Final
September 2025

Comprehensive Monitoring Plan, Revision 1

Former Naval Arctic Research Laboratory (NARL) Sites 5, 12, and 13, Utqiagvik, Alaska

United States Department of the Navy
Naval Facilities Engineering Systems Command
Engineering Field Activity, Northwest

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Silverdale, WA 98315-1101

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Naval Facilities Engineering Systems Command Northwest
Silverdale, WA

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September 2025

DCN: LBJV-5006-4210-0003

Prepared for:

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Contract Number: N44255-20-D-5006; Task Order No. N4425525F4210

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FINAL
COMPREHENSIVE MONITORING PLAN, REVISION 1
FOR
FORMER NAVAL ARCTIC RESEARCH LABORATORY (NARL) SITES 5, 12, AND 13, UTQIAGVIK, ALASKA

September 2025

Prepared for
United States Department of the Navy
Naval Facilities Engineering Systems Command Northwest

Silverdale, WA 98315

REVIEW AND APPROVAL

Task Order Manager:	Chelsea Foster, LG Liberty JV	16 September 2025 Date

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Acronyms and Abbreviations

µg/L .... micrograms per liter

AAC .... Alaska Administrative Code
ADEC .... Alaska Department of Environmental Conservation
ARAR .... applicable or relevant and appropriate requirements
AST .... aboveground storage tank

BFTF .... Bulk Fuel Tank Farm
BTEX .... benzene, toluene, ethylbenzene, and xylene

CMP .... Comprehensive Monitoring Plan
COC .... contaminant of concern
CUL .... cleanup level

DD .... Decision Document
DRO .... diesel-range organics

EPA .... US Environmental Protection Agency
ESD .... Explanation of Significant Difference

GRO .... gasoline-range organics

HAVE .... hot air vapor extraction

IDW .... Investigation-derived waste

LEA .... Land Exchange Agreement
LTM .... long-term monitoring

mg/kg .... milligrams per kilogram
MS/MSD .... matrix spike/matrix spike duplicate

NARL .... Naval Arctic Research Laboratory
Navy .... United States Department of the Navy

PFAS .... per- and polyfluoroalkyl substances

QA/QC .... quality assurance and quality control

Acronyms and Abbreviations (continued)

RRO .... residual-range organics

SGC .... silica gel cleanup

UIC .... Ukpeaġvik Iñupiat Corporation
USGS .... United States Geological Survey

1.0 Introduction

The former Naval Arctic Research Laboratory (NARL) is approximately 4 miles northeast of the village of Utqiaġvik (formerly Barrow) and 6 miles southwest of Point Barrow on the coastal plains of Alaska's North Slope (Figure 1-1). The United States Department of the Navy (Navy) established the NARL in 1947 using approximately 3,500 acres of land and facilities from the National Petroleum Reserve No. 4, which were withdrawn from the United States Department of the Interior by Public Land Order 82 (115). The original mission of NARL was to serve as a supply center for regional petroleum exploration. At the time NARL was established, structures at the site consisted of two buildings used for scientific research and other support buildings, such as residential housing (Navy, 2000).

The topography at former NARL is comparatively flat, with local relief generally limited to 6 to 8 feet. A natural beach ridge has been built up to serve as a roadbed. Soils at the former NARL remain frozen at the surface throughout most of the year, and shallow lakes are abundant due to the flat topography and shallow permafrost. Some surface thawing does occur during the short summers, leading to a limited "active zone" of groundwater that commonly reaches a maximum depth of 6 feet by August or September (Navy, 2018a).

The Navy began phasing out NARL activities in 1978, and laboratory operations ceased in 1980. The United States Geological Survey (USGS) took over as site caretaker in 1981, and Ukpeaġvik Iñupiat Corporation (UIC) assumed caretaker responsibilities in 1984. UIC cared for the facility until 1986. The 1986 Land Exchange Agreement (LEA) executed between the United States Government and UIC transferred former NARL lands to UIC, with the exception of the Airstrip (Site 5) (Figure 1-2) and the area east of the Middle Salt Lagoon. The LEA required actions that address environmental issues at the former NARL, including at the Airstrip (Figure 1-2), Powerhouse (Figure 1-3), and the former Bulk Fuel Tank Farm (BFTF) (Figure 1-4) (Navy, 2018a).

Actions taken to address the environmental issues at the former NARL included soil excavation and hot air vapor extraction (HAVE) at all sites; further, there was landfarming at Site 13. Due to contamination levels remaining above those allowing unlimited use and unrestricted exposure, long-term monitoring (LTM) of residual petroleum in groundwater was initiated in 2003 at Site 5 and in 2004 at Sites 12 and 13.

This Comprehensive Monitoring Plan (CMP) outlines the monitoring requirements for the three active sites, ensuring compliance with site-specific Decision Documents (DDs) established by the Navy, the Alaska Department of Environmental Conservation (ADEC), and, for Sites 12 and 13, the landowner, UIC (NARL-CT, 2002a, 2002b, 2002c). These DDs define monitoring locations, testing parameters, and target endpoints to verify that remedies remain protective of human health and the environment.

To ensure ongoing protection, statutory Five-Year Reviews have been conducted, with reports finalized in June 2008, April 2013, November 2018, and October 2023, summarizing work performed at Sites 5, 12, and 13. Additionally, two Explanations of Significant Differences (ESD), completed in November 2022 and January 2025, revised cleanup levels for multiple chemicals of concern across the three sites to update soil and active zone groundwater standards. This CMP includes sampling and testing of active zone water, surface water, and sediment to meet five objectives: complying with DDs, evaluating site conditions over time, verifying natural attenuation rates, assessing the need for modified monitoring or contingency measures, and determining if remedial action goals have been achieved.

1.1 Purpose and Objectives

This CMP ensures that environmental monitoring activities outlined in the approved DDs for the former NARL Airstrip, Powerhouse, and former BFTF are effectively implemented to protect human health and the environment. This CMP provides clear, site-specific guidance on the scope and procedures for environmental sampling and LTM. It establishes a framework for sampling, evaluating results, and recommending alternative actions when necessary to maintain the effectiveness of the selected remedies.

This CMP is designed to achieve the following goals:

- Comply with DDs developed for each site, incorporating any adjustments based on annual and Five-Year Review findings to ensure ongoing protection of human health and the environment
- Collect sufficient data to evaluate site conditions over time and compare them against established remedial action goals
- Specify procedures for determining whether monitoring activities need adjustment due to changing site conditions
- Define criteria for implementing contingency measures in response to rising contaminant levels
- Establish methods for verifying whether remedial action goals have been achieved

The overall objective of the NARL monitoring program is to protect human health and the environment. To meet this objective, the monitoring program established the following specific goals:

- Satisfy regulatory requirements,
- Confirm that previous soil remediation efforts have effectively controlled contaminant sources to prevent further migration to surface water via groundwater,
- Verify that surface waters remain safe for drinking, although use of Imikpuk Lake as a drinking water source has ceased,
- Assess the effectiveness of natural attenuation in active zone water,
- Monitor changes in the shape, size, and position of contaminant plumes,
- Evaluate the need for additional remediation, and
- Determine when exit criteria for monitoring have been met.

Through these efforts, the monitoring program ensures the collection of high-quality data to support informed decision-making regarding environmental remediation at NARL.

1.2 Scope

This CMP outlines the application of regulatory and industry-standard methodologies for conducting monitoring at the former NARL Airstrip, Powerhouse, and former BFTF. It consolidates site-specific monitoring requirements, aligning them with Alaska state regulations and guidance for contaminated sites. As mandated by the approved DDs, each site requires a Five-Year Review to ensure ongoing protection of human health and the environment.

The monitoring program encompasses sampling and analysis of active zone water, surface water, and sediments. This CMP defines the scope of these activities, specifying the environmental media to be sampled, analytes to be quantified, field parameters to be collected, sample locations, monitoring endpoints, and methodologies for data evaluation.

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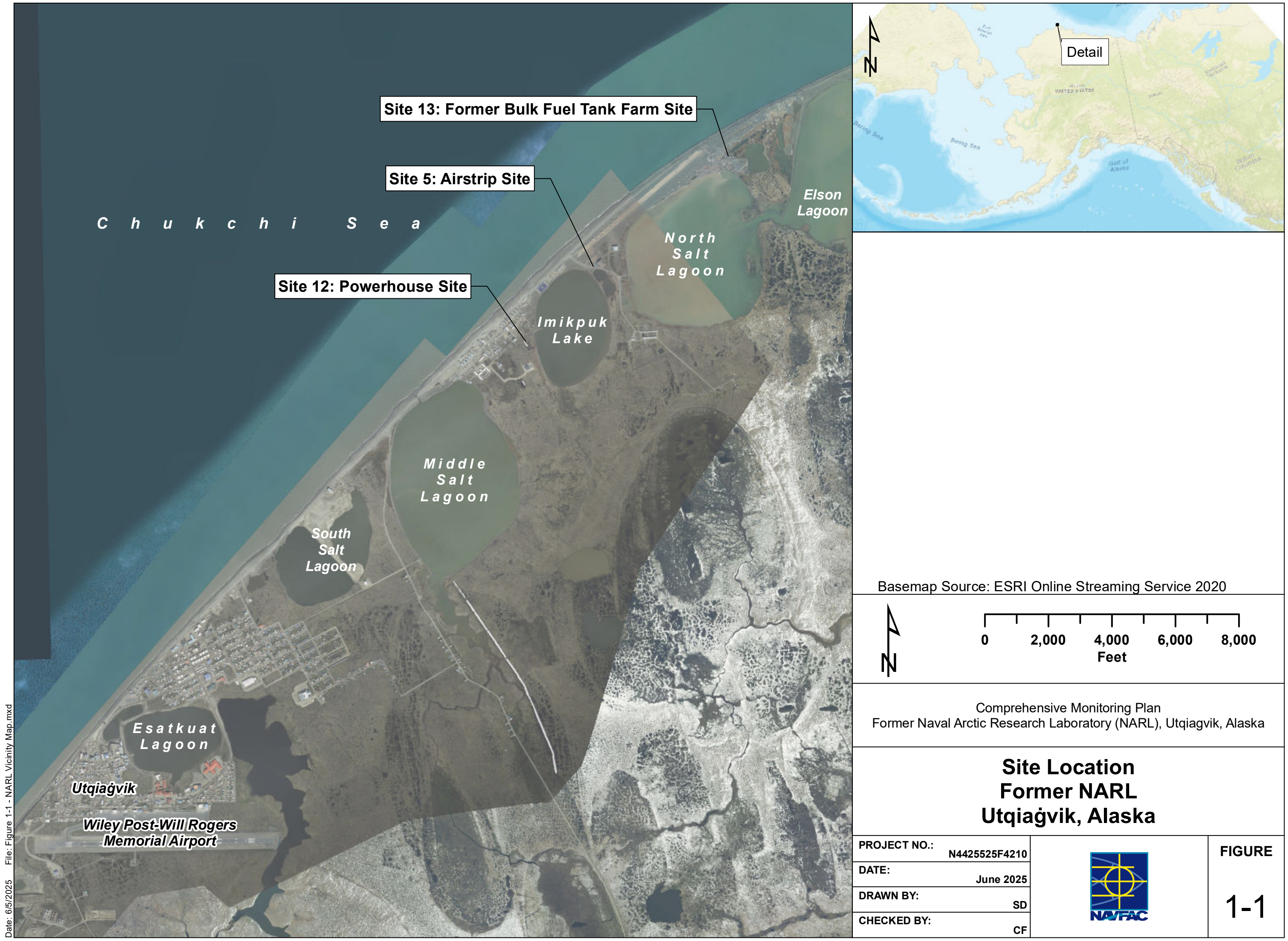
Site 13: Former Bulk Fuel Tank Farm Site
Site 5: Airstrip Site
Site 12: Powerhouse Site
Chukchi Sea
Elson Lagoon
North Salt Lagoon
Imikpuk Lake
Middle Salt Lagoon
South Salt Lagoon
Esatkuat Lagoon
Utqiaġvik
Wiley Post-Will Rogers Memorial Airport
Detail
N
Basemap Source: ESRI Online Streaming Service 2020
0 2,000 4,000 6,000 8,000
Feet
Comprehensive Monitoring Plan
Former Naval Arctic Research Laboratory (NARL), Utqiagvik, Alaska
Site Location
Former NARL
Utqiaġvik, Alaska
PROJECT NO.: N4425525F4210
DATE: June 2025
DRAWN BY: SD
CHECKED BY: CF
NAVFAC
FIGURE
1-1
Date: 6/5/2025 File: Figure 1-1 - NARL Vicinity Map.mxd

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Chukchi Sea
Former Runway
1978 JP-5 Spill
North Depression
Hangar 100
North Salt Lagoon
1987 MoGas/JP-5 Spill
AS-WP-11
Facility 18
AFAS-WP-20
AFAS-WP-19
AFAS-WP-22
AFAS-WP-21
Stevenson Street
Building 134
Building 133
Dewline Road
Hangar 136
AS-WP-101B
South Depression
AS-WP-18B
1978 MoGas Spill
AS-WP-02C
AS-WP-10
AS-WP-12
AS-WP-16D
1978 MoGas Spill
AS-WP-21B (background)
Imikpuk Lake
Dewline Road
Date: 7/15/2025 File: Figure 1-2 - Airstrip Site Layout.mxd
Detail
Legend
Monitoring Well
Former Pipeline
Recovery Trench
Containment Berm
Culvert
Navy Owned Property
Former Spill
Demolished Building
Former AST
Former Excavation Area
Depression/Saturated Area
South Depression Cap
DRO Soil Source Area (Navy, 2013)
GRO Soil Source Area (Navy, 2013)
Note:
AST - Aboveground Storage Tank
DRO - Diesel Range Organics
GRO - Gasoline Range Organics
Figure features adapted from figures found in the
2021 Annual Monitoring Report, Former Naval Arctic
Research Laboratory, Utqiaġvik, AK, April 2022.
Final Third Five Year Review Naval Arctic Research Laboratory
Barrow, AK, November 2018.
Soil Investigation Report, NARL Airstrip and Powerhouse Sites,
Former Naval Arctic Research Laboratory,
Barrow, Alaska, October 2013.
Basemap Source: ESRI Online Streaming Service 2020
N
0 100 200 300 400
Feet
Comprehensive Monitoring Plan
Former Naval Arctic Research Laboratory (NARL), Utqiagvik, Alaska
Airstrip Site Layout and Historical Remediation Activities
PROJECT NO.: N4425525F4210
DATE: June 2025
DRAWN BY: SD
CHECKED BY: CF
NAVFAC
FIGURE
1-2

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Comprehensive Monitoring Plan
Former Naval Arctic Research Laboratory (NARL), Utqiagvik, Alaska

Powerhouse Site Layout and Historical Remediation Activities

PROJECT NO.:	N44255525F4210
DATE:	June 2025
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FIGURE 1-3

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Detail
BFTF-WP-04B
BFTF-WP-07B
Melt Water Pond
South Bank Area
BFTF-WP-05D
Turnaround Area
BFTF-WP-08K
BFTF-WP-09H
BFTF-WP-06G
BFTF-WP-10F
Historical Location 90
North Salt Lagoon
Legend
Monitoring Well
Site Sentinel Well
Former AST
Gravel Pad
Historical Location 90
South Bank Area
Turnaround Area
Note:
AST - Aboveground Storage Tank
BFTF - Bulk Fuel Tank Farm
Figure features adapted from figures found in the 2021 Annual Monitoring Report, Former Naval Arctic Research Laboratory, Utqiaġvik, AK, April 2022.
Final Third Five Year Review Naval Arctic Research Laboratory Barrow, AK, November 2018.
Basemap Source: ESRI Online Streaming Service 2020
0 50 100 150 200
Feet
Comprehensive Monitoring Plan
Former Naval Arctic Research Laboratory (NARL), Utqiagvik, Alaska
Bulk Fuel Tank Farm Site Layout and Historical Remediation Activities
PROJECT NO.: N4425525F4210
DATE: June 2025
DRAWN BY: SD
CHECKED BY: CF
NAVFAC
FIGURE 1-4

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2.0 Background

2.1 Physical Setting

The former NARL is on Alaska's North Slope coastal plain along the Chukchi Sea, approximately 4 miles northeast of Utqiaġvik (formerly Barrow from 1901 to 2016) and 6 miles southwest of Point Barrow. Its coordinates are 71°20'29" N latitude and 156°36'28" W longitude (Figure 1-1). The surrounding landscape is flat, with minimal topographic relief of 6 to 8 feet, featuring building structures, gravel roadways, bare gravel, tundra, and freshwater and saltwater bodies. A prominent beach ridge, constructed with sand and gravel in the 1940s, runs parallel to the Arctic Ocean about 150 feet from the shoreline, with a road atop it forming NARL's highest land surface.

Soils at NARL remain frozen at the surface for most of the year, with permafrost dominating the subsurface. From late June to October, the surface soil thaws to a depth of 1 to 6 feet, occasionally reaching up to 11 feet in areas saturated with saline active-zone water. Hydrogeologic processes are governed by the brief annual thaw season and near-surface permafrost. During this period, the active zone comprises a complex mix of hydrologically connected groundwater, discontinuous perched water lenses, localized frost barriers, and areas lacking subsurface water. The perched water and groundwater are collectively called "active zone water." Due to its shallow depth (typically a few feet) and frozen state for much of the year, groundwater in the active zone is not a viable potable water source (Navy, 2004). Imikpuk Lake, historically a seasonal drinking water source for North Slope communities, is no longer used for drinking or cooking following the 2017 detection of per- and polyfluoroalkyl substances (PFAS) above tap water screening levels at the Airstrip and Powerhouse Sites (CH2M, 2021; Navy, 2023b). Isatkoak Lagoon, the primary drinking water source, is occasionally affected by Chukchi Sea storm surges. The flat terrain and impermeable permafrost limit runoff and percolation, creating numerous shallow lakes during the thaw season (Navy, 2004).

Groundwater flow is complex, influenced by local variations in permafrost depth and land topography. The permafrost surface generally mimics the land surface, with features like permafrost ridges beneath elevated roads potentially impeding groundwater flow (USGS, 1993). Groundwater table depths typically range from 0.5 to 4 feet below ground surface. A surface water and groundwater divide, located roughly in the center of the airstrip apron, separates the Imikpuk Lake drainage basin to the west from the North Salt Lagoon drainage basin to the east. Surface water and groundwater flow westward toward Imikpuk Lake or eastward toward North Salt Lagoon (Navy, 2004).

2.2 Property Ownership

Established in 1947 as a logistic supply center for petroleum exploration within Naval Petroleum Reserve No. 4, the NARL was managed by the Navy from 1947 to 1981. During this period, the Office of Naval Research oversaw research operations, providing facilities and services for studies in arctic oceanography, meteorology, hydro-acoustics, geophysics, atmospheric and ionospheric physics, biology, cold weather physiology, and engineering. Over three decades, federal agencies, scientific organizations, educational institutions, and individual researchers intermittently utilized NARL for basic and applied research (EA, 1999).

A succession of agencies operated support facilities at the site prior to UIC assuming caretaker responsibilities in 1984:

- 1947–1953: USGS
- 1954–1972: United States Air Force
- 1972–1981: Navy
- 1981–1984: USGS
- 1984–1986: UIC

The Navy began phasing out NARL operations in 1978, with laboratory activities ceasing in 1980. In 1981, the USGS assumed caretaker responsibilities for the site, followed by UIC in 1984, which continued until 1986. A 1986 LEA between the United States Government and UIC transferred ownership of portions of the former NARL, including the Powerhouse and BFTF lands to UIC (NARL-CT, 2002a, 2002b). In 1988, the Navy and UIC signed an amendment to the original LEA that clarified the Navy's environmental cleanup program and property ownership. The 1988 amendment also states that if, after the transfer of the site, it is discovered that the Navy was responsible under applicable federal or state law for the release or disposal of hazardous substances that have been identified before transfer, the Navy will be responsible for bringing the site into compliance with said law (United States & UIC, 1988).

2.3 Regulatory Context

Environmental actions at the former NARL are governed by the State of Alaska's Contaminated Sites regulations, the Department of Defense Installation Restoration Program, and the 1986 LEA between the United States and UIC (United States & UIC, 1986). The LEA, a binding legal document, outlines unresolved environmental issues from the land transfer that the Navy is obligated to address. ADEC serves as the lead regulatory agency overseeing contaminated sites at the former NARL (Navy, 2004).

Alaska regulates soil and water contaminated by petroleum products or hazardous substances under the Alaska Administrative Code (AAC). Cleanup levels for groundwater and surface water are specified in 18 AAC 75.345 (ADEC, 2023b). Cleanup standards for groundwater classified as a current or potential drinking water source are detailed in 18 AAC 75, Table C; for non-drinking water groundwater, cleanup levels may be up to ten times the drinking water standard. Surface water is regulated under 18 AAC 70, Water Quality Standards, and groundwater hydrologically connected to surface water must comply with these standards to prevent contamination.

Site-specific DDs have been developed and approved by the Navy, ADEC, and, where applicable, UIC as the landowner for each site covered by this CMP (NARL-CT, 2002a, 2002b, 2002c). These DDs provide comprehensive details on each site's background, investigations, risk assessments, approved cleanup levels, proposed cleanup alternatives, and selected remedies. Cleanup levels are determined based on site-specific risk assessments and align with Alaska's regulations for oil and hazardous substances pollution control, ensuring that evaluations, remedies, and target endpoints for all three sites—Airstrip, Powerhouse, and former BFTF—meet state compliance standards.

2.4 Site Summaries

2.4.1 Airstrip Site

Located approximately 1 mile northeast of the former NARL complex, the Airstrip (Site 5) lies between the Chukchi Sea, the northern edge of Imikpuk Lake, and the northwest boundary of North Salt Lagoon (Figures 1-2). Imikpuk Lake is no longer a potable or cooking water source for the former NARL complex (Navy, 2023b), while North Salt Lagoon supports fishing and waterfowl hunting (NARL-CT, 2002c). The site encompasses a 5,000-foot runway, Hangar 136, an apron connecting the hangar to the runway, and associated buildings. Its northern end lies about 700 feet northwest of the BFTF (Site 13).

Historically, approximately 366,000 gallons of fuel were released, including a 48,000-gallon gasoline spill in 1976, two 1978 spills totaling 25,000 gallons of jet fuel and 277,000 gallons of gasoline (140,000 gallons recovered), and a 16,000-gallon jet fuel spill in 1986 (1,100 gallons recovered) (Navy, 2023b). Between 1996 and 2002, remediation efforts included constructing a 1,500-foot ice wall containment berm and fuel recovery trench along Imikpuk Lake's eastern shoreline, extended by 220 feet in 2000, recovering 75,600 gallons of fuel and 2.3 million gallons of treated active zone water (NARL-CT, 2002c). Approximately 4,000 feet of underground pipeline were removed in 1997, with soil samples showing gasoline-range organics (GRO), diesel-range organics (DROs), and residual-range organics (RROs) below ADEC Method 2 cleanup levels (CULs) (NARL-CT, 2002c).

In 2000, 40 cubic yards of polycyclic aromatic hydrocarbon-contaminated soil were excavated, achieving residential use standards, and a risk assessment identified GRO, DRO, and RRO as contaminants of concern (COCs) (NARL-CT, 2002c). By 2002, remaining free product was confined to immobile permafrost pockets (NARL-CT, 2002c). Between 2000 and 2002, 2,268 cubic yards of fuel-contaminated soil were treated via HAVE and used to backfill excavations and cap the south depression (NARL-CT, 2002a).

Soil investigations in 2010 and 2012 identified residual petroleum hydrocarbons. The 2010 study found elevated fuel levels in two of five borings, though below CULs (Navy, 2011). The 2012 investigation detected DRO (1,000–5,000 milligrams per kilogram [mg/kg]) north of Hangar 136 and east of the apron, and GRO (100–1,700 mg/kg) west of the hangar, with one GRO result exceeding the 1,400 mg/kg CUL (Navy, 2013b). These areas, linked to historical spills, likely contribute to active zone water contamination migrating toward Imikpuk Lake. In 2011, the United States Air Force installed four monitoring wells (AFAS-WP-19 to AFAS-WP-22) to assess potential contaminant migration to North Salt Lagoon, incorporated into LTM since 2012 (Navy, 2011).

A 2014 study confirmed the containment berm's functionality but noted a potential active zone water flow pathway due to a removed sump (Navy, 2015). A 2016 hydrological study with 10 new wells indicated flow toward Imikpuk Lake and saturated areas east of the apron (Navy, 2016). DRO aliphatic and aromatic sampling in 2016 (shoreline wells) and 2021 (inland wells) using silica gel cleanup (SGC) showed concentrations below the 8,200 micrograms per liter (µg/L) DRO aliphatic CUL (Navy, 2017; EA, 2022).

In 2018, Buildings 133, 134, and Facility Building 18 were demolished, with lead-based paint, asbestos, and contaminated soil managed per the approved plans (Navy, 2018b). A 2019 Engineering Evaluation/Cost Analysis recommended ex-situ thermal treatment for soil and monitored natural attenuation for active zone water, but thermal treatment was not pursued due to PFAS concerns (Navy, 2019).

The Fourth Five-Year Review (2017–2022 data) noted ongoing COC exceedances and increasing trends in groundwater, with surface water COC concentrations below CULs (Navy, 2023b). Recommendations included revising the DRO total CUL for inland active zone water, revising the GRO total CUL, updating the analytical methods with SGC, addressing residual soil contamination, investigating PFAS, and evaluating climate change impacts on permafrost thaw (Navy, 2023b).

Revisions to CULs and updates to the analytical methods were based on recommendations in the Fourth Five-Year Review and completed in the 2025 ESD (Navy, 2025).

The 2023 LTM indicated limited progress toward active zone water CULs, with anaerobic natural attenuation occurring but degradation rates undefined, suggesting uncertainty in achieving CULs via natural attenuation (EA, 2024a).

2.4.2 Powerhouse Site

The Powerhouse (Site 12) at the northern end of the former NARL complex, west of Imikpuk Lake (Figure 1-3), includes Building 342 (Powerhouse, 1950–1971), Building 442 (constructed 1971), and the UIC construction storage/laydown yard (“Boneyard”). The Boneyard, identified as a separate area in the 1986 LEA, is included in the Powerhouse Site for cleanup evaluation, along with 2,000 feet of former subsurface fuel pipeline, which extended from two 20,000-gallon aboveground storage tanks (ASTs, removed in 1999) to Imikpuk Lake’s northern edge. The pipeline was removed in 1997 (Navy, 2008).

Four petroleum spills occurred between 1952 and 2002: a 15,000-gallon jet fuel spill in 1952 (half recovered), a 10,000-gallon JP-5 jet fuel spill in 1958, an unquantified AST fuel leak in 1988 (tanks removed that year), and a 2002 spill (Navy, 2008, 2023b). In 1997, 4,000 feet of pipeline were removed, with groundwater samples near Imikpuk Lake showing GRO, DRO, and RRO below ADEC Method 2 CULs (NARL-CT, 2002b).

Between 2000 and 2003, 590 cubic yards of petroleum-contaminated soil were excavated from the former ASTs, pipeline alignment, and near Building 137, treated via HAVE, and confirmed free of RRO above the 22,000 mg/kg CUL, completing the soil remedy (NARL-CT, 2002b, 2003a; ADEC, 2003).

Soil investigations in 2010 and 2012 identified residual contamination. The 2010 study found elevated fuel in three of five borings (2–3 feet deep), below CULs (Navy, 2011). The 2012 investigation detected DRO (1,000–6,300 mg/kg) between and northeast of the powerhouses and along the pipeline corridor (1,000–2,000 mg/kg), below the 12,500 mg/kg CUL, with GRO below 100 mg/kg (Navy, 2013b). These DRO areas, linked to historical spills, likely contribute to active zone water contamination migrating toward Imikpuk Lake. DRO aliphatic and aromatic sampling in 2016 (shoreline wells) and 2021 (inland wells) using SGC showed concentrations below the 8,200 µg/L DRO aliphatic CUL (Navy, 2017, 2022a).

A 2019 Engineering Evaluation/Cost Analysis recommended ex-situ thermal treatment for soil and monitored natural attenuation for active zone water, but thermal treatment was not pursued due to PFAS concerns (Navy, 2019). The 2023 LTM and Fourth Five-

Year Review (2017–2022 data) noted ongoing COC exceedances and increasing groundwater trends, with surface water COC concentrations below CULs (Navy, 2023b). Recommendations—unimplemented in 2023 due to the October 2023 review finalization—include revising the DRO total CUL for inland active zone water to 2,563 µg/L (based on a 1,640 µg/L aliphatic CUL per updated EPA dermal and ADEC toxicity guidance), increasing the GRO total CUL to 2,200 µg/L, updating analytical methods with SGC, addressing residual soil contamination, investigating PFAS, and evaluating climate change impacts on permafrost thaw (Navy, 2023b). The 2023 LTM indicated limited progress toward active zone water CULs, with anaerobic natural attenuation occurring but undefined degradation rates, suggesting uncertainty in achieving CULs via natural attenuation.

2.4.3 Bulk Fuel Tank Farm

The former BFTF, spanning approximately 5 acres, is 2 miles northeast of the former NARL complex, near the northeast end of the Airstrip (Figure 1-4). The site is bordered by Elson Lagoon and a large freshwater melt pond to the east and North Salt Lagoon to the southwest, which supports fishing and waterfowl hunting (NARL-CT, 2002a).

The BFTF, which housed six ASTs for gasoline, diesel, and jet fuel, was removed in 1990 (URS, 2000). Spills included 100,000 gallons of JP-5 jet fuel in 1970 and an unquantified diesel leak from Tank 3 discovered during removal (NARL-CT, 2002a). In 1994, two cubic yards of contaminated surface soil were treated via vapor extraction, reducing gasoline and diesel by 98%, and returned in 1996 (NARL-CT, 2002a).

A 1997 investigation identified 9,000 cubic yards of soil contaminated with petroleum hydrocarbons and volatile organic compounds, with a 1999 risk assessment adding lead as a COC (EA, 1999). In 2003, clean gravel pad soil was repurposed, leaving a 3- to 4-foot-thick pad over permafrost (5 feet below ground under the pad, 1–5 feet in tundra), with a 1.5-foot active zone water layer absent beneath the pad due to drainage (Navy, 2025). A 4,700-cubic-yard in-situ landfarming remediation was also completed in 2003 (Navy, 2003b).

In 2016, five new wells (BFTF-SES-01 to BFTF-SES-05) were installed for remedy optimization, sampled only once, showing GRO, DRO, benzene, and xylene exceedances in three gravel pad wells (BFTF-SES-02, -03, -04) and DRO in one off-pad well (BFTF-SES-05) (Navy, 2016). These wells, removed during 2019 remediation, were not part of the annual LTM.

In 2019 and 2021, 4,550 tons of soil from four areas (Gravel Pad, South Bank, Turnaround, Historical Location “90”) were excavated, ex-situ land farmed, and replaced, but confirmation samples indicated residual contamination above ADEC

Method 2 CULs (Navy, 2021, 2022b). A 2021 soil investigation at Historical Location "90" and Turnaround Area concluded further delineation is needed, with residual contamination remaining below a 6-mil liner (Navy, 2021, 2022b). In 2022, the soil CUL for lead was updated to 124 mg/kg per an ESD (Navy, 2022c).

The 2023 LTM and Fourth Five-Year Review (2017–2022 data) noted persistent COC exceedances and increasing groundwater trends, with sediment GRO and DRO concentrations generally below human health criteria, protecting North Salt Lagoon (Navy, 2023b). Recommendations—not implemented in 2023 due to the October 2023 review finalization—include revising CULs, updating this CMP for agreed-upon analytical methods, further soil delineation at Historical Location "90" and Turnaround Area, and evaluating climate change impacts on permafrost thaw and contaminant release (Navy, 2023b).

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3.0 Monitoring Approach

The monitoring approach outlined in this CMP is designed to protect human health and the environment and comply with applicable or relevant and appropriate legal requirements. The monitoring for each site should be conducted in accordance with this document, the DDs (NARL-CT, 2002a, 2002b, 2002c), and the most recent project plans.

The monitoring approach includes the following components:

- Visual site inspections
- Environmental media sampling
- Data evaluation and reporting

3.1 Visual Inspections

Visual inspections to assess site conditions and ensure monitoring integrity will be performed before the annual sampling. These inspections include the following:

- Inspecting monitoring wells to confirm they are suitable for sampling
- Inspecting surface water for petroleum sheen or unnatural debris
- Inspecting sediments, where sampling is required, for discoloration or odor
- Inspecting vegetation for signs of distress

Due to frost heaving, ice plugs, and the shallow depth of wells, monitoring wells may be out of service and require reinstallation. A well integrity inspection must be performed that includes gauging each of the planned monitoring wells with an oil/water level indicator to determine whether the wells are suitable for sampling or require replacement.

If any wells require replacement, the well installation and development must follow site-specific procedures outlined in the project plans and the ADEC Monitoring Well Guidance (ADEC, 2013), and replaced wells must be renamed sequentially from the previous well designation. The annual monitoring report must document details about the monitoring wells that require replacement, and appendices to this report must include the well construction diagrams and well development records. Finally, a professional land surveyor must complete a well survey.

Observations during the visual inspections will be documented during each monitoring event before sampling. Example checklists and associated information that will be documented on field forms are provided in Appendix A.

Due to maintenance concerns, temporary sampling wells may also be considered in areas that experience consistent frost jacking or are prone to damage from environmental conditions. The temporary wells would be constructed in the same relative location as the permanent well(s) to ensure congruency in monitoring efforts. As such, any permanent well that is replaced, will be properly decommissioned per ADEC Monitoring Well Guidance (ADEC, 2013).

3.2 Sampling of Environmental Media

LTM at the Airstrip, Powerhouse, and BFTF Sites, initiated in 2003–2004 per site-specific DDs, is conducted to assess their current environmental status, evaluate the effectiveness of natural attenuation, and ensure compliance with drinking water and surface water quality standards. The results help determine whether natural attenuation processes are occurring and if they are progressing at a rate sufficient to protect human health and the environment.

Conducted biannually until 2009 and annually thereafter due to minimal differences in results (Navy, 2013a, 2018a, 2023b), monitoring includes active zone water, surface water, and, at BFTF, sediment, with biannual sampling to resume when sites approach DD CULs (Navy, 2023b). When monitoring results indicate that a site is at or near the target CULs, two sampling events in a year may be needed to confirm that seasonal variations in contaminant concentrations do not exceed CULs (ADEC, 2009).

Table 3-1 summarizes the media sampled annually at each site, and Section 4.0, Sampling Protocol, provides specific sampling locations and analytes.

Table 3-1: Monitoring Conducted at the Former NARL Sites

Site	Type of Monitoring Required
Airstrip	• Active zone water from shoreline wells and inland wells • Active zone water from background well • Surface water from Imikpuk Lake
Powerhouse	• Active zone water from shoreline wells and inland wells • Active zone water from background well • Surface water from Imikpuk Lake
Bulk Fuel Tank Farm	• Active zone water from wells upgradient of surface water bodies • Active zone water from background well • Sediments in North Salt Lagoon

3.3 Data Evaluation and Reporting

After completing site inspections, sample collection, and analytical testing, the collected data are evaluated to assess validity, identify trends, determine significance, and interpret implications. Section 6 provides details on data evaluation and reporting, while Section 7 outlines information on decision endpoints.

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4.0 Sampling Protocol

4.1 Scope

This section presents the planned sampling protocol for collecting and analyzing environmental media at the three NARL sites that require monitoring. The outlined sampling activities and frequencies support the Five-Year Review program mandated for these sites, as well as the annual monitoring requirements specified in the approved DDs.

All project activities will comply with ADEC regulations and guidance, Navy protocols, and the monitoring contractor's Sampling and Analysis Plan, Accident Prevention Plan, and Site Safety and Health Plan. Environmental media sampling should primarily follow the procedures outlined in the ADEC Field Sampling Guidance (ADEC, 2024). This guide provides fundamental guidelines, methods, and equipment options for sample collection, with illustrations, for each media. Project plans for each site may also reference Navy Engineering Field Activity Northwest standard operating procedures or site-specific procedures for certain tasks.

4.2 Sampling Locations

Sampling locations and their rationale are defined in the DDs for each site and are further detailed in the subsections below. Figures 4-1 through 4-3 provide site maps illustrating the current monitoring locations. Table 4-1 lists the most recent survey coordinates for required sampling locations (EA, 2025).

Table 4-1: Former NARL Sampling Location Details

Sample Location	Location Designation	Latitude [1]	Longitude [1]	Total Depth [2] (ft btoc)	Screen Length (ft)
Airstrip Site					
AS-WP-02C	Shoreline Well	71º 20' 00.1692" N	156º 39' 17.5055" W	4.15	1.5
AS-WP-10	Shoreline Well	71º 19' 59.7507" N	156º 39' 01.9586" W	4.46	1.7
AS-WP-11	Inland Well	71º 20' 04.3550" N	156º 38' 48.3213" W	4.75	1.9
AS-WP-12	Shoreline Well	71º 19' 59.9409" N	156º 38' 51.0272" W	4.03	1.7
AS-WP-16D	Shoreline Well	71º 19' 58.8890" N	156º 38' 44.3745" W	3.82	0.93
AS-WP-18B	Inland Well	71º 20' 00.0200" N	156º 38' 39.7313" W	4.52	1.66
AS-WP-21B	Background Well	71º 19' 57.6902" N	156º 39' 32.6455" W	4.01	1.8
AS-WP-101B	Inland Well	71º 20' 00.9407" N	156º 38' 58.4504" W	8.05	2.0
AFAS-WP-19	Inland Well	71º 20' 02.3863" N	156º 38' 48.3213" W	5.23	1.9

Table 4-1: Former NARL Sampling Location Details (continued)

Sample Location	Location Designation	Latitude [1]	Longitude [1]	Total Depth [2] (ft btoc)	Screen Length (ft)
AFAS-WP-20	Inland Well	71º 20’ 02.9244” N	156º 38’ 41.0321” W	3.19	1.2
AFAS-WP-21	Inland Well	71º 20’ 01.7248” N	156º 38’ 37.0574” W	5.52	1.65
AFAS-WP-22	Inland Well	71º 20’ 01.6919” N	156º 38’ 40.8783” W	3.13	0.75
AS-SW-01	Surface Water	Approximate – Offshore from well AS-WP-02C			
AS-SW-02	Surface Water	Approximate – Offshore from well AS-WP-10			
AS-SW-03	Surface Water	Approximate – Offshore from well AS-WP-12			
AS-SW-04	Surface Water	Approximate – Offshore from well AS-WP-16D			
Powerhouse Site					
PH-WP-01F	Shoreline Well	71º 19’ 43.0535” N	156º 39’ 55.5757” W	4.68	1.79
PH-WP-02	Shoreline Well	71º 19’ 45.1811” N	156º 39’ 55.4357” W	3.91	1.7
PH-WP-03B	Shoreline Well	71º 19’ 47.2059” N	156º 39’ 54.7436” W	4.49	2.0
PH-WP-06B	Inland Well	71º 19’ 42.4148” N	156º 40’ 08.0105” W	3.93	1.54
PH-WP-09D	Inland Well	71º 19’ 39.7010” N	156º 40’ 13.1251” W	4.08	1.0
PH-MW-02C	Inland Well	71º 19’ 40.1289” N	156º 40’ 17.3229” W	5.21	1.0
PH-MW-06B	Inland Well	71º 19’ 45.2918” N	156º 40’ 02.6689” W	6.41	1.5
PH-MW-10C	Inland Well	71º 19’ 42.6771” N	156º 40’ 04.6422” W	7.57	2.0
PH-MW-11	Inland Well	71º 19’ 41.5985” N	156º 40’ 05.0887” W	7.09	1.8
PH-SW-01	Surface Water	Approximate – Offshore from well PH-WP-01F			
PH-SW-02	Surface Water	Approximate – Offshore from well PH-WP-02			
PH-SW-03	Surface Water	Approximate – Offshore from well PH-WP-03B			
Bulk Fuel Tank Farm					
BFTF-WP-04B	Melt Water Pond Sentinel Well	71º 20’ 33.0979” N	156º 36’ 26.3194” W	2.58	1.0
BFTF-WP-05D	Melt Water Pond Sentinel Well	71º 20’ 31.0734” N	156º 36’ 25.4378” W	4.53	0.50
BFTF-WP-06G	Melt Water Pond Sentinel Well	71º 20’ 29.0421” N	156º 36’ 23.9842” W	5.11	1.0
BFTF-WP-07B	Sentinel Well	71º 20’ 32.7638” N	156º 36’ 42.9596” W	4.30	2.0
BFTF-WP-08K	North Salt Lagoon Sentinel Well	71º 20’ 29.9601” N	156º 36’ 44.1232” W	4.06	1.0
BFTF-WP-09H	North Salt Lagoon Sentinel Well	71º 20’ 29.5479” N	156º 36’ 41.0929” W	5.43	1.0
BFTF-WP-10F	North Salt Lagoon Sentinel Well	71º 20’ 28.8379” N	156º 36’ 38.1217” W	4.78	1.0
BFTF-SED-53	NIRIS Location: 53	71º 20’ 29.89878” N	156º 36’ 44.300952” W	--	--

Table 4-1: Former NARL Sampling Location Details (continued)

Sample Location	Location Designation	Latitude [1]	Longitude [1]	Total Depth [2] (ft btoc)	Screen Length (ft)
BFTF-SED-54	NIRIS Location: 54	71º 20’ 29.737852” N	156º 36’ 41.464044” W	--	--
BFTF-SED-55	NIRIS Location: 55	71º 20’ 28. 737852” N	156º 36’ 38.556036” W	--	--

Notes:
[1] Latitude and longitude are based on a well and sampling location survey conducted in August 2024. Well coordinates are North American Datum 1983 (2011), EPOCH 2010.0000. Sediment location coordinates are World Geodetic System 1984 (WGS84).
[2] Total depths are based on 2024 field measurements. In some cases, the reported total depth in ft btoc may be the depth to the surface of frozen active zone water at the bottom of the well.

º = degrees; ’ = minutes; ” = seconds; btoc = below top of casing; ft = foot (feet); NIRIS = Naval Installation Restoration Information Solution

4.3 Field Schedule

Annual sampling events typically occur in August and September. A detailed project schedule for each site is provided in the annual project planning documents. Field personnel will possess current HAZWOPER training and meet ADEC qualifications for sampling. Project-specific personnel are also designated in each year’s project plan documents.

4.4 Laboratory and Field Analyses

Contaminants selected for laboratory analysis are based on historical exceedances of ADEC cleanup levels and screening criteria. Analytical methods comply with 18 AAC 75 and are detailed in the ADEC Underground Storage Tank Procedures Manual (ADEC, 2017). Table 4-2 outlines these methods and the preservation requirements for the COCs.

The laboratory conducting these analyses must be certified under the ADEC Contaminated Sites Laboratory Approval Program and accredited by the U.S. Department of Defense Environmental Laboratory Accreditation Program. Each year’s project plans will identify the designated laboratory, with copies of its certifications included as an appendix.

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Table 4-2: Analytical Methods and Laboratory Specifications

Analyte	Method	Preservation	Container Description	Holding Time
Active Zone and Surface Water				
Gasoline-Range Organics (GRO)	AK101	Cool to 4° ± 2°C, HCL to pH < 2	(2) 40-ml VOA vials with Teflon lined screw caps	14 days
Diesel-Range Organics (DRO)[1]	AK102	Cool to 4° ± 2°C, HCL to pH < 2	1-L amber glass with Teflon lined screw caps	14 days to extraction, 40 days to analysis
Residual-Range Organics (RRO)	AK103	Cool to 4° ± 2°C, HCL to pH < 2	1-L amber glass with Teflon lined screw caps	7 days to extraction, 40 days to analysis
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)	8260D	Cool to 4° ± 2°C, HCL to pH < 2	(3) 40-ml VOA vials with Teflon lined screw caps	14 days
Volatile Organic Compounds (VOC)	8260D	Cool to 4° ± 2°C, HCL to pH < 2	(3) 40-ml VOA vials with Teflon lined screw caps	14 days
Total Aromatic Hydrocarbons (TAH)[2]	8260D	Cool to 4° ± 2°C, HCL to pH < 2	(3) 40-ml VOA vials with Teflon lined screw caps	14 days
Sediment				
DRO	AK102	Cool to 4° ± 2°C	4 oz amber glass with Teflon lined screw caps	14 days to extraction, 40 days to analysis
BTEX	8260D	Cool to 4° ± 2°C, MeOH	4 oz amber glass with Teflon lined screw caps	14 days

Source: ADEC Field Sampling Guidance, Appendices D and E (ADEC, 2024)
Notes:
[1] During sample preparation prior to AK102 analysis, sample cleanup and separation into aliphatic and aromatic fractions will be conducted using silica gel. This method will be used for active zone water samples collected for diesel-range organics analysis from inland wells, as stated in the Explanation of Significant Difference (Navy, 2025).
[2] TAH (summation of benzene, toluene, ethylbenzene, and xylenes).

HCL = hydrochloric acid; MeOH = methanol; VOA = volatile organic analysis

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Natural attenuation parameters will also be monitored to evaluate whether active zone water conditions are conducive to biodegradation of petroleum contaminants.

The geochemical indicators listed in Table 4-3 will be measured in the field for active zone water samples.

Table 4-3: Geochemical Indicators for Assessing Natural Attenuation

Analysis	Comments	Data Use
Dissolved Oxygen (DO)	Time sensitive; should be performed during well purging.	Substrate for aerobic microbial respiration. Identify aerobic or anoxic conditions.
Ferrous Iron [Fe(II)]	May be field or laboratory tested. Filter water if turbidity interferes with analysis.	Indicator of iron reduction. Measured instead of the substrate ferric iron due to the difficulty in measuring biologically available Fe(III) in aquifer systems.
Sulfate (SO_4^{2-})	May be field or laboratory tested.	Substrate for anoxic microbial respiration if oxygen, nitrate and ferric iron are depleted.
Methane (CH_4)	If tested, use EPA method RSK-175.	Presence suggests biodegradation via methanogenesis.
Redox	Time sensitive; should be performed during well purging.	Reflects relative oxidizing or reducing nature of the ground water system.
Alkalinity	May be field or laboratory tested.	Indicator of microbial activity.
pH	Time sensitive; should be performed during well purging.	Hydrocarbon-degrading microbes generally prefer neutral pH values.
Temperature	Time sensitive; should be performed during well purging.	Well purging.
Conductivity	Time sensitive; should be performed during well purging.	Used as a marker to verify that site samples are obtained from the same ground water system.
Salinity	May be field or laboratory tested.	Determine if saltwater intrusion from the Chukchi Sea is occurring during sampling event.
Turbidity	May be field or laboratory tested.	Can impact data quality.

4.4.1 Airstrip Site

Annual monitoring includes the collection of active zone water samples at 12 monitoring wells and surface water samples at four locations (Figure 4-1) sampled for GRO; DRO; benzene, toluene, ethylbenzene, and xylene (BTEX); 1,2-dichloroethane; and geochemical indicators to monitor contamination trends and protect Imikpuk Lake (Navy, 2023b). The four surface water locations are positioned just offshore from four of the lake shoreline monitoring wells. The surface water samples from these locations will be used to evaluate contaminant impacts on Imikpuk Lake.

The four shoreline wells assess concentration trends in active zone water next to Imikpuk Lake (downgradient of the ice wall containment berm) and represent the regulatory point of compliance for active zone water cleanup levels based on protecting the integrity of Imikpuk Lake. Wells AS-WP-18B and AS-WP-11 assess concentration trends to document natural attenuation performance at locations upgradient of the containment berm where some of the highest contaminant concentrations were historically detected. Concentration trends measured in AS-WP-101B document the effectiveness of soil remediation in controlling contaminant transport via groundwater upgradient of the containment berm. AS-WP-21B provides background data for active zone water parameters.

Inland wells AFAS-WP-19 through AFAS-WP-22 were added to the LTM program in 2012. These wells were installed in 2011 to determine if residual contamination is migrating from the south depression toward the eastern ponds and ultimately to the North Salt Lagoon (Navy, 2023b). Table 4-4 summarizes sample locations and analytes.

Table 4-4: Airstrip Site Monitoring

Sample Location	GRO	DRO	BTEX	TAH[1]	Geochemical Indicators	Comments
Shoreline Wells						
AS-WP-02C		X	X	X	X	• Monitor contaminant trends in active zone water adjacent to Imikpuk Lake and downgradient of the containment berm. • Serve as regulatory points of compliance for active zone water. • Document whether source controls remain effective at this site.
AS-WP-10[2]	X	X	X	X	X	
AS-WP-12	X	X	X	X	X	
AS-WP-16D	X	X	X	X	X	
Inland Wells[3]						
AS-WP-11	X	X	X	X	X	• Monitor contaminant trends at locations upgradient of the containment berm. • Represent the historical high concentration locations for the site (source area).
AS-WP-18B	X	X	X	X	X	
AS-WP-101B	X	X	X	X	X	
AFAS-WP-19	X	X	X	X	X	• Provide active zone water monitoring along the northeast property boundary • Evaluate if contamination is migrating from Navy property to United States Air Force property, and if so, if it is migrating toward the North Salt Lagoon.
AFAS-WP-20	X	X	X	X	X	
AFAS-WP-21		X	X	X	X	
AFAS-WP-22	X	X	X	X	X	

Table 4-4: Airstrip Site Monitoring (continued)

Sample Location	GRO	DRO	BTEX	TAH[1]	Geochemical Indicators	Comments
Background Well						
AS-WP-21B	X	X	X	X	X	Monitor ambient (background) water quality.
Surface Water Locations						
AS-SW-01	X	X	X	X		Evaluate contaminant impacts to Imikpuk Lake adjacent to well AS-WP-02C.
AS-SW-02[2]	X	X	X	X		Evaluate contaminant impacts to Imikpuk Lake adjacent to AS-WP-10.
AS-SW-03	X	X	X	X		Evaluate contaminant impacts to Imikpuk Lake adjacent to AS-WP-12.
AS-SW-04	X	X	X	X		Evaluate contaminant impacts to Imikpuk Lake adjacent to AS-WP-16D.

Notes:
[1] TAH is an ADEC surface water standard for the protection of aquatic life and is equal to the sum of BTEX (18 AAC 70.020) (ADEC, 2025).
[2] 1,2-DCA was analyzed in the sample from well AS-WP-10 and surface water location AS-SW-02 only, as specified in the Sampling and Analysis Plan (Navy, 2024a).
[3] In accordance with the 2025 ESD, silica gel cleanup will be used prior to analysis by Method AK102 to reduce matrix interferences at inland wells (ADEC, 2021).

BTEX = benzene, toluene, ethylbenzene, xylenes; DCA = dichloroethane; DRO = diesel-range organics, GRO = gasoline-range organics; TAH = total aromatic hydrocarbons

4.4.2 Powerhouse Site

Annual monitoring includes the collection of active zone water samples at nine groundwater monitoring wells and three Imikpuk Lake surface water locations (Figure 4-2). Active zone water and surface water samples are analyzed for GRO, DRO, RRO, and BTEX. Active zone water monitoring also includes analysis for geochemical indicators.

The three shoreline wells allow assessment of concentration trends in groundwater next to the lake, whereas the other six wells provide information for locations within and downgradient of areas where source control actions have been taken. Background well, AS-WP-21B (Figure 4-2), allows comparison to background conditions for the Powerhouse Site. Surface water samples are used to confirm that drinking water quality standards are maintained in Imikpuk Lake, as outlined in the DD (NARL-CT, 2002b). Table 4-5 summarizes sample locations and analytes.

Table 4-5: Powerhouse Site Monitoring

Sample Location	GRO	DRO	RRO	BTEX	TAH[1]	Geochemical Indicators	Comments
Shoreline Wells							
PH-WP-01F		X	X	X	X	X	• Monitor contaminant trends in active zone water adjacent to Imikpuk Lake • Serve as regulatory points of compliance for active zone water • Document whether source controls remain effective at this site.
PH-WP-02	X	X	X	X	X	X	
PH-WP-03B		X	X	X	X	X	
Inland Wells[2]							
PH-MW-02C		X	X	X		X	Monitor contaminant trends in active zone water and document the progress of natural attenuation.
PH-WP-06B		X	X	X		X	
PH-MW-06B		X	X	X		X	
PH-WP-09D	X	X	X	X		X	
PH-MW-10C		X	X	X		X	
PH-MW-11		X	X	X		X	
Background Well							
AS-WP-21B	X	X	X	X	X	X	Monitor ambient (background) water quality.
Surface Water Locations							
PH-SW-01	X	X	X	X	X		Evaluate contaminant impacts to Imikpuk Lake offshore from PH-WP-01F
PH-SW-02	X	X	X	X	X		Evaluate contaminant impacts to Imikpuk Lake offshore from PH-WP-02
PH-SW-03	X	X	X	X	X		Evaluate contaminant impacts to Imikpuk Lake offshore from PH-WP-03B

Notes:
[1] TAH is an ADEC surface water standard for the protection of aquatic life and is equal to the sum of BTEX (18 AAC 70.020) (ADEC, 2025).
[2] In accordance with the 2025 ESD, silica gel cleanup will be used prior to analysis by Method AK102 to reduce matrix interferences at inland wells (ADEC, 2021).

BTEX = benzene, toluene, ethylbenzene, xylenes; DRO = diesel-range organics, GRO = gasoline-range organics; RRO = residual-range organics

4.4.3 Bulk Fuel Tank Farm

Annual monitoring includes the collection of active zone water samples at six sentinel wells and one background well (Figure 4-3). Three wells are located along the road to the north and east of the raised gravel pad to monitor natural attenuation and the potential migration of the impacted active zone water toward the melt water pond. Three wells are located southwest of the gravel pad, along the North Salt Lagoon shoreline, to monitor natural attenuation and the potential migration of the impacted active zone water toward the lagoon. The remaining well provides background data for active zone water parameters. Active zone water from the sentinel wells are analyzed for GRO, DRO, and BTEX. Geochemical indicators of petroleum hydrocarbon biodegradation will also be measured for each well at the time of sampling. Three sediment samples are collected annually and analyzed for DRO and lead. Table 4-6 summarizes sample locations and analytes.

Table 4-6: Bulk Fuel Tank Farm Site Monitoring

Sample Location	GRO	DRO	BTEX	Lead	Geochemical Indicators	Comments
Melt Water Pond Sentinel Wells						
BFTF-WP-04B		X			X	Monitor natural attenuation and the potential migration of the impacted active zone water toward Melt Water Pond.
BFTF-WP-05D		X			X	
BFTF-WP-06G		X			X	
Site Sentinel Well						
BFTF-WP-07B	X	X	X		X	Monitor the potential migration of the impacted active zone water downgradient from the source area.
North Salt Lagoon Sentinel Wells						
BFTF-WP-08K	X	X	X		X	Monitor natural attenuation and the potential migration of the impacted active zone water toward the lagoon.
BFTF-WP-09G	X	X			X	
BFTF-WP-10F		X			X	
Background Well						
AS-WP-21B	X	X	X		X	Monitor ambient (background) water quality.
North Salt Lagoon Sediment Locations						
BFTF-SED-53		X		X		Evaluate the potential migration of contaminants from nearby soil to shoreline sediments.
BFTF-SED-54		X		X		
BFTF-SED-55		X		X		

Notes:
BTEX = benzene, toluene, ethylbenzene, xylenes; DRO = diesel-range organics, GRO = gasoline-range organics

4.5 Investigation-Derived Waste Handling

Investigation-derived waste (IDW), including water from well development, purging, decontamination, and liquid test kits, is managed based on site-specific requirements.

At the former BFTF Site, water waste is filtered using the on-site Absorbent® W model water scrubber (Spill Shield International) located at the Airstrip Site's former water treatment plant and discharged to the ground near the treatment plant compound. Details about the scrubber and its operating instructions are provided in Appendix B.

At the Airstrip and Powerhouse Sites, where PFAS have been detected in surface water and groundwater above screening levels, water waste is containerized in United States Department of Transportation-approved 55-gallon drums, labeled, and stored for off-site disposal.

Non-dedicated sampling equipment is decontaminated at each sampling point before moving to the next location, with decontamination water collected and managed alongside purge water according to each site's protocols. Additional details on waste handling, storage, and off-site disposal are outlined in each year's project plans.

All IDW to be disposed of off-site will be with ADEC approval in accordance with 18 AAC 75.325(i), 18 AAC 75.370(b), and 18 AAC 78.274(b). Approval from ADEC would be acquired for the off-site transport and disposal via the submittal of a Contaminated Media Transport and Treatment or Disposal Approval Form. All waste would be removed from site within 60 days of generation.

4.6 Quality Assurance / Quality Control

Quality assurance and quality control (QA/QC) procedures will be conducted in accordance with this CMP, the DDs (NARL-CT, 2002a, 2002b, 2002c), and the most recent project plans. QA/QC measures will follow the procedures outlined in the ADEC Field Sampling Guidance (ADEC, 2024).

All sampling and field activities must use standard industry methods and practices. In addition, all sampling and field methods must be performed using tools and instruments that are either single-use (disposable) or are free of contamination and will not contribute to false readings in the field or the laboratory. Field instruments should be calibrated daily and documented in a field record or logbook. Deviations from these protocols must be clearly identified and discussed in the project plans and annual monitoring report.

4.6.1 Data Quality Objectives

The sampling and analyses are intended to generate data of sufficient technical quality to evaluate the effectiveness of the selected cleanup remedies. To achieve this, data collected during monitoring will be validated in accordance with industry standards, laboratory analytical standard operating instructions, the latest Department of Defense Quality Systems Manual for Environmental Laboratories, and the General Data Validation Guidelines, Revision 1 (DoD, 2019). Data quality will be assessed using quantitative criteria (precision, accuracy, completeness) and qualitative criteria (representativeness and comparability). Definitions of these parameters and the corresponding quality control procedures are provided below.

Sensitivity (Reporting Limits). Analytical reporting limits for active zone and surface water samples must be sufficient to allow comparison with the applicable cleanup levels specified in Tables 5-1 and 5-2 of this document.

Precision. Precision quantifies the variability in data due to random error, measuring the scatter of a group of measurements relative to their average. For organic analyses, precision is assessed using matrix spike/matrix spike duplicate (MS/MSD) samples, while laboratory duplicate samples are used for inorganic analyses. Precision is expressed quantitatively as the relative percentage difference between MS/MSD or duplicate results.

Accuracy. Accuracy reflects how closely a measured value aligns with the true value. It is evaluated by spiking samples with known standards (surrogates or matrix spikes) and calculating percentage recovery. To account for potential matrix interferences specific to this project, MS/MSD analyses will be conducted on samples from this project exclusively (not from other projects). Surrogate recoveries will be determined for all samples analyzed for organic compounds.

Representativeness. Representativeness indicates how well a sample's measured results reflect the actual concentration or distribution of chemical compounds in the sampled matrix. The sampling plan, techniques, and handling protocols are designed to ensure that collected samples accurately represent site conditions.

Completeness. Completeness is the ratio of acceptable (non-rejected) measurements to the total number of measurements for an activity. The target completeness goal for this project is 90%.

Comparability. Comparability is a qualitative measure of the confidence in comparing one dataset to another. Using standardized techniques for sample collection and laboratory analysis ensures that data generated are comparable to both internal project data and external datasets.

To meet these quality assurance objectives, the laboratory will implement internal quality control checks, performance evaluation standards, preventive maintenance, and corrective actions as needed.

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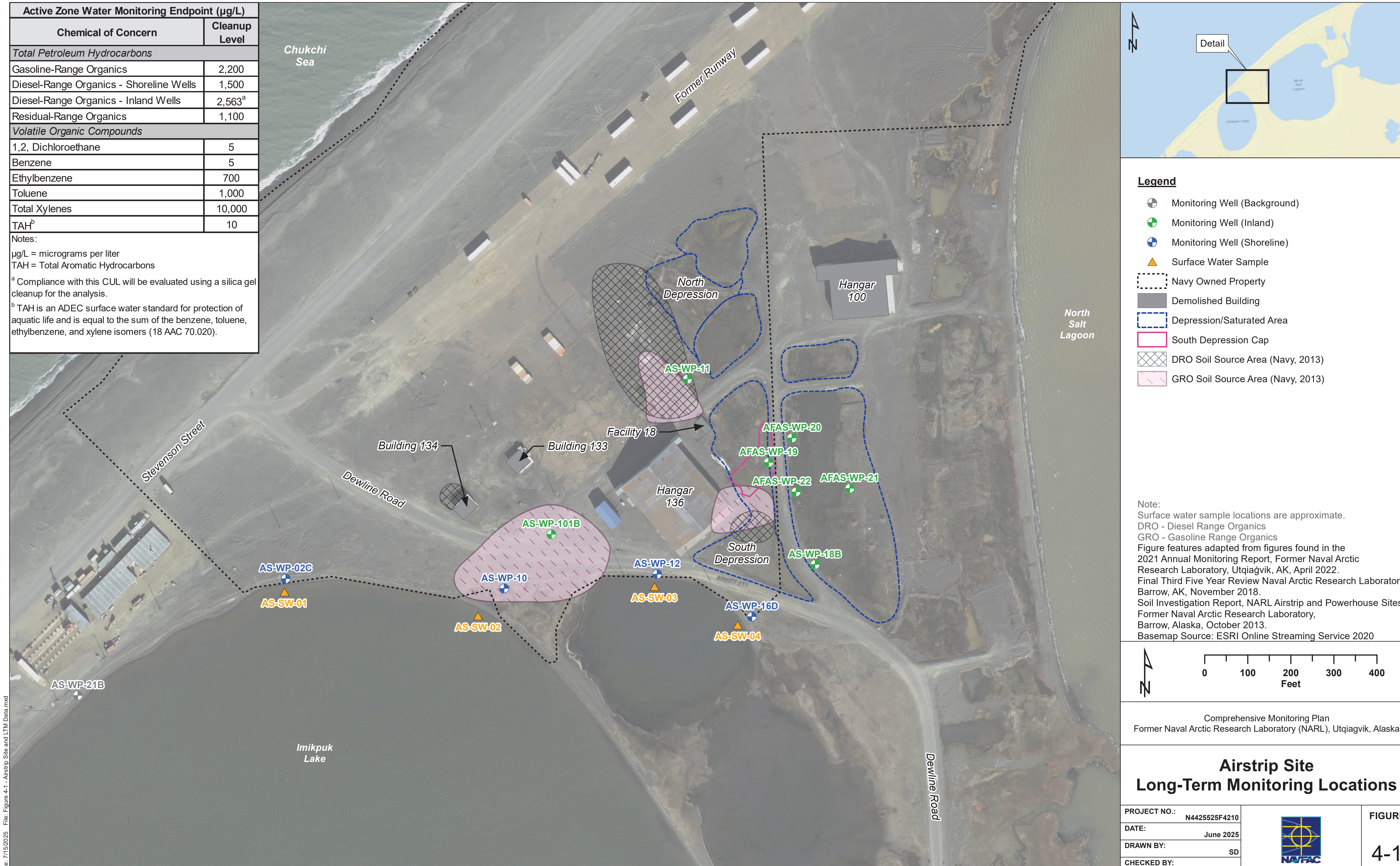
Active Zone Water Monitoring Endpoint (µg/L)	
Chemical of Concern	Cleanup Level
Total Petroleum Hydrocarbons	
Gasoline-Range Organics	2,200
Diesel-Range Organics - Shoreline Wells	1,500
Diesel-Range Organics - Inland Wells	2,563[a]
Residual-Range Organics	1,100
Volatile Organic Compounds	
1,2, Dichloroethane	5
Benzene	5
Ethylbenzene	700
Toluene	1,000
Total Xylenes	10,000
TAH[b]	10

Notes:

µg/L = micrograms per liter
TAH = Total Aromatic Hydrocarbons

[a] Compliance with this CUL will be evaluated using a silica gel cleanup for the analysis.

[b] TAH is an ADEC surface water standard for protection of aquatic life and is equal to the sum of the benzene, toluene, ethylbenzene, and xylene isomers (18 AAC 70.020).



Legend

- Monitoring Well (Background)
- Monitoring Well (Inland)
- Monitoring Well (Shoreline)
- Surface Water Sample
- Navy Owned Property
- Demolished Building
- Depression/Saturated Area
- South Depression Cap
- DRO Soil Source Area (Navy, 2013)
- GRO Soil Source Area (Navy, 2013)

Note:
Surface water sample locations are approximate.
DRO - Diesel Range Organics
GRO - Gasoline Range Organics
Figure features adapted from figures found in the 2021 Annual Monitoring Report, Former Naval Arctic Research Laboratory, Utqiaġvik, AK, April 2022.
Final Third Five Year Review Naval Arctic Research Laboratory Barrow, AK, November 2018.
Soil Investigation Report, NARL Airstrip and Powerhouse Sites, Former Naval Arctic Research Laboratory, Barrow, Alaska, October 2013.
Basemap Source: ESRI Online Streaming Service 2020

0 100 200 300 400
Feet

Comprehensive Monitoring Plan
Former Naval Arctic Research Laboratory (NARL), Utqiagvik, Alaska

Airstrip Site Long-Term Monitoring Locations

PROJECT NO.:	N44255525F4210
DATE:	June 2025
DRAWN BY:	SD
CHECKED BY:	CF

FIGURE 4-1

Date: 7/15/2025 File: Figure 4-1 - Airstrip Site and LTM Data.mxd

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Active Zone Water Monitoring Endpoint (µg/L)	
Chemical of Concern	**Cleanup Level**
Total Petroleum Hydrocarbons	
Gasoline-Range Organics	2,200
Diesel-Range Organics - Shoreline Wells	1,500
Diesel-Range Organics - Inland Wells	2,563[a]
Residual-Range Organics	1,100
Volatile Organic Compounds	
Tetrachloroethylene (PCE)	5
Benzene	5
Ethylbenzene	700
Toluene	1,000
Total Xylenes	10,000
TAH[b]	10

Notes:

µg/L = micrograms per liter
TAH = Total Aromatic Hydrocarbons

[a] Compliance with this CUL will be evaluated using a silica gel cleanup for the analysis.

[b] TAH is an ADEC surface water standard for protection of aquatic life and is equal to the sum of the benzene, toluene, ethylbenzene, and xylene isomers (18 AAC 70.020).

Legend

- Monitoring Well (Inland)
- Monitoring Well (Shoreline)
- Surface Water Sample
- Former Pipeline
- Former AST
- Former Excavation Area
- DRO Soil Source Area (Navy, 2013)
- Remediation Treatment Block Location (CRREL, 2019)
- Near-Shore Soil Treatment Area (Battelle, 2019)

Note:
Surface water sample locations are approximate.
AST - Aboveground Storage Tank
DRO - Diesel Range Organics
Figure features adapted from figures found in the 2021 Annual Monitoring Report, Former Naval Arctic Research Laboratory, Utqiaġvik, AK, April 2022.
Final Third Five Year Review Naval Arctic Research Laboratory Barrow, AK, November 2018.
Basemap Source: ESRI Online Streaming Service 2020

N
0 75 150 225 300
Feet

Comprehensive Monitoring Plan
Former Naval Arctic Research Laboratory (NARL), Utqiagvik, Alaska

Powerhouse Site
Long-Term Monitoring Locations

PROJECT NO.: N44255525F4210		FIGURE
DATE: June 2025		4-2
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Active Zone Water Monitoring Endpoint (µg/L)	
Chemical of Concern	**Cleanup Level**
Total Petroleum Hydrocarbons	
Gasoline-Range Organics (GRO)	2,200
Diesel-Range Organics (DRO)	1,500
Volatile Organic Compounds	
Benzene	4.6
Total Xylenes	18
Metals	
Lead	6.8

Notes:
µg/L = micrograms per liter

Legend

- Monitoring Well (Shoreline)
- Site Sentinel Well
- Sediment Sample
- Former AST

Figure features adapted from figures found in the 2021 Annual Monitoring Report, Former Naval Arctic Research Laboratory, Utqiaġvik, AK, April 2022.
Final Third Five Year Review Naval Arctic Research Laboratory Barrow, AK, November 2018.
Basemap Source: ESRI Online Streaming Service 2020

N 0 50 100 150 200 Feet

Comprehensive Monitoring Plan
Former Naval Arctic Research Laboratory (NARL), Utqiagvik, Alaska

Bulk Fuel Tank Farm Site
Long-Term Monitoring Locations

PROJECT NO.: N4425525F4210		FIGURE
DATE: June 2025		4-3
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5.0 Cleanup Levels

Active zone water at NARL is not a potential drinking water source due to its low yield and periodic saltwater intrusions. However, active zone water at the Airstrip and Powerhouse Sites is hydrologically connected to Imikpuk Lake, which was historically a seasonal drinking water source but is no longer used due to PFAS contamination (Navy, 2023b). Active zone water CULs at these sites are established to protect adjacent surface waters and ensure the safety of construction workers through risk-based standards. At the BFTF Site, active zone water is hydrologically connected to a melt water pond and the North Salt Lagoon, an area used as habitat by local wildlife. Active zone water cleanup levels for the BFTF Site were established based on risk-based levels to protect future construction workers, aquatic receptors, and water quality standards. Soil CULs have also been established for all three sites to address residual contamination, particularly for petroleum hydrocarbons and lead, based on human health and ecological risk assessments, as detailed in site-specific DDs and updated through ESDs.

The regulatory point of compliance for the groundwater monitoring endpoints is the groundwater/surface water interface, with sentinel wells along shorelines verifying that groundwater entering surface waters meets surface water protection CULs. Monitoring upgradient active zone water confirms the effectiveness of source control and natural attenuation in reducing contaminant transport.

Initial CULs for active zone water were based on ADEC drinking water and water quality standards, and site-specific risk assessments, adopting the most stringent values as monitoring endpoints, as detailed in each site's DD. Subsequent updates to CULs for both active zone water and soil, reflecting current ADEC regulations and risk assessments, are described in the 2022 ESD for BFTF and the 2025 ESD for multiple contaminants across the three active sites.

The 2022 ESD revised the surface soil cleanup level for lead at the BFTF Site from 40.5 mg/kg to 124 mg/kg, since the original level was overly conservative compared to current risk-based assessments (Navy, 2022c). Based on a site-specific ecological risk assessment using the Lapland longspur as an indicator species (EA, 1999), the new 124 mg/kg CUL is protective of wildlife and complies with ADEC's human health standard of 400 mg/kg for residential use (18 AAC 75.341, Table B2; ADEC, 2019). This level, derived from no-observed-adverse-effect levels, supports unrestricted land use, minimizes offsite soil disposal, and reduces remedial costs by allowing greater flexibility in managing hydrocarbon-treated soil. The revised CUL addresses ecological and human health risks without requiring consideration of soil migration to surface water, which was not identified as a concern at BFTF (Navy, 2022c).

The 2025 ESD updates active zone water and soil CULs for the Airstrip, Powerhouse, and BFTF Sites to align with current ADEC regulations and risk-based assessments (Navy, 2025). ADEC regulatory guidance referenced in this paragraph cites documents that were current at the time of the preparation of the ESD; some of this material has subsequently been updated as cited in other sections of this document. For the Airstrip and Powerhouse, the active zone water GRO CUL increased from 1,300 µg/L to 2,200 µg/L(18 AAC 75.345, Table C; ADEC, 2023a), and the DRO (total) CUL for inland wells was revised to 2,563 µg/L, replacing the 8,200 µg/L aliphatic fraction, using silica gel cleanup and a 64% aliphatic fraction extrapolation (Navy, 2004). The Airstrip soil CUL for total xylenes decreased from 81 mg/kg to 57 mg/kg due to updated inhalation pathway calculations (18 AAC 75.341, Table B1; ADEC, 2023a). For the BFTF, active zone water CULs shift to total GRO (2,200 µg/L) and DRO (1,500 µg/L) from fractionated values, the lead CUL increased from 3.2 µg/L to 6.8 µg/L, and benzene decreased slightly from 5 µg/L to 4.6 µg/L (18 AAC 75.345, Table C; ADEC, 2001, 2022). BFTF soil CULs were updated for GRO to 1,400 mg/kg, retain DRO (total) at 1,328 mg/kg for wildlife protection, and increase 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene to 43 mg/kg and 37 mg/kg, respectively, based on soil saturation limits (18 AAC 75.341, Tables A2, B2; ADEC, 2023a). These revisions ensure compliance with applicable or relevant and appropriate requirements (ARARs), enhance monitoring accuracy, and protect human and ecological receptors while supporting site remedial objectives.

Table 5-1 summarizes active zone water monitoring endpoints, Table 5-2 summarizes the Surface Water Standards for Imikpuk Lake, and Table 5-3 lists soil CULs for the Airstrip, Powerhouse, and BFTF Sites.

Table 5-1: Active Zone Water Monitoring Endpoints

Chemical of Concern	Active Zone Water Monitoring Endpoint (µg/L)		
	Airstrip	Powerhouse	BFTF
Total Petroleum Hydrocarbons			
Gasoline-Range Organics (GRO)	2,200	2,200	2,200
Diesel-Range Organics (DRO)	1,500/2,563 [1]	1,500/2,563 [1]	1,500
Residual-Range Organics (RRO)	1,100	1,100	-
Volatile Organic Compounds			
1,2, Dichloroethane	5	-	-
Tetrachloroethylene (PCE)	-	5	-
Benzene	5	5	4.6
Ethylbenzene	700	700	-
Toluene	1,000	1,000	-
Total Xylenes	10,000	10,000	18
TAH[2]	10	10	-
Metals			
Lead	-		6.8

Notes:
[1] The cleanup level of 1,500 micrograms per liter (µg/L) applies to results from samples collected from shoreline wells at the Airstrip and Powerhouse Sites. The cleanup level of 2,563 µg/L applies to results from samples collected from inland wells at the Airstrip and Powerhouse Sites. Samples collected from inland wells at the Airstrip and Powerhouse Sites will be analyzed using silica gel cleanup to remove interference.
[2] TAH is an ADEC surface water standard for protection of aquatic life and is equal to the sum of the benzene, toluene, ethylbenzene, and xylene isomers (18 AAC 70.020).

µg/L = micrograms per liter; ADEC = Alaska Department of Environmental Conservation; TAH = Total Aromatic Hydrocarbons

Imikpuk Lake is the only surface water for which samples will be collected. As a potential drinking water source, water quality standards are identified as those established for ADEC’s Maximum Contaminant Levels for drinking water (18 AAC 80.300) and water quality standards for surface waters used as a source of potable water (18 AAC 75.345).

Table 5-2: Surface Water Standards for Imikpuk Lake

Chemical of Concern	Surface Water Standard µg/L
GRO	2,200
DRO	1,500
Benzene	5
Ethylbenzene	700
Toluene	1,000
Total Xylenes	10,000

Source: ADEC Surface Water Standards Table, February 2022.
Note: µg/L = micrograms per liter

Table 5-3: Soil Cleanup Levels

Chemical of Concern	Soil Cleanup Level (mg/kg)		
	Airstrip	Powerhouse	BFTF
Total Petroleum Hydrocarbons			
GRO	1,400	1,400	1,400
DRO	12,500	12,500	1,328
RRO	22,000	22,000	
Volatile Organic Compounds			
Total Xylenes	57		
PCB		1	
1,2,4-Trimethyl-benzene			43
1,3,5-Trimethyl-benzene			37
Metals			
Lead	-	-	124

Key: BFTF = Bulk Fuel Tank Farm; DRO = diesel-range organics; GRO = gasoline-range organics; mg/kg = milligrams per kilogram; PCB = polychlorinated biphenyl; RRO = residual-range organics

6.0 Data Evaluation and Reporting

The evaluation of hydrocarbon natural attenuation processes and their effectiveness is conducted in alignment with guidelines from the EPA (2004, 2011), as well as the approved DDs for each site. This approach adheres to ADEC (2000) and Navy (1998a, 2024b) guidance for assessing groundwater natural attenuation.

Natural attenuation encompasses physical processes (dispersion, advection), chemical processes (sorption), and biological processes (reduction, oxidation). The occurrence and efficacy of these processes, along with the potential migration of dissolved hydrocarbons, are assessed for the three NARL sites using data from field monitoring and laboratory analyses. Two primary lines of evidence are used to evaluate process efficiency: 1) analytical data indicating whether contaminant plumes are stabilizing, decreasing, or increasing; and 2) geochemical indicators of biological activity.

Given the unique hydrogeologic conditions, discontinuous groundwater systems, and absence of traditional groundwater “plumes” at the Airstrip, Powerhouse, and BFTF sites, quantitative comparisons of contaminant transport rates versus biodegradation rates are not performed. Instead, natural attenuation effectiveness is primarily assessed by analyzing trends in contaminant concentrations and determining whether geochemical indicators suggest that active zone water supports hydrocarbon biodegradation.

6.1 Contaminant Concentration Trends

Concentrations of COCs are analyzed using the Mann-Kendall trend test to determine whether active zone water contamination levels at the Airstrip, Powerhouse, and BFTF sites are stable, decreasing, or increasing. Temporal trend graphs and contaminant distribution maps are generated to visualize these trends, aiding in the assessment of natural attenuation effectiveness as described above.

A 90% confidence level is applied in the trend evaluations because it provides a high degree of certainty, sufficient to make informed decisions about site remediation but it is less stringent than higher thresholds like 95% or 99%, which require stronger evidence to confirm a trend. A higher confidence level could miss subtle but real trends due to the need for more data or less variability, which is challenging in NARL’s complex environment. The use of a 90% confidence level ensures sufficient statistical confidence while accounting for environmental variability, supporting data-driven decisions for site remediation.

The COCs subject to these data evaluation methods are as follows:

- GRO, DRO, BTEX, total aromatic hydrocarbons, and 1,2-dichloroethane at the Airstrip Site
- GRO, DRO, RRO, BTEX, and total aromatic hydrocarbons at the Powerhouse Site
- GRO, DRO, benzene, xylenes, and lead at the BFTF

Temporal Trend Graphs. For temporal trend analyses, previously sampled locations have been selected for active zone monitoring. Graphs plotting COC concentrations over time, generated for each sampled well and presented in annual monitoring reports, are analyzed using the Mann-Kendall trend test to identify statistically significant trends. Additionally, temporal trend graphs of average concentrations across multiple wells within a site may be created to illustrate broader temporal patterns. These trends are evaluated considering site-specific hydrologic characteristics, such as minimal groundwater flow, where a prior study found that groundwater flux from the Airstrip Site into Imikpuk Lake accounts for less than 0.1 percent of the lake's total inflow from snowmelt and precipitation (USGS, 1994).

Mann-Kendall Trend Analysis. The Mann-Kendall trend test, a non-parametric statistical method, is used to evaluate temporal trends in COC concentrations at the former NARL sites. This test detects monotonic trends (increasing, decreasing, or no trend) in time-series data without requiring a normal distribution, making it suitable for environmental datasets with non-normal distributions, missing values, or irregular sampling intervals. Its robustness against outliers and applicability to small datasets is particularly valuable for NARL's unique hydrogeologic conditions, including discontinuous groundwater systems and minimal flow, where traditional contaminant plumes are absent. By applying the Mann-Kendall test, the monitoring program can reliably assess whether contaminant concentrations are declining sufficiently to meet cleanup goals or if contingency measures are warranted, aligning with EPA's technical protocol (EPA, 2004, 2011) and site-specific DD guidelines.

Contaminant Distribution Maps. Maps illustrating the spatial distribution of COC concentrations in active zone water for each site are created and included in the Five-Year Reviews. These maps display concentration values alongside a linear regression plot indicating the overall direction of groundwater flow, which facilitates the evaluation of contaminant migration and natural attenuation processes. The spatial data complement the Mann-Kendall temporal trend analyses, providing a comprehensive understanding of contamination dynamics across the Airstrip, Powerhouse, and BFTF sites.

6.2 Redox Conditions

Redox conditions in active zone water are documented and assessed as a key indicator of the effectiveness of natural attenuation through biological processes. To support this evaluation, measurements of naturally occurring electron acceptors and other water quality parameters are collected. These data help determine the occurrence of hydrocarbon degradation and the relative significance of various terminal electron-accepting processes. Given that dissolved oxygen is more soluble in cold water, the potential temperature dependence of dissolved oxygen concentrations is factored into the data analysis.

Site-specific environmental conditions dictate which terminal electron-accepting processes predominate. Typically, aerobic biodegradation occurs first, followed by denitrification, iron (III) reduction, sulfate reduction, and finally methanogenesis. The stoichiometric equations for these common preferential electron acceptance reactions, ordered by efficiency, are listed below. Competition among microorganisms for available organic carbon sources results in distinct redox zones, which can be inferred from the presence or absence of electron acceptors and specific end products (Navy, 1998a).

Oxygen reduction: $O_2 + CH_2O \rightarrow CO_2 + H_2O$

Nitrate reduction: $4NO_{-3} + 4H^+ + 5CH_2O \rightarrow 2N_2 + 5CO_2 + 7H_2O$

Iron reduction: $4Fe(OH)_3 + CH_2O + 8H^+ \rightarrow 4Fe^{2+} + CO_2 + 11H_2O$

Sulfate reduction: $SO_4 + 2CH_20 + H^+ \rightarrow 2CO_2 + HS^- + 2H_2O$

Methanogenesis: $2CH_2O \rightarrow CH_4 + CO_2$

The concentration distributions of key geochemical indicators may be depicted on site maps in the annual reports to illustrate the spatial distribution of dominant electron-acceptance processes driving hydrocarbon biodegradation.

If notable changes in concentrations of specific geochemical parameters are measured over time at a site, temporal trend graphs may be prepared to illustrate the geochemical evolution of the hydrocarbon-contaminated active zone water.

6.3 Attenuation Rates

Groundwater monitoring data are used to estimate attenuation rates, which help predict the time required to meet groundwater cleanup goals. The Mann-Kendall trend tests the null-hypothesis, that there is no trend in the data, at selected confidence intervals. The analysis output indicates whether the parameter trend is: 1) increasing, 2) decreasing, or 3) exhibits no trend. The test is suitable for data that do not follow a normal distribution and that contain non-detected results. If the Mann-Kendall trend analysis identifies a statistically significant decreasing trend, then the Sen’s Slope estimate is used to calculate the overall median slope of the data trend. To ensure the calculated confidence intervals were relevant, the Sen's evaluation is performed on data for which sampling events are not greater than two years apart. Once the slope of the trend line is calculated using Sen's test, the time necessary to reach an endpoint concentration can be estimated on a chemical-specific basis.

During each Five-Year Review, the estimated time to achieve groundwater cleanup standards is a critical factor in determining whether groundwater contingency measures are necessary to protect human health and the environment. At the former NARL, contamination exists in discontinuous pockets, making it challenging to accurately determine the volume of contamination. As a result, estimates of the time to achieve cleanup goals carry inherent uncertainties related to both volume calculations and attenuation rates. Therefore, attenuation rates and cleanup time estimates should be evaluated alongside evidence that active zone water redox conditions support biological activity. Together, these data provide a basis for assessing whether biodegradation is an effective component of hydrocarbon natural attenuation at the Airstrip, Powerhouse, and BFTF sites.

Geochemical parameters indicate that natural attenuation is occurring through various processes to varying degrees among the sites; however, established degradation rates are currently unavailable to precisely determine when these sites will achieve CULs (EA, 2024b). To address this, the Theil-Sen Slope Analysis will be conducted as part of annual reporting for all locations with COCs exceeding their CULs to estimate attenuation timelines. This analysis calculates the median slope of all pairwise concentration differences over time, providing a reliable estimate of the rate of change in contaminant concentrations, even in the presence of outliers or non-normal data (Theil, 1950; Sen, 1968).

By applying Theil-Sen Slope Analysis to COCs with decreasing trends, the Navy can project the number of years required to reach CULs, supporting data-driven decisions on monitoring continuation or contingency measures. This approach enhances the evaluation of natural attenuation effectiveness, aligning with site-specific DDs (NARL-CT, 2002a, 2002b, 2002c) and guidance from EPA (2004, 2011).

6.4 Evaluation of Imikpuk Lake Surface Water

Surface water is the primary exposure medium for the Airstrip and Powerhouse Sites for establishing protection of human health and the environment. Imikpuk Lake surface water samples collected from these sites during the 2023 field event showed contaminant concentrations below CULs. These results indicate that human health and the environment are currently protected from petroleum contamination, consistent with the Protectiveness Statement in the Fourth Five-Year Review (Navy, 2023b).

Surface water data from Imikpuk Lake should be compared to the standards listed in Table 5-2. These standards are not cleanup levels, as no surface water cleanup action is designated for Imikpuk Lake. If an exceedance of these standards is detected in a sample from Imikpuk Lake, the Navy will notify ADEC, providing recommendations for follow-up sampling and analysis to confirm the exceedance and/or proposing other appropriate actions based on the circumstances.

6.5 Evaluation of North Salt Lagoon Sediment

A risk assessment determined that North Salt Lagoon sediment poses no unacceptable risks (Navy, 1998b). However, sediment at the former BFTF site is the medium for evaluating potential human health exposures through migration of contaminants from nearby soil to shoreline sediments. As a result, samples are collected from the North Salt Lagoon and analyzed in accordance with the DD, which includes the remedy element, “a 5-year monitoring program for natural attenuation of sediments in North Salt Lagoon to verify that contaminant transport has ceased following soil cleanup.” This is done with LTM operations for the site.

Analytical results from sediment sampling are compared with historical detections to assess trends in DRO and lead concentrations. Decreasing concentrations would indicate that contaminant migration to North Salt Lagoon has stopped following the BFTF soil cleanup efforts. Conversely, increasing DRO or lead concentrations in the sediment would suggest ongoing contaminant transport from source soils, potentially necessitating further cleanup actions. Although no sediment CULs have been established, soil CULs are protective of human health sediment exposures.

6.6 Reporting

Annual field sampling events are conducted to comply with the environmental monitoring requirements set forth in the original CMP (Navy, 2004) and reflect refinements to the monitoring program agreed to by ADEC and the Navy during the Five-Year Reviews (Navy, 2008, 2013a, 2018a, 2023b) and recommendations in annual monitoring reports. The report presents the monitoring results for each site and includes historical information generated for prior sampling years.

The reports include the following for each site:

1. A summary of the field sampling and analysis activities completed that year
2. Tabulations of chemical data collected to date for the locations sampled
3. Evaluation of data collected from each site
4. Deviation from work plan (if any)

5. Evaluation of comprehensive data trends using Mann-Kendall trend analysis
6. Conclusions regarding the active zone water natural attenuation performance and protection of adjacent surface water bodies and sediment
7. Recommendations regarding potential adjustments to the site sampling and analysis, or other elements of the cleanup, based on the data collected to date

7.0 Decision Endpoints

The monitoring program for the former NARL is designed to confirm that natural attenuation, as part of the selected cleanup remedies, is occurring at rates sufficient to protect potential receptors. Monitoring will continue until the collected data demonstrate either that remedial goals have been achieved, supporting a decision for site closure, or that additional remedial actions are necessary.

7.1 Annual Reviews

The former NARL monitoring program was initially scheduled to run for five years, after which a decision would be made for each site regarding whether to continue, discontinue, or modify water and sediment quality monitoring. Following each year's sampling and analysis, the Navy, ADEC, and the landowner review the annual report's findings and decide on future actions for each site.

As part of the annual data review, adjustments to the monitoring program will be considered. For example, if active zone monitoring at a site indicates no groundwater transport pathway to a surface water body, it may be concluded that the remedy has met its objectives, potentially eliminating the need for further sampling at specific locations. Alternatively, if data indicate that human health or the environment are not sufficiently protected, contingency measures will be considered.

Per the relevant DDs, the Navy will assess and, if necessary, implement contingency measures to protect water quality if monitoring data confirm any of the following conditions:

- Presence of free product in Imikpuk Lake, the BFTF meltwater pond, or North Salt Lagoon;
- Exceedances of drinking water standards or surface water quality in Imikpuk Lake;
- Consistent increasing trends in contaminant concentrations, particularly in Imikpuk Lake shoreline wells
- Exceedance of the construction worker CUL of 2,563 µg/L DRO in active zone water.

These criteria are designed to ensure protection while allowing flexibility and the application of professional judgment. Care will be taken to avoid triggering contingency remedies unnecessarily due to sampling variability or seasonal fluctuations.

7.1.1 Aliphatic / Aromatic Fraction Considerations

The original 2004 CMP (Navy, 2004) established risk-based cleanup levels based on GRO and DRO aliphatic/aromatic fraction testing conducted in 1997. These levels were driven by the need to protect future construction workers at the Airstrip and Powerhouse Sites and aquatic organisms at the BFTF. In 2001, ADEC discouraged aliphatic/aromatic testing due to concerns about method repeatability, accuracy, and precision, prompting a shift for the five-year monitoring program to total GRO and DRO measurements for more reliable trend analyses (ADEC, 2001). The Fourth Five-Year Review (Navy, 2023b) evaluated DD cleanup levels against ARARs and recommended updates to GRO and DRO (aliphatic) CULs for active zone water. These changes were detailed in the ESD (Navy, 2025) and implemented following it's approval by ADEC. These updated CULs, detailed in Section 5.0, align with current ADEC regulations.

To address potential biogenic interference in groundwater, sediment, and surface water samples, this CMP incorporates SGC for DRO and RRO analyses, as outlined in ADEC's Technical Memorandum 21-001, effective December 22, 2021. The memorandum allows SGC under AK 102 (DRO) and AK 103 (RRO) methods to remove biogenic materials, such as plant and animal-derived compounds, which can inflate reported concentrations in organic-rich environments like NARL's tundra soils. While AK 101 (GRO) is unaffected by biogenic interference and not addressed in the memorandum, SGC for AK 102 ensures accurate characterization of petroleum hydrocarbons by separating non-polar petrogenic compounds from biogenic and polar petrogenic hydrocarbons. For samples showing only petrogenic compounds, the higher of pre- or post-SGC concentrations is reported; for mixed biogenic and petrogenic content, post-SGC concentrations are used; and for solely biogenic material, results are reported as non-detect.

Two studies were performed outside the LTM program to evaluate aliphatic and aromatic DRO. In 2016, select monitoring wells located near Imikpuk Lake were sampled for DRO aliphatic and aromatics (Navy, 2017). The 2016 analytical results from the shoreline well samples indicate that the aliphatic DRO concentrations no longer exceed risk-based levels associated with unacceptable non-cancer risks to construction workers. In 2021, select inland wells were sampled for aliphatic and aromatic fractions (EA, 2022). For active zone water collected from inland monitoring wells, sample results were below the CUL of 8,200 µg/L applicable to the DRO aliphatic fraction. The DRO aliphatic and aromatic fractions for these 2016 and 2021 sampling events were analyzed using a technique that utilizes silica gel cleanup during sample preparation to separate aliphatic hydrocarbons from aromatics (EA, 2024a).

The ESD (Navy, 2025) presents the revision to the DRO CUL and analytical method. To have a CUL that is directly comparable to the analytical data, the updated aliphatic value of 1,640 µg/L is extrapolated to a total DRO value using the aliphatic percentages calculated from the DRO fractionation testing completed in 2021 (EA, 2022). This follows the same methodology for extrapolation used in the original CMP (Navy, 2004) to calculate a CUL for DRO (total). The percentage was calculated using ProUCL software. The combined aliphatic percentage for the Airstrip and Powerhouse Sites dataset is 64 percent, based on a 95-percent upper-confidence limit on the mean of the combined datasets. The datasets are statistically similar and were deemed suitable to use as a combined dataset to determine an overall percentage. This results in a calculated DRO (total) CUL for the Airstrip and Powerhouse Sites of 2,563 µg/L (1,640/0.64). DRO in inland well active zone water at the Airstrip and Powerhouse Sites should be analyzed only as DRO (total) using Method AK 102 and silica gel cleanup to remove interference. The concentration of 2,563 µg/L is the updated CUL for DRO (total) in inland well active zone water at the Airstrip and the Powerhouse Sites (Navy, 2025).

The annual monitoring report will include laboratory reports in the appendices with pre- and post-SGC chromatograms, DRO/RRO concentrations, and pattern interpretations to confirm the presence of biogenic interference, supported by site photos, soil descriptions, and other characteristics. While SGC is primarily applied to soil samples due to higher biogenic interference, its use in groundwater requires evidence that removed material is biogenic, not petrogenic polar hydrocarbons, which must be included in DRO calculations. This approach, consistent with Technical Memorandum 21-001, ensures reliable data for decision-making while maintaining protection for human health and ecological receptors at NARL.

The original CMP included extrapolation of CULs based on aliphatic/aromatic percentages. All aliphatic/aromatic-specific CULs for the three sites were removed or replaced in the 2025 ESD (Navy, 2025). Because of this change, CUL extrapolation is no longer included in the CMP.

7.2 Five-Year Review

The former NARL monitoring program, initiated under the 2004 CMP, has continued beyond its initial five-year period, with the Fourth Five-Year Review issued in October 2023 (Navy, 2023b). The CMP is being updated to reflect the ongoing monitoring program, which includes annual field sampling events to meet environmental monitoring requirements and incorporates refinements agreed upon by the Navy and ADEC during prior Five-Year Reviews (Navy, 2008, 2013a, 2018a, 2023b). After each five-year cycle, the Navy, ADEC, and the landowner evaluate monitoring data to decide whether to continue, discontinue, or modify the program for each site.

Per the DDs, surface water is the primary exposure medium for assessing risks to human health and the environment at the Airstrip and Powerhouse Sites, while sediment serves as the exposure medium for the BFTF Site. The Fourth Five-Year Review's protectiveness statements confirm that current cleanup actions at all three sites protect human health and the environment with respect to petroleum hydrocarbons, the COCs included in DDs. At the Airstrip and Powerhouse Sites, COC concentrations in surface water remain below CULs, though increasing trends of petroleum hydrocarbons in active zone water may necessitate CUL adjustments or additional actions. At the BFTF Site, DRO and lead concentrations in sediment are generally below human health criteria for soil (also protective of sediment exposures), indicating no adverse impact on North Salt Lagoon; however, groundwater concentrations exceeding CULs require follow-up actions to ensure long-term protectiveness.

The monitoring program will conclude when the following conditions are demonstrated:

- Contaminant concentrations in active zone water are decreasing
- Receiving waters, including Imikpuk Lake, North Salt Lagoon, and the BFTF Site's meltwater pond, are protected
- Site construction workers who may come into direct contact with active zone water are protected

Until these criteria are met, the Navy will continue the monitoring program, incorporating any necessary adjustments based on annual and Five-Year Review findings to ensure ongoing protection of human health and the environment.

7.3 Contingency Measures

If monitoring data reveals that one or more trigger-point criteria outlined in Section 7.1 (Annual Reviews) have been met, or if the Five-Year Review indicates that contaminant concentrations are not decreasing at a rate sufficient to meet applicable cleanup standards within a reasonable timeframe, the Navy will evaluate and, if necessary, implement contingency measures. Each site's DD specifies potential contingency measures. To address new contaminant sources or pathways, the monitoring program may be expanded to include additional sampling locations for active zone water and/or surface water.

Transitioning from monitored natural attenuation to an alternative remedy will depend on the technical feasibility of the contingency action in a permafrost environment and its alignment with ADEC regulations. Potential contingency measures include the following:

- Enhancing hydrocarbon biodegradation in the active zone by introducing oxygen and/or nutrients (for example, nitrogen and phosphorus), potentially through shallow open trenches into the groundwater. These trenches could also passively warm adjacent groundwater via radiant energy, accelerating biodegradation.
- Constructing a subsurface containment structure along surface water shorelines to further reduce the minimal groundwater discharge to surface water bodies, extending groundwater travel times to allow more opportunity for biodegradation.
- Pumping and treating groundwater, which may involve dewatering the local groundwater system.
- Excavating and treating source soils.

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Appendix A:
Visual Inspection Checklists

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	Yes	No
Previous Deficiency		
Date(s) of Deficiency ___________		

Monitoring Well (Groundwater) Sampling
Visual Inspection Checklist

Site Name or Location ID: ____________________________ **Map Reference No.:** _______________

Inspectors: ____ **Date/Time**: ________________________

Company: ____

Weather/Temperature: ____

		Yes	No
1.	Was the monitoring well located?	☐	☐
2.	Is the well clearly labeled? If not, please relabel	☐	☐
3.	Is there a cap on the monitoring well?	☐	☐
4.	Specify type of cap:____		
5.	Specify size and number of bolts on flush-mount cap:__________________________		
6.	Is there any evidence of tampering with the cap or well casing?	☐	☐
7.	Is the monument in good condition?	☐	☐
8.	Is the casing in good condition?	☐	☐
9.	Are there any odors (e.g., petroleum or sulfide/rotten egg)? If yes, describe the odor and intensity.	☐	☐

____

____

10.	Does the well need to be replaced? If yes, why	☐	☐

____

____

11.	Is there an oily sheen on the water?	☐	☐
12.	Is the well dry?	☐	☐
13.	Is there product in the well?	☐	☐
14.	If so, product thickness ________________.		
15.	Is the well depth consistent with past depth measurements?	☐	☐
16.	Previous well depth ______________. Current well depth _______________.		

Additional notes: ____

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	Yes	No
Previous Deficiency	☐	☐
Date(s) of Deficiency ___________		

Surface Water Sampling
Visual Inspection Checklist

Site Name or Location ID: ____________________________ **Map Reference No.:** _______________

Inspectors: ____ **Date/Time**: ________________________

Company: ____

Weather/Temperature: ____

		Yes	No
1.	Is there any sheen on the surface of the water body?	☐	☐
2.	Are there any odors (e.g., petroleum or sulfide/rotten egg)? If yes, describe the odor and intensity.	☐	☐

____

____

3.	Is there manmade debris within 200 feet of the sampling location?	☐	☐
4.	Is there discoloring along the banks of the water body? If yes, describe appearance, location, and square footage.	☐	☐

____

____

5.	Is the water clear? If no, describe the condition.	☐	☐

____

____

6.	Is there vegetation growing on the banks of the water body?	☐	☐
7.	Are there signs of wildlife use (birds, fish, etc.)?	☐	☐
8.	Is erosion occurring? If yes, describe conditions and severity.	☐	☐

____

____

9.	Is deposition occurring in the water body? If yes, describe conditions	☐	☐

____

Additional notes: ____

	Yes	**No**
Previous Deficiency	☐	☐
Date(s) of Deficiency ____________		

Sediment Sampling
Visual Inspection Checklist

Site Name or Location ID: ______________________________ **Map Reference No.:** ________________

Inspectors: ____ **Date/Time**: ________________________

Company: ____

Weather/Temperature: ____

		Yes	**No**
1.	Is the sediment discolored? If yes, describe appearance and extent....................................	☐	☐

____

____

2.	Are there any odors? If yes, describe the odor and intensity..	☐	☐

____

____

3.	Is there manmade debris within 200 feet of the sampling location?.....................................	☐	☐
4.	Is there an oily sheen on the surface of the sediment?..	☐	☐
5.	Is there vegetation growing in the sediment?..	☐	☐
6.	Are there any insects, invertebrates, or fish in the sediment?...	☐	☐

Additional notes:

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Appendix B:
Water Scrubber Operations and Maintenance

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Spill Shield International

P.O. Box 93009 • Anchorage, AK 99509-3009
(907) 561-6033 • Fax: (907) 561-4504

Absorbent W®

WATER SCRUBBING SYSTEM

KEEP THE E.P.A. AND THE D.E.C. OUT OF YOUR POCKET!

The *Absorbent W* water scrubbing system is designed to remove hydrocarbons from wash and waste water in applications including steam cleaning of boat bilges, construction equipment and parts.

No application is too large or too small. Because of *Absorbent W's* unique ability to instantly absorb oil while repelling water it is now possible to eliminate the need for large expensive mechanical water recycling systems.

All systems are custom made right here in Alaska and are designed to meet your specific needs.

URL: www.spillshield.com

E-MAIL: spillshield@ak.net

Spill Shield International

P.O. Box 93009 • Anchorage, AK 99509-3009
(907) 561-6033 • Fax: (907) 561-4504

OILY WATER DISPOSAL PROBLEM?

There is no easier or more effective method for removing oil contamination from water than the WATER SCRUBBER.

In repeated tests with diesel, standard motor oil and gasoline in water, at initial hydrocarbon levels of 30,000 to over 250,000 ppm, the ***Water Scrubber*** removed over 99.9% of the hydrocarbons in one quick pass.

How the Water Scrubber Works

Whether tank cleaning, dewatering sludge or removing oily run-off water, simply pour the oil contaminated water in the top of the scrubber and seconds later, clear water will flow from the bottom. The ***Water Scrubber*** will extract all oils - from light fuels to heavy crude - immediately.

Who can use the Water Scrubber

The ***Water Scrubber*** is invaluable in machine shops, industrial settings, oily washdown stations, marinas, construction/work sites, parking lots or any place where there is danger of oil contamination entering into the water system resulting in environmental damage, costly fines or project shutdowns.

The ***Water Scrubber*** removes oil from water for a fraction of the cost of other removal systems. The light, natural filter, ***Absorbent W***[1] can be disposed of by incineration, bioremediation, biodegradation or landfilling, in accordance with local, state and federal regulations.

[1] ***Absorbent W*** is a registered trademark

Spill Shield International

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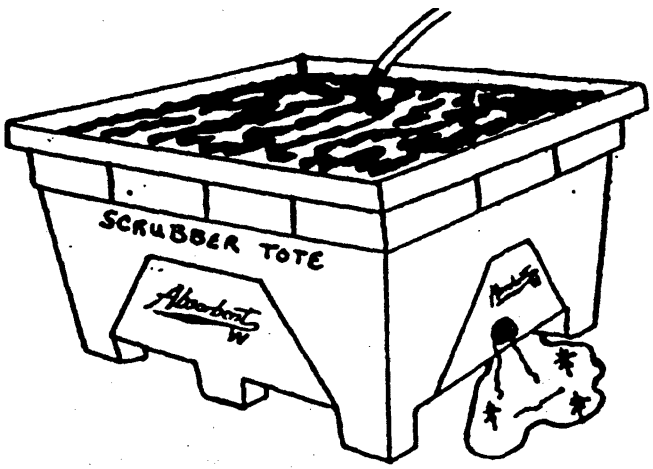
WATER SCRUBBER TOTE



The ***Water Scrubber Tote*** uses a Tra-Tote as an outer casing. It has an oil absorption capacity of 60-90 gallons depending on viscosity of oil. The ***Water Scrubber Tote*** comes equipped with an additional 3/4" thru-hull plug designed to ease final drain of tote. Ship wt. approx. 255 lbs.

WATER SCRUBBER 55

The ***Water Scrubber 55*** uses a 55 gal. plastic drum as an outer casing. It has an oil absorption capacity of 15 to 20 gallons depending on viscosity of oil.
Ship wt. approx. 65 lbs.

Water Scrubber 55	Part No. 70105	Water Scrubber Tote	Part No. 70180
Filter Media Refill	Part No. 50001	Filter Media Refill	Part No. 52023
	Part No. 52022		

The ***Water Scrubber Tote*** and the ***Water Scrubber 55*** will handle flow rates of up to 600 gallons/hour. Filter medium ***(Absorbent W)*** life depends upon the amount of oil contamination in the water.

Spill Shield International

P.O. Box 93009 • Anchorage, AK 99509-3009
(907) 561-6033 • Fax: (907) 561-4504

"THE WATER SCRUBBER"

The most cost effective way known to man to quickly and efficiently clean oil from water. Pour oil-water mix in the top and, within seconds, clear water is coming out the bottom. There is nothing that works as quickly and efficiently as the ***Water Scrubber.***

This simple system can save money in many ways:

* reduced waste disposal fees
* reduces hazardous waste handling costs
* reduce water usage by using reclaimed water
* eliminate fines related to pollution from oil contaminated outflow
* extend the life of expensive filter systems such as activated carbon

The ***Water Scrubber's*** performance is based on ***Absorbent W's*** unique ability to instantly absorb oil while repelling water. ***Absorbent W*** is a natural fiber cellulose material that selectively absorbs and retains hydrocarbons. ***Absorbent W*** has many benefits including:

* supports a wide range of disposal alternatives
* safely burnable, producing no toxic byproducts
* biodegradeable and supports enhanced bioremediation
* non-toxic material containing no silica dust, recycled inks or dioxins

Analysis of oil water mix having pass thru an Absorbent W Water Scrubbe

Sample	oil in ppm	oil out ppm	0% remove
30 wt oil			
207-1119	250000	1	99.9996
207-1120	250000	6.5	99.9974
Diesel			
207-1121	250000	130	99.948
207-1122	250000	20	99.992
Gasoline			
207-1123	250000	52	99.9792
207-1124	250000	89	99.9644

In repeated tests and actual operating situations, the ***Water Scrubber*** consistently removes 99.9% of hydrocarbons. Common applications have included the removal of gasoline, diesel, used motor oil and heating oil from water.

Spill Shield International
P.O. Box 93009 • Anchorage, AK 99509-3009
(907) 561-6033 • Fax: (907) 561-4504

WATER SCRUBBER OPERATING INSTRUCTIONS

1. **Pour "Absorbent W" loose particulate in bottom of scrubber.** (If you purchased a fully loaded system this step had been done for you.)

2. **Fill remainder of scrubber with "Absorbent W" open mesh pillows to 6 inches of the top of the drum.** (If you purchased a fully loaded system this step has been done for you.)

3. **Place water diffuser on top of pillows.**

4. **Remove plug from discharge hole.**

5. **Pour or gravity feed oily water through diffuser (DO NOT PUMP as this will emulsify the oil.)**
   If you must pump the oily water to get it from your location to the water scrubber it will be necessary to pump it to a holding tank and allow the oil to settle back out from the water. Then pour the settled solution of oily water through the scrubber.

6. **Check water discharge and pillows periodically. When saturated, (dark gray color) change filter media.**

**** **Time intervals between filter media changes will vary depending on the viscosity of the oil and PPM of the oily water.**

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Appendix C:
Response to Comments

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THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Environmental Conservation

SPILL PREVENTION & RESPONSE
Contaminated Sites Program
PO BOX 111800
Juneau, AK 99811
Main: 907.451.2185
Fax: 907-465-5245
www.dec.alaska.gov

File: 310.38.012
310.38.013
310.38.037
Hazard ID: 28020, 556, 557

September 16, 2025

Electronic Delivery Only
William Kaage
NAVFAC NW
1101 Tautog Circle, Suite 203
Silverdale, WA 98315-1101

RE: DEC approval of the *Comprehensive Monitoring Plan Revision 1 Former Naval Artic Research Laboratory (NARL) Sites 5, 12, and 13, Utqiagvik, Alaska* dated September 2025.

Dear Mr. Kaage:

The Alaska Department of Environmental Conservation (DEC) has completed reviewing the document above. The final version of the document was received by DEC on September 16, 2025. This Comprehensive Monitoring Plan (CMP) addresses the environmental monitoring activities outlined in the approved Decision Documents for the former Naval Arctic Research Laboratory (NARL) sites 5, 12, and 13 listed as the Airstrip, Powerhouse, and former Bulk Fuel Tank Farm. This CMP provides site-specific guidance on the scope and procedures for environmental sampling and long-term monitoring. It establishes a framework for sampling, evaluating results, and recommending alternative actions when necessary to maintain the effectiveness of the selected remedies.

DEC approves this document. Please contact me with further comments or questions at kathleen.iler-galau@alaska.gov or (907) 451-2185.

Sincerely,

Kathleen Galau

Kathleen Iler-Galau
Environmental Program Specialist

cc: Sarah Bernhardt, DEC

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REVIEW COMMENTS PROJECT: **NARL Sites 5, 12, and 13 Utqiagvik, Alaska**
DOCUMENT: **Draft Comprehensive Monitoring Plan, Revision 1 NARL Sites 5, 12, and 13 Utqiagvik, Alaska**

ALASKA DEPT. OF ENVIRONMENTAL CONSERVATION	DATE: 8/06/2025 RTC 9/5/2025 REVIEWER: C. JENSEN PHONE: (907) 269-3077	Action taken on comment by:

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	ADEC/EPA RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)	CONTRACTOR RESPONSE
1.	General	These sites have not determined if recovery of the maximum extent practicable (MEP) of light non-aqueous phase liquid (LNAPL) in groundwater has been recovered in accordance with 18 AAC 75.325(f)(1)(B) and 18 AAC 78.240(b). LNAPL transmissivity tends to correlate with LNAPL recovery from a well. Please review Technical Memorandum – 23-001 Light Non-Aqueous Phase Liquid Recovery and include a method for calculating MEP for these sites.	A	There have been zero instances of measurable product in wells across the sites for several years. The sites satisfy the condition, "LNAPL recovery rates are low and have diminished over multiple seasons, and LNAPL body is spatially stable, is not migrating, and is not expected to migrate in the future. Contaminant data collected from monitoring wells downgradient of the LNAPL body shows a stable or decreasing trend over multiple seasons."	A	
2.	Section 3.1	"If any wells require replacement, the well installation and development must follow…" Please consider the possibility of using temporary sampling wells in areas that experience consistent frost jacking. The temp wells would have to be in the same relative location of the permanent wells to ensure congruency in monitoring efforts, but it may make sampling easier than maintaining permanent wells that are prone to damage. Any permanent well that is being replaced in the monitoring program by a temp well will have to be properly decommissioned.	A	An additional paragraph has been included at the end of Section 3.1 to read, *"Due to maintenance concerns, temporary sampling wells may also be considered in areas that experience consistent frost jacking or are prone to damage from environmental conditions. The temporary wells would be constructed in the same relative location as the permanent well(s) to ensure congruency in monitoring efforts. As such, any permanent well that is replaced, will be properly decommissioned per ADEC Monitoring Well Guidance (ADEC, 2013)."*	A	

3.	Table 4-3	For Ferrous Iron and Sulfate please provide the instrument being used in the field to test levels and the kits' LODs.		As the instruments and LODs may be different year to year, specific instruments will not be included in this table. Specific instrumentation, and associated LODs, are outlined in the SAP produced each year.	A	
4.	Table 4-4	Please provide information on why AS-WP-02C and AFAS-WP-21 are not being tested for GRO.	A	The most recent SAP (EA, 2025) states the approved changes to the monitoring program. GRO monitoring at AS-WP-02C was discontinued in 2014 after a recommendation was included in the second FYR (Navy, 2013). GRO monitoring was discontinued at AFAS-WP-21 in 2018 after a recommendation was included in the 2018 Annual Monitoring Report (Navy, 2019).	A	
5.	Section 4.5	Please include information concerning submitting an approval to transport form to ADEC and expected timeline for disposal of stored waste.	A	An additional paragraph has been included in Section 4-5 to read, *"All IDW to be disposed of off-site will be disposed with ADEC approval in accordance with 18 AAC 75.325(i), 18 AAC 75.370(b), and 18 AAC 78.274(b). Approval from ADEC will be acquired for the off-site transport and disposal via the submittal of a Contaminated Media Transport and Treatment or Disposal Approval Form. All waste will be removed from site within 60 days of generation."*	A	
6.	Section 4.6	"Field instruments should be periodically calibrated and documented in a field record or logbook" The DEC Field Sampling Guidance 2024 section 12.1 indicates that field instruments should be calibrated daily. Please revise.	A	Sentence revised to read, *"Field instruments should be calibrated daily and documented in a field record or logbook."*	A	
7.	Section 6.6 Reporting	Please add Mann-Kendall trend analysis.	A	The statement, *"5. Evaluation of comprehensive data trends using Mann-Kendall trend analysis."* has been added to Section 6.6.	A	

8.	Appendix A	Please include copies of your field sampling forms, and calibration logs. Advise Appendix be renamed to "Field Forms"	A	The previous CMP did not include specific field forms. These forms are often company-specific for each contractor working on the sites while this updated plan is implemented. To avoid confusion across teams working on the sites in upcoming years, forms were not included in the CMP and are anticipated to continue to be included in the annual SAP.	A	
		--End of Comments--				

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