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ENTERED



MAR 12 2019

MAR 15 2019

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Subject: Submittal of Chemical Waste Landfill (CWL) Annual Post-Closure Care Report, Calendar Year (CY) 2018, CWL Post-Closure Care Permit for Sandia National Laboratories/New Mexico, Environmental Protection Agency Identification Number NM5890110518


Dear Mr. Kieling:

The Department of Energy/National Nuclear Security Administration and National Technology and Engineering Solutions of Sandia, LLC, are submitting the Chemical Waste Landfill Post-Closure Care Report, CY 2018, dated March 2019, to the New Mexico Environment Department. This submittal is required by Part 2, Section 2.6.3, of the CWL Post-Closure Care Permit. The post-closure care requirements were met for CY 2018.

This document is comprised of a main report and four annexes that provide information for post-closure care activities conducted at the CWL during CY 2018. The report and supporting documentation satisfy requirements listed in Permit Attachment 1, Section 1.12.

If you have any questions contact Mr. David Rast of our staff at (505) 845-5349.

Sincerely,


Jeffrey P. Harrell
Manager

Enclosure

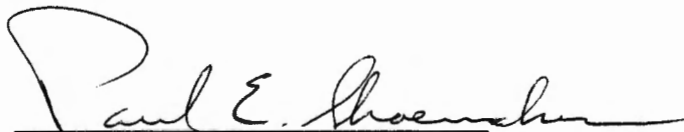
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**Chemical Waste Landfill Annual Post-Closure Care Report
Calendar Year 2018
Chemical Waste Landfill Post-Closure Care Permit**

**Sandia National Laboratories
Albuquerque, New Mexico
EPA ID No. NM5890110518**

CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.



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**Sandia
National
Laboratories**

**CHEMICAL WASTE LANDFILL
ANNUAL POST-CLOSURE CARE REPORT
CALENDAR YEAR 2018**

**SANDIA NATIONAL LABORATORIES, NEW MEXICO
LONG-TERM STEWARDSHIP**

MARCH 2019



**U.S. DEPARTMENT OF
ENERGY**



**United States Department of Energy
Sandia Field Office**

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**ANNUAL CHEMICAL WASTE LANDFILL
POST-CLOSURE CARE REPORT
CALENDAR YEAR 2018**

Facility: Chemical Waste Landfill

Location: Sandia National Laboratories
Albuquerque, New Mexico

EPA ID No.: NM5890110518

Permit Basis: Chemical Waste Landfill Post-Closure Care Permit, issued October 15, 2009, effective June 2, 2011, and subsequently modified.

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- Annex B Chemical Waste Landfill Calendar Year 2018 Soil-Gas Monitoring Forms and Reports
- Annex C Chemical Waste Landfill Calendar Year 2018 Post-Closure Inspection Forms
- Annex D Chemical Waste Landfill Calendar Year 2018 Biology Report

ACRONYMS AND ABBREVIATIONS

AOP	administrative operating procedure
bgs	below ground surface
CAMU	Corrective Action Management Unit
CFR	Code of Federal Regulations
CWL	Chemical Waste Landfill
CY	calendar year
DOE	U.S. Department of Energy
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
ET	evapotranspirative
gpm	gallons per minute
KAFB	Kirtland Air Force Base
LCL	lower confidence limit
LE	Landfill Excavation
MDL	method detection limit
µg/L	micrograms per liter
mg/L	milligrams per liter
NMED	New Mexico Environment Department
NTESS	National Technology & Engineering Solutions of Sandia, LLC
NTU	nephelometric turbidity units
PCCP	Post-Closure Care Permit
PCE	tetrachloroethene
%	percent
pH	potential of hydrogen (negative logarithm of the hydrogen ion concentration)
ppbv	parts per billion by volume
ppmv	parts per million by volume
PQL	practical quantitation limit
QC	quality control
RPD	relative percent difference
SAP	sampling and analysis plan
SC	specific conductivity
SNL	Sandia National Laboratories
SNL/NM	Sandia National Laboratories, New Mexico
TCE	trichloroethene (also trichloroethylene)
UCL	upper confidence limit
VCM	Voluntary Corrective Measure
VE	Vapor Extraction
VOC	volatile organic compound

EXECUTIVE SUMMARY

The Chemical Waste Landfill (CWL) at Sandia National Laboratories/New Mexico (SNL/NM) is a remediated hazardous waste landfill that underwent closure in accordance with Title 20, Chapter 4, Part 1 of the New Mexico Administrative Code (20.4.1.600 NMAC), incorporating Title 40, Code of Federal Regulations (CFR), Part 265, (40 CFR § 265) Subpart G, and the CWL Final Closure Plan (SNL/NM December 1992 and subsequent revisions). The CWL Post-Closure Care Permit (PCCP) (NMED October 2009), which became effective June 2, 2011 (Kieling June 2011) and as modified, defines all post-closure requirements. This eighth CWL Annual Post-Closure Care Report documents all activities and results as required by the PCCP Attachment 1, Section 1.12.

Two semiannual groundwater sampling events were conducted in calendar year (CY) 2018. Analytical and statistical assessment results were consistent with previous years. No hazardous constituent concentration limits were exceeded and there was no statistically significant evidence of increasing contamination.

One annual soil-gas monitoring event was conducted in January 2018. Analytical and statistical assessment results are consistent with previous years and there were no exceedances of established trigger levels. Soil-gas monitoring results continue to confirm stability and three-dimensional diffusion of the residual volatile organic compound soil-gas plume beneath the CWL in the vadose zone.

Inspections of the CWL final cover system, compliance monitoring networks and sampling equipment, storm-water diversion structures, and security fence were performed in accordance with PCCP requirements. Required repairs were minor and were generally performed during the inspections. All controls are performing as designed.

The Evapotranspirative (ET) Cover continues to meet successful revegetation criteria and is in good condition with even coverage of mature, native perennial grasses. Maintenance was performed in CY 2018 in response to the inspections and as best practice for ET Cover vegetation. The purpose of ongoing maintenance efforts is to promote the growth and health of the desired native grass species on the ET Cover by reducing competition with weedy species for limited moisture and nutrients.

Regulatory activities in CY 2018 included submittal of four updated procedures used to conduct groundwater monitoring activities (Harrell February 2018) and the Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2017 (SNL/NM March 2018).

All PCCP requirements have been met for CY 2018. Industrial land use is being maintained for the CWL consistent with PCCP requirements. Based upon monitoring, inspection, and maintenance results, the ET Cover is functioning as designed and site conditions remain protective of human health and the environment.

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1.0 INTRODUCTION

Sandia National Laboratories (SNL) is a multi-purpose engineering and science laboratory owned by the U.S. Department of Energy (DOE)/National Nuclear Security Administration. SNL is managed and operated by National Technology & Engineering Solutions of Sandia, LLC (NTESS), a wholly owned subsidiary of Honeywell International Inc.

The Chemical Waste Landfill (CWL) at SNL/New Mexico (SNL/NM) is a remediated hazardous waste landfill that underwent closure in accordance with Title 20, Chapter 4, Part 1 of the New Mexico Administrative Code (20.4.1.600 NMAC), incorporating Title 40, Code of Federal Regulations (CFR), Part 265, (40 CFR § 265) Subpart G, and the CWL Final Closure Plan (SNL/NM December 1992 and subsequent revisions). The CWL Post-Closure Care Permit (PCCP) (NMED October 2009), which became effective June 2, 2011 (Kieling June 2011) and as modified, defines all post-closure requirements. There were no PCCP modifications in calendar year (CY) 2018. The modification history of the PCCP through CY 2018 is documented in Chapter 7, along with a summary of documents submitted to the New Mexico Environment Department (NMED) associated with the PCCP through CY 2018.

All PCCP monitoring, inspection, and maintenance/repair requirements have been met for CY 2018 and are documented in this CWL Annual Post-Closure Care Report in accordance with PCCP Attachment 1. Based upon monitoring, inspection, and maintenance results, the Evapotranspirative (ET) Cover and associated controls are functioning as designed, and site conditions remain protective of human health and the environment. No groundwater or soil-gas monitoring hazardous constituent and trigger levels were exceeded. Industrial land use is being maintained for the CWL consistent with PCCP requirements.

1.1 Purpose and Scope

The purpose of this CWL Annual Post-Closure Care Report is to document monitoring, inspection, maintenance, and repair activities conducted during CY 2018 as required by PCCP Attachment 1, Section 1.12 (NMED October 2009 and subsequent revisions). This annual report documents post-closure care activities conducted from January through December 2018 and fulfills the PCCP requirement for annual reporting to the NMED.

The PCCP monitoring, inspection, and maintenance/repair activities that must be documented and reported for each CY are presented in Chapter 3 of this report and are summarized as follows.

- Two semiannual groundwater monitoring events.
- One annual soil-gas monitoring event.
- Two inspections of the groundwater monitoring network and sampling equipment performed in conjunction with semiannual monitoring events.

- One annual inspection of the soil-gas monitoring network and sampling equipment performed in conjunction with the annual monitoring event.
- One annual inspection of final cover vegetation and biological parameters (i.e., biology inspection of the ET Cover).
- Four quarterly inspections of the final cover surface (i.e., physical features and specific biological parameters), storm-water diversion structures, fence, locks, gates, signs, and survey monuments.
- Maintenance and repair as needed to ensure adequate performance of the ET Cover system and monitoring networks.

This CY 2018 report is organized as follows:

- Chapter 1 presents background information, purpose and scope, and report organization.
- Chapter 2 provides a description of the final cover system, compliance monitoring system (groundwater and soil-gas), storm-water diversion structures, and security fence (fence, locks, gate, signage, and survey monuments).
- Chapter 3 presents monitoring, inspection, maintenance, and repair requirements.
- Chapter 4 presents groundwater monitoring activities and results.
- Chapter 5 presents soil-gas monitoring activities and results.
- Chapter 6 presents inspection, maintenance, and repair activities and results.
- Chapter 7 summarizes regulatory activities.
- Chapter 8 presents a general summary and conclusions for the CY 2018 reporting period.
- Chapter 9 lists the references cited in this report.

Annexes are provided that include CY 2018 supporting information as follows:

- Annex A – Groundwater Monitoring Forms and Reports
- Annex B – Soil-Gas Monitoring Forms and Reports
- Annex C – Post-Closure Inspection Forms
- Annex D – Chemical Waste Landfill Biology Report

2.0 CHEMICAL WASTE LANDFILL POST-CLOSURE CARE CONDITIONS

The CWL is a 1.9-acre remediated hazardous waste landfill located in the southeastern corner of SNL/NM Technical Area III (Figures 2-1 and 2-2) undergoing post-closure care in accordance with the PCCP (NMED October 2009 and subsequent revisions). From 1962 until 1981, the CWL was used for the disposal of chemical and solid waste generated by SNL/NM research activities. Additionally, a small amount of radioactive waste was disposed of during the operational years. Disposal of liquid waste in unlined pits and trenches ended in 1981, and after 1982 all liquid waste disposal was terminated. From 1982 through 1985, only solid waste was disposed of at the CWL, and after 1985 all waste disposal ended. The CWL was also used as a hazardous waste drum-storage facility from 1981 to 1989. A summary of the CWL disposal history is presented in the CWL Final Closure Plan (SNL/NM December 1992) along with a waste inventory based upon available disposal records and information.

2.1 Background

Two voluntary corrective measures (VCMs) were conducted during closure of the CWL. A soil-vapor extraction (VE) VCM was conducted from 1997 through 1998 to reduce the concentrations of VOC soil gas in the vadose zone, to control the volatile organic compound (VOC) soil-gas plume, and to reduce groundwater trichloroethene (TCE) concentrations below the regulatory standard of 5 micrograms per liter ($\mu\text{g/L}$). TCE concentrations in groundwater have been below 5 $\mu\text{g/L}$ since completion of the VE VCM in 1998. Following the VE VCM, the CWL Landfill Excavation (LE) VCM was conducted from September 1998 through February 2002. All former disposal areas were excavated during the LE VCM. The excavation was backfilled and an ET cover was constructed over the CWL.

Additional information on the VCMs, other closure activities, and CWL current conditions can be found in the CWL Final Resource Conservation and Recovery Act Closure Report (SNL/NM September 2010), the PCCP, the CWL Corrective Measures Study Report (SNL/NM December 2004), and previous annual reports. Detailed information on residual soil contamination at the CWL can be found in PCCP Part 3, Section 3.1 and Table 3-1.

2.2 Final Cover System

The CWL final cover is a centrally crowned "at-grade" ET Cover designed to minimize infiltration of moisture into the former disposal area and to minimize long-term maintenance consistent with 40 CFR § 264.111(a). The crown of the cover slopes to the north and south at a 1-percent grade, and east to west at a 3-percent grade, to minimize erosion losses and control run-on/run-off. The ET Cover consists of two discrete layers; a 3-foot-thick native soil layer installed from 4 feet below ground surface (bgs) to 1 foot bgs, and a topsoil layer (approximately 1.5 feet thick) installed from 1 foot bgs to the local grade. The topsoil layer was revegetated with native plants

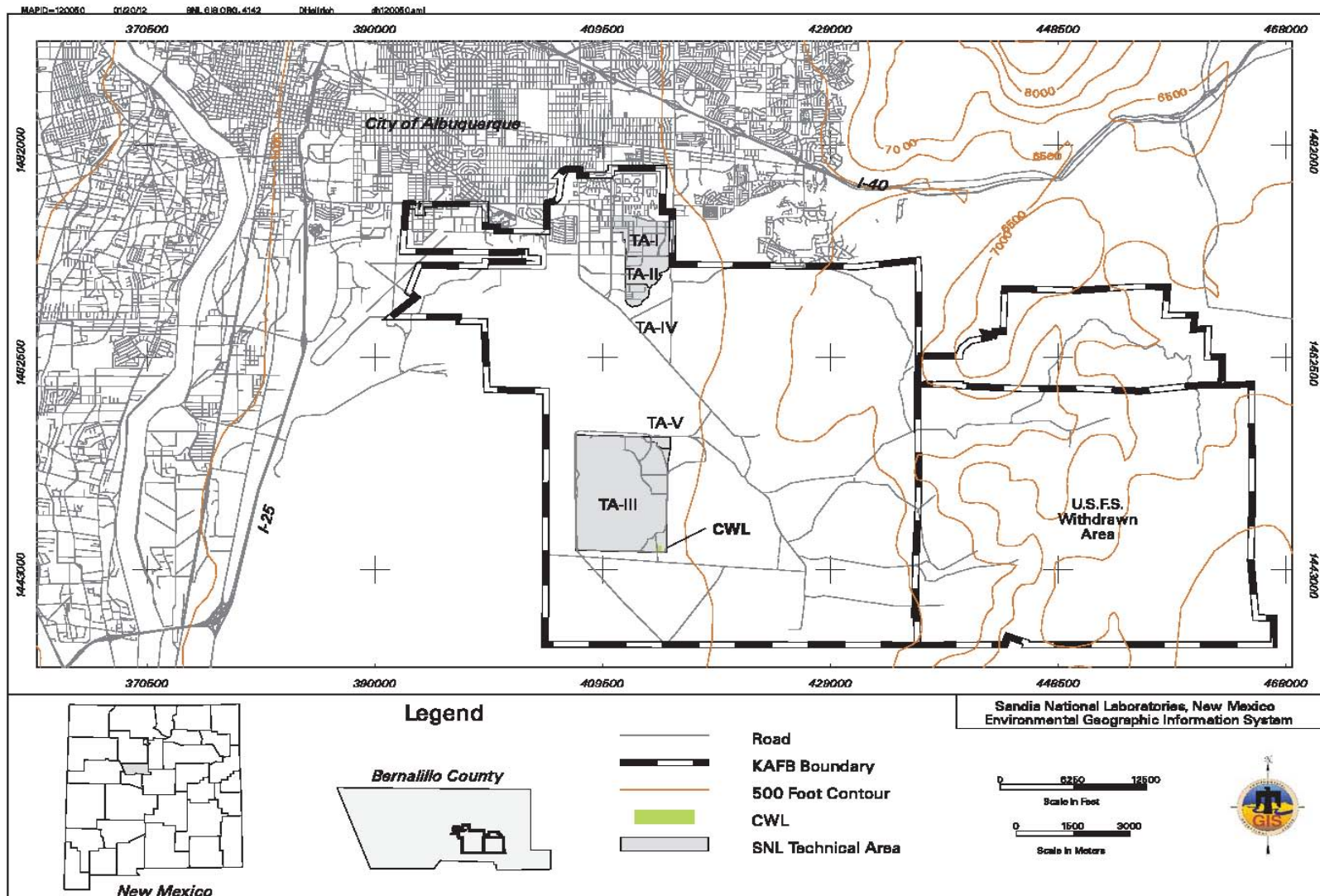


Figure 2-1
 Location of the Chemical Waste Landfill with Respect to Kirtland Air Force Base and the City of Albuquerque

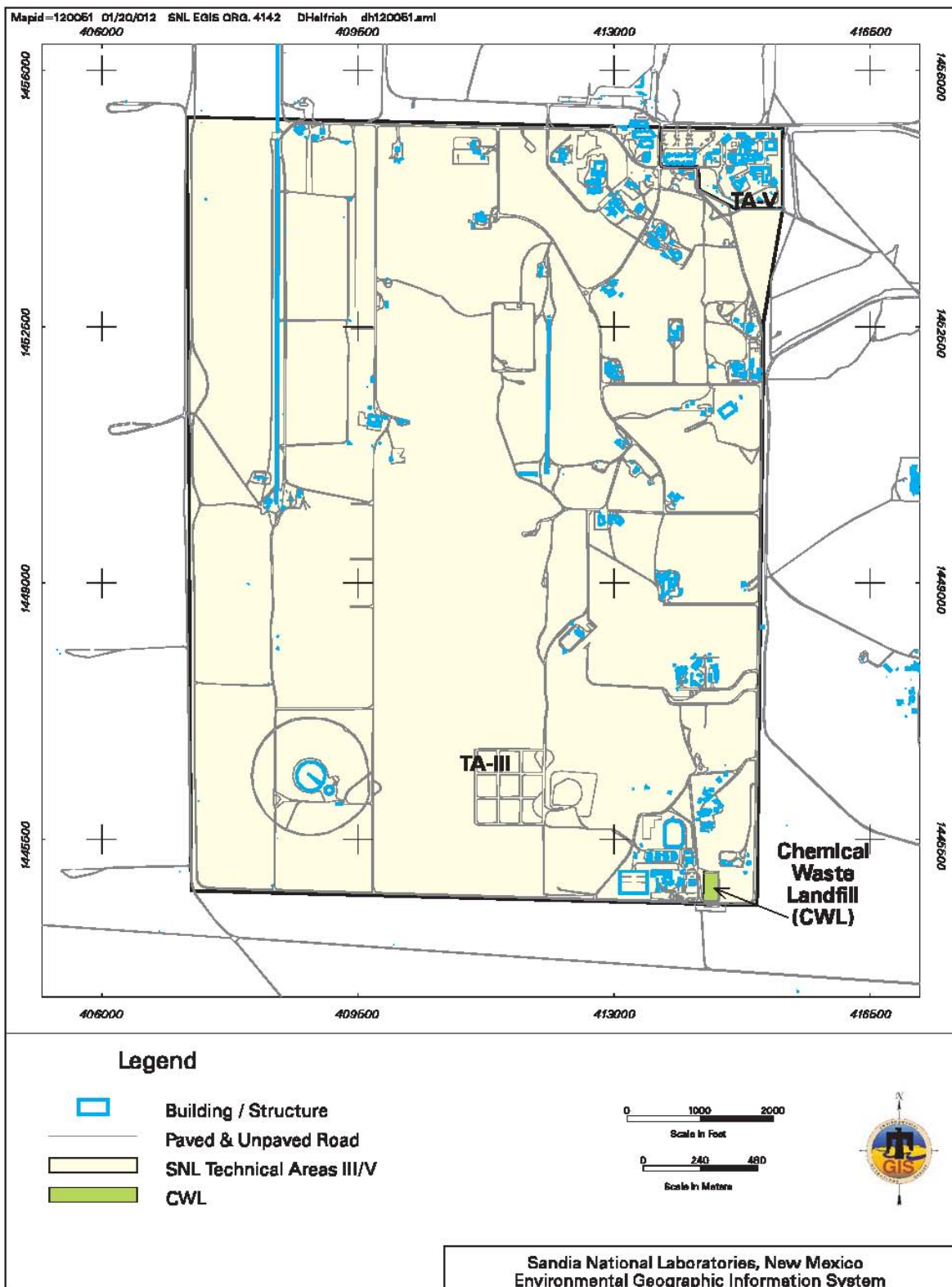


Figure 2-2
Location of the Chemical Waste Landfill within Technical Area III

according to the specifications contained in the Remedial Action Proposal, Annex I, Corrective Measures Study Report (SNL/NM December 2004). Figure 2-3 shows a conceptual schematic profile of the ET Cover and Figure 2-4 shows the central crown and surface drainage patterns.

2.3 Compliance Monitoring System

The compliance monitoring system includes a groundwater monitoring well network and a soil-gas monitoring well network, which are described in the following sections.

2.3.1 Groundwater Monitoring Network

Groundwater monitoring is performed to ensure the protection of groundwater during the compliance and post-closure care periods. The CWL groundwater monitoring network consists of four NMED-approved monitoring wells that monitor the uppermost part of the regional aquifer in accordance with the requirements of 40 CFR § 264.99. The four wells are described below and their locations are shown in Figure 2-4.

- One hydraulically upgradient background well – CWL-BW5, and
- Three hydraulically downgradient compliance wells – CWL-MW9, CWL-MW10, and CWL-MW11.

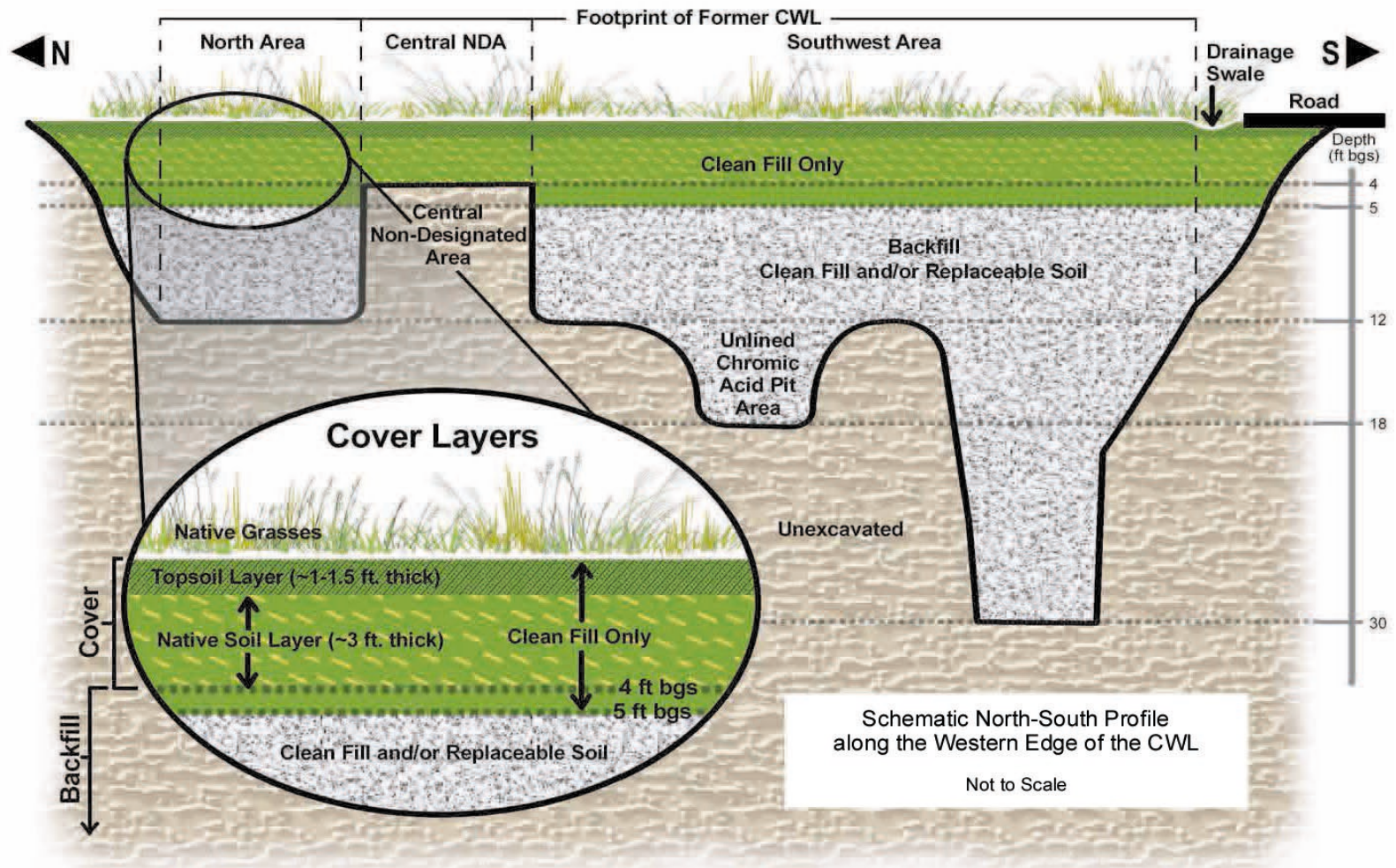
Well-completion diagrams for the groundwater monitoring wells are provided in PCCP Attachment 2.

2.3.2 Soil-Gas Monitoring Network

The soil-gas monitoring network is designed to ensure the protection of groundwater quality by providing early detection data to indicate whether the VOC soil-gas plume has the potential to contaminate groundwater at concentrations exceeding PCCP limits. The five multiport wells shown in Figure 2-4 are designed to monitor the vadose zone at various depths beneath the CWL in the area most contaminated by past disposal of organic liquid waste. The wells and their depth-specific sampling ports are as follows:

- CWL-D1 – Sampling Ports at 100, 160, 240, 350, and 470 feet bgs (5 ports)
- CWL-D2 – Sampling Ports at 120, 240, 350, 440, and 470 feet bgs (5 ports)
- CWL-D3 – Sampling Ports at 120, 170, 350, 440, and 480 feet bgs (5 ports)
- CWL-UI1 – Sampling Ports at 40, 80, and 120 feet bgs (3 ports)
- CWL-UI2 – Sampling Ports at 36, 76, and 136 feet bgs (3 ports)

Well-completion diagrams for the soil-gas monitoring wells are provided in PCCP Attachment 3.



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Figure 2-3
 Schematic Profile of the Chemical Waste Landfill Evapotranspirative Cover

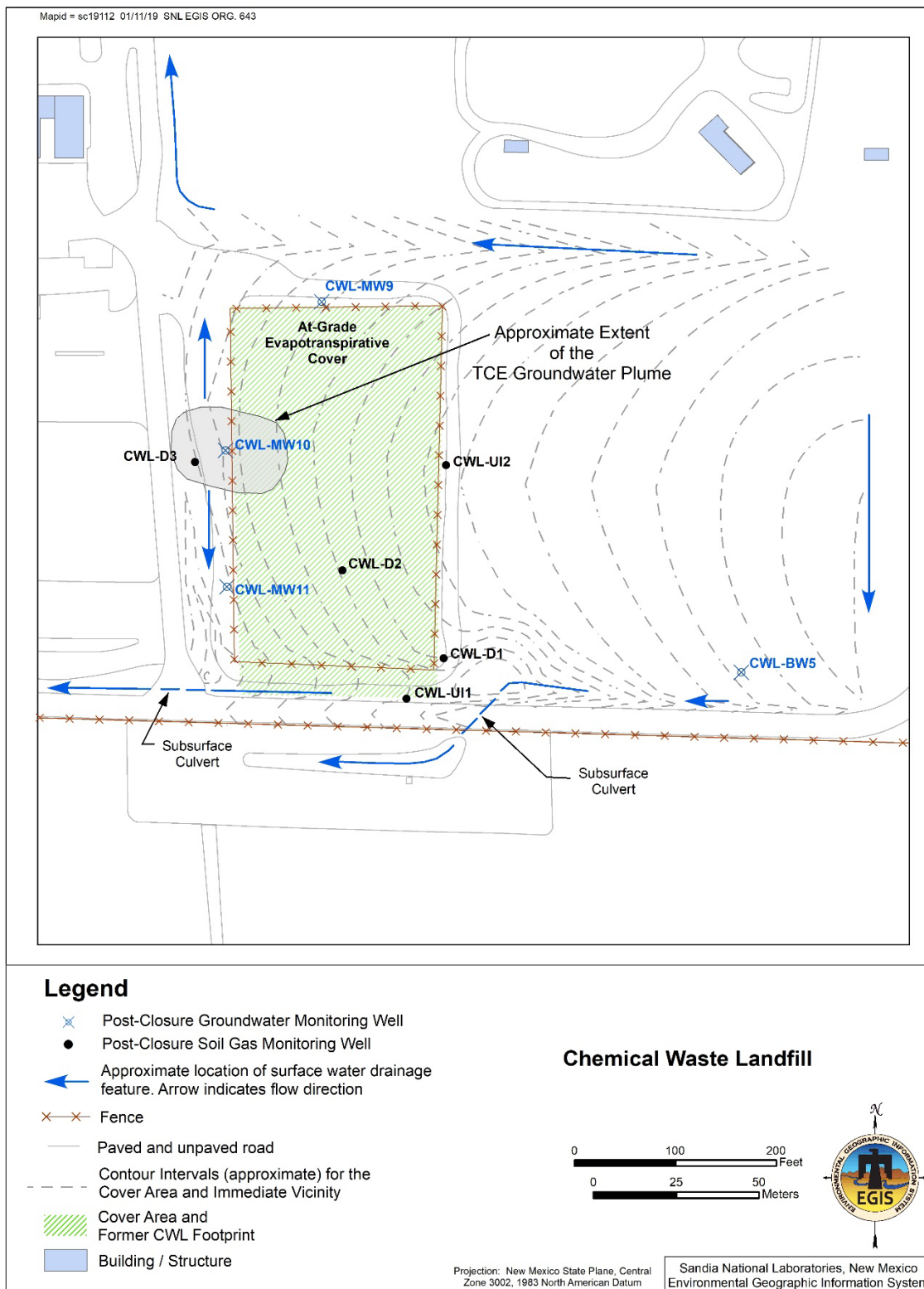


Figure 2-4
 Chemical Waste Landfill Surface Drainage Patterns and Monitoring Networks

2.4 Storm-Water Diversion Structures

The function of the storm-water diversion features associated with the CWL is to minimize soil erosion caused by storm-water run-on and run-off and to reduce the amount of water that could potentially percolate into the former disposal area. Drainage features are shown in Figure 2-4 and include: ET Cover surface topography/slopes that direct water away from and off the ET Cover surface; road ditches; boundary swales; and two ditch-drainage culverts at the southeastern and southwestern corners of the CWL that divert surface water from the road ditch away from the CWL. The slight northeast and southeast inflection of the surface topography to the east of the ET Cover prevents significant run-on by directing the upgradient surface water toward the northern and southern boundary swales (Figure 2-4). Precipitation that falls directly on the ET Cover is diverted toward the boundary swales that intersect at the northwestern and southwestern corners of the site; its impact is minimized by the native vegetation, the central crown, and gently sloping topography (approximately 3-percent grade from east to west) of the ET Cover surface.

2.5 Security Fence

The location of the perimeter security fence is shown in Figure 2-4. It is a four-strand, barbed-wire fence with two gates. The gates remain locked except during inspections, maintenance, and monitoring activities. The keys to the locks are controlled by authorized personnel. Warning signs are posted on all sides of the CWL fence at 100-foot intervals and at the gates.

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3.0 MONITORING AND INSPECTION REQUIREMENTS

Monitoring, inspection, maintenance, and repair requirements are defined in PCCP Attachment 1 (NMED October 2009 and subsequent revisions) and are briefly summarized in this chapter. Monitoring requirements include groundwater and soil-gas, which generate empirical data that are evaluated to assess site conditions during the post-closure care period. Inspection requirements apply to the final cover, storm-water diversion structures, compliance monitoring networks and associated sampling equipment, and security fence. Emergency equipment required by the CWL Contingency Plan (PCCP Attachment 6) is also subject to routine inspections. Maintenance and/or repairs are performed based upon the inspection results. Inspection, maintenance, and repair are performed to ensure the adequate performance of the ET Cover, monitoring networks, and surface features throughout the post-closure care period.

Monitoring, inspection, and maintenance/repair activities were conducted in CY 2018 in accordance with PCCP Attachment 1, Sections 1.8 through 1.10. Results of CY 2018 monitoring, inspection, and repair activities are presented in Chapters 4.0, 5.0, and 6.0 of this report. The following sections provide information specific to the requirements for each type of monitoring and inspection activity under the PCCP.

3.1 Monitoring Requirements

The frequency, parameters/constituents of concern, and methods for groundwater and soil-gas monitoring are summarized in Table 3-1. The groundwater and soil-gas monitoring networks are described in Section 2.3.1 and 2.3.2, respectively. The groundwater and soil-gas monitoring requirements are detailed in PCCP Attachment 1, Section 1.8. Sampling and analysis plans (SAPs) in PCCP Attachments 2 and 3, respectively, describe the procedures, methods, and analytical protocols for collecting and analyzing groundwater and soil-gas samples.

For all groundwater monitoring events, environmental samples must be analyzed for TCE, chromium, and nickel. Additionally, during one semiannual event each year, environmental samples must be analyzed for an enhanced list of VOCs comprised of 1,1,2-trichloro-1,2,2-trifluoroethane (commonly known as Freon 113), tetrachloroethene (PCE), 1,1-dichloroethene, chloroform, and trichlorofluoromethane (commonly known as Freon 11). Groundwater surface elevation must be measured each time groundwater is sampled and the groundwater flow rate, hydraulic gradient, and flow direction must be determined annually.

Soil-gas monitoring must be performed annually in accordance with the Soil-Gas SAP (PCCP Attachment 3) using U.S. Environmental Protection Agency (EPA) Compendium Method TO-14 (EPA January 1999a) or equivalent (e.g., method TO-15 [EPA January 1999b]) to ensure the collection of data in a manner consistent with historical soil-gas monitoring. Consistency in sampling and analysis is necessary so that results can be evaluated over time to determine changes/trends in soil-gas concentrations. EPA Method TO-15 has been used since CY 2013. This method provides lower detection limits and enhanced quality assurance/quality control (QC) measures relative to the EPA Method TO-14.

Table 3-1
 Chemical Waste Landfill Groundwater and
 Soil-Gas Monitoring Frequency, Parameters, and Methods

Monitoring System	Monitoring Frequency	Monitoring Parameters/ Constituents of Concern	Monitoring Method
Groundwater	Semiannual ^a	TCE by EPA Method 8260 ^b and Cr and Ni by EPA Method 6020 ^b	Sampling and Analysis per PCCP Attachment 2
Soil-Gas	Annual	VOCs ^c by EPA Compendium Method TO-15 or equivalent	Sampling and Analysis per PCCP Attachment 3

Notes:

^aSemiannual: An enhanced list of constituents must be analyzed on an annual basis (see Section 1.8.1.1 of PCCP Attachment 1).

^bEPA November 1986.

^cSee Table 1-5 in PCCP Attachment 1 for the required list of 50 VOCs.

Cr = Chromium.

EPA = U.S. Environmental Protection Agency.

Ni = Nickel.

NMED = New Mexico Environment Department.

PCCP = Post-Closure Care Permit.

TCE = Trichloroethene (also known as trichloroethylene).

VOC = Volatile organic compound.

3.2 Inspection, Maintenance, and Repair Requirements

Inspection requirements for the final cover system, storm-water diversion structures, compliance monitoring system, security fence, and emergency equipment are briefly summarized in this section and detailed in PCCP Attachment 1, Section 1.9. All inspections were performed by personnel who meet the qualification and training requirements of PCCP Attachment 5. The schedule for implementing inspections and prescribed maintenance and/or repairs is provided in PCCP Attachment 1, Section 1.10, Table 1-6. Maintenance and/or repairs are performed as needed when inspected items exceed or do not meet requirements and in accordance with best practice. Best practice measures are actions and/or improvements not explicitly required by the PCCP that improve performance and/or minimize maintenance.

3.2.1 Final Cover System Inspection/Maintenance/Repair Requirements

Inspection of the final cover includes vegetation inspection and monitoring by the staff biologist (i.e., biology inspection) and cover inspection by a field technician.

3.2.1.1 *Vegetation Inspection and Monitoring*

Achieving and maintaining a sustainable native plant community on the final cover is an important component of overall ET Cover performance. Vegetation minimizes erosion by stabilizing the ET Cover surface and reduces infiltration of surface water by transferring soil moisture from the ET Cover to the atmosphere through transpiration.

Cover vegetation monitoring is performed to establish and maintain a mature plant community such that successful revegetation criteria (defined in PCCP Attachment 1 Section 1.9) are met. These criteria are provided below.

- Total percent foliar coverage equals 20 percent (i.e., 20 percent of the land surface is covered with living plants versus 80 percent bare surface area);
- Of the 20 percent total foliar coverage, 50 percent or greater comprises native perennial species, and 50 percent or less comprises annual species; and
- No contiguous bare spots greater than 200 square feet (approximately 14 by 14 feet).

The ET Cover vegetation has met successful revegetation criteria since CY 2011. Since this time, the staff biologist inspects the cover annually near the end of the growing season (August-September) to most accurately determine the coverage of living plants. The inspection is to be documented on the Biology Inspection Form/Checklist (PCCP Attachment 4 or equivalent) and includes inspecting the cover for contiguous areas lacking vegetation in excess of 200 square feet, signs of animal intrusion, and deep-rooted plants. Repairs required to address vegetation parameters not meeting PCCP specifications documented during the inspections are to be performed as described in Section 3.2.1.3. At the end of each CY, the staff biologist must compile the results in a report with a summary of local climate trends and recommendations to be included in the CWL Annual Post-Closure Care Report submitted to NMED.

3.2.1.2 Cover Inspection Requirements

Cover inspections are required to be performed by a field technician on a quarterly basis to assess the physical integrity of the ET Cover. Settlement of the cover surface in excess of 6 inches, erosion of the cover soil in excess of 6 inches deep, areas of ponding water, animal intrusion burrows in excess of 4 inches in diameter, contiguous areas lacking vegetation in excess of 200 square feet, and any other conditions that may impact the cover integrity must be documented on the Post-Closure Inspection Form/Inspection Checklist (PCCP Attachment 4 or equivalent). During the first phase of quarterly cover vegetation monitoring described in Section 3.2.1.1, documentation of animal intrusion burrows in excess of 4 inches in diameter and contiguous areas lacking vegetation in excess of 200 square feet are addressed on the Biology Inspection Form/Checklist (or equivalent). During the second phase of annual cover vegetation monitoring, these inspection parameters must be noted by the field technician on the Post-Closure Inspection Form/Checklist (or equivalent).

3.2.1.3 Cover Repairs

Cover damage exceeding PCCP specifications must be repaired within 60 days to a condition that meets or exceeds the original design. However, repairs to fix inadequate cover vegetation may be delayed until the appropriate growing season if approved by NMED in advance, and if measures are taken as needed to prevent excessive erosion of the ET Cover during the delay period. Repairs to the cover are to be completed using materials consistent with the cover installation specifications in accordance with PCCP Attachment 1, Section 1.9.1.3.

3.2.2 Storm-Water Diversion Structure Inspection Requirements

Inspection of the storm-water diversion structures is required on a quarterly basis to verify structural integrity and to ensure adequate performance. These inspections are to be performed at the same time as the cover inspections. Erosion of the channels or sidewalls in excess of 6 inches deep, accumulations of silt greater than 6 inches deep, or debris that blocks more than one-third of the channel width must be documented on the Post-Closure Inspection Form/Inspection Checklist (PCCP Attachment 4 or equivalent). Repairs, if needed, will be completed within 60 days.

3.2.3 Monitoring Well Network Inspection Requirements

Inspection of monitoring wells and sampling equipment is required at the same frequency as the associated monitoring and is to be performed concurrently with all groundwater and soil-gas monitoring events. Inspections must be documented on the Post-Closure Inspection Form/Inspection Checklist (PCCP Attachment 4 or equivalent) and must address the condition of the components including protective casings and bollards, wellhead covers/caps/locks, soil-gas sampling ports, well identification markings, and passive venting BaroBalls™ or equivalent devices. Sampling pumps and tubing are inspected during each sampling event (pumps are not dedicated to the wells). Pump replacement and maintenance/repair, and tubing replacement are performed on an as-needed basis based upon pump and tubing performance, inspections, project experience, and review of analytical sampling results. Accumulation of wind-blown plants and debris that would interfere with any of the groundwater or soil-gas monitoring network components will also be documented and the material removed within 60 days.

3.2.4 Security Fence Inspection Requirements

Inspection of the fence, gates, locks, and warning signs at the CWL is required on a quarterly basis and is to be performed concurrently with the cover inspection. The condition of the fence, including fence wires, posts, gates, locks, and warning signs, is to be inspected and documented on the Post-Closure Inspection Form/Inspection Checklist (PCCP Attachment 4 or equivalent). Accumulation of wind-blown plants and debris on the fence that would obscure warning signs or block access to the CWL will be documented during the inspection and the material removed within 60 days. Local survey monuments must also be inspected and excess soil and/or vegetation covering these features will be removed within 60 days.

3.2.5 Emergency Equipment Inspection Requirements

Inspection of emergency equipment is required on a quarterly basis. Emergency equipment is maintained at the nearby Corrective Action Management Unit (CAMU) for use at the CWL, if necessary. A list of emergency equipment and its location is provided in PCCP Attachment 6, Table 6-4.

4.0 GROUNDWATER MONITORING RESULTS

This chapter presents groundwater monitoring activities (i.e., sampling and analysis), analytical results, and data evaluation for CY 2018 in accordance with PCCP Attachment 1, Sections 1.8 and 1.12, and Attachment 2 (NMED October 2009 and subsequent revisions). Groundwater sampling field activities are described in Section 4.1, analytical laboratory results and a discussion of data quality are presented in Section 4.2, data evaluation requirements and results are presented in Section 4.3, and hydrogeologic information on the regional aquifer is presented in Section 4.4. A summary of groundwater monitoring activities and results is provided in Section 8.1. Monitoring well locations are shown in Figure 2-4.

4.1 Groundwater Sampling Field Activities

This section describes groundwater monitoring activities conducted at the CWL in conformance with the CWL Groundwater SAP, PCCP Attachment 2, that describes the procedures, methods, and analytical protocols for collecting and analyzing groundwater samples. The data quality objective (DQO) for groundwater monitoring is to collect accurate and defensible data of high quality to determine the concentrations of hazardous constituents in the groundwater in the uppermost aquifer beneath the CWL (i.e., the Region Aquifer). Field forms and documentation that address calibration of equipment, well purging and water quality measurements, and equipment decontamination activities are provided in Annex A of this report and filed in the SNL/NM Records Center.

Two groundwater sampling events, scheduled semiannually, were conducted in CY 2018.

- The first sampling event was conducted January 15-22, 2018. Groundwater samples were collected from monitoring wells CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11, and a duplicate sample was collected from CWL-MW9. Samples collected from all wells were analyzed for TCE, chromium, nickel, and the enhanced list of VOCs. The enhanced list of VOCs includes 1,1-dichloroethene, 1,1,2-trichloro-1,2,2-trifluoroethane (commonly known as Freon 113), chloroform, PCE, and trichlorofluoromethane (commonly known as Freon 11) in addition to TCE.
- The second sampling event was conducted July 17-23, 2018. Groundwater samples were collected from monitoring wells CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11, and a duplicate sample was collected from CWL-BW5. Samples collected from all wells were analyzed for TCE, chromium, and nickel.

4.1.1 Well Purging and Sampling

Purging removes stagnant water from the well so that a representative groundwater sample can be collected. For the CWL, the minimum purge requirement is one saturated casing volume (the volume of all static water in the well screen plus the borehole annulus around the saturated

screen interval). The purging process continued after meeting the minimum purge volume requirement until four stable field measurements for temperature, specific conductivity (SC), potential of hydrogen (pH), and turbidity were obtained in all monitoring wells that did not purge dry. After completion of the purging process, the groundwater samples are collected in appropriate containers. As specified in PCCP Attachment 2, Section 2.12, groundwater stability is considered to be acceptable when four successive measurements are less than five nephelometric turbidity units (NTU) for turbidity or within a range of 10 percent for turbidity values greater than 5 NTU, pH is within 0.1 units, temperature is within 1.0 degree Celsius, and SC is within five percent as micromhos per centimeter. The January 2018 water quality field measurement parameters were collected using a YSI EXO1 Water Quality Meter and a HACH™ Model 2100Q portable turbidity meter. The July 2018 water quality field measurement parameters were collected using an In-Situ Incorporated Aqua TROLL® 600 Multiparameter Water Quality Sonde and a HACH™ Model 2100Q portable turbidity meter. Additional water quality measurements included oxidation-reduction potential and dissolved oxygen.

A portable Bennett Company groundwater sampling system was used to purge and collect groundwater samples from all wells. Consistent with historical monitoring results, minimum purge requirements were satisfied at all monitoring wells except CWL-MW10. In accordance with PCCP Attachment 2, Section 2.12, this monitoring well was purged to dryness, allowed to recover, and then sampled to collect the most representative groundwater sample possible given the low yield of this well. In an effort to decrease the flow rate for CWL-MW10, the existing sampling system is equipped with a flow meter valve located along the discharge line, and with small diameter tubing (i.e., 0.25-inch inside diameter). During the purging process at CWL-MW10, the flow rate was continually adjusted to achieve as low a flow rate as possible without causing the pump to fail. This represents a “best faith effort” to purge the wells at the slowest rate possible, given equipment limitations, as specified in PCCP Attachment 2, Section 2.12.

During January, approximately 15.0 gallons were purged from monitoring well CWL-MW10 prior to the well going dry (purge volume requirement was approximately 26 gallons). The average estimated flow rate was 0.093 gallons per minute (gpm), and the estimated flow rate was 0.15 gpm during the final three gallons (equivalent to 0.35 and 0.57 liters per minute, respectively). During July, approximately 14.7 gallons were purged from CWL-MW10 prior to the well going dry (purge volume requirement was approximately 25 gallons). The average estimated flow rate was 0.11 gpm, and the estimated flow rate was 0.16 gpm during the final three gallons (equivalent to 0.42 and 0.60 liters per minute, respectively).

4.1.2 Field Quality Control

Field QC samples were collected as part of each sampling event and included environmental duplicate, equipment blank, trip blank, and field blank samples. The sampling pump and tubing bundle used to collect groundwater samples were decontaminated prior to sampling each monitoring well in accordance with the SNL/NM field operating procedure. The following solutions were pumped through the entire sampling system: 5 gallons of deionized water mixed with 20 milliliters of non-phosphate laboratory detergent; 5 gallons of deionized water; 5 gallons of deionized water mixed with 20 milliliters reagent grade nitric acid; and 15 gallons of deionized water. In addition, the outside of the pump tubing was rinsed with deionized water.

An environmental duplicate sample was collected and analyzed to estimate the overall reproducibility of the sampling and analysis process. The duplicate sample was collected immediately after the original environmental sample to reduce variability caused by time and/or sampling mechanics. Equipment blank (also referred to as rinsate blank) samples were collected to verify equipment decontamination prior to installing the equipment in a monitoring well for the purging and environmental sample collection process. Trip blank samples were used to evaluate potential contamination by VOCs during sampling, shipment, and the laboratory process. Field blank samples were used to evaluate potential sample contamination by VOCs resulting from ambient field conditions.

The field QC samples were submitted for analysis with the groundwater samples. A brief explanation of the field QC sampling protocol for the January and July sampling events is provided below. Analytical results are presented in Section 4.2.2.

First Semiannual Sampling Event – January 15-22, 2018

A duplicate environmental sample was collected from CWL-MW9. One equipment blank sample was collected prior to sampling monitoring well CWL-MW9. The samples (equipment blank, environmental sample, and environmental duplicate sample) were submitted for all analyses. A second equipment blank sample was collected after the field team discovered a faint, green-colored staining in the Bennett™ sampling system flow meter (i.e., a small, transparent, plastic device that helps regulate the pump flow rate). This observation was made during routine equipment inspection after sampling CWL-MW9 during post-sampling decontamination. The staining was not observed prior to sampling CWL-MW9. The flow meter was removed and an additional equipment blank sample was collected as best practice and analyzed for VOCs after completing the decontamination process and prior to sampling well CWL-MW11. A total of seven trip blank samples were submitted with the January 2018 groundwater samples and analyzed for the enhanced list of VOCs. Two field blank samples were collected for VOC analysis (enhanced list) by pouring deionized water into sample containers at the CWL-MW10 and CWL-MW11 sampling locations to simulate the transfer of environmental samples from the sampling system to the sample container. A third field blank sample was collected from the deionized water source used for the equipment decontamination process by pouring the water into the sampling container at the field office where equipment decontamination is performed.

Second Semiannual Sampling Event – July 17-23, 2018

A duplicate environmental sample was collected from CWL-BW5 and one equipment blank sample was also collected prior to sampling CWL-BW5. The samples were submitted for all analyses. A total of five trip blank samples were submitted with the July 2018 groundwater samples and analyzed for TCE. Two field blank samples were collected for TCE analysis by pouring deionized water into sample containers at the CWL-BW5 and CWL-MW10 sampling locations to simulate the transfer of environmental samples. A third field blank sample was collected from the deionized water source used for the equipment decontamination process.

4.1.3 Waste Management

Purge and decontamination water generated from sampling activities were placed into 55-gallon containers and managed at a less-than-90-day hazardous waste accumulation area.

Approximately 245 gallons of wastewater were generated during the January sampling event and approximately 255 gallons of wastewater were generated during the July sampling event (total of 500 gallons). Separate waste characterization samples were collected from purge and decontamination water and analyzed for Albuquerque Bernalillo County Water Utility Authority discharge parameters. All wastewater was discharged to the sanitary sewer after waste characterization data were compared to discharge limits and determined to meet these requirements.

Personal protective equipment and other solid waste generated during January and July 2018 monitoring activities were packaged into 5-gallon plastic buckets and managed as hazardous waste in accordance with all applicable requirements. All hazardous waste was disposed at a permitted off-site facility.

4.2 Laboratory Results

Groundwater and field QC samples were submitted to GEL Laboratories LLC for analyses. Samples were analyzed in accordance with applicable EPA analytical methods. For comparison, hazardous constituent concentration limits from the PCCP are included in the analytical results tables. Analytical results that are above the analytical laboratory method detection limit (MDL) but below the practical quantitation limit (PQL) are qualified as estimated values by the analytical laboratory and designated with a “J” qualifier. Analytical laboratory reports, including certificates of analyses, analytical methods, MDLs, PQLs, dates of analyses, results of QC analyses, and data validation reports are filed in the SNL/NM Records Center.

4.2.1 Environmental Sample Results

Table 4-1 summarizes TCE results and Table 4-2 summarizes chromium and nickel results for the January and July 2018 groundwater sampling events. Table 4-3 summarizes results for the additional VOCs (enhanced list) included in the January 2018 event. Table 4-4 summarizes field water quality measurements collected prior to sampling for both events. A summary of the results from the January and July sampling events is provided below. Statistical evaluation and comparison of results to concentration limits specified in the PCCP is provided in Section 4.3.

First Semiannual Sampling Event – January 15-22, 2018

TCE was detected above the laboratory MDL in the CWL-MW10 sample at a concentration of 0.350 µg/L. There were no other detections of TCE or enhanced list VOCs.

Chromium was not detected above the laboratory MDL in any of the groundwater samples. Nickel was detected above the laboratory MDL in all groundwater samples at concentrations ranging from 0.0011 milligrams per liter (mg/L) to 0.00861 mg/L.

Table 4-1
 Summary of TCE Results
 Chemical Waste Landfill Groundwater Monitoring
 Analytical Method SW846-8260B^a
 Calendar Year 2018

Well ID	Result (µg/L)	MDL (µg/L)	PQL (µg/L)	Laboratory Qualifier ^b	Validation Qualifier ^b
January 2018 Sampling Event					
CWL-BW5	ND	0.300	1.00	U	--
CWL-MW9	ND	0.300	1.00	U	--
CWL-MW9 (Duplicate)	ND	0.300	1.00	U	--
CWL-MW10	0.350	0.300	1.00	J	--
CWL-MW11	ND	0.300	1.00	U	--
July 2018 Sampling Event					
CWL-BW5	ND	0.300	1.00	U	--
CWL-BW5 (Duplicate)	ND	0.300	1.00	U	--
CWL-MW9	ND	0.300	1.00	U	--
CWL-MW10	0.550	0.300	1.00	J	--
CWL-MW11	ND	0.300	1.00	U	--

Notes:

^aEPA November 1986.

^bLaboratory/Validation Qualifier - If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples. See explanation for "J" and "U" laboratory qualifiers below.

EPA = U.S. Environmental Protection Agency.

ID = Identification.

J = Amount detected is above the MDL but below the PQL.

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99 percent confidence that the analyte is greater than zero, analyte is matrix-specific.

µg/L = Micrograms per liter.

ND = Not detected at MDL.

PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by the applicable method under routine laboratory operating conditions.

TCE = Trichloroethene (trichloroethylene).

U = Analyte is not present or concentration is below the MDL.

Table 4-2
 Summary of Chromium and Nickel Results
 Chemical Waste Landfill Groundwater Monitoring
 Analytical Method SW846-6020^a
 Calendar Year 2018

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	Laboratory Qualifier ^b	Validation Qualifier ^b
January 2018 Sampling Event						
CWL-BW5	Chromium	ND	0.003	0.010	U	--
	Nickel	0.00861	0.0006	0.002	--	--
CWL-MW9	Chromium	ND	0.003	0.010	U	--
	Nickel	0.00207	0.0006	0.002	--	--
CWL-MW9 (Duplicate)	Chromium	ND	0.003	0.010	U	--
	Nickel	0.00192	0.0006	0.002	J	--
CWL-MW10	Chromium	ND	0.003	0.010	U	--
	Nickel	0.0011	0.0006	0.002	J	--
CWL-MW11	Chromium	ND	0.003	0.010	U	--
	Nickel	0.00183	0.0006	0.002	J	--
July 2018 Sampling Event						
CWL-BW5	Chromium	ND	0.003	0.010	U	--
	Nickel	ND	0.0006	0.002	U	--
CWL-BW5 (Duplicate)	Chromium	ND	0.003	0.010	U	--
	Nickel	ND	0.0006	0.002	U	--
CWL-MW9	Chromium	ND	0.003	0.010	U	--
	Nickel	ND	0.0006	0.002	U	--
CWL-MW10	Chromium	ND	0.003	0.010	U	--
	Nickel	ND	0.0006	0.002	U	--
CWL-MW11	Chromium	ND	0.003	0.010	U	--
	Nickel	ND	0.0006	0.002	U	--

Notes:

^aEPA November 1986.

^bLaboratory/Validation Qualifier - If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted sample. See explanation for "J," and "U" qualifiers below.

EPA = U.S. Environmental Protection Agency.

ID = Identification.

J = Amount detected is above the MDL but below the PQL.

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99 percent confidence that the analyte is greater than zero, analyte is matrix-specific.

mg/L = Milligram(s) per liter.

ND = Not detected at MDL.

PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by the applicable method under routine laboratory operating conditions.

U = Analyte is not present or concentration is below the MDL.

Table 4-3
 Summary of Additional Volatile Organic Compound Results
 Chemical Waste Landfill Groundwater Monitoring
 Analytical Method SW846-8260B^a
 January 2018

Well ID	Analyte	Result (µg/L)	MDL (µg/L)	PQL (µg/L)	Laboratory Qualifier ^b	Validation Qualifier ^b
CWL-BW5	1,1-Dichloroethene	ND	0.300	1.00	U	--
	Chloroform	ND	0.300	1.00	U	--
	Tetrachloroethene	ND	0.300	1.00	U	--
	Trichlorofluoromethane	ND	0.300	1.00	U	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.00	5.00	U	--
CWL-MW9	1,1-Dichloroethene	ND	0.300	1.00	U	--
	Chloroform	ND	0.300	1.00	U	--
	Tetrachloroethene	ND	0.300	1.00	U	--
	Trichlorofluoromethane	ND	0.300	1.00	U	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.00	5.00	U	--
CWL-MW9 (Duplicate)	1,1-Dichloroethene	ND	0.300	1.00	U	--
	Chloroform	ND	0.300	1.00	U	--
	Tetrachloroethene	ND	0.300	1.00	U	--
	Trichlorofluoromethane	ND	0.300	1.00	U	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.00	5.00	U	--
CWL-MW10	1,1-Dichloroethene	ND	0.300	1.00	U	--
	Chloroform	ND	0.300	1.00	U	--
	Tetrachloroethene	ND	0.300	1.00	U	--
	Trichlorofluoromethane	ND	0.300	1.00	U	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.00	5.00	U	--
CWL-MW11	1,1-Dichloroethene	ND	0.300	1.00	U	--
	Chloroform	ND	0.300	1.00	U	--
	Tetrachloroethene	ND	0.300	1.00	U	--
	Trichlorofluoromethane	ND	0.300	1.00	U	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.00	5.00	U	--

Refer to footnotes at end of table.

Table 4-3 (Concluded)
Summary of Additional Volatile Organic Compound Results
Chemical Waste Landfill Groundwater Monitoring
Analytical Method SW846-8260B^a
January 2018

Notes:

^aEPA November 1986.

^bLaboratory/Validation Qualifier - If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples.

EPA = U.S. Environmental Protection Agency.

ID = Identification.

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99 percent confidence that the analyte is greater than zero, analyte is matrix-specific.

µg/L = Microgram(s) per liter.

ND = Not detected at MDL.

PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by the applicable method under routine laboratory operating conditions.

U = Analyte is not present or concentration is below the MDL.

Table 4-4
 Summary of Field Water Quality Measurements^a
 Chemical Waste Landfill Groundwater Monitoring
 Calendar Year 2018

Well ID	Temperature (°C)	SC (µmho/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (% Sat)	DO (mg/L)
January 2018 Sampling Event							
CWL-BW5	17.00	953.9	137.9	6.92	0.30	72.5	6.99
CWL-MW9	17.81	989.6	197.8	7.05	0.28	44.5	4.24
CWL-MW10	11.66	874.2	20.6	7.06	2.74	20.5	2.22
CWL-MW11	18.12	948.1	169.8	7.03	0.36	57.4	5.39
July 2018 Sampling Event							
CWL-BW5	22.12	1186.0	150.3	6.95	0.42	87.9	6.21
CWL-MW9	22.9	1188.6	147.9	7.03	0.39	55.2	3.84
CWL-MW10	25.41	1238.5	-21.8	6.94	2.85	20.4	1.40
CWL-MW11	25.97	1345.9	60.2	6.98	2.03	74.2	4.69

Notes:

^aField measurements collected prior to sampling.

°C = Degrees Celsius.

% Sat = Percent saturation.

DO = Dissolved oxygen.

ID = Identification.

mg/L = Milligram(s) per liter.

µmho/cm = Micromhos per centimeter.

mV = Millivolt(s).

NTU = Nephelometric turbidity units.

ORP = Oxidation-reduction potential.

pH = Potential of hydrogen (negative logarithm of the hydrogen ion concentration).

SC = Specific conductivity.

Second Semiannual Sampling Event – July 17-23, 2018

TCE was detected above the laboratory MDL in the CWL-MW10 sample at a concentration of 0.550 µg/L. There were no other detections of TCE.

Chromium and nickel were not detected above the laboratory MDL in any of the groundwater samples.

4.2.2 Field Quality Control Sample Results

Table 4-5 summarizes results of duplicate sample analyses and the calculated relative percent difference (RPD) between the environmental and duplicate sample results for the January (CWL-MW9) and July (CWL-BW5) sample pairs. For the environmental-duplicate sample pair collected at CWL-MW9 in January, nickel was the only analyte detected in both samples. The RPD value for nickel was eight and shows good agreement (i.e., RPD value < 35 for metals). For the environmental-duplicate sample pair collected at CWL-BW5 in July, no VOCs or metals were detected. Therefore, RPD values were not calculated.

Table 4-5
 Summary of Duplicate Sample Results
 Chemical Waste Landfill Groundwater Monitoring
 Calendar Year 2018

Well ID/Parameter	Environmental Sample (R1)	Duplicate Sample (R2)	RPD ^a
January 2018 Sampling Event (CWL-MW9)			
Nickel (mg/L)	0.00207	0.00192	8

Notes:

^aRPD = Relative percent difference is calculated with the following equation and rounded to the nearest whole number.

$$RPD = \frac{|R_1 - R_2|}{[(R_1 + R_2) / 2]} \times 100$$

where: R₁ = environmental sample result.
 R₂ = duplicate sample result.

ID = Identification.
 mg/L = Milligram(s) per liter.

One equipment blank sample was collected in January prior to sampling monitoring well CWL-MW9 and analyzed for all constituents. No constituents were detected in the equipment blank sample. A second equipment blank sample was collected in January prior to sampling monitoring well CWL-MW11 and analyzed for VOCs (Section 4.1.2). Chloroform was detected in this equipment blank sample but no corrective action was necessary since chloroform was not detected in the CWL-MW11 environmental sample. One equipment blank sample was collected in July prior to sampling monitoring well CWL-BW5 and analyzed for all constituents. Nickel was detected in the equipment blank sample; no corrective action was necessary since nickel was not detected in the CWL-BW5 environmental sample.

VOCs were not detected above the associated laboratory MDLs in the three field blank samples associated with the January sampling event. For the three field blank samples collected in July, TCE was not detected above the MDL in any of the samples.

No VOCs were detected in the seven trip blank samples associated with the January VOC environmental samples. For the five trip blank samples associated with the July VOC environmental sampling event, TCE was not detected above the laboratory MDL.

4.2.3 Data Quality

Field QC sample results met the sampling DQOs and validated the adequacy of the field sampling procedures and protocol. Internal laboratory QC samples were analyzed concurrently with all environmental samples in accordance with laboratory procedures and EPA methods. These samples included laboratory control samples, method blanks, matrix spike and matrix spike duplicate samples, surrogate spike samples, and replicate samples. The results were used to evaluate potential contamination associated with the laboratory analytical process and to determine the accuracy and precision of the analytical methods. All laboratory control sample

results met PCCP requirements (PCCP Attachment 2). All chemical data were reviewed and qualified in accordance with SNL/NM Administrative Operating Procedure (AOP) AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data" (SNL/NM June 2017).

Based upon the data validation and review criteria, all analytical data were determined acceptable. Reported QC samples results were in compliance with analytical method and laboratory procedure requirements. Data Validation Reports and Contract Verification Review forms are provided in Annex A of this report and are filed in the SNL/NM Records Center.

4.2.4 Variances and Non-Conformances

Variances and non-conformances are defined in the PCCP Attachment 2, Section 2.22 for groundwater monitoring. No variances or non-conformances were identified during the January and July 2018 semiannual groundwater sampling events.

4.3 Data Evaluation

Groundwater monitoring is required to determine whether constituent concentrations in the groundwater beneath the CWL are in compliance with the groundwater protection standard under 40 CFR § 264.92 and for the determination of statistical significance under 40 CFR § 264.97(h). In accordance with PCCP Attachment 1, Section 1.8.1.2, statistical evaluation of groundwater monitoring results from all wells is required after three years of groundwater sampling results have been obtained (i.e., minimum data set for statistical analysis as defined by the NMED is six analytical results). For replacement wells, historical groundwater sampling results are used to augment the data sets and increase the amount of data available for statistical analysis. Historical groundwater data is limited to data obtained no earlier than May 1998 (i.e., near the completion of the VE VCM).

Statistical evaluation of the groundwater data includes results from CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11. Wells CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11 were installed in 2010 and have been sampled sixteen times as of July 2018 (November-December 2010, July-August 2011, January and July 2012 through 2018). Statistical evaluation of the results from these wells was first presented in the CY 2013 Annual Report. CWL-BW5 is a replacement well for CWL-BW4A; therefore, historical data for CWL-BW4A is included in the statistical evaluation of results from well CWL-BW5.

4.3.1 Statistical Assessment Requirements

Groundwater monitoring data are statistically evaluated on a well-by-well basis for each of the three hazardous constituents in accordance with the requirements stated in PCCP Attachment 1, Section 1.8.1.2. The hazardous constituents and their respective concentration limits are listed in Table 4-6. Prediction and confidence intervals are calculated and used to evaluate groundwater monitoring results. In addition, the cumulative percentage of sample results that are greater than the median (i.e., Median Test) is calculated to determine whether

Table 4-6
 Concentration Limits for the Hazardous Constituents of Concern at the Chemical Waste Landfill

Hazardous Constituent	Concentration Limit	Basis of Concentration Limit
Trichloroethene	5 µg/L	EPA MCL, 40 CFR § 264.94(b)
Chromium	0.050 mg/L	Table 1, 40 CFR § 264.94(a)(2)
Nickel	0.028 mg/L	SNL/NM background level, 40 CFR § 264.94(a)(1)

Notes:

- CFR = Code of Federal Regulations.
- EPA = U.S. Environmental Protection Agency.
- MCL = Maximum contaminant level.
- µg/L = Microgram(s) per liter.
- mg/L = Milligram(s) per liter.
- SNL/NM = Sandia National Laboratories/New Mexico.

there is statistically significant evidence of increased contamination. If a result is below the analytical laboratory detection limits, the MDL for the constituent is used for statistical analysis. For duplicate analyses, only the highest detection is used for statistical analysis. Results qualified by the laboratory and/or data validation as estimated (i.e., “J” qualified) are used as reported. For laboratory detections that are qualified during the data validation process as “not detected” (i.e., “U” qualified) due to blank contamination or some other quality issue, the original result reported by the laboratory is used for statistical analysis. More detailed information regarding statistical assessment requirements is provided below. Statistical assessment results for CY 2018 groundwater monitoring data are presented in Section 4.3.2.

Prediction and Confidence Intervals

The probability that each semiannual sample result for a given hazardous constituent falls within the range of previous sample results is determined using prediction intervals. The prediction interval for a given hazardous constituent is the range between the 95 percent (%) upper confidence limit (UCL) and the 95% lower confidence limit (LCL) of the mean. Therefore, the probability of a sample result for a given hazardous constituent falling within the range of previous sample results (i.e., between the LCL and the UCL) is 90%. Strictly for comparison, CY 2018 sample results are also compared to the historical range (minimum and maximum result derived from historical results not including CY 2018 results) to determine whether they fall within, below, or above the range of previous sample results.

The 95% LCL is also used to determine statistically significant evidence that the concentration limit for the hazardous constituent has been exceeded as specified in PCCP Attachment 1, Section 1.8.1.2. The calculated 95% LCL is compared to the concentration limit in Table 4-6. If it exceeds the concentration limit, this is considered statistically significant evidence that the concentration limit has been exceeded, and it triggers corrective action in accordance with PCCP Attachment 1, Section 1.8.3. Individual sample results are not directly compared to concentration limits, and if an individual result exceeds the concentration limit this does not constitute an exceedance requiring corrective action.

Median Test

The median value is calculated using all historical data prior to the sampling event(s) being evaluated. For example, the median values against which the July 2018 CWL-BW5/4A sample results are compared were calculated using all historical results obtained since May 1998 (i.e., completion of the VE VCM) not including the July 2018 sample results. For the next groundwater monitoring event, the median values will be recalculated and will include the July 2018 sample results. If the cumulative percentage of results greater than the median for a given hazardous constituent is 80% or greater, that is considered statistically significant evidence of increased contamination. However, in accordance with PCCP Attachment 1, Section 1.8.1.2, no action is required in the case of statistically significant evidence of increasing contamination unless the 95% LCL of the mean for a given constituent exceeds the respective concentration limit.

4.3.2 Statistical Assessment Results

No hazardous waste concentration limits were exceeded and there was no evidence of increasing contamination based on the statistical assessment performed in accordance with PCCP Attachment 1, Section 1.8.1. CY 2018 groundwater sampling data and statistical analysis for CWL-BW5/4A, CWL-MW9, CWL-MW10, and CWL-MW11 are discussed in this section. Statistical assessment results are presented in Table 4-7 and shown graphically in Figures 4-1 through 4-9.

The statistical analysis of specific constituents was not performed if all results for the data set were non-detections. The statistical analysis presented for wells CWL-MW9, CWL-MW10, and CWL-MW11 is significantly impacted by the small data set (each contains sixteen data points for each constituent), the very low concentrations, and in several cases, the large number of non-detect results. Because the evaluation process uses the laboratory MDL in the case of laboratory non-detections, the statistical results are also affected by changes in the MDL over time. In general, the laboratory MDLs have decreased over time, which impacts the CWL-BW5/4A statistical evaluation results as the historical data set for this well includes results from 1998 through the present. Statistical results are presented below for all cases where evaluation was possible.

Prediction Intervals Results

Monitoring Well CWL-BW5/4A

CY 2018 CWL-BW5 chromium and TCE sample results were all non-detections, and the corresponding MDL for TCE (0.3 µg/L) was lower than the 95% LCL. Thus, the TCE result is below the prediction interval (range of 95% LCL to 95% UCL). This is due to the decrease in the laboratory detection limits over time and the fact most TCE results were non-detections. Results for chromium and TCE (using the MDL) fell within the historical range. The one CY 2018 nickel result (January environmental sample, 0.00861 mg/L) exceeded the 95% UCL (i.e., was above the prediction interval) and was within the historical range. The MDL for the one nickel non-detection (July environmental sample, 0.0006 mg/L) was below the 95% LCL and within the historical range.

Table 4-7
Statistical Assessment Results Summary
Chemical Waste Landfill Groundwater Monitoring
Calendar Year 2018

Hazardous Constituent ^a	Minimum ^b	Maximum ^b	Mean ^c	Standard Deviation ^c	LCL ^c	UCL ^c	Distribution Type ^c	Median Test ^d	Concentration Limit Exceeded ^e ?
CWL-BW5/4A									
Chromium (mg/L)	0.00038	0.0125	0.00314	0.00282	0.0024	0.00388	Normal	45%	No
Nickel (mg/L)	0.0005	0.049	0.00484	0.00762	0.00284	0.00684	Normal	39%	No
TCE (µg/L)	0.1	0.78	0.34	0.121	0.308	0.372	Normal	3%	No
CWL-MW9									
Chromium (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	No
Nickel (mg/L)	0.0005	0.00435	0.00225	0.00131	0.00168	0.00282	Normal	23%	No
TCE (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA	No
CWL-MW10									
Chromium (mg/L)	0.002	0.00325	0.0024	0.00054273	0.00216	0.00264	Normal	38%	No
Nickel (mg/L)	0.000501	0.00707	0.00228	0.0018	0.0015	0.00306	Normal	8%	No
TCE (µg/L)	0.43	4.68	1.691	1.544	1.015	2.367	Normal	15%	No
CWL-MW11									
Chromium (mg/L)	0.002	0.00304	0.00244	0.00047758	0.00223	0.00265	Normal	54%	No
Nickel (mg/L)	0.0005	0.00449	0.0019	0.00123	0.00136	0.00244	Normal	15%	No
TCE (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA	No

Notes:

^aHazardous Constituents from CWL Permit Attachment 1, Section 1.4.1, Table 1-2 (Table 4-6 of this report).

^bMinimum and maximum result determined from historical data not including 2018 sample results.

^cMean, LCL, UCL, Standard Deviation, and Distribution Type determined using ProUCL statistical program.

^dMedian Test is the cumulative percentage of sample results that are greater than the median.

^eExceedance determined by comparing the sample result (Tables 4-1, 4-2, and 4-3 of this report) against the concentration limit in CWL Permit Attachment 1, Table 1-2 (Table 4-6 of this report).

CWL = Chemical Waste Landfill.

LCL = Lower confidence limit.

µg/L = Microgram(s) per liter.

mg/L = Milligram(s) per liter.

NA = Not Applicable; constituent has not been detected in any samples from this monitoring well.

TCE = Trichloroethene.

UCL = Upper confidence limit.

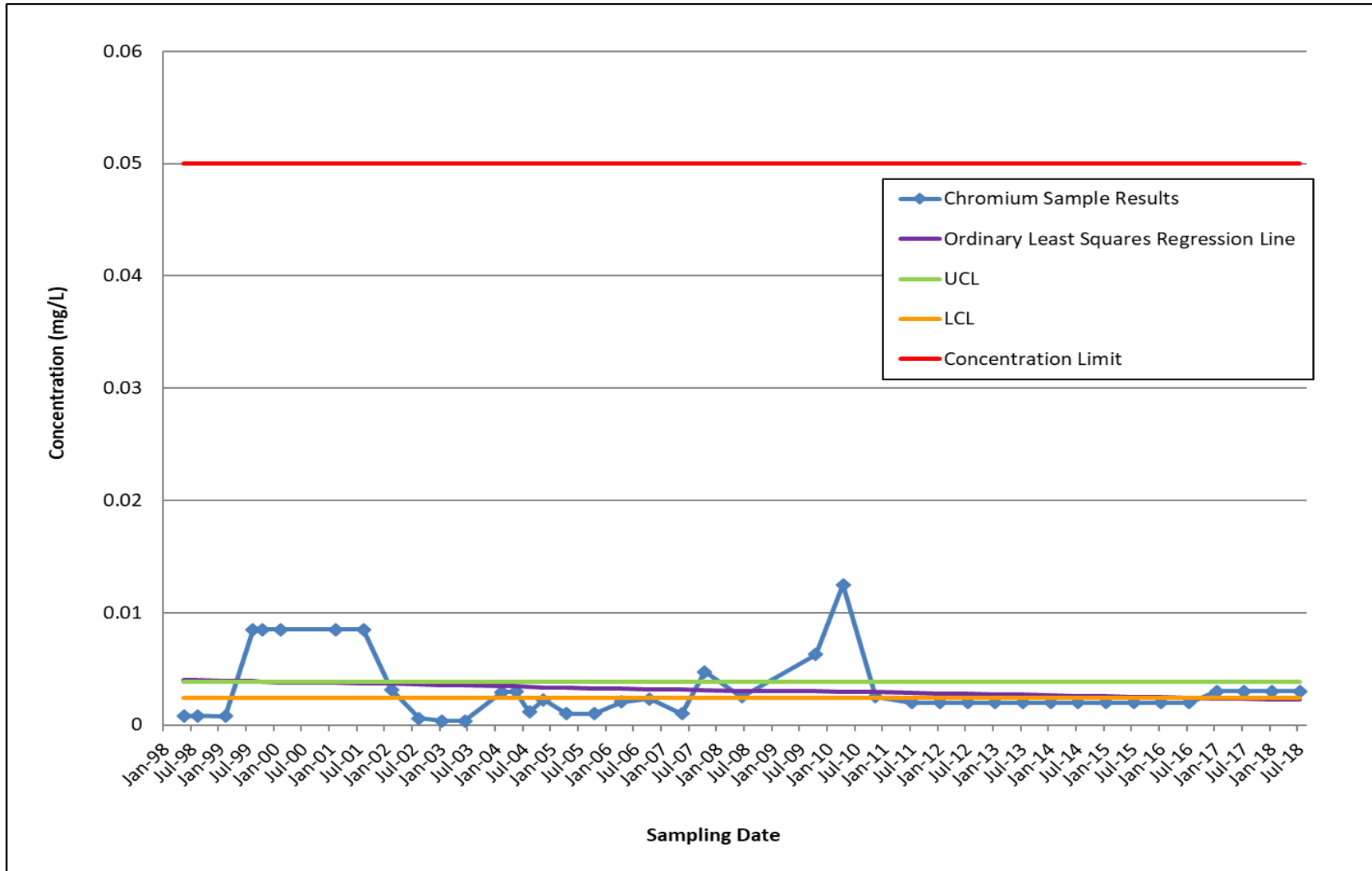


Figure 4-1
Chromium Control Chart for CWL-BW5/4A

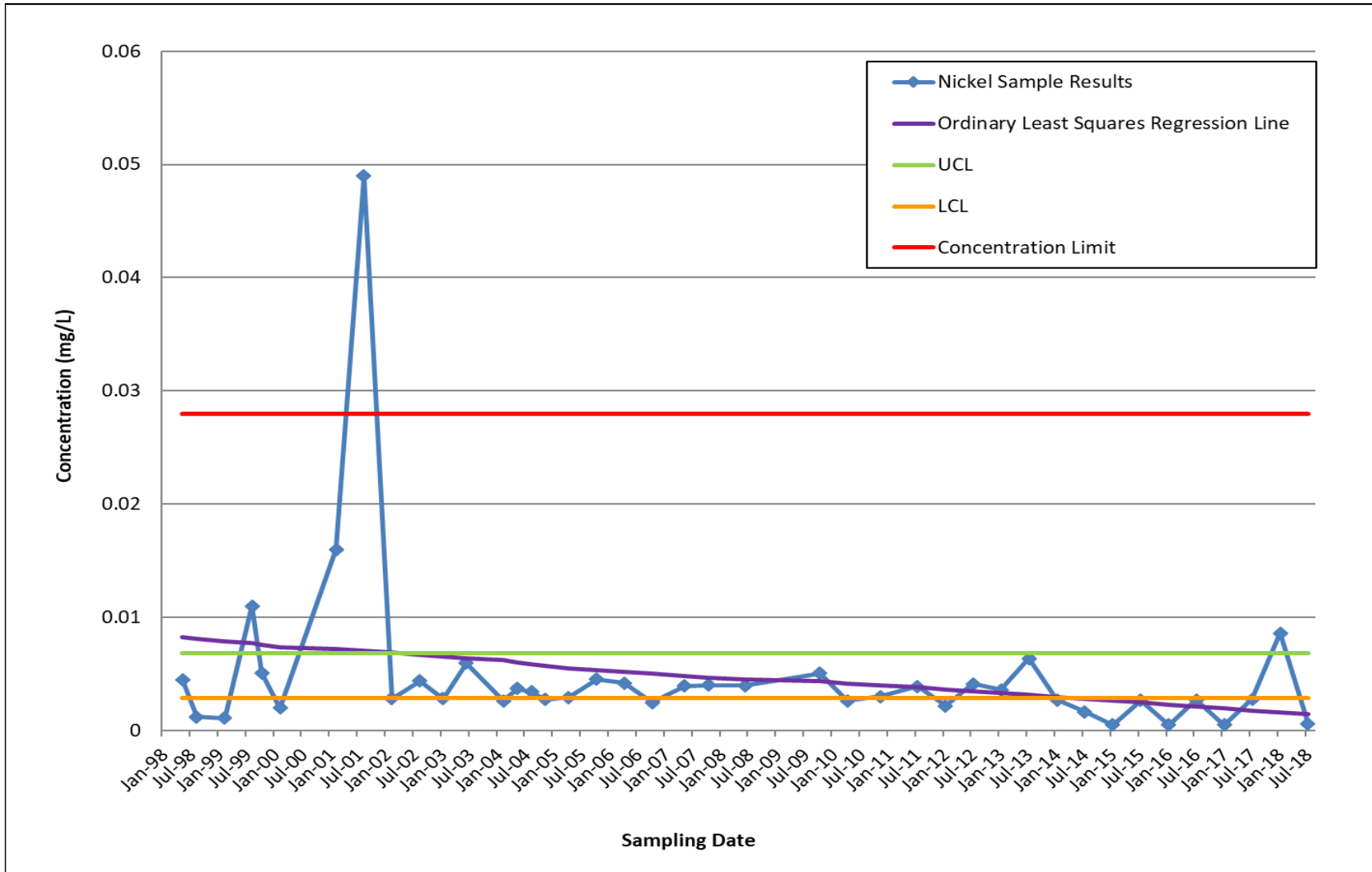


Figure 4-2
Nickel Control Chart for CWL-BW5/4A

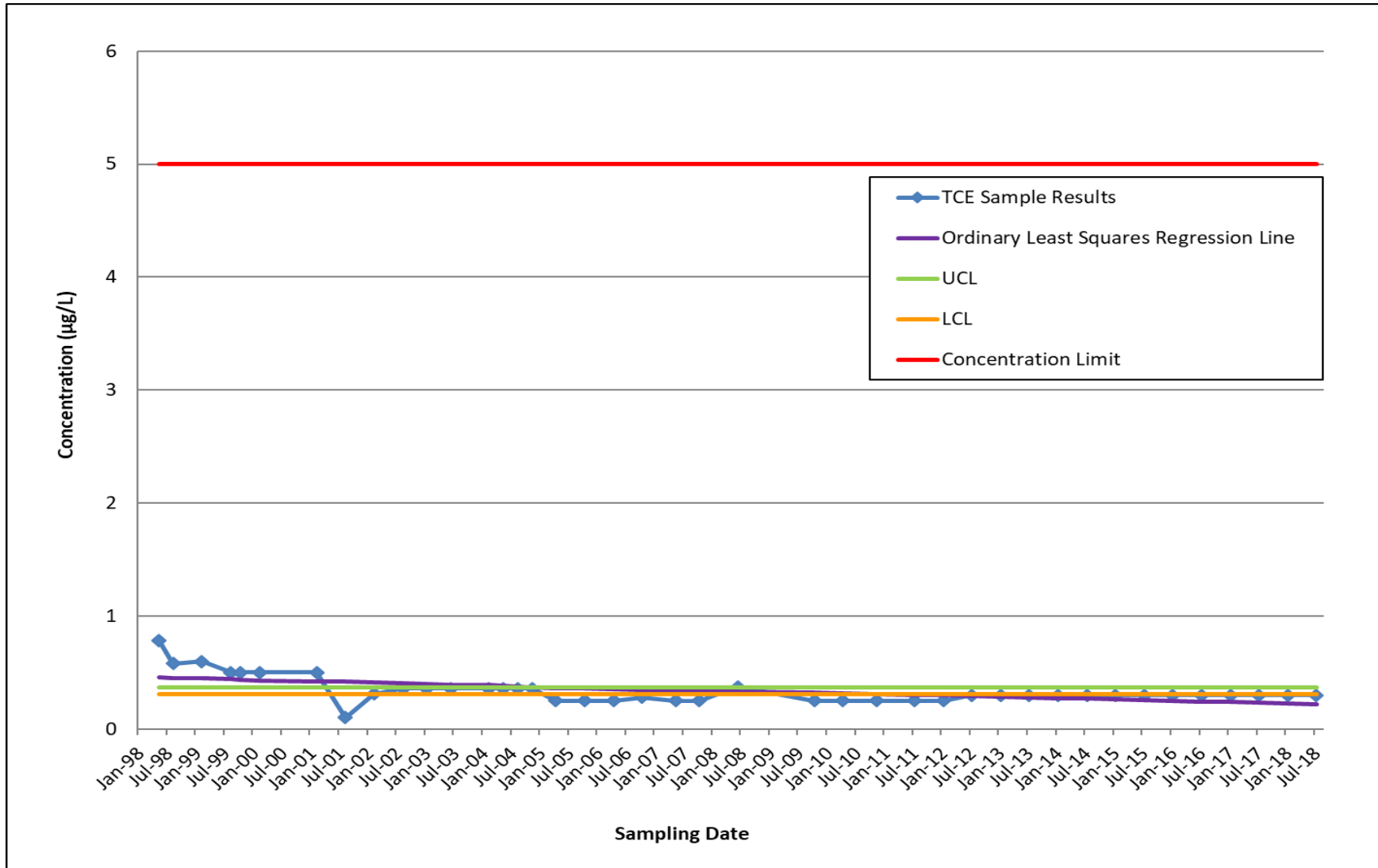


Figure 4-3
TCE Control Chart for CWL-BW5/4A

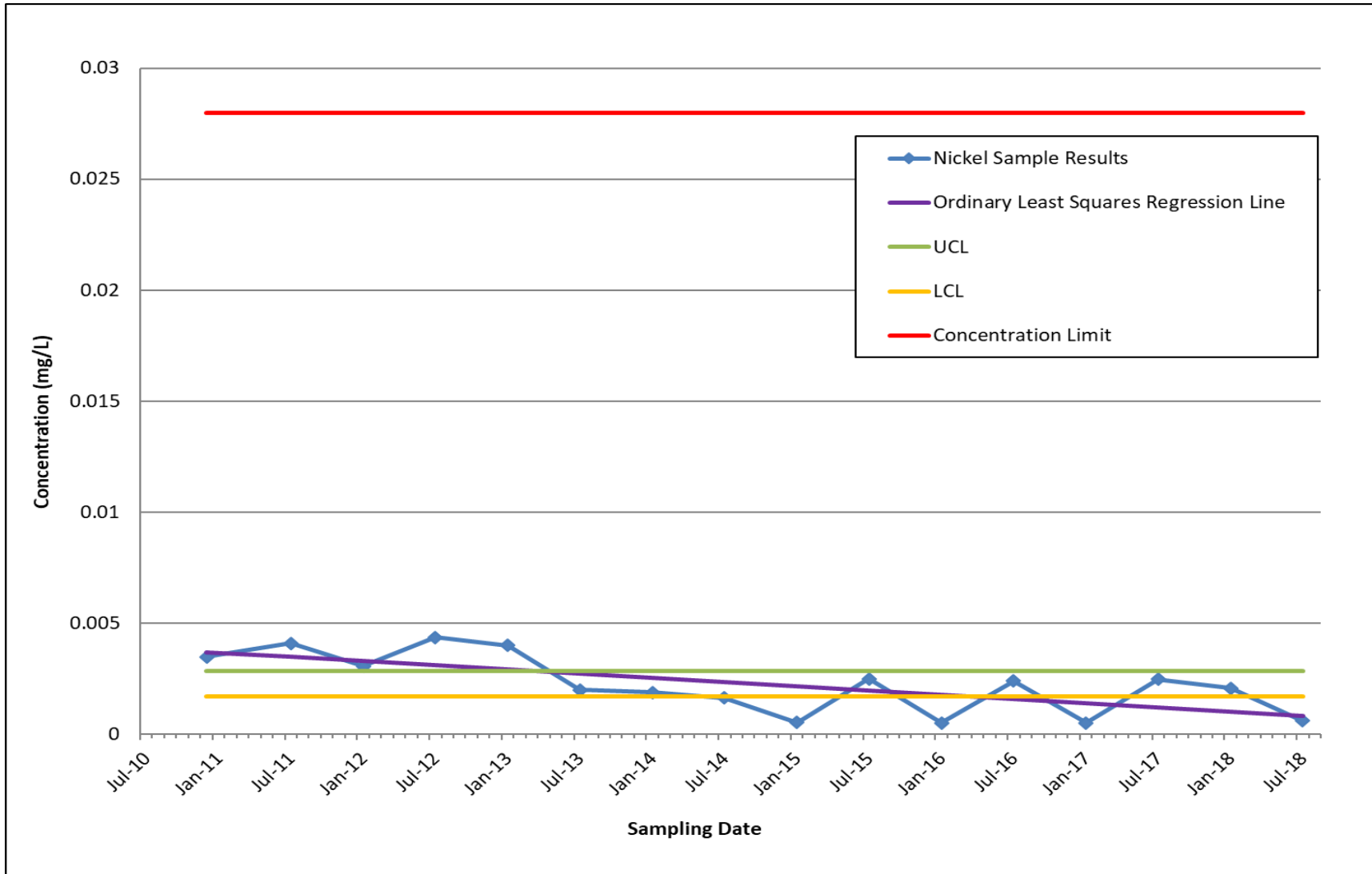


Figure 4-4
Nickel Control Chart for CWL-MW9

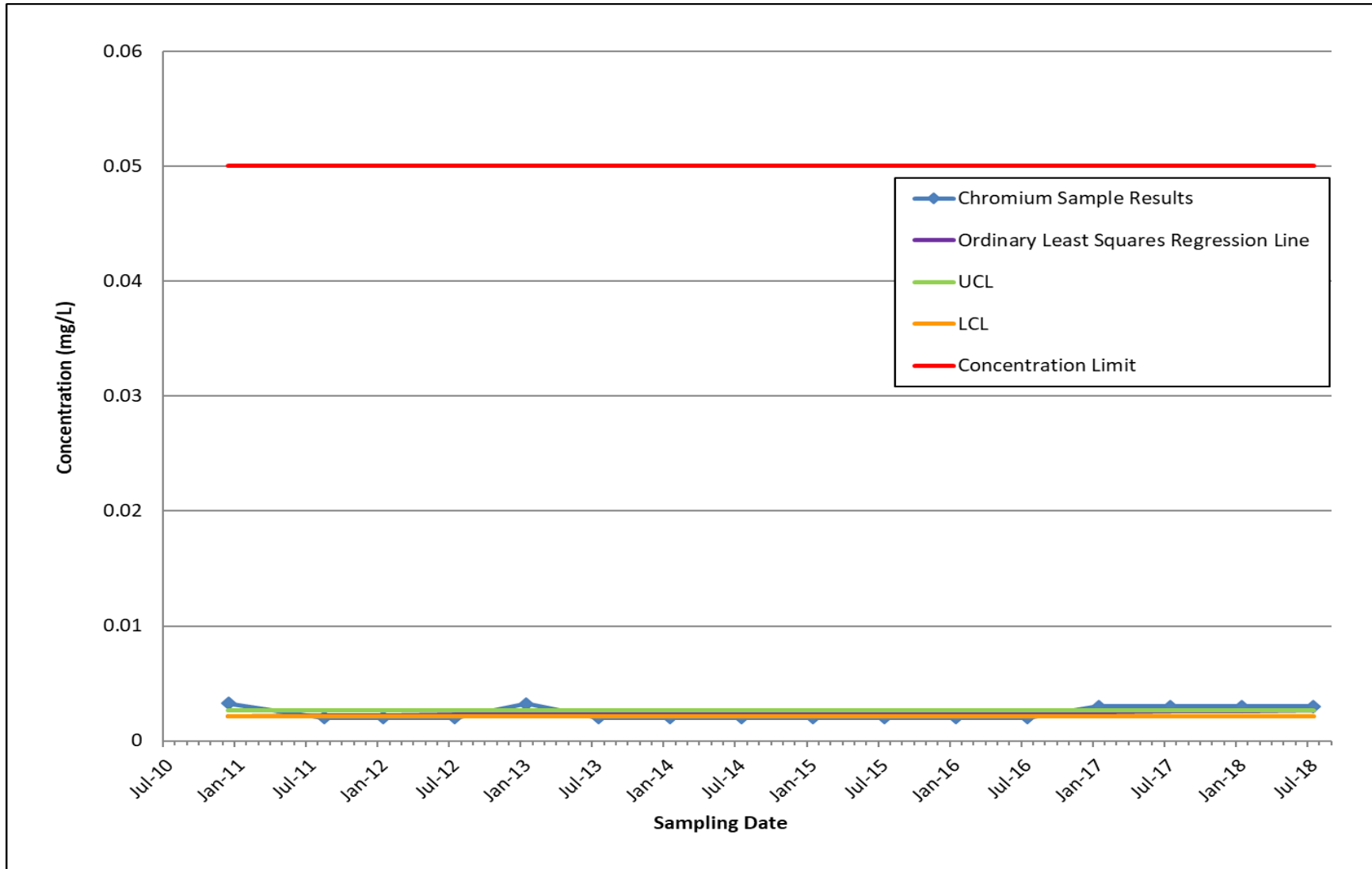


Figure 4-5
Chromium Control Chart for CWL-MW10

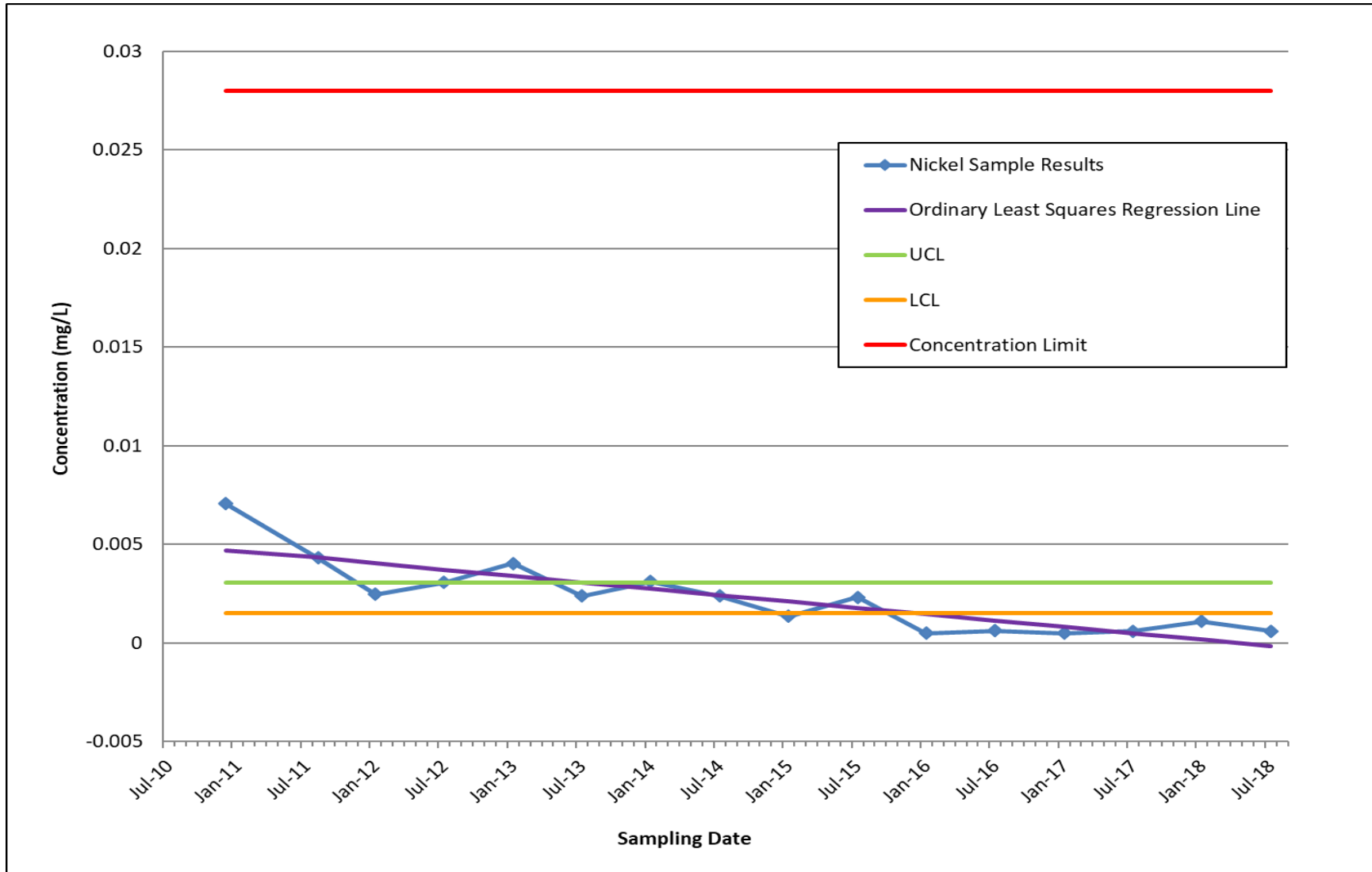


Figure 4-6
Nickel Control Chart for CWL-MW10

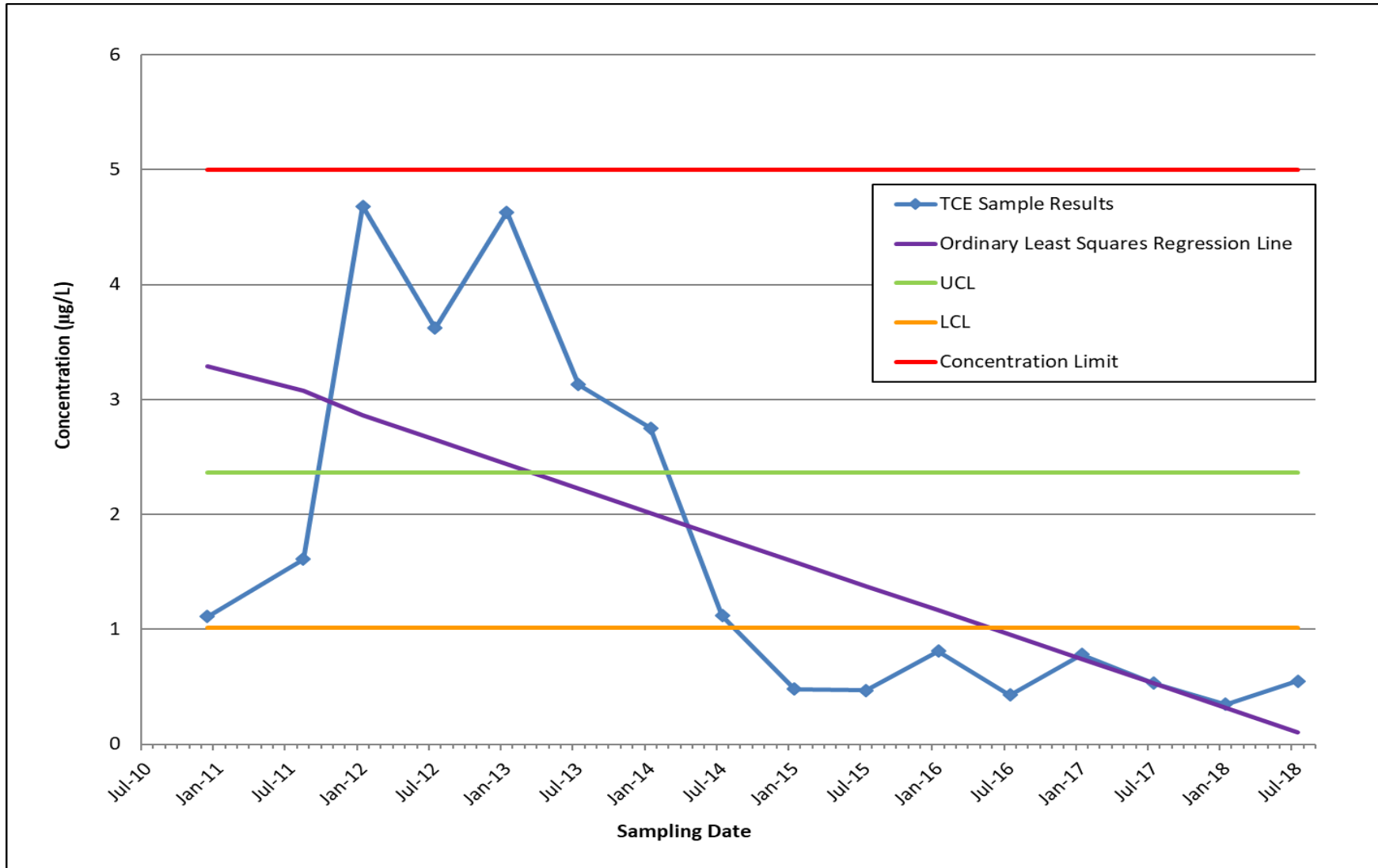


Figure 4-7
TCE Control Chart for CWL-MW10

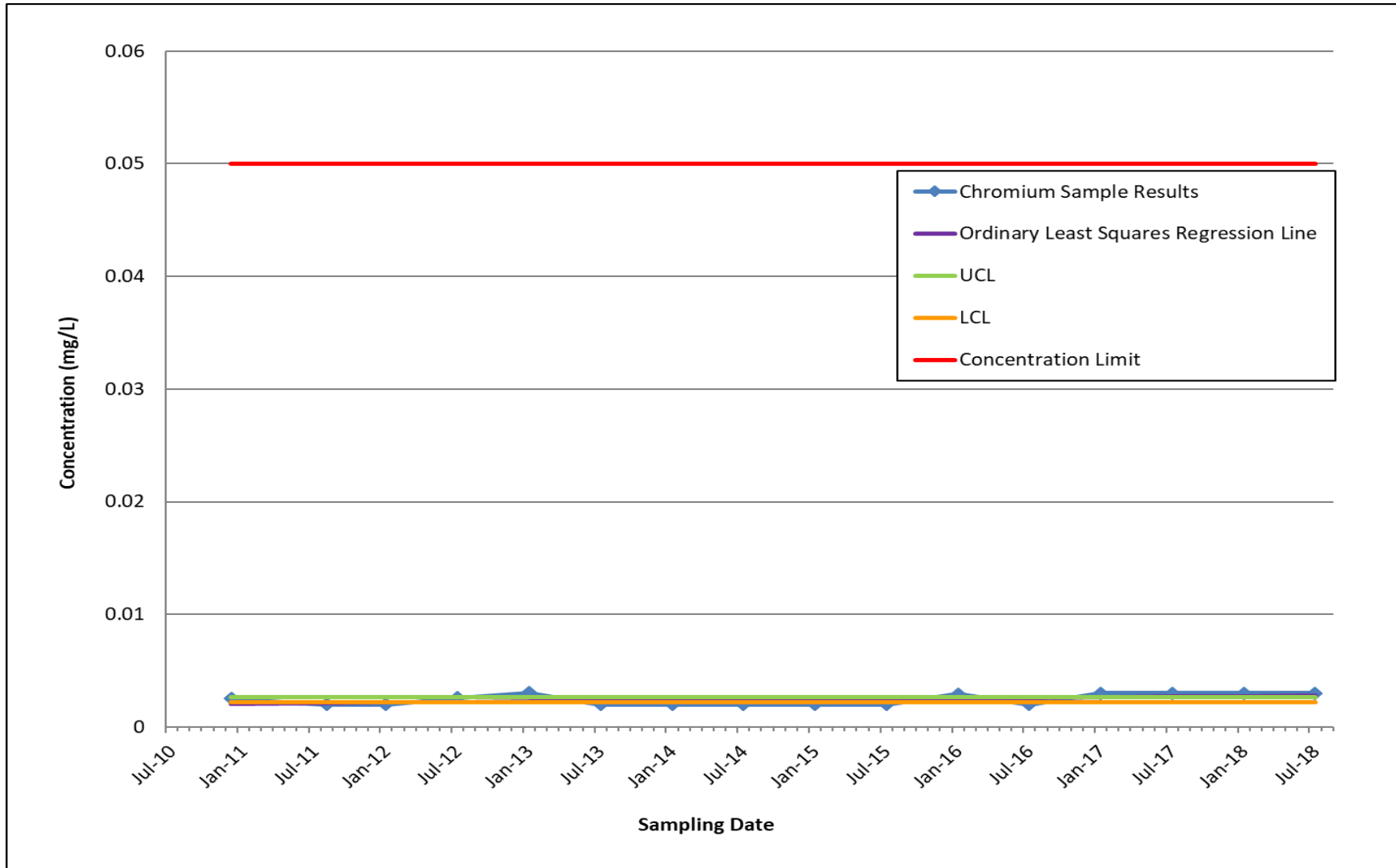


Figure 4-8
Chromium Control Chart for CWL-MW11

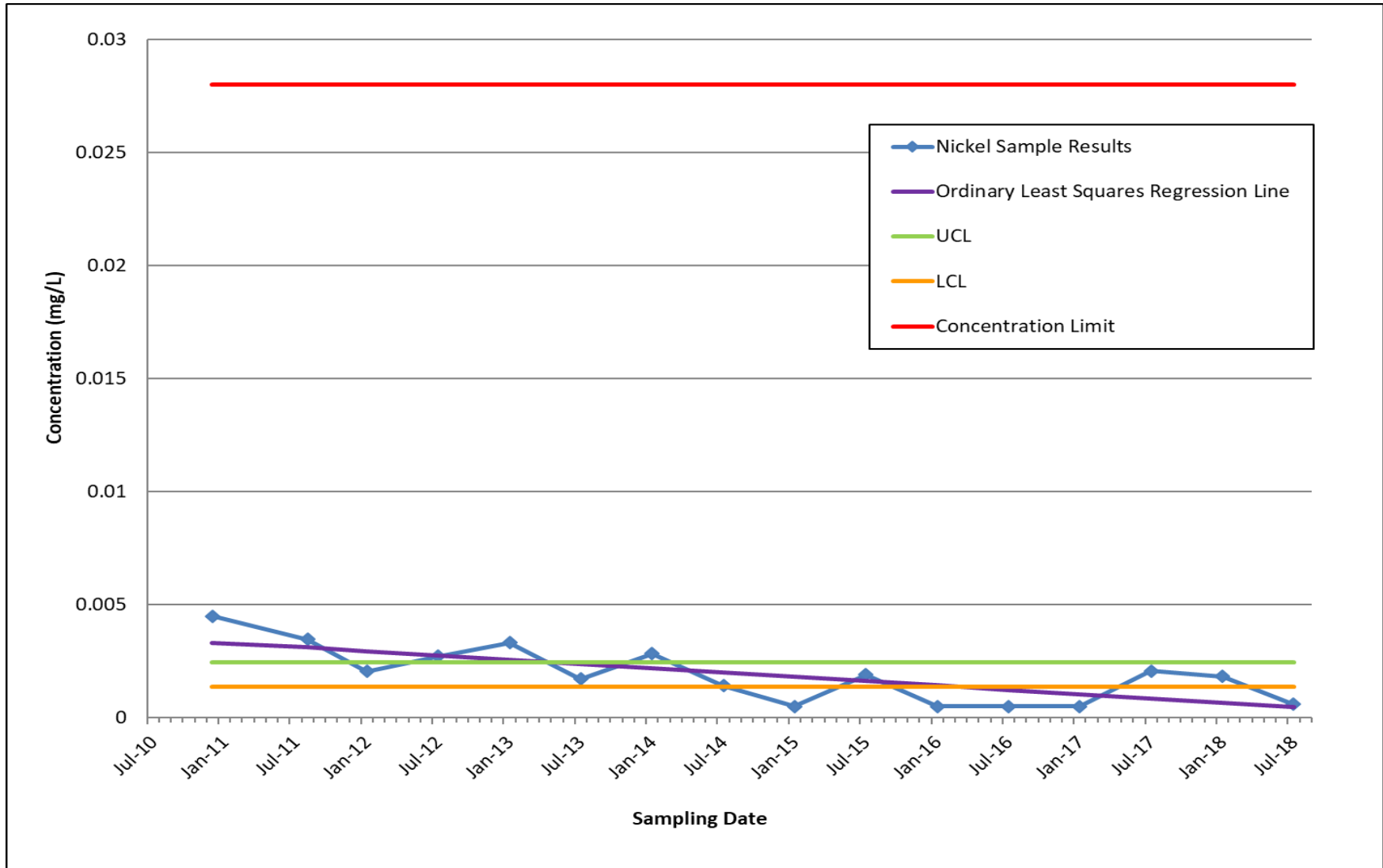


Figure 4-9
Nickel Control Chart for CWL-MW11

Monitoring Well CWL-MW9

Chromium and TCE have not been detected in any CWL-MW9 samples (CY 2010 through 2018). Therefore, statistical evaluation of these constituents is not presented. Of the two CY 2018 nickel results (January environmental and duplicate samples, 0.00207 and 0.00192 mg/L, respectively) were between the 95% LCL and 95% UCL and were within the historical range. The July result was a non-detect, and the MDL (0.0006 mg/L) was less than the 95% LCL and within the historical range.

Monitoring Well CWL-MW10

CY 2018 CWL-MW10 chromium sample results were all non-detects, and the laboratory MDL (0.003 mg/L) was greater than the 95% UCL and fell within the historical range. Nickel was only detected in the January environmental sample (0.0011 mg/L); this result was below the 95% LCL and within the historical range. The July environmental sample was a non-detect; the MDL (0.0006 mg/L) was less than the 95% LCL and within the historical range. TCE results for the January (0.350 µg/L) and July (0.550 µg/L) samples were below the 95% LCL and the January result was below the historical range. The July result was within the historical range.

Monitoring Well CWL-MW11

CY 2018 CWL-MW11 chromium sample results were all non-detects; the MDL (0.003 mg/L) exceeded the 95% UCL and was within the historical range. Nickel was only detected in the January environmental sample (0.00183 mg/L); this result was between the 95% LCL and 95% UCL and within the historical range. The July environmental sample was a non-detect; the MDL (0.0006 mg/L) was less than the 95% LCL and within the historical range. TCE has not been detected in any CWL-MW11 samples (CY 2010 through 2018). Therefore, statistical evaluation of TCE is not presented.

Confidence Intervals Results

Chromium, nickel, and TCE 95% LCLs and 95% UCLs of the mean are presented for each CWL monitoring well in Table 4-7 and are shown on the associated control charts (Figures 4-1 through 4-9). As previously explained, no statistical evaluation was performed for constituents that have not been detected in groundwater samples from monitoring wells CWL-MW9 (chromium and TCE) and CWL-MW11 (TCE). All calculated 95% LCLs are below the respective concentration limits; therefore, there are no exceedances of any concentration limits.

Median Test Results

The cumulative percentage of sample results greater than the median (i.e., Median Test) for the three hazardous constituents is below 80% for all detected constituents at all four monitoring wells. Therefore, there is no statistically significant evidence of increasing contamination for any of the hazardous constituents. The highest Median Test result was 54% for chromium (CWL-MW11); all CY 2018 CWL-MW11 chromium results were non-detects. The low median

test results for TCE in CWL-BW5/4A (3%) reflects a data set influenced by non-detection results and an analytical laboratory detection limit that has decreased over time.

In addition, the ordinary least squares regression line is shown on Figures 4-1 through 4-9. This line provides a visual representation of the overall trend of the sample results. As shown in Figures 4-1 through 4-9, all three hazardous constituents show a decreasing or very flat trend in each well, consistent with the Median Test results. The ordinary least squares regression line shown in Figure 4-7 for CWL-MW10 TCE results shows a stronger decreasing trend as a result of the chart scale and decreases during the last 11 sampling events (July 2013 through July 2018). The variation shown in Figure 4-7 is typical of very low concentrations (low parts per billion) that are fluctuating over time.

4.4 Hydrogeologic Assessment

The regional aquifer beneath the CWL is located within the Santa Fe Group alluvial sediments at a depth of approximately 485 to 500 feet bgs. Regional groundwater beneath Kirtland Air Force Base (KAFB) flows generally westward away from the mountains toward the Rio Grande. Pumping by the City of Albuquerque and KAFB have modified the natural groundwater flow regime and resulted in a steady decline of the upper surface of the regional aquifer. Water levels at the CWL have been declining since monitoring began in 1985. The average rate of decline has been somewhat variable over time, but has typically been in the range of 0.4 to 0.8 feet per year. The groundwater elevation decline between October 2017 and October 2018 ranged from 0.59 (CWL-MW11) to 1.23 (CWL-MW10) feet. The average rate of decline at the four monitoring wells was 0.81 feet. This rate of decline was higher than the rate of decline for 2015 to 2017, and is similar the 2014 to 2015 average decline rate, which was 0.72 feet.

In CY 2018, water levels were measured in the groundwater monitoring wells on a quarterly basis, and also during the January and July sampling events. Figure 4-10 depicts the potentiometric surface map of the regional aquifer beneath the CWL based upon the October 2018 water-level measurements. The westward deflection of the potentiometric surface is a localized salient in the potentiometric surface of the regional aquifer. Based on this figure, the local groundwater flow direction varies across the site. However, the overall groundwater flow direction is generally westward in the CWL vicinity, which is consistent with the hydrogeologic conceptual model for the KAFB area (SNL/NM June 2018). Localized variations in the water table reflect site-specific geologic controls (i.e., vertical and lateral variability in permeability of the saturated Santa Fe Group alluvial sediments).

Measured orthogonally from the potentiometric surface contours on Figure 4-10 across the site, the horizontal gradient did not change significantly from previous years and is approximately 0.013 feet/feet. Groundwater velocities were calculated using (a) the current potentiometric surface gradient, (b) the hydraulic conductivity range from the four groundwater monitoring wells (i.e., high and low values from 2012 slug tests), and (c) a porosity of 29 percent as determined from the laboratory analyses of CWL soil samples (SNL/NM October 1995). The calculated velocities are the same as those reported since CY 2014, and range from approximately 1.8×10^{-4} to 2.8×10^{-3} feet per day (equivalent to 6.3×10^{-8} to 1.0×10^{-6} centimeters per second). The average groundwater velocity is 1×10^{-3} feet per day (equivalent to 4.1×10^{-7} centimeters per second). These very low values are consistent with previous estimates for horizontal groundwater flow at the water table in the CWL vicinity.

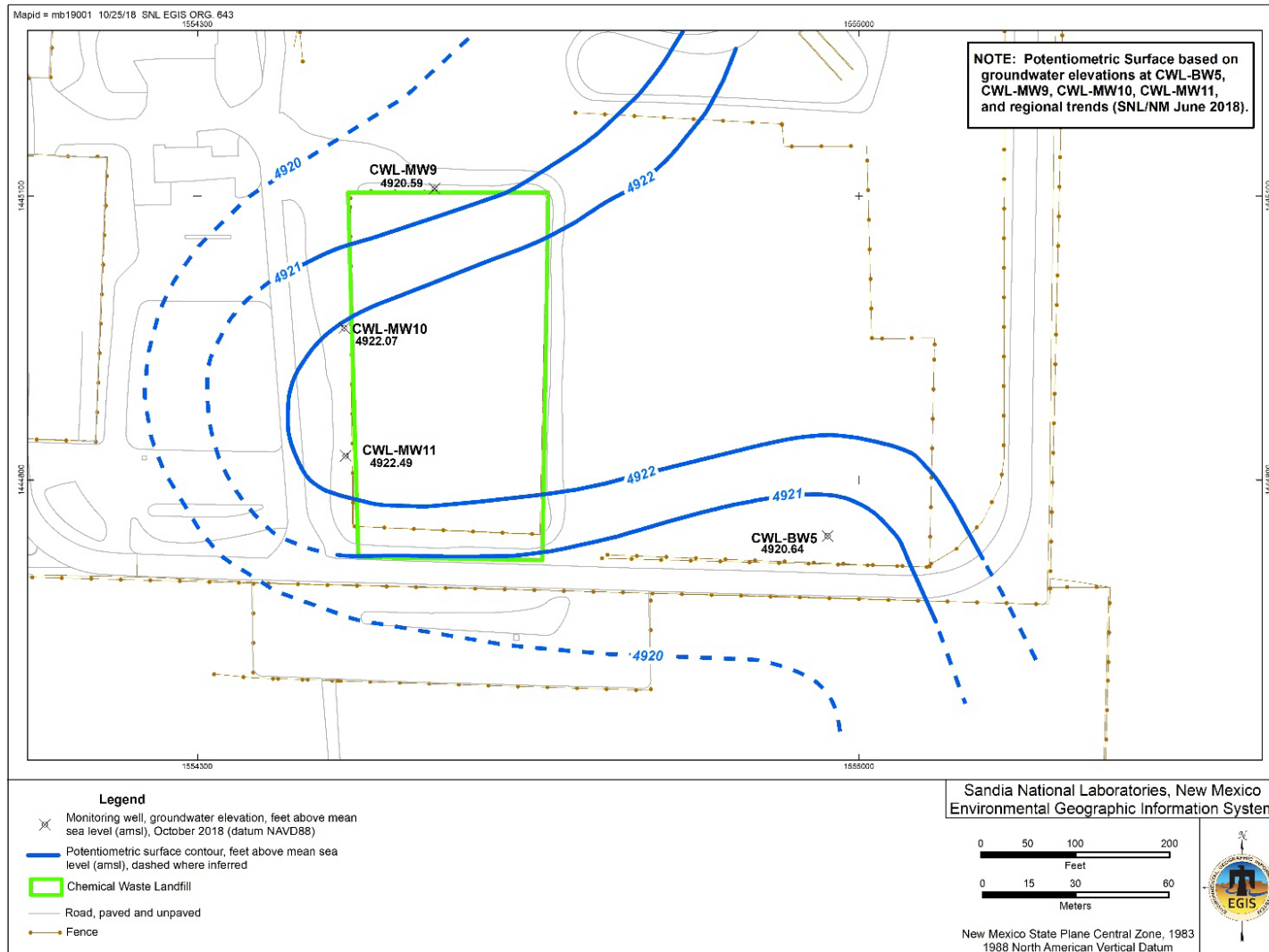


Figure 4-10
 Potentiometric Surface of the Regional Aquifer at the Chemical Waste Landfill, October 2018

5.0 SOIL-GAS MONITORING RESULTS

This chapter presents soil-gas monitoring activities (i.e., sampling and analysis), analytical results, and data evaluation for CY 2018 in accordance with PCCP Attachment 1, Sections 1.8 and 1.12, and Attachment 3 (NMED October 2009 and subsequent revisions). The CY 2018 annual soil-gas sampling event was the seventh performed under the PCCP, which became effective June 2, 2011. Soil-gas sampling field activities are described in Section 5.1, analytical laboratory results and a discussion of data quality are presented in Section 5.2, and data evaluation requirements and results are presented in Section 5.3. Monitoring well locations are shown in Figure 2-4.

5.1 Soil-Gas Sampling Field Activities

This section describes soil-gas monitoring activities conducted at the CWL in conformance with the CWL Soil-Gas SAP, PCCP Attachment 3 that describes the procedures, methods, and analytical protocols for collecting and analyzing soil-gas samples. The DQO for soil-gas monitoring is to collect accurate and defensible data of high quality to determine the concentrations of hazardous constituents at various depths in the vadose zone at the CWL (i.e., unsaturated soil and sediments above the regional groundwater aquifer). Field forms and documentation that address calibration of equipment, well evacuation, purge volumes, and vacuum pressure readings for each sample container are provided in Annex B of this report and filed in the SNL/NM Records Center.

Soil-gas samples were collected from monitoring wells CWL-UI1, CWL-UI2, CWL-D1, CWL-D2, and CWL-D3 on January 24, 2018. All samples were analyzed using the EPA Method TO-15 (EPA January 1999b) for the 50 VOCs listed in PCCP Attachment 1, Table 1-5. CY 2018 soil-gas sampling activities and results are described in the following sections.

5.1.1 Well Evacuation and Sampling

Purging removes stagnant air from each monitoring well port and sample tubing, allowing the collection of representative soil gas from the soil pore space surrounding the sampling port in the subsurface. Purging continued after meeting the minimum requirement of three tubing volumes until field measurements for VOC levels stabilized, in accordance with PCCP Attachment 3, Section 3.9.2. VOCs were measured by attaching a VOC monitoring instrument, a photoionization detector, to the exhaust port of the vacuum pump.

The CWL soil-gas sampling equipment includes a vacuum pump, a sampling manifold assembly, a duplicate sampling manifold assembly, and a multiport purging chamber. The multiport purging chamber is equipped with individual valves, fittings, and tubing that can be connected to as many as ten individual sample ports. Valves were connected to each sampling port and purging was performed until minimum purge requirements were satisfied. Upon completion of purging, soil-gas samples were collected in SUMMA[®] canisters per laboratory protocols and sent to the off-site laboratory for analysis.

5.1.2 Field Quality Control

Field QC samples include environmental duplicate samples (minimum of two per annual monitoring event) and field blank samples. Field QC samples were submitted for analysis with the soil-gas samples and analytical results are presented in Section 5.2.2 and Annex B.

During the January 2018 monitoring event, duplicate environmental samples were collected from two CWL-UI1 monitoring well sample ports, CWL-UI1-40 (40 feet bgs) and CWL-UI1-80 (80 feet bgs). The duplicate samples were collected using a manifold system that allows for the simultaneous collection of the environmental and duplicate sample. The two duplicate samples were submitted for analysis with the January 2018 environmental samples. The sample results are used to evaluate the reproducibility of the sampling and analytical processes.

Field blank samples are prepared in the field during sampling activities by collecting an ultra-pure grade nitrogen gas sample in SUMMA® canisters. Results are used to assess whether contamination of the samples may have resulted from ambient field conditions. A total of five field blank samples were submitted for analysis with CY 2018 environmental samples.

5.1.3 Waste Management

Only a small volume of solid waste (personal protective equipment, less than one cubic foot) was generated during the January 2018 soil-gas monitoring event. This waste was combined with the groundwater monitoring solid waste and managed as hazardous waste in accordance with all applicable requirements. The waste was disposed at a permitted off-site facility.

5.2 Laboratory Results

Soil-gas samples were submitted to Test America, Inc. for chemical analyses by EPA Method TO-15 (EPA January 1999b) in accordance with PCCP Attachment 1, Section 1.8. Analytical reports (i.e., certificates of analyses), analytical methods, MDLs, reporting limits, dates of analyses, results of field and laboratory QC analyses, and data validation reports are included in Annex B and filed in the SNL/NM Records Center.

5.2.1 Environmental Sample Results

This section summarizes detected VOCs from soil-gas samples collected in January 2018. The results are presented in Table 5-1.

Table 5-1
 Summary of Detected Volatile Organic Compounds
 Chemical Waste Landfill Soil-Gas Monitoring
 Analytical Method TO-15^a
 January 2018

Well ID/Sample Port	Analyte	Result (ppbv)	MDL (ppbv)	RL (ppbv)	Laboratory Qualifier ^b	Validation Qualifier ^b
CWL-UI1-40	Carbon tetrachloride	14	4.6	58	J	--
	Chloroform	430	6.9	22	--	--
	1,2-Dibromoethane	6.3	5.4	58	J	--
	1,2-Dichlorobenzene	11	9.4	29	J	--
	Dichlorodifluoromethane	32	11	29	--	--
	1,1-Dichloroethane	16	5.2	22	J	--
	1,2-Dichloroethane	36	6.4	58	J	--
	1,1-Dichloroethene	340	9.4	58	--	--
	1,2-Dichloropropane	79	17	29	--	--
	Methylene chloride	150	5.2	29	--	--
	Tetrachloroethene	730	3.7	29	--	--
	Toluene	5.7	3.7	29	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	830	12	29	--	--
	1,1,1-Trichloroethane	34	4.7	22	--	--
	1,1,2-Trichloroethane	7.1	4.9	29	J	--
	Trichloroethene	8200	14	55	--	--
	Trichlorofluoromethane	220	14	29	--	--
	o-Xylene	4.8	3.9	29	J	--
	Total Organics ^c	11145.9	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
 Summary of Detected Volatile Organic Compounds
 Chemical Waste Landfill Soil-Gas Monitoring
 Analytical Method TO-15^a
 January 2018

Well ID/Sample Port	Analyte	Result (ppbv)	MDL (ppbv)	RL (ppbv)	Laboratory Qualifie ^b	Validation Qualifier ^b
CWL-UI1-40 (Duplicate)	Carbon tetrachloride	19	5.1	64	J	--
	Chloroform	450	7.6	24	--	--
	1,2-Dibromoethane	6.7	6.0	64	J	--
	1,2-Dichlorobenzene	12	10	32	J	--
	Dichlorodifluoromethane	33	12	32	--	--
	1,1-Dichloroethane	17	5.7	24	J	--
	1,2-Dichloroethane	37	7.0	64	J	--
	1,1-Dichloroethene	360	10	64	--	--
	1,2-Dichloropropane	79	19	32	--	--
	Methylene chloride	160	5.7	32	--	--
	Tetrachloroethene	760	4.1	32	--	--
	Toluene	5.7	4.1	32	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	870	13	32	--	--
	1,1,1-Trichloroethane	35	5.2	24	--	--
	1,1,2-Trichloroethane	7.1	5.3	32	J	--
	Trichloroethene	8300	15	56	--	--
	Trichlorofluoromethane	230	16	32	--	--
	o-Xylene	4.9	4.3	32	J	--
	Total Organics ^c	11386.4	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
 Summary of Detected Volatile Organic Compounds
 Chemical Waste Landfill Soil-Gas Monitoring
 Analytical Method TO-15^a
 January 2018

Well ID/Sample Port	Analyte	Result (ppbv)	MDL (ppbv)	RL (ppbv)	Laboratory Qualifier ^b	Validation Qualifier ^b
CWL-UI1-80	Carbon tetrachloride	13	4.1	51	J	--
	Chloroform	460	6.1	19	--	--
	Dichlorodifluoromethane	27	9.3	26	--	--
	1,1-Dichloroethane	12	4.6	19	J	--
	1,2-Dichloroethane	13	5.6	51	J	--
	1,1-Dichloroethene	260	8.2	51	--	--
	1,2-Dichloropropane	53	15	26	--	--
	Methylene chloride	40	4.6	26	--	--
	Tetrachloroethene	940	3.3	26	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	670	10	26	--	--
	1,1,1-Trichloroethane	31	4.2	19	--	--
	1,1,2-Trichloroethane	6.8	4.3	26	J	--
	Trichloroethene	6200	11	43	--	--
	Trichlorofluoromethane	180	13	26	--	--
	Total Organics ^c	8905.8	NA	NA	NA	NA
CWL-UI1-80 (Duplicate)	Carbon tetrachloride	13	3.5	43	J	--
	Chloroform	420	5.1	16	--	--
	Dichlorodifluoromethane	24	7.8	22	--	--
	1,1-Dichloroethane	11	3.9	16	J	--
	1,2-Dichloroethane	13	4.8	43	J	--
	1,1-Dichloroethene	230	7.0	43	--	--
	1,2-Dichloropropane	48	13	22	--	--
	Methylene chloride	37	3.9	22	--	--
	Tetrachloroethene	870	2.8	22	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	610	8.8	22	--	--
	1,1,1-Trichloroethane	29	3.5	16	--	--
	1,1,2-Trichloroethane	5.8	3.6	22	J	--
	Trichloroethene	5200	10	39	--	--
	Trichlorofluoromethane	160	11	22	--	--
	Total Organics ^c	7670.8	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
 Summary of Detected Volatile Organic Compounds
 Chemical Waste Landfill Soil-Gas Monitoring
 Analytical Method TO-15^a
 January 2018

Well ID/Sample Port	Analyte	Result (ppbv)	MDL (ppbv)	RL (ppbv)	Laboratory Qualifier ^b	Validation Qualifier ^b
CWL-UI1-120	Carbon tetrachloride	12	3.5	44	J	--
	Chloroform	620	5.2	16	--	--
	1,2-Dichlorobenzene	16	7.1	22	J	--
	Dichlorodifluoromethane	24	7.9	22	--	--
	1,1-Dichloroethane	11	3.9	16	J	--
	1,1-Dichloroethene	150	7.0	44	--	--
	1,2-Dichloropropane	37	13	22	--	--
	Methylene chloride	6.7	3.9	22	J	--
	Tetrachloroethene	3500	2.8	22	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	610	8.9	22	--	--
	1,1,1-Trichloroethane	37	3.5	16	--	--
	1,1,2-Trichloroethane	8.6	3.6	22	J	--
	Trichloroethene	5300	5.7	22	--	--
	Trichlorofluoromethane	160	11	22	--	--
	o-Xylene	6.2	2.9	22	J	--
	Total Organics ^c	10498.5	NA	NA	NA	NA
CWL-UI2-36	Acetone	11	5.3	150	J	150U
	Carbon tetrachloride	6.6	1.9	24	J	--
	Chloroform	370	2.8	8.9	--	--
	Dichlorodifluoromethane	13	4.3	12	--	--
	1,1-Dichloroethane	3.0	2.1	8.9	J	--
	1,1-Dichloroethene	26	3.8	24	--	--
	1,2-Dichloropropane	29	7.2	12	--	--
	Methylene chloride	4.2	2.1	12	J	12U
	Tetrachloroethene	110	1.5	12	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	280	4.9	12	--	--
	1,1,1-Trichloroethane	16	1.9	8.9	--	--
	Trichloroethene	2300	3.1	12	--	--
	Trichlorofluoromethane	83	5.8	12	--	--
	Total Organics ^c	3236.6	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
 Summary of Detected Volatile Organic Compounds
 Chemical Waste Landfill Soil-Gas Monitoring
 Analytical Method TO-15^a
 January 2018

Well ID/Sample Port	Analyte	Result (ppbv)	MDL (ppbv)	RL (ppbv)	Laboratory Qualifier ^b	Validation Qualifier ^b
CWL-UI2-76	Carbon tetrachloride	15	4.9	61	J	J-
	Chloroform	560	7.3	23	--	J-
	Dichlorodifluoromethane	27	11	31	J	J-
	1,1-Dichloroethane	5.8	5.5	23	J	J-
	1,1-Dichloroethene	84	9.9	61	--	J-
	1,2-Dichloropropane	83	18	31	--	J-
	Methylene chloride	8.3	5.5	31	J	31UJ
	Tetrachloroethene	200	3.9	31	--	J-
	1,1,2-Trichloro-1,2,2-trifluoroethane	540	12	31	--	J-
	1,1,1-Trichloroethane	22	5.0	23	J	J-
	Trichloroethene	4700	16	61	--	--
	Trichlorofluoromethane	150	15	31	--	J-
	Total Organics ^c	6386.8	NA	NA	NA	NA
CWL-UI2-136	Carbon tetrachloride	20	5.5	69	J	--
	Chloroform	520	8.2	26	--	--
	Dichlorodifluoromethane	36	13	35	--	--
	1,2-Dichloroethane	18	7.6	69	J	--
	1,1-Dichloroethene	140	11	69	--	--
	1,2-Dichloropropane	150	21	35	--	--
	Methylene chloride	7.7	6.2	35	J	35U
	Tetrachloroethene	240	4.4	35	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	660	14	35	--	--
	1,1,1-Trichloroethane	20	5.6	26	J	--
	Trichloroethene	6700	16	61	--	--
	Trichlorofluoromethane	190	17	35	--	--
	Total Organics ^c	8694	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
 Summary of Detected Volatile Organic Compounds
 Chemical Waste Landfill Soil-Gas Monitoring
 Analytical Method TO-15^a
 January 2018

Well ID/Sample Port	Analyte	Result (ppbv)	MDL (ppbv)	RL (ppbv)	Laboratory Qualifier ^b	Validation Qualifier ^b
CWL-D1-100	Carbon tetrachloride	9.6	6.5	81	J	J-
	Chloroform	340	9.6	30	--	J-
	Dichlorodifluoromethane	33	15	40	J	J-
	1,1-Dichloroethane	10	7.3	30	J	J-
	1,2-Dichloroethane	15	8.9	81	J	J-
	1,1-Dichloroethene	230	13	81	--	J-
	1,2-Dichloropropane	76	24	40	--	J-
	Methylene chloride	22	7.3	40	J	40UJ
	Tetrachloroethene	770	5.2	40	--	J-
	1,1,2-Trichloro-1,2,2-trifluoroethane	630	16	40	--	J-
	1,1,1-Trichloroethane	24	6.6	30	J	J-
	Trichloroethene	6100	16	61	--	--
	Trichlorofluoromethane	180	20	40	--	J-
	Total Organics ^c	8417.6	NA	NA	NA	NA
CWL-D1-160	Carbon tetrachloride	23	3.3	41	J	--
	Chloroform	400	4.9	15	--	--
	Dichlorodifluoromethane	44	7.5	21	--	--
	1,1-Dichloroethane	17	3.7	15	--	--
	1,2-Dichloroethane	30	4.5	41	J	--
	1,1-Dichloroethene	420	6.6	41	--	--
	1,2-Dichloropropane	130	12	21	--	--
	Methylene chloride	23	3.7	21	--	J+
	Tetrachloroethene	590	2.6	21	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	1000	8.4	21	--	--
	1,1,1-Trichloroethane	28	3.3	15	--	--
	1,1,2-Trichloroethane	4.3	3.5	21	J	--
	Trichloroethene	10000	17	64	--	--
	Trichlorofluoromethane	280	10	21	--	--
Total Organics ^c	12989.3	NA	NA	NA	NA	

Refer to footnotes at end of table.

Table 5-1 (Continued)
 Summary of Detected Volatile Organic Compounds
 Chemical Waste Landfill Soil-Gas Monitoring
 Analytical Method TO-15^a
 January 2018

Well ID/Sample Port	Analyte	Result (ppbv)	MDL (ppbv)	RL (ppbv)	Laboratory Qualifier ^b	Validation Qualifier ^b
CWL-D1-240	Carbon tetrachloride	26	20	240	J	--
	Chloroform	300	29	92	--	--
	1,1-Dichloroethene	520	39	240	--	--
	1,2-Dichloropropane	100	73	120	J	--
	Methylene chloride	30	22	120	J	120U
	Tetrachloroethene	290	16	120	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	1200	50	120	--	--
	1,1,1-Trichloroethane	21	20	92	J	--
	Trichloroethene	11000	32	120	--	--
	Trichlorofluoromethane	300	60	120	--	--
	Total Organics ^c	13757	NA	NA	NA	NA
CWL-D1-350	Acetone	27	15	410	J	--
	Carbon tetrachloride	15	5.2	65	J	--
	Chloroform	89	7.8	24	--	--
	Dichlorodifluoromethane	19	12	33	J	--
	1,1-Dichloroethane	8.4	5.9	24	J	--
	1,1-Dichloroethene	320	11	65	--	--
	1,2-Dichloropropane	24	20	33	J	--
	Methylene chloride	21	5.9	33	J	33U
	Tetrachloroethene	43	4.2	33	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	710	13	33	--	--
	1,1,1-Trichloroethane	5.9	5.3	24	J	--
	Trichloroethene	4200	8.6	33	--	--
	Trichlorofluoromethane	190	16	33	--	--
	Total Organics ^c	5651.3	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
 Summary of Detected Volatile Organic Compounds
 Chemical Waste Landfill Soil-Gas Monitoring
 Analytical Method TO-15^a
 January 2018

Well ID/Sample Port	Analyte	Result (ppbv)	MDL (ppbv)	RL (ppbv)	Laboratory Qualifier ^b	Validation Qualifier ^b
CWL-D1-470	Acetone	4.3	0.88	25	B, J	25U
	Carbon tetrachloride	1.9	0.32	4.0	J	--
	Chloroform	2.6	0.47	1.5	--	--
	Dichlorodifluoromethane	7.8	0.72	2.0	--	--
	1,1-Dichloroethene	24	0.64	4.0	--	--
	Methylene chloride	2.4	0.36	2.0	--	J+
	Tetrachloroethene	6.9	0.25	2.0	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	150	0.81	2.0	--	--
	Trichloroethene	190	0.52	2.0	--	--
	Trichlorofluoromethane	45	0.97	2.0	--	--
	Total Organics ^c	430.6	NA	NA	NA	NA
CWL-D2-120	Carbon tetrachloride	20	19	240	J	--
	Chloroform	450	29	91	--	--
	1,2-Dichloroethane	28	27	240	J	--
	1,1-Dichloroethene	350	39	240	--	--
	1,2-Dichloropropane	86	73	120	J	--
	Methylene chloride	41	22	120	J	--
	Tetrachloroethene	300	15	120	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	920	49	120	--	--
	1,1,1-Trichloroethane	27	20	91	J	--
	Trichloroethene	7700	32	120	--	--
	Trichlorofluoromethane	250	59	120	--	--
	Total Organics ^c	10172	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
 Summary of Detected Volatile Organic Compounds
 Chemical Waste Landfill Soil-Gas Monitoring
 Analytical Method TO-15^a
 January 2018

Well ID/Sample Port	Analyte	Result (ppbv)	MDL (ppbv)	RL (ppbv)	Laboratory Qualifier ^b	Validation Qualifier ^b
CWL-D2-240	Carbon tetrachloride	23	19	240	J	--
	Chloroform	430	29	91	--	--
	1,2-Dichloroethane	29	27	240	J	--
	1,1-Dichloroethene	430	39	240	--	--
	1,2-Dichloropropane	120	72	120	--	--
	Methylene chloride	28	22	120	J	--
	Tetrachloroethene	400	15	120	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	1000	49	120	--	--
	1,1,1-Trichloroethane	27	20	91	J	--
	Trichloroethene	9700	32	120	--	--
	Trichlorofluoromethane	280	59	120	--	--
	Total Organics ^c	12467	NA	NA	NA	NA
	CWL-D2-350	Carbon tetrachloride	15	13	160	J
Chloroform		240	20	62	--	--
Dichlorodifluoromethane		30	30	82	J	--
1,1-Dichloroethene		320	27	160	--	--
1,2-Dichloropropane		77	49	82	J	--
Methylene chloride		42	15	82	J	--
Tetrachloroethene		270	11	82	--	--
1,1,2-Trichloro-1,2,2-trifluoroethane		720	34	82	--	--
1,1,1-Trichloroethane		15	13	62	J	--
Trichloroethene		6400	22	82	--	--
Trichlorofluoromethane		200	40	82	--	--
Total Organics ^c		8329	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
 Summary of Detected Volatile Organic Compounds
 Chemical Waste Landfill Soil-Gas Monitoring
 Analytical Method TO-15^a
 January 2018

Well ID/Sample Port	Analyte	Result (ppbv)	MDL (ppbv)	RL (ppbv)	Laboratory Qualifier ^b	Validation Qualifier ^b
CWL-D2-440	Acetone	3.5	0.41	12	J	--
	Benzene	0.28	0.18	0.92	J	--
	Carbon tetrachloride	0.27	0.15	1.8	J	--
	Chloroform	3.9	0.22	0.69	--	--
	Chloromethane	0.71	0.45	1.8	J	--
	Dichlorodifluoromethane	0.70	0.33	0.92	J	--
	1,1-Dichloroethane	0.22	0.17	0.69	J	--
	1,2-Dichloroethane	0.31	0.20	1.8	J	--
	1,1-Dichloroethene	5.4	0.30	1.8	--	--
	1,2-Dichloropropane	1.6	0.55	0.92	--	--
	Methylene chloride	1.2	0.17	0.92	--	--
	Tetrachloroethene	8.7	0.12	0.92	--	--
	Toluene	0.18	0.12	0.92	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	10	0.37	0.92	--	--
	1,1,1-Trichloroethane	0.20	0.15	0.69	J	--
	Trichloroethene	120	0.24	0.92	--	--
	Trichlorofluoromethane	3.4	0.45	0.92	--	--
Total Organics ^c	160.57	NA	NA	NA	NA	
CWL-D2-470	Carbon tetrachloride	10	9.2	120	J	--
	Chloroform	320	14	43	--	--
	1,2-Dichloroethane	14	13	120	J	--
	1,1-Dichloroethene	140	19	120	--	--
	1,2-Dichloropropane	84	35	58	--	--
	Methylene chloride	10	10	58	J	--
	Tetrachloroethene	310	7.3	58	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	360	23	58	--	--
	1,1,1-Trichloroethane	23	9.4	43	J	--
	Trichloroethene	4800	15	58	--	--
	Trichlorofluoromethane	110	28	58	--	--
	Total Organics ^c	6181	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
 Summary of Detected Volatile Organic Compounds
 Chemical Waste Landfill Soil-Gas Monitoring
 Analytical Method TO-15^a
 January 2018

Well ID/Sample Port	Analyte	Result (ppbv)	MDL (ppbv)	RL (ppbv)	Laboratory Qualifier ^b	Validation Qualifier ^b
CWL-D3-120	Carbon tetrachloride	8.7	7.7	97	J	--
	Chloroform	150	11	36	--	--
	Dichlorodifluoromethane	20	18	48	J	--
	1,2-Dichloroethane	18	11	97	J	--
	1,1-Dichloroethene	150	16	97	--	--
	1,2-Dichloropropane	70	29	48	--	--
	Methylene chloride	24	8.7	48	J	--
	Tetrachloroethene	97	6.2	48	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	420	20	48	--	--
	1,1,1-Trichloroethane	8.8	7.9	36	J	--
	Trichloroethene	3500	13	48	--	--
	Trichlorofluoromethane	120	24	48	--	--
	Total Organics ^c	4586.5	NA	NA	NA	NA
CWL-D3-170	Carbon tetrachloride	12	9.2	120	J	--
	Chloroform	170	14	43	--	--
	Dichlorodifluoromethane	27	21	58	J	--
	1,2-Dichloroethane	22	13	120	J	--
	1,1-Dichloroethene	200	19	120	--	--
	1,2-Dichloropropane	100	35	58	--	--
	Methylene chloride	28	10	58	J	--
	Tetrachloroethene	120	7.3	58	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	570	23	58	--	--
	Trichloroethene	4700	15	58	--	--
	Trichlorofluoromethane	160	28	58	--	--
	Total Organics ^c	6109	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
 Summary of Detected Volatile Organic Compounds
 Chemical Waste Landfill Soil-Gas Monitoring
 Analytical Method TO-15^a
 January 2018

Well ID/Sample Port	Analyte	Result (ppbv)	MDL (ppbv)	RL (ppbv)	Laboratory Qualifier ^b	Validation Qualifier ^b
CWL-D3-350	Carbon tetrachloride	12	9.4	120	J	--
	Chloroform	120	14	44	--	--
	Dichlorodifluoromethane	27	21	59	J	--
	1,2-Dichloroethane	13	13	120	J	--
	1,1-Dichloroethene	210	19	120	--	--
	1,2-Dichloropropane	95	35	59	--	--
	Methylene chloride	45	11	59	J	--
	Tetrachloroethene	100	7.5	59	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	580	24	59	--	--
	Trichloroethene	4500	15	59	--	--
	Trichlorofluoromethane	160	29	59	--	--
	Total Organics ^c	5862	NA	NA	NA	NA
CWL-D3-440	Carbon tetrachloride	12	9.9	120	J	--
	Chloroform	130	15	46	--	--
	Dichlorodifluoromethane	28	22	62	J	--
	1,2-Dichloroethane	14	14	120	J	--
	1,1-Dichloroethene	220	20	120	--	--
	1,2-Dichloropropane	98	37	62	--	--
	Methylene chloride	22	11	62	J	--
	Tetrachloroethene	110	7.9	62	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	620	25	62	--	--
	Trichloroethene	4800	16	62	--	--
	Trichlorofluoromethane	170	30	62	--	--
	Total Organics ^c	6224	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Concluded)
 Summary of Detected Volatile Organic Compounds
 Chemical Waste Landfill Soil-Gas Monitoring
 Analytical Method TO-15^a
 January 2018

Well ID/Sample Port	Analyte	Result (ppbv)	MDL (ppbv)	RL (ppbv)	Laboratory Qualifier ^b	Validation Qualifier ^b
CWL-D3-480	Acetone	1.6	0.18	5.0	J	5.0U
	Benzene	0.19	0.079	0.40	J	--
	2-Butanone	0.20	0.20	0.80	J	--
	Carbon disulfide	0.10	0.078	0.80	B, J	0.80U
	Carbon tetrachloride	0.11	0.064	0.80	J	--
	Chloroform	0.62	0.095	0.30	--	--
	Chloromethane	0.52	0.20	0.80	J	--
	Dichlorodifluoromethane	0.29	0.15	0.40	J	--
	1,1-Dichloroethene	0.91	0.13	0.80	--	--
	1,2-Dichloropropane	0.51	0.24	0.40	--	--
	Methylene chloride	0.27	0.072	0.40	J	--
	Tetrachloroethene	1.1	0.051	0.40	--	--
	Toluene	0.23	0.051	0.40	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	2.5	0.16	0.40	--	--
	Trichloroethene	25	0.11	0.40	--	--
	Trichlorofluoromethane	0.89	0.20	0.40	--	--
Total Organics ^c		33.34	NA	NA	NA	NA

Notes:

^aEPA January 1999b.

^bLaboratory/Validation Qualifier – If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples.

Laboratory Qualifier

B = Compound was found in blank and sample.

J = Result is less than the RL but greater than or equal to the MDL.

Validation Qualifier

J+ = The associated value is an estimated quantity with a suspected positive bias.

J- = The associated value is an estimated quantity with a suspected negative bias.

U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.

UJ = The analyte was analyzed for but was not detected. The associated numerical value is an estimate and may be inaccurate or imprecise.

^cTotal Organics - sum of validated detected organic compounds (i.e., results for analytes reported as detections by the laboratory but qualified during data validation as not detected are not included in the Total Organics value).

EPA = U.S. Environmental Protection Agency.

ID = Identification.

MDL = Method detection limit. The minimum concentration that can be measured and reported with 99 percent confidence that the analyte is greater than zero, analyte is matrix specific.

NA = Not applicable.

ppbv = Parts per billion by volume.

RL = Reporting limit. The minimum concentration that can be reported with a specified degree of confidence.

January 24, 2018 Soil-Gas Results

Twenty-three samples were collected from the 21 sampling ports (21 environmental samples and 2 duplicate samples). In general, the January 2018 soil-gas results were consistent with the 2017 data set. For both the 2017 and 2018 data sets, a total of 22 VOCs were detected. The detected VOCs are listed below.

1,2-Dibromoethane	Benzene
1,2-Dichlorobenzene	Carbon tetrachloride
1,1-Dichloroethane	Chloroform
1,1-Dichloroethene	Chloromethane
1,2-Dichloroethane	Dichlorodifluoromethane
1,2-Dichloropropane	Methylene chloride
1,1,2-Trichloro-1,2,2-trifluoroethane	Tetrachloroethene (PCE)
1,1,1-Trichloroethane	Toluene
1,1,2-Trichloroethane	Trichloroethene (TCE)
2-Butanone	Trichlorofluoromethane
Acetone	o-Xylene

TCE is the primary VOC of concern at the CWL and was detected in all 23 samples. TCE concentrations ranged from 25 parts per billion by volume (ppbv) to 11,000 ppbv (CWL-D3-480 and CWL-D1-240, respectively). PCE was also detected in all samples at concentrations ranging from 1.1 ppbv to 3,500 ppbv (CWL-D3-480 and CWL-UI1-120, respectively). Other VOCs detected in all samples, generally at lower concentrations, included carbon tetrachloride, chloroform, 1,1-dichloroethene, 1,1,2-trichloro-1,2,2-trifluoroethane (commonly known as Freon 113), and trichlorofluoromethane (commonly known as Freon 11). Total VOCs, as the sum of validated detected VOCs, were reported in all environmental samples at concentrations ranging from 33.34 ppbv at CWL-D3-480 to 13,757 ppbv at CWL-D1-240. Consistent with historical results, the maximum TCE and Total VOC concentrations were reported in samples from the 240 foot bgs sampling port at monitoring well CWL-D1.

The maximum soil-gas concentration from the three deepest sampling ports (CWL-D1-470, CWL-D2-470, CWL-D3-480) was TCE at a concentration of 4,800 ppbv or 4.8 parts per million by volume (ppmv) from CWL-D2-470. TCE was the only VOC that exceeded a concentration of 0.50 ppmv at the three deepest sampling ports.

5.2.2 Field and Laboratory Quality Control Sample Results

Table 5-2 presents field duplicate results for environmental-duplicate sample pairs collected in 2018 from sample ports located at 40 and 80 feet bgs at monitoring well CWL-UI1. In accordance with PCCP Attachment 3, Section 3.6, RPD calculations were performed for all detected compounds with concentrations exceeding five times the analytical laboratory reporting limit in both the environmental and duplicate sample. If a detected compound in one sample was not detected in the corresponding duplicate or environmental sample, no RPD was calculated. The duplicate sample results show good agreement for all detected VOCs (i.e., RPDs less than 50), with RPDs ranging from 1 to 18.

A total of five field blank samples were submitted with the 2018 samples. VOCs detected above laboratory MDLs in field blank samples included acetone (2 samples), benzene

Table 5-2
 Summary of January 2018 Duplicate Samples
 Chemical Waste Landfill Soil-Gas Monitoring

Well ID/Parameter	Environmental Sample (R1)	Duplicate Sample (R2)	RPD ^a (%)
	(ppbv)		
CWL-UI1-40			
Chloroform	430	450	5
1,1-Dichloroethene	340	360	6
Methylene chloride	150	160	6
Tetrachloroethene	730	760	4
1,1,2-Trichloro-1,2,2-trifluoroethane	830	870	5
Trichloroethene	8200	8300	1
Trichlorofluoromethane	220	230	4
CWL-UI1-80			
Chloroform	460	420	9
1,1-Dichloroethene	260	230	12
Tetrachloroethene	940	870	8
1,1,2-Trichloro-1,2,2-trifluoroethane	670	610	9
Trichloroethene	6200	5200	18
Trichlorofluoromethane	180	160	12

Notes:

^aRPD = Relative percent difference is calculated with the following equation and rounded to nearest whole number.

$$RPD = \frac{|R_1 - R_2|}{[(R_1 + R_2) / 2]} \times 100$$

where: R₁ = environmental sample result.
 R₂ = duplicate sample result.

ID = Identification.

ppbv = Parts per billion by volume.

(1 sample), carbon disulfide (3 samples), chloroform (1 sample), chloromethane (1 sample), methylene chloride (2 samples), PCE (1 sample), toluene (1 sample), and TCE (4 samples). No corrective action was required for benzene, carbon disulfide, chloroform, chloromethane, PCE, toluene, and TCE, since all associated environmental sample results were either not detected, results were less than five times the field blank sample concentration, or compound(s) were qualified separately due to associated laboratory method blank sample contamination. Acetone in the sample from well CWL-D3-480 and methylene chloride in samples from CWL-D1 (100, 240, and 350 feet bgs sample ports) and all CWL-UI2 samples were qualified as not detected during data validation since the sample result was less than ten times the related field blank concentration.

QC analytical blank samples were also prepared to determine potential contamination introduced by the laboratory processes and methodologies. Laboratory spike samples were also prepared by the laboratory to determine the accuracy and precision of the analytical methods. These samples included laboratory control samples, replicates, matrix spikes, matrix spike supplicates, and surrogate spike samples. Internal laboratory QC samples were analyzed concurrently with all environmental samples. Carbon disulfide in the sample from CWL-D3-480

and acetone in the sample from CWL-D1-470 were qualified as not detected during data validation due to contamination in the associated laboratory control sample.

5.2.3 Data Quality

Field QC sample results met the sampling DQOs and validated the adequacy of the field sampling procedures and protocol. Laboratory QC samples identified potential contamination introduced at the laboratory and verified the accuracy and precision of the analytical method. The data were reviewed and qualified in accordance with AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data" (SNL/NM June 2017).

All data were determined to be acceptable and reported QC measures were in compliance with analytical method and laboratory procedure requirements. Data Validation Reports and Contract Verification Review forms are provided in Annex B of this report and are filed in the SNL/NM Records Center.

5.2.4 Variances

There were no variances from PCCP requirements for the January 2018 soil-gas monitoring activities.

5.3 Data Evaluation

Soil-gas monitoring is required to determine whether the groundwater beneath the CWL is adequately protected as part of the CWL groundwater monitoring program. In accordance with PCCP Attachment 1, Section 1.8.2.2, statistical evaluation of soil-gas results for specific VOCs that exceed 0.50 ppmv from the three deepest sampling ports of wells CWL-D1 through CWL-D3 (i.e., CWL-D1-470, CWL-D2-470, and CWL-D3-480) is required annually, and include the following:

- Calculate the UCL and LCL of the mean at a 95% confidence level using current data and historical data since completion of the VE VCM, and
- Compare the LCL to the trigger level of 20 ppmv.

The trigger level of 20 ppmv only applies to the 95% LCL of the mean and not to individual sample results. For the first 5 years after the effective date of the PCCP (June 2, 2011), historical soil-gas monitoring results were used to augment the statistical analysis. Starting with the March 2018 CWL Annual Post-Closure Care Report, six data sets collected under the PCCP were available (January 2012 through January 2017 data sets). In accordance with PCCP Attachment 1, Section 1.8.2.2, historical data collected prior to implementation of the PCCP are no longer used for statistical analysis. Historical soil-gas data is still presented in Section 5.4 and includes results from June 1998, June 1999, August 2001, June 2004, September 2004, and October 2005. Although the VE VCM was not completed until July 1998, the June 1998 data set is included as it is representative of the conditions when the VE system was shut down a month later.

5.3.1 Statistical Assessment Requirements

Similar to CY 2017 results, only TCE (4.800 ppmv) in the CWL-D2-470 sample exceeded the 0.50 ppmv threshold. In accordance with the PCCP Attachment 1, Section 1.8.2.2, confidence intervals (UCLs and LCLs) are calculated and used to compare to the trigger level of 20 ppmv. If a result is below the analytical laboratory detection limit, the MDL for the constituent is used for statistical analysis. For duplicate analyses, only the highest detection for the environmental-duplicate sample pair is used for statistical analysis.

5.3.2 Statistical Assessment Results

CY 2018 soil-gas statistical assessment results are presented in Table 5-3. The calculated LCL for the CWL-D2-470 TCE result was 4.098 ppmv and is below the trigger level of 20 ppmv.

5.4 Historical Data Evaluation

In accordance with PCCP Attachment 1, Section 1.12 and Attachment 3, Section 3.11, current soil-gas monitoring results are compared and evaluated with respect to historical results since completion of the VE VCM. This allows for long-term trends to be defined and provides for more meaningful interpretations of current results with respect to historical data. Tables 5-4 and 5-5 present TCE and Total VOCs soil-gas monitoring results, respectively, for the post-closure care monitoring network. Data sets included in the analysis range from June 1998 (representative of the end of the VE VCM) to January 2018. To be consistent with historical soil-gas monitoring data sets and for a more technically sound historical comparison, the concentrations shown in Tables 5-4 and 5-5 for the 2012, 2013, and 2015 data sets are taken from the January sampling events that included results for all monitoring wells and sampling ports. The much more limited data sets associated with resampling in May 2012, March 2013, and March 2015 were not incorporated into Tables 5-4 and 5-5.

Consistent with pre-VE VCM characterization data and the detailed conceptual site model presented in Annex E of the CWL Corrective Measures Study Report (SNL/NM December 2004), the highest CY 2018 concentrations of TCE in soil gas remain in the central part of the vadose zone, from approximately 160 to 240 feet bgs (CWL-D1 and CWL-D2 results for the 240 foot bgs depth, 11.00 and 9.70 ppmv, respectively, and CWL-D1 result from 160 feet bgs, 10.0 ppmv).

In general, TCE and Total VOC concentrations are relatively stable and slowly decreasing throughout the vadose zone (Tables 5-4 and 5-5). When the January 2012 and January 2018 TCE and Total VOC results are compared (i.e., comparing results since monitoring began under the PCCP), 19 sampling ports show a small decrease and 2 sampling ports show a small increase. All CY 2018 TCE results below 240 feet bgs are low concentrations ranging from 6.40 ppmv (CWL-D2-350) to 0.03 ppmv (CWL-D3-480). All CY 2018 Total VOC results below 240 feet bgs are also low concentrations ranging from 8.33 ppmv (CWL-D2-350) to 0.03 ppmv (CWL-D3-480).

Table 5-3
 Statistical Assessment Results Summary
 Chemical Waste Landfill Soil-Gas Monitoring
 Calendar Year 2018

Soil-Gas Constituent Exceeding Threshold Concentration ^a	Minimum ^b (ppmv)	Maximum ^b (ppmv)	Mean ^c (ppmv)	Standard Deviation ^c	LCL ^c (ppmv)	UCL ^c (ppmv)	Distribution Type ^c	Trigger Level ^a (ppmv)	Trigger Level Exceeded ^d
Trichloroethene (4.8 ppmv)	4.1	7.1	4.847	1.02	4.098	5.596	Normal	20	No

Notes:

^aMaximum concentration from CWL-D2-470 January environmental sample. CWL Permit Attachment 1, Section 1.8.2.2, defines the threshold concentration (0.50 ppmv) and trigger level (20 ppmv). Both concentration limits apply only to soil-gas constituents detected in the three deepest sampling ports of wells CWL-D1 through CWL-D3.

^bMinimum and maximum results determined from historical data, including the CY 2018 results.

^cMean, standard deviation, LCL, UCL, and Distribution Type determined using ProUCL statistical program.

^dExceedance determined by comparing the constituent LCL against the trigger level of 20 ppmv.

CWL = Chemical Waste Landfill.

CY = Calendar year.

LCL = Lower confidence limit.

ppmv = Parts per million by volume.

UCL = Upper confidence limit.

Figures 5-1 through 5-5 show the concentration of TCE over time for each sampling port of each well. Figures 5-6 through 5-10 show the concentration of Total VOCs over time for each sampling port of each well. The figures are graphical representations of the data presented in Tables 5-4 and 5-5. The Total VOC plots for CWL-UI1 and CWL-UI2 (Figures 5-6 and 5-7) look very different than the corresponding TCE plots (Figures 5-1 and 5-2). This is because for these locations and the shallower depths represented (36 to 136 feet bgs), acetone used to occur at very high concentrations, especially at the shallowest two ports (36 and 40 feet bgs) (SNL/NM December 2004). Concentrations of Total VOCs have decreased dramatically since August 2001 at the shallowest ports of CWL-UI1 and CWL-UI2, most likely due to upward diffusion to the surface and the LE VCM completed in February 2002. TCE concentrations have generally remained consistent with some slight increases in the shallow ports of CWL-UI2 as shown in Figure 5-2, but remain low (i.e., less than 10 ppmv).

The majority of the CWL residual soil-gas plume is represented by the CWL-D1 through D3 wells that have significantly deeper sampling ports, ranging from 110 to 480 feet bgs. TCE is the primary VOC of concern, although chloroform, 1,1-dichloroethene, PCE, 1,1,2-trichloro-1,2,2-trifluoroethane, and trichlorofluoromethane were also detected in all the samples. Together with TCE, these VOCs comprise the majority of the Total VOC concentration calculated for each sample. Concentrations are generally steady or decreasing over time (Figures 5-3 and 5-4), except at the CWL-D3 location (Figure 5-5). Results collected at CWL-D3 since the PCCP was implemented (January 2012 through January 2018 results) are generally stable with all ports showing 2018 concentrations that are less than 2012 concentrations for both TCE and Total VOCs. Over the historical monitoring period, the highest TCE and Total VOC concentrations in the deepest ports (CWL-D1-470, CWL-D2-470, and DWL-D3-480) have been consistently observed at the CWL-D2-470 port (one to two orders of magnitude higher).

TCE in groundwater has only been detected in CWL-MW10, which is the closest groundwater monitoring well to CWL-D3 (see Figure 2-4). Because of the concern that VOC soil gas could potentially enter a groundwater well and contaminate groundwater samples through the upper unsaturated portion of the well screen or at casing joints that may not be air-tight, passive soil-gas venting devices (i.e., BaroBalls™) were installed on all groundwater monitoring wells in March 2012. The BaroBall™ devices remained on all groundwater and soil-gas monitoring wells throughout CY 2018 and were inspected during the sampling events. As discussed in Chapter 4, TCE concentrations in groundwater samples from CWL-MW10 have decreased since January 2013 (see Figure 4-7).

It is unlikely that the current residual VOC soil-gas plume will directly impact groundwater due to the very low residual VOC soil-gas concentrations, the capillary fringe barrier above the regional aquifer, and the declining surface of the regional aquifer beneath the CWL (Section 4.4 and Annex E of the CWL Corrective Measures Study Report [SNL/NM December 2004]). This conclusion is supported by historical and current groundwater monitoring results and statistical evaluation of CWL-MW10 results (Section 4.3) since implementation of the PCCP in June 2011.

Seven years of soil-gas monitoring under the PCCP (2012 through 2018) and previous monitoring conducted since completion of the VE VCM in July 1998 have established a clear picture of the CWL VOC soil-gas plume. Overall, the CY 2018 data set and historical post-VE VCM soil-gas monitoring results confirm the residual VOC soil-gas plume beneath the CWL is stable and slowly dissipating in three dimensions through diffusion in the vadose zone. These data and conclusions are consistent with the conceptual site model presented in Annex E of the CWL Corrective Measures Study Report (SNL/NM December 2004).

Table 5-4
 Historical Soil-Gas Monitoring Summary – TCE Concentrations^a
 Chemical Waste Landfill

Well ID & Sample Port Depth ^b	June 1998	June 1999	Aug 2001	June 2004	Sept 2004	Oct 2005	Jan ^c 2012	Jan ^c 2013	Jan 2014	Jan ^c 2015	Jan 2016	Jan 2017	Jan 2018
CWL-UI1-40	4.5	16.0	7.9	3.8	4.0	4.5	5.20	7.30	4.80	4.20	4.70	5.68	8.30
CWL-UI1-80	0.19	4.9	6.7	5.9	6.1	6.8	6.50	9.70	6.30	5.10	5.80	7.23	6.20
CWL-UI1-120	3.0	5.9	9.1	6.0	14.0	13.0	7.70	11.00	7.60	8.20	7.30	7.82	5.30
CWL-UI2-36	0.037	0.70	ND	1.6	ND	1.2	3.10	3.50	2.80	3.00	5.20	3.72	2.30
CWL-UI2-76	0.091	1.0	2.4	3.4	4.1	3.7	5.60	7.80	3.70	3.70	5.60	5.32	4.70
CWL-UI2-136	5.5	1.9	4.6	3.0	1.9	3.0	8.50	6.60	6.20	5.40	7.30	6.76	6.70
CWL-D1-100	0.220	2.5	7.1	9.8	13.0	12.0	10.00	12.00	9.90	11.00	12.00	8.04	6.10
CWL-D1-160	120.0	14.0	21.0	25.0	29.0	22.0	14.00	16.00	16.00	16.00	21.00	15.60	10.00
CWL-D1-240	160.0	44.0	44.0	34.0	34.0	24.0	22.00	23.00	19.00	17.00	27.00	20.40	11.00
CWL-D1-350	0.013	11.0	19.0	13.0	22.0	2.8	13.00	13.00	8.50	13.00	12.00	10.00	4.20
CWL-D1-470	0.077	0.17	0.25	0.25	0.27	0.34	0.51	0.08	0.16	0.11	0.20	0.17	0.19
CWL-D2-120	3.1	21.0	20.0	22.0	25.0	16.0	16.00	19.00	13.00	13.00	11.00	14.3	7.70
CWL-D2-240	ND	40.0	38.0	26.0	13.0	17.0	18.00	23.00	16.00	13.00	14.00	14.8	9.70
CWL-D2-350	0.064	12.0	18.0	11.0	17.0	5.0	11.00	13.00	9.90	8.10	10.00	9.85	6.40
CWL-D2-440	0.082	1.0	7.6	2.5	5.9	2.8	1.80	0.11	0.14	3.90	0.10	0.07	0.12
CWL-D2-470	ND	0.94	5.8	3.1	4.6	4.3	4.10	7.00	4.70	4.50	4.40	4.33	4.80
CWL-D3-120	0.009	1.1	4.0	6.0	4.9	4.5	7.00	5.30	4.10	5.20	4.10	5.77	3.50
CWL-D3-170	ND	2.5	9.9	4.5	6.6	4.4	7.90	7.20	5.40	6.40	8.50	6.36	4.70
CWL-D3-350	ND	1.6	2.4	2.2	1.5	1.4	8.80	7.80	5.30	6.60	7.80	5.61	4.50
CWL-D3-440	ND	1.8	0.26	0.75	3.4	3.3	6.80	13.00	8.20	6.80	6.30	8.09	4.80
CWL-D3-480	ND	1.9	1.2	0.2	2.1	4.1	0.21	0.03	0.04	0.30	0.02	0.11	0.03

Notes:

All results are in ppmv.

January 2012 – 2018 concentrations have been rounded for significant digit consistency; they may not exactly match the reported concentrations in corresponding data tables.

^aJune 1998 through January 2012 are EPA Method TO-14 results (EPA January 1999a). January 2013 – 2018 are EPA Method TO-15 results (EPA January 1999b). If a duplicate sample was collected, the maximum concentration of the environmental-duplicate sample pair is shown.

^bPort depth is the last number in the Well Identification (ID), and is in feet below ground surface.

^cResults associated with duplicate resampling conducted in May (2012 data set), March (2013 data set), and March (2015 data set) are not included. CWL-D3-440 results for January 2012 were collected in March 2012 due to issues with sampling this port; could not be sampled in January 2012.

EPA = U.S. Environmental Protection Agency.

ND = Not detected.

TCE = Trichloroethene.

ppmv = Parts per million by volume.

Table 5-5
 Historical Soil-Gas Monitoring Summary – Total Volatile Organic Compound Concentrations^a
 Chemical Waste Landfill

Well ID & Sample Port Depth ^b	June 1998	June 1999	Aug 2001	June 2004	Sept 2004	Oct 2005	Jan ^c 2012	Jan ^c 2013	Jan 2014	Jan ^c 2015	Jan 2016	Jan 2017	Jan 2018
CWL-UI1-40	112	246	141	11.78	11.47	13.15	11.76	14.68	9.54	9.27	9.14	11.31	11.46
CWL-UI1-80	0.22	9.63	13	10.61	10.67	11.61	10.18	13.74	9.43	8.74	8.63	10.69	8.91
CWL-UI1-120	6.32	9.94	45.42	9.36	21.41	19.18	11.07	14.64	11.20	13.29	10.15	10.83	10.50
CWL-UI2-36	17.6	2117	1800	813.7	850.0	391.78	4.64	5.02	4.81	5.37	7.63	5.47	3.24
CWL-UI2-76	0.126	1.65	4.37	5.52	6.90	5.96	7.85	10.74	6.04	6.28	8.32	7.52	6.39
CWL-UI2-136	10.5	4.21	7.98	4.42	2.85	4.89	11.45	9.12	9.31	9.16	9.89	9.24	8.69
CWL-D1-100	0.248	4.93	11.9	14.59	18.22	17.25	13.84	15.90	14.25	17.41	16.36	11.21	8.42
CWL-D1-160	167	21.4	30.1	33.32	38.41	29.28	18.48	20.33	21.45	20.78	27.27	20.62	13.00
CWL-D1-240	261	78.4	61.5	45.27	44.74	32.60	22.46	28.71	25.32	26.04	34.14	26.60	13.76
CWL-D1-350	0.02	20.7	31.7	18.73	30.53	4.07	16.56	16.31	11.61	19.29	15.44	12.94	5.65
CWL-D1-470	0.105	0.231	0.921	0.612	0.82	0.603	0.87	0.13	0.39	0.44	0.63	0.52	0.43
CWL-D2-120	5.4	33.0	29.4	29.26	34.23	22.31	20.70	24.05	18.49	18.81	15.37	19.41	10.17
CWL-D2-240	0.047	101	52.9	34.72	17.62	22.83	22.90	28.38	22.11	18.27	19.08	19.52	12.47
CWL-D2-350	0.091	22.9	25.9	15.42	23.41	7.50	13.31	16.01	16.04	12.64	13.86	12.70	8.33
CWL-D2-440	0.453	4.38	11.8	3.85	9.29	4.17	2.60	0.15	0.22	6.15	0.15	0.12	0.16
CWL-D2-470	0.058	6.95	8.40	4.17	6.60	6.40	5.78	8.49	10.14	8.14	5.90	5.77	6.18
CWL-D3-120	0.009	2.17	6.20	8.39	7.10	6.23	9.19	6.80	6.92	8.83	5.55	7.63	4.59
CWL-D3-170	0.037	5.01	15.0	6.11	9.40	6.12	10.57	9.18	8.83	10.38	11.25	8.43	6.11
CWL-D3-350	0.106	2.76	3.98	3.39	2.34	2.27	12.90	10.44	9.12	11.15	10.40	7.48	5.86
CWL-D3-440	0.017	4.04	0.519	0.96	5.14	4.64	9.69	17.73	12.60	11.12	8.59	10.69	6.22
CWL-D3-480	0.001	4.47	1.85	0.31	3.30	5.71	0.30	0.06	0.05	0.43	0.34	0.15	0.03

Notes:

All results are in ppmv.

January 2012 - 2018 concentrations have been rounded for significant digit consistency; they may not exactly match the reported concentrations in corresponding data tables.

^aThe Total VOC concentration is the sum of all detected constituents. June 1998 through January 2012 are EPA Method TO-14 results (EPA January 1999a). January 2013 – 2018 are EPA Method TO-15 results (EPA January 1999b). If a duplicate sample was collected, the maximum concentration of the environmental-duplicate sample pair is shown.

^bPort depth is the last number in the Well Identification (ID), and is in feet below ground surface.

^cResults associated with duplicate resampling conducted in May (2012 data set), March (2013 data set), and March (2015) are not included. CWL-D3-440 results for January 2012 were collected in March 2012 due to issues with sampling this port; could not be sampled in January 2012.

EPA = U.S. Environmental Protection Agency. VOC = Volatile organic compound.
 ppmv = Parts per million by volume.

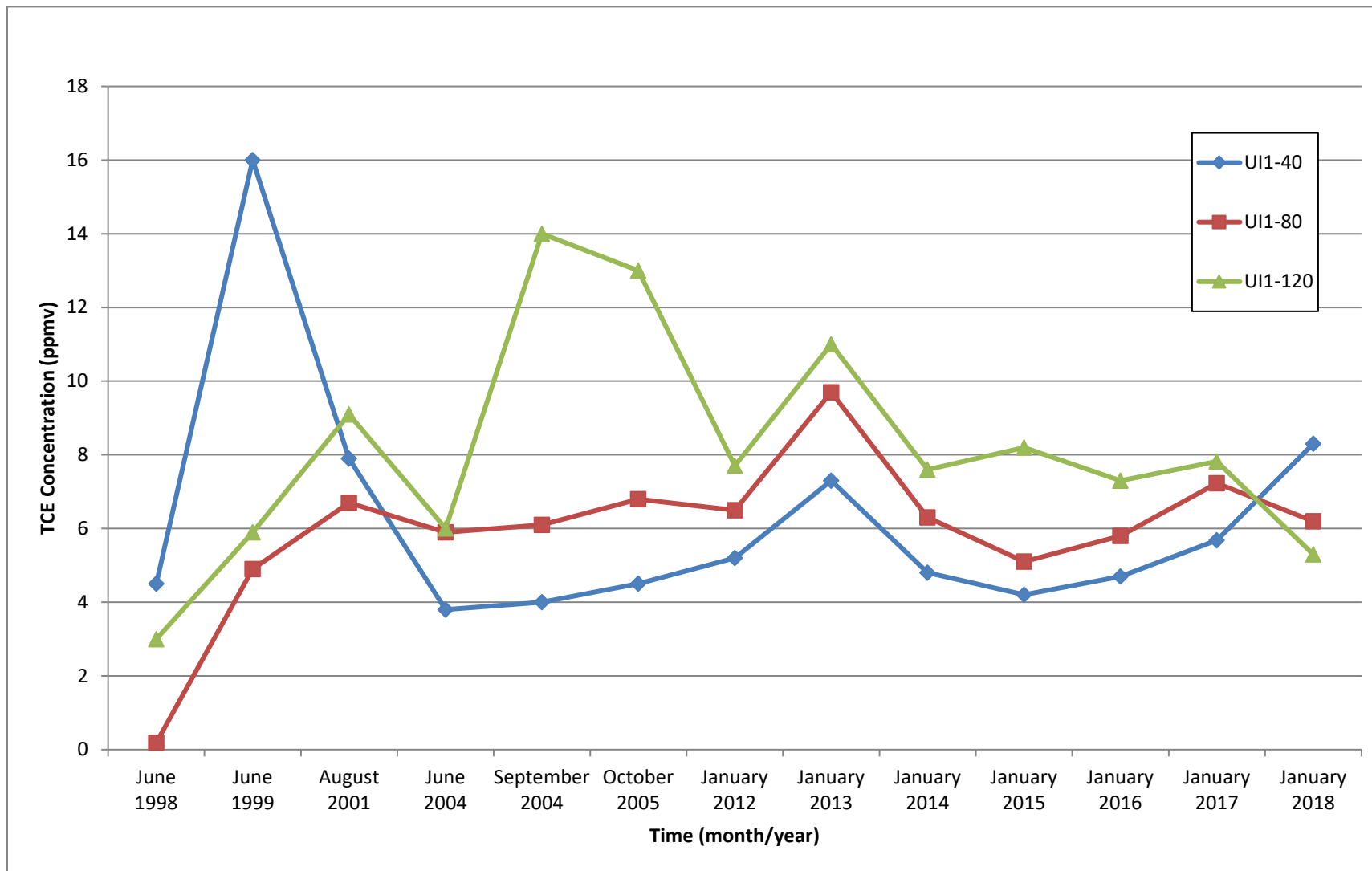


Figure 5-1
Historical TCE Concentrations vs. Time
Chemical Waste Landfill Well UI-1 Ports

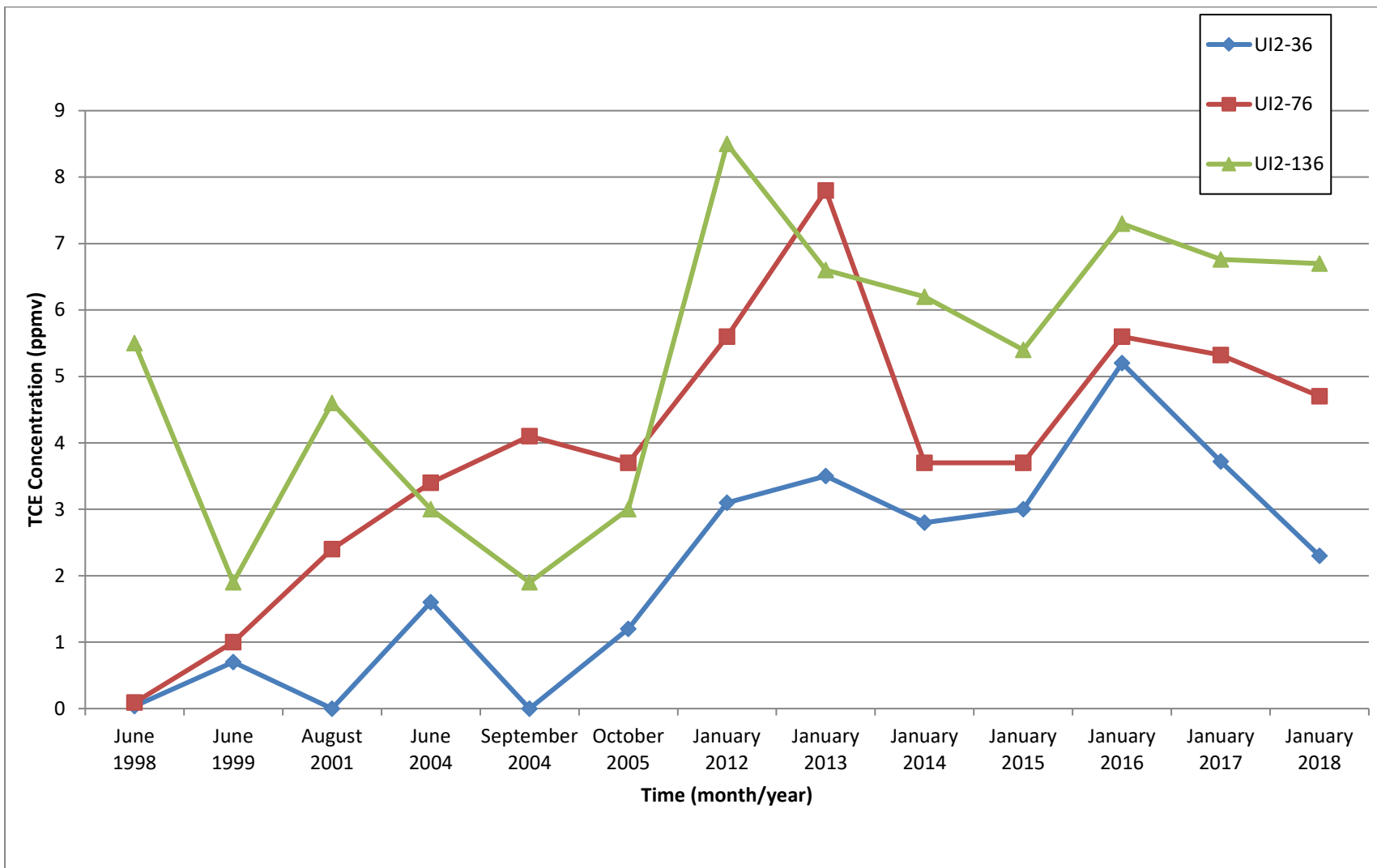


Figure 5-2
 Historical TCE Concentrations vs. Time
 Chemical Waste Landfill Well UI-2 Ports

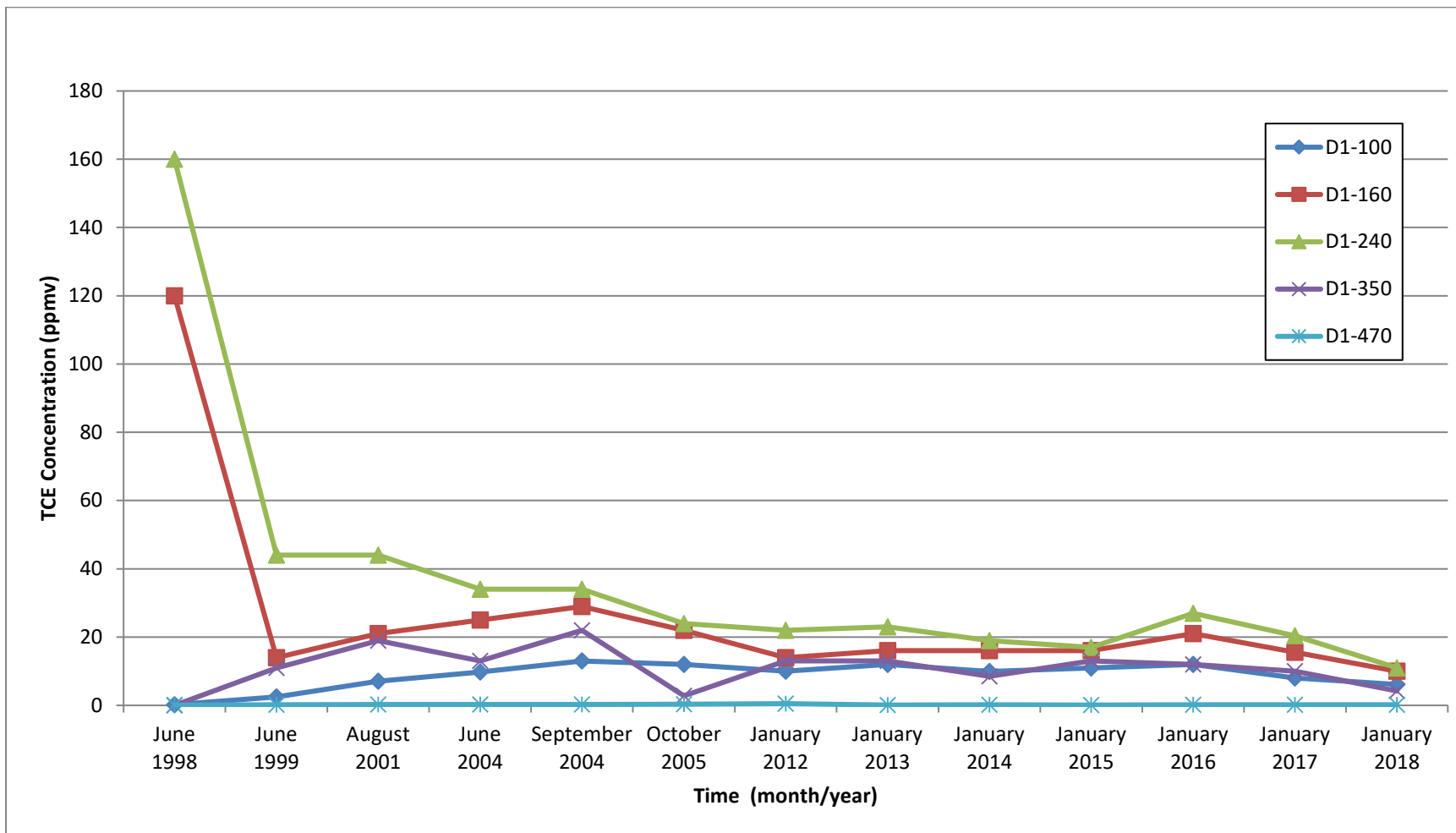


Figure 5-3
 Historical TCE Concentrations vs. Time
 Chemical Waste Landfill Well D1 Ports

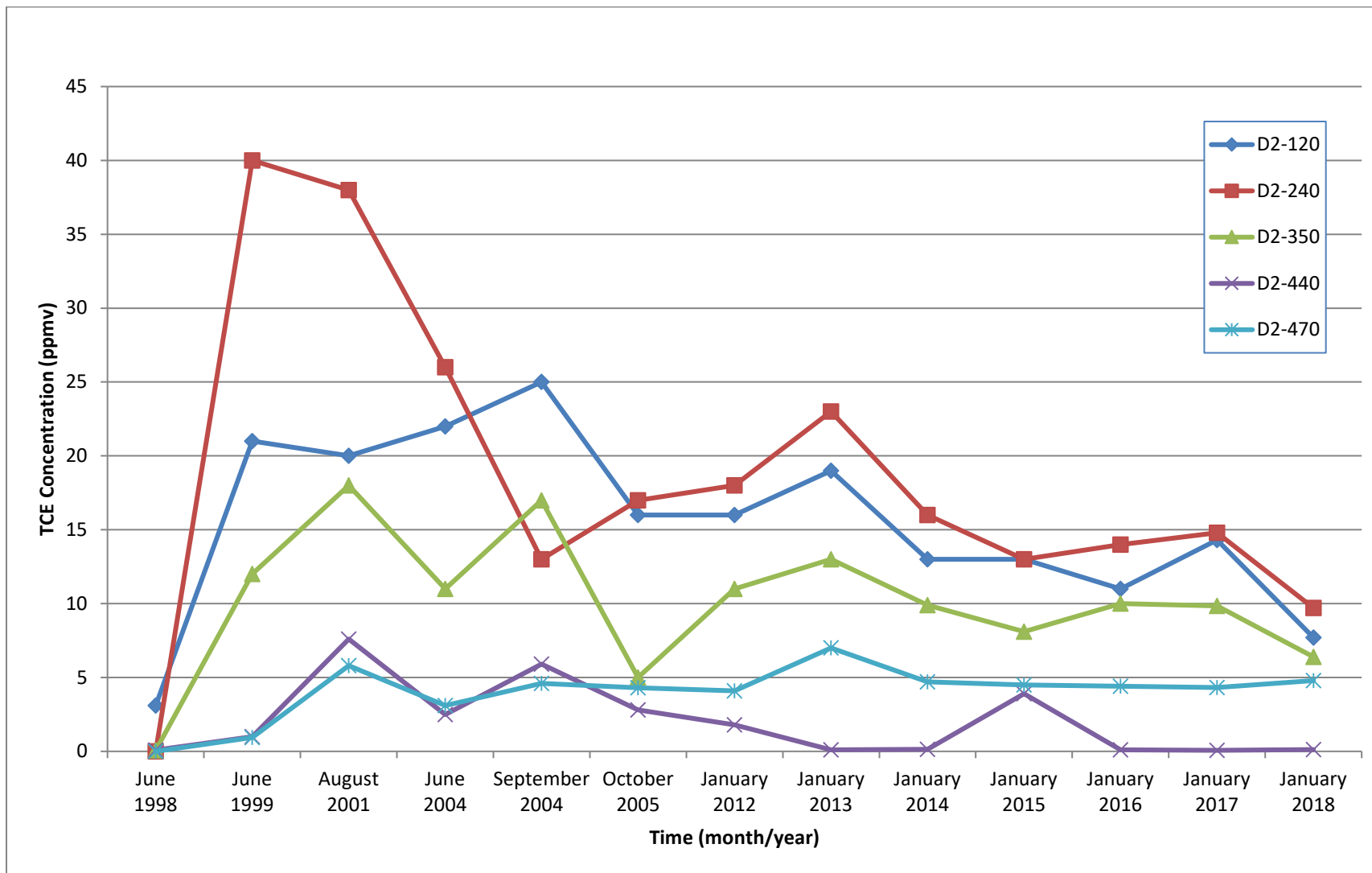


Figure 5-4
 Historical TCE Concentrations vs. Time
 Chemical Waste Landfill Well D2 Ports

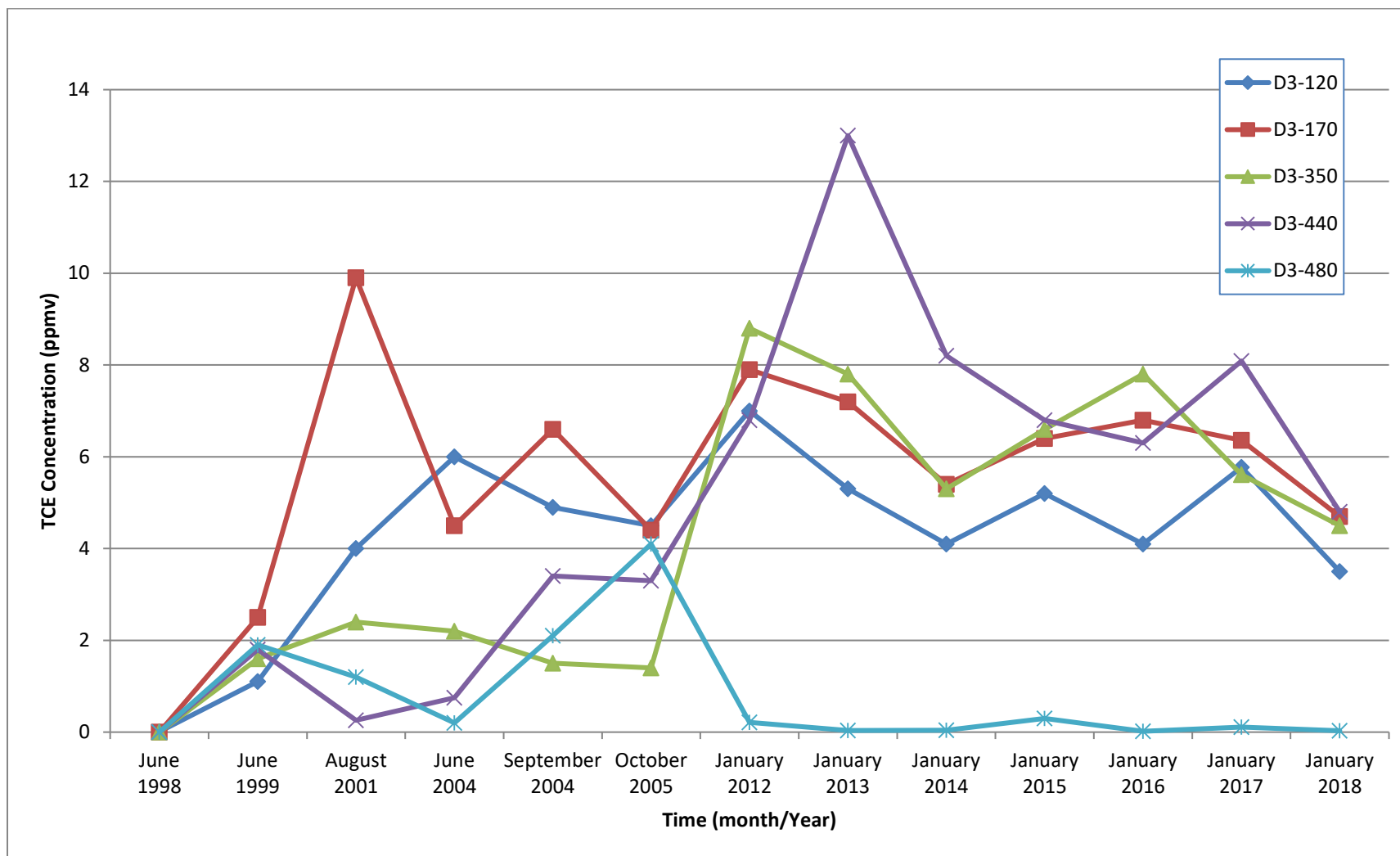


Figure 5-5
 Historical TCE Concentrations vs. Time
 Chemical Waste Landfill Well D3 Ports

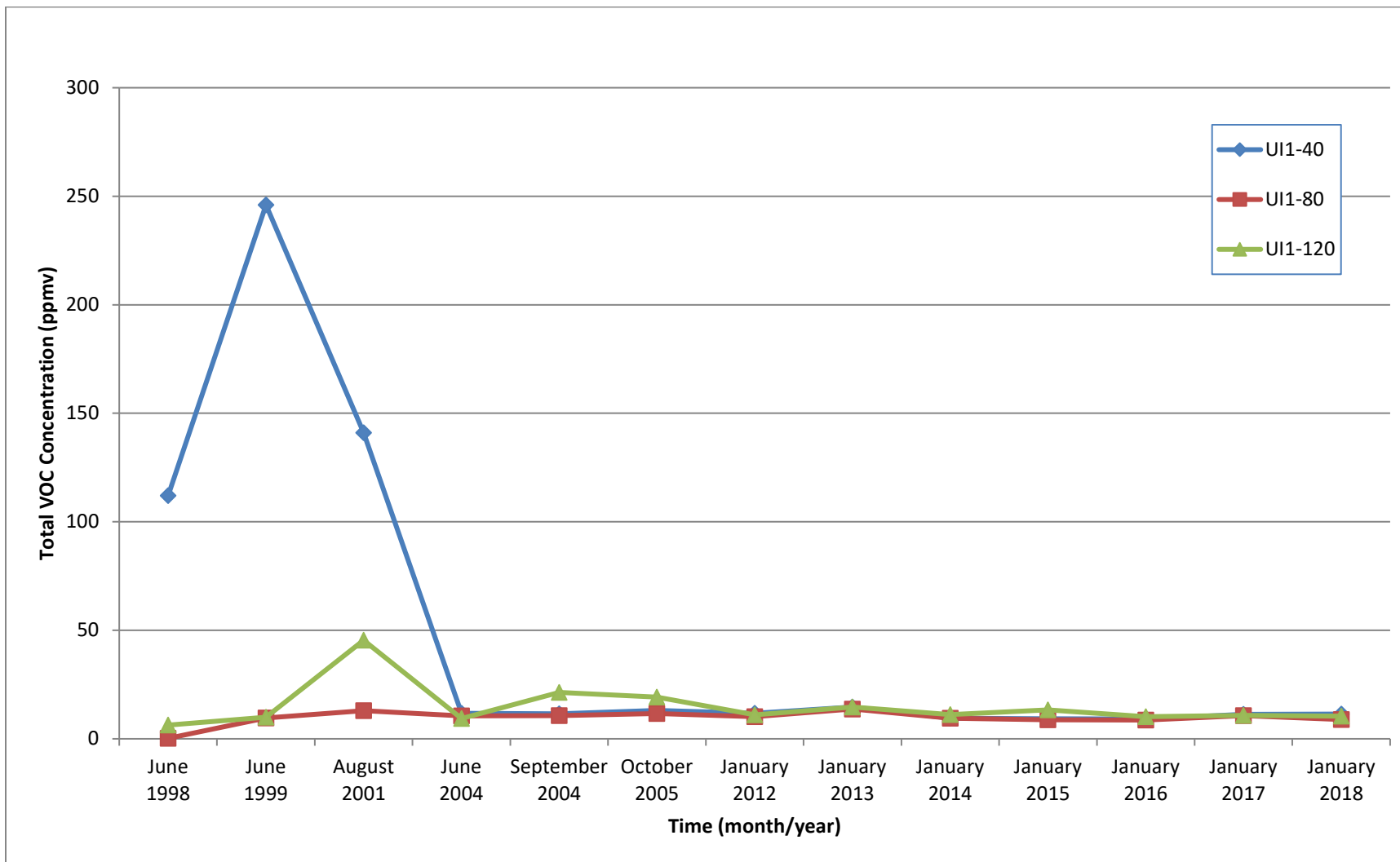


Figure 5-6
Historical Total Volatile Organic Compound Concentrations vs. Time
Chemical Waste Landfill Well UI-1 Ports

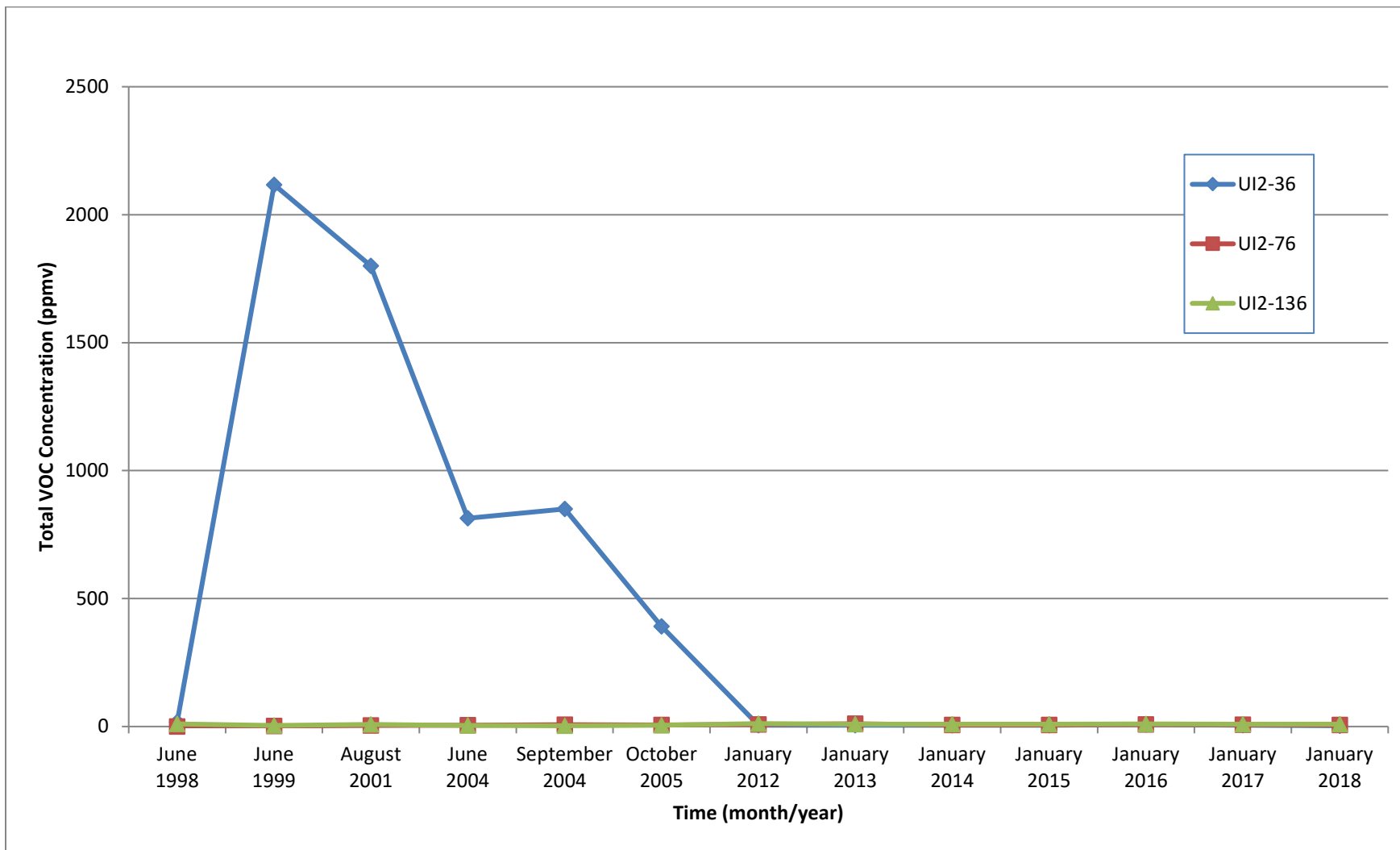


Figure 5-7
Historical Total Volatile Organic Compound Concentrations vs. Time
Chemical Waste Landfill Well UI-2 Ports

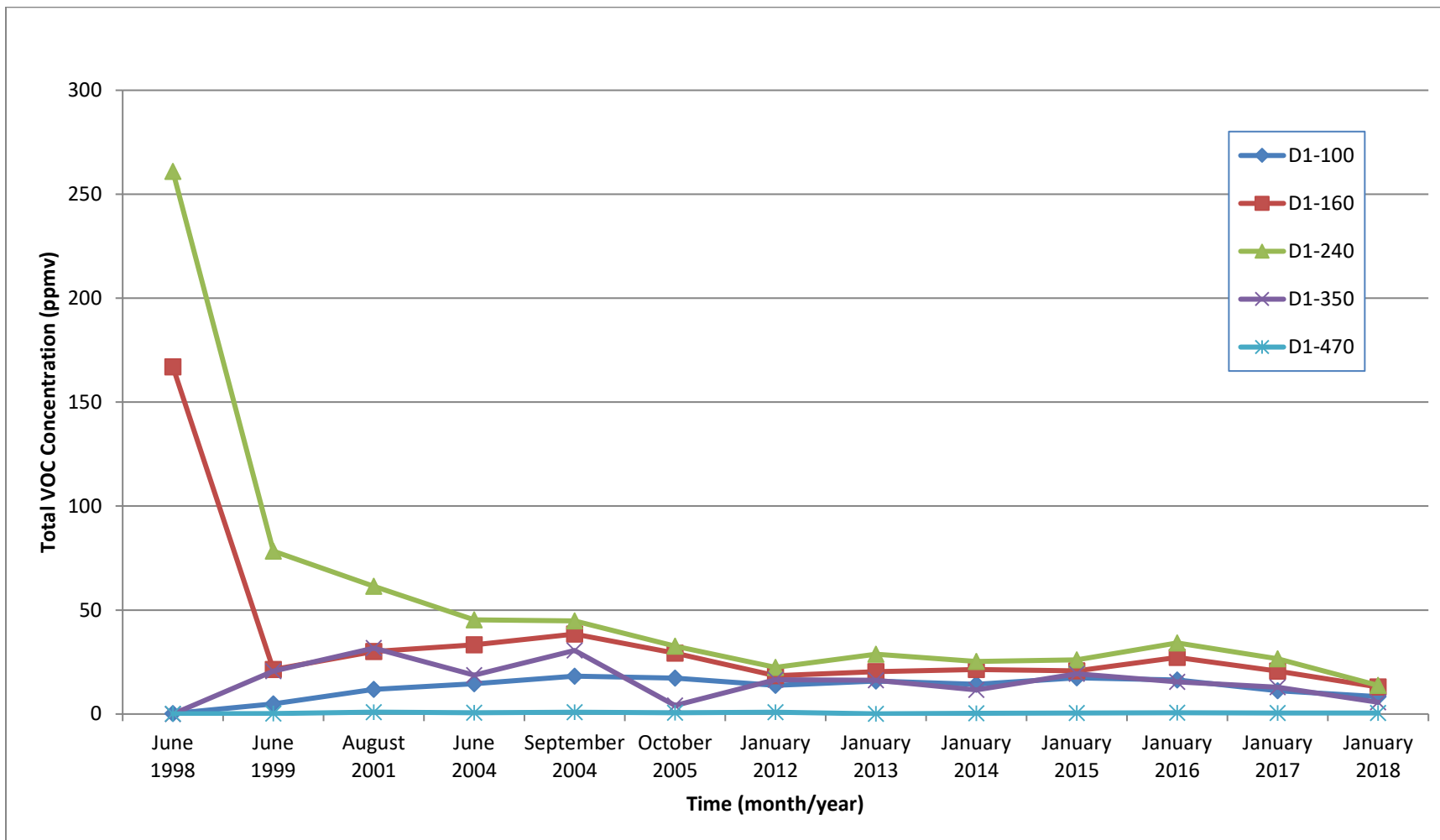


Figure 5-8
 Historical Total Volatile Organic Compound Concentrations vs. Time
 Chemical Waste Landfill Well D1 Ports

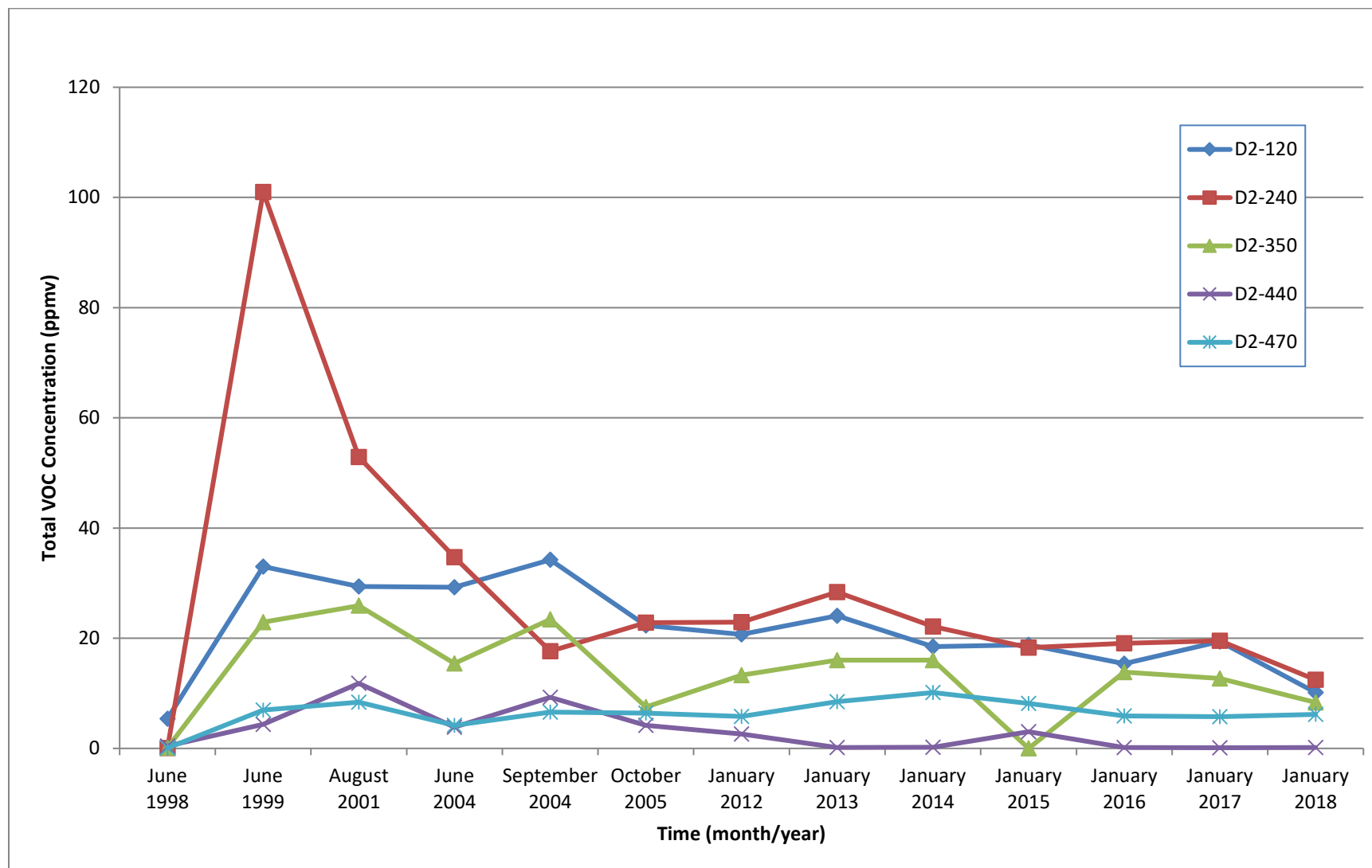


Figure 5-9
 Historical Total Volatile Organic Compound Concentrations vs. Time
 Chemical Waste Landfill Well D2 Ports

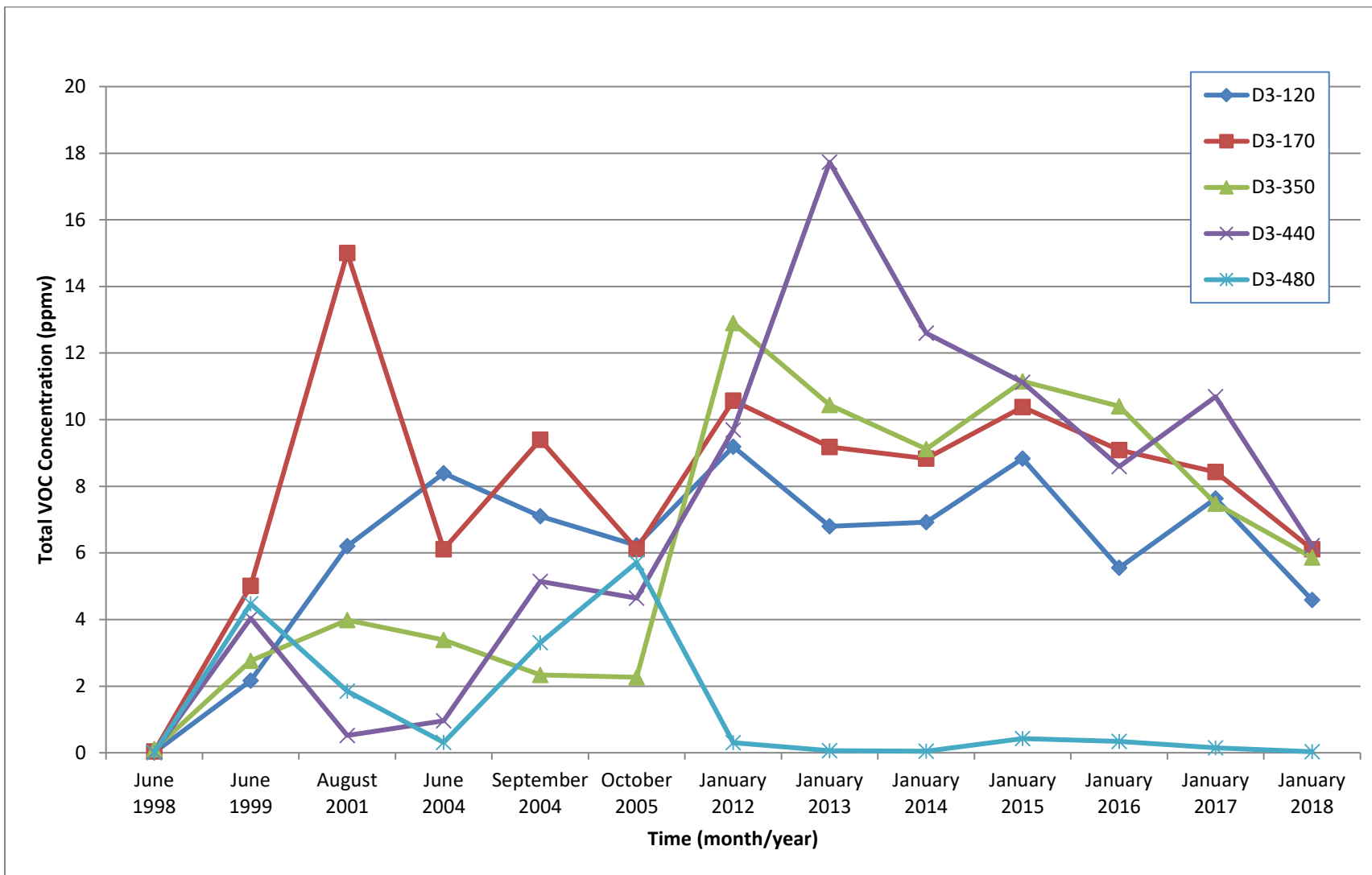


Figure 5-10
 Historical Total Volatile Organic Compound Concentrations vs. Time
 Chemical Waste Landfill Well D3 Ports

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6.0 INSPECTION, MAINTENANCE, AND REPAIR RESULTS

This chapter presents a summary of CY 2018 inspection, maintenance, and repair activities. Requirements for inspection, maintenance, and repair are presented in Section 3.2 of this report. The CWL post-closure care systems and features that require periodic inspection, maintenance, and/or repair include:

- Final cover system (vegetation and cover);
- Surface water diversion structures;
- Compliance monitoring system (groundwater and soil-gas monitoring networks and sampling equipment);
- Perimeter security fence (including signs, gates, locks, and survey monuments); and
- Emergency equipment.

A schedule for implementing inspections and prescribed maintenance is provided in PCCP Attachment 1, Section 1.10, Table 1-6. CY 2018 inspections are summarized in Sections 6.1 through 6.5 and results are documented on the CWL Post-Closure Inspection Forms/Checklists provided in Annex C of this report, in conformance with the requirements in PCCP Attachment 1, Section 1.9 and 1.10 (NMED October 2009 and subsequent revisions). ET Cover maintenance and/or repair work performed by the ET Cover maintenance contractor in response to the inspections and/or as best practice (i.e., beneficial maintenance and/or repair work not required by the PCCP) is described in Section 6.6.

6.1 Final Cover System

The final cover system includes the ET Cover vegetation and the cover surface. ET Cover vegetation is inspected by the staff biologist annually, documented on the Biology Inspection Form/Checklist for the CWL Cover, and summarized in Section 6.1.1. The ET Cover surface is inspected quarterly by a field technician, documented on the Post-Closure Inspection Form/Inspection Checklist, and summarized in Section 6.1.2.

6.1.1 Vegetation Monitoring and Inspection

The annual Biology Inspection of the ET Cover vegetation was conducted on September 11, 2018 by the SNL/NM staff biologist (Inspection Form in Annex C). The inspection was conducted at the end of the New Mexico growing season so an accurate determination of living plants at the site could be performed. The ET Cover continues to meet PCCP requirements for successful revegetation, with 39 percent total foliar coverage, of which 99 percent is comprised of native species. The PCCP requirement is 20 percent total foliar coverage, of which 50 percent or more must be comprised of native species. No barren areas exceeding 200 square feet or large mammal burrows (i.e., greater than four inches in diameter) were observed during

the annual biology inspection. Ant hills/burrows were observed at frequencies and locations similar to previous inspections. In general, the level of weedy plant species present on the ET Cover was very low.

The 2018 Chemical Waste Landfill Biology Report is presented in Annex D of this report and includes a summary of local climate trends, the successional development of the native grasses, ET Cover photographs, a summary of 2018 observations, and staff biologist recommendations.

6.1.2 Cover Inspection

Quarterly cover surface inspections were performed by a field technician on March 9, June 12, September 12, and December 4, 2018. During all but the September inspection, a staff biologist also performed a supplemental quarterly biology inspection. During September, the annual ET Cover biology inspection (see Section 6.1.1) and a quarterly cover inspection were performed independently. Based on the quarterly inspections the ET Cover surface and vegetation was in good condition throughout CY 2018 and no maintenance and/or repairs were required. Cover and site maintenance performed during CY 2018 by the ET Cover maintenance contractor is summarized in Section 6.6.

6.2 Storm-Water Diversion Structure Inspection

Quarterly inspections of storm-water diversion structures were performed by a field technician on March 9, June 12, September 12, and December 4, 2018 at the same time as the cover surface inspections. Minor maintenance performed during or after the inspections based on PCCP requirements is summarized below. No additional storm-water diversion structure inspection items or issues required repairs.

During the March and June inspections, wind-blown tumbleweeds were identified in the drainage culverts along the southern perimeter. The debris was removed in April and June 2018, respectively, within 60 days of the inspection as documented on the respective Inspection Forms. Removal was performed by the ET Cover maintenance contractor in April and by the field technician at the time of the inspection in June.

6.3 Monitoring Well Network Inspection

Semiannual inspection of the groundwater monitoring network and sampling equipment was performed by a field technician during the January and July 2018 monitoring events on the first day. In January, the annual inspection for the soil-gas monitoring wells and sampling equipment was also performed. No inspection items or issues required repairs based on these inspections. BaroBall™ passive venting devices remain on all soil-gas and groundwater monitoring wells, and are in good condition.

Additional groundwater monitoring equipment inspections were performed prior to and after sampling each monitoring well during both semiannual events. Any observations and follow-up actions associated with these inspections are documented in Section 4.1.2. The January soil-gas monitoring event was completed in one day.

6.4 Security Fence Inspection

Quarterly inspections of the security fence, access controls (gates, locks, signs), and survey monuments were performed by a field technician on March 9, June 12, September 12, and December 4, 2018 at the same time as the cover surface inspections. Minor maintenance and/or repairs performed during or after the inspections based on PCCP requirements are summarized below. No additional inspection items or issues required repairs.

During the March, June, September, and December inspections, wind-blown tumbleweeds were identified on the perimeter fence. Removal was performed by the ET Cover maintenance contractor in April and by the field technician at the time of the inspection in June, September, and December. All removals were performed within 60 days of the inspection and are documented on the respective Inspection Forms. Tumbleweed debris and sediment partially covering the western-most survey monument was removed by the field technician during the June inspection. During the September inspection sediment was again removed from this monument, two gate locks were replaced (not closing properly), and six faded signs on the fence were replaced.

6.5 Emergency Equipment Inspection

For the CWL, quarterly inspection of emergency equipment listed in PCCP Attachment 6, Table 6-4, is required. This equipment is shared with the CAMU, and monthly inspections are performed and documented on CAMU inspection forms. Any repairs or replacement of equipment are performed, as necessary, to maintain compliance with requirements for emergency equipment.

6.6 Cover and Site Maintenance

Cover and site maintenance performed during CY 2018 by the ET Cover maintenance contractor is summarized below. ET Cover maintenance continued in 2018 with the long-range goal of establishing healthy, self-sustaining native grasses on the CWL ET Cover and perimeter areas by reducing competition with weedy species for limited moisture and nutrients. Removal of live and dead weed material helps reduce the availability of weed seeds, future weed growth, and future maintenance efforts.

Maintenance was performed in response to inspections and as recommended by the staff biologist as best practice. Inspection-required maintenance is described above and involved manually clearing the perimeter fence and storm-water diversion features of wind-blown tumbleweed debris. The two maintenance events conducted in April and October 2018 are described below and in addition involved best practice maintenance to remove live and dead weeds from the ET Cover and perimeter areas.

April 23 - 24, 2018

Wind-blown, dead weeds (primarily tumbleweeds) identified during the March 29, 2018 quarterly inspection were removed from the perimeter fence, the area between the fence and road on the south and west sides of the ET Cover, and northern and southern storm-water diversion

features over a two-day period. A total of approximately 14.5 cubic yards (one trailer load) of highly compressed weeds were removed and disposed at the KAFB Landfill.

October 25 – 26, 2018

Wind-blown, dead weeds (primarily tumbleweeds) were removed from the perimeter fence, area between the fence and road on the south and west sides of the ET Cover, northern and southern storm-water diversion features, and the ET Cover by hand and/or using pitch forks and rakes. Live weeds were also removed from the ET Cover and 3-foot area outside the perimeter fence using the same method. This best practice maintenance effort removed live and dead weeds and cleared the open spaces between the native grass clumps on ET Cover, providing more space for the living grass clumps. A total of approximately 13 cubic yards (quarter-full trailer load) of highly compressed weeds were removed and disposed at the KAFB Landfill.

7.0 REGULATORY ACTIVITIES

On June 2, 2011, the NMED approved closure of the CWL and the PCCP took effect (Kieling June 2011). Regulatory activities in CY 2018 consisted of one submittal of four updated reference documents cited in the PCCP and submittal of the CY 2017 Chemical Waste Landfill Annual Post-Closure Care Report (SNL/NM March 2018). These activities are summarized below in Section 7.2. NMED-approved permit modifications and DOE/Sandia Corporation and DOE/NTESS submittals since the PCCP became effective are summarized in Section 7.4.

7.1 2018 Permit Modification Requests

There were no modifications to the CWL PCCP in the CY 2018 reporting period.

7.2 2018 Permit Submittals

On February 8, 2018, DOE and NTESS submitted four updated reference documents cited in the PCCP in accordance with requirement of Attachment 2, Section 2.0 of the PCCP (Harrell February 2018). Revisions included updates to keep the reference documents current and to reflect ongoing modifications and improvements in industry practices. The revised reference documents became effective on January 23, 2018.

On March 12, 2018, DOE and NTESS submitted the Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2017 to NMED (SNL/NM March 2018). NMED approved the report on March 29, 2018 (Kieling March 2018).

7.3 2018 Technical Communication

There were no technical communications with NMED staff regarding CWL activities in CY 2018.

7.4 Permit Modification and Submittal History

Table 7-1 summarizes the modification history of the PCCP through CY 2018. Table 7-2 summarizes all submittals associated with the PCCP through CY 2018, not including routine annual reports.

Table 7-1
 Chemical Waste Landfill Post-Closure Care Permit Modification History

Date of Modification ^a	Affected Parts of PCCP	Description of Modification
September 26, 2011	Attachment 6 (Contingency Plan)	Updates to emergency response agreements, equipment, emergency coordinators, and inclusion of an evacuation route and assembly point figure and updated figure list.
November 16, 2011	Attachment 6 (Contingency Plan)	Correction of a typographical error in the telephone number for an emergency coordinator.
February 20, 2012	Attachments 1-5	Allow use of equivalent soil-gas passive venting devices and alternate method for analysis of soil-gas samples; clarification of cover inspection and repair specifications; updates to three figures for well locations; revisions to groundwater purging and stability requirements; inclusion of well completion diagrams for the four groundwater monitoring wells, updates to the list of operating procedures; clarification of soil-gas purging requirements; format updates to inspection forms; and correction of typographical errors.
November 7, 2013	Permit Part 3, Attachments 1-4	Provide clarification that alternative formats may be used to document inspections; provide additional detail regarding soil-gas passive venting devices; remove table and text references to the SNL/NM SOW for Analytical Laboratories, the SMO QAPP, and the Groundwater Monitoring HASP; and clarify data quality requirements for soil-gas samples.
February 23, 2017	Permit Parts 1 and 2; Permit Attachments 1, 2, 3, and 6	Revise, from two to one, the number of copies of submittals to be made to NMED; update the list of agencies with whom SNL/NM has coordination agreements; update reference test methods and revisions to certain laboratory quality control requirements in the groundwater sampling and analysis plan; revise the soil-gas sampling and analysis plan; and revise text in the Contingency Plan.
May 1, 2017	Permit Parts 1 and 2, Permit Attachments 1 and 6	Revise name of the Operator at SNL/NM from Sandia Corporation to National Technology & Engineering Solutions of Sandia, LLC (NTESS).

Notes:

^aDate represents the effective date of modification.

HASP = Health and Safety Plan.

NMED = New Mexico Environment Department.

PCCP = Post-Closure Care Permit.

QAPP = Quality Assurance Project Plan.

SMO = Sample Management Office.

SNL/NM = Sandia National Laboratories/New Mexico.

SOW = Statement of Work.

Table 7-2
 Chemical Waste Landfill Post-Closure Care Permit Document Submittal History^a

Date of Submittal ^b	PCCP Requirement	Description of Submittal
July 22, 2011	Permit Attachments 2 & 3	Procedures, plans, and documents cited in the PCCP used by SNL/NM personnel for groundwater and soil-gas monitoring.
February 7, 2012	Permit Attachment 2	Four procedures and one plan related to groundwater monitoring activities were updated to include minor changes that do not affect sampling procedures or protocols. Two title changes to procedures incorporated into the November 2011 Class 1 permit modification request.
January 24, 2013	Permit Attachments 2 & 3	Updates to reference document (SNL/NM Statement of Work for Analytical Laboratories) related to groundwater and soil-gas monitoring to reflect ongoing modifications and improvements in industry practices.
December 9, 2013	Permit Attachments 2 & 3	Revisions to three procedures related to sample management, shipping, and data review that were revised to keep the documents current and reflecting ongoing modifications and improvements in industry practices.
July 8, 2014	Permit Attachments 2 & 3	Two operating procedures cited in the PCCP used by SNL/NM personnel to validate analytical data from contract laboratories and conduct activities related to sampling CWL soil-gas wells.
February 18, 2015	Permit Attachment 2	Four operating procedures related to groundwater monitoring activities were updated to include minor changes that do not affect sampling procedures or protocols.
May 20, 2016	Permit Attachments 2 & 3	Two operating procedures cited in the PCCP used by SNL/NM personnel to package and ship CWL monitoring event samples and to complete contract verification reviews of laboratory analytical results.
November 4, 2016	Permit Attachments 2 & 3	Two operating procedures cited in the PCCP used by SNL/NM personnel to conduct activities related to sampling at the CWL and process soil-gas and groundwater samples.
July 11, 2017	Permit Attachments 2 & 3	One operating procedure cited in the PCCP used by SNL/NM personnel to validate analytical data from contract laboratories.
February 8, 2018	Permit Attachment 2	Four operating procedures related to groundwater monitoring activities were updated to include minor changes that do not affect sampling procedures or protocols.

Notes:

^aThis table does not include the submittal of routine CWL Annual Post-Closure Care Reports.

^bDate represents the date stamp on the DOE transmittal letter for the submittal.

CWL = Chemical Waste Landfill.

DOE = U.S. Department of Energy.

PCCP = Post-Closure Care Permit.

SNL/NM = Sandia National Laboratories/New Mexico.

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8.0 SUMMARY AND CONCLUSIONS

A summary of CY 2018 activities and results is provided in this chapter, along with conclusions.

8.1 Groundwater and Soil-Gas Monitoring

Semiannual groundwater monitoring events were conducted in January and July 2018. There were no variances or non-conformances. Analytical and statistical assessment results are consistent with previous years. There was no statistically significant evidence of increasing contamination and no hazardous constituent concentration limits were exceeded. Groundwater surface elevation, hydraulic gradient, flow direction, and groundwater flow rate have been determined and are consistent with previous year's results.

One annual soil-gas monitoring event was conducted in January 2018. There were no variances. Analytical and statistical assessment results are consistent with previous years. There were no exceedances of trigger levels. Seven years of soil-gas monitoring under the PCCP and previous monitoring conducted since completion of the VE VCM in July 1998 have established a clear picture of the CWL VOC soil-gas plume. CY 2018 soil-gas monitoring results continue to confirm the residual VOC soil-gas plume beneath the CWL is stable and slowly dissipating in three dimensions through diffusion in the vadose zone.

8.2 Inspections and Maintenance

Inspections of the CWL final cover system, storm-water diversion structures, compliance monitoring system, and security fence were performed in accordance with PCCP requirements. Required repairs were minor and generally performed during the inspections. Repairs included removal of tumbleweeds from the storm-water diversion features and perimeter fence and clearing tumbleweeds and soil from survey monuments.

The ET Cover continues to meet successful revegetation criteria. As documented in the September 2018 annual inspection, the ET Cover is in good condition with even coverage of mature, native perennial grasses. CY 2018 ET Cover maintenance was performed in April and October in response to the inspections and as best practice for ET Cover vegetation. CY 2018 ET Cover maintenance included removal of dead and live weeds from the ET Cover and 3-foot area outside the fence, and removal of dead, wind-blown weeds from the perimeter fence; western and southern perimeter areas between the fence and road; and all storm-water diversion features on the north and south sides of the site. The purpose of ongoing maintenance efforts is to promote the growth and health of the desired native grass species on the ET Cover by reducing competition with weedy species for limited moisture and nutrients. Removal of live and dead weeds also helps reduce the availability of weed seeds, future weed growth, and future maintenance efforts.

8.3 Regulatory Activities

Regulatory activities in CY 2018 included one submittal of four updated reference documents cited in the PCCP (Harrell February 2018) and submittal of the Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2017 (SNL/NM March 2018).

8.4 Conclusions

All PCCP monitoring, inspection, and maintenance/repair requirements have been met for CY 2018. This CWL Annual Post-Closure Care Report documents all activities and results as required by PCCP Attachment 1, Section 1.12. Based upon monitoring, inspection, and maintenance results, the ET Cover is performing as designed and site conditions remain protective of human health and the environment. Industrial land use is being maintained for the CWL consistent with PCCP requirements.

9.0 REFERENCES

EPA, see U.S. Environmental Protection Agency.

Harrell, J.P., February 2018. "Submittal of Updated Reference Documents Cited in the Chemical Waste Landfill Post-Closure Care Permit, Sandia National Laboratories, New Mexico, Environmental Protection Agency Identification Number NM5890110518," U.S. Department of Energy, February 8, 2018.

Kieling, J.E., June 2011. "Notice of Approval, Closure of Chemical Waste Landfill and Post-Closure Care Permit in Effect, Sandia National Laboratories, EPA ID No. NM5890110518, HWB-SNL-10-013," New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, June 2, 2011.

Kieling, J.E., February 2012. "Approval, Class 1 Modification to Chemical Waste Landfill Post-Closure Care Permit for Sandia National Laboratories, November 2011, Sandia National Laboratories, EPA ID No. NM5890110518, HWB-SNL-11-015," New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, February 20, 2012.

Kieling, J.E., March 2018. "Approval Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2017, March 2018, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-18-003," New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, March 29, 2018.

New Mexico Environment Department (NMED), October 2009. "Resource Conservation and Recovery Act, Post-Closure Care Permit, EPA ID No. NM5890110518, to the U.S. Department of Energy/Sandia Corporation, for the Sandia National Laboratories Chemical Waste Landfill," New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, October 15, 2009.

NMED, see New Mexico Environment Department.

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Sandia National Laboratories/New Mexico (SNL/NM), October 1995. "Chemical Waste Landfill Groundwater Assessment Report," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), December 2004. "Chemical Waste Landfill Corrective Measures Study Report," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), September 2010. "Chemical Waste Landfill Final Resource Conservation and Recovery Act Closure Report," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), June 2017. "Data Validation Procedure for Chemical and Radiochemical Data," (AOP 00-03), Sample Management Office, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), March 2018. "Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2017," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), June 2018. "Calendar Year 2017 Annual Groundwater Monitoring Report," SAND2017-5876 R, Sandia National Laboratories, Albuquerque, New Mexico.

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U.S. Environmental Protection Agency (EPA), November 1986. "Test Methods for Evaluating Solid Waste," 3rd ed., Update 3, SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), January 1999a. "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition, Compendium Method TO-14A," Center for Environmental Research Information, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio.

U.S. Environmental Protection Agency (EPA), January 1999b. "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition, Compendium Method TO-15," Center for Environmental Research Information, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio.

ANNEX A
Chemical Waste Landfill
Calendar Year 2018 Groundwater Monitoring Forms and Reports

Field Forms

Data Validation Reports

Contract Verification Reports

FIELD SAMPLING FORMS

CWL POST-CLOSURE CARE GROUNDWATER MONITORING

Form Title	Corresponding Procedure
Tailgate Safety Briefing	PLA 05-09
Groundwater Sample Collection Field Equipment Check Log	FOP 05-02
Portable Pump and Tubing/Water Level Indicator Decontamination Log Form	FOP 05-03
Field Measurement Log For Groundwater Sample Collection	FOP 05-01
Analysis Request and Chain of Custody*	LOP 94-03

*Completed AR/COC forms are provided in the Data Validation Section of this Annex.

FIELD SAMPLING FORMS
JANUARY 2018 GROUNDWATER MONITORING

HEALTH & SAFETY MEETING FORM

Dept: 0641 Facility: 9925 Date: 01/12/18 Time: 1245

Activities: Pre-CWL Pump Decon
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:
 Temp: 47 °F Wind Speed: 5 MPH Humidity: 33 % Wind Chill: NA °F

Chemicals Used: None Preservatives in sample bottles Other: _____
 Hospital/Clinic: Sandia Medial Clinic Bldg. 831 Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input type="checkbox"/> Be aware of electrical hazards	<input type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or **NO**. If answered YES explain.

Attendees

Robert Lynch
 Printed Name

William Gibson
 Printed Name

 Printed Name

 Printed Name

 Printed Name

 Printed Name

Robert Lynch
 Signature

William Gibson
 Signature

 Signature

 Signature

 Signature

 Signature

Notes

HEALTH & SAFETY MEETING FORM

Dept: 0641 Facility: CWL-BW 5 Date: 01/15/18 Time: 6815

Activities: Groundwater Monitoring and Sampling
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:
 Temp: 40 °F Wind Speed: 6 MPH Humidity: 45 % Wind Chill: 35 °F

Chemicals Used: None Preservatives in sample bottles Other: _____
 Hospital/Clinic: Sandia Medial Clinic Bldg. 831 Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or **NO**. If answered YES explain.

Printed Name Robert Lynch

Printed Name Thomas Evans

Printed Name William Gibson

Printed Name _____

Printed Name _____

Printed Name _____

Attendees

Signature [Signature]

Signature [Signature]

Signature [Signature]

Signature _____

Signature _____

Signature _____

Notes

HEALTH & SAFETY MEETING FORM

Dept: 0641 Facility: CWL-MW 9 Date: 01/17/18 Time: 0820

Activities: Groundwater Monitoring and Sampling
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:
 Temp: 28 °F Wind Speed: 2 MPH Humidity: 57 % Wind Chill: 28 °F

Chemicals Used: None Preservatives in sample bottles Other: _____
 Hospital/Clinic: Sandia Medial Clinic Bldg. 831 Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or **NO**. If answered YES explain.

Robert Lynch
 Printed Name
CHRIS HOLLAND
 Printed Name
William Gibson
 Printed Name
Thomas Evans
 Printed Name

 Printed Name

 Printed Name

Attendees

Robert Lynch
 Signature
Chris Holland
 Signature
William Gibson
 Signature
Thomas Evans
 Signature

 Signature

 Signature

Notes

HEALTH & SAFETY MEETING FORM

Dept: 0641 Facility: CWL-MW 11 Date: 01/18/18 Time: 0821

Activities: Groundwater Monitoring and Sampling
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:
 Temp: 46 °F Wind Speed: 1 MPH Humidity: 29 % Wind Chill: 46 °F

Chemicals Used: None Preservatives in sample bottles Other: _____
 Hospital/Clinic: Sandia Medial Clinic Bldg. 831 Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or **NO**. If answered YES explain.

Robert Lynch
 Printed Name

William Gibson
 Printed Name

CHRIS HOLLIGER
 Printed Name

Thomas Evans
 Printed Name

 Printed Name

 Printed Name

Attendees

Robert Lynch
 Signature

William Gibson
 Signature

Chris Holliger
 Signature

Thomas Evans
 Signature

 Signature

 Signature

Notes

IMPORTANT NOTICE: A printed copy of this form may not be the document currently in effect. The official version is located on the Sandia Restricted Network (SRN), 4100 Controlled Documents homepage.

HEALTH & SAFETY MEETING FORM

TA 1130110

Dept: 0641 Facility: CWL-MW 110 Date: 01/19/18 Time: 0819

01/22/18 0816

Activities: Groundwater Monitoring and Sampling
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:
 Temp: 28 °F Wind Speed: 15 MPH Humidity: 49 % Wind Chill: 18 °F

Chemicals Used: None Preservatives in sample bottles Other: _____

Hospital/Clinic: Sandia Medial Clinic Bldg. 831 Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or **NO**. If answered YES explain.

Robert Lynch
 Printed Name
Chris Hollister
 Printed Name
William Gibson
 Printed Name
Thomas Evans
 Printed Name
 01/22 Robert Lynch
 Printed Name
CHRIS HOLLISTER
 Printed Name

Attendees

[Signature]
 Signature
[Signature]
 Signature
William Gibson
 Signature
Thomas Evans
 Signature
Robert Lynch
 Signature
[Signature]
 Signature

William Gibson

Notes

William Gibson

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: CWL	
Well I.D.: CWL-BW5	Date: 01/15/18
Method: Portable pump <input checked="" type="checkbox"/>	Dedicated pump <input type="checkbox"/> Pump depth: 522'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)
513.88	0835	Start							
515.67	0905	3	15.9	919.4	142.6	6.88	0.40	73.2	7.21
516.04	0917	5	16.5	933.7	123.3	6.90	0.56	73.0	7.10
516.22	0929	7	16.3	927.5	124.1	6.91	0.40	72.2	7.07
516.44	0940	9	16.6	936.1	125.5	6.92	0.50	72.3	7.02
516.66	0952	11	17.3	952.1	129.4	6.92	0.31	73.1	6.99
516.78	1003	13	17.5	955.6	131.5	6.92	0.37	73.2	6.97
516.81	1008	14	17.7	958.9	132.3	6.92	0.33	73.4	6.97
516.87	1014	15	17.5	954.1	135.4	6.92	0.26	73.1	6.98
516.91	1021	16	17.3	954.0	138.0	6.92	0.26	72.9	6.98
516.95	10.27	17	17.0	953.9	137.9	6.92	0.30	72.5	6.99
	1028	Sampling							

Comments: ~1.5 gals purged from tubing 0847
 #089 - 1090 DIW for qc sample

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FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: <u>CWL</u>		
Well I.D.: <u>CWL-MW9</u>	Date: <u>01/17/18</u>	
Method: Portable pump <u>X</u>	Dedicated pump _____	Pump depth: <u>517'</u>

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)
<u>505.49</u>	<u>0836</u>	Start							
<u>508.27</u>	<u>0901</u>	5	<u>17.23</u>	<u>948.9</u>	<u>240.3</u>	<u>7.03</u>	<u>0.34</u>	<u>36.7</u>	<u>3.51</u>
<u>509.14</u>	<u>0919</u>	10	<u>17.67</u>	<u>964.7</u>	<u>202.8</u>	<u>7.06</u>	<u>0.59</u>	<u>37.4</u>	<u>3.55</u>
<u>509.59</u>	<u>0935</u>	14	<u>17.97</u>	<u>973.8</u>	<u>195.6</u>	<u>7.06</u>	<u>0.46</u>	<u>41.1</u>	<u>3.88</u>
<u>509.78</u>	<u>0943</u>	16	<u>17.97</u>	<u>981.2</u>	<u>195.6</u>	<u>7.06</u>	<u>0.41</u>	<u>42.3</u>	<u>3.99</u>
<u>509.89</u>	<u>0951</u>	18	<u>17.92</u>	<u>983.8</u>	<u>195.9</u>	<u>7.06</u>	<u>0.65</u>	<u>43.1</u>	<u>4.08</u>
<u>509.94</u>	<u>0959</u>	20	<u>18.01</u>	<u>985.8</u>	<u>195.5</u>	<u>7.07</u>	<u>0.42</u>	<u>43.3</u>	<u>4.09</u>
<u>509.95</u>	<u>1005</u>	21	<u>17.84</u>	<u>984.5</u>	<u>196.4</u>	<u>7.06</u>	<u>0.38</u>	<u>43.4</u>	<u>4.11</u>
<u>509.98</u>	<u>1009</u>	22	<u>17.73</u>	<u>990.5</u>	<u>197.1</u>	<u>7.06</u>	<u>0.30</u>	<u>43.7</u>	<u>4.14</u>
<u>509.96</u>	<u>1013</u>	23	<u>17.56</u>	<u>990.8</u>	<u>198.0</u>	<u>7.05</u>	<u>0.59</u>	<u>43.6</u>	<u>4.15</u>
<u>509.90</u>	<u>1018</u>	24	<u>17.81</u>	<u>989.6</u>	<u>197.8</u>	<u>7.05</u>	<u>0.28</u>	<u>44.5</u>	<u>4.24</u>
	<u>1019</u>		<u>SAMPLING</u>						

Comments: ~1.5 gals purged from tubing 0842

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FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: CWL		
Well I.D.: CWL-MW 10	Date: 01/19/18	01/22/18
Method: Portable pump <input checked="" type="checkbox"/>	Dedicated pump <input type="checkbox"/>	Pump depth: 515'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)
502.40	0835	Start							
504.99	0909	2	12.45	762.7	337.3	7.00	1.95	32.6	3.46
506.51	0930	4	12.18	757.9	312.6	7.06	1.33	26.9	2.88
508.08	0955	6	13.17	777.0	275.3	7.08	1.20	23.9	2.50
509.64	1012	8	14.78	808.8	219.1	7.09	1.50	20.5	2.07
511.23	1031	10	15.04	813.2	170.7	7.10	2.12	18.6	1.87
512.93	1049	12	15.62	825.0	143.2	7.10	2.93	17.5	1.73
513.90	1059	13	16.24	838.0	122.3	7.10	3.30	16.7	1.63
514.48	1115	14	15.75	829.5	122.4	7.11	4.37	17.0	1.60
515.42	1130	15	17.04	855.9	109.0	7.11	3.62	16.0	1.54
515.42	1131	Well	DRY						
502.77	0839	START							
504.59	0856	1	9.38	824.1	38.3	7.07	1.74	36.4	4.14
505.38	0902	2	10.75	854.3	38.4	7.05	3.55	25.2	2.78
506.42	0909	3	11.66	874.2	20.6	7.06	2.74	20.5	2.22
	0910	SAMPLING							

Comments: ~1.5 gals purged from tubing 0848
 01/22/18 0849
 FB Lot# 092 1090PIW

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: CWL	
Well I.D.: CWL-MW 11	Date: 01/18/18
Method: Portable pump ^x	Dedicated pump _____ Pump depth: 513'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)
500.65	0836	Start							
504.79	0903	5	17.21	932.3	288.4	7.00	0.43	61.4	5.89
507.27	0934	10	16.90	925.0	263.6	7.02	0.64	60.8	5.92
508.40	1007	13	15.25	889.5	264.2	7.02	0.49	60.8	6.07
509.14	1030	15	16.43	914.9	264.1	7.03	0.34	60.8	5.90
509.81	1053	17	16.85	924.2	264.8	7.03	0.30	60.5	5.84
510.90	1116	19	17.77	943.8	264.7	7.03	0.41	60.2	5.71
511.54	1134	21	18.11	949.6	210.1	7.03	0.37	58.5	5.51
511.90	1147	22	18.31	952.4	168.1	7.03	0.29	55.9	5.25
512.11	1200	23	18.39	953.1	169.6	7.04	0.32	57.0	5.34
512.31	1214	24	18.18	949.7	170.0	7.04	0.33	57.0	5.36
512.41	1231	25	18.12	948.1	169.8	7.03	0.30	57.4	5.39
	1232	SAMPLING							

Comments: ~1.5 gals purged from tubing.

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG Page 1 of 2

SNL/NM Project Name: **CWL**

Calibrations done by: **R Lynch**

Date: **1-15-18**

Make & Model: **EXO 1**

Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: **13C101167**

Other (S/N): **NA**

pH Calibration/Check

pH Calibrated to (std): **7.00**

pH sloped to (std): **10.00**

Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time: 0722	3.98	20.2	7.00	19.8	10.00	19.9
2. Time: 1249	4.00	20.5	7.01	20.1	10.00	19.9
3. Time:						
4. Time:						

Standard lot no.: **6GH909**

7GG488

6GF797

Expiration date: **AUG/18**

JUL/19

JUN/18

SC Calibration/Check

Reference Value: **1309 uS @ 20c**

Standard Lot No.: **7GC297**

	Value	Temp	Expiration Date:
1. Time: 0742	1309.3	19.9	MAR/19
2. Time: 1247	1309.1	19.9	
3. Time:			
4. Time:			

ORP Calibration/Check

Reference Value: **220 mV**

Standard Lot No. **77GG707**

	Value	Temp	Expiration Date:
1. Time: 0714	220.0	20.5	APR/18
2. Time: 1251	220.1	20.7	
3. Time:			
4. Time:			

DO Calibration/Check

Calibration Value:

81% air saturation @ 5200 ft.

Atmospheric Pressure in Hg

1. Time: 0712	81.9	24.48
2. Time: 1245	81.8	24.47
3. Time:		
4. Time:		

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: CWL				
Calibration done by: R Lynch			Date: 1-15-10	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 10060c003035	
Reference Value	10	20	100	800
Standard Lot No.	A6055	A6056	A6064	A6104
1. Time <i>0.758</i>	<i>9.88</i>	<i>20.1</i>	<i>101</i>	<i>797</i>
2. Time <i>1300</i>	<i>9.91</i>	<i>20.1</i>	<i>100</i>	<i>801</i>
3. Time				
4. Time				
Comments:				

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG Page 1 of 2

SNL/NM Project Name: CWL						
Calibrations done by: C. Hulliger				Date: 1/17/18		
Make & Model: YSI Exo 1						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 13C101167						
Other (S/N): _____						
pH Calibration/Check						
pH Calibrated to (std):			pH sloped to (std):			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time:	0604	3.90	19.6	7.00	19.4	10.00
2. Time:	1236	4.02	19.4	7.03	19.7	9.93
3. Time:						
4. Time:						
Standard lot no.:	6GH909		7GG488		6GF797	
Expiration date:	AUG/18		JUL/19		JUN/18	
SC Calibration/Check						
Reference Value: 1260@19c			Standard Lot No.: 7GC297			
	Value	Temp	Expiration Date: MAR/18			
1. Time:	0610	1260				
2. Time:	1239	1260				
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220mV			Standard Lot No. 7GG707			
	Value	Temp	Expiration Date: APR/18			
1. Time:	0612	220				
2. Time:	1242	220				
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	0600	80.8	24.6			
2. Time:	1230	82.9	24.6			
3. Time:						
4. Time:						

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: CML				
Calibration done by: C. Hulliger			Date: 1/17/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 10060C003035	
Reference Value	10	20	100	800
Standard Lot No.	A6055	A6056	A6064	A6104
1. Time 0600	9.72	19.8	99.2	7.99
2. Time 1230	10.2	20.2	102	800
3. Time				
4. Time				
Comments:				

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG Page 1 of 2

SNL/NM Project Name: CWL						
Calibrations done by: C. Hulliger				Date: 1/18/18		
Make & Model: YSI Exo 1						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 13C101167						
Other (S/N): _____						
pH Calibration/Check						
pH Calibrated to (std):			pH sloped to (std):			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time:	01004 4.00	19.9	7.03	19.5	9.97	19.4
2. Time:	1255 4.01	19.8	7.02	19.8	10.00	19.6
3. Time:						
4. Time:						
Standard lot no.:	6GH909		7GG488		6GF797	
Expiration date:	AUG/18		JUL/19		JUN/18	
SC Calibration/Check						
Reference Value: 1260@19c			Standard Lot No.: 7GC297			
	Value	Temp	Expiration Date: MAR/18			
1. Time:	0610 1251	19.3				
2. Time:	1250 1258	19.6				
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220mV			Standard Lot No. 7GG707			
	Value	Temp	Expiration Date: APR/18			
1. Time:	0612 219.2	19.7				
2. Time:	1259 220.1	19.8				
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	0600	81.2	24.5			
2. Time:	1247	81.4	24.5			
3. Time:						
4. Time:						

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: CWL				
Calibration done by: C. Hulliger			Date: 1/18/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 10060C003035	
Reference Value	10	20	100	800
Standard Lot No.	A6055	A6056	A6064	A6104
1. Time <i>0600</i>	<i>9.86</i>	<i>20</i>	<i>101</i>	<i>798</i>
2. Time <i>1303</i>	<i>9.94</i>	<i>20.2</i>	<i>100</i>	<i>801</i>
3. Time				
4. Time				
Comments:				

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG Page 1 of 2

SNL/NM Project Name: CWL						
Calibrations done by: C. Hulliger				Date: 1/19/18		
Make & Model: YSI EXO 1						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 13C101167						
Other (S/N): _____						
pH Calibration/Check						
pH Calibrated to (std):			pH sloped to (std):			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time:	0548	4.02	20.5	7.04	20.1	9.98
2. Time:	1240	4.01	20.6	7.01	20.3	9.99
3. Time:						
4. Time:						
Standard lot no.:	6GH909		7GG488		6GF797	
Expiration date:	AUG/18		JUL/19		JUN/18	
SC Calibration/Check						
Reference Value: 1260@19c			Standard Lot No.: 7GC297			
	Value	Temp	Expiration Date: MAR/18			
1. Time:	0552	1262				
2. Time:	1233	1261				
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220mV			Standard Lot No. 7GG707			
	Value	Temp	Expiration Date: APR/18			
1. Time:	0554	218.7				
2. Time:	1235	219.6				
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	0545	81.9	24.4			
2. Time:	1230	82.1	24.5			
3. Time:						
4. Time:						

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: CWL				
Calibration done by: C. Hulliger			Date: 1/19/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 10060C003035	
Reference Value	10	20	100	800
Standard Lot No.	A6055	A6056	A6064	A6104
1. Time 0545	10.0	20.1	101	798
2. Time 1220	9.99	20.1	100	799
3. Time				
4. Time				
Comments:				

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG Page 1 of 2

SNL/NM Project Name: CWL						
Calibrations done by: C. Hulliger				Date: 1/22/18		
Make & Model: YSI Exo 1						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 13C101167						
Other (S/N): _____						
pH Calibration/Check						
pH Calibrated to (std):			pH sloped to (std):			
Reference value:		4.00		7.00		10.00
	Value	Temp	Value	Temp	Value	Temp
1. Time:	0554	3.95	17.4	6.99	18.6	19.1
2. Time:	1232	4.02	19.6	7.03	19.5	9.98
3. Time:						
4. Time:						
Standard lot no.:	6GH909		7GG488		6GF797	
Expiration date:	AUG/18		JUL/19		JUN/18	
SC Calibration/Check						
Reference Value: 1260@19c			Standard Lot No.: 7GC297			
	Value	Temp	Expiration Date: MAR/18			
1. Time:	0600	1250	18.9			
2. Time:	1238	1260	19.4			
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220mV			Standard Lot No. 7GG707			
	Value	Temp	Expiration Date: APR/18			
1. Time:	0603	220	19.2			
2. Time:	1240	220	19.8			
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	0550	80.1	24.4			
2. Time:	1230	82.2	24.5			
3. Time:						
4. Time:						

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: CWL				
Calibration done by: C. Hulliger			Date: 1/22/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 10060C003035	
Reference Value	10	20	100	800
Standard Lot No.	A6055	A6056	A6064	A6104
1. Time 0550	10.1	20.1	102	798
2. Time 1230	9.98	20.2	101	801
3. Time				
4. Time				
Comments:				

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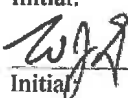
**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>CWL</u>	Monitoring Well ID #: <u>NA</u>	Date: <u>01/12/18</u>
--------------------------	---------------------------------	-----------------------

The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03

Pump and Tubing Bundle ID #: <u>1806-640</u>	Water Level Indicator ID #: <u>NA</u>
--	---------------------------------------

Personnel Performing Decontamination:

Print Name: <u>Robert Lynch</u>	 Initial: _____
Print Name: <u>William Gibson</u>	 Initial: _____

Condition of Equipment		
Pump: <u>Good</u>	Tubing Bundle: <u>New</u>	Water Level Indicator: <u>na</u>

List of Decontamination Materials	
<p align="center">Deionized Water</p> <p>Source: <u>Culligan</u></p> <p>Lot Number: <u>12/15/18 17</u> <u>Bf 2/2/19</u></p>	<p align="center">HNO₃</p> <p>Grade: <u>Reagent</u></p> <p>UN #: <u>2031</u></p> <p>Manufacturer: <u>ARCOS</u></p> <p>Lot Number: <u>A0358899</u></p>

IMPORTANT NOTICE: A printed copy of this document may not be the document currently in effect. The official version is located on the Sandia Restricted Network (SRN), 4100 Controlled Documents home page.

Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form

Project Name: <u>CWL-GWM</u>	Monitoring Well ID #: <u>CWL-BW5</u>	Date: <u>01/15/18</u>
------------------------------	--------------------------------------	-----------------------

The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03

Pump and Tubing Bundle ID #: <u>1806-640</u>	Water Level Indicator ID #: <u>210272</u>
--	---

Personnel Performing Decontamination:

Robert Lynch

Print Name:



Initial:

Thomas Evans

Print Name:



Initial:

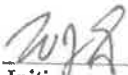

Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Good</u>

List of Decontamination Materials

Deionized Water	HNO ₃
Source: <u>1090</u>	Grade: <u>Reagent</u>
Lot Number: <u>84, 73, 80, 98, 67, 90, 100, 89, 69, 75, 94, 82</u>	UN #: <u>2031</u>
	Manufacturer: <u>ACROS</u>
	Lot Number: <u>A0358899</u>

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**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>CWL-GWM</u>	Monitoring Well ID #: <u>CWL-MW9</u>	Date: <u>01/17/18</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
Pump and Tubing Bundle ID #: <u>1806-640</u>	Water Level Indicator ID #: <u>210272</u>	
Personnel Performing Decontamination:		
<u>William Gibson</u> Print Name:	 Initial:	
<u>Thomas Evans</u> Print Name:	 Initial:	
Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Good</u>
List of Decontamination Materials		
Deionized Water	HNO₃	
Source: <u>Culligan</u>	Grade: <u>Reagent</u>	
Lot Number: <u>12/19/18</u> <i>BL 2/21/19</i>	UN #: <u>2031</u>	
	Manufacturer: <u>ACROS</u>	
	Lot Number: <u>A0358899</u>	

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**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>CWL-GWM</u>	Monitoring Well ID #: <u>CWL-MW11</u>	Date: <u>1/18/18</u>
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The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03

Pump and Tubing Bundle ID #: <u>1806-640</u>	Water Level Indicator ID #: <u>210272</u>
--	---

Personnel Performing Decontamination:

William Gibson

Print Name: _____

WJG
Initial: _____

Thomas Evans

Print Name: _____

TE
Initial: _____


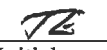
Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Good</u>

List of Decontamination Materials

Deionized Water	HNO ₃
Source: <u>Culligan</u>	Grade: <u>Reagent</u>
Lot Number: <u>12/15/17, 12/19/17</u>	UN #: <u>2031</u>
	Manufacturer: <u>ACROS</u>
	Lot Number: <u>A0358899</u>

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**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>CWL-GWM</u>	Monitoring Well ID #: <u>CWL-MW10</u>	Date: <u>01/22/18</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
Pump and Tubing Bundle ID #: <u>1806-640</u>	Water Level Indicator ID #: <u>210272</u>	
<u>Personnel Performing Decontamination:</u>		
William Gibson Print Name: _____	 Initial: _____	
Thomas Evans Print Name: _____	 Initial: _____	
Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Good</u>
List of Decontamination Materials		
Deionized Water	HNO₃	
Source: <u>Culligan</u>	Grade: <u>Reagent</u>	
Lot Number: <u>12/19/17</u>	UN #: <u>2031</u>	
	Manufacturer: <u>ACROS</u>	
	Lot Number: <u>A0358899</u>	

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SUMMARY SHEET FOR JANUARY 2018 SAMPLES

Sample Summary for CWL GWM
January 2018

Sample ID	Sample Date	ARCOG	Sample Number	Sample Type	Associated Equipment Blank (ARCOG #/Sample #)	Associated Trip Blank (ARCOG # / Sample #)	Associated Field Blank (ARCOG # / Sample #)	Comments
CWL GWM: Project Task # 195122.10.11.03. Service Order # CF 327-18								
Environmental Samples								
CWL-BW5	15-Jan-18	618439	104382	Environmental	n/a	618439 / 104383	n/a	
CWL-MW9	17-Jan-18	618442	104388	Environmental	618440 / 104384	618442 / 104390	n/a	
CWL-MW9	17-Jan-18	618442	104389	Duplicate	618440 / 104384	618442 / 104390	n/a	
CWL-MW10	22-Jan-18	618443	104392	Environmental	618452 / 104409	618443 / 104393	618443 / 104391	
CWL-MW11	18-Jan-18	618444	104395	Environmental	n/a	618444 / 104396	618444 / 104394	
CWL-EB1	15-Jan-18	618440	104384	Equipment Blank	n/a	618440 / 104385	n/a	Decon prior to CWL-MW9
CWL-EB2	17-Jan-18	618452	104409	Equipment Blank	n/a	618452 / 104410	n/a	Decon prior to CWL-MW11 (VOCs only)
CWL-FB 1	22-Jan-18	618443	104391	Field Blank	n/a	618443 / 104393	n/a	at CWL-MW10
CWL-FB 2	18-Jan-18	618444	104394	Field Blank	n/a	618444 / 104396	n/a	at CWL-MW11
CWL QC/DIW	15-Jan-18	618441	104386	QC-DIW	n/a	618441 / 104387	n/a	DIW source for CWL-EB1
Waste Characterization Samples								
CWL-BW5	15-Jan-18	618445	104397	Waste	n/a	618445 / 104398	n/a	No data validation required
CWL-MW9	17-Jan-18	618446	104399	Waste	n/a	618446 / 104400	n/a	No data validation required
CWL-MW10	22-Jan-18	618447	104401	Waste	n/a	618447 / 104402	n/a	No data validation required
CWL-MW11	18-Jan-18	618448	104403	Waste	n/a	618448 / 104404	n/a	No data validation required

DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES
GROUNDWATER MONITORING
JANUARY 2018

AR/COC NUMBERS 618439, 618440, 618441, 618442, 618444, 618452

Memorandum

Date: March 1, 2018

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL
Site: CWL GWM
ARCOG: 618439, 618440, 618441, 618442, 618444 and 618452
SDG: 441807
Laboratory: GEL
Project/Task: 195122.10.11.03
Analysis: VOCs

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Fourteen aqueous samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. No problems were identified with the data package that resulted in the qualification of data.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding time and were properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration (ICAL) and continuing calibration data met QC acceptance criteria except as follows. For the ICAL associated with samples 441807019 and -020, the ICAL intercepts were > the MDL and positive for tert-butyl methyl ether; trans-1,3-dichloropropylene and 1,2-dibromo-3-chloropropane. The associated sample results were non-detect and will not be qualified.

For the ICV associated with samples -019 and -020, the %Ds were >20% and positive for dichlorodifluoromethane and 1,1,1-trichloroethane. The associated sample results were non-detect and will not be qualified.

For the CCV associated with samples -019 and -020, the %Ds were >20% but ≤40% with negative bias for carbon disulfide, methyl acetate and methylene chloride. The associated sample results were non-detect and since no other calibration infractions occurred, will not be qualified.

Blanks

No target analytes were detected in any of the blanks except as follows. Bromoform was detected at ≤ the PQL and bromodichloromethane, chloroform and dibromochloromethane at > the PQL in EB2, sample -019, associated with sample -016. The analytes detected in EB2 were not requested for sample -016. No data in this SDG will be qualified.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD acceptance criteria were met. It should be noted that the MS/MSD analyses associated with samples -019 and -020 were performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

Six TBs were submitted, one for each ARCO. FB 2 was submitted with ARCO 618444 and was associated with the samples on the same ARCO. A distilled water sample, the source water for EB1, was submitted with ARCO 618441 and was not associated with any field samples. EB1 was submitted with ARCO 618440 and was associated with the samples on ARCO 618442. A field duplicate pair was submitted with ARCO 618442. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result. EB2 was submitted with ARCO 618452 and was associated with samples submitted with ARCO 618444.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 03/01/18

Memorandum

Date: March 1, 2018

To: File

From: Linda Thal

Subject: Inorganic Data Review and Validation – SNL
Site: CWL GWM
ARCO: 618439, 618440, 618441, 618442 and 618444
SDG: 441807
Laboratory: GEL
Project/Task: 195122.10.11.03
Analysis: Metals

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Six samples were prepared and analyzed with approved procedures using method EPA 6020 (ICP-MS). Data were reported for all required analytes. No problems were identified with the data package that resulted in the qualification of data.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and were properly preserved.

ICP-MS Instrument Tune

The ICP-MS tune met QC acceptance criteria.

Calibration

All initial and continuing calibration criteria met QC acceptance criteria.

Reporting Limit Verification

All LLCCV recoveries met QC acceptance criteria.

Blanks

No target analytes were detected in any of the blanks.

ICP -MS Internal Standards

The ICP-MS internal standards met QC acceptance criteria.

Matrix Spike (MS)

The MS met all QC acceptance criteria.

Laboratory Replicate

The replicate met all QC acceptance criteria.

Laboratory Control Sample (LCS)

The LCS met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The sample was not diluted.

ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were evaluated because the Ca concentration for samples -002, -008 and -017 was > that in the ICS A and AB solutions. All QC acceptance criteria were met.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

A distilled water sample, the source water for EB1, was submitted with ARCOG 618441 and was not associated with any field samples. EB1 was submitted with ARCOG 618440 and was associated with the samples on ARCOG 618442. A field duplicate pair was submitted with ARCOG 618442. There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donivan

Level: I

Date: 03/01/18

Sandia Data Validation Summary Worksheet

ARCO#(s): 618439, 618440, 618441, 618442, 618444 and 618452	Site/Project: CWL GWM	Validation Date: 02/27/2018
SDG: 441807	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 20	CVR present: Yes
ARCO#(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input type="checkbox"/> Rad		

Requested Analyses Not Reported			
Client Sample ID	Lab Sample ID	Analysis	Comments
None			

Hold Time/Preservation Outliers								
Client Sample ID	Lab Sample ID	Analysis	Pres.	Collection Date	Preparation Date	Analysis Date	Analysis <2X HT	Analysis ≥2X HT
None								

Comments: Collected: 01/15, 1/17 and 1/18/2018
 One vial each for samples 441807012(104384-001) and 441807014(104385-001) and all three vials for sample 441807011(104390-001) were received with headspace.

Validated by:


Sandia Organic Worksheet (GC/MS VOC)

ARCO # (s): 618439, 618440, 618441, 618442, 618444 and 618452	SDG: 441807	Matrix: Aqueous
Laboratory Sample IDs: 441807001, -003, -004, -006, -007, -009, -011, -012, -014, -015, -016, -018, -019, -020		
Method/Batch #s: 8260B 1733626 and 1735137	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	TB1 -003 TB3 -006	QC/ DIW -004	TB4 -011 TB2 -014	EB1 -012
	Int.	RF/ Slope	RSD/ r ²	(ICV)/CCV %D										
VOA4.I - 001, -003, -004, -006, -007, -009, -011, -012, -014														
None														
VOA1.I -015, -016, -018, -019, -020														
Bromodichloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	3.58	✓
Bromoform	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	.35J	✓
Chloroform	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	22.8	✓
Dibromochloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	2.43	✓
tert-Butyl methyl ether	+62	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
trans-1,3-Dichloropropylene	+68	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
1,2-Dibromo-3-chloropropane	+70	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Dichlorodifluoromethane	NA	✓	✓	(+24)	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
1,1,1-Trichloroethane	NA	✓	✓	(+24)	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Carbon disulfide	NA	✓	✓	-25	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Methyl acetate	NA	✓	✓	-21	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Methylene chloride	NA	✓	✓	-25	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓

Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R	Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R
None							

IS Outliers

Sample ID	FBZ		Chl-d5		1,4-DCB-d4							
	Area	RT	Area	RT	Area	RT						
None												

Comments: HTs OK.

1733626: Samples 001, -003, -004, -006, -007, -009, -011, -012, -014, -015, -016, -018; MS/MSD -001

1735137: Samples -019, -020; MS/MSD SNL sample from SDG 442133.

-019 and -020 full list TCL VOCs; all remaining samples short list

ICAL VOA4.I 01/15/2018 (Samples 001, -003, -004, -006, -007, -009, -011, -012, -014)

ICAL VOA1.I 01/23/2018 Linear: tert-Butyl methyl ether; trans-1,3-Dichloropropylene and 1,2-Dibromo-3-chloropropane (Samples -015, -016, -018,-019, -020)

Sandia Inorganic Metals Worksheet

ARCO # (s): 618439, 618440, 618441, 618442 and 618444	SDG # (s): 441807	Matrix: Aqueous
---	-------------------	-----------------

Laboratory Sample IDs: 441807002, -005, -008, -010, -013, -017

Method/Batch #s: **3005A/6020**:1733313/1733314

ICPMS Mass Cal: Pass Fail NA ICPMS Resolution: Pass Fail NA

Analyte (outliers)	Calibration						MB mg/L	5X Blank mg/L	LCS %R	MS %R	DUP RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	LLCCV %R	QC DIW -005	EB1 -013		
	Int. mg/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L													
none																			

IS Outliers 60-125%				IS Outliers 80-120%			
Sample ID	%Recovery	%Recovery	%Recovery	CCV/CCB ID	%Recovery	%Recovery	%Recovery
none				None			

Comments: HTs OK. MS, DUP, SD on -002
Ca > ICS A -002, -008, -017

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. *MA* *441807*

SMO Use

AR/COC **618439**

Project Name: CWL GWM/SVM	Date Samples Shipped: <i>1/16/18</i>	SMO Authorization: <i>[Signature]</i>	<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <i>276879</i>	SMO Contact Phone: <i>910</i>	
Project/Task Number: 195122.10.11.03	Lab Contact: Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	
Service Order: CF327-18	Lab Destination: GEL	Send Report to SMO: Stephanie Montaño/505.284.2553	
Contract No.: 1303873			

Bill to: Sandia National Laboratories (Accounts Payable),
P.O. Box 5800, MS-0154
Albuquerque, NM 87185-0154 *441807*

Tech Area: _____
Building: _____ Room: _____ Operational Site: _____

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected		Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
							Type	Volume					
104382	001	CWL-BW5	522	1/15/18	10:28	GW	G	3x40 ml	HCl	G	SA	VOC-TCE (SW846-8260B)	<i>001</i>
104382	002	CWL-BW5	522	1/15/18	10:30	GW	P	500 ml	HNO3	G	SA	CHROMIUM, NICKEL (SW846-6020)	<i>002</i>
104383	001	CWL-TB 1	NA	1/15/18	10:28	DIW	G	3x40 ml	HCl	G	TB	VOC-TCE (SW846-8260B)	<i>003</i>

Last Chain: <input type="checkbox"/> Yes	Validation Req'd: <input checked="" type="checkbox"/> Yes	Background: <input type="checkbox"/> Yes	Confirmatory: <input type="checkbox"/> Yes	Sample Tracking	SMO Use	Special Instructions/QC Requirements:	Conditions on Receipt	
				Date Entered:	EDD <input checked="" type="checkbox"/> Yes			
				Entered by:	Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day			
				QC inits.:	Negotiated TAT <input type="checkbox"/>			
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		
	Thomas Evans	<i>[Signature]</i>	<i>TE</i>	AIS/00641/505-284/0804/505-274-0488		Return Samples By:		
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/00641/505-844-4013/505-250-7090		Comments: Report CWL enhanced list of VOCs (chloroform; 1,1-DCE; PCE; TCE; Freon 11; and Freon 113) for environmental groundwater monitoring samples.		
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/00641/505-239-7367/505-239-7367				

Relinquished by <i>[Signature]</i> Org. <i>00641</i> Date <i>1/15/18</i> Time <i>1058</i>	Relinquished by _____ Org. _____ Date _____ Time _____
Received by <i>[Signature]</i> Org. <i>00631</i> Date <i>1/15/18</i> Time <i>1058</i>	Received by _____ Org. _____ Date _____ Time _____
Relinquished by <i>[Signature]</i> Org. <i>00631</i> Date <i>1/16/18</i> Time <i>0745</i>	Relinquished by _____ Org. _____ Date _____ Time _____
Received by <i>[Signature]</i> Org. <i>306</i> Date <i>1-17-18</i> Time <i>12:20</i>	Received by _____ Org. _____ Date _____ Time _____

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 6 of 510

Internal Lab

Batch No. *MA*

SMO Use

AR/COC **618441**

Project Name: CWL GWM/SVM	Date Samples Shipped: <i>1/16/18</i>	SMO Authorization: <i>[Signature]</i>	<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <i>276879</i>	SMO Contact Phone: <i>SMO</i>	
Project/Task Number: 195122.10.11.03	Lab Contact: Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	
Service Order: CF327-18	Lab Destination: GEL	Send Report to SMO: Stephanie Montaño/505.284.2553	
	Contract No.: 1303873		

Bill to: Sandia National Laboratories (Accounts Payable),
P.O. Box 5800, MS-0154
Albuquerque, NM 87185-0154 *441807*

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected		Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
							Type	Volume					
104386	001	CWL QC/DIW	NA	1/15/18	10:00	DIW	G	3x40 ml	HCl	G	FB	VOC-TCE (SW846-8260B)	<i>004</i>
104386	002	CWL QC/DIW	NA	1/15/18	10:01	DIW	P	500 ml	HNO3	G	FB	CHROMIUM, NICKEL (SW846-6020)	<i>005</i>
104387	001	CWL-TB 3	NA	1/15/18	10:00	DIW	G	3x40 ml	HCl	G	TB	VOC-TCE (SW846-8260B)	<i>006</i>

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:				EDD <input checked="" type="checkbox"/> Yes		
Background: <input type="checkbox"/> Yes		Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day		
Confirmatory: <input type="checkbox"/> Yes		QC inits.:				Negotiated TAT <input type="checkbox"/>		
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		
	Thomas Evans	<i>[Signature]</i>	<i>TE</i>	AIS/00641/505-284/0804/505-274-0488		Return Samples By:		
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/00641/505-844-4013/505-250-7090		Comments: Report CWL enhanced list of VOCs (chloroform; 1,1-DCE; PCE; TCE; Freon 11; and Freon 113) for environmental groundwater monitoring samples.		
William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/00641/505-239-7367/505-239-7367					

Relinquished by <i>[Signature]</i> Org. <i>00641</i> Date <i>1/15/18</i> Time <i>11:00</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. <i>00631</i> Date <i>1/15/18</i> Time <i>11:00</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i> Org. <i>00631</i> Date <i>1/16/18</i> Time <i>07:45</i>	Relinquished by	Org.	Date	Time
Received by <i>P. Albert</i> Org. <i>GEL</i> Date <i>1.17.18</i> Time <i>12:20</i>	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. <i>MA</i>		SMO Use		AR/COG 618442								
Project Name: CWL GWM/SVM		Date Samples Shipped: <i>1/17/18</i>		SMO Authorization: <i>[Signature]</i>								
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <i>276963</i>		SMO Contact Phone: <i>[Signature]</i>								
Project/Task Number: 195122.10.11.03		Lab Contact: Edie Kent/843-769-7385		Wendy Palencia/505-844-3132								
Service Order: CF327-18		Lab Destination: GEL		Send Report to SMO: Stephanie Montaño/505.284.2553								
Contract No.: 1303873				<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius								
Tech Area:		Operational Site:		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <i>441807</i>								
Building:		Room:										
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
104388	001	CWL-MW9	517	1/17/18 10:19	GW	G	3x40 ml	HCl	G	SA	VOC-TCE (SW846-8260B)	<i>007</i>
104388	002	CWL-MW9	517	1/17/18 10:21	GW	P	500 ml	HNO3	G	SA	CHROMIUM, NICKEL (SW846-6020)	<i>008</i>
104389	001	CWL-MW9	517	1/17/18 10:19	GW	G	3x40 ml	HCl	G	DU	VOC-TCE (SW846-8260B)	<i>009</i>
104389	002	CWL-MW9	517	1/17/18 10:21	GW	P	500 ml	HNO3	G	DU	CHROMIUM, NICKEL (SW846-6020)	<i>010</i>
104390	001	CWL-TB 4	NA	1/17/18 10:19	DIW	G	3x40 ml	HCl	G	TB	VOC-TCE (SW846-8260B)	<i>011</i>
Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:				Conditions on Receipt		
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:				EDD <input checked="" type="checkbox"/> Yes						
Background: <input type="checkbox"/> Yes		Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day						
Confirmatory: <input type="checkbox"/> Yes		QC Inits.:				Negotiated TAT <input type="checkbox"/>						
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab						
	Thomas Evans	<i>[Signature]</i>	<i>TE</i>	AIS/00641/505-284/0804/505-274-0488		Return Samples By:						
	Chris Hulliger	<i>[Signature]</i>	<i>CA</i>	AIS/00641/505/284-3309/505-382-0353		Comments: Report CWL enhanced list of VOCs (chloroform;1,1-DCE;PCE;TCE;Freon 11;and Freon 113) for environmental groundwater monitoring samples.						
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/00641/505-844-4013/505-250-7090								
William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/00641/505-239-7367/505-239-7367									
Relinquished by <i>[Signature]</i>	Org. <i>00641</i>	Date <i>1/17/18</i>	Time <i>1054</i>	Relinquished by	Org.	Date	Time					
Received by <i>[Signature]</i>	Org. <i>00631</i>	Date <i>1/17/18</i>	Time <i>1054</i>	Received by	Org.	Date	Time					
Relinquished by <i>[Signature]</i>	Org. <i>00631</i>	Date <i>1/17/18</i>	Time <i>1125</i>	Relinquished by	Org.	Date	Time					
Received by <i>[Signature]</i>	Org. <i>GEL</i>	Date <i>1-18-18</i>	Time <i>10:55</i>	Received by	Org.	Date	Time					

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. **441807** SMO Use

Project Name: CWL GWM/SVM	Date Samples Shipped: 1/17/18	SMO Authorization: [Signature]	<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. 276963	SMO Contact Phone: Wendy Palencia/505-844-3132	
Project/Task Number: 195122.10.11.03	Lab Contact: Edie Kent/843-769-7385	Send Report to SMO: Stephanie Montaño/505.284.2553	
Service Order: CF327-18	Lab Destination: GEL	Contract No.: 1303873	

AR/COG **618440**

Tech Area: Building: Room: Operational Site: Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154, Albuquerque, NM 87185-0154 **441807**

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected		Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
							Type	Volume					
104384	001	CWL-EB1	NA	1/15/18	14:39	DIW	G	3x40 ml	HCl	G	EB	VOC-TCE (SW846-8260B)	012
104384	002	CWL-EB1	NA	1/15/18	14:41	DIW	P	500 ml	HNO3	G	EB	CHROMIUM, NICKEL (SW846-6020)	013
104385	001	CWL-TB 2	NA	1/15/18	14:39	DIW	G	3x40 ml	HCl	G	TB	VOC-TCE (SW846-8260B)	014

Last Chain: <input type="checkbox"/> Yes	Sample Tracking	SMO Use	Special Instructions/QC Requirements:	Conditions on Receipt	
Validation Req'd: <input checked="" type="checkbox"/> Yes	Date Entered:		EDD <input checked="" type="checkbox"/> Yes		
Background: <input type="checkbox"/> Yes	Entered by:		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day		
Confirmatory: <input type="checkbox"/> Yes	QC inits.:		Negotiated TAT <input type="checkbox"/>		
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell	Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab
	Thomas Evans	[Signature]	TE	AIS/00641/505-284/0804/505-274-0488	Return Samples By:
	Robert Lynch	[Signature]		SNL/00641/505-844-4013/505-250-7090	Comments: Report CWL enhanced list of VOCs (chloroform; 1,1-DCE; PCE; TCE; Freon 11; and Freon 113) for environmental groundwater monitoring samples.
William Gibson	[Signature]		SNL/00641/505-239-7367/505-239-7367		

Relinquished by [Signature]	Org. 00641	Date 1/16/18	Time 1058	Relinquished by	Org.	Date	Time
Received by [Signature]	Org. 00631	Date 1/16/18	Time 1058	Received by	Org.	Date	Time
Relinquished by [Signature]	Org. 00631	Date 1/17/18	Time 1120	Relinquished by	Org.	Date	Time
Received by [Signature]	Org. GEL	Date 1/19/18	Time 1055	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. *N/A*

SMO Use

AR/COC **618444**

Project Name: CWL GWM/SVM	Date Samples Shipped: <i>1/18/18</i>	SMO Authorization: <i>[Signature]</i>	<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <i>277097</i>	SMO Contact Phone: <i>SMO</i>	
Project/Task Number: 195122.10.11.03	Lab Contact: Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	
Service Order: CF327-18	Lab Destination: GEL	Send Report to SMO:	
	Contract No.: 1303873	Stephanie Montaño/505.284.2553	

Tech Area:	Operational Site:	Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <i>441807</i>
Building:	Room:	

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected		Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
							Type	Volume					
104394	001	CWL-FB 2	NA	1/18/18	12:32	DIW	G	3x40 ml	HCl	G	FB	VOC-TCE (SW846-8260B)	<i>015</i>
104395	001	CWL-MW11	513	1/18/18	12:32	GW	G	3x40 ml	HCl	G	SA	VOC-TCE (SW846-8260B)	<i>016</i>
104395	002	CWL-MW11	513	1/18/18	12:34	GW	P	500 ml	HNO3	G	SA	CHROMIUM, NICKEL (SW846-6020)	<i>017</i>
104396	001	CWL-TB 6	NA	1/18/18	12:32	DIW	G	3x40 ml	HCl	G	TB	VOC-TCE (SW846-8260B)	<i>018</i>

Last Chain: <input type="checkbox"/> Yes	Sample Tracking	SMO Use	Special Instructions/QC Requirements:	Conditions on Receipt
Validation Req'd: <input checked="" type="checkbox"/> Yes	Date Entered:		EDD <input checked="" type="checkbox"/> Yes	
Background: <input type="checkbox"/> Yes	Entered by:		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day	
Confirmatory: <input type="checkbox"/> Yes	QC inits.:		Negotiated TAT <input type="checkbox"/>	
Sample Team Members	Name	Signature	Init.	
	Thomas Evans	<i>[Signature]</i>	<i>TE</i>	AIS/00641/505-284/0804/505-274-0488
	Chris Hulliger	<i>[Signature]</i>	<i>CH</i>	AIS/00641/505/284-3309
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/00641/505-844-4013/505-250-7090
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/00641/505-239-7367/505-239-7367
			Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab	Return Samples By: Comments: Report CWL enhanced list of VOCs (chloroform; 1,1-DCE; PCE; TCE; Freon 11; and Freon 113) for environmental groundwater monitoring samples.

Relinquished by <i>[Signature]</i>	Org. <i>00641</i>	Date <i>1/18/18</i>	Time <i>1311</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>00631</i>	Date <i>1/18/18</i>	Time <i>1311</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. <i>00631</i>	Date <i>1/18/18</i>	Time <i>1335</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org.	Date <i>1/17/18</i>	Time <i>1035</i>	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. <i>MA</i>	SMO Use	AR/COC	618452
Project Name: CWL GWM/SVM	Date Samples Shipped: <i>1/18/18</i>	SMO Authorization: <i>[Signature]</i>	
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <i>277047</i>	SMO Contact Phone: Wendy Palencia/505-844-3132	
Project/Task Number: 195122.10.11.03	Lab Contact: Edie Kent/843-769-7385	Send Report to SMO: Stephanie Montaño/505.284.2553	
Service Order: CF327-18	Lab Destination: GEL	<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius	
	Contract No.: 1303873	Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <i>441807</i>	

Tech Area:	Building:	Room:	Operational Site:
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Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected		Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
							Type	Volume					
104409	001	CWL-EB2	NA	1/17/18	13:53	DIW	G	3x40 ml	HCl	G	EB	VOC-TCE (SW846-8260B)	<i>019</i>
104410	001	CWL-TB11	NA	1/17/18	13:53	DIW	G	3x40 ml	HCl	G	TB	VOC-TCE (SW846-8260B)	<i>020</i>

Last Chain: <input type="checkbox"/> Yes	Sample Tracking	SMO Use	Special Instructions/QC Requirements:	Conditions on Receipt	
Validation Req'd: <input checked="" type="checkbox"/> Yes	Date Entered:		EDD <input checked="" type="checkbox"/> Yes		
Background: <input type="checkbox"/> Yes	Entered by:		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day		
Confirmatory: <input type="checkbox"/> Yes	QC inits.:		Negotiated TAT <input type="checkbox"/>		
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell	Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab
	Thomas Evans	<i>[Signature]</i>	<i>TE</i>	AIS/00641/505-284/0804/505-274-0488	Return Samples By: Comments: Report CWL enhanced list of VOCs (chloroform, TCE, DCE, PCE, TCE, Freon 11, and Freon 113) for environmental groundwater monitoring samples. <i>TA 1/18/18</i>
	Chris Hulliger	<i>[Signature]</i>	<i>CH</i>	AIS/00641/505/284-3309	
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/00641/505-844-4013/505-250-7090	
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/00641/505-239-7367/505-239-7367	
			SNL/00641/505-844-2507/505-228-2606		

Relinquished by <i>[Signature]</i>	Org. <i>0641</i>	Date <i>1/17/18</i>	Time <i>14:03</i>	Relinquished by <i>[Signature]</i>	Org. <i>00671</i>	Date <i>1/18/18</i>	Time <i>0930</i>
Received by <i>[Signature]</i>	Org. <i>0671</i>	Date <i>1/17/18</i>	Time <i>14:03</i>	Received by <i>[Signature]</i>	Org. <i>00671</i>	Date <i>1/19/18</i>	Time <i>1035</i>
Relinquished by <i>[Signature]</i>	Org. <i>00671</i>	Date <i>1/17/18</i>	Time <i>1440</i>	Relinquished by <i>[Signature]</i>	Org. <i>00671</i>	Date <i>1/17/18</i>	Time <i>1440</i>
Received by <i>[Signature]</i>	Org. <i>00671</i>	Date <i>1/17/18</i>	Time <i>1440</i>	Received by <i>[Signature]</i>	Org. <i>00671</i>	Date <i>1/17/18</i>	Time <i>1440</i>

*Prior confirmation with SMO required for 7 and 15 day TAT

AR/COC NUMBER 618443

Memorandum

Date: February 22, 2018
To: File
From: Linda Thal
Subject: GC/MS Organic Data Review and Validation – SNL
Site: CWL GWM
ARCO: 618443
SDG: 442135
Laboratory: GEL
Project/Task: 195122.10.11.03
Analysis: VOCs

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Three aqueous samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. No problems were identified with the data package that resulted in the qualification of data.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding time and were properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria.

Blanks

No target analytes were detected in any of the blanks.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD acceptance criteria were met. It should be noted that the MS/MSD analyses were performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

A TB and an FB were submitted with ARCOG 618443.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 02/23/18

Memorandum

Date: February 22, 2018
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: CWL GWM
ARCOG: 618443
SDG: 442135
Laboratory: GEL
Project/Task: 195122.10.11.03
Analysis: Metals

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

One sample was prepared and analyzed with approved procedures using method EPA 6020 (ICP-MS). Data were reported for all required analytes. No problems were identified with the data package that resulted in the qualification of data.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times and Preservation

The sample was prepared and analyzed within the prescribed holding times and was properly preserved.

ICP-MS Instrument Tune

The ICP-MS tune met QC acceptance criteria.

Calibration

All initial and continuing calibration criteria met QC acceptance criteria.

Reporting Limit Verification

All LLCCV recoveries met QC acceptance criteria.

Blanks

No target analytes were detected in any of the blanks.

ICP -MS Internal Standards

The ICP-MS internal standards met QC acceptance criteria.

Matrix Spike (MS)

The MS met all QC acceptance criteria. It should be noted that the MS analysis was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Laboratory Replicate

The replicate met all QC acceptance criteria. It should be noted that the replicate analysis was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Laboratory Control Sample (LCS)

The LCS met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The sample was not diluted.

ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were evaluated because the sample concentration for Ca was > that in the ICS A and AB solutions. All QC acceptance criteria were met.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria. It should be noted that the serial dilution analysis was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 02/23/18



Sample Findings Summary



AR/COC: 618443

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC

All other analyses met QC acceptance criteria; no further data should be qualified.


Sandia Data Validation Summary Worksheet

ARCO#(s): 618443	Site/Project: CWL GWM	Validation Date: 02/22/2018
SDG: 442135	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 4	CVR present: Yes
ARCO#(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input type="checkbox"/> Rad		

Requested Analyses Not Reported			
Client Sample ID	Lab Sample ID	Analysis	Comments
None			

Hold Time/Preservation Outliers								
Client Sample ID	Lab Sample ID	Analysis	Pres.	Collection Date	Preparation Date	Analysis Date	Analysis <2X HT	Analysis ≥2X HT
None								

Comments: Collected: 01/22/2018
 All three vials for sample 442135004(104393-001) were received with headspace

Validated by:


Sandia Organic Worksheet (GC/MS VOC)

ARCO # (s): 618443	SDG: 442135	Matrix: Aqueous
Laboratory Sample IDs: 442135001, -002, -004		
Method/Batch #s: 8260B 1735137	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	TB4 -004	X5	FB1 -001	X5
	Int.	RF/ Slope	RSD/ r ²	(ICV)/CCV %D										
None														

Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R		Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R	
None									

IS Outliers										
	FBZ		Chl-d5		1,4-DCB-d4					
Sample ID	Area	RT	Area	RT	Area	RT				
None										

Comments: HTs OK. MS/MSD SNL sample from SDG 442133.
ICAL VOA1.I 01/23/2018

Sandia Inorganic Metals Worksheet

ARCO #s: 618443	SDG #(s): 442135	Matrix: Aqueous
Laboratory Sample IDs: 442135003		
Method/Batch #s: 3005A/6020 :1733479/1733481		

ICPMS Mass Cal: Pass Fail NA ICPMS Resolution: Pass Fail NA

Analyte (outliers)	Calibration						MB mg/L	5X Blank (5X MDL) mg/L	LCS %R	MS %R	DUP RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	LLCCV %R					
	Int. mg/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L														
none																				

IS Outliers 60-125%				IS Outliers 80-120%			
Sample ID	%Recovery	%Recovery	%Recovery	CCV/CCB ID	%Recovery	%Recovery	%Recovery
none				None			

Comments: HTs OK. MS, DUP, SD on SNL sample from SDG 442133
Ca > ICS A

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. *214*

SMO Use

AR/COC **618443**

Project Name: CWL GWM/SVM	Date Samples Shipped: <i>1/22/18</i>	SMO Authorization: <i>[Signature]</i>	<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <i>277214</i>	SMO Contact Phone: Wendy Palencia/505-844-3132	
Project/Task Number: 195122.10.11.03	Lab Contact: Edie Kent/843-769-7385	Send Report to SMO: Stephanie Montaño/505.284.2553	
Service Order: CF327-18	Lab Destination: GEL	Contract No.: 1303873	

Bill to: Sandia National Laboratories (Accounts Payable),
P.O. Box 5800, MS-0154
Albuquerque, NM 87185-0154 *442135*

Tech Area:		Operational Site:											Parameter & Method Requested		Lab Sample ID
Building:	Room:	Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type			
								Type	Volume						
		104391	001	CWL-FB 1	NA	1/22/18 09:12	DIW	G	3x40 ml	HCl	G	FB	VOC-TCE (SW846-8260B)	001	
		104392	001	CWL-MW10	515	1/22/18 09:12	GW	G	3x40 ml	HCl	G	SA	VOC-TCE (SW846-8260B)	002	
		104392	002	CWL-MW10	515	1/22/18 09:14	GW	P	500 ml	HNO3	G	SA	CHROMIUM, NICKEL (SW846-6020)	003	
		104393	001	CWL-TB 4	NA	1/22/18 09:12	DIW	G	3x40 ml	HCl	G	TB	VOC-TCE (SW846-8260B)	004	

Last Chain: <input type="checkbox"/> Yes	Sample Tracking	SMO Use	Special Instructions/QC Requirements:	Conditions on Receipt	
Validation Req'd: <input checked="" type="checkbox"/> Yes	Date Entered:		EDD <input checked="" type="checkbox"/> Yes		
Background: <input type="checkbox"/> Yes	Entered by:		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day		
Confirmatory: <input type="checkbox"/> Yes	QC inits.:		Negotiated TAT <input type="checkbox"/>		
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell	Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab
	Thomas Evans	<i>[Signature]</i>	TE	AIS/00641/505-284/0804/505-274-0488	Return Samples By: Comments: Report CWL enhanced list of VOCs (chloroform; 1,1-DCE;PCE;TCE;Freon 11;and Freon 113) for environmental groundwater monitoring samples.
	Chris Hulliger	<i>[Signature]</i>	CH	AIS/00641/505/284-3309	
	Robert Lynch	<i>[Signature]</i>	RL	SNL/00641/505-844-4013/505-250-7090	
	William Gibson	<i>[Signature]</i>	WG	SNL/00641/505-239-7367/505-239-7367	

Relinquished by <i>[Signature]</i>	Org. <i>00641</i> Date <i>1/22/18</i> Time <i>0950</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>00641</i> Date <i>1/22/18</i> Time <i>0950</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. <i>00641</i> Date <i>1/22/18</i> Time <i>1130</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>00641</i> Date <i>1-23-18</i> Time <i>8:10</i>	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT VERIFICATION REVIEW FORMS
GROUNDWATER MONITORING
JANUARY 2018

Note: The review forms in this section include AR/COC numbers for environmental samples and additional AR/COC numbers for waste characterization samples.

AR/COC Number	Sample Type
618439	Environmental*
618442	Environmental*
618443	Environmental*
618444	Environmental*
618445	Waste Characterization
618446	Waste Characterization
618447	Waste Characterization
618448	Waste Characterization

* These AR/COC forms are provided in the Data Validation Section of this Annex.

Contract Verification Form (CVR)

Project Leader Jackson

Project Name CWL GWM **Project/Task No.** 195122_10.11.03

ARCOC No. 618439, 618440, 618441, 618442, 618444 & 618452

Analytical Lab GEL

SDG No. 441807

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete?		If no, explain
		Yes	No	
1.1	All items on ARCOG complete - data entry clerk initialed and dated	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	X		
1.4	Preservative correct for analyses requested	X		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		One vial for samples 104384-001 and 104385-001 and all three vials for sample 104390-001 were received with headspace

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X		
2.4	Matrix spike/matrix spike duplicate data provided	X		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		
2.6	QC batch numbers provided	X		
2.7	Dilution factors provided and all dilution levels reported	X		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	X		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1	Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2	Quantitation limit met for all samples	X		
3.3	Accuracy	X		
	a) Laboratory control sample accuracy reported and met for all samples			
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
	c) Matrix spike recovery data reported and met	X		
3.4	Precision	X		
	a) Replicate sample precision reported and met for all inorganic and radiochemistry samples			
	b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5	Blank data	X		
	a) Method or reagent blank data reported and met for all samples			

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Bromodichloromethane, bromoform, chloroform and dibromochloromethane detected in CWL-EB2
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270) a) 12-hour tune check provided	X		
	b) Initial calibration provided	X		
	c) Continuing calibration provided	X		

Line No.	Item	Yes	No	Comments
	d) Internal standard performance data provided	X		
	e) Instrument run logs provided	X		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668)	N/A		
	a) 12-hour tune check provided			
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		

Line No.	Item	Yes	No	Comments
	c) CRI provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
4.5	Inorganics (metals)	X		
	a) Initial calibration provided			
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		
	e) Instrument run logs provided	X		
4.6	Radiochemistry and General Chemistry	N/A		
	a) Instrument run logs provided			

5.0 Data Anomaly Report

Line No.	Item	Yes	No	If no, explain
5.1	DAR completed for monitoring and surveillance sample data	N/A		
5.2	Problems or outliers noted	N/A		
5.3	Verification or reanalysis requested from lab	N/A		

Line No.	Item	Yes	No	If no, explain
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6.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies has been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
104384-001 & 104384-002	VOCs & metals	Sample location detail incorrect
.	.	.

Were deficiencies unresolved? Yes No

Based on the review, this data package is complete. Yes No

If no, provide nonconformance report or correction request number and date correction request was submitted: 02-20-2018

Reviewed by: Wendy Palencia Date: 02-20-2018 08:34:00

Were resolutions adequate and data package complete? Yes No

Closed by: Wendy Palencia Date: 02-27-2018 09:22:00

Contract Verification Form (CVR)

Project Leader Jackson

Project Name CWL GWM

Project/Task No. 195122_10.11.03

ARCOC No. 618443

Analytical Lab GEL

SDG No. 442135

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete?		If no, explain
		Yes	No	
1.1	All items on ARCOG complete - data entry clerk initialed and dated	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	X		
1.4	Preservative correct for analyses requested	X		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		All three vials for sample 104393-001 were received with headspace

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X		
2.4	Matrix spike/matrix spike duplicate data provided	X		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		
2.6	QC batch numbers provided	X		
2.7	Dilution factors provided and all dilution levels reported	X		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	X		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1	Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2	Quantitation limit met for all samples	X		
3.3	Accuracy a) Laboratory control sample accuracy reported and met for all samples	X		
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
	c) Matrix spike recovery data reported and met	X		
3.4	Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	X		
	b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5	Blank data a) Method or reagent blank data reported and met for all samples	X		
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met	X		

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270)	X		
	a) 12-hour tune check provided	X		
	b) Initial calibration provided	X		
	c) Continuing calibration provided	X		
	d) Internal standard performance data provided	X		

Line No.	Item	Yes	No	Comments
	e) Instrument run logs provided	X		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668)	N/A		
	a) 12-hour tune check provided			
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) CRI provided	N/A		

Line No.	Item	Yes	No	Comments
	d) Internal standard performance data provided	N/A		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
4.5	Inorganics (metals)	X		
	a) Initial calibration provided			
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		
	e) Instrument run logs provided	X		
4.6	Radiochemistry and General Chemistry	N/A		
	a) Instrument run logs provided			

5.0 Data Anomaly Report

Line No.	Item	Yes	No	If no, explain
5.1	DAR completed for monitoring and surveillance sample data	N/A		
5.2	Problems or outliers noted	N/A		
5.3	Verification or reanalysis requested from lab	N/A		

6.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies has been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
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Were deficiencies unresolved? Yes No

Based on the review, this data package is complete. Yes No

Reviewed by: Wendy Palencia Date: 02-21-2018 12:16:00

Closed by: Wendy Palencia Date: 02-21-2018 12:16:00

Contract Verification Form (CVR)

Project Leader Jackson

Project Name CWL GWM

Project/Task No. 195122_10.11.03

ARCOC No. 618445, 618446 & 618448

Analytical Lab GEL

SDG No. 441806

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete?		If no, explain
		Yes	No	
1.1	All items on ARCOG complete - data entry clerk initialed and dated	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	X		
1.4	Preservative correct for analyses requested	X		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X		
2.4	Matrix spike/matrix spike duplicate data provided	X		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		
2.6	QC batch numbers provided	X		
2.7	Dilution factors provided and all dilution levels reported	X		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	X		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	X		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1	Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2	Quantitation limit met for all samples	X		
3.3	Accuracy	X		
	a) Laboratory control sample accuracy reported and met for all samples			
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
	c) Matrix spike recovery data reported and met	X		
3.4	Precision	X		
	a) Replicate sample precision reported and met for all inorganic and radiochemistry samples			
	b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5	Blank data		X	Antimony and copper detected in method blank (QC1203955724). Total phenol detected in method blank (QC1203952509).
	a) Method or reagent blank data reported and met for all samples			
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met	X		

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	X		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270)	X		
	a) 12-hour tune check provided	X		
	b) Initial calibration provided	X		
	c) Continuing calibration provided	X		
	d) Internal standard performance data provided	X		

Line No.	Item	Yes	No	Comments
	e) Instrument run logs provided	X		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668)	N/A		
	a) 12-hour tune check provided			
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) CRI provided	N/A		

Line No.	Item	Yes	No	Comments
	d) Internal standard performance data provided	N/A		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
4.5	Inorganics (metals)	X		
	a) Initial calibration provided			
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		
	e) Instrument run logs provided	X		
4.6	Radiochemistry and General Chemistry	X		
	a) Instrument run logs provided			

5.0 Data Anomaly Report

Line No.	Item	Yes	No	If no, explain
5.1	DAR completed for monitoring and surveillance sample data	N/A		
5.2	Problems or outliers noted	N/A		
5.3	Verification or reanalysis requested from lab	N/A		

6.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies has been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
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Were deficiencies unresolved? Yes No

Based on the review, this data package is complete. Yes No

Reviewed by: Wendy Palencia Date: 02-22-2018 10:55:00

Closed by: Wendy Palencia Date: 02-22-2018 10:55:00

Contract Verification Form (CVR)

Project Leader Jackson

Project Name CWL GWM

Project/Task No. 195122_10.11.03

ARCOC No. 618447

Analytical Lab GEL

SDG No. 442133

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete?		If no, explain
		Yes	No	
1.1	All items on ARCOG complete - data entry clerk initialed and dated	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	X		
1.4	Preservative correct for analyses requested	X		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		All three vials for sample 104402-001 were received with headspace

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X		
2.4	Matrix spike/matrix spike duplicate data provided	X		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		
2.6	QC batch numbers provided	X		
2.7	Dilution factors provided and all dilution levels reported	X		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	X		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	X		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1	Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2	Quantitation limit met for all samples	X		
3.3	Accuracy	X		
	a) Laboratory control sample accuracy reported and met for all samples			
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
	c) Matrix spike recovery data reported and met	X		
3.4	Precision	X		
	a) Replicate sample precision reported and met for all inorganic and radiochemistry samples			
	b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5	Blank data		X	Antimony and uranium detected in method blank (QC1203957007). Total Phenol detected in method blank (QC1203956333). Potassium-40 detected in method blank (QC1203957834).
	a) Method or reagent blank data reported and met for all samples			
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met	X		

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	X		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270)	X		
	a) 12-hour tune check provided	X		
	b) Initial calibration provided	X		
	c) Continuing calibration provided	X		
	d) Internal standard performance data provided	X		

Line No.	Item	Yes	No	Comments
	e) Instrument run logs provided	X		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668)	N/A		
	a) 12-hour tune check provided			
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) CRI provided	N/A		

Line No.	Item	Yes	No	Comments
	d) Internal standard performance data provided	N/A		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
4.5	Inorganics (metals)	X		
	a) Initial calibration provided			
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		
	e) Instrument run logs provided	X		
4.6	Radiochemistry and General Chemistry	X		
	a) Instrument run logs provided			

5.0 Data Anomaly Report

Line No.	Item	Yes	No	If no, explain
5.1	DAR completed for monitoring and surveillance sample data	N/A		
5.2	Problems or outliers noted	N/A		
5.3	Verification or reanalysis requested from lab	N/A		

6.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies has been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
---------------------	----------	-------------------------------

Were deficiencies unresolved? Yes No

Based on the review, this data package is complete. Yes No

Reviewed by: Wendy Palencia Date: 02-22-2018 01:33:00

Closed by: Wendy Palencia Date: 02-22-2018 01:33:00

FIELD SAMPLING FORMS
JULY 2018 GROUNDWATER MONITORING

HEALTH & SAFETY MEETING FORM

Dept: 8888 Facility: ERFO Date: 07/16/18 Time: 0840

Activities: Deon of CWL Pump prior to sampling.
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:
 Temp: 77 °F Wind Speed: 5 MPH Humidity: 68 % Wind Chill: 77 °F

Chemicals Used: None Preservatives in sample bottles Other: _____
 Hospital/Clinic: Sandia Medial Clinic Bldg. 831 Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input type="checkbox"/> Be aware of electrical hazards	<input type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or **NO**. If answered YES explain.

Robert Lynch
 Printed Name
[Signature]
 Printed Name
 Printed Name
 Printed Name
 Printed Name
 Printed Name

Attendees

[Signature]
 Signature
CHRIS AMATORE
 Signature
 Signature
 Signature
 Signature
 Signature

Notes

HEALTH & SAFETY MEETING FORM

Dept: 8888 Facility: CWL-BW 5 Date: 07/17/18 Time: 0815

Activities: Groundwater Monitoring and Sampling
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:
 Temp: 73 °F Wind Speed: 4 MPH Humidity: 64 % Wind Chill: N/A °F

Chemicals Used: None Preservatives in sample bottles Other: _____
 Hospital/Clinic: Sandia Medial Clinic Bldg. 831 Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or **NO**. If answered YES explain.

Robert Lynch
 Printed Name
Chris Hollmer
 Printed Name
Joseph Sinclair
 Printed Name
Tim Jackson
 Printed Name

 Printed Name

 Printed Name

Attendees

Robert Lynch
 Signature
Chris Hollmer
 Signature
Joseph Sinclair
 Signature
Tim Jackson
 Signature

 Signature

 Signature

Notes

HEALTH & SAFETY MEETING FORM

Dept: 8888 Facility: CWL-MW 9 Date: 07/18/18 Time: 0808

Activities: Groundwater Monitoring and Sampling
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:
 Temp: 76 °F Wind Speed: 4 MPH Humidity: 41 % Wind Chill: 76 °F

Chemicals Used: None Preservatives in sample bottles Other: _____
 Hospital/Clinic: Sandia Medial Clinic Bldg. 831 Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle **YES** or **NO**. If answered **YES** explain.

Robert Lynch
 Printed Name
Chris Houston
 Printed Name
Tim Jackson
 Printed Name

 Printed Name

 Printed Name

 Printed Name

Attendees

Robert Lynch
 Signature
Chris Houston
 Signature
Tim Jackson
 Signature

 Signature

 Signature

 Signature

Notes

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HEALTH & SAFETY MEETING FORM

Dept: 8888 Facility: CWL-MW 11 Date: 07/19/18 Time: 0815

Activities: Groundwater Monitoring and Sampling
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather/Conditions:
 Temp: 94 °F Wind Speed: 7 MPH Humidity: 22 % Wind Chill: 94 °F

Chemicals Used: None Preservatives in sample bottles Other: _____
 Hospital/Clinic: Sandia Medial Clinic Bldg. 831 Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or **NO**. If answered YES explain.

Robert Lynch
 Printed Name
Tim Jackson
 Printed Name
Chris Hollifield
 Printed Name

 Printed Name

 Printed Name

 Printed Name

Attendees

Robert Lynch
 Signature
Tim Jackson
 Signature
Chris Hollifield
 Signature

 Signature

 Signature

 Signature

Notes

HEALTH & SAFETY MEETING FORM

Dept: 8888 Facility: CWL-MW 10 Date: 07/20/18 Time: 0818

Activities: Groundwater Monitoring and Sampling 07/23/18 0830
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

^{7/20} Weather Conditions:
 Temp: 86 °F 94 Wind Speed: 3 MPH 20 Humidity: 30 % Wind Chill: NA °F
^{7/23} Chemicals Used: None Preservatives in sample bottles Other: _____
 Hospital/Clinic: Sandia Medial Clinic Bldg. 831 Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle **YES** or **NO**. If answered **YES** explain.

Robert Lynch
Printed Name
William Gibson
Printed Name
CHRIS HOLLITER
Printed Name
^{57/23/18} Robert Lynch
Printed Name
CHRIS HOLLITER
Printed Name
William Gibson
Printed Name

Attendees

[Signature]
Signature
[Signature]
Signature
[Signature]
Signature
[Signature]
Signature
[Signature]
Signature

Notes

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: CWL		
Well I.D.: CWL-BW 5	Date: 07/17/18	
Method: Portable pump ^X	Dedicated pump	Pump depth: 522'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol (L gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)
514.16	0827	Start							
515.93	0909	3	21.21	1117.9	157.1	6.96	0.56	91.0	6.57
516.23	0923	5	21.22	1188.3	155.1	6.96	1.13	89.4	6.45
516.44	0936	7	21.27	1204.5	153.1	6.96	0.49	89.4	6.45
516.59	0949	9	21.56	1164.9	152.0	6.96	0.54	89.8	6.43
516.70	1001	11	21.60	1152.5	150.9	6.96	0.49	88.8	6.37
516.76	1013	13	21.85	1175.1	150.3	6.95	0.48	88.3	6.32
516.79	1020	14	21.87	1179.2	150.1	6.95	0.43	89.9	6.42
516.76	1027	15	22.03	1184.1	150.0	6.95	0.72	89.9	6.38
516.71	1034	16	22.05	1189.3	150.0	6.95	0.61	88.5	6.25
516.68	1042	17	22.12	1186.0	150.3	6.95	0.42	87.9	6.21
	1043	Sampling							

Comments: ~1.5 gals purged from tubing 0848

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FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: CWL		
Well I.D.: CWL-MW9	Date: 07/18/18	
Method: Portable pump <input checked="" type="checkbox"/>	Dedicated pump <input type="checkbox"/>	Pump depth: 517'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)	
505.63	0824	Start								
507.87	0910	5	22.4	1139.7	166.2	7.05	0.31	52.1	3.67	
508.25	0929	8	22.5	1155.6	159.9	7.05	0.41	50.9	3.58	
508.40	0940	10	22.5	1126.1	156.3	7.06	0.57	51.8	3.65	
508.60	0957	12	22.4	1146.1	154.5	7.05	0.61	51.5	3.63	
508.93	1002	14	22.6	1135.4	152.2	7.06	0.49	51.4	3.61	
509.05	1011	16	22.5	1149.1	151.3	7.05	0.45	51.7	3.64	
509.11	1022	18	22.7	1182.6	149.8	7.05	0.43	52.4	3.66	
509.27	1032	20	22.5	1159.1	149.5	7.05	0.61	52.9	3.72	
509.19	1037	21	22.8	1171.1	149.2	7.04	0.32	53.5	3.74	
509.19	1042	22	22.8	1178.5	148.8	7.04	0.52	54.3	3.79	
509.20	1047	23	22.8	1181.1	148.5	7.03	0.37	54.5	3.82	
509.22	1053	24	22.9	1188.6	147.9	7.03	0.39	55.2	3.84	
	1054		SAMPLING							

Comments: ~1.5 gals purged from tubing 0837

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: CWL	
Well I.D.: CWL-MW 10	Date: 07/20/18 <u>7/23/18</u>
Method: Portable pump ^X	Dedicated pump _____ Pump depth: 515'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)
502.59	0835	Start							
505.29	0909	2	25.54	1231.4	176.1	7.02	2.46	39.4	2.60
506.95	0927	4	25.03	1214.6	163.5	7.03	1.63	31.1	2.08
508.49	0945	6	24.67	1202.0	138.9	7.03	1.54	27.0	1.82
509.96	1003	8	24.70	1199.4	108.0	7.03	1.98	24.9	1.68
511.40	1008	10	24.92	1214.3	81.6	7.02	2.36	23.85	1.60
512.19	1031	11	24.92	1213.1	74.3	7.02	2.57	23.4	1.57
513.18	1040	12	24.92	1213.2	65.6	7.02	2.58	22.5	1.51
514.04	1049	13	25.13	1221.1	59.4	7.02	3.29	21.5	1.43
514.81	1105	14	26.49	1248.5	54.1	7.00	4.28	23.2	1.51
515.55	1109	14.65	24.80	1201.1	49.5	7.00	6.15	20.82	1.41
515.55	1109	well	DRY						
503.18	0840		START						
505.25	0858	1	26.63	1283.0	-11.2	6.94	2.38	38.1	2.56
506.11	0904	2	25.80	1256.7	-21.2	6.94	3.07	24.8	1.70
506.98	0910	3	25.41	1238.5	-21.8	6.94	2.85	20.4	1.40
	0911		SAMPLING						

Comments: ~1.5 gals purged from tubing 0850 07/23/18

FB-2 1090 D/W # 091

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FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: CWL	
Well I.D.: CWL-MW 11	Date: 07/19/18
Method: Portable pump <input checked="" type="checkbox"/>	Dedicated pump <input type="checkbox"/> Pump depth: 513'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)
500.78	0831	Start							
504.69	0930	5	24.84	1302.2	160.1	6.98	0.36	78.7	5.29
506.22	0958	8	25.06	1310.5	155.7	6.99	0.61	77.6	5.20
507.11	1016	10	25.67	1324.8	153.6	6.98	0.72	77.6	5.13
507.95	1035	12	25.33	1307.0	152.2	6.99	0.63	76.3	5.09
508.87	1055	14	25.15	1313.7	150.7	6.99	0.57	77.7	5.19
509.82	1113	16	25.51	1320.4	149.7	6.99	0.45	76.8	5.10
510.70	1131	18	25.45	1337.8	147.3	6.99	0.42	76.0	5.05
511.63	1148	20	25.82	1323.8	-17.0	6.98	0.52	78.4	4.51
512.08	1216	22	25.89	1392.1	33.2	6.97	0.59	77.2	4.78
512.41	1226	23	25.99	1378.3	42.9	6.97	0.56	74.1	4.70
512.80	1236	24	25.97	1345.9	60.2	6.98	2.03	74.2	4.69
	1237	25		Samples					
		26							

Comments: ~1.5 gals purged from tubing 0845 @ 20 gals ORP changed, continued reading. Pump would shut off when attempting to pour late.

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: CWL		Used Tablet			
Calibrations done by: C. Hulliger			Date: 7/17/18		
Make & Model: IN-SITU Aqua Troll 600					
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 536303					
Other (S/N): _____					
pH Calibration/Check					
pH Calibrated to (std):			pH sloped to (std):		
Reference value:	4.00		7.00		10.00
	Value	Temp	Value	Temp	Value Temp
1. Time:	0619	4.00	23.4	7.00	23.9
2. Time:	1237	4.04	24.8	7.02	24.2
3. Time:					9.98
4. Time:					24.5
Standard lot no.:	8GD878		8GD396		8GD394
Expiration date:	APR/20		APR/20		APR/20
SC Calibration/Check					
Reference Value: 1360@23c			Standard Lot No.: 8GD041		
	Value	Temp	Expiration Date: JAN/19		
1. Time:	0631	1388			
2. Time:	1305	1427			
3. Time:					
4. Time:					
ORP Calibration/Check					
Reference Value: 220mV			Standard Lot No. 8GD094		
	Value	Temp	Expiration Date: JAN/19		
1. Time:	0635	220			
2. Time:	1316	219			
3. Time:					
4. Time:					
DO Calibration/Check					
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg		
1. Time:	0615	91.6	24.5		
2. Time:	1234	93.4	24.5		
3. Time:					
4. Time:					

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: CWL				
Calibration done by: C. Hulliger			Date: 7/17/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 14060C033238	
Reference Value	10	20	100	800
Standard Lot No.	A8012	A8015	A8010	A8015
1. Time <i>0625</i>	<i>10.1</i>	<i>20.2</i>	<i>101</i>	<i>798</i>
2. Time <i>1319</i>	<i>10.0</i>	<i>20.2</i>	<i>100</i>	<i>797</i>
3. Time				
4. Time				
Comments:				

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG **Page 1 of 2**

SNL/NM Project Name: CWL		Used Tablet			
Calibrations done by: C. Hulliger			Date: 7/18/18		
Make & Model: IN-SITU Aqua Troll 600					
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 536303					
Other (S/N): _____					
pH Calibration/Check					
pH Calibrated to (std):			pH sloped to (std):		
Reference value:	4.00		7.00		10.00
	Value	Temp	Value	Temp	Value Temp
1. Time:	0604	4.03	23.6	7.00	23.4 10.00
2. Time:	1237	4.02	24.2	7.02	25.3 9.99
3. Time:					
4. Time:					
Standard lot no.:	8GD878		8GD396		8GD394
Expiration date:	APR/20		APR/20		APR/20
SC Calibration/Check					
Reference Value: 1360@23c			Standard Lot No.: 8GD041		
	Value	Temp	Expiration Date: JAN/19		
1. Time:	0614	1379	23.8		
2. Time:	1320	1387	23.8		
3. Time:					
4. Time:					
ORP Calibration/Check					
Reference Value: 220mV			Standard Lot No. 8GD094		
	Value	Temp	Expiration Date: JAN/19		
1. Time:	0619	220	23.7		
2. Time:	1326	220	24.1		
3. Time:					
4. Time:					
DO Calibration/Check					
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg		
1. Time:	0600	92.3	24.5		
2. Time:	1233	94.5	24.5		
3. Time:					
4. Time:					

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: CWL				
Calibration done by: C. Hulliger			Date: 7/18/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 14060C033238	
Reference Value	10	20	100	800
Standard Lot No.	A8012	A8015	A8010	A8015
1. Time <i>0020</i>	<i>10</i>	<i>20.1</i>	<i>101</i>	<i>799</i>
2. Time <i>1300</i>	<i>9.98</i>	<i>20.1</i>	<i>99.7</i>	<i>799</i>
3. Time				
4. Time				
Comments:				

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG Page 1 of 2

SNL/NM Project Name: CWL		Used Tablet			
Calibrations done by: C. Hulliger			Date: 7/19/18		
Make & Model: IN-SITU Aqua Troll 600					
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 536303					
Other (S/N): _____					
pH Calibration/Check					
pH Calibrated to (std):			pH sloped to (std):		
Reference value:	4.00		7.00		10.00
	Value	Temp	Value	Temp	Value Temp
1. Time:	0607 4.03	23.6	6.99	23.4	9.99 23.4
2. Time:	1339 4.00	25.9	6.99	26.7	9.98 25.9
3. Time:					
4. Time:					
Standard lot no.:	8GD878		8GD396		8GD394
Expiration date:	APR/20		APR/20		APR/20
SC Calibration/Check					
Reference Value: 1360@23c			Standard Lot No.: 8GD041		
	Value	Temp	Expiration Date: JAN/19		
1. Time:	0618 1369	23.5			
2. Time:	1417 1418	25.1			
3. Time:					
4. Time:					
ORP Calibration/Check					
Reference Value: 220mV			Standard Lot No. 8GD094		
	Value	Temp	Expiration Date: JAN/19		
1. Time:	0620 221	23.4			
2. Time:	1420 220	25.1			
3. Time:					
4. Time:					
DO Calibration/Check					
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg		
1. Time:	0605 94.1		24.5		
2. Time:	1335 96.3		24.5		
3. Time:					
4. Time:					

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: CWL				
Calibration done by: C. Hulliger			Date: 7/19/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 14060C033238	
Reference Value	10	20	100	800
Standard Lot No.	A8012	A8015	A8010	A8015
1. Time 0621	10.1	20	100	801
2. Time 1421	10.1	20.1	100	798
3. Time				
4. Time				
Comments:				

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG Page 1 of 2

SNL/NM Project Name: CWL			Used Tablet			
Calibrations done by: C. Hulliger			Date: 7/20/18 - 7/23/18			
Make & Model: IN-SITU Aqua Troll 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 536303						
Other (S/N): _____						
pH Calibration/Check						
pH Calibrated to (std):			pH sloped to (std):			
Reference value:		4.00		7.00		10.00
	Value	Temp	Value	Temp	Value	Temp
1. Time:	0602	4.00	23.2	6.98	23.1	9.96
2. Time:	0623	4.00	26.2	7.00	26.8	9.98
3. Time:	1047	4.00	24.7	6.97	25.9	9.95
4. Time:	1315	4.01	24.5	7.00	24.3	10.01
Standard lot no.:	8GD878		8GD396		8GD394	
Expiration date:	APR/20		APR/20		APR/20	
SC Calibration/Check						
Reference Value: 1360@23c			Standard Lot No.: 8GD041			
	Value	Temp	Expiration Date: JAN/19			
1. Time:	0610	1382	23.4			
2. Time:	0631	1430	25.3			
3. Time:	1057	1380	24.5			
4. Time:	1326	1387	24.2			
ORP Calibration/Check						
Reference Value: 220mV			Standard Lot No. 8GD094			
	Value	Temp	Expiration Date: JAN/19			
1. Time:	0612	221	23.6			
2. Time:	0634	220	26.0			
3. Time:	1059	220	24.3			
4. Time:	1329	220	24.2			
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	0600	94.2	24.5			
2. Time:	0620	93.6	24.5			
3. Time:	1045	94.1	24.5			
4. Time:	1312	94.3	24.5			

7/23

7/23

7/23

7/23

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: CWL				
Calibration done by: C. Hulliger			Date: 7/20/18 - 7/23/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 14060C033238	
Reference Value	10	20	100	800
Standard Lot No.	A8012	A8015	A8010	A8015
1. Time <i>0613</i>	<i>10</i>	<i>19.9</i>	<i>101</i>	<i>799</i>
2. Time <i>0635</i>	<i>10.1</i>	<i>20</i>	<i>100</i>	<i>801</i>
<i>7/23</i> 3. Time <i>1101</i>	<i>7.98</i>	<i>20.1</i>	<i>100</i>	<i>798</i>
4. Time <i>1330</i>	<i>9.99</i>	<i>20.1</i>	<i>101</i>	<i>798</i>
Comments:				

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**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>CWL-GWM</u>	Monitoring Well ID #: <u>CWL</u>	Date: <u>07/16/18</u>
------------------------------	----------------------------------	-----------------------

The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03

Pump and Tubing Bundle ID #: <u>1806-640</u>	Water Level Indicator ID #: <u>N/A</u>
--	--

Personnel Performing Decontamination:

Robert Lynch Print Name: _____	<u>RL</u> Initial: _____
Chris Hulliger Print Name: _____	<u>CH</u> Initial: _____

Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Good</u>

List of Decontamination Materials

<p align="center">Deionized Water</p> <p>Source: <u>1090 DIW QC Lot# 086</u></p> <p>Lot Number: <u>009,080,082,068,010,096,084,090,081,092,079</u></p>	<p align="center">HNO₃</p> <p>Grade: <u>Reagent</u></p> <p>UN #: <u>2031</u></p> <p>Manufacturer: <u>ACROS</u></p> <p>Lot Number: <u>A0385545</u></p>
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**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>CWL-GWM</u>	Monitoring Well ID #: <u>CWL-BW5</u>	Date: <u>07/17/18</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
Pump and Tubing Bundle ID #: <u>1806-640</u>	Water Level Indicator ID #: <u>62089</u>	
<u>Personnel Performing Decontamination:</u>		
Robert Lynch Print Name:	<u>RL</u> Initial:	
Chris Hulliger Print Name:	<u>CH</u> Initial:	
Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Good</u>
List of Decontamination Materials		
Deionized Water	HNO₃	
Source: <u>Culligan</u>	Grade: <u>Reagent</u>	
Lot Number: <u>06/14/18, 06/27/18</u>	UN #: <u>2031</u>	
	Manufacturer: <u>ACROS</u>	
	Lot Number: <u>A0385545</u>	

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**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>CWL GWM</u>	Monitoring Well ID #: <u>CWL-MW9</u>	Date: <u>07/18/18</u>
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The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03

Pump and Tubing Bundle ID #: <u>1806-640</u>	Water Level Indicator ID #: <u>62089</u>
--	--

Personnel Performing Decontamination:

Robert Lynch

Print Name:

RL
Initial:

Chris Hulliger

Print Name:

CHA
Initial:

Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Good</u>

List of Decontamination Materials

Deionized Water	HNO ₃
Source: <u>Culligan</u>	Grade: <u>Reagent</u>
Lot Number: <u>6/27/18, 6/17/18, 6/24/18</u>	UN #: <u>2031</u>
	Manufacturer: <u>ACROS</u>
	Lot Number: <u>A0385545</u>

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**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>CWL GWM</u>	Monitoring Well ID #: <u>CWL-MW11</u>	Date: <u>07/19/18</u>
------------------------------	---------------------------------------	-----------------------

The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03

Pump and Tubing Bundle ID #: <u>1806-640</u>	Water Level Indicator ID #: <u>62089</u>
--	--

Personnel Performing Decontamination:

Robert Lynch

Print Name:

Chris Hulliger

Print Name:


 Initial: _____

 Initial: _____

Condition of Equipment

Pump: Excellent Tubing Bundle: Excellent Water Level Indicator: Good

List of Decontamination Materials

<p align="center">Deionized Water</p> <p>Source: <u>Culligan</u></p> <p>Lot Number: <u>6/27/18, 6/17/18, 5/24/18</u></p>	<p align="center">HNO₃</p> <p>Grade: <u>Reagent</u></p> <p>UN #: <u>2031</u></p> <p>Manufacturer: <u>ACROS</u></p> <p>Lot Number: <u>A0385545</u></p>
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**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>CWL-GWM</u>	Monitoring Well ID #: <u>CWL-MW10</u>	Date: <u>07/23/18</u>
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The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03

Pump and Tubing Bundle ID #: <u>1806-640</u>	Water Level Indicator ID #: <u>62089</u>
---	---

Personnel Performing Decontamination:

<u>Robert Lynch</u> Print Name:	 Initial:
<u>William Gibson</u> Print Name:	 Initial:

Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Good</u>

List of Decontamination Materials	
<p align="center">Deionized Water</p> <p>Source: <u>Culligan</u></p> <p>Lot Number: <u>06/14/18,06/27/18</u></p>	<p align="center">HNO₃</p> <p>Grade: <u>Reagent</u></p> <p>UN #: <u>2031</u></p> <p>Manufacturer: <u>ACROS</u></p> <p>Lot Number: <u>A0385545</u></p>

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SUMMARY SHEET FOR JULY 2018 SAMPLES

Sample Summary for CWL Groundwater Monitoring
July 2018

Sample ID	Sample Date	ARCOC	Sample Number	Sample Type	Associated Equipment Blank (ARCOC #/Sample #)	Associated Trip Blank (ARCOC # / Sample #)	Associated Field Blank (ARCOC # / Sample #)	Comments
CWL GWM: Project Task # 195122.10.11.03. Service Order # CF 327-18								
Environmental Samples								
CWL-BW5	17-Jul-18	618892	105709	Environmental	618891 / 105707	618892 / 105712	618892 / 105711	
CWL-BW5	17-Jul-18	618892	105710	Duplicate	618891 / 105707	618892 / 105712	618892 / 105711	
CWL-MW9	18-Jul-18	618893	105713	Environmental	n/a	618893 / 105714	n/a	
CWL-MW10	23-Jul-18	618894	105715	Environmental	n/a	618894 / 105717	618894 / 105716	
CWL-MW11	19-Jul-18	618895	105718	Environmental	n/a	618895 / 105719	n/a	
CWL-EB1	16-Jul-18	618891	105707	Equipment Blank	n/a	618891 / 105708	n/a	Decon prior to CWL-BW5
CWL-FB1	17-Jul-18	618892	105711	Field Blank	n/a	618892 / 105712	n/a	at CWL-BW5
CWL-FB2	23-Jul-18	618894	105716	Field Blank	n/a	618894 / 105717	n/a	at CWL-MW10
CWL-DIW QC	16-Jul-18	618896	105720	QC-DIW	n/a	618896 / 105721	n/a	DIW source for CWL-EB1
Waste Characterization Samples								
CWL-BW5	17-Jul-18	618897	105699	Waste	n/a	618897 / 105700	n/a	No data validation required
CWL-MW9	18-Jul-18	618898	105701	Waste	n/a	618898 / 105702	n/a	No data validation required
CWL-MW10	23-Jul-18	618899	105703	Waste	n/a	618899 / 105704	n/a	No data validation required
CWL-MW11	19-Jul-18	618900	105705	Waste	n/a	618900 / 105706	n/a	No data validation required

DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES

GROUNDWATER MONITORING

JULY 2018

AR/COC NUMBERS 618891, 618892, 618893, 618896

Memorandum

Date: August 17, 2018
To: File
From: Linda Thal
Subject: GC/MS Organic Data Review and Validation – SNL
Site: CWL GWM
ARCO: 618891, 618892, 618893 and 618896
SDG: 454724
Laboratory: GEL
Project/Task: 195122.10.11.03
Analysis: VOCs

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Ten samples were prepared and analyzed with accepted procedures for trichloroethylene using method EPA 8260B (VOCs). All compounds were successfully analyzed. No problems were identified with the data package that resulted in the qualification of data.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding time and were properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria.

Blanks

No target analytes were detected in any of the blanks.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD acceptance criteria were met.

It should be noted that the MS/MSD analyses associated with both batches were performed on SNL samples of similar matrix from another SDG. No data will be qualified.

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

Four TBs were submitted, one for each ARCOC. FB1 was submitted with ARCOC 618892 and was associated with the samples on the same ARCOC. EB1 was submitted with ARCOC 618891 and was associated with the samples on ARCOC 618892. A deionized water sample, the source water for EB1, was submitted with ARCOC 618896 and was not associated with any field samples. A field duplicate pair was submitted with ARCOC 618892. There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 08/17/18

Memorandum

Date: August 17, 2018
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: CWL GWM
ARCO: 618891, 618892, 618893 and 618896
SDG: 454724
Laboratory: GEL
Project/Task: 195122.10.11.03
Analysis: Metals

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Five samples were prepared and analyzed with approved procedures using method EPA 6020 (ICP-MS). Data were reported for all required analytes. No problems were identified with the data package that resulted in the qualification of data.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and were properly preserved.

ICP-MS Instrument Tune

The ICP-MS tune met QC acceptance criteria.

Calibration

All initial and continuing calibration criteria met QC acceptance criteria.

Reporting Limit Verification

All LLCCV recoveries met QC acceptance criteria.

Blanks

No target analytes were detected in any of the blanks with the following exception. Ni was detected at \leq the PQL in EB1, sample 454724005 associated with samples -008 and -010. The associated sample results were non-detect and will not be qualified.

ICP -MS Internal Standards

The ICP-MS internal standards met QC acceptance criteria.

Matrix Spike (MS)

The MS met all QC acceptance criteria.

Laboratory Replicate

The replicate met all QC acceptance criteria.

Laboratory Control Sample (LCS)

The LCS met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were evaluated because the Ca concentrations for samples -008, -010 and -014 were $>$ that in the ICS A and AB solutions. All QC acceptance criteria were met.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

EB1 was submitted with ARCOG 618891 and was associated with the samples on ARCOG 618892. A deionized water sample, the source water for EB1, was submitted with ARCOG 618896 and was not associated with any field samples. A field duplicate pair was submitted with ARCOG 618892. There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 08/17/18



Sample Findings Summary



AR/COC: 618891, 618892, 618893, 618896

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC

All other analyses met QC acceptance criteria; no further data should be qualified.


Sandia Data Validation Summary Worksheet

ARCO#(s): 618891, 618892, 618893 and 618896	Site/Project: CWL GWM	Validation Date: 08/17/2018
SDG: 454724	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 15	CVR present: Yes
ARCO#(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input type="checkbox"/> Rad		

Requested Analyses Not Reported			
Client Sample ID	Lab Sample ID	Analysis	Comments
None			

Hold Time/Preservation Outliers								
Client Sample ID	Lab Sample ID	Analysis	Pres.	Collection Date	Preparation Date	Analysis Date	Analysis <2X HT	Analysis ≥2X HT
None								

Comments: Collected: 07/16 through 07/18/2018
 All three vials for samples 454724003(105721-001), 454724006(105708-001), 454724012(105712-001) and 454724015(105714-001) were received with headspace.

Validated by:


Sandia Organic Worksheet (GC/MS VOC)

ARCO # (s): 618891, 618892, 618893 and 618896	SDG: 454724	Matrix: Aqueous
Laboratory Sample IDs: 454724001, -003, -004, -006, -007, -009, -011, -012, -013, -015		
Method/Batch #s: 8260B1 ¹ 1786532 and ² 1787595 (TCE only)	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	TB1 -006 TB2 -003	TB3 -012 TB4 -015	EB1 -004 DIW QC -001	FB1 -011
	Int.	RF/ Slope	RSD/ r ²	(ICV)/CCV %D										
None														

Surrogate Recovery Outliers									
Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R		Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R	
None									

IS Outliers									
	FBZ		Chl-d5		1,4-DCB-d4				
Sample ID	Area	RT	Area	RT	Area	RT			
None									

Comments: HTs OK. MS/MSD on SNL samples from SDG 454790 (-001, -007).
 ICAL VOAA.I 06/27/2018 Avg RF.
¹ 1786532: Samples -001, -003, -004, -006, -007, -009, -011, -012
² 1787595: Samples -013, -015

Sandia Inorganic Metals Worksheet

ARCO #s: 618891, 618892, 618893 and 618896	SDG #(s): 454724	Matrix: Aqueous
Laboratory Sample IDs: 454724002, -005, -008, -010, -014		
Method/Batch #s: 3005A/6020 :1784351/1784352		

ICPMS Mass Cal: Pass Fail NA ICPMS Resolution: Pass Fail NA

Analyte (outliers)	Calibration						MB mg/L	5X Blank (5X MDL) mg/L	LCS %R	MS %R	DUP RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	LLCCV %R	EB1 -005	X5	DIW QC -002	X5
	Int. mg/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L													
Ni	NA	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	.00171J	.0086	✓	NA	

IS Outliers 60-125%				IS Outliers 80-120%			
Sample ID	%Recovery	%Recovery	%Recovery	CCV/CCB ID	%Recovery	%Recovery	%Recovery
none				None			

Comments: HTs OK. MS, DUP, SD on -008
Ca > ICS A -008, -010, -014

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. <i>N/A</i>	SMO Use	AR/COC	618896
Project Name: CWL GWM/SVM	Date Samples Shipped: <i>7/16/18</i>	SMO Authorization: <i>[Signature]</i>	
Project/Task Manager: Timmie Jackson	Carrier/Waybill No.: <i>284902</i>	SMO Contact Phone: <i>SMO</i>	
Project/Task Number: 195122.10.11.03	Lab Contact: Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	
Service Order: CF327-18	Lab Destination: GEL	Send Report to SMO: Stephanie Montano/505-284-2553	
	Contract No.: 1303873	<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius	

Tech Area:	Operational Site:	Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <i>454724</i>
Building:	Room:	

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
105720	001	CWL-DIW QC	na	7/16/18 09:30	DIW	G	3x40 ml	HCl	G	FB	VOC-TCE (SW846-8260B)	001
105720	002	CWL-DIW QC	na	7/16/18 09:31	DIW	P	500 ml	HNO3	G	FB	CHROMIUM, NICKEL (SW846-6020)	002
105721	001	CWL-TB2	na	7/16/18 09:30	DIW	G	3x40 ml	HCl	G	TB	VOC-TCE (SW846-8260B)	003

Last Chain: <input type="checkbox"/> Yes	Sample Tracking	SMO Use	Special Instructions/QC Requirements:	Conditions on Receipt	
Validation Req'd: <input checked="" type="checkbox"/> Yes	Date Entered:		EDD <input checked="" type="checkbox"/> Yes		
Background: <input type="checkbox"/> Yes	Entered by:		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day		
Confirmatory: <input type="checkbox"/> Yes	QC inits.:		Negotiated TAT <input type="checkbox"/>		
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell	Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab
	Robert Lynch	<i>[Signature]</i>	RL	SNL/8888/505-844-4013/505-250-7090	Return Samples By: Comments:
	Christopher Hulliger	<i>[Signature]</i>	CH	SNL/8888/505-284-3309/505-382-0353	

Relinquished by <i>[Signature]</i> Org. <i>00641</i> Date <i>7/16/18</i> Time <i>1050</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. <i>00631</i> Date <i>7/16/18</i> Time <i>1050</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i> Org. <i>00631</i> Date <i>7/16/18</i> Time <i>1330</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. <i> </i> Date <i>7/17/18</i> Time <i>855</i>	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. *N/A* SMO Use *AR/CO* **618891**

Project Name: CWL GWM/SVM	Date Samples Shipped: <i>7/16/18</i>	SMO Authorization: <i>[Signature]</i>	<input type="checkbox"/> Waste Characterization
Project/Task Manager: Timmie Jackson	Carrier/Waybill No.: <i>284902</i>	SMO Contact Phone: <i>[Signature]</i>	<input type="checkbox"/> RMA
Project/Task Number: 195122.10.11.03	Lab Contact: Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	<input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Service Order: CF327-18	Lab Destination: GEL	Send Report to SMO: Stephanie Montano/505-284-2553	Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154
Contract No.: 1303873			

Tech Area: _____
 Building: _____ Room: _____ Operational Site: _____

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
105707	001	CWL-EB1	na	7/16/18 09:50	DIW	G	3x40 ml	HCl	G	EB	VOC-TCE (SW846-8260B)	<i>004</i>
105707	002	CWL-EB1	na	7/16/18 09:51	DIW	P	500 ml	HNO3	G	EB	CHROMIUM, NICKEL (SW846-6020)	<i>005</i>
105708	001	CWL-TB1	na	7/16/18 09:50	DIW	G	3x40 ml	HCl	G	TB	VOC-TCE (SW846-8260B)	<i>006</i>

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:				Conditions on Receipt
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:				EDD <input checked="" type="checkbox"/> Yes				
Background: <input type="checkbox"/> Yes		Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day				
Confirmatory: <input type="checkbox"/> Yes		QC inits.:				Negotiated TAT <input type="checkbox"/>				
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab				
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/8888/505-844-4013/505-250-7090		Return Samples By:				
	Christopher Hulliger	<i>[Signature]</i>	<i>CH</i>	SNL/8888/505-284-3309/505-382-0353		Comments:				
Relinquished by	<i>[Signature]</i>	Org. <i>00641</i>	Date <i>7/16/18</i>	Time <i>1050</i>	Relinquished by	Org.	Date	Time	Lab Use	
Received by	<i>[Signature]</i>	Org. <i>00631</i>	Date <i>7/16/18</i>	Time <i>1050</i>	Received by	Org.	Date	Time		
Relinquished by	<i>[Signature]</i>	Org. <i>00631</i>	Date <i>7/16/18</i>	Time <i>1330</i>	Relinquished by	Org.	Date	Time		
Received by	<i>[Signature]</i>	Org.	Date <i>7/17/18</i>	Time <i>855</i>	Received by	Org.	Date	Time		

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab		AR/COG 618892											
Batch No. <i>MA</i>		SMO Use											
Project Name: CWL GWM/SVM		Date Samples Shipped: <i>7/17/18</i>	SMO Authorization: <i>[Signature]</i>										
Project/Task Manager: Timmie Jackson		Carrier/Waybill No.: <i>285062</i>	SMO Contact Phone: <i>9MO</i>										
Project/Task Number: 195122.10.11.03		Lab Contact: Edie Kent/843-769-7385	Wendy Palencia/505-844-3132										
Service Order: CF327-18		Lab Destination: GEL	Send Report to SMO:										
		Contract No.: 1303873	Stephanie Montano/505-284-2553										
Tech Area:		Bill to: Sandia National Laboratories (Accounts Payable),											
Building:		P.O. Box 5800, MS-0154											
Room:		Albuquerque, NM 87185-0154											
Operational Site:													
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected		Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
							Type	Volume					
105709	001	CWL-BW5	522	7/17/18	10:43	GW	G	3x40 ml	HCl	G	SA	VOC-TCE (SW846-8260B)	007
105709	002	CWL-BW5	522	7/17/18	10:44	GW	P	500 ml	HNO3	G	SA	CHROMIUM, NICKEL (SW846-6020)	008
105710	001	CWL-BW5-DU	522	7/17/18	10:43	GW	G	3x40 ml	HCl	G	DU	VOC-TCE (SW846-8260B)	009
105710	002	CWL-BW5-DU	522	7/17/18	10:44	GW	P	500 ml	HNO3	G	DU	CHROMIUM, NICKEL (SW846-6020)	010
105711	001	CWL-FB1	na	7/17/18	10:43	DIW	G	3x40 ml	HCl	G	FB	VOC-TCE (SW846-8260B)	011
105712	001	CWL-TB3	na	7/17/18	10:43	DIW	G	3x40 ml	HCl	G	TB	VOC-TCE (SW846-8260B)	012
Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:				Conditions on Receipt			
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:				EDD <input checked="" type="checkbox"/> Yes							
Background: <input type="checkbox"/> Yes		Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day							
Confirmatory: <input type="checkbox"/> Yes		QC inits.:				Negotiated TAT <input type="checkbox"/>							
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab				Lab Use			
	Robert Lynch	<i>[Signature]</i>	RL	SNL/8888/505-844-4013/505-250-7090		Return Samples By:							
	Christopher Hulliger	<i>[Signature]</i>	CH	SNL/8888/505-284-3309/505-382-0353		Comments:							
Relinquished by <i>[Signature]</i>	Org. <i>00641</i>	Date <i>7/17/18</i>	Time <i>1133</i>	Relinquished by		Org.	Date	Time					
Received by <i>[Signature]</i>	Org. <i>00631</i>	Date <i>7/17/18</i>	Time <i>1133</i>	Received by		Org.	Date	Time					
Relinquished by <i>[Signature]</i>	Org. <i>0631</i>	Date <i>7/17/18</i>	Time <i>1215</i>	Relinquished by		Org.	Date	Time					
Received by <i>[Signature]</i>	Org.	Date <i>7-18-18</i>	Time <i>828</i>	Received by		Org.	Date	Time					

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab		Page 1 of 1													
Batch No. <i>NA</i>		SMO Use					AR/COC					618893			
Project Name: CWL GWM/SVM		Date Samples Shipped: <i>7/18/18</i>		SMO Authorization: <i>[Signature]</i>					<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius						
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <i>285106</i>		SMO Contact Phone: <i>[Signature]</i>					Wendy Palencia/505-844-3132						
Project/Task Number: 195122.10.11.03		Lab Contact: Edie Kent/843-769-7385		Send Report to SMO:					Stephanie Montano/505-284-2553						
Service Order: CF327-18		Lab Destination: GEL		Contract No.: 1303873					Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <i>454724</i>						
Tech Area:		Operational Site:													
Building:		Room:													
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected		Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID		
							Type	Volume							
105713	001	CWL-MW9	517	7/18/18	10:54	GW	G	3x40 ml	HCl	G	SA	VOC-TCE (SW846-8260B)	<i>013</i>		
105713	002	CWL-MW9	517	7/18/18	10:56	GW	P	500 ml	HNO3	G	SA	CHROMIUM, NICKEL (SW846-6020)	<i>014</i>		
105714	001	CWL-TB4	na	7/18/18	10:54	DIW	G	3x40 ml	HCl	G	TB	VOC-TCE (SW846-8260B)	<i>015</i>		
Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:					Conditions on Receipt				
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		EDD		<input checked="" type="checkbox"/> Yes									
Background: <input type="checkbox"/> Yes		Entered by:		Turnaround Time		<input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day									
Confirmatory: <input type="checkbox"/> Yes		QC inits.:		Negotiated TAT		<input type="checkbox"/>									
Sample Team Members	Name	Signature		Init	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab								
	Robert Lynch	<i>[Signature]</i>		<i>RL</i>	SNL/08888/505-844-4013/505-250-7090		Return Samples By: Comments: Air bubbles present in trip blank samples.								
	Christopher Hulliger	<i>[Signature]</i>		<i>CH</i>	SNL/08888/505-284-3309/505-382-0353										
	Tim Jackson	<i>[Signature]</i>		<i>TJ</i>	SNL/08888/505-284-2547/505-263-6639										
												Lab Use			
Relinquished by <i>[Signature]</i>		Org. <i>0641</i>		Date <i>7/18/18</i>		Time <i>1130</i>		Relinquished by		Org.		Date		Time	
Received by <i>[Signature]</i>		Org. <i>06631</i>		Date <i>7/18/18</i>		Time <i>1130</i>		Received by		Org.		Date		Time	
Relinquished by <i>[Signature]</i>		Org. <i>0671</i>		Date <i>7/18/18</i>		Time <i>1215</i>		Relinquished by		Org.		Date		Time	
Received by <i>[Signature]</i>		Org.		Date <i>7/19/18</i>		Time <i>745</i>		Received by		Org.		Date		Time	

*Prior confirmation with SMO required for 7 and 15 day TAT

AR/COC NUMBERS 618894, 618895

Memorandum

Date: August 23, 2018
To: File
From: Linda Thal
Subject: GC/MS Organic Data Review and Validation – SNL
Site: CWL GWM
ARCO: 618894 and 618895
SDG: 455220
Laboratory: GEL
Project/Task: 195122.10.11.03
Analysis: VOCs

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Five samples were prepared and analyzed with accepted procedures for trichloroethylene using method EPA 8260B (VOCs). All compounds were successfully analyzed. No problems were identified with the data package that resulted in the qualification of data.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding time and were properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria.

Blanks

No target analyte was detected in any of the blanks.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD acceptance criteria were met.

It should be noted that the MS/MSD analyses were performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

Two TBs were submitted, one for each ARCO. FB2 was submitted with ARCO 618894 and was associated with the samples on the same ARCO.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donivan

Level: I

Date: 08/27/18

Memorandum

Date: August 23, 2018
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: CWL GWM
ARCOG: 618894 and 618895
SDG: 455220
Laboratory: GEL
Project/Task: 195122.10.11.03
Analysis: Metals

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Two samples were prepared and analyzed with approved procedures using method EPA 6020 (ICP-MS). Data were reported for all required analytes. No problems were identified with the data package that resulted in the qualification of data.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and were properly preserved.

ICP-MS Instrument Tune

The ICP-MS tune met QC acceptance criteria.

Calibration

All initial and continuing calibration criteria met QC acceptance criteria.

Reporting Limit Verification

All LLCCV recoveries met QC acceptance criteria.

Blanks

No target analytes were detected in any of the blanks.

ICP -MS Internal Standards

The ICP-MS internal standards met QC acceptance criteria.

Matrix Spike (MS)

The MS met all QC acceptance criteria. It should be noted that the MS analysis was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Laboratory Replicate

The replicate met all QC acceptance criteria. It should be noted that the replicate analysis was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Laboratory Control Sample (LCS)

The LCS met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were evaluated because the Ca concentrations for both samples were > that in the ICS A and AB solutions. All QC acceptance criteria were met.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria. It should be noted that the serial dilution analysis was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 08/27/18



Sample Findings Summary



AR/COC: 618894, 618895

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC

All other analyses met QC acceptance criteria; no further data should be qualified.

Sandia Data Validation Summary Worksheet

ARCOG#(s): 618894 and 618895	Site/Project: CWL GWM	Validation Date: 08/23/2018
SDG: 455220	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 7	CVR present: Yes
ARCOG(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input type="checkbox"/> Rad		

Requested Analyses Not Reported			
Client Sample ID	Lab Sample ID	Analysis	Comments
None			

Hold Time/Preservation Outliers								
Client Sample ID	Lab Sample ID	Analysis	Pres.	Collection Date	Preparation Date	Analysis Date	Analysis <2X HT	Analysis ≥2X HT
None								

Comments: Collected: 07/19 and 07/23/2018
 All three vials for samples 455220003(105719-001) and 455220007(105717-001) were received with headspace.

Validated by:

L. Thal

Sandia Inorganic Metals Worksheet

ARCOG #(s): 618894 and 618895	SDG #(s): 455220	Matrix: Aqueous
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Laboratory Sample IDs: 455220002, -005

Method/Batch #s: **3005A/6020**:1785721/1785722

ICPMS Mass Cal: Pass Fail NA ICPMS Resolution: Pass Fail NA

Analyte (outliers)	Calibration						MB mg/L	5X Blank (5X MDL) mg/L	LCS %R	MS %R	DUP RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	LLCCV %R					
	Int. mg/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L														
none																				

IS Outliers 60-125%				IS Outliers 80-120%			
Sample ID	%Recovery	%Recovery	%Recovery	CCV/CCB ID	%Recovery	%Recovery	%Recovery
none				None			

Comments: HTs OK. MS, DUP, SD on 455221-002
Ca > ICS A -002, -005

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. <i>N/A</i>	SMO Use	AR/COC	618895
Project Name: CWL GWM/SVM	Date Samples Shipped: <i>7/23/18</i>	SMO Authorization: <i>[Signature]</i>	
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <i>285319</i>	SMO Contact Phone: <i>[Signature]</i>	
Project/Task Number: 195122.10.11.03	Lab Contact: Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	
Service Order: CF327-18	Lab Destination: GEL	Send Report to SMO:	
	Contract No.: 1303873	Stephanie Montano/505-284-2553	
Tech Area:		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No.	
Building: Room: Operational Site:		<input checked="" type="checkbox"/> 4° Celsius Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <i>455220</i>	

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
105718	001	CWL-MW11	513	7/19/18 12:37	GW	G	3x40 ml	HCl	G	SA	VOC-TCE (SW846-8260B)	001
105718	002	CWL-MW11	513	7/19/18 12:38	GW	P	500 ml	HNO3	G	SA	CHROMIUM, NICKEL (SW846-6020)	002
105719	001	CWL-TB5	na	7/19/18 12:37	DIW	G	3x40 ml	HCl	G	TB	VOC-TCE (SW846-8260B)	003

Last Chain: <input type="checkbox"/> Yes	Sample Tracking	SMO Use	Special Instructions/QC Requirements:	Conditions on Receipt	
Validation Req'd: <input checked="" type="checkbox"/> Yes	Date Entered:		EDD <input checked="" type="checkbox"/> Yes		
Background: <input type="checkbox"/> Yes	Entered by:		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day		
Confirmatory: <input type="checkbox"/> Yes	QC inits.:		Negotiated TAT <input type="checkbox"/>		
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell	Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/08888/505-844-4013/505-250-7090	Return Samples By: Comments: Air bubbles in trip blank vials
	Christopher Hulliger	<i>[Signature]</i>	<i>CH</i>	SNL/08888/505-284-3309/505-382-0353	
	Tim Jackson	<i>[Signature]</i>	<i>TJ</i>	SNL/08888/505-284-2547/505-263-6639	

Relinquished by <i>[Signature]</i> Org. <i>0631</i> Date <i>7/19/18</i> Time <i>1310</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. <i>0631</i> Date <i>7/19/18</i> Time <i>1310</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i> Org. <i>0631</i> Date <i>7/23/18</i> Time <i>1102</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. <i> </i> Date <i>7/24/18</i> Time <i>800</i>	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab		AR/COC 618894										
Batch No. <i>N/A</i>		SMO Use										
Project Name: CWL GWM/SVM		Date Samples Shipped: <i>7/23/18</i>										
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <i>285319</i>										
Project/Task Number: 195122.10.11.03		Lab Contact: Edie Kent/843-769-7385										
Service Order: CF327-18		Lab Destination: GEL										
Contract No.: 1303873		SMO Authorization: <i>[Signature]</i>										
		SMO Contact Phone: Wendy Palencia/505-844-3132										
		Send Report to SMO: Stephanie Montano/505-284-2553										
Tech Area:		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius										
Building:		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154										
Room:												
Operational Site:												
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
105715	001	CWL-MW10	515	7/23/18 09:11	GW	G	3x40 ml	HCl	G	SA	VOC-TCE (SW846-8260B)	<i>004</i>
105715	002	CWL-MW10	515	7/23/18 09:12	GW	P	500 ml	HNO3	G	SA	CHROMIUM, NICKEL (SW846-6020)	<i>005</i>
105716	001	CWL-FB2	na	7/23/18 09:11	DIW	G	3x40 ml	HCl	G	FB	VOC-TCE (SW846-8260B)	<i>006</i>
105717	001	CWL-TB6	na	7/23/18 09:11	DIW	G	3x40 ml	HCl	G	TB	VOC-TCE (SW846-8260B)	<i>007</i>
Last Chain: <input checked="" type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:				Conditions on Receipt		
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		EDD		<input checked="" type="checkbox"/> Yes						
Background: <input type="checkbox"/> Yes		Entered by:		Turnaround Time		<input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day						
Confirmatory: <input type="checkbox"/> Yes		QC inits.:		Negotiated TAT		<input type="checkbox"/>						
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab				
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/08888/505-844-4013/505-250-7090		Return Samples By:		Comments: Received trip blanks from lab for voc, tcl with bubbles				
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/08888/505-239-7367/505-239-7367								
	Christopher Hulliger	<i>[Signature]</i>	<i>CH</i>	SNL/08888/505-284-3309/505-382-0353								
Relinquished by <i>[Signature]</i>		Org. <i>00641</i>	Date <i>7/23/18</i>	Time <i>1010</i>	Relinquished by		Org.	Date	Time	Lab Use		
Received by <i>[Signature]</i>		Org. <i>00631</i>	Date <i>7/23/18</i>	Time <i>1010</i>	Received by		Org.	Date	Time			
Relinquished by <i>[Signature]</i>		Org. <i>00631</i>	Date <i>7/23/18</i>	Time <i>1100</i>	Relinquished by		Org.	Date	Time			
Received by <i>[Signature]</i>		Org.	Date <i>7/24/18</i>	Time <i>800</i>	Received by		Org.	Date	Time			

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT VERIFICATION REVIEW FORMS
GROUNDWATER MONITORING
JULY 2018

Note: The review forms in this section include AR/COC numbers for environmental samples and additional AR/COC numbers for waste characterization samples.

AR/COC Number	Sample Type
618892	Environmental*
618893	Environmental*
618894	Environmental*
618895	Environmental*
618897	Waste Characterization
618898	Waste Characterization
618899	Waste Characterization
618900	Waste Characterization

* These AR/COC forms are provided in the Data Validation Section of this Annex.

Contract Verification Form (CVR)

Project Leader Jackson

Project Name CWL GWM

Project/Task No. 195122_10.11.03

ARCOC No. 618891, 618892, 618893 & 618896

Analytical Lab GEL

SDG No. 454724

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete?		If no, explain
		Yes	No	
1.1	All items on ARCOG complete - data entry clerk initialed and dated	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	X		
1.4	Preservative correct for analyses requested	X		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		All three vials for samples 105721-001, 105708-001, 105712-001 and 105714-001 were received with headspace

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X		
2.4	Matrix spike/matrix spike duplicate data provided	X		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		
2.6	QC batch numbers provided	X		
2.7	Dilution factors provided and all dilution levels reported	X		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	X		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1	Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2	Quantitation limit met for all samples	X		
3.3	Accuracy	X		
	a) Laboratory control sample accuracy reported and met for all samples			
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
	c) Matrix spike recovery data reported and met	X		
3.4	Precision	X		
	a) Replicate sample precision reported and met for all inorganic and radiochemistry samples			
	b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5	Blank data	X		
	a) Method or reagent blank data reported and met for all samples			

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Nickel detected in CWL-EB1
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270) a) 12-hour tune check provided	X		
	b) Initial calibration provided	X		
	c) Continuing calibration provided	X		

Line No.	Item	Yes	No	Comments
	d) Internal standard performance data provided	X		
	e) Instrument run logs provided	X		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668)	N/A		
	a) 12-hour tune check provided			
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		

Line No.	Item	Yes	No	Comments
	c) CRI provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
4.5	Inorganics (metals)	X		
	a) Initial calibration provided			
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		
	e) Instrument run logs provided	X		
4.6	Radiochemistry and General Chemistry	N/A		
	a) Instrument run logs provided			

5.0 Data Anomaly Report

Line No.	Item	Yes	No	If no, explain
5.1	DAR completed for monitoring and surveillance sample data	N/A		
5.2	Problems or outliers noted	N/A		
5.3	Verification or reanalysis requested from lab	N/A		

Line No.	Item	Yes	No	If no, explain
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6.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies has been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
---------------------	----------	-------------------------------

Were deficiencies unresolved? Yes No

Based on the review, this data package is complete. Yes No

Reviewed by: Wendy Palencia Date: 08-16-2018 13:03:00

Closed by: Wendy Palencia Date: 08-16-2018 13:03:00

Contract Verification Form (CVR)

Project Leader Jackson

Project Name CWL GWM

Project/Task No. 195122_10.11.03

ARCOC No. 618894 & 618895

Analytical Lab GEL

SDG No. 455220

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete?		If no, explain
		Yes	No	
1.1	All items on ARCOG complete - data entry clerk initialed and dated	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	X		
1.4	Preservative correct for analyses requested	X		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		All three vials for samples 105719-001 and 105717-001 were received with headspace

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X		
2.4	Matrix spike/matrix spike duplicate data provided	X		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		
2.6	QC batch numbers provided	X		
2.7	Dilution factors provided and all dilution levels reported	X		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	X		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1	Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2	Quantitation limit met for all samples	X		
3.3	Accuracy	X		
	a) Laboratory control sample accuracy reported and met for all samples			
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
	c) Matrix spike recovery data reported and met	X		
3.4	Precision	X		
	a) Replicate sample precision reported and met for all inorganic and radiochemistry samples			
	b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5	Blank data		X	
	a) Method or reagent blank data reported and met for all samples			

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270) a) 12-hour tune check provided	X		
	b) Initial calibration provided	X		
	c) Continuing calibration provided	X		

Line No.	Item	Yes	No	Comments
	d) Internal standard performance data provided	X		
	e) Instrument run logs provided	X		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668)	N/A		
	a) 12-hour tune check provided			
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		

Line No.	Item	Yes	No	Comments
	c) CRI provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
4.5	Inorganics (metals)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) ICP interference check sample data provided	N/A		
	d) ICP serial dilution provided	N/A		
	e) Instrument run logs provided	N/A		
4.6	Radiochemistry and General Chemistry	X		
	a) Instrument run logs provided			

5.0 Data Anomaly Report

Line No.	Item	Yes	No	If no, explain
5.1	DAR completed for monitoring and surveillance sample data	N/A		
5.2	Problems or outliers noted	N/A		
5.3	Verification or reanalysis requested from lab	N/A		

Line No.	Item	Yes	No	If no, explain
----------	------	-----	----	----------------

6.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies has been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
---------------------	----------	-------------------------------

Were deficiencies unresolved? Yes No

Based on the review, this data package is complete. Yes No

Reviewed by: Wendy Palencia Date: 08-21-2018 10:38:00

Closed by: Wendy Palencia Date: 08-21-2018 10:38:00

ANNEX B
Chemical Waste Landfill
Calendar Year 2018 Soil-Gas Monitoring Forms and Reports

Field Forms

Data Validation Reports

Contract Verification Reports

Certificates of Analysis

FIELD SAMPLING FORMS
CWL POST-CLOSURE CARE SOIL-GAS MONITORING

Form Title	Corresponding Procedure
Tailgate Safety Briefing	PLA 05-09
SUMMA [®] Canister Log	FOP 08-22
Soil Vapor Sampling Form	FOP 08-22
Analysis Request and Chain of Custody*	LOP 94-03

*Completed AR/COC forms are provided in the Data Validation Section of this Annex.

HEALTH & SAFETY MEETING FORM

Dept: 0641 Facility: CWL-SVM Date: 01/24/18 Time: 0817

Activities: Siol Vapor monitoring and Sampling
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:
 Temp: 24 °F Wind Speed: 1 MPH Humidity: 60 % Wind Chill: 24 °F

Chemicals Used: None Preservatives in sample bottles Other: _____
 Hospital/Clinic: Sandia Medial Clinic Bldg. 831 Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input checked="" type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input checked="" type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or NO If answered YES explain.

Robert Lynch
 Printed Name
Tina Jackson
 Printed Name
Thomas Evans
 Printed Name
William Gibson
 Printed Name

 Printed Name

 Printed Name

Attendees

Ralt Guat
 Signature
Tina Jackson
 Signature
Thomas Evans
 Signature
William Gibson
 Signature

 Signature

 Signature

Notes

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (L/min)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
CWL-D1-833	1/24/13	833	34000053	NA	NA	-70	-8	FB
CWL-D1-100	1/24/13	839	NA	NA	8	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		840	34000029	↓	NA	-74	-8	
CWL-D1-160		842	NA		8	NA	NA	
↓		843	↓		↓	↓	↓	
		844	34001129		NA	-25	-8	
CWL-D1-240		845	NA		8	NA	NA	
↓		846	↓		↓	↓	↓	
		847	34000565		NA	-24	-8	OB split
CWL-D1-350		849	NA		8	NA	NA	
↓		851	↓		↓	↓	↓	
		852	34000402		NA	-25	-8	OB split
CWL-D1-470		855	NA		8	NA	NA	
↓		858	↓		↓	↓	↓	
		859	34000023	↓	NA	-24	-8	OB split

Field Notes:

OB - collects FB
 split @ 240 fbgg
 350 fbgg
 470 fbgg

Elevation ~ 5400 famsl

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (L/min)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
CWL-U1-1-QL	1/24/16	907	34001304	NA	NA	-26	-8	FB
CWL-U1-1-40		910	NA		8	NA	NA	
		910	↓		↓	↓	↓	
		913	34001303		NA	-24	-8	SA
		↓	7703		↓	-24	-8	DU
CWL-U11-80		915	NA		8	NA	NA	
		915	↓		↓	↓	↓	
		917	34000025		NA	-25	-8	SA
		917	34001479		NA	-25	-8	DU
CWL-U11-120		920	NA		8	NA	NA	
		↓	↓		↓	↓	↓	
		921	34001303		NA	-25	-8	OB split

Field Notes:

QB - split @ 120 fbgs
 elevation ~ 5400 ftasl

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (L/min)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
CWL-D2-02	1/24/12	930	7959	NA	NA	-25	-8	FB
CWL-D2-120		944	NA		8	NA	NA	
↓		945	↓		↓	↓	↓	
		946	34002050		NA	-24	-8	
CWL-D2-240		947	NA		8	NA	NA	
↓		948	↓		↓	↓	↓	
		949	34000523		NA	-25	-8	
CWL-D2-350		951	NA		8	NA	NA	
↓		953	↓		↓	↓	↓	
		954	7820		NA	-23	-8	OB split
CWL-D2-440		958	NA		8	NA	NA	
↓		1001	↓		↓	↓	↓	
		1002	8015		NA	-25	-8	OB split
CWL-D2-470		1005	NA		8	NA	NA	
↓		1008	↓		↓	↓	↓	
		1013	8104		NA	-26	-8	OB split

Field Notes: Elevation ~ 5400 fms 51
 OB splits at 350
 440
 470

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (cc/min)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
CWL-D3-QC	1/24/16	1031	34001351	NA	NA	-25	-8	FB → OB
CWL-D3-120		1033	NA		B	NA	NA	
↓		1034	↓		↓	↓	↓	
		1036	34002124		NA	-25	-8	
CWL-D3-170		1036	NA		B	NA	NA	
↓		1037	↓		↓	↓	↓	
		1038	34001063		NA	-24	-8	
CWL-D3-350		1038	NA		B	NA	NA	
↓		1041	↓		↓	↓	↓	
		1044	8337		NA	-26	-8	OB split
CWL-D3-440		1045	NA		B	NA	NA	
↓		1047	↓		↓	↓	↓	
		1051	34000584		NA	-27	-6	OB split
CWL-D3-480		1052	NA		B	NA	NA	
↓		1055	↓		↓	↓	↓	
		1056	34000888		NA	-26	-8	OB split

Field Notes: Elevation ~ 5400 ft
 OB splits - FB, 350, 440

SUMMARY SHEET FOR JANUARY 2018 SAMPLES

**Sample Summary for CWL Soil-Vapor Monitoring
January 2018**

Well ID	Sample Date	Sample ID / Port	SUMMA Number	ARCOC	Sample Number	Sample Type	Associated Equipment Blank (ARCOC #/Sample #)	Associated Trip Blank (ARCOC #/Sample #)	Associated Field Blank (ARCOC #/Sample #)	Comments
Chemical Waste Landfill Soil Vapor Monitoring: Project Task Number 195122.10.11.03 / Service Order Number CF 327-18										
CWL-UI1	24-Jan-18	CWL-UI1-40	34001303	618464	104432	Environmental	n/a	n/a	618464 / 104437	
		CWL-UI1-40	7703		104433	Duplicate				
		CWL-UI1-80	34000025		104434	Environmental				
		CWL-UI1-80	34001479		104435	Duplicate				
		CWL-UI1-120	34001303		104436	Environmental				
		CWL-QC-1	34001304		104437	Field QC				n/a
CWL-UI2	24-Jan-18	CWL-UI2-36	34001341	618465	104438	Environmental	n/a	n/a	618465 / 104441	
		CWL-UI2-76	34000826		104439	Environmental				
		CWL-UI2-136	34000608		104440	Environmental				
		CWL-QC 2	34002156		104441	Field QC				n/a
CWL-D1	24-Jan-18	CWL-D1-100	34000029	618466	104446	Environmental	n/a	n/a	618466 / 104451	
		CWL-D1-160	34001128		104447	Environmental				
		CWL-D1-240	34000565		104448	Environmental				
		CWL-D1-350	34000402		104449	Environmental				
		CWL-D1-470	34000023		104450	Environmental				
		CWL-QC 3	34000053		104451	Field QC				n/a
CWL-D2	24-Jan-18	CWL-D2-120	34002050	618467	104452	Environmental	n/a	n/a	618467 / 104457	
		CWL-D2-240	34000523		104453	Environmental				
		CWL-D2-350	7828		104454	Environmental				
		CWL-D2-440	8015		104455	Environmental				
		CWL-D2-470	8104		104456	Environmental				
		CWL-QC-4	7959		104457	Field QC				n/a
CWL-D3	24-Jan-18	CWL-D3-120	34002124	618469	104470	Environmental	n/a	n/a	618469 / 104475	
		CWL-D3-170	34001063		104471	Environmental				
		CWL-D3-350	8337		104472	Environmental				
		CWL-D3-440	34000584		104473	Environmental				
		CWL-D3-480	34008888		104474	Environmental				
		CWL-QC-5	34001351		104475	Field QC				n/a

DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES

Memorandum

Date: March 2, 2018

To: File

From: Mary Donovan

Subject: GC/MS Organic Data Review and Validation – SNL
Site: CWL SVM
ARCOG: 618464, 618465, 618466, 618467 and 618469
SDG: 320-35639
Laboratory: TestAmerica Laboratories, Inc. - West Sacramento
Project/Task: 195122.10.11.03
Analysis: VOCs by method TO-15

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Twenty-eight samples were prepared and analyzed with accepted procedures using method EPA TO-15 (Determination of VOCs in Air collected in specially prepared canisters and analyzed by GC-MS). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. Carbon disulfide was detected at \leq the PQL in the MB associated with samples 320-35639-1 through 7. The associated result for sample -6 was a detect \leq the PQL and will be **qualified 0.80U,B** at the PQL.
2. Acetone was detected at \leq the PQL in the MB associated with samples -8 through -11. The associated result for sample -10 was a detect \leq the PQL and will be **qualified 5.0U,B** at the PQL.
3. Acetone was detected at \leq the PQL in the MB associated with samples -12 and -15. The associated result for sample -15 was a detect \leq the PQL and will be **qualified 25U,B** at the PQL.
4. Carbon disulfide was detected at \leq the PQL in the MB associated with samples -21 through -28. The associated result for sample -27 was a detect \leq the PQL and will be **qualified 0.80U,B** at the PQL.
5. Acetone was detected at \leq the PQL and methylene chloride at $>$ the PQL in FB2, sample -10, associated with samples -7 through -9. The associated acetone result for sample -7 was a detect \leq the PQL and will be **qualified 150U,B2** at the PQL. The associated methylene chloride results for samples -7, -8 and -9 were detects \leq the PQL and will be **qualified 12U,B2, 31U,B2 and 35U,B2** respectively at their PQLs.

6. Methylene chloride was detected at \leq the PQL in FB3, sample -16RA, associated with samples -11 through -15. The associated results for samples -11, -13RA and -14DL were detects \leq the PQL and will be **qualified 40U,B2, 120U,B2 and 33U,B2** respectively at their PQLs. The associated results for samples -12 and -15 were detects $>$ the PQL but $\leq 10X$ the FB values and will be qualified J+,B2.
7. Acetone and carbon disulfide were detected at \leq the PQLs in FB5, sample -28, associated with samples -23 through -27. The associated results for sample -27 were detects \leq the PQLs and will be **qualified 5.0U,B2 and 0.80U,B2** for acetone and carbon disulfide respectively at their PQLs.
8. The %Rs for surrogate 4-Bromofluorobenzene in samples -8 and -11 were slightly below the lower acceptance limit. All associated sample results which were detects will be **qualified J-, S2** and those which were non-detect will be **qualified UJ, S2** based on professional judgment.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding time and properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria.

Blanks

No target analytes were detected in the blanks except as noted above in the Summary section and as follows. Carbon disulfide was detected at \leq the PQL in the MB associated with samples -1 through 7. The associated results for all samples *except* sample -6 were non-detect and will not be qualified.

Acetone was detected at \leq the PQL in the MB associated with samples -8 through -11. The associated results for all samples *except* sample -10 were non-detect and will not be qualified.

Acetone was detected at \leq the PQL in the MB associated with samples -12 and -15. The associated result for sample -12 was non-detect and will not be qualified.

Carbon disulfide was detected in the MB associated with samples -13RA, -14DL, -16RA through -19RA and -20DL. The associated sample results were non-detect and will not be qualified.

Carbon disulfide was detected at \leq the PQL in the MB associated with samples -21 through -28. All associated samples results *except* the result for sample -27 were non-detect and will not be qualified.

Acetone, carbon disulfide and chloroform were detected at \leq the PQL and tetrachloroethene and trichloroethene at $>$ the PQL in FB1, sample -6, associated with samples -1 through -5. The associated sample results for acetone and carbon disulfide were non-detect and will not be qualified. The associated

sample results for chloroform, tetrachloroethene and trichloroethene were detects > the PQL and >5X the FB values and will not be qualified.

Acetone, benzene, chloromethane, toluene and trichloroethene were detected at \leq the PQL in FB2, sample -10, associated with samples -7 through -9. The associated acetone results for all samples *except* sample -7 and all associated sample results for benzene, chloromethane and toluene were non-detect and will not be qualified. All associated sample results for trichloroethene were detects > the PQL and >5X the FB value and will not be qualified.

Trichloroethene was detected at > the PQL in FB3, sample -16RA, associated with samples -11 through -15. All associated sample results were detects > the PQL and >5X the FB value and will not be qualified.

Trichloroethene was detected at > the PQL in FB4, sample -22, associated with samples -17 through -21. All associated sample results were detects >5X the FB value and will not be qualified.

Acetone and carbon disulfide were detected at \leq the PQLs in FB5, sample -28, associated with samples -23 through -27. All associated sample results *except* the acetone and carbon disulfide results for sample -27 were non-detect and will not be qualified.

Surrogates

All surrogate acceptance criteria were met except as noted above in the Summary section.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

An MS/MSD was not performed.

Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD)

The LCS/LCSD met all QC acceptance criteria except as follows. For the LCS associated with samples -12 and -15, the recovery was > than the upper acceptance limit for styrene. Since 50 target analytes were reported, up to three LCS recoveries may fall outside acceptance criteria with no qualification. Therefore, no data will be qualified.

Detection Limits/Dilutions

All detection limits were properly reported and correctly adjusted for dilutions. The samples were not diluted except as follows.

The canister for sample 104455-001/CWL-D2-440 (-20) was received at -19.10" Hg which is an insufficient sample volume that required pressurization greater than the laboratory SOP stipulates. As a result, the data was reported at a dilution and reporting limits were raised accordingly.

Sample -1 was diluted (72.6X, TCE-138X); sample -2 (79.7X, TCE-139X); sample -3 (63.9X, TCE-107X); sample -4 (54X, TCE-97.3X); sample -5 (54.4X); sample -7 (29.8X); sample -8 (76.5X, TCE-153X); sample -9 (86.6X, TCE-152); sample -11 (101X, TCE-152X); sample -12 (51.5X, TCE-159X); sample -13 (306X); sample

-14 (81.6X); sample -15 (4.97X); sample -17 (303X); sample -18 (302X); sample -19 (206X); sample -20 (2.3X); sample -21 (144X); sample -23 (121X); sample -24 (144X); sample -25 (147X) and sample -26 (154X).

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

Mass spectra acceptability were verified during data validation and met QC acceptance criteria. Sample results < the PQL with missing ions or poor ratios were qualified J by the laboratory and were not further qualified during data validation.

FBs were submitted, one with each ARCO. Two field duplicate pairs were submitted with ARCO 618464. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Linda Thal

Level: I

Date: 03/06/18



Sample Findings Summary



AR/COC: 618464, 618465, 618466, 618467, 618469

Page 1 of 5

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
TO15			
	104437-001/CWL QC-1	CARBON DISULFIDE (75-15-0)	0.80U, B
	104438-001/CWL-UI2-36	ACETONE (67-64-1)	150U, B2
	104438-001/CWL-UI2-36	METHYLENE CHLORIDE (75-09-2)	12U, B2
	104439-001/CWL-UI2-76	1,1,1-TRICHLOROETHANE (71-55-6)	J-, S2
	104439-001/CWL-UI2-76	1,1,2,2-TETRACHLOROETHANE (79-34-5)	UJ, S2
	104439-001/CWL-UI2-76	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE (76-13-1)	J-, S2
	104439-001/CWL-UI2-76	1,1,2-TRICHLOROETHANE (79-00-5)	UJ, S2
	104439-001/CWL-UI2-76	1,1-DICHLOROETHANE (75-34-3)	J-, S2
	104439-001/CWL-UI2-76	1,1-DICHLOROETHENE (75-35-4)	J-, S2
	104439-001/CWL-UI2-76	1,2,4-TRICHLOROBENZENE (120-82-1)	UJ, S2
	104439-001/CWL-UI2-76	1,2,4-TRIMETHYLBENZENE (95-63-6)	UJ, S2
	104439-001/CWL-UI2-76	1,2-DIBROMOETHANE (EDB) (106-93-4)	UJ, S2
	104439-001/CWL-UI2-76	1,2-DICHLORO-1,1,2,2-TETRAFLUOROETHANE (76-14-2)	UJ, S2
	104439-001/CWL-UI2-76	1,2-DICHLOROBENZENE (95-50-1)	UJ, S2
	104439-001/CWL-UI2-76	1,2-DICHLOROETHANE (107-06-2)	UJ, S2
	104439-001/CWL-UI2-76	1,2-DICHLOROPROPANE (78-87-5)	J-, S2
	104439-001/CWL-UI2-76	1,3,5-TRIMETHYLBENZENE (108-67-8)	UJ, S2
	104439-001/CWL-UI2-76	1,3-DICHLOROBENZENE (541-73-1)	UJ, S2
	104439-001/CWL-UI2-76	1,4-DICHLOROBENZENE (106-46-7)	UJ, S2
	104439-001/CWL-UI2-76	2-BUTANONE (MEK) (78-93-3)	UJ, S2
	104439-001/CWL-UI2-76	2-HEXANONE (591-78-6)	UJ, S2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	104439-001/CWL-UI2-76	4-ETHYLTOLUENE (622-96-8)	UJ, S2
	104439-001/CWL-UI2-76	4-METHYL-2-PENTANONE (MIBK) (108-10-1)	UJ, S2
	104439-001/CWL-UI2-76	ACETONE (67-64-1)	UJ, S2
	104439-001/CWL-UI2-76	BENZENE (71-43-2)	UJ, S2
	104439-001/CWL-UI2-76	BENZYL CHLORIDE (100-44-7)	UJ, S2
	104439-001/CWL-UI2-76	BROMODICHLOROMETHANE (75- 27-4)	UJ, S2
	104439-001/CWL-UI2-76	BROMOFORM (75-25-2)	UJ, S2
	104439-001/CWL-UI2-76	BROMOMETHANE (74-83-9)	UJ, S2
	104439-001/CWL-UI2-76	CARBON DISULFIDE (75-15-0)	UJ, S2
	104439-001/CWL-UI2-76	CARBON TETRACHLORIDE (56-23-5)	J-, S2
	104439-001/CWL-UI2-76	CHLOROBENZENE (108-90-7)	UJ, S2
	104439-001/CWL-UI2-76	CHLOROETHANE (75-00-3)	UJ, S2
	104439-001/CWL-UI2-76	CHLOROFORM (67-66-3)	J-, S2
	104439-001/CWL-UI2-76	CHLOROMETHANE (74-87-3)	UJ, S2
	104439-001/CWL-UI2-76	CIS-1,2-DICHLOROETHENE (156-59- 2)	UJ, S2
	104439-001/CWL-UI2-76	CIS-1,3-DICHLOROPROPENE (10061- 01-5)	UJ, S2
	104439-001/CWL-UI2-76	DIBROMOCHLOROMETHANE (124- 48-1)	UJ, S2
	104439-001/CWL-UI2-76	DICHLORODIFLUOROMETHANE (75- 71-8)	J-, S2
	104439-001/CWL-UI2-76	ETHYLBENZENE (100-41-4)	UJ, S2
	104439-001/CWL-UI2-76	HEXACHLOROBUTADIENE (87-68-3)	UJ, S2
	104439-001/CWL-UI2-76	M,P-XYLENE (179601-23-1)	UJ, S2
	104439-001/CWL-UI2-76	METHYLENE CHLORIDE (75-09-2)	31UJ, B2,S2
	104439-001/CWL-UI2-76	O-XYLENE (95-47-6)	UJ, S2
	104439-001/CWL-UI2-76	STYRENE (100-42-5)	UJ, S2
	104439-001/CWL-UI2-76	TETRACHLOROETHENE (127-18-4)	J-, S2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	104439-001/CWL-UI2-76	TOLUENE (108-88-3)	UJ, S2
	104439-001/CWL-UI2-76	TRANS-1,2-DICHLOROETHENE (156-60-5)	UJ, S2
	104439-001/CWL-UI2-76	TRANS-1,3-DICHLOROPROPENE (10061-02-6)	UJ, S2
	104439-001/CWL-UI2-76	TRICHLOROFLUOROMETHANE (75-69-4)	J-, S2
	104439-001/CWL-UI2-76	VINYL ACETATE (108-05-4)	UJ, S2
	104439-001/CWL-UI2-76	VINYL CHLORIDE (75-01-4)	UJ, S2
	104440-001/CWL-UI2-136	METHYLENE CHLORIDE (75-09-2)	35U, B2
	104441-001/CWL QC-2	ACETONE (67-64-1)	5.0U, B
	104446-001/CWL-D1-100	1,1,1-TRICHLOROETHANE (71-55-6)	J-, S2
	104446-001/CWL-D1-100	1,1,2,2-TETRACHLOROETHANE (79-34-5)	UJ, S2
	104446-001/CWL-D1-100	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE (76-13-1)	J-, S2
	104446-001/CWL-D1-100	1,1,2-TRICHLOROETHANE (79-00-5)	UJ, S2
	104446-001/CWL-D1-100	1,1-DICHLOROETHANE (75-34-3)	J-, S2
	104446-001/CWL-D1-100	1,1-DICHLOROETHENE (75-35-4)	J-, S2
	104446-001/CWL-D1-100	1,2,4-TRICHLOROBENZENE (120-82-1)	UJ, S2
	104446-001/CWL-D1-100	1,2,4-TRIMETHYLBENZENE (95-63-6)	UJ, S2
	104446-001/CWL-D1-100	1,2-DIBROMOETHANE (EDB) (106-93-4)	UJ, S2
	104446-001/CWL-D1-100	1,2-DICHLORO-1,1,2,2-TETRAFLUOROETHANE (76-14-2)	UJ, S2
	104446-001/CWL-D1-100	1,2-DICHLOROBENZENE (95-50-1)	UJ, S2
	104446-001/CWL-D1-100	1,2-DICHLOROETHANE (107-06-2)	J-, S2
	104446-001/CWL-D1-100	1,2-DICHLOROPROPANE (78-87-5)	J-, S2
	104446-001/CWL-D1-100	1,3,5-TRIMETHYLBENZENE (108-67-8)	UJ, S2
	104446-001/CWL-D1-100	1,3-DICHLOROBENZENE (541-73-1)	UJ, S2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	104446-001/CWL-D1-100	1,4-DICHLOROBENZENE (106-46-7)	UJ, S2
	104446-001/CWL-D1-100	2-BUTANONE (MEK) (78-93-3)	UJ, S2
	104446-001/CWL-D1-100	2-HEXANONE (591-78-6)	UJ, S2
	104446-001/CWL-D1-100	4-ETHYLTOLUENE (622-96-8)	UJ, S2
	104446-001/CWL-D1-100	4-METHYL-2-PENTANONE (MIBK) (108-10-1)	UJ, S2
	104446-001/CWL-D1-100	ACETONE (67-64-1)	UJ, S2
	104446-001/CWL-D1-100	BENZENE (71-43-2)	UJ, S2
	104446-001/CWL-D1-100	BENZYL CHLORIDE (100-44-7)	UJ, S2
	104446-001/CWL-D1-100	BROMODICHLOROMETHANE (75- 27-4)	UJ, S2
	104446-001/CWL-D1-100	BROMOFORM (75-25-2)	UJ, S2
	104446-001/CWL-D1-100	BROMOMETHANE (74-83-9)	UJ, S2
	104446-001/CWL-D1-100	CARBON DISULFIDE (75-15-0)	UJ, S2
	104446-001/CWL-D1-100	CARBON TETRACHLORIDE (56-23-5)	J-, S2
	104446-001/CWL-D1-100	CHLOROBENZENE (108-90-7)	UJ, S2
	104446-001/CWL-D1-100	CHLOROETHANE (75-00-3)	UJ, S2
	104446-001/CWL-D1-100	CHLOROFORM (67-66-3)	J-, S2
	104446-001/CWL-D1-100	CHLOROMETHANE (74-87-3)	UJ, S2
	104446-001/CWL-D1-100	CIS-1,2-DICHLOROETHENE (156-59- 2)	UJ, S2
	104446-001/CWL-D1-100	CIS-1,3-DICHLOROPROPENE (10061- 01-5)	UJ, S2
	104446-001/CWL-D1-100	DIBROMOCHLOROMETHANE (124- 48-1)	UJ, S2
	104446-001/CWL-D1-100	DICHLORODIFLUOROMETHANE (75- 71-8)	J-, S2
	104446-001/CWL-D1-100	ETHYLBENZENE (100-41-4)	UJ, S2
	104446-001/CWL-D1-100	HEXACHLOROBUTADIENE (87-68-3)	UJ, S2
	104446-001/CWL-D1-100	M,P-XYLENE (179601-23-1)	UJ, S2
	104446-001/CWL-D1-100	METHYLENE CHLORIDE (75-09-2)	40UJ, B2,S2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	104446-001/CWL-D1-100	O-XYLENE (95-47-6)	UJ, S2
	104446-001/CWL-D1-100	STYRENE (100-42-5)	UJ, S2
	104446-001/CWL-D1-100	TETRACHLOROETHENE (127-18-4)	J-, S2
	104446-001/CWL-D1-100	TOLUENE (108-88-3)	UJ, S2
	104446-001/CWL-D1-100	TRANS-1,2-DICHLOROETHENE (156-60-5)	UJ, S2
	104446-001/CWL-D1-100	TRANS-1,3-DICHLOROPROPENE (10061-02-6)	UJ, S2
	104446-001/CWL-D1-100	TRICHLOROFLUOROMETHANE (75-69-4)	J-, S2
	104446-001/CWL-D1-100	VINYL ACETATE (108-05-4)	UJ, S2
	104446-001/CWL-D1-100	VINYL CHLORIDE (75-01-4)	UJ, S2
	104447-001/CWL-D1-160	METHYLENE CHLORIDE (75-09-2)	J+, B2
	104448-001/CWL-D1-240	METHYLENE CHLORIDE (75-09-2)	120U, B2
	104449-001/CWL-D1-350	METHYLENE CHLORIDE (75-09-2)	33U, B2
	104450-001/CWL-D1-470	ACETONE (67-64-1)	25U, B
	104450-001/CWL-D1-470	METHYLENE CHLORIDE (75-09-2)	J+, B2
	104474-001/CWL-D3-480	ACETONE (67-64-1)	5.0U, B2
	104474-001/CWL-D3-480	CARBON DISULFIDE (75-15-0)	0.80U, B,B2

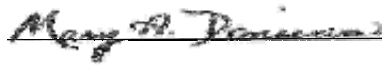
All other analyses met QC acceptance criteria; no further data should be qualified.

Sandia Data Validation Summary Worksheet

ARCOG#: 618464, 618465, 618466, 618467 and 618469	Site/Project: CWL SVM	Validation Date: 03/02/2018
SDG #: 320-35639	Laboratory: TestAmerica Laboratories, Inc. – West Sacramento	Validator: Mary Donovan
Matrix: Air	# of Samples: 28	CVR present: Yes
ARCOG(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input type="checkbox"/> Metals <input type="checkbox"/> Genchem <input type="checkbox"/> Rad		

Requested Analyses Not Reported			
Client Sample ID	Lab Sample ID	Analysis	Comments
None			

Hold Time/Preservation Outliers								
Client Sample ID	Lab Sample ID	Analysis	Pres.	Collection Date	Preparation Date	Analysis Date	Analysis <2X HT	Analysis ≥2X HT
None								

Comments: Collected: 01/24/2018.
Validated by: 

Sandia Organic Worksheet (GC/MS VOC)

ARCOC #: 618464, 618465, 618466, 618467 and 618469	SDG: 320-35639	Matrix: Air
Laboratory Sample IDs: 320-35639-1 through -28		
Method/Batch #s: TO-15/207738 (samples -1 thru -7); 207749 (samples -8 thru -11); 208072 (samples -9, -12, -15, -8DL, -11DL); 208137 (samples -21 thru -28); 208339 (samples -1DL thru -4DL, -12DL, -13RA, -14DL, -16RA thru -19RA, -20DL)	Tuning (pass/fail):pass	TICs Required? (yes/no):no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	LCSD %R	LCS/ LCSD RPD	FB2 -10	X5 (X10)			
	Int.	RF/ Slope	RSD/r ²	(ICV)/ CCV %D										
ATMS7 01/19/2018														
Batch 207749 (-8 thru -11)														
Acetone	NA	✓	✓	✓	.199J	(1.99)	✓	✓	✓	1.6J	(16)			
Benzene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.093J	0.47			
Chloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	0.32J	1.6			
Methylene chloride	NA	✓	✓	✓	✓	NA	✓	✓	✓	0.67	(6.7)			
Toluene	NA	✓	✓	✓	✓	NA	✓	✓	✓	0.18J	(1.8)			
Trichloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	0.38J	1.9			
Batch 208072 (-9*, -12, -15, -8DL*, -11DL*) *TCE only														
Acetone	NA	✓	✓	✓	.187J	(1.87)	✓	✓	✓					
Styrene	NA	✓	✓	✓	✓	NA	128	✓	✓					

Surrogate Recovery Outliers

Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R		Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R	
-8	✓	✓	69						
-11	✓	✓	69						

IS Outliers

Sample ID	FBZ		Chl-d5		1,4-DCB-d4							
	Area	RT	Area	RT	Area	RT						
none												

Comments: HTs OK. LCS/LCSD (lab limits)
ATMS 7 All avg RF

Sandia Organic Worksheet (GC/MS VOC)

ARCOG #: 618464, 618465, 618466, 618467 and 618469	SDG: 320-35639	Matrix: Air
Laboratory Sample IDs: 320-35639-1 through -28		
Method/Batch #s: TO-15/207738 (samples -1 thru -7); 207749 (samples -8 thru -11); 208072 (samples -9, -12, -15, -8DL, -11DL); 208137 (samples -21 thru -28); 208339 (samples -1DL thru -4DL, -12DL, -13RA, -14DL, -16RA thru -19RA, -20DL)	Tuning (pass/fail):yes	TICs Required? (yes/no):no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	LCSD %R	LCS/ LCSD RPD	FB1 -6	X5 (X10)				
	Int.	RF/ Slope	RSD/r ²	(ICV)/ CCV %D											
ATMS9 02/08/2018															
Batch 207738 (-1 thru -7)															
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	0.5J	(5.0)				
Carbon disulfide	NA	✓	✓	✓	0.134J	0.67	✓	✓	✓	0.16J	0.8				
Chloroform	NA	✓	✓	✓	✓	NA	✓	✓	✓	0.17J	0.85				
Tetrachloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	1.1	5.5				
Trichloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	1.7	8.5				
Batch 208137 (-21 thru -28)										FB4 -22	X5 (X10)	FB5 -28	X5 (X10)		
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA	0.24J	(2.4)		
Carbon disulfide	NA	✓	✓	✓	0.100J	0.50	✓	✓	✓	✓	NA	0.17J	0.85		
Trichloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	0.51	2.6	✓	NA		
Surrogate Recovery Outliers															
Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R		Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R							
none															
IS Outliers															
	FBZ		Chl-d5		1,4-DCB-d4										
Sample ID	Area	RT	Area	RT	Area	RT									
none															

Comments: HTs OK. LCS/LCSD (lab limits)
ATMS 9 All avg RF except 1,2,4-Trichlorobenzene

Sandia Organic Worksheet (GC/MS VOC)

ARCOG #: 618464, 618465, 618466, 618467 and 618469	SDG: 320-35639	Matrix: Air
Laboratory Sample IDs: 320-35639-1 through -28		
Method/Batch #s: TO-15/207738 (samples -1 thru -7); 207749 (samples -8 thru -11); 208072 (samples -9, -12, -15, -8DL, -11DL); 208137 (samples -21 thru -28); 208339 (samples -1DL thru -4DL, -12DL, -13RA, -14DL, -16RA thru -19RA, -20DL)	Tuning (pass/fail):pass	TICs Required? (yes/no):no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	LCSD %R	LCS/ LCSD RPD	FB3 -16	X5 (X10)			
	Int.	RF/ Slope	RSD/r ²	(ICV)/ CCV %D										
ATMS9 02/08/2018														
Batch 208339 (-1DL* thru -4DL*, -12DL*, -13RA, -14DL, -16RA thru -19RA, -20DL) *TCE only														
Carbon disulfide	NA	✓	✓	✓	.0905J	0.45	✓	✓	✓	✓	NA			
Methylene chloride	NA	✓	✓	✓	✓	NA	✓	✓	✓	0.098J	(0.98)			
Trichloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	1.3	6.5			

Surrogate Recovery Outliers

Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R		Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R	
none									

IS Outliers

Sample ID	FBZ		ChI-d5		1,4-DCB-d4							
	Area	RT	Area	RT	Area	RT						
none												

Comments: HTs OK. LCS/LCSD (lab limits)

ATMS 9 All avg RF except 1,2,4-Trichlorobenzene

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. <i>M12</i>		SMO Use		AR/COC 618464	
Project Name:	CWL GWM/SVM	Date Samples Shipped:	<i>1/26/18</i>	SMO Authorization:	<i>[Signature]</i>
Project/Task Manager:	Timmie Jackson	Carrier/Waybill No.:	<i>277402</i>	SMO Contact Phone:	<i>SMO</i>
Project/Task Number:	195122.10.11.03	Lab Contact:	Lee Ann Heathcote/916-373-5600	Wendy Palencia/505-844-3132	
Service Order:	CF327-18	Lab Destination:	TAL-WS	Send Report to SMO:	
		Contract No.:	1636780	Stephanie Montaño/505.284.2553	
Tech Area:				<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius	
Building:		Room:		Operational Site:	
Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154					

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
104432	001	CWL-UI1-40	40	1/24/18 09:13	SG	S	6 L	None	G	SA	VOC (TO-15)	
104433	001	CWL-UI1-40	40	1/24/18 09:13	SG	S	6 L	None	G	DU	VOC (TO-15)	
104434	001	CWL-UI1-80	80	1/24/18 09:17	SG	S	6 L	None	G	SA	VOC (TO-15)	
104435	001	CWL-UI1-80	80	1/24/18 09:17	SG	S	6 L	None	G	DU	VOC (TO-15)	
104436	001	CWL-UI1-120	120	1/24/18 09:21	SG	S	6 L	None	G	SA	VOC (TO-15)	
104437	001	CWL QC-1	NA	1/24/18 09:07	UPN	S	6 L	None	G	FB	VOC (TO-15)	



320-35639 Chain of Custody

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:																										
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		Entered by:		EDD <input checked="" type="checkbox"/> Yes																										
Background: <input type="checkbox"/> Yes		QC inits.:		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day		Negotiated TAT <input type="checkbox"/>																										
Confirmatory: <input type="checkbox"/> Yes		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Sample Team Members</th> <th>Name</th> <th>Signature</th> <th>Init.</th> <th>Company/Organization/Phone/Cell</th> </tr> <tr> <td></td> <td>Tim Jackson</td> <td><i>[Signature]</i></td> <td><i>TJ</i></td> <td>SNL/00631/505-284-2547/505-263-6639</td> </tr> <tr> <td></td> <td>Robert Lynch</td> <td><i>[Signature]</i></td> <td><i>RL</i></td> <td>SNL/00641/505-844-4013/505-250-7090</td> </tr> <tr> <td></td> <td>William Gibson</td> <td><i>[Signature]</i></td> <td><i>WG</i></td> <td>SNL/00641/505-239-7367/505-239-7367</td> </tr> <tr> <td></td> <td>Thomas Evans</td> <td><i>[Signature]</i></td> <td><i>TE</i></td> <td>AIS/00641/505-284-0804/505-274-0488</td> </tr> </table>		Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Tim Jackson	<i>[Signature]</i>	<i>TJ</i>	SNL/00631/505-284-2547/505-263-6639		Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/00641/505-844-4013/505-250-7090		William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/00641/505-239-7367/505-239-7367		Thomas Evans	<i>[Signature]</i>	<i>TE</i>	AIS/00641/505-284-0804/505-274-0488	Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab Return Samples By:		Receipt	
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell																												
	Tim Jackson	<i>[Signature]</i>	<i>TJ</i>	SNL/00631/505-284-2547/505-263-6639																												
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/00641/505-844-4013/505-250-7090																												
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/00641/505-239-7367/505-239-7367																												
	Thomas Evans	<i>[Signature]</i>	<i>TE</i>	AIS/00641/505-284-0804/505-274-0488																												
		Comments:																														

Relinquished by <i>[Signature]</i>	Org. <i>00641</i>	Date <i>1/24/18</i>	Time <i>13:19</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>00631</i>	Date <i>1/24/18</i>	Time <i>13:19</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. <i>00631</i>	Date <i>1/26/18</i>	Time <i>07:05</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>TA SMO</i>	Date <i>2/16/18</i>	Time <i>13:43</i>	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

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02/16/2018

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. <i>W/LA</i>		SMO Use		AR/COC		618465	
Project Name: CWL GWM/SVM		Date Samples Shipped: <i>1/26/18</i>		SMO Authorization: <i>[Signature]</i>		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No.	
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <i>277402</i>		SMO Contact Phone: <i>gmo</i>		<input checked="" type="checkbox"/> 4° Celsius	
Project/Task Number: 195122.10.11.03		Lab Contact: Lee Ann Heathcote/916-373-5600		Wendy Palencia/505-844-3132		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154	
Service Order: CF327-18		Lab Destination: TAL-WS		Send Report to SMO:			
		Contract No.: 1636780		Stephanie Montaño/505.284.2553			
Tech Area:		Operational Site:					
Building:		Room:					

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected		Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
							Type	Volume					
104438	001	CWL-UI2-36	36	1/24/18	11:17	SG	S	6 L	None	G	SA	VOC (TO-15)	
104439	001	CWL-UI2-76	76	1/24/18	11:19	SG	S	6 L	None	G	SA	VOC (TO-15)	
104440	001	CWL-UI2-136	136	1/24/18	11:22	SG	S	6 L	None	G	SA	VOC (TO-15)	
104441	001	CWL-QC 2	NA	1/24/18	11:13	UPN	S	6 L	None	G	FB	VOC (TO-15)	

Last Chain: <input checked="" type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt				
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		EDD		<input checked="" type="checkbox"/> Yes						
Background: <input type="checkbox"/> Yes		Entered by:		Turnaround Time		<input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day						
Confirmatory: <input type="checkbox"/> Yes		QC inits.:		Negotiated TAT		<input type="checkbox"/>						
Sample Team Members	Name		Signature		Init.		Company/Organization/Phone/Cell		Sample Disposal		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab	
	Tim Jackson		<i>[Signature]</i>		TJ		SNL/00631/505-284-2547/505-263-6639		Return Samples By:			
	Robert Lynch		<i>[Signature]</i>		RL		SNL/00641/505-844-4013/505-250-7090		Comments:			
	William Gibson		<i>[Signature]</i>		WG		SNL/00641/505-239-7367/505-239-7367					
	Thomas Evans		<i>[Signature]</i>		TE		AIS/00641/505-284-0804/505-274-0488					

Relinquished by <i>[Signature]</i>	Org. <i>00641</i>	Date <i>1/24/18</i>	Time <i>1321</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>00631</i>	Date <i>1/24/18</i>	Time <i>1321</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. <i>00631</i>	Date <i>1/26/18</i>	Time <i>0705</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>HA SAC</i>	Date <i>02-01-18</i>	Time <i>1549</i>	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

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CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. <i>N/A</i>		SMO Use		AR/COC		618466	
Project Name: CWL GWM/SVM		Date Samples Shipped: <i>1/26/18</i>		SMO Authorization: <i>[Signature]</i>		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No.	
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <i>277402</i>		SMO Contact Phone: <i>[Signature]</i>		<input checked="" type="checkbox"/> 4° Celsius	
Project/Task Number: 195122.10.11.03		Lab Contact: Lee Ann Heathcote/916-373-5600		Wendy Palencia/505-844-3132		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154	
Service Order: CF327-18		Lab Destination: TAL-WS		Send Report to SMO: Stephanie Montaño/505.284.2553			
Tech Area:		Contract No.: 1636780					
Building:		Room:		Operational Site:			

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
104446	001	CWL-D1-100	100	1/24/18 08:40	SG	S	6 L	None	G	SA	VOC (TO-15)	
104447	001	CWL-D1-160	160	1/24/18 08:44	SG	S	6 L	None	G	SA	VOC (TO-15)	
104448	001	CWL-D1-240	240	1/24/18 08:47	SG	S	6 L	None	G	SA	VOC (TO-15)	
104449	001	CWL-D1-350	350	1/24/18 08:52	SG	S	6 L	None	G	SA	VOC (TO-15)	
104450	001	CWL-D1-470	470	1/24/18 08:59	SG	S	6 L	None	G	SA	VOC (TO-15)	
104451	001	CWL-QC 3	NA	1/24/18 08:31	UPN	S	6 L	None	G	FB	VOC (TO-15)	

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt		
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		EDD		<input checked="" type="checkbox"/> Yes				
Background: <input type="checkbox"/> Yes		Entered by:		Turnaround Time		<input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day				
Confirmatory: <input type="checkbox"/> Yes		QC inits.:		Negotiated TAT		<input type="checkbox"/>				
Sample Team Members	Name		Signature		Init.		Company/Organization/Phone/Cell		Sample Disposal	
	Tim Jackson		<i>[Signature]</i>		TJ		SNL/00631/505-284-2547/505-263-6639		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab	
	Robert Lynch		<i>[Signature]</i>		RL		SNL/00641/505-844-4013/505-250-7090		Return Samples By:	
	William Gibson		<i>[Signature]</i>		WG		SNL/00641/505-239-7367/505-239-7367		Comments:	
Thomas Evans		<i>[Signature]</i>		TE		AIS/00641/505-284-0804/505-274-0488				

Relinquished by <i>[Signature]</i>	Org. <i>00641</i>	Date <i>1/24/18</i>	Time <i>13:22</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>00641</i>	Date <i>1/24/18</i>	Time <i>13:22</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. <i>00631</i>	Date <i>1/26/18</i>	Time <i>07:05</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>SAC</i>	Date <i>6/21/18</i>	Time <i>13:43</i>	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

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CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. <i>N/A</i>		SMO Use		AR/COC		618467	
Project Name: CWL GWM/SVM		Date Samples Shipped: <i>1/26/18</i>		SMO Authorization: <i>[Signature]</i>		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No.	
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <i>277402</i>		SMO Contact Phone: <i>6740</i>		<input checked="" type="checkbox"/> 4° Celsius	
Project/Task Number: 195122.10.11.03		Lab Contact: Lee Ann Heathcote/916-373-5600		Wendy Palencia/505-844-3132		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154	
Service Order: CF327-18		Lab Destination: TAL-WS		Send Report to SMO:			
		Contract No.: 1636780		Stephanie Montaño/505.284.2553			
Tech Area:		Operational Site:					
Building:		Room:					

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected		Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
							Type	Volume					
104452	001	CWL-D2-120	120	1/24/18	09:46	SG	S	6 L	None	G	SA	VOC (TO-15)	
104453	001	CWL-D2-240	240	1/24/18	09:49	SG	S	6 L	None	G	SA	VOC (TO-15)	
104454	001	CWL-D2-350	350	1/24/18	09:54	SG	S	6 L	None	G	SA	VOC (TO-15)	
104455	001	CWL-D2-440	440	1/24/18	10:02	SG	S	6 L	None	G	SA	VOC (TO-15)	
104456	001	CWL-D2-470	470	1/24/18	10:13	SG	S	6 L	None	G	SA	VOC (TO-15)	
104457	001	CWL QC-4	NA	1/24/18	09:30	UPN	S	6 L	None	G	FB	VOC (TO-15)	

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt		
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:				EDD <input checked="" type="checkbox"/> Yes				
Background: <input type="checkbox"/> Yes		Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day				
Confirmatory: <input type="checkbox"/> Yes		QC inits.:				Negotiated TAT <input type="checkbox"/>				
Sample Team Members	Name		Signature		Init.		Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab	
	Tim Jackson		<i>[Signature]</i>		TJ		SNL/00631/505-284-2547/505-263-6639		Return Samples By:	
	Robert Lynch		<i>[Signature]</i>		RL		SNL/00641/505-844-4013/505-250-7090		Comments:	
	William Gibson		<i>[Signature]</i>		WG		SNL/00641/505-239-7367/505-239-7367			
Thomas Evans		<i>[Signature]</i>		TE		SNL/00641/505-844-2507/505-228-2606				

Relinquished by <i>[Signature]</i> Org. 00641 Date 1/24/18 Time 1324	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. 00631 Date 1/24/18 Time 1324	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i> Org. 00631 Date 1/26/18 Time 0705	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. SAC Date 02/01/18 Time 13:43	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

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02/16/2018

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. *N/A*

SMO Use

AR/COC

618469

Project Name: CWL GWM/SVM	Date Samples Shipped: <i>1/26/18</i>	SMO Authorization: <i>[Signature]</i>	<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <i>277402</i>	SMO Contact Phone: <i>9700</i>	
Project/Task Number: 195122.10.11.03	Lab Contact: Lee Ann Heathcote/916-373-5600	Wendy Palencia/505-844-3132	
Service Order: CF327-18	Lab Destination: TAL-WS	Send Report to SMO: Stephanie Montaño/505.284.2553	
Contract No.: 1636780			

Bill to: Sandia National Laboratories (Accounts Payable),
P.O. Box 5800, MS-0154
Albuquerque, NM 87185-0154

Tech Area:	Operational Site:	
Building:	Room:	

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected		Sample Matrix	Container		Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
							Type	Volume					
104470	001	CWL-D3-120	120	1/24/18	10:36	SG	S	6 L	None	G	SA	VOC (TO-15)	
104471	001	CWL-D3-170	170	1/24/18	10:38	SG	S	6 L	None	G	SA	VOC (TO-15)	
104472	001	CWL-D3-350	350	1/24/18	10:44	SG	S	6 L	None	G	SA	VOC (TO-15)	
104473	001	CWL-D3-440	440	1/24/18	10:51	SG	S	6 L	None	G	SA	VOC (TO-15)	
104474	001	CWL-D3-480	470	1/24/18	10:56	SG	S	6 L	None	G	SA	VOC (TO-15)	
104475	001	CWL QC-5	NA	1/24/18	10:31	UPN	S	6 L	None	G	FB	VOC (TO-15)	

Last Chain: <input type="checkbox"/> Yes	Sample Tracking	SMO Use	Special Instructions/QC Requirements:	Conditions on Receipt	
Validation Req'd: <input checked="" type="checkbox"/> Yes	Date Entered:		EDD <input checked="" type="checkbox"/> Yes		
Background: <input type="checkbox"/> Yes	Entered by:		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day		
Confirmatory: <input type="checkbox"/> Yes	QC inits.:		Negotiated TAT <input type="checkbox"/>		
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell	Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab
	Tim Jackson	<i>[Signature]</i>	<i>TJ</i>	SNL/00631/505-284-2547/505-263-6639	Return Samples By: Comments:
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/00641/505-844-4013/505-250-7090	
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/00641/505-239-7367/505-239-7367	
Thomas Evans	<i>[Signature]</i>	<i>TE</i>	AIS/00641/505-284-0804/505-274-0488		

Relinquished by <i>[Signature]</i> Org. 00641 Date 1/24/18 Time 1326	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. 00631 Date 1/24/18 Time 1326	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i> Org. 00631 Date 1/26/18 Time 0705	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. TASAAC Date 02/01/18 Time 13143	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

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02/16/2018

CONTRACT VERIFICATION REVIEW FORMS

SOIL-GAS MONITORING

JANUARY 2018

Note: The review forms in this section include AR/COC numbers for environmental samples and additional AR/COC numbers for waste characterization samples.

AR/COC Number	Sample Type
618464	Environmental
618465	Environmental
618466	Environmental
618467	Environmental
618469	Environmental

Note: AR/COC forms are provided in the Data Validation Section of this Annex.

Contract Verification Form (CVR)

Project Leader Jackson

Project Name CWL SVM **Project/Task No.** 195122_10.11.03

ARCOC No. 618464, 618465, 618466, 618467 & 618469

Analytical Lab TAL-WS

SDG No. 320-35639-1

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete?		If no, explain
		Yes	No	
1.1	All items on ARCOG complete - data entry clerk initialed and dated	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	X		
1.4	Preservative correct for analyses requested	X		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		

Line No.	Item	Complete?		If no, explain
		Yes	No	
1.8	Condition upon receipt information provided	X		The canister for sample 104455-001/CWL-D2-440 was received at -19.10" Hg which is an insufficient sample volume. The data has been reported at a dilution. Canisters for samples 104451-001/CWL QC-3 and 104454-001/CWL-D2-350 were leaking during the initial leak check. A secondary valve was placed on top. The initial pressures were still at vacuum.

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X		
2.4	Matrix spike/matrix spike duplicate data provided	N/A		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		
2.6	QC batch numbers provided	X		
2.7	Dilution factors provided and all dilution levels reported	X		
2.8	Data reported in appropriate units and using correct significant figures	X		

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	X		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1	Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2	Quantitation limit met for all samples	X		
3.3	Accuracy a) Laboratory control sample accuracy reported and met for all samples	X		

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique		X	4-Bromofluorobenzene failed recovery limits for samples 104439-001/CWL-UI2-76 and 104446-001/CWL-D1-100. Sample reanalysis confirmed.
	c) Matrix spike recovery data reported and met	N/A		
3.4	Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	N/A		
	b) Matrix spike duplicate RPD data reported and met for all organic samples	N/A		
3.5	Blank data a) Method or reagent blank data reported and met for all samples		X	Carbon disulfide detected in method blank (batch 207738, 208137 and 208339). Acetone detected in method blank (batch 207749 and 208072)
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Acetone, carbon disulfide, chloroform, tetrachloroethene and trichloroethene detected in CWL QC-1. Acetone, benzene, chloromethane, methylene chloride, toluene and trichloroethene detected in CWL QC-2. Methylene chloride and trichloroethene detected in CWL QC-3. Trichloroethene detected in CWL QC-4. Acetone and carbon disulfide detected in CWL QC-5.

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270)	X		
	a) 12-hour tune check provided	X		
	b) Initial calibration provided	X		
	c) Continuing calibration provided	X		
	d) Internal standard performance data provided	X		

Line No.	Item	Yes	No	Comments
	e) Instrument run logs provided	X		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668)	N/A		
	a) 12-hour tune check provided			
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) CRI provided	N/A		

Line No.	Item	Yes	No	Comments
	d) Internal standard performance data provided	N/A		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
4.5	Inorganics (metals)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) ICP interference check sample data provided	N/A		
	d) ICP serial dilution provided	N/A		
	e) Instrument run logs provided	N/A		
4.6	Radiochemistry and General Chemistry	N/A		
	a) Instrument run logs provided			

5.0 Data Anomaly Report

Line No.	Item	Yes	No	If no, explain
5.1	DAR completed for monitoring and surveillance sample data	N/A		
5.2	Problems or outliers noted	N/A		
5.3	Verification or reanalysis requested from lab	N/A		

6.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies has been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
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Were deficiencies unresolved? Yes No

Based on the review, this data package is complete. Yes No

Reviewed by: Wendy Palencia Date: 02-28-2018 12:36:00

Closed by: Wendy Palencia Date: 02-28-2018 12:36:00

**SOIL-GAS SAMPLING RESULTS
CERTIFICATES OF ANALYSIS**

Chemical Waste Landfill

January 2018 – Soil-Gas Samples

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104432-001/CWL-UI1-40

Lab Sample ID: 320-35639-1

Date Collected: 01/24/18 09:13

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		360	13	ppb v/v			02/09/18 20:40	72.6
Benzene	ND		29	5.7	ppb v/v			02/09/18 20:40	72.6
Benzyl chloride	ND		58	12	ppb v/v			02/09/18 20:40	72.6
Bromodichloromethane	ND		22	4.8	ppb v/v			02/09/18 20:40	72.6
Bromoform	ND		29	5.1	ppb v/v			02/09/18 20:40	72.6
Bromomethane	ND		58	24	ppb v/v			02/09/18 20:40	72.6
2-Butanone (MEK)	ND		58	14	ppb v/v			02/09/18 20:40	72.6
Carbon disulfide	ND		58	5.7	ppb v/v			02/09/18 20:40	72.6
Carbon tetrachloride	14	J	58	4.6	ppb v/v			02/09/18 20:40	72.6
Chlorobenzene	ND		22	4.6	ppb v/v			02/09/18 20:40	72.6
Chloroethane	ND		58	22	ppb v/v			02/09/18 20:40	72.6
Chloroform	430		22	6.9	ppb v/v			02/09/18 20:40	72.6
Chloromethane	ND		58	14	ppb v/v			02/09/18 20:40	72.6
Dibromochloromethane	ND		29	5.7	ppb v/v			02/09/18 20:40	72.6
1,2-Dibromoethane (EDB)	6.3	J	58	5.4	ppb v/v			02/09/18 20:40	72.6
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		29	11	ppb v/v			02/09/18 20:40	72.6
1,2-Dichlorobenzene	11	J	29	9.4	ppb v/v			02/09/18 20:40	72.6
1,3-Dichlorobenzene	ND		29	8.0	ppb v/v			02/09/18 20:40	72.6
1,4-Dichlorobenzene	ND		29	11	ppb v/v			02/09/18 20:40	72.6
Dichlorodifluoromethane	32		29	11	ppb v/v			02/09/18 20:40	72.6
1,1-Dichloroethane	16	J	22	5.2	ppb v/v			02/09/18 20:40	72.6
1,2-Dichloroethane	36	J	58	6.4	ppb v/v			02/09/18 20:40	72.6
1,1-Dichloroethene	340		58	9.4	ppb v/v			02/09/18 20:40	72.6
cis-1,2-Dichloroethene	ND		29	6.5	ppb v/v			02/09/18 20:40	72.6
trans-1,2-Dichloroethene	ND		29	7.3	ppb v/v			02/09/18 20:40	72.6
1,2-Dichloropropane	79		29	17	ppb v/v			02/09/18 20:40	72.6
cis-1,3-Dichloropropene	ND		29	7.6	ppb v/v			02/09/18 20:40	72.6
trans-1,3-Dichloropropene	ND		29	6.4	ppb v/v			02/09/18 20:40	72.6
Ethylbenzene	ND		29	4.6	ppb v/v			02/09/18 20:40	72.6
4-Ethyltoluene	ND		29	14	ppb v/v			02/09/18 20:40	72.6
Hexachlorobutadiene	ND		150	31	ppb v/v			02/09/18 20:40	72.6
2-Hexanone	ND		29	6.3	ppb v/v			02/09/18 20:40	72.6
4-Methyl-2-pentanone (MIBK)	ND		29	9.8	ppb v/v			02/09/18 20:40	72.6
Methylene Chloride	150		29	5.2	ppb v/v			02/09/18 20:40	72.6
Styrene	ND		29	4.3	ppb v/v			02/09/18 20:40	72.6
1,1,2,2-Tetrachloroethane	ND		29	5.0	ppb v/v			02/09/18 20:40	72.6
Tetrachloroethene	730		29	3.7	ppb v/v			02/09/18 20:40	72.6
Toluene	5.7	J	29	3.7	ppb v/v			02/09/18 20:40	72.6
1,1,2-Trichloro-1,2,2-trifluoroethane	830		29	12	ppb v/v			02/09/18 20:40	72.6
1,2,4-Trichlorobenzene	ND		150	31	ppb v/v			02/09/18 20:40	72.6
1,1,1-Trichloroethane	34		22	4.7	ppb v/v			02/09/18 20:40	72.6
1,1,2-Trichloroethane	7.1	J	29	4.9	ppb v/v			02/09/18 20:40	72.6
Trichlorofluoromethane	220		29	14	ppb v/v			02/09/18 20:40	72.6
1,2,4-Trimethylbenzene	ND		58	12	ppb v/v			02/09/18 20:40	72.6
1,3,5-Trimethylbenzene	ND		29	9.1	ppb v/v			02/09/18 20:40	72.6
Vinyl acetate	ND		58	11	ppb v/v			02/09/18 20:40	72.6
Vinyl chloride	ND		29	8.7	ppb v/v			02/09/18 20:40	72.6

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104432-001/CWL-UI1-40

Lab Sample ID: 320-35639-1

Date Collected: 01/24/18 09:13

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		58	7.3	ppb v/v			02/09/18 20:40	72.6
o-Xylene	4.8	J	29	3.9	ppb v/v			02/09/18 20:40	72.6

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		70 - 130		02/09/18 20:40	72.6
1,2-Dichloroethane-d4 (Surr)	91		70 - 130		02/09/18 20:40	72.6
Toluene-d8 (Surr)	99		70 - 130		02/09/18 20:40	72.6

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	8200		55	14	ppb v/v			02/14/18 17:23	138

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130		02/14/18 17:23	138
1,2-Dichloroethane-d4 (Surr)	95		70 - 130		02/14/18 17:23	138
Toluene-d8 (Surr)	100		70 - 130		02/14/18 17:23	138

Client Sample ID: 104433-001/CWL-UI1-40

Lab Sample ID: 320-35639-2

Date Collected: 01/24/18 09:13

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		400	14	ppb v/v			02/09/18 21:31	79.7
Benzene	ND		32	6.3	ppb v/v			02/09/18 21:31	79.7
Benzyl chloride	ND		64	13	ppb v/v			02/09/18 21:31	79.7
Bromodichloromethane	ND		24	5.3	ppb v/v			02/09/18 21:31	79.7
Bromoform	ND		32	5.6	ppb v/v			02/09/18 21:31	79.7
Bromomethane	ND		64	27	ppb v/v			02/09/18 21:31	79.7
2-Butanone (MEK)	ND		64	16	ppb v/v			02/09/18 21:31	79.7
Carbon disulfide	ND		64	6.2	ppb v/v			02/09/18 21:31	79.7
Carbon tetrachloride	19	J	64	5.1	ppb v/v			02/09/18 21:31	79.7
Chlorobenzene	ND		24	5.1	ppb v/v			02/09/18 21:31	79.7
Chloroethane	ND		64	25	ppb v/v			02/09/18 21:31	79.7
Chloroform	450		24	7.6	ppb v/v			02/09/18 21:31	79.7
Chloromethane	ND		64	16	ppb v/v			02/09/18 21:31	79.7
Dibromochloromethane	ND		32	6.3	ppb v/v			02/09/18 21:31	79.7
1,2-Dibromoethane (EDB)	6.7	J	64	6.0	ppb v/v			02/09/18 21:31	79.7
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		32	12	ppb v/v			02/09/18 21:31	79.7
1,2-Dichlorobenzene	12	J	32	10	ppb v/v			02/09/18 21:31	79.7
1,3-Dichlorobenzene	ND		32	8.8	ppb v/v			02/09/18 21:31	79.7
1,4-Dichlorobenzene	ND		32	12	ppb v/v			02/09/18 21:31	79.7
Dichlorodifluoromethane	33		32	12	ppb v/v			02/09/18 21:31	79.7
1,1-Dichloroethane	17	J	24	5.7	ppb v/v			02/09/18 21:31	79.7
1,2-Dichloroethane	37	J	64	7.0	ppb v/v			02/09/18 21:31	79.7
1,1-Dichloroethene	360		64	10	ppb v/v			02/09/18 21:31	79.7
cis-1,2-Dichloroethene	ND		32	7.1	ppb v/v			02/09/18 21:31	79.7
trans-1,2-Dichloroethene	ND		32	8.0	ppb v/v			02/09/18 21:31	79.7

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104433-001/CWL-UI1-40

Lab Sample ID: 320-35639-2

Date Collected: 01/24/18 09:13

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dichloropropane	79		32	19	ppb v/v			02/09/18 21:31	79.7
cis-1,3-Dichloropropene	ND		32	8.3	ppb v/v			02/09/18 21:31	79.7
trans-1,3-Dichloropropene	ND		32	7.0	ppb v/v			02/09/18 21:31	79.7
Ethylbenzene	ND		32	5.0	ppb v/v			02/09/18 21:31	79.7
4-Ethyltoluene	ND		32	15	ppb v/v			02/09/18 21:31	79.7
Hexachlorobutadiene	ND		160	34	ppb v/v			02/09/18 21:31	79.7
2-Hexanone	ND		32	6.9	ppb v/v			02/09/18 21:31	79.7
4-Methyl-2-pentanone (MIBK)	ND		32	11	ppb v/v			02/09/18 21:31	79.7
Methylene Chloride	160		32	5.7	ppb v/v			02/09/18 21:31	79.7
Styrene	ND		32	4.7	ppb v/v			02/09/18 21:31	79.7
1,1,2,2-Tetrachloroethane	ND		32	5.5	ppb v/v			02/09/18 21:31	79.7
Tetrachloroethene	760		32	4.1	ppb v/v			02/09/18 21:31	79.7
Toluene	5.7 J		32	4.1	ppb v/v			02/09/18 21:31	79.7
1,1,2-Trichloro-1,2,2-trifluoroethane	870		32	13	ppb v/v			02/09/18 21:31	79.7
1,2,4-Trichlorobenzene	ND		160	35	ppb v/v			02/09/18 21:31	79.7
1,1,1-Trichloroethane	35		24	5.2	ppb v/v			02/09/18 21:31	79.7
1,1,2-Trichloroethane	7.1 J		32	5.3	ppb v/v			02/09/18 21:31	79.7
Trichlorofluoromethane	230		32	16	ppb v/v			02/09/18 21:31	79.7
1,2,4-Trimethylbenzene	ND		64	13	ppb v/v			02/09/18 21:31	79.7
1,3,5-Trimethylbenzene	ND		32	10	ppb v/v			02/09/18 21:31	79.7
Vinyl acetate	ND		64	12	ppb v/v			02/09/18 21:31	79.7
Vinyl chloride	ND		32	9.6	ppb v/v			02/09/18 21:31	79.7
m,p-Xylene	ND		64	8.0	ppb v/v			02/09/18 21:31	79.7
o-Xylene	4.9 J		32	4.3	ppb v/v			02/09/18 21:31	79.7

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		70 - 130		02/09/18 21:31	79.7
1,2-Dichloroethane-d4 (Surr)	91		70 - 130		02/09/18 21:31	79.7
Toluene-d8 (Surr)	98		70 - 130		02/09/18 21:31	79.7

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	8300		56	15	ppb v/v			02/14/18 18:16	139

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		70 - 130		02/14/18 18:16	139
1,2-Dichloroethane-d4 (Surr)	96		70 - 130		02/14/18 18:16	139
Toluene-d8 (Surr)	100		70 - 130		02/14/18 18:16	139

Client Sample ID: 104434-001/CWL-UI1-80

Lab Sample ID: 320-35639-3

Date Collected: 01/24/18 09:17

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		320	11	ppb v/v			02/09/18 22:23	63.9
Benzene	ND		26	5.0	ppb v/v			02/09/18 22:23	63.9
Benzyl chloride	ND		51	10	ppb v/v			02/09/18 22:23	63.9

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104434-001/CWL-UI1-80

Lab Sample ID: 320-35639-3

Date Collected: 01/24/18 09:17

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromodichloromethane	ND		19	4.2	ppb v/v			02/09/18 22:23	63.9
Bromoform	ND		26	4.5	ppb v/v			02/09/18 22:23	63.9
Bromomethane	ND		51	21	ppb v/v			02/09/18 22:23	63.9
2-Butanone (MEK)	ND		51	13	ppb v/v			02/09/18 22:23	63.9
Carbon disulfide	ND		51	5.0	ppb v/v			02/09/18 22:23	63.9
Carbon tetrachloride	13	J	51	4.1	ppb v/v			02/09/18 22:23	63.9
Chlorobenzene	ND		19	4.1	ppb v/v			02/09/18 22:23	63.9
Chloroethane	ND		51	20	ppb v/v			02/09/18 22:23	63.9
Chloroform	460		19	6.1	ppb v/v			02/09/18 22:23	63.9
Chloromethane	ND		51	13	ppb v/v			02/09/18 22:23	63.9
Dibromochloromethane	ND		26	5.0	ppb v/v			02/09/18 22:23	63.9
1,2-Dibromoethane (EDB)	ND		51	4.8	ppb v/v			02/09/18 22:23	63.9
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		26	9.9	ppb v/v			02/09/18 22:23	63.9
1,2-Dichlorobenzene	ND		26	8.3	ppb v/v			02/09/18 22:23	63.9
1,3-Dichlorobenzene	ND		26	7.0	ppb v/v			02/09/18 22:23	63.9
1,4-Dichlorobenzene	ND		26	9.5	ppb v/v			02/09/18 22:23	63.9
Dichlorodifluoromethane	27		26	9.3	ppb v/v			02/09/18 22:23	63.9
1,1-Dichloroethane	12	J	19	4.6	ppb v/v			02/09/18 22:23	63.9
1,2-Dichloroethane	13	J	51	5.6	ppb v/v			02/09/18 22:23	63.9
1,1-Dichloroethene	260		51	8.2	ppb v/v			02/09/18 22:23	63.9
cis-1,2-Dichloroethene	ND		26	5.7	ppb v/v			02/09/18 22:23	63.9
trans-1,2-Dichloroethene	ND		26	6.4	ppb v/v			02/09/18 22:23	63.9
1,2-Dichloropropane	53		26	15	ppb v/v			02/09/18 22:23	63.9
cis-1,3-Dichloropropene	ND		26	6.6	ppb v/v			02/09/18 22:23	63.9
trans-1,3-Dichloropropene	ND		26	5.6	ppb v/v			02/09/18 22:23	63.9
Ethylbenzene	ND		26	4.0	ppb v/v			02/09/18 22:23	63.9
4-Ethyltoluene	ND		26	12	ppb v/v			02/09/18 22:23	63.9
Hexachlorobutadiene	ND		130	28	ppb v/v			02/09/18 22:23	63.9
2-Hexanone	ND		26	5.6	ppb v/v			02/09/18 22:23	63.9
4-Methyl-2-pentanone (MIBK)	ND		26	8.6	ppb v/v			02/09/18 22:23	63.9
Methylene Chloride	40		26	4.6	ppb v/v			02/09/18 22:23	63.9
Styrene	ND		26	3.8	ppb v/v			02/09/18 22:23	63.9
1,1,2,2-Tetrachloroethane	ND		26	4.4	ppb v/v			02/09/18 22:23	63.9
Tetrachloroethene	940		26	3.3	ppb v/v			02/09/18 22:23	63.9
Toluene	ND		26	3.3	ppb v/v			02/09/18 22:23	63.9
1,1,2-Trichloro-1,2,2-trifluoroethane	670		26	10	ppb v/v			02/09/18 22:23	63.9
1,2,4-Trichlorobenzene	ND		130	28	ppb v/v			02/09/18 22:23	63.9
1,1,1-Trichloroethane	31		19	4.2	ppb v/v			02/09/18 22:23	63.9
1,1,2-Trichloroethane	6.8	J	26	4.3	ppb v/v			02/09/18 22:23	63.9
Trichlorofluoromethane	180		26	13	ppb v/v			02/09/18 22:23	63.9
1,2,4-Trimethylbenzene	ND		51	10	ppb v/v			02/09/18 22:23	63.9
1,3,5-Trimethylbenzene	ND		26	8.0	ppb v/v			02/09/18 22:23	63.9
Vinyl acetate	ND		51	9.3	ppb v/v			02/09/18 22:23	63.9
Vinyl chloride	ND		26	7.7	ppb v/v			02/09/18 22:23	63.9
m,p-Xylene	ND		51	6.4	ppb v/v			02/09/18 22:23	63.9
o-Xylene	ND		26	3.5	ppb v/v			02/09/18 22:23	63.9

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104434-001/CWL-UI1-80

Lab Sample ID: 320-35639-3

Date Collected: 01/24/18 09:17

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		70 - 130		02/09/18 22:23	63.9
1,2-Dichloroethane-d4 (Surr)	92		70 - 130		02/09/18 22:23	63.9
Toluene-d8 (Surr)	98		70 - 130		02/09/18 22:23	63.9

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	6200		43	11	ppb v/v			02/14/18 19:06	107

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		70 - 130		02/14/18 19:06	107
1,2-Dichloroethane-d4 (Surr)	95		70 - 130		02/14/18 19:06	107
Toluene-d8 (Surr)	100		70 - 130		02/14/18 19:06	107

Client Sample ID: 104435-001/CWL-UI1-80

Lab Sample ID: 320-35639-4

Date Collected: 01/24/18 09:17

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		270	9.6	ppb v/v			02/09/18 23:16	54
Benzene	ND		22	4.3	ppb v/v			02/09/18 23:16	54
Benzyl chloride	ND		43	8.8	ppb v/v			02/09/18 23:16	54
Bromodichloromethane	ND		16	3.6	ppb v/v			02/09/18 23:16	54
Bromoform	ND		22	3.8	ppb v/v			02/09/18 23:16	54
Bromomethane	ND		43	18	ppb v/v			02/09/18 23:16	54
2-Butanone (MEK)	ND		43	11	ppb v/v			02/09/18 23:16	54
Carbon disulfide	ND		43	4.2	ppb v/v			02/09/18 23:16	54
Carbon tetrachloride	13	J	43	3.5	ppb v/v			02/09/18 23:16	54
Chlorobenzene	ND		16	3.5	ppb v/v			02/09/18 23:16	54
Chloroethane	ND		43	17	ppb v/v			02/09/18 23:16	54
Chloroform	420		16	5.1	ppb v/v			02/09/18 23:16	54
Chloromethane	ND		43	11	ppb v/v			02/09/18 23:16	54
Dibromochloromethane	ND		22	4.3	ppb v/v			02/09/18 23:16	54
1,2-Dibromoethane (EDB)	ND		43	4.1	ppb v/v			02/09/18 23:16	54
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		22	8.4	ppb v/v			02/09/18 23:16	54
1,2-Dichlorobenzene	ND		22	7.0	ppb v/v			02/09/18 23:16	54
1,3-Dichlorobenzene	ND		22	5.9	ppb v/v			02/09/18 23:16	54
1,4-Dichlorobenzene	ND		22	8.0	ppb v/v			02/09/18 23:16	54
Dichlorodifluoromethane	24		22	7.8	ppb v/v			02/09/18 23:16	54
1,1-Dichloroethane	11	J	16	3.9	ppb v/v			02/09/18 23:16	54
1,2-Dichloroethane	13	J	43	4.8	ppb v/v			02/09/18 23:16	54
1,1-Dichloroethene	230		43	7.0	ppb v/v			02/09/18 23:16	54
cis-1,2-Dichloroethene	ND		22	4.8	ppb v/v			02/09/18 23:16	54
trans-1,2-Dichloroethene	ND		22	5.4	ppb v/v			02/09/18 23:16	54
1,2-Dichloropropane	48		22	13	ppb v/v			02/09/18 23:16	54
cis-1,3-Dichloropropene	ND		22	5.6	ppb v/v			02/09/18 23:16	54
trans-1,3-Dichloropropene	ND		22	4.8	ppb v/v			02/09/18 23:16	54
Ethylbenzene	ND		22	3.4	ppb v/v			02/09/18 23:16	54
4-Ethyltoluene	ND		22	10	ppb v/v			02/09/18 23:16	54

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104435-001/CWL-UI1-80

Lab Sample ID: 320-35639-4

Date Collected: 01/24/18 09:17

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hexachlorobutadiene	ND		110	23	ppb v/v			02/09/18 23:16	54
2-Hexanone	ND		22	4.7	ppb v/v			02/09/18 23:16	54
4-Methyl-2-pentanone (MIBK)	ND		22	7.3	ppb v/v			02/09/18 23:16	54
Methylene Chloride	37		22	3.9	ppb v/v			02/09/18 23:16	54
Styrene	ND		22	3.2	ppb v/v			02/09/18 23:16	54
1,1,2,2-Tetrachloroethane	ND		22	3.7	ppb v/v			02/09/18 23:16	54
Tetrachloroethene	870		22	2.8	ppb v/v			02/09/18 23:16	54
Toluene	ND		22	2.8	ppb v/v			02/09/18 23:16	54
1,1,2-Trichloro-1,2,2-trifluoroethane	610		22	8.8	ppb v/v			02/09/18 23:16	54
1,2,4-Trichlorobenzene	ND		110	23	ppb v/v			02/09/18 23:16	54
1,1,1-Trichloroethane	29		16	3.5	ppb v/v			02/09/18 23:16	54
1,1,2-Trichloroethane	5.8 J		22	3.6	ppb v/v			02/09/18 23:16	54
Trichlorofluoromethane	160		22	11	ppb v/v			02/09/18 23:16	54
1,2,4-Trimethylbenzene	ND		43	8.7	ppb v/v			02/09/18 23:16	54
1,3,5-Trimethylbenzene	ND		22	6.8	ppb v/v			02/09/18 23:16	54
Vinyl acetate	ND		43	7.8	ppb v/v			02/09/18 23:16	54
Vinyl chloride	ND		22	6.5	ppb v/v			02/09/18 23:16	54
m,p-Xylene	ND		43	5.4	ppb v/v			02/09/18 23:16	54
o-Xylene	ND		22	2.9	ppb v/v			02/09/18 23:16	54

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130		02/09/18 23:16	54
1,2-Dichloroethane-d4 (Surr)	92		70 - 130		02/09/18 23:16	54
Toluene-d8 (Surr)	97		70 - 130		02/09/18 23:16	54

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	5200		39	10	ppb v/v			02/14/18 19:58	97.3

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		70 - 130		02/14/18 19:58	97.3
1,2-Dichloroethane-d4 (Surr)	95		70 - 130		02/14/18 19:58	97.3
Toluene-d8 (Surr)	98		70 - 130		02/14/18 19:58	97.3

Client Sample ID: 104436-001/CWL-UI1-120

Lab Sample ID: 320-35639-5

Date Collected: 01/24/18 09:21

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		270	9.7	ppb v/v			02/10/18 00:07	54.4
Benzene	ND		22	4.3	ppb v/v			02/10/18 00:07	54.4
Benzyl chloride	ND		44	8.9	ppb v/v			02/10/18 00:07	54.4
Bromodichloromethane	ND		16	3.6	ppb v/v			02/10/18 00:07	54.4
Bromoform	ND		22	3.8	ppb v/v			02/10/18 00:07	54.4
Bromomethane	ND		44	18	ppb v/v			02/10/18 00:07	54.4
2-Butanone (MEK)	ND		44	11	ppb v/v			02/10/18 00:07	54.4
Carbon disulfide	ND		44	4.2	ppb v/v			02/10/18 00:07	54.4

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104436-001/CWL-UI1-120

Lab Sample ID: 320-35639-5

Date Collected: 01/24/18 09:21

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon tetrachloride	12	J	44	3.5	ppb v/v			02/10/18 00:07	54.4
Chlorobenzene	ND		16	3.5	ppb v/v			02/10/18 00:07	54.4
Chloroethane	ND		44	17	ppb v/v			02/10/18 00:07	54.4
Chloroform	620		16	5.2	ppb v/v			02/10/18 00:07	54.4
Chloromethane	ND		44	11	ppb v/v			02/10/18 00:07	54.4
Dibromochloromethane	ND		22	4.3	ppb v/v			02/10/18 00:07	54.4
1,2-Dibromoethane (EDB)	ND		44	4.1	ppb v/v			02/10/18 00:07	54.4
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		22	8.4	ppb v/v			02/10/18 00:07	54.4
1,2-Dichlorobenzene	16	J	22	7.1	ppb v/v			02/10/18 00:07	54.4
1,3-Dichlorobenzene	ND		22	6.0	ppb v/v			02/10/18 00:07	54.4
1,4-Dichlorobenzene	ND		22	8.1	ppb v/v			02/10/18 00:07	54.4
Dichlorodifluoromethane	24		22	7.9	ppb v/v			02/10/18 00:07	54.4
1,1-Dichloroethane	11	J	16	3.9	ppb v/v			02/10/18 00:07	54.4
1,2-Dichloroethane	ND		44	4.8	ppb v/v			02/10/18 00:07	54.4
1,1-Dichloroethene	150		44	7.0	ppb v/v			02/10/18 00:07	54.4
cis-1,2-Dichloroethene	ND		22	4.8	ppb v/v			02/10/18 00:07	54.4
trans-1,2-Dichloroethene	ND		22	5.4	ppb v/v			02/10/18 00:07	54.4
1,2-Dichloropropane	37		22	13	ppb v/v			02/10/18 00:07	54.4
cis-1,3-Dichloropropene	ND		22	5.7	ppb v/v			02/10/18 00:07	54.4
trans-1,3-Dichloropropene	ND		22	4.8	ppb v/v			02/10/18 00:07	54.4
Ethylbenzene	ND		22	3.4	ppb v/v			02/10/18 00:07	54.4
4-Ethyltoluene	ND		22	10	ppb v/v			02/10/18 00:07	54.4
Hexachlorobutadiene	ND		110	24	ppb v/v			02/10/18 00:07	54.4
2-Hexanone	ND		22	4.7	ppb v/v			02/10/18 00:07	54.4
4-Methyl-2-pentanone (MIBK)	ND		22	7.3	ppb v/v			02/10/18 00:07	54.4
Methylene Chloride	6.7	J	22	3.9	ppb v/v			02/10/18 00:07	54.4
Styrene	ND		22	3.2	ppb v/v			02/10/18 00:07	54.4
1,1,2,2-Tetrachloroethane	ND		22	3.8	ppb v/v			02/10/18 00:07	54.4
Tetrachloroethene	3500		22	2.8	ppb v/v			02/10/18 00:07	54.4
Toluene	ND		22	2.8	ppb v/v			02/10/18 00:07	54.4
1,1,2-Trichloro-1,2,2-trifluoroethane	610		22	8.9	ppb v/v			02/10/18 00:07	54.4
1,2,4-Trichlorobenzene	ND		110	24	ppb v/v			02/10/18 00:07	54.4
1,1,1-Trichloroethane	37		16	3.5	ppb v/v			02/10/18 00:07	54.4
1,1,2-Trichloroethane	8.6	J	22	3.6	ppb v/v			02/10/18 00:07	54.4
Trichloroethene	5300		22	5.7	ppb v/v			02/10/18 00:07	54.4
Trichlorofluoromethane	160		22	11	ppb v/v			02/10/18 00:07	54.4
1,2,4-Trimethylbenzene	ND		44	8.8	ppb v/v			02/10/18 00:07	54.4
1,3,5-Trimethylbenzene	ND		22	6.8	ppb v/v			02/10/18 00:07	54.4
Vinyl acetate	ND		44	7.9	ppb v/v			02/10/18 00:07	54.4
Vinyl chloride	ND		22	6.5	ppb v/v			02/10/18 00:07	54.4
m,p-Xylene	ND		44	5.4	ppb v/v			02/10/18 00:07	54.4
o-Xylene	6.2	J	22	2.9	ppb v/v			02/10/18 00:07	54.4

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130		02/10/18 00:07	54.4
1,2-Dichloroethane-d4 (Surr)	94		70 - 130		02/10/18 00:07	54.4
Toluene-d8 (Surr)	100		70 - 130		02/10/18 00:07	54.4

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104437-001/CWL QC-1

Lab Sample ID: 320-35639-6

Date Collected: 01/24/18 09:07

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.50	J	5.0	0.18	ppb v/v			02/10/18 01:05	1
Benzene	ND		0.40	0.079	ppb v/v			02/10/18 01:05	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			02/10/18 01:05	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			02/10/18 01:05	1
Bromoform	ND		0.40	0.070	ppb v/v			02/10/18 01:05	1
Bromomethane	ND		0.80	0.34	ppb v/v			02/10/18 01:05	1
2-Butanone (MEK)	ND		0.80	0.20	ppb v/v			02/10/18 01:05	1
Carbon disulfide	0.16	J B	0.80	0.078	ppb v/v			02/10/18 01:05	1
Carbon tetrachloride	ND		0.80	0.064	ppb v/v			02/10/18 01:05	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			02/10/18 01:05	1
Chloroethane	ND		0.80	0.31	ppb v/v			02/10/18 01:05	1
Chloroform	0.17	J	0.30	0.095	ppb v/v			02/10/18 01:05	1
Chloromethane	ND		0.80	0.20	ppb v/v			02/10/18 01:05	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			02/10/18 01:05	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			02/10/18 01:05	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			02/10/18 01:05	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			02/10/18 01:05	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			02/10/18 01:05	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			02/10/18 01:05	1
Dichlorodifluoromethane	ND		0.40	0.15	ppb v/v			02/10/18 01:05	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			02/10/18 01:05	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			02/10/18 01:05	1
1,1-Dichloroethene	ND		0.80	0.13	ppb v/v			02/10/18 01:05	1
cis-1,2-Dichloroethene	ND		0.40	0.089	ppb v/v			02/10/18 01:05	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			02/10/18 01:05	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			02/10/18 01:05	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			02/10/18 01:05	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			02/10/18 01:05	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			02/10/18 01:05	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			02/10/18 01:05	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			02/10/18 01:05	1
2-Hexanone	ND		0.40	0.087	ppb v/v			02/10/18 01:05	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			02/10/18 01:05	1
Methylene Chloride	ND		0.40	0.072	ppb v/v			02/10/18 01:05	1
Styrene	ND		0.40	0.059	ppb v/v			02/10/18 01:05	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			02/10/18 01:05	1
Tetrachloroethene	1.1		0.40	0.051	ppb v/v			02/10/18 01:05	1
Toluene	ND		0.40	0.051	ppb v/v			02/10/18 01:05	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16	ppb v/v			02/10/18 01:05	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			02/10/18 01:05	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			02/10/18 01:05	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			02/10/18 01:05	1
Trichloroethene	1.7		0.40	0.11	ppb v/v			02/10/18 01:05	1
Trichlorofluoromethane	ND		0.40	0.20	ppb v/v			02/10/18 01:05	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			02/10/18 01:05	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			02/10/18 01:05	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			02/10/18 01:05	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			02/10/18 01:05	1

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104437-001/CWL QC-1

Lab Sample ID: 320-35639-6

Date Collected: 01/24/18 09:07

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.80	0.10	ppb v/v			02/10/18 01:05	1
o-Xylene	ND		0.40	0.054	ppb v/v			02/10/18 01:05	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		70 - 130					02/10/18 01:05	1
1,2-Dichloroethane-d4 (Surr)	94		70 - 130					02/10/18 01:05	1
Toluene-d8 (Surr)	99		70 - 130					02/10/18 01:05	1

Client Sample ID: 104438-001/CWL-UI2-36

Lab Sample ID: 320-35639-7

Date Collected: 01/24/18 11:17

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	11	J	150	5.3	ppb v/v			02/10/18 01:56	29.8
Benzene	ND		12	2.4	ppb v/v			02/10/18 01:56	29.8
Benzyl chloride	ND		24	4.9	ppb v/v			02/10/18 01:56	29.8
Bromodichloromethane	ND		8.9	2.0	ppb v/v			02/10/18 01:56	29.8
Bromoform	ND		12	2.1	ppb v/v			02/10/18 01:56	29.8
Bromomethane	ND		24	10	ppb v/v			02/10/18 01:56	29.8
2-Butanone (MEK)	ND		24	5.9	ppb v/v			02/10/18 01:56	29.8
Carbon disulfide	ND		24	2.3	ppb v/v			02/10/18 01:56	29.8
Carbon tetrachloride	6.6	J	24	1.9	ppb v/v			02/10/18 01:56	29.8
Chlorobenzene	ND		8.9	1.9	ppb v/v			02/10/18 01:56	29.8
Chloroethane	ND		24	9.2	ppb v/v			02/10/18 01:56	29.8
Chloroform	370		8.9	2.8	ppb v/v			02/10/18 01:56	29.8
Chloromethane	ND		24	5.9	ppb v/v			02/10/18 01:56	29.8
Dibromochloromethane	ND		12	2.4	ppb v/v			02/10/18 01:56	29.8
1,2-Dibromoethane (EDB)	ND		24	2.2	ppb v/v			02/10/18 01:56	29.8
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		12	4.6	ppb v/v			02/10/18 01:56	29.8
1,2-Dichlorobenzene	ND		12	3.9	ppb v/v			02/10/18 01:56	29.8
1,3-Dichlorobenzene	ND		12	3.3	ppb v/v			02/10/18 01:56	29.8
1,4-Dichlorobenzene	ND		12	4.4	ppb v/v			02/10/18 01:56	29.8
Dichlorodifluoromethane	13		12	4.3	ppb v/v			02/10/18 01:56	29.8
1,1-Dichloroethane	3.0	J	8.9	2.1	ppb v/v			02/10/18 01:56	29.8
1,2-Dichloroethane	ND		24	2.6	ppb v/v			02/10/18 01:56	29.8
1,1-Dichloroethene	26		24	3.8	ppb v/v			02/10/18 01:56	29.8
cis-1,2-Dichloroethene	ND		12	2.7	ppb v/v			02/10/18 01:56	29.8
trans-1,2-Dichloroethene	ND		12	3.0	ppb v/v			02/10/18 01:56	29.8
1,2-Dichloropropane	29		12	7.2	ppb v/v			02/10/18 01:56	29.8
cis-1,3-Dichloropropene	ND		12	3.1	ppb v/v			02/10/18 01:56	29.8
trans-1,3-Dichloropropene	ND		12	2.6	ppb v/v			02/10/18 01:56	29.8
Ethylbenzene	ND		12	1.9	ppb v/v			02/10/18 01:56	29.8
4-Ethyltoluene	ND		12	5.6	ppb v/v			02/10/18 01:56	29.8
Hexachlorobutadiene	ND		60	13	ppb v/v			02/10/18 01:56	29.8
2-Hexanone	ND		12	2.6	ppb v/v			02/10/18 01:56	29.8
4-Methyl-2-pentanone (MIBK)	ND		12	4.0	ppb v/v			02/10/18 01:56	29.8
Methylene Chloride	4.2	J	12	2.1	ppb v/v			02/10/18 01:56	29.8

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104438-001/CWL-UI2-36

Lab Sample ID: 320-35639-7

Date Collected: 01/24/18 11:17

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	ND		12	1.8	ppb v/v			02/10/18 01:56	29.8
1,1,2,2-Tetrachloroethane	ND		12	2.1	ppb v/v			02/10/18 01:56	29.8
Tetrachloroethene	110		12	1.5	ppb v/v			02/10/18 01:56	29.8
Toluene	ND		12	1.5	ppb v/v			02/10/18 01:56	29.8
1,1,2-Trichloro-1,2,2-trifluoroethane	280		12	4.9	ppb v/v			02/10/18 01:56	29.8
1,2,4-Trichlorobenzene	ND		60	13	ppb v/v			02/10/18 01:56	29.8
1,1,1-Trichloroethane	16		8.9	1.9	ppb v/v			02/10/18 01:56	29.8
1,1,2-Trichloroethane	ND		12	2.0	ppb v/v			02/10/18 01:56	29.8
Trichloroethene	2300		12	3.1	ppb v/v			02/10/18 01:56	29.8
Trichlorofluoromethane	83		12	5.8	ppb v/v			02/10/18 01:56	29.8
1,2,4-Trimethylbenzene	ND		24	4.8	ppb v/v			02/10/18 01:56	29.8
1,3,5-Trimethylbenzene	ND		12	3.7	ppb v/v			02/10/18 01:56	29.8
Vinyl acetate	ND		24	4.3	ppb v/v			02/10/18 01:56	29.8
Vinyl chloride	ND		12	3.6	ppb v/v			02/10/18 01:56	29.8
m,p-Xylene	ND		24	3.0	ppb v/v			02/10/18 01:56	29.8
o-Xylene	ND		12	1.6	ppb v/v			02/10/18 01:56	29.8

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		70 - 130		02/10/18 01:56	29.8
1,2-Dichloroethane-d4 (Surr)	92		70 - 130		02/10/18 01:56	29.8
Toluene-d8 (Surr)	99		70 - 130		02/10/18 01:56	29.8

Client Sample ID: 104439-001/CWL-UI2-76

Lab Sample ID: 320-35639-8

Date Collected: 01/24/18 11:19

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		380	14	ppb v/v			02/10/18 01:21	76.5
Benzene	ND		31	6.0	ppb v/v			02/10/18 01:21	76.5
Benzyl chloride	ND		61	12	ppb v/v			02/10/18 01:21	76.5
Bromodichloromethane	ND		23	5.0	ppb v/v			02/10/18 01:21	76.5
Bromoform	ND		31	5.4	ppb v/v			02/10/18 01:21	76.5
Bromomethane	ND		61	26	ppb v/v			02/10/18 01:21	76.5
2-Butanone (MEK)	ND		61	15	ppb v/v			02/10/18 01:21	76.5
Carbon disulfide	ND		61	6.0	ppb v/v			02/10/18 01:21	76.5
Carbon tetrachloride	15	J	61	4.9	ppb v/v			02/10/18 01:21	76.5
Chlorobenzene	ND		23	4.9	ppb v/v			02/10/18 01:21	76.5
Chloroethane	ND		61	24	ppb v/v			02/10/18 01:21	76.5
Chloroform	560		23	7.3	ppb v/v			02/10/18 01:21	76.5
Chloromethane	ND		61	15	ppb v/v			02/10/18 01:21	76.5
Dibromochloromethane	ND		31	6.0	ppb v/v			02/10/18 01:21	76.5
1,2-Dibromoethane (EDB)	ND		61	5.7	ppb v/v			02/10/18 01:21	76.5
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		31	12	ppb v/v			02/10/18 01:21	76.5
1,2-Dichlorobenzene	ND		31	9.9	ppb v/v			02/10/18 01:21	76.5
1,3-Dichlorobenzene	ND		31	8.4	ppb v/v			02/10/18 01:21	76.5
1,4-Dichlorobenzene	ND		31	11	ppb v/v			02/10/18 01:21	76.5

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104439-001/CWL-UI2-76

Lab Sample ID: 320-35639-8

Date Collected: 01/24/18 11:19

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	27	J	31	11	ppb v/v			02/10/18 01:21	76.5
1,1-Dichloroethane	5.8	J	23	5.5	ppb v/v			02/10/18 01:21	76.5
1,2-Dichloroethane	ND		61	6.7	ppb v/v			02/10/18 01:21	76.5
1,1-Dichloroethene	84		61	9.9	ppb v/v			02/10/18 01:21	76.5
cis-1,2-Dichloroethene	ND		31	6.8	ppb v/v			02/10/18 01:21	76.5
trans-1,2-Dichloroethene	ND		31	7.7	ppb v/v			02/10/18 01:21	76.5
1,2-Dichloropropane	83		31	18	ppb v/v			02/10/18 01:21	76.5
cis-1,3-Dichloropropene	ND		31	8.0	ppb v/v			02/10/18 01:21	76.5
trans-1,3-Dichloropropene	ND		31	6.7	ppb v/v			02/10/18 01:21	76.5
Ethylbenzene	ND		31	4.8	ppb v/v			02/10/18 01:21	76.5
4-Ethyltoluene	ND		31	14	ppb v/v			02/10/18 01:21	76.5
Hexachlorobutadiene	ND		150	33	ppb v/v			02/10/18 01:21	76.5
2-Hexanone	ND		31	6.7	ppb v/v			02/10/18 01:21	76.5
4-Methyl-2-pentanone (MIBK)	ND		31	10	ppb v/v			02/10/18 01:21	76.5
Methylene Chloride	8.3	J	31	5.5	ppb v/v			02/10/18 01:21	76.5
Styrene	ND		31	4.5	ppb v/v			02/10/18 01:21	76.5
1,1,2,2-Tetrachloroethane	ND		31	5.3	ppb v/v			02/10/18 01:21	76.5
Tetrachloroethene	200		31	3.9	ppb v/v			02/10/18 01:21	76.5
Toluene	ND		31	3.9	ppb v/v			02/10/18 01:21	76.5
1,1,2-Trichloro-1,2,2-trifluoroethane	540		31	12	ppb v/v			02/10/18 01:21	76.5
1,2,4-Trichlorobenzene	ND		150	33	ppb v/v			02/10/18 01:21	76.5
1,1,1-Trichloroethane	22	J	23	5.0	ppb v/v			02/10/18 01:21	76.5
1,1,2-Trichloroethane	ND		31	5.1	ppb v/v			02/10/18 01:21	76.5
Trichlorofluoromethane	150		31	15	ppb v/v			02/10/18 01:21	76.5
1,2,4-Trimethylbenzene	ND		61	12	ppb v/v			02/10/18 01:21	76.5
1,3,5-Trimethylbenzene	ND		31	9.6	ppb v/v			02/10/18 01:21	76.5
Vinyl acetate	ND		61	11	ppb v/v			02/10/18 01:21	76.5
Vinyl chloride	ND		31	9.2	ppb v/v			02/10/18 01:21	76.5
m,p-Xylene	ND		61	7.7	ppb v/v			02/10/18 01:21	76.5
o-Xylene	ND		31	4.1	ppb v/v			02/10/18 01:21	76.5

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	69	X	70 - 130		02/10/18 01:21	76.5
1,2-Dichloroethane-d4 (Surr)	108		70 - 130		02/10/18 01:21	76.5
Toluene-d8 (Surr)	99		70 - 130		02/10/18 01:21	76.5

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	4700		61	16	ppb v/v			02/13/18 20:43	153

Client Sample ID: 104440-001/CWL-UI2-136

Lab Sample ID: 320-35639-9

Date Collected: 01/24/18 11:22

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		430	15	ppb v/v			02/10/18 02:12	86.6

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104440-001/CWL-UI2-136

Lab Sample ID: 320-35639-9

Date Collected: 01/24/18 11:22

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		35	6.8	ppb v/v			02/10/18 02:12	86.6
Benzyl chloride	ND		69	14	ppb v/v			02/10/18 02:12	86.6
Bromodichloromethane	ND		26	5.7	ppb v/v			02/10/18 02:12	86.6
Bromoform	ND		35	6.1	ppb v/v			02/10/18 02:12	86.6
Bromomethane	ND		69	29	ppb v/v			02/10/18 02:12	86.6
2-Butanone (MEK)	ND		69	17	ppb v/v			02/10/18 02:12	86.6
Carbon disulfide	ND		69	6.8	ppb v/v			02/10/18 02:12	86.6
Carbon tetrachloride	20	J	69	5.5	ppb v/v			02/10/18 02:12	86.6
Chlorobenzene	ND		26	5.5	ppb v/v			02/10/18 02:12	86.6
Chloroethane	ND		69	27	ppb v/v			02/10/18 02:12	86.6
Chloroform	520		26	8.2	ppb v/v			02/10/18 02:12	86.6
Chloromethane	ND		69	17	ppb v/v			02/10/18 02:12	86.6
Dibromochloromethane	ND		35	6.8	ppb v/v			02/10/18 02:12	86.6
1,2-Dibromoethane (EDB)	ND		69	6.5	ppb v/v			02/10/18 02:12	86.6
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		35	13	ppb v/v			02/10/18 02:12	86.6
1,2-Dichlorobenzene	ND		35	11	ppb v/v			02/10/18 02:12	86.6
1,3-Dichlorobenzene	ND		35	9.5	ppb v/v			02/10/18 02:12	86.6
1,4-Dichlorobenzene	ND		35	13	ppb v/v			02/10/18 02:12	86.6
Dichlorodifluoromethane	36		35	13	ppb v/v			02/10/18 02:12	86.6
1,1-Dichloroethane	ND		26	6.2	ppb v/v			02/10/18 02:12	86.6
1,2-Dichloroethane	18	J	69	7.6	ppb v/v			02/10/18 02:12	86.6
1,1-Dichloroethene	140		69	11	ppb v/v			02/10/18 02:12	86.6
cis-1,2-Dichloroethene	ND		35	7.7	ppb v/v			02/10/18 02:12	86.6
trans-1,2-Dichloroethene	ND		35	8.7	ppb v/v			02/10/18 02:12	86.6
1,2-Dichloropropane	150		35	21	ppb v/v			02/10/18 02:12	86.6
cis-1,3-Dichloropropene	ND		35	9.0	ppb v/v			02/10/18 02:12	86.6
trans-1,3-Dichloropropene	ND		35	7.6	ppb v/v			02/10/18 02:12	86.6
Ethylbenzene	ND		35	5.5	ppb v/v			02/10/18 02:12	86.6
4-Ethyltoluene	ND		35	16	ppb v/v			02/10/18 02:12	86.6
Hexachlorobutadiene	ND		170	37	ppb v/v			02/10/18 02:12	86.6
2-Hexanone	ND		35	7.5	ppb v/v			02/10/18 02:12	86.6
4-Methyl-2-pentanone (MIBK)	ND		35	12	ppb v/v			02/10/18 02:12	86.6
Methylene Chloride	7.7	J	35	6.2	ppb v/v			02/10/18 02:12	86.6
Styrene	ND		35	5.1	ppb v/v			02/10/18 02:12	86.6
1,1,2,2-Tetrachloroethane	ND		35	6.0	ppb v/v			02/10/18 02:12	86.6
Tetrachloroethene	240		35	4.4	ppb v/v			02/10/18 02:12	86.6
Toluene	ND		35	4.4	ppb v/v			02/10/18 02:12	86.6
1,1,2-Trichloro-1,2,2-trifluoroethane	660		35	14	ppb v/v			02/10/18 02:12	86.6
1,2,4-Trichlorobenzene	ND		170	37	ppb v/v			02/10/18 02:12	86.6
1,1,1-Trichloroethane	20	J	26	5.6	ppb v/v			02/10/18 02:12	86.6
1,1,2-Trichloroethane	ND		35	5.8	ppb v/v			02/10/18 02:12	86.6
Trichloroethene	6700		61	16	ppb v/v			02/13/18 21:35	152
Trichlorofluoromethane	190		35	17	ppb v/v			02/10/18 02:12	86.6
1,2,4-Trimethylbenzene	ND		69	14	ppb v/v			02/10/18 02:12	86.6
1,3,5-Trimethylbenzene	ND		35	11	ppb v/v			02/10/18 02:12	86.6
Vinyl acetate	ND		69	13	ppb v/v			02/10/18 02:12	86.6
Vinyl chloride	ND		35	10	ppb v/v			02/10/18 02:12	86.6
m,p-Xylene	ND		69	8.7	ppb v/v			02/10/18 02:12	86.6

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104440-001/CWL-UI2-136

Lab Sample ID: 320-35639-9

Date Collected: 01/24/18 11:22

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
o-Xylene	ND		35	4.7	ppb v/v			02/10/18 02:12	86.6
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	71		70 - 130					02/10/18 02:12	86.6
4-Bromofluorobenzene (Surr)	72		70 - 130					02/13/18 21:35	152
1,2-Dichloroethane-d4 (Surr)	109		70 - 130					02/10/18 02:12	86.6
1,2-Dichloroethane-d4 (Surr)	109		70 - 130					02/13/18 21:35	152
Toluene-d8 (Surr)	96		70 - 130					02/10/18 02:12	86.6
Toluene-d8 (Surr)	93		70 - 130					02/13/18 21:35	152

Client Sample ID: 104441-001/CWL QC-2

Lab Sample ID: 320-35639-10

Date Collected: 01/24/18 11:13

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	1.6	J B	5.0	0.18	ppb v/v			02/10/18 00:29	1
Benzene	0.093	J	0.40	0.079	ppb v/v			02/10/18 00:29	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			02/10/18 00:29	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			02/10/18 00:29	1
Bromoform	ND		0.40	0.070	ppb v/v			02/10/18 00:29	1
Bromomethane	ND		0.80	0.34	ppb v/v			02/10/18 00:29	1
2-Butanone (MEK)	ND		0.80	0.20	ppb v/v			02/10/18 00:29	1
Carbon disulfide	ND		0.80	0.078	ppb v/v			02/10/18 00:29	1
Carbon tetrachloride	ND		0.80	0.064	ppb v/v			02/10/18 00:29	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			02/10/18 00:29	1
Chloroethane	ND		0.80	0.31	ppb v/v			02/10/18 00:29	1
Chloroform	ND		0.30	0.095	ppb v/v			02/10/18 00:29	1
Chloromethane	0.32	J	0.80	0.20	ppb v/v			02/10/18 00:29	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			02/10/18 00:29	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			02/10/18 00:29	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			02/10/18 00:29	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			02/10/18 00:29	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			02/10/18 00:29	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			02/10/18 00:29	1
Dichlorodifluoromethane	ND		0.40	0.15	ppb v/v			02/10/18 00:29	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			02/10/18 00:29	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			02/10/18 00:29	1
1,1-Dichloroethene	ND		0.80	0.13	ppb v/v			02/10/18 00:29	1
cis-1,2-Dichloroethene	ND		0.40	0.089	ppb v/v			02/10/18 00:29	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			02/10/18 00:29	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			02/10/18 00:29	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			02/10/18 00:29	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			02/10/18 00:29	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			02/10/18 00:29	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			02/10/18 00:29	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			02/10/18 00:29	1
2-Hexanone	ND		0.40	0.087	ppb v/v			02/10/18 00:29	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104441-001/CWL QC-2

Lab Sample ID: 320-35639-10

Date Collected: 01/24/18 11:13

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			02/10/18 00:29	1
Methylene Chloride	0.67		0.40	0.072	ppb v/v			02/10/18 00:29	1
Styrene	ND		0.40	0.059	ppb v/v			02/10/18 00:29	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			02/10/18 00:29	1
Tetrachloroethene	ND		0.40	0.051	ppb v/v			02/10/18 00:29	1
Toluene	0.18 J		0.40	0.051	ppb v/v			02/10/18 00:29	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16	ppb v/v			02/10/18 00:29	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			02/10/18 00:29	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			02/10/18 00:29	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			02/10/18 00:29	1
Trichloroethene	0.38 J		0.40	0.11	ppb v/v			02/10/18 00:29	1
Trichlorofluoromethane	ND		0.40	0.20	ppb v/v			02/10/18 00:29	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			02/10/18 00:29	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			02/10/18 00:29	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			02/10/18 00:29	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			02/10/18 00:29	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			02/10/18 00:29	1
o-Xylene	ND		0.40	0.054	ppb v/v			02/10/18 00:29	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	87		70 - 130		02/10/18 00:29	1
1,2-Dichloroethane-d4 (Surr)	107		70 - 130		02/10/18 00:29	1
Toluene-d8 (Surr)	89		70 - 130		02/10/18 00:29	1

Client Sample ID: 104446-001/CWL-D1-100

Lab Sample ID: 320-35639-11

Date Collected: 01/24/18 08:40

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		510	18	ppb v/v			02/10/18 03:05	101
Benzene	ND		40	8.0	ppb v/v			02/10/18 03:05	101
Benzyl chloride	ND		81	16	ppb v/v			02/10/18 03:05	101
Bromodichloromethane	ND		30	6.7	ppb v/v			02/10/18 03:05	101
Bromoform	ND		40	7.1	ppb v/v			02/10/18 03:05	101
Bromomethane	ND		81	34	ppb v/v			02/10/18 03:05	101
2-Butanone (MEK)	ND		81	20	ppb v/v			02/10/18 03:05	101
Carbon disulfide	ND		81	7.9	ppb v/v			02/10/18 03:05	101
Carbon tetrachloride	9.6 J		81	6.5	ppb v/v			02/10/18 03:05	101
Chlorobenzene	ND		30	6.5	ppb v/v			02/10/18 03:05	101
Chloroethane	ND		81	31	ppb v/v			02/10/18 03:05	101
Chloroform	340		30	9.6	ppb v/v			02/10/18 03:05	101
Chloromethane	ND		81	20	ppb v/v			02/10/18 03:05	101
Dibromochloromethane	ND		40	8.0	ppb v/v			02/10/18 03:05	101
1,2-Dibromoethane (EDB)	ND		81	7.6	ppb v/v			02/10/18 03:05	101
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		40	16	ppb v/v			02/10/18 03:05	101
1,2-Dichlorobenzene	ND		40	13	ppb v/v			02/10/18 03:05	101
1,3-Dichlorobenzene	ND		40	11	ppb v/v			02/10/18 03:05	101

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104446-001/CWL-D1-100

Lab Sample ID: 320-35639-11

Date Collected: 01/24/18 08:40

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	ND		40	15	ppb v/v			02/10/18 03:05	101
Dichlorodifluoromethane	33	J	40	15	ppb v/v			02/10/18 03:05	101
1,1-Dichloroethane	10	J	30	7.3	ppb v/v			02/10/18 03:05	101
1,2-Dichloroethane	15	J	81	8.9	ppb v/v			02/10/18 03:05	101
1,1-Dichloroethene	230		81	13	ppb v/v			02/10/18 03:05	101
cis-1,2-Dichloroethene	ND		40	9.0	ppb v/v			02/10/18 03:05	101
trans-1,2-Dichloroethene	ND		40	10	ppb v/v			02/10/18 03:05	101
1,2-Dichloropropane	76		40	24	ppb v/v			02/10/18 03:05	101
cis-1,3-Dichloropropene	ND		40	11	ppb v/v			02/10/18 03:05	101
trans-1,3-Dichloropropene	ND		40	8.9	ppb v/v			02/10/18 03:05	101
Ethylbenzene	ND		40	6.4	ppb v/v			02/10/18 03:05	101
4-Ethyltoluene	ND		40	19	ppb v/v			02/10/18 03:05	101
Hexachlorobutadiene	ND		200	44	ppb v/v			02/10/18 03:05	101
2-Hexanone	ND		40	8.8	ppb v/v			02/10/18 03:05	101
4-Methyl-2-pentanone (MIBK)	ND		40	14	ppb v/v			02/10/18 03:05	101
Methylene Chloride	22	J	40	7.3	ppb v/v			02/10/18 03:05	101
Styrene	ND		40	6.0	ppb v/v			02/10/18 03:05	101
1,1,2,2-Tetrachloroethane	ND		40	7.0	ppb v/v			02/10/18 03:05	101
Tetrachloroethene	770		40	5.2	ppb v/v			02/10/18 03:05	101
Toluene	ND		40	5.2	ppb v/v			02/10/18 03:05	101
1,1,2-Trichloro-1,2,2-trifluoroethane	630		40	16	ppb v/v			02/10/18 03:05	101
1,2,4-Trichlorobenzene	ND		200	44	ppb v/v			02/10/18 03:05	101
1,1,1-Trichloroethane	24	J	30	6.6	ppb v/v			02/10/18 03:05	101
1,1,2-Trichloroethane	ND		40	6.8	ppb v/v			02/10/18 03:05	101
Trichlorofluoromethane	180		40	20	ppb v/v			02/10/18 03:05	101
1,2,4-Trimethylbenzene	ND		81	16	ppb v/v			02/10/18 03:05	101
1,3,5-Trimethylbenzene	ND		40	13	ppb v/v			02/10/18 03:05	101
Vinyl acetate	ND		81	15	ppb v/v			02/10/18 03:05	101
Vinyl chloride	ND		40	12	ppb v/v			02/10/18 03:05	101
m,p-Xylene	ND		81	10	ppb v/v			02/10/18 03:05	101
o-Xylene	ND		40	5.5	ppb v/v			02/10/18 03:05	101

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	69	X	70 - 130		02/10/18 03:05	101
1,2-Dichloroethane-d4 (Surr)	106		70 - 130		02/10/18 03:05	101
Toluene-d8 (Surr)	95		70 - 130		02/10/18 03:05	101

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	6100		61	16	ppb v/v			02/13/18 22:27	152

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104447-001/CWL-D1-160

Lab Sample ID: 320-35639-12

Date Collected: 01/24/18 08:44

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		260	9.2	ppb v/v			02/13/18 23:20	51.5
Benzene	ND		21	4.1	ppb v/v			02/13/18 23:20	51.5
Benzyl chloride	ND		41	8.4	ppb v/v			02/13/18 23:20	51.5
Bromodichloromethane	ND		15	3.4	ppb v/v			02/13/18 23:20	51.5
Bromoform	ND		21	3.6	ppb v/v			02/13/18 23:20	51.5
Bromomethane	ND		41	17	ppb v/v			02/13/18 23:20	51.5
2-Butanone (MEK)	ND		41	10	ppb v/v			02/13/18 23:20	51.5
Carbon disulfide	ND		41	4.0	ppb v/v			02/13/18 23:20	51.5
Carbon tetrachloride	23	J	41	3.3	ppb v/v			02/13/18 23:20	51.5
Chlorobenzene	ND		15	3.3	ppb v/v			02/13/18 23:20	51.5
Chloroethane	ND		41	16	ppb v/v			02/13/18 23:20	51.5
Chloroform	400		15	4.9	ppb v/v			02/13/18 23:20	51.5
Chloromethane	ND		41	10	ppb v/v			02/13/18 23:20	51.5
Dibromochloromethane	ND		21	4.1	ppb v/v			02/13/18 23:20	51.5
1,2-Dibromoethane (EDB)	ND		41	3.9	ppb v/v			02/13/18 23:20	51.5
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		21	8.0	ppb v/v			02/13/18 23:20	51.5
1,2-Dichlorobenzene	ND		21	6.7	ppb v/v			02/13/18 23:20	51.5
1,3-Dichlorobenzene	ND		21	5.7	ppb v/v			02/13/18 23:20	51.5
1,4-Dichlorobenzene	ND		21	7.7	ppb v/v			02/13/18 23:20	51.5
Dichlorodifluoromethane	44		21	7.5	ppb v/v			02/13/18 23:20	51.5
1,1-Dichloroethane	17		15	3.7	ppb v/v			02/13/18 23:20	51.5
1,2-Dichloroethane	30	J	41	4.5	ppb v/v			02/13/18 23:20	51.5
1,1-Dichloroethene	420		41	6.6	ppb v/v			02/13/18 23:20	51.5
cis-1,2-Dichloroethene	ND		21	4.6	ppb v/v			02/13/18 23:20	51.5
trans-1,2-Dichloroethene	ND		21	5.2	ppb v/v			02/13/18 23:20	51.5
1,2-Dichloropropane	130		21	12	ppb v/v			02/13/18 23:20	51.5
cis-1,3-Dichloropropene	ND		21	5.4	ppb v/v			02/13/18 23:20	51.5
trans-1,3-Dichloropropene	ND		21	4.5	ppb v/v			02/13/18 23:20	51.5
Ethylbenzene	ND		21	3.2	ppb v/v			02/13/18 23:20	51.5
4-Ethyltoluene	ND		21	9.6	ppb v/v			02/13/18 23:20	51.5
Hexachlorobutadiene	ND		100	22	ppb v/v			02/13/18 23:20	51.5
2-Hexanone	ND		21	4.5	ppb v/v			02/13/18 23:20	51.5
4-Methyl-2-pentanone (MIBK)	ND		21	7.0	ppb v/v			02/13/18 23:20	51.5
Methylene Chloride	23		21	3.7	ppb v/v			02/13/18 23:20	51.5
Styrene	ND	*	21	3.0	ppb v/v			02/13/18 23:20	51.5
1,1,2,2-Tetrachloroethane	ND		21	3.6	ppb v/v			02/13/18 23:20	51.5
Tetrachloroethene	590		21	2.6	ppb v/v			02/13/18 23:20	51.5
Toluene	ND		21	2.6	ppb v/v			02/13/18 23:20	51.5
1,1,2-Trichloro-1,2,2-trifluoroethane	1000		21	8.4	ppb v/v			02/13/18 23:20	51.5
1,2,4-Trichlorobenzene	ND		100	22	ppb v/v			02/13/18 23:20	51.5
1,1,1-Trichloroethane	28		15	3.3	ppb v/v			02/13/18 23:20	51.5
1,1,2-Trichloroethane	4.3	J	21	3.5	ppb v/v			02/13/18 23:20	51.5
Trichlorofluoromethane	280		21	10	ppb v/v			02/13/18 23:20	51.5
1,2,4-Trimethylbenzene	ND		41	8.3	ppb v/v			02/13/18 23:20	51.5
1,3,5-Trimethylbenzene	ND		21	6.4	ppb v/v			02/13/18 23:20	51.5
Vinyl acetate	ND		41	7.5	ppb v/v			02/13/18 23:20	51.5
Vinyl chloride	ND		21	6.2	ppb v/v			02/13/18 23:20	51.5
m,p-Xylene	ND		41	5.2	ppb v/v			02/13/18 23:20	51.5

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104447-001/CWL-D1-160

Lab Sample ID: 320-35639-12

Date Collected: 01/24/18 08:44

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
o-Xylene	ND		21	2.8	ppb v/v			02/13/18 23:20	51.5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	71		70 - 130					02/13/18 23:20	51.5
1,2-Dichloroethane-d4 (Surr)	108		70 - 130					02/13/18 23:20	51.5
Toluene-d8 (Surr)	97		70 - 130					02/13/18 23:20	51.5

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	10000		64	17	ppb v/v			02/14/18 20:50	159
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		70 - 130					02/14/18 20:50	159
1,2-Dichloroethane-d4 (Surr)	94		70 - 130					02/14/18 20:50	159
Toluene-d8 (Surr)	100		70 - 130					02/14/18 20:50	159

Client Sample ID: 104448-001/CWL-D1-240

Lab Sample ID: 320-35639-13

Date Collected: 01/24/18 08:47

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air - RA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		1500	54	ppb v/v			02/14/18 21:42	306
Benzene	ND		120	24	ppb v/v			02/14/18 21:42	306
Benzyl chloride	ND		240	50	ppb v/v			02/14/18 21:42	306
Bromodichloromethane	ND		92	20	ppb v/v			02/14/18 21:42	306
Bromoform	ND		120	21	ppb v/v			02/14/18 21:42	306
Bromomethane	ND		240	100	ppb v/v			02/14/18 21:42	306
2-Butanone (MEK)	ND		240	61	ppb v/v			02/14/18 21:42	306
Carbon disulfide	ND		240	24	ppb v/v			02/14/18 21:42	306
Carbon tetrachloride	26	J	240	20	ppb v/v			02/14/18 21:42	306
Chlorobenzene	ND		92	20	ppb v/v			02/14/18 21:42	306
Chloroethane	ND		240	94	ppb v/v			02/14/18 21:42	306
Chloroform	300		92	29	ppb v/v			02/14/18 21:42	306
Chloromethane	ND		240	60	ppb v/v			02/14/18 21:42	306
Dibromochloromethane	ND		120	24	ppb v/v			02/14/18 21:42	306
1,2-Dibromoethane (EDB)	ND		240	23	ppb v/v			02/14/18 21:42	306
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		120	47	ppb v/v			02/14/18 21:42	306
1,2-Dichlorobenzene	ND		120	40	ppb v/v			02/14/18 21:42	306
1,3-Dichlorobenzene	ND		120	34	ppb v/v			02/14/18 21:42	306
1,4-Dichlorobenzene	ND		120	46	ppb v/v			02/14/18 21:42	306
Dichlorodifluoromethane	ND		120	44	ppb v/v			02/14/18 21:42	306
1,1-Dichloroethane	ND		92	22	ppb v/v			02/14/18 21:42	306
1,2-Dichloroethane	ND		240	27	ppb v/v			02/14/18 21:42	306
1,1-Dichloroethene	520		240	39	ppb v/v			02/14/18 21:42	306
cis-1,2-Dichloroethene	ND		120	27	ppb v/v			02/14/18 21:42	306
trans-1,2-Dichloroethene	ND		120	31	ppb v/v			02/14/18 21:42	306
1,2-Dichloropropane	100	J	120	73	ppb v/v			02/14/18 21:42	306

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104448-001/CWL-D1-240

Lab Sample ID: 320-35639-13

Date Collected: 01/24/18 08:47

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air - RA (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,3-Dichloropropene	ND		120	32	ppb v/v			02/14/18 21:42	306
trans-1,3-Dichloropropene	ND		120	27	ppb v/v			02/14/18 21:42	306
Ethylbenzene	ND		120	19	ppb v/v			02/14/18 21:42	306
4-Ethyltoluene	ND		120	57	ppb v/v			02/14/18 21:42	306
Hexachlorobutadiene	ND		610	130	ppb v/v			02/14/18 21:42	306
2-Hexanone	ND		120	27	ppb v/v			02/14/18 21:42	306
4-Methyl-2-pentanone (MIBK)	ND		120	41	ppb v/v			02/14/18 21:42	306
Methylene Chloride	30	J	120	22	ppb v/v			02/14/18 21:42	306
Styrene	ND		120	18	ppb v/v			02/14/18 21:42	306
1,1,2,2-Tetrachloroethane	ND		120	21	ppb v/v			02/14/18 21:42	306
Tetrachloroethene	290		120	16	ppb v/v			02/14/18 21:42	306
Toluene	ND		120	16	ppb v/v			02/14/18 21:42	306
1,1,2-Trichloro-1,2,2-trifluoroethane	1200		120	50	ppb v/v			02/14/18 21:42	306
1,2,4-Trichlorobenzene	ND		610	130	ppb v/v			02/14/18 21:42	306
1,1,1-Trichloroethane	21	J	92	20	ppb v/v			02/14/18 21:42	306
1,1,2-Trichloroethane	ND		120	21	ppb v/v			02/14/18 21:42	306
Trichloroethene	11000		120	32	ppb v/v			02/14/18 21:42	306
Trichlorofluoromethane	300		120	60	ppb v/v			02/14/18 21:42	306
1,2,4-Trimethylbenzene	ND		240	50	ppb v/v			02/14/18 21:42	306
1,3,5-Trimethylbenzene	ND		120	38	ppb v/v			02/14/18 21:42	306
Vinyl acetate	ND		240	44	ppb v/v			02/14/18 21:42	306
Vinyl chloride	ND		120	37	ppb v/v			02/14/18 21:42	306
m,p-Xylene	ND		240	31	ppb v/v			02/14/18 21:42	306
o-Xylene	ND		120	17	ppb v/v			02/14/18 21:42	306
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		70 - 130					02/14/18 21:42	306
1,2-Dichloroethane-d4 (Surr)	95		70 - 130					02/14/18 21:42	306
Toluene-d8 (Surr)	99		70 - 130					02/14/18 21:42	306

Client Sample ID: 104449-001/CWL-D1-350

Lab Sample ID: 320-35639-14

Date Collected: 01/24/18 08:52

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	27	J	410	15	ppb v/v			02/14/18 22:37	81.6
Benzene	ND		33	6.4	ppb v/v			02/14/18 22:37	81.6
Benzyl chloride	ND		65	13	ppb v/v			02/14/18 22:37	81.6
Bromodichloromethane	ND		24	5.4	ppb v/v			02/14/18 22:37	81.6
Bromoform	ND		33	5.7	ppb v/v			02/14/18 22:37	81.6
Bromomethane	ND		65	27	ppb v/v			02/14/18 22:37	81.6
2-Butanone (MEK)	ND		65	16	ppb v/v			02/14/18 22:37	81.6
Carbon disulfide	ND		65	6.4	ppb v/v			02/14/18 22:37	81.6
Carbon tetrachloride	15	J	65	5.2	ppb v/v			02/14/18 22:37	81.6
Chlorobenzene	ND		24	5.2	ppb v/v			02/14/18 22:37	81.6
Chloroethane	ND		65	25	ppb v/v			02/14/18 22:37	81.6

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104449-001/CWL-D1-350

Lab Sample ID: 320-35639-14

Date Collected: 01/24/18 08:52

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloroform	89		24	7.8	ppb v/v			02/14/18 22:37	81.6
Chloromethane	ND		65	16	ppb v/v			02/14/18 22:37	81.6
Dibromochloromethane	ND		33	6.4	ppb v/v			02/14/18 22:37	81.6
1,2-Dibromoethane (EDB)	ND		65	6.1	ppb v/v			02/14/18 22:37	81.6
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		33	13	ppb v/v			02/14/18 22:37	81.6
1,2-Dichlorobenzene	ND		33	11	ppb v/v			02/14/18 22:37	81.6
1,3-Dichlorobenzene	ND		33	9.0	ppb v/v			02/14/18 22:37	81.6
1,4-Dichlorobenzene	ND		33	12	ppb v/v			02/14/18 22:37	81.6
Dichlorodifluoromethane	19 J		33	12	ppb v/v			02/14/18 22:37	81.6
1,1-Dichloroethane	8.4 J		24	5.9	ppb v/v			02/14/18 22:37	81.6
1,2-Dichloroethane	ND		65	7.2	ppb v/v			02/14/18 22:37	81.6
1,1-Dichloroethene	320		65	11	ppb v/v			02/14/18 22:37	81.6
cis-1,2-Dichloroethene	ND		33	7.3	ppb v/v			02/14/18 22:37	81.6
trans-1,2-Dichloroethene	ND		33	8.2	ppb v/v			02/14/18 22:37	81.6
1,2-Dichloropropane	24 J		33	20	ppb v/v			02/14/18 22:37	81.6
cis-1,3-Dichloropropene	ND		33	8.5	ppb v/v			02/14/18 22:37	81.6
trans-1,3-Dichloropropene	ND		33	7.2	ppb v/v			02/14/18 22:37	81.6
Ethylbenzene	ND		33	5.1	ppb v/v			02/14/18 22:37	81.6
4-Ethyltoluene	ND		33	15	ppb v/v			02/14/18 22:37	81.6
Hexachlorobutadiene	ND		160	35	ppb v/v			02/14/18 22:37	81.6
2-Hexanone	ND		33	7.1	ppb v/v			02/14/18 22:37	81.6
4-Methyl-2-pentanone (MIBK)	ND		33	11	ppb v/v			02/14/18 22:37	81.6
Methylene Chloride	21 J		33	5.9	ppb v/v			02/14/18 22:37	81.6
Styrene	ND		33	4.8	ppb v/v			02/14/18 22:37	81.6
1,1,2,2-Tetrachloroethane	ND		33	5.6	ppb v/v			02/14/18 22:37	81.6
Tetrachloroethene	43		33	4.2	ppb v/v			02/14/18 22:37	81.6
Toluene	ND		33	4.2	ppb v/v			02/14/18 22:37	81.6
1,1,2-Trichloro-1,2,2-trifluoroethane	710		33	13	ppb v/v			02/14/18 22:37	81.6
1,2,4-Trichlorobenzene	ND		160	35	ppb v/v			02/14/18 22:37	81.6
1,1,1-Trichloroethane	5.9 J		24	5.3	ppb v/v			02/14/18 22:37	81.6
1,1,2-Trichloroethane	ND		33	5.5	ppb v/v			02/14/18 22:37	81.6
Trichloroethene	4200		33	8.6	ppb v/v			02/14/18 22:37	81.6
Trichlorofluoromethane	190		33	16	ppb v/v			02/14/18 22:37	81.6
1,2,4-Trimethylbenzene	ND		65	13	ppb v/v			02/14/18 22:37	81.6
1,3,5-Trimethylbenzene	ND		33	10	ppb v/v			02/14/18 22:37	81.6
Vinyl acetate	ND		65	12	ppb v/v			02/14/18 22:37	81.6
Vinyl chloride	ND		33	9.8	ppb v/v			02/14/18 22:37	81.6
m,p-Xylene	ND		65	8.2	ppb v/v			02/14/18 22:37	81.6
o-Xylene	ND		33	4.4	ppb v/v			02/14/18 22:37	81.6

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		70 - 130		02/14/18 22:37	81.6
1,2-Dichloroethane-d4 (Surr)	95		70 - 130		02/14/18 22:37	81.6
Toluene-d8 (Surr)	98		70 - 130		02/14/18 22:37	81.6

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104450-001/CWL-D1-470

Lab Sample ID: 320-35639-15

Date Collected: 01/24/18 08:59

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	4.3	J B	25	0.88	ppb v/v			02/13/18 18:56	4.97
Benzene	ND		2.0	0.39	ppb v/v			02/13/18 18:56	4.97
Benzyl chloride	ND		4.0	0.81	ppb v/v			02/13/18 18:56	4.97
Bromodichloromethane	ND		1.5	0.33	ppb v/v			02/13/18 18:56	4.97
Bromoform	ND		2.0	0.35	ppb v/v			02/13/18 18:56	4.97
Bromomethane	ND		4.0	1.7	ppb v/v			02/13/18 18:56	4.97
2-Butanone (MEK)	ND		4.0	0.99	ppb v/v			02/13/18 18:56	4.97
Carbon disulfide	ND		4.0	0.39	ppb v/v			02/13/18 18:56	4.97
Carbon tetrachloride	1.9	J	4.0	0.32	ppb v/v			02/13/18 18:56	4.97
Chlorobenzene	ND		1.5	0.32	ppb v/v			02/13/18 18:56	4.97
Chloroethane	ND		4.0	1.5	ppb v/v			02/13/18 18:56	4.97
Chloroform	2.6		1.5	0.47	ppb v/v			02/13/18 18:56	4.97
Chloromethane	ND		4.0	0.98	ppb v/v			02/13/18 18:56	4.97
Dibromochloromethane	ND		2.0	0.39	ppb v/v			02/13/18 18:56	4.97
1,2-Dibromoethane (EDB)	ND		4.0	0.37	ppb v/v			02/13/18 18:56	4.97
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		2.0	0.77	ppb v/v			02/13/18 18:56	4.97
1,2-Dichlorobenzene	ND		2.0	0.65	ppb v/v			02/13/18 18:56	4.97
1,3-Dichlorobenzene	ND		2.0	0.55	ppb v/v			02/13/18 18:56	4.97
1,4-Dichlorobenzene	ND		2.0	0.74	ppb v/v			02/13/18 18:56	4.97
Dichlorodifluoromethane	7.8		2.0	0.72	ppb v/v			02/13/18 18:56	4.97
1,1-Dichloroethane	ND		1.5	0.36	ppb v/v			02/13/18 18:56	4.97
1,2-Dichloroethane	ND		4.0	0.44	ppb v/v			02/13/18 18:56	4.97
1,1-Dichloroethene	24		4.0	0.64	ppb v/v			02/13/18 18:56	4.97
cis-1,2-Dichloroethene	ND		2.0	0.44	ppb v/v			02/13/18 18:56	4.97
trans-1,2-Dichloroethene	ND		2.0	0.50	ppb v/v			02/13/18 18:56	4.97
1,2-Dichloropropane	ND		2.0	1.2	ppb v/v			02/13/18 18:56	4.97
cis-1,3-Dichloropropene	ND		2.0	0.52	ppb v/v			02/13/18 18:56	4.97
trans-1,3-Dichloropropene	ND		2.0	0.44	ppb v/v			02/13/18 18:56	4.97
Ethylbenzene	ND		2.0	0.31	ppb v/v			02/13/18 18:56	4.97
4-Ethyltoluene	ND		2.0	0.93	ppb v/v			02/13/18 18:56	4.97
Hexachlorobutadiene	ND		9.9	2.1	ppb v/v			02/13/18 18:56	4.97
2-Hexanone	ND		2.0	0.43	ppb v/v			02/13/18 18:56	4.97
4-Methyl-2-pentanone (MIBK)	ND		2.0	0.67	ppb v/v			02/13/18 18:56	4.97
Methylene Chloride	2.4		2.0	0.36	ppb v/v			02/13/18 18:56	4.97
Styrene	ND *		2.0	0.29	ppb v/v			02/13/18 18:56	4.97
1,1,2,2-Tetrachloroethane	ND		2.0	0.34	ppb v/v			02/13/18 18:56	4.97
Tetrachloroethene	6.9		2.0	0.25	ppb v/v			02/13/18 18:56	4.97
Toluene	ND		2.0	0.25	ppb v/v			02/13/18 18:56	4.97
1,1,2-Trichloro-1,2,2-trifluoroethane	150		2.0	0.81	ppb v/v			02/13/18 18:56	4.97
1,2,4-Trichlorobenzene	ND		9.9	2.2	ppb v/v			02/13/18 18:56	4.97
1,1,1-Trichloroethane	ND		1.5	0.32	ppb v/v			02/13/18 18:56	4.97
1,1,2-Trichloroethane	ND		2.0	0.33	ppb v/v			02/13/18 18:56	4.97
Trichloroethene	190		2.0	0.52	ppb v/v			02/13/18 18:56	4.97
Trichlorofluoromethane	45		2.0	0.97	ppb v/v			02/13/18 18:56	4.97
1,2,4-Trimethylbenzene	ND		4.0	0.81	ppb v/v			02/13/18 18:56	4.97
1,3,5-Trimethylbenzene	ND		2.0	0.62	ppb v/v			02/13/18 18:56	4.97
Vinyl acetate	ND		4.0	0.72	ppb v/v			02/13/18 18:56	4.97
Vinyl chloride	ND		2.0	0.60	ppb v/v			02/13/18 18:56	4.97

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104450-001/CWL-D1-470

Lab Sample ID: 320-35639-15

Date Collected: 01/24/18 08:59

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		4.0	0.50	ppb v/v			02/13/18 18:56	4.97
o-Xylene	ND		2.0	0.27	ppb v/v			02/13/18 18:56	4.97
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	75		70 - 130					02/13/18 18:56	4.97
1,2-Dichloroethane-d4 (Surr)	109		70 - 130					02/13/18 18:56	4.97
Toluene-d8 (Surr)	99		70 - 130					02/13/18 18:56	4.97

Client Sample ID: 104451-001/CWL QC-3

Lab Sample ID: 320-35639-16

Date Collected: 01/24/18 08:31

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air - RA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		5.0	0.18	ppb v/v			02/14/18 23:35	1
Benzene	ND		0.40	0.079	ppb v/v			02/14/18 23:35	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			02/14/18 23:35	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			02/14/18 23:35	1
Bromoform	ND		0.40	0.070	ppb v/v			02/14/18 23:35	1
Bromomethane	ND		0.80	0.34	ppb v/v			02/14/18 23:35	1
2-Butanone (MEK)	ND		0.80	0.20	ppb v/v			02/14/18 23:35	1
Carbon disulfide	ND		0.80	0.078	ppb v/v			02/14/18 23:35	1
Carbon tetrachloride	ND		0.80	0.064	ppb v/v			02/14/18 23:35	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			02/14/18 23:35	1
Chloroethane	ND		0.80	0.31	ppb v/v			02/14/18 23:35	1
Chloroform	ND		0.30	0.095	ppb v/v			02/14/18 23:35	1
Chloromethane	ND		0.80	0.20	ppb v/v			02/14/18 23:35	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			02/14/18 23:35	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			02/14/18 23:35	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			02/14/18 23:35	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			02/14/18 23:35	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			02/14/18 23:35	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			02/14/18 23:35	1
Dichlorodifluoromethane	ND		0.40	0.15	ppb v/v			02/14/18 23:35	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			02/14/18 23:35	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			02/14/18 23:35	1
1,1-Dichloroethene	ND		0.80	0.13	ppb v/v			02/14/18 23:35	1
cis-1,2-Dichloroethene	ND		0.40	0.089	ppb v/v			02/14/18 23:35	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			02/14/18 23:35	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			02/14/18 23:35	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			02/14/18 23:35	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			02/14/18 23:35	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			02/14/18 23:35	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			02/14/18 23:35	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			02/14/18 23:35	1
2-Hexanone	ND		0.40	0.087	ppb v/v			02/14/18 23:35	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			02/14/18 23:35	1
Methylene Chloride	0.098	J	0.40	0.072	ppb v/v			02/14/18 23:35	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104451-001/CWL QC-3

Lab Sample ID: 320-35639-16

Date Collected: 01/24/18 08:31

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air - RA (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	ND		0.40	0.059	ppb v/v			02/14/18 23:35	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			02/14/18 23:35	1
Tetrachloroethene	ND		0.40	0.051	ppb v/v			02/14/18 23:35	1
Toluene	ND		0.40	0.051	ppb v/v			02/14/18 23:35	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16	ppb v/v			02/14/18 23:35	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			02/14/18 23:35	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			02/14/18 23:35	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			02/14/18 23:35	1
Trichloroethene	1.3		0.40	0.11	ppb v/v			02/14/18 23:35	1
Trichlorofluoromethane	ND		0.40	0.20	ppb v/v			02/14/18 23:35	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			02/14/18 23:35	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			02/14/18 23:35	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			02/14/18 23:35	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			02/14/18 23:35	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			02/14/18 23:35	1
o-Xylene	ND		0.40	0.054	ppb v/v			02/14/18 23:35	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		70 - 130		02/14/18 23:35	1
1,2-Dichloroethane-d4 (Surr)	94		70 - 130		02/14/18 23:35	1
Toluene-d8 (Surr)	97		70 - 130		02/14/18 23:35	1

Client Sample ID: 104452-001/CWL-D2-120

Lab Sample ID: 320-35639-17

Date Collected: 01/24/18 09:46

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air - RA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		1500	54	ppb v/v			02/15/18 00:27	303
Benzene	ND		120	24	ppb v/v			02/15/18 00:27	303
Benzyl chloride	ND		240	49	ppb v/v			02/15/18 00:27	303
Bromodichloromethane	ND		91	20	ppb v/v			02/15/18 00:27	303
Bromoform	ND		120	21	ppb v/v			02/15/18 00:27	303
Bromomethane	ND		240	100	ppb v/v			02/15/18 00:27	303
2-Butanone (MEK)	ND		240	60	ppb v/v			02/15/18 00:27	303
Carbon disulfide	ND		240	24	ppb v/v			02/15/18 00:27	303
Carbon tetrachloride	20	J	240	19	ppb v/v			02/15/18 00:27	303
Chlorobenzene	ND		91	19	ppb v/v			02/15/18 00:27	303
Chloroethane	ND		240	93	ppb v/v			02/15/18 00:27	303
Chloroform	450		91	29	ppb v/v			02/15/18 00:27	303
Chloromethane	ND		240	60	ppb v/v			02/15/18 00:27	303
Dibromochloromethane	ND		120	24	ppb v/v			02/15/18 00:27	303
1,2-Dibromoethane (EDB)	ND		240	23	ppb v/v			02/15/18 00:27	303
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		120	47	ppb v/v			02/15/18 00:27	303
1,2-Dichlorobenzene	ND		120	39	ppb v/v			02/15/18 00:27	303
1,3-Dichlorobenzene	ND		120	33	ppb v/v			02/15/18 00:27	303
1,4-Dichlorobenzene	ND		120	45	ppb v/v			02/15/18 00:27	303
Dichlorodifluoromethane	ND		120	44	ppb v/v			02/15/18 00:27	303

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104452-001/CWL-D2-120

Lab Sample ID: 320-35639-17

Date Collected: 01/24/18 09:46

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air - RA (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	ND		91	22	ppb v/v			02/15/18 00:27	303
1,2-Dichloroethane	28	J	240	27	ppb v/v			02/15/18 00:27	303
1,1-Dichloroethene	350		240	39	ppb v/v			02/15/18 00:27	303
cis-1,2-Dichloroethene	ND		120	27	ppb v/v			02/15/18 00:27	303
trans-1,2-Dichloroethene	ND		120	30	ppb v/v			02/15/18 00:27	303
1,2-Dichloropropane	86	J	120	73	ppb v/v			02/15/18 00:27	303
cis-1,3-Dichloropropene	ND		120	32	ppb v/v			02/15/18 00:27	303
trans-1,3-Dichloropropene	ND		120	27	ppb v/v			02/15/18 00:27	303
Ethylbenzene	ND		120	19	ppb v/v			02/15/18 00:27	303
4-Ethyltoluene	ND		120	57	ppb v/v			02/15/18 00:27	303
Hexachlorobutadiene	ND		610	130	ppb v/v			02/15/18 00:27	303
2-Hexanone	ND		120	26	ppb v/v			02/15/18 00:27	303
4-Methyl-2-pentanone (MIBK)	ND		120	41	ppb v/v			02/15/18 00:27	303
Methylene Chloride	41	J	120	22	ppb v/v			02/15/18 00:27	303
Styrene	ND		120	18	ppb v/v			02/15/18 00:27	303
1,1,2,2-Tetrachloroethane	ND		120	21	ppb v/v			02/15/18 00:27	303
Tetrachloroethene	300		120	15	ppb v/v			02/15/18 00:27	303
Toluene	ND		120	15	ppb v/v			02/15/18 00:27	303
1,1,2-Trichloro-1,2,2-trifluoroethane	920		120	49	ppb v/v			02/15/18 00:27	303
1,2,4-Trichlorobenzene	ND		610	130	ppb v/v			02/15/18 00:27	303
1,1,1-Trichloroethane	27	J	91	20	ppb v/v			02/15/18 00:27	303
1,1,2-Trichloroethane	ND		120	20	ppb v/v			02/15/18 00:27	303
Trichloroethene	7700		120	32	ppb v/v			02/15/18 00:27	303
Trichlorofluoromethane	250		120	59	ppb v/v			02/15/18 00:27	303
1,2,4-Trimethylbenzene	ND		240	49	ppb v/v			02/15/18 00:27	303
1,3,5-Trimethylbenzene	ND		120	38	ppb v/v			02/15/18 00:27	303
Vinyl acetate	ND		240	44	ppb v/v			02/15/18 00:27	303
Vinyl chloride	ND		120	36	ppb v/v			02/15/18 00:27	303
m,p-Xylene	ND		240	30	ppb v/v			02/15/18 00:27	303
o-Xylene	ND		120	16	ppb v/v			02/15/18 00:27	303

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	91		70 - 130		02/15/18 00:27	303
1,2-Dichloroethane-d4 (Surr)	93		70 - 130		02/15/18 00:27	303
Toluene-d8 (Surr)	98		70 - 130		02/15/18 00:27	303

Client Sample ID: 104453-001/CWL-D2-240

Lab Sample ID: 320-35639-18

Date Collected: 01/24/18 09:49

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air - RA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		1500	54	ppb v/v			02/15/18 01:18	302
Benzene	ND		120	24	ppb v/v			02/15/18 01:18	302
Benzyl chloride	ND		240	49	ppb v/v			02/15/18 01:18	302
Bromodichloromethane	ND		91	20	ppb v/v			02/15/18 01:18	302
Bromoform	ND		120	21	ppb v/v			02/15/18 01:18	302

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104453-001/CWL-D2-240

Lab Sample ID: 320-35639-18

Date Collected: 01/24/18 09:49

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air - RA (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromomethane	ND		240	100	ppb v/v			02/15/18 01:18	302
2-Butanone (MEK)	ND		240	60	ppb v/v			02/15/18 01:18	302
Carbon disulfide	ND		240	24	ppb v/v			02/15/18 01:18	302
Carbon tetrachloride	23	J	240	19	ppb v/v			02/15/18 01:18	302
Chlorobenzene	ND		91	19	ppb v/v			02/15/18 01:18	302
Chloroethane	ND		240	93	ppb v/v			02/15/18 01:18	302
Chloroform	430		91	29	ppb v/v			02/15/18 01:18	302
Chloromethane	ND		240	59	ppb v/v			02/15/18 01:18	302
Dibromochloromethane	ND		120	24	ppb v/v			02/15/18 01:18	302
1,2-Dibromoethane (EDB)	ND		240	23	ppb v/v			02/15/18 01:18	302
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		120	47	ppb v/v			02/15/18 01:18	302
1,2-Dichlorobenzene	ND		120	39	ppb v/v			02/15/18 01:18	302
1,3-Dichlorobenzene	ND		120	33	ppb v/v			02/15/18 01:18	302
1,4-Dichlorobenzene	ND		120	45	ppb v/v			02/15/18 01:18	302
Dichlorodifluoromethane	ND		120	44	ppb v/v			02/15/18 01:18	302
1,1-Dichloroethane	ND		91	22	ppb v/v			02/15/18 01:18	302
1,2-Dichloroethane	29	J	240	27	ppb v/v			02/15/18 01:18	302
1,1-Dichloroethene	430		240	39	ppb v/v			02/15/18 01:18	302
cis-1,2-Dichloroethene	ND		120	27	ppb v/v			02/15/18 01:18	302
trans-1,2-Dichloroethene	ND		120	30	ppb v/v			02/15/18 01:18	302
1,2-Dichloropropane	120		120	72	ppb v/v			02/15/18 01:18	302
cis-1,3-Dichloropropene	ND		120	31	ppb v/v			02/15/18 01:18	302
trans-1,3-Dichloropropene	ND		120	27	ppb v/v			02/15/18 01:18	302
Ethylbenzene	ND		120	19	ppb v/v			02/15/18 01:18	302
4-Ethyltoluene	ND		120	56	ppb v/v			02/15/18 01:18	302
Hexachlorobutadiene	ND		600	130	ppb v/v			02/15/18 01:18	302
2-Hexanone	ND		120	26	ppb v/v			02/15/18 01:18	302
4-Methyl-2-pentanone (MIBK)	ND		120	41	ppb v/v			02/15/18 01:18	302
Methylene Chloride	28	J	120	22	ppb v/v			02/15/18 01:18	302
Styrene	ND		120	18	ppb v/v			02/15/18 01:18	302
1,1,2,2-Tetrachloroethane	ND		120	21	ppb v/v			02/15/18 01:18	302
Tetrachloroethene	400		120	15	ppb v/v			02/15/18 01:18	302
Toluene	ND		120	15	ppb v/v			02/15/18 01:18	302
1,1,2-Trichloro-1,2,2-trifluoroethane	1000		120	49	ppb v/v			02/15/18 01:18	302
1,2,4-Trichlorobenzene	ND		600	130	ppb v/v			02/15/18 01:18	302
1,1,1-Trichloroethane	27	J	91	20	ppb v/v			02/15/18 01:18	302
1,1,2-Trichloroethane	ND		120	20	ppb v/v			02/15/18 01:18	302
Trichloroethene	9700		120	32	ppb v/v			02/15/18 01:18	302
Trichlorofluoromethane	280		120	59	ppb v/v			02/15/18 01:18	302
1,2,4-Trimethylbenzene	ND		240	49	ppb v/v			02/15/18 01:18	302
1,3,5-Trimethylbenzene	ND		120	38	ppb v/v			02/15/18 01:18	302
Vinyl acetate	ND		240	44	ppb v/v			02/15/18 01:18	302
Vinyl chloride	ND		120	36	ppb v/v			02/15/18 01:18	302
m,p-Xylene	ND		240	30	ppb v/v			02/15/18 01:18	302
o-Xylene	ND		120	16	ppb v/v			02/15/18 01:18	302

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	91		70 - 130		02/15/18 01:18	302

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104453-001/CWL-D2-240

Lab Sample ID: 320-35639-18

Date Collected: 01/24/18 09:49

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air - RA (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	95		70 - 130		02/15/18 01:18	302
Toluene-d8 (Surr)	98		70 - 130		02/15/18 01:18	302

Client Sample ID: 104454-001/CWL-D2-350

Lab Sample ID: 320-35639-19

Date Collected: 01/24/18 09:54

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air - RA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		1000	37	ppb v/v			02/15/18 02:10	206
Benzene	ND		82	16	ppb v/v			02/15/18 02:10	206
Benzyl chloride	ND		160	34	ppb v/v			02/15/18 02:10	206
Bromodichloromethane	ND		62	14	ppb v/v			02/15/18 02:10	206
Bromoform	ND		82	14	ppb v/v			02/15/18 02:10	206
Bromomethane	ND		160	69	ppb v/v			02/15/18 02:10	206
2-Butanone (MEK)	ND		160	41	ppb v/v			02/15/18 02:10	206
Carbon disulfide	ND		160	16	ppb v/v			02/15/18 02:10	206
Carbon tetrachloride	15	J	160	13	ppb v/v			02/15/18 02:10	206
Chlorobenzene	ND		62	13	ppb v/v			02/15/18 02:10	206
Chloroethane	ND		160	63	ppb v/v			02/15/18 02:10	206
Chloroform	240		62	20	ppb v/v			02/15/18 02:10	206
Chloromethane	ND		160	41	ppb v/v			02/15/18 02:10	206
Dibromochloromethane	ND		82	16	ppb v/v			02/15/18 02:10	206
1,2-Dibromoethane (EDB)	ND		160	15	ppb v/v			02/15/18 02:10	206
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		82	32	ppb v/v			02/15/18 02:10	206
1,2-Dichlorobenzene	ND		82	27	ppb v/v			02/15/18 02:10	206
1,3-Dichlorobenzene	ND		82	23	ppb v/v			02/15/18 02:10	206
1,4-Dichlorobenzene	ND		82	31	ppb v/v			02/15/18 02:10	206
Dichlorodifluoromethane	30	J	82	30	ppb v/v			02/15/18 02:10	206
1,1-Dichloroethane	ND		62	15	ppb v/v			02/15/18 02:10	206
1,2-Dichloroethane	ND		160	18	ppb v/v			02/15/18 02:10	206
1,1-Dichloroethene	320		160	27	ppb v/v			02/15/18 02:10	206
cis-1,2-Dichloroethene	ND		82	18	ppb v/v			02/15/18 02:10	206
trans-1,2-Dichloroethene	ND		82	21	ppb v/v			02/15/18 02:10	206
1,2-Dichloropropane	77	J	82	49	ppb v/v			02/15/18 02:10	206
cis-1,3-Dichloropropene	ND		82	21	ppb v/v			02/15/18 02:10	206
trans-1,3-Dichloropropene	ND		82	18	ppb v/v			02/15/18 02:10	206
Ethylbenzene	ND		82	13	ppb v/v			02/15/18 02:10	206
4-Ethyltoluene	ND		82	39	ppb v/v			02/15/18 02:10	206
Hexachlorobutadiene	ND		410	89	ppb v/v			02/15/18 02:10	206
2-Hexanone	ND		82	18	ppb v/v			02/15/18 02:10	206
4-Methyl-2-pentanone (MIBK)	ND		82	28	ppb v/v			02/15/18 02:10	206
Methylene Chloride	42	J	82	15	ppb v/v			02/15/18 02:10	206
Styrene	ND		82	12	ppb v/v			02/15/18 02:10	206
1,1,2,2-Tetrachloroethane	ND		82	14	ppb v/v			02/15/18 02:10	206
Tetrachloroethene	270		82	11	ppb v/v			02/15/18 02:10	206
Toluene	ND		82	11	ppb v/v			02/15/18 02:10	206

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104454-001/CWL-D2-350

Lab Sample ID: 320-35639-19

Date Collected: 01/24/18 09:54

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air - RA (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloro-1,2,2-trifluoroethane	720		82	34	ppb v/v			02/15/18 02:10	206
1,2,4-Trichlorobenzene	ND		410	89	ppb v/v			02/15/18 02:10	206
1,1,1-Trichloroethane	15 J		62	13	ppb v/v			02/15/18 02:10	206
1,1,2-Trichloroethane	ND		82	14	ppb v/v			02/15/18 02:10	206
Trichloroethene	6400		82	22	ppb v/v			02/15/18 02:10	206
Trichlorofluoromethane	200		82	40	ppb v/v			02/15/18 02:10	206
1,2,4-Trimethylbenzene	ND		160	33	ppb v/v			02/15/18 02:10	206
1,3,5-Trimethylbenzene	ND		82	26	ppb v/v			02/15/18 02:10	206
Vinyl acetate	ND		160	30	ppb v/v			02/15/18 02:10	206
Vinyl chloride	ND		82	25	ppb v/v			02/15/18 02:10	206
m,p-Xylene	ND		160	21	ppb v/v			02/15/18 02:10	206
o-Xylene	ND		82	11	ppb v/v			02/15/18 02:10	206

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	88		70 - 130		02/15/18 02:10	206
1,2-Dichloroethane-d4 (Surr)	94		70 - 130		02/15/18 02:10	206
Toluene-d8 (Surr)	96		70 - 130		02/15/18 02:10	206

Client Sample ID: 104455-001/CWL-D2-440

Lab Sample ID: 320-35639-20

Date Collected: 01/24/18 10:02

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	3.5 J		12	0.41	ppb v/v			02/15/18 03:06	2.3
Benzene	0.28 J		0.92	0.18	ppb v/v			02/15/18 03:06	2.3
Benzyl chloride	ND		1.8	0.37	ppb v/v			02/15/18 03:06	2.3
Bromodichloromethane	ND		0.69	0.15	ppb v/v			02/15/18 03:06	2.3
Bromoform	ND		0.92	0.16	ppb v/v			02/15/18 03:06	2.3
Bromomethane	ND		1.8	0.77	ppb v/v			02/15/18 03:06	2.3
2-Butanone (MEK)	ND		1.8	0.46	ppb v/v			02/15/18 03:06	2.3
Carbon disulfide	ND		1.8	0.18	ppb v/v			02/15/18 03:06	2.3
Carbon tetrachloride	0.27 J		1.8	0.15	ppb v/v			02/15/18 03:06	2.3
Chlorobenzene	ND		0.69	0.15	ppb v/v			02/15/18 03:06	2.3
Chloroethane	ND		1.8	0.71	ppb v/v			02/15/18 03:06	2.3
Chloroform	3.9		0.69	0.22	ppb v/v			02/15/18 03:06	2.3
Chloromethane	0.71 J		1.8	0.45	ppb v/v			02/15/18 03:06	2.3
Dibromochloromethane	ND		0.92	0.18	ppb v/v			02/15/18 03:06	2.3
1,2-Dibromoethane (EDB)	ND		1.8	0.17	ppb v/v			02/15/18 03:06	2.3
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.92	0.36	ppb v/v			02/15/18 03:06	2.3
1,2-Dichlorobenzene	ND		0.92	0.30	ppb v/v			02/15/18 03:06	2.3
1,3-Dichlorobenzene	ND		0.92	0.25	ppb v/v			02/15/18 03:06	2.3
1,4-Dichlorobenzene	ND		0.92	0.34	ppb v/v			02/15/18 03:06	2.3
Dichlorodifluoromethane	0.70 J		0.92	0.33	ppb v/v			02/15/18 03:06	2.3
1,1-Dichloroethane	0.22 J		0.69	0.17	ppb v/v			02/15/18 03:06	2.3
1,2-Dichloroethane	0.31 J		1.8	0.20	ppb v/v			02/15/18 03:06	2.3
1,1-Dichloroethene	5.4		1.8	0.30	ppb v/v			02/15/18 03:06	2.3

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104455-001/CWL-D2-440

Lab Sample ID: 320-35639-20

Date Collected: 01/24/18 10:02

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	ND		0.92	0.20	ppb v/v			02/15/18 03:06	2.3
trans-1,2-Dichloroethene	ND		0.92	0.23	ppb v/v			02/15/18 03:06	2.3
1,2-Dichloropropane	1.6		0.92	0.55	ppb v/v			02/15/18 03:06	2.3
cis-1,3-Dichloropropene	ND		0.92	0.24	ppb v/v			02/15/18 03:06	2.3
trans-1,3-Dichloropropene	ND		0.92	0.20	ppb v/v			02/15/18 03:06	2.3
Ethylbenzene	ND		0.92	0.14	ppb v/v			02/15/18 03:06	2.3
4-Ethyltoluene	ND		0.92	0.43	ppb v/v			02/15/18 03:06	2.3
Hexachlorobutadiene	ND		4.6	0.99	ppb v/v			02/15/18 03:06	2.3
2-Hexanone	ND		0.92	0.20	ppb v/v			02/15/18 03:06	2.3
4-Methyl-2-pentanone (MIBK)	ND		0.92	0.31	ppb v/v			02/15/18 03:06	2.3
Methylene Chloride	1.2		0.92	0.17	ppb v/v			02/15/18 03:06	2.3
Styrene	ND		0.92	0.14	ppb v/v			02/15/18 03:06	2.3
1,1,2,2-Tetrachloroethane	ND		0.92	0.16	ppb v/v			02/15/18 03:06	2.3
Tetrachloroethene	8.7		0.92	0.12	ppb v/v			02/15/18 03:06	2.3
Toluene	0.18 J		0.92	0.12	ppb v/v			02/15/18 03:06	2.3
1,1,2-Trichloro-1,2,2-trifluoroethane	10		0.92	0.37	ppb v/v			02/15/18 03:06	2.3
1,2,4-Trichlorobenzene	ND		4.6	1.0	ppb v/v			02/15/18 03:06	2.3
1,1,1-Trichloroethane	0.20 J		0.69	0.15	ppb v/v			02/15/18 03:06	2.3
1,1,2-Trichloroethane	ND		0.92	0.15	ppb v/v			02/15/18 03:06	2.3
Trichloroethene	120		0.92	0.24	ppb v/v			02/15/18 03:06	2.3
Trichlorofluoromethane	3.4		0.92	0.45	ppb v/v			02/15/18 03:06	2.3
1,2,4-Trimethylbenzene	ND		1.8	0.37	ppb v/v			02/15/18 03:06	2.3
1,3,5-Trimethylbenzene	ND		0.92	0.29	ppb v/v			02/15/18 03:06	2.3
Vinyl acetate	ND		1.8	0.33	ppb v/v			02/15/18 03:06	2.3
Vinyl chloride	ND		0.92	0.28	ppb v/v			02/15/18 03:06	2.3
m,p-Xylene	ND		1.8	0.23	ppb v/v			02/15/18 03:06	2.3
o-Xylene	ND		0.92	0.12	ppb v/v			02/15/18 03:06	2.3
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		70 - 130					02/15/18 03:06	2.3
1,2-Dichloroethane-d4 (Surr)	95		70 - 130					02/15/18 03:06	2.3
Toluene-d8 (Surr)	97		70 - 130					02/15/18 03:06	2.3

Client Sample ID: 104456-001/CWL-D2-470

Lab Sample ID: 320-35639-21

Date Collected: 01/24/18 10:13

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		720	26	ppb v/v			02/13/18 20:22	144
Benzene	ND		58	11	ppb v/v			02/13/18 20:22	144
Benzyl chloride	ND		120	23	ppb v/v			02/13/18 20:22	144
Bromodichloromethane	ND		43	9.5	ppb v/v			02/13/18 20:22	144
Bromoform	ND		58	10	ppb v/v			02/13/18 20:22	144
Bromomethane	ND		120	48	ppb v/v			02/13/18 20:22	144
2-Butanone (MEK)	ND		120	29	ppb v/v			02/13/18 20:22	144
Carbon disulfide	ND		120	11	ppb v/v			02/13/18 20:22	144

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104456-001/CWL-D2-470

Lab Sample ID: 320-35639-21

Date Collected: 01/24/18 10:13

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon tetrachloride	10	J	120	9.2	ppb v/v			02/13/18 20:22	144
Chlorobenzene	ND		43	9.2	ppb v/v			02/13/18 20:22	144
Chloroethane	ND		120	44	ppb v/v			02/13/18 20:22	144
Chloroform	320		43	14	ppb v/v			02/13/18 20:22	144
Chloromethane	ND		120	28	ppb v/v			02/13/18 20:22	144
Dibromochloromethane	ND		58	11	ppb v/v			02/13/18 20:22	144
1,2-Dibromoethane (EDB)	ND		120	11	ppb v/v			02/13/18 20:22	144
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		58	22	ppb v/v			02/13/18 20:22	144
1,2-Dichlorobenzene	ND		58	19	ppb v/v			02/13/18 20:22	144
1,3-Dichlorobenzene	ND		58	16	ppb v/v			02/13/18 20:22	144
1,4-Dichlorobenzene	ND		58	21	ppb v/v			02/13/18 20:22	144
Dichlorodifluoromethane	ND		58	21	ppb v/v			02/13/18 20:22	144
1,1-Dichloroethane	ND		43	10	ppb v/v			02/13/18 20:22	144
1,2-Dichloroethane	14	J	120	13	ppb v/v			02/13/18 20:22	144
1,1-Dichloroethene	140		120	19	ppb v/v			02/13/18 20:22	144
cis-1,2-Dichloroethene	ND		58	13	ppb v/v			02/13/18 20:22	144
trans-1,2-Dichloroethene	ND		58	14	ppb v/v			02/13/18 20:22	144
1,2-Dichloropropane	84		58	35	ppb v/v			02/13/18 20:22	144
cis-1,3-Dichloropropene	ND		58	15	ppb v/v			02/13/18 20:22	144
trans-1,3-Dichloropropene	ND		58	13	ppb v/v			02/13/18 20:22	144
Ethylbenzene	ND		58	9.1	ppb v/v			02/13/18 20:22	144
4-Ethyltoluene	ND		58	27	ppb v/v			02/13/18 20:22	144
Hexachlorobutadiene	ND		290	62	ppb v/v			02/13/18 20:22	144
2-Hexanone	ND		58	13	ppb v/v			02/13/18 20:22	144
4-Methyl-2-pentanone (MIBK)	ND		58	19	ppb v/v			02/13/18 20:22	144
Methylene Chloride	10	J	58	10	ppb v/v			02/13/18 20:22	144
Styrene	ND		58	8.5	ppb v/v			02/13/18 20:22	144
1,1,2,2-Tetrachloroethane	ND		58	9.9	ppb v/v			02/13/18 20:22	144
Tetrachloroethene	310		58	7.3	ppb v/v			02/13/18 20:22	144
Toluene	ND		58	7.3	ppb v/v			02/13/18 20:22	144
1,1,2-Trichloro-1,2,2-trifluoroethane	360		58	23	ppb v/v			02/13/18 20:22	144
1,2,4-Trichlorobenzene	ND		290	62	ppb v/v			02/13/18 20:22	144
1,1,1-Trichloroethane	23	J	43	9.4	ppb v/v			02/13/18 20:22	144
1,1,2-Trichloroethane	ND		58	9.6	ppb v/v			02/13/18 20:22	144
Trichloroethene	4800		58	15	ppb v/v			02/13/18 20:22	144
Trichlorofluoromethane	110		58	28	ppb v/v			02/13/18 20:22	144
1,2,4-Trimethylbenzene	ND		120	23	ppb v/v			02/13/18 20:22	144
1,3,5-Trimethylbenzene	ND		58	18	ppb v/v			02/13/18 20:22	144
Vinyl acetate	ND		120	21	ppb v/v			02/13/18 20:22	144
Vinyl chloride	ND		58	17	ppb v/v			02/13/18 20:22	144
m,p-Xylene	ND		120	14	ppb v/v			02/13/18 20:22	144
o-Xylene	ND		58	7.8	ppb v/v			02/13/18 20:22	144

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		70 - 130		02/13/18 20:22	144
1,2-Dichloroethane-d4 (Surr)	94		70 - 130		02/13/18 20:22	144
Toluene-d8 (Surr)	97		70 - 130		02/13/18 20:22	144

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104457-001/CWL QC-4

Lab Sample ID: 320-35639-22

Date Collected: 01/24/18 09:30

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		5.0	0.18	ppb v/v			02/13/18 21:19	1
Benzene	ND		0.40	0.079	ppb v/v			02/13/18 21:19	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			02/13/18 21:19	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			02/13/18 21:19	1
Bromoform	ND		0.40	0.070	ppb v/v			02/13/18 21:19	1
Bromomethane	ND		0.80	0.34	ppb v/v			02/13/18 21:19	1
2-Butanone (MEK)	ND		0.80	0.20	ppb v/v			02/13/18 21:19	1
Carbon disulfide	ND		0.80	0.078	ppb v/v			02/13/18 21:19	1
Carbon tetrachloride	ND		0.80	0.064	ppb v/v			02/13/18 21:19	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			02/13/18 21:19	1
Chloroethane	ND		0.80	0.31	ppb v/v			02/13/18 21:19	1
Chloroform	ND		0.30	0.095	ppb v/v			02/13/18 21:19	1
Chloromethane	ND		0.80	0.20	ppb v/v			02/13/18 21:19	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			02/13/18 21:19	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			02/13/18 21:19	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			02/13/18 21:19	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			02/13/18 21:19	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			02/13/18 21:19	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			02/13/18 21:19	1
Dichlorodifluoromethane	ND		0.40	0.15	ppb v/v			02/13/18 21:19	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			02/13/18 21:19	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			02/13/18 21:19	1
1,1-Dichloroethene	ND		0.80	0.13	ppb v/v			02/13/18 21:19	1
cis-1,2-Dichloroethene	ND		0.40	0.089	ppb v/v			02/13/18 21:19	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			02/13/18 21:19	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			02/13/18 21:19	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			02/13/18 21:19	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			02/13/18 21:19	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			02/13/18 21:19	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			02/13/18 21:19	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			02/13/18 21:19	1
2-Hexanone	ND		0.40	0.087	ppb v/v			02/13/18 21:19	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			02/13/18 21:19	1
Methylene Chloride	ND		0.40	0.072	ppb v/v			02/13/18 21:19	1
Styrene	ND		0.40	0.059	ppb v/v			02/13/18 21:19	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			02/13/18 21:19	1
Tetrachloroethene	ND		0.40	0.051	ppb v/v			02/13/18 21:19	1
Toluene	ND		0.40	0.051	ppb v/v			02/13/18 21:19	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16	ppb v/v			02/13/18 21:19	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			02/13/18 21:19	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			02/13/18 21:19	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			02/13/18 21:19	1
Trichloroethene	0.51		0.40	0.11	ppb v/v			02/13/18 21:19	1
Trichlorofluoromethane	ND		0.40	0.20	ppb v/v			02/13/18 21:19	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			02/13/18 21:19	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			02/13/18 21:19	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			02/13/18 21:19	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			02/13/18 21:19	1

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104457-001/CWL QC-4

Lab Sample ID: 320-35639-22

Date Collected: 01/24/18 09:30

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.80	0.10	ppb v/v			02/13/18 21:19	1
o-Xylene	ND		0.40	0.054	ppb v/v			02/13/18 21:19	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		70 - 130					02/13/18 21:19	1
1,2-Dichloroethane-d4 (Surr)	92		70 - 130					02/13/18 21:19	1
Toluene-d8 (Surr)	99		70 - 130					02/13/18 21:19	1

Client Sample ID: 104470-001/CWL-D3-120

Lab Sample ID: 320-35639-23

Date Collected: 01/24/18 10:36

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		610	22	ppb v/v			02/13/18 22:09	121
Benzene	ND		48	9.6	ppb v/v			02/13/18 22:09	121
Benzyl chloride	ND		97	20	ppb v/v			02/13/18 22:09	121
Bromodichloromethane	ND		36	8.0	ppb v/v			02/13/18 22:09	121
Bromoform	ND		48	8.5	ppb v/v			02/13/18 22:09	121
Bromomethane	ND		97	41	ppb v/v			02/13/18 22:09	121
2-Butanone (MEK)	ND		97	24	ppb v/v			02/13/18 22:09	121
Carbon disulfide	ND		97	9.4	ppb v/v			02/13/18 22:09	121
Carbon tetrachloride	8.7	J	97	7.7	ppb v/v			02/13/18 22:09	121
Chlorobenzene	ND		36	7.7	ppb v/v			02/13/18 22:09	121
Chloroethane	ND		97	37	ppb v/v			02/13/18 22:09	121
Chloroform	150		36	11	ppb v/v			02/13/18 22:09	121
Chloromethane	ND		97	24	ppb v/v			02/13/18 22:09	121
Dibromochloromethane	ND		48	9.6	ppb v/v			02/13/18 22:09	121
1,2-Dibromoethane (EDB)	ND		97	9.1	ppb v/v			02/13/18 22:09	121
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		48	19	ppb v/v			02/13/18 22:09	121
1,2-Dichlorobenzene	ND		48	16	ppb v/v			02/13/18 22:09	121
1,3-Dichlorobenzene	ND		48	13	ppb v/v			02/13/18 22:09	121
1,4-Dichlorobenzene	ND		48	18	ppb v/v			02/13/18 22:09	121
Dichlorodifluoromethane	20	J	48	18	ppb v/v			02/13/18 22:09	121
1,1-Dichloroethane	ND		36	8.7	ppb v/v			02/13/18 22:09	121
1,2-Dichloroethane	18	J	97	11	ppb v/v			02/13/18 22:09	121
1,1-Dichloroethene	150		97	16	ppb v/v			02/13/18 22:09	121
cis-1,2-Dichloroethene	ND		48	11	ppb v/v			02/13/18 22:09	121
trans-1,2-Dichloroethene	ND		48	12	ppb v/v			02/13/18 22:09	121
1,2-Dichloropropane	70		48	29	ppb v/v			02/13/18 22:09	121
cis-1,3-Dichloropropene	ND		48	13	ppb v/v			02/13/18 22:09	121
trans-1,3-Dichloropropene	ND		48	11	ppb v/v			02/13/18 22:09	121
Ethylbenzene	ND		48	7.6	ppb v/v			02/13/18 22:09	121
4-Ethyltoluene	ND		48	23	ppb v/v			02/13/18 22:09	121
Hexachlorobutadiene	ND		240	52	ppb v/v			02/13/18 22:09	121
2-Hexanone	ND		48	11	ppb v/v			02/13/18 22:09	121
4-Methyl-2-pentanone (MIBK)	ND		48	16	ppb v/v			02/13/18 22:09	121
Methylene Chloride	24	J	48	8.7	ppb v/v			02/13/18 22:09	121

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104470-001/CWL-D3-120

Lab Sample ID: 320-35639-23

Date Collected: 01/24/18 10:36

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	ND		48	7.1	ppb v/v			02/13/18 22:09	121
1,1,2,2-Tetrachloroethane	ND		48	8.3	ppb v/v			02/13/18 22:09	121
Tetrachloroethene	97		48	6.2	ppb v/v			02/13/18 22:09	121
Toluene	ND		48	6.2	ppb v/v			02/13/18 22:09	121
1,1,2-Trichloro-1,2,2-trifluoroethane	420		48	20	ppb v/v			02/13/18 22:09	121
1,2,4-Trichlorobenzene	ND		240	52	ppb v/v			02/13/18 22:09	121
1,1,1-Trichloroethane	8.8 J		36	7.9	ppb v/v			02/13/18 22:09	121
1,1,2-Trichloroethane	ND		48	8.1	ppb v/v			02/13/18 22:09	121
Trichloroethene	3500		48	13	ppb v/v			02/13/18 22:09	121
Trichlorofluoromethane	120		48	24	ppb v/v			02/13/18 22:09	121
1,2,4-Trimethylbenzene	ND		97	20	ppb v/v			02/13/18 22:09	121
1,3,5-Trimethylbenzene	ND		48	15	ppb v/v			02/13/18 22:09	121
Vinyl acetate	ND		97	18	ppb v/v			02/13/18 22:09	121
Vinyl chloride	ND		48	15	ppb v/v			02/13/18 22:09	121
m,p-Xylene	ND		97	12	ppb v/v			02/13/18 22:09	121
o-Xylene	ND		48	6.5	ppb v/v			02/13/18 22:09	121

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		70 - 130		02/13/18 22:09	121
1,2-Dichloroethane-d4 (Surr)	94		70 - 130		02/13/18 22:09	121
Toluene-d8 (Surr)	98		70 - 130		02/13/18 22:09	121

Client Sample ID: 104471-001/CWL-D3-170

Lab Sample ID: 320-35639-24

Date Collected: 01/24/18 10:38

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		720	26	ppb v/v			02/13/18 23:02	144
Benzene	ND		58	11	ppb v/v			02/13/18 23:02	144
Benzyl chloride	ND		120	23	ppb v/v			02/13/18 23:02	144
Bromodichloromethane	ND		43	9.5	ppb v/v			02/13/18 23:02	144
Bromoform	ND		58	10	ppb v/v			02/13/18 23:02	144
Bromomethane	ND		120	48	ppb v/v			02/13/18 23:02	144
2-Butanone (MEK)	ND		120	29	ppb v/v			02/13/18 23:02	144
Carbon disulfide	ND		120	11	ppb v/v			02/13/18 23:02	144
Carbon tetrachloride	12 J		120	9.2	ppb v/v			02/13/18 23:02	144
Chlorobenzene	ND		43	9.2	ppb v/v			02/13/18 23:02	144
Chloroethane	ND		120	44	ppb v/v			02/13/18 23:02	144
Chloroform	170		43	14	ppb v/v			02/13/18 23:02	144
Chloromethane	ND		120	28	ppb v/v			02/13/18 23:02	144
Dibromochloromethane	ND		58	11	ppb v/v			02/13/18 23:02	144
1,2-Dibromoethane (EDB)	ND		120	11	ppb v/v			02/13/18 23:02	144
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		58	22	ppb v/v			02/13/18 23:02	144
1,2-Dichlorobenzene	ND		58	19	ppb v/v			02/13/18 23:02	144
1,3-Dichlorobenzene	ND		58	16	ppb v/v			02/13/18 23:02	144
1,4-Dichlorobenzene	ND		58	21	ppb v/v			02/13/18 23:02	144

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104471-001/CWL-D3-170

Lab Sample ID: 320-35639-24

Date Collected: 01/24/18 10:38

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	27	J	58	21	ppb v/v			02/13/18 23:02	144
1,1-Dichloroethane	ND		43	10	ppb v/v			02/13/18 23:02	144
1,2-Dichloroethane	22	J	120	13	ppb v/v			02/13/18 23:02	144
1,1-Dichloroethene	200		120	19	ppb v/v			02/13/18 23:02	144
cis-1,2-Dichloroethene	ND		58	13	ppb v/v			02/13/18 23:02	144
trans-1,2-Dichloroethene	ND		58	14	ppb v/v			02/13/18 23:02	144
1,2-Dichloropropane	100		58	35	ppb v/v			02/13/18 23:02	144
cis-1,3-Dichloropropene	ND		58	15	ppb v/v			02/13/18 23:02	144
trans-1,3-Dichloropropene	ND		58	13	ppb v/v			02/13/18 23:02	144
Ethylbenzene	ND		58	9.1	ppb v/v			02/13/18 23:02	144
4-Ethyltoluene	ND		58	27	ppb v/v			02/13/18 23:02	144
Hexachlorobutadiene	ND		290	62	ppb v/v			02/13/18 23:02	144
2-Hexanone	ND		58	13	ppb v/v			02/13/18 23:02	144
4-Methyl-2-pentanone (MIBK)	ND		58	19	ppb v/v			02/13/18 23:02	144
Methylene Chloride	28	J	58	10	ppb v/v			02/13/18 23:02	144
Styrene	ND		58	8.5	ppb v/v			02/13/18 23:02	144
1,1,2,2-Tetrachloroethane	ND		58	9.9	ppb v/v			02/13/18 23:02	144
Tetrachloroethene	120		58	7.3	ppb v/v			02/13/18 23:02	144
Toluene	ND		58	7.3	ppb v/v			02/13/18 23:02	144
1,1,2-Trichloro-1,2,2-trifluoroethane	570		58	23	ppb v/v			02/13/18 23:02	144
1,2,4-Trichlorobenzene	ND		290	62	ppb v/v			02/13/18 23:02	144
1,1,1-Trichloroethane	ND		43	9.4	ppb v/v			02/13/18 23:02	144
1,1,2-Trichloroethane	ND		58	9.6	ppb v/v			02/13/18 23:02	144
Trichloroethene	4700		58	15	ppb v/v			02/13/18 23:02	144
Trichlorofluoromethane	160		58	28	ppb v/v			02/13/18 23:02	144
1,2,4-Trimethylbenzene	ND		120	23	ppb v/v			02/13/18 23:02	144
1,3,5-Trimethylbenzene	ND		58	18	ppb v/v			02/13/18 23:02	144
Vinyl acetate	ND		120	21	ppb v/v			02/13/18 23:02	144
Vinyl chloride	ND		58	17	ppb v/v			02/13/18 23:02	144
m,p-Xylene	ND		120	14	ppb v/v			02/13/18 23:02	144
o-Xylene	ND		58	7.8	ppb v/v			02/13/18 23:02	144

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		70 - 130		02/13/18 23:02	144
1,2-Dichloroethane-d4 (Surr)	93		70 - 130		02/13/18 23:02	144
Toluene-d8 (Surr)	99		70 - 130		02/13/18 23:02	144

Client Sample ID: 104472-001/CWL-D3-350

Lab Sample ID: 320-35639-25

Date Collected: 01/24/18 10:44

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		740	26	ppb v/v			02/13/18 23:53	147
Benzene	ND		59	12	ppb v/v			02/13/18 23:53	147
Benzyl chloride	ND		120	24	ppb v/v			02/13/18 23:53	147
Bromodichloromethane	ND		44	9.7	ppb v/v			02/13/18 23:53	147

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104472-001/CWL-D3-350

Lab Sample ID: 320-35639-25

Date Collected: 01/24/18 10:44

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromoform	ND		59	10	ppb v/v			02/13/18 23:53	147
Bromomethane	ND		120	49	ppb v/v			02/13/18 23:53	147
2-Butanone (MEK)	ND		120	29	ppb v/v			02/13/18 23:53	147
Carbon disulfide	ND		120	11	ppb v/v			02/13/18 23:53	147
Carbon tetrachloride	12	J	120	9.4	ppb v/v			02/13/18 23:53	147
Chlorobenzene	ND		44	9.4	ppb v/v			02/13/18 23:53	147
Chloroethane	ND		120	45	ppb v/v			02/13/18 23:53	147
Chloroform	120		44	14	ppb v/v			02/13/18 23:53	147
Chloromethane	ND		120	29	ppb v/v			02/13/18 23:53	147
Dibromochloromethane	ND		59	12	ppb v/v			02/13/18 23:53	147
1,2-Dibromoethane (EDB)	ND		120	11	ppb v/v			02/13/18 23:53	147
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		59	23	ppb v/v			02/13/18 23:53	147
1,2-Dichlorobenzene	ND		59	19	ppb v/v			02/13/18 23:53	147
1,3-Dichlorobenzene	ND		59	16	ppb v/v			02/13/18 23:53	147
1,4-Dichlorobenzene	ND		59	22	ppb v/v			02/13/18 23:53	147
Dichlorodifluoromethane	27	J	59	21	ppb v/v			02/13/18 23:53	147
1,1-Dichloroethane	ND		44	11	ppb v/v			02/13/18 23:53	147
1,2-Dichloroethane	13	J	120	13	ppb v/v			02/13/18 23:53	147
1,1-Dichloroethene	210		120	19	ppb v/v			02/13/18 23:53	147
cis-1,2-Dichloroethene	ND		59	13	ppb v/v			02/13/18 23:53	147
trans-1,2-Dichloroethene	ND		59	15	ppb v/v			02/13/18 23:53	147
1,2-Dichloropropane	95		59	35	ppb v/v			02/13/18 23:53	147
cis-1,3-Dichloropropene	ND		59	15	ppb v/v			02/13/18 23:53	147
trans-1,3-Dichloropropene	ND		59	13	ppb v/v			02/13/18 23:53	147
Ethylbenzene	ND		59	9.3	ppb v/v			02/13/18 23:53	147
4-Ethyltoluene	ND		59	27	ppb v/v			02/13/18 23:53	147
Hexachlorobutadiene	ND		290	64	ppb v/v			02/13/18 23:53	147
2-Hexanone	ND		59	13	ppb v/v			02/13/18 23:53	147
4-Methyl-2-pentanone (MIBK)	ND		59	20	ppb v/v			02/13/18 23:53	147
Methylene Chloride	45	J	59	11	ppb v/v			02/13/18 23:53	147
Styrene	ND		59	8.7	ppb v/v			02/13/18 23:53	147
1,1,2,2-Tetrachloroethane	ND		59	10	ppb v/v			02/13/18 23:53	147
Tetrachloroethene	100		59	7.5	ppb v/v			02/13/18 23:53	147
Toluene	ND		59	7.5	ppb v/v			02/13/18 23:53	147
1,1,2-Trichloro-1,2,2-trifluoroethane	580		59	24	ppb v/v			02/13/18 23:53	147
1,2,4-Trichlorobenzene	ND		290	64	ppb v/v			02/13/18 23:53	147
1,1,1-Trichloroethane	ND		44	9.6	ppb v/v			02/13/18 23:53	147
1,1,2-Trichloroethane	ND		59	9.8	ppb v/v			02/13/18 23:53	147
Trichloroethene	4500		59	15	ppb v/v			02/13/18 23:53	147
Trichlorofluoromethane	160		59	29	ppb v/v			02/13/18 23:53	147
1,2,4-Trimethylbenzene	ND		120	24	ppb v/v			02/13/18 23:53	147
1,3,5-Trimethylbenzene	ND		59	18	ppb v/v			02/13/18 23:53	147
Vinyl acetate	ND		120	21	ppb v/v			02/13/18 23:53	147
Vinyl chloride	ND		59	18	ppb v/v			02/13/18 23:53	147
m,p-Xylene	ND		120	15	ppb v/v			02/13/18 23:53	147
o-Xylene	ND		59	7.9	ppb v/v			02/13/18 23:53	147

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104472-001/CWL-D3-350

Lab Sample ID: 320-35639-25

Date Collected: 01/24/18 10:44

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		70 - 130		02/13/18 23:53	147
1,2-Dichloroethane-d4 (Surr)	93		70 - 130		02/13/18 23:53	147
Toluene-d8 (Surr)	99		70 - 130		02/13/18 23:53	147

Client Sample ID: 104473-001/CWL-D3-440

Lab Sample ID: 320-35639-26

Date Collected: 01/24/18 10:51

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		770	27	ppb v/v			02/14/18 00:45	154
Benzene	ND		62	12	ppb v/v			02/14/18 00:45	154
Benzyl chloride	ND		120	25	ppb v/v			02/14/18 00:45	154
Bromodichloromethane	ND		46	10	ppb v/v			02/14/18 00:45	154
Bromoform	ND		62	11	ppb v/v			02/14/18 00:45	154
Bromomethane	ND		120	52	ppb v/v			02/14/18 00:45	154
2-Butanone (MEK)	ND		120	31	ppb v/v			02/14/18 00:45	154
Carbon disulfide	ND		120	12	ppb v/v			02/14/18 00:45	154
Carbon tetrachloride	12	J	120	9.9	ppb v/v			02/14/18 00:45	154
Chlorobenzene	ND		46	9.9	ppb v/v			02/14/18 00:45	154
Chloroethane	ND		120	47	ppb v/v			02/14/18 00:45	154
Chloroform	130		46	15	ppb v/v			02/14/18 00:45	154
Chloromethane	ND		120	30	ppb v/v			02/14/18 00:45	154
Dibromochloromethane	ND		62	12	ppb v/v			02/14/18 00:45	154
1,2-Dibromoethane (EDB)	ND		120	12	ppb v/v			02/14/18 00:45	154
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		62	24	ppb v/v			02/14/18 00:45	154
1,2-Dichlorobenzene	ND		62	20	ppb v/v			02/14/18 00:45	154
1,3-Dichlorobenzene	ND		62	17	ppb v/v			02/14/18 00:45	154
1,4-Dichlorobenzene	ND		62	23	ppb v/v			02/14/18 00:45	154
Dichlorodifluoromethane	28	J	62	22	ppb v/v			02/14/18 00:45	154
1,1-Dichloroethane	ND		46	11	ppb v/v			02/14/18 00:45	154
1,2-Dichloroethane	14	J	120	14	ppb v/v			02/14/18 00:45	154
1,1-Dichloroethene	220		120	20	ppb v/v			02/14/18 00:45	154
cis-1,2-Dichloroethene	ND		62	14	ppb v/v			02/14/18 00:45	154
trans-1,2-Dichloroethene	ND		62	15	ppb v/v			02/14/18 00:45	154
1,2-Dichloropropane	98		62	37	ppb v/v			02/14/18 00:45	154
cis-1,3-Dichloropropene	ND		62	16	ppb v/v			02/14/18 00:45	154
trans-1,3-Dichloropropene	ND		62	14	ppb v/v			02/14/18 00:45	154
Ethylbenzene	ND		62	9.7	ppb v/v			02/14/18 00:45	154
4-Ethyltoluene	ND		62	29	ppb v/v			02/14/18 00:45	154
Hexachlorobutadiene	ND		310	67	ppb v/v			02/14/18 00:45	154
2-Hexanone	ND		62	13	ppb v/v			02/14/18 00:45	154
4-Methyl-2-pentanone (MIBK)	ND		62	21	ppb v/v			02/14/18 00:45	154
Methylene Chloride	22	J	62	11	ppb v/v			02/14/18 00:45	154
Styrene	ND		62	9.1	ppb v/v			02/14/18 00:45	154
1,1,2,2-Tetrachloroethane	ND		62	11	ppb v/v			02/14/18 00:45	154
Tetrachloroethene	110		62	7.9	ppb v/v			02/14/18 00:45	154
Toluene	ND		62	7.9	ppb v/v			02/14/18 00:45	154

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104473-001/CWL-D3-440

Lab Sample ID: 320-35639-26

Date Collected: 01/24/18 10:51

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloro-1,2,2-trifluoroethane	620		62	25	ppb v/v			02/14/18 00:45	154
1,2,4-Trichlorobenzene	ND		310	67	ppb v/v			02/14/18 00:45	154
1,1,1-Trichloroethane	ND		46	10	ppb v/v			02/14/18 00:45	154
1,1,2-Trichloroethane	ND		62	10	ppb v/v			02/14/18 00:45	154
Trichloroethene	4800		62	16	ppb v/v			02/14/18 00:45	154
Trichlorofluoromethane	170		62	30	ppb v/v			02/14/18 00:45	154
1,2,4-Trimethylbenzene	ND		120	25	ppb v/v			02/14/18 00:45	154
1,3,5-Trimethylbenzene	ND		62	19	ppb v/v			02/14/18 00:45	154
Vinyl acetate	ND		120	22	ppb v/v			02/14/18 00:45	154
Vinyl chloride	ND		62	18	ppb v/v			02/14/18 00:45	154
m,p-Xylene	ND		120	15	ppb v/v			02/14/18 00:45	154
o-Xylene	ND		62	8.3	ppb v/v			02/14/18 00:45	154

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		70 - 130		02/14/18 00:45	154
1,2-Dichloroethane-d4 (Surr)	95		70 - 130		02/14/18 00:45	154
Toluene-d8 (Surr)	98		70 - 130		02/14/18 00:45	154

Client Sample ID: 104474-001/CWL-D3-480

Lab Sample ID: 320-35639-27

Date Collected: 01/24/18 10:56

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	1.6	J	5.0	0.18	ppb v/v			02/14/18 01:43	1
Benzene	0.19	J	0.40	0.079	ppb v/v			02/14/18 01:43	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			02/14/18 01:43	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			02/14/18 01:43	1
Bromoform	ND		0.40	0.070	ppb v/v			02/14/18 01:43	1
Bromomethane	ND		0.80	0.34	ppb v/v			02/14/18 01:43	1
2-Butanone (MEK)	0.20	J	0.80	0.20	ppb v/v			02/14/18 01:43	1
Carbon disulfide	0.10	J B	0.80	0.078	ppb v/v			02/14/18 01:43	1
Carbon tetrachloride	0.11	J	0.80	0.064	ppb v/v			02/14/18 01:43	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			02/14/18 01:43	1
Chloroethane	ND		0.80	0.31	ppb v/v			02/14/18 01:43	1
Chloroform	0.62		0.30	0.095	ppb v/v			02/14/18 01:43	1
Chloromethane	0.52	J	0.80	0.20	ppb v/v			02/14/18 01:43	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			02/14/18 01:43	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			02/14/18 01:43	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			02/14/18 01:43	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			02/14/18 01:43	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			02/14/18 01:43	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			02/14/18 01:43	1
Dichlorodifluoromethane	0.29	J	0.40	0.15	ppb v/v			02/14/18 01:43	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			02/14/18 01:43	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			02/14/18 01:43	1
1,1-Dichloroethene	0.91		0.80	0.13	ppb v/v			02/14/18 01:43	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104474-001/CWL-D3-480

Lab Sample ID: 320-35639-27

Date Collected: 01/24/18 10:56

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	ND		0.40	0.089	ppb v/v			02/14/18 01:43	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			02/14/18 01:43	1
1,2-Dichloropropane	0.51		0.40	0.24	ppb v/v			02/14/18 01:43	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			02/14/18 01:43	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			02/14/18 01:43	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			02/14/18 01:43	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			02/14/18 01:43	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			02/14/18 01:43	1
2-Hexanone	ND		0.40	0.087	ppb v/v			02/14/18 01:43	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			02/14/18 01:43	1
Methylene Chloride	0.27	J	0.40	0.072	ppb v/v			02/14/18 01:43	1
Styrene	ND		0.40	0.059	ppb v/v			02/14/18 01:43	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			02/14/18 01:43	1
Tetrachloroethene	1.1		0.40	0.051	ppb v/v			02/14/18 01:43	1
Toluene	0.23	J	0.40	0.051	ppb v/v			02/14/18 01:43	1
1,1,2-Trichloro-1,2,2-trifluoroethane	2.5		0.40	0.16	ppb v/v			02/14/18 01:43	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			02/14/18 01:43	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			02/14/18 01:43	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			02/14/18 01:43	1
Trichloroethene	25		0.40	0.11	ppb v/v			02/14/18 01:43	1
Trichlorofluoromethane	0.89		0.40	0.20	ppb v/v			02/14/18 01:43	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			02/14/18 01:43	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			02/14/18 01:43	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			02/14/18 01:43	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			02/14/18 01:43	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			02/14/18 01:43	1
o-Xylene	ND		0.40	0.054	ppb v/v			02/14/18 01:43	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		70 - 130		02/14/18 01:43	1
1,2-Dichloroethane-d4 (Surr)	95		70 - 130		02/14/18 01:43	1
Toluene-d8 (Surr)	97		70 - 130		02/14/18 01:43	1

Client Sample ID: 104475-001/CWL QC-5

Lab Sample ID: 320-35639-28

Date Collected: 01/24/18 10:31

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.24	J	5.0	0.18	ppb v/v			02/14/18 02:41	1
Benzene	ND		0.40	0.079	ppb v/v			02/14/18 02:41	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			02/14/18 02:41	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			02/14/18 02:41	1
Bromoform	ND		0.40	0.070	ppb v/v			02/14/18 02:41	1
Bromomethane	ND		0.80	0.34	ppb v/v			02/14/18 02:41	1
2-Butanone (MEK)	ND		0.80	0.20	ppb v/v			02/14/18 02:41	1
Carbon disulfide	0.17	J B	0.80	0.078	ppb v/v			02/14/18 02:41	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: CWL GWM/SVM

TestAmerica Job ID: 320-35639-1

Client Sample ID: 104475-001/CWL QC-5

Lab Sample ID: 320-35639-28

Date Collected: 01/24/18 10:31

Matrix: Air

Date Received: 02/01/18 13:43

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon tetrachloride	ND		0.80	0.064	ppb v/v			02/14/18 02:41	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			02/14/18 02:41	1
Chloroethane	ND		0.80	0.31	ppb v/v			02/14/18 02:41	1
Chloroform	ND		0.30	0.095	ppb v/v			02/14/18 02:41	1
Chloromethane	ND		0.80	0.20	ppb v/v			02/14/18 02:41	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			02/14/18 02:41	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			02/14/18 02:41	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			02/14/18 02:41	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			02/14/18 02:41	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			02/14/18 02:41	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			02/14/18 02:41	1
Dichlorodifluoromethane	ND		0.40	0.15	ppb v/v			02/14/18 02:41	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			02/14/18 02:41	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			02/14/18 02:41	1
1,1-Dichloroethene	ND		0.80	0.13	ppb v/v			02/14/18 02:41	1
cis-1,2-Dichloroethene	ND		0.40	0.089	ppb v/v			02/14/18 02:41	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			02/14/18 02:41	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			02/14/18 02:41	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			02/14/18 02:41	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			02/14/18 02:41	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			02/14/18 02:41	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			02/14/18 02:41	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			02/14/18 02:41	1
2-Hexanone	ND		0.40	0.087	ppb v/v			02/14/18 02:41	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			02/14/18 02:41	1
Methylene Chloride	ND		0.40	0.072	ppb v/v			02/14/18 02:41	1
Styrene	ND		0.40	0.059	ppb v/v			02/14/18 02:41	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			02/14/18 02:41	1
Tetrachloroethene	ND		0.40	0.051	ppb v/v			02/14/18 02:41	1
Toluene	ND		0.40	0.051	ppb v/v			02/14/18 02:41	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16	ppb v/v			02/14/18 02:41	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			02/14/18 02:41	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			02/14/18 02:41	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			02/14/18 02:41	1
Trichloroethene	ND		0.40	0.11	ppb v/v			02/14/18 02:41	1
Trichlorofluoromethane	ND		0.40	0.20	ppb v/v			02/14/18 02:41	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			02/14/18 02:41	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			02/14/18 02:41	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			02/14/18 02:41	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			02/14/18 02:41	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			02/14/18 02:41	1
o-Xylene	ND		0.40	0.054	ppb v/v			02/14/18 02:41	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		70 - 130		02/14/18 02:41	1
1,2-Dichloroethane-d4 (Surr)	93		70 - 130		02/14/18 02:41	1
Toluene-d8 (Surr)	99		70 - 130		02/14/18 02:41	1

ANNEX C
Chemical Waste Landfill
Calendar Year 2018 Post-Closure Inspection Forms

COVER/SITE INSPECTIONS

Chemical Waste Landfill Post-Closure Inspection Form Checklist for Cover System / Surface-Water / Security Fence

1. Date of Inspection March 9, 2018
2. Time of Inspection 08:42 to 09:05
3. Name of Inspector Robert Zook, Bruce Reavis

Mandatory requirement:

The inspector has read the CWL Post-Closure Care Permit and activity-related procedures in the last 12 months, and completed all required training: (Inspector must initial box before proceeding with the inspection.)

Training records maintained at CAMU Administrative Trailer.

RM
BR

Provide explanatory notes for each parameter not inspected or each action required. Include any remedial steps required.

I. COVER SYSTEM [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Visible settlement of the soil cover in excess of 6 inches.	yes	No	
B. Erosion of the soil cover in excess of 6 inches deep.	yes	No	
C. Evidence of water ponding on the CWL cover surface in excess of 100 square feet.	yes	No	
D. Animal intrusion burrows in excess of 4 inches in diameter. Note: For first 3 to 5 years this inspection requirement may be covered on the Cover Biology Checklist.	yes	No	
E. Contiguous areas of no vegetation greater than 200 ft ² . Note: For first 3 to 5 years this inspection requirement may be covered on the Cover Biology Checklist.	yes	No	

II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]			
<i>Inspection Parameters</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Channel or sidewall erosion in excess of 6 inches deep.	yes	No	
B. Channel sediment accumulation in excess of 6 inches deep.	yes	No	
C. Debris that blocks more than 1/3 of the channel width.	yes	yes	1

**Chemical Waste Landfill
Post-Closure Inspection Form
Checklist for Cover System / Surface-Water / Security Fence (continued)**

III. SECURITY FENCE [Quarterly]			
<i>Inspection Parameters</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Accumulation of wind-blown plants and debris.	yes	yes	2
B. Fence wires and posts in need of repair/maintenance.	yes	No	
C. Gates in need of oiling/repair/maintenance.	yes	No	
D. Locks in need of cleaning or replacement.	yes	No	
E. Warning signs in need of repair or replacement.	yes	No	
F. Survey monuments in vicinity of CWL visible.	yes	No	

IV. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Chemical Waste Landfill
Post-Closure Inspection Form
Checklist for Cover System / Surface-Water / Security Fence (continued)**

Action (Note Number) 1 assigned to Mike Mitchell Date action completed 4/23/2018

Action (Note Number) 2 assigned to Mike Mitchell Date action completed 4/23/2018

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

1. Wind blown plant debris was removed from the north-west drainage channel and from the drainage culverts on the south side of the site by the landscaping/maintenance contractor on 4/23/2018. RM

2. Windblown plant debris was removed from the site security fence by the landscaping/maintenance contractor on 4/23/2018. RM

Inspector's Signature Robert Quirk Bruce Reavis

Original to: Chemical Waste Landfill Operating Record

Copy to: Environmental Safety and Health (ES&H) and Security Records Center



date: March 20, 2018

to: Mike Mitchell (08854)

from: Jennifer Payne (00643) jjpayne@sandia.gov

subject: **March 2018 Quarterly Inspections - Biology Follow-Up**

Biological Requirement:

Biological Surveys are required prior to driving across any area of native vegetation, spraying herbicides or initiating other work activities that disturb wildlife.

Please submit request three weeks to prior work at: <https://info.sandia.gov/esh/ecoticket/request.php>

Should personnel find a bird's nest during any of the work associated with these sites, they will need to halt work, and contact the Ecology Program at <https://info.sandia.gov/esh/ecoticket/request.php> If other wildlife is encountered that may cause a health and safety issue, contact the Ecology Program.

All proposed project activities will be conducted in keeping with Corporate Procedure ESH100.2.ENV.2, "Comply with Environmental Requirements for Migratory Birds, Protected Species, and Other Biota".

ET Covers Observations and Recommendations

The biology quarterly evaluation of the three ET Covers was conducted on March 19, 2018.

CAMU

- The ET Cover is in excellent condition. The mature perennial grasses still mostly dormant; some individual grass clumps and scattered other perennial native vegetation are in an early seasonal growth stage, evidenced by a limited amount of green vegetation on the cover.
- Few tumbleweeds or partial tumbleweeds observed on the ET Cover and along the fence lines.

CWL

- Overall the ET Cover is in very good condition.
- The base of most native grass clumps are beginning to green up, showing early seasonal growth.
- The native grass clumps are more mature than they were in March 2017. The ET cover is still in the process of developing into a mature native plant community. Currently the majority of grasses are in a middle to older juvenile stage of development. A limited number of grass

clumps have fully developed to full size. Due to the vegetative litter raking event in 2017, the spaces between the native grass clumps are more evident than prior to raking. The current spacing between the native grass clumps is much less than the initial “turf-like” tight proximity spacing of young juvenile grasses that originally developed and largely collapsed across the ET cover due to lack of root growth space. The current spacing is still slightly tighter than what typically occurs across a natural landscape of these grass species. Due to this, additional recruitment (seed germination and growth of new individuals) is not recommended in 2018. The CWL ET cover should be actively managed in 2018 to discourage the establishment of additional native grass clumps. This will allow the current individuals appropriate growth and development opportunities.

- Very few other perennial or annual plants were observed on the ET Cover.
- Few tumbleweeds or partial tumbleweeds observed on the ET Cover and along the fence lines.

MWL

- The ET Cover is in excellent condition. The mature perennial grasses still mostly dormant; some individual grass clumps and scattered other perennial native vegetation are in an early seasonal growth stage, evidenced by a limited amount of green vegetation on the cover.
- Few tumbleweeds or partial tumbleweeds observed on the ET Cover and along the fence lines.

ET Covers Recommendations

- The 2017 annual inspection recommendation of a pre-emergent herbicide application during the first quarter of 2018 to control the annual winter weeds was not implemented due to extremely dry meteorological conditions since October 2017. This recommendation was made as a best management practice in the fall of 2017 for ET Cover maintenance planning purposes, based on the expectation of normal winter moisture. When fall and winter moisture was far below normal, the biologist’s maintenance recommendation changed to no early 2018 pre-emergent herbicide application. This was discussed and agreed upon with the ET Cover Project Lead. Avoiding unnecessary herbicide application benefits the environment, and supports the SNL Environment, Safety, and Health Corporate Policy of ESH100.
- An early summer pre-emergent application is anticipated to be needed to control the development of Russian thistle, particularly before the monsoon rains begin. Early in the May-June 2018 timeframe is ideal.

If you should have any questions, don’t hesitate to contact me at my office 845-9849, cell 218-1815, or email at jjpayne@sandia.gov.

cc: Customer Funded Records Center
Ecology Library
Steve Cox
Robert Ziock
Don Schofield
Rick Dotson

Chemical Waste Landfill Post-Closure Inspection Form Checklist for Cover System / Surface-Water / Security Fence

1. Date of Inspection 6/12/18
2. Time of Inspection 0910-0956
3. Name of Inspector R. Zink/D. Michel

Mandatory requirement:

The inspector has read the CWL Post-Closure Care Permit and activity-related procedures in the last 12 months, and completed all required training: (Inspector must initial box before proceeding with the inspection.)

Training records maintained at CAMU Administrative Trailer.



Provide explanatory notes for each parameter not inspected or each action required. Include any remedial steps required.

I. COVER SYSTEM [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Visible settlement of the soil cover in excess of 6 inches.	YES	NO	
B. Erosion of the soil cover in excess of 6 inches deep.	YES	NO	
C. Evidence of water ponding on the CWL cover surface in excess of 100 square feet.	YES	NO	
D. Animal intrusion burrows in excess of 4 inches in diameter. Note: For first 3 to 5 years this inspection requirement may be covered on the Cover Biology Checklist.	YES	NO	
E. Contiguous areas of no vegetation greater than 200 ft ² . Note: For first 3 to 5 years this inspection requirement may be covered on the Cover Biology Checklist.	YES	NO	

II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]			
<i>Inspection Parameters</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Channel or sidewall erosion in excess of 6 inches deep.	YES	NO	
B. Channel sediment accumulation in excess of 6 inches deep.	YES	NO	
C. Debris that blocks more than 1/3 of the channel width.	YES	YES	1

**Chemical Waste Landfill
Post-Closure Inspection Form
Checklist for Cover System / Surface-Water / Security Fence (continued)**

III. SECURITY FENCE [Quarterly]			
<i>Inspection Parameters</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Accumulation of wind-blown plants and debris.	YES	YES	2
B. Fence wires and posts in need of repair/maintenance.	YES	NO	
C. Gates in need of oiling/repair/maintenance.	YES	NO	
D. Locks in need of cleaning or replacement.	YES	NO	
E. Warning signs in need of repair or replacement.	YES	NO	
F. Survey monuments in vicinity of CWL visible.	YES	YES	3

IV. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	YES	NO	

**Chemical Waste Landfill
Post-Closure Inspection Form
Checklist for Cover System / Surface-Water / Security Fence (continued)**

NOTES

Note Number	Description
1	Wind-blown plant debris removed from north - south drainage channels at time of inspection 6/12/18.
2	Wind-blown plant debris removed from security fence at time of inspection 6/12/18.
3	Removed dirt and plant debris from two western survey monuments at time of inspection 6/12/18



date: June 19, 2018

to: Mike Mitchell (08888)
Robert Ziock (00641)

from: Jennifer Payne (00643) jjpayne@sandia.gov

subject: **June 2018 Quarterly Inspections - Biology Follow-Up**

Biological Requirement:

Biological Surveys are required prior to driving across any area of native vegetation, spraying herbicides or initiating other work activities that disturb wildlife.

Please submit request three weeks to prior work at: <https://info.sandia.gov/esh/ecoticket/request.php>

Should personnel find a bird's nest during any of the work associated with these sites, they will need to halt work, and contact the Ecology Program at <https://info.sandia.gov/esh/ecoticket/request.php> If other wildlife is encountered that may cause a health and safety issue, contact the Ecology Program.

All proposed project activities will be conducted in keeping with Corporate Procedure ESH100.2.ENV.2, "Comply with Environmental Requirements for Migratory Birds, Protected Species, and Other Biota".

ET Covers Observations and Recommendations

The biology quarterly evaluation of the three ET Covers was conducted on June 19, 2018.

CAMU

- The ET Cover appears to be in excellent condition, with consideration of the current hot June temperatures and an "Extreme Drought" status according to the U.S. Drought Monitor (<http://droughtmonitor.unl.edu/>).
- The mature native perennial grasses have started to green up at the base of the clumps in response to recent brief rain events.
- Only a few weeds (primarily silverleaf nightshade (*Solanum elaeagnifolium*)) and very few tumbleweeds remnants were observed on the ET Cover.
- The fence lines were clear of tumbleweeds.

CWL

- Overall the ET Cover appears to be in decent condition, with consideration of the current hot June temperatures and an “Extreme Drought” status according to the U.S. Drought Monitor.
- Many of the native grasses have some green blades at the base of their clumps, though it does appear to be less than the grasses at either the CAMU or the MWL. Due to grasses that are not as mature with less developed root systems at the CWL, these grasses appear to be more stressed than at either of the other ET Covers.
- The ET cover is still in the process of developing into a mature native plant community. Currently the majority of grasses are in a middle to older juvenile stage of development. A limited number of grass clumps have fully developed to full size. Due to the vegetative litter raking event in 2017, the spaces between the native grass clumps are more evident than prior to raking. The current spacing between the native grass clumps is much less than the initial “turf-like” tight proximity spacing of young juvenile grasses that originally developed and largely collapsed across the ET cover due to lack of root growth space.
- Very few forbs (wrinkled globemallow (*Sphaeralcea hastulata*)), weedy plant species ((Russian thistle (*Salsola tragus*), silverleaf nightshade (*Solanum elaeagnifolium*)), or tumbleweeds remnants were observed on the ET Cover.
- The fence lines were clear of tumbleweeds.

MWL

- The ET Cover is in very good condition. The mature perennial native grasses are in an initial stage of “greening up” in response to recent brief rains.
- Very few forbs (wrinkled globemallow (*Sphaeralcea hastulata*), wire lettuce (*Stephanomeria pauciflora*), lacy tansyaster (*Xanthisma spinulosum*)), weedy plant species (Russian thistle (*Salsola tragus*), silverleaf nightshade (*Solanum elaeagnifolium*)), or tumbleweeds remnants were observed on the ET Cover.
- The older juvenile native clump grasses on the west side near the relatively new erosion control structures were greening up nicely. The soil in the area appears to possibly be more sandy than other surface soils on the MWL ET Cover.
- The fence lines were clear of tumbleweeds.

ET Covers Recommendations

- Due to the extreme drought conditions and the lack of weeds on any of the ET Covers, the use of a pre-emergent herbicide is not recommended at this time. Although a pre-emergent may be safely used in the presence of established native plants, the risk of any possible adverse impact during this time of extreme drought outweighs the potential benefit. The 2017 annual inspection recommendation of a pre-emergent herbicide application was made as a best management practice in the fall of 2017 for ET Cover maintenance planning purposes, based on the expectation of normal winter moisture. Avoiding unnecessary herbicide application benefits the environment, and supports the SNL Environment, Safety, and Health Corporate Policy of ESH100.
- If the monsoonal rainfall is reduced during the warm growing season, supplemental water should be applied to the CWL in the fall to boost soil moisture and aid the root systems prior to winter.

If you should have any questions, don't hesitate to contact me at my office 845-9849, cell 218-1815, or email at jjpayne@sandia.gov.

Chemical Waste Landfill Post-Closure Inspection Form Checklist for Cover System / Surface-Water / Security Fence

1. Date of Inspection September 12, 2018
2. Time of Inspection 10:30-11:10
3. Name of Inspector Robert Ziouk, Danielle Michel

Mandatory requirement:

The inspector has read the CWL Post-Closure Care Permit and activity-related procedures in the last 12 months, and completed all required training: (Inspector must initial box before proceeding with the inspection.)

Training records maintained at CAMU Administrative Trailer.

Provide explanatory notes for each parameter not inspected or each action required. Include any remedial steps required.

I. COVER SYSTEM [Quarterly]			
Inspection Parameter	Parameter Inspected (Yes or No)	Action Required (Yes or No)	Note Number
A. Visible settlement of the soil cover in excess of 6 inches.	yes	No	
B. Erosion of the soil cover in excess of 6 inches deep.	yes	No	
C. Evidence of water ponding on the CWL cover surface in excess of 100 square feet.	yes	No	
D. Animal intrusion burrows in excess of 4 inches in diameter. Note: For first 3 to 5 years this inspection requirement may be covered on the Cover Biology Checklist.	yes	No	
E. Contiguous areas of no vegetation greater than 200 ft ² . Note: For first 3 to 5 years this inspection requirement may be covered on the Cover Biology Checklist.	yes	No	

II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]			
Inspection Parameters	Parameter Inspected (Yes or No)	Action Required (Yes or No)	Note Number
A. Channel or sidewall erosion in excess of 6 inches deep.	yes	No	
B. Channel sediment accumulation in excess of 6 inches deep.	yes	No	
C. Debris that blocks more than 1/3 of the channel width.	yes	No	

**Chemical Waste Landfill
Post-Closure Inspection Form
Checklist for Cover System / Surface-Water / Security Fence (continued)**

III. SECURITY FENCE [Quarterly]			
<i>Inspection Parameters</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Accumulation of wind-blown plants and debris.	yes	yes	1
B. Fence wires and posts in need of repair/maintenance.	yes	No	
C. Gates in need of oiling/repair/maintenance.	yes	No	
D. Locks in need of cleaning or replacement.	yes	yes	2
E. Warning signs in need of repair or replacement.	yes	yes	3
F. Survey monuments in vicinity of CWL visible.	yes	yes	4

IV. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Chemical Waste Landfill
Post-Closure Inspection Form
Checklist for Cover System / Surface-Water / Security Fence (continued)**

NOTES

Note Number	Description
1.	Wind-blown plant debris was removed from the security fence at time of the inspection.
2.	The locks on each gate need to be replaced. They do not close properly.
3.	Four signs on the east fence line and two signs on the south fence line are faded and need to be replaced.
4.	The two east survey monuments and the western most survey monument were covered with sediment. The survey monuments were cleared of the sediment at time of the inspection.

**Chemical Waste Landfill
Post-Closure Inspection Form
Checklist for Cover System / Surface-Water / Security Fence (continued)**

Action (Note Number) 1 assigned to Robert Zick Date action completed 9/12/18
Action (Note Number) 2 assigned to Robert Zicka Date action completed 9/13/18
Action (Note Number) 3 assigned to Danielle Michel Date action completed 9/13/18
Action (Note Number) 4 assigned to Robert Zick Date action completed 9/12/18
Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

1. Wind-blown plant debris was removed from the security fence at time of the inspection. RZ 9/12/18
2. The two locks were replaced on 9/13/18. RZ
3. Six faded signs were replaced on 9/13/18. RZ
4. The three survey monuments were cleared of sediment at time of the inspection. 9/12/18 RZ

Inspector's Signature

Danielle Michel

Original to: Chemical Waste Landfill Operating Record

Copy to: Environmental Safety and Health (ES&H) and Security Records Center

Chemical Waste Landfill Post-Closure Inspection Form Checklist for Cover System / Surface-Water / Security Fence

1. Date of Inspection December 4, 2018
2. Time of Inspection 13:56 - 14:20
3. Name of Inspector Robert Zick, Danielle Michel

Mandatory requirement:

The inspector has read the CWL Post-Closure Care Permit and activity-related procedures in the last 12 months, and completed all required training: Any
 (Inspector must initial box before proceeding with the inspection.)

Training records maintained at CAMU Administrative Trailer.

Provide explanatory notes for each parameter not inspected or each action required. Include any remedial steps required.

I. COVER SYSTEM [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Visible settlement of the soil cover in excess of 6 inches.	yes	No	
B. Erosion of the soil cover in excess of 6 inches deep.	yes	No	
C. Evidence of water ponding on the CWL cover surface in excess of 100 square feet.	yes	No	
D. Animal intrusion burrows in excess of 4 inches in diameter. Note: For first 3 to 5 years this inspection requirement may be covered on the Cover Biology Checklist.	yes	No	
E. Contiguous areas of no vegetation greater than 200 ft ² . Note: For first 3 to 5 years this inspection requirement may be covered on the Cover Biology Checklist.	yes	No	

II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]			
<i>Inspection Parameters</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Channel or sidewall erosion in excess of 6 inches deep.	yes	No	
B. Channel sediment accumulation in excess of 6 inches deep.	yes	No	
C. Debris that blocks more than 1/3 of the channel width.	yes	No	

**Chemical Waste Landfill
 Post-Closure Inspection Form
 Checklist for Cover System / Surface-Water / Security Fence (continued)**

III. SECURITY FENCE [Quarterly]			
<i>Inspection Parameters</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Accumulation of wind-blown plants and debris.	yes	yes	1
B. Fence wires and posts in need of repair/maintenance.	yes	No	
C. Gates in need of oiling/repair/maintenance.	yes	No	
D. Locks in need of cleaning or replacement.	yes	No	
E. Warning signs in need of repair or replacement.	yes	No	
F. Survey monuments in vicinity of CWL visible.	yes	No	

IV. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	N/A	N/A	

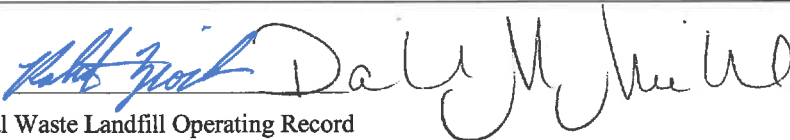
**Chemical Waste Landfill
Post-Closure Inspection Form
Checklist for Cover System / Surface-Water / Security Fence (continued)**

Action (Note Number) 1. assigned to Robert Zick / Danielle Miles Date action completed 12/4/2013
Action (Note Number) _____ assigned to _____ Date action completed _____
Action (Note Number) _____ assigned to _____ Date action completed _____
Action (Note Number) _____ assigned to _____ Date action completed _____
Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

1. Wind-blown plant debris was removed from the security fence at time of the inspection. RZ 12/4/2013

Inspector's Signature



Original to: Chemical Waste Landfill Operating Record

Copy to: Environmental Safety and Health (ES&H) and Security Records Center



date: January 21, 2018

to: Mike Mitchell (08888)
Robert Ziock (00641)

from: Jennifer Payne (00643) jjpayne@sandia.gov

subject: **December 2018 Quarterly Inspections - Biology Follow-Up**

Biological Requirement:

Biological Surveys are required prior to driving across any area of native vegetation, spraying herbicides or initiating other work activities that disturb wildlife.

Please submit request three weeks to prior work at: <https://info.sandia.gov/esh/ecoticket/request.php>

Should personnel find a bird's nest during any of the work associated with these sites, they will need to halt work, and contact the Ecology Program at <https://info.sandia.gov/esh/ecoticket/request.php> If other wildlife is encountered that may cause a health and safety issue, contact the Ecology Program.

All proposed project activities will be conducted in keeping with Corporate Procedure ESH100.2.ENV.2, "Comply with Environmental Requirements for Migratory Birds, Protected Species, and Other Biota".

EU Covers Observations and Recommendations

The biology quarterly evaluation of the three EU Covers was conducted on January 21, 2018.

CAMU

- The EU Cover appears to be in very good condition during winter dormancy.
- The mature native perennial grasses continue to have good, even spacing across the cover.
- Extremely few small winter annuals (weedy species) on the cover.
- The fence lines only had a few tumbleweeds.

CWL

- Overall the EU Cover appears to be in good condition during winter dormancy.
- The native perennial grasses continue to be in a middle to older juvenile stage of development.

- Small winter annuals (weedy species) were observed broadly across the cover. Although individuals are currently not large in size, the population of winter annuals should continue to be monitored for an increased population or larger growth. Based on the continuation of weed growth on the CWL cover during the warm season, I anticipate the CWL will continue to have more winter annuals, and likely more spring annuals, than the other two covers. The above average precipitation this winter is encouraging the growth of annuals. If curbing future growth of winter and spring annuals is of interest, a herbicide application could be implemented.
- The fence lines had very few tumbleweeds.

MWL

- The EU Cover appears to be in very good condition during winter dormancy.
- The mature native perennial grasses continue to have good, even spacing across the cover.
- Extremely few small winter annuals (weedy species) on the cover.
- The fence lines only had a few tumbleweeds.

EU Covers Recommendations

- The only potential issue observed is the number of winter annual weeds at the CWL. As noted above, based on the continued warm season weed growth on the CWL cover I anticipate the CWL will continue to have more winter annuals and likely more spring annuals than either of the other EU Covers. From Bari's Climate Update for January 2019:

“The CPC has increased their forecast to 90% chance of El Niño conditions persisting this winter and a 60% chance this pattern will continue into spring of 2019.”

Based on the prediction of continued winter and spring precipitation, the winter and spring annual weeds could be quite abundant this year at the CWL. If this occurs, an increased amount of weed seed will be created for future winter and spring annuals. This year the competition for soil moisture with weedy species may not be significant if a lot of precipitation is received. However, winter and spring soil moisture competition in future years may be more problematic with less precipitation. Applying a pre-emergent herbicide as soon as possible would prevent new growth of winter and spring weeds across the site. In my June 2018 EU Quarterly Inspection Biology Follow-Up memo a pre-emergent herbicide was not recommended due to the extreme drought conditions. With the current good soil moisture conditions a pre-emergent could safely be used. If the weeds were still small at the time of herbicide application, a post-emergent could also be used effectively at the CWL.

If you should have any questions, don't hesitate to contact me at my office 845-9849, cell 218-1815, or email at jjpayne@sandia.gov.

cc: Customer Funded Records Center
Ecology Library
Steve Cox
Robert Ziock
Rick Dotson
Stephanie Salinas

GROUNDWATER/SOIL-VAPOR EQUIPMENT INSPECTIONS

Chemical Waste Landfill Post-Closure Inspection Form Checklist for Groundwater Monitoring Locations / Sampling Equipment

1. Date of Inspection 01/15/18
2. Time of Inspection 0810
3. Name of Inspector Robert Lynch

Mandatory requirement:

The inspector has read the CWL Post-Closure Care Permit and activity-related procedures in the last 12 months, and completed all required training: RL
(Inspector must initial box before proceeding with the inspection.)

Training records maintained at CAMU Administrative Trailer.

Provide explanatory notes for each parameter not inspected or each action required. Include any remedial steps required.

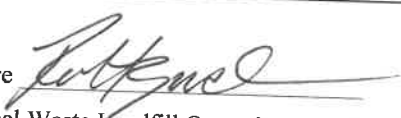
I. GROUNDWATER MONITORING LOCATIONS [Semi-annually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Concrete pads, bollards, and protective casings in need of repair/maintenance.	YES	NO	
B. Well cover caps (e.g., PVC caps, J-Plug, or equivalent) in need of repair/maintenance.	YES	NO	1
C. Well casing in need of repair/maintenance.	YES	NO	
D. Monitoring well properly labeled.	YES	NO	
E. Locks in need of cleaning or replacement.	YES	NO	

II. GROUNDWATER SAMPLING EQUIPMENT [Semi-annually]			
<i>Inspection Parameters</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Sampling pump in need of repair/maintenance.	YES	NO	
B. Sampling assembly (e.g., tubing, gauges, and valves) in need of repair/maintenance.	YES	NO	

**Chemical Waste Landfill
Post-Closure Inspection Form
Checklist for Groundwater Monitoring Locations / Sampling Equipment
(continued)**

- Action (Note Number) _____ assigned to _____ Date action completed _____
- Action (Note Number) _____ assigned to _____ Date action completed _____
- Action (Note Number) _____ assigned to _____ Date action completed _____
- Action (Note Number) _____ assigned to _____ Date action completed _____
- Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

Inspector's Signature 

Original to: Chemical Waste Landfill Operating Record
Copy to: Environmental Safety and Health (ES&H) and Security Records Center

Soil Vapor Monitoring Inspection Form

1. Soil vapor monitoring site CWL
2. Date of Inspection 01/24/18
3. Time of Inspection 0820
4. Name of Inspector Robert Lynch

Provide explanatory notes for each parameter not inspected or each action required. Include any remedial steps required.

SOIL VAPOR MONITORING LOCATIONS				
<i>Inspection Parameter</i>	<i>Indicate if Applicable (Yes or No)</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Concrete pads, bollards, and protective casings in need of repair/maintenance.	YES	YES	NO	
B. Above-ground enclosure in need of repair/maintenance.	NO	NO	NO	
C. Well cover caps and Swagelok® dust caps in need of repair/maintenance.	YES	YES	NO	
D. Sampling ports in need of repair/maintenance.	YES	YES	NO	
E. Passive venting Baroballs™ in need of repair/maintenance.	YES	YES	NO	
F. Monitoring wells and soil-gas sample port locations properly labeled.	YES	YES	NO	
G. Locks in need of cleaning or replacement.				

SAMPLING EQUIPMENT				
<i>Inspection Parameter</i>	<i>Indicate if Applicable (Yes or No)</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Sampling pump in need of repair/maintenance	YES	YES	NO	
B. Sampling manifold (tubing, gauges, and valves) in need of repair/maintenance.	YES	YES	NO	

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Soil Vapor Monitoring Inspection Form

PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	IVA	NA	

NOTES

Note Number	Description

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

IMPORTANT NOTICE: A printed copy of this document may not be the document currently in effect. The official version is located on the Sandia Restricted Network, 4100 Controlled Documents home page.

Chemical Waste Landfill Post-Closure Inspection Form Checklist for Groundwater Monitoring Locations / Sampling Equipment

1. Date of Inspection 07/17/18
2. Time of Inspection 0820
3. Name of Inspector Robert Lynch

Mandatory requirement:

The inspector has read the CWL Post-Closure Care Permit and activity-related procedures in the last 12 months, and completed all required training: RL
(Inspector must initial box before proceeding with the inspection.)

Training records maintained at CAMU Administrative Trailer.

Provide explanatory notes for each parameter not inspected or each action required. Include any remedial steps required.

I. GROUNDWATER MONITORING LOCATIONS [Semi-annually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Concrete pads, bollards, and protective casings in need of repair/maintenance.	YES	NO	
B. Well cover caps (e.g., PVC caps, J-Plug, or equivalent) in need of repair/maintenance.	YES	NO	1
C. Well casing in need of repair/maintenance.	YES	NO	
D. Monitoring well properly labeled.	YES	NO	
E. Locks in need of cleaning or replacement.	YES	NO	

II. GROUNDWATER SAMPLING EQUIPMENT [Semi-annually]			
<i>Inspection Parameters</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Sampling pump in need of repair/maintenance.	YES	NO	
B. Sampling assembly (e.g., tubing, gauges, and valves) in need of repair/maintenance.	YES	NO	

**Chemical Waste Landfill
Post-Closure Inspection Form
Checklist for Groundwater Monitoring Locations / Sampling Equipment
(continued)**

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

Inspector's Signature 

Original to: Chemical Waste Landfill Operating Record

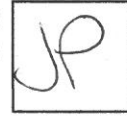
Copy to: Environmental Safety and Health (ES&H) and Security Records Center

BIOLOGY INSPECTION

**Chemical Waste Landfill
Post-Closure Inspection Form
Biology Inspection Checklist for the CWL Cover**

Mandatory requirement:

The inspector has read the CWL Post-Closure Care Permit and activity-related procedures in the last 12 months, and completed all required training:
(Inspector must initial box before proceeding with the inspection.)



Approximate vegetative coverage (i.e., living plants): 39 %¹

Approximate percent native vegetation of the total vegetative cover: 99 %

Listed below are the main plant species identified growing on the CWL cover and the approximate percent cover for each species.

<u>Scientific Name</u>	<u>Common Name (optional)</u>	<u>%Total cover</u>
<u>Sporobolus cryptandrus</u>	<u>Sand dropseed</u>	<u>3 %</u>
<u>Bouteloua gracilis</u>	<u>Blue grama</u>	<u>20 %</u>
<u>Pleuraphis jamesii</u>	<u>Galleta grass</u>	<u>2 %</u>
<u>Sporobolus flexuosus</u>	<u>Mesa dropseed</u>	<u>3 %</u>
<u>Kallstroemia californica</u>	<u>California caltrop</u>	<u>7 %</u>
<u>Euphorbia exstipulata</u>	<u>Square-seed spurge</u>	<u>3 %</u>
<u>Chamaesyce species</u>	<u>Spurge species</u>	<u>1 %</u>
<u>Bassia scoparia</u>	<u>Mexican fireweed</u>	<u><0.5 %</u>
<u>Salsola tragus</u>	<u>Russian thistle</u>	<u><0.5 %</u>
<u>Solanum elaeagnifolium</u>	<u>Silverleaf nightshade</u>	<u><0.5 %</u>
<u>Opuntia phaeacantha</u>	<u>Brown spined prickly pear</u>	<u><0.5 %</u>
<u>Sphaeralcea angustifolia</u>	<u>Narrowleaf globemallow</u>	<u><0.5 %</u>
<u>Sphaeralcea hastulata</u>	<u>Wrinkled globemallow</u>	<u><0.5 %</u>
<u>Chenopodium species</u>	<u>Goosefoot species</u>	<u><0.5 %</u>
<u>Amaranthus species</u>	<u>Pigweed species</u>	<u><0.5 %</u>
<u>Datura wrightii</u>	<u>Sacred datura</u>	<u><0.5 %</u>

Note: ¹All species observed to be present at less than one-half of one-percent are not calculated into the total vegetative coverage

Chemical Waste Landfill Biology Inspection Checklist for the CWL Cover (Continued)

Permit Requirements:

- 1) Is the total foliar coverage (i.e., land surface covered with living plants) greater than or equal to 20%? Yes If "No," explain below.

Notes: _____

- 2) Of the 20% total foliar coverage, is 50% or greater comprised of native perennial species, and 50% or less comprised of annual species? Yes If "No," explain below.

Notes: _____

- 3) Are there any contiguous areas of no vegetation greater than 200 square feet (approximately 14 x14 ft.)? No If "Yes," mark such areas on a map and attach to this checklist. Describe area(s) and plans to actively improve/repair area(s) as detailed in Permit Attachment 1, Section 1.9.1.3 below.

Notes: _____

- 4) Are there any animal burrow entrances on the cover in excess of 4 inches in diameter? No If "Yes," mark such areas on a map and provide additional information below.

Notes: _____

General Cover Information:

Are any burrows smaller than 4 inches in diameter present on the cover? No

Does any burrow(s) appear to be active? Yes

Animal Burrow Notes: Ant burrows are distributed across the CWL cover with varied activity levels, all ant burrows have normal ant-size entrances that are much smaller than 4 inches in diameter. No map is attached because there are no burrow entrances in excess of 4 inches in diameter.

Are there any potentially deep-rooted plants (roots greater than 8 feet deep at maturity) or other undesirable plants (i.e., weeds) present on the cover? Yes If "Yes," describe below.

Plant Notes: No deeply rooted plant species are present on the cover. Some weedy species including California caltrop, square-seed and another unidentifiable species of spurge, Mexican fireweed, Russian thistle, silverleaf nightshade and pigweed are present on the cover.

ANNEX D
Calendar Year 2018 Chemical Waste Landfill Biology Report

2018 Chemical Waste Landfill Biology Report

Introduction

As required by the Chemical Waste Landfill (CWL) Post-Closure Care Permit (PCCP) (NMED October 2009), Attachment 1, Section 1.9.1.1, this summary report for Calendar Year (CY) 2018 presents the results of vegetation inspection and monitoring activities performed by the staff biologist on the CWL evapotranspirative (ET) Cover. The purpose of this report is to provide relevant background information, describe local climate trends over the 2018 growing season, expand on the inspection results, and provide recommendations for future ET Cover vegetation monitoring and maintenance. The annual CWL Biology Inspection of the ET Cover (Biology Inspection) for CY 2018 was conducted on September 11, 2018. The inspection observations are documented on the "Chemical Waste Landfill Post-Closure Inspection Form Biology Inspection Checklist for the CWL Cover" (Annex C). The inspection was conducted during the 2018 growing season to most accurately determine the coverage of living plants. In addition, the staff biologist monitored the ET Cover vegetation and biological parameters during the 2018 quarterly inspections of the ET Cover surface, storm water diversion structures, security fence, and survey benchmarks.

A self-sustaining plant community is an important component of overall ET Cover performance. Vegetation minimizes erosion by stabilizing the ET Cover surface and moves soil moisture from the ET Cover Topsoil and Native Soil Layers to the atmosphere through transpiration. Vegetation species that are native to the area create the optimal, self-sustaining plant community because the species are specifically adapted to the local climate and soil conditions. The CWL is located at a relatively high elevation (approximately 5,400 feet above sea level) and in a challenging semi-arid climate that experiences high temperatures throughout the summer, cold temperatures in the winter, drying winds in the spring, and infrequent precipitation. Perennial native grass species provide the best ET Cover performance due to their extensive near-surface root systems that uptake moisture throughout the year and prevent precipitation from percolating more deeply into the subsurface soil. The deeper, permanent roots of perennial native grasses enable them to better withstand drought conditions, provide additional soil stabilization, and remove moisture from deeper soil layers of the ET Cover relative to non-native or annual species.

Background Information

The CWL ET Cover was first seeded in September 2005 after cover construction was completed. To meet the criteria for successful revegetation in the timeframe specified in the PCCP (i.e., within 5 years of the PCCP becoming effective), the CWL was weeded, reseeded, and supplemental watering was conducted for approximately two months during the end of the 2009 growing season. Based on the results of the September 2011 CWL Biology Inspection, the ET Cover met the criteria for successful revegetation as defined in Attachment 1, Section 1.9 of the PCCP (NMED October 2009).

The 2012 through 2018 CWL Biology Inspections document cover conditions that continue to meet the criteria for successful revegetation. CWL cover vegetation during the 2012 and 2013 inspections was characterized by small and tightly-spaced native juvenile clump grasses, with an increased diversity of native grasses in 2013. As the cover has developed into a more mature plant community, the native species composition has varied from year

2018 Chemical Waste Landfill Biology Report

to year. However, blue grama and sand dropseed have been the dominant grass species. As documented in the 2016-2018 CWL Biology Inspections, the ET Cover continues to display healthy, even coverage of mixed-age native perennial clump grasses.

Local Climate Trends for 2018 Growing Season

Climate trends for north-central New Mexico are presented in this section as they have a significant impact on the cover vegetation. Since the reseeding effort in August 2009, the local climate has generally experienced below average precipitation with temperature extremes across the seasons.

Vegetation during the growing season is directly affected by the summer meteorological conditions, and it is also strongly influenced by the conditions during the preceding autumn, winter and spring. Soil moisture during the dormant seasons can significantly stress or assist the root systems, which compose the bulk of each native plant. An extended period of very low soil moisture can severely injure root systems during the dormant season, whereas ample soil moisture during the dormant season can promote vigorous above ground growth during the growing season.

Precipitation, Relative Humidity and Winds

Tables 1 and 2 provide meteorological data for the period preceding and including the CY 2018 growing season. A 20-year data set (1995-2014) provides the reference mean monthly meteorological data and will be the reference mean data set until 2019, when a 25-year data set will be created for the 1994-2018 period.

Warmer than average temperatures with below average precipitation have been the meteorological norm in the CWL area since 2008. As of November 1, 2018 the CWL area was still classified as “Abnormally Dry” according to the U.S. Drought Monitor (November 2018).

The eight months of October 2017 through May 2018 was a period of below average precipitation and associated low relative humidity. Total precipitation for this period was 1.24 inches, which is only 31% of normal, 2.78 inches below the mean precipitation of 4.02 inches. Monthly relative humidity was an average of 8.8% below normal for this period; averaging 32.5% versus the mean monthly relative humidity of 41.3%. This lengthy period of below normal moisture stresses native vegetation due to prolonged soil drying prior to the growing season.

June 2018 received greater than twice its normal precipitation, 0.65 inches above the monthly mean of 0.49 inches. This long-awaited precipitation was followed by a very wet July with 4.37 inches of rain, significantly above the monthly average of 1.64 inches. Thunderstorms brought regular rainfall during the 2nd and 4th weeks of July, with several events including heavy downpours and significant hail. A downpour on July 27th yielded 0.98 inches in a 15-minute period, an occurrence that equates to a 50-year return interval (i.e., 50-year rainfall event). The active growing season of June through September 2018 received 7.51 inches of precipitation, well above the 20-year mean of 4.70 inches. October continued this wetter than normal stretch, receiving 1.85 inches, which is twice the mean

2018 Chemical Waste Landfill Biology Report

rainfall for the month. Total precipitation in 2018 was 11.34 inches, 2.62 inches above the 20-year annual mean of 8.72 inches.

Relative humidity for June-October 2018 was 41.5%, above the 20-year annual mean for the period of 39.1%. Average relative humidity for 2018 was 37.5%, which is 3.1% below the 20-year annual mean of 40.6%.

The 2018 monthly and annual wind speed means were very close to 20-year monthly and annual means. The largest difference was in October 2018, which experienced an average wind speed that was 1.2 miles per hour above the 20-year mean. All other months recorded average wind speeds that were within 1.0 mile per hour of the respective 20-year monthly mean.

Temperature

Average monthly temperature for October 2017 through May 2018 was nearly four degrees warmer than normal. These eight months experienced a mean temperature of 3.94°F above the 20-year mean. Average annual temperature for 2018 was 59.4°F, which is 2.1°F above the 20-year annual mean of 57.3°F

In CY 2018 the CWL experienced 98.2 degrees of temperature variability, with a low of 2.4°F in December 2018 and a high of 100.6°F in June 2018. The monthly temperature means in January through September were all more than one-degree Fahrenheit above normal. January, February, April, May and June 2018 had more significant departures of 2.9F, 3.6°F, 4.5°F, 5.3°F and 4.1°F above their respective historical mean temperatures. The mean temperature in November 2018 was 1.8°F cooler than the historical mean, the only month in 2018 to experience lower than normal temperatures.

The continued warmer than normal annual temperatures for the region coupled with highly variable precipitation and periods of drought stresses the native vegetation on the CWL ET Cover and across central New Mexico.

Cover Development and Maintenance

The successional development of the native grasses on the CWL ET Cover has been significant in the past few growing seasons. Less robust individual native grass clumps died off in large numbers in 2013, creating barren interspaces for the more resilient grass clumps to expand their root systems and grow. Since 2013 additional native grass clumps have become established and developed in these open areas.

CWL ET Cover maintenance activities performed by the ET Cover maintenance contractor are intended to address PCCP requirements and promote the growth and health of the desired native perennial grasses. 2018 activities are presented in Section 6.6 of this 2018 CWL Annual Post-Closure Care Report and are briefly summarized below. Relatively little ET Cover maintenance was required in 2018, which reflects significant progress in establishing healthy, self-sustaining native grasses on the CWL ET Cover and perimeter areas.

2018 Chemical Waste Landfill Biology Report

Table 1
October-December 2017 Meteorological Data Summary for the Chemical Waste Landfill^a

Month	October	November	December	
Temperature (°F)				3-Month Avg
Monthly Mean	57.9	54.1	42.8	51.6
20-year Temp Means	57.9	46.4	37.0	47.1
Precipitation (Inches)				3-Month Total
Monthly Total	0.07	0.00	0.00	0.07
20-year Precip Means	0.93	0.41	0.57	1.91
Relative Humidity (%)				3-Month Avg
Monthly Mean	40.5	35.5	35.6	37.2
20-year RH Means	46.6	47.6	48.6	47.6
Wind (Miles/hour)				3-Month Avg
Monthly Mean	8.2	6.6	6.3	7.0
20-year Wind Means	7.8	7.1	6.8	7.2

^aInformation Source: SNL/NM Meteorological Monitoring Program.

2018 Chemical Waste Landfill Biology Report

Table 2
2018 Meteorological Data Summary for the Chemical Waste Landfill^a

Month	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	
Year	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2017	
Temperature (°F)													Annual ^b
Monthly Mean	40.6	45.3	50.5	60.3	71.4	79.5	77.9	75.9	71.4	57.9	44.6	37.2	59.4
20-year Temp Means	37.7	41.7	48.8	55.8	66.1	75.4	76.7	74.8	68.9	57.9	46.4	37.0	57.3
Precipitation (Inches)													Annual ^c
Monthly Total	0.05	0.71	0.28	0.01	0.12	1.14	4.37	0.55	1.45	1.85	0.00	0.81	11.34
20-year Precip Means	0.34	0.45	0.56	0.50	0.26	0.49	1.64	1.57	1.00	0.93	0.41	0.57	8.72
Relative Humidity (%)													Annual ^b
Monthly Mean	38.8	38.1	31.6	22.0	17.6	22.2	42.1	43.5	43.9	55.9	41.2	52.7	37.5
20-year RH Means	49.9	44.9	36.4	30.3	26.3	24.9	40.9	44.6	45.6	46.6	47.6	48.6	40.6
Wind (Miles/hour)													Annual ^b
Monthly Mean	6.6	8.7	8.7	11.4	9.7	9.1	9.2	7.3	7.4	9.0	6.6	6.8	8.4
20-year Wind Means	6.94	8.13	9.10	10.47	9.96	9.76	8.42	7.91	7.99	7.81	7.08	6.77	8.36

^aInformation Source: SNL/NM Meteorological Monitoring Program.

^bValues provided are averages of the monthly data.

^cValues provided are totals of the monthly data.

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Two relatively minor maintenance events were conducted during CY 2018. From April 23-24, 2018, windblown, dead weeds (primarily tumbleweeds) identified during the March 29, 2018 quarterly inspection were removed from the site storm-water diversion structures, perimeter fence, ET Cover, and perimeter areas. A total of approximately 14.5 cubic yards of highly compressed weeds were removed from the site and disposed at the KAFB Landfill. From October 25-26, 2018, dead, windblown weeds were again removed from the site storm-water diversion structures, perimeter fence, ET Cover, and perimeter areas. In addition, live weeds were removed from the ET Cover and 3-foot area outside the perimeter fence by hand pulling and using rakes. This effort included removal of live and dead weeds the spaces between established native grass clumps on the ET Cover. A total of approximately 13.25 cubic yards of highly compressed weeds were removed and disposed at the KAFB Landfill. The two maintenance efforts helped remove weed seed from the ET Cover area and surface water drainages prior to the 2019 growing season.

September 2018 Inspection Results

The September biology inspection determined the CWL ET Cover continues to meet or exceed all permit requirements related to biological parameters.

- Total foliar coverage equal to or greater than 20%
- Of the total foliar coverage, 50% or greater comprised of native perennial species
- No areas devoid of vegetation greater than 200 square feet
- No animal burrows in excess of 4 inches in diameter.

The CWL ET Cover foliar coverage was approximately 39%, of which approximately 99% was native perennial grasses (Figure 1). Blue grama was the dominant grass species (20% total foliar coverage). The four native grass species present on the ET Cover accounted for 28% total foliar coverage. Identification of each native grass species and its foliar coverage was more accurate in 2018 than in 2017 due to the inspection being conducted later in the growing season after seed production; seeds are the primary method of identification for native grass species. Good, even coverage of mature native perennial clump grasses was present across the cover. The native perennial grasses appear increasingly mature and robust each year, displaying healthy leaf blades and an abundance of seeds at the time of the 2018 inspection. Many juvenile native grass clumps were also present across the CWL Cover, providing a healthy varied-age plant community.

California caltrop and square-seed spurge are both mat-forming annual forbs native to the southwestern United States. They were both unusually large and abundant across the CWL ET Cover in 2018, most likely in response to the significant monsoonal rainfall. They were removed during the October 2018 maintenance event as a best practice as they compete with the desired native grasses for sparse soil moisture and nutrients. As the CWL cover develops into a more mature plant community, the native species composition will likely continue to gradually change (i.e., foliar coverage of different native grasses will shift over time).

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Recommendations

Based on vegetation inspection and monitoring conducted during CY 2018, the existing native grasses could benefit from reduced competition with annual weedy species and other less desirable native species. This would benefit the established native grasses through increased availability of soil moisture and nutrients, and assist development of native perennial grasses in the open spaces on the CWL ET Cover (i.e., allow existing native grass clumps to expand). To achieve this, weed removal and/or application of a broad leaf pre-emergent herbicide across the entire site in late June 2019 is recommended. Pre-emergent herbicide application will help to proactively control weed growth on the CWL ET Cover by interfering with weed seed germination. Controlling weed growth aids in the overall health of the native grasses because the weeds compete for limited nutrients and soil moisture. Continued development of the established bunch grasses to more fully occupy interspaces on the CWL will help to reduce future maintenance and improve the overall health of the established native grasses. Applying a pre-emergent herbicide at this key time during the growing season would aid in reducing the summer annual weedy species. The pre-emergent should not have any adverse effects on the desired perennial native grasses, whose health will be bolstered with the onset of the monsoon rains which typically begin during the first half of July. An herbicide application in early 2019 would also aid in controlling competition from winter and spring annual weeds, which are anticipated to be more abundant than normal due to high October and December precipitation and winter El Niño meteorological conditions. El Niño conditions typically bring greater than normal precipitation, leading to increased soil moisture. Above normal winter soil moisture will also benefit native vegetation into the warm growing season and aid in buffering against adverse impacts during the warm season.

References

New Mexico Environment Department (NMED), October 2009. "Resource Conservation and Recovery Act, Post Closure Care Permit, EPA ID No. NM5890110518, to the U.S. Department of Energy/Sandia Corporation, for the Sandia National Laboratories Chemical Waste Landfill," New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, October 15, 2009.

U. S. Drought Monitor (November 2018)

<http://droughtmonitor.unl.edu/>

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Southwest portion of the cover



Northwest portion of the cover



Southeast portion of the cover



Looking north from the center of the cover

Figure 1 September 11, 2018 CWL ET Cover Photos