THE UNITED STATES AIR FORCE
INSTALLATION RESTORATION PROGRAM

DECISION DOCUMENT FOR PERFORMANCE-BASED REMEDIATION SOURCE AREAS SO075, SS078, SO504, MY512, AND MY518

EIELSON PERFORMANCE-BASED REMEDIATION

EIELSON AIR FORCE BASE, ALASKA

PREPARED FOR
AIR FORCE CIVIL ENGINEER CENTER
CONTRACT NO. FA-8903-09-D-8568

FINAL
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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AF103	U.S. Air Force Base Form 103
AF332	U.S. Air Force Base Form 332
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AST	aboveground storage tank
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
BTV	background threshold value
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CES	Civil Engineer Squadron
CITS	Combat Information Training System
COC	chemical of concern
COPC	chemical of potential concern
CSM	conceptual site model
CSP	Contaminated Sites Program
cy	cubic yard(s)
DD	Decision Document
DRO	diesel-range organics
EDB	1,2-dibromoethane
EIAP	Environmental Impact Analysis Process
EPA	U.S. Environmental Protection Agency
GRO	gasoline-range organics
HAZMAT	hazardous materials
HI	hazard index
IRP	Installation Restoration Program
J	The analyte was positively identified; however, the associated result was less than the limit of quantitation but greater than or equal to the detection limit.

ACRONYMS AND ABBREVIATIONS (Continued)

JS+	The result is potentially biased high because at least one surrogate failed recovery criteria for that sample.
LUC	land use control
LUCIP	Land Use Control Implementation Plan
MDC	maximum detected concentration
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MNA	monitored natural attenuation
NFA	no further action
PAH	polycyclic aromatic hydrocarbon
PBR	Performance-Based Remediation
PCB	polychlorinated biphenyl
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
POL	petroleum, oil, and lubricants
PSL	project screening level
RAO	remedial action objective
RRO	residual-range organics
SC	site characterization
SCRI	site characterization report
SCRI	Site Characterization Report I (USAF 2018b)
SVOC	semivolatile organic compound
TMB	trimethylbenzene
UCL	upper control limit
UIW	underground injection well
USAF	U.S. Air Force
UST	underground storage tank
UTL	upper tolerance limit
UU/UE	unlimited use and unrestricted exposure
VOC	volatile organic compound

EXECUTIVE SUMMARY

This Decision Document describes the remedial actions at Eielson Source Areas SO075, SS078, SO504, MY512, and MY518, all of which are associated with potential contamination resulting from petroleum, storage, distribution, and/or use. The U.S. Air Force (USAF) is managing remediation of petroleum, oil, and lubricants (POL) or petroleum-related contamination at these source areas in accordance with the State-Eielson Agreement (USAF 2014d), herein referred to as the two-party agreement. Any Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) constituents remaining will be addressed by transferring source areas back to the *Eielson Air Force Base, Federal Facility Agreement Under CERCLA Section 120* (USAF 2013a), herein referred to as the three-party agreement. Source areas addressed are recommended for either no further action (NFA) when no POL- or petroleum-related chemicals of concern (COCs) are present, remediation by means of excavation where only POL- or petroleum-related soil contamination is present, or a combination of excavation and monitored natural attenuation (MNA) where both POL- or petroleum-related soil and groundwater contamination are present. The selected remedial actions for each source area and the supporting rationales are summarized in Table ES-1.

Source Areas SO075, SS078, SO504, MY512, and MY518 have completed the source evaluation process required by the Eielson Federal Facilities Agreement (USAF 1990), as documented in the *Site Characterization Report I Source Areas ST011, SD021, SD022, SD023, SD024, DP025, ST027, SS030, ST058, SO065, SO069, SO070, SO071, SO073, SO075, SS078, SS084, SO504, TU506, MY512, and MY518* (USAF 2018b), herein referred to as SCRI. At the time these source areas were transferred from the three-party agreement to the two-party agreement for site characterization (SC), only POL- or petroleum-related contamination was known at each source area. The USAF intends to address POL- or petroleum-related contamination under the two-party agreement. Source areas will be transferred back to the three-party agreement for any remaining remedial action under CERCLA. No sampling for perfluorooctanoic acid (PFOA) and/or perfluorooctane sulfonate (PFOS) was conducted as part of SC activities; any source areas with suspected PFOA/PFOS or remaining CERCLA constituents will be addressed under the three-party agreement.

The remedial action objectives for these source areas include:

- Protect human health and the environment from risks associated with exposure to POL- or petroleum-related COCs at concentrations greater than Alaska Department of Environmental Conservation (ADEC) cleanup levels in soil and groundwater.
- Limit or eliminate the potential for POL- or petroleum-related contaminant migration from soil to sediment, surface water, and groundwater or from soil, sediment, surface water, or groundwater to indoor or outdoor air.
- Limit or eliminate the potential for human exposure to POL- or petroleum-related contamination in soil above ADEC cleanup levels until source area conditions support unlimited use and unrestricted exposure (UU/UE).

Table ES-1
Remedies for Applicable Source Areas

Source Area	Remedial Action	Rationale
SO075	Excavation	• Where no infrastructure is present, excavation will effectively remove the exposure risk posed by POL- or petroleum-related contamination in soil. • Groundwater is not a POL- or petroleum-related impacted medium at this source area. • LUCs (e.g., dig restrictions) will be implemented until the remedy action occurs and until cleanup levels are attained for POL- or petroleum-related soil contamination. • Any CERCLA constituents remaining will be addressed under the three-party agreement.
SS078	Excavation and MNA	• Where no infrastructure is present, excavation will effectively remove the exposure risk posed by POL- or petroleum-related contamination in soil. • Where excavation cannot occur at this time due to existing infrastructure, POL- or petroleum-related soil contamination will be left in place until land use changes. Once land use change occurs, excavation will effectively remove the exposure risk posed by contamination in soil. • MNA of POL- or petroleum-related contamination in groundwater will occur until concentrations are below cleanup levels. • LUCs (e.g., dig restrictions and groundwater-use restrictions) will be implemented until the remedy action occurs and until cleanup levels are attained for POL- or petroleum-related soil and groundwater contamination. • LUCs will be reviewed periodically, not to exceed every five years, until UU/UE is achieved. • If groundwater concentrations are greater than cleanup levels for one or both analytical sampling monitoring events within one year, periodic review will determine continued remediation and will be undertaken at a frequency not exceeding five years unless a longer timeframe is agreed upon by the USAF and ADEC. This applies only to POL-related contamination; all other non-petroleum-related contamination will be addressed under the three-party agreement. • Any CERCLA constituents remaining will be addressed under the three-party agreement.
SO504	NFA	• No further investigation is required for POL. • Soil is not a petroleum-impacted medium at this source area. • Groundwater is not a petroleum-impacted medium at this source area. • Any CERCLA constituents remaining will be addressed under the three-party agreement.

Table ES-1 (Continued)
Remedies for Applicable Source Areas

Source Area	Remedial Action	Rationale
MY512	Excavation and MNA	• Where no infrastructure is present, excavation will effectively remove the exposure risk posed by POL- or petroleum-related contamination in soil. • MNA of POL- or petroleum-related contamination in groundwater will occur until concentrations are below cleanup levels. • LUCs (e.g., dig restrictions and groundwater-use restrictions) will be implemented until the remedy action occurs and until cleanup levels are attained for POL- or petroleum-related soil and groundwater contamination. • LUCs will be reviewed periodically, not to exceed every five years, until UU/UE is achieved. • If groundwater concentrations are greater than cleanup levels for one or both analytical sampling monitoring events within one year, Periodic Review will determine continued remediation and will be undertaken at a frequency not exceeding five years unless a longer timeframe is agreed upon by the USAF and ADEC. This applies only to POL-related contamination; all other non-petroleum-related contamination will be addressed under the three-party agreement. • Any CERCLA constituents remaining will be addressed under the three-party agreement.
MY518	NFA	• No further investigation is required for POL. • Soil is not a petroleum-impacted medium at this source area. • Groundwater is not a petroleum-impacted medium at this source area. • Any CERCLA constituents remaining will be addressed under the three-party agreement.

Note:
For definitions, refer to the Acronyms and Abbreviations section.

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PART 1: SITE NAMES AND LOCATIONS

Facility Name:	Eielson AFB, Alaska
Site Locations:	Source Areas SO075, SS078, SO504, MY512, and MY518
Latitude/Longitude:	Eielson AFB, Alaska; Latitude: 64.7, Longitude: -147.0
ADEC Source Area File No:	Refer to Table 2-1
ADEC Hazard ID No:	Refer to Table 2-1
Operating Unit/Site:	Refer to Table 2-1
Owner and Point of Contact:	U.S. Government (managed by USAF) Kristina Smith USAF Restoration Program Manager 2310 Central Avenue, Suite 213 Eielson AFB, AK 99702 Phone number: 907-377-4299

The Alaska Department of Environmental Conservation (ADEC) provides regulatory oversight of the environmental restoration actions at Source Areas SO075, SS078, SO504, MY512, and MY518 (Figure A-1 in Appendix A) in accordance with the State-Eielson Air Force Base (AFB) Petroleum Site Restoration Agreement signed in April 2014 (U.S. Air Force [USAF] 2014d) and Article 3 of Alaska Administrative Code (AAC) Title 18, Chapter 75 (18 AAC 75) (ADEC 2017c).

The USAF is managing remediation of petroleum, oil, and lubricants (POL) or petroleum-related contamination at Source Areas SO075, SS078, SO504, MY512, and MY518 in accordance with the State-Eielson Agreement (USAF 2014d), herein referred to as the two-party agreement, and the Defense Environmental Restoration Program (Title 10, §2701 et seq., of the U.S. Code; Executive Order 125080; 52 Federal Register 2923 [23 January 1987]). Any Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) constituents remaining will be addressed by transferring source areas back to the *Eielson Air Force Base, Federal Facility Agreement Under CERCLA Section 120* (USAF 2013a), herein referred to as the three-party agreement.

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PART 2: INTRODUCTION

This Decision Document (DD) includes Eielson source areas SO075, SS078, SO504, MY512, and MY518 associated with potential contamination resulting from petroleum storage, distribution, and/or use. Source Areas SO075, SS078, SO504, MY512, and MY518 are not associated with an Operable Unit and have completed the source evaluation process required by the Eielson Federal Facilities Agreement (USAF 1990). The Memorandum to Site File (USAF 2018a) transferred regulatory oversight and also stipulated that these five source areas would be managed under the State-Eielson AFB Petroleum Site Restoration Agreement (USAF 2014d). Table 2-1 lists the source areas and their location coordinates. Figure A-1 (Appendix A) displays the source area locations on Eielson AFB.

The source-area-specific background information and assessments presented in this DD were primarily obtained from the *Site Characterization Report I Source Areas ST011, SD021, SD022, SD023, SD024, DP025, ST027, SS030, ST058, SO065, SO069, SO070, SO071, SO073, SO075, SS078, SS084, SO504, TU506, MY512, and MY518* (USAF 2018b), herein referred to as SCRI.

Table 2-1
Site Names and Locations

Source Area	Source Area Reference	Latitude	Longitude	ADEC File No., Hazard ID
SO075	Building 285 (Facility 1301) AST/UIW	64.645013	-147.073145	107.38.099, 1935
SS078	HAZMAT Area - CITS	64.664000	-174.101806	107.38.098, 3690
SO504	Building 588 (Facility 1344)/Five USTs	64.650986	-147.060183	107.26.006, 1651
MY512	Former Boat Shop	64.658864	-147.078589	107.38.100, 2921
MY518	Building 2275 (Facility 2196) Contaminated Soil Dorm Parking Utilidor	64.683666	-147.098372	107.38.105, 4393

Notes:
Latitude and longitude are in the World Geodetic System 84 coordinate system.
For definitions, refer to the Acronyms and Abbreviations section.

2.1 EIELSON AFB GENERAL ENVIRONMENTAL SETTING

Eielson AFB is located within the Fairbanks North Star Borough in the east-central portion of interior Alaska, approximately 2 miles east of the Tanana River and 25 miles southeast of

Fairbanks, Alaska. Eielson AFB encompasses an area of roughly 19,700 acres (Figure A-1 in Appendix A). The Trans-Alaska Pipeline transects the facility for approximately 5 miles.

2.1.1 Climate

Eielson AFB is situated in a continental climatic zone that covers interior Alaska. This climate zone is characterized by low precipitation and low humidity, both a result of the blockage of moist maritime air masses by the Brooks Range to the north and the Alaska Range to the south. Interior Alaska also experiences extreme seasonal fluctuations in daylight and temperature. The average summer temperature is 57 degrees Fahrenheit (°F) while the average winter temperature is -4°F. Annual precipitation averages 12 inches of rain and 69 inches of snow. Rainfall is generally highest in July and August (Alaska Climate Research Center 2018).

2.1.2 Regional Geology

Eielson AFB is built on the Tanana Basin, a tectonic basin filled with alluvium, primarily shed from the Alaska Range. Along the eastern edge of the base, metamorphic bedrock of the Yukon-Tanana Terrane (historically referred to as the Birch Creek Schist) crops out as the Yukon-Tanana Uplands. Moose Creek Bluff, a metamorphic bedrock inselberg, rises above the floodplain 3 miles to the northwest of the base. Tanana River deposits fill the basin beneath Eielson AFB and consist of unconsolidated fluvial sands and gravels, with rare silt. Where unmodified by human activity, the uppermost 10 to 15 feet of basin fill commonly consists of silts and sands (Péwé and Reger 1983). Below this, the basin fill consists of sub-equal proportions of well-graded sand with variable amounts of gravel interbedded with poorly graded sand and rare intervals of silt. Even at depth, this material is unconsolidated and lacking any degree of cementation.

Engineer Hill has a maximum elevation of approximately 900 feet above mean sea level. Lily Lake is located at the base of the hill at approximately 570 feet above mean sea level. Engineer Hill is composed of Paleozoic quartz-mica schist, phyllite, and quartzite (Foster et al 1994). During drilling, bedrock was encountered at approximately 30 feet below ground surface (bgs). The local aquifer is below 50 feet bgs and is characterized as fractured with low transmissivity.

2.1.3 Regional Hydrology

The Alaska Range forms the southern margin of the Tanana Basin and supplies most of the water to this basin in the form of glacier melt. The low hills of the Yukon-Tanana Uplands to the north supply a smaller amount of water derived from snowmelt and summer rains. In the Eielson-Fairbanks area, the floodplain of the Tanana River, which flows through the Tanana Basin, is approximately 11 miles wide. Several surface water bodies are within the Eielson AFB boundary including Garrison Slough, Piledriver Slough, Moose Creek, French Creek, Lily Lake, multiple ponds, and lakes (USAF 1996).

The groundwater hydrology beneath Eielson AFB is dominated by a strong connection to the Tanana River, which serves as a practically inexhaustible source of recharge or sink for discharge. Free exchange between in-river flow and groundwater causes water table elevations to match river elevations, with groundwater flow approximately parallel to river flow in the vicinity of Eielson AFB. Other inputs to the groundwater system include minor contributions from Moose Creek and French Creek, originating in the nearby uplands, and from local recharge derived from snow melt and summer rains. Groundwater is typically encountered at 8 to 10 feet bgs within the main developed area of Eielson AFB. Seasonally, groundwater elevations fluctuate by approximately 2 feet, with the highest water levels occurring during the spring thaw in May and early June (USAF 2015c).

The eastern portion of Eielson AFB is underlain by unconsolidated sediment that acts as an unconfined aquifer overlying fractured metamorphic bedrock. The unconfined aquifer extends from near the ground surface to a depth of approximately 250 to 400 feet bgs. The hydrogeological properties of the bedrock are unknown, but it likely acts as an aquitard at depth. Some outcrops or shallow occurrences of bedrock locally produce usable quantities of water near the eastern edge of the base. Fractured bedrock is generally much less conductive than the fluvial soils of the unconfined aquifer. The aquifer's primary sources of recharge include the Tanana River, its tributaries, and vertical percolation of rainfall and snowmelt. The direction of groundwater flow in the shallow aquifer is north-northwest, which is parallel to the flow of the Tanana River. Flow may be locally influenced by buried stream channels where the hydraulic

conductivity is greater than surrounding sediments, local surface drainages, groundwater production wells, and zones of permafrost.

2.2 CLEANUP LEVEL CHANGES

The SCRI references the soil and groundwater cleanup levels listed in Worksheet #15 of the Performance-Based Remediation (PBR) *Programmatic Quality Assurance Project Plan Addendum No. 2* (USAF 2017), which were largely based on 2017 ADEC cleanup levels (ADEC 2017c). In 2018, ADEC promulgated new cleanup levels for several analytes that became effective on 29 September 2018 (ADEC 2018b) and are outlined in regulation Tables B1 and C of 18 AAC 75 (ADEC 2018b). Cleanup levels for 22 compounds were modified, three new compounds were added, and one compound was removed. To account for these cleanup level changes, the maximum detected concentrations (MDCs) of all analytes were rescreened against the 2018 revised cleanup levels to ensure that analytes with concentrations greater than the 2018 cleanup levels were evaluated for possible inclusion as POL- or petroleum-related chemicals of concern (COCs) in this DD. A small number of analytes that did not exceed 2017 ADEC cleanup levels (ADEC 2017c) but exceed 2018 ADEC cleanup levels (ADEC 2018b) were added as POL- or petroleum-related COCs. In addition, some COCs proposed in the SCRI with concentrations less than the 2018 cleanup levels were removed from the COC lists presented in this DD. The changes to the final POL- or petroleum-related COC list based on this rescreening process are described by source area throughout Part 3 of this DD.

2.3 IDENTIFICATION OF POL-RELATED CHEMICALS OF CONCERN AND NON-PETROLEUM-RELATED CHEMICALS OF POTENTIAL CONCERN

The final list of POL- or petroleum-related COCs for each source area was determined through a multi-step process detailed in the SCRI (USAF 2018b). Historical and recent sampling data for each source area were compiled into matrix-specific lists. In the SCRI, all analytes were compared to the most stringent 2017 ADEC cleanup levels, as presented in Tables B1, B2, and C (ADEC 2017c), in addition to one-tenth of their respective human health cleanup levels for Cumulative Risk Evaluation using the ADEC online calculator (ADEC 2017b). Chemicals of potential concern (COPCs) with concentrations greater than the 2017 cleanup levels and/or

for which the calculated risk exceeded a 1×10^{-5} lifetime cancer risk value or a hazard index (HI) of 1 in the Cumulative Risk Evaluation were retained as POL- or petroleum-related COCs or as non-petroleum-related COPCs to be addressed under the three-party agreement, except as noted in the SCRI (USAF 2018b). Additional screening against the revised 2018 cleanup levels was done as described in Section 2.2; in addition, the cumulative risk for each site was re-calculated based on the 2018 cleanup levels (see Appendix C).

2.3.1 Background Metals

Metals contamination is outside the scope of this DD and will be addressed under the three-party agreement. Previous investigations identified high concentrations of naturally occurring metals, including arsenic, in soil and groundwater at Eielson AFB (USAF 2014b). In 2012 and 2013, background studies for soil and groundwater were conducted to establish accepted background threshold values (BTVs) for fluvial soil, loess, and groundwater at Eielson AFB (USAF 2014a, 2014c). The 95-percent upper tolerance limit (UTL) reported in the 2012 and 2013 background studies was typically used as the BTV, except where the MDC exceeded the upper prediction limit and/or UTL, in which case the MDC was used as the BTV (USAF 2014a, 2014c). The BTVs for thallium in the soil background dataset, and aluminum, chromium, mercury, selenium, silver, and thallium in the groundwater background dataset, no longer have ADEC support, as discussed in the technical memorandum *Comparing Eielson Background to Site Metals Concentrations* (USAF 2019a).

Soil and groundwater metals results included in the SCRI (USAF 2018b) were compared to accepted BTVs for soil and groundwater (USAF 2014a, 2014c) as part of an initial threshold comparison. Hypothesis testing was completed where metals in soil or groundwater exceeded both the project screening levels (PSLs) and BTVs. The purpose of the hypothesis testing was to provide a statistical site-to-background comparison for metals in soil and groundwater. All statistical tests followed the methodology described in the technical memorandum entitled *Comparing Eielson Background to Site Metals Concentrations* and references cited therein (USAF 2019a). The results of the initial threshold comparisons and hypothesis tests, along with

all input and output files and tables of excluded data, are presented in Appendix M of the SCRI (USAF 2018b).

Based on the results of hypothesis testing, metals in groundwater at Source Areas SS078, and MY512 were included in the list of proposed non-petroleum-related COPCs in the SCRI. A 95-percent upper control limit (UCL) was calculated where metals concentrations were not consistent with the background population (i.e., failed the hypothesis test). In addition, a 95-percent UCL was calculated where the MDC at a source area exceeded the PSL and there was no accepted BTV. The calculated 95-percent UCLs were compared to the PSL for reference purposes (refer to Table M-1.9 for soil and Table M-1.10 for groundwater in Appendix M of the SCRI [USAF 2018b]).

2.3.1.1 Thallium

The majority of the historical soil sample results reported in the 2012 Phase 1 Source Evaluation (USAF 2013b) indicate thallium concentrations are above the PSLs at Source Areas SO075, SO504, MY512, and MY518. However, many of the 2012 thallium results were qualified due to method blank contamination. Based on the qualified 2012 thallium results, the widespread detections at similar levels for multiple source areas, and the lack of similar thallium detections in recent samples, thallium will not be proposed as a non-petroleum-related COPC based on historical (2012) data alone. Historical thallium exceedances are included in the Human Health Cumulative Risk Evaluations (Appendix C) for consistency with historical investigative reports.

2.3.1.2 Chromium Speciation

Chromium speciation in soil and groundwater was not performed during the PBR investigations at the source areas addressed in this DD due to the lack of known or suspected anthropogenic sources of chromium VI at these source areas. More specifically, the source areas included in this DD do not fit into any of the following categories for site type, which were deemed by project stakeholders to be sites with a probable history of chromium VI usage: unlined landfills, auto body or paint shops, corrosion control ships, used oil sites, metal-plating or finishing shops,

photo development sites, coal ash disposal sites, and unlined wastewater treatment facility ponds. Based on the history of activities at each source area, as described in Sections 3.1 through 3.5, analytical results for total chromium are not expected to be the result of anthropogenic activities. Therefore, the absence of chromium speciation data is not considered a data gap for the sites addressed in this DD, and Total Chromium (III) has not been proposed as a non-petroleum-related COPC at any site in this DD, because Total Chromium (III) results did not exceed the ADEC cleanup level in soil or groundwater (i.e., SO075, SS078, SO504, MY512, and MY518).

2.3.2 PAHs in Surface and Near Surface Soil

Polycyclic aromatic hydrocarbons (PAHs) are frequently detected at concentrations greater than ADEC cleanup levels in surface and near surface soil samples collected across Eielson AFB. Due to the wide distribution of PAH detections in absence of collocated fuels, the USAF and regulatory stakeholders are establishing an Eielson-wide approach. PAHs with non-petrogenic signatures that occur in the absence of collocated fuel exceedances are termed "non-petroleum-related COPCs" and will be addressed under the three-party agreement after the petroleum response is complete. PAH contamination not collocated with fuel contamination most likely has no direct relationship to historical source area activities. Frequent detections occurring along roadways and at locations adjacent to the airfield are typically due to non-petrogenic sources such as combustion from vehicles and aircraft.

2.3.3 Perfluorinated Compounds

No sampling for perfluorooctanoic acid (PFOA) and/or perfluorooctane sulfonate (PFOS) was conducted as part of site characterization (SC) activities, and there is no confirmed PFOA/PFOS contamination in groundwater at the source areas described in this DD. A separate basewide effort to identify and delineate PFOA/PFOS is underway. Additionally, the potential risks to human health attributable to PFOA and PFOS are not included in the cumulative risk calculations or proposed remedies described in Part 3 of this DD.

2.4 CONCEPTUAL SITE MODEL DEVELOPMENT

Only those analytes exceeding one-tenth the ADEC human health-based cleanup levels were considered when developing the conceptual site model (CSM)s (ADEC 2017a). Although no remedies are proposed for background metal and PAH contamination unrelated to site use, these constituents were incorporated into the CSMs. Receptors include residents, commercial or industrial workers, site visitors, trespassers, recreational users, and construction workers. Although residents do not presently inhabit source areas except MY518 due to their industrial nature, hypothetical future residents are considered potential future receptors as a conservative approach. The CSM forms for each source area will be reevaluated and revised once remedial activities have been completed or if changes to site conditions or land use occur. The CSM forms for each source area are found in Appendix B.

ADEC ecoscoping forms were completed for each source area to assess the potential for ecological risk. The assessment identified that Source Areas SO075, SS078, SO504, MY512, and MY518 did not require additional assessment because they did not contain ecological habitat or are fenced industrial compounds that are inaccessible to wildlife.

2.5 LAND USE CONTROLS

Land use controls (LUCs) (i.e., dig and groundwater-use restrictions) are recommended to protect human health and the environment at source areas requiring remedial activity before being eligible for unlimited use and unrestricted exposure (UU/UE). Presently, soil and groundwater LUCs areas proposed in the SCRI are in place, as described in the *Land-Use Control Implementation Plan* (LUCIP)*, Eielson Air Force Base, Alaska* (USAF 2015a); these shall be retained, revised, reviewed, and approved by ADEC, and documented in future versions of the LUCIP. Soil and groundwater LUC boundaries for each source area are depicted on figures in Appendix A.

PART 3: ASSESSMENT OF SITES

This section presents conclusions drawn from environmental investigations conducted at Source Areas SO075, SS078, SO504, MY512, and MY518. Supporting information is available in the SCRI (USAF 2018b), including the remedies evaluated and the basis for action at all source areas included in this DD.

3.1 SOURCE AREA SO075 – BUILDING 285 (FACILITY 1301) AST/UIW

Source Area SO075 is located north of Cargain Road in the southern part of Eielson AFB (Figures A-2.1 through A-2.7). Building 285 (Facility 1301), an active well house, is located in a vegetated area and isolated from other Eielson AFB buildings and facilities. Contamination sources are suspected to include spills and leaks from former aboveground storage tanks (ASTs), an underground storage tank (UST), and an underground injection well (UIW) system (USAF 2013b).

3.1.1 SO075 Background

Detailed descriptions of environmental investigations and analytical results at Source Area SO075 are presented in Section 4.15 of the SCRI (USAF 2018b). Soil and groundwater sample locations are presented on Figures A-2.1 through A-2.7 (Appendix A). A timeline of environmental investigations at SO075 is provided here:

- In 1993, a soil boring was advanced south of the former UST. Soil samples were analyzed for gasoline-range organics (GRO), diesel-range organics (DRO), benzene, toluene, ethylbenzene, and xylenes (BTEX), and metals (USAF 2013b). Building 285 was added to the ADEC Contaminated Sites Program (CSP) database for lead and total petroleum hydrocarbon contamination (File Number 107.26.015, Hazard ID 1935).
- In 1996, contamination suspected to originate from the UIW at Source Area SO516 was discovered during a site investigation. Groundwater monitoring wells were installed, and groundwater samples and soil samples were collected downgradient and upgradient to the southwest of the UIW in Building 285. Soil and groundwater samples were analyzed for DRO, BTEX, and PAHs. (USAF 2013b). Soil results indicated low levels of PAHs and BTEX; DRO was not detected in any soil samples.
- In 1997, the 30- to 40-gallon AST associated with Source Area SO075 was removed. One soil sample was collected from beneath the AST. Analytical results from the soil sample indicated a benzene concentration above the PSL (USAF 2013b).

- In August 2002, a SC study at Building 285 evaluated the potential horizontal and vertical extents of suspected subsurface soil contamination resulting from the former AST. Results indicated benzene contamination west of the former AST and north of the former UST. Soil gas was sampled at three locations: one on the south end of the building (close to the location of the former AST) and two downgradient of the tank where surface runoff from the former tank location was evident on the east side of the building. Soil gas samples were analyzed for hydrocarbon vapors (USAF 2013b).
- In 2012, a Phase 1 Source Evaluation was conducted at Source Areas SO075 and SO516. A total of 11 surface samples and 12 subsurface samples were collected from six soil boring locations. Groundwater grab samples were collected from four collocated borings and two groundwater monitoring wells. Surface soil, subsurface soil, and groundwater samples were analyzed for GRO, DRO, residual-range organics (RRO), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals (USAF 2013b). Arsenic, chromium, and thallium exceeded PSLs but not BTVs (where applicable) in surface and subsurface soil. No other analytes exceed PSLs (USAF 2018b).
- In 2015, seven soil samples (six primary samples and one field duplicate sample) were collected from three soil borings advanced near the former UST excavation footprint. Two surface soil samples were also collected: one from north of the presumed floor-drain-discharge point to the UIW and one from the end of the concrete spillway. Soil samples were submitted for analysis of GRO, DRO, RRO, VOCs, PAHs, SVOCs, and metals. Two primary groundwater samples were collected from two temporary well points that were collocated with two soil borings; these samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, SVOCs, 1,2-dibromoethane (EDB), and metals (USAF 2018b). No elevated photoionization detector readings or olfactory indications of contamination were noted. Benzene was nondetect in all soil samples collected at SO075 in 2015, including beneath the former AST (historical sample location 1301SS02500.6). Analytical subsurface soil samples collected from 4 to 6 feet bgs and 6 to 8 feet bgs were nondetect for benzene. Naphthalene concentrations exceed PSLs in one surface soil sample (SO075SS02), and metals (arsenic, manganese) exceed PSLs and BTVs in the same surface soil sample.

3.1.1.1 Operational History

The well house (Building 285) and a water main were installed during the 1990s and now supply water during emergencies. In 1990, a former 200-gallon diesel fuel UST was removed from south of Building 285 and replaced by a 100-gallon diesel fuel AST. A former 30- to 40-gallon diesel and heating fuel AST located along the southeast corner of the building was removed in 1997. A concrete spillway, fed by two overflow drains, exits on the east side of Building 285. A concrete-lined sump along the interior, western wall of Building 285 discharges to the ground surface at the northwest corner of Building 285 via a 1-inch (estimated) pipe. The UIW system and drainage were designated under Source Area SO516. In 2005, ADEC designated Source

Area SO516 as no further action (NFA) but stipulated that the AST and UIW would need to be addressed under SO075 (USAF 2013b).

3.1.1.2 Known or Suspected Sources of POL- or Petroleum-Related Contamination

The suspected primary sources of contamination are surface spills and leaks from former and existing ASTs, and subsurface spills and leaks from a former UST and UIW. Specific volumes of the suspected releases are not known. No source-area-related contamination was identified in groundwater; although a historical (1996) benzene exceedance in groundwater was identified northwest of the well house, the potential source of contamination has been removed and groundwater concentrations are now below cleanup levels. Soil results indicate petroleum-related compounds are found just north of the end of the concrete culvert connected to Building 285.

3.1.1.3 Current and Anticipated Future Land Use

The well in Building 285 is currently used to supply water during emergencies (USAF 2013b). A forested area that separates Building 285 from Garrison Slough is located approximately 500 feet to the east. No other buildings, aside from the well house, are located within the source area boundary. During SC activities, the 100-gallon diesel fuel AST was confirmed south of Building 285 (USAF 2018b). The industrial nature of the site is unlikely to change in the near future. No changes to current activities are anticipated and no construction is planned.

3.1.2 Assessment of SO075

CSMs, POL-related COCs, non-petroleum-related COPCs, and the extent of contamination were evaluated to assist in selecting the appropriate remedy for Source Area SO075. The CSM scoping and graphic forms are presented in Appendix B.

Exposure media and pathways at Source Area SO075 are dermal exposure or ingestion of contaminated soil (surface and subsurface), and the potential for future ingestion, dermal contact, or inhalation of surface water and groundwater contaminants. Inhalation of fugitive

dust and inhalation of VOCs in outdoor air as a result of soil and groundwater contamination are potential exposure pathways. Current and future receptors for soil and groundwater media include commercial or industrial workers; construction workers; and site visitors, trespassers, or recreational users. Future receptors include hypothetical residents. The area is not used for hunting, subsistence, or farming.

3.1.2.1 POL-Related Chemicals of Concern and Non-Petroleum-Related Chemicals of Potential Concern

The POL-related soil COC for Source Area SO075 is listed in Table 3-1, along with its corresponding 2017 and 2018 cleanup levels. Benzo(a)pyrene was proposed as a POL-related COC in soil in the SCRI because the MDC exceeded the 2017 ADEC cleanup level (ADEC 2017c). However, the MDC is less than the 2018 ADEC cleanup level (ADEC 2018b); therefore, benzo(a)pyrene was removed from the list of soil COCs for this DD. No POL-related groundwater COCs were identified at Source Area SO075.

The following analytes were not retained as soil or groundwater POL-related COCs or non-petroleum-related COPCs in the SCRI even though the calculated risk exceeded a 1×10^{-5} lifetime cancer risk value or an HI of 1 in the Cumulative Risk Evaluation:

- In soil, arsenic and manganese were identified above PSLs and BTVs but do not correlate with POL exceedances. In addition, hypothesis testing was completed for arsenic and manganese in soil at Source Area SO075. The results indicate that concentrations of arsenic and manganese are consistent with background concentrations and are presented in Appendix M of the SCRI (USAF 2018b). All metals in soil at SO075 are considered naturally occurring.
- Based on the 2012 qualified thallium results at SO075, the widespread detections at similar levels for multiple source areas, and the lack of similar thallium detections in recent samples, thallium is not a non-petroleum-related soil COPC at SO075 (USAF 2018b). This DD only addresses POL- and petroleum-related contamination; therefore, any further investigation or remediation activities related to thallium at this site will be done under the three-party agreement.
- Benzene was present in one historical (1996) groundwater sample from monitoring well 1301-MW02, north of Building 285 along the roadside, but benzene was not detected at this monitoring well in 2012. The historical source was understood to be the former AST, UST, and drainage outfall associated with the UIW at Building 285. In 2015, one temporary well point (SO075TW02) was placed between the former benzene exceedance and the assumed

source; no analytes exceeded PSLs. Analytical results from SO075TW02 were nondetect for benzene, indicating that the 1996 benzene exceedance in groundwater downgradient from the site is either unrelated to site activities at SO075, or the former benzene plume has dissipated through natural degradation (USAF 2018b).

Table 3-1
POL-Related Soil COC at Source Area SO075 with Comparison of Cleanup Levels

COC	MDC (mg/kg)	Year of Maximum Detection[1]	ADEC 2017 Soil Cleanup Level[2] (mg/kg)	ADEC 2018 Soil Cleanup Level[3] (mg/kg)
Naphthalene	0.15	2015	0.038	0.038

Notes:
[1] MDC in soil is the MDC for any specific analyte.
[2] 18 AAC 75 Table B1, Method Two most conservative of under-40-inch-zone human health or migration to groundwater (ADEC 2017c).
[3] 18 AAC 75 Table B1, Method Two most conservative of under-40-inch-zone human health or migration to groundwater (ADEC 2018b).
Benz(a)pyrene was identified as a proposed POL-related COC in soil in the SCRI; however, the MDC does not exceed the 2018 ADEC cleanup level.
Bold values indicate cleanup level change.
For definitions, refer to the Acronyms and Abbreviations section.

3.1.2.2 Lateral and Vertical Extent of POL- or Petroleum-Related Contaminated Area

The maximum lateral extent of soil contamination at Source Area SO075 is presented on Figure A-2.7 (Appendix A).

Soil

Naphthalene contamination in soil is present at the end of a concrete spillway, fed by two overflow drains, that exits on the east side of Building 285. The contaminated soil extends approximately 2 feet bgs and covers an area of approximately 232 square feet. The estimated volume of contaminated soil is 17.2 cubic yards (cy). The inferred vertical extent and estimated volume of soil contamination is presented in Table 3-2.

Table 3-2
POL-Related Contaminated Soil at Source Area SO075

Depth of Contamination (feet)	Area of Contamination (square feet)	Estimated Volume of Contamination[1] (cy)
0 to 2	232	17.2

Notes:
[1] Estimated volume of contamination is in place volume and does not account for expansion of material.
For definitions, refer to the Acronyms and Abbreviations section.

3.1.3 Description of Remedy for SO075

The remedial action objectives (RAOs), remedy, remedy components, and cleanup levels for naphthalene are presented in the following subsections. Any CERCLA constituents (e.g., PAHs and metals) remaining will be addressed under the three-party agreement.

3.1.3.1 Remedial Action Objectives

The following RAOs address POL-related soil contamination at Source Area SO075:

- Protect human health and the environment from risks associated with exposure to naphthalene at concentrations greater than ADEC cleanup levels in soil (Table 3-1).
- Limit or eliminate the potential for contaminant migration from soil to groundwater or from soil or groundwater to indoor or outdoor air.
- Limit or eliminate the potential for human exposure to soil contamination above ADEC cleanup levels until source area conditions support UU/UE.

3.1.3.2 Remedy and Remedy Components

Excavation with offsite disposal of contaminated soil is the remedy to address contamination in soil at Source Area SO075. The contamination at SO075 currently presents a potential risk to human health and the environment. Until the remedy can be performed, soil control areas are recommended to mitigate exposure potential (Figure A-2.7 in Appendix A). Remedy components are described in the following subsection.

Excavation

- All soil at SO075 having naphthalene concentrations greater than the applicable cleanup level will be removed to the extent practicable. If limitations to excavation are encountered during removal activities, the USAF will notify ADEC and identify a course of action. POL- or petroleum-related contaminated soil is also in areas with no existing infrastructure that would limit excavation.
- Existing sample results will guide initial excavation activities. Field screening of soil will be used to guide excavation until suspected clean boundaries have been achieved. Confirmation samples will be collected from suspected clean boundaries and submitted for laboratory analysis of soil COCs (Table 3-1).
- Excavation will be considered complete once analytical results are below cleanup levels or contamination has been removed to the extent practicable, as agreed to by the USAF and ADEC.
- Clean fill from an approved borrow source will be utilized as needed.

LUCs will be implemented as interim remedial actions to protect human health and the environment and will remain in place until UU/UE is achieved. Interim restrictions on soil and groundwater use as well as site access are already in place as described in the LUCIP (USAF 2015a) and shall be retained, revised, reviewed and approved by ADEC, and documented in future versions of the LUCIP.

3.1.3.3 Cleanup Level for POL- or Petroleum-Related COC at SO075

The regulatory-based cleanup level for naphthalene at Source Area SO075 is shown in Table 3-3. The soil cleanup level is the most conservative of 18 AAC 75 Table B1, Method Two under 40-inch zone human health and migration to groundwater.

Table 3-3
Cleanup Level for POL-Related Soil COC at SO075

COC	Soil Cleanup Level[1] (mg/kg)
Naphthalene	0.038

Notes:
[1] 18 AAC 75 Table B1, Method Two most conservative of under-40-inch-zone human health or migration to groundwater (ADEC 2018b).
For definitions, refer to the Acronyms and Abbreviations section.

3.2 SOURCE AREA SS078 – HAZMAT AREA - CITS

Source Area SS078 corresponds to a Combat Information Training System (CITS) hazardous materials (HAZMAT) site. The source area is located adjacent to the intersection of Loop Access Road and Flightline Access Road (Figures A-3.1 through A-3.7). Contamination sources are suspected to include leaks and spills from active pipelines, a former pipeline, a former refueling station, and the adjacent runways and taxiways.

3.2.1 SS078 Background

Detailed descriptions of environmental investigations and analytical results at Source Area SS078 are presented in Section 4.16 of the SCRI (USAF 2018b). Soil and groundwater sample locations are presented on Figures A-3.1 through A-3.7 (Appendix A). A timeline of environmental investigations at SS078 is provided here:

- In 2000, two subsurface samples were collected during installation of the CITS communication line south of the hazardous waste facility. Analysis indicated hydrocarbon contamination at the groundwater interface (smear zone) (USAF 2003).
- In 2002, 11 soil gas probes and four monitoring wells were installed, and eight soil borings were advanced. The locations of soil borings and groundwater wells were based on soil gas results. Soil and groundwater samples were analyzed for GRO, DRO, RRO, and BTEX (USAF 2003). DRO and benzene were detected above PSLs in soil southwest of the AST containment area. Benzene contamination was also identified above PSLs in soil southeast of the intersection of the runways. In groundwater, all analytes except RRO were above PSLs (USAF 2018b).
- In 2004, three soil borings were advanced and five temporary wells were sampled as part of an SC. Nine soil samples (including a field duplicate sample) were collected from the soil borings and analyzed for BTEX and total lead; one sample was also analyzed for PAHs. Eight groundwater samples were collected and analyzed for GRO, DRO, RRO, BTEX, and total lead (USAF 2005b). In soil, none of the analytes exceeded PSLs. In groundwater, GRO, DRO, BTEX, and total lead were measured above PSLs (USAF 2018b).
- In 2012, six surface soil samples from three soil boring locations under the Phase I source evaluation. Three groundwater samples were also collected from temporary well points collocated with the three soil boring locations. Subsurface soil samples from deeper than 6 feet bgs were not collected from soil borings due to insufficient soil recovery. All samples were analyzed for GRO, DRO, RRO, VOCs, and SVOCs (USAF 2013b). Benzo(a)pyrene and naphthalene exceeded the PSL in surface soil. No analytes exceed PSLs in groundwater (USAF 2018b).

- In 2015, five collocated soil boring/temporary well point pairs were sampled south (upgradient) of Source Area SS078. A total of 11 soil samples (10 primary samples and one field duplicate sample) were collected from five soil borings. Soil samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, and metals. Five groundwater grab samples were collected from the temporary well points. Groundwater samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, EDB, and metals (USAF 2018b). GRO, DRO, some VOCs (1,2,4-TMB, 1,3,5-TMB, ethylbenzene, and xylenes), and some PAHs (naphthalene, 1-methylnaphthalene, and 2- methylnaphthalene) exceed PSLs in subsurface soil. Metals do not exceed PSLs in any soil samples. GRO, DRO, VOCs (benzene, 1,2,4-TMB, 1,3,5-TMB, ethylbenzene, and xylenes), PAHs (naphthalene, 1-methylnaphthalene), and metals (arsenic, iron, lead, chromium, and manganese) exceed PSLs in groundwater. Arsenic, iron, lead, chromium, and manganese exceed both PSLs and BTVs (where applicable) in some groundwater samples.
- In 2017, all historical and SC analytical results were compared to recently promulgated ADEC cleanup levels. Based on the new cleanup levels, two additional temporary well points were sampled. Groundwater samples were analyzed for DRO, GRO, and fuel-related VOCs (USAF 2018b). In addition, a 2017 SC investigation occurred at adjacent Source Area PL089, where a pipeline rupture released aviation fuel to the ground surface and was subsequently excavated. During the 2017 SC investigation, two soil borings intersected DRO and GRO contamination in soil at the groundwater interface, approximately 200 feet cross-gradient from the known fuel line rupture. DRO and GRO contamination exceeding PSLs in subsurface soil at PL089SB11 and PL089SB14 is interpreted to be associated with source area contamination originating from SS078 (USAF 2018b).

3.2.1.1 Operational History

Soil contaminated with petroleum hydrocarbons was initially discovered at Source Area SS078 during installation of the CITS communication line in 2000 (USAF 2013b). SS078 was added to the ADEC CSP database in 2001 (File No. 107.38.098, Hazard ID 3690). The ADEC lists Source Area SS078 as the southern extension of Source Area DP026 in its CSP database (ADEC 2018a). Prior to demolition, Facility 1354 was located east of this source area (USAF 2018b).

3.2.1.2 Known or Suspected Sources of POL- or Petroleum-Related Contamination

Contamination at SS078 includes GRO, DRO, VOCs, and PAHs in subsurface soil and groundwater. The suspected primary release mechanisms are subsurface leaks and spills from former and active pipelines, and surface leaks and spills from a former refueling station and activity on adjacent runways and taxiways. GRO and DRO groundwater contamination east of

Taxiways Echo and Foxtrot is believed to be the result of a plume of a light non-aqueous phase liquid on groundwater (USAF 2018b). Specific volumes of the suspected releases are not known.

3.2.1.3 Current and Anticipated Future Land Use

Source Area SS078 is an open, flat, grass-covered area containing no buildings within the airfield fence. Installation Restoration Program (IRP) Source Areas ST013 and DP026 are located downgradient (north-northeast) of Source Area SS078. A CERCLA tank farm site is located north-northeast of SS078 within Source Area DP026. A product recovery UST and a waste storage UST are located to the north of Source Area SS078 within Source Area ST013. Source Area SS078 is near two active pipelines, an abandoned pipeline corridor, and a refueling station, approximately 600 feet south and upgradient of the hazardous waste facility area (USAF 2018b). The industrial nature of the site is unlikely to change in the near future. No changes to current activities are anticipated and no construction is planned for Source Area SS078.

3.2.2 Assessment of SS078

CSMs, POL-related COCs, non-petroleum-related COPCs, and the extent of contamination were evaluated to assist in selecting the appropriate remedy for Source Area SS078. The CSM scoping and graphic forms are presented in Appendix B.

Exposure media and pathways at SS078 are dermal exposure or ingestion of contaminated soil (surface and subsurface) and the potential for future ingestion, dermal contact, or inhalation of groundwater contaminants. Inhalation of VOCs in air as a result of soil and groundwater contamination is a potential exposure pathway. Current and future receptors for soil and groundwater media include commercial or industrial workers and construction workers. Future receptors include hypothetical residents. The area is not used for hunting, subsistence, or farming. SS078 is not considered ecological habitat due to the industrial nature of the site.

3.2.2.1 POL-Related Chemicals of Concern and Non-Petroleum-Related Chemicals of Potential Concern

The POL-related soil and groundwater COCs and non-petroleum-related groundwater COPCs for Source Area SS078 are listed in Table 3-4 and Table 3-5, along with their corresponding 2017 and 2018 cleanup levels.

Table 3-4
POL-Related Soil COCs at Source Area SS078 with Comparison of Cleanup Levels

COC	MDC (mg/kg)	Year of Maximum Detection[1]	ADEC 2017 Soil Cleanup Level[2] (mg/kg)	ADEC 2018 Soil Cleanup Level[3] (mg/kg)
Benzene	0.445	2002	0.022	0.022
DRO	3460	2002	250	250
Ethylbenzene	1 JS+	2015	0.13	0.13
GRO	1800	2015	300	300
Benzo(a)pyrene	1.51 J	2012	0.2	1.5
1-Methylnaphthalene	1.4	2015	0.41	0.41
2-Methylnaphthalene	2.2	2015	1.3	1.3
Naphthalene	0.54	2015	0.038	0.038
1,2,4-TMB	16	2016	0.16	**0.61**
1,3,5-TMB	5.9 JS+	2015	1.3	**0.66**
Xylenes	12	2015	1.5	1.5

Notes:
[1] The MDC in soil is the MDC for any specific analyte.
[2] 18 AAC 75 Table B1, Method Two most conservative of under-40-inch-zone human health or migration to groundwater and Table B2, Method Two under 40-inch zone migration to groundwater (ADEC 2017c).
[3] 18 AAC 75 Table B1, Method Two most conservative of under-40-inch-zone human health or migration to groundwater and Table B2, Method Two under 40-inch zone migration to groundwater (ADEC 2018b).
J = The analyte was positively identified; however, the associated result was less than the limit of quantitation but greater than or equal to the detection limit.
JS+ = The result is potentially biased high because at least one surrogate failed recovery criteria for that sample.
Bold values indicate cleanup level change.
For definitions, refer to the Acronyms and Abbreviations section.

Table 3-5
POL-Related Groundwater COCs and Non-Petroleum-Related Groundwater COPCs at Source Area SS078 with Comparison of Cleanup Levels

COC or COPC	MDC (mg/L)	Year of Maximum Detection[1]	ADEC 2017 Groundwater Cleanup Level[2] (mg/L)	ADEC 2018 Groundwater Cleanup Level[3] (mg/L)
Benzene	0.58	2002	0.0046	0.0046
EDB	0.026	2002	0.000075	0.000075
DRO	4.58	2002	0.015	1.5
Ethylbenzene	2.8	2002	0.015	0.015
GRO	46.7	2002	2.2	2.2
1-Methylnaphthalene	0.017	2015	0.011	0.011
Naphthalene	0.26	2002	0.0017	0.0017
1,2,4-TMB	0.88	2002	0.015	**0.056**
1,3,5-TMB	0.53	2002	0.12	**0.060**
Toluene	2.4	2002	1.1	1.1
Xylenes	18	2002	0.19	0.19
Arsenic[4,6]	0.0223	2015	0.00052	0.00052
Iron[4,5,6]	24.8	2015	14	14
Lead[4]	0.0628	2004	0.015	0.015
Manganese[4,6]	18.3	2015	-	0.43

Notes:
[1] The MDC in groundwater is the maximum of the most recent sampling year for any specific analyte.
[2] 18 AAC 75 Table C, groundwater cleanup levels (ADEC 2017c).
[3] 18 AAC 75 Table C, groundwater cleanup levels (ADEC 2018b).
[4] Added as a COC in groundwater based on the results of hypothesis testing (SCRI, Appendix M).
[5] ADEC has not established a groundwater cleanup level for iron in ADEC 18 AAC 75, Table C (ADEC 2018b). The human health cleanup level for iron was calculated by ADEC during review of PBR SCRII (USAF 2019b); calculations were performed using the ADEC Method 3 Calculator and parameters from the EPA Regional Screening Level.
[6] Non-petroleum-related COPC to be addressed under the three-party agreement; remediation is not within the scope of this DD.
- No 2017 cleanup level was assigned for manganese in groundwater (ADEC 2017c).
Bold values indicate cleanup level change.
For definitions, refer to the Acronyms and Abbreviations section.

3.2.2.2 Lateral and Vertical Extent of POL- or Petroleum-Related Contaminated Area

The maximum lateral extents of soil contamination at Source Area SS078 are presented on Figure A-3.7.

Soil

GRO, DRO, VOC, and PAH exceedances in soil are present south of Loop Access Road on the east and west sides of Flightline Access Road at three separate locations (Contamination Areas 01, 02, and 03), as well as in two locations (Contamination Areas 04 and 05) at the northeast corner of the Flightline Access Road intersection with Loop Access Road. Contamination is

anticipated to extend to the groundwater interface (6 to 10 feet bgs) in all areas of soil contamination. The groundwater interface may exist as a smear zone due to seasonal groundwater fluctuations in all contamination areas. Therefore, when calculating contaminated soil volumes, the depth of contaminated soil was extended by 2 feet to account for seasonal fluctuations in the depth to groundwater. The total volume of contaminated soil at SS078 is estimated at 6,130 cy. The inferred vertical extent and estimated volume of soil contamination in each area are presented in Table 3-6.

Table 3-6
POL-Related Contaminated Soil at Source Area SS078

Location of Contamination	Depth of Contamination (feet)	Area of Contamination (square feet)	Estimated Volume of Contamination[1] (cy)
01	5 to 12*	10,810	2,800
02	6 to 9*	12,870	2,380
03	6.5 to 8*	4,975	645
04	2 to 8*	625	185
05	6 to 9*	635	120
		Total	6,130

Notes:
[1] Estimated volume of contamination is in place volume and does not account for expansion of material.
*Depth of contaminated soil extended by 2 feet to account for seasonal fluctuations of the groundwater table.

Groundwater

Fuel, VOC, PAH, and metals contamination in groundwater is present in three separate areas along Flightline Access Road, south of Loop Access Road. The largest plume extends beneath and surrounds the southern portion of Flightline Access Road. A second plume is located approximately 200 feet west of Flightline Access Road. The third plume is located approximately 200 feet east of Flightline Access Road.

3.2.3 Description of Remedy for SS078

The RAOs, remedy, remedy components, and cleanup levels for POL-related COCs are presented in the following sections. Any CERCLA constituents (e.g., PAHs and metals) remaining will be addressed under the three-party agreement.

3.2.3.1 Remedial Action Objectives

The following RAOs address POL-related soil and groundwater contamination at Source Area SS078:

- Protect human health and the environment from risks associated with exposure to POL-related COCs listed in Table 3-4 at concentrations greater than ADEC cleanup levels in soil.
- Protect human health and the environment from risks associated with exposure to POL-related COCs listed in Table 3-5 at concentrations greater than ADEC cleanup levels in groundwater.
- Limit or eliminate the potential for contaminant migration from soil to groundwater or from soil or groundwater to indoor or outdoor air.
- Limit or eliminate the potential for human exposure to soil contamination above ADEC cleanup levels until source area conditions support UU/UE.

3.2.3.2 Remedy and Remedy Components

Excavation and offsite disposal of contaminated soil and monitored natural attenuation (MNA) of groundwater is the remedy to address fuel, POL-related VOC, POL-related PAH, and POL-related metals contamination in soil and/or groundwater at Source Area SS078. The contamination at SS078 currently presents a potential risk to human health and the environment. Excavation of contaminated soil will not extend beneath Flightline Access Road or the runway until land use changes or contaminated soil becomes accessible; therefore, contamination may be left in place beneath the paved surfaces. The asphalt and concrete paved surfaces of Flightline Access Road and the runway will cap the soil left in place, preventing direct human exposure and limiting migration to groundwater. Until the final remedy can be performed, interim LUCs are recommended to mitigate exposure potential (Figure A-3.7). Remedy components are described in the following subsections.

Excavation

- All soil at SS078 with concentrations of POL- or petroleum-related COCs greater than applicable cleanup levels will be removed to the extent practicable from the area within the soil contamination extent boundary. Existing paved roadways will inhibit the complete excavation of contaminated soil in Area 01 and may inhibit complete excavation of

contaminated soil in Areas 03 and 04 along their eastern edges. Complete excavation of contaminated soil in Areas 04 and 05 may be limited by the AST farm fence line and utilities. If additional limitations to excavation are encountered during removal activities, the USAF will notify ADEC and identify a course of action. Additional limitations to excavation may include high groundwater, depending on seasonal variability. No existing structures remain onsite. The vadose zone thickness of approximately 6 to 10 feet could potentially pose technical challenges to reach contaminated soil.

- Existing sample results will guide initial excavation activities. Field screening of soil will be used to guide excavation until clean boundaries have been achieved. Confirmation samples will be collected from suspected clean boundaries and submitted for laboratory analysis of soil COCs (Table 3-7).
- Excavation will be considered complete once analytical results are below cleanup levels or contamination has been removed to the extent practicable, as agreed to by the USAF and ADEC.
- Where present, overburden will be stockpiled onsite and used as backfill. Overburden was excluded from the volume calculation. Overburden will be sampled prior to use as backfill. Clean fill from an approved borrow source will be utilized as needed.

Monitored Natural Attenuation

- Groundwater monitoring for POL-related groundwater COCs (Table 3-5) shall be conducted annually until concentrations are stable and below the applicable cleanup levels for three consecutive monitoring events. Results from groundwater monitoring will be documented in an annual monitoring report. Periodic Review will determine continued remediation and will be undertaken at a frequency not exceeding five years unless a longer timeframe is agreed upon by USAF and ADEC.
- Monitoring for POL-related metals COCs in groundwater (i.e., lead) will comply with the following:
  - Monitoring will include at least two groundwater sampling events and both unfiltered and filtered groundwater samples will be collected.
  - Filtered samples will be analyzed to evaluate any bias introduced by the filtering process.
  - If lead concentrations in filtered groundwater are less than applicable cleanup levels for two consecutive events, monitoring for metals COCs will cease; monitoring for other COCs may continue as needed.
  - These monitoring requirements apply only to POL-related metals; all other non-petroleum-related metals in groundwater (e.g., arsenic, iron, and manganese) will be addressed under the three-party agreement.
- In addition to the monitoring of groundwater COCs (Table 3-5), MNA of groundwater will include periodic assessment of the mechanism of attenuation (e.g., biodegradation) in order to predict a cleanup date. MNA-specific parameters include dissolved oxygen, nutrients,

methane, and oxidation reduction potential. MNA assessment will be conducted in conjunction with monitoring efforts to determine whether geochemical conditions remain conducive to biodegradation.

- Based on the size of the source area and the release locations, six new monitoring wells will be installed to augment the two existing monitoring wells (Figure A-3.7).

LUCs will be implemented as interim remedial actions to protect human health and the environment until UU/UE is achieved. Interim restrictions on soil and groundwater use as well as site access are already in place as described in the LUCIP, Eielson AFB, Alaska (USAF 2015a), and shall be retained, revised, reviewed, and approved by ADEC, and documented in future versions of the LUCIP.

3.2.3.3 Cleanup Levels for POL-Related COCs and Non-Petroleum-Related COPCs at SS078

The regulatory-based cleanup levels for POL-related COCs and non-petroleum-related COPCs at Source Area SS078 are shown in Table 3-7 and Table 3-8. The soil cleanup levels are the most conservative of 18 AAC 75 Tables B1 and B2, Method Two under 40-inch zone human health and migration to groundwater (ADEC 2018b). Groundwater cleanup levels are the 18 AAC 75 Table C human health cleanup levels.

Table 3-7
Cleanup Levels for POL-Related Soil COCs at SS078

COC	Soil Cleanup Level[1] (mg/kg)
Benzene	0.022
DRO	250
Ethylbenzene	0.13
GRO	300
Benzo(a)pyrene	1.5
1-Methylnaphthalene	0.41
2-Methylnaphthalene	1.3
Naphthalene	0.038
Propylbenzene	9.1
1,2,4-TMB	0.61
1,3,5-TMB	0.66
Xylenes	1.5

Notes:
[1] 18 AAC 75 Table B1, Method Two most conservative of under-40-inch-zone human health or migration to groundwater and Table B2, Method Two under 40-inch zone migration to groundwater (ADEC 2018b)
For definitions, refer to the Acronyms and Abbreviations section.

Table 3-8
Cleanup Levels for Groundwater COCs and Non-Petroleum-Related Groundwater COPCs at SS078

COC or COPC	Groundwater Cleanup Level[1] (mg/L)
Benzene	0.0046
DRO	1.5
Ethylbenzene	0.015
EDB	0.000075
GRO	2.2
1-Methylnaphthalene	0.011
Naphthalene	0.0017
1,2,4-TMB	0.056
1,3,5-TMB	0.060
Toluene	1.1
Xylenes	0.19
Arsenic[3]	0.00052
Iron[2]	14
Lead	0.015
Manganese[3]	0.43

Notes:
[1] 18 AAC 75 Table C, groundwater cleanup levels (ADEC 2018b).
[2] ADEC has not established a groundwater cleanup level for iron in ADEC 18 AAC 75, Table C (ADEC 2018b). The human health cleanup level for iron was calculated by ADEC during review of PBR SCRII (USAF 2019b); calculations were performed using the ADEC Method 3 Calculator and parameters from the EPA Regional Screening Level.
[3] Non-petroleum-related COPC to be addressed under the three-party Agreement.
For definitions, refer to the Acronyms and Abbreviations section.

3.3 SOURCE AREA SO504 – BUILDING 588 (FACILITY 1344)/ FIVE USTS

Source Area SO504 is located on the south side of Loop Access Road in the developed area of Eielson AFB (Figure A-1). Building 588 (Facility 1344) is located directly south of Source Area SO504. IRP Source Area ST020, the E-9 refueling loop, is located east of Building 588. Source Area SO504 is predominantly paved, with grassy lots to the west, north, and east of the source area (USAF 2013c). Contamination sources are suspected to include spills and leaks from five USTs and the associated piping (USAF 2013b).

3.3.1 SO504 Background

Detailed descriptions of environmental investigations and analytical results at Source Area SO504 are presented in Section 4.18 of the SCRI (USAF 2018b). A timeline of environmental investigations at Source Area SO504 is provided here:

- In 1994, soil samples were collected during the excavation and removal of the five USTs at Building 588. Soil samples were collected from undisturbed soil at approximately 6 to 6.5 feet bgs from locations beneath the former USTs. Samples collected from beneath the oily water and used oil USTs were analyzed for GRO, DRO, total recoverable petroleum hydrocarbons, and BTEX. Samples collected from beneath the JP-4 UST were analyzed for DRO and BTEX. Samples collected from beneath the hydraulic oil UST were analyzed for total recoverable petroleum hydrocarbons. Samples collected from beneath the methylene chloride tank were analyzed for halogenated VOCs (USAF 2013b). All soil sample concentrations were below PSLs except for methylene chloride in two subsurface soil samples collected from beneath the methylene chloride tank. Methylene chloride was also present in the method blanks for these two samples (USAF 2018b).
- In 2012, soil and groundwater samples were collected as part of a Phase I source evaluation. Six surface and five subsurface soil samples from three soil borings were collected and analyzed for GRO, DRO, RRO, VOCs, SVOCs, polychlorinated biphenyls (PCBs), and total metals. One groundwater sample was collected and analyzed for GRO, DRO, RRO, VOCs, SVOCs, PCBs, and total metals (USAF 2013b). Naphthalene exceeded the PSL in one subsurface soil sample and arsenic, chromium, and thallium concentrations exceeded the PSLs but not the BTVs (where applicable) in some soil samples (USAF 2018b).
- In 2016, soil, groundwater, and soil gas samples were collected. Six soil samples were collected and analyzed for GRO, DRO, RRO, VOCs, PAHs, PCBs, and metals. Eight groundwater samples were collected. Five groundwater samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, and metals. Two groundwater samples were analyzed for VOCs and metals. One groundwater sample was analyzed for filtered and unfiltered metals. Three near-slab soil gas samples were collected and analyzed for VOCs (USAF 2018b). Metals (arsenic, chromium, and iron) exceed PSLs in subsurface soil samples but do not exceed

BTVs; no other analytes exceed PSLs in soil. Two of the three primary soil gas samples exceeded PSLs for dichlorodifluoromethane (Freon-12). Arsenic, chromium, cobalt, iron, lead, manganese, and thallium exceed PSLs in unfiltered groundwater samples from Source Area SO504. Under Stage II, dissolved metals were analyzed at SO504TW09, SO504TW10, and SO504TW11; filtered samples from SO504TW09 and SO504TW10 do not contain any dissolved metals exceeding both PSLs and BTVs. Groundwater at SO504TW11 contains dissolved chromium and dissolved cobalt at concentrations exceeding both PSLs and BTVs; no other analytes exceed PSLs.

3.3.1.1 Operational History

Source Area SO504 is the former location of five USTs and associated piping that were removed in 1994. The five USTs, reportedly installed in 1987, were located inside the north interior wall of the Phase Hangar (Building 588):

- Tank 19: 500-gallon hydraulic oil UST
- Tank 20: 500-gallon JP-4 UST
- Tank 21: 500-gallon used oil UST
- Tank 22: 1,000-gallon oily water UST
- Tank 23: 1,000-gallon methylene chloride UST

3.3.1.2 Known or Suspected Sources of POL- or Petroleum-Related Contamination

The suspected primary source of contamination was assumed to be subsurface spills and leaks from USTs and associated piping (USAF 2013b). Specific volumes of the suspected releases are not known. No source-area-related contamination was identified in soil, groundwater, or soil gas at Source Area SO504.

3.3.1.3 Current and Anticipated Future Land Use

Source Area SO504 is located in an industrialized area in an active part of Eielson AFB. Building 588, the Phase Hangar, is actively used within the source area. The industrial nature of the site is unlikely to change in the near future. No changes to current site use are anticipated and no construction is planned.

3.3.2 Assessment of SO504

CSMs, POL-related COCs, non-petroleum-related COPCs, and the extent of contamination were evaluated to assist in selecting the appropriate remedy for Source Area SO504. The CSM scoping and graphic forms are presented in Appendix B. There are no current or future receptors because of the lack of POL-related contamination at SO504.

3.3.2.1 POL-Related Chemicals of Concern and Non-Petroleum-Related Chemicals of Potential Concern

There are no POL-related COCs for Source Area SO504.

The following analytes were not retained as non-petroleum-related soil and groundwater COPCs in the SCRI even though the calculated risk exceeded a 1×10^{-5} lifetime cancer risk value or an HI of 1 in the Cumulative Risk Evaluation:

- Based on the 2012 qualified thallium results at SO504, the widespread detections at similar levels for multiple source areas, and the lack of similar thallium detections in recent samples, thallium is not a non-petroleum-related soil COPC at SO504 (USAF 2018b).
- Hypothesis testing was completed for arsenic, cobalt, and iron in groundwater at Source Area SO504. The results indicate that arsenic concentrations are consistent with background concentrations (USAF 2018b).
- Filtered and unfiltered samples were collected under Stage II of the 2016 investigation in order to rule out turbidity as the source of elevated lead, thallium, and other metals in groundwater at SO504TW03. SO504TW03 was re-advanced and re-sampled as SO504TW09, and filtered and unfiltered samples were collected from SO504TW09. No metals (including thallium) exceeded PSLs in filtered samples from SO504TW09; therefore, thallium is not proposed as a non-petroleum-related COPC in groundwater.

3.3.2.2 Lateral and Vertical Extent of POL- or Petroleum-Related Contaminated Area

There is no remaining POL-related contamination as a result of a release at Source Area SO504.

3.3.3 Description of Remedy for SO504

NFA is the remedy for POL-related contamination at this site.

3.3.3.1 Remedial Action Objectives

No RAOs are necessary at Source Area SO504 because no POL-related contamination is present.

3.3.4 No Further Action Required for Petroleum

A determination of No Further Action Required for Petroleum in Any Media is recommended for Source Area SO504 based on the historical results and SC activities from the SC report (SCR) (USAF 2018b). Any CERCLA constituents (e.g., metals) remaining will be addressed under the three-party agreement. All analytical data, as published in the SCRI, will be maintained by the USAF and made available to ADEC upon request for at least 50 years after submission of the report to ADEC.

3.3.4.1 Support for Site NFA on Petroleum Determination

No POL- or petroleum-related contaminants as a result of the source area release were detected at concentrations greater than ADEC cleanup levels; the SCRI (USAF 2018b) describes investigative methods and analytical results for Source Area SO504.

3.4 SOURCE AREA MY512 – FORMER BOAT SHOP

Source Area MY512 is located in the yard of the former boat shop, Facility 4231 (Figure A-4.1 through A-4.7). Facility 4231 is located on the northeast corner of the intersection of Flightline Avenue and Quarry Road, east of the southern half of the runway. Source Area MY512 is approximately 1,000 feet north (downgradient) of IRP Source Area SS037, which was a mixing area for asphalt and a staging area for road oiling. Contamination sources are suspected to include leaks from former ASTs and a fuel pump island (USAF 2013b).

3.4.1 MY512 Background

Detailed descriptions of environmental investigations and analytical results at Source Area MY512 are presented in Section 4.20 of the SCRI (USAF 2018b). Soil and groundwater sample

locations are presented on Figures A-4.1 through A-4.7 (Appendix A). A timeline of environmental investigations at MY512 is provided here:

- In 1997, the gasoline AST was removed. Soil samples were collected and analyzed for an unknown analytical suite (USAF 2013b). Sampling during the removal of the AST in 1997 identified GRO and BTEX concentrations above ADEC soil cleanup levels (USAF 2018b).
- In 2002, soil sampling and a soil gas survey were performed in a grid pattern east of the former AST. Results of the sampling and survey were used to guide an excavation and removal of 130 cy of contaminated soil. GRO and BTEX contaminated soil was left in place (USAF 2005a).
- In 2004, a SC was performed at MY512 to investigate locations of probable contaminant release. During this investigation, a second isolated area of contamination was identified in the area of the former fuel pump island. An excavation removed 700 cy of soil from the area of the former AST and fuel pump island. Contamination remained along the sidewall and base of the excavation. Furthermore, benzene contamination was identified in groundwater 30 to 85 feet downgradient of the pump island (USAF 2005a).
- In 2012, soil and groundwater samples were collected as part of a Phase I source evaluation. Five surface soil and six subsurface soil samples were collected from three boring locations and analyzed for GRO, DRO, RRO, VOCs, SVOCs, and metals. Three groundwater samples were collected and analyzed for GRO, DRO, RRO, VOCs, SVOCs, and total metals (USAF 2013b). None of these samples had GRO or BTEX above the PSLs; however, methylene chloride, benzo(a)pyrene, and metals all exceeded PSLs in soil and/or groundwater. Methylene chloride was identified as a laboratory contaminant, benzo(a)pyrene was attributed to vehicle exhaust, and cobalt and lead in groundwater were attributed to ex situ issues (the blank was similarly contaminated) (USAF 2018b).
- In 2015, soil, groundwater, and soil gas samples were collected as part of the Phase I SC. Twenty soil samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, and metals. Five groundwater samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, EDB, and metals. Four soil gas samples were collected from three locations near Facility 4231 and analyzed for VOCs (USAF 2018b). During Stage II, seven soil samples and three groundwater samples were collected and analyzed for DRO, RRO, and PAHs; one soil sample was also analyzed for GRO and VOCs. A soil gas sample was re-sampled and analyzed for VOCs due to an inadequate sample volume collected during Phase I. Arsenic and chromium exceeded PSLs in subsurface soil at MY512; no other analytes exceeded PSLs in soil. In groundwater, DRO and RRO are present at concentrations above PSLs. Arsenic, chromium, cobalt, and manganese exceed PSLs and BTVs in four temporary wellpoints and chromium exceeds BTVs at two locations (USAF 2018b).

3.4.1.1 Operational History

Former facilities at Source Area MY512 include the former boat shop, a former 1,000-gallon AST, and an associated fuel pump island that stored and distributed gasoline. The AST and fuel

pump island were removed in 1997. Facility 4231 currently houses the Liquid Fuels Maintenance Shop offices (Figure A-4.7).

3.4.1.2 Known or Suspected Sources of POL- or Petroleum-Related Contamination

Contamination at Source Area MY512 includes naphthalene in soil and VOCs and metals in groundwater. The suspected primary sources of contamination are assumed to be surface leaks and spills from ASTs and subsurface leaks and spills from a fuel pump island that stored and distributed gasoline. Specific volumes of the suspected releases are not known. Fuel contamination in groundwater is not associated with potential sources of contamination at MY512 as it was identified during the 2015 SC (USAF 2018b) and is suspected to be sourced from an upgradient plume of DRO and RRO contamination.

3.4.1.3 Current and Anticipated Future Land Use

Source Area MY512 is situated in the former boat shop, Facility 4231, and currently houses the Liquid Fuels Maintenance Shop offices. Most of the site surface is compacted gravel with several poured concrete slabs (USAF 2013b). The industrial nature of the site is unlikely to change in the near future. No changes to current site use are anticipated and no construction is planned.

3.4.2 Assessment of MY512

CSMs, POL-related COCs, non-petroleum-related COPCs, and the extent of contamination were evaluated to assist in selecting the appropriate remedy for Source Area MY512. The CSM scoping and graphic forms are presented in Appendix B.

Exposure media and pathways at Source Area MY512 are dermal exposure or ingestion of contaminated soil (surface and subsurface) and the potential for future ingestion, dermal contact, or inhalation of groundwater contaminants. Inhalation of VOCs in air as a result of soil and groundwater contamination is a potential exposure pathway. Current and future receptors for soil and groundwater media include commercial or industrial workers and construction

workers. Future receptors include hypothetical residents. The area is not used for hunting, subsistence, or farming. Source Area MY512 is not considered ecological habitat due to the industrial nature of the site.

3.4.2.1 POL-Related Chemicals of Concern and Non-Petroleum-Related Chemicals of Potential Concern

The POL-related soil and groundwater COCs and non-petroleum-related groundwater COPCs for Source Area MY512 are listed in Table 3-9 and Table 3-10, along with their corresponding 2017 and 2018 cleanup levels. Benzo(a)anthracene and benzo(a)pyrene were proposed as POL-related COCs in soil in the SCRI because the MDCs exceeded the 2017 ADEC cleanup levels (ADEC 2017c). However, the MDCs are less than the 2018 ADEC cleanup levels (ADEC 2018b); therefore, benzo(a)anthracene and benzo(a)pyrene were removed from the list of POL-related soil COCs for this DD.

The following analytes were not retained as non-petroleum-related soil and groundwater COPCs in the SCRI even though the calculated risk exceeded a 1×10^{-5} lifetime cancer risk value or an HI of 1 in the Cumulative Risk Evaluation:

- Hypothesis testing was completed for arsenic in soil at Source Area MY512. The results indicate that arsenic concentrations are consistent with background concentrations (USAF 2018b).
- Hypothesis testing was completed for arsenic, cobalt, and manganese in groundwater at Source Area MY512. The results indicate that cobalt and manganese concentrations are consistent with background concentrations in groundwater (USAF 2018b).

Table 3-9
POL-Related Soil COC at Source Area MY512 with Comparison of Cleanup Levels

COC	MDC (mg/kg)	Year of Maximum Detection[1]	ADEC 2017 Soil Cleanup Level[2] (mg/kg)	ADEC 2018 Soil Cleanup Level[3] (mg/kg)
Naphthalene	0.052	2012	0.038	0.038

Notes:
[1] The MDC in soil is the MDC for any specific analyte.
[2] 18 AAC 75 Table B1, Method Two most conservative of under-40-inch-zone human health or migration to groundwater (ADEC 2017c).
[3] 18 AAC 75 Table B1, Method Two most conservative of under-40-inch-zone human health or migration to groundwater (ADEC 2018b).
Benzo(a)anthracene and benzo(a)pyrene were identified as proposed COCs in soil in the SCRI; however, the MDCs do not exceed the 2018 ADEC cleanup levels.
For definitions, refer to the Acronyms and Abbreviations section.

Table 3-10
POL-Related Groundwater COCs and Non-Petroleum-Related Groundwater COPCs at Source Area MY512 with Comparison of Cleanup Levels

COC or COPC	MDC (mg/L)	Year of Maximum Detection[1]	ADEC 2017 Groundwater Cleanup Level[2] (mg/L)	ADEC 2018 Groundwater Cleanup Level[3] (mg/L)
Benzene	0.135	2004	0.0046	0.0046
Ethylbenzene	0.021	2004	0.015	0.015
Xylenes	0.205	2004	0.19	0.19
Arsenic[4,5]	0.02	2004	0.00052	0.00052

Notes:
[1] The MDC in groundwater is the maximum of the most recent sampling year for any specific analyte.
[2] 18 AAC 75 Table C, groundwater cleanup levels (ADEC 2017c).
[3] 18 AAC 75 Table C, groundwater cleanup levels (ADEC 2018b).
[4] Added as a COPC in groundwater based on the results of hypothesis testing (SCRI, Appendix M).
[5] Non-petroleum-related COPC to be addressed under the three-party agreement; remediation is not within the scope of this DD.
For definitions, refer to the Acronyms and Abbreviations section.

3.4.2.2 Lateral and Vertical Extent of POL- or Petroleum-Related Contaminated Area

The maximum lateral extents of soil and groundwater contamination at Source Area MY512 are presented on Figure A-4.7.

Soil

Naphthalene contaminated soil is present on the southern edge of the historical excavation. Contamination associated with sample EIC512DP002SO01 is anticipated to extend vertically

from 0 to 1 foot bgs. The inferred vertical extent and estimated volume of soil contamination is presented in Table 3-11.

Table 3-11
POL-Related Contaminated Soil at Source Area MY512

Location of Contamination	Depth of Contamination (feet)	Area of Contamination (square feet)	Estimated Volume of Contamination[1] (cy)
DP002SO01-01	0 to 1	605	22.4
		Total	22.4

Notes:
[1] Estimated volume of contamination is in place volume and does not account for expansion of material.
For definitions, refer to the Acronyms and Abbreviations section.

Groundwater

VOC-contaminated groundwater is present surrounding the historical excavation extent. DRO and RRO contamination in groundwater exists upgradient of the suspected source. The full extent of DRO and RRO contamination in groundwater is unknown and will be investigated as a new source area under a separate effort.

3.4.3 Description of Remedy for MY512

The RAOs, remedy, remedy components, and cleanup levels for POL-related COCs and non-petroleum-related COPCs are presented in the following sections. Any CERCLA constituents (e.g., metals) remaining will be addressed under the three-party agreement.

3.4.3.1 Remedial Action Objectives

The following RAOs address POL-related soil and groundwater contamination at Source Area MY512:

- Protect human health and the environment from risks associated with exposure to POL-related COCs and COPCs listed in Table 3-9 at concentrations greater than ADEC cleanup levels in soil.
- Protect human health and the environment from risks associated with exposure to POL-related COCs and COPCs listed in Table 3-10 at concentrations greater than ADEC cleanup levels in groundwater.

- Limit or eliminate the potential for contaminant migration from soil to groundwater or from soil or groundwater to indoor or outdoor air.
- Limit or eliminate the potential for human exposure to soil contamination above ADEC cleanup levels until source area conditions support UU/UE.

3.4.3.2 Remedy and Remedy Components

Excavation and offsite disposal of contaminated soil and MNA of groundwater is the remedy to address naphthalene contamination in soil and VOC in groundwater at Source Area MY512. Metals contamination is outside the scope of this DD and will be addressed under the three-party agreement. POL-related contamination at MY512 currently presents a potential risk to human health and the environment. Until the final remedy can be performed, interim LUCs are recommended to mitigate exposure potential (Figure A-4.7). Remedy components are described in the following subsections.

Excavation

- All soil at MY512 with concentrations of POL- or petroleum-related COCs greater than applicable cleanup levels will be removed to the extent practicable from the area within the soil contamination extent boundary. If additional limitations to excavation are encountered during removal activities, the USAF will notify ADEC and identify a course of action. Additional limitations to excavation may include high groundwater, depending on seasonal variability. No existing structures interfere with excavation extents.
- Existing sample results will guide initial excavation activities. Field screening of soil will be used to guide excavation until clean boundaries have been achieved. Confirmation samples will be collected from suspected clean boundaries and submitted for laboratory analysis of the soil COC (Table 3-9).
- Excavation will be considered complete once analytical results are below cleanup levels or contamination has been removed to the extent practicable, as agreed to by the USAF and ADEC.
- Where present, overburden will be stockpiled onsite and used as backfill. Overburden was excluded from the volume calculation. Overburden will be sampled prior to use as backfill. Clean fill from an approved borrow source will be utilized, as needed.

Monitored Natural Attenuation

- Groundwater monitoring shall be conducted annually until groundwater COC concentrations (Table 3-10) are stable for three monitoring events below the applicable

cleanup levels. Results from groundwater monitoring will be documented in an annual monitoring report.

- Non-petroleum-related metals COPCs in groundwater (i.e., arsenic) will be addressed and monitored under the three-party agreement.
- In addition to the monitoring of groundwater COCs (Table 3-10), MNA of groundwater will include periodic assessment of the mechanism of attenuation (e.g., biodegradation) in order to predict a cleanup date. MNA-specific parameters include dissolved oxygen, nutrients, methane, and oxidation reduction potential. MNA assessment will be conducted in conjunction with monitoring efforts to determine whether geochemical conditions remain conducive to biodegradation and will be undertaken at a frequency not exceeding five years unless agreed by USAF and ADEC.
- Based on the size of the source area and the release locations, four new monitoring wells will be installed (Figure A-4.7).

LUCs will be implemented as interim remedial actions to protect human health and the environment until UU/UE is achieved. Interim restrictions on soil and groundwater use, as well as site access, are already in place as described in the LUCIP, Eielson AFB, Alaska (USAF 2015a), and shall be retained, revised, reviewed, and accepted by ADEC, and documented in future versions of the LUCIP.

3.4.3.3 Cleanup Levels for POL-Related COCs and Non-Petroleum-Related COPCs at MY512

The regulatory-based cleanup levels for POL-related COCs and non-petroleum-related COPCs at Source Area MY512 are shown in Table 3-12 and Table 3-13. The soil cleanup level is the most conservative of 18 AAC 75 Table B1, Method Two under 40-inch zone human health and migration to groundwater (ADEC 2018b). Groundwater cleanup levels are the 18 AAC 75 Table C human health cleanup levels.

Table 3-12
Cleanup Level for POL-Related Soil COC at MY512

COC	Soil Cleanup Level[1] (mg/kg)
Naphthalene	0.038

Notes:
[1] 18 AAC 75 Table B1, Method Two most conservative of under-40-inch-zone human health or migration to groundwater (ADEC 2018b)
For definitions, refer to the Acronyms and Abbreviations section.

Table 3-13
Cleanup Levels for POL-Related Groundwater COCs and Non-Petroleum-Related COPCs at MY512

COC or COPC	Groundwater Cleanup Level[1] (mg/L)
Benzene	0.0046
Ethylbenzene	0.015
Xylenes	0.19
Arsenic[2]	0.00052

Notes:
[1] 18 AAC 75 Table C, groundwater cleanup levels (ADEC 2018b).
[2] Non-petroleum-related COPC to be addressed under the three-party agreement; remediation is not within the scope of this DD. For definitions, refer to the Acronyms and Abbreviations section.

3.5 SOURCE AREA MY518 – BUILDING 2275 (FACILITY 2196) CONTAMINATED SOIL DORM PARKING UTILIDOR

Source Area MY518 is located north of Building 2275 (Facility 2196), west of Wabash Avenue in a developed area near the north end of the Eielson AFB runway (Figure A-1). Building 2275 is surrounded by grass and concrete walkways. Contamination sources are suspected to include spills and leaks from vehicle maintenance activities (USAF 2013b).

3.5.1 MY518 Background

Detailed descriptions of environmental investigations and analytical results at Source Area MY518 are presented in Section 4.21 of the SCRI (USAF 2018b). A timeline of environmental investigations at MY518 is provided here:

- In 2005, soil samples were collected from potentially contaminated stockpiled soil, discovered during an utilidor excavation. Soil samples collected from stockpiled soil were analyzed for GRO, DRO, RRO, VOCs, SVOCs, and PAHs. The soil samples with the highest photoionization detector readings were also analyzed for PAHs, BTEX, and metals (USAF 2013b). DRO exceeded the PSL in all soil samples (USAF 2018b).
- In 2012, soil and groundwater samples were collected as part of the Phase 1 Source Evaluation from the suspected location of the former utilidor, west of one of the manholes at Source Area MY518. Six surface and six subsurface soil samples were analyzed for GRO, DRO, RRO, VOCs, SVOCs, and metals. Four groundwater samples were analyzed for GRO, DRO, RRO, VOCs, SVOCs, and total metals (USAF 2013b). Arsenic, chromium, and thallium concentrations exceed PSLs in surface and subsurface soil samples, but do not exceed BTVs; no other analytes exceed PSLs in soil. Arsenic, chromium, and manganese

concentrations exceed PSLs in groundwater samples; no other analytes exceed PSLs in groundwater. Concentrations of arsenic and chromium exceeded BTVs (USAF 2018b).

- In 2015, soil, groundwater, and soil gas samples were collected at Source Area MY518. Twenty soil samples were collected from nine soil borings and analyzed for GRO, DRO, RRO, VOCs, SVOCs, PAHs, and metals. Seven groundwater grab samples were collected from six temporary well points and analyzed for GRO, DRO, RRO, VOCs, SVOCs, PAHs, and metals. Four soil gas samples were collected from three locations and analyzed for VOCs (USAF 2018b). Arsenic, iron, and chromium exceed soil PSLs in several borings, but concentrations of all metals are below soil BTVs. In soil, pentachlorophenol does not exceed the ASL at MY518SB01. In groundwater, arsenic, cobalt, chromium, manganese, and iron exceed PSLs and BTVs. Although low levels of fuel-related contaminants and solvents were detected in soil gas, no analytes exceed PSLs at the three sample locations or in the field duplicate sample (USAF 2018b).

3.5.1.1 Operational History

Source Area MY518 is the site of a former vehicle maintenance shop. In 2005, the vehicle maintenance shop was demolished and Building 2275 was constructed as a three-story dormitory at the source area. Contaminated soils were discovered during excavation of a utilidor. The contaminated soils were identified in an area "west of the manhole between 60 and 75 feet and also from 150 and 190 feet." A precise description of the excavation and stained soil locations were not provided. The area was landscaped, and an associated parking lot was constructed north of Building 2275 (USAF 2013b).

3.5.1.2 Known or Suspected Sources of POL- or Petroleum-Related Contamination

The suspected primary source of contamination was assumed to be surface spills or leaks from vehicle maintenance activities. Specific volumes of the suspected releases are not known. No source-area-related contamination was identified in soil, groundwater, or soil gas at Source Area MY518.

3.5.1.3 Current and Anticipated Future Land Use

Source Area MY518 is located in an industrialized and residential area in an active part of Eielson AFB. The area is presently used as a dormitory (USAF 2013b). Land cover consists of

concrete and grass. The nature of the site is unlikely to change in the near future. No changes to current site use are anticipated and no construction is planned.

3.5.2 Assessment of MY518

CSMs, POL-related COCs, and the extent of contamination were evaluated to assist in selecting the appropriate remedy for Source Area MY518. The CSM scoping and graphic forms are presented in Appendix B. There are no current or future receptors because of the lack of contamination at MY518.

3.5.2.1 POL-Related Chemicals of Concern and Non-Petroleum-Related Chemicals of Potential Concern

There are no POL- or petroleum-related COCs for Source Area MY518.

The following analytes were not retained as non-petroleum-related soil or groundwater COCs in the SCRI even though the calculated risk exceeded a 1×10^{-5} lifetime cancer risk value or an HI of 1 in the Cumulative Risk Evaluation:

- Based on the 2012 qualified thallium results at MY518, the widespread detections at similar levels for multiple source areas, and the lack of similar thallium detections in recent samples, thallium is not a non-petroleum-related soil COPC at MY518 (USAF 2018b).
- Hypothesis testing was completed for arsenic, cobalt, iron, and manganese in groundwater at Source Area MY518. The results indicate that arsenic, cobalt, iron, and manganese concentrations are consistent with background concentrations (USAF 2018b).

3.5.2.2 Lateral and Vertical Extent of POL- or Petroleum-Related Contaminated Area

There is no remaining POL or petroleum-related contamination as a result of a release at Source Area MY518.

3.5.3 Description of Remedy at MY518

NFA is the remedy for POL- or petroleum-related contamination at this site.

3.5.3.1 Remedial Action Objectives

No RAOs are necessary at Source Area MY518 because no POL- or petroleum-related contamination is present.

3.5.4 No Further Action Required for Petroleum

A determination of No Further Action Required for Petroleum in Any Media is recommended for Source Area MY518 based on the historical results for petroleum and SC activities from the SCR (USAF 2018b). Any known CERCLA constituents remaining (e.g., metals) will be addressed under the three-party agreement. All analytical data, as published in the SCRI, will be maintained by the USAF and made available to ADEC upon request for at least 50 years after submission of the report to ADEC.

3.5.4.1 Support for Site NFA on Petroleum Determination

No POL- or petroleum-related contaminants as a result of the source area release were detected at concentrations greater than ADEC cleanup levels; the SCRI (USAF 2018b) describes investigative methods and analytical results for Source Area MY518.

PART 4: WASTE MANAGEMENT

Nonhazardous waste will be generated as part of remedy implementation at Source Areas SO075, SS078, and MY512. Anticipated waste streams are listed in Table 4-1.

Table 4-1
Projected Remedial Activities Waste

Source Area	Types of Anticipated Waste			
	Excavated Soil	Purge Water	Decontamination Water	General Trash
SO075	X		X	X
SS078	X	X	X	X
MY512	X	X	X	X

Note:
Waste generated by remedial activities at all source areas are anticipated to be nonhazardous.

Contaminated waste will be characterized, transported, and treated at an approved treatment facility in accordance with 18 AAC 60 (ADEC 2017d) and 18 AAC 75.325-390 (ADEC 2017c). Specific details regarding disposal and treatment of wastes generated from remediation efforts at each source area will be described in a future cleanup work plan that will be provided to ADEC for review and approval prior to implementation of the remedies described in this DD.

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PART 5: LAND USE CONTROLS

LUCs are legal, administrative, and/or physical mechanisms for implementing restrictions to land use and access in order to limit the exposure of future landowners and/or users of the property to hazardous or toxic substances and/or to maintain the integrity of the remedial action until the property is suitable for UU/UE. The USAF is responsible for implementing, maintaining, reporting on, and enforcing the LUCs. The USAF shall retain ultimate responsibility for remedy integrity. LUCs shall be implemented in accordance with the *Air Force Land-Use Control Checklist for Active-Duty Bases on the National Priorities List* (USAF 2015b):

Resource Uses and Risk-Exposure Assumptions.

a. The state has designated all groundwater of the state as potential drinking water. Eielson AFB currently does not use groundwater at or downgradient of the source areas addressed in this DD as drinking water sources and does not plan to do so in the future. Production intake wells that are used for drinking water at Eielson AFB are sufficiently distant and upgradient to Source Areas SO075, SS078, SO504, MY512, or MY518 that the drinking water exposure pathway is incomplete and will remain incomplete. However, to assess the need for LUCs, contamination present in the groundwater was assessed for risk under a drinking water use scenario.

b. The Base General Plan designates land use at source areas presented in this DD as industrial for both current and future classification. However, to assess the need for LUCs, contamination at the source area was assessed for UU/UE, particularly residential use.

Risks Necessitating the LUCs.

a. Residual soil contamination is not safe for residential use or for industrial or construction workers involved in soil disturbance. LUCs are, therefore, necessary to preclude such uses and to control the disposition and use of any soil excavated.

b. Groundwater is not safe for drinking or dermal absorption because contamination exceeds applicable ADEC cleanup levels. Accordingly, Eielson AFB must impose LUCs to ensure the groundwater is not used for drinking water purposes and prevent dermal exposure until it is remediated to cleanup levels.

c. Impacted surface water is not safe for recreational use, such as swimming or fishing. Accordingly, Eielson AFB must impose LUCs to ensure surface water is not used for recreational use until it is remediated to cleanup levels.

Performance Objectives.

a. Prevent ground-disturbing construction activities or ensure safe soil management procedures in areas with residual contamination. The Eielson AFB construction review process will also prevent any use of potentially contaminated groundwater.
b. Prevent access to or use of the groundwater until cleanup levels are met.
c. Maintain the integrity of future monitoring wells.
d. Prohibit the development and use of property for residential housing, elementary and secondary schools, or child care facilities and playgrounds.

Location of LUCs. The LUC areas will be revised from the LUCIP interim boundaries and separated into soil and groundwater areas where access and use restrictions apply. Boundaries are shown on figures in Appendix A for each source area.

Duration of LUCs. LUCs will be maintained until the concentrations of COCs in the soil and groundwater are at levels that allow for UU/UE.

Description of Each LUC and How It Achieves Specific LUC Performance. The internal procedures that the USAF will use to implement the LUCs include but are not limited to the following:

a. **Base Civil Engineer Work Requests –** One tool for achieving the LUC performance objectives is USAF Form 332 (AF332) or Base Civil Engineer Work Request. This form must be submitted and approved before the start of any construction project at Eielson AFB. One step in the approval process for this form is a comparison of the construction site with all constraints that are described in the Base General Plan. The AF332 serves as the document for communicating any construction constraints to the appropriate offices. Any constraints at the site result in the disapproval of the form unless the requester makes appropriate modifications to the construction plans.
b. **Excavation Permits** – Eielson AFB also uses the USAF Form 103 (AF103), Base Work Clearance Request or Excavation Permit to enforce soil and sediment disturbance restrictions. The requester submits the permit to the Civil Engineer Squadron (CES) for any project that involves mechanical soil or sediment excavation, such as trench digging for underground utilities or soil excavation for building foundations. If constraints involving soil disturbance or worker safety exist at the excavation area, the permit describes the appropriate procedures that workers must implement before the start of excavation to prevent unknowing exposure to contamination.

c. **Base Environmental Impact Analysis Process (EIAP)** – An EIAP is conducted pursuant to the National Environmental Policy Act, as promulgated for the USAF in 32 Code of Federal Regulations 989, to assess the potential environmental impact of any federal action initiated by or involving Eielson AFB. An USAF Form 813 (AF813) initiates the EIAP. Both AF332s and excavation permits are subject to an evaluation under the EIAP. The proponent of a proposed action is required to submit the AF332 or excavation permit with AF813 so that the appropriate environmental analysis of the proposed action and alternatives to the proposed action is accomplished prior to any construction or excavation activities. The EIAP works to ensure proposed construction and excavation sites take into account the constraints that are described in the Base General Plan and known to the Air Force Civil Engineer Center (AFCEC) Environmental Restoration Installation Support Team. The EIAP also ensures that all environmental factors, such as LUCs, are considered in the selection of locations for construction projects.

d. **Eielson AFB General Plan** – The Base General Plan is a long-range planning tool that designates current and future land uses. It also provides a framework for selecting the locations of future facilities needed to carry out the Eielson AFB mission. The Base General Plan describes the specific LUCs for each site, the reasons for the controls, and the areas where the controls are applied. For a LUC to remain protective, Eielson AFB personnel must have access to information concerning its existence, purpose, and maintenance requirements. The Base General Plan provides the important information to ensure that LUC management takes place and that the presence of LUCs is effectively communicated.

e. **Base Well Permitting System** – All Eielson AFB groundwater monitoring, extraction, and injection wells are managed under the GeoBase and Installation Real Property facility. Approval of the construction of new wells is received during the regulatory review and acceptance of work plans for groundwater remedial actions and technology demonstration projects. All modifications to the Eielson AFB well network receive Eielson AFB approval through the submission and approval of the AF332 and the AF103, as described in paragraph 16a (Base Civil Engineer Work Requests).

f. **Environmental Restoration Program Atlas** – The Environmental Restoration Program Atlas is a document that describes the LUCs, Base Administrative Controls, and Institutional Controls for each site in the Eielson AFB Environmental Restoration Program. The document also contains figures of the fuels, solvents, or fuels and solvents plumes across sites, LUC boundaries, source area boundaries, as well as program and non-program monitoring well locations. The EIAP is implemented by 354 CES.

General Performance Responsibility. The USAF is responsible for implementing, maintaining, monitoring, reporting, and enforcing LUCs.

Specific Performance Responsibility to Bind Contractors and Tenants. The USAF shall inform, monitor, enforce, and bind, where appropriate, authorized lessees, tenants, contractors,

and other authorized occupants of the source areas regarding the LUCs affecting the source areas.

Specific Performance Responsibility for Transferring Sites. Although the USAF may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the USAF shall retain ultimate responsibility for remedy implementation and protectiveness.

Notification and Corrective Measures Requirement. The USAF will notify ADEC as soon as practicable, but no longer than 10 days after discovery, of any activity that is inconsistent with the LUC objectives or use restrictions, or any other action that may interfere with the effectiveness of the LUCs. The USAF will take prompt measures within 30 days to notify ADEC of the violation or deficiency and prevent its recurrence. In this notification, the USAF will identify any corrective measures it has taken or any corrective measures it plans to take and the estimated time frame for completing them. For corrective measures taken after the notification, the USAF shall notify ADEC when the measures are complete.

Notification of Transfers. The USAF must provide notice to ADEC at least six months prior to any transfer or sale of property containing LUCs so that ADEC can be involved in discussions to ensure that appropriate provisions are included in the transfer or conveyance documents to maintain effective LUCs. If it is not possible for the facility to notify ADEC at least six months prior to any transfer or sale, then the facility will notify ADEC as soon as possible but no later than 60 days prior to the transfer or sale of any property subject to LUCs. The USAF agrees to provide ADEC with such notice, within the same time frames, for federal-to-federal transfer of property accountability. The USAF shall provide either access to or a copy of the executed deed or transfer assembly to ADEC.

Concurrence Language. The USAF shall not modify or terminate LUCs, modify land uses that might impact the effectiveness of the LUCs, take any anticipated action that might disrupt the effectiveness of the LUCs, or take any action that might alter or negate the need for LUCs

without 45 days' notice prior to the change seeking and obtaining approval from ADEC of any required DD modification.

Monitoring Language. The USAF will monitor and inspect all source areas subject to LUCs at least annually.

Reporting Language. The USAF will report annually, to ADEC on the frequency, scope, and nature of LUC monitoring activities, the results or such monitoring, any changes to the LUCs, and any corrective measures resulting from monitoring during the time period.

The USAF will notify ADEC in advance of any changes to internal procedures associated with the remedy that might affect the LUCs. Implementation of these LUCs will replace interim LUCs and will meet the requirements of the settlement agreement between the USAF, ADEC, and the U.S. Environmental Protection Agency (EPA) (USAF 2013a).

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PART 6: SCHEDULE

Soil removal and/or monitoring well installation at Source Areas SO075, SS078, and MY512 are currently planned for summer 2021. At source areas requiring monitoring well installations (SS078), monitoring wells will be developed and sampled per the ADEC *Monitoring Well Guidance* (ADEC 2013) for source-area-specific COCs (Section 3.0), as well as baseline MNA parameters. Beyond the year of installation and initial sampling, the monitoring wells will be sampled annually until groundwater contaminant concentrations show statistically stable or decreasing trends for two consecutive events (for metals) or three consecutive years (for non-metals) below the applicable cleanup levels, at which time the monitoring frequency, analyses performed, and wells sampled may be reevaluated.

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PART 7: COMMUNITY PARTICIPATION

An Administrative Record has been established for Eielson AFB by the 354th CES Environmental Restoration Section. The Administrative Record is the legal record for the Environmental Restoration Program process at USAF installations and includes copies of all technical reports, regulatory correspondence, meeting minutes, and other documents relied upon for restoration decisions. The Administrative Record is accessible to the public and available electronically at http://afcec.publicadmin-record.us.af.mil/. The USAF contact for public affairs is Eielson AFB 354th Fighter Wing Public Affairs, which can be reached at 907-377-2116.

Upon finalization and approval of this DD by the USAF and ADEC, it will be made available by adding the document to the Administrative Record. The public will be informed of the availability of the final DD by the USAF through a published notice in the *Fairbanks Daily News-Miner*. The notice will include a brief description of the final DD for Source Areas SO075, SS078, SO504, MY512, and MY518.

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PART 8: REOPENER CLAUSE AND SIGNATURE BLOCK

The final compliance determination will be made by ADEC, in accordance with 18 AAC 75.380, utilizing all applicable cleanup levels and maximum concentrations remaining at Source Areas SO075, SS078, SO504, MY512, and MY518. After reviewing the final cleanup report, ADEC will determine if these five source areas have been adequately characterized for POL or petroleum-related contamination under 18 AAC 75.335 and have achieved the applicable requirements under the site cleanup rules. Once ADEC determines the five source areas have been adequately characterized within the limited ability to access soil contamination beneath buildings, roads, and other obstructions and that each source area meets the applicable requirements under the site cleanup rules, ADEC will issue a written determination that the petroleum cleanup is complete under the current LUCs. The determination may be reviewed and modified in the future if information becomes available indicating the presence of contaminants, exposures that may cause unacceptable risk to human health or the environment, or a change in current land use. If sites are closed and LUCs are implemented to ensure that people are not exposed above human health soil cleanup levels or Table C groundwater cleanup levels, then a notice of activity and use limitation will be completed. ADEC will, as necessary to ensure protection of human health, safety, or welfare, as well as of the environment, require a responsible person to conduct additional actions that meet the requirements.

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AUTHORIZING SIGNATURES

This signature sheet documents the decision made for petroleum contamination at Source Areas SO075, SS078, SO504, MY512, and MY518 on Eielson AFB.

The USAF has selected the remedies for SO075, SS078, SO504, MY512, and MY518.

This decision will be reviewed and may be modified in the future if information becomes available that indicates the presence of contaminants or exposures that may cause unacceptable risk to human health or the environment. If additional contaminants are discovered, the USAF and ADEC will determine compliance levels for soil and groundwater cleanup actions.

LOPEZ.JUDY.M.1291747988 Digitally signed by LOPEZ.JUDY.M.1291747988 Date: 2022.01.03 13:36:56 -06'00'

Judy M. Lopez, GS-15, P.E.
Director, Environmental Management
Air Force Civil Engineer Center

Date

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AUTHORIZING SIGNATURES

This signature sheet documents the decision made for petroleum contamination at Source Areas SO075, SS078, SO504, MY512, and MY518 on Eielson AFB.

The USAF has selected the remedies for SO075, SS078, SO504, MY512, and MY518. By signing this declaration, ADEC concurs that proper implementation of the selected remedies will comply with State of Alaska environmental laws.

This decision will be reviewed and may be modified in the future if information becomes available that indicates the presence of contaminants or exposures that may cause unacceptable risk to human health or the environment. If additional contaminants are discovered, the USAF and ADEC will determine compliance levels for soil and groundwater cleanup actions.

9 FEB 2022

MELINDA BRUNNER, DSMOA Manager — Date
Federal Facilities Section, Contaminated Sites Program
Alaska Department of Environmental Conservation

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PART 9: REFERENCES

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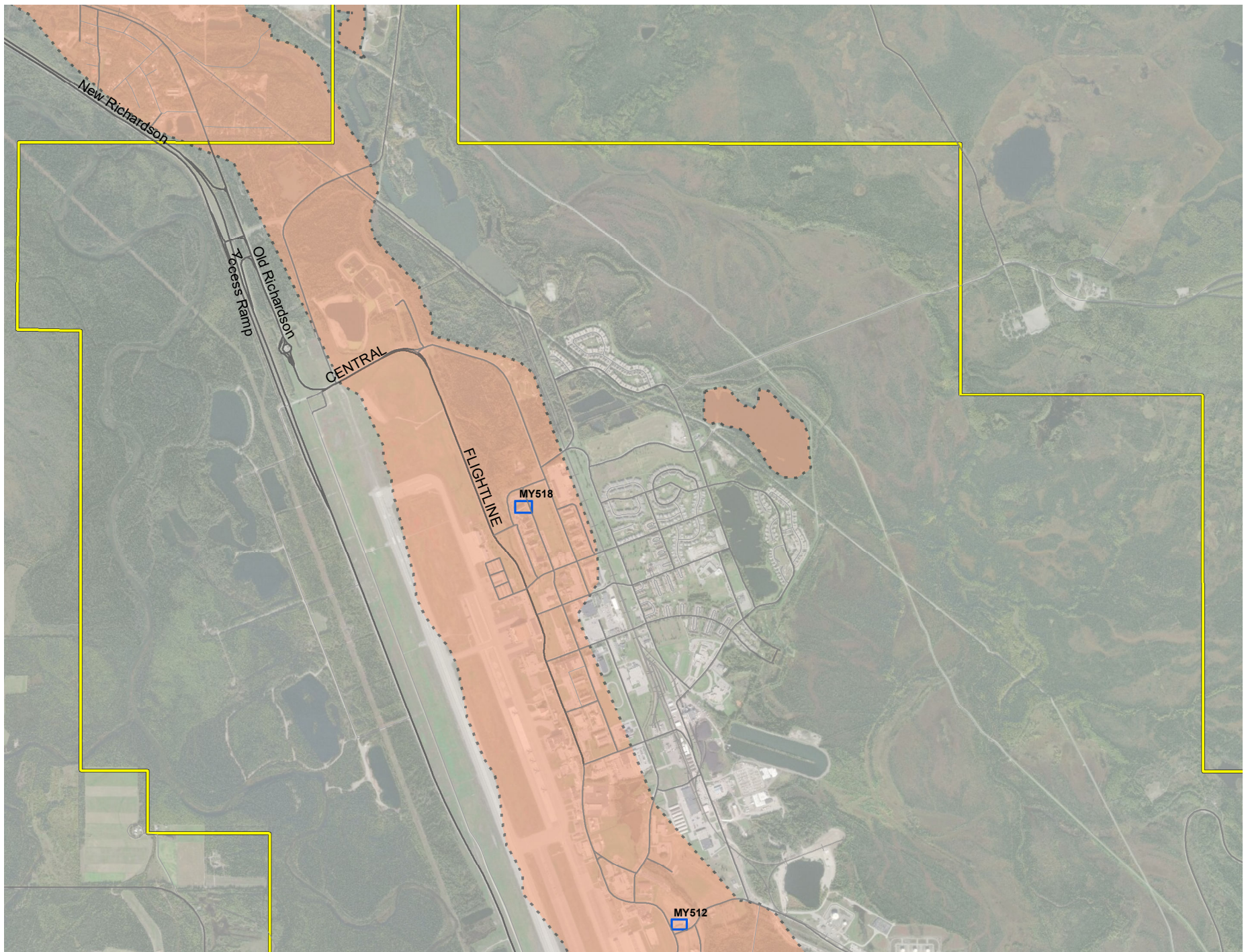
APPENDIX A

Figures



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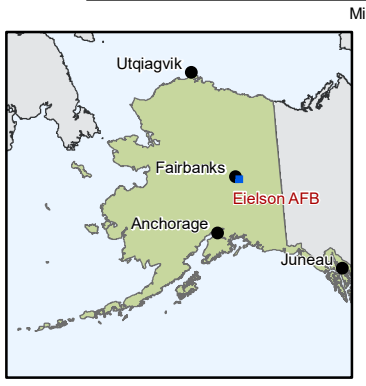

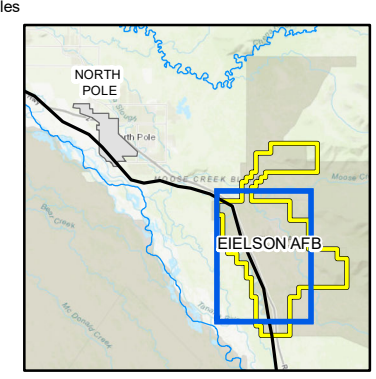

- Railroad
- Primary Road
- Secondary Road
- Source Area Location
- PFOS/PFOA Groundwater Plume
- EAFB Installation Area

N

WGS 1984 UTM Zone 6N

Note:
Eielson Air Force Base PFOS and PFOA plume reference data from multiple sources. The plume is incompletely delineated to the northeast and southwest (ADEC 2020).

Reference:
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LOCATION AND VICINITY

DECISION DOCUMENT FOR PBR SOURCE AREAS
SO075, SS078, SO504, MY512, AND MY518

EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO:
	30 APR 2020	H. AMSKOLD	A-1

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PBR Results - Fuels in Surface Soil

- Surface Soil - No Exceedance (2)

PBR Results - Fuels in Subsurface Soil

- Subsurface Soil - No Exceedance (3)

Non-PBR Results - Fuels In Surface Soil

- Surface Soil - No Exceedance (6)

Non-PBR Results - Fuels In Subsurface Soil

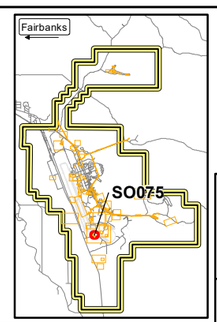
- Subsurface Soil - No Exceedance (10)
- Estimated Extent of COC Contamination in Soil
- Fence
- Underground Injection Well
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Former Aboveground Storage Tank
- Former Underground Storage Tank
- Drain
- Excavation
- Concrete Culvert
- Septic Leach Field
- Structure/Building
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Pavement Section
- Eielson AFB Boundary

Notes:

Soil results were compared to PSLs (18 AAC 75 Tables B1 and B2, most conservative of under-40-inch-zone human health or migration to groundwater cleanup levels [ADEC 2018]) to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

Reference:

ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.



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1 inch = 25 feet
WGS 1984 UTM Zone 6N

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SO075
FUEL COCS IN SOIL
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO:
	29 APR 2020	H. AMSKOLD	A-2.1

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PBR Results - Fuels in Water

- Temporary Well - No Exceedance (2)

Non-PBR Results - Fuels In Water

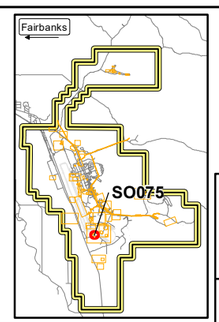
- Monitoring Well - No Exceedance (1)
- Temporary Well - No Exceedacne (7)
- Fence
- Underground Injection Well
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Former Aboveground Storage Tank
- Former Underground Storage Tank
- Drain
- Excavation
- Concrete Culvert
- Septic Leach Field
- Structure/Building
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Pavement Section
- Eielson AFB Boundary

Notes:

Groundwater results were compared to PSLs (18 AAC 75 Table C cleanup level [ADEC 2018]) to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

Reference:

ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.



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1 inch = 25 feet
WGS 1984 UTM Zone 6N

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SO075
FUEL COCS IN WATER
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE: 29 APR 2020	PROJECT MANAGER: H. AMSKOLD	FIGURE NO: A-2.2

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PBR Results - Metals in Surface Soil
- Surface Soil - No Exceedance (2)

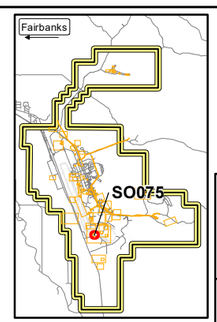
PBR Results - Metals in Subsurface Soil
- Subsurface Soil - No Exceedance (3)

Non-PBR Results - Metals In Surface Soil
- Surface Soil - No Exceedance (6)

Non-PBR Results - Metals In Subsurface Soil
- Subsurface Soil - No Exceedance (7)
- Estimated Extent of COC Contamination in Soil
- Fence
- Underground Injection Well
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Former Aboveground Storage Tank
- Former Underground Storage Tank
- Drain
- Excavation
- Concrete Culvert
- Septic Leach Field
- Structure/Building
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Pavement Section
- Eielson AFB Boundary

Notes:
Soil results were compared to PSLs (18 AAC 75 Tables B1 and B2, most conservative of under-40-inch-zone human health or migration to groundwater cleanup levels [ADEC 2018]) to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
Bold soil results also exceed BTVs.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

Reference:
ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.



0 25 50
Feet

1:300
1 inch = 25 feet
WGS 1984 UTM Zone 6N

N

SO075
METAL COCS IN SOIL
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE: 29 APR 2020	PROJECT MANAGER: H. AMSKOLD	FIGURE NO: A-2.3

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PBR Results - Metals in Water

- Temporary Well - No Exceedance (2)

Non-PBR Results - Metals In Water

- Monitoring Well - No Exceedance (3)
- Temporary Well - No Exceedacne (4)
- Fence
- Underground Injection Well
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Former Aboveground Storage Tank
- Former Underground Storage Tank
- Drain
- Excavation
- Concrete Culvert
- Septic Leach Field
- Structure/Building
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Pavement Section
- Eielson AFB Boundary

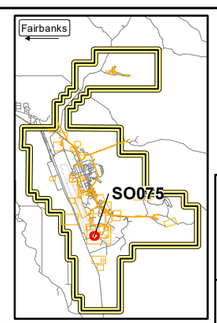
Notes:

Groundwater results were compared to PSLs (18 AAC 75 Table C cleanup level [ADEC 2018]) except RSL tables [EPA 2017] for iron, cobalt, and manganese to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

References:

ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.

EPA. 2017 (June). Regional Screening Levels (RSLs) — Generic Tables. https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-june-2017.



0 25 50
Feet

1:300
1 inch = 25 feet
WGS 1984 UTM Zone 6N

N

SO075
METAL COCS IN WATER
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE: 29 APR 2020	PROJECT MANAGER: H. AMSKOLD	FIGURE NO: A-2.4

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PBR Results - VOCs and SVOCs In Surface Soil

- Surface Soil - Exceedance (1)
- Surface Soil - No Exceedance (1)

PBR Results - VOCs and SVOCs In Subsurface Soil

- Subsurface Soil - No Exceedance (3)

Non-PBR Results - VOCs and SVOCs In Surface Soil

- Surface Soil - No Exceedance (6)

Non-PBR Results - VOC and SVOCs In Subsurface Soil

- Subsurface Soil - No Exceedance (7)

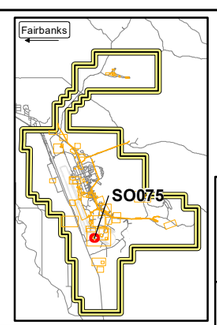
- Estimated Extent of COC Contamination in Soil
- Fence
- Underground Injection Well
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Former Aboveground Storage Tank
- Former Underground Storage Tank
- Drain
- Excavation
- Concrete Culvert
- Septic Leach Field
- Structure/Building
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Pavement Section
- Eielson AFB Boundary

Notes:

Soil results were compared to PSLs (18 AAC 75 Tables B1 and B2, most conservative of under-40-inch-zone human health or migration to groundwater cleanup levels [ADEC 2018]) to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

Reference:

ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.



0 25 50
Feet

1:300
1 inch = 25 feet
WGS 1984 UTM Zone 6N

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SO075
VOC AND SVOC COCS IN SOIL
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE: 29 APR 2020	PROJECT MANAGER: H. AMSKOLD	FIGURE NO: A-2.5

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PBR Results - VOCs and SVOCs in Water

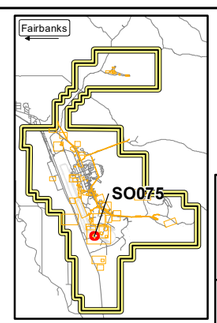
- Temporary Well - No Exceedance (2)

Non-PBR Results - VOCs and SVOCs In Water

- Monitoring Well - No Exceedance (2)
- Temporary Well - No Exceedacne (7)
- Fence
- Underground Injection Well
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Former Aboveground Storage Tank
- Former Underground Storage Tank
- Drain
- Excavation
- Concrete Culvert
- Septic Leach Field
- Structure/Building
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Pavement Section
- Eielson AFB Boundary

Notes:
Groundwater results were compared to PSLs (18 AAC 75 Table C cleanup level [ADEC 2018]) to identify exceedances.
Sucations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

Reference:
ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.



0 25 50
Feet

1:300
1 inch = 25 feet
WGS 1984 UTM Zone 6N

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SO075
VOC AND SVOC COCS IN WATER
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE: 29 APR 2020	PROJECT MANAGER: H. AMSKOLD	FIGURE NO: A-2.6

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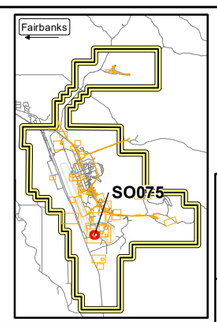
- Proposed Soil Land Use Control Area
- Estimated Extent of COC Contamination in Soil
- Fence
- Underground Injection Well
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Former Aboveground Storage Tank
- Former Underground Storage Tank
- Drain
- Excavation
- Concrete Culvert
- Septic Leach Field
- Structure/Building
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Pavement Section
- Eielson AFB Boundary

Notes:
For definitions, refer to the Acronyms and Abbreviations section.
Buildings are labeled with Building-Number above the Facility-ID, when known.



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Feet

1:300
1 inch = 25 feet
WGS 1984 UTM Zone 6N

N

SO075
INTERIM LAND USE CONTROL PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE: 29 APR 2020	PROJECT MANAGER: H. AMSKOLD	FIGURE NO: A-2.7

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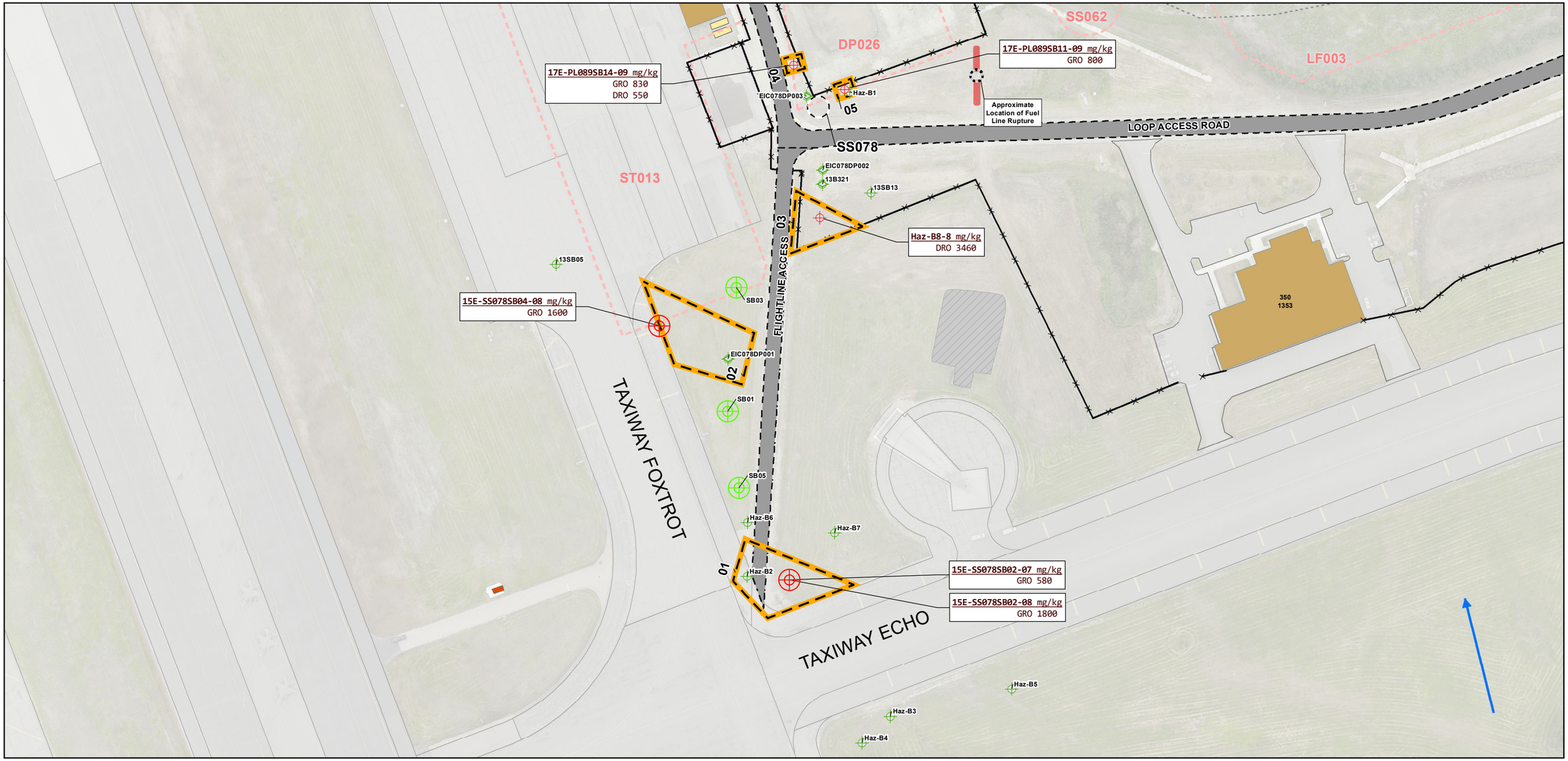


PBR Results - Fuels in Subsurface Soil

- Subsurface Soil - Exceedance (2)
- Subsurface Soil - No Exceedance (3)

Non-PBR Results - Fuels In Surface Soil

- Surface Soil - No Exceedance (4)

Non-PBR Results - Fuels In Subsurface Soil

- Subsurface Soil - Exceedance (3)
- Subsurface Soil - No Exceedance (13)

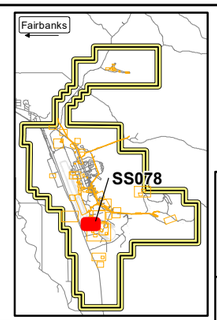
- Estimated Extent of COC Contamination in Soil
- Fence
- Pipeline Rupture
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Underground Storage Tank
- 2010 Excavation
- Subsurface Disposal Area
- Structure/Building
- Demolished Structure
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Road Area
- Eielson AFB Boundary

Notes:

Soil results were compared to PSLs (18 AAC 75 Tables B1 and B2, most conservative of under-40-inch-zone human health or migration to groundwater cleanup levels [ADEC 2018]) to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

Reference:

ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.



0 140 280
Feet

1:1,800
1 inch = 150 feet
WGS 1984 UTM Zone 6N

N

SS078
FUEL COCS IN SOIL
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO:
	29 APR 2020	H. AMSKOLD	A-3.1

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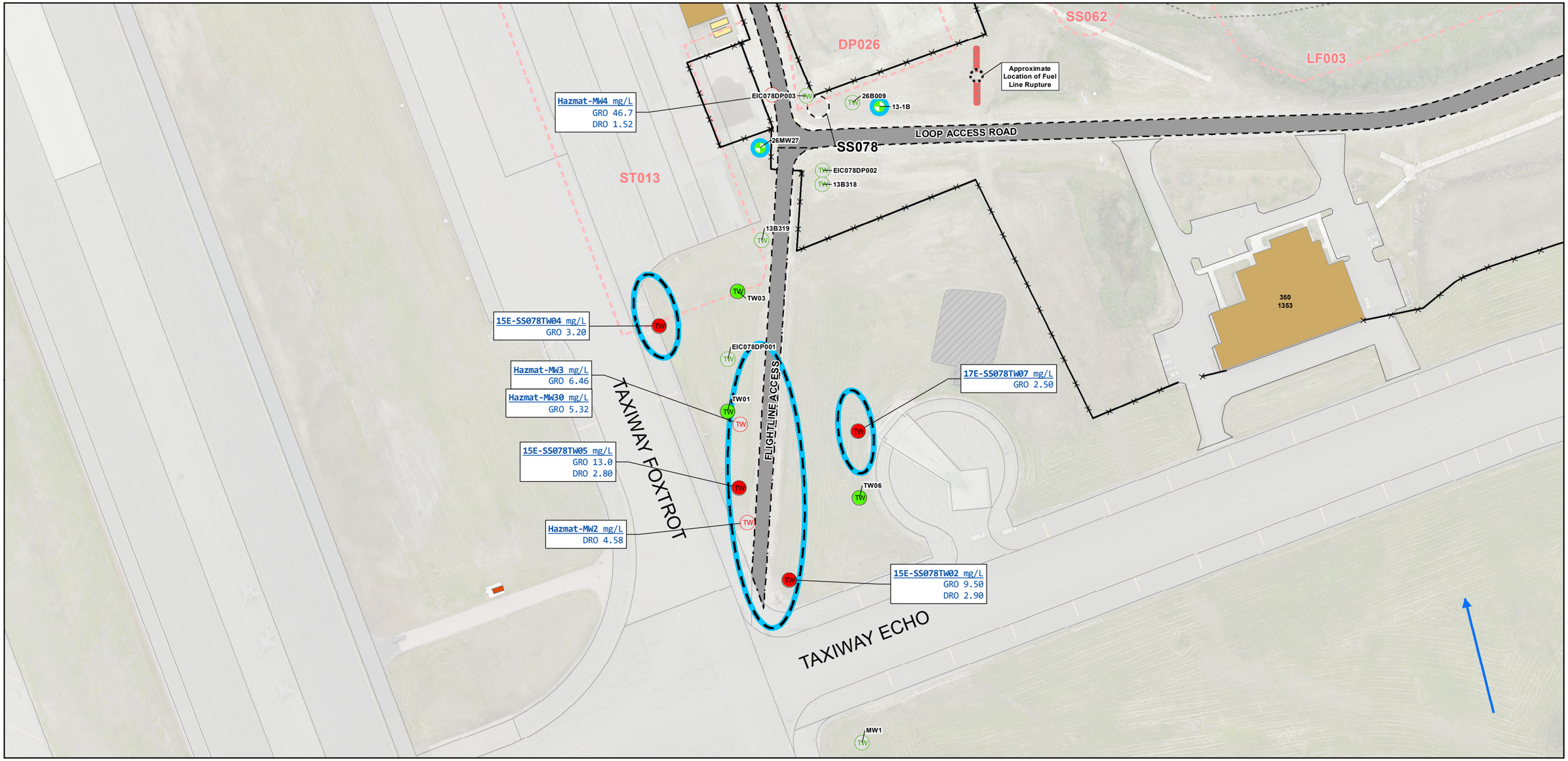


PBR Results - Fuels in Water

- Temporary Well - Exceedance (4)
- Temporary Well - No Exceedance (3)

Non-PBR Results - Fuels In Water

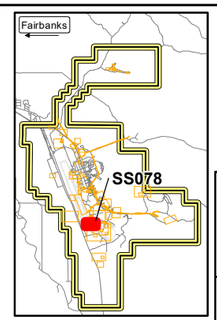
- IWMP Well - No Exceedance (2)
- Temporary Well - Exceedance (3)
- Temporary Well - No Exceedacne (7)
- Estimated Extent of COC Contamination in Groundwater
- Fence
- Pipeline Rupture
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Underground Storage Tank
- 2010 Excavation
- Subsurface Disposal Area
- Structure/Building
- Demolished Structure
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Road Area
- Eielson AFB Boundary

Notes:

Groundwater results were compared to PSLs (18 AAC 75 Table C cleanup level [ADEC 2018]) to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

Reference:

ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.



0 140 280
Feet

1:1,800
1 inch = 150 feet
WGS 1984 UTM Zone 6N

N

SS078
FUEL COCS IN WATER
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO:
	29 APR 2020	H. AMSKOLD	A-3.2

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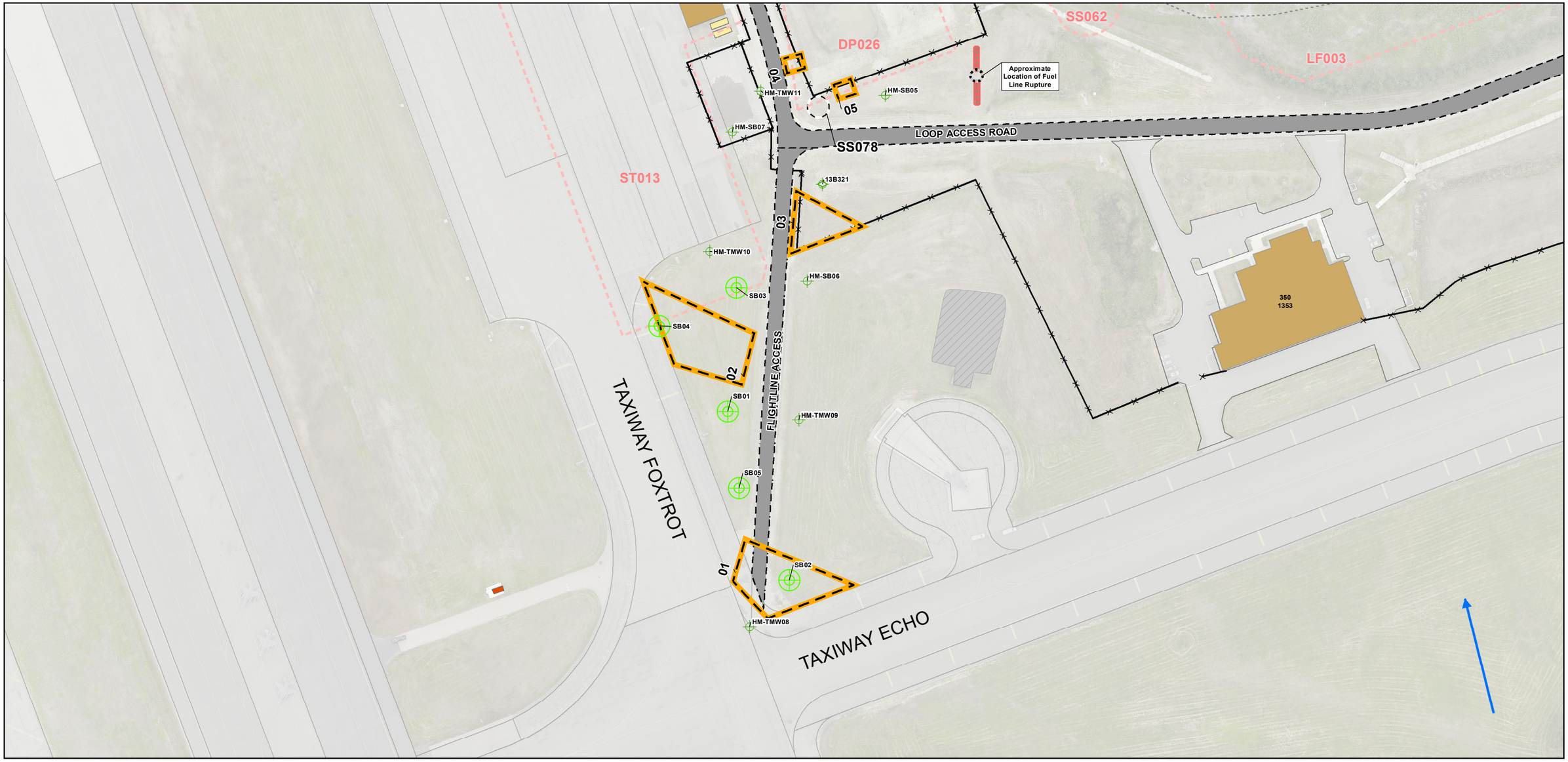


PBR Results - Metals in Subsurface Soil

- Subsurface Soil - No Exceedance (5)

Non-PBR Results - Metals In Surface Soil

- Surface Soil - No Exceedance (1)

Non-PBR Results - Metals In Subsurface Soil

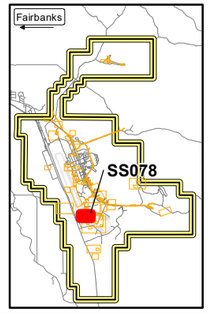
- Subsurface Soil - No Exceedance (8)
- Estimated Extent of COC Contamination in Soil
- Fence
- Pipeline Rupture
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Underground Storage Tank
- 2010 Excavation
- Subsurface Disposal Area
- Structure/Building
- Demolished Structure
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Road Area
- Eielson AFB Boundary

Notes:

Soil results were compared to PSLs (18 AAC 75 Tables B1 and B2, most conservative of under-40-inch-zone human health or migration to groundwater cleanup levels [ADEC 2018]) to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
Bold soil results also exceed BTVs.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

Reference:

ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.



0 140 280
Feet

1:1,800
1 inch = 150 feet
WGS 1984 UTM Zone 6N

N

SS078
METAL COCS IN SOIL
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO:
	29 APR 2020	H. AMSKOLD	A-3.3

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HM-TMW112004 mg/L
Lead 0.0152

HM-SB072004 mg/L
Lead 0.0628

15E-SS078TW04 mg/L
Arsenic 0.00826
Lead 0.0167
Manganese 3.67

15E-SS078TW01 mg/L
Manganese 4.71

15E-SS078TW05 mg/L
Arsenic 0.0223
Manganese 18.3

15E-SS078TW02 mg/L
Arsenic 0.00918
Lead 0.0457
Manganese 5.79

HM-SB052004 mg/L
Lead 0.0412

17E-SS078TW07 mg/L
Arsenic 0.0112

17E-SS078TW06 mg/L
Manganese 3.69

SS062
DP026
LF003
ST013
SS078
LOOP ACCESS ROAD
FLIGHTLINE ACCESS
TAXIWAY FOXTROT
TAXIWAY ECHO
13-1B
26MW27
HM-TMW10
HM-SB06
TW03
HM-TMW09
HM-TMW08
Approximate Location of Fuel Line Rupture
350
1353

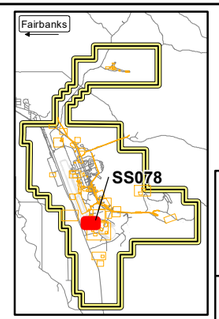
PBR Results - Metals in Water
- Temporary Well - Exceedance (6)
- Temporary Well - No Exceedance (1)

Non-PBR Results - Metals In Water
- IWMP Well - No Exceedance (2)
- Temporary Well - Exceedance (3)
- Temporary Well - No Exceedeacne (4)
- Fence
- Pipeline Rupture
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Underground Storage Tank
- 2010 Excavation
- Subsurface Disposal Area
- Structure/Building
- Demolished Structure
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Road Area
- Eielson AFB Boundary

Notes:
Groundwater results were compared to PSLs (18 AAC 75 Table C cleanup level [ADEC 2018]) except RSL tables [EPA 2017] for iron, cobalt, and manganese to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

References:
ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.

EPA. 2017 (June). Regional Screening Levels (RSLs) — Generic Tables. https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-june-2017.



0 140 280
Feet
1:1,800
1 inch = 150 feet
WGS 1984 UTM Zone 6N

N

SS078
METAL COCS IN WATER
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS | DATE: 29 APR 2020 | PROJECT MANAGER: H. AMSKOLD | FIGURE NO: A-3.4

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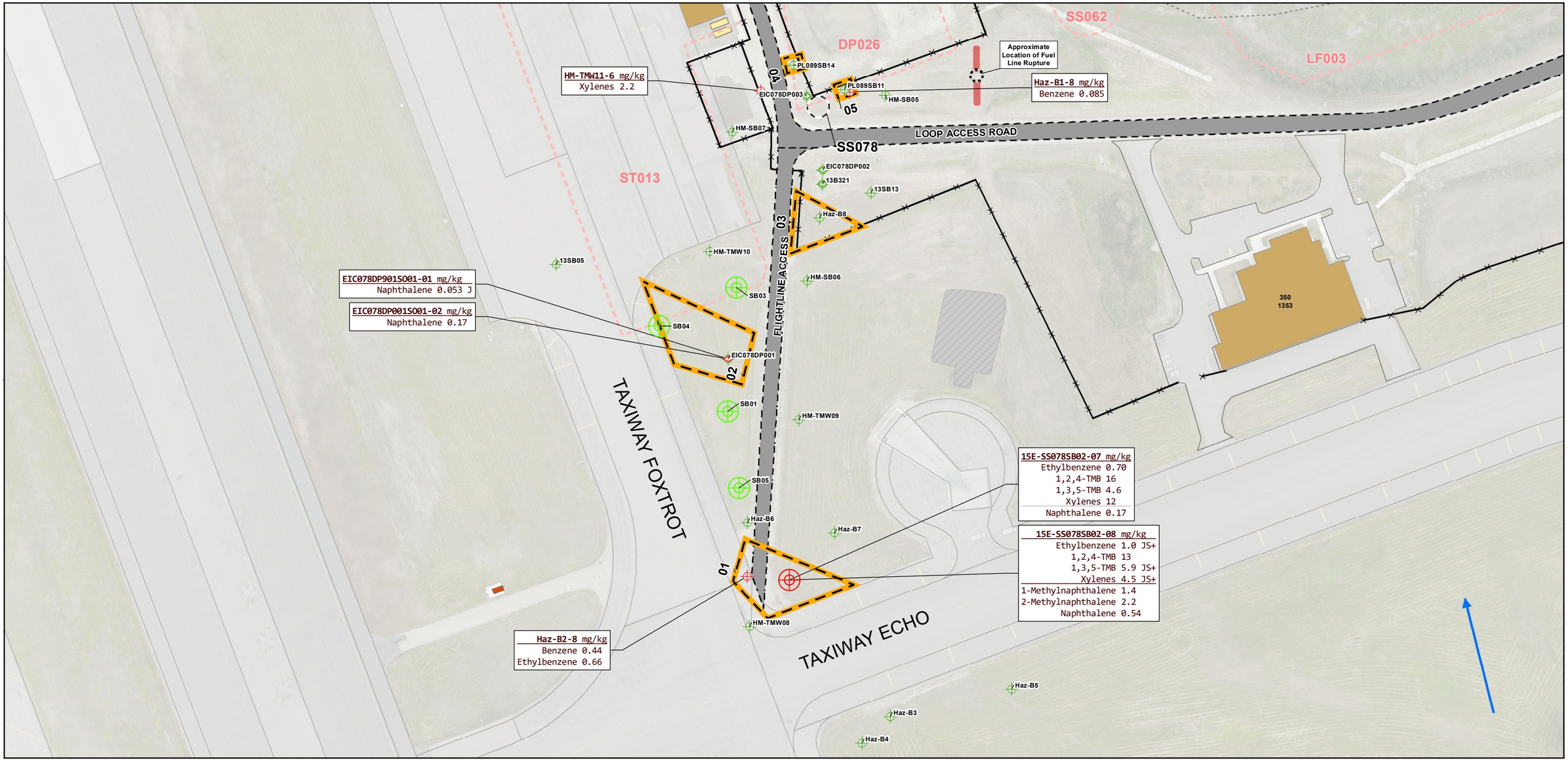

PBR Results - VOCs and SVOCs In Subsurface Soil

- Subsurface Soil - Exceedance (1)
- Subsurface Soil - No Exceedance (4)

Non-PBR Results - VOCs and SVOCs In Surface Soil

- Surface Soil - Exceedance (1)
- Surface Soil - No Exceedance (3)

Non-PBR Results - VOC and SVOCs In Subsurface Soil

- Subsurface Soil - Exceedance (3)
- Subsurface Soil - No Exceedance (20)

- Estimated Extent of COC Contamination in Soil
- Fence
- Pipeline Rupture
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Underground Storage Tank
- 2010 Excavation
- Subsurface Disposal Area
- Structure/Building
- Demolished Structure
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Road Area
- Eielson AFB Boundary

Notes:

Soil results were compared to PSLs (18 AAC 75 Tables B1 and B2, most conservative of under-40-inch-zone human health or migration to groundwater cleanup levels [ADEC 2018]) to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

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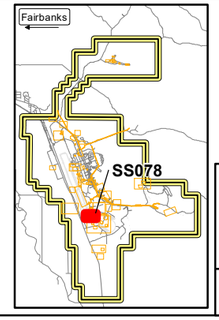

0 140 280
Feet

1:1,800
1 inch = 150 feet
WGS 1984 UTM Zone 6N

N

SS078
VOC AND SVOC COCS IN SOIL
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE: 29 APR 2020	PROJECT MANAGER: H. AMSKOLD	FIGURE NO: A-3.5

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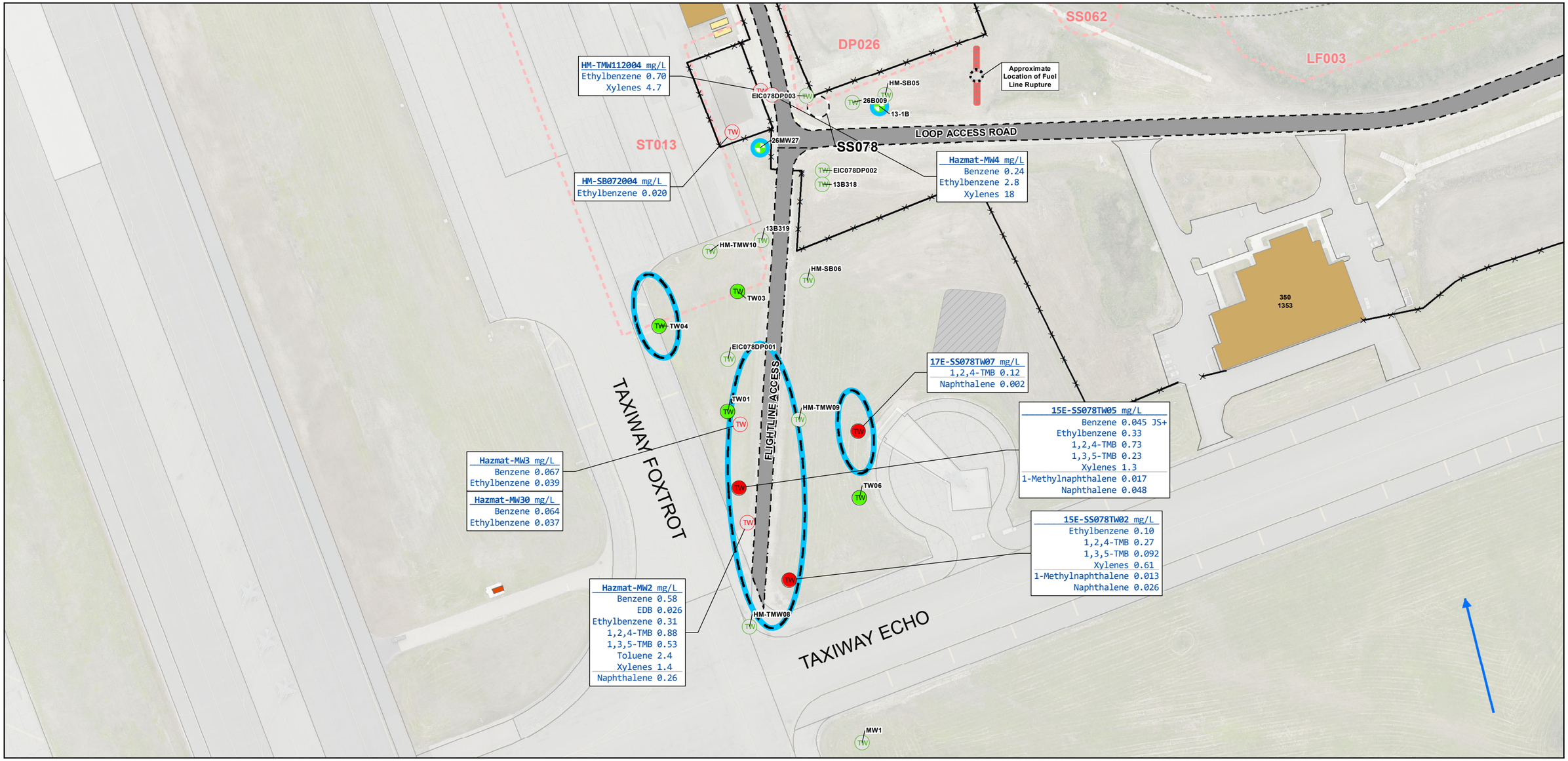


PBR Results - VOCs and SVOCs in Water

- Temporary Well - Exceedance (3)
- Temporary Well - No Exceedance (4)

Non-PBR Results - VOCs and SVOCs In Water

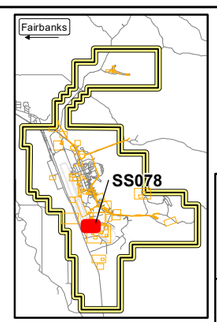
- IWMP Well - No Exceedance (2)
- Temporary Well - Exceedance (5)
- Temporary Well - No Exceedacne (12)
- Estimated Extent of COC Contamination in Groundwater
- Fence
- Pipeline Rupture
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Underground Storage Tank
- 2010 Excavation
- Subsurface Disposal Area
- Structure/Building
- Demolished Structure
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Road Area
- Eielson AFB Boundary

Notes:

Groundwater results were compared to PSLs (18 AAC 75 Table C cleanup level [ADEC 2018]) to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

Reference:

ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.



0 140 280
Feet

1:1,800
1 inch = 150 feet
WGS 1984 UTM Zone 6N

N

SS078
VOC AND SVOC COCS IN WATER
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO:
	29 APR 2020	H. AMSKOLD	A-3.6

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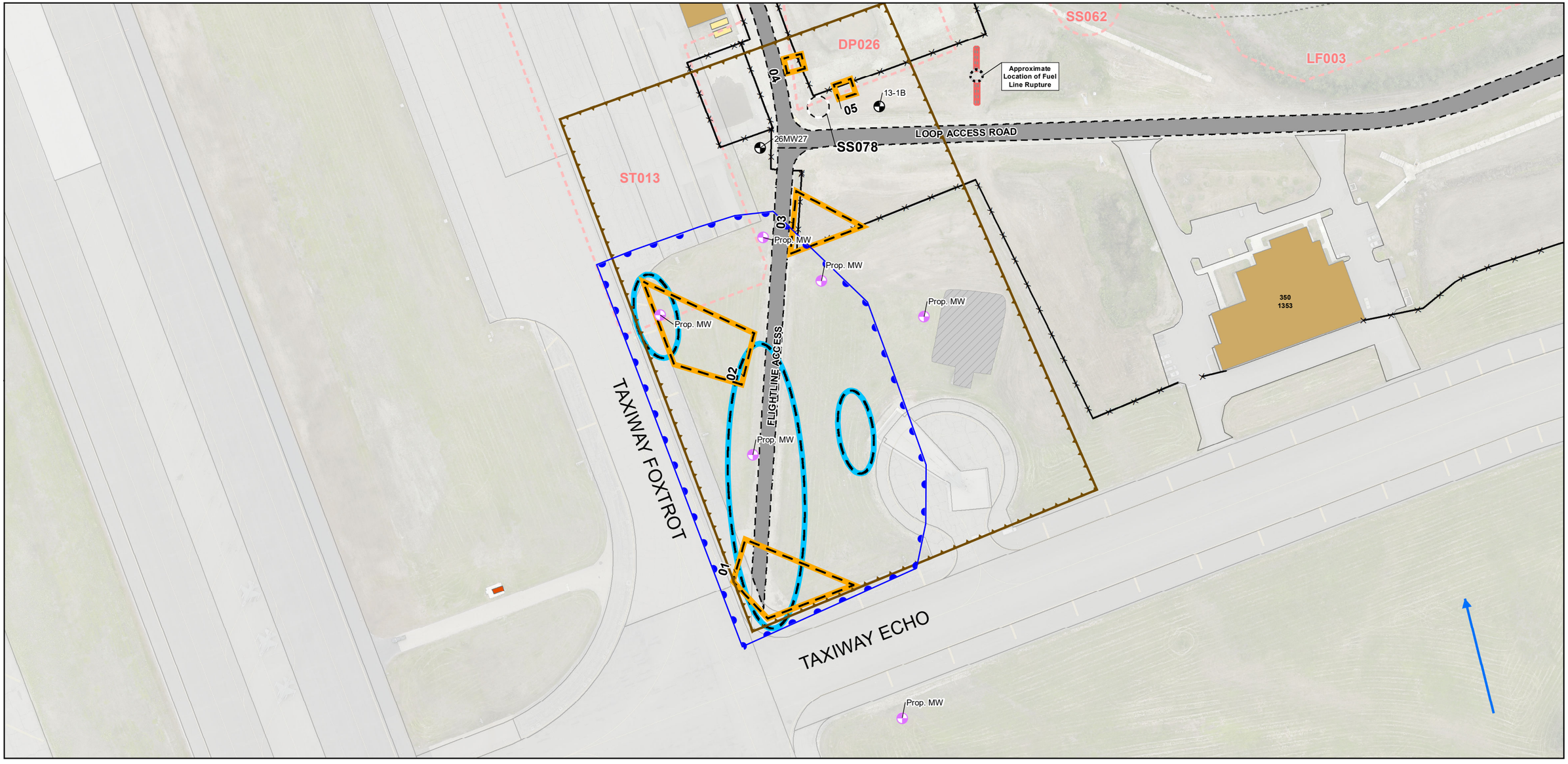
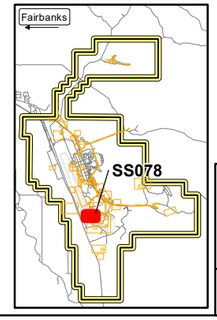


- Existing Monitoring Well
- Proposed Groundwater Land Use Control Area
- Proposed Soil Land Use Control Area
- Proposed Monitoring Well (6)
- Estimated Extent of COC Contamination in Soil
- Estimated Extent of COC Contamination in Groundwater
- Fence
- Pipeline Rupture
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Underground Storage Tank
- 2010 Excavation
- Subsurface Disposal Area
- Structure/Building
- Demolished Structure
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Road Area
- Eielson AFB Boundary

Notes:
For definitions, refer to the Acronyms and Abbreviations section.
Buildings are labeled with Building-Number above the Facility-ID, when known.



0 140 280
Feet

1:1,800
1 inch = 150 feet
WGS 1984 UTM Zone 6N

N

SS078
INTERIM LAND USE CONTROL
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE: 29 APR 2020	PROJECT MANAGER: H. AMSKOLD	FIGURE NO: A-3.7

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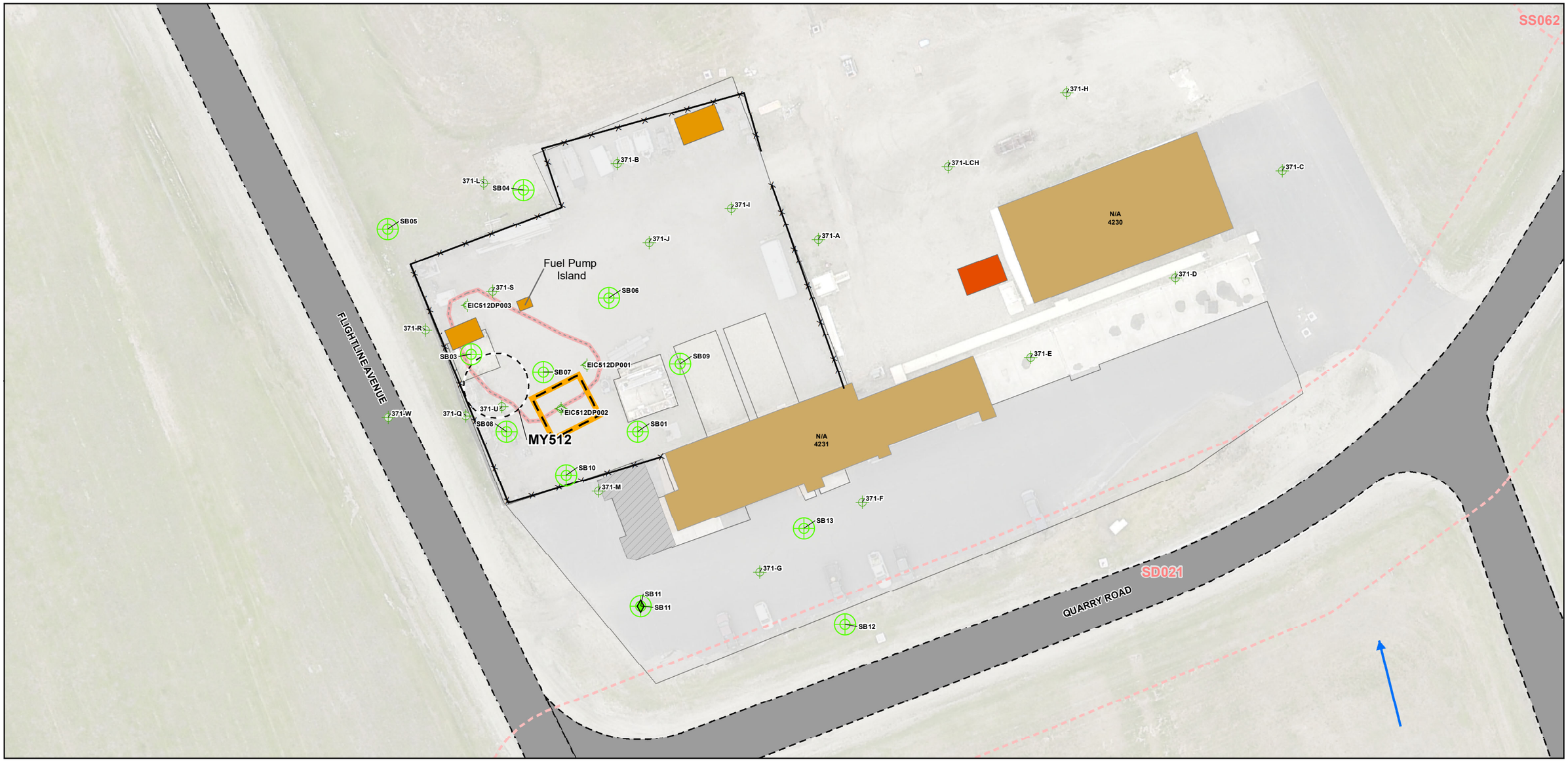


PBR Results - Fuels in Surface Soil

- Surface Soil - No Exceedance (1)

PBR Results - Fuels in Subsurface Soil

- Subsurface Soil - No Exceedance (12)

Non-PBR Results - Fuels In Surface Soil

- Surface Soil - No Exceedance (3)

Non-PBR Results - Fuels In Subsurface Soil

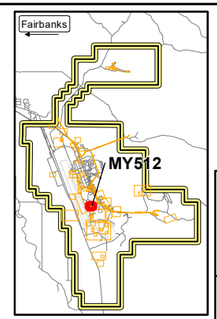
- Subsurface Soil - No Exceedance (21)
- Estimated Extent of COC Contamination in Soil
- Fence
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Former Aboveground Storage Tank
- Excavation
- Structure/Building
- Demolished Structure
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Road Area
- Eielson AFB Boundary

Notes:

Soil results were compared to PSLs (18 AAC 75 Tables B1 and B2, most conservative of under-40-inch-zone human health or migration to groundwater cleanup levels [ADEC 2018]) to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

Reference:

ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.



0 40 80
Feet

1:600
1 inch = 50 feet
WGS 1984 UTM Zone 6N

N

MY512
FUEL COCS IN SOIL
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO:
	29 APR 2020	H. AMSKOLD	A-4.1

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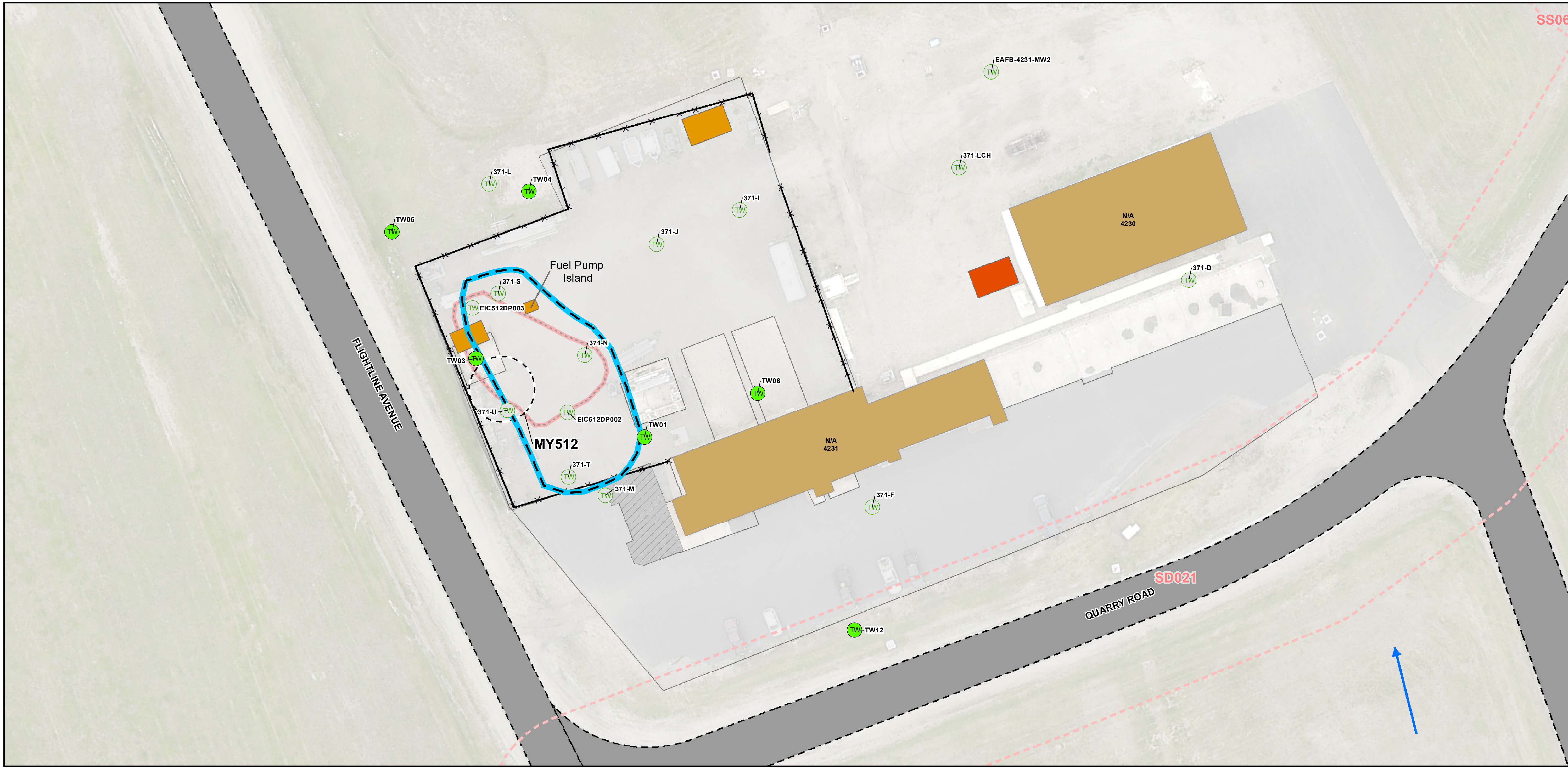


PBR Results - Fuels in Water

Temporary Well - No Exceedance (6)

Non-PBR Results - Fuels In Water

Temporary Well - No Exceedacne (14)

Estimated Extent of COC Contamination in Groundwater

Fence

Other PBR Source Area Boundary

Non-OU Source Area Boundary (20 ft Buffer)

Aboveground Storage Tank

Former Aboveground Storage Tank

Excavation

Structure/Building

Demolished Structure

Approximate Regional Groundwater Flow Direction (IWMP 2015)

Road Area

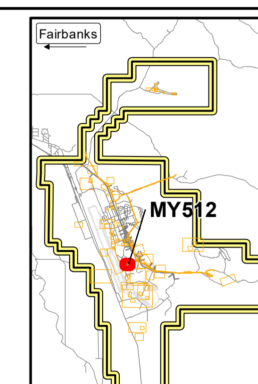
Eielson AFB Boundary

Notes:

Groundwater results were compared to PSLs (18 AAC 75 Table C cleanup level [ADEC 2018]) to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

Reference:

ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.

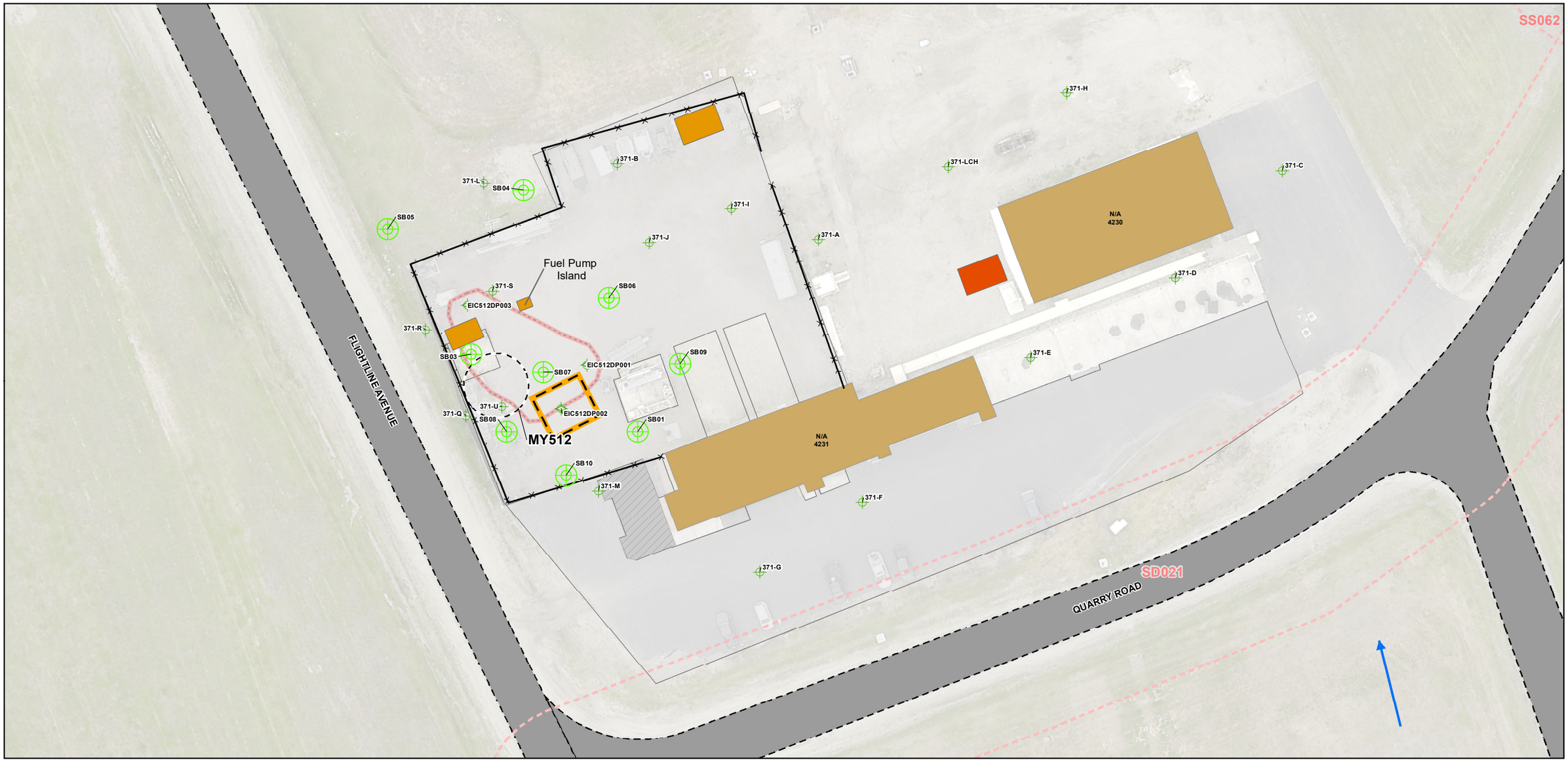


0 40 80
Feet
1:600
1 inch = 50 feet
WGS 1984 UTM Zone 6N

N

MY512
FUEL COCS IN WATER
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE: 29 APR 2020	PROJECT MANAGER: H. AMSKOLD	FIGURE NO: A-4.2



PBR Results - Metals in Subsurface Soil

- Subsurface Soil - No Exceedance (9)

Non-PBR Results - Metals In Surface Soil

- Surface Soil - No Exceedance (3)

Non-PBR Results - Metals In Subsurface Soil

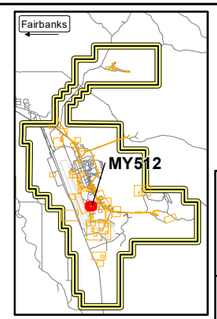
- Subsurface Soil - No Exceedance (20)
- Estimated Extent of COC Contamination in Soil
- Fence
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Former Aboveground Storage Tank
- Excavation
- Structure/Building
- Demolished Structure
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Road Area
- Eielson AFB Boundary

Notes:

Soil results were compared to PSLs (18 AAC 75 Tables B1 and B2, most conservative of under-40-inch-zone human health or migration to groundwater cleanup levels [ADEC 2018]) to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
Bold soil results also exceed BTVs.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

Reference:

ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.



0 40 80
Feet

1:600
1 inch = 50 feet
WGS 1984 UTM Zone 6N

N

MY512
METAL COCS IN SOIL
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE: 29 APR 2020	PROJECT MANAGER: H. AMSKOLD	FIGURE NO: A-4.3

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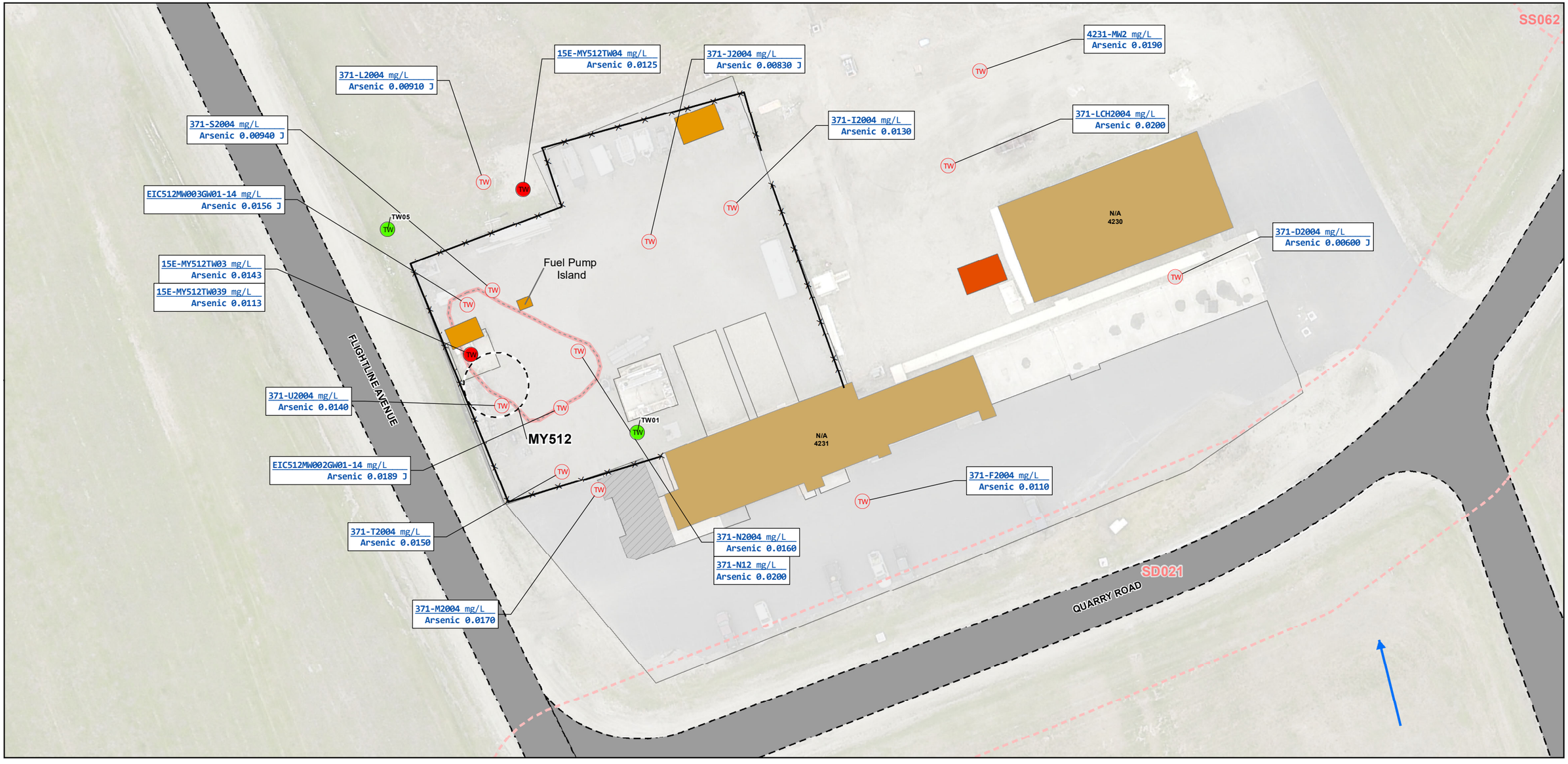


PBR Results - Metals in Water

- Temporary Well - Exceedance (2)
- Temporary Well - No Exceedance (2)

Non-PBR Results - Metals In Water

- Temporary Well - Exceedance (14)
- Fence
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Former Aboveground Storage Tank
- Excavation
- Structure/Building
- Demolished Structure
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Road Area
- Eielson AFB Boundary

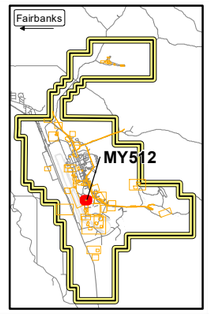
Notes:

Groundwater results were compared to PSLs (18 AAC 75 Table C cleanup level [ADEC 2018]) except RSL tables [EPA 2017] for iron, cobalt, and manganese to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

References:

ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.

EPA. 2017 (June). Regional Screening Levels (RSLs) — Generic Tables. https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-june-2017.



0 40 80
Feet

1:600
1 inch = 50 feet
WGS 1984 UTM Zone 6N

N

MY512
METAL COCS IN WATER
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO:
	29 APR 2020	H. AMSKOLD	A-4.4

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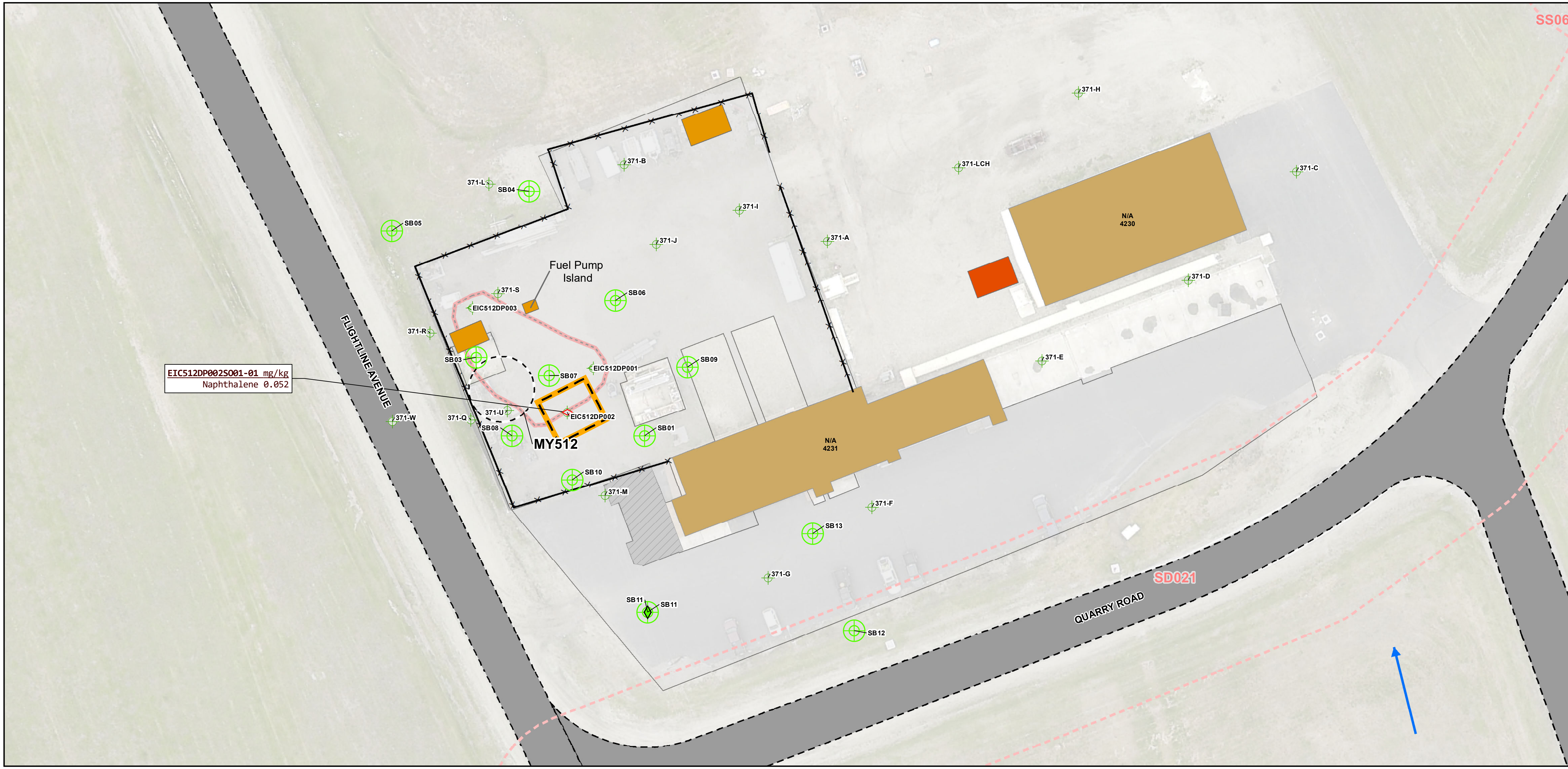


PBR Results - VOCs and SVOCs In Surface Soil

- Surface Soil - No Exceedance (1)

PBR Results - VOCs and SVOCs In Subsurface Soil

- Subsurface Soil - No Exceedance (12)

Non-PBR Results - VOCs and SVOCs In Surface Soil

- Surface Soil - Exceedance (1)
- Surface Soil - No Exceedance (2)

Non-PBR Results - VOC and SVOCs In Subsurface Soil

- Subsurface Soil - No Exceedance (21)

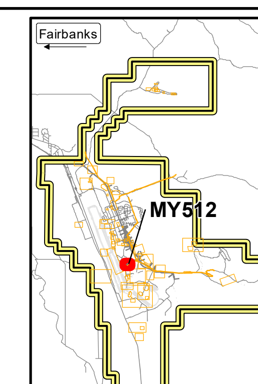
- Estimated Extent of COC Contamination in Soil
- Fence
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Former Aboveground Storage Tank
- Excavation
- Structure/Building
- Demolished Structure
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Road Area
- Eielson AFB Boundary

Notes:

Soil results were compared to PSLs (18 AAC 75 Tables B1 and B2, most conservative of under-40-inch-zone human health or migration to groundwater cleanup levels [ADEC 2018]) to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

Reference:

ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.



0 40 80
Feet
1:600
1 inch = 50 feet
WGS 1984 UTM Zone 6N

N

MY512
VOC AND SVOC COCS IN SOIL
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE: 29 APR 2020	PROJECT MANAGER: H. AMSKOLD	FIGURE NO: A-4.5

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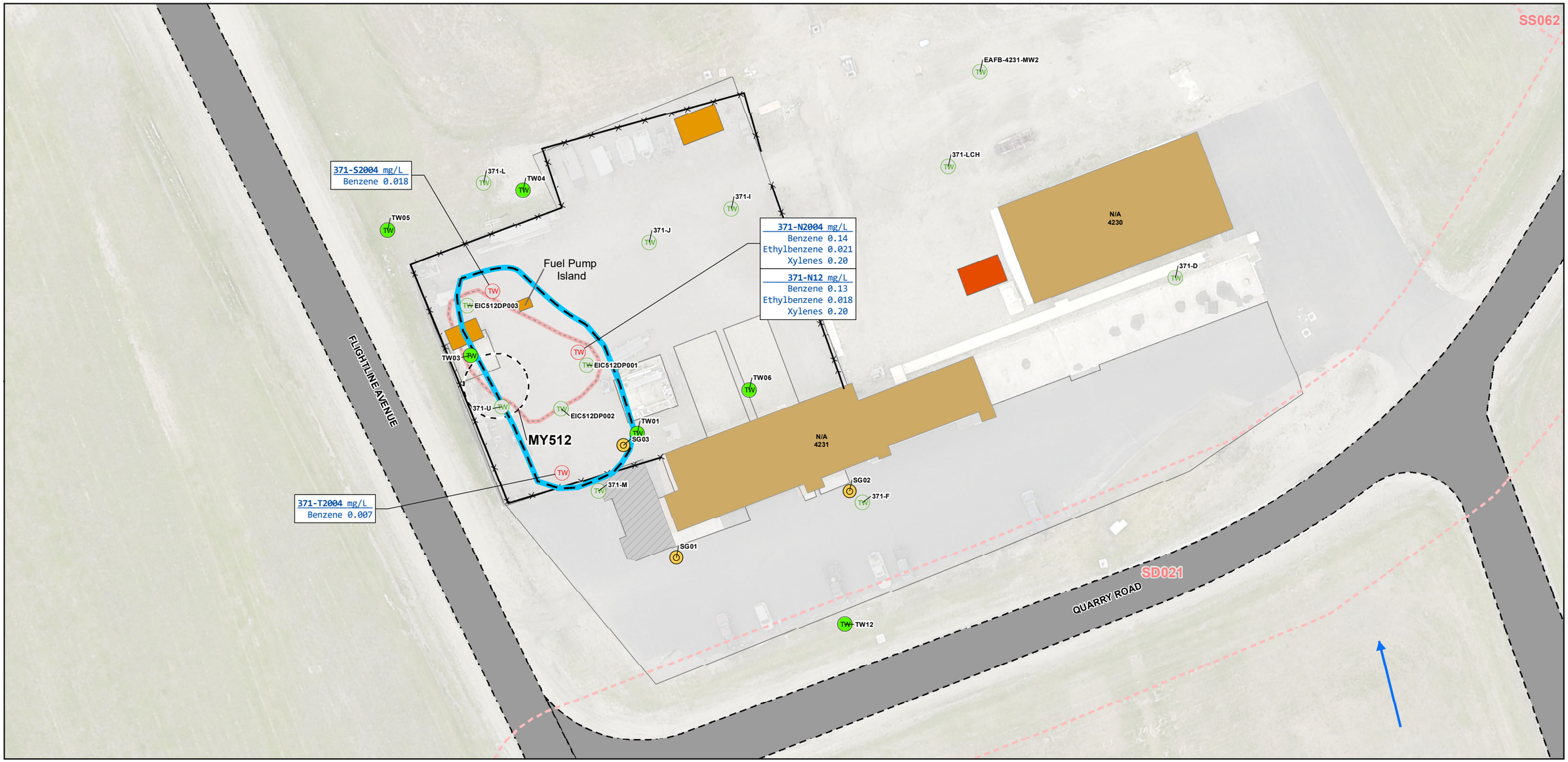


PBR Results - VOCs and SVOCs in Water

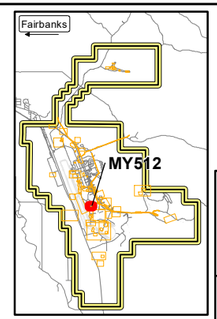
- SG, no (3)
- Temporary Well - No Exceedance (6)

Non-PBR Results - VOCs and SVOCs In Water

- Temporary Well - Exceedance (3)
- Temporary Well - No Exceedacne (12)
- Estimated Extent of COC Contamination in Groundwater
- Fence
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Former Aboveground Storage Tank
- Excavation
- Structure/Building
- Demolished Structure
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Road Area
- Eielson AFB Boundary

Notes:
Groundwater results were compared to PSLs (18 AAC 75 Table C cleanup level [ADEC 2018]) to identify exceedances.
Locations without annotation yielded no exceedances.
Annotation shows the sample ID and lists the associated exceedances.
A '-9' at the end of the sample ID signifies a duplicate sample.
For definitions, refer to the Acronyms and Abbreviations section.
For qualifiers, refer to the Analytical Data Qualifiers Section in the Data Quality Assessment.
Buildings are labeled with Building-Number above the Facility-ID, when known.

Reference:
ADEC. 2018 (October). Oil and Other Hazardous Pollution Control Regulations—Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.



0 40 80
Feet

1:600
1 inch = 50 feet
WGS 1984 UTM Zone 6N

N

MY512
VOC AND SVOC COCS IN WATER
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO:
	29 APR 2020	H. AMSKOLD	A-4.6

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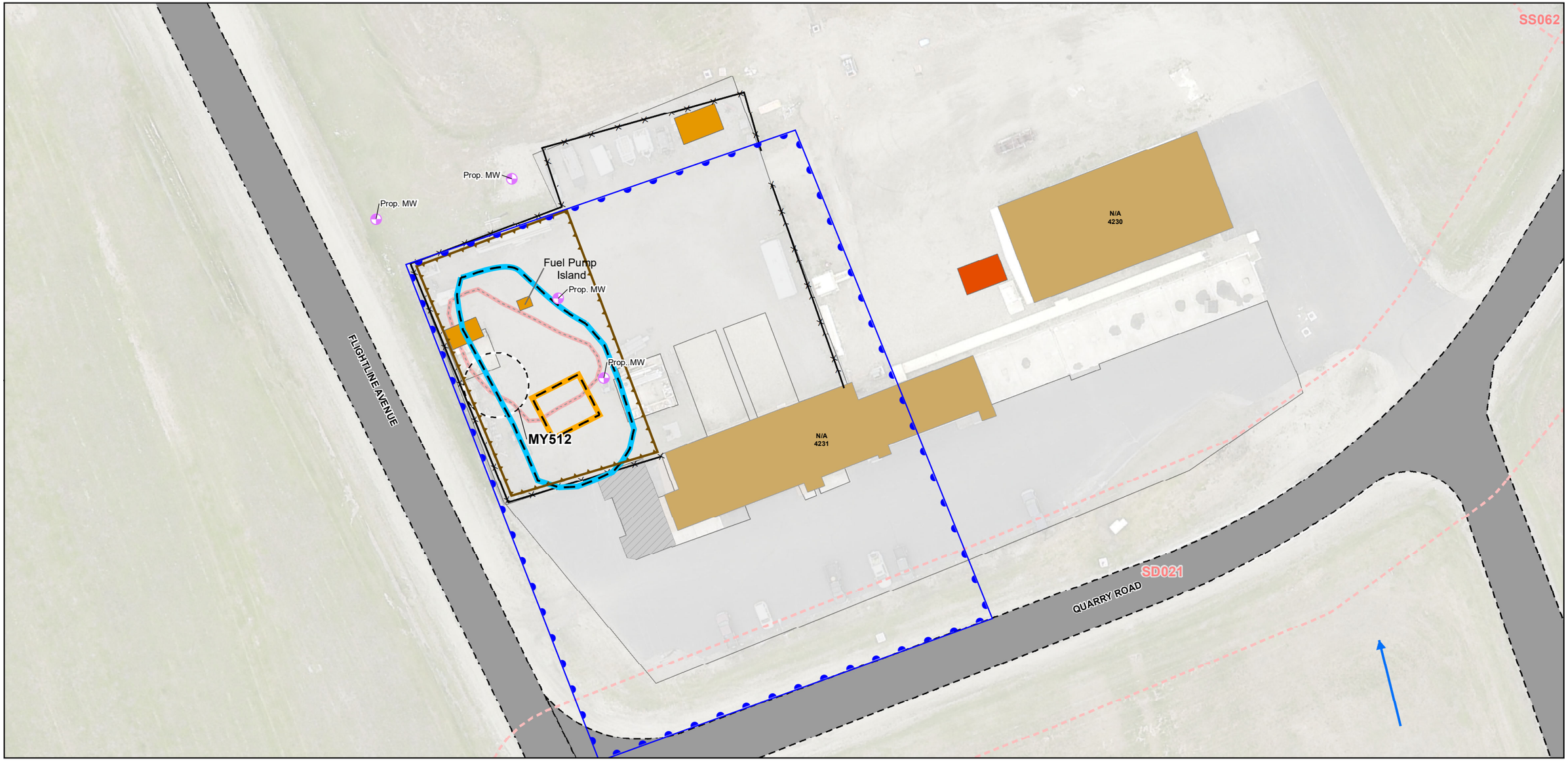
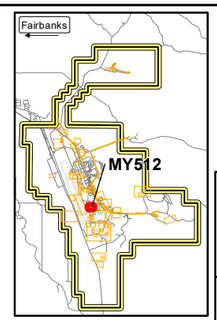


- Proposed Groundwater Land Use Control Area
- Proposed Soil Land Use Control Area
- Proposed Monitoring Well (4)
- Estimated Extent of COC Contamination in Soil
- Estimated Extent of COC Contamination in Groundwater
- Fence
- Other PBR Source Area Boundary
- Non-OU Source Area Boundary (20 ft Buffer)
- Aboveground Storage Tank
- Former Aboveground Storage Tank
- Excavation
- Structure/Building
- Demolished Structure
- Approximate Regional Groundwater Flow Direction (IWMP 2015)
- Road Area
- Eielson AFB Boundary

Notes:
For definitions, refer to the Acronyms and Abbreviations section.
Buildings are labeled with Building-Number above the Facility-ID, when known.



0 40 80
Feet

1:600
1 inch = 50 feet
WGS 1984 UTM Zone 6N

N

MY512
INTERIM LAND USE CONTROL
PBR AND NON-PBR SAMPLING RESULTS
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE: 29 APR 2020	PROJECT MANAGER: H. AMSKOLD	FIGURE NO: A-4.7

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APPENDIX B

Conceptual Site Models

Human Health Conceptual Site Model
Scoping Form and Standardized Graphic

Site Name: SO075 BUILDING 285 (FACILITY 1301) AST/UIW

File Number: 107.38.099

Completed by: Jacobs Engineering

Introduction

The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

General Instructions: Follow the italicized instructions in each section below.

1. General Information:

Sources *(check potential sources at the site)*

- ☒ USTs
- ☒ ASTs
- ☐ Dispensers/fuel loading racks
- ☐ Drums
- ☐ Vehicles
- ☐ Landfills
- ☐ Transformers
- ☒ Other: UIW

Release Mechanisms *(check potential release mechanisms at the site)*

- ☒ Spills
- ☒ Leaks
- ☒ Direct discharge
- ☐ Burning
- ☐ Other:

Impacted Media *(check potentially-impacted media at the site)*

- ☒ Surface soil (0-2 feet bgs*)
- ☒ Subsurface soil (>2 feet bgs)
- ☐ Air
- ☐ Sediment
- ☐ Groundwater
- ☐ Surface water
- ☐ Biota
- ☐ Other:

Receptors *(check receptors that could be affected by contamination at the site)*

- ☒ Residents (adult or child)
- ☒ Commercial or industrial worker
- ☒ Construction worker
- ☐ Subsistence harvester (i.e. gathers wild foods)
- ☐ Subsistence consumer (i.e. eats wild foods)
- ☒ Site visitor
- ☒ Trespasser
- ☐ Recreational user
- ☐ Farmer
- ☐ Other:

* bgs - below ground surface

2. Exposure Pathways: *(The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".)*

a) Direct Contact -

1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.) ☒

If the box is checked, label this pathway complete: Complete

Comments:

Benzene, PAHs and metals exceed 1/10th of the ADEC health-based cleanup levels in surface soil. Benzene, GRO, DRO, and RRO were previously detected in soil but were below PSLs during the 2015 investigation.

2. Dermal Absorption of Contaminants from Soil

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Can the soil contaminants permeate the skin (see Appendix B in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

Arsenic and PAHs exceed 1/10th of the ADEC health-based cleanup levels in soil.

b) Ingestion -

1. Ingestion of Groundwater

Have contaminants been detected or are they expected to be detected in the groundwater, or are contaminants expected to migrate to groundwater in the future? ☒

Could the potentially affected groundwater be used as a current or future drinking water source? Please note, only leave the box unchecked if DEC has determined the groundwater is not a currently or reasonably expected future source of drinking water according to 18 AAC 75.350. ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

Groundwater is not currently being used as a drinking water source. 1,2-DCA, benzene, benzo(a)pyrene, chloroform, ethylbenzene, TCE, xylenes and metals (including lead) have been detected above 1/10th of the ADEC health-based cleanup levels in either historical or recent groundwater samples. PFOA/PFOS contamination is probable in groundwater.

2. Ingestion of Surface Water

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future? ☐

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities). ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

There is no surface water at or near the site.

3. Ingestion of Wild and Farmed Foods

Is the site in an area that is used or reasonably could be used for hunting, fishing, or harvesting of wild or farmed foods? ☐

Do the site contaminants have the potential to bioaccumulate (see Appendix C in the guidance document)? ☒

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. soil within the root zone for plants or burrowing depth for animals, in groundwater that could be connected to surface water, etc.) ☒

If all of the boxes are checked, label this pathway complete: Incomplete

Comments:

This source area is located near an airfield on an active military base and subsistence activities are not expected to occur at this site.

c) Inhalation-

1. Inhalation of Outdoor Air

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Are the contaminants in soil volatile (see Appendix D in the guidance document)? ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

BTEX is considered volatile when in the presence of fuels, but fuels are below 1/10th of the ADEC health-based cleanup levels in soil at this source area.

2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminted soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures) ☒

Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

Inhalation of indoor air affects future receptors only. Building 285 houses a well and is not continuously occupied. 1,2-DCA, chloroform, and TCE have been detected above 1/10th of the ADEC health-based cleanup levels in either historical or recent groundwater samples.

3. **Additional Exposure Pathways:** *(Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)*

Dermal Exposure to Contaminants in Groundwater and Surface Water

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- Climate permits recreational use of waters for swimming.
- Climate permits exposure to groundwater during activities, such as construction.
- Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are deemed protective of this pathway because dermal absorption is incorporated into the groundwater exposure equation for residential uses.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

1,2-DCA, benzene, benzo(a)pyrene, chloroform, ethylbenzene, TCE, xylenes and metals (including lead) have been detected above 1/10th of the ADEC health-based cleanup levels in either historical or recent groundwater samples. PFOA/PFOS contamination is probable in groundwater. Dermal exposure to contaminants in groundwater could potentially occur during construction activities. There is no surface water at this source area.

Inhalation of Volatile Compounds in Tap Water

Inhalation of volatile compounds in tap water may be a complete pathway if:

- The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

DEC groundwater cleanup levels in 18 AAC 75, Table C are protective of this pathway because the inhalation of vapors during normal household activities is incorporated into the groundwater exposure equation.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

Groundwater is not currently used for household purposes. Volatile contaminants (1,2-DCA, chloroform, and TCE) have been detected above 1/10th of the ADEC health-based cleanup levels in either historical or recent groundwater samples. This pathway affects future receptors only.

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter - PM_{10}). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.

DEC human health soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because the inhalation of particulates is incorporated into the soil exposure equation.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

This site is paved and landscaped with grass. The fugitive dust inhalation pathway is not expected to be complete, but inhalation of particulates has been calculated under the ADEC Resident Cumulative Risk Calculator for Soil (see Appendix F). The maximum detected chromium concentration at this site (148 mg/kg) is above both the BTV of 29 mg/kg and 1/10th of the ADEC Table B1 under 40-inch zone human health cleanup level of 3.9 mg/kg.

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- Climate permits recreational activities around sediment.
- The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

There is no sediment at this source area.

4. Other Comments *(Provide other comments as necessary to support the information provided in this form.)*

Metals at concentrations below established BTVs for Eielson AFB are not considered site contaminants for the purposes of this CSM and were not included in risk screening using the ADEC Cumulative Risk Evaluation tool.

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: SO075 BUILDING 285 (FACILITY 1301) AST/UIW

Completed By: Jacobs Engineering

Date Completed: 2018-05-23

***Instructions*: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.**

(1)

Check the media that could be directly affected by the release.

(2)

For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Check additional media under (1) if the media acts as a secondary source.

(3)

Check all exposure media identified in (2).

(4)

*Check all pathways that could be complete. The pathways identified in this column **must** agree with Sections 2 and 3 of the Human Health CSM Scoping Form.*

(5)

Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.

Current & Future Receptors

Media	Transport Mechanisms	Exposure Media	Exposure Pathway/Route	Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☑ Surface Soil (0-2 ft bgs)	☑ Direct release to surface soil — check soil	☑ soil	☑ Incidental Soil Ingestion	F	C/F	C/F	C/F			
	☑ Migration to subsurface — check soil		☑ Dermal Absorption of Contaminants from Soil	F	C/F	C/F	C/F			
	☑ Migration to groundwater — check groundwater		☑ Inhalation of Fugitive Dust	F	C/F	C/F	C/F			
	☑ Volatilization — check air									
	☐ Runoff or erosion — check surface water									
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☑ Subsurface Soil (2-15 ft bgs)	☑ Direct release to subsurface soil — check soil	☑ groundwater	☑ Ingestion of Groundwater	F	C/F	C/F				
	☑ Migration to groundwater — check groundwater		☑ Dermal Absorption of Contaminants in Groundwater	F	F	F	C/F			
	☑ Volatilization — check air		☑ Inhalation of Volatile Compounds in Tap Water	F						
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☐ Ground-water	☐ Direct release to groundwater — check groundwater	☑ air	☐ Inhalation of Outdoor Air							
	☐ Volatilization — check air		☑ Inhalation of Indoor Air	F		F				
	☐ Flow to surface water body — check surface water		☑ Inhalation of Fugitive Dust	F	C/F	C/F	C/F			
	☐ Flow to sediment — check sediment									
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☐ Surface Water	☐ Direct release to surface water — check surface water	☐ surface water	☐ Ingestion of Surface Water							
	☐ Volatilization — check air		☐ Dermal Absorption of Contaminants in Surface Water							
	☐ Sedimentation — check sediment		☐ Inhalation of Volatile Compounds in Tap Water							
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☐ Sediment	☐ Direct release to sediment — check sediment	☐ sediment	☐ Direct Contact with Sediment							
	☐ Resuspension, runoff, or erosion — check surface water									
	☐ Uptake by plants or animals — check biota	☐ biota	☐ Ingestion of Wild or Farmed Foods							
	☐ Other (list):									

Revised, 10/01/2010

Human Health Conceptual Site Model
Scoping Form and Standardized Graphic

Site Name: SS078 HazMat Area - CITS

File Number: 107.38.098

Completed by: Jacobs Engineering Group Inc.

Introduction

The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

General Instructions: Follow the italicized instructions in each section below.

1. General Information:

Sources *(check potential sources at the site)*

- ☐ USTs
- ☐ ASTs
- ☒ Dispensers/fuel loading racks
- ☐ Drums
- ☐ Vehicles
- ☐ Landfills
- ☐ Transformers
- ☒ Other: Two active pipelines, old pipeline corridor and refueling station, runway/taxiway

Release Mechanisms *(check potential release mechanisms at the site)*

- ☒ Spills
- ☒ Leaks
- ☐ Direct discharge
- ☐ Burning
- ☐ Other:

Impacted Media *(check potentially-impacted media at the site)*

- ☒ Surface soil (0-2 feet bgs*)
- ☒ Subsurface soil (>2 feet bgs)
- ☒ Air
- ☐ Sediment
- ☒ Groundwater
- ☐ Surface water
- ☐ Biota
- ☐ Other:

Receptors *(check receptors that could be affected by contamination at the site)*

- ☒ Residents (adult or child)
- ☒ Commercial or industrial worker
- ☒ Construction worker
- ☐ Subsistence harvester (i.e. gathers wild foods)
- ☐ Subsistence consumer (i.e. eats wild foods)
- ☒ Site visitor
- ☒ Trespasser
- ☐ Recreational user
- ☐ Farmer
- ☐ Other:

* bgs - below ground surface

2. Exposure Pathways: *(The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".)*

a) Direct Contact -

1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.) ☒

If the box is checked, label this pathway complete: Complete

Comments:

GRO, DRO, RRO, 1,2,4-TMB, 1,3,5-TMB, n-butylbenzene, xylenes, and PAHs exceed 1/10th of the ADEC health-based cleanup levels in subsurface soil.

2. Dermal Absorption of Contaminants from Soil

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Can the soil contaminants permeate the skin (see Appendix B in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

Only PAHs exceed 1/10th of the ADEC health-based cleanup levels in subsurface soil and are chemicals of concern for dermal absorption. Pathway is complete but PAHs may be unrelated to site activities.

b) Ingestion -

1. Ingestion of Groundwater

Have contaminants been detected or are they expected to be detected in the groundwater, or are contaminants expected to migrate to groundwater in the future? ☒

Could the potentially affected groundwater be used as a current or future drinking water source? Please note, only leave the box unchecked if DEC has determined the groundwater is not a currently or reasonably expected future source of drinking water according to 18 AAC 75.350. ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

DRO, GRO, RRO, EDB, 1,2-DCA, 1,2,4-TMB, 1,3,5-TMB, 1-methylnaphthalene, 2-methylnapthalene, BTEX, cumene, naphthalene, propylbenzene, TCE and metals are exceed 1/10th of the ADEC health-based cleanup levels in unfiltered groundwater. Groundwater at SS078 is not currently used as a drinking water source.

2. Ingestion of Surface Water

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future? ☐

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities). ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

There is no surface water at this site.

3. Ingestion of Wild and Farmed Foods

Is the site in an area that is used or reasonably could be used for hunting, fishing, or harvesting of wild or farmed foods? ☐

Do the site contaminants have the potential to bioaccumulate (see Appendix C in the guidance document)? ☒

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. soil within the root zone for plants or burrowing depth for animals, in groundwater that could be connected to surface water, etc.) ☒

If all of the boxes are checked, label this pathway complete: Incomplete

Comments:

The site is industrial, located adjacent to an aircraft taxiway, and is unlikely to be used for hunting, subsistence or farming. PAHs have the potential to bioaccumulate but may be unrelated to site activities.

c) Inhalation-

1. Inhalation of Outdoor Air

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Are the contaminants in soil volatile (see Appendix D in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

Volatile components in soil include: GRO, DRO, n-butylbenzene, 1,2,4-TMB, 1,3,5-TMB, and xylenes.

2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminted soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures) ☒

Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

There are no buildings at this site. Volatile components in soil and/or groundwater include: n-butylbenzene, EDB, 1,2-DCA, 1,2,4-TMB, 1,3,5-TMB, 1-methylnaphthalene, 2-methylnapthalene, BTEX, naphthalene, propylbenzene, and TCE. Groundwater at SS078 is not currently used as a drinking water source. This pathway may be complete if site use changes in the future.

3. **Additional Exposure Pathways:** *(Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)*

Dermal Exposure to Contaminants in Groundwater and Surface Water

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- Climate permits recreational use of waters for swimming.
- Climate permits exposure to groundwater during activities, such as construction.
- Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are deemed protective of this pathway because dermal absorption is incorporated into the groundwater exposure equation for residential uses.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

There is no surface water at SS078. Groundwater is not currently used for household purposes. Dermal exposure to contaminants in groundwater could potentially occur during construction activities.

Inhalation of Volatile Compounds in Tap Water

Inhalation of volatile compounds in tap water may be a complete pathway if:

- The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

DEC groundwater cleanup levels in 18 AAC 75, Table C are protective of this pathway because the inhalation of vapors during normal household activities is incorporated into the groundwater exposure equation.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

There are currently no residential buildings at this site. Water would not be used for household purposes unless site usage changes in the future. Volatile contaminants are present in groundwater including: GRO, DRO, RRO, n-butylbenzene, EDB, 1,2-DCA, 1,2,4-TMB, 1,3,5-TMB, 1-methylnaphthalene, 2-methylnapthalene, BTEX, naphthalene, propylbenzene, and TCE.

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter - PM_{10}). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.

DEC human health soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because the inhalation of particulates is incorporated into the soil exposure equation.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

This site is partly paved and partly landscaped with grass. The fugitive dust inhalation pathway is not expected to be complete, but inhalation of particulates has been calculated under the ADEC Resident Cumulative Risk Calculator for Soil (see Appendix F). The maximum detected chromium concentration at this site (27.2 mg/kg) is below the BTV of 29 mg/kg but exceeds 1/10th of the ADEC Table B1 under 40-inch zone human health cleanup level of 3.9 mg/kg.

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- Climate permits recreational activities around sediment.
- The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

There is no sediment at this source area.

4. Other Comments *(Provide other comments as necessary to support the information provided in this form.)*

Metals at concentrations below established BTVs for Eielson AFB are not considered site contaminants for the purposes of this CSM and were not included in risk screening using the ADEC Cumulative Risk Evaluation tool.

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: SS078 HazMat Area - CITS

Completed By: Jacobs Engineering

Date Completed: 2018-05-23

***Instructions*: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.**

(1) *Check the media that could be directly affected by the release.*

(2) *For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Check additional media under (1) if the media acts as a secondary source.*

(3) *Check all exposure media identified in (2).*

(4) *Check all pathways that could be complete. The pathways identified in this column **must** agree with Sections 2 and 3 of the Human Health CSM Scoping Form.*

(5) *Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.*

Media	Transport Mechanisms	Exposure Media	Exposure Pathway/Route	Current & Future Receptors: Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☑ Surface Soil (0-2 ft bgs)	☑ Direct release to surface soil → check soil	☑ soil	☑ Incidental Soil Ingestion	F	C/F	C/F	C/F			
	☑ Migration to subsurface → check soil		☑ Dermal Absorption of Contaminants from Soil	F	C/F	C/F	C/F			
	☑ Migration to groundwater → check groundwater		☑ Inhalation of Fugitive Dust	F	C/F	C/F	C/F			
	☑ Volatilization → check air									
	☐ Runoff or erosion → check surface water									
	☐ Uptake by plants or animals → check biota									
	☐ Other (list):									
☑ Subsurface Soil (2-15 ft bgs)	☑ Direct release to subsurface soil → check soil	☑ groundwater	☑ Ingestion of Groundwater	F	F	F				
	☑ Migration to groundwater → check groundwater		☑ Dermal Absorption of Contaminants in Groundwater	F	F	F	C/F			
	☑ Volatilization → check air		☑ Inhalation of Volatile Compounds in Tap Water	F						
	☐ Uptake by plants or animals → check biota									
	☐ Other (list):									
☑ Ground-water	☑ Direct release to groundwater → check groundwater	☑ air	☑ Inhalation of Outdoor Air	F	C/F	C/F	C/F			
	☑ Volatilization → check air		☑ Inhalation of Indoor Air	F		F				
	☐ Flow to surface water body → check surface water		☑ Inhalation of Fugitive Dust	F	C/F	C/F	C/F			
	☐ Flow to sediment → check sediment									
	☐ Uptake by plants or animals → check biota									
	☐ Other (list): C/F									
☐ Surface Water	☐ Direct release to surface water → check surface water	☐ surface water	☐ Ingestion of Surface Water							
	☐ Volatilization → check air		☐ Dermal Absorption of Contaminants in Surface Water							
	☐ Sedimentation → check sediment		☐ Inhalation of Volatile Compounds in Tap Water							
	☐ Uptake by plants or animals → check biota									
	☐ Other (list):									
☐ Sediment	☐ Direct release to sediment → check sediment	☐ sediment	☐ Direct Contact with Sediment							
	☐ Resuspension, runoff, or erosion → check surface water									
	☐ Uptake by plants or animals → check biota	☐ biota	☐ Ingestion of Wild or Farmed Foods							
	☐ Other (list):									

Revised, 10/01/2010

Human Health Conceptual Site Model
Scoping Form and Standardized Graphic

Site Name: SO504 BUILDING 588 (FACILITY 1344)/ FIVE USTs

File Number: 107.26.006

Completed by: Jacobs Engineering

Introduction

The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

General Instructions: Follow the italicized instructions in each section below.

1. General Information:

Sources *(check potential sources at the site)*

- ☒ USTs
- ☐ ASTs
- ☐ Dispensers/fuel loading racks
- ☐ Drums
- ☐ Vehicles
- ☐ Landfills
- ☐ Transformers
- ☒ Other: UST Piping

Release Mechanisms *(check potential release mechanisms at the site)*

- ☒ Spills
- ☒ Leaks
- ☐ Direct discharge
- ☐ Burning
- ☐ Other:

Impacted Media *(check potentially-impacted media at the site)*

- ☐ Surface soil (0-2 feet bgs*)
- ☒ Subsurface soil (>2 feet bgs)
- ☒ Air
- ☐ Sediment
- ☒ Groundwater
- ☐ Surface water
- ☐ Biota
- ☐ Other:

Receptors *(check receptors that could be affected by contamination at the site)*

- ☒ Residents (adult or child)
- ☒ Commercial or industrial worker
- ☒ Construction worker
- ☐ Subsistence harvester (i.e. gathers wild foods)
- ☐ Subsistence consumer (i.e. eats wild foods)
- ☒ Site visitor
- ☒ Trespasser
- ☐ Recreational user
- ☐ Farmer
- ☐ Other:

* bgs - below ground surface

2. Exposure Pathways: *(The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".)*

a) Direct Contact -

1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.) ☐

If the box is checked, label this pathway complete: Incomplete

Comments:

All metals are below established BTVs for Eielson AFB except thallium; a historical (2012) result exceeds 1/10th of the ADEC health-based cleanup levels in surface soil. Qualified 2012 thallium results were widespread at similar levels for multiple source areas, and similar thallium detections are lacking in recent samples. Many of the 2012 thallium results were qualified due to method blank contamination.

2. Dermal Absorption of Contaminants from Soil

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☐

Can the soil contaminants permeate the skin (see Appendix B in the guidance document)? ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

See above; incidental soil ingestion is not a complete pathway.

b) Ingestion -

1. Ingestion of Groundwater

Have contaminants been detected or are they expected to be detected in the groundwater, or are contaminants expected to migrate to groundwater in the future? ☒

Could the potentially affected groundwater be used as a current or future drinking water source? Please note, only leave the box unchecked if DEC has determined the groundwater is not a currently or reasonably expected future source of drinking water according to 18 AAC 75.350. ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

Metals (antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, thallium, and vanadium) and naphthalene exceed 1/10th of the ADEC health-based cleanup levels in unfiltered groundwater. PFOA/PFOS contamination is probable in groundwater. Drinking water is not currently obtained from shallow supply wells on Eielson, but could be utilized in the future.

2. Ingestion of Surface Water

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future? ☐

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities). ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

There is no surface water present at or near this source area.

3. Ingestion of Wild and Farmed Foods

Is the site in an area that is used or reasonably could be used for hunting, fishing, or harvesting of wild or farmed foods? ☐

Do the site contaminants have the potential to bioaccumulate (see Appendix C in the guidance document)? ☒

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. soil within the root zone for plants or burrowing depth for animals, in groundwater that could be connected to surface water, etc.) ☐

If all of the boxes are checked, label this pathway complete: Incomplete

Comments:

Metals of concern for bioaccumulation (arsenic, cadmium, copper, lead, mercury, nickel) exceed 1/10th of the ADEC health-based cleanup levels in unfiltered groundwater only. There is no surface water at this source area. This site is industrial in nature and is not habitat.

c) Inhalation-

1. Inhalation of Outdoor Air

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Are the contaminants in soil volatile (see Appendix D in the guidance document)? ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

No volatile contaminants exceed 1/10th of the ADEC health-based cleanup levels in soil or groundwater except naphthalene, but naphthalene is not investigated as a volatile compound due to the lack of any colocated fuel exceedance. In addition, the naphthalene result was not replicated in 2016.

2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminted soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures) ☒

Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)? ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

Methylene chloride within Building 588 exceeded migration to groundwater cleanup levels at this source area shortly after UST removal. Building 588 (Facility 1344) is not currently in use. Ethyl benzene and Freon-12 are present in soil gas in concentrations exceeding ADEC criteria. Naphthalene exceeded the PSL in 2012 historical results, but is not investigated as a volatile compound due to the lack of any colocated fuel exceedance. Naphthalene did not exceed PSLs in 2016 soil samples (low level analysis).

3. **Additional Exposure Pathways:** *(Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)*

Dermal Exposure to Contaminants in Groundwater and Surface Water

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- Climate permits recreational use of waters for swimming.
- Climate permits exposure to groundwater during activities, such as construction.
- Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are deemed protective of this pathway because dermal absorption is incorporated into the groundwater exposure equation for residential uses.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

PFOA/PFOS contamination is probable in groundwater. Groundwater is not currently used for household purposes. There is no surface water present at this source area. Construction workers could be exposed to groundwater during excavation activity. Unfiltered groundwater samples contain metals (arsenic, cadmium, copper, lead, mercury, nickel) and naphthalene.

Inhalation of Volatile Compounds in Tap Water

Inhalation of volatile compounds in tap water may be a complete pathway if:

- The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

DEC groundwater cleanup levels in 18 AAC 75, Table C are protective of this pathway because the inhalation of vapors during normal household activities is incorporated into the groundwater exposure equation.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

Groundwater is not currently used for household purposes. No volatile contaminants exceed 1/10th of the ADEC health-based cleanup levels in groundwater except naphthalene, but naphthalene is not investigated as a volatile compound due to the lack of any colocated fuel exceedance.

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter - PM_{10}). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.

DEC human health soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because the inhalation of particulates is incorporated into the soil exposure equation.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

This site is paved and landscaped with grass. The fugitive dust inhalation pathway is not expected to be complete, but inhalation of particulates has been calculated under the ADEC Resident Cumulative Risk Calculator for Soil (see Appendix F). The maximum detected chromium concentration at this site (20.7 mg/kg) is below the BTV of 29 mg/kg but exceeds 1/10th of the ADEC Table B1 under 40-inch zone human health cleanup level of 3.9 mg/kg.

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- Climate permits recreational activities around sediment.
- The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

There is no sediment at this source area.

4. Other Comments *(Provide other comments as necessary to support the information provided in this form.)*

Metals at concentrations below established BTVs for Eielson AFB are not considered site contaminants for the purposes of this CSM and were not included in risk screening using the ADEC Cumulative Risk Evaluation tool.

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: SO504 BUILDING 588 (FACILITY 1344)/ FIVE USTs

Completed By: Jacobs Engineering

Date Completed: 2018-05-23

***Instructions*: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.**

(1)

Check the media that could be directly affected by the release.

(2)

For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Check additional media under (1) if the media acts as a secondary source.

(3)

Check all exposure media identified in (2).

(4)

*Check all pathways that could be complete. The pathways identified in this column **must** agree with Sections 2 and 3 of the Human Health CSM Scoping Form.*

(5)

Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.

Current & Future Receptors

Media	Transport Mechanisms	Exposure Media	Exposure Pathway/Route	Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☐ Surface Soil (0-2 ft bgs)	☐ Direct release to surface soil — check soil									
	☐ Migration to subsurface — check soil									
	☐ Migration to groundwater — check groundwater									
	☐ Volatilization — check air									
	☐ Runoff or erosion — check surface water									
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☑ Subsurface Soil (2-15 ft bgs)	☐ Direct release to subsurface soil — check soil									
	☑ Migration to groundwater — check groundwater									
	☑ Volatilization — check air									
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☐ Ground-water	☐ Direct release to groundwater — check groundwater									
	☐ Volatilization — check air									
	☐ Flow to surface water body — check surface water									
	☐ Flow to sediment — check sediment									
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☐ Surface Water	☐ Direct release to surface water — check surface water									
	☐ Volatilization — check air									
	☐ Sedimentation — check sediment									
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☐ Sediment	☐ Direct release to sediment — check sediment									
	☐ Resuspension, runoff, or erosion — check surface water									
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
		☑ soil	☐ Incidental Soil Ingestion							
			☐ Dermal Absorption of Contaminants from Soil							
			☑ Inhalation of Fugitive Dust	F	C/F	C/F	C/F			
		☑ groundwater	☑ Ingestion of Groundwater	F	F	F				
			☑ Dermal Absorption of Contaminants in Groundwater	F	C/F	C/F	C/F			
			☐ Inhalation of Volatile Compounds in Tap Water							
		☑ air	☐ Inhalation of Outdoor Air							
			☐ Inhalation of Indoor Air							
			☑ Inhalation of Fugitive Dust	F	C/F	C/F	C/F			
		☐ surface water	☐ Ingestion of Surface Water							
			☐ Dermal Absorption of Contaminants in Surface Water							
			☐ Inhalation of Volatile Compounds in Tap Water							
		☐ sediment	☐ Direct Contact with Sediment							
		☐ biota	☐ Ingestion of Wild or Farmed Foods							

Revised, 10/01/2010

Human Health Conceptual Site Model
Scoping Form and Standardized Graphic

Site Name: MY512 - Former Boat Shop

File Number: 107.38.100

Completed by: Jacobs Engineering

Introduction

The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

General Instructions: Follow the italicized instructions in each section below.

1. General Information:

Sources *(check potential sources at the site)*

- ☐ USTs
- ☒ ASTs
- ☒ Dispensers/fuel loading racks
- ☐ Drums
- ☐ Vehicles
- ☐ Landfills
- ☐ Transformers
- ☐ Other:

Release Mechanisms *(check potential release mechanisms at the site)*

- ☒ Spills
- ☒ Leaks
- ☐ Direct discharge
- ☐ Burning
- ☐ Other:

Impacted Media *(check potentially-impacted media at the site)*

- ☒ Surface soil (0-2 feet bgs*)
- ☒ Subsurface soil (>2 feet bgs)
- ☒ Air
- ☐ Sediment
- ☒ Groundwater
- ☐ Surface water
- ☐ Biota
- ☐ Other:

Receptors *(check receptors that could be affected by contamination at the site)*

- ☒ Residents (adult or child)
- ☒ Commercial or industrial worker
- ☒ Construction worker
- ☐ Subsistence harvester (i.e. gathers wild foods)
- ☐ Subsistence consumer (i.e. eats wild foods)
- ☒ Site visitor
- ☒ Trespasser
- ☐ Recreational user
- ☐ Farmer
- ☒ Other: Site Employee

* bgs - below ground surface

2. Exposure Pathways: *(The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".)*

a) Direct Contact -

1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.) ☒

If the box is checked, label this pathway complete: Complete

Comments:

PAHs (benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene) exceed 1/10th of the ADEC health-based cleanup and levels in soil. Metals (arsenic, chromium and thallium) exceed BTVs and 1/10th of the ADEC health-based cleanup and levels in soil.

2. Dermal Absorption of Contaminants from Soil

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Can the soil contaminants permeate the skin (see Appendix B in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

Arsenic, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene exceed can permeate the skin and exceed 1/10th of the ADEC health-based cleanup levels in soil.

b) Ingestion -

1. Ingestion of Groundwater

Have contaminants been detected or are they expected to be detected in the groundwater, or are contaminants expected to migrate to groundwater in the future? ☒

Could the potentially affected groundwater be used as a current or future drinking water source? Please note, only leave the box unchecked if DEC has determined the groundwater is not a currently or reasonably expected future source of drinking water according to 18 AAC 75.350. ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

GRO, DRO, RRO, 1,2,4-TMB, benzene, ethylbenzene, xylenes, naphthalene, PAHs and metals (antimony, arsenic, cadmium, chromium, and lead) exceed 1/10th of the ADEC health-based cleanup levels in unfiltered groundwater. PFOA/PFOS contamination is probable in groundwater.

2. Ingestion of Surface Water

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future? ☐

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities). ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

There is no surface water at or near this source area.

3. Ingestion of Wild and Farmed Foods

Is the site in an area that is used or reasonably could be used for hunting, fishing, or harvesting of wild or farmed foods? ☐

Do the site contaminants have the potential to bioaccumulate (see Appendix C in the guidance document)? ☒

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. soil within the root zone for plants or burrowing depth for animals, in groundwater that could be connected to surface water, etc.) ☒

If all of the boxes are checked, label this pathway complete: Incomplete

Comments:

This site is located in an industrial area and does not contain habitat for harvesting of wild or farmed foods.

c) Inhalation-

1. Inhalation of Outdoor Air

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Are the contaminants in soil volatile (see Appendix D in the guidance document)? ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

No volatile contaminants exceed 1/10th of the ADEC health-based cleanup levels in soil. .

2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminted soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures) ☒

Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

Facility 4231 is occupied by site workers during business hours. Soil gas samples were collected near Facility 4231 in 2015: no volatile compounds exceeded PSLs. This pathway is complete for future receptors only (if site usage changes). Volatile compounds that exceed 1/10th of the ADEC health-based cleanup levels in unfiltered groundwater include 1,2,4-TMB, benzene, ethylbenzene, xylenes, and naphthalene at location 371-N within the excavated soil area, over 50 feet from Facility 4231.

3. **Additional Exposure Pathways:** *(Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)*

Dermal Exposure to Contaminants in Groundwater and Surface Water

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- Climate permits recreational use of waters for swimming.
- Climate permits exposure to groundwater during activities, such as construction.
- Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are deemed protective of this pathway because dermal absorption is incorporated into the groundwater exposure equation for residential uses.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

PFOA/PFOS contamination is probable in groundwater. Construction workers could be exposed to contaminants in groundwater during activities such as excavation. There is no surface water at this source area.

Inhalation of Volatile Compounds in Tap Water

Inhalation of volatile compounds in tap water may be a complete pathway if:

- The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

DEC groundwater cleanup levels in 18 AAC 75, Table C are protective of this pathway because the inhalation of vapors during normal household activities is incorporated into the groundwater exposure equation.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

Volatile compounds that exceed 1/10th of the ADEC health-based cleanup levels in unfiltered groundwater include GRO, DRO, RRO, 1,2,4-TMB, benzene, ethylbenzene, xylenes, and naphthalene. Groundwater is not currently used for household purposes. The pathway is complete for future receptors only (if site usage changes).

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter - PM_{10}). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.

DEC human health soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because the inhalation of particulates is incorporated into the soil exposure equation.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

The ground surface at MY512 is paved and landscaped with grass. The fugitive dust inhalation pathway is not expected to be complete, but inhalation of particulates has been calculated under the ADEC Resident Cumulative Risk Calculator for Soil (see Appendix F). The maximum detected chromium concentration at this site (98 mg/kg) exceeds both the BTV of 29 mg/kg and 1/10th of the ADEC Table B1 under 40-inch zone human health cleanup level of 3.9 mg/kg

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- Climate permits recreational activities around sediment.
- The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

There is no sediment at this source area.

4. Other Comments *(Provide other comments as necessary to support the information provided in this form.)*

Metals at concentrations below established BTVs for Eielson AFB are not considered site contaminants for the purposes of this CSM and were not included in risk screening using the ADEC Cumulative Risk Evaluation tool.

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: MY512 Former Boat Shop

Completed By: Jacobs Engineering

Date Completed: 2018-05-24

***Instructions*: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.**

(1) *Check the media that could be directly affected by the release.*

(2) *For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Check additional media under (1) if the media acts as a secondary source.*

(3) *Check all exposure media identified in (2).*

(4) *Check all pathways that could be complete. The pathways identified in this column **must** agree with Sections 2 and 3 of the Human Health CSM Scoping Form.*

(5) *Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.*

Media	Transport Mechanisms	Exposure Media	Exposure Pathway/Route	Current & Future Receptors: Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☑ Surface Soil (0-2 ft bgs)	☑ Direct release to surface soil — check soil	☑ soil	☑ Incidental Soil Ingestion	F	C/F	C/F	C/F			C/F
	☑ Migration to subsurface — check soil		☑ Dermal Absorption of Contaminants from Soil	F	C/F	C/F	C/F			C/F
	☑ Migration to groundwater — check groundwater		☑ Inhalation of Fugitive Dust	F	C/F	C/F	C/F			C/F
	☐ Volatilization — check air									
	☐ Runoff or erosion — check surface water									
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☑ Subsurface Soil (2-15 ft bgs)	☑ Direct release to subsurface soil — check soil	☑ groundwater	☑ Ingestion of Groundwater	F	C/F	C/F	C/F			C/F
	☑ Migration to groundwater — check groundwater		☑ Dermal Absorption of Contaminants in Groundwater	F			C/F			
	☐ Volatilization — check air		☑ Inhalation of Volatile Compounds in Tap Water	F						
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☑ Ground-water	☑ Direct release to groundwater — check groundwater	☑ air	☐ Inhalation of Outdoor Air							
	☑ Volatilization — check air		☑ Inhalation of Indoor Air	F		F				F
	☐ Flow to surface water body — check surface water		☑ Inhalation of Fugitive Dust	F	C/F	C/F	C/F			C/F
	☐ Flow to sediment — check sediment									
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☐ Surface Water	☐ Direct release to surface water — check surface water	☐ surface water	☐ Ingestion of Surface Water							
	☐ Volatilization — check air		☐ Dermal Absorption of Contaminants in Surface Water							
	☐ Sedimentation — check sediment		☐ Inhalation of Volatile Compounds in Tap Water							
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☐ Sediment	☐ Direct release to sediment — check sediment	☐ sediment	☐ Direct Contact with Sediment							
	☐ Resuspension, runoff, or erosion — check surface water									
	☐ Uptake by plants or animals — check biota	☐ biota	☐ Ingestion of Wild or Farmed Foods							
	☐ Other (list):									

Revised, 10/01/2010

Human Health Conceptual Site Model
Scoping Form and Standardized Graphic

Site Name: MY518 - BUILDING 2275 (FACILITY 2196)

File Number: 107.38.105

Completed by: Jacobs Engineering Group Inc.

Introduction

The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

General Instructions: Follow the italicized instructions in each section below.

1. General Information:

Sources *(check potential sources at the site)*

- ☐ USTs
- ☐ ASTs
- ☐ Dispensers/fuel loading racks
- ☐ Drums
- ☐ Vehicles
- ☐ Landfills
- ☐ Transformers
- ☒ Other: Vehicle maintenance activities

Release Mechanisms *(check potential release mechanisms at the site)*

- ☒ Spills
- ☒ Leaks
- ☒ Direct discharge
- ☐ Burning
- ☐ Other:

Impacted Media *(check potentially-impacted media at the site)*

- ☒ Surface soil (0-2 feet bgs*)
- ☒ Subsurface soil (>2 feet bgs)
- ☒ Air
- ☐ Sediment
- ☒ Groundwater
- ☐ Surface water
- ☐ Biota
- ☐ Other:

Receptors *(check receptors that could be affected by contamination at the site)*

- ☒ Residents (adult or child)
- ☒ Commercial or industrial worker
- ☒ Construction worker
- ☐ Subsistence harvester (i.e. gathers wild foods)
- ☐ Subsistence consumer (i.e. eats wild foods)
- ☒ Site visitor
- ☒ Trespasser
- ☐ Recreational user
- ☐ Farmer
- ☐ Other:

* bgs - below ground surface

2. Exposure Pathways: *(The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".)*

a) Direct Contact -

1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.) ☐

If the box is checked, label this pathway complete: Incomplete

Comments:

All metals are below established BTVs for Eielson AFB except thallium; a historical (2012) result exceeds 1/10th of the ADEC health-based cleanup levels in surface soil. Qualified 2012 thallium results were widespread at similar levels for multiple source areas, and similar thallium detections are lacking in recent samples. Many of the 2012 thallium results were qualified due to method blank contamination.

2. Dermal Absorption of Contaminants from Soil

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☐

Can the soil contaminants permeate the skin (see Appendix B in the guidance document)? ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

See above; incidental soil ingestion is not a complete pathway.

b) Ingestion -

1. Ingestion of Groundwater

Have contaminants been detected or are they expected to be detected in the groundwater, or are contaminants expected to migrate to groundwater in the future? ☒

Could the potentially affected groundwater be used as a current or future drinking water source? Please note, only leave the box unchecked if DEC has determined the groundwater is not a currently or reasonably expected future source of drinking water according to 18 AAC 75.350. ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

DRO, RRO, bis(2-Ethylhexyl)phthalate and metals (antimony, arsenic, barium, chromium, lead and vanadium) exceed 1/10th of the ADEC health-based cleanup levels in unfiltered groundwater.

2. Ingestion of Surface Water

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future? ☐

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities). ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

There is no surface water at or near this source area.

3. Ingestion of Wild and Farmed Foods

Is the site in an area that is used or reasonably could be used for hunting, fishing, or harvesting of wild or farmed foods? ☐

Do the site contaminants have the potential to bioaccumulate (see Appendix C in the guidance document)? ☒

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. soil within the root zone for plants or burrowing depth for animals, in groundwater that could be connected to surface water, etc.) ☒

If all of the boxes are checked, label this pathway complete: Incomplete

Comments:

This site is located in a landscaped residential area and does not contain habitat for harvesting of wild or farmed foods.

c) Inhalation-

1. Inhalation of Outdoor Air

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Are the contaminants in soil volatile (see Appendix D in the guidance document)? ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

There are no volatile contaminants in soil that have been detected above 1/10th the ADEC health based cleanup level.

2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminted soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures) ☒

Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)? ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

No volatile compounds evaluated for indoor air inhalation are present in soil or groundwater within 30 ft of dormitory building 2275/ Facility 2196. Although low levels of fuel-related contaminants and solvents were detected in soil gas samples collected within 10 feet of the building, no analytes exceeded PSLs at the three soil gas sample locations or in the field duplicate sample. This pathway is incomplete.

3. **Additional Exposure Pathways:** *(Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)*

Dermal Exposure to Contaminants in Groundwater and Surface Water

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- Climate permits recreational use of waters for swimming.
- Climate permits exposure to groundwater during activities, such as construction.
- Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are deemed protective of this pathway because dermal absorption is incorporated into the groundwater exposure equation for residential uses.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

Construction workers could be exposed to groundwater during activities such as excavation. There is no surface water at his source area. Groundwater is no currently used for household purposes but future use is considered for this CSM.

Inhalation of Volatile Compounds in Tap Water

Inhalation of volatile compounds in tap water may be a complete pathway if:

- The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

DEC groundwater cleanup levels in 18 AAC 75, Table C are protective of this pathway because the inhalation of vapors during normal household activities is incorporated into the groundwater exposure equation.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

DRO and RRO exceed 1/10th of the ADEC health-based cleanup levels in unfiltered groundwater. Groundwater is no currently used for household purposes but future use is considered for this CSM.

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter - PM_{10}). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.

DEC human health soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because the inhalation of particulates is incorporated into the soil exposure equation.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

The ground surface at MY518 is paved and landscaped with grass. The fugitive dust inhalation pathway is not expected to be complete, but inhalation of particulates has been calculated under the ADEC Resident Cumulative Risk Calculator for Soil (see Appendix F). The maximum detected chromium concentration at this site (24.8 mg/kg) is below the BTV of 29 mg/kg but exceeds 1/10th of the ADEC Table B1 under 40-inch zone human health cleanup level of 3.9 mg/kg.

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- Climate permits recreational activities around sediment.
- The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

There is no sediment at this source area.

4. Other Comments *(Provide other comments as necessary to support the information provided in this form.)*

Metals at concentrations below established BTVs for Eielson AFB are not considered site contaminants for the purposes of this CSM and were not included in risk screening using the ADEC Cumulative Risk Evaluation tool.

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: MY518 BUILDING 2275 (FACILITY 2196)

Completed By: Jacobs Engineering

Date Completed: 2018-05-24

***Instructions*: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.**

(1)

Check the media that could be directly affected by the release.

(2)

For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Check additional media under (1) if the media acts as a secondary source.

Media / Transport Mechanisms

Surface Soil (0-2 ft bgs) — ☑
- ☑ Direct release to surface soil → *check soil*
- ☑ *Migration to subsurface* → *check soil*
- ☑ *Migration to groundwater* → *check groundwater*
- ☐ *Volatilization* → *check air*
- ☐ *Runoff or erosion* → *check surface water*
- ☐ *Uptake by plants or animals* → *check biota*
- ☐ *Other (list):*

Subsurface Soil (2-15 ft bgs) — ☑
- ☑ Direct release to subsurface soil → *check soil*
- ☑ *Migration to groundwater* → *check groundwater*
- ☐ *Volatilization* → *check air*
- ☐ *Uptake by plants or animals* → *check biota*
- ☐ *Other (list):*

Ground-water — ☑
- ☑ Direct release to groundwater → *check groundwater*
- ☑ *Volatilization* → *check air*
- ☐ *Flow to surface water body* → *check surface water*
- ☐ *Flow to sediment* → *check sediment*
- ☐ *Uptake by plants or animals* → *check biota*
- ☐ *Other (list):*

Surface Water — ☐
- ☐ Direct release to surface water → *check surface water*
- ☐ *Volatilization* → *check air*
- ☐ *Sedimentation* → *check sediment*
- ☐ *Uptake by plants or animals* → *check biota*
- ☐ *Other (list):*

Sediment — ☐
- ☐ Direct release to sediment → *check sediment*
- ☐ *Resuspension, runoff, or erosion* → *check surface water*
- ☐ *Uptake by plants or animals* → *check biota*
- ☐ *Other (list):*

(3)

Check all exposure media identified in (2).

(4)

*Check all pathways that could be complete. The pathways identified in this column **must** agree with Sections 2 and 3 of the Human Health CSM Scoping Form.*

(5)

Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.

Current & Future Receptors

Exposure Media	Exposure Pathway/Route	Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☑ soil	☐ Incidental Soil Ingestion							
	☐ Dermal Absorption of Contaminants from Soil							
	☑ Inhalation of Fugitive Dust	C/F	C/F	C/F	C/F			
☑ groundwater	☑ Ingestion of Groundwater	C/F	F	F				
	☑ Dermal Absorption of Contaminants in Groundwater	F	F	F	C/F			
	☑ Inhalation of Volatile Compounds in Tap Water	F						
☑ air	☐ Inhalation of Outdoor Air							
	☐ Inhalation of Indoor Air							
	☑ Inhalation of Fugitive Dust	C/F	C/F	C/F	C/F			
☐ surface water	☐ Ingestion of Surface Water							
	☐ Dermal Absorption of Contaminants in Surface Water							
	☐ Inhalation of Volatile Compounds in Tap Water							
☐ sediment	☐ Direct Contact with Sediment							
☐ biota	☐ Ingestion of Wild or Farmed Foods							

APPENDIX C

Cumulative Risk Evaluations

(Based On 2018 ADEC Cleanup Levels)

Decision Document for PBR Source Areas SO075, SS078, SO504, MY512, and MY518
Table C-1 Soil Maximum Detections

SCR	Source Area	Analyte	Result (mg/kg)	PSL (mg/kg)	ADEC HH (mg/kg)	BTV (mg/kg)	Sample ID	Year	Sample Date	Exceeds PSL?	Exceeds HH/10?	Exceeds BTV?	COPC? (Exceeds PSL or HH/10)	Included in CRE? (Exceeds HH/10 and BTV)
1	SO075	GRO	3.09	300	1400	-	EIC516DP003SO01-01	2012	6/29/2012	No	No	-	No	No
1	SO075	DRO	52.5	250	10250	-	EIC516DP003SO01-01	2012	6/29/2012	No	No	-	No	No
1	SO075	RRO	500	10000	10000	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Benzene	**1.337**	0.022	11	-	1301SS02500.62002	2002	1/1/2002	Yes	Yes	-	Yes	Yes
1	SO075	Methylene Chloride	0.16 J, B	0.33	460	-	15E-SO075SS01-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Methylene Chloride	0.16 J, B	0.33	460	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Toluene	0.0576	6.7	200	-	EIC516DP902SO01-01	2012	6/29/2012	No	No	-	No	No
1	SO075	Acenaphthene	0.037	37	4600	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Acenaphthylene	0.018 J	18	2300	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Anthracene	0.041	390	23000	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Benzo(a)anthracene	0.15	0.7	14	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Benzo(a)pyrene	0.21	1.5	1.5	-	15E-SO075SS02-0.5	2015	7/11/2015	No	Yes	-	Yes	Yes
1	SO075	Benzo(b)fluoranthene	0.3	15	15	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Benzo(g,h,i)perylene	0.14	2300	2300	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Benzo(k)fluoranthene	0.1	150	150	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Benzoic Acid	0.289	200	100000	-	EIC516DP003SO01-01	2012	6/29/2012	No	No	-	No	No
1	SO075	Chrysene	0.22	600	1500	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Dibenzo(a,h)anthracene	0.032	1.5	1.5	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Fluoranthene	0.43	590	3100	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Fluorene	0.033	36	3100	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Indeno(1,2,3-cd)pyrene	0.13	15	15	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	1-Methylnaphthalene	0.014 J	0.41	68	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	2-Methylnaphthalene	0.025	1.3	310	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Naphthalene	**0.15**	0.038	29	-	15E-SO075SS02-0.5	2015	7/11/2015	Yes	No	-	Yes	No
1	SO075	Phenanthrene	0.29	39	2300	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Pyrene	0.4	87	2300	-	15E-SO075SS02-0.5	2015	7/11/2015	No	No	-	No	No
1	SO075	Aluminum	14900	77000	-	13329	EIC516DP002SO01-01	2012	6/29/2012	No	-	Yes	No	No
1	SO075	Antimony	0.926	4.6	41	1.175	15E-SO075SS02-0.5	2015	7/11/2015	No	No	No	No	No
1	SO075	Arsenic	**32.6**	0.2	8.8	23.54	15E-SO075SS02-0.5	2015	7/11/2015	Yes	Yes	Yes	Yes	Yes
1	SO075	Barium	625	2100	20000	160	EIC516DP002SO01-01	2012	6/29/2012	No	No	Yes	No	No
1	SO075	Beryllium	0.79	200	200	0.259	EIC516DP002SO01-01	2012	6/29/2012	No	No	Yes	No	No
1	SO075	Cadmium	1.32	9.1	92	0.303	15E-SO075SS02-0.5	2015	7/11/2015	No	No	Yes	No	No
1	SO075	Calcium	17900	-	-	7565	EIC516DP002SO01-01	2012	6/29/2012	-	-	Yes	No	No
1	SO075	Chromium	**148**	0.089	3.9	29.03	15E-SO075SB03-04	2015	7/9/2015	Yes	Yes	Yes	Yes	Yes
1	SO075	Cobalt	10.6	23	-	14	EIC516DP003SO01-04	2012	6/29/2012	No	-	No	No	No
1	SO075	Copper	161	370	4100	66.68	15E-SO075SS02-0.5	2015	7/11/2015	No	No	Yes	No	No
1	SO075	Iron	39800	55000	-	31000	15E-SO075SS02-0.5	2015	7/11/2015	No	-	Yes	No	No
1	SO075	Lead	88.8	400	400	12.32	15E-SO075SS02-0.5	2015	7/11/2015	No	Yes	Yes	Yes	Yes
1	SO075	Magnesium	6600	-	-	8000	EIC516DP003SO01-04	2012	6/29/2012	-	-	No	No	No
1	SO075	Manganese	**2820**	370	2700	557.7	15E-SO075SS02-0.5	2015	7/11/2015	Yes	Yes	Yes	Yes	Yes
1	SO075	Mercury	0.0571 J	0.36	3.1	0.0411	15E-SO075SS02-0.5	2015	7/11/2015	No	No	Yes	No	No
1	SO075	Molybdenum	2.5	390	-	0	EIC516DP001SO01-07	2012	6/28/2012	No	-	Yes	No	No
1	SO075	Nickel	26.4	340	2000	36	EIC516DP003SO01-04	2012	6/29/2012	No	No	No	No	No
1	SO075	Potassium	1180	-	-	1219	EIC516DP001SO01-02	2012	6/28/2012	-	-	No	No	No
1	SO075	Selenium	0.23 J	6.9	510	0.955	15E-SO075SB02-03	2015	7/9/2015	No	No	No	No	No
1	SO075	Silver	0.0766 J	11	510	0.146	15E-SO075SS02-0.5	2015	7/11/2015	No	No	No	No	No
1	SO075	Sodium	793	-	-	491.5	EIC516DP003SO01-04	2012	6/29/2012	-	-	Yes	No	No

Decision Document for PBR Source Areas SO075, SS078, SO504, MY512, and MY518
Table C-1 Soil Maximum Detections

SCR	Source Area	Analyte	Result (mg/kg)	PSL (mg/kg)	ADEC HH (mg/kg)	BTV (mg/kg)	Sample ID	Year	Sample Date	Exceeds PSL?	Exceeds HH/10?	Exceeds BTV?	COPC? (Exceeds PSL or HH/10)	Included in CRE? (Exceeds HH/10 and BTV)
1	SO075	Thallium	**2.19 B**	0.19	1	-	EIC075DP002SO01-05	2012	6/29/2012	Yes	Yes	-	Yes	Yes
1	SO075	Vanadium	46.1	510	510	58.2	EIC516DP002SO01-01	2012	6/29/2012	No	No	No	No	No
1	SO075	Zinc	668	4900	30000	89.13	15E-SO075SS02-0.5	2015	7/11/2015	No	No	Yes	No	No
1	SS078	GRO	**1800**	300	1400	-	15E-SS078SB02-08	2015	7/8/2015	Yes	Yes	-	Yes	Yes
1	SS078	DRO	**3460**	250	10250	-	Haz-B8-8	2002	8/1/2002	Yes	Yes	-	Yes	Yes
1	SS078	RRO	774	10000	10000	-	EIC078DP003SO01-01	2012	7/8/2012	No	No	-	No	No
1	SS078	Acetone	0.007 Q	38	81000	-	13SB05-3	1991	1/1/1991	No	No	-	No	No
1	SS078	Benzene	**0.445**	0.022	11	-	Haz-B2-8	2002	8/1/2002	Yes	No	-	Yes	No
1	SS078	n-Butylbenzene	4.2 JS+	20	20	-	15E-SS078SB02-08	2015	7/8/2015	No	Yes	-	Yes	Yes
1	SS078	sec-Butylbenzene	0.87 JS+	28	28	-	15E-SS078SB02-08	2015	7/8/2015	No	No	-	No	No
1	SS078	Chloroform	**0.019 J**	0.0071	4	-	13E-13B321-S001	2013	10/19/2013	Yes	No	-	Yes	No
1	SS078	Cumene	1.1 JS+	5.6	54	-	15E-SS078SB02-08	2015	7/8/2015	No	No	-	No	No
1	SS078	p-Cymene	0.47 JS+	-	-	-	15E-SS078SB02-08	2015	7/8/2015	-	-	-	No	No
1	SS078	1,2-Dichloroethane	0.000709 J	0.0055	5.5	-	EIC078DP003SO01-02	2012	7/8/2012	No	No	-	No	No
1	SS078	Ethylbenzene	**1 JS+**	0.13	49	-	15E-SS078SB02-08	2015	7/8/2015	Yes	No	-	Yes	No
1	SS078	Methylene Chloride	0.063 J,B	0.33	460	-	13E-13B321-S002	2013	10/19/2013	No	No	-	No	No
1	SS078	Propylbenzene	4.3 JS+	9.1	52	-	15E-SS078SB02-08	2015	7/8/2015	No	No	-	No	No
1	SS078	1,2,4-TMB	**16**	0.61	43	-	15E-SS078SB02-07	2015	7/8/2015	Yes	Yes	-	Yes	Yes
1	SS078	1,3,5-TMB	**5.9 JS+**	0.66	37	-	15E-SS078SB02-08	2015	7/8/2015	Yes	Yes	-	Yes	Yes
1	SS078	Toluene	1.1	6.7	200	-	Haz-B2-8	2002	8/1/2002	No	No	-	No	No
1	SS078	Xylene, m & p	7.7	-	-	-	15E-SS078SB02-07	2015	7/8/2015	-	-	-	No	No
1	SS078	Xylene, o	4	-	-	-	15E-SS078SB02-07	2015	7/8/2015	-	-	-	No	No
1	SS078	Xylenes	**12**	1.5	57	-	15E-SS078SB02-07	2015	7/8/2015	Yes	Yes	-	Yes	Yes
1	SS078	Acenaphthene	0.014	37	4600	-	15E-SS078SB02-08	2015	7/8/2015	No	No	-	No	No
1	SS078	Acenaphthylene	0.015	18	2300	-	15E-SS078SB02-08	2015	7/8/2015	No	No	-	No	No
1	SS078	Anthracene	0.019 J	390	23000	-	17E-PL089SB03-03	2017	6/16/2017	No	No	-	No	No
1	SS078	Benzo(a)anthracene	**1.29 J**	0.7	14	-	EIC078DP003SO01-01	2012	7/8/2012	Yes	No	-	Yes	No
1	SS078	Benzo(a)pyrene	**1.51 J**	1.5	1.5	-	EIC078DP003SO01-01	2012	7/8/2012	Yes	Yes	-	Yes	Yes
1	SS078	Benzo(b)fluoranthene	1.79	15	15	-	EIC078DP003SO01-01	2012	7/8/2012	No	Yes	-	Yes	Yes
1	SS078	Benzo(g,h,i)perylene	0.912 J	2300	2300	-	EIC078DP003SO01-01	2012	7/8/2012	No	No	-	No	No
1	SS078	Benzo(k)fluoranthene	0.689 J	150	150	-	EIC078DP003SO01-01	2012	7/8/2012	No	No	-	No	No
1	SS078	Benzoic Acid	0.181 J	200	100000	-	EIC078DP901SO01-01	2012	7/8/2012	No	No	-	No	No
1	SS078	Benzyl Alcohol	0.681 J	5.7	8200	-	EIC078DP003SO01-01	2012	7/8/2012	No	No	-	No	No
1	SS078	Chrysene	1.48 J	600	1500	-	EIC078DP003SO01-01	2012	7/8/2012	No	No	-	No	No
1	SS078	Dibenzo(a,h)anthracene	0.013 J	1.5	1.5	-	17E-PL089SB03-03	2017	6/16/2017	No	No	-	No	No
1	SS078	Fluoranthene	2.84 J	590	3100	-	EIC078DP003SO01-01	2012	7/8/2012	No	No	-	No	No
1	SS078	Fluorene	0.12	36	3100	-	HM-TMW10-6	2004	8/7/2004	No	No	-	No	No
1	SS078	Indeno(1,2,3-cd)pyrene	0.864 J	15	15	-	EIC078DP003SO01-01	2012	7/8/2012	No	No	-	No	No
1	SS078	1-Methylnaphthalene	**1.4**	0.41	68	-	15E-SS078SB02-08	2015	7/8/2015	Yes	No	-	Yes	No
1	SS078	2-Methylnaphthalene	**2.2**	1.3	310	-	15E-SS078SB02-08	2015	7/8/2015	Yes	No	-	Yes	No
1	SS078	Naphthalene	**0.54**	0.038	29	-	15E-SS078SB02-08	2015	7/8/2015	Yes	No	-	Yes	No
1	SS078	Phenanthrene	2.16 J	39	2300	-	EIC078DP003SO01-01	2012	7/8/2012	No	No	-	No	No
1	SS078	Pyrene	2.62 J	87	2300	-	EIC078DP003SO01-01	2012	7/8/2012	No	No	-	No	No
1	SS078	Aluminum	13600	77000	-	13329	15E-SS078SB01-059	2015	7/8/2015	No	-	Yes	No	No
1	SS078	Antimony	0.791	4.6	41	1.175	15E-SS078SB01-05	2015	7/8/2015	No	No	No	No	No
1	SS078	Arsenic	15.1	0.2	8.8	23.54	15E-SS078SB01-03	2015	7/8/2015	Yes	Yes	No	Yes	No
1	SS078	Barium	138	2100	20000	160	15E-SS078SB01-059	2015	7/8/2015	No	No	No	No	No

Decision Document for PBR Source Areas SO075, SS078, SO504, MY512, and MY518
Table C-1 Soil Maximum Detections

SCR	Source Area	Analyte	Result (mg/kg)	PSL (mg/kg)	ADEC HH (mg/kg)	BTV (mg/kg)	Sample ID	Year	Sample Date	Exceeds PSL?	Exceeds HH/10?	Exceeds BTV?	COPC? (Exceeds PSL or HH/10)	Included in CRE? (Exceeds HH/10 and BTV)
1	SS078	Beryllium	0.224 J	200	200	0.259	15E-SS078SB01-03	2015	7/8/2015	No	No	No	No	No
1	SS078	Cadmium	0.426 J	9.1	92	0.303	15E-SS078SB01-05	2015	7/8/2015	No	No	Yes	No	No
1	SS078	Calcium	11600	-	-	7565	15E-SS078SB01-059	2015	7/8/2015	-	-	Yes	No	No
1	SS078	Chromium	**27.2**	0.089	3.9	29.03	15E-SS078SB01-059	2015	7/8/2015	Yes	Yes	No	Yes	No
1	SS078	Cobalt	12.5	23	-	14	15E-SS078SB01-05	2015	7/8/2015	No	-	No	No	No
1	SS078	Copper	40	370	4100	66.68	15E-SS078SB01-05	2015	7/8/2015	No	No	No	No	No
1	SS078	Iron	27300	55000	-	31000	15E-SS078SB01-03	2015	7/8/2015	No	-	No	No	No
1	SS078	Lead	9.85	400	400	12.32	15E-SS078SB01-05	2015	7/8/2015	No	No	No	No	No
1	SS078	Magnesium	8030	-	-	8000	15E-SS078SB01-059	2015	7/8/2015	-	-	Yes	No	No
1	SS078	Manganese	**478**	370	2700	557.7	15E-SS078SB01-03	2015	7/8/2015	Yes	Yes	No	Yes	No
1	SS078	Mercury	0.0259 J	0.36	3.1	0.0411	15E-SS078SB01-059	2015	7/8/2015	No	No	No	No	No
1	SS078	Nickel	31.3	340	2000	36	15E-SS078SB01-05	2015	7/8/2015	No	No	No	No	No
1	SS078	Potassium	1540	-	-	1219	15E-SS078SB01-059	2015	7/8/2015	-	-	Yes	No	No
1	SS078	Selenium	0.434 J	6.9	510	0.955	15E-SS078SB01-05	2015	7/8/2015	No	No	No	No	No
1	SS078	Silver	0.125 J	11	510	0.146	15E-SS078SB01-05	2015	7/8/2015	No	No	No	No	No
1	SS078	Sodium	669	-	-	491.5	15E-SS078SB01-059	2015	7/8/2015	-	-	Yes	No	No
1	SS078	Thallium	0.0922 J	0.19	1	-	15E-SS078SB01-059	2015	7/8/2015	No	No	-	No	No
1	SS078	Vanadium	48.9	510	510	58.2	15E-SS078SB01-059	2015	7/8/2015	No	No	No	No	No
1	SS078	Zinc	69.5	4900	30000	89.13	15E-SS078SB01-059	2015	7/8/2015	No	No	No	No	No
1	SO504	GRO	12.3	300	1400	-	UST-21E-1994	1994	6/14/1994	No	No	-	No	No
1	SO504	DRO	153	250	10250	-	EIC504DP002SO01-01	2012	6/28/2012	No	No	-	No	No
1	SO504	RRO	817 J	10000	10000	-	EIC504DP001SO01-02	2012	6/28/2012	No	No	-	No	No
1	SO504	TPH	17.8	250	10250	-	UST-21W-1994	1994	6/14/1994	No	No	-	No	No
1	SO504	Benzene	0.00495	0.022	11	-	EIC504DP002SO01-02	2012	6/28/2012	No	No	-	No	No
1	SO504	1,2-Dichloroethane	0.000213 J	0.0055	5.5	-	EIC504DP003SO01-09	2012	6/28/2012	No	No	-	No	No
1	SO504	Methylene Chloride	**0.41 B**	0.33	460	-	UST-23W-1994	1994	6/14/1994	Yes	No	-	Yes	No
1	SO504	1,2,4-TMB	0.0643	0.61	43	-	EIC504DP002SO01-06	2012	6/28/2012	No	No	-	No	No
1	SO504	1,3,5-TMB	0.0418 J	0.66	37	-	EIC504DP002SO01-06	2012	6/28/2012	No	No	-	No	No
1	SO504	Xylene, o	0.0248 J	-	-	-	EIC504DP002SO01-06	2012	6/28/2012	-	-	-	No	No
1	SO504	Xylenes	0.0248	1.5	57	-	EIC504DP002SO01-06	2012	6/28/2012	No	No	-	No	No
1	SO504	Naphthalene	**0.0398 J**	0.038	29	-	EIC504DP002SO01-06	2012	6/28/2012	Yes	No	-	Yes	No
1	SO504	Aluminum	8660	77000	-	13329	16E-SO504SB02-06	2016	8/20/2016	No	-	No	No	No
1	SO504	Antimony	0.246 J	4.6	41	1.175	16E-SO504SB03-10	2016	8/20/2016	No	No	No	No	No
1	SO504	Arsenic	**6.68**	0.2	8.8	23.54	16E-SO504SB03-06	2016	8/20/2016	Yes	Yes	No	Yes	No
1	SO504	Barium	86.4	2100	20000	160	16E-SO504SB03-06	2016	8/20/2016	No	No	No	No	No
1	SO504	Beryllium	0.35	200	200	0.259	EIC504DP001SO01-07	2012	6/28/2012	No	No	Yes	No	No
1	SO504	Beryllium	0.35	200	200	0.259	EIC504DP003SO01-06	2012	6/28/2012	No	No	Yes	No	No
1	SO504	Cadmium	0.21 J	9.1	92	0.303	16E-SO504SB02-06	2016	8/20/2016	No	No	No	No	No
1	SO504	Calcium	4810	-	-	7565	EIC504DP002SO01-01	2012	6/28/2012	-	-	No	No	No
1	SO504	Chromium	**20.7**	0.089	3.9	29.03	EIC504DP003SO01-02	2012	6/28/2012	Yes	Yes	No	Yes	No
1	SO504	Cobalt	7.14	23	-	14	16E-SO504SB02-06	2016	8/20/2016	No	-	No	No	No
1	SO504	Copper	21.4	370	4100	66.68	16E-SO504SB02-06	2016	8/20/2016	No	No	No	No	No
1	SO504	Iron	15800	55000	-	31000	16E-SO504SB02-06	2016	8/20/2016	No	-	No	No	No
1	SO504	Lead	22.1	400	400	12.32	EIC504DP002SO01-02	2012	6/28/2012	No	No	Yes	No	No
1	SO504	Magnesium	4790	-	-	8000	16E-SO504SB01-11	2016	8/22/2016	-	-	No	No	No
1	SO504	Manganese	358	370	2700	557.7	16E-SO504SB02-06	2016	8/20/2016	No	Yes	No	Yes	No
1	SO504	Mercury	0.0122 J	0.36	3.1	0.0411	16E-SO504SB03-06	2016	8/20/2016	No	No	No	No	No

Decision Document for PBR Source Areas SO075, SS078, SO504, MY512, and MY518
Table C-1 Soil Maximum Detections

SCR	Source Area	Analyte	Result (mg/kg)	PSL (mg/kg)	ADEC HH (mg/kg)	BTV (mg/kg)	Sample ID	Year	Sample Date	Exceeds PSL?	Exceeds HH/10?	Exceeds BTV?	COPC? (Exceeds PSL or HH/10)	Included in CRE? (Exceeds HH/10 and BTV)
1	SO504	Molybdenum	3.12	390	-	0	EIC504DP002SO01-01	2012	6/28/2012	No	-	Yes	No	No
1	SO504	Nickel	19.5	340	2000	36	16E-SO504SB02-06	2016	8/20/2016	No	No	No	No	No
1	SO504	Potassium	1460	-	-	1219	16E-SO504SB01-11	2016	8/22/2016	-	-	Yes	No	No
1	SO504	Selenium	0.142 J	6.9	510	0.955	16E-SO504SB02-06	2016	8/20/2016	No	No	No	No	No
1	SO504	Silver	0.056 J,JD	11	510	0.146	16E-SO504SB01-08	2016	8/22/2016	No	No	No	No	No
1	SO504	Sodium	542	-	-	491.5	16E-SO504SB02-06	2016	8/20/2016	-	-	Yes	No	No
1	SO504	Thallium	**0.41 J**	0.19	1	-	EIC504DP003SO01-02	2012	6/28/2012	Yes	Yes	-	Yes	Yes
1	SO504	Vanadium	32.2	510	510	58.2	16E-SO504SB02-06	2016	8/20/2016	No	No	No	No	No
1	SO504	Zinc	41	4900	30000	89.13	16E-SO504SB02-06	2016	8/20/2016	No	No	No	No	No
1	MY512	GRO	5.5	300	1400	-	371-SB-01-080304A	2004	8/3/2004	No	No	-	No	No
1	MY512	DRO	200	250	10250	-	15E-MY512SB11-02	2015	10/5/2015	No	No	-	No	No
1	MY512	RRO	753	10000	10000	-	371-SB-01-080404H	2004	8/4/2004	No	No	-	No	No
1	MY512	Acetone	0.34 J	38	81000	-	15E-MY512SB03-03	2015	7/9/2015	No	No	-	No	No
1	MY512	Benzene	**0.379**	0.022	11	-	371-SB-01-081704W	2004	8/4/2004	Yes	No	-	Yes	No
1	MY512	1,2-Dichloroethane	0.000327 J	0.0055	5.5	-	EIC512DP001SO01-02	2012	6/21/2012	No	No	-	No	No
1	MY512	Ethylbenzene	0.06	0.13	49	-	371-SB-01-081704W	2004	8/4/2004	No	No	-	No	No
1	MY512	Methylene Chloride	0.29 J, B	0.33	460	-	15E-MY512SB03-03	2015	7/9/2015	No	No	-	No	No
1	MY512	1,2,4-TMB	0.019 J	0.61	43	-	15E-MY512SB04-08	2015	7/10/2015	No	No	-	No	No
1	MY512	Toluene	0.04 J	6.7	200	-	371-SB-01-080504Q	2004	8/5/2004	No	No	-	No	No
1	MY512	Xylene, m & p	0.057 J	-	-	-	15E-MY512SB04-08	2015	7/10/2015	-	-	-	No	No
1	MY512	Xylene, o	0.024 J	-	-	-	15E-MY512SB04-08	2015	7/10/2015	-	-	-	No	No
1	MY512	Xylenes	0.23	1.5	57	-	371-SB-01-080304A	2004	8/3/2004	No	No	-	No	No
1	MY512	Acenaphthene	0.076 JD	37	4600	-	15E-MY512SB07-079	2015	7/9/2015	No	No	-	No	No
1	MY512	Acenaphthylene	0.024 JD	18	2300	-	15E-MY512SB07-079	2015	7/9/2015	No	No	-	No	No
1	MY512	Anthracene	0.22 JD	390	23000	-	15E-MY512SB07-079	2015	7/9/2015	No	No	-	No	No
1	MY512	Benzo(a)anthracene	0.692 J	0.7	14	-	EIC512DP002SO01-01	2012	6/22/2012	No	No	-	No	No
1	MY512	Benzo(a)pyrene	0.682 J	1.5	1.5	-	EIC512DP002SO01-01	2012	6/22/2012	No	Yes	-	Yes	Yes
1	MY512	Benzo(b)fluoranthene	0.72	15	15	-	15E-MY512SB07-079	2015	7/9/2015	No	No	-	No	No
1	MY512	Benzo(g,h,i)perylene	0.32	2300	2300	-	15E-MY512SB07-079	2015	7/9/2015	No	No	-	No	No
1	MY512	Benzo(k)fluoranthene	0.19	150	150	-	15E-MY512SB07-07	2015	7/9/2015	No	No	-	No	No
1	MY512	Chrysene	0.884 J	600	1500	-	EIC512DP002SO01-01	2012	6/22/2012	No	No	-	No	No
1	MY512	Dibenzo(a,h)anthracene	0.076	1.5	1.5	-	15E-MY512SB07-079	2015	7/9/2015	No	No	-	No	No
1	MY512	2,4-Dinitrophenol	0.068 J	0.34	160	-	EIC512DP002SO01-06	2012	6/22/2012	No	No	-	No	No
1	MY512	Fluoranthene	1.55 J	590	3100	-	EIC512DP002SO01-01	2012	6/22/2012	No	No	-	No	No
1	MY512	Fluorene	0.1 JD	36	3100	-	15E-MY512SB07-079	2015	7/9/2015	No	No	-	No	No
1	MY512	Indeno(1,2,3-cd)pyrene	0.31	15	15	-	15E-MY512SB07-079	2015	7/9/2015	No	No	-	No	No
1	MY512	1-Methylnaphthalene	0.013 J	0.41	68	-	15E-MY512SB07-079	2015	7/9/2015	No	No	-	No	No
1	MY512	2-Methylnaphthalene	0.018	1.3	310	-	15E-MY512SB11-02	2015	10/5/2015	No	No	-	No	No
1	MY512	Naphthalene	**0.052**	0.038	29	-	EIC512DP002SO01-01	2012	6/22/2012	Yes	No	-	Yes	No
1	MY512	Phenanthrene	1.8	39	2300	-	EIC512DP002SO01-01	2012	6/22/2012	No	No	-	No	No
1	MY512	Pyrene	1.65	87	2300	-	EIC512DP002SO01-01	2012	6/22/2012	No	No	-	No	No
1	MY512	Aluminum	14000	77000	-	13329	15E-MY512SB03-03	2015	7/9/2015	No	-	Yes	No	No
1	MY512	Antimony	1.16 JD	4.6	41	1.175	15E-MY512SB09-03	2015	7/10/2015	No	No	No	No	No
1	MY512	Arsenic	**26.9**	0.2	8.8	23.54	15E-MY512SB09-039	2015	7/10/2015	Yes	Yes	Yes	Yes	Yes
1	MY512	Barium	504	2100	20000	160	371-SB-02-080504Q	2004	8/5/2004	No	No	Yes	No	No
1	MY512	Beryllium	0.53	200	200	0.259	EIC512DP003SO01-03	2012	6/22/2012	No	No	Yes	No	No
1	MY512	Cadmium	0.58	9.1	92	0.303	371-SB-01-081704U	2004	8/17/2004	No	No	Yes	No	No

Decision Document for PBR Source Areas SO075, SS078, SO504, MY512, and MY518
Table C-1 Soil Maximum Detections

SCR	Source Area	Analyte	Result (mg/kg)	PSL (mg/kg)	ADEC HH (mg/kg)	BTV (mg/kg)	Sample ID	Year	Sample Date	Exceeds PSL?	Exceeds HH/10?	Exceeds BTV?	COPC? (Exceeds PSL or HH/10)	Included in CRE? (Exceeds HH/10 and BTV)
1	MY512	Calcium	9950	-	-	7565	15E-MY512SB09-03	2015	7/10/2015	-	-	Yes	No	No
1	MY512	Chromium	**98**	0.089	3.9	29.03	371-SB-02-080504R	2004	8/5/2004	Yes	Yes	Yes	Yes	Yes
1	MY512	Cobalt	12.3	23	-	14	15E-MY512SB03-03	2015	7/9/2015	No	-	No	No	No
1	MY512	Cobalt	12.3	23	-	14	15E-MY512SB09-03	2015	7/10/2015	No	-	No	No	No
1	MY512	Copper	50 JD	370	4100	66.68	15E-MY512SB09-03	2015	7/10/2015	No	No	No	No	No
1	MY512	Iron	28600	55000	-	31000	15E-MY512SB09-039	2015	7/10/2015	No	-	No	No	No
1	MY512	Lead	28.7	400	400	12.32	EIC512DP002SO01-01	2012	6/22/2012	No	No	Yes	No	No
1	MY512	Magnesium	6720	-	-	8000	15E-MY512SB03-03	2015	7/9/2015	-	-	No	No	No
1	MY512	Manganese	**436**	370	2700	557.7	15E-MY512SB09-03	2015	7/10/2015	Yes	Yes	No	Yes	No
1	MY512	Mercury	0.03 J	0.36	3.1	0.0411	371-SB-01-080404J	2004	8/4/2004	No	No	No	No	No
1	MY512	Mercury	0.03 J	0.36	3.1	0.0411	371-SB-01-080404L	2004	8/4/2004	No	No	No	No	No
1	MY512	Mercury	0.03 J	0.36	3.1	0.0411	371-SB-01-080504Q	2004	8/5/2004	No	No	No	No	No
1	MY512	Mercury	0.03 J	0.36	3.1	0.0411	371-SB-01-080504R	2004	8/5/2004	No	No	No	No	No
1	MY512	Mercury	0.03 J	0.36	3.1	0.0411	371-SB-02-080404C	2004	8/4/2004	No	No	No	No	No
1	MY512	Mercury	0.03 J	0.36	3.1	0.0411	371-SB-02-080404E	2004	8/4/2004	No	No	No	No	No
1	MY512	Molybdenum	10.3	390	-	0	EIC512DP001SO01-06	2012	6/21/2012	No	-	Yes	No	No
1	MY512	Nickel	35.8	340	2000	36	15E-MY512SB09-03	2015	7/10/2015	No	No	No	No	No
1	MY512	Potassium	1810 JD	-	-	1219	15E-MY512SB07-07	2015	7/9/2015	-	-	Yes	No	No
1	MY512	Selenium	0.9	6.9	510	0.955	371-SB-01-080404J	2004	8/4/2004	No	No	No	No	No
1	MY512	Silver	0.115 J	11	510	0.146	15E-MY512SB03-03	2015	7/9/2015	No	No	No	No	No
1	MY512	Sodium	700	-	-	491.5	15E-MY512SB03-03	2015	7/9/2015	-	-	Yes	No	No
1	MY512	Thallium	**0.74 J**	0.19	1	-	EIC512DP003SO01-03	2012	6/22/2012	Yes	Yes	-	Yes	Yes
1	MY512	Vanadium	48.6	510	510	58.2	15E-MY512SB03-03	2015	7/9/2015	No	No	No	No	No
1	MY512	Zinc	80.7	4900	30000	89.13	15E-MY512SB09-039	2015	7/10/2015	No	No	No	No	No
1	MY518	GRO	2.02 B	300	1400	-	EIC518DP002SO01-05	2012	6/19/2012	No	No	-	No	No
1	MY518	DRO	126	250	10250	-	EIC518DP002SO01-10	2012	6/19/2012	No	No	-	No	No
1	MY518	RRO	361	10000	10000	-	EIC518DP002SO01-10	2012	6/19/2012	No	No	-	No	No
1	MY518	Acetone	0.21 J	38	81000	-	15E-MY518SB01-10	2015	7/16/2015	No	No	-	No	No
1	MY518	Benzene	0.000949 J	0.022	11	-	EIC518DP001SO01-10	2012	6/19/2012	No	No	-	No	No
1	MY518	Methylene Chloride	0.14 B	0.33	460	-	15E-MY518SB08-01	2015	7/16/2015	No	No	-	No	No
1	MY518	Anthracene	0.0018 J	390	23000	-	15E-MY518SB01-03	2015	7/16/2015	No	No	-	No	No
1	MY518	Benzo(a)anthracene	0.003 J	0.7	14	-	15E-MY518SB01-03	2015	7/16/2015	No	No	-	No	No
1	MY518	Benzo(a)pyrene	0.003 J	1.5	1.5	-	15E-MY518SB01-03	2015	7/16/2015	No	No	-	No	No
1	MY518	Benzo(g,h,i)perylene	0.003 J	2300	2300	-	15E-MY518SB01-03	2015	7/16/2015	No	No	-	No	No
1	MY518	Chrysene	0.0027 J	600	1500	-	15E-MY518SB01-03	2015	7/16/2015	No	No	-	No	No
1	MY518	Fluoranthene	0.0037 J	590	3100	-	15E-MY518SB07-03	2015	7/16/2015	No	No	-	No	No
1	MY518	Naphthalene	0.0029 J	0.038	29	-	15E-MY518SB01-10	2015	7/16/2015	No	No	-	No	No
1	MY518	Pentachlorophenol	**0.029 J**	0.0043	13	-	15E-MY518SB01-03	2015	7/16/2015	Yes	No	-	Yes	No
1	MY518	Phenanthrene	0.0022 J	39	2300	-	15E-MY518SB01-03	2015	7/16/2015	No	No	-	No	No
1	MY518	Pyrene	0.0025 J	87	2300	-	15E-MY518SB01-03	2015	7/16/2015	No	No	-	No	No
1	MY518	Aluminum	12000	77000	-	13329	15E-MY518-SB02-05	2015	7/17/2015	No	-	No	No	No
1	MY518	Aluminum	12000	77000	-	13329	EIC518DP001SO01-02	2012	6/19/2012	No	-	No	No	No
1	MY518	Antimony	0.793	4.6	41	1.175	15E-MY518-SB02-05	2015	7/17/2015	No	No	No	No	No
1	MY518	Arsenic	**14.6**	0.2	8.8	23.54	15E-MY518-SB02-05	2015	7/17/2015	Yes	Yes	No	Yes	No
1	MY518	Barium	136	2100	20000	160	15E-MY518SB08-01	2015	7/16/2015	No	No	No	No	No
1	MY518	Beryllium	0.62	200	200	0.259	EIC518DP001SO01-02	2012	6/19/2012	No	No	Yes	No	No
1	MY518	Cadmium	0.31 J	9.1	92	0.303	15E-MY518SB05-09	2015	7/16/2015	No	No	Yes	No	No

Decision Document for PBR Source Areas SO075, SS078, SO504, MY512, and MY518
Table C-1 Soil Maximum Detections

SCR	Source Area	Analyte	Result (mg/kg)	PSL (mg/kg)	ADEC HH (mg/kg)	BTV (mg/kg)	Sample ID	Year	Sample Date	Exceeds PSL?	Exceeds HH/10?	Exceeds BTV?	COPC? (Exceeds PSL or HH/10)	Included in CRE? (Exceeds HH/10 and BTV)
1	MY518	Calcium	8800	-	-	7565	EIC518DP003SO01-10	2012	6/19/2012	-	-	Yes	No	No
1	MY518	Chromium	**24.8**	0.089	3.9	29.03	EIC518DP003SO01-05	2012	6/19/2012	Yes	Yes	No	Yes	No
1	MY518	Cobalt	11.6	23	-	14	15E-MY518-SB02-05	2015	7/17/2015	No	-	No	No	No
1	MY518	Copper	35	370	4100	66.68	15E-MY518-SB02-05	2015	7/17/2015	No	No	No	No	No
1	MY518	Iron	26900	55000	-	31000	15E-MY518-SB02-05	2015	7/17/2015	No	-	No	No	No
1	MY518	Lead	15.4	400	400	12.32	15E-MY518SB08-01	2015	7/16/2015	No	No	Yes	No	No
1	MY518	Magnesium	7390	-	-	8000	15E-MY518-SB02-05	2015	7/17/2015	-	-	No	No	No
1	MY518	Manganese	**450**	370	2700	557.7	15E-MY518-SB02-05	2015	7/17/2015	Yes	Yes	No	Yes	No
1	MY518	Mercury	0.0206 J	0.36	3.1	0.0411	15E-MY518-SB09-05	2015	7/17/2015	No	No	No	No	No
1	MY518	Molybdenum	5.37	390	-	0	EIC518DP903SO01-05	2012	6/19/2012	No	-	Yes	No	No
1	MY518	Nickel	29.8	340	2000	36	15E-MY518-SB02-05	2015	7/17/2015	No	No	No	No	No
1	MY518	Potassium	1120	-	-	1219	15E-MY518SB06-08	2015	7/16/2015	-	-	No	No	No
1	MY518	Selenium	0.357 J	6.9	510	0.955	15E-MY518SB05-09	2015	7/16/2015	No	No	No	No	No
1	MY518	Silver	0.45 J	11	510	0.146	EIC518DP003SO01-10	2012	6/19/2012	No	No	Yes	No	No
1	MY518	Sodium	544	-	-	491.5	15E-MY518SB05-09	2015	7/16/2015	-	-	Yes	No	No
1	MY518	Thallium	**1.2 J**	0.19	1	-	EIC518DP002SO01-02	2012	6/19/2012	Yes	Yes	-	Yes	Yes
1	MY518	Vanadium	50	510	510	58.2	15E-MY518SB07-09	2015	7/16/2015	No	No	No	No	No
1	MY518	Zinc	60.4	4900	30000	89.13	15E-MY518-SB02-05	2015	7/17/2015	No	No	No	No	No

Notes:

Bold = Exceeds PSL

= Exceeds 1/10 HH

Gray = Below BTV (metals only except WP038)

For definitions, refer to the Acronyms and Abbreviations section in the DD.

Data Qualifiers

B = The analyte was detected in the method blank or the trip blank above the detection limit, and the concentration in the sample did not exceed the blank concentration by a factor of 5 (factor of 10 for common laboratory contaminants acetone, methylene chloride, and toluene).

J = The analyte was positively identified; however, the associated result was less than the limit of quantitation but greater than or equal to the detection limits.

JD = The result is estimated based on the relative percent difference between the primary sample and the field duplicate sample.

JS+ = The result was an estimated value because at least one surrogate failed recovery criteria for that sample; results were biased high because the recovery was greater than the UCL. SW8260, SW8270SIM, and SW8270 results were only flagged if two or more surrogates failed recovery criteria The field surrogate, 4-bromofluorobenzene, was evaluated individually using 50 to 150 percent as the acceptance criterion for fieldsurrogated, methanol-preserved SW8260 soil samples.

Q = Estimated due to quality control failure.

Decision Document for PBR Source Areas SO075, SS078, SO504, MY512, and MY518
Table C-2 Groundwater Maximum Detections

SCR	Source Area	Result (µg/L)	Analyte	Result (mg/L)	PSL/ ADEC HH (mg/L)	BTV (mg/L)	Sample ID	Year	Sample Date	Exceeds PSL/ADEC HH?	Exceeds HH/10?	Exceeds BTV?	COPC? (Exceeds HH/10)	Included in CRE? (Exceeds HH/10 and BTV)
1	SO075	60	GRO	0.06 B	2.2	-	EIC075MW902GW01-10	2012	6/29/2012	No	No	-	No	No
1	SO075	149	DRO	0.149	1.5	-	EID516MW003GW01-12	2012	6/29/2012	No	No	-	No	No
1	SO075	170	RRO	0.17 J	1.1	-	15E-SO075TW02	2015	7/9/2015	No	Yes	-	Yes	Yes
1	SO075	49	Benzene	**0.049**	0.0046	-	1301-MW021996	1996	6/19/1996	Yes	Yes	-	Yes	Yes
1	SO075	1.17	sec-Butylbenzene	0.00117	2	-	EID516MW003GW01-12	2012	6/29/2012	No	No	-	No	No
1	SO075	0.26	Chloroform	0.00026 B	0.0022	-	EIC075MW002GW01-10	2012	6/29/2012	No	Yes	-	Yes	Yes
1	SO075	1.28	Cumene	0.00128	0.45	-	EID516MW003GW01-12	2012	6/29/2012	No	No	-	No	No
1	SO075	0.5	1,1-Dichloroethane	0.0005	0.028	-	EIC1301MW002GW01-13	2012	7/2/2012	No	No	-	No	No
1	SO075	0.5	1,2-Dichloroethane	0.0005	0.0017	-	EIC1301MW002GW01-13	2012	7/2/2012	No	Yes	-	Yes	Yes
1	SO075	2	Ethylbenzene	0.002 J	0.015	-	B-3-1988	1988	2/1/1988	No	Yes	-	Yes	Yes
1	SO075	0.52	Freon-11	0.00052 J	5.2	-	15E-SO075TW02	2015	7/9/2015	No	No	-	No	No
1	SO075	0.79	TCE	0.00079 J	0.0028	-	15E-SO075TW02	2015	7/9/2015	No	Yes	-	Yes	Yes
1	SO075	0.22	1,2,4-TMB	0.00022	0.056	-	EID516MW003GW01-12	2012	6/29/2012	No	No	-	No	No
1	SO075	0.22	1,2,4-TMB	0.00022 J, B	0.056	-	15E-SO075TW01	2015	7/9/2015	No	No	-	No	No
1	SO075	22	Toluene	0.022	1.1	-	1301-MW021996	1996	6/19/1996	No	No	-	No	No
1	SO075	0.34	1,1,1-Trichloroethane	0.00034 J	8	-	EIC075MW002GW01-10	2012	6/29/2012	No	No	-	No	No
1	SO075	1.74	Xylene, m & p	0.00174	-	-	EID516MW003GW01-12	2012	6/29/2012	No	No	-	No	No
1	SO075	68	Xylenes	0.068	0.19	-	1301-MW021996	1996	6/19/1996	No	Yes	-	Yes	Yes
1	SO075	2.1	Anthracene	0.0021 J	0.043	-	EIC075MW001GW01-10	2012	6/28/2012	No	No	-	No	No
1	SO075	2.1	Benzo(a)pyrene	**0.0021 J**	0.00025	-	EIC075MW001GW01-10	2012	6/28/2012	Yes	Yes	-	Yes	Yes
1	SO075	4.8	Benzoic Acid	0.0048 J	75	-	EIC075MW001GW01-10	2012	6/28/2012	No	No	-	No	No
1	SO075	2.1	4-Chloro-3-methylphenol	0.0021 J	-	-	EIC075MW001GW01-10	2012	6/28/2012	No	No	-	No	No
1	SO075	2.1	2,4-Dichlorophenol	0.0021 J	0.046	-	EIC075MW001GW01-10	2012	6/28/2012	No	No	-	No	No
1	SO075	2.1	2-Methylphenol	0.0021 J	0.93	-	EIC075MW001GW01-10	2012	6/28/2012	No	No	-	No	No
1	SO075	0.009	Pyrene	0.000009	0.12	-	1301-MW031996	1996	6/19/1996	No	No	-	No	No
1	SO075	494	Aluminum	0.494 J	-	-	EIC075MW001GW01-10	2012	6/28/2012	No	No	-	No	No
1	SO075	0.309	Antimony	0.000309 J	0.0078	0.00059	15E-SO075TW02	2015	7/9/2015	No	No	No	No	No
1	SO075	12.4	Arsenic	**0.0124 J**	0.00052	0.0054	EIC075MW001GW01-10	2012	6/28/2012	Yes	Yes	Yes	Yes	Yes
1	SO075	211	Barium	0.211	3.8	0.18	EIC1301MW002GW01-13	2012	7/2/2012	No	No	Yes	No	No
1	SO075	0.217	Cadmium	0.000217 J	0.0092	0.00023	15E-SO075TW01	2015	7/9/2015	No	No	No	No	No
1	SO075	121000	Calcium	121	-	81	15E-SO075TW02	2015	7/9/2015	No	No	Yes	No	No
1	SO075	2.5	Chromium	**0.0025 B**	0.00035	-	EIC075MW001GW01-10	2012	6/28/2012	Yes	Yes	-	Yes	Yes
1	SO075	4.7	Cobalt	0.0047 J	-	0.0053	EIC075MW001GW01-10	2012	6/28/2012	No	No	No	No	No
1	SO075	5.3	Copper	0.0053 J	0.8	0.0025	EIC075MW001GW01-10	2012	6/28/2012	No	No	Yes	No	No
1	SO075	4900	Iron	4.9	-	2.6	EIC1301MW002GW01-13	2012	7/2/2012	No	No	Yes	No	No
1	SO075	6.5	Lead	0.0065	0.015	0.00037	B-3-1988	1988	2/1/1988	No	Yes	Yes	Yes	Yes
1	SO075	20500	Magnesium	20.5	-	16	15E-SO075TW02	2015	7/9/2015	No	No	Yes	No	No
1	SO075	3000	Manganese	**3**	0.43	3	EIC1301MW002GW01-13	2012	7/2/2012	Yes	Yes	Yes	Yes	Yes
1	SO075	2.6	Molybdenum	0.0026 J	-	-	EIC1301MW002GW01-13	2012	7/2/2012	No	No	-	No	No
1	SO075	11.7	Nickel	0.0117	0.39	0.0075	15E-SO075TW02	2015	7/9/2015	No	No	Yes	No	No
1	SO075	5830	Potassium	5.83	-	3.8	15E-SO075TW02	2015	7/9/2015	No	No	Yes	No	No
1	SO075	0.381	Selenium	0.000381 J	0.1	-	15E-SO075TW02	2015	7/9/2015	No	No	-	No	No
1	SO075	1.1	Silver	0.0011 J	0.094	-	EIC075MW001GW01-10	2012	6/28/2012	No	No	-	No	No

Decision Document for PBR Source Areas SO075, SS078, SO504, MY512, and MY518
Table C-2 Groundwater Maximum Detections

SCR	Source Area	Result (µg/L)	Analyte	Result (mg/L)	PSL/ ADEC HH (mg/L)	BTV (mg/L)	Sample ID	Year	Sample Date	Exceeds PSL/ADEC HH?	Exceeds HH/10?	Exceeds BTV?	COPC? (Exceeds HH/10)	Included in CRE? (Exceeds HH/10 and BTV)
1	SO075	18500	Sodium	18.5	-	4.9	15E-SO075TW02	2015	7/9/2015	No	No	Yes	No	No
1	SO075	1.1	Vanadium	0.0011 J	0.086	0.005	EIC075MW001GW01-10	2012	6/28/2012	No	No	No	No	No
1	SO075	56	Zinc	0.056	6	0.0067	EID516MW002GW01-12	2012	6/29/2012	No	No	Yes	No	No
1	SS078	46700	GRO	**46.7**	2.2	-	Hazmat-MW4	2002	8/1/2002	Yes	Yes	-	Yes	Yes
1	SS078	4580	DRO	**4.58**	1.5	-	Hazmat-MW2	2002	8/1/2002	Yes	Yes	-	Yes	Yes
1	SS078	1030	RRO	1.03	1.1	-	Hazmat-MW4	2002	8/1/2002	No	Yes	-	Yes	Yes
1	SS078	583	Benzene	**0.583**	0.0046	-	Hazmat-MW2	2002	8/1/2002	Yes	Yes	-	Yes	Yes
1	SS078	24	n-Butylbenzene	0.024 JS+	1	-	15E-SS078TW05	2015	7/8/2015	No	No	-	No	No
1	SS078	6.5	sec-Butylbenzene	0.0065 JS+	2	-	15E-SS078TW05	2015	7/8/2015	No	No	-	No	No
1	SS078	0.7	tert-Butylbenzene	0.0007 J	0.69	-	13E-26B009-GS	2013	8/17/2013	No	No	-	No	No
1	SS078	0.07	Carbon Disulfide	0.00007 J	0.81	-	13E-26B009-GS	2013	8/17/2013	No	No	-	No	No
1	SS078	0.28	Chloromethane	0.00028 J	0.19	-	EIC078MW002GW01-15	2012	7/8/2012	No	No	-	No	No
1	SS078	100	Cumene	0.1	0.45	-	13E-26B009-GS	2013	8/17/2013	No	Yes	-	Yes	Yes
1	SS078	4.4	p-Cymene	0.0044 JS+	-	-	15E-SS078TW05	2015	7/8/2015	No	No	-	No	No
1	SS078	0.39	cis-DCE	0.00039 J	0.036	-	15E-SS078TW02	2015	7/8/2015	No	No	-	No	No
1	SS078	0.18	1,2-Dichloroethane	0.00018 J	0.0017	-	13E-26B009-GS	2013	8/17/2013	No	Yes	-	Yes	Yes
1	SS078	0.17	1,1-Dichloroethene	0.00017 J	0.28	-	13-1B-2016F	2016	9/3/2016	No	No	-	No	No
1	SS078	26.3	EDB	**0.0263**	0.000075	-	Hazmat-MW2	2002	8/1/2002	Yes	Yes	-	Yes	Yes
1	SS078	2820	Ethylbenzene	**2.82**	0.015	-	Hazmat-MW4	2002	8/1/2002	Yes	Yes	-	Yes	Yes
1	SS078	0.55	Methylene Chloride	0.00055 J	0.11	-	13-1B-2016S	2016	5/25/2016	No	No	-	No	No
1	SS078	92	Propylbenzene	0.092	0.66	-	15E-SS078TW05	2015	7/8/2015	No	Yes	-	Yes	Yes
1	SS078	0.29	TCE	0.00029 J	0.0028	-	15E-SS078TW02	2015	7/8/2015	No	Yes	-	Yes	Yes
1	SS078	880	1,2,4-TMB	**0.88**	0.056	-	Hazmat-MW2	2002	8/1/2002	Yes	Yes	-	Yes	Yes
1	SS078	527	1,3,5-TMB	**0.527**	0.06	-	Hazmat-MW2	2002	8/1/2002	Yes	Yes	-	Yes	Yes
1	SS078	2440	Toluene	**2.44**	1.1	-	Hazmat-MW2	2002	8/1/2002	Yes	Yes	-	Yes	Yes
1	SS078	1200	Xylene, m & p	1.2	-	-	15E-SS078TW05	2015	7/8/2015	No	No	-	No	No
1	SS078	140	Xylene, o	0.14	-	-	15E-SS078TW05	2015	7/8/2015	No	No	-	No	No
1	SS078	17730	Xylenes	**17.73**	0.19	-	Hazmat-MW4	2002	8/1/2002	Yes	Yes	-	Yes	Yes
1	SS078	0.082	Acenaphthene	0.000082 J	0.53	-	17E-SS078TW07	2017	9/30/2017	No	No	-	No	No
1	SS078	0.27	Fluorene	0.00027 J	0.29	-	13-1B-2016F	2016	9/3/2016	No	No	-	No	No
1	SS078	17	1-Methylnaphthalene	**0.017**	0.011	-	15E-SS078TW05	2015	7/8/2015	Yes	Yes	-	Yes	Yes
1	SS078	27	2-Methylnaphthalene	0.027	0.036	-	15E-SS078TW05	2015	7/8/2015	No	Yes	-	Yes	Yes
1	SS078	255	Naphthalene	**0.255**	0.0017	-	Hazmat-MW2	2002	8/1/2002	Yes	Yes	-	Yes	Yes
1	SS078	1090	Aluminum	1.09	-	-	15E-SS078TW03	2015	7/8/2015	No	No	-	No	No
1	SS078	0.744	Antimony	0.000744 J, B	0.0078	0.00059	15E-SS078TW02	2015	7/8/2015	No	No	Yes	No	No
1	SS078	22.3	Arsenic	**0.0223**	0.00052	0.0054	15E-SS078TW05	2015	7/8/2015	Yes	Yes	Yes	Yes	Yes
1	SS078	432	Barium	0.432	3.8	0.18	15E-SS078TW05	2015	7/8/2015	No	Yes	Yes	Yes	Yes
1	SS078	1.6	Cadmium	0.0016	0.0092	0.00023	15E-SS078TW02	2015	7/8/2015	No	Yes	Yes	Yes	Yes
1	SS078	98500	Calcium	98.5	-	81	15E-SS078TW05	2015	7/8/2015	No	No	Yes	No	No
1	SS078	3.06	Chromium	**0.00306 B**	0.00035	-	15E-SS078TW03	2015	7/8/2015	Yes	Yes	-	Yes	Yes
1	SS078	4.59	Cobalt	0.00459	-	0.0053	15E-SS078TW05	2015	7/8/2015	No	No	No	No	No
1	SS078	38.1	Copper	0.0381	0.8	0.0025	15E-SS078TW02	2015	7/8/2015	No	No	Yes	No	No
1	SS078	24800	Iron	24.8	-	2.6	15E-SS078TW05	2015	7/8/2015	No	No	Yes	No	No

Decision Document for PBR Source Areas SO075, SS078, SO504, MY512, and MY518
Table C-2 Groundwater Maximum Detections

SCR	Source Area	Result (µg/L)	Analyte	Result (mg/L)	PSL/ ADEC HH (mg/L)	BTV (mg/L)	Sample ID	Year	Sample Date	Exceeds PSL/ADEC HH?	Exceeds HH/10?	Exceeds BTV?	COPC? (Exceeds HH/10)	Included in CRE? (Exceeds HH/10 and BTV)
1	SS078	62.8	Lead	**0.0628**	0.015	0.00037	HM-SB072004	2004	8/7/2004	Yes	Yes	Yes	Yes	Yes
1	SS078	24100	Magnesium	24.1	-	16	17E-SS078TW07	2017	9/30/2017	No	No	Yes	No	No
1	SS078	18300	Manganese	**18.3**	0.43	3	15E-SS078TW05	2015	7/8/2015	Yes	Yes	Yes	Yes	Yes
1	SS078	7.43	Nickel	0.00743	0.39	0.0075	15E-SS078TW03	2015	7/8/2015	No	No	No	No	No
1	SS078	11800	Potassium	11.8	-	3.8	15E-SS078TW04	2015	7/8/2015	No	No	Yes	No	No
1	SS078	0.431	Selenium	0.000431 J	0.1	-	15E-SS078TW05	2015	7/8/2015	No	No	-	No	No
1	SS078	0.22	Silver	0.00022 J	0.094	-	15E-SS078TW02	2015	7/8/2015	No	No	-	No	No
1	SS078	5490	Sodium	5.49	-	4.9	17E-SS078TW07	2017	9/30/2017	No	No	Yes	No	No
1	SS078	3.4	Vanadium	0.0034	0.086	0.005	15E-SS078TW04	2015	7/8/2015	No	No	No	No	No
1	SS078	20.4	Zinc	0.0204 B	6	0.0067	15E-SS078TW02	2015	7/8/2015	No	No	Yes	No	No
1	SO504	30	GRO	0.03	2.2	-	EIC504MW003GW01-14	2012	6/29/2012	No	No	-	No	No
1	SO504	73.2	DRO	0.0732 J	1.5	-	EIC504MW003GW01-14	2012	6/29/2012	No	No	-	No	No
1	SO504	73.4	RRO	0.0734 J	1.1	-	EIC504MW003GW01-14	2012	6/29/2012	No	No	-	No	No
1	SO504	3.9	Acetone	0.0039 J,B	14	-	16E-SO504TW02	2016	8/20/2016	No	No	-	No	No
1	SO504	0.006	EDB	0.000006	0.000075	-	EIC504MW003GW01-14	2012	6/29/2012	No	No	-	No	No
1	SO504	0.83	Freon-12	0.00083 J	0.2	-	16E-SO504TW02	2016	8/20/2016	No	No	-	No	No
1	SO504	0.19	1,2,4-TMB	0.00019 J	0.056	-	16E-SO504TW03	2016	8/20/2016	No	No	-	No	No
1	SO504	0.2	1,2,3-Trichlorobenzene	0.0002	0.007	-	EIC504MW003GW01-14	2012	6/29/2012	No	No	-	No	No
1	SO504	0.057	Acenaphthene	0.000057 J	0.53	-	16E-SO504TW03	2016	8/20/2016	No	No	-	No	No
1	SO504	0.055	Acenaphthylene	0.000055 J	0.26	-	16E-SO504TW03	2016	8/20/2016	No	No	-	No	No
1	SO504	0.25	1-Methylnaphthalene	0.00025 J	0.011	-	16E-SO504TW03	2016	8/20/2016	No	No	-	No	No
1	SO504	0.25	2-Methylnaphthalene	0.00025 J	0.036	-	16E-SO504TW03	2016	8/20/2016	No	No	-	No	No
1	SO504	0.23	Naphthalene	0.00023 J	0.0017	-	16E-SO504TW03	2016	8/20/2016	No	Yes	-	Yes	Yes
1	SO504	15200	Aluminum	15.2	-	-	16E-SO504TW03	2016	8/20/2016	No	No	-	No	No
1	SO504	1.37	Antimony	0.00137	0.0078	0.00059	16E-SO504TW03	2016	8/20/2016	No	Yes	Yes	Yes	Yes
1	SO504	13.4	Arsenic	**0.0134**	0.00052	0.0054	16E-SO504TW03	2016	8/20/2016	Yes	Yes	Yes	Yes	Yes
1	SO504	320	Barium	0.32	3.8	0.18	16E-SO504TW03	2016	8/20/2016	No	No	Yes	No	No
1	SO504	0.452	Beryllium	0.000452 J	0.025	0.00036	16E-SO504TW03	2016	8/20/2016	No	No	Yes	No	No
1	SO504	0.947	Cadmium	0.000947 J	0.0092	0.00023	16E-SO504TW03	2016	8/20/2016	No	Yes	Yes	Yes	Yes
1	SO504	87100	Calcium	87.1	-	81	16E-SO504TW03	2016	8/20/2016	No	No	Yes	No	No
1	SO504	43	Chromium	**0.043**	0.00035	-	16E-SO504TW03	2016	8/20/2016	Yes	Yes	-	Yes	Yes
1	SO504	19.4	Cobalt	0.0194	-	0.0053	16E-SO504TW03	2016	8/20/2016	No	No	Yes	No	No
1	SO504	82	Copper	0.082	0.8	0.0025	16E-SO504TW03	2016	8/20/2016	No	Yes	Yes	Yes	Yes
1	SO504	29800	Iron	29.8	-	2.6	16E-SO504TW03	2016	8/20/2016	No	No	Yes	No	No
1	SO504	107	Lead	**0.107 JL+**	0.015	0.00037	16E-SO504TW03	2016	8/20/2016	Yes	Yes	Yes	Yes	Yes
1	SO504	24000	Magnesium	24	-	16	16E-SO504TW03	2016	8/20/2016	No	No	Yes	No	No
1	SO504	2570	Manganese	2.57	0.43	3	16E-SO504TW01	2016	8/22/2016	Yes	Yes	No	Yes	No
1	SO504	0.118	Mercury	0.000118 J	0.00052	-	16E-SO504TW02	2016	8/20/2016	No	Yes	-	Yes	Yes
1	SO504	2	Molybdenum	0.002 J	-	-	EIC504MW003GW01-14	2012	6/29/2012	No	No	-	No	No
1	SO504	55	Nickel	0.055	0.39	0.0075	16E-SO504TW03	2016	8/20/2016	No	Yes	Yes	Yes	Yes
1	SO504	9660	Potassium	9.66	-	3.8	16E-SO504TW03	2016	8/20/2016	No	No	Yes	No	No
1	SO504	1.15	Selenium	0.00115	0.1	-	16E-SO504TW04	2016	8/22/2016	No	No	-	No	No
1	SO504	0.458	Silver	0.000458 J	0.094	-	16E-SO504TW03	2016	8/20/2016	No	No	-	No	No

Decision Document for PBR Source Areas SO075, SS078, SO504, MY512, and MY518
Table C-2 Groundwater Maximum Detections

SCR	Source Area	Result (µg/L)	Analyte	Result (mg/L)	PSL/ ADEC HH (mg/L)	BTV (mg/L)	Sample ID	Year	Sample Date	Exceeds PSL/ADEC HH?	Exceeds HH/10?	Exceeds BTV?	COPC? (Exceeds HH/10)	Included in CRE? (Exceeds HH/10 and BTV)
1	SO504	17400	Sodium	17.4	-	4.9	16E-SO504TW03	2016	8/20/2016	No	No	Yes	No	No
1	SO504	0.235	Thallium	**0.000235 J**	0.0002	-	16E-SO504TW03	2016	8/20/2016	Yes	Yes	-	Yes	Yes
1	SO504	51.1	Vanadium	0.0511	0.086	0.005	16E-SO504TW03	2016	8/20/2016	No	Yes	Yes	Yes	Yes
1	SO504	110	Zinc	0.11	6	0.0067	16E-SO504TW03	2016	8/20/2016	No	No	Yes	No	No
1	MY512	917	GRO	0.917	2.2	-	371-N2004	2004	8/20/2004	No	Yes	-	Yes	Yes
1	MY512	2100	DRO	**2.1**	1.5	-	15E-MY512TW01	2015	7/9/2015	Yes	Yes	-	Yes	Yes
1	MY512	1300	RRO	**1.3**	1.1	-	15E-MY512TW12	2015	10/5/2015	Yes	Yes	-	Yes	Yes
1	MY512	6.54	Acetone	0.00654	14	-	EIC512MW001GW01-10	2012	6/21/2012	No	No	-	No	No
1	MY512	135	Benzene	**0.135**	0.0046	-	371-N2004	2004	8/20/2004	Yes	Yes	-	Yes	Yes
1	MY512	0.44	n-Butylbenzene	0.00044 J	1	-	371-N12	2004	8/20/2004	No	No	-	No	No
1	MY512	0.61	sec-Butylbenzene	0.00061 J	2	-	371-N12	2004	8/20/2004	No	No	-	No	No
1	MY512	2.39	Cumene	0.00239	0.45	-	371-N12	2004	8/20/2004	No	No	-	No	No
1	MY512	0.49	cis-DCE	0.00049 J	0.036	-	15E-MY512TW03	2015	7/9/2015	No	No	-	No	No
1	MY512	21	Ethylbenzene	**0.021**	0.015	-	371-N2004	2004	8/20/2004	Yes	Yes	-	Yes	Yes
1	MY512	0.63	Methylene Chloride	0.00063 J, B	0.11	-	15E-MY512TW05	2015	7/10/2015	No	No	-	No	No
1	MY512	5.5	MTBE	0.0055	0.14	-	371-N2004	2004	8/20/2004	No	No	-	No	No
1	MY512	2.8	Propylbenzene	0.0028	0.66	-	371-N12	2004	8/20/2004	No	No	-	No	No
1	MY512	9.4	1,2,4-TMB	0.0094	0.056	-	371-N2004	2004	8/20/2004	No	Yes	-	Yes	Yes
1	MY512	4.1	1,3,5-TMB	0.0041	0.06	-	371-N12	2004	8/20/2004	No	No	-	No	No
1	MY512	31	Toluene	0.031	1.1	-	371-N2004	2004	8/20/2004	No	No	-	No	No
1	MY512	0.12	1,1,1-Trichloroethane	0.00012 J	8	-	15E-MY512TW05	2015	7/10/2015	No	No	-	No	No
1	MY512	0.4	Xylene, m & p	0.0004 J, B	-	-	15E-MY512TW039	2015	7/9/2015	No	No	-	No	No
1	MY512	205	Xylenes	**0.205**	0.19	-	371-N2004	2004	8/20/2004	Yes	Yes	-	Yes	Yes
1	MY512	0.17	Benzo(a)pyrene	0.00017 J, JD	0.00025	-	15E-MY512TW06	2015	10/5/2015	No	Yes	-	Yes	Yes
1	MY512	0.11	Benzo(b)fluoranthene	0.00011 J, JD	0.0025	-	15E-MY512TW06	2015	10/5/2015	No	No	-	No	No
1	MY512	0.11	Benzo(g,h,i)perylene	0.00011 J, JD	0.00026	-	15E-MY512TW06	2015	10/5/2015	No	Yes	-	Yes	Yes
1	MY512	0.073	Benzo(k)fluoranthene	0.000073 J	0.0008	-	15E-MY512TW06	2015	10/5/2015	No	No	-	No	No
1	MY512	0.17	Dibenzo(a,h)anthracene	0.00017 J, JD	0.00025	-	15E-MY512TW06	2015	10/5/2015	No	Yes	-	Yes	Yes
1	MY512	0.052	Fluoranthene	0.000052 J	0.26	-	15E-MY512TW039	2015	7/9/2015	No	No	-	No	No
1	MY512	0.05	Fluorene	0.00005	0.29	-	371-LCH2004	2004	8/19/2004	No	No	-	No	No
1	MY512	0.11	Indeno(1,2,3-cd)pyrene	0.00011 J, JD	0.00019	-	15E-MY512TW06	2015	10/5/2015	No	Yes	-	Yes	Yes
1	MY512	0.4	1-Methylnaphthalene	0.0004 J	0.011	-	15E-MY512TW12	2015	10/5/2015	No	No	-	No	No
1	MY512	0.18	2-Methylnaphthalene	0.00018 J, JD	0.036	-	15E-MY512TW06	2015	10/5/2015	No	No	-	No	No
1	MY512	0.34	Naphthalene	0.00034 J, B	0.0017	-	15E-MY512TW12	2015	10/5/2015	No	Yes	-	Yes	Yes
1	MY512	2230	Aluminum	2.23 JD, B	-	-	15E-MY512TW03	2015	7/9/2015	No	No	-	No	No
1	MY512	3.7	Antimony	0.0037 J	0.0078	0.00059	EIC512MW002GW01-14	2012	6/22/2012	No	Yes	Yes	Yes	Yes
1	MY512	20	Arsenic	**0.02**	0.00052	0.0054	371-LCH2004	2004	8/19/2004	Yes	Yes	Yes	Yes	Yes
1	MY512	379	Barium	0.379	3.8	0.18	371-D2004	2004	8/18/2004	No	No	Yes	No	No
1	MY512	0.0836	Beryllium	0.0000836 J	0.025	0.00036	15E-MY512TW03	2015	7/9/2015	No	No	No	No	No
1	MY512	1.2	Cadmium	0.0012 J	0.0092	0.00023	371-U2004	2004	8/20/2004	No	Yes	Yes	Yes	Yes
1	MY512	98700	Calcium	98.7	-	81	15E-MY512TW05	2015	7/10/2015	No	No	Yes	No	No
1	MY512	7.34	Chromium	**0.00734 JD, B**	0.00035	-	15E-MY512TW03	2015	7/9/2015	Yes	Yes	-	Yes	Yes
1	MY512	6.68	Cobalt	0.00668 JD	-	0.0053	15E-MY512TW03	2015	7/9/2015	No	No	Yes	No	No

Decision Document for PBR Source Areas SO075, SS078, SO504, MY512, and MY518
Table C-2 Groundwater Maximum Detections

SCR	Source Area	Result (µg/L)	Analyte	Result (mg/L)	PSL/ ADEC HH (mg/L)	BTV (mg/L)	Sample ID	Year	Sample Date	Exceeds PSL/ADEC HH?	Exceeds HH/10?	Exceeds BTV?	COPC? (Exceeds HH/10)	Included in CRE? (Exceeds HH/10 and BTV)
1	MY512	22.4	Copper	0.0224 JD, B	0.8	0.0025	15E-MY512TW03	2015	7/9/2015	No	No	Yes	No	No
1	MY512	12600	Iron	12.6	-	2.6	EIC512MW002GW01-14	2012	6/22/2012	No	No	Yes	No	No
1	MY512	11.4	Lead	0.0114 JD	0.015	0.00037	15E-MY512TW03	2015	7/9/2015	No	Yes	Yes	Yes	Yes
1	MY512	16500	Magnesium	16.5	-	16	15E-MY512TW01	2015	7/9/2015	No	No	Yes	No	No
1	MY512	7210	Manganese	**7.21**	0.43	3	15E-MY512TW03	2015	7/9/2015	Yes	Yes	Yes	Yes	Yes
1	MY512	2.6	Molybdenum	0.0026 J	-	-	EIC512MW003GW01-14	2012	6/22/2012	No	No	-	No	No
1	MY512	17.6	Nickel	0.0176 JD, B	0.39	0.0075	15E-MY512TW03	2015	7/9/2015	No	No	Yes	No	No
1	MY512	5290	Potassium	5.29	-	3.8	15E-MY512TW05	2015	7/10/2015	No	No	Yes	No	No
1	MY512	0.318	Selenium	0.000318 J	0.1	-	15E-MY512TW05	2015	7/10/2015	No	No	-	No	No
1	MY512	1	Silver	0.001 J	0.094	-	EIC512MW002GW01-14	2012	6/22/2012	No	No	-	No	No
1	MY512	6470	Sodium	6.47	-	4.9	15E-MY512TW03	2015	7/9/2015	No	No	Yes	No	No
1	MY512	8.06	Vanadium	0.00806 JD, B	0.086	0.005	15E-MY512TW03	2015	7/9/2015	No	No	Yes	No	No
1	MY512	28.7	Zinc	0.0287 JD, B	6	0.0067	15E-MY512TW03	2015	7/9/2015	No	No	Yes	No	No
1	MY518	580	DRO	0.58	1.5	-	15E-MY518TW01	2015	7/16/2015	No	Yes	-	Yes	Yes
1	MY518	790	RRO	0.79	1.1	-	15E-MY518TW01	2015	7/16/2015	No	Yes	-	Yes	Yes
1	MY518	7.6	Acetone	0.0076 J	14	-	15E-MY518TW01	2015	7/16/2015	No	No	-	No	No
1	MY518	0.11	Benzene	0.00011 J	0.0046	-	15E-MY518TW01	2015	7/16/2015	No	No	-	No	No
1	MY518	2.5	cis-DCE	0.0025	0.036	-	15E-MY518-TW06	2015	7/17/2015	No	No	-	No	No
1	MY518	2.9	trans-DCE	0.0029	0.36	-	15E-MY518-TW06	2015	7/17/2015	No	No	-	No	No
1	MY518	0.21	TCE	0.00021 J	0.0028	-	EIC518MW002GW01-15	2012	6/19/2012	No	No	-	No	No
1	MY518	0.12	Toluene	0.00012 J, B	1.1	-	15E-MY518TW01	2015	7/16/2015	No	No	-	No	No
1	MY518	9.2	bis(2-Ethylhexyl)phthalate	0.0092 J	0.056	-	15E-MY518-TW02	2015	7/17/2015	No	Yes	-	Yes	Yes
1	MY518	0.083	1-Methylnaphthalene	0.000083 J	0.011	-	15E-MY518-TW03	2015	7/17/2015	No	No	-	No	No
1	MY518	0.14	Naphthalene	0.00014 J	0.0017	-	15E-MY518-TW03	2015	7/17/2015	No	No	-	No	No
1	MY518	1940	Aluminum	1.94	-	-	15E-MY518TW01	2015	7/16/2015	No	No	-	No	No
1	MY518	4.8	Antimony	0.0048 J	0.0078	0.00059	EIC518MW002GW01-15	2012	6/19/2012	No	Yes	Yes	Yes	Yes
1	MY518	164	Arsenic	**0.164**	0.00052	0.0054	15E-MY518TW01	2015	7/16/2015	Yes	Yes	Yes	Yes	Yes
1	MY518	501	Barium	0.501	3.8	0.18	15E-MY518TW01	2015	7/16/2015	No	Yes	Yes	Yes	Yes
1	MY518	0.0702	Beryllium	0.0000702 J	0.025	0.00036	15E-MY518TW01	2015	7/16/2015	No	No	No	No	No
1	MY518	0.31	Cadmium	0.00031 J	0.0092	0.00023	EIC518MW001GW01-15	2012	6/19/2012	No	No	Yes	No	No
1	MY518	119000	Calcium	119	-	81	15E-MY518TW01	2015	7/16/2015	No	No	Yes	No	No
1	MY518	21.4	Chromium	**0.0214**	0.00035	-	15E-MY518TW01	2015	7/16/2015	Yes	Yes	-	Yes	Yes
1	MY518	6.7	Cobalt	0.0067	-	0.0053	15E-MY518TW01	2015	7/16/2015	No	No	Yes	No	No
1	MY518	14.8	Copper	0.0148	0.8	0.0025	15E-MY518TW01	2015	7/16/2015	No	No	Yes	No	No
1	MY518	54400	Iron	54.4	-	2.6	15E-MY518TW01	2015	7/16/2015	No	No	Yes	No	No
1	MY518	3.97	Lead	0.00397	0.015	0.00037	15E-MY518TW01	2015	7/16/2015	No	Yes	Yes	Yes	Yes
1	MY518	20100	Magnesium	20.1	-	16	15E-MY518TW01	2015	7/16/2015	No	No	Yes	No	No
1	MY518	3220	Manganese	**3.22**	0.43	3	EIC518MW003GW01-15	2012	6/19/2012	Yes	Yes	Yes	Yes	Yes
1	MY518	2.4	Molybdenum	0.0024 J	-	-	EIC518MW001GW01-15	2012	6/19/2012	No	No	-	No	No
1	MY518	26	Nickel	0.026	0.39	0.0075	15E-MY518TW01	2015	7/16/2015	No	No	Yes	No	No
1	MY518	8320	Potassium	8.32	-	3.8	15E-MY518TW01	2015	7/16/2015	No	No	Yes	No	No
1	MY518	0.988	Selenium	0.000988 J	0.1	-	15E-MY518-TW02	2015	7/17/2015	No	No	-	No	No
1	MY518	15000	Sodium	15	-	4.9	15E-MY518TW01	2015	7/16/2015	No	No	Yes	No	No

Decision Document for PBR Source Areas SO075, SS078, SO504, MY512, and MY518
Table C-2 Groundwater Maximum Detections

SCR	Source Area	Result (µg/L)	Analyte	Result (mg/L)	PSL/ ADEC HH (mg/L)	BTV (mg/L)	Sample ID	Year	Sample Date	Exceeds PSL/ADEC HH?	Exceeds HH/10?	Exceeds BTV?	COPC? (Exceeds HH/10)	Included in CRE? (Exceeds HH/10 and BTV)
1	MY518	10.2	Vanadium	0.0102	0.086	0.005	15E-MY518TW01	2015	7/16/2015	No	Yes	Yes	Yes	Yes
1	MY518	79.1	Zinc	0.0791	6	0.0067	15E-MY518TW01	2015	7/16/2015	No	No	Yes	No	No

Notes:

Bold = Exceeds PSL

= Exceeds 1/10 HH

Gray = Below BTV (metals only except WP038)

For definitions, refer to the Acronyms and Abbreviations section in the DD.

Data Qualifiers

B = The analyte was detected in the method blank or the trip blank above the detection limit, and the concentration in the sample did not exceed the blank concentration by a factor of 5 (factor of 10 for common laboratory contaminants acetone, methylene chloride, and toluene).

J = The analyte was positively identified; however, the associated result was less than the limit of quantitation but greater than or equal to the detection limits.

JD = The result is estimated based on the relative percent difference between the primary sample and the field duplicate sample.

JL+ = The result is potentially biased high based on a greater recovery than the UCL.

JS+ = The result was an estimated value because at least one surrogate failed recovery criteria for that sample; results were biased high because the recovery was greater than the UCL. SW8260, SW8270SIM, and SW8270 results were only flagged if two or more surrogates failed recovery criteria The field surrogate, 4-bromofluorobenzene, was evaluated individually using 50 to 150 percent as the acceptance criterion for fieldsurrogated, methanol-preserved SW8260 soil samples.

Site-specific Risk Models
Resident Equation Inputs
Soil (<40" Precipitation Zone)

Variable	Value
ED_{resc} (exposure duration - resident) yr	26
ED_{resc} (exposure duration - child) yr	6
ED_{resa} (exposure duration - adult) yr	20
ET_{resc} (exposure time - resident) hr/day	24
ET_{resc} (exposure time - child) hr/day	24
ET_{resa} (exposure time - adult) hr/day	24
BW_{resa} (body weight - adult) kg	80
BW_{resc} (body weight - child) kg	15
SA_{resa} (skin surface area - adult) cm^2/day	6032
SA_{resc} (skin surface area - child) cm^2/day	2373
LT (lifetime - resident) yr	70
$EF_{resc<40"}$ (exposure frequency - resident) day/yr	270
$EF_{resc<40"}$ (exposure frequency - child) day/yr	270
$EF_{resa<40"}$ (exposure frequency - adult) day/yr	270
IRS_{resa} (soil intake rate - adult) mg/day	100
IRS_{resc} (soil intake rate - child) mg/day	200
AF_{resa} (skin adherence factor - adult) mg/cm^2	0.07
AF_{resc} (skin adherence factor - child) mg/cm^2	0.2
$IFS_{resc<40"-adj}$ (age-adjusted soil ingestion factor) mg/kg	28350
$DFS_{resc<40"-adj}$ (age-adjusted soil dermal factor) mg/kg	79758
$IFSM_{resc<40"-adj}$ (mutagenic age-adjusted soil ingestion factor) mg/kg	128700
$DFSM_{resc<40"-adj}$ (mutagenic age-adjusted soil dermal factor) mg/kg	330372
AF_{0-2} (skin adherence factor) mg/cm^2	0.2
AF_{2-6} (skin adherence factor) mg/cm^2	0.2
AF_{6-16} (skin adherence factor) mg/cm^2	0.07
AF_{16-26} (skin adherence factor) mg/cm^2	0.07
BW_{0-2} (body weight) kg	15
BW_{2-6} (body weight) kg	15
BW_{6-16} (body weight) kg	80
BW_{16-26} (body weight) kg	80
ED_{0-2} (exposure duration) yr	2
ED_{2-6} (exposure duration) yr	4

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Site-specific Risk Models
Resident Equation Inputs
Soil (<40" Precipitation Zone)

Variable	Value
ED_{6-16} (exposure duration) yr	10
ED_{16-26} (exposure duration) yr	10
$EF_{0-2<40"}$ (exposure frequency) day/yr	270
$EF_{2-6<40"}$ (exposure frequency) day/yr	270
$EF_{6-16<40"}$ (exposure frequency) day/yr	270
$EF_{16-26<40"}$ (exposure frequency) day/yr	270
ET_{0-2} (exposure time) hr/day	24
ET_{2-6} (exposure time) hr/day	24
ET_{6-16} (exposure time) hr/day	24
ET_{16-26} (exposure time) hr/day	24
IRS_{0-2} (soil intake rate) mg/day	200
IRS_{2-6} (soil intake rate) mg/day	200
IRS_{6-16} (soil intake rate) mg/day	100
IRS_{16-26} (soil intake rate) mg/day	100
SA_{0-2} (skin surface area) cm^2/day	2373
SA_{2-6} (skin surface area) cm^2/day	2373
SA_{6-16} (skin surface area) cm^2/day	6032
SA_{16-26} (skin surface area) cm^2/day	6032
A_c (acres)	0.5
Q/C_{wp} (g/m^2-s per kg/m^3)	93.7736
PEF (particulate emission factor) m^3/kg	1.36E+09
A (PEF Dispersion Constant)	16.2302
B (PEF Dispersion Constant)	18.7762
C (PEF Dispersion Constant)	216.108
V (fraction of vegetative cover) unitless	0.5
U_m (mean annual wind speed) m/s	4.69
U_t (equivalent threshold value)	11.32
F(x) (function dependent on U_m/U_t) unitless	0.194
A_c (acres)	0.5
Q/C_{wp} (g/m^2-s per kg/m^3)	93.7736
foc (fraction organic carbon in soil) g/g	0.001
p_b (dry soil bulk density) g/cm^3	1.5

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Site-specific Risk Models
Resident Equation Inputs
Soil (<40" Precipitation Zone)

Variable	Value
p_s (soil particle density) g/cm ^{3}	2.65
θ $_w$ (water-filled soil porosity) L_{water}/L_{soil}	0.15
θ $_a$ (air-filled soil porosity) L_{air}/L_{soil}	0.28396
n (total soil porosity) L_{pore}/L_{soil}	0.43396
T (exposure interval) s	819936000
A (VF Dispersion Constant)	16.2302
B (VF Dispersion Constant)	18.7762
C (VF Dispersion Constant)	216.108

Site-specific Risk Models
Resident Cumulative Risk
Soil (<40" Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Chemical	Mutagen?	Volatile?	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Ref	Inhalation Unit Risk $(\mu^3)^{-1}$	IUR Ref	GIABS	ABS	MW	Density (g/cm^3)	D_{ia} (cm^2/s)
Arsenic, Inorganic	No	No	3.00E-04	U	1.50E-05	U	1.50E+00	U	4.30E-03	U	1	0.03	7.49E+01	4.90E+00	-
Benzene	No	Yes	4.00E-03	U	3.00E-02	U	5.50E-02	U	7.80E-06	U	1	-	7.81E+01	8.76E-01	8.95E-02
Benzo[a]pyrene	Yes	No	3.00E-04	U	2.00E-06	U	1.00E+00	U	6.00E-04	U	1	0.13	2.52E+02	-	4.76E-02
Chromium(III), Insoluble Salts	No	No	1.50E+00	U	-		-		-		0.013	-	5.20E+01	5.22E+00	-
Manganese (Non-diet)	No	No	2.40E-02	U	5.00E-05	U	-		-		0.04	-	5.49E+01	7.30E+00	-
Thallium (Soluble Salts)	No	No	1.00E-05	U	-		-		-		1	-	2.04E+02	1.18E+01	-
Iron	No	No	7.00E-01	U	-		-		-		1	-	5.58E+01	7.87E+00	-
**Total Risk/HI*			-		-		-		-		-	-	-	-	-

Site-specific Risk Models
Resident Cumulative Risk
Soil (<40" Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Chemical	D_{iw} (cm^2/s)	Henry's Law Constant (unitless)	Volatilization Factor (m^3/kg)	K_{oc} (cm^3/g)	K_d (cm^3/g)	Particulate Emission Factor (m^3/kg)	RBA	Concentration (mg/kg)	Ingestion Noncarcinogenic CDI Child	Inhalation Noncarcinogenic (Volatiles) CDI Child
Arsenic, Inorganic	-	-	-	-	2.90E+01	1.36E+09	0.6	3.26E+01	1.93E-04	-
Benzene	1.03E-05	2.27E-01	2.59E+03	1.46E+02	1.46E-01	1.36E+09	1	1.34E+00	1.32E-05	3.82E-04
Benzo[a]pyrene	5.56E-06	1.87E-05	-	5.87E+05	-	1.36E+09	1	2.10E-01	2.07E-06	-
Chromium(III), Insoluble Salts	-	-	-	-	1.80E+06	1.36E+09	1	1.48E+02	1.46E-03	-
Manganese (Non-diet)	-	-	-	-	6.50E+01	1.36E+09	1	2.82E+03	2.78E-02	-
Thallium (Soluble Salts)	-	-	-	-	7.10E+01	1.36E+09	1	2.19E+00	2.16E-05	-
Iron	-	-	-	-	2.50E+01	1.36E+09	1	3.98E+04	3.93E-01	-
**Total Risk/HI*	-	-	-	-	-	-	-	-	-	-

Site-specific Risk Models
Resident Cumulative Risk
Soil (<40" Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Chemical	Inhalation Noncarcinogenic (Particulates) CDI Child	Dermal Noncarcinogenic CDI Child	Ingestion Carcinogenic CDI	Inhalation (Volatiles) Carcinogenic CDI	Inhalation (Particulates) Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HI Child	Inhalation (Volatiles) HI Child	Inhalation (Particulates) HI Child
Arsenic, Inorganic	1.77E-08	2.29E-05	2.17E-05	-	6.59E-06	3.05E-06	6.43E-01	-	1.18E-03
Benzene	7.27E-10	-	1.48E-06	1.42E-01	2.70E-07	-	3.30E-03	1.27E-02	2.42E-08
Benzo[a]pyrene	1.14E-10	6.39E-07	1.06E-06	-	1.17E-07	3.53E-07	6.90E-03	-	5.71E-05
Chromium(III), Insoluble Salts	-	-	-	-	-	-	9.73E-04	-	-
Manganese (Non-diet)	1.53E-06	-	-	-	-	-	1.16E+00	-	3.07E-02
Thallium (Soluble Salts)	-	-	-	-	-	-	2.16E+00	-	-
Iron	-	-	-	-	-	-	5.61E-01	-	-
**Total Risk/HI*	-	-	-	-	-	-	*4.53E+00*	*1.27E-02*	*3.19E-02*

Site-specific Risk Models
Resident Cumulative Risk
Soil (<40" Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Chemical	Dermal HI Child	Noncarcinogenic HI Child	Ingestion Risk	Inhalation (Volatiles) Risk	Inhalation (Particulates) Risk	Dermal Risk	Carcinogenic Risk
Arsenic, Inorganic	7.63E-02	**7.21E-01**	3.26E-05	-	2.83E-08	4.58E-06	**3.72E-05**
Benzene	-	**1.60E-02**	8.16E-08	1.11E-06	2.11E-12	-	**1.19E-06**
Benzo[a]pyrene	2.13E-03	**9.09E-03**	1.06E-06	-	7.05E-11	3.53E-07	**1.41E-06**
Chromium(III), Insoluble Salts	-	**9.73E-04**	-	-	-	-	**-**
Manganese (Non-diet)	-	**1.19E+00**	-	-	-	-	**-**
Thallium (Soluble Salts)	-	**2.16E+00**	-	-	-	-	**-**
Iron	-	**5.61E-01**	-	-	-	-	**-**
**Total Risk/HI*	*7.84E-02*	***4.66E+00***	*3.37E-05*	*1.11E-06*	*2.84E-08*	*4.93E-06*	***3.98E-05***

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Site-specific Risk Models
Resident Equation Inputs
Soil (<40" Precipitation Zone)

Variable	Value
ED_{resc} (exposure duration - resident) yr	26
ED_{resc} (exposure duration - child) yr	6
ED_{resa} (exposure duration - adult) yr	20
ET_{resc} (exposure time - resident) hr/day	24
ET_{resc} (exposure time - child) hr/day	24
ET_{resa} (exposure time - adult) hr/day	24
BW_{resa} (body weight - adult) kg	80
BW_{resc} (body weight - child) kg	15
SA_{resa} (skin surface area - adult) cm^2/day	6032
SA_{resc} (skin surface area - child) cm^2/day	2373
LT (lifetime - resident) yr	70
$EF_{resc<40"}$ (exposure frequency - resident) day/yr	270
$EF_{resc<40"}$ (exposure frequency - child) day/yr	270
$EF_{resa<40"}$ (exposure frequency - adult) day/yr	270
IRS_{resa} (soil intake rate - adult) mg/day	100
IRS_{resc} (soil intake rate - child) mg/day	200
AF_{resa} (skin adherence factor - adult) mg/cm^2	0.07
AF_{resc} (skin adherence factor - child) mg/cm^2	0.2
$IFS_{resc<40"-adj}$ (age-adjusted soil ingestion factor) mg/kg	28350
$DFS_{resc<40"-adj}$ (age-adjusted soil dermal factor) mg/kg	79758
$IFSM_{resc<40"-adj}$ (mutagenic age-adjusted soil ingestion factor) mg/kg	128700
$DFSM_{resc<40"-adj}$ (mutagenic age-adjusted soil dermal factor) mg/kg	330372
AF_{0-2} (skin adherence factor) mg/cm^2	0.2
AF_{2-6} (skin adherence factor) mg/cm^2	0.2
AF_{6-16} (skin adherence factor) mg/cm^2	0.07
AF_{16-26} (skin adherence factor) mg/cm^2	0.07
BW_{0-2} (body weight) kg	15
BW_{2-6} (body weight) kg	15
BW_{6-16} (body weight) kg	80
BW_{16-26} (body weight) kg	80
ED_{0-2} (exposure duration) yr	2
ED_{2-6} (exposure duration) yr	4

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Site-specific Risk Models
Resident Equation Inputs
Soil (<40" Precipitation Zone)

Variable	Value
ED_{6-16} (exposure duration) yr	10
ED_{16-26} (exposure duration) yr	10
$EF_{0-2<40"}$ (exposure frequency) day/yr	270
$EF_{2-6<40"}$ (exposure frequency) day/yr	270
$EF_{6-16<40"}$ (exposure frequency) day/yr	270
$EF_{16-26<40"}$ (exposure frequency) day/yr	270
ET_{0-2} (exposure time) hr/day	24
ET_{2-6} (exposure time) hr/day	24
ET_{6-16} (exposure time) hr/day	24
ET_{16-26} (exposure time) hr/day	24
IRS_{0-2} (soil intake rate) mg/day	200
IRS_{2-6} (soil intake rate) mg/day	200
IRS_{6-16} (soil intake rate) mg/day	100
IRS_{16-26} (soil intake rate) mg/day	100
SA_{0-2} (skin surface area) cm^2/day	2373
SA_{2-6} (skin surface area) cm^2/day	2373
SA_{6-16} (skin surface area) cm^2/day	6032
SA_{16-26} (skin surface area) cm^2/day	6032
A_c (acres)	0.5
Q/C_{wp} (g/m^2-s per kg/m^3)	93.7736
PEF (particulate emission factor) m^3/kg	1.36E+09
A (PEF Dispersion Constant)	16.2302
B (PEF Dispersion Constant)	18.7762
C (PEF Dispersion Constant)	216.108
V (fraction of vegetative cover) unitless	0.5
U_m (mean annual wind speed) m/s	4.69
U_t (equivalent threshold value)	11.32
F(x) (function dependent on U_m/U_t) unitless	0.194
A_c (acres)	0.5
Q/C_{wp} (g/m^2-s per kg/m^3)	93.7736
foc (fraction organic carbon in soil) g/g	0.001
p_b (dry soil bulk density) g/cm^3	1.5

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Site-specific Risk Models
Resident Equation Inputs
Soil (<40" Precipitation Zone)

Variable	Value
p_s (soil particle density) g/cm ^{3}	2.65
θ $_w$ (water-filled soil porosity) L_{water}/L_{soil}	0.15
θ $_a$ (air-filled soil porosity) L_{air}/L_{soil}	0.28396
n (total soil porosity) L_{pore}/L_{soil}	0.43396
T (exposure interval) s	819936000
A (VF Dispersion Constant)	16.2302
B (VF Dispersion Constant)	18.7762
C (VF Dispersion Constant)	216.108

Site-specific Risk Models
Resident Cumulative Risk
Soil (<40" Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Chemical	Mutagen?	Volatile?	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m^3)	Chronic RfC Ref	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Ref	Inhalation Unit Risk $(\mu g/m^3)^{-1}$	IUR Ref	GIABS	ABS	MW	ρ (g/cm^3)
Benzo[a]pyrene (50-32-8)	Yes	No	3.00E-04	I	2.00E-06	I	1.00E+00	I	6.00E-04	I	1	0.13	252.32	-
Benzo[b]fluoranthene (205-99-2)	Yes	No	-		-		1.00E-01	W	6.00E-05	W	1	0.13	252.32	-
Butylbenzene, n- (104-51-8)	No	Yes	5.00E-02	P	-		-		-		1	-	134.22	8.60E-01
Trimethylbenzene, 1,2,4- (95-63-6)	No	Yes	1.00E-02	I	6.00E-02	I	-		-		1	-	120.2	8.76E-01
Trimethylbenzene, 1,3,5- (108-67-8)	No	Yes	1.00E-02	I	6.00E-02	I	-		-		1	-	120.2	8.62E-01
Xylenes (1330-20-7)	No	Yes	2.00E-01	I	1.00E-01	I	-		-		1	-	106.17	8.64E-01
**Total Risk/HI*			-		-		-		-		-	-	-	-

Site-specific Risk Models
Resident Cumulative Risk
Soil (<40" Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Chemical	D_{ia} (cm^2/s)	D_{iw} (cm^2/s)	H`	Volatilization Factor (m^3/kg)	K_{oc} (cm^3/g)	K_d (cm^3/g)	Particulate Emission Factor (m^3/kg)	RBA	Concentration (mg/kg)	Ingestion Noncarcinogenic CDI Child
Benzo[a]pyrene (50-32-8)	4.76E-02	5.56E-06	1.87E-05	-	5.87E+05	-	1.36E+09	1.00E+00	1.51E+00	1.49E-05
Benzo[b]fluoranthene (205-99-2)	4.76E-02	5.56E-06	2.69E-05	-	5.99E+05	-	1.36E+09	1.00E+00	1.79E+00	-
Butylbenzene, n- (104-51-8)	5.28E-02	7.33E-06	6.50E-01	4.84E+03	1.48E+03	1.48E+00	1.36E+09	1.00E+00	4.20E+00	4.14E-05
Trimethylbenzene, 1,2,4- (95-63-6)	6.07E-02	7.92E-06	2.52E-01	4.85E+03	6.14E+02	6.14E-01	1.36E+09	1.00E+00	1.60E+01	1.58E-04
Trimethylbenzene, 1,3,5- (108-67-8)	6.02E-02	7.84E-06	3.59E-01	4.10E+03	6.02E+02	6.02E-01	1.36E+09	1.00E+00	5.90E+00	5.82E-05
Xylenes (1330-20-7)	6.85E-02	8.46E-06	2.71E-01	3.69E+03	3.83E+02	3.83E-01	1.36E+09	1.00E+00	1.20E+01	1.18E-04
**Total Risk/HI*	-	-	-	-	-	-	-	-	-	-

Site-specific Risk Models
Resident Cumulative Risk
Soil (<40" Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Chemical	Inhalation Noncarcinogenic (Volatiles) CDI Child	Inhalation Noncarcinogenic (Particulates) CDI Child	Dermal Noncarcinogenic CDI Child	Ingestion Carcinogenic CDI	Inhalation (Volatiles) Carcinogenic CDI	Inhalation (Particulates) Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HI Child
Benzo[a]pyrene (50-32-8)	-	8.21E-10	4.59E-06	7.61E-06	-	8.45E-07	2.54E-06	4.96E-02
Benzo[b]fluoranthene (205-99-2)	-	-	-	9.02E-06	-	1.00E-06	3.01E-06	-
Butylbenzene, n- (104-51-8)	-	-	-	-	-	-	-	8.28E-04
Trimethylbenzene, 1,2,4- (95-63-6)	2.44E-03	8.70E-09	-	-	-	-	-	1.58E-02
Trimethylbenzene, 1,3,5- (108-67-8)	1.06E-03	3.21E-09	-	-	-	-	-	5.82E-03
Xylenes (1330-20-7)	2.41E-03	6.53E-09	-	-	-	-	-	5.92E-04
**Total Risk/HI*	-	-	-	-	-	-	-	*7.27E-02*

Site-specific Risk Models
Resident Cumulative Risk
Soil (<40" Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Chemical	Inhalation (Volatiles) HI Child	Inhalation (Particulates) HI Child	Dermal HI Child	Noncarcinogenic HI Child	Ingestion Risk	Inhalation (Volatiles) Risk	Inhalation (Particulates) Risk	Dermal Risk	Carcinogenic Risk
Benzo[a]pyrene (50-32-8)	-	4.11E-04	1.53E-02	**6.54E-02**	7.61E-06	-	5.07E-10	2.54E-06	**1.01E-05**
Benzo[b]fluoranthene (205-99-2)	-	-	-	**-**	9.02E-07	-	6.01E-11	3.01E-07	**1.20E-06**
Butylbenzene, n- (104-51-8)	-	-	-	**8.28E-04**	-	-	-	-	**-**
Trimethylbenzene, 1,2,4- (95-63-6)	4.07E-02	1.45E-07	-	**5.64E-02**	-	-	-	-	**-**
Trimethylbenzene, 1,3,5- (108-67-8)	1.77E-02	5.35E-08	-	**2.35E-02**	-	-	-	-	**-**
Xylenes (1330-20-7)	2.41E-02	6.53E-08	-	**2.47E-02**	-	-	-	-	**-**
**Total Risk/HI*	*8.25E-02*	*4.11E-04*	*1.53E-02*	***1.71E-01***	*8.51E-06*	*-*	*5.67E-10*	*2.84E-06*	***1.13E-05***

Site-specific Risk Models
Resident Soil (<40 in. Zone) Inputs

Variable	Value
ED_{ress} (exposure duration - resident) yr	26
ED_{resc} (exposure duration - child) yr	6
ED_{resa} (exposure duration - adult) yr	20
ET_{ress} (exposure time - resident) hr/day	24
ET_{resc} (exposure time - child) hr/day	24
ET_{resa} (exposure time - adult) hr/day	24
BW_{resa} (body weight - adult) kg	80
BW_{resc} (body weight - child) kg	15
SA_{resa} (skin surface area - adult) cm^2/day	6032
SA_{resc} (skin surface area - child) cm^2/day	2373
LT (lifetime - resident) yr	70
$EF_{res\ lt\ 40\ in}$ (exposure frequency - resident) day/yr	270
$EF_{resc\ lt\ 40\ in}$ (exposure frequency - child) day/yr	270
$EF_{resa\ lt\ 40\ in}$ (exposure frequency - adult) day/yr	270
IRS_{resa} (soil intake rate - adult) mg/day	100
IRS_{resc} (soil intake rate - child) mg/day	200
AF_{resa} (skin adherence factor - adult) mg/cm^2	0.07
AF_{resc} (skin adherence factor - child) mg/cm^2	0.2
$IFS_{res\ lt\ 40\ in\ adj}$ (age-adjusted soil ingestion factor) mg/kg	28350
$DFS_{res\ lt\ 40\ in\ adj}$ (age-adjusted soil dermal factor) mg/kg	79758
$IFSM_{res\ lt\ 40\ in\ adj}$ (mutagenic age-adjusted soil ingestion factor) mg/kg	128700
$DFSM_{res\ lt\ 40\ in\ adj}$ (mutagenic age-adjusted soil dermal factor) mg/kg	330372
AF_{0-2} (skin adherence factor) mg/cm^2	0.2
AF_{2-6} (skin adherence factor) mg/cm^2	0.2
AF_{6-16} (skin adherence factor) mg/cm^2	0.07
AF_{16-26} (skin adherence factor) mg/cm^2	0.07
BW_{0-2} (body weight) kg	15
BW_{2-6} (body weight) kg	15
BW_{6-16} (body weight) kg	80
BW_{16-26} (body weight) kg	80
ED_{0-2} (exposure duration) yr	2
ED_{2-6} (exposure duration) yr	4
ED_{6-16} (exposure duration) yr	10

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Site-specific Risk Models
Resident Soil (<40 in. Zone) Inputs

Variable	Value
ED_{16-26} (exposure duration) yr	10
$EF_{0-2\ lt\ 40\ in}$ (exposure frequency) day/yr	270
$EF_{2-6\ lt\ 40\ in}$ (exposure frequency) day/yr	270
$EF_{6-16\ lt\ 40\ in}$ (exposure frequency) day/yr	270
$EF_{16-26\ lt\ 40\ in}$ (exposure frequency) day/yr	270
ET_{0-2} (exposure time) hr/day	24
ET_{2-6} (exposure time) hr/day	24
ET_{6-16} (exposure time) hr/day	24
ET_{16-26} (exposure time) hr/day	24
IRS_{0-2} (soil intake rate) mg/day	200
IRS_{2-6} (soil intake rate) mg/day	200
IRS_{6-16} (soil intake rate) mg/day	100
IRS_{16-26} (soil intake rate) mg/day	100
SA_{0-2} (skin surface area) cm^2/day	2373
SA_{2-6} (skin surface area) cm^2/day	2373
SA_{6-16} (skin surface area) cm^2/day	6032
SA_{16-26} (skin surface area) cm^2/day	6032
A_c (acres)	0.5
Q/C_{wp} (g/m^2-s per kg/m^3)	93.7736
PEF (particulate emission factor) m^3/kg	1.36E09
A (PEF Dispersion Constant)	16.2302
B (PEF Dispersion Constant)	18.7762
C (PEF Dispersion Constant)	216.108
V(fraction of vegetative cover) unitless	0.5
U_m(mean annual wind speed) m/s	4.69
U_t(equivalent threshold value)	11.32
F(x) (function dependent on U_m/U_t) unitless	0.194
A_c (acres)	0.5
Q/C_{wp} (g/m^2-s per kg/m^3)	93.7736
foc (fraction organic carbon in soil) g/g	0.001
p_b (dry soil bulk density) g/cm^3	1.5
p_s (soil particle density) g/cm^3	2.65
$Theta_w$ (water-filled soil porosity)L_{water}/L_{soil}	0.15

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Site-specific Risk Models
Resident Soil (<40 in. Zone) Inputs

Variable	Value
Theta$_a$ (air-filled soil porosity) L_{air}/L_{soil}	0.28396
n (total soil porosity) L_{pore}/L_{soil}	0.43396
T (exposure interval) s	819936000
A (VF Dispersion Constant)	16.2302
B (VF Dispersion Constant)	18.7762
C (VF Dispersion Constant)	216.108

Site-specific Risk Models
Resident Cumulative Risk
Soil (<40 in. Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Chemical	Mutagen?	Volatile?	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m^3)	Chronic RfC Ref	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Ref	Inhalation Unit Risk $(\mu g/m^3)^{-1}$	IUR Ref	GIABS	ABS	MW	ρ (g/cm^3)
Thallium (Soluble Salts)	No	No	1.00E-05	S	-		-		-		1	-	204.38	1.18E+01
**Total Risk/HI*			-		-		-		-		-	-	-	-

D_{ia} (cm^2/s)	D_{iw} (cm^2/s)	H`	Volatilization Factor (m^3/kg)	K_{oc} (cm^3/g)	K_d (cm^3/g)	Particulate Emission Factor (m^3/kg)	RBA	Concentration (mg/kg)	Ingestion Noncarcinogenic CDI Child	Inhalation Noncarcinogenic (Volatiles) CDI Child
-	-	-	-	-	7.10E+01	1.36E+09	1.00E+00	4.10E-01	4.04E-06	-
-	-	-	-	-	-	-	-	-	-	-

Inhalation Noncarcinogenic (Particulates) CDI Child	Dermal Noncarcinogenic CDI Child	Ingestion Carcinogenic CDI	Inhalation (Volatiles) Carcinogenic CDI	Inhalation (Particulates) Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HI Child	Inhalation (Volatiles) HI Child	Inhalation (Particulates) HI Child	Dermal HI Child
-	-	-	-	-	-	4.04E-01	-	-	-
-	-	-	-	-	-	*4.04E-01*	-	-	-

Noncarcinogenic HI Child	Ingestion Risk	Inhalation (Volatiles) Risk	Inhalation (Particulates) Risk	Dermal Risk	Carcinogenic Risk
4.04E-01	-	-	-	-	**-**
4.04E-01	-	-	-	-	**-**

Site-specific Risk Models
Resident Soil (<40 in. Zone) Inputs

Variable	Value
ED_{ress} (exposure duration - resident) yr	26
ED_{resc} (exposure duration - child) yr	6
ED_{resa} (exposure duration - adult) yr	20
ET_{ress} (exposure time - resident) hr/day	24
ET_{resc} (exposure time - child) hr/day	24
ET_{resa} (exposure time - adult) hr/day	24
BW_{resa} (body weight - adult) kg	80
BW_{resc} (body weight - child) kg	15
SA_{resa} (skin surface area - adult) cm^2/day	6032
SA_{resc} (skin surface area - child) cm^2/day	2373
LT (lifetime - resident) yr	70
$EF_{res\ lt\ 40\ in}$ (exposure frequency - resident) day/yr	270
$EF_{resc\ lt\ 40\ in}$ (exposure frequency - child) day/yr	270
$EF_{resa\ lt\ 40\ in}$ (exposure frequency - adult) day/yr	270
IRS_{resa} (soil intake rate - adult) mg/day	100
IRS_{resc} (soil intake rate - child) mg/day	200
AF_{resa} (skin adherence factor - adult) mg/cm^2	0.07
AF_{resc} (skin adherence factor - child) mg/cm^2	0.2
$IFS_{res\ lt\ 40\ in\ adj}$ (age-adjusted soil ingestion factor) mg/kg	28350
$DFS_{res\ lt\ 40\ in\ adj}$ (age-adjusted soil dermal factor) mg/kg	79758
$IFSM_{res\ lt\ 40\ in\ adj}$ (mutagenic age-adjusted soil ingestion factor) mg/kg	128700
$DFSM_{res\ lt\ 40\ in\ adj}$ (mutagenic age-adjusted soil dermal factor) mg/kg	330372
AF_{0-2} (skin adherence factor) mg/cm^2	0.2
AF_{2-6} (skin adherence factor) mg/cm^2	0.2
AF_{6-16} (skin adherence factor) mg/cm^2	0.07
AF_{16-26} (skin adherence factor) mg/cm^2	0.07
BW_{0-2} (body weight) kg	15
BW_{2-6} (body weight) kg	15
BW_{6-16} (body weight) kg	80
BW_{16-26} (body weight) kg	80
ED_{0-2} (exposure duration) yr	2
ED_{2-6} (exposure duration) yr	4
ED_{6-16} (exposure duration) yr	10

Site-specific Risk Models
Resident Soil (<40 in. Zone) Inputs

Variable	Value
ED_{16-26} (exposure duration) yr	10
$EF_{0-2\ lt\ 40\ in}$ (exposure frequency) day/yr	270
$EF_{2-6\ lt\ 40\ in}$ (exposure frequency) day/yr	270
$EF_{6-16\ lt\ 40\ in}$ (exposure frequency) day/yr	270
$EF_{16-26\ lt\ 40\ in}$ (exposure frequency) day/yr	270
ET_{0-2} (exposure time) hr/day	24
ET_{2-6} (exposure time) hr/day	24
ET_{6-16} (exposure time) hr/day	24
ET_{16-26} (exposure time) hr/day	24
IRS_{0-2} (soil intake rate) mg/day	200
IRS_{2-6} (soil intake rate) mg/day	200
IRS_{6-16} (soil intake rate) mg/day	100
IRS_{16-26} (soil intake rate) mg/day	100
SA_{0-2} (skin surface area) cm^2/day	2373
SA_{2-6} (skin surface area) cm^2/day	2373
SA_{6-16} (skin surface area) cm^2/day	6032
SA_{16-26} (skin surface area) cm^2/day	6032
A_c (acres)	0.5
Q/C_{wp} (g/m^2-s per kg/m^3)	93.7736
PEF (particulate emission factor) m^3/kg	1.36E09
A (PEF Dispersion Constant)	16.2302
B (PEF Dispersion Constant)	18.7762
C (PEF Dispersion Constant)	216.108
V(fraction of vegetative cover) unitless	0.5
U_m(mean annual wind speed) m/s	4.69
U_t(equivalent threshold value)	11.32
F(x) (function dependent on U_m/U_t) unitless	0.194
A_c (acres)	0.5
Q/C_{wp} (g/m^2-s per kg/m^3)	93.7736
foc (fraction organic carbon in soil) g/g	0.001
p_b (dry soil bulk density) g/cm^3	1.5
p_s (soil particle density) g/cm^3	2.65
$Theta_w$ (water-filled soil porosity)L_{water}/L_{soil}	0.15

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Site-specific Risk Models
Resident Soil (<40 in. Zone) Inputs

Variable	Value
Theta$_a$ (air-filled soil porosity) L_{air}/L_{soil}	0.28396
n (total soil porosity) L_{pore}/L_{soil}	0.43396
T (exposure interval) s	819936000
A (VF Dispersion Constant)	16.2302
B (VF Dispersion Constant)	18.7762
C (VF Dispersion Constant)	216.108

Site-specific Risk Models
Resident Cumulative Risk
Soil (<40 in. Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Chemical	Mutagen?	Volatile?	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m^3)	Chronic RfC Ref	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Ref	Inhalation Unit Risk $(\mu g/m^3)^{-1}$	IUR Ref	GIABS	ABS	MW	ρ (g/cm^3)
Arsenic, Inorganic	No	No	3.00E-04	I	1.50E-05	C	1.50E+00	I	4.30E-03	I	1	0.03	74.922	4.90E+00
Benzo[a]pyrene	Yes	No	3.00E-04	I	2.00E-06	I	1.00E+00	I	6.00E-04	I	1	0.13	252.32	1.35E+00
Chromium, Total	No	No	1.50E+00	S	-		-		-		0.013	-	51.996	7.15E+00
Thallium (Soluble Salts)	No	No	1.00E-05	S	-		-		-		1	-	204.38	1.18E+01
**Total Risk/HI*			-		-		-		-		-	-	-	-

Site-specific Risk Models
Resident Cumulative Risk
Soil (<40 in. Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

D_{ia} (cm^2/s)	D_{iw} (cm^2/s)	H`	Volatilization Factor (m^3/kg)	K_{oc} (cm^3/g)	K_d (cm^3/g)	Particulate Emission Factor (m^3/kg)	RBA	Concentration (mg/kg)	Ingestion Noncarcinogenic CDI Child	Inhalation Noncarcinogenic (Volatiles) CDI Child
-	-	-	-	-	2.90E+01	1.36E+09	6.00E-01	2.69E+01	1.59E-04	-
4.76E-02	5.56E-06	1.87E-05	-	5.87E+05	-	1.36E+09	1.00E+00	6.82E-01	6.73E-06	-
-	-	-	-	-	1.80E+06	1.36E+09	1.00E+00	9.80E+01	9.67E-04	-
-	-	-	-	-	7.10E+01	1.36E+09	1.00E+00	7.40E-01	7.30E-06	-
-	-	-	-	-	-	-	-	-	-	-

Site-specific Risk Models
Resident Cumulative Risk
Soil (<40 in. Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Inhalation Noncarcinogenic (Particulates) CDI Child	Dermal Noncarcinogenic CDI Child	Ingestion Carcinogenic CDI	Inhalation (Volatiles) Carcinogenic CDI	Inhalation (Particulates) Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HI Child	Inhalation (Volatiles) HI Child	Inhalation (Particulates) HI Child	Dermal HI Child
1.46E-08	1.89E-05	1.79E-05	-	5.43E-06	2.52E-06	5.31E-01	-	9.75E-04	6.30E-02
3.71E-10	2.08E-06	3.44E-06	-	3.82E-07	1.15E-06	2.24E-02	-	1.85E-04	6.92E-03
-	-	-	-	-	-	6.44E-04	-	-	-
-	-	-	-	-	-	7.30E-01	-	-	-
-	-	-	-	-	-	*1.28E+00*	-	*1.16E-03*	*6.99E-02*

Site-specific Risk Models
Resident Cumulative Risk
Soil (<40 in. Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Noncarcinogenic HI Child	Ingestion Risk	Inhalation (Volatiles) Risk	Inhalation (Particulates) Risk	Dermal Risk	Carcinogenic Risk
5.95E-01	2.69E-05	-	2.34E-08	3.78E-06	**3.07E-05**
2.95E-02	3.44E-06	-	2.29E-10	1.15E-06	**4.58E-06**
6.44E-04	-	-	-	-	**-**
7.30E-01	-	-	-	-	**-**
1.35E+00	*3.03E-05*	*-*	*2.36E-08*	*4.93E-06*	***3.52E-05***

Site-specific Risk Models
Resident Soil (<40 in. Zone) Inputs

Variable	Value
ED_{ress} (exposure duration - resident) yr	26
ED_{resc} (exposure duration - child) yr	6
ED_{resa} (exposure duration - adult) yr	20
ET_{ress} (exposure time - resident) hr/day	24
ET_{resc} (exposure time - child) hr/day	24
ET_{resa} (exposure time - adult) hr/day	24
BW_{resa} (body weight - adult) kg	80
BW_{resc} (body weight - child) kg	15
SA_{resa} (skin surface area - adult) cm^2/day	6032
SA_{resc} (skin surface area - child) cm^2/day	2373
LT (lifetime - resident) yr	70
$EF_{res\ lt\ 40\ in}$ (exposure frequency - resident) day/yr	270
$EF_{resc\ lt\ 40\ in}$ (exposure frequency - child) day/yr	270
$EF_{resa\ lt\ 40\ in}$ (exposure frequency - adult) day/yr	270
IRS_{resa} (soil intake rate - adult) mg/day	100
IRS_{resc} (soil intake rate - child) mg/day	200
AF_{resa} (skin adherence factor - adult) mg/cm^2	0.07
AF_{resc} (skin adherence factor - child) mg/cm^2	0.2
$IFS_{res\ lt\ 40\ in\ adj}$ (age-adjusted soil ingestion factor) mg/kg	28350
$DFS_{res\ lt\ 40\ in\ adj}$ (age-adjusted soil dermal factor) mg/kg	79758
$IFSM_{res\ lt\ 40\ in\ adj}$ (mutagenic age-adjusted soil ingestion factor) mg/kg	128700
$DFSM_{res\ lt\ 40\ in\ adj}$ (mutagenic age-adjusted soil dermal factor) mg/kg	330372
AF_{0-2} (skin adherence factor) mg/cm^2	0.2
AF_{2-6} (skin adherence factor) mg/cm^2	0.2
AF_{6-16} (skin adherence factor) mg/cm^2	0.07
AF_{16-26} (skin adherence factor) mg/cm^2	0.07
BW_{0-2} (body weight) kg	15
BW_{2-6} (body weight) kg	15
BW_{6-16} (body weight) kg	80
BW_{16-26} (body weight) kg	80
ED_{0-2} (exposure duration) yr	2
ED_{2-6} (exposure duration) yr	4
ED_{6-16} (exposure duration) yr	10

Site-specific Risk Models
Resident Soil (<40 in. Zone) Inputs

Variable	Value
ED_{16-26} (exposure duration) yr	10
$EF_{0-2\ lt\ 40\ in}$ (exposure frequency) day/yr	270
$EF_{2-6\ lt\ 40\ in}$ (exposure frequency) day/yr	270
$EF_{6-16\ lt\ 40\ in}$ (exposure frequency) day/yr	270
$EF_{16-26\ lt\ 40\ in}$ (exposure frequency) day/yr	270
ET_{0-2} (exposure time) hr/day	24
ET_{2-6} (exposure time) hr/day	24
ET_{6-16} (exposure time) hr/day	24
ET_{16-26} (exposure time) hr/day	24
IRS_{0-2} (soil intake rate) mg/day	200
IRS_{2-6} (soil intake rate) mg/day	200
IRS_{6-16} (soil intake rate) mg/day	100
IRS_{16-26} (soil intake rate) mg/day	100
SA_{0-2} (skin surface area) cm^2/day	2373
SA_{2-6} (skin surface area) cm^2/day	2373
SA_{6-16} (skin surface area) cm^2/day	6032
SA_{16-26} (skin surface area) cm^2/day	6032
A_c (acres)	0.5
Q/C_{wp} (g/m^2-s per kg/m^3)	93.7736
PEF (particulate emission factor) m^3/kg	1.36E09
A (PEF Dispersion Constant)	16.2302
B (PEF Dispersion Constant)	18.7762
C (PEF Dispersion Constant)	216.108
V(fraction of vegetative cover) unitless	0.5
U_m(mean annual wind speed) m/s	4.69
U_t(equivalent threshold value)	11.32
F(x) (function dependent on U_m/U_t) unitless	0.194
A_c (acres)	0.5
Q/C_{wp} (g/m^2-s per kg/m^3)	93.7736
foc (fraction organic carbon in soil) g/g	0.001
p_b (dry soil bulk density) g/cm^3	1.5
p_s (soil particle density) g/cm^3	2.65
$Theta_w$ (water-filled soil porosity)L_{water}/L_{soil}	0.15

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Site-specific Risk Models
Resident Soil (<40 in. Zone) Inputs

Variable	Value
Theta$_a$ (air-filled soil porosity) L_{air}/L_{soil}	0.28396
n (total soil porosity) L_{pore}/L_{soil}	0.43396
T (exposure interval) s	819936000
A (VF Dispersion Constant)	16.2302
B (VF Dispersion Constant)	18.7762
C (VF Dispersion Constant)	216.108

Site-specific Risk Models
Resident Cumulative Risk
Soil (<40 in. Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Chemical	Mutagen?	Volatile?	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m^3)	Chronic RfC Ref	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Ref	Inhalation Unit Risk $(\mu g/m^3)^{-1}$	IUR Ref	GIABS	ABS	MW	ρ (g/cm^3)
Thallium (Soluble Salts)	No	No	1.00E-05	S	-		-		-		1	-	204.38	1.18E+01
**Total Risk/HI*			-		-		-		-		-	-	-	-

D_{ia} (cm^2/s)	D_{iw} (cm^2/s)	H`	Volatilization Factor (m^3/kg)	K_{oc} (cm^3/g)	K_d (cm^3/g)	Particulate Emission Factor (m^3/kg)	RBA	Concentration (mg/kg)	Ingestion Noncarcinogenic CDI Child	Inhalation Noncarcinogenic (Volatiles) CDI Child
-	-	-	-	-	7.10E+01	1.36E+09	1.00E+00	1.20E+00	1.18E-05	-
-	-	-	-	-	-	-	-	-	-	-

Inhalation Noncarcinogenic (Particulates) CDI Child	Dermal Noncarcinogenic CDI Child	Ingestion Carcinogenic CDI	Inhalation (Volatiles) Carcinogenic CDI	Inhalation (Particulates) Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HI Child	Inhalation (Volatiles) HI Child	Inhalation (Particulates) HI Child	Dermal HI Child
-	-	-	-	-	-	1.18E+00	-	-	-
-	-	-	-	-	-	*1.18E+00*	-	-	-

Noncarcinogenic HI Child	Ingestion Risk	Inhalation (Volatiles) Risk	Inhalation (Particulates) Risk	Dermal Risk	Carcinogenic Risk
1.18E+00	-	-	-	-	**-**
1.18E+00	-	-	-	-	**-**

Site-specific Risk Models
Equation Inputs
Groundwater

Variable	Value
LT (lifetime - resident) year	70
K (volatilization factor of Andelman) L/m^3	0.5
l_{sc} (apparent thickness of stratum corneum) cm	0.001
ED_{resw} (exposure duration - resident) year	26
ED_{reswc} (exposure duration - child) year	6
ED_{reswa} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration first phase) year	2
ED_{2-6} (mutagenic exposure duration second phase) year	4
ED_{6-16} (mutagenic exposure duration third phase) year	10
ED_{16-26} (mutagenic exposure duration fourth phase) year	10
EF_{resw} (exposure frequency) day/year	350
EF_{reswc} (exposure frequency - child) day/year	350
EF_{reswa} (exposure frequency - adult) day/year	350
EF_{0-2} (mutagenic exposure frequency first phase) day/year	350
EF_{2-6} (mutagenic exposure frequency second phase) day/year	350
EF_{6-16} (mutagenic exposure frequency third phase) day/year	350
EF_{16-26} (mutagenic exposure frequency fourth phase) day/year	350
$ET_{resw-adj}$ (age-adjusted exposure time) hour/event	0.67077
$ET_{resw-madj}$ (mutagenic age-adjusted exposure time) hour/event	0.67077
ET_{resw} (exposure time) hour/day	24
ET_{reswc} (dermal exposure time - child) hour/event	0.54
ET_{reswa} (dermal exposure time - adult) hour/event	0.71
ET_{reswc} (inhalation exposure time - child) hour/day	24
ET_{reswa} (inhalation exposure time - adult) hour/day	24
ET_{0-2} (mutagenic inhalation exposure time first phase) hour/day	24
ET_{2-6} (mutagenic inhalation exposure time second phase) hour/day	24
ET_{6-16} (mutagenic inhalation exposure time third phase) hour/day	24
ET_{16-26} (mutagenic inhalation exposure time fourth phase) hour/day	24
ET_{0-2} (mutagenic dermal exposure time first phase) hour/event	0.54
ET_{2-6} (mutagenic dermal exposure time second phase) hour/event	0.54
ET_{6-16} (mutagenic dermal exposure time third phase) hour/event	0.71
ET_{16-26} (mutagenic dermal exposure time fourth phase) hour/event	0.71

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Site-specific Risk Models
Equation Inputs
Groundwater

Variable	Value
BW_{reswa} (body weight - adult) kg	80
BW_{reswc} (body weight - child) kg	15
BW_{0-2} (mutagenic body weight) kg	15
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-26} (mutagenic body weight) kg	80
$IFW_{res-adj}$ (adjusted intake factor) L/kg	327.95
$IFWM_{res-adj}$ (mutagenic adjusted intake factor) L/kg	1019.9
IRW_{reswc} (water intake rate - child) L/day	0.78
IRW_{reswa} (water intake rate - adult) L/day	2.5
IRW_{0-2} (mutagenic water intake rate) L/day	0.78
IRW_{2-6} (mutagenic water intake rate) L/day	0.78
IRW_{6-16} (mutagenic water intake rate) L/day	2.5
IRW_{16-26} (mutagenic water intake rate) L/day	2.5
EV_{reswa} (events - adult) per day	1
EV_{reswc} (events - child) per day	1
EV_{0-2} (mutagenic events) per day	1
EV_{2-6} (mutagenic events) per day	1
EV_{6-16} (mutagenic events) per day	1
EV_{16-26} (mutagenic events) per day	1
$DFW_{res-adj}$ (age-adjusted dermal factor) cm^2-event/kg	2610650
$DFWM_{res-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	8191633
SA_{reswc} (skin surface area - child) cm^2	6365
SA_{reswa} (skin surface area - adult) cm^2	19652
SA_{0-2} (mutagenic skin surface area) cm^2	6365
SA_{2-6} (mutagenic skin surface area) cm^2	6365
SA_{6-16} (mutagenic skin surface area) cm^2	19652
SA_{16-26} (mutagenic skin surface area) cm^2	19652

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Site-specific Risk Models
Cumulative Risk
Groundwater

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

*The sum of PFHpA, PFHxS, PFNA, PFOS, and PFOA concentrations should not exceed 0.07 ug/L.

Chemical	Mutagen?	Volatile?	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Ref	Inhalation Unit Risk $(\mu^3)^{-1}$	IUR Ref	GIABS	MW	log K_{ow} (L/kg)	In EPD?
Arsenic, Inorganic	No	No	3.00E-04	U	1.50E-05	U	1.50E+00	U	4.30E-03	U	1	7.49E+01	-	Yes
Benzene	No	Yes	4.00E-03	U	3.00E-02	U	5.50E-02	U	7.80E-06	U	1	7.81E+01	2.13E+00	Yes
Benzo[a]pyrene	Yes	No	3.00E-04	U	2.00E-06	U	1.00E+00	U	6.00E-04	U	1	2.52E+02	6.13E+00	
Chloroform	No	Yes	1.00E-02	U	9.77E-02	U	3.10E-02	U	2.30E-05	U	1	1.19E+02	1.97E+00	Yes
Chromium(III), Insoluble Salts	No	No	1.50E+00	U	-		-		-		0.013	5.20E+01	-	Yes
Dichloroethane, 1,2-	No	Yes	6.00E-03	U	7.00E-03	U	9.10E-02	U	2.60E-05	U	1	9.90E+01	1.48E+00	Yes
Ethylbenzene	No	Yes	1.00E-01	U	1.00E+00	U	1.10E-02	U	2.50E-06	U	1	1.06E+02	3.15E+00	Yes
Manganese (Non-diet)	No	No	2.40E-02	U	5.00E-05	U	-		-		0.04	5.49E+01	-	Yes
Trichloroethylene	Yes	Yes	5.00E-04	U	2.00E-03	U	4.60E-02	U	4.10E-06	U	1	1.31E+02	2.42E+00	Yes
Xylenes	No	Yes	2.00E-01	U	1.00E-01	U	-		-		1	1.06E+02	3.16E+00	Yes
Iron	No	No	7.00E-01	U	-		-		-		1	5.58E+01	-	Yes
*Total Risk/HI			-		-		-		-		-	-	-	

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Site-specific Risk Models
Cumulative Risk
Groundwater

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

*The sum of PFHpA, PFHxS, PFNA, PFOS, and PFOA concentrations should not exceed 0.07 ug/L.

Chemical	Concentration (µg/L)	Ingestion Noncarcinogenic CDI Child	Inhalation Noncarcinogenic (Volatiles) CDI Child	Dermal Noncarcinogenic CDI Child	Ingestion Carcinogenic CDI	Inhalation (Volatiles) Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HI Child
Arsenic, Inorganic	1.24E+01	6.18E-04	-	2.72E-06	1.59E-04	-	8.50E-07	2.06E+00
Benzene	4.90E+01	2.44E-03	2.35E-02	3.24E-04	6.29E-04	8.73E+00	9.06E-05	6.11E-01
Benzo[a]pyrene	2.10E+00	1.05E-04	-	-	8.38E-05	-	-	3.49E-01
Chloroform	2.60E-01	1.30E-05	1.25E-04	1.03E-06	3.34E-06	4.63E-02	2.88E-07	1.30E-03
Chromium(III), Insoluble Salts	2.50E+00	1.25E-04	-	5.49E-07	-	-	-	8.31E-05
Dichloroethane, 1,2-	5.00E-01	2.49E-05	2.40E-04	1.07E-06	6.42E-06	8.90E-02	2.98E-07	4.16E-03
Ethylbenzene	2.00E+00	9.97E-05	9.59E-04	5.24E-05	2.57E-05	3.56E-01	1.47E-05	9.97E-04
Manganese (Non-diet)	3.00E+03	1.50E-01	-	6.59E-04	-	-	-	6.23E+00
Trichloroethylene	7.90E-01	3.94E-05	3.79E-04	5.73E-06	1.45E-05	2.01E-01	2.31E-06	7.88E-02
Xylenes	6.80E+01	3.39E-03	3.26E-02	1.81E-03	-	-	-	1.70E-02
Iron	4.90E+03	2.44E-01	-	1.08E-03	-	-	-	3.49E-01
**Total Risk/HI*	-	-	-	-	-	-	-	*9.71E+00*

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Site-specific Risk Models
Cumulative Risk
Groundwater

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

*The sum of PFHpA, PFHxS, PFNA, PFOS, and PFOA concentrations should not exceed 0.07 ug/L.

Chemical	Inhalation (Volatiles) HI Child	Dermal HI Child	Noncarcinogenic HI Child	Ingestion Risk	Inhalation (Volatiles) Risk	Dermal Risk	Carcinogenic Risk
Arsenic, Inorganic	-	9.08E-03	**2.07E+00**	2.39E-04	-	1.27E-06	**2.40E-04**
Benzene	7.83E-01	8.09E-02	**1.47E+00**	3.46E-05	6.81E-05	4.98E-06	**1.08E-04**
Benzo[a]pyrene	-	-	**3.49E-01**	8.38E-05	-	-	**8.38E-05**
Chloroform	1.28E-03	1.03E-04	**2.68E-03**	1.03E-07	1.06E-06	8.91E-09	**1.18E-06**
Chromium(III), Insoluble Salts	-	2.82E-05	**1.11E-04**	-	-	-	**-**
Dichloroethane, 1,2-	3.42E-02	1.78E-04	**3.86E-02**	5.84E-07	2.32E-06	2.71E-08	**2.93E-06**
Ethylbenzene	9.59E-04	5.24E-04	**2.48E-03**	2.82E-07	8.90E-07	1.61E-07	**1.33E-06**
Manganese (Non-diet)	-	6.87E-01	**6.92E+00**	-	-	-	**-**
Trichloroethylene	1.89E-01	1.15E-02	**2.80E-01**	6.68E-07	8.26E-07	1.06E-07	**1.60E-06**
Xylenes	3.26E-01	9.03E-03	**3.52E-01**	-	-	-	**-**
Iron	-	1.54E-03	**3.51E-01**	-	-	-	**-**
**Total Risk/HI*	*1.33E+00*	*8.00E-01*	***1.18E+01***	*3.59E-04*	*7.32E-05*	*6.56E-06*	***4.39E-04***

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Site-specific Risk Models
Equation Inputs
Groundwater

Variable	Value
LT (lifetime - resident) year	70
K (volatilization factor of Andelman) L/m^3	0.5
l_{sc} (apparent thickness of stratum corneum) cm	0.001
ED_{resw} (exposure duration - resident) year	26
ED_{reswc} (exposure duration - child) year	6
ED_{reswa} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration first phase) year	2
ED_{2-6} (mutagenic exposure duration second phase) year	4
ED_{6-16} (mutagenic exposure duration third phase) year	10
ED_{16-26} (mutagenic exposure duration fourth phase) year	10
EF_{resw} (exposure frequency) day/year	350
EF_{reswc} (exposure frequency - child) day/year	350
EF_{reswa} (exposure frequency - adult) day/year	350
EF_{0-2} (mutagenic exposure frequency first phase) day/year	350
EF_{2-6} (mutagenic exposure frequency second phase) day/year	350
EF_{6-16} (mutagenic exposure frequency third phase) day/year	350
EF_{16-26} (mutagenic exposure frequency fourth phase) day/year	350
$ET_{resw-adj}$ (age-adjusted exposure time) hour/event	0.67077
$ET_{resw-madj}$ (mutagenic age-adjusted exposure time) hour/event	0.67077
ET_{resw} (exposure time) hour/day	24
ET_{reswc} (dermal exposure time - child) hour/event	0.54
ET_{reswa} (dermal exposure time - adult) hour/event	0.71
ET_{reswc} (inhalation exposure time - child) hour/day	24
ET_{reswa} (inhalation exposure time - adult) hour/day	24
ET_{0-2} (mutagenic inhalation exposure time first phase) hour/day	24
ET_{2-6} (mutagenic inhalation exposure time second phase) hour/day	24
ET_{6-16} (mutagenic inhalation exposure time third phase) hour/day	24
ET_{16-26} (mutagenic inhalation exposure time fourth phase) hour/day	24
ET_{0-2} (mutagenic dermal exposure time first phase) hour/event	0.54
ET_{2-6} (mutagenic dermal exposure time second phase) hour/event	0.54
ET_{6-16} (mutagenic dermal exposure time third phase) hour/event	0.71
ET_{16-26} (mutagenic dermal exposure time fourth phase) hour/event	0.71

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Site-specific Risk Models
Equation Inputs
Groundwater

Variable	Value
$BW_{resw a}$ (body weight - adult) kg	80
$BW_{resw c}$ (body weight - child) kg	15
BW_{0-2} (mutagenic body weight) kg	15
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-26} (mutagenic body weight) kg	80
$IFW_{res-adj}$ (adjusted intake factor) L/kg	327.95
$IFWM_{res-adj}$ (mutagenic adjusted intake factor) L/kg	1019.9
$IRW_{resw c}$ (water intake rate - child) L/day	0.78
$IRW_{resw a}$ (water intake rate - adult) L/day	2.5
IRW_{0-2} (mutagenic water intake rate) L/day	0.78
IRW_{2-6} (mutagenic water intake rate) L/day	0.78
IRW_{6-16} (mutagenic water intake rate) L/day	2.5
IRW_{16-26} (mutagenic water intake rate) L/day	2.5
$EV_{resw a}$ (events - adult) per day	1
$EV_{resw c}$ (events - child) per day	1
EV_{0-2} (mutagenic events) per day	1
EV_{2-6} (mutagenic events) per day	1
EV_{6-16} (mutagenic events) per day	1
EV_{16-26} (mutagenic events) per day	1
$DFW_{res-adj}$ (age-adjusted dermal factor) cm^2-event/kg	2610650
$DFWM_{res-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	8191633
$SA_{resw c}$ (skin surface area - child) cm^2	6365
$SA_{resw a}$ (skin surface area - adult) cm^2	19652
SA_{0-2} (mutagenic skin surface area) cm^2	6365
SA_{2-6} (mutagenic skin surface area) cm^2	6365
SA_{6-16} (mutagenic skin surface area) cm^2	19652
SA_{16-26} (mutagenic skin surface area) cm^2	19652

Site-specific Risk Models
Cumulative Risk
Groundwater

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

*The sum of PFHpA, PFHxS, PFNA, PFOS, and PFOA concentrations should not exceed 0.07 ug/L.

Chemical	Mutagen?	Volatile?	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Ref	Inhalation Unit Risk $(\mu^3)^{-1}$	IUR Ref	GIABS	MW	log K_{ow} (L/kg)	In EPD?
Arsenic, Inorganic	No	No	3.00E-04	U	1.50E-05	U	1.50E+00	U	4.30E-03	U	1	7.49E+01	-	Yes
Barium	No	No	2.00E-01	U	5.00E-04	U	-		-		0.07	1.37E+02	-	Yes
Benzene	No	Yes	4.00E-03	U	3.00E-02	U	5.50E-02	U	7.80E-06	U	1	7.81E+01	2.13E+00	Yes
Cadmium (Water)	No	No	5.00E-04	U	1.00E-05	U	-		1.80E-03	U	0.05	1.12E+02	-	Yes
Chromium(III), Insoluble Salts	No	No	1.50E+00	U	-		-		-		0.013	5.20E+01	-	Yes
Cumene	No	Yes	1.00E-01	U	4.00E-01	U	-		-		1	1.20E+02	3.66E+00	Yes
Dibromoethane, 1,2-	No	Yes	9.00E-03	U	9.00E-03	U	2.00E+00	U	6.00E-04	U	1	1.88E+02	1.96E+00	Yes
Dichloroethane, 1,2-	No	Yes	6.00E-03	U	7.00E-03	U	9.10E-02	U	2.60E-05	U	1	9.90E+01	1.48E+00	Yes
Ethylbenzene	No	Yes	1.00E-01	U	1.00E+00	U	1.10E-02	U	2.50E-06	U	1	1.06E+02	3.15E+00	Yes
Manganese (Non-diet)	No	No	2.40E-02	U	5.00E-05	U	-		-		0.04	5.49E+01	-	Yes
Methylnaphthalene, 1-	No	Yes	7.00E-02	U	-		2.90E-02	U	-		1	1.42E+02	3.87E+00	Yes
Methylnaphthalene, 2-	No	Yes	4.00E-03	U	-		-		-		1	1.42E+02	3.86E+00	Yes
Naphthalene	No	Yes	2.00E-02	U	3.00E-03	U	-		3.40E-05	U	1	1.28E+02	3.30E+00	Yes
Propyl benzene	No	Yes	1.00E-01	U	1.00E+00	U	-		-		1	1.20E+02	3.69E+00	Yes
Toluene	No	Yes	8.00E-02	U	5.00E+00	U	-		-		1	9.21E+01	2.73E+00	Yes
Trichloroethylene	Yes	Yes	5.00E-04	U	2.00E-03	U	4.60E-02	U	4.10E-06	U	1	1.31E+02	2.42E+00	Yes
Trimethylbenzene, 1,2,4-	No	Yes	1.00E-02	U	6.00E-02	U	-		-		1	1.20E+02	3.63E+00	Yes
Trimethylbenzene, 1,3,5-	No	Yes	1.00E-02	U	6.00E-02	U	-		-		1	1.20E+02	3.42E+00	Yes
Xylenes	No	Yes	2.00E-01	U	1.00E-01	U	-		-		1	1.06E+02	3.16E+00	Yes
Iron	No	No	7.00E-01	U	-		-		-		1	5.58E+01	-	Yes
*Total Risk/HI			-		-		-		-		-	-	-	

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Site-specific Risk Models
Cumulative Risk
Groundwater

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I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

*The sum of PFHpA, PFHxS, PFNA, PFOS, and PFOA concentrations should not exceed 0.07 ug/L.

Chemical	Concentration (μg/L)	Ingestion Noncarcinogenic CDI Child	Inhalation Noncarcinogenic (Volatiles) CDI Child	Dermal Noncarcinogenic CDI Child	Ingestion Carcinogenic CDI	Inhalation (Volatiles) Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HI Child
Arsenic, Inorganic	2.23E+01	1.11E-03	-	4.90E-06	2.86E-04	-	1.53E-06	3.71E+00
Barium	4.32E+02	2.15E-02	-	9.49E-05	-	-	-	1.08E-01
Benzene	5.83E+02	2.91E-02	2.80E-01	3.85E-03	7.48E-03	1.04E+02	1.08E-03	7.27E+00
Cadmium (Water)	1.60E+00	7.98E-05	-	3.52E-07	2.05E-05	-	1.10E-07	1.60E-01
Chromium(III), Insoluble Salts	3.06E+00	1.53E-04	-	6.72E-07	-	-	-	1.02E-04
Cumene	1.00E+02	4.99E-03	4.79E-02	5.22E-03	-	-	-	4.99E-02
Dibromoethane, 1,2-	2.63E+01	1.31E-03	1.26E-02	6.58E-05	3.38E-04	4.68E+00	1.84E-05	1.46E-01
Dichloroethane, 1,2-	1.80E-01	8.98E-06	8.63E-05	3.83E-07	2.31E-06	3.21E-02	1.07E-07	1.50E-03
Ethylbenzene	2.82E+03	1.41E-01	1.35E+00	7.39E-02	3.62E-02	5.02E+02	2.07E-02	1.41E+00
Manganese (Non-diet)	1.83E+04	9.12E-01	-	4.02E-03	-	-	-	3.80E+01
Methylnaphthalene, 1-	1.70E+01	8.48E-04	-	1.06E-03	2.18E-04	-	2.97E-04	1.21E-02
Methylnaphthalene, 2-	2.70E+01	1.35E-03	-	1.66E-03	-	-	-	3.37E-01
Naphthalene	2.55E+02	1.27E-02	1.22E-01	7.28E-03	3.27E-03	4.54E+01	2.04E-03	6.36E-01
Propyl benzene	9.20E+01	4.59E-03	4.41E-02	5.03E-03	-	-	-	4.59E-02
Toluene	2.44E+03	1.22E-01	1.17E+00	3.68E-02	-	-	-	1.52E+00
Trichloroethylene	2.90E-01	1.45E-05	1.39E-04	2.10E-06	5.33E-06	7.39E-02	8.46E-07	2.89E-02
Trimethylbenzene, 1,2,4-	8.80E+02	4.39E-02	4.22E-01	4.39E-02	-	-	-	4.39E+00
Trimethylbenzene, 1,3,5-	5.27E+02	2.63E-02	2.53E-01	1.90E-02	-	-	-	2.63E+00
Xylenes	1.77E+04	8.84E-01	8.50E+00	4.71E-01	-	-	-	4.42E+00
Iron	2.48E+04	1.24E+00	-	5.45E-03	-	-	-	1.77E+00
*Total Risk/HI	-	-	-	-	-	-	-	6.66E+01

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Site-specific Risk Models
Cumulative Risk
Groundwater

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*The sum of PFHpA, PFHxS, PFNA, PFOS, and PFOA concentrations should not exceed 0.07 ug/L.

Chemical	Inhalation (Volatiles) HI Child	Dermal HI Child	Noncarcinogenic HI Child	Ingestion Risk	Inhalation (Volatiles) Risk	Dermal Risk	Carcinogenic Risk
Arsenic, Inorganic	-	1.63E-02	**3.72E+00**	4.29E-04	-	2.29E-06	**4.32E-04**
Barium	-	6.78E-03	**1.14E-01**	-	-	-	**-**
Benzene	9.32E+00	9.63E-01	**1.75E+01**	4.12E-04	8.10E-04	5.93E-05	**1.28E-03**
Cadmium (Water)	-	1.41E-02	**1.74E-01**	-	-	-	**-**
Chromium(III), Insoluble Salts	-	3.45E-05	**1.36E-04**	-	-	-	**-**
Cumene	1.20E-01	5.22E-02	**2.22E-01**	-	-	-	**-**
Dibromoethane, 1,2-	1.40E+00	7.31E-03	**1.55E+00**	6.75E-04	2.81E-03	3.68E-05	**3.52E-03**
Dichloroethane, 1,2-	1.23E-02	6.39E-05	**1.39E-02**	2.10E-07	8.33E-07	9.77E-09	**1.05E-06**
Ethylbenzene	1.35E+00	7.39E-01	**3.50E+00**	3.98E-04	1.26E-03	2.27E-04	**1.88E-03**
Manganese (Non-diet)	-	4.19E+00	**4.22E+01**	-	-	-	**-**
Methylnaphthalene, 1-	-	1.52E-02	**2.73E-02**	6.33E-06	-	8.61E-06	**1.49E-05**
Methylnaphthalene, 2-	-	4.15E-01	**7.51E-01**	-	-	-	**-**
Naphthalene	4.08E+01	3.64E-01	**4.18E+01**	-	1.54E-03	-	**1.54E-03**
Propyl benzene	4.41E-02	5.03E-02	**1.40E-01**	-	-	-	**-**
Toluene	2.34E-01	4.60E-01	**2.22E+00**	-	-	-	**-**
Trichloroethylene	6.95E-02	4.21E-03	**1.03E-01**	2.45E-07	3.03E-07	3.89E-08	**5.87E-07**
Trimethylbenzene, 1,2,4-	7.03E+00	4.39E+00	**1.58E+01**	-	-	-	**-**
Trimethylbenzene, 1,3,5-	4.21E+00	1.90E+00	**8.74E+00**	-	-	-	**-**
Xylenes	8.50E+01	2.36E+00	**9.18E+01**	-	-	-	**-**
Iron	-	7.78E-03	**1.77E+00**	-	-	-	**-**
**Total Risk/HI*	*1.50E+02*	*1.59E+01*	***2.32E+02***	*1.92E-03*	*6.42E-03*	*3.35E-04*	***8.68E-03***

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Site-specific Risk Models
Equation Inputs
Groundwater

Variable	Value
LT (lifetime - resident) year	70
K (volatilization factor of Andelman) L/m^3	0.5
l_{sc} (apparent thickness of stratum corneum) cm	0.001
ED_{resw} (exposure duration - resident) year	26
ED_{reswc} (exposure duration - child) year	6
ED_{reswa} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration first phase) year	2
ED_{2-6} (mutagenic exposure duration second phase) year	4
ED_{6-16} (mutagenic exposure duration third phase) year	10
ED_{16-26} (mutagenic exposure duration fourth phase) year	10
EF_{resw} (exposure frequency) day/year	350
EF_{reswc} (exposure frequency - child) day/year	350
EF_{reswa} (exposure frequency - adult) day/year	350
EF_{0-2} (mutagenic exposure frequency first phase) day/year	350
EF_{2-6} (mutagenic exposure frequency second phase) day/year	350
EF_{6-16} (mutagenic exposure frequency third phase) day/year	350
EF_{16-26} (mutagenic exposure frequency fourth phase) day/year	350
$ET_{resw-adj}$ (age-adjusted exposure time) hour/event	0.67077
$ET_{resw-madj}$ (mutagenic age-adjusted exposure time) hour/event	0.67077
ET_{resw} (exposure time) hour/day	24
ET_{reswc} (dermal exposure time - child) hour/event	0.54
ET_{reswa} (dermal exposure time - adult) hour/event	0.71
ET_{reswc} (inhalation exposure time - child) hour/day	24
ET_{reswa} (inhalation exposure time - adult) hour/day	24
ET_{0-2} (mutagenic inhalation exposure time first phase) hour/day	24
ET_{2-6} (mutagenic inhalation exposure time second phase) hour/day	24
ET_{6-16} (mutagenic inhalation exposure time third phase) hour/day	24
ET_{16-26} (mutagenic inhalation exposure time fourth phase) hour/day	24
ET_{0-2} (mutagenic dermal exposure time first phase) hour/event	0.54
ET_{2-6} (mutagenic dermal exposure time second phase) hour/event	0.54
ET_{6-16} (mutagenic dermal exposure time third phase) hour/event	0.71
ET_{16-26} (mutagenic dermal exposure time fourth phase) hour/event	0.71

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Site-specific Risk Models
Equation Inputs
Groundwater

Variable	Value
BW_{reswa} (body weight - adult) kg	80
BW_{reswc} (body weight - child) kg	15
BW_{0-2} (mutagenic body weight) kg	15
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-26} (mutagenic body weight) kg	80
$IFW_{res-adj}$ (adjusted intake factor) L/kg	327.95
$IFWM_{res-adj}$ (mutagenic adjusted intake factor) L/kg	1019.9
IRW_{reswc} (water intake rate - child) L/day	0.78
IRW_{reswa} (water intake rate - adult) L/day	2.5
IRW_{0-2} (mutagenic water intake rate) L/day	0.78
IRW_{2-6} (mutagenic water intake rate) L/day	0.78
IRW_{6-16} (mutagenic water intake rate) L/day	2.5
IRW_{16-26} (mutagenic water intake rate) L/day	2.5
EV_{reswa} (events - adult) per day	1
EV_{reswc} (events - child) per day	1
EV_{0-2} (mutagenic events) per day	1
EV_{2-6} (mutagenic events) per day	1
EV_{6-16} (mutagenic events) per day	1
EV_{16-26} (mutagenic events) per day	1
$DFW_{res-adj}$ (age-adjusted dermal factor) cm^2-event/kg	2610650
$DFWM_{res-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	8191633
SA_{reswc} (skin surface area - child) cm^2	6365
SA_{reswa} (skin surface area - adult) cm^2	19652
SA_{0-2} (mutagenic skin surface area) cm^2	6365
SA_{2-6} (mutagenic skin surface area) cm^2	6365
SA_{6-16} (mutagenic skin surface area) cm^2	19652
SA_{16-26} (mutagenic skin surface area) cm^2	19652

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Cumulative Risk
Groundwater

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*The sum of PFHpA, PFHxS, PFNA, PFOS, and PFOA concentrations should not exceed 0.07 ug/L.

Chemical	Mutagen?	Volatile?	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Ref	Inhalation Unit Risk $(\mu^3)^{-1}$	IUR Ref	GIABS	MW	log K_{ow} (L/kg)
Antimony (metallic)	No	No	4.00E-04	U	-		-		-		0.15	1.22E+02	-
Arsenic, Inorganic	No	No	3.00E-04	U	1.50E-05	U	1.50E+00	U	4.30E-03	U	1	7.49E+01	-
Cadmium (Water)	No	No	5.00E-04	U	1.00E-05	U	-		1.80E-03	U	0.05	1.12E+02	-
Chromium(III), Insoluble Salts	No	No	1.50E+00	U	-		-		-		0.013	5.20E+01	-
Copper	No	No	4.00E-02	U	-		-		-		1	6.35E+01	-
Mercury (elemental)	No	Yes	1.60E-04	U	3.00E-04	U	-		-		1	2.01E+02	6.20E-01
Naphthalene	No	Yes	2.00E-02	U	3.00E-03	U	-		3.40E-05	U	1	1.28E+02	3.30E+00
Nickel Soluble Salts	No	No	2.00E-02	U	9.00E-05	U	-		2.60E-04	U	0.04	5.87E+01	-
Thallium (Soluble Salts)	No	No	1.00E-05	U	-		-		-		1	2.04E+02	-
Vanadium and Compounds	No	No	5.04E-03	U	1.00E-04	U	-		-		0.026	5.09E+01	-
Cobalt	No	No	3.00E-04	U	6.00E-06	U	-		-		1	5.89E+01	-
Iron	No	No	7.00E-01	U	-		-		-		1	5.58E+01	-
**Total Risk/HI*			-		-		-		-		-	-	-

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Cumulative Risk
Groundwater

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I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

*The sum of PFHpA, PFHxS, PFNA, PFOS, and PFOA concentrations should not exceed 0.07 ug/L.

Chemical	In EPD?	Concentration (µg/L)	Ingestion Noncarcinogenic CDI Child	Inhalation Noncarcinogenic (Volatiles) CDI Child	Dermal Noncarcinogenic CDI Child	Ingestion Carcinogenic CDI	Inhalation (Volatiles) Carcinogenic CDI
Antimony (metallic)	Yes	1.37E+00	6.83E-05	-	3.01E-07	-	-
Arsenic, Inorganic	Yes	1.34E+01	6.68E-04	-	2.94E-06	1.72E-04	-
Cadmium (Water)	Yes	9.47E-01	4.72E-05	-	2.08E-07	1.22E-05	-
Chromium(III), Insoluble Salts	Yes	4.30E+01	2.14E-03	-	9.45E-06	-	-
Copper	Yes	8.20E+01	4.09E-03	-	1.80E-05	-	-
Mercury (elemental)	Yes	1.18E-01	5.88E-06	5.66E-05	2.59E-08	-	-
Naphthalene	Yes	2.30E-01	1.15E-05	1.10E-04	6.56E-06	2.95E-06	4.10E-02
Nickel Soluble Salts	Yes	5.50E+01	2.74E-03	-	2.42E-06	7.06E-04	-
Thallium (Soluble Salts)	Yes	2.35E-01	1.17E-05	-	5.16E-08	-	-
Vanadium and Compounds	Yes	5.11E+01	2.55E-03	-	1.12E-05	-	-
Cobalt	Yes	1.94E+01	9.67E-04	-	1.71E-06	-	-
Iron	Yes	2.98E+04	1.49E+00	-	6.55E-03	-	-
Total Risk/HI		-	-	-	-	-	-

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Cumulative Risk
Groundwater

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I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

*The sum of PFHpA, PFHxS, PFNA, PFOS, and PFOA concentrations should not exceed 0.07 ug/L.

Chemical	Dermal Carcinogenic CDI	Ingestion HI Child	Inhalation (Volatiles) HI Child	Dermal HI Child	Noncarcinogenic HI Child	Ingestion Risk	Inhalation (Volatiles) Risk	Dermal Risk	Carcinogenic Risk
Antimony (metallic)	-	1.71E-01	-	5.02E-03	**1.76E-01**	-	-	-	-
Arsenic, Inorganic	9.18E-07	2.23E+00	-	9.81E-03	**2.24E+00**	2.58E-04	-	1.38E-06	**2.59E-04**
Cadmium (Water)	6.49E-08	9.44E-02	-	8.32E-03	**1.03E-01**	-	-	-	-
Chromium(III), Insoluble Salts	-	1.43E-03	-	4.85E-04	**1.91E-03**	-	-	-	-
Copper	-	1.02E-01	-	4.50E-04	**1.03E-01**	-	-	-	-
Mercury (elemental)	-	3.68E-02	1.89E-01	1.62E-04	**2.26E-01**	-	-	-	-
Naphthalene	1.84E-06	5.73E-04	3.68E-02	3.28E-04	**3.77E-02**	-	1.39E-06	-	**1.39E-06**
Nickel Soluble Salts	7.54E-07	1.37E-01	-	3.02E-03	**1.40E-01**	-	-	-	-
Thallium (Soluble Salts)	-	1.17E+00	-	5.16E-03	**1.18E+00**	-	-	-	-
Vanadium and Compounds	-	5.06E-01	-	8.57E-02	**5.91E-01**	-	-	-	-
Cobalt	-	3.22E+00	-	5.68E-03	**3.23E+00**	-	-	-	-
Iron	-	2.12E+00	-	9.35E-03	**2.13E+00**	-	-	-	-
**Total Risk/HI*	-	*9.80E+00*	*2.25E-01*	*1.33E-01*	***1.02E+01***	*2.58E-04*	*1.39E-06*	*1.38E-06*	***2.61E-04***

Output generated 20AUG2019:14:12:44

Site-specific Risk Models
Equation Inputs
Groundwater

Variable	Value
LT (lifetime - resident) year	70
K (volatilization factor of Andelman) L/m ^{3}	0.5
l_{sc} (apparent thickness of stratum corneum) cm	0.001
ED_{resw} (exposure duration - resident) year	26
ED_{reswc} (exposure duration - child) year	6
ED_{reswa} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration first phase) year	2
ED_{2-6} (mutagenic exposure duration second phase) year	4
ED_{6-16} (mutagenic exposure duration third phase) year	10
ED_{16-26} (mutagenic exposure duration fourth phase) year	10
EF_{resw} (exposure frequency) day/year	350
EF_{reswc} (exposure frequency - child) day/year	350
EF_{reswa} (exposure frequency - adult) day/year	350
EF_{0-2} (mutagenic exposure frequency first phase) day/year	350
EF_{2-6} (mutagenic exposure frequency second phase) day/year	350
EF_{6-16} (mutagenic exposure frequency third phase) day/year	350
EF_{16-26} (mutagenic exposure frequency fourth phase) day/year	350
$ET_{resw-adj}$ (age-adjusted exposure time) hour/event	0.67077
$ET_{resw-madj}$ (mutagenic age-adjusted exposure time) hour/event	0.67077
ET_{resw} (exposure time) hour/day	24
ET_{reswc} (dermal exposure time - child) hour/event	0.54
ET_{reswa} (dermal exposure time - adult) hour/event	0.71
ET_{reswc} (inhalation exposure time - child) hour/day	24
ET_{reswa} (inhalation exposure time - adult) hour/day	24
ET_{0-2} (mutagenic inhalation exposure time first phase) hour/day	24
ET_{2-6} (mutagenic inhalation exposure time second phase) hour/day	24
ET_{6-16} (mutagenic inhalation exposure time third phase) hour/day	24
ET_{16-26} (mutagenic inhalation exposure time fourth phase) hour/day	24
ET_{0-2} (mutagenic dermal exposure time first phase) hour/event	0.54
ET_{2-6} (mutagenic dermal exposure time second phase) hour/event	0.54
ET_{6-16} (mutagenic dermal exposure time third phase) hour/event	0.71
ET_{16-26} (mutagenic dermal exposure time fourth phase) hour/event	0.71

Output generated 20AUG2019:14:07:22

Site-specific Risk Models
Equation Inputs
Groundwater

Variable	Value
BW_{reswa} (body weight - adult) kg	80
BW_{reswc} (body weight - child) kg	15
BW_{0-2} (mutagenic body weight) kg	15
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-26} (mutagenic body weight) kg	80
$IFW_{res-adj}$ (adjusted intake factor) L/kg	327.95
$IFWM_{res-adj}$ (mutagenic adjusted intake factor) L/kg	1019.9
IRW_{reswc} (water intake rate - child) L/day	0.78
IRW_{reswa} (water intake rate - adult) L/day	2.5
IRW_{0-2} (mutagenic water intake rate) L/day	0.78
IRW_{2-6} (mutagenic water intake rate) L/day	0.78
IRW_{6-16} (mutagenic water intake rate) L/day	2.5
IRW_{16-26} (mutagenic water intake rate) L/day	2.5
EV_{reswa} (events - adult) per day	1
EV_{reswc} (events - child) per day	1
EV_{0-2} (mutagenic events) per day	1
EV_{2-6} (mutagenic events) per day	1
EV_{6-16} (mutagenic events) per day	1
EV_{16-26} (mutagenic events) per day	1
$DFW_{res-adj}$ (age-adjusted dermal factor) cm^2-event/kg	2610650
$DFWM_{res-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	8191633
SA_{reswc} (skin surface area - child) cm^2	6365
SA_{reswa} (skin surface area - adult) cm^2	19652
SA_{0-2} (mutagenic skin surface area) cm^2	6365
SA_{2-6} (mutagenic skin surface area) cm^2	6365
SA_{6-16} (mutagenic skin surface area) cm^2	19652
SA_{16-26} (mutagenic skin surface area) cm^2	19652

Site-specific Risk Models
Cumulative Risk
Groundwater

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

*The sum of PFHpA, PFHxS, PFNA, PFOS, and PFOA concentrations should not exceed 0.07 ug/L.

Chemical	Mutagen?	Volatile?	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Ref	Inhalation Unit Risk $(\mu^3)^{-1}$	IUR Ref	GIABS	MW	log K_{ow} (L/kg)	In EPD?
Antimony (metallic)	No	No	4.00E-04	U	-		-		-		0.15	1.22E+02	-	Yes
Arsenic, Inorganic	No	No	3.00E-04	U	1.50E-05	U	1.50E+00	U	4.30E-03	U	1	7.49E+01	-	Yes
Benzene	No	Yes	4.00E-03	U	3.00E-02	U	5.50E-02	U	7.80E-06	U	1	7.81E+01	2.13E+00	Yes
Benzo[a]pyrene	Yes	No	3.00E-04	U	2.00E-06	U	1.00E+00	U	6.00E-04	U	1	2.52E+02	6.13E+00	
Benzo[g,h,i]perylene	No	No	3.00E-02	U	-		-		-		1	2.76E+02	6.63E+00	
Cadmium (Water)	No	No	5.00E-04	U	1.00E-05	U	-		1.80E-03	U	0.05	1.12E+02	-	Yes
Chromium(III), Insoluble Salts	No	No	1.50E+00	U	-		-		-		0.013	5.20E+01	-	Yes
Dibenz[a,h]anthracene	Yes	No	-		-		1.00E+00	U	6.00E-04	U	1	2.78E+02	6.75E+00	
Ethylbenzene	No	Yes	1.00E-01	U	1.00E+00	U	1.10E-02	U	2.50E-06	U	1	1.06E+02	3.15E+00	Yes
Indeno[1,2,3-cd]pyrene	Yes	No	-		-		1.00E-01	U	6.00E-05	U	1	2.76E+02	6.70E+00	
Manganese (Non-diet)	No	No	2.40E-02	U	5.00E-05	U	-		-		0.04	5.49E+01	-	Yes
Naphthalene	No	Yes	2.00E-02	U	3.00E-03	U	-		3.40E-05	U	1	1.28E+02	3.30E+00	Yes
Trimethylbenzene, 1,2,4-	No	Yes	1.00E-02	U	6.00E-02	U	-		-		1	1.20E+02	3.63E+00	Yes
Xylenes	No	Yes	2.00E-01	U	1.00E-01	U	-		-		1	1.06E+02	3.16E+00	Yes
Cobalt	No	No	3.00E-04	U	6.00E-06	U	-		-		1	5.89E+01	-	Yes
Iron	No	No	7.00E-01	U	-		-		-		1	5.58E+01	-	Yes
**Total Risk/HI*			-		-		-		-		-	-	-	

Output generated 20AUG2019:14:07:22

Site-specific Risk Models
Cumulative Risk
Groundwater

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

*The sum of PFHpA, PFHxS, PFNA, PFOS, and PFOA concentrations should not exceed 0.07 ug/L.

Chemical	Concentration (μg/L)	Ingestion Noncarcinogenic CDI Child	Inhalation Noncarcinogenic (Volatiles) CDI Child	Dermal Noncarcinogenic CDI Child	Ingestion Carcinogenic CDI	Inhalation (Volatiles) Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HI Child
Antimony (metallic)	3.70E+00	1.84E-04	-	8.13E-07	-	-	-	4.61E-01
Arsenic, Inorganic	2.00E+01	9.97E-04	-	4.39E-06	2.57E-04	-	1.37E-06	3.32E+00
Benzene	1.35E+02	6.73E-03	6.47E-02	8.92E-04	1.73E-03	2.40E+01	2.50E-04	1.68E+00
Benzo[a]pyrene	1.70E-01	8.48E-06	-	-	6.79E-06	-	-	2.83E-02
Benzo[g,h,i]perylene	1.10E-01	5.48E-06	-	-	-	-	-	1.83E-04
Cadmium (Water)	1.20E+00	5.98E-05	-	2.64E-07	1.54E-05	-	8.22E-08	1.20E-01
Chromium(III), Insoluble Salts	7.34E+00	3.66E-04	-	1.61E-06	-	-	-	2.44E-04
Dibenz[a,h]anthracene	1.70E-01	-	-	-	6.79E-06	-	-	-
Ethylbenzene	2.10E+01	1.05E-03	1.01E-02	5.50E-04	2.70E-04	3.74E+00	1.54E-04	1.05E-02
Indeno[1,2,3-cd]pyrene	1.10E-01	-	-	-	4.39E-06	-	-	-
Manganese (Non-diet)	7.21E+03	3.60E-01	-	1.58E-03	-	-	-	1.50E+01
Naphthalene	3.40E-01	1.70E-05	1.63E-04	9.70E-06	4.36E-06	6.05E-02	2.72E-06	8.48E-04
Trimethylbenzene, 1,2,4-	9.40E+00	4.69E-04	4.51E-03	4.69E-04	-	-	-	4.69E-02
Xylenes	2.05E+02	1.02E-02	9.83E-02	5.45E-03	-	-	-	5.11E-02
Cobalt	6.68E+00	3.33E-04	-	5.87E-07	-	-	-	1.11E+00
Iron	1.26E+04	6.28E-01	-	2.77E-03	-	-	-	8.98E-01
*Total Risk/HI	-	-	-	-	-	-	-	2.27E+01

Site-specific Risk Models
Cumulative Risk
Groundwater

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

*The sum of PFHpA, PFHxS, PFNA, PFOS, and PFOA concentrations should not exceed 0.07 ug/L.

Chemical	Inhalation (Volatiles) HI Child	Dermal HI Child	Noncarcinogenic HI Child	Ingestion Risk	Inhalation (Volatiles) Risk	Dermal Risk	Carcinogenic Risk
Antimony (metallic)	-	1.35E-02	**4.75E-01**	-	-	-	**-**
Arsenic, Inorganic	-	1.46E-02	**3.34E+00**	3.85E-04	-	2.06E-06	**3.87E-04**
Benzene	2.16E+00	2.23E-01	**4.06E+00**	9.53E-05	1.88E-04	1.37E-05	**2.97E-04**
Benzo[a]pyrene	-	-	**2.83E-02**	6.79E-06	-	-	**6.79E-06**
Benzo[g,h,i]perylene	-	-	**1.83E-04**	-	-	-	**-**
Cadmium (Water)	-	1.05E-02	**1.30E-01**	-	-	-	**-**
Chromium(III), Insoluble Salts	-	8.27E-05	**3.27E-04**	-	-	-	**-**
Dibenz[a,h]anthracene	-	-	**-**	6.79E-06	-	-	**6.79E-06**
Ethylbenzene	1.01E-02	5.50E-03	**2.60E-02**	2.97E-06	9.35E-06	1.69E-06	**1.40E-05**
Indeno[1,2,3-cd]pyrene	-	-	**-**	4.39E-07	-	-	**4.39E-07**
Manganese (Non-diet)	-	1.65E+00	**1.66E+01**	-	-	-	**-**
Naphthalene	5.43E-02	4.85E-04	**5.57E-02**	-	2.06E-06	-	**2.06E-06**
Trimethylbenzene, 1,2,4-	7.51E-02	4.69E-02	**1.69E-01**	-	-	-	**-**
Xylenes	9.83E-01	2.72E-02	**1.06E+00**	-	-	-	**-**
Cobalt	-	1.96E-03	**1.11E+00**	-	-	-	**-**
Iron	-	3.96E-03	**9.01E-01**	-	-	-	**-**
**Total Risk/HI*	*3.28E+00*	*2.00E+00*	***2.80E+01***	*4.97E-04*	*1.99E-04*	*1.75E-05*	***7.14E-04***

Output generated 20AUG2019:14:07:22

Site-specific Risk Models
Equation Inputs
Groundwater

Variable	Value
LT (lifetime - resident) year	70
K (volatilization factor of Andelman) L/m^3	0.5
l_{sc} (apparent thickness of stratum corneum) cm	0.001
ED_{resw} (exposure duration - resident) year	26
ED_{reswc} (exposure duration - child) year	6
ED_{reswa} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration first phase) year	2
ED_{2-6} (mutagenic exposure duration second phase) year	4
ED_{6-16} (mutagenic exposure duration third phase) year	10
ED_{16-26} (mutagenic exposure duration fourth phase) year	10
EF_{resw} (exposure frequency) day/year	350
EF_{reswc} (exposure frequency - child) day/year	350
EF_{reswa} (exposure frequency - adult) day/year	350
EF_{0-2} (mutagenic exposure frequency first phase) day/year	350
EF_{2-6} (mutagenic exposure frequency second phase) day/year	350
EF_{6-16} (mutagenic exposure frequency third phase) day/year	350
EF_{16-26} (mutagenic exposure frequency fourth phase) day/year	350
$ET_{resw-adj}$ (age-adjusted exposure time) hour/event	0.67077
$ET_{resw-madj}$ (mutagenic age-adjusted exposure time) hour/event	0.67077
ET_{resw} (exposure time) hour/day	24
ET_{reswc} (dermal exposure time - child) hour/event	0.54
ET_{reswa} (dermal exposure time - adult) hour/event	0.71
ET_{reswc} (inhalation exposure time - child) hour/day	24
ET_{reswa} (inhalation exposure time - adult) hour/day	24
ET_{0-2} (mutagenic inhalation exposure time first phase) hour/day	24
ET_{2-6} (mutagenic inhalation exposure time second phase) hour/day	24
ET_{6-16} (mutagenic inhalation exposure time third phase) hour/day	24
ET_{16-26} (mutagenic inhalation exposure time fourth phase) hour/day	24
ET_{0-2} (mutagenic dermal exposure time first phase) hour/event	0.54
ET_{2-6} (mutagenic dermal exposure time second phase) hour/event	0.54
ET_{6-16} (mutagenic dermal exposure time third phase) hour/event	0.71
ET_{16-26} (mutagenic dermal exposure time fourth phase) hour/event	0.71

Output generated 20AUG2019:14:01:17

Site-specific Risk Models
Equation Inputs
Groundwater

Variable	Value
BW_{reswa} (body weight - adult) kg	80
BW_{reswc} (body weight - child) kg	15
BW_{0-2} (mutagenic body weight) kg	15
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-26} (mutagenic body weight) kg	80
$IFW_{res-adj}$ (adjusted intake factor) L/kg	327.95
$IFWM_{res-adj}$ (mutagenic adjusted intake factor) L/kg	1019.9
IRW_{reswc} (water intake rate - child) L/day	0.78
IRW_{reswa} (water intake rate - adult) L/day	2.5
IRW_{0-2} (mutagenic water intake rate) L/day	0.78
IRW_{2-6} (mutagenic water intake rate) L/day	0.78
IRW_{6-16} (mutagenic water intake rate) L/day	2.5
IRW_{16-26} (mutagenic water intake rate) L/day	2.5
EV_{reswa} (events - adult) per day	1
EV_{reswc} (events - child) per day	1
EV_{0-2} (mutagenic events) per day	1
EV_{2-6} (mutagenic events) per day	1
EV_{6-16} (mutagenic events) per day	1
EV_{16-26} (mutagenic events) per day	1
$DFW_{res-adj}$ (age-adjusted dermal factor) cm^2-event/kg	2610650
$DFWM_{res-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	8191633
SA_{reswc} (skin surface area - child) cm^2	6365
SA_{reswa} (skin surface area - adult) cm^2	19652
SA_{0-2} (mutagenic skin surface area) cm^2	6365
SA_{2-6} (mutagenic skin surface area) cm^2	6365
SA_{6-16} (mutagenic skin surface area) cm^2	19652
SA_{16-26} (mutagenic skin surface area) cm^2	19652

Output generated 20AUG2019:14:01:17

Site-specific Risk Models
Cumulative Risk
Groundwater

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

*The sum of PFHpA, PFHxS, PFNA, PFOS, and PFOA concentrations should not exceed 0.07 ug/L.

Chemical	Mutagen?	Volatile?	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Ref	Inhalation Unit Risk $(\mu^3)^{-1}$	IUR Ref	GIABS	MW	log K_{ow} (L/kg)	In EPD?
Antimony (metallic)	No	No	4.00E-04	U	-		-		-		0.15	1.22E+02	-	Yes
Arsenic, Inorganic	No	No	3.00E-04	U	1.50E-05	U	1.50E+00	U	4.30E-03	U	1	7.49E+01	-	Yes
Barium	No	No	2.00E-01	U	5.00E-04	U	-		-		0.07	1.37E+02	-	Yes
Bis(2-ethylhexyl)phthalate	No	No	2.00E-02	U	-		1.40E-02	U	2.40E-06	U	1	3.91E+02	7.60E+00	
Chromium(III), Insoluble Salts	No	No	1.50E+00	U	-		-		-		0.013	5.20E+01	-	Yes
Manganese (Non-diet)	No	No	2.40E-02	U	5.00E-05	U	-		-		0.04	5.49E+01	-	Yes
Vanadium and Compounds	No	No	5.04E-03	U	1.00E-04	U	-		-		0.026	5.09E+01	-	Yes
Cobalt	No	No	3.00E-04	U	6.00E-06	U	-		-		1	5.89E+01	-	Yes
Iron	No	No	7.00E-01	U	-		-		-		1	5.58E+01	-	Yes
**Total Risk/HI*			-		-		-		-		-	-	-	

Site-specific Risk Models
Cumulative Risk
Groundwater

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

*The sum of PFHpA, PFHxS, PFNA, PFOS, and PFOA concentrations should not exceed 0.07 ug/L.

Chemical	Concentration (μg/L)	Ingestion Noncarcinogenic CDI Child	Inhalation Noncarcinogenic (Volatiles) CDI Child	Dermal Noncarcinogenic CDI Child	Ingestion Carcinogenic CDI	Inhalation (Volatiles) Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HI Child
Antimony (metallic)	4.80E+00	2.39E-04	-	1.05E-06	-	-	-	5.98E-01
Arsenic, Inorganic	1.64E+02	8.18E-03	-	3.60E-05	2.11E-03	-	1.12E-05	2.73E+01
Barium	5.01E+02	2.50E-02	-	1.10E-04	-	-	-	1.25E-01
Bis(2-ethylhexyl)phthalate	9.20E+00	4.59E-04	-	-	1.18E-04	-	-	2.29E-02
Chromium(III), Insoluble Salts	2.14E+01	1.07E-03	-	4.70E-06	-	-	-	7.11E-04
Manganese (Non-diet)	3.22E+03	1.61E-01	-	7.08E-04	-	-	-	6.69E+00
Vanadium and Compounds	1.02E+01	5.09E-04	-	2.24E-06	-	-	-	1.01E-01
Cobalt	6.70E+00	3.34E-04	-	5.89E-07	-	-	-	1.11E+00
Iron	5.44E+04	2.71E+00	-	1.20E-02	-	-	-	3.88E+00
Total Risk/HI	-	-	-	-	-	-	-	*3.98E+01*

Site-specific Risk Models
Cumulative Risk
Groundwater

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

*The sum of PFHpA, PFHxS, PFNA, PFOS, and PFOA concentrations should not exceed 0.07 ug/L.

Chemical	Inhalation (Volatiles) HI Child	Dermal HI Child	Noncarcinogenic HI Child	Ingestion Risk	Inhalation (Volatiles) Risk	Dermal Risk	Carcinogenic Risk
Antimony (metallic)	-	1.76E-02	**6.16E-01**	-	-	-	**-**
Arsenic, Inorganic	-	1.20E-01	**2.74E+01**	3.16E-03	-	1.69E-05	**3.17E-03**
Barium	-	7.86E-03	**1.33E-01**	-	-	-	**-**
Bis(2-ethylhexyl)phthalate	-	-	**2.29E-02**	1.65E-06	-	-	**1.65E-06**
Chromium(III), Insoluble Salts	-	2.41E-04	**9.53E-04**	-	-	-	**-**
Manganese (Non-diet)	-	7.37E-01	**7.43E+00**	-	-	-	**-**
Vanadium and Compounds	-	1.71E-02	**1.18E-01**	-	-	-	**-**
Cobalt	-	1.96E-03	**1.12E+00**	-	-	-	**-**
Iron	-	1.71E-02	**3.89E+00**	-	-	-	**-**
**Total Risk/HI*	*-*	*9.19E-01*	***4.07E+01***	*3.16E-03*	*-*	*1.69E-05*	***3.18E-03***

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APPENDIX D

Response to Comments

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Environmental Conservation

DIVISION OF SPILL PREVENTION AND RESPONSE
Contaminated Sites Program

610 University Ave
Fairbanks, Alaska, 99709-3643
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May 06, 2021

File No: 107.38.006

Kristina Smith
Installation Restoration Program
AFCEC CZOP
2310 Central Avenue, Suite 213
Eielson AFB, AK 99702

Re: **DEC Backcheck and Approval for the *Draft Final Decision Document for Performance Based Remediation, Source Areas SO075, SS078, SO504, MY512, and MY518, Eielson Air Force Base, Alaska, April 2021***

Dear Ms. Smith:

The Alaska Department of Environmental Conservation (DEC) has completed a backcheck review of the above referenced Decision Document. This Decision Document describes the remedial actions for Eielson Source Areas SO075, SS078, SO504, MY512, and MY518, Eielson Air Force Base, Alaska, all of which are associated with potential contamination resulting from petroleum, storage, distribution, and/or use. DEC is accepting all responses to comments (see enclosed) for the draft final document.

Please finalize the document for signature. Once DEC has received a signed final version, DEC will sign and provide a copy for the Air Force administrative record. If you have any questions, please do not hesitate to contact the DEC project manager at (907) 451-2180, or by email at dennis.shepard@alaska.gov.

Sincerely,

Digitally signed by
Dennis Shepard
Date: 2021.05.06
08:16:16 -08'00'

Dennis Shepard
Remedial Project Manager

cc via email: Joe Price, AFCEC
Mike Boese, AFCEC
Roy Willis, AFCEC
Dustan Bott, EPA
Melinda Brunner, DEC
Axl Levan, DEC

Enclosure: DEC Comment Matrix

DEC Comments for the *Draft Decision Document for Performance Based Remediation, Source Areas SO075, SS078, SO504, MY512, and MY518, Eielson Air Force Base, Alaska, May 2020*

September 23, 2020

Reviewer: Alaska Department of Environmental Conservation

Comment No.	Page	Section	Comment / Recommendation	Response
1.	ES-1 & General		1st paragraph, Text specifies: *Source areas addressed are recommended for either no further action (NFA)when no chemicals of concern (COCs) are present, remediation by means of excavation where only soil contamination is present, or a combination of excavation and monitored natural attenuation (MNA) where both soil and groundwater contamination are present.* Please be specific that: Source areas addressed are recommended for either no further action (NFA) when no POL or petroleum related chemicals of concern (COCs) are present, remediation by means of excavation where only POL or petroleum related soil contamination is present, or a combination of excavation and monitored natural attenuation (MNA) where both POL or petroleum related soil and groundwater contamination are present.	Accept. The text will be revised to state: "Source areas addressed are recommended for either no further action (NFA) when no POL or petroleum-related chemicals of concern (COCs) are present, remediation by means of excavation where only POL or petroleum-related soil contamination is present, or a combination of excavation and monitored natural attenuation (MNA) where both POL or petroleum-related soil and groundwater contamination are present." **DEC Accept 4/03/2021**
2.	General Executive Summary		There should be a sentence in here about how we thought there was only POL so it transferred from the 3 party to 2 party. We are addressing the POL and then they will be sent back to the 3 party for PFAS and any other CERCLA constituents. Also revise all references in the document to COCs to make it clear the document is not including PFAS but only POL.	Accept. The following text will be added to the end of the second paragraph of the Executive Summary: "At the time these source areas were transferred from the three-party agreement to two-party agreement for site characterization (SC), only POL or petroleum-related contamination was known at each

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				source area. The USAF intends to address POL or petroleum-related contamination under the two-party agreement. Source areas will be transferred back to the three-party agreement for any remaining remedial action under CERCLA. No sampling for perfluorooctanoic acid (PFOA) and/or perfluorooctane sulfonate (PFOS) was conducted as part of SC activities; any source areas with suspected PFOA/PFOS or remaining CERCLA constituents will be addressed under the three-party agreement." **DEC Accept 4/03/2021**
			@Remedial action objectives: Specify petroleum COCs. Add petroleum to all of the RAOs as needed.	Accept. The RAOs will be revised to state: • "Protect human health and the environment from risks associated with exposure to <u>POL or petroleum-related</u> COCs at concentrations greater than Alaska Department of Environmental Conservation (ADEC) cleanup levels in soil and groundwater. • Limit or eliminate the potential for <u>POL or petroleum-related</u> contaminant migration from soil to sediment, surface water, and groundwater <u>or from soil, sediment, surface water, or</u>

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				groundwater to indoor or outdoor air. • Limit or eliminate the potential for human exposure to POL or petroleum-related contamination in soil above ADEC cleanup levels until source area conditions support unlimited use and unrestricted exposure (UU/UE)." **DEC Accept 4/03/2021**
3.	General Table ES-1		Table ES-1, Remedies for Applicable Source Areas: For each SITE where there are remaining data gaps, or metals or PAHs are not fully addressed, the decision document needs to specify the SITE returns to the three-party agreement once the petroleum remedy has been implemented. Please clarify for each site requiring additional investigation of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) constituents, that the site will be transferred back to the 3-party, and constituents remaining will be addressed under the Eielson AFB, Eielson Federal Facilities Agreement. "Upon removal of all soil impacted solely by petroleum, any CERCLA constituents remaining in any media will be transferred to and addressed under the three-party agreement."	Accept. The following has been added for each site in Table ES-1: "Any CERCLA constituents remaining will be addressed under the three-party agreement." **DEC Accept 4/03/2021** Additionally, the following sentence has been added at the end of Part 1: "Any Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) constituents remaining will be addressed by transferring source areas back to the *Eielson Air Force Base, Federal Facility Agreement Under CERCLA Section 120* (USAF 2013a), herein referred to as the three-party agreement."

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			Throughout the table, wherever the word contamination is used, please specify petroleum or petroleum related contamination. @SS078: the first two sentences contradict each other. The second sentence should be revised to, "Where excavation cannot occur at this time, due to existing infrastructure, petroleum soil contamination will be left in place until land use changes." @SO504: Please revise statement to be specific concerning petroleum. i.e. No further investigation of petroleum is required. Soil is not a petroleum impacted medium at this source area. Groundwater is not a petroleum impacted medium at this source area. Do this for each source area statement.	**DEC Accept 4/03/2021** Accept. The bullets in the table will be revised to state: "POL or petroleum-related contamination" **DEC Accept 4/03/2021** Accept. The first sentence of the second bullet will be revised to state: "Where excavation cannot occur at this time due to existing infrastructure, POL or petroleum-related soil contamination will be left in place until land use changes." **DEC Accept 4/03/2021** Accept. The applicable bullets will be revised to state: • "Soil is not a petroleum impacted medium at this source area. • Groundwater is not a petroleum impacted medium at this source area." **DEC Accept 4/03/2021**
4.	ES-1		2nd paragraph: Please add a sentence to the executive summary describing how the Air Force thought there was only POL on these sites, so they were transferred from the 3 party to 2 party for site characterization. The Air Force intends to address the POL under 2 party agreement and then they will be transferred back to the 3 party for remedial action on PFAS. Also, throughout this document specify clearly that any reference in	Accept. The following sentence will be added to the end of the second paragraph of the Executive Summary: "At the time these source areas were transferred from the three-party agreement to two-party agreement for site characterization (SC), only

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			the document to COCs is not including PFAS but only POL, as in the example above.	POL or petroleum-related contamination was known at each source area. The USAF intends to address POL or petroleum-related contamination under the two-party agreement. Source areas will be transferred back to the three-party agreement for any remaining remedial action under CERCLA. No sampling for perfluorooctanoic acid (PFOA) and/or perfluorooctane sulfonate (PFOS) was conducted as part of SC activities; any source areas with suspected PFOA/PFOS or remaining CERCLA constituents will be addressed under the three-party agreement." **DEC Accept 4/03/2021** Text discussing COCs throughout the document will be qualified as: "POL or petroleum-related COCs" **DEC Accept 4/03/2021**
5.	1-1		Text states: *The USAF is managing remediation of contamination at Source Areas SO075, SS078, SO504, MY512, and MY518 in accordance with the State-Eielson Agreement (USAF 2014d).* Please revise: The USAF is managing remediation of POL or petroleum related contamination…	Accept. The text will be revised to state: "The USAF is managing remediation of <u>petroleum, oil, and lubricants (POL) or petroleum-related</u> contamination at Source Areas SO075, SS078, SO504, MY512, and MY518 in accordance with the State-Eielson Agreement (USAF 2014d), <u>herein referred to as the two-party agreement,</u> and…" **DEC Accept 4/03/2021**

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			Text states: "Any Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) constituents remaining will be addressed under the Eielson Air Force Base, Federal Facility Agreement Under CERCLA Section 120." Please revise: constituents remaining will be addressed by transferring the sites back to the Eielson Air Force Base, Federal Facility Agreement (3 party agreement).	This sentence in the Executive Summary and Part 1 will be revised to state: "Any Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) constituents remaining will be addressed by transferring source areas back to the *Eielson Air Force Base, Federal Facility Agreement Under CERCLA Section 120* (USAF 2013a), herein referred to as the three-party agreement." **DEC Accept 4/03/2021**
6.	2-4	2.3	Text states: "Chemicals of potential concern with concentrations greater than the 2017 cleanup levels and/or for which the calculated risk exceeded a 1×10-5 lifetime cancer risk value or a hazard index (HI) of 1 in the Cumulative Risk Evaluation were retained as COCs, except as noted in the SCRI. Please identify the exceptions for each source area in the decision document.	Accept. Additional discussion will be added to Sections 3.1.2.1, 3.2.2.1, 3.3.2.1, 3.4.2.1, and 3.5.2.1 to identify the exceptions noted in the SCRI. **DEC Accept 4/03/2021** In Section 2.3, the fourth sentence will be updated to read: "Chemicals of potential concern (COPCs) with concentrations greater than the 2017 cleanup levels and/or for which the calculated risk exceeded a 1×10 5 lifetime cancer risk value or a hazard index (HI) of 1 in the Cumulative Risk Evaluation were retained as POL or petroleum-related COCs or as non-petroleum-related COPCs to be addressed

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				under the three-party agreement, except as noted in the SCRI (USAF 2018b)." **DEC Accept 4/03/2021** In Section 2.3.1 the following sentence will be added at the beginning of the paragraph: "Metals contamination is outside the scope of this DD and will be addressed under the three-party agreement." **DEC Accept 4/03/2021** Section 2.3.1.1 will be revised to refer to thallium as a "non-petroleum-related COPC". **DEC Accept 4/03/2021** Section 2.3.2 will be revised to refer to PAHs with non-petrogenic signatures that occur in the absence of co-located fuel exceedances as "non-petroleum-related COPCs" that will be addressed under the three-party agreement after the petroleum response is complete. **DEC Accept 4/03/2021** Analytes that are not POL-related will be referred to as "non-petroleum-related COPCs" and will be addressed under the three-party agreement. Analytes that are POL-related are referred to as "POL-related COCs". Text, table headers, and tables notes have been updated

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				to reflect this distinction throughout the text. **DEC Accept 4/03/2021**
7.	2-5 & 2-6	2.3.1	Text states: "however, metals exceedances in groundwater are not believed to be anthropogenic in origin due to the prevalence of naturally occurring metals in unfiltered groundwater across Eielson AFB, the lack of corresponding soil anomalies in collocated soil borings, and the lack of known or suspected anthropogenic sources of metals at these source areas." Please remove this editorial statement. Any metals contamination remaining after the implementation of the petroleum remedy will necessitate the site being moved back to the 3-party agreement for redress.	Accept. The text will be revised as requested. **DEC Accept 4/03/2021**
8.	2-6 & 2-7	2.3.1.2	Text states: "and chromium will not be proposed as a COC at source areas where total chromium exceeds the PSL in soil or groundwater (i.e., SO075, SS078, SO504, MY512, and MY518)." Please specify that DEC Table B1 soil cleanup levels in 18 AAC 75.341 were not exceeded for total chromium.	Accept. Total Chromium (III) results did not exceed the ADEC cleanup level in soil or groundwater at SO075, SS078, SO504, MY512, or MY518. **DEC Accept 4/03/2021** The last sentence in Section 2.3.1.2 will be revised to state, "Therefore, the absence of chromium speciation data is not considered a data gap for the sites addressed in this DD, and Total Chromium (III) has not been proposed as a non-petroleum-related COPC at any site in this DD, because Total Chromium (III) results did not exceed the ADEC cleanup level in soil or groundwater (i.e., SO075, SS078, SO504, MY512, and MY518). **DEC Accept 4/03/2021**

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9.	2-7	2.3.3	Text states: "No sampling for perfluorooctanoic acid (PFOA) and/or perfluorooctane sulfonate (PFOS) was conducted as part of site characterization (SC) activities, but information from the ADEC Contaminated Sites Database indicates that PFOA/PFOS is presumed to be present in groundwater at the source areas described in this DD (Figure A-1)." However, the Air Force has conducted limited PFAS investigations in a PA-SI and an expanded SI and identified areas of groundwater exceedances of the EPA lifetime health advisory for PFOS and or PFOA throughout Eielson Air Force Base and downgradient locations. The ADEC plume map only consolidates the information provided by the Air Force from its sampling efforts. Please revise the sentence to indicate the Air Force has sampled for and identified PFAS in the groundwater, and the information from ADEC plume map consolidates that data. It's not appropriate for the Air Force to say it's not on the DEC map, therefore it isn't there. Reframe this statement to indicate there's no confirmed PFAS contamination at these locations.	Accept. The text in Section 2.3.3 will be changed to read: "No sampling for perfluorooctanoic acid (PFOA) and/or perfluorooctane sulfonate (PFOS) was conducted as part of site characterization (SC) activities, and there is no confirmed PFOA/PFOS contamination in groundwater at the source areas described in this DD. A separate basewide effort to identify and delineate PFOA/PFOS is underway." **DEC Accept 4/03/2021**
10.	2-8	2.5	On September 15, 2018, the State of Alaska adopted the Uniform Environmental Covenants Act (UECA) and added sections to Alaska Statute 46.04 (46.04.300 – 46.04.390). Federally owned sites with underlying PFAS or other remaining contamination at concentrations that do not allow for all safe uses of the property will require a Notice of Activity and Use Limitation in accordance with UECA. Text states: "Presently, soil and groundwater LUCs areas proposed in the site characterization (SC) report are in place, as described in the Land Use Control Implementation Plan [LUCIP], Eielson Air Force Base, Alaska (USAF 2015a); these shall be retained, revised, and documented in future versions of the LUCIP." Please add that any proposed LUCIP changes will be reviewed and	Noted. Accept. The text in Section 2.5 will be revised to state: "…these shall be retained, revised, reviewed and approved by ADEC, and documented in future versions of the LUCIP." **DEC Accept 4/03/2021**

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			approved by DEC.	
11.	3-1	3.1.1 Bullets	Please add results from sampling to these bullets and any other sections describing historical sampling. E.G. samples exceeded for ___. Or no samples exceeded DEC cleanup levels. Text states: "In 1997, the 30- to 40-gallon AST associated with Source Area SO075 was removed. One soil sample was collected from beneath the AST (USAF 2013b)." Please add to the bullet: Analytical results from the soil sample indicated a benzene concentration, above the ADEC Method Two migration to groundwater cleanup level for the under 40-inch zone (USAF 2013b).	Accept. Sample results have been added to Section 3.1.1 and relevant sections throughout the document. **DEC Accept 4/03/2021** Accept. The sentence will be revised to, "Analytical results from the soil sample indicated a benzene concentration above the PSL (USAF 2013b)." **DEC Accept 4/03/2021**
12.	3-3	3.1.1.2	Section title: Known or Suspected Sources of Contamination. Please specify: Known or Suspected Sources of POL or Petroleum Related Contamination. - make this change for every section title that has COC or contamination in it. Make this change for table titles with COC, or contamination in them.	Accept. "POL or Petroleum-Related" will be added to applicable section titles. **DEC Accept 4/03/2021**
13.	3-3	3.1.2 & App. B	Inhalation of fugitive dust and inhalation of VOCs in outdoor air as a result of soil and groundwater contamination are potential exposure pathways. However, the Human Health Conceptual Site Model Graphic Form for SO075 does not indicate this pathway. Please revise the CSM to include inhalation of outdoor air as an exposure pathway.	Accept. The CSM Graphic and Scoping Forms for SO075 will be updated to include inhalation of outdoor air. **DEC Accept 4/03/2021**
14.	3-4 & Cum Risk Calc	3.1.2.1 & App. C	The cumulative risk evaluation presented for SO075 identifies manganese and thallium as potential non-carcinogenic risk drivers. Please discuss why they are not included in the list of soil COCs for the site. Also see Comment 5.	Clarification. The following information is presented in Section 1.2 of the Final SCR I and in Section 2.3.1.1 of DD1b: "The majority of the historical soil sample results reported in the 2012 Phase 1 Source Evaluation

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				(USAF 2013b) indicate thallium concentrations are above the PSLs at Source Areas SO075, SO504, MY512, and MY518. However, many of the 2012 thallium results were qualified due to method blank contamination. Based on the qualified 2012 thallium results, the widespread detections at similar levels for multiple source areas, and the lack of similar thallium detections in recent samples, thallium will not be proposed as a non-petroleum-related COPC based on historical (2012) data alone." The following sentence has been added to clarify why the 2012 method blank contaminated thallium exceedance was used in the SO075 Cumulative Risk Evaluation. "Historical thallium exceedances are included in Human Health Cumulative Risk Evaluations (Appendix C) for consistency with historical investigative reports." **DEC Accept 4/03/2021** The following information has been added to Section 3.1.2.1: "In soil, arsenic and manganese were identified above PSLs and BTVs but do not correlate with POL

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				exceedances. In addition, hypothesis testing was completed for arsenic and manganese in soil at Source Area SO075. The results indicate that concentrations of arsenic and manganese are consistent with background concentrations and are presented in Appendix M of SCRI (USAF 2018b). All metals in soil at SO075 are considered naturally occurring." **DEC Accept 4/03/2021** The first sentence of Section 3.1.2 will be revised to state: "CSMs, POL-related COCs, non-petroleum-related COPCs, and the extent of contamination were evaluated to assist in selecting the appropriate remedy for Source Area SO075." **DEC Accept 4/03/2021** All Section 3.X.2.1 headers will be updated to: "POL-Related Chemicals of Concern and Non-Petroleum-Related Chemicals of Potential Concern" **DEC Accept 4/03/2021** The second bullet in Section 3.1.2.1 will be revised to state "Based on the 2012 qualified thallium results at SO075, the widespread detections at similar levels for multiple source

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				areas, and the lack of similar thallium detections in recent samples, thallium is not a non-petroleum-related soil COPC at SO075 (USAF 2018b). This DD only addresses POL and petroleum related contamination; therefore, any further investigation or remediation activities related to thallium at this site will be done under the three-party agreement." **DEC Accept 4/03/2021**
15.	3-4	Table 3-1	@ Note 1, Text states: "[1]MDC in soil is maximum value for any specific analyte." Please revise to indicate MDC is Maximum Detected Concentration.	Accept. The Table notes will be revised to state "maximum detected concentration" (not value). **DEC Accept 4/03/2021**
16.	3-6	3.1.3.2	1st Bullet, Text states: 'Contaminated soil is in areas with no existing infrastructure that would limit excavation." Please revise: Contaminated soil is also in areas with no existing… 3rd Bullet, Text states: "Excavation will be considered complete once analytical results are below cleanup levels or contamination has been removed to the extent practicable." Please add: As agreed to by the USAF and DEC.	Accept. In Section 3.1.3.2, the last sentence of the 1st bullet will be revised to state: "POL or petroleum-related contaminated soil is also in areas with no existing infrastructure that would limit excavation." **DEC Accept 4/03/2021** Accept. The text in the third bullet will be revised to state: "Excavation will be considered complete once analytical results are below cleanup levels or contamination has been removed to the extent practicable, as agreed to by the USAF and ADEC." **DEC Accept 4/03/2021**

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17.	3-6	3.1.3.2	Text states: "LUCs are recommended as interim remedial actions to protect human health and the environment until the site is eligible for UU/UE." Please revise: LUCs will be implemented …and remain in place until UU/UE is achieved. Text states: "Interim restrictions on soil and groundwater use as well as site access are already in place as described in the LUCIP (USAF 2015a) and shall be retained, revised, and documented in future versions of the LUCIP." Please add that any proposed LUCIP changes will be reviewed and approved by DEC prior to implementation. Add here and throughout document where this sentence appears. Sites with underlying PFAS or remaining contamination above a cleanup level that doesn't allow for all uses of the property will require a Notice of Activity and Use Limitation in accordance with UECA.	Accept. The 1st sentence of the last paragraph in Section 3.1.3.2 will be revised to state: "LUCs will be implemented as interim remedial actions to protect human health and the environment and will remain in place until UU/UE is achieved." **DEC Accept 4/03/2021** Accept. The text will be revised to state: "…and shall be retained, revised, reviewed and approved by ADEC, and documented in future versions of the LUCIP." **DEC Accept 4/03/2021** Noted.
18.	3-11	Table 3-5	For all sites with metals contamination, if the metals contamination remains after the petroleum response action is complete, the site will have to transfer back to the 3-party.	Agree. Language to this effect has been included throughout the text for clarity. The first paragraph in Section 3.4.3.2 has been revised to state: "Metals contamination is outside the scope of this DD and will be addressed under the three-party agreement." **DEC Accept 4/03/2021** The header to Table 3-5 will be updated to "POL-Related Groundwater COCs and Non-Petroleum-Related Groundwater COPCs at Source Area SS078 with

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				Comparison of Cleanup Levels" **DEC Accept 4/03/2021** In addition, a note will be added to Table 3-5: "[6] Non-petroleum-related COPC to be addressed under the three-party agreement; remediation is not within the scope of this DD." **DEC Accept 4/03/2021**
19.	3-13 & CSM	3.2.3.1	The Human Health Conceptual Site Model Graphic Form indicates that inhalation of indoor air is a future exposure pathway. The CSM identifies inhalation of indoor air a complete pathway at source areas SO075 and MY512. Inhalation of outdoor air is a complete pathway for source areas SS078 and MY518. Please add RAO: Limit or eliminate the potential for contaminant migration from soil or groundwater to indoor air and outdoor air.	Accept. The lists of RAOs for SO075, SS078 and MY512 have been modified to add the following: "Limit or eliminate the potential for contaminant migration from soil to groundwater <u>or from soil or groundwater to indoor or outdoor air</u>." **DEC Accept 4/03/2021** No RAOs are proposed for NFA sites such as MY518. **DEC Accept 4/03/2021** **<u>SS078</u>** -The SS078 CSM Scoping form has been updated to reflect the graphic form. In Section 2(c) Inhalation of Indoor Air, the first box has been checked and the pathway has been marked complete. This pathway is currently incomplete but if site use changes and an occupied building is placed on the site, there is the future

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				potential for the inhalation of indoor air at SS078. **DEC Accept 4/03/2021** **MY518** -The MY518 CSM Scoping and Graphic forms previously included the Inhalation of Outdoor Air as a complete pathway. There are no volatile contaminants in soil that have been detected above 1/10th the ADEC health based cleanup level. The pathway has been updated to incomplete and the CSM Graphic Form has been updated accordingly. **DEC Accept 4/03/2021**
20.	3-13	3.2.3.2	@ Excavation, Text states: "All soil at SS078 having COC concentrations greater than applicable cleanup levels… Please specify petroleum COC concentrations.	Accept. The first bullet under *Excavation* will be revised to state: "All soil at SS078 with concentrations of POL or petroleum-related COCs greater than applicable cleanup levels…" **DEC Accept 4/03/2021**
21.	3-14	3.2.3.2	Excavation Bullet, Text states: Excavation will be considered complete once analytical results are below cleanup levels or contamination has been removed to the extent practicable. Please add: as agreed upon by USAF and DEC.	Accept. In Sections 3.2.3.2 and 3.4.3.2, the third bullet under *Excavation* will be revised to state: "Excavation will be considered complete once analytical results are below cleanup levels or contamination has been removed to the extent practicable, as agreed to by the USAF and ADEC." (Note

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			Monitored Natural Attenuation, Bullet 2, Text states: "If concentrations of metals COCs (Table 3-5) in filtered groundwater are less than applicable cleanup levels for two consecutive events, monitoring will cease." Please clarify that monitoring and analysis of **metals** COCs will be discontinued; monitoring for other COCs may continue as needed.	that the phrasing initially suggested in ADEC comment #16 will be used throughout.) **DEC Accept 4/03/2021** Accept. The first bullet under *Monitored Natural Attenuation* will be revised to state: "Groundwater monitoring <u>for POL-related groundwater COCs (Table 3-5)</u> shall be conducted annually until concentrations are stable <u>and</u> below the applicable cleanup levels <u>for three consecutive monitoring events</u>. Results from groundwater monitoring will be documented in an annual monitoring report. Periodic Review will determine continued remediation and will be undertaken at a frequency not exceeding five years unless a longer timeframe is agreed upon by USAF and ADEC." **DEC Accept 4/03/2021** The second bullet under *Monitored Natural Attenuation* will be revised to state: "<u>Monitoring for POL-related metals COCs in groundwater (i.e., lead) will comply with the following:</u> <u>-Monitoring will include at least two groundwater sampling events and both unfiltered and filtered</u>
			Per DEC's "Field Sampling Guidance": Water samples typically should not be filtered prior to analysis. If filtering is approved by CSP in a site-specific work plan, both filtered and non-filtered samples will need to be collected and analyzed so the effects (bias) of the filtering process on the contaminant concentrations can be evaluated. Please indicate that both filtered and unfiltered samples will be collected.	
			Text states: "If concentrations are greater than cleanup levels for one	

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			or both monitoring events, periodic review will determine continued remediation." Please add: at a frequency not to exceed five years unless agreed upon by DEC and USAF, wherever periodic assessment appears.	groundwater samples will be collected. -Filtered samples will be analyzed to evaluate any bias introduced by the filtering process. -If lead concentrations in filtered groundwater are less than applicable cleanup levels for two consecutive events, monitoring for metals COCs will cease; monitoring for other COCs may continue as needed. -These monitoring requirements apply only to POL-related metals; all other non-petroleum-related metals in groundwater (e.g., arsenic, iron, and manganese) will be addressed under the three-party agreement." **DEC Accept 4/03/2021** In Section 3.4.3.2, the second bullet under *Monitored Natural Attenuation* will be revised to state: "Non-petroleum-related metals COPCs in groundwater (i.e., arsenic) will be addressed and monitored under the three-party agreement." **DEC Accept 4/03/2021**
22.	3-14 3-25	3.2.3.2 3.4.3.2	LUCs are recommended as interim remedial actions to protect human health and the environment until the site is eligible for UU/UE. Interim restrictions on soil and groundwater use as well as site access are already in place as described in the LUCIP, Eielson AFB, Alaska (USAF 2015a), and shall be retained, revised, and documented in	Accept. Sections 3.1.3.2, 3.2.3.2 and 3.4.3.2 will be revised to state: "LUCs will be implemented as interim remedial actions to protect human health and the environment

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			future versions of the LUCIP. Please revise: from LUCs are recommended to LUCs will be adopted. Please add: and shall be retained, revised, and documented in future versions of the LUCIP as agreed by ADEC and USAF.	and remain in place until UU/UE is achieved. Interim restrictions on soil and groundwater use as well as site access are already in place as described in the LUCIP (USAF 2015a) and shall be retained, revised, reviewed and approved by ADEC, and documented in future versions of the LUCIP." **DEC Accept 4/03/2021** (Note that the phrasing initially suggested in ADEC comment #17 will be used throughout.) **DEC Accept 4/03/2021**
23.	3-19	3.3.4	1st sentence, text states: *Site closure is recommended for Source Area SO504* Please revise: Site closure of POL and petroleum related contamination is recommended for Source Area SO504. However, due to PFAS concerns, DEC proposes the site should receive a "No Further Action Required for Petroleum in Any Media" decision from DEC, then the site will remain open and transfer back to the 3-party agreement for further remedial action. Site closure is not possible if there is underlying PFAS contamination, as DEC also regulates PFAS.	Accept. The first sentence of Section 3.3.4 will be revised to state: "A determination of No Further Action Required for Petroleum in Any Media is recommended for Source Area SO504…" **DEC Accept 4/03/2021**
24.	3-22	3.3.4.1	Text states: *No contaminants as a result of the source area release were detected*. Revise to: No POL or petroleum related contaminants as a result of the source area release were detected.	Accept. The first sentence of Section 3.3.4.1 will be revised to state: "No POL or petroleum-related contaminants as a result of the source area release were detected…" **DEC Accept 4/03/2021**

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25.	3-22	3.4.2.1	DRO and RRO are identified as COCs in the SCR1. Please add.	Clarification. DRO and RRO exceeded groundwater PSLs in two temporary wellpoints. In SCR1, it was concluded that groundwater contamination related to fuels migrating from offsite (upgradient from the former AST and pump area at MY512) should be investigated as a new source area under a separate effort. **DEC Accept 4/03/2021**
26.	3-23	3.4.2.2	Groundwater. Text states: *VOC-contaminated groundwater is present surrounding the historical excavation extent. DRO and RRO contamination in groundwater exists upgradient of the suspected source. The full extent of DRO and RRO contamination in groundwater is unknown and will be investigated as a new source area under a separate effort.* The Figure A-4.2 indicates fuel COCs in groundwater are bound and the extent located on MY512. Please clarify. Please provide a schedule for when an additional source evaluation of the upgradient contamination will be undertaken.	Clarification. The blue "Estimated Extent of COC contamination in groundwater" on Figure A-4.2 is pertains only to VOCs and does not represent the extent of DRO and RRO in groundwater at the site. **DEC Accept 4/03/2021** An additional source evaluation of the upgradient contamination is not currently scheduled but will be added to the two-party decision tracker. **DEC Accept 4/03/2021 with comment.** **It should also be added to the AOC tracker.**
27.	3-25	3.4.3.2	Monitored Natural Attenuation, Bullet 2, Text states: "If concentrations of metals COCs (Table 3-5) in filtered groundwater are less than applicable cleanup levels for two consecutive events,	Accept. There are no POL-related COCs that will be addressed or monitored under this DD at

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			monitoring will cease." Please clarify that monitoring and analysis of **metals** COCs will be discontinued. Per DEC's "Field Sampling Guidance": Water samples typically should not be filtered prior to analysis. If filtering is approved by CSP in a site-specific work plan, both filtered and non-filtered samples will need to be collected and analyzed so the effects (bias) of the filtering process on the contaminant concentrations can be evaluated. Please indicate that both filtered and unfiltered samples will be collected. Text states: "If concentrations are greater than cleanup levels for one or both monitoring events, periodic review will determine continued remediation." Please add: at a frequency not to exceed five years wherever periodic assessment appears.	MY512, therefore the following will be added to the second bullet under Monitored Natural Attenuation.: "Non-petroleum-related metals COPCs in groundwater (i.e., arsenic) will be addressed and monitored under the three-party agreement." **DEC Accept 4/03/2021**
28.	3-28	3.5.2.1, 3.5.2.2, 3.5.4, 3.5.4.1	Please specify POL or Petroleum Related: at COCs, Contamination, Site Closure and contaminants for clarity. Revise at section titles and text.	Accept. The section titles and text will be revised to state: "**3.5.1.2 Known or Suspected Sources of POL or Petroleum-related Contamination**" **DEC Accept 4/03/2021** "**3.5.2.1 POL-Related Chemicals of Concern and Non-Petroleum-Related Chemicals of Potential Concern** There are no POL or petroleum-related COCs for Source Area MY518." **DEC Accept 4/03/2021** "**3.5.2.2 Lateral and Vertical Extent of POL or Petroleum-Related Contaminated Area**

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				There is no remaining POL or petroleum-related contamination as a result of a release at Source Area MY518." **DEC Accept 4/03/2021** **3.5.4 No Further Action Required for Petroleum** A determination of No Further Action Required for Petroleum in Any Media is recommended for Source Area MY518 based on the historical results for petroleum and SC activities from the SCR (USAF 2018b). Any known CERCLA constituents remaining (e.g., metals) will be…" **DEC Accept 4/03/2021** **3.5.4.1 Support for Site NFA on Petroleum Determination** No POL or petroleum-related contaminants as a result…" **DEC Accept 4/03/2021**
29.	3-28	3.5.4	Text states: "Site closure is recommended for Source Area MY518 based on the historical results and SC activities from the SCR (USAF 2018b)." Clarify "historical results for petroleum". However, the site expected to be within the PFAS plume. DEC proposes that the site receive a "No Further Action Required for Petroleum in Any Media" decision from DEC, and then the site will remain open and transfer back to the 3-party agreement for further remedial action.	Accept. The first sentence of Section 3.5.4: "A determination of No Further Action Required for Petroleum in Any Media is recommended for Source Area MY518 based on the historical results for petroleum and SC activities from the SCR (USAF 2018b)." **DEC Accept 4/03/2021**

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			Text states: "Any CERCLA constituents remaining will be addressed under the three-party agreement." Please identify the CERCLA constituents remaining. The cumulative risk groundwater calculations provided indicate non-carcinogenic and carcinogenic risk is driven by metals.	Accept. The text will be revised to state: "Any known CERCLA constituents remaining (e.g., metals) will be addressed under the three-party agreement." **DEC Accept 4/03/2021**
30.		3.5.4.1	Support for Site Closure Determination Please rename this section. "Support for Site NFA on Petroleum Determination" or something similar. See comment above.	Accept. The Section 3.5.4.1 and 3.3.4.1 headings will be revised to state: "Support for Site NFA on Petroleum Determination" **DEC Accept 4/03/2021**
31.	4-1	Part 4	Text states: "Waste contaminated with POL will be characterized, transported, and treated at an approved treatment facility in accordance with 18 AAC 60 (ADEC 2017d)." However, the waste may contain metals, so this should be left "Contaminated waste will be characterized…" Please revise. Also, the Characterization, Transport, Treatment and Approved Treatment Facilities are approved in accordance with 18 AAC 75.325-18 AAC 75.390. Please revise the reference.	Accept. The text will be revised to state: "Contaminated waste will be characterized, transported, and treated at an approved treatment facility in accordance with 18 AAC 60 (ADEC 2017d) and 18 AAC 75 75.325-390 (ADEC 2017c)." **DEC Accept 4/03/2021**
32.	5-3	Bullets.	f. Environmental Restoration Program Atlas – The Atlas should also provide a figure showing the known extents of the PFAS plume. The Atlas should also identify areas where a notice of activity and use limitation (NAUL) has been established (i.e. for DLA sites). Sites with underlying PFAS or remaining contamination above a cleanup level that makes the property safe for some but not all uses will require a Notice of Activity and Use Limitation (NAUL) in accordance with UECA. Add a bullet discussing the need for a NAUL if contamination is left on site.	Accept. A figure showing the known extents of the PFAS plume and current controls was added to the 2020 ERP Atlas. **DEC Accept 4/03/2021**
33.	5-4		Notification and Corrective Measures Requirement.	Accept. The text will be revised to

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			Text states: "The USAF will take prompt measures to correct the violation or deficiency and prevent its recurrence." Please add: "prompt measures within 30 days".	state: "The USAF will take prompt measures within 30 days to notify ADEC of the violation or deficiency and prevent its recurrence." **DEC Accept 4/03/2021**
34.	8-1	Part 8	Text states: "ADEC will determine if these five source areas have been adequately characterized." Please add: for POL or petroleum related contamination… Text states: "The determination may be reviewed and modified in the future if new information becomes available…" Please remove "new" from the sentence.	Accept. The text will be revised to state: "After reviewing the final cleanup report, ADEC will determine if these five source areas have been adequately characterized for POL or petroleum-related contamination under 18 AAC 75.335…" **DEC Accept 4/03/2021** Accept. The text will be revised to state: "…ADEC will issue a written determination that the petroleum cleanup is complete under the current LUCs. The determination may be reviewed and modified in the future if information becomes available indicating the presence of contaminants…" **DEC Accept 4/03/2021**
End of Comments.				

Jacobs Initiated Comments (JICs):

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1.	ES-1	Table ES-1	Based on comments from DD1a (7 sites) the following change has been incorporated: General comment Table ES-1: For each remedy where contamination may remain in place after excavation, or GW is being treated by MNA, please add a periodic review of the protectiveness of the remedy, not to exceed every five years, until UU/UE is achieved. The following will be added as a bullet for source areas SS078 and MY512: "LUCs will be reviewed periodically, not to exceed every five years, until UU/UE is achieved." For Source Areas SS078 and MY512, an additional bullet will be added: "If groundwater concentrations are greater than cleanup levels for one or both monitoring events, periodic review will determine continued remediation and will be undertaken at a frequency not exceeding five years unless a longer timeframe is agreed by USAF and ADEC."	**DEC Accept 4/03/2021**
2.	Part 2	2.3	Based on comments from DD1a (7 sites) the following change has been incorporated: Text states: "In SCRI, all analytes were compared to one-tenth of their respective 2017 human health cleanup levels, as presented in Tables B1, B2, and C.." However, Air Force should be comparing directly to the B2 levels, not one tenth of them. Please revise. During the investigation phase (SC phase), analytes were compared directly to ADEC Table B1 (most conservative of human health under 40-inch zone and migration to groundwater for soil) and B2 cleanup levels. Separately, analytes were compared to one-tenth of 2017 ADEC human health cleanup levels to determine which analytes	**DEC Accept 4/03/2021**

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			would be included in CRE. The statement as presented in Section 2.3 will be revised for clarity. At this stage (DD phase), results are compared directly to ADEC cleanup levels (RAOs).	
3.	Part 3	3.2.3.3 & 3.4.3.3	Based on comments from DD1a (7 sites) the following change has been incorporated: In Sections 3.2.3.3 and 3.4.3.3, the text states: "Groundwater cleanup levels are the Table C human health cleanup levels." A reference to 18 AAC 75 for groundwater cleanup levels has been added. The text will be revised to state: "Groundwater cleanup levels are the 18 AAC 75 Table C human health cleanup levels."	**DEC Accept 4/03/2021**
4.	Part 5	5-4	Based on comments from DD1a (7 sites) the following change has been incorporated: Bottom of page 5-4, text states, "without 45 days notice prior to the change seeking and obtaining approval from ADEC of any required Record of Decision modification." Text has been revised to "DD" instead of Record of Decision.	**DEC Accept 4/03/2021**
5.	Part 8	8-1	Based on comments from DD1a (7 sites) the following change has been incorporated: Note: If the sites are closed with LUCs to ensure that people are not exposed above human health soil cleanup levels, or Table C groundwater cleanup levels, then a notice of activity and use limitation (NAUL) would be required. The following sentence will be added to the end of Part 8: "If sites are closed and LUCs are implemented to ensure that people are not exposed above human health soil cleanup levels or Table C groundwater cleanup levels, then a notice of activity and use limitation will be completed."	**DEC Accept 4/03/2021**
6.	Appendix C		Some cumulative risk evaluations (CREs) were not included in the Pre-Draft or Draft versions of this Decision Document. Soil CREs	**DEC Accept 4/03/2021**

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			have been incorporated for SO504, MY512, and MY518 and are presented in Appendix C.	
7	Section 3.X.2		Based on comments from DD1a (7 sites) the following change has been incorporated: the first sentence will updated from "CSMs, COCs, and the extent of contamination…" to "CSMs, POL-related COCs, non-petroleum-related COPCs, and the extent of contamination…"	**DEC Accept 4/03/2021**
8	Section 3		Any contamination not covered under this DD will be described as a non-petroleum-related COPC. Table headers and notes were updated throughout the text to identify contamination that will be addressed under the third-party agreement.	**DEC Accept 4/03/2021**
End of JICs.				