79-125%
2037-26-5	Toluene-D8	93%	93%	99%	85-112%
460-00-4	4-Bromofluorobenzene	96%	97%	102%	83-118%

(a) Outside DOD QSM control limits.

* = Outside of Control Limits.

The results set forth herein are provided by SGS North America Inc.

e-Hardcopy 2.0
Automated Report

Technical Report for

AECOM, INC.

NASA KSC, Biosparge Area (BSA)

60615493.4

SGS Job Number: FA69570

Sampling Dates: 10/31/19 - 11/01/19

Report to:

andrea.colby@sgs.com

Total number of pages in report: **31**

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Caitlin Brice, M.S.
General Manager

Client Service contact: Andrea Colby 407-425-6700

Certifications: FL(E83510), LA(03051), KS(E-10327), IL(200063), NC(573), NJ(FL002), NY(12022), SC(96038001) DoD ELAP(ANAB L2229), AZ(AZ0806), CA(2937), TX(T104704404), PA(68-03573), VA(460177), AK, AR, IA, KY, MA, MS, ND, NH, NV, OK, OR, UT, WA, WV

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Sample Summary

AECOM, INC.

Job No: FA69570

NASA KSC, Biosparge Area (BSA)
Project No: 60615493.4

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
FA69570-1	11/01/19	10:30	SKL	11/01/19	AQ	Ground Water	MLPV-IW0031-030.0-20191101
FA69570-2	11/01/19	10:08	SKL	11/01/19	AQ	Ground Water	MLPV-IW0057-045.0-20191101
FA69570-3	11/01/19	10:43	SKL	11/01/19	AQ	Ground Water	MLPV-IW0058-047.5-20191101
FA69570-4	10/31/19	15:20	SKL	11/01/19	AQ	Ground Water	MLPV-IW0059-047.5-20191031
FA69570-5	11/01/19	09:45	SKL	11/01/19	AQ	Ground Water	MLPV-IW0060-045.0-20191101
FA69570-6	10/31/19	14:43	SKL	11/01/19	AQ	Ground Water	MLPV-IW0061-037.5-20191031
FA69570-7	10/31/19	14:25	SKL	11/01/19	AQ	Ground Water	MLPV-IW0062-042.5-20191031
FA69570-8	11/01/19	11:25	SKL	11/01/19	AQ	Ground Water	MLPV-IW0063-037.5-20191101
FA69570-9	11/01/19	11:00	SKL	11/01/19	AQ	Ground Water	MLPV-IW0064-042.5-20191101
FA69570-10	11/01/19	11:05	SKL	11/01/19	AQ	Ground Water	MLPV-ASMW0004-037.5-20191101
FA69570-11	11/01/19	10:32	SKL	11/01/19	AQ	Ground Water	MLPV-ASMW0005-037.5-20191101
FA69570-12	11/01/19	10:08	SKL	11/01/19	AQ	Ground Water	MLPV-ASMW0006-037.5-20191101
FA69570-13	11/01/19	00:00	SKL	11/01/19	AQ	Trip Blank Water	MLPV-TB02-20191101

SAMPLE DELIVERY GROUP CASE NARRATIVE

Client: AECOM, INC. **Job No:** FA69570

Site: NASA KSC, Biosparge Area (BSA) **Report Date** 3/2/2020 2:24:27 PM

12 Samples, 1 Trip Blank were collected between 10/31/2019 and 11/01/2019 and were received at SGS North America Inc - Orlando on 11/01/2019 properly preserved, at 1.3 Deg. C and intact. These Samples received an SGS Orlando job number of FA69570. A listing of the Laboratory Sample ID, Client Sample ID and dates of collection are presented in the Results Summary Section. Except as noted below, all method specified calibrations and quality control performance criteria were met for this job. For more information, please refer to QC summary pages.

MS Volatiles By Method SW846 8260B

Matrix: AQ **Batch ID:** V1A928

All samples were analyzed within the recommended method holding time.

Sample(s) FA69570-1MS, FA69570-1MSD were used as the QC samples indicated.

All method blanks for this batch meet method specific criteria.

FA69570-1: Confirmation run.

Matrix: AQ **Batch ID:** V1A931

All samples were analyzed within the recommended method holding time.

Sample(s) FA69621-1MS, FA69621-1MSD were used as the QC samples indicated.

All method blanks for this batch meet method specific criteria.

SGS Orlando certifies that this report meets the project requirements for analytical data produced for the samples as received at SGS Orlando and as stated on the COC. SGS Orlando certifies that the data meets the Data Quality Objectives for precision, accuracy and completeness as specified in the SGS Orlando Quality Manual except as noted above. This report is to be used in its entirety. SGS Orlando is not responsible for any assumptions of data quality if partial data packages are used.

Narrative prepared by:

_____

Ariel Hartney, Client Services *(Signature on file)*

Summary of Hits

Job Number: FA69570
Account: AECOM, INC.
Project: NASA KSC, Biosparge Area (BSA)
Collected: 10/31/19 thru 11/01/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	PQL	MDL	Units	Method
FA69570-1	**MLPV-IW0031-030.0-20191101**					
No hits reported in this sample.						
FA69570-2	**MLPV-IW0057-045.0-20191101**					
cis-1,2-Dichloroethylene		23.8	1.0	0.28	ug/l	SW846 8260B
trans-1,2-Dichloroethylene		6.9	1.0	0.22	ug/l	SW846 8260B
Vinyl Chloride		920	20	8.2	ug/l	SW846 8260B
FA69570-3	**MLPV-IW0058-047.5-20191101**					
cis-1,2-Dichloroethylene		6.5	1.0	0.28	ug/l	SW846 8260B
Vinyl Chloride		77.1	1.0	0.41	ug/l	SW846 8260B
FA69570-4	**MLPV-IW0059-047.5-20191031**					
cis-1,2-Dichloroethylene		0.38 I	1.0	0.28	ug/l	SW846 8260B
trans-1,2-Dichloroethylene		2.0	1.0	0.22	ug/l	SW846 8260B
Vinyl Chloride		6.9	1.0	0.41	ug/l	SW846 8260B
FA69570-5	**MLPV-IW0060-045.0-20191101**					
cis-1,2-Dichloroethylene		0.82 I	1.0	0.28	ug/l	SW846 8260B
Vinyl Chloride		0.90 I	1.0	0.41	ug/l	SW846 8260B
FA69570-6	**MLPV-IW0061-037.5-20191031**					
Vinyl Chloride		20.6	1.0	0.41	ug/l	SW846 8260B
FA69570-7	**MLPV-IW0062-042.5-20191031**					
cis-1,2-Dichloroethylene		5.0	1.0	0.28	ug/l	SW846 8260B
trans-1,2-Dichloroethylene		0.57 I	1.0	0.22	ug/l	SW846 8260B
Vinyl Chloride		834	20	8.2	ug/l	SW846 8260B
FA69570-8	**MLPV-IW0063-037.5-20191101**					
No hits reported in this sample.						
FA69570-9	**MLPV-IW0064-042.5-20191101**					
cis-1,2-Dichloroethylene		0.93 I	1.0	0.28	ug/l	SW846 8260B

Summary of Hits

Job Number: FA69570
Account: AECOM, INC.
Project: NASA KSC, Biosparge Area (BSA)
Collected: 10/31/19 thru 11/01/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	PQL	MDL	Units	Method
FA69570-10	**MLPV-ASMW0004-037.5-20191101**					
cis-1,2-Dichloroethylene		8.4	1.0	0.28	ug/l	SW846 8260B
trans-1,2-Dichloroethylene		0.52 I	1.0	0.22	ug/l	SW846 8260B
FA69570-11	**MLPV-ASMW0005-037.5-20191101**					
No hits reported in this sample.						
FA69570-12	**MLPV-ASMW0006-037.5-20191101**					
Vinyl Chloride		0.47 I	1.0	0.41	ug/l	SW846 8260B
FA69570-13	**MLPV-TB02-20191101**					
No hits reported in this sample.						

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	MLPV-IW0031-030.0-20191101		
Lab Sample ID:	FA69570-1	**Date Sampled:**	11/01/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Biosparge Area (BSA)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A22946.D	1	11/11/19 12:05	CV	n/a	n/a	V1A931
Run #2 [a]	1A22885.D	2	11/08/19 00:00	CV	n/a	n/a	V1A928

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.28 U	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	0.41 U	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%	96%	83-118%
17060-07-0	1,2-Dichloroethane-D4	100%	103%	79-125%
2037-26-5	Toluene-D8	104%	101%	85-112%
460-00-4	4-Bromofluorobenzene	103%	98%	83-118%

(a) Confirmation run.

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0057-045.0-20191101		
Lab Sample ID:	FA69570-2	**Date Sampled:**	11/01/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Biosparge Area (BSA)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A22886.D	1	11/08/19 00:26	CV	n/a	n/a	V1A928
Run #2	1A22947.D	20	11/11/19 12:32	CV	n/a	n/a	V1A931

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	23.8	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	6.9	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	920 [a]	20	8.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	96%	97%	83-118%
17060-07-0	1,2-Dichloroethane-D4	102%	98%	79-125%
2037-26-5	Toluene-D8	101%	106%	85-112%
460-00-4	4-Bromofluorobenzene	99%	103%	83-118%

(a) Result is from Run# 2

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0058-047.5-20191101		
Lab Sample ID:	FA69570-3	**Date Sampled:**	11/01/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Biosparge Area (BSA)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A22887.D	1	11/08/19 00:51	CV	n/a	n/a	V1A928
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	6.5	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	77.1	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	95%		83-118%
17060-07-0	1,2-Dichloroethane-D4	104%		79-125%
2037-26-5	Toluene-D8	102%		85-112%
460-00-4	4-Bromofluorobenzene	98%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0059-047.5-20191031		
Lab Sample ID:	FA69570-4	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Biosparge Area (BSA)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A22888.D	1	11/08/19 01:17	CV	n/a	n/a	V1A928
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.38	1.0	0.28	ug/l	I
156-60-5	trans-1,2-Dichloroethylene	2.0	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	6.9	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	95%		83-118%
17060-07-0	1,2-Dichloroethane-D4	105%		79-125%
2037-26-5	Toluene-D8	102%		85-112%
460-00-4	4-Bromofluorobenzene	98%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0060-045.0-20191101		
Lab Sample ID:	FA69570-5	**Date Sampled:**	11/01/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Biosparge Area (BSA)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A22889.D	1	11/08/19 01:43	CV	n/a	n/a	V1A928
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.82	1.0	0.28	ug/l	I
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	0.90	1.0	0.41	ug/l	I

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	96%		83-118%
17060-07-0	1,2-Dichloroethane-D4	104%		79-125%
2037-26-5	Toluene-D8	102%		85-112%
460-00-4	4-Bromofluorobenzene	98%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0061-037.5-20191031		
Lab Sample ID:	FA69570-6	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Biosparge Area (BSA)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A22890.D	1	11/08/19 02:08	CV	n/a	n/a	V1A928
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.28 U	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	20.6	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	95%		83-118%
17060-07-0	1,2-Dichloroethane-D4	104%		79-125%
2037-26-5	Toluene-D8	101%		85-112%
460-00-4	4-Bromofluorobenzene	97%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0062-042.5-20191031		
Lab Sample ID:	FA69570-7	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Biosparge Area (BSA)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A22893.D	1	11/08/19 03:26	CV	n/a	n/a	V1A928
Run #2	1A22948.D	20	11/11/19 12:58	CV	n/a	n/a	V1A931

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	5.0	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.57	1.0	0.22	ug/l	I
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	834 [a]	20	8.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%	96%	83-118%
17060-07-0	1,2-Dichloroethane-D4	100%	97%	79-125%
2037-26-5	Toluene-D8	99%	106%	85-112%
460-00-4	4-Bromofluorobenzene	100%	102%	83-118%

(a) Result is from Run# 2

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0063-037.5-20191101		
Lab Sample ID:	FA69570-8	**Date Sampled:**	11/01/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Biosparge Area (BSA)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A22894.D	1	11/08/19 03:51	CV	n/a	n/a	V1A928
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.28 U	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	0.41 U	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	95%		83-118%
17060-07-0	1,2-Dichloroethane-D4	100%		79-125%
2037-26-5	Toluene-D8	100%		85-112%
460-00-4	4-Bromofluorobenzene	100%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0064-042.5-20191101		
Lab Sample ID:	FA69570-9	**Date Sampled:**	11/01/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Biosparge Area (BSA)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A22895.D	1	11/08/19 04:17	CV	n/a	n/a	V1A928
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.93	1.0	0.28	ug/l	I
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	0.41 U	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	95%		83-118%
17060-07-0	1,2-Dichloroethane-D4	104%		79-125%
2037-26-5	Toluene-D8	100%		85-112%
460-00-4	4-Bromofluorobenzene	97%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-ASMW0004-037.5-20191101		
Lab Sample ID:	FA69570-10	**Date Sampled:**	11/01/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Biosparge Area (BSA)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A22896.D	1	11/08/19 04:43	CV	n/a	n/a	V1A928
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	8.4	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.52	1.0	0.22	ug/l	I
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	0.41 U	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	95%		83-118%
17060-07-0	1,2-Dichloroethane-D4	101%		79-125%
2037-26-5	Toluene-D8	100%		85-112%
460-00-4	4-Bromofluorobenzene	99%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-ASMW0005-037.5-20191101		
Lab Sample ID:	FA69570-11	**Date Sampled:**	11/01/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Biosparge Area (BSA)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A22897.D	1	11/08/19 05:08	CV	n/a	n/a	V1A928
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.28 U	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	0.41 U	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	95%		83-118%
17060-07-0	1,2-Dichloroethane-D4	101%		79-125%
2037-26-5	Toluene-D8	100%		85-112%
460-00-4	4-Bromofluorobenzene	97%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-ASMW0006-037.5-20191101		
Lab Sample ID:	FA69570-12	**Date Sampled:**	11/01/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Biosparge Area (BSA)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A22898.D	1	11/08/19 05:34	CV	n/a	n/a	V1A928
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.28 U	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	0.47	1.0	0.41	ug/l	I

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	96%		83-118%
17060-07-0	1,2-Dichloroethane-D4	105%		79-125%
2037-26-5	Toluene-D8	100%		85-112%
460-00-4	4-Bromofluorobenzene	97%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-TB02-20191101		
Lab Sample ID:	FA69570-13	**Date Sampled:**	11/01/19
Matrix:	AQ - Trip Blank Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Biosparge Area (BSA)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A22884.D	1	11/07/19 23:34	CV	n/a	n/a	V1A928
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.28 U	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	0.41 U	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	96%		83-118%
17060-07-0	1,2-Dichloroethane-D4	102%		79-125%
2037-26-5	Toluene-D8	102%		85-112%
460-00-4	4-Bromofluorobenzene	98%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

FA69570

SGS North America Inc - Orlando

Chain of Custody

4405 Vineland Road, Suite C-15 Orlando, Fl 32811
TEL. 407-425-6700 FAX: 407-425-0707
www.sgs.com

SGS - ORLANDO JOB # : PAGE 1 OF 2

SGS - ORLANDO Quote # | SKIFF #

Client / Reporting Information

Company Name: AECOM
Address: 150 N. Orange Ave. Suite 200
City: Orlando State: FL Zip: 32801
Project Contact: Megan Garcia Email: megan.garcia@aecom.com
Phone #:

Project Information

Project Name: NASA KSC Bio Garage Assess (BGA)
Street: Launcher Rd
City: Titusville State: FL
Project #: 60615493.4
Fax #:
Client Purchase Order #:

Sampler(s) Name(s) (Printed)
Sampler 1: J. Stefan Sampler 2: G. Kusel, C. Lee

Analytical Information

Matrix Codes: DW - Drinking Water; GW - Ground Water; WW - Water; SW - Surface Water; SO - Soil; SL- Sludge; OI - Oil; LIQ - Other Liquid; AIR - Air; SOL - Other Solid

SGS Orlando Sample #	Field ID / Point of Collection	COLLECTION DATE	TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NAOH+ZNA	DI WATER	MEOH	8260 VOC (VOA Vials)	LAB USE ONLY
1	MLAV-IW0031-080.0-20191101	11/1/19	1030	GK	GW	3			X								
2	MLAV-IW0051-045.0-20191101	11/1/19	1002	CL		3			X								
3	MLAV-IW0052-047.5-20191101	11/1/19	1043	CL		3			X								
4	MLAV-IW0054-047.5-20191031	10/31/19	1520	CL		3			X								
5	MLAV-IW0060-045.0-20191101	11/1/19	0945	GK		3			X								
6	MLAV-IW0061-037.5-20191031	10/31/19	1443	CL		3			X								
7	MLAV-IW0062-042.5-20191031	10/31/19	1425	CL		3			X								
8	MLAV-IW0063-037.5-20191101	11/1/19	1025	GK		3			X								
9	MLAV-IW0064-042.5-20191101	11/1/19	1100	GK		3			X								
10	MLAV-ASMW0051-037.5-20191101	11/1/19	1105	GK		3			X								
11	MLAV-ASMW0055-037.5-20191101	11/1/19	1032	GK		3			X								
12	MLAV-ASMW0062-037.5-20191101	11/1/19	1008	GK	W	3			X								

Turnaround Time (Business days)

10 Day (Business) Approved By: / Date:
7 Day
5 Day
3 Day *RUSH*
2 Day *RUSH*
1 Day *RUSH*
Other
Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information

- COMMERCIAL "A" (RESULTS ONLY)
- COMMERCIAL "B" (RESULTS PLUS QC)
- REDT1 (EPA LEVEL 3)
- FULLT1 (EPA LEVEL 4)
- EDD'S

Comments / Remarks

Sample cooler dropped off at lab (SGS in Orlando)
Temp. Blank in cooler

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
1	Drug Mail / AECOM	11/1/19 1440	2	3		4
5	Relinquished by/Affiliation	Date Time:	6 Received By/Affiliation	7 Relinquished By/Affiliation	Date Time:	8 Received By/Affiliation

Lab Use Only : Cooler Temperature (s) Celsius (corrected): 1.3

http://www.sgs.com/en/terms-and-conditions

ORLD-SMT-0001-03-FORM-COC (1) Rev 031318

SGS North America Inc - Orlando

Chain of Custody

4405 Vineland Road, Suite C-15 Orlando, Fl 32811
TEL. 407-425-6700 FAX: 407-425-0707
www.sgs.com

FA69570

SGS - ORLANDO JOB # : PAGE 1 OF 2

SGS - ORLANDO Quote # | SKIFF #

Client / Reporting Information

Company Name: AECOM
Address: 151 N. Orange Ave Suite 200
City: Orlando State: FL Zip: 32801
Project Contact: Megan Garcia Email: megan.garcia@aecom.com
Phone #:
Sampler(s) Name(s) (Printed)
Sampler 1: D. Slater Sampler 2: G. Kastl, C. Lee

Project Information

Project Name: NASA KSC Bio Sparge Area (BSA)
Street: Launcher Rd.
City: Titusville State: FL
Project #: 60615493.4
Fax #:
Client Purchase Order #

Analytical Information

8260 voc (VBS)

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid

SGS Orlando Sample #	Field ID / Point of Collection	COLLECTION DATE	TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NaOH+ZnAc	DI WATER	MEOH	LAB USE ONLY
43	MLRV-TR02	11/1/19			WW	2			X							

Turnaround Time (Business days)

- 10 Day (Business) — Approved By: / Date:
- 7 Day
- 5 Day
- 3 Day *RUSH*
- 2 Day *RUSH*
- 1 Day *RUSH*
- Other

Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information

- ☐ COMMERCIAL "A" (RESULTS ONLY)
- ☐ COMMERCIAL "B" (RESULTS PLUS QC)
- ☐ REDT1 (EPA LEVEL 3)
- ☐ FULLT1 (EPA LEVEL 4)
- ☐ EDD'S

Comments / Remarks

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
1			2	3		4
	Relinquished by/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
5			6	7		8

11/1/19 1440

Lab Use Only : Cooler Temperature (s) Celsius (corrected):

http://www.sgs.com/en/terms-and-conditions

ORLD-SMT-0001-03-FORM-COC (1) Rev 031318

SGS Sample Receipt Summary

Job Number: FA69570 **Client:** AECOM **Project:** NASA KSC

Date / Time Received: 11/1/2019 2:40:00 PM **Delivery Method:** FX **Airbill #'s:**

Therm ID: IR 1; **Therm CF:** -0.8; **# of Coolers:** 1

Cooler Temps (Raw Measured) °C: Cooler 1: (2.1);

Cooler Temps (Corrected) °C: Cooler 1: (1.3);

Cooler Information	Y	or	N
1. Custody Seals Present	☑		☐
2. Custody Seals Intact	☑		☐
3. Temp criteria achieved	☑		☐
4. Cooler temp verification	IR Gun		
5. Cooler media	Ice (Bag)		

Trip Blank Information	Y	or	N	N/A
1. Trip Blank present / cooler	☑		☐	☐
2. Trip Blank listed on COC	☑		☐	☐

	W	or	S	N/A
3. Type Of TB Received	☑		☐	☐

Sample Information	Y	or	N	N/A
1. Sample labels present on bottles	☑		☐	
2. Samples preserved properly	☑		☐	
3. Sufficient volume/containers recvd for analysis:	☑		☐	
4. Condition of sample	Intact			
5. Sample recvd within HT	☑		☐	
6. Dates/Times/IDs on COC match Sample Label	☑		☐	
7. VOCs have headspace	☐		☑	☐
8. Bottles received for unspecified tests	☐		☑	
9. Compositing instructions clear	☐		☐	☑
10. Voa Soil Kits/Jars received past 48hrs?	☐		☐	☑
11. % Solids Jar received?	☐		☐	☑
12. Residual Chlorine Present?	☐		☐	☑

Misc. Information

Number of Encores: 25-Gram _____ 5-Gram _____ Number of 5035 Field Kits: _____ Number of Lab Filtered Metals: _____

Test Strip Lot #s: pH 0-3 230315 pH 10-12 219813A Other: (Specify) _____ _____

Residual Chlorine Test Strip Lot #: _____

Comments

SM001
Rev. Date 05/24/17

Technician: PETERH Date: 11/1/2019 2:40:00 PM Reviewer: _____ Date: _____

MS Volatiles

6

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA69570
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Biosparge Area (BSA)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V1A928-MB	1A22882.D	1	11/07/19	CV	n/a	n/a	V1A928

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69570-2, FA69570-3, FA69570-4, FA69570-5, FA69570-6, FA69570-7, FA69570-8, FA69570-9, FA69570-10, FA69570-11, FA69570-12, FA69570-13

CAS No.	Compound	Result	RL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	ND	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	98%	83-118%
17060-07-0	1,2-Dichloroethane-D4	99%	79-125%
2037-26-5	Toluene-D8	99%	85-112%
460-00-4	4-Bromofluorobenzene	101%	83-118%

Method Blank Summary

Job Number: FA69570
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Biosparge Area (BSA)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V1A931-MB	1A22944.D	1	11/11/19	CV	n/a	n/a	V1A931

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69570-1, FA69570-2, FA69570-7

CAS No.	Compound	Result	RL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	ND	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	98%	83-118%
17060-07-0	1,2-Dichloroethane-D4	98%	79-125%
2037-26-5	Toluene-D8	104%	85-112%
460-00-4	4-Bromofluorobenzene	105%	83-118%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
10024-97-2	Nitrous Oxide	2.81	970	ug/l	JN
	Total TIC, Volatile		970	ug/l	J

Blank Spike Summary

Job Number: FA69570
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Biosparge Area (BSA)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V1A928-BS	1A22881.D	1	11/07/19	CV	n/a	n/a	V1A928

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69570-2, FA69570-3, FA69570-4, FA69570-5, FA69570-6, FA69570-7, FA69570-8, FA69570-9, FA69570-10, FA69570-11, FA69570-12, FA69570-13

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
156-59-2	cis-1,2-Dichloroethylene	25	27.3	109	78-120
156-60-5	trans-1,2-Dichloroethylene	25	27.2	109	76-127
127-18-4	Tetrachloroethylene	25	26.7	107	76-135
79-01-6	Trichloroethylene	25	26.7	107	81-126
75-01-4	Vinyl Chloride	25	22.9	92	69-159

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	104%	83-118%
17060-07-0	1,2-Dichloroethane-D4	100%	79-125%
2037-26-5	Toluene-D8	96%	85-112%
460-00-4	4-Bromofluorobenzene	101%	83-118%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA69570
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Biosparge Area (BSA)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V1A931-BS	1A22943.D	1	11/11/19	CV	n/a	n/a	V1A931

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69570-1, FA69570-2, FA69570-7

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
156-59-2	cis-1,2-Dichloroethylene	25	27.7	111	78-120
156-60-5	trans-1,2-Dichloroethylene	25	28.3	113	76-127
127-18-4	Tetrachloroethylene	25	28.5	114	76-135
79-01-6	Trichloroethylene	25	25.8	103	81-126
75-01-4	Vinyl Chloride	25	23.6	94	69-159

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	104%	83-118%
17060-07-0	1,2-Dichloroethane-D4	102%	79-125%
2037-26-5	Toluene-D8	100%	85-112%
460-00-4	4-Bromofluorobenzene	104%	83-118%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA69570
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Biosparge Area (BSA)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA69570-1MS	1A22891.D	10	11/08/19	CV	n/a	n/a	V1A928
FA69570-1MSD	1A22892.D	10	11/08/19	CV	n/a	n/a	V1A928
FA69570-1 [a]	1A22885.D	2	11/08/19	CV	n/a	n/a	V1A928

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69570-2, FA69570-3, FA69570-4, FA69570-5, FA69570-6, FA69570-7, FA69570-8, FA69570-9, FA69570-10, FA69570-11, FA69570-12, FA69570-13

CAS No.	Compound	FA69570-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
156-59-2	cis-1,2-Dichloroethylene	2.0	U	250	273	109	250	276	110	1	78-120/15
156-60-5	trans-1,2-Dichloroethylene	2.0	U	250	270	108	250	271	108	0	76-127/17
127-18-4	Tetrachloroethylene	2.0	U	250	248	99	250	249	100	0	76-135/16
79-01-6	Trichloroethylene	2.0	U	250	272	109	250	259	104	5	81-126/15
75-01-4	Vinyl Chloride	2.0	U	250	222	89	250	229	92	3	69-159/18

CAS No.	Surrogate Recoveries	MS	MSD	FA69570-1	Limits
1868-53-7	Dibromofluoromethane	103%	105%	96%	83-118%
17060-07-0	1,2-Dichloroethane-D4	102%	102%	103%	79-125%
2037-26-5	Toluene-D8	94%	94%	101%	85-112%
460-00-4	4-Bromofluorobenzene	100%	99%	98%	83-118%

(a) Confirmation run.

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA69570
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Biosparge Area (BSA)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA69621-1MS	1A22955.D	1	11/11/19	CV	n/a	n/a	V1A931
FA69621-1MSD	1A22956.D	1	11/11/19	CV	n/a	n/a	V1A931
FA69621-1	1A22945.D	1	11/11/19	CV	n/a	n/a	V1A931

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69570-1, FA69570-2, FA69570-7

CAS No.	Compound	FA69621-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
156-59-2	cis-1,2-Dichloroethylene	1.0	U	25	25.6	102	25	25.1	100	2	78-120/15
156-60-5	trans-1,2-Dichloroethylene	1.0	U	25	25.4	102	25	24.7	99	3	76-127/17
127-18-4	Tetrachloroethylene	1.0	U	25	25.4	102	25	24.9	100	2	76-135/16
79-01-6	Trichloroethylene	1.0	U	25	23.5	94	25	22.9	92	3	81-126/15
75-01-4	Vinyl Chloride	1.0	U	25	21.3	85	25	21.9	88	3	69-159/18

CAS No.	Surrogate Recoveries	MS	MSD	FA69621-1	Limits
1868-53-7	Dibromofluoromethane	105%	105%	98%	83-118%
17060-07-0	1,2-Dichloroethane-D4	104%	103%	100%	79-125%
2037-26-5	Toluene-D8	99%	100%	104%	85-112%
460-00-4	4-Bromofluorobenzene	104%	105%	104%	83-118%

* = Outside of Control Limits.

The results set forth herein are provided by SGS North America Inc.

e-Hardcopy 2.0
Automated Report

Technical Report for

AECOM, INC.

NASA KSC, Hot Spot 2 (Air Asparge System Area)

60615493.4

SGS Job Number: FA69571

Sampling Date: 10/31/19

Report to:

andrea.colby@sgs.com

Total number of pages in report: 39

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Caitlin Brice, M.S.
General Manager

Client Service contact: Andrea Colby 407-425-6700

Certifications: FL(E83510), LA(03051), KS(E-10327), IL(200063), NC(573), NJ(FL002), NY(12022), SC(96038001) DoD ELAP(ANAB L2229), AZ(AZ0806), CA(2937), TX(T104704404), PA(68-03573), VA(460177), AK, AR, IA, KY, MA, MS, ND, NH, NV, OK, OR, UT, WA, WV

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Sample Summary

AECOM, INC.

Job No: FA69571

NASA KSC, Hot Spot 2 (Air Asparge System Area)
Project No: 60615493.4

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
FA69571-1	10/31/19	10:18	KLS	11/01/19	AQ	Ground Water	MLPV-IW0011I-037.0-20191031
FA69571-2	10/31/19	12:17	KLS	11/01/19	AQ	Ground Water	MLPV-IW0033-045.0-20191031
FA69571-3	10/31/19	15:30	KLS	11/01/19	AQ	Ground Water	MLPV-IW0034-032.5-20191031
FA69571-4	10/31/19	14:35	KLS	11/01/19	AQ	Ground Water	MLPV-IW0035-045.0-20191031
FA69571-5	10/31/19	10:40	KLS	11/01/19	AQ	Ground Water	MLPV-IW0036-042.5-20191031
FA69571-6	10/31/19	10:47	KLS	11/01/19	AQ	Ground Water	MLPV-IW0037-045.0-20191031
FA69571-7	10/31/19	14:43	KLS	11/01/19	AQ	Ground Water	MLPV-IW0039-045.0-20191031
FA69571-8	10/31/19	12:35	KLS	11/01/19	AQ	Ground Water	MLPV-IW0041-047.5-20191031
FA69571-9	10/31/19	14:08	KLS	11/01/19	AQ	Ground Water	MLPV-IW0043-045.0-20191031
FA69571-10	10/31/19	11:22	KLS	11/01/19	AQ	Ground Water	MLPV-IW0044-045.0-20191031
FA69571-11	10/31/19	15:16	KLS	11/01/19	AQ	Ground Water	MLPV-IW0045-045.0-20191031
FA69571-12	10/31/19	11:15	KLS	11/01/19	AQ	Ground Water	MLPV-SAMW0004I-037.5-20191031
FA69571-13	10/31/19	11:45	KLS	11/01/19	AQ	Ground Water	MLPV-SAMW0004D-047.5-20191031

Sample Summary
(continued)

AECOM, INC.

Job No: FA69571

NASA KSC, Hot Spot 2 (Air Asparge System Area)
Project No: 60615493.4

Sample Number	Collected Date	Time	By	Received	Matrix Code	Matrix Type	Client Sample ID
FA69571-14	10/31/19	00:00	KLS	11/01/19	AQ	Trip Blank Water	MLPV-TB01-20191031

SAMPLE DELIVERY GROUP CASE NARRATIVE

Client: AECOM, INC. **Job No:** FA69571

Site: NASA KSC, Hot Spot 2 (Air Asparge System Area) **Report Date** 3/2/2020 2:40:30 PM

13 Samples, 1 Trip Blank were collected on 10/31/2019 and were received at SGS North America Inc - Orlando on 11/01/2019 properly preserved, at 1.8 Deg. C and intact. These Samples received an SGS Orlando job number of FA69571. A listing of the Laboratory Sample ID, Client Sample ID and dates of collection are presented in the Results Summary Section. Except as noted below, all method specified calibrations and quality control performance criteria were met for this job. For more information, please refer to QC summary pages.

MS Volatiles By Method SW846 8260B

Matrix: AQ **Batch ID:** VI1956

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FA69588-10MS, FA69588-10MSD were used as the QC samples indicated.

FA69571-10: Sample vial(s) contained bubbles greater than 6mm; reported results are considered minimum values.

FA69571-11: Sample vial(s) contained bubbles greater than 6mm; reported results are considered minimum values.

Matrix: AQ **Batch ID:** VI1957

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FA69588-9MS, FA69588-9MSD were used as the QC samples indicated.

FA69571-10: Sample vial(s) contained bubbles greater than 6mm; reported results are considered minimum values.

FA69571-11: Sample vial(s) contained bubbles greater than 6mm; reported results are considered minimum values.

Matrix: AQ **Batch ID:** VP2611

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FA69725-7MS, FA69725-7MSD were used as the QC samples indicated.

Matrix Spike Recovery(s) for cis-1,2-Dichloroethylene are outside control limits. Outside control limits due to high level in sample relative to spike amount.

Matrix Spike Duplicate Recovery(s) for Trichloroethylene are outside control limits. Probable cause is due to matrix interference.

RPD(s) for MSD for Tetrachloroethylene, trans-1,2-Dichloroethylene, Trichloroethylene are outside control limits for sample FA69725-7MSD. Probable cause is due to sample non-homogeneity.

Matrix: AQ **Batch ID:** VP2612

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FA69571-4MS, FA69571-4MSD were used as the QC samples indicated.

Matrix Spike Duplicate Recovery(s) for Vinyl Chloride are outside control limits. Probable cause is due to matrix interference.

RPD(s) for MSD for Trichloroethylene are outside control limits for sample FA69571-4MSD. Probable cause is due to sample non-homogeneity.

SGS Orlando certifies that this report meets the project requirements for analytical data produced for the samples as received at SGS Orlando and as stated on the COC. SGS Orlando certifies that the data meets the Data Quality Objectives for precision, accuracy and completeness as specified in the SGS Orlando Quality Manual except as noted above. This report is to be used in its entirety. SGS Orlando is not responsible for any assumptions of data quality if partial data packages are used.

Narrative prepared by:

_____

Ariel Hartney, Client Services *(Signature on file)*

Summary of Hits

Job Number: FA69571
Account: AECOM, INC.
Project: NASA KSC, Hot Spot 2 (Air Asparge System Area)
Collected: 10/31/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	PQL	MDL	Units	Method
FA69571-1	**MLPV-IW0011I-037.0-20191031**					
Vinyl Chloride		0.48 I	1.0	0.41	ug/l	SW846 8260B
FA69571-2	**MLPV-IW0033-045.0-20191031**					
cis-1,2-Dichloroethylene		58.4	5.0	1.4	ug/l	SW846 8260B
Vinyl Chloride		365	5.0	2.0	ug/l	SW846 8260B
FA69571-3	**MLPV-IW0034-032.5-20191031**					
No hits reported in this sample.						
FA69571-4	**MLPV-IW0035-045.0-20191031**					
Vinyl Chloride		152	2.5	1.0	ug/l	SW846 8260B
FA69571-5	**MLPV-IW0036-042.5-20191031**					
trans-1,2-Dichloroethylene		0.33 I	1.0	0.22	ug/l	SW846 8260B
Vinyl Chloride		9.1	1.0	0.41	ug/l	SW846 8260B
FA69571-6	**MLPV-IW0037-045.0-20191031**					
cis-1,2-Dichloroethylene		135	2.0	0.55	ug/l	SW846 8260B
Vinyl Chloride		178	2.0	0.82	ug/l	SW846 8260B
FA69571-7	**MLPV-IW0039-045.0-20191031**					
cis-1,2-Dichloroethylene		198	2.5	0.69	ug/l	SW846 8260B
trans-1,2-Dichloroethylene		4.6	2.5	0.55	ug/l	SW846 8260B
Vinyl Chloride		241	2.5	1.0	ug/l	SW846 8260B
FA69571-8	**MLPV-IW0041-047.5-20191031**					
cis-1,2-Dichloroethylene		14.0	1.0	0.28	ug/l	SW846 8260B
trans-1,2-Dichloroethylene		2.3	1.0	0.22	ug/l	SW846 8260B
Trichloroethylene		0.39 I	1.0	0.35	ug/l	SW846 8260B
Vinyl Chloride		166	2.5	1.0	ug/l	SW846 8260B
FA69571-9	**MLPV-IW0043-045.0-20191031**					
cis-1,2-Dichloroethylene		149	2.5	0.69	ug/l	SW846 8260B
trans-1,2-Dichloroethylene		2.4 I	2.5	0.55	ug/l	SW846 8260B
Vinyl Chloride		155	2.5	1.0	ug/l	SW846 8260B

Summary of Hits

Job Number: FA69571
Account: AECOM, INC.
Project: NASA KSC, Hot Spot 2 (Air Asparge System Area)
Collected: 10/31/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	PQL	MDL	Units	Method
FA69571-10	**MLPV-IW0044-045.0-20191031**					
cis-1,2-Dichloroethylene [a]		2.9	1.0	0.28	ug/l	SW846 8260B
trans-1,2-Dichloroethylene [a]		1.8	1.0	0.22	ug/l	SW846 8260B
Vinyl Chloride [a]		458	5.0	2.0	ug/l	SW846 8260B
FA69571-11	**MLPV-IW0045-045.0-20191031**					
cis-1,2-Dichloroethylene [a]		4.8	1.0	0.28	ug/l	SW846 8260B
trans-1,2-Dichloroethylene [a]		3.6	1.0	0.22	ug/l	SW846 8260B
Vinyl Chloride [a]		97.2	2.0	0.82	ug/l	SW846 8260B
FA69571-12	**MLPV-SAMW0004I-037.5-20191031**					
cis-1,2-Dichloroethylene		0.40 I	1.0	0.28	ug/l	SW846 8260B
Vinyl Chloride		15.9	1.0	0.41	ug/l	SW846 8260B
FA69571-13	**MLPV-SAMW0004D-047.5-20191031**					
cis-1,2-Dichloroethylene		0.32 I	1.0	0.28	ug/l	SW846 8260B
trans-1,2-Dichloroethylene		0.37 I	1.0	0.22	ug/l	SW846 8260B
Vinyl Chloride		2.6	1.0	0.41	ug/l	SW846 8260B
FA69571-14	**MLPV-TB01-20191031**					

No hits reported in this sample.

(a) Sample vial(s) contained bubbles greater than 6mm; reported results are considered minimum values.

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	MLPV-IW0011I-037.0-20191031		
Lab Sample ID:	FA69571-1	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 2 (Air Asparge System Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	P67742.D	1	11/11/19 11:19	SO	n/a	n/a	VP2611
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.28 U	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	0.48	1.0	0.41	ug/l	I

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%		83-118%
17060-07-0	1,2-Dichloroethane-D4	96%		79-125%
2037-26-5	Toluene-D8	98%		85-112%
460-00-4	4-Bromofluorobenzene	98%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0033-045.0-20191031		
Lab Sample ID:	FA69571-2	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 2 (Air Asparge System Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	P67743.D	5	11/11/19 11:44	SO	n/a	n/a	VP2611
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	58.4	5.0	1.4	ug/l	
156-60-5	trans-1,2-Dichloroethylene	1.1 U	5.0	1.1	ug/l	
127-18-4	Tetrachloroethylene	1.1 U	5.0	1.1	ug/l	
79-01-6	Trichloroethylene	1.7 U	5.0	1.7	ug/l	
75-01-4	Vinyl Chloride	365	5.0	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		83-118%
17060-07-0	1,2-Dichloroethane-D4	99%		79-125%
2037-26-5	Toluene-D8	97%		85-112%
460-00-4	4-Bromofluorobenzene	99%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0034-032.5-20191031		
Lab Sample ID:	FA69571-3	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 2 (Air Asparge System Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	P67744.D	1	11/11/19 12:09	SO	n/a	n/a	VP2611
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.28 U	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	0.41 U	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%		83-118%
17060-07-0	1,2-Dichloroethane-D4	99%		79-125%
2037-26-5	Toluene-D8	98%		85-112%
460-00-4	4-Bromofluorobenzene	99%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0035-045.0-20191031		
Lab Sample ID:	FA69571-4	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 2 (Air Asparge System Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	P67771.D	2.5	11/12/19 10:41	SO	n/a	n/a	VP2612
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.69 U	2.5	0.69	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.55 U	2.5	0.55	ug/l	
127-18-4	Tetrachloroethylene	0.54 U	2.5	0.54	ug/l	
79-01-6	Trichloroethylene	0.86 U	2.5	0.86	ug/l	
75-01-4	Vinyl Chloride	152	2.5	1.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	97%		83-118%
17060-07-0	1,2-Dichloroethane-D4	100%		79-125%
2037-26-5	Toluene-D8	101%		85-112%
460-00-4	4-Bromofluorobenzene	98%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0036-042.5-20191031		
Lab Sample ID:	FA69571-5	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 2 (Air Asparge System Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	P67746.D	1	11/11/19 12:59	SO	n/a	n/a	VP2611
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.28 U	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.33	1.0	0.22	ug/l	I
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	9.1	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		83-118%
17060-07-0	1,2-Dichloroethane-D4	97%		79-125%
2037-26-5	Toluene-D8	99%		85-112%
460-00-4	4-Bromofluorobenzene	101%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0037-045.0-20191031		
Lab Sample ID:	FA69571-6	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 2 (Air Asparge System Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	P67772.D	2	11/12/19 11:06	SO	n/a	n/a	VP2612
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	135	2.0	0.55	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.44 U	2.0	0.44	ug/l	
127-18-4	Tetrachloroethylene	0.43 U	2.0	0.43	ug/l	
79-01-6	Trichloroethylene	0.69 U	2.0	0.69	ug/l	
75-01-4	Vinyl Chloride	178	2.0	0.82	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	97%		83-118%
17060-07-0	1,2-Dichloroethane-D4	99%		79-125%
2037-26-5	Toluene-D8	102%		85-112%
460-00-4	4-Bromofluorobenzene	99%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0039-045.0-20191031		
Lab Sample ID:	FA69571-7	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 2 (Air Asparge System Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	I62805.D	2.5	11/12/19 18:46	KB	n/a	n/a	VI1957
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	198	2.5	0.69	ug/l	
156-60-5	trans-1,2-Dichloroethylene	4.6	2.5	0.55	ug/l	
127-18-4	Tetrachloroethylene	0.54 U	2.5	0.54	ug/l	
79-01-6	Trichloroethylene	0.86 U	2.5	0.86	ug/l	
75-01-4	Vinyl Chloride	241	2.5	1.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		83-118%
17060-07-0	1,2-Dichloroethane-D4	102%		79-125%
2037-26-5	Toluene-D8	98%		85-112%
460-00-4	4-Bromofluorobenzene	100%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0041-047.5-20191031		
Lab Sample ID:	FA69571-8	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 2 (Air Asparge System Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	I62778.D	1	11/11/19 17:24	KB	n/a	n/a	VI1956
Run #2	I62806.D	2.5	11/12/19 19:12	KB	n/a	n/a	VI1957

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	14.0	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	2.3	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.39	1.0	0.35	ug/l	I
75-01-4	Vinyl Chloride	166 [a]	2.5	1.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%	101%	83-118%
17060-07-0	1,2-Dichloroethane-D4	102%	101%	79-125%
2037-26-5	Toluene-D8	98%	98%	85-112%
460-00-4	4-Bromofluorobenzene	100%	99%	83-118%

(a) Result is from Run# 2

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0043-045.0-20191031		
Lab Sample ID:	FA69571-9	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 2 (Air Asparge System Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	I62807.D	2.5	11/12/19 19:39	KB	n/a	n/a	VI1957
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	149	2.5	0.69	ug/l	
156-60-5	trans-1,2-Dichloroethylene	2.4	2.5	0.55	ug/l	I
127-18-4	Tetrachloroethylene	0.54 U	2.5	0.54	ug/l	
79-01-6	Trichloroethylene	0.86 U	2.5	0.86	ug/l	
75-01-4	Vinyl Chloride	155	2.5	1.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		83-118%
17060-07-0	1,2-Dichloroethane-D4	102%		79-125%
2037-26-5	Toluene-D8	99%		85-112%
460-00-4	4-Bromofluorobenzene	100%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0044-045.0-20191031		
Lab Sample ID:	FA69571-10	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 2 (Air Asparge System Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	I62780.D	1	11/11/19 18:16	KB	n/a	n/a	VI1956
Run #2 [a]	I62808.D	5	11/12/19 20:05	KB	n/a	n/a	VI1957

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	2.9	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	1.8	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	458 [b]	5.0	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%	101%	83-118%
17060-07-0	1,2-Dichloroethane-D4	103%	102%	79-125%
2037-26-5	Toluene-D8	98%	98%	85-112%
460-00-4	4-Bromofluorobenzene	100%	100%	83-118%

(a) Sample vial(s) contained bubbles greater than 6mm; reported results are considered minimum values.
(b) Result is from Run# 2

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IW0045-045.0-20191031		
Lab Sample ID:	FA69571-11	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 2 (Air Asparge System Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	I62781.D	1	11/11/19 18:43	KB	n/a	n/a	VI1956
Run #2 [a]	I62809.D	2	11/12/19 20:31	KB	n/a	n/a	VI1957

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	4.8	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	3.6	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	97.2 [b]	2.0	0.82	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%	101%	83-118%
17060-07-0	1,2-Dichloroethane-D4	104%	102%	79-125%
2037-26-5	Toluene-D8	98%	98%	85-112%
460-00-4	4-Bromofluorobenzene	100%	99%	83-118%

(a) Sample vial(s) contained bubbles greater than 6mm; reported results are considered minimum values.
(b) Result is from Run# 2

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-SAMW0004I-037.5-20191031		
Lab Sample ID:	FA69571-12	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 2 (Air Asparge System Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	I62782.D	1	11/11/19 19:10	KB	n/a	n/a	VI1956
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.40	1.0	0.28	ug/l	I
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	15.9	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		83-118%
17060-07-0	1,2-Dichloroethane-D4	103%		79-125%
2037-26-5	Toluene-D8	98%		85-112%
460-00-4	4-Bromofluorobenzene	100%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-SAMW0004D-047.5-20191031		
Lab Sample ID:	FA69571-13	**Date Sampled:**	10/31/19
Matrix:	AQ - Ground Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 2 (Air Asparge System Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	I62783.D	1	11/11/19 19:36	KB	n/a	n/a	VI1956
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.32	1.0	0.28	ug/l	I
156-60-5	trans-1,2-Dichloroethylene	0.37	1.0	0.22	ug/l	I
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	2.6	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		83-118%
17060-07-0	1,2-Dichloroethane-D4	103%		79-125%
2037-26-5	Toluene-D8	98%		85-112%
460-00-4	4-Bromofluorobenzene	101%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-TB01-20191031		
Lab Sample ID:	FA69571-14	**Date Sampled:**	10/31/19
Matrix:	AQ - Trip Blank Water	**Date Received:**	11/01/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC, Hot Spot 2 (Air Asparge System Area)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	I62765.D	1	11/11/19 11:38	KB	n/a	n/a	VI1956
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	PQL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	0.28 U	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	0.41 U	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		83-118%
17060-07-0	1,2-Dichloroethane-D4	99%		79-125%
2037-26-5	Toluene-D8	99%		85-112%
460-00-4	4-Bromofluorobenzene	98%		83-118%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

SGS North America Inc - Orlando

Chain of Custody

FA69571

SGS - ORLANDO JOB # :

PAGE 1 OF 2

4405 Vineland Road, Suite C-15 Orlando, Fl 32811
TEL. 407-425-6700 FAX: 407-425-0707
www.sgs.com

SGS - ORLANDO Quote # | SKIFF #

Client / Reporting Information

Company Name: AECOM
Address: 150 N Orange Ave.
City: Orlando State: FL Zip: 32801
Project Contact: Megan Garcia Email: megan.garcia@AECOM.com
Phone #:
Sampler(s) Name(s) (Printed) Chad Lee
Sampler 1: Greg Kusel Sampler 2: Dustin Slater

Project Information

Project Name: NASA KSC (Air Sparge System Area Hot Spot 2)
Street: Launcher Road
City: Titusville State: FL
Project #: 606154 93.4
Fax #:
Client Purchase Order #:

Analytical Information

8260 VOC (VOA 40 ml)

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid

SGS Orlando Sample #	Field ID / Point of Collection	COLLECTION DATE	COLLECTION TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	CONTAINER INFORMATION: OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NaOH+ZnAc	DI WATER	MeOH	LAB USE ONLY
1	IW0011I-037.0-20191031	10/31/19	1019	DS	GW	3			X						X	
2	IW0033-045.0-20191031		1217	DS					X						X	
3	IW0034-032.5-20191031		1530	GK					X						X	
4	IW0035-045.0-20191031		1435	GK					X						X	
5	IW0036-042.5-20191031		1040	GK					X						X	
6	IW0037-045.0-20191031		1047	DS					X						X	
7	IW0039-045.0-20191031		1443	DS					X						X	
8	IW0041-047.5-20191031		1235	GK					X						X	
9	IW0043-045.0-20191031		1408	DS					X						X	
10	IW0044-045.0-20191031		1122	DS					X						X	
11	IW0045-045.0-20191031		1516	DS					X						X	
12	SAMW0041-037.5-20191031		1115	GK					X						X	

Turnaround Time (Business days)

10 Day (Business) Approved By: / Date:
7 Day
5 Day
3 Day *RUSH*
2 Day *RUSH*
1 Day *RUSH*
Other
Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information

- [ ] COMMERCIAL "A" (RESULTS ONLY)
- [ ] COMMERCIAL "B" (RESULTS PLUS QC)
- [ ] REDT1 (EPA LEVEL 3)
- [ ] FULLT1 (EPA LEVEL 4)
- [ ] EDD'S

Comments / Remarks

Sample cooler dropped off at Lab (SGS in orlando)
Temp blank in cooler

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler/Affiliation	Date Time:	Received By/Affiliation		Relinquished By/Affiliation	Date Time:	Received By/Affiliation
1	Greg Kusel/AECOM	11/1/19 1440	2	11/1/19 1440	3		4
5	Relinquished by/Affiliation	Date Time:	Received By/Affiliation 6		Relinquished By/Affiliation 7	Date Time:	Received By/Affiliation 8

Lab Use Only: Cooler Temperature (s) Celsius (corrected): 1.8

http://www.sgs.com/en/terms-and-conditions

ORLD-SMT-0001-03-FORM-COC (1) Rev 031318

FA69571: Chain of Custody
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SGS North America Inc - Orlando

Chain of Custody

FA69571

SGS - ORLANDO JOB # :

PAGE 2 OF 2

4405 Vineland Road, Suite C-15 Orlando, Fl 32811
TEL. 407-425-6700 FAX: 407-425-0707
www.sgs.com

SGS - ORLANDO Quote # | SKIFF #

Client / Reporting Information

Company Name: AECOM
Address: 150 N orange AVE.
City: Orlando State: FL Zip: 32801
Project Contact: Megan Garcia Email: Megan.Garcia@AECOM.com
Phone #:
Sampler(s) Name(s) (Printed) Chad Lee
Sampler 1: Greg Kusel Sampler 2: Dustin Slater

Project Information

Project Name:
Street
City: Titusville State FL
Site: Launcher Road
Project #: 60615493.4
Fax #
Client Purchase Order #

Analytical Information

8260 VOC (V8260 SL)

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid

SGS Orlando Sample #	Field ID / Point of Collection	COLLECTION DATE	TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	CONTAINER INFORMATION: OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NAOH+ZNAC	DI WATER	MEOH	LAB USE ONLY
13	SAMW0004D-047.5-20191031	10/31/19	1145	GK	GW	3			X						X	
	~~Trip Blank - 20191031~~	10/31/19			WW	~~2~~										GK
14	MLPV-TB01	10/31/19			WW	2										

Turnaround Time (Business days)

- 10 Day (Business)
- 7 Day
- 5 Day
- 3 Day *RUSH*
- 2 Day *RUSH*
- 1 Day *RUSH*
- Other

Approved By: / Date:

Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information

- [ ] COMMERCIAL "A" (RESULTS ONLY)
- [ ] COMMERCIAL "B" (RESULTS PLUS QC)
- [ ] REDT1 (EPA LEVEL 3)
- [ ] FULLT1 (EPA LEVEL 4)
- [ ] EDD'S

Comments / Remarks

Sample cooler dropped off at lab (SGS in orlando)

Temp blank in Cooler

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
1		2 PEBAM 11/1/19 1440	3		4
Relinquished by/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
5		6	7		8

Lab Use Only: Cooler Temperature (s) Celsius (corrected):

http://www.sgs.com/en/terms-and-conditions

ORLD-SMT-0001-03-FORM-COC (1) Rev 031318

SGS Sample Receipt Summary

Job Number: FA69571 **Client:** AECOM **Project:** NASA

Date / Time Received: 11/1/2019 2:40:00 PM **Delivery Method:** D/O **Airbill #'s:**

Therm ID: IR 1; **Therm CF:** -0.8; **# of Coolers:** 1

Cooler Temps (Raw Measured) °C: Cooler 1: (2.6);

Cooler Temps (Corrected) °C: Cooler 1: (1.8);

Cooler Information	Y	or	N
1. Custody Seals Present	☑		☐
2. Custody Seals Intact	☑		☐
3. Temp criteria achieved	☑		☐
4. Cooler temp verification	IR Gun		
5. Cooler media	Ice (Bag)		

Trip Blank Information	Y	or	N	N/A
1. Trip Blank present / cooler	☑		☐	☐
2. Trip Blank listed on COC	☑		☐	☐

	W	or	S	N/A
3. Type Of TB Received	☑		☐	☐

Sample Information	Y	or	N	N/A
1. Sample labels present on bottles	☑		☐	
2. Samples preserved properly	☑		☐	
3. Sufficient volume/containers recvd for analysis:	☑		☐	
4. Condition of sample	Intact			
5. Sample recvd within HT	☑		☐	
6. Dates/Times/IDs on COC match Sample Label	☑		☐	
7. VOCs have headspace	☐		☑	☐
8. Bottles received for unspecified tests	☐		☑	
9. Compositing instructions clear	☐		☐	☑
10. Voa Soil Kits/Jars received past 48hrs?	☐		☐	☑
11. % Solids Jar received?	☐		☐	☑
12. Residual Chlorine Present?	☐		☐	☑

Misc. Information

Number of Encores: 25-Gram _____ 5-Gram _____ Number of 5035 Field Kits: _____ Number of Lab Filtered Metals: _____

Test Strip Lot #s: pH 0-3 230315 pH 10-12 219813A Other: (Specify) _____ _____

Residual Chlorine Test Strip Lot #: _____

Comments

SM001
Rev. Date 05/24/17

Technician: PETERH Date: 11/1/2019 2:40:00 PM Reviewer: _____ Date: _____

5.1

5

FA69571: Chain of Custody
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MS Volatiles

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QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA69571
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 2 (Air Asparge System Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VP2611-MB	P67738.D	1	11/11/19	SO	n/a	n/a	VP2611

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69571-1, FA69571-2, FA69571-3, FA69571-5

CAS No.	Compound	Result	RL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	ND	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	99%	83-118%
17060-07-0	1,2-Dichloroethane-D4	94%	79-125%
2037-26-5	Toluene-D8	94%	85-112%
460-00-4	4-Bromofluorobenzene	97%	83-118%

Method Blank Summary

Job Number: FA69571
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 2 (Air Asparge System Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VI1956-MB	I62764.D	1	11/11/19	KB	n/a	n/a	VI1956

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69571-8, FA69571-10, FA69571-11, FA69571-12, FA69571-13, FA69571-14

CAS No.	Compound	Result	RL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	ND	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	99%	83-118%
17060-07-0	1,2-Dichloroethane-D4	99%	79-125%
2037-26-5	Toluene-D8	98%	85-112%
460-00-4	4-Bromofluorobenzene	100%	83-118%

Method Blank Summary

Job Number: FA69571
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 2 (Air Asparge System Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VP2612-MB	P67768.D	1	11/12/19	SO	n/a	n/a	VP2612

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69571-4, FA69571-6

CAS No.	Compound	Result	RL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	ND	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	96%	83-118%
17060-07-0	1,2-Dichloroethane-D4	100%	79-125%
2037-26-5	Toluene-D8	101%	85-112%
460-00-4	4-Bromofluorobenzene	102%	83-118%

Method Blank Summary

Job Number: FA69571
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 2 (Air Asparge System Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VI1957-MB	I62793.D	1	11/12/19	KB	n/a	n/a	VI1957

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69571-7, FA69571-8, FA69571-9, FA69571-10, FA69571-11

CAS No.	Compound	Result	RL	MDL	Units	Q
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.22	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.22	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.35	ug/l	
75-01-4	Vinyl Chloride	ND	1.0	0.41	ug/l	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	100%	83-118%
17060-07-0	1,2-Dichloroethane-D4	100%	79-125%
2037-26-5	Toluene-D8	99%	85-112%
460-00-4	4-Bromofluorobenzene	99%	83-118%

Blank Spike Summary

Job Number: FA69571
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 2 (Air Asparge System Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VP2611-BS	P67737.D	1	11/11/19	SO	n/a	n/a	VP2611

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69571-1, FA69571-2, FA69571-3, FA69571-5

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
156-59-2	cis-1,2-Dichloroethylene	25	26.3	105	78-120
156-60-5	trans-1,2-Dichloroethylene	25	26.2	105	76-127
127-18-4	Tetrachloroethylene	25	26.2	105	76-135
79-01-6	Trichloroethylene	25	27.7	111	81-126
75-01-4	Vinyl Chloride	25	22.4	90	69-159

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	101%	83-118%
17060-07-0	1,2-Dichloroethane-D4	97%	79-125%
2037-26-5	Toluene-D8	96%	85-112%
460-00-4	4-Bromofluorobenzene	99%	83-118%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA69571
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 2 (Air Asparge System Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VI1956-BS	I62763.D	1	11/11/19	KB	n/a	n/a	VI1956

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69571-8, FA69571-10, FA69571-11, FA69571-12, FA69571-13, FA69571-14

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
156-59-2	cis-1,2-Dichloroethylene	25	23.5	94	78-120
156-60-5	trans-1,2-Dichloroethylene	25	23.9	96	76-127
127-18-4	Tetrachloroethylene	25	24.2	97	76-135
79-01-6	Trichloroethylene	25	23.4	94	81-126
75-01-4	Vinyl Chloride	25	24.1	96	69-159

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	101%	83-118%
17060-07-0	1,2-Dichloroethane-D4	98%	79-125%
2037-26-5	Toluene-D8	98%	85-112%
460-00-4	4-Bromofluorobenzene	99%	83-118%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA69571
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 2 (Air Asparge System Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VP2612-BS	P67767.D	1	11/12/19	SO	n/a	n/a	VP2612

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69571-4, FA69571-6

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
156-59-2	cis-1,2-Dichloroethylene	25	21.0	84	78-120
156-60-5	trans-1,2-Dichloroethylene	25	20.4	82	76-127
127-18-4	Tetrachloroethylene	25	21.3	85	76-135
79-01-6	Trichloroethylene	25	21.1	84	81-126
75-01-4	Vinyl Chloride	25	19.8	79	69-159

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	101%	83-118%
17060-07-0	1,2-Dichloroethane-D4	102%	79-125%
2037-26-5	Toluene-D8	96%	85-112%
460-00-4	4-Bromofluorobenzene	100%	83-118%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA69571
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 2 (Air Asparge System Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VI1957-BS	I62791.D	1	11/12/19	KB	n/a	n/a	VI1957

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69571-7, FA69571-8, FA69571-9, FA69571-10, FA69571-11

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
156-59-2	cis-1,2-Dichloroethylene	25	23.2	93	78-120
156-60-5	trans-1,2-Dichloroethylene	25	23.8	95	76-127
127-18-4	Tetrachloroethylene	25	23.3	93	76-135
79-01-6	Trichloroethylene	25	23.3	93	81-126
75-01-4	Vinyl Chloride	25	23.4	94	69-159

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	101%	83-118%
17060-07-0	1,2-Dichloroethane-D4	99%	79-125%
2037-26-5	Toluene-D8	96%	85-112%
460-00-4	4-Bromofluorobenzene	98%	83-118%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA69571
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 2 (Air Asparge System Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA69588-10MS	I62774.D	1	11/11/19	KB	n/a	n/a	VI1956
FA69588-10MSD	I62775.D	1	11/11/19	KB	n/a	n/a	VI1956
FA69588-10	I62767.D	1	11/11/19	KB	n/a	n/a	VI1956

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69571-8, FA69571-10, FA69571-11, FA69571-12, FA69571-13, FA69571-14

CAS No.	Compound	FA69588-10 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
156-59-2	cis-1,2-Dichloroethylene	ND		25	26.4	106	25	25.3	101	4	78-120/15
156-60-5	trans-1,2-Dichloroethylene	ND		25	27.0	108	25	25.8	103	5	76-127/17
127-18-4	Tetrachloroethylene	ND		25	26.4	106	25	25.5	102	3	76-135/16
79-01-6	Trichloroethylene	ND		25	27.0	108	25	25.6	102	5	81-126/15
75-01-4	Vinyl Chloride	ND		25	22.0	88	25	25.1	100	13	69-159/18

CAS No.	Surrogate Recoveries	MS	MSD	FA69588-10	Limits
1868-53-7	Dibromofluoromethane	102%	102%	100%	83-118%
17060-07-0	1,2-Dichloroethane-D4	101%	99%	100%	79-125%
2037-26-5	Toluene-D8	96%	97%	99%	85-112%
460-00-4	4-Bromofluorobenzene	97%	98%	102%	83-118%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA69571
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 2 (Air Asparge System Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA69725-7MS	P67760.D	50	11/11/19	SO	n/a	n/a	VP2611
FA69725-7MSD	P67761.D	50	11/11/19	SO	n/a	n/a	VP2611
FA69725-7 [a]	P67753.D	50	11/11/19	SO	n/a	n/a	VP2611

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69571-1, FA69571-2, FA69571-3, FA69571-5

CAS No.	Compound	FA69725-7 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
156-59-2	cis-1,2-Dichloroethylene	2590		1250	4110	122* [b]	1250	3630	83	12	78-120/15
156-60-5	trans-1,2-Dichloroethylene	50 U		1250	1180	94	1250	983	79	18*	76-127/17
127-18-4	Tetrachloroethylene	50 U		1250	1240	99	1250	1030	82	19*	76-135/16
79-01-6	Trichloroethylene	50 U		1250	1200	96	1250	991	79*	19*	81-126/15
75-01-4	Vinyl Chloride	1140		1250	2400	101	1250	2080	75	14	69-159/18

CAS No.	Surrogate Recoveries	MS	MSD	FA69725-7	Limits
1868-53-7	Dibromofluoromethane	102%	101%	99%	83-118%
17060-07-0	1,2-Dichloroethane-D4	108%	103%	100%	79-125%
2037-26-5	Toluene-D8	103%	95%	101%	85-112%
460-00-4	4-Bromofluorobenzene	98%	99%	99%	83-118%

(a) Sample was not preserved to a pH < 2.
(b) Outside control limits due to high level in sample relative to spike amount.

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA69571
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 2 (Air Asparge System Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA69571-4MS	P67785.D	2.5	11/12/19	SO	n/a	n/a	VP2612
FA69571-4MSD	P67786.D	2.5	11/12/19	SO	n/a	n/a	VP2612
FA69571-4	P67771.D	2.5	11/12/19	SO	n/a	n/a	VP2612

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69571-4, FA69571-6

CAS No.	Compound	FA69571-4 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
156-59-2	cis-1,2-Dichloroethylene	2.5	U	62.5	59.8	96	62.5	54.4	87	9	78-120/15
156-60-5	trans-1,2-Dichloroethylene	2.5	U	62.5	59.3	95	62.5	51.4	82	14	76-127/17
127-18-4	Tetrachloroethylene	2.5	U	62.5	55.4	89	62.5	56.0	90	1	76-135/16
79-01-6	Trichloroethylene	2.5	U	62.5	60.6	97	62.5	51.5	82	16*	81-126/15
75-01-4	Vinyl Chloride	152		62.5	204	83	62.5	178	42* [a]	14	69-159/18

CAS No.	Surrogate Recoveries	MS	MSD	FA69571-4	Limits
1868-53-7	Dibromofluoromethane	102%	100%	97%	83-118%
17060-07-0	1,2-Dichloroethane-D4	99%	101%	100%	79-125%
2037-26-5	Toluene-D8	93%	104%	101%	85-112%
460-00-4	4-Bromofluorobenzene	100%	98%	98%	83-118%

(a) Outside control limits due to high level in sample relative to spike amount.

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA69571
Account: MEFLOR AECOM, INC.
Project: NASA KSC, Hot Spot 2 (Air Asparge System Area)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA69588-9MS	I62810.D	10	11/12/19	KB	n/a	n/a	VI1957
FA69588-9MSD	I62811.D	10	11/12/19	KB	n/a	n/a	VI1957
FA69588-9	I62800.D	5	11/12/19	KB	n/a	n/a	VI1957

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA69571-7, FA69571-8, FA69571-9, FA69571-10, FA69571-11

CAS No.	Compound	FA69588-9 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
156-59-2	cis-1,2-Dichloroethylene	ND		250	257	103	250	277	111	7	78-120/15
156-60-5	trans-1,2-Dichloroethylene	ND		250	260	104	250	276	110	6	76-127/17
127-18-4	Tetrachloroethylene	ND		250	252	101	250	269	108	7	76-135/16
79-01-6	Trichloroethylene	ND		250	263	105	250	274	110	4	81-126/15
75-01-4	Vinyl Chloride	ND		250	286	114	250	320	128	11	69-159/18

CAS No.	Surrogate Recoveries	MS	MSD	FA69588-9	Limits
1868-53-7	Dibromofluoromethane	103%	101%	101%	83-118%
17060-07-0	1,2-Dichloroethane-D4	102%	100%	102%	79-125%
2037-26-5	Toluene-D8	95%	96%	98%	85-112%
460-00-4	4-Bromofluorobenzene	97%	97%	95%	83-118%

* = Outside of Control Limits.

The results set forth herein are provided by SGS North America Inc.

e-Hardcopy 2.0
Automated Report

Technical Report for

AECOM, INC.

NASA KSC MLPV IDW

60615493

SGS Job Number: FA70025

Sampling Date: 11/18/19

Report to:

andrea.colby@sgs.com

Total number of pages in report: **36**

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Caitlin Brice, M.S.
General Manager

Client Service contact: Andrea Colby 407-425-6700

Certifications: FL(E83510), LA(03051), KS(E-10327), IL(200063), NC(573), NJ(FL002), NY(12022), SC(96038001) DoD ELAP(ANAB L2229), AZ(AZ0806), CA(2937), TX(T104704404), PA(68-03573), VA(460177), AK, AR, IA, KY, MA, MS, ND, NH, NV, OK, OR, UT, WA, WV

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Test results relate only to samples analyzed.

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Please share your ideas about how we can serve you better at:
EHS.US.CustomerCare@sgs.com

February 24, 2020

Ms. Krista Sommerfeldt
AECOM
150 N Orange Ave.
Orlando, FL 32801

RE: SGS North America Inc. - Orlando job FA70025 Reissue

Dear Ms. Sommerfeldt,

The final report for job number FA70025 has been edited to reflect requested corrections. These edits have been incorporated into the revised report.

A narrative has been added per your request.

SGS North America Inc. - Orlando apologies for any inconvenience this may have caused. Please feel free to contact us if we can be of further assistance.

Sincerely,

SGS North America, Inc. - Orlando

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SGS North America Inc.

Sample Summary

AECOM, INC.

Job No: FA70025

NASA KSC MLPV IDW
Project No: 60615493

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
FA70025-1	11/18/19	14:15	GKCL	11/18/19	AQ	Water	MLPV-IDW-20191118-01

SAMPLE DELIVERY GROUP CASE NARRATIVE

Client: AECOM, INC. **Job No:** FA70025

Site: NASA KSC MLPV IDW **Report Date** 2/24/2020 7:39:05 AM

1 Sample was collected on 11/18/2019 and received at SGS North America Inc - Orlando on 11/18/2019 properly preserved, at 2 Deg. C and intact. These Samples received an SGS Orlando job number of FA70025. A listing of the Laboratory Sample ID, Client Sample ID and dates of collection are presented in the Results Summary Section. Except as noted below, all method specified calibrations and quality control performance criteria were met for this job. For more information, please refer to QC summary pages.

MS Volatiles By Method SW846 8260B

Matrix: AQ **Batch ID:** V1A939

All samples were analyzed within the recommended method holding time.

Sample(s) FA69740-3MS, FA69740-3MSD were used as the QC samples indicated.

All method blanks for this batch meet method specific criteria.

Matrix Spike Recovery(s) for 2-Hexanone, 4-Methyl-2-pentanone (MIBK) are outside control limits. Probable cause is due to matrix interference.

RPD(s) for MSD for Methyl Bromide are outside control limits for sample FA69740-3MSD. Probable cause is due to sample non-homogeneity.

FA70025-1 for Dichlorodifluoromethane: Associated CCV outside of control limits high, sample was ND.

MS Semi-volatiles By Method EPA 537M BY ID

Matrix: AQ **Batch ID:** OP77819

All samples were extracted within the recommended method holding time.

All samples were analyzed within the recommended method holding time.

Sample(s) FA70041-1MS, FA70043-1DUP were used as the QC samples indicated.

All method blanks for this batch meet method specific criteria.

SGS Orlando certifies that this report meets the project requirements for analytical data produced for the samples as received at SGS Orlando and as stated on the COC. SGS Orlando certifies that the data meets the Data Quality Objectives for precision, accuracy and completeness as specified in the SGS Orlando Quality Manual except as noted above. This report is to be used in its entirety.
SGS Orlando is not responsible for any assumptions of data quality if partial data packages are used.

Revised Narrative prepared by:

_____
Ariel Hartney, Client Services (signature on file)

Summary of Hits

Job Number: FA70025
Account: AECOM, INC.
Project: NASA KSC MLPV IDW
Collected: 11/18/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	PQL	MDL	Units	Method
FA70025-1	**MLPV-IDW-20191118-01**					
cis-1,2-Dichloroethylene		6.2	1.0	0.28	ug/l	SW846 8260B
Vinyl Chloride		2.1	1.0	0.41	ug/l	SW846 8260B
Perfluorohexanoic acid		0.0120	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00454 I	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0147	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.0124	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0710	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.196	0.0080	0.0030	ug/l	EPA 537M BY ID

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	MLPV-IDW-20191118-01		
Lab Sample ID:	FA70025-1	**Date Sampled:**	11/18/19
Matrix:	AQ - Water	**Date Received:**	11/18/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC MLPV IDW		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A23184.D	1	11/20/19 19:25	CV	n/a	n/a	V1A939
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	PQL	MDL	Units	Q
67-64-1	Acetone	10 U	25	10	ug/l	
71-43-2	Benzene	0.31 U	1.0	0.31	ug/l	
108-86-1	Bromobenzene	0.37 U	1.0	0.37	ug/l	
74-97-5	Bromochloromethane	0.45 U	1.0	0.45	ug/l	
75-27-4	Bromodichloromethane	0.24 U	1.0	0.24	ug/l	
75-25-2	Bromoform	0.41 U	1.0	0.41	ug/l	
78-93-3	2-Butanone (MEK)	2.0 U	5.0	2.0	ug/l	
104-51-8	n-Butylbenzene	0.23 U	1.0	0.23	ug/l	
135-98-8	sec-Butylbenzene	0.24 U	1.0	0.24	ug/l	
98-06-6	tert-Butylbenzene	0.31 U	1.0	0.31	ug/l	
75-15-0	Carbon Disulfide	0.53 U	2.0	0.53	ug/l	
56-23-5	Carbon Tetrachloride	0.36 U	1.0	0.36	ug/l	
108-90-7	Chlorobenzene	0.20 U	1.0	0.20	ug/l	
75-00-3	Chloroethane	0.67 U	2.0	0.67	ug/l	
67-66-3	Chloroform	0.30 U	1.0	0.30	ug/l	
95-49-8	o-Chlorotoluene	0.22 U	1.0	0.22	ug/l	
106-43-4	p-Chlorotoluene	0.31 U	1.0	0.31	ug/l	
110-82-7	Cyclohexane	0.39 U	1.0	0.39	ug/l	
124-48-1	Dibromochloromethane	0.28 U	1.0	0.28	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	1.0 U	5.0	1.0	ug/l	
106-93-4	1,2-Dibromoethane	0.28 U	2.0	0.28	ug/l	
75-71-8	Dichlorodifluoromethane [a]	0.50 U	2.0	0.50	ug/l	
95-50-1	1,2-Dichlorobenzene	0.32 U	1.0	0.32	ug/l	
541-73-1	1,3-Dichlorobenzene	0.22 U	1.0	0.22	ug/l	
106-46-7	1,4-Dichlorobenzene	0.26 U	1.0	0.26	ug/l	
75-34-3	1,1-Dichloroethane	0.34 U	1.0	0.34	ug/l	
107-06-2	1,2-Dichloroethane	0.31 U	1.0	0.31	ug/l	
75-35-4	1,1-Dichloroethylene	0.32 U	1.0	0.32	ug/l	
156-59-2	cis-1,2-Dichloroethylene	6.2	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	0.22 U	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	0.43 U	1.0	0.43	ug/l	
142-28-9	1,3-Dichloropropane	0.31 U	1.0	0.31	ug/l	

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: MLPV-IDW-20191118-01
Lab Sample ID: FA70025-1
Matrix: AQ - Water
Method: SW846 8260B
Project: NASA KSC MLPV IDW

Date Sampled: 11/18/19
Date Received: 11/18/19
Percent Solids: n/a

VOA 8260 List

CAS No.	Compound	Result	PQL	MDL	Units	Q
594-20-7	2,2-Dichloropropane	0.24 U	1.0	0.24	ug/l	
563-58-6	1,1-Dichloropropene	0.34 U	1.0	0.34	ug/l	
10061-01-5	cis-1,3-Dichloropropene	0.29 U	1.0	0.29	ug/l	
10061-02-6	trans-1,3-Dichloropropene	0.21 U	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	0.36 U	1.0	0.36	ug/l	
76-13-1	Freon 113	0.48 U	1.0	0.48	ug/l	
87-68-3	Hexachlorobutadiene	0.30 U	2.0	0.30	ug/l	
591-78-6	2-Hexanone	2.0 U	10	2.0	ug/l	
98-82-8	Isopropylbenzene	0.22 U	1.0	0.22	ug/l	
99-87-6	p-Isopropyltoluene	0.21 U	1.0	0.21	ug/l	
79-20-9	Methyl Acetate	5.0 U	20	5.0	ug/l	
74-83-9	Methyl Bromide	0.59 U	2.0	0.59	ug/l	
74-87-3	Methyl Chloride	0.50 U	2.0	0.50	ug/l	
74-95-3	Methylene Bromide	0.37 U	2.0	0.37	ug/l	
75-09-2	Methylene Chloride	2.0 U	5.0	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone (MIBK)	1.0 U	5.0	1.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	0.23 U	1.0	0.23	ug/l	
91-20-3	Naphthalene	1.0 U	5.0	1.0	ug/l	
103-65-1	n-Propylbenzene	0.29 U	1.0	0.29	ug/l	
100-42-5	Styrene	0.22 U	1.0	0.22	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	0.28 U	1.0	0.28	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	0.30 U	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	0.22 U	1.0	0.22	ug/l	
108-88-3	Toluene	0.30 U	1.0	0.30	ug/l	
87-61-6	1,2,3-Trichlorobenzene	0.61 U	2.0	0.61	ug/l	
120-82-1	1,2,4-Trichlorobenzene	0.50 U	2.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	0.25 U	1.0	0.25	ug/l	
79-00-5	1,1,2-Trichloroethane	0.47 U	1.0	0.47	ug/l	
79-01-6	Trichloroethylene	0.35 U	1.0	0.35	ug/l	
75-69-4	Trichlorofluoromethane	0.50 U	2.0	0.50	ug/l	
96-18-4	1,2,3-Trichloropropane	0.63 U	2.0	0.63	ug/l	
95-63-6	1,2,4-Trimethylbenzene	0.32 U	1.0	0.32	ug/l	
108-67-8	1,3,5-Trimethylbenzene	0.27 U	1.0	0.27	ug/l	
75-01-4	Vinyl Chloride	2.1	1.0	0.41	ug/l	
	m,p-Xylene	0.47 U	2.0	0.47	ug/l	
95-47-6	o-Xylene	0.26 U	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	0.72 U	3.0	0.72	ug/l	

U = Not detected MDL = Method Detection Limit
PQL = Practical Quantitation Limit
L = Indicates value exceeds calibration range
I = Result > = MDL but < PQL J = Estimated value
V = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IDW-20191118-01		
Lab Sample ID:	FA70025-1	**Date Sampled:**	11/18/19
Matrix:	AQ - Water	**Date Received:**	11/18/19
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	NASA KSC MLPV IDW		

VOA 8260 List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%		83-118%
17060-07-0	1,2-Dichloroethane-D4	100%		79-125%
2037-26-5	Toluene-D8	106%		85-112%
460-00-4	4-Bromofluorobenzene	103%		83-118%

(a) Associated CCV outside of control limits high, sample was ND.

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: MLPV-IDW-20191118-01
Lab Sample ID: FA70025-1
Matrix: AQ - Water
Method: EPA 537M BY ID EPA 537 MOD
Project: NASA KSC MLPV IDW

Date Sampled: 11/18/19
Date Received: 11/18/19
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q11928.D	1	11/24/19 20:52	NAF	11/22/19 07:00	OP77819	S3Q210
Run #2							

	Initial Volume	Final Volume
Run #1	125 ml	1.0 ml
Run #2		

EPA 537 Method List

CAS No.	Compound	Result	PQL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
307-24-4	Perfluorohexanoic acid	0.0120	0.0080	0.0020	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00454	0.0080	0.0020	ug/l	I
335-67-1	Perfluorooctanoic acid	0.0147	0.0080	0.0020	ug/l	
375-95-1	Perfluorononanoic acid	0.0020 U	0.0080	0.0020	ug/l	
335-76-2	Perfluorodecanoic acid	0.0020 U	0.0080	0.0020	ug/l	
2058-94-8	Perfluoroundecanoic acid	0.0020 U	0.0080	0.0020	ug/l	
307-55-1	Perfluorododecanoic acid	0.0030 U	0.0080	0.0030	ug/l	
72629-94-8	Perfluorotridecanoic acid	0.0020 U	0.0080	0.0020	ug/l	
376-06-7	Perfluorotetradecanoic acid	0.0020 U	0.0080	0.0020	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.0124	0.0080	0.0020	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.0710	0.0080	0.0020	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.196	0.0080	0.0030	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	0.0080 U	0.040	0.0080	ug/l	
2991-50-6	EtFOSAA	0.0080 U	0.040	0.0080	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C5-PFHxA	89%		50-150%
	13C4-PFHpA	91%		50-150%
	13C8-PFOA	93%		50-150%
	13C9-PFNA	90%		50-150%
	13C6-PFDA	91%		50-150%
	13C7-PFUnDA	87%		50-150%
	13C2-PFDoDA	80%		50-150%
	13C2-PFTeDA	62%		40-150%
	13C3-PFBS	90%		50-150%
	13C3-PFHxS	91%		50-150%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MLPV-IDW-20191118-01		
Lab Sample ID:	FA70025-1	**Date Sampled:**	11/18/19
Matrix:	AQ - Water	**Date Received:**	11/18/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	NASA KSC MLPV IDW		

EPA 537 Method List

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C8-PFOS	84%		50-150%
	d3-MeFOSAA	86%		50-150%

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Certification Exceptions
- Chain of Custody

Parameter Certification Exceptions

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

The following parameters included in this report are exceptions to NELAC certification.
The certification status of each is indicated below.

Parameter	CAS#	Method	Mat	Certification Status
EtFOSAA	2991-50-6	**EPA 537M BY ID**	AQ	Certified by SOP MS014
MeFOSAA	2355-31-9	**EPA 537M BY ID**	AQ	Certified by SOP MS014
Perfluorobutanesulfonic acid	375-73-5	**EPA 537M BY ID**	AQ	Certified by SOP MS014
Perfluorodecanoic acid	335-76-2	**EPA 537M BY ID**	AQ	Certified by SOP MS014
Perfluorododecanoic acid	307-55-1	**EPA 537M BY ID**	AQ	Certified by SOP MS014
Perfluoroheptanoic acid	375-85-9	**EPA 537M BY ID**	AQ	Certified by SOP MS014
Perfluorohexanesulfonic acid	355-46-4	**EPA 537M BY ID**	AQ	Certified by SOP MS014
Perfluorohexanoic acid	307-24-4	**EPA 537M BY ID**	AQ	Certified by SOP MS014
Perfluorononanoic acid	375-95-1	**EPA 537M BY ID**	AQ	Certified by SOP MS014
Perfluorooctanesulfonic acid	1763-23-1	**EPA 537M BY ID**	AQ	Certified by SOP MS014
Perfluorooctanoic acid	335-67-1	**EPA 537M BY ID**	AQ	Certified by SOP MS014
Perfluorotetradecanoic acid	376-06-7	**EPA 537M BY ID**	AQ	Certified by SOP MS014
Perfluorotridecanoic acid	72629-94-8	**EPA 537M BY ID**	AQ	Certified by SOP MS014
Perfluoroundecanoic acid	2058-94-8	**EPA 537M BY ID**	AQ	Certified by SOP MS014

FA70025

CHAIN OF CUSTODY AND ANALYTICAL REQUEST RECORD

AECOM

COC No. | Page: 1 of 1

Project Name: NASA KSC - MLPV | PO No. | Project No. 60615493 | Phase:

Site Location: MLPV | Send Invoice To: Instructions in MSA # 19S-24548-GV03 | EDD to: Jennifer Chastain Cc: Megan Garcia

TO No.: 80KSC019F0071 | AECOM Project Manager: **Krista Sommerfeldt** | Deliver Sample Kits To: AECOM Depot, 523 18th Street, Orlando | Report to Jennifer Chastain Cc: Megan Garcia

Sampler/Phone # Greg Kusel / (772) 631-7426 Chad Lee / (864) 650-4338 | Deliver Samples To: SGS Orlando | Site-Spicific WS#15 from QAPP:

Lab Name: SGS | Turnaround Time(specify): Standard 14 day | **Sample Analysis Requested** (*Enter number of containers for each test*)

Lab ID	Sample ID (sys_samp_code)	Location ID (sys_loc_code)	Date (YYYYMMDD)	Time (Military) (hhmm)	Matrix Code (1)	Sample Type (2)	G=Grab C=Comp	(3) Total No. of Containers	HCl Select VOCs by SW8260B for IDW (Preserved)	4 DEG Select PFAS by 537									Comments
1	**MLPV-IDW-20191118-01**	**MLPV-IDW**	**20191118**	1415	**IDW**	**IDW**	**G=Grab**	**5**	**3**	**2**									

***Field* Comments:**

Report only per QAPP WS #15

***Lab* Comments:**

Sample Shipment and Delivery Details

Number of coolers in shipment:

Samples Iced?(check) Yes_____ No____

Shipping Company:

Tracking No:

Date Shipped:

Relinquished by (signature)	Date	Time	Received by (signature)	Date	Time
1 Greg Kusel	11/18/19	1630	1 SGSSE	11/19/19	1630
2			2		
3			3		

(1) AA=Ambient air, **AQ**=Air quality control, **ASB**=Asbestos, **CK**=Caulk, **DS**=Storm drain sediment, **GS**=Soil gas, **IC**=IDW Concrete, **IDD**=IDW Solid, **IDS**=IDW soil, **IDW**=IDW Water, **LF**=Free Product, **MA**=Mastic, **PC**=Paint Chips, **SC**=Cement/Concrete, **SE**=Sediment, **SL**=Sludge, **SO**=Soil, **SQ**=Soil/Solid quality control, **SSD**=Subsurface sediment, **SU**=Surface soil (<6 in), **SW**=Swab or wipe, **TA**=Animal tissue, **TP**=Plant tissue, **TQ**=Tissue quality control, **WG**=Ground water, **WL**=Leachate, **WO**=Ocean water, **WP**=Drinking water, **WQ**=Water quality control, **WR**=Ground water effluent, **WS**=Surface water, **WU**=Storm water, **WW**=Waste water

(2) Sample Type: AB=Ambient Blk, **EB**=Equipment Blk, **FB**=Field Blk, **FD**=Field Duplicate Sample, **IDW**=Investigative-Derived Waste, **MIS**=Incremental Sampling Methodology, **N**=Normal Environmental Sample, **TB**=Trip Blk

(3) Preservative added: 4 DEG C=Cool to 4 degrees, **Dark**=Store in Darkness, store cool at 4 degrees C **H2SO4**=Hydrogen sulfate, **H2SO4 <2**=Adjust to pH < 2 with sulfuric acid, **H3PO4**=Phosphoric acid, **H3PO4 <2**=Adjust to pH <2 with phosphoric acid, **HCl <2**=Adjust to pH < 2 with hydrochloric acid, **HNaO4S**=Sodium bisulfate preservation, **HNO3 <2**=Adjust to pH < 2 with nitric acid, **MeOH**=Methanol preservation, **Na2O3S2**=Sodium thiosulfate, **Na2O3S2 3/gal**=Add 3 mL 10% sodium thiosulfate per l-gal, **Na2O3S2 4/4oz**=4 drops of 10% sodium thiosulfate to 4 oz, **NaHSO4 <2**=Adjust to pH < 2 with sodium hydrogen sulfate, NaOH >12=Adjust to pH > 12 with sodium hydroxide, NaOH >9=Adjust to pH >9 with sodium hydroxide, **VitC 0.6/500**=0.6 g of ascorbic acid to 500mLs, **ZnAct 2/500**=Add 2 mL of zinc acetate to 500mLs, **ZnAct+NaOH >9**=Zinc acetate and NaOH to pH>9; store cool at 4C If **NO preservative** added leave blank

Rev 8/19

FA70025: Chain of Custody
Page 1 of 2

SGS Sample Receipt Summary

Job Number: FA70025 **Client:** AECOM **Project:** NASA KSC - MLPV

Date / Time Received: 11/18/2019 4:30:00 PM **Delivery Method:** DROP OFF **Airbill #'s:**

Therm ID: IR 1; **Therm CF:** -0.8; **# of Coolers:** 1

Cooler Temps (Raw Measured) °C: Cooler 1: (2.8);

Cooler Temps (Corrected) °C: Cooler 1: (2.0);

Cooler Information	Y	or	N
1. Custody Seals Present	☑		☐
2. Custody Seals Intact	☑		☐
3. Temp criteria achieved	☑		☐
4. Cooler temp verification	IR Gun		
5. Cooler media	Ice (Bag)		

Trip Blank Information	Y	or	N	N/A
1. Trip Blank present / cooler	☐		☑	☐
2. Trip Blank listed on COC	☐		☑	☐

	W	or	S	N/A
3. Type Of TB Received	☐		☐	☑

Sample Information	Y	or	N	N/A
1. Sample labels present on bottles	☑		☐	
2. Samples preserved properly	☑		☐	
3. Sufficient volume/containers recvd for analysis:	☑		☐	
4. Condition of sample	Intact			
5. Sample recvd within HT	☑		☐	
6. Dates/Times/IDs on COC match Sample Label	☑		☐	
7. VOCs have headspace	☐		☑	☐
8. Bottles received for unspecified tests	☐		☑	
9. Compositing instructions clear	☐		☐	☑
10. Voa Soil Kits/Jars received past 48hrs?	☐		☐	☑
11. % Solids Jar received?	☐		☐	☑
12. Residual Chlorine Present?	☐		☐	☑

Misc. Information

Number of Encores: 25-Gram _____ 5-Gram _____ Number of 5035 Field Kits: _____ Number of Lab Filtered Metals: _____

Test Strip Lot #s: pH 0-3 230315 pH 10-12 219813A Other: (Specify) _____ _____

Residual Chlorine Test Strip Lot #: _____

Comments

SM001
Rev. Date 05/24/17

Technician: RYANO Date: 11/18/2019 4:30:00 P Reviewer: _____ Date: _____

FA70025: Chain of Custody
Page 2 of 2

MS Volatiles

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QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V1A939-MB	1A23166.D	1	11/20/19	CV	n/a	n/a	V1A939

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA70025-1

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.31	ug/l	
108-86-1	Bromobenzene	ND	1.0	0.37	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.45	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.24	ug/l	
75-25-2	Bromoform	ND	1.0	0.41	ug/l	
78-93-3	2-Butanone (MEK)	ND	5.0	2.0	ug/l	
104-51-8	n-Butylbenzene	ND	1.0	0.23	ug/l	
135-98-8	sec-Butylbenzene	ND	1.0	0.24	ug/l	
98-06-6	tert-Butylbenzene	ND	1.0	0.31	ug/l	
75-15-0	Carbon Disulfide	ND	2.0	0.53	ug/l	
56-23-5	Carbon Tetrachloride	ND	1.0	0.36	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.67	ug/l	
67-66-3	Chloroform	ND	1.0	0.30	ug/l	
95-49-8	o-Chlorotoluene	ND	1.0	0.22	ug/l	
106-43-4	p-Chlorotoluene	ND	1.0	0.31	ug/l	
110-82-7	Cyclohexane	ND	1.0	0.39	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.28	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	5.0	1.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	0.28	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	0.50	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.32	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.22	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.26	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.34	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.31	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.32	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.43	ug/l	
142-28-9	1,3-Dichloropropane	ND	1.0	0.31	ug/l	
594-20-7	2,2-Dichloropropane	ND	1.0	0.24	ug/l	
563-58-6	1,1-Dichloropropene	ND	1.0	0.34	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.29	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	

Method Blank Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V1A939-MB	1A23166.D	1	11/20/19	CV	n/a	n/a	V1A939

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA70025-1

CAS No.	Compound	Result	RL	MDL	Units	Q
100-41-4	Ethylbenzene	ND	1.0	0.36	ug/l	
76-13-1	Freon 113	ND	1.0	0.48	ug/l	
87-68-3	Hexachlorobutadiene	ND	2.0	0.30	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.22	ug/l	
99-87-6	p-Isopropyltoluene	ND	1.0	0.21	ug/l	
79-20-9	Methyl Acetate	ND	20	5.0	ug/l	
74-83-9	Methyl Bromide	ND	2.0	0.59	ug/l	
74-87-3	Methyl Chloride	ND	2.0	0.50	ug/l	
74-95-3	Methylene Bromide	ND	2.0	0.37	ug/l	
75-09-2	Methylene Chloride	ND	5.0	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone (MIBK)	ND	5.0	1.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.23	ug/l	
91-20-3	Naphthalene	ND	5.0	1.0	ug/l	
103-65-1	n-Propylbenzene	ND	1.0	0.29	ug/l	
100-42-5	Styrene	ND	1.0	0.22	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	ND	1.0	0.28	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.22	ug/l	
108-88-3	Toluene	ND	1.0	0.30	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	2.0	0.61	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.25	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.47	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.35	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.50	ug/l	
96-18-4	1,2,3-Trichloropropane	ND	2.0	0.63	ug/l	
95-63-6	1,2,4-Trimethylbenzene	ND	1.0	0.32	ug/l	
108-67-8	1,3,5-Trimethylbenzene	ND	1.0	0.27	ug/l	
75-01-4	Vinyl Chloride	ND	1.0	0.41	ug/l	
	m,p-Xylene	ND	2.0	0.47	ug/l	
95-47-6	o-Xylene	ND	1.0	0.26	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.72	ug/l	

Method Blank Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V1A939-MB	1A23166.D	1	11/20/19	CV	n/a	n/a	V1A939

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA70025-1

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	96%	83-118%
17060-07-0	1,2-Dichloroethane-D4	96%	79-125%
2037-26-5	Toluene-D8	106%	85-112%
460-00-4	4-Bromofluorobenzene	102%	83-118%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
10024-97-2	Nitrous Oxide	2.82	860	ug/l	JN
	Total TIC, Volatile		860	ug/l	J

Blank Spike Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V1A939-BS	1A23165.D	1	11/20/19	CV	n/a	n/a	V1A939

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA70025-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
67-64-1	Acetone	125	148	118	50-147
71-43-2	Benzene	25	26.0	104	81-122
108-86-1	Bromobenzene	25	25.1	100	80-121
74-97-5	Bromochloromethane	25	23.0	92	76-123
75-27-4	Bromodichloromethane	25	27.0	108	79-123
75-25-2	Bromoform	25	27.0	108	66-123
78-93-3	2-Butanone (MEK)	125	141	113	56-143
104-51-8	n-Butylbenzene	25	26.6	106	79-126
135-98-8	sec-Butylbenzene	25	26.1	104	83-133
98-06-6	tert-Butylbenzene	25	24.6	98	80-133
75-15-0	Carbon Disulfide	25	25.7	103	66-148
56-23-5	Carbon Tetrachloride	25	27.3	109	76-136
108-90-7	Chlorobenzene	25	25.4	102	82-124
75-00-3	Chloroethane	25	23.4	94	62-144
67-66-3	Chloroform	25	25.9	104	80-124
95-49-8	o-Chlorotoluene	25	24.6	98	81-127
106-43-4	p-Chlorotoluene	25	25.1	100	83-130
110-82-7	Cyclohexane	25	26.7	107	73-138
124-48-1	Dibromochloromethane	25	25.6	102	78-122
96-12-8	1,2-Dibromo-3-chloropropane	25	26.2	105	64-123
106-93-4	1,2-Dibromoethane	25	25.5	102	75-120
75-71-8	Dichlorodifluoromethane	25	25.0	100	42-167
95-50-1	1,2-Dichlorobenzene	25	24.6	98	82-124
541-73-1	1,3-Dichlorobenzene	25	25.5	102	84-125
106-46-7	1,4-Dichlorobenzene	25	24.0	96	78-120
75-34-3	1,1-Dichloroethane	25	27.6	110	81-122
107-06-2	1,2-Dichloroethane	25	25.3	101	75-125
75-35-4	1,1-Dichloroethylene	25	28.2	113	78-137
156-59-2	cis-1,2-Dichloroethylene	25	27.5	110	78-120
156-60-5	trans-1,2-Dichloroethylene	25	27.6	110	76-127
78-87-5	1,2-Dichloropropane	25	26.7	107	76-124
142-28-9	1,3-Dichloropropane	25	25.7	103	80-118
594-20-7	2,2-Dichloropropane	25	27.3	109	74-139
563-58-6	1,1-Dichloropropene	25	27.8	111	79-131
10061-01-5	cis-1,3-Dichloropropene	25	24.6	98	75-118
10061-02-6	trans-1,3-Dichloropropene	25	26.1	104	80-120

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V1A939-BS	1A23165.D	1	11/20/19	CV	n/a	n/a	V1A939

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA70025-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
100-41-4	Ethylbenzene	25	25.7	103	81-121
76-13-1	Freon 113	25	22.8	91	72-134
87-68-3	Hexachlorobutadiene	25	26.0	104	75-142
591-78-6	2-Hexanone	125	133	106	61-129
98-82-8	Isopropylbenzene	25	28.3	113	83-132
99-87-6	p-Isopropyltoluene	25	25.9	104	79-130
79-20-9	Methyl Acetate	125	134	107	65-126
74-83-9	Methyl Bromide	25	23.1	92	59-143
74-87-3	Methyl Chloride	25	24.3	97	50-159
74-95-3	Methylene Bromide	25	25.9	104	78-119
75-09-2	Methylene Chloride	25	23.7	95	69-135
108-10-1	4-Methyl-2-pentanone (MIBK)	125	137	110	66-122
1634-04-4	Methyl Tert Butyl Ether	25	24.9	100	72-117
91-20-3	Naphthalene	25	25.6	102	63-132
103-65-1	n-Propylbenzene	25	25.1	100	82-133
100-42-5	Styrene	25	25.0	100	78-119
630-20-6	1,1,1,2-Tetrachloroethane	25	26.3	105	77-122
79-34-5	1,1,2,2-Tetrachloroethane	25	26.7	107	72-120
127-18-4	Tetrachloroethylene	25	27.3	109	76-135
108-88-3	Toluene	25	25.1	100	80-120
87-61-6	1,2,3-Trichlorobenzene	25	25.0	100	68-131
120-82-1	1,2,4-Trichlorobenzene	25	24.6	98	73-129
71-55-6	1,1,1-Trichloroethane	25	25.6	102	75-130
79-00-5	1,1,2-Trichloroethane	25	26.7	107	76-119
79-01-6	Trichloroethylene	25	25.4	102	81-126
75-69-4	Trichlorofluoromethane	25	25.8	103	71-156
96-18-4	1,2,3-Trichloropropane	25	24.8	99	77-120
95-63-6	1,2,4-Trimethylbenzene	25	24.0	96	79-120
108-67-8	1,3,5-Trimethylbenzene	25	25.3	101	79-120
75-01-4	Vinyl Chloride	25	23.7	95	69-159
	m,p-Xylene	50	51.9	104	79-126
95-47-6	o-Xylene	25	26.2	105	80-127
1330-20-7	Xylene (total)	75	78.2	104	80-126

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V1A939-BS	1A23165.D	1	11/20/19	CV	n/a	n/a	V1A939

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA70025-1

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	101%	83-118%
17060-07-0	1,2-Dichloroethane-D4	99%	79-125%
2037-26-5	Toluene-D8	101%	85-112%
460-00-4	4-Bromofluorobenzene	102%	83-118%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA69740-3MS	1A23177.D	5	11/20/19	CV	n/a	n/a	V1A939
FA69740-3MSD	1A23178.D	5	11/20/19	CV	n/a	n/a	V1A939
FA69740-3	1A23172.D	1	11/20/19	CV	n/a	n/a	V1A939

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA70025-1

CAS No.	Compound	FA69740-3 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	25 U		625	739	118	625	659	105	11	50-147/21
71-43-2	Benzene	1.0 U		125	133	106	125	132	106	1	81-122/14
108-86-1	Bromobenzene	1.0 U		125	133	106	125	130	104	2	80-121/14
74-97-5	Bromochloromethane	1.0 U		125	122	98	125	119	95	2	76-123/14
75-27-4	Bromodichloromethane	1.0 U		125	141	113	125	138	110	2	79-123/19
75-25-2	Bromoform	1.0 U		125	146	117	125	140	112	4	66-123/21
78-93-3	2-Butanone (MEK)	5.0 U		625	765	122	625	666	107	14	56-143/18
104-51-8	n-Butylbenzene	1.0 U		125	136	109	125	131	105	4	79-126/16
135-98-8	sec-Butylbenzene	1.0 U		125	132	106	125	131	105	1	83-133/16
98-06-6	tert-Butylbenzene	1.0 U		125	125	100	125	125	100	0	80-133/16
75-15-0	Carbon Disulfide	0.53	J	125	128	102	125	130	104	2	66-148/23
56-23-5	Carbon Tetrachloride	1.0 U		125	138	110	125	140	112	1	76-136/23
108-90-7	Chlorobenzene	1.0 U		125	129	103	125	128	102	1	82-124/14
75-00-3	Chloroethane	2.0 U		125	118	94	125	115	92	3	62-144/20
67-66-3	Chloroform	1.0 U		125	132	106	125	133	106	1	80-124/15
95-49-8	o-Chlorotoluene	1.0 U		125	125	100	125	124	99	1	81-127/15
106-43-4	p-Chlorotoluene	1.0 U		125	127	102	125	125	100	2	83-130/15
110-82-7	Cyclohexane	1.0 U		125	136	109	125	138	110	1	73-138/18
124-48-1	Dibromochloromethane	1.0 U		125	136	109	125	132	106	3	78-122/19
96-12-8	1,2-Dibromo-3-chloropropane	5.0 U		125	152	122	125	133	106	13	64-123/18
106-93-4	1,2-Dibromoethane	2.0 U		125	140	112	125	132	106	6	75-120/13
75-71-8	Dichlorodifluoromethane	2.0 U		125	131	105	125	129	103	2	42-167/19
95-50-1	1,2-Dichlorobenzene	1.0 U		125	129	103	125	126	101	2	82-124/14
541-73-1	1,3-Dichlorobenzene	1.0 U		125	133	106	125	130	104	2	84-125/14
106-46-7	1,4-Dichlorobenzene	1.0 U		125	122	98	125	119	95	2	78-120/15
75-34-3	1,1-Dichloroethane	1.0 U		125	141	113	125	140	112	1	81-122/15
107-06-2	1,2-Dichloroethane	8.5		125	138	104	125	136	102	1	75-125/14
75-35-4	1,1-Dichloroethylene	1.0 U		125	144	115	125	144	115	0	78-137/18
156-59-2	cis-1,2-Dichloroethylene	3.8		125	145	113	125	144	112	1	78-120/15
156-60-5	trans-1,2-Dichloroethylene	1.5		125	142	112	125	143	113	1	76-127/17
78-87-5	1,2-Dichloropropane	1.0 U		125	139	111	125	138	110	1	76-124/14
142-28-9	1,3-Dichloropropane	1.0 U		125	135	108	125	132	106	2	80-118/13
594-20-7	2,2-Dichloropropane	1.0 U		125	138	110	125	140	112	1	74-139/17
563-58-6	1,1-Dichloropropene	1.0 U		125	143	114	125	143	114	0	79-131/16
10061-01-5	cis-1,3-Dichloropropene	1.0 U		125	128	102	125	126	101	2	75-118/23
10061-02-6	trans-1,3-Dichloropropene	1.0 U		125	135	108	125	134	107	1	80-120/22

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA69740-3MS	1A23177.D	5	11/20/19	CV	n/a	n/a	V1A939
FA69740-3MSD	1A23178.D	5	11/20/19	CV	n/a	n/a	V1A939
FA69740-3	1A23172.D	1	11/20/19	CV	n/a	n/a	V1A939

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA70025-1

CAS No.	Compound	FA69740-3 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
100-41-4	Ethylbenzene	1.0	U	125	132	106	125	131	105	1	81-121/14
76-13-1	Freon 113	1.0	U	125	116	93	125	116	93	0	72-134/20
87-68-3	Hexachlorobutadiene	2.0	U	125	141	113	125	135	108	4	75-142/19
591-78-6	2-Hexanone	10	U	625	860	138*	625	722	116	17	61-129/18
98-82-8	Isopropylbenzene	1.0	U	125	146	117	125	144	115	1	83-132/15
99-87-6	p-Isopropyltoluene	1.0	U	125	132	106	125	130	104	2	79-130/16
79-20-9	Methyl Acetate	20	U	625	726	116	625	660	106	10	65-126/18
74-83-9	Methyl Bromide	2.0	U	125	85.1	68	125	108	86	24*	59-143/19
74-87-3	Methyl Chloride	2.0	U	125	126	101	125	123	98	2	50-159/19
74-95-3	Methylene Bromide	2.0	U	125	141	113	125	133	106	6	78-119/14
75-09-2	Methylene Chloride	5.0	U	125	121	97	125	121	97	0	69-135/16
108-10-1	4-Methyl-2-pentanone (MIBK)	5.0	U	625	820	131*	625	724	116	12	66-122/16
1634-04-4	Methyl Tert Butyl Ether	1.0	U	125	134	107	125	129	103	4	72-117/14
91-20-3	Naphthalene	5.0	U	125	150	120	125	127	102	17	63-132/25
103-65-1	n-Propylbenzene	1.0	U	125	128	102	125	127	102	1	82-133/15
100-42-5	Styrene	1.0	U	125	132	106	125	127	102	4	78-119/23
630-20-6	1,1,1,2-Tetrachloroethane	1.0	U	125	137	110	125	135	108	1	77-122/19
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	125	146	117	125	134	107	9	72-120/14
127-18-4	Tetrachloroethylene	1.0	U	125	144	115	125	141	113	2	76-135/16
108-88-3	Toluene	1.0	U	125	129	103	125	128	102	1	80-120/14
87-61-6	1,2,3-Trichlorobenzene	2.0	U	125	142	114	125	129	103	10	68-131/25
120-82-1	1,2,4-Trichlorobenzene	2.0	U	125	137	110	125	128	102	7	73-129/20
71-55-6	1,1,1-Trichloroethane	1.0	U	125	131	105	125	132	106	1	75-130/16
79-00-5	1,1,2-Trichloroethane	1.0	U	125	147	118	125	136	109	8	76-119/14
79-01-6	Trichloroethylene	1.1		125	129	102	125	131	104	2	81-126/15
75-69-4	Trichlorofluoromethane	2.0	U	125	139	111	125	132	106	5	71-156/21
96-18-4	1,2,3-Trichloropropane	2.0	U	125	137	110	125	125	100	9	77-120/16
95-63-6	1,2,4-Trimethylbenzene	1.0	U	125	123	98	125	120	96	2	79-120/18
108-67-8	1,3,5-Trimethylbenzene	1.0	U	125	130	104	125	129	103	1	79-120/19
75-01-4	Vinyl Chloride	1.0	U	125	123	98	125	121	97	2	69-159/18
	m,p-Xylene	2.0	U	250	265	106	250	263	105	1	79-126/15
95-47-6	o-Xylene	1.0	U	125	137	110	125	134	107	2	80-127/14
1330-20-7	Xylene (total)	3.0	U	375	402	107	375	397	106	1	80-126/15

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA69740-3MS	1A23177.D	5	11/20/19	CV	n/a	n/a	V1A939
FA69740-3MSD	1A23178.D	5	11/20/19	CV	n/a	n/a	V1A939
FA69740-3	1A23172.D	1	11/20/19	CV	n/a	n/a	V1A939

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA70025-1

CAS No.	Surrogate Recoveries	MS	MSD	FA69740-3	Limits
1868-53-7	Dibromofluoromethane	103%	103%	96%	83-118%
17060-07-0	1,2-Dichloroethane-D4	101%	100%	101%	79-125%
2037-26-5	Toluene-D8	102%	102%	108%	85-112%
460-00-4	4-Bromofluorobenzene	106%	105%	100%	83-118%

* = Outside of Control Limits.

MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP77819-MB	3Q11921.D	1	11/24/19	NAF	11/22/19	OP77819	S3Q210

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA70025-1

CAS No.	Compound	Result	RL	MDL	Units	Q
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	84%	30-140%
	13C5-PFPeA	82%	40-140%
	13C5-PFHxA	83%	50-150%
	13C4-PFHpA	83%	50-150%
	13C8-PFOA	84%	50-150%
	13C9-PFNA	81%	50-150%
	13C6-PFDA	82%	50-150%
	13C7-PFUnDA	77%	50-150%
	13C2-PFDoDA	75%	50-150%
	13C2-PFTeDA	64%	40-150%
	13C3-PFBS	83%	50-150%
	13C3-PFHxS	80%	50-150%
	13C8-PFOS	76%	50-150%
	13C8-FOSA	87%	30-140%
	d3-MeFOSAA	77%	50-150%
	13C2-4:2FTS	81%	50-150%
	13C2-6:2FTS	82%	50-150%
	13C2-8:2FTS	78%	50-150%

Method Blank Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP77819-MB	3Q11921.D	1	11/24/19	NAF	11/22/19	OP77819	S3Q210

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA70025-1

CAS No.	ID Standard Recoveries		Limits
	13C3-HFPO-DA	63%	50-150%

Instrument Blank

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S3Q210-IBLK	3Q11894.D	1	11/24/19	NAF	n/a	n/a	S3Q210

The QC reported here applies to the following samples: **Method:** EPA 537M QSM5.1 B-15

FA70025-1

CAS No.	Compound	Result	RL	MDL	Units	Q
307-24-4	Perfluorohexanoic acid	ND	0.0077	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0077	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0077	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0077	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0077	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0077	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0077	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0077	0.0019	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0077	0.0019	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0077	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0077	0.0029	ug/l	
2355-31-9	MeFOSAA	ND	0.038	0.0077	ug/l	
2991-50-6	EtFOSAA	ND	0.038	0.0077	ug/l	

CAS No.	ID Standard Recoveries		Limits
	13C5-PFHxA	95%	50-150%
	13C4-PFHpA	99%	50-150%
	13C8-PFOA	91%	50-150%
	13C9-PFNA	94%	50-150%
	13C6-PFDA	99%	50-150%
	13C7-PFUnDA	92%	50-150%
	13C2-PFDoDA	99%	50-150%
	13C2-PFTeDA	89%	50-150%
	13C3-PFBS	97%	50-150%
	13C3-PFHxS	96%	50-150%
	13C8-PFOS	97%	50-150%
	d3-MeFOSAA	83%	50-150%

Blank Spike Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP77819-BS	3Q11920.D	1	11/24/19	NAF	11/22/19	OP77819	S3Q210

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA70025-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
307-24-4	Perfluorohexanoic acid	0.08	0.0746	93	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0765	96	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0750	94	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0748	94	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0710	89	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0747	93	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0744	93	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0850	106	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0795	99	70-130
375-73-5	Perfluorobutanesulfonic acid	0.08	0.0783	98	73-130
355-46-4	Perfluorohexanesulfonic acid	0.08	0.0759	95	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.08	0.0726	91	70-130
2355-31-9	MeFOSAA	0.08	0.0757	95	70-130
2991-50-6	EtFOSAA	0.08	0.0730	91	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	95%	30-140%
	13C5-PFPeA	93%	40-140%
	13C5-PFHxA	93%	50-150%
	13C4-PFHpA	93%	50-150%
	13C8-PFOA	94%	50-150%
	13C9-PFNA	92%	50-150%
	13C6-PFDA	92%	50-150%
	13C7-PFUnDA	81%	50-150%
	13C2-PFDoDA	72%	50-150%
	13C2-PFTeDA	60%	40-150%
	13C3-PFBS	95%	50-150%
	13C3-PFHxS	90%	50-150%
	13C8-PFOS	87%	50-150%
	13C8-FOSA	95%	30-140%
	d3-MeFOSAA	84%	50-150%
	13C2-4:2FTS	97%	50-150%
	13C2-6:2FTS	97%	50-150%
	13C2-8:2FTS	93%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP77819-BS	3Q11920.D	1	11/24/19	NAF	11/22/19	OP77819	S3Q210

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA70025-1

CAS No.	ID Standard Recoveries	BSP	Limits
	13C3-HFPO-DA	78%	50-150%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP77819-MS	3Q11938.D	1	11/24/19	NAF	11/22/19	OP77819	S3Q210
FA70041-1	3Q11937.D	1	11/24/19	NAF	11/22/19	OP77819	S3Q210

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA70025-1

CAS No.	Compound	FA70041-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	Limits
307-24-4	Perfluorohexanoic acid	0.00415		0.069	0.0680	93	70-130
375-85-9	Perfluoroheptanoic acid	0.00196		0.069	0.0679	96	71-130
335-67-1	Perfluorooctanoic acid	0.00804		0.069	0.0733	95	74-130
375-95-1	Perfluorononanoic acid	ND		0.069	0.0649	94	76-130
335-76-2	Perfluorodecanoic acid	ND		0.069	0.0623	90	70-130
2058-94-8	Perfluoroundecanoic acid	ND		0.069	0.0658	95	70-130
307-55-1	Perfluorododecanoic acid	ND		0.069	0.0659	96	70-130
72629-94-8	Perfluorotridecanoic acid	ND		0.069	0.0718	104	70-139
376-06-7	Perfluorotetradecanoic acid	ND		0.069	0.0690	100	70-130
375-73-5	Perfluorobutanesulfonic acid	0.00462		0.069	0.0704	95	73-130
355-46-4	Perfluorohexanesulfonic acid	0.00106		0.069	0.0693	99	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.00494		0.069	0.0661	89	70-130
2355-31-9	MeFOSAA	ND		0.069	0.0663	96	70-130
2991-50-6	EtFOSAA	ND		0.069	0.0674	98	70-130

CAS No.	ID Standard Recoveries	MS	FA70041-1	Limits
	13C4-PFBA	100%	97%	30-140%
	13C5-PFPeA	98%	95%	40-140%
	13C5-PFHxA	98%	97%	50-150%
	13C4-PFHpA	98%	98%	50-150%
	13C8-PFOA	100%	100%	50-150%
	13C9-PFNA	99%	99%	50-150%
	13C6-PFDA	99%	100%	50-150%
	13C7-PFUnDA	95%	93%	50-150%
	13C2-PFDoDA	86%	77%	50-150%
	13C2-PFTeDA	75%	65%	40-150%
	13C3-PFBS	99%	98%	50-150%
	13C3-PFHxS	98%	98%	50-150%
	13C8-PFOS	94%	93%	50-150%
	13C8-FOSA	98%	95%	30-140%
	d3-MeFOSAA	98%	94%	50-150%
	13C2-4:2FTS	102%	95%	50-150%
	13C2-6:2FTS	103%	98%	50-150%
	13C2-8:2FTS	101%	97%	50-150%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP77819-MS	3Q11938.D	1	11/24/19	NAF	11/22/19	OP77819	S3Q210
FA70041-1	3Q11937.D	1	11/24/19	NAF	11/22/19	OP77819	S3Q210

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA70025-1

CAS No.	ID Standard Recoveries	MS	FA70041-1	Limits
	13C3-HFPO-DA	73%	64%	50-150%

* = Outside of Control Limits.

Duplicate Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP77819-DUP	3Q11941.D	1	11/25/19	NAF	11/22/19	OP77819	S3Q210
FA70043-1	3Q11940.D	1	11/25/19	NAF	11/22/19	OP77819	S3Q210

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA70025-1

CAS No.	Compound	FA70043-1 ug/l	Q	DUP ug/l	Q	RPD	Limits
307-24-4	Perfluorohexanoic acid	0.00603		0.00582		4	30
375-85-9	Perfluoroheptanoic acid	0.00237		0.00226	J	5	30
335-67-1	Perfluorooctanoic acid	0.00500		0.00487		3	30
375-95-1	Perfluorononanoic acid	0.00133		0.00133	J	0	30
335-76-2	Perfluorodecanoic acid	ND		ND		nc	30
2058-94-8	Perfluoroundecanoic acid	ND		ND		nc	30
307-55-1	Perfluorododecanoic acid	ND		ND		nc	30
72629-94-8	Perfluorotridecanoic acid	ND		ND		nc	30
376-06-7	Perfluorotetradecanoic acid	ND		ND		nc	30
375-73-5	Perfluorobutanesulfonic acid	0.00821		0.00781		5	30
355-46-4	Perfluorohexanesulfonic acid	0.00186		0.00163	J	13	30
1763-23-1	Perfluorooctanesulfonic acid	0.00347		0.00360		4	30
2355-31-9	MeFOSAA	ND		ND		nc	30
2991-50-6	EtFOSAA	ND		ND		nc	30

CAS No.	ID Standard Recoveries	DUP	FA70043-1	Limits
	13C4-PFBA	77%	92%	30-140%
	13C5-PFPeA	78%	94%	40-140%
	13C5-PFHxA	82%	98%	50-150%
	13C4-PFHpA	84%	101%	50-150%
	13C8-PFOA	89%	109%	50-150%
	13C9-PFNA	88%	107%	50-150%
	13C6-PFDA	90%	105%	50-150%
	13C7-PFUnDA	84%	95%	50-150%
	13C2-PFDoDA	70%	80%	50-150%
	13C2-PFTeDA	54%	52%	40-150%
	13C3-PFBS	83%	100%	50-150%
	13C3-PFHxS	85%	105%	50-150%
	13C8-PFOS	81%	96%	50-150%
	13C8-FOSA	83%	62%	30-140%
	d3-MeFOSAA	87%	99%	50-150%
	13C2-4:2FTS	84%	104%	50-150%
	13C2-6:2FTS	90%	112%	50-150%
	13C2-8:2FTS	89%	107%	50-150%

* = Outside of Control Limits.

Duplicate Summary

Job Number: FA70025
Account: MEFLOR AECOM, INC.
Project: NASA KSC MLPV IDW

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP77819-DUP	3Q11941.D	1	11/25/19	NAF	11/22/19	OP77819	S3Q210
FA70043-1	3Q11940.D	1	11/25/19	NAF	11/22/19	OP77819	S3Q210

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA70025-1

CAS No.	ID Standard Recoveries	DUP	FA70043-1	Limits
	13C3-HFPO-DA	55%	68%	50-150%

* = Outside of Control Limits.

APPENDIX H
RIS COMPLETION TICKETS

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Data Checker

Completion Ticket

On 12/12/2019 at 10:14 PM the following files were submitted to TtNUS

COMPLETION_AECOM_BLANK_20191212.txt

LITHOLOGY_AECOM_BLANK_20191212.txt

LOCATION_AECOM_MLPV_20191212.txt

PROJECT_AECOM_MLPV_20191212.txt

RESULT_AECOM_MLPV_20191212.txt

SAMPLE_AECOM_MLPV_20191212.txt

WATER_AECOM_MLPV_20191212.txt

The following comment was provided with this submission:
Hello TT - attached are the MLPV Oct/Nov 2019 sampling data. All existing locations. If you have any questions, please let me know. thanks! Jennifer Chastain

If you need to identify this session at a later date you may use the Ticket Key:

Repository20191212_550531986_kedd_AECOM

You may print this page by clicking on the "Print This Page" button

Thank you for using the Data Checker, to upload more files click the "Upload Files" link in the menu.

Print this Page

APPENDIX I
TREND CHARTS

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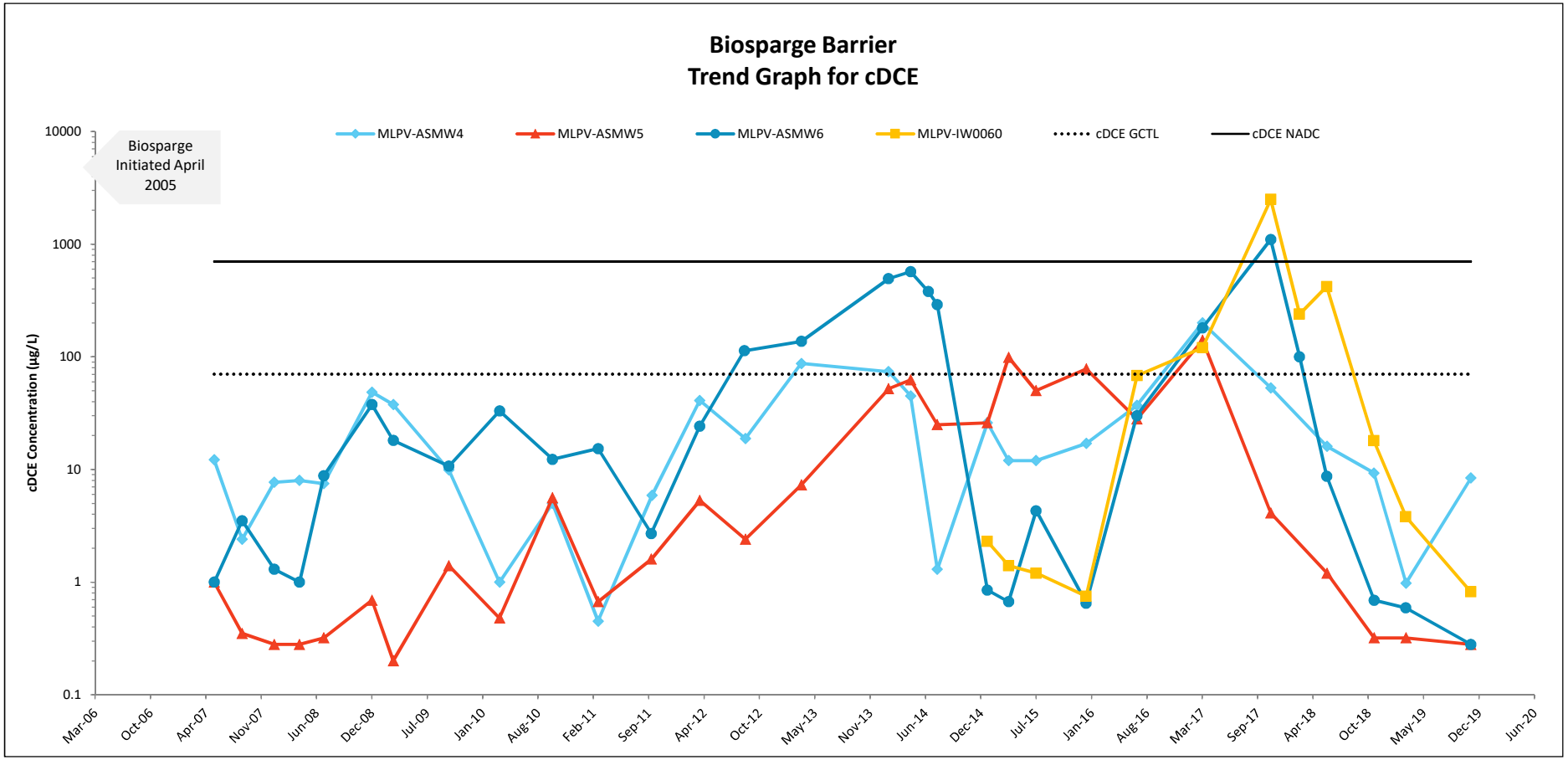
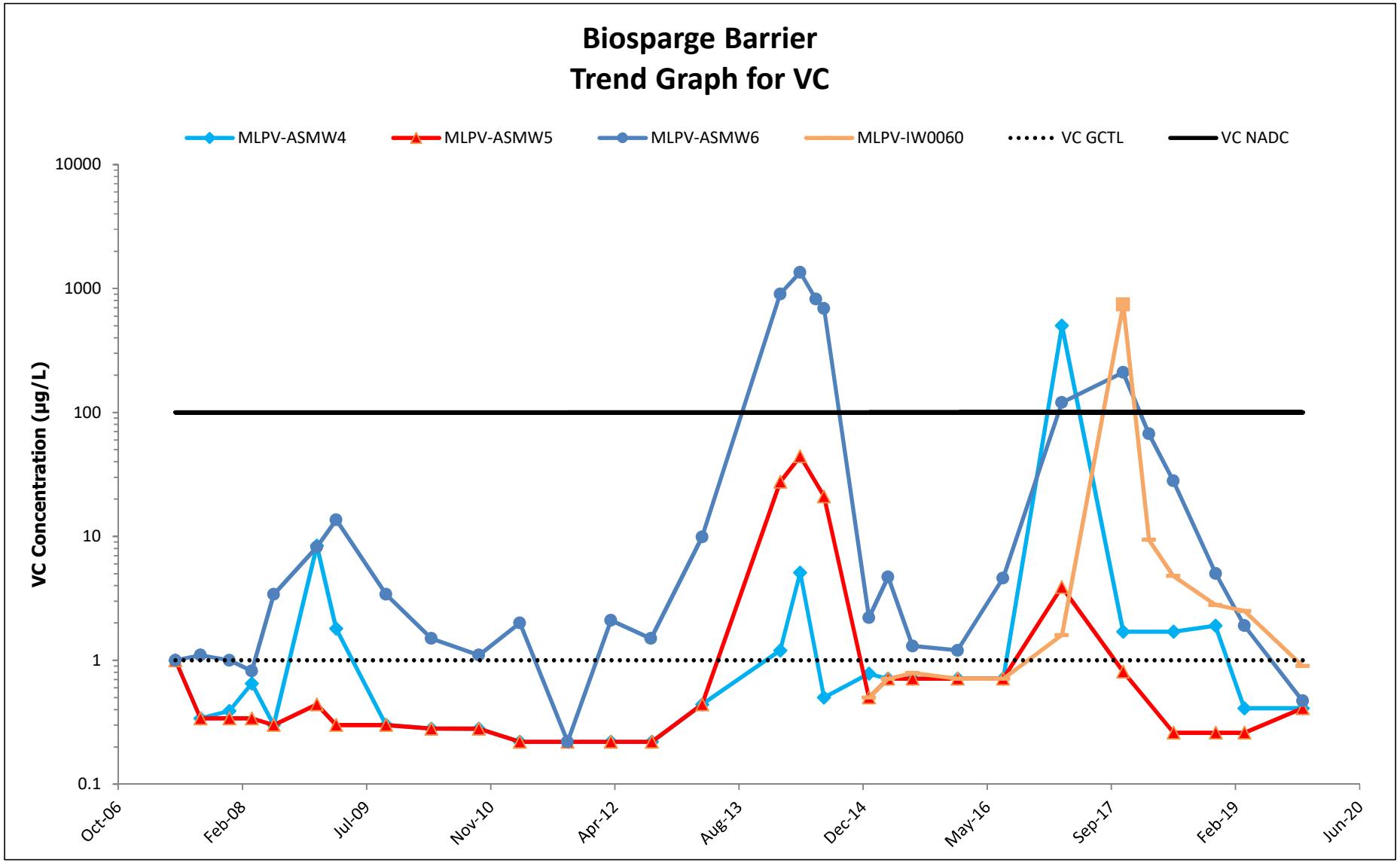
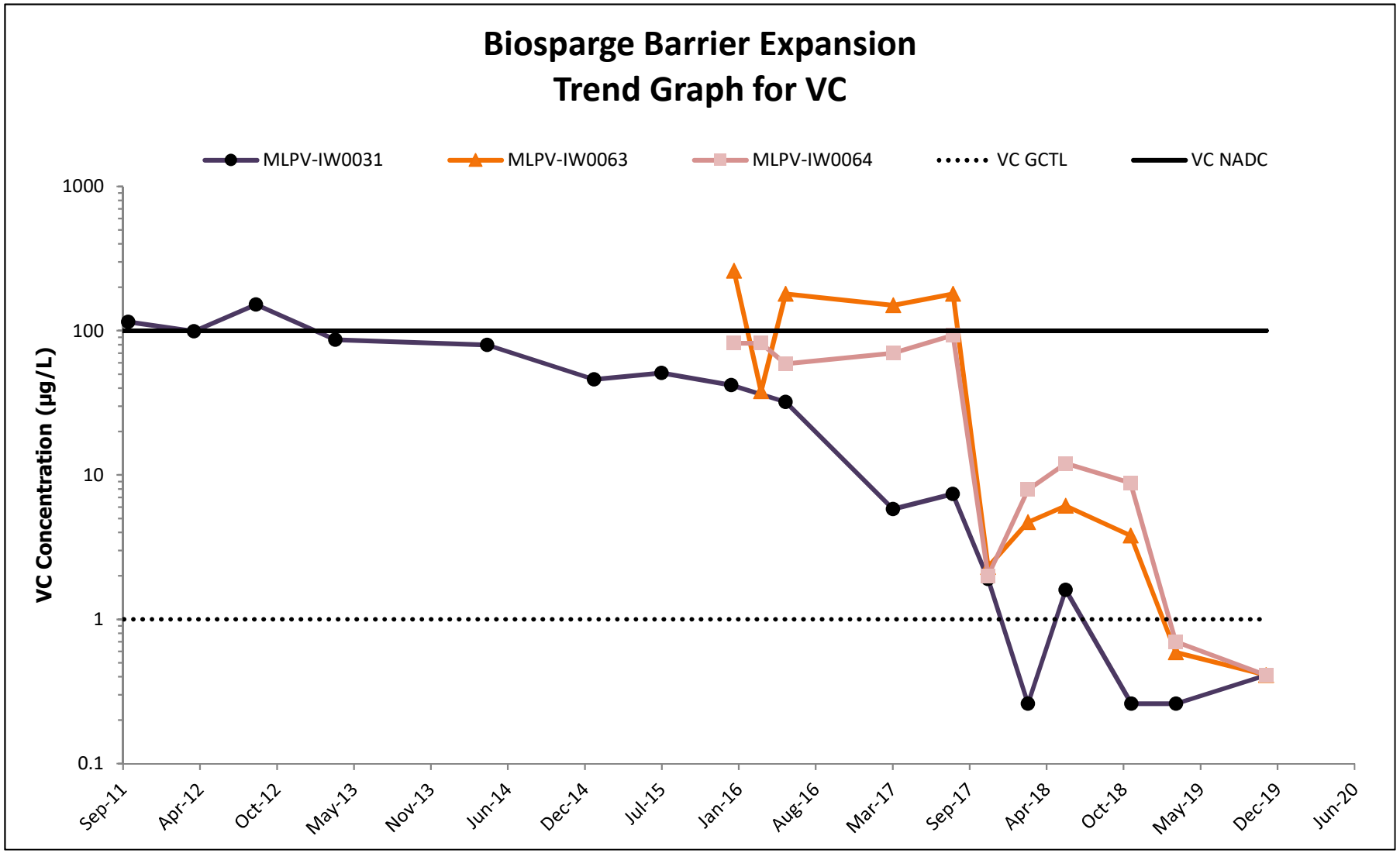
Original Biosparge Barrier



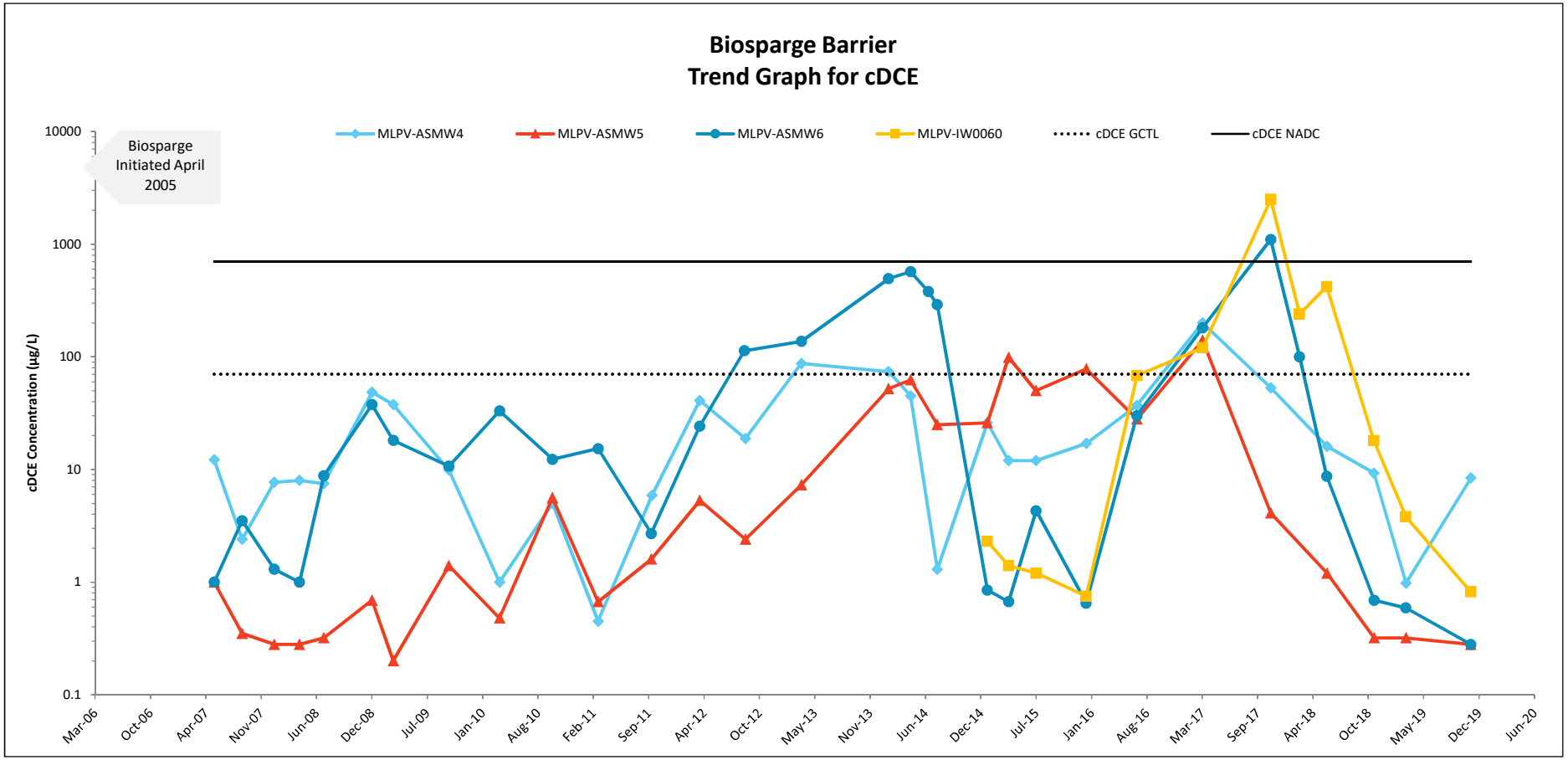
Original Biosparge Barrier



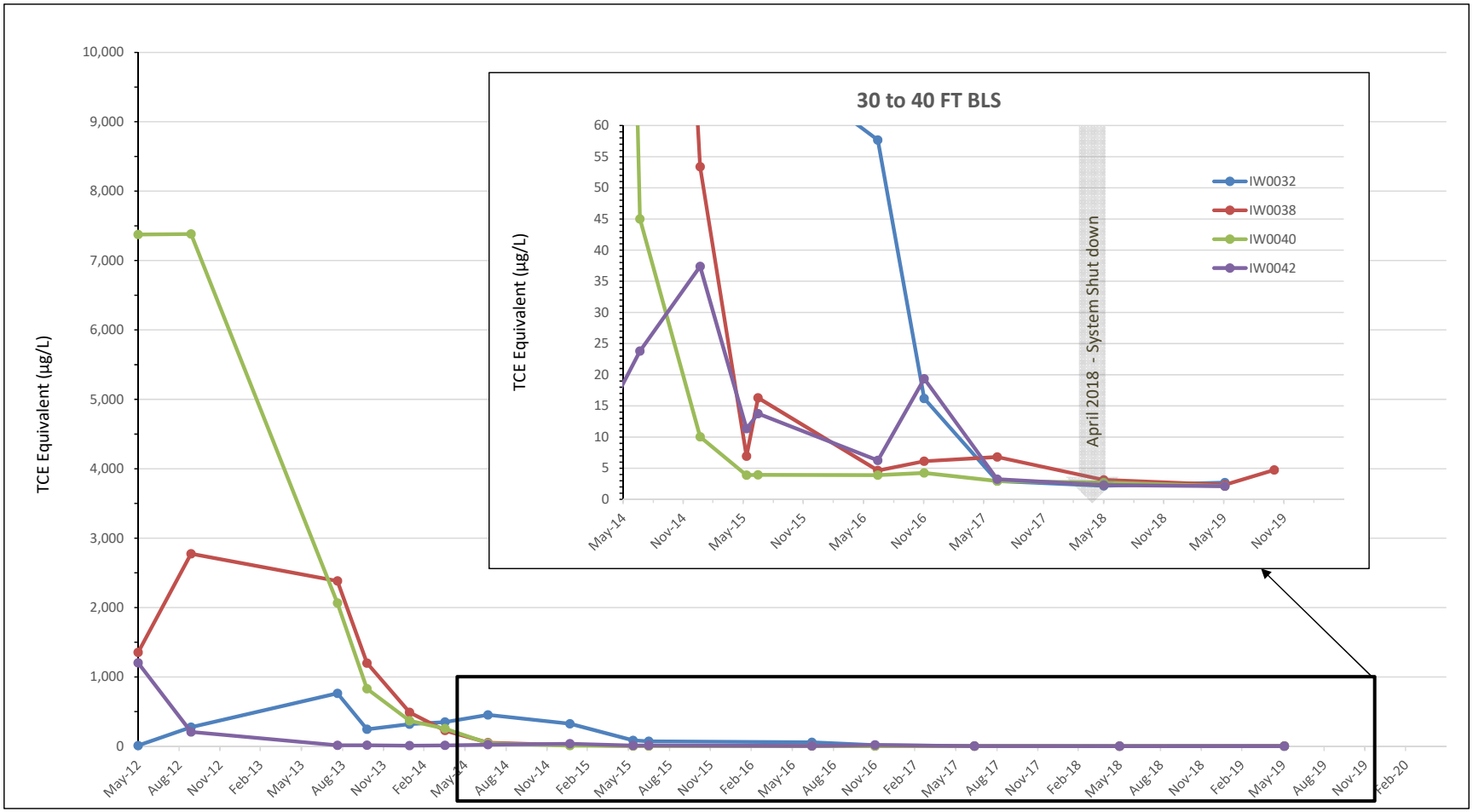
Biosparge Barrier Expansion



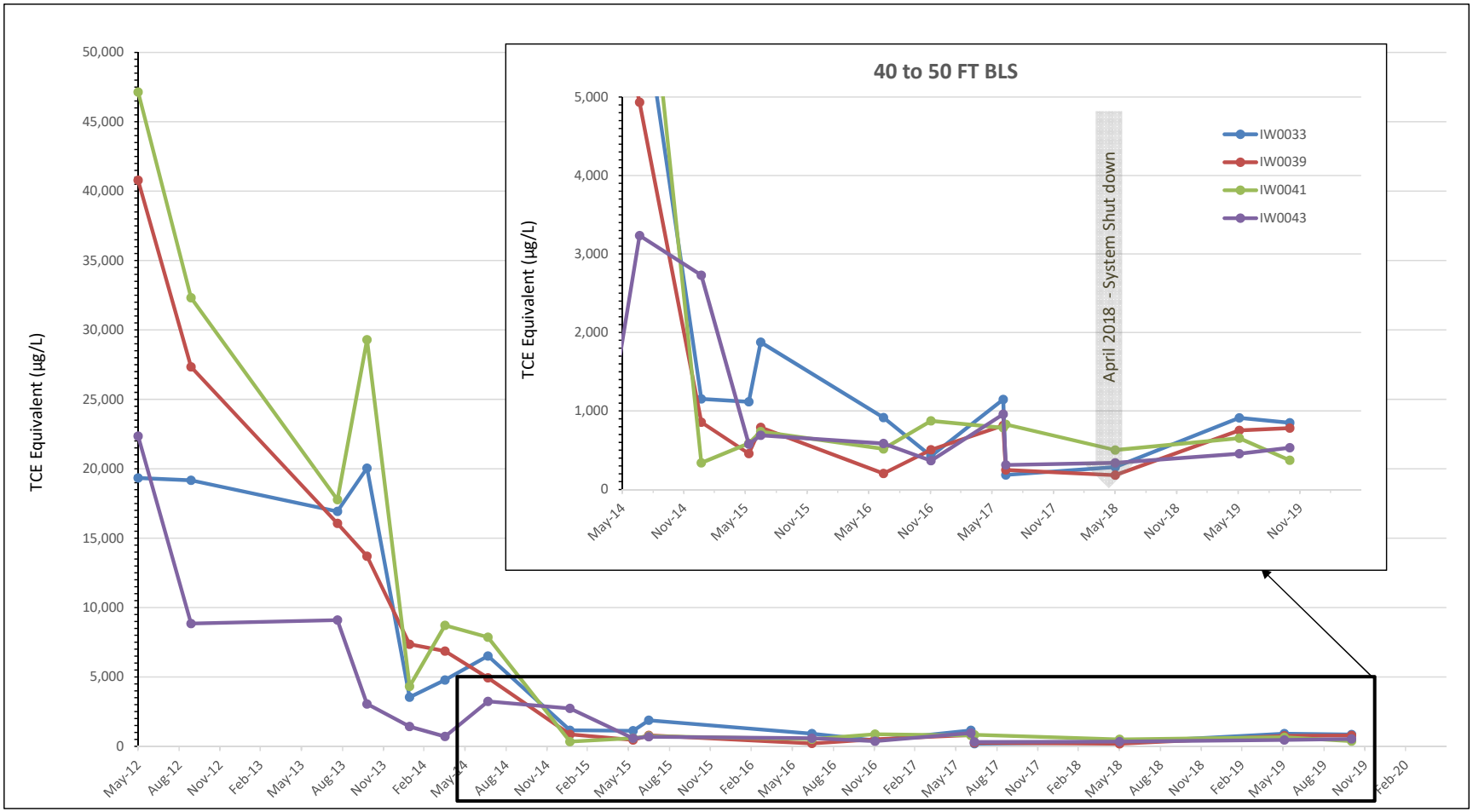
Original Biosparge Barrier



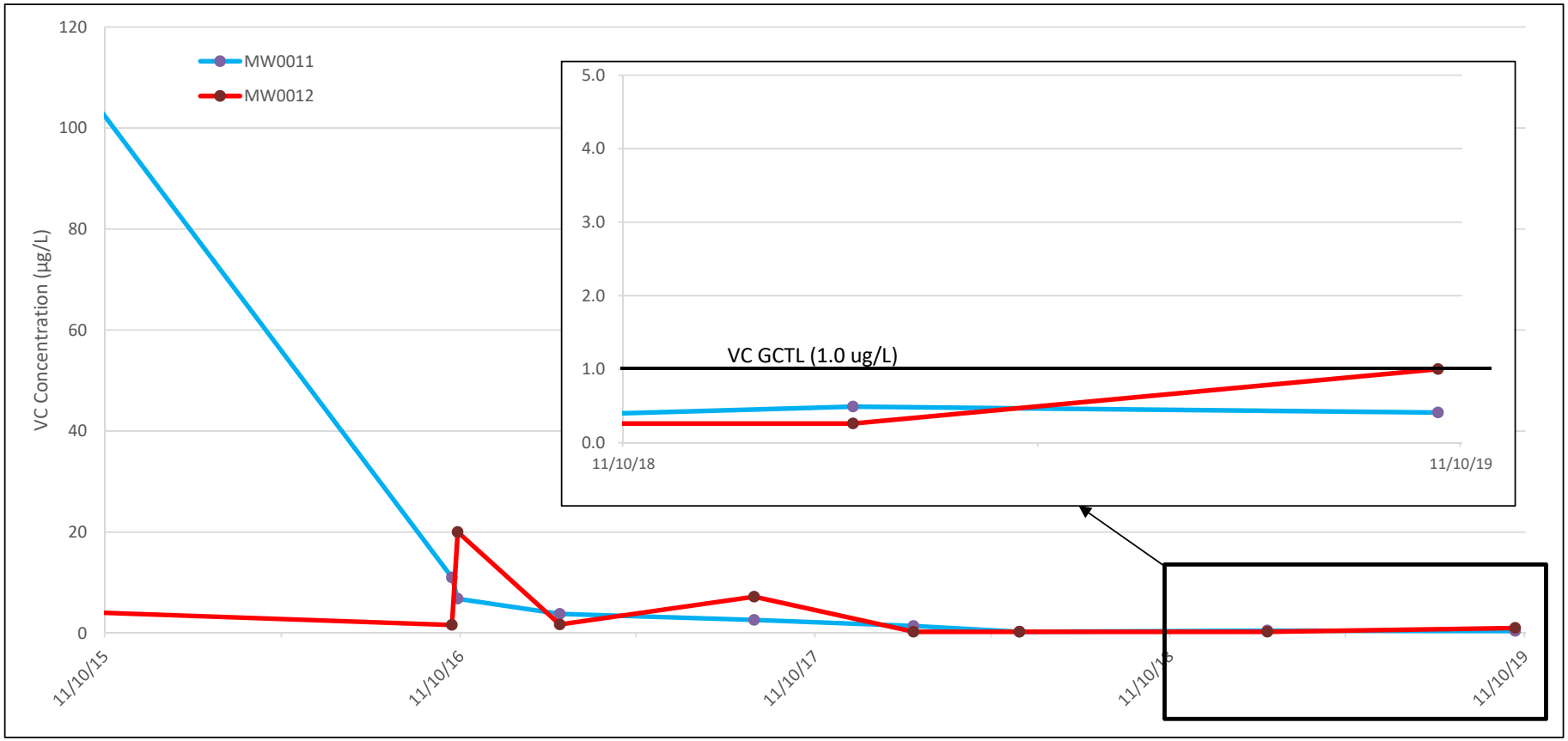
Hot Spot 2 (Air Sparge Area)
Trend Chart



Hot Spot 2 (Air Sparge Area)
Trend Chart



Hot Spot 3 (OFW Area)
Trend Chart



Hot Spot 3 (OFW Area)
Trend Chart