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FORMER MATHER AIR FORCE BASE
INSTALLATION RESTORATION PROGRAM

BUILDING 4260 VADOSE ZONE SITE INSPECTION REPORT AND ENGINEERING EVALUATION/COST ANALYSIS

DRAFT

Prepared for

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NOTICE

This report was prepared by the staff of URS Group, Inc. (URS) under the supervision of registered professionals. The data interpretation, conclusions, and recommendations presented in the report were governed by URS' experience and professional judgment. This report has been prepared based on data current at the time of preparation. Assumptions based on these data, although believed reasonable and appropriate based on the data provided herein, may not prove to be true in the future as new data are collected. The conclusions and recommendations of URS are conditioned upon these assumptions.

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ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
1,1,1-TCA	1,1,1-trichloroethane
A/WT	Unit A water-table unit
ACL	aquifer cleanup level
AFCEC	Air Force Civil Engineer Center
ARAR	applicable or relevant and appropriate requirement
AWS	air/water separator
B4260	Building 4260
bgs	below ground surface
CCR	California Code of Regulations
cis-1,2-DCE	cis-1,2-dichloroethene
cm/s	centimeters
cm$_2$	centimeter squared
CTCL	carbon tetrachloride
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DTSC	California Department of Toxic Substances Control
EE/CA	engineering evaluation and cost analysis
ESD	Explanation of Significant Differences
GCLE	groundwater cleanup level equivalent
HASP	Health and Safety Plan
HHRA	human health risk assessment
IC	institutional control
IDW	investigation-derived waste
in. Hg	inches of mercury
LUC	land use covenant
NCP	National Contingency Plan
Mather	former Mather Air Force Base
mm Hg	millimeters of mercury
mph	miles per hour
O&M	operations and monitoring
OWS	oil-water separator

ACRONYMS AND ABBREVIATIONS
(Continued)

PCE	tetrachloroethene
PID	photoionization detector
ppmv	part per million by volume
PVC	polyvinyl chloride
ROD	Record of Decision
SI	site inspection
SLUC	State Land Use Covenant
SMAQMD	Sacramento Metropolitan Air Quality Management District
SVE	soil vapor extraction
SVM	soil vapor monitoring
t-1,2-DCE	trans-1,2-Dichloroethene
TCE	trichloroethene
USEPA	U.S. Environmental Protection Agency
VI	vapor intrusion
VOC	volatile organic compound
WIMS	Work Information Management System
Work plan	remedial investigation work plan

1.0 INTRODUCTION

This report documents the results of field activities that were conducted to characterize the vadose zone soil gas volatile organic compound (VOC) contamination at Building 4260 (B4260), identified in the Air Force's Work Information Management System (WIMS) as WL509, located at the former Mather Air Force Base (Mather) (Figures 1-1 and 1-2), and to select a non-time-critical removal action to address this vadose zone contamination that has the potential to affect groundwater quality at levels exceeding the Mather aquifer cleanup levels (ACLs). This report was prepared by URS Group, Incorporated, under contract FA8903-16-D-0029, task order number 0008, on behalf of the Air Force Civil Engineer Center (AFCEC).

1.1 Objectives

This report includes a site inspection (SI) report, an engineering evaluation and cost analysis (EE/CA), and a soil vapor extraction (SVE) system design and operations and monitoring (O&M) plan. Investigative activities that are described in the SI report were conducted in accordance with the 2017 remedial investigation work plan (2017 work plan) (URS 2017a). The objectives of these documents are described next.

The objectives of the SI report are to:

- present the results of indoor air sampling that was conducted to produce data in support of the human health risk assessment (HHRA; URS, 2017b);
- summarize the final HHRA (URS, 2017b), which used the indoor air sampling results to evaluate the potential health risk to current occupants of the office space on the southern end of Building 4260 (the hangar) (Building #3 in Figure 1-2); and
- present the results of a soil vapor investigation conducted beneath and in the immediate vicinity of the southeastern corner of Building 4260, to assess the extent of vadose zone contamination near soil vapor monitoring (SVM) well 59-PW-12 and evaluate whether vadose zone contamination has the potential to affect groundwater.

The objectives of the EE/CA are to:

- evaluate removal action alternatives to remediate the vadose zone contamination at B4260; and
- select a vadose zone remedy to be implemented at B4260.

The objectives of the SVE design and O&M plan are to:

- present the design of the SVE well proposed for the removal action and required changes to the exisiting Site 59 SVE system; and
- describe the proposed monitoring program for SVE operations.

1.2 Data Collection Objectives

The objectives for data collected during the SI were to:

- determine whether vadose zone soil vapor VOC concentrations present an unacceptable risk to building occupants via the vapor intrusion pathway;

- determine whether vadose zone soil vapor VOCs have the potential to affect groundwater quality at concentrations greater than ACLs, and if the impact would be expected to extend the time and cost to remediate groundwater in the vicinity of the site; and
- provide sufficient data to evaluate the extent of the soil vapor plume and design a remedy to address subsurface contamination in the vadose zone.

The 2017 work plan provides the rationale and decision-making process as well as the screening criteria that were used to assess risks to human health and groundwater.

1.3 Report Organization

This report is organized as follows:

- Section 1.0 explains the overall objectives.
- Section 2.0 presents the description and history of B4260.
- Section 3.0 describes the work performed to construct soil vapor wells and sub-slab vapor probes, conduct indoor air sampling, and conduct baseline soil vapor sampling.
- Section 4.0 discusses the results and conclusions of the indoor air sampling event and the vadose zone investigation, and suggests a recommendation to conduct a non-time-critical removal action to address vadose zone contamination.
- Section 5.0 presents the selection and evaluation of the removal action alternatives.
- Section 6.0 lists references for the information cited in this report.

This document also includes the following appendices:

- Appendix A provides historical information.
- Appendix B provides the field logs associated with the indoor air sampling event and the baseline soil vapor monitoring event.
- Appendix C provides the lithologic and well construction logs for the new wells and sub-slab vapor probes.
- Appendix D provides the laboratory analytical data for the indoor air sampling event and the baseline soil vapor monitoring event, as well as the associated data summary analyses for each event.
- Appendix E provides the VLEACH modeling data.
- Appendix F provides a copy of the *Building 4260 SVE System Design and Operations and Maintenance Plan*.

2.0 BACKGROUND AND PREVIOUS INVESTIGATIONS

2.1 Site Description and History

B4260 is the contaminated vadose zone in the vicinity of SVM well 59-PW-12, an area located near the southeastern corner of Building 4260 (B4260) at Mather. The site includes B4260 and the areas immediately south and east of this building.

The B4260 source area was identified during sampling activities to further delineate the boundaries of the Site 59 soil vapor plume, which was associated with an SVE site west of B4260. The source area of Site 59 was the former oil-water separator (OWS) 4251 and wash rack, shown in Figure 1-2. The soil vapor wells associated with Site 59 were decommissioned in 2017, but the SVE system and the associated piping, shown in Figure 1-2, were left in place so that SVE could be implemented easily at B4260, if determined to be appropriate.

B4260 was previously known as Site 59b. Use of the Site 59b nomenclature occurred between approximately 2015 and 2017. When the source area near 59-PW-12 was first identified, the Air Force proposed to conduct SVE as part of the selected remedy for Site 59. The OWS source area at Site 59 was referred to at that time as Site 59a, and the B4260 source area was referred to as Site 59b. It was later agreed that the new source area would be handled as a separate site, and the site was designated as Building 4260, or B4260. The new site was assigned a WIMS number (Air Force Site identification number) of WL509.

B4260 currently serves as a commercial aircraft maintenance hangar for Mather Aviation, which occupies the central and southern sections of the building, and Intel Corporation, which occupies the northeastern section of the building. This building was constructed in 1954 and originally was used for aircraft repair and maintenance.

B4260's history—previous investigations (prior to 2017), geology, and hydrogeology—are detailed in the 2017 work plan. A lithologic cross-section is provided in Section 4.0.

The locations of the B4260 SVM wells (59-PW-05 through 59-PW-17) are shown in Figure 1-2. This system of wells includes 13 well clusters and 38 soil vapor wells. SVM wells 59-PW-05 through 59-PW-13 were installed between 2009 and 2015 as part of the Site 59 delineation activities; 59-PW-14 through 59-PW-17 were installed in 2017 as part of B4260 delineation activities, which are discussed in Sections 3.0 and 4.0 of this report. The source area is believed to be located in the vicinity of 59-PW-12 at a relatively shallow depth, approximately 10 feet below ground surface (bgs); 59-PW-05 and 59-PW-06 are believed to represent the transition area between the Site 59 and B4260 source areas. The historical analytical results for the primary VOCs detected in soil vapor samples between 2009 and 2015 are shown in Table A-1 in Appendix A.

At present, the source of vadose zone contamination is unknown but is suspected to be associated with the storm drain line located west of 59-PW-12 (Figure 1-2). Four storm drain lines run in a north–south direction through the hangar and were designed to capture spills and stormwater collected from the roof. Two storm drain lines would have collected liquids from the northern quarter of the building and transported the fluid by gravity to the north; the two other storm drain lines would have collected spills from the remainder of the hangar and transported them by gravity to the south. It is believed that all of the floor drain inlets, with the exception of the drain inlet located in the northwest corner of the building, were plugged when the property was transferred to Sacramento County.

2.2 Previous Investigations and Remedial Actions

The previous investigations conducted at B4260 primarily include the well installation activities discussed in Section 2.1 and the associated soil vapor sampling data shown in Table A-1 in Appendix A. As shown in Table A-1, TCE is the predominant soil vapor VOC at B4260 and was detected above its groundwater cleanup level equivalent (GCLE) in 14 out of 21 soil vapor wells during previous investigations. Cis-1,2-dichloroethene (cis-1,2-DCE) was detected in two soil vapor wells above its GCLE, and carbon tetrachloride was detected in one well above its GCLE. The highest exceedances were at well 59-PW-12A, where TCE and cis-1,2-DCE were detected at 160 and 14 parts per million by volume (ppmv), respectively.

No known removal actions have been conducted for this site; however, SVE was successfully implemented at other vadose zone sites at Mather under the *Final Superfund Record of Decision, Soil Operable Unit Sites and Groundwater Operable Unit Plumes* (1996 ROD; AFBCA 1996), including at Site 59, the site west of B4260.

2.2.1 Screening Criteria for Assessing Impact to Groundwater

The groundwater cleanup level equivalent (GCLE) is a numerical value that has been used at Mather as a conservative screening tool for comparison to soil vapor concentrations data, to determine whether soil vapor has the potential to affect groundwater at concentrations above the ACL. The GCLE calculation determines for each contaminant of interest the soil vapor concentration that would be in equilibrium with the aqueous phase (i.e., soil moisture) with an aqueous concentration of exactly the ACL. Actual soil vapor sample concentrations from the site then are compared to the GCLEs, and those with lower concentrations are determined to be unable to cause groundwater to exceed the ACL, even if pore moisture in equilibrium with that soil vapor or the soil vapor itself was to migrate to the water table without dilution. For soil vapor samples with one or more GCLE concentration exceedances, consideration of environmental attenuation factors is used to predict whether the contaminants at that location could affect groundwater at concentrations above one ACL.

The equivalent soil vapor concentrations are calculated assuming equilibrium partitioning between the vapor phase and aqueous phase of the contaminant at 20 degrees Celsius, using the following equation:

$$C_a = \frac{24.055 C_w H}{MW}$$

Where:

C_w is the soil water (aqueous phase) concentration (µg/L), equal to the ACL for each contaminant considered

C_a is the equivalent soil vapor concentration (ppmv)

MW is the molecular weight of the contaminant compound (grams per mole)

H is the Henry’s Law constant for the contaminant compound (unitless)

The following GCLE soil vapor concentrations are provided for TCE and cis-1,2-DCE, the primary soil vapor VOCs, with their associated ACLs (URS 2015):

Contaminant	**Aquifer Cleanup Level (µg/L)**	**GCLE Soil Vapor Concentration (ppmv)**
TCE	5	0.35
cis-1,2-DCE	6	0.2

Notes:

µg/L	=	micrograms per liter
cis-1,2-DCE	=	cis-1,2-dichlroethene
GCLE	=	groundwater cleanup level soil vapor equivalent
ppmv	=	parts per million by volume
TCE	=	trichloroethene

If the measured soil vapor concentration is less than the calculated GCLE soil vapor concentration (C_a in the above equation), the residual contamination associated with that sample will not affect the groundwater above the ACL, and no further assessment is necessary. The GCLE is a conservative screening tool and has the potential to over-estimate impact on groundwater. More rigorous models may therefore be employed if the GCLE is exceeded and further assessment is appropriate.

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3.0 FIELD INVESTIGATION OVERVIEW

Field investigation activities were performed between January 2017 and February 2018. The following subsections describe the field characterization objectives, field sampling activities, and methods.

3.1 Field Characterization Objectives

The objectives of the field characterization activities were to:

- conduct indoor air sampling within B4260 to produce data in support of an HHRA, to evaluate the potential health risk to current occupants of the office space in Building #3; and
- conduct a soil vapor investigation beneath and within approximately 150 feet of 59-PW-12, to assess the vertical and lateral extent of vadose zone contamination, and to assess whether it may affect groundwater quality.

The rationale for selection of the indoor air sample locations and the SVM well locations is presented in the 2017 work plan, as is the selection process for the screening levels used to evaluate the data.

All work was conducted in accordance with the 2017 work plan; the indoor air study also was conducted in accordance with the California Department of Toxic Substances Control's (DTSC) *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* (Vapor Intrusion Guidance; DTSC 2011). The U.S. Environmental Protection Agency (USEPA) 2015 vapor intrusion (VI) guidance, the *Office of Solid Waste and Emergency Response (OSWER) Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway for Subsurface Vapor Sources to Indoor Air* (USEPA 2015), also is referenced, as appropriate.

3.2 Health and Safety

All field activities performed under the 2017 work plan adhered to the guidelines and procedures outlined in the *Former Mather Air Force Base Health and Safety Plan for Long-Term Operations, Maintenance, and Monitoring* (HASP; URS 2010). A photoionization detector (PID) was used to screen soil cuttings and confirm that air in the work area breathing zone was below the safety criterion of 10 parts per million. A fire extinguisher and spill kit were at the site during drilling.

All personnel entering the work zone during field activities were given a safety orientation and asked to sign the HASP briefing form. The safety orientation outlined site-specific hazards and health and safety procedures. Daily tailgate safety meetings were held each morning, and all authorized personnel signed a tailgate safety briefing before any work began. Visitors who remained outside the exclusion zone were given a safety briefing and instructed to remain outside the delineated work area. All personnel were required to wear level D personal protective equipment.

3.3 Pre-Fieldwork Activities

3.3.1 Permitting/Notifications/Utility Clearance

This field investigation, conducted under the Comprehensive Environmental Response, Compensation, and Liability Act, is exempt from permitting. Therefore, no drilling or well installation permits were obtained from the Sacramento County Environmental Management Department. Sacramento County was notified in its capacity as property owner; the tenant, Mather Aviation was notified as one of the wells was to be installed inside its hangar; and a Notification of Proposed Construction was submitted to the Federal Aviation Administration to notify them that work would be conducted on or near the taxiway.

The proposed work area and drilling locations were marked by AECOM field staff. Underground Service Alert and a private utility locator were contacted to clear all areas proposed for drilling. Before beginning drilling activities, each boring location was cleared to a depth of 5 feet bgs, using a vacuum truck equipped with an air knife to avoid hitting unknown utilities or other subsurface obstructions or hazards. No utilities or obstructions were encountered. The final well locations are shown in Figure 1-2.

No wastewater was generated during field activities.

3.3.2 Security and Site Control

The field crew implemented security and site control procedures to reduce the potential for uncontrolled migration of contaminants from the work areas and limit access by unauthorized personnel. Perimeter controls were employed around work areas, and all site personnel complied with the site control requirements of the HASP on entering the work zone. During nonworking periods, all equipment and materials were secured appropriately.

3.4 Mobilization and Field Preparation

Before the start of fieldwork, the following mobilization and field preparations were performed:

- Vehicles for field crews and all equipment and materials for initial activities were obtained.
- Applicable forms for health and safety, daily operations, and field logs were acquired per the 2017 work plan, for tasks such as lithologic logging.
- The PID was charged, calibrated, and tested each day.
- Field staff reviewed the 2017 work plan and the HASP.

All drilling equipment was transported to the site, including the drilling rig and support trucks. The drill rig, subsurface tools, and equipment were decontaminated before being brought onto the site.

One roll-off soil bin was delivered to the site, to store investigation-derived waste (IDW).

3.5 Field Activities

The field activities are discussed next. The results of the field and laboratory testing are discussed in Section 4.0.

3.5.1 Field Logs

Field staff maintained daily field logs and notes, recording all field activities and observations, problems encountered, and actions taken to solve problems. The field data sheets are provided in Appendix B, and the detailed lithologic logs with well construction details are provided in Appendix C.

3.5.2 Installation of Sub-Slab Soil Vapor Probes

The four sub-slab soil vapor probes were installed from 19 to 23 January 2017 at 59-SS-01 through 04 (Figure 3-1):

- 59-SS-01 was installed inside of a small room on the southeastern side of Building #3;
- 59-SS-02 through 04 were installed within the hangar to the north, the west, and the east of Building #3;
- 59-SS-04 was installed near an airline utility vault where the maximum PID survey reading was recorded in June 2015.

The thickness of the concrete floor was estimated to be 6 to 7 inches at SS-01 and 17 inches at all other locations. The construction logs for these probes are provided in Appendix C.

3.5.3 Indoor Air and Ambient Air Sampling

Indoor air and ambient air samples were collected on 26 January 2017 from indoor air sample locations IA-01 through IA-04 and ambient air sample locations AA-01 and AA-02, shown in Figure 3-1. One set of 8-hour samples was collected in accordance with the 2017 work plan. Sampling started at 8:09 a.m. and ended at 4:25 p.m. The average barometric pressure for the sample period was 30.43 inches of mercury (in. Hg), the predominant wind direction was north-northwest, and the wind speed ranged from calm to 13.8 miles per hour (mph), with gusts up to 20.7 mph. Hourly barometric pressure, wind direction, and wind speed data collected at Mather Airport are shown in Table B-3 in Appendix B. The sample results are presented in Section 4.0.

3.5.4 Sub-Slab Vapor Sampling

Sub-slab vapor samples were collected from the sub-slab soil vapor probes on 27 January 2017, at 59-SS-01 through 04, in accordance with the 2017 work plan. The average barometric pressure for the sampling period was 30.56 in. Hg. Hourly barometric pressure, wind direction, and wind speed data collected at Mather Airport are shown in Table B-3 in Appendix B. The sample results are presented in Section 4.0.

3.5.5 Borehole Drilling and Sample Collection for Lithologic Description

Sonic drilling equipment was used to drill the boreholes for the soil vapor monitoring wells. Sonic drilling was selected because of the likelihood of encountering coarse gravels and cobbles below the ground surface and to provide a continuous core for lithologic description.

The boreholes were 12 inches in diameter and terminated at depths ranging from 83.5 to 84.5 feet bgs. All boreholes were located within approximately 150 feet of 59-PW-12. SVM well 59-PW-14 is located approximately 10 feet east of 59-PW-12. The remaining SVM wells, 59-PW-15, 59-PW-16, and 59-PW-17 are approximately 150 feet southeast, east, and north of 59-PW-12. A continuous soil core was collected from inside the sonic sampling tool at each borehole. The soil encountered was described and classified by the on-site geologist, in accordance with the Unified Soil Classification System. The lithologies encountered are described in Section 4.0 of this report, as well as in the lithologic and well construction logs, provided in Appendix C.

Groundwater in the vicinity of Site 59 was expected at a depth of approximately 100 feet bgs. Perched water was encountered during drilling activities at depth intervals well above the water table.

3.5.6 Vapor Well Installation

Nested SVM wells were installed in the four boreholes. Three nested wells were installed in 59-PW-14 and five nested wells each were installed in 59-PW-15, -16, and -17. Each SVM well was constructed of 1-inch-diameter schedule 40 polyvinyl chloride (PVC) casing and a 2-foot length of 0.020-inch screen. The wells were screened at approximate depths of 8–10 feet, 20–22 feet, 30–32 feet, 60–62 feet, and 80–82 feet. The construction details for each well are shown in Table 3-1.

For each screen interval, 4 feet of #2/12 filter sand was placed in the borehole annulus at the depth of each screen, allowing 1 foot of filter sand to extend above the top of the screen and 1 foot below. One foot of #0/30 transition sand was placed above the #2/12 filter sand in the annulus above each screen. Dry granulated bentonite was placed above the #0/30 transition sand in the annulus above each screen in approximately one 6-inch lift, hydrated according to manufacturer recommendations, and left to fully hydrate for 10–15 minutes. After the granular bentonite was completely hydrated, bentonite chips were placed in the annulus and hydrated in 1-foot lifts up to 1 foot below the next screen interval. After construction of the shallowest well, cement grout, containing approximately 5 percent powdered bentonite to reduce shrinkage, was emplaced to within 0.5 feet of the ground surface, to allow installation of the flush-mounted, traffic-rated well vault.

Well construction procedures were based on recommendations from the Nebraska Grout Task Force's *In-Situ Study of Grout Materials 2001–2006 and 2007 Dye Tests* (Lackey et al. 2009) and information included in the *Practical Handbook of Environmental Site Characterization and Ground-Water Monitoring* (Nielsen, 2005), as well as *Advisory—Active Soil Gas Investigations* (DTSC et al. 2015) and *Statewide Advisory: Sealing Materials for Water Wells, Monitoring Wells, Cathodic Protection Wells, and Geothermal Heat Exchange Wells* (DWR 2015).

3.5.7 SVM Stabilization and Water Level Monitoring

PID, oxygen, and carbon dioxide measurements were collected to assess stable well conditions before collecting soil vapor samples, in accordance with the *Advisory—Active Soil Gas Investigations* (DTSC et al. 2015). Stabilization monitoring activities began on 08 February 2017, approximately one week after the last SVM well was installed. A total of five stabilization monitoring events were conducted between 08 February and 16 May 2017 at the 18 new SVM wells and the 59-PW-12 well cluster. Monitoring was discontinued because parameters had stabilized in wells, though the presence of water and/or vacuum conditions precluded collection of vapor samples at up to eight of the new wells and the existing SVM well, 59-PW-12 (8 to 10). The data collected are shown in Table B-1 in Appendix B.

Water level readings were collected as part of 10 monitoring events from 01 March 2017 through 21 February 2017, to assess trends. The data are shown in Table B-2 in Appendix B. The data indicate that perched water primarily is found in wells located near the southeast quadrant of the building. Seven of the wells consistently had more than 1 foot of water in them for much of the monitoring period:

- 59-PW-13A (8 to 10)
- 59-PW-14 (30 to 32)
- 59-PW-14 (60 to 62)
- 59- PW-15 (8 to 10)
- 59-PW-16 (8 to 10)
- 59-PW-17 (8 to 10)
- 59-PW-17 (60 to 62)

The maximum height of water measured was 8.16 feet at 59-PW-14 (30–32) in April 2017. The minimum height of water generally occurred for all wells in November 2017, when water levels were collected during the baseline soil vapor sampling event, but the water levels rebounded by February 2018.

Originally, in 2017, the presence of water in the perched zones above the water table was believed to be associated with higher than average rainfall between October 2016 and April 2017. Although rainfall between November 2017 and February 2018 was below average, the water levels rebounded to approximately the same levels. Because water levels were lowest at the end of the dry season, in November 2017, rainfall is still believed to be the predominant cause of water in the wells. However, based on the water level data collected to date, it is expected that the wells will continue to experience standing water in the perched zones during the rainy season, even if rainfall is below average.

3.5.8 SVM Vapor Sampling

Baseline monitoring samples were collected from 38 SVM wells, which included the 20 existing wells associated with 59-PW-05 through 59-PW-13 and the 18 new wells associated with 59-PW-14 through 59-PW-17. The well names and screen intervals for these wells are provided below:

Existing Wells			New Wells		
59-PW-05	10–20		59-PW-14	30 to 32	w
59-PW-05	30–40		59-PW-14	60 to 62	w
59-PW-05	50–60		59-PW-14	80 to 82	
59-PW-05	70–90		59-PW-15	9 to 11	
59-PW-06	11–21		59-PW-15	20 to 22	
59-PW-06	31–41		59-PW-15	30 to 32	
59-PW-06	51–61		59-PW-15	60 to 62	
59-PW-06	70–90		59-PW-15	80 to 82	
59-PW-07	10–20		59-PW-16	8 to 10	w; no sg
59-PW-08	10–20		59-PW-16	20 to 22	
59-PW-09A	10–11		59-PW-16	30 to 32	
59-PW-09B	20–21		59-PW-16	60 to 62	
59-PW-10A	8–10		59-PW-16	80 to 82	
59-PW-10B	20–22		59-PW-17	8 to 10	
59-PW-11A	8–10		59-PW-17	20 to 22	
59-PW-11B	20–22		59-PW-17	30 to 32	
59-PW-12A	8–10		59-PW-17	60 to 62	w
59-PW-12B	20–22		59-PW-17	80 to 82	
59-PW-13A	8–10	w			
59-PW-13B	20–22				

Notes:
no sg = no soil gas sample was collected
w = perched water sample collected

The vapor samples were collected according to the Mather Vapor Sampling Standard Operating Procedures found in the 2017 work plan, which are consistent with those outlined in *Advisory—Active Soil Gas Investigations* (DTSC et al. 2015). The vapor sampling included ambient air leak testing that used isopropanol as a leak test compound. The following modifications were made to the soil gas sampling protocol at five of the wells to address the perched water:

a. Measured and recorded depth to water and calculated water height.
b. For wells with more than 1 foot of perched water, measured and recorded pH, temp., and conductivity before starting and during the purge period, following typical groundwater purge procedures.
c. Purged three well volumes or until the parameters stabilized.
d. Collected water samples for VOC analysis and submitted them to the lab for analysis.
e. Collected a second water sample and ran a free and total chlorine test on it, using a Hach field test kit.
f. Used decontamination/change-out tubing before collecting the next sample.
g. Continued to purge water from the well until the water level was as low as possible. Took a water level measurement and collected a soil vapor sample. Retook the water level measurement after the vapor sample was collected.
h. Collected soil vapor samples using the soil vapor sampling protocol (included leak testing) provided in the 2017 work plan.

Soil vapor samples were collected at 37 of the SVM wells; a sample was not collected at 59-PW-16 (8 to 10) because the perched water rebounded too quickly for a soil vapor sample to be collected. Leak testing was not performed at the 59-PW-05 and 59-PW-06 cluster of wells, where the shroud could not be used because of construction of the well vault.

As noted above, the five wells with standing water (identified by a “w” notation in the table above) were purged, and a water sample was collected for laboratory analysis and field testing for free and total chlorine. These wells had 0.62 to 2.67 feet of water in them. A tap water sample was collected from the sink in the women’s bathroom in B4260 after allowing the water to run for 5 minutes, and tested for free and total chlorine for comparison to the well samples. The free and total chlorine concentrations of 1.0 and 1.1 milligrams per liter were detected in the tap water sample, but no chlorine was detected in the perched water samples. These tests were conducted to eliminate a leaking water supply line as a source of water in the wells. The results do not indicate a water line leak. However, the results may not be definitive, because the chlorine could potentially have dissipated by the time it reached these wells.

The field logs from the baseline sampling event are provided in Appendix B. The results are discussed in Section 4.0.

3.6 Cuttings and Wastewater Removal

The soil IDW produced from drilling was containerized and stored in a roll-off soil bin, stored adjacent to Building 4260. A composite sample was collected from the bin and analyzed for VOCs, total petroleum hydrocarbons, and metals, to characterize the waste stream and select an appropriate landfill. The soil was classified as a non-hazardous waste and was transported to Potrero Hill Landfill in Suisun City on 29 February 2017.

No wastewater was generated during drilling activities. Purge water collected during sampling was taken to the Main Base treatment plant to be treated and/or discharged.

3.7 Demobilization and Site Restoration

After completion of well installation activities, URS demobilized the equipment and materials from the work site. Demobilization included:

- ensuring that the security casings of the new wells were installed, marked, and properly secured, and that site restoration was adequate;
- verifying that the drilling rig and equipment, including support vehicles, were cleaned and removed from the site;
- inspecting the drilling areas located in the vicinity of Mather Aviation, LLC (B4260), and verifying that they were properly cleaned/void of any construction materials;
- verifying that all IDW cuttings from field activities were disposed properly, and that no soil bins remained on site;
- ensuring that site surface features were restored to match the surrounding area;
- removing all trash and excess materials generated during construction;
- ensuring that the site was left neat and orderly;
- ensuring that the contractor’s staging area was clear of all construction-related equipment and materials; and
- ensuring that all rental equipment and rental vehicles were cleaned, decontaminated as necessary, and returned to the vendor.

3.8 Surveying

Precise elevation data is not required for SVM wells. Therefore, a hand-held Trimble Global Positioning System unit was used to collect the geospatial data for 59-PW-14, 59-PW-15, and 59-PW-16, and a measuring wheel was used to collect horizontal coordinates for 59-PW-17 inside of the hangar. Horizontal coordinates were determined to the closest 0.01 foot and referenced to the State Plane Coordinate System, Zone 2, North American Datum of 1983. Ground surface elevations were surveyed using the National Geodetic Vertical Datum of 1988, to the closest 0.01 foot. All well locations are shown in Figure 1-2. Northings and eastings are included in the lithologic and well construction logs, provided in Appendix C.

3.9 Field Sampling Summary

During the B4260 SI field effort, four sub-slab vapor probes were installed inside B4260 and 18 SVM wells were installed as well clusters at four locations. An indoor air sampling event was conducted, during which 8-hour soil vapor samples were collected from four indoor air sampling locations and two ambient air locations. Soil vapor samples were collected from the four sub-slab vapor probe locations and 37 soil vapor wells. Perched water samples were collected from five soil vapor wells. All samples were submitted for VOC analysis by TO-15 SIM or TO-15, as indicated on the sampling matrix (Table 3-2).

All vapor samples were submitted to Eurofins Air Toxics in Folsom, California for analysis; the perched water samples were submitted to Enthalpy Analytical in Berkeley, California (previously Curtis & Tompkins) for analysis. A discussion of the results is presented in Section 4.0.

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4.0 INVESTIGATION RESULTS

This section presents a description of the regional geology and hydrology, and the SI sampling results.

4.1 Regional Geology and Hydrogeology

Three geologic units are of interest at Mather—from youngest to oldest they are the Terrace Gravels, the Laguna Formation, and the Mehrten Formation (MWH 2000). A generalized hydrogeologic cross-section for Mather with the four hydrostratigraphic units is shown in Figure 4-1, identified as Units A, B, C, and D. All known groundwater contamination in the site vicinity is present in the Laguna Formation, which includes Units A, B, C, and D, but the hydrogeologic units pertinent to the evaluation of soil vapor impacts are the saturated portions of Unit A (referred to as the water-table unit [A/WT]) and the underlying Unit B. The geologic units beneath Site B4260 are described next.

Terrace Gravels. Mather is situated on a series of stream terraces that were deposited during the northwestward migration of the ancestral American River. The Terrace Gravels include a surficial unit, composed predominantly of silt and clay, extending from ground surface to approximately 10 to 15 feet bgs. Below this unit, the main Terrace Gravel unit begins, consisting of coarse-grained sand and gravel with 1- to 3-inch cobbles, extending to a depth of approximately 35 to 40 feet bgs. The Terrace Gravels are unsaturated throughout Mather.

Unit A of the Laguna Formation. The upper portion of the Laguna Formation consists of unconsolidated arkosic fluvial and deltaic sediment in the form of interbedded fine to coarse sand, silt, and clay. The upper unit of the Laguna Formation (Unit A) occurs directly beneath the terrace gravels, extending to a depth of approximately 110 feet bgs.

Unit B of the Laguna Formation. The middle unit of the Laguna Formation (Unit B) lies beneath Unit A. Unit B primarily consists of sand and gravel at B4260.

Units C and D of the Laguna Formation. Units C and D make up the lower parts of the Laguna Formation. Unit C consists of silts and clays, which occur between the lowermost Unit B sands and gravels and the uppermost Unit D sands. Unit D consists of sands and silty sands, and extends from the top of the uppermost sandy layer to the beginning of the Laguna-Mehrten Transition Zone. The Laguna-Mehrten Transition Zone has been defined as a 60- to 100-foot-thick transition between the Laguna and Mehrten Formation (IT Corp 1996). The late-Tertiary Mehrten Formation is the lowermost geologic unit identified at Mather. This water-bearing unit is the primary source of potable water in the area, extracted via water supply wells located in the former Mather housing area and in the off-base areas north and west of Mather. The Mehrten Formation contains fluvial, reworked volcanic sediments, consisting primarily of black andesitic sand and interbeds of blue to brown clay. Locally, fluvial channels are filled with andesitic gravels. The top of the Mehrten Formation is interpreted to be between approximately 245 and 306 feet below mean sea level.

4.2 Geologic Results

For each SVM drilling location, a continuous soil core was collected inside the sonic sampling tool. All soil that was encountered was described and classified by the on-site geologist, in accordance with the Unified Soil Classification System.

Lithologies encountered during drilling of the four bore holes for 59-PW-14 through 17 were fairly uniform between boring locations and were similar to what was observed at borings previously installed in the area. They consisted of gravels and cobbles in a clay and/or sandy/silty matrix from approximately

0.5–28 feet bgs. These lithologies were followed by predominantly fine-grained sands with varying amounts of silty/clayey fines. Intermittent lean clay layers were encountered in all borings except 59-PW-17. These clay layers ranged from 1 to 3 feet thick, with one layer extending 6.5 feet in 59-PW-15. These clay layers have firm, medium plastic characteristics with about 5 percent very fine sands by volume, with some containing laminations and/or interbedded silty layers. Sand content increases with depth from about 55 feet bgs to the terminal depth of the borings, at approximately 84 feet bgs.

The detailed lithologic logs with well construction details are provided in Appendix C. A geologic cross-section is shown in Figure 4-2.

4.3 Indoor Air Sample Results

The indoor air, ambient air, and sub-slab soil vapor sample results are shown in Table D-1 in Appendix D. This table presents only the analytical results for compounds detected in at least one sample. VOCs detected included: 1,1,1-trichloroethane (1,1,1-TCA), 1,2-dichloroethane, carbon tetrachloride (CTCL), tetrachloroethene (PCE), trans-1,2-dichloroethene (t-1,2-DCE), and trichloroethene (TCE).

This data is presented in units of micrograms per cubic meter, because the data was specifically collected for the HHRA. The data quality assessment is provided in Section D-1 of Appendix D, and the data analysis is provided in the HHRA, which was submitted in its final form in 2017 (URS, 2017b; AR #564638).

The only compound that exceeded its health risk criteria in indoor air or ambient air samples was CTCL, but CTCL was not detected in the sub-slab samples and the detected concentrations in indoor air were consistent with national background rates reported by USEPA; therefore, the detections of CTCL are considered background and not site-related. TCE was non-detect in indoor air and was the only site-related compound detected in the sub-slab samples. Although the sub-slab concentration of TCE substantially exceeded the screening level, its absence in the indoor air samples indicates that vapor intrusion is not occurring at B4260. The HHRA concluded that an incomplete pathway occurs between the subsurface contamination and indoor air under current conditions.

4.4 Soil Vapor Sample and Perched Water Results

Soil vapor samples were collected from all but one of the B4260 vapor wells; 59-PW-16 (8 to 10) could not be sampled because the water level in this well rebounded too fast to allow time to sample. Five perched water samples were also collected from wells expected to have more than 1 foot of water in them. The soil vapor and groundwater sample results are shown in Tables D-2 and D-3, respectively, in Appendix D. Table D-2 shows only the analytical results for compounds detected in at least one sample.

VOCs detected in the soil vapor samples included: 1,1,1-TCA, 1,1-dichloroethene, benzene, CTCL, chlorobenzene, chloroform, cis-1,2-DCE, m,p-xylene, PCE, toluene, t-1,2-DCE, TCE, and trichlorofluoromethane. VOCs detected in the perched water samples included TCE and chloroform.

TCE was the predominant VOC detected in both matrices. A summary of the TCE results for both matrices is shown in Table 4-1. The soil vapor results are shown in Figure 4-3, with an estimated soil vapor plume.

Soil Vapor Analytical Results. The maximum TCE concentration detected in soil vapor was 2,400 ppmv at 59-PW-12 (8 to 10), which exceeds its GCLE of 0.35 ppmv by a factor of more than 6,000. Compounds other than TCE that were detected at concentrations exceeding 1 ppmv included cis-1,2-DCE with a maximum concentration of 37 ppmv, 1,1-DCE with a maximum concentration of 3.9 ppmv, and t-1,2-DCE with a maximum concentration of 7.2 ppmv. The maximum concentrations of all of these VOCs were detected at 59-PW-12 (8 to 10).

The highest TCE concentrations were located at 59-PW-12 (8 to 10) and 59-PW-12 (20 to 22), as shown in Figure 4-3. The next highest TCE concentrations occurred at the 59-PW-09 well cluster, with concentrations of 24 ppmv detected at 59-PW-09A (10 to 11) and 26 ppmv at 59-PW-09B (20 to 21).

The soil vapor analytical results are assessed relative to the GCLE for TCE of 0.35 ppmv, leak test data, and soil vapor concentrations calculated from perched water concentrations, as shown in Table 4-1. The soil vapor concentration used for each well is then listed in the last column of the table. Each evaluation is described as follows:

- **GCLE**: TCE concentrations exceeded the GCLE of 0.35 ppmv in 21 of the 38 wells. Exceedance of the GCLE implies the potential for the soil vapor contamination to affect groundwater quality. VLEACH modeling was therefore performed to evaluate the leachate concentration that would be observed just above the groundwater table, as discussed in Section 4.5.
- **Leak test data**: An evaluation of the leak test data is shown in Table D-3 in Appendix D. This table shows that TCE concentrations detected at 59-PW-10 (8 to 10) and 59-PW-14 (30 to 32) potentially were biased low:
- **Calculated soil vapor concentration**s. Calculated soil vapor concentrations used perched water data. TCE concentrations in the perched water samples ranged from non-detect to 200 micrograms per liter (µg/L).

The following equation was used to calculate equivalent soil vapor concentrations for TCE:

$$C(a) = 24.055\ C(w)\ H/MW$$

Where,

MW = Molecular weight for TCE = 131.39

H = Henry’s Law constant, dimensionless for TCE = 0.377

C(w) = soil water (aqueous phase) concentration (µg/L)

C(a) = soil vapor concentration (ppmv)

The calculated soil vapor concentrations are shown in Table 4-1, and the results are discussed as follows:

- **59-PW-10A (8 to 10)**. The soil vapor concentration of 0.0056 ppmv was identified as potentially biased low. No perched water sample was collected at this location. Therefore, the value is unchanged.
- **59-PW-14 (30 to 32)**. The soil vapor concentration of 0.10 ppmv was identified as potentially biased low. The calculated value of 13.8 ppmv is substituted.
- **59-PW-14 (60 to 62)**. The calculated TCE concentration of 2.07 ppmv is lower than the measured concentration of 8.0 ppmv. No change to the measured value is made.
- **59-PW-16 (8 to 10)**. A soil vapor sample was not collected at this well because the perched water rebounded too quickly. The calculated soil vapor concentration of non-detect is substituted.
- **59-PW-17 (60 to 62)**. The soil vapor sample result of 1.4 ppmv and the calculated soil vapor concentration of 2.35 ppmv are similar. The value is not changed.

The last column of Table 4-1 shows the soil vapor concentrations selected for Figure 4-2 and Figure 4-3. Based on the potential impact on groundwater implied by exceedances of the TCE GCLE, VLEACH modeling was conducted, as discussed in Section 4.5.

4.5 Vadose Zone Modeling

Estimation of the residual contamination mass inputs to VLEACH was performed using the Thiessen polygons, shown in Figure 4-4. Thiessen polygons are used to represent spatially distributed data and are derived by drawing lines that connect halfway between wells or borings (i.e., relevant soil gas data locations), so that each data location has its own polygon. For B4260, a 150-foot radius of influence was drawn around the PW-12A/B well cluster.

The November 2017 baseline sampling data (summarized in Table 4-1) were used as inputs to VLEACH. Table E-1 in Appendix E shows the TCE concentration data for each Thiessen polygon, and the calculated equivalent soil gas concentration in micrograms per kilogram for each 5-foot-depth interval input to the VLEACH model. Also provided is the calculated, weighted average concentration for all polygons. The majority of the residual mass remaining is associated with polygon 1. The estimated mass of TCE is 354 pounds, of which 333 pounds is associated with 59-PW-12 and 59-PW-14.

VLEACH predicts leachate concentrations just above the water table. The TCE leachate concentrations predicted by VLEACH are shown in Figure 4-5 and tabulated in Table E-2 in Appendix E. The maximum initial concentration of 378 µg/L occurs at Polygon 2, where 59-PW-09 is located; the concentrations decline to 211 µg/L after 200 years. Polygon 1 is where 59-PW-12 and 59-PW-14 are located. The leachate concentration just above the water table starts at a concentration of 20 µg/L in year zero, decreases for approximately 15 years to 16.5 µg/L, then increases to a concentration of 779 µg/L after 200 years. The initial leachate concentration for the combined polygons is 78 µg/L; this concentration declines to a minimum of 53 µg/L in year 55, then increases to 181 µg/L after 200 years. The leachate concentrations predicted for Polygon 2 are likely biased high, because the soil vapor concentration at 59-PW-09 (20 to 21) is extrapolated to the water table and concentrations at depth would be expected to be lower. The Polygon 1 and combined polygon leachate concentrations, however, continue to show an increasing trend at 200 years. The VLEACH results indicate that the TCE in the B4260 source area is likely to affect groundwater quality at concentrations that exceed the ACL of 5 µg/L.

4.6 Conclusions

Field activities were conducted between January 2017 and February 2018, to evaluate the potential health risk to current occupants of the office space in Building #3 from vapor intrusion and to assess the extent of vadose zone contamination and its potential impact on groundwater quality.

The indoor air study results were used in support of the HHRA report (URS, 2017b). The HHRA concluded that there is an incomplete pathway between subsurface contamination and indoor air at B4260 under current conditions. However, the HHRA noted that modifications to the building or its foundation could introduce the risk of vapor intrusion, and recommended that the existing institutional control (IC) boundaries for Site 59 be extended to cover the B4260 area. The ICs would prohibit modification to the building or its foundation without evaluating or addressing potential for risk due to vapor intrusion. It was further recommended that the ICs include provisions for addressing risk to site construction workers involved in trenching or invasive digging (excluding shallow excavations such as landscaping).

The vadose zone characterization activities indicated that the extent of vadose zone contamination is approximately contained within a 150-foot radius of 59-PW-12, which is located near the southeastern corner of B4260. The contamination extends from a depth of approximately 8 feet to approximately 60 feet bgs.

TCE is the predominant VOC detected in the vadose zone. Soil vapor concentrations of TCE exceed the GCLE of 0.35 ppmv in 21 of 38 wells, with the maximum TCE concentration of 2,400 ppmv occurring in the vicinity of the source area. VLEACH modeling was conducted, which indicated that the TCE leachate concentration in Polygon 1 and the combined polygons would be expected to rise over time; the concentration after 200 years was modeled as 779 and 181 µg/L, respectively. Although groundwater modeling was not conducted to assess the concentration that would be observed after mixing with groundwater, the TCE leachate concentrations are expected to result in TCE concentrations that exceed the ACL of 5 µg/L.

4.7 Recommendations

The results of the VLEACH modeling indicate that the vadose zone contamination constitutes a potential threat to groundwater quality. Under the Superfund Accelerated Cleanup Model, a non-time-critical removal action is proposed to achieve prompt risk reduction (USEPA 1993).

As part of the non-time-critical removal action, an EE/CA is provided in Section 5.0, to evaluate removal action alternatives to address the vadose zone contamination at B4260.

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5.0 ENGINEERING EVALUATION AND COST ANALYSIS

Section 4.0 discussed the results of the baseline soil vapor monitoring and presented VLEACH modeling results that indicate the vadose zone contamination constitutes a threat to groundwater quality. This section presents justification of an SVE removal action to address VOCs in the vadose zone, discusses the removal action objectives, evaluates the removal action alternatives, and introduces the design which is provided as an appendix to this document.

5.1 Justification of SVE Removal Action

The results of the VLEACH modeling in Section 4.5 show that the predicted TCE leachate concentration in Polygon 1 and the combined polygons would be expected to rise over time; the concentration after 200 years was modeled as 779 and 181 µg/L, respectively. Although groundwater modeling was not conducted to assess the concentration that would be observed after mixing with groundwater, the TCE leachate concentrations are expected to result in TCE concentrations that exceed the ACL of 5 µg/L.

The current groundwater pump and treat system for the contaminated groundwater plume that extends under the main base portion of Mather, including B4260, is currently projected to operate until approximately 2057. If the leachate concentrations from the TCE soil vapor plume at B4260 rise over time as predicted, the resulting impact to groundwater would occur well after the projected end date of the groundwater pump and treat remedy. Implementation of a non-time-critical removal action to reduce the amount of mass at B4260 that could migrate to groundwater is therefore indicated.

Based on the success of SVE at other Mather vadose zone sites similarly contaminated with VOCs, an SVE removal action is recommended for the B4260 soil gas VOC contamination. SVE is evaluated below based on the following criteria for employing SVE as a presumptive remedy (USEPA 1996):

- Dimensionless Henry’s law constant greater than 0.01
- VOC vapor pressure greater than 0.5 millimeters of mercury (mm Hg)
- Soil permeability greater than 10–6 centimeter squared (cm_2)
- Soil moisture content less than 50 percent
- Soil/air-filled porosity less than 40 percent
- Low organic carbon content

Contaminants are VOCs. At B4260, the contaminants identified are primarily halogenated VOCs, with TCE being the predominant contaminant in soil gas. Compounds other than TCE that were detected at concentrations exceeding 1 ppmv included cis-1,2-DCE, 1,1-DCE, and t-1,2-DCE.

Contaminant volatility. Dimensionless Henry’s law constants for the predominant VOC compounds are greater than 0.01:

TCE = 0.377
Cis-1,2-DCE = 0.134
1,1-DCE = 1.07
Trans-1,2-DCE = 0.384

Contaminant vapor pressure. Vapor pressures for the predominant VOC compounds are greater than 0.5 mm Hg (Wiedemeier 1999; Patnaik 1992):

TCE = 58 mm Hg
Cis-1,2-DCE = 200 mm Hg
1,1-DCE = 500 mm Hg
Trans-1,2-DCE = 331 mm Hg

Geotechnical Data. Soil samples were submitted for geotechnical testing from 59-PW-03, at depths of 37 feet, 57 feet, 77 feet, and 92 feet in 2007. The soil parameters are as follows:

> **Soil permeability.** The silt sample collected at 37 feet bgs and the sand sample collected at 57 feet bgs had hydraulic conductivities of 1.76 E-05 centimeters per second (cm/s) and 2.17E-03 cm/s, respectively, or soil permeabilities of 4.58E-11 and 2.21E-08 cm^2, respectively (using a conversion factor of 1.0 cm/s = 1.02E-05 cm^2). Although this is lower than the ideal criteria for SVE, it is within the range of soil permeabilities for which SVE can be moderately effective (USEPA 2017). Further, as described in Section 4.2, the soil lithology from approximately 0.5–28 feet bgs, where TCE concentrations are highest, consists of gravels and cobbles in a clay and/or sandy/silty matrix. Geotechnical testing was not conducted for soil within this depth layer, but higher permeability is predicted due to the presence of gravels and cobbles.
>
> **Soil moisture content.** Moisture content ranged from 22.1 to 31.9 percent. Areas of the site where perched water is found may have considerably higher than 50 percent moisture content, particularly during the rainy season. The mass removal rates in these areas likely will be slower than typical, and water removal activities need to be accounted in the design. SVE activities will likely be conducted primarily in the summer when soil moisture content is lower.
>
> **Soil/air filled porosity**. The porosity ranged from 41 to 50 percent, just above the criteria of 40 percent.
>
> **Organic content.** The organic content ranged from 0.05 to 0.14 percent. This is considered relatively low.

The contaminants of concern, soil lithology, and geotechnical parameters at B4260 are similar to those found at adjacent SVE sites at Mather, including Site 59, Site 37/39/54, Site 29/71, and Site 18. SVE has been effectively implemented at each of those sites, successfully reducing VOC mass in soil vapor to below levels predicted to impact groundwater. SVE is a proven, cost-effective technology for remediating VOCs in soil vapor, and a treatment system is already in place at Site 59 that can be readily utilized for SVE at B4260. SVE can be implemented at B4260 with minimal disturbance to existing on-site tenants and operations. SVE is therefore considered to be the best available technology for removing soil vapor VOCs at B4260.

5.2 Removal Action Objectives

The removal action objectives of the non-time-critical-removal action B4260 for the vadose zone contamination at B4260 are based on the remedial action objectives found in the 1996 ROD and its associated explanation of significant differences, the *Final Explanation of Significant Differences for Soil Operable Unit Sites and Ground Water Operable Unit Plumes for Record of Decision for Sites 56, 59, and 60* (1998 ESD; AFBCA 1998), and the *Revised Final Explanation of Significant Differences from the Record of Decision for Soil Operable Unit Sites and Groundwater Operable Unit Plumes* (2010 ESD; AFBCA 2010). The 1996 ROD, 1998 ESD, and 2010 ESD collectively define the remedial action objectives that were selected for vadose zone cleanup at Mather as being protective of human health, the environment, and groundwater quality; the objective of remediating the vadose zone is to minimize further degradation of the groundwater caused by contaminants migrating from the overlying soil.

The soil cleanup standard will be achieved when the residual vadose zone contaminants will not cause the groundwater cleanup standard, as measured in groundwater wells monitoring the plume, to be exceeded after cessation of the groundwater remediation. The TCE ACL identified in the 1996 ROD for the Main Base/SAC Industrial Area plume was 5 µg/L. In accordance with the 1996 ROD and 1998 ESD, the Air Force will demonstrate that the cleanup standard has been met through contaminant fate-and-transport modeling, trend analysis, mass balance, and/or other means. SVE termination criteria are discussed further in Section 5.7.

5.3 ARARs

Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) specifies that Superfund remedial actions must meet any federal standards, requirements, criteria, or limitations that are determined to be legally "applicable" or "relevant and appropriate" requirements (ARARs). It also specifies that state ARARs must be met if they are more stringent than federal requirements. CERCLA 121 requirements generally apply as a matter of law only to remedial actions. However, the National Contingency Plan (NCP) requires that ARARs be identified and attained to the extent practicable considering the exigencies of the situation for removal actions (40 CFR 300 415). ARARs are generally placed in three categories: chemical-specific, action-specific, and location-specific. Chemical-specific ARARs define the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment. Action-specific ARARs define performance and design standards for the action taken. Location-specific ARARs modify chemical- and/or action-specific ARARs to reflect the unique requirements of the location.

Because the purpose of this SVE removal action is to remove vadose zone VOCs such that groundwater remediation will not be extended, it is considered to be ancillary to the Mather groundwater remedy. Groundwater remediation ARARs are presented and discussed in the 1996 ROD. This EE/CA will only discuss ARARs deemed applicable or relevant and appropriate for the SVE removal action.

5.3.1 Chemical-Specific ARARs

Chemical-specific ARARs set limits on concentrations of specific hazardous substances, pollutants, and contaminants in the environment where removal actions are being applied. These ARARs are applied to the chemical of concern in the designated media. For Mather SVE removal actions, the key removal action ARARs are those associated with soil vapor VOCs that may impact groundwater above the MCL. The table below lists the chemical-specific ARARs, that is, the groundwater cleanup levels to be used when screening or modeling residual vadose zone soil gas VOC concentrations to assess their potential impact on the groundwater cleanup.

Mather B4260 SVE Chemical-specific ARARs

Potential Contaminant of Concern	Safe Drinking Water Act or State Equivalent
	Primary MCL (µg/L)
1,1-Dichloroethene	6
TCE	5
cis-1,2-Dichloroethene	6
trans-1,2-Dichloroethene	10

Notes: µg/L = micrograms per liter

5.3.2 Action-Specific ARARs

Action-specific ARARs set controls or restrictions on activities related to the management of hazardous substances or pollutants. The table below lists action-specific ARARs for SVE at B4260.

Mather B4260 SVE Action-specific ARARs

Action: SVE	Requirement	ARAR Determination	Description of Requirement	Comment
Hazardous waste identification and handling	22 CCR 66262.10(a) and 66262.11	Applicable	Requirements for the identification and accumulation of hazardous waste are applicable to hazardous wastes (i.e., treatment system O&M wastes) generated during the implementation of the remedial alternative.	These requirements are applicable to hazardous wastes that are generated, containerized, and stored onsite, such as treatment unit residuals from the SVE system.
Container storage	22 CCR 66264.171, 172, 173, 174	Applicable	Containers of hazardous waste must: • Be maintained in good condition. • Be compatible with hazardous waste to be stored. • Be closed during storage except to add or remove waste. • Have adequate secondary containment when stored onsite.	These requirements are applicable to hazardous wastes that are generated, containerized, and stored at the site, such as treatment unit residuals from the SVE system.
	and (b)	Applicable	Hazardous waste generators must: Place containers on a sloped, crack-free base, and protect from contact with accumulated liquid. Provide a containment system with a capacity of 10 percent of the volume of containers with liquids. Remove spilled or leaked waste in a timely manner to prevent overflow of containment system.	These requirements are applicable to hazardous wastes that are generated, containerized, and stored onsite, such as treatment unit residuals from the SVE system.
Control of Air Emissions	SMAQMD Rule 201	Applicable	Requires sources of air emissions to obtain permits to operate.	Substantive requirements of air permits would apply if 2 pounds per day or more of air emissions would occur from onsite treatment systems. These requirements could include operational restrictions, such as emission limits.
	SMAQMD Rule 202, Section 302	Applicable	Requires Best Available Control Technology to be applied to new emissions.	
	SMAQMD Rule 402 (as promulgated)	Applicable	Emissions from a new SVE system may not cause injury to the public.	
Deed restrictions and SLUC	22 CCR 67391.1(a), (d), and (e)	Relevant and Appropriate	Requires imposition of appropriate limitations on land use by recorded LUC when hazardous substances remain on the property at levels that are not suitable for unrestricted use of the land. Requires that the LUC be recorded in the county where the land is located.	Appropriate restrictions (in the form of institutional controls) may be included in the Federal deed as well as a SLUC.
	CA Civil Code Sect. 1471(a) and (b)	Relevant and Appropriate	Specifies requirements for the LUC to apply to successors in the title to the land.	

Notes:

ARAR = applicable or relevant and appropriate requirement
B4260 = Building 4260
CCR = California Code of Regulations
LUC = land use covenant
O&M = operations and monitoring
SLUC = State Land Use Covenant
SMAQMD = Sacramento Metropolitan Air Quality Management District
SVE = soil vapor extraction

5.3.3 Location-Specific ARARs

These ARARs establish additional restrictions on contaminant levels or activities in the environment and are triggered by the unique nature of a site's location or its immediate environment. They may function as chemical-specific ARARs or action-specific ARARS. Examples of locations that require special consideration include floodplains, wetlands, historic places, and sensitive ecosystems or habitats. The proposed SVE site is located adjacent to a hangar at an operating airport with no unique features requiring location-specific ARARs.

5.4 Identification of Removal Action Alternatives

The removal action alternatives selected for evaluation in this EE/CA include the No Action alternative and SVE. Although no historical removal actions are known to have occurred at B4260, SVE is the remedy that has been successfully implemented for Mather vadose zone sites previously contaminated with VOCs, in accordance with the 1996 ROD, including the adjacent Site 59. As discussed in Section 5.1, the site conditions are consistent with EPA's criteria for using SVE as a presumptive remedy (USEPA 1996). SVE is considered to be the best available technology for removing soil vapor VOCs at B4260, and a treatment system is already in place at Site 59 that can be readily utilized for SVE at B4260. Therefore, SVE is considered the presumptive remedy for VOCs in soil at B4260 and the alternatives are defined as follows:

- **Alternative 1, No Action.** Under the no action scenario, no attempts would be taken to remove the VOCs from the vadose zone.
- **Alternative 2, SVE.** The SVE remedy for B4260 would include the following components:
  - treating the contaminated shallow and medium depth soils by in situ SVE; and
  - monitoring the residual soil gas vadose zone concentrations to assess the potential impact on groundwater.

5.5 Analysis of Removal Action Alternatives

5.5.1 Criteria for Comparison of Alternatives

The removal action alternatives are evaluated based on the criteria of effectiveness, implementability, and cost:

- **Effectiveness.** The effectiveness of an alternative refers to its ability to meet the removal action objectives within the scope of the removal action. This criteria looks at overall protection of public health and the environment, protectiveness of workers during implementation, long-term effectiveness and permanence, short-term effectiveness, and compliance with the ARARs.
- **Implementability.** This includes technical feasibility, availability of equipment and services, and administrative feasibility.
- **Cost.** This includes the capital, operational costs, close-out costs, and present worth cost to implement the alternative.

5.5.2 Comparison of Alternatives

The No Action and SVE alternatives are described in more detail next and are ranked against the criteria of effectiveness, implementability, and cost. A rating of zero is given if the criteria are not met, and a rating of 5 is given if the criteria are fully met.

Alternative 1, No Action. The No Action alternative would not include any additional field activities to remediate the vadose zone contamination. This alternative is considered to be a no-cost alternative for purposes of comparison to SVE.

The No Action alternative is expected to rank poorly in effectiveness because it would not be able to meet the removal action objectives, and therefore would not be protective of groundwater quality. However, because no groundwater data is available to validate the VLEACH modeling results, a ranking of 1 is given for effectiveness.

The No Action alternative would be highly implementable from a technical standpoint because no field activities would be conducted. However, this alternative would score low for implementability from an administrative standpoint because it would not be protective of groundwater and is therefore not likely to achieve community and regulatory acceptance. The No Action alternative was therefore assigned a rank of 2 for overall implementability.

The No Action alternative would rank high for cost in the short term, because it is a no-cost alternative. However, selection of the No Action alternative could result in future expenditures over and above the current cost for SVE if, for example, a groundwater extraction and treatment system is required. Therefore, cost is given a rank of 3.

Alternative 2, SVE. The SVE alternative would include installation of an SVE well, screened from 8 to 40 feet and from 54 to 60 feet in the vicinity of the source area, by 59-PW-12. The well would be plumbed to the existing Site 59 SVE extraction and treatment system, which includes an air/water separator (AWS), a 750-cubic-foot-per-minute blower, and two 3,000-pound vapor-phase granular-activated carbon vessels for off-gas treatment. A second AWS would be installed near the SVE well, and locations for drainage of water would be included in the design. The system would be operated for a minimum of 6 months; an additional 2 years of operation is anticipated, after which the system would be shut down and evaluated for rebound. Provided that the data justifies SVE termination, the wells, piping, and the Site 59 SVE system would be decommissioned.

The SVE alternative is expected to rank high in effectiveness because SVE is known to be an effective technology for removing VOCs from the vadose zone. However, because of the presence of perched water, the rate of removal may be slower and SVE may take longer than for other sites. Therefore, a ranking of 4 is given for effectiveness.

The SVE alternative is highly implementable from a technical standpoint, but some challenges would occur because of the number of underground utilities and the presence of perched water. These challenges would be mitigated by installing the piping aboveground and by adding additional capacity to remove water from the system. This alternative would rank high from an administrative standpoint, because SVE is a proven technology that has previously achieved regulatory and community acceptance for its ability protect groundwater. A ranking of 4 is given for implementability.

The SVE alternative would be more costly than the No Action alternative in the short term. The cost breakdown is shown in Table 5-1 and includes a capital cost of approximately $420,000, two years with annual operating costs of approximately $240,000 per year, and closeout costs after 3 years of $267,000. The present worth cost for the SVE removal action is estimated at $1,170,000. However, long-term costs could exceed that amount if contaminants remain in place and future groundwater extraction and treatment is required, particularly if a new groundwater pump and treat system was needed. A ranking of 3 is therefore given for cost.

Alternative	Effectiveness	Implementability	Cost	Total
Alt 1 – No Action	1	2	3	6
Alt 2 – SVE	4	4	3	11

Summary. The No Action alternative ranks poorly compared to SVE, being given 6 points; SVE is given 11 points. Key factors in the rankings include the inability of the No Action alternative to protect groundwater, to achieve public and regulatory acceptance, and to reduce costs in the long term.

5.6 Implementation Plan for SVE Removal Action

The proposed schedule to prepare the documents and implement an SVE removal action at B4260 is shown below. The draft SI/EE/CA would be made available for public comment concurrent with the agency review period. The system design is provided in Appendix F. SVE system construction would follow the Action Memorandum.

Task	Start		End
SI/EECA + Design–Agency Review	4/2/2018	to	5/2/18
Final SI/EECA	5/16/2018	to	5/16/18
Public Comment Period (30 days)	4/2/2018	to	5/2/2018
Action Memorandum–Agency Review	5/3/2018	to	5/16/2018
Final Action Memorandum	5/23/2018	to	5/23/18
SVE Well and Piping Installation	5/24/2018	to	6/14/2018
Startup	6/15/2018	to	6/21/2018
SVE O&M Start Date	6/22/2018	to	6/22/2018

The SVE system would operate for a minimum of 6 months after the start date. An additional 2 years of operation is anticipated, after which the system would be shut down and evaluated for rebound. Termination of SVE would occur after the narrative vadose zone cleanup standards from the 1996 ROD and 1998 ESD are met, and would consider the following factors:

a. whether the predicted concentration of the leachate from the vadose zone (using VLEACH or another appropriate vadose zone model that interprets soil vapor data) will exceed the groundwater cleanup standard;

b. whether the mass removal rate is approaching asymptotic levels after temporary shutdown periods and appropriate optimization of the SVE system;

c. the additional cost of continuing to operate the SVE system at concentrations approaching asymptotic mass removal levels;

d. the predicted effectiveness and cost of further enhancements to the SVE system (e.g., additional vapor extraction wells);

e. whether the cost of groundwater remediation would be significantly more if the residual vadose zone contamination is not addressed;

f. whether residual mass in the vadose zone would significantly prolong the time to attain the groundwater cleanup standard; and

g. the incremental cost over time of vadose zone remediation compared to the incremental cost over time for groundwater remediation on the basis of a common unit (e.g., cost per pound of TCE removed), provided that the underlying groundwater has not reached aquifer cleanup levels.

Optimization activities may include cycling of the SVE system on and off, to optimize the SVE operation and/or evaluate the factors listed above.

6.0 REFERENCES

Air Force Base Conversion Agency (AFBCA). 1996. *Final Superfund Record of Decision, Soil Operable Unit Sites and Groundwater Operable Unit Plumes* [1996 ROD].

———. 1998 (August). *Final Explanation of Significant Differences for Soil Operable Unit Sites and Ground Water Operable Unit Plumes for Record of Decision for Sites 56, 59, and 60* [1998 ESD].

———. 2010 (February). *Explanation of Significant Differences from the Record of Decision for Soil Operable Unit Sites and Groundwater Operable Unit Plumes* [2010 ESD]. Soil Sites WPO7/F1-1l, ST-37/ST-39/SS-54, SD-57, SD-59, OT-69, Main Base/SAC Area Plume, Site 7 Plume, Northeast Plume, former Mather AFB.

California Department of Toxic Substances Control (DTSC). 2011. *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* [Vapor Intrusion Guidance].

California Department of Toxic Substances Control (DTSC), Los Angeles Regional Water Quality Control Board, and San Francisco Regional Water Quality Control Board. 2015 (July). *Advisory–Active Soil Vapor Investigations.*

California Department of Water Resources (DWR). 2015. *Statewide Advisory: Sealing Materials for Water Wells, Monitoring Wells, Cathodic Protection Wells, and Geothermal Heat Exchange Wells*.

International Technology Corporation (IT Corp). 1996. *Additional Site Characterization and Basewide Operable Unit Remedial Investigation Report for Mather Air Force Base, California*. Final. September.

Lackey, S. O., W. Myers, T. C. Christopherson, and J. J. Gottula. 2009 (October, and subsequent unpublished research). *In-Situ Study of Grout Materials 2001–2006 and 2007 Dye Tests*. Nebraska Grout Task Force, Lincoln, NE: University of Nebraska.

Montgomery Watson Harza (MWH). 2000. *Informal Technical Information Report and Hydrogeologic Report for Phase III and Phase III Groundwater Remediation of the Main Base/SAC Groundwater Plume*. Mather Air Force Base, California. Draft Final. July.

Nielsen, D. M. 2005 (September). Practical Handbook of Environmental Site Characterization and Ground-Water Monitoring. Second edition.

Patnaik, P. 1992. *A Comprehensive Guide to the Hazardous Properties of Chemical Substances*. Van Nostrand Reinhold.

URS Group, Inc. (URS). 2010 (August). *Former Mather Air Force Base Health and Safety Plan for Long-Term Operations, Maintenance, and Monitoring*.

———. 2015a (March). *2014 Soil Vapor Extraction/Bioventing Annual Monitoring Report, Former Mather Air Force Base, California.*

———. 2017a (February). *Site 59b Remedial Investigation Work Plan, Former Mather Air Force Base, California*.

———. 2017b (September). *Final Building 4260 Human Health Risk Assessment, Former Mather Air Force Base, California*.

U.S. Environmental Protection Agency (USEPA). 1993 (August). *Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA.* EPA/540-R-93-057.

———. 1996 (July). *User's Guide to the VOCs in Soils Presumptive Remedy.*

———. 2015. *Office of Solid Waste and Emergency Response (OSWER) Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway for Subsurface Vapor Sources to Indoor Air*.

———. 2017 (October). *How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites.* EPA 510-B-17-003.

Wiedemeier. 1999.Natural Attenuation of Fuels and Chlorinated Solvents in the Subsurface. John Wiley and Sons, Inc.

TABLES

Table 3-1. Soil Vapor Monitoring Well Construction Summary
B4260, Former Mather Air Force Base

Borehole Depth (feet)	Casing and Screen Diameter (inches)	Casing and Screen Material	Screen Intervals (feet)	Screen Slot Size (inches)	Filter Pack #2/12 Sand + Sand Bridge #0/30 Sand (feet)	Hydrated Bentonite Seal (feet)	Above Hydrated Bentonite
59-PW-14	1	1” SCH 40 PVC	30–32	0.020	5	25	Cement Grout*
	1	1” SCH 40 PVC	60–62	0.020	5	25	NA
	1	1” SCH 40 PVC	80–82	0.020	5	15	NA
59-PW-15	1	1” SCH 40 PVC	9–11	0.020	5	4	Cement Grout*
	1	1” SCH 40 PVC	20–22	0.020	5	6	NA
	1	1” SCH 40 PVC	30–32	0.020	5	5	NA
	1	1” SCH 40 PVC	60–62	0.020	5	25	NA
	1	1” SCH 40 PVC	80–82	0.020	5	15	NA
59-PW-16	1	1” SCH 40 PVC	8–10	0.020	5	3	Cement Grout*
	1	1” SCH 40 PVC	20–22	0.020	5	7	NA
	1	1” SCH 40 PVC	30–32	0.020	5	5	NA
	1	1” SCH 40 PVC	60–62	0.020	5	25	NA
	1	1” SCH 40 PVC	80–82	0.020	5	15	NA
59-PW-17	1	1” SCH 40 PVC	8–10	0.020	5	3	Cement Grout*
	1	1” SCH 40 PVC	20–22	0.020	5	7	NA
	1	1” SCH 40 PVC	30–32	0.020	5	5	NA
	1	1” SCH 40 PVC	60–62	0.020	5	25	NA
	1	1” SCH 40 PVC	80–82	0.020	5	15	NA

* Contains approximately 5 percent bentonite to reduce shrinkage.

NA = not applicable
PVC = polyvinyl chloride
SCH = schedule
SVE = soil vapor extraction

Table 3-2. Sampling Matrix
B4260, Former Mather Air Force Base

Sample Location	Sample Depth (feet bgs)	Sample ID Number	QA Sample	Soil Vapor Sample Analysis		Perched Water Analysis	Note
				TO-15	TO-15 SIM	SW8260B	
Indoor Air Samples:							
59-IA-01		59-IA-01-NS			1		
59-IA-01		59-IA-01-FD	FD		1		
59-IA-02		59-IA-02-NS			1		
59-IA-03		59-IA-03-NS			1		
59-IA-04		59-IA-04-NS			1		
Ambient Air Samples:							
59-AA-01		59-AA-01-NS			1		
59-AA-01		59-AA-01-FD	FD		1		
59-AA-02		59-AA-02-NS			1		
Sub-Slab Samples:							
59-SS-01		59-SS-01-NS		1			
59-SS-01		59-SS-01-FD	FD	1			
59-SS-02		59-SS-02-NS		1			
59-SS-03		59-SS-03-NS		1			
59-SS-04		59-SS-04-NS		1			
Existing Soil Vapor Wells:							
59-PW-05	10-20	59-PW-05-10-NS		1			
59-PW-05	30-40	59-PW-05-30-NS		1			
59-PW-05	50-60	59-PW-05-50-NS		1			
59-PW-05	70-90	59-PW-05-70-NS		1			
59-PW-06	11-21	59-PW-06-11-NS		1			
59-PW-06	31-41	59-PW-06-31-NS		1			
59-PW-06	51-61	59-PW-06-51-NS		1			
59-PW-06	51-61	59-PW-06-51-FD	FD	1			
59-PW-06	70-90	59-PW-06-70-NS		1			
59-PW-07	10-20	59-PW-07-10-NS		1			
59-PW-08	10-20	59-PW-08-10-NS		1			
59-PW-09A	10-11	59-PW-09A-10-NS		1			
59-PW-09B	20-21	59-PW-09B-20-NS		1			
59-PW-09B	20-21	59-PW-09B-20-FD		1			
59-PW-10A	8-10	59-PW-10A-08-NS		1			
59-PW-10B	20-22	59-PW-10B-20-NS		1			
59-PW-11A	8-10	59-PW-11A-08-NS		1			
59-PW-11A	8-10	59-PW-11A-08-FD	FD	1			
59-PW-11B	20-22	59-PW-11B-20-NS		1			
59-PW-12A	8-10	59-PW-12A-08-NS		1			
59-PW-12B	20-22	59-PW-12B-20-NS		1			
59-PW-13A	8-10	59-PW-13A-08-NS		1		1	
59-PW-13B	20-22	59-PW-13B-20-NS		1			
New Soil Vapor Wells:							
59-PW-14	30-32	59-PW-14-30-NS		1		1	
59-PW-14	60-62	59-PW-14-60-NS		1		1	
59-PW-14	60-62	59-PW-14-60-FD	FD	1			
59-PW-14	80-82	59-PW-14-80-NS		1			
59-PW-15	8-10	59-PW-15-08-NS		1			
59-PW-15	20-22	59-PW-15-20-NS		1			
59-PW-15	30-32	59-PW-15-30-NS		1			
59-PW-15	60-62	59-PW-15-60-NS		1			
59-PW-15	80-82	59-PW-15-80-NS		1			
59-PW-16	8-10	59-PW-16-08-NS				1	a
59-PW-16	20-22	59-PW-16-20-NS		1			
59-PW-16	30-32	59-PW-16-30-NS		1			
59-PW-16	60-62	59-PW-16-60-NS		1			
59-PW-16	80-82	59-PW-16-80-NS		1			
59-PW-17	8-10	59-PW-17-08-NS		1			

Table 3-2. Sampling Matrix
B4260, Former Mather Air Force Base

Sample Location	Sample Depth (feet bgs)	Sample ID Number	QA Sample	Soil Vapor Sample Analysis		Perched Water Analysis	Note
				TO-15	TO-15 SIM	SW8260B	
59-PW-17	20-22	59-PW-17-20-NS		1			
59-PW-17	20-22	59-PW-17-20-FD	FD	1			
59-PW-17	30-32	59-PW-17-30-NS		1			
59-PW-17	60-62	59-PW-17-60-NS		1		1	
59-PW-17	80-82	59-PW-17-80-NS		1			
			Totals:	47	8	5	

Notes:

The indoor air, ambient air, and sub-slab soil vapor samples were analyzed for the 9 TO-15 SIM analytes listed in Table E-1 of the quality assurance project plan (QAPP) addendum in the work plan (URS, 2017a).

The soil vapor samples will be analyzed for the TO-15 suite of analyses listed in Table E-1 of the QAPP addendum in the work plan (URS, 2017a).

a = No soil vapor sample collected; perched water recharges too quickly.

bgs = below ground surface
FD = field duplicate
NS = normal sample
QA = quality assurance
SIM = selective ion monitoring

Table 4-1. TCE Results in Soil Vapor and Perched Water
B4260, Former Mather AFB, Baseline Soil Vapor Sampling Event

LOCATION	Sample Depth (feet bgs)	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	TCE Soil Vapor Results (ppmv)	TCE Soil Vapor EPA Flags	TCE Perched Water Result (ug/L)	Calculated TCE Soil Vapor Conc (ppmv)	Leak Test Result	Selected TCE Soil Vapor Results (ppmv)	
59-PW-05	10-20	11/7/2017	59-PW-05-10-NS	NS1	0.11					0.11	
59-PW-05	30-40	11/7/2017	59-PW-05-30-NS	NS1	0.32					0.32	
59-PW-05	50-60	11/7/2017	59-PW-05-50-NS	NS1	0.018	J+				0.018	J+
59-PW-05	70-90	11/7/2017	59-PW-05-70-NS	NS1	0.41					0.41	
59-PW-06	11-21	11/7/2017	59-PW-06-11-NS	NS1	0.023					0.023	
59-PW-06	31-41	11/7/2017	59-PW-06-31-NS	NS1	0.01	B				0.01	B
59-PW-06	51-61	11/7/2017	59-PW-06-51-FD	FD1	0.011	B				0.011	B, c
59-PW-06	51-61	11/7/2017	59-PW-06-51-NS	NS1	0.01	B				0.01	B
59-PW-06	70-90	11/7/2017	59-PW-06-70-NS	NS1	0.36					0.36	
59-PW-07	10-20	11/7/2017	59-PW-07-10-NS	NS1	7.1					7.1	
59-PW-08	10-20	11/7/2017	59-PW-08-10-NS	NS1	1.1					1.1	
59-PW-09A	10-11	11/7/2017	59-PW-09A-10-NS	NS1	24					24	
59-PW-09B	20-21	11/7/2017	59-PW-09B-20-FD	FD1	26					26	
59-PW-09B	20-21	11/7/2017	59-PW-09B-20-NS	NS1	26					26	
59-PW-10A	8-10	11/7/2017	59-PW-10A-08-NS	NS1	0.0056	F			C	0.0056	F
59-PW-10B	20-22	11/7/2017	59-PW-10B-20-NS	NS1	0.0039	F				0.0039	F
59-PW-11A	8-10	11/8/2017	59-PW-11A-08-FD	FD1	0.033					0.033	c
59-PW-11A	8-10	11/8/2017	59-PW-11A-08-NS	NS1	0.031					0.031	
59-PW-11B	20-22	11/7/2017	59-PW-11B-20-NS	NS1	1.4					1.4	
59-PW-12A	8-10	11/7/2017	59-PW-12A-08-NS	NS1	2,400					2400	
59-PW-12B	20-22	11/7/2017	59-PW-12B-20-NS	NS1	270					270	
59-PW-13A	8-10	11/2/2017	59-PW-13A-08-NS	NS1	0.0018	F	<0.1	< 0.01		0.0018	F
59-PW-13B	20-22	11/2/2017	59-PW-13B-20-NS	NS1	0.53					0.53	
59-PW-14	30-32	11/1/2017	59-PW-14-30-NS	NS1	0.10	F	200	13.8	C	13.8	a
59-PW-14	60-62	11/1/2017	59-PW-14-60-FD	FD1	8.0					8	
59-PW-14	60-62	11/1/2017	59-PW-14-60-NS	NS1	8.0		30	2.07		8	
59-PW-14	80-82	11/3/2017	59-PW-14-80-NS	NS1	1.4					1.4	
59-PW-15	8-10	11/2/2017	59-PW-15-08-NS	NS1	0.00					0.00	
59-PW-15	20-22	11/2/2017	59-PW-15-20-NS	NS1	0.59					0.59	
59-PW-15	30-32	11/2/2017	59-PW-15-30-NS	NS1	0.017					0.017	
59-PW-15	60-62	11/2/2017	59-PW-15-60-NS	NS1	0.47					0.47	
59-PW-15	80-82	11/2/2017	59-PW-15-80-NS	NS1	0.07					0.07	
59-PW-16	8-10	11/2/2017	59-PW-16-10-NS	NS1	NS		<0.1	< 0.0069		< 0.0069	b
59-PW-16	20-22	11/1/2017	59-PW-16-20-NS	NS1	1.40					1.4	
59-PW-16	30-32	11/1/2017	59-PW-16-30-NS	NS1	0.37					0.37	
59-PW-16	60-62	11/3/2017	59-PW-16-60-NS	NS1	1.20					1.2	
59-PW-16	80-82	11/3/2017	59-PW-16-80-NS	NS1	0.039					0.039	
59-PW-17	8-10	11/3/2017	59-PW-17-08-NS	NS1	0.0081	F				0.0081	F
59-PW-17	20-22	11/3/2017	59-PW-17-20-FD	FD1	5.30					5.3	
59-PW-17	20-22	11/3/2017	59-PW-17-20-NS	NS1	5.50					5.5	
59-PW-17	30-32	11/3/2017	59-PW-17-30-NS	NS1	3.30					3.3	
59-PW-17	60-62	11/2/2017	59-PW-17-60-NS	NS1	1.40		34	2.35		1.4	
59-PW-17	80-82	11/3/2017	59-PW-17-80-NS	NS1	0.050					0.05	

Bolded values exceed the groundwater contaminant level equivalent (GCLE) for TCE of 0.35 ppmv

Notes:

a = Isopropylene concentration exceeds leak test criteria; VOC concentration potentially biased low; calculated soil vapor concentration from perched water analyses substituted for soil vapor analytical result

b = Soil vapor sample was not collected because perched water levels rebounded. Calculated TCE soil vapor concentration from perched water analysis is used.

c = Field duplicate analysis result is used because it is greater than the normal sample concentration

B = Qualified as non-detected due to blank contamination
bgs = below ground surface
C = potentially compromised - VOC concentration may be low.
F = result reported between method detection limit and reporting limit
J+ = estimated value, potential high bias

NS = not sampled
ppmv = parts per million by volume
TCE = trichloroethene
ug/L = micrograms per liter
< = not detected above the detection limit

Table 5-1. Cost Breakdown for Alternative 2 - Soil Vapor Extraction
B4260, Former Mather AFB

Alternative 2 - Soil Vapor Extraction

Cost Estimate Summary

Site: B4260
Location: Mather Air Force Base
Phase: EECA (-30% to +50%)
Base Year: 2018
Date: March 2018

Description: Alternative 2 includes the installation of a new SVE well near the source area, installation of piping from the new well to the existing Site 59 SVE system, minor upgrades to the Site 59 SVE system, and operation of the SVE system for up to 2 additional years.

CAPITAL COSTS:

Description	**Quantity**	**Unit**	**Unit Cost**	**Subtotal**	**Total**	**Notes**
Work Plans & Permits	1	lump sum	$0	$0	$0	Already completed
Plans & Specifications and Procurement	1	lump sum	$20,000	$20,000	$20,000	In progress
Completion Report	1	lump sum	$30,000	$30,000	$30,000	
Land Use Controls	1	lump sum	$0	$0	$0	
SVE Well Installation	1	lump sum	$23,000	$23,000	$23,000	
Piping Installation and SVE system upgrade	1	lump sum	$100,000	$100,000	$100,000	
System Startup	1	lump sum	$15,000	$15,000	$15,000	
System Operations - 6 months	1	lump sum	$70,000	$70,000	$70,000	
Quarterly Monitoring - 2 events	1	lump sum	$30,000	$30,000	$30,000	
Monthly and Quarterly Reporting - 6 months	1	lump sum	$30,000	$30,000	$30,000	
Subtotal					$318,000	
Contingency	20%				$63,600	"Scope contingency typically ranges from 10 to 25 percent. Bid contingency typically ranges from 10 to 20 percent." (EPA, 2000) 10% Scope + 10% Bid
Subtotal					$381,600	
Project Management	10%				$38,160	Based on EPA, 2000
Remedial Design	20%				$0	Included above
Construction Management	15%				$0	Included above
Total Capital Cost					$419,760	

Table 5-1. Cost Breakdown for Alternative 2 - Soil Vapor Extraction
B4260, Former Mather AFB

Alternative 2 - Soil Vapor Extraction — Cost Estimate Summary

O&M COSTS:

Description	Quantity	Unit	Unit Cost	Subtotal	Total	Notes
Annual O&M Activities	1	Event	$200,000	$200,000	$200,000	
Contingency	20%				$40,000	"The total contingency value (bid + scope) that is applied to annual O&M costs is typically equal to or greater than the contingency applied to capital costs." (EPA, 2000)
Total O&M Cost					$240,000	

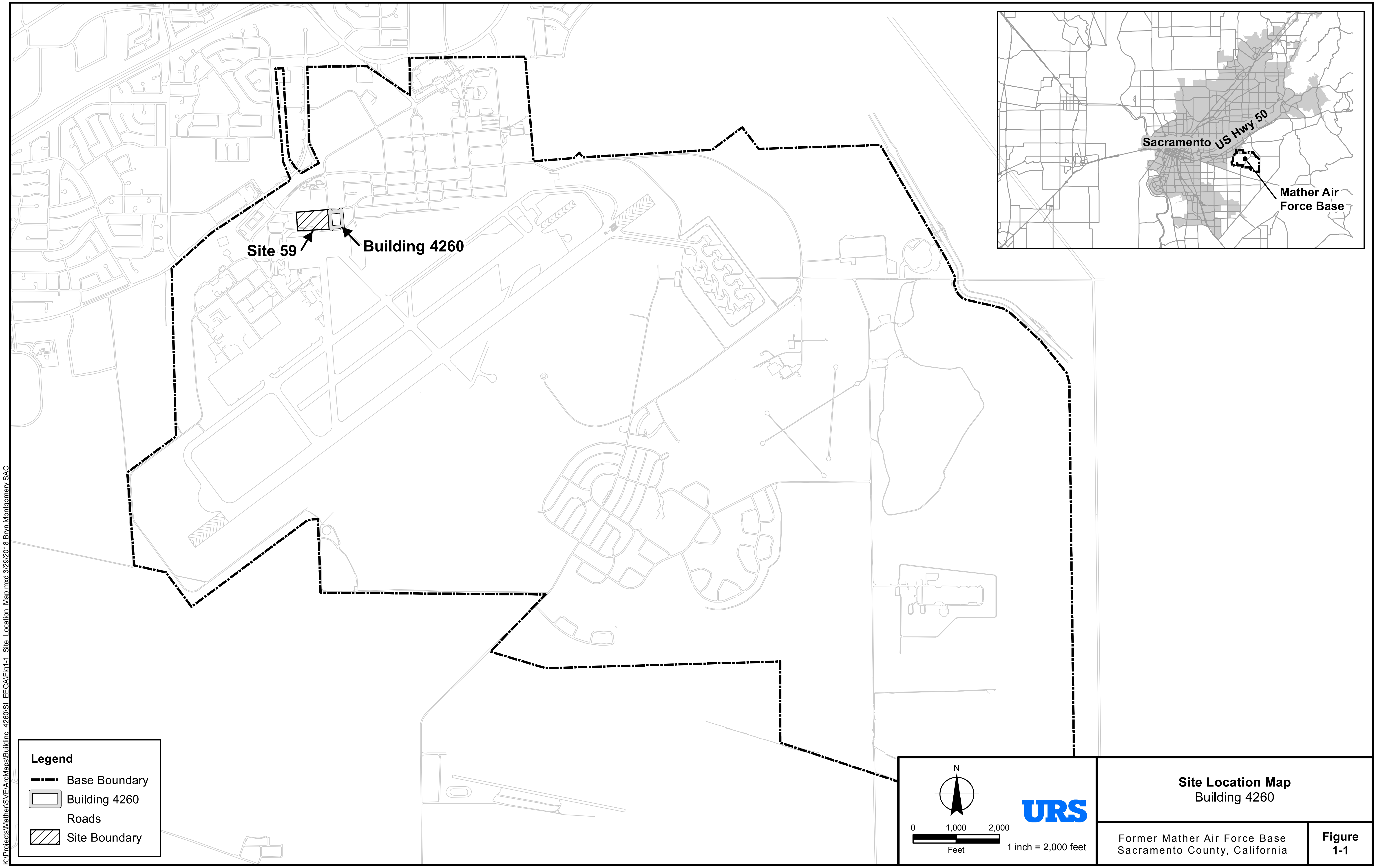
PERIODIC COSTS:

Description	Year	Quantity	Unit	Unit Cost	Subtotal	Total	Notes
SVE Well Decommissioning		14	well	$8,000	$112,000	$112,000	
SVE System Decommissioning		1	lump sum	$20,000	$20,000	$20,000	
SVE Completion Report		1	lump sum	$40,000	$40,000	$40,000	
Decommissioning Work Plan		1	lump sum	$20,000	$20,000	$20,000	
Decommissioning Report		1	lump sum	$10,000	$10,000	$10,000	
Subtotal						$202,000	
Contingency	20%					$40,400	
Subtotal						$242,400	
Project Management	10%					$24,240	Based on EPA, 2000
Total Periodic Cost						$266,640	

PRESENT VALUE ANALYSIS:

Description	Year	Capital Cost	Annual O&M Cost	Periodic Cost	Total Cost	3-year Discount Factor (-0.5%)	Present Worth
	0	$419,760	$0	$0	$419,760	1	$419,760
	1	$0	$240,000	$0	$240,000	1.005	$241,206
	2	$0	$240,000	$0	$240,000	1.010	$242,418
	3	$0	$0	$266,640	$266,640	1.015	$270,680
	4	$0	$0	$0	$0	1.020	$0
	Subtotals	$419,760	$480,000	$266,640	$1,166,400		$1,174,064
	TOTAL						**$1,174,064**

FIGURES

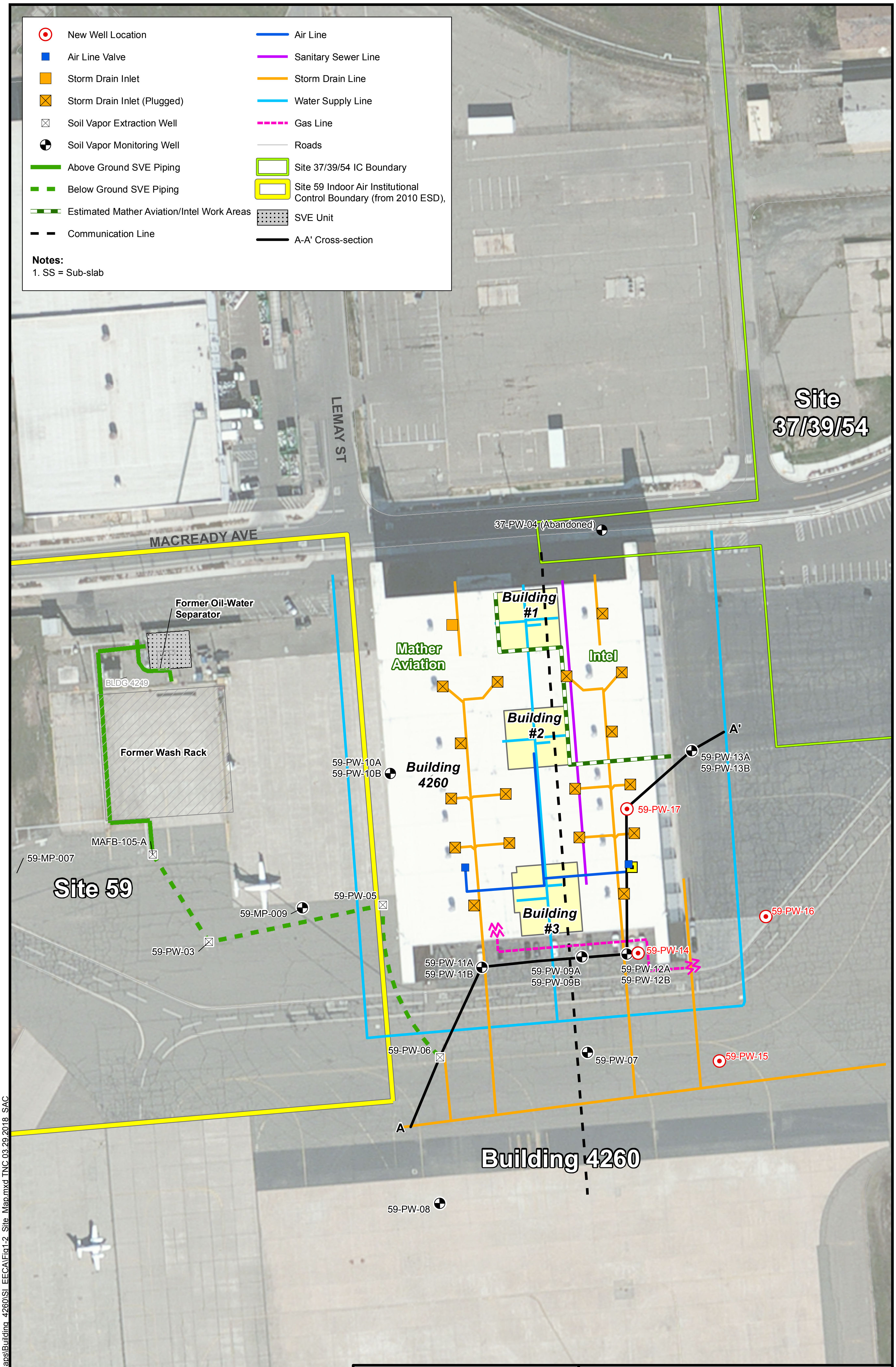


Site Location Map
Building 4260

Former Mather Air Force Base
Sacramento County, California

Figure 1-1

K:\Projects\Mather\SVE\ArcMaps\Building_4260\SI_EECA\Fig1-1_Site_Location_Map.mxd 3/29/2018 Bryn.Montgomery SAC



N

0 100

Feet

URS

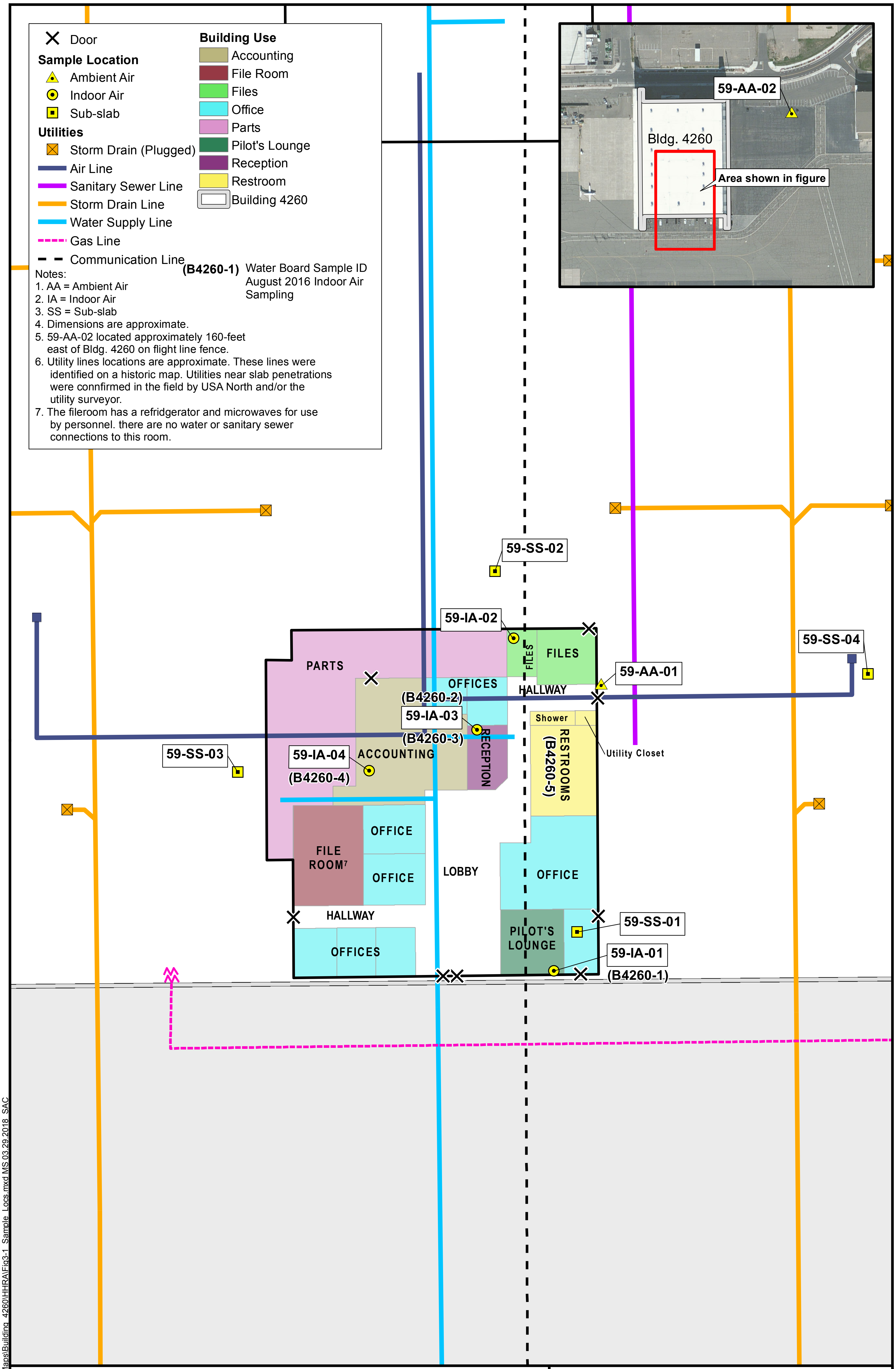
1 inch = 100 feet

Site Map
Building 4260

Former Mather Air Force Base
Sacramento County, California

Figure
1-2

K:\Projects\Mather\SVE\ArcMaps\Building 4260\SI EECA\Fig1-2 Site Map.mxd TNC 03.29.2018 SAC



Notes:
1. AA = Ambient Air
2. IA = Indoor Air
3. SS = Sub-slab
4. Dimensions are approximate.
5. 59-AA-02 located approximately 160-feet east of Bldg. 4260 on flight line fence.
6. Utility lines locations are approximate. These lines were identified on a historic map. Utilities near slab penetrations were connfirmed in the field by USA North and/or the utility surveyor.
7. The fileroom has a refridgerator and microwaves for use by personnel. there are no water or sanitary sewer connections to this room.

K:\Projects\Mather\SVE\ArcMaps\Building_4260\HHRA\Fig3-1_Sample_Locs.mxd MS 03.29.2018 SAC

URS

N
0 20
Feet
1 inch = 20 feet

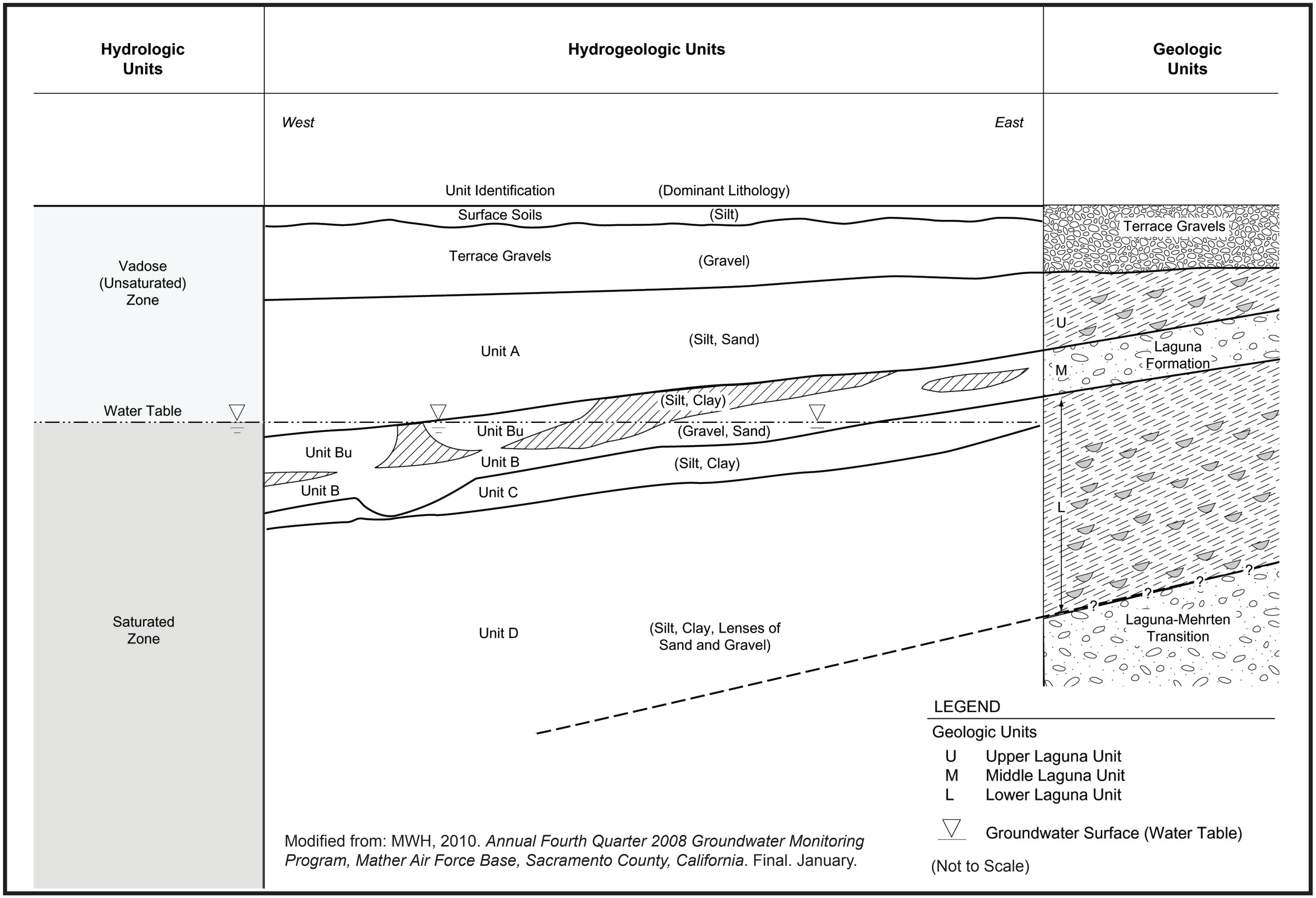
Indoor Air, Sub-Slab, and Ambient Air Sample Location Map

Building #3

Former Mather Air Force Base
Sacramento County, California

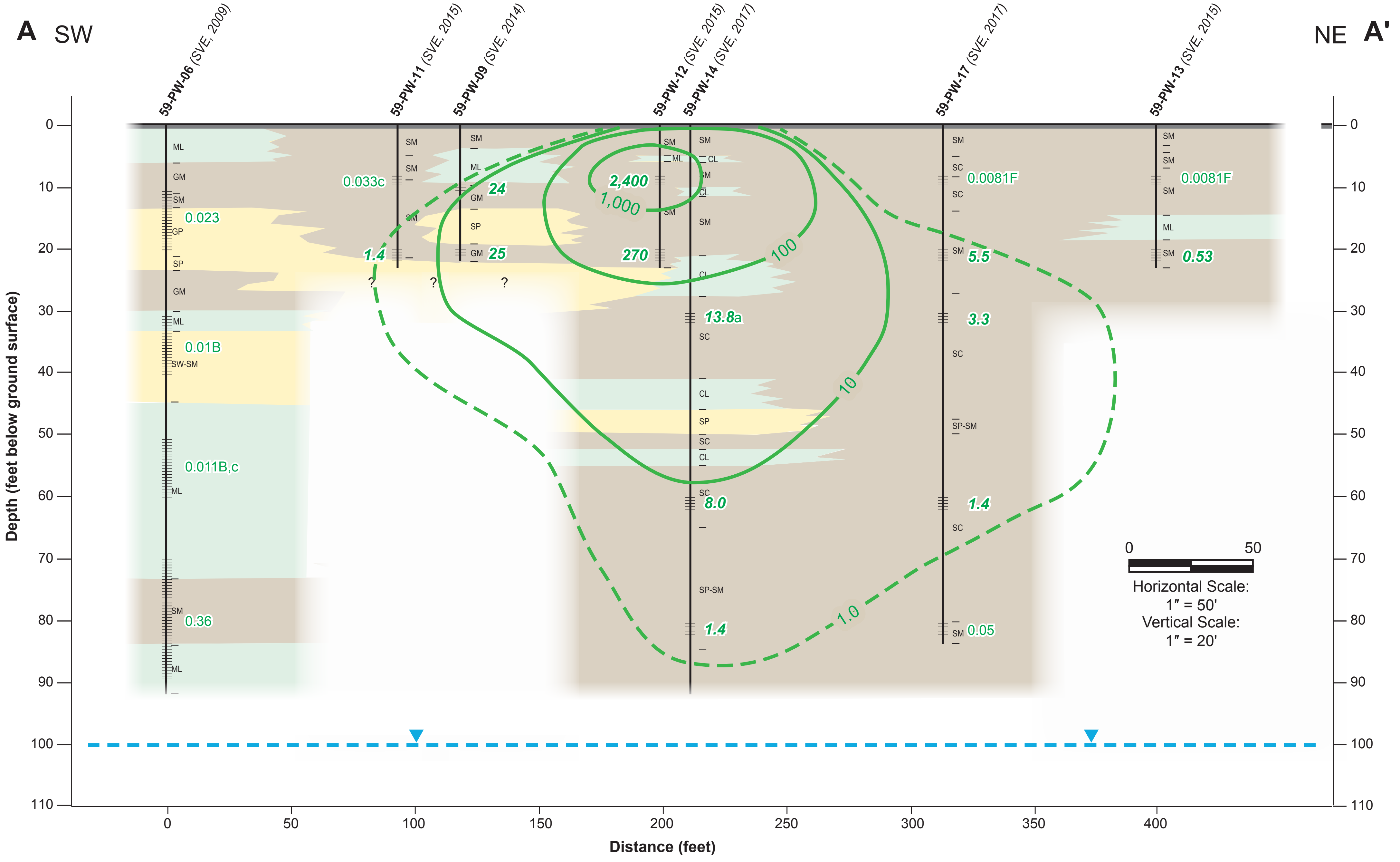
Figure 3-1

H:\Graphics\Mather\03-18-Mather-Hydrogeo-Xsec.indd - VMG 03/21/2018 SAC



Modified from: MWH, 2010. *Annual Fourth Quarter 2008 Groundwater Monitoring Program, Mather Air Force Base, Sacramento County, California*. Final. January.

Figure 4-1. Generalized Hydrologic, Hydrogeologic, and Geologic Units, Former Mather Air Force Base, Sacramento County, California



Legend

Well ID Number – 59-PW-006 (SVE, 2009) – Year Installed

– Type of Well:
SVE = Soil Vapor Extraction
SVM = Soil Vapor Monitoring

Well

Well Screen

🟨	Higher Permeability Soils (SP, SW-SM, GW, GP—poorly graded sand, well-graded sand with silt, well-graded gravel, poorly-graded gravel, ≤10% fines)
▨	Moderate Permeability Soils (SM, SP-SM, SC, GM—silty sand, poorly graded sand with silt, clayey sand, >10% fines, silty gravel)
🟩	Lower Permeability Soils (CL, ML—clay, sandy silt, >50% fines)
▼ - - -	Estimated Potentiometric Groundwater Surface (2014)
———	Asphalt/Concrete
0.18	Current TCE Soil Vapor Concentration (ppmv)
———	Current Estimated TCE Extent (Dashed Where Uncertain)

ppmv = parts per million by volume

GCLE = Groundwater Cleanup Level Equivalent for TCE is 0.35 pppmv

Bold Italic values exceed GCLE

B = Qualified as non-detected due to blank contamination

F = Result reported between method detection limit and reporting limit

a = Isopropylene concentration exceeds leak test criteria; VOC concentration potentially biased low; calculated TCE soil vapor concentration from perched water analysis substituted for soil vapor analytical result

c = If a field duplication analyses result is used it was greater than the normal sample concentrations

Note: Sample results are from the November 2017 baseline monitoring event.

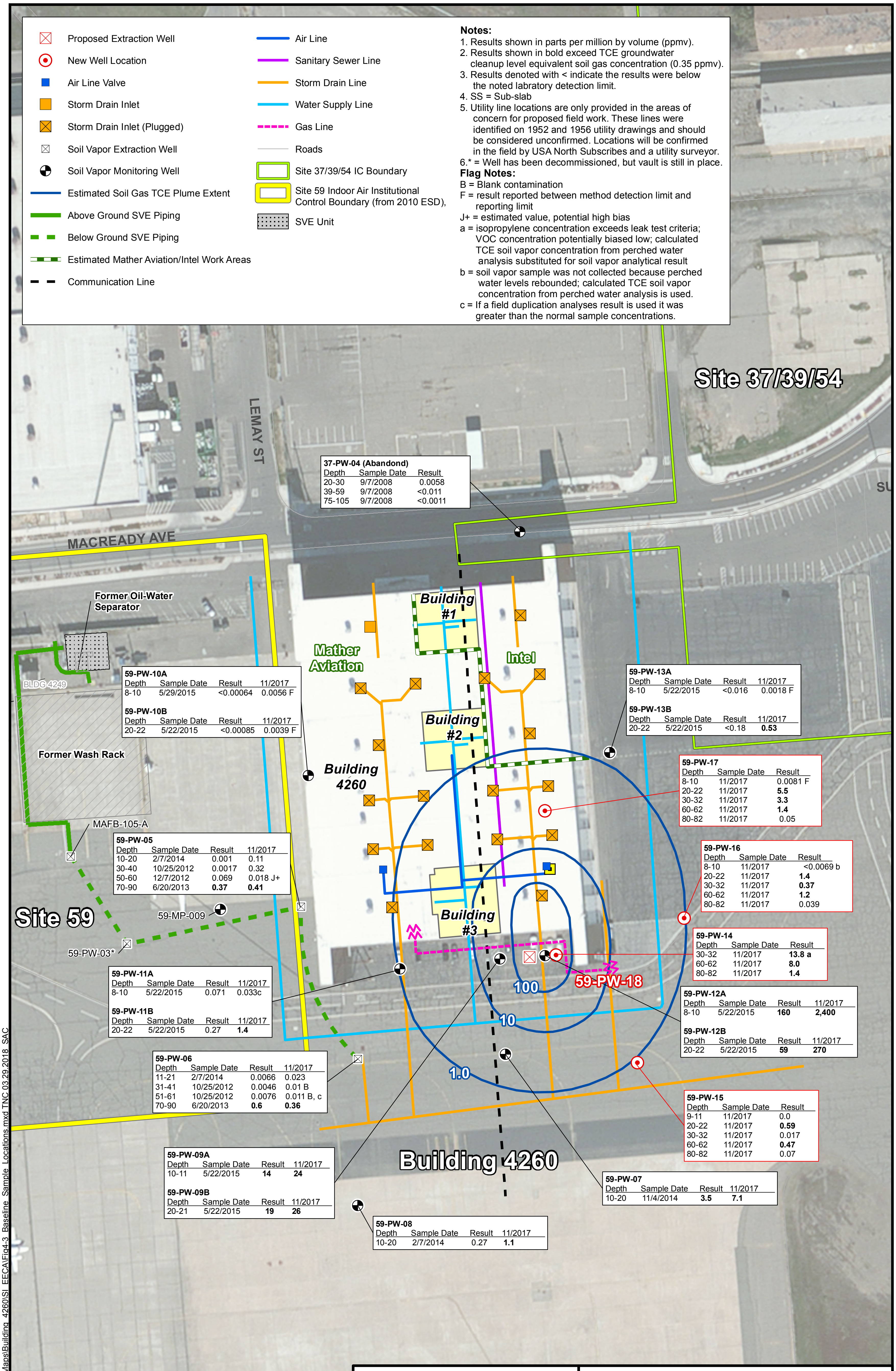
URS

Geologic Cross-Section A-A'
Building 4260

Former Mather Air Force Base
Sacramento County, California

Figure
4-2

H:\Graphics\Mather\03-18-Site-WL509-Xsec-AA.ai - VMG 03/30/2018 SAC



☒ Proposed Extraction Well
⊙ New Well Location
■ Air Line Valve
■ Storm Drain Inlet
☒ Storm Drain Inlet (Plugged)
☒ Soil Vapor Extraction Well
◑ Soil Vapor Monitoring Well
— Estimated Soil Gas TCE Plume Extent
— Above Ground SVE Piping
- - Below Ground SVE Piping
- - Estimated Mather Aviation/Intel Work Areas
- - Communication Line
— Air Line
— Sanitary Sewer Line
— Storm Drain Line
— Water Supply Line
- - Gas Line
— Roads
☐ Site 37/39/54 IC Boundary
☐ Site 59 Indoor Air Institutional Control Boundary (from 2010 ESD),
▨ SVE Unit

Notes:

1. Results shown in parts per million by volume (ppmv).
2. Results shown in bold exceed TCE groundwater cleanup level equivalent soil gas concentration (0.35 ppmv).
3. Results denoted with < indicate the results were below the noted labratory detection limit.
4. SS = Sub-slab
5. Utility line locations are only provided in the areas of concern for proposed field work. These lines were identified on 1952 and 1956 utility drawings and should be considered unconfirmed. Locations will be confirmed in the field by USA North Subscribes and a utility surveyor.
6.* = Well has been decommissioned, but vault is still in place.

Flag Notes:

B = Blank contamination
F = result reported between method detection limit and reporting limit
J+ = estimated value, potential high bias
a = isopropylene concentration exceeds leak test criteria; VOC concentration potentially biased low; calculated TCE soil vapor concentration from perched water analysis substituted for soil vapor analytical result
b = soil vapor sample was not collected because perched water levels rebounded; calculated TCE soil vapor concentration from perched water analysis is used.
c = If a field duplication analyses result is used it was greater than the normal sample concentrations.

37-PW-04 (Abandond)

Depth	Sample Date	Result
20-30	9/7/2008	0.0058
39-59	9/7/2008	<0.011
75-105	9/7/2008	<0.0011

59-PW-10A

Depth	Sample Date	Result	11/2017
8-10	5/29/2015	<0.00064	0.0056 F

59-PW-10B

Depth	Sample Date	Result	11/2017
20-22	5/22/2015	<0.00085	0.0039 F

59-PW-13A

Depth	Sample Date	Result	11/2017
8-10	5/22/2015	<0.016	0.0018 F

59-PW-13B

Depth	Sample Date	Result	11/2017
20-22	5/22/2015	<0.18	**0.53**

59-PW-17

Depth	Sample Date	Result
8-10	11/2017	0.0081 F
20-22	11/2017	**5.5**
30-32	11/2017	**3.3**
60-62	11/2017	**1.4**
80-82	11/2017	0.05

59-PW-05

Depth	Sample Date	Result	11/2017
10-20	2/7/2014	0.001	0.11
30-40	10/25/2012	0.0017	0.32
50-60	12/7/2012	0.069	0.018 J+
70-90	6/20/2013	**0.37**	**0.41**

59-PW-16

Depth	Sample Date	Result
8-10	11/2017	<0.0069 b
20-22	11/2017	**1.4**
30-32	11/2017	**0.37**
60-62	11/2017	**1.2**
80-82	11/2017	0.039

59-PW-14

Depth	Sample Date	Result
30-32	11/2017	**13.8 a**
60-62	11/2017	**8.0**
80-82	11/2017	**1.4**

59-PW-11A

Depth	Sample Date	Result	11/2017
8-10	5/22/2015	0.071	0.033c

59-PW-11B

Depth	Sample Date	Result	11/2017
20-22	5/22/2015	0.27	**1.4**

59-PW-12A

Depth	Sample Date	Result	11/2017
8-10	5/22/2015	**160**	**2,400**

59-PW-12B

Depth	Sample Date	Result	11/2017
20-22	5/22/2015	**59**	**270**

59-PW-06

Depth	Sample Date	Result	11/2017
11-21	2/7/2014	0.0066	0.023
31-41	10/25/2012	0.0046	0.01 B
51-61	10/25/2012	0.0076	0.011 B, c
70-90	6/20/2013	**0.6**	**0.36**

59-PW-15

Depth	Sample Date	Result
9-11	11/2017	0.0
20-22	11/2017	**0.59**
30-32	11/2017	0.017
60-62	11/2017	**0.47**
80-82	11/2017	0.07

59-PW-09A

Depth	Sample Date	Result	11/2017
10-11	5/22/2015	**14**	**24**

59-PW-09B

Depth	Sample Date	Result	11/2017
20-21	5/22/2015	**19**	**26**

59-PW-07

Depth	Sample Date	Result	11/2017
10-20	11/4/2014	**3.5**	**7.1**

59-PW-08

Depth	Sample Date	Result	11/2017
10-20	2/7/2014	0.27	**1.1**

1 inch = 100 feet

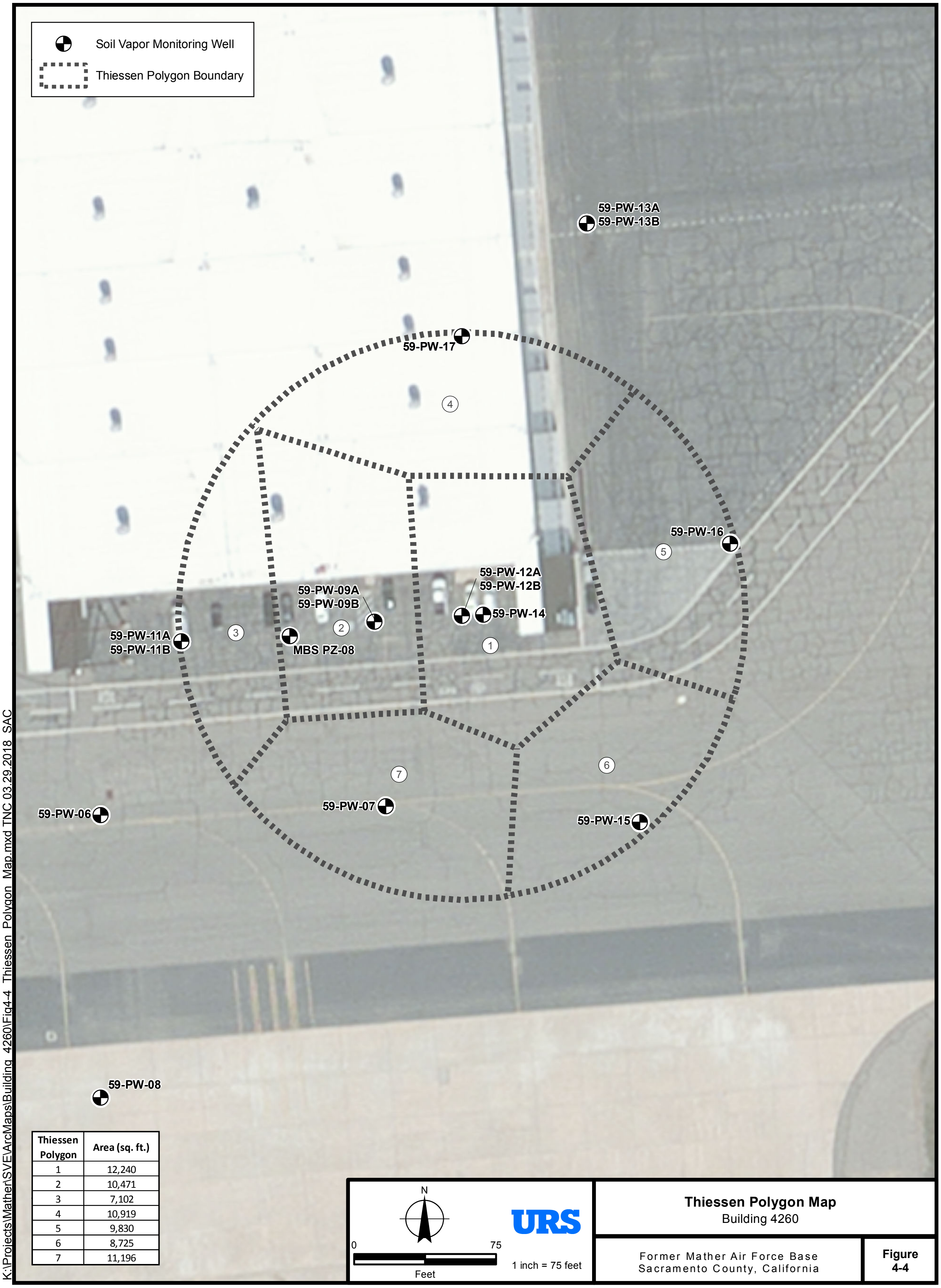
URS

Baseline Sampling Results
Building 4260

Former Mather Air Force Base
Sacramento County, California

Figure 4-3

K:\Projects\Mather\SVE\ArcMaps\Building_4260\SI_EECA\Fig4-3_Baseline_Sample_Locations.mxd TNC 03.29.2018 SAC



Thiessen Polygon	Area (sq. ft.)
1	12,240
2	10,471
3	7,102
4	10,919
5	9,830
6	8,725
7	11,196

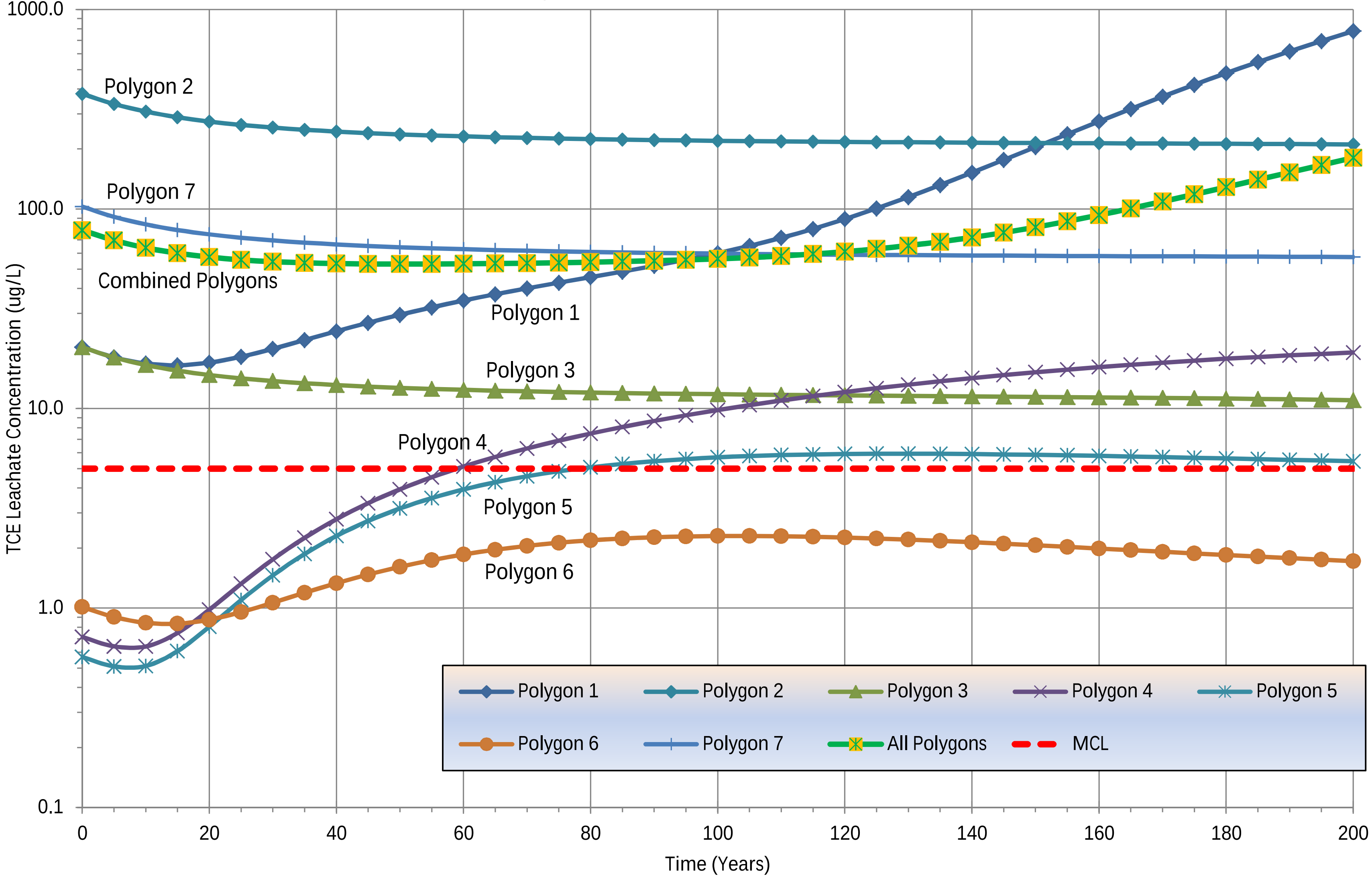
Thiessen Polygon Map
Building 4260

Former Mather Air Force Base
Sacramento County, California

Figure 4-4

K:\Projects\Mather\SVE\ArcMaps\Building 4260\Fig4-4 Thiessen Polygon Map.mxd TNC 03.29.2018 SAC

Figure 4-5. TCE Leachate Concentrations - VLEACH Modeling
Building 4260, Former Mather AFB



APPENDIX A

Historical Data
(Provided on CD)

Remedial Investigation Work Plan
(URS 2017)

Excerpts:
Analytical Data
Well Construction Logs

Remedial Investigation Work Plan

(URS 2017)

Excerpts:

- Analytical Data
- Well Construction Logs

TABLE A-1
SITE 59b HISTORICAL SOIL VAPOR ANALYTICAL RESULTS
WELLHEAD/FIELD BASELINE, REBOUND, AND PERFORMANCE SAMPLE RESULTS
MATHER AIR FORCE BASE
SACRAMENTO COUNTY, CALIFORNIA
(Page 1 of 3)

Well ID	Soil Type (USCS Class)	Sample Depth (feet bgs)	Date Sampled	Rebound Duration (weeks)	PCE (ppmv)	TCE (ppmv)	cis -1,2 DCE (ppmv)	CTCL (ppmv)	TPH-g (ppmv)	NMOC (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethyl benzene (ppmv)	Total Xylenes (ppmv)	Total (ppmv)	7/23/15 PID (ppm)
59-PW-05	ML/SM/SW	10-20	11/19/2009	Baseline	0.0099	0.064	< 0.0011	< 0.0011	<0.022	NA	< 0.0011	< 0.0011	< 0.0011	< 0.0011	0.07	
59-PW-05	ML/SM/SW	10-20	3/5/2010	5	0.053	1.3	<0.0022	<0.0022	<0.043	NA	<0.0022	<0.0022	<0.0022	0.0052	1.4	
59-PW-05	ML/SM/SW	10-20	9/23/2011	12	0.028	0.69	<0.00064	<0.00031	NA	NA	0.00034	0.0087	0.0027	0.0103	0.74	
59-PW-05	ML/SM/SW	10-20	10/25/2012	17	0.016	0.43	<0.0021	<0.0021	NA	NA	<0.0021	0.0033	<0.0021	0.0038	0.45	
59-PW-05	ML/SM/SW	10-20	6/20/2013	Perf Sample	0.012	0.014	0.0033	<0.00023	NA	NA	0.00022	0.0019	0.0007	0.00322	0.04	
59-PW-05	ML/SM/SW	10-20	2/7/2014	27	0.00022	0.001	<0.00021	<0.00016	-	NA	<0.0002	0.00051	<0.00017	0.00039	0.00	0.3
59-PW-05	GC/SC	30-40	11/19/2009	Baseline	0.095	1.2	<0.0072	<0.0072	<0.14	NA	<0.0072	<0.0072	<0.0072	<0.0072	1.3	
59-PW-05	GC/SC	30-40	3/5/2010	5	0.069	1.9	<0.0029	<0.0029	<0.058	NA	<0.0029	0.012	<0.0029	0.0047	2.0	
59-PW-05	GC/SC	30-40	9/21/2010	34	0.0078	0.46	<0.0011	<0.0011	0.24	NA	<0.0011	<0.0011	<0.0011	<0.0011	0.71	
59-PW-05	GC/SC	30-40	9/23/2011	12	0.089	4.2	<0.004	<0.0019	NA	NA	<0.0016	0.019	0.0054	0.0212	4.3	
59-PW-05	GC/SC	30-40	10/25/2012	17	<0.0012	0.0017	<0.0012	<0.0012	0.67	NA	<0.0012	<0.0012	<0.0012	<0.0012	0.67	0.3
59-PW-05	ML/CL	50-60	11/19/2009	Baseline	0.062	3	< 0.015	< 0.015	<0.3	NA	0.03	< 0.015	< 0.015	< 0.015	3.1	
59-PW-05	ML/CL	50-60	3/5/2010	5	0.082	6.3	0.017	<0.011	<0.22	NA	<0.011	<0.011	<0.011	0.0047	6.4	
59-PW-05	ML/CL	50-60	9/21/2010	34	0.079	0.66	0.0028	<0.0024	0.66	NA	<0.0024	<0.0024	<0.0024	<0.0024	1.4	
59-PW-05	ML/CL	50-60	9/23/2011	12	0.046	5.3	0.0091	<0.0045	NA	NA	<0.0045	<0.0037	<0.0042	<0.004	5.4	
59-PW-05	ML/CL	50-60	12/7/2012	25	<0.00031	0.069	<0.00037	<0.00012	0.55	NA	<0.00025	0.021	0.0037	0.0191	0.66	0.4
59-PW-05	ML	70-90	11/19/2009	Baseline	0.024	0.13	<0.001	0.0014	0.3	NA	0.026	0.0015	<0.001	<0.001	0.48	
59-PW-05	ML	70-90	3/5/2010	5	<0.0011	0.02	<0.0011	<0.0011	<0.022	NA	<0.0011	0.0012	<0.0011	0.0047	0.03	
59-PW-05	ML	70-90	10/25/2012	17	0.046	0.88	<0.0043	<0.0043	NA	NA	<0.0043	<0.0043	<0.0043	<0.0043	0.93	
59-PW-05		70-90	6/20/2013	Perf Sample	0.026	0.37	0.013	0.024	NA	NA	0.00054	0.0019	0.00084	0.00418	0.44	0.3
59-PW-06	GM/SM/GP	11-21	11/19/2009	Baseline	0.027	1.2	< 0.0054	< 0.0054	<0.11	NA	0.027	< 0.0054	< 0.0054	< 0.0054	1.3	
59-PW-06	GM/SM/GP	11-21	3/5/2010	5	0.051	7	<0.011	<0.011	<0.22	NA	<0.011	<0.011	<0.011	0.0047	7.1	
59-PW-06	GM/SM/GP	11-21	9/21/2010	34	0.044	3.7	<0.0098	<0.0098	<0.49	NA	<0.0098	<0.0098	<0.0098	<0.0098	3.7	
59-PW-06	GM/SM/GP	11-21	9/23/2011	12	<0.00024	0.0048	<0.00032	<0.00015	NA	NA	<0.00012	<0.00016	<0.00022	<0.00027	0.0048	
59-PW-06	GM/SM/GP	11-21	10/25/2012	17	0.0071	0.48	<0.00023	<0.00023	NA	NA	<0.00023	<0.00023	<0.00023	<0.00023	0.49	
59-PW-06	GM/SM/GP	11-21	6/20/2013	Perf Sample	0.016	0.97	0.0063	<0.00059	NA	NA	<0.00047	0.002	0.00085	0.00299	1.0	
59-PW-06	GM/SM/GP	11-21	2/7/2014	27	0.00019	0.0066	<0.00021	0.00021	-	NA	<0.0002	0.00058	0.00026	0.00113	0.0090	0.4
59-PW-06	ML/SW-SM	31-41	11/19/2009	Baseline	0.035	4.7	<0.027	<0.027	<0.54	NA	<0.027	<0.027	<0.027	<0.027	4.7	
59-PW-06	ML/SW-SM	31-41	3/5/2010	5	0.057	8.1	0.02	<0.011	<0.23	NA	<0.011	<0.011	<0.011	0.0047	8.2	
59-PW-06	ML/SW-SM	31-41	9/21/2010	34	0.05	6.6	0.024	<0.012	0.63	NA	<0.012	<0.012	<0.012	<0.012	7.3	
59-PW-06	ML/SW-SM	31-41	9/23/2011	12	0.03	13	0.03	<0.0086	NA	NA	<0.0088	0.013	<0.0081	0.009	13.1	
59-PW-06	ML/SW-SM	31-41	10/25/2012	17	<0.0011	0.0046	<0.0011	<0.0011	1	NA	<0.0011	<0.0011	<0.0011	<0.0011	1.0	0.6
59-PW-06	ML	51-61	11/19/2009	Baseline	0.033	2.6	0.02	< 0.014	<0.29	NA	< 0.014	< 0.014	< 0.014	< 0.014	2.7	
59-PW-06	ML	51-61	3/5/2010	5	0.082	6.3	0.018	<0.011	<0.23	NA	<0.011	<0.011	<0.011	0.0047	6.4	
59-PW-06	ML	51-61	9/21/2010	34	0.067	7.4	0.051	<0.012	0.77	NA	<0.012	<0.012	<0.012	<0.012	8.3	
59-PW-06	ML	51-61	9/23/2011	12	0.066	10	0.054	<0.0088	NA	NA	<0.0089	0.017	<0.0083	0.0092	10.1	

TABLE A-1
SITE 59b HISTORICAL SOIL VAPOR ANALYTICAL RESULTS
WELLHEAD/FIELD BASELINE, REBOUND, AND PERFORMANCE SAMPLE RESULTS
MATHER AIR FORCE BASE
SACRAMENTO COUNTY, CALIFORNIA
(Page 2 of 3)

Well ID	Soil Type (USCS Class)	Sample Depth (feet bgs)	Date Sampled	Rebound Duration (weeks)	PCE (ppmv)	TCE (ppmv)	cis -1,2 DCE (ppmv)	CTCL (ppmv)	TPH-g (ppmv)	NMOC (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethyl benzene (ppmv)	Total Xylenes (ppmv)	Total (ppmv)	7/23/15 PID (ppm)
59-PW-06	ML	51-61	10/25/2012	17	<0.0011	0.0076	<0.0011	<0.0011	1.1	NA	<0.0011	<0.0011	<0.0011	<0.0011	1.1	0.7
59-PW-06	ML/SM/ML	70-90	11/19/2009	Baseline	0.022	0.23	< 0.0011	0.0022	0.022	NA	0.014	< 0.0011	< 0.0011	< 0.0011	0.29	
59-PW-06	ML/SM/ML	70-90	3/5/2010	5	0.017	0.72	0.0028	0.01	<0.023	NA	<0.0011	<0.0011	<0.0011	<0.0011	0.75	
59-PW-06	ML/SM/ML	70-90	9/23/2011	13	0.0083	0.54	0.0019	0.003	NA	NA	0.00033	0.018	0.0051	0.0198	0.60	
59-PW-06	ML/SM/ML	70-90	10/25/2012	17	0.017	1.2	0.0029	0.0041	NA	NA	<0.0045	<0.0045	<0.0045	<0.0045	1.2	
59-PW-06	ML/SM/ML	70-90	6/20/2013	Perf Sample	0.017	0.6	0.0029	0.47	NA	NA	<0.00075	0.0086	0.0038	0.0165	1.1	0.2
59-PW-07	GW	10-20	1/17/2014	Baseline	<0.0015	1.3	<0.00085	<0.0005	NA	NA	<0.0007	0.011	0.013	0.055	1.4	
		10-20	2/7/2014	27	0.003	1.4	0.0013	<0.00066	NA	NA	<0.0008	0.0013	<0.00069	0.0015	1.4	
		10-20	4/3/2014	35	0.0043	2.3	<0.0053	<0.0024	NA	NA	<0.0018	0.026	0.018	0.077	2.4	
		10-20	10/1/2014	61	0.014	4.9	0.007	<0.0027	NA	NA	<0.0029	0.022	0.02	0.087	5.0	
		10-20	11/4/2014	66	0.01	3.5	0.0048	<0.0018	NA	NA	<0.0041	0.019	0.014	0.053	3.6	
		10-20	5/22/2015	94	0.011	4.4	0.0054	<0.012	NA	3.6	<0.012	0.018	0.0092	0.0394	11.7	5.3
59-PW-08	GM/GW	10-20	1/17/2014	Baseline	<0.0039	0.35	<0.0022	0.0041	NA	NA	<0.0018	0.019	0.017	0.075	0.47	
		10-20	2/7/2014	27	0.0066	0.27	0.00098	0.0016	NA	NA	0.00035	0.00052	<0.00017	0.00056	0.27	
		10-20	5/22/2015	94	0.012	0.6	0.0032	0.0012	NA	0.93	0.00043	0.015	0.0068	0.0309	2.5	1.2
59-PW-09A	GM	10-11	11/4/2014	Baseline	0.0077	5.7	0.012	<0.0018	NA	NA	<0.0041	0.048	0.018	0.075	5.9	
		10-11	5/22/2015	28	0.024	14	0.033	<0.022	NA	12	<0.022	0.025	0.0085	0.0367	38	12.9
59-PW-09B	GM	20-21	11/4/2014	Baseline	0.012	7	0.013	<0.0028	NA	NA	<0.0063	0.035	0.021	0.081		
		20-21	5/22/2015	28	0.024	19	0.042	<0.024	NA	17	<0.024	0.039	0.011	0.0508	53	13.4
59-PW-10A	SM/ML	8-10	5/29/2015	Baseline	0.00046	0.00064	<0.00026	<0.00016	NA	2.4	0.0047	0.033	0.02	0.075	4.9	0.5
59-PW-10B	GM	20-22	5/22/2015	Baseline	0.00073	0.00085	<0.0011	<0.0011	NA	0.58	0.0066	0.029	0.0085	0.0477	1.25	0.1
59-PW-11A	SM/GM	8-10	5/22/2015	Baseline	0.12	0.071	<0.0011	<0.0011	NA	0.83	0.0022	0.031	0.0082	0.0421	1.8	0.8
59-PW-11B	GM	20-22	5/22/2015	Baseline	0.088	0.27	0.00034	0.00039	NA	0.89	0.0035	0.026	0.0067	0.0328	2.1	1
59-PW-12A	GM	8-10	5/22/2015	Baseline	<0.32	160	14	<0.32	NA	140	<0.32	0.072	<0.32	0.079	454	255
59-PW-12B	GM	20-22	5/22/2015	Baseline	<0.12	59	0.45	<0.12	NA	50	<0.12	0.033	<0.12	0.055	160	104

TABLE A-1
SITE 59b HISTORICAL SOIL VAPOR ANALYTICAL RESULTS
WELLHEAD/FIELD BASELINE, REBOUND, AND PERFORMANCE SAMPLE RESULTS
MATHER AIR FORCE BASE
SACRAMENTO COUNTY, CALIFORNIA
(Page 3 of 3)

Well ID	Soil Type (USCS Class)	Sample Depth (feet bgs)	Date Sampled	Rebound Duration (weeks)	PCE (ppmv)	TCE (ppmv)	cis -1,2 DCE (ppmv)	CTCL (ppmv)	TPH-g (ppmv)	NMOC (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethyl benzene (ppmv)	Total Xylenes (ppmv)	Total (ppmv)	7/23/15 PID (ppm)
59-PW-13A	SM	8-10	5/22/2015	Baseline	0.0033*	0.016*	<0.013*	<0.013*	NA	2.3	0.0054*	0.043*	0.015*	0.064*	2.4	0.7
59-PW-13B	GM	20-22	5/22/2015	Baseline	0.0061	0.18	0.0076	<0.0012	NA	0.9	0.0025	0.015	0.0073	0.0361	2.0	0.6

Notes:

< Values represent laboratory's detection limit.
bgs = below ground surface
CL = clay
GP = poorly graded gravel
GM = silty gravel
GW = well-graded gravel
J = estimated value
ML = silt
NA = not analyzed
NMOC = non-methane organic compounds. This analysis measures all non-methane (CH4) hydrocarbons. An NMOC concentration similar to the total sum of the concentrations of speciated analytes (e.g., TCE, PCE, etc.) indicates minimal TPH-g or other “unaccounted for” hydrocarbon concentrations.
ppmv = parts per million by volume
SC = clayey silt
SM = silty sand
SP = poorly graded sand
TPH-g = total petroleum hydrocarbons as gasoline
USCS = Unified Soil Classification System
µg/L = micrograms per liter

Rebound sample = Sample was collected at least 2 weeks after system shutdown.
Perf Sample = Performance sample = Sample was collected while system was operating or was collected less than 2 weeks after system shutdown.
*Baseline sample results for 59-PW-13A may be biased low, high tracer gas concentration in sample.

Contaminant	Groundwater Cleanup Level (µg/L)	GCLE Soil Gas Concentration (ppmv)
Trichloroethene	5	0.350
Tetrachloroethene	5	0.670
cis-1,2-dichloroethene	6	0.2
Carbon tetrachloride	0.5	0.08
Benzene	1	0.07
Toluene	150	8.3
Ethylbenzene	300	17
Total Xylenes	1750	63
1,4 Dichlorobenzene	5	0.06

▨ **≥ Groundwater Cleanup Level Soil Gas Equivalent Concentration (ppmv)**

Table A-2. Soil Vapor Sample Results
22 May 2015 Sampling Event
Former Mather Air Force Base, Site 59b

LOCATION	SAMPLE_NAME	SAMPLE CODE	SAMPLE DATE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	1,1,1-Trichloroethane	2.1		PPBV	0.35	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	1,1,1-Trichloroethane	19		PPBV	3.6	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	1,1,1-Trichloroethane	1.1	J	PPBV	0.67	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	1,1,1-Trichloroethane	83		PPBV	4.6	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	1,1,1-Trichloroethane	150		PPBV	4.9	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	1,1,1-Trichloroethane	0		PPBV	0.14	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	1,1,1-Trichloroethane	0		PPBV	0.31	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	1,1,1-Trichloroethane	0.98	J	PPBV	0.33	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	1,1,1-Trichloroethane	2.4		PPBV	0.34	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	1,1,1-Trichloroethane	0		PPBV	66	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	1,1,1-Trichloroethane	360		PPBV	24	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	1,1,1-Trichloroethane	0		PPBV	3.8	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	1,1,1-Trichloroethane	2.2		PPBV	0.35	1.2
					1,1,1-Trichloroethane Max	**360**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	1,1-Dichloroethane	0		PPBV	0.2	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	1,1-Dichloroethane	0		PPBV	2.1	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	1,1-Dichloroethane	0		PPBV	0.38	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	1,1-Dichloroethane	0		PPBV	2.7	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	1,1-Dichloroethane	0		PPBV	2.9	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	1,1-Dichloroethane	0		PPBV	0.24	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	1,1-Dichloroethane	0		PPBV	0.18	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	1,1-Dichloroethane	0		PPBV	0.18	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	1,1-Dichloroethane	0		PPBV	0.19	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	1,1-Dichloroethane	0		PPBV	38	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	1,1-Dichloroethane	0		PPBV	14	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	1,1-Dichloroethane	0		PPBV	2.1	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	1,1-Dichloroethane	0		PPBV	0.2	1.2
					1,1-Dichloroethane Max	**0**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	1,1-Dichloroethene	6		PPBV	0.32	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	1,1-Dichloroethene	90		PPBV	3.3	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	1,1-Dichloroethene	6.3		PPBV	0.6	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	1,1-Dichloroethene	340		PPBV	20	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	1,1-Dichloroethene	480		PPBV	21	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	1,1-Dichloroethene	0		PPBV	0.38	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	1,1-Dichloroethene	0		PPBV	0.28	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	1,1-Dichloroethene	1.1		PPBV	0.29	1.1

Table A-2. Soil Vapor Sample Results
22 May 2015 Sampling Event
Former Mather Air Force Base, Site 59b

LOCATION	SAMPLE_NAME	SAMPLE CODE	SAMPLE DATE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	1,1-Dichloroethene	7.5		PPBV	0.3	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	1,1-Dichloroethene	400		PPBV	280	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	1,1-Dichloroethene	970		PPBV	100	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	1,1-Dichloroethene	0		PPBV	3.4	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	1,1-Dichloroethene	6.4		PPBV	0.32	1.2
					1,1-Dichloroethene Max	**970**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	1,2-Dichloroethane	0		PPBV	0.4	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	1,2-Dichloroethane	0		PPBV	4.2	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	1,2-Dichloroethane	0		PPBV	0.76	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	1,2-Dichloroethane	0		PPBV	4	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	1,2-Dichloroethane	0		PPBV	4.2	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	1,2-Dichloroethane	0.19	F	PPBV	0.15	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	1,2-Dichloroethane	0		PPBV	0.36	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	1,2-Dichloroethane	0		PPBV	0.37	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	1,2-Dichloroethane	0		PPBV	0.38	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	1,2-Dichloroethane	0		PPBV	56	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	1,2-Dichloroethane	0		PPBV	20	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	1,2-Dichloroethane	0		PPBV	4.3	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	1,2-Dichloroethane	0		PPBV	0.4	1.2
					1,2-Dichloroethane Max	**0.19**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Benzene	2.4		PPBV	0.14	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Benzene	0		PPBV	1.5	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Benzene	0.43	J	PPBV	0.27	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Benzene	0		PPBV	4.3	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Benzene	0		PPBV	4.5	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Benzene	4.7		PPBV	0.11	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Benzene	6.6		PPBV	0.13	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Benzene	2.2		PPBV	0.13	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Benzene	3.5		PPBV	0.14	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Benzene	0		PPBV	60	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Benzene	0		PPBV	22	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Benzene	5.4	J	PPBV	1.5	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Benzene	2.5		PPBV	0.14	1.2
					Benzene Max	**6.6**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Carbon Tetrachloride	0		PPBV	0.24	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Carbon Tetrachloride	0		PPBV	2.4	12

Table A-2. Soil Vapor Sample Results
22 May 2015 Sampling Event
Former Mather Air Force Base, Site 59b

LOCATION	SAMPLE_NAME	SAMPLE CODE	SAMPLE DATE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Carbon Tetrachloride	1.2	J	PPBV	0.44	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Carbon Tetrachloride	0		PPBV	3.8	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Carbon Tetrachloride	0		PPBV	4	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Carbon Tetrachloride	0		PPBV	0.16	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Carbon Tetrachloride	0		PPBV	0.21	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Carbon Tetrachloride	0		PPBV	0.22	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Carbon Tetrachloride	0.39	J	PPBV	0.22	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Carbon Tetrachloride	0		PPBV	53	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Carbon Tetrachloride	0		PPBV	19	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Carbon Tetrachloride	0		PPBV	2.5	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Carbon Tetrachloride	0		PPBV	0.23	1.2
					Carbon Tetrachloride Max	**1.2**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Chlorobenzene	0		PPBV	0.21	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Chlorobenzene	0		PPBV	2.1	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Chlorobenzene	0		PPBV	0.39	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Chlorobenzene	0		PPBV	4.9	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Chlorobenzene	0		PPBV	5.2	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Chlorobenzene	0		PPBV	0.23	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Chlorobenzene	0		PPBV	0.18	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Chlorobenzene	0		PPBV	0.19	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Chlorobenzene	0.2	J	PPBV	0.2	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Chlorobenzene	0		PPBV	69	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Chlorobenzene	0		PPBV	25	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Chlorobenzene	0		PPBV	2.2	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Chlorobenzene	0		PPBV	0.21	1.2
					Chlorobenzene Max	**0.2**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Chloroform	2.9		PPBV	0.24	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Chloroform	3.7	J	PPBV	2.5	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Chloroform	1.8	J	PPBV	0.46	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Chloroform	4.8	J	PPBV	3.8	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Chloroform	6.9	J	PPBV	4	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Chloroform	0.35	F	PPBV	0.15	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Chloroform	0		PPBV	0.22	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Chloroform	0.46	J	PPBV	0.22	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Chloroform	1.6		PPBV	0.23	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Chloroform	85	J	PPBV	54	320

Table A-2. Soil Vapor Sample Results
22 May 2015 Sampling Event
Former Mather Air Force Base, Site 59b

LOCATION	SAMPLE_NAME	SAMPLE CODE	SAMPLE DATE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Chloroform	0		PPBV	20	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Chloroform	0		PPBV	2.6	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Chloroform	2.7		PPBV	0.24	1.2
					Chloroform Max	**85**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Chloromethane	0		PPBV	1.1	12
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Chloromethane	0		PPBV	11	120
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Chloromethane	0		PPBV	2.1	22
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Chloromethane	0		PPBV	10	90
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Chloromethane	0		PPBV	11	95
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Chloromethane	9	F	PPBV	1.1	11
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Chloromethane	0		PPBV	0.98	11
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Chloromethane	1.5	J	PPBV	1	11
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Chloromethane	1.4	J	PPBV	1	11
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Chloromethane	0		PPBV	140	1300
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Chloromethane	0		PPBV	52	460
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Chloromethane	0		PPBV	12	130
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Chloromethane	0		PPBV	1.1	12
					Chloromethane Max	**9**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	cis-1,2-Dichloroethene	7.7		PPBV	0.32	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	cis-1,2-Dichloroethene	5.4	J	PPBV	3.3	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	cis-1,2-Dichloroethene	3.2		PPBV	0.61	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	cis-1,2-Dichloroethene	33		PPBV	5.1	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	cis-1,2-Dichloroethene	42		PPBV	5.4	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	cis-1,2-Dichloroethene	0		PPBV	0.26	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	cis-1,2-Dichloroethene	0		PPBV	0.29	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	cis-1,2-Dichloroethene	0		PPBV	0.3	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	cis-1,2-Dichloroethene	0.34	J	PPBV	0.31	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	cis-1,2-Dichloroethene	14000		PPBV	72	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	cis-1,2-Dichloroethene	450		PPBV	26	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	cis-1,2-Dichloroethene	0		PPBV	3.4	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	cis-1,2-Dichloroethene	7.6		PPBV	0.32	1.2
					cis-1,2-Dichloroethene Max	**14000**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Dichlorodifluoromethane	1	J	PPBV	0.15	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Dichlorodifluoromethane	0		PPBV	1.5	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Dichlorodifluoromethane	0.44	J	PPBV	0.28	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Dichlorodifluoromethane	0		PPBV	3.4	22

Table A-2. Soil Vapor Sample Results
22 May 2015 Sampling Event
Former Mather Air Force Base, Site 59b

LOCATION	SAMPLE_NAME	SAMPLE CODE	SAMPLE DATE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Dichlorodifluoromethane	0		PPBV	3.6	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Dichlorodifluoromethane	0.66	F	PPBV	0.24	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Dichlorodifluoromethane	0.94	J	PPBV	0.13	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Dichlorodifluoromethane	0.68	J	PPBV	0.14	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Dichlorodifluoromethane	1	J	PPBV	0.14	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Dichlorodifluoromethane	0		PPBV	48	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Dichlorodifluoromethane	0		PPBV	17	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Dichlorodifluoromethane	0		PPBV	1.6	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Dichlorodifluoromethane	1.1	J	PPBV	0.15	1.2
					Dichlorodifluoromethane Max	**1.1**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Ethylbenzene	7.5		PPBV	0.25	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Ethylbenzene	9.2	J	PPBV	2.6	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Ethylbenzene	6.8		PPBV	0.47	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Ethylbenzene	8.5	J	PPBV	4.7	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Ethylbenzene	11	J	PPBV	5	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Ethylbenzene	20		PPBV	0.22	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Ethylbenzene	8.5		PPBV	0.22	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Ethylbenzene	8.2		PPBV	0.23	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Ethylbenzene	6.7		PPBV	0.24	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Ethylbenzene	0		PPBV	67	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Ethylbenzene	0		PPBV	24	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Ethylbenzene	15		PPBV	2.6	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Ethylbenzene	7.3		PPBV	0.25	1.2
					Ethylbenzene Max	**20**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Freon 113	0		PPBV	0.28	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Freon 113	0		PPBV	2.8	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Freon 113	0		PPBV	0.52	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Freon 113	0		PPBV	7.1	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Freon 113	0		PPBV	7.5	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Freon 113	0		PPBV	0.21	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Freon 113	0		PPBV	0.24	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Freon 113	0		PPBV	0.25	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Freon 113	0		PPBV	0.26	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Freon 113	0		PPBV	100	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Freon 113	0		PPBV	36	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Freon 113	0		PPBV	2.9	13

Table A-2. Soil Vapor Sample Results
22 May 2015 Sampling Event
Former Mather Air Force Base, Site 59b

LOCATION	SAMPLE_NAME	SAMPLE CODE	SAMPLE DATE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Freon 113	0		PPBV	0.27	1.2
					Freon 113 Max	**0**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Isopropanol	340		PPBV	0.88	4.8
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Isopropanol	300		PPBV	9	49
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Isopropanol	210		PPBV	1.6	9
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Isopropanol	220		PPBV	11	90
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Isopropanol	290		PPBV	12	95
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Isopropanol	3400	J	PPBV	0.89	4.6
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Isopropanol	270		PPBV	0.78	4.2
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Isopropanol	320		PPBV	0.81	4.4
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Isopropanol	180		PPBV	0.84	4.5
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Isopropanol	430	J	PPBV	160	1300
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Isopropanol	280	J	PPBV	56	460
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Isopropanol	6100	J	PPBV	9.3	51
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Isopropanol	380		PPBV	0.87	4.7
					Isopropanol Max	**6100**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	m,p-Xylenes	30		PPBV	0.18	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	m,p-Xylenes	31		PPBV	1.8	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	m,p-Xylenes	26		PPBV	0.34	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	m,p-Xylenes	30		PPBV	1.9	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	m,p-Xylenes	41		PPBV	2	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	m,p-Xylenes	62		PPBV	0.21	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	m,p-Xylenes	39		PPBV	0.16	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	m,p-Xylenes	35		PPBV	0.16	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	m,p-Xylenes	27		PPBV	0.17	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	m,p-Xylenes	79	J	PPBV	27	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	m,p-Xylenes	40	J	PPBV	9.7	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	m,p-Xylenes	52		PPBV	1.9	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	m,p-Xylenes	30		PPBV	0.18	1.2
					m,p-Xylenes Max	**79**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Methylene Chloride	0		PPBV	0.56	12
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Methylene Chloride	0		PPBV	5.8	120
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Methylene Chloride	0		PPBV	1	22
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Methylene Chloride	0		PPBV	6	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Methylene Chloride	0		PPBV	6.4	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Methylene Chloride	0		PPBV	0.6	11

Table A-2. Soil Vapor Sample Results
22 May 2015 Sampling Event
Former Mather Air Force Base, Site 59b

LOCATION	SAMPLE_NAME	SAMPLE CODE	SAMPLE DATE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Methylene Chloride	0		PPBV	0.5	11
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Methylene Chloride	0		PPBV	0.52	11
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Methylene Chloride	0		PPBV	0.53	11
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Methylene Chloride	0		PPBV	86	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Methylene Chloride	0		PPBV	31	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Methylene Chloride	0		PPBV	6	130
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Methylene Chloride	0		PPBV	0.56	12
					Methylene Chloride Max	**0**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Non-methane organic carbons	880		PPBV	24	24
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Non-methane organic carbons	3600		PPBV	250	250
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Non-methane organic carbons	930		PPBV	45	45
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Non-methane organic carbons	12000		PPBV	450	450
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Non-methane organic carbons	17000		PPBV	480	480
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Non-methane organic carbons	2400		PPBV	23	23
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Non-methane organic carbons	580		PPBV	21	21
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Non-methane organic carbons	830		PPBV	22	22
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Non-methane organic carbons	890		PPBV	23	23
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Non-methane organic carbons	140000		PPBV	6400	6400
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Non-methane organic carbons	50000		PPBV	2300	2300
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Non-methane organic carbons	2300		PPBV	250	250
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Non-methane organic carbons	900		PPBV	24	24
					Non-methane organic carbons Ma	**140000**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	o-Xylene	6.3		PPBV	0.29	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	o-Xylene	8.4	J	PPBV	3	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	o-Xylene	4.9		PPBV	0.55	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	o-Xylene	6.7	J	PPBV	2.7	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	o-Xylene	9.8	J	PPBV	2.9	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	o-Xylene	13		PPBV	0.16	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	o-Xylene	8.7		PPBV	0.26	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	o-Xylene	7.1		PPBV	0.27	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	o-Xylene	5.8		PPBV	0.28	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	o-Xylene	0		PPBV	38	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	o-Xylene	15	J	PPBV	14	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	o-Xylene	12	J	PPBV	3.1	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	o-Xylene	6.1		PPBV	0.29	1.2
					o-Xylene Max	**15**				

Table A-2. Soil Vapor Sample Results
22 May 2015 Sampling Event
Former Mather Air Force Base, Site 59b

LOCATION	SAMPLE_NAME	SAMPLE CODE	SAMPLE DATE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Tetrachloroethene	6.1		PPBV	0.15	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Tetrachloroethene	11	J	PPBV	1.5	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Tetrachloroethene	12		PPBV	0.28	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Tetrachloroethene	24		PPBV	5.7	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Tetrachloroethene	24		PPBV	6	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Tetrachloroethene	0.46	F	PPBV	0.26	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Tetrachloroethene	0.73	J	PPBV	0.13	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Tetrachloroethene	120		PPBV	0.14	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Tetrachloroethene	88		PPBV	0.14	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Tetrachloroethene	0		PPBV	81	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Tetrachloroethene	0		PPBV	29	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Tetrachloroethene	3.3	J	PPBV	1.6	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Tetrachloroethene	6.1		PPBV	0.14	1.2
					Tetrachloroethene Max	**120**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Toluene	16		PPBV	0.16	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Toluene	18		PPBV	1.7	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Toluene	15		PPBV	0.31	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Toluene	25		PPBV	2.7	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Toluene	39		PPBV	2.9	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Toluene	33		PPBV	0.26	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Toluene	29		PPBV	0.15	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Toluene	31		PPBV	0.15	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Toluene	26		PPBV	0.16	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Toluene	72	J	PPBV	39	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Toluene	33	J	PPBV	14	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Toluene	43		PPBV	1.8	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Toluene	15		PPBV	0.16	1.2
					Toluene Max	**72**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	trans-1,2-Dichloroethene	0		PPBV	0.46	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	trans-1,2-Dichloroethene	0		PPBV	4.8	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	trans-1,2-Dichloroethene	0		PPBV	0.87	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	trans-1,2-Dichloroethene	28		PPBV	4.6	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	trans-1,2-Dichloroethene	32		PPBV	4.9	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	trans-1,2-Dichloroethene	0		PPBV	0.33	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	trans-1,2-Dichloroethene	0		PPBV	0.41	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	trans-1,2-Dichloroethene	0		PPBV	0.43	1.1

Table A-2. Soil Vapor Sample Results
22 May 2015 Sampling Event
Former Mather Air Force Base, Site 59b

LOCATION	SAMPLE_NAME	SAMPLE CODE	SAMPLE DATE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	trans-1,2-Dichloroethene	0		PPBV	0.44	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	trans-1,2-Dichloroethene	1400		PPBV	66	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	trans-1,2-Dichloroethene	140		PPBV	24	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	trans-1,2-Dichloroethene	0		PPBV	4.9	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	trans-1,2-Dichloroethene	0		PPBV	0.46	1.2
					trans-1,2-Dichloroethene Max	**1400**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Trichloroethene	180		PPBV	0.3	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Trichloroethene	4400		PPBV	3.1	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Trichloroethene	600		PPBV	0.57	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Trichloroethene	14000		PPBV	4.7	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Trichloroethene	19000		PPBV	4.9	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Trichloroethene	0.64	F	PPBV	0.22	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Trichloroethene	0.85	U	PPBV	0.27	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Trichloroethene	71		PPBV	0.28	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Trichloroethene	270		PPBV	0.29	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Trichloroethene	160000		PPBV	66	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Trichloroethene	59000		PPBV	24	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Trichloroethene	16	U	PPBV	3.2	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Trichloroethene	180		PPBV	0.3	1.2
					Trichloroethene Max	**160000**				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Trichlorofluoromethane	0.41	J	PPBV	0.19	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Trichlorofluoromethane	0		PPBV	2	12
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Trichlorofluoromethane	0.37	J	PPBV	0.37	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Trichlorofluoromethane	0		PPBV	2	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Trichlorofluoromethane	0		PPBV	2.2	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Trichlorofluoromethane	0.42	F	PPBV	0.21	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Trichlorofluoromethane	0.42	J	PPBV	0.17	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Trichlorofluoromethane	0.35	J	PPBV	0.18	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Trichlorofluoromethane	0.42	J	PPBV	0.18	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Trichlorofluoromethane	0		PPBV	29	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Trichlorofluoromethane	0		PPBV	10	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Trichlorofluoromethane	0		PPBV	2.1	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Trichlorofluoromethane	0.43	J	PPBV	0.19	1.2
					Trichlorofluoromethane Max	0.43				
59-PW-13B	59-PW-13B-FD	FD1	5/22/15 10:43	TO15	Vinyl Chloride	0		PPBV	0.41	1.2
59-PW-07	59-PW-07-NS	NS1	5/22/15 11:05	TO15	Vinyl Chloride	0		PPBV	4.3	12

Table A-2. Soil Vapor Sample Results
22 May 2015 Sampling Event
Former Mather Air Force Base, Site 59b

LOCATION	SAMPLE_NAME	SAMPLE CODE	SAMPLE DATE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-08	59-PW-08-NS	NS1	5/22/15 8:43	TO15	Vinyl Chloride	0		PPBV	0.78	2.2
59-PW-09A	59-PW-09A-NS	NS1	5/22/15 11:30	TO15	Vinyl Chloride	0		PPBV	7.3	22
59-PW-09B	59-PW-09B-NS	NS1	5/22/15 11:45	TO15	Vinyl Chloride	0		PPBV	7.7	24
59-PW-10A	59-PW-10A-NS	NS1	5/29/15 11:28	TO15	Vinyl Chloride	0		PPBV	0.19	1.1
59-PW-10B	59-PW-10B-NS	NS1	5/22/15 9:23	TO15	Vinyl Chloride	0		PPBV	0.37	1.1
59-PW-11A	59-PW-11A-NS	NS1	5/22/15 9:45	TO15	Vinyl Chloride	0		PPBV	0.38	1.1
59-PW-11B	59-PW-11B-NS	NS1	5/22/15 10:00	TO15	Vinyl Chloride	0		PPBV	0.39	1.1
59-PW-12A	59-PW-12A-NS	NS1	5/22/15 12:05	TO15	Vinyl Chloride	0		PPBV	100	320
59-PW-12B	59-PW-12B-NS	NS1	5/22/15 12:28	TO15	Vinyl Chloride	0		PPBV	37	120
59-PW-13A	59-PW-13A-NS	NS1	5/22/15 10:23	TO15	Vinyl Chloride	0		PPBV	4.4	13
59-PW-13B	59-PW-13B-NS	NS1	5/22/15 10:43	TO15	Vinyl Chloride	0		PPBV	0.41	1.2
					Vinyl Chloride Max	0				
					Grand Max	160000				

DL = laboratory detection limit
FD1 = field duplicate sample
Max = maximum
NS1 = normal sample
ppbv = parts per billion by volume
RL = laboratory reporting limit

EPA Flags:
F = detected between the laboratory J = detection limit and reporting limit
J = estimated concentration
U = not detected

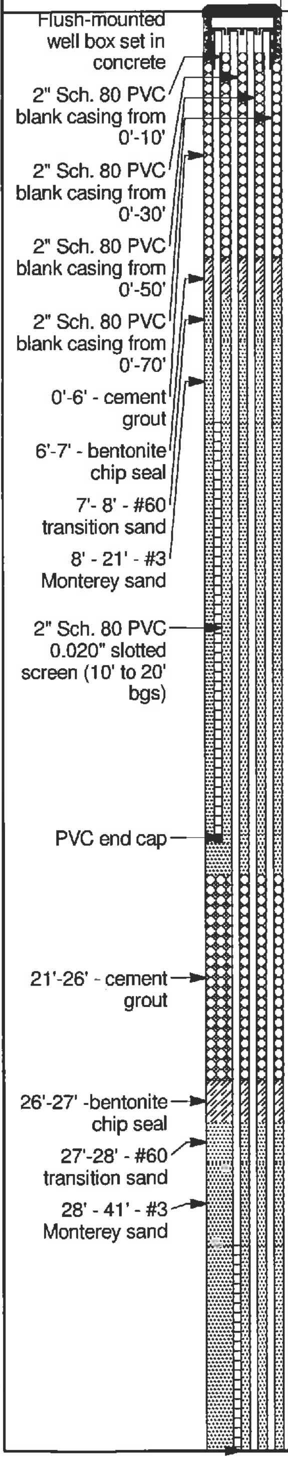
MWH

Boring ID: 59-PW-05   **Well ID: 59-PW-05**

Borehole Diam. (in.): **14**	Total Depth (ft): **91.5**	Project: **TO-35**	
Northing (ft): **1967678.49**	Easting (ft): **6760422.06**	Job Number: **1951160**	Site: **Former Mather AFB**
Drill Start Date: **10-19-2009**	Start Time: **14:30**	Logged By: **M. Sperber**	Reviewed By: **T. Daniels, P.G.**
Drill Finish Date: **10-20-2009**	Finish Time: **15:00**	Drilling Contractor: **WDC Exploration Wells**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **ARCH SpeedStar 30K**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Joe Zimmer**	

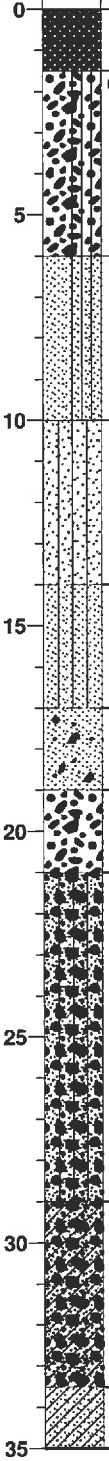
Comments: **west of hanger**
Well Comp. Date: **10-21-2009** Completion Time: **16:30**
Samplers: **grab cuttings from cyclone**
Soil Backfill Date: **N/A** Backfill Time: **N/A**

Well Completion



Sample Interval / Retained / Sample Type / Recovery (%) / Blow Count/6" / PID (ppm) / Water Level

Depth (feet) / **Graphic Log**



USCS Soil Classification	Description Hand augered first five feet	Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
	18" thick asphalt					
GP-GM	(GP-GM) Poorly Graded Gravel With Silt, dark yellowish brown (10YR 3/4), very dense, moist, noncemented, nonplastic, coarse gravel, with sands and fines, subrounded to rounded sand and gravel, no odor	60	5	15	10	10
SP-SM	(SP-SM) Poorly Graded Sand With Silt, brown (7.5YR 4/4), loose to medium dense, moist, weak cementation, nonplastic, no odor	10	20	30	25	15
ML	(ML) Silt With Sand, brown (10YR 4/3), soft, moist, noncemented, low plasticity, trace clay, no odor	tr	tr	5	10	75
SM	(SM) Silty Sand, dark brown (10YR 3/3), medium dense to dense, moist, noncemented, nonplastic, trace gravel, no odor	5	20	30	20	25
SW	(SW) Well Graded Sand With Gravel, dark yellowish brown (10YR 3/4), dense to very dense, noncemented, nonplastic, rounded sand and gravel, gravel up to 2", meta-sedimentary gravel	30	20	25	20	tr
GP	(GP) Poorly Graded Gravel, dark bluish gray (GLEY 2 4/5B 4/1), very dense, dry, noncemented, nonplastic, gravel up to 3", mete-sedimentary gravels, subangular to rounded	90	10			
GM	(GM) Silty Gravel With Sand, dark yellowish brown (10YR 4/6), dense, slightly moist, noncemented, nonplastic, subrounded to rounded gravel up to 1.5", no odor	50	20	5	5	20
GC	(GC) Clayey Gravel With Sand, yellowish brown (10YR 5/6), very dense to dense, moist, noncemented, fines have medium plasticity, mica flakes, rounded to subrounded meta-sedimentary gravels, up to 4", no odor	45	10	15	10	20
SC	(SC) Clayey Sand, dark yellowish brown (10YR 3/4), dense, moist, noncemented, low to non			40	40	20

Log Continued on Next Page

Borehole Diam. (in.): **14**	Total Depth (ft): **91.5**	Project: **TO-35**	
Northing (ft): **1967678.49**	Easting (ft): **6760422.06**	Job Number: **1951160**	Site: **Former Mather AFB**
Drill Start Date: **10-19-2009**	Start Time: **14:30**	Logged By: **M. Sperber**	Reviewed By: **T. Daniels, P.G.**
Drill Finish Date: **10-20-2009**	Finish Time: **15:00**	Drilling Contractor: **WDC Exploration Wells**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **ARCH SpeedStar 30K**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Joe Zimmer**	

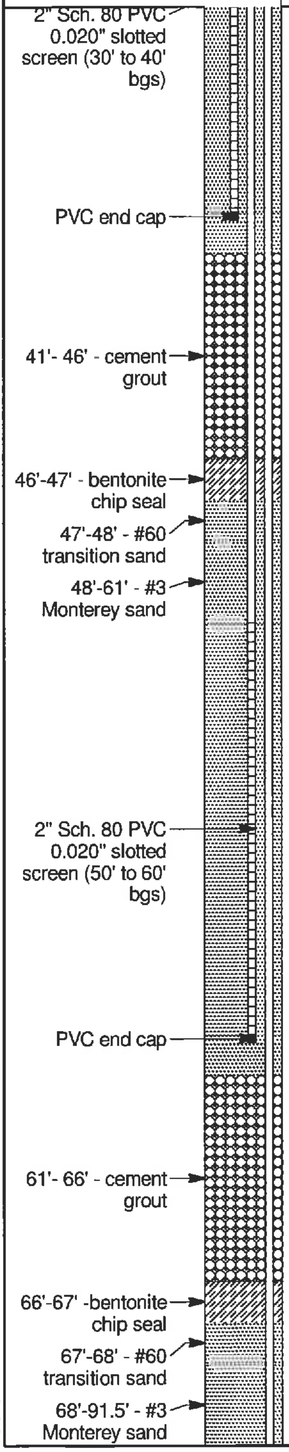
Comments: **west of hanger**

Samplers: **grab cuttings from cyclone**

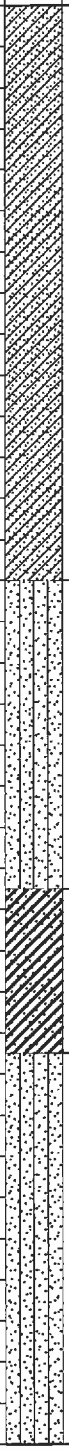
Well Comp. Date: **10-21-2009** | Completion Time: **16:30**

Soil Backfill Date: **N/A** | Backfill Time: **N/A**

Well Completion



Graphic Log



Sample Interval Retained	Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	USCS Soil Classification	Description	Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
						35		plastic, rounded to subrounded sands, mica flakes present, no odor					
								cementation increases					
							ML	(ML) Sandy Silt, dark yellowish brown (10YR 3/4), soft, moist, weak cementation, low plasticity, mica flakes present, no odor			5	20	75
							CL	(CL) Sandy Lean Clay, light olive brown (2.5Y 5/4), very stiff, moist, noncemented, low plasticity, mica flakes present, no odor			10	5	85
							ML	(ML) Sandy Silt, strong brown (7.5YR 4/6), very stiff, moist, noncemented, low to no plasticity			10	15	75
						70							

Log Continued on Next Page

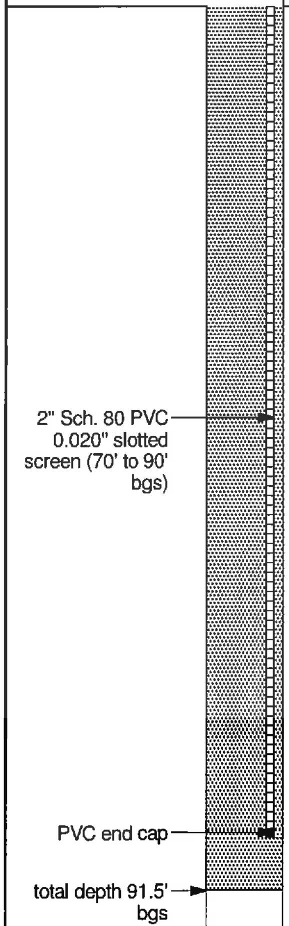
MWH

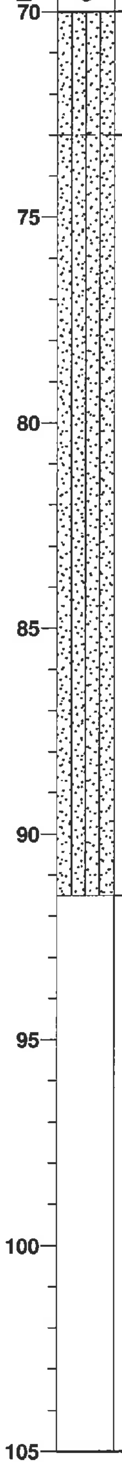
Boring ID: **59-PW-05**

Well ID: **59-PW-05**

Borehole Diam. (in.): **14**
Total Depth (ft): **91.5**
Project: **TO-35**
Northing (ft): **1967678.49**
Easting (ft): **6760422.06**
Job Number: **1951160**
Site: **Former Mather AFB**
Drill Start Date: **10-19-2009**
Start Time: **14:30**
Logged By: **M. Sperber**
Reviewed By: **T. Daniels, P.G.**
Drill Finish Date: **10-20-2009**
Finish Time: **15:00**
Drilling Contractor: **WDC Exploration Wells**
Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**
Date / Time: **N/A**
Drill Rig Type/Method: **ARCH SpeedStar 30K**
Depth H_2O After Drilling (ft): **N/A**
Date / Time: **N/A**
Driller's Name: **Joe Zimmer**
Comments: **west of hanger**
Well Comp. Date: **10-21-2009**
Completion Time: **16:30**
Samplers: **grab cuttings from cyclone**
Soil Backfill Date: **N/A**
Backfill Time: **N/A**

Well Completion	Sample Interval Retained	Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
										weak cementation					
									ML	(ML) Sandy Silt, brown (10YR 4/3), stiff, moist, noncemented, nonplastic, no odor				30	70
										mica flakes present					
										total depth 91.5' bgs					



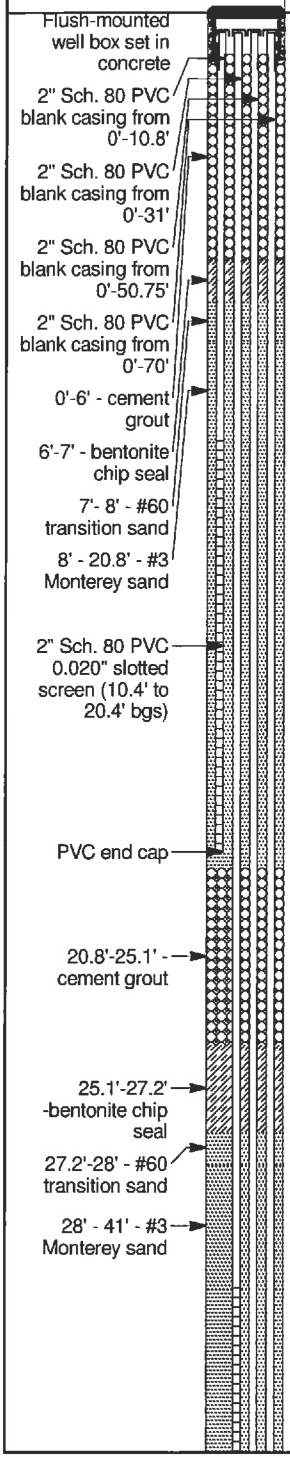


MWH

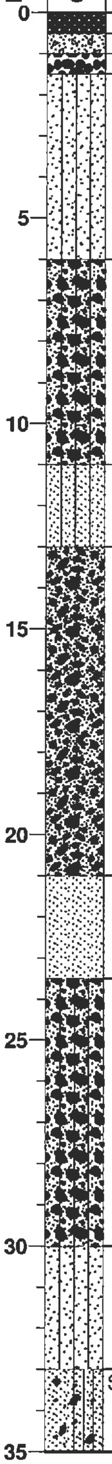
Boring ID: **59-PW-06**		Well ID: **59-PW-06**	
Borehole Diam. (in.): 14	Total Depth (ft): 92.0	Project: TO-35	
Northing (ft): 1967523.29	Easting (ft): 6760454.14	Job Number: 1951160	Site: Former Mather AFB
Drill Start Date: 10-22-2009	Start Time: 07:30	Logged By: M. Sperber	Reviewed By: T. Daniels, P.G.
Drill Finish Date: 10-22-2009	Finish Time: 12:34	Drilling Contractor: WDC Exploration Wells	Field Instrumentation: PID
Depth 1st H_2O (ft): N/A	Date / Time: N/A	Drill Rig Type/Method: ARCH SpeedStar 30K	
Depth H_2O After Drilling (ft): N/A	Date / Time: N/A	Driller's Name: Joe Zimmer	

Comments: south of hanger	Well Comp. Date: 10-26-2009	Completion Time: 10:20
Samplers: grab cuttings from cyclone	Soil Backfill Date: N/A	Backfill Time: N/A

Well Completion



Depth (feet) / Graphic Log



Sample Interval Retained	Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	USCS Soil Classification	Description Hand augered first five feet	Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
							6" thick asphalt					
							6" thick concrete					
							6" thick aggregate base					
				0.0		ML	(ML) Sandy Silt, brown (7.5YR 4/4), medium stiff, moist, noncemented, non to low plasticity, small mica flakes present				35	65
				0.0 0.0		GM	(GM) Silty Gravel With Sand, dark brown (10YR 3/3), dense, moist, noncemented, nonplastic, rounded gravel, rounded to subrounded sand, gravel up to 1.5" diameter	50	20	10		20
				0.0		SM	(SM) Silty Sand, dark brown (10YR 3/3), dense, moist, noncemented, nonplastic, subrounded sand		15	10	55	20
				0.0 0.0 0.0		GP	(GP) Poorly Graded Gravel With Sand, olive brown (2.5Y 4/3), to greenish gray (GLEY 5/5GY 5/1), dense, moist to dry, weak cementation, nonplastic, subangular to subrounded gravel, subrounded to subangular sand, gravel up to 2.5" diameter, meta-sedimentary gravel, quartz rich sand, some mica flakes present, no odor	50	15	20	10	tr
						SP	(SP) Poorly Graded Sand, dark yellowish brown (10YR 4/4), loose, moist, weak cementation, nonplastic, small mica flakes present, no odor			80	15	5
				0.0		GM	(GM) Silty Gravel With Sand, dark yellowish brown (10YR 3/4), dense to very dense, moist, noncemented, nonplastic, gravel up to 2" diameter, subrounded to angular gravel, subrounded to subangular sand, meta-sedimentary gravel, quartz rich sand with small mica flakes	50	10	10	10	20
				0.0 0.0		ML	(ML) Sandy Silt, dark yellowish brown (10YR 4/6), stiff, moist, noncemented, low to nonplastic, no odor, minor gravel	10			20	70
						SW-SM	(SW-SM) Well Graded Sand With Silt And Gravel, dark brown (10YR 3/3), dense, moist, noncemented, nonplastic, subrounded to angular	25	20	20	20	15

Log Continued on Next Page

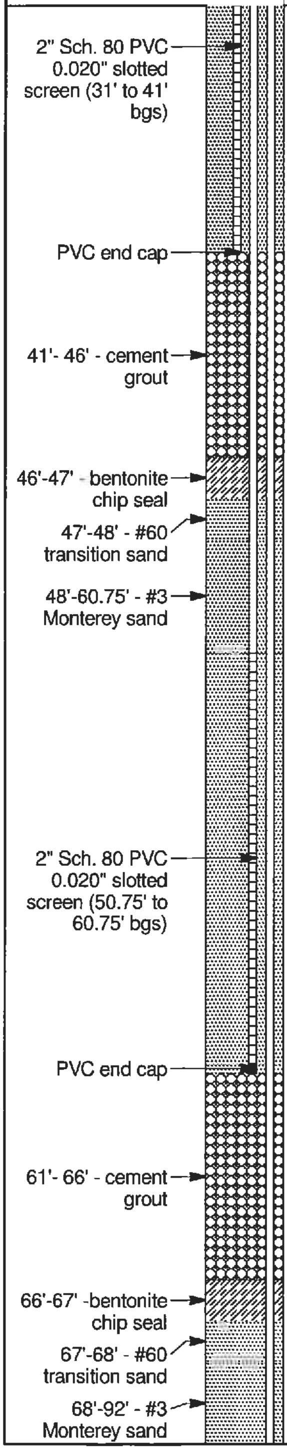
MWH

Boring ID: **59-PW-06**

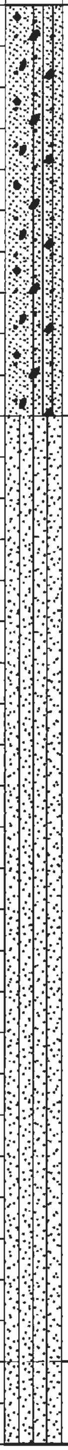
Well ID: **59-PW-06**

Borehole Diam. (in.): 14	Total Depth (ft): 92.0	Project: TO-35			
Northing (ft): 1967523.29	Easting (ft): 6760454.14	Job Number: 1951160	Site: Former Mather AFB		
Drill Start Date: 10-22-2009	Start Time: 07:30	Logged By: M. Sperber	Reviewed By: T. Daniels, P.G.		
Drill Finish Date: 10-22-2009	Finish Time: 12:34	Drilling Contractor: WDC Exploration Wells	Field Instrumentation: PID		
Depth 1st H_2O (ft): N/A	Date / Time: N/A	Drill Rig Type/Method: ARCH SpeedStar 30K			
Depth H_2O After Drilling (ft): N/A	Date / Time: N/A	Driller's Name: Joe Zimmer			
Comments: south of hanger			Well Comp. Date: 10-26-2009	Completion Time: 10:20	
Samplers: grab cuttings from cyclone			Soil Backfill Date: N/A	Backfill Time: N/A	

Well Completion



Graphic Log



Sample Interval Retained	Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	USCS Soil Classification	Description	Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
				0.0		35		gravel, sand is subrounded to subangular, quartz rich, mica present, gravel is up to 1.5" diameter					
				0.0									
						40							
						45	ML	(ML) Sandy Silt, yellowish brown (10YR 5/4), medium stiff, moist, medium plasticity, trace mica, trace mafic, no odor			10	15	75
				0.0									
						50							
							ML	(ML) Sandy Silt, becomes brown (7.5YR 4/4), slight increase sand content			15	20	65
				0.0		55							
						60							
						65							
							ML	(ML) Sandy Silt, brown (7.5YR 4/4), soft, moist, nonplastic, trace clay			30	15	55
						70							

Log Continued on Next Page

MWH

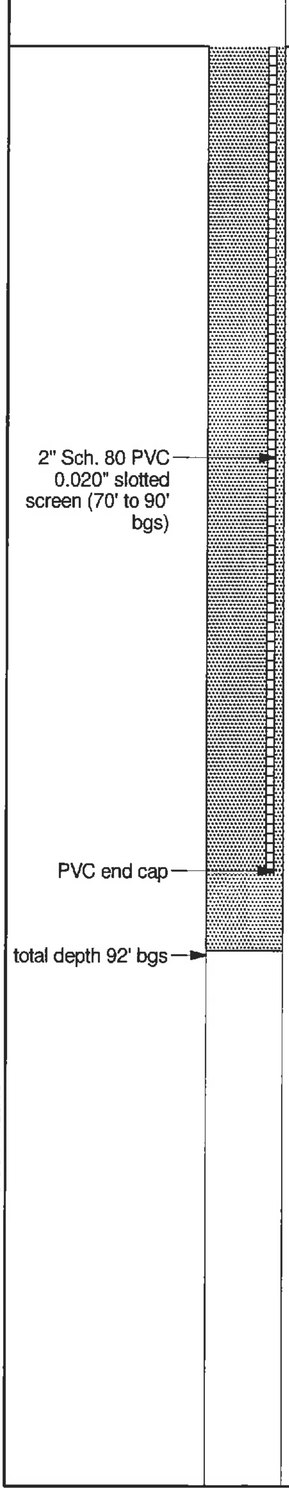
Boring ID: **59-PW-06**

Well ID: **59-PW-06**

Borehole Diam. (in.): 14	Total Depth (ft): 92.0	Project: TO-35	
Northing (ft): 1967523.29	Easting (ft): 6760454.14	Job Number: 1951160	Site: Former Mather AFB
Drill Start Date: 10-22-2009	Start Time: 07:30	Logged By: M. Sperber	Reviewed By: T. Daniels, P.G.
Drill Finish Date: 10-22-2009	Finish Time: 12:34	Drilling Contractor: WDC Exploration Wells	Field Instrumentation: PID
Depth 1st H_2O (ft): N/A	Date / Time: N/A	Drill Rig Type/Method: ARCH SpeedStar 30K	
Depth H_2O After Drilling (ft): N/A	Date / Time: N/A	Driller's Name: Joe Zimmer	

Comments: south of hanger	Well Comp. Date: 10-26-2009	Completion Time: 10:20
Samplers: grab cuttings from cyclone	Soil Backfill Date: N/A	Backfill Time: N/A

Well Completion



Sample Interval Retained	Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
						70								
								SM	(SM) Silty Sand, brown (7.5YR 5/3), loose, moist, noncemented, nonplastic, trace mica			50	15	35
				0.0		75								
						80		SM	(SM) Silty Sand, becomes dark yellowish brown (10YR 4/4), trace mafic			55	20	25
								ML	(ML) Sandy Silt, brown (7.5YR 4/4), medium stiff, moist, noncemented, low to moderate plasticity, trace mica, trace mafic, trace iron oxide staining			10	25	65
						85								
						90								
									total depth 92' bgs					
						95								
						100								
						105								

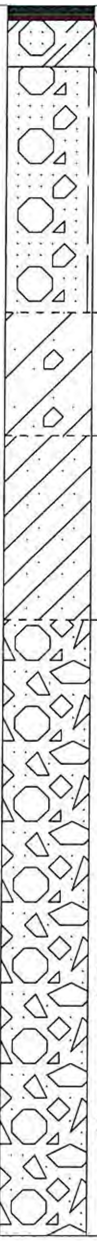
Project: Former Mather Air Force Base

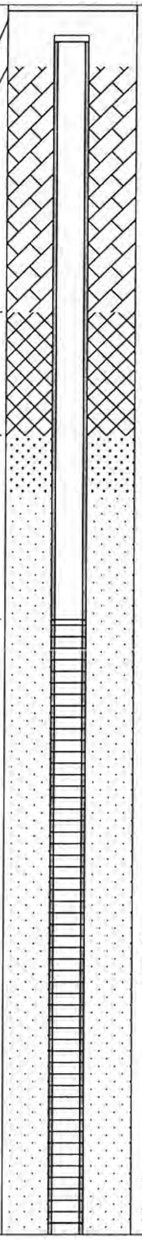
Location: Mather, CA **Project: 18600771**

Log of Monitoring Well: 59-PW-07

Drilling Contractor: National Drilling	Drilled by: Jimmy Freitas	Borehole Name:	Logged By: A. McGinnis
Drilling Method: ARCH	Dates Drilled: 1/9/2014	Well Construction: 1/9/2014	Checked By: Thomas F. Cudzilo P.G. 4473
Borehole Diameter: 8-inch	Casing Diameter: 2-inch	Casing Type: SCH 40 PVC	QC Initial: S. Lookingbill
Total Depth Drilled: 20 feet	Screen Interval: 10-20'	Slot Size: 0.020-inch	Ground Surface Elevation:
Sampling Method: NA	Top of Protective Casing Elevation:		Northing: Easting:

Comments: Approximately 200 ft south of B4260 on Macready Ave.





Depth (Vertical Feet)	Sample Interval	Hammer Count	PID (ppm) BZ	PID (ppm) Soil Core	Time (military)	LITHOLOGY DESCRIPTION	WELL CONSTRUCTION
0							
			0.0			Asphalt	Traffic rated flush mount well box.
						Concrete removed with concrete cutter.	
						Hand augered to 5 ft bgs. Sandy gravel with cobbles up to 4 in.	Cement Grout 0-5'
5						Sandy, gravelly clay (CL). Reddish brown, soft, moist, high plasticity.	SCH 40 PVC Blank Casing 0-10' Bentonite Seal 5-7'
						Sandy Clay (CL). Light reddish brown, dry, soft, 60% clay, 40% sand.	Sand Bridge #30 7-8'
			0.0			Increase in clay.	
						Gravel size increases to 1 in.	
10						Sandy gravel (GW). Dry, subangular, 70% gravel, 30% sand, fine-grained sand. Gravel size is up to 2 in.	SCH 40 PVC Screen 0.020" 2-inch diameter 10-20'
			0.0			80% gravel, 20% sand.	
15						Gravel size is decreasing to approximately 1 in. max, 60% gravel, 40% sand.	Filter Pack #3 8-20'
						Increase in gravel, gravel size increases up to 2 in.	Well Depth 20'
20							Borehole Depth 20'

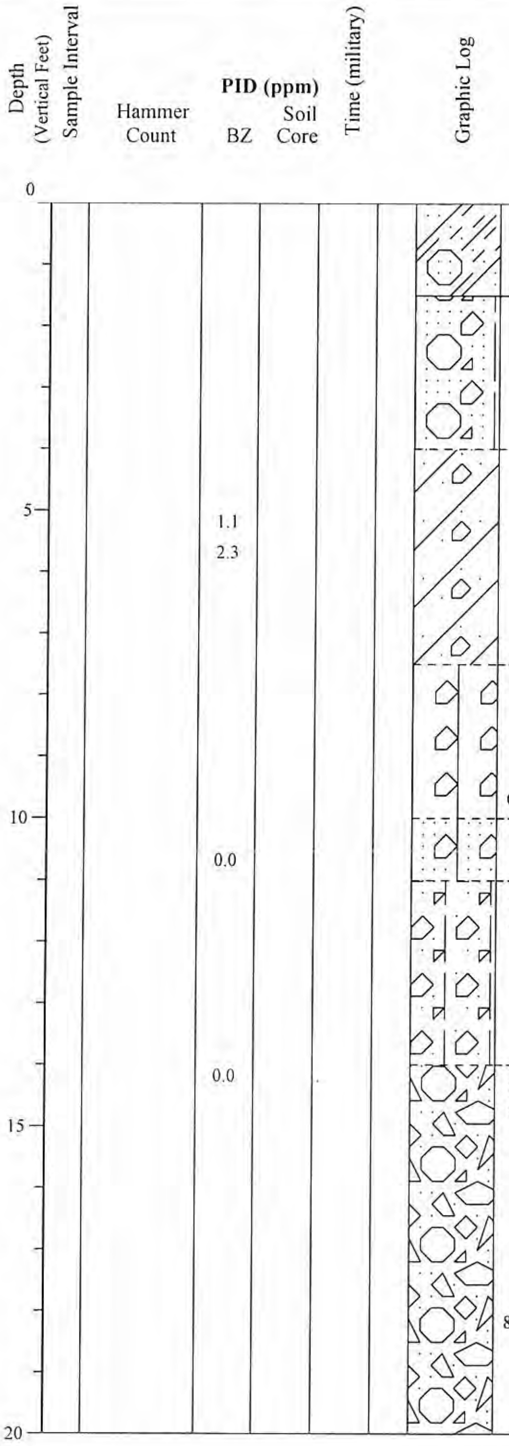
Project: Former Mather Air Force Base

Location: Mather, CA **Project: 18600771**

Log of Monitoring Well:
59-PW-08

Drilling Contractor: National Drilling	Drilled by: Jimmy Freitas	Borehole Name:	Logged By: A. McGinnis
Drilling Method: ARCH	Dates Drilled: 1/8/2014	Well Construction: 1/8/2014	Checked By: Thomas F. [illegible] P.G. 4473
Borehole Diameter: 8-inch	Casing Diameter: 2-inch	Casing Type: SCH 40 PVC	QC Initial: S. Lookingbill
Total Depth Drilled: 20 feet	Screen Interval: 10-20'	Slot Size: 0.020-inch	Ground Surface Elevation:
Sampling Method: NA	Top of Protective Casing Elevation:		Northing: Easting:

Comments: Approximately 300 ft south of B4260 on Macready Ave.



LITHOLOGY DESCRIPTION

Concrete Surface removed with concrete cutter.

Hand augered to 4 ft bgs. Sandy gravel with cobbles up to 4 in.

Gravelly clay (CL). Reddish brown, soft, moist, high plasticity.

Silt with gravel (ML). Yellowish brown, firm, dry, gravel size is to 0.5 in.

Gravel size increases to 1 in.

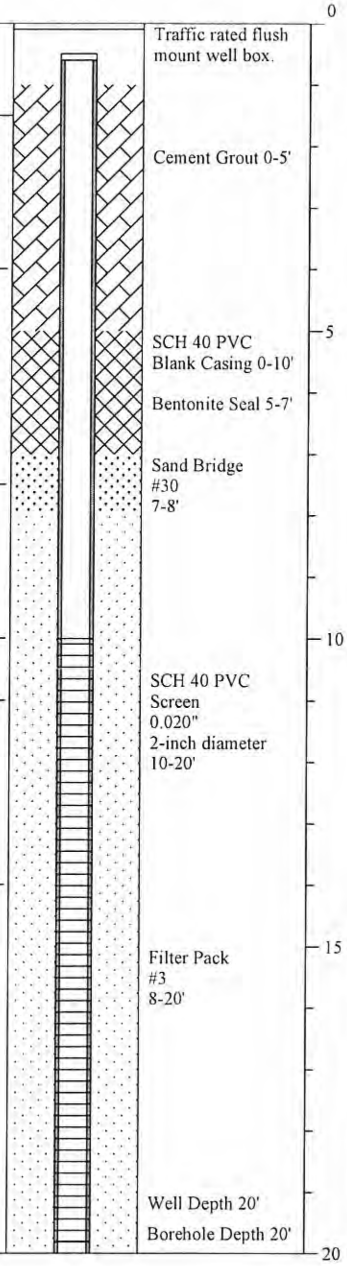
Silty sand with gravel (SM). Yellowish brown, dry.

Silty gravel (GM). Brownish gray, subangular, 80% gravel, 20% silt, dry, loose.

Sandy gravel (GW). Gray, subangular, gravel size is up to 1 in., 70% gravel, 30% sand, dry, loose. Sand content decreases at 15 ft.

80% gravel, 20% sand.

WELL CONSTRUCTION



Project: Former Mather Air Force Base

Location: Mather, CA **Project: 18600771**

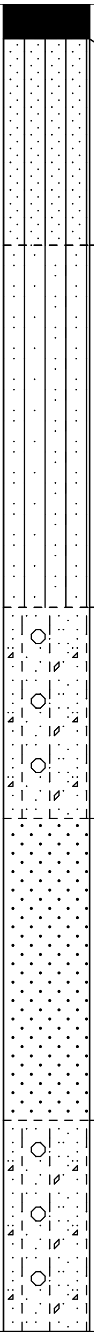
Log of Monitoring Well: 59-PW-09A/B

Drilling Contractor: Cascade Drilling	Drilled by: Steve Vibbard	Borehole Name: 59-PW-09	Logged By: J. Brandon
Drilling Method: ARCH	Dates Drilled: 10/24/2014	Well Construction: 10/24-10/27	Checked By: TRG
Borehole Diameter: 8-Inch	Casing Diameter: 1-inch	Casing Type: SCH 40 PVC	QC Initial: PMB
Total Depth Drilled: 22'	Screen Interval: 10'-11', 20'-21'	Slot Size: 0.020-inch	Ground Surface Elevation: 85.8 ft msl
Sampling Method: Grab	Top of Protective Casing Elevation: NM		Northing: 1967625.56 Easting: 6760598.79

Comments:

Depth (Vertical Feet)	Sample Interval	Hammer Count	PID (ppm) BZ	PID (ppm) Soil Core	Time (military)
0					
			0.0	0.0	0952
			0.0	0.0	1120
5					
			0.0	0.0	1324
10					
			0.0	0.0	1330
			0.0	0.0	1335
			0.0	0.0	1341
15					
			0.0	0.1	1405
20					
			0.0	0.1	
			0.0	0.1	1420

Graphic Log



LITHOLOGY DESCRIPTION

Asphalt to 7 inches

Silty Sand w/ Cobbles (SM). Dark brown (10YR 3/3), very fine- to coarse-grained sand, poorly graded, loose to medium density, damp.

Hand Auger to 5'

Sandy Silt (ML). Strong brown (2.5Y 5/6), very fine-grained sand, soft to firm consistency, slow dilatancy, low plasticity, dry.

At 5.5 ft bgs color change to yellowish brown (10YR 5/6).

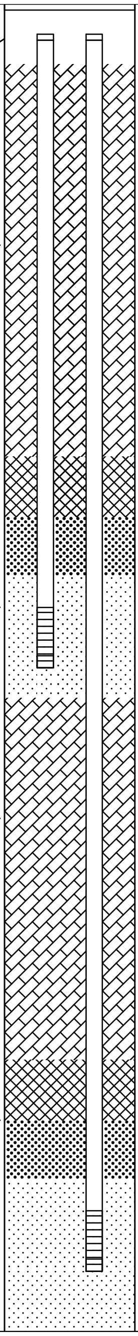
Silty Sand w/ Gravel (GM). Light olive brown (2.5Y 5/3), very fine to fine-grained sand, poorly graded, subangular and rounded gravels, medium density, moist.

Sand (SP). Light olive brown (2.5Y 5/3), very fine- to medium-grained sand, trace coarse-grained sand, poorly graded, loose density, moist.

Gravels at 17 ft.

Silty Sandy Gravel (GM). Light olive brown (2.5Y 5/3), very fine- to medium-grained sand, poorly graded, loose density, damp.

WELL CONSTRUCTION



Traffic rated flush mount well box.

Cement Grout
0-7.4'

SCH 40 PVC Blank Casing
0-10'

Bentonite Seal
7.4-8.5'

#30 Sand Bridge
8.5-9.5'

#3 Filter Pack
9.5-11.5'

SCH 40 PVC Screen
10-11'

Cement Grout
11.5-17.5'

SCH 40 PVC Blank Casing
0-20'

Bentonite Seal
17.5-18.5'

#30 Sand Bridge
18.5-19.5'

#3 Filter Pack
19.5-22'

SCH 40 PVC Screen
20-21'

Well Depth 21'

Borehole Depth 22'

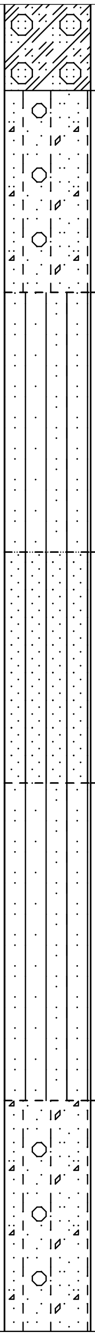
Project: Former Mather Air Force Base

Location: Mather, CA **Project: 18600771**

Log of Monitoring Well: 59-PW-10A/B

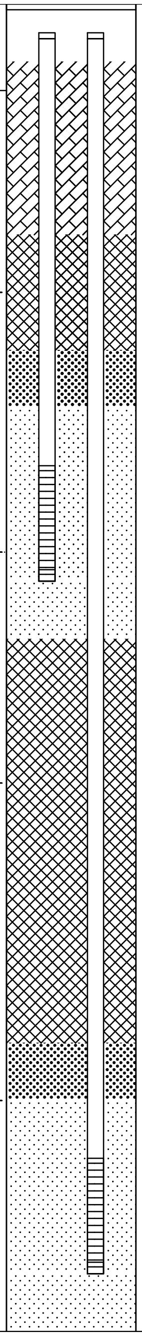
Drilling Contractor: National EWP	Drilled by: Sam Rivera	Borehole Name: 59-PW-10	Logged By: J. Brandon
Drilling Method: Sonic	Dates Drilled: 5/16/2015	Well Construction: 5/16/2015	Checked By: TRG
Borehole Diameter: 8-inch	Casing Diameter: 1-inch	Casing Type: SCH 40 PVC	QC Initial: B. Russell
Total Depth Drilled: 23 ft bgs	Screen Interval: 8-10', 20-22'	Slot Size: 0.020-inch	Ground Surface Elevation: 86.2 ft msl
Sampling Method: Grab	Top of Protective Casing Elevation: NM		Northing: 1967812.54 Easting: 6760403.46

Comments: 320 ft northwest of 59-PW-09



Depth (Vertical Feet)	Sample Interval	Hammer Count	PID (ppm) BZ	PID (ppm) Soil Core	Time (military)	LITHOLOGY DESCRIPTION
0						Concrete
						Silty Sand with Gravel and Cobbles (SM). Brown (2.5Y 4/3), very fine to medium-grained sand, poorly graded.
5						Silty Sand-Sandy Silt (SM-ML). Brown (2.5Y 4/3), very fine to fine-grained sand, poorly graded, damp.
			0.0	0.0	1000	
10			0.0	0.0	1005	Silty Sand (SM). Brown (2.5Y 4/3), very fine to fine-grained sand, poorly graded, damp.
			0.0	0.0	1010	
			0.0	0.0	1015	
						Sandy Silt (ML). Brown (2.5Y 4/3), very fine-grained sand, poorly graded, soft to firm consistency, low to medium plasticity, damp.
15			0.0	0.0	1020	
			0.0	0.0	1025	
			0.0	0.0	1030	Silty Sand with Gravel (SM). Very fine to medium-grained sand, poorly graded.
20						
			0.0	0.0	1032	
						Trace fine grained sand at 21.5 ft bgs.
			0.0	0.0	1035	

WELL CONSTRUCTION



Traffic rated flush mount well box.

Cement Grout 0-4'

SCH 40 PVC Blank Casing 0-8'

Hydrated Bentonite Seal 4-6'

#30 Sand Bridge 6-7'

#3 Filter Pack 7-11'

SCH 40 PVC Screen 8-10'

Hydrated Bentonite Seal 11-18'

SCH 40 PVC Blank Casing 0-20'

#30 Sand Bridge 18-19'

#3 Filter Pack 19-23'

SCH 40 PVC Screen 20-22'

Well Depth 22'

Borehole Depth 23'

Project: Former Mather Air Force Base

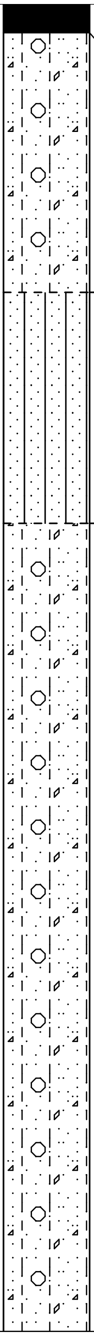
Location: Mather, CA **Project: 18600771**

Log of Monitoring Well: 59-PW-11A/B

Drilling Contractor: National EWP
Drilled by: Sam Rivera
Borehole Name: 59-PW-11
Logged By: J. Brandon
Drilling Method: Sonic
Dates Drilled: 5/15/2015
Well Construction: 5/15/2015
Checked By: TRG
Borehole Diameter: 8-inch
Casing Diameter: 1-inch
Casing Type: SCH 40 PVC
QC Initial: B. Russell
Total Depth Drilled: 23 ft bgs
Screen Interval: 8-10', 20-22'
Slot Size: 0.020-inch
Ground Surface Elevation: 86.2 ft msl
Sampling Method: Grab
Top of Protective Casing Elevation: NM
Northing: 1967615.03 Easting: 6760496.82
Comments: 120 ft west of 59-PW-09

Depth (Vertical Feet)	Sample Interval	Hammer Count	PID (ppm) BZ	PID (ppm) Soil Core	Time (military)
0					
5					
			0.0	0.0	
			0.0		1405
10					
			0.0	0.0	1410
			0.0	0.0	1415
15			0.0	0.0	1420
			0.0	0.0	1432
			0.0	0.1	1437
20					
			0.0	0.4	1440

Graphic Log



LITHOLOGY DESCRIPTION

Asphalt

Silty Sand with Cobbles (SM). Brown (2.5Y 4/3), very fine to fine-grained sand, trace medium-grained sand, poorly graded, large cobbles and gravel.

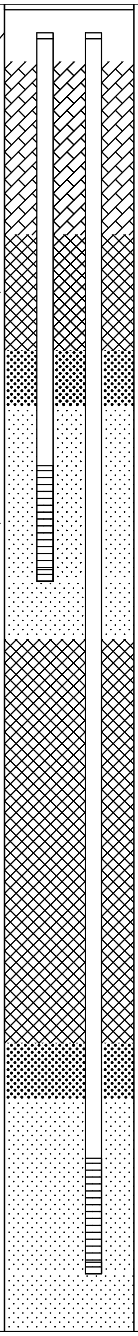
Silty Sand (SM). Brown (2.5Y 4/3), very fine to fine-grained sand, poorly graded, low density, damp.

Silty Sand with Gravel and Cobbles (SM). Very fine to medium-grained sand, poorly graded.

Increase gravel and cobbles content.

Decrease medium-grained sand at 21.5 ft bgs.

WELL CONSTRUCTION



Traffic rated flush mount well box.

Cement Grout
0-4'

SCH 40 PVC Blank Casing
0-8'

Hydrated Bentonite Seal
4-6'

#30 Sand Bridge
6-7'

#3 Filter Pack
7-11'

SCH 40 PVC Screen
8-10'

Hydrated Bentonite Seal
11-18'

SCH 40 PVC Blank Casing
0-20'

#30 Sand Bridge
18-19'

#3 Filter Pack
19-23'

SCH 40 PVC Screen
20-22'

Well Depth 22'

Borehole Depth 23'

Project: Former Mather Air Force Base

Location: Mather, CA **Project: 18600771**

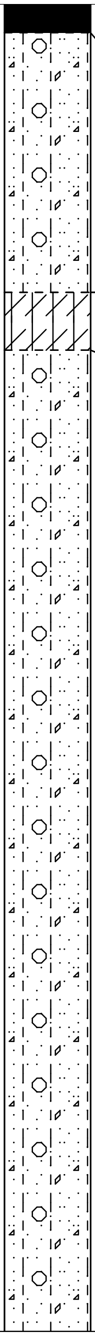
Log of Monitoring Well: 59-PW-12A/B

Drilling Contractor: National EWP	Drilled by: Sam Rivera	Borehole Name: 59-PW-12	Logged By: J. Brandon
Drilling Method: Sonic	Dates Drilled: 5/15/2015	Well Construction: 5/15/2015	Checked By: TRG
Borehole Diameter: 8-inch	Casing Diameter: 1-inch	Casing Type: SCH 40 PVC	QC Initial: B. Russell
Total Depth Drilled: 23 ft bgs	Screen Interval: 8-10', 20-22'	Slot Size: 0.020-inch	Ground Surface Elevation: 86.2 ft msl
Sampling Method: Grab	Top of Protective Casing Elevation: NM		Northing: 1967628.66 Easting: 6760645.00

Comments: 30 ft east of 59-PW-09

Depth (Vertical Feet)	Sample Interval	Hammer Count	PID (ppm) BZ	PID (ppm) Soil Core	Time (military)
			0.0	0.0	0935
			0.0	0.5	0938
			0.0	0.0	0940
			0.0	0.0	0945
			0.0	0.0	0950
			0.0	0.0	1017
			0.0	0.0	1025
			0.0	0.5	1030
			0.0	0.0	1035

Graphic Log



LITHOLOGY DESCRIPTION

Asphalt

Silty Sand with Cobbles (SM). Brown (2.5Y 4/3), very fine to fine-grained sand, poorly graded, large cobbles.

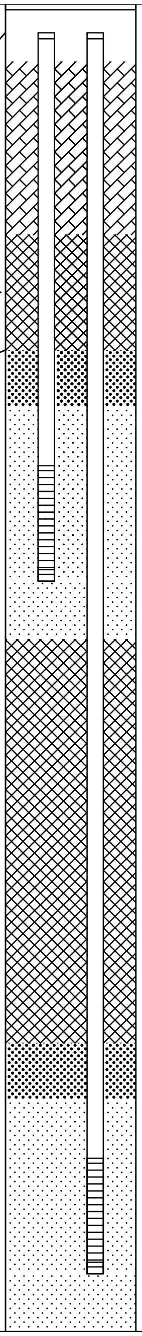
Clayey Silt (ML). Dark reddish brown (5YR 3/4), trace very fine-grained sand, firm consistency, medium plasticity.

Silty Sand with Gravels (SM). Brown (2.5Y 4/3), very fine to fine-grained sand, trace medium-grained sand, poorly graded, trace cobbles.

Increase fine-grained sand content.

Increase gravels and fine-grained sand 20.5 to 23 ft bgs. Trace medium-grained sand.

WELL CONSTRUCTION



Traffic rated flush mount well box.

Cement Grout
0-4'

SCH 40 PVC Blank Casing
0-8'

Hydrated Bentonite Seal
4-6'

#30 Sand Bridge
6-7'

#3 Filter Pack
7-11'

SCH 40 PVC Screen
8-10'

Hydrated Bentonite Seal
11-18'

SCH 40 PVC Blank Casing
0-20'

#30 Sand Bridge
18-19'

#3 Filter Pack
19-23'

SCH 40 PVC Screen
20-22'

Well Depth 22'

Borehole Depth 23'

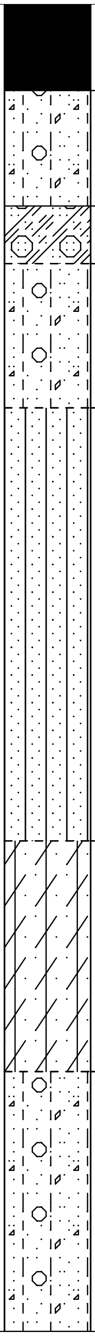
Project: Former Mather Air Force Base

Location: Mather, CA
Project: 18600771

Log of Monitoring Well: 59-PW-13A/B

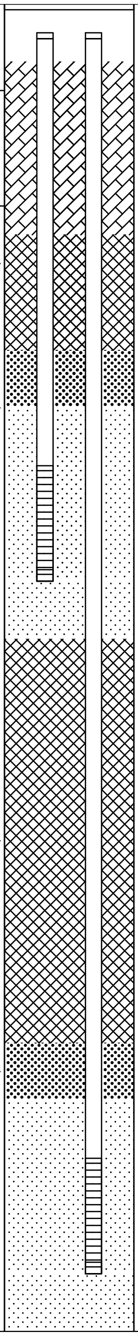
Drilling Contractor: National EWP	Drilled by: Sam Rivera	Borehole Name: 59-PW-13	Logged By: J. Brandon
Drilling Method: Sonic	Dates Drilled: 5/16/2015	Well Construction: 5/16/2015	Checked By: TRG
Borehole Diameter: 8-inch	Casing Diameter: 1-inch	Casing Type: SCH 40 PVC	QC Initial: B. Russell
Total Depth Drilled: 23 ft bgs	Screen Interval: 8-10', 20-22'	Slot Size: 0.020-inch	Ground Surface Elevation: 86.1
Sampling Method: Grab	Top of Protective Casing Elevation: NM		Northing: 1967835.88 Easting: 6760711.08

Comments: 240 ft northeast of 59-PW-09



Depth (Vertical Feet)	Sample Interval	Hammer Count	PID (ppm) BZ	PID (ppm) Soil Core	Time (military)	LITHOLOGY DESCRIPTION
0						Asphalt
						Silty Sand with Cobbles (SM). Brown (2.5Y 4/4), very fine to fine-grained sand, poorly graded.
						Concrete
5						Silty Sand with Gravels and Cobbles (SM). Brown (2.5Y 4/3), very fine to fine-grained sand, poorly graded, damp to moist.
			0.0	0.0	0720	Silty Sand (SM). Brown (2.5Y 4/3), very fine to fine-grained sand, trace medium-grained sand, poorly graded, medium density, damp to moist.
			0.0	0.0	0725	
10						
			0.0	0.0	0730	
						No medium-grained sand starting at 12 ft bgs.
			0.0	0.0	0735	
15			0.0	0.0	0740	Sandy Silt with Clay (ML). Brown (2.5Y 4/3), very fine-grained sand, poorly graded, trace Fe staining throughout, low to medium plasticity, damp.
			0.0	0.0	0745	
			0.0	0.0	0750	Silty Sand with Gravel (SM). Brown (2.5Y 4/3), very fine to medium-grained sand, trace coarse-grained sand, poorly graded.
20						
			0.0	0.0	0755	
						Cobbles at 21.5 ft bgs.
			0.0	0.0	0800	

WELL CONSTRUCTION



Traffic rated flush mount well box.

Cement Grout
0-4'

SCH 40 PVC Blank Casing
0-8'

Hydrated Bentonite Seal
4-6'

#30 Sand Bridge
6-7'

#3 Filter Pack
7-11'

SCH 40 PVC Screen
8-10'

Hydrated Bentonite Seal
11-18'

SCH 40 PVC Blank Casing
0-20'

#30 Sand Bridge
18-19'

#3 Filter Pack
19-23'

SCH 40 PVC Screen
20-22'

Well Depth 22'

Borehole Depth 23'

APPENDIX B

Field Logs
(Provided on CD)

Table B-1. Stabilization Parameters for New Soil Vapor Wells
Table B-2. Water Levels in Soil Vapor Wells (March 2017 – February 2018)
Table B-3. Indoor Air and Sub-Slab Vapor Sampling Weather Parameters (January 26 and 27, 2017)

Indoor Air Sampling Event Field Logs
Baseline Soil Vapor Monitoring Event Field Logs
Waste Disposal Receipts

Table B-1. Stabilization Parameters for New Soil Vapor Wells
B4260, Former Mather Air Force Base

Well ID	Depth (ft bgs)	Top of Screen (ft bgs)	Date	Time	Water Level (ft bgs)	Purge time (sec)	Methane (% LEL)	O2 (%)	CO2 (ppmv)	PID (ppmv)	Notes:
59-PW-12	8 to 10	8	2/8/2017	---	N/A	12	---	---	---	---	vacuum during purge
59-PW-12	8 to 10	8	2/15/2017	10:47	N/A	12	0	17.6	25,400	0	low vacuum in well
59-PW-12	8 to 10	8	3/16/2017	8:43	N/A	12	---	---	---	---	Created vacuum when purged
59-PW-12	8 to 10	8	4/6/2017	12:51	N/A	12	---	---	---	---	Created vacuum
59-PW-12	8 to 10	8	5/16/2017	10:26	N/A	12	---	---	---	---	created vacuum
59-PW-12	20 to 22	20	2/8/2017	---	N/A	26.4	0	16.6	10,260	83.4	
59-PW-12	20 to 22	20	2/15/2017	10:50	N/A	26.4	0	18.4	13,100	130	
59-PW-12	20 to 22	20	3/16/2017	8:46	N/A	26.4	0	20.9	15,000	1.30	vacuum noted - data may not be good.
59-PW-12	20 to 22	20	4/6/2017	12:53	N/A	26.4	0	16.6	14,800	70	
59-PW-12	20 to 22	20	5/16/2017	---	---	---	---	---	---	---	adequate data; no further testing
59-PW-14	30 to 32	30	2/8/2017	9:16	N/A	38.4	---	---	---	---	vacuum during purge
59-PW-14	30 to 32	30	2/15/2017	10:31	24.68	38.4	---	---	---	---	saturated screen
59-PW-14	30 to 32	30	3/16/2017	8:53	25.22	---	---	---	---	---	Submerged
59-PW-14	30 to 32	30	4/6/2017	13:00	23.67	---	---	---	---	---	Water saturated screen
59-PW-14	30 to 32	30	5/16/2017	---	---	---	---	---	---	---	Water saturated screen
59-PW-14	60 to 62	60	2/8/2017	9:30	N/A	74.4	---	---	---	---	vacuum during purge
59-PW-14	60 to 62	60	2/15/2017	10:35	55.00	74.4	---	---	---	---	saturated screen
59-PW-14	60 to 62	60	3/16/2017	8:55	56.19	---	---	---	---	---	Submerged
59-PW-14	60 to 62	60	4/6/2017	13:03	56.53	---	---	---	---	---	Water saturated screen
59-PW-14	60 to 62	60	5/16/2017	---	---	---	---	---	---	---	Water saturated screen
59-PW-14	80 to 82	80	2/8/2017	9:35	N/A	98.4	0	20	20,760	0	
59-PW-14	80 to 82	80	2/15/2017	10:39	N/A	98.4	0	20.3	40,600	1.2	
59-PW-14	80 to 82	80	3/16/2017	8:58	N/A	98.4	0	20.3	28,200	1.0	
59-PW-14	80 to 82	80	4/6/2017	13:07	N/A	98.4	0	19.8	43,700	6.5	
59-PW-14	80 to 82	80	5/16/2017	---	---	---	---	---	---	---	adequate data; no further testing
59-PW-15	9 to 11	9	2/8/2017	---	N/A	12	---	---	---	---	vacuum during purge
59-PW-15	9 to 11	9	2/15/2017	10:05	8.64	12	0	19.9	850	0.5	low vacuum; screen partially submerged
59-PW-15	9 to 11	9	3/16/2017	9:08	7.5	---	---	---	---	---	Submerged
59-PW-15	9 to 11	9	4/6/2017	14:05	7.39	---	---	---	---	---	Water, pumped 3 gal gw, slow recharge
59-PW-15	9 to 11	9	5/16/2017	---	---	---	---	---	---	---	Submerged

Table B-1. Stabilization Parameters for New Soil Vapor Wells
B4260, Former Mather Air Force Base

Well ID	Depth (ft bgs)	Top of Screen (ft bgs)	Date	Time	Water Level (ft bgs)	Purge time (sec)	Methane (% LEL)	O2 (%)	CO2 (ppmv)	PID (ppmv)	Notes:
59-PW-15	20 to 22	20	2/8/2017	---	N/A	---	---	---	---	---	vacuum during purge
59-PW-15	20 to 22	20	2/15/2017	10:11	N/A	26.4	0	17.3	20,800	1.2	
59-PW-15	20 to 22	20	3/16/2017	9:14	N/A	26.4	0	16.9	13,700	0.30	
59-PW-15	20 to 22	20	4/6/2017	13:38	N/A	26.4	0	16.2	22,100	3.7	
59-PW-15	20 to 22	20	5/16/2017	---	---	---	---	---	---	---	adequate data - stop testing
59-PW-15	30 to 32	30	2/8/2017	9:45	N/A	38.4	0	15.9	10,640	0	
59-PW-15	30 to 32	30	2/15/2017	10:14	N/A	38.4	0	17.4	22,800	1.2	
59-PW-15	30 to 32	30	3/16/2017	9:18	N/A	38.4	0	20.9	1,300	0.0	
59-PW-15	30 to 32	30	4/6/2017	13:41	N/A	38.4	0	16.2	26,300	3	
59-PW-15	30 to 32	30	5/16/2017	---	---	---	---	---	---	---	adequate data - stop testing
59-PW-15	60 to 62	60	2/8/2017	9:56	N/A	74.4	0	19.3	10,680	0	
59-PW-15	60 to 62	60	2/15/2017	10:20	N/A	74.4	0	19.1	16,600	3.1	
59-PW-15	60 to 62	60	3/16/2017	9:23	N/A	74.4	0	19.6	11,900	1.8	
59-PW-15	60 to 62	60	4/6/2017	13:45	N/A	74.4	0	18.8	26,300	4.6	
59-PW-15	60 to 62	60	5/16/2017	---	---	---	---	---	---	---	adequate data - stop testing
59-PW-15	80 to 82	80	2/8/2017	10:07	N/A	98.4	0	19.9	10,840	0	
59-PW-15	80 to 82	80	2/15/2017	10:23	N/A	98.4	0	20.1	28,800	1.7	
59-PW-15	80 to 82	80	3/16/2017	10:02	N/A	98.4	0	20.4	7,800	0.10	
59-PW-15	80 to 82	80	4/6/2017	13:52	N/A	98.4	0	19.7	33,900	3.2	
59-PW-15	80 to 82	80	5/16/2017	---	---	---	---	---	---	---	adequate data - stop testing
59-PW-16	8 to 10	8	2/8/2017	---	N/A	13.2	---	---	---	---	vacuum during purge
59-PW-16	8 to 10	8	2/15/2017	9:33	3.78	13.2	---	---	---	---	water in well
59-PW-16	8 to 10	8	3/16/2017	---	4.26	---	---	---	---	---	Submerged
59-PW-16	8 to 10	8	4/6/2017	11:12	4.22	---	---	---	---	---	Water saturated screen
59-PW-16	8 to 10	8	5/16/2017	---	---	---	---	---	---	---	Submerged
59-PW-16	20 to 22	20	2/8/2017	---	N/A	---	---	---	---	---	water in well
59-PW-16	20 to 22	20	2/15/2017	9:39	N/A	26.4	0	17.1	14,100	0.8	
59-PW-16	20 to 22	20	3/16/2017	10:48	N/A	26.4	0	16.7	12,700	0.4	
59-PW-16	20 to 22	20	4/6/2017	11:14	N/A	26.4	0	15.4	21,500	0.7	
59-PW-16	20 to 22	20	5/16/2017	---	---	---	---	---	---	---	adequate data - stop testing

Table B-1. Stabilization Parameters for New Soil Vapor Wells
B4260, Former Mather Air Force Base

Well ID	Depth (ft bgs)	Top of Screen (ft bgs)	Date	Time	Water Level (ft bgs)	Purge time (sec)	Methane (% LEL)	O2 (%)	CO2 (ppmv)	PID (ppmv)	Notes:
59-PW-16	30 to 32	30	2/8/2017	10:32	N/A	38.4	0	14.7	10,170	0.1	
59-PW-16	30 to 32	30	2/15/2017	9:42	N/A	38.4	0	16.7	25,400	1.8	
59-PW-16	30 to 32	30	3/16/2017	10:51	N/A	38.4	0	15.0	19,100	0.7	
59-PW-16	30 to 32	30	4/6/2017	11:36	N/A	38.4	0	14.9	28,600	1.3	
59-PW-16	30 to 32	30	5/16/2017	---	---	---	---	---	---	---	adequate data - stop testing
59-PW-16	60 to 62	60	2/8/2017	---	N/A	74.4	---	---	---	---	vacuum during purge
59-PW-16	60 to 62	60	2/15/2017	9:56	N/A	74.4	0	15.5	2,400	6.0	
59-PW-16	60 to 62	60	3/16/2017	11:06	N/A	---	---	---	---	---	Created vacuum when purged
59-PW-16	60 to 62	60	4/6/2017	11:41	N/A	---	---	---	---	---	Created vacuum
59-PW-16	60 to 62	60	5/16/2017	---	---	---	---	---	---	---	did not sample
59-PW-16	80 to 82	80	2/8/2017	10:55	N/A	98.4	0	20.6	5,870	0	
59-PW-16	80 to 82	80	2/15/2017	10:00	N/A	98.4	0	19.9	28,100	0.6	
59-PW-16	80 to 82	80	3/16/2017	11:01	N/A	98.4	0	20.9	10,800	0.0	
59-PW-16	80 to 82	80	4/6/2017	11:44	N/A	98.4	0	19.4	40,000	0.8	
59-PW-16	80 to 82	80	5/16/2017	---	---	---	---	---	---	---	adequate data - stop testing
59-PW-17	8 to 10	8	2/8/2017	---	N/A	12	---	---	---	---	water in well
59-PW-17	8 to 10	8	2/15/2017	8:52	3.80	12	---	---	---	---	water in well/pump line
59-PW-17	8 to 10	8	3/16/2017	~	4.72	---	---	---	---	---	Submerged
59-PW-17	8 to 10	8	4/6/2017	10:43	4.7	---	---	---	---	---	Water saturated screen
59-PW-17	8 to 10	8	5/16/2017	---	---	---	---	---	---	---	Water saturated screen
59-PW-17	20 to 22	20	2/8/2017	8:03	N/A	26.4	3	16.6	9,150	11.8	
59-PW-17	20 to 22	20	2/15/2017	8:59	N/A	26.4	0	18.4	8,810	16.7	
59-PW-17	20 to 22	20	3/16/2017	10:23	N/A	26.4	0	17.1	4,700	2.9	
59-PW-17	20 to 22	20	4/6/2017	10:51	N/A	26.4	0	16.3	6,280	3.0	
59-PW-17	20 to 22	20	5/16/2017	---	---	---	---	---	---	---	adequate data - stop testing
59-PW-17	30 to 32	30	2/8/2017	8:17	N/A	38.4	0	12.6	5,060	0.8	
59-PW-17	30 to 32	30	2/15/2017	9:03	N/A	38.4	0	16	4,400	3.7	
59-PW-17	30 to 32	30	3/16/2017	10:27	N/A	38.4	0	12.9	12,300	1.9	
59-PW-17	30 to 32	30	4/6/2017	10:55	N/A	38.4	---	---	---	---	Created vacuum
59-PW-17	30 to 32	30	5/16/2017	---	---	---	---	---	---	---	not sampled; adequate data available.

Table B-1. Stabilization Parameters for New Soil Vapor Wells
B4260, Former Mather Air Force Base

Well ID	Depth (ft bgs)	Top of Screen (ft bgs)	Date	Time	Water Level (ft bgs)	Purge time (sec)	Methane (% LEL)	O2 (%)	CO2 (ppmv)	PID (ppmv)	Notes:
59-PW-17	60 to 62	60	2/8/2017	8:39	N/A	74.4	0	15.1	20,550	2.2	
59-PW-17	60 to 62	60	2/15/2017	9:08	N/A	74.4	0	16.7	46,000	2.6	
59-PW-17	60 to 62	60	3/16/2017	~	60.45	---	---	---	---	---	Submerged
59-PW-17	60 to 62	60	4/6/2017	10:45	60.16	---	---	---	---	---	Water saturated screen
59-PW-17	60 to 62	60	5/16/2017	---	---	---	---	---	---	---	Water saturated screen
59-PW-17	80 to 82	80	2/8/2017	8:52	N/A	98.4	0	19.3	30,110	0	
59-PW-17	80 to 82	80	2/15/2017	9:15	N/A	98.4	1	20.2	41,300	0.7	
59-PW-17	80 to 82	80	3/16/2017	10:33	N/A	98.4	0	20.5	14,500	0.3	
59-PW-17	80 to 82	80	4/6/2017	11:00	N/A	98.4	0	19.7	48,100	0.7	
59-PW-17	80 to 82	80	5/16/2017	---	---	---	---	---	---	---	adequate data - stop testing

% LEL = percent lower explosive limit

CO2 = carbon dioxide

ft bgs = feet below ground surface

N/A = not applicable

O2 = oxygen

PID = photoionization detector

ppmv = parts per million by volume

Table B-2. Water Levels in Soil Vapor Wells (March 2017-February 2018)
B4260, Former Mather Air Force Base

Date	Sample Location	Sample Depth (feet bgs)	Well Diameter (in.)	Depth to Bottom (ft)	Total Well Depth (ft bgs)	Well Volume (cf)	Well Volume (gal)	Depth to Water (ft bgs)	Height of Water Column (ft)	Volume of Water in Well (gal)	Volume of Water Pumped (gal)	Notes
3/1/2017	59-PW-05	10-20	1	20	19.20	0.109	0.82	19.02	0.18	0.007	0	
3/16/2017	59-PW-05	10-20	2	20	19.20	0.436	3.26	19.02	0.18	0.029	0	
4/6/2017	59-PW-05	10-20	2	20	19.20	0.436	3.26	19.02	0.18	0.029	0	
5/16/2017	59-PW-05	10-20	2	20	19.20	0.436	3.26	19.02	0.18	0.029	0	
9/21/2017	59-PW-05	10-20	2	20	19.21	0.436	3.26	19.03	0.18	0.029	0	
11/7/2017	59-PW-05	10-20	2	20	19.21	0.436	3.26	19.03	0.18	0.029	0	
3/1/2017	59-PW-05	30-40	2	40	NM	0.873	6.53	dry	0	0	0	
5/16/2017	59-PW-05	30-40	2	40	NM	0.873	6.53	dry	0	0	0	
9/21/2017	59-PW-05	30-40	2	40	39.24	0.873	6.53	dry	0	0	0	
11/7/2017	59-PW-05	30-40	2	40	39.24	0.873	6.53	dry	0	0	0	
3/1/2017	59-PW-05	50-60	1	60	59.25	0.327	2.45	59.07	0.18	0.007	0	
3/16/2017	59-PW-05	50-60	2	60	59.25	1.309	9.79	59.07	0.18	0.029	0	
4/6/2017	59-PW-05	50-60	2	60	59.25	1.309	9.79	59.07	0.18	0.029	0	
5/16/2017	59-PW-05	50-60	2	60	59.25	1.309	9.79	59.08	0.17	0.028	0	
9/21/2017	59-PW-05	50-60	2	60	59.24	1.309	9.79	59.08	0.16	0.026	0	
11/7/2017	59-PW-05	50-60	2	60	59.24	1.309	9.79	59.10	0.14	0.023	0	
3/1/2017	59-PW-05	70-90	2	90	NM	1.963	14.7	dry	0	0	0	
5/16/2017	59-PW-05	70-90	2	90	NM	1.963	14.7	dry	0	0	0	
9/21/2017	59-PW-05	70-90	2	90	89.20	1.963	14.7	dry	0	0	0	
11/7/2017	59-PW-05	70-90	2	90	89.20	1.963	14.7	dry	0	0	0	
3/1/2017	59-PW-06	11-21	2	21	NM	0.458	3.43	dry	0	0	0	
5/16/2017	59-PW-06	11-21	2	21	NM	0.458	3.43	dry	0	0	0	
9/21/2017	59-PW-06	11-21	2	21	19.15	0.458	3.43	18.74	0.41	0	0	
11/7/2017	59-PW-06	11-21	2	21	19.15	0.458	3.43	18.75	0.4	0	0	

Table B-2. Water Levels in Soil Vapor Wells (March 2017-February 2018)

B4260, Former Mather Air Force Base

Date	Sample Location	Sample Depth (feet bgs)	Well Diameter (in.)	Depth to Bottom (ft)	Total Well Depth (ft bgs)	Well Volume (cf)	Well Volume (gal)	Depth to Water (ft bgs)	Height of Water Column (ft)	Volume of Water in Well (gal)	Volume of Water Pumped (gal)	Notes
3/1/2017	59-PW-06	31-41	1	41	39.10	0.224	1.67	38.81	0.29	0.012	0	
3/16/2017	59-PW-06	31-41	2	41	39.10	0.894	6.69	38.82	0.28	0.046	0	
4/6/2017	59-PW-06	31-41	2	41	39.10	0.894	6.69	38.83	0.27	0.044	0	
5/16/2017	59-PW-06	31-41	2	41	39.10	0.894	6.69	38.84	0.26	0.042	0	
9/21/2017	59-PW-06	31-41	2	41	39.11	0.894	6.69	38.88	0.23	0.038	0	
11/7/2017	59-PW-06	31-41	2	41	39.11	0.894	6.69	38.90	0.21	0.034	0	
3/1/2017	59-PW-06	51-61	1	61	59.13	0.333	2.49	58.82	0.31	0.013	0	
3/16/2017	59-PW-06	51-61	2	61	59.13	1.331	9.96	58.81	0.32	0.052	0	
4/6/2017	59-PW-06	51-61	2	61	59.13	1.331	9.96	58.82	0.31	0.051	0	
5/16/2017	59-PW-06	51-61	2	61	59.13	1.331	9.96	58.82	0.31	0.051	0	
9/21/2017	59-PW-06	51-61	2	61	59.17	1.331	9.96	58.83	0.34	0.055	0	
11/7/2017	59-PW-06	51-61	2	61	59.17	1.331	9.96	58.85	0.32	0.052	0	
3/1/2017	59-PW-06	70-90	1	90	89.20	0.491	3.67	88.88	0.32	0.013	0	
3/16/2017	59-PW-06	70-90	2	90	89.20	1.963	14.69	88.86	0.34	0.055	0	
4/6/2017	59-PW-06	70-90	2	90	89.20	1.963	14.69	88.88	0.32	0.052	0	
5/16/2017	59-PW-06	70-90	2	90	89.20	1.963	14.69	88.89	0.31	0.051	0	
9/21/2017	59-PW-06	70-90	2	90	89.25	1.963	14.69	88.88	0.37	0.060	0	
11/7/2017	59-PW-06	70-90	2	90	89.25	1.963	14.69	88.92	0.33	0.054	0	
3/1/2017	59-PW-07	10-20	2	20	NM	0.436	3.26	dry	0	0	0	
5/16/2017	59-PW-07	10-20	2	20	NM	0.436	3.26	dry	0	0	0	
9/21/2017	59-PW-07	10-20	2	20	19.89	0.436	3.26	dry	0	0	0	
11/7/2017	59-PW-07	10-20	2	20	19.89	0.436	3.26	19.90	0	0	0	
3/1/2017	59-PW-08	10-20	1	20	19.56	0.109	0.82	19.51	0.05	0.002	0	

Table B-2. Water Levels in Soil Vapor Wells (March 2017-February 2018)
B4260, Former Mather Air Force Base

Date	Sample Location	Sample Depth (feet bgs)	Well Diameter (in.)	Depth to Bottom (ft)	Total Well Depth (ft bgs)	Well Volume (cf)	Well Volume (gal)	Depth to Water (ft bgs)	Height of Water Column (ft)	Volume of Water in Well (gal)	Volume of Water Pumped (gal)	Notes
3/16/2017	59-PW-08	10-20	2	20	19.56	0.436	3.26	19.5	0.06	0.010	0	
4/6/2017	59-PW-08	10-20	2	20	19.56	0.436	3.26	19.51	0.05	0.008	0	
5/16/2017	59-PW-08	10-20	2	20	19.56	0.436	3.26	19.51	0.05	0.008	0	
9/21/2017	59-PW-08	10-20	2	20	19.77	0.436	3.26	19.50	0.27	0.044	0	
11/7/2017	59-PW-08	10-20	2	20	19.77	0.436	3.26	19.53	0.24	0.039	0	
3/1/2017	59-PW-09A	10-11	1	11	NM	0.060	0.45	dry	0	0	0	
5/16/2017	59-PW-09A	10-11	1	11	NM	0.060	0.45	dry	0	0	0	
9/21/2017	59-PW-09A	10-11	1	11	10.76	0.060	0.45	dry	0	0	0	
11/7/2017	59-PW-09A	10-11	1	11	10.76	0.060	0.45	dry	0	0	0	
3/1/2017	59-PW-09B	20-21	1	21	NM	0.115	0.86	dry	0	0	0	
5/16/2017	59-PW-09B	20-21	1	21	NM	0.115	0.86	dry	0	0	0	
9/21/2017	59-PW-09B	20-21	1	21	20.76	0.115	0.86	dry	0	0	0	
111/7/2017	59-PW-09B	20-21	1	21	20.76	0.115	0.86	dry	0	0	0	
3/1/2017	59-PW-10A	8-10	1	10	9.70	0.055	0.41	9.65	0.05	0.002	0	
4/6/2017	59-PW-10A	8-10	1	10	9.70	0.055	0.41	dry	0	0	0	
5/16/2017	59-PW-10A	8-10	1	10	9.70	0.055	0.41	dry	0	0	0	
9/21/2017	59-PW-10A	8-10	1	10	9.64	0.055	0.41	dry	0	0	0	
11/7/2017	59-PW-10A	8-10	1	10	9.64	0.055	0.41	dry	0	0	0	
3/1/2017	59-PW-10B	20-22	1	22	NM	0.120	0.90	dry	0	0	0	
5/16/2017	59-PW-10B	20-22	1	22	NM	0.120	0.90	dry	0	0	0	
9/21/2017	59-PW-10B	20-22	1	22	21.70	0.120	0.90	dry	0	0	0	
11/7/2017	59-PW-10B	20-22	1	22	21.70	0.120	0.90	dry	0	0	0	
3/1/2017	59-PW-11A	8-10	1	10	NM	0.055	0.41	dry	0	0	0	

Table B-2. Water Levels in Soil Vapor Wells (March 2017-February 2018)
B4260, Former Mather Air Force Base

Date	Sample Location	Sample Depth (feet bgs)	Well Diameter (in.)	Depth to Bottom (ft)	Total Well Depth (ft bgs)	Well Volume (cf)	Well Volume (gal)	Depth to Water (ft bgs)	Height of Water Column (ft)	Volume of Water in Well (gal)	Volume of Water Pumped (gal)	Notes
5/16/2017	59-PW-11A	8-10	1	10	NM	0.055	0.41	dry	0	0	0	
9/21/2017	59-PW-11A	8-10	1	10	9.88	0.055	0.41	dry	0	0	0	
11/8/2017	59-PW-11A	8-10	1	10	9.88	0.055	0.41	dry	0	0	0	
3/1/2017	59-PW-11B	20-22	1	22	NM	0.120	0.90	dry	0	0	0	
5/16/2017	59-PW-11B	20-22	1	22	NM	0.120	0.90	dry	0	0	0	
9/21/2017	59-PW-11B	20-22	1	22	21.68	0.120	0.90	dry	0	0	0	
11/8/2017	59-PW-11B	20-22	1	22	21.68	0.120	0.90	dry	0	0	0	
3/1/2017	59-PW-12A	8-10	1	10	NM	0.055	0.41	dry	0	0	0	
5/16/2017	59-PW-12A	8-10	1	10	NM	0.055	0.41	dry	0	0	0	
9/21/2017	59-PW-12A	8-10	1	10	9.92	0.055	0.41	dry	0	0	0	
11/7/2017	59-PW-12A	8-10	1	10	9.92	0.055	0.41	dry	0	0	0	
3/1/2017	59-PW-12B	20-22	1	22	NM	0.120	0.90	dry	0	0	0	
5/16/2017	59-PW-12B	20-22	1	22	NM	0.120	0.90	dry	0	0	0	
9/21/2017	59-PW-12B	20-22	1	22	21.95	0.120	0.90	dry	0	0	0	
11/7/2017	59-PW-12B	20-22	1	22	21.95	0.120	0.90	dry	0	0	0	
3/1/2017	59-PW-13A	8-10	1	10	9.70	0.055	0.41	5.41	4.29	0.175	0.25	bailed > slow recharge
3/16/2017	59-PW-13A	8-10	1	10	9.70	0.055	0.41	6.33	3.37	0.138	0	
4/6/2017	59-PW-13A	8-10	1	10	9.70	0.055	0.41	5.82	3.88	0.158	0	
5/16/2017	59-PW-13A	8-10	1	10	9.70	0.055	0.41	5.98	3.72	0.152	0	
6/15/2017	59-PW-13A	8-10	1	10	9.70	0.055	0.41	6.32	3.38	0.138	0	
7/11/2017	59-PW-13A	8-10	1	10	9.70	0.055	0.41	6.68	3.02	0.123	0	08:25 - before purging -
7/11/2017	59-PW-13A	8-10	1	10	9.70	0.055	0.41	8.3	1.40	0.057	0.75	08:43 - after purging
7/11/2017	59-PW-13A	8-10	1	10	9.70	0.055	0.41	8.3	1.40	0.057	0	12:43 - after rebound
8/10/2017	59-PW-13A	8-10	1	10	9.70	0.055	0.41	7.3	2.40	0.098	0	

Table B-2. Water Levels in Soil Vapor Wells (March 2017-February 2018)
B4260, Former Mather Air Force Base

Date	Sample Location	Sample Depth (feet bgs)	Well Diameter (in.)	Depth to Bottom (ft)	Total Well Depth (ft bgs)	Well Volume (cf)	Well Volume (gal)	Depth to Water (ft bgs)	Height of Water Column (ft)	Volume of Water in Well (gal)	Volume of Water Pumped (gal)	Notes
9/21/2017	59-PW-13A	8-10	1	10	9.72	0.055	0.41	7.42	2.30	0.094	0	
11/2/2017	59-PW-13A	8-10	1	10	9.72	0.055	0.41	9.10	0.62	0.025	0	
2/21/2018	59-PW-13A	8-10	1	10	9.71	0.055	0.41	5.83	3.88	0.158	0	Screen saturated
3/1/2017	59-PW-13B	20-22	1	22	NM	0.120	0.90	dry	0	0	0	
5/16/2017	59-PW-13B	20-22	1	22	NM	0.120	0.90	dry	0	0	0	
9/21/2017	59-PW-13B	20-22	1	22	21.69	0.120	0.90	dry	0	0	0	
11/2/2017	59-PW-13B	20-22	1	22	21.69	0.120	0.90	dry	0	0	0	
3/1/2017	59-PW-14	30-32	1	32	31.83	0.175	1.31	24.13	7.70	0.314	1.6	Bailed > slow recharge
3/16/2017	59-PW-14	30-32	1	32	31.83	0.175	1.31	25.22	6.61	0.270	0	
4/6/2017	59-PW-14	30-32	1	32	31.83	0.175	1.31	23.67	8.16	0.333	0	
5/16/2017	59-PW-14	30-32	1	32	31.83	0.175	1.31	23.77	8.06	0.329	0	
6/15/2017	59-PW-14	30-32	1	32	31.83	0.175	1.31	24.79	7.04	0.287	0	
7/11/2017	59-PW-14	30-32	1	32	31.83	0.175	1.31	25.73	6.10	0.249	0	11:38 - before purging
7/11/2017	59-PW-14	30-32	1	32	31.83	0.175	1.31	30.38	1.45	0.059	1.15	12:25 - after purging
7/11/2017	59-PW-14	30-32	1	32	31.83	0.175	1.31	30.38	1.45	0.059	0	12:30 - after rebound
8/10/2017	59-PW-14	30-32	1	32	31.83	0.175	1.31	26.66	5.17	0.211	0	
9/21/2017	59-PW-14	30-32	1	32	31.77	0.175	1.31	26.84	4.93	0.201	0	
11/1/2017	59-PW-14	30-32	1	32	31.77	0.175	1.31	30.36	1.41	0.058	0	
2/21/2018	59-PW-14	30-32	1	32	31.74	0.175	1.31	27.32	4.42	0.180	0	Screen saturated
3/1/2017	59-PW-14	60-62	1	62	61.61	0.338	2.53	55.49	6.12	0.250	0	
3/16/2017	59-PW-14	60-62	1	62	61.61	0.338	2.53	56.19	5.42	0.221	0	
4/6/2017	59-PW-14	60-62	1	62	61.61	0.338	2.53	56.53	5.08	0.207	0	
5/16/2017	59-PW-14	60-62	1	62	61.61	0.338	2.53	57.07	4.54	0.185	0	
6/15/2017	59-PW-14	60-62	1	62	61.61	0.338	2.53	56.99	4.62	0.189	0	
7/11/2017	59-PW-14	60-62	1	62	61.61	0.338	2.53	57.04	4.57	0.186	0	10:55 - before purging

Table B-2. Water Levels in Soil Vapor Wells (March 2017-February 2018)
B4260, Former Mather Air Force Base

Date	Sample Location	Sample Depth (feet bgs)	Well Diameter (in.)	Depth to Bottom (ft)	Total Well Depth (ft bgs)	Well Volume (cf)	Well Volume (gal)	Depth to Water (ft bgs)	Height of Water Column (ft)	Volume of Water in Well (gal)	Volume of Water Pumped (gal)	Notes
7/11/2017	59-PW-14	60-62	1	62	61.61	0.338	2.53	59.6	2.01	0.082	0.2	11:20 - after purging
7/11/2017	59-PW-14	60-62	1	62	61.61	0.338	2.53	57.82	3.79	0.155	0	12:35 - after rebound
8/10/2017	59-PW-14	60-62	1	62	61.61	0.338	2.53	57.17	4.44	0.181	0	
9/21/2017	59-PW-14	60-62	1	62	61.65	0.338	2.53	57.04	4.61	0.188	0	
11/1/2017	59-PW-14	60-62	1	62	61.61	0.338	2.53	58.94	2.67	0.109	0	
2/21/2018	59-PW-14	60-62	1	62	61.63	0.338	2.53	56.82	4.81	0.196	0	Screen saturated
3/1/2017	59-PW-14	80-82	1	82	NM	0.447	3.35	dry	0	0	0	
5/16/2017	59-PW-14	80-82	1	82	NM	0.447	3.35	dry	0	0	0	
9/21/2017	59-PW-14	80-82	1	82	81.65	0.447	3.35	dry	0	0	0	
11/3/2017	59-PW-14	80-82	1	82	81.65	0.447	3.35	dry	0	0	0	
3/1/2017	59-PW-15	8-10	1	10	10.19	0.055	0.41	8.44	1.75	0.071	0.1	Bailed > slow recharge
3/16/2017	59-PW-15	8-10	1	10	10.19	0.055	0.41	7.5	2.69	0.110	0	
4/6/2017	59-PW-15	8-10	1	10	10.19	0.055	0.41	7.39	2.80	0.114	3	19 min to pump dry, slow recharge
5/16/2017	59-PW-15	8-10	1	10	10.19	0.055	0.41	7.53	2.66	0.109	0	
6/15/2017	59-PW-15	8-10	1	10	10.19	0.055	0.41	7.61	2.58	0.105	0	
7/11/2017	59-PW-15	8-10	1	10	10.19	0.055	0.41	7.58	2.61	0.106	0	9:15 - before purging
7/11/2017	59-PW-15	8-10	1	10	10.19	0.055	0.41	9.15	1.04	0.042	1.5	9:40 - after purging
7/11/2017	59-PW-15	8-10	1	10	10.19	0.055	0.41	9.10	1.09	0.044	0	12:37 - after rebound
8/10/2017	59-PW-15	8-10	1	10	10.19	0.055	0.41	8.67	1.52	0.062	0	
9/21/2017	59-PW-15	8-10	1	10	10.21	0.055	0.41	8.77	1.44	0.059	0	
11/2/2017	59-PW-15	8-10	1	10	10.31	0.055	0.41	9.96	0.35	0.014	0	
2/21/2018	59-PW-15	8-10	1	10	10.19	0.055	0.41	7.31	2.88	0.118	0	
3/1/2017	59-PW-15	20-22	1	22	NM	0.120	0.90	dry	0	0	0	
5/16/2017	59-PW-15	20-22	1	22	NM	0.120	0.90	dry	0	0	0	
9/21/2017	59-PW-15	20-22	1	22	21.45	0.120	0.90	dry	0	0	0	

Table B-2. Water Levels in Soil Vapor Wells (March 2017-February 2018)
B4260, Former Mather Air Force Base

Date	Sample Location	Sample Depth (feet bgs)	Well Diameter (in.)	Depth to Bottom (ft)	Total Well Depth (ft bgs)	Well Volume (cf)	Well Volume (gal)	Depth to Water (ft bgs)	Height of Water Column (ft)	Volume of Water in Well (gal)	Volume of Water Pumped (gal)	Notes
11/2/2017	59-PW-15	20-22	1	22	21.45	0.120	0.90	dry	0	0	0	
3/1/2017	59-PW-15	30-32	1	32	NM	0.175	1.31	dry	0	0	0	
5/16/2017	59-PW-15	30-32	1	32	NM	0.175	1.31	dry	0	0	0	
9/21/2017	59-PW-15	30-32	1	32	31.65	0.175	1.31	dry	0	0	0	
11/2/2017	59-PW-15	30-32	1	32	31.65	0.175	1.31	dry	0	0	0	
3/1/2017	59-PW-15	60-62	1	62	NM	0.338	2.53	dry	0	0	0	
5/16/2017	59-PW-15	60-62	1	62	NM	0.338	2.53	dry	0	0	0	
9/21/2017	59-PW-15	60-62	1	62	61.34	0.338	2.53	dry	0	0	0	
11/2/2017	59-PW-15	60-62	1	62	61.34	0.338	2.53	dry	0	0	0	
3/1/2017	59-PW-15	80-82	1	82	NM	0.447	3.35	dry	0	0	0	
5/16/2017	59-PW-15	80-82	1	82	NM	0.447	3.35	dry	0	0	0	
9/21/2017	59-PW-15	80-82	1	82	81.65	0.447	3.35	dry	0	0	0	
11/2/2017	59-PW-15	80-82	1	82	81.65	0.447	3.35	dry	0	0	0	
3/1/2017	59-PW-16	8-10	1	10	9.65	0.055	0.41	3.94	5.71	0.233	0.25	bailed > fast recharge
3/16/2017	59-PW-16	8-10	1	10	9.65	0.055	0.41	4.26	5.39	0.220	0	
4/6/2017	59-PW-16	8-10	1	10	9.65	0.055	0.41	4.22	5.43	0.222	0	
5/16/2017	59-PW-16	8-10	1	10	9.65	0.055	0.41	4.81	4.84	0.197	3	fast recharge
6/15/2017	59-PW-16	8-10	1	10	9.65	0.055	0.41	5.05	4.60	0.188	2.4	fast recharge
7/11/2017	59-PW-16	8-10	1	10	9.65	0.055	0.41	5.35	4.30	0.175	0	10:00 - before purging
7/11/2017	59-PW-16	8-10	1	10	9.65	0.055	0.41	5.55	4.10	0.167	1.25	10:35 - after purging
7/11/2017	59-PW-16	8-10	1	10	9.65	0.055	0.41	5.35	4.30	0.175	0	10:38 - after rebound
8/10/2017	59-PW-16	8-10	1	10	9.65	0.055	0.41	5.71	3.94	0.161	0	
9/21/2017	59-PW-16	8-10	1	10	9.66	0.055	0.41	6.74	2.92	0.119	0	
11/1/2017	59-PW-16	8-10	1	10	9.66	0.055	0.41	8.00	1.66	0.068	0	(a)

Table B-2. Water Levels in Soil Vapor Wells (March 2017-February 2018)
B4260, Former Mather Air Force Base

Date	Sample Location	Sample Depth (feet bgs)	Well Diameter (in.)	Depth to Bottom (ft)	Total Well Depth (ft bgs)	Well Volume (cf)	Well Volume (gal)	Depth to Water (ft bgs)	Height of Water Column (ft)	Volume of Water in Well (gal)	Volume of Water Pumped (gal)	Notes
2/21/2018	59-PW-16	8-10	1	10	9.65	0.055	0.41	4.68	4.97	0.203	0	Screen saturated
3/1/2017	59-PW-16	20-22	1	22	NM	0.120	0.90	dry	0	0	0	
5/16/2017	59-PW-16	20-22	1	22	NM	0.120	0.90	dry	0	0	0	
9/21/2017	59-PW-16	20-22	1	22	21.57	0.120	0.90	dry	0	0	0	
11/1/2017	59-PW-16	20-22	1	22	21.57	0.120	0.90	dry	0	0	0	
3/1/2017	59-PW-16	30-32	1	32	NM	0.175	1.31	dry	0	0	0	
5/16/2017	59-PW-16	30-32	1	32	NM	0.175	1.31	dry	0	0	0	
9/21/2017	59-PW-16	30-32	1	32	31.55	0.175	1.31	dry	0	0	0	
11/1/2017	59-PW-16	30-32	1	32	31.55	0.175	1.31	dry	0	0	0	
3/1/2017	59-PW-16	60-62	1	62	NM	0.338	2.53	dry	0	0	0	
5/16/2017	59-PW-16	60-62	1	62	NM	0.338	2.53	dry	0	0	0	
9/21/2017	59-PW-16	60-62	1	62	59.97	0.338	2.53	dry	0	0	0	
11/3/2017	59-PW-16	60-62	1	62	59.97	0.338	2.53	dry	0	0	0	
3/1/2017	59-PW-16	80-82	1	82	NM	0.447	3.35	dry	0	0	0	
5/16/2017	59-PW-16	80-82	1	82	NM	0.447	3.35	dry	0	0	0	
9/21/2017	59-PW-16	80-82	1	82	81.35	0.447	3.35	dry	0	0	0	
11/3/2017	59-PW-16	80-82	1	82	81.35	0.447	3.35	dry	0	0	0	
3/1/2017	59-PW-17	8-10	1	10	9.73	0.055	0.41	3.97	5.76	0.235	0	
3/16/2017	59-PW-17	8-10	1	10	9.73	0.055	0.41	4.72	5.01	0.204	0	
4/6/2017	59-PW-17	8-10	1	10	9.73	0.055	0.41	4.7	5.03	0.205	0	
5/16/2017	59-PW-17	8-10	1	10	9.73	0.055	0.41	5.33	4.40	0.180	3.8	slow recharge
6/15/2017	59-PW-17	8-10	1	10	9.73	0.055	0.41	6.54	3.19	0.130	2.6	slow recharge
7/11/2017	59-PW-17	8-10	1	10	9.73	0.055	0.41	7.16	2.57	0.105	0	no access to purge well

Table B-2. Water Levels in Soil Vapor Wells (March 2017-February 2018)
B4260, Former Mather Air Force Base

Date	Sample Location	Sample Depth (feet bgs)	Well Diameter (in.)	Depth to Bottom (ft)	Total Well Depth (ft bgs)	Well Volume (cf)	Well Volume (gal)	Depth to Water (ft bgs)	Height of Water Column (ft)	Volume of Water in Well (gal)	Volume of Water Pumped (gal)	Notes
8/10/2017	59-PW-17	8-10	1	10	9.73	0.055	0.41	8.10	1.63	0.067	0	
9/21/2017	59-PW-17	8-10	1	10	9.75	0.055	0.41	8.84	0.91	0.037	0	
11/3/2017	59-PW-17	8-10	1	10	9.75	0.055	0.41	muddy	NC	0	0	
2/21/2018	59-PW-17	8-10	1	10	9.73	0.055	0.41	5.73	4.00	0.163	0	Screen saturated
3/1/2017	59-PW-17	20-22	1	22	NM	0.120	0.90	dry	0	0	0	
5/16/2017	59-PW-17	20-22	1	22	NM	0.120	0.90	dry	0	0	0	
9/21/2017	59-PW-17	20-22	1	22	21.43	0.120	0.90	dry	0	0	0	
11/3/2017	59-PW-17	20-22	1	22	21.43	0.120	0.90	dry	0	0	0	
3/1/2017	59-PW-17	30-32	1	32	NM	0.175	1.31	dry	0	0	0	
5/16/2017	59-PW-17	30-32	1	32	NM	0.175	1.31	dry	0	0	0	
9/21/2017	59-PW-17	30-32	1	32	31.44	0.175	1.31	dry	0	0	0	
11/3/2017	59-PW-17	30-32	1	32	31.44	0.175	1.31	dry	0	0	0	
3/1/2017	59-PW-17	60-62	1	62	61.54	0.338	2.53	60.74	0.80	0.033	0	
3/16/2017	59-PW-17	60-62	1	62	61.54	0.338	2.53	60.45	1.09	0.044	0	
4/6/2017	59-PW-17	60-62	1	62	61.54	0.338	2.53	60.16	1.38	0.056	0	
5/16/2017	59-PW-17	60-62	1	62	61.54	0.338	2.53	59.92	1.62	0.066	0	
6/15/2017	59-PW-17	60-62	1	62	61.54	0.338	2.53	59.92	1.62	0.066	0	
7/11/2017	59-PW-17	60-62	1	62	61.54	0.338	2.53	60.00	1.54	0.063	0	no access to purge well
8/10/2017	59-PW-17	60-62	1	62	61.54	0.338	2.53	60.16	1.38	0.056	0	
9/21/2017	59-PW-17	60-62	1	62	61.54	0.338	2.53	60.22	1.32	0.054	0	
11/2/2017	59-PW-17	60-62	1	62	61.65	0.338	2.53	60.62	1.03	0.042	0	
2/21/2018	59-PW-17	60-62	1	62	61.51	0.338	2.53	60.39	1.12	0.046	0	0.88 ft exposed screen
3/1/2017	59-PW-17	80-82	1	82	NM	0.447	3.35	dry	0	0	0	
5/16/2017	59-PW-17	80-82	1	82	NM	0.447	3.35	dry	0	0	0	

Table B-2. Water Levels in Soil Vapor Wells (March 2017-February 2018)
B4260, Former Mather Air Force Base

Date	Sample Location	Sample Depth (feet bgs)	Well Diameter (in.)	Depth to Bottom (ft)	Total Well Depth (ft bgs)	Well Volume (cf)	Well Volume (gal)	Depth to Water (ft bgs)	Height of Water Column (ft)	Volume of Water in Well (gal)	Volume of Water Pumped (gal)	Notes
9/21/2017	59-PW-17	80-82	1	82	81.35	0.447	3.35	dry	0	0	0	
11/3/2017	59-PW-17	80-82	1	82	81.35	0.447	3.35	dry	0	0	0	

Red text = wells with >1 ft of water

(a) = below top of pump before start of purging. This is the post- pumping value
(b) = NR - water level rose too quickly to collect a steady read
NC = not calculated

3/1/17 and 5/16/17: Checked all wells for water
3/16/17: The objective of the field effort was to check wells that had water in them on 03.01.17 to see if there was any change. Wells that were dry on 03.01.17 were not checked unless they are new wells installed in January and February 2017. Water was not pumped from any of the wells.
4/6/17: Only check wells that had water in them on 03.01.17
5.16.17: Checked all wells for the presence of water.
6.15.17: only checked the 7 wells with >1 ft of water
7.11.17 only check the 7 wells with >1 ft water, purged 5 of the wells
8.10.17: only check the 7 wells with >1 ft water
9.21.17: check all wells for the presence of water and total depth.
11.1.17: check all wells for presence of water; baseline soil vapor monitoring event
2.21.18: only check the 7 wells that previously had > 1 ft water

maximum = 8.16

Table B-3. Indoor Air and Sub-Slab Vapor Sampling Weather Parameters
(January 26 and 27, 2017)
B4260, Former Mather AFB

Date	Time	Barometric Pressure (in. Hg)	Wind Direction	Wind Speed (mph)	Gust Speed (mph)	Average Barometric Pressure (in. Hg)
1/26/2017	5:49 AM	30.42	Calm	Calm		
	6:53 AM	30.43	Calm	Calm		
	7:55 AM	30.43	Calm	Calm		Indoor and ambient air sampling: 08:09 am to 4:25 pm Average barometric pressure = 30.43 in. Hg
	8:50 AM	30.45	NNW	5.8		
	9:45 AM	30.45	NNW	4.6		
	10:45 AM	30.47	NNW	9.2		
	11:45 AM	30.45	NNW	11.5		
	12:45 PM	30.43	NNW	15	20.7	
	1:50 PM	30.41	NNW	13.8		
	2:45 PM	30.41	NNW	13.8	19.6	
	3:45 PM	30.41	NNW	11.5	19.6	
	4:45 PM	30.41	NNW	10.4	16.1	
	5:45 PM	30.42	NNW	5.8		
	6:45 PM	30.42	N	4.6		
1/27/2017						
	5:50 AM	30.54	NNE	3.5		
	6:45 AM	30.55	ENE	6.9		
	7:45 AM	30.55	Calm	Calm		Sub-Slab sampling: 08:22 to 09:33 am Average barometric pressure = 30.56 in. Hg
	8:50 AM	30.56	Calm	Calm		
	10:50 AM	30.58	WSW	5.8		
	11:50 AM	30.57	W	3.5		

in. Hg = inches of Mercury
mph = miles per hour

Indoor Air Sampling Event

Field Logs

URS Air Sampling Data Sheet

Installation: MATHR Project: S59B Event: RND1

Boring Name: 59-1A-01 Date: 1-26-17

Location Description: SE corner of Pilot's Lounge, on top of white/red cabinet
(Direction and Distance from MW Number or Building Number and Corner)

At what height above ground was sampler placed? 4'

Were existing volatiles found during screening removed? None found. - SEE INVENTORY FOR MORE INFO

Were any new volatiles in the sample area? If an airplane is active to the south of the building, exhaust comes through the front door when door is opened.

Weather Conditions: Sunny

Rain in last 24 hours? No Sampler(s): JR/TH

SAMPLE TRAIN LEAK CHECK

Initial Vacuum Reading: -28.5 inhg
(Complete sample train)

Final Vacuum Reading: -28.5 inhg

Sampling Method: Indoor Air w/ 8hr regulator, 6L canister

PID Serial Number: 110-007425

Sample Start (Date/Time): 1-26-17 0809

Sample End Time (Date/Time): 1-26-17 1615 ←

NORMAL SAMPLE

Sample Number: 59-1A-01-NS Sample Number: N/A

Canister Number: 12338

Initial Canister Vacuum: -28.5 inhg Final Canister Vacuum: -14.5 inhg

DUPLICATE SAMPLE

Sample Number: 59-1A-01-FD Sample Number: N/A

Canister Number: N0436

Initial Canister Vacuum: -28.5 inhg Final Canister Vacuum: -14.5 inhg

URS Air Sampling Data Sheet

Installation: MATHR Project: S59B Event: RND1

Boring Name: 59-1A-02 Date: 1-26-17

Location Description: NW corner of the IT office, on top of printer
(Direction and Distance from MW Number or Building Number and Corner)

At what height above ground was sampler placed? 6'

Were existing volatiles found during screening removed? None found - SEE INVENTORY FOR MORE INFO

Were any new volatiles in the sample area? NO

Weather Conditions: Sunny

Rain in last 24 hours? No Sampler(s): JR/TH

SAMPLE TRAIN LEAK CHECK

Initial Vacuum Reading: -30 inhg
(Complete sample train)

Final Vacuum Reading: -30 inhg

Sampling Method: Indoor Air w/8hr regulator, 6L canister

PID Serial Number: 110-007425

Sample Start (Date/Time): 1-26-17 0809

Sample End Time (Date/Time): 1-26-17 1612 ←

NORMAL SAMPLE

Sample Number: 59-1A-02-NS Sample Number: N/A

Canister Number: 33871

Initial Canister Vacuum: -30 inhg Final Canister Vacuum: -5.5 inhg

DUPLICATE SAMPLE

Sample Number: N/A Sample Number: —

Canister Number: —

Initial Canister Vacuum: ~~-30~~ Final Canister Vacuum: —

URS Air Sampling Data Sheet

Installation: MATHR
Project: S59B
Event: RND1

Boring Name: 59-1A-03
Date: 1-26-17

Location Description: NW corner of receptionst area, on top of back cabinet
(Direction and Distance from MW Number or Building Number and Corner)

At what height above ground was sampler placed? 5'

Were existing volatiles found during screening removed? None found - SEE INVENTORY FOR MORE INFO

Were any new volatiles in the sample area? No

Weather Conditions: Sunny

Rain in last 24 hours? NO
Sampler(s): JR/TH

SAMPLE TRAIN LEAK CHECK

Initial Vacuum Reading: -30 inhg
(Complete sample train)

Final Vacuum Reading: -30 inhg

Sampling Method: Indoor Air w/8hr regulator, 6L canister

PID Serial Number: 110-007425

Sample Start (Date/Time): 1-26-17 0809

Sample End Time (Date/Time): 1-26-17 1613 4

NORMAL SAMPLE

Sample Number: 59-1A-03-NS
Sample Number: N/A

Canister Number: 00394

Initial Canister Vacuum: -30 inhg
Final Canister Vacuum: -6 inhg

DUPLICATE SAMPLE

Sample Number: N/A
Sample Number: —

Canister Number: —

Initial Canister Vacuum: —
Final Canister Vacuum: —

URS Air Sampling Data Sheet

Installation: MATHR Project: S59B Event: RND1

Boring Name: 59-1A-04 Date: 1-26-17

Location Description: SW area of accounting office, on top of "wood" file box
(Direction and Distance from MW Number or Building Number and Corner)

At what height above ground was sampler placed? 4.5'

Were existing volatiles found during screening removed? None found ← SEE INVENTORY FOR MORE INFO

Were any new volatiles in the sample area? No

Weather Conditions: Sunny

Rain in last 24 hours? No Sampler(s): JR/TH

SAMPLE TRAIN LEAK CHECK

Initial Vacuum Reading: -30 inhg
(Complete sample train)

Final Vacuum Reading: -30 inhg

Sampling Method: Indoor Air w/8hr regulator, 6L canister

PID Serial Number: 110-007425

Sample Start (Date/Time): 1-26-17 0809

Sample End Time (Date/Time): 1-26-17 1614 ←

NORMAL SAMPLE

Sample Number: 59-1A-04-NS Sample Number: N/A

Canister Number: N0447

Initial Canister Vacuum: -30 inhg Final Canister Vacuum: -6.5 inhg

DUPLICATE SAMPLE

Sample Number: N/A Sample Number: —

Canister Number: —

Initial Canister Vacuum: — Final Canister Vacuum: —

Baseline Soil Vapor Monitoring Event

Field Logs

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER Project: ______ Event: BASELINE

Boring Name: 59-PW-05-20 Date: 11-7-17

Location Description: ______
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): DA/TH

Weather Conditions: ☑ ~~No~~ ☐ Yes
(Rain in last 24 hours?)

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-27	
After probe placement, before purging:	WL 19.03	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: MINI RAE 2000 PI 104 PID Readings *(ppmv)*: Pre: NONE UNABLE TO USE SHROUD Maximum: ______ Post: ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

Distance Probe Driven: ______ Length Retracted: ______

NORMAL SAMPLE Sample Time: 1208

Sample Number: 59-PW-05-10-NS

Canister Number: N 1994 Attempts to Sample: 1

Begin/End Depths of Sample: ______ / ______ Evacuation Time: /
(Note: Two liters/minute or less)

Vacuum: / *(-) inch Hg* Purge Volume: /

Initial Canister Vacuum: -30 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: NA Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID = 0.5

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER Project: ________ Event: BASELINE

Boring Name: 59-AW-05-40 Date: 11-7-17

Location Description: ________
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: ________

Departure Time: — Sampler(s): DA / TH

Weather Conditions: (Rain in last 24 hours?) ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-27	
After probe placement, before purging:	DRY	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: MINI RAE 2000 PI 104 PID Readings (ppmv): Pre: ________ UNABLE TO USE SHROUD Maximum: ________ Post: ________

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ________

Distance Probe Driven: ________ Length Retracted: ________

NORMAL SAMPLE Sample Time: 1219

Sample Number: 59-AW-05-30-NS

Canister Number: 5526 Attempts to Sample: 1

Begin/End Depths of Sample: — / — Evacuation Time: ________
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: ________

Initial Canister Vacuum: -28 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ________

Sample Number: NA Canister Number: ________

Initial Canister Vacuum: ________ *(-) inch Hg* Final Canister Volume: ________ *(-) inch Hg*

PID = 2.2

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URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER Project: ______ Event: BASELINE

Boring Name: 59-PW-05-~~40~~ 60 Dce Date: 11/7/17

Location Description: ______

(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: ______ Initial Vacuum Reading: ______

Departure Time: — Sampler(s): DA/TH

Weather Conditions: *(Rain in last 24 hours?)* ☒ ~~No~~ ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-27.5	
After probe placement, before purging:	WL 59.1	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: MINI RAE 2000 PID Readings *(ppmv)*: Pre: NONE UNABLE TO USE SHROUD Maximum: ______ Post: ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

Distance Probe Driven: ______ Length Retracted: ______

NORMAL SAMPLE Sample Time: 1232

Sample Number: 59-PW-05-50-NS

Canister Number: 3059 Attempts to Sample: 1 —

Begin/End Depths of Sample: — / — Evacuation Time: —

(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: ______

Initial Canister Vacuum: -30 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: NA Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID = 0.6

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER Project: BASELINE Event: 11-7-17

Boring Name: 59-PW-05-90 Date: 11-7-17

Location Description:

(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: / Initial Vacuum Reading: —

Departure Time: — Sampler(s): DA/TH Weather Conditions: *(Rain in last 24 hours?)* ☒ *No* ☐ *Yes*

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-24.5	
After probe placement, before purging:	DRY	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: MINI RAE 2000 PI 104 PID Readings *(ppmv)*: Pre: UNABLE TO USE SHROUD Maximum: Post:

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:*

Distance Probe Driven: Length Retracted:

NORMAL SAMPLE Sample Time: 1247

Sample Number: 59-PW-05-70-NS

Canister Number: N2651 Attempts to Sample: 1

Begin/End Depths of Sample: / Evacuation Time:

(Note: Two liters/minute or less)

Vacuum: *(-) inch Hg* Purge Volume:

Initial Canister Vacuum: -29.5 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time:

Sample Number: Canister Number:

Initial Canister Vacuum: *(-) inch Hg* Final Canister Volume: *(-) inch Hg*

PID ≈ 1.2

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER Project: ______ Event: BASELINE

Boring Name: 59-PW-06-20 Date: 11-7-17

Location Description: EAST OF HANGER ON APRON /
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): AK / TTH

Weather Conditions: (Rain in last 24 hours?) ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-21	
After probe placement, before purging:	pre WL 18.75	POST WL 18.75

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: MINI RAE AI 104 PID Readings *(ppmv)*: Pre: ______ UNABLE TO USE SHROUD Maximum: ______ Post: ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

Distance Probe Driven: ______ Length Retracted: ______

NORMAL SAMPLE Sample Time: 0920

Sample Number: 59-PW-06-11-NS

Canister Number: S0150 Attempts to Sample: 1

Begin/End Depths of Sample: — / — Evacuation Time: ______
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1.2

Initial Canister Vacuum: -30 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: ______ Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID SAMPLE = 1.5

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER Project: ______ Event: BASELINE

Boring Name: 59-PW-06-40 Date: 11-7-17

Location Description: EAST of HANGER
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: ______

Departure Time: — Sampler(s): DA/TH Weather Conditions: (Rain in last 24 hours?) ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20.5	
After probe placement, before purging:	PRE WL 38.9	POST WL 38.9

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: MINI RAE 2000 PI 104 PID Readings (ppmv): Pre: ______ UNABLE TO USE SHROUD Maximum: ______ Post: ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

Distance Probe Driven: ______ Length Retracted: ______

NORMAL SAMPLE Sample Time: 0936

Sample Number: 59-PW-06-31-NS

Canister Number: N2663 Attempts to Sample: 1

Begin/End Depths of Sample: — / — Evacuation Time: ______
(Note: Two liters/minute or less)

Vacuum: -30 [illegible] *(-) inch Hg* Purge Volume: 1 L

Initial Canister Vacuum: -30 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: NA Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID Sample 0.1

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER Project: ________ Event: BASELINE

Boring Name: 59-PW-06-60 Date: 11-7-17

Location Description: EAST of HANGER on APRON
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: - Lithology at Sample Point: - Initial Vacuum Reading: ________

Departure Time: - Sampler(s): DA/TH Weather Conditions: *(Rain in last 24 hours?)* ☒ *No* ☐ *Yes*

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	LEAK TEST -27	
After probe placement, before purging:	PRE WL 58.85	POST 58.85

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: MINI RAE 2000 PID Readings *(ppmv)*: Pre: ________ Maximum: ________ Post: ________

UNABLE TO USE SHROUD

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ________

Distance Probe Driven: ________ Length Retracted: ________

NORMAL SAMPLE Sample Time: 0959

Sample Number: 59-PW-06-51-NS

Canister Number: O 0727 Attempts to Sample: 1

Begin/End Depths of Sample: ________ / ________ Evacuation Time: ________
(Note: Two liters/minute or less)

Vacuum: ________ *(-) inch Hg* Purge Volume: 1 L

Initial Canister Vacuum: 29.5 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: 0959

Sample Number: 59-PW-06-51-FD Canister Number: S 0017

Initial Canister Vacuum: 29.5 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

PID = .5

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URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER Project: ______ Event: BASELINE

Boring Name: 59-PW-06-90 Date: 11/7/17

Location Description: VAULT EAST of HANGER
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: ______ Initial Vacuum Reading: ______

Departure Time: — Sampler(s): DA/TH Weather Conditions: *(Rain in last 24 hours?)* ☒ No ☐ *Yes*

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	LEAK TEST -27	
After probe placement, before purging:	PRE WL 88.92	POST WL 88.92

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: MINI RAE 2000 PI 104 PID Readings *(ppmv)*: Pre: 0 UNABLE TO USE SHROUD Maximum: ______ Post: ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

Distance Probe Driven: ______ Length Retracted: ______

NORMAL SAMPLE Sample Time: 1021

Sample Number: 59-PW-06-70-NS

Canister Number: N 2019 Attempts to Sample: ______

Begin/End Depths of Sample: ______ / ______ Evacuation Time: ______
(Note: Two liters/minute or less)

Vacuum: 29.5 *(-) inch Hg* Purge Volume: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: NA Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID = .7

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER Project: ____ Event: BASELINE

Boring Name: 59 - PW - ~~08~~ 07 - 10 Date: 11-7-17

Location Description: ____
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): TH/DA Weather Conditions: (Rain in last 24 hours?) ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20.5	-20.5
After probe placement, before purging:	pre WL 19.9	POST WL 19.9

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

LEAK TEST MINI R 2000
PID Serial Number: PI 104 PID Readings (ppmv): Pre: 47 Maximum: ____ Post: ____

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ____

Distance Probe Driven: ____ Length Retracted: ____

NORMAL SAMPLE Sample Time: 0853

Sample Number: 59-PW-07-10-NS

Canister Number: N3132 Attempts to Sample: 1

Begin/End Depths of Sample: — / — Evacuation Time: ____
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1 L

Initial Canister Vacuum: -30 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ____

Sample Number: N/A Canister Number: ____

Initial Canister Vacuum: ____ *(-) inch Hg* Final Canister Volume: ____ *(-) inch Hg*

PID sample 8.7

URS Downhole Soil Gas Sampling Data Sheet

Installation: Mather Project: ______ Event: Baseline

Boring Name: 59-PW-08-10 Date: 11/7/17

Location Description: —
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): TT / DA Weather Conditions: (Rain in last 24 hours?) ☑ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20.5	-20.5
After probe placement, before purging:	pre WL 19.53	post WL 19.53

96/

1.5 min purge

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

Leak test

PID Serial Number: mini 2000 PID Readings (ppmv): Pre: 26.2 Maximum: ______ Post: ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:*

Distance Probe Driven: ______ Length Retracted: ______

NORMAL SAMPLE Sample Time: 0826

Sample Number: 59-PW-08-10-NS

Canister Number: 34096 Attempts to Sample: —

Begin/End Depths of Sample: — / — Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1L

Initial Canister Vacuum: -30 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

N/A

Sample Number: ______ Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID sample = 2.0

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER　Project: ______　Event: BASELINE

Boring Name: 59-PW-09A　Date: 11/7/17

Location Description: ______
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: —　Lithology at Sample Point: —　Initial Vacuum Reading: —

Departure Time: —　Sampler(s): DA/TH　Weather Conditions: *(Rain in last 24 hours?)* ☑ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-27	
After probe placement, before purging:	DRY	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: MINI RAE 2000 PI 104　PID Readings *(ppmv)*: Pre: 81.9　Maximum: ______　Post: ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated*　Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

Distance Probe Driven: ______　Length Retracted: ______

NORMAL SAMPLE　Sample Time: 1319

Sample Number: 59-PW-09A-10-NS

Canister Number: A8980　Attempts to Sample: 1

Begin/End Depths of Sample: — / —　Evacuation Time: ______
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg*　Purge Volume: ______

Initial Canister Vacuum: -27 *(-) inch Hg*　Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE　Sample Time: ______

Sample Number: NA　Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg*　Final Canister Volume: ______ *(-) inch Hg*

PID = 31.5

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER Project: ______ Event: BASELINE

Boring Name: 59-PW-09B Date: 11-7-17

Location Description: ______
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: ______ Initial Vacuum Reading: ______

Departure Time: — Sampler(s): DA / TH Weather Conditions: *(Rain in last 24 hours?)* ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-27	
After probe placement, before purging:	WL - DRY	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: MINI RAE 2000 PI 104 PID Readings *(ppmv)*: Pre: 54.8 Maximum: ______ Post: ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

Distance Probe Driven: ______ Length Retracted: ______

NORMAL SAMPLE Sample Time: 1337

Sample Number: 59-PW-09B-20-NS

Canister Number: 01001 Attempts to Sample: 1

Begin/End Depths of Sample: ______ / ______ Evacuation Time: ______
(Note: Two liters/minute or less)

Vacuum: ______ *(-) inch Hg* Purge Volume: ______

Initial Canister Vacuum: -28 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: 1337

Sample Number: 59-PW-09B-20-FD Canister Number: N2429

Initial Canister Vacuum: -28 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

PID = 34.2

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URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER
Project:
Event: BASELINE

Boring Name: 59-PW-10A-08
Date: 11-7-17

Location Description:
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: —
Lithology at Sample Point: —
Initial Vacuum Reading:

Departure Time: /
Sampler(s): DA/TH
Weather Conditions: *(Rain in last 24 hours?)* ☑ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-27	
After probe placement, before purging:	DRY	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: MINI RAE 2000 AI 104
PID Readings *(ppmv)*: Pre: 38.5
Maximum:
Post:

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated*
Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:*

Distance Probe Driven:
Length Retracted:

NORMAL SAMPLE

Sample Time: 1130

Sample Number: 59-PW-10A-08-NS

Canister Number: 12042
Attempts to Sample: 1

Begin/End Depths of Sample: — / —
Evacuation Time:
(Note: Two liters/minute or less)

Vacuum: ✓ *(-) inch Hg*
Purge Volume:

Initial Canister Vacuum: -29.5 *(-) inch Hg*
Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE

Sample Time:

Sample Number: NA
Canister Number:

Initial Canister Vacuum: *(-) inch Hg*
Final Canister Volume: *(-) inch Hg*

PID = 0.5

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URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER Project: ______ Event: BASELINE

Boring Name: 59-PW-10B-20 Date: 11-7-17

Location Description: ______
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): DA / TH

Weather Conditions: ☑ No
(Rain in last 24 hours?) ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-27	
After probe placement, before purging:	WL - DRY	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: MINI RAE 2000 pI 104 PID Readings *(ppmv)*: Pre: 31.5 Maximum: ______ Post: ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

Distance Probe Driven: ______ Length Retracted: ______

NORMAL SAMPLE Sample Time: 1145

Sample Number: 59-PW-10B-20-NS

Canister Number: 35685 Attempts to Sample: 1

Begin/End Depths of Sample: ______ / ______ Evacuation Time: ______
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: ______

Initial Canister Vacuum: -30 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: NA Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID - 6.5

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URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER Project: ______ Event: BASELINE

Boring Name: 59-PW-11A Date: 11-8-17

Location Description: ______
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: ______ Lithology at Sample Point: ______ Initial Vacuum Reading: ______

Departure Time: ______ Sampler(s): DA / TH

Weather Conditions: ☒ No ☐ Yes
(Rain in last 24 hours?)

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20	
After probe placement, before purging:	WL = DRY	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: MINI RAE 2000 PI 104 PID Readings *(ppmv)*: Pre: 12.5 Maximum: ______ Post: ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

Distance Probe Driven: ______ Length Retracted: ______

NORMAL SAMPLE Sample Time: 0805

Sample Number: 59-PW-11A-08-NS

Canister Number: 50022 Attempts to Sample: 1

Begin/End Depths of Sample: ______ / ______ Evacuation Time: ______
(Note: Two liters/minute or less)

Vacuum: ______ *(-) inch Hg* Purge Volume: ______

Initial Canister Vacuum: -29.5 *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

FIELD DUPLICATE Sample Time: 0805

Sample Number: 59-PW-11A-08-FD Canister Number: N2732

Initial Canister Vacuum: -29.5 *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID = ~~12.5~~ ~~DA~~ 0.0

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URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER Project: Event: BASELINE

Boring Name: 59-PW-11B Date: 11-8-17

Location Description:
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: – Lithology at Sample Point: – Initial Vacuum Reading:

Departure Time: – Sampler(s): DA/TH Weather Conditions: *(Rain in last 24 hours?)* ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	– 20.5	
After probe placement, before purging:	WL = DRY	

Sampling Method: ☐ Slide Hammer ☐ Hand Auger Hole ☐ Hand Drive ☐ Pneumatic ☐ Hydraulic (Direct Push) ☐ Well

PID Serial Number: MINI RAE 2000 pE 104 PID Readings (ppmv): Pre: 10.0 Maximum: Post:

Apparent Moisture: ☐ Dry ☐ Moist ☐ Saturated Backfill Material: ☐ Soil ☐ Grout ☐ Bentonite ☐ Other:

Distance Probe Driven: Length Retracted:

NORMAL SAMPLE Sample Time: 0817

Sample Number: 59-PW-11B-20-NS

Canister Number: 0 0273 Attempts to Sample: 1

Begin/End Depths of Sample: / Evacuation Time:
(Note: Two liters/minute or less)

Vacuum: *(-) inch Hg* Purge Volume:

Initial Canister Vacuum: -30 *(-) inch Hg* Final Canister Volume: *(-) inch Hg*

FIELD DUPLICATE Sample Time:

Sample Number: Canister Number:

Initial Canister Vacuum: *(-) inch Hg* Final Canister Volume: *(-) inch Hg*

PID 3.8 (JUMPED TO 48.0 ppm MOMENTARILY & RETURNED TO 3.8-4.0)

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER Project: ______ Event: BASELINE

Boring Name: 59- AW-12A Date: 10/2/17

Location Description: ______
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: ______ Lithology at Sample Point: ______ Initial Vacuum Reading: ______

Departure Time: ______ Sampler(s): DA / TH

Weather Conditions: *(Rain in last 24 hours?)* ☑ *No* ☐ *Yes*

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-27.5	
After probe placement, before purging:	wL - DRY	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: MINI RAE 2000 PE 104 PID Readings *(ppmv)*: Pre: 185 Maximum: ______ Post: ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

Distance Probe Driven: ______ Length Retracted: ______

NORMAL SAMPLE Sample Time: 1404

Sample Number: 59-AW-12A-08-NS

Canister Number: ______ Attempts to Sample: ______

Begin/End Depths of Sample: ______ / ______ Evacuation Time: ______
(Note: Two liters/minute or less)

Vacuum: ______ *(-) inch Hg* Purge Volume: ______

Initial Canister Vacuum: -26 *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: NA Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID - 4048.

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URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHER Project: ________ Event: BASELINE

Boring Name: 59-PW-12B Date: 11-7-17

Location Description: ________

(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): DA/TH

Weather Conditions: ☑ No

(Rain in last 24 hours?) ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-27	
After probe placement, before purging:	WL - DRY	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: MINI RAE 2000 PI/04 PID Readings *(ppmv)*: Pre: 8/3 Maximum: ________ Post: ________

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ________

Distance Probe Driven: ________ Length Retracted: ________

NORMAL SAMPLE Sample Time: 1421

Sample Number: 59-PW-12B-20-US

Canister Number: 0 0817 Attempts to Sample: ________

Begin/End Depths of Sample: ________ / ________ Evacuation Time: ________

(Note: Two liters/minute or less)

Vacuum: ________ *(-) inch Hg* Purge Volume: ________

Initial Canister Vacuum: 26.5 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ________

Sample Number: NA Canister Number: ________

Initial Canister Vacuum: ________ *(-) inch Hg* Final Canister Volume: ________ *(-) inch Hg*

PID 429

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: ______ Event: Baseline

Boring Name: 59-PW-134-08 Date: 11-2-17

Location Description: East of building
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Weather Conditions: (Rain in last 24 hours?) ☒ No ☐ Yes

Departure Time: — Sampler(s): JR|TH

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20	-20
After probe placement, before purging:	Pre WL = 9.10	Post WL = 9.09

9.10 36.44 0.61

~~Sampling Method: ☐ Slide Hammer ☐ Hand Auger Hole ☐ Hand Drive~~ ☐ Pneumatic ☐ Hydraulic (Direct Push) ☐ Well

PID Serial Number: Mini 2000 PID Readings (ppmv): Pre: 43 Maximum: ______ Post: ______

~~Apparent Moisture: ☐ Dry ☐ Moist ☐ Saturated Backfill Material: ☐ Soil~~ ☐ Grout ☐ Bentonite ☐ Other: ______

~~Distance Probe Driven: ______ Length Retracted: ______~~

NORMAL SAMPLE Sample Time: 0942

Sample Number: 59-PW-134-08-NS

Canister Number: N0224 Attempts to Sample: —

Begin/End Depths of Sample: — / — Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — (-) inch Hg Purge Volume: 1L

Initial Canister Vacuum: -30 (-) inch Hg Final Canister Volume: -5.5 (-) inch Hg

FIELD DUPLICATE Sample Time: ______

Sample Number: N/A Canister Number: ______

Initial Canister Vacuum: ______ (-) inch Hg Final Canister Volume: ______ (-) inch Hg

PID sample read = 1800 ppm

@0838 WL=8.45 @0900 WL=8.82 @0922 WL [illegible] sample

URS

Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: ______ Event: Baseline

Boring Name: 59-PW-13B-20 Date: 11-2-17

Location Description: East of building
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: (Rain in last 24 hours?) ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20.5	-20.5
After probe placement, before purging:	Pre WL = Dry	

~~Sampling Method~~: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: Mini 2000 PID Readings (ppmv): Pre: 28 Maximum: ______ Post: ______

~~Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated*~~ Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

~~Distance Probe Driven:~~ ______ Length Retracted: ______

10 = 21.67 ~~[illegible]~~ 0.43

NORMAL SAMPLE Sample Time: 1007

Sample Number: 59-PW-13B-20-NS

Canister Number: 3018 Attempts to Sample: —

Begin/End Depths of Sample: — / ______ Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1L

Initial Canister Vacuum: -30 *(-) inch Hg* Final Canister Volume: 5.5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: N/A Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID sample read = 10,000+ over meter

URS Downhole Soil Gas Sampling Data Sheet

Installation: ~~Mather~~ MATHR Project: ~~60520477~~ 559B Event: Baseline

Boring Name: 59-PW-14-30 Date: 11-1-17

Location Description: South of building in parking space
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: (Rain in last 24 hours?) ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20.5	-20.5
After probe placement, before purging:	Pre WL=30.36	Post WL=30.35

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☒ *Well*

Leak Test

PID Serial Number: Mini 2000 PID Readings (ppmv): ~~Pre:~~ 60ppm ~~Maximum:~~ ~~Post:~~

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:*

Distance Probe Driven: — Length Retracted: —

NORMAL SAMPLE Sample Time: 1006

Sample Number: 59-PW-14-30-NS

Canister Number: 37311 Attempts to Sample: —

Begin/End Depths of Sample: — / — Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1 L

Initial Canister Vacuum: -30 *(-) inch Hg* Final Canister Volume: -6 *(-) inch Hg*

FIELD DUPLICATE Sample Time:

Sample Number: N/A Canister Number:

Initial Canister Vacuum: *(-) inch Hg* Final Canister Volume: *(-) inch Hg*

PID sample Read= 21.0ppm

1005-1007

58.12
45sec

purge 0.64
x60

TD=31.77

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URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: SS9B Event: Baseline

Boring Name: 59-PW-14-60 Date: 11-1-17

Location Description: South of building in parking space
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: (Rain in last 24 hours?) ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20	-20
After probe placement, before purging:	Pre WL = 58.94	Post WL = 52.85

ID-61.61 1.23 73.93 1126-1128

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☒ *Well*

Leak Test
PID Serial Number: Mini2000 PID Readings *(ppmv)*: Pre: ~~44~~ 290 ppm Maximum: — Post:

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:*

Distance Probe Driven: — Length Retracted: —

NORMAL SAMPLE Sample Time: 1130

Sample Number: 59-PW-14-60-NS

Canister Number: 01056 Attempts to Sample: —

Begin/End Depths of Sample: — / Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1L

Initial Canister Vacuum: -29.5 *(-) inch Hg* Final Canister Volume: -6.5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: 1130

Sample Number: 59-PW-14-60-FD Canister Number: 15755

Initial Canister Vacuum: -29.5 *(-) inch Hg* Final Canister Volume: -6.5 *(-) inch Hg*

PID sample = 44 ppm

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: ______ Event: Baseline

Boring Name: 59-PW-14-80 Date: 11-3-17

Location Description: South of building in parking space
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: *(Rain in last 24 hours?)* ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20	-20
After probe placement, before purging:	Pre WL = Dry	

~~Sampling Method~~: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: Mini 2000 PID Readings *(ppmv)*: Pre: 36 ~~Maximum:~~ — ~~Post:~~ ______

~~Apparent Moisture~~: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

~~Distance Probe Driven~~: ______ Length Retracted: ______

TD = 81.65 1.63 79.98

NORMAL SAMPLE Sample Time: 0836

Sample Number: 59-PW-14-80-NS

Canister Number: 00258 Attempts to Sample: —

Begin/End Depths of Sample: — / ______ Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1L

Initial Canister Vacuum: -29.5 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: N/A Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID sample Read = 5.1 ppm

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: ______ Event: Baseline

Boring Name: 59-PW-15-08 Date: 11-2-17

Location Description: Southeast of building
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: (Rain in last 24 hours?) ☒ No ☐ Yes

TD = 10.31 12.37 0.22

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20	-20
After probe placement, before purging:	Pre WL = 9.96	Post WL =

Sampling ~~Method~~: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

Leak Test

PID Serial Number: Mini 2000 PID Readings *(ppmv)*: ~~Pre:~~ 100 ~~Maximum:~~ ______ ~~Post:~~ ______

Apparent ~~Moisture~~: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

Distance ~~Probe~~ Driven: ______ Length Retracted: ______

NORMAL SAMPLE Sample Time: 1334

Sample Number: 59-PW-15-08-NS

Canister Number: 3001 Attempts to Sample: —

Begin/End Depths of Sample: — / — Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1L

Initial Canister Vacuum: -30 *(-) inch Hg* Final Canister Volume: -6 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: N/A Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID sample read = 700 ppm

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: ______ Event: Baseline

Boring Name: 59-PW-15-20 Date: 11-2-17

Location Description: Southeast of building
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: *(Rain in last 24 hours?)* ☒ *No* ☐ *Yes*

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20	-20
After probe placement, before purging:	Prewell=Dry	

~~Sampling~~ Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: Mini 2000 PID Readings *(ppmv)*: ~~Pre~~: 34 ~~Maximum~~: ______ ~~Post~~: ______

~~Apparent~~ Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

~~Distance~~ Probe Driven: ______ Length Retracted: ______

TD 21.45

25.24

NORMAL SAMPLE Sample Time: 1355

Sample Number: 59-PW-15-20-NS

Canister Number: N2598 Attempts to Sample: —

Begin/End Depths of Sample: — / — Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1L

Initial Canister Vacuum: -29.5 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: N/A Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID sample read = 660 ppm

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: Event: Baseline

Boring Name: 59-PW-15-30 Date: 11-2-17

Location Description: Southeast of building
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: (Rain in last 24 hours?) ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20.5	-20.5
After probe placement, before purging:	PreWL = Dry	

TP=31.65 37.98

~~Sampling~~ Method: ☐ Slide Hammer ☐ Hand Auger Hole ☐ Hand Drive ☐ Pneumatic ☐ Hydraulic (Direct Push) ☐ Well
Leak Test

PID Serial Number: Mini 2000 PID Readings (ppmv): ~~Pre.~~ 32 ~~Maximum:~~ ~~Post:~~

~~Apparent Moisture~~: ☐ Dry ☐ Moist ☐ Saturated Backfill Material: ☐ Soil ☐ Grout ☐ Bentonite ☐ Other:

~~Distance Probe Driven~~: Length Retracted:

NORMAL SAMPLE Sample Time: 1410

Sample Number: 59-PW-15-30-NS

Canister Number: 00808 Attempts to Sample: —

Begin/End Depths of Sample: — / Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — (-) inch Hg Purge Volume: 1L

Initial Canister Vacuum: -28.5 (-) inch Hg Final Canister Volume: (-) inch Hg

FIELD DUPLICATE Sample Time:

Sample Number: N/A Canister Number:

Initial Canister Vacuum: (-) inch Hg Final Canister Volume: (-) inch Hg

PID sample read = 360 ppm

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: ______ Event: Baseline

Boring Name: 59-PW-15-60 Date: 11-2-17

Location Description: Southeast of building
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR | TH Weather Conditions: *(Rain in last 24 hours?)* ☒ *No* ☐ *Yes*

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20	-20
After probe placement, before purging:	PreWL = Dry	

~~Sampling Method:~~ ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

Leak Test
PID Serial Number: Mini 2000 PID Readings *(ppmv)*: ~~Pre:~~ 36 ~~Maximum:~~ ______ ~~Post:~~ ______

~~Apparent Moisture:~~ ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

~~Distance Probe~~ Driven: ______ Length Retracted: ______

NORMAL SAMPLE Sample Time: 1423

Sample Number: 59-PW-15-60-NS

Canister Number: 00486 Attempts to Sample: —

Begin/End Depths of Sample: — / ______ Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1L

Initial Canister Vacuum: -30 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: N/A Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID sample reed = 700 ppm

TO= 61.34 0.98 58.88

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URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: ________ Event: Baseline

Boring Name: 59-PW-15-80-~~NS~~ Date: 11-2-17

Location Description: Southeast of building
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: *(Rain in last 24 hours?)* ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	20.5	20.5
After probe placement, before purging:	Pre WL = Dry	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: Mini 2000 PID Readings *(ppmv)*: Pre: 38 Maximum: ____ Post: ____

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ____

Distance Probe Driven: ____ Length Retracted: ____

NORMAL SAMPLE Sample Time: 1437

Sample Number: 59-PW-15-80-NS

Canister Number: 3038 Attempts to Sample: —

Begin/End Depths of Sample: — / — Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1L

Initial Canister Vacuum: -30 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ____

Sample Number: N/A Canister Number: ____

Initial Canister Vacuum: ____ *(-) inch Hg* Final Canister Volume: ____ *(-) inch Hg*

PID sample read = 40ppm

TD = 81.65 1.63 47.98

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: 559B Event: Baseline

Boring Name: 59-PW-16-08 Date: 11-1-17

Location Description: Near southeastern corner of building
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: *(Rain in last 24 hours?)* ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20.5	-20.5
After probe placement, before purging:	Pre WL = below top of pump	Post WL = 8.00

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

Leak Test

PID Serial Number: Mini 2000 PID Readings (ppmv): Pre: 80 ppm Maximum: Post:

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:*

Distance Probe Driven: Length Retracted:

NORMAL SAMPLE

Sample Time: No sample

Sample Number: ~~59-PW-16-08-NS~~ JR N/A see note below

Canister Number: Attempts to Sample: —

Begin/End Depths of Sample: — / Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1 L

Initial Canister Vacuum: -30 *(-) inch Hg* Final Canister Volume: *(-) inch Hg*

FIELD DUPLICATE

Sample Time:

Sample Number: N/A Canister Number:

Initial Canister Vacuum: *(-) inch Hg* Final Canister Volume: *(-) inch Hg*

WL @ 8.00 after sampling. purged 0.3 gal (scrn 8-10')
WL @ 8.30 after 30 min purged 1 gal total - recharge too fast, can't [illegible]e a vapor sample per Kimiye

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: S59B Event: Baseline

Boring Name: 59-PW-16-20 Date: 11-1-17

Location Description: Near southeastern corner of building
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: *(Rain in last 24 hours?)* ☒ *No* ☐ *Yes*

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	20.5	20.5
After probe placement, before purging:	PreWL-DRY	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

Leak Test

PID Serial Number: Mini 2000 PID Readings *(ppmv)*: Pre: 40ppm Maximum: ______ Post: ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

Distance Probe Driven: ______ Length Retracted: ______

NORMAL SAMPLE

Sample Time: 1426

Sample Number: 59-PW-16-20-NS

Canister Number: 00477 Attempts to Sample: —

Begin/End Depths of Sample: — / ______ Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1L

Initial Canister Vacuum: -30 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE

Sample Time: ______

Sample Number: N/A Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID sample vapor = 3.0 ppm

1426

25.88

TD = 21.57

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URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: S59B Event: Baseline

Boring Name: 59-PW-16-30 Date: 11-1-17

Location Description: SE corner of building
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: (Rain in last 24 hours?) ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20	-20
After probe placement, before purging:	Pre WL-Dry	

Sampling Method: ☐ Slide Hammer ☐ Hand Auger Hole ☐ Hand Drive ☐ Pneumatic ☐ Hydraulic (Direct Push) ☐ Well

Leak Test

PID Serial Number: Mini 2000 PID Readings (ppmv): Pre: 44 ppm Maximum: Post:

Apparent Moisture: ☐ Dry ☐ Moist ☐ Saturated Backfill Material: ☐ Soil ☐ Grout ☐ Bentonite ☐ Other:

Distance Probe Driven: Length Retracted:

NORMAL SAMPLE Sample Time: 1441

Sample Number: 59-PW-16-30-NS

Canister Number: S0156 Attempts to Sample: —

Begin/End Depths of Sample: — / Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — (-) inch Hg Purge Volume: 1L

Initial Canister Vacuum: -28 (-) inch Hg Final Canister Volume: -5 (-) inch Hg

FIELD DUPLICATE Sample Time:

Sample Number: N/A Canister Number:

Initial Canister Vacuum: (-) inch Hg Final Canister Volume: (-) inch Hg

PID sample = 2.3 ppm

0.631/57.86

TD = 31.55

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: ______ Event: Baseline

Boring Name: 59-PW-16-60- Date: 11-3-17

Location Description: Southeast corner of building
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: - Lithology at Sample Point: - Initial Vacuum Reading: -

Departure Time: - Sampler(s): JR/TH Weather Conditions: *(Rain in last 24 hours?)* ☒ *No* ☐ *Yes*

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-21	-21
After probe placement, before purging:	Pre WL = Dry	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

Leak Test

PID Serial Number: Mini 2000 PID Readings ~~(ppmv): Pre~~: 87 ~~Maximum~~: ______ ~~Post~~: ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

Distance Probe Driven: ______ Length Retracted: ______

TD = 59.97 1.19 71.96

NORMAL SAMPLE Sample Time: 0755

Sample Number: 59-PW-16-60

Canister Number: N0288 Attempts to Sample: -

Begin/End Depths of Sample: - / Evacuation Time: -
(Note: Two liters/minute or less)

Vacuum: - *(-) inch Hg* Purge Volume: 1L

Initial Canister Vacuum: -28 *(-) inch Hg* Final Canister Volume: -6 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: N/A Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID Sample Read = 5.3 ppm

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: ______ Event: Baseline

Boring Name: 59-PW-16-80 Date: 11-3-17

Location Description: Southeast corner of building
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: (Rain in last 24 hours?) ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20	-20
After probe placement, before purging:	Pre WL = Dry	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

Leak Test

PID Serial Number: Mini 2000 PID Readings *(ppmv)*: Pre: 15 ~~Maximum:~~ ______ ~~Post:~~ ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

Distance Probe Driven: ______ Length Retracted: ______

TD = 81.35 1.63 97.62

NORMAL SAMPLE Sample Time: 0817

Sample Number: 59-PW-16-80-NS

Canister Number: N3092 Attempts to Sample: —

Begin/End Depths of Sample: — / ______ Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1L

Initial Canister Vacuum: -29.5 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: N/A Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID sample read = 1.8 ppm

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URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: Event: Baseline

Boring Name: 59-PW-17-08 Date: 11-3-17

Location Description: Inside hangar
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: (Rain in last 24 hours?) ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20	-20
After probe placement, before purging:	Pre WL = Muddy Bottom	

~~Sampling Method~~: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

Leak Test
PID Serial Number: Mini2000 PID Readings (ppmv): Pre: 28 ~~Maximum:~~ — ~~Post:~~

~~Apparent Moisture~~: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:*

~~Distance Probe Driven~~: Length Retracted:

NORMAL SAMPLE Sample Time: 0931

Sample Number: 59-PW-17-08-NS

Canister Number: N1980 Attempts to Sample: —

Begin/End Depths of Sample: — / — Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1 L

Initial Canister Vacuum: -28.5 *(-) inch Hg* Final Canister Volume: -5.5 *(-) inch Hg*

FIELD DUPLICATE Sample Time:

Sample Number: N/A Canister Number:

Initial Canister Vacuum: *(-) inch Hg* Final Canister Volume: *(-) inch Hg*

PID sample read = 80.0 ppm

TD = 9.25 0.195 11.7

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URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: ________ Event: Baseline

Boring Name: 59-PW-17-20 Date: 11-3-17

Location Description: Inside hangar
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: *(Rain in last 24 hours?)* ☒ *No* ☐ *Yes*

TD = 21.43 0.43 25.71

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20.5	-20.5
After probe placement, before purging:	Pre WL = Dry	

Sampling ~~Method~~: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: Mini 2000 PID Readings *(ppmv)*: Pre: 42 ~~Maximum~~: ____ ~~Post~~: ____

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:*

Distance ~~Probe~~ Driven: ____ Length Retracted: ____

NORMAL SAMPLE Sample Time: 0950

Sample Number: 59-PW-17-20-NS

Canister Number: 8021 Attempts to Sample: —

Begin/End Depths of Sample: — / Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1L

Initial Canister Vacuum: -29 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: 0950

Sample Number: 59-PW-17-20-FD Canister Number: S0006

Initial Canister Vacuum: -29 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

PID sample read = 25 ppm

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: ______ Event: Baseline

Boring Name: 59-PW-17-30 Date: 11-3-17

Location Description: Inside hanger
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: *(Rain in last 24 hours?)* ☒ *No* ☐ *Yes*

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20	-20
After probe placement, before purging:	Pre WL - Dry	

TD=31.44 0.50 30.18

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: Mini 2000 PID Readings (ppmv): Pre: 38 ~~Maximum:~~ ______ Post: ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

Distance Probe Driven: ______ Length Retracted: ______

NORMAL SAMPLE Sample Time: 1003

Sample Number: 59-PW-17-30-NS

Canister Number: 00810 Attempts to Sample: —

Begin/End Depths of Sample: — / ______ Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1L

Initial Canister Vacuum: 29.5 *(-) inch Hg* Final Canister Volume: -4 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: N/A Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID sample read =10.0 ppm

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: ______ Event: Baseline

Boring Name: 59-PW-17-60 Date: 11-2-17

Location Description: Inside Hangar
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR/TH Weather Conditions: *(Rain in last 24 hours?)* ☒ *No* ☐ *Yes*

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-20	-20
After probe placement, before purging:	Pre WL = 60.62	Post WL = 60.55

~~Sampling Method:~~ ☐ ~~*Slide Hammer*~~ ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: Mini 2000 PID Readings *(ppmv)*: Pre: 38 Maximum: ______ Post: ______

~~Apparent Moisture:~~ ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ______

~~Distance Probe Driven:~~ ______ Length Retracted: ______

NORMAL SAMPLE Sample Time: 1235

Sample Number: 59-PW-17-60-NS

Canister Number: N2650 Attempts to Sample: —

Begin/End Depths of Sample: — / — Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1L

Initial Canister Vacuum: -28 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ______

Sample Number: N/A Canister Number: ______

Initial Canister Vacuum: ______ *(-) inch Hg* Final Canister Volume: ______ *(-) inch Hg*

PID Sample Read = 2600ppm

1.47min

73.98

1.27

TD=61.05

URS Downhole Soil Gas Sampling Data Sheet

Installation: MATHR Project: S59B Event: Baseline

Boring Name: 59-PW-17-80 Date: 11-3-17

Location Description: Inside hangar
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: — Lithology at Sample Point: — Initial Vacuum Reading: —

Departure Time: — Sampler(s): JR | TH Weather Conditions: *(Rain in last 24 hours?)* ☒ No ☐ Yes

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	-27	-27
After probe placement, before purging:	Pre WL = Dry	

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

Leak Test
PID Serial Number: Mini 2000 PID Readings *(ppmv)*: Pre: 107 Maximum: ____ Post: ____

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ____

Distance Probe Driven: ____ Length Retracted: ____

NORMAL SAMPLE Sample Time: 1028

Sample Number: 59-PW-17-80-NS

Canister Number: A9013 Attempts to Sample: —

Begin/End Depths of Sample: — / ____ Evacuation Time: —
(Note: Two liters/minute or less)

Vacuum: — *(-) inch Hg* Purge Volume: 1L

Initial Canister Vacuum: ~~@ 26.5~~ 27 *(-) inch Hg* Final Canister Volume: -5 *(-) inch Hg*

FIELD DUPLICATE Sample Time: ____

Sample Number: N/A Canister Number: ____

Initial Canister Vacuum: ____ *(-) inch Hg* Final Canister Volume: ____ *(-) inch Hg*

PID sample read = 40ppm

TD=81.35 1.627 97.62

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MONITORING WELL SAMPLING DATA SHEET

AECOM

Client: USAF Project No: ________ Well Designation: Ladies Room

Site: Mather S59B Date: 11-1-17

Well Type: Flush Mount Stove pipe Is well cap sealed? YES NO (explain in remarks)

Bolts: ____/____ Well O-ring? YES NO Tabs Broken? YES(#____/____) NO

General condition of Wellhead assembly: Excellent Good Fair Poor (Explain in remarks)

Sample Type: 3 Casing Volumes________ Low Flow ________

Sample Method: Submersible Bladder Pump Peristaltic Pump Watera

Sampled with: Disposable bailer ________ From Pump tubing ________

Well diameter:	1"____	2"____	4"____	6"____	8"____
Purge Vol. Multiplier:	0.04	0.163	0.653	1.47	2.61 gal/ft.

Initial Measurement	Recharge Measurement	Purge Volume
Time:________	Time:________	Calculated:________
Depth of well:________	Depth to water:________	Actual:________
Depth to water:________	80% recharge depth:________	

Discharge (sec): ________ Recharge (sec): ________ Pressure (psi): ________

1040

Time	Temp (C)	E.C. (µS)	pH	ORP	Turb (NTU)	DO	DTW (FT BTOC)	Flow Rate (LPM)	Vol. (Liters)
Free Chlorine (1min) = 1.0 mg/L									
Total Chlorine (3min) = 1.1 mg/L									

Note pump set at ________feet. Actual purge volume:________

Sample appearance:________

QC samples collected? YES NO QC sample ID: ________ Time: ________

Remarks:

KT took samples

Signature:________ Review:________

Flow rate: 0.1 – 0.5 L/min
Drawdown: <25% of well screen interval
pH: ±0.1 pH units
Conductivity: ±3% of reading

Dissolved Oxygen: ±10% of reading or 0.2 mg/L, whichever is greater
ORP: ±10mV
Turbidity: ±10% of prior reading or ±1.0 NTU, whichever is greater
Temperature: ±1°C

MONITORING WELL SAMPLING DATA SHEET

AECOM

Client: USAF Project No: ________ Well Designation: 59-PW-13A-08

Site: Mather S59B Date: 11-2-17 JR/TH

Well Type: [✓ Flush Mount] Stove pipe Is well cap sealed? [✓ YES] NO (explain in remarks)

Bolts: 2/2 Well O-ring? [✓ YES] NO Tabs Broken? YES(#____/____) [✓ NO]

General condition of Wellhead assembly: [✓ Excellent] Good Fair Poor (Explain in remarks)

Sample Type: 3 Casing Volumes ✓ Low Flow ________

Sample Method: Submersible [✓ Bladder Pump] Peristaltic Pump Watera

Sampled with: Disposable bailer ________ From Pump tubing ✓

Well diameter:	1" ✓	2" ____	4" ____	6" ____	8" ____	
Purge Vol. Multiplier:	0.04	0.163	0.653	1.47	2.61	gal/ft.

Initial Measurement

Time: 0747

Depth of well: 9.83

Depth to water: 7.59

Recharge Measurement

Time: ________

Depth to water: ________

80% recharge depth: ________

Purge Volume

Calculated: 0.27

Actual: ________

WC = 2.24
x0.04
x3
0.268

Discharge (sec): ________ Recharge (sec): ________ Pressure (psi): ________

Time	Temp (C)	E.C. (µS)	pH	ORP	Turb (NTU)	DO	DTW (FT BTOC)	Flow Rate (LPM)	Vol. (Liters)
0810	Start								
0812	20.3	408	6.94				Below top of pump		
0817	21.6	366	7.09						
0821	21.2	367	7.31						
0822	22.0	365	7.37						
0824	Sample								
0828	Free	Chlorine =	0.0						
0831	Total	Chlorine =	0.0						
0838							8.45		

Note pump set at 9.75 feet. Actual purge volume: 1 gal

Sample appearance: Clear

QC samples collected? YES [✓ NO] QC sample ID: ________ Time: ________

Remarks:
purged water until 0930 for vapor sample WL=9.10

Signature: ________ Review: ________

Flow rate: 0.1 – 0.5 L/min
Drawdown: <25% of well screen interval
pH: ±0.1 pH units
Conductivity: ±3% of reading

Dissolved Oxygen: ±10% of reading or 0.2 mg/L, whichever is greater
ORP: ±10mV
Turbidity: ±10% of prior reading or ±1.0 NTU, whichever is greater
Temperature: ±1°C

MONITORING WELL SAMPLING DATA SHEET

AECOM

-PW-

Client: USAF Project No: 60520471 Well Designation: 59-14-30

Site: Mather S59B Date: 11-1-17 JR/TH

Well Type: [✓ Flush Mount] Stove pipe Is well cap sealed? [✓ YES] NO (explain in remarks)

Bolts: 2 / 2 Well O-ring? [✓ YES] NO Tabs Broken? YES(#____/____) [✓ NO]

General condition of Wellhead assembly: [✓ Excellent] Good Fair Poor (Explain in remarks)

Sample Type: 3 Casing Volumes ✓ Low Flow ________

Sample Method: Submersible [✓ Bladder Pump] Peristaltic Pump Watera

Sampled with: Disposable bailer ________ From Pump tubing ✓

Well diameter:	1" ✓	2"	4"	6"	8"
Purge Vol. Multiplier:	0.04	0.163	0.653	1.47	2.61 gal/ft.

Initial Measurement

Time:

Depth of well: 31.77

Depth to water: 27.02

Recharge Measurement

Time:

Depth to water:

80% recharge depth:

Purge Volume

Calculated: 0.57

Actual:

WC 4.75 x .04 x3 0.57

Discharge (sec): Recharge (sec): Pressure (psi):

Time	Temp (C)	E.C. (µS)	pH	ORP	Turb (NTU)	DO	DTW (FT BTOC)	Flow Rate (LPM)	Vol. ~~(Liters)~~ gal
0903	Start						27.43		—
0908	20.5	575	6.84	—	—	—	29.02		0.25
0918	21.1	566	6.89	—	—	—	Below top of pump		0.5
0924	Sample per Kimiye								
0934	Free Chlorine (1min) 0.0 mg/L								
0939	Total " (3min) 0.0 mg/L								
1111	WL @ 30.25								

Note pump set at 31.5 feet. Actual purge volume: [illegible]

Sample appearance: Clear

QC samples collected? YES [✓ NO] QC sample ID: ________ Time: ________

Remarks:

WL @ 30.15 @ 1459

Signature: ________ Review: ________

Flow rate: 0.1 – 0.5 L/min
Drawdown: <25% of well screen interval
pH: ±0.1 pH units
Conductivity: ±3% of reading

Dissolved Oxygen: ±10% of reading or 0.2 mg/L, whichever is greater
ORP: ±10mV
Turbidity: ±10% of prior reading or ±1.0 NTU, whichever is greater
Temperature: ±1°C

MONITORING WELL SAMPLING DATA SHEET

AECOM

Client: USAF Project No: 60520471 Well Designation: 59-PW-14-60

Site: Medher S59B Date: 11-1-17 JR/TH

Well Type: [✓ Flush Mount] Stove pipe Is well cap sealed? [✓ YES] NO (explain in remarks)

Bolts: 2 / 2 Well O-ring? [✓ YES] NO Tabs Broken? YES(#____/____) [✓ NO]

General condition of Wellhead assembly: [✓ Excellent] Good Fair Poor (Explain in remarks)

Sample Type: 3 Casing Volumes ✓ Low Flow ________

Sample Method: Submersible [✓ Bladder Pump] Peristaltic Pump Watera

Sampled with: Disposable bailer ________ From Pump tubing ________

Well diameter:	1" ✓	2"	4"	6"	8"	
Purge Vol. Multiplier:	0.04	0.163	0.653	1.47	2.61	gal/ft.

Initial Measurement	Recharge Measurement	Purge Volume
Time:	Time:	Calculated: 0.57
Depth of well: 61.61	Depth to water:	Actual:
Depth to water: 56.86	80% recharge depth:	

Discharge (sec): ________ Recharge (sec): ________ Pressure (psi): ________

WC = 4.75
x.04
x3
0.57

Time	Temp (C)	E.C. (µS)	pH	ORP	Turb (NTU)	DO	DTW (FT BTOC)	Flow Rate (LPM)	Vol. (~~Liters~~) gal
1048	Start								
								0.10-0.15	
Not enough water to Collect parameters or all VOAS									
1105	Sampled one VOA								
	No chlorine								

Note pump set at 61.0 feet. Actual purge volume: ________

Sample appearance: Clear

QC samples collected? YES [✓ NO] QC sample ID: ________ Time: ________

Remarks:
WL@ 57.30 @ 1500

Signature: ________ Review: ________

Flow rate: 0.1 – 0.5 L/min
Drawdown: <25% of well screen interval
pH: ±0.1 pH units
Conductivity: ±3% of reading

Dissolved Oxygen: ±10% of reading or 0.2 mg/L, whichever is greater
ORP: ±10mV
Turbidity: ±10% of prior reading or ±1.0 NTU, whichever is greater
Temperature: ±1°C

MONITORING WELL SAMPLING DATA SHEET

AECOM

Client: USAF Project No: 60520471 Well Designation: 59-PW-15-08

Site: ~~59-PW-15-08~~ Mather S59B Date: 11-1-17 JR/TH

Well Type: Flush Mount Stove pipe Is well cap sealed? YES NO (explain in remarks)

Bolts: ____/____ Well O-ring? YES NO Tabs Broken? YES(#____/____) NO

General condition of Wellhead assembly: Excellent Good Fair Poor (Explain in remarks)

Sample Type: 3 Casing Volumes_________ Low Flow _________

Sample Method: Submersible Bladder Pump Peristaltic Pump Watera

Sampled with: Disposable bailer ___________ From Pump tubing ___________

Well diameter:	1"_____	2"_____	4"_____	6"_____	8"_____
Purge Vol. Multiplier:	0.04	0.163	0.653	1.47	2.61 gal/ft.

Initial Measurement	Recharge Measurement	Purge Volume
Time:__________	Time:__________	Calculated:__________
Depth of well:__________	Depth to water:__________	Actual:__________
Depth to water:__________	80% recharge depth:__________	

Discharge (sec): __________ Recharge (sec): __________ Pressure (psi): __________

Time	Temp (C)	E.C. (µS)	pH	ORP	Turb (NTU)	DO	DTW (FT BTOC)	Flow Rate (LPM)	Vol. (Liters)
N/A	see note								

Note pump set at ________feet. Actual purge volume:__________

Sample appearance:__________

QC samples collected? YES NO QC sample ID: __________ Time: __________

Remarks:

1245 0.37 water column, no sample needed

Signature:__________ Review:__________

Flow rate: 0.1 – 0.5 L/min
Drawdown: <25% of well screen interval
pH: ±0.1 pH units
Conductivity: ±3% of reading

Dissolved Oxygen: ±10% of reading or 0.2 mg/L, whichever is greater
ORP: ±10mV
Turbidity: ±10% of prior reading or ±1.0 NTU, whichever is greater
Temperature: ±1°C

MONITORING WELL SAMPLING DATA SHEET

AECOM

Client: USAF Project No: 60520471 Well Designation: 59-PW-16-08

Site: Mather Date: 11-1-17 JR/TH

Well Type: [✓ Flush Mount] Stove pipe Is well cap sealed? [✓ YES] NO (explain in remarks)

Bolts: 2/2 Well O-ring? [✓ YES] NO Tabs Broken? YES(#___/___) [✓ NO]

General condition of Wellhead assembly: [✓ Excellent] Good Fair Poor (Explain in remarks)

Sample Type: 3 Casing Volumes ✓ Low Flow _____

Sample Method: Submersible [✓ Bladder Pump] Peristaltic Pump Watera

Sampled with: Disposable bailer _____ From Pump tubing ✓

Well diameter:	1" ✓	2"	4"	6"	8"
Purge Vol. Multiplier:	0.04	0.163	0.653	1.47	2.61 gal/ft.

Initial Measurement

Time: _____

Depth of well: 9.66

Depth to water: 7.30

Recharge Measurement

Time: _____

Depth to water: _____

80% recharge depth: _____

Purge Volume

Calculated: 0.28

Actual: _____

0.28gal

WC = 2.36

Discharge (sec): _____ Recharge (sec): _____ Pressure (psi): _____

Time	Temp (C)	E.C. (µS)	pH	ORP	Turb (NTU)	DO	DTW (FT BTOC)	Flow Rate (LPM)	Vol. ~~(Liters)~~ gal
1305	Start						Below top of pump		
1306	27.0	697	7.11						
1308	26.7	627	7.39						
1309	26.7	622	7.50						0.25
1310	26.6	619	7.51						
1311	Sample								
1312	Chlorine Free =			0.0					
1315	Chlorine Total =			0.0					

Note pump set at 9.5 feet. Actual purge volume: _____

Sample appearance: Clear

QC samples collected? YES [✓ NO] QC sample ID: _____ Time: _____

Remarks:

Signature: _____ Review: _____

Flow rate: 0.1 – 0.5 L/min
Drawdown: <25% of well screen interval
pH: ±0.1 pH units
Conductivity: ±3% of reading

Dissolved Oxygen: ±10% of reading or 0.2 mg/L, whichever is greater
ORP: ±10mV
Turbidity: ±10% of prior reading or ±1.0 NTU, whichever is greater
Temperature: ±1°C

MONITORING WELL SAMPLING DATA SHEET

AECOM

Client: USAF Project No: ______ Well Designation: 59-PW-17-60

Site: Mather S59B Date: 11-2-17 JR/TH

Well Type: [✓ Flush Mount] Stove pipe Is well cap sealed? [✓ YES] NO (explain in remarks)

Bolts: 2/2 Well O-ring? [✓ YES] NO Tabs Broken? YES(#___/___) [✓ NO]

General condition of Wellhead assembly: [✓ Excellent] Good Fair Poor (Explain in remarks)

Sample Type: 3 Casing Volumes ✓ Low Flow ______

Sample Method: Submersible [✓ Bladder Pump] Peristaltic Pump Watera

Sampled with: Disposable bailer ______ From Pump tubing ✓

Well diameter:	1” ✓	2”___	4”___	6”___	8”___
Purge Vol. Multiplier:	0.04	0.163	0.653	1.47	2.61 gal/ft.

Initial Measurement

Time: ______

Depth of well: 61.65

Depth to water: 60.~~32~~41

Recharge Measurement

Time: ______

Depth to water: ______

80% recharge depth: ______

Purge Volume

Calculated: 0.15

Actual: ______

Discharge (sec): ______ Recharge (sec): ______ Pressure (psi): ______

WC = 1.24
x 0.04
x 3
0.15

Time	Temp (C)	E.C. (µS)	pH	ORP	Turb (NTU)	DO	DTW (FT BTOC)	Flow Rate (LPM)	Vol. (Liters)
1131	Start						Below top of pump		
1152	18.2	550	6.93						
1158	18.3	531	7.07						
1205	18.4	525	7.15						
1209	18.7	523	7.12						
1211	Sample - only sampled 2 VOAs Not enough water								
	WL @ 60.62								

Note pump set at 61.5 feet. Actual purge volume: ______

Sample appearance: Clear

QC samples collected? YES [✓ NO] QC sample ID: ______ Time: ______

Remarks:

Signature: ______ Review: ______

Flow rate: 0.1 – 0.5 L/min
Drawdown: <25% of well screen interval
pH: ±0.1 pH units
Conductivity: ±3% of reading

Dissolved Oxygen: ±10% of reading or 0.2 mg/L, whichever is greater
ORP: ±10mV
Turbidity: ±10% of prior reading or ±1.0 NTU, whichever is greater
Temperature: ±1°C

Waste Disposal Receipts

Daily Transportation & Disposal Time Ticket

PONDER ENVIRONMENTAL SERVICES, INC.
P.O. Box 1427, Benicia, CA 94510 / 707-748-7775 (Office) / 707-748-7776 (Fax)

WORK ORDER - D #: 08968

For Internal Use Only
Prevailing Wage: Yes / No
6206 (Vacuum Trucks)
7515 (General Maintenance)
9403 (Roll-Off Bins)

CUSTOMER: URS Corp

SITE ADDRESS: Mathew A.F.B

JOB NO: 17·16025

DATE: 3/15/17

DAY: Mon. / Tue. / [✓ Wed.] / Thur. / Fri. / Sat. / Sun.

CUSTOMER P.O.:

CONTACT: Kim

PHONE #:

CUSTOMER APPROVAL:

JOB DESCRIPTION: Roll/Off Bin # 1711

COMMENTS: To disposal / Potreo L/F Soil

SERVICE PROFESSIONALS - LAST / FIRST NAME	CLASS	START / END	1st MEAL TIME OUT / IN	2nd MEAL TIME OUT / IN	S/T	O/T	P/T
Quinn, Melvin	Dvr	0530 -	0900-0930				

EQUIPMENT

DESCRIPTION	EQUIP / TRL #	DESCRIPTION	QTY	HRS / UM
PICKUP		MANIFEST		Each
GEAR TRUCK		2" VAC HOSE		Each
5 TON STAKE BED		3" VAC HOSE		Each
50 BBL VAC		4" VAC HOSE		Each
70 BBL VAC		GAS MTR (4 GAS)		Daily
120 BBL VAC		BENZENE METER		Daily
VACTOR		GAS MTR (FID)		Daily
HYDRO EX.		HARNESS		Daily
BOOM TRUCK		CONTAINMENT (25 ft)		Daily
48' DRY VAN		CONTAINMENT (50 ft)		Daily
LOW BOY		55 GAL DM PLY CT		Each
ROLL OFF (S / [✓ D])	120/244	55 GAL DRM PLY OT		Each
BIN LINER		55 GAL DRM STL CT		Each
8 YRD BIN		55 GAL DRM STL OT		Each
20 YRD BIN		85 GAL SALV DRM		Each
40 YRD BIN		CUBIC YARD BOX		Each
TANK 8.5				

SUPPLIES

DESCRIPTION	QTY	HRS / UM	DESCRIPTION	QTY	HRS / UM
5 GAL BUCKETS		Each			
ABS. (Kitty Litter)		Each			
ABSOR. PADS		BDL			
ABSOR. BOOM		Each			
RESPIRATOR		Daily			
CARTRIDGES (DF)		Set			
CARTRIDGES (OV)		Set			
DEGREASER JPX		Gallons			
DRUM LINERS		Each			
DUCT TAPE		Each			
GLOVES (CUT)		Pair			
GLOVES (Leather)		Pair			
GLOVES (Impact)		Pair			
GLOVES (PVC)		Pair			
RAGS		LBS / BDL	**MISCELLANEOUS:**		
RAIN SUITS (FRC)		Each	BRIDGE TOLL (2 AXLE)		
TRAIN MAT 8'		Each	BRIDGE TOLL (3 AXLE)		
TYVEK (FRC)		Each	BRIDGE TOLL (4 AXLE)		
TYVEK (Poly)		Each	BRIDGE TOLL (5 AXLE)		
TYVEK (White)		Each	PER DIEM (S / H)		
VISQUEEN (6 ML)		Roll	FUEL (DIESEL)		Gallons
VISQUEEN (10 ML)		Roll	FUEL (GASOLINE)		Gallons

DISPOSAL / SUBCONTRACTORS

VENDOR	P.O. #	MANIFEST # / BOL #

WHITE - OFFICE COPY

Ref. No: G 613412755

PINK - CUSTOMER COPY

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number: CA8570024143
2. Page 1 of: 1
3. Emergency Response Phone: (877) 256-6265
4. Waste Tracking Number: 17-16025-001

5. Generator's Name and Mailing Address
AFCEC/CIBW
3411 Olson St
McClellan, CA 95652
Generator's Phone: (916) 643-1250

Generator's Site Address (if different than mailing address)
10360 Macready Ave
Mather, CA 95655

6. Transporter 1 Company Name: Ponder Environmental Services Inc
U.S. EPA ID Number: CAR000180737

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
Potrero Hills Landfill
3675 Potrero Hills Ln
Suisun City, CA 94585
Facility's Phone: (707) 432-4627
U.S. EPA ID Number: CAR000089488

GENERATOR

9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.
1. Non-Hazardous waste, solid (drill cuttings)	001	CM	15	Y
2.				
3.				
4.				

13. Special Handling Instructions and Additional Information

Profile #PHLF-17-204
PO #737242
Job #17-16025
Bin #1711
Truck # [illegible]

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Joe Anderson (on behalf of Generator)
Signature: J. Anderson
Month: 02 Day: 15 Year:

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S.
Port of entry/exit:
Transporter Signature (for exports only):
Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: [illegible]
Signature:
Month: Day: Year:
Transporter 2 Printed/Typed Name:
Signature:
Month: Day: Year:

DESIGNATED FACILITY

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:
17c. Signature of Alternate Facility (or Generator)
Month: Day: Year:

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name:
Signature:
Month: Day: Year:

169-BLC-O 5 11977 (Rev. 9/09)

GENERATOR'S/SHIPPER'S INITIAL COPY

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number: CA8570024143

2. Page 1 of: 1

3. Emergency Response Phone: (877) 256-6265

4. Waste Tracking Number: 17-16025-001

5. Generator's Name and Mailing Address:
AFCEC/CIBW
3411 Olson St
McClellan, CA 95652

Generator's Phone: (916) 643-1250

Generator's Site Address (if different than mailing address):
10360 Macready Ave
Mather, CA 95655

6. Transporter 1 Company Name: Ponder Environmental Services Inc
U.S. EPA ID Number: CAR000180737

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address:
Potrero Hills Landfill
3675 Potrero Hills Ln
Suisun City, CA 94585

Facility's Phone: (707) 432-4627

U.S. EPA ID Number: CAR000089466

9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.
1. Non-Hazardous waste, solid (drill cuttings)	001	CM	15	Y
2.				
3.				
4.				

13. Special Handling Instructions and Additional Information

Profile #PHLF-17-204
PO #737242
Job #17-16025

Bin #1711
Truck #120/246

14. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Joe Anderson (on behalf of Generator)
Signature: J. Anderson
Month 03 Day 15 Year 17

15. International Shipments ☐ Import to U.S. ☐ Export from U.S.
Port of entry/exit:
Transporter Signature (for exports only):
Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Melvin Dunn
Signature:
Month 03 Day 15 Year 17

Transporter 2 Printed/Typed Name:
Signature:
Month Day Year

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name
Signature
Month Day Year

GENERATOR
INT'L
TRANSPORTER
DESIGNATED FACILITY

169-BLC-O 5 11977 (Rev. 9/09)

DESIGNATED FACILITY TO GENERATOR

2043265
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APPENDIX C

Lithologic and Well Construction Logs

59-PW-14
59-PW-15
59-PW-16
59-PW-17

59-SS-01
59-SS-02
59-SS-03
59-SS-04

Project: **Mather Bldg 4260**

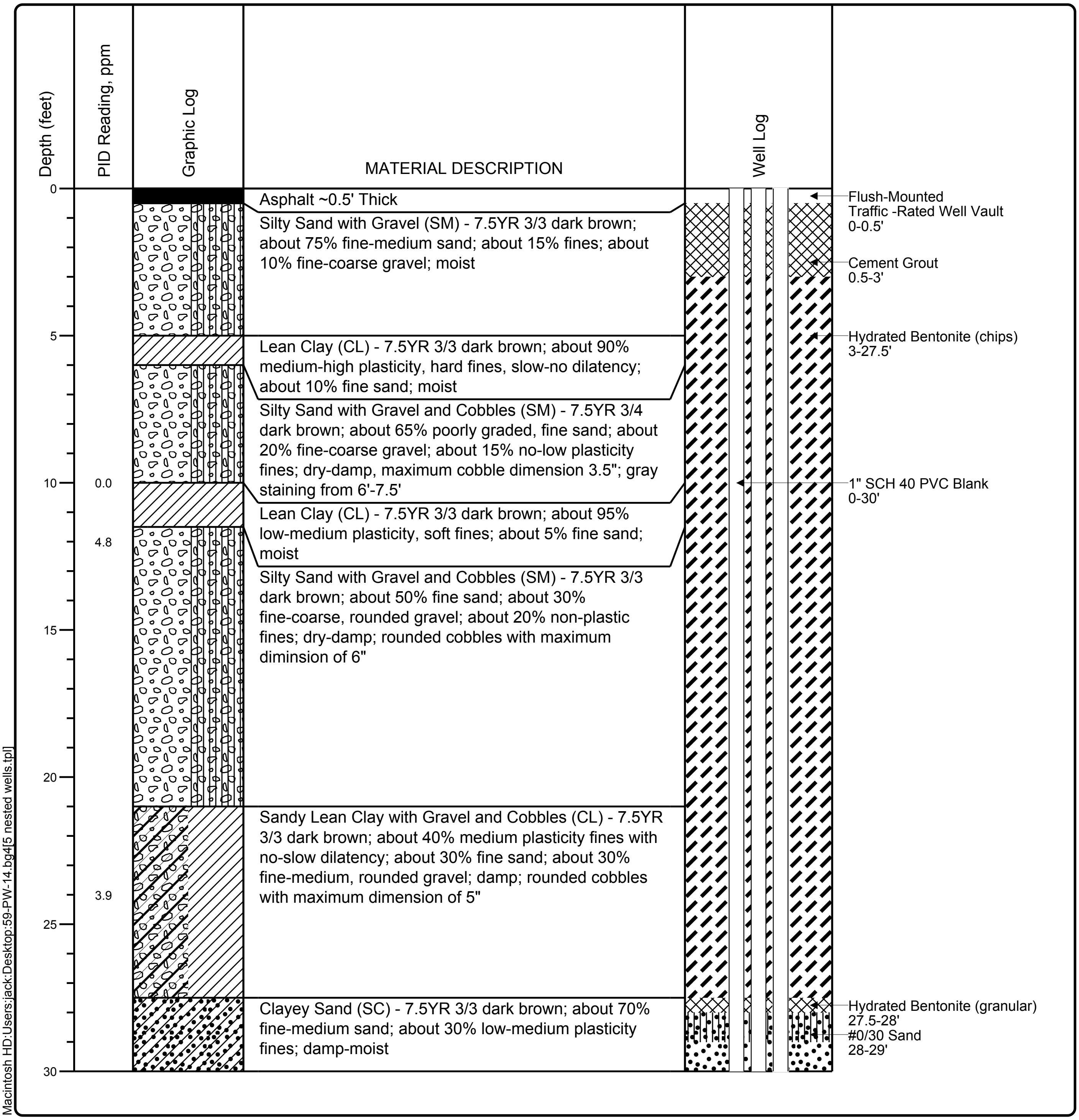
Project Location: **Adjacent to Mather Aviation, LLC - Building 4260**

Project Number: **60520471**

Log of Boring 59-PW-14

Sheet 1 of 3

Date(s) Drilled **2/1/17-2/2/17**	Logged By **Jack Rayl**	Checked By **Don Bransford**
Drilling Method **Sonic**	Drill Bit Size/Type **12" Core**	Total Depth of Borehole **84.5'**
Drill Rig Type **FE6S56**	Drilling Contractor **Gregg Drilling & Testing, Inc.**	Approximate Surface Elevation
Groundwater Level and Date Measured **N/A**	Sampling Method(s) **N/A**	Hammer Data **N/A**
Borehole Backfill **See Well Log**	Location **Approximately 25' Southeast of Building 4260**	



Asphalt ~0.5' Thick

Silty Sand with Gravel (SM) - 7.5YR 3/3 dark brown; about 75% fine-medium sand; about 15% fines; about 10% fine-coarse gravel; moist

Lean Clay (CL) - 7.5YR 3/3 dark brown; about 90% medium-high plasticity, hard fines, slow-no dilatency; about 10% fine sand; moist

Silty Sand with Gravel and Cobbles (SM) - 7.5YR 3/4 dark brown; about 65% poorly graded, fine sand; about 20% fine-coarse gravel; about 15% no-low plasticity fines; dry-damp, maximum cobble dimension 3.5"; gray staining from 6'-7.5'

Lean Clay (CL) - 7.5YR 3/3 dark brown; about 95% low-medium plasticity, soft fines; about 5% fine sand; moist

Silty Sand with Gravel and Cobbles (SM) - 7.5YR 3/3 dark brown; about 50% fine sand; about 30% fine-coarse, rounded gravel; about 20% non-plastic fines; dry-damp; rounded cobbles with maximum diminsion of 6"

Sandy Lean Clay with Gravel and Cobbles (CL) - 7.5YR 3/3 dark brown; about 40% medium plasticity fines with no-slow dilatency; about 30% fine sand; about 30% fine-medium, rounded gravel; damp; rounded cobbles with maximum dimension of 5"

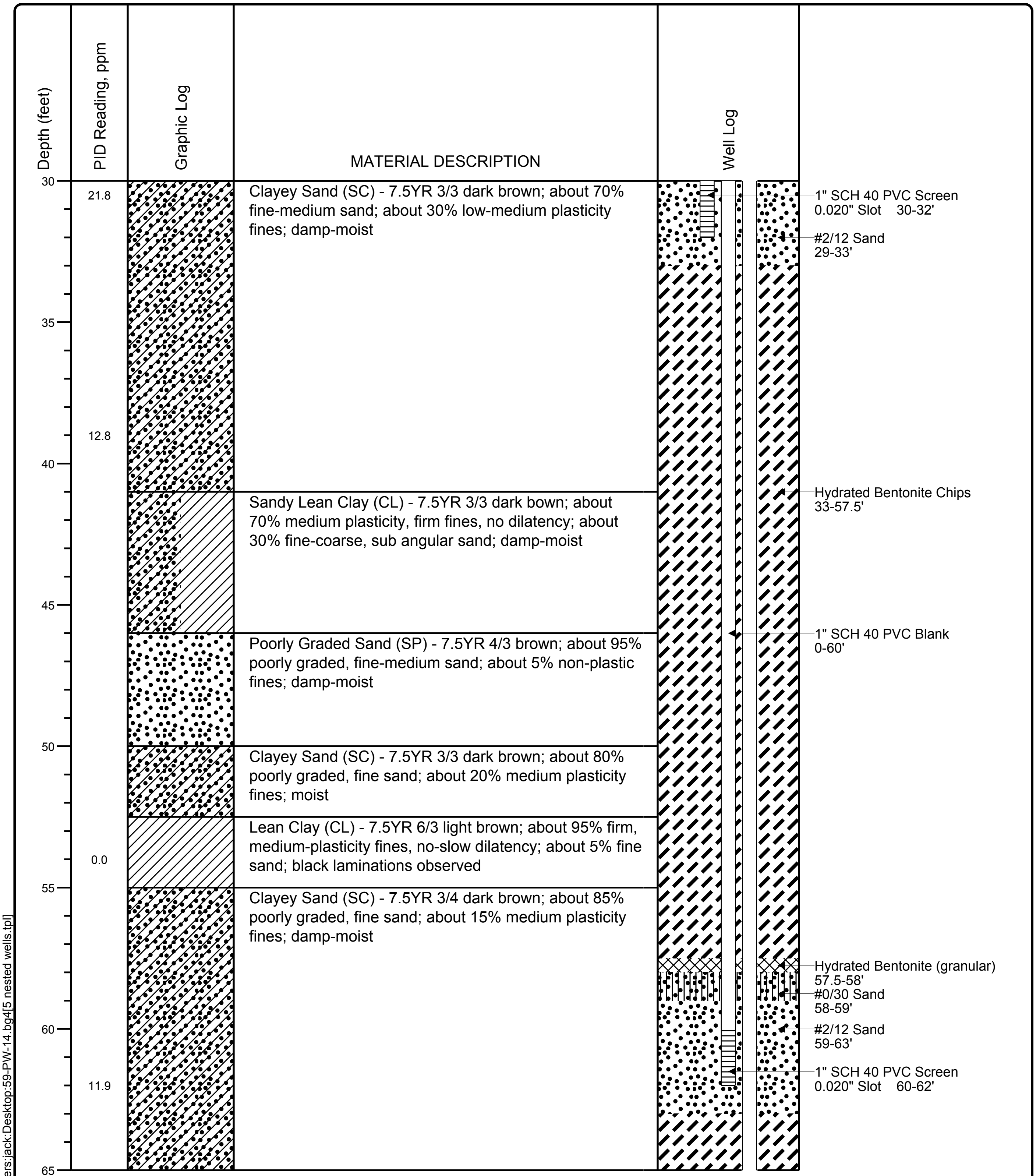
Clayey Sand (SC) - 7.5YR 3/3 dark brown; about 70% fine-medium sand; about 30% low-medium plasticity fines; damp-moist

Macintosh HD:Users:jack:Desktop:59-PW-14.bg4[5 nested wells.tpl]

Project: **Mather Bldg 4260**
Project Location: **Adjacent to Mather Aviation, LLC - Building 4260**
Project Number: **60520471**

Log of Boring 59-PW-14

Sheet 2 of 3



Clayey Sand (SC) - 7.5YR 3/3 dark brown; about 70% fine-medium sand; about 30% low-medium plasticity fines; damp-moist

Sandy Lean Clay (CL) - 7.5YR 3/3 dark bown; about 70% medium plasticity, firm fines, no dilatency; about 30% fine-coarse, sub angular sand; damp-moist

Poorly Graded Sand (SP) - 7.5YR 4/3 brown; about 95% poorly graded, fine-medium sand; about 5% non-plastic fines; damp-moist

Clayey Sand (SC) - 7.5YR 3/3 dark brown; about 80% poorly graded, fine sand; about 20% medium plasticity fines; moist

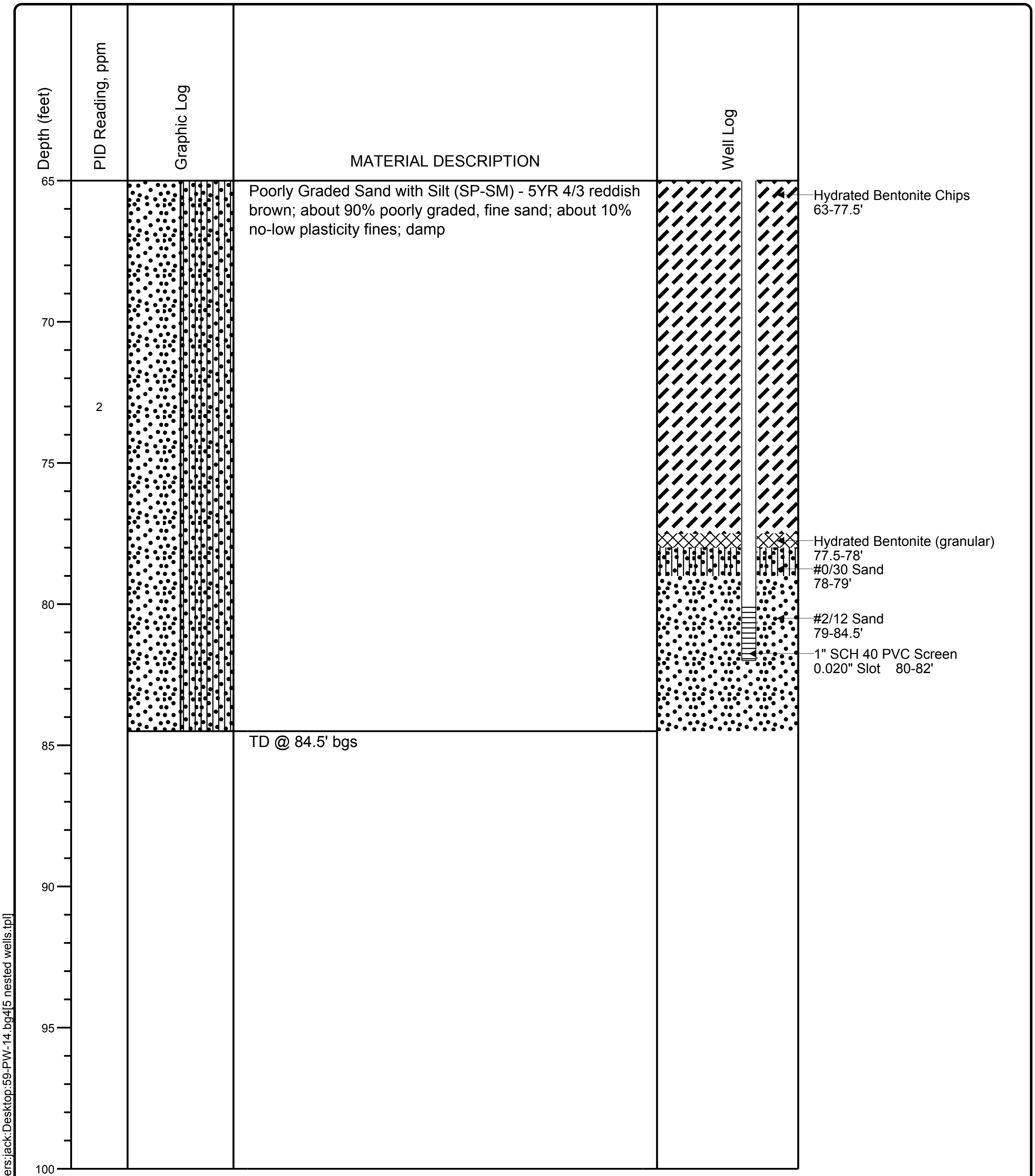
Lean Clay (CL) - 7.5YR 6/3 light brown; about 95% firm, medium-plasticity fines, no-slow dilatency; about 5% fine sand; black laminations observed

Clayey Sand (SC) - 7.5YR 3/4 dark brown; about 85% poorly graded, fine sand; about 15% medium plasticity fines; damp-moist

Project: **Mather Bldg 4260**
Project Location: **Adjacent to Mather Aviation, LLC - Building 4260**
Project Number: **60520471**

Log of Boring 59-PW-14

Sheet 3 of 3



Poorly Graded Sand with Silt (SP-SM) - 5YR 4/3 reddish brown; about 90% poorly graded, fine sand; about 10% no-low plasticity fines; damp

TD @ 84.5' bgs

Macintosh HD:Users:jack:Desktop:59-PW-14.bg4[5 nested wells.tpl]

Project: **Mather Bldg 4260**

Project Location: **Adjacent to Mather Aviation, LLC - Building 4260**

Project Number: **60520471**

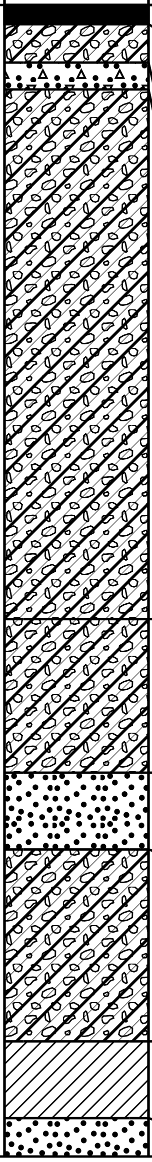
Log of Boring 59-PW-15

Sheet 1 of 3

Date(s) Drilled **1/30/17-1/31/17**	Logged By **Jack Rayl**	Checked By **Don Bransford**
Drilling Method **Sonic**	Drill Bit Size/Type **12" Core**	Total Depth of Borehole **83.5'**
Drill Rig Type **FE6S56**	Drilling Contractor **Gregg Drilling & Testing, Inc.**	Approximate Surface Elevation
Groundwater Level and Date Measured **N/A**	Sampling Method(s) **N/A**	Hammer Data **N/A**
Borehole Backfill **See Well Log**	Location **Approximately 140' South-Southeast of building 4260**	

Depth (feet)	PID Reading, ppm
0	
5	
10	
15	
20	1.2
25	
30	

Graphic Log



MATERIAL DESCRIPTION

Asphalt ~0.5' Thick

Clayey Gravel with Sand (GC) - 10YR 4/2 dark grayish brown; about 50% fine-coarse, sub-round gravel; about 30% medium plasticity fines; about 20% poorly graded, fine-medium sand; moist; silty sand interebeds

Concrete ~7-8" Thick

Clayey Gravel with Sand (GC) - 10YR 4/2 dark grayish brown; about 50% fine-coarse, sub-round gravel; about 30% medium plasticity fines; about 20% poorly graded, fine-medium sand; moist; silty sand interebeds ~1-3" thick

Clayey Gravel with Sand and Cobbles (GC) - 10YR 4/2 dark grayish brown; about 50% fine-coarse, sub-round gravel; about 30% fine-medium, poorly graded sand; about 20% medium plasticity fines; damp, sub-round cobbles with maximum dimension of 4"

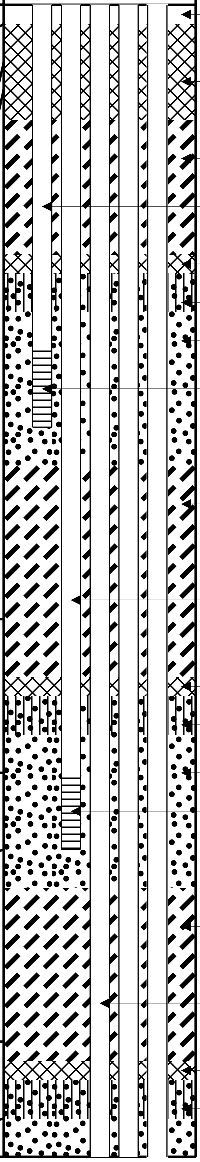
Poorly Graded Sand (SP) - 10YR 4/3 brown; about 90% fine-medium, poorly graded sand; about 10% fine-coarse, sub-round gravel; moist

Clayey Gravel with Sand and Cobbles (GC) - 10YR 4/2 dark grayish brown; about 50% fine-coarse, sub-round gravel; about 30% poorly graded, fine-medium sand; about 20% medium plasticity fines; damp, sub-round cobbles with maximum deminsion of 4"

Lean Clay (CL) - 10YR 5/4, yellowish brown; about 95% medium plasticity, firm fines; about 5% poorly graded, fine sand; 10YR 5/4, yellowish brown

Poorly Graded Sand (SP) - 10YR 5/4, yellowish brown;

Well Log



Flush-Mount Traffic-Rated Well Vault 0-0.5'

Cement Grout 0.5-3'

Hydrated Bentonite (chips) 3-6.5'

1" SCH 40 PVC Blank 0-9'

Hydrated Bentonite (granular) 6.5-7'

#0/30 Sand 7-8'

#2/12 Sand 8-12'

1" SCH 40 PVC Screen 0.020" Slot 9-11'

Hydrated Bentonite (chips) 12-17.5'

1" SCH 40 PVC Blank 0-20'

Hydrated Bentonite (granular) 17.5-18'

#0/30 Sand 18-19'

#2/12 Sand 19-23'

1" SCH 40 PVC Screen 0.020" Slot 20-22'

Hydrated Bentonite (chips) 23-27.5'

1" SCH 40 PVC Blank 0-30'

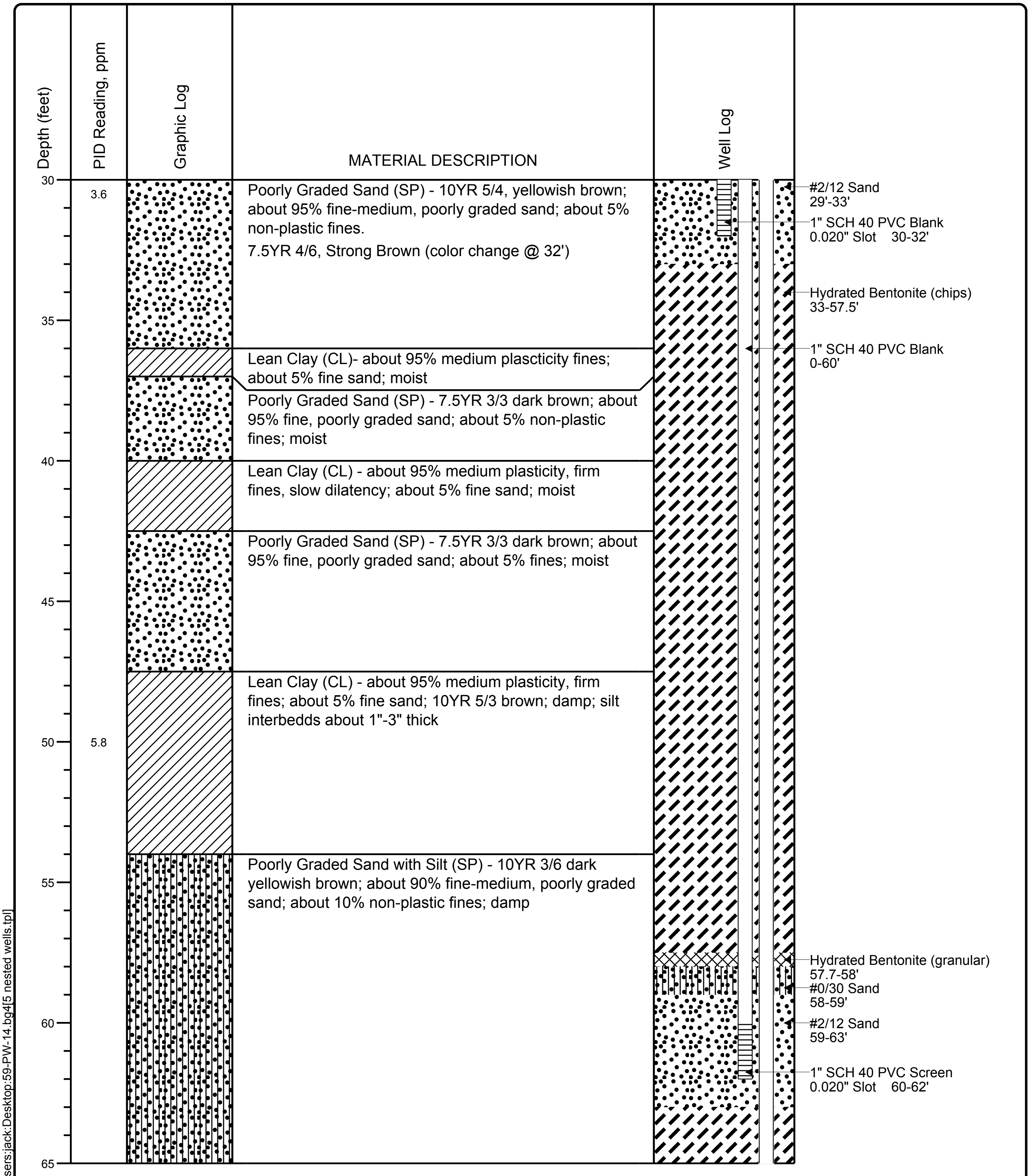
Hydrated Bentonite (graunular) 27.5-28'

#0/30 Sand 28-29'

Project: **Mather Bldg 4260**
Project Location: **Adjacent to Mather Aviation, LLC - Building 4260**
Project Number: **60520471**

Log of Boring 59-PW-15

Sheet 2 of 3



Poorly Graded Sand (SP) - 10YR 5/4, yellowish brown; about 95% fine-medium, poorly graded sand; about 5% non-plastic fines.

7.5YR 4/6, Strong Brown (color change @ 32')

Lean Clay (CL)- about 95% medium plascticity fines; about 5% fine sand; moist

Poorly Graded Sand (SP) - 7.5YR 3/3 dark brown; about 95% fine, poorly graded sand; about 5% non-plastic fines; moist

Lean Clay (CL) - about 95% medium plasticity, firm fines, slow dilatency; about 5% fine sand; moist

Poorly Graded Sand (SP) - 7.5YR 3/3 dark brown; about 95% fine, poorly graded sand; about 5% fines; moist

Lean Clay (CL) - about 95% medium plasticity, firm fines; about 5% fine sand; 10YR 5/3 brown; damp; silt interbedds about 1"-3" thick

Poorly Graded Sand with Silt (SP) - 10YR 3/6 dark yellowish brown; about 90% fine-medium, poorly graded sand; about 10% non-plastic fines; damp

Macintosh HD:Users:jack:Desktop:59-PW-14.bg4[5 nested wells.tpl]

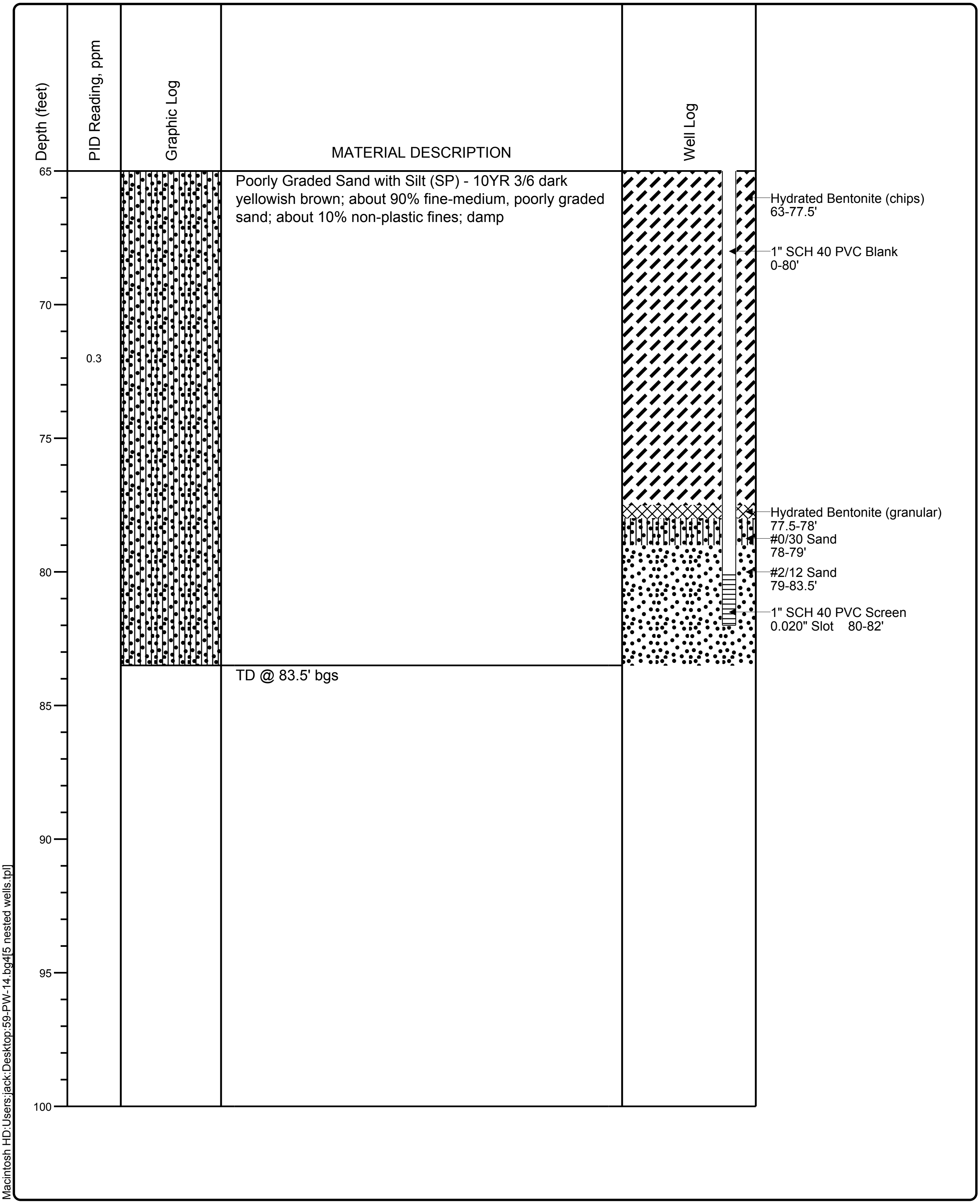
Project: **Mather Bldg 4260**

Project Location: **Adjacent to Mather Aviation, LLC - Building 4260**

Project Number: **60520471**

Log of Boring 59-PW-15

Sheet 3 of 3



Poorly Graded Sand with Silt (SP) - 10YR 3/6 dark yellowish brown; about 90% fine-medium, poorly graded sand; about 10% non-plastic fines; damp

TD @ 83.5' bgs

Project: **Mather Bldg 4260**

Project Location: **Adjacent to Mather Aviation, LLC - Building 4260**

Project Number: **60520471**

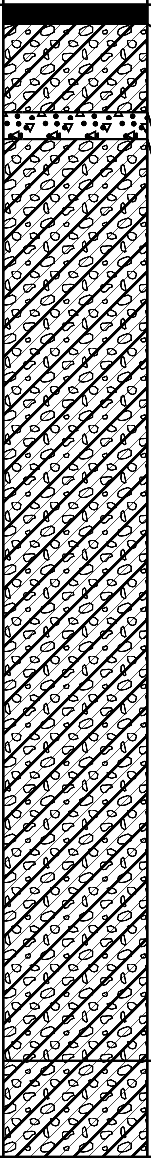
Log of Boring 59-PW-16

Sheet 1 of 3

Date(s) Drilled **1/31/17-2/1/17**	Logged By **Jack Rayl**	Checked By **Don Bransford**
Drilling Method **Sonic**	Drill Bit Size/Type **12" Core**	Total Depth of Borehole **83.5'**
Drill Rig Type **FE6S56**	Drilling Contractor **Gregg Drilling & Testing, Inc.**	Approximate Surface Elevation
Groundwater Level and Date Measured **N/A**	Sampling Method(s) **N/A**	Hammer Data **N/A**
Borehole Backfill **See Well Log**	Location **Approximately 90' East-Southeast of Building 4260**	

Depth (feet)	PID Reading, ppm
0	
5	
10	1.9
15	
20	0.6
25	
30	

Graphic Log



MATERIAL DESCRIPTION

Asphalt ~0.5'

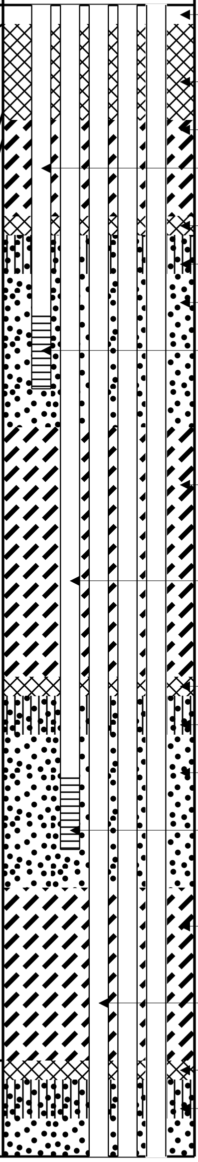
Clayey Gravel with Sand and Cobbles (GC) - 5YR 4/3 reddish brown; about 60% fine-coarse, sub-round gravel; about 25% poorly graded, fine sand; about 15% low-medium plasticity, soft fines; saturated; Sub-round cobbles with maximum dimension of 8"

Concrete ~7-8" Thick

Poorly Graded Sand with Clay and Gravel (SP-SC) - 5YR 4/3 reddish brown; about 50% poorly graded, fine sand, about 40% fine-coarse, sub-round gravel; about 10% low-medium plasticity fines; moist

Poorly Graded Sand with Clay, Gravel and Cobbles (SP-SC) - 7.5YR 3/3 dark brown; about 60% fine-medium sand; about 30% medium-coarse, sub-round gravel; about 10% medium plasticity fines; moist; sub-round cobbles with maximum dimension of 5"

Well Log



Flush-Mounted Traffic-Rated Well Vault
0-0.5'

Cement Grout
0.5-3'

Hydrated Bentonite (chips)
3-5.5'

1" SCH 40 PVC Blank
0-8'

Hydrated Bentonite (granular)
5.5-6'

#0/30 Sand
6-7'

#2/12 Sand
7-11'

1" SCH 40 PVC Screen
0.020" Slot 8-10'

Hydrated Bentonite (chips)
11-17.5'

1" SCH 40 PVC Blank
0-20'

Hydrated Bentonite (granular)
17.5-18'

#0/30 Sand
18-19'

#2/12 Sand
19-23'

1" SCH 40 PVC Screen
0.020" Slot 20-22'

Hydrated Bentonite (chips)
23-27.5'

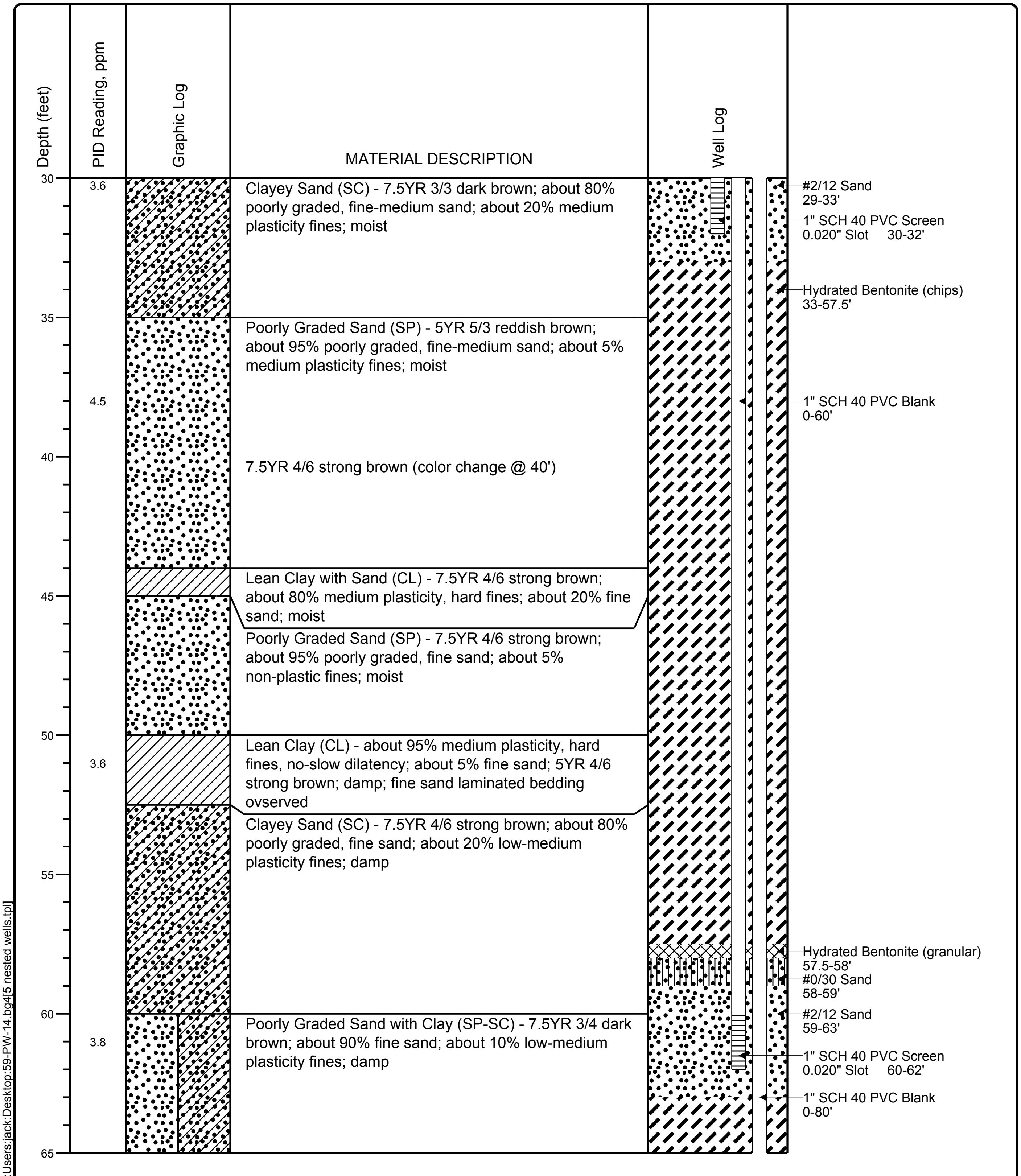
1" SCH 40 PVC Blank
0-30'

Hydrated Bentonite (granular)
27.5-28'

#0/30 Sand
28-29'

Project: **Mather Bldg 4260**
Project Location: **Adjacent to Mather Aviation, LLC - Building 4260**
Project Number: **60520471**

Log of Boring 59-PW-16
Sheet 2 of 3



Clayey Sand (SC) - 7.5YR 3/3 dark brown; about 80% poorly graded, fine-medium sand; about 20% medium plasticity fines; moist

Poorly Graded Sand (SP) - 5YR 5/3 reddish brown; about 95% poorly graded, fine-medium sand; about 5% medium plasticity fines; moist

7.5YR 4/6 strong brown (color change @ 40')

Lean Clay with Sand (CL) - 7.5YR 4/6 strong brown; about 80% medium plasticity, hard fines; about 20% fine sand; moist

Poorly Graded Sand (SP) - 7.5YR 4/6 strong brown; about 95% poorly graded, fine sand; about 5% non-plastic fines; moist

Lean Clay (CL) - about 95% medium plasticity, hard fines, no-slow dilatency; about 5% fine sand; 5YR 4/6 strong brown; damp; fine sand laminated bedding ovserved

Clayey Sand (SC) - 7.5YR 4/6 strong brown; about 80% poorly graded, fine sand; about 20% low-medium plasticity fines; damp

Poorly Graded Sand with Clay (SP-SC) - 7.5YR 3/4 dark brown; about 90% fine sand; about 10% low-medium plasticity fines; damp

Macintosh HD:Users:jack:Desktop:59-PW-14.bg4[5 nested wells.tpl]

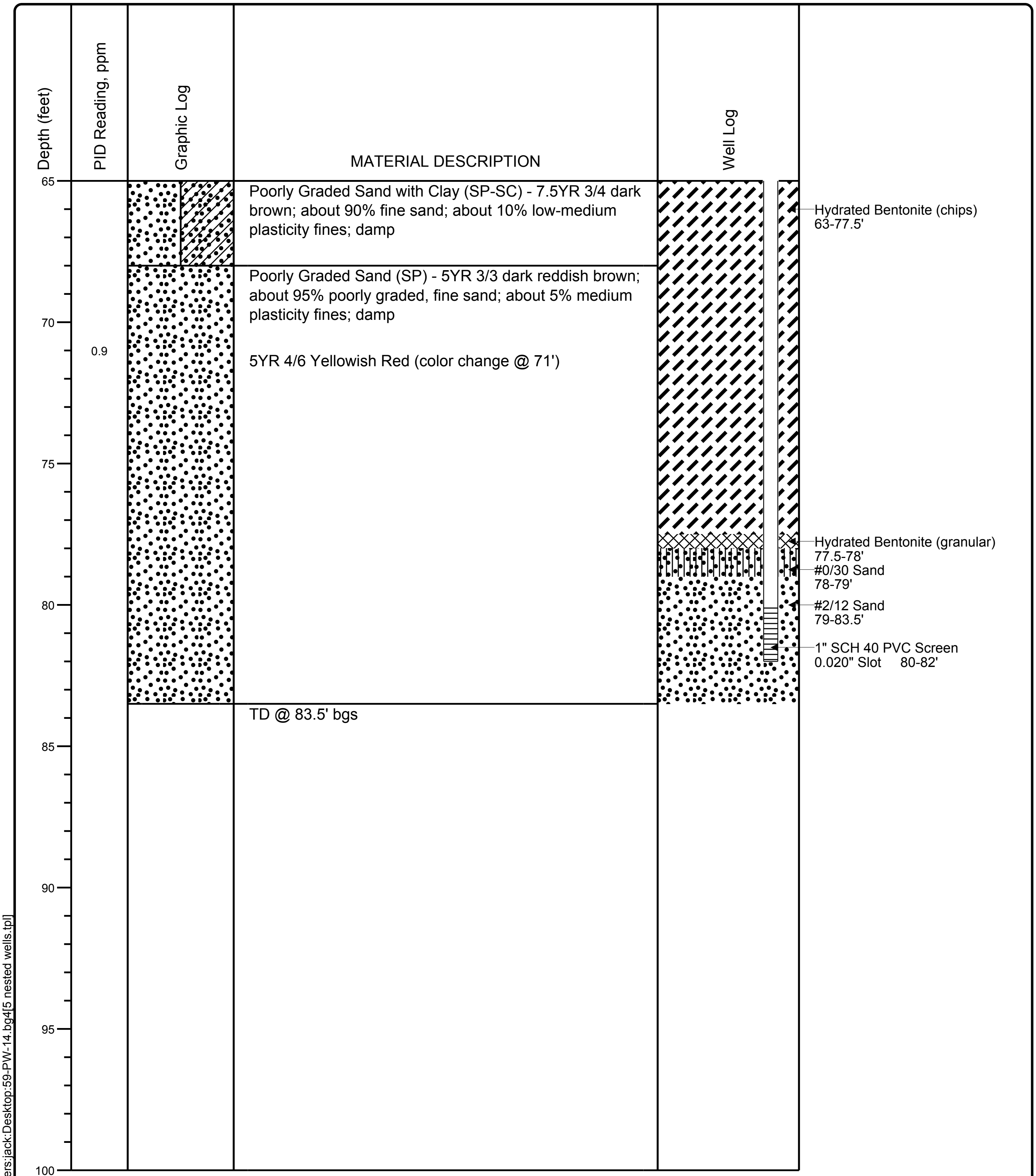
Project: **Mather Bldg 4260**

Project Location: **Adjacent to Mather Aviation, LLC - Building 4260**

Project Number: **60520471**

Log of Boring 59-PW-16

Sheet 3 of 3



Poorly Graded Sand with Clay (SP-SC) - 7.5YR 3/4 dark brown; about 90% fine sand; about 10% low-medium plasticity fines; damp

Poorly Graded Sand (SP) - 5YR 3/3 dark reddish brown; about 95% poorly graded, fine sand; about 5% medium plasticity fines; damp

5YR 4/6 Yellowish Red (color change @ 71')

TD @ 83.5' bgs

Hydrated Bentonite (chips)
63-77.5'

Hydrated Bentonite (granular)
77.5-78'

#0/30 Sand
78-79'

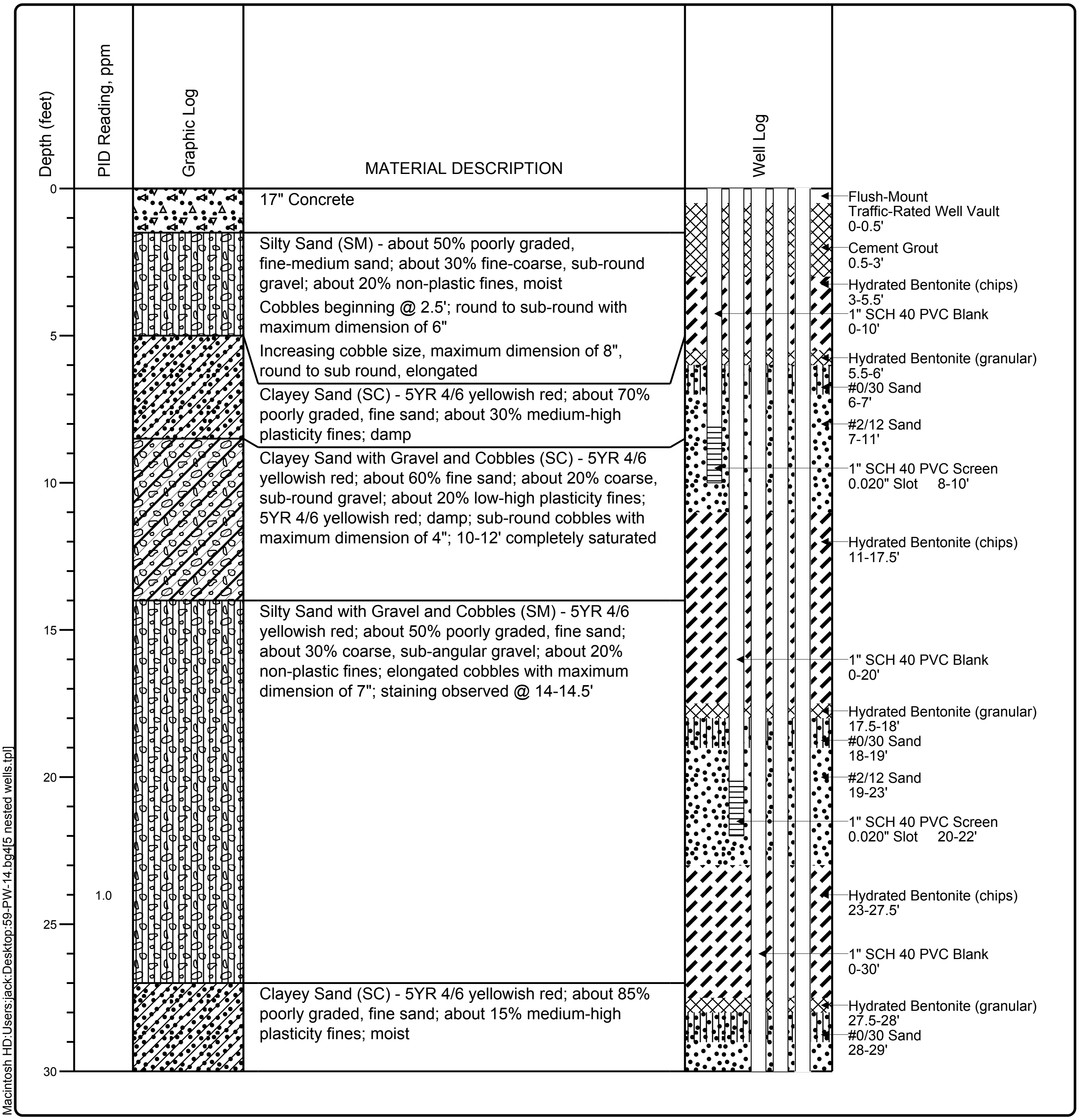
#2/12 Sand
79-83.5'

1" SCH 40 PVC Screen
0.020" Slot 80-82'

Project: **Mather Bldg 4260**
Project Location: **Adjacent to Mather Aviation, LLC - Building 4260 Aviation**
Project Number: **60520471**

Log of Boring 59-PW-17
Sheet 1 of 3

Date(s) Drilled **2/4/17**	Logged By **Jack Rayl**	Checked By **Don Bransford**
Drilling Method **Sonic**	Drill Bit Size/Type **12" Core**	Total Depth of Borehole **83.5'**
Drill Rig Type **FE6S56**	Drilling Contractor **Gregg Drilling & Testing, Inc.**	Approximate Surface Elevation
Groundwater Level and Date Measured **N/A**	Sampling Method(s) **N/A**	Hammer Data **N/A**
Borehole Backfill **See Well Log**	Location **Inside Hanger (building 4260), Approximately 40' From Eastern Hanger Doors**	



17" Concrete

Silty Sand (SM) - about 50% poorly graded, fine-medium sand; about 30% fine-coarse, sub-round gravel; about 20% non-plastic fines, moist

Cobbles beginning @ 2.5'; round to sub-round with maximum dimension of 6"

Increasing cobble size, maximum dimension of 8", round to sub round, elongated

Clayey Sand (SC) - 5YR 4/6 yellowish red; about 70% poorly graded, fine sand; about 30% medium-high plasticity fines; damp

Clayey Sand with Gravel and Cobbles (SC) - 5YR 4/6 yellowish red; about 60% fine sand; about 20% coarse, sub-round gravel; about 20% low-high plasticity fines; 5YR 4/6 yellowish red; damp; sub-round cobbles with maximum dimension of 4"; 10-12' completely saturated

Silty Sand with Gravel and Cobbles (SM) - 5YR 4/6 yellowish red; about 50% poorly graded, fine sand; about 30% coarse, sub-angular gravel; about 20% non-plastic fines; elongated cobbles with maximum dimension of 7"; staining observed @ 14-14.5'

Clayey Sand (SC) - 5YR 4/6 yellowish red; about 85% poorly graded, fine sand; about 15% medium-high plasticity fines; moist

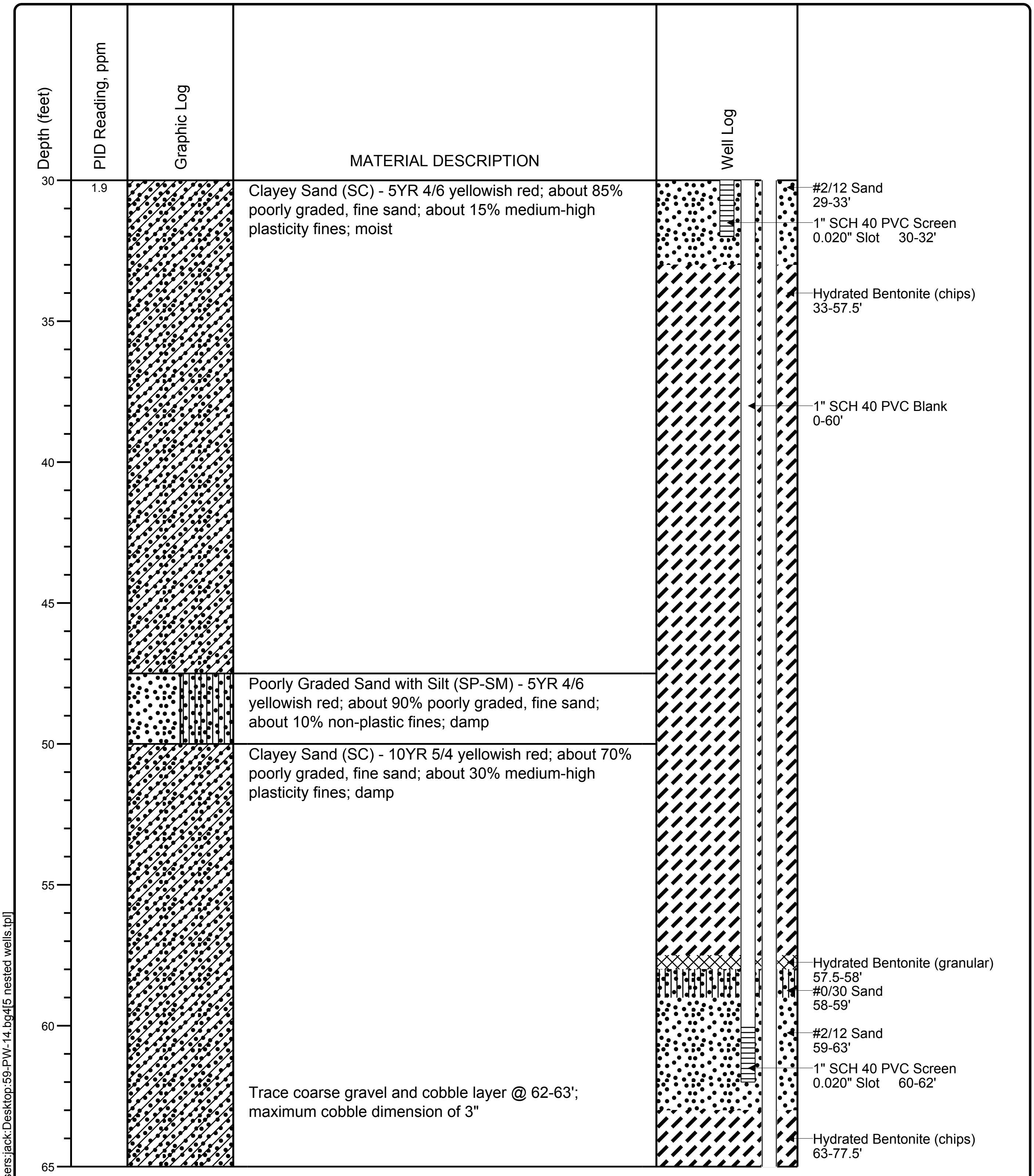
Project: **Mather Bldg 4260**

Project Location: **Adjacent to Mather Aviation, LLC - Building 4260 Aviation**

Project Number: **60520471**

Log of Boring 59-PW-17

Sheet 2 of 3



Depth (feet)	PID Reading, ppm	MATERIAL DESCRIPTION
30	1.9	Clayey Sand (SC) - 5YR 4/6 yellowish red; about 85% poorly graded, fine sand; about 15% medium-high plasticity fines; moist
47.5		Poorly Graded Sand with Silt (SP-SM) - 5YR 4/6 yellowish red; about 90% poorly graded, fine sand; about 10% non-plastic fines; damp
50		Clayey Sand (SC) - 10YR 5/4 yellowish red; about 70% poorly graded, fine sand; about 30% medium-high plasticity fines; damp
62		Trace coarse gravel and cobble layer @ 62-63'; maximum cobble dimension of 3"

#2/12 Sand
29-33'

1" SCH 40 PVC Screen
0.020" Slot 30-32'

Hydrated Bentonite (chips)
33-57.5'

1" SCH 40 PVC Blank
0-60'

Hydrated Bentonite (granular)
57.5-58'

#0/30 Sand
58-59'

#2/12 Sand
59-63'

1" SCH 40 PVC Screen
0.020" Slot 60-62'

Hydrated Bentonite (chips)
63-77.5'

Macintosh HD:Users:jack:Desktop:59-PW-14.bg4[5 nested wells.tpl]

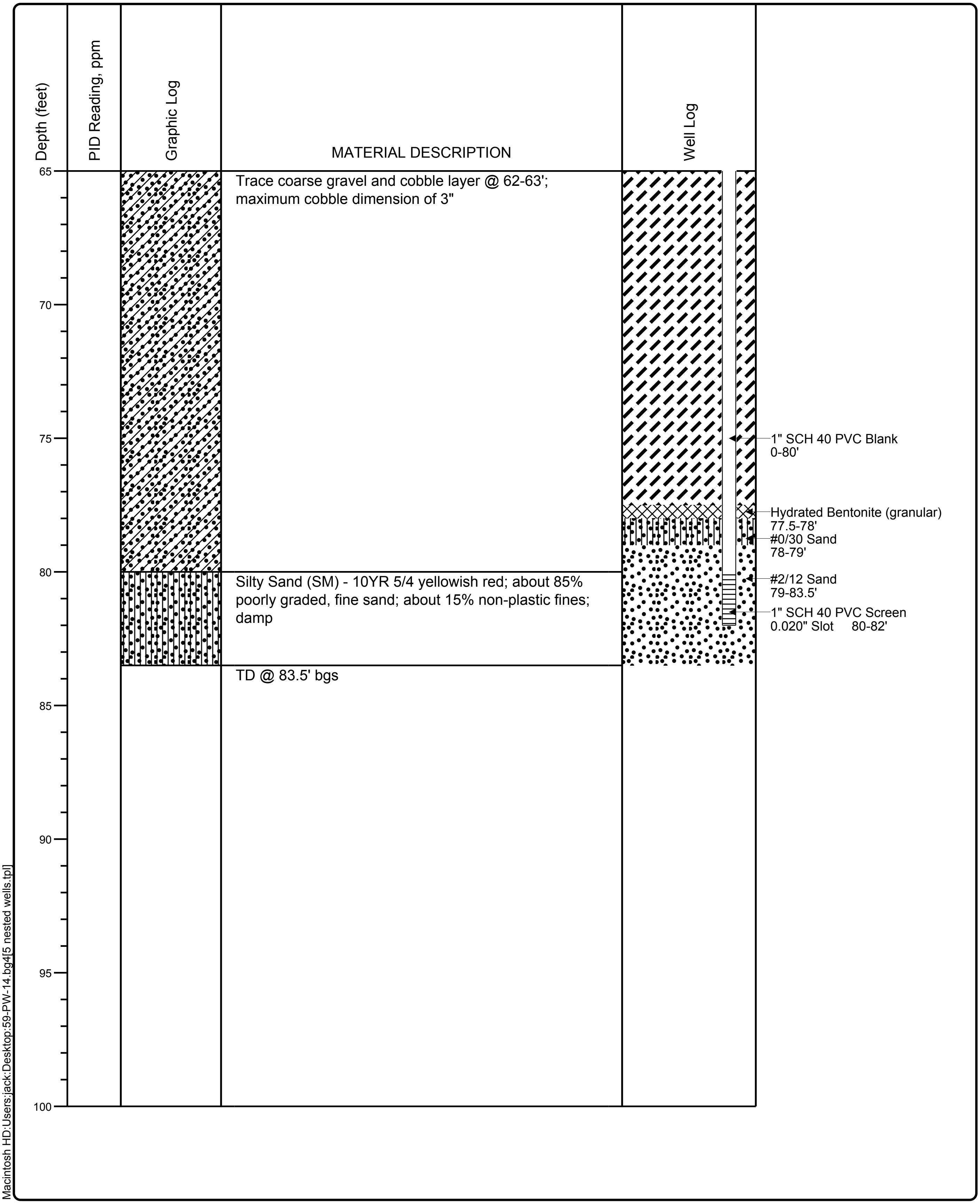
Project: **Mather Bldg 4260**

Project Location: **Adjacent to Mather Aviation, LLC - Building 4260 Aviation**

Project Number: **60520471**

Log of Boring 59-PW-17

Sheet 3 of 3



Trace coarse gravel and cobble layer @ 62-63'; maximum cobble dimension of 3"

Silty Sand (SM) - 10YR 5/4 yellowish red; about 85% poorly graded, fine sand; about 15% non-plastic fines; damp

TD @ 83.5' bgs

1" SCH 40 PVC Blank
0-80'

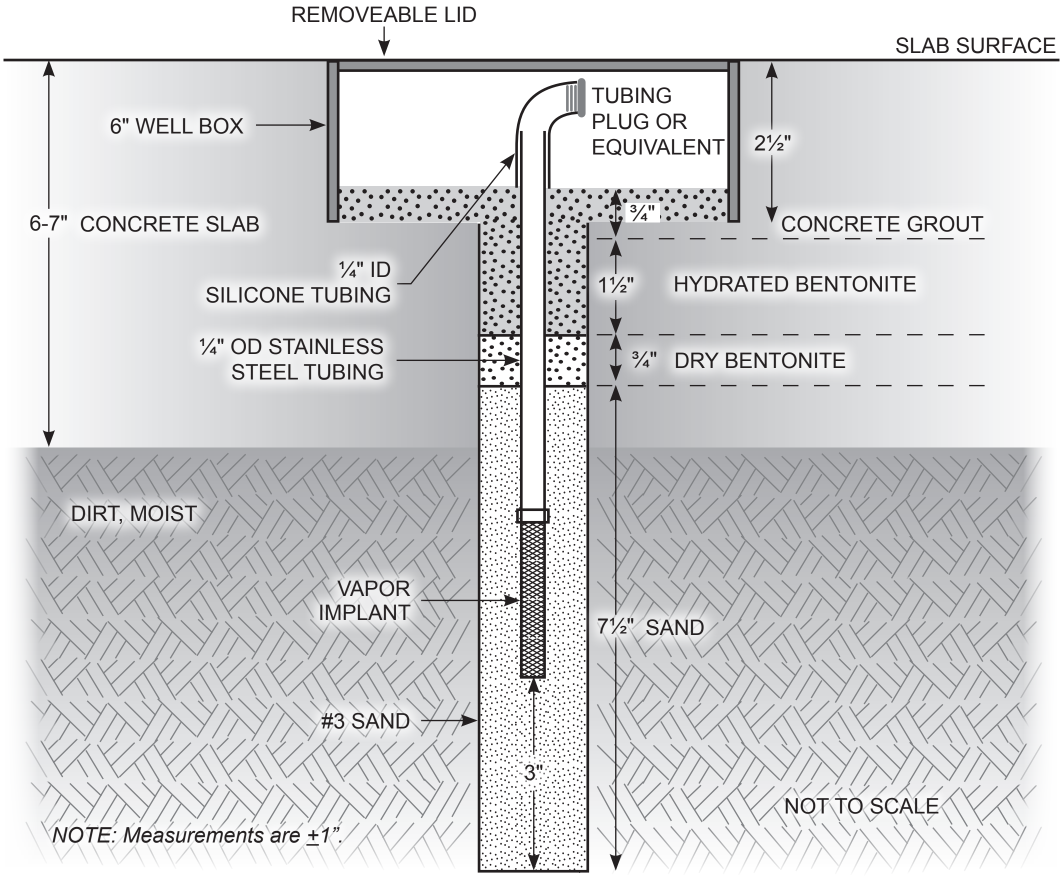
Hydrated Bentonite (granular)
77.5-78'

#0/30 Sand
78-79'

#2/12 Sand
79-83.5'

1" SCH 40 PVC Screen
0.020" Slot 80-82'

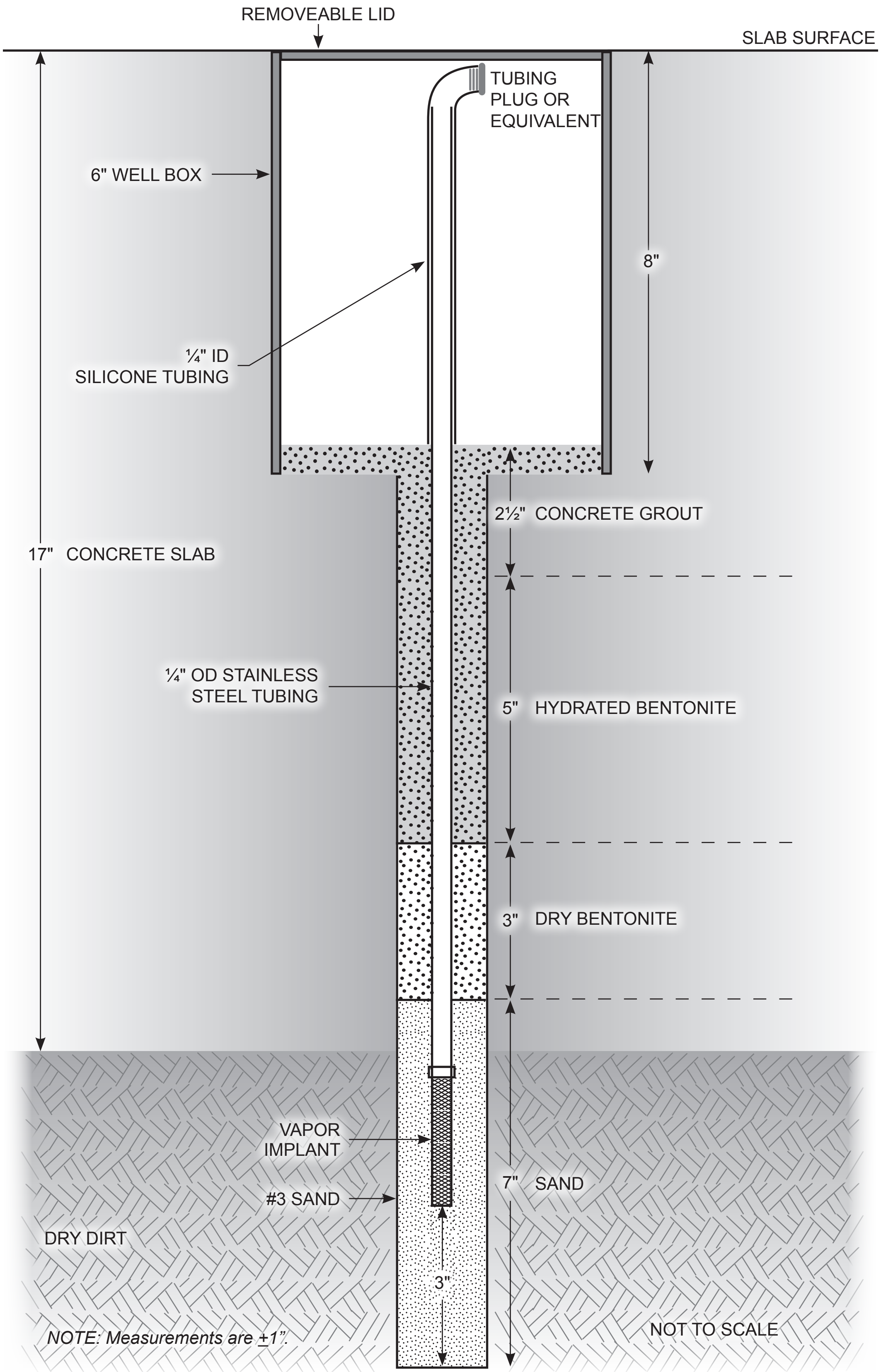
Macintosh HD:Users:jack:Desktop:59-PW-14.bg4[5 nested wells.tpl]



INSTALLATION DATE: 1/19/17
INSTALLED BY: URS, B. Romero, L. Ramirez

H:\Graphics\Mather\Site 59\01-17-Subslab-Sampling-Probe-Construction-Detail.indd - VMG 03.20.17 SAC 1

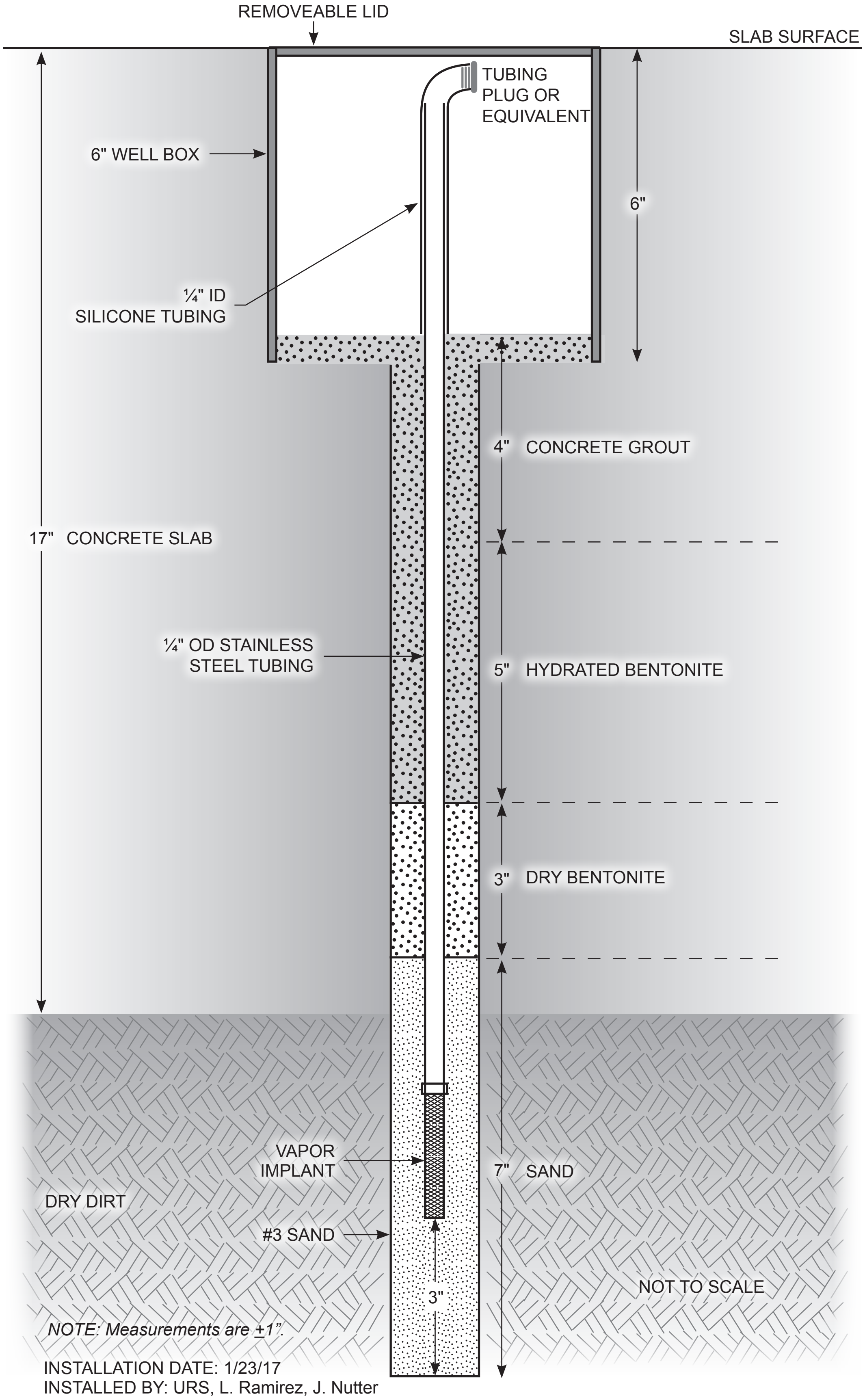
Sub-Slab Sampling Probe 59-SS-01 Construction Detail
Site 59b, Former Mather Air Force Base



NOTE: Measurements are ±1".

INSTALLATION DATE: 1/23/17
INSTALLED BY: URS, L. Ramirez, J. Nutter

Sub-Slab Sampling Probe 59-SS-02 Construction Detail
Site 59b, Former Mather Air Force Base



NOTE: Measurements are ±1".

INSTALLATION DATE: 1/23/17
INSTALLED BY: URS, L. Ramirez, J. Nutter

Sub-Slab Sampling Probe 59-SS-03 Construction Detail
Site 59b, Former Mather Air Force Base

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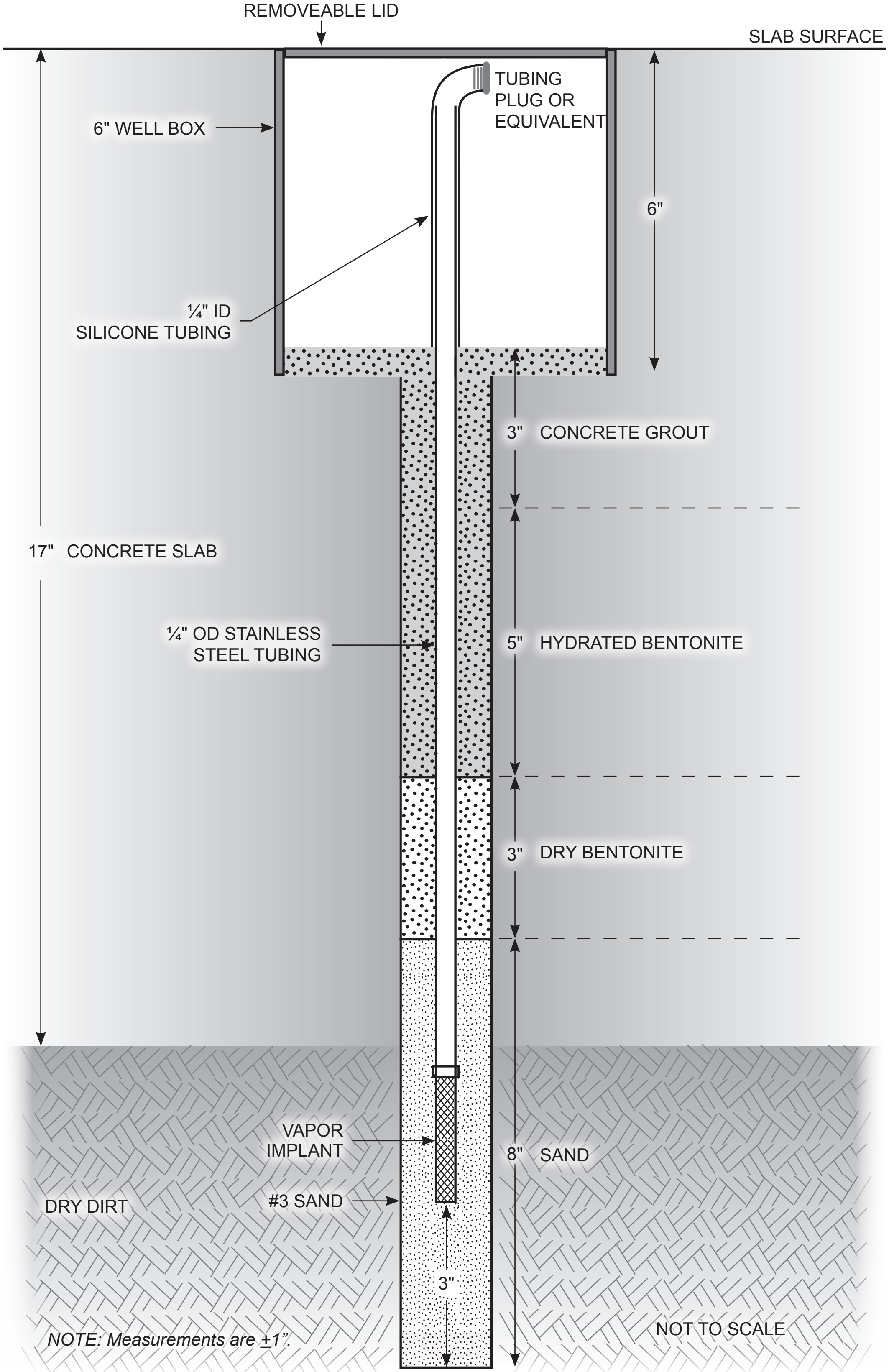

NOTE: Measurements are ±1".

INSTALLATION DATE: 1/23/17
INSTALLED BY: URS, L. Ramirez, J. Nutter

Sub-Slab Sampling Probe 59-SS-04 Construction Detail
Site 59b, Former Mather Air Force Base

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APPENDIX D

Data Quality Summary Analysis and Analytical Data

D-1

DATA QUALITY SUMMARY FOR INDOOR AIR, SUB SLAB, AND AMBIENT AIR VAPOR SAMPLES

This section summarizes the Quality Assurance and Quality Control (QC) results for samples collected and data generated in support of indoor air (including ambient air) and sub-slab samples from within and around Building 4260 (B4260) at the former Mather Air Force Base. The data quality was evaluated by examining the field results against laboratory accuracy and precision limits and the *Former Mather Air Force Base Site 59B Remedial Investigation Work Plan* (workplan; URS 2017a). URS Group, Inc. staff collected and validated the soil vapor samples.

Data were reviewed and qualified using the accuracy and precision criteria shown in Table E-2 of the workplan. Accuracy was evaluated using the percent recoveries of the spiked analytes in laboratory control samples (LCSs), surrogate spikes, and continuing calibration verification (CCV) analyses. The calculated relative percent difference (RPD) from field duplicate (FD), laboratory control sample duplicate (LCSD), and laboratory duplicate (LD) analyses were used to evaluate precision. External contamination was assessed through evaluation of method blanks. Comparability of the data was ensured by having project personnel follow standardized field procedures, described in the workplan, and having laboratories follow promulgated analytical methods. The completeness of the data is the measure of the amount of valid data divided by the number of total results (expressed as a percentage). Completeness and integrity of data were evaluated by validating all the project data, ensuring that all the analytical requests were met, noting whether samples were received in proper condition, and verifying that analyses were performed within the appropriate holding times. The following samples were collected and analyzed for nine contaminants of concern (COCs):

- Four sub-slab samples and one field duplicate (FD) sample by TO-15S
- Four indoor air samples and one FD sample by TO-15 selective ion monitoring (SIM)
- Two ambient air samples and one FD sample by TO-15SIM

Samples were collected on 26 and 27 January 2017. The nine COCs included 1,1,1-trichloroethane, 1,1-dichloroethene, 1,2-dichloroethane, carbon tetrachloride, cis-1,2-dichloroethene, tetrachloroethene, trans-1,2-dichloroethene, trichloroethene, and vinyl chloride. Isopropanol (leak check compound) was also reported for samples analyzed by TO-15S. All soil vapor samples were analyzed by Eurofins Air Toxics Ltd. in Folsom, California.

The data were evaluated at a minimum for the following parameters:

(*) - sample integrity
(*) - CCV analysis
(#) - blank analysis
(*) - LCS recoveries
(*) - surrogate spike recoveries
(#) LCSD, FD, or LD RPDs
(*) - reporting limits (RLs)
(*) - data completeness

(*) = All criteria were met for this parameter.
(#) = See below for parameter not meeting criteria.

No rejected results (R flagged) occurred. Data flagged as estimated (JF or F) are acceptable and usable with an understanding of limitations, as noted by the U.S. Environmental Protection Agency data flags. Data flagged with "F" were detected between the reporting limit (RL) and detection limit (DL), and are considered estimated concentrations. Data flagged with a "J" are considered to be estimated because of QC criteria that did not meet project limits. Data flagged "B" should be considered not detected; the result is an artifact of external contamination and does not represent site conditions.

Based on the validation performed, all soil gas data are acceptable and can be used for data interpretation. Completeness for the B4260 data is provided in Table 1. Qualified sample results are shown in Table 2 at the end of this section**.** For Method TO-15S and TO-15SIM, 42 out of 122 field soil vapor results are qualified as estimated concentrations or as "not detected" because of external contamination. A summary of the qualified results are as follows:

- Eight results are qualified as estimated concentrations (F) because they were detected between the RL and DL.
- Two results are qualified as estimated (JF) because they were detected between the RL and DL, and indicated FD imprecision.
- A total of 32 results are qualified as not detected (FB) because the detection is associated with blank contamination.

Table 1. Summary of Completeness for B4260, Mather Air Force Base

Method	Number of Samples[a]	Number of Analytes[b]	Total Number of Results	Number of Qualified Results	Number of Rejected Results	Percent Completeness
Volatile Organic Compounds						
TO-15S	5	10	50	5	0	100%
TO-15 SIM	8	9	72	37	0	100%

a. Includes field and field duplicate samples.
b. Based on the analyte lists requested.

Table 2. Qualified Data for 2017 Indoor Air, Sub Slab and Ambient Air Results

Sample Date	Sample Name	Analyte	Result	Unit	EPA Flags	Reason Codes	DL	RL	DF
TO15SIM									
1/26/17 16:18	59-AA-01-FD	1,2-Dichloroethane	0.064	μg/m_3	FB	1A	0.014	0.19	2.3
1/26/17 16:18	59-AA-01-FD	Tetrachloroethene	0.04	μg/m_3	FB	1A	0.015	0.31	2.3
1/26/17 16:18	59-AA-01-FD	Trichloroethene	0.028	μg/m_3	FB	1A	0.013	0.25	2.3
1/26/17 16:18	59-AA-01-FD	1,1,1-Trichloroethane	0.039	μg/m_3	FB	1A	0.022	0.25	2.3
1/26/17 16:18	59-AA-01-NS	1,2-Dichloroethane	0.06	μg/m_3	FB	1A	0.014	0.19	2.3
1/26/17 16:18	59-AA-01-NS	Tetrachloroethene	0.032	μg/m_3	FB	1A	0.015	0.31	2.3
1/26/17 16:18	59-AA-01-NS	Trichloroethene	0.023	μg/m_3	FB	1A	0.013	0.25	2.3
1/26/17 16:18	59-AA-01-NS	1,1,1-Trichloroethane	0.044	μg/m_3	FB	1A	0.022	0.25	2.3
1/26/17 16:25	59-AA-02-NS	1,2-Dichloroethane	0.062	μg/m_3	FB	1A	0.0097	0.12	1.55
1/26/17 16:25	59-AA-02-NS	Tetrachloroethene	0.033	μg/m_3	FB	1A	0.01	0.21	1.55
1/26/17 16:25	59-AA-02-NS	Trichloroethene	0.017	μg/m_3	FB	1A	0.0088	0.17	1.55
1/26/17 16:25	59-AA-02-NS	1,1,1-Trichloroethane	0.022	μg/m_3	FB	1A	0.015	0.17	1.55
1/26/17 16:15	59-IA-01-FD	Tetrachloroethene	0.061	μg/m_3	FB	1A	0.016	0.33	2.44
1/26/17 16:15	59-IA-01-FD	Carbon Tetrachloride	0.22	μg/m_3	JF	6G,3D	0.012	0.31	2.44
1/26/17 16:15	59-IA-01-FD	trans-1,2-Dichloroethene	0.63	μg/m_3	F	6G	0.018	0.97	2.44
1/26/17 16:15	59-IA-01-FD	Trichloroethene	0.025	μg/m_3	FB	1A	0.014	0.26	2.44
1/26/17 16:15	59-IA-01-FD	1,2-Dichloroethane	0.1	μg/m_3	FB	1A	0.015	0.2	2.44
1/26/17 16:15	59-IA-01-FD	1,1,1-Trichloroethane	0.029	μg/m_3	FB	1A	0.024	0.27	2.44
1/26/17 16:15	59-IA-01-NS	Tetrachloroethene	0.05	μg/m_3	FB	1A	0.016	0.33	2.44
1/26/17 16:15	59-IA-01-NS	Carbon Tetrachloride	0.43	μg/m_3	JF	6G,3D	0.012	0.31	2.44
1/26/17 16:15	59-IA-01-NS	1,2-Dichloroethane	0.12	μg/m_3	FB	1A	0.015	0.2	2.44
1/26/17 16:15	59-IA-01-NS	1,1,1-Trichloroethane	0.043	μg/m_3	FB	1A	0.024	0.27	2.44
1/26/17 16:15	59-IA-01-NS	Trichloroethene	0.028	μg/m_3	FB	1A	0.014	0.26	2.44
1/26/17 16:15	59-IA-01-NS	trans-1,2-Dichloroethene	0.68	μg/m_3	F	6G	0.018	0.97	2.44
1/26/17 16:12	59-IA-02-NS	1,2-Dichloroethane	0.096	μg/m_3	FB	1A	0.0098	0.13	1.58
1/26/17 16:12	59-IA-02-NS	Tetrachloroethene	0.054	μg/m_3	FB	1A	0.01	0.21	1.58
1/26/17 16:12	59-IA-02-NS	Trichloroethene	0.026	μg/m_3	FB	1A	0.009	0.17	1.58
1/26/17 16:12	59-IA-02-NS	trans-1,2-Dichloroethene	0.56	μg/m_3	F	6G	0.012	0.63	1.58
1/26/17 16:12	59-IA-02-NS	1,1,1-Trichloroethane	0.036	μg/m_3	FB	1A	0.015	0.17	1.58
1/26/17 16:13	59-IA-03-NS	1,2-Dichloroethane	0.095	μg/m_3	FB	1A	0.0098	0.13	1.58
1/26/17 16:13	59-IA-03-NS	Trichloroethene	0.021	μg/m_3	FB	1A	0.009	0.17	1.58
1/26/17 16:13	59-IA-03-NS	Tetrachloroethene	0.053	μg/m_3	FB	1A	0.01	0.21	1.58
1/26/17 16:13	59-IA-03-NS	1,1,1-Trichloroethane	0.036	μg/m_3	FB	1A	0.015	0.17	1.58
1/26/17 16:14	59-IA-04-NS	1,2-Dichloroethane	0.096	μg/m_3	FB	1A	0.0098	0.13	1.58

Table 2. Qualified Data for 2017 Baseline Soil Vapor Results (Continued)

Sample Date	Sample Name	Analyte	Result	Unit	EPA Flags	Reason Codes	DL	RL	DF
1/26/17 16:14	59-IA-04-NS	Trichloroethene	0.028	µg/m_3	FB	1A	0.009	0.17	1.58
1/26/17 16:14	59-IA-04-NS	Tetrachloroethene	0.052	µg/m_3	FB	1A	0.01	0.21	1.58
1/26/17 16:14	59-IA-04-NS	1,1,1-Trichloroethane	0.069	µg/m_3	FB	1A	0.015	0.17	1.58
TO15									
1/27/17 8:22	59-SS-01-FD	Trichloroethene	16	µg/m_3	F	6G	2.4	11	2.25
1/27/17 8:22	59-SS-01-NS	Trichloroethene	24	µg/m_3	F	6G	2.4	11	2.27
1/27/17 9:08	59-SS-02-NS	Trichloroethene	36	µg/m_3	F	6G	2.3	11	2.22
1/27/17 9:33	59-SS-03-NS	Trichloroethene	37	µg/m_3	F	6G	2.2	11	2.12
1/27/17 8:48	59-SS-04-NS	Isopropanol	61	µg/m_3	F	6G	5.6	43	2.17

ACRONYMS
DF = dilution factor
DL = detection limit
EPA = U.S. Environmental Protection Agency
FD = field duplicate
NS = normal sample
QC = quality control
RL = reporting limit
SIM = selective ion monitoring

UNITS
µg/m_3 = micrograms per cubic meter

EPA FLAG
F = Estimated result; analyte detected between the RL and DL
FB = Estimated result; analyte detected between the RL and DL; result is attributed to blank contamination
JF = Estimated result; analyte detected between the RL and DL; one or more QC criteria were not met

REASON CODE
1A = Method blank contamination
3D = Field duplicate imprecision
6G = Analyte detected between the RL and DL

D-2

DATA QUALITY SUMMARY FOR BASELINE SOIL VAPOR AND GROUNDWATER SAMPLES

This section summarizes the Quality Assurance and Quality Control (QC) results for samples collected and data generated in support of soil vapor and groundwater samples collected from within and around Building 4260 (B4260) at the former Mather Air Force Base. The data quality was evaluated by examining the field results against laboratory accuracy and precision limits. URS Group, Inc. staff collected and validated the samples.

Data were reviewed and qualified using the accuracy and precision criteria provided by the laboratories. Accuracy was evaluated using the percent recoveries of the spiked analytes in laboratory control samples (LCSs), surrogate spikes, and continuing calibration verification (CCV) analyses. The calculated relative percent difference (RPD) from field duplicate (FD), laboratory control sample duplicate (LCSD), and laboratory duplicate (LD) analyses was used to evaluate precision. External contamination was assessed through evaluation of method blanks. Comparability of the data was ensured by having project personnel follow standardized field procedures, described in the workplan, and having the laboratories follow promulgated analytical methods. The completeness of the data is the measure of the amount of valid data divided by the number of total results (expressed as a percentage). Completeness and integrity of data were evaluated by validating all the project data, ensuring that all the analytical requests were met, noting whether samples were received in proper condition, and verifying that analyses were performed within the appropriate holding times. The following samples were collected and analyzed for contaminants of concern:

- A total of 37 soil vapor samples and five FD samples for select volatile organic compounds (VOCs) by Method TO-15
- Five groundwater samples for VOCs by Method SW8260B

Samples were collected on 1, 2, 3, 7 and 8 November 2017. All soil vapor samples were analyzed by Eurofins Air Toxics Ltd. in Folsom, California. The groundwater samples were analyzed by Enthalpy Analytical in Berkeley, California.

The data were evaluated at a minimum for the following parameters:

(*) - sample integrity
(#) - CCV analysis
(#) - blank analysis
(#) - LCS recoveries
(*) - surrogate spike recoveries
(*) - LCSD, FD, or LD RPDs
(*) - reporting limits (RLs)
(*) - data completeness

(*) = All criteria were met for this parameter.
(#) = See below for parameter not meeting criteria.

No rejected results (R flagged) occurred. Data results flagged as estimated (J or F) are acceptable and usable, with an understanding of limitations, as noted by the U.S. Environmental Protection Agency data flags. Data flagged with “F” were detected between the reporting limit (RL) and detection limit (DL), and also are considered estimated concentrations. Data flagged with a “J” are considered estimated because of QC criteria that did not meet project limits. Non-detect results flagged (UJ) are considered to have estimated reporting limits with a potential for false negative results at the stated reporting limit. Furthermore, data flagged “B” should be considered not detected; the result is an artifact of external contamination and does not represent site conditions.

Based on the validation performed, all data are acceptable and can be used for data interpretation. Completeness for the B4260 data is shown in Table 1. Qualified sample results are shown in Table 2 at the end of this section.

For Method TO-15, 105 out of 1,008 soil vapor results are qualified as estimated concentrations, estimated reporting limits, or as “not detected.” A summary of the qualified results are as follows:

- A total of 79 results are qualified as estimated concentrations (F) because they were detected between the RL and DL.
- Two results are qualified as estimated (J) because the results exceeded the calibration range.
- Three results are qualified as not detected (B) because the detection is associated with blank contamination. One result is flagged for potential high bias (J+) because of blank contamination.
- A total of 20 non-detect results (naphthalene) are qualified for having estimated RLs with a potential for false negative results at the stated RLs because of low CCVs or LCS recoveries.

For Method SW8260B, no VOC results are qualified.

Table 1. Summary of Completeness for B4260, Former Mather Air Force Base

Method	Number of Samples[a]	Number of Analytes[b]	Total Number of Results	Number of Qualified Results	Number of Rejected Results	Percent Completeness
Volatile Organic Compounds						
TO-15	42	24	1,008	105	0	100%
SW8260B	5	67	335	0	0	100%

a Includes normal field samples and field duplicate samples.
b Based on the analyte lists requested.

Table 2. Qualified Data for 2017 Baseline Soil Vapor Results

Sample Date	Sample Name	Analyte	Result	EPA Flags	Reason Codes	DL	RL	DF
TO-15 (ppbv)								
11/7/17 12:08	59-PW-05-10-NS	Naphthalene	0	UJ	2A-	0.79	49	2.46
		Isopropanol	10	F	6G	5.4	49	2.46
		cis-1,2-Dichloroethene	2.3	F	6G	2.1	12	2.46
11/7/17 12:19	59-PW-05-30-NS	Naphthalene	0	UJ	2A-	0.78	49	2.44
		Chloroform	2	F	6G	1.9	12	2.44
11/7/17 12:32	59-PW-05-50-NS	Trichloroethene	18	J+	1A	1.8	12	2.49
		Naphthalene	0	UJ	2A-	0.8	50	2.49
11/7/17 12:47	59-PW-05-70-NS	Naphthalene	0	UJ	2A-	0.79	49	2.47
		cis-1,2-Dichloroethene	3.2	F	6G	2.1	12	2.47
		Carbon Tetrachloride	4.5	F	6G	1.8	12	2.47
		Chloroform	4.3	F	6G	1.9	12	2.47
11/7/17 9:20	59-PW-06-11-NS	Naphthalene	0	UJ	2A-	0.76	48	2.38
11/7/17 9:36	59-PW-06-31-NS	Trichloroethene	10	B	1A	1.8	12	2.42
		Naphthalene	0	UJ	2A-	0.77	48	2.42
11/7/17 9:59	59-PW-06-51-FD	Trichloroethene	11	B	1A	1.7	12	2.39
		Naphthalene	0	UJ	2A-	0.76	48	2.39
11/7/17 9:59	59-PW-06-51-NS	Trichloroethene	10	B	1A	1.8	12	2.42
		Naphthalene	0	UJ	2A-	0.77	48	2.42
11/7/17 10:21	59-PW-06-70-NS	Naphthalene	0	UJ	5B-	0.77	48	2.4
		1,1-Dichloroethene	5.2	F	6G	1.5	12	2.4
		Chloroform	2.9	F	6G	1.9	12	2.4
11/7/17 8:53	59-PW-07-10-NS	Naphthalene	0	UJ	5B-	0.76	48	2.39
		Chloroform	6.8	F	6G	1.9	12	2.39
		1,1,1-Trichloroethane	5	F	6G	1.3	12	2.39
		cis-1,2-Dichloroethene	3.4	F	6G	2	12	2.39
11/7/17 8:26	59-PW-08-10-NS	Naphthalene	0	UJ	5B-	0.74	46	2.31
		cis-1,2-Dichloroethene	3.6	F	6G	1.9	12	2.31
		Chloroform	3.3	F	6G	1.8	12	2.31
		1,1-Dichloroethene	11	F	6G	1.4	12	2.31
		Carbon Tetrachloride	4.6	F	6G	1.7	12	2.31
11/7/17 13:19	59-PW-09A-10-NS	Naphthalene	0	UJ	5B-	0.81	50	2.52
		Chloroform	8.6	F	6G	2	13	2.52
11/7/17 13:37	59-PW-09B-20-FD	Naphthalene	0	UJ	5B-	1.3	83	4.16
		Isopropanol	29	F	6G	9.2	83	4.16
		Chloroform	8	F	6G	3.2	21	4.16

Table 2. Qualified Data for 2017 Baseline Soil Vapor Results (Continued)

Sample Date	Sample Name	Analyte	Result	EPA Flags	Reason Codes	DL	RL	DF
11/7/17 13:37	59-PW-09B-20-NS	Naphthalene	0	UJ	5B-	0.81	50	2.52
		Chlorobenzene	1.8	F	6G	1.6	13	2.52
		Chloroform	7.9	F	6G	2	13	2.52
		Isopropanol	6.4	F	6G	5.5	50	2.52
11/7/17 11:30	59-PW-10A-08-NS	Naphthalene	0	UJ	5B-	0.78	49	2.44
		Isopropanol	30000	J	6E	5.4	49	2.44
		Trichloroethene	5.6	F	6G	1.8	12	2.44
		Toluene	3	F	6G	1.4	12	2.44
11/7/17 11:45	59-PW-10B-20-NS	Naphthalene	0	UJ	5B-	0.76	48	2.38
		Trichloroethene	3.9	F	6G	1.7	12	2.38
		Tetrachloroethene	5.8	F	6G	1.1	12	2.38
11/8/17 8:05	59-PW-11A-08-FD	Naphthalene	0	UJ	5B-	0.76	47	2.37
		Toluene	3.2	F	6G	1.4	12	2.37
		m,p-Xylenes	3.8	F	6G	1.5	12	2.37
11/8/17 8:05	59-PW-11A-08-NS	Naphthalene	0	UJ	5B-	0.76	48	2.39
		Isopropanol	5.3	F	6G	5.2	48	2.39
11/7/17 8:17	59-PW-11B-20-NS	Naphthalene	0	UJ	5B-	0.76	47	2.36
		1,1,1-Trichloroethane	4.1	F	6G	1.3	12	2.36
		Isopropanol	29	F	6G	5.2	47	2.36
		Chloroform	3.2	F	6G	1.8	12	2.36
11/7/17 14:04	59-PW-12A-08-NS	Tetrachloroethene	320	F	6G	220	2400	485
		Chloroform	500	F	6G	380	2400	485
		Isopropanol	8900	F	6G	1100	9700	485
11/7/17 14:21	59-PW-12B-20-NS	Tetrachloroethene	66	F	6G	18	200	41
		trans-1,2-Dichloroethene	180	F	6G	56	200	41
11/2/17 9:42	59-PW-13A-08-NS	Naphthalene	0	UJ	5B-	0.78	49	2.44
		Isopropanol	25000	J	6E	5.4	49	2.44
		Trichloroethene	1.8	F	6G	1.8	12	2.44
		Benzene	1.7	F	6G	1.7	12	2.44
11/2/17 10:07	59-PW-13B-20-NS	1,1,1-Trichloroethane	6.6	F	6G	1.4	12	2.46
		Chloroform	5.4	F	6G	1.9	12	2.46
		cis-1,2-Dichloroethene	3.9	F	6G	2.1	12	2.46
11/1/17 10:06	59-PW-14-30-NS	Trichloroethene	100	F	6G	31	210	42.9

Table 2. Qualified Data for 2017 Baseline Soil Vapor Results (Continued)

Sample Date	Sample Name	Analyte	Result	EPA Flags	Reason Codes	DL	RL	DF
11/1/17 11:30	59-PW-14-60-FD	Chlorobenzene	1.8	F	6G	1.7	14	2.75
		Carbon Tetrachloride	3.6	F	6G	2.1	14	2.75
		Trichlorofluoromethane	2.9	F	6G	1.3	14	2.75
		cis-1,2-Dichloroethene	9.3	F	6G	2.3	14	2.75
11/1/17 11:30	59-PW-14-60-NS	cis-1,2-Dichloroethene	7.4	F	6G	2.2	13	2.68
		Carbon Tetrachloride	4	F	6G	2	13	2.68
		Trichlorofluoromethane	2.2	F	6G	1.3	13	2.68
11/3/17 8:36	59-PW-14-80-NS	Trichlorofluoromethane	2.3	F	6G	1.1	12	2.38
		Carbon Tetrachloride	3.1	F	6G	1.8	12	2.38
		cis-1,2-Dichloroethene	4.9	F	6G	2	12	2.38
11/2/17 13:55	59-PW-15-20-NS	Tetrachloroethene	4	F	6G	1.1	12	2.4
11/2/17 14:23	59-PW-15-60-NS	Chloroform	3	F	6G	1.9	12	2.44
		Tetrachloroethene	3.4	F	6G	1.1	12	2.44
11/1/17 14:26	59-PW-16-20-NS	1,1,1-Trichloroethane	3.9	F	6G	1.4	12	2.48
		Tetrachloroethene	9.8	F	6G	1.1	12	2.48
		Chloroform	4.2	F	6G	1.9	12	2.48
11/1/17 14:41	59-PW-16-30-NS	Tetrachloroethene	3.4	F	6G	1.1	12	2.51
		1,1-Dichloroethene	12	F	6G	1.5	12	2.51
		Isopropanol	15	F	6G	5.5	50	2.51
		Chloroform	2.7	F	6G	2	12	2.51
11/3/17 7:55	59-PW-16-60-NS	Tetrachloroethene	12	F	6G	2.1	24	4.76
		1,1-Dichloroethene	3.3	F	6G	2.9	24	4.76
		Chloroform	16	F	6G	3.7	24	4.76
11/3/17 9:31	59-PW-17-08-NS	Trichloroethene	8.1	F	6G	1.8	12	2.46
		Isopropanol	19	F	6G	5.4	49	2.46
11/3/17 9:50	59-PW-17-20-FD	Toluene	2.8	F	6G	1.4	12	2.32
11/3/17 9:50	59-PW-17-20-NS	Toluene	2.3	F	6G	1.4	12	2.38
		cis-1,2-Dichloroethene	2.2	F	6G	2	12	2.38
11/3/17 10:03	59-PW-17-30-NS	1,1,1-Trichloroethane	4.1	F	6G	1.3	12	2.31
		cis-1,2-Dichloroethene	2.1	F	6G	1.9	12	2.31
		Toluene	1.8	F	6G	1.4	12	2.31
11/2/17 12:35	59-PW-17-60-NS	1,1-Dichloroethene	7.5	F	6G	1.5	12	2.4
		Toluene	4.8	F	6G	1.4	12	2.4
		Chloroform	9.8	F	6G	1.9	12	2.4

Table 2. Qualified Data for 2017 Baseline Soil Vapor Results (Continued)

Sample Date	Sample Name	Analyte	Result	EPA Flags	Reason Codes	DL	RL	DF
11/3/17 10:28	59-PW-17-80-NS	Tetrachloroethene	4.6	F	6G	1.1	12	2.48
		m,p-Xylenes	1.6	F	6G	1.5	12	2.48
		Toluene	9.4	F	6G	1.5	12	2.48

ACRONYMS
DF = dilution factor
DL = detection limit
EPA = U.S. Environmental Protection Agency
FD = field duplicate
NS = normal sample
RL = reporting limit

EPA FLAG
B = associated with blank contamination
F = detected between the RL and DL
J = estimated concentration
J+ = estimated concentration; potential high bias
UJ = analyte not detected; estimated RL with potential for false negative result

REASON CODE
1A = associated with method blank contamination
2B- = low matrix spike recovery
5B- = low continuing calibration recovery
6E = exceeds calibration range
6G = detected between the RL and DL

Table 2. Qualified Data for 2017 Baseline Soil Vapor Results

Sample Date	Sample Name	Analyte	Result	EPA Flags	Reason Codes	DL	RL	DF
TO-15 (ppbv)								
11/7/17 12:08	59-PW-05-10-NS	Naphthalene	0	UJ	2A-	0.79	49	2.46
		Isopropanol	10	F	6G	5.4	49	2.46
		cis-1,2-Dichloroethene	2.3	F	6G	2.1	12	2.46
11/7/17 12:19	59-PW-05-30-NS	Naphthalene	0	UJ	2A-	0.78	49	2.44
		Chloroform	2	F	6G	1.9	12	2.44
11/7/17 12:32	59-PW-05-50-NS	Trichloroethene	18	J+	1A	1.8	12	2.49
		Naphthalene	0	UJ	2A-	0.8	50	2.49
11/7/17 12:47	59-PW-05-70-NS	Naphthalene	0	UJ	2A-	0.79	49	2.47
		cis-1,2-Dichloroethene	3.2	F	6G	2.1	12	2.47
		Carbon Tetrachloride	4.5	F	6G	1.8	12	2.47
		Chloroform	4.3	F	6G	1.9	12	2.47
11/7/17 9:20	59-PW-06-11-NS	Naphthalene	0	UJ	2A-	0.76	48	2.38
11/7/17 9:36	59-PW-06-31-NS	Trichloroethene	10	B	1A	1.8	12	2.42
		Naphthalene	0	UJ	2A-	0.77	48	2.42
11/7/17 9:59	59-PW-06-51-FD	Trichloroethene	11	B	1A	1.7	12	2.39
		Naphthalene	0	UJ	2A-	0.76	48	2.39
11/7/17 9:59	59-PW-06-51-NS	Trichloroethene	10	B	1A	1.8	12	2.42
		Naphthalene	0	UJ	2A-	0.77	48	2.42
11/7/17 10:21	59-PW-06-70-NS	Naphthalene	0	UJ	5B-	0.77	48	2.4
		1,1-Dichloroethene	5.2	F	6G	1.5	12	2.4
		Chloroform	2.9	F	6G	1.9	12	2.4
11/7/17 8:53	59-PW-07-10-NS	Naphthalene	0	UJ	5B-	0.76	48	2.39
		Chloroform	6.8	F	6G	1.9	12	2.39
		1,1,1-Trichloroethane	5	F	6G	1.3	12	2.39
		cis-1,2-Dichloroethene	3.4	F	6G	2	12	2.39
11/7/17 8:26	59-PW-08-10-NS	Naphthalene	0	UJ	5B-	0.74	46	2.31
		cis-1,2-Dichloroethene	3.6	F	6G	1.9	12	2.31
		Chloroform	3.3	F	6G	1.8	12	2.31
		1,1-Dichloroethene	11	F	6G	1.4	12	2.31
		Carbon Tetrachloride	4.6	F	6G	1.7	12	2.31
11/7/17 13:19	59-PW-09A-10-NS	Naphthalene	0	UJ	5B-	0.81	50	2.52
		Chloroform	8.6	F	6G	2	13	2.52
11/7/17 13:37	59-PW-09B-20-FD	Naphthalene	0	UJ	5B-	1.3	83	4.16
		Isopropanol	29	F	6G	9.2	83	4.16
		Chloroform	8	F	6G	3.2	21	4.16

Table 2. Qualified Data for 2017 Baseline Soil Vapor Results (Continued)

Sample Date	Sample Name	Analyte	Result	EPA Flags	Reason Codes	DL	RL	DF
11/7/17 13:37	59-PW-09B-20-NS	Naphthalene	0	UJ	5B-	0.81	50	2.52
		Chlorobenzene	1.8	F	6G	1.6	13	2.52
		Chloroform	7.9	F	6G	2	13	2.52
		Isopropanol	6.4	F	6G	5.5	50	2.52
11/7/17 11:30	59-PW-10A-08-NS	Naphthalene	0	UJ	5B-	0.78	49	2.44
		Isopropanol	30000	J	6E	5.4	49	2.44
		Trichloroethene	5.6	F	6G	1.8	12	2.44
		Toluene	3	F	6G	1.4	12	2.44
11/7/17 11:45	59-PW-10B-20-NS	Naphthalene	0	UJ	5B-	0.76	48	2.38
		Trichloroethene	3.9	F	6G	1.7	12	2.38
		Tetrachloroethene	5.8	F	6G	1.1	12	2.38
11/8/17 8:05	59-PW-11A-08-FD	Naphthalene	0	UJ	5B-	0.76	47	2.37
		Toluene	3.2	F	6G	1.4	12	2.37
		m,p-Xylenes	3.8	F	6G	1.5	12	2.37
11/8/17 8:05	59-PW-11A-08-NS	Naphthalene	0	UJ	5B-	0.76	48	2.39
		Isopropanol	5.3	F	6G	5.2	48	2.39
11/7/17 8:17	59-PW-11B-20-NS	Naphthalene	0	UJ	5B-	0.76	47	2.36
		1,1,1-Trichloroethane	4.1	F	6G	1.3	12	2.36
		Isopropanol	29	F	6G	5.2	47	2.36
		Chloroform	3.2	F	6G	1.8	12	2.36
11/7/17 14:04	59-PW-12A-08-NS	Tetrachloroethene	320	F	6G	220	2400	485
		Chloroform	500	F	6G	380	2400	485
		Isopropanol	8900	F	6G	1100	9700	485
11/7/17 14:21	59-PW-12B-20-NS	Tetrachloroethene	66	F	6G	18	200	41
		trans-1,2-Dichloroethene	180	F	6G	56	200	41
11/2/17 9:42	59-PW-13A-08-NS	Naphthalene	0	UJ	5B-	0.78	49	2.44
		Isopropanol	25000	J	6E	5.4	49	2.44
		Trichloroethene	1.8	F	6G	1.8	12	2.44
		Benzene	1.7	F	6G	1.7	12	2.44
11/2/17 10:07	59-PW-13B-20-NS	1,1,1-Trichloroethane	6.6	F	6G	1.4	12	2.46
		Chloroform	5.4	F	6G	1.9	12	2.46
		cis-1,2-Dichloroethene	3.9	F	6G	2.1	12	2.46
11/1/17 10:06	59-PW-14-30-NS	Trichloroethene	100	F	6G	31	210	42.9

Table 2. Qualified Data for 2017 Baseline Soil Vapor Results (Continued)

Sample Date	Sample Name	Analyte	Result	EPA Flags	Reason Codes	DL	RL	DF
11/1/17 11:30	59-PW-14-60-FD	Chlorobenzene	1.8	F	6G	1.7	14	2.75
		Carbon Tetrachloride	3.6	F	6G	2.1	14	2.75
		Trichlorofluoromethane	2.9	F	6G	1.3	14	2.75
		cis-1,2-Dichloroethene	9.3	F	6G	2.3	14	2.75
11/1/17 11:30	59-PW-14-60-NS	cis-1,2-Dichloroethene	7.4	F	6G	2.2	13	2.68
		Carbon Tetrachloride	4	F	6G	2	13	2.68
		Trichlorofluoromethane	2.2	F	6G	1.3	13	2.68
11/3/17 8:36	59-PW-14-80-NS	Trichlorofluoromethane	2.3	F	6G	1.1	12	2.38
		Carbon Tetrachloride	3.1	F	6G	1.8	12	2.38
		cis-1,2-Dichloroethene	4.9	F	6G	2	12	2.38
11/2/17 13:55	59-PW-15-20-NS	Tetrachloroethene	4	F	6G	1.1	12	2.4
11/2/17 14:23	59-PW-15-60-NS	Chloroform	3	F	6G	1.9	12	2.44
		Tetrachloroethene	3.4	F	6G	1.1	12	2.44
11/1/17 14:26	59-PW-16-20-NS	1,1,1-Trichloroethane	3.9	F	6G	1.4	12	2.48
		Tetrachloroethene	9.8	F	6G	1.1	12	2.48
		Chloroform	4.2	F	6G	1.9	12	2.48
11/1/17 14:41	59-PW-16-30-NS	Tetrachloroethene	3.4	F	6G	1.1	12	2.51
		1,1-Dichloroethene	12	F	6G	1.5	12	2.51
		Isopropanol	15	F	6G	5.5	50	2.51
		Chloroform	2.7	F	6G	2	12	2.51
11/3/17 7:55	59-PW-16-60-NS	Tetrachloroethene	12	F	6G	2.1	24	4.76
		1,1-Dichloroethene	3.3	F	6G	2.9	24	4.76
		Chloroform	16	F	6G	3.7	24	4.76
11/3/17 9:31	59-PW-17-08-NS	Trichloroethene	8.1	F	6G	1.8	12	2.46
		Isopropanol	19	F	6G	5.4	49	2.46
11/3/17 9:50	59-PW-17-20-FD	Toluene	2.8	F	6G	1.4	12	2.32
11/3/17 9:50	59-PW-17-20-NS	Toluene	2.3	F	6G	1.4	12	2.38
		cis-1,2-Dichloroethene	2.2	F	6G	2	12	2.38
11/3/17 10:03	59-PW-17-30-NS	1,1,1-Trichloroethane	4.1	F	6G	1.3	12	2.31
		cis-1,2-Dichloroethene	2.1	F	6G	1.9	12	2.31
		Toluene	1.8	F	6G	1.4	12	2.31
11/2/17 12:35	59-PW-17-60-NS	1,1-Dichloroethene	7.5	F	6G	1.5	12	2.4
		Toluene	4.8	F	6G	1.4	12	2.4
		Chloroform	9.8	F	6G	1.9	12	2.4

Table 2. Qualified Data for 2017 Baseline Soil Vapor Results (Continued)

Sample Date	Sample Name	Analyte	Result	EPA Flags	Reason Codes	DL	RL	DF
11/3/17 10:28	59-PW-17-80-NS	Tetrachloroethene	4.6	F	6G	1.1	12	2.48
		m,p-Xylenes	1.6	F	6G	1.5	12	2.48
		Toluene	9.4	F	6G	1.5	12	2.48

ACRONYMS

DF	=	dilution factor
DL	=	detection limit
EPA	=	U.S. Environmental Protection Agency
FD	=	field duplicate
NS	=	normal sample
RL	=	reporting limit

EPA FLAG

B	=	associated with blank contamination
F	=	detected between the RL and DL
J	=	estimated concentration
J+	=	estimated concentration; potential high bias
UJ	=	analyte not detected; estimated RL with potential for false negative result

REASON CODE

1A	=	associated with method blank contamination
2B-	=	low matrix spike recovery
5B-	=	low continuing calibration recovery
6E	=	exceeds calibration range
6G	=	detected between the RL and DL

Table D-1. Indoor Air Results, January 26-27, 2017
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-AA-01	1/26/17 16:18	59-AA-01-FD	NS1	TO15SIM	1,1,1-Trichloroethane	0.039	FB	ug/m3	0.022	0.25
59-AA-01	1/26/17 16:18	59-AA-01-NS	NS1	TO15SIM	1,1,1-Trichloroethane	0.044	FB	ug/m3	0.022	0.25
59-AA-02	1/26/17 16:25	59-AA-02-NS	NS1	TO15SIM	1,1,1-Trichloroethane	0.022	FB	ug/m3	0.015	0.17
59-IA-01	1/26/17 16:15	59-IA-01-FD	NS1	TO15SIM	1,1,1-Trichloroethane	0.029	FB	ug/m3	0.024	0.27
59-IA-01	1/26/17 16:15	59-IA-01-NS	NS1	TO15SIM	1,1,1-Trichloroethane	0.043	FB	ug/m3	0.024	0.27
59-IA-02	1/26/17 16:12	59-IA-02-NS	NS1	TO15SIM	1,1,1-Trichloroethane	0.036	FB	ug/m3	0.015	0.17
59-IA-03	1/26/17 16:13	59-IA-03-NS	NS1	TO15SIM	1,1,1-Trichloroethane	0.036	FB	ug/m3	0.015	0.17
59-IA-04	1/26/17 16:14	59-IA-04-NS	NS1	TO15SIM	1,1,1-Trichloroethane	0.069	FB	ug/m3	0.015	0.17
59-SS-01	1/27/17 8:22	59-SS-01-FD	NS1	TO15	1,1,1-Trichloroethane	0		ug/m3	15	61
59-SS-01	1/27/17 8:22	59-SS-01-NS	NS1	TO15	1,1,1-Trichloroethane	0		ug/m3	15	62
59-SS-02	1/27/17 9:08	59-SS-02-NS	NS1	TO15	1,1,1-Trichloroethane	0		ug/m3	14	60
59-SS-03	1/27/17 9:33	59-SS-03-NS	NS1	TO15	1,1,1-Trichloroethane	0		ug/m3	14	58
59-SS-04	1/27/17 8:48	59-SS-04-NS	NS1	TO15	1,1,1-Trichloroethane	0		ug/m3	14	59
59-AA-01	1/26/17 16:18	59-AA-01-FD	NS1	TO15SIM	1,2-Dichloroethane	0.064	FB	ug/m3	0.014	0.19
59-AA-01	1/26/17 16:18	59-AA-01-NS	NS1	TO15SIM	1,2-Dichloroethane	0.06	FB	ug/m3	0.014	0.19
59-AA-02	1/26/17 16:25	59-AA-02-NS	NS1	TO15SIM	1,2-Dichloroethane	0.062	FB	ug/m3	0.0097	0.12
59-IA-01	1/26/17 16:15	59-IA-01-FD	NS1	TO15SIM	1,2-Dichloroethane	0.1	FB	ug/m3	0.015	0.2
59-IA-01	1/26/17 16:15	59-IA-01-NS	NS1	TO15SIM	1,2-Dichloroethane	0.12	FB	ug/m3	0.015	0.2
59-IA-02	1/26/17 16:12	59-IA-02-NS	NS1	TO15SIM	1,2-Dichloroethane	0.096	FB	ug/m3	0.0098	0.13
59-IA-03	1/26/17 16:13	59-IA-03-NS	NS1	TO15SIM	1,2-Dichloroethane	0.095	FB	ug/m3	0.0098	0.13
59-IA-04	1/26/17 16:14	59-IA-04-NS	NS1	TO15SIM	1,2-Dichloroethane	0.096	FB	ug/m3	0.0098	0.13
59-SS-01	1/27/17 8:22	59-SS-01-FD	NS1	TO15	1,2-Dichloroethane	0		ug/m3	14	46
59-SS-01	1/27/17 8:22	59-SS-01-NS	NS1	TO15	1,2-Dichloroethane	0		ug/m3	14	46
59-SS-02	1/27/17 9:08	59-SS-02-NS	NS1	TO15	1,2-Dichloroethane	0		ug/m3	13	45
59-SS-03	1/27/17 9:33	59-SS-03-NS	NS1	TO15	1,2-Dichloroethane	0		ug/m3	13	43
59-SS-04	1/27/17 8:48	59-SS-04-NS	NS1	TO15	1,2-Dichloroethane	0		ug/m3	13	44
59-AA-01	1/26/17 16:18	59-AA-01-FD	NS1	TO15SIM	Carbon Tetrachloride	0.41		ug/m3	0.011	0.29
59-AA-01	1/26/17 16:18	59-AA-01-NS	NS1	TO15SIM	Carbon Tetrachloride	0.43		ug/m3	0.011	0.29
59-AA-02	1/26/17 16:25	59-AA-02-NS	NS1	TO15SIM	Carbon Tetrachloride	0.43		ug/m3	0.0077	0.2
59-IA-01	1/26/17 16:15	59-IA-01-FD	NS1	TO15SIM	Carbon Tetrachloride	0.22	JF	ug/m3	0.012	0.31
59-IA-01	1/26/17 16:15	59-IA-01-NS	NS1	TO15SIM	Carbon Tetrachloride	0.43	JF	ug/m3	0.012	0.31
59-IA-02	1/26/17 16:12	59-IA-02-NS	NS1	TO15SIM	Carbon Tetrachloride	0.39		ug/m3	0.0078	0.2
59-IA-03	1/26/17 16:13	59-IA-03-NS	NS1	TO15SIM	Carbon Tetrachloride	0.42		ug/m3	0.0078	0.2
59-IA-04	1/26/17 16:14	59-IA-04-NS	NS1	TO15SIM	Carbon Tetrachloride	0.43		ug/m3	0.0078	0.2
59-SS-01	1/27/17 8:22	59-SS-01-FD	NS1	TO15	Carbon Tetrachloride	0		ug/m3	17	71
59-SS-01	1/27/17 8:22	59-SS-01-NS	NS1	TO15	Carbon Tetrachloride	0		ug/m3	17	71
59-SS-02	1/27/17 9:08	59-SS-02-NS	NS1	TO15	Carbon Tetrachloride	0		ug/m3	17	70

Table D-1. Indoor Air Results, January 26-27, 2017
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-SS-03	1/27/17 9:33	59-SS-03-NS	NS1	TO15	Carbon Tetrachloride	0		ug/m3	16	67
59-SS-04	1/27/17 8:48	59-SS-04-NS	NS1	TO15	Carbon Tetrachloride	0		ug/m3	17	68
59-AA-01	1/26/17 16:18	59-AA-01-FD	NS1	TO15SIM	Tetrachloroethene	0.04	FB	ug/m3	0.015	0.31
59-AA-01	1/26/17 16:18	59-AA-01-NS	NS1	TO15SIM	Tetrachloroethene	0.032	FB	ug/m3	0.015	0.31
59-AA-02	1/26/17 16:25	59-AA-02-NS	NS1	TO15SIM	Tetrachloroethene	0.033	FB	ug/m3	0.01	0.21
59-IA-01	1/26/17 16:15	59-IA-01-FD	NS1	TO15SIM	Tetrachloroethene	0.061	FB	ug/m3	0.016	0.33
59-IA-01	1/26/17 16:15	59-IA-01-NS	NS1	TO15SIM	Tetrachloroethene	0.05	FB	ug/m3	0.016	0.33
59-IA-02	1/26/17 16:12	59-IA-02-NS	NS1	TO15SIM	Tetrachloroethene	0.054	FB	ug/m3	0.01	0.21
59-IA-03	1/26/17 16:13	59-IA-03-NS	NS1	TO15SIM	Tetrachloroethene	0.053	FB	ug/m3	0.01	0.21
59-IA-04	1/26/17 16:14	59-IA-04-NS	NS1	TO15SIM	Tetrachloroethene	0.052	FB	ug/m3	0.01	0.21
59-SS-01	1/27/17 8:22	59-SS-01-FD	NS1	TO15	Tetrachloroethene	0		ug/m3	25	76
59-SS-01	1/27/17 8:22	59-SS-01-NS	NS1	TO15	Tetrachloroethene	0		ug/m3	25	77
59-SS-02	1/27/17 9:08	59-SS-02-NS	NS1	TO15	Tetrachloroethene	0		ug/m3	24	75
59-SS-03	1/27/17 9:33	59-SS-03-NS	NS1	TO15	Tetrachloroethene	0		ug/m3	23	72
59-SS-04	1/27/17 8:48	59-SS-04-NS	NS1	TO15	Tetrachloroethene	0		ug/m3	24	74
59-AA-01	1/26/17 16:18	59-AA-01-FD	NS1	TO15SIM	trans-1,2-Dichloroethene	0		ug/m3	0.017	0.91
59-AA-01	1/26/17 16:18	59-AA-01-NS	NS1	TO15SIM	trans-1,2-Dichloroethene	0		ug/m3	0.017	0.91
59-AA-02	1/26/17 16:25	59-AA-02-NS	NS1	TO15SIM	trans-1,2-Dichloroethene	0		ug/m3	0.012	0.61
59-IA-01	1/26/17 16:15	59-IA-01-FD	NS1	TO15SIM	trans-1,2-Dichloroethene	0.63	F	ug/m3	0.018	0.97
59-IA-01	1/26/17 16:15	59-IA-01-NS	NS1	TO15SIM	trans-1,2-Dichloroethene	0.68	F	ug/m3	0.018	0.97
59-IA-02	1/26/17 16:12	59-IA-02-NS	NS1	TO15SIM	trans-1,2-Dichloroethene	0.56	F	ug/m3	0.012	0.63
59-IA-03	1/26/17 16:13	59-IA-03-NS	NS1	TO15SIM	trans-1,2-Dichloroethene	0.68		ug/m3	0.012	0.63
59-IA-04	1/26/17 16:14	59-IA-04-NS	NS1	TO15SIM	trans-1,2-Dichloroethene	0.72		ug/m3	0.012	0.63
59-SS-01	1/27/17 8:22	59-SS-01-FD	NS1	TO15	trans-1,2-Dichloroethene	0		ug/m3	16	45
59-SS-01	1/27/17 8:22	59-SS-01-NS	NS1	TO15	trans-1,2-Dichloroethene	0		ug/m3	16	45
59-SS-02	1/27/17 9:08	59-SS-02-NS	NS1	TO15	trans-1,2-Dichloroethene	0		ug/m3	16	44
59-SS-03	1/27/17 9:33	59-SS-03-NS	NS1	TO15	trans-1,2-Dichloroethene	0		ug/m3	15	42
59-SS-04	1/27/17 8:48	59-SS-04-NS	NS1	TO15	trans-1,2-Dichloroethene	0		ug/m3	15	43
59-AA-01	1/26/17 16:18	59-AA-01-FD	NS1	TO15SIM	Trichloroethene	0.028	FB	ug/m3	0.013	0.25
59-AA-01	1/26/17 16:18	59-AA-01-NS	NS1	TO15SIM	Trichloroethene	0.023	FB	ug/m3	0.013	0.25
59-AA-02	1/26/17 16:25	59-AA-02-NS	NS1	TO15SIM	Trichloroethene	0.017	FB	ug/m3	0.0088	0.17
59-IA-01	1/26/17 16:15	59-IA-01-FD	NS1	TO15SIM	Trichloroethene	0.025	FB	ug/m3	0.014	0.26
59-IA-01	1/26/17 16:15	59-IA-01-NS	NS1	TO15SIM	Trichloroethene	0.028	FB	ug/m3	0.014	0.26
59-IA-02	1/26/17 16:12	59-IA-02-NS	NS1	TO15SIM	Trichloroethene	0.026	FB	ug/m3	0.009	0.17
59-IA-03	1/26/17 16:13	59-IA-03-NS	NS1	TO15SIM	Trichloroethene	0.021	FB	ug/m3	0.009	0.17
59-IA-04	1/26/17 16:14	59-IA-04-NS	NS1	TO15SIM	Trichloroethene	0.028	FB	ug/m3	0.009	0.17
59-SS-01	1/27/17 8:22	59-SS-01-FD	NS1	TO15	Trichloroethene	16	F	ug/m3	13	60

Table D-1. Indoor Air Results, January 26-27, 2017
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-SS-01	1/27/17 8:22	59-SS-01-NS	NS1	TO15	Trichloroethene	24	F	ug/m3	13	61
59-SS-02	1/27/17 9:08	59-SS-02-NS	NS1	TO15	Trichloroethene	36	F	ug/m3	12	60
59-SS-03	1/27/17 9:33	59-SS-03-NS	NS1	TO15	Trichloroethene	37	F	ug/m3	12	57
59-SS-04	1/27/17 8:48	59-SS-04-NS	NS1	TO15	Trichloroethene	1400		ug/m3	12	58
Leak Testing Results:										
59-SS-01	1/27/17 8:22	59-SS-01-FD	NS1	TO15	Isopropanol	0		ug/m3	14	110
59-SS-01	1/27/17 8:22	59-SS-01-NS	NS1	TO15	Isopropanol	0		ug/m3	14	110
59-SS-02	1/27/17 9:08	59-SS-02-NS	NS1	TO15	Isopropanol	160		ug/m3	14	110
59-SS-03	1/27/17 9:33	59-SS-03-NS	NS1	TO15	Isopropanol	0		ug/m3	13	100
59-SS-04	1/27/17 8:48	59-SS-04-NS	NS1	TO15	Isopropanol	60	F	ug/m3	14	110

AA = ambient air sample
IA = indoor air sample
SS = sub-slab vapor sample

DL = detection limit
F = detected between the reporting limit and detection limit.
FB = qualified as not detected due to blank contamination; detected between the reporting limit and the detection limit
FD = field duplicate
NS = normal sample
RL = reporting limit
ug/m3 = micrograms per cubic meter

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-05	11/7/2017	59-PW-05-10-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.4	12
59-PW-05	11/7/2017	59-PW-05-10-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.5	12
59-PW-05	11/7/2017	59-PW-05-10-NS	NS1	TO15	Benzene	0		PPBV	1.7	12
59-PW-05	11/7/2017	59-PW-05-10-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-05	11/7/2017	59-PW-05-10-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-05	11/7/2017	59-PW-05-10-NS	NS1	TO15	Chloroform	0		PPBV	1.9	12
59-PW-05	11/7/2017	59-PW-05-10-NS	NS1	TO15	cis-1,2-Dichloroethene	2.3	F	PPBV	2.1	12
59-PW-05	11/7/2017	59-PW-05-10-NS	NS1	TO15	Isopropanol	10	F	PPBV	5.4	49
59-PW-05	11/7/2017	59-PW-05-10-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-05	11/7/2017	59-PW-05-10-NS	NS1	TO15	Tetrachloroethene	67		PPBV	1.1	12
59-PW-05	11/7/2017	59-PW-05-10-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-05	11/7/2017	59-PW-05-10-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.4	12
59-PW-05	11/7/2017	59-PW-05-10-NS	NS1	TO15	Trichloroethene	110		PPBV	1.8	12
59-PW-05	11/7/2017	59-PW-05-10-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-05	11/7/2017	59-PW-05-30-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-05	11/7/2017	59-PW-05-30-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.5	12
59-PW-05	11/7/2017	59-PW-05-30-NS	NS1	TO15	Benzene	0		PPBV	1.7	12
59-PW-05	11/7/2017	59-PW-05-30-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-05	11/7/2017	59-PW-05-30-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-05	11/7/2017	59-PW-05-30-NS	NS1	TO15	Chloroform	2	F	PPBV	1.9	12
59-PW-05	11/7/2017	59-PW-05-30-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-05	11/7/2017	59-PW-05-30-NS	NS1	TO15	Isopropanol	0		PPBV	5.4	49
59-PW-05	11/7/2017	59-PW-05-30-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-05	11/7/2017	59-PW-05-30-NS	NS1	TO15	Tetrachloroethene	26		PPBV	1.1	12
59-PW-05	11/7/2017	59-PW-05-30-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-05	11/7/2017	59-PW-05-30-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.4	12
59-PW-05	11/7/2017	59-PW-05-30-NS	NS1	TO15	Trichloroethene	320		PPBV	1.8	12
59-PW-05	11/7/2017	59-PW-05-30-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-05	11/7/2017	59-PW-05-50-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.4	12
59-PW-05	11/7/2017	59-PW-05-50-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.5	12
59-PW-05	11/7/2017	59-PW-05-50-NS	NS1	TO15	Benzene	0		PPBV	1.7	12
59-PW-05	11/7/2017	59-PW-05-50-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.9	12
59-PW-05	11/7/2017	59-PW-05-50-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-05	11/7/2017	59-PW-05-50-NS	NS1	TO15	Chloroform	0		PPBV	1.9	12
59-PW-05	11/7/2017	59-PW-05-50-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2.1	12
59-PW-05	11/7/2017	59-PW-05-50-NS	NS1	TO15	Isopropanol	0		PPBV	5.5	50
59-PW-05	11/7/2017	59-PW-05-50-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-05	11/7/2017	59-PW-05-50-NS	NS1	TO15	Tetrachloroethene	0		PPBV	1.1	12
59-PW-05	11/7/2017	59-PW-05-50-NS	NS1	TO15	Toluene	0		PPBV	1.5	12

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-05	11/7/2017	59-PW-05-50-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.4	12
59-PW-05	11/7/2017	59-PW-05-50-NS	NS1	TO15	Trichloroethene	18	J+	PPBV	1.8	12
59-PW-05	11/7/2017	59-PW-05-50-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-05	11/7/2017	59-PW-05-70-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.4	12
59-PW-05	11/7/2017	59-PW-05-70-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.5	12
59-PW-05	11/7/2017	59-PW-05-70-NS	NS1	TO15	Benzene	0		PPBV	1.7	12
59-PW-05	11/7/2017	59-PW-05-70-NS	NS1	TO15	Carbon Tetrachloride	4.5	F	PPBV	1.8	12
59-PW-05	11/7/2017	59-PW-05-70-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-05	11/7/2017	59-PW-05-70-NS	NS1	TO15	Chloroform	4.3	F	PPBV	1.9	12
59-PW-05	11/7/2017	59-PW-05-70-NS	NS1	TO15	cis-1,2-Dichloroethene	3.2	F	PPBV	2.1	12
59-PW-05	11/7/2017	59-PW-05-70-NS	NS1	TO15	Isopropanol	0		PPBV	5.4	49
59-PW-05	11/7/2017	59-PW-05-70-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-05	11/7/2017	59-PW-05-70-NS	NS1	TO15	Tetrachloroethene	23		PPBV	1.1	12
59-PW-05	11/7/2017	59-PW-05-70-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-05	11/7/2017	59-PW-05-70-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.4	12
59-PW-05	11/7/2017	59-PW-05-70-NS	NS1	TO15	Trichloroethene	410		PPBV	1.8	12
59-PW-05	11/7/2017	59-PW-05-70-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-06	11/7/2017	59-PW-06-11-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-06	11/7/2017	59-PW-06-11-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.4	12
59-PW-06	11/7/2017	59-PW-06-11-NS	NS1	TO15	Benzene	0		PPBV	1.6	12
59-PW-06	11/7/2017	59-PW-06-11-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-06	11/7/2017	59-PW-06-11-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-06	11/7/2017	59-PW-06-11-NS	NS1	TO15	Chloroform	0		PPBV	1.8	12
59-PW-06	11/7/2017	59-PW-06-11-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-06	11/7/2017	59-PW-06-11-NS	NS1	TO15	Isopropanol	0		PPBV	5.2	48
59-PW-06	11/7/2017	59-PW-06-11-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-06	11/7/2017	59-PW-06-11-NS	NS1	TO15	Tetrachloroethene	0		PPBV	1.1	12
59-PW-06	11/7/2017	59-PW-06-11-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-06	11/7/2017	59-PW-06-11-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.3	12
59-PW-06	11/7/2017	59-PW-06-11-NS	NS1	TO15	Trichloroethene	23		PPBV	1.7	12
59-PW-06	11/7/2017	59-PW-06-11-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.1	12
59-PW-06	11/7/2017	59-PW-06-31-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-06	11/7/2017	59-PW-06-31-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.5	12
59-PW-06	11/7/2017	59-PW-06-31-NS	NS1	TO15	Benzene	0		PPBV	1.7	12
59-PW-06	11/7/2017	59-PW-06-31-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-06	11/7/2017	59-PW-06-31-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-06	11/7/2017	59-PW-06-31-NS	NS1	TO15	Chloroform	0		PPBV	1.9	12
59-PW-06	11/7/2017	59-PW-06-31-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-06	11/7/2017	59-PW-06-31-NS	NS1	TO15	Isopropanol	0		PPBV	5.3	48

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-06	11/7/2017	59-PW-06-31-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-06	11/7/2017	59-PW-06-31-NS	NS1	TO15	Tetrachloroethene	0		PPBV	1.1	12
59-PW-06	11/7/2017	59-PW-06-31-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-06	11/7/2017	59-PW-06-31-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.3	12
59-PW-06	11/7/2017	59-PW-06-31-NS	NS1	TO15	Trichloroethene	10	B	PPBV	1.8	12
59-PW-06	11/7/2017	59-PW-06-31-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-06	11/7/2017	59-PW-06-51-FD	FD1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-06	11/7/2017	59-PW-06-51-FD	FD1	TO15	1,1-Dichloroethene	0		PPBV	1.4	12
59-PW-06	11/7/2017	59-PW-06-51-FD	FD1	TO15	Benzene	0		PPBV	1.6	12
59-PW-06	11/7/2017	59-PW-06-51-FD	FD1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-06	11/7/2017	59-PW-06-51-FD	FD1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-06	11/7/2017	59-PW-06-51-FD	FD1	TO15	Chloroform	0		PPBV	1.9	12
59-PW-06	11/7/2017	59-PW-06-51-FD	FD1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-06	11/7/2017	59-PW-06-51-FD	FD1	TO15	Isopropanol	0		PPBV	5.2	48
59-PW-06	11/7/2017	59-PW-06-51-FD	FD1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-06	11/7/2017	59-PW-06-51-FD	FD1	TO15	Tetrachloroethene	0		PPBV	1.1	12
59-PW-06	11/7/2017	59-PW-06-51-FD	FD1	TO15	Toluene	0		PPBV	1.4	12
59-PW-06	11/7/2017	59-PW-06-51-FD	FD1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.3	12
59-PW-06	11/7/2017	59-PW-06-51-FD	FD1	TO15	Trichloroethene	11	B	PPBV	1.7	12
59-PW-06	11/7/2017	59-PW-06-51-FD	FD1	TO15	Trichlorofluoromethane	0		PPBV	1.1	12
59-PW-06	11/7/2017	59-PW-06-51-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-06	11/7/2017	59-PW-06-51-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.5	12
59-PW-06	11/7/2017	59-PW-06-51-NS	NS1	TO15	Benzene	0		PPBV	1.7	12
59-PW-06	11/7/2017	59-PW-06-51-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-06	11/7/2017	59-PW-06-51-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-06	11/7/2017	59-PW-06-51-NS	NS1	TO15	Chloroform	0		PPBV	1.9	12
59-PW-06	11/7/2017	59-PW-06-51-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-06	11/7/2017	59-PW-06-51-NS	NS1	TO15	Isopropanol	0		PPBV	5.3	48
59-PW-06	11/7/2017	59-PW-06-51-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-06	11/7/2017	59-PW-06-51-NS	NS1	TO15	Tetrachloroethene	0		PPBV	1.1	12
59-PW-06	11/7/2017	59-PW-06-51-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-06	11/7/2017	59-PW-06-51-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.3	12
59-PW-06	11/7/2017	59-PW-06-51-NS	NS1	TO15	Trichloroethene	10	B	PPBV	1.8	12
59-PW-06	11/7/2017	59-PW-06-51-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-06	11/7/2017	59-PW-06-70-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-06	11/7/2017	59-PW-06-70-NS	NS1	TO15	1,1-Dichloroethene	5.2	F	PPBV	1.5	12
59-PW-06	11/7/2017	59-PW-06-70-NS	NS1	TO15	Benzene	0		PPBV	1.6	12
59-PW-06	11/7/2017	59-PW-06-70-NS	NS1	TO15	Carbon Tetrachloride	67		PPBV	1.8	12
59-PW-06	11/7/2017	59-PW-06-70-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-06	11/7/2017	59-PW-06-70-NS	NS1	TO15	Chloroform	2.9	F	PPBV	1.9	12
59-PW-06	11/7/2017	59-PW-06-70-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-06	11/7/2017	59-PW-06-70-NS	NS1	TO15	Isopropanol	0		PPBV	5.3	48
59-PW-06	11/7/2017	59-PW-06-70-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-06	11/7/2017	59-PW-06-70-NS	NS1	TO15	Tetrachloroethene	27		PPBV	1.1	12
59-PW-06	11/7/2017	59-PW-06-70-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-06	11/7/2017	59-PW-06-70-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.3	12
59-PW-06	11/7/2017	59-PW-06-70-NS	NS1	TO15	Trichloroethene	360		PPBV	1.8	12
59-PW-06	11/7/2017	59-PW-06-70-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-07	11/7/2017	59-PW-07-10-NS	NS1	TO15	1,1,1-Trichloroethane	5	F	PPBV	1.3	12
59-PW-07	11/7/2017	59-PW-07-10-NS	NS1	TO15	1,1-Dichloroethene	88		PPBV	1.4	12
59-PW-07	11/7/2017	59-PW-07-10-NS	NS1	TO15	Benzene	0		PPBV	1.6	12
59-PW-07	11/7/2017	59-PW-07-10-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-07	11/7/2017	59-PW-07-10-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-07	11/7/2017	59-PW-07-10-NS	NS1	TO15	Chloroform	6.8	F	PPBV	1.9	12
59-PW-07	11/7/2017	59-PW-07-10-NS	NS1	TO15	cis-1,2-Dichloroethene	3.4	F	PPBV	2	12
59-PW-07	11/7/2017	59-PW-07-10-NS	NS1	TO15	Isopropanol	0		PPBV	5.2	48
59-PW-07	11/7/2017	59-PW-07-10-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-07	11/7/2017	59-PW-07-10-NS	NS1	TO15	Tetrachloroethene	16		PPBV	1.1	12
59-PW-07	11/7/2017	59-PW-07-10-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-07	11/7/2017	59-PW-07-10-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.3	12
59-PW-07	11/7/2017	59-PW-07-10-NS	NS1	TO15	Trichloroethene	7100		PPBV	1.7	12
59-PW-07	11/7/2017	59-PW-07-10-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.1	12
59-PW-08	11/7/2017	59-PW-08-10-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-08	11/7/2017	59-PW-08-10-NS	NS1	TO15	1,1-Dichloroethene	11	F	PPBV	1.4	12
59-PW-08	11/7/2017	59-PW-08-10-NS	NS1	TO15	Benzene	0		PPBV	1.6	12
59-PW-08	11/7/2017	59-PW-08-10-NS	NS1	TO15	Carbon Tetrachloride	4.6	F	PPBV	1.7	12
59-PW-08	11/7/2017	59-PW-08-10-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.4	12
59-PW-08	11/7/2017	59-PW-08-10-NS	NS1	TO15	Chloroform	3.3	F	PPBV	1.8	12
59-PW-08	11/7/2017	59-PW-08-10-NS	NS1	TO15	cis-1,2-Dichloroethene	3.6	F	PPBV	1.9	12
59-PW-08	11/7/2017	59-PW-08-10-NS	NS1	TO15	Isopropanol	0		PPBV	5.1	46
59-PW-08	11/7/2017	59-PW-08-10-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.4	12
59-PW-08	11/7/2017	59-PW-08-10-NS	NS1	TO15	Tetrachloroethene	38		PPBV	1	12
59-PW-08	11/7/2017	59-PW-08-10-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-08	11/7/2017	59-PW-08-10-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.2	12
59-PW-08	11/7/2017	59-PW-08-10-NS	NS1	TO15	Trichloroethene	1100		PPBV	1.7	12
59-PW-08	11/7/2017	59-PW-08-10-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.1	12
59-PW-09A	11/7/2017	59-PW-09A-10-NS	NS1	TO15	1,1,1-Trichloroethane	44		PPBV	1.4	13
59-PW-09A	11/7/2017	59-PW-09A-10-NS	NS1	TO15	1,1-Dichloroethene	380		PPBV	1.5	13

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-09A	11/7/2017	59-PW-09A-10-NS	NS1	TO15	Benzene	0		PPBV	1.7	13
59-PW-09A	11/7/2017	59-PW-09A-10-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.9	13
59-PW-09A	11/7/2017	59-PW-09A-10-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.6	13
59-PW-09A	11/7/2017	59-PW-09A-10-NS	NS1	TO15	Chloroform	8.6	F	PPBV	2	13
59-PW-09A	11/7/2017	59-PW-09A-10-NS	NS1	TO15	cis-1,2-Dichloroethene	52		PPBV	2.1	13
59-PW-09A	11/7/2017	59-PW-09A-10-NS	NS1	TO15	Isopropanol	0		PPBV	5.5	50
59-PW-09A	11/7/2017	59-PW-09A-10-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.6	13
59-PW-09A	11/7/2017	59-PW-09A-10-NS	NS1	TO15	Tetrachloroethene	36		PPBV	1.1	13
59-PW-09A	11/7/2017	59-PW-09A-10-NS	NS1	TO15	Toluene	0		PPBV	1.5	13
59-PW-09A	11/7/2017	59-PW-09A-10-NS	NS1	TO15	trans-1,2-Dichloroethene	31		PPBV	3.5	13
59-PW-09A	11/7/2017	59-PW-09A-10-NS	NS1	TO15	Trichloroethene	24000		PPBV	1.8	13
59-PW-09A	11/7/2017	59-PW-09A-10-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	13
59-PW-09B	11/7/2017	59-PW-09B-20-FD	FD1	TO15	1,1,1-Trichloroethane	85		PPBV	2.3	21
59-PW-09B	11/7/2017	59-PW-09B-20-FD	FD1	TO15	1,1-Dichloroethene	490		PPBV	2.5	21
59-PW-09B	11/7/2017	59-PW-09B-20-FD	FD1	TO15	Benzene	0		PPBV	2.9	21
59-PW-09B	11/7/2017	59-PW-09B-20-FD	FD1	TO15	Carbon Tetrachloride	0		PPBV	3.1	21
59-PW-09B	11/7/2017	59-PW-09B-20-FD	FD1	TO15	Chlorobenzene	0		PPBV	2.6	21
59-PW-09B	11/7/2017	59-PW-09B-20-FD	FD1	TO15	Chloroform	8	F	PPBV	3.2	21
59-PW-09B	11/7/2017	59-PW-09B-20-FD	FD1	TO15	cis-1,2-Dichloroethene	51		PPBV	3.5	21
59-PW-09B	11/7/2017	59-PW-09B-20-FD	FD1	TO15	Isopropanol	29	F	PPBV	9.2	83
59-PW-09B	11/7/2017	59-PW-09B-20-FD	FD1	TO15	m,p-Xylenes	0		PPBV	2.6	21
59-PW-09B	11/7/2017	59-PW-09B-20-FD	FD1	TO15	Tetrachloroethene	47		PPBV	1.9	21
59-PW-09B	11/7/2017	59-PW-09B-20-FD	FD1	TO15	Toluene	0		PPBV	2.4	21
59-PW-09B	11/7/2017	59-PW-09B-20-FD	FD1	TO15	trans-1,2-Dichloroethene	28		PPBV	5.7	21
59-PW-09B	11/7/2017	59-PW-09B-20-FD	FD1	TO15	Trichloroethene	26000		PPBV	3	21
59-PW-09B	11/7/2017	59-PW-09B-20-FD	FD1	TO15	Trichlorofluoromethane	0		PPBV	2	21
59-PW-09B	11/7/2017	59-PW-09B-20-NS	NS1	TO15	1,1,1-Trichloroethane	85		PPBV	1.4	13
59-PW-09B	11/7/2017	59-PW-09B-20-NS	NS1	TO15	1,1-Dichloroethene	520		PPBV	1.5	13
59-PW-09B	11/7/2017	59-PW-09B-20-NS	NS1	TO15	Benzene	0		PPBV	1.7	13
59-PW-09B	11/7/2017	59-PW-09B-20-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.9	13
59-PW-09B	11/7/2017	59-PW-09B-20-NS	NS1	TO15	Chlorobenzene	1.8	F	PPBV	1.6	13
59-PW-09B	11/7/2017	59-PW-09B-20-NS	NS1	TO15	Chloroform	7.9	F	PPBV	2	13
59-PW-09B	11/7/2017	59-PW-09B-20-NS	NS1	TO15	cis-1,2-Dichloroethene	54		PPBV	2.1	13
59-PW-09B	11/7/2017	59-PW-09B-20-NS	NS1	TO15	Isopropanol	6.4	F	PPBV	5.5	50
59-PW-09B	11/7/2017	59-PW-09B-20-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.6	13
59-PW-09B	11/7/2017	59-PW-09B-20-NS	NS1	TO15	Tetrachloroethene	46		PPBV	1.1	13
59-PW-09B	11/7/2017	59-PW-09B-20-NS	NS1	TO15	Toluene	0		PPBV	1.5	13
59-PW-09B	11/7/2017	59-PW-09B-20-NS	NS1	TO15	trans-1,2-Dichloroethene	25		PPBV	3.5	13
59-PW-09B	11/7/2017	59-PW-09B-20-NS	NS1	TO15	Trichloroethene	26000		PPBV	1.8	13

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-09B	11/7/2017	59-PW-09B-20-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	13
59-PW-10A	11/7/2017	59-PW-10A-08-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-10A	11/7/2017	59-PW-10A-08-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.5	12
59-PW-10A	11/7/2017	59-PW-10A-08-NS	NS1	TO15	Benzene	0		PPBV	1.7	12
59-PW-10A	11/7/2017	59-PW-10A-08-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-10A	11/7/2017	59-PW-10A-08-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-10A	11/7/2017	59-PW-10A-08-NS	NS1	TO15	Chloroform	0		PPBV	1.9	12
59-PW-10A	11/7/2017	59-PW-10A-08-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-10A	11/7/2017	59-PW-10A-08-NS	NS1	TO15	Isopropanol	30000	J	PPBV	5.4	49
59-PW-10A	11/7/2017	59-PW-10A-08-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-10A	11/7/2017	59-PW-10A-08-NS	NS1	TO15	Tetrachloroethene	0		PPBV	1.1	12
59-PW-10A	11/7/2017	59-PW-10A-08-NS	NS1	TO15	Toluene	3	F	PPBV	1.4	12
59-PW-10A	11/7/2017	59-PW-10A-08-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.4	12
59-PW-10A	11/7/2017	59-PW-10A-08-NS	NS1	TO15	Trichloroethene	5.6	F	PPBV	1.8	12
59-PW-10A	11/7/2017	59-PW-10A-08-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-10B	11/7/2017	59-PW-10B-20-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-10B	11/7/2017	59-PW-10B-20-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.4	12
59-PW-10B	11/7/2017	59-PW-10B-20-NS	NS1	TO15	Benzene	0		PPBV	1.6	12
59-PW-10B	11/7/2017	59-PW-10B-20-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-10B	11/7/2017	59-PW-10B-20-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-10B	11/7/2017	59-PW-10B-20-NS	NS1	TO15	Chloroform	0		PPBV	1.8	12
59-PW-10B	11/7/2017	59-PW-10B-20-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-10B	11/7/2017	59-PW-10B-20-NS	NS1	TO15	Isopropanol	97		PPBV	5.2	48
59-PW-10B	11/7/2017	59-PW-10B-20-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-10B	11/7/2017	59-PW-10B-20-NS	NS1	TO15	Tetrachloroethene	5.8	F	PPBV	1.1	12
59-PW-10B	11/7/2017	59-PW-10B-20-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-10B	11/7/2017	59-PW-10B-20-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.3	12
59-PW-10B	11/7/2017	59-PW-10B-20-NS	NS1	TO15	Trichloroethene	3.9	F	PPBV	1.7	12
59-PW-10B	11/7/2017	59-PW-10B-20-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.1	12
59-PW-11A	11/8/2017	59-PW-11A-08-FD	FD1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-11A	11/8/2017	59-PW-11A-08-FD	FD1	TO15	1,1-Dichloroethene	0		PPBV	1.4	12
59-PW-11A	11/8/2017	59-PW-11A-08-FD	FD1	TO15	Benzene	0		PPBV	1.6	12
59-PW-11A	11/8/2017	59-PW-11A-08-FD	FD1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-11A	11/8/2017	59-PW-11A-08-FD	FD1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-11A	11/8/2017	59-PW-11A-08-FD	FD1	TO15	Chloroform	0		PPBV	1.8	12
59-PW-11A	11/8/2017	59-PW-11A-08-FD	FD1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-11A	11/8/2017	59-PW-11A-08-FD	FD1	TO15	Isopropanol	0		PPBV	5.2	47
59-PW-11A	11/8/2017	59-PW-11A-08-FD	FD1	TO15	m,p-Xylenes	3.8	F	PPBV	1.5	12
59-PW-11A	11/8/2017	59-PW-11A-08-FD	FD1	TO15	Tetrachloroethene	35		PPBV	1.1	12

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-11A	11/8/2017	59-PW-11A-08-FD	FD1	TO15	Toluene	3.2	F	PPBV	1.4	12
59-PW-11A	11/8/2017	59-PW-11A-08-FD	FD1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.3	12
59-PW-11A	11/8/2017	59-PW-11A-08-FD	FD1	TO15	Trichloroethene	33		PPBV	1.7	12
59-PW-11A	11/8/2017	59-PW-11A-08-FD	FD1	TO15	Trichlorofluoromethane	0		PPBV	1.1	12
59-PW-11A	11/8/2017	59-PW-11A-08-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-11A	11/8/2017	59-PW-11A-08-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.4	12
59-PW-11A	11/8/2017	59-PW-11A-08-NS	NS1	TO15	Benzene	0		PPBV	1.6	12
59-PW-11A	11/8/2017	59-PW-11A-08-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-11A	11/8/2017	59-PW-11A-08-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-11A	11/8/2017	59-PW-11A-08-NS	NS1	TO15	Chloroform	0		PPBV	1.9	12
59-PW-11A	11/8/2017	59-PW-11A-08-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-11A	11/8/2017	59-PW-11A-08-NS	NS1	TO15	Isopropanol	5.3	F	PPBV	5.2	48
59-PW-11A	11/8/2017	59-PW-11A-08-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-11A	11/8/2017	59-PW-11A-08-NS	NS1	TO15	Tetrachloroethene	35		PPBV	1.1	12
59-PW-11A	11/8/2017	59-PW-11A-08-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-11A	11/8/2017	59-PW-11A-08-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.3	12
59-PW-11A	11/8/2017	59-PW-11A-08-NS	NS1	TO15	Trichloroethene	31		PPBV	1.7	12
59-PW-11A	11/8/2017	59-PW-11A-08-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.1	12
59-PW-11B	11/7/2017	59-PW-11B-20-NS	NS1	TO15	1,1,1-Trichloroethane	4.1	F	PPBV	1.3	12
59-PW-11B	11/7/2017	59-PW-11B-20-NS	NS1	TO15	1,1-Dichloroethene	36		PPBV	1.4	12
59-PW-11B	11/7/2017	59-PW-11B-20-NS	NS1	TO15	Benzene	0		PPBV	1.6	12
59-PW-11B	11/7/2017	59-PW-11B-20-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-11B	11/7/2017	59-PW-11B-20-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-11B	11/7/2017	59-PW-11B-20-NS	NS1	TO15	Chloroform	3.2	F	PPBV	1.8	12
59-PW-11B	11/7/2017	59-PW-11B-20-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-11B	11/7/2017	59-PW-11B-20-NS	NS1	TO15	Isopropanol	29	F	PPBV	5.2	47
59-PW-11B	11/7/2017	59-PW-11B-20-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-11B	11/7/2017	59-PW-11B-20-NS	NS1	TO15	Tetrachloroethene	280		PPBV	1.1	12
59-PW-11B	11/7/2017	59-PW-11B-20-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-11B	11/7/2017	59-PW-11B-20-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.2	12
59-PW-11B	11/7/2017	59-PW-11B-20-NS	NS1	TO15	Trichloroethene	1400		PPBV	1.7	12
59-PW-11B	11/7/2017	59-PW-11B-20-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.1	12
59-PW-12A	11/7/2017	59-PW-12A-08-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	270	2400
59-PW-12A	11/7/2017	59-PW-12A-08-NS	NS1	TO15	1,1-Dichloroethene	3900		PPBV	300	2400
59-PW-12A	11/7/2017	59-PW-12A-08-NS	NS1	TO15	Benzene	0		PPBV	330	2400
59-PW-12A	11/7/2017	59-PW-12A-08-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	360	2400
59-PW-12A	11/7/2017	59-PW-12A-08-NS	NS1	TO15	Chlorobenzene	0		PPBV	300	2400
59-PW-12A	11/7/2017	59-PW-12A-08-NS	NS1	TO15	Chloroform	500	F	PPBV	380	2400
59-PW-12A	11/7/2017	59-PW-12A-08-NS	NS1	TO15	cis-1,2-Dichloroethene	37000		PPBV	410	2400

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-12A	11/7/2017	59-PW-12A-08-NS	NS1	TO15	Isopropanol	8900	F	PPBV	1100	9700
59-PW-12A	11/7/2017	59-PW-12A-08-NS	NS1	TO15	m,p-Xylenes	0		PPBV	300	2400
59-PW-12A	11/7/2017	59-PW-12A-08-NS	NS1	TO15	Tetrachloroethene	320	F	PPBV	220	2400
59-PW-12A	11/7/2017	59-PW-12A-08-NS	NS1	TO15	Toluene	0		PPBV	290	2400
59-PW-12A	11/7/2017	59-PW-12A-08-NS	NS1	TO15	trans-1,2-Dichloroethene	7200		PPBV	670	2400
59-PW-12A	11/7/2017	59-PW-12A-08-NS	NS1	TO15	Trichloroethene	2400000		PPBV	350	2400
59-PW-12A	11/7/2017	59-PW-12A-08-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	230	2400
59-PW-12B	11/7/2017	59-PW-12B-20-NS	NS1	TO15	1,1,1-Trichloroethane	1200		PPBV	22	200
59-PW-12B	11/7/2017	59-PW-12B-20-NS	NS1	TO15	1,1-Dichloroethene	3500		PPBV	25	200
59-PW-12B	11/7/2017	59-PW-12B-20-NS	NS1	TO15	Benzene	0		PPBV	28	200
59-PW-12B	11/7/2017	59-PW-12B-20-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	31	200
59-PW-12B	11/7/2017	59-PW-12B-20-NS	NS1	TO15	Chlorobenzene	0		PPBV	25	200
59-PW-12B	11/7/2017	59-PW-12B-20-NS	NS1	TO15	Chloroform	0		PPBV	32	200
59-PW-12B	11/7/2017	59-PW-12B-20-NS	NS1	TO15	cis-1,2-Dichloroethene	780		PPBV	34	200
59-PW-12B	11/7/2017	59-PW-12B-20-NS	NS1	TO15	Isopropanol	0		PPBV	90	820
59-PW-12B	11/7/2017	59-PW-12B-20-NS	NS1	TO15	m,p-Xylenes	0		PPBV	25	200
59-PW-12B	11/7/2017	59-PW-12B-20-NS	NS1	TO15	Tetrachloroethene	66	F	PPBV	18	200
59-PW-12B	11/7/2017	59-PW-12B-20-NS	NS1	TO15	Toluene	0		PPBV	24	200
59-PW-12B	11/7/2017	59-PW-12B-20-NS	NS1	TO15	trans-1,2-Dichloroethene	180	F	PPBV	56	200
59-PW-12B	11/7/2017	59-PW-12B-20-NS	NS1	TO15	Trichloroethene	270000		PPBV	30	200
59-PW-12B	11/7/2017	59-PW-12B-20-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	20	200
59-PW-13A	11/2/2017	59-PW-13A-08-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-13A	11/2/2017	59-PW-13A-08-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.5	12
59-PW-13A	11/2/2017	59-PW-13A-08-NS	NS1	TO15	Benzene	1.7	F	PPBV	1.7	12
59-PW-13A	11/2/2017	59-PW-13A-08-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-13A	11/2/2017	59-PW-13A-08-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-13A	11/2/2017	59-PW-13A-08-NS	NS1	TO15	Chloroform	0		PPBV	1.9	12
59-PW-13A	11/2/2017	59-PW-13A-08-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-13A	11/2/2017	59-PW-13A-08-NS	NS1	TO15	Isopropanol	25000	J	PPBV	5.4	49
59-PW-13A	11/2/2017	59-PW-13A-08-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-13A	11/2/2017	59-PW-13A-08-NS	NS1	TO15	Tetrachloroethene	0		PPBV	1.1	12
59-PW-13A	11/2/2017	59-PW-13A-08-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-13A	11/2/2017	59-PW-13A-08-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.4	12
59-PW-13A	11/2/2017	59-PW-13A-08-NS	NS1	TO15	Trichloroethene	1.8	F	PPBV	1.8	12
59-PW-13A	11/2/2017	59-PW-13A-08-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-13B	11/2/2017	59-PW-13B-20-NS	NS1	TO15	1,1,1-Trichloroethane	6.6	F	PPBV	1.4	12
59-PW-13B	11/2/2017	59-PW-13B-20-NS	NS1	TO15	1,1-Dichloroethene	29		PPBV	1.5	12
59-PW-13B	11/2/2017	59-PW-13B-20-NS	NS1	TO15	Benzene	0		PPBV	1.7	12
59-PW-13B	11/2/2017	59-PW-13B-20-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-13B	11/2/2017	59-PW-13B-20-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-13B	11/2/2017	59-PW-13B-20-NS	NS1	TO15	Chloroform	5.4	F	PPBV	1.9	12
59-PW-13B	11/2/2017	59-PW-13B-20-NS	NS1	TO15	cis-1,2-Dichloroethene	3.9	F	PPBV	2.1	12
59-PW-13B	11/2/2017	59-PW-13B-20-NS	NS1	TO15	Isopropanol	140		PPBV	5.4	49
59-PW-13B	11/2/2017	59-PW-13B-20-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-13B	11/2/2017	59-PW-13B-20-NS	NS1	TO15	Tetrachloroethene	18		PPBV	1.1	12
59-PW-13B	11/2/2017	59-PW-13B-20-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-13B	11/2/2017	59-PW-13B-20-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.4	12
59-PW-13B	11/2/2017	59-PW-13B-20-NS	NS1	TO15	Trichloroethene	530		PPBV	1.8	12
59-PW-13B	11/2/2017	59-PW-13B-20-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-14	11/1/2017	59-PW-14-30-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	24	210
59-PW-14	11/1/2017	59-PW-14-30-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	26	210
59-PW-14	11/1/2017	59-PW-14-30-NS	NS1	TO15	Benzene	0		PPBV	30	210
59-PW-14	11/1/2017	59-PW-14-30-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	32	210
59-PW-14	11/1/2017	59-PW-14-30-NS	NS1	TO15	Chlorobenzene	0		PPBV	26	210
59-PW-14	11/1/2017	59-PW-14-30-NS	NS1	TO15	Chloroform	0		PPBV	33	210
59-PW-14	11/1/2017	59-PW-14-30-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	36	210
59-PW-14	11/1/2017	59-PW-14-30-NS	NS1	TO15	Isopropanol	190000		PPBV	94	860
59-PW-14	11/1/2017	59-PW-14-30-NS	NS1	TO15	m,p-Xylenes	0		PPBV	26	210
59-PW-14	11/1/2017	59-PW-14-30-NS	NS1	TO15	Tetrachloroethene	0		PPBV	19	210
59-PW-14	11/1/2017	59-PW-14-30-NS	NS1	TO15	Toluene	0		PPBV	25	210
59-PW-14	11/1/2017	59-PW-14-30-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	59	210
59-PW-14	11/1/2017	59-PW-14-30-NS	NS1	TO15	Trichloroethene	100	F	PPBV	31	210
59-PW-14	11/1/2017	59-PW-14-30-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	20	210
59-PW-14	11/1/2017	59-PW-14-60-FD	FD1	TO15	1,1,1-Trichloroethane	0		PPBV	1.5	14
59-PW-14	11/1/2017	59-PW-14-60-FD	FD1	TO15	1,1-Dichloroethene	240		PPBV	1.7	14
59-PW-14	11/1/2017	59-PW-14-60-FD	FD1	TO15	Benzene	0		PPBV	1.9	14
59-PW-14	11/1/2017	59-PW-14-60-FD	FD1	TO15	Carbon Tetrachloride	3.6	F	PPBV	2.1	14
59-PW-14	11/1/2017	59-PW-14-60-FD	FD1	TO15	Chlorobenzene	1.8	F	PPBV	1.7	14
59-PW-14	11/1/2017	59-PW-14-60-FD	FD1	TO15	Chloroform	23		PPBV	2.1	14
59-PW-14	11/1/2017	59-PW-14-60-FD	FD1	TO15	cis-1,2-Dichloroethene	9.3	F	PPBV	2.3	14
59-PW-14	11/1/2017	59-PW-14-60-FD	FD1	TO15	Isopropanol	16000		PPBV	6	55
59-PW-14	11/1/2017	59-PW-14-60-FD	FD1	TO15	m,p-Xylenes	0		PPBV	1.7	14
59-PW-14	11/1/2017	59-PW-14-60-FD	FD1	TO15	Tetrachloroethene	34		PPBV	1.2	14
59-PW-14	11/1/2017	59-PW-14-60-FD	FD1	TO15	Toluene	0		PPBV	1.6	14
59-PW-14	11/1/2017	59-PW-14-60-FD	FD1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.8	14
59-PW-14	11/1/2017	59-PW-14-60-FD	FD1	TO15	Trichloroethene	8000		PPBV	2	14
59-PW-14	11/1/2017	59-PW-14-60-FD	FD1	TO15	Trichlorofluoromethane	2.9	F	PPBV	1.3	14
59-PW-14	11/1/2017	59-PW-14-60-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.5	13

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-14	11/1/2017	59-PW-14-60-NS	NS1	TO15	1,1-Dichloroethene	240		PPBV	1.6	13
59-PW-14	11/1/2017	59-PW-14-60-NS	NS1	TO15	Benzene	0		PPBV	1.8	13
59-PW-14	11/1/2017	59-PW-14-60-NS	NS1	TO15	Carbon Tetrachloride	4	F	PPBV	2	13
59-PW-14	11/1/2017	59-PW-14-60-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.7	13
59-PW-14	11/1/2017	59-PW-14-60-NS	NS1	TO15	Chloroform	23		PPBV	2.1	13
59-PW-14	11/1/2017	59-PW-14-60-NS	NS1	TO15	cis-1,2-Dichloroethene	7.4	F	PPBV	2.2	13
59-PW-14	11/1/2017	59-PW-14-60-NS	NS1	TO15	Isopropanol	17000		PPBV	5.9	54
59-PW-14	11/1/2017	59-PW-14-60-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.7	13
59-PW-14	11/1/2017	59-PW-14-60-NS	NS1	TO15	Tetrachloroethene	33		PPBV	1.2	13
59-PW-14	11/1/2017	59-PW-14-60-NS	NS1	TO15	Toluene	0		PPBV	1.6	13
59-PW-14	11/1/2017	59-PW-14-60-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.7	13
59-PW-14	11/1/2017	59-PW-14-60-NS	NS1	TO15	Trichloroethene	8000		PPBV	2	13
59-PW-14	11/1/2017	59-PW-14-60-NS	NS1	TO15	Trichlorofluoromethane	2.2	F	PPBV	1.3	13
59-PW-14	11/3/2017	59-PW-14-80-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-14	11/3/2017	59-PW-14-80-NS	NS1	TO15	1,1-Dichloroethene	16		PPBV	1.4	12
59-PW-14	11/3/2017	59-PW-14-80-NS	NS1	TO15	Benzene	0		PPBV	1.6	12
59-PW-14	11/3/2017	59-PW-14-80-NS	NS1	TO15	Carbon Tetrachloride	3.1	F	PPBV	1.8	12
59-PW-14	11/3/2017	59-PW-14-80-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-14	11/3/2017	59-PW-14-80-NS	NS1	TO15	Chloroform	21		PPBV	1.8	12
59-PW-14	11/3/2017	59-PW-14-80-NS	NS1	TO15	cis-1,2-Dichloroethene	4.9	F	PPBV	2	12
59-PW-14	11/3/2017	59-PW-14-80-NS	NS1	TO15	Isopropanol	190		PPBV	5.2	48
59-PW-14	11/3/2017	59-PW-14-80-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-14	11/3/2017	59-PW-14-80-NS	NS1	TO15	Tetrachloroethene	49		PPBV	1.1	12
59-PW-14	11/3/2017	59-PW-14-80-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-14	11/3/2017	59-PW-14-80-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.3	12
59-PW-14	11/3/2017	59-PW-14-80-NS	NS1	TO15	Trichloroethene	1400		PPBV	1.7	12
59-PW-14	11/3/2017	59-PW-14-80-NS	NS1	TO15	Trichlorofluoromethane	2.3	F	PPBV	1.1	12
59-PW-15	11/2/2017	59-PW-15-08-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	6.9	63
59-PW-15	11/2/2017	59-PW-15-08-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	7.7	63
59-PW-15	11/2/2017	59-PW-15-08-NS	NS1	TO15	Benzene	0		PPBV	8.7	63
59-PW-15	11/2/2017	59-PW-15-08-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	9.4	63
59-PW-15	11/2/2017	59-PW-15-08-NS	NS1	TO15	Chlorobenzene	0		PPBV	7.8	63
59-PW-15	11/2/2017	59-PW-15-08-NS	NS1	TO15	Chloroform	0		PPBV	9.8	63
59-PW-15	11/2/2017	59-PW-15-08-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	10	63
59-PW-15	11/2/2017	59-PW-15-08-NS	NS1	TO15	Isopropanol	58000		PPBV	28	250
59-PW-15	11/2/2017	59-PW-15-08-NS	NS1	TO15	m,p-Xylenes	0		PPBV	7.8	63
59-PW-15	11/2/2017	59-PW-15-08-NS	NS1	TO15	Tetrachloroethene	0		PPBV	5.7	63
59-PW-15	11/2/2017	59-PW-15-08-NS	NS1	TO15	Toluene	0		PPBV	7.4	63
59-PW-15	11/2/2017	59-PW-15-08-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	17	63

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-15	11/2/2017	59-PW-15-08-NS	NS1	TO15	Trichloroethene	0		PPBV	9.2	63
59-PW-15	11/2/2017	59-PW-15-08-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	6	63
59-PW-15	11/2/2017	59-PW-15-20-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-15	11/2/2017	59-PW-15-20-NS	NS1	TO15	1,1-Dichloroethene	50		PPBV	1.5	12
59-PW-15	11/2/2017	59-PW-15-20-NS	NS1	TO15	Benzene	0		PPBV	1.6	12
59-PW-15	11/2/2017	59-PW-15-20-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-15	11/2/2017	59-PW-15-20-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-15	11/2/2017	59-PW-15-20-NS	NS1	TO15	Chloroform	0		PPBV	1.9	12
59-PW-15	11/2/2017	59-PW-15-20-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-15	11/2/2017	59-PW-15-20-NS	NS1	TO15	Isopropanol	740		PPBV	5.3	48
59-PW-15	11/2/2017	59-PW-15-20-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-15	11/2/2017	59-PW-15-20-NS	NS1	TO15	Tetrachloroethene	4	F	PPBV	1.1	12
59-PW-15	11/2/2017	59-PW-15-20-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-15	11/2/2017	59-PW-15-20-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.3	12
59-PW-15	11/2/2017	59-PW-15-20-NS	NS1	TO15	Trichloroethene	590		PPBV	1.8	12
59-PW-15	11/2/2017	59-PW-15-20-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-15	11/2/2017	59-PW-15-30-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-15	11/2/2017	59-PW-15-30-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.5	12
59-PW-15	11/2/2017	59-PW-15-30-NS	NS1	TO15	Benzene	0		PPBV	1.7	12
59-PW-15	11/2/2017	59-PW-15-30-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-15	11/2/2017	59-PW-15-30-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-15	11/2/2017	59-PW-15-30-NS	NS1	TO15	Chloroform	0		PPBV	1.9	12
59-PW-15	11/2/2017	59-PW-15-30-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-15	11/2/2017	59-PW-15-30-NS	NS1	TO15	Isopropanol	620		PPBV	5.3	49
59-PW-15	11/2/2017	59-PW-15-30-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-15	11/2/2017	59-PW-15-30-NS	NS1	TO15	Tetrachloroethene	0		PPBV	1.1	12
59-PW-15	11/2/2017	59-PW-15-30-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-15	11/2/2017	59-PW-15-30-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.4	12
59-PW-15	11/2/2017	59-PW-15-30-NS	NS1	TO15	Trichloroethene	17		PPBV	1.8	12
59-PW-15	11/2/2017	59-PW-15-30-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-15	11/2/2017	59-PW-15-60-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-15	11/2/2017	59-PW-15-60-NS	NS1	TO15	1,1-Dichloroethene	13		PPBV	1.5	12
59-PW-15	11/2/2017	59-PW-15-60-NS	NS1	TO15	Benzene	0		PPBV	1.7	12
59-PW-15	11/2/2017	59-PW-15-60-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-15	11/2/2017	59-PW-15-60-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-15	11/2/2017	59-PW-15-60-NS	NS1	TO15	Chloroform	3	F	PPBV	1.9	12
59-PW-15	11/2/2017	59-PW-15-60-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-15	11/2/2017	59-PW-15-60-NS	NS1	TO15	Isopropanol	9100		PPBV	5.4	49
59-PW-15	11/2/2017	59-PW-15-60-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-15	11/2/2017	59-PW-15-60-NS	NS1	TO15	Tetrachloroethene	3.4	F	PPBV	1.1	12
59-PW-15	11/2/2017	59-PW-15-60-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-15	11/2/2017	59-PW-15-60-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.4	12
59-PW-15	11/2/2017	59-PW-15-60-NS	NS1	TO15	Trichloroethene	470		PPBV	1.8	12
59-PW-15	11/2/2017	59-PW-15-60-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-15	11/2/2017	59-PW-15-80-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-15	11/2/2017	59-PW-15-80-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.5	12
59-PW-15	11/2/2017	59-PW-15-80-NS	NS1	TO15	Benzene	0		PPBV	1.7	12
59-PW-15	11/2/2017	59-PW-15-80-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-15	11/2/2017	59-PW-15-80-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-15	11/2/2017	59-PW-15-80-NS	NS1	TO15	Chloroform	0		PPBV	1.9	12
59-PW-15	11/2/2017	59-PW-15-80-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-15	11/2/2017	59-PW-15-80-NS	NS1	TO15	Isopropanol	100		PPBV	5.3	49
59-PW-15	11/2/2017	59-PW-15-80-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-15	11/2/2017	59-PW-15-80-NS	NS1	TO15	Tetrachloroethene	0		PPBV	1.1	12
59-PW-15	11/2/2017	59-PW-15-80-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-15	11/2/2017	59-PW-15-80-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.4	12
59-PW-15	11/2/2017	59-PW-15-80-NS	NS1	TO15	Trichloroethene	70		PPBV	1.8	12
59-PW-15	11/2/2017	59-PW-15-80-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-16	11/1/2017	59-PW-16-20-NS	NS1	TO15	1,1,1-Trichloroethane	3.9	F	PPBV	1.4	12
59-PW-16	11/1/2017	59-PW-16-20-NS	NS1	TO15	1,1-Dichloroethene	66		PPBV	1.5	12
59-PW-16	11/1/2017	59-PW-16-20-NS	NS1	TO15	Benzene	0		PPBV	1.7	12
59-PW-16	11/1/2017	59-PW-16-20-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.9	12
59-PW-16	11/1/2017	59-PW-16-20-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-16	11/1/2017	59-PW-16-20-NS	NS1	TO15	Chloroform	4.2	F	PPBV	1.9	12
59-PW-16	11/1/2017	59-PW-16-20-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2.1	12
59-PW-16	11/1/2017	59-PW-16-20-NS	NS1	TO15	Isopropanol	120		PPBV	5.4	50
59-PW-16	11/1/2017	59-PW-16-20-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-16	11/1/2017	59-PW-16-20-NS	NS1	TO15	Tetrachloroethene	9.8	F	PPBV	1.1	12
59-PW-16	11/1/2017	59-PW-16-20-NS	NS1	TO15	Toluene	0		PPBV	1.5	12
59-PW-16	11/1/2017	59-PW-16-20-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.4	12
59-PW-16	11/1/2017	59-PW-16-20-NS	NS1	TO15	Trichloroethene	1400		PPBV	1.8	12
59-PW-16	11/1/2017	59-PW-16-20-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-16	11/1/2017	59-PW-16-30-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.4	12
59-PW-16	11/1/2017	59-PW-16-30-NS	NS1	TO15	1,1-Dichloroethene	12	F	PPBV	1.5	12
59-PW-16	11/1/2017	59-PW-16-30-NS	NS1	TO15	Benzene	0		PPBV	1.7	12
59-PW-16	11/1/2017	59-PW-16-30-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.9	12
59-PW-16	11/1/2017	59-PW-16-30-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.6	12
59-PW-16	11/1/2017	59-PW-16-30-NS	NS1	TO15	Chloroform	2.7	F	PPBV	2	12

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-16	11/1/2017	59-PW-16-30-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2.1	12
59-PW-16	11/1/2017	59-PW-16-30-NS	NS1	TO15	Isopropanol	15	F	PPBV	5.5	50
59-PW-16	11/1/2017	59-PW-16-30-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.6	12
59-PW-16	11/1/2017	59-PW-16-30-NS	NS1	TO15	Tetrachloroethene	3.4	F	PPBV	1.1	12
59-PW-16	11/1/2017	59-PW-16-30-NS	NS1	TO15	Toluene	0		PPBV	1.5	12
59-PW-16	11/1/2017	59-PW-16-30-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.5	12
59-PW-16	11/1/2017	59-PW-16-30-NS	NS1	TO15	Trichloroethene	370		PPBV	1.8	12
59-PW-16	11/1/2017	59-PW-16-30-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-16	11/3/2017	59-PW-16-60-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	2.6	24
59-PW-16	11/3/2017	59-PW-16-60-NS	NS1	TO15	1,1-Dichloroethene	3.3	F	PPBV	2.9	24
59-PW-16	11/3/2017	59-PW-16-60-NS	NS1	TO15	Benzene	0		PPBV	3.3	24
59-PW-16	11/3/2017	59-PW-16-60-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	3.6	24
59-PW-16	11/3/2017	59-PW-16-60-NS	NS1	TO15	Chlorobenzene	0		PPBV	3	24
59-PW-16	11/3/2017	59-PW-16-60-NS	NS1	TO15	Chloroform	16	F	PPBV	3.7	24
59-PW-16	11/3/2017	59-PW-16-60-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	4	24
59-PW-16	11/3/2017	59-PW-16-60-NS	NS1	TO15	Isopropanol	13000		PPBV	10	95
59-PW-16	11/3/2017	59-PW-16-60-NS	NS1	TO15	m,p-Xylenes	0		PPBV	3	24
59-PW-16	11/3/2017	59-PW-16-60-NS	NS1	TO15	Tetrachloroethene	12	F	PPBV	2.1	24
59-PW-16	11/3/2017	59-PW-16-60-NS	NS1	TO15	Toluene	0		PPBV	2.8	24
59-PW-16	11/3/2017	59-PW-16-60-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	6.6	24
59-PW-16	11/3/2017	59-PW-16-60-NS	NS1	TO15	Trichloroethene	1200		PPBV	3.5	24
59-PW-16	11/3/2017	59-PW-16-60-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	2.3	24
59-PW-16	11/3/2017	59-PW-16-80-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-16	11/3/2017	59-PW-16-80-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.5	12
59-PW-16	11/3/2017	59-PW-16-80-NS	NS1	TO15	Benzene	0		PPBV	1.6	12
59-PW-16	11/3/2017	59-PW-16-80-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-16	11/3/2017	59-PW-16-80-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-16	11/3/2017	59-PW-16-80-NS	NS1	TO15	Chloroform	0		PPBV	1.9	12
59-PW-16	11/3/2017	59-PW-16-80-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-16	11/3/2017	59-PW-16-80-NS	NS1	TO15	Isopropanol	310		PPBV	5.3	48
59-PW-16	11/3/2017	59-PW-16-80-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-16	11/3/2017	59-PW-16-80-NS	NS1	TO15	Tetrachloroethene	0		PPBV	1.1	12
59-PW-16	11/3/2017	59-PW-16-80-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-16	11/3/2017	59-PW-16-80-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.3	12
59-PW-16	11/3/2017	59-PW-16-80-NS	NS1	TO15	Trichloroethene	39		PPBV	1.8	12
59-PW-16	11/3/2017	59-PW-16-80-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-17	11/3/2017	59-PW-17-08-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.4	12
59-PW-17	11/3/2017	59-PW-17-08-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.5	12
59-PW-17	11/3/2017	59-PW-17-08-NS	NS1	TO15	Benzene	0		PPBV	1.7	12

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-17	11/3/2017	59-PW-17-08-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-17	11/3/2017	59-PW-17-08-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-17	11/3/2017	59-PW-17-08-NS	NS1	TO15	Chloroform	0		PPBV	1.9	12
59-PW-17	11/3/2017	59-PW-17-08-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2.1	12
59-PW-17	11/3/2017	59-PW-17-08-NS	NS1	TO15	Isopropanol	19	F	PPBV	5.4	49
59-PW-17	11/3/2017	59-PW-17-08-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-17	11/3/2017	59-PW-17-08-NS	NS1	TO15	Tetrachloroethene	0		PPBV	1.1	12
59-PW-17	11/3/2017	59-PW-17-08-NS	NS1	TO15	Toluene	0		PPBV	1.4	12
59-PW-17	11/3/2017	59-PW-17-08-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.4	12
59-PW-17	11/3/2017	59-PW-17-08-NS	NS1	TO15	Trichloroethene	8.1	F	PPBV	1.8	12
59-PW-17	11/3/2017	59-PW-17-08-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-17	11/3/2017	59-PW-17-20-FD	FD1	TO15	1,1,1-Trichloroethane	31		PPBV	1.3	12
59-PW-17	11/3/2017	59-PW-17-20-FD	FD1	TO15	1,1-Dichloroethene	130		PPBV	1.4	12
59-PW-17	11/3/2017	59-PW-17-20-FD	FD1	TO15	Benzene	0		PPBV	1.6	12
59-PW-17	11/3/2017	59-PW-17-20-FD	FD1	TO15	Carbon Tetrachloride	0		PPBV	1.7	12
59-PW-17	11/3/2017	59-PW-17-20-FD	FD1	TO15	Chlorobenzene	0		PPBV	1.4	12
59-PW-17	11/3/2017	59-PW-17-20-FD	FD1	TO15	Chloroform	0		PPBV	1.8	12
59-PW-17	11/3/2017	59-PW-17-20-FD	FD1	TO15	cis-1,2-Dichloroethene	0		PPBV	1.9	12
59-PW-17	11/3/2017	59-PW-17-20-FD	FD1	TO15	Isopropanol	190		PPBV	5.1	46
59-PW-17	11/3/2017	59-PW-17-20-FD	FD1	TO15	m,p-Xylenes	0		PPBV	1.4	12
59-PW-17	11/3/2017	59-PW-17-20-FD	FD1	TO15	Tetrachloroethene	13		PPBV	1	12
59-PW-17	11/3/2017	59-PW-17-20-FD	FD1	TO15	Toluene	2.8	F	PPBV	1.4	12
59-PW-17	11/3/2017	59-PW-17-20-FD	FD1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.2	12
59-PW-17	11/3/2017	59-PW-17-20-FD	FD1	TO15	Trichloroethene	5300		PPBV	1.7	12
59-PW-17	11/3/2017	59-PW-17-20-FD	FD1	TO15	Trichlorofluoromethane	0		PPBV	1.1	12
59-PW-17	11/3/2017	59-PW-17-20-NS	NS1	TO15	1,1,1-Trichloroethane	31		PPBV	1.3	12
59-PW-17	11/3/2017	59-PW-17-20-NS	NS1	TO15	1,1-Dichloroethene	130		PPBV	1.4	12
59-PW-17	11/3/2017	59-PW-17-20-NS	NS1	TO15	Benzene	0		PPBV	1.6	12
59-PW-17	11/3/2017	59-PW-17-20-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-17	11/3/2017	59-PW-17-20-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-17	11/3/2017	59-PW-17-20-NS	NS1	TO15	Chloroform	0		PPBV	1.8	12
59-PW-17	11/3/2017	59-PW-17-20-NS	NS1	TO15	cis-1,2-Dichloroethene	2.2	F	PPBV	2	12
59-PW-17	11/3/2017	59-PW-17-20-NS	NS1	TO15	Isopropanol	180		PPBV	5.2	48
59-PW-17	11/3/2017	59-PW-17-20-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-17	11/3/2017	59-PW-17-20-NS	NS1	TO15	Tetrachloroethene	13		PPBV	1.1	12
59-PW-17	11/3/2017	59-PW-17-20-NS	NS1	TO15	Toluene	2.3	F	PPBV	1.4	12
59-PW-17	11/3/2017	59-PW-17-20-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.3	12
59-PW-17	11/3/2017	59-PW-17-20-NS	NS1	TO15	Trichloroethene	5500		PPBV	1.7	12
59-PW-17	11/3/2017	59-PW-17-20-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.1	12

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-17	11/3/2017	59-PW-17-30-NS	NS1	TO15	1,1,1-Trichloroethane	4.1	F	PPBV	1.3	12
59-PW-17	11/3/2017	59-PW-17-30-NS	NS1	TO15	1,1-Dichloroethene	55		PPBV	1.4	12
59-PW-17	11/3/2017	59-PW-17-30-NS	NS1	TO15	Benzene	0		PPBV	1.6	12
59-PW-17	11/3/2017	59-PW-17-30-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.7	12
59-PW-17	11/3/2017	59-PW-17-30-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.4	12
59-PW-17	11/3/2017	59-PW-17-30-NS	NS1	TO15	Chloroform	12		PPBV	1.8	12
59-PW-17	11/3/2017	59-PW-17-30-NS	NS1	TO15	cis-1,2-Dichloroethene	2.1	F	PPBV	1.9	12
59-PW-17	11/3/2017	59-PW-17-30-NS	NS1	TO15	Isopropanol	69		PPBV	5.1	46
59-PW-17	11/3/2017	59-PW-17-30-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.4	12
59-PW-17	11/3/2017	59-PW-17-30-NS	NS1	TO15	Tetrachloroethene	38		PPBV	1	12
59-PW-17	11/3/2017	59-PW-17-30-NS	NS1	TO15	Toluene	1.8	F	PPBV	1.4	12
59-PW-17	11/3/2017	59-PW-17-30-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.2	12
59-PW-17	11/3/2017	59-PW-17-30-NS	NS1	TO15	Trichloroethene	3300		PPBV	1.7	12
59-PW-17	11/3/2017	59-PW-17-30-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.1	12
59-PW-17	11/2/2017	59-PW-17-60-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.3	12
59-PW-17	11/2/2017	59-PW-17-60-NS	NS1	TO15	1,1-Dichloroethene	7.5	F	PPBV	1.5	12
59-PW-17	11/2/2017	59-PW-17-60-NS	NS1	TO15	Benzene	0		PPBV	1.6	12
59-PW-17	11/2/2017	59-PW-17-60-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.8	12
59-PW-17	11/2/2017	59-PW-17-60-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-17	11/2/2017	59-PW-17-60-NS	NS1	TO15	Chloroform	9.8	F	PPBV	1.9	12
59-PW-17	11/2/2017	59-PW-17-60-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2	12
59-PW-17	11/2/2017	59-PW-17-60-NS	NS1	TO15	Isopropanol	540		PPBV	5.3	48
59-PW-17	11/2/2017	59-PW-17-60-NS	NS1	TO15	m,p-Xylenes	0		PPBV	1.5	12
59-PW-17	11/2/2017	59-PW-17-60-NS	NS1	TO15	Tetrachloroethene	14		PPBV	1.1	12
59-PW-17	11/2/2017	59-PW-17-60-NS	NS1	TO15	Toluene	4.8	F	PPBV	1.4	12
59-PW-17	11/2/2017	59-PW-17-60-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.3	12
59-PW-17	11/2/2017	59-PW-17-60-NS	NS1	TO15	Trichloroethene	1400		PPBV	1.8	12
59-PW-17	11/2/2017	59-PW-17-60-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12
59-PW-17	11/3/2017	59-PW-17-80-NS	NS1	TO15	1,1,1-Trichloroethane	0		PPBV	1.4	12
59-PW-17	11/3/2017	59-PW-17-80-NS	NS1	TO15	1,1-Dichloroethene	0		PPBV	1.5	12
59-PW-17	11/3/2017	59-PW-17-80-NS	NS1	TO15	Benzene	0		PPBV	1.7	12
59-PW-17	11/3/2017	59-PW-17-80-NS	NS1	TO15	Carbon Tetrachloride	0		PPBV	1.9	12
59-PW-17	11/3/2017	59-PW-17-80-NS	NS1	TO15	Chlorobenzene	0		PPBV	1.5	12
59-PW-17	11/3/2017	59-PW-17-80-NS	NS1	TO15	Chloroform	0		PPBV	1.9	12
59-PW-17	11/3/2017	59-PW-17-80-NS	NS1	TO15	cis-1,2-Dichloroethene	0		PPBV	2.1	12
59-PW-17	11/3/2017	59-PW-17-80-NS	NS1	TO15	Isopropanol	5800		PPBV	5.4	50
59-PW-17	11/3/2017	59-PW-17-80-NS	NS1	TO15	m,p-Xylenes	1.6	F	PPBV	1.5	12
59-PW-17	11/3/2017	59-PW-17-80-NS	NS1	TO15	Tetrachloroethene	4.6	F	PPBV	1.1	12
59-PW-17	11/3/2017	59-PW-17-80-NS	NS1	TO15	Toluene	9.4	F	PPBV	1.5	12

Table D-2. Soil Vapor Baseline Monitoring - Detected VOCs
B4260, Former Mather AFB

LOCATION	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	ANALYTICAL METHOD	ANALYTE	RESULT	EPA FLAGS	UNIT	DL	RL
59-PW-17	11/3/2017	59-PW-17-80-NS	NS1	TO15	trans-1,2-Dichloroethene	0		PPBV	3.4	12
59-PW-17	11/3/2017	59-PW-17-80-NS	NS1	TO15	Trichloroethene	50		PPBV	1.8	12
59-PW-17	11/3/2017	59-PW-17-80-NS	NS1	TO15	Trichlorofluoromethane	0		PPBV	1.2	12

Note: Only VOC that were detected in at least one well are included in this table.

DL = detection limit
FD = field duplicate sample
NS = normal sample
ppbv = parts per million by volume
RL = reporting limit

Table D-3. Comparison of TCE and Isopropanol Concentration Data in Soil Vapor
B4260, Former Mather AFB, Baseline Soil Vapor Sampling Event

					TRICHLOROETHENE DATA (ppbv)				ISOPROPANOL DATA (ppbv)				SHROUD PID DATA		Leak Test Criterion		
LOCATION	Sample Depth (feet bgs)	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	TCE RESULT	EPA FLAGS	TCE DL	TCE RL	IPA RESULT	EPA FLAGS	IPA DL	IPA RL	Shroud PID Conc (ppmv)	Shroud IPA Conc (ppbv)	10% of Shroud IPA Conc (ppbv)	[IPA in Lab Sample] - [10% of Shroud Conc] (ppbv)	Is Sample Potentially Biased Low?
59-PW-05	10-20	11/7/2017	59-PW-05-10-NS	NS1	110		1.8	12	10	F	5.4	49	no shroud	no shroud	no shroud	no shroud	no shroud
59-PW-05	30-40	11/7/2017	59-PW-05-30-NS	NS1	320		1.8	12	0		5.4	49	no shroud	no shroud	no shroud	no shroud	no shroud
59-PW-05	50-60	11/7/2017	59-PW-05-50-NS	NS1	18	J+	1.8	12	0		5.5	50	no shroud	no shroud	no shroud	no shroud	no shroud
59-PW-05	70-90	11/7/2017	59-PW-05-70-NS	NS1	410		1.8	12	0		5.4	49	no shroud	no shroud	no shroud	no shroud	no shroud
59-PW-06	11-21	11/7/2017	59-PW-06-11-NS	NS1	23		1.7	12	0		5.2	48	no shroud	no shroud	no shroud	no shroud	no shroud
59-PW-06	31-41	11/7/2017	59-PW-06-31-NS	NS1	10	B	1.8	12	0		5.3	48	no shroud	no shroud	no shroud	no shroud	no shroud
59-PW-06	51-61	11/7/2017	59-PW-06-51-FD	FD1	11	B	1.7	12	0		5.2	48	no shroud	no shroud	no shroud	no shroud	no shroud
59-PW-06	51-61	11/7/2017	59-PW-06-51-NS	NS1	10	B	1.8	12	0		5.3	48	no shroud	no shroud	no shroud	no shroud	no shroud
59-PW-06	70-90	11/7/2017	59-PW-06-70-NS	NS1	360		1.8	12	0		5.3	48	no shroud	no shroud	no shroud	no shroud	no shroud
59-PW-07	10-20	11/7/2017	59-PW-07-10-NS	NS1	7,100		1.7	12	0		5.2	48	47	282,000	28,200	(28,200)	No
59-PW-08	10-20	11/7/2017	59-PW-08-10-NS	NS1	1,100		1.7	12	0		5.1	46	26.2	157,200	15,720	(15,720)	No
59-PW-09A	10-11	11/7/2017	59-PW-09A-10-NS	NS1	24,000		1.8	13	0		5.5	50	81.9	491,400	49,140	(49,140)	No
59-PW-09B	20-21	11/7/2017	59-PW-09B-20-FD	FD1	26,000		3	21	29	F	9.2	83	54.8	328,800	32,880	(32,851)	No
59-PW-09B	20-21	11/7/2017	59-PW-09B-20-NS	NS1	26,000		1.8	13	6.4	F	5.5	50	54.8	328,800	32,880	(32,874)	No
59-PW-10A	8-10	11/7/2017	59-PW-10A-08-NS	NS1	5.6	F	1.8	12	30,000	J	5.4	49	38.5	231,000	23,100	6,900	Yes
59-PW-10B	20-22	11/7/2017	59-PW-10B-20-NS	NS1	3.9	F	1.7	12	97		5.2	48	31.5	189,000	18,900	(18,803)	No
59-PW-11A	8-10	11/8/2017	59-PW-11A-08-FD	FD1	33		1.7	12	0		5.2	47	12.5	75,000	7,500	(7,500)	No
59-PW-11A	8-10	11/8/2017	59-PW-11A-08-NS	NS1	31		1.7	12	5.3	F	5.2	48	12.5	75,000	7,500	(7,495)	No
59-PW-11B	20-22	11/7/2017	59-PW-11B-20-NS	NS1	1,400		1.7	12	29	F	5.2	47	10	60,000	6,000	(5,971)	No
59-PW-12A	8-10	11/7/2017	59-PW-12A-08-NS	NS1	2,400,000		350	2400	8,900	F	1100	9700	185	1,110,000	111,000	(102,100)	No
59-PW-12B	20-22	11/7/2017	59-PW-12B-20-NS	NS1	270,000		30	200	0		90	820	813	4,878,000	487,800	(487,800)	No
59-PW-13A	8-10	11/2/2017	59-PW-13A-08-NS	NS1	1.8	F	1.8	12	25,000	J	5.4	49	43	258,000	25,800	(800)	No
59-PW-13B	20-22	11/2/2017	59-PW-13B-20-NS	NS1	530		1.8	12	140		5.4	49	28	168,000	16,800	(16,660)	No
59-PW-14	30-32	11/1/2017	59-PW-14-30-NS	NS1	100	F	31	210	190,000		94	860	60	360,000	36,000	154,000	Yes
59-PW-14	60-62	11/1/2017	59-PW-14-60-FD	FD1	8,000		2	14	16,000		6	55	290	1,740,000	174,000	(158,000)	No
59-PW-14	60-62	11/1/2017	59-PW-14-60-NS	NS1	8,000		2	13	17,000		5.9	54	290	1,740,000	174,000	(157,000)	No
59-PW-14	80-82	11/3/2017	59-PW-14-80-NS	NS1	1,400		1.7	12	190		5.2	48	36	216,000	21,600	(21,410)	No
59-PW-15	8-10	11/2/2017	59-PW-15-08-NS	NS1	0		9.2	63	58,000		28	250	100	600,000	60,000	(2,000)	No
59-PW-15	20-22	11/2/2017	59-PW-15-20-NS	NS1	590		1.8	12	740		5.3	48	34	204,000	20,400	(19,660)	No
59-PW-15	30-32	11/2/2017	59-PW-15-30-NS	NS1	17		1.8	12	620		5.3	49	32	192,000	19,200	(18,580)	No
59-PW-15	60-62	11/2/2017	59-PW-15-60-NS	NS1	470		1.8	12	9,100		5.4	49	36	216,000	21,600	(12,500)	No
59-PW-15	80-82	11/2/2017	59-PW-15-80-NS	NS1	70		1.8	12	100		5.3	49	38	228,000	22,800	(22,700)	No
59-PW-16	8-10	11/2/2017	59-PW-16-10-NS	NS1	NS				NS					NS	NS	NS	NS
59-PW-16	20-22	11/1/2017	59-PW-16-20-NS	NS1	1,400		1.8	12	120		5.4	50	40	240,000	24,000	(23,880)	No
59-PW-16	30-32	11/1/2017	59-PW-16-30-NS	NS1	370		1.8	12	15	F	5.5	50	44	264,000	26,400	(26,385)	No

Table D-3. Comparison of TCE and Isopropanol Concentration Data in Soil Vapor
B4260, Former Mather AFB, Baseline Soil Vapor Sampling Event

					TRICHLOROETHENE DATA (ppbv)				ISOPROPANOL DATA (ppbv)				SHROUD PID DATA		Leak Test Criterion		
LOCATION	Sample Depth (feet bgs)	SAMPLE DATE	SAMPLE NAME	SAMPLE CODE	TCE RESULT	EPA FLAGS	TCE DL	TCE RL	IPA RESULT	EPA FLAGS	IPA DL	IPA RL	Shroud PID Conc (ppmv)	Shroud IPA Conc (ppbv)	10% of Shroud IPA Conc (ppbv)	[IPA in Lab Sample] - [10% of Shroud Conc] (ppbv)	Is Sample Potentially Biased Low?
59-PW-16	60-62	11/3/2017	59-PW-16-60-NS	NS1	1,200		3.5	24	13,000		10	95	87	522,000	52,200	(39,200)	No
59-PW-16	80-82	11/3/2017	59-PW-16-80-NS	NS1	39		1.8	12	310		5.3	48	15	90,000	9,000	(8,690)	No
59-PW-17	8-10	11/3/2017	59-PW-17-08-NS	NS1	8.1	F	1.8	12	19	F	5.4	49	28	168,000	16,800	(16,781)	No
59-PW-17	20-22	11/3/2017	59-PW-17-20-FD	FD1	5,300		1.7	12	190		5.1	46	42	252,000	25,200	(25,010)	No
59-PW-17	20-22	11/3/2017	59-PW-17-20-NS	NS1	5,500		1.7	12	180		5.2	48	42	252,000	25,200	(25,020)	No
59-PW-17	30-32	11/3/2017	59-PW-17-30-NS	NS1	3,300		1.7	12	69		5.1	46	38	228,000	22,800	(22,731)	No
59-PW-17	60-62	11/2/2017	59-PW-17-60-NS	NS1	1,400		1.8	12	540		5.3	48	38	228,000	22,800	(22,260)	No
59-PW-17	80-82	11/3/2017	59-PW-17-80-NS	NS1	50		1.8	12	5,800		5.4	50	107	642,000	64,200	(58,400)	No

B = qualified as not detected due to blank contamination
bgs = below ground surface
DL = detection limit
F = detected between the reporting limit and detection limit
FD = field duplicate
IPA = isopropanol
J = estimated concentration
J+ = estimated concentration, biased high
NS = normal sample
PID = photoionization detector
ppbv = parts per million by volume
ppmv = parts per million by volume
RL = reporting limit

APPENDIX E

VLEACH Modeling

TABLE E-1: TCE Soil Gas Data and Polygons for VLEACH Modeling
Former Mather Air Force Base Site B4260 Evaluation of Potential Impacts to Groundwater to Assess the Need for SVE

Polygon No.		1		2		3		4		5		6		7		Total			
Polygon Area (ft^2)		12,240		10,471		7,102		10,919		9,830		8,725		11,196		70,483	ft^2		
Polygon % area		17%		15%		10%		15%		14%		12%		16%		100%			
Well(s) and screen depths		59-PW-12; 59-PW-14	8-10, 20-22, 30-32, 60-62, 80-82	59-PW-09	10-11, 20-21	59-PW-11	8-10, 20-22	59-PW-17	8-10, 20-22, 30-32, 60-62, 80-82	59-PW-16	8-10, 20-22, 30-32, 60-62, 80-82	59-PW-15	9-11, 20-22, 30-32, 60-62, 80-82	59-PW-07	10-20	**Combined (all polygons)**			
Cell	Depth (ft bgs)	Soil Gas Conc. (ppbv)	Equivalent Soil Conc. (ug/kg)	Soil Gas Conc. (ppbv)	Equivalent Soil Conc. (ug/kg)	Soil Gas Conc. (ppbv)	Equivalent Soil Conc. (ug/kg)	Soil Gas Conc. (ppbv)	Equivalent Soil Conc. (ug/kg)	Soil Gas Conc. (ppbv)	Equivalent Soil Conc. (ug/kg)	Soil Gas Conc. (ppbv)	Equivalent Soil Conc. (ug/kg)	Soil Gas Conc. (ppbv)	Equivalent Soil Conc. (ug/kg)	Weighted Average conc. (ppbv)	Residual Mass (lbs)	MCL Equiv. (ppbv)	Weighted Average conc. (ug/kg)
1	5	**2,400,000**	14,078	**24,000**	140.8	33	0.19	8.1	0.05	0	0.00	0	0.00	**7,100**	41.6	421,479	78.83	350	2,472
2	10	**2,400,000**	14,078	**24,000**	140.8	33	0.19	8.1	0.05	0	0.00	0	0.00	**7,100**	41.6	421,479	78.83	350	2,472
3	15	**2,400,000**	14,078	**24,000**	140.8	33	0.19	8.1	0.05	0	0.00	0	0.00	**7,100**	41.6	421,479	78.83	350	2,472
4	20	**2,400,000**	14,078	**24,000**	140.8	33	0.19	8.1	0.05	0	0.00	0	0.00	**7,100**	41.6	421,479	78.83	350	2,472
5	25	**270,000**	1,584	**26,000**	153	**1400**	8.21	**5,500**	32.3	**1,400**	8.21	**590**	3.46	**7,100**	41.6	53,140	9.94	350	311.7
6	30	**270,000**	1,584	**26,000**	153	**1400**	8.21	**5,500**	32.3	**1,400**	8.21	**590**	3.46	**7,100**	41.6	53,140	9.94	350	311.7
7	35	**13,800**	80.95	**26,000**	153	**1400**	8.21	**3,300**	19.4	**370**	2.2	17	0.10	**7,100**	41.6	8,093	1.51	350	47.5
8	40	**13,800**	80.95	**26,000**	153	**1400**	8.21	**3,300**	19.4	**370**	2.2	17	0.10	**7,100**	41.6	8,093	1.51	350	47.5
9	45	**13,800**	80.95	**26,000**	153	**1400**	8.21	**3,300**	19.4	**370**	2.2	17	0.10	**7,100**	41.6	8,093	1.51	350	47.5
10	50	**13,800**	80.95	**26,000**	153	**1400**	8.21	**3,300**	19.4	**370**	2.2	17	0.10	**7,100**	41.6	8,093	1.51	350	47.5
11	55	**13,800**	80.95	**26,000**	153	**1400**	8.21	**3,300**	19.4	**370**	2.2	17	0.10	**7,100**	41.6	8,093	1.51	350	47.5
12	60	**13,800**	80.95	**26,000**	153	**1400**	8.21	**3,300**	19.4	**370**	2.2	17	0.10	**7,100**	41.6	8,093	1.51	350	47.5
13	65	**8,000**	46.93	**26,000**	153	**1400**	8.21	**1,400**	8.2	**1,200**	7.0	**470**	2.8	**7,100**	41.6	6,963	1.30	350	40.8
14	70	**8,000**	46.93	**26,000**	153	**1400**	8.21	**1,400**	8.2	**1,200**	7.0	**470**	2.8	**7,100**	41.6	6,963	1.30	350	40.8
15	75	**8,000**	46.93	**26,000**	153	**1400**	8.21	**1,400**	8.2	**1,200**	7.0	**470**	2.8	**7,100**	41.6	6,963	1.30	350	40.8
16	80	**8,000**	46.93	**26,000**	153	**1400**	8.21	**1,400**	8.2	**1,200**	7.0	**470**	2.8	**7,100**	41.6	6,963	1.30	350	40.8
17	85	**1,400**	8.21	**26,000**	153	**1400**	8.21	50	0.29	39	0.23	70	0.41	**7,100**	41.6	5,396	1.01	350	31.7
18	90	**1,400**	8.21	**26,000**	153	**1400**	8.21	50	0.29	39	0.23	70	0.41	**7,100**	41.6	5,396	1.01	350	31.7
19	95	**1,400**	8.21	**26,000**	153	**1400**	8.21	50	0.29	39	0.23	70	0.41	**7,100**	41.6	5,396	1.01	350	31.7
20	100	**1,400**	8.21	**26,000**	153	**1400**	8.21	50	0.29	39	0.23	70	0.41	**7,100**	41.6	5,396	1.01	350	31.7
Average		513,020	3,009	25,600	150	1,127	6.61	1,832	10.7	499	2.93	172	1.01	7,100	41.6	94,510			554
Residual Mass (lbs)		**333.3**		**14.23**		**0.42**		**1.06**		**0.26**		**0.08**		**4.22**			**353.5**		[VLEACH input]
Total Mass (lbs)		**353.5**																	

KEY

▒ Highlighted cells denote screen interval (sample depth)

🟦 Screen interval - No soil vapor data collected - water table rebounded too quickly to collect soil gas sample. Value is calculated value based on perched water concentration.

🟧 Leak test results indicate soil vapor concentration is potentially biased low; value is calculated based on perched water concentration.

550 **Bold Cells** denote concentrations exceeding the MCL equivalent of 350 ppbv.

All concentrations shown in parts per billion by volume (ppbv). Data is most recent soil gas results at each well thru 2014 with data collected at select wells in 2015.

Sample concentration extended downward to next sample depth or GW. Shallowest sample data extended to surface.

At 20 deg. C

TCE	
Pgas=	5.46
MW=	131.39
Koc=	126
Pa=	1.45
TOC=	0.0009
H=	0.377
Porosity=	0.46
PORw=	0.40
PORa=	0.06

Equations:

Mass (lbs) = 2.205*Pgas*Cgas*Vs*Y*[(Koc*Pa*TOC/H)+(PORw/H)+PORa]*10e-12

Weighted Avg Conc (ug/kg) = 0.001*Pgas*Cgas*[(Koc*Pa*TOC/H)+(PORw/H)+PORa)]/Pa

Pgas = Contaminant gas density (ng/nL) = Molecular wt (MW)/24.055 to convert from ppbv to ug/L

Cgas = Avg. contaminant soil gas concentration (nL/L=ppbv)

Vs =Contaminated soil volume (ft3)

Y = Conversion factor (28.3 L/ft3)

Koc = Soil partition coeff. (ml/g)

Pa = Soil bulk density (g/cc)

TOC = Total organic carbon (fraction)

H =Henry's constant (unitless)

Total porosity

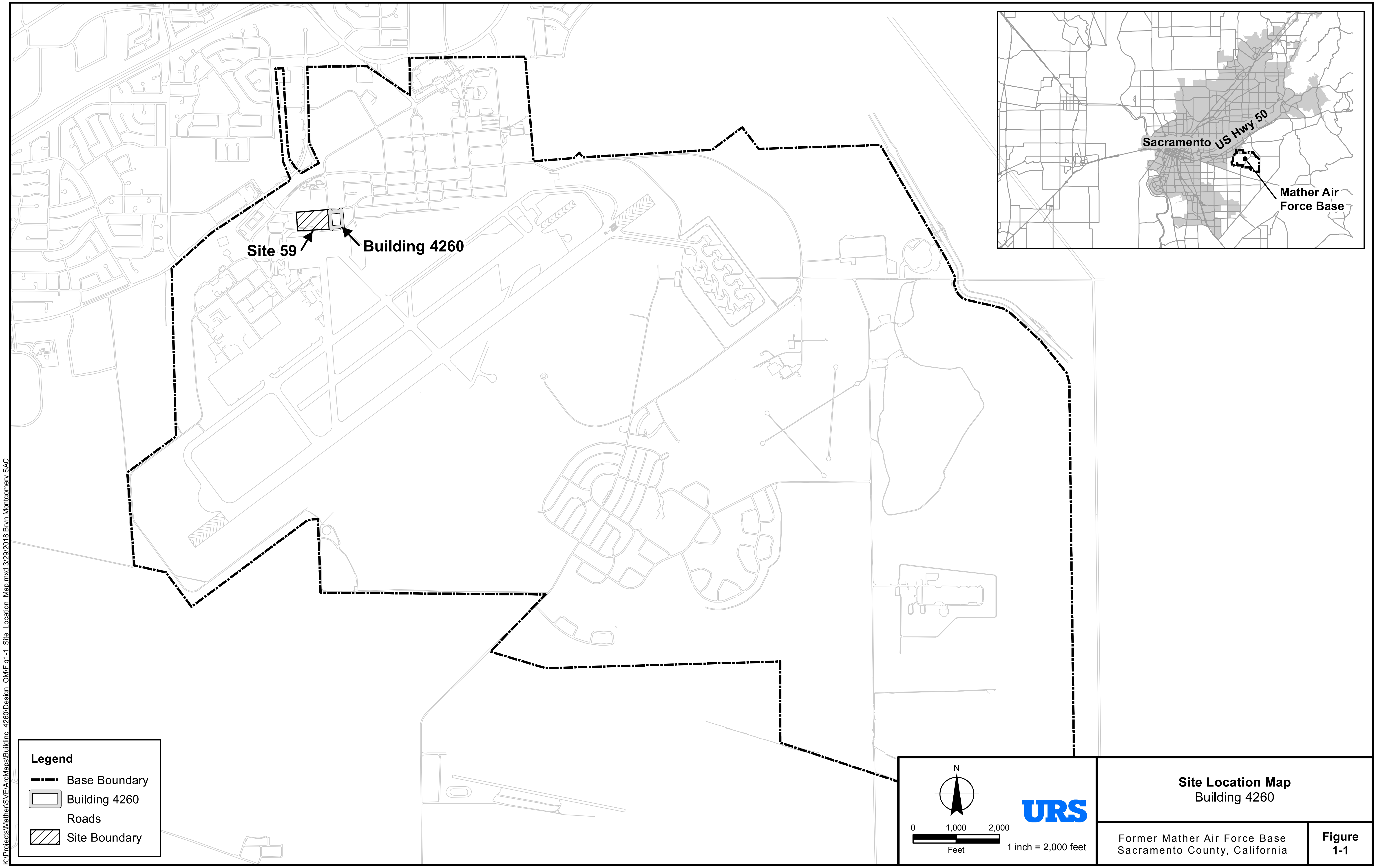
PORw = Water-filled soil porosity (as fraction of total)

PORa = Air-filled soil porosity (as fraction of total) = total porosity - water-filled porosity

Other numbers are unit conversion factors

Table E-2. VLEACH Modeling Results - TCE Leachate Concentrations
B4260, Former Mather Air Force Base

Time (years)	VLEACH - TCE Leachate Concentration at 97.5 feet bgs (ug/L)							
	Polygon 1	Polygon 2	Polygon 3	Polygon 4	Polygon 5	Polygon 6	Polygon 7	All Polygons
0	20.3	378	20.3	0.72	0.57	1.01	102.8	78.3
5	18.1	336	18.0	0.64	0.51	0.90	91.4	69.7
10	16.8	308	16.5	0.64	0.51	0.84	83.8	63.9
15	16.5	289	15.5	0.75	0.61	0.83	78.5	60.0
20	17.0	275	14.7	0.98	0.81	0.87	74.6	57.4
25	18.2	264	14.2	1.32	1.10	0.95	71.8	55.6
30	19.9	256	13.7	1.75	1.46	1.06	69.6	54.5
35	22.0	250	13.4	2.25	1.87	1.19	67.8	53.7
40	24.4	244	13.1	2.79	2.30	1.33	66.4	53.3
45	26.9	240	12.9	3.35	2.73	1.47	65.3	53.1
50	29.5	237	12.7	3.93	3.16	1.61	64.4	53.0
55	32.1	234	12.5	4.52	3.56	1.74	63.6	53.0
60	34.8	231	12.4	5.12	3.93	1.86	62.9	53.1
65	37.4	229	12.3	5.71	4.27	1.96	62.3	53.3
70	40.0	227	12.2	6.31	4.58	2.05	61.8	53.5
75	42.7	226	12.1	6.90	4.85	2.12	61.3	53.8
80	45.6	224	12.0	7.49	5.08	2.18	60.9	54.2
85	48.6	223	12.0	8.08	5.28	2.23	60.6	54.5
90	51.9	222	11.9	8.66	5.45	2.26	60.3	55.0
95	55.7	221	11.8	9.25	5.58	2.29	60.0	55.6
100	60.1	220	11.8	9.83	5.69	2.30	59.8	56.3
105	65.3	219	11.7	10.4	5.78	2.30	59.6	57.1
110	71.7	218	11.7	11.0	5.84	2.29	59.4	58.2
115	79.5	218	11.7	11.5	5.89	2.28	59.2	59.5
120	89.0	217	11.6	12.1	5.92	2.26	59.0	61.1
125	101	216	11.6	12.6	5.93	2.23	58.9	63.1
130	115	216	11.6	13.2	5.93	2.20	58.7	65.5
135	132	215	11.5	13.7	5.93	2.17	58.6	68.5
140	152	215	11.5	14.2	5.91	2.14	58.5	72.0
145	176	215	11.5	14.7	5.89	2.10	58.4	76.2
150	204	214	11.4	15.2	5.86	2.06	58.3	81.1
155	237	214	11.4	15.7	5.83	2.03	58.2	86.7
160	275	214	11.4	16.1	5.79	1.99	58.1	93.3
165	318	213	11.3	16.6	5.75	1.95	58.0	101
170	366	213	11.3	17.0	5.71	1.91	57.9	109
175	420	213	11.3	17.4	5.67	1.88	57.8	118
180	480	212	11.2	17.8	5.62	1.84	57.8	129
185	545	212	11.2	18.1	5.58	1.81	57.7	140
190	617	212	11.1	18.5	5.53	1.78	57.6	153
195	695	211	11.1	18.8	5.49	1.75	57.5	166
200	779	211	11.0	19.1	5.44	1.72	57.4	181



Site Location Map
Building 4260

Former Mather Air Force Base
Sacramento County, California

Figure 1-1

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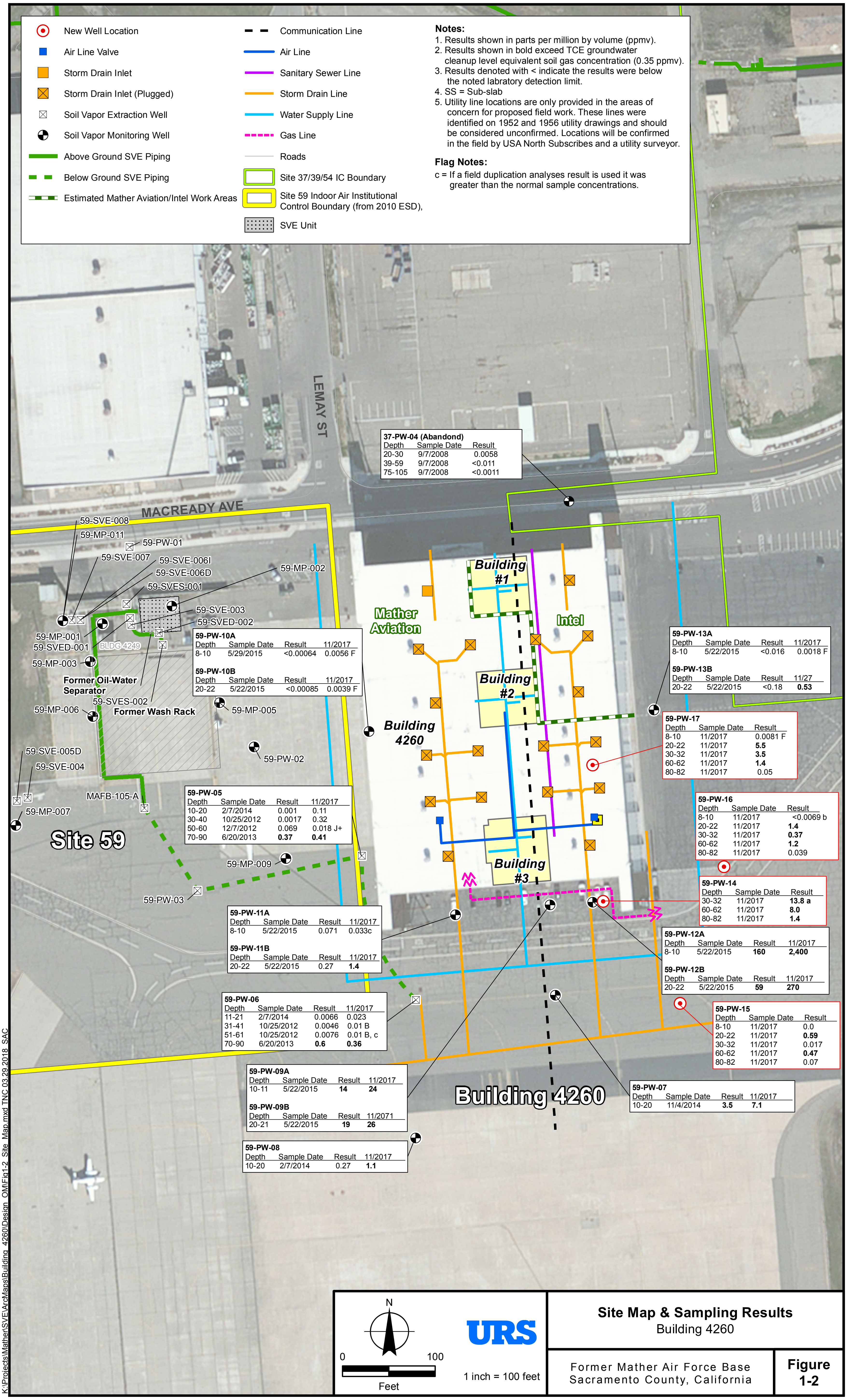

Notes:
1. Results shown in parts per million by volume (ppmv).
2. Results shown in bold exceed TCE groundwater cleanup level equivalent soil gas concentration (0.35 ppmv).
3. Results denoted with < indicate the results were below the noted labratory detection limit.
4. SS = Sub-slab
5. Utility line locations are only provided in the areas of concern for proposed field work. These lines were identified on 1952 and 1956 utility drawings and should be considered unconfirmed. Locations will be confirmed in the field by USA North Subscribes and a utility surveyor.

Flag Notes:

c = If a field duplication analyses result is used it was greater than the normal sample concentrations.

37-PW-04 (Abandond)

Depth	Sample Date	Result
20-30	9/7/2008	0.0058
39-59	9/7/2008	<0.011
75-105	9/7/2008	<0.0011

59-PW-10A

Depth	Sample Date	Result	11/2017
8-10	5/29/2015	<0.00064	0.0056 F

59-PW-10B

Depth	Sample Date	Result	11/2017
20-22	5/22/2015	<0.00085	0.0039 F

59-PW-13A

Depth	Sample Date	Result	11/2017
8-10	5/22/2015	<0.016	0.0018 F

59-PW-13B

Depth	Sample Date	Result	11/27
20-22	5/22/2015	<0.18	**0.53**

59-PW-17

Depth	Sample Date	Result
8-10	11/2017	0.0081 F
20-22	11/2017	**5.5**
30-32	11/2017	**3.5**
60-62	11/2017	**1.4**
80-82	11/2017	0.05

59-PW-16

Depth	Sample Date	Result
8-10	11/2017	<0.0069 b
20-22	11/2017	**1.4**
30-32	11/2017	**0.37**
60-62	11/2017	**1.2**
80-82	11/2017	0.039

59-PW-05

Depth	Sample Date	Result	11/2017
10-20	2/7/2014	0.001	0.11
30-40	10/25/2012	0.0017	0.32
50-60	12/7/2012	0.069	0.018 J+
70-90	6/20/2013	**0.37**	**0.41**

59-PW-14

Depth	Sample Date	Result
30-32	11/2017	**13.8 a**
60-62	11/2017	**8.0**
80-82	11/2017	**1.4**

59-PW-11A

Depth	Sample Date	Result	11/2017
8-10	5/22/2015	0.071	0.033c

59-PW-11B

Depth	Sample Date	Result	11/2017
20-22	5/22/2015	0.27	**1.4**

59-PW-12A

Depth	Sample Date	Result	11/2017
8-10	5/22/2015	**160**	**2,400**

59-PW-12B

Depth	Sample Date	Result	11/2017
20-22	5/22/2015	**59**	**270**

59-PW-06

Depth	Sample Date	Result	11/2017
11-21	2/7/2014	0.0066	0.023
31-41	10/25/2012	0.0046	0.01 B
51-61	10/25/2012	0.0076	0.01 B, c
70-90	6/20/2013	**0.6**	**0.36**

59-PW-15

Depth	Sample Date	Result
8-10	11/2017	0.0
20-22	11/2017	**0.59**
30-32	11/2017	0.017
60-62	11/2017	**0.47**
80-82	11/2017	0.07

59-PW-09A

Depth	Sample Date	Result	11/2017
10-11	5/22/2015	**14**	**24**

59-PW-09B

Depth	Sample Date	Result	11/2071
20-21	5/22/2015	**19**	**26**

59-PW-07

Depth	Sample Date	Result	11/2017
10-20	11/4/2014	**3.5**	**7.1**

59-PW-08

Depth	Sample Date	Result	11/2017
10-20	2/7/2014	0.27	**1.1**

URS

Site Map & Sampling Results
Building 4260

Former Mather Air Force Base
Sacramento County, California

Figure 1-2

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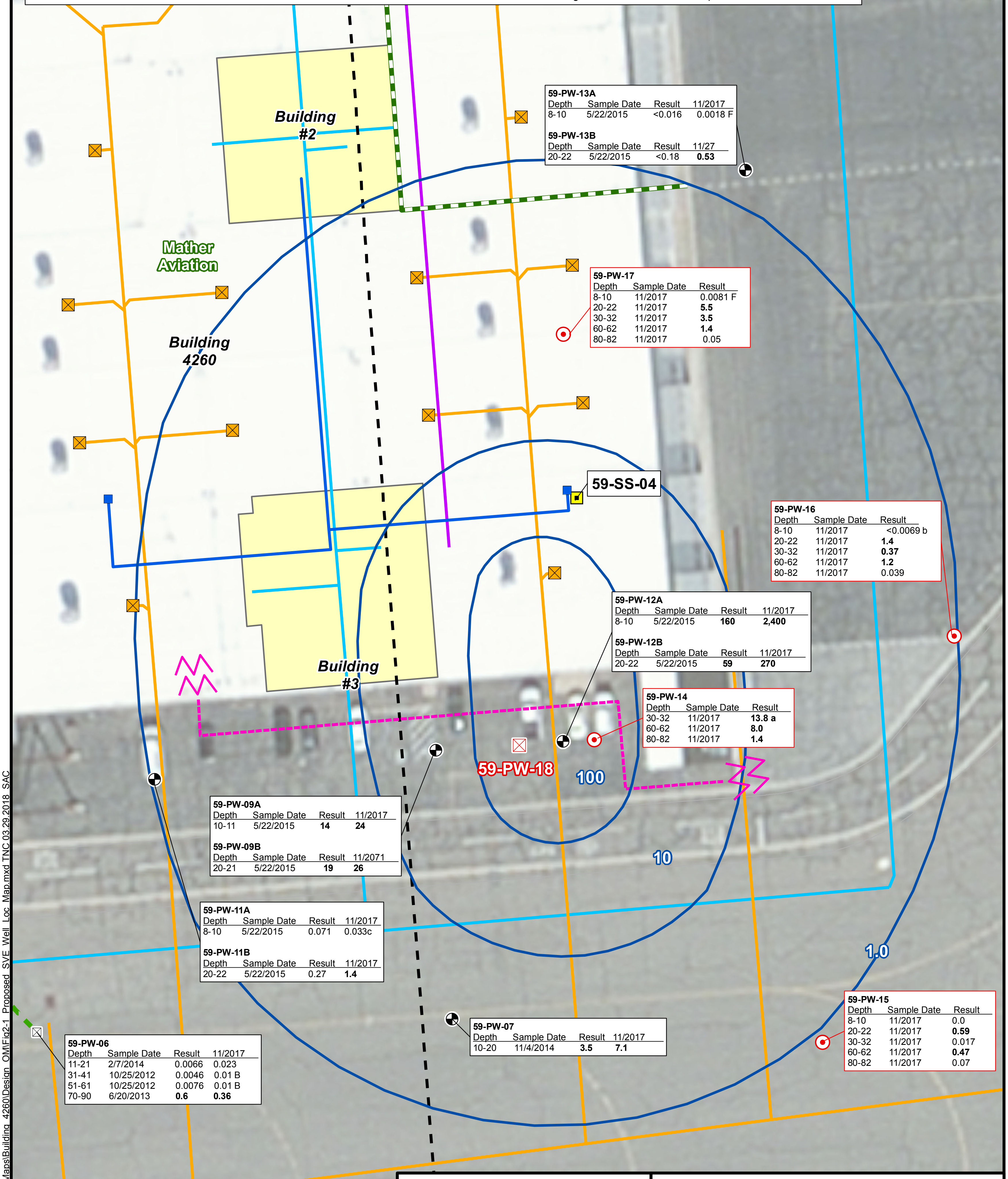
☒	Proposed Extraction Well
⊙	New Well Location
▣	Recommended Sub-slab Sample Location
■	Air Line Valve
🟧	Storm Drain Inlet
☒	Storm Drain Inlet (Plugged)
☒	Soil Vapor Extraction Well
◐	Soil Vapor Monitoring Well
—	Estimated Soil Gas TCE Plume Extent
—	Above Ground SVE Piping
- -	Below Ground SVE Piping
- -	Estimated Mather Aviation/Intel Work Areas
- -	Communication Line
—	Air Line
—	Sanitary Sewer Line
—	Storm Drain Line
—	Water Supply Line
- -	Gas Line
—	Roads

Notes:

1. Results shown in parts per million by volume (ppmv).
2. Results shown in bold exceed TCE groundwater cleanup level equivalent soil gas concentration (0.35 ppmv).
3. Results denoted with < indicate the results were below the noted labratory detection limit.
4. SS = Sub-slab
5. Utility line locations are only provided in the areas of concern for proposed field work. These lines were identified on 1952 and 1956 utility drawings and should be considered unconfirmed. Locations will be confirmed in the field by USA North Subscribes and a utility surveyor.

Flag Notes:

B = Blank contamination
F = result reported between method detection limit and reporting limit
J+ = estimated value, potential high bias
a = isopropylene concentration exceeds leak test criteria; VOC concentration potentially biased low; calculated TCE soil vapor concentration from perched water analysis substituted for soil vapor analytical result
b = soil vapor sample was not collected because perched water levels rebounded; calculated TCE soil vapor concentration from perched water analysis is used.
c = If a field duplication analyses result is used it was greater than the normal sample concentrations.



59-PW-13A

Depth	Sample Date	Result	11/2017
8-10	5/22/2015	<0.016	0.0018 F

59-PW-13B

Depth	Sample Date	Result	11/27
20-22	5/22/2015	<0.18	**0.53**

59-PW-17

Depth	Sample Date	Result
8-10	11/2017	0.0081 F
20-22	11/2017	**5.5**
30-32	11/2017	**3.5**
60-62	11/2017	**1.4**
80-82	11/2017	0.05

59-PW-16

Depth	Sample Date	Result
8-10	11/2017	<0.0069 b
20-22	11/2017	**1.4**
30-32	11/2017	**0.37**
60-62	11/2017	**1.2**
80-82	11/2017	0.039

59-PW-12A

Depth	Sample Date	Result	11/2017
8-10	5/22/2015	**160**	**2,400**

59-PW-12B

Depth	Sample Date	Result	11/2017
20-22	5/22/2015	**59**	**270**

59-PW-14

Depth	Sample Date	Result
30-32	11/2017	**13.8 a**
60-62	11/2017	**8.0**
80-82	11/2017	**1.4**

59-PW-09A

Depth	Sample Date	Result	11/2017
10-11	5/22/2015	**14**	**24**

59-PW-09B

Depth	Sample Date	Result	11/2071
20-21	5/22/2015	**19**	**26**

59-PW-11A

Depth	Sample Date	Result	11/2017
8-10	5/22/2015	0.071	0.033c

59-PW-11B

Depth	Sample Date	Result	11/2017
20-22	5/22/2015	0.27	**1.4**

59-PW-07

Depth	Sample Date	Result	11/2017
10-20	11/4/2014	**3.5**	**7.1**

59-PW-15

Depth	Sample Date	Result
8-10	11/2017	0.0
20-22	11/2017	**0.59**
30-32	11/2017	0.017
60-62	11/2017	**0.47**
80-82	11/2017	0.07

59-PW-06

Depth	Sample Date	Result	11/2017
11-21	2/7/2014	0.0066	0.023
31-41	10/25/2012	0.0046	0.01 B
51-61	10/25/2012	0.0076	0.01 B
70-90	6/20/2013	**0.6**	**0.36**

N

0 40

Feet

URS

1 inch = 40 feet

Proposed SVE Well Location Map
Building 4260

Former Mather Air Force Base
Sacramento County, California

Figure 2-1

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APPENDIX F

B4260 SVE System Design

and

Operations and Maintenance Plan

60520471.02020

FORMER MATHER AIR FORCE BASE
INSTALLATION RESTORATION PROGRAM

BUILDING 4260 SVE SYSTEM DESIGN AND OPERATIONS AND MAINTENANCE PLAN

Draft

Prepared for

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Prepared by:

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May 2018

NOTICE

This report was prepared by the staff of URS Group, Inc. (URS) under the supervision of registered professionals. The data interpretation, conclusions, and recommendations presented in the report were governed by URS' experience and professional judgment. This report has been prepared based on data current at the time of preparation. Assumptions based on these data, although believed reasonable and appropriate based on the data provided herein, may not prove to be true in the future as new data are collected. The conclusions and recommendations of URS are conditioned on these assumptions.

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APPENDICES

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LIST OF ACRONYMS

AFCEC	Air Force Civil Engineer Center
AWS	air-water separator
B4260	Building 4260
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
EE/CA	engineering evaluation and cost analysis
FAA	Federal Aviation Administration
HASP	Health and Safety Plan
IDW	investigation-derived waste
Mather	Mather Air Force Base
MBSA	Main Base/Strategic Air Command Area
O&M	operations and maintenance
OWS	oil-water separator
PID	photoionization detector
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
SI	site inspection report
SI/EECA	*Building 4260 Vadose Zone Site Inspection Report and Engineering Evaluation/Cost Analysis*
SOP	standard operating procedure
SVE	soil vapor extaction
SVM	soil vapor monitoring
TCE	trichloroethene
URS	URS Group Incorporated
USA North 811	Underground Service Alert North 811
USC	Uniform Soil Classification
VFD	variable frequency drive
VGAC	vapor-phase granular-activated carbon
VOCs	volatile organic compound

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1.0 INTRODUCTION

This design/operations and monitoring plan was prepared for Building 4260 by URS Group Incorporated (URS) under contract FA8903-16-D-0029, task order number 0008. This document provides the plans for construction of a new soil vapor extaction (SVE) well and associated components, and proposed operations and maintenance (O&M) for the first 6 months of operations of the SVE system. The justification for much of this work, particularly SVE well drilling and sampling, is described in the *Building 4260 Vadose Zone Site Inspection Report and Engineering Evaluation/Cost Analysis* (SI/EECA; URS 2018). This work is being conducted near the the southeastern corner of Building 4260 (B4260) at the former Mather Air Force Base (Mather) for the Air Force Civil Engineer Center (AFCEC) (Figures 1-1 and 1-2).

1.1 Plan Objectives

The plan objectives are to:

- provide design drawings for installation of a new SVE well and construction of associated conveyance piping and equipment to connect the SVE well to the exisitng Site 59 SVE system to allow for the extraction and treatment of soil vapors; and
- provide specifications for operation of the SVE system and monitoring that will occur for the first 6 months.

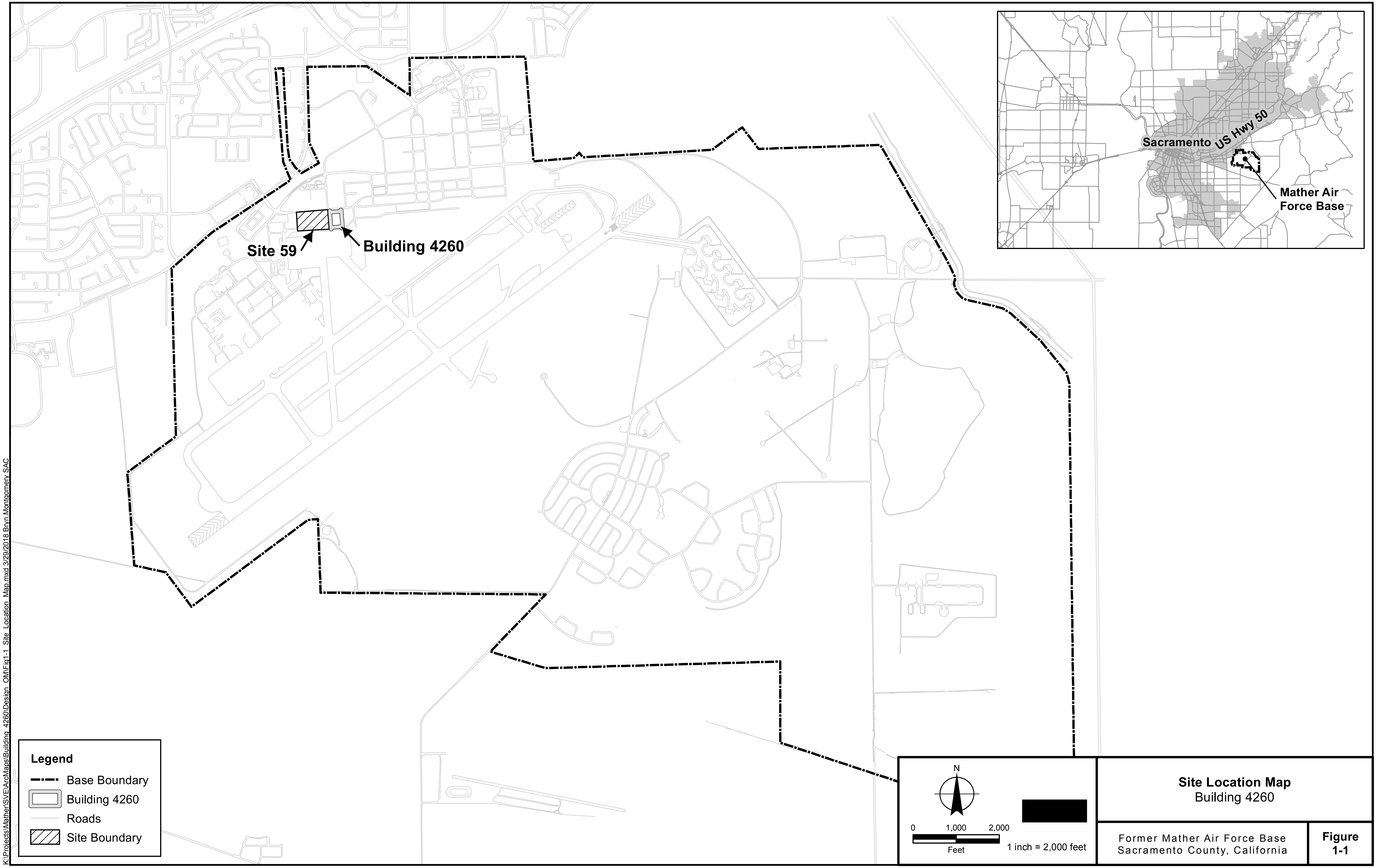
1.2 Report Organization

This report is organized as follows:

- Section 1.0 is an introduction to the overall plan objectives and report organization.
- Section 2.0 discusses the SVE system design.
- Section 3.0 describes the construction activities to be conducted.
- Section 4.0 discusses operations and monitoring activities.
- Section 5.0 lists the references cited in this document.

This report also includes the following appendices:

- Appendix A–Design Drawings
- Appendix B–Forms
- Appendix C–Quality Assurance Project Plan (QAPP) Addendum

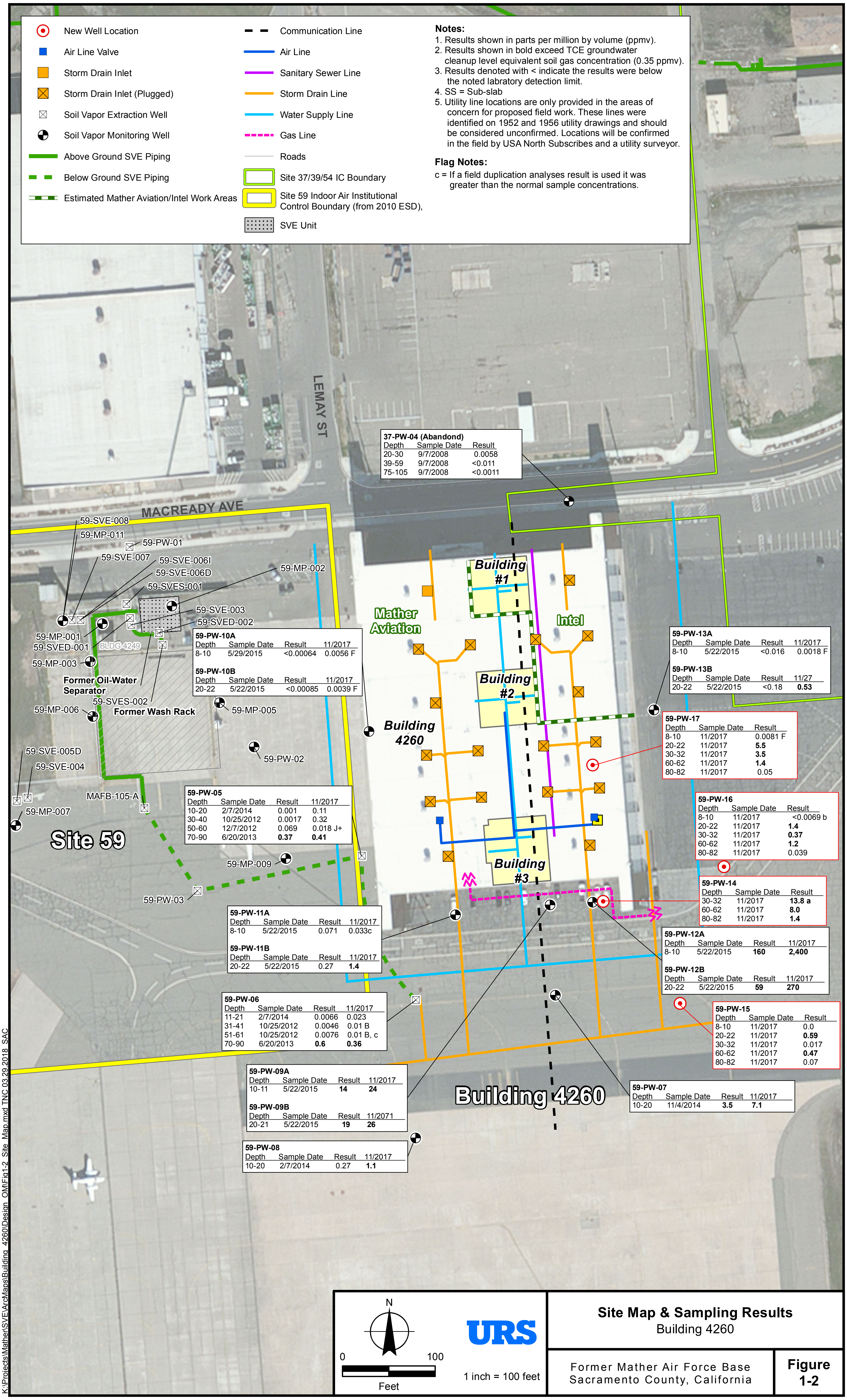


Site Location Map
Building 4260

Former Mather Air Force Base
Sacramento County, California

Figure
1-1

K:\Projects\Mather\SVE\ArcMaps\Building 4260\Design OM\Fig1-1 Site Location Map.mxd 3/29/2018 Bryn.Montgomery SAC



● New Well Location
■ Air Line Valve
■ Storm Drain Inlet
☒ Storm Drain Inlet (Plugged)
☒ Soil Vapor Extraction Well
● Soil Vapor Monitoring Well
━ Above Ground SVE Piping
- - Below Ground SVE Piping
▬ Estimated Mather Aviation/Intel Work Areas
- - Communication Line
━ Air Line
━ Sanitary Sewer Line
━ Storm Drain Line
━ Water Supply Line
- - Gas Line
— Roads
☐ Site 37/39/54 IC Boundary
☐ Site 59 Indoor Air Institutional Control Boundary (from 2010 ESD),
▨ SVE Unit

Notes:

1. Results shown in parts per million by volume (ppmv).
2. Results shown in bold exceed TCE groundwater cleanup level equivalent soil gas concentration (0.35 ppmv).
3. Results denoted with < indicate the results were below the noted labratory detection limit.
4. SS = Sub-slab
5. Utility line locations are only provided in the areas of concern for proposed field work. These lines were identified on 1952 and 1956 utility drawings and should be considered unconfirmed. Locations will be confirmed in the field by USA North Subscribes and a utility surveyor.

Flag Notes:

c = If a field duplication analyses result is used it was greater than the normal sample concentrations.

37-PW-04 (Abandond)

Depth	Sample Date	Result
20-30	9/7/2008	0.0058
39-59	9/7/2008	<0.011
75-105	9/7/2008	<0.0011

59-PW-10A

Depth	Sample Date	Result	11/2017
8-10	5/29/2015	<0.00064	0.0056 F

59-PW-10B

Depth	Sample Date	Result	11/2017
20-22	5/22/2015	<0.00085	0.0039 F

59-PW-13A

Depth	Sample Date	Result	11/2017
8-10	5/22/2015	<0.016	0.0018 F

59-PW-13B

Depth	Sample Date	Result	11/27
20-22	5/22/2015	<0.18	**0.53**

59-PW-17

Depth	Sample Date	Result
8-10	11/2017	0.0081 F
20-22	11/2017	**5.5**
30-32	11/2017	**3.5**
60-62	11/2017	**1.4**
80-82	11/2017	0.05

59-PW-16

Depth	Sample Date	Result
8-10	11/2017	<0.0069 b
20-22	11/2017	**1.4**
30-32	11/2017	**0.37**
60-62	11/2017	**1.2**
80-82	11/2017	0.039

59-PW-05

Depth	Sample Date	Result	11/2017
10-20	2/7/2014	0.001	0.11
30-40	10/25/2012	0.0017	0.32
50-60	12/7/2012	0.069	0.018 J+
70-90	6/20/2013	**0.37**	**0.41**

59-PW-14

Depth	Sample Date	Result
30-32	11/2017	**13.8 a**
60-62	11/2017	**8.0**
80-82	11/2017	**1.4**

59-PW-11A

Depth	Sample Date	Result	11/2017
8-10	5/22/2015	0.071	0.033c

59-PW-11B

Depth	Sample Date	Result	11/2017
20-22	5/22/2015	0.27	**1.4**

59-PW-12A

Depth	Sample Date	Result	11/2017
8-10	5/22/2015	**160**	**2,400**

59-PW-12B

Depth	Sample Date	Result	11/2017
20-22	5/22/2015	**59**	**270**

59-PW-06

Depth	Sample Date	Result	11/2017
11-21	2/7/2014	0.0066	0.023
31-41	10/25/2012	0.0046	0.01 B
51-61	10/25/2012	0.0076	0.01 B, c
70-90	6/20/2013	**0.6**	**0.36**

59-PW-15

Depth	Sample Date	Result
8-10	11/2017	0.0
20-22	11/2017	**0.59**
30-32	11/2017	0.017
60-62	11/2017	**0.47**
80-82	11/2017	0.07

59-PW-09A

Depth	Sample Date	Result	11/2017
10-11	5/22/2015	**14**	**24**

59-PW-09B

Depth	Sample Date	Result	11/2071
20-21	5/22/2015	**19**	**26**

59-PW-07

Depth	Sample Date	Result	11/2017
10-20	11/4/2014	**3.5**	**7.1**

59-PW-08

Depth	Sample Date	Result	11/2017
10-20	2/7/2014	0.27	**1.1**

URS

Site Map & Sampling Results
Building 4260

Former Mather Air Force Base
Sacramento County, California

Figure
1-2

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2.0 SVE SYSTEM DESIGN

2.1 Background

The B4260 site is a vadose zone VOC source area located near the southeastern corner of the building. B4260 currently serves as a commercial aircraft maintenance hangar for Mather Aviation, which occupies the central and southern sections of the building, and Intel Corporation, which occupies the northeastern section of the building. This building was constructed around 1954, and originally was used for military purposes, including aircraft repair and maintenance. East of B4260 is the Site 59 SVE system, which was installed to remediate the vadose zone contamination associated with the former Site 59 oil-water separator (OWS) and wash rack.

The main vadose zone VOC contaminant of concern (COC) is trichloroethene (TCE); the source area is located in the vicinity of soil vapor monitoring (SVM) well 59-PW-12A. The approximate contamination extent is shown in Figure 2-1. This plume map is based on the baseline sampling activities that were conducted in November 2017, which are discussed in the SI/EECA (URS 2018).

A potential source of vadose zone contamination at 59-PW-12A is the nearby storm drain (Figure 1-2). There are four storm drain lines that run in a north-south direction through the hangar that were designed to capture spills and storm water collected from the roof. Two storm drain lines would have collected liquids from the northern quarter of the building and transported the fluid by gravity to the north; two additional storm drain lines would have collected spills from the remainder of the hangar and transported them by gravity to the south. It is believed that all of the floor drains inlets, with the exception of the drain inlet located in the northwest corner of the building, were plugged when the property was transferred to Sacramento County.

Perched water was observed in the soil vapor wells near the southeastern end of B4260, after the new SVM wells were installed in February 2017, following an unseasonably wet rainy season. The perched water persisted, but water levels declined over time. Baseline sampling was conducted in November 2017, to assess the extent of vadose zone contamination. Sampling could not be performed for all of the SVM wells due to the perched water, but sufficient data were collected to determine that an SVE removal action was appropriate.

2.2 Design

The design for the SVE well and the construction of conveyance piping to the existing Site 59 SVE system are provided in Appendix A. The new SVE well (59-PW-18) will be installed northwest of SVM well 59-PW-12, west of the storm drain line, as shown in Figure 2-1. The SVE system conveyance line and SVE system details are shown in the design drawings, provided in Appendix A. The design includes the following:

- Soil vapor will be extracted from the new SVE well at B4260, 59-PW-18.
- An air-water separator (AWS) (AWS-2) will be installed near the new SVE well, to capture perched water and condensate to minimize accumulation of water in the remaining piping. AWS-2 will be a refurbished unit, taken from one of the decommissioned Mather SVE systems, and will have a minimum capacity of 50 gallons; the existing AWS, located at the Site 59 blower, will be referred to as AWS-1.
- Conveyance piping will be installed from the new SVE well to the piping that connects 59-PW-05 and 59-PW-06 to the Site 59 SVE treatment system; the existing Site 59 conveyance piping from that area is still intact and will be used to convey the soil vapor to the Site 59 blower. Multiple low-point

drains are located along the length of the piping, to facilitate capture of condensed water generated during SVE.

- A variable frequency drive (VFD) will be installed at the Site 59 treatment system to improve control of the blower motor while conserving power.
- A high vacuum sensor will be installed to trigger an SVE blower shutdown. If water accumulates in AWS-2 or in the piping, a high vacuum condition will trigger a system shutdown. The SVE system can be restarted only manually, after the AWS and low-point drains have been drained and the alarm has been reset.
- A cellular notification system to notify URS personnel of system alarms and shutdowns will replace the analog autodialer.

☒ Proposed Extraction Well

◉ New Well Location

▣ Recommended Sub-slab Sample Location

■ Air Line Valve

🟧 Storm Drain Inlet

☒ Storm Drain Inlet (Plugged)

☒ Soil Vapor Extraction Well

◐ Soil Vapor Monitoring Well

― Estimated Soil Gas TCE Plume Extent

― Above Ground SVE Piping

- - Below Ground SVE Piping

- - Estimated Mather Aviation/Intel Work Areas

- - Communication Line

― Air Line

― Sanitary Sewer Line

― Storm Drain Line

― Water Supply Line

- - Gas Line

― Roads

Notes:

1. Results shown in parts per million by volume (ppmv).
2. Results shown in bold exceed TCE groundwater cleanup level equivalent soil gas concentration (0.35 ppmv).
3. Results denoted with < indicate the results were below the noted labratory detection limit.
4. SS = Sub-slab
5. Utility line locations are only provided in the areas of concern for proposed field work. These lines were identified on 1952 and 1956 utility drawings and should be considered unconfirmed. Locations will be confirmed in the field by USA North Subscribes and a utility surveyor.

Flag Notes:

B = Blank contamination

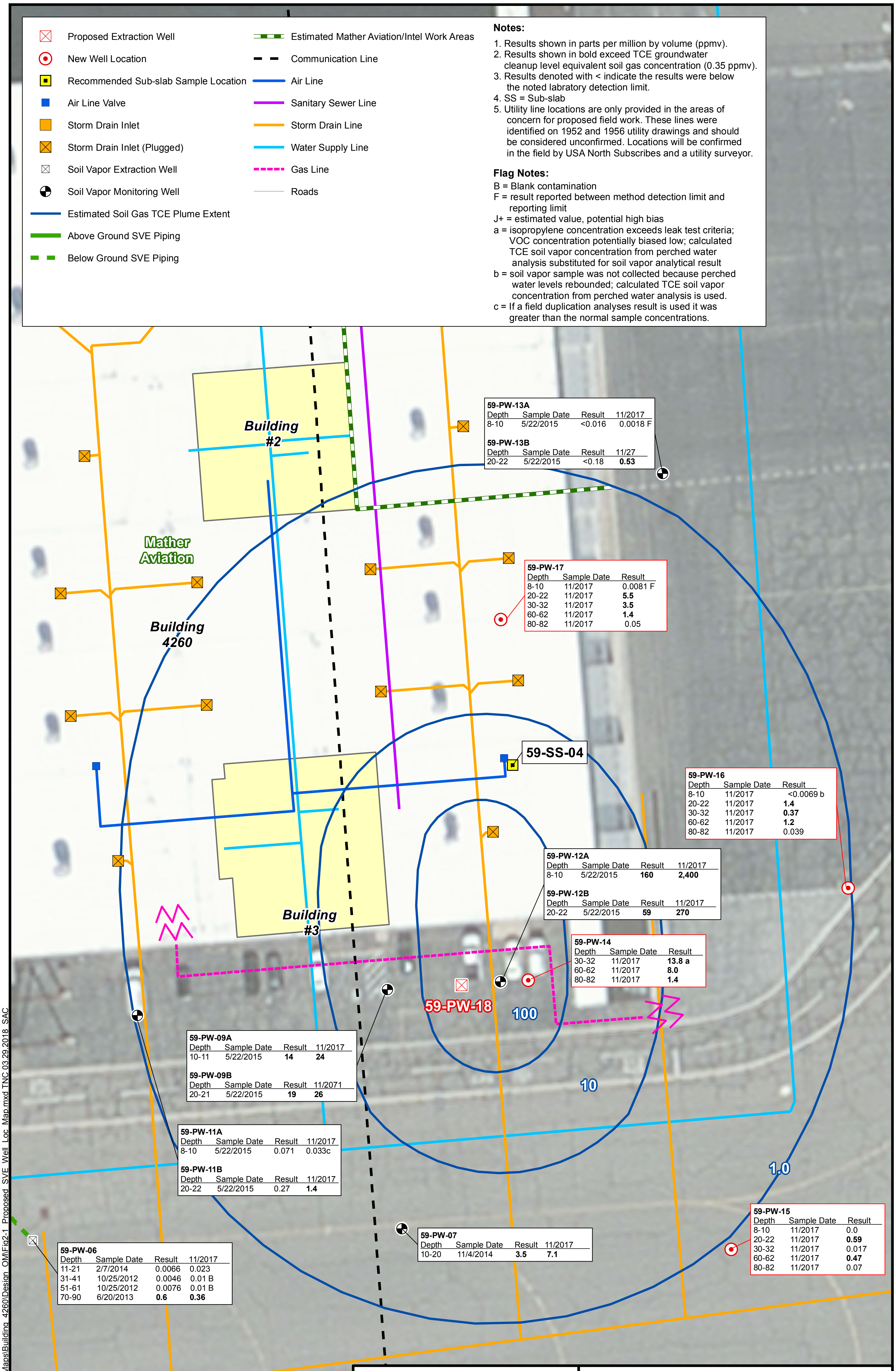
F = result reported between method detection limit and reporting limit

J+ = estimated value, potential high bias

a = isopropylene concentration exceeds leak test criteria; VOC concentration potentially biased low; calculated TCE soil vapor concentration from perched water analysis substituted for soil vapor analytical result

b = soil vapor sample was not collected because perched water levels rebounded; calculated TCE soil vapor concentration from perched water analysis is used.

c = If a field duplication analyses result is used it was greater than the normal sample concentrations.



59-PW-13A

Depth	Sample Date	Result	11/2017
8-10	5/22/2015	<0.016	0.0018 F

59-PW-13B

Depth	Sample Date	Result	11/27
20-22	5/22/2015	<0.18	**0.53**

59-PW-17

Depth	Sample Date	Result
8-10	11/2017	0.0081 F
20-22	11/2017	**5.5**
30-32	11/2017	**3.5**
60-62	11/2017	**1.4**
80-82	11/2017	0.05

59-PW-16

Depth	Sample Date	Result
8-10	11/2017	<0.0069 b
20-22	11/2017	**1.4**
30-32	11/2017	**0.37**
60-62	11/2017	**1.2**
80-82	11/2017	0.039

59-PW-12A

Depth	Sample Date	Result	11/2017
8-10	5/22/2015	**160**	**2,400**

59-PW-12B

Depth	Sample Date	Result	11/2017
20-22	5/22/2015	**59**	**270**

59-PW-14

Depth	Sample Date	Result
30-32	11/2017	**13.8 a**
60-62	11/2017	**8.0**
80-82	11/2017	**1.4**

59-PW-09A

Depth	Sample Date	Result	11/2017
10-11	5/22/2015	**14**	**24**

59-PW-09B

Depth	Sample Date	Result	11/2071
20-21	5/22/2015	**19**	**26**

59-PW-11A

Depth	Sample Date	Result	11/2017
8-10	5/22/2015	0.071	0.033c

59-PW-11B

Depth	Sample Date	Result	11/2017
20-22	5/22/2015	0.27	**1.4**

59-PW-15

Depth	Sample Date	Result
8-10	11/2017	0.0
20-22	11/2017	**0.59**
30-32	11/2017	0.017
60-62	11/2017	**0.47**
80-82	11/2017	0.07

59-PW-07

Depth	Sample Date	Result	11/2017
10-20	11/4/2014	**3.5**	**7.1**

59-PW-06

Depth	Sample Date	Result	11/2017
11-21	2/7/2014	0.0066	0.023
31-41	10/25/2012	0.0046	0.01 B
51-61	10/25/2012	0.0076	0.01 B
70-90	6/20/2013	**0.6**	**0.36**

N

0 40

Feet

URS

1 inch = 40 feet

Proposed SVE Well Location Map

Building 4260

Former Mather Air Force Base
Sacramento County, California

Figure 2-1

K:\Projects\Mather\SVE\ArcMaps\Building_4260\Design_OM\Fig2-1_Proposed_SVE_Well_Loc_Map.mxd TNC 03.29.2018 SAC

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3.0 CONSTRUCTION ACTIVITIES

This section discusses the well installation, conveyance line construction, and initial baseline vapor sampling activities for the proposed SVE well and SVE treatment system. This section is intended for use by field staff, to provide guidance for the field work outlined in this document. The Sampling and Analysis Plan, which is made up of the field sampling plan (Part 1) and the QAPP (Part 2), discusses all quality-related field sampling and laboratory analysis activities that will be implemented during sampling and monitoring activities (MWH 2010). An addendum to the QAPP specific to activities discussed in the plan is provided in Appendix C.

3.1 Pre-Field Work Activities

Pre-field work activities are those that must be completed before the well drilling subcontractor mobilizes to the site. Before mobilization, all access will be coordinated through AFCEC personnel and Mather Aviation. After field work has begun, drilling activities will be coordinated directly with Mather Aviation staff.

3.1.1 Permitting/Notifications/Utility Clearance

The proposed well drilling location and subsurface trenching locations will be marked by the field crew. Field staff will contact Underground Service Alert North 811 (USA North 811) to clear these areas at least 48 hours before any subsurface activity. West Coast Gas Company, Inc., the local natural gas company, has requested a meeting with the construction supervisor at the time of the USA North 811 utility survey and before the trenching activities that will cross its utility line. This area previously was surveyed by a utility-locating subcontractor before installation of the existing SVM wells. The SVE well location will be hand-augered or otherwise cleared by “soft-digging” methods (e.g., hand augering, air knife, and vacuum truck) to a depth of 5 feet below ground surface (bgs), to avoid unknown utilities or other belowground obstructions/hazards.

Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), this work is exempt from permitting, although field activities must be performed in a manner that meets the substantive local permitting and notification requirements. Therefore, no drilling or well installation permits will be obtained from the Sacramento County Environmental Health Department. However, as the property owner, Sacramento County will be notified.

The drilling, trenching, and conveyance pipe installation activites will occur close to B4260 but do not appear to require a Federal Aviation Administration (FAA) Form 7460-1, “Notice of Proposed Construction or Alteration.” However, the FAA will be contacted before the start of field activites, to confirm that this is the case.

Wastewater generated during field activities and system operations will be contained and handled as described in Section 4.1. The method of discharge of the water currently is being evaluated. Options include pumping the water to a nearby groundwater conveyance line to the Main Base/Strategic Air Command Area (MBSA) groundwater treatment system, transporting the water to a location just before the air stripper of the MBSA groundwater treatment system, or transporting the water to the Mather contractor yard to be discharged to the sanitary sewer at Mather Outfall #1 (on the east side of Femoyer Street, east of Grissom Avenue), under a Sacramento County Regional Sanitation District Sewer Discharge Permit GRW021.

The SVE blower air/water heat exchanger requires a source of water and will discharge no-contact cooling water to Mather Outfall #5, under Sacramento County Regional Sanitation District Sewer Discharge Permit GRW021.

The SVE system has two 3,000-pound vapor-phase granular-activated carbon (VGAC) units that will be used to treat discharged air until VOC emissions meet the standards, allowing direct discharge outlined in the existing Site 59 SVE system's air discharge permit exemption.

3.2 Mobilization and Field Work Preparation

Before the start of field work, the following mobilization and field preparations will be performed:

- A staging area will be set up (for drinking water, sampling supplies) for field team use.
- Portable toilets will be deployed to the work site, if other facilities are unavailable.
- Vehicles for field crews and all equipment and materials for initial activities will be obtained.
- Applicable field work forms will be copied, including tailgate forms, daily operations and field logs, sampling forms, and lithologic/well construction logs (samples of these forms are provided in Appendix B).
- Applicable field instruments (e.g., a photoionization detector [PID]) will be calibrated, tested, and charged.
- Field staff will review this design document, the Mather Health and Safety Plan (HASP) (URS 2010), and other applicable documents pertaining to construction practices and sampling procedures.
- All drilling equipment will be brought on site, including a drill rig, support trucks, drilling tools, well construction materials, and decontamination pads. The drill rig and subsurface tools and equipment will be decontaminated before being brought onto the work site and beginning work, and an equipment inspection form and checklist will be completed.
- A waste hauling subcontractor will deliver soil bins to the site, to be located in an area designated by URS personnel and as agreed by Airport Operations staff. Any wastes that are generated will be stored in an area designated by URS personnel at the URS staging yard or other area, as agreed by Sacramento County and the Air Force.

3.3 Field Activities

The following sections describe field activities to be conducted.

3.3.1 Field Logs

Field staff will maintain daily field logs and notes, recording all field activities and observations, problems encountered, actions taken to solve the problem, and deviations from this plan or the QAPP Addendum (provided in Appendix C). The field logs are to be a chronological record of the day's activities and will include the following information:

- Date;
- subcontractor and URS staff names;
- weather conditions;
- problems/action items (if any);

- visitors (name of visitor/affiliation/reason for visit); and
- chronological log of activities.

3.3.2 Security and Site Control

The field crew will implement security and site control procedures, to reduce the potential for uncontrolled contaminant migration from the work areas, and to limit access by unauthorized personnel.

The site will be managed to contain all soil, water, grout, concrete, and personal protective equipment wastes. During non-working periods, all equipment and materials will be secured appropriately. Caution tape and delineators will be used to mark potentially dangerous areas.

Perimeter controls will be employed around work areas, and all site personnel will comply with the site control requirements of the Mather HASP when entering the work zone. The site supervisor will conduct a daily “tailgate” safety meeting at the start of each day’s work, and all authorized personnel will be required to sign the tailgate safety form (a blank tailgate form is provided in Appendix B) before the start of daily activities.

3.3.3 SVE Drilling and Well Installation

After hand-augering or air-knifing to 5 feet bgs for borehole utility clearance, a sonic drilling rig will be used to drill the borehole for the proposed SVE well 59-PW-18, shown in Figure 2-1. Sonic drilling was selected for its ability to penetrate coarse gravels and cobbles, which may be encountered below the ground surface. The SVE borehole will be advanced to approximately 61 feet bgs (Sheet C-6 in Appendix A). Continuous soil cores, collected from inside the sonic sampling tool, will be described and classified by the on-site geologist, in accordance with the Uniform Soil Classification (USC) System.

The SVE well will be constructed according to the schedule provided below, using machine-slotted (0.02-inch-wide slot size), 4-inch-diameter Schedule 40 polyvinyl chloride (PVC), screened from 8 to 40 feet bgs and from 54 to 60 feet bgs. The well construction details are provided in the design, Sheet C-6, in Appendix A. The SVE well will have two screen intervals. The upper screen interval will target the 8 to 40 ft bgs depth interval and the lower screen interval will target the 54 to 60 foot bgs depth interval. This construction is based on the presence of a permeable sand layer observed from 46 to 50 feet bgs in the nearyby well, 59-PW-14, that is to be avoided in order to maximize the air flow in the zero to 40-foot depth interval.

Table 3-1. Well Construction Specifications, Building 4260

Borehole Depth (feet)	Casing and Screen Diameter (inches)	Casing and Screen Material	Screen Intervals (feet)	Screen Slot Size (inches)	Filter Pack #3 Sand + Sand bridge Sand (feet)	Hydrated Bentonite Seal (feet)	Above Hydrated Bentonite
59-PW-18	4	4” SCH 40 PVC	8-40	0.020	34.5	1.5	cement grout*
59-PW-18	4	4” SCH 40 PVC	54-60	0.020	8.5	9.5	NA

* Contains approximately 5 percent bentonite to reduce shrinkage.

NA = not applicable
PVC = polyvinyl chloride
SCH = schedule

The SVE well will be plumbed to the Site 59 SVE conveyance piping. The SVE well vault will be H-20 traffic-rated (i.e., 25,000-pound load) and installed flush with the ground surface with a bolted cover. See Sheet C-7 in Appendix A for further details.

3.3.4 SVE System Conveyance Line and System Upgrades

The SVE system conveyance line and SVE system installation will follow the design drawings (Appendix A).

3.3.5 SVE Vapor Sampling

Per DTSC guidance for wells installed using the sonic method, the initial, baseline vapor sample will be collected from the new SVE well no sooner than 72 hours after installation is completed and the subsurface has equilibrated. Subsurface equilibration will be evaluated by collecting PID, oxygen, and carbon dioxide measurements beginning the day after installation, until the measurements are considered stable, as recommended in *Advisory–Active Soil Vapor Investigations* (DTSC et al. 2015).

The SVE soil vapor sample will be collected using the vapor sampling standard operating procedure (SOP), provided in Appendix D of the RI workplan. Leak testing also will be conducted where possible.

3.4 Cuttings and Wastewater Removal

Well drilling, installation, and decontamination activities will generate soil core (cuttings) and possibly wastewater. This investigation-derived waste (IDW) will be containerized and stored at an appropriate location, to be determined by URS and Airport Operations staff. A designated subcontractor will be responsible for providing all containers (e.g., soil bins), transportation, and disposal of soil cuttings. The soil bins will be lined and water-tight. Sections 5.1.3.1 and 5.1.3.1.1 of the Sampling and Analysis Plan (MWH 2010) present more specific instructions for disposal of the drill cuttings and wastewater.

3.4.1 Drill Cuttings and Excavated Soils

During drilling operations and trenching, soil cuttings and excavated soils will be contained in separate bins or 55-gallon drums. Soil cores and trench materials will be screened with a PID, as they are generated, to evaluate the presence of VOCs.

When full, or before transportation, each container will be sealed, and an IDW label will be completed and attached. The label will include the following information, at a minimum: drum or bin number, boring identification, site name, date, material contained, and contact information.

A representative composite sample of the IDW soil will be collected and submitted for non-volatile laboratory analysis, as described in the QAPP Addendum (provided in Appendix C), to determine whether the soil cuttings will require off-site disposal. Discrete soil samples will be collected for all VOC analyses. The samples will consist of soil only; all other material (e.g., rocks, concrete) will be segregated and disposed as solid waste. The field crew will deposit all nonhazardous trash in dumpsters in the staging area, for subsequent disposal in a municipal landfill.

3.4.2 Wastewater

Decontamination of drilling equipment should not generate a volume of wastewater that will require separate handling from the drill cuttings. However, if this is not the case, disposal of wastewater generated during project activities will be coordinated with the AFCEC field engineer and/or Base Realignment and Closure Environmental Coordinator. Wastewater will be contained in a vessel (e.g., water tank) on site and will be transported to the staging area, to be discharged at an approved sewer outfall after sewer permit requirements are met, or to the MBSA treatment system.

3.5 Demobilization and Site Restoration

Following completion of well installation and SVE system upgrade activities, URS will demobilize equipment and materials from the work site. Demobilization will include the following:

- Ensuring that the surface completion for the installed wells are completed and properly secured, and that site restoration meets airport approval.
- Using the State Plane Coordinate System, Zone 3, North American Datum of 1983 and National Geodetic Vertical Datum of 1988 to map survey locations of the SVE well and subsurface piping.
- Inspecting the drilling decontamination pad/area located in the URS Mather Field Office area and verifying that it is clean.
- Verifying that all IDW wastewater and cuttings from field activities have been manifested/profiled properly and transported off-site to an appropriate disposal facility, and that no soil bins remain on site.
- Ensuring that site surface features are restored to match the surrounding area, with a minimum of surface disturbance.
- Removing all trash and excess materials that are generated during construction.
- Ensuring that the site is left neat and orderly.
- Ensuring that the contractor’s staging area is clear of all construction-related equipment and materials.
- Ensuring that all rental equipment and rental vehicles have been cleaned, decontaminated as necessary, and returned to the vendors.

3.6 Final Inspections

If requested, following demobilization and site restoration, a site walk with an AFCEC representative and the Mather Airport Operations staff will be performed to ensure that the site has been appropriately restored.

4.0 OPERATIONS AND MONITORING

Soil vapor will be extracted from the new B4260 SVE well, 59-PW-18, using the upgraded Site 59 SVE conveyance and treatment system. The soil vapor will be treated by VGAC until concentrations drop below the direct discharge criteria in the air permit.

4.1 SVE Operations

The SVE system will be operated for a minimum of 6 months. The need for continued operations after the initial 6 months will be evaluated at that time.

Water removal. AWS-1, AWS-2, and the low-point drains will be emptied on an as-needed basis. Initially, the system will be checked at least 2 times a week, until the rate of water removal normalizes and the frequency of removal becomes more predictable. The frequency of site visits will be determined based on the rate of water removal and is expected to be more frequent in winter, when air temperatures drop to below subsurface temperatures, and following rain events, when perched water levels are likely to rise.

Water from AWS-1, AWS-2, and the low-point drains will be pumped manually to a holding tank, mounted on a trailer or the back of a truck. Treatment and disposal options for the water are being evaluated, as discussed in Section 3.1.1.

4.2 System Monitoring

System monitoring will include collection of flow measurements and soil vapor samples from the treatment system and the monitoring wells for laboratory analysis.

SVE Treatment System Monitoring. Following restart of the Site 59 SVE system, system pressure measurements, PID readings, and flow parameters initially will be recorded daily to weekly, until system flows normalize, after which they will be monitored and recorded during weekly to bi-weekly site visits.

Soil Vapor Sampling. Soil vapor sampling will be conducted per the sampling matrix shown in Table 4-1 for the first 6 months. After the first 6 months of operations, the sampling frequency will be re-evaluated as appropriate.

- SVE treatment system monitoring points will be sampled monthly at the following:
    - the SVE system inlet;
    - the VGAC lead vessel outlet; and
    - the VGAC lag vessel outlet.
- Soil vapor monitoring wells will be sampled quarterly, following the sampling matrix shown in Table 4-1. Only those SVM wells immediate to the source area near 59-PW-12 will be sampled during the first quarterly sampling event. The second quarterly sampling event will include sampling for all SVM wells associated with B4260.

Table 4-1. SVE System Sampling Matrix

	Soil Gas Sampling Events						
				First Quarter		Second Quarter	
Sampling Locations:	**SVM Baseline [a]**	**SVE Well Drilling**	**SVE System Startup**	**3 Monthly SVE System Sample Events**	**SVE System Quarterly Monitoring Event #1**	**3 Monthly SVE System Sample Events**	**SVE System Quarterly Monitoring Event #2**
Wells installed prior to 2017							
59-PW-05 (10-20)	[a]				0		1
59-PW-05 (30-40)	[a]				0		1
59-PW-05 (50-60)	[a]				0		1
59-PW-05 (70-90)	[a]				0		1
59-PW-06 (11-21)	[a]				0		1
59-PW-06 (31-41)	[a]				0		1
59-PW-06 (51-61)	[a]				0		1
59-PW-06 (70-90)	[a]				0		1
59-PW-07 (10-20)	[a]				1		1
59-PW-08 (10-20)	[a]				1		1
59-PW-09A (10-11)	[a]				1		1
59-PW-09B (20-21)	[a]				1		1
59-PW-10A (8-10)	[a]				0		1
59-PW-10B (20-22)	[a]				0		1
59-PW-11A (8-10)	[a]				1		1
59-PW-11B (20-22)	[a]				1		1
59-PW-12A (8-10)	[a]				1		1
59-PW-12B (20-22)	[a]				1		1
59-PW-13A (8-10)	[a]				1		1
59-PW-13B (20-22)	[a]				1		1
SVM wells installed in 2017							
59-PW-14 (30-32)	[a]				1		1
59-PW-14 (60-62)	[a]				1		1
59-PW-14 (80-82)	[a]				1		1
59-PW-15 (8-10)	[a]				1		1
59-PW-15 (20-22)	[a]				1		1
59-PW-15 (30-32)	[a]				1		1
59-PW-15 (60-62)	[a]				1		1
59-PW-15 (80-82)	[a]				1		1
59-PW-16 (8-10)	[a]				1		1
59-PW-16 (20-22)	[a]				1		1
59-PW-16 (30-32)	[a]				1		1
59-PW-16 (60-62)	[a]				1		1
59-PW-16 (80-82)	[a]				1		1
59-PW-17 (8-10)	[a]				1		1
59-PW-17 (20-22)	[a]				1		1
59-PW-17 (30-32)	[a]				1		1
59-PW-17 (60-62)	[a]				1		1
59-PW-17 (80-82)	[a]				1		1
New SVE well							
59-PW-18 (8-40)		1			[b]		[b]
SVE system operations							
SVE system influent [b]			**2**	**3**		**3**	
SVE VGAC mid-bed			**2**	**3**		**3**	
SVE VGAC outlet			**2**	**3**		**3**	
Number of Well Samples =	**[a]**	**1**	**0**	**0**	**28**	**0**	**38**
SVE System Samples =	**[a]**	**0**	**6**	**9**	**0**	**9**	**0**
Number of Samples =	**0**	**1**	**6**	**9**	**28**	**9**	**38**
Field Duplicates =	**0**	**0**	**1**	**1**	**3**	**1**	**4**
Total Samples per Event =	**0**	**1**	**7**	**10**	**31**	**10**	**42**

Assumptions:

[a] The SVM baseline samples were collected in November 2017.

[b] The SVE well and SVE system influent are equivalent; for the quarterly sampling events, the sample will be collected at the SVE well. For system monitoring events that do not coincide with quarterly monitoring events, the system inlet sample location can be used if access is more convenient.

PID levels also will be recorded so that interim PID readings can be used to assess system conditions.

Soil vapor samples will be collected using the vapor sampling SOP, provided in Appendix D of the RI workplan. All samples will be analyzed for the site-specific VOCs listed in Table C-1 in the QAPP Addendum (Appendix C), using Method TO-15, with reporting limits of 5 parts per billion by volume for target analytes.

PID Monitoring. PID monitoring will be conducted concurrent with soil vapor sampling, to develop a correlation so that real-time monitoring with the PID can be conducted with some level of confidence between sampling events. This will be particularly helpful to assess the VGAC outlet concentrations.

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5.0 REFERENCES

Air Force Civil Engineer Center (AFCEC). 2018 (in progress). *Final Building 4260 Action Memorandum.*

California Department of Toxic Substances Control (DTSC), Los Angeles Regional Water Quality Control Board, and San Francisco Regional Water Quality Control Board. 2015 (July). *Advisory–Active Soil Vapor Investigations.*

Montgomery Watson Harza (MWH). 2010 (May). *Sampling and Analysis Plan. Part I-Field; Part 2-Quality Assurance Project Plan, Sampling Plan, Former Mather Air Force Base*. Sacramento County, CA.

URS Group, Inc. (URS). 2010 (August). *Former Mather Air Force Base Health and Safety Plan for Long-Term Operations, Maintenance, and Monitoring*.

———. 2017 (February). *Site 59b Remedial Investigation Work Plan, Former Mather Air Force Base, California*.

———. 2018 (March). *Building 4260 Vadose Zone Site Inspection Report and Engineering Evaluation and Cost Analysis, Former Mather Air Force Base*.

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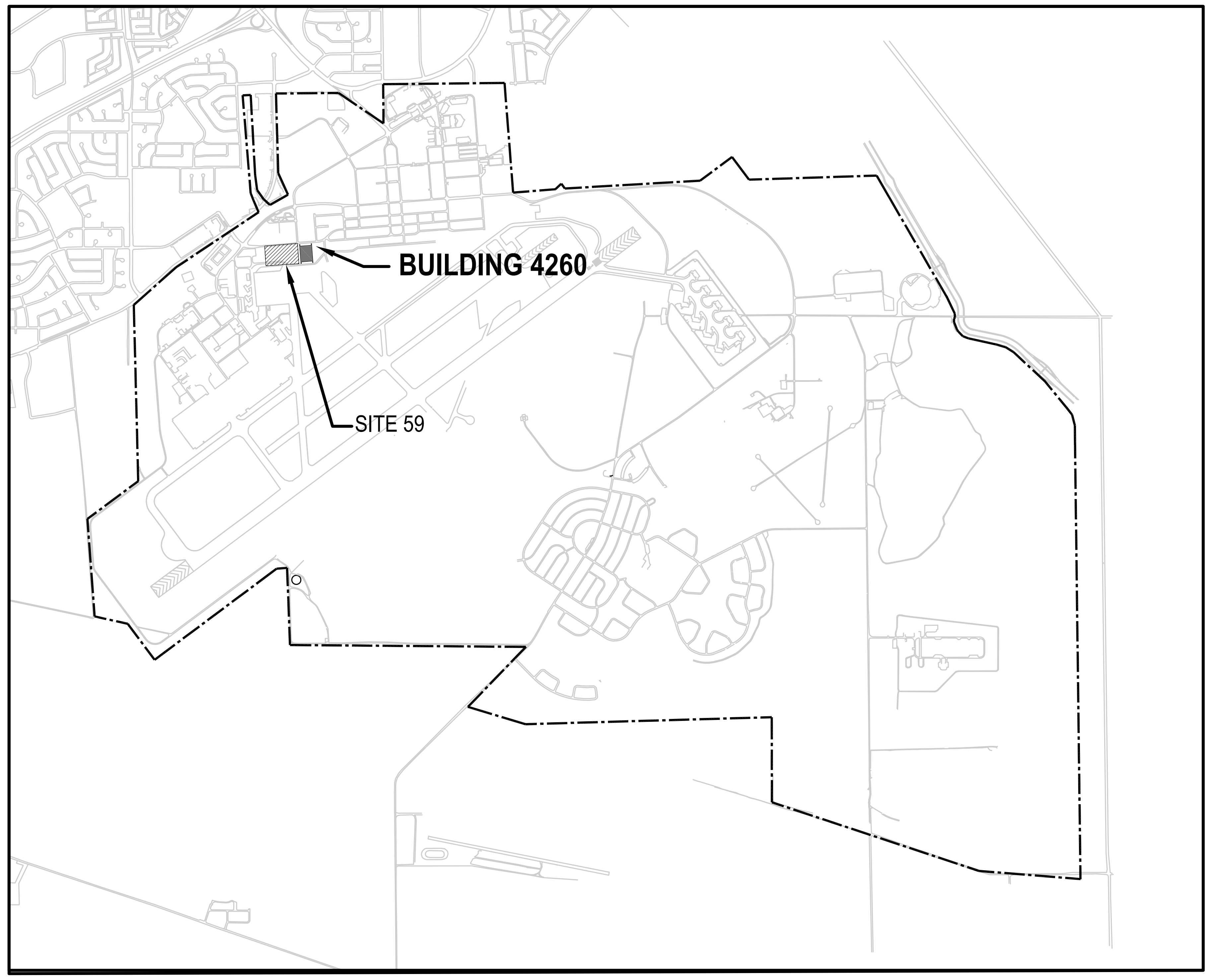
APPENDIX A

Design Drawings

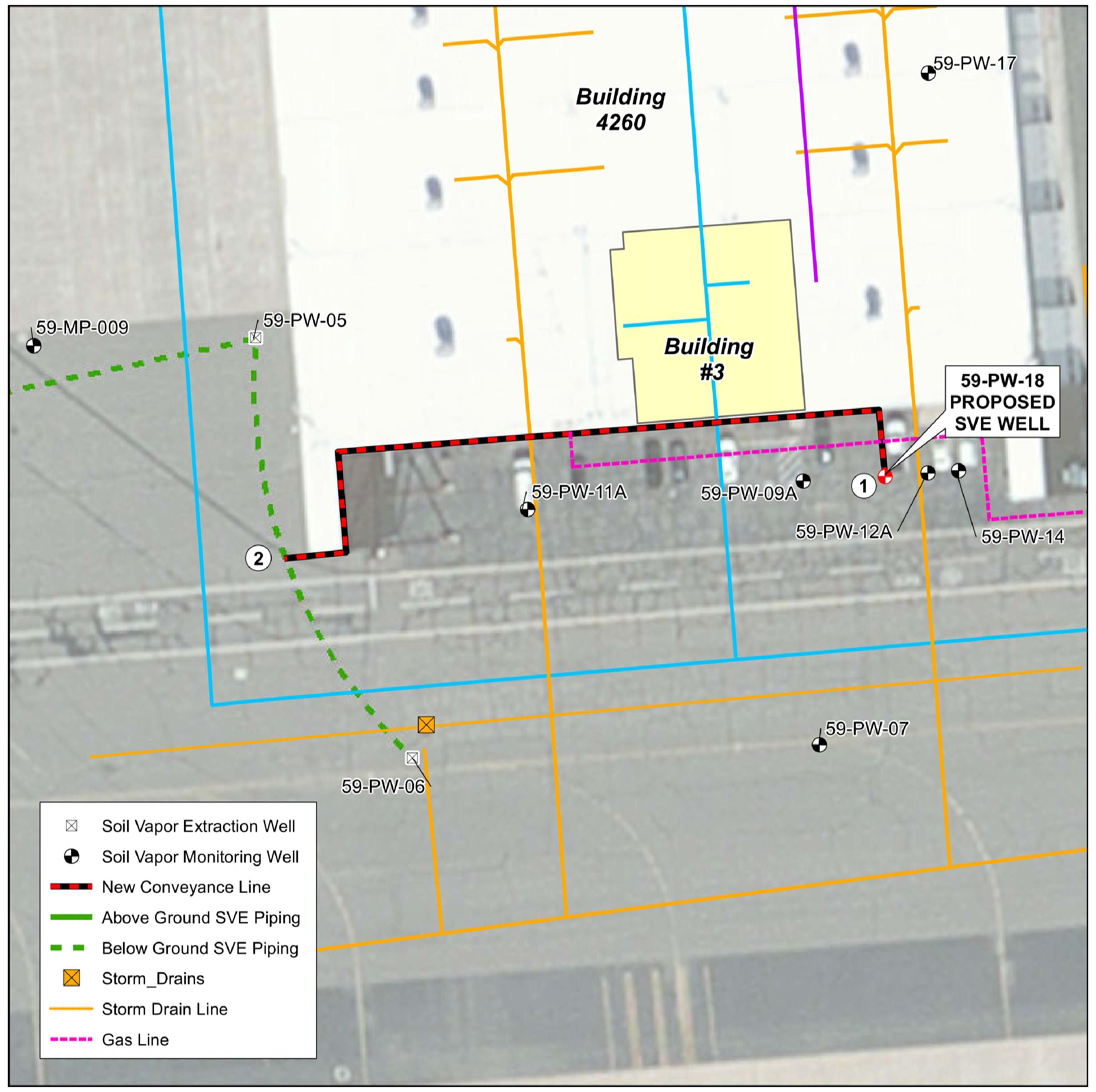
AIR FORCE CIVIL ENGINEERING CENTER

BUILDING 4260 SVE SYSTEM DESIGN INVESTIGATION AND REMEDY OPTIMIZATION AT THE FORMER MATHER AIR FORCE BASE, CALIFORNIA

FEBRUARY 2018
CONTRACT # FA8903-16-D-0029



VICINITY MAP
BUILDING 4260
FORMER MATHER AIR FORCE BASE



SITE MAP
BUILDING 4260 SVE SYSTEM

DRAFT SUBMITTAL
FEBRUARY 2018

No.	REVISIONS	APPROVED	No.	REVISIONS	APPROVED

PROJECT MANAGER:
ENGINEER OF RECORD:
QUALITY CONTROL:

PREPARED BY:
URS

ENGINEER OF RECORD DATE

PREPARED FOR:

AIR FORCE CIVIL ENGINEER CENTER DATE

DEPARTMENT OF THE AIR FORCE CONTRACT No.:
FA8903-16-D-0029
URS PROJECT No.:
60520471

BUILDING 4260 SVE SYSTEM DESIGN
INVESTIGATION AND REMEDY OPTIMIZATION
AT FORMER MATHER AIR FORCE BASE,
CALIFORNIA

BUILDING 4260 SVE SYSTEM

TITLE SHEET, LOCATION MAP, AND VICINITY MAP

G-1
SHEET
1
OF
12

FILE NAME: G:\US Air Force\FA8903-16-D-0029\Mather B4260\500 Deliverables - Reports\502 Design and O&M Plan\design\1_2018\1 G-1_Title Sheet.dwg LAYOUT NAME: G-1_Title Sheet PLOTTED: Thursday, February 15, 2018 - 5:11pm USER: Brownm6

CONSTRUCTION NOTES:

A. SCOPE:

1. PARTIES INVOLVED IN THE PROJECT:

- CLIENT – U.S. AIR FORCE (AFCEC/CIBW)
  SACRAMENTO COUNTY AIRPORT SYSTEM
- TENANT – MATHER AVIATION
- ENGINEER – URS GROUP INC.
- CONTRACTOR – URS GROUP INC.

B. GENERAL NOTES:

1. ANY CONTRADICTIONS OR CONFLICTING STATEMENTS CONTAINED IN THESE NOTES OR BETWEEN THESE NOTES AND THE PROJECT DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY. CONTRACTOR IS TO REVIEW DRAWINGS AND CONDUCT A SITE VISIT PRIOR TO START OF WORK. ANY CONFLICT BETWEEN THE DRAWINGS AND ACTUAL SITE CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO START OF WORK.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL FIELD DIMENSIONS WITH ENGINEER BEFORE BEGINNING WORK; THE ENGINEER SHALL BE NOTIFIED OF ANY DISCREPANCY.

3. LOCATIONS OF EXISTING UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT LOCATIONS OF ALL UTILITIES, WHETHER SHOWN ON THE PLANS OR NOT.

4. ALL IMPROVEMENTS WHICH SURROUND THE PROPERTY SHALL REMAIN UNDISTURBED AND UNDAMAGED AS A RESULT OF THE PROJECT.

5. CONTRACTOR SHALL ORGANIZE WORKFLOW TO MINIMIZE THE TIME THAT TRENCHES ARE OPEN. BARRICADES AND SECURITY FENCING SHALL BE PROVIDED AS NEEDED AT ALL EXCAVATIONS AND DISTURBED AREAS THROUGHOUT THE PROJECT TO ENSURE VEHICULAR AND PEDESTRIAN SAFETY. IF EXCAVATION WILL REMAIN OPEN OVERNIGHT, TRENCH PLATES SHALL BE USED AND BARRICADES SHALL BE LIGHTED FROM DUSK TO DAWN.

6. SITE SHALL BE MAINTAINED IN A NEAT AND CLEAN CONDITION THROUGHOUT CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL FOLLOW FEDERAL AVIATION ADMINISTRATION REQUIREMENTS FOR WORK ADJACENT TO AN AIRFIELD. NO DEBRIS, MOUNDS OF EARTH OR ARTICLES OR EXCESS MATERIAL SHALL REMAIN AFTER COMPLETION OF THE PROJECT.

7. CONTRACTOR SHALL INSTALL EQUIPMENT AND APPURTENANCES WITH RESPECTIVE MANUFACTURES' INSTALLATION MANUALS, UNIFROM PLUMBING CODE (UPC), UNIFORM BUILDING CODE (UBC), NATIONAL ELECTRIC CODE (NEC), AND UNIFORM FIRE CODE (UFC) STANDARDS AND SPECIFICATIONS.

8. PROVIDE AS-BUILT DRAWINGS TO THE ENGINEER.

9. CONTRACTOR SHALL COORDINATE ALL WORK WITH TENANT TO MINIMIZE DISRUPTION TO BUSINESS OPERATIONS AND PARKING. WORK THAT IS EXCESSIVELY LOUD SHALL BE CONDUCTED AFTER HOURS.

C. TRENCHING, EXCAVATION, CONCRETE, AND PAVING:

1. EXISTING ASPHALT AND CONCRETE SURFACES SHALL BE SAWCUT ALONG A STRAIGHT LINE PRIOR TO RESTORATION.

2. UTILITY TRENCHES SHALL BE EXCAVATED A MINIMUM OF 2 INCHES DEEPER THAN THE INVERT OF INSTALLED PIPES. ALL BELOW GRADE PIPING SHALL HAVE A MINIMUM BURIED DEPTH OF 24 INCHES (EXCEPT WHERE SPECIFIED). PLEASE REFER TO TRENCH DETAILS ON SHEET 6 FOR MINIMUM TRENCH BACKFILL REQUIREMENTS WHICH APPLY TO ALL SITE TRENCHING.

3. CONTRACTOR SHALL INSTALL SVE CONVEYANCE PIPING UNDER THE EXISTING WEST COAST GAS LINE AND MAINTAIN A SEPARATION OF 12 INCHES. CONTRACTOR SHALL CONTACT WEST COAST GAS REPRESENTATIVE TO COORDINATE A SITE VISIT AS PART OF THE USA NORTH UTILITY CLEARANCE.

4. CONTRACTOR SHALL BACKFILL UTILITY TRENCHES WITH NATIVE BACKFILL IN ACCORDANCE WITH CALTRANS STANDARD SPECIFICATION SECTION 10-3.025B. UTILITY TRENCH BACKFILL SHALL BE COMPACTED AS SPECIFIED BELOW.

5. CONTRACTOR SHALL PLACE A MINIMUM OF 6.5 INCHES OF AGGREGATE BASE PRIOR TO SURFACING. AGGREGATE BASE SHALL BE IN ACCORDANCE WITH CALTRANS STANDARD SPECIFICATIONS, LATEST EDITION, SECTION 26 FOR CLASS II A.B., 3/4 INCH MAXIMUM AGGREGATE. AGGREGATE BASE SHALL BE COMPACTED TO 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D-1557.

6. SURFACING SHALL BE REPLACED WITH LIKE PAVEMENT, UNLESS SHOWN OTHERWISE, AND SHALL BE RESTORED TO EXISTING CONDITIONS.

7. ASPHALT PAVEMENT SHALL BE IN ACCORDANCE WITH CALTRANS STANDARD SPECIFICATIONS LATEST EDITION, FOR TYPE B ASPHALT CONCRETE. SAWCUT EDGE OF EXISTING ASPHALT SHALL BE CLEANED AND SHALL HAVE A COAT OF LIQUID ASPHALT APPLIED PRIOR TO CONSTRUCTION OF NEW ASPHALT PAVEMENT.

8. CONTRACTOR SHALL PLACE EXCAVATED SOIL INTO A BIN LOCATED ON THE WASH RACK PAD AND SHALL COLLECT A 4 PART COMPOSITE FOR LAB ANALYSIS. SOIL MAY BE STOCKPILED ON TOP OF PLASTIC TEMPORARILY, BUT MUST BE PLACED IN THE BIN AT THE END OF EACH DAY. SOIL SHALL BE DISPOSED OF AFTER WASTE CHARACTERIZATION IS COMPLETE.

9. CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL EXCAVATED ASPHALT AND CONCRETE FROM THE SITE AS CONSTRUCTION DEBRIS.

10. THE CONTRACTOR SHALL USE ONLY THE WASH RACK OR OTHER APPROVED ON-SITE AREAS FOR STORING CONSTRUCTION MATERIALS AND EQUIPMENT, AND FOR STOCKPILING EXCAVATED SOIL OR DEMOLITION DEBRIS.

E. PLUMBING AND ELECTRICAL

1. ALL PIPING RUNS ARE SHOWN SCHEMATICALLY. THE BEST ROUTE SHALL BE DETERMINED IN THE FIELD WITH THE ENGINEER AND SHALL BE IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE, AND LOCAL CODE REQUIREMENTS.

2. ALL CONVEYANCE PIPES SHALL BE PRESSURE TESTED PRIOR TO BACKFILLING. CONVEYANCE PIPING SHALL BE PNEUMATICALLY PRESSURE TESTED TO VACUUM psi 7 IN. Hg AND HELD FOR 1 HOUR. NO PRESSURE DROP WILL BE PERMITTED. SHOULD TESTING INDICATE LEAKAGE OR OTHER DEFECT. REPAIRS SHALL BE MADE AND PRESSURE TESTED AGAIN. IF TESTING IS PERFORMED IN PORTIONS, A FINAL TEST SHALL BE PERFORMED TO ENSURE INTEGRITY OF ENTIRE PIPE "RUN."

3. UNLESS SPECIALLY NOTED ON DRAWING "DO NOT GLUE," ALL PVC PIPE SHALL BE SOLVENT WELDED IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.

4. ABOVEGROUND CONVEYANCE PIPING SHALL BE ATTACHED TO UNISTRUT P100 HOT DIPPED GALVANIZED (OR EQUIVALENT) AT A MAXIMUM 8-FOOT INTERVAL. USE UNISTRUT PIPE CLAMP P2039 (HG), P2062 (HG), OR EQUIVALENT AS SPECIFIED IN THE DRAWINGS.

5. ALL ELECTRICAL WIRES SHALL BE ENCLOSED IN METALLIC ELECTRICAL CONDUIT OR WATERTIGHT FLEX CONDUIT, AS APPLICABLE PER CODE.

LEGEND:

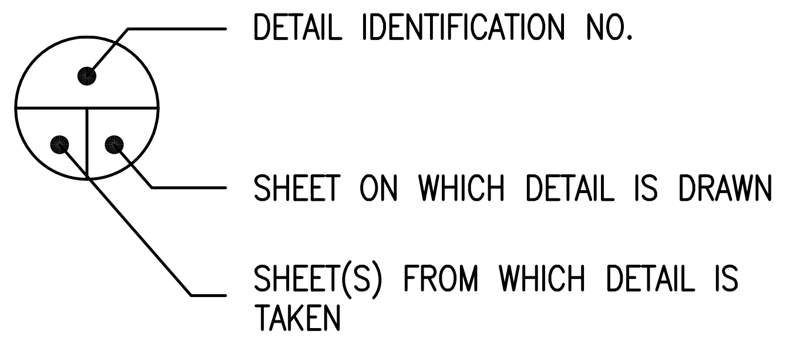
SB – SOIL BORING
E – ELECTRICAL UTILITY
MW – MONITORING WELL
SS – SANITARY SEWER
SVE – VAPOR EXTRACTION WELL

SURVEY CONTROL:

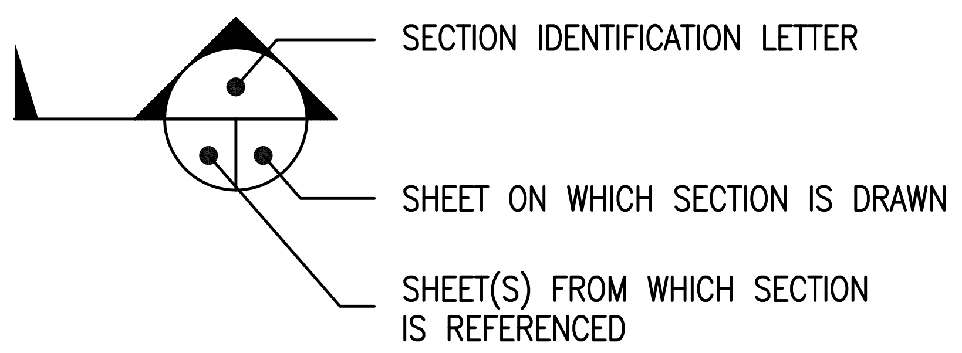
① 59-PW-05
N: 1967678.49
E: 6760422.06

② 59-PW-06
N: 1967523.29
E: 6760454.14

CALLOUTS LEGEND:



DETAIL CALLOUTS



SECTION CALLOUTS

INDEX OF DRAWINGS

DRAWING NO	SHEET NO	DRAWING CONTENT
G-1	1 OF 12	TITLE SHEET, LOCATION MAP, AND VICINITY MAP
G-2	2 OF 12	SURVEY NOTES, ABBREVIATIONS, GENERAL NOTES, CALLOUTS LEGEND, AND INDEX OF DRAWINGS
C-1	3 OF 12	CONVEYANCE PIPING PROFILE VIEW
C-2	4 OF 12	CONVEYANCE PIPING PLAN VIEW
C-3	5 OF 12	CONVEYANCE PIPING DETAILS
C-4	6 OF 12	UNISTRUT DETAILS
C-5	7 OF 12	BOLLARD DETAILS
C-6	8 OF 12	CONVEYANCE PIPING CROSSING GAS LINE DETAIL
C-7	9 OF 12	SOIL VAPOR EXTRACTION WELL DETAILS
C-8	10 OF 12	SVE MANIFOLD DETAILS
C-9	11 OF 12	FOUNDATION DETAILS
E-1	12 OF 12	SVE ELECTRICAL DETAILS

DRAFT SUBMITTAL
FEBRUARY 2018

No.	REVISIONS	APPROVED	No.	REVISIONS	APPROVED

PROJECT MANAGER:
ENGINEER OF RECORD:
QUALITY CONTROL:

PREPARED BY:
URS

ENGINEER OF RECORD DATE

PREPARED FOR:

AIR FORCE CIVIL ENGINEER CENTER DATE

DEPARTMENT OF THE AIR FORCE CONTRACT No.:
FA8903-16-D-0029
URS PROJECT No.:
60520471

BUILDING 4260 SVE SYSTEM DESIGN
INVESTIGATION AND REMEDY OPTIMIZATION
AT FORMER MATHER AIR FORCE BASE,
CALIFORNIA

BUILDING 4260 SVE SYSTEM

CONVEYANCE PIPING PROFILE VIEW

G-2
SHEET
2
OF
12

NOTE:
EXTEND THE 4" Ø SCH-80 PVC PIPE TO WEST SIDE OF THE CORNER OF BUILDING 4260.
HISTORIC DWGS INDICATE THAT THE FOUNDATION EXTENDS LATERALLY FROM SOUTH EDGE OF BUILDING. INSTALL 90° AND/OR 45° ELBOW(S) AS NECESSARY TO EXTEND PVC PIPING VERTICALLY UP THE SW CORNER OF THE BUILDING.

22"x34" SHEET-SCALE : 1"=40'
20' 10' 0 20'
11"x17" SHEET-SCALE : 1"=80'
40' 20' 0 40'

DRAFT SUBMITTAL
FEBRUARY 2018

No.	REVISIONS	APPROVED	No.	REVISIONS	APPROVED

PROJECT MANAGER:
ENGINEER OF RECORD:
QUALITY CONTROL:

PREPARED BY:
URS

ENGINEER OF RECORD DATE

PREPARED FOR:

AIR FORCE CIVIL ENGINEER CENTER DATE

DEPARTMENT OF THE AIR FORCE CONTRACT No.:
FA8903-16-D-0029
URS PROJECT No.:
60520471

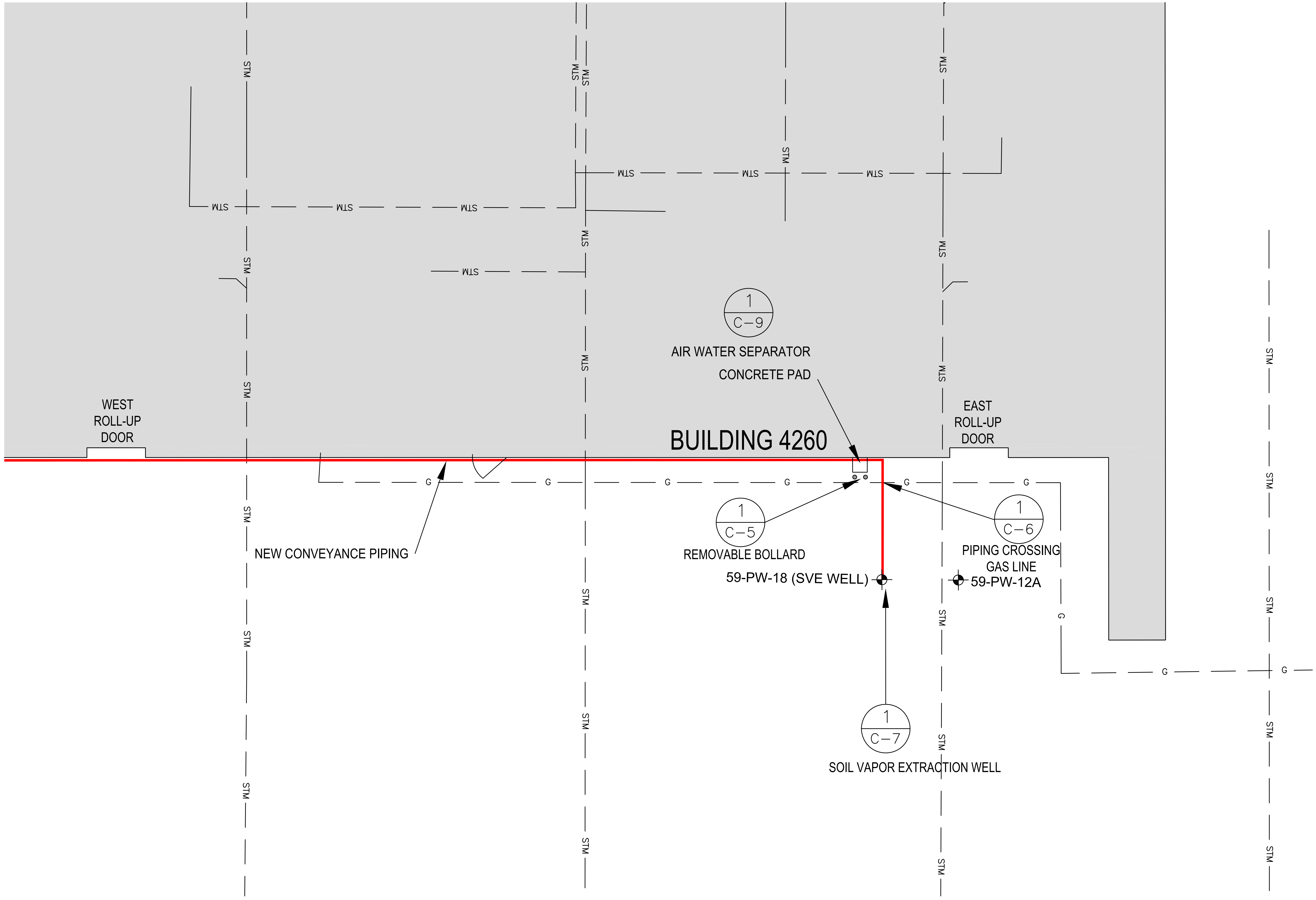
BUILDING 4260 SVE SYSTEM DESIGN
INVESTIGATION AND REMEDY OPTIMIZATION
AT FORMER MATHER AIR FORCE BASE,
CALIFORNIA

BUILDING 4260 SVE SYSTEM

CONVEYANCE PIPING PROFILE VIEW

C-1
SHEET
3
OF
12

FILE NAME: G:\US Air Force\FA8903-16-D-0029\Mather B4260\500 Deliverables - Reports\502 Design and O&M Plan\design\1_2018\Pipe Design Drawings 02162018.dwg LAYOUT NAME: C-1 Conveyance Piping Profile PLOTTED: Friday, February 16, 2018 - 1:41pm USER: Brownm6



22"x34" SHEET-SCALE : 1"=10'

5' 2.5' 0 5'

11"x17" SHEET-SCALE : 1"=20'

10' 5' 0 10'

DRAFT SUBMITTAL
FEBRUARY 2018

No.	REVISIONS	APPROVED	No.	REVISIONS	APPROVED

PROJECT MANAGER:

ENGINEER OF RECORD:

QUALITY CONTROL:

PREPARED BY:
URS

ENGINEER OF RECORD DATE

PREPARED FOR:

AIR FORCE CIVIL ENGINEER CENTER DATE

DEPARTMENT OF THE AIR FORCE CONTRACT No.:
FA8903–16–D–0029

URS PROJECT No.:
60520471

BUILDING 4260 SVE SYSTEM DESIGN
INVESTIGATION AND REMEDY OPTIMIZATION
AT FORMER MATHER AIR FORCE BASE,
CALIFORNIA

BUILDING 4260 SVE SYSTEM

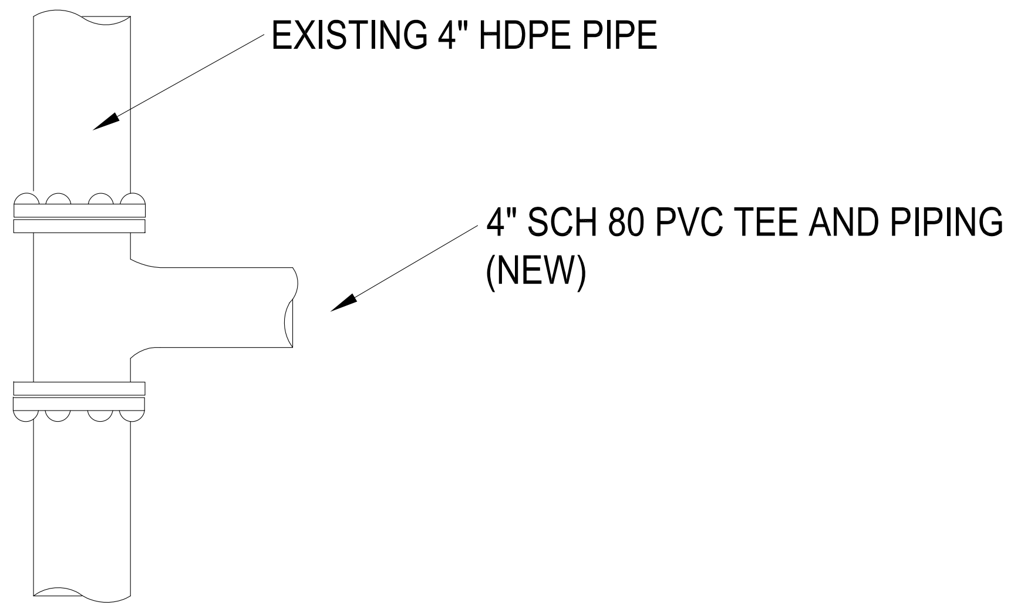
CONVEYANCE PIPING PLAN VIEW

C-2

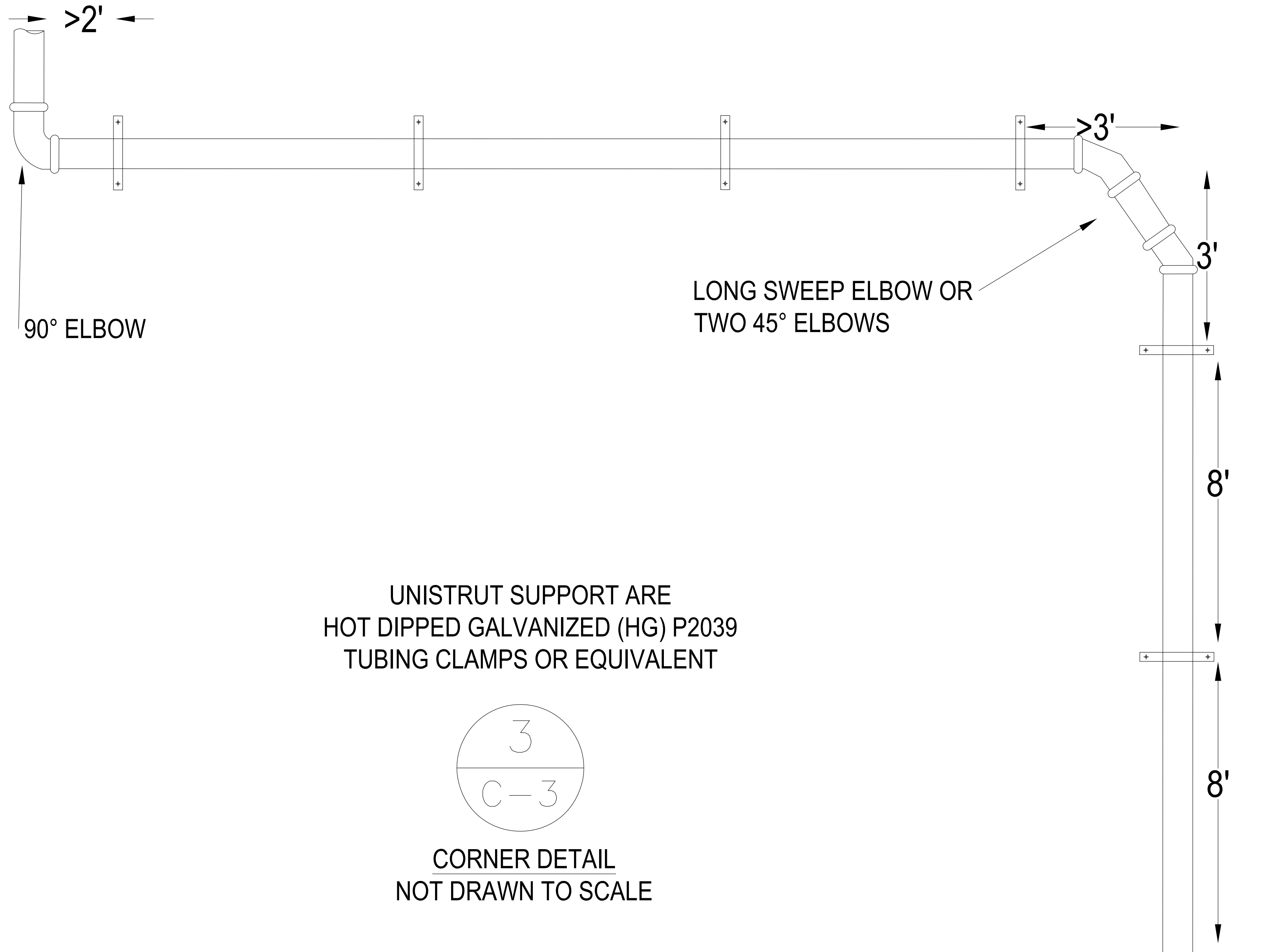
SHEET
3
OF
12

FILE NAME: G:\US Air Force\FA8903–16–D–0029\Mather B4260\500 Deliverables – Reports\502 Design and O&M Plan\design\1_2018\Pipe Design Drawings 02162018.dwg LAYOUT NAME: C–2 Conveyance Piping Plan View PLOTTED: Friday, February 16, 2018 – 1:42pm USER: Brownm6

NOTE:
TRENCH TO EXPOSE THE EXISTING 4' Ø HDPE PIPE THAT RUNS BETWEEN 59-PW-05 AND 59-PW-06. CUT AND INSTALL A FLANGE CONNECTION TO THE (E) 4" Ø HDPE PIPE. INSTALL 4" Ø SCH 80 PVC TEE WITH SLIP CONNECTION TO 4" Ø SCH 80 PVC PIPE.

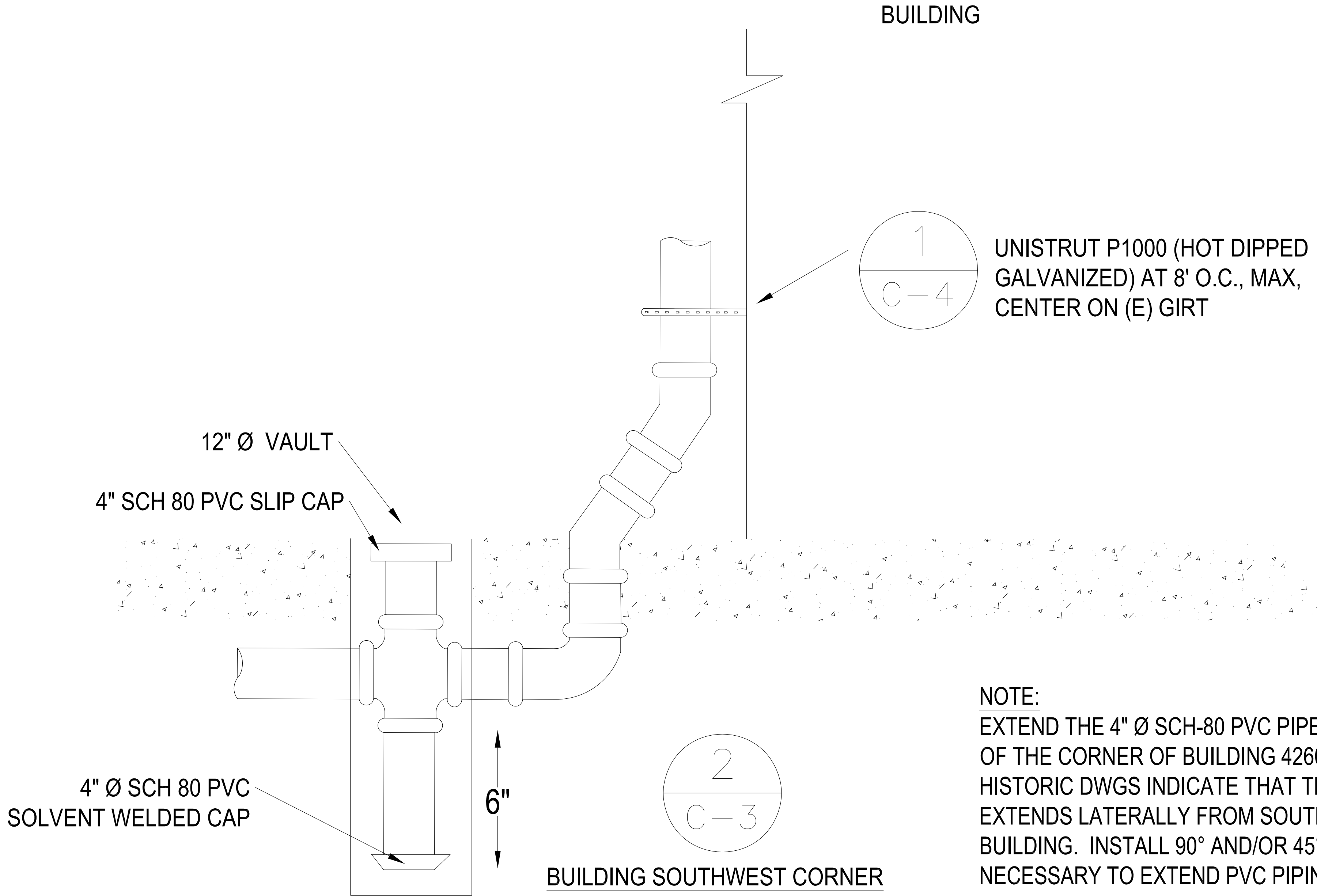


1
C-3
FLANGE CONECTOR TO SCH 80 PVC PIPE TEE
NOT DRAWN TO SCALE



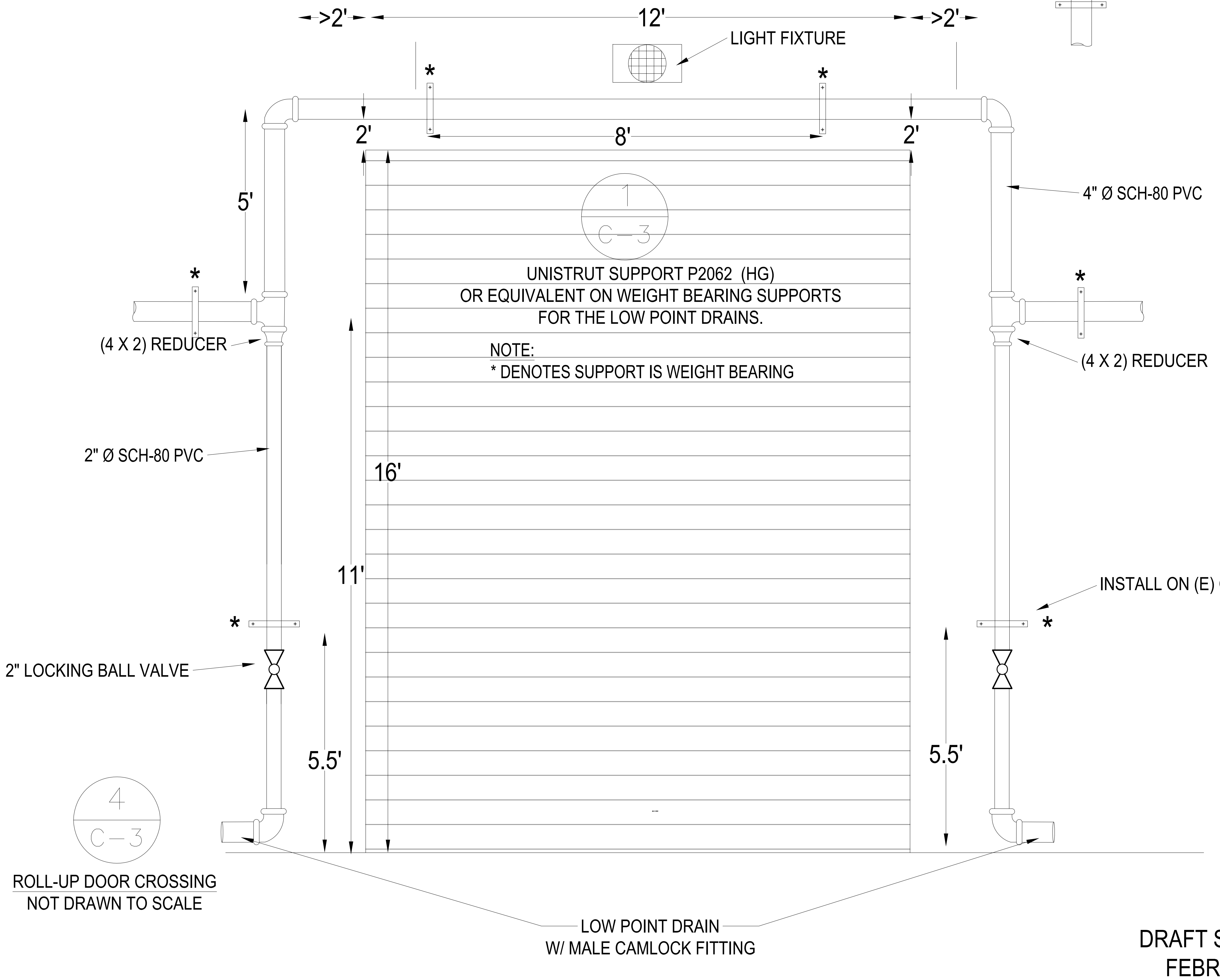
UNISTRUT SUPPORT ARE
HOT DIPPED GALVANIZED (HG) P2039
TUBING CLAMPS OR EQUIVALENT

3
C-3
CORNER DETAIL
NOT DRAWN TO SCALE



2
C-3
BUILDING SOUTHWEST CORNER
NOT DRAWN TO SCALE

NOTE:
EXTEND THE 4" Ø SCH-80 PVC PIPE TO WEST SIDE OF THE CORNER OF BUILDING 4260.
HISTORIC DWGS INDICATE THAT THE FOUNDATION EXTENDS LATERALLY FROM SOUTH EDGE OF BUILDING. INSTALL 90° AND/OR 45° ELBOW(S) AS NECESSARY TO EXTEND PVC PIPING VERTICALLY UP THE SW CORNER OF THE BUILDING.



UNISTRUT SUPPORT P2062 (HG)
OR EQUIVALENT ON WEIGHT BEARING SUPPORTS
FOR THE LOW POINT DRAINS.

NOTE:
* DENOTES SUPPORT IS WEIGHT BEARING

4
C-3
ROLL-UP DOOR CROSSING
NOT DRAWN TO SCALE

DRAFT SUBMITTAL
FEBRUARY 2018

	REVISIONS	APPROVED		REVISIONS	APPROVED

PROJECT MANAGER:
ENGINEER OF RECORD:
QUALITY CONTROL:

PREPARED BY:
URS

ENGINEER OF RECORD DATE

PREPARED FOR:
AIR FORCE CIVIL ENGINEER CENTER DATE

DEPARTMENT OF THE AIR FORCE CONTRACT No.:
FA8903-16-D-0029
URS PROJECT No.:
60520471

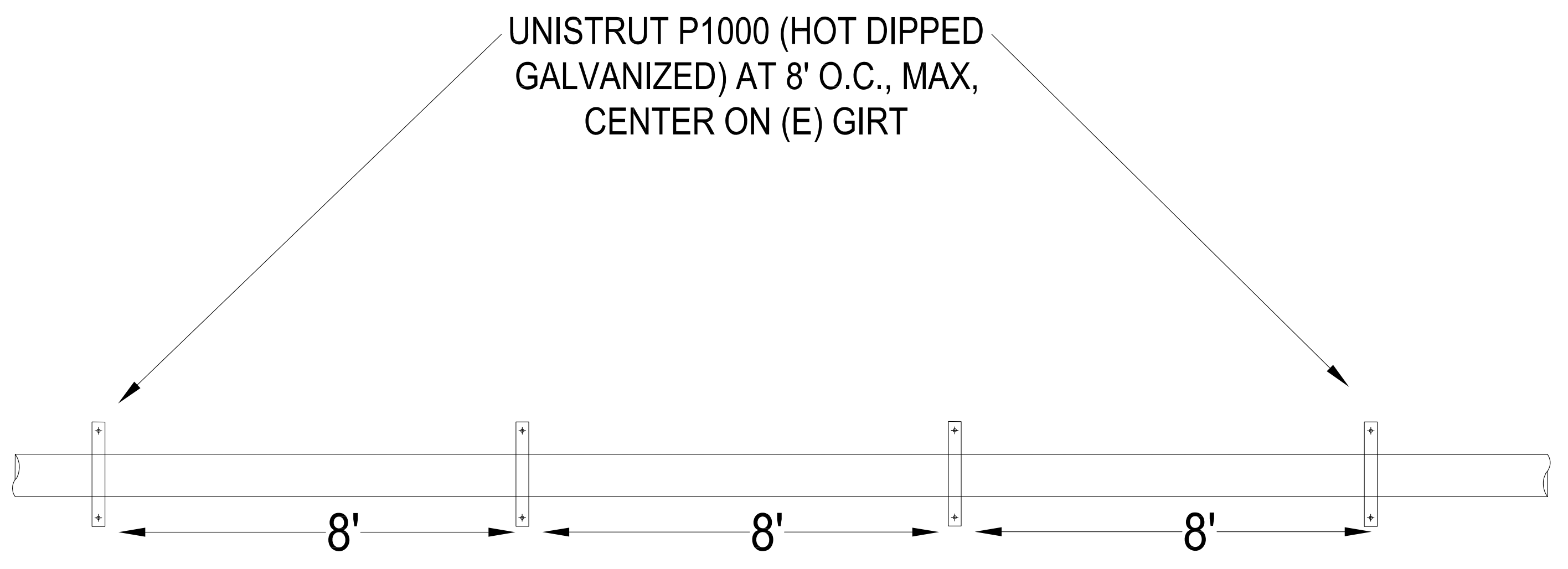
BUILDING 4260 SVE SYSTEM DESIGN
INVESTIGATION AND REMEDY OPTIMIZATION
AT FORMER MATHER AIR FORCE BASE, CALIFORNIA

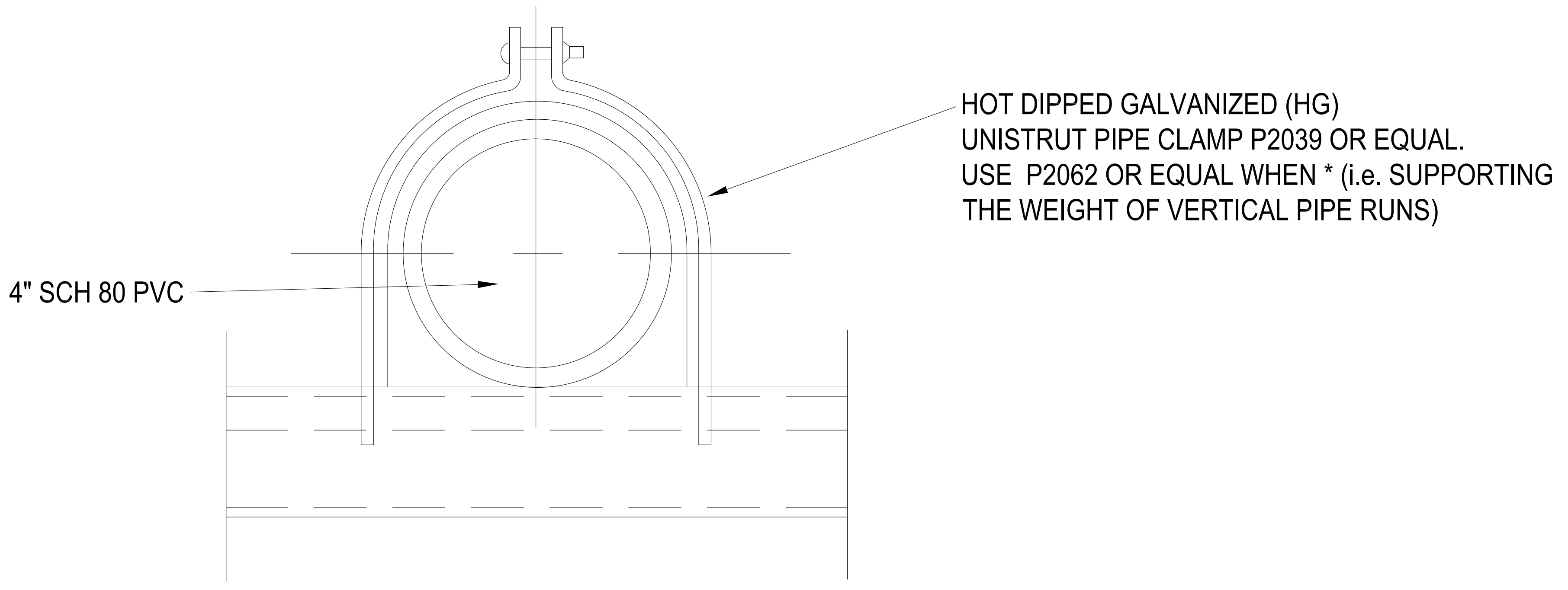
BUILDING 4260 SVE SYSTEM

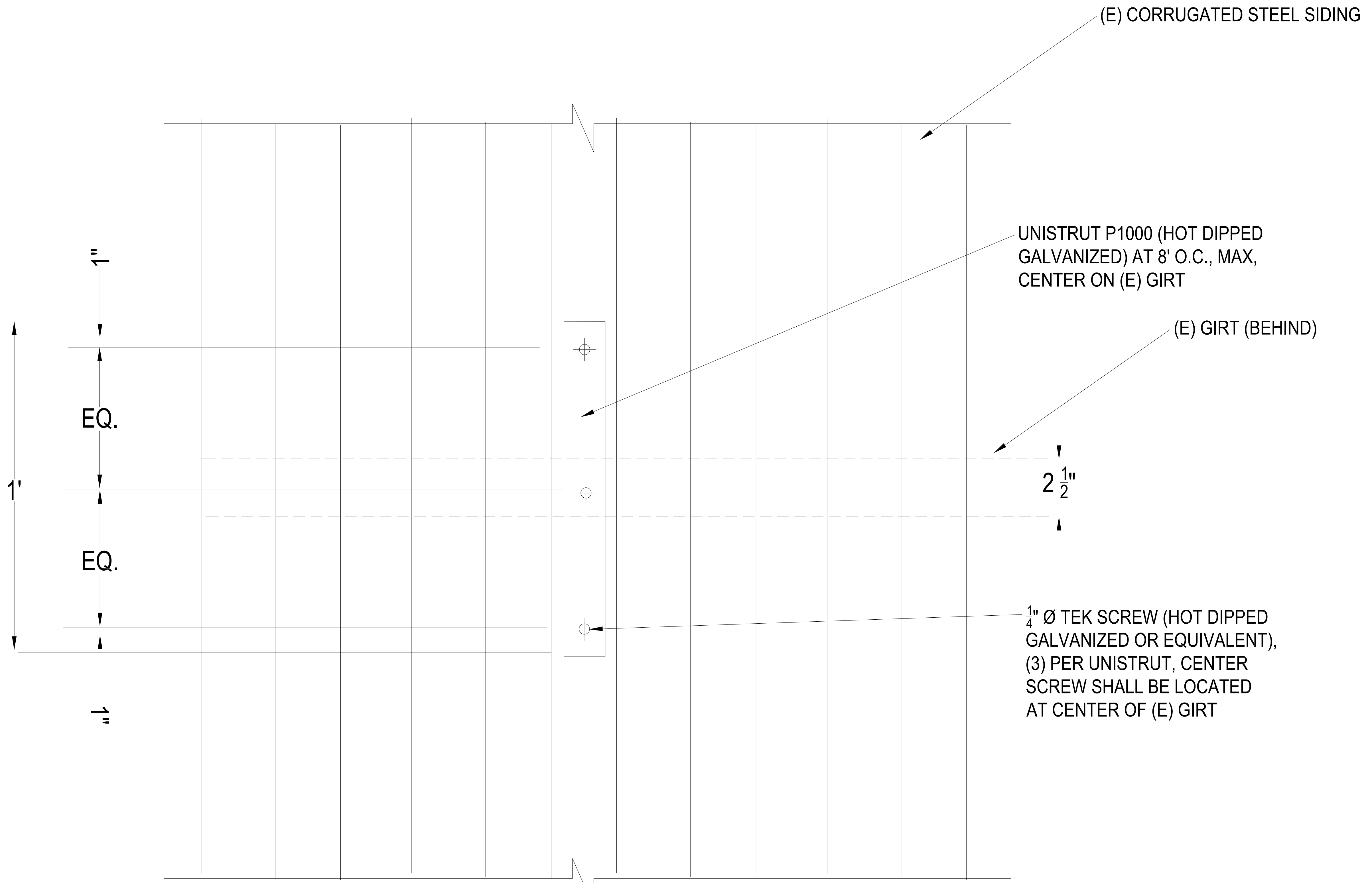
CONVEYANCE PIPING DETAILS

C-3
SHEET
5
OF
12

FILE NAME: G:\US Air Force\FA8903-16-D-0029\Mather B4260\500 Deliverables - Reports\502 Design and O&M Plan\design\1_2018\Pipe Design Drawings 02162018.dwg LAYOUT NAME: C-3 PIPING DETAILS PLOTTED: Friday, February 16, 2018 - 1:43pm USER: Brownm6







NOTES:
PVC PIPE NOT SHOWN FOR CLARITY
SEAL ALL PENETRATIONS THROUGH THE CORRUGATED METAL SIDING WITH A WEATHER RESISTANT CAULKING/SEALANT TO PREVENT THE INGRESS OF WATER OR MOISTURE.

1
C-4

UNISTRUT DETAIL
NOT DRAWN TO SCALE

DRAFT SUBMITTAL
FEBRUARY 2018

	REVISIONS	APPROVED		REVISIONS	APPROVED

PROJECT MANAGER:
ENGINEER OF RECORD:
QUALITY CONTROL:

PREPARED BY:
URS

ENGINEER OF RECORD DATE

PREPARED FOR:
AIR FORCE CIVIL ENGINEER CENTER DATE

DEPARTMENT OF THE AIR FORCE CONTRACT No.:
FA8903-16-D-0029
URS PROJECT No.:
60520471

BUILDING 4260 SVE SYSTEM DESIGN
INVESTIGATION AND REMEDY OPTIMIZATION
AT FORMER MATHER AIR FORCE BASE,
CALIFORNIA

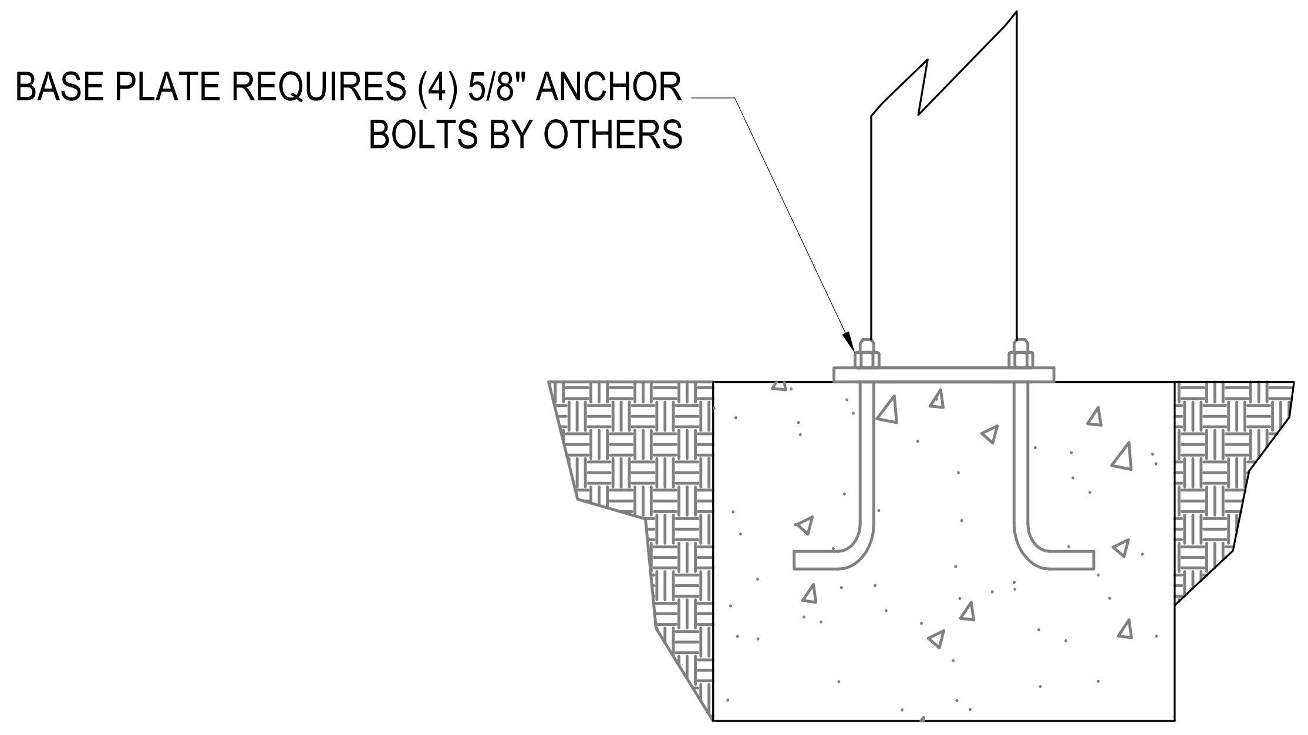
BUILDING 4260 SVE SYSTEM

UNISTRUT DETAILS

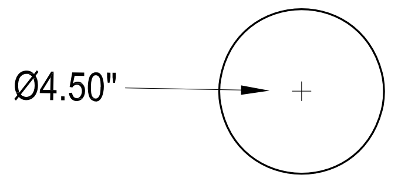
C-4
SHEET
6
OF
12

FILE NAME: G:\US Air Force\FA8903-16-D-0029\Mather B4260\500 Deliverables – Reports\502 Design and O&M Plan\design\1_2018\Pipe Design Drawings 02162018.dwg LAYOUT NAME: C-4 UNISTRUT DETAILS (2) PLOTTED: Friday, February 16, 2018 – 1:43pm USER: Brownm6

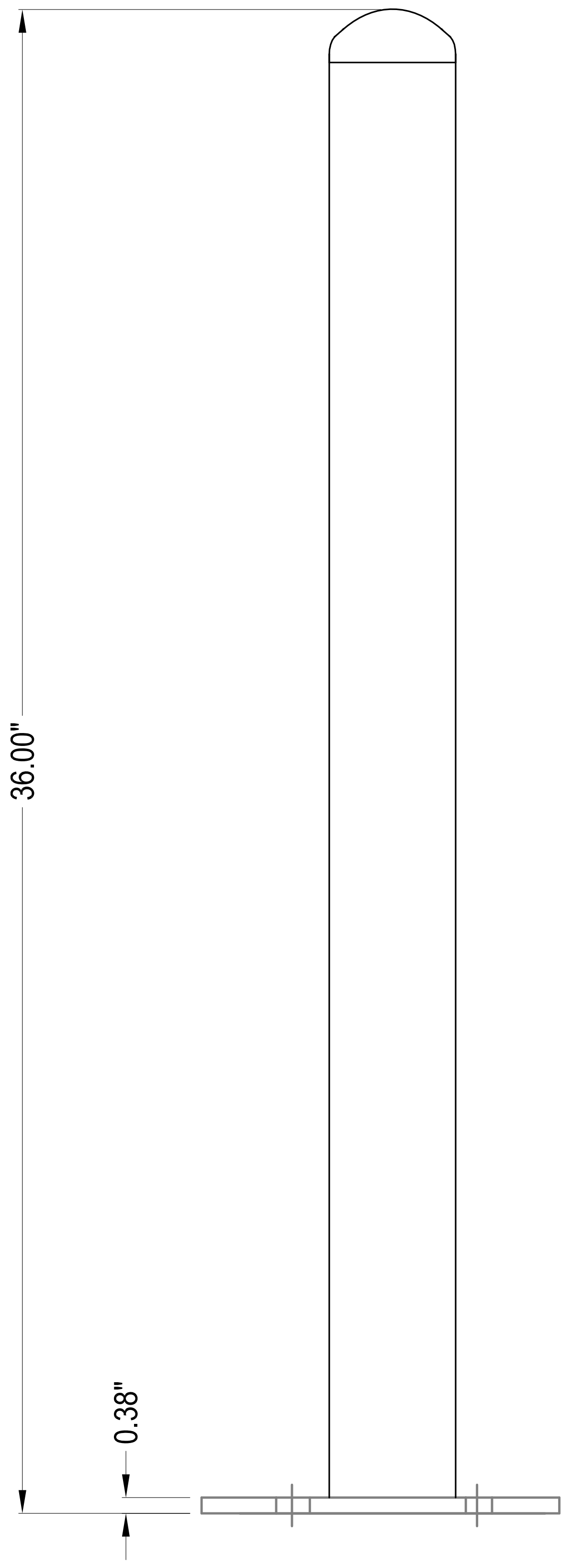
FILE NAME: G:\US Air Force\FA8903-16-D-0029\Mather B4260\500 Deliverables - Reports\502 Design and O&M Plan\design\1_2018\Pipe Design Drawings 02162018.dwg LAYOUT NAME: C-5 BOLLARD DETAILS PLOTTED: Friday, February 16, 2018 - 1:43pm USER: Brownm6



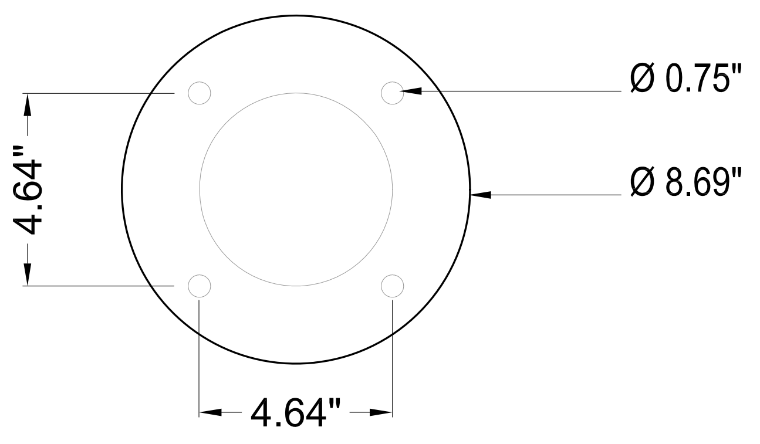
END VIEW
FOUNDATION



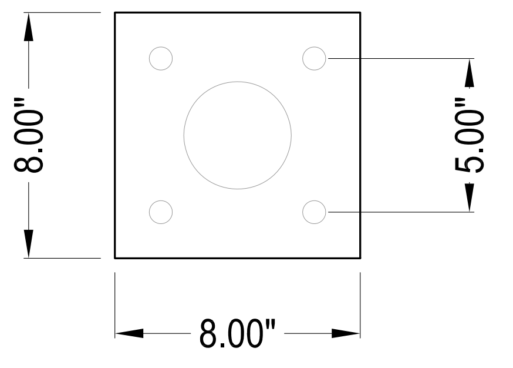
PLAN VIEW



FRONT
ELEVATION



PLAN VIEW - BASE PLATE
(USED ON STAINLESS STEEL
BOLLARD)



PLAN VIEW - BASE PLATE
(USED ON CARBON STEEL
BOLLARD)

1
C-5

REMOVABLE BOLLARD
NOT DRAWN TO SCALE

DRAFT SUBMITTAL
FEBRUARY 2018

No.	REVISIONS	APPROVED	No.	REVISIONS	APPROVED

PROJECT MANAGER:
ENGINEER OF RECORD:
QUALITY CONTROL:

PREPARED BY:
URS

ENGINEER OF RECORD DATE

PREPARED FOR:

AIR FORCE CIVIL ENGINEER CENTER DATE

DEPARTMENT OF THE AIR FORCE CONTRACT No.:
FA8903-16-D-0029
URS PROJECT No.:
60520471

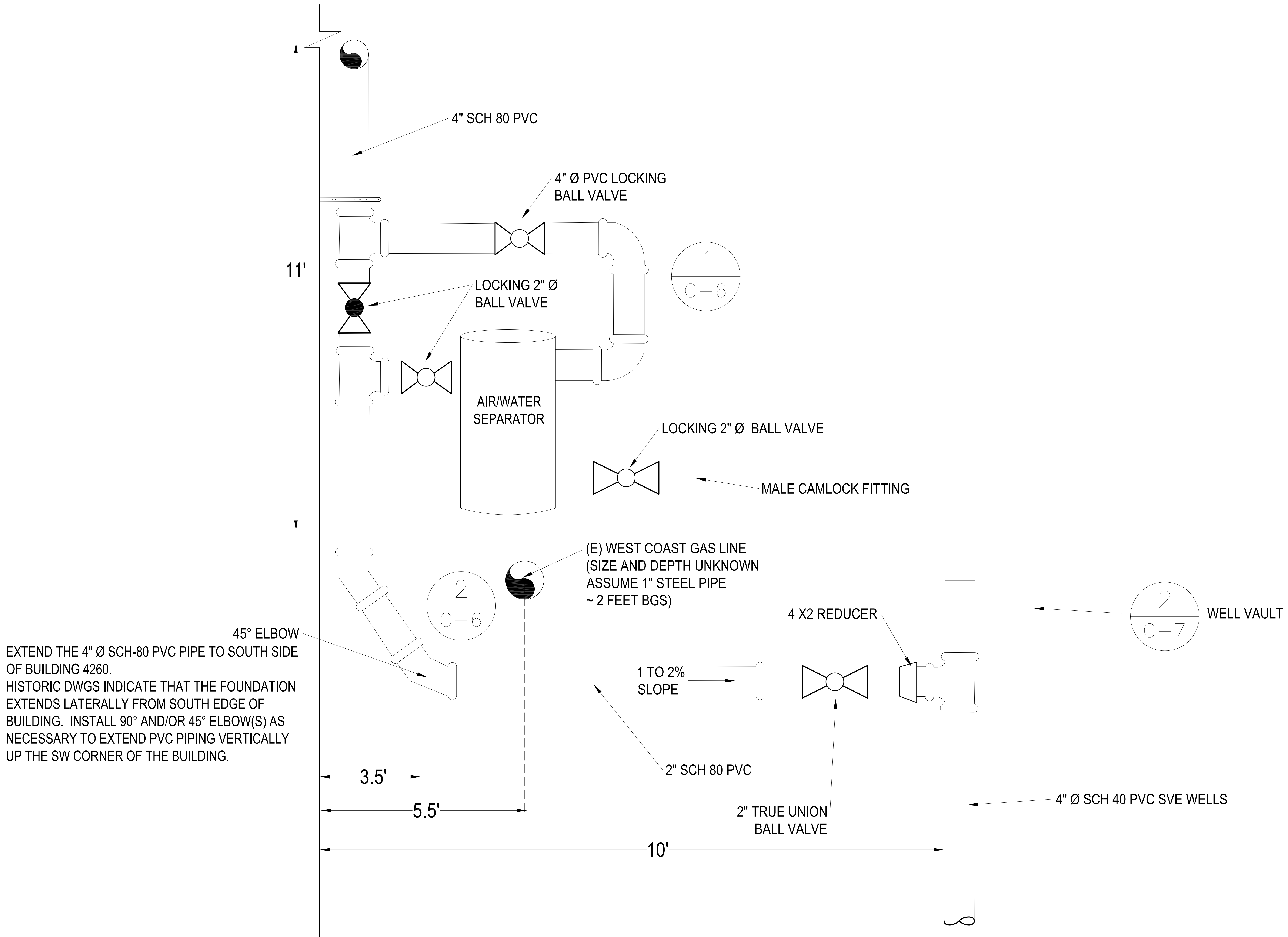
BUILDING 4260 SVE SYSTEM DESIGN
INVESTIGATION AND REMEDY OPTIMIZATION
AT FORMER MATHER AIR FORCE BASE,
CALIFORNIA

BUILDING 4260 SVE SYSTEM

BOLLARD DETAILS

C-5
SHEET
7
OF
12

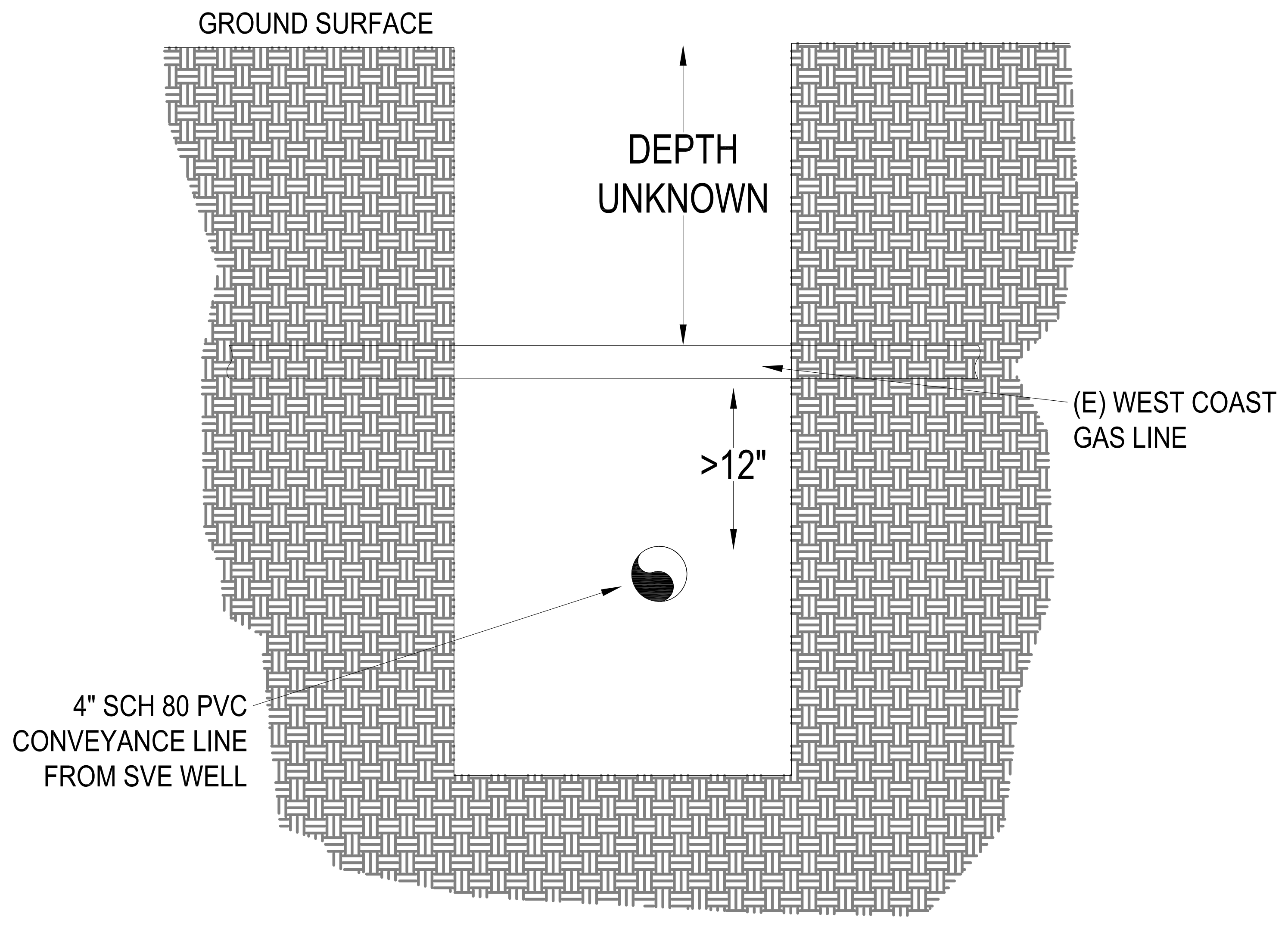
FILE NAME: G:\US Air Force\FA8903-16-D-0029\Mather B4260\500 Deliverables - Reports\502 Design and O&M Plan\design\1_2018\Pipe Design Drawings 02162018.dwg LAYOUT NAME: C-6 PIPE CROSSING GAS LINE PLOTTED: Friday, February 16, 2018 - 1:44pm USER: Brownm6



EXTEND THE 4" Ø SCH-80 PVC PIPE TO SOUTH SIDE OF BUILDING 4260.
HISTORIC DWGS INDICATE THAT THE FOUNDATION EXTENDS LATERALLY FROM SOUTH EDGE OF BUILDING. INSTALL 90° AND/OR 45° ELBOW(S) AS NECESSARY TO EXTEND PVC PIPING VERTICALLY UP THE SW CORNER OF THE BUILDING.

1
C-6

PIPE FROM SVE WELL VAULT TO BUILDING
NOT DRAWN TO SCALE



2
C-6

CROSS SECTION OF TRENCH
NOT DRAWN TO SCALE

DRAFT SUBMITTAL
FEBRUARY 2018

No.	REVISIONS	APPROVED	No.	REVISIONS	APPROVED

PROJECT MANAGER:
ENGINEER OF RECORD:
QUALITY CONTROL:

PREPARED BY:
URS

ENGINEER OF RECORD DATE

PREPARED FOR:

AIR FORCE CIVIL ENGINEER CENTER DATE

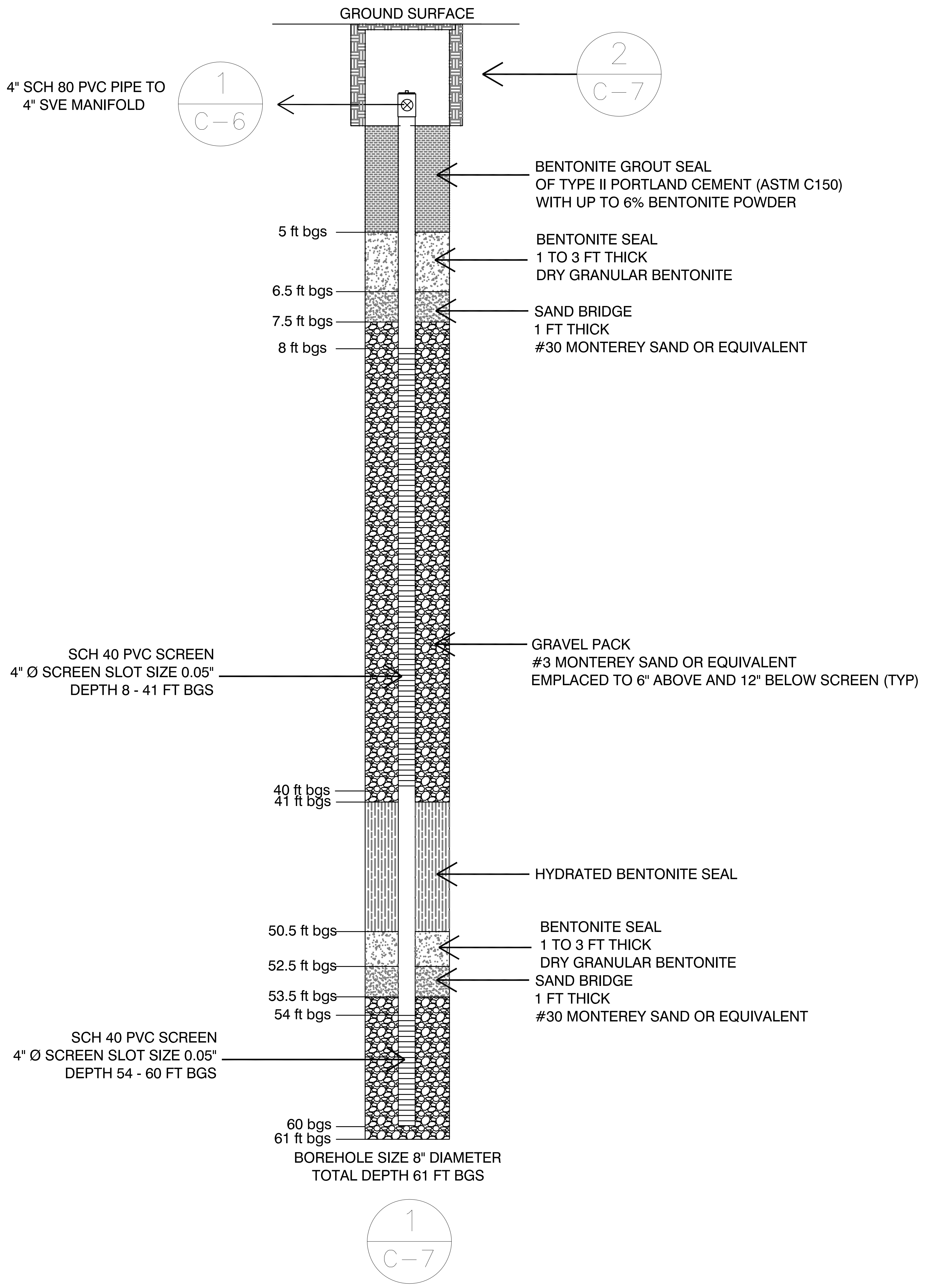
DEPARTMENT OF THE AIR FORCE CONTRACT No.:
FA8903-16-D-0029
URS PROJECT No.:
60520471

BUILDING 4260 SVE SYSTEM DESIGN
INVESTIGATION AND REMEDY OPTIMIZATION
AT FORMER MATHER AIR FORCE BASE,
CALIFORNIA

BUILDING 4260 SVE SYSTEM

CONVEYANCE PIPING CROSSING GAS LINE DETAIL

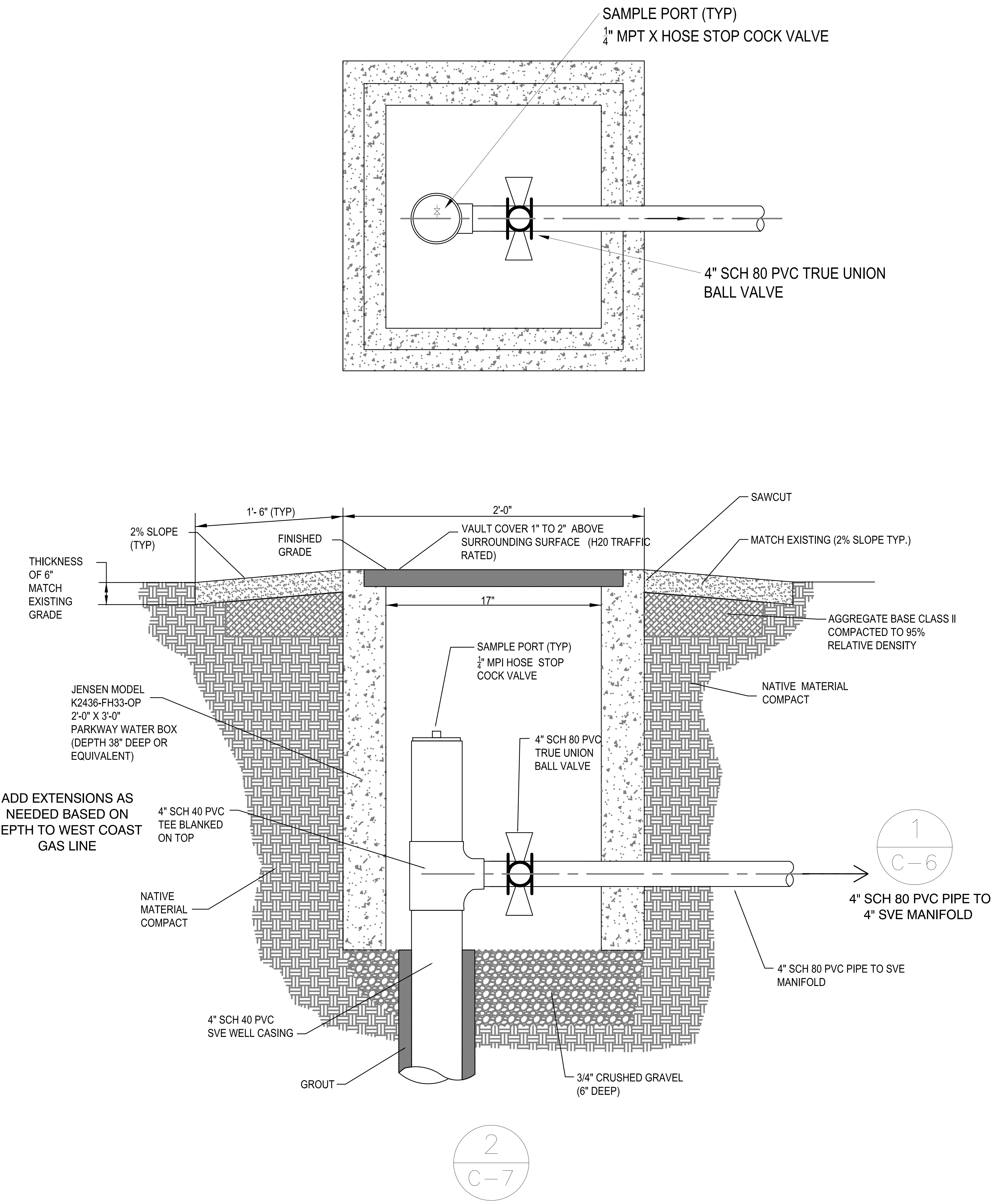
C-6
SHEET
8
OF
12



SOIL VAPOR EXTRACTION WELL DETAIL
NOT DRAWN TO SCALE

NOTES:

1. GEOLOGIST SHALL LOG THE BOREHOLE. THE LOWER SCREEN INTERVAL SHALL NOT INTERSECT THE PERMEABLE SAND LAYER OBSERVED FROM 46 TO 50 FT BGS IN 59-PW-14



SOIL VAPOR EXTRACTION WELL HEAD
PLAN VIEW AND ELEVATION VIEW (TYP)
NOT DRAWN TO SCALE

DRAFT SUBMITTAL
FEBRUARY 2018

No.	REVISIONS	APPROVED	No.	REVISIONS	APPROVED

PROJECT MANAGER:
ENGINEER OF RECORD:
QUALITY CONTROL:

PREPARED BY:
URS

ENGINEER OF RECORD DATE

PREPARED FOR:

AIR FORCE CIVIL ENGINEER CENTER DATE

DEPARTMENT OF THE AIR FORCE CONTRACT No.:
FA8903-16-D-0029
URS PROJECT No.:
60520471

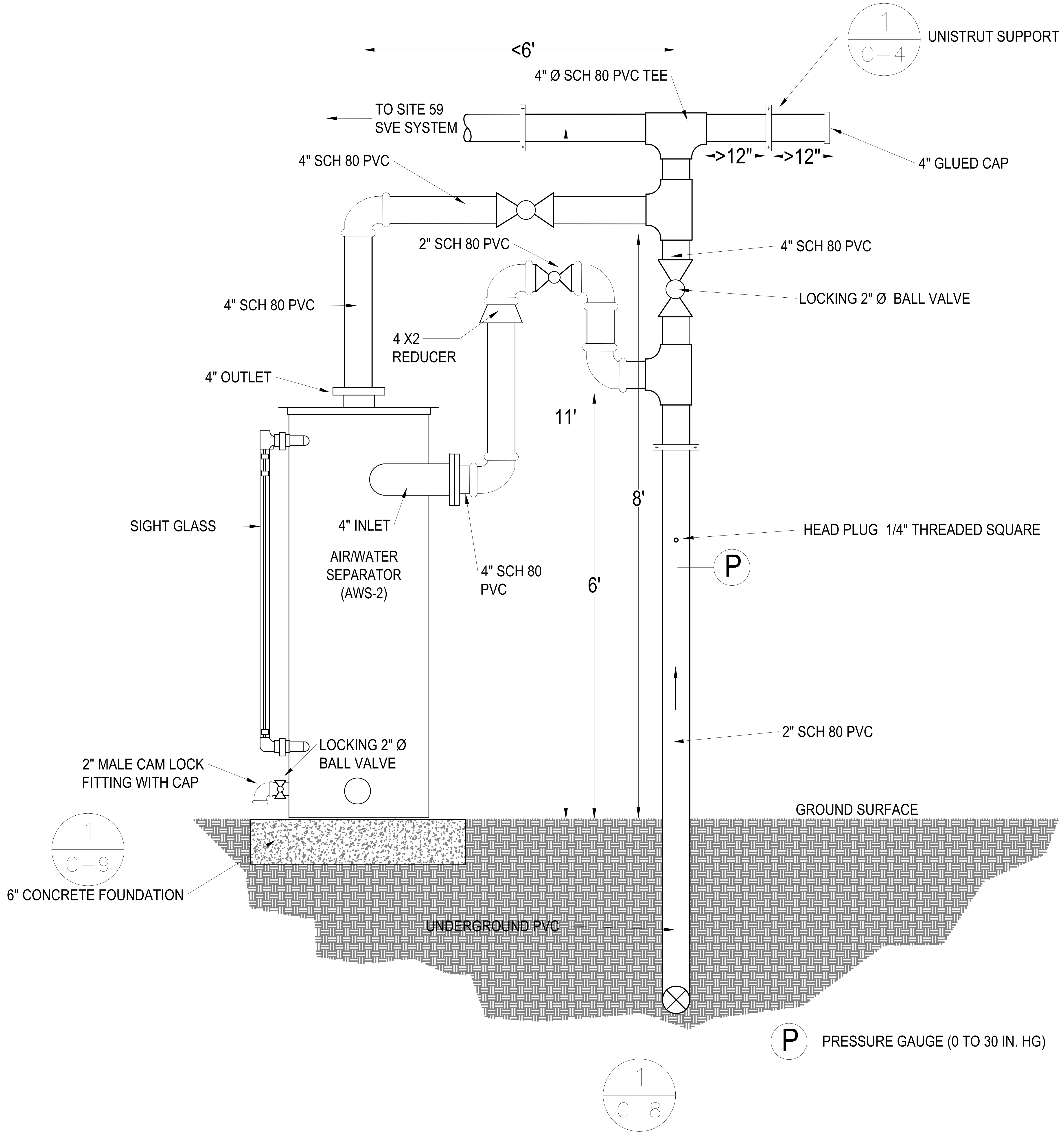
BUILDING 4260 SVE SYSTEM DESIGN
INVESTIGATION AND REMEDY OPTIMIZATION
AT FORMER MATHER AIR FORCE BASE,
CALIFORNIA

BUILDING 4260 SVE SYSTEM

SOIL VAPOR EXTRACTION WELL DETAILS

C-7
SHEET
9
OF
12

FILE NAME: G:\US Air Force\FA8903-16-D-0029\Mather B4260\500 Deliverables – Reports\502 Design and O&M Plan\design\1_2018\Pipe Design Drawings 02162018.dwg LAYOUT NAME: C-7 SVE DETAILS PLOTTED: Friday, February 16, 2018 – 2:05pm USER: Brownm6



VAPOR PHASE EXTRACTION PIPING MANIFOLD DETAIL

NOT DRAWN TO SCALE

NOTES:

AIR/WATER SEPARATOR:

1. AN AIR/WATER SEPARATOR WITH A MINIMUM CAPACITY OF 60 GALLONS WILL BE INSTALLED TO CAPTURE PERCHED WATER AND CONDENSATE FROM THE EXTRACTED SOIL VAPOR.
2. THE AIR/WATER SEPARATOR WILL BE PROVIDED WITH A GRAVITY DRAIN WHICH CAN BE CONNECTED TO A PUMP TO MANUALLY DRAIN THE WATER TO A HOLDING TANK. DISCHARGE OF THE WATER TO ONE OF THE MATHER GROUNDWATER TREATMENT PLANTS WILL BE COORDINATED WITH THE MATHER CONTRACTOR.
3. THE INLET PIPING WILL BE CONNECTED TO THE SVE WELL. THIS LINE WILL BE INSTALLED SO THAT THE HIGHEST POINT OF THIS LINE IS AT LEAST 6 INCHES ABOVE THE TOP OF THE AIR/WATER SEPARATOR. THE SVE BLOWER WILL SHUT DOWN WHEN A HIGH VACUUM CONDITION IS DETECTED BY THE VACUUM SWITCH LOCATED AT THE BLOWER.

HEAD PLUG:

1. THE HEAD PLUG WILL ACCOMMODATE A HAND-HELD VELOCITY METER TO COLLECT FLOW AND TEMPERATURE READINGS. IN ORDER TO ENSURE LAMINAR FLOW, THE HEAD PLUG WILL BE LOCATED AT 10 TO 15 PIPE DIAMETERS FROM THE NEAREST FITTING IN THE UPSTREAM DIRECTION AND AT LEAST 5 PIPE DIAMETERS FROM THE NEAREST FITTING IN THE DOWNSTREAM DIRECTION.

DRAFT SUBMITTAL
FEBRUARY 2018

	REVISIONS	APPROVED		REVISIONS	APPROVED

PROJECT MANAGER:
ENGINEER OF RECORD:
QUALITY CONTROL:

PREPARED BY:
URS

ENGINEER OF RECORD DATE

PREPARED FOR:
AIR FORCE CIVIL ENGINEER CENTER DATE

DEPARTMENT OF THE AIR FORCE CONTRACT No.:
FA8903-16-D-0029
URS PROJECT No.:
60520471

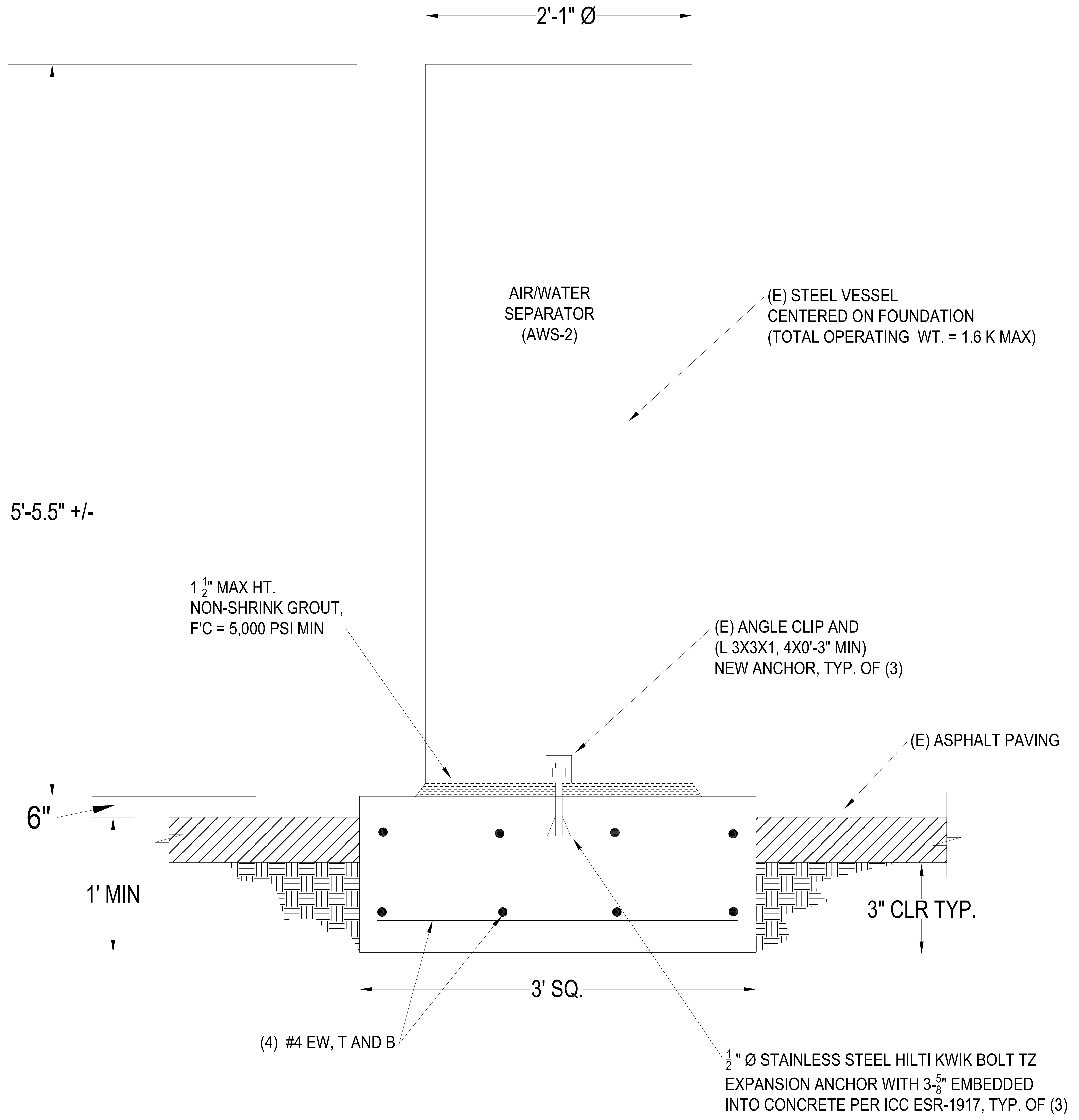
BUILDING 4260 SVE SYSTEM DESIGN
INVESTIGATION AND REMEDY OPTIMIZATION
AT FORMER MATHER AIR FORCE BASE,
CALIFORNIA

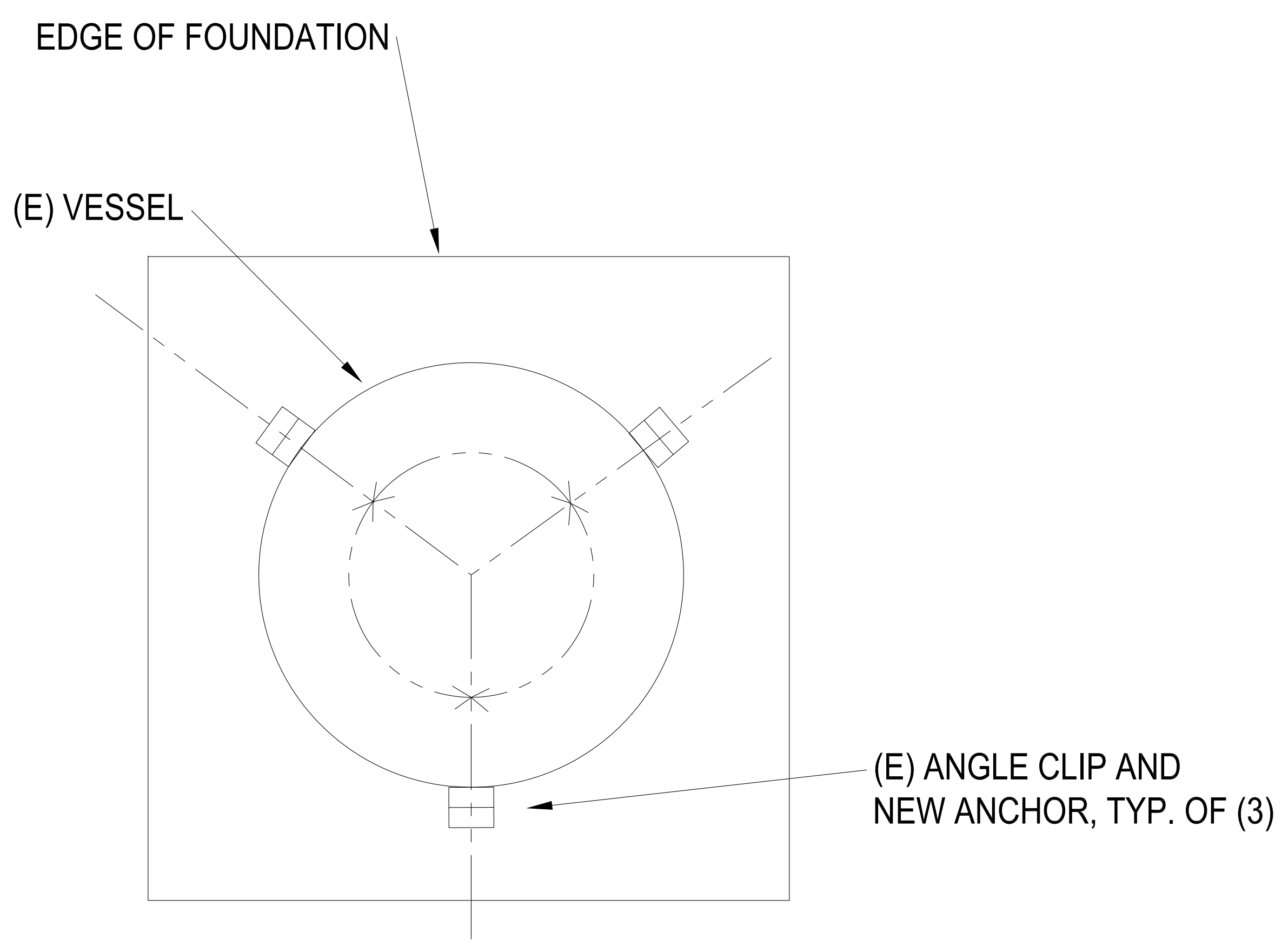
BUILDING 4260 SVE SYSTEM

SVE MANIFOLD DETAILS

C-8
SHEET
10
OF
12

FILE NAME: G:\US Air Force\FA8903-16-D-0029\Mather 84260\500 Deliverables - Reports\502 Design and O&M Plan\design\1_2018\Pipe Design Drawings 02162018.dwg LAYOUT NAME: C-8 SVE MANIFOLD DETAILS PLOTTED: Friday, February 16, 2018 - 2:06pm USER: Brownm6





PLAN VIEW
NOT DRAWN TO SCALE

1
C-9

AWS-2 AND FOUNDATION DETAIL
NOT DRAWN TO SCALE

DRAFT SUBMITTAL
FEBRUARY 2018

	REVISIONS	APPROVED		REVISIONS	APPROVED

PROJECT MANAGER:
ENGINEER OF RECORD:
QUALITY CONTROL:

PREPARED BY:
URS

ENGINEER OF RECORD DATE

PREPARED FOR:

AIR FORCE CIVIL ENGINEER CENTER DATE

DEPARTMENT OF THE AIR FORCE CONTRACT No.:
FA8903-16-D-0029
URS PROJECT No.:
60520471

BUILDING 4260 SVE SYSTEM DESIGN
INVESTIGATION AND REMEDY OPTIMIZATION
AT FORMER MATHER AIR FORCE BASE,
CALIFORNIA

BUILDING 4260 SVE SYSTEM

FOUNDATION DETAILS

C-9
SHEET
11
OF
12

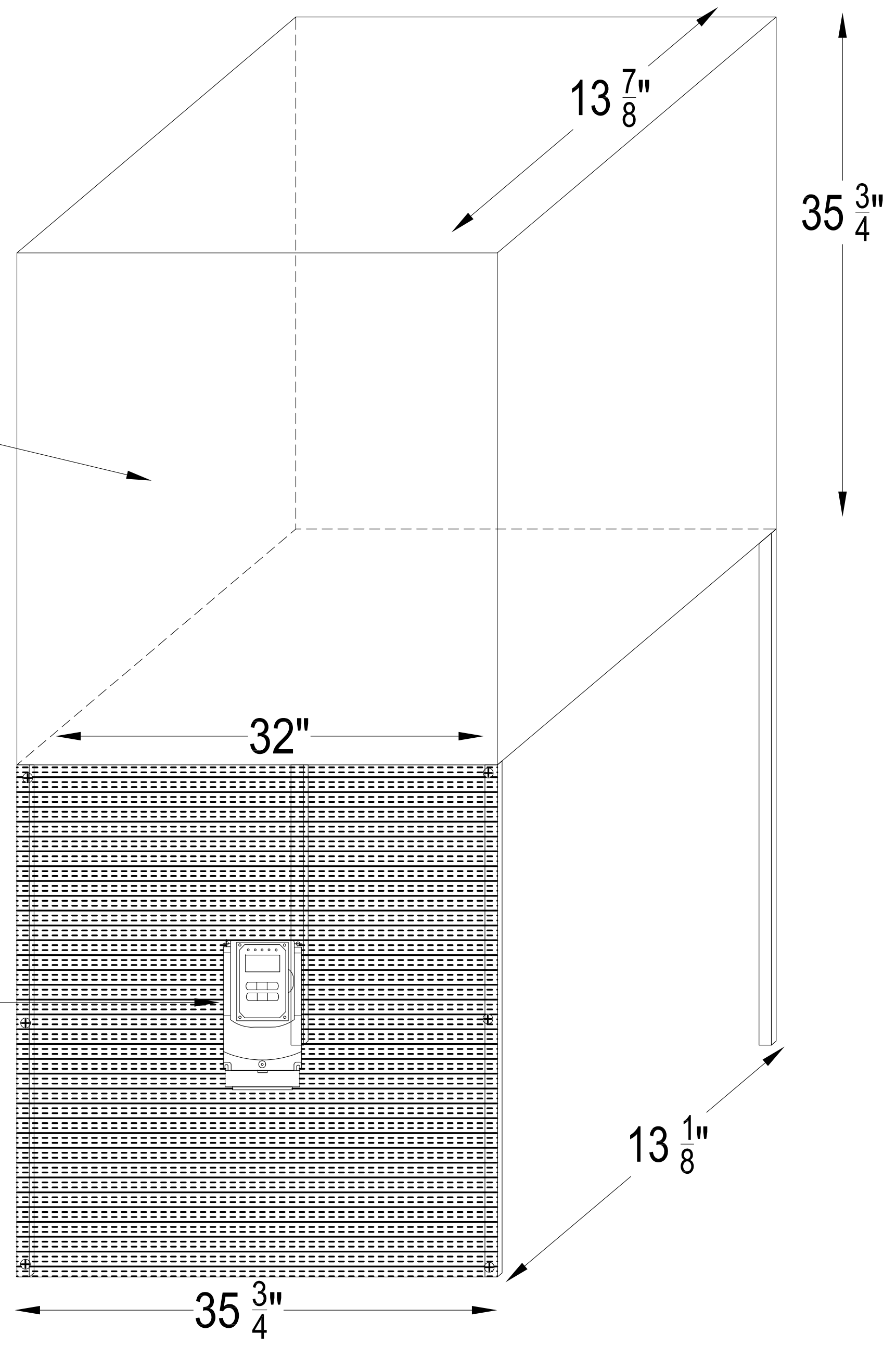
FILE NAME: G:\US Air Force\FA8903-16-D-0029\Mather B4260\500 Deliverables - Reports\502 Design and O&M Plan\design\1_2018\Pipe Design Drawings 02162018.dwg LAYOUT NAME: C-8 FOUNDATIONDETAILS PLOTTED: Friday, February 16, 2018 - 2:08pm USER: Brownm6

IMAGE OF EXISTING PANEL

EXISTING PANEL

2
E-1

INSTALL
TECO F510-4050-C3-4 OR
EQUIVALENT VFD
INSIDE RAIN TIGHT
ENCLOSURE MOUNTED
BELOW EXISTING PANEL



INSTALL A VFD TO CONTROL THE SPEED OF THE SVE BLOWER MOTOR. THE VFD SHALL BE INSTALLED INSIDE OF A PROTECTIVE PANEL IN ACCORDANCE WITH THE VFD MANUFACTURERS' RECOMMENDATIONS. MOUNT THE PANEL BELOW THE EXISTING ELECTRICAL AND CONTROLS PANEL. THE EXISTING CABINET IS 35 ¾ INCHES WIDE, 35 ¾-INCHES TALL AND 13-7/8 INCHES DEEP. THE HEIGHT OF THE SPACE UNDER THE EXISTING CABINET IS 32-3/8-INCHES. THE SUPPORTS ARE 2-INCHES WIDE. THE VFD PANEL MUST THEREFORE BE MORE THAN 32 INCHES WIDE TO USE THE EXISTING SUPPORTS.

AIR/WATER SEPARATOR CONTROLS:

1. INSTALL A PRESSURE SWITCH WITH AN ADJUSTABLE 0 TO 30 INCH MERCURY VACUUM RANGE (DWYER BOURDON TUBE PRESSURE SWITCH DA-31-153-2 OR EQUIVALENT) IN THE SVE CONVEYANCE LINE TO THE SVE BLOWER, NEAR THE SVE CONTROL PANEL. CONNECT THE SIGNAL WIRES TO THE EXISTING SVE SYSTEM ALARM INTERLOCKS TO SHUT OFF THE SVE MOTOR WHEN A HIGH VACUUM CONDITION EXISTS. THE HIGH VACUUM SETPOINT WILL BE DETERMINED IN THE FIELD, BUT IS EXPECTED TO BE BETWEEN 10 AND 12 INCHES MERCURY.

2. REPLACE THE EXISTING ANALOG AUTODIALER WITH A SENSAPHONE CELL 682 OR EQUIVALENT CELLULAR TRANSMITTER. WIRE THE CELL 682 TO THE SVE SYSTEM ALARM INTERLOCKS TO NOTIFY APPROPRIATE PERSONNEL OF ALARM CONDITIONS SUCH AS A HIGH VACUUM ALARM THAT HAS RESULTED IN A SYSTEM SHUT DOWN.

1
E-1

EXISTING PANEL WITH VFD INSTALL
NOT DRAWN TO SCALE

DRAFT SUBMITTAL
FEBRUARY 2018

△	REVISIONS	APPROVED	△	REVISIONS	APPROVED

PROJECT MANAGER:
ENGINEER OF RECORD:
QUALITY CONTROL:

PREPARED BY:
URS

ENGINEER OF RECORD DATE

PREPARED FOR:

AIR FORCE CIVIL ENGINEER CENTER DATE

DEPARTMENT OF THE AIR FORCE CONTRACT No.:
FA8903-16-D-0029
URS PROJECT No.:
60520471

BUILDING 4260 SVE SYSTEM DESIGN
INVESTIGATION AND REMEDY OPTIMIZATION
AT FORMER MATHER AIR FORCE BASE,
CALIFORNIA

BUILDING 4260 SVE SYSTEM

SVE ELECTRICAL DETAILS

E-1
SHEET
12
OF
12

FILE NAME: G:\US Air Force\FA8903-16-D-0029\Mather B4260\500 Deliverables - Reports\502 Design and O&M Plan\design\1_2018\Pipe Design Drawings 02162018.dwg LAYOUT NAME: E-1 ELECTRICAL PLOTTED: Friday, February 16, 2018 - 1:46pm USER: Brownm6

APPENDIX B

Field Forms

Daily Tail Gate Meeting

Air Sampling Data Sheet

Location Data Sheet

Log of Drilling Operations

Lithologic Log

Well Construction Details

New SVE Well Stabilization Parameters

Downhole Soil Gas Sampling Data Sheet

SVM and SVE PID and Water Level Log

SVE System Process Readings Log

Americas

Daily Tailgate Meeting

S3NA-209-FM5

Job Location:		Date:	
AECOM Site Supervisor:		Person Conducting Tailgate Meeting:	
AECOM Site Supervisor Phone:		AECOM Safety Officer Name & Phone:	

List activities to be performed today:	

Muster Point:		Spill Kit Location:	
First Aid Kit Location:		Fire Extinguisher Location:	

Have all personnel reviewed and understand the site-specific safety plan?	☐ Yes ☐ No*
Are current Pre-Job Hazard Assessments in place for each of the tasks to be performed today and understood by all?	☐ Yes ☐ No*
Does each subcontractor have hazard assessments (e.g., THA, JSA, JHA) for their activities?	☐ Yes ☐ No* ☐ N/A
Are any required permits in place for the applicable tasks to be performed today and understood by all? Identify required permits and permit #s:	☐ Yes ☐ No* ☐ N/A
Have all members of the work team confirmed understanding of the work, hazards, and controls/ mitigation?	☐ Yes ☐ No*
Have work areas been properly cordoned-off to protect workers, site staff, and the public?	☐ Yes ☐ No* ☐ N/A
Have equipment checks been completed, documented, and reviewed?	☐ Yes ☐ No* ☐ N/A
Do all site workers understand injury/ intervention reporting requirements including immediately notifying the AECOM Site Supervisor of any injury near miss, unsafe condition or hazard observation?	☐ Yes ☐ No*

** if No, then work cannot be performed until corrective action is completed and documented.*

Topics covered in today's tailgate meeting:	

Other Items Discussed Today:	**Stop Work Authority & Obligation**
	* All employees will stop the job any time anyone is concerned or uncertain about safety. * All employees will stop the job if anyone identifies a hazard or additional mitigation not recorded on the THA. * All employees will be alerted to any changes in personnel or conditions at the worksite. * All employees will stop the job and reassess a task, hazards, and mitigations, and then amend the THA as needed.

SITE WORKERS (including AECOM Contractors and Subcontractors): By signing here, you are stating the following: * You have been involved in reviewing the THAs and understand the hazards and control measures associated with each task you are about to perform. * You understand the permit to work requirements applicable to the work you are about to perform (if it includes permitted activities). * You are aware that no tasks or work (that is not risk-assessed) is to be performed. * You are aware of your authority and obligation to 'Stop Work'. **I arrived and departed fit for duty:** * You are physically and mentally fit for duty. * You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely. * You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or fatigue issue you may have to the AECOM Supervisor. * You signed-out uninjured unless you have otherwise informed the AECOM Supervisor.			
Print Name & Company	**Signature**	**Initials & Sign In Time**	**Initials & Sign Out Time**
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed)

SITE VISITOR / SITE REPRESENTATIVE				
Name	**Company Name**	**Arrival Time**	**Departure Time**	**Signature**

To be completed once activities for the day have been concluded:		
Were there any Incidents, Near Misses or Observations?	☐ Yes ☐ No	If yes, details:
Were there any ‘Stop Work’ interventions?	☐ Yes ☐ No	If yes, details:
Were there any areas for improvement noted?	☐ Yes ☐ No	If yes, details:
At the conclusion of the day, the job site is being left in a safe condition and there were no reports of injury or first aid.	☐ Yes ☐ No	AECOM Supervisor Signature:

URS Air Sampling Data Sheet

Installation: ______________________ Project: __________________________ Event: ____________________

Boring Name: ____ Date: ____________________

Location Description: ____

(Direction and Distance from MW Number or Building Number and Corner)

At what height above ground was sampler placed? _________________________

Were existing volatiles found during screening removed? ___________________

Were any new volatiles in the sample area? ______________________________

Weather Conditions: ____

Rain in last 24 hours? ___________________ Sampler(s): _________________________

SAMPLE TRAIN LEAK CHECK

Initial Vacuum Reading: ______________________________ Final Vacuum Reading: ______________________________

(Complete sample train)

Sampling Method: ____

PID Serial Number: ____

Sample Start (Date/Time): _______________________________________

Sample End Time (Date/Time): ___________________________________

NORMAL SAMPLE

Sample Number: _________________________ Sample Number: _____________________________

Canister Number: ________________________

Initial Canister Vacuum: __________________ Final Canister Vacuum: ________________________

DUPLICATE SAMPLE

Sample Number: _________________________ Sample Number: _____________________________

Canister Number: ________________________

Initial Canister Vacuum: __________________ Final Canister Vacuum: ________________________

URS Location Data Sheet

Installation: __________ Date Location Established: __________

Project: __________

Location ID: __________ Location Proximity: On Depot / Off Depot

Type of Location: Surface Scrape Borehole Extraction Well Monitoring Well CPT Hand Auger

Location Description:

Survey Data:

Northing: __________

Easting: __________

Datum: __________

Surface Elevation/Units:

Projection: __________

Zone: __________

How was survey data gathered?

Surveyor: __________

Surveyor Company and Address:

Borehole Data:

Total Depth: __________ Units: _____

Diameter: __________ Units: _____

Drilling Method: __________

Driller(s): __________

Drilling Company and Address:

Surface Scrape/Test Pit Data:

Excavation Method:

Excavator: __________

Excavation Company and Address:

H:\Graphics\Data Mgmt\Mather\04-15-Mather-Location-Data-Sheet.indd - VMG 04/16/15 SAC

URS Log of Drilling Operations

Boring ID:

Page 1 of ____

Installation: ____________ Project: ____________ Event: ____________

Total Depth (ft bgs): ____________ Start Date: ____________ Finish Date: ____________

Geologist: ____________ Instrument/Units: ____________

Drilling Company: ____________ Driller: ____________

Drilling Method: ____________ Rig Type: ____________

Drill Bit Type and Size: ____________

Boring Location (Street Address or Description): ____________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
0									0
1									1
2									2
3									3
4									4
5									5
6									6
7									7
8									8
9									9
10									10

URS Log of Drilling Operations

Boring ID:

Page 2 of ____

Start Date: ____________________ Geologist: ________________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
10									10
11									11
12									12
13									13
14									14
15									15
16									16
17									17
18									18
19									19
20									20

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URS Log of Drilling Operations

Boring ID:

Page 3 of ____

Start Date: ____________________ Geologist: ________________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
20									20
21									21
22									22
23									23
24									24
25									25
26									26
27									27
28									28
29									29
30									30

URS Log of Drilling Operations

Boring ID:

Page 4 of ____

Start Date: ____________________ Geologist: ________________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
30									30
31									31
32									32
33									33
34									34
35									35
36									36
37									37
38									38
39									39
40									40

URS Log of Drilling Operations

Boring ID:

Page 5 of ____

Start Date: ____________________ Geologist: ________________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
40									40
41									41
42									42
43									43
44									44
45									45
46									46
47									47
48									48
49									49
50									50

URS Log of Drilling Operations

Boring ID:

Page 6 of ____

Start Date: ____________________ Geologist: ________________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
50									50
51									51
52									52
53									53
54									54
55									55
56									56
57									57
58									58
59									59
60									60

URS Log of Drilling Operations

Boring ID:

Page 7 of ____

Start Date: ____________________ Geologist: ________________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
60									60
61									61
62									62
63									63
64									64
65									65
66									66
67									67
68									68
69									69
70									70

URS Log of Drilling Operations

Boring ID:

Page 8 of ____

Start Date: ________________ Geologist: ________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
70									70
71									71
72									72
73									73
74									74
75									75
76									76
77									77
78									78
79									79
80									80

URS Log of Drilling Operations

Boring ID:

Page 9 of ____

Start Date: ____________________ Geologist: ________________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
80									80
81									81
82									82
83									83
84									84
85									85
86									86
87									87
88									88
89									89
90									90

URS Log of Drilling Operations

Boring ID:

Page 10 of ____

Start Date: ____________________ Geologist: ________________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
90									90
91									91
92									92
93									93
94									94
95									95
96									96
97									97
98									98
99									99
100									100

URS **Log of Drilling Operations**

Boring ID:

Page 11 of ____

Start Date: ____________________ Geologist: ________________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
100									100
101									101
102									102
103									103
104									104
105									105
106									106
107									107
108									108
109									109
110									110

URS Log of Drilling Operations

Boring ID:

Page 12 of ____

Start Date: ____________________ Geologist: ________________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
110									110
111									111
112									112
113									113
114									114
115									115
116									116
117									117
118									118
119									119
120									120

URS Log of Drilling Operations

Boring ID:

Page 13 of ____

Start Date: ____________ Geologist: ____________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
120									120
121									121
122									122
123									123
124									124
125									125
126									126
127									127
128									128
129									129
130									130

URS Log of Drilling Operations

Boring ID:

Page 14 of ____

Start Date: ____________________ Geologist: ________________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
130									130
131									131
132									132
133									133
134									134
135									135
136									136
137									137
138									138
139									139
140									140

URS Log of Drilling Operations

Boring ID:

Page 15 of ____

Start Date: ____________________ Geologist: ____________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
140									140
141									141
142									142
143									143
144									144
145									145
146									146
147									147
148									148
149									149
150									150

URS Log of Drilling Operations

Boring ID:

Page 16 of ____

Start Date: ____________________ Geologist: ____________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
150									150
151									151
152									152
153									153
154									154
155									155
156									156
157									157
158									158
159									159
160									160

URS Log of Drilling Operations

Boring ID:

Page 17 of ____

Start Date: ________________ Geologist: ________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
160									160
161									161
162									162
163									163
164									164
165									165
166									166
167									167
168									168
169									169
170									170

URS Log of Drilling Operations

Boring ID:

Page 18 of ____

Start Date: ____________________ Geologist: ____________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
170									170
171									171
172									172
173									173
174									174
175									175
176									176
177									177
178									178
179									179
180									180

URS Log of Drilling Operations

Boring ID:

Page 19 of ____

Start Date: ____________________ Geologist: ________________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
180									180
181									181
182									182
183									183
184									184
185									185
186									186
187									187
188									188
189									189
190									190

URS Log of Drilling Operations

Boring ID:

Page 20 of ____

Start Date: ____________________ Geologist: ________________________

Depth Below Surface (ft)	Sample Interval	Core Run/ Recovery	Field Sample ID	BH/BZ (PID/FID)	Soil Core PID (ppm)	Time (Military)	Drilling Notes	Lithology	Depth Below Surface (ft)
190									190
191									191
192									192
193									193
194									194
195									195
196									196
197									197
198									198
199									199
200									200

URS

Lithologic Log

Page ____ **of** ____

Installation: ____________________ **Project:** ____________

Location: ____________ **Boring Number:** ________ **Date:** ________ **Geologist:** ____________

Starting Depth ____	**Main Mod:**	Gravelly Sandy Silty Clayey			**Pred Lith:**	Gravel Sand Silt Clay
	Minor/Trace:	Gravel Sand Silt Clay			**Organics:**	N 0-5% 6-10% >10%
	Color:		**Munsell:**		**Grain Size:**	VFS: FS: MS: CS: G:
	Grading:	Well Moderate Poor Gap			**Roundness:**	Rndd Sbrndd Subang Ang
	Lithics:	Qtz: Mafic:	Volc:	Gran:	FSPR:	Mica: Other Lithics:
	2nd Porosity:		**Density (Sands)**	VL L MD D VD	**Consistency (Silt & Clay)**	VS Soft Firm Hard VH
	USCS:	GW GP GM	GC	SW SP SM	SC	ML CL OL MH CH OH
Ending Depth	**Dilatancy**	No Slow Rapid	**Plasticity:**	No Low Med High	**Staining**	
	Moisture:	Dry Damp Moist Wet Sat			**Interbeds:**	
____	**Observations:**				**No Recovery: (Depth)**	

Starting Depth ____	**Main Mod:**	Gravelly Sandy Silty Clayey			**Pred Lith:**	Gravel Sand Silt Clay
	Minor/Trace:	Gravel Sand Silt Clay			**Organics:**	N 0-5% 6-10% >10%
	Color:		**Munsell:**		**Grain Size:**	VFS: FS: MS: CS: G:
	Grading:	Well Moderate Poor Gap			**Roundness:**	Rndd Sbrndd Subang Ang
	Lithics:	Qtz: Mafic:	Volc:	Gran:	FSPR:	Mica: Other Lithics:
	2nd Porosity:		**Density (Sands)**	VL L MD D VD	**Consistency (Silt & Clay)**	VS Soft Firm Hard VH
	USCS:	GW GP GM	GC	SW SP SM	SC	ML CL OL MH CH OH
Ending Depth	**Dilatancy**	No Slow Rapid	**Plasticity:**	No Low Med High	**Staining**	
	Moisture:	Dry Damp Moist Wet Sat			**Interbeds:**	
____	**Observations:**				**No Recovery: (Depth)**	

Starting Depth ____	**Main Mod:**	Gravelly Sandy Silty Clayey			**Pred Lith:**	Gravel Sand Silt Clay
	Minor/Trace:	Gravel Sand Silt Clay			**Organics:**	N 0-5% 6-10% >10%
	Color:		**Munsell:**		**Grain Size:**	VFS: FS: MS: CS: G:
	Grading:	Well Moderate Poor Gap			**Roundness:**	Rndd Sbrndd Subang Ang
	Lithics:	Qtz: Mafic:	Volc:	Gran:	FSPR:	Mica: Other Lithics:
	2nd Porosity:		**Density (Sands)**	VL L MD D VD	**Consistency (Silt & Clay)**	VS Soft Firm Hard VH
	USCS:	GW GP GM	GC	SW SP SM	SC	ML CL OL MH CH OH
Ending Depth	**Dilatancy**	No Slow Rapid	**Plasticity:**	No Low Med High	**Staining**	
	Moisture:	Dry Damp Moist Wet Sat			**Interbeds:**	
____	**Observations:**				**No Recovery: (Depth)**	

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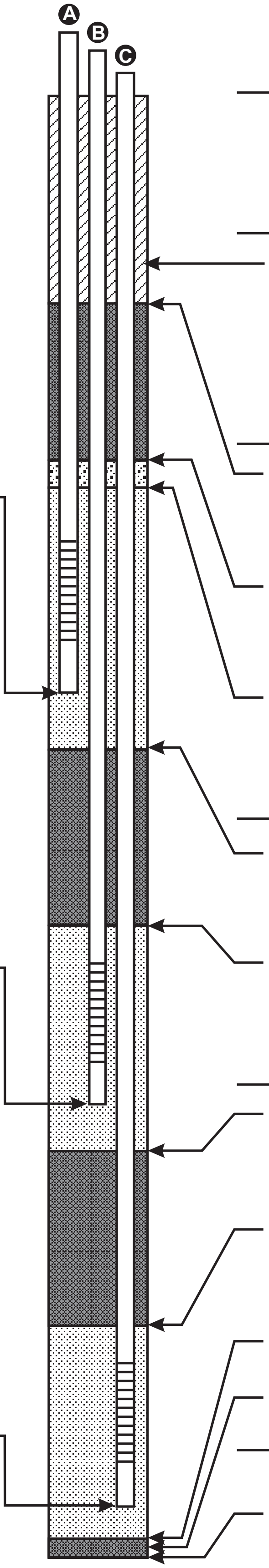
URS Well Construction Details

Installation ______________ **Project** ______________ **Event** ______________ **Well I.D.** ☐

Supervised by: ______________ **Date:** ______________ **Drilling Company:** ______________

Boring No: ______________ **Construction Method:** ______________ **Well Type: SVE SVMW GWEW GWMW PZW Other:** ______________



Ⓐ Well I.D. ______________

Casing Type/Amount ______________

Casing Diameter ______________

Top of Screen ______________

Screen Diameter/Type/Length ______________

Slot Size/Percent Open ______________

Bottom of Screen ______________

Total Well Casing Depth ______________

Ⓑ Well I.D. ______________

Casing Type/Amount ______________

Casing Diameter ______________

Top of Screen ______________

Screen Diameter/Type/Length ______________

Slot Size/Percent Open ______________

Bottom of Screen ______________

Total Well Casing Depth ______________

Ⓒ Well I.D. ______________

Casing Type/Amount ______________

Casing Diameter ______________

Top of Screen ______________

Screen Diameter/Type/Length ______________

Slot Size/Percent Open ______________

Bottom of Screen ______________

Total Well Casing Depth ______________

Surface Completion : Flush Mount / Stickup

Centralizer Spacing/Number Used ______________

Type/Amount of Grout ______________

Gallons of Water ______________

Sacks of Cement ______________

Top of Bentonite Seal ______________

Type/Amount of Bentonite ______________

Top of Sand Bridge ______________

Type/Amount of Sand Bridge ______________

Top of Filter Pack ______________

Type/Amount of Filter Pack ______________

Top of Bentonite Seal ______________

Type/Amount of Bentonite ______________

Top of Filter Pack ______________

Type/Amount of Filter Pack ______________

Top of Bentonite Seal ______________

Type/Amount of Bentonite ______________

Top of Filter Pack ______________

Type/Amount of Filter Pack ______________

Bottom of Filter Pack ______________

Backfill Material ______________

Boring Diameter ______________

Total Depth of Boring ______________

Mather B4260 - New SVE Well
Stabilization Parameters
Field Readings:

Sampler's Initials: ________________

Well ID: SVE well 59-PW-18 (8 to 40 ft bgs)

Date	Time	Purge time (sec)	Methane (% LEL)	O2 (%)	CO2 (ppmv)	PID (ppmv) Notes:

Note: Purge Time (sec) = 60(PV)/scfh. Purge Volume (PV) = 4 x Depth x 0.005 x Diameter^2. All wells have a 1" diameter. The calcuation for PV has 0.005 as a conversion factor that accounts for pi, inches to feet and radius to diameter.

URS Downhole Soil Gas Sampling Data Sheet

Installation: ____________ Project: ____________ Event: ____________

Boring Name: ____________________________ Date: ____________

Location Description: ____
(Direction and Distance from MW Number or Building Number and Corner)

Arrival Time: ________ Lithology at Sample Point: ________ Initial Vacuum Reading: ________

Departure Time: ________ Sampler(s): ____________ Weather Conditions: *(Rain in last 24 hours?)* ☐ *No* ☐ *Yes*

SAMPLE TRAIN LEAK CHECK *Performed before each sample. The system must hold vacuum for a minimum of one minute and not lose more than 10% of the maximum pump vacuum. If the system fails the leak check procedure, check all fittings and re-test the system.)*

	Initial Vacuum Reading:	Final Vacuum Reading:
Above ground, complete sample train:	____________	____________
After probe placement, before purging:	____________	____________

Sampling Method: ☐ *Slide Hammer* ☐ *Hand Auger Hole* ☐ *Hand Drive* ☐ *Pneumatic* ☐ *Hydraulic (Direct Push)* ☐ *Well*

PID Serial Number: ________ PID Readings *(ppmv)*: Pre: ______ Maximum: ______ Post: ______

Apparent Moisture: ☐ *Dry* ☐ *Moist* ☐ *Saturated* Backfill Material: ☐ *Soil* ☐ *Grout* ☐ *Bentonite* ☐ *Other:* ________

Distance Probe Driven: ____________ Length Retracted: ____________

NORMAL SAMPLE Sample Time: ____________

Sample Number: ____________________________

Canister Number: ____________ Attempts to Sample: ____________

Begin/End Depths of Sample: ________ / ________ Evacuation Time: ____________
(Note: Two liters/minute or less)

Vacuum: ____________ *(-) inch Hg* Purge Volume: ____________

Initial Canister Vacuum: ____________ *(-) inch Hg* Final Canister Volume: ____________ *(-) inch Hg*

FIELD DUPLICATE Sample Time: ____________

Sample Number: ____________ Canister Number: ____________

Initial Canister Vacuum: ____________ *(-) inch Hg* Final Canister Volume: ____________ *(-) inch Hg*

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SVM and SVE PID and Water Level Log
B4260 - Former Mather Air Force Base

Sample Location	Sample Depth (feet bgs)	Well Diameter (in.)	Depth to Bottom (ft)	MEASURE Total Well Depth (ft bgs)	MEASURE Depth to Water (ft bgs)	PID (ppmv)	Notes
59-PW-05	10-20	2	20	19.2			
59-PW-05	30-40	2	40				
59-PW-05	50-60	2	60	59.25			
59-PW-05	70-90	2	90				
59-PW-06	11-21	2	21				
59-PW-06	31-41	2	41	39.1			
59-PW-06	51-61	2	61	59.13			
59-PW-06	70-90	2	90	89.2			
59-PW-07	10-20	2	20				
59-PW-08	10-20	2	20	19.56			
59-PW-09A	10-11	1	11				
59-PW-09B	20-21	1	21				
59-PW-10A	8-10	1	10	9.7			
59-PW-10B	20-22	1	22				
59-PW-11A	8-10	1	10				
59-PW-11B	20-22	1	22				
59-PW-12A	8-10	1	10				
59-PW-12B	20-22	1	22				
59-PW-13A	8-10	1	10	9.7			
59-PW-13B	20-22	1	22				
59-PW-14	30-32	1	32	31.83			
59-PW-14	60-62	1	62	61.61			
59-PW-14	80-82	1	82				
59-PW-15	8-10	1	10	10.19			
59-PW-15	20-22	1	22				
59-PW-15	30-32	1	32				
59-PW-15	60-62	1	62				
59-PW-15	80-82	1	82				
59-PW-16	8-10	1	10	9.65			
59-PW-16	20-22	1	22				
59-PW-16	30-32	1	32				
59-PW-16	60-62	1	62				
59-PW-16	80-82	1	82				
59-PW-17	8-10	1	10	9.73			
59-PW-17	20-22	1	22				
59-PW-17	30-32	1	32				
59-PW-17	60-62	1	62	61.54			
59-PW-17	80-82	1	82				
59-PW-18	8-40	4					

Sampler Name: ____________

Date: ___________

Weather: _______________

Start Time: __________

End Time: __________

Mather - B4260 SVE System Process Readings Log

Month ____________________ **Year** __________

Weekly System Readings	Date:					
	Time:					
	Operator:					
Elec. Meter	(Kwh #20)					
Hour Meter	(Hour)					
Fire EX	(color)					
AWS-1	(gal)					
Dil. Air	(% closed)					
Inlet manifold	Flow (units)					
	Pressure (units)					
	Temperature (units)					
Blower	Out Temp (units)					
	Out Press (units)					
Heat Ex. Out	Temperature (units)					
Mid Gac	Temperature (units)					
	Pressure (units)					
Non Contact cooling water	Flow rate (gpm)					
	Totalizer (gal)					
Stack	Temperature (units)					
	Flow (units)					
	Pressure (units)					
AWS-2	(gal)					
Low Point Drains	(gal)					

Notes: ____

____

____

APPENDIX C

Quality Assurance Project Plan Addendum

C.0 QUALITY ASSURANCE PROJECT PLAN ADDENDUM

This Quality Assurance Project Plan (QAPP) Addendum serves as an addendum to the *Former Mather Air Force Base Sampling and Analysis Plan, Part II–Quality Assurance Project Plan* (MWH 2010). The QAPP presents the program procedures, objectives, functional activities, and specific quality assurance/quality control (QA/QC) activities designed to achieve established data quality goals. The Sampling and Analysis Plan (SAP)–Part 1 and the QAPP–Part 2 describe all quality-related field sampling and laboratory analysis activities that will be implemented during investigation activities. This QAPP Addendum details the specific guidance for the QA/QC of subsurface soil vapor and system monitoring sampling and analysis for Building 4260 (B4260, previously Site 59b).

Environmental measurements are made to produce data that are scientifically valid, are of known and acceptable quality, meet established objectives, and are legally defensible. This QAPP Addendum recognizes the responsibility to implement minimum procedures that assure the precision, accuracy, representativeness, comparability, and completeness (PARCC) parameters of all data generated to meet the specified data quality objectives (DQOs). Throughout this addendum, specific procedural guidance is included. These procedures and their associated data collection and data tracking forms will be used to ensure the consistency and thoroughness of data generation and data integrity.

C.1 Project Design and Rationale

The Air Force initiated an investigation to further define the extent of volatile organic compounds (VOCs) contamination at B4260 and determine whether implementation of SVE to treat vadose zone VOCs was appropriate. The investigation and monitoring to be conducted as part of the SVE remedy includes sampling subsurface soil vapor around B4260 using the extraction wells of the SVE system and adjacent soil vapor monitoring wells.

C.2 Analytical Data Objectives

The data quality objectives for this effort are to install an extraction well that will help remediate the soil vapor contamination associated with the source area near the southeastern corner of B4260, and to collect sufficient samples and analytical data of known quality to ensure that the contamination is being reduced.

C.2.1 Quality Objectives

Specific QA indicators have been established for PARCC and QC measurements. These parameters are expressed as quantitative and qualitative statements concerning the type of data needed to support a decision, based on a specified level of uncertainty. Table C-1 provides the analyte lists, reporting limits, and precision, accuracy, and completeness objectives for Method TO-15. The criteria (predetermined acceptance limits) are expressed as numerical values for all laboratory analyses and field tests identified.

Table C-1
Analyte List, Reporting Limits, and Analytical Data Quality Objectives

Reference Method	Analyte	TO-15 Reporting Limits (ppbv)*	Accuracy Objectives	Precision Objective	Completeness Objectives (percent)
			LCS/CCV (%R)	Field Duplicate Analysis (RPD)	
TO-15	**1,1,1-Trichloroethane**	5.0	70–130	≤30	≥90
	1,1-Dichloroethene	5.0	70–130	≤30	≥90
	1,2-Dichloroethane	5.0	70–130	≤30	≥90
	Benzene	5.0	70–130	≤30	≥90
	Carbon tetrachloride	5.0	70–130	≤30	≥90
	Chlorobenzene	5.0	70–130	≤30	≥90
	Chloroform	5.0	70–130	≤30	≥90
	cis-1,2-Dichloroethene	5.0	70–130	≤30	≥90
	Ethylbenzene	5.0	70–130	≤30	≥90
	Freon 11	5.0	70–130	≤30	≥90
	Freon 113	5.0	70–130	≤50	≥90
	Freon 12	5.0	70–130	≤30	≥90
	m,p-Xylene	5.0	70–130	≤30	≥90
	o-Xylene	5.0	70–130	≤30	≥90
	Tetrachloroethene	5.0	70–130	≤30	≥90
	Toluene	5.0	70–130	≤30	≥90
	trans-1,2-Dichloroethene	5.0	70–130	≤30	≥90
	Trichloroethene	5.0	70–130	≤30	≥90
	Vinyl chloride	5.0	70–130	≤30	≥90
	2-Propanol	20.0	70–130	≤30	≥90

Notes: **BOLD** indicates main contaminants of concern

* = Laboratory-specific. These are approximate limits and do not take into account residual vacuum or dilutions. Method detection limits are at or below the reporting limits, but are not presented because they are instrument-specific.

%R = percent recovery
≤ = less than or equal to
≥ = greater than or equal to
CCV = continuing calibration verification
LCS = laboratory control sample
ppbv = parts per billion by volume
RPD = relative percent difference
μg/m^3 = micrograms per cubic meter

C.3 Analytical Support Level

Definitive data are necessary to determine the presence or absence of contaminants with a level of certainty. All samples will be submitted to the laboratory under this field effort with the objective of obtaining definitive data. As the analytical results of the field samples are reported by the laboratory, the data will undergo a validation process. This process will begin following receipt of the final analytical data reports in hard-copy and electronic deliverable formats. The project chemist will review the data in accordance with the U.S. Environmental Protection Agency’s (EPA) *National Functional Guidelines for Organic Data Review* (EPA 2016). Field logbooks and chain-of-custody (COC) forms will be compared with laboratory results, for consistency and sample identification. Qualification flags, applied to the data during the validation process, will be incorporated into the database. Any rejected results will be brought to the attention of the QA manager and the Air Force project manager (PM), for review and suggested corrective action. Corrective action, depending on each case, may take the form of additional sampling, re-analysis, exclusion from use in the project database, or no action. Data that pass the validation process and meet the project DQOs will be considered definitive data.

C.4 Sample Collection and Quality Control

The quality of data collected in an environmental study is critically dependent on the quality and thoroughness of field sampling activities. Considering the sensitivity of analytical methods and the levels of detection specified for contaminant analyses, the sampling process becomes integral to the quality of data generated. Therefore, consistent, approved field operations and practices, and specific sample collection procedures will be followed.

C.4.1 Soil Vapor Sampling

All soil vapor samples will be collected in 1-liter canisters and analyzed for B4260 site-specific VOCs (see Table C-1).

C.4.2 Investigation-Derived Waste Sampling

Soil, purge or wastewater, or used carbon samples will be collected for waste characterization. Discrete soil samples(s) will be collected for VOCs by EPA Method SW8260B/C. A representative composite sample(s) of investigation-derived waste (IDW) (e.g., drill cuttings or soil excavated during trenching) will be analyzed for total metals by EPA Method SW6010B/SW7470A, at a minimum, for off-site disposal purposes. Wastewater or purge water will be sampled for metals and VOCs, if needed, for discharge to a groundwater treatment system or sewer outfall. Spent carbon will be analyzed by the toxicity characteristic leaching procedure for VOC analysis. All samples will be analyzed by a certified analytical laboratory.

C.4.3 Sample Containers, Volumes, and Preservation

The sample container, preservation method, and holding time requirements are shown in Tables C-2 and C-3.

Sample preservation is instrumental in maintaining the integrity of the samples from the time of collection until the analyses are performed. Therefore, the samples will be preserved during collection and storage, to prevent or retard degradation or modification of the chemicals in the samples. The preservation requirements are shown in Tables C-2 and C-3. For soil vapor samples, the canisters can be shipped at room temperature in a cardboard box or couriered to the laboratory. For water or soil IDW samples, all samples will be placed in ice chests and preserved at 4º Celsius. Samples will be shipped, delivered, or couriered within 2 days of collection.

Table C-2
Sample Container and Holding Time Requirements for Soil Vapor Samples

Methods	Parameter	Sample Container	Volume	Preservative	Holding Time
TO-15	VOCs	1-liter canister	1 liter	None	30 days

Note:
VOC = volatile organic compound

Table C-3
Sample Container and Holding Time Requirements for IDW Samples

Matrix	U.S. Environmental Protection Agency Method	Sample Container	Volume	Preservative	Holding Time
Soil	SW8260B	4 oz. jar	5 grams	4°C	14 days
Soil	SW6010B/SW7471A	glass	(1) 8 oz. jar	4°C	180 days/Hg 28 days
Carbon	TCLP/8260B	glass	(1) 8 oz. jar	4°C	14 days
Water	SW8260B	amber glass, Teflon-lined	(3) 40 ml VOA vials	HCl, pH<2, 4°C	14 days
Water	SW6010B/SW7470A	plastic	250 ml	HNO_3, pH<2, 4°C	180 days/Hg 28 days

Notes:

HCl = hydrochloric acid
Hg = mercury
HNO_3 = nitric acid
IDW = investigative-derived waste
ml = milliliter
oz. = ounce
VOA = volatile organics analysis
°C = degrees Celsius
< = less than

C.4.4 Field Data and Sample Collection Procedures

Field data collection forms and sample collection procedures will follow the SAP (MWH 2010) and RI work plan (URS 2017). The purpose of these procedures is to obtain representative samples. Procedures that will be used for field and sampling activities are discussed in Section 2.0 and 4.0 of the RI work plan, Sections 3.0 and 4.0 of the design and operations and maintenance (O&M) plan for B4260, and in the sections below.

Field personnel will be responsible for the use and maintenance of field notebooks when conducting project-related fieldwork. Field notebooks provide a means for recording all data collection activities performed at a site. Field notebooks are intended to provide sufficient data and observation notes to enable participants to reconstruct events that occur during site activities. All entries need to be as factual, detailed, and descriptive as possible, so that a particular situation can be reconstructed without reliance on the collector’s memory. Field notebooks are not to be used as a sole source of project or sampling information, nor should they be used for recording personal feelings, opinions, or any other inappropriate terminology. Field notebooks will be completed with consecutively numbered pages. Notebooks will be permanently assigned to field personnel.

The cover of each notebook will contain the following information:

- person or organization to whom the book is assigned;
- book number;
- project number;
- site name and number; and
- start date of notebook entries.

Entries in the notebook may contain a variety of information. At a minimum, notebook entries must include the following information at the beginning of each day:

- date;
- start time;
- weather conditions;
- county, state, and site address;
- all field personnel present and directly involved; and
- level of personal protection being used on site.

In addition, the information recorded in the field notebook is to include the following:

- a detailed description of sampling locations, physical parameters, and other field measurements;
- information on field QC samples (i.e., duplicates and trip blanks);
- observations about site and samples (e.g., odors, appearance);
- information about any activities extraneous to sampling activities that may affect the integrity of the samples (e.g., low-flying aircraft nearby, fossil-fueled motors being used nearby, painting operations being carried out upwind of sampling sites);
- equipment used on site, including time and date of calibration (equipment calibration also will be recorded in the calibration log book);
- maps or photographs acquired or taken at the sampling site; and
- forms used during sampling.

All notebook entries will be made in indelible black or blue ink. No erasures are permitted. If an incorrect entry is made, the data will be crossed out with a single strike mark, and then dated and initialed by the originator. Entries will be organized into easily understandable tables, if possible. The PM or PM-designee will review field notebooks from field operations for completeness and accuracy, on completion of the project.

C.5 Chain-of-Custody Procedures

Proper COC and sample tracking methods will be used during sample collection. These methods will include maintaining the documentation necessary to trace sample possession and the proper completion of standardized COC forms used to accompany samples shipped to the certified laboratory.

Field personnel (samplers) will be responsible for performing sample custody, documentation, and tracking tasks when collecting environmental samples meant for laboratory analysis. These personnel will be responsible for the care and custody of the collected samples, and for the proper and complete preparation of all sample labels and COC forms related to the samples until the samples are transferred or dispatched properly. During field efforts, custody will be maintained when an environmental sample is in any of the following conditions:

- in one’s actual physical possession or view;
- in one’s physical possession, and has not been tampered with (i.e., under lock or official seal);
- retained in a secure area with restricted access; or
- placed in a container and secured with an official seal so that the sample cannot be accessed without breaking the seal.

A COC form will be used as the sample custody and analyses specification document for all samples, from the time of collection to laboratory analysis.

C.5.1 Field Procedures for Custody Documentation

The following COC procedures will be implemented to maintain the samples and document sample possession:

- Samples will be collected as described in the Design and O&M Plan.
- The sampler (or person in possession of samples) will be responsible for the care and custody of the samples collected until they are properly transferred or dispatched to the analytical laboratory.
- Sample labels will be completed for each sample container, using block-printed text and indelible ink.
- When possible, all samples pertaining to one physical sampling location will be recorded on the same COC form.

C.5.2 Transfer of Custody and Shipment

Samples always must be accompanied by COC paperwork. When transferring the possession of samples, the individual(s) relinquishing and receiving the samples will sign, date, and note the time in the appropriate space on the custody paperwork. If the transfer occurs among the sampling team, the individual receiving the samples must document the range of sample numbers transferred to his/her possession in the “Received By” field. This act will document the physical transfer of the sample or group of samples from one sampler to another field person. When shipping samples by overnight courier, the individual in possession of the samples will relinquish the samples by signing, dating, and noting the time, and completing the “Received By” box with the courier name and air bill number.

All shipments will be accompanied by the appropriate custody and analyses specification document(s), identifying the shipment container’s contents and analyses needed for each sample. The original documents will be sealed in a plastic bag and placed in an ice chest.

If sent by common courier or air freight, the air bill will be maintained. The method of shipment, courier name(s), and other pertinent information will be entered on the COC form.

The following information will be conveyed to the scheduled laboratory when samples are shipped:

- date shipped;
- number of samples by concentration (i.e., high, medium, low), if known, and sample matrix; and

- courier and air bill number.

Field personnel will notify the laboratory representative of Saturday sample deliveries, if necessary.

C.6 Quality Control Procedures

QC checks for field and laboratory sample analysis will be used to assess and document data quality, and to identify discrepancies in the measurement process that need correction. The collection and analysis of field duplicates and ambient blanks may be used for QC checks on the representativeness of the environmental samples, the precision of sample collection and handling procedures, and the accuracy of laboratory analysis.

Analytical quality control will be assessed using continuing calibration recoveries, method blanks, laboratory control sample (LCS) analysis, and laboratory duplicate analysis. These QC measures will be performed by the laboratory per method requirements. A summary of calibration and QC procedures is shown in Table C-4. The analytical laboratory will report any QC failures, such as calibration check samples that exceed control limits.

C.7 Data Quality Management

C.7.1 Data Handling Systems

The following sections describe the process for handling data in terms of data generation, review, and routing for field sampling data. The procedures identified in previous sections describe the recording of measurements onto data collection forms. This section discusses the monitoring and controls established to track field data through the following events: field form completion; and field review and correction.

C.7.1.1 Field Form Completion

Data collection procedures and instructions included in the SAP (MWH 2010) provide the guidance necessary to complete the field forms and analytical sampling paperwork involved with data collection activities.

C.7.1.2 Field Review and Correction

After completion of field data and analytical sampling paperwork, efforts will be made to ensure that the information recorded is accurate, complete, and legible. Data review and correction protocols have been established for both field- and office-specific data collection and processing. Technical personnel will document and review their own work and will be accountable for its correctness. The intent of the review is to ensure that all forms are complete, legible, and possess the required data elements.

If any document completion errors are found by the PM or a PM-designee during review of project documents, a correction process will be undertaken by the individual who discovered the error. If an individual discovers an error, the incorrect form will be sent to the individual best suited to correct the error. After the form has been corrected, it will, in effect, become the final version of the document, suitable for report usage.

Table C-4

Summary of Calibration and Quality Control Procedures for Methods TO-15

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Tuning Criteria	Every 24 hours	TO-15 ion abundance criteria	Correct problem, and then repeat tune.
Minimum 5-Point Initial Calibration (ICAL)	Before sample analysis	%RSD ≤30 with 2 compounds allowed out to ≤40% RSD	Correct problem, and then repeat Initial Calibration curve.
Initial Calibration Verification and Laboratory Control Spike (ICV and LCS)	After each initial calibration curve, and daily before sample analysis	Recoveries for 85% of “Standard” compounds must be 70–130%. No recovery may be <50%. If specified by the client, in-house generated control limits may be used.	Check the system and reanalyze the standard. Re-prepare the standard if necessary, to determine the source of error. Re-calibrate the instrument if the primary standard is found to be in error.
Initial Calibration Verification and Laboratory Control Spike (ICV and LCS) for Non-standard compounds	Per client request or specific project requirements only	Recoveries of compounds must be 60–140%. No recovery may be <50%.	Check the system and re-analyze the standard. Re-prepare the standard if necessary, to determine the source of error. Re-calibrate the instrument if the primary standard is found to be in error.
Continuing Calibration Verification (CCV) for Standard compounds	At the start of each analytical clock after the tune check	70–130%	Compounds exceeding this criterion and associated data will be flagged and narrated, with the exception of high bias associated with non-detects. If more than two compounds from the standard list recover outside 70–130%, corrective action will be taken. If any compound exceeds 60–140%, samples are not to be analyzed unless the data meet project needs. Check the system and re-analyze the standard. Re-prepare the standard if necessary. Re-calibrate the instrument if the criteria cannot be met.
Continuing Calibration Verification (CCV) for Non-standard compounds	Per client request or specific project requirements only	Recoveries of compounds must be 60–140%. No recovery may be <50%.	Check the system and re-analyze the standard. Re-prepare the standard if necessary, to determine the source of error. Re-calibrate the instrument if the primary standard is found to be in error.
Laboratory Blank	After analysis of standards and before sample analysis, or when contamination is present	Results less than the laboratory reporting limit	Inspect the system and re-analyze the blank. “B”-flag for common contaminants.
Internal Standard (IS)	As each standard, blank, and sample is being loaded	(RT for blanks and samples must be within ±0.33 min of the RT in the CCV and within ±40% of the area counts of the daily CCV internal standards	**For blanks:** Inspect the system and re-analyze the blank. **For samples:** Re-analyze the sample. If the ISs are within limits in the re-analysis, report the second analysis. If ISs are out-of-limits a second time, dilute the sample until ISs are within acceptance limits and narrate.
Surrogates	As each standard, blank, and sample is being loaded	70–130% If specified by the client, in-house generated control limits may be used	**For blanks:** Inspect the system and re-analyze the blank. **For samples:** Re-analyze the samples unless obvious matrix interference is documented. If the %Rs are within limits in the re-analysis, report the second analysis. If %Rs are out-of-limits a second time, report data from first analysis and narrate.
Laboratory Duplicates–Laboratory Control Spike Duplicates (LCSD)	One per analytical batch	RPD ≤25%	**Narrate exceedances**: If more than 5% of the compound list is outside criteria or if the compound has >40% RPD, investigate the cause and perform maintenance as required. If instrument maintenance is required, calibrate as needed.

Notes:

%R = percent recovery
CCV = continuing calibration verification
ICAL = initial calibration
ICV = Initial Calibration Verification
IS = Internal Standard
LCS = laboratory control spike
LCSD = Laboratory Control Spike Duplicates
QC = quality control
RPD = relative percent difference
RSD = relative standard deviation
RT = Retention time

C.7.2 Data Validation

Batch data validation will be performed on every work order (100 percent of the data). This will include review of analytical results, associated laboratory internal QC data, and field QC data reported by the analytical laboratory. All data generated will be assessed for PARCC parameters. The data assessment criteria for accuracy and precision are shown in Table C-1.

C.7.3 Data Reporting

Laboratory measurements will be recorded in standard formats that specify site location, sample identification, date, matrix parameter, parameter value, and reporting limit. Laboratory and field data will be combined and summarized in final tables and graphs that are appropriate to the type of data, and will convey information to support the findings of the data collection program. In all cases, data will be tabulated clearly and presented in a consistent way to facilitate comparison of common sets of data.

C.8 References

Montgomery Watson Harza (MWH). 2010 (May). *Sampling and Analysis Plan. Part I-Field; Part 2-Quality Assurance Project Plan, Sampling Plan, Former Mather Air Force Base*. Sacramento County, CA.

United States Environmental Protection Agency (EPA), 2016. Office of Superfund Remediation and Technology Innovation, *National Functional Guidelines for Superfund Organic Methods Data Review*. OLEM 9355.0-134, EPA-540-R-2016-002. September 2016.

URS Group, Inc. (URS). 2017. *Final Site 59b Remedial Investigation Work Plan, Former Mather Air Force Base, California.* February.