US Army Corps of Engineers
Alaska District

2022 Groundwater Sampling Report

Wildwood AFS
Formerly Used Defense Site (FUDS)
Property F10AK0251

HTRW Project -05 Former Tank Farm,
CON/HTRW Project -06 Operations Building Former ASTs/USTs,
HTRW Project -07 12-acre Landfill, and
CON/HTRW Project -08 UST 502-1

Kenai, AK

June 2023

Prepared By:
U.S. Army Corps of Engineers - Alaska District
Environmental Engineering Section
P.O. Box 6898
Joint Base Elmendorf Richardson, Alaska 99506-0898

Table of Contents

LIST OF ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AFS	Air Force Station
AST	aboveground storage tank
AS/SVE	air sparge/soil vapor extraction
bgs	below ground surface
BLM	Bureau of Land Management
BTEX	benzene, toluene, ethylbenzene, and xylenes
°C	degrees Celsius
COC	contaminants of concern
CDQR	Chemical Data Quality Review
DCA	1-2 Dichloroethane
DO	dissolved oxygen
DoD	Department of Defense
DRO	diesel-range organics
°F	Degrees Fahrenheit
FUDS	Formerly Used Defense Site
GRO	gasoline-range organics
HVAC	heating, ventilation and air conditioning
IDW	investigation-derived waste
HCl	hydrochloric acid
KIT	Kenaitze Indian Tribe
KNA	Kenai Natives Association Inc.
mg/L	milligrams per liter
mL	milliliter
MW	monitoring well
NALEMP	Native American Lands Environmental Mitigation Program
PAH	Polycyclic Aromatic Hydrocarbons
PID	Photo Ionization Detector

POL	petroleum, oil, and lubricants
QC	quality control
QSM	Quality Systems Manual
RI	Remedial Investigation
ROST/LIF	Rapid Optical Screening Tool/Laser Induced Fluorescence
USACE	United States Army Corps of Engineers
USAF	United States Air Force
UST	underground storage tank
VOC	Volatile Organic Compounds

EXECUTIVE SUMMARY

Groundwater samples were collected from monitoring wells (MWs) at the Former Wildwood Air Force Station (AFS) Former Tank Farm, Operations Facility, 12-acre Landfill, and Underground Storage Tank (UST) 502-1 project locations during the 2022 groundwater monitoring event. Groundwater monitoring was conducted to evaluate remaining groundwater contaminant trends at the above-mentioned locations. The field work was conducted by U.S. Army Corps of Engineers (USACE) personnel on June 27-30, 2022. Samples from the four different sites were submitted for analysis, and included primary samples, field duplicates, and trip blanks. At the Tank Farm, former UST 502-1, and Operations Facility, project groundwater samples were submitted for analysis of diesel-range organics (DRO). At the 12-acre Landfill, the two new monitoring wells that were installed in the 2020 sampling event, were sampled, and submitted for analysis of volatile organic compounds (VOCs).

At the Former Tank Farm, monitoring wells MW-3, MW-4, MW-6, MW-11, MW-23, MW-24, AP-397, and MW-30 were sampled for DRO. MW-3, MW-4, MW-6, and MW-11 exceeded the groundwater level criteria from 18 AAC 75.345 Table C of 1.5 milligrams per liter (mg/L) for DRO, with exceedances of 2.79, 6.61, 3.26, and 7.67 mg/L, respectively. Based on data results of DRO from this year and the last five sampling events, it will take many more years of monitoring before the contamination levels are below screening criteria, therefore in 2020 it was suggested that the sampling events are to be conducted every two or three years rather than annually. The next sampling event at the Tank Farm will be in 2024.

At the Operations Facility, groundwater samples were collected at MW-1, MW-2, and MW-3 were analyzed for DRO. DRO was detected in monitoring wells MW-1 and MW-2 at concentrations of 2.49 and 1.74 mg/L, respectively, exceeding the 18 AAC 75.345 Table C groundwater criteria of 1.5 mg/L.

At the 12-acre Landfill, the two groundwater monitoring wells were sampled for vinyl chloride. Vinyl chloride was not detected at MW-1 or MW-2, resulting in no exceedances of 18 AAC 75.345 Table C groundwater criteria of 0.00019 mg/L. Both wells should continue to be tested for vinyl chloride for at least two more monitoring events assuming vinyl chloride is not detected above screening criteria.

At the UST 502-1 location, there were no groundwater exceedances of DRO. This well is proposed for decommissioning during the 2023 groundwater sampling event. DRO is not present in the groundwater at concentrations exceeding the Alaska Department of Environmental Conservation (ADEC) cleanup level.

1.0 INTRODUCTION

This report describes chemical results of groundwater samples collected from wells at the former Wildwood Air Force Station (AFS) Tank Farm, Operations Facility, Landfill, and UST 502-1, Formerly Used Defense Sites (FUDS), Kenai, Alaska. The Alaska Department of Environmental Conservation (ADEC) file number for all Wildwood sites is 2320.38.051. The Former Tank Farm ADEC Hazard ID is 25199, the Operations Facility ADEC Hazard ID is 25213, the 12-acre Landfill ADEC Hazard ID is 282, and the UST 502-1 ADEC Hazard ID is 25200.

1.1 Project Overview

The project objective at each of the Wildwood sites is outlined as follows:

At the Former Tank Farm, annual sampling of nine monitoring wells (MWs) for DRO and 1,2-dichloroethane (DCA) has been conducted annually since 2016. Groundwater monitoring has occurred annually to document and evaluate the natural attenuation progress and remaining levels of DRO and 1,2-DCA contamination at the site, however the 2020 groundwater sampling report suggested that the sampling be conducted every two years. Groundwater monitoring frequency may be revised after the first Periodic Review (i.e., after five years) with ADEC concurrence. The remedial action phase is anticipated to last 20+ years. Project response is to be completed by 2050. The sampling of monitoring wells was conducted in June 2022 in order to achieve the project objective. The following wells were sampled and analyzed for DRO, MW-3, MW-4, MW-6, MW-11, MW-16, MW-23, MW-24, MW-30, and AP-397.

At the former Operations Facility, the three MWs installed during the 2015 field effort (MW-1, MW-2, and MW-3) were sampled and analyzed for DRO with the purpose of conducting groundwater monitoring to monitor and analyze groundwater natural attenuation.

The Native American Lands Environmental Mitigation Program (NALEMP) conducted a soil excavation effort at the former Operations Facility in 2020 and 2021. In June 2022, all three existing wells continued to be sampled. The data collected will be used to determine the impact that excavations have had on the project site groundwater.

At the 12-acre Landfill, two groundwater monitoring wells were installed in 2020 with the purpose of determining remaining contaminant concentrations of vinyl chloride at the site. The two wells were installed at a depth of 12 feet below ground surface (bgs) with 10 feet of screen across the groundwater interface in accordance with the 2013 ADEC Monitoring Well Guidance. The wells were installed using a direct push method and were

completed with a permanent concrete flush mount that included a means to lock the wells. Final groundwater depths of the wells were 3.71 feet bgs and 5.40 feet bgs. The wells were developed in accordance with ADEC monitoring well guidance (ADEC, 2013) and sampled for vinyl chloride. The two wells have been sampled for vinyl chloride for the last three years including June 2022.

At the former UST 502-1 site, one groundwater monitoring well was installed in 2020 to a depth of 40 feet bgs with 10 feet of screen across the groundwater interface in accordance with the 2013 ADEC Monitoring Well Guidance. The well was installed using a direct push method, and it was completed with a permanent concrete flush mount that includes a means to lock the well. The groundwater depth at this location at the time of well installation was 23.58 feet bgs. The well at UST 502-1 was developed and sampled in accordance with ADEC monitoring well guidance (ADEC, 2013). During the last three years including June 2022, groundwater samples have been collected and analyzed for DRO.

1.2 Site Description and Background

1.2.1 Site Location

The former Wildwood Air Force Station (AFS) is located 3.5 miles northwest of Kenai, Alaska, accessed via Wildwood Drive East of the Kenai Spur Highway (Figures 1 and 2). The site is located at 60° 35’ North (N) latitude and 151° 17.8’ West (W) longitude, in Sections 24 and 25, Township 6N, Range 12W, of the Seward Meridian.

1.2.2 Site History

Wildwood AFS, originally named Seward Station, was constructed as a communications station and activated in 1953 by the United States Army. The total area of the station was approximately 5,300 acres; however, military construction was confined to a 125-acre tract. In May 1954, the station was renamed Wildwood Station, and in 1966 the property was transferred to the U.S. Air Force (USAF). Wildwood AFS was closed by the USAF in July 1972.

Following closure, the entire 5,300 acres were transferred to the U.S. Department of the Interior, Bureau of Land Management (BLM). The BLM transferred 4,300 acres to the Kenai Natives Association Inc. (KNA) in 1974. KNA sold the 125-acre tract of land that the former Wildwood AFS Main Complex was located on to the Alaska Department of Natural Resources in 1994 (USACE, 2011). The Alaska Department of Corrections currently operates the Wildwood Correctional Center on a portion of this tract, immediately north of the former Wildwood AFS Tank Farm site.

1.2.3 Site Descriptions

Tank Farm

The Former Tank Farm site, adjacent to the Wildwood Correctional Center, is accessed via Wildwood Drive east of the Kenai Spur Highway. Between 1993 and 1995, the Tank Farm infrastructure was removed, and a remedial investigation was initiated. Subsurface soil and groundwater contamination were discovered and an in-situ air sparging and vapor extraction remediation system was installed at the site in 1996. The system injected air below the groundwater table and extracted air out of the soil zone above the groundwater table to remove volatile contaminants from both the groundwater and soil zones. The system also provided much-needed subsurface oxygen to support natural microbial degradation of contaminants. It was operated and maintained from 1997 until 2005. USACE performed groundwater and soil sampling throughout the remedial activities to monitor and further delineate the extent of contamination and the effectiveness of the remedy. Review of system operation and monitoring data was conducted in 2006. The remedial system reached a point of diminished return. USACE decommissioned the remediation system in summer 2008.

The 2013 Decision Document issued for the site stated the selected remedy was Natural Attenuation with Monitoring and Institutional Controls and that USACE would continue to monitor groundwater annually, record informational notices with the State of Alaska Recorder's Office for parcels with impacted soil and/or groundwater, and conduct a periodic five-year review. Groundwater sampling was conducted from eight monitoring wells in August 2016, August 2017, August 2018, June 2019, and June 2020. During the 2020 sampling event, DRO was detected in four monitoring wells at a concentration in excess of the Decision Document cleanup criteria of 2013. In 2021, an inspection of the wells was conducted to ensure that the wells are still in good conditions. Groundwater sampling at the site resumed in June 2022. Free phase product continues to be observed in MW16, which is up gradient from the other monitoring wells. Annual groundwater sampling will continue and trends in the data will be assessed at the end of the five-year monitoring period.

Operations Facility

The Operations Building Facility is located approximately 0.5 miles southeast of the Landfill Area and approximately 1.5 miles north of the Main Complex Area. The facility formerly consisted of an operations building that housed computer and heating, ventilating, and air conditioning (HVAC) systems (Building 100), a shop with a boiler and generator (Building 101), a transformer storage area, a drum storage location, two above ground storage tanks (ASTs) and two USTs. Currently, the site consists of a large level open area approximately 1 acre in size.

As part of the 2019 new project delineation, the Former ASTs/USTs feature has become its own project. USACE has determined that additional monitoring is needed to achieve its goals at this site. USACE has conducted groundwater sampling yearly since 2015, with the most recent event occurring in June 2022. Concentrations of DRO were above Alaska Department of Environmental Conservation (ADEC) groundwater cleanup levels in two wells during 2022 event.

NALEMP conducted a soil excavation effort at the former Operations Facility in 2020 and 2021. Continued annual groundwater sampling was recommended to monitor contaminant trends at the site following the excavation of contaminated soil, and it took place in June 2022.

Landfill

The 12-Acre Landfill Area is located near the western boundary of the Wildwood AFS property. It was used for solid waste disposal during the operation of the Wildwood AFS. Sampling of surface soil, subsurface soil, surface water, sediment, and groundwater was conducted at the landfill during the 1995 Remedial Investigation (RI). No subsurface sources of contaminated soil were identified in the Landfill area. Installation and sampling of nine monitoring wells and ten micro-wells was conducted.

Following removal actions in 1997 and 1998, the landfill was capped and graded. Routine groundwater monitoring occurred until 1999. A groundwater monitoring event in 2009 detected vinyl chloride concentrations below ADEC cleanup levels in place at the time. In 2020, The Kenaitze Indian Tribe (KIT), through cooperative agreement with DoD under NALEMP, has been removing and disposing of buried debris, and activities at the site continued in 2021. In 2020, two groundwater monitoring wells were installed at the site to verify that vinyl chloride concentrations remain below cleanup levels. The wells have been sampled for the last three years, and June 2022 being the latest sampling event.

UST 502-1

UST 502-1 was a 500-gallon diesel storage tank located near the southwest extent of the facility that supplied fuel to the station guard shack, now within the currently active Wildwood Correctional Center. The tank was installed in 1957 and removed in 1994. In 2005, USACE identified a small area of DRO contamination below the former UST. Down-gradient DRO concentrations did not exceed ADEC cleanup levels.

In 2020, a groundwater monitoring well was installed at the site and sampled for DRO, VOCs, and PAHs. Soil at the site was sampled and analyzed for DRO. In 2021 and 2022, the groundwater at the well was sampled for DRO.

1.2.4 Site Environmental Setting

Geology and Land Surface

The former Wildwood AFS is located within the northwest region of the Kenai Peninsula, which extends approximately 150 miles into the Gulf of Alaska. The region is characterized by flat to undulating terrain with abundant wetlands, lakes, and streams. The western portion of Wildwood AFS, which includes the areas impacted by military construction, is generally well-drained, forested, and characterized by flat to gently sloping terrain.

Soils in the vicinity of Wildwood AFS are derived from glacial and fluvial deposits. On terraces and outwash plains, the well-drained soils consist of a surface mat of forest litter overlying silt loam. In depressions, the poorly drained soils consist of a surface layer of decomposed sphagnum moss overlying moss and sedge peat. These soils are approximately 2 to 10 feet thick. Sediments in the vicinity of Wildwood AFS consist of inter-bedded Quaternary-age glacial, fluvial, lacustrine, and marine deposits and underlie the soils described above. Bedrock beneath Wildwood AFS consists of the Tertiary-age Kenai Formation, which is composed of alternating strata of semi consolidated silt, sand, and gravel, and is locally coal-bearing (E&E, 1995).

Climate

Wildwood AFS is located in the transition climate zone of Alaska and experiences cool summers and cold winters. January temperatures typically range from 10- and 30-degrees Fahrenheit (ºF) and July temperatures from 40 to 60 ºF. Average annual precipitation is approximately 20 inches; average snowfall is approximately 70 inches.

1.2.5 Summary of Previous Investigations and Removal Actions

Former Tank Farm:

Between 1993 and 1995, the Tank Farm infrastructure was removed, and a RI was initiated. Subsurface soil beneath the former ASTs and adjacent to the former pump house was contaminated with petroleum. Groundwater contamination was also identified directly beneath and downgradient of the Tank Farm. This contamination was attributed to oiled sands used as foundation for the ASTs, as well as probable tank and piping releases. The upper 2 feet of oiled sand was removed from the former AST berm area during demolition of the ASTs.

The primary contaminants detected at the Tank Farm were DRO, GRO, and the VOC DCA. These contaminants were discovered in surface soils, subsurface soils, and groundwater (USACE, 1995) at concentrations exceeding ADEC cleanup levels.

An air sparge/soil vapor extraction (AS/SVE) system was installed in 1996 and 1997. The system was modified and operated between 1997 and 2006. Several new monitoring wells were also installed during this time period for more extensive groundwater sampling. As of 2002, approximately 10,115 pounds of hydrocarbon (1,501 gallons of gasoline equivalent) had been removed via vadose zone biodegradation. An additional estimated 24,962 pounds of hydrocarbon (3,704 gallons as gasoline) was removed by vapor extraction. Operation of the AS/SVE treatment system was discontinued in 2006, and the AS/SVE system was decommissioned in 2008 (USACE, 2011).

The remaining contaminants of concern (COCs) at the site above the ADEC Method Two cleanup level are DRO in subsurface soil and groundwater, and DCA in the groundwater. All other COCs were remediated to a level below the ADEC cleanup level (USACE, 2011).

Groundwater samples were collected from eight existing monitoring wells (those not containing product) located at the Tank Farm site in May 2011 (USACE 2011). In addition, one abandoned well located upgradient of the former Tank Farm area was decommissioned. Groundwater samples could not be collected from well MW-16 due to the presence of free product. DRO was above ADEC screening levels in five wells.

A Decision Document was completed in October 2013 and signed in December 2013 that outlined the path forward at the Tank Farm Site. The Decision Document stated that residual contaminated soil present at greater than 15 feet below ground surface will be left in place. It also required that groundwater monitoring at the Tank Farm Site be conducted annually for at least five years to monitor contaminant degradation. Nine wells (MW-3, MW-4, MW-6, MW-11, MW-16, MW-23, MW-24, MW-30 and AP-397) were identified to be sampled for DRO and DCA (USACE, 2011; USACE, 2013).

The first groundwater sampling event was conducted in August 2016. Right-of-entry complications with the Alaska Department of Natural Resources had previously resulted in no annual groundwater monitoring since the Decision Document was signed. All project wells were sampled except for MW-16 which had free product (0.03 feet). DRO was detected in four monitoring wells (MW-3, MW-4, MW-6, and MW-11) at a concentration equal to or exceeding the Decision Document criteria of 1.5 mg/L. DCA was not detected in any well in excess of the Decision Document established cleanup criteria of 0.005 mg/L.

A second groundwater sampling event was conducted in August 2017. All project wells were sampled except for MW-16 which had free product (0.02 feet). DRO was detected in four monitoring wells (MW-3, MW-4, MW-6, and MW-11) at a concentration equal to or exceeding the Decision Document criteria of 1.5 mg/L. DCA as not detected in any well in excess of the Decision Document established cleanup criteria of 0.005 mg/L.

A third groundwater sampling event was conducted in September 2018. All project wells were sampled except for MW-16 which had free product (0.03 feet). DRO was detected in four monitoring wells (MW-3, MW-4, MW-6, and MW-11) at a concentration equal to or exceeding the Decision Document criteria of 1.5 mg/L. DCA as not detected in any well in excess of the Decision Document established cleanup criteria of 0.005 mg/L.

In 2019, groundwater monitoring was conducted in June, and all wells were sampled except for MW-16 which had free product. DRO was detected in MW-4 at a concentration of 4.57 mg/L QL, in MW-6 at 1.60 mg/L QL and in MW-11 at a concentration of 4.11 mg/L QL, all equal to or exceeding the Decision Document criteria of 1.5 mg/L. Free product was measured in MW-16 at a thickness of 0.03 feet which is consistent with previous monitoring events. DCA was not detected above the decision document cleanup level, see Figure 3 for historical results.

In 2020, groundwater monitoring was conducted in June, and similar to the 2019 sampling event, all wells were sampled except for MW-16 which had free product. DRO was detected in four minitoring wells; MW-3, MW-4, MW-6, and MW-11 DRO was detected at concentrations of 3.04, 8.37, 3.12, and 9.39 mg/L respectively, exceeding the 2013 Decision Document criteria of 1.5 mg/L. All DCA results from the Former Tank Farm wells, were below the Decision Document criteria of 0.005 mg/L. DCA results were all also below the current 18 Alaska Administrative Code (AAC) 75. 345 Table C groundwater screening criteria of 0.0017 mg/L, see Figure 3.

In 2021, the groundwater monitoring wells were not sampled, but they were inspected to ensure that they are still in good conditions.

Operations Facility:

Two 3,500-gallon ASTs and two 15,000-gallon USTs were formerly located southeast of Building 101. The tanks were used to supply diesel fuel to the facility's generator and were removed prior to the start of the RI in 1995.

Surface soil, subsurface soil, and groundwater sampling was conducted during the 1995 RI. This included installation and sampling of two monitoring wells, nine micro-wells, and six soil borings. DRO concentrations were elevated in all three matrices (USACE, 1995).

Approximately 345 cubic yards of petroleum, oil and lubricant (POL) contaminated soil were removed during the removal action in 1997. Final excavation dimensions were 45 feet by 26 feet by 8 feet deep with DRO remaining in soil at the base of the excavation.

In 2005, a Rapid Optical Screening Tool/ Laser Induced Fluorescence investigation delineated the lateral and vertical extent of the remaining soil POL contamination. The plume was estimated to extend 340 feet downgradient and toward the southwest. The plume was bounded on all sides except the east. POL contamination in soils existed at a depth interval extending from approximately 2 to 11 feet bgs.

In November 2009, three temporary monitoring wells were installed at locations where elevated DRO contamination in soil or groundwater had been detected. Groundwater samples were collected and analyzed for GRO and DRO. DRO was detected in one monitoring well located directly downgradient of the former ASTs at a concentration above the ADEC cleanup level at 3.8 mg/L.

In 2013, 350 cubic yards of soil was removed from the Building 101 footprint and surrounding areas by the KIT through NALEMP. Three groundwater monitoring wells were installed in 2015 at the location of the 2009 groundwater exceedance and downgradient to determine contaminant concentrations and to determine groundwater flow direction. One well (MW-2) exceeded the ADEC 18 AAC 75 Table C groundwater criteria of 1.5 mg/L for DRO at 1.7 mg/L. All other compounds were below screening criteria in all wells (USACE, 2015). In 2017, KIT conducted an investigation; test trenches were dug at the former UST area and between the UST and AST areas. DRO concentrations in soil samples from the trenches ranged from 722 to 40,400 mg/kg

The 2015 groundwater monitoring wells were sampled again in August 2016 and submitted for the analysis of GRO, DRO, and BTEX. DRO was the only analyte detected in excess of ADEC groundwater criteria in monitoring well MW-2 at a concentration of 2.3 mg/L.

All groundwater monitoring wells were sampled again in August 2017 and submitted for the analysis of GRO, DRO, and BTEX. DRO was the only analyte detected in excess of ADEC groundwater criteria in monitoring well MW-2 at a concentration of 1.5 mg/L QL, and in MW-3 at 3.9 mg/L QL.

In September 2018, all groundwater monitoring wells were sampled again and submitted for the analysis of GRO, DRO, and BTEX. DRO was the only analyte detected in excess of ADEC groundwater criteria in monitoring well MW-2 at a concentration of 2.2 mg/L QL, and MW-1 was slightly below the ADEC exceeding level at 1.2 mg/L QL.

In 2019, all three groundwater monitoring wells were sampled in June 2019 and submitted for analysis of GRO, DRO, and BTEX. DRO was detected in MW-2 at a concentration of 1.24 mg/L QL slightly below the ADEC groundwater criteria of 1.5 mg/L.

DRO was also detected in MW-1 at a concentration of 0.724 mg/L QL, below ADEC screening criteria, see Figure 4.

In 2020, all three groundwater monitoring wells were sampled in June and submitted for analysis of GRO, DRO, and BTEX. DRO was detected in MW-1 and MW-2 at concentrations of 3.46 and 1.82 mg/L respectively, exceeding the 18 AAC 75.345 Table C groundwater criteria of 1.5 mg/L, see Figure 4.

In 2021, groundwater monitoring was conducted at the wells in November after a removal action being conducted under NALEMP. One of the wells exceeded groundwater criteria levels of 18 AAC 75.345 Table C for DRO.

12-acre Landfill:

Surface debris was removed and disposed during the 1997 and 1998 Removal Action. The landfill was surveyed, capped with clean fill, graded to promote drainage, and seeded. Groundwater monitoring was conducted until 1999, when all wells were decommissioned. In November 2009, two temporary monitoring wells were installed at locations where high vinyl chloride had been previously detected in groundwater. Vinyl chloride was detected in both wells at a depth of 8.51 and 11.39 feet bgs, but at concentrations well below the ADEC cleanup level in effect at that time. ADEC vinyl chloride cleanup level has since lowered. KIT in 2020, through cooperative agreement with DoD under NALEMP, is removing buried debris. See Figure 5 for Landfill well locations.

In 2020, two groundwater monitoring wells were installed and sampled for vinyl chloride. One of the monitoring wells sampled exceeded at 0.000197 mg/L, marginally above the 18 AAC 75.345 Table C groundwater criteria of 0.00019 mg/L.

In 2021, the wells were sampled for vinyl chloride, and similar to 2020, one of the wells exceeded criteria levels of 18 AAC 75.345 Table C for groundwater.

UST 502-1:

In 1994, following the removal of the underground storage tank, soil samples were collected and analyzed. DRO concentrations of 6,300 and 11,000 mg/kg were found in the 14 to 16-foot depth range. The subsurface soil and groundwater were investigated during a RI which included the installation and sampling of two monitoring wells, three micro-wells, and two soil borings. DRO concentrations in subsurface soil extended to the water table and ranged from 71 mg/kg to 6,900 mg/kg. The depth to groundwater is approximately 25 to 27 feet bgs. Groundwater at down-gradient locations was monitored

and DRO concentrations did not exceed 18 AAC 75.345 Table C for groundwater. See Figure 6 for UST 502-1 well location.

In 2020, one groundwater monitoring well was installed at the site and groundwater and soil were sampled for DRO, VOCs, and PAHs. Samples results indicated there were no exceedances of 18 AAC 75.345 Table C for groundwater. The DRO concentrations in the soil, however, exceeded the 18 AAC 75.341 Table B2 (Under 40-inch zone) migration to groundwater criteria of 250 mg/kg for DRO at concentrations of 2,200 mg/kg.

In 2021, the groundwater monitoring well was sampled for DRO, and no exceedances based on 18 AAC 75.345 Table C were recorded.

2.0 FIELD ACTIVITIES AND OBSERVATIONS

Groundwater sampling was conducted according to procedures identified in the July 2016 *Wildwood AFS Former Tank Farm and Partly Mitigated Sites Groundwater Sampling Work Plan F10AK025104/05 HTRW* (USACE 2016) and the USACE, August 2021, *Groundwater Sampling Work Plan Addendum, Wildwood AFS Former Tank Farm and Partly Mitigated Sites, FUDS, F10AK0251-05/-06/-07/-08 HTRW*.

2.1 Groundwater Sampling

Static water levels were measured to the nearest 0.01 feet, relative to the top of the monitoring well casing. Water levels and total well depths were measured using an electronic oil/water interface probe. Groundwater samples were collected by ADEC-qualified environmental professionals, Jenny Dedmore, Jacob Sweet and Kaitlin East from wells at the Former Tank Farm, Operations Facility, 12-acre Landfill, and UST 502-1.

Bladder pumps were used to sample all monitoring wells. Bladder pumps were set in the center of the screened interval of each well. Bladder pumps were connected to dedicated sample tubing inside each well, and the flow rate was set to 150 milliliters (mL)/minute. Groundwater parameters were measured in a flow-through cell prior to sampling. Measured parameters included pH, temperature, specific conductivity, turbidity, dissolved oxygen concentration, and oxidation/reduction potential. Water levels were also monitored, and the pump flow rate was controlled to prevent excessive drawdown. Field parameters were recorded in the field logbook for each well. A copy of the field logbooks can be found in Attachment A. Once the parameters stabilized, the flow-through cell was disconnected, and samples were collected using the pump set at a low flow rate. Sample containers were filled in order of volatility. DRO samples were collected by filling 250 mL hydrochloric acid (HCl) preserved containers. Vinyl chloride samples were

collected by filling 40 mL HCL preserved vials. Dedicated pumps and pump bladders were used when sampling each well. An equipment blank was collected at the end of the project.

The groundwater samples were stored in coolers containing frozen gel ice or in the refrigerator. Ice was changed out when needed to keep samples at the proper holding temperature of 0-6 degrees °C. The samples were hand delivered for each sampling event to SGS Laboratories in Anchorage, Alaska on June 30, 2022.

Section 3.0 discusses the chemical data results for the sampling effort. Sample summary and analytical data tables are presented in Attachment B. Field and laboratory data quality are evaluated in the Chemical Data Quality Review (CDQR) included in Attachment C. ADEC laboratory data review checklists are also included in Attachment C.

2.2 Photographic Log

A photographic log is provided in Attachment D. The photographic log includes pictures that are representative of the groundwater sampling conducted during the June 2022 field effort.

2.3 Investigation-Derived Waste Handling and Disposal

Decontamination was performed at each site during the sampling process. Purge water was collected, filtered through a granulated activated carbon filtration unit, and discharged into a vegetated area at each site. Solid non-hazardous investigation-derived waste (IDW) produced during sampling activities was comprised of sampling gloves, paper towels, and sample tubing. At the end of the sampling event, USACE personnel disposed of this solid waste in local trash receptacles.

3.0 RESULTS OF CHEMICAL ANALYSIS

3.1 Groundwater Elevations and Flow Direction

Groundwater elevations were collected for all wells at the Former Tank Farm, Operations Facility, UST 502-1, and 12 -acre Landfill on September 21-23, 2022. The measurements were taken at top of the PVC pipes and well casings as noted in the data tables in Attachment B and in the survey data in Attachment E. The figures for the sites show the groundwater flow direction using historical measurements.

3.2 Chemical Data Quality

A USACE chemist performed a review of project and quality control (QC) data in order to assess whether analytical data met data quality objectives and were acceptable for use. The project data were reviewed for deviations to the requirements presented in the Sampling and Analysis Plan; ADEC Technical Memorandum Minimum Quality Assurance Requirements for Sample Handling, Reports, and Laboratory Data; and the DoD Quality Systems Manual, version 5.3. The results of the review are included in the CDQR and the ADEC Checklists in Attachment C. All data was acceptable to use as flagged. No data was rejected.

3.3 Sample Results

Samples were collected from the Former Tank Farm, Operations Facility, 12-acre Landfill, and UST 502-1 project sites and were analyzed by SGS, an analytical laboratory located in Anchorage, Alaska. The results of the groundwater chemical analyses were compared to the cleanup criteria specified in the State of Alaska under 18 AAC 75.345 Table C – Groundwater Cleanup Levels (amended November 2021) and in the project 2013 Decision Document. Complete analytical results are presented in Attachment B. The data tables and groundwater samples results are summarized below:

Tank Farm:

- DRO was detected in MW-3, MW-4, MW-6, and MW-11 at concentrations of 2.79, 6.61, 3.26, and 7.67 mg/L, respectively, exceeding Decision Document Criteria of 1.5 mg/L.
- DRO was detected in AP-397, MW-23, MW-24, and MW-30 at concentrations of 0.496, 0.699, 1.20, and 0.453 mg/L, respectively, below the Decision Document and ADEC criteria of 1.5 mg/L.

Operations Facility results:

- DRO was detected in MW-1 and MW-2 at a concentration of 2.49 and 1.74 mg/L, respectively, slightly above the Decision Document and ADEC criteria of 1.5 mg/L.
- For MW-3, the DRO concentrations detected were 0.372 mg/L, significantly below the Decision Document criteria.

12-acre Landfill results:

- Vinyl chloride was not detected in MW-1 or MW-2, therefore, not exceeding ADEC criteria of 0.00019 mg/L.

UST 502-1 results:

- DRO was detected in MW-1 at a concentration of 0.299 mg/L significantly below the ADEC groundwater criteria of 1.5 mg/L.

4.0 SUMMARY AND RECOMMENDATIONS

The following summarizes the evaluation of contaminant concentrations detected in groundwater samples collected from groundwater monitoring wells at the Wildwood AFS Operations sites in 2022 and provides recommendations. At the Former Tank Farm, DRO was detected in four wells at concentrations levels that exceed the cleanup criteria. At the Operations Facility, DRO was detected in two wells at levels that exceed Decision Document groundwater criteria. At the 12-acre Landfill no detections of vinyl chloride were found. Groundwater was analyzed at the UST 502-1 site, and groundwater results do not exceed ADEC groundwater criteria.

4.1 Groundwater Contaminant Evaluation

4.1.1 Extent of Groundwater Contamination

Tank Farm:

DRO was detected in MW-3, MW-4, MW-6, and MW-11 at concentrations of 2.79, 6.61, 3.26, and 7.67 mg/L, respectively, exceeding Decision Document and ADEC Criteria of 1.5 mg/L. DRO was detected in AP-397, MW-23, MW-24, and MW-30 at concentrations 0.496, 0.699, 1.20, and 0.453 mg/L, respectively, below the Decision Document and ADEC criteria of 1.5 mg/L.

This is the seventh sampling event to collect groundwater samples from the wells installed in 2015.

Operations Facility:

DRO was detected in MW-1 and MW-2 at a concentration of 2.49 and 1.74 mg/L, respectively, slightly above the Decision Document and ADEC criteria of 1.5 mg/L. For MW-3, the DRO concentrations detected were 0.372 mg/L, significantly below the Decision Document and ADEC cleanup criteria.

This is the eighth sampling event to collect groundwater samples from the wells installed in 2015.

12-acre Landfill:

Vinyl chloride was not detected in MW-1 or MW-2, therefore, not exceeding ADEC criteria of 0.00019 mg/L.

This was the third sampling event to be conducted at the landfill since the wells were installed in 2020, and the first event where both of the wells are clean of the contaminant. MW-2 contamination levels have been below ADEC criteria for the three sampling events.

UST 502-1:

There were no exceedances of ADEC groundwater criteria for DRO in MW-1 at the UST 502-1 site.

This was the third sampling event to be conducted at the site since the well was installed in 2020. The well sampling results have been below cleanup levels for all three sampling events since 2020.

4.2 Groundwater Monitoring Recommendations

Tank Farm:

Based on previous groundwater sampling results, MW-3, MW-4, MW-6, and MW-11 continue to have DRO above the Decision Document cleanup criteria. DCA concentrations have not exceeded the Decision Document cleanup criteria since the Decision Document was created and approved. Recommendations of how to proceed with this site continue to be the same as of those established in the 2020 Groundwater Sampling Report, which are outlined as followed:

- Based on data results of DRO from the last five sampling events, it will take many more years of sampling before the contamination levels are below cleanup criteria, therefore is it suggested that the sampling events are to be conducted every two or three years rather than annually.
- To ensure there is no potential exposure of DRO contamination to humans and the environment due to land use changes, annual visual monitoring of this site is recommended when sampling is not conducted.

Operations Facility:

Based on current year groundwater sampling results MW-1 and MW-2 exceeded ADEC groundwater criteria for DRO. MW-3 contamination levels were below ADEC groundwater criteria for DRO. The KIT, under NALEMP, started a removal action at the site during the summer of 2021. Following soil removal, the natural attenuation of residual contamination is expected to accelerate. Based on this the following is recommended for this site:

- Continue to sample the wells remaining at the site after the removal action is completed.
- Pursue site closeout of the site following three sampling events for each well showing contamination levels below screening criteria.

12-acre Landfill:

The monitoring wells at this site were non-detect for vinyl chloride during this year's sampling event. The KIT, under NALEMP, continues to remove buried metal debris at the landfill. It is recommended that:

- MW-1 at this site should be sampled for at least two more events and analyzed for vinyl chloride.
- Following three sampling events resulting in no exceedances of vinyl chloride, the site should be proposed for closeout.

UST 502-1:

Based on current results, the groundwater concentration of DRO is below screening criteria. The following is recommended for this site:

- The groundwater monitoring wells at this site should be decommissioned in 2023 due to the last three year's sampling events results being below cleanup criteria.
- The site should be proposed for closeout.

5.0 REFERENCES

ADEC, 2013. 18 AAC 75, *Monitoring Well Guidance*. September

ADEC, 2022. 18 AAC 75, *Field Sampling Guidance*. January.

ADEC, 2021. 18 AAC 75, *Oil and Other Hazardous Substances, Pollution Control*. November.

ADEC, 2019. *Minimum Quality Assurance Requirements for Sample Handling, Reports, and Laboratory Data*. October.

Department of Defense, 2019. Quality Systems Manual for Environmental Laboratories Version 5.3. September.

USACE, 1995. Prepared by Ecology and Environmental, Inc. *Remedial Investigation Report, Phase III – Cleanup Design, Wildwood Air Force Station, Kenai, Alaska*. August.

USACE, 2011. Prepared by Fairbanks Environmental Services, Inc. 2011 Annual Report, Tank Farm Site Groundwater Monitoring and Former Operations Building Facility Soil Assessment. October. F10AK025104_07.08_0501_p; F10AK025104_07.08_0505_p

USACE, 2011. *Proposed Plan Former Tank Farm and USTs 5-1 and 5-2 Site, Wildwood Air Force Station, Formerly Used Defense Site*. May 2011. F10AK025105_04.10_0500_a

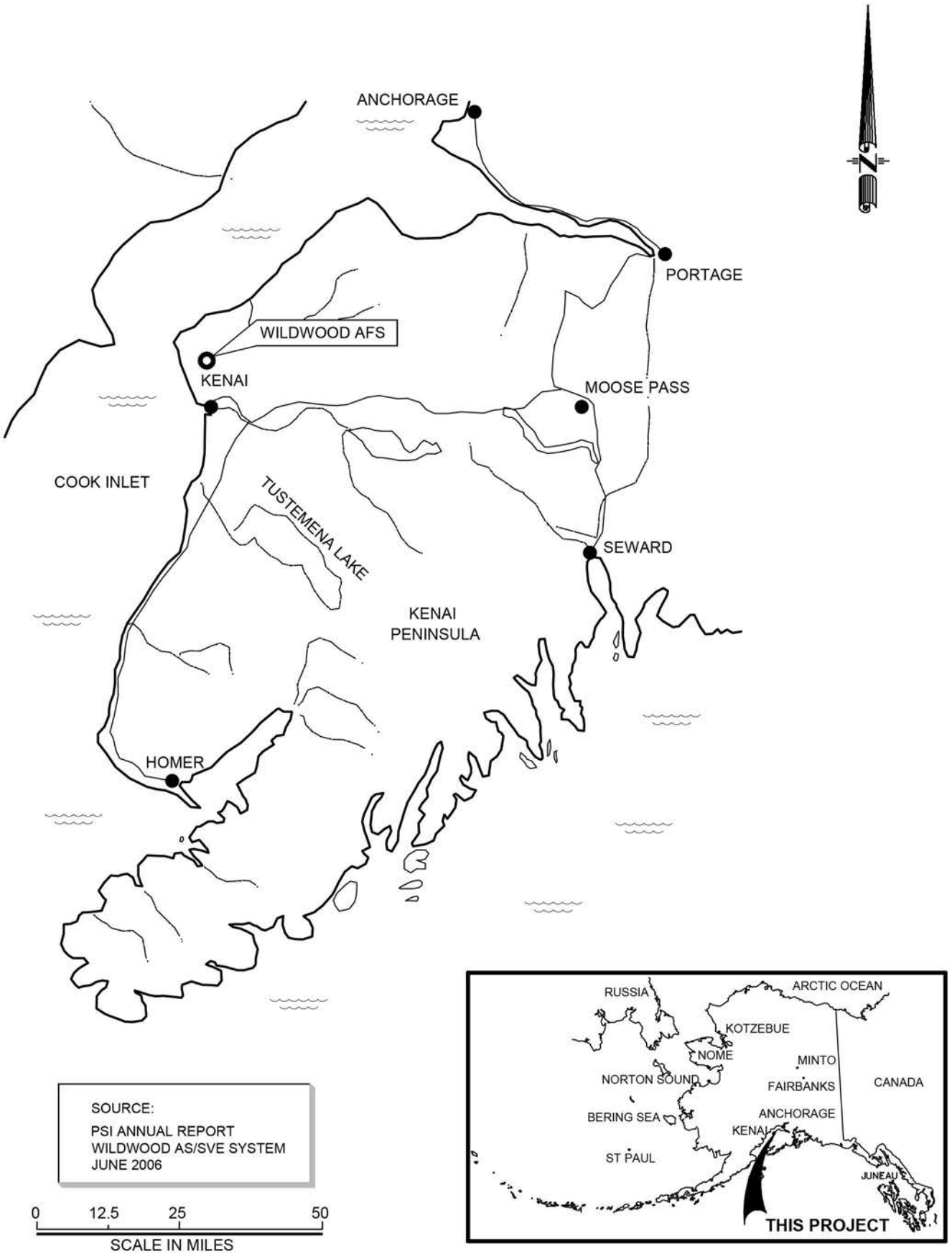
USACE, 2013. Decision Document, HTRW Project F10AK0251-05, Former Tank Farm and USTs 5-1 and 5-2, Wildwood AFS, Kenai, Alaska. October. F10AK025105_05.09_0500_a

USACE, 2015. 2015 Follow-up Investigation Report, Additional UVOST Delineation, Soil Sampling, and Monitoring Well Installation, Wildwood AFS Partly Mitigated Sites, Project 04. June. F10AK025104_03.10_0501_p

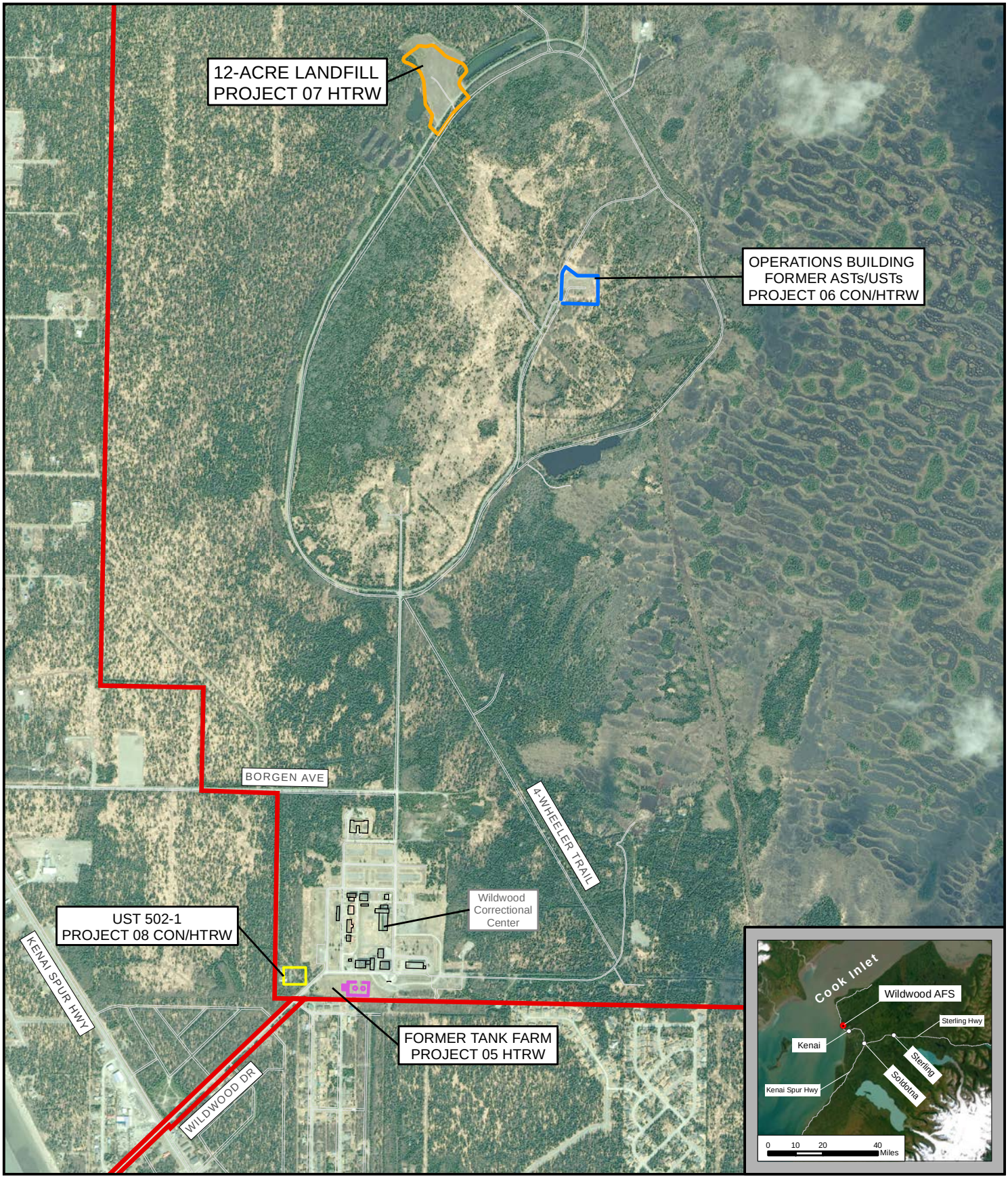
USACE, 2016. *Groundwater Sampling Work Plan, Wildwood AFS Former Tank Farm and Partly Mitigated Sites*. July. F10AK025105_07.04_0503_p

USACE, 2020. *Groundwater Sampling Work Plan Addendum, Wildwood AFS Former Tank Farm and Partly Mitigated Sites, FUDS, F10AK0251-05/-06/-07/-08 HTRW*. June. F10AK025105_07.04_0510_p

USACE, 2021. *Groundwater Sampling Report, Wildwood AFS, Formerly Used Defense Site (FUDS), Property F10AK0251*. F10AK025107_XX.XX_XXXX_a.



U.S. Army Corps of Engineers Alaska District	Wildwood Air Force Station FUDS F10AK0251-05 **Location and Vicinity**	27 July 2011 Revision 0 Scale: Noted	**Figure** 1



Document Path: O:\EN\Public\Engineer\Projects\FUDS_NEW_PROPERTIES\WILDWOOD_AFS_F10AK0251\1_MXD\2022_GW_Sampling_Report\02_Loc_Vic_Map.mxd

Coordinate System: NAD 1983 2011 StatePlane Alaska 4 FIPS 5004 Feet

Project Sites (Number)

- Operations Building Former ASTs/USTs (06)
- Former Tank Farm (05)
- 12-acre Landill (07)
- UST 502-1 (08)
- Road
- Structure
- FUDS Property

Acronym:
UST: Underground Storage Tank
AST: Aboveground Storage Tank

Project Vicinity and Sites

WILDWOOD AFS, KENAI, ALASKA
F10AK0251

Imagery: Main Dataframe- DigitalGlobe Multispec Satellite Imagery, 2019-05-04
(Inset- ESRI Basemap Imagery)

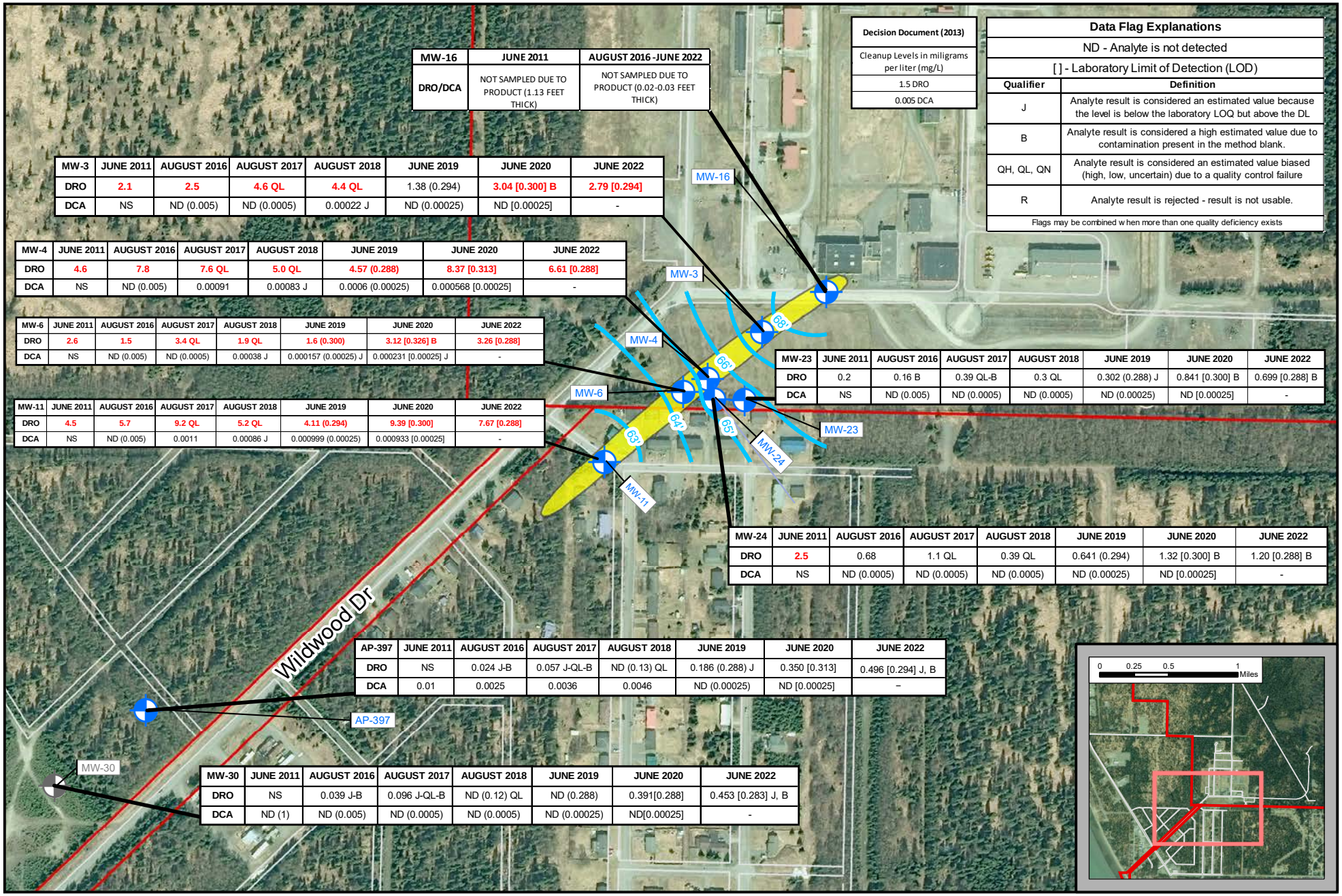
1 inch = 0.32 miles
1:20,000

0 1,000 2,000 4,000
Feet

U.S. ARMY CORPS OF ENGINEERS ALASKA DISTRICT

DATE: 2/9/2023
PM: J.G

FIGURE: **2**



MW-16	JUNE 2011	AUGUST 2016 -JUNE 2022
DRO/DCA	NOT SAMPLED DUE TO PRODUCT (1.13 FEET THICK)	NOT SAMPLED DUE TO PRODUCT (0.02-0.03 FEET THICK)

Decision Document (2013)
Cleanup Levels in miligrams per liter (mg/L)
1.5 DRO
0.005 DCA

Data Flag Explanations	
ND - Analyte is not detected	
[ ] - Laboratory Limit of Detection (LOD)	
Qualifier	**Definition**
J	Analyte result is considered an estimated value because the level is below the laboratory LOQ but above the DL
B	Analyte result is considered a high estimated value due to contamination present in the method blank.
QH, QL, QN	Analyte result is considered an estimated value biased (high, low, uncertain) due to a quality control failure
R	Analyte result is rejected - result is not usable.
Flags may be combined when more than one quality deficiency exists	

MW-3	JUNE 2011	AUGUST 2016	AUGUST 2017	AUGUST 2018	JUNE 2019	JUNE 2020	JUNE 2022
DRO	2.1	2.5	4.6 QL	4.4 QL	1.38 (0.294)	3.04 [0.300] B	2.79 [0.294]
DCA	NS	ND (0.005)	ND (0.0005)	0.00022 J	ND (0.00025)	ND [0.00025]	-

MW-4	JUNE 2011	AUGUST 2016	AUGUST 2017	AUGUST 2018	JUNE 2019	JUNE 2020	JUNE 2022
DRO	4.6	7.8	7.6 QL	5.0 QL	4.57 (0.288)	8.37 [0.313]	6.61 [0.288]
DCA	NS	ND (0.005)	0.00091	0.00083 J	0.0006 (0.00025)	0.000568 [0.00025]	-

MW-6	JUNE 2011	AUGUST 2016	AUGUST 2017	AUGUST 2018	JUNE 2019	JUNE 2020	JUNE 2022
DRO	2.6	1.5	3.4 QL	1.9 QL	1.6 (0.300)	3.12 [0.326] B	3.26 [0.288]
DCA	NS	ND (0.005)	ND (0.0005)	0.00038 J	0.000157 (0.00025) J	0.000231 [0.00025] J	-

MW-11	JUNE 2011	AUGUST 2016	AUGUST 2017	AUGUST 2018	JUNE 2019	JUNE 2020	JUNE 2022
DRO	4.5	5.7	9.2 QL	5.2 QL	4.11 (0.294)	9.39 [0.300]	7.67 [0.288]
DCA	NS	ND (0.005)	0.0011	0.00086 J	0.000999 (0.00025)	0.000933 [0.00025]	-

MW-23	JUNE 2011	AUGUST 2016	AUGUST 2017	AUGUST 2018	JUNE 2019	JUNE 2020	JUNE 2022
DRO	0.2	0.16 B	0.39 QL-B	0.3 QL	0.302 (0.288) J	0.841 [0.300] B	0.699 [0.288] B
DCA	NS	ND (0.005)	ND (0.0005)	ND (0.0005)	ND (0.00025)	ND [0.00025]	-

MW-24	JUNE 2011	AUGUST 2016	AUGUST 2017	AUGUST 2018	JUNE 2019	JUNE 2020	JUNE 2022
DRO	2.5	0.68	1.1 QL	0.39 QL	0.641 (0.294)	1.32 [0.300] B	1.20 [0.288] B
DCA	NS	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.00025)	ND [0.00025]	-

AP-397	JUNE 2011	AUGUST 2016	AUGUST 2017	AUGUST 2018	JUNE 2019	JUNE 2020	JUNE 2022
DRO	NS	0.024 J-B	0.057 J-QL-B	ND (0.13) QL	0.186 (0.288) J	0.350 [0.313]	0.496 [0.294] J, B
DCA	0.01	0.0025	0.0036	0.0046	ND (0.00025)	ND [0.00025]	–

MW-30	JUNE 2011	AUGUST 2016	AUGUST 2017	AUGUST 2018	JUNE 2019	JUNE 2020	JUNE 2022
DRO	NS	0.039 J-B	0.096 J-QL-B	ND (0.12) QL	ND (0.288)	0.391[0.288]	0.453 [0.283] J, B
DCA	ND (1)	ND (0.005)	ND (0.0005)	ND (0.0005)	ND (0.00025)	ND[0.00025]	-

O:\ESP\Private\FUDS_Properties\Wildwood F10AK0251\FY20\Work Plan\WP_GIS\01_MXD\June_2020_Updates\03_FormerTankFarm.mxd

Coordinate System: NAD 1983 2011 StatePlane Alaska 4 FIPS 5004 Feet

Monitoring Well
Monitoring Well Decommissioned
Groundwater Contours (ft)
Environmental Contamination
Road
FUDS Property

Notes:
1. Well, road and contamination layers represent approximate locations of features.
2. Concentrations exceeding decision document cleanup levels are shown in **RED**.
3. Ground water 1 ft contours generated for tank farm monitoring wells, AP-397 and MW-30 were not included in analysis

Acronym:
DRO =Diesel Range Organics
DCA: 1, 2-Dichloroethane
ND: Not Detected
MW: Monitoring Well

0 125 250 500
Feet

1 inch = 400 feet
1:4,800

Imagery: DigitalGlobe Multispec Satellite Imagery (2019-05-04)

FORMER TANK FARM, PROJECT 05 HTRW

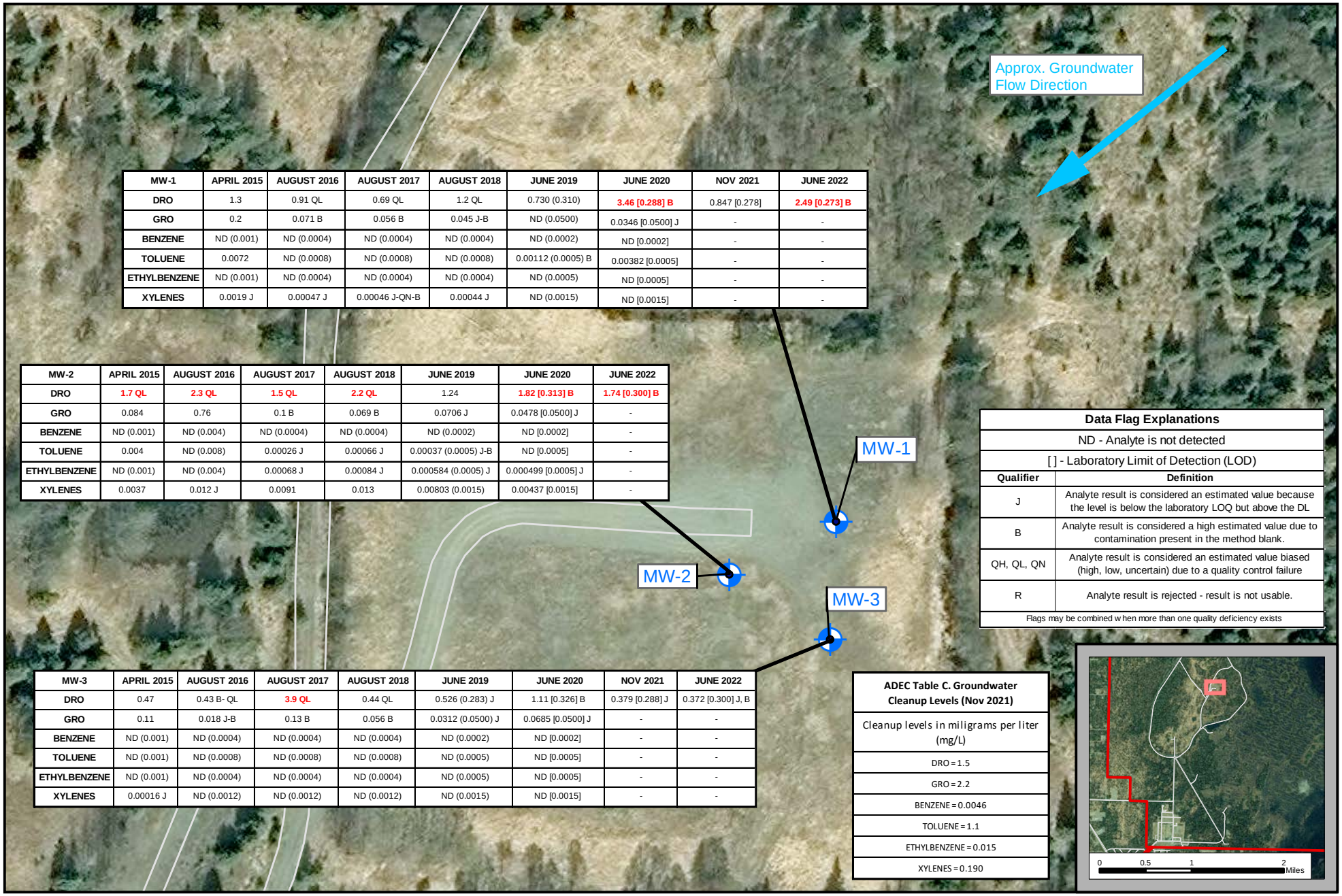
WILDWOOD AFS, KENAI, ALASKA

U.S. ARMY CORPS OF ENGINEERS ALASKA DISTRICT

F10AK0251-05

DATE: 4/21/2023 PM: J.G.

FIGURE: 3



MW-1	APRIL 2015	AUGUST 2016	AUGUST 2017	AUGUST 2018	JUNE 2019	JUNE 2020	NOV 2021	JUNE 2022
DRO	1.3	0.91 QL	0.69 QL	1.2 QL	0.730 (0.310)	3.46 [0.288] B	0.847 [0.278]	2.49 [0.273] B
GRO	0.2	0.071 B	0.056 B	0.045 J-B	ND (0.0500)	0.0346 [0.0500] J	-	-
BENZENE	ND (0.001)	ND (0.0004)	ND (0.0004)	ND (0.0004)	ND (0.0002)	ND [0.0002]	-	-
TOLUENE	0.0072	ND (0.0008)	ND (0.0008)	ND (0.0008)	0.00112 (0.0005) B	0.00382 [0.0005]	-	-
ETHYLBENZENE	ND (0.001)	ND (0.0004)	ND (0.0004)	ND (0.0004)	ND (0.0005)	ND [0.0005]	-	-
XYLENES	0.0019 J	0.00047 J	0.00046 J-QN-B	0.00044 J	ND (0.0015)	ND [0.0015]	-	-

MW-2	APRIL 2015	AUGUST 2016	AUGUST 2017	AUGUST 2018	JUNE 2019	JUNE 2020	JUNE 2022
DRO	1.7 QL	2.3 QL	1.5 QL	2.2 QL	1.24	1.82 [0.313] B	1.74 [0.300] B
GRO	0.084	0.76	0.1 B	0.069 B	0.0706 J	0.0478 [0.0500] J	-
BENZENE	ND (0.001)	ND (0.004)	ND (0.0004)	ND (0.0004)	ND (0.0002)	ND [0.0002]	-
TOLUENE	0.004	ND (0.008)	0.00026 J	0.00066 J	0.00037 (0.0005) J-B	ND [0.0005]	-
ETHYLBENZENE	ND (0.001)	ND (0.004)	0.00068 J	0.00084 J	0.000584 (0.0005) J	0.000499 [0.0005] J	-
XYLENES	0.0037	0.012 J	0.0091	0.013	0.00803 (0.0015)	0.00437 [0.0015]	-

MW-3	APRIL 2015	AUGUST 2016	AUGUST 2017	AUGUST 2018	JUNE 2019	JUNE 2020	NOV 2021	JUNE 2022
DRO	0.47	0.43 B- QL	3.9 QL	0.44 QL	0.526 (0.283) J	1.11 [0.326] B	0.379 [0.288] J	0.372 [0.300] J, B
GRO	0.11	0.018 J-B	0.13 B	0.056 B	0.0312 (0.0500) J	0.0685 [0.0500] J	-	-
BENZENE	ND (0.001)	ND (0.0004)	ND (0.0004)	ND (0.0004)	ND (0.0002)	ND [0.0002]	-	-
TOLUENE	ND (0.001)	ND (0.0008)	ND (0.0008)	ND (0.0008)	ND (0.0005)	ND [0.0005]	-	-
ETHYLBENZENE	ND (0.001)	ND (0.0004)	ND (0.0004)	ND (0.0004)	ND (0.0005)	ND [0.0005]	-	-
XYLENES	0.00016 J	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0015)	ND [0.0015]	-	-

Data Flag Explanations	
ND - Analyte is not detected	
[ ] - Laboratory Limit of Detection (LOD)	
Qualifier	**Definition**
J	Analyte result is considered an estimated value because the level is below the laboratory LOQ but above the DL
B	Analyte result is considered a high estimated value due to contamination present in the method blank.
QH, QL, QN	Analyte result is considered an estimated value biased (high, low, uncertain) due to a quality control failure
R	Analyte result is rejected - result is not usable.
Flags may be combined when more than one quality deficiency exists	

ADEC Table C. Groundwater Cleanup Levels (Nov 2021)
Cleanup levels in miligrams per liter (mg/L)
DRO = 1.5
GRO = 2.2
BENZENE = 0.0046
TOLUENE = 1.1
ETHYLBENZENE = 0.015
XYLENES = 0.190

Coordinate System: NAD 1983 2011 StatePlane Alaska 4 FIPS 5004 Feet

Road
Monitoring Well

Notes:
1. Well and road layers represent approximate locations of features
2. Concentrations exceeding ADEC Table C cleanup levels are shown in **RED**.

Acronym:
DRO: Diesel Range Organics
GRO: Gasoline Range Organics
MW: Monitoring Well
ND: Not Detected

N

0 50 100 200
Feet

1 inch = 100 feet
1:1,200

Imagery: DigitalGlobe Multispec Satellite Imagery (2019-05-04)

OPS BUILDING FORMER ASTs/USTs - PROJECT 06 CON/HTRW
WILDWOOD AFS, KENAI, ALASKA

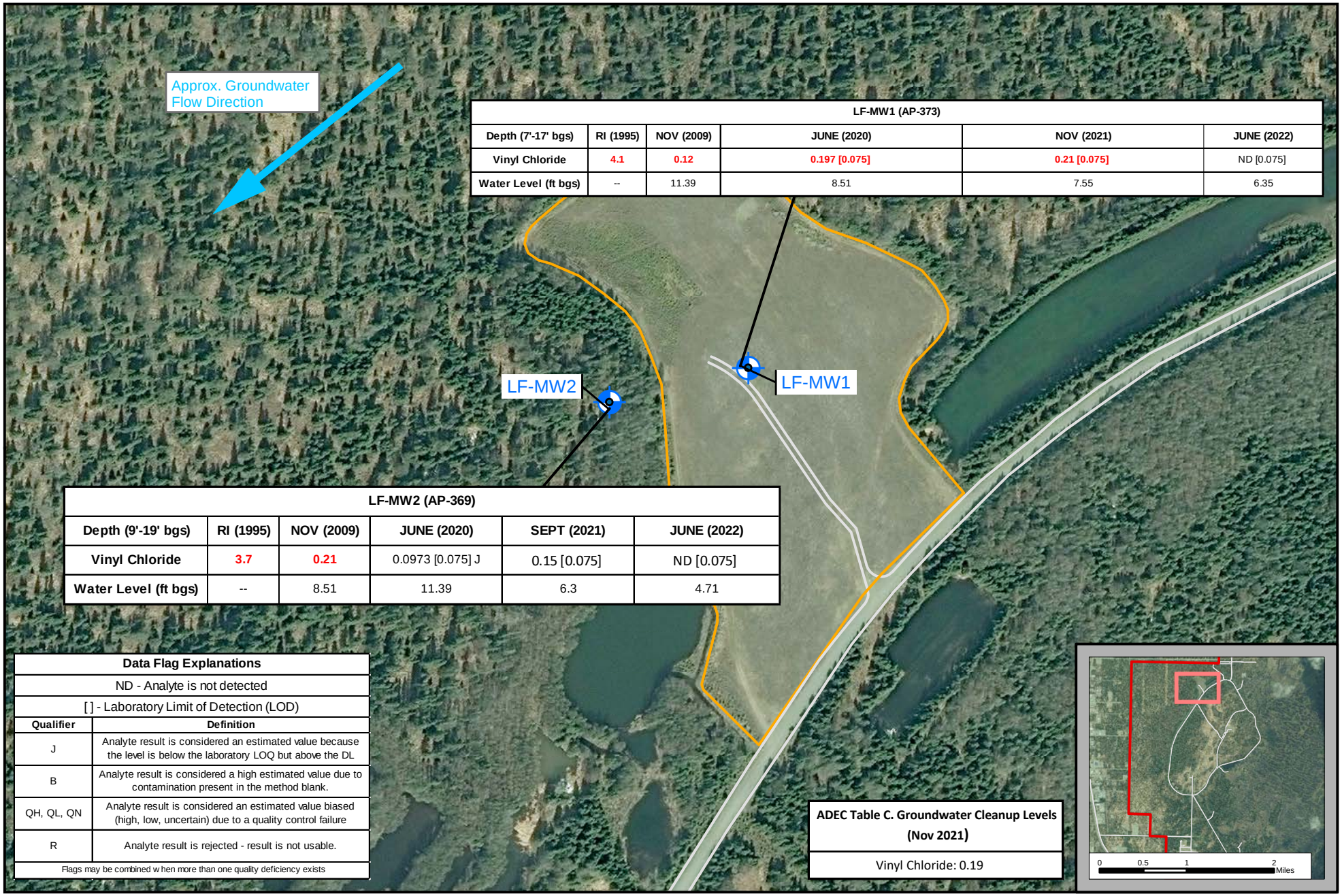
U.S. ARMY CORPS OF ENGINEERS ALASKA DISTRICT

F10AK0251-06

DATE: 2/9/2023 PM: J.G.

FIGURE: **4**

O:\ESP\Private\FUDS_Properties\Wildwood F10AK0251\FY20\Work Plan\WP_GIS\01_MXD\June_2020_Updates\04_FormerOpsBuilding.mxd



LF-MW1 (AP-373)					
Depth (7'-17' bgs)	RI (1995)	NOV (2009)	JUNE (2020)	NOV (2021)	JUNE (2022)
Vinyl Chloride	4.1	0.12	0.197 [0.075]	0.21 [0.075]	ND [0.075]
Water Level (ft bgs)	--	11.39	8.51	7.55	6.35

LF-MW2 (AP-369)					
Depth (9'-19' bgs)	RI (1995)	NOV (2009)	JUNE (2020)	SEPT (2021)	JUNE (2022)
Vinyl Chloride	3.7	0.21	0.0973 [0.075] J	0.15 [0.075]	ND [0.075]
Water Level (ft bgs)	--	8.51	11.39	6.3	4.71

Data Flag Explanations	
ND - Analyte is not detected	
[ ] - Laboratory Limit of Detection (LOD)	
Qualifier	**Definition**
J	Analyte result is considered an estimated value because the level is below the laboratory LOQ but above the DL
B	Analyte result is considered a high estimated value due to contamination present in the method blank.
QH, QL, QN	Analyte result is considered an estimated value biased (high, low, uncertain) due to a quality control failure
R	Analyte result is rejected - result is not usable.
Flags may be combined when more than one quality deficiency exists	

ADEC Table C. Groundwater Cleanup Levels (Nov 2021)
Vinyl Chloride: 0.19

O:\ESP\Private\FUDS_Properties\Wildwood F10AK0251\FY20\Work Plan\WP_GIS\01_MXD\June_2020_Updates\05_12acre_Landfill.mxd

Coordinate System: NAD 1983 2011 StatePlane Alaska 4 FIPS 5004 Feet

Road
12-acre Landfill (Treeline)
Monitoring Well

Notes:
1. Project sites layer represents approximate locations of features
2. Concentrations exceeding ADEC Nov 2021 cleanup levels are shown in **RED**.

0 100 200 400
Feet

1 inch = 250 feet
1:3,000

Imagery: DigitalGlobe Multispec Satellite Imagery (2019-05-04)

12-ACRE LANDFILL PROJECT 07 HTRW

WILDWOOD AFS, KENAI, ALASKA

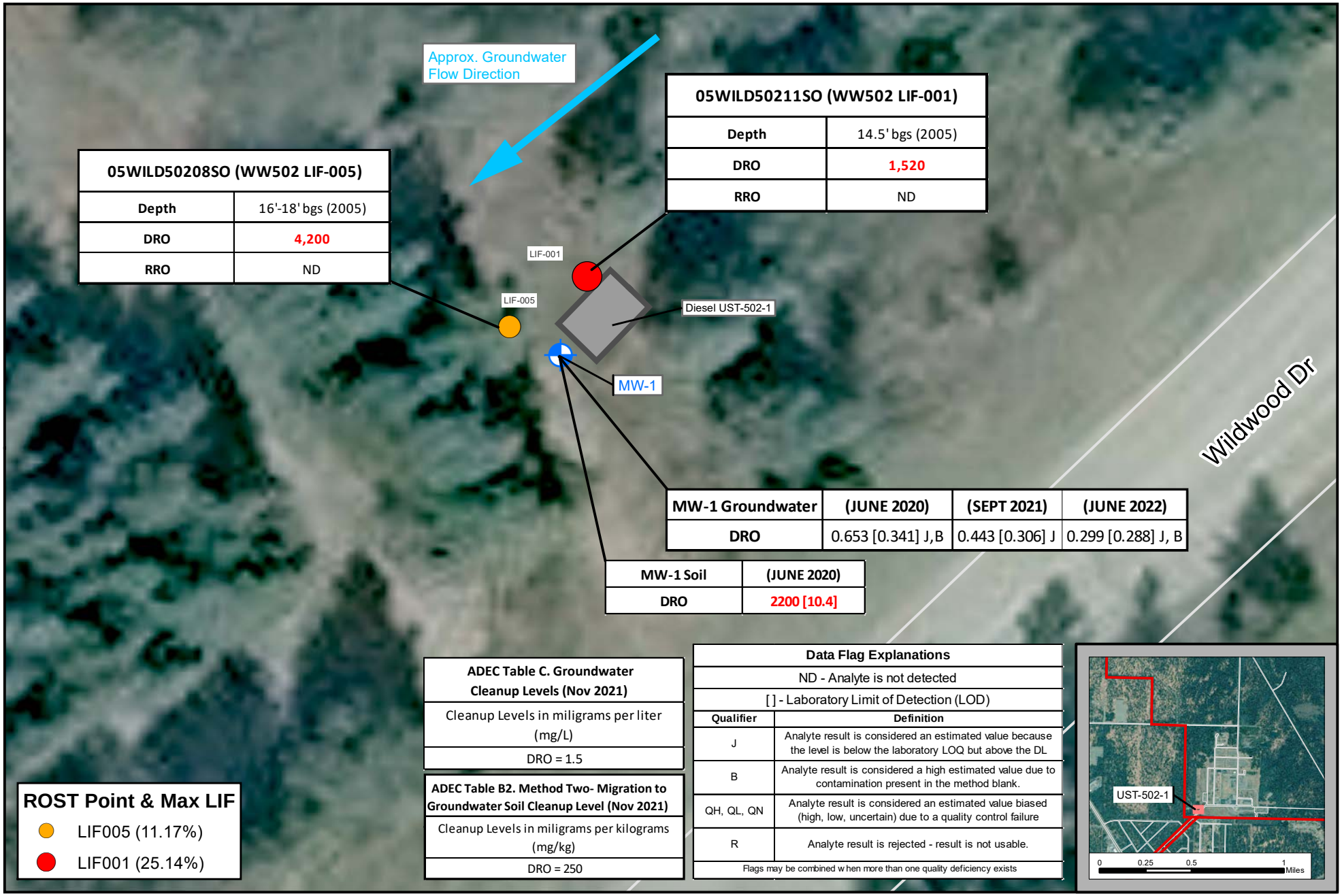
U.S. ARMY CORPS OF ENGINEERS ALASKA DISTRICT

F10AK0251-07

DATE: 4/1/2022

PM: J.G.

FIGURE: **5**



05WILD50208SO (WW502 LIF-005)	
Depth	16'-18' bgs (2005)
DRO	4,200
RRO	ND

05WILD50211SO (WW502 LIF-001)	
Depth	14.5' bgs (2005)
DRO	1,520
RRO	ND

MW-1 Groundwater	(JUNE 2020)	(SEPT 2021)	(JUNE 2022)
DRO	0.653 [0.341] J,B	0.443 [0.306] J	0.299 [0.288] J, B

MW-1 Soil	(JUNE 2020)
DRO	2200 [10.4]

ROST Point & Max LIF

- LIF005 (11.17%)
- LIF001 (25.14%)

ADEC Table C. Groundwater Cleanup Levels (Nov 2021)
Cleanup Levels in miligrams per liter (mg/L)
DRO = 1.5

ADEC Table B2. Method Two- Migration to Groundwater Soil Cleanup Level (Nov 2021)
Cleanup Levels in miligrams per kilograms (mg/kg)
DRO = 250

Data Flag Explanations	
ND - Analyte is not detected	
[ ] - Laboratory Limit of Detection (LOD)	
Qualifier	**Definition**
J	Analyte result is considered an estimated value because the level is below the laboratory LOQ but above the DL
B	Analyte result is considered a high estimated value due to contamination present in the method blank.
QH, QL, QN	Analyte result is considered an estimated value biased (high, low, uncertain) due to a quality control failure
R	Analyte result is rejected - result is not usable.
Flags may be combined when more than one quality deficiency exists	

Coordinate System: NAD 1983 2011 StatePlane Alaska 4 FIPS 5004 Feet

Document Path: O:\ENP\Public\Engineer\Projects\FUDS_NEW_PROPERTIES\WILDWOOD_AFS_F10AK025111_MXD\2022_GW_Sampling_Report\03_UST502_1.mxd

- Monitoring Well
- Road
- UST 502-1 (Diesel)

Notes:
1. Well, boring and road layers represents approximate locations of features.
2. ROST probe location are approximate, multipath interference was encountered near trees and buildings. Locations based on differential GPS.
3. Concentrations exceeding ADEC (Nov 2021) cleanup levels are shown in **RED**.

Acronyms:
DRO: Diesel Range Organics
RRO: Residual Range Organics
BGS: Bellow Ground Surface
ROST: Rapid Optical Screening Tool
LIF: Laser-Induced Fluorescence
UST: Underground Storage Tank
ND: Not Detected

0 10 20 40
Feet

1 inch = 20.83 feet
1:250

Imagery: DigitalGlobe Multispec Satellite Imagery (2019-05-04)

UST 502-1 PROJECT 08 CON/HTRW

WILDWOOD AFS, KENAI, ALASKA

U.S. ARMY CORPS OF ENGINEERS ALASKA DISTRICT

F10AK0251-08

DATE: 2/9/2023 PM: J.G.

FIGURE: 6

Attachment A

Field Logbook

Outdoor writing products®
for Outdoor writing people

RECYCLABLE

All components of this product are recyclable

Rite in the Rain

A patented, environmentally responsible, all-weather writing paper that sheds water and enables you to write anywhere, in any weather.

Using a pencil or all-weather pen, *Rite in the Rain* ensures that your notes survive the rigors of the field, regardless of the conditions.

J. L. DARLING CORPORATION
Tacoma, WA 98424-1017 USA
www.RiteintheRain.com

Item No. 351
ISBN: 978-1-932149-27-2

Made in the USA
US Pat. No. 6,863,940

6 32281 35112 2

Rite in the Rain®
ALL-WEATHER
FIELD
№ 351

Wildwood 2022
GW Sampling

1 of 2

INCH

Rite in the Rain®
ALL-WEATHER WRITING PAPER

Name CEPOA-EC-EE
(Jacob Sweet)

Address 2204 3rd Street
JBER Ak 99506

Phone 907 753 2694

Project 2022 Wildwood GW
Sampling.

22-052

Clear Vinyl Protective Slipcovers (Item No. 30) are available for this style of notebook.
Helps protect your notebook from wear & tear. Contact your dealer or the J. L. Darling Corporation

6/27/22

0930 - Depart to Kenai
1620 - arrive @ landfill site
onsite: Jake Sweet, Jenny Salamanca
Kaitlin East.

64°F. Sunny. Breeze

1625: setup on Landfill MW-1
DTW: 6.35' DTB: 11.82'

Time	temp	Cond	pH	DO	ORP	Turb
1655	9.72	0.397	6.28	0.55	23.2	131.6
1700	9.51	0.384	5.80	0.43	97.4	179.3
1705	9.43	0.378	5.83	0.32	42.3	142.7

1710 - Sonde disconnecting. will allow to pump w/o readings until we can use other set up.

1730	9.07	0.366	5.86	0.17	19.3	372.2
1735	9.04	0.366	5.82	0.19		
1740	9.19	0.390	5.71	0.70	150.7	2.1
1743	9.15	0.381	5.83	0.41	137.1	2.0
1744	9.07	0.376	5.90	0.31	123.0	2.3

6/27/22 64°F sunny. breeze

Continue on Landfill MW-1

Time	temp	Cond	pH	DO	ORP	Turb
1749	9.04	0.372	5.92	0.26	111.8	2.0
1752	9.05	0.370	5.93	0.27	105.0	2.2
1755	9.01	0.369	5.95	0.23	95.0	1.6

Parameters stable @ 1756. start sampling.

1813 sample # MW LF01 collected
9 x 40 mL Vinyl Chloride
* MS/MSD

1820 sample # MW LF03
* False time
3 x 40 mL vinyl chloride
Dupe of LF01

6/28/22 61°F sun, calm.

0815 set up on OF MW-2

DTW: 5.14'
DTB: 12.65'

Flow rate 150 mL/min
Water slightly turbid
No odor

* No water meter available, will hook up after other well finishes.

0845 - hook up Flow thru cell.

Time	Temp	cond	pH	DO	ORP	Turb
0855	7.00	0.110	5.78	0.97	131.5	3.7
0858	7.03	0.111	5.80	0.74	134.7	3.4
0901	6.93	0.112	5.82	0.69	131.7	3.1
0904	6.91	0.112	5.84	0.58	129.2	3.3
0907	7.00	0.113	5.84	0.64	128.6	3.1

0915 sample # OF-MW-02 collected from OF MW2

2 x 250 mL DRO

0920 false time sample # OF-MW-04 Dupe of OF-02

2 x 250 mL DRO

removed excess sand from casing

6/28/22 61°F clear, calm. Sun

1222 - Setup @ Tank Farm MW-11
- tubing is short - replace
DTW: 22.71 150 mL/min. no drawdown
DTB: 31.82 very dirty at first, cleaning quickly. Fuel odor.

Time	temp	cond	pH	DO	ORP	Turb
1248	8.21	0.529	5.47	0.91	90.0	12.6
1251	8.00	0.493	6.20	0.65	81.5	10.2
1254	7.96	0.473	6.29	0.52	72.5	8.2
1257	7.83	0.465	6.31	0.54	67.3	8.6
1300	7.81	0.459	6.32	0.43	62.3	7.6
1303	7.71	0.455	6.33	0.40	57.6	7.3
1306	7.74	0.452	6.34	0.37	55.0	6.3
1309	7.84	0.448	6.33	0.36	50.8	5.7
1312	7.91	0.446	6.33	0.34	49.1	5.5
1315	7.89	0.445	6.32	0.36	47.1	5.4

1320 collect sample 22WWTF-MW11

2 x 250 mL DRO

6/29/22 55°F clear, smoky, calm,

0700 - Contact Rover + security @ WW Pretrial. No answer. Left message.

0730 - Made contact w/ Rover @ WW checked in + good to go.

0739 setup @ TF MW-24

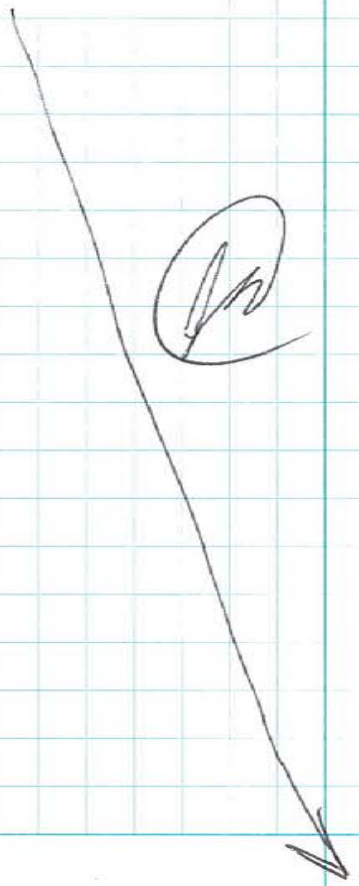
DTW: 25.82' Flow rate 150 mL/min
DTB: 40.10' Water clear, slight fuel odor, no drawdown.

Time	Temp	Cond	pH	DO	ORP	Turb
0815	6.96	0.340	5.71	1.06	225.1	4.9
0820	6.76	0.304	6.18	0.63	198.5	4.2
0823	6.74	0.296	6.30	0.51	184.0	3.4
0826	6.69	0.292	6.35	0.49	173.6	3.3
0829	6.68	0.289	6.39	0.48	160.6	3.7

0854 Sample TFMW24 collected from MW24
6 x 250 mL DRO
* MS/MSD

6/29/22 54°F, Sun, calm

0900 sample # TF-MW50
Field Time
2 x 250 mL ORO
* Dupe of TF-~~MW24~~ MW24



6/29/22 66°F clear calm.

0905. setup @ TF-MW06

DTW: 27.95' BTOC
DTB: 32.95' BTOC

Flow 150 mL/min
no drawdown.
clear. No odor.

Time	Temp	Cond	pH	DO	ORP	Turb
0938	8.26	0.454	6.69	0.68	46.0	17.2
0941	8.06	0.455	6.70	0.51	26.0	16.0
0944	8.00	0.455	6.71	0.47	12.6	14.9
0947	7.96	0.455	6.71	0.42	2.5	13.7
0950	8.00	0.454	6.71	0.35	-6.6	11.1
0953	8.00	0.454	6.70	0.36	-12.8	10.1
0956	8.06	0.455	6.69	0.32	-16.8	10.5
0959	8.00	0.454	6.68	0.29	-21.0	9.7

1010 Sample # TF-MW06 collected
2x 250 mL DRO

6/29/22 64°F clear, calm.

1014 - Setup on TF-MW03
No flow thru right now. Set up & let pump until available
start pump @ 1019. Flow rate 150 mL/min
DTW: 25.74' BTOC Sheen Find odor
DTB: 40.30' BTOC Water is clear.

Time	Temp	Cond	pH	DO	ORP	Turb
1045	8.29	0.329	6.27	0.44	11.3	8.6
1048	8.31	0.329	6.26	0.36	8.8	7.9
1051	8.23	0.329	6.25	0.36	6.7	7.5
1054	8.25	0.328	6.25	0.33	4.9	7.1

1102 Sample # TF-MW03 collected
2x 250 mL DRO

Rite in the Rain

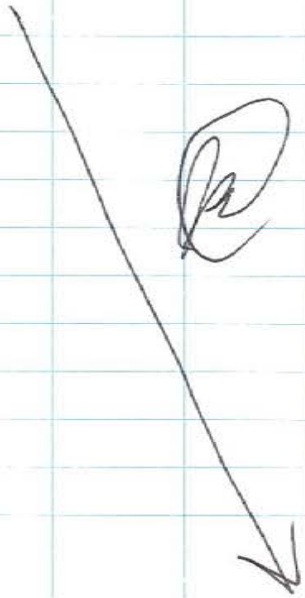
6/29/22 61°F Sunny Breeze.

1400 Setup to collect equipment blank for project Pumped distilled water through bladder pump into containers.

1410 Sample # WW-EB collected

2 x 250 mL AMBER
3 x 40 mL VL

* Equipment blank.



6/29/22

1600 - trip blank # 22WW-TB

3 x 40 mL VL

* trip blank

Dated 6/24/22

Outdoor writing products®
for Outdoor writing people

RECYCLABLE

All components of this product are recyclable

Rite in the Rain

A patented, environmentally responsible, all-weather writing paper that sheds water and enables you to write anywhere, in any weather.

Using a pencil or all-weather pen, *Rite in the Rain* ensures that your notes survive the rigors of the field, regardless of the conditions.

J. L. DARLING CORPORATION
Tacoma, WA 98424-1017 USA
www.RiteintheRain.com

Item No. 311
NSN: 7530-01-433-5654
ISBN: 978-1-932149-29-6

Made in the USA
US Pat No. 6,863,940

6 32281 31112 6

Rite in the Rain®
ALL-WEATHER
LEVEL
№ 311

Wildwood 2022
GW Sampling

2 of 2

6/27/22 64°F clear, sun, breeze

1715 setup on Landfill MW-2

DTW 4.71 flow rate 150 ml/min,
DTB 10.79 water is dirty orange

No odor / No drawdown

set up 1715 Landfill MW2

Time Temp Cond. pH DO ORP Turb

only have 1 working sonde. return to collect readings @ 1800 ~ 2.5 gallons removed. water is fairly turbid typical for this well.

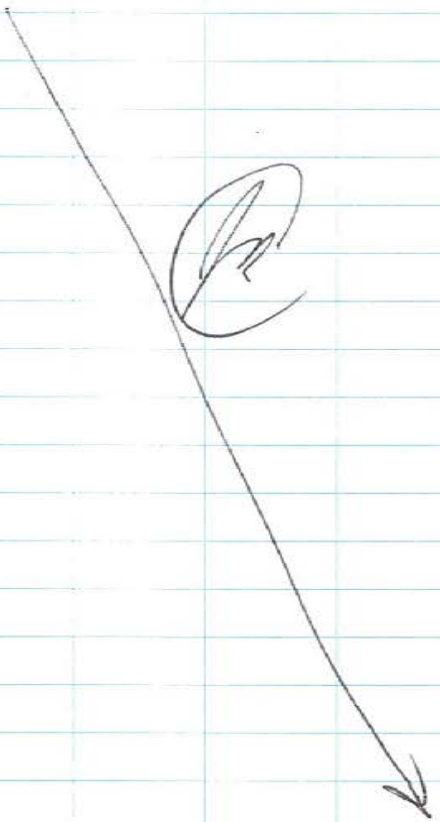
Time	temp	Cond	PH	DO	ORP	Turb
1802	4.59	0.146	5.92	4.02	125.6	11.2
1810	4.59	0.145	5.92	5.73	151.9	10.0
1813	4.42	0.144	5.89	3.28	135.8	8.2
1816	4.38	0.143	5.89	3.20	137.3	7.1
1819	4.31	0.143	5.89	3.17	150.2	7.3

6/27/22 64°F clear, sun, breeze

1820 parameters stable, start sampling.

1829 sample ~~MW~~ LF 02 collected @ LF MW-2

3x 40 ml vinyl chloride



6/28/22 61°F clear. calm

onsite: Jake Sweet, Kaitlin East, Jenny Salomanca

0757 - set up on OPS MW-3

DTW: 4.96 Flow rate 150 mL/min

DTB: 12.20 clear. no odor.

Time	Temp	pH	ORP	Cond	DO	Turb
0828	5.03	4.94	142.8	0.071	0.51	2.4
0831	5.13	4.98	132.3	0.068	0.50	2.1
0834	5.08	5.06	121.6	~~0.11~~ 0.062	0.41	1.2
0838	5.09	5.08	111.4	0.060	0.40	1.8
0841	5.16	5.16	103.5	0.059	0.43	1.8

0842 parameters stable.

0847 Sample # OF MW3 @ OF MW5

2 x ~~125~~ 250 mL DRO

6/28/22 62°F clear. sun. calm

0854 set up on OF MW1

DTW: 4.10' Flow rate 150 mL/min

DTB: 12.62' slight fuel odor. no drawdown

TIME	Temp	Cond	pH	DO	ORP	Turb
0920	9.36	0.058	5.79	0.73	38.6	7.1
0925	9.35	0.058	5.80	0.66	30.7	7.1
0930	8.98	0.055	5.82	0.45	19.1	6.5
0935	8.88	0.053	5.85	0.~~55~~	11.3	5.2
0940	8.85	0.052	5.86	0.44	6.3	4.2
0945	8.85	0.052	5.86	0.35	3.1	4.1
0950	8.83	0.052	5.86	0.30	1.9	3.9

0951 parameters stable

0955 Sample # OF MW1

2 X 250mL DRO

6/29/22 55 F clear, calm, smoky.

0752 - set up on TF-MW-23

DTW; 25.02' Flow rate 150 ml/min.

DTB; 37.71' water is rusty clearing quickly
No fuel odor

0758 - start pumping. No Flow through @ first
Went for other well to finish

TIME	Temp	Cond	pH	DO	ORP	Turb
0845	6.60	0.210	6.13	1.20	160.5	30.1
0848	6.49	0.209	6.15	0.72	160.0	28.1
0851	6.43	0.210	6.15	0.53	157.4	26.0
0854	6.48	0.211	6.15	0.44	153.5	24.8
0857	6.49	0.212	6.16	0.43	149.1	21.6
0900	6.48	0.214	6.16	0.39	143.2	21.6

Samples taken 0905 Sample # TF-MW23

2x 250 ml ORO

6/29/22 61 F clear, calm.

0924 - setup on TF-MW04

DTW; 27.35' BTOC Flow rate 150ml/min

DTB; 40.23' BTOC slight odor. clear.

tubing is short. Replace. start @ 0930

Time	Temp	Cond	pH	DO	ORP	Turb
1012	9.27	0.268	5.93	0.59	85.4	9.7
1015	9.24	0.269	5.93	0.55	85.9	9.2
1018	9.34	0.276	5.92	0.38	85.8	8.1
1021	9.41	0.271	5.92	0.38	85.3	7.5
1024	9.32	0.274	5.93	0.34	84.5	7.1

1039 Sample # TF-MW04 collected

2x 250 ml ORO

6/29/2022 63°F Clear, Cool

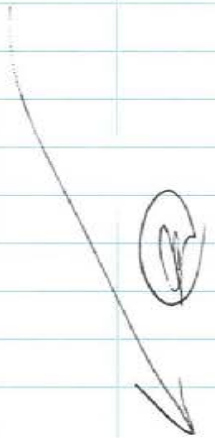
1050 TF MW16.

This well historically has had free product

DTP 21.30'
DTW 21.34'

there is free product in this MW16 monitoring well. the well will not be sampled this year

Free product: 0.04 feet of product



6/29/22 65 F clear, calm.

1117 set up on UST502-1 MW1

DTW 25.39' BTOC Flow 150 ml/min
DTB 31.10' BTOC clear no odor.

TIME	temp	cond	pH	DO	ORP	Turb
1135	7.42	0.106	5.75	2.46	232.2	51.0
1138	7.25	0.103	5.86	2.19	224.4	46.1
1141	7.09	0.102	5.92	2.09	220.6	38.6
1144	6.97	0.102	5.93	2.07	219.7	36.2
1147	6.88	0.101	5.95	2.14	218.2	30.0
1150	6.74	0.101	5.96	2.02	217.5	25.3
1153	6.71	0.102	5.95	2.04	217.7	22.3

1201 Sample ~~UST502-1MW1~~ (2) taken 22WW-UST-MW01

2 X 250 mL DRO

6/29/22 61°F clear breeze,

1345 setup on TF MW AP-397

DTW: 38.52 Flow rate 150mL/min
DTB: 44.55 Clear, no sheen, no oder

Time	Temp.	Cond.	pH	DO	ORP	Turb.
1403	6.53	0.205	4.74	4.38	334.3	5.2
1406	6.08	0.183	5.16	3.24	325.5	4.0
1409	6.00	0.174	5.43	2.52	314.9	3.4
1412	5.89	0.169	5.59	1.97	309.7	4.0
1415	5.89	0.169	5.69	1.68	297.4	3.1
1418	5.88	0.169	5.75	1.57	289.5	2.2
1421	5.83	0.170	5.80	1.38	282.9	2.5
1424	5.82	0.171	5.83	1.34	276.5	2.1

1430 sample # MW-AP397

2 x 250 mL DRO

6/29/22 64°F clear, sun, breeze

1447 setup @ TF MW-30

DTW: 41.75' BTOC 150 ml/4 min. clear
DTB: 48.80' BTOC, No odor

TIME	temp	cond	pH	DO	ORP	Turb
1503	7.75	0.335	5.62	1.18	265.4	66.2
1506	7.55	0.315	5.97	0.86	243.7	89.7
1509	7.39	0.311	6.12	0.73	227.1	104.9
1512	7.38	0.295	6.17	0.63	215.8	106.6
1515	7.49	0.286	6.21	0.71	205.0	100.1
1518	turbidity is high. Empty flow thru + start over. start filling @ 1518					
1523	7.61	0.266	6.29	1.17	185.7	55.8
1526	7.44	0.265	6.30	0.69	179.1	49.3
1529	7.33	0.265	6.31	0.70	167.6	39.7
1532	7.29	0.265	6.31	0.47	157.7	34.0
1535	7.27	0.265	6.32	0.44	145.0	27.4
1538	7.26	0.265	6.32	0.42	134.1	21.8

1541 sample TF MW30

2 x 250 mL DRO

Attachment B

Complete Chemical Data Tables with Sample Summary

			Sample ID	22WW-LF-MW01	22WW-LF-MW03	22WW-LF-MW02	22WW-OF-MW01	22WW-OF-MW02	22WW-OF-MW04
			Location ID	LF-MW1	LF-MW3	LF-MW2	OF-MW1	OF-MW2	OF-MW4
			Collection Date	06/27/2022 18:13	06/27/2022 18:13	06/27/2022 18:29	06/28/2022 09:55	06/28/2022 09:15	06/28/2022 09:20
			Lab Sample ID	1223589001	1223589005	1223589004	1223589006	1223589007	1223589009
			Matrix	Ground_Water	Ground_Water	Ground_Water	Ground_Water	Ground_Water	Ground_Water
Groundwater elevation				100.27		99.62	112.9	112.7	
Depth to groundwater (bgs)				6.35		4.71	4.1	5.14	
Method	**Units**	**Analyte**	**ADEC**	**MS/MSD**	**Dupe of LF-MW01**				**Dupe of OF-MW02**
8260D	mg/L	Vinyl Chloride	0.00019	ND [0.000075]	ND [0.000075]	ND [0.000075]			
AK102	mg/L	Diesel Range Organics (C10-C25)	1.5				**2.49 [0.273] B**	**1.74 [0.300] B**	**1.55 [0.300] B**

ADEC - 18 AAC 75 Method 2 Table B1/B2 Cleanup Levels for soil, Table C for groundwater

[ ] - Laboratory LOD

Solid shade indicates screening value exceedance

Data Flags are defined at the end of the table

				Sample ID	22WW-OF-MW03	22WW-TF-AP397	22WW-TF-MW03	22WW-TF-MW04	22WW-TF-MW06	22WW-TF-MW11
				Location ID	OF-MW3	TF-AP397	TF-MW03	TF-MW04	TF-MW06	TF-MW11
				Collection Date	06/28/2022 08:47	06/29/2022 14:30	06/29/2022 11:02	06/29/2022 10:39	06/29/2022 10:10	06/28/2022 13:20
				Lab Sample ID	1223589008	1223589019	1223589018	1223589017	1223589016	1223589010
				Matrix	Ground_Water	Ground_Water	Ground_Water	Ground_Water	Ground_Water	Ground_Water
Groundwater elevation					112.76	46.76	67.77	65.24	64.45	62.37
Depth to groundwater (bgs)					4.96	38.52	25.74	27.35	27.95	22.71
Method	**Units**	**Analyte**	**ADEC**							
8260D	mg/L	Vinyl Chloride	0.00019							
AK102	mg/L	Diesel Range Organics (C10-C25)	1.5	0.372 [0.300] J, B	0.496 [0.294] J, B	**2.79 [0.294]**	**6.61 [0.288]**	**3.26 [0.288]**	**7.67 [0.288]**

ADEC - 18 AAC 75 Method 2 Table B1/B2 Cleanup Levels for soil, Table C for groundwater

[ ] - Laboratory LOD

Solid shade indicates screening value exceedance

Data Flags are defined at the end of the table

				Sample ID	22WW-TF-MW23	22WW-TF-MW24	22WW-TF-MW50	22WW-TF-MW30	22WW-UST-MW01	22WW-EB
				Location ID	TF-MW23	TF-MW24	TF-MW50	TF-MW30	UST-MW01	EB
				Collection Date	06/29/2022 09:05	06/29/2022 08:54	06/29/2022 09:00	06/29/2022 15:41	06/29/2022 12:01	06/29/2022 14:10
				Lab Sample ID	1223589011	1223589012	1223589015	1223589020	1223589021	1223589022
				Matrix	Ground_Water	Ground_Water	Ground_Water	Ground_Water	Ground_Water	Ground_Water
Groundwater elevation					65.53	65.45		42.29	63.92	
Depth to groundwater (bgs)					25.02	25.82		41.75	25.34	
Method	**Units**	**Analyte**	**ADEC**		**MS/MSD**	**Dupe of TF-MW24**				**Equipment Blank**
8260D	mg/L	Vinyl Chloride	0.00019							ND [0.000075]
AK102	mg/L	Diesel Range Organics (C10-C25)	1.5	0.699 [0.288] B	1.20 [0.288] B	0.969 [0.283] B	0.453 [0.283] J, B	0.299 [0.288] J, B	0.256 [0.306] J	

ADEC - 18 AAC 75 Method 2 Table B1/B2 Cleanup Levels for soil, Table C for groundwater

[ ] - Laboratory LOD

Solid shade indicates screening value exceedance

Data Flags are defined at the end of the table

			Sample ID	22WW-TB
			Location ID	T_ BLANK
			Collection Date	06/29/2022 16:00
			Lab Sample ID	1223589023
			Matrix	Ground_Water
Groundwater elevation				
Depth to groundwater (bgs)				
Method	Units	Analyte	ADEC	Trip Blank
8260D	mg/L	Vinyl Chloride	0.00019	ND [0.000075]
AK102	mg/L	Diesel Range Organics (C10-C25)	1.5	

ADEC - 18 AAC 75 Method 2 Table B1/B2 Cleanup Levels for soil, Table C for groundwater

[ ] - Laboratory LOD

Solid shade indicates screening value exceedance

Data Flags are defined at the end of the table

Attachment C

CDQR and Laboratory Data Review Checklists

CDQR

1. Introduction

1.1. The U.S. Army Corps of Engineers Alaska District (USACE-AK), Engineering and Construction Division, Environmental Engineering Branch (CEPOA-ECE) prepared this data review at the request of the USACE Environmental and Special Programs (CEPOA-PM-ESP) branch. This report presents a review of the results from the 2022 groundwater investigation conducted by USACE-AK personnel at the Wildwood Former Air Force Station project site located in Wildwood, Alaska. (22-052). This CDQR covers one SDG (1223589) that contained a total of 14 primary samples from the following wells: AP-397, MW-03, MW-04, MW-06, MW-11, MW-23, MW-24, MW-30 (Former Tank Farm); MW-1, MW-2, and MW-3 (Operations Building Former ASTs/USTs), MW-1 and MW-2 (12-acre Landfill), and MW-1 (UST 502-1).

2. Project Description

2.1. See Section 1.2 of the 2022 Groundwater Sampling Report (ref 5.5) for a complete site description and history. The purpose of sampling was to determine contaminant concentrations in groundwater wells at the project locations. The results of the chemical analyses at the site were screened against the groundwater cleanup values established in the October 2013 Former Tank Farm Decision Document (ref 5.2) which are the same as current Alaska Department of Environmental Conservation (ADEC) cleanup criteria for both diesel range organics (DRO) and vinyl chloride (VC).

2.2. To that end, 14 primary groundwater samples, one trip blank, one equipment blank, and three duplicate samples were collected June 27 through June 29, 2022. Groundwater samples were collected by ADEC qualified environmental professionals, Jake Sweet and Jenny Salamanca from a total of fourteen wells. Bladder pumps were used to collect samples from all monitoring wells. One equipment blank was also collected by running distilled water through the bladder pump into sample containers. A trip blank, supplied by the project laboratory, was also submitted in the project cooler.

2.3. A total of 19 samples (including 3 duplicates, 1 equipment rinsate blank, and 1 trip blank) were delivered in this Sample Delivery Group (SDG) to SGS Laboratory in Anchorage, AK with property custody procedures. All samples were analyzed by SGS in Anchorage, AK. This SDG contained samples from the Wildwood Former Tank Farm, Operations Building Former ASTs/USTs, 12-acre Landfill, and UST-502-1 project sites. This lab is approved by ADEC through the Underground Storage Tank (UST) Program and is certified by the Department of Defense (DOD) Environmental Laboratory Accreditation Program (ELAP) for all analytical methods utilized under this project.

2.4. The analytical method utilized for the Wildwood Former Tank Farm, Operations Building Former ASTs/USTs and UST 502-1 project sites was AK102 for DRO. The analytical method used for the 12-acre landfill was 8260D for VC.

2.5. The project data was reviewed for deviations to the requirements presented in the Sampling and Analysis Plan, the DOD-QSM (Version 5.3), and the ADEC Technical Memorandum 22-001, Guidelines for Data Reporting (dated August 2022) in the following areas – precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). Elements reviewed include sample handling, holding times, method and trip blanks, laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recoveries and relative percent differences (RPDs), matrix spikes and matrix spike duplicates (MS/MSD) recoveries and RPDs, surrogate recovery, and field duplicate comparability. Calibration curves and continuing calibration standard recoveries were not specifically reviewed; however, laboratories are required to document such failures in the appropriate case narratives. These narratives were reviewed for each sample delivery group.

2.6. The laboratory electronic data format (EDF) for this project was used to generate this report. When discrepancies between the hardcopy data and the EDF are found, the EDF has been modified to reflect values from the hardcopy, unless the hardcopy is found to be in error. Results used to generate this report are deemed to be accurate.

2.7. The following qualifiers, listed below in order of increasing severity, are used in the data tables to indicate quality control deficiencies. With the exception of J and B which provide additional usability information, the most severe flag will be utilized when quality issues indicate the use of more than one qualifier.

Qualifier	Definition
J	Analyte result is considered an estimated value because the level is below the laboratory LOQ but above the DL.
B	Analyte result is considered a high estimated value due to contamination present in the method or trip blank.
H	Analyte result is considered a low estimated value due to being analyzed outside of holding time.
QH, QL, QN	Analyte result is considered an estimated value (biased high, low, indeterminate) due to a quality control failure.
R	Analyte result is rejected - result is not usable.

2.8. Details of the data review are presented by SDG below:

3. SDS Description

3.1. Collection and Preservation: A total of 19 samples (including 3 duplicates, 1 equipment rinsate blank, and 1 trip blank) associated with the Wildwood project sites were shipped to the laboratory in a single cooler. Cooler “Wildwood 2022” contained a project trip blank and was measured at 4.0 ° C upon receipt. All temperatures met criteria and all sample handling criteria were met. All containers were deemed acceptable.

3.2. Holding times: All reported sample analyses for the Wildwood project sites were completed within applicable holding times.

3.3. Method, equipment, and trip blanks were analyzed at the required frequency and/or target analytes were not detected in any blank or detections do not impact data quality except for the following:

- DRO was detected in sample 22WW-EB, the project equipment blank, at a concentration of 0.256 mg/L. All samples with results within 10X the blank contamination are affected and are flagged B. This includes the following samples: OF-MW01, OF-MW02, OF-MW04, OF-MW03, TF-AP397, TF-MW23, TF-MW24, TF-MW50, TF-MW30 and UST-MW01. Most of the flagged results are usable as they are biased high and are below the screening criteria. However, the result for OF-MW02 (and it's duplicate OF-MW04) are biased high and are slightly above the screening criteria. It is possible that the true results for these wells are slightly below screening criteria. These data points should be used with caution.

3.4. LCS/LCSDs were analyzed at the required frequency and recoveries were within the QSM acceptance limits for all analytes in project samples.

3.5. LCS precision: The LCS precision as measured by RPD was within QSM or method acceptance limits or any deviations do not impact data quality.

3.6. Surrogate recoveries for all samples were within method and/or QSM acceptance limits or deviations do not impact data usability for all primary samples.

3.7. MS/MSDs were analyzed at the required frequency and recoveries were within the QSM acceptance limits or did not affect data quality. The following was noted:

- There was one MS/MSD supplied with the cooler shipment of samples. However, the project equipment blank and trip blank VOC analysis was performed on a separate extraction batch without a project specific MS/MSD, which is not in alignment with the work plan. There were no impacts to data, as the only samples missing MS/MSD data are blank samples. No VOCs were detected in any sample.

3.8. The MS/MSD precision did not exceed QSM acceptance limits or did not affect data quality.

3.9. There were three duplicate pairs of site samples reported in this SDG, meeting the 10% frequency requirement. Groundwater sample 22WW-LF-MW03 was a duplicate of sample 22WW-LF-MW01. Groundwater sample 22WW-OF-MW04 was a duplicate of sample 22WW-OF-MW02. Groundwater sample 22WW-TF-MW50 was a duplicate of sample 22WW-TF-MW24. For comparison purposes, the limit of detection (LOD) is used for a nondetect result. All results are compliant with the criteria specified in the

ADEC Tech Memo.

3.10. Reporting/detection limits are defined by the QSM as follows: the Limit of Quantification (LOQ) is the lowest concentration that produces a quantitative result within specified limits of precision and bias. For DOD projects, the LOQ shall be set at or above the concentration of the lowest initial calibration standard corrected for sample preparation, dilution and moisture (if applicable). Laboratories can often detect analytes at levels less than the LOQ, albeit less quantitatively; therefore, the Limit of Detection (LOD) is defined as the smallest amount or concentration of a substance that must be present in a sample in order to be detected at a high level of confidence (99%). At the LOD, the false positive rate is 1%. Consequently, any nondetect result with an LOD greater than the associated cleanup limit cannot be used to prove the absence of that analyte at that limit. The laboratory reporting limits meet or exceed ADEC regulatory requirements for all analytes.

4. Overall Assessment

All results for this project are usable as reported and flagged. The overall completeness goal of 95% was met, with 100% of the data being usable to make project decisions.

5. References

5.1. ADEC, Technical Memorandum 22-001, Guidelines for Data Reporting, August 2022.

5.2. USACE, Decision Document, HTRW Project #F10AK0251-05, Former Tank Farm and USTs 5-1 & 5-2, FUDS, Wildwood Air Force Station, Kenai, Alaska, October, 2013. F10AK02105_05.09_0500_a.

5.3. Department of Defense, Quality Systems Manual for Environmental Laboratories, Final Version 5.3, May 2019.

5.4. SGS Anchorage, Laboratory Analytical Report; 1223589, 22-052 Wildwood Summer 2022, July 2022.

5.5. USACE, 2022. Groundwater Sampling Report, Wildwood AFS, Formerly Used Defense Site (FUDS), Property F10AK0251. F10AK025107_XX.XX_XXXX_a.

Laboratory Data Review Checklist

Completed By:

Jacob Sweet

Title:

USACE Chemist

Date:

8/5/2022

Consultant Firm:

USACE

Laboratory Name:

SGS, Anchorage

Laboratory Report Number:

1223589

Laboratory Report Date:

7/25/2022

CS Site Name:

22-052 Wildwood Summer 2022

ADEC File Number:

2320.38.051

Hazard Identification Number:

25213, 278 and 25199

1223589

Laboratory Report Date:

7/25/2022

CS Site Name:

22-052 Wildwood Summer 2022

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:

   All analysis was performed by SGS in Anchorage, Alaska, which holds both ADEC and ELAP certification for all methods.

   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 network labs used.

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:

   One cooler was received. Cooler "Wildwood 2022" had a receipt temperature of 4.0 °C, meeting thermal preservation requirements.

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

   Yes☒ No☐ N/A☐ Comments:

   All thermal and pH requirements were met. All samples were properly preserved.

1223589

Laboratory Report Date:

7/25/2022

CS Site Name:

22-052 Wildwood Summer 2022

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

Yes☒ No☐ N/A☐ Comments:

There were no sample condition issues noted.

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:

No discrepancies were noted.

e. Data quality or usability affected?

Comments:

There were no impacts to data quality or usability.

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:

No failures were noted by the lab.

c. Were all corrective actions documented?

Yes☐ No☐ N/A☒ Comments:

No corrective actions were noted.

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

Comments:

There is no effect on data usability.

1223589

Laboratory Report Date:

7/25/2022

CS Site Name:

22-052 Wildwood Summer 2022

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:

c. All soils reported on a dry weight basis?

Yes☐ No☐ N/A☒ Comments:

There were no soils in this delivery group.

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

Yes☒ No☐ N/A☐ Comments:

e. Data quality or usability affected?

Data usability was not affected.

6. QC Samples

a. Method Blank

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

Yes☒ No☐ N/A☐ Comments:

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

Yes☒ No☐ N/A☐ Comments:

1223589

Laboratory Report Date:

7/25/2022

CS Site Name:

22-052 Wildwood Summer 2022

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:

There were no method blank detections.

v. Data quality or usability affected?

Comments:

Data usability is not affected.

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:

There were no inorganic analyses run.

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:

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:

1223589

Laboratory Report Date:

7/25/2022

CS Site Name:

22-052 Wildwood Summer 2022

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

Comments:

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

Yes☐ No☐ N/A☒ Comments:

There were no LCS failures.

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

Comments:

Data usability is not affected as there were no LCS failures.

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:

There was one MS/MSD supplied with the cooler shipment of samples. However, the project equipment blank and trip blank VOC analysis was performed on a separate extraction batch without a project specific MS/MSD, which is not in alignment with the work plan. There were no impacts to data, as the only samples missing MS/MSD data are blank samples. No VOCs were detected in any sample.

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

Yes☐ No☐ N/A☒ Comments:

There were no inorganic analyses in this SDG.

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

Yes☒ No☐ N/A☐ Comments:

1223589

Laboratory Report Date:

7/25/2022

CS Site Name:

22-052 Wildwood Summer 2022

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:

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

Comments:

None.

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

Yes☐ No☐ N/A☒ Comments:

None required.

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

Comments:

Data usability is not affected.

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:

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:

There were no surrogate failures in project samples.

1223589

Laboratory Report Date:

7/25/2022

CS Site Name:

22-052 Wildwood Summer 2022

iv. Data quality or usability affected?

Comments:

Data usability is not affected due to surrogate failures.

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:

Sample 22WW-TB was the project trip blank. It was shipped in the single project cooler.

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

Yes☒ No☐ N/A☐ Comments:

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

Comments:

v. Data quality or usability affected?

Comments:

None.

f. Field Duplicate

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

Yes☒ No☐ N/A☐ Comments:

Groundwater sample 22WW-LF-MW03 was a duplicate of sample 22WW-LF-MW01. Groundwater sample 22WW-OF-MW04 was a duplicate of sample 22WW-OF-MW02. Groundwater sample 22WW-TF-MW50 was a duplicate of sample 22WW-TF-MW24.

1223589

Laboratory Report Date:

7/25/2022

CS Site Name:

22-052 Wildwood Summer 2022

ii. Submitted blind to lab?

Yes☒ No☐ N/A☐ Comments:

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:

None.

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

Yes☒ No☐ N/A☐ Comments:

Sample 22WW-EB was the project equipment blank.

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

Yes☐ No☒ N/A☐ Comments:

DRO was detected in the equipment blank at a concentration of 0.256 mg/L.

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

Comments:

All samples with results within 10X the blank contamination are affected and are flagged B. This includes the following samples: OF-MW01, OF-MW02, OF-MW04, OF-MW03, TF-AP397, TF-MW23, TF-MW24, TF-MW50, TF-MW30 and UST-MW01.

1223589

Laboratory Report Date:

7/25/2022

CS Site Name:

22-052 Wildwood Summer 2022

iii. Data quality or usability affected?

Comments:

Most of the flagged results are usable as they are biased high and are below the screening criteria. However, the result for OF-MW02 (and it's duplicate OF-MW04) are biased high and are slightly above the screening criteria. It is possible that the true results for these wells are slightly below screening criteria. These data points should be used with caution.

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

a. Defined and appropriate?

Yes☒ No☐ N/A☐ Comments:

See data tables for flag definitions.

Attachment D

Site Photographs

Photo #1: [Tank Farm, Well AP-397 setup, Looking East, Photographer, Jacob Sweet]

Photo #2: [Tank Farm, MW-24 setup in process, Looking South, Photographer, Jacob Sweet]

Photo #3: [Operational Facility, MW-1 sample collection, Looking West, Photographer, Jacob Sweet]

Photo #4: [UST 502-1, MW-1 sample collection, Looking North-West, Photographer, Jacob Sweet]

Photo #5: [12-acre Landfill, MW-2 setup, Looking East, Photographer, Jacob Sweet]

Photo #6: [Tank Farm, MW-30 Removal, Looking West, Photographer, Jacob Sweet]

Photo #7: [Tank Farm, MW-30 removal, Looking East, Photographer, Jacob Sweet]

Photo #8: [All Wildwood AFS Sites Survey, OF, Looking West, Photographer, Jacob Sweet]

Photo #9: [All Wildwood AFS Sites Survey, TF, Looking South, Photographer, Jacob Sweet]

Photo #10: [All Wildwood AFS Sites Survey, TF, Looking East, Photographer, Jacob Sweet]

Attachment E

Survey Data

WILDWOOD AFS, KENAI ALASKA
FUDS F10AK0251

TANK FARM	NAD83 (2011) COORDINATES (US FT.)		NAVD88 ELEVATION (US FT.)			
NAME	NORTHING	EASTING	PVC	CASE	DTW	GW Elev
MW-3	2,407,056.77	1,406,076.75	92.45	93.51	25.74	67.77
MW-4	2,406,911.89	1,405,909.64	92.37	92.59	27.35	65.24
MW-6	2,406,872.41	1,405,835.14	92.51	92.40	27.95	64.45
MW-11	2,406,658.12	1,405,594.49	84.84	85.08	22.71	62.37
MW-16	2,407,179.66	1,406,273.12	89.73	89.88	21.30	68.58
MW-23	2,406,847.53	1,406,023.30	90.87	90.55	25.02	65.53
MW-24	2,406,850.75	1,405,929.16	90.80	91.27	25.82	65.45
MW-30	2,405,665.49	1,403,910.43	83.74	84.04	41.75	42.29
AP-397	2,405,897.33	1,404,190.04	84.27	85.28	38.52	46.76

OPS FACILITY	NAD83 (2011) COORDINATES (US FT.)		NAVD88 ELEVATION (US FT.)			
NAME	NORTHING	EASTING	TOP OF PVC	CASE	DTW	GW Elev
MW-1	2,415,937.90	1,409,229.20	116.67	117.00	4.10	112.90
MW-2	2,415,897.53	1,409,147.45	117.61	117.84	5.14	112.70
MW-3	2,415,847.70	1,409,224.61	117.48	117.72	4.96	112.76

UST 502-1	NAD83 (2011) COORDINATES (US FT.)		NAVD88 ELEVATION (US FT.)			
NAME	NORTHING	EASTING	PVC	CASE	DTW	GW Elev
UST 502-1	2,407,062.31	1,405,563.34	88.91	89.26	25.34	63.92

12-ACRE LANDFILL	NAD83 (2011) COORDINATES (US FT.)		NAVD88 ELEVATION (US FT.)			
NAME	NORTHING	EASTING	TOP OF PVC	CASE	DTW	GW Elev
MW-1	2,418,622.90	1,407,252.48	106.21	106.62	6.35	100.27
MW-2	2,418,557.19	1,406,987.09	103.75	104.33	4.71	99.62

Horizontal Control - NAD83(2011.00) Alaska State Plane Coordinates, Zone 4, USFeet

Coordinates are NAD83(2011) Alaska State Plane Coordinates, Zone 4, in US Feet based on an OPUS solution at benchmark USACE SBC W-3. Other horizontal positions shown hereon were determined by differential static GPS observations, or Real Time Kinamatic (RTK) observations using using Trimble R10 dual frequency receivers during September 2022.

Vertical Control - NAVD88, US Feet

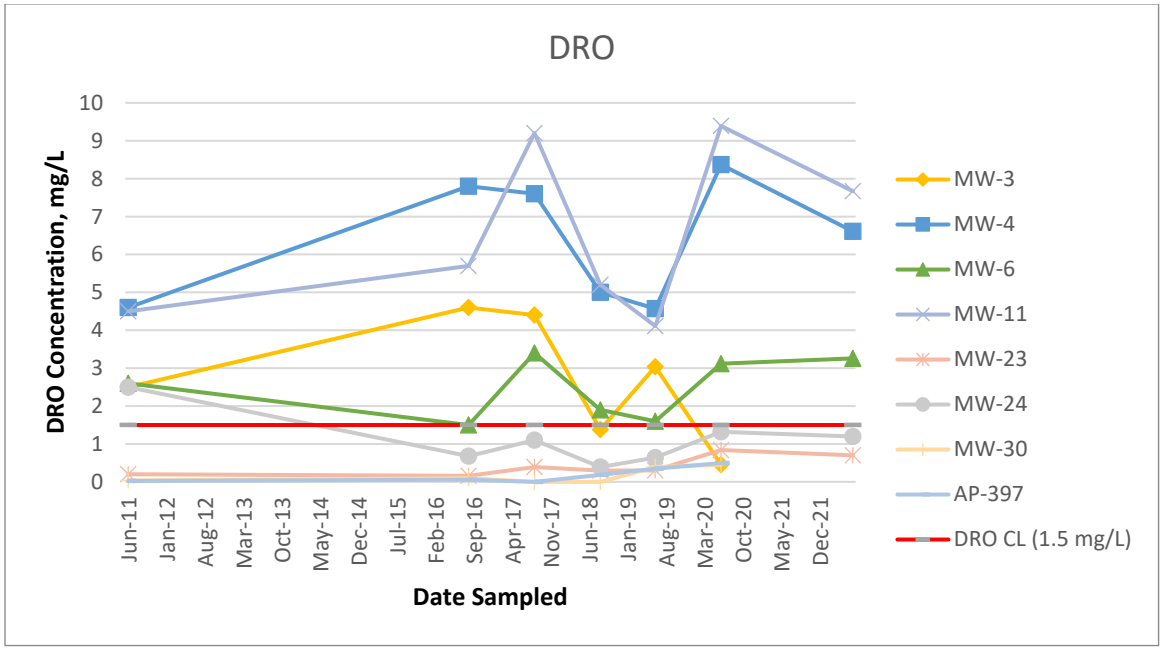
Elevations are NAVD88 in US Feet. The Basis of Elevations are USC&GS Bench Mark "H-81", (PID TT0533), a 3-3/4" brass cap monument on a copper-clad steel rod, having a value of 86.21 US Feet, and USC&GS Bench Mark "G-81", (PID TT0532), a 3-3/4" brass cap monument on a copper-clad steel rod, having a value of 85.21 US Feet; as retreived from the NGS database on September 20, 2022. Other elevations are derived from differential leveling using a Wild NA2 automatic level , differential static GPS observations, or Real Time Kinamatic (RTK) observations using Trimble R10 dual frequency GPS receivers. Elevations derived from differential static GPS observations and RTK were computed using GEOID12B orthometric heights.

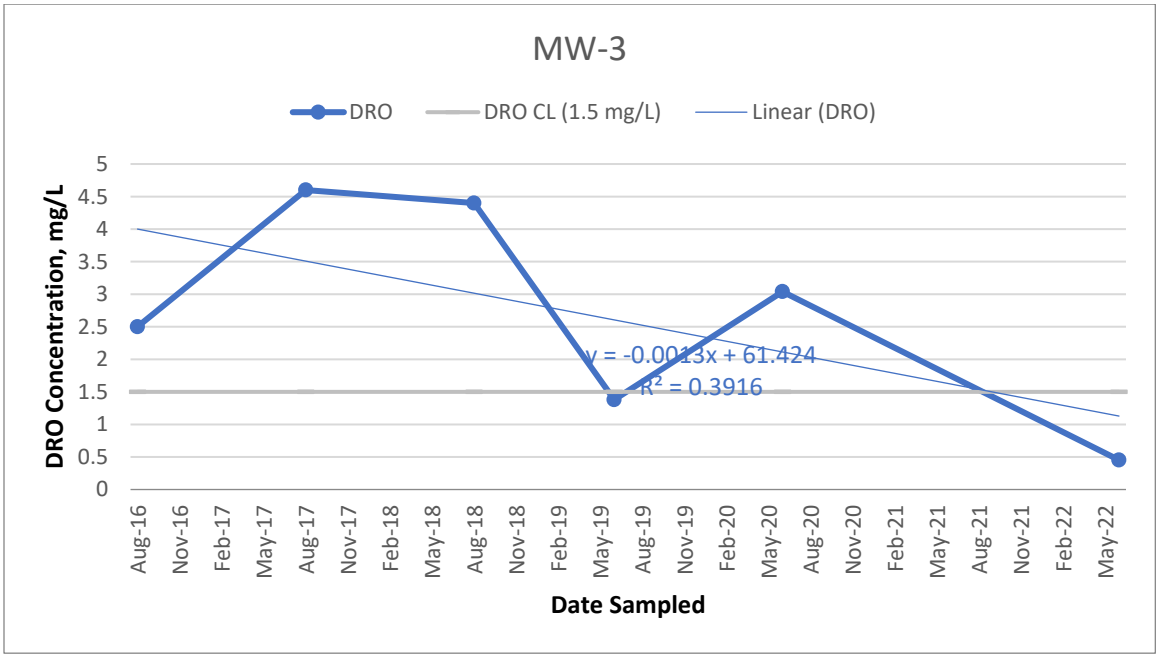
Attachment F

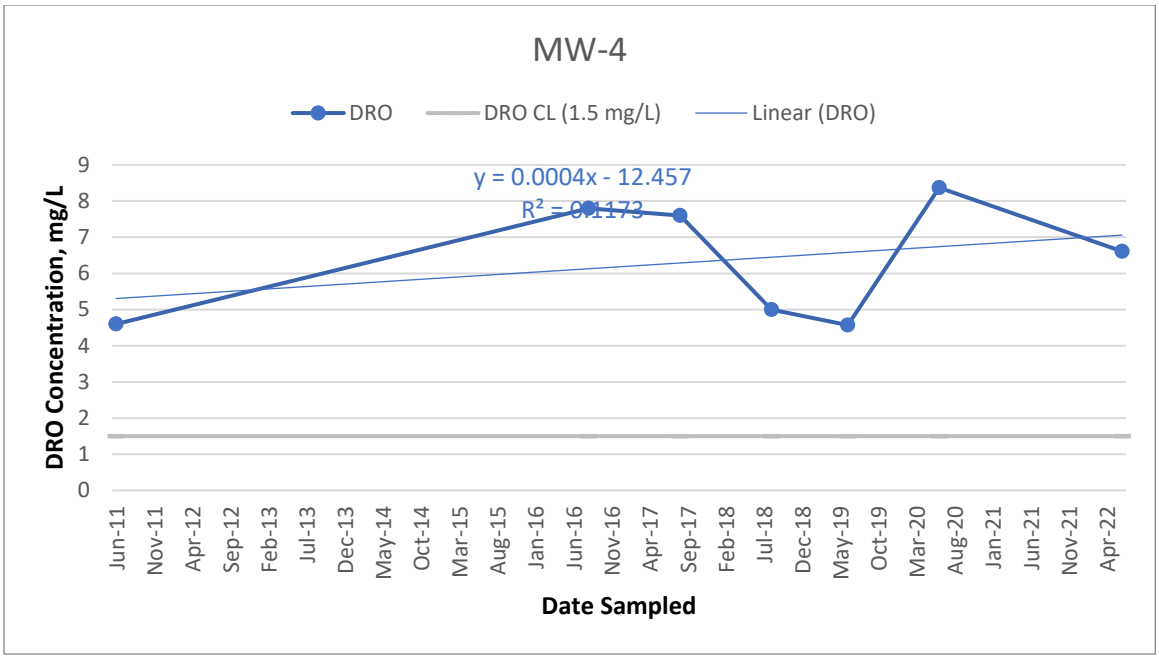
Tank Farm and Operations Facility Well Trend Graphs

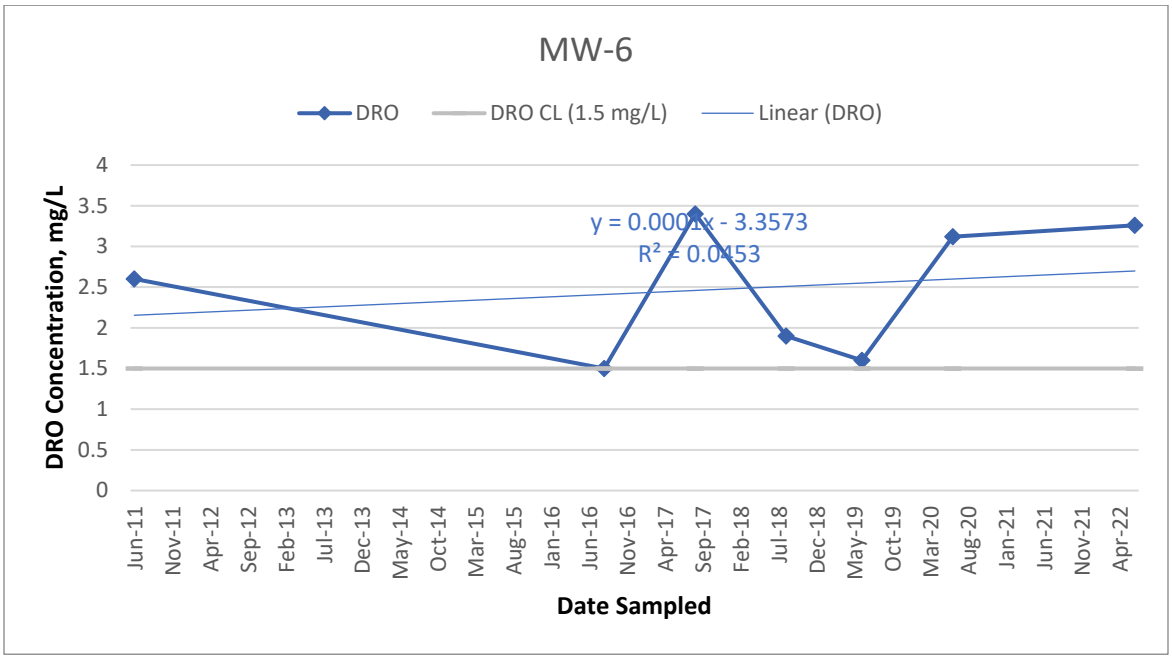
Tank Farm Data Trends Graphs

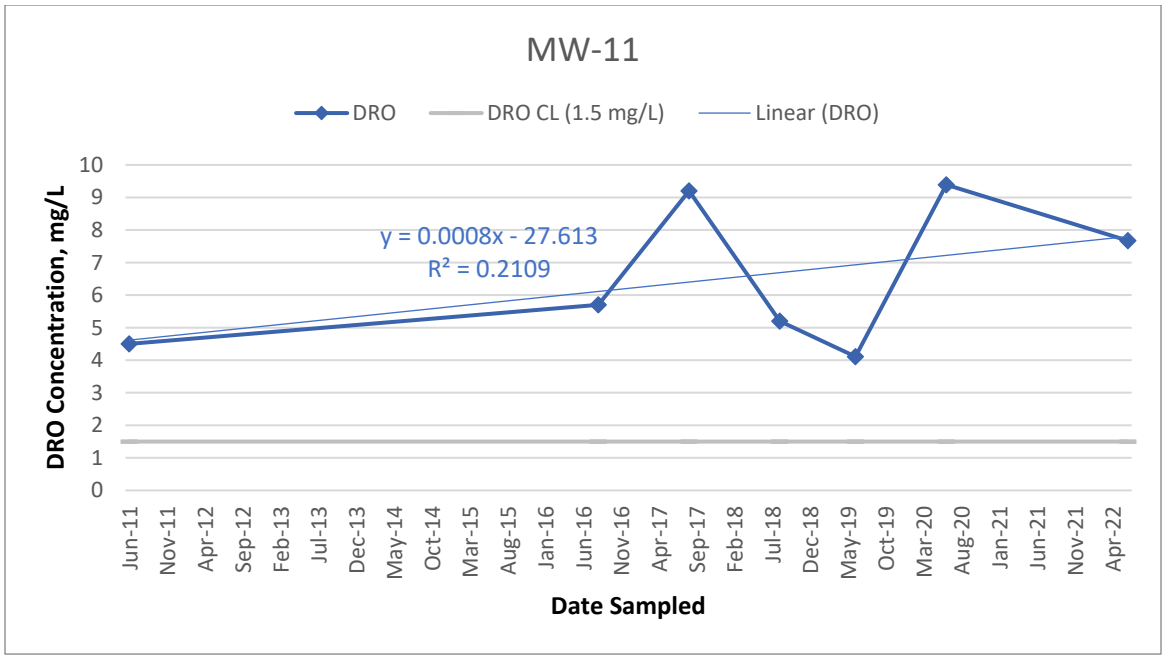
Diesel Range Organics, DRO

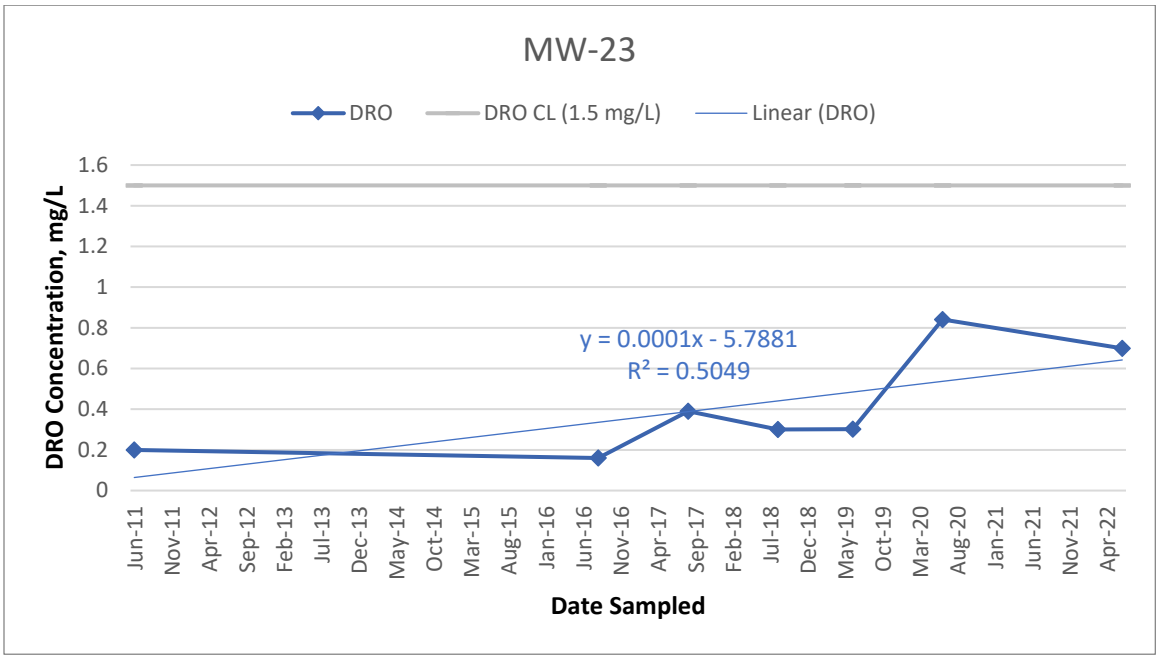


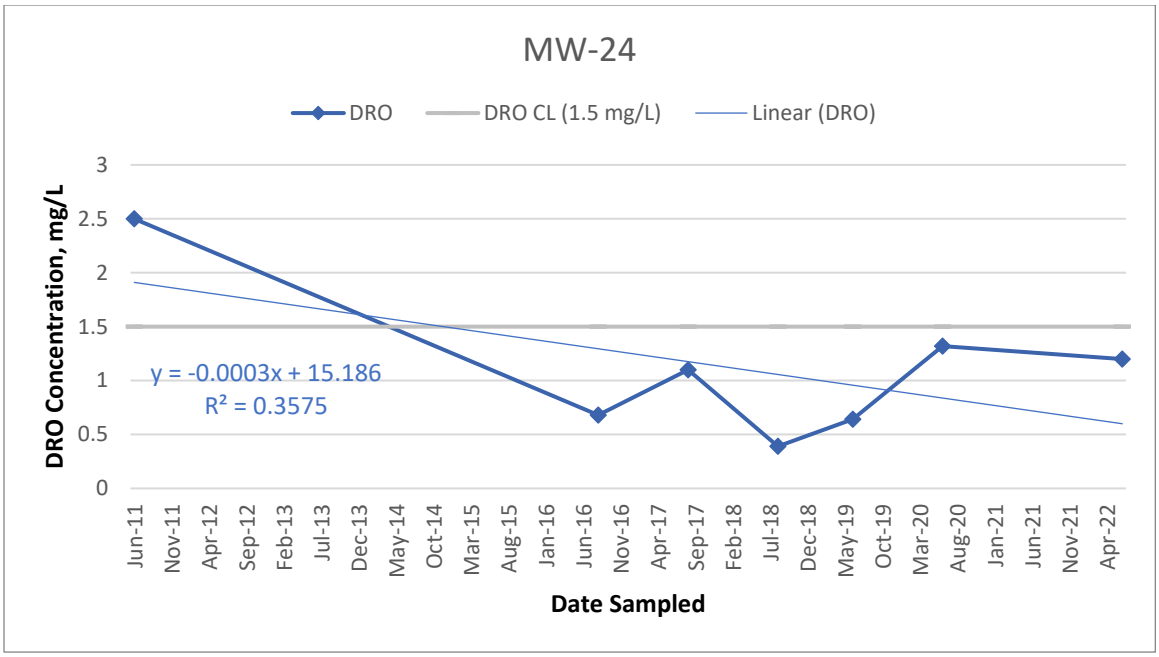


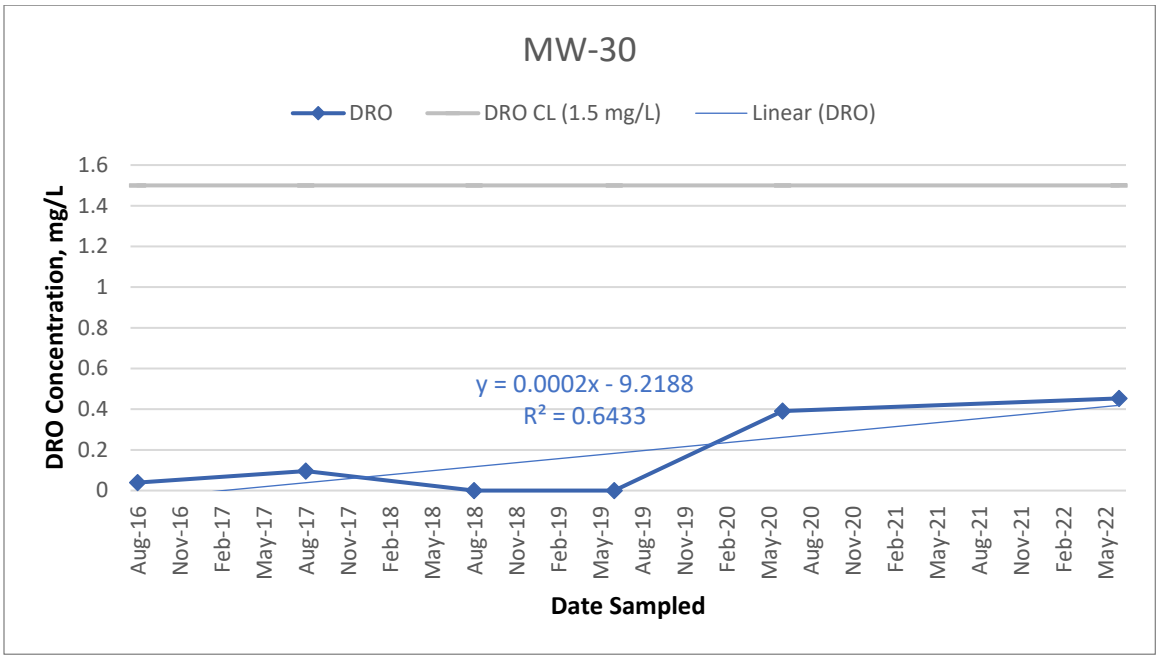

MW-4
DRO
DRO CL (1.5 mg/L)
Linear (DRO)
y = 0.0004x - 12.457
R² = 0.1173
DRO Concentration, mg/L
0
1
2
3
4
5
6
7
8
9
Jun-11
Nov-11
Apr-12
Sep-12
Feb-13
Jul-13
Dec-13
May-14
Oct-14
Mar-15
Aug-15
Jan-16
Jun-16
Nov-16
Apr-17
Sep-17
Feb-18
Jul-18
Dec-18
May-19
Oct-19
Mar-20
Aug-20
Jan-21
Jun-21
Nov-21
Apr-22
Date Sampled

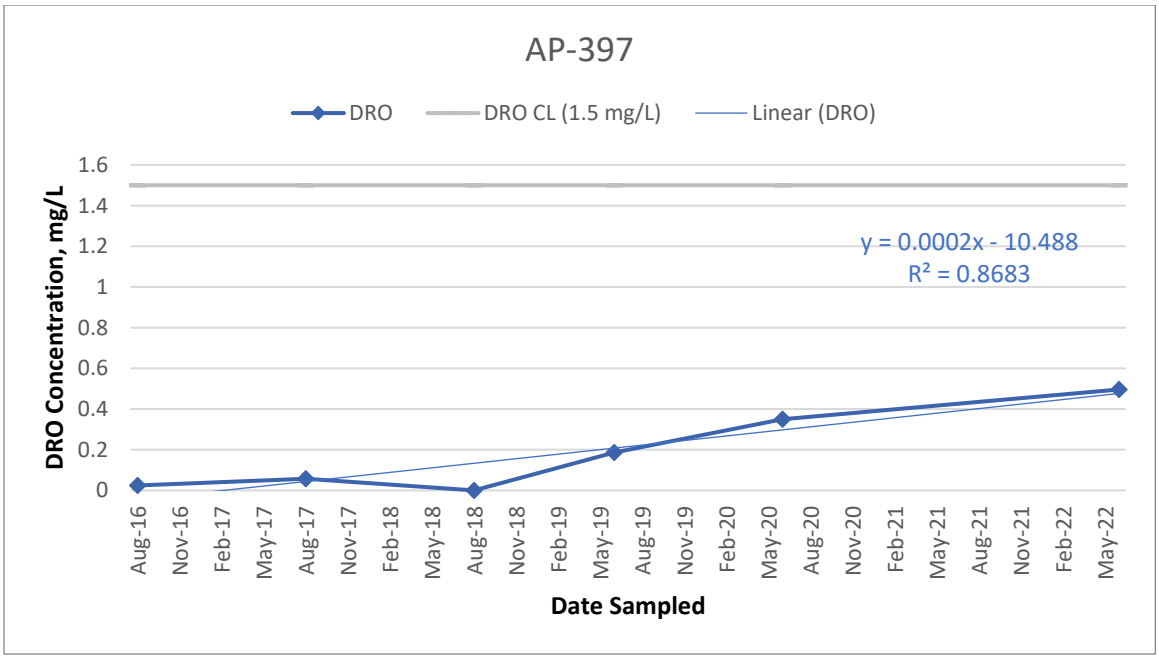

MW-6
DRO
DRO CL (1.5 mg/L)
Linear (DRO)
y = 0.0001x - 3.3573
R² = 0.0453
DRO Concentration, mg/L
0
0.5
1
1.5
2
2.5
3
3.5
4
Jun-11
Nov-11
Apr-12
Sep-12
Feb-13
Jul-13
Dec-13
May-14
Oct-14
Mar-15
Aug-15
Jan-16
Jun-16
Nov-16
Apr-17
Sep-17
Feb-18
Jul-18
Dec-18
May-19
Oct-19
Mar-20
Aug-20
Jan-21
Jun-21
Nov-21
Apr-22
Date Sampled


MW-11
DRO
DRO CL (1.5 mg/L)
Linear (DRO)
y = 0.0008x - 27.613
R² = 0.2109
DRO Concentration, mg/L
Date Sampled

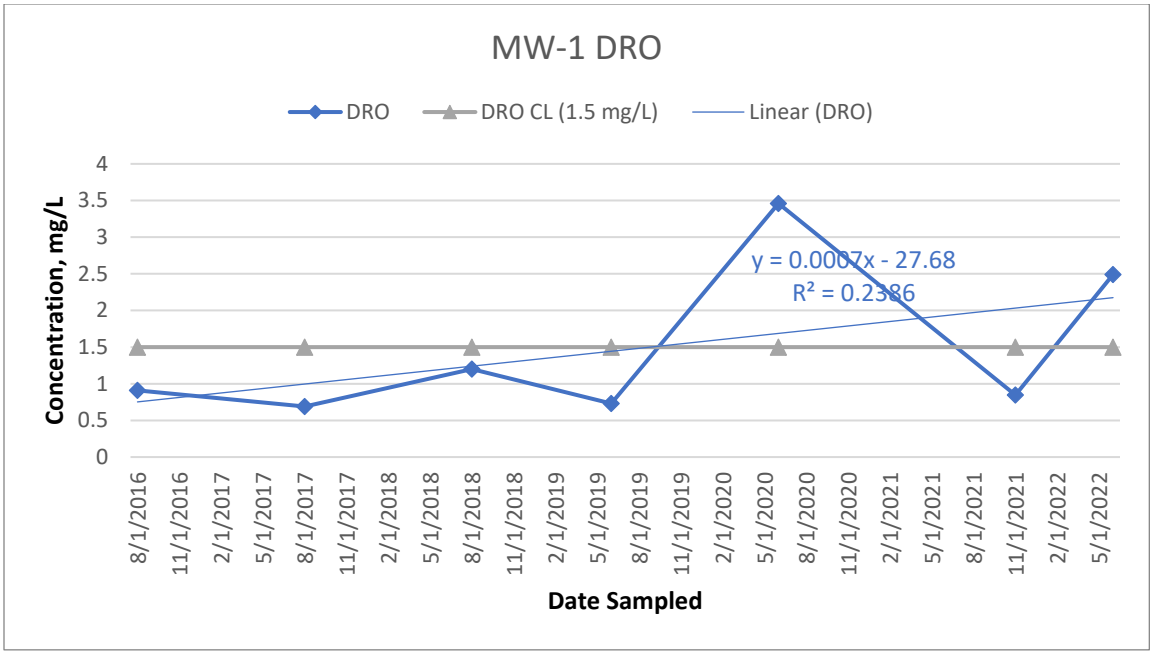

MW-23
DRO
DRO CL (1.5 mg/L)
Linear (DRO)
y = 0.0001x - 5.7881
R² = 0.5049
DRO Concentration, mg/L
Date Sampled

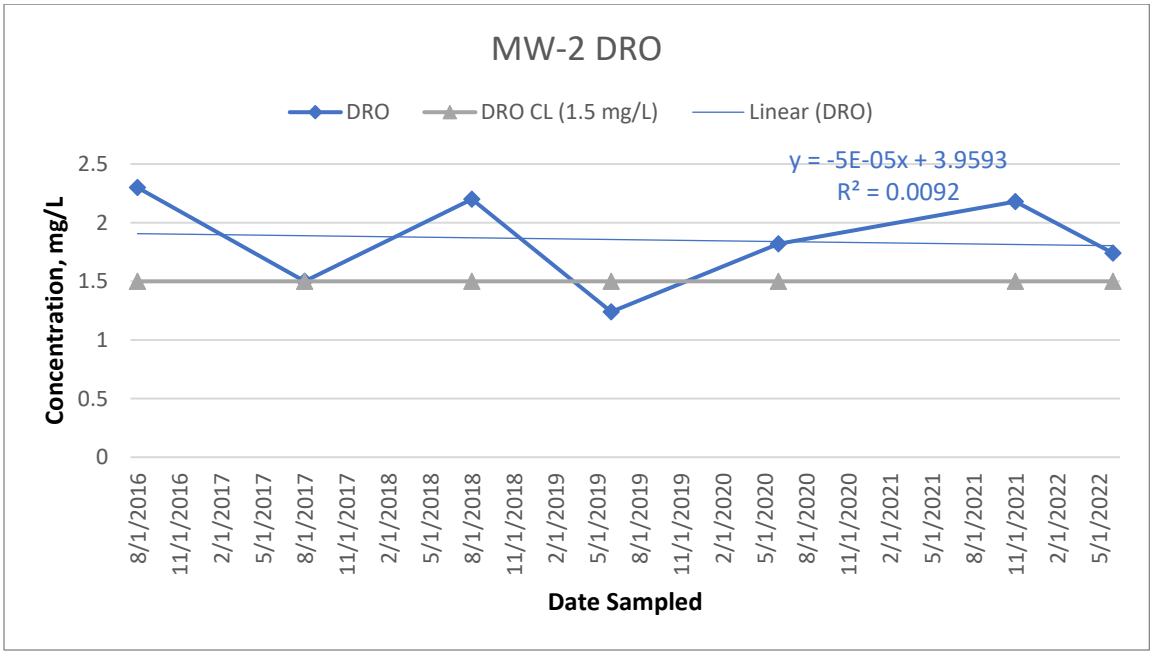

MW-24
DRO
DRO CL (1.5 mg/L)
Linear (DRO)
DRO Concentration, mg/L
3
2.5
2
1.5
1
0.5
0
y = -0.0003x + 15.186
R² = 0.3575
Jun-11
Nov-11
Apr-12
Sep-12
Feb-13
Jul-13
Dec-13
May-14
Oct-14
Mar-15
Aug-15
Jan-16
Jun-16
Nov-16
Apr-17
Sep-17
Feb-18
Jul-18
Dec-18
May-19
Oct-19
Mar-20
Aug-20
Jan-21
Jun-21
Nov-21
Apr-22
Date Sampled

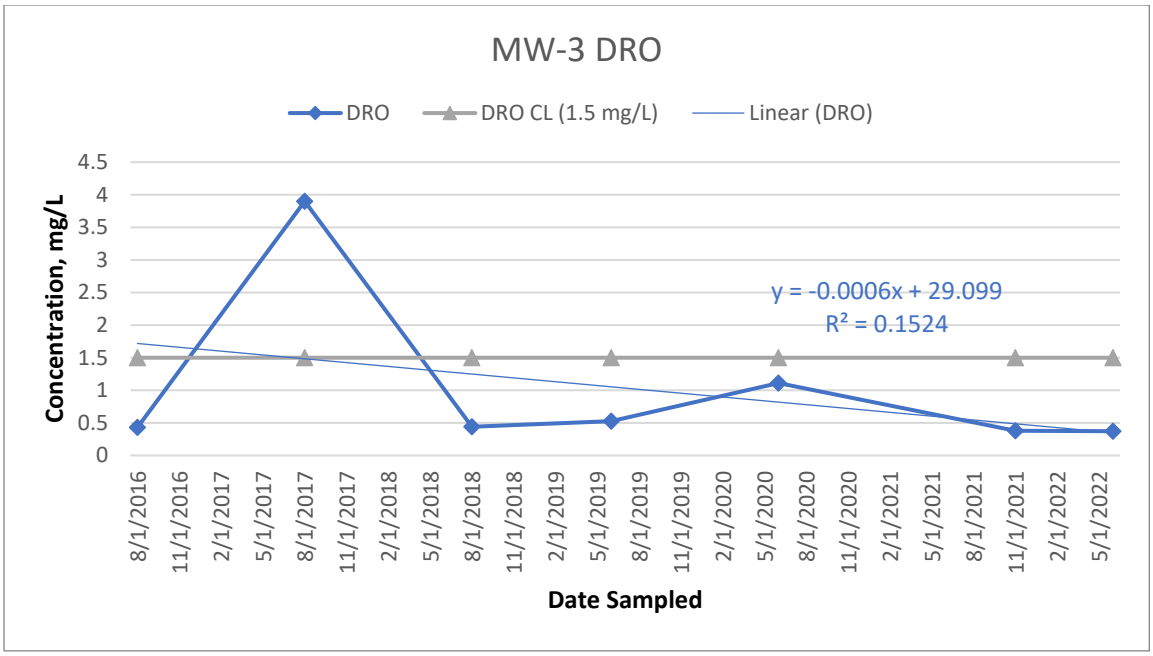

MW-30
DRO
DRO CL (1.5 mg/L)
Linear (DRO)
DRO Concentration, mg/L
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
y = 0.0002x - 9.2188
R² = 0.6433
Aug-16
Nov-16
Feb-17
May-17
Aug-17
Nov-17
Feb-18
May-18
Aug-18
Nov-18
Feb-19
May-19
Aug-19
Nov-19
Feb-20
May-20
Aug-20
Nov-20
Feb-21
May-21
Aug-21
Nov-21
Feb-22
May-22
Date Sampled


AP-397
DRO
DRO CL (1.5 mg/L)
Linear (DRO)
y = 0.0002x - 10.488
R² = 0.8683
DRO Concentration, mg/L
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Aug-16
Nov-16
Feb-17
May-17
Aug-17
Nov-17
Feb-18
May-18
Aug-18
Nov-18
Feb-19
May-19
Aug-19
Nov-19
Feb-20
May-20
Aug-20
Nov-20
Feb-21
May-21
Aug-21
Nov-21
Feb-22
May-22
Date Sampled

Operations Facility Data Trends Graphs






MW-3 DRO
DRO
DRO CL (1.5 mg/L)
Linear (DRO)
Concentration, mg/L
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
y = -0.0006x + 29.099
R² = 0.1524
8/1/2016
11/1/2016
2/1/2017
5/1/2017
8/1/2017
11/1/2017
2/1/2018
5/1/2018
8/1/2018
11/1/2018
2/1/2019
5/1/2019
8/1/2019
11/1/2019
2/1/2020
5/1/2020
8/1/2020
11/1/2020
2/1/2021
5/1/2021
8/1/2021
11/1/2021
2/1/2022
5/1/2022
Date Sampled

Attachment G

ADEC Comments

(To be included in Final)