FINAL
2021 REMEDIAL ACTION OPERATIONS LAND USE / INSTITUTIONAL CONTROL REPORT

Cape Romanzof Long Range Radar Site, Alaska
Sites LF003, SS010, SS015, SS016, SS017, and ST009

Prepared for:

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October 2022

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Cape Romanzof Long Range Radar Site, Alaska

October 2021

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(Included at End of Report)

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
µg/L	microgram(s) per liter
AAC	Alaska Administrative Code
ADEC	Alaska Department of Conservation
AFCEC	Air Force Civil Engineering Center
AST	aboveground storage tank
BTEX	benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CL	cleanup level
COC	contaminant of concern
COV	coefficient of variation
CY	cubic yards
DO	dissolved oxygen
DoD	Department of Defense
DQAR	Data Quality Assessment Report
DQO	data quality objective
DRO	diesel range organics
EPA	U.S. Environmental Protection Agency
ERP	Environmental Restoration Program
GPS	global positioning system
GRO	gasoline range organics
IC	institutional control
ID	identification
IDW	investigation derived waste
LDC	Laboratory Data Consultants, Inc.

LRRS	Long Range Radar Site
LTM	long term management
LUC	land use control
mg/kg	milligram(s) per kilogram
mg/L	milligram(s) per liter
MK	Mann-Kendall
MS	matrix spike
MSD	matrix spike duplicate
MW	monitoring well
ND	non-detect
No.	number
North Wind-EA JV	North Wind-EA Joint Venture
ORP	oxidation reduction potential
PAL	project action limit
PCB	polychlorinated biphenyl
PPE	personal protective equipment
PVC	polyvinyl chloride
QC	quality control
QSM	Quality Systems Manual
RA-O	Remedial Action-Operation
ROD	record of decision
RRO	residual range organics
UFP-QAPP	Uniform Federal Policy for Quality Assurance Project Plan
USAF	U.S. Air Force
UST	underground storage tank
UU/UE	unlimited use and unrestricted exposure

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EXECUTIVE SUMMARY

This report presents the results of the 2021 Environmental Remedial Action-Operation (RA-O)/Long Term Management (LTM) program at the Cape Romanzof Long Range Radar Site (LRRS) in Cape Romanzof, Alaska. This 2021 Remedial Action Operations Institutional Control/Land Use Control Report was prepared by North Wind-EA Joint Venture, LLC (North Wind-EA JV) under U.S. Army Corps of Engineers – Alaska District Contract Number W911KB-20-D-0012, Task Order W911KB20F0120 for the Air Force Civil Engineering Center (AFCEC).

One field event was conducted 28 September through 30 September 2021 to address land use controls (LUCs) and institutional controls (ICs) associated with LRRS sites LF003, SS010, SS015, SS016, SS017, and ST009. LTM activities at sites LF003, SS010, SS015, SS016, SS017, and ST009 including sampling monitoring wells WW-01, WW-05, WW06, MW-4, MW- 7, and MW-9; sediment and surface water sampling at Site LF003; and IC/LUC inspections at sites LF003, SS010, SS015, SS016, SS017, and ST009 during one mobilization. The 2021 LTM field activities were performed in accordance with the 2021 Final Cape Romanzof LRRS Uniform Federal Policy for Quality Assurance Project Plan for Long-Term Management and Remedial Action Operation Activities (U.S. Air Force [USAF], 2021).

Site SS015 Sample Results

Groundwater monitoring wells at Site SS015 (WW-01, WW-05, and WW-06) were sampled and analyzed for gasoline range organics (GRO), diesel range organics/residual range organics (DRO/RRO), and benzene, toluene, ethylbenzene, and total xylenes (BTEX). One primary sample was collected from each monitoring well. One field duplicate was collected.

Results for contaminants of concern (GRO, DRO, RRO, and BTEX) in groundwater at SS015 were reported below the 2021 ADEC cleanup levels (CLs), with the following exceptions: ethylbenzene was detected in the primary and duplicate sample from WW-05 at 75.4 micrograms per liter (µg/L) and 80.6 µg/L, respectively. DRO was detected at 4,620 J- µg/L, exceeding the CL of 1,500 µg/L in the sample collected at WW-01. Benzene CL (4.6 µg/L) exceedances in groundwater were reported for WW-01 at 15.5 J µg/L, and WW-05 in the primary and duplicate at 50 µg/L and 52.1 µg/L, respectively. Mann-Kendall trend analysis indicated that none of the analytes showed a statistically significant trend in any of the three wells.

Site ST009 Sample Results

Groundwater monitoring wells at Site ST009 (MW-4, MW-7, and MW-9) were sampled and analyzed for GRO, DRO, and BTEX. One duplicate was collected from MW-07.

Results for contaminants of concern (GRO, DRO, and BTEX) in groundwater at ST009 were reported below CLs, with the following exceptions: DRO was detected at 3,960 J- and 4,650 J- µg/L in the primary and duplicate samples (respectively) collected at MW-7, exceeding the CL of 1,500 µg/L. Mann-Kendall trend analysis indicated the following:

- GRO is decreasing in MW-7 and MW-9; does not have a statistically significant trend in MW-4.
- DRO is decreasing in MW-4 and MW-9; does not have a statistically significant trend in MW-7.

- RRO does not have a statistically significant trend in any of the three wells.
- Benzene does not have a statistically significant trend in any of the three wells.
- Ethylbenzene is decreasing in all three wells.
- Toluene is decreasing in MW-4 and MW-9; does not have a statistically significant trend in MW-7.
- Xylenes (total) is decreasing in MW-7 and MW-9; does not have a statistically significant trend in MW-4.

Site LF003 Sample Results

Four sediment primary samples and three surface water primary sample were collected for polychlorinated biphenyls (PCBs) analysis at LF003. One field duplicate sample was collected for each medium. Total PCBs were below CL in all surface water and sediment samples.

Institutional Controls

The ICs at Sites LF003, SS010, SS015, SS016, SS017, and ST009 are functioning as intended to protect human receptors from exposure to contaminated media. Litter and vehicle tracks at Sites LF003, SS010, SS015, SS016, SS017, and ST009 suggest that these sites are occasionally accessed, and wind erosion may have exposed some liner and metal debris at Sites LF003, SS015, and SS017. Evidence of wildlife was noted on the visual inspection checklists.

LUC warning signs at each site were in good condition, legible, and not obscured by vegetation, with the exception of signs that have been downed by wind or snowplow, or removed since the previous visit at sites LF003, SS010 and SS015.

Continued IC/LUC inspections at the six sites are recommended to confirm IC/LUCs remain protective of human health and the environment. The landfill cover at Site LF003 will continue to be visually monitored for signs of settlement, subsidence, erosion, or other such events. Should the USAF decide that site conditions require more or less stringent control than ICs and LTM, the selected remedy would need to be re-evaluated.

1.0 INTRODUCTION

This report details the 2021 Remedial Action-Operation/Long Term Management (RA-O/LTM) activities performed at the Cape Romanzof Long Range Radar Site (LRRS). The 2021 field activities were performed at six Environmental Restoration Program (ERP) sites associated with the Cape Romanzof LRRS: Sites LF003, SS010, SS015, SS016, SS017, and ST009. This report was prepared by North Wind-EA, Joint Venture, LLC (North Wind-EA JV) for the Air Force Civil Engineering Center (AFCEC) under U.S. Army Corps of Engineers – Alaska District Contract Number W911KB-20-D-0012, Task Order W911KB20F0120 and in accordance with the Statement of Work.

The six LRRS ERP sites addressed include the following:

- LF003: Former Landfill #2,
- SS010: Weather Station Building Area,
- SS015: Lower Camp Underground Storage Tanks (USTs),
- SS016: Upper Tram Terminal Area,
- SS017: Lower Tram Terminal Area, and
- ST009: Former Truck Fueling Station.

The following LTM field activities were conducted between September 28 and 30, 2021:

- Visual inspections at Sites LF003, SS010, SS015, SS016, SS017, and ST009 to verify the effectiveness of institutional controls (IC)/land use controls (LUCs).
- Groundwater monitoring and sample collection at Sites SS015 and ST009 for analysis of volatile organic compounds (benzene, toluene, ethylbenzene, and total xylenes [BTEX]), gasoline range organics (GRO), diesel range organics (DRO), residual range organics (RRO) (SS015 only).
- Collection of four sediment samples at Site LF003 for analysis of polychlorinated biphenyls (PCBs).
- Collection of three surface water samples at Site LF003 for analysis of PCBs.

Inspection and sampling activities that occurred in September 2021 were conducted in accordance with the *2021 Final Cape Romanzof LRRS Uniform Federal Policy for Quality Assurance Project Plan (UFP-QAPP) for Long-Term Management (LTM) and Remedial Action Operation (RA-O) Activities* (USAF, 2021a) under U.S. Air Force (USAF) authority.

1.1 Purpose

The purpose of the 2021 LTM field activities was to monitor the effectiveness of the LUCs and ICs in accordance with each site's Record of Decision (ROD). Activities were performed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the 2021 Final UFP-QAPP for LTM and RA-O Activities (USAF, 2021a), the USAF AFCEC *Land Use Control*

Management Plan Pacific Air Forces Regional Support Center Remote Installations (USAF, 2019); and each site's ROD (USAF, 2008; 2011; 2013).

1.2 Project Background and History

Cape Romanzof LRRS is located approximately 540 miles west of Anchorage, Alaska. The nearest communities are Scammon Bay and Hooper Bay, located approximately 15 miles to the east and south, respectively. The Cape Romanzof LRRS facility was constructed in 1953 as one of 10 original aircraft control and warning sites in Alaska. It has been operated by independent contractors since 1977 and was converted to a minimally-attended radar site in the 1980s. The site consists of 4,900 acres of land located within the Yukon Delta Wildlife Refuge (USAF, 2013). Remedial activities under CERCLA were initiated at the installation in 1989. Various subsequent environmental investigations at the facility have identified areas where hazardous substances or petroleum products were released to the environment or disposed of onsite.

The 2021 LTM effort at Cape Romanzof LRRS included LUC/IC inspections at all six sites listed below, groundwater monitoring at two sites (SS015 and ST009), sediment and surface water sampling at Site LF003 to fulfill the selected remedial actions identified in each site-specific ROD, and landfill cap inspection at Site LF003.

1.2.1 Site LF003, Landfill No. 2

LF003 is identified as Landfill No. 2 according to the *Land Use Management Plan Pacific Air Forces Regional Support Center Remote Installations* (USAF, 2019). ICs identified in the ROD include prohibiting the development and use of property for residential housing, prohibiting excavation or disturbance of the landfill cap/cover, and requiring maintenance of the cap/cover (USAF, 2013).

Site LF003 (CS hazard identification [ID] 1341) consists of a former, capped landfill located on the south side of the access road between the Lower Camp and the airstrip. The area covers approximately 43,800 square feet and was used as the primary landfill for the installation from 1953 until the mid-1970s. Landfill No. 2 received various household and industrial wastes including garbage, wood, metal, plastic, construction/demolition debris, shop waste, and incinerator ash. The landfill was initially capped in 1993 and 1994 (USAF, 2017). The interim ROD identified the remedy as additional capping of the disposal cell, combined with excavation and disposal of impacted soil/sediment outside of the disposal cell, and long-term monitoring and ICs (USAF, 2017). PCBs and lead in surface soil and sediment are the site contaminants of concern (COCs) for LF003 that were addressed in the final ROD (USAF, 2013). The ROD provides a more detailed description of site history and COC distribution (USAF, 2013). The remedy implemented at the LF003 included excavation and off-site disposal, as well as ICs/LUCs and post-closure monitoring requirements. The third Five Year Review was completed in 2018, which confirmed that the selected remedy was not considered protective of human health and the environment, due to exposed debris present at the site, a lack of soil erosion control barriers, and the remaining presence of PCB-contaminated sediment (USAF, 2018).

LTM activities completed in 2019 and 2020 included the installation of silt fencing downgradient of LF003 to prevent offsite migration of sediments, LUC/IC inspections, and the continued monitoring of surface water and sediments for PCBs (USAF, 2020; 2021a; 2021b). No detections of PCBs exceeding the regulatory criteria were noted in sediment or surface water and the warning signs were in good shape (USAF 2021a). However, the inspection noted exposed geotextile fabric, damaged sediment traps (silt fences), and minor erosional areas. Downgradient movement of PCBs from the landfill is a primary concern at LF003. The sediment traps (i.e., silt fences) were placed to limit potential migration, and the

inspection and sampling program is intended to confirm migration in excess of Alaska Department of Conservation (ADEC) criteria is not occurring.

1.2.2 Site SS010, Weather Station Building Area

Site SS010 is identified as Weather Station Well Spill Site 4 according to the *Land Use Management Plan Pacific Air Forces Regional Support Center Remote Installations* (USAF, 2019). ICs identified in the ROD include preventing access to groundwater and soil, prohibiting development and use of property for residential housing, preventing the use of contaminated soil, and implementing a soil management plan (USAF, 2013).

Site SS010 (CS Hazard ID 1334) is located approximately 600 feet east of the southwest end of the airstrip. The site encompasses a Weather Station Building area and consists of fuel spills associated with a former diesel fuel aboveground storage tank (AST). The suspected contaminant sources, Tank #11 (a 25,000-gallon diesel AST) and diesel fuel AST Tank #4, have been removed. Previous investigations conducted identified total petroleum hydrocarbons (GRO, DRO and RRO) as COCs in subsurface soil and groundwater. The ROD provides a more detailed description of site history and COC distribution at SS010 (USAF, 2013). The remedy implemented for SS010 included ICs and long-term monitoring. Monitoring ceased in 2015 due to the site meeting remedial goals for two successive monitoring events (USAF, 2018). The most recent Non-CERCLA Periodic Review was completed in 2018, which confirmed that the selected remedy remains protective of human health and the environment (USAF, 2018). The most recent LTM inspections were completed in 2019 and 2020 (USAF, 2020b; 2021a; 2021b), which documented the decommissioning of three site wells. No issues were noted with the ICs.

1.2.3 Site SS015, Lower Camp USTs

Site SS015 is identified as Old UST Site/Leaking USTs according to the *Land Use Management Plan Pacific Air Forces Regional Support Center Remote Installations* (USAF, 2019). ICs identified in the ROD include limiting excavation and prohibiting installation of water supply wells (USAF, 2011).

Site SS015 (CS Hazard ID 1329) is located at Lower Camp. This UST spill area, located 200 feet south of the Lower Camp and north of SS013, is the result of diesel fuel spills from two USTs. The 5,000- and 15,000- gallon USTs were discovered in 1991 during an excavation of fuel-contaminated soils from an adjacent AST (USAF, 2011). Multiple investigations were completed in the 1990s to document soil and groundwater exceeding ADEC CLs and an interim ROD consisting of monitored natural attenuation and IC/LUC was implemented in 2002 (USAF, 2011). Site COCs include GRO, DRO, RRO, and benzene in groundwater. Inspections and monitoring have been ongoing since the 2002 interim ROD was approved, with the most recent LTM activities completed in 2019 and 2020 (USAF, 2020b; 2021a; 2021b). The most recent Non-CERCLA Periodic Review was completed in 2018, which confirmed that the selected remedy remains protective of human health and the environment (USAF, 2018). The 2020 site inspection noted that the LUC warning signs were in good condition and recommended continued annual inspections.

1.2.4 Site SS016, Upper Tram Terminal Area

Site SS016 is identified as Upper Tram Terminal Area according to the *Land Use Management Plan Pacific Air Forces Regional Support Center Remote Installations* (USAF, 2019). ICs identified in the ROD include prohibiting development and use of property for residential housing, preventing use of contaminated soil for restricted uses, requiring a dig permit in the event of excavation, implementing a soil management plan, and maintaining the cap (USAF, 2013).

Site SS016 (CS Hazard ID 4129) is situated on top of a steep slope at the Upper Camp. COCs identified at the Site SS016 consist of PCBs and lead in the surface soil. Approximately 339 cubic yards (CY) of surface soil was previously identified with PCB contamination. The ROD identified the SS016 remedy as excavation with off-site disposal, but also stated that excavation of all impacted soil might not be possible, in which case capping and institutional controls would be implemented (USAF, 2013). The 2016 removal action conducted at Site SS016 resulted in the removal of approximately 129 tons of PCB- and lead-contaminated soil (USAF, 2017). The extent and volume of lead-contaminated soil remaining has not yet been determined. While soil contamination remains at the site, safety concerns must be resolved before additional remedial actions can be performed. These safety concerns include the relocation of live high voltage power cables and stabilization of the tram dock footing before additional remedial activities can be performed. The first Non-CERCLA Periodic Review was completed in 2018, which determined that a protectiveness statement would be deferred until remediation could occur. This remediation, which is to include the removal of the Upper Tram Terminal, excavation of the remaining previously inaccessible PCB- and lead-contaminated soil, relocation of a high- voltage power line, and stabilization of the slope is expected to take place in 2023, at which time a protectiveness determination can be made (USAF, 2018). The 2020 site inspection noted that the LUC warning sign was in good condition and recommended continued annual inspections.

1.2.5 Site SS017, Lower Tram Terminal Area

Site SS017 is identified as Lower Tram Terminal Area according to the *Land Use Management Plan Pacific Air Forces Regional Support Center Remote Installations* (USAF, 2019). ICs identified in the ROD include prohibiting development and use of property for residential housing, preventing use of contaminated soil for restricted uses, requiring a dig permit in the event of excavation, implementing a soil management plan, and maintaining the cap (USAF, 2013).

Site SS017 (CS Hazard ID 4129) sits at the toe of the slope from the Upper Camp. COCs identified at Site SS017 consist of PCBs and lead in the subsurface soil and surface soil. Approximately 11 CY of PCB-contaminated subsurface soil and 179 CY of PCB-contaminated surface soil had been previously identified at the site. The ROD identified the SS017 remedy as excavation with off-site disposal (USAF, 2013). The 2016 removal action conducted at Site SS017 resulted in the removal of approximately 454 tons of PCB and lead contaminated surface and subsurface soil. The extent and volume of lead contaminated soil remaining at Site SS017 has yet to be determined. While soil contamination of lead and PCB remains at the site, safety concerns must be resolved before additional remedial actions can be performed at Site SS017. These safety concerns include the presence of live high voltage power cable, which will require relocation prior to resuming remedial activities at Site SS017 (USAF, 2017). The first Non-CERCLA Periodic Review was completed in 2018, which determined that a protectiveness statement would be deferred until remediation could occur. This remediation, which is to include the removal of the Lower Tram Terminal, excavation of the remaining previously inaccessible PCB- and lead-contaminated soil, and relocation of a high- voltage power line is expected to take place in 2023, at which time a protectiveness determination can be made (USAF, 2018). The 2020 site inspection noted that the LUC warning signs were in good condition and recommended continued annual inspections.

1.2.6 Site ST009, Former Truck Fueling Station (Spill Site 3)

Site ST009 is identified as Spill Site 3 according to the *Land Use Management Plan Pacific Air Forces Regional Support Center Remote Installations* (USAF, 2019). ICs identified in the ROD include excavation and construction restrictions, documentation that soil is impacted above levels allowing unrestricted use, and a prohibition on the installation of water supply wells (USAF, 2008).

Site ST009 (CS Hazard ID 1339) consists of a former truck fueling station, located downstream of Lower Camp and adjacent to the mouth of Fowler Creek. The site was contaminated as a result of numerous small petroleum spills associated with vehicle fueling activities. A 1994 investigation estimated that approximately 955 CY of contaminated soil were present at the site. Soil was left in place and further characterized during a 2004 site investigation. Investigations at the site identified GRO, DRO, and benzene as COCs. The 2008 ROD (USAF, 2008) summarizes the nature and extent and the remedy for Site ST009, which include monitored natural attenuation as a remedial action for groundwater. Inspections and monitoring have been ongoing since the ROD was approved, with the most recent LTM activities completed in 2019 and 2020 (USAF, 2020b; 2021a; 2021b). The most recent non-CERCLA Periodic Review was completed in 2018, which confirmed that the selected remedy remains protective of human health and the environment (USAF, 2018). The 2020 site inspection noted that the LUC warning signs were in good condition and recommended continued annual monitoring and inspections.

1.3 Project Objectives

The objective of the September 2021 field effort was to perform environmental monitoring to ensure the current LTM and IC/LUC programs continue to prevent human exposure to site COCs and future releases of contaminants, and to continue to monitor contaminant degradation at the installation.

The LTM program was instituted at the facility to meet the requirements of CERCLA and the National Contingency Plan. The objective of the program was to track the reduction of residual contamination at the impacted sites and to monitor for any further release of contaminants to the undisturbed surrounding areas.

Field activities included the inspection of the landfill cap at Site LF003, LUC/IC inspections at six sites, and collection of environmental samples at Sites LF003, ST009, and SS015.

1.4 Regulatory Framework

The cleanup of the installation is conducted in accordance with CERCLA, the National Contingency Plan, and Alaska state regulations. In accordance with the CERCLA process, the USAF was identified as the responsible party and is the lead cleanup agency. ADEC oversees the cleanup effort on behalf of the state to ensure that remediation objectives are consistent with the State of Alaska CLs and guidance for soil/sediment, groundwater, and surface water.

Under the ERP, the USAF 611th Civil Engineer Squadron developed a LTM program in accordance with the Final Record of Decision documents at the Cape Romanzof LRRS (USAF, 2008; 2011; 2013).

1.5 Report Organization

This report is organized as follows:

- **Section 1.0, Introduction.** This section presents the project purpose, objectives, project area background and history, regulatory setting, document organization, and analytical program.

- **Section 2.0, 2020 Site Activities and Observations:** This section describes IC/LUC inspection activities, sampling methodology, global positioning system (GPS) surveys, deviations, and investigation derived waste (IDW) disposal from the ADEC-approved UFP-QAPP (USAF, 2021a), as well as the analytical results of media samples collected.

- **Section 3, Data Quality Review:** Presents the results of the data verification, validation, and usability assessment, as well as ADEC data review checklists.

- **Section 4, Summary and Recommendations:** Presents a summary of the conclusions, data limitations, and recommendations for future work.

- **Section 5, References:** Presents the works cited and referenced within this report.

- **Appendix A, Photograph Log:** Presents general site photographs for 2021 field activities, including LUC inspection photographs, monitoring well inspection photographs, low-flow groundwater sampling, and sediment and surface water sampling.

- **Appendix B, Field Forms and Logbook:** Presents the daily logbook notes, visual inspection checklists, calibration log forms, and low-flow groundwater sampling and stabilization forms associated with 2021 field activities.

- **Appendix C, Chemical Data Tables:** Presents the full chemical data tables.

- **Appendix D, Data Quality Assessment Report and ADEC Data Review Checklist:** Presents a chemical data quality review, ADEC checklists, and sample summary table.

- **Appendix E, Laboratory Results:** Presents the Level II analytical laboratory report associated with project samples in electronic version only. The Level IV laboratory report will be provided separately.

- **Appendix F, Mann-Kendall Trend Analysis:** Presents the ProUCL output for the Mann-Kendall trend analysis.

- **Appendix G, Response to Comments:** Presents responses to regulatory comments in final version only.

2.0 2021 SITE ACTIVITIES AND OBSERVATIONS

The 2021 LTM field activities were conducted at Cape Romanzof LRRS Sites LF003, SS010, SS015, SS016, SS017, and ST009 in accordance with the approved UFP-QAPP (USAF, 2021a). Field activities conducted from September 28, 2021 through September 30, 2021 included visual inspections, groundwater monitoring/sample collection, and sediment and surface water sample collection. Travel was conducted via chartered aircraft from Bethel, Alaska to Cape Romanzof LRRS.

Photographs of site conditions and field activities are presented in the Photograph Log (Appendix A). Inspection checklists, sample forms, instrument calibration log forms, and field notes are presented in Appendix B.

2.1 Land Use Control/Institutional Control and Landfill Cover Inspections

LUC/IC visual inspections were conducted at Sites LF003, SS010, SS015, SS016, SS017, and ST009. A landfill cover inspection was conducted at LF003. Site locations are shown on Figure 1. The following subsections describe each site inspection. Photographs documenting site activities and conditions are provided in Appendix A.

2.1.1 Site LF003, Landfill No. 2

Minor settling of the capped surface was observed. Ponded water was noted due to recent and ongoing rainfall and snowfall; no sheen was observed on the ponded water. Petroleum sheen and chemical odors were not observed or evident at the cap or at surface water downgradient to the southwest. The site had some debris and areas of possible escapement of landfill material including geotextile liners, plastics, and metal materials. Significant metal debris is present at the site, north of the road. An extracted well casing was laying on the ground at the bottom of the east side slope. Vehicle tracks were observed in the flat/pull-off area of the site, and recent excavation and fill activities were noted. The south and west side slopes had recently been graded. Surface erosion was observed on all side slopes of the landfill cap (water runoff areas) except for the road boundary. The site had damaged or missing silt fences. All silt fences were in various states of disrepair and non-operative condition due to high winds and require replacement. Damage to the silt fences include those done by wind damage where they were observed ripped and partially attached to bent posts and completely missing given by standalone posts with no attached fabric. No discolored vegetation was observed. Several birds of an unidentified species were present at the site. The site is not vegetated on the cap surface and south/west side slopes, and up to 70 percent vegetated on the east side slope. Signage at the west end of the site was destroyed and laying on the ground. Two signs were still in place and in good condition, though slightly faded. One was at the east end of the site on the south side of the road, the other was on the north side of the road.

2.1.2 Site SS010, Weather Station Building Area

There was no evidence of settling on the capped surface, and no ponded water with petroleum sheen or any chemical odors were observed. Vehicle tracks were observed on the access road to the weather station. A large area of surface erosion/water runoff was present along the western and eastern boundary of the site. No discolored vegetation or evidence of excavation was observed. Various birds and fox were observed at the site. The site is approximately 30 percent vegetated. One LUC warning sign was present and in good condition. The second sign for the site was not located.

2.1.3 Site SS015, Lower Camp USTs

There was minor evidence of settling on parts of graded surface areas, but there were no observations of ponded water. Trash, metal, and construction debris were observed throughout the site, possibly wind-

blown from another location. Monitoring wells are present at this site. All wells were observed to be in good condition. Vehicles were observed driving on the road around the site boundary. Survey marker nails were present, but they are not tied to the National Geodetic Survey database. The site did not have surface erosion, discolored vegetation, or previously buried debris materials exposed at the ground surface. Various birds and fox were present at the site. The site is 90 percent vegetated. Two LUC warning sign were present; one of the signs near the main access road was damaged.

2.1.4 Site SS016, Upper Tram Terminal Area

The building and debris have been removed from this site. Although portions of the building footprint exist at the site, there was no debris present. There was no signage present. There was no evidence of settling on the site's surface and no observations of ponded water. No monitoring wells were present. One survey marker was observed between the site and the radar dome. Vehicle tracks were observed, indicating the base operation support contractor accesses this site. Surface erosion, discolored vegetation, previously buried debris were not observed. Evidence of fox and caribou was noted, and various birds were present at the site. The site is approximately 5 percent vegetated.

2.1.5 Site SS017, Lower Tram Terminal Area

The building has been removed from this site. Portions of the building footprint exist and piles of metal, concrete and wood debris are still present. There was no signage present. There was no evidence of settling on the capped surface and no observations of ponded water. No monitoring wells or survey monuments were present. Vehicle tracks were present in the southwest/southeast portion of the site. Surface erosion and discolored vegetation were not observed. Various birds were observed at the site. The site is approximately 5 percent vegetated.

2.1.6 Site ST009, Former Truck Fueling Station (Spill Site 3)

There was no evidence of settling on the site surface, and no petroleum sheen was observed in any of the surface water bodies at this site. Metal and other debris was scattered across the site. A large area of the site was filled with large supersacks. Site personnel stated these were being removed from the site via barge. All six wells appear in good condition.

MW-9 had an open lock which was corroded, so field personnel installed a new combination lock. Vehicle tracks were observed on the access road within the site boundary, as well as on the barge unloading area. Minor, natural erosion was observed on beach/in barge unloading dock area. Surface erosion, discolored vegetation, and previously buried debris were not observed. Seagulls, eagles, falcons, and unidentified scat was observed at the site. The site is 40 percent vegetated on the surface, and up to 15 percent vegetated on the side slopes. Well IDs were written on the inside of each outer casing to assist future fieldwork at this site. Two LUC warning signs were present and in good condition.

2.2 Sampling Methodology

All environmental media samples were collected by ADEC Qualified Environmental Professionals meeting the requirements of 18 Alaska Administrative Code (AAC) 75.333 following the approved UFP-QAPP (USAF, 2021a). Any deviations to sampling methods are presented in Section 2.3.

After sample collection, the sample containers were placed directly into sealable plastic bags and placed in an insulated cooler with frozen gel packs. The gel packs were replaced at the time of shipment to maintain the inside temperature of the cooler at equal to or less than 6 degrees Celsius (°C). The samples were shipped via charter to Bethel, Alaska where North Wind-EA JV personnel directly transferred the samples to Alaska Air Cargo for shipment to Anchorage, AK. Once the samples arrived in Anchorage, the insulated coolers were opened by North Wind-EA personnel and the gel packs were replaced with fresh

frozen gel packs and secured using chain of custody procedures and shipped via FedEx within 24 hours to Pace Analytical National Laboratory (Pace) in Mount Juliet, Tennessee.

2.2.1 Groundwater Monitoring and Sampling

Groundwater monitoring was conducted at Sites SS015 and ST009 in accordance with the UFP-QAPP (USAF, 2021a). Prior to initiating sampling activities, depth to groundwater was measured and recorded at each well using a water level meter (electronic tape) to 0.01 foot precision from the northern or marked side of the polyvinyl chloride (PVC) well casing. At ST009 monitoring well MW07, small globules of light non-aqueous phase liquids were observed on the electronic tape that exhibited a strong fuel odor. The water level meter was decontaminated after each well gauging with non-phosphate soap and distilled water mix and then rinsed with distilled water.

Monitoring wells were purged and sampled using low-flow sampling protocols in accordance with Field Sampling Guidance (ADEC, 2019) to minimize disruption to the water column. To ensure the purged groundwater was flowing from the aquifer, water was purged from the wells at a minimal rate to limit drawdown.

A low flow, submersible pump (12 volt Proactive stainless steel Mini-Monsoon) was used to purge and sample each well at Site SS015 – Lower Camp USTs. A low-flow peristaltic pump (Masterflex L/S) was used to purge and sample each well at Site ST009 – Former Truck Fueling Station. New silicone and low-density polyethylene tubing were used for each well. The pump or tubing was lowered into the well slowly and carefully to a depth corresponding with the approximate midpoint of the saturated screen interval. When a visible sheen or odor was observed in the purge water or on the water level meter tape, to target suspected petroleum contaminants, the intake was set as close as possible to the water table surface (within the top foot of water column) regardless of screened interval length (ADEC, 2019). The pump was turned on to a flow rate of 0.1 to 0.5 liters per minute. The water level in the well was monitored during sampling to measure drawdown during purging and the flow rate was adjusted to ensure minimum drawdown (less than 0.3 foot below initial water level).

Groundwater samples were collected for laboratory analysis when field parameters indicated that groundwater had stabilized (see below for criteria). If the well was purged dry, it was sampled once it had recharged to approximately 80% of its initial volume. If parameters did not stabilize, the well was sampled after at least three casing volumes had been purged.

Water quality parameters were measured at regular intervals (3-5 minutes) during groundwater purging activities using a closed flow-through cell water quality meter. Field stabilization parameters including potential hydrogen (pH), temperature, specific conductance, dissolved oxygen, and oxidation reduction potential, were measured in the field using a calibrated YSI™ 556 multiprobe system water quality meter during purging and prior to sample collection and documented on the Well Purge and Sampling Field Forms included in Appendix B.

Once groundwater quality parameters stabilized, groundwater was collected into laboratory-provided sample containers after disconnecting the tubing from the YSI flow cell in accordance with the ADEC *Field Sampling Guidance* (ADEC, 2019).

All groundwater monitoring wells at the Lower Camp UST Site SS015 (SS015-WW-01, SS015-WW-05, SS015-WW-06) and the Former Truck Fueling Station (Spill Site 3) Site ST009 (ST009-MW-4, ST009-MW-7, and ST009-MW-9) were sampled on September 29, 2021. Locations of groundwater monitoring wells for Sites SS015 and ST009 are shown on Figure 2 and Figure 3, respectively.

The analytical results of groundwater samples collected at Sites SS015 and ST009 are presented in Section 2.5.1. Groundwater quality control (QC) samples included two field duplicate samples (one per site) and additional aliquots for designated matrix spike (MS) and rinse blank samples submitted to the laboratory with the primary groundwater samples.

2.2.2 Surface Water Sampling

Surface water sampling at Site LF003 was conducted on 30 September 2021 down gradient from the silt fence using the direct fill method. The sampler faced upstream and collected the sample without disturbing the sediment. The sampler submerged the closed sample container, unscrewed the container lid to collect the sample, and then returned the lid while sub-surface. A transfer bottle was not needed for collection since the sample bottles did not contain any preservatives.

Measurements for pH, conductivity, temperature, dissolved oxygen (DO), and oxidation-reduction potential (ORP) were collected at the sample location by gently lowering a YSI multi-parameter water quality meter, post sample collection, into the water so as not to disturb sediment. The water quality meter probe was allowed to stabilize before measurements were documented in the field logbook. Observations and location description were also documented in the field logbook.

The analytical results of surface water samples collected at LF003 are presented in Section 2.5.2. The QC samples included one field duplicate sample and additional aliquots for designated MS/matrix spike duplicate (MSD) samples submitted to the laboratory with the primary surface water samples. Figure 4 shows the surface water collection locations at Site LF003.

2.2.3 Sediment Sampling

Sediment sampling at Site LF003 was conducted 30 September 2021. The sediment samples at LF003 were collected just upgradient from the established silt fences via grab sampling methods using a disposable trowel. The sampler filled the unpreserved container full to ensure no head space was present.

Four primary sediment samples, plus one field duplicate sample were collected from the immediate upgradient vicinities of each silt fence location. The silt fences were previously installed in the downgradient areas below the Site LF003 cap boundary. Samples LF003-S01-093021, LF003-S02-093021 (and field duplicate LF003-S02-093021-02), LF003-S03-093021, and LF003-S04-093021 were collected for laboratory analysis of PCBs by U.S. Environmental Protection Agency (EPA) Method 8082A. Samples were collected into laboratory-provided sample containers using dedicated/disposable sampling equipment at each sample location.

Information about sample analyses, sediment characterization, and other sampling collection details were documented in the field logbook provided in Appendix B. Figure 4 shows the sediment collection locations, and analytical results are presented in Section 2.5.3.

2.3 Work Plan Deviations

Deviations from the 2021 Final QAPP (USAF, 2021a) are presented below.

- Turbidity was not measured as one of the field stabilization parameters due to an unresolvable issue with the calibration standards. Visual observation was noted as being clear throughout the sampling process.

- Only three surface water samples were collected due to no surface water being present at or down gradient from the farthest southwest location.

- A peristaltic pump was used to collect samples at the three ST009 wells. The samples collected include: ST009-MW-04, ST009-MW-07, ST009-MW-09, and associated MS/MSD and duplicate samples.

2.4 Investigation Derived Waste

The IDW generated during the 2021 field effort included purge water from groundwater sampling, decontamination fluids, and disposable sampling equipment. Purge and decontamination water generated during the groundwater sampling effort was cycled through a 5-gallon granulated activated carbon treatment system and discharged to the ground surface close to the point of generation at locations where it would not run-off to existing streams of surface water bodies and greater than 100 feet from drinking water wells in accordance with the approved UFP-QAPP (USAF, 2021a).

The remaining miscellaneous solid waste including used personal protective equipment (PPE), disposable sampling equipment and various other solid waste items, was bagged onsite and transported back to Anchorage for disposal in the municipal landfill.

2.5 Analytical Results

This section describes laboratory analytical results for media sampled at Sites LF003, SS015, and ST009.

Tabulated analytical data is presented in Appendix C. The Level II laboratory report is included as Appendix D. The USACE North Pacific Division Laboratory (NPDL) project number is 21-037.

2.5.1 Groundwater Sampling Results

Three primary groundwater samples, plus one field duplicate sample were collected from Site SS015 groundwater monitoring wells WW-01, WW-05, WW-06 for analysis of GRO (Alaska Method (AK) 101), DRO (AK102), RRO (AK103), and BTEX (EPA method 8260D).

Analytical results from the Lower Camp USTs (SS015) 2021 sampling event showed detections of GRO in all wells ranging from 30.2 U to 1,280 micrograms per liter (µg/L), all below the 18 AAC 75.345 Table C groundwater cleanup criterion of 2,200 µg/L. Detections of DRO were also observed in all wells ranging from 1,290 J- to 4,620 J- mg/L; only one of the wells (WW01) exceeded the Table C cleanup criterion of 1,500 µg/L. RRO was not detected above the laboratory limit of quantitation (LOQ).

Two wells detected benzene concentrations above Table C criterion of 4.6 µg/L: WW01 (primary: 15.5 J µg/L) and) and WW05 (primary: 50 µg/L; and duplicate: 5.21 ug/L); benzene was not detected in well WW06. Monitoring well WW05 exhibited exceedances of ethylbenzene in the primary and duplicate sample (75.4 µg/L and 80.6 µg/L). Ethylbenzene was also detected in well WW01, but below the Table C cleanup criterion of 15 µg/L. No ethylbenzene was detected in well WW06.

Concentrations of toluene were detected in well WW05 primary and duplicate samples (1.2 and 1.23 mg/L), but below Table C cleanup criterion of 1,100 µg/L. Wells WW01 and WW06 did not detect any toluene above the LOQ. Total xylenes were detected in well WW05 primary and duplicate samples ranging from 99.8 to 108 µg/L, but below Table C cleanup criterion of 190 µg/L. No xylenes were detected in wells WW01 or WW06.

Three primary groundwater samples, plus one field duplicate sample were collected from Site ST009 groundwater monitoring wells MW-4, MW-7, and MW-9 for the analysis of GRO (AK101), DRO (AK102), and BTEX (8260D). Analysis for RRO was not requested for Site ST009 per the QAPP in

accordance with the scope of work consolidated task list. RRO was inadvertently analyzed and reported by the laboratory for MW-7, but was not detected in the sample.

Analytical results from the Former Truck Fueling Station Spill Site 3 (ST009) 2021 sampling event showed detections of DRO in all wells ranging from 208 J- µg/L to 4,650 J- µg/L; two samples, ST009-MW7-092921 and duplicate ST009-MW7-092921-S01, exceeded DRO Table C cleanup criterion of 1,500 µg/L, at 4,650 J- mg/L and 3,960 J- µg/L respectively. This well was observed to have small globules of light non-aqueous phase liquids on the water level meter electronic tape exhibiting a strong fuel odor.

Table 2-1 and Table 2-2 provide summaries of groundwater analytical results for Sites SS015 and ST009, respectively, listing each COC compared against their respective November 2021 ADEC Table C groundwater CLs. Figure 2 and Figure 3 present the site layouts, groundwater sample locations, and summaries of analytical results for monitoring wells at Sites SS015 and ST009, respectively.

2.5.2 Surface Water Sampling Results

Three primary surface water samples and one field duplicate were collected from Site LF003 for the analysis of PCBs as Aroclors and total PCBs by SW8082A. Results for PCBs were nondetectable in surface water samples; however, the limit of detection (LOD) for all surface water samples were slightly above the corresponding ADEC project action limit (PAL) of 0.00044 mg/L. Figure 4 shows the site layout, surface water sample locations, and a summary of analytical results for the samples collected. Table C-3 in Appendix C presents the summary of the 2021 analytical results.

2.5.3 Sediment Sampling Results

Four primary sediment samples and one field duplicate sample were collected at LF003 for the analysis of PCBs as Aroclors by SW8082A. Aroclor 1260 and total PCBs were detected in two sediment samples, LF003-S02 and LF003-S04, at concentrations below the PAL of 1.0 mg/kg for soil. PCB results were compared to soil CLs for screening purposes because the State of Alaska does not have CLs for sediment. Aroclor 1260 and total PCBs were detected at 0.240 J milligrams per kilogram (mg/kg) and 0.0977 J mg/kg in LF003-S02 and LF003-S04, respectively. The remaining PCB Aroclors analyzed were not detected in any other sediment samples.

shows the site layout, sediment sample locations, and a summary of analytical results for the samples collected.

Table 2-1. SS015 Summary of Groundwater Analytical Results

		GRO		DRO		RRO		Benzene		Toluene		Ethylbenzene		Xylenes	
Cleanup Level [1] (µg/L)		**2,200**		**1,500**		**1,100**		**4.6**		**1,100**		**15**		**190**	
Monitoring Well ID	Year	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020
WW-01		278 J	172	**4,620 J-**	**3,830**	ND UJ	ND	**15.5 J**	**12.5**	ND	ND	2.82 U	7.83	6.84 U	11.7
WW-05		1280	ND	1,290 J-	ND	ND UJ	ND	52.1	ND	1.20	ND	**75.4**	ND	99.8	ND
WW-06		30.2 U	ND	1,370 J-	431	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
[1] ADEC Groundwater Cleanup Levels, AAC Title 18, Chapter 75.345, Table C for Human Health (ADEC, 2021).
Results shown in **bold** and highlighted exceed cleanup levels.
µg/L = microgram(s) per liter
ND = Not detected above the detection limit (DL).
Data Qualifiers
U = The analyte was analyzed for, but not detected or is qualified as non-detect because of blank contamination.
J = The analyte was positively identified; the quantitation is estimated because of discrepancies in meeting certain analyte-specific QC criteria.
J- = The analyte was positively identified and the result is an estimated quantity, but the result may be biased low.
UJ = The analyte was not detected; however, the result is estimated because of discrepancies in meeting certain analyte-specific QC criteria.

Table 2-2. ST009 Summary of Groundwater Analytical Results

		GRO		DRO		RRO		Benzene		Toluene		Ethylbenzene		Xylenes	
Cleanup Level [1] (µg/L)		**2,200**		**1,500**		**1,100**		**4.6**		**1,100**		**15**		**190**	
Monitoring Well ID	Year	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020
MW-4		ND	58.3	208 J-	**5,460**	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-7		295 J-	412	**4,650 J-**	**4,010**	ND	ND	ND UJ	ND	ND	ND	1.16 J-	1.45	2.07 J	2.92
MW-9		127 U	ND	600 J-	230	NA	469	ND	ND	ND	ND	0.241 U	ND	0.451 U	ND

Notes:
[1] ADEC Groundwater Cleanup Levels, AAC Title 18, Chapter 75.345, Table C for Human Health (ADEC, 2021).
Results shown in **bold** and highlighted exceed cleanup levels.
µg/L = microgram(s) per liter
NA = not analyzed
ND = Not detected above the detection limit (DL).
Data Qualifiers
U = The analyte was analyzed for, but not detected or is qualified as non-detect because of blank contamination.
J = The analyte was positively identified; the quantitation is estimated because of discrepancies in meeting certain analyte-specific QC criteria.
J- = The analyte was positively identified and the result is an estimated quantity, but the result may be biased low.
UJ = The analyte was not detected; however, the result is estimated because of discrepancies in meeting certain analyte-specific QC criteria.

Table 2-3. LF003 Summary of Sediment Analytical Results.

		PCB 1016		PCB 1221		PCB 1232		PCB 1242		PCB 1248		PCB 1254		PCB 1260		PCB 1262		PCB 1268		Total PCBs	
PAL[1]																				**1.0**	
Location ID	Units	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020
S01	mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S02	mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0242	ND	ND	ND	ND	ND	ND	ND	0.0242
S03	mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.240 J	ND	0.240 J	ND
S04	mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0893	ND	ND	ND	ND	0.098 J	ND	0.098 J	0.0893

Notes:
[1] Project Action Limits (PALs) are the Final Remedial Action-Operation objectives per the Record of Decision for site LF003. PAL is based on ADEC Soil Cleanup Levels, AAC Title 18, Chapter 75.341, Table B1 for Human Health (ADEC, 2021).
mg/kg = microgram(s) per liter
ND = Not detected above the detection limit (DL).
PCB = polychlorinated biphenyl
QC = quality control
Data Qualifier:
J = The analyte was positively identified; the quantitation is estimated because of discrepancies in meeting certain analyte-specific QC criteria.

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3.0 DATA QUALITY REVIEW

All laboratory results, including laboratory QC sample results, were reviewed and evaluated for quality, validity, and usability by Laboratory Data Consultants, Inc. (LDC). The data validation was performed under Stage 2B validated guidelines in accordance with the Final UFP-QAPP for Cape Romanzof (USAF, 2021a), the DoD General Validation Guidelines (November 2019), and the DoD Data Validation Guidelines Module 1: Data Validation Procedure for Organic Analysis by GC/MS (May 2020). Where specific guidance was not available, the data were evaluated in a conservative manner consistent with industry standards using professional experience.

A DQAR is included in Appendix D along with the ADEC Laboratory Data Review Checklist. The level II laboratory analytical report is provided in Appendix E.

QC samples (including field duplicates, matrix spikes, trip blanks, and equipment blanks) were collected to monitor accuracy, precision, and the presence of field contamination. A summary of the QC results is presented in Appendix D.

The results of data verification and validation processes indicate that the data generated from the samples collected during the September 2021 field activities are of sufficient quality and quantity necessary to accomplish project objectives. Sample results accurately indicate the presence and/or absence of target analyte concentrations at sampled locations and are representative of conditions at the time of collection. Samples were collected and analyzed as specified in the 2021 Final UFP-QAPP (USAF, 2021a), except as noted within the ADEC data checklists provided in Appendix D and Section 2.3, Work Plan Deviations.

The following issues were noted during the validation:

- Volatiles:
    - Trip Blank 2 and ST009-MW-7 were analyzed out of hold time and assigned qualifiers of UJ (for non-detects) and J (for detects).
    - The equipment blank had detections of ethylbenzene and xylenes. The ethylbenzene and xylene results for samples ST009-MW9 and SS015-WW01 were similar to concentrations in the equipment blank and considered as non-detected by the validator.
    - The surrogate recovery was low for sample SS015-WW01; all associated detections were assigned J qualifiers.
    - The MS/MSD recovery was low and relative percent difference was high for sample ST009-MW7. All associated samples were assigned J qualifiers.
    - The rinsate blank had detections of ethylbenzene and xylenes. The ethylbenzene and xylene results for samples ST009-MW9 and SS015-WW01 were similar to concentrations in the rinsate blank and considered as non-detected by the validator.
    - ST009 wells MW-9, MW-7, and MW-4 were incorrectly sampled using a peristaltic pump. As a result, all volatile compound detections for these three wells have been assigned J- qualifiers.

- PCBs:
    - Initial and continuing calibration verifications recovered outside acceptance criteria for Aroclor 1016 and Aroclor 1260. All samples were qualified UJ (non-detects) and J (detects).
    - The PCB Aroclor 1016 MS/MSD percent recoveries and RPD were high. The parent sample LF003-S04-093021 was non detect and qualified UJ.
- GRO
    - Holding times were exceeded for samples SS015-WW01 and ST009-MW7. All detects were assigned J qualifiers.
    - ST009 wells MW-9, MW-7, and MW-4 were incorrectly sampled using a peristaltic pump. As a result, all detects for these three wells were assigned J- qualifiers.
    - MS/MSD recovery was low for MW-7, all associated detections were assigned J- qualifiers.
- DRO/RRO
    - The surrogate recovery was low for all samples were assigned qualifiers of UJ (for non-detects) and J- (for detects).
    - MS/MSD recovery was low for MW-7, all associated detections were assigned J- qualifiers.

Results obtained are comparable to industry standards in that collection and analytical techniques followed approved, documented procedures, and results are reported in industry standard units. The data are complete, and the results are usable for project objectives. The overall completeness of the data indicates that the quality of the analytical program and the laboratory and field procedures were sufficient to meet the data quality objectives (DQOs).

The overall quality of the data was acceptable. No results were rejected, and the project completeness goal was met. Acceptable data are associated with QC data that meet QC criteria, or with QC samples that did not meet QC criteria, but DQOs were not affected. Estimated results are considered inaccurate due to a bias created by matrix interference or QC acceptance criteria, which were not met.

4.0 MANN-KENDALL TREND ANALYSIS

The Mann-Kendall (MK) test was used to evaluate the site groundwater concentration trends. The EPA ProUCL program (EPA, 2016) was used to complete the statistical analyses. The MK test is well-suited for environmental data because it can be used on small sample sizes (i.e., $n \geq 4$) and does not assume any underlying distribution for the data (i.e., it is nonparametric). The output of the MK test is the S statistic. Positive and negative S statistics are indicators of increasing and decreasing concentration trends, respectively. To differentiate whether a trend finding from the S-statistic is statistically significant, ProUCL was used to develop a decision matrix based on the S-statistic, the confidence in the trend, and the coefficient of variation (COV). The confidence level, expressed as a percentage, is calculated by subtracting the probability (p) from 1 (i.e., confidence = [1-p] x 100). The p-value indicates whether or not the association between the response and predictor (analyte concentration vs. time) is statistically significant at the given level of confidence. The COV is defined as the standard deviation of the sample set divided by the average of the sample set. Based on the results of calculating these three statistics, the concentration trend indicated by the S-statistic is determined to be increasing, likely increasing, no trend, stable, likely decreasing, or decreasing using the decision matrix presented in Table 4-1. Appendix F provides the ProUCL output for the MK analyses.

Table 4-1. Mann-Kendall Analysis Decision Matrix

Mann-Kendall Statistic	Confidence in Trend	Statistical Trend
S > 0	>95%	Increasing
S > 0	90-95%	Likely Increasing
S > 0	<90%	No Trend
S ≤ 0	<90% and COV ≥ 1	No Trend
S ≤ 0	<90% and COV < 1	Stable
S < 0	90-95%	Likely Decreasing
S < 0	>95%	Decreasing

The historic site data summarized in Table 4-2 were used as input for the ProUCL program. Appendix E provides the ProUCL output for the MK analysis. The results of the MK test are shown in Table 4-3.

The MK results are summarized as follows:

- ST009-MW4: DRO is decreasing while all other analytes demonstrate no trend.
- ST009-MW7: GRO, ethylbenzene and xylenes are decreasing, DRO is stable, RRO, benzene and toluene demonstrate no trend.
- ST009-MW9: GRO, DRO, ethylbenzene, toluene and xylenes are decreasing, RRO is stable, benzene demonstrates no trend.
- SS015-WW01: RRO, GRO, DRO, benzene and toluene are stable, ethylbenzene and xylenes demonstrate no trend.
- SS015-WW05: DRO is stable while all other analytes demonstrate no trend.
- SS015-WW06: DRO is stable while all other analytes demonstrate no trend.

Table 4-2. Summary of Historic Analytical Data

Well ID	Year	RRO (µg/L)	GRO (µg/L)	DRO (µg/L)	Benzene (µg/L)	Ethylbenzene (µg/L)	Toluene (µg/L)	Xylenes (µg/L)
		Cleanup Levels [1]						
		1,100	2,200	1,500	4.6	15	1,100	190
SS015-WW01	2014	NA	191	3160	2.21	3.63	ND (0.5)	6.75
	2015	NA	1040	19700	87.6	27.2	ND (0.5)	139
	2016	NA	460	12000	70	NA	NA	NA
	2017	552	249	8960	56.7	6.85	ND (0.5)	33.2
	2019	170	190	3800	9.3	5.8	ND (1)	7.7
	2020	ND (460)	172	3830	12.5	7.83	ND (0.5)	11.7
	2021	ND (460) UJ	278 J	4620 J-	15.5 J	2.82 U	ND (0.05)	6.84 U
SS015-WW05	2014	NA	ND (50)	418	ND (0.2)	ND (0.5)	ND (0.5)	ND (1.5)
	2015	NA	70.3	887	3.51	0.68	ND (0.5)	3.66
	2016	NA	4200	2300	67	NA	NA	NA
	2017	168	807	1360	66.6	69.4	1.52	89.9
	2019	110	780	1300	46	91	1.2	113.1
	2020	ND (460)	ND (50)	ND (400)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.5)
	2021	ND (483) UJ	1280	1290 J-	50	75.4	1.2	99.8
SS015-WW06	2014	NA	37.8	1560	ND (0.2)	ND (0.5)	ND (0.5)	ND (1.5)
	2015	NA	ND (0.05)	421	ND (0.2)	ND (0.5)	ND (0.5)	ND (1.5)
	2016	NA	NA	2300	NA	NA	NA	NA
	2017	318	ND (0.05)	1700	ND (0.2)	ND (0.5)	ND (0.5)	ND (1.5)
	2019	180	ND (200)	1800	ND (2)	ND (1)	ND (1)	ND (2)
	2020	ND (460)	ND (50)	308	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.5)
	2021	ND (480)	30.2 U	1370 J-	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.5)
ST009-MW04	2004	34500	75700	1360000	5.96	340	59.9	291
	2006	340	60	13700	0.65	1.42	ND (2)	5.6
	2007	NA	521	5900	ND (0.5)	1.33	ND (2)	8
	2008	NA	240	40000	ND (0.12)	ND (0.2)	ND (0.21)	ND (0.15)
	2009	NA	140	1140	ND (0.15)	ND (0.62)	1.41	2.1
	2012	NA	45	2400	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.45)
	2013	NA	42.5	1280	ND (0.24)	0.51	0.65	1.26
	2014	NA	ND (72.7)	1210	ND (0.2)	ND (0.5)	ND (0.5)	ND (1.5)
	2015	NA	175	5440	ND (0.2)	ND (0.5)	ND (0.5)	ND (1.5)
	2016	NA	NA	1200	NA	NA	NA	NA
	2017	386	ND (67.3)	4530	ND (0.2)	ND (0.5)	ND (0.5)	ND (1.5)
	2019	NA	320	320	ND (2)	ND (1)	ND (1)	ND (2)
	2020	ND (460)	58.3	5460	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.5)
	2021	NA	ND (50)	208 J-	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.5)

Table 4-2, continued

Well ID	Year	RRO (µg/L)	GRO (µg/L)	DRO (µg/L)	Benzene (µg/L)	Ethylbenzene (µg/L)	Toluene (µg/L)	Xylenes (µg/L)
		Cleanup Levels [1]						
		1,100	**2,200**	**1,500**	**4.6**	**15**	**1,100**	**190**
ST009-MW07	2004	427	1020	3090	ND (0.5)	14	1.13	19.3
	2006	2310	1560	1350	ND (0.5)	ND (2)	6.6	2.8
	2007	NA	1300	4440	0.185	18.8	8.6	3.3
	2008	NA	370	2100	ND (0.12)	3.7	ND (0.21)	8.9
	2009	NA	421	3030	ND (0.15)	5.36	2.05	151.6
	2012	NA	340	6400	ND (0.15)	2.3	ND (0.15)	5.5
	2013	NA	462	2760	ND (0.24)	1.97	0.76	4.79
	2014	NA	495	2870	ND (0.2)	2	ND (0.5)	5.35
	2015	NA	512	2580	ND (0.2)	2	ND (0.5)	5.12
	2016	NA	NA	2300	NA	NA	NA	NA
	2017	243	138	1270	ND (0.2)	1.39	ND (0.5)	3.24
	2019	NA	310	1900	ND (2)	2	ND (1)	3.8
	2020	ND (460)	412	4010	ND (0.5)	1.45	ND (0.5)	2.92
	2021	ND (460) UJ	293 J-	4650 J-	ND (0.5) UJ	1.16 J-	ND (0.5) UJ	2.07 J
ST009-MW09	2004	505	456	4140	0.402	3.3	ND (2)	5.1
	2006	458	441	2240	0.18	4.37	2.62	14
	2007	NA	236	2860	1.98	1.98	ND (2)	5.89
	2008	NA	280	1400	ND (0.12)	1.5	ND (0.21)	3.1
	2009	NA	217	1150	ND (0.15)	1.57	1.43	5.74
	2013	NA	216	1460	ND (0.24)	1.17	0.54	2.67
	2014	NA	293	1040	ND (0.2)	0.64	ND (0.5)	1.06
	2015	NA	208	3480	ND (0.2)	0.35	ND (0.5)	ND (1.5)
	2016	NA	NA	2900	NA	NA	NA	NA
	2017	376	ND (68.8)	1500	ND (0.2)	ND (0.5)	ND (0.5)	ND (1.5)
	2019	NA	220	1300	ND (2)	ND (1)	ND (1)	ND (2)
	2020	469	ND (50)	230	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.5)
	2021	NA	127 U	600 J-	ND (0.5)	0.241 U	ND (0.5)	0.451 U

Notes
[1] ADEC 18 AAC 75.345 Table C Groundwater Human Health Cleanup Levels (ADEC, 2021).
NA - Not Available
ND (#) – Non-detect (method detection limit)

Table 4-3. Mann-Kendall Trend Analysis Results

Site-Well ID	Analyte	Mann-Kendall Statistic (S)	p-Value	Confidence Factor (%)	COV	Mann-Kendall Trend
SS015-WW01	RRO	-1	0.625	37.500	0.41	Stable
	GRO	-7	0.191	80.900	0.85	Stable
	DRO	-3	0.386	61.400	0.76	Stable
	Benzene	-3	0.382	61.800	0.95	Stable
	Ethylbenzene	-3	0.360	64.000	1.01	No Trend
	Toluene	-3	0.360	64.000	0.59	Stable
	Xylenes	-3	0.360	64.000	1.53	No Trend
SS015-WW05	RRO	4	0.167	83.300	0.63	No Trend
	GRO	4	0.281	71.900	1.43	No Trend
	DRO	-1	0.500	50.000	0.58	Stable
	Benzene	3	0.386	61.400	0.93	No Trend
	Ethylbenzene	6	0.136	86.400	1.10	No Trend
	Toluene	3	0.360	64.000	0.51	No Trend
	Xylenes	6	0.136	86.400	1.06	No Trend
SS015-WW06	RRO	4	0.167	83.300	0.39	No Trend
	GRO	2	0.360	64.000	0.41	No Trend
	DRO	-3	0.386	61.400	0.54	Stable
	Benzene	7	0.136	86.400	1.17	No Trend
	Ethylbenzene	1	0.500	50.000	0.35	No Trend
	Toluene	1	0.500	50.000	0.35	No Trend
	Xylenes	1	0.500	50.000	0.13	No Trend
ST009-MW4	RRO	0	0.625	37.500	1.91	No Trend
	GRO	-26	0.064	93.600	3.52	No Trend
	DRO	-32	0.029	97.100	1.69	Decreasing
	Benzene	3	0.476	52.400	1.84	No Trend
	Ethylbenzene	-28	0.050	95.000	3.52	No Trend
	Toluene	-29	0.050	95.000	3.05	No Trend
	Xylenes	-16	0.184	81.600	3.27	No Trend
ST009-MW7	RRO	1	0.592	40.800	1.10	No Trend
	GRO	-36	0.015	98.500	0.73	Decreasing
	DRO	-5	0.420	58.000	0.46	Stable
	Benzene	20	0.126	87.400	1.19	No Trend
	Ethylbenzene	-50	0.001	99.900	1.23	Decreasing
	Toluene	-22	0.102	89.800	1.51	No Trend
	Xylenes	-34	0.021	97.900	2.42	Decreasing
ST009-MW9	RRO	-2	0.375	62.500	0.12	Stable
	GRO	-44	0.001	99.900	0.53	Decreasing
	DRO	-34	0.021	97.900	0.62	Decreasing
	Benzene	18	0.125	87.500	0.23	No Trend
	Ethylbenzene	-51	0.000	100.000	0.89	Decreasing
	Toluene	-29	0.031	96.900	0.77	Decreasing
	Xylenes	-43	0.002	99.800	1.01	Decreasing

5.0 SUMMARY AND RECOMMENDATIONS

LTM field work at Cape Romanzof LRRS was conducted from 28 through 30 September 2021. LTM activities included LUC/IC inspections at six sites (Sites LF003, SS010, SS015, SS016, SS017, and ST009), sediment and surface water sampling at Site LF003, and groundwater monitoring at Sites ST009 and SS015. The objective of the September 2021 field effort was to perform site inspections and environmental monitoring to ensure the current LTM and IC programs continue to be effective in preventing future releases of contaminants and to continue to monitor contaminant decline at Cape Romanzof LRRS.

5.1 Site LF003: Former Landfill #2

5.1.1 Summary

- There were no PCB exceedances in surface water and sediment samples.
- The landfill cap shows minor erosion along the side slopes from water runoff. Exposure of geotextile liner can be seen in multiple areas within the landfill cap boundaries. The geotextile that was exposed appeared to be recently placed and was in good condition. Tire ruts from heavy equipment were present on the landfill cap and the southern side slope had been recently graded due to excavation and fill activities along the south edge of the site. During the site inspection, there was work being performed at the site by another contractor.
- Silt fences previously installed downgradient from the site are damaged or missing.
- One LUC warning sign on east side of the site is in good condition; the second LUC warning sign on the north end of the road was also in good condition. The third LUC warning sign on the west side of the site was destroyed by wind.

5.1.2 Recommendations

- Erosion control measures should be implemented along the downslope boundaries of Site LF003.
- Maintenance of the landfill cap should be completed periodically to re-cover exposed sections of the landfill fabric cover, replace or improve the structural integrity of the downslope silt fences, and remove scattered surficial metal debris.
- Sediment fences should either be reinstalled, or a wet basin or small pool should be excavated in the downslope region to capture upstream surface water flow and allow suspended sediment to settle. Other alternative materials for constructing more effective, longer-lasting sediment fences may also be entertained.
- Sediment and surface water sampling should be continued on an annual basis, both in the vicinity of the seep (which could be transporting contaminants into the surface water or sediment near the toe of the landfill) and in the downgradient vicinities of each landfill side slope (to investigate off-site PCB contaminant migration).
- Continue to discourage site use and perform LUC/IC inspections on an annual basis until this site is acceptable for unlimited use and unrestricted exposure (UU/UE) and inspections are deemed unnecessary by the USAF and ADEC.
- Replace the destroyed LUC warning sign at west end of the site.

5.2 Site SS010: Weather Station Building Area

5.2.1 Summary

- Two signs should be located at this site. One warning sign is in good condition; the second LUC sign was not located.

5.2.2 Recommendations

- Replace the warning sign that was missing from the site.
- Discourage site use and continue LUC/IC inspections on an annual basis until this site is deemed acceptable for UU/UE and inspections are deemed unnecessary by the USAF and ADEC.

5.3 Site SS015: Lower Camp USTs

5.3.1 Summary

- DRO was reported at a concentration of 4,620 J- µg/L in samples WW-01-092021, exceeding the ADEC Table C CL of 1,500 µg/L. DRO concentrations in WW-01-092921 increased from the most recent sampling event in August 2020.
- Benzene was reported at concentrations of 50 µg/L in sample SS015-WW05-092921, 52.1 µg/L in field duplicate SS015-WW05-092921-02, and 15.5 J µg/L in SS015-WW01-092921, exceeding the ADEC Table C CL of 4.6 µg/L.
- Ethylbenzene was reported at concentrations of 75.4 µg/L in sample SS015-WW05-092921 and 80.6 µg/L in field duplicate SS015-WW05-092921-02, exceeding the ADEC Table C CL of 15 µg/L.
- All other constituents were detected below CLs or not detected.
- Site surfaces are rocky and uneven; mounds often revealed emerging debris, including construction and metal debris.
- One LUC warning sign was in good condition, and the second sign was damaged beyond repair.

5.3.2 Recommendations

- Groundwater monitoring should be continued on an annual basis.
- Replace the damaged LUC warning sign near main access road.
- Discourage site use and continue LUC/IC inspections on an annual basis until this site is acceptable for UU/UE and inspections are deemed unnecessary by the USAF and ADEC.

5.5 Site SS016: Upper Tram Terminal Area

5.5.1 Summary

- The tram building and all signage has been removed.
- Minor steel and concrete from the structure footing remain.

5.5.2 Recommendations

- Complete site remediation activities to include removal of scattered remnant debris (steel wire, empty 55-gallon drums, wood, and metal piping).
- Warning signs that were previously attached to the building should be replaced at the site. Replacement will require a mounting system and should be coordinated to ensure that it does not prevent further removal of remaining contamination.
- Discourage site use and continue LUC/IC inspections on an annual basis until this site is acceptable for UU/UE and inspections are deemed unnecessary by the USAF and ADEC.

5.6 Site SS017: Lower Tram Terminal Area

5.6.1 Summary

- The tram building and all signage has been removed.
- Recent surface workings and piling of rock materials was observed. Metal, wood, and cables are present throughout the site.

5.6.2 Recommendations

- Remove any remaining site materials and debris.
- Warning signs that were previously attached to the building should be replaced at the site. Replacement will require a mounting system and should be coordinated to ensure that it does not prevent further removal of remaining contamination.
- Discourage site use and continue LUC/IC inspections on an annual basis until the site is acceptable for UU/UE and inspections are deemed unnecessary by the USAF and ADEC.

5.7 Site ST009: Former Truck Fueling Station

5.7.1 Summary

- Analytical results for groundwater samples collected at Site ST009 reported exceedances of the ADEC Table C Groundwater CLs for monitoring well ST009-MW-7. DRO was reported at concentrations of 3,960 J- µg/L and 4,650 J- µg/L in samples ST009-MW7-092921-S01 and duplicate ST009-MW7-092921, respectively, which exceeded the ADEC Table C Groundwater CL of 1,500 µg/L. All other constituents were detected below CLs or not detected. DRO concentrations in ST009-MW-4 and ST009-MW-7 increased from the most recent sampling event in August 2020.

- Small globules of light non-aqueous phase liquids were observed on the water level meter electronic tape that exhibited a strong fuel odor at monitoring well MW07.
- The two LUC warning signs are in good condition.

5.7.2 Recommendations

- Cleanup visible trash from bank and beach/barge unloading area annually.
- Groundwater monitoring should be continued on an annual basis.
- Discourage site use and continue LUC/IC inspections on an annual basis until this site is acceptable for UU/UE and inspections are deemed unnecessary by the USAF and ADEC.

6.0 REFERENCES

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FIGURES

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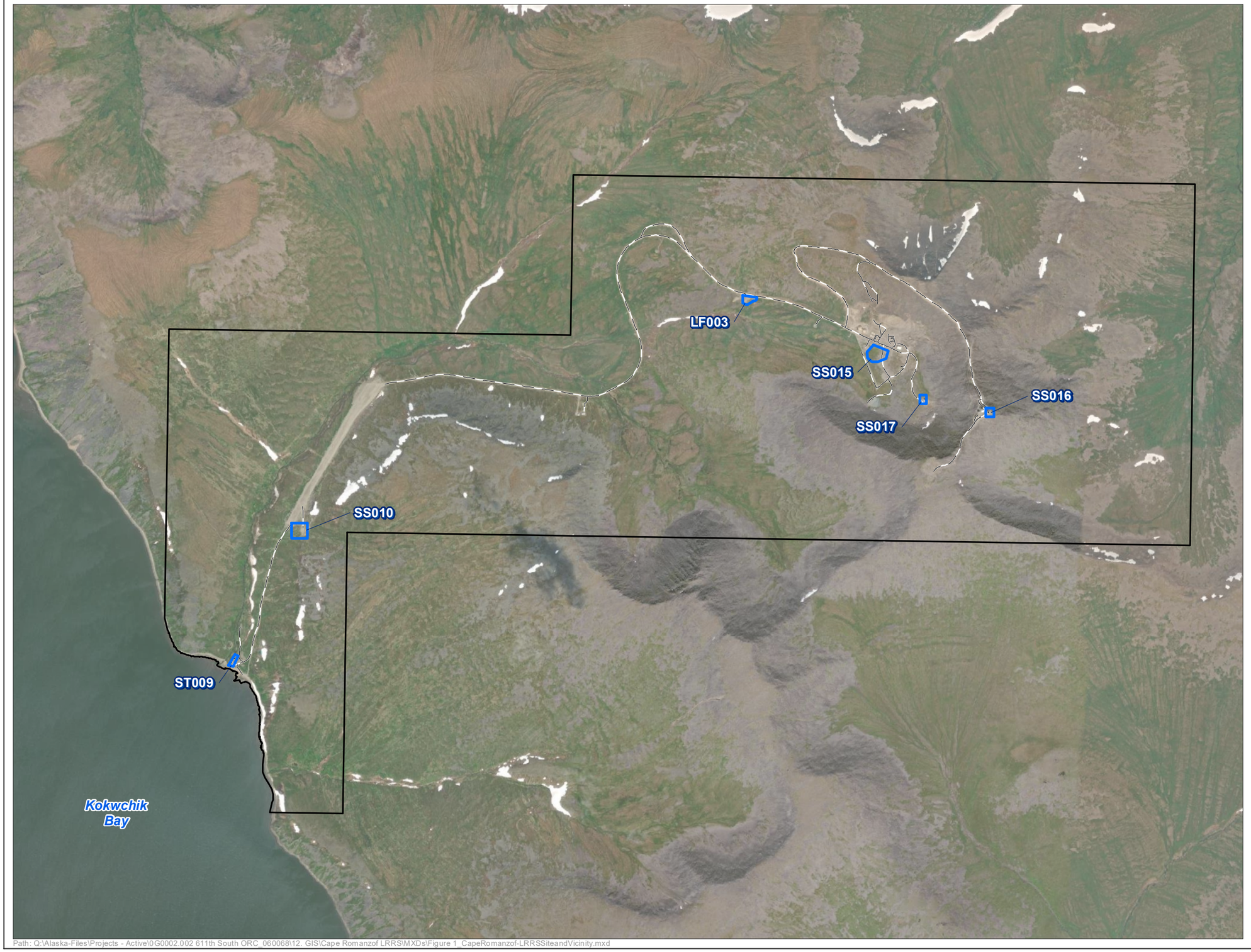

Legend

- Land Use Control Boundary
- Installation Boundary
- Installation Roads (OT005)

Notes:
1. LUC boundaries depicted on this figure are preliminary pending final analysis of survey information. LUC boundaries will be updated once this information is available.
2. Boundary data are from 611th GeoBase or have been georeferenced into GIS from historical documents. Data could be incomplete and are of unknown accuracy.
3. For more detailed land use restriction information, see individual site descriptions and summaries.

Acronyms
GIS - Geographic Information System
LRRS - Long Range Radio Site
LUC - Land Use Control

1 inch = 2,374 feet

0 1,000 2,000 4,000 6,000

Feet

Coordinate System: NAD 1983 UTM Zone 3N

2021 Remedial Action Operations, Institutional Control/Land Use Control Report
Cape Romanzof LRRS, Alaska

Figure 1
Cape Romanzof LRRS Site and Vicinity

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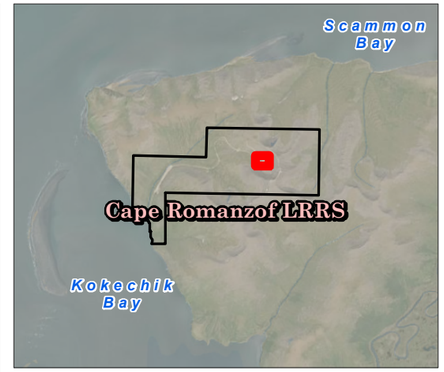
WW-05*	Cleanup Level (ug/L)	Result (ug/L)
GRO	2,200	1,280 [50]
DRO	1,500	1,290 [420] J-
RRO	1,100	ND [483] UJ
Benzene	4.6	**52.1 [0.5]**
Toluene	1,100	1.23 [0.5]
Ethylbenzene	15	**80.6 [0.5]**
Xylenes, Total	190	108 [1.5]

SS015

WW-01	Cleanup Level (ug/L)	Result (ug/L)
GRO	2,200	278 [50] J
DRO	1,500	**4,620 [400] J-**
RRO	1,100	ND [460] UJ
Benzene	4.6	**15.5 [5] J**
Toluene	1,100	ND [5]
Ethylbenzene	15	2.82 [5] U
Xylenes, Total	190	6.84 [15] U

WW-06	Cleanup Level (ug/L)	Result (ug/L)
GRO	2,200	30.2 [50] U
DRO	1,500	1,370 [420] J-
RRO	1,100	ND [480] U
Benzene	4.6	ND [0.5] U
Toluene	1,100	ND [0.5] U
Ethylbenzene	15	ND [0.5] U
Xylenes, Total	190	ND [0.5] U



Legend

- Monitoring Well
- LUC Boundary
- Installation Boundary
- Installation Roads (OT005)

Notes:
Cleanup level from 18 AAC 75.345 Table C.
* Value listed if primary or duplicate concentration greater.
ND [LOD] = Not detected above limit of detection
Values in red exceed cleanup limits.

Data Qualifiers
J = Estimated value
J- = Estimated value with low bias
U = Not detected or is qualified as non-detect because of blank contamination
UJ = Not detected; result is estimated due to QC discrepancy

Acronyms
GIS - Geographic Information System
LUC - Land Use Control
LRRS - Long Range Radar Site
ug/L - microgram(s) per liter

0 50 100 200 300
Feet

Coordinate System: NAD 1983 UTM Zone 3N

2021 Remedial Action Operations, Institutional Control/Land Use Control Report
Cape Romanzof LRRS, Alaska

Figure 2
Groundwater Analytical Results - SS015

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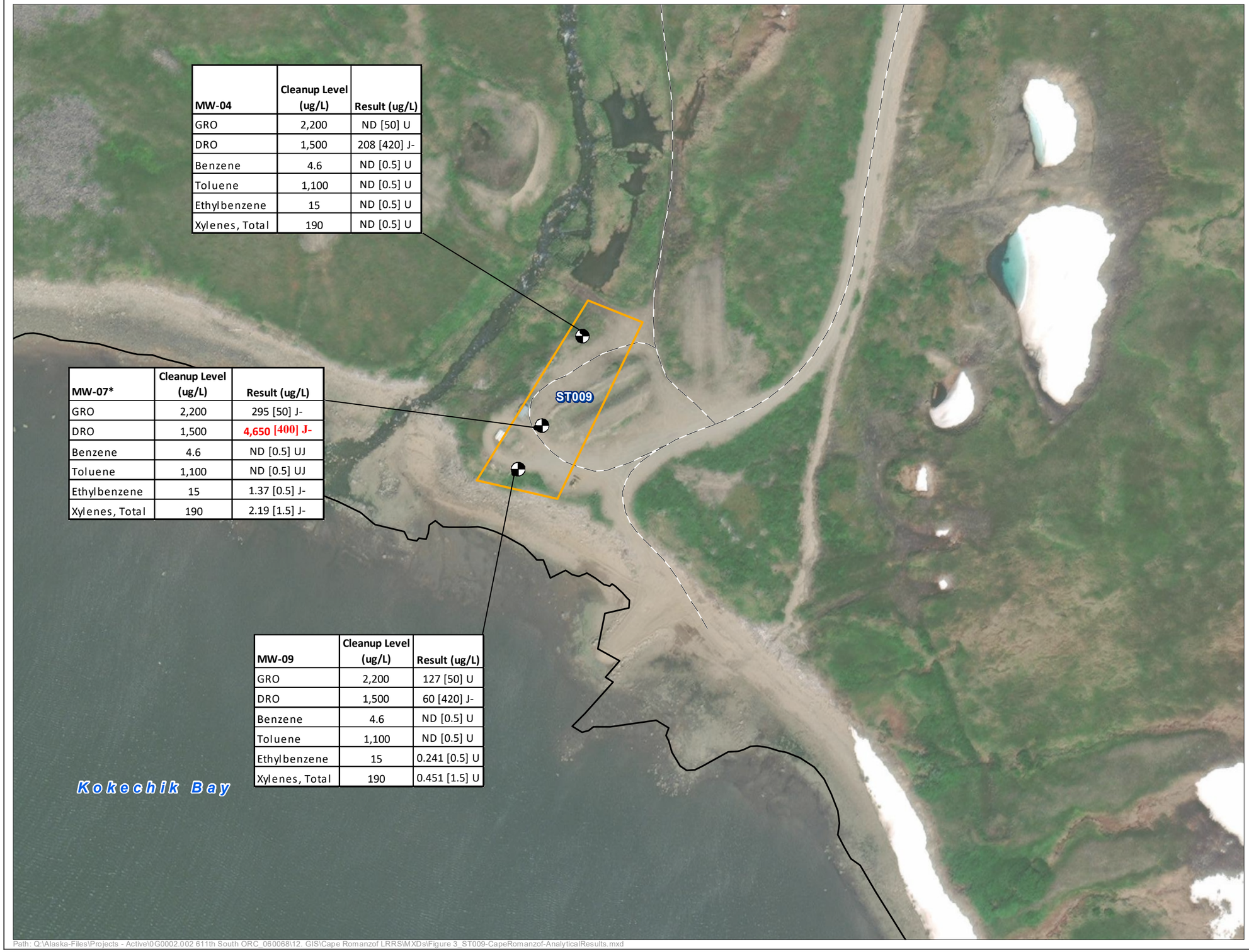
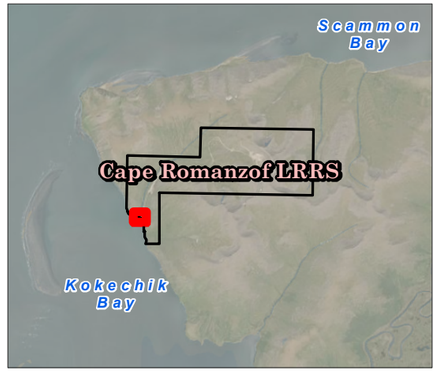
MW-04	Cleanup Level (ug/L)	Result (ug/L)
GRO	2,200	ND [50] U
DRO	1,500	208 [420] J-
Benzene	4.6	ND [0.5] U
Toluene	1,100	ND [0.5] U
Ethylbenzene	15	ND [0.5] U
Xylenes, Total	190	ND [0.5] U

MW-07*	Cleanup Level (ug/L)	Result (ug/L)
GRO	2,200	295 [50] J-
DRO	1,500	**4,650 [400] J-**
Benzene	4.6	ND [0.5] UJ
Toluene	1,100	ND [0.5] UJ
Ethylbenzene	15	1.37 [0.5] J-
Xylenes, Total	190	2.19 [1.5] J-

MW-09	Cleanup Level (ug/L)	Result (ug/L)
GRO	2,200	127 [50] U
DRO	1,500	60 [420] J-
Benzene	4.6	ND [0.5] U
Toluene	1,100	ND [0.5] U
Ethylbenzene	15	0.241 [0.5] U
Xylenes, Total	190	0.451 [1.5] U





Legend

- Monitoring Well
- LUC Boundary
- Installation Boundary
- Installation Roads (OT005)

Notes:
ND [LOD] = Not detected above limit of detection
* Value listed if primary or duplicate concentration greater.
Values in red exceed cleanup limits.

Data Qualifiers:
J = Estimated value
J- = Estimated value with low bias
U = Not detected or is qualified as non-detect because of blank contamination
UJ = Not detected; result is estimated due to QC discrepancy

Acronyms
GIS - Geographic Information System
LRRS - Long Range Radio Site
LUC - Land Use Control
ug/L - microgram(s) per liter

0 50 100 200 300
Feet

Coordinate System: NAD 1983 UTM Zone 3N

2021 Remedial Action Operations, Institutional Control/Land Use Control Report
Cape Romanzof LRRS, Alaska

Figure 3
Groundwater Analytical Results - ST009

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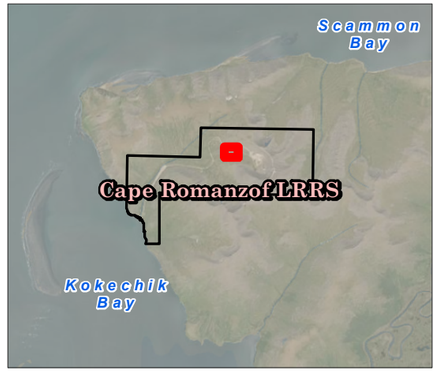
	LF003-S04-093021	LF003-S04-093021
	Sediment [1]	Surface Water [2]
PAL	*1.0 mg/kg*	*0.00044 mg/L*
PCBs, Total	0.0977 [0.0135] J	NS

	LF003-S01-093021	LF003-SW01-093021
	Sediment [1]	Surface Water [2]
PAL	*1.0 mg/kg*	*0.00044 mg/L*
PCBs, Total	ND [0.0156] U	ND [0.0005] U

	LF003-S03-093021	LF003-SW03-093021
	Sediment [1]	Surface Water [2]
PAL	*1.0 mg/kg*	*0.00044 mg/L*
PCBs, Total	0.240 [0.0152] J	ND [0.0005] U

	LF003-S02-093021-02	LF003-SW02-093021
	Sediment [1]	Surface Water [2]
PAL	*1.0 mg/kg*	*0.00044 mg/L*
PCBs, Total	ND [0.0112] U	ND [0.0005] U



Legend

- Surface Sample
- LUC Boundary
- Installation Boundary
- Installation Roads (OT005)

Notes:
ND [LOD] = Not detected above limit of detection
[1] ADEC Soil Cleanup Levels, AAC Title18, Chapter 75.341,Table B1 for Human Health (ADEC, 2021).
[2] PALs are the Final Remedial Action-Operation objectives per the Record of Decision for site LF003. PAL based on ADEC Groundwater Cleanup Levels (ADEC, 2021), 18 AAC 75.345 Table C.
Data Qualifiers:
J = Estimated Value
U = Not detected or is qualified as non-detect because of blank contamination
Acronyms
GIS - Geographic Information System
LRRS - Long Range Radio Site
LUC - Land Use Control
RRS - Radio Relay Station
NS - Not sampled
ug/L - microgram(s) per liter
mg/kg - milligram(s) per kilogram

0 50 100 200 300
Feet

Coordinate System: NAD 1983 UTM Zone 3N

2021 Remedial Action Operations, Institutional Control/Land Use Control Report
Cape Romanzof LRRS, Alaska

Figure 4
Surface Water and Sediment Analytical Results - LF003

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APPENDIX A

PHOTOGRAPH LOG

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Photograph No.: 001	**Date taken:** 09-30-2021
Photograph taken by: Kristopher Ashton	
Direction: East	**Location:** LF003
Description: Sign on south side of road, east side of site, facing NE. Good condition.	

Photograph No.: 002	**Date taken:** 09-30-2021
Photograph taken by: Kristopher Ashton	
Direction: South	**Location:** LF003
Description: West side slope with destroyed sign, south side of road, west side of site.	

Photograph No.: 003	**Date taken:** 09-30-2021
Photograph taken by: Kristopher Ashton	
Direction: South	**Location:** LF003
Description: CMW-07, frost-jacked outer casing, still serviceable.	

Photograph No.: 004	**Date taken:** 09-30-2021
Photograph taken by: Kristopher Ashton	
Direction: East	**Location:** LF003
Description: MW-01, good condition.	

Photograph No.: 005	**Date taken:** 09-30- 2021
Photograph taken by: Kristopher Ashton	
Direction: Southwest	**Location:** LF003
Description: MW-02, good condition.	

Photograph No.: 006	**Date taken:** 09-30-2021
Photograph taken by: Kristopher Ashton	
Direction: Southeast	**Location:** LF003
Description: CMW-03, good condition.	

Photograph No.: 007	**Date taken:** 09-30-2021
Photograph taken by: Kristopher Ashton	
Direction: North	**Location:** LF003
Description: Large, scattered debris north of the road.	

Photograph No.: 008	**Date taken:** 09-30-2021
Photograph taken by: Kristopher Ashton	
Direction: Southwest	**Location:** LF003
Description: Discarded well casing from MW03 on east side slope near creek.	

Photograph No.: 009	**Date taken:** 09-30-2021
Photograph taken by: Kristopher Ashton	
Direction: Southwest	**Location:** LF003
Description: Location of CMW-01, the well is not present, though a wooden concrete form is laying on the ground.	

Photograph No.: 010	**Date taken:** 09-30-2021
Photograph taken by: Kristopher Ashton	
Direction: East	**Location:** LF003
Description: South side slope with recent excavation and fill.	

Photograph No.: 011	**Date taken:** 09-30-2021
Photograph taken by: Kristopher Ashton	
Direction: East	**Location:** LF003
Description: South side slope with recent excavation and fill.	

Photograph No.: 012	**Date taken:** 09-30-2021
Photograph taken by: Kristopher Ashton	
Direction: North	**Location:** LF003
Description: Exposed cap liner, newly placed, on recent excavation and fill, south side slope.	

Photograph No.: 013	**Date taken:** 09-30-2021
Photograph taken by: Kristopher Ashton	
Direction: South	**Location:** LF003
Description: Top of landfill cap.	

Photograph No.: 014	**Date taken:** 09-29-2021
Photograph taken by: Kristopher Ashton	
Direction: Southwest	**Location:** SS015
Description: Damaged sign near main access road, southwest side of road, facing northeast.	

Photograph No.: 015	**Date taken:** 09-28-2021
Photograph taken by: Kristopher Ashton	
Direction: Northeast	**Location:** SS016
Description: Previous upper tram station site. Minor metal and cement debris remains.	

Photograph No.: 016	**Date taken:** 09-28-2021
Photograph taken by: Kristopher Ashton	
Direction: South	**Location:** SS016
Description: Previous upper tram station site. Minor metal and cement debris remains.	

Photograph No.: 017	**Date taken:** 09-28-2021
Photograph taken by: Kristopher Ashton	
Direction: South	**Location:** SS016
Description: Remaining tram station concrete and steel infrastructure.	

Photograph No.: 018	**Date taken:** 09-28-2021
Photograph taken by: Kristopher Ashton	
Direction: Northeast	**Location:** SS016
Description: Metal and other debris on the east mountain slope.	

Photograph No.: 019	**Date taken:** 09-28-2021
Photograph taken by: Kristopher Ashton	
Direction: East	**Location:** SS016
Description: Metal and other debris on the east mountain slope.	

Photograph No.: 020	**Date taken:** 09-28-2021
Photograph taken by: Kristopher Ashton	
Direction: Northwest	**Location:** SS016
Description: Survey marker.	

Photograph No.: 021	**Date taken:** 09-28-2021
Photograph taken by: Kristopher Ashton	
Direction: East	**Location:** SS017
Description: Infrastructure remaining on site after building removal.	

Photograph No.: 022	**Date taken:** 09-28-2021
Photograph taken by: Kristopher Ashton	
Direction: Northwest	**Location:** SS017
Description: Wooden poles and debris remaining on site after building removal.	

Photograph No.: 023	**Date taken:** 09-28-2021
Photograph taken by: Kristopher Ashton	
Direction: East	**Location:** SS017
Description: Infrastructure remaining on site after building removal.	

Photograph No.: 024	**Date taken:** 09-28-2021
Photograph taken by: Kristopher Ashton	
Direction: Northeast	**Location:** SS017
Description: Infrastructure remaining on site after building removal.	

Photograph No.: 025	**Date taken:** 09-28-2021
Photograph taken by: Kristopher Ashton	
Direction: Southeast	**Location:** SS017
Description: Wooden poles and debris remaining on site after building removal.	

Photograph No.: 026	**Date taken:** 09-28-2021
Photograph taken by: Darion Carden	
Direction: North	**Location:** SS017
Description: Access road and rock piles.	

Photograph No.: 027	**Date taken:** 09-28-2021
Photograph taken by: Kristopher Ashton	
Direction: South	**Location:** SS017
Description: Surface material consisting of soil, boulders, cobbles, pebbles, and sand.	

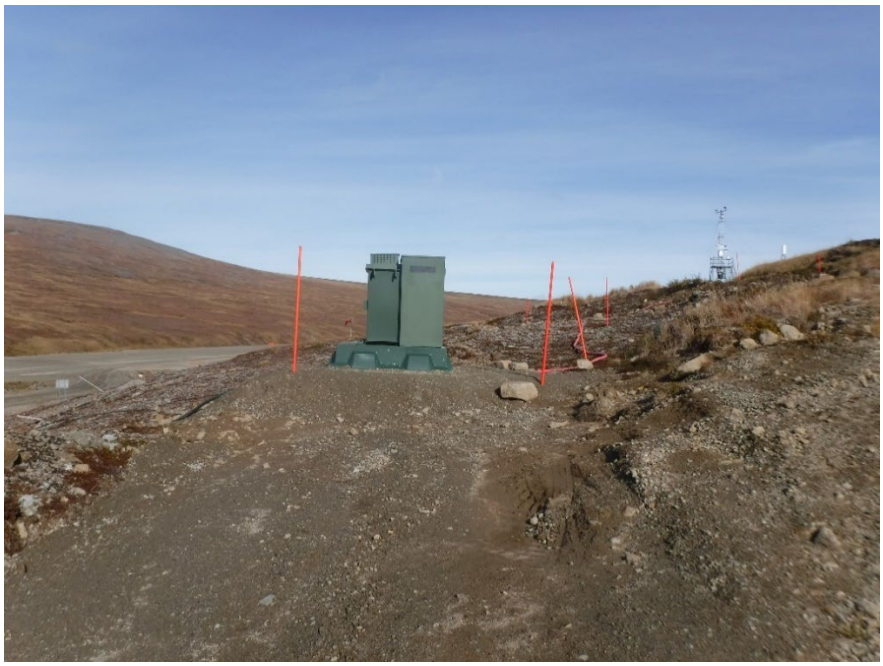
Photograph No.: 028	**Date taken:** 09-29-2021
Photograph taken by: Kristopher Ashton	
Direction: South	**Location:** SS010
Description: Sign at access road, east side of road, facing north, good condition.	

Photograph No.: 029	**Date taken:** 09-29-2021
Photograph taken by: Darion Carden	
Direction: South	**Location:** SS010
Description: Weather station building on site, north side.	

Photograph No.: 030	**Date taken:** 09-29-2021
Photograph taken by: Kristopher Ashton	
Direction: West	**Location:** SS010
Description: Weather station building on site, east side.	

Photograph No.: 031	**Date taken:** 09-29-2021
Photograph taken by: Kristopher Ashton	
Direction: North	**Location:** SS010
Description: Erosion of upper slope, east side of road, and minor repair fill.	

Photograph No.: 032	**Date taken:** 09-29-2021
Photograph taken by: Darion Carden	
Direction: North	**Location:** SS010
Description: New power transformer and high-voltage wires on site.	



Photograph No.: 033	**Date taken:** 09-29-2021
Photograph taken by: Darion Carden	
Direction: North	**Location:** SS010
Description: Weather station on site.	

Photograph No.: 034	**Date taken:** 09-29-2021
Photograph taken by: Darion Carden	
Direction: Northeast	**Location:** SS010
Description: Exposed high-voltage wires from recent electrical work.	

Photograph No.: 035	**Date taken:** 09-29-2021
Photograph taken by: Darion Carden	
Direction: Southeast	**Location:** SS010
Description: Site access road and turnaround.	

Photograph No.: 036	**Date taken:** 09-29-2021
Photograph taken by: Darion Carden	
Direction: Northwest	**Location:** SS010
Description: Site access road and turnaround, south side of weather station building.	

Photograph No.: 037	**Date taken:** 09-29-2021
Photograph taken by: Kristopher Ashton	
Direction: South	**Location:** ST009
Description: Sign at access road, north end of the site, west side of road, facing north.	

Photograph No.: 038	**Date taken:** 09-29-2021
Photograph taken by: Darion Carden	
Direction: West	**Location:** ST009
Description: Sign at the south end of the site, facing the barge loading area.	

Photograph No.: 039	**Date taken:** 09-29-2021
Photograph taken by: Darion Carden	
Direction: Southwest	**Location:** ST009
Description: MW-09, good condition, installed new lock, labeled the inside of the outer casing.	

Photograph No.: 040	**Date taken:** 09-29-2021
Photograph taken by: Darion Carden	
Direction: North	**Location:** ST009
Description: MW-07, good condition, labeled the inside of the outer casing.	

Photograph No.: 041	**Date taken:** 09-29-2021
Photograph taken by: Darion Carden	
Direction: Southwest	**Location:** ST009
Description: MW-05, good condition, labeled the inside of the outer casing.	

Photograph No.: 042	**Date taken:** 09-29-2021
Photograph taken by: Darion Carden	
Direction: North	**Location:** ST009
Description: MW-04, good condition, labeled the inside of the outer casing.	

Photograph No.: 043	**Date taken:** 09-29-2021
Photograph taken by: Darion Carden	
Direction: Southeast	**Location:** ST009
Description: MW-04, storage containers and supersacks.	

Photograph No.: 044	**Date taken:** 09-29-2021
Photograph taken by: Darion Carden	
Direction: North	**Location:** ST009
Description: Looking north from MW-04 at the creek to the west of the site.	

Photograph No.: 045	**Date taken:** 09-29-2021
Photograph taken by: Darion Carden	
Direction: Southeast	**Location:** ST009
Description: The beach area and barge loading area.	

Photograph No.: 046	**Date taken:** 09-29-2021
Photograph taken by: Darion Carden	
Direction: South	**Location:** ST009
Description: Access road to the barge loading area.	

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APPENDIX B

FIELD FORMS AND LOGBOOK

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VISIUAL INSPECTION CHECKLIST

INSTALLATION: Cape Romanzof			INSPECTION SITE NAME: LF003
MONITORING ITEM	**YES**	**NO**	**COMMENTS**
If unit is a landfill, is there any evidence of settling at ground surface?		X	
Evidence of fencing? Any damaged or broken areas?	X		sediment catch fences are all down except at SD1
Evidence of escape of impacted materials or debris from the site?		X	
Survey monuments observed?	X		
Evidence of surface erosion/washouts in area?		X	
Ponded water observed at or near the site? If yes, is petroleum sheen observed?	X		no sheen
Chemical or petroleum odors noted?		X	
Discoloring of vegetations in the surrounding area of the site?		X	
Notification signage present? Confirm present and condition of each sign.	X		west sign is laying on ground east sign is in place. See photos
Integrity of observed monitoring wells, if present?	X		good. MW-03 is not present
Is there wildlife present? Indicate number and types.		X	
Evidence of excavation activities or animal burrows?	X		material was recently removed and back fill added
Structures present on site? If so what is the structural integrity?		X	
Estimated Percent Vegetative Cover: On Cap Surface: 15 % On sideslopes: 70 % Comments:			

Name of Inspector: Kristopher Ashton Date: 9/30/2021

Weather Conditions: sunny, 15-35 mph wind, 20-30°F

Temperature: 20-30 °F

Photographs Taken: yes

General Comments: fabric cover is visible in a few places along SW edge (down slope)

Correction Action Taken:

VISIUAL INSPECTION CHECKLIST

INSTALLATION: INSPECTION SITE NAME: WEATHER STATION SS010

MONITORING ITEM	YES	NO	COMMENTS
If unit is a landfill, is there any evidence of settling at ground surface?			N/A
Evidence of fencing? Any damaged or broken areas?		X	NO FENCE
Evidence of escape of impacted materials or debris from the site?		X	
Survey monuments observed?		X	
Evidence of surface erosion/washouts in area?		X	
Ponded water observed at or near the site? If yes, is petroleum sheen observed?		X	
Chemical or petroleum odors noted?		X	
Discoloring of vegetations in the surrounding area of the site?		X	
Notification signage present? Confirm present and condition of each sign.	X		1 SIGN; GOOD
Integrity of observed monitoring wells, if present?		X	
Is there wildlife present? Indicate number and types.		X	
Evidence of excavation activities or animal burrows?		X	
Structures present on site? If so what is the structural integrity?	X		GOOD
Estimated Percent Vegetative Cover: On Cap Surface: N/A On sideslopes: N/A Comments:			

Name of Inspector: DARIN C, KRISTOPHER A. Date: 09-29-21

Weather Conditions: PARTLY CLOUDY

Temperature: 30-40 °F

Photographs Taken: YES

General Comments:

WHITE BLDG. SHELTER IN GOOD CONDITION, ROAD IN GOOD CONDITION

Correction Action Taken:

VISIUAL INSPECTION CHECKLIST

INSTALLATION: Romanzof			INSPECTION SITE NAME: SS015
MONITORING ITEM	**YES**	**NO**	**COMMENTS**
If unit is a landfill, is there any evidence of settling at ground surface?			NA
Evidence of fencing? Any damaged or broken areas?			NA
Evidence of escape of impacted materials or debris from the site?		X	
Survey monuments observed?		X	
Evidence of surface erosion/washouts in area?	X		minor surface erosion along dirt roads
Ponded water observed at or near the site? If yes, is petroleum sheen observed?	X		no sheen
Chemical or petroleum odors noted?		X	
Discoloring of vegetations in the surrounding area of the site?		X	
Notification signage present? Confirm present and condition of each sign.	X		good condition
Integrity of observed monitoring wells, if present?	X		good
Is there wildlife present? Indicate number and types.	X		birds and fox
Evidence of excavation activities or animal burrows?		X	
Structures present on site? If so what is the structural integrity?		X	
Estimated Percent Vegetative Cover: On Cap Surface: 70 % On sideslopes: 70 % Comments:			

Name of Inspector: K. Ashton Date: 9/29/21

Weather Conditions: cloudy, light precipitation, 15-20 mph wind

Temperature: 35 °F

Photographs Taken: yes

General Comments:

Correction Action Taken:

VISIUAL INSPECTION CHECKLIST

INSTALLATION: Romanzof			INSPECTION SITE NAME: ST009
MONITORING ITEM	**YES**	**NO**	**COMMENTS**
If unit is a landfill, is there any evidence of settling at ground surface?			NA
Evidence of fencing? Any damaged or broken areas?			NA
Evidence of escape of impacted materials or debris from the site?		X	
Survey monuments observed?		X	
Evidence of surface erosion/washouts in area?		X	
Ponded water observed at or near the site? If yes, is petroleum sheen observed?		X	
Chemical or petroleum odors noted?		X	not at surface
Discoloring of vegetations in the surrounding area of the site?		X	
Notification signage present? Confirm present and condition of each sign.	X		good condition
Integrity of observed monitoring wells, if present?			good, replaced lock on MW-9
Is there wildlife present? Indicate number and types.	X		birds, fox tracks
Evidence of excavation activities or animal burrows?		X	
Structures present on site? If so what is the structural integrity?	X		storage containers, rusty but good integrity
Estimated Percent Vegetative Cover: On Cap Surface: 70 % On sideslopes: 70 % Comments:			

Name of Inspector: K. Ashton Date: 9/29/21

Weather Conditions: sunny, 10-15 mph wind

Temperature: 42 °F

Photographs Taken: yes

General Comments:
super sacks of soil are stored on site
Petroleum odor noted inside MW-7

Correction Action Taken:

VISIUAL INSPECTION CHECKLIST

INSTALLATION: Romanzof			INSPECTION SITE NAME: SS017
MONITORING ITEM	**YES**	**NO**	**COMMENTS**
If unit is a landfill, is there any evidence of settling at ground surface?			NA
Evidence of fencing? Any damaged or broken areas?			NA
Evidence of escape of impacted materials or debris from the site?		X	
Survey monuments observed?		X	
Evidence of surface erosion/washouts in area?	X		slight surface erosion
Ponded water observed at or near the site? If yes, is petroleum sheen observed?	X		no sheen
Chemical or petroleum odors noted?		X	
Discoloring of vegetations in the surrounding area of the site?		X	
Notification signage present? Confirm present and condition of each sign.		X	
Integrity of observed monitoring wells, if present?			NA
Is there wildlife present? Indicate number and types.	X		birds, fox tracks
Evidence of excavation activities or animal burrows?	X		building recently removed
Structures present on site? If so what is the structural integrity?		X	
Estimated Percent Vegetative Cover: On Cap Surface: 5 % On sideslopes: 5 % Comments:			

Name of Inspector: K. Ashton Date: 9/28/21

Weather Conditions: cloudy, 10-15 mph wind

Temperature: 38 °F

Photographs Taken: yes

General Comments:
signage was removed with building removal, some infrastructure remains

Correction Action Taken:

VISIUAL INSPECTION CHECKLIST

INSTALLATION: Romanzof			INSPECTION SITE NAME: SS016
MONITORING ITEM	**YES**	**NO**	**COMMENTS**
If unit is a landfill, is there any evidence of settling at ground surface?			NA
Evidence of fencing? Any damaged or broken areas?			NA
Evidence of escape of impacted materials or debris from the site?		X	
Survey monuments observed?	X		one survey marker observed
Evidence of surface erosion/washouts in area?		X	
Ponded water observed at or near the site? If yes, is petroleum sheen observed?		X	
Chemical or petroleum odors noted?		X	
Discoloring of vegetations in the surrounding area of the site?		X	
Notification signage present? Confirm present and condition of each sign.		X	
Integrity of observed monitoring wells, if present?			NA
Is there wildlife present? Indicate number and types.	X		various birds, fox tracks, caribou tracks
Evidence of excavation activities or animal burrows?	X		the building was recently removed
Structures present on site? If so what is the structural integrity?		X	
Estimated Percent Vegetative Cover: On Cap Surface: 0 % On sideslopes: 0 % Comments:			

Name of Inspector: K. Ashton Date: 9/28/21

Weather Conditions: Partly cloudy, -3°c, light wind

Temperature: 27 °F

Photographs Taken: yes

General Comments: signage was removed with building removal

Correction Action Taken:

CAPE ROMANZOF 9-28-21

WEATHER: 5 mph WIND, SUNNY/PARTLY CLOUDY, ~ 45°F

PERSONNEL: DARON C., KRISTOPHER A.

12:15 LANDED @ CAPE ROMANZOF VIA GRANT CHARTER

1245 SITE CHECK IN AND SAFETY INTRODUCTION/ ORIENTATION W/ CR SITE PERSONNEL

1330 LUNCH

1400 DRIVE AROUND SITE TO SELF-CLIENT WHERE WELLS AND INSPECTIONS SITES ARE

1430 EQUIPMENT INVENTORY & YSI CALIBRATION (SEE CALIBRATION SHEET)

1700 DINNER

1730 HIKED UP TO SS016 UPPER TRAM TERMINAL AREA

1750 UPPER TRAM TERMINAL AREA APPEARS TO HAVE BEEN REMOVED (CONFIRMED THROUGH CONVERSATION W/ GUYS DOWN @ CAMP)

1845 IMMENSE AMOUNT OF SCATTERED DEBRIS (DRUMS, CABLES, etc.) ON BACKSIDE OF DOME DOWN SLOPE

1915 DID NOT ENCOUNTER ANY LUC SIGN FOR THE SITE

1945 RETURN BACK TO CAMP

END OF FIELD DAY

Daron Carey

Scale: 1 square = _____

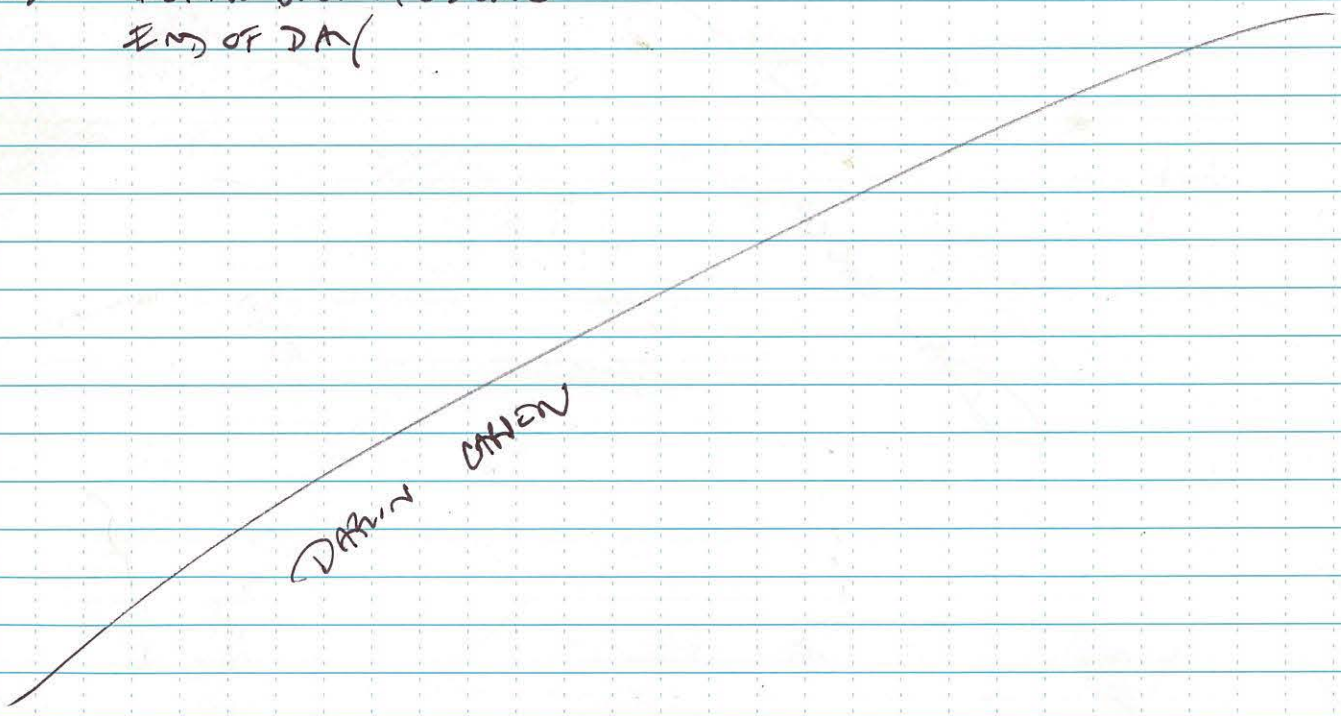
Rite in the Rain

CAPE ROMANZOF 9-29-21

WEATHER: OVERCAST, FOGGY, ~10 mph WIND, ~40 :F

PERSONNEL: DARWIN CARDEN, KRISTOPHER BURTON

830	TAILGATE SAFETY
900	LOAD UP EQUIPMENT
930	EQUIPMENT CALIBRATION (SEE FS)
1000	DRIVE DOWN TO STOOP
1010	MW-9
	WL: 20.45
	TD = 26.45
	REPLACED WELL LOCK: 0911
1020	BEGIN PURGE @ MW-9
1120	END SAMPLING @ MW-9
1140	BEGIN PURGE @ MW-7
1240	END SAMPLING @ MW-7
1315	BEGIN PURGE @ MW-4
1400	END SAMPLING @ MW-4
1430	VENT BACK TO WORKSHOP TO PICKUP MINION PUMP
1500	ARRIVE @ WW-05
1600	ARRIVE @ WW-01
1700	SITE INSPECTION @ SSOLO
1715	DINNER @ DOME
1745	HEADED BACK OUT TO WW-06 TO SAMPLE
20:30	RETURN BACK TO DOME
	END OF DAY



Scale: 1 square = _____

CAPE ROMANZOF 9-30-21
WEATHER: WINDY (20-40 KNOTS), 20-35°F
PERSONNEL: DARION C. KRISTOPHER A.

9:30 TAILGATE SAFETY & LOAD UP
10:00 YSI CALIBRATION
10:20 INSPECTION @ MW-01 : GOOD (pic)
10:25 INSPECTION @ MW-02 : GOOD (pic)
10:30 COULD NOT LOCATE CMW-01; DID NOTICE SUBSIDENCE POSSIBLY RELATED TO DRILLING, ALSO CONCRETE FORMS (SQUARE 2x4'S) ADJACENT TO SMALL AREA OF SUBSIDENCE. NO SIGN OF CASING STICKUP.
10:35 INSPECTION @ LANDFILL (LF003)
1 DOWNED/DAMAGED SIGN + 1 GOOD SIGN (SHORT & SLIGHTLY FADED)
RECENT SOIL REMOVAL ACTION BY OLGOONIK COMPANY
PICTURE ORDER: WEST LC SIGNAGE (DOWN)
POSSIBLE (ABANDONED) WELL (KEY LOCK, GOOD CONDITION)
CMW-07 (2 WELLS within ~100 ft, ONLY 1 IS ON MAP) (both in good condition)
// MW-03 → DID NOT LOCATE
IN AREA REPRESENTED ON MAP, THERE WAS A LOT OF FRESH EXCAVATOR & SKIDSTEER TRACKS FROM RECENT SOIL REMOVAL ACTIONS
CMW-03
OTHER WELL (S OF GOOD SIGN (EAST SIGN)) WHICH IS NOT MARKED ON MAP; HAS KEY LOCK
→ EXTRACTED CASING w/ CONCRETE STILL ATTACHED AROUND LYING NEAR OTHER WELL. COULD BE WHAT'S LEFT OF MW-03.
11:15 SOIL SAMPLE COLLECTION @ S01 (SILT FENCE BARELY INTACT)
11:45 SOIL SAMPLE COLLECTION @ S04 (COULD NOT LOCATE SILT FENCE)
1200 LUNCH @ DOME
1230 RETURN TO LF003
1245 SOIL SAMPLE @ S02
1300 SOIL SAMPLE @ S03
1345 SW COLLECTION @ SO ~~2~~ 3 DC
1.42°C
0.020 mS/cm
11.29 DO mg/L
4.99 pH
143.7 ORP

Scale: 1 square = ________
Rite in the Rain

1400 SW COLLECTION @ SW02 (+DUP)
1.93°C
0.016 MS/CM
11.75 DO MG/L
5.02 PH
139.8 ORP

1410 SW COLLECTION @ SW01 (M+MD)
2.01°C
0.031 MS/CM
11.44 DO MG/L
5.47 PH
137.1 ORP

DID NOT FIND ANY SW DOWNGRADIENT OF ~~SW~~ SW04 SO COLLECTED MS/MD @ SW01 INSTEAD

1430 ARRIVE BACK @ DOME

1440 CALL ANC. OFFICE ABOUT FLIGHT LOGISTICS BACK TO BETHEL

1500 INSPECTION @ LOWER TRAM SITE
MATERIAL HAS BEEN REMOVED
SOME REMNANT & ABANDONED DEBRIS REMAINS (NOTED)

1530 ARRIVE @ DOME
END OF FIELD DAY

Scale: 1 square = _____

~~9.875~~

North Wind-EA JV, LLC

WELL PURGE AND SAMPLING FIELDSHEET

Project: Cape Romanzof | Well ID: MW-09
Project Location: ST09 Romanzof | Date: 9-29-2021
Project #: 06006D.001.21 | Start Time: 1020
Field Team: K. Ashton, D. Carden | End Time: 1120
Sample ID: ST09-MW9-092921 | Time: 1105 | (primary) dup other:
Sample ID: | Time: | primary dup other:
Sample ID: | Time: | primary dup other:
Filtered? Y / (N) | 0.45µm | 1.0µm

Well Information

Depth to Top of Product: N/A
Depth to Oil/Water Interface: N/A
Depth to Water (BTOC): 20.45
Total Depth (BTOC): 20.45
Water Column (ft): 6.00
Casing Volume (gal): 0.978
Screen Interval : to
Measured Stickup:

Casing Diameter:	1-in	2-in	4-in
gal/ft of casing:	0.041	0.163	0.653

Pump Intake Depth:
Stable DTW (BTOC):

Method of Purging

Pump: SUB BLADR (PERIST) OTHER:
Purge Start Time: 1040
Purge End Time: 1105
Flow Rate (gpm): 350mL/1.5min
Volume Purged (gal): 6.0075 GPM
Bailer: Teflon SS Other:
Bailer volume (gal):
Required Pulls:
Volume Purged (gal):

Criteria for Stable Parameters

Parameter	Working Range	Stability Criteria	Depth to Water Stabilization	
			Time	Depth to Water
Temperature	-5 to 45 degrees C	+/- 0.2 degrees C		
pH	0 to 14 NTU	+/- 0.1		
Conductivity	0 to 200 mS/cm	+/- 3%		
ORP	-999 to +999 mV	+/- 10 mV		
Dissolved Oxygen	0 to 50 mg/L	+/- 10%		
Turbidity	0 to 1,000 NTU	+/- 10% [<10 NTU]		

Instrument Observations

Round	Time	Water Level [ft BTOC]	Volume Purged [liters]	pH	Cond [mS/cm]	Turbidity [NTU]	DO [mg/L]	Temp [C]	ORP [mV]
1	10:40	20.45	0.0	5.31	0.078		4.15	3.90	147.0
2	10:45	20.~~70~~55	0.3	3.85	0.077		1.58	3.78	111.6
3	10:50	20.62	0.6	5.25	0.077		1.11	4.02	96.3
4	10:55	20.69	0.9	5.27	0.076		0.93	3.96	84.4
5	11:00	20.70	1.2	5.30	0.076		0.89	4.02	78.4
6	1105	20.71	1.5	5.33	0.076		0.86	4.05	74.5
7									
8									
9									
10									

Notes: Draw-down should ideally be less than 0.3 feet from the original depth to groundwater. Minimal draw-down achieved and measured by: 1) pumping at a low rate (approximately 1 liter/3 minutes or 0.1 gal/min and 2) continually measuring water levels in the well.

Sensory Observations

Color: Clear, Amber, Tan, Brown, Grey, Milky White, Other:
Odor: None, Low, Medium, High, Very Strong, H2S, Fuel Like, Chemical, Unknown
Turbidity: None, Low, Medium, High, Very Turbid, Heavy Silts

Analytical Suite:

Comments:

North Wind-EA JV, LLC

WELL PURGE AND SAMPLING FIELDSHEET

Project: CAPE TOWNSEND Well ID: MW-7
Project Location: ST 009 Date: 9-29-21
Project #: 060069.001.21 Start Time: 1130
Field Team: K. ASHTON D. CARDEN End Time: 1240
Sample ID: ST009-MW7-092921 Time: 1205 primary dup other:
Sample ID: ST009-MW7-092921 Time: 1205 primary dup other:
Sample ID: ST009-MW7-092921 Time: 1205 primary dup other: MS/MSD
Filtered? Y / N 0.45µm 1.0µm

Well Information

Depth to Top of Product:
Depth to Oil/Water Interface:
Casing Diameter: 1-in 2-in 4-in
gal/ft of casing: 0.041 0.163 0.653
Pump Intake Depth:
Stable DTW (BTOC): 18.50
Depth to Water (BTOC): 18.42
Total Depth (BTOC): 24.60
Water Column (ft): 6.18
Casing Volume (gal): 1.007
Screen Interval : to
Measured Stickup:

Method of Purging

Pump: SUB BLADR PERIST OTHER:
Purge Start Time: 1140
Purge End Time: 1205
Flow Rate (gpm): 0.045
Volume Purged (gal):
Bailer: Teflon SS Other:
Bailer volume (gal):
Required Pulls:
Volume Purged (gal):

Criteria for Stable Parameters

Parameter	Working Range	Stability Criteria	Depth to Water Stabilization	
			Time	Depth to Water
Temperature	-5 to 45 degrees C	+/- 0.2 degrees C		
pH	0 to 14 NTU	+/- 0.1		
Conductivity	0 to 200 mS/cm	+/- 3%		
ORP	-999 to +999 mV	+/- 10 mV		
Dissolved Oxygen	0 to 50 mg/L	+/- 10%		
Turbidity	0 to 1,000 NTU	+/- 10% [<10 NTU]		

Instrument Observations

Round	Time	Water Level [ft BTOC]	Volume Purged [liters]	pH	Cond [mS/cm]	Turbidity [NTU]	DO [mg/L]	Temp [C]	ORP [mV]
1	1145	18.42	0.00	5.49	0.079		2.81	3.92	127.2
2	1150	18.50	0.85	5.45	0.079		0.72	3.80	86.4
3	1155	18.50	1.70	5.45	0.078		0.63	3.75	78.1
4	1200	18.50	2.55	5.44	0.078		0.58	3.75	70.4
5	1205	18.50	3.40	5.43	0.077		0.52	3.77	66.2
6									
7									
8									
9									
10									

Notes: Draw-down should ideally be less than 0.3 feet from the original depth to groundwater. Minimal draw-down achieved and measured by: 1) pumping at a low rate (approximately 1 liter/3 minutes or 0.1 gal/min and 2) continually measuring water levels in the well.

Sensory Observations

Color: Clear, Amber, Tan, Brown, Grey, Milky White, Other:
Odor: None, Low, Medium, High, Very Strong, H2S, Fuel Like, Chemical, Unknown
Turbidity: None, Low, Medium, High, Very Turbid, Heavy Silts

Analytical Suite:

Comments:
SMALL GLOBULES OF PRODUCT OBSERVED ON ETAPE; STRONG ODOR (LNAPL)

North Wind-EA JV, LLC

WELL PURGE AND SAMPLING FIELDSHEET

Project: CAPE MANZIE Well ID: MW-4
Project Location: ST009 Date: 092921
Project #: 060668.001.21 Start Time: 1315
Field Team: K. ASHTON D. CARDEN End Time: 1400
Sample ID: ST009-MW4-092921 Time: 1345 (primary) dup other:
Sample ID: Time: primary dup other:
Sample ID: Time: primary dup other:
Filtered? Y / (N) 0.45µm 1.0µm

Well Information

Depth to Top of Product:
Depth to Oil/Water Interface:
Casing Diameter: 1-in 2-in 4-in
gal/ft of casing: 0.041 0.163 0.653
Pump Intake Depth:
Stable DTW (BTOC):

Depth to Water (BTOC): 9.94
Total Depth (BTOC): 15.04
Water Column (ft): 5.7
Casing Volume (gal): 0.929
Screen Interval : to
Measured Stickup:

Method of Purging

Pump: SUB BLADR (PERIST) OTHER: Bailer: Teflon SS Other:
Purge Start Time: 1319 Flow Rate (gpm): 0.034 Bailer volume (gal):
Purge End Time: 1345 Volume Purged (gal): Required Pulls:
45 mL/30sec Volume Purged (gal):

Criteria for Stable Parameters

Parameter	Working Range	Stability Criteria	Depth to Water Stabilization	
			Time	Depth to Water
Temperature	-5 to 45 degrees C	+/- 0.2 degrees C		
pH	0 to 14 NTU	+/- 0.1		
Conductivity	0 to 200 mS/cm	+/- 3%		
ORP	-999 to +999 mV	+/- 10 mV		
Dissolved Oxygen	0 to 50 mg/L	+/- 10%		
Turbidity	0 to 1,000 NTU	+/- 10% [<10 NTU]		

Instrument Observations

Round	Time	Water Level [ft BTOC]	Volume Purged [liters]	pH	Cond [mS/cm]	Turbidity [NTU]	DO [mg/L]	Temp [C]	ORP [mV]
1	1325	10.13	0.00	5.30	0.027		1.21	6.50	168.0
2	1330	10.16	0.65	5.25	0.027		1.00	6.37	158.8
3	1335	10.19	1.30	5.25	0.027		1.17	6.43	160.0
4	1340	10.20	1.95	5.24	0.027		1.31	6.45	160.9
5	1345	10.19	2.60	5.23	0.027		1.41	6.38	161.1
6									
7									
8									
9									
10									

Notes: Draw-down should ideally be less than 0.3 feet from the original depth to groundwater. Minimal draw-down achieved and measured by: 1) pumping at a low rate (approximately 1 liter/3 minutes or 0.1 gal/min and 2) continually measuring water levels in the well.

Sensory Observations

Color: (Clear), Amber, Tan, Brown, Grey, Milky White, Other:
Odor: (None), Low, Medium, High, Very Strong, H2S, Fuel Like, Chemical, Unknown
Turbidity: None, Low, Medium, High, Very Turbid, Heavy Silts

Analytical Suite:

Comments:
SMALL AMOUNTS OF ORANGEISH GLOBBY RESIDUE IN PURGE WATER BUCKET. BACTERIA?

North Wind-EA JV, LLC

WELL PURGE AND SAMPLING FIELDSHEET

Project: CAPE ROMAINE - SCFC Well ID: WW-05
Project Location: SS 015 Date: 9-29-21
Project #: 060066 Col. 21 Start Time: 15:00
Field Team: K. Ashton, D. Carden End Time: 15:50
Sample ID: SS015-WW05-092921 Time: 1535 (primary) dup other:
Sample ID: SS015-WW05-092921 Time: 1535 primary (dup) other:
Sample ID: Time: primary dup other:
Filtered? Y / (N) 0.45µm 1.0µm

Well Information

Depth to Top of Product: Depth to Water (BTOC): 27.07
Depth to Oil/Water Interface: Total Depth (BTOC): 49.14
Casing Diameter: 1-in | 2-in | (4-in) Water Column (ft): 22.07
gal/ft of casing: 0.041 | 0.163 | (0.653) Casing Volume (gal): 3.6
Pump Intake Depth: ~~38.1~~ 40.6 KA Screen Interval : 32 to
Stable DTW (BTOC): Measured Stickup:

Method of Purging

Pump: (SUB) BLADR PERIST OTHER: Bailer: Teflon SS Other:
Purge Start Time: 1520 Flow Rate (gpm): Bailer volume (gal):
Purge End Time: 1534 Volume Purged (gal): 0.06 Required Pulls:
Volume Purged (gal):

Criteria for Stable Parameters

Parameter	Working Range	Stability Criteria	Depth to Water Stabilization	
			Time	Depth to Water
Temperature	-5 to 45 degrees C	+/- 0.2 degrees C		
pH	0 to 14 NTU	+/- 0.1		
Conductivity	0 to 200 mS/cm	+/- 3%		
ORP	-999 to +999 mV	+/- 10 mV		
Dissolved Oxygen	0 to 50 mg/L	+/- 10%		
Turbidity	0 to 1,000 NTU	+/- 10% [<10 NTU]		

Instrument Observations

Round	Time	Water Level [ft BTOC]	Volume Purged [liters]	pH	Cond [mS/cm]	Turbidity [NTU]	DO [mg/L]	Temp [C]	ORP [mV]
1	1520	27.14	0.0	5.45	0.098		3.55	2.59	172.2
2	1525	27.12	1.2	5.49	0.099		0.83	2.83	128.1
3	1528	27.11	1.82	5.51	0.099		0.75	2.86	123.1
4	1531	27.10	2.54	5.52	0.100		0.70	2.86	119.8
5	1534	27.10	3.26	5.53	0.100		0.66	2.86	116.7
6									
7									
8									
9									
10									

Notes: Draw-down should ideally be less than 0.3 feet from the original depth to groundwater. Minimal draw-down achieved and measured by: 1) pumping at a low rate (approximately 1 liter/3 minutes or 0.1 gal/min and 2) continually measuring water levels in the well.

Sensory Observations

Color: Clear, Amber, Tan, Brown, Grey, Milky White, Other:
Odor: None, Low, Medium, High, Very Strong, H2S, Fuel Like, Chemical, Unknown
Turbidity: None, Low, Medium, High, Very Turbid, Heavy Silts

Analytical Suite:

Comments:

North Wind-EA JV, LLC

WELL PURGE AND SAMPLING FIELDSHEET

Project: CAPE KRUSENSTERN Well ID: WW-01

Project Location: SS015 Date: 09-29-21

Project #: 060018.001.21 Start Time: 1600

Field Team: K. ASHTON, D. CARDEN End Time: 1645

Sample ID: SS015-WW01-092921 Time: 1630 (primary) dup other:

Sample ID: Time: primary dup other:

Sample ID: Time: primary dup other:

Filtered? Y / (N) 0.45μm 1.0μm

Well Information

Depth to Top of Product:				Depth to Water (BTOC):	39.81
Depth to Oil/Water Interface:				Total Depth (BTOC):	64.45
Casing Diameter:	1-in	2-in	(4-in)	Water Column (ft):	24.65
gal/ft of casing:	0.041	0.163	0.653	Casing Volume (gal):	16.09
Pump Intake Depth:			56.7	Screen Interval :	49 to
Stable DTW (BTOC):				Measured Stickup:	

56.7

Method of Purging

Pump: (SUB) BLADR ~~PERIST~~ OTHER: Bailer: Teflon SS Other:

Purge Start Time: 1618 Flow Rate (gpm): Bailer volume (gal):

Purge End Time: 1630 Volume Purged (gal): Required Pulls:

85 mL / 30 sec Volume Purged (gal):

Criteria for Stable Parameters

Parameter	Working Range	Stability Criteria
Temperature	-5 to 45 degrees C	+/- 0.2 degrees C
pH	0 to 14 NTU	+/- 0.1
Conductivity	0 to 200 mS/cm	+/- 3%
ORP	-999 to +999 mV	+/- 10 mV
Dissolved Oxygen	0 to 50 mg/L	+/- 10%
Turbidity	0 to 1,000 NTU	+/- 10% [<10 NTU]

Depth to Water Stabilization

Time	Depth to Water

Instrument Observations

Round	Time	Water Level [ft BTOC]	Volume Purged [liters]	pH	Cond [mS/cm]	Turbidity [NTU]	DO [mg/L]	Temp [C]	ORP [mV]
1	1618	39.87	0.51	5.58	0.167		1.22	2.43	83.6
2	1621	39.85	1.02	5.59	0.167		1.15	2.50	77.9
3	1624	39.84	1.53	5.60	0.168		0.75	2.60	73.6
4	1627	39.84	2.04	5.61	0.168		0.70	2.50	69.8
5	1630	39.83	2.55	5.61	0.168		0.68	2.68	68.4
6									
7									
8									
9									
10									

Notes: Draw-down should ideally be less than 0.3 feet from the original depth to groundwater. Minimal draw-down achieved and measured by: 1) pumping at a low rate (approximately 1 liter/3 minutes or 0.1 gal/min and 2) continually measuring water levels in the well.

Sensory Observations

Color: (Clear), Amber, Tan, Brown, Grey, Milky White, Other:

Odor: None, Low, Medium, High, (Very Strong), H2S, Fuel Like, Chemical, Unknown

Turbidity: None, Low, Medium, High, Very Turbid, Heavy Silts

Analytical Suite:

Comments:

CLAY @ BOC; VISIBLE SHEEN IN PURGE WTR; STRONG ODOR

North Wind-EA JV, LLC

WELL PURGE AND SAMPLING FIELDSHEET

Project: CAPE ROMAIN AFB Well ID: WW-06

Project Location: SS015 Date: 09-29-21

Project #: 060069.001.21 Start Time: 1900

Field Team: K. ASHTON D. CARDEN End Time: 1945

Sample ID: SS015-WW06-092921 Time: 1935 primary dup other:

Sample ID: Time: primary dup other:

Sample ID: Time: primary dup other:

Filtered? Y / N 0.45µm 1.0µm

Well Information

Depth to Top of Product:

Depth to Oil/Water Interface:

Depth to Water (BTOC): ~~28.95~~ 17.27

Total Depth (BTOC): 29.05

Water Column (ft): 11.56

Casing Volume (gal): 7.56

Screen Interval : 20 to

Measured Stickup:

Casing Diameter:	1-in	2-in	4-in
gal/ft of casing:	0.041	0.163	0.653

Pump Intake Depth: 24.4

Stable DTW (BTOC):

Method of Purging

Pump: SUB BLADR PERIST OTHER: Bailer: Teflon SS Other:

Purge Start Time: 1910 Flow Rate (gpm): 0.037 Bailer volume (gal):

Purge End Time: 1930 Volume Purged (gal): Required Pulls:

70mL/min Volume Purged (gal):

Criteria for Stable Parameters

Parameter	Working Range	Stability Criteria	Depth to Water Stabilization	
			Time	Depth to Water
Temperature	-5 to 45 degrees C	+/- 0.2 degrees C		
pH	0 to 14 NTU	+/- 0.1		
Conductivity	0 to 200 mS/cm	+/- 3%		
ORP	-999 to +999 mV	+/- 10 mV		
Dissolved Oxygen	0 to 50 mg/L	+/- 10%		
Turbidity	0 to 1,000 NTU	+/- 10% [<10 NTU]		

Instrument Observations

Round	Time	Water Level [ft BTOC]	Volume Purged [liters]	pH	Cond [mS/cm]	Turbidity [NTU]	DO [mg/L]	Temp [C]	ORP [mV]
1	1920	17.27	470	5.56	0.024		9.96	2.55	98.2
2	1924	17.27		5.50	0.023		9.66	2.49	96.5
3	1927	17.27		5.48	0.023		9.67	2.54	97.7
4	1930	17.27		5.47	0.023		9.73	2.54	99.6
5									
6									
7									
8									
9									
10									

Notes: Draw-down should ideally be less than 0.3 feet from the original depth to groundwater. Minimal draw-down achieved and measured by: 1) pumping at a low rate (approximately 1 liter/3 minutes or 0.1 gal/min and 2) continually measuring water levels in the well.

Sensory Observations

Color: Clear, Amber, Tan, Brown, Grey, Milky White, Other:

Odor: None, Low, Medium, High, Very Strong, H2S, Fuel Like, Chemical, Unknown

Turbidity: None, Low, Medium, High, Very Turbid, Heavy Silts

Analytical Suite:

Comments:

North Wind-EA JV, LLC

Well CES South ORC

FIELD INSTRUMENT CALIBRATION DATASHEET

Project Location: CARLSBAD, NM Project Number: 0600068 Page of

Calibration Event	1	10.01.21 2
Date & Time:	09-28-21 14:30	
Instrument		
Instrument Type	Water Quality Meter	Turbidimeter
Instrument Make & Model Number:	YSI 556	Micro TPW 2000
Serial Number:	14B100523	20140153
Owner of Instrument:	NW.	NW

Calibration Solution(s)	DO	ORP	Cond.	pH			Turbidity				DO	ORP	Cond.	pH			Turbidity			
				1st pt.	2nd pt.	3rd pt.	1st pt.	2nd pt.	3rd pt.	4th pt.				1st pt.	2nd pt.	3rd pt.	1st pt.	2nd pt.	3rd pt.	4th pt.
Solution Type(s):	DI H_2O	240 mV	1413 ms/cm	4.01	7.00	10.01	1000	10.0	0.02											
Solution Lot Number(s):		6658	CC21 263	CC66 5751	CC66 7900	CC66 5418	Gel Ex Solutions													
Solution Exp. Date:		7/26	5/22	3/22	3/22	3/22														
Calibration Solution Temperature (°C):		25°C	25°C	25°C	25°C	25°C														
Solution Standard Value(s) @ Temp.		±10.0	1413	4.01 ±0.01	7.00 ±0.01	10.01 ±0.02														
Calibration Values																				
Calibration Value @ Temperature: Pre-Cal		240.1	1146	3.89	6.43	10.31														
Operator's Name:	Post Cal	241.4	1147	4.01	7.00	10.01	1001	10.0	0.03											
Notes/Comments:	DARIAN CARDEN, KRISTOPHER ASHTON																			

North Wind-EA JV, LLC

611 CES South ORC **FIELD INSTRUMENT CALIBRATION DATASHEET**

Project Location: CAPE ROMANTOF Project Number: 0600068 Page of

Calibration Event	1	001.21 2
Date & Time:	9-29-21 900	
Instrument		
Instrument Type	Water Quality Meter	Turbidimeter
Instrument Make & Model Number:	YSI 5560	Micro TPW 2000
Serial Number:	14B100 523	20401053
Owner of Instrument:	NW.	NW

Calibration Solution(s)	DO	ORP	Cond.	pH			Turbidity				DO	ORP	Cond.	pH			Turbidity			
				1st pt.	2nd pt.	3rd pt.	1st pt.	2nd pt.	3rd pt.	4th pt.				1st pt.	2nd pt.	3rd pt.	1st pt.	2nd pt.	3rd pt.	4th pt.
Solution Type(s):	DI H_2O	240 mV	1413 ms/cm	4.01	7.00	10.01	1000	10.0	0.02											
Solution Lot Number(s):		6e58	CC21 263	CCGG 5751	CCGG 7900	CCGG 5418	Gel Ex Solutions													
Solution Exp. Date:		7/26	5/22	3/22	3/22	3/22														
Calibration Solution Temperature (°C):		25°C	15°C ~~25°C~~	25°C	25°C	25°C														
Solution Standard Value(s) @ Temp.		±10.0	1413	4.01 ±0.01	7.00 ±0.01	10.01 ±0.02														
Calibration Values																				
Calibration Value @ PRE		236	1144	4.01	7.22	11.56														
Temperature: Post		236	1144	4.01	7.00	10.02														

Operator's Name: DARION CARDEN, CHRISTOPHER ASHTON

Notes/Comments:

North Wind-EA JV, LLC

611 CES South ORC **FIELD INSTRUMENT CALIBRATION DATASHEET**

Project Location: CAPE ROMANZOF Project Number: 0600068 Page of

Calibration Event	1	1001.21 2
Date & Time:	09-30-21 10:00	
Instrument		
Instrument Type	Water Quality Meter	Turbidimeter
Instrument Make & Model Number:	YSI 556	Micro TPW 2000
Serial Number:	14B100523	20401053
Owner of Instrument:	NW.	NW

Calibration Solution(s)	DO	ORP	Cond.	pH			Turbidity				DO	ORP	Cond.	pH			Turbidity			
				1st pt.	2nd pt.	3rd pt.	1st pt.	2nd pt.	3rd pt.	4th pt.				1st pt.	2nd pt.	3rd pt.	1st pt.	2nd pt.	3rd pt.	4th pt.
Solution Type(s):	DI H_2O	240 mV	1413 ms/cm	4.01	7.00	10.01	1000	10.0	0.02											
Solution Lot Number(s):		6658	CC21 263	CCGG 5751	CCGG 7900	CCGG 5918	Gel Ex Solutions													
Solution Exp. Date:		7/26	5/22	3/22	3/22	3/22														
Calibration Solution Temperature (°C):		25°C	25°C	25°C	25°C	25°C														
Solution Standard Value(s) @ Temp.		±10.0	1413	4.01 ±0.01	7.00 ±0.01	10.01 ±0.02														
Calibration Values																				
Calibration Value @ Temperature:		243	1.117 1.147	4.44 4.01	6.11 6.99	9.83 10.00	1001	9.9	0.02											
Operator's Name:	DARIN C. KRISTOFFERSEN																			

Notes/Comments:

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APPENDIX C

CHEMICAL DATA TABLES

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Table C-1. Summary of 2021 Analytical Results for Groundwater Samples at Site SS015.

			Field Sample ID	SS015-WW01-092921	SS015-WW05-092921	SS015-WW05-092921-02	SS015-RB-092921	SS015-WW06-092921
			Site ID	SS015				
			Well ID	WW01	WW05		NA	WW06
			Laboratory Sample Delivery Group	L1413596				
			Laboratory Sample ID	L1413596-16	L1413596-10	L1413596-11	L1413596-12	L1413596-13
			Sample Type	Primary	Primary	Duplicate of SS015-WW05-092921	Equipment Blank	Primary
			Sample Collection Date	09/29/2021	09/29/2021	09/29/2021	09/29/2021	09/29/2021
Analyte	**Analytical Method**	**Units**	**Cleanup Level [1]**	**Result**				
Petroleum Hydrocarbons								
GRO (C6-C10)	AK101	mg/L	2.2	0.278 [0.05] J	1.28 [0.05]	1.22 [0.05]	ND [0.05] U	0.0302 [0.05] U
DRO (C10-C25)	AK102/103	mg/L	1.5	**4.62** [0.4] J-	1.29 [0.42] J-	1.23 [0.42] J-	ND [0.4] UJ	1.37 [0.42] J-
RRO (C25-C36)	AK102/103	mg/L	1.1	ND [0.46] UJ	ND [0.483] UJ	ND [0.483] UJ	NA	ND [0.48] U
Volatile Organic Compounds								
Benzene	8260D	mg/L	0.0046	**0.0155** [0.005] J	**0.05** [0.0005]	**0.0521** [0.0005]	ND [0.0005] U	ND [0.0005] U
Ethylbenzene	8260D	mg/L	0.015	0.00282 [0.005] U	**0.0754** [0.0005]	**0.0806** [0.0005]	0.000161 [0.0005] J	ND [0.0005] U
Toluene	8260D	mg/L	1.1	ND [0.005] U	0.0012 [0.0005]	0.00123 [0.0005]	ND [0.0005] U	ND [0.0005] U
Xylenes, Total	8260D	mg/L	0.19	0.00684 [0.015] U	0.0998 [0.0015]	0.108 [0.0015]	0.000239 [0.0015] J	ND [0.0015] U

Notes:
[1] ADEC Groundwater Cleanup Levels, AAC Title 18, Chapter 75.345, Table C for Human Health (ADEC, 2021).
BOLD = Concentration exceeds ADEC cleanup level.
Results are reported with the limit of detection (LOD) in brackets [ ].
mg/L = milligram(s) per liter
NA = not analyzed
ND = not detected above LOD
Data Qualifiers
U = The analyte was analyzed for, but not detected or is qualified as non-detect because of blank contamination.
J = The analyte was positively identified; the quantitation is estimated because of discrepancies in meeting certain analyte-specific QC criteria.
J- = The analyte was positively identified and the result is an estimated quantity, but the result may be biased low.
UJ = The analyte was not detected; however, the result is estimated because of discrepancies in meeting certain analyte-specific QC criteria.

Table C-2. Summary of 2021 Analytical Results for Groundwater Samples at Site ST009

			Field Sample ID	ST009-MW4-092921	ST009-MW7-092921-S01	ST009-MW7-092921	ST009-MW9-092921
			Site ID	ST009			
			Well ID	MW04	MW7		MW9
			Laboratory Sample Delivery Group	L1413596			
			Laboratory Sample ID	L1413596-15	L1413596-19	L1413596-20	L1413596-14
			Sample Type	Primary	Field duplicate of ST009-MW7-092921	Primary	Primary
			Sample Collection Date	09/29/2021	09/29/2021		09/29/2021
Analyte	**Analytical Method**	**Units**	**Cleanup Level [1]**	**Result**	**Result**	**Result**	**Result**
Petroleum Hydrocarbons							
Gasoline Range Organics (C6-C10)	AK101	mg/L	2.2	ND [0.05] U	0.295 [0.05] J-	0.293 [0.05] J-	0.127 [0.05] U
Diesel Range Organics (C10-C25)	AK102/103	mg/L	1.5	0.208 [0.42] J-	**3.96** [0.4] J-	**4.65** [0.4] J-	0.6 [0.42] J-
Residual Range Organics (C25-C36)	AK102/103	mg/L	1.1	NA	ND [0.46] UJ	ND [0.46] UJ	NA
Volatile Organic Compounds							
Benzene	8260D	mg/L	0.0046	ND [0.0005] U	ND [0.0005] UJ	ND [0.0005] UJ	ND [0.0005] U
Ethylbenzene	8260D	mg/L	0.015	ND [0.0005] U	0.00137 [0.0005] J-	0.00116 [0.0005] J-	0.000241 [0.0005] U
Toluene	8260D	mg/L	1.1	ND [0.0005] U	ND [0.0005] UJ	ND [0.0005] UJ	ND [0.0005] U
Xylenes (total)	8260D	mg/L	0.19	ND [0.0015] U	0.00219 [0.0015] J-	0.00207 [0.0015] J	0.000451 [0.0015] U

Notes:
[1] ADEC Groundwater Cleanup Levels, AAC Title 18, Chapter 75.345, Table C for Human Health (ADEC, 2021).
BOLD = Concentration exceeds ADEC cleanup level.
Results are reported with the limit of detection (LOD) in brackets [ ].
mg/L = milligram(s) per liter
NA = not analyzed
ND = not detected above the LOD.

Data Qualifiers
U = The analyte was analyzed for, but not detected or is qualified as non-detect because of blank contamination.
J = The analyte was positively identified; the quantitation is estimated because of discrepancies in meeting certain analyte-specific QC criteria.
J- = The analyte was positively identified and the result is an estimated quantity, but the result may be biased low.
UJ = The analyte was not detected; however, the result is estimated because of discrepancies in meeting certain analyte-specific QC criteria.

Table C-3. Summary of 2021 Analytical Results for Surface Water Samples at Site LF003

			Client Sample ID	LF003-SW01-093021	LF003-SW02-093021	LF003-SW02-093021-02	LF003-SW03-093021
			Location ID	SW01	SW02		SW03
			Laboratory Sample Delivery Group	L1413596			
			Laboratory Sample ID	L1413596-08	L1413596-07	L1413596-09	L1413596-06
			Sample Type	Primary	Primary	Duplicate	Primary
			Date Collected	09/30/2021	09/30/2021	09/30/2021	09/30/2021
Analyte	**Method**	**Units**	**PAL [1, 2]**	**Result**	**Result**	**Result**	**Result**
PCB 1016	8082 A	mg/L	NS	ND [0.0075] UJ	ND [0.0075] UJ	ND [0.0075] UJ	ND [0.0075] UJ
PCB 1221	8082 A	mg/L	NS	ND [0.00075] U	ND [0.00075] U	ND [0.00075] U	ND [0.00075] U
PCB 1232	8082 A	mg/L	NS	ND [0.00075] U	ND [0.00075] U	ND [0.00075] U	ND [0.00075] U
PCB 1242	8082 A	mg/L	NS	ND [0.00075] U	ND [0.00075] U	ND [0.00075] U	ND [0.00075] U
PCB 1248	8082 A	mg/L	NS	ND [0.067] U	ND [0.067] U	ND [0.067] U	ND [0.067] U
PCB 1254	8082 A	mg/L	NS	ND [0.0005] U	ND [0.0005] U	ND [0.0005] U	ND [0.0005] U
PCB 1260	8082 A	mg/L	NS	ND [0.0005] UJ	ND [0.0005] UJ	ND [0.0005] UJ	ND [0.0005] UJ
PCB 1262	8082 A	mg/L	NS	ND [0.0005] U	ND [0.0005] U	ND [0.0005] U	ND [0.0005] U
PCB 1268	8082 A	mg/L	NS	ND [0.0005] U	ND [0.0005] U	ND [0.0005] U	ND [0.0005] U
Total PCBs[3]	8082 A	mg/L	0.00044	ND [0.0005] U	ND [0.0005] U	ND [0.0005] U	ND [0.0005] U

Notes:
[1] ADEC Groundwater Cleanup Levels (ADEC, 2021), 18 AAC 75.345 Table C.
[2] PALs are the Final Remedial Action-Operation objectives per the Record of Decision for site LF003.
[3] Reported LODs were reported at 0.0005 mg/L, which exceeded the project LOD for Total PCBs of 0.00025 mg/L and the PAL limit at 0.00044 mg/L.
Results are reported with the limit of detection (LOD) in brackets [ ].
NS = Not specified
PAL = Project action limit
ND = not detected above the DL.

Data Qualifiers
U = The analyte was analyzed for, but not detected or is qualified as non-detect because of blank contamination.
UJ = The analyte was not detected; however, the result is estimated because of discrepancies in meeting certain analyte-specific QC criteria.

Table C-4. Summary of 2021 Analytical Results for Sediment Samples at Site LF003

			Client Sample ID	LF003-S01-093021	LF003-S02-093021	LF003-S02-093021-02	LF003-S03-093021	LF003-S04-093021
			Location ID	S01	S02		S03	S04
			Sample Type	Primary	Primary	Duplicate	Primary	Primary
			Laboratory Sample Delivery Group	L1413596				
			Laboratory Sample ID	L1413596-02	L1413596-01	L1413596-03	L1413596-05	L1413596-04
			Date Collected	09/30/2021	09/30/2021	09/30/2021	09/30/2021	09/30/2021
Analyte	**Method**	**Unit**	**PAL[1,2]**	**Result**	**Result**	**Result**	**Result**	**Result**
PCB 1016	8082A	mg/kg	NS	ND [0.0312] UJ	ND [0.0200] UJ	ND [0.0224] UJ	ND [0.0305] UJ	ND [0.0270] UJ
PCB 1221	8082A	mg/kg	NS	ND [0.0312] U	ND [0.0200] U	ND [0.0224] U	ND [0.0305] U	ND [0.0270] U
PCB 1232	8082A	mg/kg	NS	ND [0.0312] U	ND [0.0200] U	ND [0.0224] U	ND [0.0305] U	ND [0.0270] U
PCB 1242	8082A	mg/kg	NS	ND [0.0312] U	ND [0.0200] U	ND [0.0224] U	ND [0.0305] U	ND [0.0270] U
PCB 1248	8082A	mg/kg	NS	ND [0.0156] U	ND [0.00999] U	ND [0.0112] U	ND [0.0152] U	ND [0.0135] U
PCB 1254	8082A	mg/kg	NS	ND [0.0156] U	ND [0.00999] U	ND [0.0112] U	ND [0.0152] U	ND [0.0135] U
PCB 1260	8082A	mg/kg	NS	ND [0.0156] UJ	ND [0.00999] UJ	ND [0.0112] UJ	0.240 [0.0152] J	0.0977 [0.0135] J
PCB 1262	8082A	mg/kg	NS	ND [0.0156] U	ND [0.00999] U	ND [0.0112] U	ND [0.0152] U	ND [0.0135] U
PCB 1268	8082A	mg/kg	NS	ND [0.0156] U	ND [0.00999] U	ND [0.0112] U	ND [0.0152] U	ND [0.0135] U
Total PCBs	8082A	mg/kg	1.0	ND [0.0156] U	ND [0.00999] U	ND [0.0112] U	0.240 [0.0152] J	0.0977 [0.0135] J

Notes:
[1] ADEC 18 AAC 75.341 Table B1 and B2 Method 2, human health, under 40-inch zone Soil Cleanup Levels (ADEC, 2021); no ADEC sediment cleanup levels are available.

[2] PALs are the Final Remedial Action-Operation objectives per the Record of Decision for site LF003.

Results are reported with the limit of detection (LOD) in brackets [ ].
NS = not specified
mg/kg = milligram(s) per kilogram
ND = not detected above the DL
PAL = project action limit
Data Qualifiers
U = The analyte was analyzed for, but not detected or is qualified as non-detect because of blank contamination.
J = The analyte was positively identified; the quantitation is estimated because of discrepancies in meeting certain analyte-specific QC criteria.
UJ = The analyte was not detected; however, the result is estimated because of discrepancies in meeting certain analyte-specific QC criteria.

APPENDIX D

DATA QUALITY ASSURANCE REVIEW AND ADEC LABORATORY CHECKLIST

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LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Northwind Environmental Services
764 East Winchester St., Suite 150
Murray, UT 84107
ATTN: Jill Jones
jill.jones@northwindgrp.com

April 12, 2022

SUBJECT: Cape Romanzof, Data Validation

Dear Ms Jones,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on October 21, 2021. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #52369 RV1:

SDG #	Fraction
L1413596	Volatiles, PCBs, GRO, DRO, RRO

The data validation was performed under Stage 2B validation guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Final Uniform Federal Policy for Quality Assurance Project Plan for Long-Term Management and Remedial Action Operation Activities, Cape Romanzof Long Range Radar Station, Alaska (August 2021)
- U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019)
- DoD General Validation Guidelines (November 2019)
- DoD Data Validation Guidelines Module 1: Data Validation Procedure for Organic Analysis by GC/MS (May 2020)
- DoD Data Validation Guidelines Module 4: Data Validation Procedure for Organic Analysis by GC (March 2021)
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014; update VI, July 2018

Please feel free to contact us if you have any questions.

Sincerely,

Christina Rink

Christina Rink
Project Manager/Senior Chemist
crink@lab-data.com

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Northwind Environemental Services
764 East Winchester St., Suite 150
Murray, UT 84107
ATTN: Jill Jones
jill.jones@northwindgrp.com

November 16, 2021

SUBJECT: Cape Romanzof, Data Validation

Dear Ms Jones,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on October 21, 2021. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #52369:

SDG #	Fraction
L1413596	Volatiles, PCBs, GRO, DRO, RRO

The data validation was performed under Stage 2B validation guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Final Uniform Federal Policy for Quality Assurance Project Plan for Long-Term Management and Remedial Action Operation Activities, Cape Romanzof Long Range Radar Station, Alaska (August 2021)
- U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019)
- DoD General Validation Guidelines (November 2019)
- DoD Data Validation Guidelines Module 1: Data Validation Procedure for Organic Analysis by GC/MS (May 2020)
- DoD Data Validation Guidelines Module 4: Data Validation Procedure for Organic Analysis by GC (March 2021)
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014; update VI, July 2018

Please feel free to contact us if you have any questions.

Sincerely,

Christina Rink

Christina Rink
Project Manager/Senior Chemist
crink@lab-data.com

Stage 2B ADEC

LDC# 52369 (Northwind Environmental Services - Murray, UT / Cape Romanzoff, AK)

LDC	SDG#	DATE REC'D	(3) DATE DUE	BTEX (8260D)		PCBs (8082A)		GRO (AK101)		DRO (AK102)		RRO (AK103)																							
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	L1413596	10/21/21	11/11/21	11	0	4	5	11	0	9	0	5	0																				
Total	T/CR			11	0	4	5	11	0	9	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation).

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Cape Romanzof

LDC Report Date: April 12, 2022

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Pace Analytical National, Mount Juliet, TN

Sample Delivery Group (SDG): L1413596

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SS015-WW05-092921(#10)	L1413596-10	Water	09/29/21
SS015-WW05-092921(#11)	L1413596-11	Water	09/29/21
SS015-RB092921	L1413596-12	Water	09/29/21
SS015-WW06-092921	L1413596-13	Water	09/29/21
ST009-MW9-092921	L1413596-14	Water	09/29/21
ST009-MW4-092921	L1413596-15	Water	09/29/21
SS015-WW01-092921	L1413596-16	Water	09/29/21
TRIP BLANK 1	L1413596-17	Water	09/29/21
TRIP BLANK 2	L1413596-18	Water	09/30/21
ST009-MW7-092921-S01	L1413596-19	Water	09/29/21
ST009-MW7-092921	L1413596-20	Water	09/29/21
ST009-MW7-092921MS	L1413596-20MS	Water	09/29/21
ST009-MW7-092921MSD	L1413596-20MSD	Water	09/29/21

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Uniform Federal Policy for Quality Assurance Project Plan for Long-Term Management and Remedial Action Operation Activities, Cape Romanzof Long Range Radar Station, Alaska (August 2021), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), the DoD General Validation Guidelines (November 2019), and the DoD Data Validation Guidelines Module 1: Data Validation Procedure for Organic Analysis by GC/MS (May 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Volatile Organic Analytes (VOCs) which are Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) by Environmental Protection Agency (EPA) SW 846 Method 8260D

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met with the following exceptions:

Sample	Analyte	Total Days From Sample Collection Until Analysis	Required Holding Time (in Days) From Sample Collection Until Analysis	Flag	A or P
TRIP BLANK 2	All analytes	16	14	UJ (all non-detects)	P
ST009-MW7-092921-S01 ST009-MW7-092921	All analytes	19	14	J (all detects) UJ (all non-detects)	P

II. GC/MS Instrument Performance Check

A bromofluorobenzene (BFB) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 15.0% for all analytes.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes.

The percent differences (%D) of the ending continuing calibration verifications (CCVs) were less than or equal to 50.0% for all analytes.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Samples TRIP BLANK 1 and TRIP BLANK 2 were identified as trip blanks. No contaminants were found.

Sample SS015-RB092921 was identified as a rinsate blank. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Analyte	Concentration	Associated Samples
SS015-RB092921	09/29/21	Ethylbenzene Xylenes, total	0.161 ug/L 0.239 ug/L	SS015-WW05-092921(#10) SS015-WW05-092921(#11) SS015-WW06-092921 ST009-MW9-092921 ST009-MW4-092921 SS015-WW01-092921 ST009-MW7-092921-S01 ST009-MW7-092921

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
ST009-MW9-092921	Ethylbenzene Xylenes, total	0.241 ug/L 0.451 ug/L	0.241U ug/L 0.451U ug/L
SS015-WW01-092921	Ethylbenzene Xylenes, total	2.82 ug/L 6.84 ug/L	2.82U ug/L 6.84U ug/L

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Affected Analyte	Flag	A or P
SS015-RB092921	1,2-Dichloroethane-d4	121 (81-118)	All analytes	J (all detects)	P

Sample	Surrogate	%R (Limits)	Affected Analyte	Flag	A or P
ST009-MW4-092921	1,2-Dichloroethane-d4	120 (81-118)	All analytes	NA	-
SS015-WW01-092921	1,2-Dichloroethane-d4	120 (81-118)	All analytes	J (all detects)	P
TRIP BLANK 1	1,2-Dichloroethane-d4	121 (81-118)	All analytes	NA	-

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
ST009-MW7-092921MS/MSD (ST009-MW7-092921)	Benzene	73.4 (79-120)	-	J (all detects)	A
	Ethylbenzene	77.0 (79-121)	-	J (all detects)	
	Toluene	73.4 (80-121)	-	J (all detects)	
	Xylenes, total	70.2 (79-121)	-	J (all detects)	

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (Limits)	Flag	A or P
ST009-MW7-092921MS/MSD (ST009-MW7-092921)	Benzene	31.3 (≤20)	J (all detects)	A
	Ethylbenzene	20.6 (≤20)	J (all detects)	
	Toluene	27.7 (≤20)	J (all detects)	
	Xylenes, total	25.0 (≤20)	J (all detects)	

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples SS015-WW05-092921(#10) and SS015-WW05-092921(#11) and samples ST009-MW7-092921-S01 and ST009-MW7-092921 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SS015-WW05-092921(#10)	SS015-WW05-092921(#11)				

Analyte	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SS015-WW05-092921(#10)	SS015-WW05-092921(#11)				
Benzene	50.0	52.1	4 (≤30)	-	-	-
Ethylbenzene	75.4	80.6	7 (≤30)	-	-	-
Toluene	1.20	1.23	-	0.03 (≤1.0)	-	-
Xylenes, total	99.8	108	8 (≤30)	-	-	-

Analyte	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
	ST009-MW7-092921-S01	ST009-MW7-092921				
Ethylbenzene	1.37	1.16	-	0.21 (≤1.0)	-	-
Xylenes, total	2.19	2.07	-	0.12 (≤3.0)	-	-

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Peristalic pumps were used to collect samples ST009-MW9-092921, ST009-MW4-092921, and ST009-MW7-092921. Perstaltic pumps should not be used for volatile analysis due to the loss of volatiles from the creation of a vacuum in the intake line that draws the sample to the land surface. As a result, the ethylbenzene and total xylenes results in sample ST009-MW9-092921 and ST009-MW7-092921 were qualified as estimated (J-).

Due to technical holding time, surrogate %R, MS/MSD %R and RPD, and samples collected via a peristalic pump, data were qualified as estimated in six samples.

Due to rinsate blank contamination, data were qualified with a U in two samples.

Cape Romanzof
Volatiles - Data Qualification Summary - SDG L1413596

Sample	Analyte	Flag	A or P	Reason
TRIP BLANK 2	All analytes	UJ (all non-detects)	P	Technical holding times
ST009-MW7-092921-S01 ST009-MW7-092921	All analytes	J (all detects) UJ (all non-detects)	P	Technical holding times
SS015-RB092921 SS015-WW01-092921	All analytes	J (all detects)	P	Surrogates (%R)
ST009-MW7-092921	Benzene Ethylbenzene Toluene Xylenes, total	J (all detects) J (all detects) J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicate (%R)(RPD)
ST009-MW9-092921 ST009-MW7-092921	Ethylbenzene Xylenes, total	J- (all detects) J- (all detects)	A	Overall assessment of data

Cape Romanzof
Volatiles - Laboratory Blank Data Qualification Summary - SDG L1413596

No Sample Data Qualified in this SDG

Cape Romanzof
Volatiles - Field Blank Data Qualification Summary - SDG L1413596

Sample	Analyte	Modified Final Concentration	A or P
ST009-MW9-092921	Ethylbenzene Xylenes, total	0.241U ug/L 0.451U ug/L	A
SS015-WW01-092921	Ethylbenzene Xylenes, total	2.82U ug/L 6.84U ug/L	A

LDC #: 52369A1a **VALIDATION COMPLETENESS WORKSHEET** Date: 11/3/21
SDG #: L1413596 Stage 2B Page: 1 of
Laboratory: Pace Analytical National, Mount Juliet, TN Reviewer:
2nd Reviewer:

METHOD: GC/MS Volatiles (BTEX)(EPA SW 846 Method 8260D)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/SW	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A/A	%RSD ≤15 ICV ≤20
IV.	Continuing calibration pending	A	CCV ≤20/50
V.	Laboratory Blanks	A	
VI.	Field blanks	SW	RB = 3 * TB = 8, 9
VII.	Surrogate spikes	SW	
VIII.	Matrix spike/Matrix spike duplicates	SW	
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	SW	D = 1,2 10,11
XI.	Internal standards	A	
XII.	Target analyte quantitation	N	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; * ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID		Lab ID	Matrix	Date
1	SS015-WW05-092921(~~#10~~) don't delete	D	L1413596-10	Water	09/29/21
2	SS015-WW05-092921(~~#11~~)	D	L1413596-11	Water	09/29/21
3	SS015-RB092921		L1413596-12	Water	09/29/21
4	SS015-WW06-092921		L1413596-13	Water	09/29/21
5	ST009-MW9-092921		L1413596-14	Water	09/29/21
6	ST009-MW4-092921		L1413596-15	Water	09/29/21
7	SS015-WW01-092921		L1413596-16	Water	09/29/21
8	TRIP BLANK 1		L1413596-17	Water	09/29/21
9	TRIP BLANK 2		L1413596-18	Water	09/30/21
10	ST009-MW7-092921-S01	D,	L1413596-19	Water	09/29/21
11	ST009-MW7-092921	D,	L1413596-20	Water	09/29/21
12	ST009-MW7-092921MS		L1413596-20MS	Water	09/29/21
13	ST009-MW7-092921MSD		L1413596-20MSD	Water	09/29/21
14 (1)	WG1755295	(R3717498-3			

(2) WG1756516 (R3718085-3
(3) WG1757658 R3717851-3)

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO.1,1-Difluoroethane	O1. 3-Methylpentane
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylenes	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methyl cyclohexane	T1. 2-Methylhexane
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1.

LDC #: 52369A1a

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: FT

All circled dates have exceeded the technical holding times.
Y (N) N/A Were all cooler temperatures within validation criteria?
Y (N) N/A Were air bubbles > 1/4 inch or was headspace present in the vials?

METHOD : GC/MS VOA (EPA SW 846 Method 8260 D)

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
9	W	Y	9/30/21		10/16/21	16	J/UJ/P
							ND
10→13	W	Y	9/29/21		10/18/21	19	J/UJ/P
							ND+ DET

TECHNICAL HOLDING TIME CRITERIA

Water unpreserved:	Aromatic within 7 days, non-aromatic within 14 days of sample collection.
Water preserved:	Within 14 days of sample collection.
Soil:	Within 14 days of sample collection.

LDC #: 52369A1a

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

Y N N/A Were field blanks identified in this SDG?

Y N N/A Were target compounds detected in the field blanks?

Blank units: ug/L **Associated sample units:** ug/L

Sampling date: 9/29/21

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: RB Associated Samples: 1, 2, 4-7, 10, 11

Compound	Blank ID	Sample Identification									
	3		5		7						
EE	0.161		0.241 / 0.500U		2.82 / 5.00U						
GG	0.239		0.451 / 1.50U		6.84 / 15.0U						

Blank units: _____ **Associated sample units:** _____

Sampling date: _____

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification									

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Common contaminants such as Methylene chloride, Acetone, 2-Butanone and Carbon disulfide that were detected in samples within ten times the associated field blank concentration were qualified as not detected, "U". Other contaminants within five times the field blank concentration were also qualified as not detected, "U".

LDC #: 52369A1a

VALIDATION FINDINGS WORKSHEET
Surrogate Spikes

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all surrogate %R within QC limits?

Y N N/A If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R out of outside of criteria?

#	Sample ID	Surrogate	%Recovery (Limits)	Qualifications
	3	DCE	121 (81-118)	J dil IP ND + Dil
			( )	
	6	↓	( )	
			120 (↓)	J dil IP ND
	7	↓	( )	
			120 (↓)	J dil IP ND + Dil
	8		( )	
	8	↓	121 (↓)	J dil IP ND
			( )	
			( )	
	R3717498-3	↓	119 (↓)	J dil IP
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	

SMC1 (TOL) = Toluene-d8
SMC2 (BFB) = Bromofluorobenzene
SMC3 (DCE) = 1,2-Dichloroethane-d4
SMC4 (DFM) = Dibromofluoromethane

LDC #: 52369A1a

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: FT

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	12 + 13	Y	73.4 (79-120)	( )	( )	11	J/UJ/Δ all Pet
		EE	77.0 (79-121)	( )	( )		
		CC	73.4 (80-121)	( )	( )		
		GG	70.2 (79-121)	( )	( )		
		Y	( )	( )	31.3 (20)		J(UJ)/Δ
		EE	( )	( )	20.6 ( )		
		CC	( )	( )	27.7 ( )		
		GG	( )	( )	25.0 ( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

LDC#:_52369A1a

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page:_1__of_1__
Reviewer:__FT____

METHOD: GCMS VOA (EPA Method 8260B)

Compound	Concentration (ug/L)		(≤30) RPD	Difference	Limits	Qual
	1	2				
V	50.0	52.1	4	~~2.1~~		
EE	75.4	80.6	7	~~5.2~~		
CC	1.20	1.23		0.03	≤ 1.0	
GG	99.8	108	8	~~8.2~~		

Compound	Concentration (ug/L)		(≤30) RPD	Difference	Limits	Qual
	10	11				
EE	1.37	1.16		0.21	≤1.0	
GG	2.19	2.07		0.12	≤3.0	

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Cape Romanzof

LDC Report Date: November 15, 2021

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 2B

Laboratory: Pace Analytical National, Mount Juliet, TN

Sample Delivery Group (SDG): L1413596

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
LF003-S02-093021	L1413596-01	Soil	09/30/21
LF003-S01-093021	L1413596-02	Soil	09/30/21
LF003-S02-093021-02	L1413596-03	Soil	09/30/21
LF003-S04-093021	L1413596-04	Soil	09/30/21
LF003-S03-093021	L1413596-05	Soil	09/30/21
LF003-SW03-093021	L1413596-06	Water	09/30/21
LF003-SW02-093021	L1413596-07	Water	09/30/21
LF003-SW01-093021	L1413596-08	Water	09/30/21
LF003-SW02-093021-02	L1413596-09	Water	09/30/21
LF003-S04-093021MS	L1413596-04MS	Soil	09/30/21
LF003-S04-093021MSD	L1413596-04MSD	Soil	09/30/21
LF003-SW01-093021MS	L1413596-08MS	Water	09/30/21
LF003-SW01-093021MSD	L1413596-08MSD	Water	09/30/21

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Uniform Federal Policy for Quality Assurance Project Plan for Long-Term Management and Remedial Action Operation Activities, Cape Romanzof Long Range Radar Station, Alaska (August 2021), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), the DoD General Validation Guidelines (November 2019), and the DoD Data Validation Guidelines Module 4: Data Validation Procedure for Organic Analysis by GC (March 2021). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls (PCBs) by Environmental Protection Agency (EPA) SW 846 Method 8082A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Affected Analyte	Flag	A or P
10/12/21	ICV-GC14	Col 1	Aroclor-1016 Aroclor-1260	29 62	LF003-S02-093021 LF003-S01-093021 LF003-S02-093021 LF003-S04-093021 LF003-S03-093021	All analytes	J (all detects) UJ (all non-detects)	A

III. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes.

The percent differences (%D) of the ending continuing calibration verifications (CCVs) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Affected Analyte	Flag	A or P
10/11/21	CCV_28	Col 1	Aroclor-1260	28	LF003-SW03-093021 LF003-SW02-093021 LF003-SW01-093021 LF003-SW02-093021 -02	All analytes	UJ (all non-detects)	A
10/11/21 (0026)	1010A_23	Col 2	Aroclor-1016	27	LF003-SW03-093021 LF003-SW02-093021 LF003-SW01-093021 LF003-SW02-093021 -02	All analytes	UJ (all non-detects)	A

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates/Internal Standards

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Column	Surrogate	%R (Limits)	Affected Analyte	Flag	A or P
LF003-SW03-093021	Not specified	Decachlorobiphenyl	818 (10-156)	All analytes	NA	-
LF003-SW02-093021-02	Not specified	Decachlorobiphenyl	416 (10-156)	All analytes	NA	-

All internal standard areas and retention times were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
LF003-S04-093021MS/MSD (LF003-S04-093021)	Aroclor-1016	1160 (47-134)	2300 (47-134)	UJ	-

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (Limits)	Flag	A or P
LF003-S04-093021MS/MSD (LF003-S04-093021)	Aroclor-1016	65.7 (≤30)	UJ	-

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Affected Analyte	Flag	A or P
WG1752974-LCS/LCSD (LF003-SW03-093021 LF003-SW02-093021 LF003-SW01-093021 LF003-SW02-093021-02)	Aroclor-1260 Aroclor-1016	174 (45-134) 372 (46-129)	- -	All analytes	NA	-

Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples LF003-SW02-093021 and LF003-SW02-093021-02 and samples LF003-S02-093021 and LF003-S02-093021-02 were identified as field duplicates. No results were detected in any of the samples.

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to ICV %D and continuing calibration %D, data were qualified as estimated in nine samples.

Cape Romanzof
Polychlorinated Biphenyls - Data Qualification Summary - SDG L1413596

Sample	Analyte	Flag	A or P	Reason
LF003-S02-093021 LF003-S01-093021 LF003-S02-093021 LF003-S04-093021 LF003-S03-093021	All analytes	J (all detects) UJ (all non-detects)	A	Initial calibration verification (%D)
LF003-SW03-093021 LF003-SW02-093021 LF003-SW01-093021 LF003- SW02-093021-02	All analytes	UJ (all non-detects)	A	Continuing calibration (%D)

Cape Romanzof
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG L1413596

No Sample Data Qualified in this SDG

Cape Romanzof
Polychlorinated Biphenyls - Field Blank Data Qualification Summary - SDG L1413596

No Sample Data Qualified in this SDG

LDC #: 52369A3b
SDG #: L1413596
Laboratory: Pace Analytical National, Mount Juliet, TN

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 11/3/21
Page: 1 of 1
Reviewer: KT
2nd Reviewer: CT

METHOD: GC Polychlorinated Biphenyls (EPA SW846 Method 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	Initial calibration/ICV	A A	%RSD/r ≤ 20, r² ICV ≤ 20
III.	Continuing calibration ending	A	CCV ≤ 20/20
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes 1/3	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS ID
IX.	Field duplicates	N	
X.	Target analyte quantitation	N	
XI.	Target analyte identification	N	
XII	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1 1	LF003-S02-093021	L1413596-01	Soil	09/30/21
2 1	LF003-S01-093021	L1413596-02	Soil	09/30/21
3 1	LF003-S02-093021	L1413596-03	Soil	09/30/21
4 1	LF003-S04-093021	L1413596-04	Soil	09/30/21
5 1	LF003-S03-093021	L1413596-05	Soil	09/30/21
6 2	LF003-SW03-093021	L1413596-06	Water	09/30/21
7 2	LF003-SW02-093021	L1413596-07	Water	09/30/21
8 2	LF003-SW01-093021	L1413596-08	Water	09/30/21
9 2	SS015-SW02-093021	L1413596-09	Water	09/30/21
10 1	LF003-S04-093021MS	L1413596-04MS	Soil	09/30/21
11 1	LF003-S04-093021MSD	L1413596-04MSD	Soil	09/30/21
12	LF003-SW01-093021MS	L1413596-08MS	Water	09/30/21
13	LF003-SW01-093021MSD	L1413596-08MSD	Water	09/30/21
14 1	WG1758699			
15 2	WG1752974 (R3714527			
16				
17				

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG. Chlordane
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH. Chlordane (Technical)
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II. Aroclor 1262
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ. Aroclor 1268
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. 2,4'-DDD	KK. Oxychlordane
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. 2,4'-DDE	LL. trans-Nonachlor
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE. 2,4'-DDT	MM. cis-Nonachlor
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF. Hexachlorobenzene	NN.

Notes:_____

LDC #: 52369A3b

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: FT

METHOD: ✓ **GC** __ **HPLC**

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of initial calibration verification calculation was performed? ___%D or ___%R
Y (N) N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?
Y (N) N/A Did the initial calibration verification standards meet the %D / %R validation criteria of ≤20.0% / 80-120%?

#	Date	Standard ID	Detector/ Column	Compound	%D (Limit ≤ 20.0)	Associated Samples	Qualifications
	10/12/21	ICV-GC14	col 1	V	29	1→4, 5, 10, 11	J/UJ/A All TCL
				BB	62	WG1758699-MB	↓ ND +Det

LDC #: 52369A3b

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: FT

METHOD: √ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of continuing calibration calculation was performed? ___%D or ___%R
Y N N/A Were continuing calibration standards analyzed at the required frequencies?
Y N N/A Did the continuing calibration standards meet the %D / %R validation criteria of ≤20.0% / 80-120%?
Level IV Only
Y N N/A Were the retention times for all calibrated compounds within their respective acceptance windows?

#	Date	Standard ID	Detector/ Column	Compound	%D (Limit ≤ 20.0)	RT (limit)	Associated Samples	Qualifications
	10/9/21	CCV-18	col 1	BB	42		WG1752974-MB	J/UJ/Δ
	1401	1009_08	col 2	BB	40		↓	↓
	10/11/21	CCV-28	col 1	BB	28		6-9, 12, 13	J/UJ/Δ all TCE TCL
	0026	1010A_23	col 2	~~BB~~ Y	~~28~~ 27		↓	↓ all ND
		closing CCV						
		CCV-~~28~~						
		1010A_~~23~~-1						

LDC #: 52369A3b

VALIDATION FINDINDS WORKSHEET
Surrogate Recovery

Reviewer: FT

METHOD: ✓ GC ___ HPLC

Are surrogates required by the method? Yes___ or No___.

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were surrogates spiked into all samples and blanks?

Y N N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Sample ID	Detector/ Column	Surrogate Compound	%R (Limits)	Qualifications
	6	NS	θ	818 (10-156)	Jdu /P ND
				( )	
				( )	
	9	↓	θ	416 (↓)	Jdu /P ND
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound		
A	Chlorobenzene (CBZ)	G	Octacosane	M	Benzo(e)Pyrene	S	1-Chloro-3-Nitrobenzene	Y	Tetrachloro-m- xylene
B	4-Bromofluorobenzene (BFB)	H	Ortho-Terphenyl	N	Terphenyl-D14	T	3,4-Dinitrotoluene	Z	2-Bromonaphthalene
C	a,a,a-Trifluorotoluene	I	Fluorobenzene (FBZ)	O	Decachlorobiphenyl (DCB)	U	Tripentyltin	AA	Chloro-octadecane
D	Bromochlorobenene	J	n-Triacontane	P	1-methylnaphthalene	V	Tri-n-propyltin	BB	2,4-Dichlorophenylacetic acid
E	1,4-Dichlorobutane	K	Hexacosane	Q	Dichlorophenyl Acetic Acid (DCAA)	W	Tributyl Phosphate	CC	2,5-Dibromotoluene
F	1,4-Difluorobenzene (DFB)	L	Bromobenzene	R	4-Nitrophenol	X	Triphenyl Phosphate		

LDC #: 52369A3b

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: FT

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?

(Y) N N/A Was an MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and relative percent differences (RPD) within QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	10 + 11	✓	1160 (47-134)	2300 (47-134)	( )	4	J dets/A (ND)
		✓	( )	( )	65.7 (30)	↓	J dets/A (ND)
			( )	( )	( )		qual Y only
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		

LDC #: 52369A3b

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: FT

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A — Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG?
Y (N) N/A — Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

Level IV/D Only
Y N (N/A) — Was an LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

#	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
			( )	( )	( )		
	WG1752974	X BB	174 (45-134)	( )	( )	6→9,	Jdets/P all ND
	-LCS/D	✓	372 (46-129)	( )	( )	WG1752974-MB	↓ ↓
			( )	( )	( )		qual all TCL
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Cape Romanzof

LDC Report Date: April 12, 2022

Parameters: Gasoline Range Organics

Validation Level: Stage 2B

Laboratory: Pace Analytical National, Mount Juliet, TN

Sample Delivery Group (SDG): L1413596

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SS015-WW05-092921(#10)	L1413596-10	Water	09/29/21
SS015-WW05-092921(#11)	L1413596-11	Water	09/29/21
SS015-RB092921	L1413596-12	Water	09/29/21
SS015-WW06-092921	L1413596-13	Water	09/29/21
ST009-MW9-092921	L1413596-14	Water	09/29/21
ST009-MW4-092921	L1413596-15	Water	09/29/21
SS015-WW01-092921	L1413596-16	Water	09/29/21
TRIP BLANK 1	L1413596-17	Water	09/29/21
TRIP BLANK 2	L1413596-18	Water	09/30/21
ST009-MW7-092921-S01	L1413596-19	Water	09/29/21
ST009-MW7-092921	L1413596-20	Water	09/29/21
ST009-MW7-092921MS	L1413596-20MS	Water	09/29/21
ST009-MW7-092921MSD	L1413596-20MSD	Water	09/29/21

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Uniform Federal Policy for Quality Assurance Project Plan for Long-Term Management and Remedial Action Operation Activities, Cape Romanzof Long Range Radar Station, Alaska (August 2021), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), the DoD General Validation Guidelines (November 2019), and the DoD Data Validation Guidelines Module 4: Data Validation Procedure for Organic Analysis by GC (March 2021). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Gasoline Range Organics by AK-101

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met with the following exceptions:

Sample	Analyte	Total Days From Sample Collection Until Analysis	Required Holding Time (in Days) From Sample Collection Until Analysis	Flag	A or P
SS015-WW01-092921 ST009-MW7-092921-S01 ST009-MW7-092921	All analytes	20	14	J (all detects)	P

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 25.0%.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 25.0%.

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 25.0%.

The percent differences (%D) of the ending continuing calibration verifications (CCVs) were less than or equal to 25.0% for all analytes.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

Samples TRIP BLANK 1 and TRIP BLANK 2 were identified as trip blanks. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Analyte	Concentration	Associated Samples
TRIP BLANK 1	09/29/21	TPH C6-C10	28.9 ug/L	SS015-WW05-092921(#10) SS015-WW05-092921(#11) SS015-RB092921 SS015-WW06-092921 ST009-MW9-092921 ST009-MW4-092921 SS015-WW01-092921 ST009-MW7-092921-S01 ST009-MW7-092921

Sample SS015-RB092921 was identified as a rinsate blank. No contaminants were found.

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
SS015-WW06-092921	TPH C6-C10	30.2 ug/L	30.2U ug/L
ST009-MW9-092921	TPH C6-C10	127 ug/L	127U ug/L

VI. Surrogates/Internal Standards

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

All internal standard areas and retention times were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
ST009-MW7-092921MS/MSD (ST009-MW7-092921)	TPH C6-C10	65.1 (70-130)	-	J (all detects)	A

Relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples SS015-WW05-092921(#10) and SS015-WW05-092921(#11) and samples ST009-MW7-092921-S01 and ST009-MW7-092921 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SS015-WW05-092921(#10)	SS015-WW05-092921(#11)				
TPH C6-C10	1280	1220	5 (≤30)	-	-	-

Analyte	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
	ST009-MW7-092921-S01	ST009-MW7-092921				
TPH C6-C10	295	293	-	2 (≤100)	-	-

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Peristalic pumps were used to collect samples ST009-MW9-092921, ST009-MW4-092921, and ST009-MW7-092921. Perstaltic pumps should not be used for volatile analysis due to the loss of volatiles from the creation of a vacuum in the intake line that draws the sample to the land surface. As a result, the TPH C6-C10 result in samples ST009-MW9-092921 and ST009-MW7-092921 were qualified as estimated (J-).

Due to technical holding time, MS/MSD %R, and samples collected via a peristalic pump, data were qualified as estimated in three samples.

Due to trip blank contamination, data were qualified as not detected in three samples.

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Gasoline Range Organics - Data Qualification Summary - SDG L1413596

Sample	Analyte	Flag	A or P	Reason
SS015-WW01-092921 ST009-MW7-092921-S01 ST009-MW7-092921	All analytes	J (all detects)	P	Technical holding times
ST009-MW7-092921	TPH C6-C10	J (all detects)	A	Matrix spike/Matrix spike duplicate (%R)
ST009-MW9-092921 ST009-MW7-092921	TPH C6-C10	J- (all detects)	A	Overall assessment of data

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Gasoline Range Organics - Laboratory Blank Data Qualification Summary - SDG L1413596

No Sample Data Qualified in this SDG

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Gasoline Range Organics - Field Blank Data Qualification Summary - SDG L1413596

Sample	Analyte	Modified Final Concentration	A or P
SS015-WW06-092921	TPH C6-C10	30.2U ug/L	A
ST009-MW9-092921	TPH C6-C10	127U ug/L	A

LDC #: 52369A7 **VALIDATION COMPLETENESS WORKSHEET** Date: 11/3/21

SDG #: L1413596 Stage 2B Page: 1 of 1

Laboratory: Pace Analytical National, Mount Juliet, TN\ Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC Gasoline Range Organics (AK-101)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A /SW	
II.	Initial calibration/ICV	A /A	%D RSD ≤ 25 ICV ≤ 25
III.	Continuing calibration ending	A	CCV ≤ 25/25
IV.	Laboratory Blanks	A	* *
V.	Field blanks	SW	RB = 3 TB = 8, 9
VI.	Surrogate spikes 1,5	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	SW	D = 1, 2 10, 11
X.	Target analyte quantitation	N	
XI.	Target analyte identification	N	
XII	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID		Lab ID	Matrix	Date
1 1	SS015-WW05-092921(#10)	D	L1413596-10	Water	09/29/21
2 1	SS015-WW05-092921(#11)	D	L1413596-11	Water	09/29/21
3 -	SS015-RB092921	RB	L1413596-12	Water	09/29/21
4 +	SS015-WW06-092921		L1413596-13	Water	09/29/21
5 +	ST009-MW9-092921		L1413596-14	Water	09/29/21
6 -	ST009-MW4-092921		L1413596-15	Water	09/29/21
7 +	SS015-WW01-092921		L1413596-16	Water	09/29/21
8 +	TRIP BLANK 1		L1413596-17	Water	09/29/21
9 -	TRIP BLANK 2		L1413596-18	Water	09/30/21
10	ST009-MW7-092921-S01	D,	L1413596-19	Water	09/29/21
11	ST009-MW7-092921	D,	L1413596-20	Water	09/29/21
12	ST009-MW7-092921MS		L1413596-20MS	Water	09/29/21
13	ST009-MW7-092921MSD		L1413596-20MSD	Water	09/29/21
14					

Notes:

1	WG1755203						
2	WG1759564						

LDC #: 52369A7

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: FT

All circled dates have exceeded the technical holding times.
Y N N/A Were all cooler temperatures within validation criteria?

METHOD : √ GC ___ HPLC

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
7, 10	W		9/29/21		~~20~~	20	J/UJ/P
11, 12, 13					10/19/21	21	Det
	Holding time from sampling date to analysis date = 14 days						

TECHNICAL HOLDING TIME CRITERIA

VOLATILES:	Water unpreserved:	Aromatic within 7 days, non-aromatic within 14 days of sample collection.
	Water preserved:	Both within 14 days of sample collection.
	Soils:	Both within 14 days of sample collection.
	Encores unpreserved:	Both within 48 hours of sample collection.
	Encores preserved:	Both within 14 days of sample collection.
EXTRACTABLES:		
	Water:	Extracted within 7 days, analyzed within 40 days.
	Soil:	Extracted within 14 days, analyzed within 40 days.

LDC #: 52369A7

VALIDATION FINDINGS WORKSHEET
Field Blanks

METHOD: ✓ **GC** __ **HPLC**

Y N N/A Were field blanks identified in this SDG?

Y N N/A Were target compounds detected in the field blanks?

Blank units: ug/L **Associated sample units:** ug/L

Sampling date: 09/29/21

Field blank type: (circle one) Field Blank / Trip Blank / Atmospheric Blank / Ambient Blank Rinsate / Equipment Rinsate / Equipment Blank / Source Blank / Other: TB

Associated Samples: 1-7, 10, 11

Compound	Blank ID	Blank ID	Sample Identification							
	8	5X	4	5						
TPH C6-C10	28.9	144.5	30.2/50.04	127 U						
CRQL										

Blank units: _____ **Associated sample units:** _____

Sampling date: _____

Field blank type: (circle one) Field Blank / Trip Blank/ Atmospheric Blank/ Ambient Blank Rinsate / Equipment Rinsate / Equipment Blank / Source Blank / Other: _____

Associated Samples: _____

Compound	Blank ID	Blank ID	Sample Identification							
CRQL										

LDC #: 52369A7

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: FT

METHOD: V GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?

(Y) N N/A Was an MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and relative percent differences (RPD) within QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	12 + 13	TPH C6-C10	65.1 (70-130)	( )	( )	11	J/UJ/A Det
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

LDC#:_52369A7 **VALIDATION FINDINGS WORKSHEET** Page:_1__of_1__
Field Duplicates Reviewer:__FT____

METHOD: GC Gasoline (AK 101)

Compound	Concentration (ug/L)		(≤30) RPD	Difference	Limits	Qual
	1	2				
TPH C6-C10	1280	1220	5			

Compound	Concentration (ug/L)		(≤30) RPD	Difference	Limits	Qual
	10	11				
TPH C6-C10	295	293		2	≤ 100	

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Cape Romanzof

LDC Report Date: April 12, 2022

Parameters: Diesel Range Organics and Residual Range Organics

Validation Level: Stage 2B

Laboratory: Pace Analytical National, Mount Juliet, TN

Sample Delivery Group (SDG): L1413596

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SS015-WW05-092921(#10)	L1413596-10	Water	09/29/21
SS015-WW05-092921(#11)	L1413596-11	Water	09/29/21
SS015-RB092921	L1413596-12	Water	09/29/21
SS015-WW06-092921	L1413596-13	Water	09/29/21
ST009-MW9-092921	L1413596-14	Water	09/29/21
ST009-MW4-092921	L1413596-15	Water	09/29/21
SS015-WW01-092921	L1413596-16	Water	09/29/21
ST009-MW7-092921-S01	L1413596-19	Water	09/29/21
ST009-MW7-092921	L1413596-20	Water	09/29/21
ST009-MW7-092921MS	L1413596-20MS	Water	09/29/21
ST009-MW7-092921MSD	L1413596-20MSD	Water	09/29/21

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Uniform Federal Policy for Quality Assurance Project Plan for Long-Term Management and Remedial Action Operation Activities, Cape Romanzof Long Range Radar Station, Alaska (August 2021), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), the DoD General Validation Guidelines (November 2019), and the DoD Data Validation Guidelines Module 4: Data Validation Procedure for Organic Analysis by GC (March 2021). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Diesel Range Organics by AK-102
Residual Range Organics by AK-103

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 25.0% for all analytes.

The percent differences (%D) of the ending continuing calibration verifications (CCVs) were less than or equal to 25.0% for all analytes.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

Sample SS015-RB092921 was identified as a rinsate blank. No contaminants were found.

VI. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Affected Analyte	Flag	A or P
SS015-WW05-092921(#10)	n-Triacontane	37.9 (50-150)	All analytes	J- (all detects) UJ (all non-detects)	P

Sample	Surrogate	%R (Limits)	Affected Analyte	Flag	A or P
SS015-WW05-092921(#11)	n-Triacontane	34.8 (50-150)	All analytes	J- (all detects) UJ (all non-detects)	P
SS015-RB092921	n-Triacontane	27.5 (50-150)	All analytes	UJ (all non-detects)	P
SS015-WW06-092921	n-Triacontane	31.3 (50-150)	All analytes	J- (all detects)	P
ST009-MW9-092921	n-Triacontane	30.9 (50-150)	All analytes	J- (all detects)	P
ST009-MW4-092921	n-Triacontane	24.8 (50-150)	All analytes	J- (all detects)	P
SS015-WW01-092921	n-Triacontane	47.7 (50-150)	All analytes	J- (all detects) UJ (all non-detects)	P
ST009-MW7-092921-S01	n-Triacontane	41.4 (50-150)	All analytes	J- (all detects) UJ (all non-detects)	P
ST009-MW7-092921	n-Triacontane	36.2 (50-150)	All analytes	J- (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
ST009-MW7-092921MS/MSD (ST009-MW7-092921)	DRO C10-C25	27.4 (75-125)	35.9 (75-125)	J- (all detects)	A

Relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples SS015-WW05-092921(#10) and SS015-WW05-092921(#11) and samples ST009-MW7-092921-S01 and ST009-MW7-092921 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SS015-WW05-092921(#10)	SS015-WW05-092921(#11)				
DRO C10-C25	1290	1230	-	60 (≤840)	-	-

Analyte	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
	ST009-MW7-092921-S01	ST009-MW7-092921				
DRO C10-C25	3960	4650	-	690 (≤800)	-	-

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to surrogate %R and MS/MSD %R, data were qualified as estimated in nine samples.

Cape Romanzof
Diesel Range Organics and Residual Range Organics - Data Qualification Summary - SDG L1413596

Sample	Analyte	Flag	A or P	Reason
SS015-WW05-092921(#10) SS015-WW05-092921(#11) SS015-WW01-092921 ST009-MW7-092921-S01 ST009-MW7-092921	All analytes	J- (all detects) UJ (all non-detects)	P	Surrogates (%R)
SS015-WW06-092921 ST009-MW9-092921 ST009-MW4-092921	All analytes	J- (all detects)	P	Surrogates (%R)
SS015-RB092921	All analytes	UJ (all non-detects)	P	Surrogates (%R)
ST009-MW7-092921	DRO C10-C25	J- (all detects)	A	Matrix spike/Matrix spike duplicate (%R)

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Diesel Range Organics and Residual Range Organics - Laboratory Blank Data Qualification Summary - SDG L1413596

No Sample Data Qualified in this SDG

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Diesel Range Organics and Residual Range Organics - Field Blank Data Qualification Summary - SDG L1413596

No Sample Data Qualified in this SDG

LDC #: 52369A8 **VALIDATION COMPLETENESS WORKSHEET** Date: 11/3/21
SDG #: L1413596 Stage 2B Page: 1 of 1
Laboratory: Pace Analytical National, Mount Juliet, TN Reviewer: FT
2nd Reviewer:

METHOD: GC Diesel Range Organics & Residual Range Organics (AK-102 / AK-103)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	Initial calibration/ICV	A/A	r2 ICV ≤ 25
III.	Continuing calibration pending	A	CCV ≤ 25 / 25
IV.	Laboratory Blanks	A	
V.	Field blanks	ND	RB = 3
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS 1D
IX.	Field duplicates	SW	D = 1,2 8,9
X.	Target analyte quantitation	N	
XI.	Target analyte identification	N	
XII.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID		Lab ID	Matrix	Date
1	SS015-WW05-092921(#10)	D	L1413596-10	Water	09/29/21
2	SS015-WW05-092921(#11)	D	L1413596-11	Water	09/29/21
3	SS015-RB092921		L1413596-12	Water	09/29/21
4	SS015-WW06-092921		L1413596-13	Water	09/29/21
5	ST009-MW9-092921		L1413596-14	Water	09/29/21
6	ST009-MW4-092921		L1413596-15	Water	09/29/21
7 ✓	SS015-WW01-092921		L1413596-16	Water	09/29/21
8	ST009-MW7-092921-S01	D1	L1413596-19	Water	09/29/21
9	ST009-MW7-092921	D1	L1413596-20	Water	09/29/21
10	ST009-MW7-092921MS		L1413596-20MS	Water	09/29/21
11	ST009-MW7-092921MSD		L1413596-20MSD	Water	09/29/21
12					
13					

Notes:

	WG1755656						

LDC #: 52369AB

VALIDATION FINDINDS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: FT

METHOD: ✓ GC ___ HPLC

Are surrogates required by the method? Yes___ or No___.

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were surrogates spiked into all samples and blanks?

Y N N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Sample ID	Detector/ Column	Surrogate Compound	%R (Limits)	Qualifications
	1		J	37.9 (50 - 150)	J|UJ|P ND + Det
	2		↓	34.8 (↓)	J|UJ|P ND + Det
	3		↓	27.5 (↓)	J|UJ|P ND
	4		↓	31.3 (↓)	J|UJ|P Det
	5		↓	30.9 (↓)	J|UJ|P Det
	6		↓	24.8 (↓)	J|UJ|P Det
	7		↓	47.7 (↓)	J|UJ|P ND + Det
	8		↓	41.2 (↓)	J|UJ|P ND + Det
	9		↓	36.2 (↓)	J|UJ/A ND + Det
			↓	32.2 (↓)	J|UJ|P
	WG175656 - MB3			( )	

	Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound		
A	Chlorobenzene (CBZ)	G	Octacosane	M	Benzo(e)Pyrene	S	1-Chloro-3-Nitrobenzene	Y	Tetrachloro-m- xylene
B	4-Bromofluorobenzene (BFB)	H	Ortho-Terphenyl	N	Terphenyl-D14	T	3,4-Dinitrotoluene	Z	2-Bromonaphthalene
C	a,a,a-Trifluorotoluene	I	Fluorobenzene (FBZ)	O	Decachlorobiphenyl (DCB)	U	Tripentyltin	AA	Chloro-octadecane
D	Bromochlorobenene	J	n-Triacontane	P	1-methylnaphthalene	V	Tri-n-propyltin	BB	2,4-Dichlorophenylacetic acid
E	1,4-Dichlorobutane	K	Hexacosane	Q	Dichlorophenyl Acetic Acid (DCAA)	W	Tributyl Phosphate	CC	2,5-Dibromotoluene
F	1,4-Difluorobenzene (DFB)	L	Bromobenzene	R	4-Nitrophenol	X	Triphenyl Phosphate		

LDC #: 52369A8

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: FT

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?
(Y) N N/A Was an MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?
Y (N) N/A Were the MS/MSD percent recoveries (%R) and relative percent differences (RPD) within QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	10 + 11	DRO C10-C25	27.4 (75-125)	35.9 (75-125)	( )	9	J/UJ/A Det
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		

LDC#:_52369A8 **VALIDATION FINDINGS WORKSHEET** Page:_1__of_1__
Field Duplicates Reviewer:__FT____

METHOD: GC DRO/RRO (AK102/AK103)

Compound	Concentration (ug/L)		(≤30) RPD	Difference	Limits	Qual
	1	2				
DRO C10-C25	1290	1230		60	≤ 840	

Compound	Concentration (ug/L)		(≤30) RPD	Difference	Limits	Qual
	8	9				
DRO C10-C25	3960	4650		690	≤ 800	

Laboratory Data Review Checklist

Completed By:

Josephine Go, Stella Cuenco, Christina Rink-Ashdown

Title:

Chemist, Principal Chemist, Senior Chemist

Date:

4/11/2022

Consultant Firm:

Laboratory Data Consultants, Inc.

Laboratory Name:

Pace Analytical, Mount Juliet, TN

Laboratory Report Number:

L1413596

Laboratory Report Date:

10/5/2021

CS Site Name:

Cape Romanzof LRRS LF003, ST009, SS010, SS015, SS016, SS017

ADEC File Number:

2526.38.001, 2526.38.011, 2526.38.007,
2526.38.010, 2526.38.015, 2621.38.015

Hazard Identification Number:

1341, 1339, 1334, 1329, 4129, 4129

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Laboratory Report Date:

10/5/2021

CS Site Name:

Note: Any N/A or No box checked must have an explanation in the comments box.

1. Laboratory

   a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

   Yes☒ No☐ N/A☐ Comments:

   b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

   Yes☐ No☐ N/A☒ Comments:

   No samples were transferred.

2. Chain of Custody (CoC)

   a. CoC information completed, signed, and dated (including released/received by)?

   Yes☒ No☐ N/A☐ Comments:

   b. Correct analyses requested?

   Yes☒ No☐ N/A☐ Comments:

3. Laboratory Sample Receipt Documentation

   a. Sample/cooler temperature documented and within range at receipt (0° to 6° C)?

   Yes☒ No☐ N/A☐ Comments:

   b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

   Yes☒ No☐ N/A☐ Comments:

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c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes☒ No☐ N/A☐ Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes☒ No☐ N/A☐ Comments:

e. Data quality or usability affected?

Comments:

Data is usable.

4. Case Narrative

a. Present and understandable?

Yes☒ No☐ N/A☐ Comments:

b. Discrepancies, errors, or QC failures identified by the lab?

Yes☒ No☐ N/A☐ Comments:

c. Were all corrective actions documented?

Yes☒ No☐ N/A☐ Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Data is usable.

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5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes☒ No☐ N/A☐ Comments:

b. All applicable holding times met?

Yes☐ No☒ N/A☐ Comments:

For method 8260D, samples TRIP BLANK 2, ST009-MW7-092921-S01, and ST009-MW7-092921 were analyzed outside the 14 day holding time all analytes. For method AK101, samples SS015-WW01-092921, ST009-MW7-092921-S01, and ST009-MW7-092921 were analyzed outside the 14 day holding time all analytes. The results were qualified as estimated J for all detects and UJ for all non-detects (See DVR).

c. All soils reported on a dry weight basis?

Yes☒ No☐ N/A☐ Comments:

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

Yes☐ No☒ N/A☐ Comments:

The reported LOD for samples LF003-SW03-093021, LF003-SW02-093021, LF003-SW01-093021, and SS015-SW02-093021 was reported at 0.500 ug/L, which exceeded the project LOD of 0.25 ug/L and the PAL limit at 0.44 ug/L.

e. Data quality or usability affected?

Data is usable as qualified. Samples that exceeded the PAL limit are noted in section 5.d.

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes☒ No☐ N/A☐ Comments:

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ii. All method blank results less than limit of quantitation (LOQ) or project specified objectives?

Yes☒ No☐ N/A☐ Comments:

.

iii. If above LOQ or project specified objectives, what samples are affected?

Comments:

.

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes☐ No☐ N/A☒ Comments:

No detected results were reported in the method blanks.

v. Data quality or usability affected?

Comments:

Data is usable.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes☒ No☐ N/A☐ Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes☐ No☐ N/A☒ Comments:

No metals or inorganics were analyzed.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes☐ No☒ N/A☐ Comments:

For method 8082A, two LCS/LCSD %Rs were above the acceptable limits however the associated results were non-detect and no sample qualification was necessary. (See DVR)

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iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes☒ No☐ N/A☐ Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

For method 8082A, several samples were associated to the %R exceedances. (See DVR)

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes☒ No☐ N/A☐ Comments:

For method 8082A, no samples were qualified since the results were all non-detected.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

Data is usable.

c. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Note: Leave blank if not required for project

i. Organics – One MS/MSD reported per matrix, analysis and 20 samples?

Yes☒ No☐ N/A☐ Comments:

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes☐ No☐ N/A☒ Comments:

No metals or inorganics were analyzed.

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CS Site Name:

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes☐ No☒ N/A☐ Comments:

For method 8260D, the %Rs for Benzene, Ethylbenzene, Toluene, and Xylenes, were below the acceptable limits. (See DVR)
For method 8082A, the %Rs for Aroclor-1016, were below the acceptable limits. (See DVR)
For method AK101, the %R for TPH C6-C10, were below the acceptable limits. (See DVR)
For method AK102, the %Rs for DRO C10-C25, were below the acceptable limits. (See DVR)

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate.

Yes☐ No☒ N/A☐ Comments:

For method 8260D, the MS/MSD RPDs for Benzene, Ethylbenzene, Toluene, and Xylenes were above the acceptable limits (See DVR)
For method 8082A, the MS/MSD RPD for Aroclor-1016 was above the acceptable limits (See DVR)

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

For method 8260D, the detected Benzene, Ethylbenzene, Toluene, and Xylenes results in sample ST009-MW7-092921 were qualified. (See DVR)
For method 8082A, the MS/MSD %R and RPD exceedances were biased high and the associated sample results were non-detect, therefore no data were qualified. (See DVR)
For method AK101, the detected TPH C6-C10 results were qualified. (See DVR)
For method AK102, the detected DRO C10-C25 results were qualified. (See DVR)

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes☒ No☐ N/A☐ Comments:

For method 8260D, the non-detect Benzene, Ethylbenzene, Toluene, and Xylenes results in sample ST009-MW7-092921 were qualified as estimated J for all detects due to MS/MSD %R and RPD exceedances. (See DVR)
For method AK101, the detected TPH C6-C10 results were qualified in sample ST009-MW7-092921 were qualified as estimated J all detects. (See DVR)
For method AK102, the detected DRO C10-C25 results were qualified in sample ST009-MW7-092921 were qualified as estimated J all detects. (See DVR)

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vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

Data is usable as qualified.

d. Surrogates – Organics Only or Isotope Dilution Analytes (IDA) – Isotope Dilution Methods Only

i. Are surrogate/IDA recoveries reported for organic analyses – field, QC and laboratory samples?

Yes☒ No☐ N/A☐ Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)

Yes☐ No☒ N/A☐ Comments:

For method 8260D, samples SS015-RB092921, ST009-MW4-092921, SS015-WW01-092921, and TRIP BLANK 1 had high surrogate %Rs. (See DVR)
For method 8082A, samples LF003-SW03-093021 and SS015-SW02-093021 had high surrogate %Rs. (See DVR)
For methods AK102/AK103, samples SS015-WW05-092921(#10), SS015-WW05-092921(#11), SS015-RB092921, SS015-WW06-092921, ST009-MW9-092921, ST009-MW4-092921, SS015-WW01-092921, ST009-MW7-092921-S01, and ST009-MW7-092921, had low surrogate %Rs. (See DVR)

iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined?

Yes☒ No☐ N/A☐ Comments:

For method 8260D, samples SS015-RB092921, ST009-MW4-092921, SS015-WW01-092921, and TRIP BLANK 1 were qualified as estimated J all detects. (See DVR)
For method 8082A, the results for samples LF003-SW03-093021 and SS015-SW02-093021 were biased high and the results were non-detect, therefore no data were qualified. (See DVR)
For methods AK102/AK103, samples SS015-WW05-092921(#10), SS015-WW05-092921(#11), SS015-RB092921, SS015-WW06-092921, ST009-MW9-092921, ST009-MW4-092921, SS015-WW01-092921, ST009-MW7-092921-S01, and ST009-MW7-092921, were qualified as estimated J all detects or UJ all non-detects. (See DVR)

iv. Data quality or usability affected?

Comments:

Data is usable as qualified.

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e. Trip Blanks

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

Yes☒ No☐ N/A☐ Comments:

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

Yes☒ No☐ N/A☐ Comments:

iii. All results less than LOQ and project specified objectives?

Yes☐ No☒ N/A☐ Comments:

For method AK101, TRIP BLANK 1 had a detection for TPH C6-C10. (See DVR)

iv. If above LOQ or project specified objectives, what samples are affected?

Comments:

For method AK101, samples SS015-WW05-092921(#10), SS015-WW05-092921(#11), SS015-RB092921, SS015-WW06-092921, ST009-MW9-092921, ST009-MW4-092921, SS015-WW01-092921, ST009-MW7-092921-S01, and ST009-MW7-092921 were associated to TRIP BLANK 1. Samples SS015-WW06-092921 and ST009-MW9-092921 were qualified as non-detected U due to the trip blank contamination. (See DVR)

v. Data quality or usability affected?

Comments:

Data is usable as qualified.

f. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes☒ No☐ N/A☐ Comments:

ii. Submitted blind to lab?

Yes☐ No☒ N/A☐ Comments:

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CS Site Name:

iii. Precision – All relative percent differences (RPD) less than specified project objectives? (Recommended: 30% water, 50% soil)

RPD (%) = Absolute value of: $\frac{(R_1-R_2)}{((R_1+R_2)/2)} \times 100$

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

Yes☒ No☐ N/A☐ Comments:

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

Data is usable.

g. Decontamination or Equipment Blank (If not applicable, a comment stating why must be entered below)?

Yes☒ No☐ N/A☐ Comments:

i. All results less than LOQ and project specified objectives?

Yes☐ No☒ N/A☐ Comments:

For method 8260D, the rinsates blank sample SS015-RB092921 had detected concentrations for Ethylbenzene and Xylenes, total.

ii. If above LOQ or project specified objectives, what samples are affected?

Comments:

For method 8260D, samples SS015-WW05-092921(#10), SS015-WW05-092921(#11), SS015-WW06-092921, ST009-MW9-092921, ST009-MW4-092921, SS015-WW01-092921, ST009-MW7-092921-S01, and ST009-MW7-092921 were associated to SS015-RB092921. Samples ST009-MW9-092921 and SS015-WW01-092921 were qualified as non-detected U due to the trip blank contamination. (See DVR)

iii. Data quality or usability affected?

Comments:

Data is usable as qualified.

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7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes☒ No☐ N/A☐ Comments:

For method 8082A, several samples were qualified due to calibration %D exceedances. (See DVR)

For methods 8260D and AK-101, peristaltic pumps were used to collect samples ST009-MW9-092921, ST009-MW4-092921, and ST009-MW7-092921. Perstaltic pumps should not be used for volatile analysis due to the loss of volatiles from the creation of a vacuum in the intake line that draws the sample to the land surface. As a result, the ethylbenzene, total xylenes, and TPH C6-C10 results in samples ST009-MW9-092921 and ST009-MW7-092921 were qualified as estimated (J).

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APPENDIX E

LEVEL II LABORATORY ANALYTICAL REPORT (LEVEL IV PROVIDED ON CD)

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ANALYTICAL REPORT

August 24, 2022

Revised Report

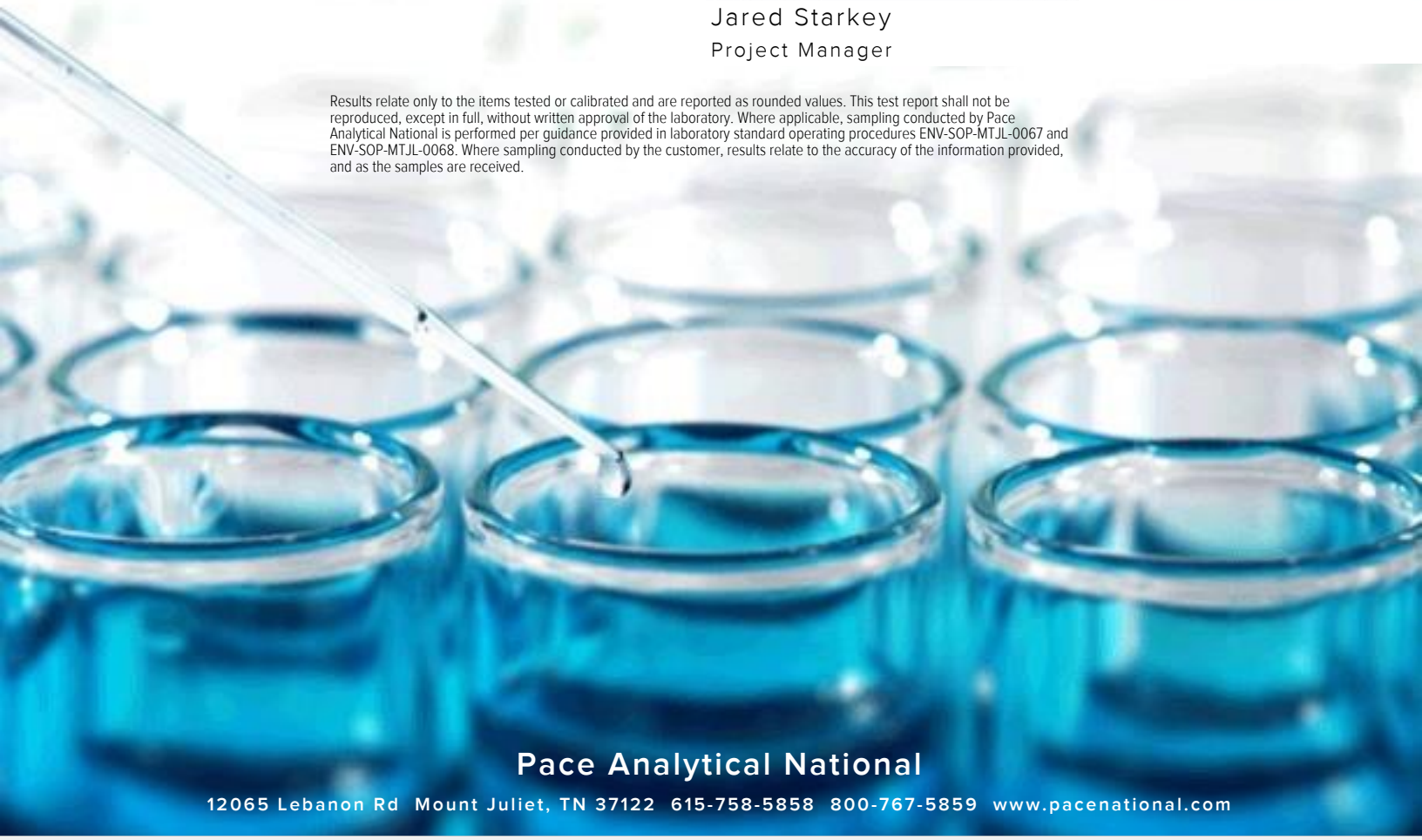
North Wind Site Services, LLC- AK

Sample Delivery Group:	L1413596
Samples Received:	10/05/2021
Project Number:	060068
Description:	Cape Romanzof NPDL 21-037
Site:	CAPE ROMANZOF
Report To:	Jill Jones 2525 C Street Suite 130 Anchorage, AK 99503

Entire Report Reviewed By:

Jared Starkey
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

LF003-S02-093021 L1413596-01 Solid

Collected by: CA | Collected date/time: 09/30/21 12:45 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1753994	1	10/11/21 10:16	10/11/21 10:23	KDW	Mt. Juliet, TN
Polychlorinated Biphenyls (GC) by Method 8082 A	WG1758699	1	10/19/21 07:23	10/19/21 22:42	CLG	Mt. Juliet, TN

LF003-S01-093021 L1413596-02 Solid

Collected by: CA | Collected date/time: 09/30/21 11:15 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1753994	1	10/11/21 10:16	10/11/21 10:23	KDW	Mt. Juliet, TN
Polychlorinated Biphenyls (GC) by Method 8082 A	WG1758699	1	10/19/21 07:23	10/19/21 22:55	CLG	Mt. Juliet, TN

LF003-S02-093021-02 L1413596-03 Solid

Collected by: CA | Collected date/time: 09/30/21 12:45 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1753994	1	10/11/21 10:16	10/11/21 10:23	KDW	Mt. Juliet, TN
Polychlorinated Biphenyls (GC) by Method 8082 A	WG1758699	1	10/19/21 07:23	10/19/21 23:08	CLG	Mt. Juliet, TN

LF003-S04-093021 L1413596-04 Solid

Collected by: CA | Collected date/time: 09/30/21 11:45 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1753994	1	10/11/21 10:16	10/11/21 10:23	KDW	Mt. Juliet, TN
Polychlorinated Biphenyls (GC) by Method 8082 A	WG1758699	1	10/19/21 07:23	10/19/21 23:21	CLG	Mt. Juliet, TN

LF003-S03-093021 L1413596-05 Solid

Collected by: CA | Collected date/time: 09/30/21 13:00 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1753994	1	10/11/21 10:16	10/11/21 10:23	KDW	Mt. Juliet, TN
Polychlorinated Biphenyls (GC) by Method 8082 A	WG1758699	1	10/19/21 07:23	10/20/21 00:00	CLG	Mt. Juliet, TN

LF003-SW03-093021 L1413596-06 GW

Collected by: CA | Collected date/time: 09/30/21 13:45 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Polychlorinated Biphenyls (GC) by Method 8082 A	WG1752974	1	10/08/21 08:30	10/10/21 23:33	AO	Mt. Juliet, TN

LF003-SW02-093021 L1413596-07 GW

Collected by: CA | Collected date/time: 09/30/21 14:00 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Polychlorinated Biphenyls (GC) by Method 8082 A	WG1752974	1	10/08/21 08:30	10/10/21 23:42	AO	Mt. Juliet, TN

LF003-SW01-093021 L1413596-08 GW

Collected by: CA | Collected date/time: 09/30/21 14:10 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Polychlorinated Biphenyls (GC) by Method 8082 A	WG1752974	1	10/08/21 08:30	10/10/21 22:41	AO	Mt. Juliet, TN

LF003-SW02-093021-02 L1413596-09 GW

Collected by: CA | Collected date/time: 09/30/21 14:00 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Polychlorinated Biphenyls (GC) by Method 8082 A	WG1752974	1	10/08/21 08:30	10/10/21 23:51	AO	Mt. Juliet, TN

SS015-WW05-092921 L1413596-10 GW

Collected by: CA | Collected date/time: 09/29/21 15:35 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method AK101	WG1755203	1	10/13/21 11:00	10/13/21 11:00	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1755295	1	10/13/21 19:25	10/13/21 19:25	JAH	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method AK102/103	WG1755656	1.05	10/13/21 09:42	10/13/21 18:56	DMG	Mt. Juliet, TN

SS015-WW05-092921-02 L1413596-11 GW

Collected by: CA | Collected date/time: 09/29/21 15:35 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method AK101	WG1755203	1	10/13/21 11:22	10/13/21 11:22	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1755295	1	10/13/21 19:44	10/13/21 19:44	JAH	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method AK102/103	WG1755656	1.05	10/13/21 09:42	10/13/21 19:17	DMG	Mt. Juliet, TN

SS015-RB-092921 L1413596-12 GW

Collected by: CA | Collected date/time: 09/29/21 15:50 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method AK101	WG1755203	1	10/13/21 11:44	10/13/21 11:44	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1755295	1	10/13/21 20:02	10/13/21 20:02	JAH	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method AK102/103	WG1755656	1	10/13/21 09:42	10/13/21 19:38	DMG	Mt. Juliet, TN

SS015-WW06-092921 L1413596-13 GW

Collected by: CA | Collected date/time: 09/29/21 19:35 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method AK101	WG1755203	1	10/13/21 12:06	10/13/21 12:06	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1755295	1	10/13/21 20:21	10/13/21 20:21	JAH	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method AK102/103	WG1755656	1.05	10/13/21 09:42	10/13/21 19:59	DMG	Mt. Juliet, TN

ST009-MW9-092921 L1413596-14 GW

Collected by: CA | Collected date/time: 09/29/21 11:05 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method AK101	WG1755203	1	10/13/21 13:47	10/13/21 13:47	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1755295	1	10/13/21 20:40	10/13/21 20:40	JAH	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method AK102/103	WG1755656	1.05	10/13/21 09:42	10/13/21 20:19	DMG	Mt. Juliet, TN

ST009-MW4-092921 L1413596-15 GW

Collected by: CA | Collected date/time: 09/29/21 13:45 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method AK101	WG1755203	1	10/13/21 14:09	10/13/21 14:09	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1755295	1	10/13/21 20:59	10/13/21 20:59	JAH	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method AK102/103	WG1755656	1.05	10/13/21 09:42	10/13/21 20:40	DMG	Mt. Juliet, TN

SS015-WW01-092921 L1413596-16 GW

Collected by: CA | Collected date/time: 09/29/21 16:30 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method AK101	WG1759915	1	10/19/21 23:13	10/19/21 23:13	NCC	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1755295	10	10/13/21 21:57	10/13/21 21:57	JAH	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method AK102/103	WG1755656	1	10/13/21 09:42	10/13/21 21:01	DMG	Mt. Juliet, TN

TRIP BLANK 1 L1413596-17 GW

Collected by: CA | Collected date/time: 09/29/21 16:30 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method AK101	WG1755203	1	10/13/21 10:16	10/13/21 10:16	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1755295	1	10/13/21 18:08	10/13/21 18:08	JAH	Mt. Juliet, TN

TRIP BLANK 2 L1413596-18 GW

Collected by: CA | Collected date/time: 09/30/21 16:30 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method AK101	WG1755203	1	10/13/21 10:38	10/13/21 10:38	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1757658	1	10/16/21 00:03	10/16/21 00:03	JAH	Mt. Juliet, TN

ST009-MW7-092921-S01 L1413596-19 GW

Collected by: CA | Collected date/time: 09/29/21 12:05 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method AK101	WG1759564	1	10/19/21 15:44	10/19/21 15:44	JBE	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1758516	1	10/18/21 14:46	10/18/21 14:46	BMB	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method AK102/103	WG1755656	1	10/13/21 09:42	10/13/21 21:22	DMG	Mt. Juliet, TN

ST009-MW7-092921 L1413596-20 GW

Collected by: CA | Collected date/time: 09/29/21 12:05 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method AK101	WG1759564	1	10/19/21 16:06	10/19/21 16:06	JBE	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1758516	1	10/18/21 15:08	10/18/21 15:08	BMB	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method AK102/103	WG1755656	1	10/13/21 09:42	10/13/21 21:42	DMG	Mt. Juliet, TN

Unless qualified or notated within the narrative below, all sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jared Starkey
Project Manager

Report Revision History

Level II Report - Version 1: 11/11/21 09:55
Level IV Report - Version 2: 11/11/21 10:18
Level II Report - Version 3: 11/17/21 10:19
Level IV Report - Version 4: 11/17/21 18:49
Level II Report - Version 5: 12/27/21 13:41
Level IV Report - Version 6: 12/27/21 14:10
Level II Report - Version 7: 01/25/22 16:05
Level IV Report - Version 8: 01/25/22 16:31
Level II Report - Version 9: 01/31/22 10:34
Level IV Report - Version 10: 01/31/22 16:26

Project Comments

Added total PCBs
Added AK103 to -13
ID Correction

Sample Delivery Group (SDG) Narrative

Sample was prepared and/or analyzed past recommended holding time. Concentrations should be considered minimum values.

Batch	Method	Lab Sample ID
WG1757658	8260D	L1413596-18
WG1758516	8260D	L1413596-19, 20
WG1759564	AK101	L1413596-19, 20
WG1759915	AK101	L1413596-16

Analyzed from headspace vial.

Batch	Method	Lab Sample ID
WG1755295	8260D	L1413596-17

Volatile Organic Compounds (GC) by Method AK101

Surrogate recovery limits have been exceeded; values are outside upper control limits.

Batch	Analyte	Lab Sample ID
WG1759564	a,a,a-Trifluorotoluene(FID)	(MSD) R3718584-4

The same analyte is found in the associated blank.

Batch	Analyte	Lab Sample ID
WG1755203	TPHGAK C6 to C10	L1413596-13, 14, 17

The sample matrix interfered with the ability to make any accurate determination; spike value is low.

Batch	Lab Sample ID	Analytes
WG1759564	(MS) R3718584-3, L1413596-20	TPHGAK C6 to C10

Volatile Organic Compounds (GC/MS) by Method 8260D

Surrogate recovery limits have been exceeded; values are outside upper control limits.

Batch	Analyte	Lab Sample ID
WG1755295	1,2-Dichloroethane-d4	(BLANK) R3717498-3, (LCS) R3717498-1, L1413596-12, 15, 16, 17

The sample matrix interfered with the ability to make any accurate determination; spike value is low.

Batch	Lab Sample ID	Analytes
WG1758516	(MS) R3718085-4, L1413596-20	Benzene, Ethylbenzene, Toluene, Total Xylenes and Xylenes, Total

The associated batch QC was outside the established quality control range for precision.

Batch	Lab Sample ID	Analytes
WG1758516	(MSD) R3718085-5, L1413596-20	Benzene, Ethylbenzene, Toluene, Total Xylenes and Xylenes, Total

Semi-Volatile Organic Compounds (GC) by Method AK102/103

Surrogate recovery limits have been exceeded; values are outside lower control limits.

Batch	Analyte	Lab Sample ID
WG1755656	n-Triacontane d62	(BLANK) R3716221-1, (LCS) R3716221-2, (LCS) R3716221-4, (LCSD) R3716221-3, (LCSD) R3716221-5, (MS) R3716221-8, (MS) R3716221-6, (MSD) R3716221-9, (MSD) R3716221-7, L1413596-10, 11, 12, 13, 14, 15, 16, 19, 20

The sample matrix interfered with the ability to make any accurate determination; spike value is low.

Batch	Lab Sample ID	Analytes
WG1755656	(MS) R3716221-6, (MSD) R3716221-7, L1413596-20	AK102 DRO C10-C25

Polychlorinated Biphenyls (GC) by Method 8082 A

RPD between the primary and confirmatory analysis exceeded 40%

Batch	Lab Sample ID	Analytes
WG1752974	(LCS) R3714527-2	PCB 1016
WG1758699	(MS) R3718529-3	PCB 1016 and PCB 1260
WG1758699	(MSD) R3718529-4	PCB 1016 and PCB 1260

Surrogate recovery limits have been exceeded; values are outside upper control limits.

Batch	Analyte	Lab Sample ID
WG1752974	Decachlorobiphenyl	L1413596-06, 09

The associated batch QC was above the established quality control range for accuracy.

Batch	Lab Sample ID	Analytes
WG1752974	(LCS) R3714527-2, L1413596-06, 07, 08, 09	PCB 1016 and PCB 1260

Polychlorinated Biphenyls (GC) by Method 8082 A

The sample matrix interfered with the ability to make any accurate determination; spike value is high.

Batch	Lab Sample ID	Analytes
WG1758699	(MS) R3718529-3, (MSD) R3718529-4, L1413596-04	PCB 1016

The associated batch QC was outside the established quality control range for precision.

Batch	Lab Sample ID	Analytes
WG1758699	(MSD) R3718529-4, L1413596-04	PCB 1016

DETECTION SUMMARY

Volatile Organic Compounds (GC) by Method AK101

Client ID	Lab Sample ID	Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
				ug/l		ug/l	ug/l	ug/l		date / time	
SS015-WW05-092921	L1413596-10	TPHGAK C6 to C10	TPH C6-C10	1280		28.7	50.0	100	1	10/13/2021 11:00	WG1755203
SS015-WW05-092921-02	L1413596-11	TPHGAK C6 to C10	TPH C6-C10	1220		28.7	50.0	100	1	10/13/2021 11:22	WG1755203
SS015-WW06-092921	L1413596-13	TPHGAK C6 to C10	TPH C6-C10	30.2	B J	28.7	50.0	100	1	10/13/2021 12:06	WG1755203
ST009-MW9-092921	L1413596-14	TPHGAK C6 to C10	TPH C6-C10	127	B	28.7	50.0	100	1	10/13/2021 13:47	WG1755203
SS015-WW01-092921	L1413596-16	TPHGAK C6 to C10	TPH C6-C10	278	Q	28.7	50.0	100	1	10/19/2021 23:13	WG1759915
TRIP BLANK 1	L1413596-17	TPHGAK C6 to C10	TPH C6-C10	28.9	B J	28.7	50.0	100	1	10/13/2021 10:16	WG1755203
ST009-MW7-092921-S01	L1413596-19	TPHGAK C6 to C10	TPH C6-C10	295	Q	28.7	50.0	100	1	10/19/2021 15:44	WG1759564
ST009-MW7-092921	L1413596-20	TPHGAK C6 to C10	TPH C6-C10	293	J6 Q	28.7	50.0	100	1	10/19/2021 16:06	WG1759564

Volatile Organic Compounds (GC/MS) by Method 8260D

Client ID	Lab Sample ID	Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
				ug/l		ug/l	ug/l	ug/l		date / time	
SS015-WW05-092921	L1413596-10	Benzene	71-43-2	50.0		0.0941	0.500	1.00	1	10/13/2021 19:25	WG1755295
SS015-WW05-092921	L1413596-10	Ethylbenzene	100-41-4	75.4		0.137	0.500	1.00	1	10/13/2021 19:25	WG1755295
SS015-WW05-092921	L1413596-10	Toluene	108-88-3	1.20		0.278	0.500	1.00	1	10/13/2021 19:25	WG1755295
SS015-WW05-092921	L1413596-10	Total Xylenes	1330-20-7	99.8		0.174	1.50	3.00	1	10/13/2021 19:25	WG1755295
SS015-WW05-092921-02	L1413596-11	Benzene	71-43-2	52.1		0.0941	0.500	1.00	1	10/13/2021 19:44	WG1755295
SS015-WW05-092921-02	L1413596-11	Ethylbenzene	100-41-4	80.6		0.137	0.500	1.00	1	10/13/2021 19:44	WG1755295
SS015-WW05-092921-02	L1413596-11	Toluene	108-88-3	1.23		0.278	0.500	1.00	1	10/13/2021 19:44	WG1755295
SS015-WW05-092921-02	L1413596-11	Total Xylenes	1330-20-7	108		0.174	1.50	3.00	1	10/13/2021 19:44	WG1755295
SS015-RB-092921	L1413596-12	Ethylbenzene	100-41-4	0.161	J	0.137	0.500	1.00	1	10/13/2021 20:02	WG1755295
SS015-RB-092921	L1413596-12	Total Xylenes	1330-20-7	0.239	J	0.174	1.50	3.00	1	10/13/2021 20:02	WG1755295
ST009-MW9-092921	L1413596-14	Ethylbenzene	100-41-4	0.241	J	0.137	0.500	1.00	1	10/13/2021 20:40	WG1755295
ST009-MW9-092921	L1413596-14	Total Xylenes	1330-20-7	0.451	J	0.174	1.50	3.00	1	10/13/2021 20:40	WG1755295
SS015-WW01-092921	L1413596-16	Benzene	71-43-2	15.5		0.941	5.00	10.0	10	10/13/2021 21:57	WG1755295
SS015-WW01-092921	L1413596-16	Ethylbenzene	100-41-4	2.82	J	1.37	5.00	10.0	10	10/13/2021 21:57	WG1755295
SS015-WW01-092921	L1413596-16	Total Xylenes	1330-20-7	6.84	J	1.74	15.0	30.0	10	10/13/2021 21:57	WG1755295
ST009-MW7-092921-S01	L1413596-19	Ethylbenzene	100-41-4	1.37	Q	0.137	0.500	1.00	1	10/18/2021 14:46	WG1758516
ST009-MW7-092921-S01	L1413596-19	Total Xylenes	1330-20-7	2.19	J Q	0.174	1.50	3.00	1	10/18/2021 14:46	WG1758516
ST009-MW7-092921	L1413596-20	Ethylbenzene	100-41-4	1.16	J3 J6 Q	0.137	0.500	1.00	1	10/18/2021 15:08	WG1758516
ST009-MW7-092921	L1413596-20	Total Xylenes	1330-20-7	2.07	J J3 J6 Q	0.174	1.50	3.00	1	10/18/2021 15:08	WG1758516

Semi-Volatile Organic Compounds (GC) by Method AK102/103

Client ID	Lab Sample ID	Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
				ug/l		ug/l	ug/l	ug/l		date / time	
SS015-WW05-092921	L1413596-10	AK102 DRO C10-C25	C10-C25	1290		179	420	840	1.05	10/13/2021 18:56	WG1755656
SS015-WW05-092921-02	L1413596-11	AK102 DRO C10-C25	C10-C25	1230		179	420	840	1.05	10/13/2021 19:17	WG1755656
SS015-WW06-092921	L1413596-13	AK102 DRO C10-C25	C10-C25	1370		179	420	840	1.05	10/13/2021 19:59	WG1755656
ST009-MW9-092921	L1413596-14	AK102 DRO C10-C25	C10-C25	600	J	179	420	840	1.05	10/13/2021 20:19	WG1755656
ST009-MW4-092921	L1413596-15	AK102 DRO C10-C25	C10-C25	208	J	179	420	840	1.05	10/13/2021 20:40	WG1755656
SS015-WW01-092921	L1413596-16	AK102 DRO C10-C25	C10-C25	4620		170	400	800	1	10/13/2021 21:01	WG1755656
ST009-MW7-092921-S01	L1413596-19	AK102 DRO C10-C25	C10-C25	3960		170	400	800	1	10/13/2021 21:22	WG1755656
ST009-MW7-092921	L1413596-20	AK102 DRO C10-C25	C10-C25	4650	J6	170	400	800	1	10/13/2021 21:42	WG1755656

Polychlorinated Biphenyls (GC) by Method 8082 A

Client ID	Lab Sample ID	Analyte	CAS #	Result (dry)	Qualifier	DL (dry)	LOD (dry)	LOQ (dry)	Dilution	Analysis	Batch
				mg/kg		mg/kg	mg/kg	mg/kg		date / time	
LF003-S04-093021	L1413596-04	PCB 1260	11096-82-5	0.0977		0.0117	0.0135	0.0270	1	10/19/2021 23:21	WG1758699
LF003-S04-093021	L1413596-04	Total PCBs	1336-36-3	0.0977		0.0117	0.0135	0.0270	1	10/19/2021 23:21	WG1758699
LF003-S03-093021	L1413596-05	PCB 1260	11096-82-5	0.240		0.0132	0.0152	0.0305	1	10/20/2021 00:00	WG1758699
LF003-S03-093021	L1413596-05	Total PCBs	1336-36-3	0.240		0.0132	0.0152	0.0305	1	10/20/2021 00:00	WG1758699

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	85.1		1	10/11/2021 10:23	WG1753994

Polychlorinated Biphenyls (GC) by Method 8082 A

Analyte	CAS #	Result (dry)	Qualifier	DL (dry)	LOD (dry)	LOQ (dry)	Dilution	Analysis	Batch
		mg/kg		mg/kg	mg/kg	mg/kg		date / time	
PCB 1016	12674-11-2	0.0200	U	0.0139	0.0200	0.0400	1	10/19/2021 22:42	WG1758699
PCB 1221	11104-28-2	0.0200	U	0.0139	0.0200	0.0400	1	10/19/2021 22:42	WG1758699
PCB 1232	11141-16-5	0.0200	U	0.0139	0.0200	0.0400	1	10/19/2021 22:42	WG1758699
PCB 1242	53469-21-9	0.0200	U	0.0139	0.0200	0.0400	1	10/19/2021 22:42	WG1758699
PCB 1248	12672-29-6	0.00999	U	0.00867	0.00999	0.0200	1	10/19/2021 22:42	WG1758699
PCB 1254	11097-69-1	0.00999	U	0.00867	0.00999	0.0200	1	10/19/2021 22:42	WG1758699
PCB 1260	11096-82-5	0.00999	U	0.00867	0.00999	0.0200	1	10/19/2021 22:42	WG1758699
PCB 1262	37324-23-5	0.00999	U	0.00867	0.00999	0.0200	1	10/19/2021 22:42	WG1758699
PCB 1268	11100-14-4	0.00999	U	0.00867	0.00999	0.0200	1	10/19/2021 22:42	WG1758699
Total PCBs	1336-36-3	0.00999	U	0.00867	0.00999	0.0200	1	10/19/2021 22:42	WG1758699
(S) Decachlorobiphenyl	*2051-24-3*	*82.3*				*10.0-143*		*10/19/2021 22:42*	WG1758699
(S) Tetrachloro-m-xylene	*877-09-8*	*84.5*				*44.0-129*		*10/19/2021 22:42*	WG1758699

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	54.5		1	10/11/2021 10:23	WG1753994

Polychlorinated Biphenyls (GC) by Method 8082 A

Analyte	CAS #	Result (dry)	Qualifier	DL (dry)	LOD (dry)	LOQ (dry)	Dilution	Analysis	Batch
		mg/kg		mg/kg	mg/kg	mg/kg		date / time	
PCB 1016	12674-11-2	0.0312	U	0.0217	0.0312	0.0624	1	10/19/2021 22:55	WG1758699
PCB 1221	11104-28-2	0.0312	U	0.0217	0.0312	0.0624	1	10/19/2021 22:55	WG1758699
PCB 1232	11141-16-5	0.0312	U	0.0217	0.0312	0.0624	1	10/19/2021 22:55	WG1758699
PCB 1242	53469-21-9	0.0312	U	0.0217	0.0312	0.0624	1	10/19/2021 22:55	WG1758699
PCB 1248	12672-29-6	0.0156	U	0.0136	0.0156	0.0312	1	10/19/2021 22:55	WG1758699
PCB 1254	11097-69-1	0.0156	U	0.0136	0.0156	0.0312	1	10/19/2021 22:55	WG1758699
PCB 1260	11096-82-5	0.0156	U	0.0136	0.0156	0.0312	1	10/19/2021 22:55	WG1758699
PCB 1262	37324-23-5	0.0156	U	0.0136	0.0156	0.0312	1	10/19/2021 22:55	WG1758699
PCB 1268	11100-14-4	0.0156	U	0.0136	0.0156	0.0312	1	10/19/2021 22:55	WG1758699
Total PCBs	1336-36-3	0.0156	U	0.0136	0.0156	0.0312	1	10/19/2021 22:55	WG1758699
(S) Decachlorobiphenyl	*2051-24-3*	*61.3*				*10.0-143*		*10/19/2021 22:55*	WG1758699
(S) Tetrachloro-m-xylene	*877-09-8*	*61.0*				*44.0-129*		*10/19/2021 22:55*	WG1758699

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	75.9		1	10/11/2021 10:23	WG1753994

Polychlorinated Biphenyls (GC) by Method 8082 A

Analyte	CAS #	Result (dry)	Qualifier	DL (dry)	LOD (dry)	LOQ (dry)	Dilution	Analysis	Batch
		mg/kg		mg/kg	mg/kg	mg/kg		date / time	
PCB 1016	12674-11-2	0.0224	U	0.0156	0.0224	0.0448	1	10/19/2021 23:08	WG1758699
PCB 1221	11104-28-2	0.0224	U	0.0156	0.0224	0.0448	1	10/19/2021 23:08	WG1758699
PCB 1232	11141-16-5	0.0224	U	0.0156	0.0224	0.0448	1	10/19/2021 23:08	WG1758699
PCB 1242	53469-21-9	0.0224	U	0.0156	0.0224	0.0448	1	10/19/2021 23:08	WG1758699
PCB 1248	12672-29-6	0.0112	U	0.00973	0.0112	0.0224	1	10/19/2021 23:08	WG1758699
PCB 1254	11097-69-1	0.0112	U	0.00973	0.0112	0.0224	1	10/19/2021 23:08	WG1758699
PCB 1260	11096-82-5	0.0112	U	0.00973	0.0112	0.0224	1	10/19/2021 23:08	WG1758699
PCB 1262	37324-23-5	0.0112	U	0.00973	0.0112	0.0224	1	10/19/2021 23:08	WG1758699
PCB 1268	11100-14-4	0.0112	U	0.00973	0.0112	0.0224	1	10/19/2021 23:08	WG1758699
Total PCBs	1336-36-3	0.0112	U	0.00973	0.0112	0.0224	1	10/19/2021 23:08	WG1758699
(S) Decachlorobiphenyl	*2051-24-3*	*83.9*				*10.0-143*		*10/19/2021 23:08*	WG1758699
(S) Tetrachloro-m-xylene	*877-09-8*	*84.2*				*44.0-129*		*10/19/2021 23:08*	WG1758699

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	62.9		1	10/11/2021 10:23	WG1753994

Polychlorinated Biphenyls (GC) by Method 8082 A

Analyte	CAS #	Result (dry)	Qualifier	DL (dry)	LOD (dry)	LOQ (dry)	Dilution	Analysis	Batch
		mg/kg		mg/kg	mg/kg	mg/kg		date / time	
PCB 1016	12674-11-2	0.0270	J3 J5 U	0.0187	0.0270	0.0540	1	10/19/2021 23:21	WG1758699
PCB 1221	11104-28-2	0.0270	U	0.0187	0.0270	0.0540	1	10/19/2021 23:21	WG1758699
PCB 1232	11141-16-5	0.0270	U	0.0187	0.0270	0.0540	1	10/19/2021 23:21	WG1758699
PCB 1242	53469-21-9	0.0270	U	0.0187	0.0270	0.0540	1	10/19/2021 23:21	WG1758699
PCB 1248	12672-29-6	0.0135	U	0.0117	0.0135	0.0270	1	10/19/2021 23:21	WG1758699
PCB 1254	11097-69-1	0.0135	U	0.0117	0.0135	0.0270	1	10/19/2021 23:21	WG1758699
PCB 1260	11096-82-5	0.0977		0.0117	0.0135	0.0270	1	10/19/2021 23:21	WG1758699
PCB 1262	37324-23-5	0.0135	U	0.0117	0.0135	0.0270	1	10/19/2021 23:21	WG1758699
PCB 1268	11100-14-4	0.0135	U	0.0117	0.0135	0.0270	1	10/19/2021 23:21	WG1758699
Total PCBs	1336-36-3	0.0977		0.0117	0.0135	0.0270	1	10/19/2021 23:21	WG1758699
(S) Decachlorobiphenyl	*2051-24-3*	*69.0*				*10.0-143*		*10/19/2021 23:21*	WG1758699
(S) Tetrachloro-m-xylene	*877-09-8*	*71.7*				*44.0-129*		*10/19/2021 23:21*	WG1758699

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	55.7		1	10/11/2021 10:23	WG1753994

Polychlorinated Biphenyls (GC) by Method 8082 A

Analyte	CAS #	Result (dry)	Qualifier	DL (dry)	LOD (dry)	LOQ (dry)	Dilution	Analysis	Batch
		mg/kg		mg/kg	mg/kg	mg/kg		date / time	
PCB 1016	12674-11-2	0.0305	U	0.0212	0.0305	0.0610	1	10/20/2021 00:00	WG1758699
PCB 1221	11104-28-2	0.0305	U	0.0212	0.0305	0.0610	1	10/20/2021 00:00	WG1758699
PCB 1232	11141-16-5	0.0305	U	0.0212	0.0305	0.0610	1	10/20/2021 00:00	WG1758699
PCB 1242	53469-21-9	0.0305	U	0.0212	0.0305	0.0610	1	10/20/2021 00:00	WG1758699
PCB 1248	12672-29-6	0.0152	U	0.0132	0.0152	0.0305	1	10/20/2021 00:00	WG1758699
PCB 1254	11097-69-1	0.0152	U	0.0132	0.0152	0.0305	1	10/20/2021 00:00	WG1758699
PCB 1260	11096-82-5	0.240		0.0132	0.0152	0.0305	1	10/20/2021 00:00	WG1758699
PCB 1262	37324-23-5	0.0152	U	0.0132	0.0152	0.0305	1	10/20/2021 00:00	WG1758699
PCB 1268	11100-14-4	0.0152	U	0.0132	0.0152	0.0305	1	10/20/2021 00:00	WG1758699
Total PCBs	1336-36-3	0.240		0.0132	0.0152	0.0305	1	10/20/2021 00:00	WG1758699
(S) Decachlorobiphenyl	*2051-24-3*	*73.2*				*10.0-143*		*10/20/2021 00:00*	WG1758699
(S) Tetrachloro-m-xylene	*877-09-8*	*69.2*				*44.0-129*		*10/20/2021 00:00*	WG1758699

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Polychlorinated Biphenyls (GC) by Method 8082 A

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
PCB 1016	12674-11-2	7.50	J4 U	0.270	7.50	15.0	1	10/10/2021 23:33	WG1752974
PCB 1221	11104-28-2	0.750	U	0.270	0.750	1.50	1	10/10/2021 23:33	WG1752974
PCB 1232	11141-16-5	0.750	U	0.270	0.750	1.50	1	10/10/2021 23:33	WG1752974
PCB 1242	53469-21-9	0.750	U	0.270	0.750	1.50	1	10/10/2021 23:33	WG1752974
PCB 1248	12672-29-6	67.0	U	0.173	67.0	134	1	10/10/2021 23:33	WG1752974
PCB 1254	11097-69-1	0.500	U	0.173	0.500	1.00	1	10/10/2021 23:33	WG1752974
PCB 1260	11096-82-5	0.500	J4 U	0.173	0.500	1.00	1	10/10/2021 23:33	WG1752974
PCB 1262	37324-23-5	0.500	U	0.173	0.500	1.00	1	10/10/2021 23:33	WG1752974
PCB 1268	11100-14-4	0.500	U	0.173	0.500	1.00	1	10/10/2021 23:33	WG1752974
Total PCBs	1336-36-3	0.500	U	0.173	0.500	1.00	1	10/10/2021 23:33	WG1752974
(S) Decachlorobiphenyl	*2051-24-3*	*818*	J1			*10.0-156*		*10/10/2021 23:33*	WG1752974
(S) Tetrachloro-m-xylene	*877-09-8*	*84.5*				*44.0-124*		*10/10/2021 23:33*	WG1752974

Sample Narrative:

L1413596-06 WG1752974: Surrogate failure due to matrix interference

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Polychlorinated Biphenyls (GC) by Method 8082 A

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
PCB 1016	12674-11-2	7.50	J4 U	0.270	7.50	15.0	1	10/10/2021 23:42	WG1752974
PCB 1221	11104-28-2	0.750	U	0.270	0.750	1.50	1	10/10/2021 23:42	WG1752974
PCB 1232	11141-16-5	0.750	U	0.270	0.750	1.50	1	10/10/2021 23:42	WG1752974
PCB 1242	53469-21-9	0.750	U	0.270	0.750	1.50	1	10/10/2021 23:42	WG1752974
PCB 1248	12672-29-6	67.0	U	0.173	67.0	134	1	10/10/2021 23:42	WG1752974
PCB 1254	11097-69-1	0.500	U	0.173	0.500	1.00	1	10/10/2021 23:42	WG1752974
PCB 1260	11096-82-5	0.500	J4 U	0.173	0.500	1.00	1	10/10/2021 23:42	WG1752974
PCB 1262	37324-23-5	0.500	U	0.173	0.500	1.00	1	10/10/2021 23:42	WG1752974
PCB 1268	11100-14-4	0.500	U	0.173	0.500	1.00	1	10/10/2021 23:42	WG1752974
Total PCBs	1336-36-3	0.500	U	0.173	0.500	1.00	1	10/10/2021 23:42	WG1752974
(S) Decachlorobiphenyl	*2051-24-3*	*140*				*10.0-156*		*10/10/2021 23:42*	WG1752974
(S) Tetrachloro-m-xylene	*877-09-8*	*75.6*				*44.0-124*		*10/10/2021 23:42*	WG1752974

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Polychlorinated Biphenyls (GC) by Method 8082 A

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
PCB 1016	12674-11-2	7.50	J4 U	0.270	7.50	15.0	1	10/10/2021 22:41	WG1752974
PCB 1221	11104-28-2	0.750	U	0.270	0.750	1.50	1	10/10/2021 22:41	WG1752974
PCB 1232	11141-16-5	0.750	U	0.270	0.750	1.50	1	10/10/2021 22:41	WG1752974
PCB 1242	53469-21-9	0.750	U	0.270	0.750	1.50	1	10/10/2021 22:41	WG1752974
PCB 1248	12672-29-6	67.0	U	0.173	67.0	134	1	10/10/2021 22:41	WG1752974
PCB 1254	11097-69-1	0.500	U	0.173	0.500	1.00	1	10/10/2021 22:41	WG1752974
PCB 1260	11096-82-5	0.500	J4 U	0.173	0.500	1.00	1	10/10/2021 22:41	WG1752974
PCB 1262	37324-23-5	0.500	U	0.173	0.500	1.00	1	10/10/2021 22:41	WG1752974
PCB 1268	11100-14-4	0.500	U	0.173	0.500	1.00	1	10/10/2021 22:41	WG1752974
Total PCBs	1336-36-3	0.500	U	0.173	0.500	1.00	1	10/10/2021 22:41	WG1752974
(S) Decachlorobiphenyl	*2051-24-3*	*81.3*				*10.0-156*		*10/10/2021 22:41*	WG1752974
(S) Tetrachloro-m-xylene	*877-09-8*	*114*				*44.0-124*		*10/10/2021 22:41*	WG1752974

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Polychlorinated Biphenyls (GC) by Method 8082 A

Analyte	CAS #	Result ug/l	Qualifier	DL ug/l	LOD ug/l	LOQ ug/l	Dilution	Analysis date / time	Batch
PCB 1016	12674-11-2	7.50	J4 U	0.270	7.50	15.0	1	10/10/2021 23:51	WG1752974
PCB 1221	11104-28-2	0.750	U	0.270	0.750	1.50	1	10/10/2021 23:51	WG1752974
PCB 1232	11141-16-5	0.750	U	0.270	0.750	1.50	1	10/10/2021 23:51	WG1752974
PCB 1242	53469-21-9	0.750	U	0.270	0.750	1.50	1	10/10/2021 23:51	WG1752974
PCB 1248	12672-29-6	67.0	U	0.173	67.0	134	1	10/10/2021 23:51	WG1752974
PCB 1254	11097-69-1	0.500	U	0.173	0.500	1.00	1	10/10/2021 23:51	WG1752974
PCB 1260	11096-82-5	0.500	J4 U	0.173	0.500	1.00	1	10/10/2021 23:51	WG1752974
PCB 1262	37324-23-5	0.500	U	0.173	0.500	1.00	1	10/10/2021 23:51	WG1752974
PCB 1268	11100-14-4	0.500	U	0.173	0.500	1.00	1	10/10/2021 23:51	WG1752974
Total PCBs	1336-36-3	0.500	U	0.173	0.500	1.00	1	10/10/2021 23:51	WG1752974
(S) Decachlorobiphenyl	*2051-24-3*	*416*	J1			*10.0-156*		*10/10/2021 23:51*	WG1752974
(S) Tetrachloro-m-xylene	*877-09-8*	*93.1*				*44.0-124*		*10/10/2021 23:51*	WG1752974

Sample Narrative:

L1413596-09 WG1752974: Surrogate failure due to matrix interference

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Volatile Organic Compounds (GC) by Method AK101

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
TPHGAK C6 to C10	TPH C6-C10	1280		28.7	50.0	100	1	10/13/2021 11:00	WG1755203
(S) a,a,a-Trifluorotoluene(FID)	*98-08-8*	*95.3*				*50.0-150*		*10/13/2021 11:00*	WG1755203

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
Benzene	71-43-2	50.0		0.0941	0.500	1.00	1	10/13/2021 19:25	WG1755295
Ethylbenzene	100-41-4	75.4		0.137	0.500	1.00	1	10/13/2021 19:25	WG1755295
Toluene	108-88-3	1.20		0.278	0.500	1.00	1	10/13/2021 19:25	WG1755295
Total Xylenes	1330-20-7	99.8		0.174	1.50	3.00	1	10/13/2021 19:25	WG1755295
(S) Toluene-d8	*2037-26-5*	*100*				*89.0-112*		*10/13/2021 19:25*	WG1755295
(S) 4-Bromofluorobenzene	*460-00-4*	*96.2*				*85.0-114*		*10/13/2021 19:25*	WG1755295
(S) 1,2-Dichloroethane-d4	*17060-07-0*	*116*				*81.0-118*		*10/13/2021 19:25*	WG1755295

Semi-Volatile Organic Compounds (GC) by Method AK102/103

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
AK102 DRO C10-C25	C10-C25	1290		179	420	840	1.05	10/13/2021 18:56	WG1755656
AK103 RRO C25-C36	C25-C36	483	U	483	483	840	1.05	10/13/2021 18:56	WG1755656
(S) o-Terphenyl	*84-15-1*	*77.1*				*50.0-150*		*10/13/2021 18:56*	WG1755656
(S) n-Triacontane d62	*93952-07-9*	*37.9*	J2			*50.0-150*		*10/13/2021 18:56*	WG1755656

Sample Narrative:

L1413596-10 WG1755656: Dilution due to sample volume.

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Volatile Organic Compounds (GC) by Method AK101

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
TPHGAK C6 to C10	TPH C6-C10	1220		28.7	50.0	100	1	10/13/2021 11:22	WG1755203
(S) a,a,a-Trifluorotoluene(FID)	*98-08-8*	*96.6*				*50.0-150*		*10/13/2021 11:22*	WG1755203

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
Benzene	71-43-2	52.1		0.0941	0.500	1.00	1	10/13/2021 19:44	WG1755295
Ethylbenzene	100-41-4	80.6		0.137	0.500	1.00	1	10/13/2021 19:44	WG1755295
Toluene	108-88-3	1.23		0.278	0.500	1.00	1	10/13/2021 19:44	WG1755295
Total Xylenes	1330-20-7	108		0.174	1.50	3.00	1	10/13/2021 19:44	WG1755295
(S) Toluene-d8	*2037-26-5*	*101*				*89.0-112*		*10/13/2021 19:44*	WG1755295
(S) 4-Bromofluorobenzene	*460-00-4*	*98.8*				*85.0-114*		*10/13/2021 19:44*	WG1755295
(S) 1,2-Dichloroethane-d4	*17060-07-0*	*118*				*81.0-118*		*10/13/2021 19:44*	WG1755295

Semi-Volatile Organic Compounds (GC) by Method AK102/103

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
AK102 DRO C10-C25	C10-C25	1230		179	420	840	1.05	10/13/2021 19:17	WG1755656
AK103 RRO C25-C36	C25-C36	483	U	483	483	840	1.05	10/13/2021 19:17	WG1755656
(S) o-Terphenyl	*84-15-1*	*74.9*				*50.0-150*		*10/13/2021 19:17*	WG1755656
(S) n-Triacontane d62	*93952-07-9*	*34.8*	J2			*50.0-150*		*10/13/2021 19:17*	WG1755656

Sample Narrative:

L1413596-11 WG1755656: Dilution due to sample volume.

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Volatile Organic Compounds (GC) by Method AK101

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
TPHGAK C6 to C10	TPH C6-C10	50.0	U	28.7	50.0	100	1	10/13/2021 11:44	WG1755203
(S) a,a,a-Trifluorotoluene(FID)	*98-08-8*	*97.5*				*50.0-150*		*10/13/2021 11:44*	WG1755203

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
Benzene	71-43-2	0.500	U	0.0941	0.500	1.00	1	10/13/2021 20:02	WG1755295
Ethylbenzene	100-41-4	0.161	J	0.137	0.500	1.00	1	10/13/2021 20:02	WG1755295
Toluene	108-88-3	0.500	U	0.278	0.500	1.00	1	10/13/2021 20:02	WG1755295
Total Xylenes	1330-20-7	0.239	J	0.174	1.50	3.00	1	10/13/2021 20:02	WG1755295
(S) Toluene-d8	*2037-26-5*	*101*				*89.0-112*		*10/13/2021 20:02*	WG1755295
(S) 4-Bromofluorobenzene	*460-00-4*	*100*				*85.0-114*		*10/13/2021 20:02*	WG1755295
(S) 1,2-Dichloroethane-d4	*17060-07-0*	*121*	J1			*81.0-118*		*10/13/2021 20:02*	WG1755295

Semi-Volatile Organic Compounds (GC) by Method AK102/103

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
AK102 DRO C10-C25	C10-C25	400	U	170	400	800	1	10/13/2021 19:38	WG1755656
(S) o-Terphenyl	*84-15-1*	*55.6*				*50.0-150*		*10/13/2021 19:38*	WG1755656
(S) n-Triacontane d62	*93952-07-9*	*27.5*	J2			*50.0-150*		*10/13/2021 19:38*	WG1755656

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Volatile Organic Compounds (GC) by Method AK101

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
TPHGAK C6 to C10	TPH C6-C10	30.2	B J	28.7	50.0	100	1	10/13/2021 12:06	WG1755203
(S) a,a,a-Trifluorotoluene(FID)	*98-08-8*	*98.7*				*50.0-150*		*10/13/2021 12:06*	WG1755203

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
Benzene	71-43-2	0.500	U	0.0941	0.500	1.00	1	10/13/2021 20:21	WG1755295
Ethylbenzene	100-41-4	0.500	U	0.137	0.500	1.00	1	10/13/2021 20:21	WG1755295
Toluene	108-88-3	0.500	U	0.278	0.500	1.00	1	10/13/2021 20:21	WG1755295
Total Xylenes	1330-20-7	1.50	U	0.174	1.50	3.00	1	10/13/2021 20:21	WG1755295
(S) Toluene-d8	*2037-26-5*	*101*				*89.0-112*		*10/13/2021 20:21*	WG1755295
(S) 4-Bromofluorobenzene	*460-00-4*	*101*				*85.0-114*		*10/13/2021 20:21*	WG1755295
(S) 1,2-Dichloroethane-d4	*17060-07-0*	*118*				*81.0-118*		*10/13/2021 20:21*	WG1755295

Semi-Volatile Organic Compounds (GC) by Method AK102/103

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
AK102 DRO C10-C25	C10-C25	1370		179	420	840	1.05	10/13/2021 19:59	WG1755656
AK103 RRO C25-C36	C25-C36	483	U	483	483	840	1.05	10/13/2021 19:59	WG1755656
(S) o-Terphenyl	*84-15-1*	*77.1*				*50.0-150*		*10/13/2021 19:59*	WG1755656
(S) n-Triacontane d62	*93952-07-9*	*31.3*	J2			*50.0-150*		*10/13/2021 19:59*	WG1755656

Sample Narrative:

L1413596-13 WG1755656: Dilution due to sample volume.

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Volatile Organic Compounds (GC) by Method AK101

Analyte	CAS #	Result ug/l	Qualifier	DL ug/l	LOD ug/l	LOQ ug/l	Dilution	Analysis date / time	Batch
TPHGAK C6 to C10	TPH C6-C10	127	B	28.7	50.0	100	1	10/13/2021 13:47	WG1755203
(S) a,a,a-Trifluorotoluene(FID)	*98-08-8*	*94.5*				*50.0-150*		*10/13/2021 13:47*	WG1755203

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	CAS #	Result ug/l	Qualifier	DL ug/l	LOD ug/l	LOQ ug/l	Dilution	Analysis date / time	Batch
Benzene	71-43-2	0.500	U	0.0941	0.500	1.00	1	10/13/2021 20:40	WG1755295
Ethylbenzene	100-41-4	0.241	J	0.137	0.500	1.00	1	10/13/2021 20:40	WG1755295
Toluene	108-88-3	0.500	U	0.278	0.500	1.00	1	10/13/2021 20:40	WG1755295
Total Xylenes	1330-20-7	0.451	J	0.174	1.50	3.00	1	10/13/2021 20:40	WG1755295
(S) Toluene-d8	*2037-26-5*	*102*				*89.0-112*		*10/13/2021 20:40*	WG1755295
(S) 4-Bromofluorobenzene	*460-00-4*	*96.8*				*85.0-114*		*10/13/2021 20:40*	WG1755295
(S) 1,2-Dichloroethane-d4	*17060-07-0*	*115*				*81.0-118*		*10/13/2021 20:40*	WG1755295

Semi-Volatile Organic Compounds (GC) by Method AK102/103

Analyte	CAS #	Result ug/l	Qualifier	DL ug/l	LOD ug/l	LOQ ug/l	Dilution	Analysis date / time	Batch
AK102 DRO C10-C25	C10-C25	600	J	179	420	840	1.05	10/13/2021 20:19	WG1755656
(S) o-Terphenyl	*84-15-1*	*76.9*				*50.0-150*		*10/13/2021 20:19*	WG1755656
(S) n-Triacontane d62	*93952-07-9*	*30.9*	J2			*50.0-150*		*10/13/2021 20:19*	WG1755656

Sample Narrative:

L1413596-14 WG1755656: Dilution due to sample volume.

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Volatile Organic Compounds (GC) by Method AK101

Analyte	CAS #	Result ug/l	Qualifier	DL ug/l	LOD ug/l	LOQ ug/l	Dilution	Analysis date / time	Batch
TPHGAK C6 to C10	TPH C6-C10	50.0	U	28.7	50.0	100	1	10/13/2021 14:09	WG1755203
(S) a,a,a-Trifluorotoluene(FID)	*98-08-8*	*97.9*				*50.0-150*		*10/13/2021 14:09*	WG1755203

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	CAS #	Result ug/l	Qualifier	DL ug/l	LOD ug/l	LOQ ug/l	Dilution	Analysis date / time	Batch
Benzene	71-43-2	0.500	U	0.0941	0.500	1.00	1	10/13/2021 20:59	WG1755295
Ethylbenzene	100-41-4	0.500	U	0.137	0.500	1.00	1	10/13/2021 20:59	WG1755295
Toluene	108-88-3	0.500	U	0.278	0.500	1.00	1	10/13/2021 20:59	WG1755295
Total Xylenes	1330-20-7	1.50	U	0.174	1.50	3.00	1	10/13/2021 20:59	WG1755295
(S) Toluene-d8	*2037-26-5*	*101*				*89.0-112*		*10/13/2021 20:59*	WG1755295
(S) 4-Bromofluorobenzene	*460-00-4*	*98.4*				*85.0-114*		*10/13/2021 20:59*	WG1755295
(S) 1,2-Dichloroethane-d4	*17060-07-0*	*120*	J1			*81.0-118*		*10/13/2021 20:59*	WG1755295

Semi-Volatile Organic Compounds (GC) by Method AK102/103

Analyte	CAS #	Result ug/l	Qualifier	DL ug/l	LOD ug/l	LOQ ug/l	Dilution	Analysis date / time	Batch
AK102 DRO C10-C25	C10-C25	208	J	179	420	840	1.05	10/13/2021 20:40	WG1755656
(S) o-Terphenyl	*84-15-1*	*61.4*				*50.0-150*		*10/13/2021 20:40*	WG1755656
(S) n-Triacontane d62	*93952-07-9*	*24.8*	J2			*50.0-150*		*10/13/2021 20:40*	WG1755656

Sample Narrative:

L1413596-15 WG1755656: Dilution due to sample volume.

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Volatile Organic Compounds (GC) by Method AK101

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
TPHGAK C6 to C10	TPH C6-C10	278	Q	28.7	50.0	100	1	10/19/2021 23:13	WG1759915
(S) a,a,a-Trifluorotoluene(FID)	*98-08-8*	*93.2*				*50.0-150*		*10/19/2021 23:13*	WG1759915

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
Benzene	71-43-2	15.5		0.941	5.00	10.0	10	10/13/2021 21:57	WG1755295
Ethylbenzene	100-41-4	2.82	J	1.37	5.00	10.0	10	10/13/2021 21:57	WG1755295
Toluene	108-88-3	5.00	U	2.78	5.00	10.0	10	10/13/2021 21:57	WG1755295
Total Xylenes	1330-20-7	6.84	J	1.74	15.0	30.0	10	10/13/2021 21:57	WG1755295
(S) Toluene-d8	*2037-26-5*	*100*				*89.0-112*		*10/13/2021 21:57*	WG1755295
(S) 4-Bromofluorobenzene	*460-00-4*	*100*				*85.0-114*		*10/13/2021 21:57*	WG1755295
(S) 1,2-Dichloroethane-d4	*17060-07-0*	*120*	J1			*81.0-118*		*10/13/2021 21:57*	WG1755295

Semi-Volatile Organic Compounds (GC) by Method AK102/103

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
AK102 DRO C10-C25	C10-C25	4620		170	400	800	1	10/13/2021 21:01	WG1755656
AK103 RRO C25-C36	C25-C36	460	U	460	460	800	1	10/13/2021 21:01	WG1755656
(S) o-Terphenyl	*84-15-1*	*84.6*				*50.0-150*		*10/13/2021 21:01*	WG1755656
(S) n-Triacontane d62	*93952-07-9*	*47.7*	J2			*50.0-150*		*10/13/2021 21:01*	WG1755656

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Volatile Organic Compounds (GC) by Method AK101

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
TPHGAK C6 to C10	TPH C6-C10	28.9	B J	28.7	50.0	100	1	10/13/2021 10:16	WG1755203
(S) a,a,a-Trifluorotoluene(FID)	*98-08-8*	*95.4*				*50.0-150*		*10/13/2021 10:16*	WG1755203

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
Benzene	71-43-2	0.500	U	0.0941	0.500	1.00	1	10/13/2021 18:08	WG1755295
Ethylbenzene	100-41-4	0.500	U	0.137	0.500	1.00	1	10/13/2021 18:08	WG1755295
Toluene	108-88-3	0.500	U	0.278	0.500	1.00	1	10/13/2021 18:08	WG1755295
Total Xylenes	1330-20-7	1.50	U	0.174	1.50	3.00	1	10/13/2021 18:08	WG1755295
(S) Toluene-d8	*2037-26-5*	*101*				*89.0-112*		*10/13/2021 18:08*	WG1755295
(S) 4-Bromofluorobenzene	*460-00-4*	*98.9*				*85.0-114*		*10/13/2021 18:08*	WG1755295
(S) 1,2-Dichloroethane-d4	*17060-07-0*	*121*	J1			*81.0-118*		*10/13/2021 18:08*	WG1755295

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Volatile Organic Compounds (GC) by Method AK101

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
TPHGAK C6 to C10	TPH C6-C10	50.0	U	28.7	50.0	100	1	10/13/2021 10:38	WG1755203
(S) a,a,a-Trifluorotoluene(FID)	*98-08-8*	*95.3*				*50.0-150*		*10/13/2021 10:38*	WG1755203

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
Benzene	71-43-2	0.500	Q U	0.0941	0.500	1.00	1	10/16/2021 00:03	WG1757658
Ethylbenzene	100-41-4	0.500	Q U	0.137	0.500	1.00	1	10/16/2021 00:03	WG1757658
Toluene	108-88-3	0.500	Q U	0.278	0.500	1.00	1	10/16/2021 00:03	WG1757658
Total Xylenes	1330-20-7	1.50	Q U	0.174	1.50	3.00	1	10/16/2021 00:03	WG1757658
(S) Toluene-d8	*2037-26-5*	*103*				*89.0-112*		*10/16/2021 00:03*	WG1757658
(S) 4-Bromofluorobenzene	*460-00-4*	*93.7*				*85.0-114*		*10/16/2021 00:03*	WG1757658
(S) 1,2-Dichloroethane-d4	*17060-07-0*	*115*				*81.0-118*		*10/16/2021 00:03*	WG1757658

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Volatile Organic Compounds (GC) by Method AK101

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
TPHGAK C6 to C10	TPH C6-C10	295	Q	28.7	50.0	100	1	10/19/2021 15:44	WG1759564
(S) a,a,a-Trifluorotoluene(FID)	*98-08-8*	*94.9*				*50.0-150*		*10/19/2021 15:44*	WG1759564

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
Benzene	71-43-2	0.500	Q U	0.0941	0.500	1.00	1	10/18/2021 14:46	WG1758516
Ethylbenzene	100-41-4	1.37	Q	0.137	0.500	1.00	1	10/18/2021 14:46	WG1758516
Toluene	108-88-3	0.500	Q U	0.278	0.500	1.00	1	10/18/2021 14:46	WG1758516
Total Xylenes	1330-20-7	2.19	J Q	0.174	1.50	3.00	1	10/18/2021 14:46	WG1758516
(S) Toluene-d8	*2037-26-5*	*104*				*89.0-112*		*10/18/2021 14:46*	WG1758516
(S) 4-Bromofluorobenzene	*460-00-4*	*103*				*85.0-114*		*10/18/2021 14:46*	WG1758516
(S) 1,2-Dichloroethane-d4	*17060-07-0*	*112*				*81.0-118*		*10/18/2021 14:46*	WG1758516

Semi-Volatile Organic Compounds (GC) by Method AK102/103

Analyte	CAS #	Result	Qualifier	DL	LOD	LOQ	Dilution	Analysis	Batch
		ug/l		ug/l	ug/l	ug/l		date / time	
AK102 DRO C10-C25	C10-C25	3960		170	400	800	1	10/13/2021 21:22	WG1755656
AK103 RRO C25-C36	C25-C36	460	U	460	460	800	1	10/13/2021 21:22	WG1755656
(S) o-Terphenyl	*84-15-1*	*79.3*				*50.0-150*		*10/13/2021 21:22*	WG1755656
(S) n-Triacontane d62	*93952-07-9*	*41.4*	J2			*50.0-150*		*10/13/2021 21:22*	WG1755656

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
Cooler#	1	
Cooler Temperature	3.7	Deg. C

Volatile Organic Compounds (GC) by Method AK101

Analyte	CAS #	Result ug/l	Qualifier	DL ug/l	LOD ug/l	LOQ ug/l	Dilution	Analysis date / time	Batch
TPHGAK C6 to C10	TPH C6-C10	293	J6 Q	28.7	50.0	100	1	10/19/2021 16:06	WG1759564
(S) a,a,a-Trifluorotoluene(FID)	*98-08-8*	*95.3*				*50.0-150*		*10/19/2021 16:06*	WG1759564

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	CAS #	Result ug/l	Qualifier	DL ug/l	LOD ug/l	LOQ ug/l	Dilution	Analysis date / time	Batch
Benzene	71-43-2	0.500	J3 J6 Q U	0.0941	0.500	1.00	1	10/18/2021 15:08	WG1758516
Ethylbenzene	100-41-4	1.16	J3 J6 Q	0.137	0.500	1.00	1	10/18/2021 15:08	WG1758516
Toluene	108-88-3	0.500	J3 J6 Q U	0.278	0.500	1.00	1	10/18/2021 15:08	WG1758516
Total Xylenes	1330-20-7	2.07	J J3 J6 Q	0.174	1.50	3.00	1	10/18/2021 15:08	WG1758516
(S) Toluene-d8	*2037-26-5*	*102*				*89.0-112*		*10/18/2021 15:08*	WG1758516
(S) 4-Bromofluorobenzene	*460-00-4*	*102*				*85.0-114*		*10/18/2021 15:08*	WG1758516
(S) 1,2-Dichloroethane-d4	*17060-07-0*	*110*				*81.0-118*		*10/18/2021 15:08*	WG1758516

Semi-Volatile Organic Compounds (GC) by Method AK102/103

Analyte	CAS #	Result ug/l	Qualifier	DL ug/l	LOD ug/l	LOQ ug/l	Dilution	Analysis date / time	Batch
AK102 DRO C10-C25	C10-C25	4650	J6	170	400	800	1	10/13/2021 21:42	WG1755656
AK103 RRO C25-C36	C25-C36	460	U	460	460	800	1	10/13/2021 21:42	WG1755656
(S) o-Terphenyl	*84-15-1*	*77.3*				*50.0-150*		*10/13/2021 21:42*	WG1755656
(S) n-Triacontane d62	*93952-07-9*	*36.2*	J2			*50.0-150*		*10/13/2021 21:42*	WG1755656

Method Blank (MB)

(MB) R3715071-1 10/11/21 10:23

Analyte	MB Result %	MB Qualifier	MB DL %	MB LOD %	MB LOQ %
Total Solids	0.00200			0.100	

L1413596-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1413596-04 10/11/21 10:23 • (DUP) R3715071-3 10/11/21 10:23

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	62.9	60.5	1	3.96		5

Laboratory Control Sample (LCS)

(LCS) R3715071-2 10/11/21 10:23

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3718277-2 10/13/21 09:21

Analyte	MB Result ug/l	MB Qualifier	MB DL ug/l	MB LOD ug/l	MB LOQ ug/l
TPHGAK C6 to C10	50.0	J U	28.7	50.0	100
(S) a,a,a-Trifluorotoluene(FID)	*98.5*				*60.0-120*

Laboratory Control Sample (LCS)

(LCS) R3718277-1 10/13/21 08:22

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPHGAK C6 to C10	5000	4190	83.8	60.0-120	
(S) a,a,a-Trifluorotoluene(FID)			*113*	*60.0-120*	

L1413989-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1413989-01 10/13/21 16:43 • (MS) R3718277-3 10/13/21 17:49 • (MSD) R3718277-4 10/13/21 18:11

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPHGAK C6 to C10	5000	50.0	4010	4400	80.2	88.0	1	70.0-130			9.27	20
(S) a,a,a-Trifluorotoluene(FID)					*110*	*109*		*50.0-150*				

Method Blank (MB)

(MB) R3718584-2 10/19/21 11:48

Analyte	MB Result ug/l	MB Qualifier	MB DL ug/l	MB LOD ug/l	MB LOQ ug/l
TPHGAK C6 to C10	50.0	J U	28.7	50.0	100
(S) a,a,a-Trifluorotoluene(FID)	*93.8*				*60.0-120*

Laboratory Control Sample (LCS)

(LCS) R3718584-1 10/19/21 11:04

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPHGAK C6 to C10	5000	4000	80.0	60.0-120	
(S) a,a,a-Trifluorotoluene(FID)			*107*	*60.0-120*	

L1413596-20 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1413596-20 10/19/21 16:06 • (MS) R3718584-3 10/19/21 16:50 • (MSD) R3718584-4 10/19/21 18:26

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPHGAK C6 to C10	5000	293	3550	3950	65.1	73.1	1	70.0-130	J6		10.7	20
(S) a,a,a-Trifluorotoluene(FID)					*96.1*	*177*		*50.0-150*		J1		

Method Blank (MB)

(MB) R3718608-2 10/19/21 22:02

Analyte	MB Result ug/l	MB Qualifier	MB DL ug/l	MB LOD ug/l	MB LOQ ug/l
TPHGAK C6 to C10	50.0	J U	28.7	50.0	100
(S) a,a,a-Trifluorotoluene(FID)	*93.4*				*60.0-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3718608-1 10/19/21 19:10 • (LCSD) R3718608-3 10/20/21 00:19

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPHGAK C6 to C10	5000	4150	3790	83.0	75.8	60.0-120			9.07	20
(S) a,a,a-Trifluorotoluene(FID)				*108*	*103*	*60.0-120*				

Method Blank (MB)

(MB) R3717498-3 10/13/21 17:29

Analyte	MB Result ug/l	MB Qualifier	MB DL ug/l	MB LOD ug/l	MB LOQ ug/l
Benzene	0.500	U	0.0941	0.500	1.00
Ethylbenzene	0.500	U	0.137	0.500	1.00
Toluene	0.500	U	0.278	0.500	1.00
Xylenes, Total	1.50	U	0.174	1.50	3.00
(S) Toluene-d8	*104*				*89.0-112*
(S) 4-Bromofluorobenzene	*98.1*				*85.0-114*
(S) 1,2-Dichloroethane-d4	*119*	J1			*81.0-118*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3717498-1 10/13/21 16:21 • (LCSD) R3717498-2 10/13/21 16:40

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	5.00	4.55	4.37	91.0	87.4	79.0-120			4.04	20
Ethylbenzene	5.00	4.54	4.39	90.8	87.8	79.0-121			3.36	20
Toluene	5.00	4.42	4.34	88.4	86.8	80.0-121			1.83	20
Xylenes, Total	15.0	13.4	13.4	89.3	89.3	79.0-121			0.000	20
(S) Toluene-d8				*101*	*103*	*89.0-112*				
(S) 4-Bromofluorobenzene				*98.9*	*96.7*	*85.0-114*				
(S) 1,2-Dichloroethane-d4				*121*	*117*	*81.0-118*	J1			

Method Blank (MB)

(MB) R3717851-3 10/15/21 23:42

Analyte	MB Result ug/l	MB Qualifier	MB DL ug/l	MB LOD ug/l	MB LOQ ug/l
Benzene	0.500	U	0.0941	0.500	1.00
Ethylbenzene	0.500	U	0.137	0.500	1.00
Toluene	0.500	U	0.278	0.500	1.00
Xylenes, Total	1.50	U	0.174	1.50	3.00
(S) Toluene-d8	*103*				*89.0-112*
(S) 4-Bromofluorobenzene	*90.7*				*85.0-114*
(S) 1,2-Dichloroethane-d4	*118*				*81.0-118*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3717851-1 10/15/21 22:19 • (LCSD) R3717851-2 10/15/21 23:01

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	5.00	4.87	4.79	97.4	95.8	79.0-120			1.66	20
Ethylbenzene	5.00	5.22	5.26	104	105	79.0-121			0.763	20
Toluene	5.00	4.75	4.39	95.0	87.8	80.0-121			7.88	20
Xylenes, Total	15.0	15.8	15.0	105	100	79.0-121			5.19	20
(S) Toluene-d8				*102*	*101*	*89.0-112*				
(S) 4-Bromofluorobenzene				*97.0*	*93.6*	*85.0-114*				
(S) 1,2-Dichloroethane-d4				*114*	*116*	*81.0-118*				

Method Blank (MB)

(MB) R3718085-3 10/18/21 10:56

Analyte	MB Result ug/l	MB Qualifier	MB DL ug/l	MB LOD ug/l	MB LOQ ug/l
Benzene	0.500	U	0.0941	0.500	1.00
Ethylbenzene	0.500	U	0.137	0.500	1.00
Toluene	0.500	U	0.278	0.500	1.00
Xylenes, Total	1.50	U	0.174	1.50	3.00
(S) Toluene-d8	*102*				*89.0-112*
(S) 4-Bromofluorobenzene	*92.1*				*85.0-114*
(S) 1,2-Dichloroethane-d4	*108*				*81.0-118*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3718085-1 10/18/21 09:52 • (LCSD) R3718085-2 10/18/21 10:13

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	5.00	4.71	4.66	94.2	93.2	79.0-120			1.07	20
Ethylbenzene	5.00	4.90	4.82	98.0	96.4	79.0-121			1.65	20
Toluene	5.00	4.62	4.65	92.4	93.0	80.0-121			0.647	20
Xylenes, Total	15.0	13.7	13.2	91.3	88.0	79.0-121			3.72	20
(S) Toluene-d8				*103*	*97.4*	*89.0-112*				
(S) 4-Bromofluorobenzene				*100*	*94.8*	*85.0-114*				
(S) 1,2-Dichloroethane-d4				*116*	*112*	*81.0-118*				

L1413596-20 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1413596-20 10/18/21 15:08 • (MS) R3718085-4 10/18/21 21:57 • (MSD) R3718085-5 10/18/21 22:19

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	5.00	0.500	3.67	5.03	73.4	101	1	79.0-120	J6	J3	31.3	20
Ethylbenzene	5.00	1.16	5.01	6.16	77.0	100	1	79.0-121	J6	J3	20.6	20
Toluene	5.00	0.500	3.67	4.85	73.4	97.0	1	80.0-121	J6	J3	27.7	20
Xylenes, Total	15.0	2.07	12.6	16.2	70.2	94.2	1	79.0-121	J6	J3	25.0	20
(S) Toluene-d8					*103*	*99.6*		*89.0-112*				
(S) 4-Bromofluorobenzene					*103*	*99.3*		*85.0-114*				
(S) 1,2-Dichloroethane-d4					*113*	*111*		*81.0-118*				

Method Blank (MB)

(MB) R3716221-1 10/13/21 17:12

Analyte	MB Result ug/l	MB Qualifier	MB DL ug/l	MB LOD ug/l	MB LOQ ug/l
AK102 DRO C10-C25	400	U	170	400	800
AK103 RRO C25-C36	460	U	460	460	800
(S) o-Terphenyl	*65.2*				*60.0-120*
(S) n-Triacontane d62	*32.2*	J2			*60.0-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3716221-2 10/13/21 17:33 • (LCSD) R3716221-3 10/13/21 17:54

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
AK102 DRO C10-C25	6000	4760	4790	79.3	79.8	75.0-125			0.628	20
(S) o-Terphenyl				*83.6*	*82.0*	*60.0-120*				
(S) n-Triacontane d62				*37.7*	*34.9*	*60.0-120*	J2	J2		

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3716221-4 10/13/21 18:15 • (LCSD) R3716221-5 10/13/21 18:35

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
AK103 RRO C25-C36	6000	4480	4110	74.7	68.5	60.0-120			8.61	20
(S) o-Terphenyl				*70.9*	*60.7*	*60.0-120*				
(S) n-Triacontane d62				*40.0*	*32.8*	*60.0-120*	J2	J2		

L1413596-20 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1413596-20 10/13/21 21:42 • (MS) R3716221-6 10/13/21 22:03 • (MSD) R3716221-7 10/13/21 22:24

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
AK102 DRO C10-C25	6320	4650	6380	6920	27.4	35.9	1.05	75.0-125	J6	J6	8.12	20
(S) o-Terphenyl					*75.0*	*83.3*		*60.0-120*				
(S) n-Triacontane d62					*32.2*	*31.9*		*60.0-120*	J2	J2		

L1413596-20 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1413596-20 10/13/21 21:42 • (MS) R3716221-8 10/13/21 22:45 • (MSD) R3716221-9 10/13/21 23:05

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
AK103 RRO C25-C36	6320	460	4960	4520	78.5	71.5	1.05	60.0-120			9.28	20
(S) o-Terphenyl					*69.0*	*66.4*		*60.0-120*				
(S) n-Triacontane d62					*45.2*	*37.8*		*60.0-120*	J2	J2		

Method Blank (MB)

(MB) R3714527-1 10/09/21 15:47

Analyte	MB Result ug/l	MB Qualifier	MB DL ug/l	MB LOD ug/l	MB LOQ ug/l
PCB 1260	0.500	U	0.173	0.500	1.00
PCB 1016	7.50	U	0.270	7.50	15.0
PCB 1221	0.750	U	0.270	0.750	1.50
PCB 1232	0.750	U	0.270	0.750	1.50
PCB 1242	0.750	U	0.270	0.750	1.50
PCB 1248	67.0	U	0.173	67.0	134
PCB 1254	0.500	U	0.173	0.500	1.00
PCB 1262	0.500	U	0.173	0.500	1.00
PCB 1268	0.500	U	0.173	0.500	1.00
Total PCBs	0.500	U	0.173	0.500	1.00
(S) Decachlorobiphenyl	*121*				*10.0-156*
(S) Tetrachloro-m-xylene	*114*				*44.0-124*

Laboratory Control Sample (LCS)

(LCS) R3714527-2 10/09/21 15:59

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
PCB 1016	2.50	9.29	372	46.0-129	J4 P
PCB 1260	2.50	4.36	174	45.0-134	J4
(S) Decachlorobiphenyl			*69.0*	*10.0-156*	
(S) Tetrachloro-m-xylene			*116*	*44.0-124*	

L1413596-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1413596-08 10/10/21 22:41 • (MS) R3715209-1 10/10/21 22:49 • (MSD) R3715209-2 10/10/21 22:58

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
PCB 1016	2.50	7.50	3.19	2.39	128	95.6	1	46.0-129			28.7	30
PCB 1260	2.50	0.500	2.95	2.23	118	89.2	1	45.0-134			27.8	30
(S) Decachlorobiphenyl					*91.0*	*70.7*		*10.0-156*				
(S) Tetrachloro-m-xylene					*114*	*79.8*		*44.0-124*				

Method Blank (MB)

(MB) R3718529-1 10/19/21 13:21

Analyte	MB Result mg/kg	MB Qualifier	MB DL mg/kg	MB LOD mg/kg	MB LOQ mg/kg
PCB 1016	0.0170	U	0.0118	0.0170	0.0340
PCB 1221	0.0170	U	0.0118	0.0170	0.0340
PCB 1232	0.0170	U	0.0118	0.0170	0.0340
PCB 1242	0.0170	U	0.0118	0.0170	0.0340
PCB 1248	0.00850	U	0.00738	0.00850	0.0170
PCB 1254	0.00850	U	0.00738	0.00850	0.0170
PCB 1260	0.00850	U	0.00738	0.00850	0.0170
PCB 1262	0.00850	U	0.00738	0.00850	0.0170
PCB 1268	0.00850	U	0.00738	0.00850	0.0170
Total PCBs	0.00850	U	0.00738	0.00850	0.0170
(S) Decachlorobiphenyl	*44.3*				*10.0-143*
(S) Tetrachloro-m-xylene	*50.3*				*44.0-129*

Laboratory Control Sample (LCS)

(LCS) R3718529-2 10/19/21 13:34

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
PCB 1016	0.167	0.151	90.4	47.0-134	
PCB 1260	0.167	0.156	93.4	53.0-140	
(S) Decachlorobiphenyl			*75.7*	*10.0-143*	
(S) Tetrachloro-m-xylene			*90.1*	*44.0-129*	

L1413596-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1413596-04 10/19/21 23:21 • (MS) R3718529-3 10/19/21 23:34 • (MSD) R3718529-4 10/19/21 23:47

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
PCB 1016	0.265	0.0270	3.08	6.10	1160	2300	1	47.0-134	J5 P	J3 J5 P	65.7	30
PCB 1260	0.265	0.0977	0.324	0.383	85.3	107	1	53.0-140	P	P	16.6	30
(S) Decachlorobiphenyl					*65.2*	*65.8*		*10.0-143*				
(S) Tetrachloro-m-xylene					*65.8*	*61.6*		*44.0-129*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
DL	Detection Limit.
DL (dry)	Detection Limit.
LOD (dry)	Limit of Detection.
LOD	Limit of Detection.
LOQ	Limit of Quantitation.
LOQ (dry)	Limit of Quantitation.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

GLOSSARY OF TERMS

Qualifier	Description
P	RPD between the primary and confirmatory analysis exceeded 40%.
Q	Sample was prepared and/or analyzed past holding time as defined in the method. Concentrations should be considered minimum values.
U	Below Detectable Limits: Indicates that the analyte was not detected.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Northwind - Salt Lake City, UT

764 E Winchester St
Salt Lake City, UT 84414

Billing Information:
Bob Piper
764 E Winchester St
Salt Lake City, UT 84414

Report to:
Jill Jones

Email To: **jill.jones@northwindgrp.com**

Project Description:

City/State Collected: Romanzof, AK

Please Circle: PT MT CT ET

Phone: **801-520-9363**

Client Project #

Lab Project #
NORTHSLCUT-DOD

Collected by (print):
K. Ashton

Site/Facility ID #
CAPE ROMANZOFF

P.O. #
6-00000372

Collected by (signature):
K Ashton

Immediately Packed on Ice N___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

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SDG # 1413576

B167

Acctnum: **NORTHSLCUT**
Template: **T194288**
Prelogin: **P870751**
PM: **824 - Chris Ward**
PB: CR 8/27/21
Shipped Via: **FedEX 2nd Day**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Pres Chk	8082 100ml Amb-NoPres	8082 4ozClr-NoPres	BTEX 40mlAmb-HCl	DRO/RRO 100ml Amb HCl	GRO 40mlAmb HCl	Remarks	Sample # (lab only)
LF003-S02-093021	G	SS		9/30	1245	1			X					-01
LF003-S01-093021	G	SS		9/30	1115	1			X					-02
LF003-S02-093021	G	SS		9/30	1245	1			X					~~-01~~ 15-03
LF003-S04-093021	G	SS		9/30	1145	1			X					-0304
LF003-S04-093021	G	SS		9/30	1145	1			X				MS	
LF003-S04-093021	G	SS		9/30	1145	1			X				MSD	
LF003-S03-093021	G	SS		9/30	1300	1			X					-0405
LF003-SW03-093021	G	GW		9/30	1345	2		X						-0506
LF003-SW02-093021	G	GW		9/30	1400	2		X						-0507
	G	GW				2		X						

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: Shipped in 2 coolers

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 5163 7721 5467

Sample Receipt Checklist

COC Seal Present/Intact:	NP	Y N
COC Signed/Accurate:		Y N
Bottles arrive intact:		Y N
Correct bottles used:		Y N
Sufficient volume sent:		Y N
If Applicable		
VOA Zero Headspace:		Y N
Preservation Correct/Checked:		Y N
RAD Screen <0.5 mR/hr:		Y N

	Date:	Time:		
Relinquished by: (Signature) K Ashton	10/3/21	1530	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR: 6
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.7 to -3.7 °C Bottles Received: 113 — If preservation required by Login: Date/Time
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 10/05/21 Time: 0945 — Hold: — Condition: NCF / OK

Company Name/Address:
Northwind - Salt Lake City, UT

764 E Winchester St
Salt Lake City, UT 84414

Billing Information:
Bob Piper
764 E Winchester St
Salt Lake City, UT 84414

Pres Chk

Report to:
Jill Jones

Email To: **jill.jones@northwindgrp.com**

Project Description:

City/State Collected: Romanzof, AK

Please Circle: PT MT CT ET

Phone: **801-520-9363**

Client Project #

Lab Project #
NORTHSLCUT-DOD

Collected by (print):
K. Ashton

Site/Facility ID #
Romanzof

P.O. #
6-00000372

Collected by (signature):
Kristoph Ashton

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8082 100ml Amb-NoPres	8082 4ozClr-NoPres	BTEX 40mlAmb-HCl	DRO/RRO 100ml Amb HCl	GRO 40mlAmb HCl	Remarks	Sample # (lab only)
LF003-SW01-093021	G	GW		9/30	1410	2	X						-0708
LF003-SW01-093021	G	GW		9/30	1410	2	X					MS	
LF003-SW01-093021	G	GW		9/30	1410	2	X					MSD	
LF003-SW02-093021	G	GW		9/30	1400	2	X						-0809
SS015-WW05-092921	G	GW		09/29	1535	8			X	X	X		-0810
SS015-WW05-092921	G	GW		09/29	1535	8			X	X	X		
SS015-RB-092921	G	~~GW~~ GW		09/29	1550	8			X	X	X		-0811 TOC
		GW				7			X	X	X		
		GW				7			X	X	X		
		GW				7			X	X	X		

Chain of Custody Page 2 of ___

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SDG # 14/3596

Table #

Acctnum: **NORTHSLCUT**
Template: **T194288**
Prelogin: **P870751**
PM: **824 - Chris Ward**
PB: dt 8/27/21

Shipped Via: **FedEX 2nd Day**

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: shipped in 2 coolers

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 5163 7721 5456

Sample Receipt Checklist

COC Seal Present/Intact:	NP	Y N
COC Signed/Accurate:		Y N
Bottles arrive intact:		Y N
Correct bottles used:		Y N
Sufficient volume sent:		Y N
If Applicable		
VOA Zero Headspace:		Y N
Preservation Correct/Checked:		Y N
RAD Screen <0.5 mR/hr:		Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: (Yes) No HCL / MeoH TBR	
K Ashton	10/3/21	1530		6	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp 4.7+0=3.7 °C	Bottles Received: 113
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 10/5/21	Time: 0945

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Company Name/Address:
Northwind - Salt Lake City, UT

764 E Winchester St
Salt Lake City, UT 84414

Billing Information:
Bob Piper
764 E Winchester St
Salt Lake City, UT 84414

Pres Chk

Report to:
Jill Jones

Email To: jill.jones@northwindgrp.com

Project Description:

City/State Collected: Romanzof Alaska

Please Circle: PT MT CT ET

Phone: 801-520-9363

Client Project #

Lab Project #
NORTHSLCUT-DOD

Collected by (print):
Ashton, Carden

Site/Facility ID #
Romanzof

P.O. #
6-00000372

Collected by (signature):
K Ashton

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8082 100ml Amb-NoPres	8082 4ozClr-NoPres	BTEX 40mlAmb-HCl	DRO/~~RRO~~ 100ml Amb HCl	GRO 40mlAmb HCl	Remarks	Sample # (lab only)
SS015-WW06-092921	G	GW		09/29	1935	8			X	X	X		-1112
SC009-MW9-092921	G	GW		09/29	1105	8			X	X	X		-1213
SC009-MW7-092921	G	GW		09/29	1205	8			X	X	X		
SC009-MW7-092921	G	GW		09/29	1205	8			X	X	X		
SC009-MW7-092921	G	GW		09/29	1205	8			X	X	X	MS	
SC009-MW7-092921	G	GW		09/29	1205	8			X	X	X	MSD	
SC009-MW4-092921	G	GW		09/29	1345	8			X	X	X		-1314
SS015-WW01-092921	G	GW		09/29	1630	8			X	X	X		-1415
Trip blank 1	—	—		09/29	1630	3			X		X		-1516
Trip blank 2	—	—		09/30	1630	3			X		X		-1617

10/5

Chain of Custody Page 3 of ___

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SDG # 141396

Table #

Acctnum: NORTHSLCUT
Template: T194288
Prelogin: P870751
PM: 824 - Chris Ward
PB: CF 8/27/21

Shipped Via: FedEX 2nd Day

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: shipped in 2 coolers

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 5163 7721 5467

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD Screen <0.5 mR/hr: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No (HCL / MeoH TBR)	If preservation required by Login: Date/Time
Kristopher Ashton	10/3/21	1530		6	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 4.7 B °C 3.7 TO = 3.7 Bottles Received: 13	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 10/5/21 Time: 0945	Hold: Condition: NCF / OK

Company Name/Address:
Northwind - Salt Lake City, UT

764 E Winchester St
Salt Lake City, UT 84414

Billing Information:
Bob Piper
764 E Winchester St
Salt Lake City, UT 84414

Pres Chk

Report to:
Jill Jones

Email To: jill.jones@northwindgrp.com

Project Description:

City/State Collected: Romanzof, AK

Please Circle: PT MT CT ET

Phone: 801-520-9363

Client Project #

Lab Project #
NORTHSLCUT-DOD

Collected by (print):
K. Ashton

Site/Facility ID #
CAPE ROMANZOFF

P.O. #
6-00000372

Collected by (signature):
K Ashton

Immediately Packed on Ice N___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8082 100ml Amb-NoPres	8082 4ozClr-NoPres	BTEX 40mlAmb-HCl	DRO/RRO 100ml Amb HCl	GRO 40mlAmb HCl						Remarks	Sample # (lab only)
LF003-S02-093021	G	SS		9/30	1245	1		X										-01
LF003-S01-093021	G	SS		9/30	1115	1		X										-02
LF003-S02-093021	G	SS		9/30	1245	1		X										~~-0315~~ -03
LF003-S04-093021	G	SS		9/30	1145	1		X										-0304
LF003-S04-093021	G	SS		9/30	1145	1		X									MS	
LF003-S04-093021	G	SS		9/30	1145	1		X									MSD	
LF003-S03-093021	G	SS		9/30	1300	1		X										-0405
LF003-SW03-093021	G	GW		9/30	1345	2	X											-0506
LF003-SW02-093021	G	GW		9/30	1400	2	X											-0607
~~_____~~	G	GW				2	X											

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

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SDG # 1413576
B167

Acctnum: NORTHSLCUT
Template: T194288
Prelogin: P870751
PM: 824 - Chris Ward
PB: CR 8/27/21
Shipped Via: FedEX 2nd Day

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: Shipped in 2 coolers

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 5163 7721 5467

Sample Receipt Checklist
COC Seal Present/Intact: __NP Y __N
COC Signed/Accurate: Y __N
Bottles arrive intact: Y __N
Correct bottles used: Y __N
Sufficient volume sent: Y __N
If Applicable
VOA Zero Headspace: Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: Y __N

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No, HCl / MeoH, TBR	If preservation required by Login: Date/Time
K Ashton	10/3/21	1530		6	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.7 to 3.7 °C Bottles Received: 113	
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 10/05/21 Time: 0945	Hold: Condition: NCF / OK

Company Name/Address:
Northwind - Salt Lake City, UT

764 E Winchester St
Salt Lake City, UT 84414

Billing Information:
Bob Piper
764 E Winchester St
Salt Lake City, UT 84414

Pres Chk

Report to:
Jill Jones

Email To: jill.jones@northwindgrp.com

Project Description:

City/State Collected: Romanzof, AK

Please Circle: PT MT CT ET

Phone: 801-520-9363

Client Project #

Lab Project #
NORTHSLCUT-DOD

Collected by (print):
K. Ashton

Site/Facility ID #
Romanzof

P.O. #
6-00000372

Collected by (signature):
Kristoph Ashton
Immediately
Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8082 100ml Amb-NoPres	8082 4ozClr-NoPres	BTEX 40mlAmb-HCl	DRO/RRO 100ml Amb HCl	GRO 40mlAmb HCl	Remarks	Sample # (lab only)
LF003-SW01-093021	G	GW		9/30	1410	2	X						-0808
LF003-SW01-093021	G	GW		9/30	1410	2	X					MS	
LF003-SW01-093021	G	GW		9/30	1410	2	X					MSD	
LF003-SW02-093021	G	GW		9/30	1400	2	X						-0809
SS015-WW05-092921	G	GW		09/29	1535	8			X	X	X		-0810
SS015-WW05-092921	G	GW		09/29	1535	8			X	X	X		
SS015-RB-092921	G	~~GW~~ GW		09/29	1550	8			X	X	X		-0811 TOK
		GW				7			X	X	X		
		GW				7			X	X	X		
		GW				7			X	X	X		

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: shipped in 2 coolers

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 5163 7721 5456

Chain of Custody Page 2 of ___

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SDG # 1413596

Table #

Acctnum: NORTHSLCUT
Template: T194288
Prelogin: P870751
PM: 824 - Chris Ward
PB: 08/27/21

Shipped Via: FedEX 2nd Day

Sample Receipt Checklist

COC Seal Present/Intact:	NP	Y N
COC Signed/Accurate:		Y N
Bottles arrive intact:		Y N
Correct bottles used:		Y N
Sufficient volume sent:		Y N
If Applicable		
VOA Zero Headspace:		Y N
Preservation Correct/Checked:		Y N
RAD Screen <0.5 mR/hr:		Y N

	Date:	Time:		
Relinquished by: (Signature) K Ashton	10/3/21	1530	Received by: (Signature)	Trip Blank Received: Yes / No (HCl / MeoH) TBR: 6
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.7+0=3.7 °C Bottles Received: 13
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) Michelle Clark	Date: 10/5/21 Time: 0945

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Company Name/Address:	Billing Information:	Pres Chk	Analysis / Container / Preservative	Chain of Custody Page 3 of ___
Northwind - Salt Lake City, UT 764 E Winchester St Salt Lake City, UT 84414	Bob Piper 764 E Winchester St Salt Lake City, UT 84414			Pace Analytical® 12065 Lebanon Rd Mount Juliet, TN 37122 Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf
Report to: Jill Jones	Email To: jill.jones@northwindgrp.com			
Project Description:	City/State Collected: Romanzof Alaska	Please Circle: PT MT CT ET		
Phone: 801-520-9363	Client Project #	Lab Project # NORTHSLCUT-DOD		SDG # 1413596
Collected by (print): Ashton, Cardon	Site/Facility ID # Romanzof	P.O. # 6-00000372		Table #
Collected by (signature): K Ashton	Rush? (Lab MUST Be Notified) ___ Same Day ___ Five Day ___ Next Day ___ 5 Day (Rad Only) ___ Two Day ___ 10 Day (Rad Only) ___ Three Day	Quote #		Acctnum: NORTHSLCUT Template: T194288 Prelogin: P870751 PM: 824 - Chris Ward PB: CJ 8/27/21
Immediately Packed on Ice N ___ Y X		Date Results Needed		Shipped Via: FedEX 2nd Day

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8082 100ml Amb-NoPres	8082 4ozClr-NoPres	BTEX 40mlAmb-HCl	DRO/~~RRO~~ 100ml Amb HCl	GRO 40mlAmb HCl		Remarks	Sample # (lab only)
SS015-WW06-092921	G	GW		09/29	1935	8			X	X	X			-~~11~~ 12
SC009-MW9-092921	G	GW		09/29	1105	8			X	X	X	ST009-MW9-092921		-~~12~~ 13
SC009-MW7-092921	G	GW		09/29	1205	8			X	X	X	ST009-MW7-092921-S01		-~~18~~ 19
SC009-MW7-092921	G	GW		09/29	1205	8			X	X	X	ST009-MW7-092921		-~~19~~ 20
SC009-MW7-092921	G	GW		09/29	1205	8			X	X	X	same as above (MS)	MS	10/9
SC009-MW7-092921	G	GW		09/29	1205	8			X	X	X	same as above (MSD)	MSD	
SC009-MW4-092921	G	GW		09/29	1345	8			X	X	X	ST009-MW4-092921		-~~13~~ 14
SS015-WW01-092921	G	GW		09/29	1630	8			X	X	X			-~~14~~ 15
Trip blank 1	—	—		09/29	1630	3			X		X			-~~15~~ 16 10/5
Trip blank 2	—	—		09/30	1630	3			X		X			-~~16~~ 17

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other ________

Remarks: Shipped in 2 coolers

pH ______ Temp ______
Flow ______ Other ______

Samples returned via: ___ UPS ___ FedEx ___ Courier ________

Tracking # 5163 7721 5467

Sample Receipt Checklist
COC Seal Present/Intact: _NP ✓ _N
COC Signed/Accurate: ✓ _N
Bottles arrive intact: ✓ _N
Correct bottles used: ✓ _N
Sufficient volume sent: ✓ _N
If Applicable
VOA Zero Headspace: ✓ _N
Preservation Correct/Checked: ✓ _N
RAD Screen <0.5 mR/hr: ✓ _N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received:	
Kristopher Ashton	10/3/21	1530		(Yes) / No — HCL / MeoH TBR — 6	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: A7 BC °C 3.7 +0 = 3.7	Bottles Received: 113
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) [signature]	Date: 10/5/21	Time: 0945

If preservation required by Login: Date/Time

Hold:

Condition: NCF / (OK)

APPENDIX F

MANN-KENDALL TREND ANALYSIS FILES

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Mann-Kendall Trend Test Analysis

User Selected Options	
Date/Time of Computation	ProUCL 5.11/14/2022 8:50:56 AM
From File	SS015_ST009 for ProUCL #1.xls
Full Precision	OFF
Confidence Coefficient	0.95
Level of Significance	0.05

GRO-ss015-ww01		GRO-ss015-ww05	
General Statistics		General Statistics	
Number of Events Reported (m)	45	Number of Events Reported (m)	45
Number of Missing Events	38	Number of Missing Events	38
Number or Reported Events Used	7	Number or Reported Events Used	7
Number Values Reported (n)	45	Number Values Reported (n)	45
Number Values Missing	38	Number Values Missing	38
Number Values Used	7	Number Values Used	7
Minimum	172	Minimum	50
Maximum	1040	Maximum	4200
Mean	368.6	Mean	1034
Geometric Mean	297.6	Geometric Mean	346.1
Median	249	Median	780
Standard Deviation	311.9	Standard Deviation	1476
Coefficient of Variation	0.846	Coefficient of Variation	1.427
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	-7	M-K Test Value (S)	4
Tabulated p-value	0.191	Tabulated p-value	0.281
Standard Deviation of S	6.658	Standard Deviation of S	6.583
Standardized Value of S	-0.901	Standardized Value of S	0.456
Approximate p-value	0.184	Approximate p-value	0.324
Insufficient evidence to identify a significant trend at the specified level of significance.		Insufficient evidence to identify a significant trend at the specified level of significance.	

GRO-ss015-ww06		GRO-st009-mw04	
General Statistics		General Statistics	
Number of Events Reported (m)	45	Number of Events Reported (m)	98
Number of Missing Events	39	Number of Missing Events	85
Number or Reported Events Used	6	Number or Reported Events Used	13
Number Values Reported (n)	45	Number Values Reported (n)	98
Number Values Missing	39	Number Values Missing	85
Number Values Used	6	Number Values Used	13
Minimum	0.05	Minimum	42.5
Maximum	200	Maximum	75700
Mean	53.02	Mean	5961
Geometric Mean	5.528	Geometric Mean	172.7
Median	34	Median	72.7
Standard Deviation	74.8	Standard Deviation	20954
Coefficient of Variation	1.411	Coefficient of Variation	3.515
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	2	M-K Test Value (S)	-26
Tabulated p-value	0.36	Tabulated p-value	0.064
Standard Deviation of S	5.228	Standard Deviation of S	16.39
Standardized Value of S	0.191	Standardized Value of S	-1.525
Approximate p-value	0.424	Approximate p-value	0.0636
Insufficient evidence to identify a significant trend at the specified level of significance.		Insufficient evidence to identify a significant trend at the specified level of significance.	

GRO-st009-mw07		GRO-st009-mw09	
General Statistics		General Statistics	
Number of Events Reported (m)	98	Number of Events Reported (m)	91
Number of Missing Events	85	Number of Missing Events	79
Number or Reported Events Used	13	Number or Reported Events Used	12
Number Values Reported (n)	98	Number Values Reported (n)	86
Number Values Missing	85	Number Values Missing	74
Number Values Used	13	Number Values Used	12
Minimum	138	Minimum	50
Maximum	1560	Maximum	456
Mean	587.2	Mean	234.4
Geometric Mean	477	Geometric Mean	198.1
Median	421	Median	218.5
Standard Deviation	428.5	Standard Deviation	125
Coefficient of Variation	0.73	Coefficient of Variation	0.533
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	-36	M-K Test Value (S)	-44
Tabulated p-value	0.015	Tabulated p-value	0.001
Standard Deviation of S	16.39	Standard Deviation of S	14.58
Standardized Value of S	-2.135	Standardized Value of S	-2.949
Approximate p-value	0.0164	Approximate p-value	0.0016
Statistically significant evidence of a decreasing trend at the specified level of significance.		Statistically significant evidence of a decreasing trend at the specified level of significance.	

Mann-Kendall Trend Test Analysis

User Selected Options	
Date/Time of Computation	ProUCL 5.11/14/2022 8:50:56 AM
From File	SS015_ST009 for ProUCL #1.xls
Full Precision	OFF
Confidence Coefficient	0.95
Level of Significance	0.05

DRO-ss015-ww01		DRO-ss015-ww05	
General Statistics		General Statistics	
Number of Events Reported (m)	45	Number of Events Reported (m)	45
Number of Missing Events	38	Number of Missing Events	38
Number or Reported Events Used	7	Number or Reported Events Used	7
Number Values Reported (n)	45	Number Values Reported (n)	45
Number Values Missing	38	Number Values Missing	38
Number Values Used	7	Number Values Used	7
Minimum	3160	Minimum	400
Maximum	19700	Maximum	2300
Mean	8010	Mean	1136
Geometric Mean	6421	Geometric Mean	964.8
Median	4620	Median	1290
Standard Deviation	6106	Standard Deviation	655.1
Coefficient of Variation	0.762	Coefficient of Variation	0.576
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	-3	M-K Test Value (S)	-1
Tabulated p-value	0.386	Tabulated p-value	0.5
Standard Deviation of S	6.658	Standard Deviation of S	6.658
Standardized Value of S	-0.3	Standardized Value of S	0
Approximate p-value	0.382	Approximate p-value	0.5
Insufficient evidence to identify a significant trend at the specified level of significance.		Insufficient evidence to identify a significant trend at the specified level of significance.	

DRO-ss015-ww06		DRO-st009-mw04	
General Statistics		General Statistics	
Number of Events Reported (m)	45	Number of Events Reported (m)	98
Number of Missing Events	38	Number of Missing Events	84
Number or Reported Events Used	7	Number or Reported Events Used	14
Number Values Reported (n)	45	Number Values Reported (n)	98
Number Values Missing	38	Number Values Missing	84
Number Values Used	7	Number Values Used	14
Minimum	308	Minimum	208
Maximum	2300	Maximum	1360000
Mean	1351	Mean	103056
Geometric Mean	1100	Geometric Mean	3917
Median	1560	Median	3465
Standard Deviation	732.7	Standard Deviation	361921
Coefficient of Variation	0.542	Coefficient of Variation	3.512
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	-3	M-K Test Value (S)	-45
Tabulated p-value	0.386	Tabulated p-value	0.007
Standard Deviation of S	6.658	Standard Deviation of S	18.27
Standardized Value of S	-0.3	Standardized Value of S	-2.409
Approximate p-value	0.382	Approximate p-value	0.008
Insufficient evidence to identify a significant trend at the specified level of significance.		Statistically significant evidence of a decreasing trend at the specified level of significance.	

DRO-st009-mw07		DRO-st009-mw09	
General Statistics		General Statistics	
Number of Events Reported (m)	98	Number of Events Reported (m)	91
Number of Missing Events	84	Number of Missing Events	78
Number or Reported Events Used	14	Number or Reported Events Used	13
Number Values Reported (n)	98	Number Values Reported (n)	87
Number Values Missing	84	Number Values Missing	74
Number Values Used	14	Number Values Used	13
Minimum	1270	Minimum	230
Maximum	6400	Maximum	4140
Mean	3054	Mean	1869
Geometric Mean	2774	Geometric Mean	1488
Median	2815	Median	1460
Standard Deviation	1409	Standard Deviation	1165
Coefficient of Variation	0.462	Coefficient of Variation	0.623
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	-5	M-K Test Value (S)	-34
Tabulated p-value	0.415	Tabulated p-value	0.021
Standard Deviation of S	18.27	Standard Deviation of S	16.39
Standardized Value of S	-0.219	Standardized Value of S	-2.013
Approximate p-value	0.413	Approximate p-value	0.022
Insufficient evidence to identify a significant trend at the specified level of significance.		Statistically significant evidence of a decreasing trend at the specified level of significance.	

Mann-Kendall Trend Test Analysis

User Selected Options	
Date/Time of Computation	ProUCL 5.11/14/2022 8:50:56 AM
From File	SS015_ST009 for ProUCL #1.xls
Full Precision	OFF
Confidence Coefficient	0.95
Level of Significance	0.05

RRO-ss015-ww01		RRO-ss015-ww05	
General Statistics		General Statistics	
Number of Events Reported (m)	45	Number of Events Reported (m)	45
Number of Missing Events	41	Number of Missing Events	41
Number or Reported Events Used	4	Number or Reported Events Used	4
Number Values Reported (n)	45	Number Values Reported (n)	45
Number Values Missing	41	Number Values Missing	41
Number Values Used	4	Number Values Used	4
Minimum	170	Minimum	110
Maximum	552	Maximum	483
Mean	410.5	Mean	305.3
Geometric Mean	375.4	Geometric Mean	253.1
Median	460	Median	314
Standard Deviation	166.1	Standard Deviation	193.7
Coefficient of Variation	0.405	Coefficient of Variation	0.634
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	-1	M-K Test Value (S)	4
Tabulated p-value	0.625	Tabulated p-value	0.167
Standard Deviation of S	2.769	Standard Deviation of S	2.944
Standardized Value of S	0	Standardized Value of S	1.019
Approximate p-value	0.5	Approximate p-value	0.154
Insufficient evidence to identify a significant trend at the specified level of significance.		Insufficient evidence to identify a significant trend at the specified level of significance.	

RRO-ss015-ww06		RRO-st009-mw04	
General Statistics		General Statistics	
Number of Events Reported (m)	45	Number of Events Reported (m)	98
Number of Missing Events	41	Number of Missing Events	94
Number or Reported Events Used	4	Number or Reported Events Used	4
Number Values Reported (n)	45	Number Values Reported (n)	98
Number Values Missing	41	Number Values Missing	94
Number Values Used	4	Number Values Used	4
Minimum	180	Minimum	340
Maximum	480	Maximum	34500
Mean	359.5	Mean	8922
Geometric Mean	335.3	Geometric Mean	1201
Median	389	Median	423
Standard Deviation	139.7	Standard Deviation	17052
Coefficient of Variation	0.389	Coefficient of Variation	1.911
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	4	M-K Test Value (S)	0
Tabulated p-value	0.167	Tabulated p-value	0.625
Standard Deviation of S	2.944	Standard Deviation of S	2.944
Standardized Value of S	1.019	Standardized Value of S	N/A
Approximate p-value	0.154	Approximate p-value	N/A
Insufficient evidence to identify a significant trend at the specified level of significance.		Insufficient evidence to identify a significant trend at the specified level of significance.	

RRO-st009-mw07		RRO-st009-mw09	
General Statistics		General Statistics	
Number of Events Reported (m)	98	Number of Events Reported (m)	91
Number of Missing Events	93	Number of Missing Events	87
Number or Reported Events Used	5	Number or Reported Events Used	4
Number Values Reported (n)	98	Number Values Reported (n)	85
Number Values Missing	93	Number Values Missing	81
Number Values Used	5	Number Values Used	4
Minimum	243	Minimum	376
Maximum	2310	Maximum	505
Mean	780	Mean	452
Geometric Mean	550.8	Geometric Mean	449.4
Median	460	Median	463.5
Standard Deviation	860	Standard Deviation	54.5
Coefficient of Variation	1.103	Coefficient of Variation	0.121
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	1	M-K Test Value (S)	-2
Tabulated p-value	0.592	Tabulated p-value	0.375
Standard Deviation of S	3.958	Standard Deviation of S	2.944
Standardized Value of S	0	Standardized Value of S	-0.34
Approximate p-value	0.5	Approximate p-value	0.367
Insufficient evidence to identify a significant trend at the specified level of significance.		Insufficient evidence to identify a significant trend at the specified level of significance.	

Mann-Kendall Trend Test Analysis

User Selected Options	
Date/Time of Computation	ProUCL 5.11/14/2022 8:50:56 AM
From File	SS015_ST009 for ProUCL #1.xls
Full Precision	OFF
Confidence Coefficient	0.95
Level of Significance	0.05

Benzene-ss015-ww01		Benzene-ss015-ww05	
General Statistics		General Statistics	
Number of Events Reported (m)	45	Number of Events Reported (m)	45
Number of Missing Events	38	Number of Missing Events	38
Number or Reported Events Used	7	Number or Reported Events Used	7
Number Values Reported (n)	45	Number Values Reported (n)	45
Number Values Missing	38	Number Values Missing	38
Number Values Used	7	Number Values Used	7
Minimum	2.21	Minimum	0.2
Maximum	87.6	Maximum	67
Mean	36.26	Mean	33.4
Geometric Mean	20.23	Geometric Mean	8.643
Median	15.5	Median	46
Standard Deviation	34.34	Standard Deviation	30.94
Coefficient of Variation	0.947	Coefficient of Variation	0.926
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	-3	M-K Test Value (S)	3
Tabulated p-value	0.386	Tabulated p-value	0.386
Standard Deviation of S	6.658	Standard Deviation of S	6.658
Standardized Value of S	-0.3	Standardized Value of S	0.3
Approximate p-value	0.382	Approximate p-value	0.382
Insufficient evidence to identify a significant trend at the specified level of significance.		Insufficient evidence to identify a significant trend at the specified level of significance.	

Benzene-ss015-ww06		Benzene-st009-mw04	
General Statistics		General Statistics	
Number of Events Reported (m)	45	Number of Events Reported (m)	98
Number of Missing Events	39	Number of Missing Events	85
Number or Reported Events Used	6	Number or Reported Events Used	13
Number Values Reported (n)	45	Number Values Reported (n)	98
Number Values Missing	39	Number Values Missing	85
Number Values Used	6	Number Values Used	13
Minimum	0.2	Minimum	0.12
Maximum	2	Maximum	5.96
Mean	0.6	Mean	0.875
Geometric Mean	0.398	Geometric Mean	0.391
Median	0.35	Median	0.24
Standard Deviation	0.701	Standard Deviation	1.607
Coefficient of Variation	1.169	Coefficient of Variation	1.837
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	7	M-K Test Value (S)	3
Tabulated p-value	0.136	Tabulated p-value	0.476
Standard Deviation of S	4.865	Standard Deviation of S	16.13
Standardized Value of S	1.233	Standardized Value of S	0.124
Approximate p-value	0.109	Approximate p-value	0.451
Insufficient evidence to identify a significant trend at the specified level of significance.		Insufficient evidence to identify a significant trend at the specified level of significance.	

Benzene-st009-mw07		Benzene-st009-mw09	
General Statistics		General Statistics	
Number of Events Reported (m)	98	Number of Events Reported (m)	91
Number of Missing Events	85	Number of Missing Events	79
Number or Reported Events Used	13	Number or Reported Events Used	12
Number Values Reported (n)	98	Number Values Reported (n)	88
Number Values Missing	85	Number Values Missing	76
Number Values Used	13	Number Values Used	12
Minimum	0.12	Minimum	0.12
Maximum	2	Maximum	2
Mean	0.419	Mean	0.556
Geometric Mean	0.293	Geometric Mean	0.341
Median	0.2	Median	0.22
Standard Deviation	0.499	Standard Deviation	0.682
Coefficient of Variation	1.192	Coefficient of Variation	1.227
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	20	M-K Test Value (S)	18
Tabulated p-value	0.126	Tabulated p-value	0.125
Standard Deviation of S	15.98	Standard Deviation of S	14.42
Standardized Value of S	1.189	Standardized Value of S	1.179
Approximate p-value	0.117	Approximate p-value	0.119
Insufficient evidence to identify a significant trend at the specified level of significance.		Insufficient evidence to identify a significant trend at the specified level of significance.	

Mann-Kendall Trend Test Analysis

User Selected Options	
Date/Time of Computation	ProUCL 5.11/14/2022 8:50:56 AM
From File	SS015_ST009 for ProUCL #1.xls
Full Precision	OFF
Confidence Coefficient	0.95
Level of Significance	0.05

Toluene-ss015-ww01		Toluene-ss015-ww05	
General Statistics		General Statistics	
Number of Events Reported (m)	45	Number of Events Reported (m)	45
Number of Missing Events	39	Number of Missing Events	39
Number or Reported Events Used	6	Number or Reported Events Used	6
Number Values Reported (n)	45	Number Values Reported (n)	45
Number Values Missing	39	Number Values Missing	39
Number Values Used	6	Number Values Used	6
Minimum	0.05	Minimum	0.5
Maximum	1	Maximum	1.52
Mean	0.508	Mean	0.903
Geometric Mean	0.382	Geometric Mean	0.806
Median	0.5	Median	0.85
Standard Deviation	0.301	Standard Deviation	0.457
Coefficient of Variation	0.592	Coefficient of Variation	0.506
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	-3	M-K Test Value (S)	3
Tabulated p-value	0.36	Tabulated p-value	0.36
Standard Deviation of S	4.435	Standard Deviation of S	4.865
Standardized Value of S	-0.451	Standardized Value of S	0.411
Approximate p-value	0.326	Approximate p-value	0.34
Insufficient evidence to identify a significant trend at the specified level of significance.		Insufficient evidence to identify a significant trend at the specified level of significance.	

Toluene-ss015-ww06		Toluene-st009-mw04	
General Statistics		General Statistics	
Number of Events Reported (m)	45	Number of Events Reported (m)	98
Number of Missing Events	39	Number of Missing Events	85
Number or Reported Events Used	6	Number or Reported Events Used	13
Number Values Reported (n)	45	Number Values Reported (n)	98
Number Values Missing	39	Number Values Missing	85
Number Values Used	6	Number Values Used	13
Minimum	0.5	Minimum	0.15
Maximum	1	Maximum	59.9
Mean	0.583	Mean	5.371
Geometric Mean	0.561	Geometric Mean	0.889
Median	0.5	Median	0.5
Standard Deviation	0.204	Standard Deviation	16.4
Coefficient of Variation	0.35	Coefficient of Variation	3.053
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	1	M-K Test Value (S)	-29
Tabulated p-value	0.5	Tabulated p-value	0.05
Standard Deviation of S	3.416	Standard Deviation of S	15.84
Standardized Value of S	0	Standardized Value of S	-1.767
Approximate p-value	0.5	Approximate p-value	0.0386
Insufficient evidence to identify a significant trend at the specified level of significance.		Statistically significant evidence of a decreasing trend at the specified level of significance.	

Toluene-st009-mw07		Toluene-st009-mw09	
General Statistics		General Statistics	
Number of Events Reported (m)	98	Number of Events Reported (m)	422
Number of Missing Events	85	Number of Missing Events	366
Number or Reported Events Used	13	Number or Reported Events Used	56
Number Values Reported (n)	98	Number Values Reported (n)	421
Number Values Missing	85	Number Values Missing	365
Number Values Used	13	Number Values Used	56
Minimum	0.15	Minimum	0.05
Maximum	8.6	Maximum	59.9
Mean	1.769	Mean	2.091
Geometric Mean	0.837	Geometric Mean	0.734
Median	0.5	Median	0.5
Standard Deviation	2.665	Standard Deviation	7.99
Coefficient of Variation	1.506	Coefficient of Variation	3.821
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	-22	M-K Test Value (S)	-246
Tabulated p-value	0.102	Critical Value (0.05)	-1.645
Standard Deviation of S	15.87	Standard Deviation of S	133
Standardized Value of S	-1.323	Standardized Value of S	-1.842
Approximate p-value	0.0929	Approximate p-value	0.0327
Insufficient evidence to identify a significant trend at the specified level of significance.		Statistically significant evidence of a decreasing trend at the specified level of significance.	

Mann-Kendall Trend Test Analysis

User Selected Options	
Date/Time of Computation	ProUCL 5.11/14/2022 8:50:56 AM
From File	SS015_ST009 for ProUCL #1.xls
Full Precision	OFF
Confidence Coefficient	0.95
Level of Significance	0.05

Ethylbenzene-ss015-ww01		Ethylbenzene-ss015-ww05	
General Statistics		General Statistics	
Number of Events Reported (m)	45	Number of Events Reported (m)	45
Number of Missing Events	39	Number of Missing Events	39
Number or Reported Events Used	6	Number or Reported Events Used	6
Number Values Reported (n)	45	Number Values Reported (n)	45
Number Values Missing	39	Number Values Missing	39
Number Values Used	6	Number Values Used	6
Minimum	2.82	Minimum	0.5
Maximum	27.2	Maximum	91
Mean	9.022	Mean	39.58
Geometric Mean	6.652	Geometric Mean	6.577
Median	6.325	Median	35.04
Standard Deviation	9.105	Standard Deviation	43.32
Coefficient of Variation	1.009	Coefficient of Variation	1.095
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	-3	M-K Test Value (S)	6
Tabulated p-value	0.36	Tabulated p-value	0.136
Standard Deviation of S	5.323	Standard Deviation of S	5.228
Standardized Value of S	-0.376	Standardized Value of S	0.956
Approximate p-value	0.354	Approximate p-value	0.169
Insufficient evidence to identify a significant trend at the specified level of significance.		Insufficient evidence to identify a significant trend at the specified level of significance.	

Ethylbenzene-ss015-ww06		Ethylbenzene-st009-mw04	
General Statistics		General Statistics	
Number of Events Reported (m)	45	Number of Events Reported (m)	98
Number of Missing Events	39	Number of Missing Events	85
Number or Reported Events Used	6	Number or Reported Events Used	13
Number Values Reported (n)	45	Number Values Reported (n)	98
Number Values Missing	39	Number Values Missing	85
Number Values Used	6	Number Values Used	13
Minimum	0.5	Minimum	0.15
Maximum	1	Maximum	340
Mean	0.583	Mean	26.75
Geometric Mean	0.561	Geometric Mean	0.88
Median	0.5	Median	0.5
Standard Deviation	0.204	Standard Deviation	94.12
Coefficient of Variation	0.35	Coefficient of Variation	3.519
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	1	M-K Test Value (S)	-28
Tabulated p-value	0.5	Tabulated p-value	0.05
Standard Deviation of S	3.416	Standard Deviation of S	15.87
Standardized Value of S	0	Standardized Value of S	-1.701
Approximate p-value	0.5	Approximate p-value	0.0445
Insufficient evidence to identify a significant trend at the specified level of significance.		Statistically significant evidence of a decreasing trend at the specified level of significance.	

Ethylbenzene-st009-mw07		Ethylbenzene-st009-mw09	
General Statistics		General Statistics	
Number of Events Reported (m)	98	Number of Events Reported (m)	91
Number of Missing Events	85	Number of Missing Events	79
Number or Reported Events Used	13	Number or Reported Events Used	12
Number Values Reported (n)	98	Number Values Reported (n)	89
Number Values Missing	85	Number Values Missing	77
Number Values Used	13	Number Values Used	12
Minimum	1.16	Minimum	0.241
Maximum	18.8	Maximum	4.37
Mean	4.472	Mean	1.427
Geometric Mean	2.867	Geometric Mean	1.005
Median	2	Median	1.085
Standard Deviation	5.496	Standard Deviation	1.267
Coefficient of Variation	1.229	Coefficient of Variation	0.888
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	-50	M-K Test Value (S)	-51
Tabulated p-value	0.001	Tabulated p-value	0
Standard Deviation of S	16.12	Standard Deviation of S	14.55
Standardized Value of S	-3.039	Standardized Value of S	-3.437
Approximate p-value	0.00119	Approximate p-value	2.94E-04
Statistically significant evidence of a decreasing trend at the specified level of significance.		Statistically significant evidence of a decreasing trend at the specified level of significance.	

Mann-Kendall Trend Test Analysis

User Selected Options	
Date/Time of Computation	ProUCL 5.11/14/2022 8:50:56 AM
From File	SS015_ST009 for ProUCL #1.xls
Full Precision	OFF
Confidence Coefficient	0.95
Level of Significance	0.05

Xylenes-ss015-ww01		Xylenes-ss015-ww05	
General Statistics		General Statistics	
Number of Events Reported (m)	45	Number of Events Reported (m)	45
Number of Missing Events	39	Number of Missing Events	39
Number or Reported Events Used	6	Number or Reported Events Used	6
Number Values Reported (n)	45	Number Values Reported (n)	45
Number Values Missing	39	Number Values Missing	39
Number Values Used	6	Number Values Used	6
Minimum	6.75	Minimum	1.5
Maximum	139	Maximum	113.1
Mean	34.2	Mean	51.58
Geometric Mean	16.36	Geometric Mean	14.25
Median	9.7	Median	46.78
Standard Deviation	52.33	Standard Deviation	54.57
Coefficient of Variation	1.53	Coefficient of Variation	1.058
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	-3	M-K Test Value (S)	6
Tabulated p-value	0.36	Tabulated p-value	0.136
Standard Deviation of S	5.323	Standard Deviation of S	5.228
Standardized Value of S	-0.376	Standardized Value of S	0.956
Approximate p-value	0.354	Approximate p-value	0.169
Insufficient evidence to identify a significant trend at the specified level of significance.		Insufficient evidence to identify a significant trend at the specified level of significance.	

Xylenes-ss015-ww06		Xylenes-st009-mw04	
General Statistics		General Statistics	
Number of Events Reported (m)	45	Number of Events Reported (m)	98
Number of Missing Events	39	Number of Missing Events	85
Number or Reported Events Used	6	Number or Reported Events Used	13
Number Values Reported (n)	45	Number Values Reported (n)	98
Number Values Missing	39	Number Values Missing	85
Number Values Used	6	Number Values Used	13
Minimum	1.5	Minimum	0.15
Maximum	2	Maximum	291
Mean	1.583	Mean	24.47
Geometric Mean	1.574	Geometric Mean	2.238
Median	1.5	Median	1.5
Standard Deviation	0.204	Standard Deviation	80.11
Coefficient of Variation	0.129	Coefficient of Variation	3.274
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	1	M-K Test Value (S)	-16
Tabulated p-value	0.5	Tabulated p-value	0.184
Standard Deviation of S	3.416	Standard Deviation of S	15.87
Standardized Value of S	0	Standardized Value of S	-0.945
Approximate p-value	0.5	Approximate p-value	0.172
Insufficient evidence to identify a significant trend at the specified level of significance.		Insufficient evidence to identify a significant trend at the specified level of significance.	

Xylenes-st009-mw07		Xylenes-st009-mw09	
General Statistics		General Statistics	
Number of Events Reported (m)	98	Number of Events Reported (m)	91
Number of Missing Events	85	Number of Missing Events	79
Number or Reported Events Used	13	Number or Reported Events Used	12
Number Values Reported (n)	98	Number Values Reported (n)	91
Number Values Missing	85	Number Values Missing	79
Number Values Used	13	Number Values Used	12
Minimum	2.07	Minimum	0.451
Maximum	151.6	Maximum	14
Mean	16.82	Mean	3.709
Geometric Mean	5.995	Geometric Mean	2.516
Median	4.79	Median	2.335
Standard Deviation	40.74	Standard Deviation	3.734
Coefficient of Variation	2.422	Coefficient of Variation	1.007
Mann-Kendall Test		Mann-Kendall Test	
M-K Test Value (S)	-34	M-K Test Value (S)	-43
Tabulated p-value	0.021	Tabulated p-value	0.002
Standard Deviation of S	16.39	Standard Deviation of S	14.46
Standardized Value of S	-2.013	Standardized Value of S	-2.905
Approximate p-value	0.022	Approximate p-value	0.00184
Statistically significant evidence of a decreasing trend at the specified level of significance.		Statistically significant evidence of a decreasing trend at the specified level of significance.	

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APPENDIX G

RESPONSES TO REGULATORY COMMENTS

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THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Environmental Conservation

Spill Prevention and Response
Contaminated Sites

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Fairbanks, Alaska 99709-3643
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File No. 2526.38.001

October 7, 2022

Todd Fitch
AFCEC/CZOP
10471 20th Street, Suite 348
JBER, AK 99506-2201

Re: **DEC Approval of the *Draft-Final 2021 Remedial Action Operations Land Use/Institutional Control Report, Cape Romanzof Long Range Radar Station, Alaska,* October 2022**

Dear Mr. Fitch:

The Alaska Department of Environmental Conservation (DEC) Contaminated Sites Program received a copy of the above referenced document and response to comments (RTCs) on October 4, 2022. This report presents the results of the 2021 Environmental Remedial Action-Operation (RA-O)/Long Term Management (LTM) program at the Cape Romanzof Long Range Radar Site (LRRS) in Cape Romanzof, Alaska. This work was performed from 28 September through 30 September 2021 and included institutional control (IC) and land use control (LUC) inspections. The event included sampling of wells at sites SS015 and ST009.

All DEC comments were addressed by the RTCs and revised version of the document. Therefore, the document is approved. Please finalize the document and attach this approval letter. If you have any questions, please do not hesitate to contact the DEC project manager at (907) 451-2156, or by email at axl.levan@alaska.gov.

Sincerely,

Axl LeVan
Environmental Program Specialist

Cc via email: Dennis Shepard, DEC

Alaska Department of Environmental Conservation
Comments on the Draft-Final 2021 Remedial Action Operation Institutional Control/Land Use Control Report,
Cape Romanzof LRRS Alaska dated May 2022
DEC Comments: 7/15/2022

Cmt. No.	Pg.	Sec.	Comment/Recommendation	Response
1.	General		An update to the 2021 LTM work plan should be provided to DEC to address any recommendations not captured by the original work plan and referenced in this document. This amendment could include sign replacement information, any debris removal (lead paint potential), updated guidance (see comment 2), and other recommendations made in this report not covered by the original workplan. This amendment can be a simple letter or set of additional pages for the work plan that will ensure that the recommendations of this report are followed in the 2022 field season.	An update to the 2021 UFP-QAPP has been provided to ADEC for review and approval 9 Aug 2022. Debris removal is not part of this long-term monitoring contract. **Acknowledged**
2.	General		USAF should be aware that the DEC Field Sampling Guidance was updated, and the newest version (January 2022) is available on the DEC CSP Guidance and Forms page.	Noted. The latest ADEC Field Sampling Guidance will be referenced when conducting the 2022 field work. **DEC Accepts Response 10/6/2022**
3.	General		DEC agrees with USAF that the data qualifying conventions should be modified before the 2022 field season if there is confusion or if the conventions do not match the 5.3 QSM guidance (currently QSM 5.4). Issues such as the labeling of blank contamination conventions should be resolved before work/reporting occurs for the next field season. This information can be added to the amendment.	Concur. The updated UFP-QAPP will include both Data Validation Blank Evaluation Guidance and QSM data qualifying conventions to match the latest QSM guidance. **DEC Accepts Response 10/6/2022**
4.	2-1	2.1.3	"One LUC warning sign was present and in good condition. A second sign was not located." Was a second sign expected for the site? If so, include its replacement in the recommendation and issues throughout the document.	The comment refers to Section 2.1.2 based on description provided (Site SS010). Two signs should be located at Site SS010. Section 2.1.2 was updated to state: "The second sign for the site was not located." Included this information in Section 5.2.1 (Summary) and recommendation for replacement in Section 5.2.2. The signage for Section 2.1.3 (Site SS015) was corrected: two signs were present, but one was damaged. This information was also included

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				in the recommendations and summary in Section 5.3. **DEC Accepts Response 10/6/2022**
5.	2-2	2.1.4/2.1.5	In both sections specify that portions of the building footprint still exist at the site.	Concur. Section 2.1.4 has been revised to indicate portions of the building footprint exist at the site and there were no signs of debris present. Section 2.1.5 has been revised to indicate portions of the building footprint exist and piles of metal, concrete and wood debris are still present. **DEC Accepts Response 10/6/2022**
6.	2-3	2.2.1	Based on review of the ST009 sampling forms it appears that some globules of product and odor was noted and should be documented in the groundwater monitoring section.	Concur. Description added to reflect field observations stating: "At ST009 monitoring well MW07, small globules of light non-aqueous phase liquids were observed on the electronic tape that exhibited a strong fuel odor." **DEC Accepts Response 10/6/2022**
7.	2-4	2.3	"Turbidity was not measured as one of the field stabilization parameters due to an unresolvable issue with the calibration standards." Was visual inspection still used to determine that turbidity was reduced during purging.	Visual inspection was used to determine that turbidity reduced during purging. Section 2.3 deviations updated to: "Visual observation was noted as being clear throughout the sampling process." **DEC Accepts Response 10/6/2022**
8.	2-4	2.3	Clarify why the peristaltic pump was used for the ST009 sites. Please ensure that appropriate sampling equipment for volatile compounds is used in the 2022 sampling event. DEC notes that data was appropriately qualified for volatile compounds.	The peristaltic pump was inadvertently used to sample the shallow ST009 site wells. As noted in the update to the 2021 UFP-QAPP, a low flow pump will

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				be used to purge and sample the well. Inertia pumps, peristaltic pumps, or bailers shall not be used for the collection of volatiles or other air sensitive parameters unless no other method is available. Then, the information will be for information only and cannot be used for project decisions. **DEC Accepts Response 10/6/2022**
9.	2-5	2.4	Please specify what was done with the granulated activated carbon treatment system. Was it left on site, disposed of, or moved with contractors to the next site?	The GAC treatment system was moved with North Wind to the next site. **DEC Accepts Response 10/6/2022**
10.	2-6	2.5.2	Please specify that LODs for PCBs in surface water were above the corresponding ADEC cleanup level.	Section 2.5.2 revised to indicate the "LOD for all surface water samples were slightly above the corresponding ADEC project action limit of 0.00044 mg/L." Included a reference to Table C-3 in Appendix C that present the summary of the 2021 analytical results in surface water. **DEC Accepts Response 10/6/2022**
11.	2-9	Table 2-3	Please remove the 2 superscripts from PAL or add the corresponding footnote.	The corresponding footnote (1) was revised to indicate the PALs are the Final RAO objectives per the Record of Decision for Site LF003. The second superscript was deleted. **DEC Accepts Response 10/6/2022**
12.	3-1	Volatiles	Based on the equipment blank and rinsate blank results, samples ST009-MW9-022921, and SS015-WW01-092921, should not be referred to as non-detect and should be qualified. DEC concurs with USACE review that the U flag, with original concentrations, is appropriate per the QAPP but should be a B flag in the future. DEC is in agreement with USACE review that data qualifiers should be updated to match the DOD-QSM preceding the 2022 field work and reporting.	Noted. The updated UFP-QAPP includes QSM data qualifying conventions to match the latest QSM guidance. **DEC Accepts Response 10/6/2022**

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13.	5-1	5.1.1	Is the exposed geotextile within the landfarm cap boundaries or beyond the cap?	The geotextile fabric observed was exposed within the landfarm cap boundaries and appeared to have been recently placed and in good condition. The second bullet in Section 5.1.1 has been updated to reflect this information. Additional information was added to the report regarding work that was being performed at the site during the inspection by another contractor. **DEC Accepts Response 10/6/2022**
14.	5-2	5.2.1	"One warning sign is in good condition." Is the site expected to have two signs? If it is please recommend replacement of the missing warning sign.	Two signs should be located at site SS010. Sections 5.2.1 was updated to state: "The second sign for the site was not located." The recommendation to replace the warning sign was included in Section 5.2.2. **DEC Accepts Response 10/6/2022**
15.	5-2/3	5.4/5.5	For site SS016 and site SS017 signage is expected until UU/UE is reached for the site. Add a recommendation that signage be replaced at the site as it should not have been removed before a UU/UE determination. Replacement will require a mounting system as the signs were previously attached to the building. Replacement should be coordinated to ensure that it does not prevent further removal of remaining contamination.	Updated recommendations in Sections 5.4.2 and 5.5.2 for Sites SS016 and SS017 to include: "Warning signs that were previously attached to the building should be replaced at the site. Replacement will require a mounting system and should be coordinated to ensure that it does not prevent further removal of remaining contamination." **DEC Accepts Response 10/6/2022**
16.	5-3	5.6.1	Please add to the summary that globules of product were found in one of the monitoring wells.	Bullet point added to section 5.6.1 stating, "Small globules of light non-aqueous phase liquids were observed on the water level meter electronic

Cmt. No.	Pg.	Sec.	Comment/Recommendation	Response
				tape that exhibited a strong fuel odor at monitoring well MW07." **DEC Accepts Response 10/6/2022**
17.	Figure 4		Potentially add "due to lack of surface water" to the NS footnote.	Figure 4 revised to include "Due to lack of surface water" to the "NS" footnote. **DEC Accepts Response 10/6/2022**
18.	A-4	Photo #8	Was the discarded well casing labeled? Does it appear to be a well from the site? Could it be CMW-01? Based on review of the 2020 Report it did appear that the two were together.	The discarded well casing was not labeled. The discarded well casing was also photographed and documented in the Final 2020 RAO IC/LUC Report in the same condition and location observed in 2021. According to the 2020 Technical Project Report for RAO, LUC/ICs at Cape Romanzof, this well is MW03, which was found damaged and lying on the ground surface. It is documented incorrectly in this 2020 Report in #2 of the Photo Log. Based on our review, and the conclusions in this 2020 Technical Report (Section 3.1), this discarded well was located on top of the landfill where previous figures show the location of MW03. Photograph No. 8 was updated to include the MW03 identification. **DEC Accepts Response 10/6/2022**
19.	A-4	Photo #12	"Exposed cap liner on recent excavation and fill, south side slope." Does the liner appear to end at the tire tracks or is the mud also on top of the liner? Secondly does this liner appear to be an extension of the landfill cap or only the geotextile related to the excavation of soil adjacent to the cap?	The exposed geotextile fabric appeared to be related to the current work that was being performed by another contractor. The fabric appeared to continue underneath where the muddy 'road' was located in photograph #12.

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				See response to comment 13. The photograph log in Appendix A was updated to reflect comment above stating: "Exposed cap liner, newly placed, on recent excavation and fill, south side slope." **DEC Accepts Response 10/6/2022**
20.	A-4	Photo #27	Please clarify if the rock pile is made up exclusively of larger rocks or a combination of soils and gravel? From the photo it appears that it could be a soil stockpile especially considering the recent work done at the site.	This was a pile of soil, boulders, cobbles, pebbles, and sand that looked like surface material that was plowed into a pile. The photograph log was updated to reflect comment above stating: "Surface material consisting of soil, boulders, cobbles, pebbles, and sand." **DEC Accepts Response 10/6/2022**
21.	75	Appendix B	"Ponded water observed at or near the site?" Please provide additional information on the ponding. Ponding was not described in section 2 of the document.	The ponding that was noted on the visual inspection form was due to recent and ongoing rainfall and snowfall. No sheen was observed on the ponded water. Section 2.1.1 updated referencing comment stated above. **DEC Accepts Response 10/6/2022**
22.	86	MW-7 Sampling Sheet	"Small globules of product observed on ETAP; strong odor (LNAPL)" Ensure that this is documented throughout the report.	This observation for MW-7 was documented in Section 2.2.1, paragraph 6 of Section 2.5.1, and summarized in Section 5.6.1. **DEC Accepts Response 10/6/2022**
23.	89	WW-01 Sampling Sheet	Is the very strong odor noted a petroleum odor?	Yes, the odor noted was associated with petroleum. **DEC Accepts Response 10/6/2022**

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24.	5	Appendix D	In the field blank section clarify that the exceptions that were detected and <10X the concentration. Should be qualified with a B based on the QAPP.	Do not concur. Per the 'Data Validation Blank Evaluation Guidance' in WS#36 of the QAPP (page 97): The concentration of contamination in the blanks will be compared to any concentrations in the field samples and if an analyte is detected in the field blank, but not in the associated samples, no action is taken. If the analyte concentrations in the field samples are higher (≥ 5×) than in the blank (≥ 10× in case of common laboratory contaminants) the data validator will apply validation qualifiers according to Table III DOD Data Validation Guidelines and Modules. A sample detect that is ≤ 5× the blank contamination (≤ 10× for common laboratory contaminants) may be considered a non-detect and flagged "U" in the data validation report. **DEC Accepts Response 10/6/2022**
25.	Laboratory Data Review Checklist		The laboratory data review checklist should include the CS Site Name, ADEC File Number, and Hazard Identification Number.	CS Site Name and numbers, the ADEC File Numbers and Hazard ID Numbers were added to the ADEC Checklist in Appendix D. **DEC Accepts Response 10/6/2022**
26.	Laboratory Data Review Checklist		"For method 8082A, the MS/MSD %R and RPD exceedances were biased high and the associated sample results were non-detect, therefore no data were qualified. (See DVR)" Based on review of worksheet #36 of the QAPP if appears that for MS/MSD RPD>CL that non-detects should be flagged UJ. Also based on the above section the %R was low not high.	For parent sample LF003-S04-093021 PCB 1016 the MS percent recovery was high (1160%) the MSD percent recovery was high (2300%), and the MS/MSD RPD was high. UJ flag has been added to

Cmt. No.	Pg.	Sec.	Comment/Recommendation	Response
				PCB MS/MSD section in the Data Validation Report in Appendix D. Please note the UJ flag already applied to non-detect for sample LF003-S04-093021 PCB 1016 results for other QC failures; therefore, no changes were applied to the tables or figures. **DEC Accepts Response 10/6/2022**
27.	LF003-SW-093021 Sample Results 6		In this sample (and other surface water samples) PCB 1248, the LOD was above the DEC cleanup level and no discussion or qualifiers are applied to this specific arochlor. Please address throughout the document and lab checklists as needed.	All LODs in Table C-3 were incorrect. These were corrected according to the updated (attached) laboratory report. The LODs, however, are still greater than the PAL of 0.00044 for Total PCBs. An additional note was included in Table C-3 to reflect this information. Section 2.5.2 revised to indicate the "LODs for all surface water samples were slightly above the corresponding ADEC project action limit of 0.00044 mg/L." The ADEC checklist updated in Sections 5d and 5e in Appendix D. The reported LOD for samples LF003-SW03-093021, LF003-SW02-093021, LF003-SW01-093021, and SS015-SW02-093021 was reported at 0.500 ug/L, which exceeded the project LOD of 0.25 ug/L. Data is usable as qualified. Samples that exceeded the PAL limit are noted in section 5.d. **DEC Accepts Response 10/6/2022**
End of comments.				